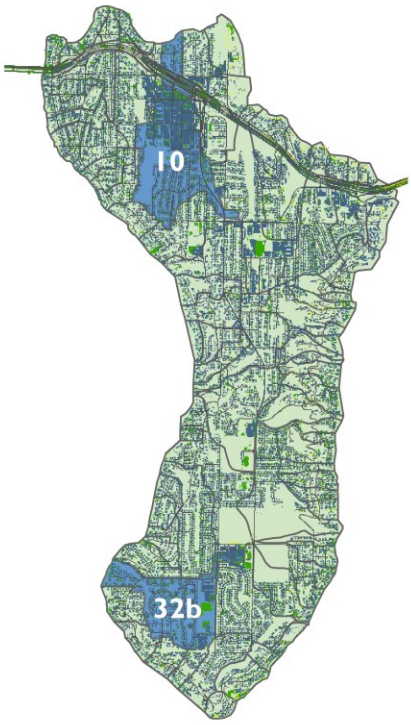
Mercer Island 2013-2014 Water Quality Monitoring Basins 10 and 32b



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Mercer Island 2013-2014 Water Quality Monitoring Basins 10 and 32b

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Submitted by:

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Department of Natural Resources and Parks

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EXECUTIVE SUMMARY

King County Water and Land Resources Division (WLRD) has performed water quality monitoring for Mercer Island since 1999 (King County, 2010; King County, 2013). Prior to 2011, sampling stations were located near the mouth of five separate drainage basins; basins 6, 10, 26, 32b, and 42 (Figure 1). In a summary comparison of data collected in all five Mercer Island basins, basins 10 and 32b recorded the highest levels of both dissolved copper (dCu) and dissolved zinc (dZn) in stormwater runoff and consistently exceeded state acute water quality standards (WQS) for these dissolved metals (Wilhelm, 2009; King County 2010). Therefore, in 2011-12 monitoring shifted focus to look more closely at basin 10 and 32b. Sampling sites were placed upstream in both basins to investigate potential sources of fecal coliform bacteria, copper, zinc, and nutrients in sub-drainages entering the main stormwater trunk line.

The 2013-14 monitoring effort was designed to further evaluate potential sources of dCu and dZn in basin 10 and 32b, as well as high fecal coliform bacteria at the mouth of basin 10, based on recommendations reported in *Mercer Island 2011-2012 Water Quality Monitoring Basins 10 and 32* (King County, 2013). During this two year period King County analyzed 13 different stormwater sampling sites for dissolved metals. In basin 10, six stations were located in catch basins to isolate sub-drainages flowing into the main trunk line that runs along 77th Avenue SE – four in the town center intersection and two further upstream. In addition, the historical location in the open stream channel along SE 22nd Street was monitored. Fecal coliforms and the human source tracking bacteria *Bacteroides* were measured at the two downstream stations in basin 10 to determine if the high bacteria counts may be from an illicit connection or some other human source. In basin 32b the historical station at the mouth of the creek was monitored as well as five upstream catch basins along the main trunk line that runs along SE 72nd Street.

Concentrations of dCu and dZn frequently exceeded state water quality criteria in both basins. Catch basin sampling sites in the town center area had the highest dCu and dZn concentrations and the most consistent exceedances of WQS. Because the concentrations of dCu were significantly greater in the specific town center drainages, it is recommended that future efforts be focused in this area. The next steps are to design retrofits to remove a portion of the metal loads from these sub-drainages before they connect with the trunk line. Retrofitting stormwater systems so runoff is diverted to rain gardens, vegetative filter strips, biofiltration swales or permeable pavements are potential options to reduce flows and attenuate these contaminants. Small footprint biofiltration systems may be particularly well suited for highly developed urban area like basin 10.

The next round of sampling combined with flow measurements will position the city to take advantage of financial assistance programs available through Ecology's Stormwater Retrofit grant program.

1.0. INTRODUCTION

King County Water and Land Resources Division (WLRD) has performed water quality monitoring for Mercer Island since 1999 (King County, 2010; King County, 2013). Prior to 2011, sampling stations were located near the mouth of five separate drainage basins; basins 6, 10, 26, 32b, and 42 (Figure 1). In a summary comparison of data collected in all five Mercer Island basins, basins 10 and 32b experienced the highest levels of both dissolved copper (dCu) and dissolved zinc (dZn) in stormwater runoff and consistently exceeded state acute water quality standards (WQS) for these dissolved metals (Wilhelm, 2009; King County 2010). Therefore, in 2011-12 monitoring shifted focus to look more closely at basin 10 and 32b. Sampling sites were placed upstream in both basins to investigate potential sources of fecal coliform bacteria, copper, zinc, and nutrients in sub-drainages entering the main stormwater trunk line.

The 2013-14 monitoring effort was designed to further evaluate potential sources of dCu and dZn in basin 10 and 32b, as well as high fecal coliform bacteria at the mouth of basin 10. This was based on the recommendations in *Mercer Island 2011-2012 Water Quality Monitoring Basins 10 and 32* (King County, 2013). The monitoring focused on answering the following questions:

1) What sub-drainage basins in the town center area, and further upstream, are contributing the most dCu and dZn to basin 10?
2) What is the source of the high fecal coliform bacteria and the human source tracking *Bacteroides spp.* measured at the mouth of basin 10?
3) What segments of basin 32b are contributing the most dCu and dZn?
4) Are landscaping practices (e.g., pesticide/herbicide or fertilizer applications) contributing to the high dCu and dZn in basins 10 and 32b?

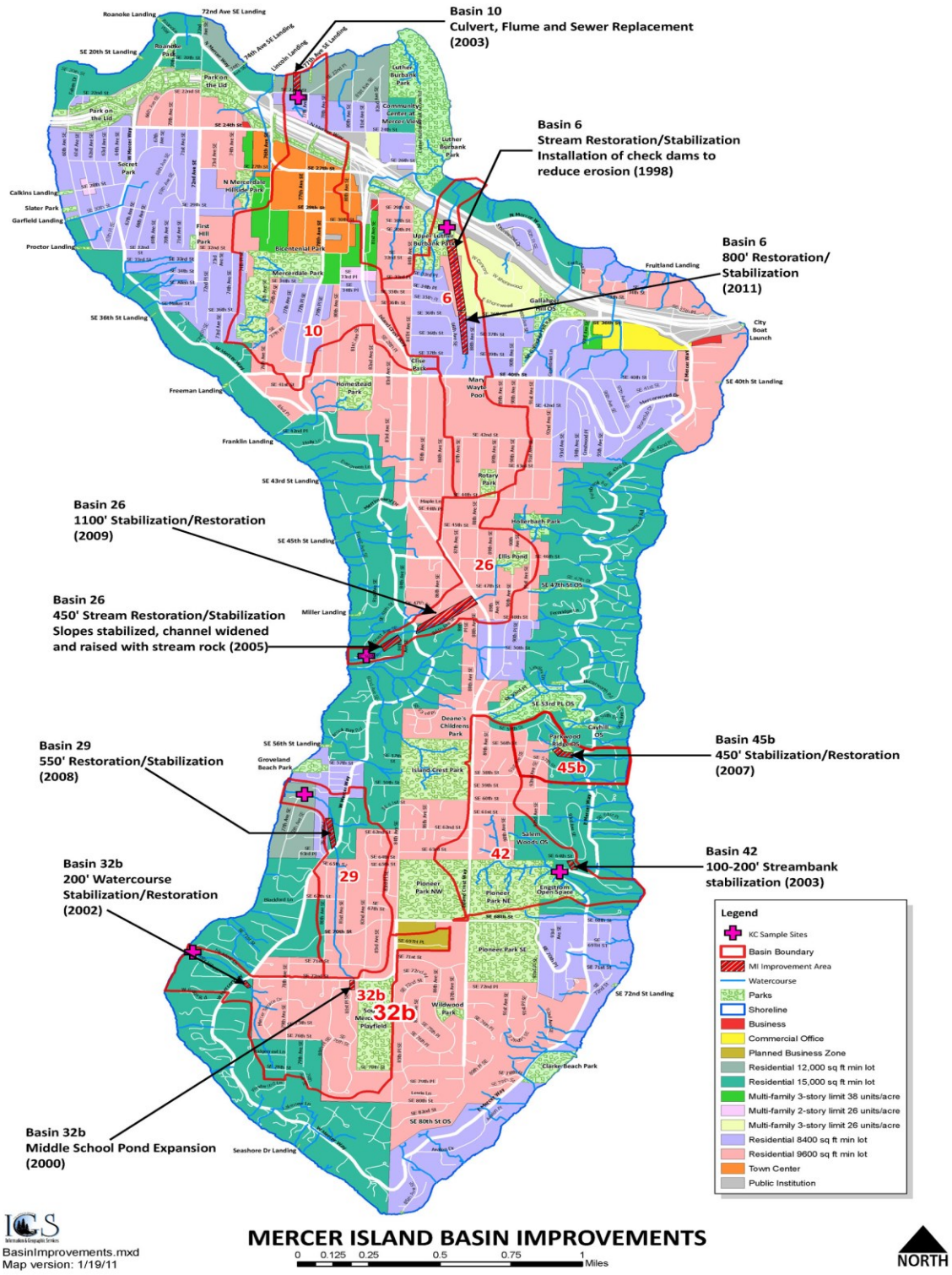

Figure 1. Mercer Island land use, drainage basins, and basin improvement projects. Note: previous monitoring efforts were focused on basin 6 (1999-2010), 29 (1999-2002), and 42 (2003-2006). This monitoring effort focused on basins 10 (1999-2014) and 32 (1999-2014).

1.1 Drainage Basin 10

Basin 10 drains the majority of the city's business district as well as single-family and high-density residential neighborhoods (Figure 2). The 2003 basin 10 improvements (culvert, flume and sewer replacement) were designed to channel flows just upstream of where the drainage enters Lake Washington in order to eliminate localized flooding during large storm events (Figure 1).

Monitoring in 2013-2014 included samples collected at station 10 near the mouth of the drainage basin on SE 22nd Place. Samples have been collected at this site since 1999. Upstream sites were modified somewhat from the 2011-12 effort to better isolate sequential sub-drainages connected with the stormwater gravity main trunk line along 77th Avenue SE (Table 1, Figures 2-9). Four sites were located in catch basins within the town center intersection of SE 27th Street and 77th Ave SE, and two sites were located in catch basins upstream the main stormwater trunk line on 77th Ave SE. These catch basins collected flows from streets, parking lots, and rooftops as described in Table 1.

As discussed in earlier reports, water quality concerns in basin 10 include high dCu and dZn found in stormwater and sediments (King County, 2013). In the 42 stormwater samples collected at the farthest downstream site (station 10) from 1999 through 2012, dCu and dZn concentrations exceeded acute WQS seven and four times, respectively. Concentrations were higher in the catch basins upstream in main stormwater trunk line, particularly in the town center area (King County, 2013). A high fraction of total phosphorus in the form of soluble reactive phosphorus (SRP), relative to those measured in regional streams in the area suggest the possible overuse of fertilizers and/or the presence of animal waste (King County 2011). Historically, both storm and baseflow events at station 10 had very high fecal coliform bacteria levels. Urban drainages with flashy stormwater flows often have high fecal coliform counts indicating a variety of potential contributors. However, the presence of the human source tracking bacteria *Bacteroides spp*. at the two downstream stations indicated that human waste was entering the water at some point in this reach (King County, 2013).

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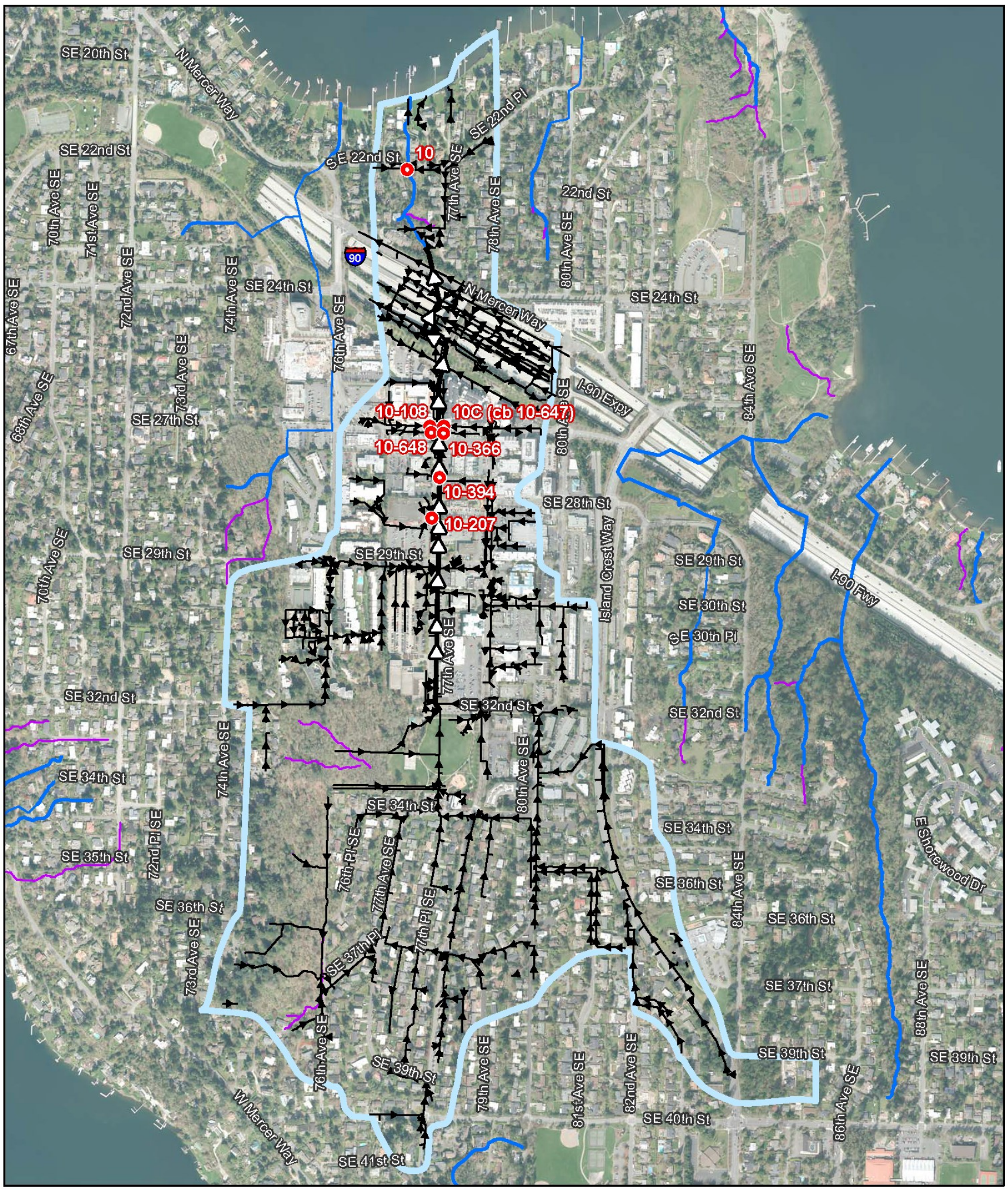

Figure 2

Mercer Island Basin 10

- Sampling Site and Number
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream - Not Piped
- Stream - Piped
- Stream - Unknown

N

0 500 1,000 Feet

November 2014

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City of Mercer Island Washington

Data Sources:
King County GIS Database;
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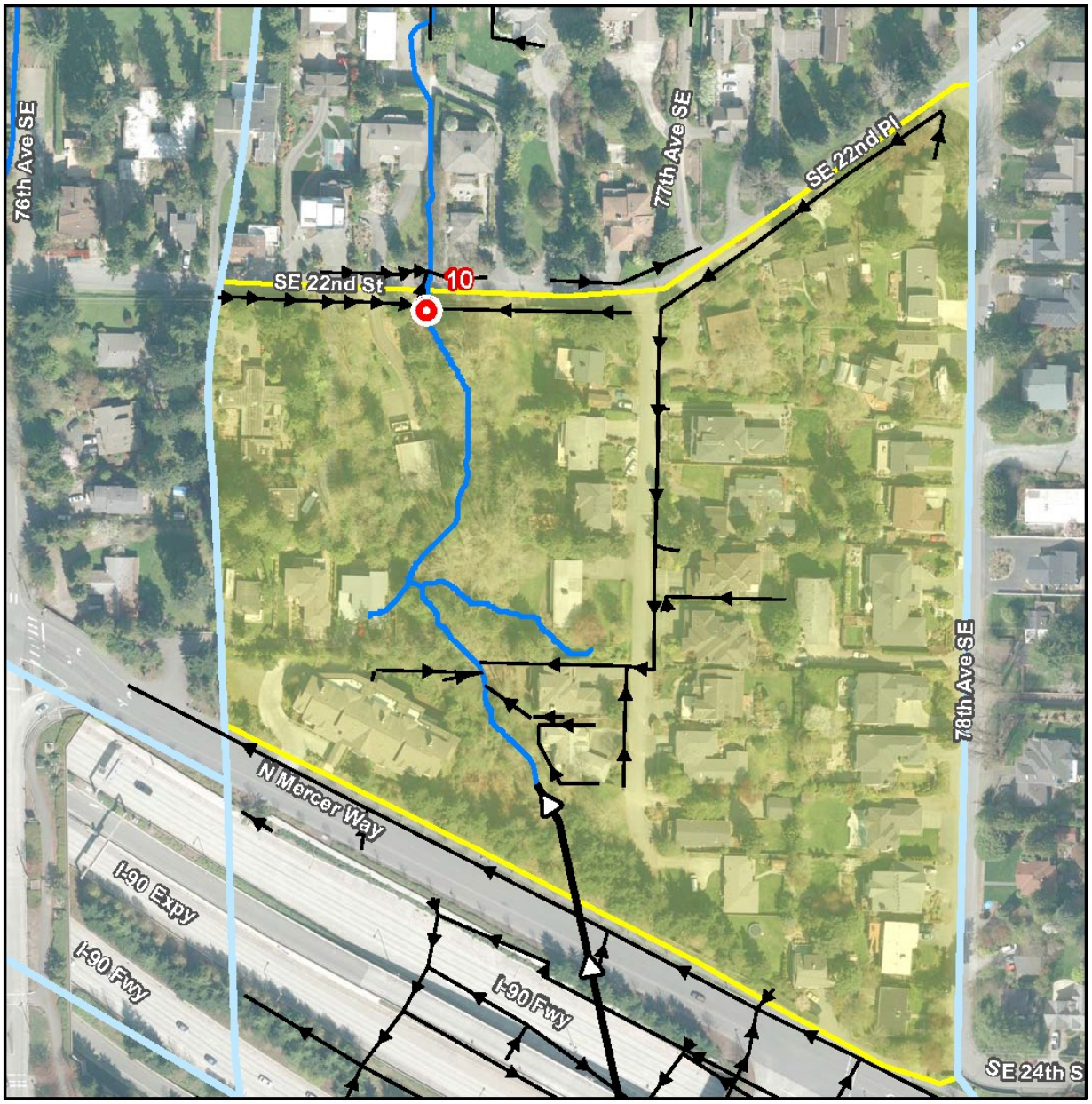

Figure 3

Mercer Island Basin 10 **Site 10 Context**

Sampling Site and Number
Site 10 Drainage
Stormwater Trunk Flow and Direction
Stormwater Pipe Flow and Direction
Stormwater Basin Boundary
Stream

N

0 100 200 Feet

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City of Mercer Island Washington

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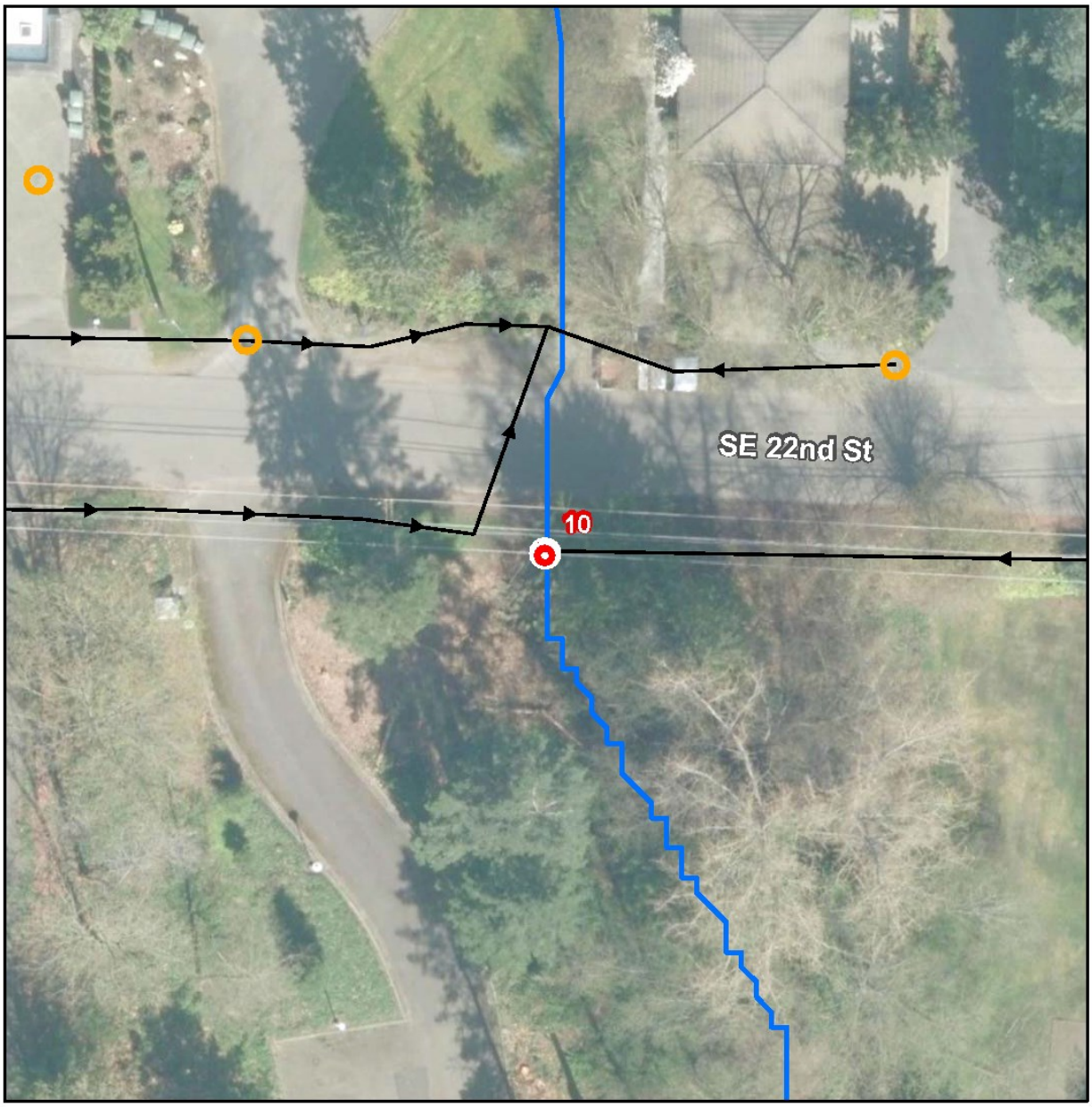

Figure 4

Mercer Island Basin 10 **Site 10 Steet View**

- Sampling Site and Number
- Catchbasin
- Stormwater Manhole
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 15 30 Feet

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CITY OF MERCER ISLAND WASHINGTON

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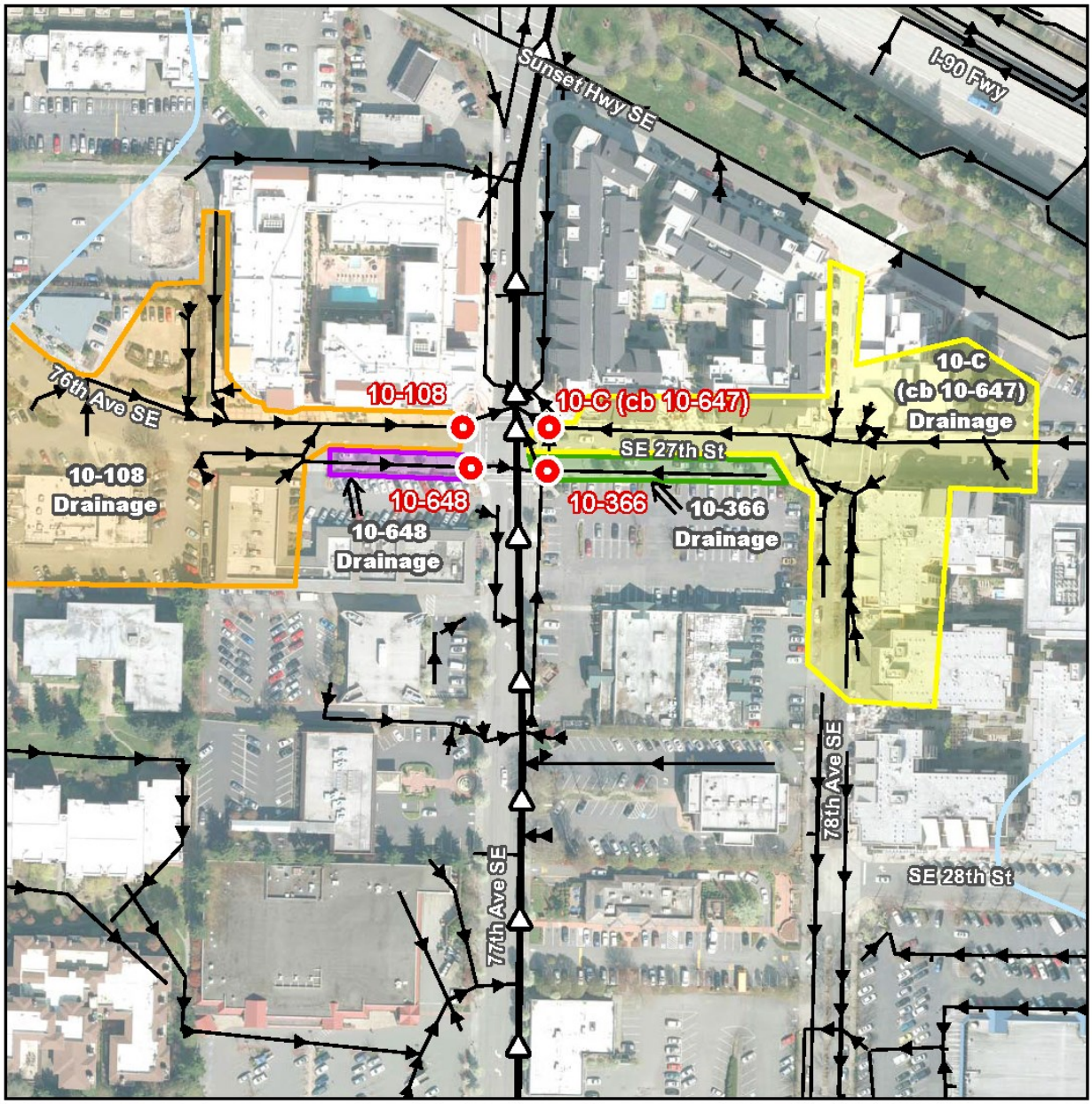

Figure 5

Mercer Island Basin 10 Town Center Context

- Sampling Site and Number
- Site 10-108 Drainage
- Site 10-366 Drainage
- Site 10-648 Drainage
- Site 10-C (cb 10-647) Drainage
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 100 200 Feet

Novembert 2014

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Water and Land Resources Division

City of Mercer Island Washington

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City of Mercer Island GIS Database;
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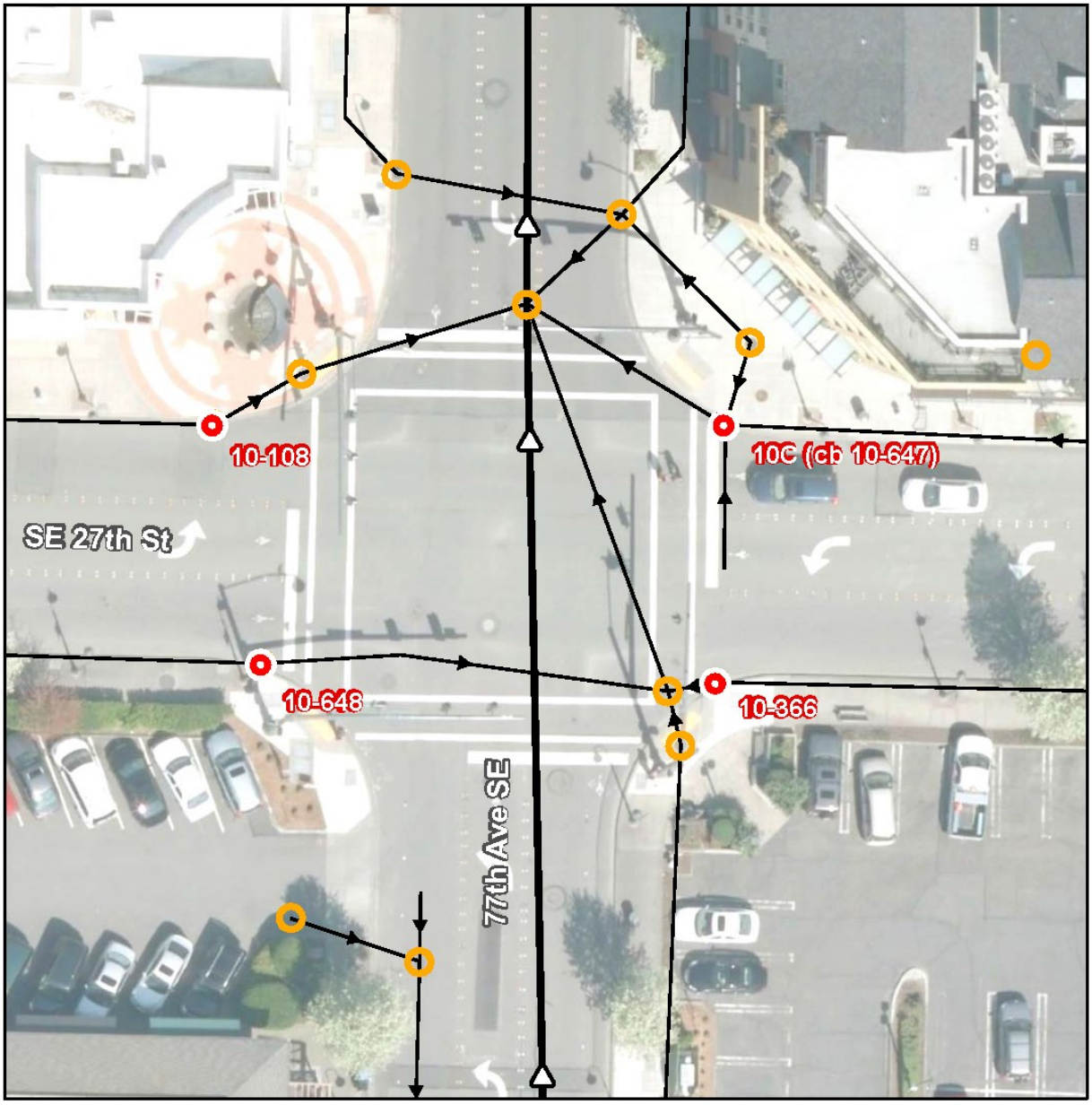

Figure 6

Mercer Island Basin 10 **Town Center Steet View**

Sampling Site and Number
Catchbasin
Stormwater Manhole
Stormwater Trunk Flow and Direction
Stormwater Pipe Flow and Direction
Stormwater Basin Boundary
Stream

N

0 15 30 Feet

November 2014

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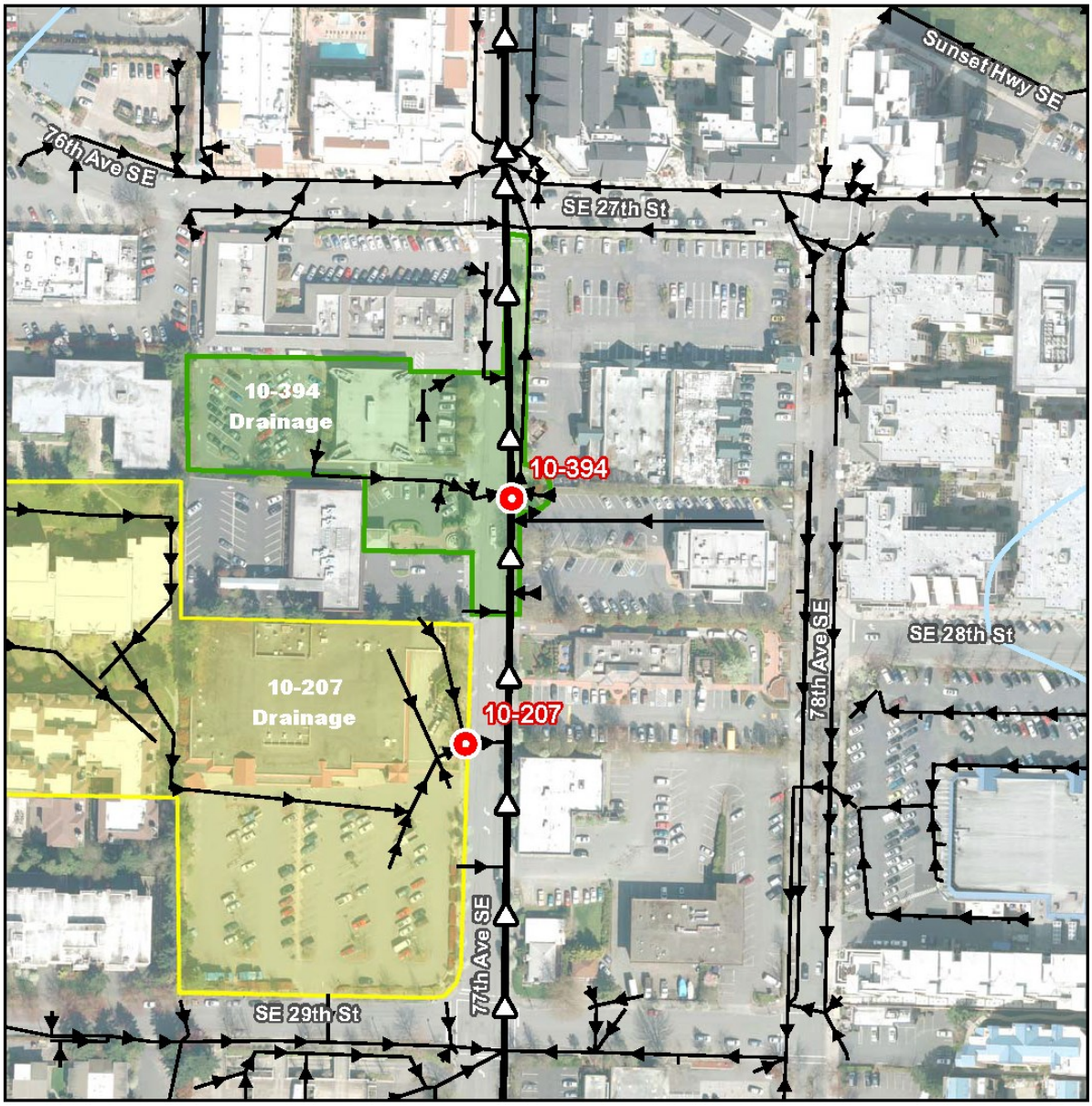

Figure 7

Mercer Island Basin 10 **Sites 207 & 394 Context**

- Sampling Site and Number
- Site 10-207 Drainage
- Site 10-394 Drainage
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 100 200 Feet

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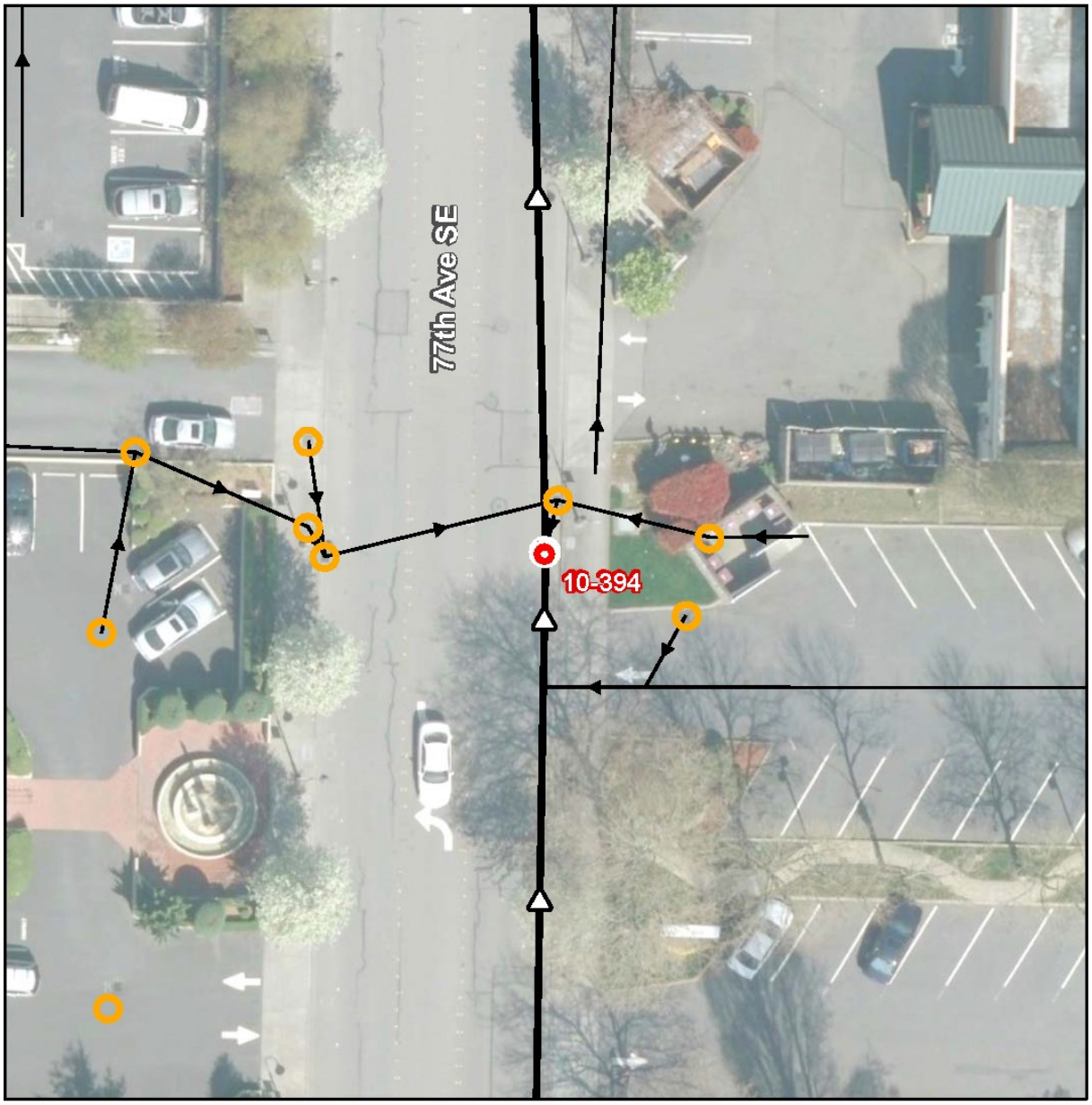

Figure 8

Mercer Island Basin 10 **Site 10-394 Steet View**

Sampling Site and Number
Catchbasin
Stormwater Manhole
Stormwater Trunk Flow and Direction
Stormwater Pipe Flow and Direction
Stormwater Basin Boundary
Stream

N

0 15 30 Feet

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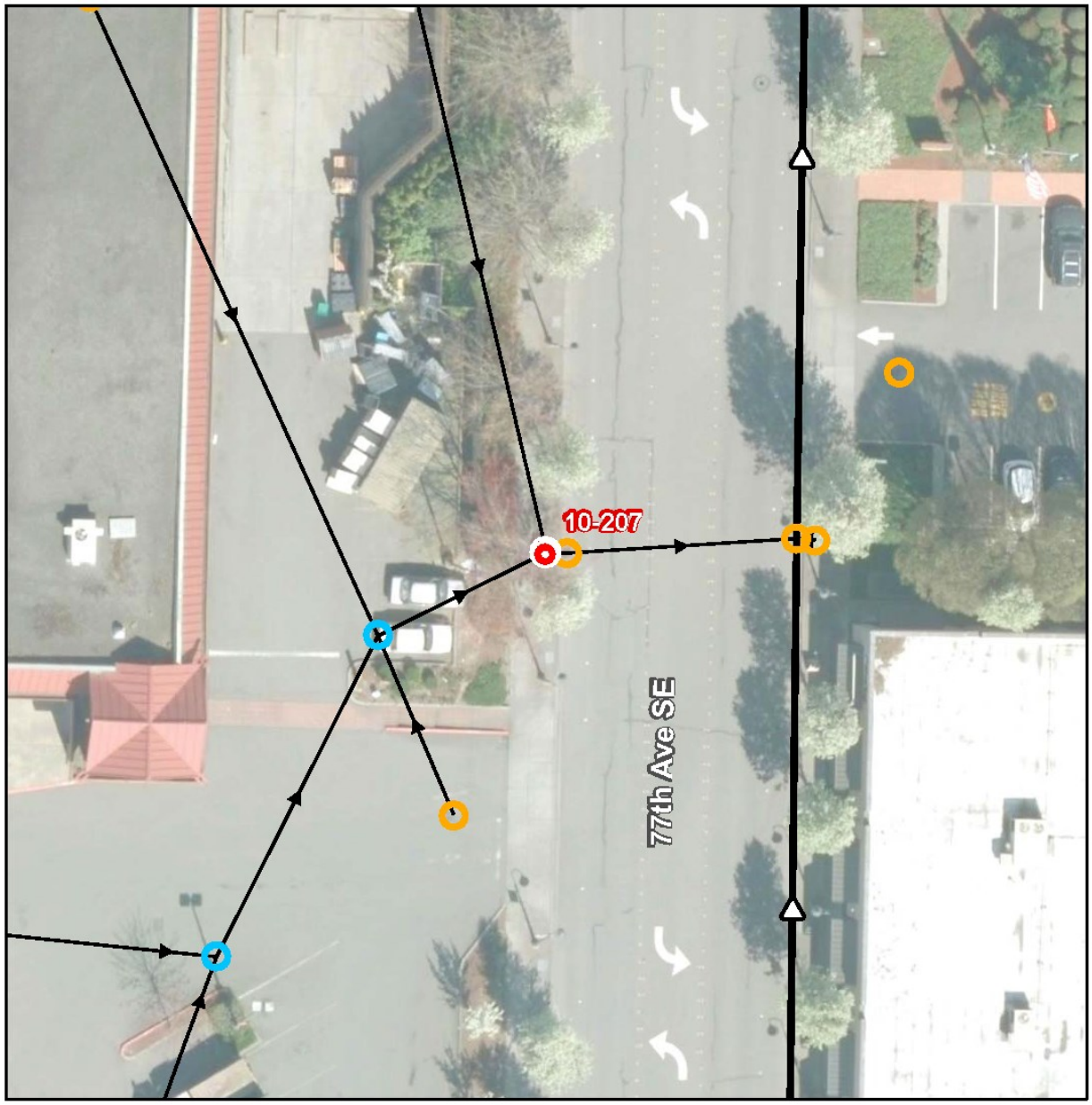

Figure 9

Mercer Island Basin 10 **Site 10-207 Steet View**

Sampling Site and Number
Catchbasin
Stormwater Manhole
Stormwater Trunk Flow and Direction
Stormwater Pipe Flow and Direction
Stormwater Basin Boundary
Stream

N

0 15 30 Feet

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Table 1. Basin 10 sampling sites in 2013 and 2014, with State Plane coordinates, listed downstream to upstream.

BASIN 10	Description	X/Y Coordinates
10	historical site, open stream channel along SE 22nd Street	1294333 / 218840
10C (cb # 10-647)	catch basin on NE corner of town center, collects flows from north east side of SE 27th St	1294568 / 217191
10-366	catch basin on SE corner of town center, collects flows from the south east side of SE 27th St	1294571 / 217148
10-648	catch basin on SW corner of town center, collects flows from the south west side of SE 27th St	1294485 / 217152
10-108	catch basin on NW corner of town center, collects flows from the north west side of SE 27th St	1294479 / 217193
10-394	catch basin on the main trunk line along 77th Ave SE, collects flow along main trunk line and flows coming from west side of street	1294541 / 216859
10-207	collects flows from the Albertson's parking lot on west side of 77th Ave SE before joining crossing street and connecting with main trunk line	1294492 / 216600

1.2 Drainage Basin 32b

Basin 32b is one of the largest drainage basins on the island and is unique in that it flows into Lake Washington with a natural day lighted stream channel. Drainage improvements in the basin have included expansion of the stormwater detention pond at Islander Middle School in 2000 and water course stabilization (200 feet) on the east side of West Mercer Way in 2002 (Figure 1). The upper part of the basin drains a few commercial businesses located at the south end shopping center but the majority of the basin is single-family residential neighborhoods, a school with playfields, and a series of small residential detention ponds. Most development occurred in the 1970s and 1980s.

From 2001 through 2010 water samples were collected at one location in the basin, station 32b, at the bottom of Holly Hill Drive on private property, 75 feet upstream from the mouth. To prevent collection of backwater from the lake, the sampling location was established approximately 75 feet upstream from the mouth where the creek flows through a natural stream channel before draining into the lake. In 2011-12 three sites were added upstream along SE 72nd Street to identify potential sources in sub-drainages (King County, 2013). Upstream site selection was expanded and refined in 2013-14 to better isolate potential inputs from sub-drainages; altogether there were six stations sampled in basin 32b as described in Table 2 (Figures 10 – 19).

As described in previous reports, water quality concerns at station 32b are high dCu and dZn concentrations with frequent WQS exceedences, and high fecal coliform bacteria

concentrations. In the 35 samples collected at the furthest downstream site (station 32b) from 2001 through 2012 dCu and dZn exceeded acute WQS eight and three time, respectively (King County, 2013).

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Figure 10

Mercer Island Basin 32b

- Sampling Site and Number
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream - Not Piped
- Stream - Piped
- Stream - Unknown

N

0 500 1,000 Feet

November 2014

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City of Mercer Island Washington

Data Sources:
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City of Mercer Island GIS Database;
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MI_Basin_32_11x17PT.mxd

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Figure 11

Mercer Island Basin 32b **Site 32 Drainage**

- Sampling Site and Number
- Site 32 Drainage
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 100 200 Feet

November 2014

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

City of Mercer Island Washington

Data Sources:
King County GIS Database;
City of Mercer Island GIS Database;
2012 Aerial Imagery

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MI_Context_32_Site32_8x11PT.mxd

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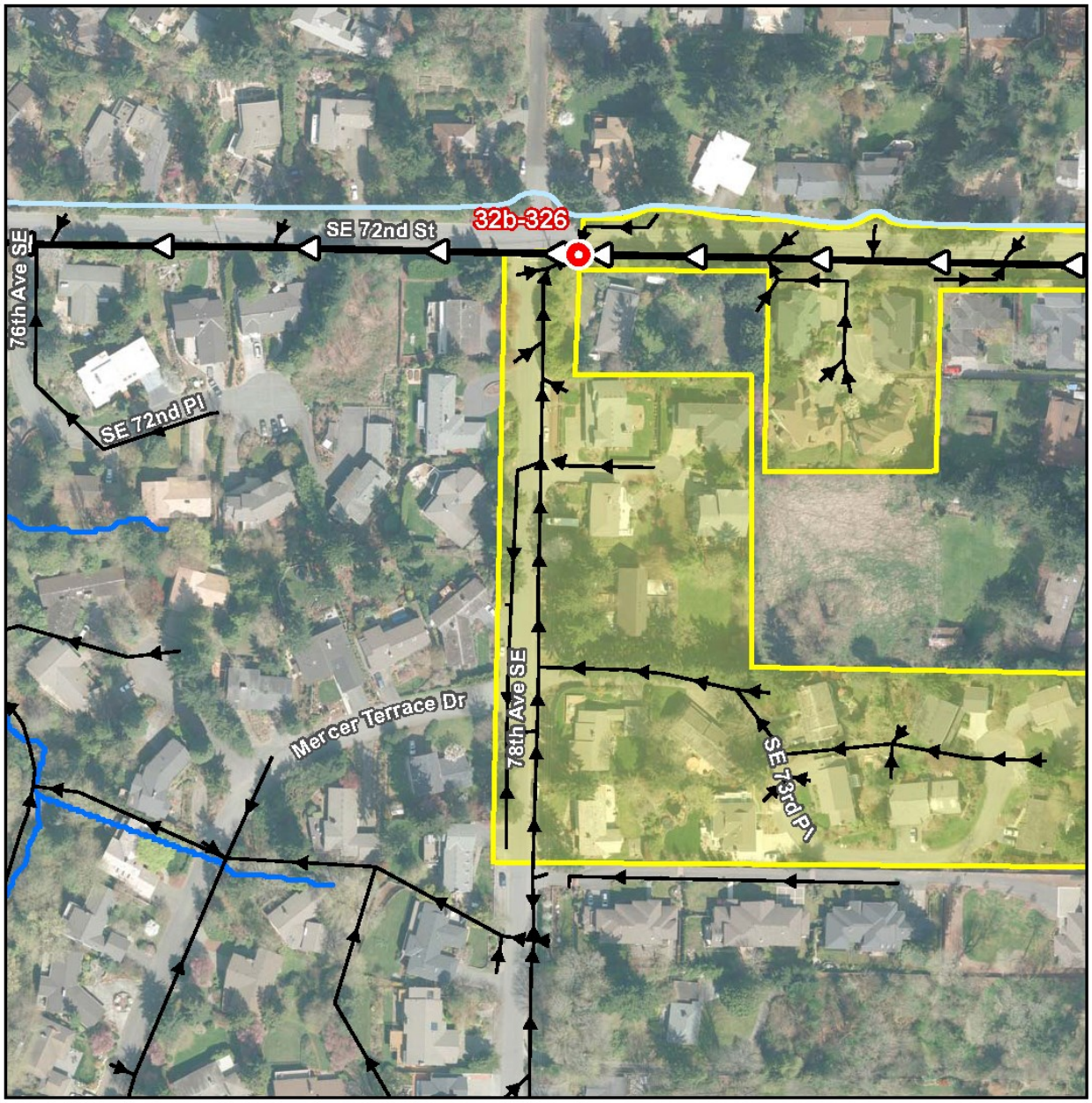

Figure 12

Mercer Island Basin 32b **Site 32b-326 Context**

- Sampling Site and Number
- Site 32b-326 Drainage
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 100 200 Feet

November 2014

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

City of Mercer Island Washington

Data Sources:
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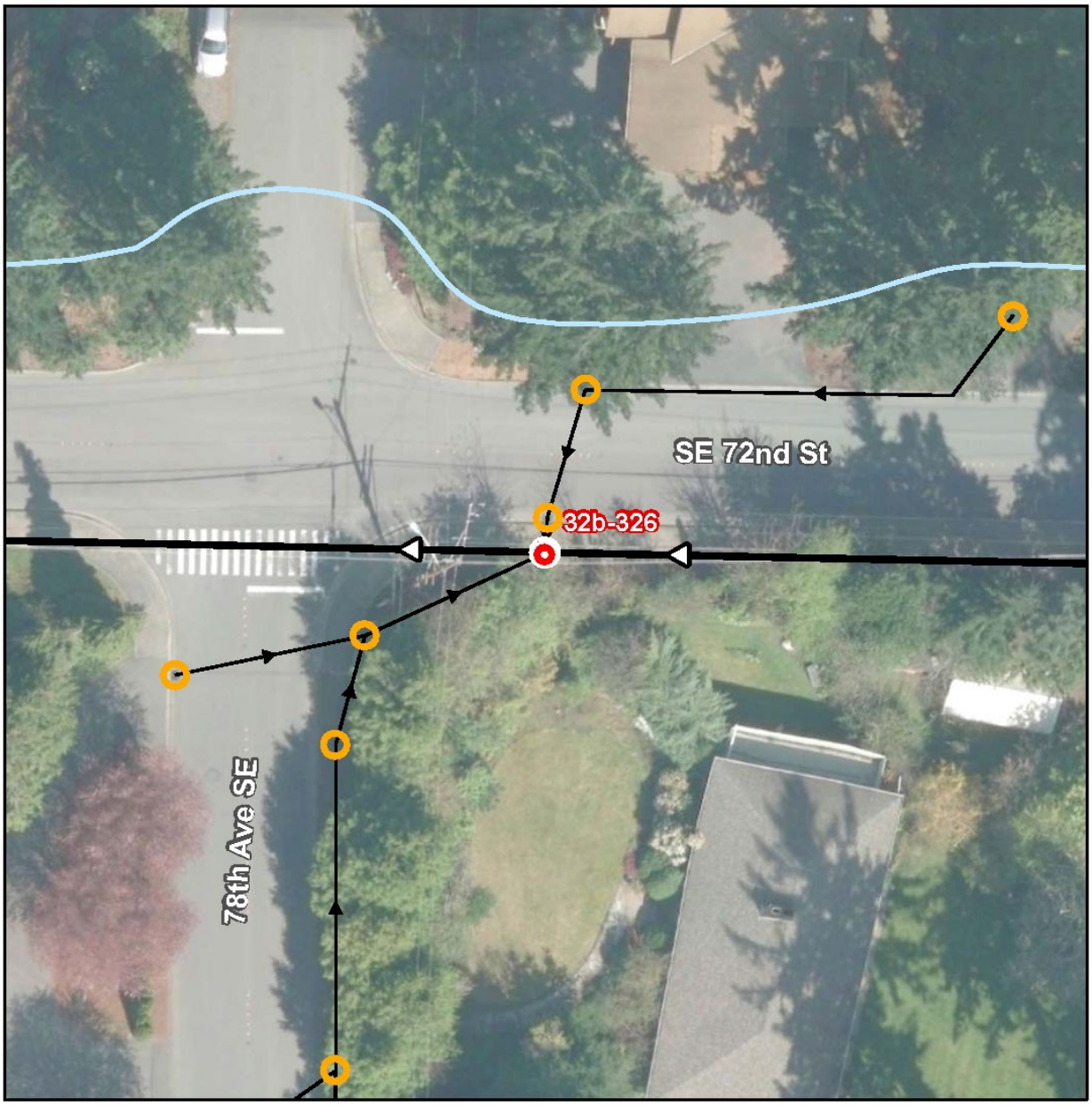

Figure 13

Mercer Island Basin 32b **Station 32b-326 Steet View**

- Sampling Site and Number
- Catchbasin
- Stormwater Manhole
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 15 30 Feet

November 2014

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

City of Mercer Island Washington

Data Sources:
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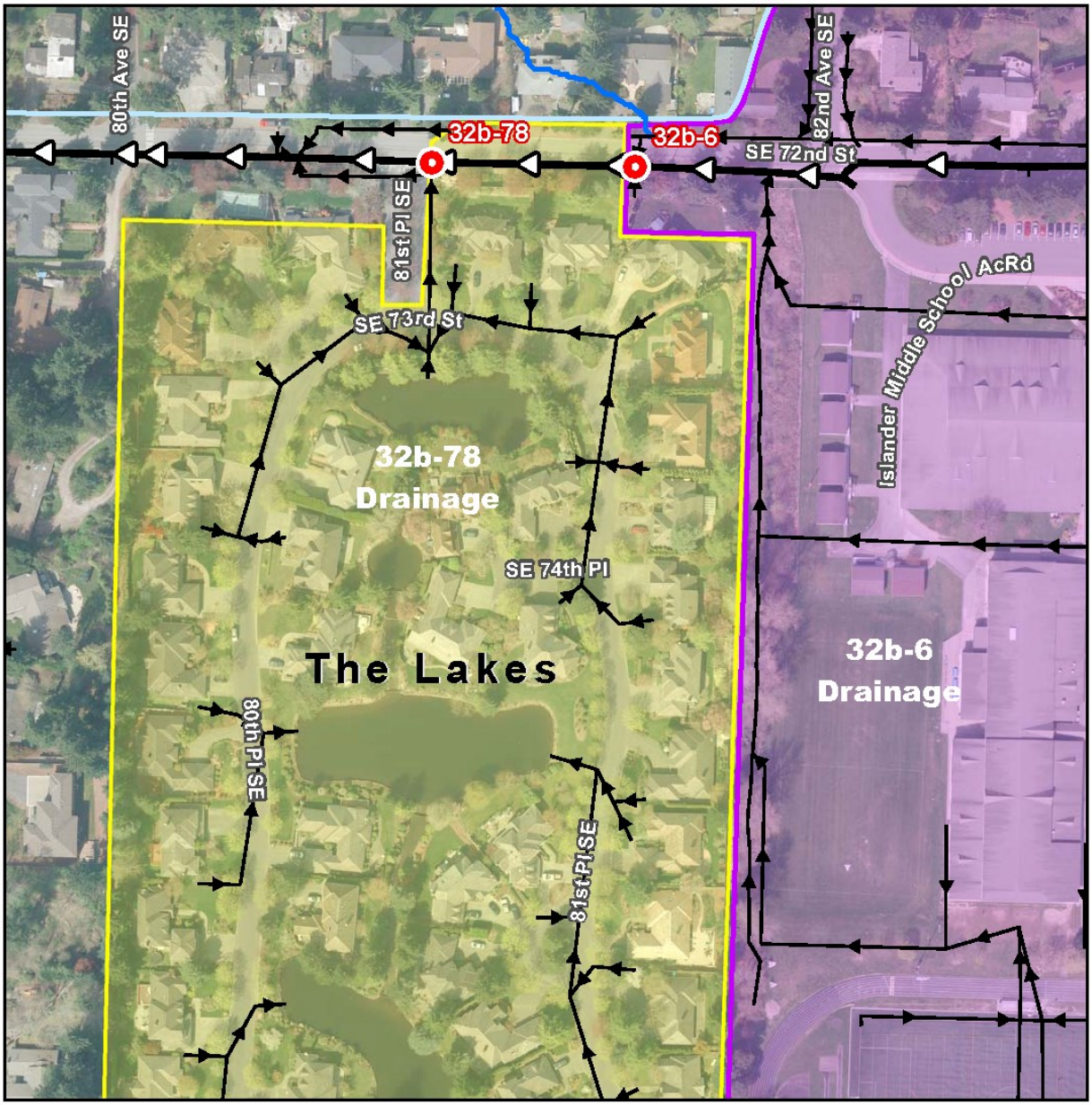

Figure 14

Mercer Island Basin 32b **Sites 32b-78 & 32b-6 Context**

- Sampling Site and Number
- Site 32b-78 Drainage
- Site 32b-6 Drainage
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 100 200 Feet

November 2014

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

City of Mercer Island Washington

Data Sources:
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MI_Context_32_Site78_6_8x11PT.mxd

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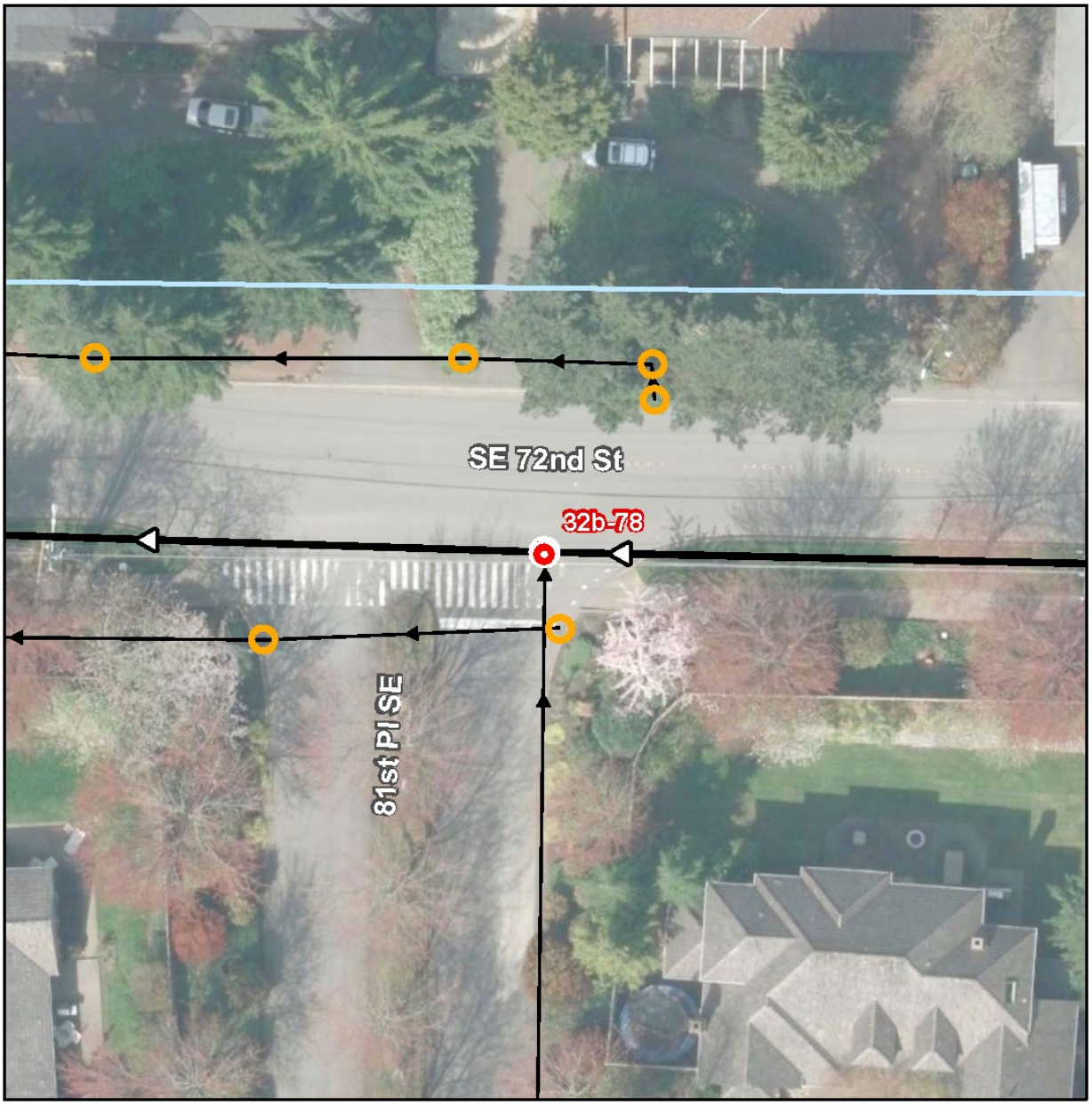

Figure 15

Mercer Island Basin 32b Station 32b-78 Steet View

Sampling Site and Number
Catchbasin
Stormwater Manhole
Stormwater Trunk Flow and Direction
Stormwater Pipe Flow and Direction
Stormwater Basin Boundary
Stream

N

0 15 30 Feet

November 2014

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

City of Mercer Island Washington

Data Sources:
King County GIS Database;
City of Mercer Island GIS Database;
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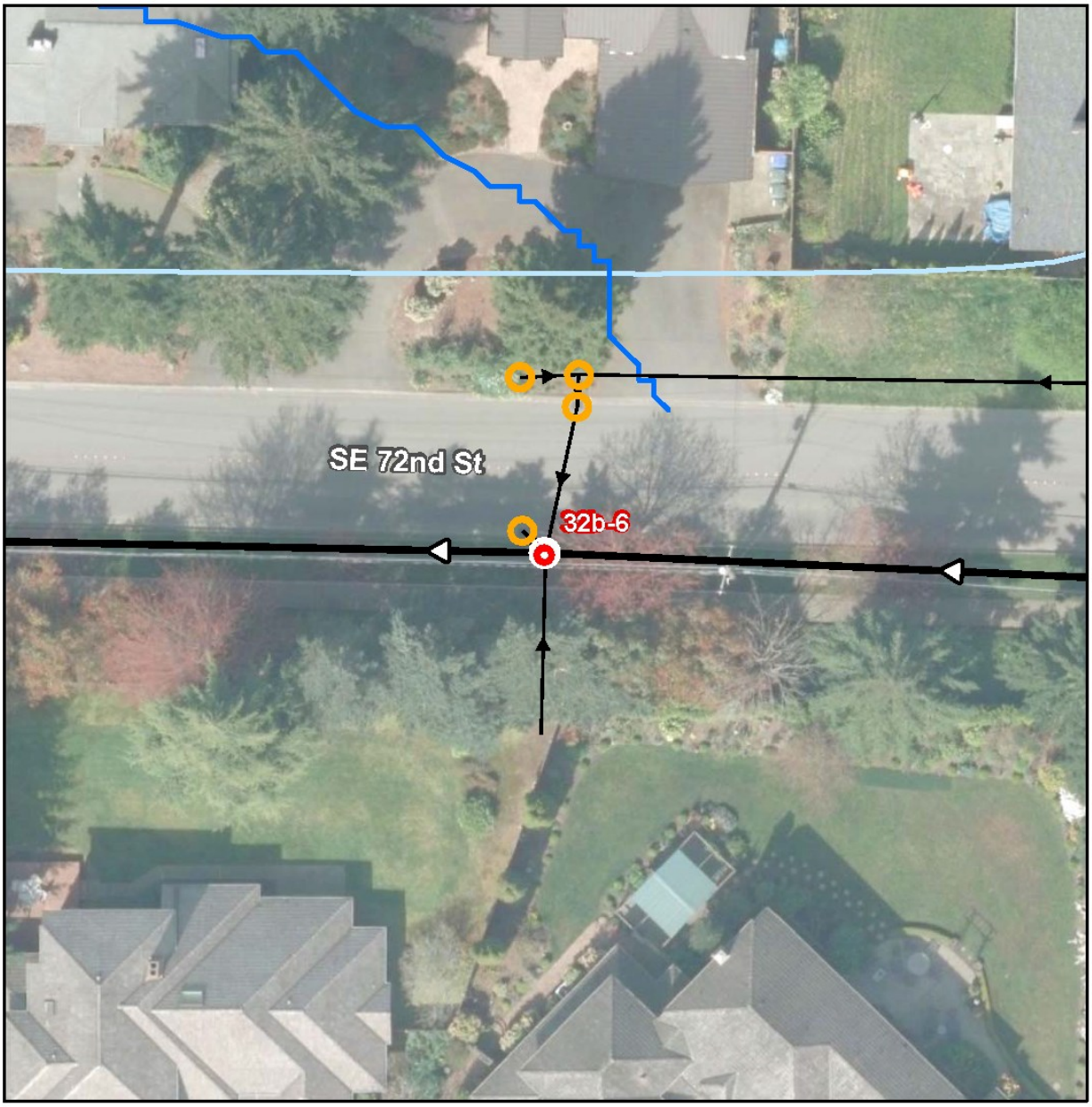

Figure 16

Mercer Island Basin 32b **Station 32b-6 Steet View**

Sampling Site and Number
Catchbasin
Stormwater Manhole
Stormwater Trunk Flow and Direction
Stormwater Pipe Flow and Direction
Stormwater Basin Boundary
Stream

N

0 15 30 Feet

November 2014

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

City of Mercer Island Washington

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City of Mercer Island GIS Database;
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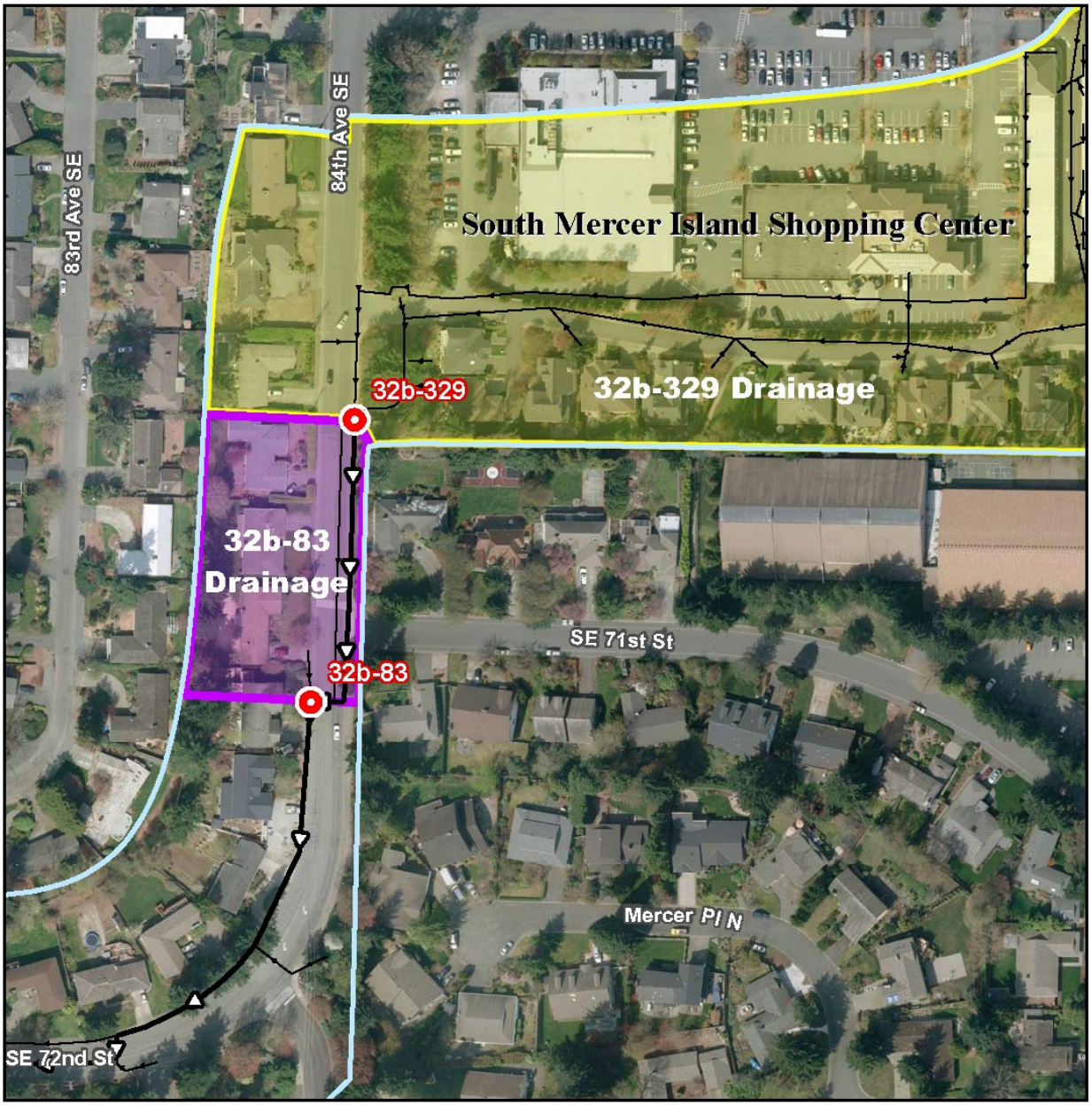

Figure 17

Mercer Island Basin 32b **Sites 32b-83 & 32b-329 Context**

- Sampling Site and Number
- Site 32b-329 Drainage
- Site 32b-83 Drainage
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 100 200 Feet

November 2014

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

City of Mercer Island Washington

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MI_Context_32_Site83_329_8x11PT.mxd

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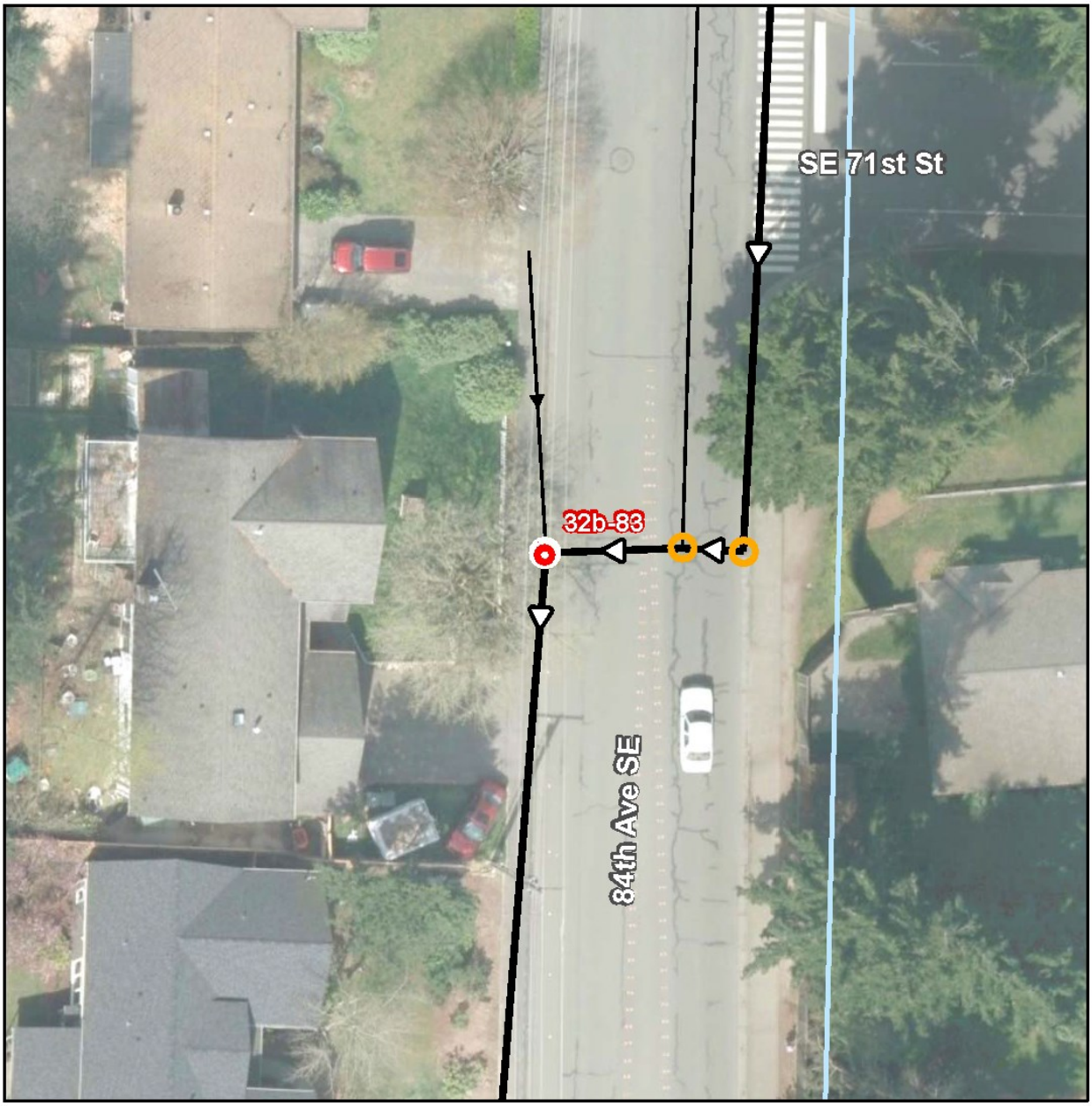

Figure 18

Mercer Island Basin 32b **Station 32b-83 Steet View**

- Sampling Site and Number
- Catchbasin
- Stormwater Manhole
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 15 30 Feet

November 2014

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

City of Mercer Island Washington

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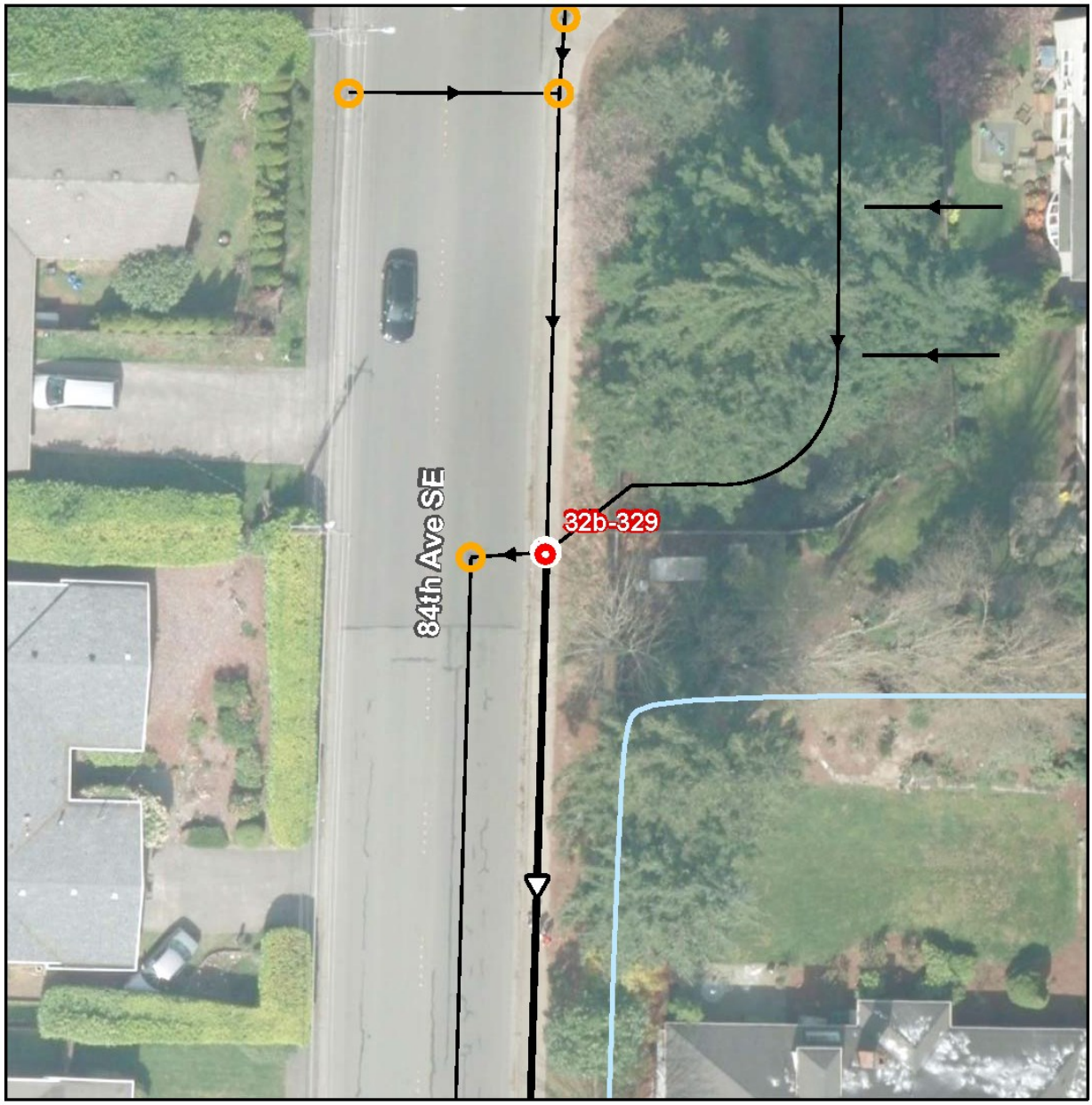

Figure 19

Mercer Island Basin 32b **Station 32b-329 Steet View**

- Sampling Site and Number
- Catchbasin
- Stormwater Manhole
- Stormwater Trunk Flow and Direction
- Stormwater Pipe Flow and Direction
- Stormwater Basin Boundary
- Stream

N

0 15 30 Feet

November 2014

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

City of Mercer Island Washington

Data Sources:
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City of Mercer Island GIS Database;
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Table 2. Basin 32b sampling sites in 2013 and 2014, with State Plane coordinates, listed downstream to upstream.

BASIN 32b	Description	X / Y coordinates
32	historical site near mouth	1292422 / 200129
32b-326	catch basin (on sidewalk) where drainage from 78th Ave combines with drainage from both sides of SE 72nd Street	1294238 / 199553
32b-78	drainage from "The Lakes" development combined with the main trunk line, there are two inputs from the east that flow into the main trunk line (not shown on map) from under north side of the divided entrance to "The Lakes" (80th Street).	1295163 / 199527
32b-6	catch basin (on sidewalk) upstream of "The Lakes", downstream of school with combined drainage from main trunk line, drainage from north (substantial flow crossing under SE 72nd St), and a smaller input from the street grate #32b-5	1295385 / 199528
32b-83	westside of 84th Ave SE collecting drainage from south end shopping center as well as flows from SE 69th Pl and SE 71st St.	1296165 / 199926
32b-329	drainage from south end shopping center downstream of swale	1266203 / 200203

2.0. METHODS

King County Environmental Laboratory staff collected water during six storm events to characterize water quality during periods of elevated surface water runoff in basins 10 and 32b. Samples were collected during the six rain events listed below. As noted, on two occasions, October 2 and November 18, the rain event was less than an hour long and only one basin could be sampled. All together each basin was sampled during four rain events. On April 17, 2014 the King County Environmental Laboratory Microbiology Unit experienced equipment failure and *Bacteroides spp*. samples could not be processed. Therefore, another bacteria sample was collected on May 8, 2014.

- October 2, 2013 – basin 10 only
- November 7, 2013 – basins 10 and 32b
- November 18, 2013 – basin 32b only
- December 12, 2013 – basins 10 and 32b
- April 17, 2014 – basins 10 and 32b (no *Bacteroides* analysis due to equipment failure)
- May 8, 2014 – basin 10 bacteria resampled

Grab samples were taken and analyzed for the following parameters: total suspended solids (TSS), hardness and dissolved metals (copper, zinc, chromium, and lead) and nutrients. In addition, samples collected at the two downstream stations in basin 10 (station 10 and 10C) were analyzed for fecal coliform bacteria and the human source tracking marker *Bacteroides spp.*

King County Environmental Lab (KCEL) staff collected and analyzed samples following Standard Operating Procedures (King County 2005a and King County 2005b). Field parameters including water temperature, DO, pH, and conductivity, were collected using a Hydrolab Series 4 sonde and data logger. A Hach 2100P turbidimeter was used to measure turbidity in the field. All water grab samples were collected and processed by the King County Environmental Lab (KCEL) according to Quality Assurance/Quality Control (QA/QC) protocols provided (King County 2005). Specific sample analysis techniques varied by parameter. If a parameter is not detected for any given analysis, the laboratory flags it as being less than the method detection limits (<MDL). In other words, the parameter was not measurable given the limits of that particular laboratory method.

2.1 Rain events

Field staff monitored real-time rainfall data to decide whether to sample during a particular storm. They focused on collection of water samples from storms which would most likely contain urban stormwater. Ideally, samples would be collected after a specified period of antecedent dry weather (e.g., a three-day pre-storm period with an overall rainfall of 0.25 inches or less) and after the storm reached the forecasted cumulative

precipitation threshold. However, real-time conditions did not conform to these strict constrictions and KCEL staff were limited to sampling during daylight hours.

Rainfall is recorded with a tipping bucket rain gage at a site on the Mercer Island High School campus. Data from the rain gauge were downloaded from the King County Hydrologic Information Center[1] (HIC) database under the locator MERC.

2.2 Water Quality Criteria

Water quality data reports for the two Mercer Island drainages were obtained from the KCEL. Data were compared with State water quality standards (WQS) and guidelines as noted in Table 3. The intent of this comparison is to characterize the data, not to evaluate compliance.

Washington State WQS are currently established only for certain parameters. The sample collection techniques (grab samples) used in this study limited the standards that could be used for comparison because they only reflected a snapshot in time. For example, temperature measured instantaneously during a sampling event does not provide context for how the temperature fluctuates diurnally or between sampling events. Temperature WQS are based on a continually recorded 7-day average, so the comparisons made in this report are to characterize the data and help screen for potential water quality problems.

Additionally, grab samples that are analyzed for dissolved metals are not appropriate to compare with chronic WQS because these standards are designed to represent what the organism would be exposed to continually over a long period of time. Therefore, the water quality data were compared to acute WQS. As stated above, the intention of this comparison is to illustrate an understanding of the parameters and land uses where stormwater improvements can be focused.

State WQS use species and life stage-specific criteria for aquatic life (WDOE 2011) and indicate that criteria for any tributary stream to Lake Washington be based on the "Core Salmonid Summer Habitat" designated use category. Adult salmonids do not enter and spawn in Mercer Island streams; however, the graveled stream mouths and nearshore areas in Lake Washington serve as important spawning and rearing habitat. Discharges from both basins could potentially alter water quality in receiving waters of Lake Washington. This study did not measure water quality in the receiving waters and therefore cannot directly quantify the impact from stormwater in these basins.

[1] King County Hydrologic Information Center: http://green.kingcounty.gov/wlr/waterres/hydrology/ .

Table 3. Water quality standards (WQS) used.

Parameter	Criteria/Guideline	Reference
Temperature	< 16 ° C, (7-DADMax)[a].	WAC 173-201A-200 Table 200(1)(c)
Dissolved oxygen (DO)	> 9.5 mg/L	WAC 173-201A-200 Table 200(1)(d)
pH	6.5 – 8.5	WAC 173-201A-200 Table 200(1)(g)
Conductivity	n/a	
Total Suspended Solids (TSS)	n/a	
Total phosphorus (TP)	n/a	
Soluble Reactive Phosphorus (SRP)	n/a	
Total nitrogen (TN)	n/a	
Nitrate+nitrite nitrogen	n/a	
Ammonia nitrogen	n/a	
Fecal coliform (FC)	<100 CFU[b]/100 ml	WAC 173-201A-200 Table 200(2)(b)
Dissolved metals (Cr, Cu, Pb, Zn)	Hardness dependent	173-201A-240 Table 240(3) – acute standards[c]

[a] 7-DADMax = 7-day average of the daily maximum temperatures
[b] CFU = colony forming unit
[c] **Acute conditions** are defined by WDOE as changes in the physical, chemical, or biologic environment which are expected or demonstrated to result in injury or death to an organism as a result of short-term exposure to the substance or detrimental environmental condition
Chronic conditions are defined changes in the physical, chemical, or biologic environment which are expected or demonstrated to result in injury or death to an organism as a result of repeated or constant exposure over an extended period of time to a substance or detrimental environmental condition

2.2.1 Conventional Parameters

Conventional parameters are the physical and chemical measurements that help define the characteristics of the aquatic environment. The following discussion describes these parameters and significance to water quality. As mentioned above, water temperature, dissolved oxygen, pH, and conductivity, and turbidity were measured in the field. The amount of total suspended solids was analyzed in the lab.

Temperature

Temperature is an important physical parameter for aquatic systems because it influences many of the chemical processes in water (e.g., dissolved oxygen concentration). Temperature also exerts a major influence on biological activity and growth, and therefore the survival of aquatic organisms.

Dissolved oxygen (DO)

Dissolved oxygen is critical to many of the chemical processes that are important in the aquatic environment. The concentration of dissolved oxygen is also important in determining the amount of habitat available for different types of aquatic organisms.

pH

The pH of water is a measure of the concentration of hydrogen ions (H+). A value higher than seven (meaning there are fewer free hydrogen ions) is considered basic, pH of seven is considered neutral, and a pH less than seven is considered acidic. The pH of water determines the solubility and biological availability of chemical constituents such as heavy metals and nutrients. At lower pH values, nutrients are in soluble form and are therefore more readily available for take up by aquatic plants. Also, pH affects the rate of decomposition of organic matter.

Conductivity

Conductivity is a measure of the passage of electric current through water. The concentration of dissolved ions in water largely determines its conductivity. Conductivity is generally higher during base flows in King County streams and decreases during storm events due to dilution from rainwater. Water in the Puget Sound region generally has low levels of dissolved minerals and relatively low conductivity compared to regions with higher concentrations of dissolved minerals in the water. Increases in conductivity can indicate the presence of dissolved ions potentially from a pollutant source. Conductivity is correlated with urbanization and though there is no WQS, trends can be meaningful.

Total Suspended Solids (TSS)

TSS is used as an indicator of the amount of suspended material in water, whether it is mineral (e.g., soil particles) or organic (e.g., plant material). Pollutants such as nutrients, metals, or bacteria can enter and be transported through water attached to particulate matter. Human activities within the watershed such as development that results in vegetation removal, increased erosion and stormwater runoff are generally the cause of higher TSS values. TSS is a measure of the actual weight of material per volume of water.

Turbidity

Turbidity is measured as the amount of light scattered in a water sample and is reported as nephelometeric turbidity units (NTU). The more material in the water, the greater the light scattering and higher NTU reading. Turbidity criterion has been used primarily for assessing the impact of point discharges.

2.2.2 Nutrients

Nitrogen and phosphorus are often monitored in streams because of their potential impact on the aquatic plants and algae of receiving waters, in this case Lake Washington. While plants need both nitrogen and phosphorus, it is the availability of phosphorus that limits plant growth in Lake Washington. Lake Washington currently has moderate to good levels of phosphorus following the diversion of wastewater in the 1960s. However, the concern is that continued loading from non-point sources from its highly urbanized watershed could result in eutrophication and subsequent nuisance, and potentially toxic algae blooms. Human activities such as poor gardening and animal management practices, or illicit sewer connections are linked to elevated nutrient concentrations. There are no state WQS for nutrients.

Total phosphorus (TP)

TP includes all forms of the nutrient, including phosphorus bound in organic matter, attached to soil particles, and dissolved. When TSS is high, TP is also high, reflecting the amount of phosphorus that is bound to sediments. SRP is a dissolved form of phosphorus which is readily available for plants and thus included in many fertilizers. The amount of phosphorus in any fertilizer is listed on the package as the middle number N-P-K. Washington State adopted legislation that bans the sale of lawn fertilizer containing phosphorus beginning in 2013. Synthetic detergents are also sources of dissolved phosphorus. The fraction of SRP (SRP:TP ratio) can be used to identify potential sources of these pollutants in runoff.

Total Nitrogen (TN)

TN includes the other measured forms of nitrogen as well as organic nitrogen. The two forms of inorganic nitrogen (ammonia and nitrate+nitrite) are highly soluble in water and are components of fertilizers, sewage effluents, and manure. Under natural conditions, the primary source of nitrate+nitrite in streams is from the decomposition of organic materials (e.g., leaf material) and therefore an increase in nitrogen in autumn would be expected. Likewise a decline in nitrogen through the growing season when plants are taking up nitrogen would be expected under natural conditions.

2.2.3 Bacteria

The state Extraordinary Primary Contact Recreation criteria for fecal coliform bacteria reads as follows: "Fecal coliform organism levels must not exceed a geometric mean value of 50 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 100 colonies/100 mL" (WAC 173-201A-200 Table 200 (2)(b)). It is not recommended to calculate the geomean when data is collected over thirty days apart. Therefore, the second part of the criteria (<100 colonies/mL) is used here for determining exceedances.

The state WQS for bacterial pollution is based on using fecal coliform (FC) bacteria as an indicator of public health risk. However, high FC bacteria counts in water do not necessarily indicate human sewage pollution because many other mammals and birds also

contribute fecal bacteria. Additionally, FC bacteria can persist and even increase in sediment and biofilms in drainage systems, and may be re-suspended during periods of high flows. Therefore it is common for urban streams with flashy and erosive flows to have high fecal coliform bacteria that exceed WQS during storm events.

King County has been working on fine-tuning the use of a qPCR (quantitative Polymerase Chain Reaction) technology for bacteria source tracking studies. The marker used by KCEL identifies and quantifies DNA of the most common human gut bacteria - *Bacteroides spp.*. Because *Bacteroides spp*. make up a significant component of human fecal material, and are anaerobic, when it is measured in abundance in surface waters it can be an indication of recent human pollution due to their short survival time and inability to reproduce in the environment. This particular human source marker has been studied throughout the nation for several years and the current marker used by KCEL is in its second generation. Samples from the two downstream stations in basin 10 were analyzed for *Bacteroides* to determine if high values measured in this section of the basin could be from a human source such as a failing septic system, an illicit connection or failing side sewer line.

2.2.4 Metal WQS and Hardness

Standards for all metals evaluated here are hardness-dependent; toxicity increases as water hardness decreases based on the current state WQS. Dissolved metal concentrations were compared to hardness adjusted acute WQS for aquatic life. The state acute WQS are defined as "the 1-hour average concentration[2] not to be exceeded more than once every 3 years on average." (Hardness is calculated using the values for calcium and magnesium.) Water with low hardness is termed "soft water." Soft water is common for Puget Sound lowland streams. There are several reasons for this, including very few carbonate rock formations in this area. In general, increased flows from rainwater often result in decreased hardness due to dilution.

[2] According to the Wa Department of Ecology Water Quality Program Policy, measurements of instantaneous concentrations will be assumed to represent the averaging periods specified in Washington State surface water quality standards for both acute and chronic criteria unless additional measurements are available to calculate averages.

3.0. RESULTS

Samples were collected during rain events spread across an eight month period as listed below.

- October 2, 2013 – basin 10 only
- November 7, 2013 – basins 10 and 32b
- November 18, 2013 – basin 32b only
- December 12, 2013 – basins 10 and 32b
- February 18, 2014 – basins 10 and 32b
- April 17, 2014 – basins 10 and 32b (no *Bacteroides* analysis due to equipment failure)
- May 8, 2014 – basin 10 bacteria resampled

Figure 20 shows rainfall collected at the Mercer Island High School rain gauge (MERC) plotted with the sampling events. The October 2, 2013 sampling event was not long enough in duration to sample both basins so only basin 10 was sampled on that date. Subsequently, basin 32 was sampled for a second time on November 18, 2013 to make up for the missed event. Station 32b-329, the furthest upstream station in basin 32b was noted to have "no flow" during the November 7th, December 2nd and February 18th sampling events.

October, November and December 2013 had lower monthly cumulative rainfall than the historical 64-year average as measured at SeaTac. Conversely, February and April 2014 were wetter than the historical average (Figure 21).

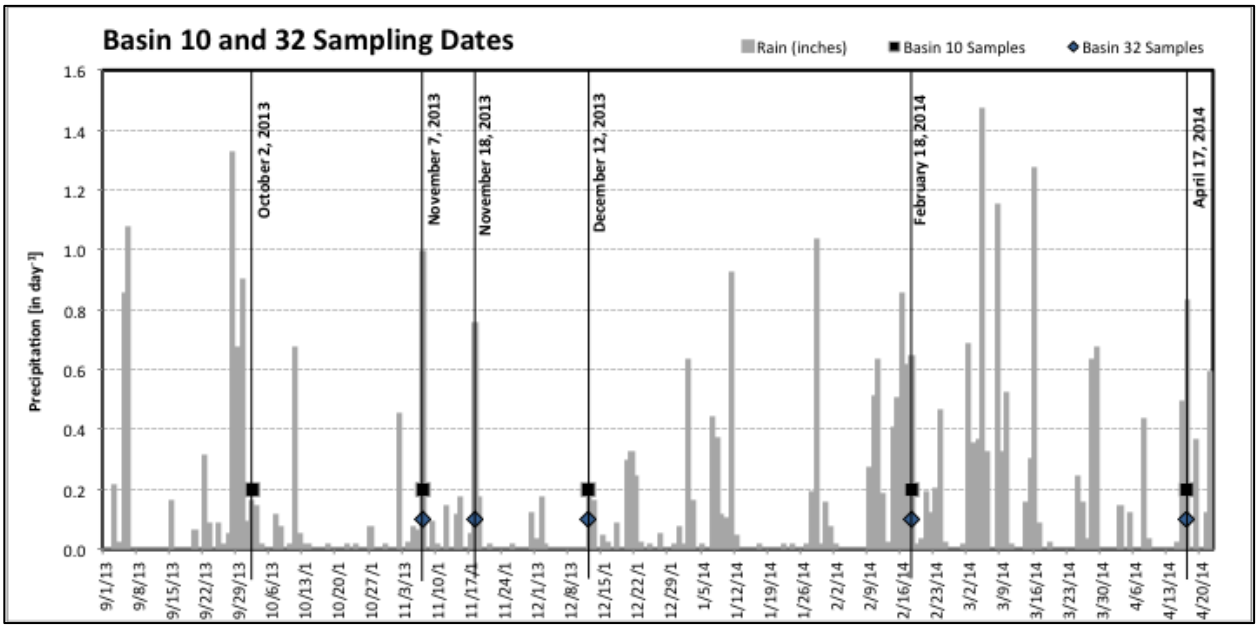
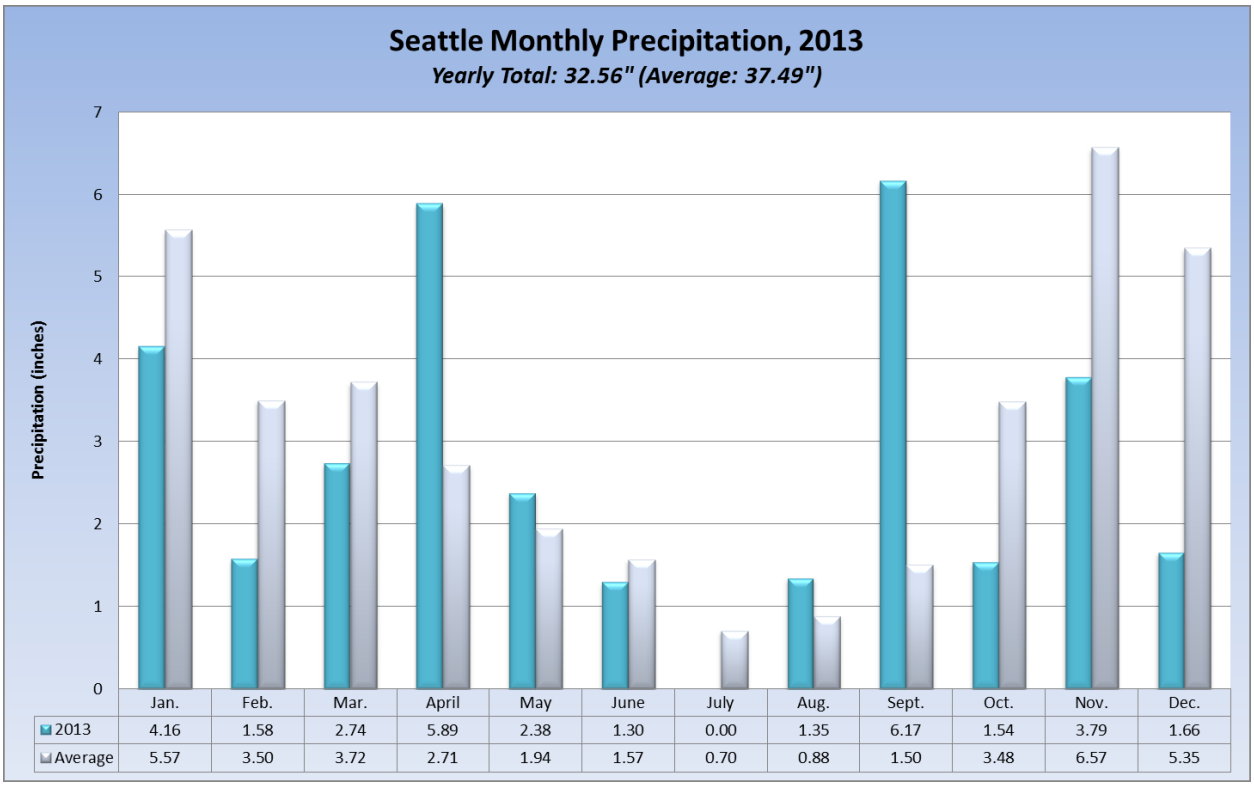


Figure 20. Rainfall measured at the Mercer Island High School rain gauge (MERC) and the sampling events 2013-14.



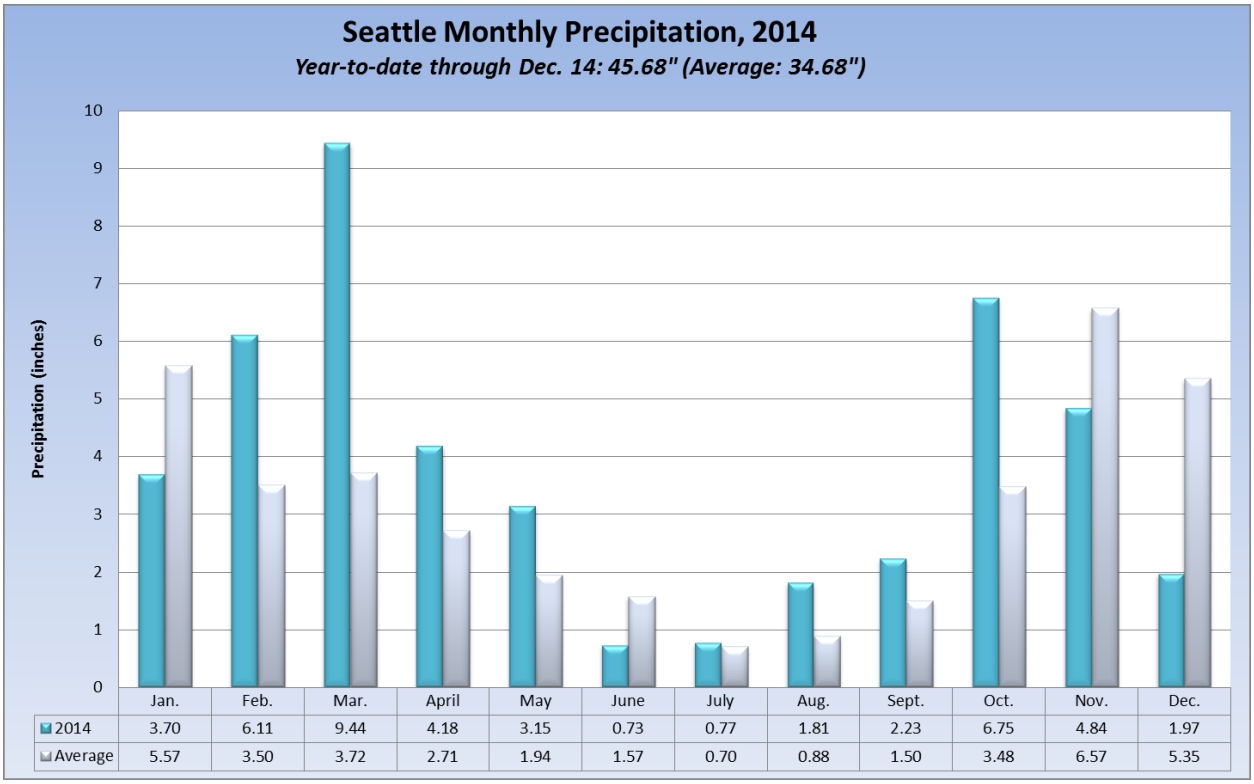


Figure 21. Seattle cummulative monthly rainfall in 2013 and 2014 compared with the 64 year historical average as measured at SeaTac Airport. (Seattle Weather Blog).

The results for each basin will be summarized separately in the following sections. Data reports for each sampling event are included in Appendix A.

3.1 Basin 10

Samples were collected at seven stations along 77th Avenue SE – that drain into the storm water trunk line through the town center (section 1.1). Results are presented here for conventionals, bacteria, nutrients, and metals. Samples collected from 10-366 and 10-648 in the town center were noted to be "very turbid" during all five sampling events. On December 12th, station 10 was noted to have a very strong gasoline odor and there was a "sheen" observed in the creek. City staff reported there had been a car accident in the downtown area where some fuel had spilled two days prior to the December 12th monitoring.

3.1.1 Conventionals - Basin 10

Basin 10 does not support salmonids. Therefore, WQS for temperature and dissolved oxygen are not directly applicable but a comparison is used here to characterize the data. Temperatures in basin 10 varied between stations by roughly 1-3 degrees (Table 4) on any given sampling date, ranging from 4.6 to 15.0°C. Temperatures were below the WQS of 16°C in all events, which is not surprising, as samples were not collected during the warmest time of the year. Temperatures measured in previous monitoring efforts ranged between 14.7 to 16.9°C in the summer months at station 10 (King County 2011).

Dissolved oxygen concentrations ranged from 6.2 to 12.1 mg/L. Station 10-648 was consistently below the WQS of 9.5 mg/L (Table 4). With the exception of the October 2, 2013 sample, dissolved oxygen at station 10 was above the WQS just upstream of discharge to the lake. The pH at station 10-648 fell below the WQS of 6.5 on three events. Station 10-366 was below the WQS once (Table 4).

Conductivity was generally below 100 µhmos/cm except during the December 12, 2013 sampling event when values were over 300 µhmos/cm at four of the five sites (Table 4). This spike in conductivity is likely due to the washing off of de-icing agents that were applied to the roads in the preceding freezing temperatures and nine-day antecedent dry period. TSS and turbidity varied between storm events, but were consistently higher at sites 10-366 and 10-648 (Table 4, Figure 22).

Table 4. Dissolved oxygen (DO), temperature, pH, conductivity and TSS measured in basin 10, 2013-14. Stations listed upstream to downstream. Highlighted values indicate where WQS were not met (see section 2.2)

Locator	Date	Dissolved Oxygen	Tempertature	pH	Conductivity	Total Suspended Solids	Turbidity
		[mg L^{-1}]	[°C]	--	[µhmos cm^{-1}]	[mg L^{-1}]	[NTU]
WQS ===>		> 9.5 [mg L^{-1}]	< 16.0 [°C]	6.5 - 8.5	--	--	--
10-207	10/2/13	10	13.78	6.97	37.7	8.4	8.4
	11/7/13	10	10.63	6.87	30.7	10.2	18.0
	12/12/13	11	5.33	6.79	61.3	24.0	20.6
	2/18/14	11	7.95	6.93	51.1	5.5	5.1
	4/17/14	10	12.23	7.04	49.1	13.0	9.9
10-394	10/2/13	9	14.10	7.04	62.6	6.0	11.3
	11/7/13	10	10.62	6.93	61.5	33.2	20.0
	12/12/13	12	5.61	6.90	327.0	34.8	49.6
	2/18/14	11	7.46	7.03	99.5	16.9	24.8
	4/17/14	10	13.45	6.59	41.0	13.3	74.7
10-108	10/2/13	10	14.73	7.05	33.5	10.4	13.6
	11/7/13	11	10.15	6.71	12.7	52.0	20.8
	12/12/13	12	5.88	6.87	72.8	7.8	12.5
	2/18/14	11	7.75	7.17	30.9	23.0	19.8
	4/17/14	10	13.13	7.19	39.6	21.2	17.0
10-648	10/2/13	9	13.54	7.29	38.1	60.0	101.0
	11/7/13	8	10.38	6.25	51.7	176.0	67.0
	12/12/13	9	4.61	6.57	482.0	101.0	95.1
	2/18/14	6	7.61	6.43	17.2	281.0	66.9
	4/17/14	7	13.71	6.42	44.9	201.0	120.0
10-366	10/2/13	9	13.75	7.29	47.9	38.0	96.8
	11/7/13	9	10.09	6.57	45.9	100.0	67.7
	12/12/13	10	4.95	6.91	519.0	34.0	120.0
	2/18/14	9	7.58	6.34	16.0	125.0	57.0
	4/17/14	9	13.45	6.59	41.0	86.5	74.7
10C	10/2/13	9	14.97	7.36	62.0	6.8	10.7
	11/7/13	10	11.15	6.99	32.3	14.2	13.6
	12/12/13	11	6.37	7.25	134.0	13.2	21.9
	2/18/14	11	8.71	7.40	50.4	8.1	8.1
	4/17/14	10	13.54	7.43	53.5	11.3	15.0
10	10/2/13	9	14.64	7.31	91.3	3.2	7.3
	11/7/13	10	11.71	7.38	135.0	4.6	11.8
	12/12/13	11	6.24	7.13	329.0	9.6	32.2
	2/18/14	12	7.64	7.12	54.9	31.0	24.9
	4/17/14	10	12.46	7.39	80.1	7.2	10.7

3.1.2 Nutrients – Basin 10

Two of the four town center stations, 10-366 and 10-648, had consistently higher TP, with median concentrations of 0.216 and 0.269 mg/L, respectively (Figure 22). Likewise, TN concentrations were highest at the same two stations with median concentrations of 1.99 mg/L at station 10-366 and 1.76 mg/L at station 10-648. As expected, higher total nutrient

concentrations are consistent with elevated TSS as nutrients bind readily to particulate matter. While station 10-366 had the highest median SRP measured in the basin (0.082 mg/L), the two downstream stations (10C and 10) had the highest ratio of SRP to TP with median ratios greater than 0.6 indicating that more than half of the phosphorus at these two stations is in the soluble form. For comparison, station 10-648 had consistently low SRP:TP ratios with a median of 0.16. Median nitrate-nitrite concentrations ranged from 0.073 mg/L at station 10-108 to 0.297 mg/L at station 10C.

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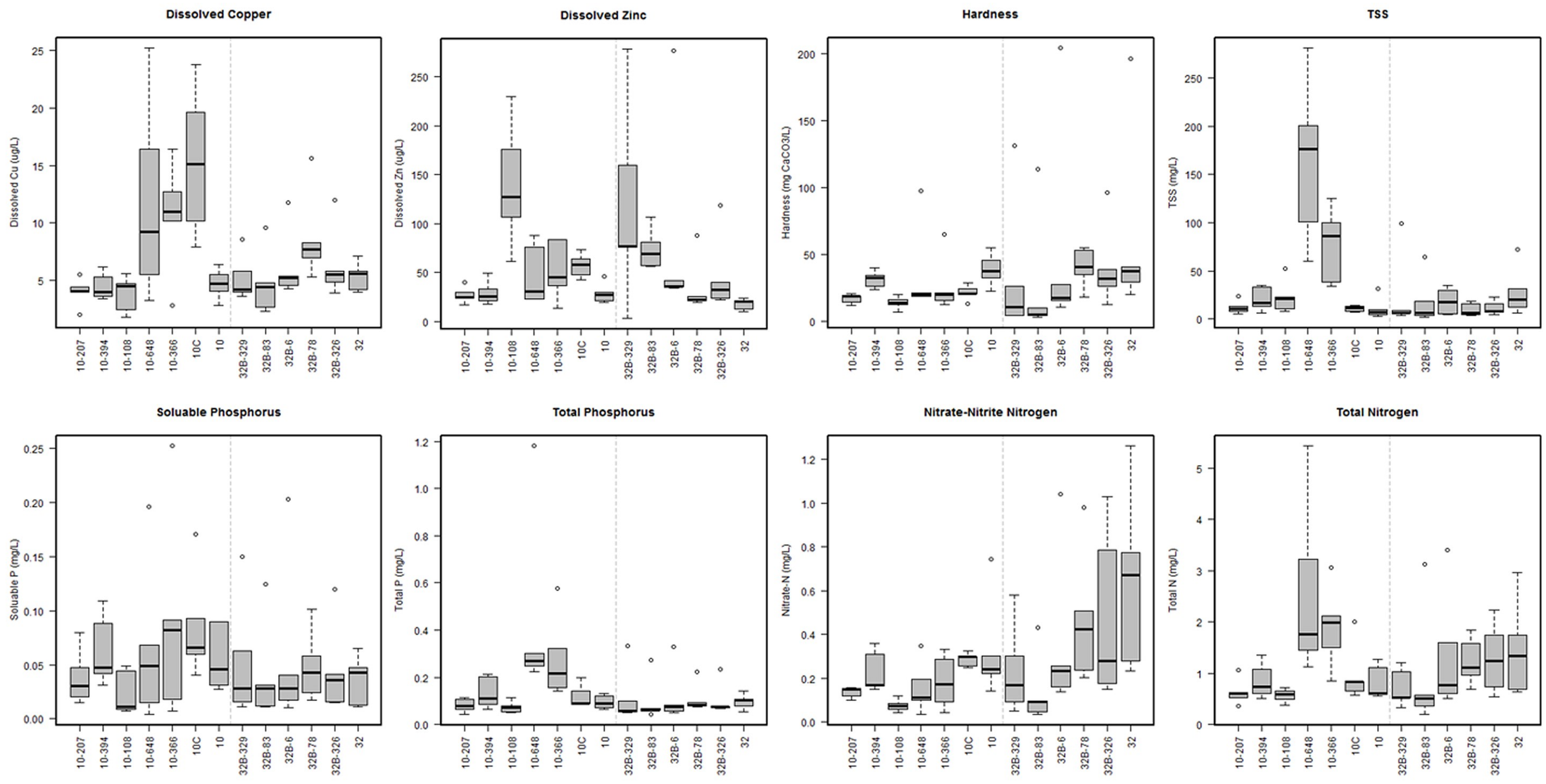
Figure 22. Box plots showing median, 75th, and 25th percentiles of dCu, dZn, hardness, TSS, SRP, TP, Nitrate-nitrite-N, and TN for each station in basins 10 and 32b, 2013-14 monitoring events.



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3.1.3 Bacteria – Basin 10

Fecal coliform bacteria measured in stormwater can be highly variable and samples collected from the two downstream sites are no exception (Figure 23). The state WQS for FC is 100 CFU/100 ml. For comparison, the value of 1000 CFU used in the King County Swimming Beach Monitoring Program[3] as the threshold prompting further management actions as the WQS of 100 is for protection of the highest and best uses of state waters which is their potential use as drinking waters. Typically values for fecal coliform and *Bacteroides* ranging in the tens of thousands would indicate a human sewage issue. On two occasions, October 2, 2013 and May 8th, 2014, high fecal coliform bacteria at station 10 was associated with high *Bacteroides* values indicating a potential human source entering the surface water somewhere between the two stations.

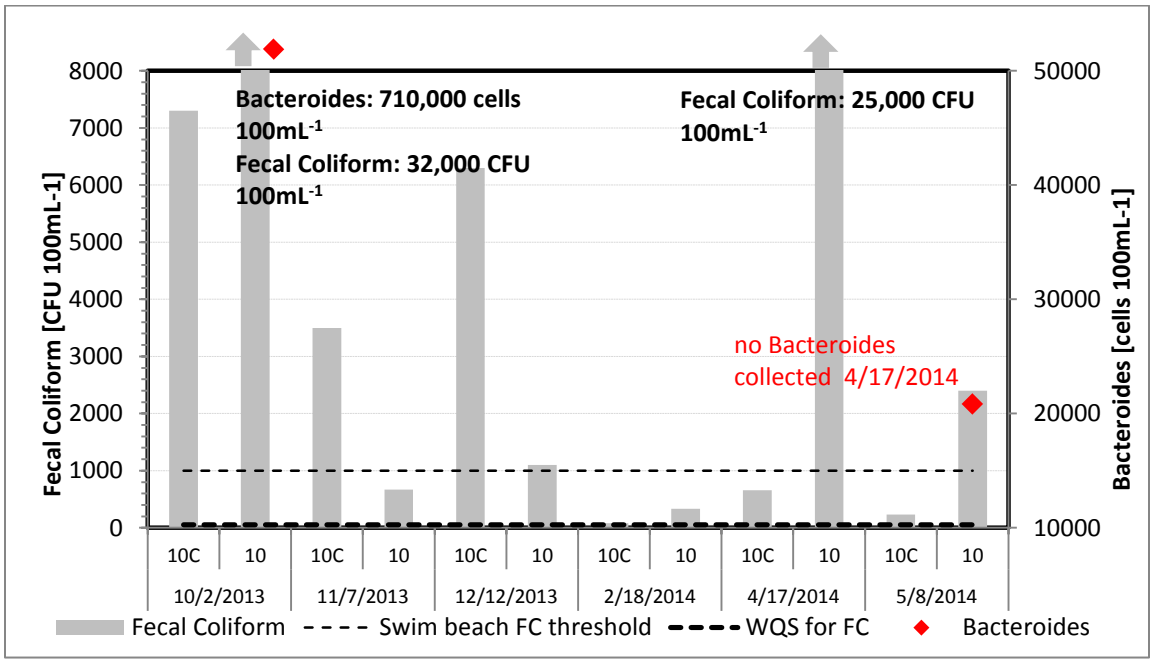

Figure 23. Fecal coliform bacteria and Bacteroides qPCR results measured at stations 10C and 10 in 2013 and 2014.

3.1.4 Metals – Basin 10

In 2013-14 the dCu and dZn concentrations in basin 10 ranged from 1.8 µg/L to 25.2 µg/L, and 13.7 µg/L to 230 µg/L, respectively. The median dCu concentrations at stations 10-366

[3] King County Swimming Beach Monitoring: http://green.kingcounty.gov/swimbeach/closures.aspx. Swimming Beach closure protocol uses the Ten State Standard. The Ten State Standard - a geometric mean of 200 CFU/100ml (colony forming units per 100 milliliter) fecal coliform with no single sample exceeding 1000 CFU/100ml.

(11 µg/L), 10-648 (9.2 µg/L), and 10C (15.1 µg/L) were higher than other basin 10 stations (Figure 22) and are over four times higher than the median stormwater concentration reported for commercial/industrial watersheds in the Puget Sound Toxics Loading Analysis (2.28 µg/L) (Herrera 2011). Median dZn concentrations at stations 10-108 (127 µg/L) and 10C (57.8 µg/L) were more than double those reported for stormwater in regional commercial/industrial watersheds (29.1 µg/L) (Herrera 2011).

Sites 10-207, 10-108, 10-648 and 10C routinely exceeded dCu and dZn WQS, while sites 10 and 10-394 exceeded the criteria only once on April 17, 2014. The acute standards for dCu and dZn are hardness-dependent where the toxicity of these metals increases as water hardness decreases. As mentioned in section 2.2.4, increased flows from rainwater will generally result in decreased hardness due to dilution. Station 10-648 was noted to have "low flows" and be "very turbid" on December 12, 2013. This lack of dilution resulted in a hardness value that was almost four times higher than the other dates (Table 5). Subsequently, the high dCu and dZn concentrations measured at that station on this date did not exceed the acute WQS.

Collectively, dCu concentrations at the four town center sites were significantly greater than those measured at the upstream sites (ρ=0.017)[4] but not significantly different than concentrations measured downstream at station 10 (ρ=0.118)[4]. Station 10-108 had relatively low dCu concentrations compared with the other town center sites (Figure 22).

The dZn concentrations at the four town center sites were significantly greater than concentrations measured at the upstream sites (ρ=0.002)[4] and the downstream station 10 (ρ=0.015)[4]. Station 10-108 had significantly high dZn concentrations compared with the other basin 10 sites (ρ = 0.001) (Figure 22).

[4] Comparison using the non-parametric Wilcoxon signed-ranked test.

Comparison	Parameter	p value*
Basin 10 town center sites vs. upstream sites	Cu	**0.017**
Basin 10 town center sites vs. downstream site	Cu	0.118
Basin 10 town center sites vs. upstream sites	Zn	**0.002**
Basin 10 town center sites vs. downstream site	Zn	**0.015**
Basin 32 site 78 vs. other basin 32 sites	Cu	**0.034**

* Bolded values significant at the 95% confidence level

Table 5. Hardness (mg/L CaCO3), dissolved metal (µg/L) concentrations and hardness corrected (except Cr) acute WQS in basin 10, 2013-14. Highlighted cells exceed acute criteria. <MDL = less than the method detection limit.

Locator	Date	Hardness	Cr Critera	dCr	Cu Critera	dCu	Pb Critera	dPb	Zn Critera	dZn
		[mg $CaCO_3$ L^{-1}]	acute/chronic	[ug L^{-1}]	acute/chronic	[ug L^{-1}]	acute/chronic	[ug L^{-1}]	acute/chronic	[ug L^{-1}]
10-207	10/2/13	14.6	113.5 / 36.8	0.26	2.8 / 2.2	4.0	7.6 / 0.3	0.21	22.4 / 20.5	23.5
	11/7/13	12.0	96.7 / 31.4	0.31	2.3 / 1.9	4.4	6.0 / 0.2	0.17	19.0 / 17.3	29.4
	12/12/13	18.9	140.2 / 45.5	0.25	3.5 / 2.7	5.5	10.1 / 0.4	0.27	27.9 / 25.5	39.7
	2/18/14	20.7	151.1 / 49.0	0.35	3.9 / 3.0	2.0	11.2 / 0.4	<MDL	30.1 / 27.5	17.0
	4/17/14	18.8	139.6 / 45.3	0.26	3.5 / 2.7	4.1	10.1 / 0.4	0.38	27.8 / 25.4	24.3
10-394	10/2/13	26.3	183.8 / 59.6	0.55	4.8 / 3.6	3.6	14.7 / 0.6	0.16	36.9 / 33.7	20.8
	11/7/13	24.3	172.3 / 55.9	0.52	4.5 / 3.4	4.0	13.4 / 0.5	0.23	34.5 / 31.5	33.3
	12/12/13	40.2	260.2 / 84.4	0.39	7.2 / 5.2	5.3	23.6 / 0.9	0.28	52.9 / 48.3	49.7
	2/18/14	34.7	230.6 / 74.8	0.53	6.3 / 4.6	3.4	20.1 / 0.8	0.18	46.7 / 42.6	17.4
	4/17/14	32.7	219.7 / 71.3	0.40	5.9 / 4.4	6.2	18.8 / 0.7	0.28	44.4 / 40.5	25.7
10-108	10/2/13	12.7	101.2 / 32.8	0.46	2.4 / 1.9	4.7	6.4 / 0.3	0.65	19.9 / 18.2	176.0
	11/7/13	7.3	64.5 / 20.9	<MDL	1.4 / 1.2	1.8	3.4 / 0.1	0.31	12.5 / 11.4	61.2
	12/12/13	20.0	146.9 / 47.6	0.25	3.7 / 2.9	4.5	10.8 / 0.4	0.39	29.3 / 26.7	127.0
	2/18/14	14.1	110.3 / 35.8	0.51	2.7 / 2.1	2.5	7.3 / 0.3	0.14	21.8 / 19.9	107.0
	4/17/14	16.5	125.5 / 40.7	0.38	3.1 / 2.4	5.6	8.7 / 0.3	0.51	24.9 / 22.7	230.0
10-648	10/2/13	19.3	142.6 / 46.3	0.91	3.6 / 2.8	9.2	10.4 / 0.4	0.62	28.4 / 25.9	22.6
	11/7/13	19.3	142.6 / 46.3	0.48	3.6 / 2.8	5.5	10.4 / 0.4	0.24	28.4 / 25.9	30.4
	12/12/13	97.9	539.3 / 174.9	0.66	16.7 / 11.1	16.4	63.1 / 2.5	0.20	112.4 / 102.6	87.8
	2/18/14	20.2	148.1 / 48.0	0.41	3.8 / 2.9	3.3	10.9 / 0.4	0.25	29.5 / 27.0	23.0
	4/17/14	21.3	154.6 / 50.2	0.54	4.0 / 3.0	25.2	11.6 / 0.5	0.47	30.9 / 28.2	76.2
10-366	10/2/13	20.1	147.5 / 47.8	1.21	3.8 / 2.9	10.2	10.9 / 0.4	0.80	29.4 / 26.8	36.8
	11/7/13	21.4	155.2 / 50.4	0.71	4.0 / 3.0	11.0	11.6 / 0.5	0.33	31.0 / 28.3	83.3
	12/12/13	65.4	387.5 / 125.7	0.77	11.4 / 7.9	16.4	40.6 / 1.6	0.21	79.9 / 72.9	83.6
	2/18/14	12.7	101.2 / 32.8	0.41	2.4 / 1.9	2.8	6.4 / 0.3	0.23	19.9 / 18.2	13.7
	4/17/14	15.6	119.8 / 38.9	0.81	3.0 / 2.3	12.7	8.1 / 0.3	0.51	23.7 / 21.7	45.0
10C	10/2/13	24.8	175.2 / 56.8	0.49	4.6 / 3.4	15.1	13.8 / 0.5	0.38	35.1 / 32.1	47.3
	11/7/13	13.3	105.1 / 34.1	0.25	2.5 / 2.0	7.9	6.8 / 0.3	0.37	20.7 / 18.9	57.6
	12/12/13	29.3	200.8 / 65.1	0.27	5.4 / 4.0	19.6	16.6 / 0.6	0.23	40.4 / 36.9	72.9
	2/18/14	21.1	153.4 / 49.8	0.44	3.9 / 3.0	10.2	11.5 / 0.4	0.19	30.6 / 28.0	42.6
	4/17/14	20.6	150.5 / 48.8	0.45	3.8 / 2.9	23.8	11.2 / 0.4	0.63	30.0 / 27.4	64.1
10	10/2/13	37.6	246.3 / 79.9	0.57	6.8 / 4.9	4.1	21.9 / 0.9	0.17	50.0 / 45.6	20.8
	11/7/13	55.1	336.8 / 109.3	0.55	9.7 / 6.8	4.7	33.6 / 1.3	0.21	69.1 / 63.1	29.5
	12/12/13	46.1	291.0 / 94.4	0.38	8.2 / 5.9	5.5	27.5 / 1.1	0.37	59.4 / 54.2	45.6
	2/18/14	22.9	164.1 / 53.2	0.43	4.2 / 3.2	2.8	12.6 / 0.5	0.16	32.8 / 30.0	19.6
	4/17/14	32.8	220.2 / 71.4	0.43	6.0 / 4.4	6.4	18.8 / 0.7	0.23	44.5 / 40.6	27.4

3.2 Basin 32b

Six sites were monitored in basin 32b including the historical site (32) at the mouth of the drainage and five upstream sites along SE 72nd Street (section 1.2). Results are presented here for conventionals, nutrients, and metals. As noted in the field notes station 32b-329 near the south end shopping center had "no flow and turbid" on November 7, 2013, and "no flow, drainage swale completely dry" on December 12, 2013.

3.2.1 Conventionals – Basin 32b

Basin 32b does not support salmonids. Therefore, WQS for temperature (<16 degrees, 7-DADMax) and dissolved oxygen (> 9.5 mg/L) is of most concern at station 32, just above where it discharges to Lake Washington. Temperatures were below the WQS of 16°C in all events, which is not surprising, as samples were not collected during the warmest time of the year.

With the exception of conditions of "no flow" noted at station 32b-329, temperatures varied by only 1-2 °C. between stations on any given sampling date (Table 6). When "no flows" were noted at 32b-329 (November 7th and December 12th, 2013), the temperatures were higher and dissolved oxygen concentrations were lower than other stations. There was not a pronounced pattern of increasing or decreasing temperature as the water moved through the system though on three occasions, temperatures increased slightly by 0.9 to 1.5 degrees at 32b-78 from the upstream station.

Dissolved oxygen concentrations ranged from 6.2 to 12.1 mg/L and concentrations were frequently below the WQS of 9.5 mg/L at the upper four stations, 32b-329, 32b-83, 32b-6, and 32b-78 (Table 6). Dissolved oxygen concentrations were higher in the downstream drainages and well above the WQS of 9.5 mg/L at the mouth before discharging to Lake Washington. Like dissolved oxygen, pH increased as it moved through the basin and the four upper stations had pH values below the WQS of 6.5 on several occasions (Table 6).

Conductivity was generally below 105 µhmos cm-1 with a couple of exceptions (Table 6). On December 12, 2013 following freezing temperatures and a nine-day antecedent dry period conductivity ranged between 200 and 800 µhmos cm-1 at the five downstream stations. This spike was likely due to the washing off of road de-icing agents. Conductivity was also above 300 µhmos cm-1 at station 32b-329 on November 11, 2013 when there was "no flow" noted and therefore no dilution in the catch basin. Likewise, TSS and turbidity were higher during the December 12th sampling event. Median TSS and turbidity values were similar for all stations in basin 32b (Figure 22).

Table 6. Dissolved oxygen (DO), temperature, pH, conductivity and TSS measured in basin 32, 2011-12. Highlighted values indicate where WQS were not met (see section 2.2).

Locator	Date	Dissolved Oxygen	Tempertature	pH	Conductivity	Total Suspended Solids	Turbidity
		[mg L^{-1}]	[°C]	--	[µhmos cm^{-1}]	[mg L^{-1}]	[NTU]
WQS ===>		> 9.5 [mg L^{-1}]	< 16.0 [°C]	6.5 - 8.5	--	--	--
32B-329	11/7/13	7	12.15	7.61	320.0	99.0	41.5
	11/18/13	10	10.07	6.44	11.7	6.2	4.7
	12/12/13	7	7.38	6.67	52.7	6.1	5.0
	2/18/14	10	5.96	6.34	30.8	9.1	12.0
	4/17/14	8	11.83	6.11	13.2	3.6	3.4
32B-83	11/7/13	10	9.48	6.48	9.1	1.8	9.1
	11/18/13	11	10.07	6.27	11.8	3.9	6.3
	12/12/13	12	3.78	6.61	501.0	64.0	69.3
	2/18/14	11	5.99	6.35	22.4	18.4	20.5
	4/17/14	8	12.02	6.32	14.1	6.0	7.2
32B-6	11/7/13	10	9.79	6.45	60.3	17.3	7.8
	11/18/13	11	10.13	6.58	22.5	5.0	5.7
	12/12/13	11	4.59	6.47	794.0	35.0	58.3
	2/18/14	11	5.97	6.57	31.1	29.8	21.5
	4/17/14	9	12.04	6.80	46.4	4.3	6.5
32B-78	11/7/13	10	9.91	6.60	80.3	4.6	8.6
	11/18/13	9	11.08	6.22	66.3	5.9	7.2
	12/12/13	12	4.23	6.55	260.0	18.0	24.8
	2/18/14	10	7.44	6.25	102.0	15.5	21.0
	4/17/14	9	12.97	6.94	101.0	3.4	5.0
32B-326	11/7/13	10	10.19	6.76	80.1	4.6	8.0
	11/18/13	11	10.45	6.65	32.5	8.0	9.9
	12/12/13	12	5.34	6.69	312.0	23.0	32.2
	2/18/14	11	6.47	6.64	57.9	16.2	11.9
	4/17/14	10	12.75	7.14	95.9	7.5	6.6
32	11/7/13	11	10.21	7.35	91.5	12.5	10.4
	11/18/13	10	10.49	7.20	49.8	20.0	14.9
	12/12/13	12	3.90	7.34	551.0	31.8	44.7
	2/18/14	12	6.82	7.33	72.5	72.2	37.3
	4/17/14	10	12.09	7.63	98.7	6.1	7.3
Washington state water		> 9.5 [mg L^{-1}]	< 16.0 [°C]	6.5 - 8.5	--	--	--

3.2.2 Nutrients – Basin 32b

Nutrient concentrations were higher at the downstream stations (Figure 22), though due to the high variability the differences were not significant. The median TP concentration ranged from 0.58 mg/L at station 32b-329 to 0.103 mg/L at station 32. Median TN concentrations ranged from 0.506 mg/L at station 32b-83 to 1.34 mg/L at station 32. As was the case in basin 10, total nutrients were highest during the December 12, 2013 sampling event and are likely associated with high total suspended solids. The median soluble phosphorus concentration was higher at stations 32b-78 and 32. The fraction of the total phosphorus concentration in soluble form (SRP:TP ratio) was consistent throughout

the basin ranging from 0.42 at station 32b-83 to 0.49 at station 32b-329. This indicates that most of the phosphorus entering the basin is in particulate form.

Nitrate-nitrite concentrations were highest in the November 7th sampling event. As discussed in section 2.3.4, under natural conditions, an increase in nitrogen in the fall in streams is the result of terrestrial decomposition of organic materials and is the primary source of nitrate+nitrite (a large component of TN). Overall, the median Nitrate-nitrite concentrations were higher at the three downstream sites.

3.2.3 Metals – Basin 32b

In 2013-14 concentrations of dCu and dZn measured in basin 32b ranged from 2.3 µg/L to 15.6 µg/L, and 3.1 µg/L to 278 µg/L, respectively. Dissolved copper at station 32b-78 was significantly higher than the other stations in the basin (ρ=0.034) with a median dCu at 7.7 µg/L. Station 32b-329 at the south end shopping center had the highest median dZn at 76.5 µg/L (Figure 22). For comparison, the median concentrations of dCu and dZn in stormwater listed for residential watersheds in the Puget Sound Toxics Loading Analysis was 1.13 µg/L and 3.4 µg/L, respectively. The dZn concentrations at 32b-329 were almost three times those reported for stormwater in Herrera's (2011) regional commercial/industrial watershed (29.1 µg/L). On the two occasions where KCEL staff reported "no flow" at station 32b-329, high metal concentrations were likely due to lack of dilution.

Acute WQS for dCu and dZn were exceeded in four of the five samples collected at the three upstream stations, 32b-329, 32b-83, and 32b-6, while station 32 had only one dCu exceedance and did not exceed the WQS for dZn (Table 7). Hardness varied considerably at each station, but in general was lower at the three upstream stations (Figure 22) resulting in more exceedances.

Table 7. Hardness (mg/L CaCO3), dissolved metal (µg/L) concentrations and hardness corrected (except Cr) acute WQS in basin 32b, 2013-14. Highlighted cells exceed acute criteria. <MDL = less than the method detection limit.

Locator	Date	Hardness	Cr Critera	dCr	Cu Critera	dCu	Pb Critera	dPb	Zn Critera	dZn
		[mg $CaCO_3$ L^{-1}]	acute/chronic	[ug L^{-1}]	acute/chronic	[ug L^{-1}]	acute/chronic	[ug L^{-1}]	acute/chronic	[ug L^{-1}]
32B-329	11/7/13	131.0	684.6 / 222.1	<MDL	21.9 / 14.3	4.0	86.5 / 3.4	0.10	143.9 / 131.4	3.1
	11/18/13	4.6	44.2 / 14.3	0.20	0.9 / 0.8	5.8	2.0 / 0.1	0.22	8.4 / 7.7	76.5
	12/12/13	26.3	183.8 / 59.6	0.28	4.8 / 3.6	8.6	14.7 / 0.6	0.16	36.9 / 33.7	278.0
	2/18/14	11.2	91.3 / 29.6	0.24	2.2 / 1.7	3.6	5.6 / 0.2	0.12	17.9 / 16.4	160.0
	4/17/14	4.8	45.7 / 14.8	<MDL	1.0 / 0.8	4.2	2.1 / 0.1	0.31	8.7 / 8.0	75.5
32B-83	11/7/13	3.3	33.4 / 10.8	<MDL	0.7 / 0.6	2.3	1.4 / 0.1	0.11	6.3 / 5.8	57.5
	11/18/13	4.6	43.7 / 14.2	0.29	0.9 / 0.8	4.8	2.0 / 0.1	0.16	8.3 / 7.6	56.4
	12/12/13	114.0	610.9 / 198.2	0.24	19.3 / 12.7	9.6	74.5 / 2.9	0.13	127.9 / 116.8	107.0
	2/18/14	10.3	85.3 / 27.7	<MDL	2.0 / 1.6	2.7	5.1 / 0.2	0.16	16.7 / 15.2	81.1
	4/17/14	5.1	47.8 / 15.5	<MDL	1.0 / 0.9	4.4	2.3 / 0.1	0.26	9.2 / 8.4	69.3
32B-6	11/7/13	27.8	192.3 / 62.4	0.42	5.1 / 3.8	5.4	15.6 / 0.6	<MDL	38.7 / 35.3	34.4
	11/18/13	10.7	88.0 / 28.5	0.28	2.1 / 1.7	4.3	5.3 / 0.2	0.13	17.2 / 15.7	35.9
	12/12/13	204.0	983.9 / 319.2	0.22	33.3 / 20.9	11.8	139.0 / 5.4	0.11	209.4 / 191.2	277.0
	2/18/14	15.9	121.7 / 39.5	0.40	3.0 / 2.4	5.2	8.3 / 0.3	0.11	24.1 / 22.0	42.0
	4/17/14	17.8	133.5 / 43.3	0.25	3.3 / 2.6	4.6	9.5 / 0.4	0.16	26.5 / 24.2	36.0
32B-78	11/7/13	53.5	328.8 / 106.6	6.12	9.4 / 6.7	7.7	32.5 / 1.3	0.10	67.4 / 61.5	19.6
	11/18/13	18.6	138.4 / 44.9	16.10	3.5 / 2.7	8.3	9.9 / 0.4	0.12	27.5 / 25.1	21.3
	12/12/13	55.0	336.3 / 109.1	20.30	9.7 / 6.8	15.6	33.5 / 1.3	0.48	69.0 / 63.0	87.7
	2/18/14	35.1	232.8 / 75.5	10.80	6.3 / 4.6	7.0	20.3 / 0.8	<MDL	47.1 / 43.0	25.4
	4/17/14	41.1	264.9 / 85.9	4.45	7.4 / 5.3	5.3	24.2 / 0.9	0.10	53.9 / 49.2	21.9
32B-326	11/7/13	32.0	215.8 / 70.0	0.83	5.8 / 4.3	5.8	18.3 / 0.7	<MDL	43.6 / 39.8	32.3
	11/18/13	12.8	101.9 / 33.1	2.94	2.5 / 2.0	3.9	6.5 / 0.3	0.11	20.1 / 18.3	23.5
	12/12/13	96.5	533.0 / 172.9	10.00	16.5 / 11.0	12.0	62.1 / 2.4	0.19	111.0 / 101.4	119.0
	2/18/14	26.8	186.6 / 60.5	3.58	4.9 / 3.7	4.9	15.0 / 0.6	<MDL	37.5 / 34.2	40.0
	4/17/14	39.2	254.8 / 82.7	4.25	7.0 / 5.1	5.5	23.0 / 0.9	0.11	51.8 / 47.3	22.2
32	11/7/13	37.8	247.4 / 80.2	1.22	6.8 / 4.9	5.8	22.1 / 0.9	<MDL	50.2 / 45.8	20.5
	11/18/13	20.2	148.1 / 48.0	3.22	3.8 / 2.9	4.2	10.9 / 0.4	0.10	29.5 / 27.0	10.4
	12/12/13	196.0	952.2 / 308.9	1.38	32.1 / 20.2	7.1	133.3 / 5.2	<MDL	202.4 / 184.8	23.6
	2/18/14	29.8	203.6 / 66.0	2.93	5.4 / 4.0	4.0	16.9 / 0.7	<MDL	41.0 / 37.5	21.1
	4/17/14	40.8	263.3 / 85.4	3.93	7.3 / 5.3	5.6	24.0 / 0.9	<MDL	53.5 / 48.9	12.7

4.0. DISCUSSION & RECOMMENDATIONS

The 2013-14 monitoring effort was designed to further isolate sub-drainages flowing into the main trunk lines in basins 10 and 32b in order to better determine areas of high concentrations of dCu and dZn (King County, 2013). In addition, high fecal coliform bacteria at the downstream station in basin 10 was investigated.

Monitoring focused on answering the following questions:

1) What sub-drainage basins in the town center area, and further upstream, are contributing the most dCu and dZn to basin 10?
2) What is the source of the high fecal coliform bacteria and the human source tracking *Bacteroides spp.* measured at the mouth of basin 10?
3) What segments of basin 32b are contributing the most dCu and dZn?
4) Are landscaping practices (e.g., pesticide/herbicide or fertilizer applications) contributing to the high dCu and dZn in basins 10 and 32b?

Concentrations of dCu and dZn frequently exceeded state water quality criteria in both basins. The results are summarized below.

<u>Basin 10</u>

- <u>Water Quality Exceedances</u>: In basin 10, sites 10-207, 10-108, 10-648, and 10C routinely exceeded copper and zinc standards while sites 10 and 10-394 had no exceedances (Table 5).
- <u>Dissolved Copper</u>: Collectively, dCu concentrations at the four town center sites were significantly greater than the upstream sites ($\rho = 0.017$) but not significantly different than concentrations measured at the downstream site, station 10 ($\rho = 0.118$). Station 10-108 had relatively low dCu concentrations compared with the other town center sites (Figure 22).
- <u>Dissolved Zinc</u>: Collectively, dZn concentrations at the four town center sites were significantly greater than the upstream stations ($\rho = 0.002$) and the downstream site, station 10 (C). Station 10-108 had significantly higher dZn concentrations compared with the other basin 10 sites ($\rho = 0.001$) (Figure 22).
- <u>Fecal coliform bacteria</u>: concentrations did not show a consistent pattern of being higher at either of the two stations monitored in the lower portion of basin 10. However, on two occasions, October 2, 2013 and May 8, 2014, high fecal coliform bacteria measured at station 10 was associated with high *Bacteroides* – the bacteria specific to human intestinal tract (Figure 23).

<u>Basin 32b</u>

- <u>Water Quality Exceedance</u>: In basin 32b, all sites had at least one criteria exceedance for both copper and zinc except site 32 which just had a single copper exceedance. (Table 7).

- Dissolved Copper: dCu concentrations at station 32b-78, the catch basin where drainage from "The Lakes" combines with the main trunk line were significantly higher than the other stations monitored in basin 32b ($\rho = 0.034$). It also had the highest median dCu of all the sites in basin 32b (Figure 22).
- Dissolved Zinc: The highest median dZn concentrations were at 32b-329, downstream of the south end shopping center (Figure 22). Concentrations at this site also had the greatest variability as well.

Landscaping practices can contribute significant amounts of metals and nutrients to surface water; copper-based pesticides are one of the largest anthropogenic sources of dCu to the environment and fertilizers are a primary source of phosphorus in runoff (Ecology and King County 2011). Nutrient data collected as part of the 2013-14 monitoring effort did not identify any particular drainage consistently contributing higher nutrients than others. Therefore, fertilizing practices are not implicated at any particular site. The higher dCu at station 32b-78 may be the result of copper-based pesticides washing into the stormwater system from "The Lakes" subdivision, as discussed below. It is worth noting however, that samples were collected October through April and may have missed the period of heaviest pesticides and/or fertilizer applications in the region - which is typically April through May (USGS, 1999).

Major sources of copper in stormwater runoff are pesticides used on urban lawns and gardens, residential plumbing component leaching, brake pad abrasion, and roofing material leaching. Smaller releases of copper also occur following the use of copper compounds in fountains and spas as an algaecide and from chromated copper arsenate (CCA) and copper azole treated wood. Concentrations of dCu were relatively low in basin 32b compared with basin 10. However, due to low hardness in the basin the dissolved metals values often exceeded the WQS. Two stations in basin 32b (32b-6 and 32b-78) were sited to provide information on the relative contribution of dissolved metals and nutrients from "The Lakes" subdivision. Any significant increase between these two sites would implicate runoff from "The Lakes" as a main contributor. The dCu concentrations at station 32b-78 were statistically higher than the other stations monitored ($\rho = 0.034$) indicating that "The Lakes" subdivision is a significant contributor of dCu in the basin. Catch basin sampling sites in the town center area of basin 10 had the highest dCu and dZn concentrations and the most consistent exceedances of the state water quality standards.

Major sources of zinc potentially include roofing material leaching, particularly those with galvanized components, and vehicle tire abrasion. While the median dZn concentration at the south end shopping center were higher than other sites in the basin, there was a great deal of variability at this site and therefore this site did not show a consistent pattern of being higher than the others in the basin. Station 10-108 in town center had significantly higher dZn than other stations in basin 10 sites ($\rho = 0.001$).

This information builds on earlier results that identified the town center as having high dissolved metals concentrations (King County, 2014). The sampling sites added in 2013 were successful in isolating the sub-drainages coming from each of the four sections of the intersection.

4.1 Next Steps

Because the concentrations of dCu were significantly greater in the specific town center drainages, it is recommended that future monitoring efforts be focused in this area. The next steps include another round of monitoring in basin 10 with flow gages installed in the town center area. This will provide information necessary for the preliminary design of retrofits to remove a portion of these metals from these sub-drainages before they connect with the trunk line. Retrofitting stormwater systems so runoff is diverted to rain gardens, vegetative filter strips, biofiltration swales or permeable pavements are potential options to reduce flows and provide some attenuation for contaminants. Small footprint biofiltration systems are particularly well suited for highly developed urban area like basin 10. The following actions are proposed.

<u>2015 Monitoring</u>:

1) Continue to monitor for dissolved copper and zinc at five of the stations in basin 10 previously sampled (stations 10, 10-108, 10C, 10-648, 10-366). These locations have a history of water quality standard exceedances and thus storm sampling for hardness, dissolved metal (copper, zinc, chromium and lead), TSS, and nutrients is proposed. Representative storms will be sampled during five rain events, preferably sampling at least one wet weather event per quarter to document any seasonal patterns in the basin.
2) Sample for fecal coliform and human source tracing qPCR analysis at two downstream sites (10 and 10C). The more specific qPCR human marker currently used by the County laboratory combined with the fecal bacteria analysis will help determine if the high bacteria counts at station 10 are from a human source.
3) Include volatile organics and total petroleum hydrocarbons (TPH) in the first monitoring event because the city is concerned about nearby groundwater contamination from former drycleaners and gas stations in the town center leaking into the stormwater system (personal communication, Nov.2014). If there is offsite migration of contaminants into the stormwater pipes we would disseminate the information to prompt Ecology or the liable parties to revise their cleanup plans before planning stormwater retrofits in the town center area.
4) Add continuous flow monitoring to gain a better understanding of the conditions contributing to these water quality exceedances. The dissolved copper and zinc storm concentration data will then be combined with the flow monitoring to estimate current pollutant loadings to downstream receiving waters from each sub-drainage basin.
5) Concentrations of dissolved copper and zinc, along with the flow and loading estimates will be used to quantitatively describe the magnitude of the water quality problems associated with the town center area runoff.

Predesign and Grant Writing

In recognition that local governments need funding to fix existing urban stormwater problems, Ecology developed the Local Government Stormwater Grants Program in 2007. These funds support stormwater planning efforts that are required through the NPDES Phase II permitting. In addition to planning, specific retrofiting projects can also be funded through this program.

Once the magnitude of the stormwater pollutant loads and runoff volumes have been estimated, design alternatives to remedy all or a portion of these problems can be developed. Approximately 15-20% of the next two year budget (2015-2016) will be used for preliminary design and cost estimates for one or more treatment technologies to remedy the stormwater criteria exceedances, reduce loadings, and address stormwater flows.

Opportunities to apply for significant stormwater retrofit funding will likely be available again in the later summer of 2016. A portion of the 2015-2016 budget will be used with the predesign information to develop retrofit grant applications. If awarded, the retrofits would likely be constructed in the 2017-2018 time-frame if adequate funding is available.

The overall goal of the 2015-16 effort is to remedy a substantial defined portion of the stormwater quality exceedances and/or the loadings of dissolved metals and fecal coliforms to downstream waters in basin 10 through additional focused monitoring and assistance to the city in applying for an Ecology retrofit grant.

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Appendix A
Data Reports

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King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCERISL10				Locator:	MERCER10C				Locator:	MERCER10-366			
	Descrip:	SE 22ND ST, NEAR M				Descrip:	BASIN 10 @ 27TH NE				Descrip:	CATCHBASIN ON SE C			
	Sample:	L58660-1				Sample:	L58660-2				Sample:	L58660-3			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	10/2/13 13:42				ColDate:	10/2/13 13:07				ColDate:	10/2/13 13:22			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	3.2		1	2	mg/L	6.8		1	2	mg/L	38		5	10	mg/L
CV SM4500-N-C															
Total Nitrogen	0.581		0.05	0.1	mg/L	0.65		0.05	0.1	mg/L	1.5		0.25	0.5	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.302		0.01	0.04	mg/L	0.298		0.01	0.04	mg/L	0.288		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.063		0.005	0.01	mg/L	0.0868		0.005	0.01	mg/L	0.156		0.025	0.05	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.046		5E-04	0.01	mg/L	0.0597		5E-04	0.01	mg/L	0.0183		5E-04	0.01	mg/L
ES HYDROLAB															
Conductivity, Field	91.3		0.5	10	umhos/cm	62		0.5	10	umhos/cm	47.9		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	89.1				%	88.7				%	87.4				%
Dissolved Oxygen, Field	9.1		0.5	1	mg/L	9		0.5	1	mg/L	9		0.5	1	mg/L
pH, Field	7.31				pH	7.36				pH	7.29				pH
Sample Temperature, Field	14.64				deg C	14.97				deg C	13.75				deg C
ES NONE															
Discharge Rate of Stream	1.8		0.05	0.1	cfs										
Field Personnel	JP				none	JP				none	JP				none
Sample Function															
Sample Information	Not up very much, not very turbid, not raining				none	Surfactant-foam and odor - brownish tinge				none	dirty, turbid, slight sheen				none
Turbidity, Field	7.3		0.5	2	NTU	10.7		0.5	2	NTU	96.8		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides	710000				cell/100ml	517				cell/100ml					
MC SM 9222D 20TH															
Fecal Coliform	32000				CFU/100ml	7300				CFU/100ml					
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	9310		50	50	ug/L	7250		50	50	ug/L	6550		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.57	<RDL	0.2	1	ug/L	0.49	<RDL	0.2	1	ug/L	1.21		0.2	1	ug/L
Copper, Dissolved, ICP-MS	4.13		0.4	2	ug/L	15.1		0.4	2	ug/L	10.2		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.17	<RDL	0.1	0.5	ug/L	0.38	<RDL	0.1	0.5	ug/L	0.799		0.1	0.5	ug/L
Magnesium, Total, ICP-MS	3490		50	50	ug/L	1640		50	50	ug/L	903		50	50	ug/L

King County Environmental Lab Analytical Report

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	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR							
	ColDate:	10/2/13 13:42					ColDate:	10/2/13 13:07					ColDate:	10/2/13 13:22							
	TimeSpan:						TimeSpan:						TimeSpan:								
	TotalSolid:						TotalSolid:						TotalSolid:								
	ClientLoc:						ClientLoc:						ClientLoc:								
	SampDepth:						SampDepth:						SampDepth:								
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**								
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**						
Zinc, Dissolved, ICP-MS	20.8		0.5	2.5	ug/L	47.3		0.5	2.5	ug/L	36.8		0.5	2.5	ug/L						
MT EPA 200.8/SW846 6020A*SM2340B																					
Hardness, Calc	37.6		0.331	0.33	ng CaCO3/L	24.8		0.331	0.33	ng CaCO3/L	20.1		0.331	0.33	ng CaCO3/L						
OR SW846 3511*SW846 8270D LVI																					
Caffeine	1.2	<RDL,H	0.086	1.43	ug/L	0.22	<RDL,H	0.086	1.43	ug/L											
Cholesterol		<MDL,H	0.86	14.3	ug/L		<MDL,H	0.86	14.3	ug/L											
Coprostanol		<MDL,H	0.86	14.3	ug/L		<MDL,H	0.86	14.3	ug/L											
Triclosan		<MDL,H	0.29	2.86	ug/L		<MDL,H	0.29	2.86	ug/L											

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER10-648				Locator:	MERCER10-108				Locator:	MERCER10-394			
	Descrip:	CATCHBASIN ON SW C				Descrip:	CATCHBASIN ON NW C				Descrip:	CATCHBASIN ON THE			
	Sample:	L58660-4				Sample:	L58660-5				Sample:	L58660-6			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	10/2/13 12:25				ColDate:	10/2/13 12:46				ColDate:	10/2/13 11:55			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	60		5	10	mg/L	10.4		2	4	mg/L	6		2	4	mg/L
CV SM4500-N-C															
Total Nitrogen	1.76		0.25	0.5	mg/L	0.48		0.05	0.1	mg/L	0.497		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.195		0.01	0.04	mg/L	0.086		0.01	0.04	mg/L	0.149		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.248		0.025	0.05	mg/L	0.0482		0.005	0.01	mg/L	0.0636		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0147		5E-04	0.005	mg/L	0.0108		5E-04	0.01	mg/L	0.0423		5E-04	0.01	mg/L
ES HYDROLAB															
Conductivity, Field	38.1		0.5	10	umhos/cm	33.5		0.5	10	umhos/cm	62.6		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	87.2				%	93.1				%	88.7				%
Dissolved Oxygen, Field	9.1		0.5	1	mg/L	9.5		0.5	1	mg/L	9.1		0.5	1	mg/L
pH, Field	7.29				pH	7.05				pH	7.04				pH
Sample Temperature, Field	13.54				deg C	14.73				deg C	14.1				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	JP				none	JP				none	JP				none
Sample Function															
Sample Information	turbid, dirty, oil sheen, shallow, 4 orthoP filters				none	a little turbid, good flow, 2 orthoP filters				none	no notes				none
Turbidity, Field	101		0.5	2	NTU	13.6		0.5	2	NTU	11.3		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	5960		50	50	ug/L	3650		50	50	ug/L	6740		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.91	<RDL	0.2	1	ug/L	0.46	<RDL	0.2	1	ug/L	0.55	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	9.18		0.4	2	ug/L	4.66		0.4	2	ug/L	3.64		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.617		0.1	0.5	ug/L	0.646		0.1	0.5	ug/L	0.16	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	1070		50	50	ug/L	884		50	50	ug/L	2300		50	50	ug/L

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180							
	Locator:	MERCER10-648					Locator:	MERCER10-108					Locator:	MERCER10-394							
	Descrip:	CATCHBASIN ON SW C					Descrip:	CATCHBASIN ON NW C					Descrip:	CATCHBASIN ON THE							
	Sample:	L58660-4					Sample:	L58660-5					Sample:	L58660-6							
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR							
	ColDate:	10/2/13 12:25					ColDate:	10/2/13 12:46					ColDate:	10/2/13 11:55							
	TimeSpan:						TimeSpan:						TimeSpan:								
	TotalSolid:						TotalSolid:						TotalSolid:								
	ClientLoc:						ClientLoc:						ClientLoc:								
	SampDepth:						SampDepth:						SampDepth:								
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**								
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**				
Zinc, Dissolved, ICP-MS	22.6		0.5	2.5	ug/L		176		0.5	2.5	ug/L		20.8		0.5	2.5	ug/L				
MT EPA 200.8/SW846 6020A*SM2340E																					
Hardness, Calc	19.3		0.331	0.331	ng CaCO3/L		12.7		0.331	0.33	ng CaCO3/L		26.3		0.331	0.33	ng CaCO3/L				
OR SW846 3511*SW846 8270D LVI																					
Caffeine																					
Cholesterol																					
Coprostanol																					
Triclosan																					

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180			
	Locator:	MERCER10-207					Locator:	FFBLANK			
	Descrip:	COLLECTS FLOWS FRO					Descrip:	FIELD FILTER BLANK			
	Sample:	L58660-7					Sample:	L58660-14			
	Matrix:	LG STORM WTR					Matrix:	LM FILTER WTR			
	ColDate:	10/2/13 11:15					ColDate:	10/2/13 10:50			
	TimeSpan:						TimeSpan:				
	TotalSolid:						TotalSolid:				
	ClientLoc:						ClientLoc:				
	SampDepth:						SampDepth:				
	WET Weight Basis						**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D											
Total Suspended Solids	8.4		1	2	mg/L						
CV SM4500-N-C											
Total Nitrogen	0.603		0.05	0.1	mg/L						
CV SM4500-NO3-F											
Nitrite + Nitrate Nitrogen	0.157		0.01	0.04	mg/L			<MDL	0.01	0.04	mg/L
CV SM4500-P-B,F											
Total Phosphorus	0.0647		0.005	0.01	mg/L						
CV SM4500-P-F											
Orthophosphate Phosphorus	0.0301		5E-04	0.01	mg/L			<MDL	5E-04	0.01	mg/L
ES HYDROLAB											
Conductivity, Field	37.7		0.5	10	umhos/cm						
Dissolved Oxygen Saturation, Field	96.9				%						
Dissolved Oxygen, Field	10.1		0.5	1	mg/L						
pH, Field	6.97				pH						
Sample Temperature, Field	13.78				deg C						
ES NONE											
Discharge Rate of Stream											
Field Personnel	JP				none						
Sample Function							FFB-Ortho				none
Sample Information	no notes				none		FFB-Ortho				none
Turbidity, Field	8.4		0.5	2	NTU						
MC MICRO SOP563VD											
Bacteroides											
MC SM 9222D 20TH											
Fecal Coliform											
MT EPA 200.8*SW846 6020A											
Calcium, Total, ICP-MS	3760		50	50	ug/L						
Chromium, Dissolved, ICP-MS	0.26	<RDL	0.2	1	ug/L						
Copper, Dissolved, ICP-MS	3.95		0.4	2	ug/L						
Lead, Dissolved, ICP-MS	0.21	<RDL	0.1	0.5	ug/L						
Magnesium, Total, ICP-MS	1280		50	50	ug/L						

King County Environmental Lab Analytical Report

Project:	421195-180	Project:	421195-180
Locator:	MERCER10-207	Locator:	FFBLANK
Descrip:	COLLECTS FLOWS FRO	Descrip:	FIELD FILTER BLANK
Sample:	L58660-7	Sample:	L58660-14
Matrix:	LG STORM WTR	Matrix:	LM FILTER WTR
ColDate:	10/2/13 11:15	ColDate:	10/2/13 10:50
TimeSpan:		TimeSpan:	
TotalSolid:		TotalSolid:	
ClientLoc:		ClientLoc:	
SampDepth:		SampDepth:	
WET Weight Basis		**WET Weight Basis**	

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
Zinc, Dissolved, ICP-MS	23.5		0.5	2.5	ug/L					
MT EPA 200.8/SW846 6020A*SM2340E										
Hardness, Calc	14.6		0.331	0.33	ng CaCO3/L					
OR SW846 3511*SW846 8270D LVI										
Caffeine										
Cholesterol										
Coprostanol										
Triclosan										

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180						
	Locator:	MERCERISL10					Locator:	MERCER10C					Locator:	MERCER10-366						
	Descrip:	SE 22ND ST, NEAR M					Descrip:	BASIN 10 @ 27TH NE					Descrip:	CATCHBASIN ON SE C						
	Sample:	L59046-1					Sample:	L59046-2					Sample:	L59046-3						
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR						
	ColDate:	11/7/13 13:35					ColDate:	11/7/13 8:10					ColDate:	11/7/13 9:05						
	TimeSpan:						TimeSpan:						TimeSpan:							
	TotalSolid:						TotalSolid:						TotalSolid:							
	ClientLoc:						ClientLoc:						ClientLoc:							
	SampDepth:						SampDepth:						SampDepth:							
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**							
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**			
CV SM2540-D																				
Total Suspended Solids	4.6		1	2	mg/L		14.2		1	2	mg/L		100		5	10	mg/L			
CV SM4500-N-C																				
Total Nitrogen	1.27		0.05	0.1	mg/L		0.832		0.05	0.1	mg/L		1.99		0.25	0.5	mg/L			
CV SM4500-NO3-F																				
Nitrite + Nitrate Nitrogen	0.744		0.01	0.04	mg/L		0.258		0.01	0.04	mg/L		0.0921		0.01	0.04	mg/L			
CV SM4500-P-B,F																				
Total Phosphorus	0.132		0.005	0.01	mg/L		0.143		0.005	0.01	mg/L		0.578		0.025	0.05	mg/L			
CV SM4500-P-F																				
Orthophosphate Phosphorus	0.0897		0.003	0.01	mg/L		0.093		0.003	0.01	mg/L		0.252		0.005	0.02	mg/L			
ES HYDROLAB																				
Conductivity, Field	135		0.5	10	umhos/cm		32.3		0.5	10	umhos/cm		45.9		0.5	10	umhos/cm			
Dissolved Oxygen Saturation, Field	91.8				%		93.9				%		81.1				%			
Dissolved Oxygen, Field	10.1		0.5	1	mg/L		10.4		0.5	1	mg/L		9.3		0.5	1	mg/L			
pH, Field	7.38				pH		6.99				pH		6.57				pH			
Sample Temperature, Field	11.71				deg C		11.15				deg C		10.09				deg C			
ES NONE																				
Discharge Rate of Stream	1.26		0.05	0.1	cfs															
Field Personnel	SH				none		SH				none		SH				none			
Sample Function																				
Turbidity, Field	11.8		0.5	2	NTU		13.6		0.5	2	NTU		67.7		0.5	2	NTU			
MC MICRO SOP563VD																				
Bacteroides	6750				cell/100ml		953				cell/100ml									
MC SM 9222D 20TH																				
Fecal Coliform	670				CFU/100ml		3500				CFU/100ml									
MT EPA 200.8*SW846 6020A																				
Calcium, Total, ICP-MS	12800		50	50	ug/L		4170		50	50	ug/L		6590		50	50	ug/L			
Chromium, Dissolved, ICP-MS	0.55	<RDL	0.2	1	ug/L		0.25	<RDL	0.2	1	ug/L		0.71	<RDL	0.2	1	ug/L			
Copper, Dissolved, ICP-MS	4.66		0.4	2	ug/L		7.89		0.4	2	ug/L		11		0.4	2	ug/L			
Lead, Dissolved, ICP-MS	0.21	<RDL	0.1	0.5	ug/L		0.37	<RDL	0.1	0.5	ug/L		0.33	<RDL	0.1	0.5	ug/L			
Magnesium, Total, ICP-MS	5620		50	50	ug/L		708		50	50	ug/L		1210		50	50	ug/L			
Zinc, Dissolved, ICP-MS	29.5		0.5	2.5	ug/L		57.6		0.5	2.5	ug/L		83.3		0.5	2.5	ug/L			

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180					
	Locator:	MERCERISL10					Locator:	MERCER10C					Locator:	MERCER10-366					
	Descrip:	SE 22ND ST, NEAR M					Descrip:	BASIN 10 @ 27TH NE					Descrip:	CATCHBASIN ON SE C					
	Sample:	L59046-1					Sample:	L59046-2					Sample:	L59046-3					
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					
	ColDate:	11/7/13 13:35					ColDate:	11/7/13 8:10					ColDate:	11/7/13 9:05					
	TimeSpan:						TimeSpan:						TimeSpan:						
	TotalSolid:						TotalSolid:						TotalSolid:						
	ClientLoc:						ClientLoc:						ClientLoc:						
	SampDepth:						SampDepth:						SampDepth:						
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**						
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**				
MT EPA 200.8/SW846 6020A*SM2340B																			
Hardness, Calc	55.1		0.331	0.33	ng CaCO3/L	13.3		0.331	0.33	ng CaCO3/L	21.4		0.331	0.33	ng CaCO3/L				
OR SW846 3511*SW846 8270D LVI																			
Caffeine	0.11	<RDL	0.086	1.43	ug/L	0.22	<RDL	0.086	1.43	ug/L									
Cholesterol		<MDL	2.8	14.3	ug/L		<MDL	2.8	14.3	ug/L									
Coprostanol		<MDL	2.5	14.3	ug/L		<MDL	2.5	14.3	ug/L									
Triclosan		<MDL	0.29	2.86	ug/L		<MDL	0.29	2.86	ug/L									

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180						
	Locator:	MERCER10-648					Locator:	MERCER10-108					Locator:	MERCER10-394						
	Descrip:	CATCHBASIN ON SW C					Descrip:	CATCHBASIN ON NW C					Descrip:	CATCHBASIN ON THE						
	Sample:	L59046-4					Sample:	L59046-5					Sample:	L59046-6						
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR						
	ColDate:	11/7/13 8:50					ColDate:	11/7/13 8:25					ColDate:	11/7/13 9:37						
	TimeSpan:						TimeSpan:						TimeSpan:							
	TotalSolid:						TotalSolid:						TotalSolid:							
	ClientLoc:						ClientLoc:						ClientLoc:							
	SampDepth:						SampDepth:						SampDepth:							
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**							
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**			
CV SM2540-D																				
Total Suspended Solids	176		2.5	5	mg/L		52		2	4	mg/L		33.2		2	4	mg/L			
CV SM4500-N-C																				
Total Nitrogen	1.45		0.05	0.1	mg/L		0.586		0.05	0.1	mg/L		1.08		0.05	0.1	mg/L			
CV SM4500-NO3-F																				
Nitrite + Nitrate Nitrogen	0.102		0.01	0.04	mg/L		0.0429		0.01	0.04	mg/L		0.361		0.01	0.04	mg/L			
CV SM4500-P-B,F																				
Total Phosphorus	0.3		0.005	0.01	mg/L		0.113		0.005	0.01	mg/L		0.211		0.005	0.01	mg/L			
CV SM4500-P-F																				
Orthophosphate Phosphorus	0.0486		5E-04	0.002	mg/L		0.0494		0.0005	0.002	mg/L		0.109		0.003	0.01	mg/L			
ES HYDROLAB																				
Conductivity, Field	51.7		0.5	10	umhos/cm		12.7		0.5	10	umhos/cm		61.5		0.5	10	umhos/cm			
Dissolved Oxygen Saturation, Field	67.3				%		93.9				%		91.9				%			
Dissolved Oxygen, Field	7.6		0.5	1	mg/L		10.7		0.5	1	mg/L		10.4		0.5	1	mg/L			
pH, Field	6.25				pH		6.71				pH		6.93				pH			
Sample Temperature, Field	10.38				deg C		10.15				deg C		10.62				deg C			
ES NONE																				
Discharge Rate of Stream																				
Field Personnel	SH				none		SH				none		SH				none			
Sample Function																				
Turbidity, Field	67		0.5	2	NTU		20.8		0.5	2	NTU		20		0.5	2	NTU			
MC MICRO SOP563VD																				
Bacteroides																				
MC SM 9222D 20TH																				
Fecal Coliform																				
MT EPA 200.8*SW846 6020A																				
Calcium, Total, ICP-MS	5170		50	50	ug/L		2390		50	50	ug/L		6160		50	50	ug/L			
Chromium, Dissolved, ICP-MS	0.48	<RDL	0.2	1	ug/L			<MDL	0.2	1	ug/L		0.52	<RDL	0.2	1	ug/L			
Copper, Dissolved, ICP-MS	5.53		0.4	2	ug/L		1.8	<RDL	0.4	2	ug/L		4.03		0.4	2	ug/L			
Lead, Dissolved, ICP-MS	0.24	<RDL	0.1	0.5	ug/L		0.31	<RDL	0.1	0.5	ug/L		0.23	<RDL	0.1	0.5	ug/L			
Magnesium, Total, ICP-MS	1550		50	50	ug/L		328		50	50	ug/L		2170		50	50	ug/L			
Zinc, Dissolved, ICP-MS	30.4		0.5	2.5	ug/L		61.2		0.5	2.5	ug/L		33.3		0.5	2.5	ug/L			

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180							
	Locator:	MERCER10-648					Locator:	MERCER10-108					Locator:	MERCER10-394							
	Descrip:	CATCHBASIN ON SW C					Descrip:	CATCHBASIN ON NW C					Descrip:	CATCHBASIN ON THE							
	Sample:	L59046-4					Sample:	L59046-5					Sample:	L59046-6							
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR							
	ColDate:	11/7/13 8:50					ColDate:	11/7/13 8:25					ColDate:	11/7/13 9:37							
	TimeSpan:						TimeSpan:						TimeSpan:								
	TotalSolid:						TotalSolid:						TotalSolid:								
	ClientLoc:						ClientLoc:						ClientLoc:								
	SampDepth:						SampDepth:						SampDepth:								
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**								
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**				
MT EPA 200.8/SW846 6020A*SM2340E																					
Hardness, Calc	19.3		0.331	0.331	ng CaCO3/L		7.32		0.331	0.331	ng CaCO3/L		24.3		0.331	0.33	ng CaCO3/L				
OR SW846 3511*SW846 8270D LVI																					
Caffeine																					
Cholesterol																					
Coprostanol																					
Triclosan																					

King County Environmental Lab Analytical Report

Project:	421195-180	421195-180	421195-180
Locator:	MERCER10-207	MERCERISL32	MERCER32B-326
Descrip:	COLLECTS FLOWS FRO	CREEK NEAR HOLLYHI	CATCHBASIN (ON SID
Sample:	L59046-7	L59046-8	L59046-9
Matrix:	LG STORM WTR	LG STORM WTR	LG STORM WTR
ColDate:	11/7/13 9:56	11/7/13 12:52	11/7/13 12:31
TimeSpan:			
TotalSolid:			
ClientLoc:			
SampDepth:			
	WET Weight Basis	**WET Weight Basis**	**WET Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
CV SM2540-D															
Total Suspended Solids	10.2		1	2	mg/L	12.5		0.6	1.3	mg/L	4.6		1	2	mg/L
CV SM4500-N-C															
Total Nitrogen	0.526		0.05	0.1	mg/L	1.74		0.05	0.1	mg/L	1.74		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.102		0.01	0.04	mg/L	1.26		0.01	0.04	mg/L	1.03		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.114		0.005	0.01	mg/L	0.0769		0.005	0.01	mg/L	0.072		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0804		0.003	0.01	mg/L	0.0428		0.0005	0.002	mg/L	0.0406		0.0005	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	30.7		0.5	10	umhos/cm	91.5		0.5	10	umhos/cm	80.1		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	92.5				%	92.6				%	91.8				%
Dissolved Oxygen, Field	10.4		0.5	1	mg/L	10.5		0.5	1	mg/L	10.4		0.5	1	mg/L
pH, Field	6.87				pH	7.35				pH	6.76				pH
Sample Temperature, Field	10.63				deg C	10.21				deg C	10.19				deg C
ES NONE															
Discharge Rate of Stream						1.96		0.05	0.1	cfs					
Field Personnel	SH				none	SH				none	SH				none
Sample Function															
Turbidity, Field	18		0.5	2	NTU	10.4		0.5	2	NTU	8		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	3250		50	50	ug/L	10000		50	50	ug/L	9470		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.31	<RDL	0.2	1	ug/L	1.22		0.2	1	ug/L	0.83	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	4.43		0.4	2	ug/L	5.76		0.4	2	ug/L	5.83		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.17	<RDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	937		50	50	ug/L	3090		50	50	ug/L	2030		50	50	ug/L
Zinc, Dissolved, ICP-MS	29.4		0.5	2.5	ug/L	20.5		0.5	2.5	ug/L	32.3		0.5	2.5	ug/L

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180					
	Locator:	MERCER10-207					Locator:	MERCERISL32					Locator:	MERCER32B-326					
	Descrip:	COLLECTS FLOWS FRO					Descrip:	CREEK NEAR HOLLYHI					Descrip:	CATCHBASIN (ON SID					
	Sample:	L59046-7					Sample:	L59046-8					Sample:	L59046-9					
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					
	ColDate:	11/7/13 9:56					ColDate:	11/7/13 12:52					ColDate:	11/7/13 12:31					
	TimeSpan:						TimeSpan:						TimeSpan:						
	TotalSolid:						TotalSolid:						TotalSolid:						
	ClientLoc:						ClientLoc:						ClientLoc:						
	SampDepth:						SampDepth:						SampDepth:						
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**						
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**				
MT EPA 200.8/SW846 6020A*SM2340E																			
Hardness, Calc	12		0.331	0.33	ng CaCO3/L	37.8		0.331	0.331	ng CaCO3/L	32		0.331	0.331	ng CaCO3/L				
OR SW846 3511*SW846 8270D LVI																			
Caffeine																			
Cholesterol																			
Coprostanol																			
Triclosan																			

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180			
	Locator:	MERCER32B-78					Locator:	MERCER32B-6					Locator:	MERCER32B-83			
	Descrip:	DRAINAGE FROM THE					Descrip:	CATCHBASIN (ON SID					Descrip:	EASTSIDE OF 84TH A			
	Sample:	L59046-10					Sample:	L59046-11					Sample:	L59046-12			
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR			
	ColDate:	11/7/13 12:02					ColDate:	11/7/13 11:44					ColDate:	11/7/13 11:20			
	TimeSpan:						TimeSpan:						TimeSpan:				
	TotalSolid:						TotalSolid:						TotalSolid:				
	ClientLoc:						ClientLoc:						ClientLoc:				
	SampDepth:						SampDepth:						SampDepth:				
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	4.6		1	2	mg/L	17.3		0.7	1.3	mg/L	1.75		0.6	1.3	mg/L
CV SM4500-N-C															
Total Nitrogen	1.58		0.05	0.1	mg/L	1.6		0.05	0.1	mg/L	0.191		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.978		0.01	0.04	mg/L	1.04		0.01	0.04	mg/L	0.0491		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.0775		0.005	0.01	mg/L	0.0818		0.005	0.01	mg/L	0.0418		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0431		5E-04	0.002	mg/L	0.0404		5E-04	0.002	mg/L	0.0306		5E-04	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	80.3		0.5	10	umhos/cm	60.3		0.5	10	umhos/cm	9.1	<RDL	0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	89.2				%	91.4				%	90.3				%
Dissolved Oxygen, Field	10.2		0.5	1	mg/L	10.4		0.5	1	mg/L	10.3		0.5	1	mg/L
pH, Field	6.6				pH	6.45				pH	6.48				pH
Sample Temperature, Field	9.91				deg C	9.79				deg C	9.48				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	SH				none	SH				none	SH				none
Sample Function															
Turbidity, Field	8.6		0.5	2	NTU	7.8		0.5	2	NTU	9.1		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	12000		50	50	ug/L	8700		50	50	ug/L	1040		50	50	ug/L
Chromium, Dissolved, ICP-MS	6.12		0.2	1	ug/L	0.42	<RDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	7.69		0.4	2	ug/L	5.41		0.4	2	ug/L	2.33		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.1	<RDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L	0.11	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	5720		50	50	ug/L	1470		50	50	ug/L	165		50	50	ug/L
Zinc, Dissolved, ICP-MS	19.6		0.5	2.5	ug/L	34.4		0.5	2.5	ug/L	57.5		0.5	2.5	ug/L

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	Project:	421195-180					Project:	421195-180					Project:	421195-180							
	Locator:	MERCER32B-78					Locator:	MERCER32B-6					Locator:	MERCER32B-83							
	Descrip:	DRAINAGE FROM THE					Descrip:	CATCHBASIN (ON SID					Descrip:	EASTSIDE OF 84TH A							
	Sample:	L59046-10					Sample:	L59046-11					Sample:	L59046-12							
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR							
	ColDate:	11/7/13 12:02					ColDate:	11/7/13 11:44					ColDate:	11/7/13 11:20							
	TimeSpan:						TimeSpan:						TimeSpan:								
	TotalSolid:						TotalSolid:						TotalSolid:								
	ClientLoc:						ClientLoc:						ClientLoc:								
	SampDepth:						SampDepth:						SampDepth:								
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**								
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**				
MT EPA 200.8/SW846 6020A*SM2340E																					
Hardness, Calc	53.5		0.331	0.331	ng CaCO3/L		27.8		0.331	0.331	ng CaCO3/L		3.28		0.331	0.331	ıg CaCO3/L				
OR SW846 3511*SW846 8270D LVI																					
Caffeine																					
Cholesterol																					
Coprostanol																					
Triclosan																					

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180			
	Locator:	MERCER32B-329					Locator:	FFBLANK			
	Descrip:	DRAINAGE FROM SOUT					Descrip:	FIELD FILTER BLANK			
	Sample:	L59046-13					Sample:	L59046-14			
	Matrix:	LG STORM WTR					Matrix:	LM FILTER WTR			
	ColDate:	11/7/13 10:52					ColDate:	11/7/13 8:00			
	TimeSpan:						TimeSpan:				
	TotalSolid:						TotalSolid:				
	ClientLoc:						ClientLoc:				
	SampDepth:						SampDepth:				
	WET Weight Basis						**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D											
Total Suspended Solids	99		2.5	5	mg/L						
CV SM4500-N-C											
Total Nitrogen	1.2		0.05	0.1	mg/L						
CV SM4500-NO3-F											
Nitrite + Nitrate Nitrogen	0.304		0.01	0.04	mg/L			<MDL	0.01	0.04	mg/L
CV SM4500-P-B,F											
Total Phosphorus	0.331		0.005	0.01	mg/L						
CV SM4500-P-F											
Orthophosphate Phosphorus	0.15		0.005	0.02	mg/L		0.00083	<RDL	0.0005	0.002	mg/L
ES HYDROLAB											
Conductivity, Field	320		0.5	10	umhos/cm						
Dissolved Oxygen Saturation, Field	59.8				%						
Dissolved Oxygen, Field	6.5		0.5	1	mg/L						
pH, Field	7.61				pH						
Sample Temperature, Field	12.15				deg C						
ES NONE											
Discharge Rate of Stream											
Field Personnel	SH				none						
Sample Function							Field filter blank for dissolved nutrients				none
Turbidity, Field	41.5		0.5	2	NTU						
MC MICRO SOP563VD											
Bacteroides											
MC SM 9222D 20TH											
Fecal Coliform											
MT EPA 200.8*SW846 6020A											
Calcium, Total, ICP-MS	50000		50	50	ug/L						
Chromium, Dissolved, ICP-MS		<MDL	0.2	1	ug/L						
Copper, Dissolved, ICP-MS	3.99		0.4	2	ug/L						
Lead, Dissolved, ICP-MS		<MDL	0.1	0.5	ug/L						
Magnesium, Total, ICP-MS	1540		50	50	ug/L						
Zinc, Dissolved, ICP-MS	3.14		0.5	2.5	ug/L						

King County Environmental Lab Analytical Report

Project:	421195-180	Project:	421195-180
Locator:	MERCER32B-329	Locator:	FFBLANK
Descrip:	DRAINAGE FROM SOUT	Descrip:	FIELD FILTER BLANK
Sample:	L59046-13	Sample:	L59046-14
Matrix:	LG STORM WTR	Matrix:	LM FILTER WTR
ColDate:	11/7/13 10:52	ColDate:	11/7/13 8:00
TimeSpan:		TimeSpan:	
TotalSolid:		TotalSolid:	
ClientLoc:		ClientLoc:	
SampDepth:		SampDepth:	
WET Weight Basis		**WET Weight Basis**	

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
MT EPA 200.8/SW846 6020A*SM2340E										
Hardness, Calc	131		0.331	0.33	ng CaCO3/L					
OR SW846 3511*SW846 8270D LVI										
Caffeine										
Cholesterol										
Coprostanol										
Triclosan										

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCERISL32				Locator:	MERCER32B-326				Locator:	MERCER32B-78			
	Descrip:	CREEK NEAR HOLLYHI				Descrip:	CATCHBASIN (ON SID				Descrip:	DRAINAGE FROM THE			
	Sample:	L59212-1				Sample:	L59212-2				Sample:	L59212-3			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	11/18/13 13:15				ColDate:	11/18/13 12:50				ColDate:	11/18/13 12:25			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	20		2	4	mg/L	8		2	4	mg/L	5.87		0.7	1.3	mg/L
CV SM4500-N-C															
Total Nitrogen	0.627		0.05	0.1	mg/L	0.536		0.05	0.1	mg/L	0.954		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.235		0.01	0.04	mg/L	0.149		0.01	0.04	mg/L	0.425		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.103		0.005	0.01	mg/L	0.0731		0.005	0.01	mg/L	0.0932		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0472		5E-04	0.002	mg/L	0.036		5E-04	0.002	mg/L	0.0583		5E-04	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	49.8		0.5	10	umhos/cm	32.5		0.5	10	umhos/cm	66.3		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	92.6				%	94.4				%	87.6				%
Dissolved Oxygen, Field	10.3		0.5	1	mg/L	10.5		0.5	1	mg/L	9.3		0.5	1	mg/L
pH, Field	7.2				pH	6.65				pH	6.22				pH
Sample Temperature, Field	10.49				deg C	10.45				deg C	11.08				deg C
ES NONE															
Discharge Rate of Stream	2.65		0.05	0.1	cfs										
Field Personnel	SH				none	SH				none	SH				none
Sample Function															
Turbidity, Field	14.9		0.5	2	NTU	9.9		0.5	2	NTU	7.2		0.5	2	NTU
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	5020		50	50	ug/L	3560		50	50	ug/L	4330		50	50	ug/L
Chromium, Dissolved, ICP-MS	3.22		0.2	1	ug/L	2.94		0.2	1	ug/L	16.1		0.2	1	ug/L
Copper, Dissolved, ICP-MS	4.23		0.4	2	ug/L	3.86		0.4	2	ug/L	8.28		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.1	<RDL	0.1	0.5	ug/L	0.11	<RDL	0.1	0.5	ug/L	0.12	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	1860		50	50	ug/L	940		50	50	ug/L	1890		50	50	ug/L
Zinc, Dissolved, ICP-MS	10.4		0.5	2.5	ug/L	23.5		0.5	2.5	ug/L	21.3		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	20.2		0.331	0.331	mg CaCO3/L	12.8		0.331	0.331	mg CaCO3/L	18.6		0.331	0.331	mg CaCO3/L

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180			
	Locator:	MERCER32B-6					Locator:	MERCER32B-83					Locator:	MERCER32B-329			
	Descrip:	CATCHBASIN (ON SID					Descrip:	EASTSIDE OF 84TH A					Descrip:	DRAINAGE FROM SOUT			
	Sample:	L59212-4					Sample:	L59212-5					Sample:	L59212-6			
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR			
	ColDate:	11/18/13 12:05					ColDate:	11/18/13 11:50					ColDate:	11/18/13 11:28			
	TimeSpan:						TimeSpan:						TimeSpan:				
	TotalSolid:						TotalSolid:						TotalSolid:				
	ClientLoc:						ClientLoc:						ClientLoc:				
	SampDepth:						SampDepth:						SampDepth:				
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	5		1	2	mg/L	3.9		0.5	1	mg/L	6.2		1	2	mg/L
CV SM4500-N-C															
Total Nitrogen	0.497		0.05	0.1	mg/L	0.362		0.05	0.1	mg/L	0.318		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.162		0.01	0.04	mg/L	0.037	<RDL	0.01	0.04	mg/L	0.051		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.0578		0.005	0.01	mg/L	0.0662		0.005	0.01	mg/L	0.0579		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0278		5E-04	0.002	mg/L	0.0283		5E-04	0.002	mg/L	0.0283		5E-04	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	22.5		0.5	10	umhos/cm	11.8		0.5	10	umhos/cm	11.7		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	93.6				%	93.7				%	87.7				%
Dissolved Oxygen, Field	10.6		0.5	1	mg/L	10.5		0.5	1	mg/L	9.9		0.5	1	mg/L
pH, Field	6.58				pH	6.27				pH	6.44				pH
Sample Temperature, Field	10.13				deg C	10.07				deg C	10.07				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	SH				none	SH				none	SH				none
Sample Function															
Turbidity, Field	5.7		0.5	2	NTU	6.3		0.5	2	NTU	4.7		0.5	2	NTU
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	3260		50	50	ug/L	1420		50	50	ug/L	1440		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.28	<RDL	0.2	1	ug/L	0.29	<RDL	0.2	1	ug/L	0.2	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	4.29		0.4	2	ug/L	4.79		0.4	2	ug/L	5.81		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.13	<RDL	0.1	0.5	ug/L	0.16	<RDL	0.1	0.5	ug/L	0.22	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	619		50	50	ug/L	244		50	50	ug/L	247		50	50	ug/L
Zinc, Dissolved, ICP-MS	35.9		0.5	2.5	ug/L	56.4		0.5	2.5	ug/L	76.5		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM23															
Hardness, Calc	10.7		0.331	0.331	mg CaCO3/L	4.55		0.331	0.331	mg CaCO3/L	4.61		0.331	0.331	mg CaCO3/L

King County Environmental Lab Analytical Report

Project: 421195-180
Locator: FFBLANK
Descrip: FIELD FILTER BLANK
Sample: L59212-7
Matrix: LM FILTER WTR
ColDate: 11/18/13 14:20
TimeSpan:
TotalSolid:
ClientLoc:
SampDepth:
WET Weight Basis

Parameters	Value	Qual	MDL	RDL	Units
CV SM2540-D					
Total Suspended Solids					
CV SM4500-N-C					
Total Nitrogen					
CV SM4500-NO3-F					
Nitrite + Nitrate Nitrogen		<MDL	0.01	0.04	mg/L
CV SM4500-P-B,F					
Total Phosphorus					
CV SM4500-P-F					
Orthophosphate Phosphorus		<MDL	5E-04	0.002	mg/L
ES HYDROLAB					
Conductivity, Field					
Dissolved Oxygen Saturation, Field					
Dissolved Oxygen, Field					
pH, Field					
Sample Temperature, Field					
ES NONE					
Discharge Rate of Stream					
Field Personnel					
Sample Function	Field filter blank for dissolved nutrients				none
Turbidity, Field					
MT EPA 200.8*SW846 6020A					
Calcium, Total, ICP-MS					
Chromium, Dissolved, ICP-MS					
Copper, Dissolved, ICP-MS					
Lead, Dissolved, ICP-MS					
Magnesium, Total, ICP-MS					
Zinc, Dissolved, ICP-MS					
MT EPA 200.8/SW846 6020A*SM23					
Hardness, Calc					

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180			
	Locator:	MERCERISL10					Locator:	MERCER10C					Locator:	MERCER10-366			
	Descrip:	SE 22ND ST, NEAR M					Descrip:	BASIN 10 @ 27TH NE					Descrip:	CATCHBASIN ON SE C			
	Sample:	L59178-1					Sample:	L59178-2					Sample:	L59178-3			
	Matrix:	LG STORM WTR					Matrix:	LG STORM WTR					Matrix:	LG STORM WTR			
	ColDate:	12/12/13 16:46					ColDate:	12/12/13 16:03					ColDate:	12/12/13 16:25			
	TimeSpan:						TimeSpan:						TimeSpan:				
	TotalSolid:						TotalSolid:						TotalSolid:				
	ClientLoc:						ClientLoc:						ClientLoc:				
	SampDepth:						SampDepth:						SampDepth:				
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	9.6		2	4	mg/L	13.2		2	4	mg/L	34		10	20	mg/L
CV SM4500-N-C															
Total Nitrogen	1.11		0.05	0.1	mg/L	2		0.05	0.1	mg/L	3.06		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.224		0.01	0.04	mg/L	0.324		0.01	0.04	mg/L	0.333		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.12		0.005	0.01	mg/L	0.197		0.005	0.01	mg/L	0.216		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0901		0.0025	0.01	mg/L	0.171		0.0025	0.01	mg/L	0.0818		0.0025	0.01	mg/L
ES HYDROLAB															
Conductivity, Field	329		0.5	10	umhos/cm	134		0.5	10	umhos/cm	519		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	90.2				%	91.6				%	80.9				%
Dissolved Oxygen, Field	11.2		0.5	1	mg/L	11.4		0.5	1	mg/L	10.4		0.5	1	mg/L
pH, Field	7.13				pH	7.25				pH	6.91				pH
Sample Temperature, Field	6.24				deg C	6.37				deg C	4.95				deg C
ES NONE															
Discharge Rate of Stream	1.72		0.05	0.1	cfs										
Field Personnel	CB, SH				none	CB, SH				none	CB, SH				none
Sample Function															
Turbidity, Field	32.2		0.5	2	NTU	21.9		0.5	2	NTU	120		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides	184				cell/100ml	4994				cell/100ml					
MC SM 9222D 20TH															
Fecal Coliform	1100				CFU/100ml	6300				CFU/100ml					
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	13300		50	50	ug/L	9400		50	50	ug/L	22300		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.38	<RDL	0.2	1	ug/L	0.27	<RDL	0.2	1	ug/L	0.77	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	5.51		0.4	2	ug/L	19.6		0.4	2	ug/L	16.4		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.37	<RDL	0.1	0.5	ug/L	0.23	<RDL	0.1	0.5	ug/L	0.21	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	3130		50	50	ug/L	1410		50	50	ug/L	2380		50	50	ug/L
Zinc, Dissolved, ICP-MS	45.6		0.5	2.5	ug/L	72.9		0.5	2.5	ug/L	83.6		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	46.1		0.331	0.331	mg CaCO3/L	29.3		0.331	0.331	mg CaCO3/L	65.4		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
Caffeine	1.63		0.086	1.43	ug/L	1.2	<RDL	0.086	1.43	ug/L					
Cholesterol		<MDL	2.8	14.3	ug/L		<MDL	2.8	14.3	ug/L					
Coprostanol		<MDL	2.5	14.3	ug/L		<MDL	2.5	14.3	ug/L					
Triclosan		<MDL	0.29	2.86	ug/L		<MDL	0.29	2.86	ug/L					

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER10-648				Locator:	MERCER10-108				Locator:	MERCER10-394			
	Descrip:	CATCHBASIN ON SW C				Descrip:	CATCHBASIN ON NW C				Descrip:	CATCHBASIN ON THE			
	Sample:	L59178-4				Sample:	L59178-5				Sample:	L59178-6			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	12/12/13 16:17				ColDate:	12/12/13 16:09				ColDate:	12/12/13 15:49			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	101		5	10	mg/L	7.8		1	2	mg/L	34.8		2	4	mg/L
CV SM4500-N-C															
Total Nitrogen	3.23		0.05	0.1	mg/L	0.711		0.05	0.1	mg/L	1.35		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.349		0.01	0.04	mg/L	0.119		0.01	0.04	mg/L	0.167		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.269		0.005	0.01	mg/L	0.0767		0.005	0.01	mg/L	0.202		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0684		0.0025	0.01	mg/L	0.044		0.0025	0.01	mg/L	0.0882		0.0025	0.01	mg/L
ES HYDROLAB															
Conductivity, Field	482		0.5	10	umhos/cm	72.8		0.5	10	umhos/cm	327		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	72.1				%	92.5				%	96.7				%
Dissolved Oxygen, Field	9.4		0.5	1	mg/L	11.6		0.5	1	mg/L	12.1		0.5	1	mg/L
pH, Field	6.57				pH	6.87				pH	6.9				pH
Sample Temperature, Field	4.61				deg C	5.88				deg C	5.61				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	CB, SH				none	CB, SH				none	CB, SH				none
Sample Function															
Turbidity, Field	95.1		0.5	2	NTU	12.5		0.5	2	NTU	49.6		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	33700		50	50	ug/L	6010		50	50	ug/L	12200		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.66	<RDL	0.2	1	ug/L	0.25	<RDL	0.2	1	ug/L	0.39	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	16.4		0.4	2	ug/L	4.52		0.4	2	ug/L	5.34		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.2	<RDL	0.1	0.5	ug/L	0.39	<RDL	0.1	0.5	ug/L	0.28	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	3340		50	50	ug/L	1230		50	50	ug/L	2350		50	50	ug/L
Zinc, Dissolved, ICP-MS	87.8		0.5	2.5	ug/L	127		0.5	2.5	ug/L	49.7		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	97.9		0.331	0.331	mg CaCO3/L	20		0.331	0.331	mg CaCO3/L	40.2		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
Caffeine															
Cholesterol															
Coprostanol															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER10-207				Locator:	MERCERISL32				Locator:	MERCER32B-326			
	Descrip:	COLLECTS FLOWS FRO				Descrip:	CREEK NEAR HOLLYHI				Descrip:	CATCHBASIN (ON SID			
	Sample:	L59178-7				Sample:	L59178-8				Sample:	L59178-9			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	12/12/13 15:37				ColDate:	12/12/13 15:05				ColDate:	12/12/13 14:52			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	24		2	4	mg/L	31.8		1	2	mg/L	23		5	10	mg/L
CV SM4500-N-C															
Total Nitrogen	1.06		0.05	0.1	mg/L	2.97		0.05	0.1	mg/L	2.23		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.12		0.01	0.04	mg/L	0.671		0.01	0.04	mg/L	0.279		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.108		0.005	0.01	mg/L	0.142		0.005	0.01	mg/L	0.234		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.047		0.0025	0.01	mg/L	0.0647		0.0025	0.01	mg/L	0.12		0.0025	0.01	mg/L
ES HYDROLAB															
Conductivity, Field	61.3		0.5	10	umhos/cm	551		0.5	10	umhos/cm	312		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	85.6				%	90				%	92.4				%
Dissolved Oxygen, Field	10.9		0.5	1	mg/L	11.9		0.5	1	mg/L	11.7		0.5	1	mg/L
pH, Field	6.79				pH	7.34				pH	6.69				pH
Sample Temperature, Field	5.33				deg C	3.9				deg C	5.34				deg C
ES NONE															
Discharge Rate of Stream						1.59		0.05	0.1	cfs					
Field Personnel	CB, SH				none	CB, SH				none	CB, SH				none
Sample Function															
Turbidity, Field	20.6		0.5	2	NTU	44.7		0.5	2	NTU	32.2		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	5210		50	50	ug/L	51800		250	250	ug/L	32400		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.25	<RDL	0.2	1	ug/L	1.38		0.2	1	ug/L	10		0.2	1	ug/L
Copper, Dissolved, ICP-MS	5.48		0.4	2	ug/L	7.07		0.4	2	ug/L	12		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.27	<RDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L	0.19	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	1430		50	50	ug/L	16300		250	250	ug/L	3780		50	50	ug/L
Zinc, Dissolved, ICP-MS	39.7		0.5	2.5	ug/L	23.6		0.5	2.5	ug/L	119		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	18.9		0.331	0.331	mg CaCO3/L	196		1.65	1.65	mg CaCO3/L	96.5		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
Caffeine															
Cholesterol															
Coprostanol															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER32B-78				Locator:	MERCER32B-6				Locator:	MERCER32B-83			
	Descrip:	DRAINAGE FROM THE				Descrip:	CATCHBASIN (ON SID				Descrip:	EASTSIDE OF 84TH A			
	Sample:	L59178-10				Sample:	L59178-11				Sample:	L59178-12			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	12/12/13 14:37				ColDate:	12/12/13 14:30				ColDate:	12/12/13 14:14			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	18		5	10	mg/L	35		5	10	mg/L	64		5	10	mg/L
CV SM4500-N-C															
Total Nitrogen	1.84		0.05	0.1	mg/L	3.4		0.05	0.1	mg/L	3.12		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.202		0.01	0.04	mg/L	0.233		0.01	0.04	mg/L	0.432		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.224		0.005	0.01	mg/L	0.33		0.005	0.01	mg/L	0.272		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.101		0.0025	0.01	mg/L	0.203		0.0025	0.01	mg/L	0.124		0.0025	0.01	mg/L
ES HYDROLAB															
Conductivity, Field	260		0.5	10	umhos/cm	794		0.5	10	umhos/cm	501		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	86.1				%	87.9				%	88				%
Dissolved Oxygen, Field	11.5		0.5	1	mg/L	11.3		0.5	1	mg/L	11.6		0.5	1	mg/L
pH, Field	6.55				pH	6.47				pH	6.61				pH
Sample Temperature, Field	4.23				deg C	4.59				deg C	3.78				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	CB, SH				none	CB, SH				none	CB, SH				none
Sample Function															
Turbidity, Field	24.8		0.5	2	NTU	58.3		0.5	2	NTU	69.3		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	17300		50	50	ug/L	71300		250	250	ug/L	38200		50	50	ug/L
Chromium, Dissolved, ICP-MS	20.3		0.2	1	ug/L	0.22	<RDL	0.2	1	ug/L	0.24	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	15.6		0.4	2	ug/L	11.8		0.4	2	ug/L	9.6		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.48	<RDL	0.1	0.5	ug/L	0.11	<RDL	0.1	0.5	ug/L	0.13	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	2900		50	50	ug/L	6220		250	250	ug/L	4490		50	50	ug/L
Zinc, Dissolved, ICP-MS	87.7		0.5	2.5	ug/L	277		0.5	2.5	ug/L	107		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	55		0.331	0.331	mg CaCO3/L	204		1.65	1.65	mg CaCO3/L	114		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
Caffeine															
Cholesterol															
Coprostanol															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180			
	Locator:	MERCER32B-329					Locator:	FFBLANK			
	Descrip:	DRAINAGE FROM SOUT					Descrip:	FIELD FILTER BLANK			
	Sample:	L59178-13					Sample:	L59178-14			
	Matrix:	LG STORM WTR					Matrix:	LM FILTER WTR			
	ColDate:	12/12/13 14:03					ColDate:	12/12/13 13:37			
	TimeSpan:						TimeSpan:				
	TotalSolid:						TotalSolid:				
	ClientLoc:						ClientLoc:				
	SampDepth:						SampDepth:				
	WET Weight Basis						**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D											
Total Suspended Solids	6.13		0.7	1.3	mg/L						
CV SM4500-N-C											
Total Nitrogen	1.03		0.05	0.1	mg/L						
CV SM4500-NO3-F											
Nitrite + Nitrate Nitrogen	0.581		0.01	0.04	mg/L			<MDL	0.01	0.04	mg/L
CV SM4500-P-B,F											
Total Phosphorus	0.0992		0.005	0.01	mg/L						
CV SM4500-P-F											
Orthophosphate Phosphorus	0.0625		0.0025	0.01	mg/L		0.00591		0.0005	0.002	mg/L
ES HYDROLAB											
Conductivity, Field	52.7		0.5	10	umhos/cm						
Dissolved Oxygen Saturation, Field	57.8				%						
Dissolved Oxygen, Field	7		0.5	1	mg/L						
pH, Field	6.67				pH						
Sample Temperature, Field	7.38				deg C						
ES NONE											
Discharge Rate of Stream											
Field Personnel	CB, SH				none						
Sample Function							Nutrient field filter blank				none
Turbidity, Field	5		0.5	2	NTU						
MC MICRO SOP563VD											
Bacteroides											
MC SM 9222D 20TH											
Fecal Coliform											
MT EPA 200.8*SW846 6020A											
Calcium, Total, ICP-MS	9220		50	50	ug/L						
Chromium, Dissolved, ICP-MS	0.28	<RDL	0.2	1	ug/L						
Copper, Dissolved, ICP-MS	8.55		0.4	2	ug/L						
Lead, Dissolved, ICP-MS	0.16	<RDL	0.1	0.5	ug/L						
Magnesium, Total, ICP-MS	798		50	50	ug/L						
Zinc, Dissolved, ICP-MS	278		0.5	2.5	ug/L						
MT EPA 200.8/SW846 6020A*SM2340B											
Hardness, Calc	26.3		0.331	0.331	mg CaCO3/L						
OR SW846 3511*SW846 8270D LVI											
Caffeine											
Cholesterol											
Coprostanol											
Triclosan											

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCERISL10				Locator:	MERCER10C				Locator:	MERCER10-366			
	Descrip:	SE 22ND ST, NEAR M				Descrip:	BASIN 10 @ 27TH NE				Descrip:	CATCHBASIN ON SE C			
	Sample:	L59386-1				Sample:	L59386-2				Sample:	L59386-3			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	2/18/14 12:57				ColDate:	2/18/14 12:13				ColDate:	2/18/14 12:42			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	31		1.3	2.5	mg/L	8.13		0.6	1.3	mg/L	125		2.5	5	mg/L
CV SM4500-N-C															
Total Nitrogen	0.608		0.05	0.1	mg/L	0.572		0.05	0.1	mg/L	0.845		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.242		0.01	0.04	mg/L	0.297		0.01	0.04	mg/L	0.0419		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.0867		0.005	0.01	mg/L	0.0891		0.005	0.01	mg/L	0.142		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0312		0.0005	0.002	mg/L	0.0662		0.0005	0.002	mg/L	0.00748		0.0005	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	54.9		0.5	10	umhos/cm	50.4		0.5	10	umhos/cm	16		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	97.1				%	92.7				%	76.1				%
Dissolved Oxygen, Field	11.5		0.5	1	mg/L	10.7		0.5	1	mg/L	9.1		0.5	1	mg/L
pH, Field	7.12				pH	7.4				pH	6.34				pH
Sample Temperature, Field	7.64				deg C	8.71				deg C	7.58				deg C
ES NONE															
Discharge Rate of Stream	15.2		0.05	0.1	cfs										
Field Personnel	BB, SH				none	BB, SH				none	BB, SH				none
Sample Function															
Turbidity, Field	24.9		0.5	2	NTU	8.1		0.5	2	NTU	57		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides	1151				cell/100ml	992				cell/100ml					
MC SM 9222D 20TH															
Fecal Coliform	330				CFU/100ml	80				CFU/100ml					
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	5380		50	50	ug/L	6530		50	50	ug/L	3640		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.43	<RDL	0.2	1	ug/L	0.44	<RDL	0.2	1	ug/L	0.41	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	2.77		0.4	2	ug/L	10.2		0.4	2	ug/L	2.77		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.16	<RDL	0.1	0.5	ug/L	0.19	<RDL	0.1	0.5	ug/L	0.23	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	2290		50	50	ug/L	1170		50	50	ug/L	889		50	50	ug/L
Zinc, Dissolved, ICP-MS	19.6		0.5	2.5	ug/L	42.6		0.5	2.5	ug/L	13.7		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	22.9		0.331	0.331	mg CaCO3/L	21.1		0.331	0.331	mg CaCO3/L	12.7		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid		<MDL	11	14.3	ug/L		<MDL	11	14.3	ug/L					
Caffeine	0.29	<RDL	0.086	1.43	ug/L		<MDL	0.086	1.43	ug/L					
Cholesterol		<MDL	2.8	14.3	ug/L		<MDL	2.8	14.3	ug/L					
Coprostanol		<MDL	2.5	14.3	ug/L		<MDL	2.5	14.3	ug/L					
Hexadecanoic acid	12	<RDL	11	14.3	ug/L		<MDL	11	14.3	ug/L					
Octadecanoic acid		<MDL	11	14.3	ug/L		<MDL	11	14.3	ug/L					
Triclosan		<MDL	0.29	2.86	ug/L		<MDL	0.29	2.86	ug/L					

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER10-648				Locator:	MERCER10-108				Locator:	MERCER10-394			
	Descrip:	CATCHBASIN ON SW C				Descrip:	CATCHBASIN ON NW C				Descrip:	CATCHBASIN ON THE			
	Sample:	L59386-4				Sample:	L59386-5				Sample:	L59386-6			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	2/18/14 12:30				ColDate:	2/18/14 12:22				ColDate:	2/18/14 12:00			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	281		3.3	6.7	mg/L	23		1	2	mg/L	16.9		0.7	1.4	mg/L
CV SM4500-N-C															
Total Nitrogen	1.13		0.05	0.1	mg/L	0.372		0.05	0.1	mg/L	0.734		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.035	<RDL	0.01	0.04	mg/L	0.0573		0.01	0.04	mg/L	0.308		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.223		0.005	0.01	mg/L	0.0523		0.005	0.01	mg/L	0.109		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.00357		0.0005	0.002	mg/L	0.00746		0.0005	0.002	mg/L	0.0469		0.0005	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	17.2		0.5	10	umhos/cm	30.9		0.5	10	umhos/cm	99.5		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	51.7				%	92.4				%	94.6				%
Dissolved Oxygen, Field	6.2		0.5	1	mg/L	10.9		0.5	1	mg/L	11.3		0.5	1	mg/L
pH, Field	6.43				pH	7.17				pH	7.03				pH
Sample Temperature, Field	7.61				deg C	7.75				deg C	7.46				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	BB, SH				none	BB, SH				none	BB, SH				none
Sample Function															
Turbidity, Field	66.9		0.5	2	NTU	19.8		0.5	2	NTU	24.8		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	5540		50	50	ug/L	3830		50	50	ug/L	7910		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.41	<RDL	0.2	1	ug/L	0.51	<RDL	0.2	1	ug/L	0.53	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	3.29		0.4	2	ug/L	2.5		0.4	2	ug/L	3.41		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.25	<RDL	0.1	0.5	ug/L	0.14	<RDL	0.1	0.5	ug/L	0.18	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	1550		50	50	ug/L	1100		50	50	ug/L	3640		50	50	ug/L
Zinc, Dissolved, ICP-MS	23		0.5	2.5	ug/L	107		0.5	2.5	ug/L	17.4		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	20.2		0.331	0.331	mg CaCO3/L	14.1		0.331	0.331	mg CaCO3/L	34.7		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid															
Caffeine															
Cholesterol															
Coprostanol															
Hexadecanoic acid															
Octadecanoic acid															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER10-207				Locator:	MERCERISL32				Locator:	MERCER32B-326			
	Descrip:	COLLECTS FLOWS FRO				Descrip:	CREEK NEAR HOLLYHI				Descrip:	CATCHBASIN (ON SID			
	Sample:	L59386-7				Sample:	L59386-8				Sample:	L59386-9			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	2/18/14 11:50				ColDate:	2/18/14 10:53				ColDate:	2/18/14 10:40			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	5.5		0.5	1	mg/L	72.2		1.1	2.2	mg/L	16.2		0.8	1.7	mg/L
CV SM4500-N-C															
Total Nitrogen	0.357		0.05	0.1	mg/L	1.34		0.05	0.1	mg/L	1.23		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.149		0.01	0.04	mg/L	0.776		0.01	0.04	mg/L	0.787		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.0426		0.005	0.01	mg/L	0.105		0.005	0.01	mg/L	0.0658		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0153		0.0005	0.002	mg/L	0.0127		0.0005	0.002	mg/L	0.0153		0.0005	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	51.1		0.5	10	umhos/cm	72.5		0.5	10	umhos/cm	57.9		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	90.6				%	97.3				%	93.4				%
Dissolved Oxygen, Field	10.6		0.5	1	mg/L	11.8		0.5	1	mg/L	11.4		0.5	1	mg/L
pH, Field	6.93				pH	7.33				pH	6.64				pH
Sample Temperature, Field	7.95				deg C	6.82				deg C	6.47				deg C
ES NONE															
Discharge Rate of Stream						8.15		0.05	0.1	cfs					
Field Personnel	BB, SH				none	BB, SH				none	BB, SH				none
Sample Function															
Turbidity, Field	5.1		0.5	2	NTU	37.3		0.5	2	NTU	11.9		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	4850		50	50	ug/L	7390		50	50	ug/L	7190		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.35	<RDL	0.2	1	ug/L	2.93		0.2	1	ug/L	3.58		0.2	1	ug/L
Copper, Dissolved, ICP-MS	2	<RDL	0.4	2	ug/L	3.95		0.4	2	ug/L	4.86		0.4	2	ug/L
Lead, Dissolved, ICP-MS		<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	2080		50	50	ug/L	2770		50	50	ug/L	2150		50	50	ug/L
Zinc, Dissolved, ICP-MS	17		0.5	2.5	ug/L	21.1		0.5	2.5	ug/L	40		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	20.7		0.331	0.331	mg CaCO3/L	29.8		0.331	0.331	mg CaCO3/L	26.8		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid															
Caffeine															
Cholesterol															
Coprostanol															
Hexadecanoic acid															
Octadecanoic acid															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER32B-78				Locator:	MERCER32B-6				Locator:	MERCER32B-83			
	Descrip:	DRAINAGE FROM THE				Descrip:	CATCHBASIN (ON SID				Descrip:	EASTSIDE OF 84TH A			
	Sample:	L59386-10				Sample:	L59386-11				Sample:	L59386-12			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	2/18/14 10:23				ColDate:	2/18/14 10:15				ColDate:	2/18/14 9:55			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	15.5		0.8	1.7	mg/L	29.8		1	2	mg/L	18.4		1	2	mg/L
CV SM4500-N-C															
Total Nitrogen	1.1		0.05	0.1	mg/L	0.761		0.05	0.1	mg/L	0.506		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.508		0.01	0.04	mg/L	0.258		0.01	0.04	mg/L	0.0926		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.0819		0.005	0.01	mg/L	0.0757		0.005	0.01	mg/L	0.0598		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0236		0.0005	0.002	mg/L	0.0166		0.0005	0.002	mg/L	0.0109		0.0005	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	102		0.5	10	umhos/cm	31.1		0.5	10	umhos/cm	22.4		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	85.9				%	90.3				%	88.1				%
Dissolved Oxygen, Field	10.1		0.5	1	mg/L	11.2		0.5	1	mg/L	10.9		0.5	1	mg/L
pH, Field	6.25				pH	6.57				pH	6.35				pH
Sample Temperature, Field	7.44				deg C	5.97				deg C	5.99				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	BB, SH				none	BB, SH				none	BB, SH				none
Sample Function															
Turbidity, Field	21		0.5	2	NTU	21.5		0.5	2	NTU	20.5		0.5	2	NTU
MC MICRO SOP563VD															
Bacteroides															
MC SM 9222D 20TH															
Fecal Coliform															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	8280		50	50	ug/L	4690		50	50	ug/L	3120		50	50	ug/L
Chromium, Dissolved, ICP-MS	10.8		0.2	1	ug/L	0.4	<RDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	6.96		0.4	2	ug/L	5.22		0.4	2	ug/L	2.67		0.4	2	ug/L
Lead, Dissolved, ICP-MS		<MDL	0.1	0.5	ug/L	0.11	<RDL	0.1	0.5	ug/L	0.16	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	3500		50	50	ug/L	1010		50	50	ug/L	609		50	50	ug/L
Zinc, Dissolved, ICP-MS	25.4		0.5	2.5	ug/L	42		0.5	2.5	ug/L	81.1		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	35.1		0.331	0.331	mg CaCO3/L	15.9		0.331	0.331	mg CaCO3/L	10.3		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid															
Caffeine															
Cholesterol															
Coprostanol															
Hexadecanoic acid															
Octadecanoic acid															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180			
	Locator:	MERCER32B-329					Locator:	FFBLANK			
	Descrip:	DRAINAGE FROM SOUT					Descrip:	FIELD FILTER BLANK			
	Sample:	L59386-13					Sample:	L59386-14			
	Matrix:	LG STORM WTR					Matrix:	LM FILTER WTR			
	ColDate:	2/18/14 9:36					ColDate:	2/18/14 9:30			
	TimeSpan:						TimeSpan:				
	TotalSolid:						TotalSolid:				
	ClientLoc:						ClientLoc:				
	SampDepth:						SampDepth:				
	WET Weight Basis						**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**		**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D											
Total Suspended Solids	9.14		0.7	1.4	mg/L						
CV SM4500-N-C											
Total Nitrogen	0.523		0.05	0.1	mg/L						
CV SM4500-NO3-F											
Nitrite + Nitrate Nitrogen	0.169		0.01	0.04	mg/L			<MDL	0.01	0.04	mg/L
CV SM4500-P-B,F											
Total Phosphorus	0.0501		0.005	0.01	mg/L						
CV SM4500-P-F											
Orthophosphate Phosphorus	0.0157		0.0005	0.002	mg/L		0.0021		0.0005	0.002	mg/L
ES HYDROLAB											
Conductivity, Field	30.8		0.5	10	umhos/cm						
Dissolved Oxygen Saturation, Field	82.1				%						
Dissolved Oxygen, Field	10.1		0.5	1	mg/L						
pH, Field	6.34				pH						
Sample Temperature, Field	5.96				deg C						
ES NONE											
Discharge Rate of Stream											
Field Personnel	BB, SH				none						
Sample Function							Field filter blank for dissolved nutrients				none
Turbidity, Field	12		0.5	2	NTU						
MC MICRO SOP563VD											
Bacteroides											
MC SM 9222D 20TH											
Fecal Coliform											
MT EPA 200.8*SW846 6020A											
Calcium, Total, ICP-MS	3660		50	50	ug/L						
Chromium, Dissolved, ICP-MS	0.24	<RDL	0.2	1	ug/L						
Copper, Dissolved, ICP-MS	3.55		0.4	2	ug/L						
Lead, Dissolved, ICP-MS	0.12	<RDL	0.1	0.5	ug/L						
Magnesium, Total, ICP-MS	513		50	50	ug/L						
Zinc, Dissolved, ICP-MS	160		0.5	2.5	ug/L						
MT EPA 200.8/SW846 6020A*SM2340B											
Hardness, Calc	11.2		0.331	0.331	mg CaCO3/L						
OR SW846 3511*SW846 8270D LVI											
9-Octadecenoic acid											
Caffeine											
Cholesterol											
Coprostanol											
Hexadecanoic acid											
Octadecanoic acid											
Triclosan											

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCERISL10				Locator:	MERCER10C				Locator:	MERCER10-366			
	Descrip:	SE 22ND ST, NEAR M				Descrip:	BASIN 10 @ 27TH NE				Descrip:	CATCHBASIN ON SE C			
	Sample:	L59715-1				Sample:	L59715-2				Sample:	L59715-3			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	4/17/14 10:37				ColDate:	4/17/14 9:54				ColDate:	4/17/14 10:20			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	7.2		0.5	1	mg/L	11.3		0.7	1.4	mg/L	86.5		2.5	5	mg/L
CV SM4500-N-C															
Total Nitrogen	0.55		0.05	0.1	mg/L	0.831		0.05	0.1	mg/L	2.11		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.141		0.01	0.04	mg/L	0.248		0.01	0.04	mg/L	0.172		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.0698		0.005	0.01	mg/L	0.0868		0.005	0.01	mg/L	0.321		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0274		0.001	0.004	mg/L	0.0404		0.001	0.004	mg/L	0.0911		0.001	0.004	mg/L
ES HYDROLAB															
Conductivity, Field	80.1		0.5	10	umhos/cm	53.5		0.5	10	umhos/cm	41		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	92.1				%	93.6				%	79.5				%
Dissolved Oxygen, Field	10		0.5	1	mg/L	9.8		0.5	1	mg/L	8.5		0.5	1	mg/L
pH, Field	7.39				pH	7.43				pH	6.59				pH
Sample Temperature, Field	12.46				deg C	13.54				deg C	13.45				deg C
ES NONE															
Discharge Rate of Stream	2.09		0.05	0.1	cfs										
Field Personnel	CB, SH				none	CB, SH				none	CB, SH				none
Sample Function															
Turbidity, Field	10.7		0.5	2	NTU	15		0.5	2	NTU	74.7		0.5	2	NTU
MC SM 9222D 20TH															
Fecal Coliform	25000				CFU/100ml	660				CFU/100ml					
MC MICRO SOP 563VD															
Bacteroides	Not Analyzed					Not Analyzed									
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	7510		50	50	ug/L	6100		50	50	ug/L	4830		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.43	<RDL	0.2	1	ug/L	0.45	<RDL	0.2	1	ug/L	0.81	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	6.37		0.4	2	ug/L	23.8		0.4	2	ug/L	12.7		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.23	<RDL	0.1	0.5	ug/L	0.634		0.1	0.5	ug/L	0.508		0.1	0.5	ug/L
Magnesium, Total, ICP-MS	3420		50	50	ug/L	1290		50	50	ug/L	867		50	50	ug/L
Zinc, Dissolved, ICP-MS	27.4		0.5	2.5	ug/L	64.1		0.5	2.5	ug/L	45		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	32.8		0.331	0.331	mg CaCO3/L	20.6		0.331	0.331	mg CaCO3/L	15.6		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid		<MDL	11	14.3	ug/L	12	<RDL	11	14.3	ug/L					
Caffeine	0.36	<RDL	0.086	1.43	ug/L	4.4		0.086	1.43	ug/L					
Cholesterol	3.1	<RDL	2.8	14.3	ug/L		<MDL	2.8	14.3	ug/L					
Coprostanol		<MDL	2.5	14.3	ug/L		<MDL	2.5	14.3	ug/L					
Hexadecanoic acid	14.7		11	14.3	ug/L	24.7		11	14.3	ug/L					
Octadecanoic acid		<MDL	11	14.3	ug/L	12	<RDL	11	14.3	ug/L					
Triclosan		<MDL	0.29	2.86	ug/L		<MDL	0.29	2.86	ug/L					

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER10-648				Locator:	MERCER10-108				Locator:	MERCER10-394			
	Descrip:	CATCHBASIN ON SW C				Descrip:	CATCHBASIN ON NW C				Descrip:	CATCHBASIN ON THE			
	Sample:	L59715-4				Sample:	L59715-5				Sample:	L59715-6			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	4/17/14 10:10				ColDate:	4/17/14 10:05				ColDate:	4/17/14 9:08			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	201		7.1	14	mg/L	21.2		0.7	1.3	mg/L	13.3		0.5	1	mg/L
CV SM4500-N-C															
Total Nitrogen	5.43		0.25	0.5	mg/L	0.653		0.05	0.1	mg/L	0.604		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.111		0.01	0.04	mg/L	0.0725		0.01	0.04	mg/L	0.168		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	1.18		0.025	0.05	mg/L	0.0706		0.005	0.01	mg/L	0.085		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.196		0.0025	0.01	mg/L	0.0088		0.0005	0.002	mg/L	0.0305		0.0005	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	44.9		0.5	10	umhos/cm	39.6		0.5	10	umhos/cm	93.2		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	65.6				%	92.6				%	96.2				%
Dissolved Oxygen, Field	6.8		0.5	1	mg/L	9.7		0.5	1	mg/L	10.4		0.5	1	mg/L
pH, Field	6.42				pH	7.19				pH	7.22				pH
Sample Temperature, Field	13.71				deg C	13.13				deg C	11.98				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	CB, SH				none	CB, SH				none	CB, SH				none
Sample Function															
Turbidity, Field	120		0.5	2	NTU	17		0.5	2	NTU	13.6		0.5	2	NTU
MC SM 9222D 20TH															
Fecal Coliform															
MC MICRO SOP 563VD															
Bacteroides															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	6550		50	50	ug/L	4320		50	50	ug/L	7530		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.54	<RDL	0.2	1	ug/L	0.38	<RDL	0.2	1	ug/L	0.4	<RDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	25.2		0.4	2	ug/L	5.55		0.4	2	ug/L	6.22		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.47	<RDL	0.1	0.5	ug/L	0.508		0.1	0.5	ug/L	0.28	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	1190		50	50	ug/L	1400		50	50	ug/L	3390		50	50	ug/L
Zinc, Dissolved, ICP-MS	76.2		0.5	2.5	ug/L	230		0.5	2.5	ug/L	25.7		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	21.3		0.331	0.331	mg CaCO3/L	16.5		0.331	0.331	mg CaCO3/L	32.7		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid															
Caffeine															
Cholesterol															
Coprostanol															
Hexadecanoic acid															
Octadecanoic acid															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER10-207				Locator:	MERCERISL32				Locator:	MERCER32B-326			
	Descrip:	COLLECTS FLOWS FRO				Descrip:	CREEK NEAR HOLLYHI				Descrip:	CATCHBASIN (ON SID			
	Sample:	L59715-7				Sample:	L59715-8				Sample:	L59715-9			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	4/17/14 8:56				ColDate:	4/17/14 12:30				ColDate:	4/17/14 12:15			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	13		0.6	1.1	mg/L	6.1		0.5	1	mg/L	7.5		0.5	1	mg/L
CV SM4500-N-C															
Total Nitrogen	0.616		0.05	0.1	mg/L	0.686		0.05	0.1	mg/L	0.737		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.154		0.01	0.04	mg/L	0.278		0.01	0.04	mg/L	0.176		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.0769		0.005	0.01	mg/L	0.0519		0.005	0.01	mg/L	0.076		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0196		0.0005	0.002	mg/L	0.0106		0.0005	0.002	mg/L	0.0158		0.0005	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	49.1		0.5	10	umhos/cm	98.7		0.5	10	umhos/cm	95.9		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	90.4				%	94.8				%	90.2				%
Dissolved Oxygen, Field	9.7		0.5	1	mg/L	10.2		0.5	1	mg/L	9.6		0.5	1	mg/L
pH, Field	7.04				pH	7.63				pH	7.14				pH
Sample Temperature, Field	12.23				deg C	12.09				deg C	12.75				deg C
ES NONE															
Discharge Rate of Stream						1.07		0.05	0.1	cfs					
Field Personnel	CB, SH				none	CB, SH				none	CB, SH				none
Sample Function															
Turbidity, Field	9.9		0.5	2	NTU	7.3		0.5	2	NTU	6.6		0.5	2	NTU
MC SM 9222D 20TH															
Fecal Coliform															
MC MICRO SOP 563VD															
Bacteroides															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	4370		50	50	ug/L	9390		50	50	ug/L	8520		50	50	ug/L
Chromium, Dissolved, ICP-MS	0.26	<RDL	0.2	1	ug/L	3.93		0.2	1	ug/L	4.25		0.2	1	ug/L
Copper, Dissolved, ICP-MS	4.13		0.4	2	ug/L	5.61		0.4	2	ug/L	5.46		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.38	<RDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L	0.11	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	1920		50	50	ug/L	4210		50	50	ug/L	4350		50	50	ug/L
Zinc, Dissolved, ICP-MS	24.3		0.5	2.5	ug/L	12.7		0.5	2.5	ug/L	22.2		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	18.8		0.331	0.331	mg CaCO3/L	40.8		0.331	0.331	mg CaCO3/L	39.2		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid															
Caffeine															
Cholesterol															
Coprostanol															
Hexadecanoic acid															
Octadecanoic acid															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180				Project:	421195-180				Project:	421195-180			
	Locator:	MERCER32B-78				Locator:	MERCER32B-6				Locator:	MERCER32B-83			
	Descrip:	DRAINAGE FROM THE				Descrip:	CATCHBASIN (ON SID				Descrip:	EASTSIDE OF 84TH A			
	Sample:	L59715-10				Sample:	L59715-11				Sample:	L59715-12			
	Matrix:	LG STORM WTR				Matrix:	LG STORM WTR				Matrix:	LG STORM WTR			
	ColDate:	4/17/14 11:57				ColDate:	4/17/14 11:50				ColDate:	4/17/14 11:37			
	TimeSpan:					TimeSpan:					TimeSpan:				
	TotalSolid:					TotalSolid:					TotalSolid:				
	ClientLoc:					ClientLoc:					ClientLoc:				
	SampDepth:					SampDepth:					SampDepth:				
	WET Weight Basis					**WET Weight Basis**					**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	3.4		0.5	1	mg/L	4.3		0.5	1	mg/L	6		0.5	1	mg/L
CV SM4500-N-C															
Total Nitrogen	0.678		0.05	0.1	mg/L	0.601		0.05	0.1	mg/L	0.565		0.05	0.1	mg/L
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.236		0.01	0.04	mg/L	0.137		0.01	0.04	mg/L	0.0946		0.01	0.04	mg/L
CV SM4500-P-B,F															
Total Phosphorus	0.0734		0.005	0.01	mg/L	0.0507		0.005	0.01	mg/L	0.0607		0.005	0.01	mg/L
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0174		0.0005	0.002	mg/L	0.0102		0.0005	0.002	mg/L	0.0119		0.0005	0.002	mg/L
ES HYDROLAB															
Conductivity, Field	101		0.5	10	umhos/cm	46.4		0.5	10	umhos/cm	14.1		0.5	10	umhos/cm
Dissolved Oxygen Saturation, Field	85.1				%	80.8				%	77				%
Dissolved Oxygen, Field	9		0.5	1	mg/L	8.8		0.5	1	mg/L	8.3		0.5	1	mg/L
pH, Field	6.94				pH	6.8				pH	6.32				pH
Sample Temperature, Field	12.97				deg C	12.04				deg C	12.02				deg C
ES NONE															
Discharge Rate of Stream															
Field Personnel	CB, SH				none	CB, SH				none	CB, SH				none
Sample Function															
Turbidity, Field	5		0.5	2	NTU	6.5		0.5	2	NTU	7.2		0.5	2	NTU
MC SM 9222D 20TH															
Fecal Coliform															
MC MICRO SOP 563VD															
Bacteroides															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	8600		50	50	ug/L	5190		50	50	ug/L	1650		50	50	ug/L
Chromium, Dissolved, ICP-MS	4.45		0.2	1	ug/L	0.25	<RDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Copper, Dissolved, ICP-MS	5.28		0.4	2	ug/L	4.62		0.4	2	ug/L	4.37		0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.1	<RDL	0.1	0.5	ug/L	0.16	<RDL	0.1	0.5	ug/L	0.26	<RDL	0.1	0.5	ug/L
Magnesium, Total, ICP-MS	4760		50	50	ug/L	1180		50	50	ug/L	236		50	50	ug/L
Zinc, Dissolved, ICP-MS	21.9		0.5	2.5	ug/L	36		0.5	2.5	ug/L	69.3		0.5	2.5	ug/L
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	41.1		0.331	0.331	mg CaCO3/L	17.8		0.331	0.331	mg CaCO3/L	5.08		0.331	0.331	mg CaCO3/L
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid															
Caffeine															
Cholesterol															
Coprostanol															
Hexadecanoic acid															
Octadecanoic acid															
Triclosan															

King County Environmental Lab Analytical Report

	Project:	421195-180					Project:	421195-180					Project:	421195-180			
	Locator:	MERCER32B-329					Locator:	FFBLANK					Locator:	FFBLANK			
	Descrip:	DRAINAGE FROM SOUT					Descrip:	FIELD FILTER BLANK					Descrip:	FIELD FILTER BLANK			
	Sample:	L59715-13					Sample:	L59715-14					Sample:	L59715-14			
	Matrix:	LG STORM WTR					Matrix:	LN BLANK WTR					Matrix:	LM FILTER WTR			
	ColDate:	4/17/14 11:25					ColDate:	4/17/14 8:50					ColDate:	4/17/14 8:50			
	TimeSpan:						TimeSpan:						TimeSpan:				
	TotalSolid:						TotalSolid:						TotalSolid:				
	ClientLoc:						ClientLoc:						ClientLoc:				
	SampDepth:						SampDepth:						SampDepth:				
	WET Weight Basis						**WET Weight Basis**						**WET Weight Basis**				
Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
CV SM2540-D															
Total Suspended Solids	3.6		0.5	1	mg/L										
CV SM4500-N-C															
Total Nitrogen	0.513		0.05	0.1	mg/L										
CV SM4500-NO3-F															
Nitrite + Nitrate Nitrogen	0.0942		0.01	0.04	mg/L		<MDL	0.01	0.04	mg/L					
CV SM4500-P-B,F															
Total Phosphorus	0.0549		0.005	0.01	mg/L										
CV SM4500-P-F															
Orthophosphate Phosphorus	0.0113		0.0005	0.002	mg/L		<MDL	0.0005	0.002	mg/L					
ES HYDROLAB															
Conductivity, Field	13.2		0.5	10	umhos/cm										
Dissolved Oxygen Saturation, Field	69.3				%										
Dissolved Oxygen, Field	7.5		0.5	1	mg/L										
pH, Field	6.11				pH										
Sample Temperature, Field	11.83				deg C										
ES NONE															
Discharge Rate of Stream															
Field Personnel	CB, SH				none										
Sample Function											Field filter blank for dissolved nutrients				none
Turbidity, Field	3.4		0.5	2	NTU										
MC SM 9222D 20TH															
Fecal Coliform															
MC MICRO SOP 563VD															
Bacteroides															
MT EPA 200.8*SW846 6020A															
Calcium, Total, ICP-MS	1540		50	50	ug/L										
Chromium, Dissolved, ICP-MS		<MDL	0.2	1	ug/L										
Copper, Dissolved, ICP-MS	4.19		0.4	2	ug/L										
Lead, Dissolved, ICP-MS	0.31	<RDL	0.1	0.5	ug/L										
Magnesium, Total, ICP-MS	233		50	50	ug/L										
Zinc, Dissolved, ICP-MS	75.5		0.5	2.5	ug/L										
MT EPA 200.8/SW846 6020A*SM2340B															
Hardness, Calc	4.81		0.331	0.331	mg CaCO3/L										
OR SW846 3511*SW846 8270D LVI															
9-Octadecenoic acid															
Caffeine															
Cholesterol															
Coprostanol															
Hexadecanoic acid															
Octadecanoic acid															
Triclosan															

King County Environmental Lab Analytical Report

Project:	421195-180	Project:	421195-180
Locator:	MERCERISL10	Locator:	MERCER10C
Descrip:	SE 22ND ST, NEAR M	Descrip:	BASIN 10 @ 27TH NE
Sample:	L60251-1	Sample:	L60251-2
Matrix:	LG STORM WTR	Matrix:	LG STORM WTR
ColDate:	5/8/14 14:30	ColDate:	5/8/14 14:25
TimeSpan:		TimeSpan:	
TotalSolid:		TotalSolid:	
ClientLoc:		ClientLoc:	
SampDepth:		SampDepth:	
WET Weight Basis		**WET Weight Basis**	

Parameters	**Value**	**Qual**	**MDL**	**RDL**	**Units**	**Value**	**Qual**	**MDL**	**RDL**	**Units**
ES NONE										
Field Personnel	BK				none	BK				none
MC MICRO:563V0										
Hu-2-bacteroides	208	JU			Copies/ml		<MDL,TA			Copies/ml
MC SM 9222D 20TH										
Fecal Coliform	2400				CFU/100ml	230				CFU/100ml

TA = Data inconclusive, inhibitors may be present

Appendix B

Summary of Precipitation from MERC rain gauge

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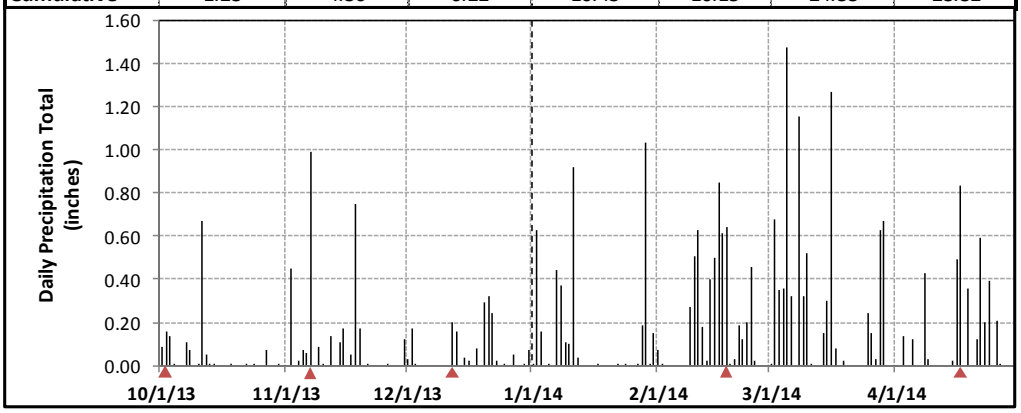
Daily Precipitation Measured at the Mercer Island Rain Gauge (Inches)

http://green.kingcounty.gov/WLR/Waterres/hydrology/SummaryDataTables/aspx?G_ID=651

Water Year				2014			
Calendar Year	2013			2014			
Day of Month	October	November	December	January	February	March	April
1	0.09	0.00	0.03	0.01	0.07	0.01	0.00
2	0.16*	0.45	0.17	0.63	0.01	0.68	0.00
3	0.14	0.00	0.01	0.16	0.00	0.35	0.14
4	0.01	0.02	0.00	0.00	0.00	0.36	0.00
5	0.00	0.07	0.00	0.01	0.00	1.47	0.12
6	0.00	0.06	0.00	0.00	0.00	0.32	0.00
7	0.11	0.99	0.00	0.44	0.00	0.00	0.00
8	0.07	0.00	0.00	0.37	0.00	1.15	0.43
9	0.00	0.09	0.00	0.11	0.27	0.32	0.03
10	0.01	0.01	0.00	0.10	0.51	0.52	0.00
11	0.67	0.00	0.00	0.92	0.63	0.01	0.00
12	0.05	0.14	0.20	0.04	0.18	0.00	0.00
13	0.01	0.00	0.16	0.00	0.02	0.00	0.00
14	0.01	0.11	0.00	0.00	0.40	0.15	0.00
15	0.00	0.17	0.04	0.00	0.50	0.30	0.02
16	0.00	0.00	0.02	0.00	0.85	1.27	0.49
17	0.00	0.05	0.00	0.01	0.61	0.08	0.83
18	0.01	0.75	0.08	0.00	0.64	0.00	0.00
19	0.00	0.17	0.00	0.00	0.01	0.02	0.36
20	0.00	0.00	0.29	0.00	0.03	0.00	0.00
21	0.00	0.01	0.32	0.00	0.19	0.00	0.12
22	0.01	0.00	0.24	0.01	0.12	0.00	0.59
23	0.00	0.00	0.02	0.00	0.20	0.00	0.20
24	0.01	0.00	0.00	0.01	0.46	0.00	0.39
25	0.00	0.00	0.01	0.00	0.02	0.24	0.00
26	0.00	0.01	0.00	0.00	0.00	0.15	0.21
27	0.07	0.00	0.05	0.01	0.00	0.03	0.01
28	0.00	0.00	0.00	0.19	0.00	0.63	0.00
29	0.00	0.00	0.00	1.03		0.67	0.00
30	0.01	0.12	0.01	0.01		0.00	0.00
31	0.00		0.07	0.15		0.00	
Monthly Total	1.28	3.22	1.72	4.21	5.72	8.73	3.94
Cumulative**	1.28	4.50	6.22	10.43	16.15	24.88	28.82



* Sampling events highlighted in red in table and with red triangles in graph

** Cumulative total for the 2014 water year