



Appendix N  
Review of WQ Monitoring Plan

## TECHNICAL MEMORANDUM

Date: April 5, 2005  
To: Scott Gonsar, and Jenny Gaus, P.E.  
From: Ken Ludwa, P.E.  
Subject: WQ Monitoring Recommendations  
cc: Paul Fendt, P.E.  
Project Number: 558-1802-035  
Project Name: Stormwater Comprehensive Plan Update

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This memo is to provide recommendations for ongoing water quality (WQ) monitoring in the City of Kirkland, specifically in Juanita Creek and Forbes Creek.

### **Recent Monitoring**

The attached table summarizes recent WQ monitoring in both streams. In Forbes Creek, the King County Department of Natural Resources (DNR) monitored WQ from 1997-2002. The City of Kirkland has continued monitoring since 2002, with samples being taken 5 to 12 times per year. In Juanita Creek, the King County DNR monitored WQ from 1997 to present. King County also performed fecal coliform RNA analysis in 1998 to identify sources of fecal coliforms at Juanita Beach; the primary sources were found to be ducks and geese.

Juanita Creek was included in an urban stream pesticide monitoring studies by USGS, the Washington State Department of Ecology (Ecology), and King County in 1998-1999. USGS also sampled organic compounds and trace elements in streambed sediment and fish tissue in 1995.

### **Pertinent Water Quality Issues and Recommendations for Sampling**

Both Juanita and Forbes Creek are listed on Washington's 2004 Draft 303(d) list of polluted waters that require a TMDL for Dissolved Oxygen (DO), Fecal Coliforms, and Temperature, based on King County DNR data. The 2004 Draft listings for DO and Temperature are new listings since the 1998 303(d) list was published, while Fecal Coliforms have been listed previously. We recommend continued sampling for these three parameters as follows:

- A separate fecal coliform source tracing plan has been prepared (Technical Memorandum dated June 9, 2004). We recommend implementation of this source tracing plan, which includes sampling for fecal coliforms during stormflow and baseflow conditions, and RNA analysis to determine likely sources of fecal coliforms. After this effort has been completed, we recommend development of a source control plan, including targeted monitoring to demonstrate source control effectiveness.

- We recommend dissolved oxygen and temperature monitoring from July-September. Sampling is recommended at all seven City of Kirkland monitoring sites in Forbes Creek, and the two King County monitoring sites in Juanita Creek. Continuous monitoring probes are the ideal monitoring method<sup>1</sup>, but are not required to meet Ecology's data standards for Water Quality Assessments. We recognize that the cost of continuous dissolved oxygen probes may be prohibitive. Temperature recording probes are less expensive. If possible, continuous DO and temperature probes should at least be used at the monitoring stations closest to the mouth of each stream, with hand probes used to take early morning and late afternoon measurements at least once per week at other sites. If continuous DO monitoring is not practical, multiple grab samples (4-6 samples per day, spaced evenly throughout the day) should be scheduled each day for at least seven consecutive days.

Unless specific surface water management actions are implemented, we do not have specific recommendations for ongoing stormwater monitoring of other constituents. Continued collection of this data is useful to establish baseline conditions against which to compare water quality effects of future management actions in these watersheds. We do recommend monitoring if management actions are implemented (e.g., construction of regional stormwater treatment facilities); the specific parameters and monitoring methods would depend on the type of management actions implemented.

In the stream pesticide studies, a total of 21 pesticides and breakdown products – 15 herbicides, five insecticides, and one fungicide – were detected in Juanita Creek. Toxicity testing indicated inhibition of growth or reproduction of the test species in some water samples; however the study results demonstrated an unclear linkage between pesticide concentrations and toxicity. Ecology (2000) recommends further study to determine the specific cause or causes of toxicity, as well as the ecological significance of the observed toxicity. Based on the presence of pesticides in all other study streams, this appears to be a regional issue, and a regional sampling effort is needed. Solely for the purposes of additional study, we do not recommend that the City of Kirkland undertake a sampling effort alone, due to the costs of this type of sampling, and the large number of samples needed for valid statistical analysis. If regional agencies (King County, Ecology, USGS) initiate further study, we advise that the City of Kirkland participate. Also, if the City undertakes future programs to reduce pesticide use, we would recommend monitoring to evaluate program effectiveness.

## References

Washington State Department of Ecology (Ecology). 2000. Washington State Pesticide Monitoring Program 1997 Surface Water Sampling Report. Publication No. 00-03-003. <http://www.ecy.wa.gov/pubs/0003003.pdf>

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<sup>1</sup> Ecology (2000) states: When continuous monitoring data are available, Ecology will assess the seven-day average of daily maximum (for temperature) or minimum (for dissolved oxygen) measurements. When continuous monitoring data are not available, but data are available from at least seven days in any 30-day period, Ecology will assess the average of the highest (for temperature) or lowest (for dissolved oxygen) measurement on seven consecutive days on which measurements were taken. In both cases, a waterbody segment will be placed on the 303(d) list for temperature or dissolved oxygen when at least one seven-day average shows a violation of the water quality standard.

When data are available from fewer than seven days in any 30-day period, Ecology will assess the highest (for temperature) or lowest (for dissolved oxygen) single measurement within that period. A waterbody segment will be placed on the 303(d) list for temperature or dissolved oxygen when these data show a violation of the water quality standard on at least one day in at least three different years.

Washington State Department of Ecology (Ecology). 2002. Assessment of Water Quality for the Section 303(d) List. WQP Policy 1-11. [http://www.ecy.wa.gov/programs/wq/303d/2002/303d\\_policy\\_final.pdf](http://www.ecy.wa.gov/programs/wq/303d/2002/303d_policy_final.pdf)

U.S. Geological Survey (USGS). 2004. Scientific Investigations Report 2004-5194. Pesticides Detected in Urban Streams in King County, Washington, 1998-2003. Prepared in cooperation with the King County Department of Natural Resources. By L.M. Frans. <http://water.usgs.gov/pubs/sir/2004/5194/>

King County Water and Land Resources Division (King County WLRD) and Parametrix. 2002. Sammamish/Washington Analysis and Modeling Program (SWAMP). Small Streams Toxicity / Pesticide Study. Prepared by Dean Wilson, Doug Henderson, Helle Andersen, and Jim Buckley (King County WLRD) and Angela Coyner, David DeForest, and Charlie Wisdom (Parametrix). <ftp://dnr.metrokc.gov/dnr/library/2002/kcr1050.pdf>

King County WLRD. 2004. Streams Monitoring Program. Juanita Creek (Sites 0446, C446). <http://dnr.metrokc.gov/wlr/waterres/streams/juanicreek.htm>

King County WLRD. 2004. Streams Monitoring Program. Streams Monitoring Program. Forbes Creek (Site 0456). [http://dnr.metrokc.gov/wlr/waterres/streams/FORBES\\_INTRO.htm](http://dnr.metrokc.gov/wlr/waterres/streams/FORBES_INTRO.htm)

Parametrix. 2004. Stream Inventory and Habitat Evaluation Report, Including Juanita Creek, Forbes Creek, Yarrow Creek, and Cochran Springs Creek. Prepared for City of Kirkland.