

Appendix I: Summary of Flow Monitoring

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APPENDIX I – SUMMARY OF FLOW MONITORING

The project that was first proposed to the Regional Stormwater Monitoring Program (RSMP), now Stormwater Action Monitoring (SAM), did not include monitoring flow at the detention tank system (DTS). However, input from Washington State Stormwater Permittees during the RSMP Effectiveness Study Workshops showed there was interest in evaluating the flow control benefits and additional water quality benefits provided by the DTS. This appendix summarizes the progression of flow monitoring for the project, and the reasons it was finally dropped from the project scope.

Before the sampling portion of the project began, flow was monitored at the main inlet and outlet of the DTS. Detailed procedures are included in the Quality Assurance Project Plan (QAPP; King County 2015). Initially, bubblers were installed at both locations, but preliminary flow data suggested there were issues with how the instruments were calculating flow. The calculated total volumes were much greater at the inlet than the outlet, whereas they should be relatively comparable given the DTS design. The first step was to verify that the variables used to calculate flow from the bubbler data were correct. The field team verified that the inputs to the Manning equation were correct, including investigating whether the slope of the pipes given on the as-builts matched those measured in the field. Small corrections after this investigation did not explain the large discrepancy between the inlet and outlet.

After further observation, the field team realized some storms created conditions where flow monitoring was not possible with the proposed equipment. For example, bubblers cannot account for flow in a submerged pipe, which would occur at the inlet pipe during moderate storms. Additionally, moderate storms were creating violent, sporadic surging of water from the flow control structure into the outlet pipe. This condition resulted in inadequate pressure being applied to the bubbler line. Installing an area velocity meter (11/10/2015) solved the monitoring issue at the inlet pipe, but monitoring the turbulent conditions at the outlet pipe could not be resolved within the original project scope. Flow monitoring was discontinued at the outlet at the end of 2015, and evaluating the flow control benefits of the DTS was dropped from the project objectives. Flow monitoring at the DTS inlet continued periodically until January 2017.

Due to inconsistent monitoring and the issues outlined above, the report does not include any analysis of flow. All preliminary flow data for the project were included in sampling and analysis (Task 2) deliverables and are posted on the Washington State Department of Ecology website (<http://www.ecy.wa.gov/programs/wq/stormwater/municipal/rsmp/effective.html>), or are available upon request.

Appendix I References

King County. 2015. Quality Assurance Project Plan For Monitoring Stormwater Retrofit in the Echo Lake Drainage Basin – RSMP Effectiveness Study. Prepared by Carly Greyell, Water and Land Resources Division. Seattle, Washington.