

CITY OF LYNDEN

STORMWATER MANAGEMENT PROGRAM

ATTACHMENT C

2017 WATER QUALITY MONITORING REPORT



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MARCH 29, 2018

This document serves as Attachment C to the City of Lynden's 2017 Annual Report submittal to the Department of Ecology for its Phase II NPDES Municipal Stormwater Permit per Appendix 2.

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1.0 Introduction

As part of the City of Lynden's (City) Western Washington Phase II Municipal Stormwater Permit (Permit) under the National Pollutant Discharge Elimination program (NPDES) Appendix 2, the City is required to monitor the quality of stormwater at one priority basin. Stormwater runoff from the City of Lynden discharges primarily into Fishtrap Creek and eventually the Nooksack River or directly into the Nooksack River.

Current state water quality standards classify the Lower Nooksack River and Fishtrap Creek as Class A waters. The standard for this classification requires that fecal coliform organism levels shall not exceed a geometric mean value of 100 colonies/100 ml, and have no more than 10 percent of all samples exceeding 200 colonies/100 ml (WAC 173-201A-030(2)(c)(A)). The Lower Nooksack River does not meet this standard. Therefore, a Total Maximum Daily Load (TMDL) study for fecal coliform was initiated.

In the late 1990's, Ecology undertook a Nooksack River Watershed Bacteria TMDL evaluation (Joy, 2000) and completed an associated Detailed Implementation Plan in 2002 (Hood, 2002). The TMDL analysis determines a plan of action to bring water bodies back into compliance with water quality standards and often requires more stringent standards than the current water quality standards (WDOE, 2006). The Nooksack River TMDL coverage includes areas served by Small Municipal Separate Storm Sewer Systems (MS4s) draining to the Nooksack River which includes the City of Lynden. Fishtrap Creek was found to be one of several tributaries that contributed elevated fecal loads to the lower Nooksack River and is listed (303d) as impaired for fecal coliform, (Joy, 2000).

The Phase II permit requires that all jurisdictions subject to an approved TMDL undertake additional requirements as outlined in Appendix 2 of the Western Washington Phase II Municipal Stormwater Permit. Appendix 2 of the permit specifically requires the City of Lynden to select a priority basin from which to collect and analyze fecal coliform samples. In addition, a Quality Assurance Project Plan (QAPP) to guide this data collection program was required. This report documents the 2017 monitoring results of the fecal coliform data collected at the selected priority basin per the methods outlined in the QAPP (Welch Ecological Services, 2013).

2.0 Selection of Priority Basin

Appendix 2 of the Permit requires the City to monitor fecal coliform from one of the City's outfalls to characterize the contribution of fecal coliform to the Nooksack River from the City of Lynden's land uses. The goal is to separate the fecal contribution generated from City land uses from the agricultural fecal levels that enter the City's MS4 from the North and are conveyed through the MS4 to Fishtrap Creek and eventually the Nooksack River.

After careful consideration, the City prioritized the BC Avenue subbasin (Figure 1) as representative of the City's contribution of fecal loading to the Nooksack River. The selected outfall is located south of Fishtrap Creek draining a portion of the southwest part of the City and

abutting the Northwest Fair Grounds to the west. The land uses that drain to this outfall are dominated by single family residences, some multiple family units and condominiums as well as a few miscellaneous services such as churches, assisted living units, and professional services.

The sample site location, Station BC-01, is located in a manhole at the southeast corner of South BC Avenue and C Street; Latitude N48° 56' 13.11" and Longitude W122° 27' 48.47" close to the City boundary. The City's stormwater network draining to this BC Avenue outfall is approximately 117 acres. The outfall is a 54" deep manhole with no logistical access problems. From the manhole, the 15" pipe daylight to a county ditch system and is conveyed to the Nooksack River. This lower area is under Whatcom County's jurisdiction and is occupied by hobby farms.

The project goal for water quality monitoring from this outfall is to provide insight into the magnitude and variation of stormwater fecal coliform input to the Nooksack River derived from land uses within the City of Lynden by collecting fecal coliform samples monthly and during storm events.

Figure 1: BC Avenue Outfall Drainage Area



3.0 Data Collection Methods at BC Avenue

The sampling design for the BC Avenue subbasin monitoring program consists of collecting grab samples for fecal coliform analysis. Lab analysis was conducted at the City of Lynden’s accredited WWTP laboratory (accreditation identification W737).

The BC Avenue outfall was sampled monthly and additional sampling was attempted during two wet season and two dry season high-precipitation events. Wet season samples were taken during November through April and dry season storm samples were taken from May to October. The storm sampling focused on discrete precipitation events of a magnitude >0.20” within the previous 24 hours prior to data collection.

Field and lab procedures followed those designated in the QAPP. The WTP/WWTP Superintendent trained crews in sampling protocol, chain of custody, and reviewed data and protocol to QA/QC the program in order to assure that measurement quality objectives (MQO’s) were met (Table 1). Specific lab protocol (SOP#004) can be found in Appendix A of the QAPP. Refresher training on the methods were given to appropriate staff. The City of Lynden WWTP Laboratory also participated in a proficiency testing study, WP-232, for Fecal Coliform analysis. Results were acceptable for the performance evaluation.

Table 1: Measurement Quality Objectives

			Accuracy	Precision	Bias	Sensitivity
Parameter	Field Sample Type	Lab Method	Check standard % recovery limits	Duplicate samples (RSD)*	Matrix spikes	Reporting limit
Fecal Coliform	Grab	SM922D Membrane filter	N/A	<50%	N/A	1cfu/100 ml

3.0 BC Avenue Fecal Coliform Results

The BC Avenue BC-01 outfall was visited over sixteen times in 2017. Only 8 fecal coliform samples were collected as there was no flow on many of the monthly field visits (Table 2). The WTP/WWTP Superintendent reviewed data for verification, validation and usability. The goals were to collect samples during the second week of each month and after storm events (Table 3), collect field duplicates and run field blanks as outlined in the QAPP. Field duplicates and blanks can only be run if samples are collected. Therefore only a few field duplicates and blanks were performed and analyzed. The duplicate results were very close to the original and the blanks were all clear. The City has adopted an adaptive management strategy to equip the crew with extra sampling materials for all visits in order to have the availability to run field duplicates and blanks when flow is present. Field visits that reported no flow were not included in statistical analyses.

Table 2: Monthly Fecal Coliform Sample Results at BC-01

	Sampling Date	Sample Results (cfu/100 mL)	24-hr rainfall preceding sampling (in.)	Daily Temp. High/Low °C	Weather: i.e. clear, windy, cloudy, raining	Flow in Pipe: High flow, low flow, no flow	Sample Appearance: Color, turbidity, sediment, oil on surface
January-17	01/10/17	--	0.32	0.5/-5.5	Clear	No flow - no sample taken	--
February-17	02/07/17	--	Trace (Snow)	0/-6	Clear	No flow - no sample taken	--
March-17	03/07/17	--	Trace (Snow)	6/2	Snowing	No flow - no sample taken	--
April-17	04/11/17	--	0.01	14/7	Clear	Very low flow - no sample taken	--
May-17	05/09/17	--	Trace	18/9	Clear	No flow - no sample taken	--
June-17	06/13/17	--	0.00	16/10	Clear	No flow - no sample taken	--
July-17	07/11/17	--	Trace	23/12	Clear	No flow - no sample taken	--
August-17	08/08/17	--	0.00	26/14	Clear	No flow - no sample taken	--
September-17	09/12/17	--	0.00	21/11	Cloudy	No flow - no sample taken	--
October-17	10/11/17	2500	0.05	11/5	Cloudy	High Flow	Slight Yellow
November-17	11/21/17	3000	0.52	16/1	Raining	High Flow	Clear
December-17	12/01/17	East:2200 West:290	0.63	8/6	Clear	High Flow	Clear
Additional Sampling (After Catch Basin Flush)	12/19/17	102	0.49	4/0.6	Raining	High Flow	Clear

*Field blank and/or duplicate on September, October and lab split in November

Table 3: Storm Event Fecal Sampling Results at BC-01

	Sampling Date	Sample Results (cfu/100 mL)	24-hr rainfall preceding sampling (in.)	Daily Temp. High/Low °C	Weather: i.e. clear, windy, cloudy, raining	Flow in Pipe: High flow, low flow, no flow	Sample Appearance: Color, turbidity, sediment, oil on surface
Wet season sample #1	1/18/17	56	0.23	13/8	Cloudy	High Flow	Turbid
Wet season sample #2	2/16/17	116	1.96	13/4	Raining	High Flow	Brown
Dry season sample #1	9/18/17	3300	0.25	17/8	Raining	High Flow	Slight Yellow
Dry season sample #2	**	--	--	--	--	--	--

** Attempts to collect dry season samples on 6/16/17 (0.20 inches), 10/19/17 (1.44 inches) & 10/20/17 (1.10 inches). Not enough flow to sample

As noted there was no flow for many of the sampling attempts. Three of the four monthly routine samples exceeded the water quality standard (>100 cfu/100mls). One of the two wet season storm samples exceeded the standard with similar results for the dry season samples. The 24-hour antecedent rainfall exceeded the storm criteria of >0.20 inches prior to both of the dry season samples. The highest antecedent rainfall was associated with one of the lower fecal counts.

The geomean of the 8 samples taken from 2017 was 566 cfu/100mls just higher than the longer term statistics using all of the data from BC Avenue taken from 2014 to 2017 as presented in Table 4. Statistics from limited datasets should be used with caution. More meaningful statistics will come as the dataset expands. When all the data is summarized together, just over 60% of the samples exceeded 200 cfu/100mls which is above the 10% criteria.

Table 4: Fecal Sampling Results at BC-01 2014-2017

Statistic	Result (cfu/100 mls)
Geomean	549
# of samples (N)	16
Maximum	10,727
Minimum	56
% of Months >200 cfu/100mls	62.5
90 th Percentile of samples	3,150

Storm patterns, first flushes and other climate conditions could be factors in the variable results. There did not seem to be a correlation between antecedent precipitation and high bacteria levels. At times, even with high antecedent precipitation there was not enough flow to sample. The City has established action items to further investigate the sporadic nature of these results.

Follow-up actions included: attempting to sample up the storm drain system above BC-01 concurrent with the sampling at the outfall, increasing frequency of catchbasin cleaning, looking for potential sources of pollution within the drainage basin, and developing targeted education efforts. Efforts to clean the catchbasins did seem to produce results in lowering fecal counts.

4.0 References

City of Lynden, 2014. Wastewater Treatment Analytical Laboratory Standard Operating Procedures and Quality Control Manual.

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