



## Oak Lodge Sanitary District

# Surface Water Management Strategic Plan

*SWM Program Review Memorandums*

- Facilities Review
- Regulatory Review
- Surface Water Monitoring Program Review
- SWM Stakeholder Interview Highlights



## MEMORANDUM

**TO:** Libby Barg  
Barney & Worth, Inc. (B&W)

**FROM:** Phil Pommier, PE  
Pacific Water Resources, Inc. (PWR)

**DATE:** January 4, 2011

**SUBJECT:** **OLSD Program Review, Setting the Context (Task 2) – Facilities**  
**PWR Project Number 1284**

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This memorandum addresses the “Facilities” topic of the Program Review Framework. The “Strategic Questions” are in bold at the beginning of each segment. The questions are followed by additional discussion concerning the strengths and uniqueness of the existing program.

### **What is the current condition of facilities?**

Pacific Water Resources, Inc. (PWR) reviewed a number of District documents, toured the site and interviewed the client for this quick evaluation of program facilities. Based on information obtained and materials reviewed the condition of existing facilities ranges from nonexistent to adequate. This is mainly due to the lack of development standards prior to implementation of the stormwater program. This situation led to numerous drainage problems throughout the District which cause minor flooding even during small storm events.

### **What does modeling show about flood conditions?**

Available modeling, as described in the Surface Water Management Program Master Plan (SWMPMP, October 1997) by Montgomery Watson, identifies over 70 capital improvement projects necessary to resolve most drainage issues. Based on information in the SWMPMP the detail and quality of the modeling appears to be good. However, the District is aware of additional issues at the neighborhood and individual site level which were not addressed by the master plan. It is important to note that the modeling appears to be based on a good understanding of system inventory which can be readily accessed via a geographical information system (GIS). And, the modeling was performed down to an average subbasin size of 20-30 acres (very high resolution).

### **What are the District’s future needs? How are they prioritized?**

The high number (>70) of proposed capital needs and limited funding capabilities required District management to thoroughly consider priorities for implementing a capital improvements program (CIP). Through a detailed prioritization process briefly described in the *10-year Capital Improvement Plan*, an initial list of some 45 projects was developed. The rolling 10-year plan began in 1997 and has since completed about 30 projects. The plan is updated annually to reflect improvements constructed, community preferences, new priorities and funding realities. Currently the plan focuses on smaller neighborhood projects and stream corridor improvements.

### **Additional Discussion**

One recent project, Stringfield Family Park, shows the District's success at leveraging multiple funding sources into an attractive, award winning project. The park is the first major stream corridor enhancement in the Boardman basin which contains the most challenging and significant capital projects remaining on the current CIP. The park, which has multiple hydrologic objectives, is also viewed as a demonstration and educational tool for the District's surface water management program. As such, it is an important keystone in future program direction highlighting non-structural approaches to floodplain management and water quality.

The District and its stormwater management program are unique in that it is landlocked and mostly developed. Future changes in the District will largely involve redevelopment of existing or similar land uses. These facts will play a significant role in refocusing the program especially as it responds to new MS4 permit requirements.

We anticipate that new permit requirements will focus on better control of peak discharges and more prescriptive measures for water quality. Many of the District's neighborhoods have been developed for decades. Area waterways may have acclimated to new flow regimes. We suspect that the new stream hydrology supports considerably less indigenous flora and fauna and more invasive species. However, detailed stream inventories are required to assess stream structure and biology.

As the program is updated in response to new permit requirements, consideration should be given to controlling the smallest, most frequent storm events. This contrasts with current District regulations which focus on the 25-year storm which is extremely rare. Also, where possible, source controls consistent with low impact development will probably be prescribed by the new permit. Application of these techniques will require close attention to sound engineering practices. These recommendations are consistent with the program's current focus on neighborhood and stream corridor improvements.

Finally, issues related to floodplain management and the control of nuisance flooding will require continued effort. While source controls and stream corridor improvements will, over time, provide some mitigation to the larger problem areas, regional flow control (i.e. detention) facilities may still be required. These can be designed to improve overall stream hydrology, thus facilitating the reemergence of more native species. The cost of these types of facilities will continue to challenge the program, and the priorities placed on regional facilities should be determined through the public involvement process.

To:	Libby Barg, Barney & Worth		
From:	Ronan Igloria	Project:	OLSD – Watershed Strategic Plan
CC:			
Date:	November 11, 2009	HDR Project No:	00102-124739
Re:	<b>Preliminary Regulatory Review - DRAFT</b>		

This memo presents HDR’s preliminary review of regulatory issues facing Oak Lodge Sanitary District (OLSD) as they develop a Watershed Strategic Plan. The issues identified are based on a review of existing permits and rules/regulations being implemented by OLSD. HDR also attended a tour of Oak Lodge Sanitary District’s service area and facilities on October 1, 2009.

The focus of this review is on regulatory issues; specifically regulatory compliance deficiencies and issues that OLSD may face based on their existing program and current and future regulatory environment. Other members of the project team are addressing water quality, facilities, operations, financing, and public involvement. The review at this stage of the project is at a “high (program) level.” More specific modifications and recommendations can be discussed with the project team after some feedback from the SWM CAC is received.

The following OLSD documents were included in the review:

- NPDES MS4 Discharge Permit (Exp. February 28, 2009, signed by DEQ July 27, 2005)
- OLSD MS4 Interim Evaluation Report (April 27, 2006)
- OLSD Rules and Regulations for Surface Water Management (Revised July 2000)
- OLSD Surface Water Management Program Master Plan – Executive Summary (October 1997)
- Draft MS4 Permit Renewal Template (DEQ October 15, 2009 version distributed by ACWA Stormwater Committee)

**Key Regulatory Issues**

The issues highlighted from the MS4 program generally affects the sanitary sewer system also. In general the regulatory issues identified below affects both the stormwater/surface water and sanitary programs under OLSD.

**MS4 Permit Renewal Process.** The MS4 permit renewal process that is on-going is the single largest regulatory issue that needs to be accounted for in the Watershed Strategic Plan. Many of the other issues discussed below are related to or fall under the permit renewal issues. It is unknown how much OLSD has been participating with the ACWA MS4 Permit Renewal Subcommittee in discussions with DEQ over the past

year. The latest draft of permit template language was based on DEQ's October 15 revised template. The level of participation and any specific issues/comments that OLSD (Brett Arvidson) has on the template language that has not been addressed by the ACWA subcommittee should be identified. From HDR's understanding the subcommittee has been taking a consensus approach in its comments and discussion with DEQ.

**Measurable Goals in SWMP.** One of the important changes in the MS4 permit is added language specifying the need to define measurable goals for management practices. In particular current MS4 template language states:

*“Each co-permittee shall implement a Stormwater Management Plan (SWMP) that includes measurable goals for each management practice, control technique, and provision for the stormwater program elements .... Each measurable goal shall be designed to assess the practice, technique or provision in protecting water quality and satisfying requirements of this permit. The measurable goals shall identify actions the permittee will undertake to implement BMPs, and where applicable, include the frequency, timeline and location where the BMP actions will occur.”*

This requirement has implications on how OLSD implements existing and future surface water management practices, or at a minimum how the practices are tracked and documented.

**TMDLs Adopted.** TMDLs for the Willamette River have been adopted for bacteria and temperature, and interim guidance for mercury which affect OLSD. The MS4 permit renewal template includes language stating:

*“The permittees shall conduct a TMDL pollutant load reduction benchmark evaluation describing progress towards meeting any applicable TMDL pollutant load reduction benchmarks identified in the SWMP to the maximum extent practicable”*

All OLSD operations and management will need to account for the load and wasteload allocations in the TMDL. I do not know the status of OLSD's development of a TMDL Implementation Plan consistent with Willamette Basin Water Quality Management Plan. The TMDL Implementation Plan needs to lay out the strategy and specific actions for both the sanitary and surface water (stormwater) programs that will achieve the benchmarks.

**Sanitary Sewer Overflows.** Nationwide, EPA has made SSO reduction and protection of surface water quality a priority. The audits generally result in some form of administrative order or consent decree. Four wastewater collection agencies were audited by EPA in the past two years in Oregon in relation to SSO management. Some of the management actions EPA looks for in the audits include: O&M procedures/manuals, record-keeping and data management program, actions to improve operations at WWTP, “spill” reporting procedures, documented pollution prevention program, I&I reporting, and pretreatment program activities.

Note: the MS4 permit renewal language also adds requirements to non-stormwater discharges, including documenting how the risk of spills are reduced, responded to, clean-up procedures for when a spill occurs, and how spills or overflows are tracked.

**Asset Management.** The regulatory changes identified in the MS4 permit renewal and the emphasis on SSO reduction from EPA call for improved asset management capability. The draft template for MS4 permit renewal states:

*“Co-permittees shall implement a program to verify that stormwater structural facilities and controls are inventoried, mapped, inspected, and operated and maintained for effective pollutant removal, infiltration and/or flow control.”*

I do not know the status of OLSD’s asset management program, but this is an area that should be prioritized as part of their overall Watershed Strategy.

**Hydromodification and Low-Impact Development Standards.** The emphasis on low impact development (LID) has increased recently as a focus in many stormwater/surface water management programs as EPA has focused on reducing hydromodification to address both water quantity and water quality issues in stream and watershed health. Draft language in the MS4 permit renewal template states:

*“Co-permittees shall incorporate site-specific management practices that are targeted to mimic natural surface and groundwater hydrologic functions. The site-specific management practices should maximize on-site retention based on the site conditions”*

*and*

*“Co-permittees shall reduce or eliminate code and development standard barriers that inhibit design and implementation techniques intended to minimize impervious surfaces and reduce stormwater runoff (e.g., Low Impact Development,-Green Infrastructure), and have been identified by and are within the jurisdiction of the permittee”*

This could require additional ordinances or other enforceable regulatory mechanism to be able to manage facilities within their service area. Any changes to ordinances and regulatory mechanisms should include the ability to regulate construction activities.

**Industrial Facilities and Construction Activities.** The new MS4 permit template requires permittees to screen and inventory existing and new industrial facilities for whether a NPDES permit is required. This added responsibility has impacts resources and financial impacts. For example the MS4 permit renewal language states:

*“Co-permittees shall develop or reference an enforceable post-construction stormwater quality management manual or equivalent document.”*

This could require additional ordinances or other enforceable regulatory mechanism to be able to manage facilities within their service area. Any changes to ordinances and regulatory mechanisms should include the ability to regulate construction activities (minimum 1,000 square feet disturbance). DEQ is interested in opportunities to integrate the various permitting programs (municipal, industrial, construction) and OLSD should work toward this goal also.

**Monitoring.** The MS4 permit renewal language has added emphasis and requirements for water quality monitoring and overall program monitoring in conjunction with an adaptive management approach. Earlier

program activities focused on monitoring for baseline information and characterizing water quality. The newer regulatory framework is moving towards implementation and effectiveness monitoring against benchmarks. MS4 permit renewal language states:

*“Each co-permittee shall develop and implement a monitoring program to evaluate the effectiveness of the SWMP in reducing the discharge of pollutants from the MS4 and to utilize in the MS4 program adaptive management process”*

and

*“DEQ expects the permittees to develop short-term monitoring activities/measurable goals within a long-term monitoring strategy that will aid in understanding the stormwater management issues that are limited by lack of information”*

The change in emphasis (or added requirements) will require OLSD to add resources and funding to conduct the monitoring as well as a data management program to process and track the data.

**Table 1** below summarizes the regulatory issues discussed above in terms of whether the issue is addressed by current program management, operations and maintenance, infrastructure or capital program, or by ordinance/rule. In general all of the regulatory requirements will require added resources or funding to implement.

**Table 1. Summary of Regulatory Issues and Status of Program Areas**

Regulatory Issue	Program Management	Operations and Maintenance	Infrastructure/ Capital Program	Ordinance/Rule
Added requirements due to adoption of TMDLs	↑	↑	↑	↔
Emphasis to eliminate and manage sanitary sewer overflows	↑	↑	↑	
Emphasis on low impact development and reduced hydromodification	↑	↔	↑	↑
Managing and permitting industrial and construction activities	↑	↔	↔	↑
Additional monitoring requirements	↑	↑	↑	↔

↔ Existing program adequately addresses issue

↑ Existing program will need to be enhanced or expanded

Note: Program Management includes activities related to asset management, database and reporting programs, inspections, etc.

## TECHNICAL MEMORANDUM

**Subject:** Preliminary review of the Oak Lodge Sanitary District surface water monitoring program

**Prepared for:** Libby Barg, Barney&Worth

**Prepared by:** Richard Raymond

**Date:** November 11, 2009



### Introduction

This memo presents the results of a preliminary review of the surface water monitoring program of the Oak Lodge Sanitary District. It describes the sampling program, identifies the locations for sample collection, and presents a summary of the existing data. The description of the surface water monitoring program is based on review of the following documents:

- Oregon Department of Environmental Quality (ODEQ) NPDES MS4 Permit No. 101348
- Oak Lodge Sanitary District (OLSD) Interim Evaluation Report, April 27, 2006.
- OLSD Proposed Program for Stormwater Management, April 27, 2006.
- OLSD Rules and Regulations for Surface Water Manatement, July 2000
- ORS 340-041-0033, Table 20.
- OLSD Surface Water Management Annual Report 2005-2006, November 1, 2006.
- OLSD Surface Water Management Annual Report 2006-2007, November 1, 2007.
- OLSD Surface Water Management Annual Report 2007-2008, November 1, 2008.
- ODEQ Preliminary Draft Permit Template, October 1, 2008.
- OLSD Surface Water Citizens Advisory Committee minutes, August 5, 2008.

### Surface Water Management Program

#### Existing Program

The Oak Lodge Sanitary District surface water management program responds to the requirements of the NPDES Municipal Separate Storm Sewer System (MS4) discharge permit (Permit No. 101348) issued to 14 co-permittees, including Oak Lodge Sanitary District, on July 27, 2005. The Program includes a number of activities including inspection and maintenance of structural measures, a program to detect and remove illicit discharges, maintaining best management practices on construction sites, field screening for illicit connections, field screening of outfalls during wet weather, and instream baseline water quality monitoring.

The baseline water quality monitoring program is outlined in ODEQ Permit No. 101348, and consists of collecting water samples four times per year at the inlet and outlet of River Forest Lake. The samples are analyzed for total suspended solids (TSS), total dissolved solids (TDS), biochemical oxygen demand (BOD), chemical oxygen demand (COD), pH, temperature, turbidity, total Kjeldahl nitrogen (TKN) total phosphorus (PT), fecal coliform, and total oil and grease (OG).

In the 2006 storm water management program OLSD proposed to modify the mandated baseline water quality monitoring program to include additional sampling sites at the outlet of Boardman Creek, the outlet of Kellogg Creek, and at an additional site rotated among the other locations of interest in the District. The samples would be analyzed for the same list of constituents as required in permit No. 101348 except that turbidity would not be included. There is concern within the District that the cost of laboratory analysis for the additional samples might exceed the available resources.

## **Possible Future Requirements**

Since the issuance of permit No. 101348 in 2005 a TMDL has been completed for the lower Willamette River, and a preliminary draft permit template has been issued by ODEQ. Both these documents have implications for the water quality monitoring program at OLSD. The TMDL imposes load allocations for bacteria, mercury, and temperature, and envisions a 78 percent reduction in fecal coliform, a 27 percent reduction in mercury, and increases in shade along streams to approach the system potential shade. Implications for OLSD could include requirements to add sampling and analysis for mercury, and increases in sampling for fecal coliform and temperature. It is also possible that ODEQ may move toward specifying numerical targets for stormwater discharges in addition to the current requirements for operational and structural measures. Such requirements could substantially increase the cost of water quality monitoring within the District.

The preliminary draft permit template proposed by ODEQ suggests even greater demands on the OLSD, proposing sampling three times per year at a minimum of three MS4 discharges and 5 additional locations. Analysis for additional constituents would also be required including total and dissolved metals (copper, lead, and zinc), ammonia-nitrogen, orthophosphorus, *E. coli* bacteria (to replace fecal coliform), and limited pesticides. Sampling would be required to ensure that determinations could be made to assess the status of implementation of the storm water management plan, the effectiveness of specific BMPs, the long-term trends in receiving water quality associated with storm water discharges, and the long-term progress toward meeting TMDL benchmarks. These proposed changes would also substantially increase the cost of water quality monitoring within the District.

## **Results**

### **Sampling**

There have been 23 locations identified at which water quality data have been, or may be, collected, 13 of which are identified as major or “regulatory” outfalls. The sites are listed in Table 1, and mapped in Figure 1. The Environmental Protection Agency (EPA) defines a major outfall as one that is:

- a single pipe 36” in diameter or greater, or
- a single conveyance other than a circular pipe serving a drainage area of more than 50 acres, or
- a single pipe 12” in diameter or greater if the outfall also receives any drainage from lands zoned for industrial activity, or
- a single conveyance other than a circular pipe which receives drainage from more than two acres of land zoned for industrial activity.

Three of the identified sites (SW15, SW16, and SW17) were associated with the River Forest Lake study, and several of the locations appear to be related to special studies or included in the “roving” sites sampled occasionally. Samples have been collected at the outlet of River Forest Lake (SW16) since 1996, and the inflow to River Forest Lake (SW15) since 2003. Boardman Creek and Kellogg Creek have been sampled since 2005. Other locations have been sampled more recently, less often, or sporadically. The sample locations and frequency of sample collection are illustrated in Figure 2.

### **Water Quality Data**

Approximately 280 samples have been analyzed since 1996 for a variety of constituents as part of the surface water management program, not including the samples collected as part of the River Forest Lake Study, which are not considered here. The constituents measured include conventional pollutants (TSS, BOD, COD, TDS, pH, temperature, and turbidity), nutrients (TKN and PT), biological (fecal coliform), and oil and grease. The constituents in each category are discussed below.

The available data were assembled in an Excel® spreadsheet and examined for consistency, and obvious errors. Duplicate records were removed from the compilation. Some inconsistencies remained; for

example, a record that was duplicated for all constituents except “Solids” where one copy had “no” and the duplicate had “yes”. Such samples were retained for this analysis.

**Table 1.** OLSD water quality sampling locations.

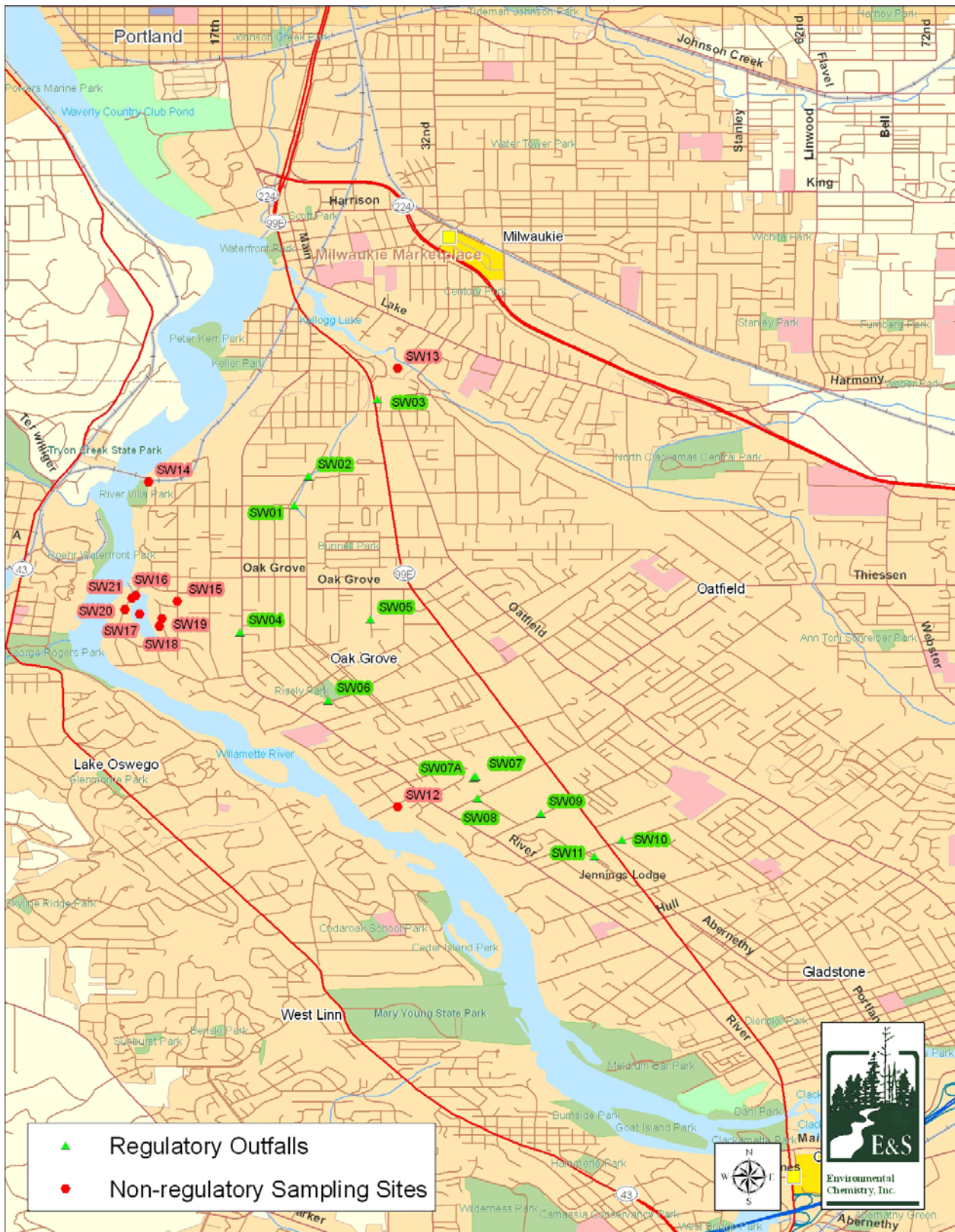
Number	Latitude	Longitude	Site ID	Notes	Unit ID	Location
1	45.4225	122.6420	SW01	No. 01 & 02	K10-6538	Courtney at Aresta
2	45.4220	122.6402	SW02	No. 01 & 02	K10-6538	Courtney at
3	45.4306	122.6346	SW03	No. 03	K10-1424	Mcloughlin Blvd. East Side 350' N of Park
4	45.4105	122.6363	SW04	No. 04	R30-0652	River Rd at Creighton-
5	45.4146	122.6018	SW05	No. 05	R50-3850	15100 Woodland Way-
6	45.4063	122.6380	SW06	No. 06	R10-7569	Risley Ave at Risley
7	45.4008	122.6273	SW07	No. 07	N30-0010	End of Vineyard Ave -
8				No. 07	N10-0656	Near End of Vineyard
9	45.3989	122.6262	SW08	No. 08	S1F-0014	Naef at Blanton
10	45.3971	122.6217	SW09	No. 09	S10-5677	4111 Roethe ( Western Steel Fabricators
11	45.3950	122.6171	SW10	No. 10	S40-1080	17833 Mcloughlin
12	45.3952	122.6159	SW11	No. 11	S1L-0009	4607 Boardman (Taco Loco)
13					K10-4375	Near Aresta at Torbank
14	45.3982	122.6328	SW12			Walta Vista
15	45.4337	122.6328	SW13			Park Ave
16	45.4245	122.6530	SW14			OLSD treatment plant
17	45.4148	122.6507	SW15			River Forest Lake Influent
18	45.4153	122.6541	SW16			River Forest Lake Effluent
19	45.4139	122.6547	SW17			River Forest Lake Study
20	45.4150	122.6543	SW18			14962 River Forest Lake
21	45.4141	122.6548	SW19			15122 River Forest
22	45.4133	122.6519	SW20			15055 Thornton
23	45.4127	122.6521	SW21			15271 Thornton

### **Conventional Pollutants**

Descriptive statistics for the measurements of conventional pollutants are provided in Table 2. Graphs showing the distribution of values by sample location are presented in Appendix 1. Water quality standards or typical effluent limits, if applicable, are shown on the graphs for relevant constituents.

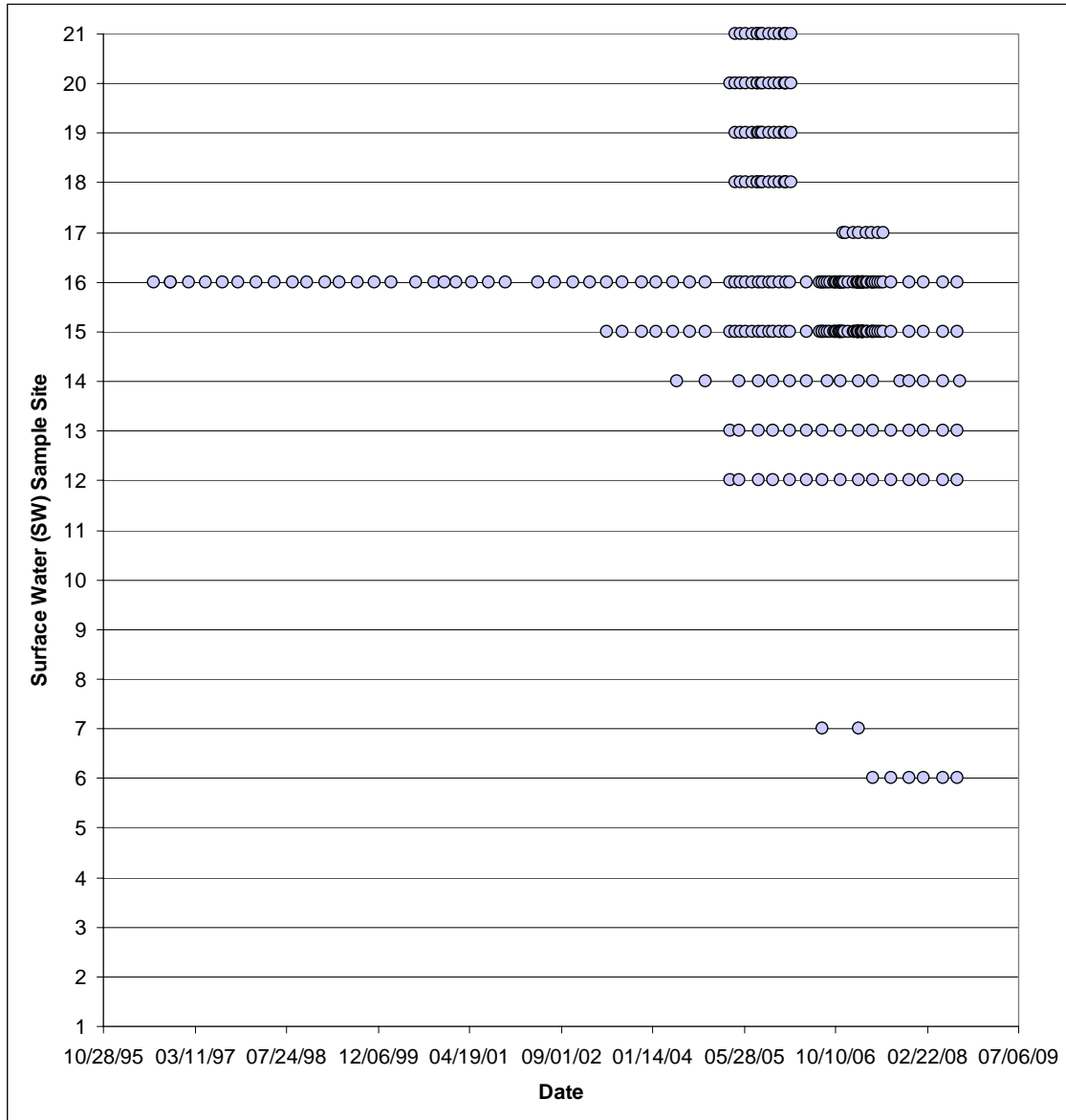
Some comments on specific constituents are provided below:

- **TSS** – Most values for TSS are below 25 mg/L. High values typically occur during the winter when rainfall and higher flows can mobilize sediments. An exception is site SW16, the outlet of River Forest Lake where high TSS values occur in the summer during algal blooms in River Forest Lake.
- **Turbidity** – Turbidity is correlated with TSS, and follows a similar seasonal pattern.
- **TDS** – Total dissolved solids are typically low, in the range of 100 to 200 mg/L. Two very high values at site SW12 suggest that there was an unauthorized discharge.
- **BOD/COD** – Oxygen demand is somewhat elevated compared to typical surface water streams, but is generally quite low relative to typical effluent discharge. High values at SW16, in the discharge from River Forest Lake are the result of algae growing in the lake. Algae growth may also contribute to high values for COD.
- **Oil and Grease** – With only a few exceptions (11 of 122 samples) oil and grease were below the method reporting limit (MRL) for the analysis.
- **pH** – Values of pH were generally within the limits specified by the water quality standards.



**Figure 1.** Map of surface water sampling sites for Oak Lodge Sanitary District.

- **Temperature** – Summer temperatures have regularly exceeded relevant water quality standards at locations in and downstream of River Forest Lake. Occasional exceedences have occurred at other locations.
- **Dissolved oxygen (DO)** – Dissolved oxygen measurements were taken at locations in River Forest Lake in 2005-2006. Most of the DO measurements are below relevant water quality standards, and approximately half of the DO measurements have been below 6.0 mg/L. This seems to be an unusually large fraction of the measurements. It suggests a high BOD exists in the lake, possibly a result of the large algae blooms, or perhaps a bias in the methodology.



**Figure 2.** Frequency of sampling at various locations in the Oak Lodge Sanitary District.

**Table 2.** Descriptive statistics for measurements of conventional pollutants at various surface water locations in the Oak Lodge Sanitary District<sup>1</sup>.

	<i>TSS</i>	<i>TURB</i>	<i>TDS</i>	<i>BOD</i>	<i>COD</i>	<i>O&amp;G</i>	<i>pH</i>	<i>TEMP.</i>	<i>DO</i>
Mean	23	19.3	122	3	19.0	2.0	7.0	14.0	6.2
Median	11	10.8	104	2	10.0	1.6	7.0	13.5	6.5
Std. Dev.	41	30.5	202	5	22.6	1.4	0.6	4.4	1.8
Range	399	241.4	1760	42	117.5	10.5	7.7	18.0	6.4
Minimum	1	1.6	1	0	2.5	0.5	1.0	5.0	2.2
Maximum	400	243.0	1760	42	120.0	11.0	8.7	23.0	8.6
Count	198	172	119	174	108.0	131	196	186	34

### **Biological Pollutants**

Descriptive statistics for the measurements of biological pollutants are provided in Table 3. Graphs showing the distribution of values by sample location are presented in Appendix 1. Water quality standards or typical effluent limits, if applicable, are shown on the graphs for relevant constituents.

Fecal coliform bacteria and *E. coli* are measured as indicators of possible contamination of surface water by sewage. They are imperfect indicators, however, because there are many other sources of bacterial contribution to surface water including wildlife, birds, and pets.

**Table 3.** Descriptive statistics for measurements of biological pollutants at various surface water locations in the Oak Lodge Sanitary District

	<i>FECAL</i>	<i>E. Coli</i>	<i>CL2</i>
Mean	606	340	0.02
Median	300	120	0.00
Std. Dev.	1125	581	0.04
Range	12000	5090	0.30
Minimum	0	10	0.00
Maximum	12000	5100	0.30
Count	179	164	158

Fecal coliform exceeded the single sample water quality standard (406 colonies/100 mL) in 41 percent of the samples, and exceeded the 126 colonies/mL average standard in 73 percent of the samples. The rates of exceedence for *E. coli* were 30 percent and 51 percent respectively. High values are not obviously associated with a particular sample site or a particular season.

One would not expect to see a chlorine residual (CL2) in a surface water stream. Presence of chlorine in surface water suggests a discharge of treated municipal water. However, most of the samples with chlorine residual are associated with River Forest Lake and suggest possibly the use of chlorine treatment in an attempt to control algae.

### **Nutrients**

Descriptive statistics for the measurements of conventional pollutants are provided in Table 4. Graphs showing the distribution of values by sample location are presented in Appendix 1. There are no water quality standards for nutrients, however, EPA recommends nutrient criteria for Willamette valley streams of 0.047 mg/L for total phosphorus (equivalent to 0.14 mg/L TOTPO<sub>4</sub>) and 0.23 mg/L for TKN<sup>2</sup>. Phosphorus values measured at the Oak Lodge Sanitary district sampling sites are in the range of the established nutrient criteria, although values appear to have increased in recent years. Most samples exceeded the guidelines for TKN, some from River Forest Lake by a substantial amount, probably as a result of extensive algal growth in the lake.

<sup>1</sup> For purposes of calculation values listed as non-detect (ND) or “less than” have been converted to ½ the method reporting limit.

<sup>2</sup> EPA 2001. Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion I. EPA 822-B-01-012. EPA Office of Water, Washington, D. C.

**Table 4.** Descriptive statistics for measurements of nutrients at various surface water locations in the Oak Lodge Sanitary District

	Mean	Median	Std. Dev.	Range	Minimum	Maximum	Count
<i>TOTPO4</i>	0.046	0.070	3.285	2.745	0.005	37.3	108
<i>TKN</i>	0.1	0.5	4.9	9.9	0.1	107.7	108
<i>PT</i>	0.11	0.07	0.15	0.89	0.00	0.90	108

### **Trace Metals**

Samples from selected locations have been analyzed for copper, lead, and zinc since 2005. Relatively few of the samples have had detectable levels of copper (5 of 21 samples), lead (3 of 21 samples), or zinc (11 of 21 samples). All of the results for trace metals that were above the method limits were also greater than the water quality standard (not adjusted for hardness) for chronic exposure of copper (0.012 mg/L), lead 0.0032 mg/L), and zinc (0.11 mg/L). Descriptive statistics for measurements of trace metals are provided in Table 5.

**Table 5.** Descriptive statistics for measurements of trace metals at various surface water locations in the Oak Lodge Sanitary District

	Mean	Median	Std. Dev.	Range	Minimum	Maximum	Count
<i>COPPER</i>	0.539	0.014	1.050	3.100	0.001	3.100	28
<i>LEAD</i>	0.018	0.005	0.041	0.159	0.001	0.160	28
<i>ZINC</i>	4.188	0.037	7.975	25.899	0.001	25.900	28

## **Conclusions**

### **Spatial Coverage**

The sampling points are all located in the lower (downstream) half of the District. The locations appear to be based more on the physical characteristics of the conveyance than on an attempt to provide uniform coverage of the various catchments. As such there may be gaps or unnecessary duplication in locations. A more detailed analysis may suggest sample sites that can be eliminated, or locations currently not sampled that should be. An analysis of the sample locations in relation to the catchment area represented at each location may allow a more efficient sample network. There do not appear to be sample locations placed that would adequately demonstrate the effects of current or potential future BMPs or stream restoration. Stipulations in future permits may require an increase in the number of sampling locations.

### **Frequency**

Current sampling frequency is sufficient to meet current regulatory requirements for sampling discharges to receiving waters, and may be sufficient for future permit requirements as well. However, more frequent sampling at some locations, for at least some constituents, may be required in order to demonstrate the effects of remedial actions, or meet the requirements of future permits.

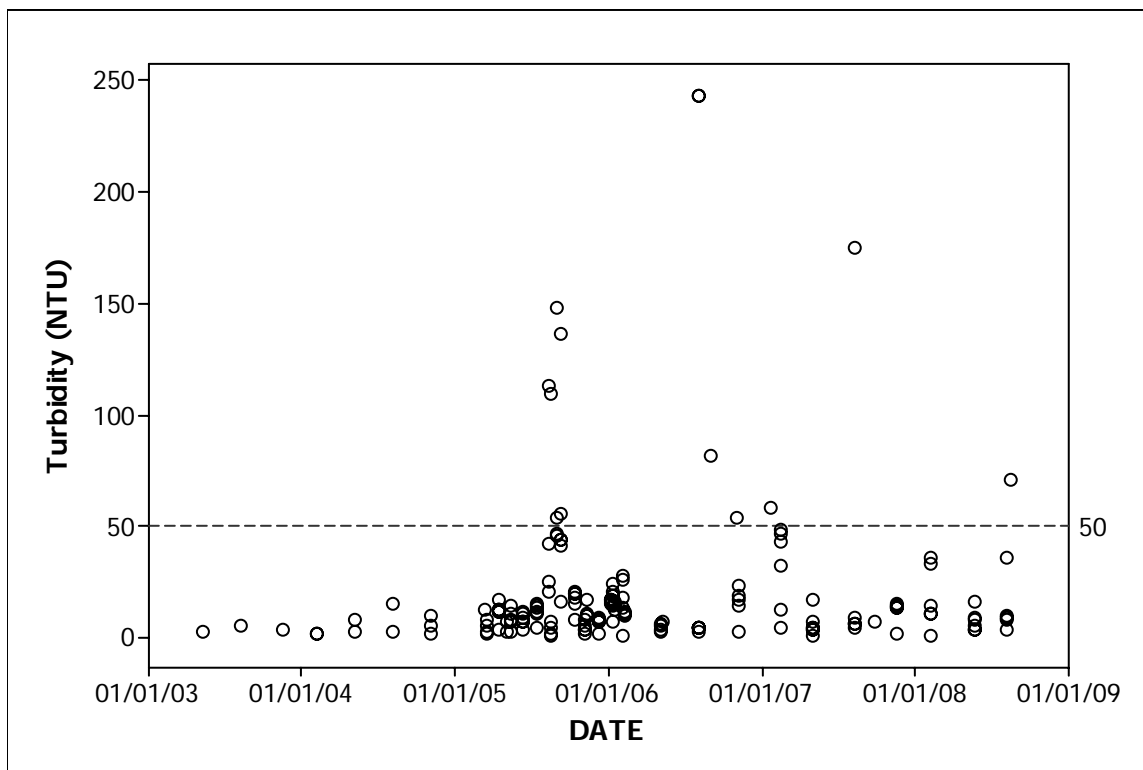
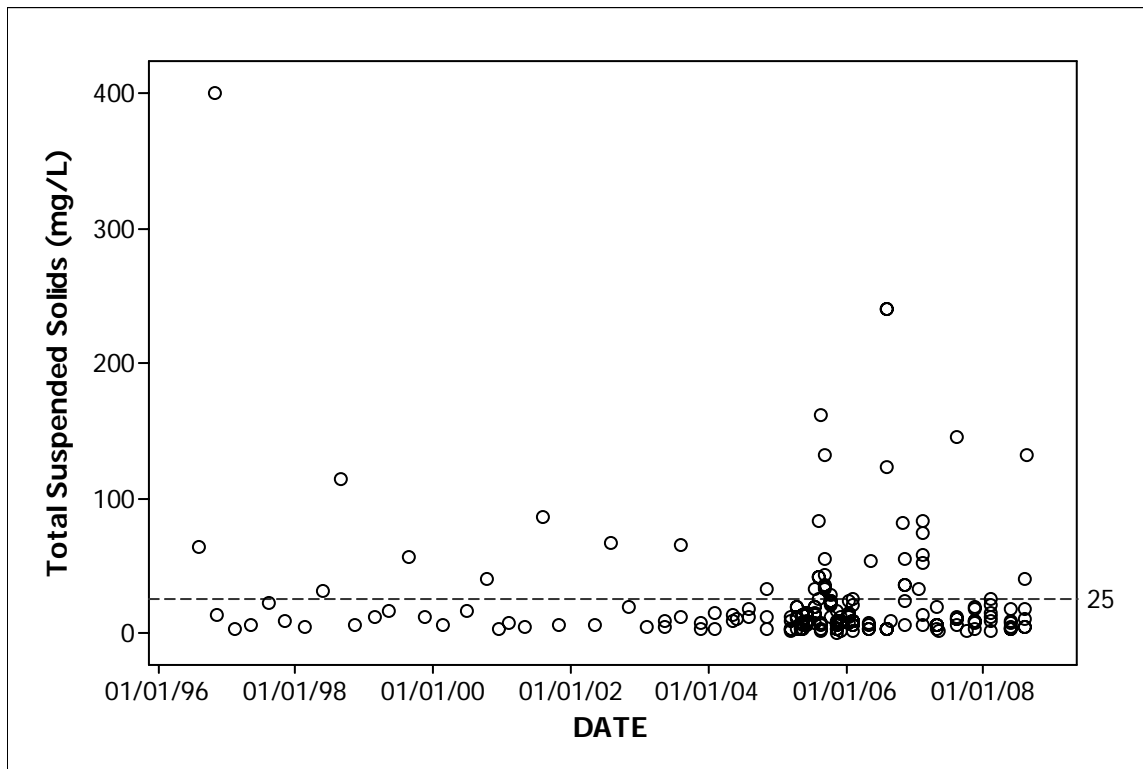
### **Water Quality**

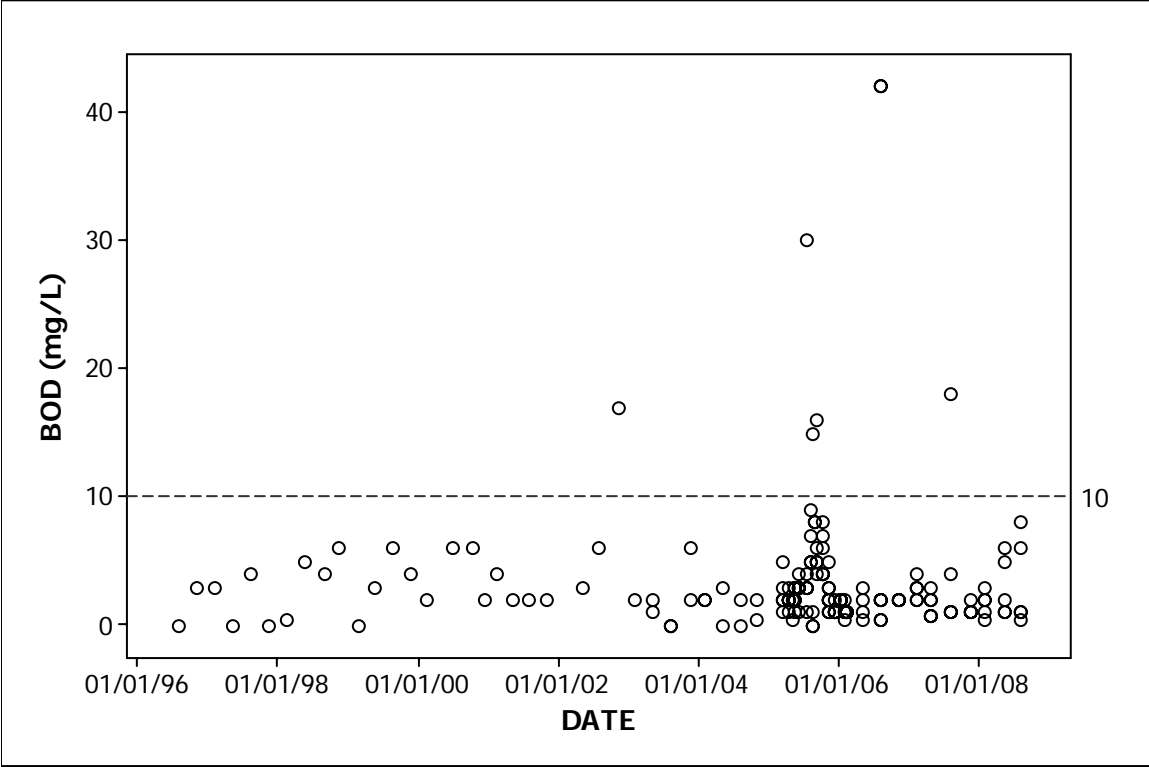
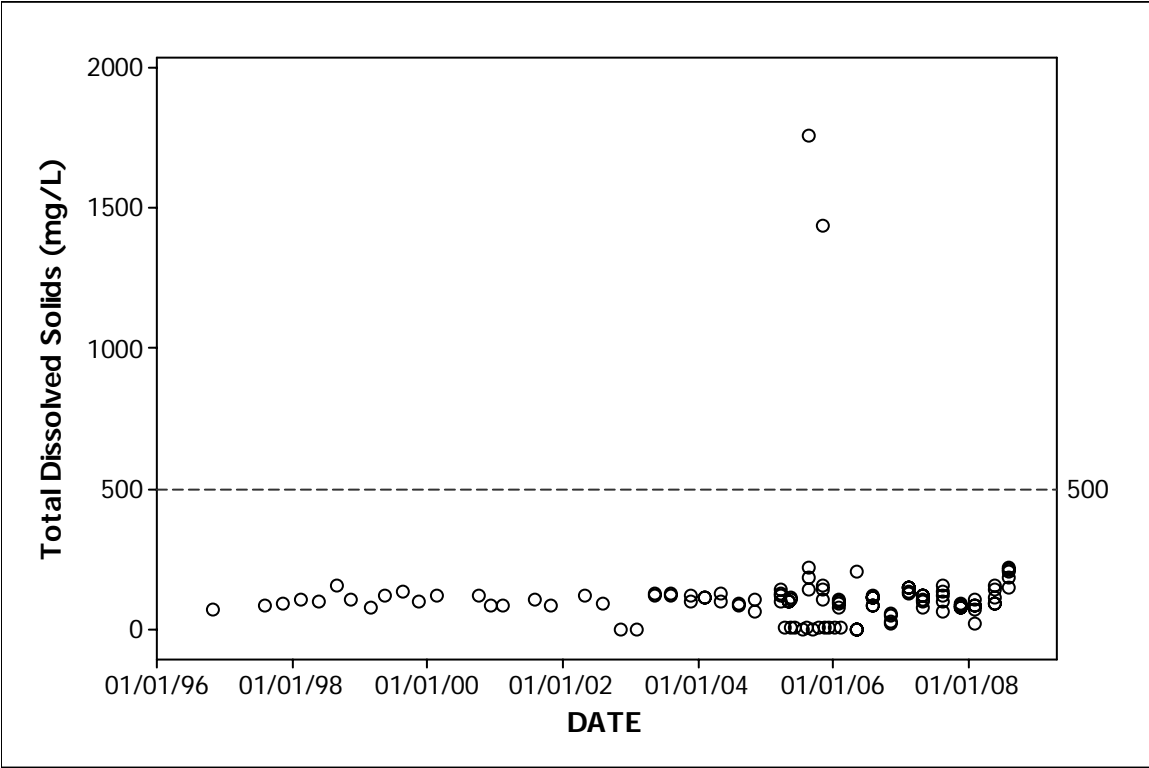
Water quality of the sites that have been sampled is generally good, although some constituents may be outside the acceptable bounds for surface water quality. Temperature in particular may present a problem for future regulatory compliance. Exceedence of criteria by bacteria may indicate problems with wastewater contamination, but is more likely to represent contamination from wildlife or pets.

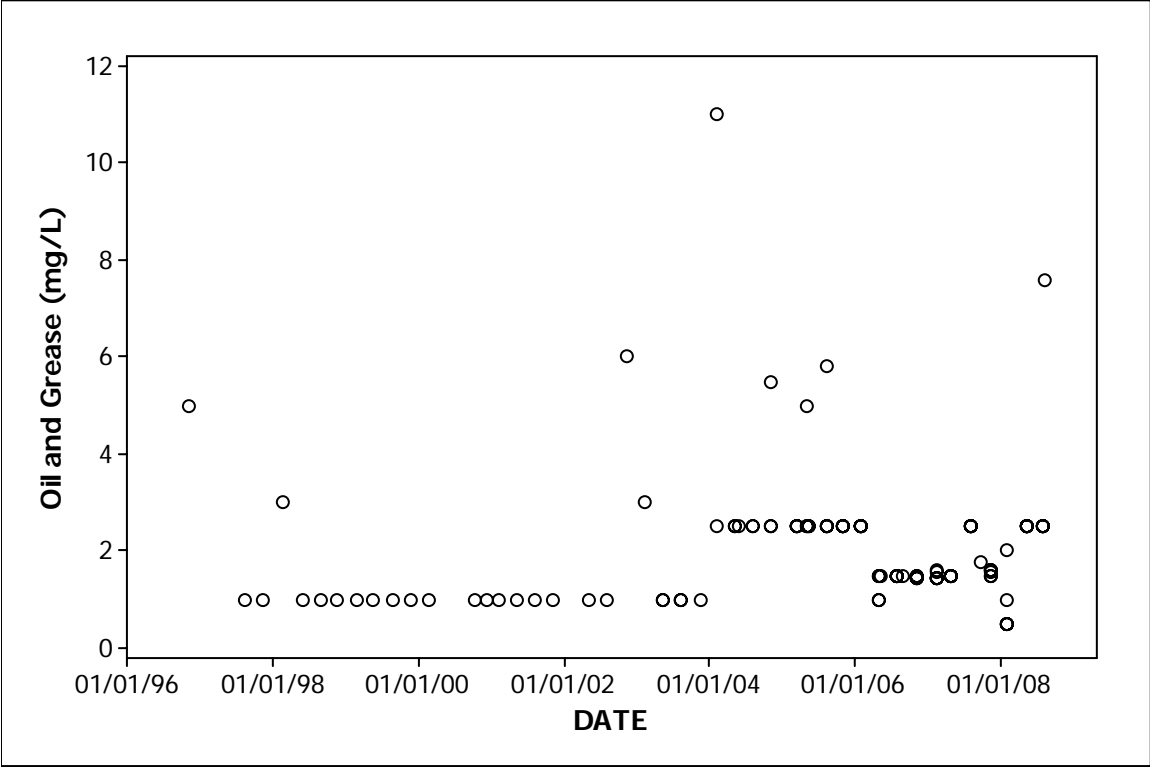
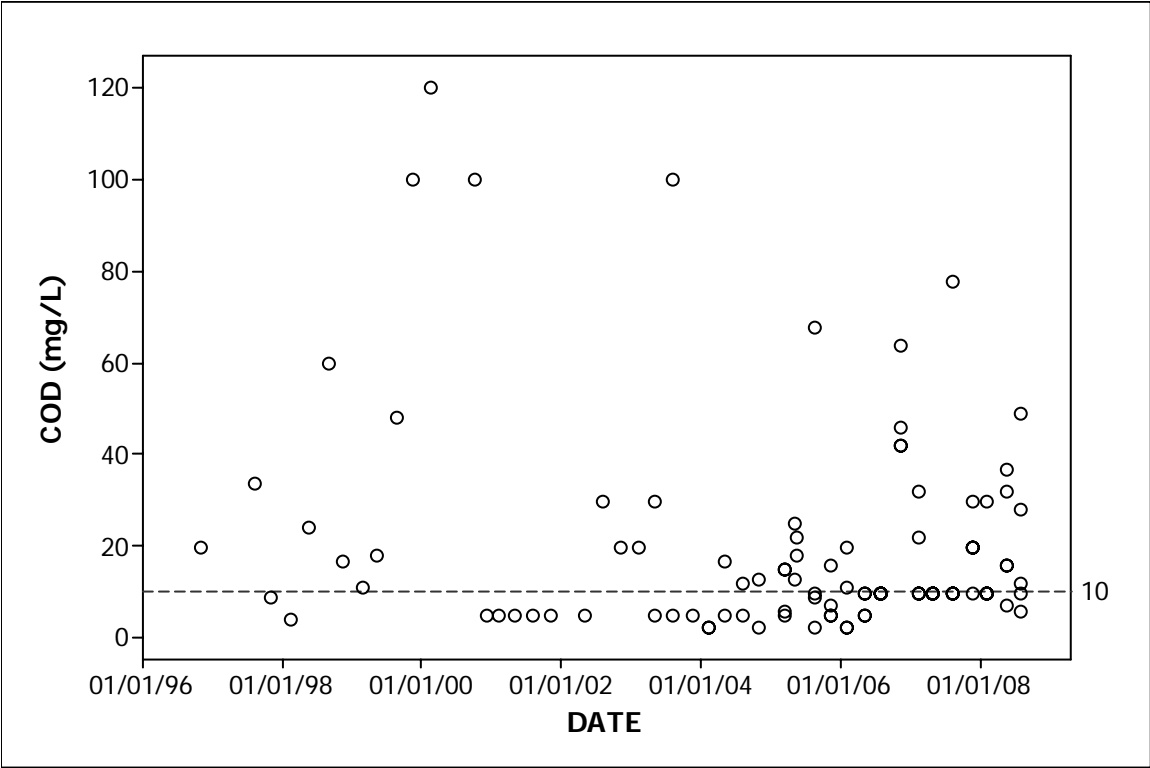
### **Data Quality**

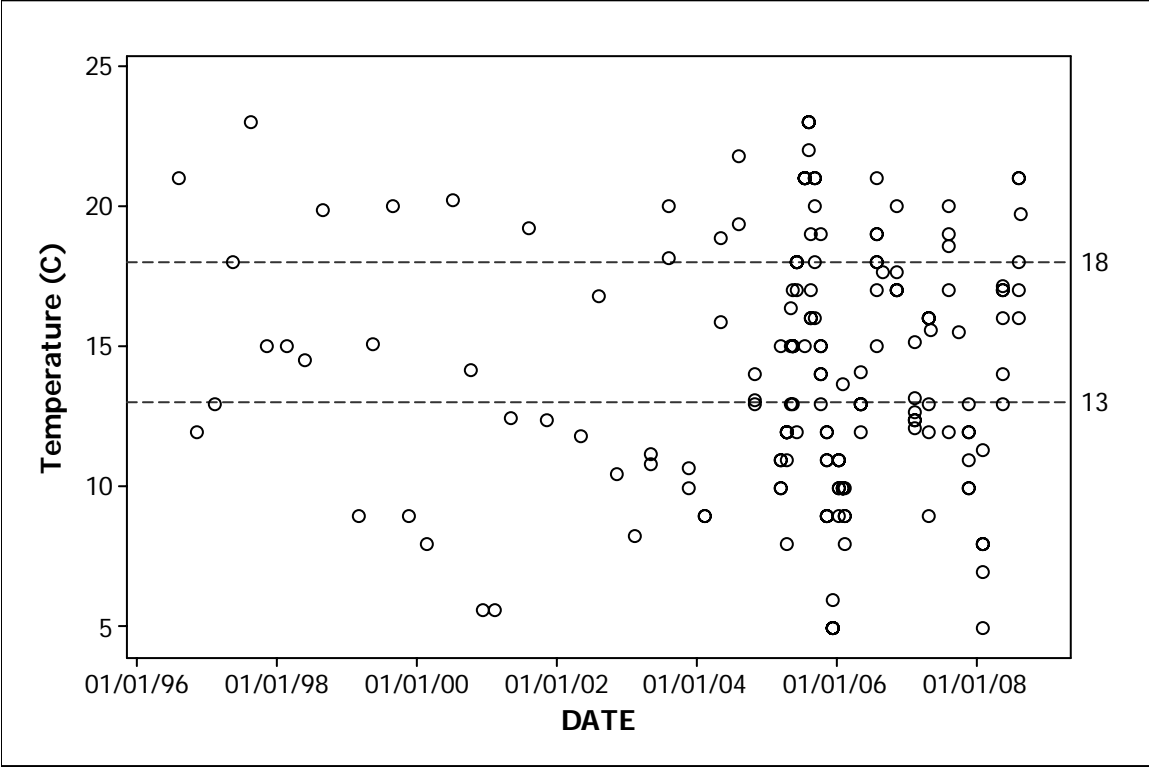
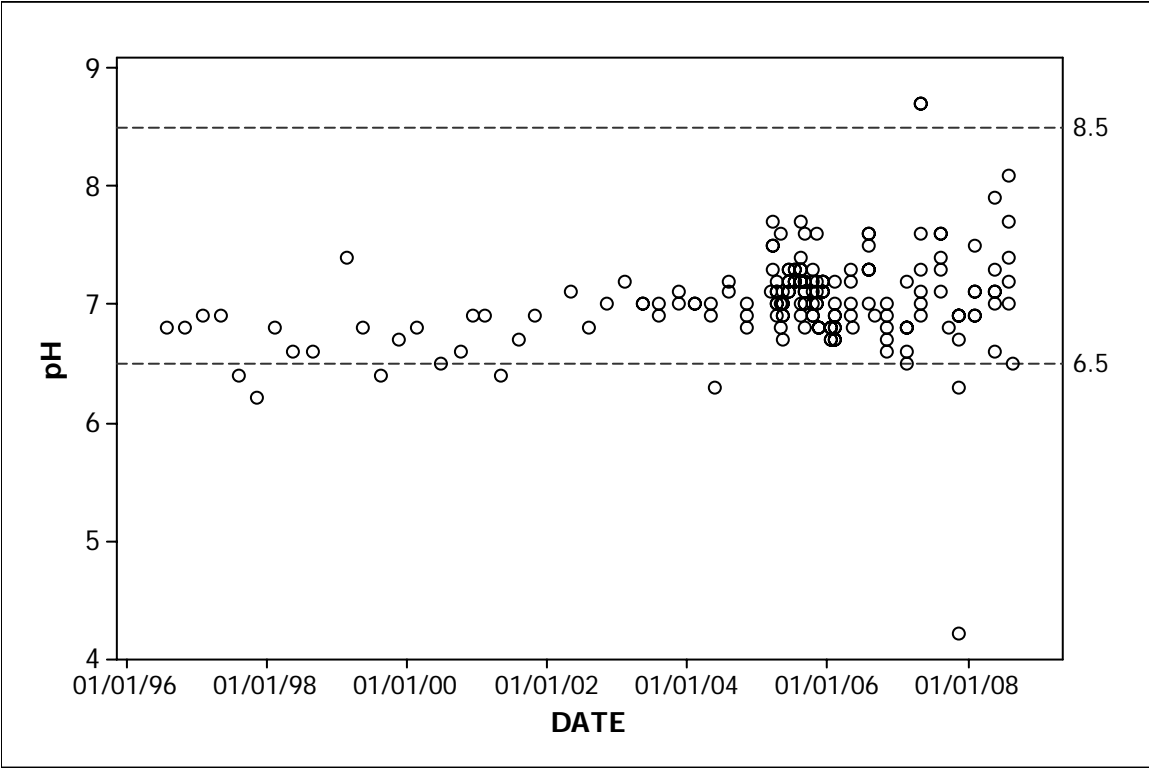
It was not clear from this review if a quality assurance plan is in effect. If not, one should be developed and adhered to for future work.

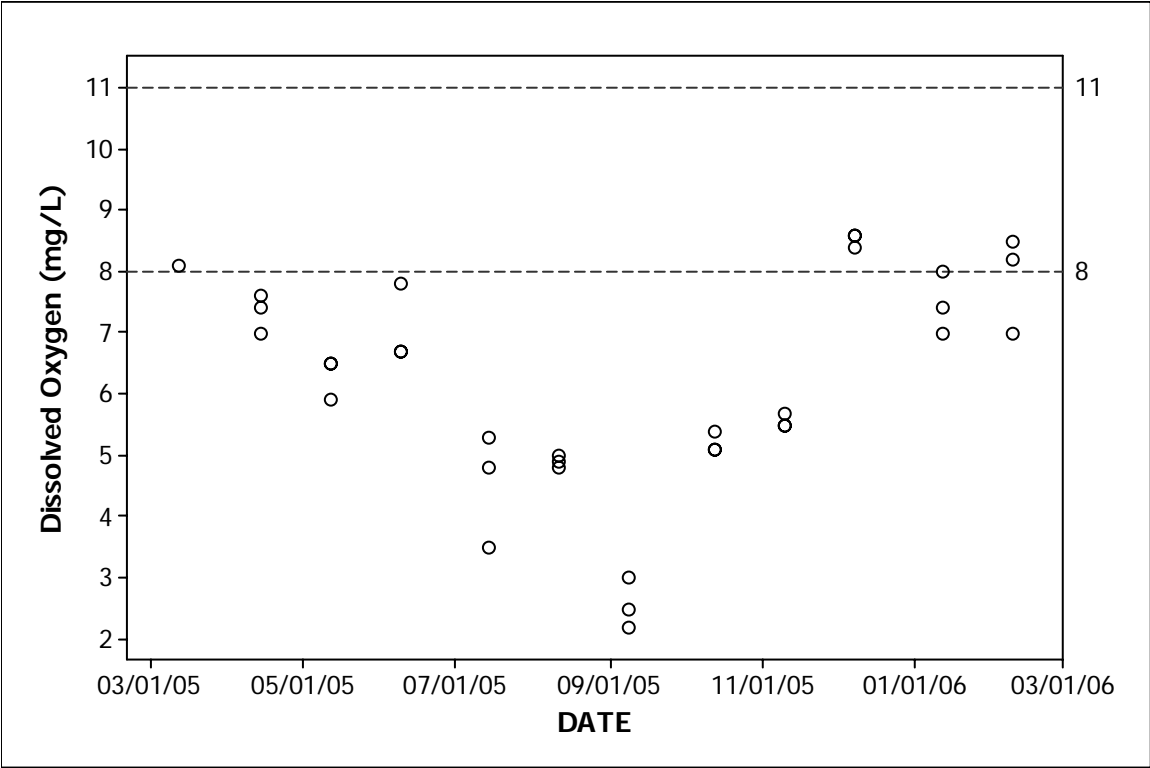
## Appendix: Graphs of Water Quality Data Conventional Pollutants



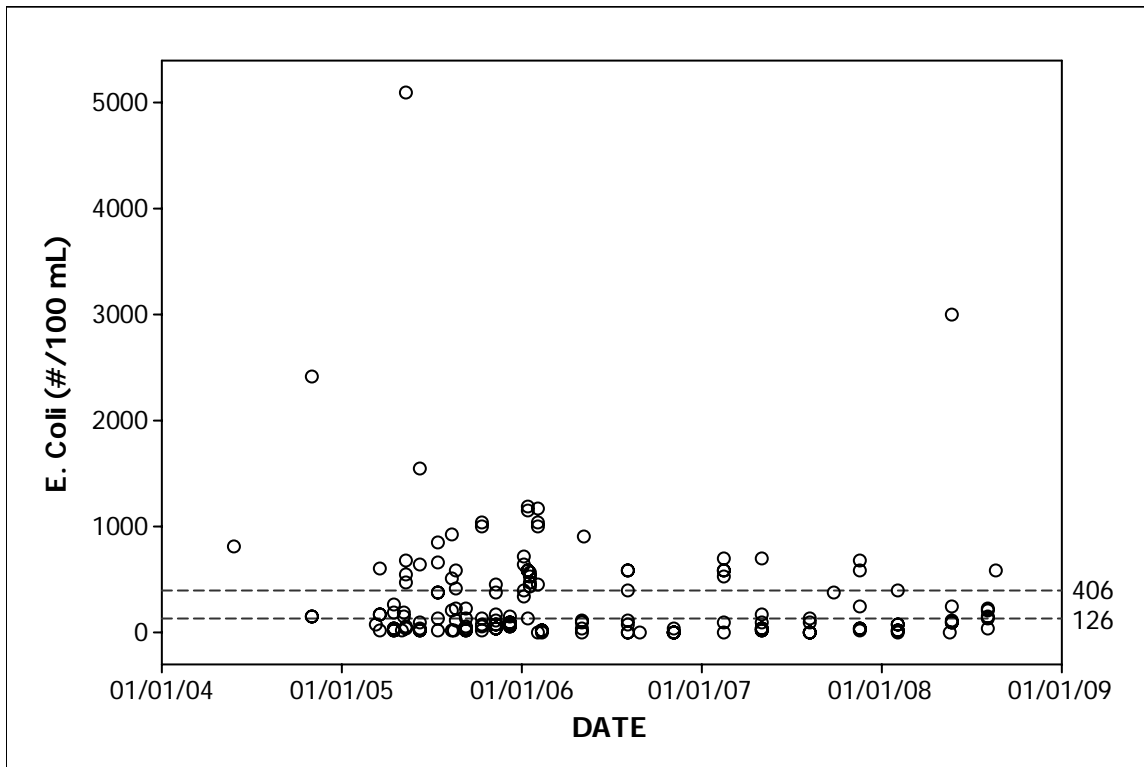
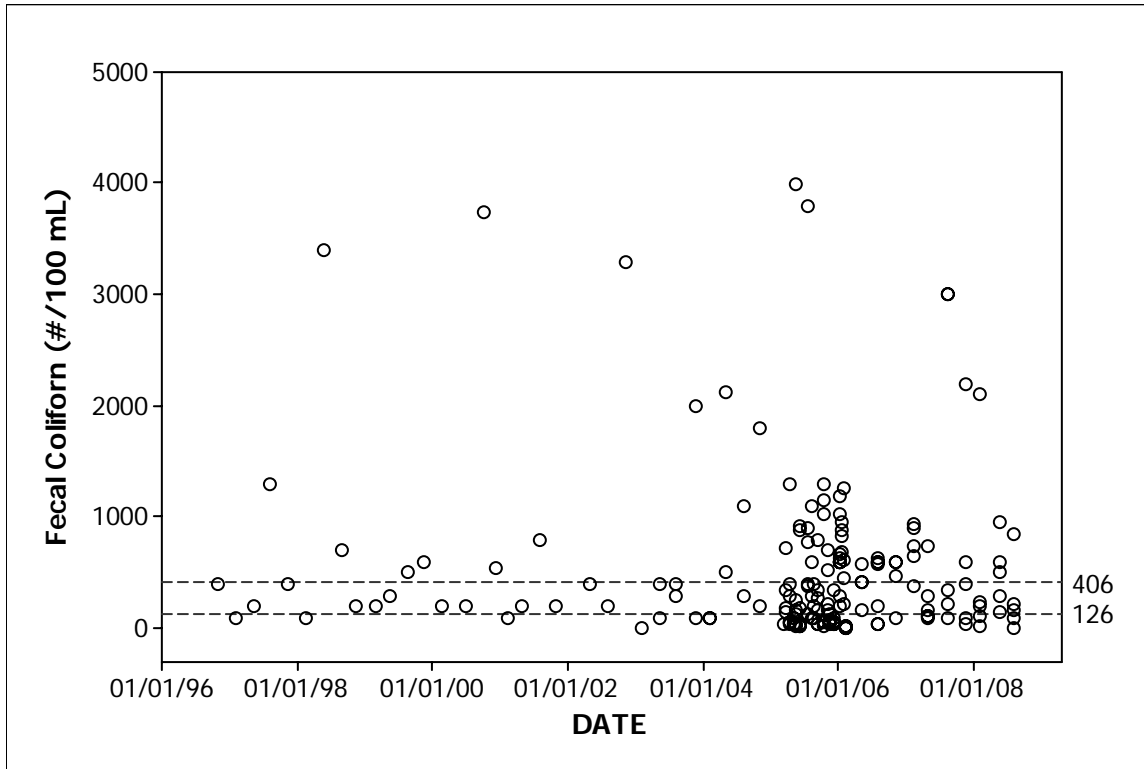






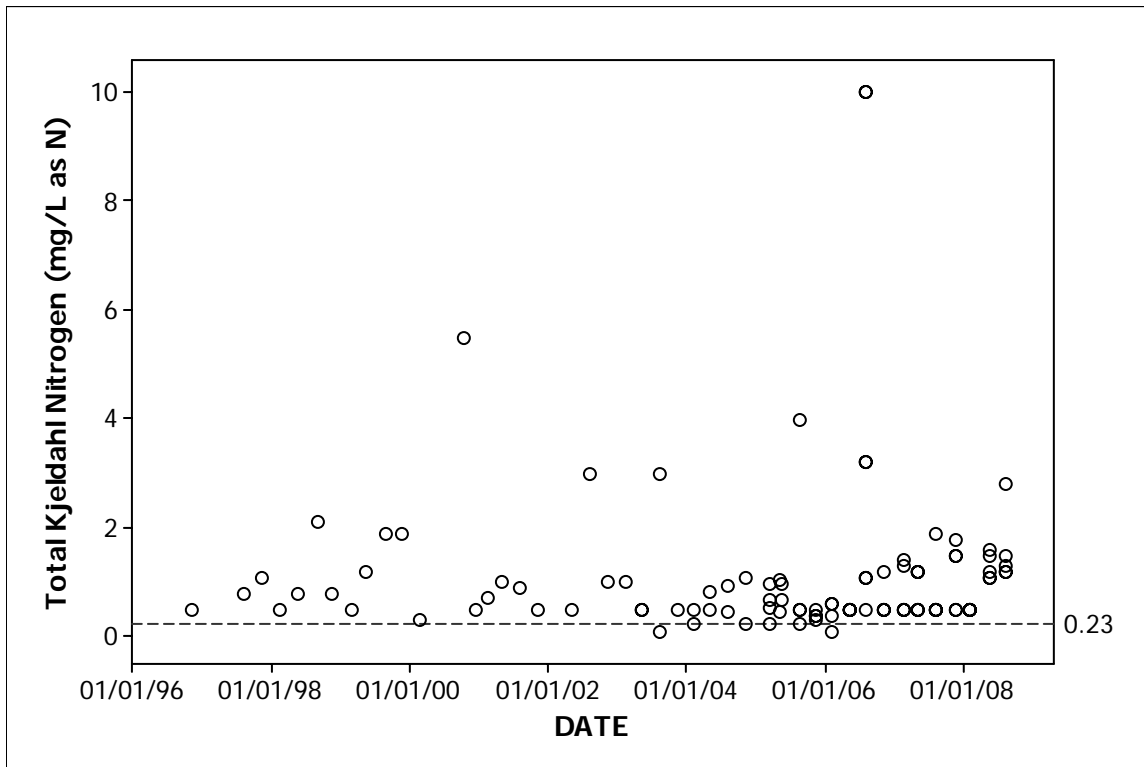
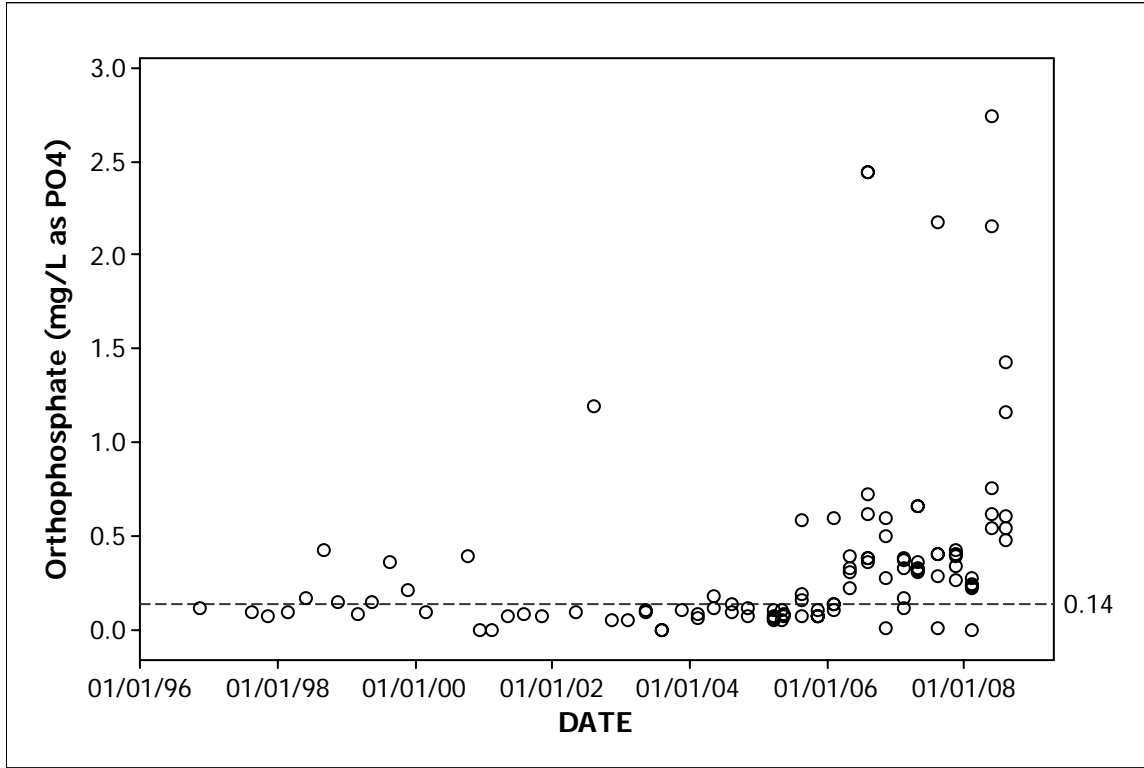


### Biological Pollutants

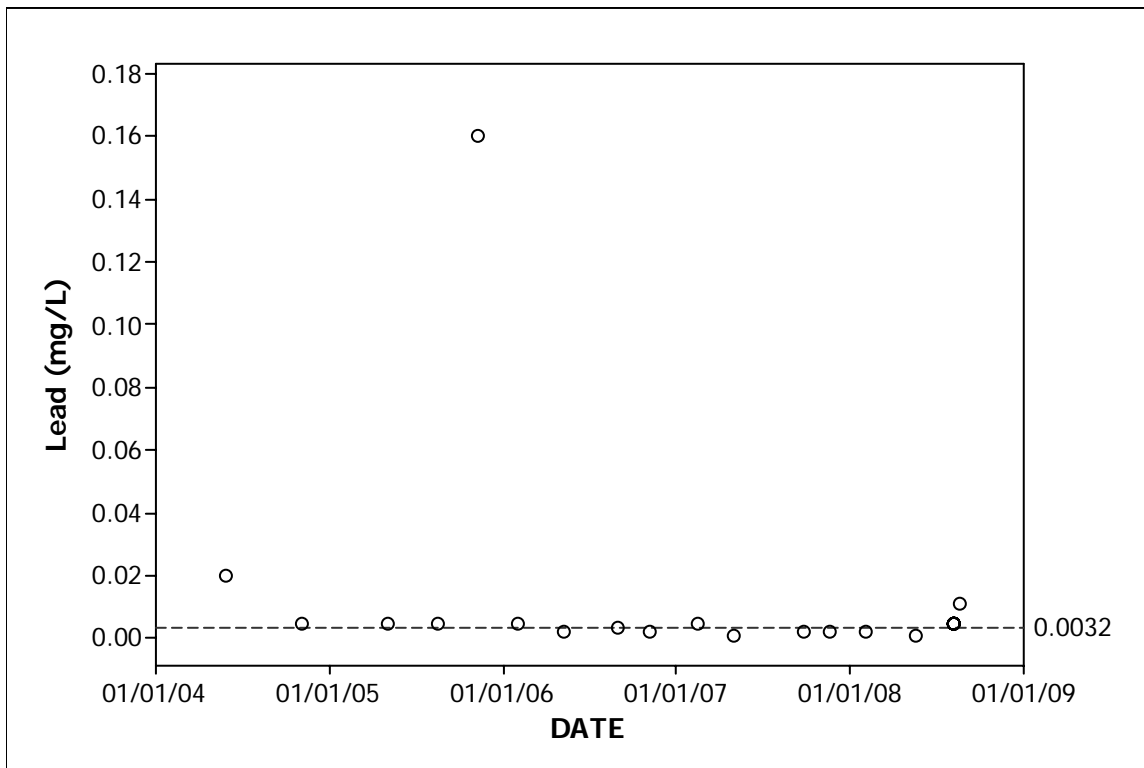
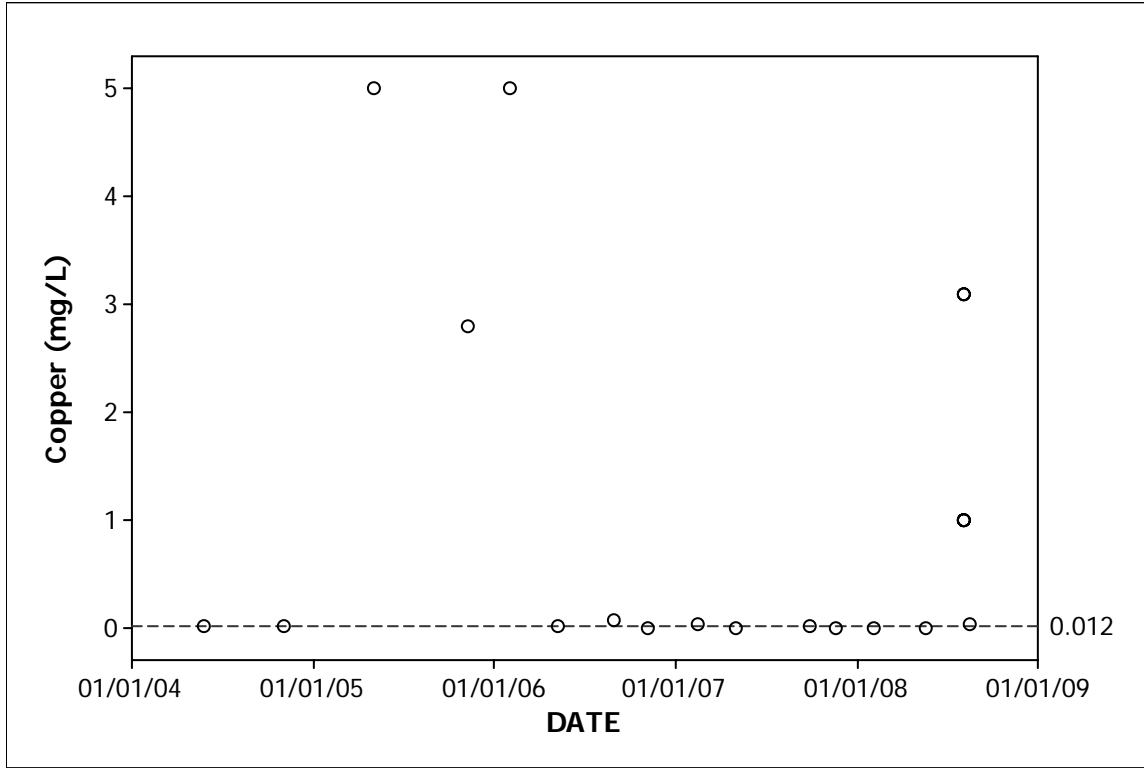


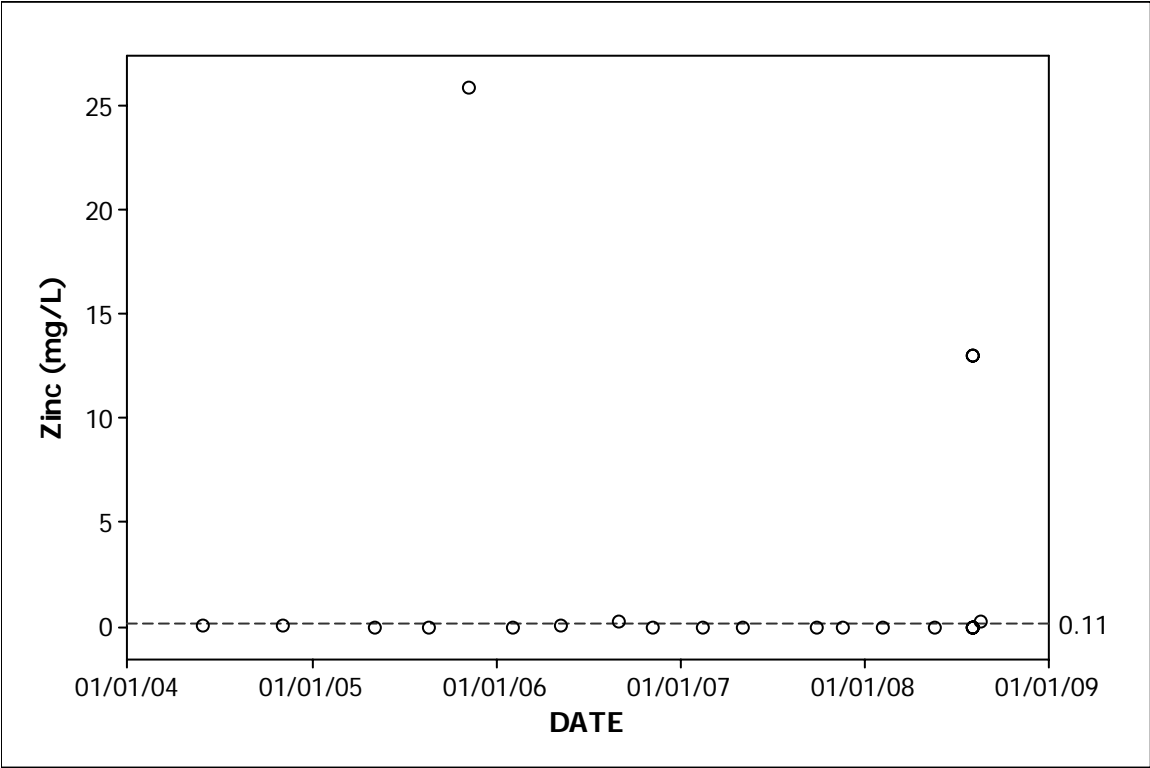


## Nutrients



### Trace Metals





# Oak Lodge Sanitary District SWM Strategic Plan – Stakeholder Interviews

## HIGHLIGHTS

Barney & Worth, Inc. leads a consultant team that is developing a strategic plan for Oak Lodge Sanitary District's surface water management (SWM) program. As an early step, the consultants conducted interviews with a cross-section of key stakeholders. Participants included 28 community leaders, agency representatives, customers, and District Board members and staff.

Interviews were conducted in November - December 2009. Stakeholders were invited to share their views on stormwater issues and problems, the District's current SWM services, and to offer their personal priorities for future improvements.

The following presents highlights of the interview results. A list of participants and discussion guide are attached.

1. **A lack of a clear SWM mission undermines the District's effectiveness.** With numerous parties involved – “It's all a gray area”. Finger pointing among agencies and others “doesn't get the job done”. Many SWM needs fall through the cracks, stakeholders complain. The District's roles in surface water management need to be clarified, across jurisdiction boundaries and internally.
2. **Customers and others aren't sure what services the District provides.** The District's SWM program is understaffed, unfocused, delivering little tangible service. The District's lack of maintenance is evident to all. Many observers can see little visible sign of surface water management services funded by the District's monthly SWM fee. District staff are friendly and respond to customers' complaints – “But nothing happens”.
3. **The District's SWM priorities appear to be complaint-driven.** Some local observers feel too much attention is paid to River Forest Lake and other problem spots where “voices are loud in comparison to the size of the problem”.
4. **Community leaders, customers and other agencies expect Oak Lodge Sanitary District to play a leadership role.** Area voters have shown their strong support for maintaining the District's independent wastewater system. In the minds of most observers, that streak of independence also suggests the District should take the lead in addressing SWM problems. The County shouldn't be counted on any longer to solve SWM problems within OLSD boundaries, they say.
5. **Flooding is the main problem.** Chronic flooding events at trouble spots along Boardman Creek and other area streams seem to go unchecked year after year. For most stakeholders this is the top priority – in contrast to the District's stated focus on water quality.
6. **Stringfield Park is a model for District SWM system improvements.** This successful partnership with the Parks & Recreation District and others shows what's possible in addressing water quantity (flood storage) and quality (natural treatment), while providing many other benefits: recreation, interpretation, habitat, etc. Partners describe working relations with District staff as collaborative and productive.

7. **Regulations are changing, with tighter water quality standards anticipated.** Stakeholders aren't sure how these regulatory changes will affect the District. There's some anxiety that environmental regulators will have unrealistic expectations that are impossible to meet. But as time goes on, participants forecast, more pollutants and their water quality effects will be recognized. Costs to stay in compliance will rise. Some stakeholders are supportive of more stringent regulations: "The stronger the better – we need better enforcement to hold people accountable."
8. **Customers are willing to pay more in SWM fees if they can see the benefits.** Today, observers say customers "don't have a clue" what their fees support. The District must demonstrate how the SWM program protects the environment, describe the need for improvements then show concrete progress. Customers will – gladly or grudgingly – pay more, as shown by the recent pattern of customer acceptance for wastewater rate increases.
9. **With community education, area residents and businesses can be enlisted to help address SWM problems.** By making information available on best practices for streambank property owners, gardeners, home and business owners, the "younger generation" and others, customers can contribute significantly to water quality and quantity solutions. Participants report a growing environmental consciousness, which can boost voluntary actions to protect and enhance area watersheds.
10. **"Let's get started"**. Community leaders and others express some impatience about the District's perceived unwillingness to make its surface water management mission a priority. Overshadowed by wastewater and stalled in recent years, the SWM program "needs a jump start". Key stakeholders want the District to take a proactive – not a reactive – stance. It's no longer acceptable to "plead poverty" as an excuse for inaction, these observers emphasize.

**Oak Lodge Sanitary District  
SWM Strategic Plan – Stakeholder Interviews**

**PARTICIPANTS** Rev. 01/24/10

Benjamin Benninghoff	Oregon Department of Environmental Quality
Jeff Bornefeld	OLSD customer, Boardman Creek flood victim
Peter Boyce	City of Gladstone
Kim Buchholz	Willamette View Manor
Tonia Burns	North Clackamas Parks & Recreation District
Vassar Byrd	Rose Villa
Tom Civiletti	SWM-CAC
Casey Cutting	Developer
Ugo Di Lullo	Clackamas County Department of Transportation & Development
Tom Foeller	OLSD Board, SWM-CAC
Gerry Foy	Developer, MPCAC
Marty Guenther	OLSD
Thelma Haggemiller	Friends of the Trolley Trail
Michelle Healy	North Clackamas Parks & Recreation District
Eleanor Hunter	Oak Grove Community Council
Richard Imholt	Clackamas County Vector Control District
Chips Janger	Clackamas County Urban Green, Friends of Trees
Rob Kappa	North Clackamas Urban Watersheds Council
Myron Martwick	SWM-CAC, MPCAC, River Forest Lake area property owner
Weston Miller	OSU Extension Service, Master Gardeners
Earl Moore	OLSD customer, Boardman Creek flood victim
Richard Pauker	OLSD
Jack Perry	OLSD
Jim Puckett	OLSD customers, River Forest Lake area property owners
Michael Read	OLSD
Ronelle Sears	City of Milwaukie
Susan Shawn	North Clackamas Urban Watersheds Council
Greg Smith	Jennings Lodge CPO

# Oak Lodge Sanitary District

## SWM Strategic Plan – Stakeholder Interviews

### DISCUSSION GUIDE

*The Oak Lodge Sanitary District is preparing a Strategic Plan to identify future priorities for its surface water management program. At this early stage of planning, we are asking community leaders to share their views. Your responses are an important part of this planning and will be kept confidential.*

#### Introduction

1. How have you been involved with Oak Lodge Sanitary District and/or surface water management (stormwater) issues?
2. What's your impression of the District's SWM program?

#### Issues and Problems

3. Are you aware of any issues or problems in the Oak Grove/Jennings Lodge/Oatfield Ridge area regarding stormwater or surface water management?
4. Are any of these items a concern for you?
  - a. Maintenance of SWM facilities
  - b. Water quality of streams
  - c. Future state/federal regulations
  - d. River Forest Lake
  - e. Flooding
  - f. Development impacts/erosion
  - g. Loss of trees
  - h. Restoration of streams and riparian areas
  - i. Other issues
5. What's your number one issue for surface water management in this area?

#### Priorities

6. Which of the following items should be priorities in the future for the District's SWM program? (Read list, then review item by item)
  - a. Reduce flooding
  - b. Eliminate pollution
  - c. Improve maintenance of the existing SWM system
  - d. Develop new SWM facilities
  - e. Minimize development impacts
  - f. Acquire land for flood and pollution control
  - g. Improve wetland management
  - h. Improve habitat for fish and wildlife
  - i. Involve area citizens/District customers in decisions
  - j. Provide citizens/customers with "how to" information on SWM best practices
7. Which of these items would be your own top priority?

## **Community Awareness**

8. What do you think is customers' current perception of the District's SWM program? (Any misconceptions?)
9. What do customers need to know about surface water management? What are the best ways to inform them?
10. Surface water management is one of the public services in which customers play a major role – controlling erosion, or keeping excess flows or pollutants from entering a stream, for example. How can the District help prepare citizens to follow in SWM best practices? Should any particular groups be targeted to receive information?

## **Funding**

The District's current SWM fee is \$6.00 per month. That's comparable to some other area agencies providing similar services: Clackamas County Service District #1, Beaverton, Oregon City, and others.

11. The SWM fee appears on customers' sewer bills as a separate item. Do you think customers understand what this fee pays for?
12. If priorities to improve the SWM program cost more money and require the District to raise customers' monthly rates – do you think that will be a problem? How large an increase (if any) would be acceptable to customers?

## **Agencies**

13. Oak Lodge Sanitary District shares responsibility for surface water management with several other parties. Do you have an idea who some of those might be? (and their roles?)
14. Some of the others involved with SWM duties include Clackamas County, ODOT, the nearby cities and private property owners. Do you have any idea how these other efforts are coordinated with the District? (Are you aware of any opportunities for improvement?)
15. Do any peer organizations come to mind that might serve as models for the District's SWM program?

## **Final Advice**

16. Can you suggest any further persons or organizations we should contact about surface water management in the Oak Lodge area?
17. If you were asked to name the number one thing you would change about Oak Lodge Sanitary District's surface water management program – what would it be?
18. Any additional comments or suggestions?