FINAL REPORT

185TH AVENUE NE BIORETENTION STORMWATER TREATMENT SYSTEM PERFORMANCE MONITORING

Prepared for
Andy Rheaume
City of Redmond Public Works
Natural Resources Division

Prepared by
Herrera Environmental Consultants, Inc.

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Note:
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Prepared for
Andy Rheaume
City of Redmond Public Works
Natural Resources Division
15670 NE 85th Street
Redmond, Washington 98052

Prepared by
Herrera Environmental Consultants, Inc.
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
Telephone: 206/441-9080

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PREFACE

Prior to the publication of this report a mid-project report was released in 2012 documenting observed pollutant export from the study swales on 185th Avenue NE (Herrera 2012a). In response to the mid-project report Ecology issued temporary restrictions on the use of bioretention and recommended further study of these systems. The City of Redmond subsequently received a grant to study 6 additional full-scale bioretention systems (monitoring to begin in 2014), while Kitsap County received a grant to conduct column studies of various alternative bioretention soil media (study to begin in 2014). These studies, combined with the additional information found in this report will provide data which will inform Ecology's decisions regarding the future use of bioretention in Washington State.

This study would not have been possible without grant funding from the Washington State Department of Ecology (Ecology). The City of Redmond Department of Public Works Natural Resources Division would like to thank the project team members for their support through this effort. The Transportation Division was cooperative throughout the planning and construction process and this study would not have been feasible without their cooperation. In addition, we would like to thank INCA Engineers, Inc. for the bioretention and roadway design, Cedar Grove, Inc. for support with the study of the bioretention soil mix, and Herrera Environmental Consultants, Inc. for support with study design, monitoring support, and reporting.

EXECUTIVE SUMMARY

The City of Redmond (the City) obtains nearly 40 percent of its drinking water supply from shallow wells within its urban core. With increased regional emphasis on the use of low impact development (LID) systems that rely on infiltration for treating stormwater runoff, the City wished to investigate potential impacts to groundwater quality that might occur if these systems are widely constructed. The specific objective of the study was to determine if using bioretention to treat runoff from pollution generating surfaces would be protective of groundwater quality in the City's shallow unconfined drinking water aquifer.

To implement this study, Herrera Environmental Consultants (Herrera) conducted hydrologic and water quality monitoring at a bioretention system installed at the southeast corner of 185th Avenue NE and NE Union Hill Road (Figure 1) from February 2012 through September 2013. The 185th Avenue NE bioretention system (also referred to herein as the "study system") is above an unconfined, municipal drinking water aquifer. To study potential impacts to this aquifer, the study system was lined with an impermeable geomembrane and incorporated an underdrain system, which does not allow stormwater to infiltrate and, thereby, avoids potential contamination of groundwater. At the same time, these design features allows influent and effluent water from the study system to be captured and characterized to quantify the level of treatment that occurred within the study system for specific pollutants of concern. Monitoring results from this study system were intended to inform broader management decisions within the City about the use of infiltrating LID systems as a viable stormwater treatment option given the need to protect its drinking water supply.

Study System

The study system was constructed to meet Ecology standards for bioretention in the 2005 Ecology Stormwater Manual. Specifically, the swales were designed to infiltrate 99 percent of the annual runoff volume through an18-inch deep bioretention soil media, using WWHM3. As with all CIP projects in the City, strict construction inspection controls were used to ensure the proper materials were provided and installed. The 60 percent sand, 40 percent compost bioretention soil mix (BSM) was applied at depths ranging from 36 inches at each side of the swale to 18 inches in the center. The BSM was underlain by a 6-inch sand blanket, then 3 inches of pea gravel over 11 inches of drywell gravel backfill. The drywell gravel backfill contained an 8-inch perforated pipe which served as the only egress for infiltrated surface runoff which entered the system. A variety of perennial grasses and shrubs were planted in the treatment system. Initially, a 2-inch mulch layer was placed above the BSM. Early observations indicated that the mulch layer was impeding infiltration, and the mulch was removed prior to the beginning of the monitoring period for this study.

Sampling Procedures

Monitoring was implemented using a Washington DOE-approved QAPP that met TAP-E standards for study design. This was the first time that full scale (i.e., built to design

standards for contributing area) TAP-E monitoring of bioretention treatment effectiveness has occurred in Washington State. A combination of automated sampling and grab sampling was used to characterize influent and effluent water qualities and evaluate the performance of the study system. Automated monitoring equipment was installed to continuously measure influent, effluent, and bypass flows. The automated equipment collected flow-weighted composite samples of the system's influent and effluent during a total of 20 separate storm events. Water quality monitoring was initiated 3 months after the bioretention swale was installed and went online and continued for 20 months from the collection of the first sample. The collected flow-weighted composite samples were analyzed for the following water quality parameters:

- Total suspended solids (TSS)
- Suspended sediment concentration (SSC)
- Total phosphorus (TP)
- Soluble Reactive Phosphorus (SRP)
- Total Kjeldahl Nitrogen (TKN)
- Nitrate+Nitrite (NO3-NO2)
- Total and dissolved copper, zinc, lead, cadmium, and mercury
- Chloride
- Hardness

In addition, field personnel collected grab samples during 20 storm events. Samples from 2 of those events were lost by the laboratory, so results for only 18 samples were included in this study. Grab samples were collected for:

- Fecal coliform
- Total petroleum hydrocarbons (TPH)

During the course of the study, these grab samples were collected for events with and without corresponding flow-weighted composite samples.

During three storm events, grab samples were collected at the inlet and outlet of the test system and analyzed for the following additional parameters:

- Semi-volatile organic compounds
- Volatile organic compounds
- Polycyclic aromatic hydrocarbons
- Polychlorinated biphenyls
- Chlorinated pesticides

- Chlorinated herbicides
- Priority pollutant metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc)

Data gathered by both the automated equipment and the grab samples were subsequently analyzed in the following ways:

- Computation of pollutant removal efficiencies with bootstrap confidence intervals
- Statistical comparisons of influent and effluent concentrations during both the first year (Year 1) and second year (Year 2) of monitoring

Hydrologic Performance

Flow control requirements for the project were vested with a proposed development in 1999. The vested requirement dictates that the site should generate a peak discharge of no more than 0.15 cubic feet per second per acre during a 10-year storm event (INCA Engineers 2009). The bioretention systems were sized using WWHM3 to meet this requirement (which predicted treatment of 99 percent of influent flows). Monitoring data showed that stormwater bypassed the treatment system during 5 of the 207 monitored events during the monitoring period. Although bypass volumes were not calculated, a bypass frequency of only 2.4 percent, and WWHM3 predicting that 99 percent of flows would be treated, suggest that the systems may have been oversized relative to today's water quality treatment standards (91 percent).

Infiltration testing conducted on March 21, 2012, 3 months after the completion of construction, indicated that saturated infiltration rates were 1.5 inches per hour. A second infiltration test, conducted 18 months later, indicated that this value increased to 2.9 inches per hour. The approximate two-fold increase in infiltration rate could be the result of increased plant establishment and associated macropore flow, increased infiltration due to bioturbation, fines, flushing from the system, or the decreased effect of the clogging mulch layer, which was removed in January 2012.

Interestingly, though the system was lined, the data indicated that the study system reduced influent volumes by 69 percent in the dry season and 78 percent in the wet season. Mechanisms for water loss in the system include evapotranspiration and leaks in the liner (of which one was confirmed during monitoring period). In addition, because influent flows were scaled up from one representative inlet to estimate inflow from the three actual inlets, there could have been extrapolation error that contributed to the discrepancy between influent and effluent flow.

Water Quality Performance

The study system was effective at treating influent concentrations of total zinc, dissolved zinc, TPH-Oil, and fecal coliform. During the second year of study system operation, the average percent reductions for these parameters were 89, 43, 88, and 77, respectively. The system also appeared effective at treating influent concentrations of pentachlorophenol and Bis(2-ethylhexyl) phthalate (removals estimated from three grab samples).

Despite these reductions, the study system exported (i.e., effluent concentrations were higher than influent concentrations) many other constituents. For example, during the first year of study (Year 1), significant pollutant export was observed for all measured nutrients, chloride, hardness, total copper, dissolved copper, and total lead. During the second year of study (Year 2), there continued to be significant export of total phosphorus, orthophosphate, and nitrate+nitrite. Effluent concentrations for Kjeldahl nitrogen, hardness, chloride, and dissolved copper were also generally higher than influent concentrations during the second year, although the observed differences were not statistically significant. In addition, one grab sample indicated a large export of methylene chloride. These results indicate that the study system itself was a source for many pollutants during the first 2 years of operation.

To evaluate potential environmental impacts stemming from this export of pollutants, effluent concentrations of selected pollutants were compared to applicable groundwater criterion. This comparison showed the study system exported nitrate concentrations in excess of the state groundwater criterion of 10 mg/L during the first 6 months of operation. One grab sample, taken on March 12, 2012, indicated that the study system also exported concentrations of methylene chloride (potentially sourced from the sealer used on the impermeable liner) in excess of groundwater criterion. Finally, the groundwater criterion for fecal coliform bacteria (1 CFU/100 mL) was exceeded at the effluent station during every sampled storm event, even though the study system exhibited a high degree of fecal coliform bacteria removal. No other measured parameters with applicable groundwater criteria were found to exceed criteria in the effluent of the study system.

Synthetic Precipitation Leaching Protocol (SPLP) extractions indicated that the compost in the bioretention soil mix was the greatest source of nutrients, zinc, and copper. Compared with the compost the sand in the mix was a less significant source for zinc and copper and did not appear to contribute to the observed nutrient export.

The results from this study indicate that bioretention systems which utilize BSMs which meet the Ecology specification can potentially act as pollutant generating sources of nutrients and metals. If these systems are installed without underdrains in critical aquifer recharge areas, special attention should be paid to the potential for nitrate export exceeding groundwater criteria. For systems installed with underdrains which discharge to sensitive receiving waters there is a potential for increasing downstream nutrient and copper loading. Future bioretention projects should attempt to use sand with lower metals concentrations and composts with lower nutrient and metals content. Follow up studies at both the bench scale and field scale are currently being conducted with the goal of formulating a BSM which does not export pollutants, while still functioning to support plants and reduce influent pollutant concentrations.

INTRODUCTION

The City of Redmond (the City) obtains approximately 40 percent of its drinking water supply from shallow wells within its urban core. With increased regional emphasis on the use of low impact development (LID) systems that rely on infiltration for treating stormwater runoff, the City wished to investigate potential impacts to groundwater quality that might occur if LID systems are widely constructed. The specific concern was groundwater quality in shallow aquifers may deteriorate if stormwater runoff from surrounding land uses receives inadequate treatment in LID systems prior to infiltration.

To investigate the efficacy of bioretention treatment in an aquifer recharge area, the City received a grant from the Washington State Department of Ecology (Ecology) in 2010 (Table 1) to construct and perform monitoring of a new bioretention swale treating runoff from a typical street in Redmond. The objective of the grant was to demonstrate through Ecology's Technology Assessment Protocol - Ecology (TAPE) that bioretention meets enhanced treatment. The grant funded:

- Design of the bioretention swale to meet Ecology standards
- Development of a Quality Assurance Project Plan (QAPP) to support flow-weighted composite sampling of stormwater influent and effluent in accordance with TAPE
- Monitoring of the bioretention swale in accordance with the Ecology approved QAPP
- Mid-project reporting of the monitoring program
- Final report of the results of the monitoring program

The City hired INCA Engineers, Inc. to design a series of bioretention swales that would meet the water quality requirements for a new street extension of 185th Avenue NE (Figure 1). The bioretention swales were sized to collect stormwater runoff from all the newly constructed pollution generating surfaces. Due to concerns about groundwater protection, the swales were constructed with an underdrain and an impermeable geomembrane liner. The City's long-term objective was to puncture the geomembrane liner and allow the swales to infiltrate after the bioretention swales had been demonstrated to be protective of groundwater. The installation of the underdrain and liner made these swales ideal for conducting full scale TAPE monitoring of bioretention as a treatment BMP. Unlike many previous studies of bioretention, the system was designed to allow for capture and testing of all the stormwater that was treated by the bioretention system, without the potential for shallow groundwater entering the system and confounding results. The adjacent sidewalk was also constructed of permeable concrete, to infiltrate rather than running into the monitored swale.

The City hired Herrera Environmental Consultants, Inc. (Herrera) to coordinate with INCA during the study design and QAPP writing phase of the project. Herrera subsequently conducted the monitoring and reported results.

Table 1. Project Schedule.															
Project Element	**2009**	**2010**	**2011 Q1**	**2011 Q2**	**2011 Q3**	**2011 Q4**	**2012 Q1**	**2012 Q2**	**2012 Q3**	**2012 Q4**	**2013 Q1**	**2013 Q2**	**2013 Q3**	**2013 Q4**	**2014 Q1**
Design															
Ecology Grant															
Construction															
Bioretention Operational															
Monitoring															
Infiltration Test 1															
Infiltration Test 2															
Mid Project Report															
Final Report															

Legend

- Project location
- Highway
- Stream

Figure 1. Vicinity Map for the City of Redmond 185th Avenue NE Bioretention Swale Performance Verification Project in Redmond, Washington.

N

0 500 1,000 2,000 Feet

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Aerial: USDA, 2009

\\herrera\hecnet\gis-k\Projects\09-04540-000\Project\vicinity_map.mxd (6/13/2011)

Monitoring was conducted over a 20-month period, from February 2012 through September 2013 (Table 1), in accordance with procedures described in the QAPP (Herrera 2012b). Three months after the study system went online in November 2011 (Table 1), the first water quality samples collected from the underdrain system exhibited a high levels of pollutant export (i.e., effluent concentrations were higher than influent concentrations) from the study system. Pollutant export of this magnitude was not an anticipated outcome and, consequently, additional analyses were performed to investigate this issue. As contaminants were progressively flushed from the bioretention soil mix, the pollutant export generally decreased. Therefore, a specific goal of these additional analyses was to characterize the temporal extent of this flushing period. Another goal of these additional analyses was to identify specific materials used in the construction of the study system that may have been contributing to the pollutant export.

Herrera prepared this report to summarize results from the monitoring performed to evaluate the study system's treatment performance and follow-up analyses to investigate the pollutant export problem. Specifically, the goals of this report are:

- Document hydrologic and water quality treatment performance of the study system, as demonstrated by field testing performed in accordance with the project QAPP (Herrera 2012b)
- Present an analysis of whether pollutant concentrations in effluent from the study system could contribute to groundwater contamination
- Summarize results from analyses that were performed to identify specific materials used in the construction of the study system that are contributing to the pollutant export problem
- Make recommendations for future research

This document is organized into the following sections:

- Technology Description
- Methods
- Results
- Conclusions

TECHNOLOGY DESCRIPTION

Bioretention provides water quality treatment of captured flows through a variety of physical and chemical unit processes. This section describes the test system, treatment processes, sizing methods, expected treatment capabilities, expected design life, and maintenance procedures.

Physical Description

The study system was designed to meet the requirements of the 2005 Ecology manual as an enhanced treatment BMP. The swales were sized to treat at least 99 percent of the annual runoff volume from the street. Contract documents and specifications prepared for the City and administered by the City's construction division ensured that materials source for the project met required specifications. Inspectors received submittals certifying products, observed placement of materials, and collected samples for additional testing.

The swales were constructed along the east side of 185th Avenue NE, immediately south of NE Union Hill Road in Redmond, Washington (Figures 1 and 2). Construction was completed in November 2011. The drainage area for the study system is approximately 0.95 acre. The study system includes three bioretention cells; its total length is approximately 655 feet.

Only one of the three cells of the study system was subject to the hydrologic and water quality monitoring described in this report. The most northerly bioretention cell (Swale No. 3) was monitored. The drainage area for Swale No. 3 is approximately 0.23 acre and slopes to the inlets with a grade of 2 percent. The swale is approximately 240 feet in length. Figure 2 shows Swale No. 3 in the context of the overall study system design. Influent flow and water quality into Swale No. 3 was estimated by monitoring at the northern most inlet of Swale No. 2. Additional grab sampling at all three inlets of Swale No. 3 and the northern most inlet of Swale No. 2 was conducted to assure that the influent monitoring station was representative of total inflow into Swale No. 3.

Stormwater is conveyed to the study system through a curb-and-gutter system along the east side of 185th Avenue NE. Catch basins route stormwater into the study system via 8-inch storm drains. At the bottom of each storm drain outlet is a flow dissipation structure that consists of 2-inch-diameter chipped rock embedded into a bioretention soil matrix. Within the northerly (monitored) section of the system is a series of three catch basins, located at the top, center, and bottom of the section (Figure 2).

The entire study system was lined with an impermeable geomembrane to prevent infiltration of stormwater into the shallow aquifer below (Figure 3). An 8-inch perforated pipe was placed in the center of the swale in 11 inches of drywell gravel backfill to provide drainage for stormwater that infiltrated through the soil layers above. The gravel backfill was overlain by 3 inches of pea gravel as a choker course, a 6-inch sand blanket, and 18 (bottom) to 36 (side slopes) inches of BSM (Figure 3). Previous unpublished research from Washington State

University – Puyallup had indicated that bioretention soil mix can export nutrients and other pollutants; the sand blanket was placed in order to attenuate some of those pollutants. A variety of perennial grasses and shrubs were planted in the swale. No fertilizers were applied to the swales during planting or anytime during the 20-month monitoring period.

The bioretention soil mix consisted of 40 percent compost and 60 percent sand. The compost was sourced from the Cedar Grove facility located in Maple Valley, Washington. The compost consisted of 100 percent vegetable compost matter, containing no viable weed seeds, and was free of all non-biodegradable material. In addition, the compost was certified through the US Composting Council's (USCC) Seal of Testing Assurance (STA) Program. C-33 builder's sand sourced from Cadman, Inc. was used for the sand fraction. The BSM components were mixed by Red-E-Topsoil, in Redmond, Washington. Additional information on the bioretention soil mix can be found in the next section.

A 2-inch mulch layer was placed above the bioretention soil mix. Initial observations indicated that the mulch layer was impeding infiltration and, consequently, the mulch was removed and not replaced. The monitoring results presented herein do not include data from the period when the mulch was in place.

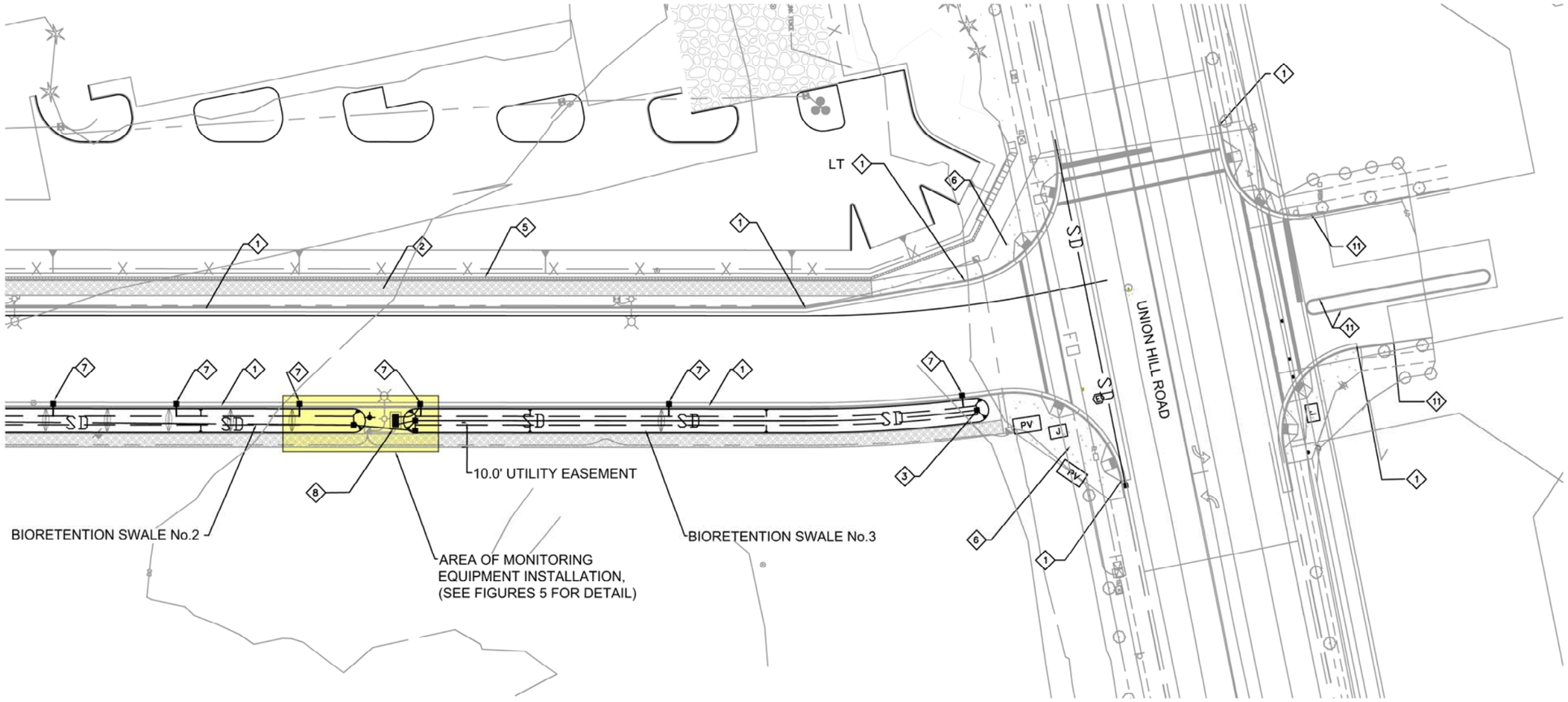
Check dams were constructed in the center of the bioretention system to increase ponding and infiltration of stormwater (Figure 2). The check dams are trapezoidal in shape and constructed out of 2-inch chipped rock. The bypass structure at the terminus of the swale was designed to maintain a 12-inch maximum ponding depth in the swale. Photographs of the system during construction and at various stages of plant establishment are provided in Figure 4.

Bioretention Soil Mix

The bioretention soil mix components were analyzed for multiple parameters to ensure that the mix met local specifications. Numerous applicable specifications exist in the region, including the Stormwater Management Manual for Western Washington (Ecology 2012), the Low Impact Development Technical Guidance Manual for Puget Sound (Hinman and Wulkan 2012), the WSDOT compost specification (WSDOT 2012), and WAC 173-350-220. Tables 2, 3, and 4 compare the materials used in the bioretention soil mix for the bioretention system to the applicable specifications for the aggregate, compost, and bioretention soil mix fractions, respectively.

As shown in Tables 2, 3, and 4, the aggregate, compost, and bioretention soil mix used in the study system met all the required specifications. Table 4 also identifies several specifications that were not applicable to the bioretention soil mix for the study system. For example, long-term infiltration rate data are not available because the study system has been in place for only 24 months. Organic matter content and pH were not measured for the bioretention soil mix because the specification does not require these measurements if the aggregate and compost meet specifications and are mixed in a 60:40 ratio (Ecology 2012). Finally, the total phosphorus criterion, which is defined in the 2012 LID manual (Hinman and Wulken 2012), pertains to available phosphorus not total phosphorus. Total phosphorus was analyzed in the bioretention soil mix for the bioretention system, so the results are not comparable to the LID manual criterion.

Figure 2
Plan View of Bioretention Swale System along 185th Avenue NE, in Redmond, Washington.



Legend

- CEMENT CONCRETE CURB & GUTTER
- FULL DEPTH HMA PAVEMENT.
- CEMENT CONCRETE SIDEWALK
- PERVIOUS CEMENT CONCRETE SIDEWALK
- SD — STORM DRAIN
- CATCH BASIN
- SWALE CHECK DAM
- MONITORING EQUIPMENT INSTALLATION AREA

Construction Notes

1. TYPE "A-1" CURB AND GUTTER PER COR STD DETAIL NO. 304
2. PERVIOUS CEMENT CONCRETE SIDEWALK
3. BIORETENTION SWALE
6. CEMENT CONCRETE SIDEWALK PER COR STD DETAILS NO. 301
7. CONCRETE INLET W/DISCHARGE PIPE
8. INSTALL WATER QUALITY MONITORING SYSTEM
11. CEMENT CONCRETE TRAFFIC CURB PER WSDOT STD PLAN F-10.12-00

N

0 25 50 100

scale in feet

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ENVIRONMENTAL CONSULTANTS

O:\proj\Y2009\09-04540-000\CAD\Dwgs\FIGURE 2.dwg

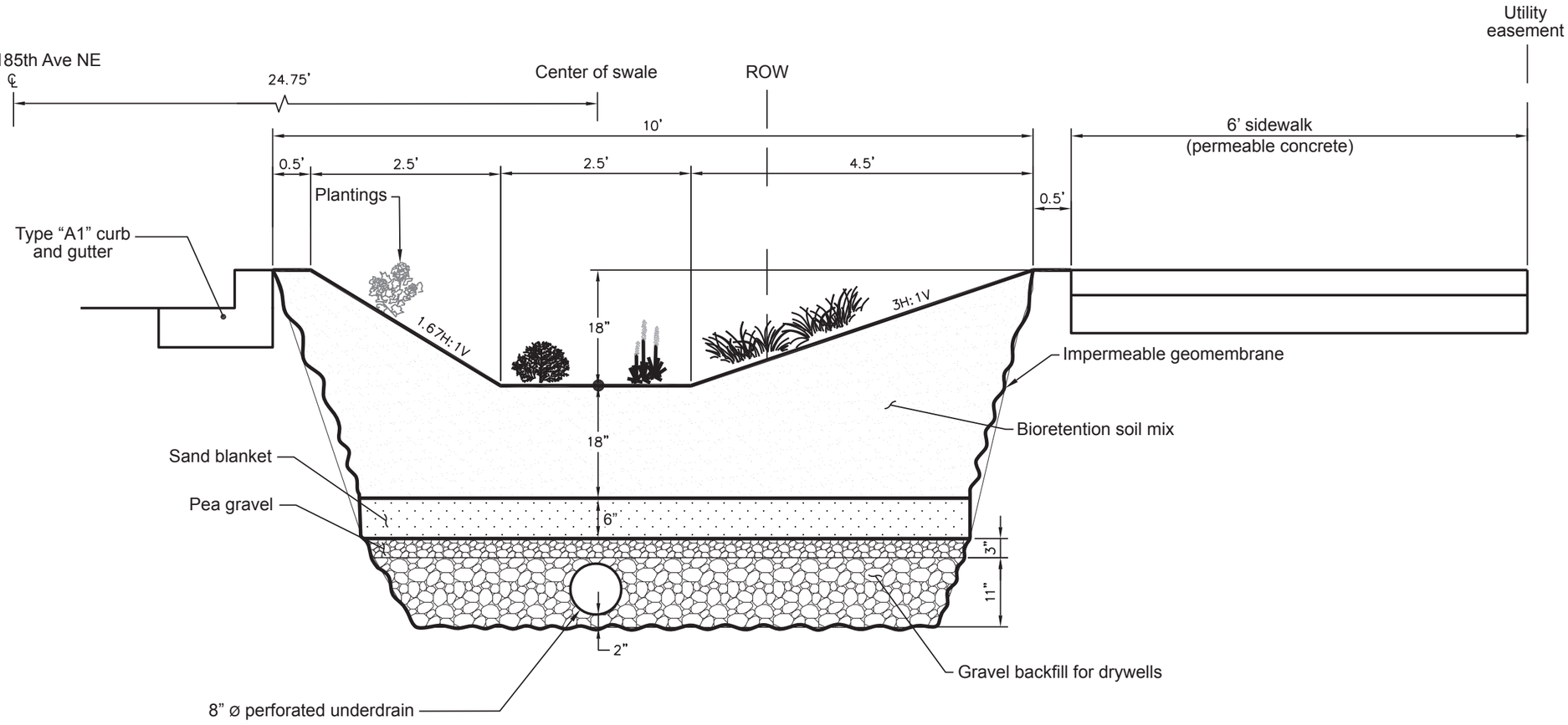

Figure 3.
Typical Cross-Section of Bioretention Swale Performance Verification in Redmond, Washington.

Legend

Not to scale

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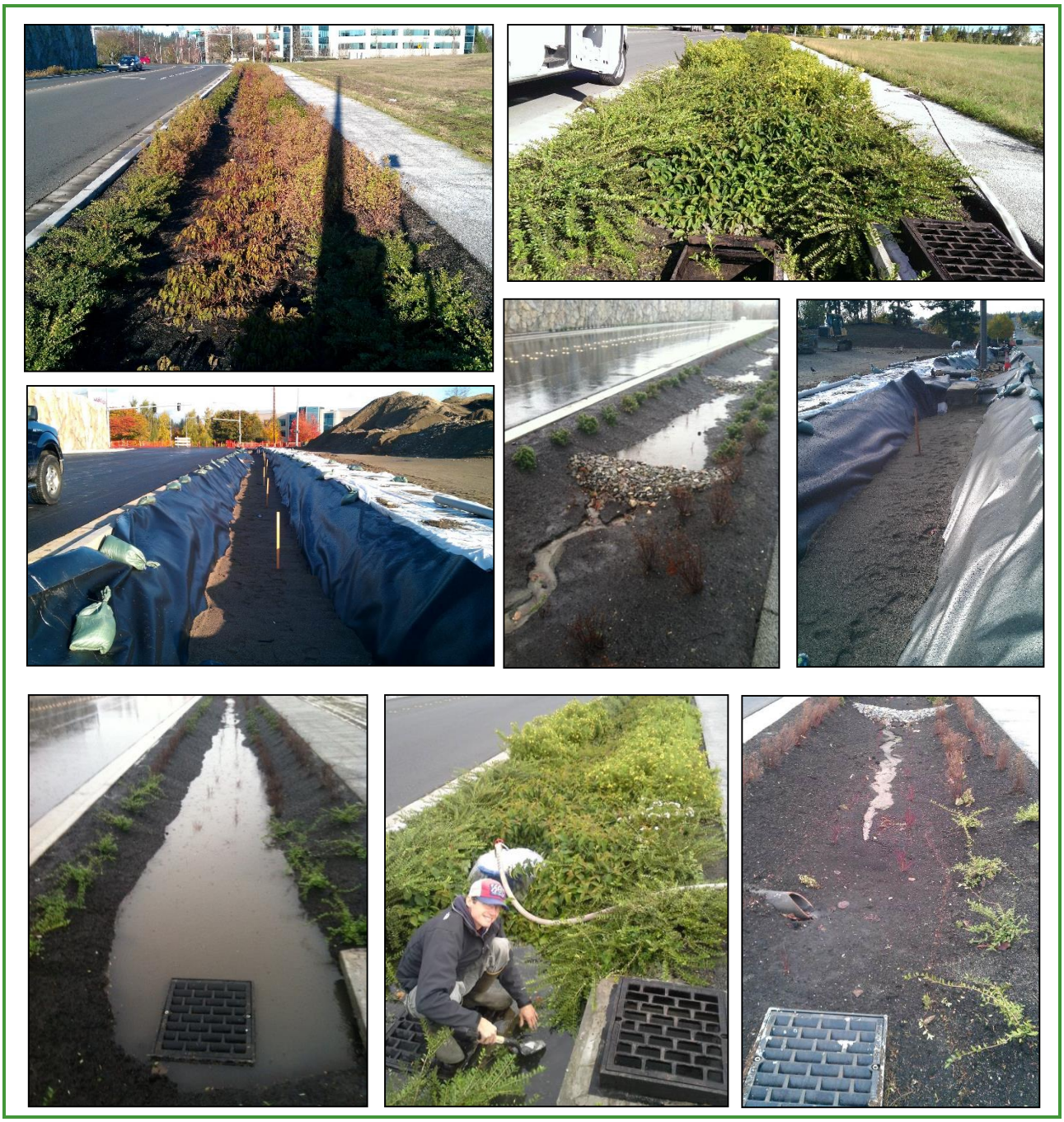


Figure 4. Photos of the 185th Avenue NE Bioretention System.

Table 2. Aggregate Specifications Compared with the Aggregate Used in the 185th Avenue NE Bioretention System.			
	Bioretention System Aggregate	**LID Manual/SMMWW Aggregate Specification**	**Within Specification? Yes/No**
% passing 3/8"	100	100	Yes
% passing 4 sieve	99.7	95-100	Yes
% passing 10 sieve	83.4	75-90	Yes
% passing 40 sieve	36.7	25-40	Yes
% passing 100 sieve	10	4-10	Yes
% passing 200 sieve	3.7	2-5	Yes
Coefficient of Uniformity (D60/D10)	5.3	≥4	Yes
Coefficient of Curve ((D30)^2/D60*D10)	1.2	1-3	Yes

LID Manual = Low Impact Development Technical Guidance Manual for Puget Sound (Hinman and Wulkan 2012)
SMMWW = Stormwater Management Manual for Western Washington (Ecology 2012)

Table 3. Compost Specifications Compared with the Compost Used in the 185th Avenue NE Bioretention System.			
	Bioretention System Compost	**LID Manual/SMMWW Aggregate Specification**	**Within Specification? Yes/No**
Copper (mg/kg)	61	<750	Yes
Zinc (mg/kg)	180	<1400	Yes
Carbon:Nitrogen	17	<35:1	Yes
Type 1 Feedstock (% yard waste)	80-85	>65	Yes
Type 2 Feedstock (% manure)	0	0	Yes
Type 3 Feedstock (% meat and food waste)	6-15	≤35	Yes
Type 4 Feedstock (% municipal solid waste)	0	0	Yes
%Moisture	No Visible	No visible	Yes
pH	6.19	6.0-8.5	Yes
Manufactured inert materials (%)	<0.5	<1	Yes
Organic Matter (%)	61.8	≥40	Yes
Soluble Salt (mmhos/cm)	3.7	<4.0	Yes
Compost Maturity (%)	100	>80	Yes
Compost Stability (mg CO_2–C/g OM/day)	3.1	≤7	Yes

LID Manual = Low Impact Development Technical Guidance Manual for Puget Sound (Hinman and Wulkan 2012)
mmhos/cm =_millimhos per centimeter
mg CO2-C/g OM/day = _milligrams CO2 per gram of organic matter per day
SMMWW = Stormwater Management Manual for Western Washington (Ecology 2012)

Table 4. Bioretention Soil Mix Specifications Compared with the Bioretention Soil Mix Used in the 185th Avenue NE Bioretention System.			
	Bioretention System BSM	**LID Manual/SMMWW BSM Specification**	**Within Specification? Yes/No**
% aggregate	60	60-65	Yes
% compost	40	35-40	Yes
CEC (meq/100 g)	10	≥5	Yes
Total phosphorus (mg/kg)	660	<100 [a]	NA
pH	NA	5.5-7.0	NA
Organic Matter (%)	NA	5-8	NA
Long-term Infiltration Rate (in/hr)	NA	≤1	NA
Initial Infiltration Rate (in/hr)	2.25	<12	Yes

BSM = bioretention soil mix
CEC = cation exchange capacity
in/hr = inches per hour
LID Manual = Low Impact Development Technical Guidance Manual for Puget Sound (Hinman and Wulkan 2012)
meq/100 g = milli-equivalents per 100 grams
mg/kg = milligrams per kilogram
NA = not applicable
SMMWW = Stormwater Management Manual for Western Washington (Ecology 2012)
[a] <100 mg/kg guideline is for available phosphorus. Total phosphorus was analyzed for the 185th Avenue bioretention soil mix, so a direct comparison is not applicable.

Treatment Processes

Bioretention provides water quality treatment of captured flows through physical and chemical unit processes. Runoff treatment is achieved through sedimentation, filtration, and adsorption.

Sedimentation

Bioretention is designed to reduce flow velocities in the ponded water and in the filter media. This promotes gravity settling of entrained particles. The amount of sedimentation is a function of particle density, size, water density, turbulence, and residence time.

Filtration

Particulates are physically removed from suspension as they come into contact with the filter media. The filter retains those particles that are unable to follow the tortuous channels of connected void space within the bioretention media. Pollutant removal rates achieved through filtration are a function of the stormwater composition and media properties including permeability, grain size, and hydraulic conductivity.

Adsorption

Unlike filtration, where physical processes control removal of sediment from suspension, adsorption relies on opposing surface charges of the media and dissolved constituents to

remove pollutants from stormwater. The media contains material with a high surface area so that the binding sites are numerous and not easily exhausted. In addition, the filter media has a high cation exchange capacity, which promotes the removal of positively charged dissolved pollutants (including metal ions) from solution.

Pollutant Export from Bioretention Soil Mix

Although the bioretention soil mix is effective at removing pollutants through sedimentation, filtration, and adsorption, the media itself can act as a pollutant source if not properly configured. Fine sands and associated bound pollutants will export during a flushing period of variable duration. In addition, labile nutrients and other bound pollutants will leach from the compost fraction for an undetermined amount of time. The documented export of pollutants from the study system is described in the *Results* section of this report.

Sizing Methodology

The study system was sized using the Western Washington Hydrology Model, Version 3 (WWHM3) (INCA Engineers 2009). Within WWHM3, the study system was modeled as one continuous, trapezoidal, infiltration pond with an assumed infiltration rate of 2 inches per hour and a drainage area of 0.95 acre (the monitored section drained only one-third of the total drainage area). A correction factor of 1.15 was applied to account for the slope of the study system. In order to satisfy flow control requirements identified in the Stormwater Management Manual for Western Washington (minimum requirement 7) that were triggered by the development of the new road, the study system was designed to achieve a peak 10-year storm release rate that does not exceed 0.251 cubic feet per second (cfs) for the entire system (all three cells, of which one was monitored). To satisfy water quality treatment requirements the system is required to treat at least 91 percent of influent flows on an annual basis. Based on the flow control sizing, WWHM3 predicted that the system would infiltrate 99 percent of influent flows.

Expected Treatment Capabilities

Bioretention systems are approved in the State of Washington to remove suspended solids, gross solids, and heavy metals. Compared with other stormwater treatment best management practices (BMPs), bioretention has not been well studied. However, in recent years there has been a growing body of literature characterizing bioretention performance. Table 5 presents results from a recent literature review of field and laboratory tests of bioretention systems (Geosyntec 2013). These literature removal rates are again presented in the results section and compared with the results from this study.

Expected Design Life

The expected design life of bioretention facilities will vary depending upon system sizing and influent pollutant loading. In general, it is expected that the study system installed at 185th Avenue NE will last 25 years before the media will need to be replaced. Infiltration testing conducted on March 21, 2012, and September 25, 2013, indicated that infiltration rates actually increased during the 18-month period between tests. These results suggest that

surface clogging of the media may not be an issue for many years and that the system may function for the full 25-year life expectancy.

Table 5. Bioretention Performance Data.

	Number of Studies	Median % Removal	Median Influent	Median Effluent	Units
Total Suspended Solids (TSS)	30	83	39	8	mg/L
Fecal Coliform	6	77	4172	290	#/100mL
Oil and Grease	16	99	1.35	0.28	mg/L
Total Copper (Cu)	11	46	13	6	µg/L
Dissolved Cu	4	61	10.7	11.1	µg/L
Total Lead (Pb)	18	81	9.9	3.2	µg/L
Dissolved Pb	3	70	0.5	1.3	µg/L
Total Zinc (Zn)	20	76	100	18	µg/L
Dissolved Zn	5	64	49	25	µg/L
Total Phosphorus (P)	28	57	0.12	0.10	mg/L
Total Nitrogen (N)	17	44	1.3	1.1	mg/L
Nitrate	27	8	0.36	0.22	mg/L
Ammonia	13	49	0.20	0.04	mg/L

Maintenance Procedures

In 2013, Ecology issued a Low Impact Development Operation and Maintenance Manual (Herrera 2013). The manual recommends the following maintenance procedures on an annual basis:

- Check side slopes for erosion, compaction, and rodent activity, and remediate as needed
- Check any concrete sidewalls for cracks and repair as needed
- Check stability of rockery sidewalls
- Remove excess sediment from the bottom area of the facility and replace vegetation and mulch as necessary
- Check for erosion around check dams and repair as needed
- Make sure inlets are functioning as designed
- Check vegetation health and replace plants as needed

In addition, the following should be conducted on a biannual basis and after major storm events:

- Remediate excessive trash and leaf accumulation in facility

- Check for excessive overflow or ponded water more than 48 hours after an event

Finally, irrigation may be required during the first two dry seasons for plant establishment.

METHODS

This section begins with a general overview of the monitoring design and describes the specific procedures that were implemented to meet the goals of the project. It then describes in more detail the site location, test system, monitoring schedule, and specific methods used to obtain the hydrologic and water quality data. Analytical methods, quality assurance and control measures, data management procedures, and data analysis procedures are also discussed.

Monitoring Design

This project entailed the collection of hydrologic, water quality, and sediment monitoring data from the study system to evaluate its treatment performance consistent with the overall objectives of this study. Separate sections below describe the sampling process design that was used in conjunction with each of the monitoring elements. Figure 5 shows the physical monitoring elements that comprise the sampling process design. The area shown on Figure 5 encompasses the south end of Swale No. 3 and the north end of Swale No. 2.

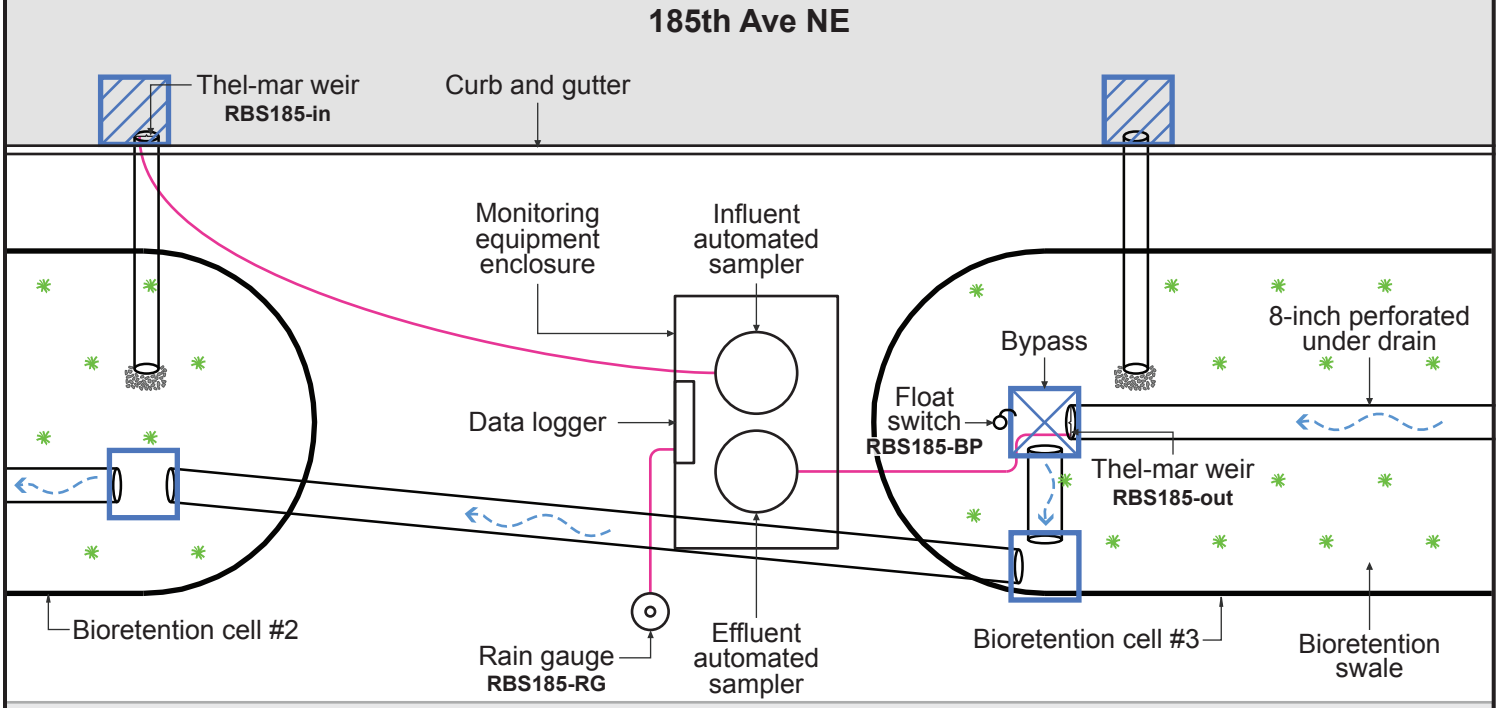
Hydrologic Monitoring

Study system influent and effluent flows were monitored continuously over a 20-month period from February 2012 through September 2013. System bypass duration and frequency were also monitored continuously. In addition, precipitation depths at the monitoring site were monitored continuously over the same period. Controlled infiltration testing and flow testing of the hydrologic monitoring equipment also occurred during the study period. The specific procedures that were used in conjunction with these activities are described in detail below.

Monitoring Stations

The northernmost inlet to Swale No. 2 (Figure 5) was selected as the influent monitoring station because it had good hydraulic characteristics, was located adjacent to the monitoring enclosure, and had a representative drainage area. The influent station at Swale No. 2 was used to represent the three inlets to Swale No. 3. The influent monitoring station was designated RBS185-in. A stilling well equipped with an INW PS-9805 pressure transducer was installed in association with a Thel-Mar weir to facilitate accurate measurement of water levels above the weir crest. The hydrologic monitoring equipment was installed in the 8-inch-diameter outlet pipe from the catch basin at the street before it discharges to the bioretention swale. The basin area draining to RBS185-in and the total basin area draining to all three inlets to Swale No. 3 were delineated during a rain event on March 12, 2012. The ratio of the monitored drainage area to the total drainage was 1:7.94. This value was used to scale up measured flows to estimate total influent flow to Swale No. 3.

Effluent flows were monitored at a second monitoring station, designated RBS185-out, in the 8-inch slotted underdrain located at the southern terminus of Swale No. 3 (Figure 5). The



Legend

2-inch diameter conduit

Catch basin

Figure 5.

Plan View of the 185th Avenue NE Bioretention Swale Physical Monitoring Elements.

N

Not to scale

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effluent monitoring station drains all of Swale No. 3, so no scaling of flows was required. In order to quantify flows, station RBS185-out was equipped with an INW PS-9805 pressure transducer, a stilling well, and an 8-inch Thel-Mar weir.

The pressure transducers at RBS185-in and RBS185-out were interfaced with a Campbell Scientific CR1000 datalogger that was programmed to cache measurements every 10 seconds and to record average water levels behind the Thel-Mar weirs on a 5-minute time step. The datalogger then converted the water level readings to estimates of discharge based on standard hydraulic equations (Walkowiak 2006). The datalogger was interfaced with an Airlink Raven XTV digital cellular modem. The communication system was configured to automatically download data and send text message alarms to field technicians and project managers.

A Global Water WA100 float switch was installed immediately adjacent to the bypass structure located at the southern terminus of the bioretention system; this monitoring station was designated RBS185-BP (Figure 5). The float switch was interfaced with the same Campbell Scientific CR1000 datalogger described above. The datalogger was programmed to scan every 10 seconds and to record the presence or absence of bypass conditions in addition to duration when bypass occurred.

To facilitate continuous monitoring of precipitation depths, a fourth hydrologic monitoring station, designated RBS185-RG, was installed adjacent to the equipment enclosure (Figure 5). Precipitation depths were monitored by a Texas Electronics TE-525WS rain gauge. The rain gauge was installed on an 8-foot steel pole more than 200 feet from the nearest tree or overhanging structure. The rain gauge was interfaced with the same Campbell Scientific CR1000 datalogger described above.

As mentioned above, the datalogger was equipped with an Airlink Raven XTV digital cellular modem to allow communication with the system via remote access. A 120-volt dual power receptacle was installed by the City to provide power for all of the monitoring equipment. The datalogger and digital cellular modem were housed in a repurposed signal control box (enclosure). Conduit was installed to convey pressure transducer cabling and automated sampler suction lines from the base of the enclosure to each station.

All discharge data and rainfall data stored on the datalogger were remotely downloaded on a 10-minute basis via cellular telemetry. The data were then processed and validated in accordance with procedures described in the project QAPP (Herrera 2012b).

Controlled Infiltration Testing

On March 21, 2012, and September 25, 2013 — 3 and 21 months, respectively, after the study system was constructed — falling head tests were performed to evaluate infiltration rates on the surface of the study system. Surface infiltration rates were measured using procedures adopted from Ecology's (2005) pilot infiltration test. Water from a hydrant was discharged into the bottom of Swale No. 3 near the RBS185-BP station. The water level in the bioretention cell was raised to the point of bypass and held constant for one-half hour. The water was then turned off, and the rate of infiltration was recorded (in inches per hour) until all the water had infiltrated. The process was then repeated. This method has been shown to

provide the most accurate estimates of infiltration rates for large-scale infiltration facilities (Seattle University 2004). The results from the first test run gave an estimate of infiltration during unsaturated conditions, while the second test gave an estimate of infiltration during saturated conditions.

Flow Testing

The automated hydrologic monitoring equipment located at the RBS185-in station (weir and pressure transducer combination) were flow tested to ensure the equipment was working properly. The specific field procedures implemented in connection with the flow testing were:

- Water from a nearby fire hydrant was routed to the site using approximately 30 feet of a 2-inch-diameter fire hose. A rotometer was attached to the fire hose to measure the discharge rate of the water.
- The flows from the rotometer were checked by timing flow into a graduated 30-gallon plastic container. This was repeated for five different flow rates: 0.675, 1.75, 7.3, 8.3, and 25.1 gallons per minute.
- Each of these flow rates was run through the weir, and recorded measurements were compared with actual.
- Inflow rates were adjusted based on the new relationship developed with the known flow rates.

Due to the configuration of the underdrain, this type of flow test could not be performed on the RBS185-out station. Consequently, the standard weir equation was assumed to be accurate. Due to low approach velocities and laminar flow at the weir face, this was deemed to be an acceptable assumption.

Water Quality Monitoring

A combination of automated sampling and grab sampling was used to characterize influent and effluent water qualities.

Automated Sampling

To facilitate the collection of flow-weighted composite samples, two ISCO 6712 automated samplers were installed in association with the RBS185-in and RBS185-out stations (Figure 5). Both automated samplers were housed in the same secure enclosure that was described above in connection with the hydrologic monitoring. Polytetrafluoroethylene (PTFE)-lined sample tubing was routed via 2-inch buried conduit from the automated samplers in the enclosure to the RBS185-in and RBS185-out stations (Figure 5). Care was taken to ensure the tubing was installed with a constant linear grade so that water completely drained through the sample tube during purge cycles. The sampler intakes were carefully positioned at each station to ensure the homogeneity and representativeness of the samples. Specifically, sampler intakes were installed to ensure that an adequate depth was available for sampling and to avoid the capture of litter, debris, and pipe load that may be present.

Both automated samplers were powered by a 120-volt dual power receptacle that was also housed in the secure enclosure. The Campbell Scientific CR1000 datalogger (described previously) was programmed to record hydrologic measurements and to trigger the inlet and outlet automated samplers at pre-defined pacing intervals during discrete storm events.

Guidelines from the Technology Assessment Protocol - Ecology (TAPE) were used for delineating and qualifying valid events (Ecology 2011a). The following conditions served as guidelines in defining the acceptability of specific storm events for sampling:

- **Target storm depth**: A minimum of 0.15 inch of precipitation over a 24-hour period
- **Antecedent conditions**: A period of at least 6 hours preceding the event with less than 0.04 inch of precipitation
- **End of storm**: A continuous period of at least 6 hours after the event with less than 0.04 inch of precipitation

Antecedent conditions and storm predictions were monitored via the Internet, and a determination was made as to whether to target an approaching storm. Once a storm was targeted, field staff visited each station to verify that the equipment was operational and to start the sampling program. A clean 20-liter high density polyethylene (HDPE) bottle and crushed ice were also placed in the sampling equipment at that time. The speed and intensity of incoming storm events were tracked using Internet-accessible, Doppler radar images. Actual rainfall totals during sampled storm events were quantified on the basis of data from the rain gauge installed at the site.

During the storm event sampling, the datalogger was programmed to enable the sampling routine in response to a predefined increase in water level (stage) at RBS185-in and RBS185-out independently. The automated samplers were then programmed to collect 220-milliliter (mL) sample aliquots at preset flow increments. The particular flow increments varied based on the expected storm magnitude. Based on the expected size of the storm, the flow increment was adjusted to ensure that the following criteria for acceptable composite samples were met at each station:

- A minimum of 10 aliquots
- Sampling was targeted to capture at least 75 percent of the hydrograph.
- Due to sample holding time considerations, the maximum duration of automated sample collection was 36 hours.

After each targeted storm event, field personnel returned to each station, made visual and operational checks of the sampling equipment, and determined the total number of aliquots composited. Pursuant to the sampling criteria identified above, the minimum number of composite aliquots that constituted an acceptable sample was 10. If the sample was determined to be acceptable, the carboy was immediately capped, removed from the automated sampler, and kept below 6 degrees Celsius (°C) using ice during transport to the laboratory. All samples were delivered to the laboratory with appropriate chain-of-custody

documentation. Twenty events were successfully composite-sampled with paired influent/ effluent samples. Collected flow-weighted composite samples were analyzed for the following parameters (also see Table 6):

- Total suspended solids
- Suspended sediment concentration
- Copper, total and dissolved
- Cadmium, total and dissolved
- Lead, total and dissolved
- Mercury, total and dissolved
- Zinc, total and dissolved
- Total phosphorus
- Orthophosphate
- Total Kjeldahl nitrogen
- Nitrite-nitrate nitrogen
- Chloride
- Hardness

Grab Sampling

When the first aliquot was collected during an event targeted for automated sampling, the datalogger would send an alarm via text message to alert field personnel that stormwater was flowing into the bioretention system. Field personnel then mobilized to collect grab samples at the RBS185-in and RBS185-out stations for:

- Fecal coliform
- Total petroleum hydrocarbons

During the course of the study, these grab samples were collected for events with and without corresponding flow-weighted composite samples. Twenty grab samples were collected but, due to lab error, results for only 18 of the 20 events are reported.

During three storm events, grab samples were collected at the RBS185-in and RBS185-out stations and analyzed for:

- Semi-volatile organic compounds
- Volatile organic compounds
- Polycyclic aromatic hydrocarbons

Table 6. Water Quality Analysis Methods and Detection Limits.

Parameter	Analytical Method	Method Number [a]	Minimum Volume of Water Required for Analysis	Field Sample Container [b]	Pre-Filtration Holding Time	Total Holding Time [c]	Field Preservation	Laboratory Preservation	Target Reporting Limit / Resolution	Units
Total suspended solids	Gravimetric [d]	SM 2540D	500 mL	20-L HDPE bottle	NA	7 days	Cool ≤6°C	Cool ≤6°C	1.0	mg/L
Suspended sediment concentration	Filtration or evaporation	ASTM D3977	1 L		NA	NA		Cool ≤6°C	0.1	mg/L
Total phosphorus	Automated ascorbic acid	EPA 365.1	125 mL		NA	28 days		Cool ≤4°C, HCl to pH <2	0.002	mg/L
Orthophosphorus	Automated ascorbic acid	EPA 365.1			24 hours [f]	48 hours [f]		Cool ≤6°C	0.001	mg/L
Total Kjeldahl nitrogen	Automated Cadmium Reduction	EPA 351.2			NA	28 days		Cool ≤ 6°C, H_2SO_4 to pH <2	0.200	mg/L
Nitrate+nitrite	Mercuric Nitrate Titration	EPA 353.2			24 hours	28 days		Cool ≤ 4°C, H_2SO_4 to pH <2	0.01	mg/L
Chloride	Mercuric Nitrate Titration	SM 4500-CL-C	100 mL		NA	28 days		None required	0.50	mg/L
Hardness as $CaCO_3$	Titration	SM 2340C	100 mL		NA	28 days		Cool ≤6°C, H_2SO_4 to pH <2	1.0	mg/L
Cadmium, dissolved	ICP-MS	EPA 200.8	250 mL		24 hours [f]	6 months		Cool ≤6°C, HNO_3 to pH <2[g]	0.0002	mg/L
Cadmium, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0002	mg/L
Copper, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months		Cool ≤6°C, HNO_3 to pH <2[g]	0.0001	mg/L
Copper, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0001	mg/L
Lead, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months		Cool ≤6°C, HNO_3 to pH <2[g]	0.001	mg/L
Lead, total	ICP-MS	EPA 200.8	250 mL	20-L HDPE bottle	NA	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2	0.001	mg/L
Mercury, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months		Cool ≤6°C, HNO_3 to pH <2[g]	0.0001	mg/L
Mercury, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0001	mg/L
Zinc, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months		Cool ≤6°C, HNO_3 to pH <2[g]	0.001	mg/L
Zinc, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.005	mg/L
Antimony, dissolved	ICP-MS	EPA 200.8	250 mL	250 mL HDPE bottle	24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0010	mg/L
Antimony, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0010	mg/L
Arsenic, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0010	mg/L
Arsenic, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0010	mg/L
Beryllium, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0010	mg/L
Beryllium, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0010	mg/L
Chromium, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0010	mg/L
Chromium, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0010	mg/L
Nickel, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0050	mg/L
Nickel, total	ICP-MS	EPA 200.8	250 mL	250 mL HDPE bottle	24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0050	mg/L
Selenium, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0050	mg/L
Selenium, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0050	mg/L

Table 6 (continued). Water Quality Analysis Methods and Detection Limits.

Parameter	Analytical Method	Method Number [a]	Minimum Volume of Water Required for Analysis	Field Sample Container [b]	Pre-Filtration Holding Time	Total Holding Time [c]	Field Preservation	Laboratory Preservation	Target Reporting Limit / Resolution	Units
Silver, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0010	mg/L
Silver, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0010	mg/L
Thallium, dissolved	ICP-MS	EPA 200.8			24 hours [f]	6 months	Cool ≤6°C	Cool ≤6°C, HNO_3 to pH <2[g]	0.0010	mg/L
Thallium, total					NA			Cool ≤6°C, HNO_3 to pH <2	0.0010	mg/L
Fecal coliform bacteria	Membrane filter	SM 9222D	100 mL	250 mL glass bottle	24 hours	24 hours	Cool ≤10°C	Cool ≤10°C	2	mg/L
Semivolatile organic compounds [g]	GC/MS	EPA 8270D	500 mL	2-500mL glass bottle	7 days to extraction	40 days to analysis	Cool ≤6°C	Cool ≤6°C	1.0-10	µg/L
Volatile organic compounds [g]	GC/MS	EPA 524.2	120 mL	3 ea 40 mL vials	7 days to extraction	40 days to analysis		Cool ≤6°C, HCL to pH <2	0.2-0.5	µg/L
Polycyclic aromatic hydrocarbons [g]	GC/MS-SIM	EPA 8270	500 ml	2-500mL glass bottle	7 days to extraction	40 days to analysis		Cool ≤6°C	0.1	µg/L
Polychlorinated biphenyls [g]	GC/ECD-Low level	EPA 8082	1000 ml	2- 1 L glass bottle	7 days to extraction	40 days to analysis		Cool ≤6°C	0.01	µg/L
Chlorinated pesticides [g]	GC/ECD	EPA 8081	500 ml	2-500mL glass bottle	7 days to extraction	40 days to analysis		Cool ≤6°C	0.5-5.0	µg/L
Chlorinated herbicides	GC/ECD	EPA 8151A	1 L	2 – 1L amber glass	7 days to extraction	14 days		Cool ≤6°C	0.4-8.0	µg/L
TPH (diesel)	GC/FID	NWTPH-Dx [e]	1 L	1-L glass bottle	14 days to extraction	40 days to analysis		Cool ≤6°C, HCl to pH <2	0.05	mg/L
TPH (motor oil)									0.1	mg/L

[a] SM method numbers are from APHA et al. (APHA et al. 1998); EPA method numbers are from US Environmental Protection Agency (1983, 1984). The 18th edition of *Standard Methods for the Examination of Water and Wastewater* (APHA et al. 1992) is the current legally adopted version in the *Code of Federal Regulations*.

[b] Samples will be split from the 20-L HDPE bottle using a 22-liter churn splitter.

[c] Holding time specified in US EPA guidance (US EPA 1983, 1984) or referenced in APHA et al. (1992) for equivalent method.

[d] A G4 glass fiber filter will be used for the total suspended solids filtration.

[e] Washington State Department of Ecology methods (Ecology 1997) includes silica gel extract cleanup step.

[f] US EPA requires filtering for dissolved metals and orthophosphorus within 15 minutes of the collection of the last aliquot. This goal is exceedingly difficult to meet when conducting flow-weighted sampling. A more practical proxy goal for this study is 24 hours. Both goals will be reported with the data.

[g] Appendix D of the project QAPP provides reporting limits for each individual parameter in this compound class.

C = Celsius
ICP = inductively coupled plasma / atomic emission spectroscopy
ICP-MS = inductively coupled plasma / mass spectrometry
GC/MS = gas chromatography / mass spectrometry
GC/FID = gas chromatography / flame ionization detection
mg/L = milligrams per liter
HDPE = high-density polyethylene
NA = not applicable
TPH = total petroleum hydrocarbons

- Polychlorinated biphenyls
- Chlorinated pesticides
- Chlorinated herbicides
- Priority pollutant metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc)

In addition to the grab sampling described above, grab samples were collected during three storm events from each of the three catch basins that contribute stormwater flow to Swale No. 3 and at station RBS185-in (Figure 5). These grab samples were analyzed for:

- Total suspended solids
- Suspended sediment concentration
- Copper, total and dissolved
- Cadmium, total and dissolved
- Lead, total and dissolved
- Mercury, total and dissolved
- Zinc, total and dissolved
- Total phosphorus
- Orthophosphate
- Total Kjeldahl nitrogen
- Nitrite-nitrate nitrogen
- Chloride
- Hardness
- Fecal coliform
- Total petroleum hydrocarbons

Data from these grab samples provided information regarding the variability of stormwater entering the study system. Since it was only feasible to monitor one inlet, it was important to characterize the other influent sources. The data were reviewed for a consistent bias in pollutant concentrations measured at the RBS185-in station relative to the other three influent sources (catch basins). The results of this analysis are presented in the *Results* section and in Appendix B.

Bioretention Soil Mix Monitoring

In addition to water sampling, three soil samples were collected from the bioretention soil mix stockpile when the bioretention system was being constructed. One sample was collected

from: the sand component, the compost component, and a mix of the two. Each sample consisted of three composite samples. Field technicians collected each subsample with a stainless steel scoop and composited the subsample in a stainless steel bowl before placing the samples in glass jars for transport, on ice, to the laboratory. The samples were analyzed to assess the soil chemistry prior to installing the soil mix in the study system. The soil samples were analyzed for the parameters listed below. Table 7 presents additional information regarding the analytes measured in each sample.

- Cation exchange capacity
- Particle size distribution
- Loss on ignition
- Total copper
- Total zinc
- Total phosphorus

Synthetic Precipitation Leaching Protocol (SPLP) Extractions

As noted previously, monitoring indicated significant export of the some pollutants from the study system after it was initially brought online. To identify specific materials used in the construction of the study system that might be contributing to the pollutant export problem, Synthetic Precipitation Leaching Protocol (SPLP) extractions were performed on the following individual components of the system:

- Sand fraction of bioretention soil mix
- Compost fraction of bioretention soil mix
- Mulch that was applied to the surface of the system
- Potting soil used for surface plantings (installed in 1 gallon pots)

The leachate from these extractions were analyzed for the following pollutants of concern for export from the study system:

- Total suspended solids
- Copper, dissolved
- Zinc, dissolved
- Total phosphorus
- Nitrite-nitrate nitrogen

Analytical Methods

Analytical methods for this project are summarized in Tables 6 and 7. Aquatic Research, Inc. in Seattle, Washington, was the primary laboratory used for this project. The soil samples

Table 7. Sediment Quality Analysis Methods and Detection Limits.									
Parameter	**Analytical Method**	**Method Number [a]**	**Field Sample Container**	**Total Holding Time [c]**	**Field Preservation**	**Laboratory Preservation**	**Actual Reporting Limit/ Resolution**	**Target Reporting Limit/ Resolution**	**Units**
Cation exchange capacity	NA replacement	S -10.10 [b]	4-oz glass or Poly	2 days	Cool ≤4°C	Cool ≤4°C	0.1	NA	meq/100 g
Grain size	Sieve/Hydrometer	ASTM D422		6 months			0.1	NA	%
Total carbon	Infrared detection	EPA 9060 mod		14 days, 6 months if frozen			0.01	0.1	%
Total phosphorus (Bray's)	Colorimetric	S -4.20 [b]		2 days			0.01	NA	mg/kg
Total copper	ICP-MS	EPA 6020		6 months, 2 years if frozen			0.1	0.1	mg/kg
Total zinc							5.0	5.0	

[a] EPA method numbers are from US EPA (1986), and ASTM method number is from ASTM (2003).
[b] From Gavlak et al. (2003)
[c] Holding time specified in the referenced methods.
°C = degrees Celsius.
ICP-MS = inductively coupled plasma/mass spectrometry.
meq/100 g = milliequivalent per 100 gram
mg/kg = milligrams per kilogram.
NA = not applicable.

were analyzed at OnSite Environmental, Inc. in Redmond, Washington, while the SPLP analyses were conducted by OnSite Environmental Inc. and Analytical Resources, Inc., in Tukwila, Washington. All laboratories are certified by Ecology and participate in audits and inter-laboratory studies by Ecology and the US Environmental Protection Agency (US EPA). Those performance and system audits have verified the adequacy of the laboratories' standard operating procedures, which include preventive maintenance and data reduction procedures. Both laboratories provided sample and quality control data in standardized reports suitable for evaluating project data. The laboratory reports also included case narratives summarizing any problems encountered in the analyses.

Quality Assurance and Control Measures

Field, laboratory, and data management quality control procedures used in this project are discussed in this section. Memorandums summarizing results from quality assurance reviews that were performed on hydrologic and water quality data can be found in Appendices A and B, respectively.

Field Quality Assurance/Quality Control

Field personnel implemented a number of quality assurance/quality control procedures to evaluate sample contamination and sampling precision. Those procedures are described below.

Rinsate Blanks

Automated samplers were cleaned using the rinse and purge-pump-purge cycle between each aliquot. In addition, before each event, field personnel back-flushed the sample line with reagent-grade water. Rinsate blanks were collected prior to sampling the first storm event on January 13, 2012, and again on September 13, 2012, and October 3, 2013. Field staff collected each field blank by pumping reagent-grade water through the intake tubing into a pre-cleaned sample container. The volume of reagent grade water pumped through the sampler for the equipment blank was similar to the volume of water collected during a typical storm event.

Field Duplicate Samples

Field duplicates were collected for composite samples on March 9, 2012; June 20, 2013; August 29, 2013; and September 5, 2013. Field duplicates for grab samples were collected on March 9, 2012; October 14, 2012; June 20, 2013; and September 28, 2013. To collect the composite sample duplicate, the sample was split from the composite bottle using a churn splitter. The duplicate samples were submitted to the laboratory and labeled as separate (blind) samples. The resultant data from these samples were used to assess variation in the analytical results that is attributable to environmental (natural), sub-sampling, and analytical variability.

Flow Measurements

The precision and bias of the automated flow measurement equipment were tested prior to monitoring on December 20, 2011, and at the end of the project on October 8, 2013. The methods used for these tests and associated results are presented in the hydrologic data

quality assurance memorandum in Appendix A. In addition, the levels sensors were routinely calibrated during the course of the project. Level calibration data can also be found in the hydrologic data quality assurance memorandum in Appendix A.

Laboratory Quality Control

Accuracy of the laboratory analyses was verified through the use of blank analyses, duplicate analyses, laboratory control spikes, and matrix spikes in accordance with the US EPA methods employed. Aquatic Research, Inc., OnSite Environmental, Inc., and Analytical Resources, Inc., (all Ecology certified) were responsible for conducting internal quality control and quality assurance measures in accordance with their own quality assurance plans.

Water quality results were first reviewed at the laboratories for errors or omissions and to verify compliance with acceptance criteria. The laboratories also validated the results by examining the completeness of the data package to determine whether method procedures and laboratory quality assurance procedures were followed. The laboratories documented their review, verification, and validation in case narratives that accompanied the analytical results.

Data were reviewed and validated within 7 days of receiving results from a laboratory. The review was performed to ensure that all data were consistent, correct, and complete, and that all required quality control information was provided. Specific quality control elements for the data were also examined to determine if the Method Quality Objectives (MQOs) specified in the QAPP for the project (Herrera 2012) were met. Results from the data validation reviews were summarized in quality assurance worksheets that were prepared for each sample batch (Appendix B). Values associated with minor quality control problems were considered estimates and assigned *J* qualifiers. Values associated with major quality control problems were rejected and qualified with an *R*. Estimated values were used for evaluation purposes, while rejected values were not used.

Data Management Procedures

All project laboratories reported analytical results within 30 days of receipt of the samples. The laboratories provided sample and quality control data in standardized reports that were suitable for evaluating the project data. The reports included all raw data, including raw quality assurance data, and all quality control results associated with the data. The reports also included case narratives summarizing any problems encountered in the analyses, corrective actions taken, changes to the referenced method, and an explanation of data qualifiers. Laboratory analytical and quality control results were delivered from the laboratory in both electronic and hardcopy form.

Data from the datalogger were remotely transferred on a 10-minute basis. The hydrologic data from each monitoring station were imported directly into an Aquarius (version 3.1) SQL based database for subsequent analysis and archiving purposes. Any data anomalies, including gaps, spikes, drift, and other irregularities, were identified and corrected within the Aquarius environment. A log of all the data corrections, including date of correction, type of correction, data corrected, and user identification is provided in Appendix A.

After the data were checked for errors and corrected, a custom program written in visual basic was applied to the flow, rain, and sample collection time data. The program uses algorithm to segregate storms based on TAPE (Ecology 2011a) criteria identified above in the *Water Quality Monitoring Procedures* section. Once the events were delineated, the algorithm calculated the following storm statistics:

- **Precipitation**:
  - Start time
  - Stop time
  - Duration (hours)
  - Antecedent dry period (hours)
  - Depth (inches)
  - Peak intensity (inches/5 minutes)
  - Peak intensity (inches/hour)
  - Average intensity (inches/hour)
- **Flow**:
  - Start time
  - Stop time
  - Duration (hours)
  - Peak Flow (cubic feet per second)
  - Average Flow (cubic feet per second)
  - Storm Volume (cubic feet)
- **Sampling**:
  - Start time
  - Stop time
  - Duration (hours)
  - Number of aliquots
  - Volume represented by sampling (cf)
  - Percent of storm sampled by volume

The storm statistics were stored in conjunction with associated water quality data in the SQL database. The laboratory reports, field notes, and event hydrograph were also stored in the database with each event. Once compiled, these data were checked for data entry errors. If errors were found, they were corrected and the date and time of the correction was logged in the database. After these checks were performed, one-page individual storm reports for each sampled event were automatically generated from the database (Appendix C). Once the data were verified and validated, they were exported to StatSoft's Statistica (version 11) software for analysis.

Data Analysis Procedures

Data analysis was be performed to meet the following objectives of the monitoring project:

- Document hydrologic and water quality treatment performance of the study system, as demonstrated by field testing performed in accordance with the project QAPP (Herrera 2012b)
- Present an analysis of whether pollutant concentrations in effluent from the study system could contribute to groundwater contamination

Separate subsections, below, describe the specific data analysis procedures that were applied to meet these objectives.

Evaluation of Bioretention Treatment Performance

To evaluate the treatment performance of the bioretention swale, the following data compilations and analyses were generated from the monitoring results:

- Statistical comparisons of influent and effluent concentrations were performed.
- Pollutant removal efficiency was calculated for each parameter during each storm event.

Each of these activities is described in more detail below.

Statistical Comparisons of Influent and Effluent Pollutant Concentrations

Statistical analyses were performed to determine whether there were significant differences in pollutant concentrations between the influent (RBS185-in) and effluent (RBS185-out) stations across individual storm events. The specific null hypothesis (H_o) and alternative hypothesis (H_a) for these analyses are as follows:

H_o: Influent and effluent pollutant concentrations are equal

H_a: Influent and effluent pollutant concentrations are not equal

To evaluate these hypotheses, a two-tailed Wilcoxon signed-rank test (Helsel and Hirsch 2002) was used to compare the influent and effluent performance data. (The Wilcoxon signed-rank test is a nonparametric analogue to the paired t-test.) Statistical significance was assessed based on an alpha (α) level of 0.05.

Pollutant Removal Efficiency Calculations

The removal efficiencies for each monitoring parameter during each storm event was calculated using the following formula:

$$\text{Percent Removal} = \frac{100[A-B]}{A}$$

where: A = Storm 1 influent concentration

B = Storm 1 effluent concentration

Evaluation of Potential Groundwater Impacts

To determine if pollutant concentrations in the effluent from the study system could contribute to groundwater contamination, compiled data from the RBS185-out station were compared to applicable Washington state groundwater standards (WAC 173-200). Data for following pollutants were specifically used in the comparison:

- Chloride
- Nitrate
- Semi-volatile organic compounds
- Volatile organic compounds
- Polycyclic aromatic hydrocarbons
- Polychlorinated biphenyls
- Chlorinated pesticides
- Chlorinated herbicides
- Priority pollutant metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc)

The total number of times a pollutant concentration in effluent samples from the study system exceeded a state standard for a specific parameter was tallied. The results were used to evaluate the overall risk to groundwater quality if treated stormwater from study system is allowed to infiltrate into the subgrade.

RESULTS

The analysis below includes the data collected from February 2012 through September 2013. Separate subsections present results from hydrologic and water quality monitoring, respectively. Additional information related to project data can also be found in the following appendices:

- **Appendix C** Individual Storm Reports
- **Appendix D** Standardized Field Forms
- **Appendix E** Water Quality and Flow Statistic Database
- **Appendix F** Priority Pollutant Results Database
- **Appendix G** Groundwater Quality Criteria
- **Appendix H** Laboratory Reports

Hydrologic Data

To provide some context for interpreting the data, this section compares rainfall totals measured during the monitoring period relative to historical data. Separate sections then evaluate the bypass results and the infiltration testing results. Finally, the flow results are reported for both the inlet and outlet stations. Appendix A summarizes results from the quality assurance review that was performed on hydrologic data prior to their analysis.

Historical Rainfall Data Comparison

To provide some context for interpreting the hydrologic performance of the study system, an analysis was performed on rainfall data collected at the Western Regional Climate Center (WRCC) rain gauge at Sea-Tac airport to determine if rainfall totals from the monitoring period (i.e., February 2012 through September 2013) were anomalous. The WRCC gauge is located approximately 18 miles southwest of the project site. The analysis specifically involved a comparison of rainfall totals measured at the WRCC rain gauge over the monitoring period to averaged totals for the same gauge from the 63-year historical record.

Results from this analysis showed the average annual rainfall total at the WRCC rain gauge from 1949 through 2013 was 37 inches (http://wwwk12.atmos.washington.edu/k12/grayskies/nw_weather.html). In comparison, the rainfall total at the WRCC rain gauge over the 2012 and 2013 water years averaged was 42.3 inches (60th percentile), indicating that the study period occurred during neither abnormally dry nor wet water years. To check if the RBS185-RG gauge was in agreement with the WRCC gauge, the rainfall totals for water year 2013 (the only full water year in the 20-month monitoring period) were compared. In water year 2013, 47.4 inches of precipitation were recorded at WRCC and 47.95 inches of precipitation were recorded at RBS185-RG, indicating there was only a 1.1 relative percent difference between the gauges over this period.

Bypass Analysis

During the monitoring period, 207 individual events were identified and five of those produced bypass flow. Table 8 presents hydrologic data for the bypass flow events. All of the bypass events occurred during the first 8 months after the study system came online, which may indicate the clogging effects of the mulch layer (see *Physical Description* section) decreased with time, or the infiltration capacity of the system increased as the plant community matured. Regardless, the fact that bypass only occurred during 2.4 percent of the measured events is an indication that the system is not undersized.

The water quality treatment goal for the study system was to capture and treat 91 percent of the average annual runoff volume. Although bypass volumes were not calculated, a bypass frequency of 2.4 percent suggests that 91 percent of the runoff volume was treated by the study system during the monitoring period.

Controlled Infiltration Testing

Controlled infiltration testing on March 21, 2012, indicated that the initial unsaturated infiltration rate was 3.5 inches per hour, while the saturated infiltration rate was 1.5 inches per hour. Both values were lower than expected and may be the result of partial clogging from the fine mulch layer (see *Physical Description* section) that was applied to the test system during construction in November 2011 and then removed on January 18, 2012, 1 month prior to the collection of the first water quality sample in February. The low infiltration rates should, in theory, result in improved water quality treatment because they would increase contact time between the stormwater and the filtration media. However, there was concern that the low infiltration rates would result in premature clogging of the system. A second infiltration test was conducted on September 25, 2013, approximately 22 months after construction. The second test indicated that the initial unsaturated infiltration rate was 5.2 inches per hour, while the saturated infiltration rate was 2.9 inches per hour. The approximate two-fold increase in infiltration rates could be the result of increased plant establishment and associated macropore flow, increased infiltration due to bioturbation, or the decreased effect of the clogging mulch layer after its removal. The higher infiltration rates may also explain why no bypass events were recorded after June 2012.

Influent versus Effluent Hydrology

To determine the hydrologic performance of the study system, the flow duration, flow volume, and peak flow were calculated for each of the 207 monitored storm events. Paired values (influent and effluent) for these flow metrics are plotted in Figures 6, 7, and 8. Figure 6 indicates that, during the dry season (May 1 through September 30), there was a 40 percent increase in flow duration between in the inlet and outlet. During the wet season (October 1 through April 30), there was only a 33 percent increase in flow duration between in the inlet and outlet. The confidence intervals for these duration differences overlap considerably (Figure 6); therefore, there is likely no significant difference between flow attenuation in the wet and dry seasons.

Table 8. Summary Statistics for Storms that Produced Bypass Flow at the 185th Avenue NE Bioretention System from February 1, 2012, through September 30, 2013.

Storm Start Date and Time	Precipitation Depth (inches)	Peak Precipitation Intensity (inches/hour)	Precipitation Duration (hours)	Antecedent Dry Period (hours)	Peak Influent Discharge (gpm)	Peak Effluent Discharge (gpm)
2/18/2012 17:10	0.36	0.6	5.4	21.6	116	7.3
2/24/2012 13:45	0.95	0.36	21.5	75.7	68	3.3
4/25/2012 7:55	0.82	1.92	25.8	7.3	735	8.1
5/1/2012 18:30	0.36	1.08	8.7	39	460	3.6
6/7/2012 4:20	0.5	1.56	9.2	29.8	152	9.5

gpm: gallons per minute

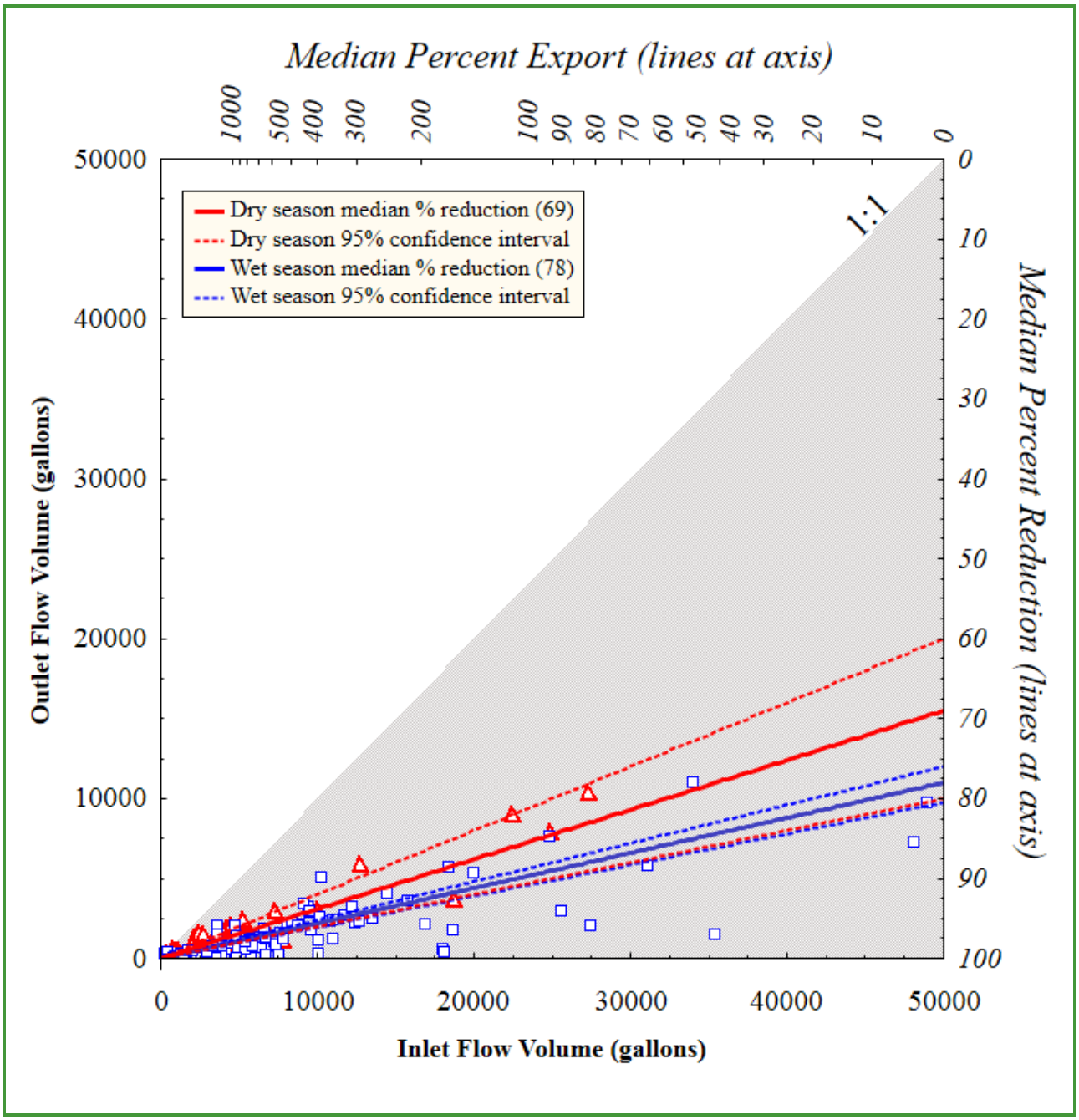

Figure 6. Influent Versus Effluent Flow Duration.

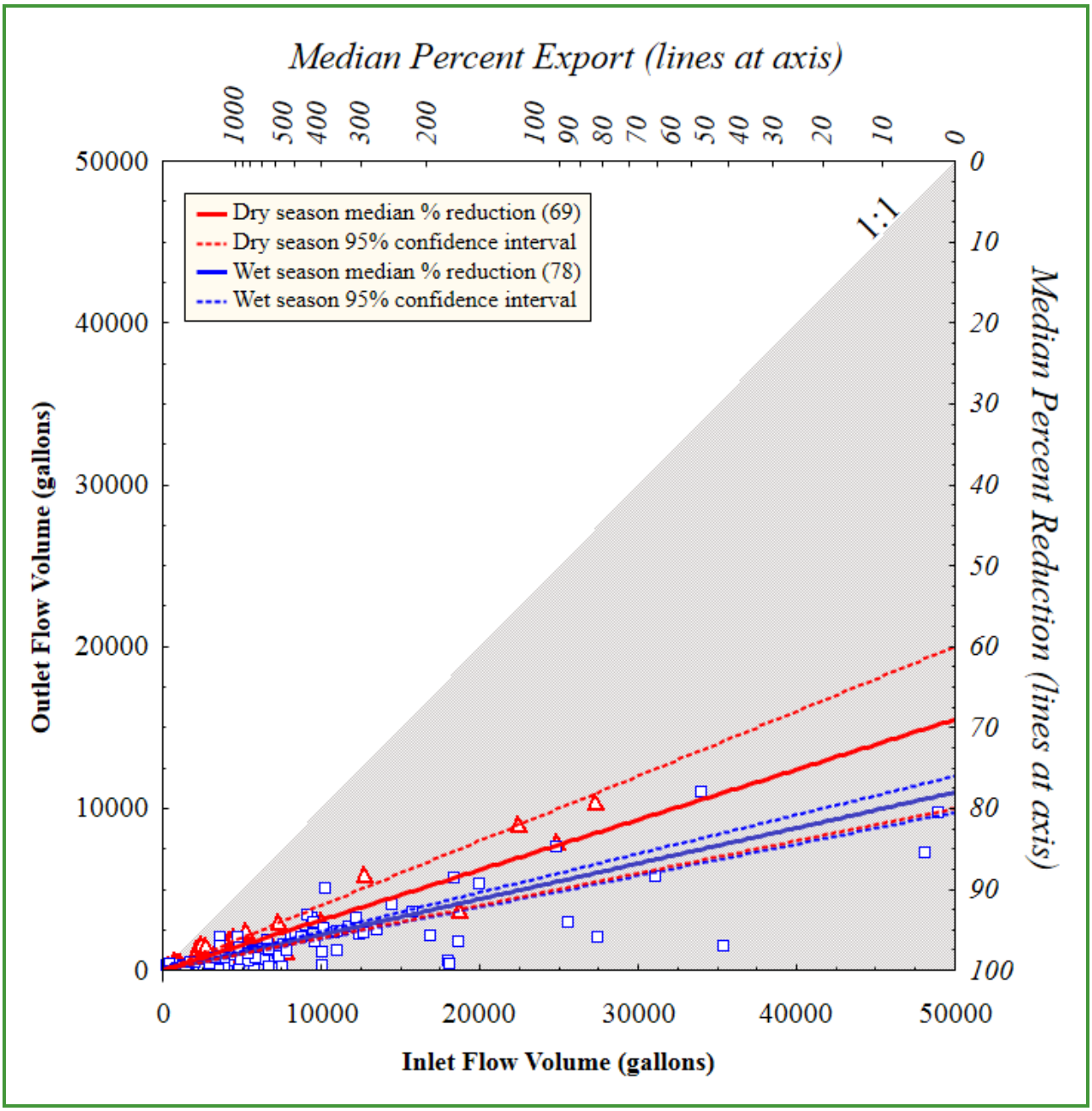

Figure 7. Influent Versus Effluent Flow Volume.

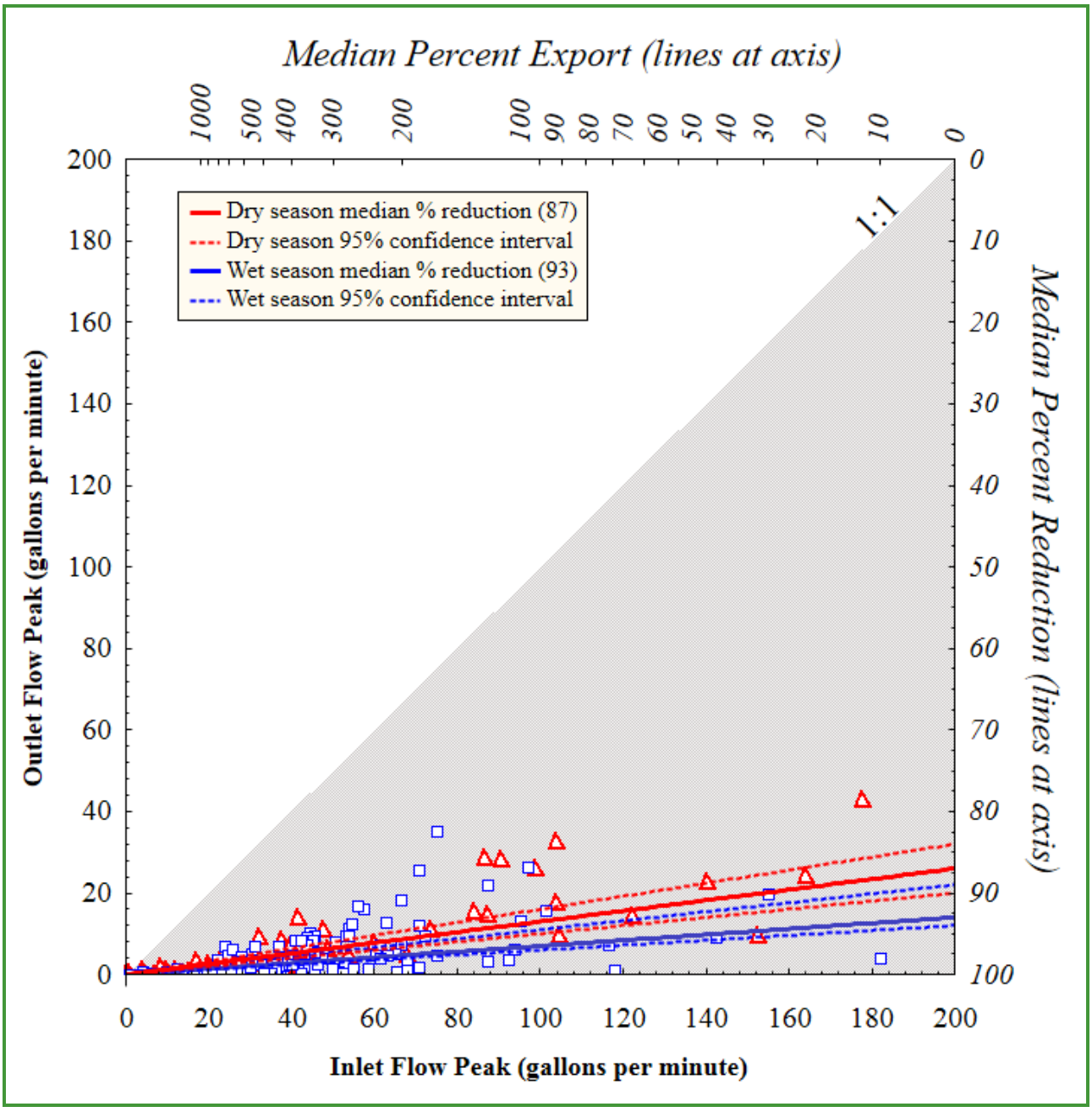

Figure 8. Influent Versus Effluent Flow Peak.

Figure 7 indicates that the study system reduced influent storm volumes by median values of 69 percent during the dry season and 78 percent during the wet season (non-significant difference between the seasons). This result was a surprise given that the study system is lined. Mechanisms for water loss in the system include evapotranspiration and leaks in the liner (of which one was confirmed during the monitoring period). In addition, because influent flows were scaled up from one representative inlet, there could have been extrapolation error that contributed to the discrepancy between influent and effluent flows.

Figure 8 presents reduction in peak discharge results. The median reduction in the dry season was 87 percent; in the wet season it increased to 93 percent. The difference between the dry and wet seasons is non-significant. Again, the results may have been affected by leaks in the liner, evapotranspiration, and extrapolation error from the inlet.

Water Quality Data

This section summarizes water quality data collected during the January 2012 to September 2013 monitoring period at the study system. It begins with an evaluation of data representativeness based on criteria that were previously identified in the project QAPP (Herrera 2012b). It then presents results under separate subsections for the following groups of parameters: Solids, Nutrients, Metals, and Other. Each subsection provides a comparison of influent and effluent concentrations, followed by a temporal analysis of the observed pollutant export; where applicable, the effluent results are also compared with groundwater standards to determine if infiltration through bioretention systems may pose a risk to groundwater in Redmond.

Water Quality Data Representativeness

During the 20-month monitoring period, 26 storm events were successfully sampled by either grab or composite sample, or both. Table 9 presents the results of the storm event and sampling criteria for each event and provides a comparison to the goals identified in the project QAPP (Herrera 2012b) and in the *Methods* section, above. As is apparent from Table 9, all the sampled events met all of the applicable criteria; consequently, the associated chemistry results are deemed representative of typical storm chemistries in the field.

Results from the grab sampling at the influent station (Swale No. 2) and each of the three inlets to Swale No. 3 indicated that for the majority of the parameters the relative percent difference (RPD) among the inlets was 10 percent or less. For those parameters where the RPD was greater than 10 percent, the apparent sampling design bias only amplified the export and reduction patterns for individual parameters observed in this study (see Appendix B for more details).

Finally, influent concentrations were, dependent upon the parameter, representative of runoff from either High-Density Residential or Commercial land use when compared with results from regional NPDES monitoring (Ecology 2011b).

Table 9. Storm and Sampling Criteria for the Sampled Storm Events.								
			Inlet			Outlet		
Event Date	Rain Total (in)	Antecedent Dry Period (hr)	Sample Count	Sample Duration (hr)	Sample Coverage (%)	Sample Count	Sample Duration (hr)	Sample Coverage (%)
2/17/2012 11:25	0.43	76.6	31	2.8	92.4	95	19.2	96.8
2/20/2012 13:50	0.79	40.8	grab only	grab only	grab only	grab only	grab only	grab only
2/24/2012 13:45	0.95	75.7	63	19.1	98.4	50	23.5	97.1
3/2/2012 14:05	0.16	51.8	34	4.7	93.9	35	7.3	84.1
3/5/2012 5:50	0.21	58.3	20	2.7	97.6	16	6	92.8
3/9/2012 11:30	0.38	98.8	13	11.6	93.6	19	12.7	88.2
3/12/2012 6:00	0.93	26.3	grab only	grab only	grab only	grab only	grab only	grab only
4/19/2012 14:55	0.93	82.2	68	19.4	99.2	84	21.5	92.3
5/21/2012 6:20	0.35	11.2	15	6.5	97	45	9.2	95.1
6/22/2012 10:25	0.81	84.6	grab only	grab only	grab only	grab only	grab only	grab only
7/2/2012 19:45	0.33	54.7	50	4.3	98.1	90	4	94.3
9/10/2012 1:40	0.27	1239.7	39	3.6	93.6	91	5.9	90.9
10/14/2012 12:05	0.5	15.6	grab only	grab only	grab only	grab only	grab only	grab only
10/15/2012 15:00	0.15	15.8	22	6.7	98.4	19	5.5	98.2
11/11/2012 16:10	0.47	106.7	91	11.4	88.9	69	11.8	96
12/16/2012 10:25	0.79	17.9	90	14.5	91.8	75	16.5	96.2
1/23/2013 12:20	0.28	310.9	25	8.5	94.7	22	10	98.3
2/22/2013 2:35	0.15	19	13	10.6	89.7	19	16.6	95.1
3/19/2013 17:15	0.83	33	grab only	grab only	grab only	grab only	grab only	grab only
4/10/2013 7:00	0.33	40	grab only	grab only	grab only	grab only	grab only	grab only
4/18/2013 14:45	0.29	68.7	48	12.2	97.5	82	16.3	99.2
6/20/2013 3:05	1.23	53.8	70	18.2	98	91	16.2	98.3
8/29/2013 0:55	0.73	20.2	91	16	86.4	91	18.5	91.5
9/5/2013 20:55	1.45	14.9	25	12.4	92.6	49	14.4	97
9/22/2013 7:45	0.25	134.9	47	2.6	97.2	26	5.1	98.3
9/28/2013 2:40	1.2	19.4	64	17.2	88.9	91	11.9	85.3
QAPP Criteria	≥ 0.15	≥ 6	≥ 10	≤ 36	≥ 75	≥ 10	≤ 36	≥ 75

Solids Results

The 185th Avenue NE bioretention system was installed and went online in November 2011. The first samples for water quality were collected in February 2012, approximately 3 months later. The data collected from February 2012 through November 2012 (the first year of operation, or Year 1 in Table 10) indicated that the bioretention system was not an effective filter for suspended solids. Table 10 indicates that, during the first year, the system increased export of total suspended solids and suspended solids concentration by 61 and 65 percent, respectively. However, that increase was not statistically significant, as determined by a Wilcoxon Signed Rank test (Table 10). The increase was likely due to the bioretention soil mix and drainage layers settling and exporting fines during the establishment period. During the second year of study system operation, the pattern changed considerably. Instead of frequent export of suspended solids, the system consistently removed suspended solids with each successive event (Figure 9). The result was that the system reduced influent total suspended solids and suspended solids concentration by 85 and 82 percent, respectively. Both reductions were statistically significant. It should be noted that, during the second year of operation (Year 2 in Table 10), there were three exceptionally high suspended solids results measured at the inlet (Figures 9 and 10). The events in January and March of 2013 were the result of road sanding; the event in June of 2013 occurred for unknown reasons. These very high influent values (above 350 mg/L) contributed to the elevated percent removal values measured in Year 2.

The 2012 Stormwater Management Manual for Western Washington (Ecology 2012) and the TAPE (Ecology 2011a) dictate that "Basic Treatment" BMPs will remove greater than or equal to 80 percent total suspended solids. Consequently, the study system would not qualify as a basic BMP during its first year of operation but would likely qualify after that point. Finally, because there are no groundwater quality criteria for total suspended solids or suspended solids concentration, the effluent results could not be compared to groundwater standards.

Nutrient Results

The nutrients measured in connection with this study consisted of total phosphorus, orthophosphate, total Kjeldahl nitrogen, and nitrate+nitrite. During the first year of study system operation, significant increases in concentration for all of these nutrients were documented (Table 10). Total phosphorus increased by 4,029 percent, orthophosphate increased by 57,854 percent, total Kjeldahl nitrogen increased by 1,163 percent, and nitrate+nitrite increased by 31,971 percent in Year 1. During Year 2, all measured nutrients except total Kjeldahl nitrogen were still significantly higher in effluent relative to the influent. Consequently, although steady nutrient flushing did occur throughout the monitoring period, the study system was still exporting nutrients at the end of the study. During Year 2, total phosphorus increased by 820 percent, orthophosphate increased by 46,527 percent, total Kjeldahl nitrogen increased by 60 percent, and nitrate+nitrite increased by 198 percent.

Total phosphorus effluent concentrations at the start of the study were as high as 5.35 mg/L. Total phosphorus flushing was evident during Year 1, but, during Year 2, effluent

Table 10. Influent and Effluent Concentrations from First Two Operating Years of the 185th Avenue NE Bioretention System.											
		Year 1					Year 2				
Parameter	Units	Mean IN	Mean OUT	Mean % Reduction	LCL95	UCL95	Mean IN	Mean OUT	Mean % Reduction	LCL95	UCL95
Total Suspended Solids	mg/L	77	74	-61	-111	-9	*194*	*21*	*85*	*80*	*90*
Suspended Solids Conc.	mg/L	72	79	-65	-116	-13	*185*	*25*	*82*	*75*	*88*
Total Phosphorus	mg/L	**0.16**	**4.14**	**-4,029**	**-5,396**	**-2,563**	**0.30**	**1.40**	**-820**	**-1,284**	**-426**
Orthophosphate	mg/L	**0.025**	**2.893**	**-57,854**	**-126,552**	**-20,272**	**0.003**	**1.187**	**-46,527**	**-61,777**	**-35,565**
Total Kjeldahl Nitrogen	mg/L	**1.27**	**14.82**	**-1,163**	**-1,656**	**-709**	5.75	7.15	-60	-121	-8
Nitrate+Nitrite	mg/L	**0.75**	**53.78**	**-31,971**	**-68,448**	**-3,742**	**0.27**	**0.55**	**-198**	**-278**	**-119**
Hardness	mg $CaCO_3$/L	**25**	**141**	**-527**	**-806**	**-330**	49	52	-74	-108	-42
Chloride	mg/L	**3**	**20**	**-643**	**-1,137**	**-359**	29	20	-166	-303	-49
Total Cadmium	µg/L	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Total Copper	µg/L	**16**	**43**	**-336**	**-561**	**-142**	29	17	25	6	49
Total Lead	µg/L	**5**	**10**	**-277**	**-446**	**-128**	*9*	*2*	*72*	*51*	*87*
Total Mercury	µg/L	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Total Zinc	µg/L	*143*	*51*	*54*	*26*	*73*	*162*	*13*	*89*	*86*	*93*
Dissolved Cadmium	µg/L	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Dissolved Copper	µg/L	**5**	**19**	**-990**	**-1,984**	**-368**	6	11	-291	-598	-102
Dissolved Lead	µg/L	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Dissolved Mercury	µg/L	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Dissolved Zinc	µg/L	*46*	*17*	*34*	*-13*	*70*	*22*	*8*	*43*	*26*	*62*
TPH - Diesel	mg/L	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TPH - Oil	mg/L	*1.11*	*0.41*	*49*	*3*	*77*	*1.74*	*0.12*	*88*	*79*	*94*
Fecal Coliform	CFU/100mL	3,010	371	64	28	85	2,808	236	77	44	94

NC = not calculable because more than 50 percent of the data were at or below the reporting limit.

CFU/100mL = colony forming units per 100 milliliters

TPH = total petroleum hydrocarbons

LCL95 = lower 95 percent confidence limit on the mean (calculated with a bootstrap approach).

UCL95 = upper 95 percent confidence limit on the mean (calculated with a bootstrap approach).

Bold values in red indicate a significant increase, *italicized* values in blue indicate a significant decrease, values in black indicate no significant difference between inlet and the outlet (Wilcoxon Signed Rank test $\alpha = 0.05$)

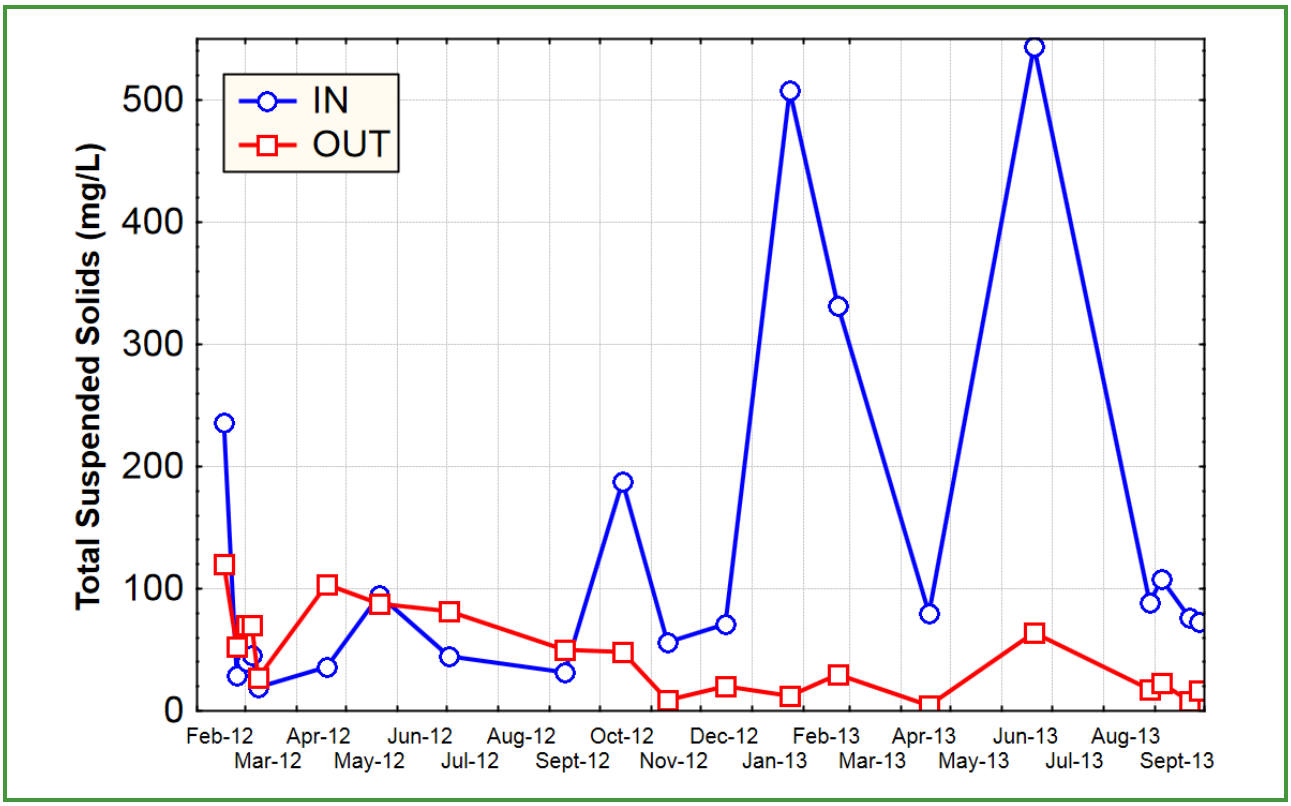

Figure 9. Total Suspended Solids Influent and Effluent Pollutograph.

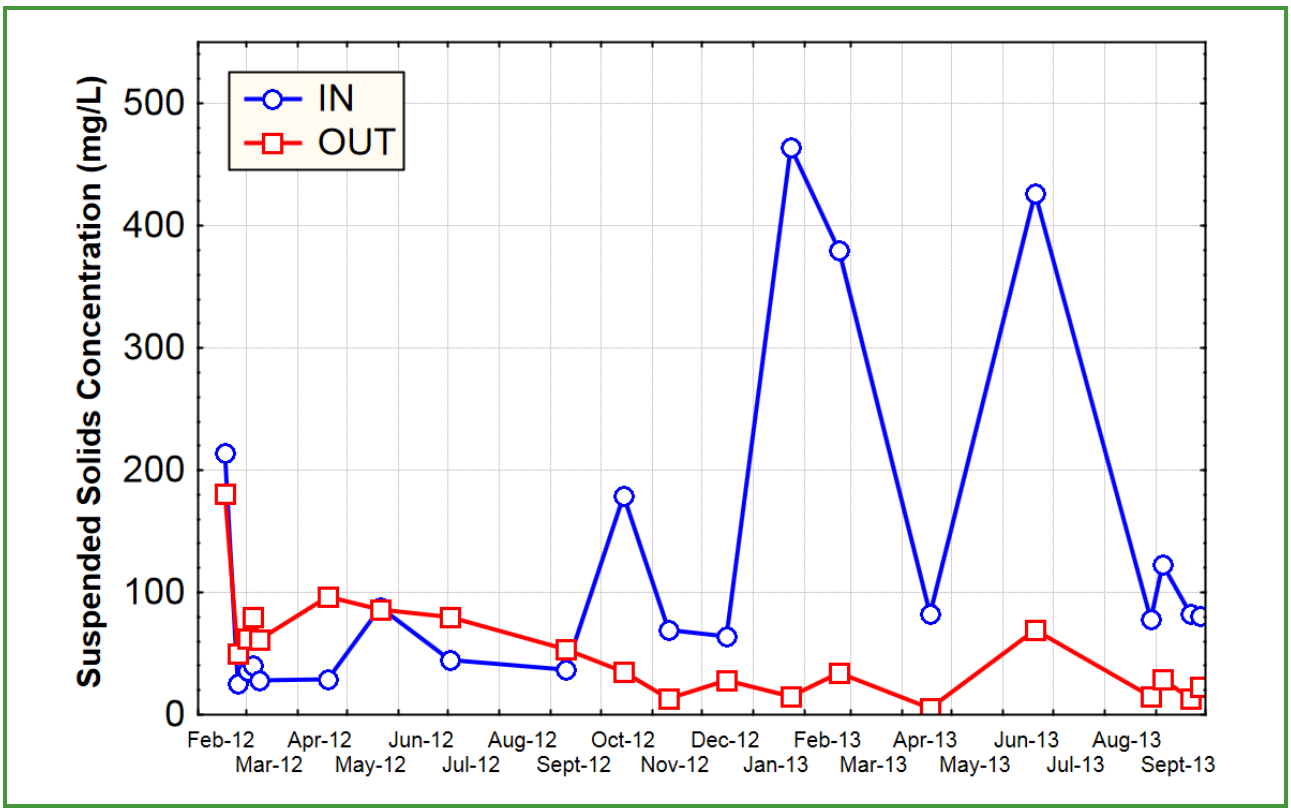

Figure 10. Suspended Solids Concentration Influent and Effluent Pollutograph.

concentrations remained around 1 mg/L with no further sign of flushing (Figure 11). SPLP extractions on the media components indicated that the sand fraction is not a likely source of total phosphorus (Figure 11), while the compost fraction and potting soil that was associated with the plants are highly enriched with phosphorus. It is assumed that SPLP total phosphorus values were not as high as values measured in the effluent because the extraction process did not adequately mimic natural leaching conditions. There are no groundwater standards for total phosphorus, so no comparisons could be made between effluent results and groundwater standards. However, the industrial benchmark for total phosphorus export is plotted on Figure 11 for reference. The 2012 Stormwater Management Manual for Western Washington (Ecology 2012) and the TAPE (Ecology 2011a) dictate that "Phosphorus Treatment" BMPs will remove greater than or equal to 50 percent total phosphorus. Given the observed export, the system would not qualify as a phosphorus treatment BMP during the first 2 years of operation.

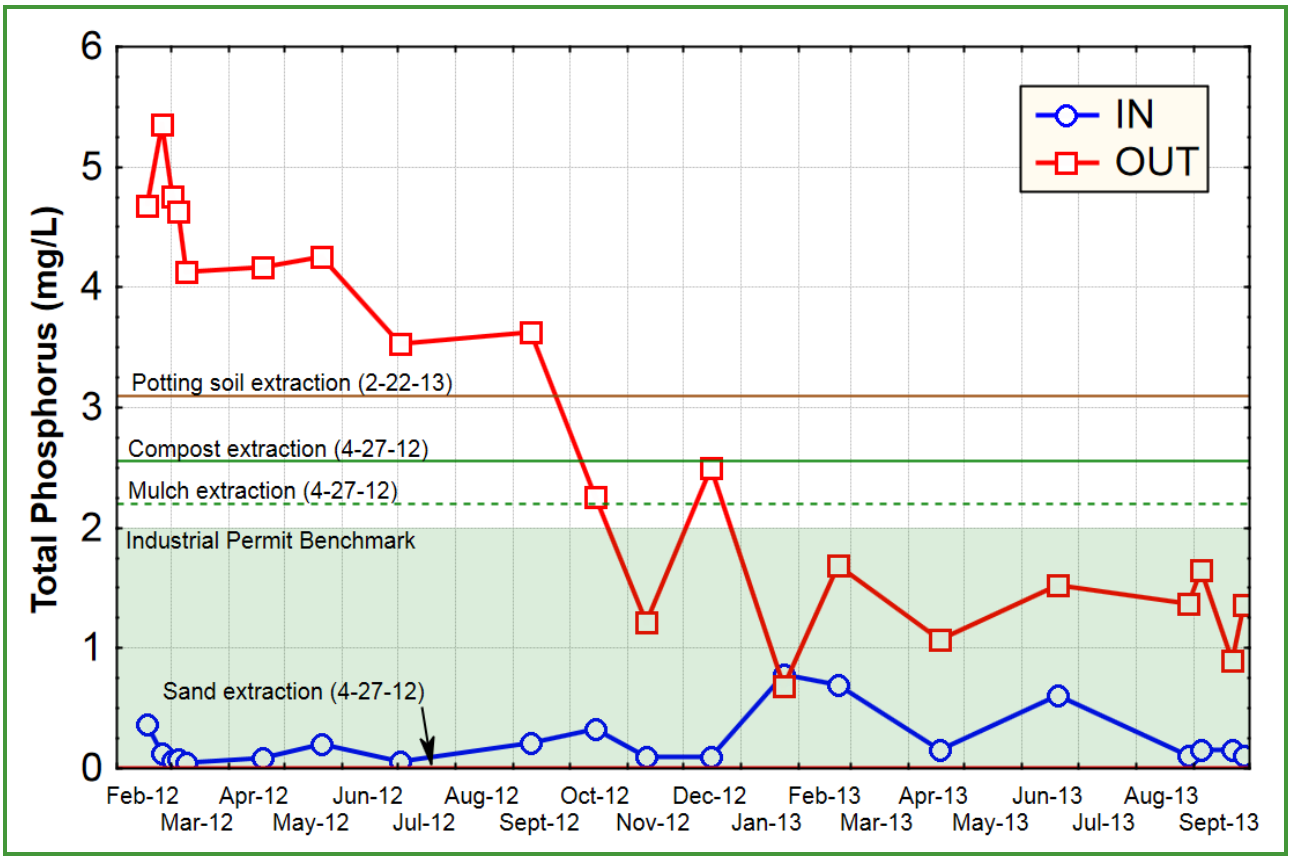

Figure 11. Total Phosphorus Influent and Effluent Pollutograph.

Orthophosphate followed a very similar pattern to total phosphorus because the majority of the total phosphorus consisted of the orthophosphate fraction (Figure 12). Again, there are no groundwater standards for orthophosphate so comparisons could not be made.

Nitrate+nitrite export was exceedingly high at the start of the study. Concentrations were as high at 125 mg/L, exceeding the nitrate groundwater quality standard of 10 mg/L until March 2012 (after 5 months of operation) (Figure 13). Nitrate+nitrite exhibited rapid flushing during Year 1, but, by Year 2, the flushing stabilized somewhat and concentrations remained

between 0.2 and 0.9 mg/L (Figure 13). SPLP extractions indicated that the compost fraction had the highest nitrate+nitrite concentrations—100 times more nitrate+nitrite than the mulch (which was removed), sand, and potting soil (associated with the plants) (Figure 13). The industrial benchmark value of 0.68 mg/L is identified on Figure 13, indicating that, during Year 1, that threshold was consistently exceeded.

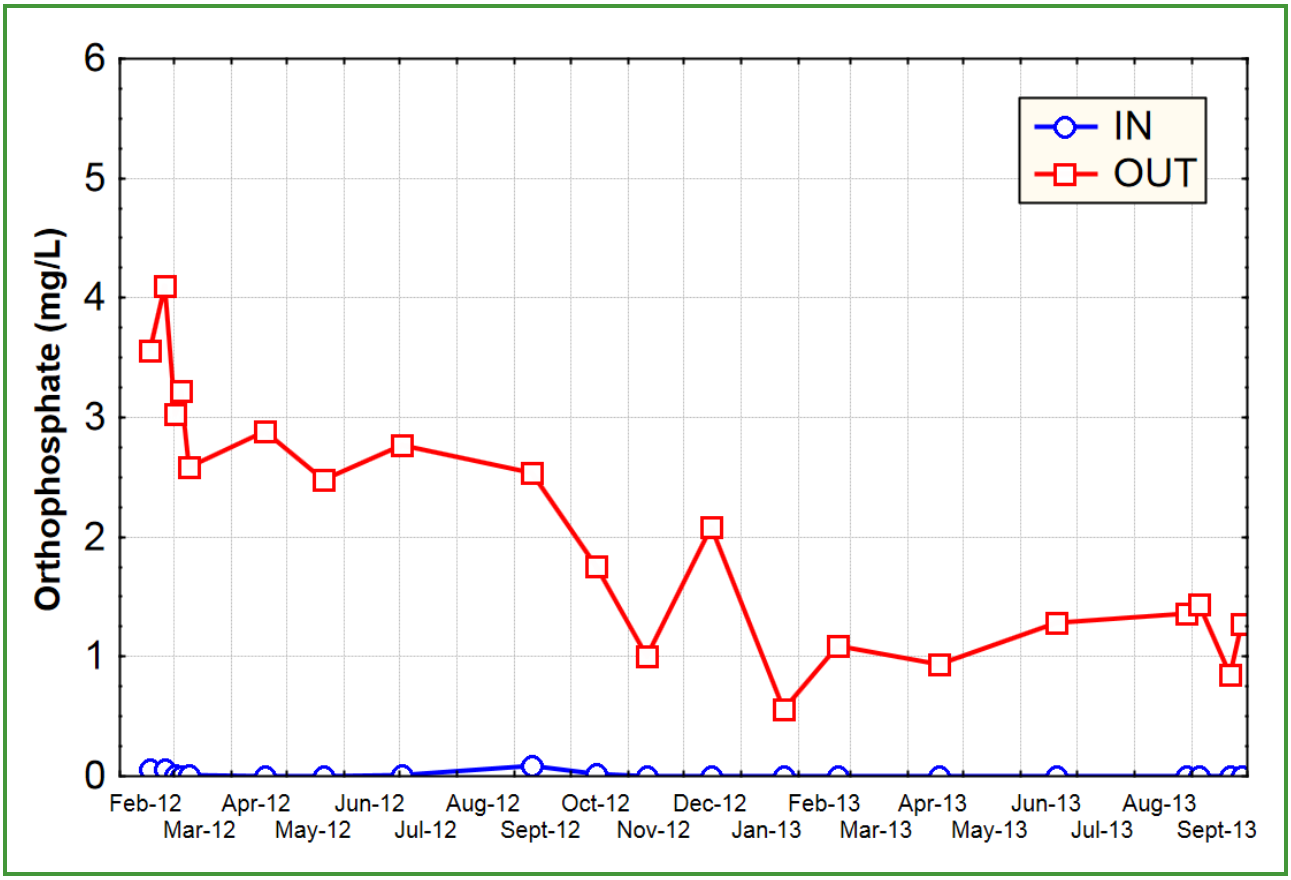

Figure 12. Orthophosphate Concentration Influent and Effluent Pollutograph.

It should be noted that the groundwater standard is 10 mg/L for nitrate alone, not nitrate+nitrite. However, nitrite is an unstable parameter under typical stormwater field conditions and is in most cases exceedingly small compared with nitrate concentrations. Consequently, it is assumed in this study that nitrite contributed very little to the nitrate+nitrite values reported herein.

Total Kjeldahl nitrogen exhibited a different pattern from nitrate+nitrite (Figure 14). Initial high values of total Kjeldahl nitrogen were rapidly flushed out by May 2012. By Year 2, there was no significant difference between influent and effluent concentrations of total Kjeldahl nitrogen (Table 10). In December 2012, there was an unexplained spike in both inlet and outlet concentrations of total Kjeldahl nitrogen (Figure 14). There is no groundwater standard for total Kjeldahl nitrogen so comparisons could not be made.

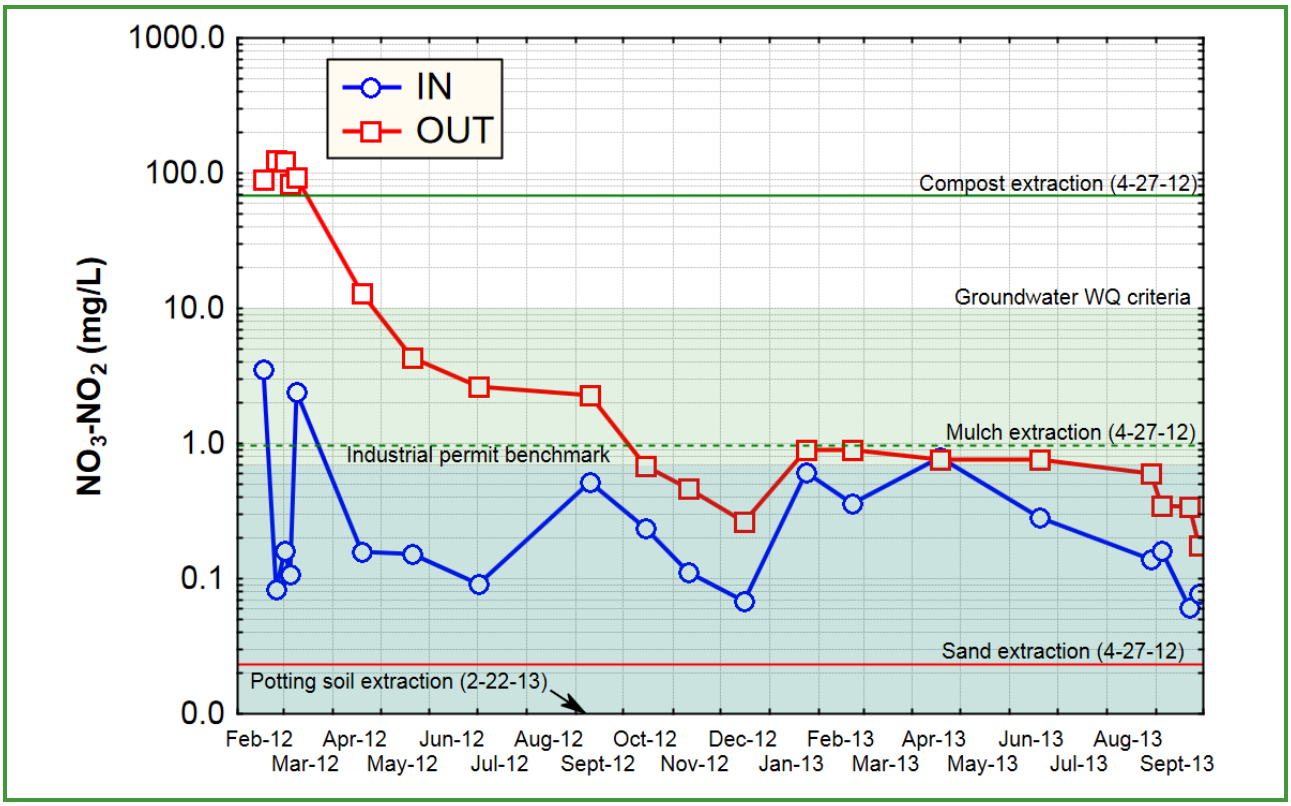

Figure 13. Nitrate+nitrite Influent and Effluent Pollutograph.

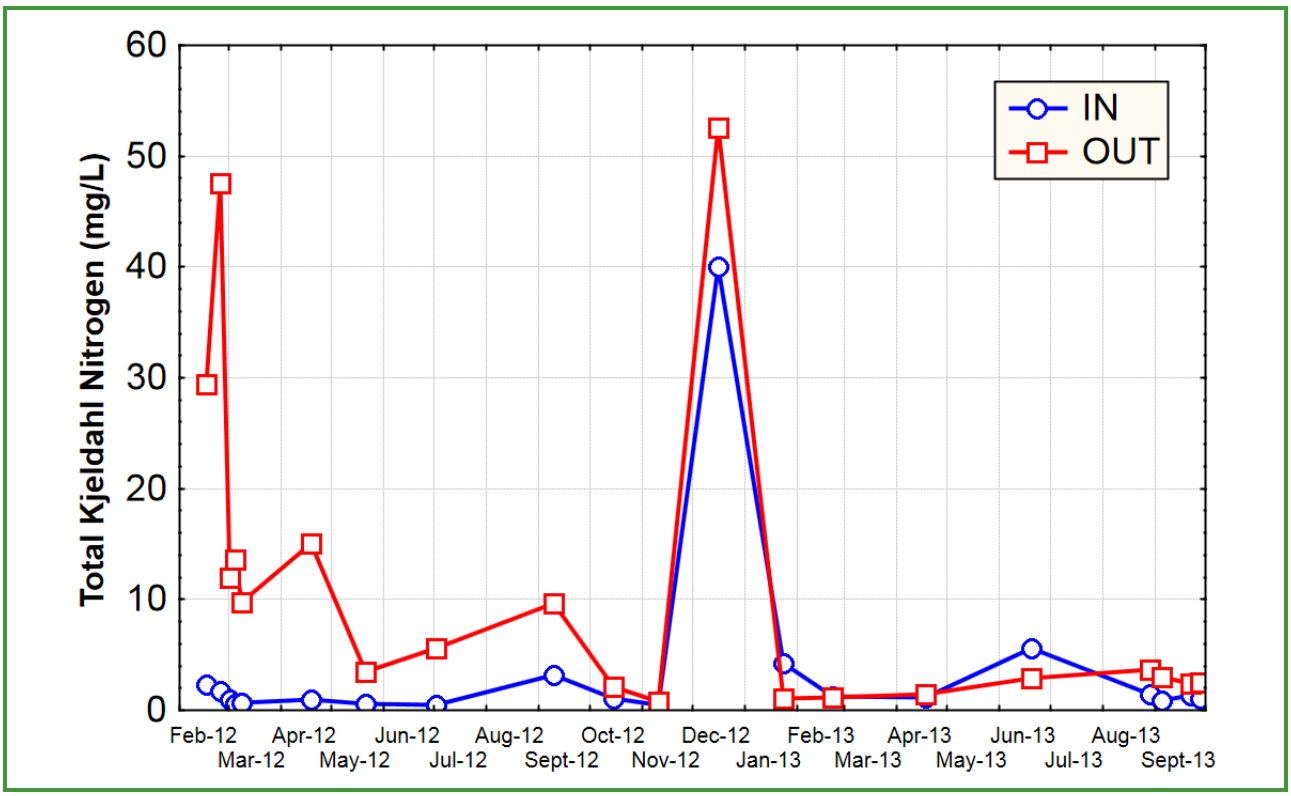

Figure 14. Total Kjeldahl Nitrogen Concentration Influent and Effluent Pollutograph.

Metals Results

The total and dissolved fraction of cadmium, copper, lead, mercury, and zinc were analyzed as part of this study. Total cadmium was detected in 2 of the 20 inlet samples and in 5 of the 20 outlet samples. Dissolved cadmium was not detected in any of the inlet or outlet samples. Similarly, total and dissolved mercury were not detected in any of the influent or effluent samples. Dissolved lead was not detected in any of the influent samples, but it was detected in six of the effluent samples (all within Year 1). All of these results are summarized in tabular format in Appendix E. The remaining metals (total lead, total and dissolved copper, and total and dissolved zinc) were detected with enough frequency for statistical and trend analysis. The results for these metals are presented below.

During the first year of operation, the study system was a significant source of total lead, with influent concentrations averaging 5 micrograms per liter (µg/L) and effluent concentrations averaging 10 µg/L; based on these values, lead export averaged 277 percent (Table 10, Figure 15). During Year 2, the trend reversed and the system significantly reduced influent total lead concentrations. This was due to lead flushing from the bioretention system and an increase in influent total lead concentrations during Year 2 (Figure 15). During Year 2, lead was reduced by 72 percent on average. All influent and effluent total lead concentrations were well below the groundwater standard of 50 µg/L; therefore, infiltrating water from the system would not be expected to negatively impact the City's drinking water supply with regard to lead concentrations.

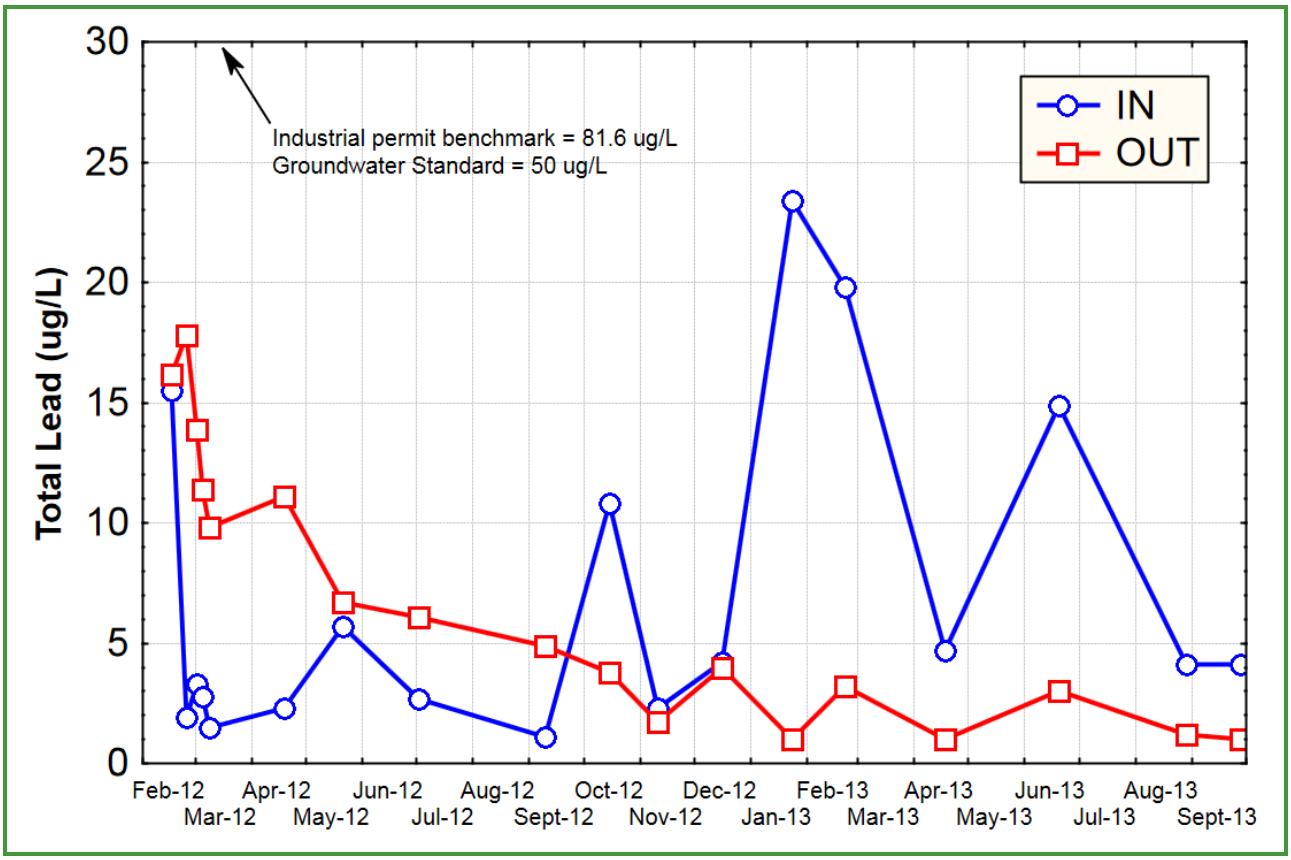

Figure 15. Total Lead Influent and Effluent Pollutograph.

Of all the measured parameters, the study system was most effective at removing total and dissolved zinc. During Year 1, the study system reduced total and dissolved zinc by 54 and 34 percent, respectively (both are significant reductions) (Table 10). During Year 2, removal improved further with 89 and 43 percent average reductions for total and dissolved zinc, respectively. Figures 16 and 17 show that there was a slight flushing pattern with total and dissolved zinc, but initial effluent concentrations were only 83 and 29 µg/L for total and dissolved zinc, respectively; well below levels that would be detrimental to downstream aquatic ecosystems. The groundwater standard for total zinc is 5,000 µg/L, which is well above any of the recorded effluent concentrations from the study system. In addition, the acute freshwater water quality criterion (170 µg/L, based on average effluent hardness) for dissolved zinc is plotted on Figure 17 for reference. This criterion is well above any of the recorded effluent dissolved zinc concentrations in Year 1 or Year 2 of the study. SPLP extractions indicated that the compost fraction had the greatest leachable zinc content, followed by the sand and mulch (Figure 16). The potting soil exhibited the lowest leachable concentrations of dissolved zinc.

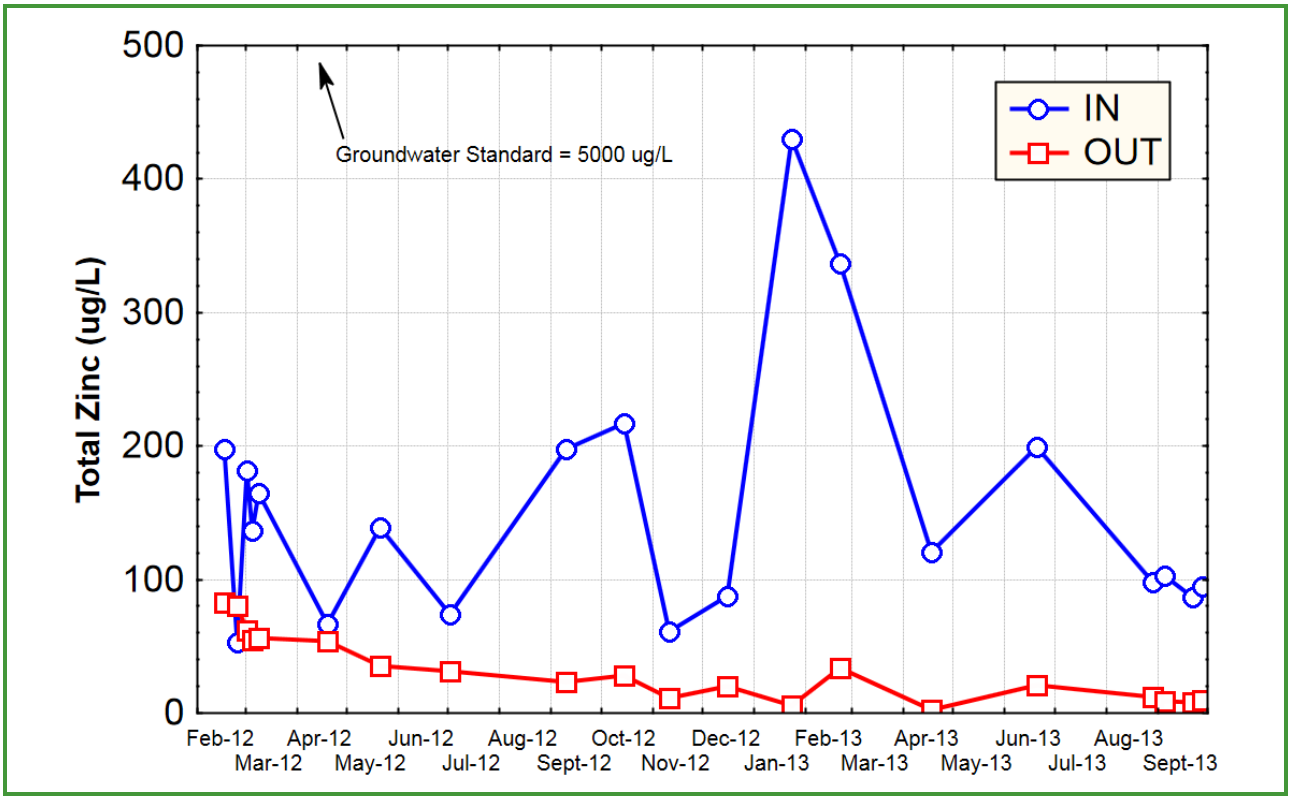

Figure 16. Total Zinc Concentration Influent and Effluent Pollutograph.

Copper export patterns differed sharply from zinc. When the first samples were collected in February of 2012, total and dissolved copper effluent concentrations were approximately 53 and 25 µg/L, respectively, while influent concentrations were much lower at approximately 12 and 3 µg/L, respectively (Figures 18 and 19). During Year 1, the system increased concentrations of total and dissolved copper by 336 and 990 percent, respectively—both significant increases (Table 10). The groundwater criterion for total copper is 1,000 µg/L, which is well above any of the recorded total copper concentrations. However,

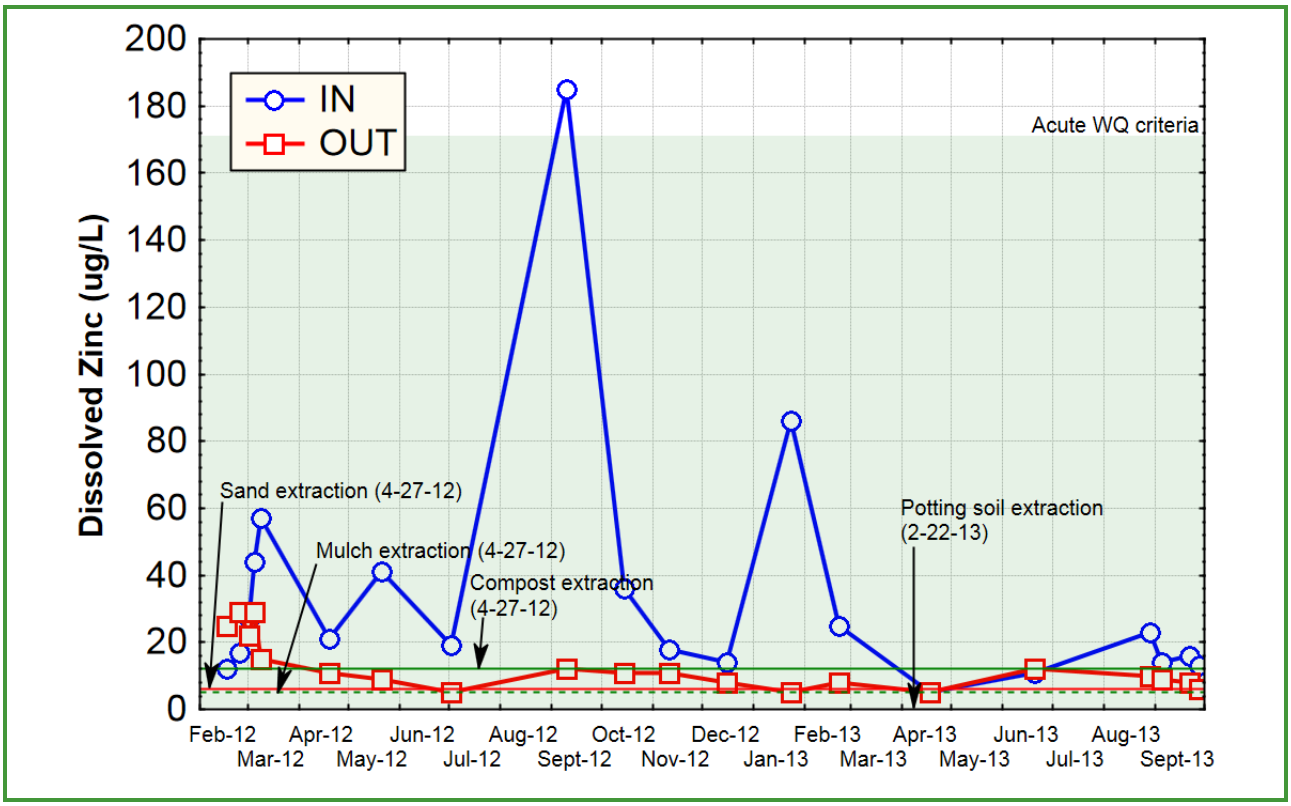

Figure 17. Dissolved Zinc Influent and Effluent Pollutograph.

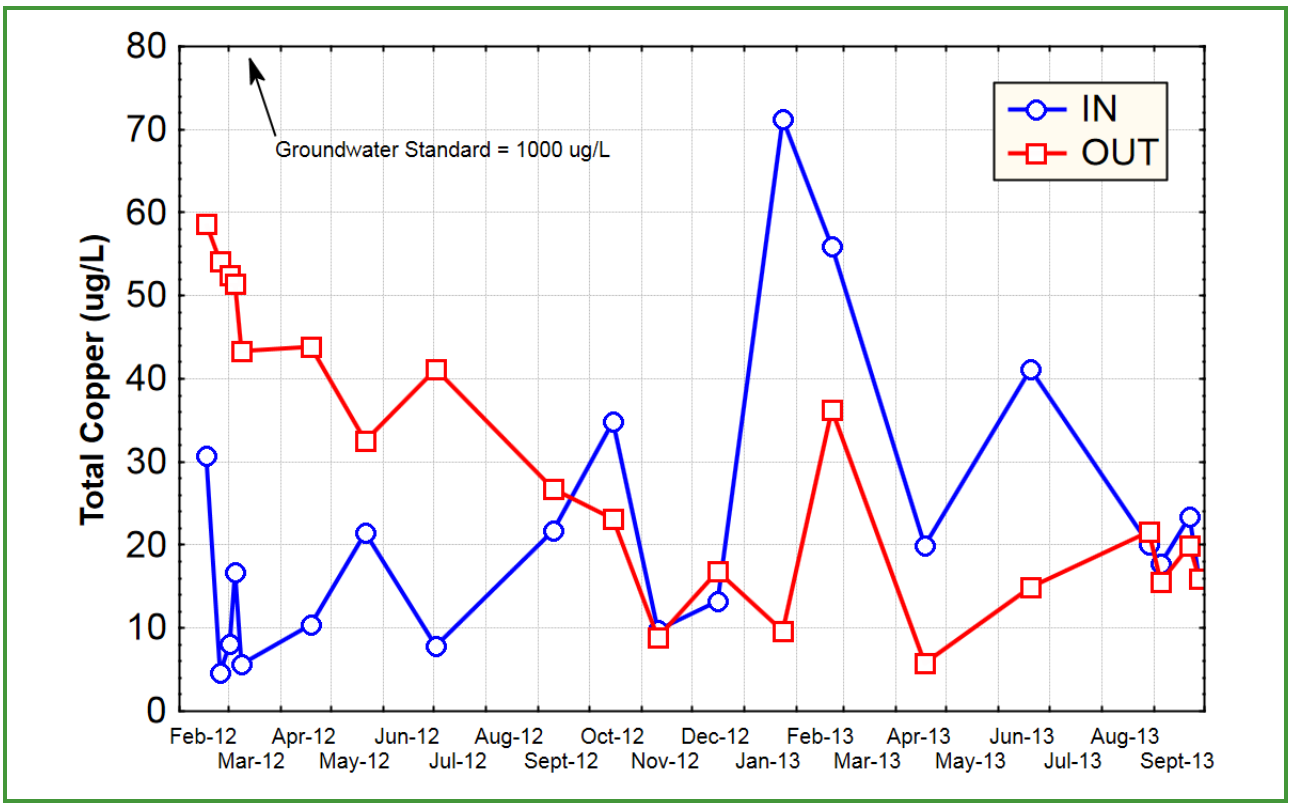

Figure 18. Total Copper Concentration Influent and Effluent Pollutograph.

the acute water quality criterion for dissolved copper is 17 ug/L (calculated based on the average effluent hardness), which was exceeded numerous times through the course of the study (Figure 19). Total copper exhibited a flushing pattern until effluent concentrations stabilized at around 10 to 20 µg/L (Figure 18).

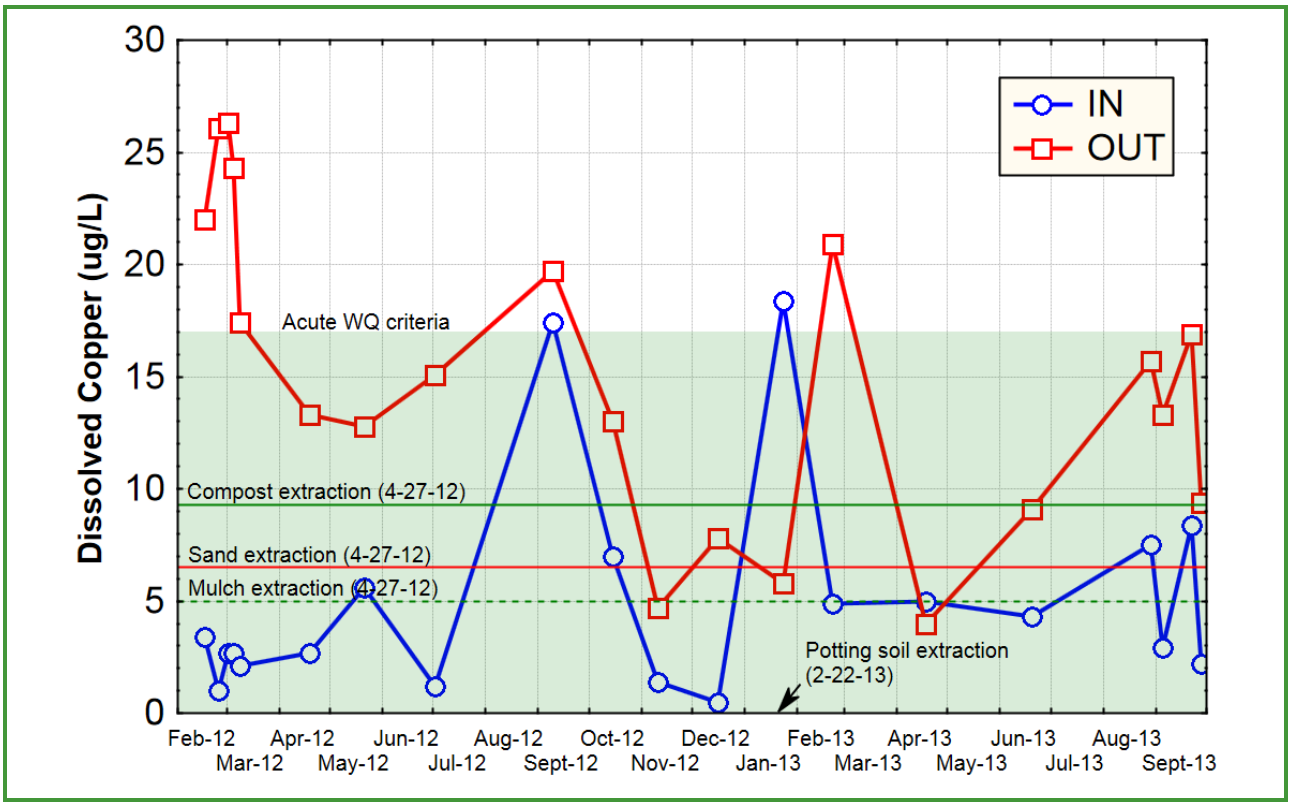

Figure 19. Dissolved Copper Influent and Effluent Pollutograph.

Dissolved copper flushed from the system during Year 1 as well, but during Year 2 there was substantial variability in effluent dissolved copper with concentrations ranging between 4 and 17 µg/L (Figure 19). During Year 2, there was no significant difference between influent and effluent concentrations of copper; however, effluent concentrations were generally greater than influent concentrations (Table 10). SPLP extractions of dissolved copper indicated that the compost was the greatest source of leachable copper, followed by the sand and mulch (Figure 19). The potting soil leached undetectable amounts of copper.

Results for Other Parameters

Hardness and chloride were elevated in the effluent during Year 1. The test system significantly increased hardness and chloride by 527 and 643 percent, respectively, in Year 1 (Table 8). The flushing of hardness and chloride during Year 1 is evident in Figures 20 and 21. In January 2013, there was a road sanding/salting event that caused a large spike in hardness and chloride (Figures 20 and 21). After that time (Year 2), there was no significant difference between influent and effluent concentrations of hardness and chloride (Table 10). There is no groundwater standard for hardness. The groundwater standard for chloride is 250 mg/L. Figure 21 indicates that the one influent concentration (road sanding/salting event in January

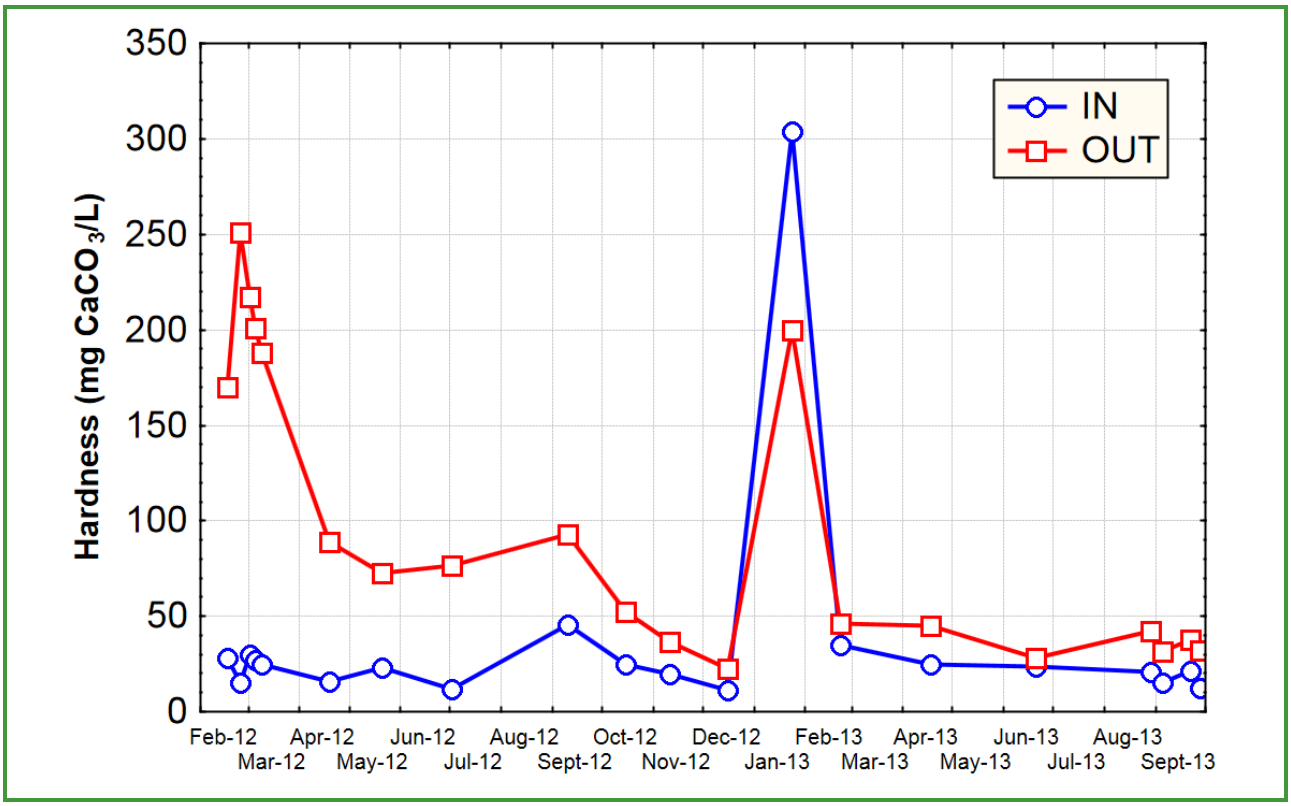

Figure 20. Hardness Concentration Influent and Effluent Pollutograph.

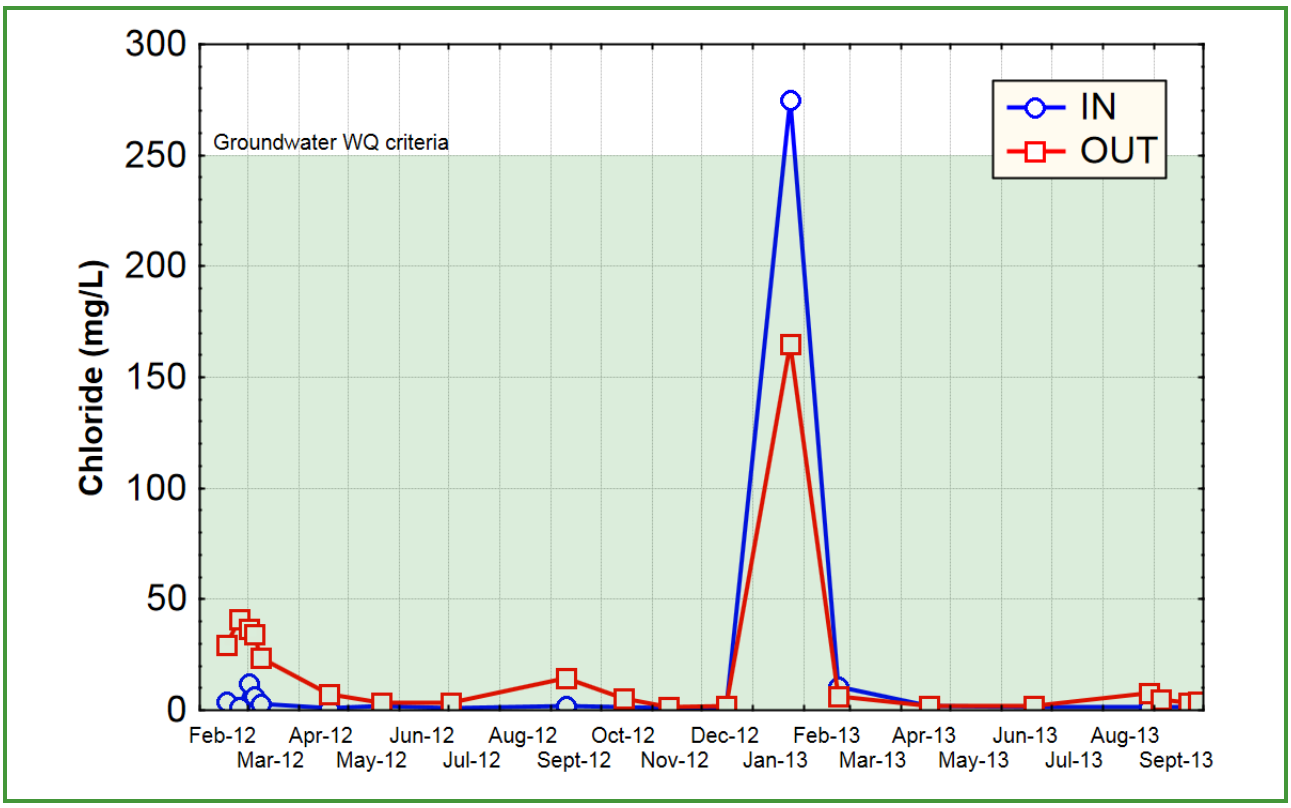

Figure 21. Chloride Influent and Effluent Pollutograph.

2013) that was greater than 250 mg/L; however, it was reduced to 165 mg/L in the effluent, which meets the standard.

Total petroleum hydrocarbons – diesel range (TPH-Diesel) was detected in only 5 of 18 influent samples and 3 of 18 effluent samples. Consequently, statistical and trend analysis could not be conducted on this parameter. Total petroleum hydrocarbons – oil range (TPH-Oil) was reduced by the test system in nearly every sampled event (Figure 22). Significant reductions of TPH-Oil were achieved in both Year 1 (average reduction of 49 percent) and Year 2 (average reduction of 88 percent) (Table 10). There are no groundwater criteria for TPH.

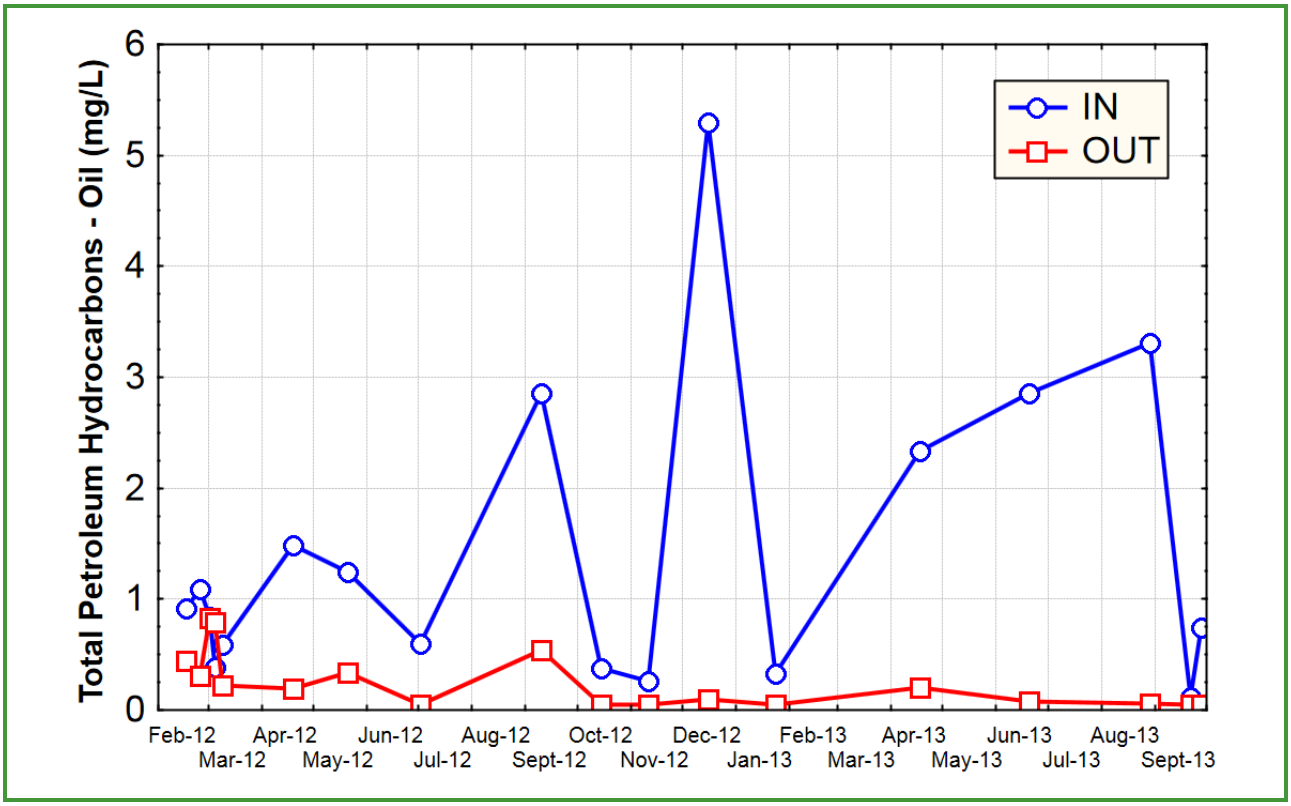

Figure 22. TPH-Oil Concentration Influent and Effluent Pollutograph.

Fecal coliform bacteria were also reduced in nearly every sampled event (Figure 23) with significant reductions in both Year 1 and 2 of the study (Table 10). In Year 1, the average reduction was 64 percent. In Year 2, it increased to 77 percent. Despite the high degree of removal, average effluent concentrations were 371 and 236 colony forming units per 100 milliliters (CFU/100mL) in Years 1 and 2, respectively. These values are well above the groundwater criterion of 1 CFU/100 mL.

During three events (March 12, 2012; October 14, 2012; and June 20, 2013) grab samples were collected from the influent and effluent stations and analyzed for:

- Semi-volatile organic compounds
- Volatile organic compounds

- Polycyclic aromatic hydrocarbons
- Polychlorinated biphenyls
- Chlorinated pesticides
- Chlorinated herbicides
- Priority pollutant metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc)

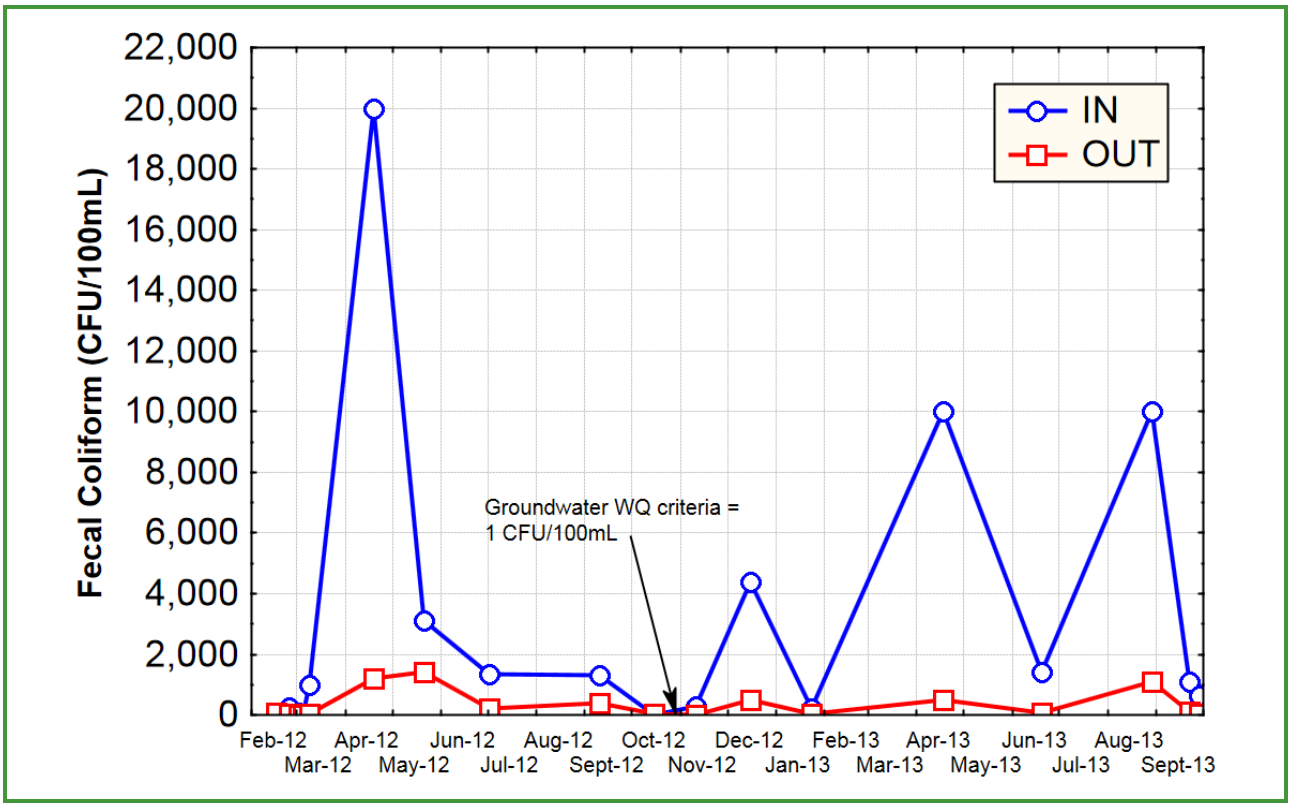

Figure 23. Fecal Coliform Bacteria Influent and Effluent Pollutograph.

The results from those samples are presented in Appendix F. None of the priority pollutant metals exceeded groundwater standards (Appendix G). Chlorinated pesticides and chlorinated herbicides were not detected in any of the influent or effluent samples. Of the semi-volatile organic compounds, pentachlorophenol was detected in one influent sample and in none of the effluent samples. In addition, Bis(2-ethylhexyl) phthalate was detected in two out of the three influent samples and in none of the effluent samples. Finally, of the volatile organic compounds, methylene chloride was the only compound detected. During the March 12, 2012, event, influent concentrations of methylene chloride were 7.5 ug/L and effluent concentrations were 1,230 ug/L. The groundwater criterion for methylene chloride is 5 ug/L (Appendix G), so the criterion was exceeded on this occasion.

CONCLUSIONS

The bioretention system at 185th Avenue NE in Redmond, Washington, had been online for 3 months before monitoring began on February 15, 2012. Monitoring then occurred for 20 months.

The water quality treatment goal for the study system was to capture and provide enhanced treatment of 91 percent of the average annual runoff volume. Monitoring data showed that stormwater bypassed the treatment system during 5 of the 207 monitored events during the monitoring period. Although bypass volumes were not calculated, a bypass frequency of 2.5 percent suggests that 91 percent of the runoff volume was treated by the study system during the monitoring period.

In Year 1, monitoring results showed significant export from the study system for all measured nutrients, chloride, hardness, total copper, dissolved copper, and total lead. In Year 2, there was significant export of total phosphorus, orthophosphate, and nitrate+nitrite. Bioretention system export during the second year was also characterized by non-significant increases in total Kjeldahl nitrogen (60 percent increase), hardness (74 percent increase), chloride (166 percent increase), and dissolved copper (291 percent increase). High levels of methylene chloride export were also noted in one grab sample collected on March 12, 2012. These results indicate that the study system itself was a source for numerous pollutants during the first 2 years of operation, which suggests that further research needs to be conducted on bioretention soil mix formulations that do not export pollutants.

Despite the observed pollutant export, the study system performed very well at reducing concentrations of total and dissolved zinc, TPH-Oil, and fecal coliform. In Year 1, the system exhibited average reductions in total zinc (54 percent), dissolved zinc (34 percent), TPH-Oil (49 percent), and fecal coliform (64 percent). During Year 2, the average reduction increased: total zinc (89 percent), dissolved zinc (43 percent), TPH-Oil (88 percent), and fecal coliform (77 percent). In addition, pentachlorophenol and Bis(2-ethylhexyl) phthalate were occasionally detected at the inlet but never detected at the outlet, so it appears that the system may be effective at treating similar organic chemicals.

One of the primary objectives of this study was to determine if export from the study system would result in exceedances of groundwater quality criteria. The nitrate groundwater criterion of 10 mg/L was exceeded in all the samples collected from February through April 2012. Based on observed trends in the data, it appears that those exceedances occurred from when the system first went online in November of 2011; consequently, the system produced nitrate concentrations in exceedance of the criterion during the first 6 months of operation. The groundwater criterion for methylene chloride of 5 ug/L was exceeded on March 12, 2012, when a grab sample at the effluent station exhibited a concentration of 1,230 ug/L. Further research is required to characterize potential materials in the study system that contributed to the export of this pollutant and the extent of any related flushing period. The only other

measured parameter that exceeded groundwater criteria was fecal coliform bacteria. The groundwater criterion of 1 CFU/100 mL was exceeded at the effluent station during every sampled storm event, even though the study system had a high degree of fecal coliform bacteria removal.

SPLP extractions indicated that the potting soil, compost, and mulch all contributed to total phosphorus export. However, approximately ten times more compost was used in the study system than the potting soil (associated with the plants) and mulch (which was removed) combined, so the compost alone was the greatest contributor to total phosphorus export. The compost was also the greatest contributor to nitrate+nitrite, zinc, and copper export. Although the SPLP extractions indicated the sand fraction (60 percent of the bioretention soil mix) contributed 50 percent less zinc and 30 percent less copper than the compost, it is also likely an important source for metals export from the study system. Future bioretention projects should attempt to use sand with lower metals content and compost with lower nutrient and metals content.

It is recommended that further research be conducted on bioretention systems which meet the same Ecology specification to determine if the results from this study are typical of other installations. If this research indicates that indeed these systems are likely to export large quantities of copper and nutrients during the first years of operation, then measures should be taken to limit the application of these systems until a replacement specification is identified. Such limitations may include prohibiting the use of underdrains in bioretention systems which drain to sensitive waterbodies, or limiting bioretention in critical aquifer recharge areas.

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APPENDIX A

Hydrologic Data Quality Assurance Memorandum

Herrera Environmental Consultants, Inc.

Memorandum

To Project file 09-04540

From Dylan Ahearn, Herrera Environmental Consultants

Date October 10, 2013

Subject Hydrologic Data Validation Review for the 185th Avenue NE bioretention swale system monitoring in Redmond, Washington, from February 2012 to September 2013

This memorandum presents the results from a quality assurance review of hydrologic data collected at monitoring stations for the 185th Avenue NE bioretention system (study system) in Redmond, Washington, from February 2012 through September 2013. Included in this review are water level and associated discharge data from the inlet and outlet monitoring stations at the study system. Also included in this review are precipitation data from a collocated project rain gauge. Detailed descriptions of each of these stations and their associated monitoring equipment are provided in the Quality Assurance Project Plan (QAPP) (Herrera 2012) for the project.

Hydrologic monitoring consisted of measurements of water level (for estimating discharge) and precipitation depth. Method Quality Objectives (MQOs) for these measurements are expressed in terms of precision, bias, representativeness, completeness, and comparability. Data quality for each of these categories is described in the sections that follow.

Table A-1 presents a list of the equipment was tested as part of this evaluation.

Table A-1. Project hydrological measurement instrument characteristics.

Instrument	Make/model	Serial number	Station	Deployment
Pressure Transducer	INW PS9805	21134068	RBS185-in	February 1, 2012, to September 30, 2013
Pressure Transducer	INW PS9805	21134069	RBS185-out	February 1, 2012, to September 30, 2013
Rain Gauge	Texas Electronics 525	47304-411	RBS185-RG	February 1, 2012, to September 30, 2013

Precision

Prior to monitoring, rain gauge precision was evaluated on August 8, 2012, by repeatedly releasing a known volume of water into the rain gauge's tipping bucket mechanism with a

burette and recording the number of tips associated with the volume. The variation among the repeated tests was then compared to assess gauge precision. This procedure was repeated after the monitoring period (October 8, 2013) to assure that the gauge precision was consistent through the project.

The MQO for rain gauge precision was 5 percent. Results from the precision test indicated that the coefficient of variation (CV) before the monitoring period was 0.99 percent (Table A-2) and the CV after the monitoring period was 0.54 percent (Table A-3); both meet the MQO of 5 percent.

Table A-2. Pre-Monitoring Precipitation (Rain Gauge) Precision and Bias Testing.

Water Volume Applied (mL)	Theoretical Number of Tips	Actual Number of Tips	Percent Error
840	102	101	0.98
840	102	100	1.96
840	102	102	0.00
Total Bias			0.98
Total Precision			**0.99**

mL = milliliters

Table A-3. Post-Monitoring Precipitation (Rain Gauge) Precision and Bias Testing.

Water Volume Applied (mL)	Theoretical Number of Tips	Actual Number of Tips	Percent Error
869	105.5	106	-0.47
870	105.6	105	0.57
870	105.6	106	-0.38
Total Bias			-0.09
Total Precision			**0.54**

mL = milliliters

In order to test the precision of the pressure sensors, both the RBS185-in and RBS185-out water level transducers were placed in a graduated cylinder filled with water for between 17 and 39 hours. Level data were recorded on a 5-minute time step. This precision test was conducted both before and after the monitoring period. Test results are presented in Figures A-1 and A-2. The CVs for the RBS185-in transducer before and after the monitoring period were 0.05 and 0.04 percent, respectively. The CVs for the RBS185-out transducer before and after the monitoring period were 0.06 and 0.05 percent, respectively. All values were less than the MQO of 5 percent identified in the project QAPP (Herrera 2012).

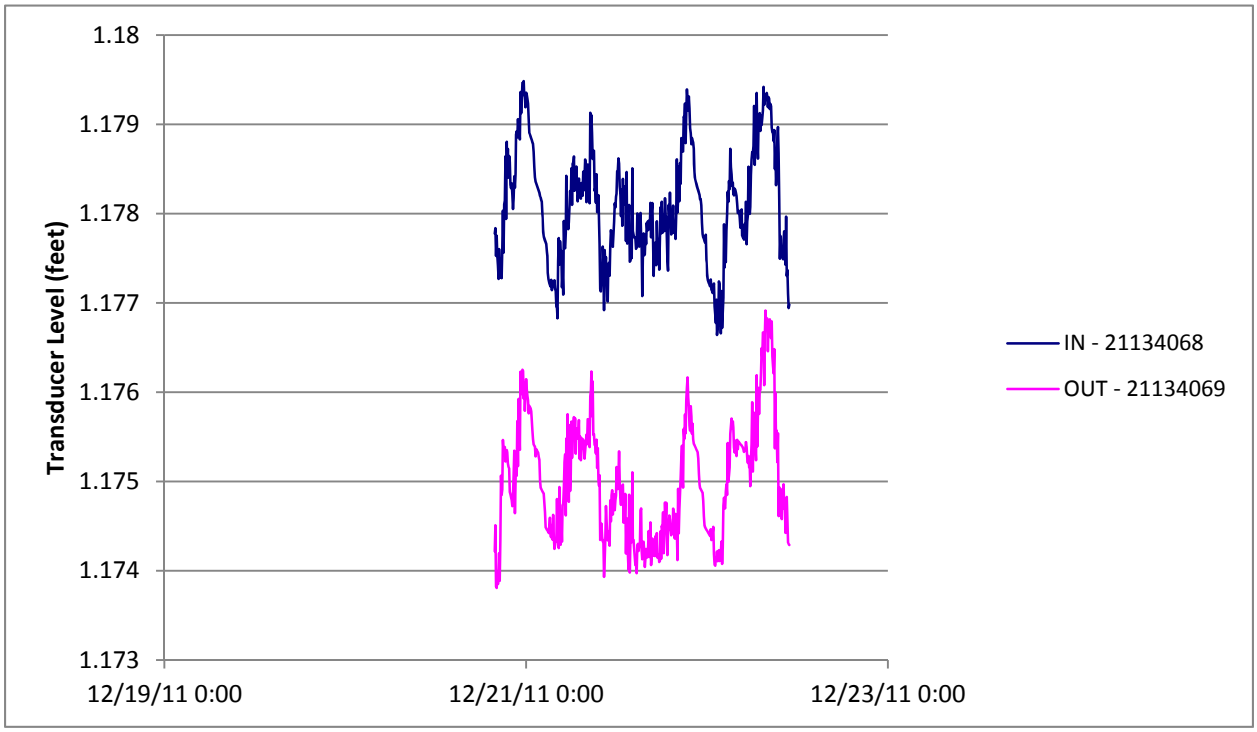


Figure A-1. Pre-Monitoring Transducer Precision Testing.

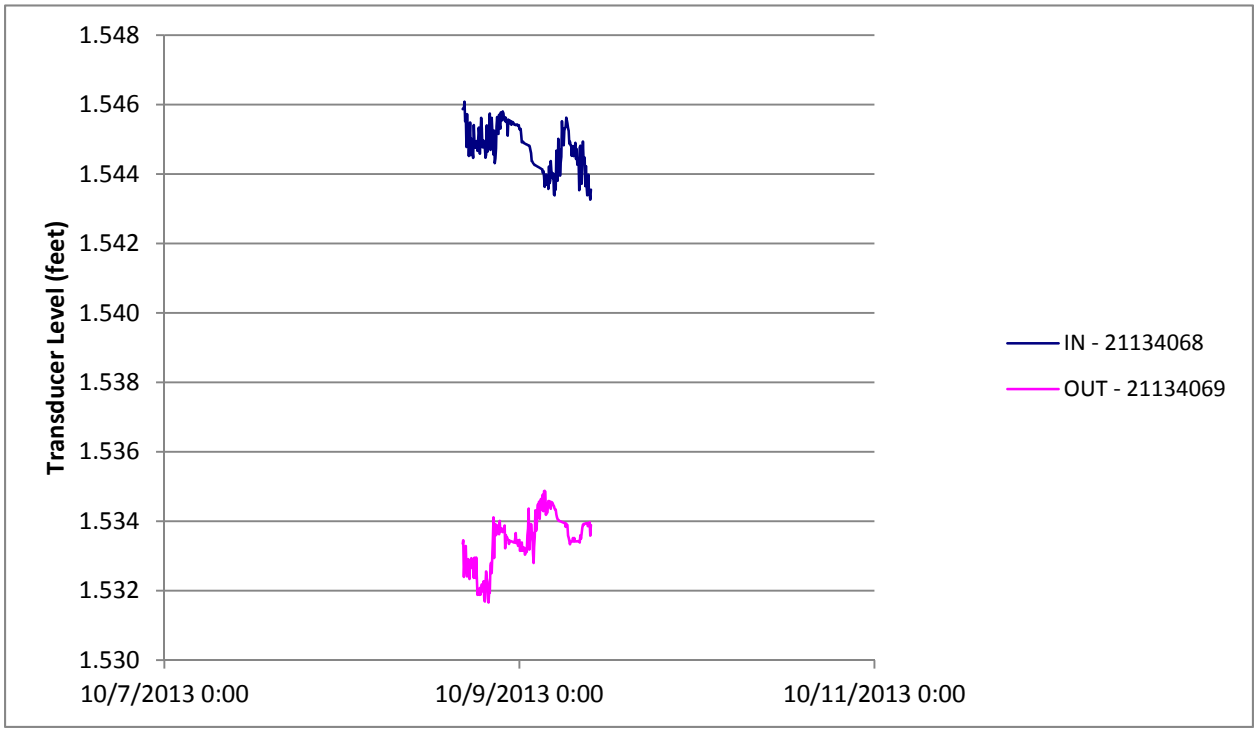


Figure A-2. Post-Monitoring Transducer Precision Testing.

Bias

Bias was assessed by comparing monitoring equipment readings to an independently measured "true" value. Bias in precipitation depth data collected through this study was assessed by comparing the rain gauge's actual tip volume to its theoretical tip volume, as specified by the manufacturer. Bias was estimated by pouring a known volume of water through the rain gauge in order to generate a theoretical number of tips of the gauge. The theoretical value of was then compared with the actual number of tips to estimate the error from bias (Table A-3).

Total bias before monitoring began was estimated to be 0.98 percent; total bias after the monitoring period was estimated to be -0.09 percent. The project QAPP (Herrera 2012) indicates a bias of 5 percent or less is acceptable; therefore, the gauge was within this specification through the duration of the project.

Bias in continuous level data is introduced from two primary sources: instrument design limitations, and calibration or operation errors. To assess if instrument design was contributing to level gauge bias, the pressure transducers were placed in a graduated cylinder filled with water. One inch of water at a time was added to the graduated cylinder, and the pressure transducer responses were recorded. Pressure transducers depths were then compared to the measured depths to assess transducer bias. This test was conducted both before and after the monitoring period for the RBS185-in and RBS185-out sensors. Results from the pressure transducer bias tests are presented in Table A-4. The table indicates that average level bias between the two sensors ranged from – 1.05 percent to 1 percent. The MQO defined in the project QAPP (Herrera 2012) was 5 percent, indicating that pressure transducer bias under controlled conditions did not exceed the project MQO.

Table A-4. Results from Pressure Transducer Bias Testing at RBS185-in and RBS185-out.

Date	Actual Depth (inches)	RBS185-in Transducer Depth (inches)	RBS185-in Percent Error	RBS185-out Transducer Depth (inches)	RBS185-out Percent Error
12/9/2011 13:22	1	0.972	2.8	0.972	2.8
12/9/2011 13:33	1	1.068	-6.8	1.068	-6.8
12/9/2011 13:42	1	0.936	6.4	0.941	5.9
12/9/2011 13:44	3	2.952	1.6	2.976	0.8
Total Bias			**1**		**0.68**
10/8/2013 15:21	1	1.016	-1.64	0.985	1.48
10/8/2013 15:24	1	1.016	-1.64	1.048	-4.76
10/8/2013 15:26	1	0.983	1.72	1.016	-1.64
10/8/2013 15:29	3	2.981	0.64	2.978	0.72
Total Bias			**-0.23**		**-1.05**

Despite this result, bias can still be introduced into the level signal when the instrument is deployed and operated in the field. This bias is usually due to calibration, operation, or configuration errors. Field calibrations of the level sensors were generally conducted before each targeted sampling event. During the 20-month monitoring period, the RBS185-in transducer was calibrated 11 times, and the RBS185-out pressure transducer was calibrated 10 times. Sensor drift between each calibration was corrected after the data were downloaded using Aquarius Version 3.1. Aquarius was also used to delete spikes and fill small data gaps. All edits to the continuous record from the RBS185-in transducer are presented in Table A-5; edits to the RBS185-out record are presented in Table A-6.

Additional bias can result when measurement devices are incorrectly designed or installed in non-ideal conditions. To assess this form of bias, dynamic flow testing was conducted at the RBS185-in. Due to site constraint issues, this testing could not be conducted at RBS185-out.

On March 21, 2012, field technicians conducted a dynamic flow test at RBS185-in. For this test, a fire hose was attached to a nearby fire hydrant, and flows from the hydrant were assessed using a graduated bucket and timer. Known flow rates across the range of flows observed at RBS185-in were produced in this manner. Pressure transducer water levels at RBS185-in were simultaneously recorded at each known flow rate to verify the rating curve for each station. The results from this test are presented in Table A-7 and Figure A-3.

Independent flow testing indicated that the RBS185-in transducer and 6-inch Thel-mar weir combination was underestimating flows by approximately 44 percent (Table A-7, Figure A-3). This error was addressed by adjusting the rating curve so that it more closely fit the dynamic flow test calibration points (Figure A-3). All RBS185-in flow data presented in this study are based on this adjusted rating curve.

Table A-5. Data correction history for RBS185-in.

QA Start Date & Time	QA Stop Date & Time	Date Applied	QA Action	Points Modified
2/8/2012 17:43	2/15/2012 10:02	10/10/2012 15:35	Offset Correction with value of -0.86700ft	1,924
2/22/2012 13:35	2/23/2012 9:25	10/10/2012 15:53	Offset error correction	239
2/22/2012 13:25	2/22/2012 13:35	10/10/2012 15:54	Fill Data Gap - spike/drop fill	1
2/8/2012 16:55	2/8/2012 18:09	10/10/2012 15:54	Fill Data Gap - spike/drop fill	7
5/20/2012 21:43	6/21/2012 14:27	10/10/2012 16:01	Drift Correction with Calibration Drift value of 0.00500ft	9,129
7/10/2012 9:50	9/13/2012 11:30	10/10/2012 16:30	Drift Correction with Calibration Drift value of 0.01900ft	18,460
10/22/2012 11:40	11/6/2012 0:35	11/12/2012 12:56	Leaves caught in weir - Offset Correction with value of -0.02800ft	4,188
11/5/2012 21:30	11/6/2012 0:55	11/12/2012 12:57	Delete Region - offset error	42
11/5/2012 21:25	11/6/2012 1:10	11/12/2012 12:58	Fill Data Gap - no rain during gap	42
10/22/2012 11:25	10/22/2012 12:00	11/12/2012 12:58	Delete Region - offset error	8
10/22/2012 11:20	10/22/2012 12:05	11/12/2012 12:59	Fill Data Gap - short gap	8
11/11/2012 18:35	11/12/2012 11:10	6/21/2013 13:27	Drift Correction with Calibration Drift value of -0.00800ft	200
11/14/2012 16:35	3/19/2013 8:40	6/21/2013 13:31	Drift Correction with Calibration Drift value of 0.00400ft	35,906
4/9/2013 19:15	4/17/2013 14:05	6/21/2013 13:33	Drift Correction with Calibration Drift value of 0.01000ft	2,243
4/18/2013 11:55	4/18/2013 12:05	6/21/2013 13:34	Delete Region - spurious data during sensor configuration	2
4/18/2013 11:50	4/18/2013 12:10	6/21/2013 13:34	Fill Data Gap - sensor reset	2
4/23/2013 5:15	4/23/2013 5:20	6/21/2013 13:37	Multi-Point Drift Correction of (Date/Time, Diff)(2013-04-23 05:15:00 -0.00967ft) (2013-04-23 05:20:00 0.00000ft)	2
1/20/2013 8:00	1/20/2013 8:05	6/21/2013 13:39	Multi-Point Drift Correction of (Date/Time, Diff)(2013-01-20 08:00:00 -0.11381ft) (2013-01-20 08:05:00 0.00000ft)	2
11/16/2012 13:40	12/1/2012 19:55	6/21/2013 13:41	Offset Correction with value of 0.00800ft	4,396
12/1/2012 21:00	12/18/2012 3:15	6/21/2013 13:42	Offset Correction with value of -0.01200ft	4,684
12/23/2012 17:15	12/29/2012 10:05	6/21/2013 13:44	Offset Correction with value of -0.01000ft	1,643
1/2/2013 14:10	2/27/2013 17:40	6/21/2013 13:54	Offset Correction with value of 0.00700ft	16,171
4/18/2013 14:05	6/21/2013 1:30	6/21/2013 13:57	Offset Correction with value of -0.01000ft	18,153
6/21/2013 1:35	9/30/2013 19:25	10/7/2013 13:16	Offset Correction with value of -0.01500ft	29,302

Table A-6. Data correction history for RBS185-out.

QA Start Date & Time	QA Stop Date & Time	Date Applied	QA Action	Points Modified
3/14/2012 5:25	3/14/2012 7:50	7/20/2012 13:21	Delete Region - calibration error	30
3/14/2012 5:15	3/14/2012 8:00	7/20/2012 13:21	Fill Data Gap - spike/drop fill	30
2/22/2012 13:35	2/23/2012 9:30	7/20/2012 13:22	Delete Region - offset error	240
2/22/2012 13:20	2/23/2012 9:55	7/20/2012 13:23	Fill Data Gap - spike/drop fill	241
2/9/2012 0:30	2/15/2012 10:00	7/20/2012 13:27	Offset error correction	1,843
2/9/2012 0:20	2/9/2012 0:25	7/20/2012 13:27	Delete drop/spike	2
2/9/2012 0:15	2/9/2012 0:30	7/20/2012 13:28	Fill Data Gap - spike/drop fill	2
2/15/2012 10:00	2/15/2012 10:05	7/20/2012 13:28	Fill Data Gap - spike/drop fill	2
4/18/2012 13:20	4/19/2012 9:10	7/20/2012 13:30	Delete Region - calibration error	239
4/18/2012 11:35	4/19/2012 10:20	7/20/2012 13:30	Fill Data Gap - spike/drop fill	239
7/3/2012 12:15	7/9/2012 12:15	10/10/2012 16:37	Offset error correction	1,729
7/3/2012 12:05	7/3/2012 13:45	10/10/2012 16:37	Delete drop/spike	21
7/3/2012 12:00	7/3/2012 13:50	10/10/2012 16:37	Fill Data Gap - spike/drop fill	21
7/9/2012 12:00	7/9/2012 13:05	10/10/2012 16:37	Delete drop/spike	14
7/9/2012 11:50	7/9/2012 13:20	10/10/2012 16:38	Fill Data Gap - spike/drop fill	14
6/21/2012 14:35	6/21/2012 14:45	10/10/2012 16:38	Delete drop/spike	3
6/21/2012 14:30	6/21/2012 14:55	10/10/2012 16:38	Fill Data Gap - spike/drop fill	3
2/8/2012 17:03	2/8/2012 17:48	10/10/2012 16:39	Fill Data Gap - spike/drop fill	7
3/21/2012 11:45	4/18/2012 13:40	10/10/2012 16:41	Drift Correction with Calibration Drift value of -0.00600ft	8,088
2/15/2012 10:00	2/15/2012 10:20	10/10/2012 16:42	Fill Data Gap - spike/drop fill	5
2/15/2012 9:55	2/15/2012 10:25	10/10/2012 16:42	Fill Data Gap - spike/drop fill	5
7/20/2012 12:50	7/21/2012 12:20	10/10/2012 16:54	Delete drop/spike	2
8/18/2012 7:30	8/18/2012 10:55	11/14/2012 16:44	Stilling well set too high - falling limb correction	42
8/20/2012 7:10	8/20/2012 10:45	11/14/2012 16:46	Stilling well set too high - falling limb correction	44
8/22/2012 9:00	8/22/2012 11:35	11/14/2012 16:48	Stilling well set too high - falling limb correction	32
8/24/2012 8:15	8/24/2012 10:30	11/14/2012 16:49	Stilling well set too high - falling limb correction	28
8/26/2012 8:15	8/26/2012 11:50	11/14/2012 16:50	Stilling well set too high - falling limb correction	44
8/28/2012 6:50	8/28/2012 12:10	11/14/2012 16:50	Stilling well set too high - falling limb correction	65
9/2/2012 8:00	9/2/2012 10:50	11/14/2012 16:51	Stilling well set too high - falling limb correction	35
9/4/2012 8:20	9/4/2012 11:30	11/14/2012 16:51	Stilling well set too high - falling limb correction	39

QA Start Date & Time	QA Stop Date & Time	Date Applied	QA Action	Points Modified
9/6/2012 8:20	9/6/2012 11:30	11/14/2012 16:52	Stilling well set too high - falling limb correction	39
9/8/2012 8:45	9/8/2012 12:15	11/14/2012 16:52	Stilling well set too high - falling limb correction	43
9/10/2012 11:30	9/10/2012 16:45	11/14/2012 16:53	Stilling well set too high - falling limb correction	64
9/12/2012 7:40	9/12/2012 10:10	11/14/2012 16:54	Stilling well set too high - falling limb correction	31
9/14/2012 8:55	9/14/2012 12:50	11/14/2012 16:55	Stilling well set too high - falling limb correction	48
9/16/2012 7:45	9/16/2012 12:15	11/14/2012 16:55	Stilling well set too high - falling limb correction	55
9/18/2012 8:50	9/18/2012 12:40	11/14/2012 16:57	Stilling well set too high - falling limb correction	47
9/20/2012 9:55	9/20/2012 13:00	11/14/2012 16:58	Stilling well set too high - falling limb correction	38
9/22/2012 10:45	9/22/2012 19:55	11/14/2012 16:59	Stilling well set too high - falling limb correction	111
9/22/2012 19:45	9/23/2012 8:10	11/14/2012 16:59	Stilling well set too high - falling limb correction	150
9/22/2012 19:40	9/23/2012 8:15	11/14/2012 16:59	Stilling well set too high - falling limb correction	150
9/24/2012 8:00	9/24/2012 13:15	11/14/2012 17:00	Stilling well set too high - falling limb correction	64
9/26/2012 8:20	9/26/2012 13:25	11/14/2012 17:00	Stilling well set too high - falling limb correction	62
9/28/2012 9:00	9/28/2012 13:35	11/14/2012 17:01	Stilling well set too high - falling limb correction	56
9/30/2012 8:35	9/30/2012 13:15	11/14/2012 17:01	Stilling well set too high - falling limb correction	57
10/2/2012 8:50	10/2/2012 13:00	11/14/2012 17:02	Stilling well set too high - falling limb correction	51
10/4/2012 8:45	10/4/2012 13:15	11/14/2012 17:02	Stilling well set too high - falling limb correction	55
10/12/2012 22:35	10/13/2012 0:25	11/14/2012 17:02	Stilling well set too high - falling limb correction	23
10/13/2012 10:45	10/13/2012 12:20	11/14/2012 17:03	Stilling well set too high - falling limb correction	20
10/13/2012 22:20	10/14/2012 0:00	11/14/2012 17:04	Stilling well set too high - falling limb correction	21
10/15/2012 2:25	10/15/2012 12:20	11/14/2012 17:04	Stilling well set too high - falling limb correction	120
10/14/2012 21:05	10/14/2012 22:10	11/14/2012 17:05	Stilling well set too high - falling limb correction	14
10/14/2012 22:15	10/14/2012 23:10	11/14/2012 17:05	Stilling well set too high - falling limb correction	12

QA Start Date & Time	QA Stop Date & Time	Date Applied	QA Action	Points Modified
10/15/2012 21:10	10/15/2012 22:50	11/14/2012 17:06	Stilling well set too high - falling limb correction	21
10/19/2012 1:35	10/19/2012 8:50	11/14/2012 17:07	Stilling well set too high - falling limb correction	88
10/19/2012 8:55	10/19/2012 20:00	11/14/2012 17:07	Stilling well set too high - falling limb correction	134
10/20/2012 0:50	10/20/2012 14:05	11/14/2012 17:10	Stilling well set too high - falling limb correction	160
10/20/2012 20:20	10/21/2012 3:10	11/14/2012 17:10	Stilling well set too high - falling limb correction	83
10/21/2012 9:20	10/21/2012 15:25	11/14/2012 17:11	Stilling well set too high - falling limb correction	74
10/21/2012 22:25	10/22/2012 13:05	11/14/2012 17:11	Stilling well set too high - falling limb correction	177
10/25/2012 4:15	10/26/2012 1:50	11/14/2012 17:12	Stilling well set too high - falling limb correction	260
10/24/2012 7:45	10/24/2012 9:25	11/14/2012 17:13	Stilling well set too high - falling limb correction	21
10/22/2012 19:25	10/24/2012 4:55	11/14/2012 17:13	Stilling well set too high - falling limb correction	403
10/27/2012 22:25	10/28/2012 12:20	11/14/2012 17:14	Stilling well set too high - falling limb correction	168
10/29/2012 8:40	10/30/2012 1:10	11/14/2012 17:14	Stilling well set too high - falling limb correction	199
11/4/2012 1:55	11/4/2012 20:05	11/14/2012 17:16	Stilling well set too high - falling limb correction	219
11/3/2012 9:05	11/3/2012 18:55	11/14/2012 17:16	Stilling well set too high - falling limb correction	119
11/1/2012 15:50	11/2/2012 16:35	11/14/2012 17:17	Stilling well set too high - falling limb correction	298
11/5/2012 5:10	11/5/2012 16:15	11/14/2012 17:17	Stilling well set too high - falling limb correction	134
10/31/2012 18:10	11/1/2012 0:15	11/14/2012 17:17	Stilling well set too high - falling limb correction	74
11/12/2012 5:40	11/12/2012 17:10	11/14/2012 17:22	Stilling well set too high - falling limb correction	139
11/12/2012 23:10	11/13/2012 0:10	11/14/2012 17:23	Stilling well set too high - falling limb correction	13
11/13/2012 3:45	11/13/2012 5:00	11/14/2012 17:24	Stilling well set too high - rising limb correction	16
11/13/2012 7:20	11/13/2012 9:00	11/14/2012 17:24	Stilling well set too high - falling limb correction	21
11/14/2012 0:40	11/14/2012 10:55	11/14/2012 17:25	Stilling well set too high - falling limb correction	124
11/14/2012 15:40	11/14/2012 16:30	11/14/2012 17:26	Delete Region - stilling well lowered	11

QA Start Date & Time	QA Stop Date & Time	Date Applied	QA Action	Points Modified
11/14/2012 6:35	11/14/2012 15:35	11/14/2012 17:27	Stilling well set too high - falling limb correction	109
11/14/2012 16:35	11/14/2012 17:15	11/14/2012 17:28	Stilling well set too high - falling limb correction	9
11/14/2012 9:10	11/14/2012 10:55	11/14/2012 17:28	Stilling well set too high - falling limb correction	22
11/14/2012 9:05	11/14/2012 11:10	11/14/2012 17:28	Stilling well set too high - falling limb correction	22
11/14/2012 15:35	11/14/2012 16:35	11/14/2012 17:29	Stilling well lowered	11
11/12/2012 15:00	11/12/2012 17:15	11/14/2012 17:29	Stilling well set too high - falling limb correction	28
11/12/2012 14:55	11/12/2012 17:25	11/14/2012 17:30	Stilling well set too high - falling limb correction	28
11/13/2012 9:05	11/13/2012 9:10	11/14/2012 17:30	Delete drop/spike	2
11/12/2012 23:55	11/13/2012 0:10	11/14/2012 17:30	Delete drop/spike	4
10/13/2012 23:45	10/14/2012 0:00	11/14/2012 17:32	Stilling well set too high - falling limb correction	4
10/13/2012 23:40	10/14/2012 0:10	11/14/2012 17:32	Stilling well set too high - falling limb correction	4
10/13/2012 12:00	10/13/2012 12:25	11/14/2012 17:33	Stilling well set too high - falling limb correction	6
10/13/2012 11:55	10/13/2012 12:30	11/14/2012 17:33	Stilling well set too high - falling limb correction	6
10/13/2012 0:00	10/13/2012 0:30	11/14/2012 17:33	Stilling well set too high - falling limb correction	7
10/12/2012 23:55	10/13/2012 0:35	11/14/2012 17:34	Stilling well set too high - falling limb correction	7
10/15/2012 12:00	10/15/2012 12:20	11/14/2012 17:34	Stilling well set too high - falling limb correction	5
10/15/2012 11:55	10/15/2012 12:25	11/14/2012 17:34	Stilling well set too high - falling limb correction	5
1/12/2013 22:00	1/14/2013 20:35	6/21/2013 14:01	Delete Region - spurious data during sensor configuration	560
1/12/2013 20:00	1/15/2013 0:00	6/21/2013 14:02	Fill Data Gap - no rain during gap	560
3/18/2013 15:10	3/18/2013 15:15	6/21/2013 14:02	Multi-Point Drift Correction of (Date/Time, Diff)(2013-03-18 15:10:00 0.05451ft) (2013-03-18 15:15:00 0.00000ft)	2
4/18/2013 11:50	4/18/2013 12:10	6/21/2013 14:03	Delete Region - calibration error	4
4/18/2013 11:45	4/18/2013 12:15	6/21/2013 14:03	Fill Data Gaps (Linear) with gap resample rate of 5.00 min	4
9/25/2013 5:25	9/26/2013 21:25	10/7/2013 13:28	Delete Region - Infiltration testing	481
9/25/2013 5:05	9/26/2013 21:50	10/7/2013 13:29	Fill Data Gaps - Infiltration testing	481

Table A-7. Results from the Dynamic Flow Tests at RBS185-in.

Date	RBS185-in Reference Discharge (gpm) [a]	RBS185-in Measured Discharge (gpm)	RBS185-in Percent Error
3/21/2012 12:07	0.675	0.32	53
3/21/2012 12:16	1.750	1.01	42
3/21/2012 12:25	7.3	3.6	51
3/21/2012 12:40	8.3	3.9	53
3/21/2012 13:11	25.1	20	20
Total Bias			**44**

[a] Reference discharge measured with graduated bucket and timer.
gpm = gallons per minute

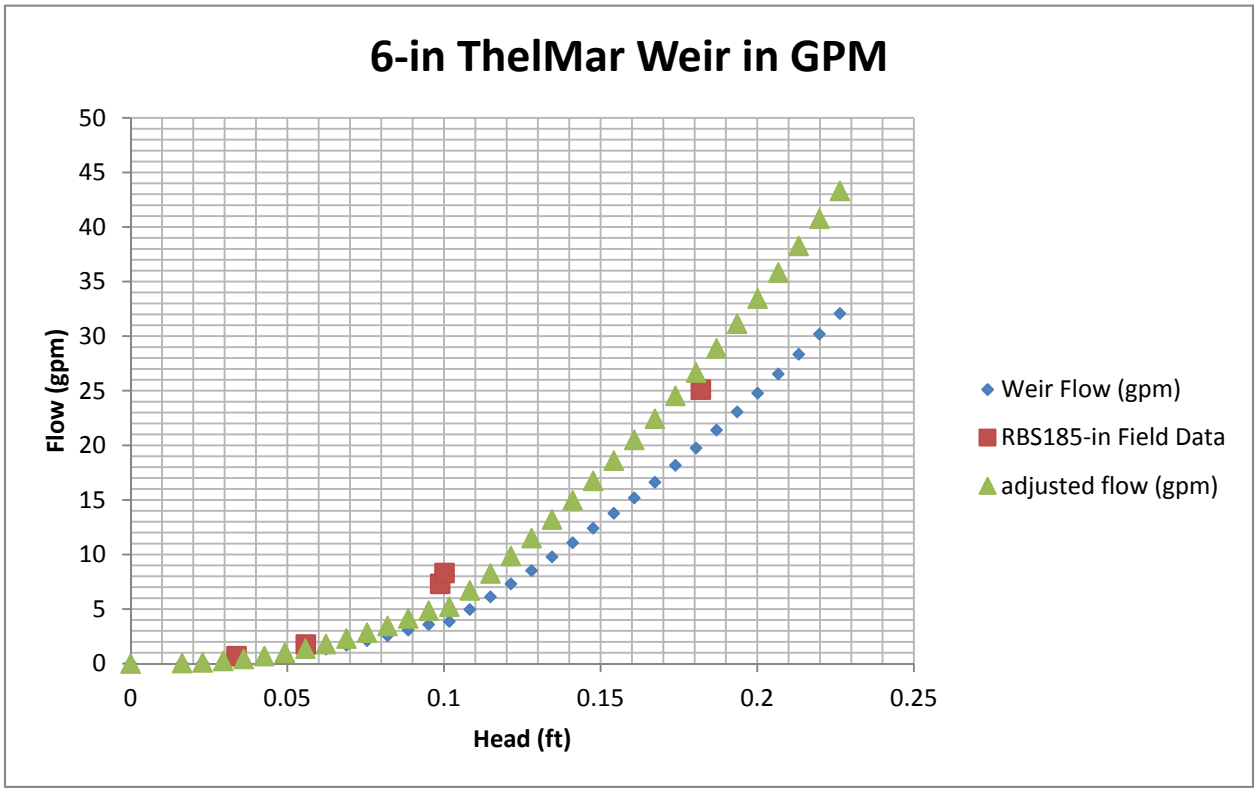


Figure A-3. Rating curve comparison from dynamic flow testing at RBS185-in.

Representativeness

The representativeness of the hydrologic data was ensured by properly selecting and installing all associated monitoring equipment. Rainfall patterns, stormwater conveyance features, and surrounding land uses were also considered when identifying monitoring locations and sampling frequencies to ensure that representative data were obtained. Finally, monitoring was conducted

during an average water year (Table 8, main text), thus ensuring that data were collected during representative climatic conditions for western Washington.

Completeness

Completeness was assessed based on the occurrence of gaps in the data record for all hydrological data signals. The associated MQO requires that less than 10 percent of the total data record be missing due to equipment malfunction or other operational problems. During the monitoring period there were minimal data gaps (Tables A-5 and A-6), and the majority of those gaps that did occur were sufficiently short in duration that they could be filled by interpolation. Therefore, the completeness MQO for hydrological data was met.

Comparability

Although there is no numeric MQO for data comparability, standard monitoring procedures, units of measurement, and reporting conventions were used in this study to meet the quality indicator of data comparability.

Conclusions

Results from this quality assurance review indicated that data the final flow record at RBS185-in and RBS185-out were of sufficient quality to be used in this report without qualification. In addition, the rainfall data at RBS185-RG can be used without qualification.

References

Herrera. 2012. Quality Assurance Project Plan: City of Redmond 185th Avenue NE Bioretention Swale Performance Verification Project. Prepared for City of Redmond by Herrera Environmental Consultants, Inc., Seattle, Washington. February 2012.

	Subtype	Creator	Comment	From Time|YYYY-MM	To Time|YYYY-MM-D	Applied Time|YYYY-	Points Modified
Normal	Offset Corr	dahearn	Offset Corr	2/8/2012 17:43	2/15/2012 10:02	10/10/2012 15:35	1,924
Normal	Multi-Point	dahearn	Offset erro	2/22/2012 13:35	2/23/2012 9:25	10/10/2012 15:53	239
Normal	Fill Data Ga	dahearn	Fill Data Ga	2/22/2012 13:25	2/22/2012 13:35	10/10/2012 15:54	1
Normal	Fill Data Ga	dahearn	Fill Data Ga	2/8/2012 16:55	2/8/2012 18:09	10/10/2012 15:54	7
Normal	Drift Correc	dahearn	Drift Correc	5/20/2012 21:43	6/21/2012 14:27	10/10/2012 16:01	9,129
Normal	Drift Correc	dahearn	Drift Correc	7/10/2012 9:50	9/13/2012 11:30	10/10/2012 16:30	18,460
Normal	Offset Corr	dahearn	Leaves cau	10/22/2012 11:40	11/6/2012 0:35	11/12/2012 12:56	4,188
Normal	Delete Reg	dahearn	Delete Reg	11/5/2012 21:30	11/6/2012 0:55	11/12/2012 12:57	42
Normal	Fill Data Ga	dahearn	Fill Data Ga	11/5/2012 21:25	11/6/2012 1:10	11/12/2012 12:58	42
Normal	Delete Reg	dahearn	Delete Reg	10/22/2012 11:25	10/22/2012 12:00	11/12/2012 12:58	8
Normal	Fill Data Ga	dahearn	Fill Data Ga	10/22/2012 11:20	10/22/2012 12:05	11/12/2012 12:59	8
Normal	Drift Correc	dahearn	Drift Correc	11/11/2012 18:35	11/12/2012 11:10	6/21/2013 13:27	200
Normal	Drift Correc	dahearn	Drift Correc	11/14/2012 16:35	3/19/2013 8:40	6/21/2013 13:31	35,906
Normal	Drift Correc	dahearn	Drift Correc	4/9/2013 19:15	4/17/2013 14:05	6/21/2013 13:33	2,243
Normal	Delete Reg	dahearn	Delete Reg	4/18/2013 11:55	4/18/2013 12:05	6/21/2013 13:34	2
Normal	Fill Data Ga	dahearn	Fill Data Ga	4/18/2013 11:50	4/18/2013 12:10	6/21/2013 13:34	2
Normal	Multi-Point	dahearn	Multi-Point	4/23/2013 5:15	4/23/2013 5:20	6/21/2013 13:37	2
Normal	Multi-Point	dahearn	Multi-Point	1/20/2013 8:00	1/20/2013 8:05	6/21/2013 13:39	2
Normal	Offset Corr	dahearn	Offset Corr	11/16/2012 13:40	12/1/2012 19:55	6/21/2013 13:41	4,396
Normal	Offset Corr	dahearn	Offset Corr	12/1/2012 21:00	12/18/2012 3:15	6/21/2013 13:42	4,684
Normal	Offset Corr	dahearn	Offset Corr	12/23/2012 17:15	12/29/2012 10:05	6/21/2013 13:44	1,643
Normal	Offset Corr	dahearn	Offset Corr	1/2/2013 14:10	2/27/2013 17:40	6/21/2013 13:54	16,171
Normal	Offset Corr	dahearn	Offset Corr	4/18/2013 14:05	6/21/2013 1:30	6/21/2013 13:57	18,153
Normal	Offset Corr	dahearn	Offset Corr	6/21/2013 1:35	9/30/2013 19:25	10/7/2013 13:16	29,302

	Subtype	Creator	Comment	From Time|YYYY-MM	To Time|YYYY-MM	Applied Time|YYYY-	Points Modified
Normal	Delete Reg	admin	Delete Reg	3/14/2012 5:25	3/14/2012 7:50	7/20/2012 13:21	30
Normal	Fill Data Ga	admin	Fill Data Ga	3/14/2012 5:15	3/14/2012 8:00	7/20/2012 13:21	30
Normal	Delete Reg	admin	Delete Reg	2/22/2012 13:35	2/23/2012 9:30	7/20/2012 13:22	240
Normal	Fill Data Ga	admin	Fill Data Ga	2/22/2012 13:20	2/23/2012 9:55	7/20/2012 13:23	241
Normal	Multi-Point	admin	Offset erro	2/9/2012 0:30	2/15/2012 10:00	7/20/2012 13:27	1,843
Normal	Delete Reg	admin	Delete drop	2/9/2012 0:20	2/9/2012 0:25	7/20/2012 13:27	2
Normal	Fill Data Ga	admin	Fill Data Ga	2/9/2012 0:15	2/9/2012 0:30	7/20/2012 13:28	2
Normal	Multi-Point	admin	Fill Data Ga	2/15/2012 10:00	2/15/2012 10:05	7/20/2012 13:28	2
Normal	Delete Reg	admin	Delete Reg	4/18/2012 13:20	4/19/2012 9:10	7/20/2012 13:30	239
Normal	Fill Data Ga	admin	Fill Data Ga	4/18/2012 11:35	4/19/2012 10:20	7/20/2012 13:30	239
Normal	Multi-Point	dahearn	Offset erro	7/3/2012 12:15	7/9/2012 12:15	10/10/2012 16:37	1,729
Normal	Delete Reg	dahearn	Delete drop	7/3/2012 12:05	7/3/2012 13:45	10/10/2012 16:37	21
Normal	Fill Data Ga	dahearn	Fill Data Ga	7/3/2012 12:00	7/3/2012 13:50	10/10/2012 16:37	21
Normal	Delete Reg	dahearn	Delete drop	7/9/2012 12:00	7/9/2012 13:05	10/10/2012 16:37	14
Normal	Fill Data Ga	dahearn	Fill Data Ga	7/9/2012 11:50	7/9/2012 13:20	10/10/2012 16:38	14
Normal	Delete Reg	dahearn	Delete drop	6/21/2012 14:35	6/21/2012 14:45	10/10/2012 16:38	3
Normal	Fill Data Ga	dahearn	Fill Data Ga	6/21/2012 14:30	6/21/2012 14:55	10/10/2012 16:38	3
Normal	Fill Data Ga	dahearn	Fill Data Ga	2/8/2012 17:03	2/8/2012 17:48	10/10/2012 16:39	7
Normal	Drift Correc	dahearn	Drift Correc	3/21/2012 11:45	4/18/2012 13:40	10/10/2012 16:41	8,088
Normal	Delete Reg	dahearn	Fill Data Ga	2/15/2012 10:00	2/15/2012 10:20	10/10/2012 16:42	5
Normal	Fill Data Ga	dahearn	Fill Data Ga	2/15/2012 9:55	2/15/2012 10:25	10/10/2012 16:42	5
Normal	Delete Reg	dahearn	Delete drop	7/20/2012 12:50	7/21/2012 12:20	10/10/2012 16:54	2
Normal	Multi-Point	dahearn	Stilling wel	8/18/2012 7:30	8/18/2012 10:55	11/14/2012 16:44	42
Normal	Multi-Point	dahearn	Stilling wel	8/20/2012 7:10	8/20/2012 10:45	11/14/2012 16:46	44
Normal	Multi-Point	dahearn	Stilling wel	8/22/2012 9:00	8/22/2012 11:35	11/14/2012 16:48	32
Normal	Multi-Point	dahearn	Stilling wel	8/24/2012 8:15	8/24/2012 10:30	11/14/2012 16:49	28
Normal	Multi-Point	dahearn	Stilling wel	8/26/2012 8:15	8/26/2012 11:50	11/14/2012 16:50	44
Normal	Multi-Point	dahearn	Stilling wel	8/28/2012 6:50	8/28/2012 12:10	11/14/2012 16:50	65
Normal	Multi-Point	dahearn	Stilling wel	9/2/2012 8:00	9/2/2012 10:50	11/14/2012 16:51	35
Normal	Multi-Point	dahearn	Stilling wel	9/4/2012 8:20	9/4/2012 11:30	11/14/2012 16:51	39
Normal	Multi-Point	dahearn	Stilling wel	9/6/2012 8:20	9/6/2012 11:30	11/14/2012 16:52	39
Normal	Multi-Point	dahearn	Stilling wel	9/8/2012 8:45	9/8/2012 12:15	11/14/2012 16:52	43
Normal	Multi-Point	dahearn	Stilling wel	9/10/2012 11:30	9/10/2012 16:45	11/14/2012 16:53	64
Normal	Multi-Point	dahearn	Stilling wel	9/12/2012 7:40	9/12/2012 10:10	11/14/2012 16:54	31
Normal	Multi-Point	dahearn	Stilling wel	9/14/2012 8:55	9/14/2012 12:50	11/14/2012 16:55	48
Normal	Multi-Point	dahearn	Stilling wel	9/16/2012 7:45	9/16/2012 12:15	11/14/2012 16:55	55
Normal	Multi-Point	dahearn	Stilling wel	9/18/2012 8:50	9/18/2012 12:40	11/14/2012 16:57	47
Normal	Multi-Point	dahearn	Stilling wel	9/20/2012 9:55	9/20/2012 13:00	11/14/2012 16:58	38
Normal	Multi-Point	dahearn	Stilling wel	9/22/2012 10:45	9/22/2012 19:55	11/14/2012 16:59	111
Normal	Delete Reg	dahearn	Stilling wel	9/22/2012 19:45	9/23/2012 8:10	11/14/2012 16:59	150
Normal	Fill Data Ga	dahearn	Stilling wel	9/22/2012 19:40	9/23/2012 8:15	11/14/2012 16:59	150
Normal	Multi-Point	dahearn	Stilling wel	9/24/2012 8:00	9/24/2012 13:15	11/14/2012 17:00	64
Normal	Multi-Point	dahearn	Stilling wel	9/26/2012 8:20	9/26/2012 13:25	11/14/2012 17:00	62
Normal	Multi-Point	dahearn	Stilling wel	9/28/2012 9:00	9/28/2012 13:35	11/14/2012 17:01	56
Normal	Multi-Point	dahearn	Stilling wel	9/30/2012 8:35	9/30/2012 13:15	11/14/2012 17:01	57
Normal	Multi-Point	dahearn	Stilling wel	10/2/2012 8:50	10/2/2012 13:00	11/14/2012 17:02	51
Normal	Multi-Point	dahearn	Stilling wel	10/4/2012 8:45	10/4/2012 13:15	11/14/2012 17:02	55
Normal	Multi-Point	dahearn	Stilling wel	10/12/2012 22:35	10/13/2012 0:25	11/14/2012 17:02	23
Normal	Multi-Point	dahearn	Stilling wel	10/13/2012 10:45	10/13/2012 12:20	11/14/2012 17:03	20
Normal	Multi-Point	dahearn	Stilling wel	10/13/2012 22:20	10/14/2012 0:00	11/14/2012 17:04	21
Normal	Multi-Point	dahearn	Stilling wel	10/15/2012 2:25	10/15/2012 12:20	11/14/2012 17:04	120
Normal	Multi-Point	dahearn	Stilling wel	10/14/2012 21:05	10/14/2012 22:10	11/14/2012 17:05	14
Normal	Multi-Point	dahearn	Stilling wel	10/14/2012 22:15	10/14/2012 23:10	11/14/2012 17:05	12
Normal	Multi-Point	dahearn	Stilling wel	10/15/2012 21:10	10/15/2012 22:50	11/14/2012 17:06	21

Normal	Multi-Point	dahearn	Stilling wel	10/19/2012 1:35	10/19/2012 8:50	11/14/2012 17:07	88
Normal	Multi-Point	dahearn	Stilling wel	10/19/2012 8:55	10/19/2012 20:00	11/14/2012 17:07	134
Normal	Multi-Point	dahearn	Stilling wel	10/20/2012 0:50	10/20/2012 14:05	11/14/2012 17:10	160
Normal	Multi-Point	dahearn	Stilling wel	10/20/2012 20:20	10/21/2012 3:10	11/14/2012 17:10	83
Normal	Multi-Point	dahearn	Stilling wel	10/21/2012 9:20	10/21/2012 15:25	11/14/2012 17:11	74
Normal	Multi-Point	dahearn	Stilling wel	10/21/2012 22:25	10/22/2012 13:05	11/14/2012 17:11	177
Normal	Multi-Point	dahearn	Stilling wel	10/25/2012 4:15	10/26/2012 1:50	11/14/2012 17:12	260
Normal	Multi-Point	dahearn	Stilling wel	10/24/2012 7:45	10/24/2012 9:25	11/14/2012 17:13	21
Normal	Multi-Point	dahearn	Stilling wel	10/22/2012 19:25	10/24/2012 4:55	11/14/2012 17:13	403
Normal	Multi-Point	dahearn	Stilling wel	10/27/2012 22:25	10/28/2012 12:20	11/14/2012 17:14	168
Normal	Multi-Point	dahearn	Stilling wel	10/29/2012 8:40	10/30/2012 1:10	11/14/2012 17:14	199
Normal	Multi-Point	dahearn	Stilling wel	11/4/2012 1:55	11/4/2012 20:05	11/14/2012 17:16	219
Normal	Multi-Point	dahearn	Stilling wel	11/3/2012 9:05	11/3/2012 18:55	11/14/2012 17:16	119
Normal	Multi-Point	dahearn	Stilling wel	11/1/2012 15:50	11/2/2012 16:35	11/14/2012 17:17	298
Normal	Multi-Point	dahearn	Stilling wel	11/5/2012 5:10	11/5/2012 16:15	11/14/2012 17:17	134
Normal	Multi-Point	dahearn	Stilling wel	10/31/2012 18:10	11/1/2012 0:15	11/14/2012 17:17	74
Normal	Multi-Point	dahearn	Stilling wel	11/12/2012 5:40	11/12/2012 17:10	11/14/2012 17:22	139
Normal	Multi-Point	dahearn	Stilling wel	11/12/2012 23:10	11/13/2012 0:10	11/14/2012 17:23	13
Normal	Multi-Point	dahearn	Stilling wel	11/13/2012 3:45	11/13/2012 5:00	11/14/2012 17:24	16
Normal	Multi-Point	dahearn	Stilling wel	11/13/2012 7:20	11/13/2012 9:00	11/14/2012 17:24	21
Normal	Multi-Point	dahearn	Stilling wel	11/14/2012 0:40	11/14/2012 10:55	11/14/2012 17:25	124
Normal	Delete Reg	dahearn	Delete Reg	11/14/2012 15:40	11/14/2012 16:30	11/14/2012 17:26	11
Normal	Multi-Point	dahearn	Stilling wel	11/14/2012 6:35	11/14/2012 15:35	11/14/2012 17:27	109
Normal	Multi-Point	dahearn	Stilling wel	11/14/2012 16:35	11/14/2012 17:15	11/14/2012 17:28	9
Normal	Delete Reg	dahearn	Stilling wel	11/14/2012 9:10	11/14/2012 10:55	11/14/2012 17:28	22
Normal	Fill Data Ga	dahearn	Stilling wel	11/14/2012 9:05	11/14/2012 11:10	11/14/2012 17:28	22
Normal	Fill Data Ga	dahearn	stilling well	11/14/2012 15:35	11/14/2012 16:35	11/14/2012 17:29	11
Normal	Delete Reg	dahearn	Stilling wel	11/12/2012 15:00	11/12/2012 17:15	11/14/2012 17:29	28
Normal	Fill Data Ga	dahearn	Stilling wel	11/12/2012 14:55	11/12/2012 17:25	11/14/2012 17:30	28
Normal	Multi-Point	dahearn	Delete drop	11/13/2012 9:05	11/13/2012 9:10	11/14/2012 17:30	2
Normal	Multi-Point	dahearn	Delete drop	11/12/2012 23:55	11/13/2012 0:10	11/14/2012 17:30	4
Normal	Delete Reg	dahearn	Stilling wel	10/13/2012 23:45	10/14/2012 0:00	11/14/2012 17:32	4
Normal	Fill Data Ga	dahearn	Stilling wel	10/13/2012 23:40	10/14/2012 0:10	11/14/2012 17:32	4
Normal	Delete Reg	dahearn	Stilling wel	10/13/2012 12:00	10/13/2012 12:25	11/14/2012 17:33	6
Normal	Fill Data Ga	dahearn	Stilling wel	10/13/2012 11:55	10/13/2012 12:30	11/14/2012 17:33	6
Normal	Delete Reg	dahearn	Stilling wel	10/13/2012 0:00	10/13/2012 0:30	11/14/2012 17:33	7
Normal	Fill Data Ga	dahearn	Stilling wel	10/12/2012 23:55	10/13/2012 0:35	11/14/2012 17:34	7
Normal	Delete Reg	dahearn	Stilling wel	10/15/2012 12:00	10/15/2012 12:20	11/14/2012 17:34	5
Normal	Fill Data Ga	dahearn	Stilling wel	10/15/2012 11:55	10/15/2012 12:25	11/14/2012 17:34	5
Normal	Delete Reg	dahearn	Delete Reg	1/12/2013 22:00	1/14/2013 20:35	6/21/2013 14:01	560
Normal	Fill Data Ga	dahearn	Fill Data Ga	1/12/2013 20:00	1/15/2013 0:00	6/21/2013 14:02	560
Normal	Multi-Point	dahearn	Multi-Point	3/18/2013 15:10	3/18/2013 15:15	6/21/2013 14:02	2
Normal	Delete Reg	dahearn	Delete Reg	4/18/2013 11:50	4/18/2013 12:10	6/21/2013 14:03	4
Normal	Fill Data Ga	dahearn	Fill Data Ga	4/18/2013 11:45	4/18/2013 12:15	6/21/2013 14:03	4
Normal	Delete Reg	dahearn	Delete Reg	9/25/2013 5:25	9/26/2013 21:25	10/7/2013 13:28	481
Normal	Fill Data Ga	dahearn	Fill Data Ga	9/25/2013 5:05	9/26/2013 21:50	10/7/2013 13:29	481

APPENDIX B

Water Quality Data Quality Assurance Memorandum

Herrera Environmental Consultants, Inc.

Memorandum

To	Project File 09-04540-000
cc	Dylan Ahearn, Herrera Environmental Consultants
From	Gina Catarra, Herrera Environmental Consultants
Date	November 25, 2013
Subject	Water Quality Data Quality Assurance Review of City of Redmond Bioretention Swale Monitoring

This memorandum presents a review of data quality for 20 composite and 23 grab influent and effluent stormwater samples collected from a bioretention swale system in Redmond, Washington between February 2012 and September 2013. Aquatic Research in Seattle, Washington analyzed the composite samples for:

- Total suspended solids by EPA method 160.2
- Total phosphorus by EPA method 365.1
- Hardness by Standard Method 2340C
- Orthrophosphate phosphorus by EPA method 365.1
- Nitrate-nitrite by Standard Method 4500NO3, F
- Total Kjeldahl nitrogen by EPA method 351.1
- Total and dissolved metals (cadmium, copper, lead, mercury, and zinc) by EPA methods 200.8/7471
- Suspended sediment concentration by ASTM method D3997-97B

Aquatic Research analyzed the grab samples for:

- Total petroleum hydrocarbons by NWTPH-Dx
- Fecal coliform by Standard Method 9222D
- Organochlorine pesticides by EPA method 8081
- Polychlorinated biphenyls by EPA method 8082
- Semivoloatile organic compounds by EPA method 8270
- Volatile organic compounds by EPA method 8260
- Chlorinated herbicides by EPA method 8151

All of the composite sample parameters and fecal coliform and TPH were collected on three occasions from the measured inlet (RBS185-IN) and the three unmeasured inlets (RBS185-CB1, RBS185-CB2, and RBS185-CB3), in order to determine the degree of variability in chemistry among the inlets. The results of this comparison are presented in the *Representativeness* section below.

Each laboratory's performance was reviewed in accordance with quality control (QC) criteria outlined in the *City of Redmond 185th Avenue NE Bioretention Swale Performance Verification Project Quality Assurance Project Plan* (QAPP) (Herrera 2011).

Quality control data summaries submitted by the laboratories were reviewed; raw data were not submitted by the laboratories. Data quality assurance worksheets summarizing the quality assurance and quality control (QA/QC) review were completed for each sampling event and are included with the data. Data qualifiers (flags) were added to the sample results in the laboratory reports. Data validation results are summarized below, followed by definitions of data qualifiers.

Custody, Preservation, Holding Times, and Completeness—Acceptable with Discussion

The samples were properly preserved and sample custody was maintained from sample collection to receipt at the laboratories. All samples were analyzed within the required holding times (Table 1). With the exceptions noted below, the laboratory reports were complete and contained results for all samples and tests requested on the chain-of-custody (COC) forms.

Due to laboratory error, grab samples collected during Event 18 and the inlet sample collected during Event 13 were not analyzed for NWTPH-Dx. No data were qualified.

Laboratory Reporting Limits—Acceptable

The QAPP specified reporting limits are provided in Table 1. The laboratory reporting limits met the QAPP specified reporting limits for all analyses. No data were qualified based on laboratory reporting limits.

Blank Analysis—Acceptable

Method Blanks

Method blanks were analyzed at the required frequency. Method blanks did not have detected levels of target analytes above the reporting limit. No data were qualified due to method blank contamination.

Rinsate Blanks

Rinsate blanks were collected at the beginning and end of the project. Rinsate blanks did not have any detected concentrations of target analytes.

Table 1. Summary of sample collection requirements and reporting limits.

Parameter	Pre-Filtration Holding Time	Total Holding Time [c]	Laboratory Preservation	RL	Units
Total suspended solids	NA	7 days	Cool ≤6°C	1.0	mg/L
Suspended sediment concentration	NA	NA	Cool ≤6°C	0.1	
Total phosphorus	NA	28 days	Cool ≤4°C, HCl to pH <2	0.01	
Orthophosphorus	NA	48 hours [f]	Cool ≤6°C	0.05	
Total Kjeldahl nitrogen	NA	28 days	Cool ≤ 6°C, H_2SO_4 to pH <2	0.200	
Nitrate+nitrite	24 hours	28 days	Cool ≤ 4°C, H_2SO_4 to pH <2	0.05	
Hardness as $CaCO_3$	NA	28 days	Cool ≤6°C, H_2SO_4 to pH <2	1.0	mg/L
Copper, dissolved	24 hours [f]	6 months	Cool ≤6°C, HNO_3 to pH <2[g]	0.0001	
Copper, total	NA				
Lead, dissolved	24 hours [f]			0.00002	
Lead, total	NA				
Zinc, dissolved	24 hours [f]			0.005	
Zinc, total	NA				
Fecal coliform bacteria	24 hours	24 hours	Cool ≤10°C	2	
TPH (diesel)	14 days to extraction	40 days to analysis	Cool ≤6°C, HCl to pH <2	0.05	
TPH (motor oil)				0.1	

[a] SM method numbers are from APHA et al. (1998); EPA method numbers are from US EPA (1983, 1984). The 18th edition of *Standard Methods for the Examination of Water and Wastewater* (APHA et al. 1992) is the current legally adopted version in the *Code of Federal Regulations.*

[b] Samples will be split from the 20-L HDPE bottle using a 22-liter churn splitter.

[c] Holding time specified in US EPA guidance (US EPA 1983, 1984) or referenced in APHA et al. (1992) for equivalent method.

[f] US EPA requires filtering for dissolved metals and orthophosphorus within 15 minutes of the collection of the last aliquot. This goal is exceedingly difficult to meet when conducting flow-weighted sampling. A more practical proxy goal for this study is 24 hours.

C = Celsius.

NA = not applicable.

Laboratory Control Sample Analysis—Acceptable

Laboratory control samples were analyzed at the required frequency. The percent recovery values for all sampling events met the laboratory criteria.

Matrix Spike Analysis—Acceptable with Qualification

Matrix spike (MS) samples were analyzed at the required frequency. All MS or MSD recovery values met control limits established by the QAPP.

Laboratory Duplicate Analysis—Acceptable

Laboratory duplicates or laboratory control sample duplicates were analyzed at the required frequency. The relative percent difference (RPD) was calculated for each analyte where both duplicate values were greater than five times the reporting limit (RL). The difference between duplicate values was calculated if the detected compound concentration was less than five times the RL in either the sample or the field duplicate. A control limit of less than 20 percent RPD (30 percent for organics) was established in the QAPP and a control limit of two times the RL was used to evaluate difference values. The relative percent difference (RPD) values met the control limits established by the QAPP, and all difference values were less than two times the RL for all project samples.

Field Duplicates—Acceptable with Qualification

Field duplicates were analyzed for all analyses. With the exceptions noted below, field duplicate precision met the QAPP specified criterion. Table 2 summarizes the samples that were qualified as estimated (J) for field duplicate RPD exceedance. No other data associated with the sample batch were qualified due to field duplicate criteria exceedance because other quality control criteria were met.

Table 2. Summary of field duplicate criteria exceedances.

Sample Event	Parameter	Sample ID	Duplicate ID	Qualifier
Composite 5	SSL-Coarse	Outlet	QA	J
Grab 4	Fecal coliform bacteria	Outlet	QA	J
Composite 16	SSL-Coarse	Inlet	QA	J
Composite 16	TKN	Inlet	QA	J
Composite 18	Total copper	Outlet	QA	J

Representativeness – Acceptable with Qualification

Grab samples from the measured inlet (RBS185-IN) and the three unmeasured inlets (RBS185-CB1, RBS185-CB2, and RBS185-CB3) were collected on 3/12/12, 10/15/12, and 6/20/13 and analyzed for the parameters listed in Table 3. The intent of this sampling was to determine the amount of bias introduced by only sampling one inlet in swale 2 and assuming that it was representative of the three inlets in swale 3 (the outlet of swale 3 was monitored as well). In order to estimate this bias the relative percent difference (RPD) was calculated between RBS185-IN and each of the other inlets. The three RPDs were then averaged for the event. This was repeated for each of the three monitored events and then the RPDs among the events were averaged to generate one overall for each parameter. The results are presented in Table 3. As is apparent the majority of the parameters exhibited an RPD of less than 10 percent. The exceptions were fecal coliform, hardness, chloride, coarse suspended solids concentration, dissolved copper, and dissolved zinc. The sampling design apparently resulted in the overestimation of influent concentrations of fecal coliform, hardness, chloride, and dissolved copper. All of these

parameters were exported from the swale, so this indicates that the percent increase in concentration induced by filtration through the bioretention soil media was likely greater than reported for these parameters. Conversely, course suspended solids and dissolved zinc we underestimated due to the sampling design. Both of these parameters were generally lower at the outlet then inlet (particularly dissolved zinc), so the removal of course suspended solids and dissolved zinc was likely greater than reported.

Table 3. Results from the comparison among the four sampled inlets.

Parameter	Overall Relative Percent Difference
Total Petroleum Hydrocarbons-Diesel	NC
Total Petroleum Hydrocarbons-Motor Oil	-5
Fecal Coliform	15
Total Phosphorus	1
Soluble Reactive Phosphorus	-8
Hardness	13
Chloride	23
Total Suspended Solids	1
Suspended Solids Concentration-Coarse	-35
Suspended Solids Concentration -Fine	3
Total Cadmium	NC
Total Copper	-2
Total Lead	9
Total Mercury	NC
Total Zinc	-5
Total Kjeldahl Nitrogen	9
Nitrate+nitrite	1
Dissolved Cadmium	NC
Dissolved Copper	20
Dissolved Lead	NC
Dissolved Mercury	NC
Dissolved Zinc	-20

Data Quality Assessment Summary

In general, the data quality for all parameters was found to be acceptable based on holding time, reporting limit, method blank, control standard, matrix spike, laboratory duplicate, and field duplicate criteria. Five results were qualified as estimated (J) due to field duplicate precision exceedances. The Representativeness analysis of the inlets indicated that any bias introduced through the sampling only exaggerated the patterns observed in this study (i.e., for those affected parameters, either the observed export was greater than measured or the observed decrease was greater than observed).

Usability of the data is based on the guidance documents previously noted. Upon consideration of the information presented here, the data are acceptable as qualified.

Definition of Data Qualifiers

The following data qualifier definitions are taken from *US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (US EPA 2002).

U The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J The associated value is an estimated quantity.

UJ The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

R The data are unusable. (Note: analyte may or may not be present.)

References

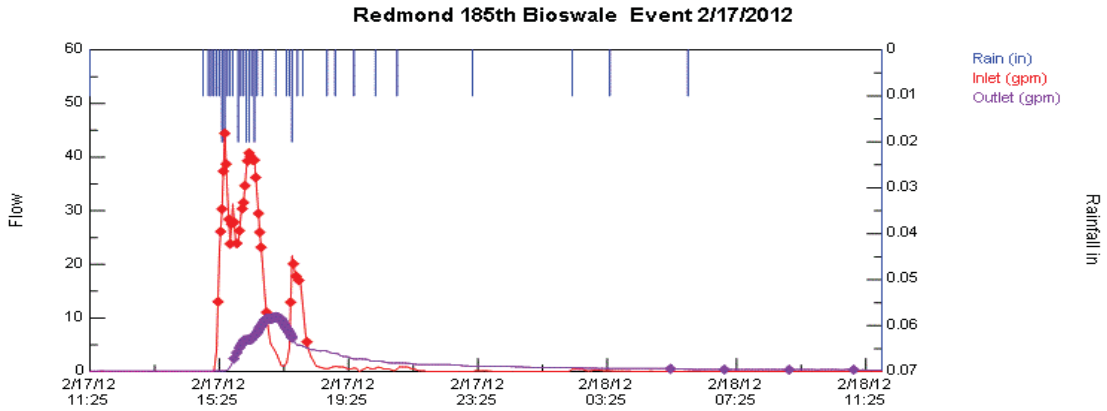
US EPA. 2002. Contract laboratory program national functional guidelines for inorganic data review. US Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. (EPA-540/R-01/008).

Herrera. 2011. City of Redmond 185th Avenue NE Bioretention Swale Performance Verification Project Quality Assurance Project Plan. Prepared for the City of Redmond by Herrera Environmental Consultants, Inc., Seattle, Washington. August 2011.

APPENDIX C

Individual Storm Reports

Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.43		
Precipitation Duration (hr)	≥1	18.5		
Max Precip. Intensity (in/5 min)	NA	0.02		
Mean Precip. Intensity (in/hr)	0.03	0.02		
Antecedent Dry Period (hr)	≥6	76.6		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	31		95		
% Storm Sampled	≥75	92		97		
Sampling Duration (hr)	≤36	3		19.2		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	44.5		10.2		
Duration (hr)	NA	10.2		24.7		
Volume (gal)	NA	3575.0		2073.0		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.368		4.680		0.002		-1172
Ortho-Phosphorus	mg/L	0.056		3.560		0.001		-6257
Hardness	mg/L	28.1		170.0		2.0		-505.0
Chloride	mg/L	3.9		29.3		0.5		-649.4
Total Suspend Solids	mg/L	236.0		120.0		0.5		49
Suspended Sediment Coarse	mg/L	7.2		0.6		0.5		92
Suspended Sediment Fine	mg/L	207.0		180.0		0.5		13
Total Kjedahl Nitrogen	mg/L	2.31		29.40		0.20		-1173
Nitrate + Nitrite	mg/L	3.56		89.70		0.01		-2419.7
Cadmium Total	mg/L	0.0010		0.0010		0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.031		0.059		0.001		-91
Copper Dissolved	mg/L	0.003		0.022		0.001		-547
Lead Total	mg/L	0.016		0.016		0.001		-5
Lead Dissolved	mg/L	0.001	U	0.002		0.001		-140
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.198		0.083		0.005		58
Zinc Dissolved	mg/L	0.012		0.025		0.005		-108

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	33		55		2.0		-67
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.16		0.05		-220.0
Total Petroleum Hydrocarbons -Oil	mg/L	0.92		0.44		0.10		52

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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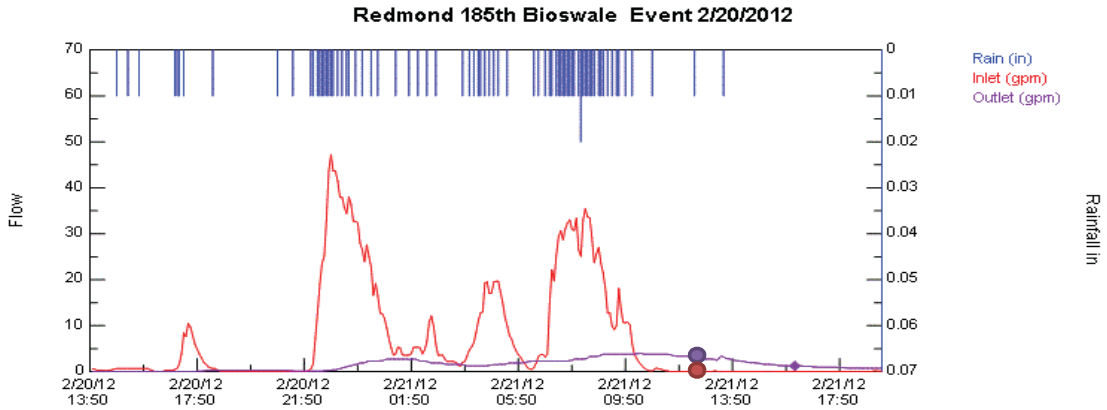
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.79		
Precipitation Duration (hr)	≥1	23.7		
Max Precip. Intensity (in/5 min)	NA	0.02		
Mean Precip. Intensity (in/hr)	0.03	0.03		
Antecedent Dry Period (hr)	≥6	40.8		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	0		1		
% Storm Sampled	≥75	0		0		
Sampling Duration (hr)	≤36	0		0.0		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	47.2		4.0		
Duration (hr)	NA	19.5		29.7		
Volume (gal)	NA	11705.4		2746.6		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L					0.002		NA
Ortho-Phosphorus	mg/L					0.001		NA
Hardness	mg/L					2.0		NA
Chloride	mg/L					0.5		NA
Total Suspend Solids	mg/L					0.5		NA
Suspended Sediment Coarse	mg/L					0.5		NA
Suspended Sediment Fine	mg/L					0.5		NA
Total Kjedahl Nitrogen	mg/L					0.20		NA
Nitrate + Nitrite	mg/L					0.01		NA
Cadmium Total	mg/L					0.0003		NA
Cadmium Dissolved	mg/L					0.0003		NA
Copper Total	mg/L					0.001		NA
Copper Dissolved	mg/L					0.001		NA
Lead Total	mg/L					0.001		NA
Lead Dissolved	mg/L					0.001		NA
Mercury Total	mg/L					0.0002		NA
Mercury Dissolved	mg/L					0.0002		NA
Zinc Total	mg/L					0.005		NA
Zinc Dissolved	mg/L					0.005		NA

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	250		23		2.0		91
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	1.09		0.31		0.10		72

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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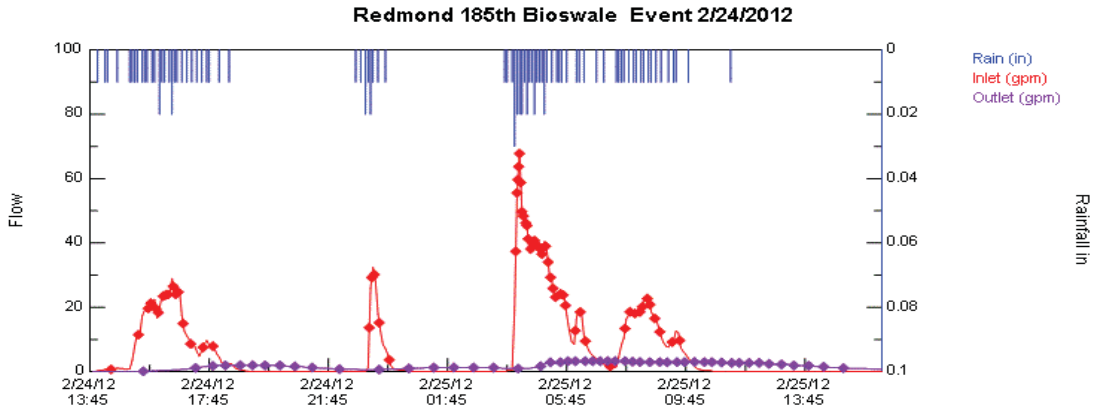
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.95		
Precipitation Duration (hr)	≥1	21.5		
Max Precip. Intensity (in/5 min)	NA	0.03		
Mean Precip. Intensity (in/hr)	0.03	0.04		
Antecedent Dry Period (hr)	≥6	75.7		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	63		50		
% Storm Sampled	≥75	98		97		
Sampling Duration (hr)	≤36	19		23.5		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	67.8		3.3		
Duration (hr)	NA	14.7		26.7		
Volume (gal)	NA	10115.7		2661.2		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.126		5.350		0.002		-4146
Ortho-Phosphorus	mg/L	0.061		4.100		0.001		-6621
Hardness	mg/L	15.0		251.0		2.0		-1573.3
Chloride	mg/L	1.6		41.1		0.5		-2534.6
Total Suspend Solids	mg/L	29.0		53.0		0.5		-83
Suspended Sediment Coarse	mg/L	0.5	U	2.0		0.5		-300
Suspended Sediment Fine	mg/L	25.0		48.0		0.5		-92
Total Kjedahl Nitrogen	mg/L	1.73		47.60		0.20		-2651
Nitrate + Nitrite	mg/L	0.08		125.00		0.01		-148709.5
Cadmium Total	mg/L	0.0003	U	0.0005		0.0003		-67
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.005		0.054		0.001		-1078
Copper Dissolved	mg/L	0.001	U	0.026		0.001		-2510
Lead Total	mg/L	0.002		0.018		0.001		-837
Lead Dissolved	mg/L	0.001	U	0.003		0.001		-230
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.053		0.080		0.005		-51
Zinc Dissolved	mg/L	0.017		0.029		0.005		-71

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	59		18		2.0		69
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	0.84		0.83		0.10		1

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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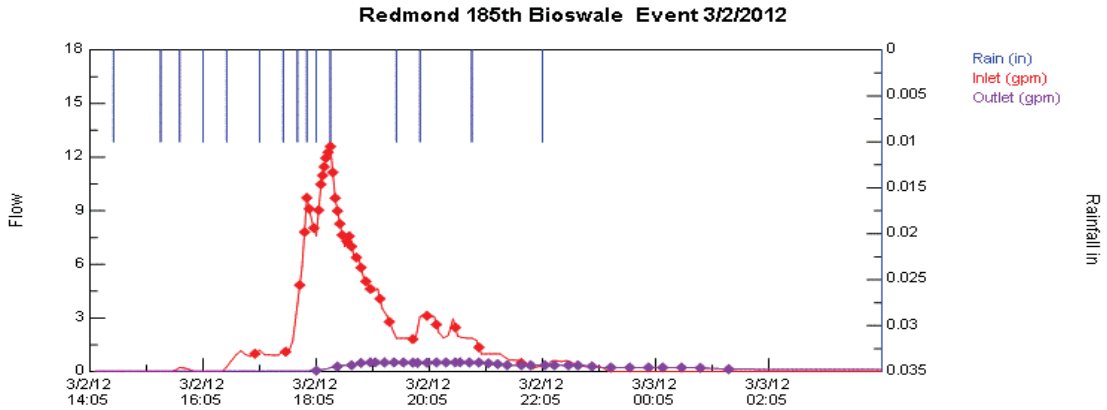
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.16		
Precipitation Duration (hr)	≥1	8.0		
Max Precip. Intensity (in/5 min)	NA	0.01		
Mean Precip. Intensity (in/hr)	0.03	0.02		
Antecedent Dry Period (hr)	≥6	51.8		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	34		35		
% Storm Sampled	≥75	94		84		
Sampling Duration (hr)	≤36	5		7.3		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	12.6		0.5		
Duration (hr)	NA	7.2		14.1		
Volume (gal)	NA	1070.2		183.6		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.072		4.760		0.002		-6511
Ortho-Phosphorus	mg/L	0.007		3.030		0.001		-43186
Hardness	mg/L	29.7		217.0		2.0		-630.6
Chloride	mg/L	12.1		36.7		0.5		-203.3
Total Suspend Solids	mg/L	40.0		70.0		0.5		-75
Suspended Sediment Coarse	mg/L	0.6		0.5	U	0.5		17
Suspended Sediment Fine	mg/L	35.5		62.0		0.5		-75
Total Kjedahl Nitrogen	mg/L	1.01		12.00		0.20		-1088
Nitrate + Nitrite	mg/L	0.16		123.00		0.01		-76775.0
Cadmium Total	mg/L	0.0003	U	0.0006		0.0003		-100
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.008		0.053		0.001		-548
Copper Dissolved	mg/L	0.003		0.026		0.001		-874
Lead Total	mg/L	0.003		0.014		0.001		-321
Lead Dissolved	mg/L	0.001	U	0.002		0.001		-140
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.182		0.062		0.005		66
Zinc Dissolved	mg/L	0.027		0.022		0.005		19

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml					2.0		NA
Total Petroleum Hydrocarbons -Diesel	mg/L					0.05		NA
Total Petroleum Hydrocarbons -Oil	mg/L					0.10		NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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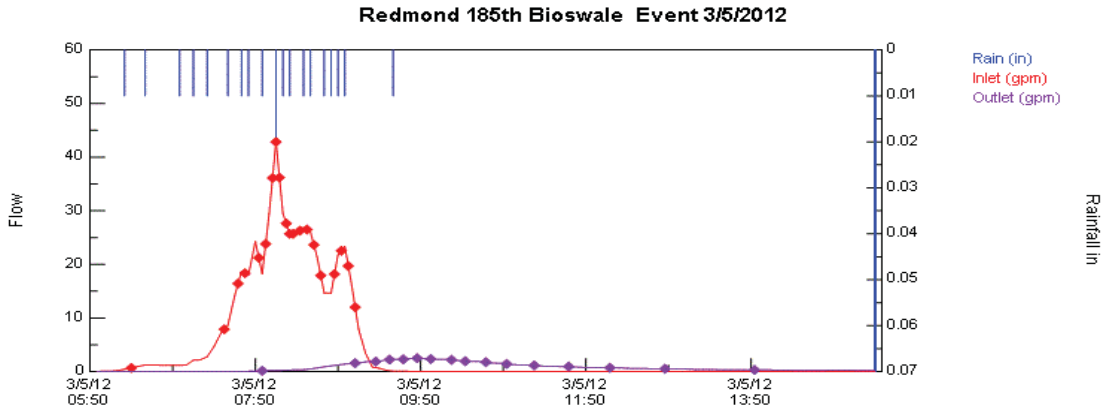
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.21		
Precipitation Duration (hr)	≥1	3.7		
Max Precip. Intensity (in/5 min)	NA	0.02		
Mean Precip. Intensity (in/hr)	0.03	0.06		
Antecedent Dry Period (hr)	≥6	58.3		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	20		16		
% Storm Sampled	≥75	98		93		
Sampling Duration (hr)	≤36	3		6.0		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	42.8		2.5		
Duration (hr)	NA	4.0		9.7		
Volume (gal)	NA	2317.3		428.3		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.078		4.630		0.002		-5836
Ortho-Phosphorus	mg/L	0.001	U	3.220		0.001		-321900
Hardness	mg/L	27.0		201.0		2.0		-644.4
Chloride	mg/L	6.3		34.2		0.5		-442.9
Total Suspend Solids	mg/L	46.0		70.0		0.5		-52
Suspended Sediment Coarse	mg/L	2.8		0.5	U	0.5		82
Suspended Sediment Fine	mg/L	38.0		80.0		0.5		-111
Total Kjedahl Nitrogen	mg/L	0.59		13.60		0.20		-2205
Nitrate + Nitrite	mg/L	0.11		84.00		0.01		-78404.7
Cadmium Total	mg/L	0.0003	U	0.0004		0.0003		-33
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.017		0.051		0.001		-208
Copper Dissolved	mg/L	0.003		0.024		0.001		-800
Lead Total	mg/L	0.003		0.011		0.001		-307
Lead Dissolved	mg/L	0.001	U	0.003		0.001		-210
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.137		0.055		0.005		60
Zinc Dissolved	mg/L	0.044		0.029		0.005		34

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml					2.0		NA
Total Petroleum Hydrocarbons -Diesel	mg/L					0.05		NA
Total Petroleum Hydrocarbons -Oil	mg/L					0.10		NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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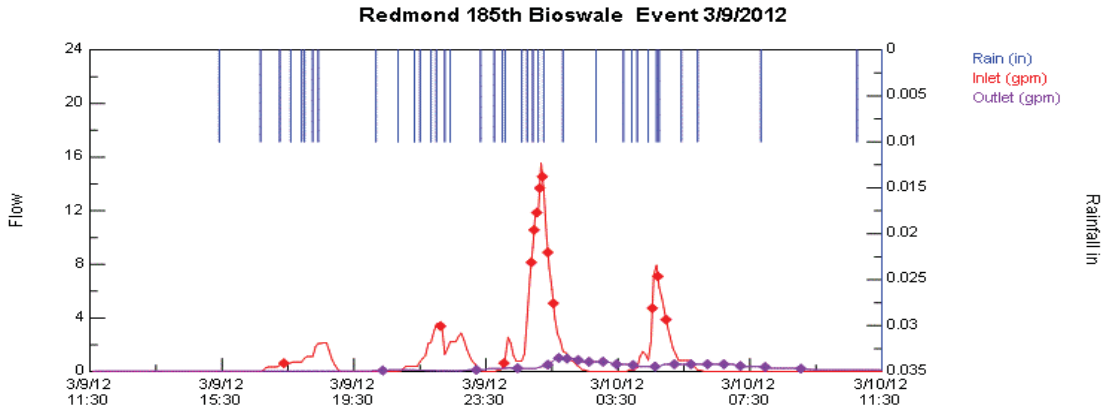
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.38		
Precipitation Duration (hr)	≥1	23.2		
Max Precip. Intensity (in/5 min)	NA	0.01		
Mean Precip. Intensity (in/hr)	0.03	0.02		
Antecedent Dry Period (hr)	≥6	98.8		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	13		19		
% Storm Sampled	≥75	94		88		
Sampling Duration (hr)	≤36	12		12.7		
Flow Information						
	Goal	In	QA	Out	QA	notes
Max Discharge (gpm)	NA	15.6		1.1		
Duration (hr)	NA	10.1		24.2		
Volume (gal)	NA	1241.7		338.8		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.053		4.130		0.002		-7692
Ortho-Phosphorus	mg/L	0.011		2.590		0.001		-23445
Hardness	mg/L	24.8		188.0		2.0		-658.1
Chloride	mg/L	2.9		23.5		0.5		-702.0
Total Suspend Solids	mg/L	18.5		54.0		0.5		-192
Suspended Sediment Coarse	mg/L	12.0		3.2	J	0.5		73
Suspended Sediment Fine	mg/L	16.5		58.0		0.5		-252
Total Kjedahl Nitrogen	mg/L	0.69		9.76		0.20		-1323
Nitrate + Nitrite	mg/L	2.40		93.30		0.01		-3787.5
Cadmium Total	mg/L	0.0003	U	0.0005		0.0003		-67
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.006		0.043		0.001		-673
Copper Dissolved	mg/L	0.002		0.017		0.001		-729
Lead Total	mg/L	0.002		0.010		0.001		-553
Lead Dissolved	mg/L	0.001	U	0.002		0.001		-80
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.165		0.056		0.005		66
Zinc Dissolved	mg/L	0.057		0.015		0.005		74

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	18		5	UJ	2.0		72
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.08		0.05		-60.0
Total Petroleum Hydrocarbons -Oil	mg/L	0.39		0.79		0.10		-103

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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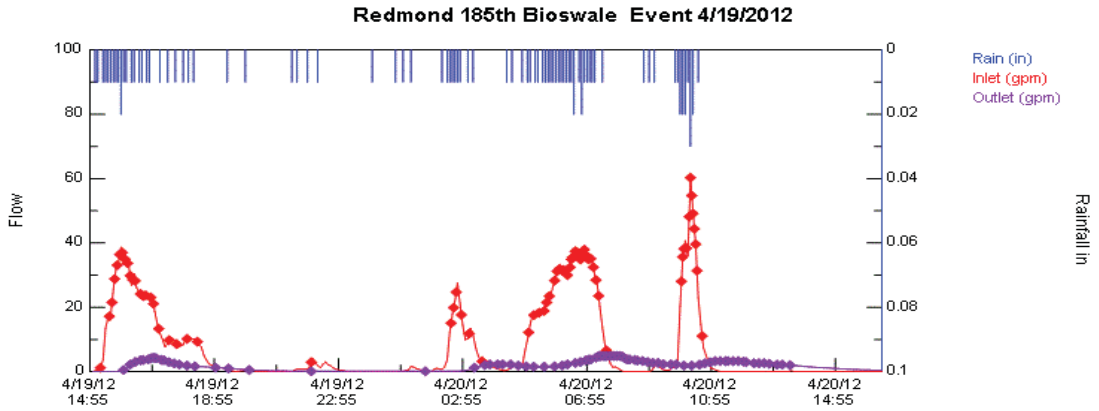
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.93		
Precipitation Duration (hr)	≥1	19.6		
Max Precip. Intensity (in/5 min)	NA	0.03		
Mean Precip. Intensity (in/hr)	0.03	0.05		
Antecedent Dry Period (hr)	≥6	82.2		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	68		84		
% Storm Sampled	≥75	99		92		
Sampling Duration (hr)	≤36	19		21.5		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	60.3		4.9		
Duration (hr)	NA	16.6		25.6		
Volume (gal)	NA	10777.8		2433.8		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.085		4.170		0.002		-4806
Ortho-Phosphorus	mg/L	0.003		2.880		0.001		-95900
Hardness	mg/L	16.0		88.7		2.0		-454.4
Chloride	mg/L	0.8		7.3		0.5		-804.9
Total Suspend Solids	mg/L	36.0		0.0		0.5		100
Suspended Sediment Coarse	mg/L	10.0		0.5	U	0.5		95
Suspended Sediment Fine	mg/L	19.0		96.0		0.5		-405
Total Kjedahl Nitrogen	mg/L	0.97		15.00		0.20		-1448
Nitrate + Nitrite	mg/L	0.16		12.90		0.01		-8064.6
Cadmium Total	mg/L	0.0003	U	0.0005		0.0003		-67
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.010		0.044		0.001		-321
Copper Dissolved	mg/L	0.003		0.013		0.001		-393
Lead Total	mg/L	0.002		0.011		0.001		-383
Lead Dissolved	mg/L	0.001	U	0.001		0.001		-20
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.067		0.054		0.005		19
Zinc Dissolved	mg/L	0.021		0.011		0.005		48

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	982		32		2.0		97
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	0.59		0.22		0.10		63

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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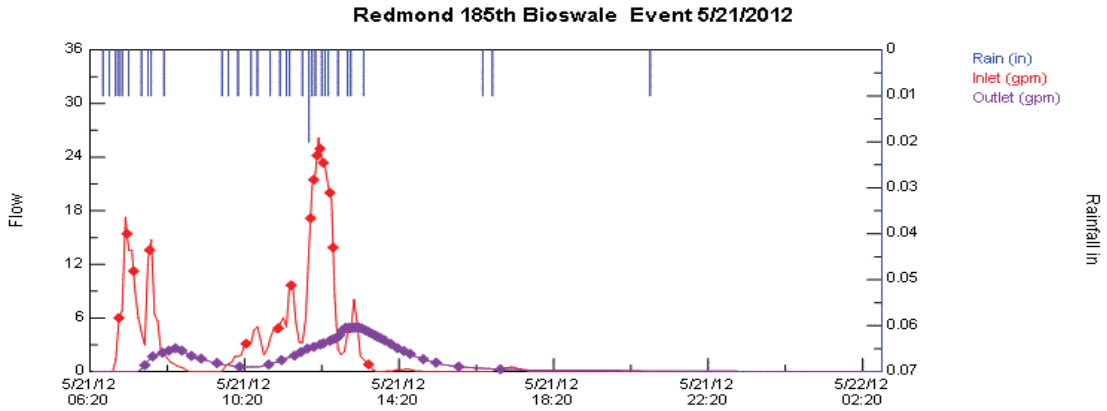
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.35		
Precipitation Duration (hr)	≥1	14.5		
Max Precip. Intensity (in/5 min)	NA	0.02		
Mean Precip. Intensity (in/hr)	0.03	0.02		
Antecedent Dry Period (hr)	≥6	11.2		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	15		45		
% Storm Sampled	≥75	97		95		
Sampling Duration (hr)	≤36	7		9.2		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	26.1		4.9		
Duration (hr)	NA	8.2		19.4		
Volume (gal)	NA	2240.5		1091.2		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.199		4.250		0.002		-2036
Ortho-Phosphorus	mg/L	0.004		2.480		0.001		-61900
Hardness	mg/L	23.1		72.8		2.0		-215.2
Chloride	mg/L	1.8		3.5		0.5		-100.6
Total Suspend Solids	mg/L	95.0		88.0		0.5		7
Suspended Sediment Coarse	mg/L	12.0		0.5	U	0.5		96
Suspended Sediment Fine	mg/L	76.0		86.0		0.5		-13
Total Kjedahl Nitrogen	mg/L	0.62		3.50		0.20		-468
Nitrate + Nitrite	mg/L	0.15		4.30		0.01		-2728.9
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.022		0.033		0.001		-52
Copper Dissolved	mg/L	0.006		0.013		0.001		-129
Lead Total	mg/L	0.006		0.007		0.001		-18
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.139		0.035		0.005		75
Zinc Dissolved	mg/L	0.041		0.009		0.005		78

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	20000		1200		2.0		94
Total Petroleum Hydrocarbons -Diesel	mg/L	0.18		0.05	U	0.05		72.2
Total Petroleum Hydrocarbons -Oil	mg/L	1.49		0.19		0.10		87

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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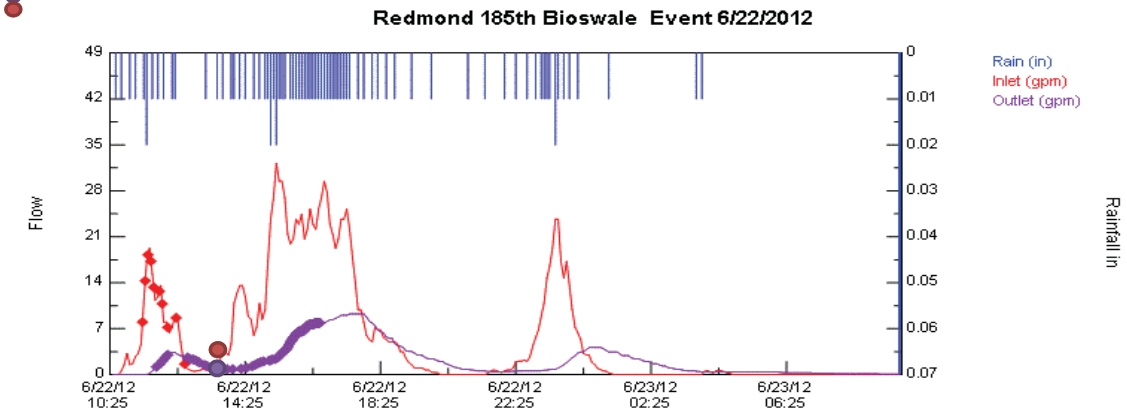
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.81		
Precipitation Duration (hr)	≥1	17.5		
Max Precip. Intensity (in/5 min)	NA	0.02		
Mean Precip. Intensity (in/hr)	0.03	0.05		
Antecedent Dry Period (hr)	≥6	84.6		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	10		91		
% Storm Sampled	≥75	10		28		
Sampling Duration (hr)	≤36	1		4.8		
Flow Information	Goal	In	QA	Out	QA	notes
Max Discharge (gpm)	NA	32.2		9.3		
Duration (hr)	NA	14.2		22.5		
Volume (gal)	NA	7269.7		2979.7		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L					0.002		NA
Ortho-Phosphorus	mg/L					0.001		NA
Hardness	mg/L					2.0		NA
Chloride	mg/L					0.5		NA
Total Suspend Solids	mg/L					0.5		NA
Suspended Sediment Coarse	mg/L					0.5		NA
Suspended Sediment Fine	mg/L					0.5		NA
Total Kjedahl Nitrogen	mg/L					0.20		NA
Nitrate + Nitrite	mg/L					0.01		NA
Cadmium Total	mg/L					0.0003		NA
Cadmium Dissolved	mg/L					0.0003		NA
Copper Total	mg/L					0.001		NA
Copper Dissolved	mg/L					0.001		NA
Lead Total	mg/L					0.001		NA
Lead Dissolved	mg/L					0.001		NA
Mercury Total	mg/L					0.0002		NA
Mercury Dissolved	mg/L					0.0002		NA
Zinc Total	mg/L					0.005		NA
Zinc Dissolved	mg/L					0.005		NA

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	3100		1400		2.0		55
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	1.24		0.34		0.10		73

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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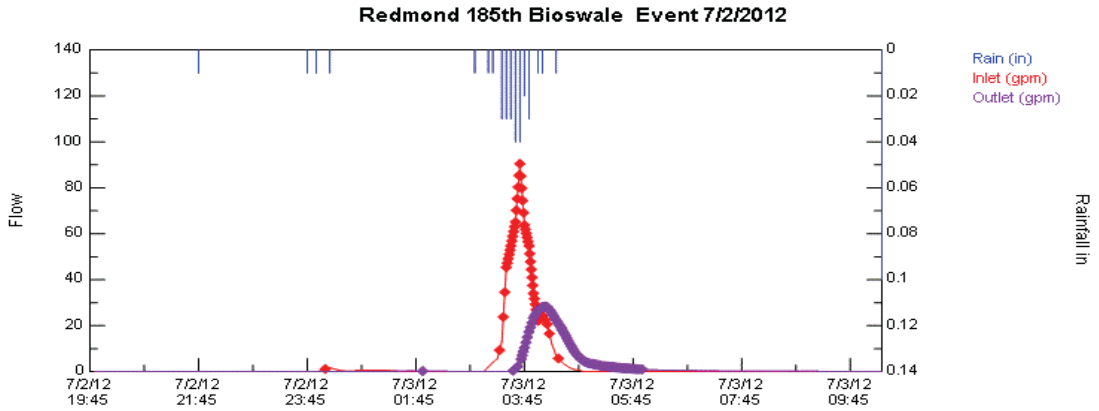
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.33		
Precipitation Duration (hr)	≥1	8.6		
Max Precip. Intensity (in/5 min)	NA	0.04		
Mean Precip. Intensity (in/hr)	0.03	0.04		
Antecedent Dry Period (hr)	≥6	54.7		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	50		90		
% Storm Sampled	≥75	98		94		
Sampling Duration (hr)	≤36	4		4.0		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	90.4		28.3		
Duration (hr)	NA	3.4		9.3		
Volume (gal)	NA	2708.4		1500.9		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.063		3.530		0.002		-5503
Ortho-Phosphorus	mg/L	0.006		2.770		0.001		-46067
Hardness	mg/L	11.7		76.4		2.0		-553.0
Chloride	mg/L	1.0		3.4		0.5		-249.0
Total Suspend Solids	mg/L	45.0		82.0		0.5		-82
Suspended Sediment Coarse	mg/L	8.6		18.0		0.5		-109
Suspended Sediment Fine	mg/L	36.0		62.0		0.5		-72
Total Kjedahl Nitrogen	mg/L	0.53		5.56		0.20		-959
Nitrate + Nitrite	mg/L	0.09		2.62		0.01		-2747.8
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.008		0.041		0.001		-428
Copper Dissolved	mg/L	0.001		0.015		0.001		-1158
Lead Total	mg/L	0.003		0.006		0.001		-126
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.074		0.031		0.005		58
Zinc Dissolved	mg/L	0.019		0.005	U	0.005		74

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml					2.0		NA
Total Petroleum Hydrocarbons -Diesel	mg/L					0.05		NA
Total Petroleum Hydrocarbons -Oil	mg/L					0.10		NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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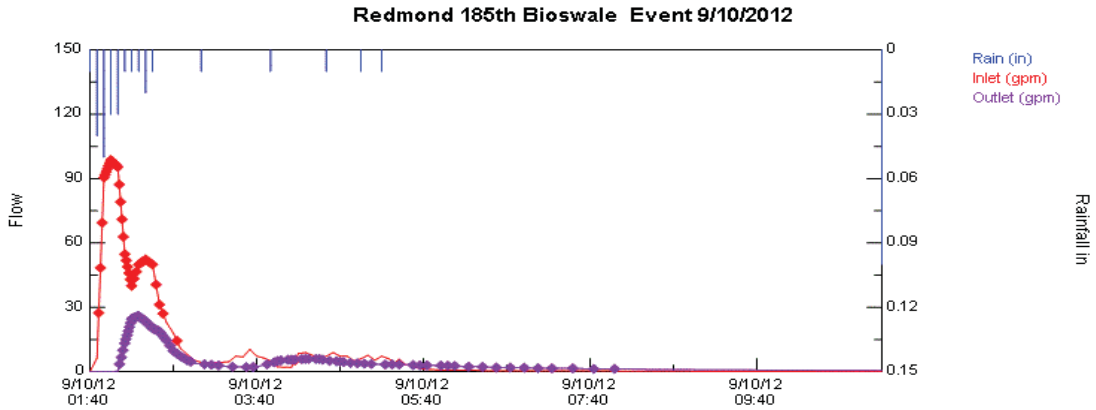
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.27		
Precipitation Duration (hr)	≥1	3.5		
Max Precip. Intensity (in/5 min)	NA	0.05		
Mean Precip. Intensity (in/hr)	0.03	0.08		
Antecedent Dry Period (hr)	≥6	1239.7		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	39		91		
% Storm Sampled	≥75	94		91		
Sampling Duration (hr)	≤36	4		5.9		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	98.7		25.9		
Duration (hr)	NA	8.8		9.7		
Volume (gal)	NA	4169.1		1884.8		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.210		3.630		0.002		-1629
Ortho-Phosphorus	mg/L	0.089		2.540		0.001		-2754
Hardness	mg/L	45.4		92.8		2.0		-104.4
Chloride	mg/L	1.8		14.7		0.5		-740.0
Total Suspend Solids	mg/L	32.0		50.0		0.5		-56
Suspended Sediment Coarse	mg/L	5.3		3.9		0.5		26
Suspended Sediment Fine	mg/L	32.0		50.0		0.5		-56
Total Kjedahl Nitrogen	mg/L	3.22		9.62		0.20		-199
Nitrate + Nitrite	mg/L	0.52		2.29		0.01		-339.5
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.022		0.027		0.001		-24
Copper Dissolved	mg/L	0.017		0.020		0.001		-13
Lead Total	mg/L	0.001		0.005		0.001		-345
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.198		0.023		0.005		88
Zinc Dissolved	mg/L	0.185		0.012		0.005		94

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml					2.0		NA
Total Petroleum Hydrocarbons -Diesel	mg/L					0.05		NA
Total Petroleum Hydrocarbons -Oil	mg/L					0.10		NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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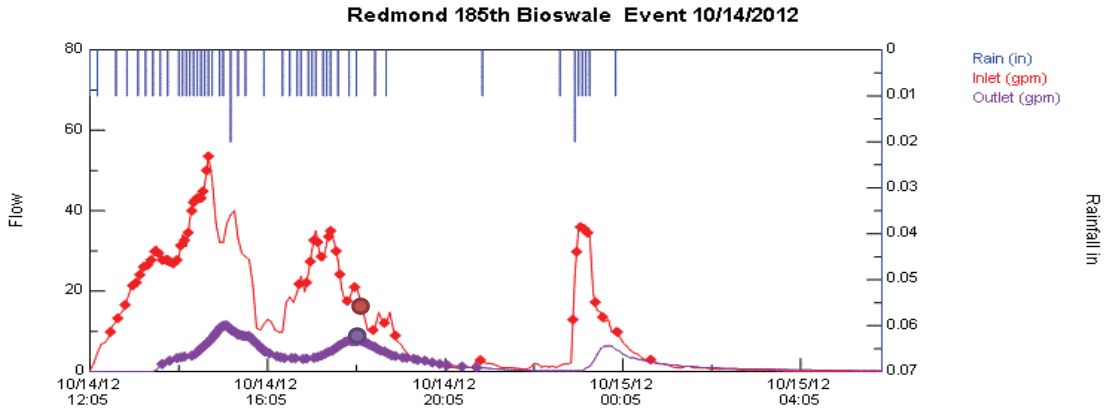
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.50		
Precipitation Duration (hr)	≥1	11.8		
Max Precip. Intensity (in/5 min)	NA	0.02		
Mean Precip. Intensity (in/hr)	0.03	0.04		
Antecedent Dry Period (hr)	≥6	15.6		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	55		91		
% Storm Sampled	≥75	97		76		
Sampling Duration (hr)	≤36	12		7.1		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	53.6		11.4		
Duration (hr)	NA	16.2		16.4		
Volume (gal)	NA	11712.2		2725.0		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L					0.002		NA
Ortho-Phosphorus	mg/L					0.001		NA
Hardness	mg/L					2.0		NA
Chloride	mg/L					0.5		NA
Total Suspend Solids	mg/L					0.5		NA
Suspended Sediment Coarse	mg/L					0.5		NA
Suspended Sediment Fine	mg/L					0.5		NA
Total Kjedahl Nitrogen	mg/L					0.20		NA
Nitrate + Nitrite	mg/L					0.01		NA
Cadmium Total	mg/L					0.0003		NA
Cadmium Dissolved	mg/L					0.0003		NA
Copper Total	mg/L					0.001		NA
Copper Dissolved	mg/L					0.001		NA
Lead Total	mg/L					0.001		NA
Lead Dissolved	mg/L					0.001		NA
Mercury Total	mg/L					0.0002		NA
Mercury Dissolved	mg/L					0.0002		NA
Zinc Total	mg/L					0.005		NA
Zinc Dissolved	mg/L					0.005		NA

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	1350		230		2.0		83
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	0.60		0.10	U	0.10		83

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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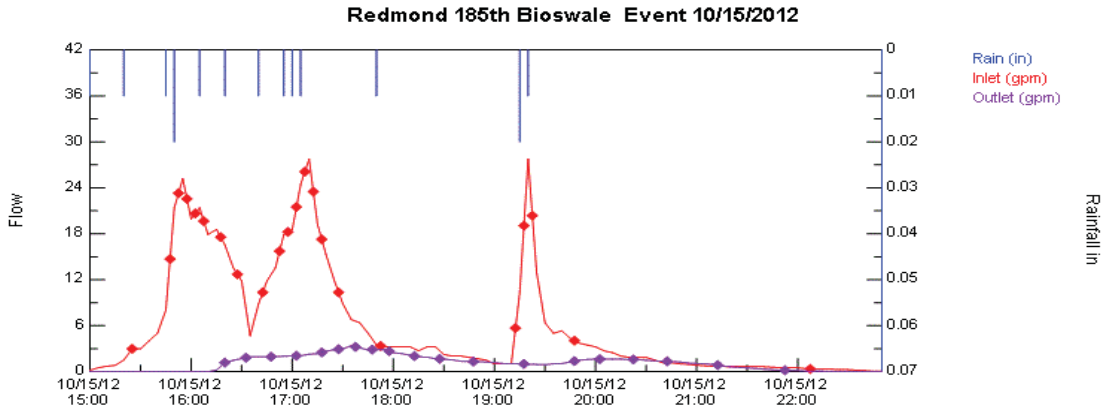
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.15		
Precipitation Duration (hr)	≥1	4.3		
Max Precip. Intensity (in/5 min)	NA	0.02		
Mean Precip. Intensity (in/hr)	0.03	0.04		
Antecedent Dry Period (hr)	≥6	15.8		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	22		19		
% Storm Sampled	≥75	98		98		
Sampling Duration (hr)	≤36	7		5.5		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	27.8		3.4		
Duration (hr)	NA	8.0		6.4		
Volume (gal)	NA	2732.8		531.3		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.325		2.263		0.002		-596
Ortho-Phosphorus	mg/L	0.015		1.758		0.001		-11705
Hardness	mg/L	25.0		52.4		2.0		-109.4
Chloride	mg/L	1.4		5.2		0.5		-273.3
Total Suspend Solids	mg/L	188.0		48.0		0.5		74
Suspended Sediment Coarse	mg/L	1.2		6.8		0.5		-467
Suspended Sediment Fine	mg/L	178.0		28.0		0.5		84
Total Kjedahl Nitrogen	mg/L	1.04		2.16		0.20		-106
Nitrate + Nitrite	mg/L	0.23		0.68		0.01		-189.8
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.035		0.023		0.001		34
Copper Dissolved	mg/L	0.007		0.013		0.001		-85
Lead Total	mg/L	0.011		0.004		0.001		65
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.217		0.028		0.005		87
Zinc Dissolved	mg/L	0.036		0.011		0.005		69

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	1300		380		2.0		71
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	2.86		0.54		0.10		81

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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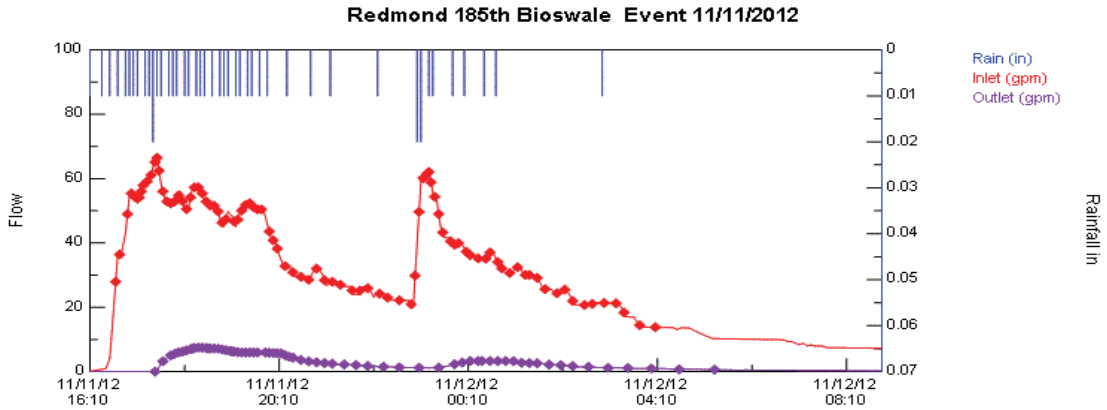
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.47		
Precipitation Duration (hr)	≥1	10.8		
Max Precip. Intensity (in/5 min)	NA	0.02		
Mean Precip. Intensity (in/hr)	0.03	0.04		
Antecedent Dry Period (hr)	≥6	106.7		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	91		69		
% Storm Sampled	≥75	89		96		
Sampling Duration (hr)	≤36	11		11.8		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	66.5		7.4		
Duration (hr)	NA	16.9		15.4		
Volume (gal)	NA	27406.5		2123.8		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.096		1.216		0.002		-1170
Ortho-Phosphorus	mg/L	0.003		1.007		0.001		-29332
Hardness	mg/L	19.9		36.6		2.0		-83.8
Chloride	mg/L	0.9		1.6		0.5		-72.8
Total Suspend Solids	mg/L	56.0		9.0		0.5		84
Suspended Sediment Coarse	mg/L	3.7		1.6		0.5		57
Suspended Sediment Fine	mg/L	66.0		11.3		0.5		83
Total Kjedahl Nitrogen	mg/L	0.48		0.82		0.20		-73
Nitrate + Nitrite	mg/L	0.11		0.47		0.01		-322.9
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.010		0.009		0.001		9
Copper Dissolved	mg/L	0.001		0.005		0.001		-236
Lead Total	mg/L	0.002		0.002		0.001		26
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.061		0.011		0.005		82
Zinc Dissolved	mg/L	0.018		0.011		0.005		39

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	18		27		2.0		-50
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	0.38		0.10	U	0.10		74

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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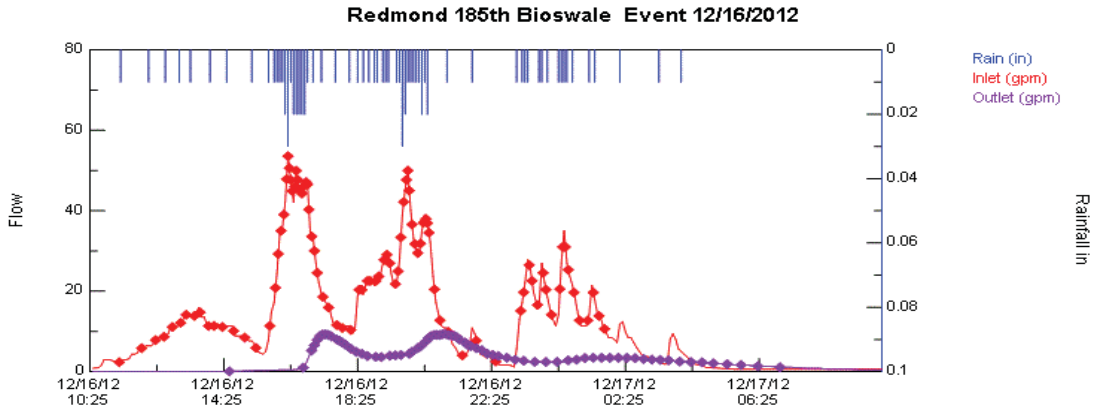
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.79		
Precipitation Duration (hr)	≥1	17.7		
Max Precip. Intensity (in/5 min)	NA	0.03		
Mean Precip. Intensity (in/hr)	0.03	0.05		
Antecedent Dry Period (hr)	≥6	17.9		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	90		75		
% Storm Sampled	≥75	92		96		
Sampling Duration (hr)	≤36	15		16.5		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	53.6		9.5		
Duration (hr)	NA	23.8		23.8		
Volume (gal)	NA	15674.9		3629.2		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.094		2.500		0.002		-2560
Ortho-Phosphorus	mg/L	0.002		2.080		0.001		-103900
Hardness	mg/L	11.3		22.5		2.0		-99.1
Chloride	mg/L	0.6		2.0		0.5		-232.2
Total Suspend Solids	mg/L	71.0		20.0		0.5		72
Suspended Sediment Coarse	mg/L	9.4		0.5	U	0.5		95
Suspended Sediment Fine	mg/L	55.0		28.0		0.5		49
Total Kjedahl Nitrogen	mg/L	40.00		52.60		0.20		-32
Nitrate + Nitrite	mg/L	0.07		0.26		0.01		-285.3
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.013		0.017		0.001		-26
Copper Dissolved	mg/L	0.001	U	0.008		0.001		-680
Lead Total	mg/L	0.004		0.004		0.001		5
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.088		0.020		0.005		77
Zinc Dissolved	mg/L	0.014		0.008		0.005		43

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	300		5	U	2.0		98
Total Petroleum Hydrocarbons -Diesel	mg/L	0.06		0.05	U	0.05		16.7
Total Petroleum Hydrocarbons -Oil	mg/L	0.26		0.10	U	0.10		62

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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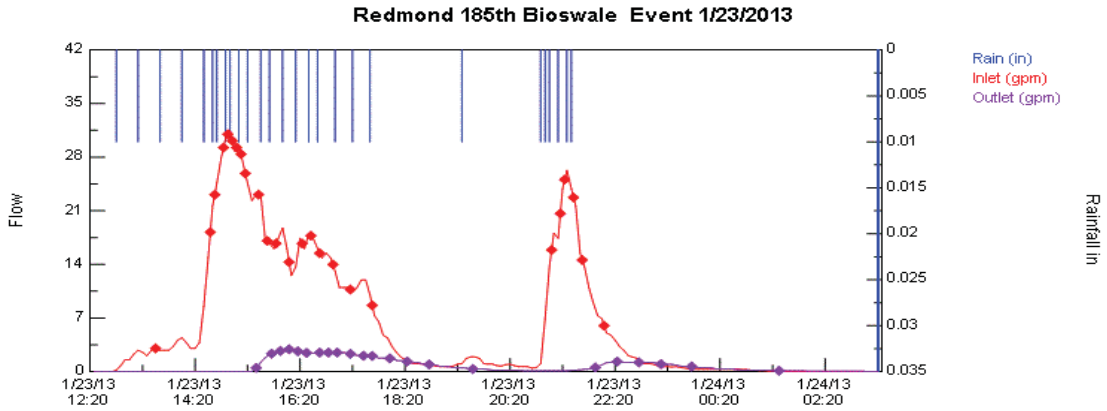
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.28		
Precipitation Duration (hr)	≥1	9.2		
Max Precip. Intensity (in/5 min)	NA	0.01		
Mean Precip. Intensity (in/hr)	0.03	0.03		
Antecedent Dry Period (hr)	≥6	310.9		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	25		22		
% Storm Sampled	≥75	95		98		
Sampling Duration (hr)	≤36	9		10.0		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	31.5		3.0		
Duration (hr)	NA	12.7		12.1		
Volume (gal)	NA	5346.5		623.7		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.782		0.685		0.002		12
Ortho-Phosphorus	mg/L	0.002		0.556		0.001		-27700
Hardness	mg/L	304.0		200.0		2.0		34.2
Chloride	mg/L	275.0		165.0		0.5		40.0
Total Suspend Solids	mg/L	508.0		12.0		0.5		98
Suspended Sediment Coarse	mg/L	20.0		0.6		0.5		97
Suspended Sediment Fine	mg/L	444.0		14.0		0.5		97
Total Kjedahl Nitrogen	mg/L	4.21		1.02		0.20		76
Nitrate + Nitrite	mg/L	0.61		0.90		0.01		-46.6
Cadmium Total	mg/L	0.0007		0.0003	U	0.0003		57
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.071		0.010		0.001		87
Copper Dissolved	mg/L	0.018		0.006		0.001		68
Lead Total	mg/L	0.023		0.001	U	0.001		96
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.430		0.006		0.005		99
Zinc Dissolved	mg/L	0.086		0.005	U	0.005		94

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	4400		500		2.0		89
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	5.30		0.10	U	0.10		98

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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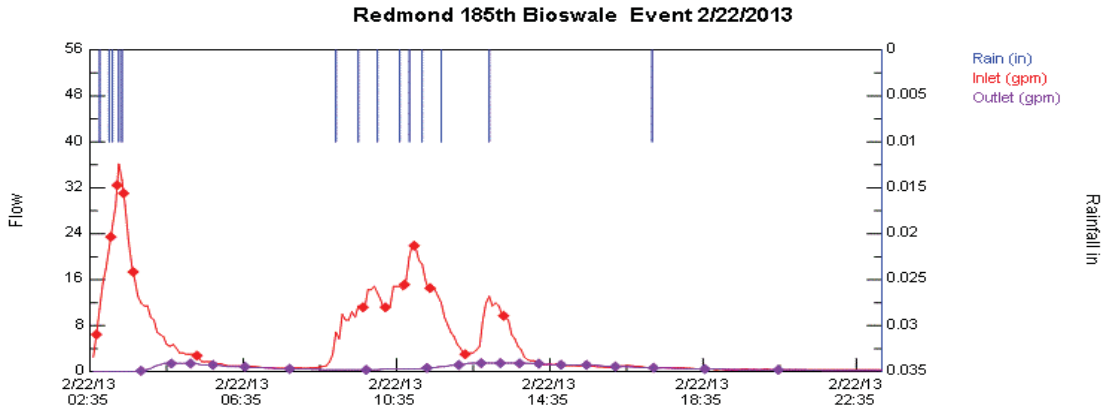
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.15		
Precipitation Duration (hr)	≥1	20.7		
Max Precip. Intensity (in/5 min)	NA	0.01		
Mean Precip. Intensity (in/hr)	0.03	0.01		
Antecedent Dry Period (hr)	≥6	19.0		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	13		19		
% Storm Sampled	≥75	90		95		
Sampling Duration (hr)	≤36	11		16.6		
Flow Information	Goal	In	QA	Out	QA	notes
Max Discharge (gpm)	NA	36.1		1.5		
Duration (hr)	NA	20.8		20.3		
Volume (gal)	NA	5826.1		852.0		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.694		1.690		0.002		-144
Ortho-Phosphorus	mg/L	0.003		1.090		0.001		-36233
Hardness	mg/L	35.2		46.1		2.0		-31.0
Chloride	mg/L	10.4		6.4		0.5		38.9
Total Suspend Solids	mg/L	332.0		30.0		0.5		91
Suspended Sediment Coarse	mg/L	7.9		0.5	U	0.5		94
Suspended Sediment Fine	mg/L	372.0		34.0		0.5		91
Total Kjedahl Nitrogen	mg/L	1.26		1.13		0.20		10
Nitrate + Nitrite	mg/L	0.36		0.90		0.01		-150.8
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.056		0.036		0.001		35
Copper Dissolved	mg/L	0.005		0.021		0.001		-327
Lead Total	mg/L	0.020		0.003		0.001		84
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.337		0.034		0.005		90
Zinc Dissolved	mg/L	0.025		0.008		0.005		68

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml					2.0		NA
Total Petroleum Hydrocarbons -Diesel	mg/L					0.05		NA
Total Petroleum Hydrocarbons -Oil	mg/L					0.10		NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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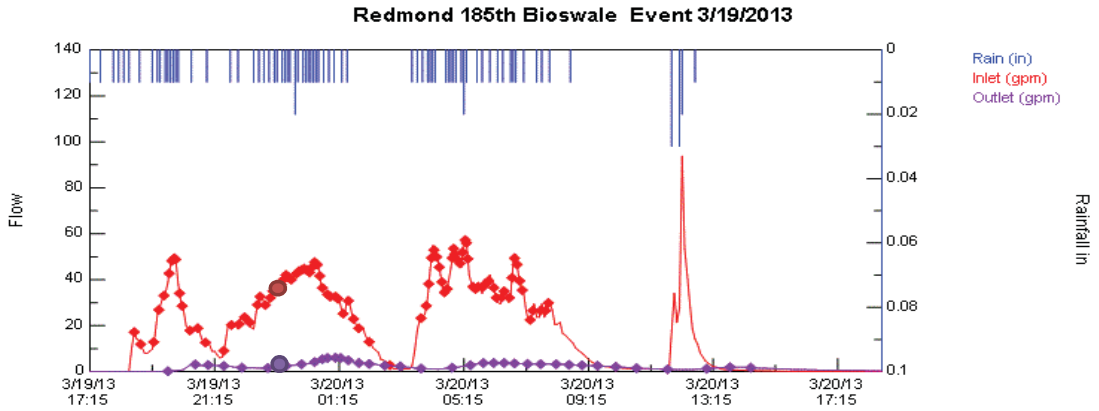
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.83		
Precipitation Duration (hr)	≥1	19.4		
Max Precip. Intensity (in/5 min)	NA	0.03		
Mean Precip. Intensity (in/hr)	0.03	0.04		
Antecedent Dry Period (hr)	≥6	33.0		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	91		37		
% Storm Sampled	≥75	86		93		
Sampling Duration (hr)	≤36	13		18.7		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	93.7		6.2		
Duration (hr)	NA	22.1		23.4		
Volume (gal)	NA	25550.5		3004.0		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L					0.002		NA
Ortho-Phosphorus	mg/L					0.001		NA
Hardness	mg/L					2.0		NA
Chloride	mg/L					0.5		NA
Total Suspend Solids	mg/L					0.5		NA
Suspended Sediment Coarse	mg/L					0.5		NA
Suspended Sediment Fine	mg/L					0.5		NA
Total Kjedahl Nitrogen	mg/L					0.20		NA
Nitrate + Nitrite	mg/L					0.01		NA
Cadmium Total	mg/L					0.0003		NA
Cadmium Dissolved	mg/L					0.0003		NA
Copper Total	mg/L					0.001		NA
Copper Dissolved	mg/L					0.001		NA
Lead Total	mg/L					0.001		NA
Lead Dissolved	mg/L					0.001		NA
Mercury Total	mg/L					0.0002		NA
Mercury Dissolved	mg/L					0.0002		NA
Zinc Total	mg/L					0.005		NA
Zinc Dissolved	mg/L					0.005		NA

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	205		23		2.0		89
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	0.33		0.10	U	0.10		70

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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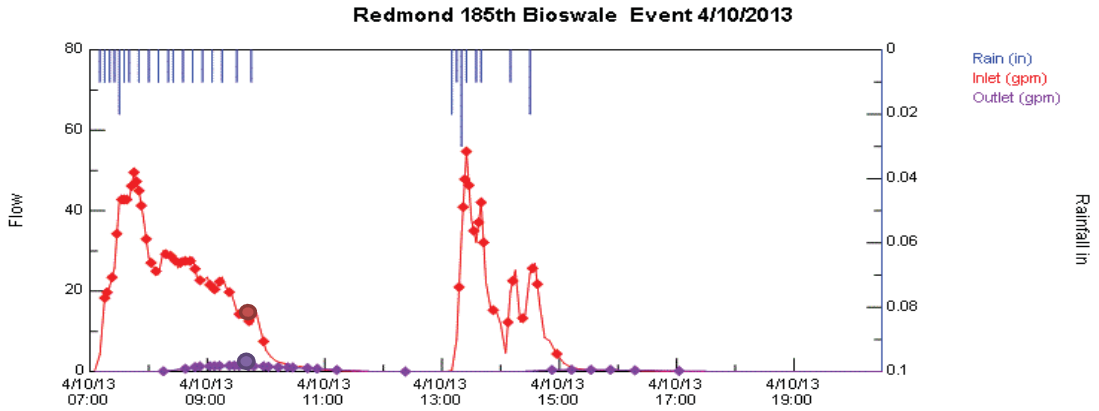
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.33		
Precipitation Duration (hr)	≥1	7.5		
Max Precip. Intensity (in/5 min)	NA	0.03		
Mean Precip. Intensity (in/hr)	0.03	0.04		
Antecedent Dry Period (hr)	≥6	40.0		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	46		27		
% Storm Sampled	≥75	97		97		
Sampling Duration (hr)	≤36	8		8.8		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	54.8		1.5		
Duration (hr)	NA	12.2		12.5		
Volume (gal)	NA	6678.5		262.0		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L					0.002		NA
Ortho-Phosphorus	mg/L					0.001		NA
Hardness	mg/L					2.0		NA
Chloride	mg/L					0.5		NA
Total Suspend Solids	mg/L					0.5		NA
Suspended Sediment Coarse	mg/L					0.5		NA
Suspended Sediment Fine	mg/L					0.5		NA
Total Kjedahl Nitrogen	mg/L					0.20		NA
Nitrate + Nitrite	mg/L					0.01		NA
Cadmium Total	mg/L					0.0003		NA
Cadmium Dissolved	mg/L					0.0003		NA
Copper Total	mg/L					0.001		NA
Copper Dissolved	mg/L					0.001		NA
Lead Total	mg/L					0.001		NA
Lead Dissolved	mg/L					0.001		NA
Mercury Total	mg/L					0.0002		NA
Mercury Dissolved	mg/L					0.0002		NA
Zinc Total	mg/L					0.005		NA
Zinc Dissolved	mg/L					0.005		NA

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	10000		500		2.0		95
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	2.33		0.20		0.10		91

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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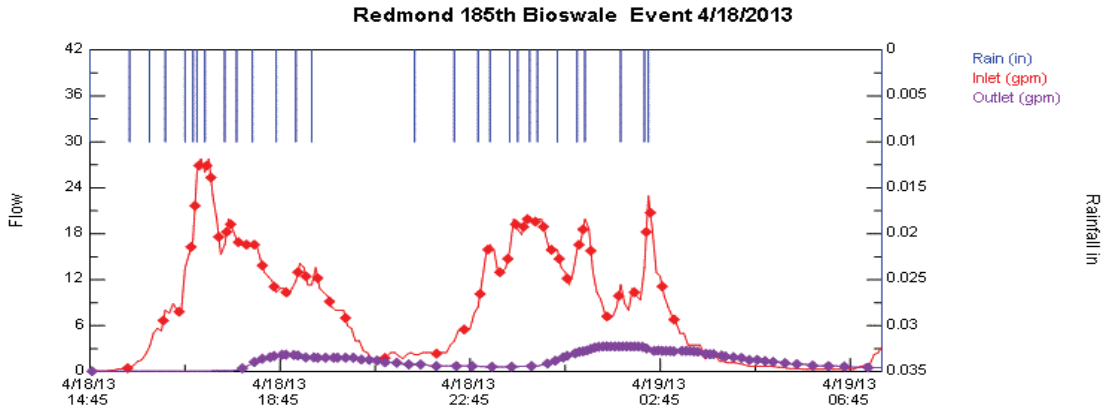
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.29		
Precipitation Duration (hr)	≥1	16.7		
Max Precip. Intensity (in/5 min)	NA	0.01		
Mean Precip. Intensity (in/hr)	0.03	0.02		
Antecedent Dry Period (hr)	≥6	68.7		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	48		82		
% Storm Sampled	≥75	98		99		
Sampling Duration (hr)	≤36	12		16.3		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	27.8		3.3		
Duration (hr)	NA	16.6		16.9		
Volume (gal)	NA	7745.9		1298.1		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.158		1.074		0.002		-580
Ortho-Phosphorus	mg/L	0.003		0.936		0.001		-36867
Hardness	mg/L	24.6		45.1		2.0		-83.5
Chloride	mg/L	1.8		2.1		0.5		-16.7
Total Suspend Solids	mg/L	80.0		4.5		0.5		94
Suspended Sediment Coarse	mg/L	10.4		0.5	U	0.5		95
Suspended Sediment Fine	mg/L	72.0		5.5		0.5		92
Total Kjedahl Nitrogen	mg/L	1.15		1.41		0.20		-23
Nitrate + Nitrite	mg/L	0.79		0.76		0.01		3.2
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.020		0.006		0.001		71
Copper Dissolved	mg/L	0.005		0.004		0.001		20
Lead Total	mg/L	0.005		0.001	U	0.001		79
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.121		0.005	U	0.005		96
Zinc Dissolved	mg/L	0.005	U	0.005	U	0.005		0

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml					2.0		NA
Total Petroleum Hydrocarbons -Diesel	mg/L					0.05		NA
Total Petroleum Hydrocarbons -Oil	mg/L					0.10		NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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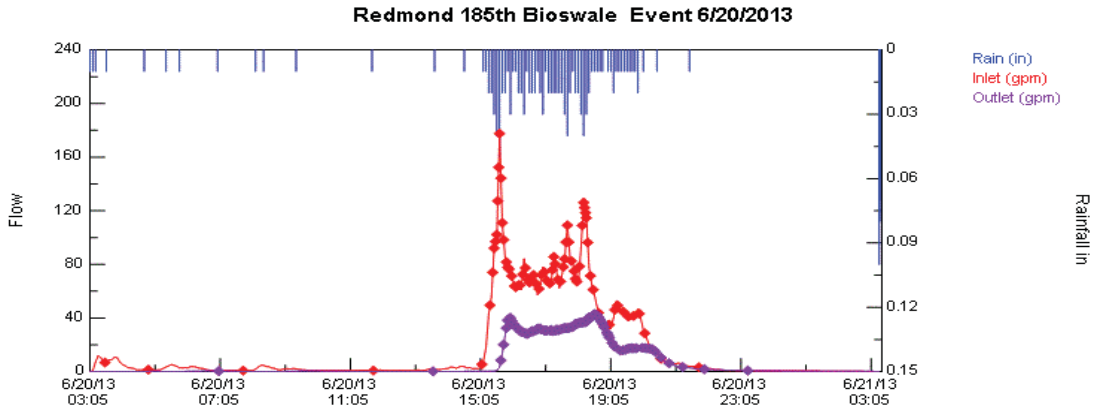
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	1.23		
Precipitation Duration (hr)	≥1	18.4		
Max Precip. Intensity (in/5 min)	NA	0.05		
Mean Precip. Intensity (in/hr)	0.03	0.07		
Antecedent Dry Period (hr)	≥6	53.8		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	70		91		
% Storm Sampled	≥75	98		98		
Sampling Duration (hr)	≤36	18		16.2		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	177.6		42.9		
Duration (hr)	NA	24.2		23.1		
Volume (gal)	NA	22463.8		8948.5		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.604		1.520		0.002		-152
Ortho-Phosphorus	mg/L	0.003		1.280		0.001		-42567
Hardness	mg/L	23.5		28.1		2.0		-19.6
Chloride	mg/L	1.4		1.9		0.5		-34.3
Total Suspend Solids	mg/L	544.0		64.0		0.5		88
Suspended Sediment Coarse	mg/L	12.0	J	5.7		0.5		53
Suspended Sediment Fine	mg/L	414.0		64.0		0.5		85
Total Kjedahl Nitrogen	mg/L	5.62	J	2.93		0.20		48
Nitrate + Nitrite	mg/L	0.29		0.76		0.01		-165.4
Cadmium Total	mg/L	0.0004		0.0003	U	0.0003		25
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.041		0.015		0.001		64
Copper Dissolved	mg/L	0.004		0.009		0.001		-112
Lead Total	mg/L	0.015		0.003		0.001		80
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.199		0.021		0.005		89
Zinc Dissolved	mg/L	0.011		0.012		0.005		-9

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	1400		59		2.0		96
Total Petroleum Hydrocarbons -Diesel	mg/L	2.79		0.14		0.05		95.0
Total Petroleum Hydrocarbons -Oil	mg/L	2.86		0.19		0.10		93

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
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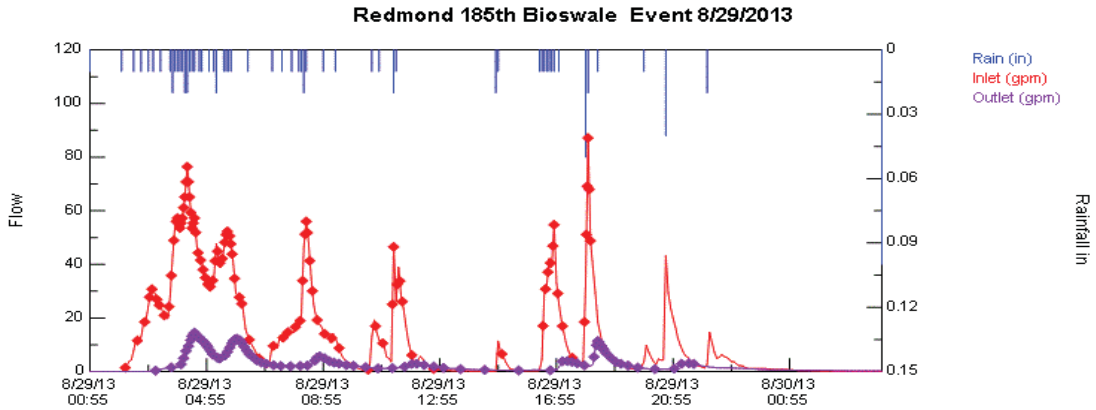
Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.73		
Precipitation Duration (hr)	≥1	21.2		
Max Precip. Intensity (in/5 min)	NA	0.05		
Mean Precip. Intensity (in/hr)	0.03	0.03		
Antecedent Dry Period (hr)	≥6	20.2		

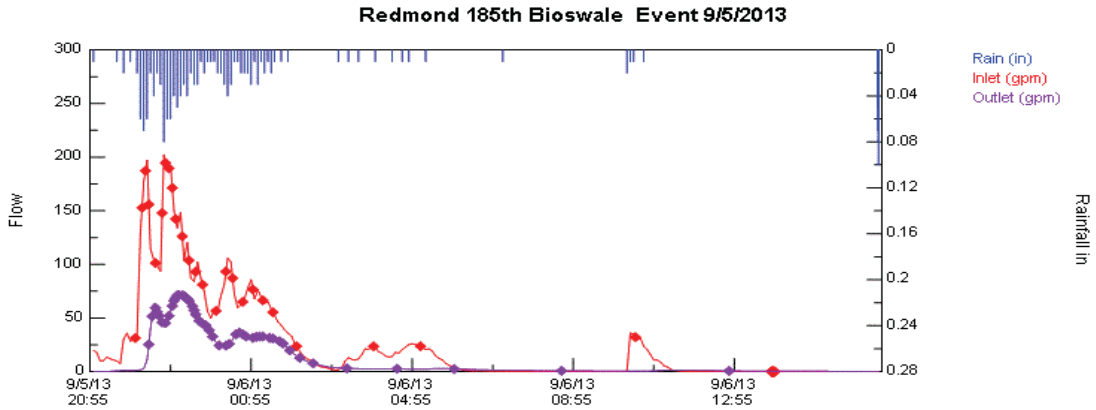
Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	91		91		
% Storm Sampled	≥75	86		92		
Sampling Duration (hr)	≤36	16		18.5		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	87.2		14.6		
Duration (hr)	NA	25.3		27.3		
Volume (gal)	NA	18660.8		3699.6		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.110		1.370		0.002		-1145
Ortho-Phosphorus	mg/L	0.004		1.360		0.001		-33900
Hardness	mg/L	20.7		42.2		2.0		-103.9
Chloride	mg/L	1.4		7.9		0.5		-479.6
Total Suspend Solids	mg/L	89.0		18.0		0.5		80
Suspended Sediment Coarse	mg/L	3.2		0.5	U	0.5		84
Suspended Sediment Fine	mg/L	75.0		15.0		0.5		80
Total Kjedahl Nitrogen	mg/L	1.49		3.69		0.20		-148
Nitrate + Nitrite	mg/L	0.14		0.60		0.01		-329.5
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.020		0.022		0.001		-8
Copper Dissolved	mg/L	0.008		0.016		0.001		-109
Lead Total	mg/L	0.004		0.001		0.001		71
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.098		0.012		0.005		88
Zinc Dissolved	mg/L	0.023		0.010		0.005		57

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	10000		1100		2.0		89
Total Petroleum Hydrocarbons -Diesel	mg/L	0.06		0.05	U	0.05		16.7
Total Petroleum Hydrocarbons -Oil	mg/L	3.31		0.11		0.10		97

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable

Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	1.45		
Precipitation Duration (hr)	≥1	13.8		
Max Precip. Intensity (in/5 min)	NA	0.08		
Mean Precip. Intensity (in/hr)	0.03	0.11		
Antecedent Dry Period (hr)	≥6	14.9		

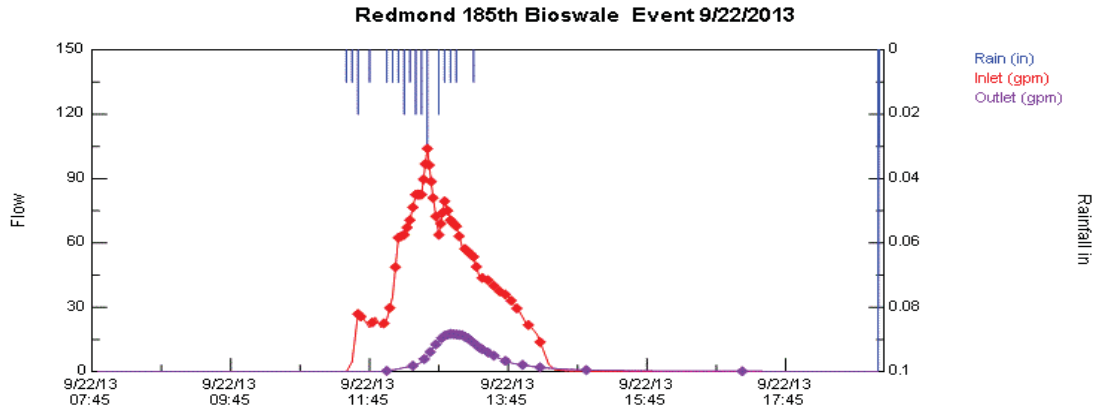
Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	25		49		
% Storm Sampled	≥75	93		97		
Sampling Duration (hr)	≤36	12		14.4		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	202.0		71.6		
Duration (hr)	NA	12.8		19.8		
Volume (gal)	NA	27329.1		10346.1		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.155		1.650		0.002		-965
Ortho-Phosphorus	mg/L	0.002		1.440		0.001		-71900
Hardness	mg/L	15.4		31.3		2.0		-103.2
Chloride	mg/L	1.3		4.6		0.5		-251.5
Total Suspend Solids	mg/L	20000.0		23.0		0.5		100
Suspended Sediment Coarse	mg/L	0.7		0.6		0.5		14
Suspended Sediment Fine	mg/L	122.0		28.0		0.5		77
Total Kjedahl Nitrogen	mg/L	0.88		3.01		0.20		-242
Nitrate + Nitrite	mg/L	0.16		0.35		0.01		-116.0
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.018		0.016	J	0.001		12
Copper Dissolved	mg/L	0.003		0.013		0.001		-359
Lead Total	mg/L	0.005		0.001	U	0.001		80
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.103		0.009		0.005		91
Zinc Dissolved	mg/L	0.014		0.009		0.005		36

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml					2.0		NA
Total Petroleum Hydrocarbons -Diesel	mg/L					0.05		NA
Total Petroleum Hydrocarbons -Oil	mg/L					0.10		NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable

Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	0.25		
Precipitation Duration (hr)	≥1	5.5		
Max Precip. Intensity (in/5 min)	NA	0.03		
Mean Precip. Intensity (in/hr)	0.03	0.05		
Antecedent Dry Period (hr)	≥6	134.9		

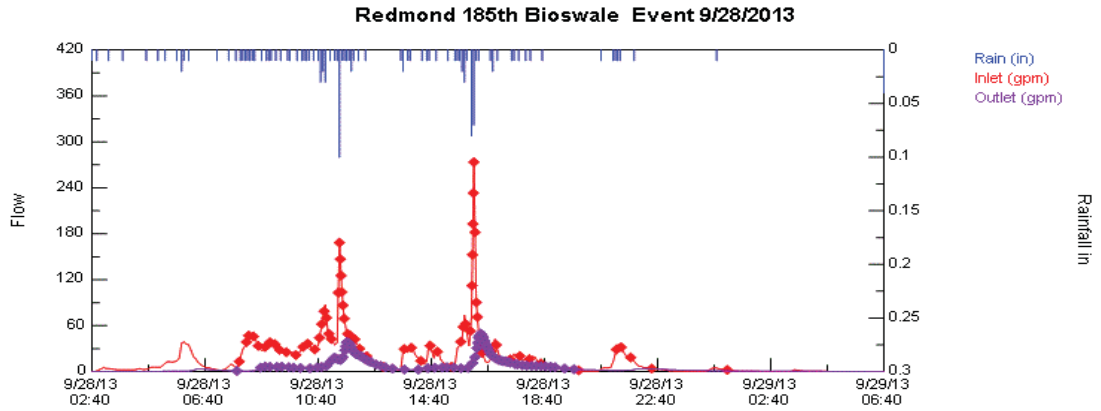
Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	47		26		
% Storm Sampled	≥75	97		98		
Sampling Duration (hr)	≤36	3		5.1		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	104.0		17.6		
Duration (hr)	NA	3.7		11.5		
Volume (gal)	NA	7774.6		1143.1		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.151		0.898		0.002		-495
Ortho-Phosphorus	mg/L	0.002		0.853		0.001		-42550
Hardness	mg/L	21.5		37.6		2.0		-74.9
Chloride	mg/L	1.6		3.5		0.5		-125.6
Total Suspend Solids	mg/L	76.0		8.0		0.5		89
Suspended Sediment Coarse	mg/L	0.5	U	2.0		0.5		-300
Suspended Sediment Fine	mg/L	82.0		11.0		0.5		87
Total Kjedahl Nitrogen	mg/L	1.37		2.39		0.20		-74
Nitrate + Nitrite	mg/L	0.06		0.34		0.01		-459.0
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.023		0.020		0.001		15
Copper Dissolved	mg/L	0.008		0.017		0.001		-101
Lead Total	mg/L	0.004		0.001	U	0.001		72
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.087		0.008		0.005		91
Zinc Dissolved	mg/L	0.016		0.008		0.005		50

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	1100		100		2.0		91
Total Petroleum Hydrocarbons -Diesel	mg/L	0.06		0.05	U	0.05		16.7
Total Petroleum Hydrocarbons -Oil	mg/L	0.12		0.10	U	0.10		17

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable

Individual Storm Report



General Information		
Site:	185th Ave NE, Redmond, WA	
Coordinates	47.675719	-122.093448
Drainage Area	0.22 acres	

Precipitation Information	Goal	Result	QA	Notes
Precipitation Total (in)	≥0.15	1.20		
Precipitation Duration (hr)	≥1	22.1		
Max Precip. Intensity (in/5 min)	NA	0.10		
Mean Precip. Intensity (in/hr)	0.03	0.05		
Antecedent Dry Period (hr)	≥6	19.4		

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots	≥10	64		91		
% Storm Sampled	≥75	89		85		
Sampling Duration (hr)	≤36	17		11.9		
Flow Information	**Goal**	**In**	**QA**	**Out**	**QA**	**notes**
Max Discharge (gpm)	NA	273.5		49.7		
Duration (hr)	NA	26.8		26.6		
Volume (gal)	NA	24874.9		7893.6		

Sample Results - Flow Composite	Units	IN	QA	OUT	QA	MDL	notes	% Reduction
Total Phosphorus	mg/L	0.107		1.358		0.002		-1169
Ortho-Phosphorus	mg/L	0.003		1.273		0.001		-49692
Hardness	mg/L	12.1		31.9		2.0		-163.6
Chloride	mg/L	0.6		3.7		0.5		-533.3
Total Suspend Solids	mg/L	73.0		17.0		0.5		77
Suspended Sediment Coarse	mg/L	2.6		0.5	U	0.5		81
Suspended Sediment Fine	mg/L	78.0		23.0		0.5		71
Total Kjedahl Nitrogen	mg/L	1.09		2.49		0.20		-128
Nitrate + Nitrite	mg/L	0.08		0.18		0.01		-125.6
Cadmium Total	mg/L	0.0003	U	0.0003	U	0.0003		0
Cadmium Dissolved	mg/L	0.0003	U	0.0003	U	0.0003		0
Copper Total	mg/L	0.016		0.016		0.001		0
Copper Dissolved	mg/L	0.002		0.009		0.001		-327
Lead Total	mg/L	0.004		0.001	U	0.001		76
Lead Dissolved	mg/L	0.001	U	0.001	U	0.001		0
Mercury Total	mg/L	0.0002	U	0.0002	U	0.0002		0
Mercury Dissolved	mg/L	0.0002	U	0.0002	U	0.0002		0
Zinc Total	mg/L	0.095		0.010		0.005		89
Zinc Dissolved	mg/L	0.013		0.006		0.005		54

Sample Results - Grab	Units	IN	QA	OUT	QA	MDL	notes	
Fecal Coliform	MPN/100 ml	650		40		2.0		94
Total Petroleum Hydrocarbons -Diesel	mg/L	0.05	U	0.05	U	0.05		0.0
Total Petroleum Hydrocarbons -Oil	mg/L	0.74		0.10	U	0.10		86

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable

APPENDIX D

Standardized Field Forms

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:**

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date:	Time:	Field Staff:	Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	
Primary Device Level?	Yes No	Primary Device Level?	Yes No		
Offset Before Adj. (ft):		Offset Before Adj. (ft):			
Offset AfterAdj. (ft):		Offset AfterAdj. (ft):			
Actual Pump Vol (ml):		Actual Pump Vol (ml)			
Pump Vol Before Adj. (ml):		Pump Vol Before Adj. (ml)			
Pump Vol After Adj. (ml):		Pump Vol After Adj. (ml)			
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date:	Time:	Field Staff:	Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:		Date/Time End:		Float Unobstructed?	
# of Samples:		# of Samples:			
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):		Est. Sample Vol (L):			
Visual Condition:		Visual Condition:			
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No		
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No	**Station Name: RBS185-RG**	
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 11/3/11 Time: 9:20 Field Staff: DSA - AR Weather: Sunny

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
Sand	grain size		HDPE Glass	4	902	yes no	Rise Peak Fall None
BSM	EC/grain size		HDPE Glass	2	902	yes no	Rise Peak Fall None
BSM QA2	TOC		HDPE Glass	1		yes no	Rise Peak Fall None
BSM	TP		HDPE Glass			yes no	Rise Peak Fall None
BSM	TCu		HDPE Glass			yes no	Rise Peak Fall None
BSM	TZn		HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

Sand was dark grey + wet
BSM was from stockpile used for other project. We were told mix would be from the same stock for our BSM.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120113 Rinsate Blank

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date:	Time:	Field Staff:	Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	
Primary Device Level?	Yes No	Primary Device Level?	Yes No		
Offset Before Adj. (ft):		Offset Before Adj. (ft):			
Offset AfterAdj. (ft):		Offset AfterAdj. (ft):			
Actual Pump Vol (ml):		Actual Pump Vol (ml)			
Pump Vol Before Adj. (ml):		Pump Vol Before Adj. (ml)			
Pump Vol After Adj. (ml):		Pump Vol After Adj. (ml)			
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date:	Time:	Field Staff:	Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:		Date/Time End:		Float Unobstructed?	
# of Samples:		# of Samples:			
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):		Est. Sample Vol (L):			
Visual Condition:		Visual Condition:			
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 1-13-2012 Time: 12:00 Field Staff: O. Bennett, D. Ahern Weather: Sunny, dry

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS 185-IN	1700	NA	(HDPE) Glass	1	2000	yes (no)	Rise Peak Fall None
RBS 185-OUT	1205	NA	(HDPE) Glass	1	2000	yes (no)	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

Both samplers were first run in reverse to rinse lines with D.I. water. Pumps were then run forward to collect D.I. water rinsate through tube, strainer, and pump, into 10L sample bottle.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120217 Sampled event 1

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 2-17-12 Time: 11:40 Field Staff: D. Braun KJ Weather: Sunny-dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No	Float Unobstructed?	✓
Offset Before Adj. (ft):		Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):		Offset AfterAdj. (ft):	-		
Actual Pump Vol (ml):	-	Actual Pump Vol (ml)	-		
Pump Vol Before Adj. (ml):	-	Pump Vol Before Adj. (ml)	-		
Pump Vol After Adj. (ml):	-	Pump Vol After Adj. (ml)	-		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No		
Pacing (cf):		Pacing (cf):		**Station Name: RBS185-RG**	
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 2/18/12 Time: 2:11 Field Staff: D. Ahearn Weather: rain

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	2/17/12 08:07	Date/Time End:	2/17/12 17:37	Float Unobstructed?	yes
# of Samples:	31	# of Samples:	91		
Sampled Without Error?	(Yes) No	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	-		
Est. Sample Vol (L):	7	Est. Sample Vol (L):	19		
Visual Condition:	cloudy	Visual Condition:	murky - coffee		
Bottles Replaced?	(Yes) No	Bottles Replaced?	(Yes) No		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No		
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)	**Station Name: RBS185-RG**	
pH sensor calibrated?	~~Yes~~ ~~No~~	pH sensor calibrated?	~~Yes~~ ~~No~~	Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak (Fall) (None)	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 2/17/12 Time: 1930 Field Staff: ALEX SVENDSEN Weather: 46 ~~WET~~ RAIN, MILD

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185-OUT	TPH, COLIFORM	—	HDPE (Glass)	2	1L/250mL	yes (no)	Rise Peak (Fall) None
RBS185-IN	TPH, COLIFORM	—	HDPE (Glass)	2	1L/250mL	yes (no)	Rise Peak (Fall) None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

RBS185-OUT FLOW MODERATELY FLOW, VERY TURBID (BROWN). LOW FLOW CONDITIONS @ RBS185-IN; STORMWATER MODERATELY TURBID.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120220 Sampled event 2

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 2-20-12 Time: 17:15 Field Staff: D Braun H. D. Akwa Weather: Rain - light

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	Yes
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No		
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	—	Actual Pump Vol (ml)	—		
Pump Vol Before Adj. (ml):	—	Pump Vol Before Adj. (ml)	—		
Pump Vol After Adj. (ml):	—	Pump Vol After Adj. (ml)	—		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):	—	Pacing (cf):	—		
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	~~Yes~~ ~~No~~
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	(Rise) Peak Fall None	Flow Conditions:	(Rise) Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Unlocked tubing - Connected tubing more securely.
- Check bypass float function next time.

Post-Storm Visit

Date: Time: Field Staff: Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:		Date/Time End:		Float Unobstructed?	
# of Samples:		# of Samples:			
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):		Est. Sample Vol (L):			
Visual Condition:		Visual Condition:			
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

STORM ARRIVED EARLY AND AUTOMATED SAMPLERS (ISCOs) WERE NOT TURNED ON; NO COMPOSITE SAMPLES WERE COLLECTED DURING THIS EVENT.

Grab Sample Visit

Date: 2/21/12 Time: IN: 1512 / OUT: 1316 Field Staff: ALEX SVENDSEN Weather: PERIODIC SHOWERS, MILD, WIND?

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185-IN	FECAL COLIFORM	—	HDPE (Glass)	1	250	yes (no)	Rise Peak (Fall) None
RBS185-IN	TPH	—	HDPE (Glass)	1	1000	yes (no)	Rise Peak (Fall) None
RBS185-OUT	FECAL COLIFORM	—	HDPE (Glass)	1	250	yes (no)	Rise Peak (Fall) None
RBS185-OUT	TPH	—	HDPE (Glass)	1	1000	yes (no)	Rise Peak (Fall) None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

VERY LOW FLOW DISCHARGING FROM INLET INTO THE SWALE, SAMPLE RBS185-IN COLLECTED FROM CB. BROWN, TURBID DISCHARGE GRAB SAMPLED @ RBS185-OUT.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120224 Sampled event 3

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 2/23/12 Time: 1600 Field Staff: ALEX SVENDSEN, D B. Weather: OVERCAST + MILD

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	Yes No	Primary Device Level?	Yes No	Float Unobstructed?	YES
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):			
Actual Pump Vol (ml):	—	Actual Pump Vol (ml)			
Pump Vol Before Adj. (ml):	—	Pump Vol Before Adj. (ml)			
Pump Vol After Adj. (ml):	—	Pump Vol After Adj. (ml)			
Intake Checked?	Yes (No)	Intake Checked?	Yes No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	Yes No		
Clean Bottle?	(Yes) No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	(Yes) No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	(Yes) No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

DRY WEATHER TODAY SO NO FLOW @ RBS185-IN; VERY LOW FLOW @ RBS185-OUT.

Post-Storm Visit

Date: 2/25/12 Time: 1900 Field Staff: ALEX SVENDSEN Weather: OVERCAST + COOL

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	2/25/12 0929	Date/Time End:	2/25/12 1502	Float Unobstructed?	
# of Samples:	03	# of Samples:	50		
Sampled Without Error?	(Yes) No	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	—		
Est. Sample Vol (L):	20L	Est. Sample Vol (L):	10L		
Visual Condition:	SILTY+TAN TURBID	Visual Condition:	VERY TURBID		
Bottles Replaced?	(Yes) No	Bottles Replaced?	(Yes) No		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)		
pH sensor calibrated?	Yes No (NA)	pH sensor calibrated?	Yes No (NA)	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak (Fall) None	Flow Conditions:	Rise Peak (Fall) None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: ~~2/24/12~~ 2/24/12 Time: 1510 Field Staff: ALEX SVENDSEN Weather: HEAVY RAIN + COOL

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185-IN	TPH	—	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
RBS185-IN	FECAL COLIFORM	—	HDPE (Glass)	1	250	yes (no)	(Rise) Peak Fall None
RBS185-OUT	TPH	—	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
RBS185-OUT	FECAL COLIFORM	—	HDPE (Glass)	1	250	yes (no)	(Rise) Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

1520 < ~~1620~~ 1620 <

Notes/Visual Conditions: (note any calibrations or maintenance on back)

RBS185-IN FLOWS MODERATELY HIGH + MODERATELY TURBID. FLOW AT RBS185-OUT TOO LOW TO SAMPLE; DELAID SAMPLING FOR ~ 1 HOUR; FLOWS STILL LOW + VERY TURBID WHEN SAMPLES WERE COLLECTED @ 1620.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120302 Sample Event 4

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 2/25/12 Time: 19:00 Field Staff: Alex Svendsen Weather: overcast + cool

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	~~Yes~~ ~~No~~	Primary Device Level?	~~Yes~~ ~~No~~	Float Unobstructed?	yes
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	—	Actual Pump Vol (ml)	—		
Pump Vol Before Adj. (ml):	—	Pump Vol Before Adj. (ml)	—		
Pump Vol After Adj. (ml):	—	Pump Vol After Adj. (ml)	—		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No		
Pacing (cf):		Pacing (cf):		**Station Name: RBS185-RG**	
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	~~Yes~~ ~~No~~
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	~~Yes~~ ~~No~~
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak (Fall) None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 3/3/12 Time: 8:56 Field Staff: D Ahearn Weather: Cloudy

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	3/2/12 21:41	Date/Time End:	3/3/12 1:21	Float Unobstructed?	yes
# of Samples:	34	# of Samples:	35		
Sampled Without Error?	(Yes) No	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	—		
Est. Sample Vol (L):	9	Est. Sample Vol (L):	7		
Visual Condition:	turbid, grey/tan	Visual Condition:	turbid, dark brown/orange		
Bottles Replaced?	(Yes) No	Bottles Replaced?	(Yes) No		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No		
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)	**Station Name: RBS185-RG**	
~~pH sensor calibrated?~~	~~Yes~~ ~~No~~	pH sensor calibrated?	Yes No	Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak (Fall) None	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

need to check sample pump volumes

Grab Sample Visit

Date: Time: Field Staff: Weather:

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120305 Sample Event 5

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 3-3-12 Time: 910 Field Staff: A Swarthout, D Ahern Weather: Cloudy

Station Name: RBS185-In			Station Name: RBS185-Out			Station Name: RBS185-BP	
						Float Unobstructed?	yes
Primary Device Level?	(Yes)	No	Primary Device Level?	(Yes)	No		
Offset Before Adj. (ft):	–		Offset Before Adj. (ft):	–			
Offset AfterAdj. (ft):	–		Offset AfterAdj. (ft):	–			
Actual Pump Vol (ml):	–		Actual Pump Vol (ml)	–			
Pump Vol Before Adj. (ml):	–		Pump Vol Before Adj. (ml)	–			
Pump Vol After Adj. (ml):	–		Pump Vol After Adj. (ml)	–			
Intake Checked?	(Yes)	No	Intake Checked?	(Yes)	No		
Desiccant Dry?	(Yes)	No	Desiccant Dry?	(Yes)	No		
Sample Line Rinsed?	(Yes)	No	Sample Line Rinsed?	(Yes)	No		
Clean Bottle?	(Yes)	No	Clean Bottle?	(Yes)	No	**Station Name: RBS185-RG**	
Pacing (cf):			Pacing (cf):				
Ice Added?	(Yes)	No	Ice Added?	(Yes)	No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes)	No	Program Started?	(Yes)	No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes)	No	Tubing Connected?	(Yes)	No		
Flow Conditions:	Rise Peak Fall (None)		Flow Conditions:	Rise Peak Fall (None)			

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 3-5-12 Time: 20:00 Field Staff: D Brun Weather: Clear

Station Name: RBS185-In			Station Name: RBS185-Out			Station Name: RBS185-BP	
Date/Time End:	3-5-12 9:03		Date/Time End:	3-5-12 BST		Float Unobstructed?	yes
# of Samples:	~~48~~ 28		# of Samples:	16			
Sampled Without Error?	(Yes)	No	Sampled Without Error?	Yes (No)	Error		
Offset Before Adj. (ft):	no gage at this station		Offset Before Adj. (ft):	–			
Offset AfterAdj. (ft):	no gage at this station		Offset AfterAdj. (ft):	–			
Est. Sample Vol (L):	6 L		Est. Sample Vol (L):	4.5L			
Visual Condition:	Slight turbid		Visual Condition:	Very turbid			
Bottles Replaced?	Yes (No)		Bottles Replaced?	Yes (No)			
Sent to Lab?	(Yes)	No	Sent to Lab?	(Yes)	No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)		Duplicate Sample?	Yes (No)			
pH sensor calibrated?	Yes (No)		pH sensor calibrated?	Yes (No)		Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall (None)		Flow Conditions:	Rise Peak Fall (None)		Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Autosampler

Grab Sample Visit

Date: Time: Field Staff: Weather:

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120309 Sampled Event 6

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 3-9-12 Time: 11:30 Field Staff: DB Weather: dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No	Float Unobstructed?	✓
Offset Before Adj. (ft):	-	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	-	Offset AfterAdj. (ft):	-		
Actual Pump Vol (ml):	-	Actual Pump Vol (ml)	-		
Pump Vol Before Adj. (ml):	-	Pump Vol Before Adj. (ml)	-		
Pump Vol After Adj. (ml):	-	Pump Vol After Adj. (ml)	-		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 3-10-12 Time: 12:30 Field Staff: DB and L Weather: Dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	3-10-12 4:58	Date/Time End:	3-10-12 9:03	Float Unobstructed?	✓
# of Samples:	13	# of Samples:	19		
Sampled Without Error?	(Yes) No	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	-		
Est. Sample Vol (L):	4L	Est. Sample Vol (L):	4.5 L		
Visual Condition:	clear	Visual Condition:	Turbid-dark.		
Bottles Replaced?	Yes (No)	Bottles Replaced?	Yes (No)		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	(Yes) No		
pH sensor calibrated?	Yes (No)	pH sensor calibrated?	Yes (No)	Rain Gauge Level?	(Yes) No
Flow Conditions:	(Rise) Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 3-10-12 Time: 10 - 11:15 p.m. Field Staff: DB and L Weather: Light rain.

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
185-IN	TPH		HDPE (Glass)	1	1080	(yes) no	Rise Peak Fall None
185-IN	Fecals		HDPE (Glass)	1	250	(yes) no	Rise Peak Fall None
185-OUT	TPH		HDPE (Glass)	1	1080	(yes) no	Rise Peak Fall None
185-OUT	Fecals		HDPE (Glass)	1	250	(yes) no	Rise Peak Fall None
185-OUT QA	TPH		HDPE (Glass)	1	1080	(yes) no	Rise Peak Fall None
185-OUT QA	Fecals		HDPE (Glass)	1	250	(yes) no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

Retrieved to sample OUT at 11:15 p.m. Sampled IN at 10:20 p.m.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120312 Sampled event 7

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: | Time: | Field Staff: | Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	Yes No	Primary Device Level?	Yes No	Float Unobstructed?	
Offset Before Adj. (ft):		Offset Before Adj. (ft):			
Offset AfterAdj. (ft):		Offset AfterAdj. (ft):			
Actual Pump Vol (ml):		Actual Pump Vol (ml)			
Pump Vol Before Adj. (ml):		Pump Vol Before Adj. (ml)			
Pump Vol After Adj. (ml):		Pump Vol After Adj. (ml)			
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

NO COMPOSITE SAMPLES COLLECTED DURING THIS STORM EVENT.

Post-Storm Visit

Date: | Time: | Field Staff: | Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:		Date/Time End:		Float Unobstructed?	
# of Samples:		# of Samples:			
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):		Est. Sample Vol (L):			
Visual Condition:		Visual Condition:			
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No		
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No	**Station Name: RBS185-RG**	
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

SEE NOTES ABOVE.

Grab Sample Visit

Date: 3/12/12 Time: 1700 Field Staff: ALEX SVENDSEN/DB Weather: STEADY RAIN

Collected?	Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
Y	RBS185-IN/OUT	Fecal Coliform	Cool ≤ 10°C	HDPE (Glass)	1	250	yes (no)	(Rise) Peak Fall None
Y		TPH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
Y		SVOA	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
Y		VOA	Cool ≤ 6°C	HDPE (Glass)	3	40	yes (no)	(Rise) Peak Fall None
Y		PAH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
Y		PCB	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
Y		Pesticides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
Y		Herbicides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
Y		Priority Metals	Cool ≤ 6°C	(HDPE) Glass	1	250	yes (no)	(Rise) Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

RBS185-IN FLOW RATE RELATIVELY HIGH + FAIRLY TURBID. RBS185-OUT FLOW RATE HIGH AND HIGHLY TURBID. COMPOSITE SAMPLES COLLECTED FROM 4 INLETS TO BIOFILTRATION SWALE (RBS185-IN, RBS185-CB1, RBS185-CB2, RBS185-CB3) FOR COMPARISON. FLOW RATES RELATIVELY HIGH @ CB1 AND CB3, WHILE LOWER @ CB2 SFAIRLY TURBID AT ALL INLETS.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120419 Comp G=65

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 4/18/12 Time: 1430 Field Staff: AS, DB Weather: PARTLY CLOUDY + MILD

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No	Float Unobstructed?	YES
Offset Before Adj. (ft):	CALIBRATED W/	Offset Before Adj. (ft):	CALIBRATED W/		
Offset AfterAdj. (ft):	MINIMAL DRIFT	Offset AfterAdj. (ft):	MINIMAL DRIFT		
Actual Pump Vol (ml):	220	Actual Pump Vol (ml)	220		
Pump Vol Before Adj. (ml):	220	Pump Vol Before Adj. (ml)	210		
Pump Vol After Adj. (ml):	NA	Pump Vol After Adj. (ml)	220		
Intake Checked?	Yes (No)	Intake Checked?	Yes (No)		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No		
Pacing (cf):		Pacing (cf):		**Station Name: RBS185-RG**	
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak (Fall) None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

RBSOUT-185 STILL HIGHLY TURBID. NO FLOW @ RBS185-IN.

Post-Storm Visit

Date: 4/20/12 Time: 1400 Field Staff: AS Weather: SUNNY + WARM

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	4/20/12 1070	Date/Time End:	4/20/12 1330	Float Unobstructed?	YES
# of Samples:	69	# of Samples:	42		
Sampled Without Error?	(Yes) No	Sampled Without Error?	Yes (No)		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	—		
Est. Sample Vol (L):	15 L	Est. Sample Vol (L):	9L		
Visual Condition:	MODERATELY TURBID	Visual Condition:	DARK BROWN / HIGHLY TURBID		
Bottles Replaced?	(Yes) No	Bottles Replaced?	(Yes) No		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No		
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)	**Station Name: RBS185-RG**	
pH sensor calibrated?	Yes (No)	pH sensor calibrated?	Yes (No)	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak (Fall) None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 4/19/20 Time: 1845 Field Staff: AS, DB Weather: MODERATE RAIN, MILD

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185-IN/OUT	FECAL COLIFORM	—	HDPE (Glass)	2	250	yes (no)	(Rise) Peak Fall None
RBS185-IN/OUT	TPH (DX, GX)	—	HDPE (Glass)	2	1000	yes (no)	(Rise) Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120521 Comp 7 grab 7

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 4/20/12 Time: 1400 Field Staff: A. SVENDSEN Weather: SUNNY + WARM

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No		
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	—	Actual Pump Vol (ml)	—		
Pump Vol Before Adj. (ml):	—	Pump Vol Before Adj. (ml)	—		
Pump Vol After Adj. (ml):	—	Pump Vol After Adj. (ml)	—		
Intake Checked?	Yes (No)	Intake Checked?	Yes (No)		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes (No)	Ice Added?	Yes (No)	Rain Gauge Level?	Yes No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 5/22/12 Time: 1000 Field Staff: D. BENNETT Weather: OVERCAST, MILD

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	5/21/12 1334	Date/Time End:	5/21/12 1657	Float Unobstructed?	YES
# of Samples:	15	# of Samples:	45		
Sampled Without Error?	(Yes) No	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	—		
Est. Sample Vol (L):	3-4	Est. Sample Vol (L):	10		
Visual Condition:	MODERATELY TURBID	Visual Condition:	HIGHLY TURBID W/ VERY DARK COLOR		
Bottles Replaced?	(Yes) No	Bottles Replaced?	(Yes) No		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)		
pH sensor calibrated?	~~Yes~~ ~~No~~	pH sensor calibrated?	~~Yes~~ ~~No~~	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak (Fall) None	Flow Conditions:	Rise Peak (Fall) None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

added ice when grab sample was collected

Grab Sample Visit

Date: 5/21/12 Time: 1050 Field Staff: A. SVENDSEN Weather:

Collected?	Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
Y	RBS185-IN/OUT	Fecal Coliform	Cool ≤ 10°C	HDPE (Glass)	1	250	yes (no)	(Rise) Peak Fall None
Y	RBS185-IN/OUT	TPH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
N	—	SVOA	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
↓	—	VOA	Cool ≤ 6°C	HDPE (Glass)	3	40	yes no	Rise Peak Fall None
	—	PAH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
	—	PCB	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
	—	Pesticides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
	—	Herbicides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
V	—	Priority Metals	Cool ≤ 6°C	(HDPE) Glass	1	250	yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)
LOW FLOW, MODERATELY TURBID @ RBS185-IN / MODERATE FLOW, HIGHLY TURBID @ RBS185-OUT. ADDED ICE TO BOTH COMPOSITE SAMPLERS (1500s)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 6-22-12 field sheet

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date:	Time:	Field Staff:	Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	
Primary Device Level?	Yes No	Primary Device Level?	Yes No		
Offset Before Adj. (ft):		Offset Before Adj. (ft):			
Offset AfterAdj. (ft):		Offset AfterAdj. (ft):			
Actual Pump Vol (ml):		Actual Pump Vol (ml)			
Pump Vol Before Adj. (ml):		Pump Vol Before Adj. (ml)			
Pump Vol After Adj. (ml):		Pump Vol After Adj. (ml)			
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	Station Name: RBS185-RG	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

grab only

Post-Storm Visit

Date:	Time:	Field Staff:	Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:		Date/Time End:		Float Unobstructed?	
# of Samples:		# of Samples:			
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):		Est. Sample Vol (L):			
Visual Condition:		Visual Condition:			
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No	Station Name: RBS185-RG	
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

grab only

Grab Sample Visit

Date: 6/22/12 Time: 13:20 Field Staff: DR Weather: rainy

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185-IN	fecal, tph		HDPE (Glass)	2	500	yes (no)	(Rise) Peak Fall None
FF			HDPE Glass			yes no	Rise Peak Fall None
RBS185-OUT	fecal, tph		HDPE (Glass)	2	500	yes (no)	(Rise) Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20120702 Comp 8

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 7-2-12 Time: 10:10 Field Staff: D. Bennett Weather: Dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	✓
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No		
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	270	Actual Pump Vol (ml)	270		
Pump Vol Before Adj. (ml):	270	Pump Vol Before Adj. (ml)	270		
Pump Vol After Adj. (ml):	270	Pump Vol After Adj. (ml)	270		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 7/3/12 Time: 1230 Field Staff: A. SVENDSEN Weather: OVERCAST + GUSTY

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	7/3/12 0421	Date/Time End:	7/3/12 0552	Float Unobstructed?	YES, LOWERED FLOAT SLIGHTLY
# of Samples:	50	# of Samples:	91		
Sampled Without Error?	(Yes) No	Sampled Without Error?	Yes (No)		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	—		
Est. Sample Vol (L):	12	Est. Sample Vol (L):	17		
Visual Condition:	SLIGHTLY TURBID	Visual Condition:	BROWN, TURBID		
Bottles Replaced?	Yes (No)	Bottles Replaced?	Yes (No)		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)		
pH sensor calibrated?	Yes No (NA)	pH sensor calibrated?	Yes No (NA)	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak (Fall) None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

TROUBLE-SHOOTING FLOAT SWITCH. ALSO ATTEMPTED TO CLEAN STILLING WELL AT RBS185-OUT. LOST CONSTRICTION FITTING NUT NEEDED FOR ATTACHING STILLING WELL TUBING WITH THEL-MAR WEIR. WILL REPLACE LATER THIS WEEK.

Grab Sample Visit

Date: Time: Field Staff: Weather:

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

NO GRAB SAMPLE COLLECTED.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 9-10-12 field sheet

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 9-9-2012 Time: 9:00, 21:00 Field Staff: D. Brandt Weather: Dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	Y
Primary Device Level?	Yes No	Primary Device Level?	Yes No		
Offset Before Adj. (ft):	-	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	-	Offset AfterAdj. (ft):	-		
Actual Pump Vol (ml):	-	Actual Pump Vol (ml)	-		
Pump Vol Before Adj. (ml):	-	Pump Vol Before Adj. (ml)	-		
Pump Vol After Adj. (ml):	-	Pump Vol After Adj. (ml)	-		
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Outlet tube was kinked. Returned in evening with pump to straighten out kink. pumped out chamber. worked well in pursing. reset program + ran successfully.

Post-Storm Visit

Date: 9-10-12 Time: 12:00 Field Staff: D. Brandt Weather: Sunny

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	9-10-12 8:59	Date/Time End:	9-10-12 8:50	Float Unobstructed?	Y
# of Samples:	39	# of Samples:	91		
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	-		
Est. Sample Vol (L):	9.5L	Est. Sample Vol (L):	20L		
Visual Condition:	gray	Visual Condition:	Turbid		
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

replaced desiccant.

Grab Sample Visit

Date: Time: Field Staff: Weather:

Collected?	Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
		Fecal Coliform	Cool ≤ 10°C	HDPE (Glass)	1	250	yes no	Rise Peak Fall None
		TPH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		SVOA	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		VOA	Cool ≤ 6°C	HDPE (Glass)	3	40	yes no	Rise Peak Fall None
		PAH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		PCB	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Pesticides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Herbicides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Priority Metals	Cool ≤ 6°C	(HDPE) Glass	1	250	yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 10-14-12 field sheet

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 10/12/12 Time: 1230 Field Staff: AS, DB Weather: OVERCAST + MILD

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	YES
Primary Device Level?	~~Yes~~ ~~No~~	Primary Device Level?	~~Yes~~ ~~No~~		
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	—	Actual Pump Vol (ml)	—		
Pump Vol Before Adj. (ml):	—	Pump Vol Before Adj. (ml)	—		
Pump Vol After Adj. (ml):	—	Pump Vol After Adj. (ml)	—		
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 10-15-12 Time: 9:00 Field Staff: D.B. Weather: Dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:		Date/Time End:		Float Unobstructed?	YES
# of Samples:		# of Samples:			
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):		Est. Sample Vol (L):			
Visual Condition:		Visual Condition:			
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No		
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No	**Station Name: RBS185-RG**	
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	~~Yes~~ No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Samples dumped due to inlet sampler malfunction.

Grab Sample Visit

Date: 10/14/12 Time: 1700 Field Staff: AS/DB Weather: STEADY RAIN, MILD

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185-IN	TPH	—	HDPE Glass	1	1000	yes no	Rise Peak Fall None
RBS185-OUT	TPH	—	HDPE Glass	2	1000	yes no	Rise Peak Fall None
RBS185-IN	FECAL COLI.	—	HDPE Glass	1	250	yes no	Rise Peak Fall None
RBS185-OUT	FECAL COLI.	—	HDPE Glass	2	250	yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

- collected) DUPLICATE @ RBS185-OUT (RBS185-QA3

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 10-15-12 field sheet

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 10/15/12 Time: 0900 Field Staff: DB Weather: PARTLY CLOUDY + MILD

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	~~Yes~~ No	Primary Device Level?	~~Yes~~ No	Float Unobstructed?	
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	220	Actual Pump Vol (ml)	220		
Pump Vol Before Adj. (ml):	NOT ADJUSTED	Pump Vol Before Adj. (ml)	NOT ADJUSTED		
Pump Vol After Adj. (ml):	NA	Pump Vol After Adj. (ml)	NA		
Intake Checked?	Yes (No)	Intake Checked?	Yes (No)		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	Yes No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak (Fall) None	Flow Conditions:	Rise Peak (Fall) None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 10.16.12 Time: 10:00 Field Staff: D. Bennett Weather: Sunny

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	10-15-12	Date/Time End:	10-15-12 21:53	Float Unobstructed?	Yes
# of Samples:	22	# of Samples:	19		
Sampled Without Error?	(Yes) No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):	4.5	Est. Sample Vol (L):	4.		
Visual Condition:	turbid - grey	Visual Condition:	TANNIC		
Bottles Replaced?	(Yes) No	Bottles Replaced?	(Yes) No		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)		
pH sensor calibrated?	Yes (No)	pH sensor calibrated?	Yes (No)	Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak (Fall) None	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 10/15/12 Time: 1710 Field Staff: AS / DB Weather: STEADY RAIN + MILD

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185-IN	NWTPH	—	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
RBS185-IN	FECAL COLI	—	HDPE (Glass)	1	250	yes (no)	(Rise) Peak Fall None
RBS185-OUT	NWTPH	—	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
RBS185-OUT	FECAL COLI	—	HDPE (Glass)	1	250	yes (no)	(Rise) Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

RBS185-OUT FLOWS MODERATELY HIGH AND VERY TURBID, MOD. FLOW + SLIGHTLY TURBID @ RBS185-IN. ALSO COLLECTED GRABS @ RBS185-IN + CB1, CB2, AND CB3.

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:**

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 11/11/12 Time: 10:00 Field Staff: AS Weather: Cloudy

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No	Float Unobstructed?	✓
Offset Before Adj. (ft):	-	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	-	Offset AfterAdj. (ft):	-		
Actual Pump Vol (ml):	-	Actual Pump Vol (ml)	-		
Pump Vol Before Adj. (ml):	-	Pump Vol Before Adj. (ml)	-		
Pump Vol After Adj. (ml):	-	Pump Vol After Adj. (ml)	-		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):	-		
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 11-12-12 Time: Field Staff: Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	11-12-12 01:25	Date/Time End:	11-12-12 05:20	Float Unobstructed?	✓
# of Samples:	91	# of Samples:	69		
Sampled Without Error?	(Yes) (No)	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	-		
Est. Sample Vol (L):	30 L	Est. Sample Vol (L):	12 L		
Visual Condition:	turbid	Visual Condition:	turbid		
Bottles Replaced?	Yes (No)	Bottles Replaced?	Yes (No)		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)		
pH sensor calibrated?	Yes (No)	pH sensor calibrated?	Yes (No)	Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

RSB-IN consists of two bottles due to pacing change. mix one part 5.4 to 1 to 2.4 parts bottle 2.

Grab Sample Visit

Date: 11-11-12 Time: 10:00 Field Staff: DB Weather: RAIN

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RSB185-IN	TPH, total	—	(HDPE) Glass	2	1000,1000	yes (no)	(Rise) Peak Fall None
RSB185-OUT	TPH, total	—	(HDPE) Glass	2	1000,1000	yes (no)	(Rise) Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			(HDPE) Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			(HDPE) Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:**

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 12-16-12 Time: Field Staff: Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No	Float Unobstructed?	✓
Offset Before Adj. (ft):	-	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	-	Offset AfterAdj. (ft):	-		
Actual Pump Vol (ml):	-	Actual Pump Vol (ml)	-		
Pump Vol Before Adj. (ml):	-	Pump Vol Before Adj. (ml)	-		
Pump Vol After Adj. (ml):	-	Pump Vol After Adj. (ml)	-		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):	-	Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 12/17/12 Time: Field Staff: D. Bennett Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	12-17-12 01:45	Date/Time End:	12-17-12 07:20	Float Unobstructed?	✓
# of Samples:	91	# of Samples:	75		
Sampled Without Error?	(Yes) No	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	-		
Est. Sample Vol (L):	20 L	Est. Sample Vol (L):	16.5		
Visual Condition:	Turbid	Visual Condition:	Turbid		
Bottles Replaced?	Yes (No)	Bottles Replaced?	Yes (No)		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)		
pH sensor calibrated?	Yes (No)	pH sensor calibrated?	Yes (No)	Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 12-16-12 Time: Field Staff: Weather: RAIN

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
12/16/12	TPH Tech		(HDPE) Glass			yes no	Rise Peak Fall None
RSB185IN	TPH Ext	-	(HDPE) Glass	2	1000/500	yes no	(Rise) Peak Fall None
RSB185OUT	TPH Ext	-	(HDPE) Glass	2	1000/500	yes (no)	(Rise) Peak Fall None
			(HDPE) Glass			yes no	Rise Peak Fall None
			HDPE (Glass)			yes no	Rise Peak Fall None
			(HDPE) Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

DSA 1/24/13

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:**

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 1-23-13 Time: 14:00 Field Staff: D. Bennett Weather: Dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	X
Primary Device Level?	Yes No	Primary Device Level?	Yes No		
Offset Before Adj. (ft):	-	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	-	Offset AfterAdj. (ft):	-		
Actual Pump Vol (ml):	-	Actual Pump Vol (ml)	-		
Pump Vol Before Adj. (ml):	-	Pump Vol Before Adj. (ml)	-		
Pump Vol After Adj. (ml):	-	Pump Vol After Adj. (ml)	-		
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 1-24-13 Time: 14:00 Field Staff: D Bennett Weather: Dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	1-23-13 22:05	Date/Time End:	1-24-13 01:28	Float Unobstructed?	X
# of Samples:	25	# of Samples:	22		
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	-		
Est. Sample Vol (L):	5.5a	Est. Sample Vol (L):	2.5a		
Visual Condition:	turbid	Visual Condition:	Slight turbid		
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

A bunch of aliquots did not collect at the outlet. I have not resolved why.

Grab Sample Visit

Date: ~~1-23-13~~ 1-23-13 Time: 16:30 Field Staff: D Bennett Weather: rain - moderate

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
~~RBS185IN~~ 3 RBS185IN	TPH	N	HDPE Glass	1	500	yes no	Rise Peak Fall None
" 3 "	Fecal	N	HDPE Glass	1	120	yes no	Rise Peak Fall None
~~RBS185OUT~~ 3 RBS185OUT	TPH	N	HDPE Glass	1	500	yes no	Rise Peak Fall None
" 3 "	Fecals	N	HDPE Glass	1	120	yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

DSH 2/22/13

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:**

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 2-20-13 Time: 1900 Field Staff: D. Burnett / A Svendsen. Weather: Sunny.

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	Y
Primary Device Level?	Yes No	Primary Device Level?	Yes No		
Offset Before Adj. (ft):	0	Offset AfterAdj. (ft):	-		
Offset AfterAdj. (ft):	0	Offset AfterAdj. (ft):	-		
Actual Pump Vol (ml):	0	Actual Pump Vol (ml)	-		
Pump Vol Before Adj. (ml):	0	Pump Vol Before Adj. (ml)	-		
Pump Vol After Adj. (ml):	700	Pump Vol After Adj. (ml)	700		
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 2-23-13 Time: 1845 Field Staff: D Burnett Weather: Sunny.

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	2-22-13 13:25	Date/Time End:	2-22-13 23:45	Float Unobstructed?	Y
# of Samples:	13	# of Samples:	20		
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	-		
Est. Sample Vol (L):	3L	Est. Sample Vol (L):	4.5L		
Visual Condition:	Dark turbid	Visual Condition:	light turbid.		
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 2-22-13 Time: 17:30 Field Staff: D Burnett Weather: rain.

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185 IN	TPH fuels	NA	HDPE Glass	2	1L/1000ml	yes no	Rise Peak Fall None
RBS185 OUT	TPH fuels	NA	HDPE Glass	2	1L/1000ml	yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 03-14-13

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 3-18-13 Time: 1200 Field Staff: DBm Weather: Rain

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	Y
Primary Device Level?	Yes No	Primary Device Level?	Yes No		
Offset Before Adj. (ft):	e	Offset Before Adj. (ft):	-		
Offset AfterAdj. (ft):	e	Offset AfterAdj. (ft):	-		
Actual Pump Vol (ml):	e	Actual Pump Vol (ml)	-		
Pump Vol Before Adj. (ml):	e	Pump Vol Before Adj. (ml)	-		
Pump Vol After Adj. (ml):	e	Pump Vol After Adj. (ml)	-		
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):	-		
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: Time: Field Staff: Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:		Date/Time End:		Float Unobstructed?	
# of Samples:		# of Samples:			
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):		Est. Sample Vol (L):			
Visual Condition:		Visual Condition:			
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

NO Sample collected. No post storm visit.

Grab Sample Visit

Date: 3-19-13 Time: 2300 Field Staff: DBm Weather: Rain.

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS-185 IN	TPH	e	HDPE Glass	1	1 L	yes no	Rise Peak Fall None
RBS-185 IN	Fecal	e	HDPE Glass	1	100ml	yes no	Rise Peak Fall None
RBS 185 OUT	TPH	e	HDPE Glass	1	1L	yes no	Rise Peak Fall None
RBS 185 OUT	Fecals	e	HDPE Glass	1	100ml	yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:**

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 4-9-13 Time: 1200 Field Staff: DBrun KT Weather: NJ

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	Y
Primary Device Level?	Yes No	Primary Device Level?	Yes No		
Offset Before Adj. (ft):	e	Offset Before Adj. (ft):	e		
Offset AfterAdj. (ft):	e	Offset AfterAdj. (ft):	e		
Actual Pump Vol (ml):	e	Actual Pump Vol (ml)	e		
Pump Vol Before Adj. (ml):	e	Pump Vol Before Adj. (ml)	e		
Pump Vol After Adj. (ml):	e	Pump Vol After Adj. (ml)	e		
Intake Checked?	Yes No	Intake Checked?	Yes No		
Desiccant Dry?	Yes No	Desiccant Dry?	Yes No		
Sample Line Rinsed?	Yes No	Sample Line Rinsed?	Yes No		
Clean Bottle?	Yes No	Clean Bottle?	Yes No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):	0		
Ice Added?	Yes No	Ice Added?	Yes No	Rain Gauge Level?	Yes No
Program Started?	Yes No	Program Started?	Yes No	Rain Gauge Unobstructed?	Yes No
Tubing Connected?	Yes No	Tubing Connected?	Yes No		
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: Time: Field Staff: Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:		Date/Time End:		Float Unobstructed?	
# of Samples:		# of Samples:			
Sampled Without Error?	Yes No	Sampled Without Error?	Yes No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):		Est. Sample Vol (L):			
Visual Condition:		Visual Condition:			
Bottles Replaced?	Yes No	Bottles Replaced?	Yes No		
Sent to Lab?	Yes No	Sent to Lab?	Yes No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes No	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes No	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

No Sample Collected.

Grab Sample Visit

Date: 4-10-13 Time: 10:00 Field Staff: DBrunt Weather: moderate rain

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185 IN	10:15 TPH	e	HDPE Glass	1	1L	yes no	Rise Peak Fall None
RBS185 IN	10:15 Fecal	e	HDPE Glass	1	100m	yes no	Rise Peak Fall None
RBS 185 OUT	10:30 TPH	e	HDPE Glass	1	1L	yes no	Rise Peak Fall None
RBS 185 OUT	10:30 Fecal	e	HDPE Glass		100m	yes no	Rise Peak Fall None
			HDPE Glass	1		yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 4-18-13

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 4.18.13 Time: 1200 Field Staff: D Brunt Weather: D-J

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	X
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No		
Offset Before Adj. (ft):		Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	Zero	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	320	Actual Pump Vol (ml)	320		
Pump Vol Before Adj. (ml):	320	Pump Vol Before Adj. (ml)	320		
Pump Vol After Adj. (ml):	320	Pump Vol After Adj. (ml)	320		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 4.19.13 Time: 17:00 Field Staff: D Brunt Weather:

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	4-19-13 03:13	Date/Time End:	4/19/13 7:05	Float Unobstructed?	
# of Samples:	48	# of Samples:	30		
Sampled Without Error?	(Yes) No	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	e		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	e		
Est. Sample Vol (L):	10 L	Est. Sample Vol (L):	12 L		
Visual Condition:	Turbid Orange	Visual Condition:	Turbid Yellow		
Bottles Replaced?	(Yes) No	Bottles Replaced?	Yes No		
Sent to Lab?	(Yes) No	Sent to Lab?	Yes No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes No		
pH sensor calibrated?	Yes (No)	pH sensor calibrated?	Yes No	Rain Gauge Level?	Yes No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall None	Rain Gauge Unobstructed?	Yes No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: Time: Field Staff: Weather:

Collected?	Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
		Fecal Coliform	Cool ≤ 10°C	HDPE (Glass)	1	250	yes no	Rise Peak Fall None
		TPH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		SVOA	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		VOA	Cool ≤ 6°C	HDPE (Glass)	3	40	yes no	Rise Peak Fall None
		PAH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		PCB	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Pesticides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Herbicides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Priority Metals	Cool ≤ 6°C	(HDPE) Glass	1	250	yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20130829 Comp 17 Sub 17

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

8/28/2013 Time: 1500 Field Staff: DBrun LT Weather: Sunny

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	✓
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No		
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):		Offset AfterAdj. (ft):	220		
Actual Pump Vol (ml):	220	Actual Pump Vol (ml)	220		
Pump Vol Before Adj. (ml):	220	Pump Vol Before Adj. (ml)	220		
Pump Vol After Adj. (ml):	220	Pump Vol After Adj. (ml)	220		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	Station Name: RBS185-RG	
Pacing (cf):		Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak (Fall) None	Flow Conditions:	Rise Peak (Fall) None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 8-30-13 Time: 9:30 Field Staff: DBrun LT Weather: Partly Cloudy, Dry

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	8-29-13 13:05	Date/Time End:	8-29-13 21:40	Float Unobstructed?	✓
# of Samples:	91	# of Samples:	91		
Sampled Without Error?	Yes (No)	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):	18L	Est. Sample Vol (L):	18L		
Visual Condition:	Grey	Visual Condition:	TANPIL		
Bottles Replaced?	Yes (No)	Bottles Replaced?	Yes (No)		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	Station Name: RBS185-RG	
Duplicate Sample?	Yes (No)	Duplicate Sample?	(Yes) No		
pH sensor calibrated?	Yes (No)	pH sensor calibrated?	Yes (No)	Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak Fall None	Flow Conditions:	Rise Peak Fall (None)	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 8-29-13 Time: 1000 Field Staff: DBrun LT Weather: light rain

Collected?	Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
Y	RBS185-IN	Fecal Coliform	Cool ≤ 10°C	HDPE (Glass)	1	250	yes (no)	Rise (Peak) Fall None
Y	RBS185-IN	TPH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	Rise (Peak) Fall None
Y	RBS185-OUT	~~SVOA~~ fecal	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes (no)	Rise (Peak) Fall None
Y	RBS185-OUT	~~VOA~~ TPH	Cool ≤ 6°C	HDPE (Glass)	3	40	yes (no)	Rise (Peak) Fall None
		PAH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		PCB	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Pesticides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Herbicides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Priority Metals	Cool ≤ 6°C	(HDPE) Glass	1	250	yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20130905 Comp 18 grab 18

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 9/4/13 Time: 1400 Field Staff: AS/DB Weather: OVERCAST + MILD

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	YES
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No		
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	225	Actual Pump Vol (ml)	215		
Pump Vol Before Adj. (ml):	290	Pump Vol Before Adj. (ml)	260		
Pump Vol After Adj. (ml):	225	Pump Vol After Adj. (ml)	220		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	Station Name: RBS185-RG	
Pacing (cf):		Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak Fall (None)		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 9/6/13 Time: 1130 Field Staff: AS Weather: LIGHT RAIN + MILD

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	9/6/13 1027	Date/Time End:	9/6/13 1248	Float Unobstructed?	YES
# of Samples:		# of Samples:			
Sampled Without Error?	Yes (No)	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):	—		
Est. Sample Vol (L):	2	Est. Sample Vol (L):	10		
Visual Condition:	TURBID, LIGHT BROWN	Visual Condition:	TURBID, DARK BROWN		
Bottles Replaced?	Yes (No)	Bottles Replaced?	Yes (No)		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	Station Name: RBS185-RG	
Duplicate Sample?	Yes (No)	Duplicate Sample?	(Yes) No		
pH sensor calibrated?	~~Yes~~ No	pH sensor calibrated?	~~Yes~~ No	Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak (Fall) None	Flow Conditions:	Rise Peak (Fall) None	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 9/6/13 Time: 1115 Field Staff: AJ Weather: STEADY RAIN, ~65°F

Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
RBS185-IN	TPH	—	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
RBS185-IN	FECAL COLIFORM	—	HDPE (Glass)	1	100	yes (no)	(Rise) Peak Fall None
RBS185-OUT	TPH	—	HDPE (Glass)	1	1000	yes (no)	(Rise) Peak Fall None
RBS185-OUT	FECAL COLIFORM	—	HDPE (Glass)	1	100	yes (no)	(Rise) Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None
			HDPE Glass			yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

INLET FLOW MODERATE TO HIGH AND TURBID W/ LIGHT BROWN COLOR
OUTLET FLOW MODERATE AND TURBID W/ DARK BROWN COLOR

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:**

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 9-21-13 Time: 9:00 Field Staff: D. Brunt Weather: D. 7.

Station Name: RBS185-In			Station Name: RBS185-Out			Station Name: RBS185-BP	
						Float Unobstructed?	V
Primary Device Level?	(Yes) No		Primary Device Level?	Yes No			
Offset Before Adj. (ft):	0		Offset Before Adj. (ft):	0			
Offset AfterAdj. (ft):	0		Offset AfterAdj. (ft):	0			
Actual Pump Vol (ml):	220		Actual Pump Vol (ml)	220			
Pump Vol Before Adj. (ml):	220		Pump Vol Before Adj. (ml)	220			
Pump Vol After Adj. (ml):	220		Pump Vol After Adj. (ml)	220			
Intake Checked?	(Yes) No		Intake Checked?	(Yes) No			
Desiccant Dry?	(Yes) No		Desiccant Dry?	(Yes) No			
Sample Line Rinsed?	(Yes) No		Sample Line Rinsed?	(Yes) No			
Clean Bottle?	(Yes) No		Clean Bottle?	(Yes) No		**Station Name: RBS185-RG**	
Pacing (cf):			Pacing (cf):				
Ice Added?	(Yes) No		Ice Added?	(Yes) No		Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No		Program Started?	(Yes) No		Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No		Tubing Connected?	(Yes) No			
Flow Conditions:	Rise Peak Fall (None)		Flow Conditions:	Rise Peak (Fall) None			

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

checked out. was 0 at 0. Could not calibrate outlet due to flow.

Post-Storm Visit

Date: 9.23-13 Time: Field Staff: D. Brunt Weather:

Station Name: RBS185-In			Station Name: RBS185-Out			Station Name: RBS185-BP	
Date/Time End:	9.22.13 14:17		Date/Time End:	9.22.13 17:07		Float Unobstructed?	V
# of Samples:	47		# of Samples:	26			
Sampled Without Error?	(Yes) No		Sampled Without Error?	(Yes) No			
Offset Before Adj. (ft):	no gage at this station		Offset Before Adj. (ft):	3			
Offset AfterAdj. (ft):	no gage at this station		Offset AfterAdj. (ft):	0			
Est. Sample Vol (L):	10		Est. Sample Vol (L):	5			
Visual Condition:	grey-tinted		Visual Condition:	TANNIC			
Bottles Replaced?	Yes (No)		Bottles Replaced?	Yes (No)			
Sent to Lab?	(Yes) No		Sent to Lab?	(Yes) No		**Station Name: RBS185-RG**	
Duplicate Sample?	(Yes) No		Duplicate Sample?	Yes No			
pH sensor calibrated?	Yes (No)		pH sensor calibrated?	Yes (No)		Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak Fall (None)		Flow Conditions:	Rise Peak (Fall) None		Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 9.22.13 Time: 1:00 Field Staff: D. Brunt Weather:

Collected?	Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
V	RBS185IN	Fecal Coliform	Cool ≤ 10°C	HDPE (Glass)	1	250	yes no	(Rise) Peak Fall None
	RBS185IN	TPH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	(Rise) Peak Fall None
	RBS185 out	Fecal ~~SVOA~~	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
	RBS185 out	TPH ~~VOA~~	Cool ≤ 6°C	HDPE (Glass)	3	40	yes no	Rise Peak Fall None
		PAH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		PCB	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Pesticides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Herbicides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Priority Metals	Cool ≤ 6°C	(HDPE) Glass	1	250	yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

FIELD LOG SHEET

Project Name: Redmond Biofiltration Swale **Project #:** 09-04540-000

Site Location: 185th Avenue NE **Client:** City of Redmond

Site ID: RBS185 **Event ID:** 20130928 comp 20 grab 20

HERRERA ENVIRONMENTAL CONSULTANTS

Pre-Storm Visit

Date: 9.27.13 Time: 11:00 Field Staff: O. Bennett / J. Bunn Weather: clear.

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
				Float Unobstructed?	✓
Primary Device Level?	(Yes) No	Primary Device Level?	(Yes) No		
Offset Before Adj. (ft):	—	Offset Before Adj. (ft):	—		
Offset AfterAdj. (ft):	—	Offset AfterAdj. (ft):	—		
Actual Pump Vol (ml):	—	Actual Pump Vol (ml)	—		
Pump Vol Before Adj. (ml):	—	Pump Vol Before Adj. (ml)	—		
Pump Vol After Adj. (ml):	—	Pump Vol After Adj. (ml)	—		
Intake Checked?	(Yes) No	Intake Checked?	(Yes) No		
Desiccant Dry?	(Yes) No	Desiccant Dry?	(Yes) No		
Sample Line Rinsed?	(Yes) No	Sample Line Rinsed?	(Yes) No		
Clean Bottle?	(Yes) No	Clean Bottle?	(Yes) No	**Station Name: RBS185-RG**	
Pacing (cf):		Pacing (cf):			
Ice Added?	(Yes) No	Ice Added?	(Yes) No	Rain Gauge Level?	(Yes) No
Program Started?	(Yes) No	Program Started?	(Yes) No	Rain Gauge Unobstructed?	(Yes) No
Tubing Connected?	(Yes) No	Tubing Connected?	(Yes) No		
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak (Fall) None		

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Post-Storm Visit

Date: 9.29.13 Time: 11:00 Field Staff: O Bennett Weather: Dry.

Station Name: RBS185-In		Station Name: RBS185-Out		Station Name: RBS185-BP	
Date/Time End:	9.28.13 19:12	Date/Time End:	9.29.13 1004	Float Unobstructed?	✓
# of Samples:	6 4	# of Samples:	91		
Sampled Without Error?	(Yes) No	Sampled Without Error?	(Yes) No		
Offset Before Adj. (ft):	no gage at this station	Offset Before Adj. (ft):			
Offset AfterAdj. (ft):	no gage at this station	Offset AfterAdj. (ft):			
Est. Sample Vol (L):	15L	Est. Sample Vol (L):	20L		
Visual Condition:	Sediment/turbid	Visual Condition:	TANNIC		
Bottles Replaced?	Yes (No)	Bottles Replaced?	Yes (No)		
Sent to Lab?	(Yes) No	Sent to Lab?	(Yes) No	**Station Name: RBS185-RG**	
Duplicate Sample?	Yes (No)	Duplicate Sample?	Yes (No)		
pH sensor calibrated?	Yes (No)	pH sensor calibrated?	Yes (No)	Rain Gauge Level?	(Yes) No
Flow Conditions:	Rise Peak Fall (None)	Flow Conditions:	Rise Peak (Fall) None	Rain Gauge Unobstructed?	(Yes) No

Notes/Visual Conditions: (if 'no' to any questions above, explain why and remedial actions taken)

Grab Sample Visit

Date: 9.29.13 Time: 11:00 Field Staff: O Bennett Weather:

Collected?	Station	Parameter	Preservation	Bottle Type	# of Bottles	Bottle Volume (ml)	Duplicated	Flow Conditions
✓		Fecal Coliform	Cool ≤ 10°C	HDPE (Glass)	1	250	yes no	Rise Peak Fall None
✓		TPH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		SVOA	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		VOA	Cool ≤ 6°C	HDPE (Glass)	3	40	yes no	Rise Peak Fall None
		PAH	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		PCB	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Pesticides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Herbicides	Cool ≤ 6°C	HDPE (Glass)	1	1000	yes no	Rise Peak Fall None
		Priority Metals	Cool ≤ 6°C	(HDPE) Glass	1	250	yes no	Rise Peak Fall None

Notes/Visual Conditions: (note any calibrations or maintenance on back)

APPENDIX E

Water Quality and Flow Statistic Database

Event Date	Event Type	Rain Start	Rain Stop	Rain Total	Rain Duration	Rain Average	Rain Max	Rain DryPeriod	Flow Start 185th Street Bioswale Inlet datetime	Flow Start 185th Street Bioswale Outlet datetime
1/13/2012	**Rinsate Blank**									
2/17/2012 11:25	**Storm**	2/17/2012 11:25	2/18/2012 5:55	0.43	18.5	0.023	0.02	76.6	2/17/2012 11:20	2/17/2012 11:20
2/20/2012 13:50	**Storm**	2/20/2012 13:50	2/21/2012 13:30	0.79	23.7	0.033	0.02	40.8	2/20/2012 13:50	2/20/2012 13:50
2/24/2012 13:45	**Storm**	2/24/2012 13:45	2/25/2012 11:15	0.95	21.5	0.044	0.03	75.7	2/24/2012 13:45	2/24/2012 13:45
3/2/2012 14:05	**Storm**	3/2/2012 14:05	3/2/2012 22:05	0.16	8	0.02	0.01	51.8	3/2/2012 14:05	3/2/2012 14:05
3/5/2012 5:50	**Storm**	3/5/2012 5:50	3/5/2012 9:30	0.21	3.7	0.057	0.02	58.3	3/5/2012 5:50	3/5/2012 5:50
3/9/2012 11:30	**Storm**	3/9/2012 11:30	3/10/2012 10:45	0.38	23.2	0.016	0.01	98.8	3/9/2012 11:25	3/9/2012 11:25
4/19/2012 14:55	**Storm**	4/19/2012 14:55	4/20/2012 10:30	0.93	19.6	0.047	0.03	82.2	4/19/2012 14:55	4/19/2012 14:55
5/21/2012 6:20	**Storm**	5/21/2012 6:20	5/21/2012 20:50	0.35	14.5	0.024	0.02	11.2	5/21/2012 6:20	5/21/2012 6:20
6/22/2012 10:25	**Storm**	6/22/2012 10:25	6/23/2012 3:55	0.81	17.5	0.046	0.02	84.6	6/22/2012 10:25	6/22/2012 10:25
7/2/2012 19:45	**Storm**	7/2/2012 19:45	7/3/2012 4:20	0.33	8.6	0.038	0.04	54.7	7/2/2012 19:45	7/2/2012 19:45
9/10/2012 1:40	**Storm**	9/10/2012 1:40	9/10/2012 5:10	0.27	3.5	0.077	0.05	1239.7	9/10/2012 1:35	9/10/2012 1:35
10/14/2012 12:05	**Storm**	10/14/2012 12:05	10/14/2012 23:55	0.5	11.8	0.042	0.02	15.6	10/14/2012 12:00	10/14/2012 12:00
10/15/2012 15:00	**Storm**	10/15/2012 15:00	10/15/2012 19:20	0.15	4.3	0.035	0.02	15.8	10/15/2012 14:55	10/15/2012 14:55
11/11/2012 16:10	**Storm**	11/11/2012 16:10	11/12/2012 3:00	0.47	10.8	0.043	0.02	106.7	11/11/2012 16:05	11/11/2012 16:05
12/16/2012 10:25	**Storm**	12/16/2012 10:25	12/17/2012 4:05	0.79	17.7	0.045	0.03	17.9	12/16/2012 10:25	12/16/2012 10:25
1/23/2013 12:20	**Storm**	1/23/2013 12:20	1/23/2013 21:30	0.28	9.2	0.031	0.01	310.9	1/23/2013 12:20	1/23/2013 12:20
2/22/2013 2:35	**Storm**	2/22/2013 2:35	2/22/2013 23:15	0.15	20.7	0.007	0.01	19	2/22/2013 2:35	2/22/2013 2:35
3/19/2013 17:15	**Storm**	3/19/2013 17:15	3/20/2013 12:40	0.83	19.4	0.043	0.03	33	3/19/2013 17:10	3/19/2013 17:10
4/10/2013 7:00	**Storm**	4/10/2013 7:00	4/10/2013 14:30	0.33	7.5	0.044	0.03	40	4/10/2013 7:00	4/10/2013 7:00
4/18/2013 14:45	**Storm**	4/18/2013 14:45	4/19/2013 7:25	0.29	16.7	0.017	0.01	68.7	4/18/2013 14:35	4/18/2013 14:35
6/20/2013 3:05	**Storm**	6/20/2013 3:05	6/20/2013 21:30	1.23	18.4	0.067	0.05	53.8	6/20/2013 3:00	6/20/2013 3:00
8/29/2013 0:55	**Storm**	8/29/2013 0:55	8/29/2013 22:05	0.73	21.2	0.034	0.05	20.2	8/29/2013 0:50	8/29/2013 0:50
9/5/2013 20:55	**Storm**	9/5/2013 20:55	9/6/2013 10:40	1.45	13.8	0.105	0.08	14.9	9/5/2013 20:55	9/5/2013 20:55
9/22/2013 7:45	**Storm**	9/22/2013 7:45	9/22/2013 13:15	0.25	5.5	0.045	0.03	134.9	9/22/2013 7:45	9/22/2013 7:45
9/28/2013 2:40	**Storm**	9/28/2013 2:40	9/29/2013 0:45	1.2	22.1	0.054	0.1	19.4	9/28/2013 2:35	9/28/2013 2:35

Event Date	Event Type	Flow Stop 185th Street Bioswale Inlet datetime	Flow Stop 185th Street Bioswale Outlet datetime	Flow Duration 185th Street Bioswale Inlet hour	Flow Duration 185th Street Bioswale Outlet hour	Flow Average 185th Street Bioswale Inlet gpm	Flow Average 185th Street Bioswale Outlet gpm	Flow Max 185th Street Bioswale Inlet gpm
1/13/2012	**Rinsate Blank**							
2/17/2012 11:25	**Storm**	2/18/2012 7:50	2/18/2012 11:55	10.2	24.7	5.8606	1.4007	44.451
2/20/2012 13:50	**Storm**	2/21/2012 19:25	2/21/2012 19:25	19.5	29.7	10.0046	1.5431	47.178
2/24/2012 13:45	**Storm**	2/25/2012 16:20	2/25/2012 16:20	14.7	26.7	11.4951	1.6633	67.792
3/2/2012 14:05	**Storm**	3/2/2012 23:15	3/3/2012 4:05	7.2	14.1	2.4601	0.2173	12.596
3/5/2012 5:50	**Storm**	3/5/2012 9:45	3/5/2012 15:25	4	9.7	9.6553	0.7385	42.848
3/9/2012 11:30	**Storm**	3/10/2012 6:05	3/10/2012 11:30	10.1	24.2	2.0524	0.2336	15.563
4/19/2012 14:55	**Storm**	4/20/2012 13:30	4/20/2012 16:25	16.6	25.6	10.832	1.5855	60.275
5/21/2012 6:20	**Storm**	5/21/2012 17:40	5/22/2012 2:50	8.2	19.4	4.5725	0.9367	26.142
6/22/2012 10:25	**Storm**	6/23/2012 4:45	6/23/2012 9:50	14.2	22.5	8.5526	2.2072	32.171
7/2/2012 19:45	**Storm**	7/3/2012 4:55	7/3/2012 10:20	3.4	9.3	13.2118	2.6801	90.442
9/10/2012 1:40	**Storm**	9/10/2012 10:25	9/10/2012 11:10	8.8	9.7	7.9411	3.2496	98.71
10/14/2012 12:05	**Storm**	10/15/2012 4:20	10/15/2012 5:55	16.2	16.4	12.0745	2.7665	53.552
10/15/2012 15:00	**Storm**	10/15/2012 22:50	10/15/2012 22:35	8	6.4	5.6934	1.38	27.764
11/11/2012 16:10	**Storm**	11/12/2012 8:55	11/12/2012 8:55	16.9	15.4	27.0014	2.296	66.482
12/16/2012 10:25	**Storm**	12/17/2012 10:05	12/17/2012 10:05	23.8	23.8	10.9999	2.5468	53.584
1/23/2013 12:20	**Storm**	1/24/2013 1:25	1/24/2013 3:25	12.7	12.1	7.0349	0.8602	31.455
2/22/2013 2:35	**Storm**	2/22/2013 23:15	2/22/2013 23:15	20.8	20.3	4.6796	0.6983	36.138
3/19/2013 17:15	**Storm**	3/20/2013 16:35	3/20/2013 18:40	22.1	23.4	19.2834	2.1381	93.742
4/10/2013 7:00	**Storm**	4/10/2013 20:30	4/10/2013 20:30	12.2	12.5	9.0864	0.3494	54.757
4/18/2013 14:45	**Storm**	4/19/2013 7:25	4/19/2013 7:25	16.6	16.9	7.7848	1.2789	27.764
6/20/2013 3:05	**Storm**	6/21/2013 3:20	6/21/2013 3:25	24.2	23.1	15.439	6.461	177.624
8/29/2013 0:55	**Storm**	8/30/2013 4:05	8/30/2013 4:05	25.3	27.3	12.2768	2.2559	87.183
9/5/2013 20:55	**Storm**	9/6/2013 12:05	9/6/2013 16:35	12.8	19.8	35.4924	8.7309	202.047
9/22/2013 7:45	**Storm**	9/22/2013 15:05	9/22/2013 19:10	3.7	11.5	35.3391	1.6567	103.964
9/28/2013 2:40	**Storm**	9/29/2013 5:30	9/29/2013 6:40	26.8	26.6	15.4984	4.9489	273.461

Event Date	Event Type	Flow Max 185th Street Bioswale Outlet gpm	Flow Volume 185th Street Bioswale Inlet gal	Flow Volume 185th Street Bioswale Outlet gal	Sample Count 185th Street Bioswale Inlet count	Sample Count 185th Street Bioswale Outlet count	Sample Duration 185th Street Bioswale Inlet hour	Sample Duration 185th Street Bioswale Outlet hour
1/13/2012	**Rinsate Blank**							
2/17/2012 11:25	**Storm**	10.18	3574.984	2073.03	31	95	2.8	19.2
2/20/2012 13:50	**Storm**	4.001	11705.37	2746.645	0	1	0	0
2/24/2012 13:45	**Storm**	3.301	10115.67	2661.245	63	50	19.1	23.5
3/2/2012 14:05	**Storm**	0.52	1070.15	183.605	34	35	4.7	7.3
3/5/2012 5:50	**Storm**	2.543	2317.27	428.345	20	16	2.7	6
3/9/2012 11:30	**Storm**	1.078	1241.71	338.785	13	19	11.6	12.7
4/19/2012 14:55	**Storm**	4.872	10777.81	2433.771	68	84	19.4	21.5
5/21/2012 6:20	**Storm**	4.934	2240.515	1091.199	15	45	6.5	9.2
6/22/2012 10:25	**Storm**	9.257	7269.708	2979.692	10	91	1.2	4.8
7/2/2012 19:45	**Storm**	28.268	2708.425	1500.856	50	90	4.3	4
9/10/2012 1:40	**Storm**	25.932	4169.051	1884.765	39	91	3.6	5.9
10/14/2012 12:05	**Storm**	11.439	11712.22	2725.046	55	91	12.2	7.1
10/15/2012 15:00	**Storm**	3.374	2732.81	531.285	22	19	6.7	5.5
11/11/2012 16:10	**Storm**	7.444	27406.461	2123.774	91	69	11.4	11.8
12/16/2012 10:25	**Storm**	9.494	15674.86	3629.239	90	75	14.5	16.5
1/23/2013 12:20	**Storm**	2.983	5346.504	623.675	25	22	8.5	10
2/22/2013 2:35	**Storm**	1.478	5826.11	851.971	13	19	10.6	16.6
3/19/2013 17:15	**Storm**	6.158	25550.471	3004.019	91	37	13.3	18.7
4/10/2013 7:00	**Storm**	1.478	6678.489	262.015	46	27	7.7	8.8
4/18/2013 14:45	**Storm**	3.292	7745.902	1298.071	48	82	12.2	16.3
6/20/2013 3:05	**Storm**	42.891	22463.801	8948.495	70	91	18.2	16.2
8/29/2013 0:55	**Storm**	14.551	18660.77	3699.621	91	91	16	18.5
9/5/2013 20:55	**Storm**	71.61	27329.141	10346.08	25	49	12.4	14.4
9/22/2013 7:45	**Storm**	17.617	7774.604	1143.149	47	26	2.6	5.1
9/28/2013 2:40	**Storm**	49.718	24874.891	7893.552	64	91	17.2	11.9

Event Date	Event Type	Sample Coverage 185th Street Bioswale Inlet %	Sample Coverage 185th Street Bioswale Outlet %	Sample AverageFlow 185th Street Bioswale Inlet gpm	Sample AverageFlow 185th Street Bioswale Outlet gpm	Nitrate + Nitrite 185th Street Bioswale Inlet mg/L	QA	Nitrate + Nitrite 185th Street Bioswale Outlet mg/L	QA	Ortho-phosphorus 185th Street Bioswale Inlet mg/L	QA
1/13/2012	**Rinsate Blank**									0.001	U
2/17/2012 11:25	**Storm**	92.4	96.8	28.478	8.1	3.56		89.7		0.056	
2/20/2012 13:50	**Storm**	0	0	0	1.26						
2/24/2012 13:45	**Storm**	98.4	97.1	26.913	2.249	0.084		125		0.061	
3/2/2012 14:05	**Storm**	93.9	84.1	6.727	0.388	0.16		123		0.007	
3/5/2012 5:50	**Storm**	97.6	92.8	22.479	1.507	0.107		84		0.001	U
3/9/2012 11:30	**Storm**	93.6	88.2	7.17	0.524	2.4		93.3		0.011	
4/19/2012 14:55	**Storm**	99.2	92.3	27.237	2.932	0.158		12.9		0.003	
5/21/2012 6:20	**Storm**	97	95.1	13.989	2.887	0.152		4.3		0.004	
6/22/2012 10:25	**Storm**	10.2	28.4	11.215	5.082						
7/2/2012 19:45	**Storm**	98.1	94.3	46.283	9.994	0.092		2.62		0.006	
9/10/2012 1:40	**Storm**	93.6	90.9	61.383	10.843	0.521		2.29		0.089	
10/14/2012 12:05	**Storm**	97.2	75.6	26.959	6.273						
10/15/2012 15:00	**Storm**	98.4	98.2	15.005	1.804	0.235		0.681		0.015	
11/11/2012 16:10	**Storm**	88.9	96	41.156	4.22	0.111		0.469		0.003	
12/16/2012 10:25	**Storm**	91.8	96.2	25.215	5.172	0.068		0.262		0.002	
1/23/2013 12:20	**Storm**	94.7	98.3	19.109	1.669	0.614		0.9		0.002	
2/22/2013 2:35	**Storm**	89.7	95.1	15.412	0.957	0.358		0.898		0.003	
3/19/2013 17:15	**Storm**	86	92.8	35.362	2.994						
4/10/2013 7:00	**Storm**	97.3	96.5	29.256	0.92						
4/18/2013 14:45	**Storm**	97.5	99.2	13.889	2.001	0.79		0.765		0.003	
6/20/2013 3:05	**Storm**	98	98.3	71.878	28.504	0.286		0.759		0.003	
8/29/2013 0:55	**Storm**	86.4	91.5	36.689	5.982	0.139		0.597		0.004	
9/5/2013 20:55	**Storm**	92.6	97	99.325	39.995	0.162		0.35		0.002	
9/22/2013 7:45	**Storm**	97.2	98.3	59.781	10.587	0.061		0.341		0.002	
9/28/2013 2:40	**Storm**	88.9	85.3	57.899	17.898	0.078		0.176		0.003	

Event Date	Event Type	Ortho-phosphorus 185th Street Bioswale Outlet mg/L	QA	Phosphorus 185th Street Bioswale Inlet mg/L	QA	Phosphorus 185th Street Bioswale Outlet mg/L	QA	Total Kjeldahl Nitrogen 185th Street Bioswale Inlet mg/L	QA	Total Kjeldahl Nitrogen 185th Street Bioswale Outlet mg/L	QA	Cadmium Total 185th Street Bioswale Inlet mg/L	QA	Cadmium Dissolved 185th Street Bioswale Inlet mg/L	QA
1/13/2012	**Rinsate Blank**	0.001	U	0.005		0.002	U								
2/17/2012 11:25	**Storm**	3.56		0.368		4.68		2.31		29.4		0.001		0	U
2/20/2012 13:50	**Storm**														
2/24/2012 13:45	**Storm**	4.1		0.126		5.35		1.73		47.6		0	U	0	U
3/2/2012 14:05	**Storm**	3.03		0.072		4.76		1.01		12		0	U	0	U
3/5/2012 5:50	**Storm**	3.22		0.078		4.63		0.59		13.6		0	U	0	U
3/9/2012 11:30	**Storm**	2.59		0.053		4.13		0.686		9.76		0	U	0	U
4/19/2012 14:55	**Storm**	2.88		0.085		4.17		0.969		15		0	U	0	U
5/21/2012 6:20	**Storm**	2.48		0.199		4.25		0.616		3.5		0	U	0	U
6/22/2012 10:25	**Storm**														
7/2/2012 19:45	**Storm**	2.77		0.063		3.53		0.525		5.56		0	U	0	U
9/10/2012 1:40	**Storm**	2.54		0.21		3.63		3.22		9.62		0	U	0	U
10/14/2012 12:05	**Storm**														
10/15/2012 15:00	**Storm**	1.758		0.325		2.263		1.045		2.155		0	U	0	U
11/11/2012 16:10	**Storm**	1.007		0.096		1.216		0.476		0.821		0	U	0	U
12/16/2012 10:25	**Storm**	2.08		0.094		2.5		40		52.6		0	U	0	U
1/23/2013 12:20	**Storm**	0.556		0.782		0.685		4.21		1.02		0.001		0	U
2/22/2013 2:35	**Storm**	1.09		0.694		1.69		1.26		1.13		0	U	0	U
3/19/2013 17:15	**Storm**														
4/10/2013 7:00	**Storm**														
4/18/2013 14:45	**Storm**	0.936		0.158		1.074		1.146		1.41		0	U	0	U
6/20/2013 3:05	**Storm**	1.28		0.604		1.52		5.62	J	2.93		0		0	U
8/29/2013 0:55	**Storm**	1.36		0.11		1.37		1.49		3.69		0	U	0	U
9/5/2013 20:55	**Storm**	1.44		0.155		1.65		0.881		3.01		0	U	0	U
9/22/2013 7:45	**Storm**	0.853		0.151		0.898		1.37		2.39		0	U	0	U
9/28/2013 2:40	**Storm**	1.273		0.107		1.358		1.092		2.495		0	U	0	U

Event Date	Event Type	Cadmium Total 185th Street Bioswale Outlet mg/L	QA	Cadmium Dissolved 185th Street Bioswale Outlet mg/L	QA	Copper Total 185th Street Bioswale Inlet mg/L	QA	Copper Dissolved 185th Street Bioswale Inlet mg/L	QA	Copper Total 185th Street Bioswale Outlet mg/L	QA	Copper Dissolved 185th Street Bioswale Outlet mg/L	QA	Lead Total 185th Street Bioswale Inlet mg/L	QA
1/13/2012	**Rinsate Blank**					0.003		0.001	U	0.002		0.001	U		
2/17/2012 11:25	**Storm**	0.001		0	U	0.031		0.003		0.059		0.022		0.015	
2/20/2012 13:50	**Storm**														
2/24/2012 13:45	**Storm**	0.001		0	U	0.005		0.001	U	0.054		0.026		0.002	
3/2/2012 14:05	**Storm**	0.001		0	U	0.008		0.003		0.052		0.026		0.003	
3/5/2012 5:50	**Storm**	0		0	U	0.017		0.003		0.051		0.024		0.003	
3/9/2012 11:30	**Storm**	0.001		0	U	0.006		0.002		0.043		0.017		0.002	
4/19/2012 14:55	**Storm**	0.001		0	U	0.01		0.003		0.044		0.013		0.002	
5/21/2012 6:20	**Storm**	0	U	0	U	0.022		0.006		0.033		0.013		0.006	
6/22/2012 10:25	**Storm**														
7/2/2012 19:45	**Storm**	0	U	0	U	0.008		0.001		0.041		0.015		0.003	
9/10/2012 1:40	**Storm**	0	U	0	U	0.022		0.017		0.027		0.02		0.001	
10/14/2012 12:05	**Storm**														
10/15/2012 15:00	**Storm**	0	U	0	U	0.035		0.007		0.023		0.013		0.011	
11/11/2012 16:10	**Storm**	0	U	0	U	0.01		0.001		0.009		0.005		0.002	
12/16/2012 10:25	**Storm**	0	U	0	U	0.013		0.001	U	0.017		0.008		0.004	
1/23/2013 12:20	**Storm**	0	U	0	U	0.071		0.018		0.01		0.006		0.023	
2/22/2013 2:35	**Storm**	0	U	0	U	0.056		0.005		0.036		0.021		0.02	
3/19/2013 17:15	**Storm**														
4/10/2013 7:00	**Storm**														
4/18/2013 14:45	**Storm**	0	U	0	U	0.02		0.005		0.006		0.004		0.005	
6/20/2013 3:05	**Storm**	0	U	0	U	0.041		0.004		0.015		0.009		0.015	
8/29/2013 0:55	**Storm**	0	U	0	U	0.02		0.007		0.022		0.016		0.004	
9/5/2013 20:55	**Storm**	0	U	0	U	0.018		0.003		0.016	J	0.013		0.005	
9/22/2013 7:45	**Storm**	0	U	0	U	0.023		0.008		0.02		0.017		0.004	
9/28/2013 2:40	**Storm**	0	U	0	U	0.016		0.002		0.016		0.009		0.004	

Event Date	Event Type	Lead Dissolved 185th Street Bioswale Inlet mg/L	QA	Lead Total 185th Street Bioswale Outlet mg/L	QA	Lead Dissolved 185th Street Bioswale Outlet mg/L	QA	Mercury Total 185th Street Bioswale Inlet mg/L	QA	Mercury Dissolved 185th Street Bioswale Inlet mg/L	QA	Mercury Total 185th Street Bioswale Outlet mg/L	QA	Mercury Dissolved 185th Street Bioswale Outlet mg/L	QA
1/13/2012	**Rinsate Blank**														
2/17/2012 11:25	**Storm**	0.001	U	0.016		0.002		0	U	0	U	0	U	0	U
2/20/2012 13:50	**Storm**														
2/24/2012 13:45	**Storm**	0.001	U	0.018		0.003		0	U	0	U	0	U	0	U
3/2/2012 14:05	**Storm**	0.001	U	0.014		0.002		0	U	0	U	0	U	0	U
3/5/2012 5:50	**Storm**	0.001	U	0.011		0.003		0	U	0	U	0	U	0	U
3/9/2012 11:30	**Storm**	0.001	U	0.01		0.002		0	U	0	U	0	U	0	U
4/19/2012 14:55	**Storm**	0.001	U	0.011		0.001		0	U	0	U	0	U	0	U
5/21/2012 6:20	**Storm**	0.001	U	0.007		0.001	U	0	U	0	U	0	U	0	U
6/22/2012 10:25	**Storm**														
7/2/2012 19:45	**Storm**	0.001	U	0.006		0.001	U	0	U	0	U	0	U	0	U
9/10/2012 1:40	**Storm**	0.001	U	0.005		0.001	U	0	U	0	U	0	U	0	U
10/14/2012 12:05	**Storm**														
10/15/2012 15:00	**Storm**	0.001	U	0.004		0.001	U	0	U	0	U	0	U	0	U
11/11/2012 16:10	**Storm**	0.001	U	0.002		0.001	U	0	U	0	U	0	U	0	U
12/16/2012 10:25	**Storm**	0.001	U	0.004		0.001	U	0	U	0	U	0	U	0	U
1/23/2013 12:20	**Storm**	0.001	U	0.001	U	0.001	U	0	U	0	U	0	U	0	U
2/22/2013 2:35	**Storm**	0.001	U	0.003		0.001	U	0	U	0	U	0	U	0	U
3/19/2013 17:15	**Storm**														
4/10/2013 7:00	**Storm**														
4/18/2013 14:45	**Storm**	0.001	U	0.001	U	0.001	U	0	U	0	U	0	U	0	U
6/20/2013 3:05	**Storm**	0.001	U	0.003		0.001	U	0	U	0	U	0	U	0	U
8/29/2013 0:55	**Storm**	0.001	U	0.001		0.001	U	0	U	0	U	0	U	0	U
9/5/2013 20:55	**Storm**	0.001	U	0.001	U	0.001	U	0	U	0	U	0	U	0	U
9/22/2013 7:45	**Storm**	0.001	U	0.001	U	0.001	U	0	U	0	U	0	U	0	U
9/28/2013 2:40	**Storm**	0.001	U	0.001	U	0.001	U	0	U	0	U	0	U	0	U

Event Date	Event Type	Zinc Total	QA	Zinc Dissolved	QA	Zinc Total	QA	Zinc Dissolved	QA	Fecal Coliform	QA	Fecal Coliform	QA	Chloride	QA
		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale	
		Inlet		Inlet		Outlet		Outlet		Inlet		Outlet		Inlet	
		mg/L		mg/L		mg/L		mg/L		CFU/100mL		CFU/100mL		mg/L	
1/13/2012	**Rinsate Blank**	0.005	U	0.005	U	0.005	U	0.005	U						
2/17/2012 11:25	**Storm**	0.198		0.012		0.083		0.025		33		55		3.91	
2/20/2012 13:50	**Storm**									250		23			
2/24/2012 13:45	**Storm**	0.053		0.017		0.08		0.029		59		18		1.56	
3/2/2012 14:05	**Storm**	0.182		0.027		0.062		0.022						12.1	
3/5/2012 5:50	**Storm**	0.137		0.044		0.055		0.029						6.3	
3/9/2012 11:30	**Storm**	0.165		0.057		0.056		0.015		18		5	UJ	2.93	
4/19/2012 14:55	**Storm**	0.067		0.021		0.054		0.011		982		32		0.81	
5/21/2012 6:20	**Storm**	0.139		0.041		0.035		0.009		20000		1200		1.76	
6/22/2012 10:25	**Storm**									3100		1400			
7/2/2012 19:45	**Storm**	0.074		0.019		0.031		0.005	U					0.98	
9/10/2012 1:40	**Storm**	0.198		0.185		0.023		0.012						1.75	
10/14/2012 12:05	**Storm**									1350		230			
10/15/2012 15:00	**Storm**	0.217		0.036		0.028		0.011		1300		380		1.396	
11/11/2012 16:10	**Storm**	0.061		0.018		0.011		0.011		18		27		0.905	
12/16/2012 10:25	**Storm**	0.088		0.014		0.02		0.008		300		5	U	0.59	
1/23/2013 12:20	**Storm**	0.43		0.086		0.006		0.005	U	4400		500		275	
2/22/2013 2:35	**Storm**	0.337		0.025		0.034		0.008						10.4	
3/19/2013 17:15	**Storm**									205		23			
4/10/2013 7:00	**Storm**									10000		500			
4/18/2013 14:45	**Storm**	0.121		0.005	U	0.005	U	0.005	U					1.795	
6/20/2013 3:05	**Storm**	0.199		0.011		0.021		0.012		1400		59		1.4	
8/29/2013 0:55	**Storm**	0.098		0.023		0.012		0.01		10000		1100		1.37	
9/5/2013 20:55	**Storm**	0.103		0.014		0.009		0.009						1.32	
9/22/2013 7:45	**Storm**	0.087		0.016		0.008		0.008		1100		100		1.56	
9/28/2013 2:40	**Storm**	0.095		0.013		0.01		0.006		650		40		0.587	

Event Date	Event Type	Chloride	QA	SSL-Coarse > 75um	QA	SSL-Coarse > 75um	QA	SSL-Fine < 75um	QA	SSL-Fine < 75um	QA	Total Suspended Solids	QA	Total Suspended Solids	QA
		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale		185th Street Bioswale	
		Outlet		Inlet		Outlet		Inlet		Outlet		Inlet		Outlet	
		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
1/13/2012	**Rinsate Blank**														
2/17/2012 11:25	**Storm**	29.3		7.2		0.6		207		180		236		120	
2/20/2012 13:50	**Storm**														
2/24/2012 13:45	**Storm**	41.1		0.5	U	2		25		48		29		53	
3/2/2012 14:05	**Storm**	36.7		0.6		0.5	U	35.5		62		40		70	
3/5/2012 5:50	**Storm**	34.2		2.8		0.5	U	38		80		46		70	
3/9/2012 11:30	**Storm**	23.5		12		3.2	J	16.5		58		18.5		54	
4/19/2012 14:55	**Storm**	7.33		10		0.5	U	19		96		36		0	
5/21/2012 6:20	**Storm**	3.53		12		0.5	U	76		86		95		88	
6/22/2012 10:25	**Storm**														
7/2/2012 19:45	**Storm**	3.42		8.6		18		36		62		45		82	
9/10/2012 1:40	**Storm**	14.7		5.3		3.9		32		50		32		50	
10/14/2012 12:05	**Storm**														
10/15/2012 15:00	**Storm**	5.214		1.2		6.8		178		28		188		48	
11/11/2012 16:10	**Storm**	1.564		3.7		1.6		66		11.333		56		9	
12/16/2012 10:25	**Storm**	1.96		9.4		0.5	U	55		28		71		20	
1/23/2013 12:20	**Storm**	165		20		0.6		444		14		508		12	
2/22/2013 2:35	**Storm**	6.35		7.9		0.5	U	372		34		332		30	
3/19/2013 17:15	**Storm**														
4/10/2013 7:00	**Storm**														
4/18/2013 14:45	**Storm**	2.095		10.4		0.5	U	72		5.5		80		4.5	
6/20/2013 3:05	**Storm**	1.88		12	J	5.7		414		64		544		64	
8/29/2013 0:55	**Storm**	7.94		3.2		0.5	U	75		15		89		18	
9/5/2013 20:55	**Storm**	4.64		0.7		0.6		122		28		20000		23	
9/22/2013 7:45	**Storm**	3.52		0.5	U	2		82		11		76		8	
9/28/2013 2:40	**Storm**	3.715		2.6		0.5	U	78		23		73		17	

Event Date	Event Type	TPH - Diesel 185th Street Bioswale Inlet mg/L	QA	TPH - Diesel 185th Street Bioswale Outlet mg/L	QA	TPH - Motor Oil 185th Street Bioswale Inlet mg/L	QA	TPH - Motor Oil 185th Street Bioswale Outlet mg/L	QA	Hardness 185th Street Bioswale Inlet mg/L	QA	Hardness 185th Street Bioswale Outlet mg/L	QA
1/13/2012	**Rinsate Blank**												
2/17/2012 11:25	**Storm**	0.05	U	0.16		0.92		0.44		28.1		170	
2/20/2012 13:50	**Storm**	0.05	U	0.05	U	1.09		0.31					
2/24/2012 13:45	**Storm**	0.05	U	0.05	U	0.84		0.83		15		251	
3/2/2012 14:05	**Storm**									29.7		217	
3/5/2012 5:50	**Storm**									27		201	
3/9/2012 11:30	**Storm**	0.05	U	0.08		0.39		0.79		24.8		188	
4/19/2012 14:55	**Storm**	0.05	U	0.05	U	0.59		0.22		16		88.7	
5/21/2012 6:20	**Storm**	0.18		0.05	U	1.49		0.19		23.1		72.8	
6/22/2012 10:25	**Storm**	0.05	U	0.05	U	1.24		0.34					
7/2/2012 19:45	**Storm**									11.7		76.4	
9/10/2012 1:40	**Storm**									45.4		92.8	
10/14/2012 12:05	**Storm**	0.05	U	0.05	U	0.6		0.1	U				
10/15/2012 15:00	**Storm**	0.05	U	0.05	U	2.86		0.54		25.016		52.378	
11/11/2012 16:10	**Storm**	0.05	U	0.05	U	0.38		0.1	U	19.935		36.645	
12/16/2012 10:25	**Storm**	0.06		0.05	U	0.26		0.1	U	11.3		22.5	
1/23/2013 12:20	**Storm**	0.05	U	0.05	U	5.3		0.1	U	304		200	
2/22/2013 2:35	**Storm**									35.2		46.1	
3/19/2013 17:15	**Storm**	0.05	U	0.05	U	0.33		0.1	U				
4/10/2013 7:00	**Storm**	0.05	U	0.05	U	2.33		0.2					
4/18/2013 14:45	**Storm**									24.598		45.137	
6/20/2013 3:05	**Storm**	2.79		0.14		2.86		0.19		23.5		28.1	
8/29/2013 0:55	**Storm**	0.06		0.05	U	3.31		0.11		20.7		42.2	
9/5/2013 20:55	**Storm**									15.4		31.3	
9/22/2013 7:45	**Storm**	0.06		0.05	U	0.12		0.1	U	21.5		37.6	
9/28/2013 2:40	**Storm**	0.05	U	0.05	U	0.74		0.1	U	12.117		31.947	

APPENDIX F

Priority Pollutant Results Database

		RBS185-IN	RBS185-IN	RBS185-IN	RBS185-OUT	RBS185-OUT	RBS185-OUT
	date	3/12/2012	10/15/2012	6/20/2012	3/12/2012	10/14/2012	6/20/2012
total metals	Total ANTIMONY (mg/L)	0.0015	0.0011	0.0010	0.0012	0.0010	0.0010
	Total ARSENIC (mg/L)	0.0237	0.0012	0.0010	0.0010	0.0073	0.0057
	Total BERYLLIUM (mg/L)	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
	Total CADMIUM (mg/L)	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003
	Total COPPER (mg/L)	0.0427	0.0137	0.0047	0.0099	0.0142	0.0130
	Total CHROMIUM (mg/L)	0.0100	0.0048	0.0022	0.0039	0.0033	0.0034
	Total LEAD (mg/L)	0.0146	0.0041	0.0010	0.0044	0.0019	0.0021
	Total MERCURY (mg/L)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	Total NICKEL (mg/L)	0.013	0.005	0.005	0.005	0.005	0.005
	Total SELENIUM (mg/L)	0.005	0.005	0.005	0.005	0.005	0.005
	Total SILVER (mg/L)	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
	Total THALLIUM (mg/L)	0.0010	0.0020	0.0010	0.0010	0.0017	0.0010
	Total ZINC (mg/L)	0.071	0.059	0.017	0.055	0.016	0.012
Dissolved Metals	Dissolved ANTIMONY (mg/L)	0.0015	0.0010	0.0010	0.0010	0.0010	0.0010
	Dissolved ARSENIC (mg/L)	0.0206	0.0010	0.0010	0.0010	0.0072	0.0049
	Dissolved BERYLLIUM (mg/L)	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
	Dissolved CHROMIUM (mg/L)	0.0013	0.0010	0.0010	0.0010	0.0010	0.0010
	Dissolved NICKEL (mg/L)	0.005	0.005	0.005	0.005	0.005	0.005
	Dissolved SELENIUM (mg/L)	0.005	0.005	0.005	0.005	0.005	0.005
	Dissolved SILVER (mg/L)	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
	Dissolved THALLIUM (mg/L)	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
pesticides (ug/L)	Aldrin (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	a-BHC (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	b-BHC (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	g-BHC (Lindane) (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	d-BHC (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	a-chlordane (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	y-chlordane (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	p,p'-DDD (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	p,p'-DDE (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	p,p'-DDT (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Dieldrin (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Endosulfan I (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Endosulfan II (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Eudosulfan Sulfate (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Endrin (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Endrin Aldehyde (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Endrin Ketone (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Heptachlor (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Heptachlor epoxide (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Methoxychlor (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
	Total PCBs (ug/L)	1.0	1.0	1.0	1.0	1.0	1.0
SVOAs (ug/L)	N-nitrosodiethylamine	0.78	0.75	0.88	0.75	0.77	0.77
	Pentachloroethane	0.78	0.75	0.88	0.75	0.77	0.77
	Aniline	0.78	0.75	0.88	0.75	0.77	0.77
	Phenol	0.78	0.75	0.88	0.75	0.77	0.77
	Bis(2-chloroethyl) ether	0.78	0.75	0.88	0.75	0.77	0.77
	2-Chlorophenol	0.78	0.75	0.88	0.75	0.77	0.77
	1,3-Dichlorobenzene	0.78	0.75	0.88	0.75	0.77	0.77
	1,4-Dichlorobenzene	0.78	0.75	0.88	0.75	0.77	0.77
	1,2-Dichlorobenzene	0.78	0.75	0.88	0.75	0.77	0.77
	Benzyl Alcohol	0.78	0.75	0.88	0.75	0.77	0.77
	2-Methyl phenol	0.78	0.75	0.88	0.75	0.77	0.77
	Bis(2-chloroisopropyl) ether	0.78	0.75	0.88	0.75	0.77	0.77
	Acetophenone	0.78	0.75	0.88	0.75	0.77	0.77
	Hexachloroethane	0.78	0.75	0.88	0.75	0.77	0.77
	N-Nitroso-n-propyl amine	0.78	0.75	0.88	0.75	0.77	0.77
	4-Methyl phenol	0.78	0.75	0.88	0.75	0.77	0.77
	Nitrobenzene	0.78	0.75	0.88	0.75	0.77	0.77
	N-nitrosopiperidine	0.78	0.75	0.88	0.75	0.77	0.77
	Isophorone	0.78	0.75	0.88	0.75	0.77	0.77
	2-Nitrophenol	0.78	0.75	0.88	0.75	0.77	0.77
	2,4-Dimethylphenol	0.78	0.75	0.88	0.75	0.77	0.77
	Benzoic Acid	0.78	0.75	0.88	0.75	0.77	0.77
	Bis(2-chloroethoxy) methane	0.78	0.75	0.88	0.75	0.77	0.77
	2,4-Dichlorophenol	0.78	0.75	0.88	0.75	0.77	0.77
	1,2,4-Trichlorobenzene	0.78	0.75	0.88	0.75	0.77	0.77
	Naphthalene	0.78	0.75	0.88	0.75	0.77	0.77
	4-Chloroaniline	0.78	0.75	0.88	0.75	0.77	0.77
	Hexachlorobutadiene	0.78	0.75	0.88	0.75	0.77	0.77
	N-nitrosodi-n-butylamine	0.78	0.75	0.88	0.75	0.77	0.77
	4-Chloro-3-methyl phenol	0.78	0.75	0.88	0.75	0.77	0.77
	2-Methyl naphthalene	0.78	0.75	0.88	0.75	0.77	0.77
	1,2,4,5-Tetrachlorobenzene	0.78	0.75	0.88	0.75	0.77	0.77
	Hexachlorocylcopentadiene	0.78	0.75	0.88	0.75	0.77	0.77
	2,4,6-Trichlorophenol	0.78	0.75	0.88	0.75	0.77	0.77
	2,4,5-Trichlorophenol	0.78	0.75	0.88	0.75	0.77	0.77
	2-Chloronaphthalene	0.78	0.75	0.88	0.75	0.77	0.77
	2-Nitroaniline	0.78	0.75	0.88	0.75	0.77	0.77
	Dimethyl phthalate	0.78	0.75	0.88	0.75	0.77	0.77
	Acenaphthylene	0.78	0.75	0.88	0.75	0.77	0.77
	2,6-Dinitrotoluene	0.78	0.75	0.88	0.75	0.77	0.77
	3-Nitroaniline	0.78	0.75	0.88	0.75	0.77	0.77
	Acenaphthene	0.78	0.75	0.88	0.75	0.77	0.77
	2,4-Dinitrophenol	0.78	0.75	0.88	0.75	0.77	0.77
	Dibenzofuran	0.78	0.75	0.88	0.75	0.77	0.77
	4-Nitrophenol	0.78	0.75	0.88	0.75	0.77	0.77
	2,4-Dinitrotoluene	0.78	0.75	0.88	0.75	0.77	0.77
	2,3,4,6-Tetrachlorophenol	0.78	0.75	0.88	0.75	0.77	0.77
	Fluorene	0.78	0.75	0.88	0.75	0.77	0.77
	Diethyl phthalate	0.78	0.75	0.88	0.75	0.77	0.77
	4-Nitroaniline	0.78	0.75	0.88	0.75	0.77	0.77
	4-Chlorophenyl phenyl ether	0.78	0.75	0.88	0.75	0.77	0.77
	2-Methyl-4,6-dinitrophenol	0.78	0.75	0.88	0.75	0.77	0.77
	N-Nitrosodiphenyl amine	0.78	0.75	0.88	0.75	0.77	0.77

red values are detected

		RBS185-IN	RBS185-IN	RBS185-IN	RBS185-OUT	RBS185-OUT	RBS185-OUT
	date	3/12/2012	10/15/2012	6/20/2012	3/12/2012	10/14/2012	6/20/2012
	Azobenzene	0.78	0.75	0.88	0.75	0.77	0.77
	4-Bromophenyl phenyl ether	0.78	0.75	0.88	0.75	0.77	0.77
	a-BHC	0.78	0.75	0.88	0.75	0.77	0.77
	Hexachlorobenzene	0.78	0.75	0.88	0.75	0.77	0.77
	b-BHC	0.78	0.75	0.88	0.75	0.77	0.77
	Pentachlorophenol	0.78	8.29	0.88	0.75	0.77	0.77
	g-BHC (Lindane)	0.78	0.75	0.88	0.75	0.77	0.77
	Phenanthrene	0.78	0.75	0.88	0.75	0.77	0.77
	Anthracene	0.78	0.75	0.88	0.75	0.77	0.77
	d-BHC	0.78	0.75	0.88	0.75	0.77	0.77
	Di-n-butyl phthalate	0.78	0.75	0.88	0.75	0.77	0.77
	Heptachlor	0.78	0.75	0.88	0.75	0.77	0.77
	Aldrin	0.78	0.75	0.88	0.75	0.77	0.77
	Heptachlor epoxide	0.78	0.75	0.88	0.75	0.77	0.77
	Fluoranthrene	0.78	0.75	0.88	0.75	0.77	0.77
	Pyrene	0.78	0.75	0.88	0.75	0.77	0.77
	Endosulfan I	0.78	0.75	0.88	0.75	0.77	0.77
	Benzidine	0.78	0.75	0.88	0.75	0.77	0.77
	4,4'-DDE	0.78	0.75	0.88	0.75	0.77	0.77
	Dieldrin	0.78	0.75	0.88	0.75	0.77	0.77
	Endrin	0.78	0.75	0.88	0.75	0.77	0.77
	Endosulfan II	0.78	0.75	0.88	0.75	0.77	0.77
	4,4'-DDD	0.78	0.75	0.88	0.75	0.77	0.77
	Endrin aldehyde	0.78	0.75	0.88	0.75	0.77	0.77
	Butyl benzenyl phthalate	0.78	0.75	0.88	0.75	0.77	0.77
	Endosulfan sulfate	0.78	0.75	0.88	0.75	0.77	0.77
	4,4'-DDT	0.78	0.75	0.88	0.75	0.77	0.77
	Benzo(a)anthracene	0.78	0.75	0.88	0.75	0.77	0.77
	Chrysene	0.78	0.75	0.88	0.75	0.77	0.77
	3,3'-Dichlorobenzidine	0.78	0.75	0.88	0.75	0.77	0.77
	Methoxychlor	0.78	0.75	0.88	0.75	0.77	0.77
	Bis(2-ethylhexyl) phthalate	11.56	2.57	0.88	0.75	0.77	0.77
	Di-n-octyl phthalate	0.78	0.75	0.88	0.75	0.77	0.77
	Benzo(b)fluoranthrene	0.78	0.75	0.88	0.75	0.77	0.77
	Benzo(k)fluoranthrene	0.78	0.75	0.88	0.75	0.77	0.77
	Benzo(a)pyrene	0.78	0.75	0.88	0.75	0.77	0.77
	Indeno(1,2,3-cd)pyrene	0.78	0.75	0.88	0.75	0.77	0.77
	Dibenzo(a,h)anthracene	0.78	0.75	0.88	0.75	0.77	0.77
	Benzo(g,h,i)perlyene	0.78	0.75	0.88	0.75	0.77	0.77
Volatile Organic Compounds (ug/l	Bromobenzene	0.4	0.4	0.4	0.4	0.4	0.4
	Bromochloromethane	0.4	0.4	0.4	0.4	0.4	0.4
	Bromomethane	0.4	0.4	0.4	0.4	0.4	0.4
	n-Butylbenzene	0.4	0.4	0.4	0.4	0.4	0.4
	sec-Butylbenzene	0.4	0.4	0.4	0.4	0.4	0.4
	tert-Butylbenzene	0.4	0.4	0.4	0.4	0.4	0.4
	Carbon tetrachloride	0.4	0.4	0.4	0.4	0.4	0.4
	Chlorobenzene	0.4	0.4	0.4	0.4	0.4	0.4
	Chloroethane	0.4	0.4	0.4	0.4	0.4	0.4
	Chloromethane	0.4	0.4	0.4	0.4	0.4	0.4
	2-Chlorotoluene	0.4	0.4	0.4	0.4	0.4	0.4
	4-Chlorotoluene	0.4	0.4	0.4	0.4	0.4	0.4
	1,2-Dibromo-3-Chloropropane	0.4	0.4	0.4	0.4	0.4	0.4
	1,2-Dibromoethane	0.4	0.4	0.4	0.4	0.4	0.4
	Dibromomethane	0.4	0.4	0.4	0.4	0.4	0.4
	1,2-Dichlorobenzene	0.4	0.4	0.4	0.4	0.4	0.4
	1,3-Dichlorobenzene	0.4	0.4	0.4	0.4	0.4	0.4
	1,4-Dichlorobenzene	0.4	0.4	0.4	0.4	0.4	0.4
	Dichlorodifluoromethane	0.4	0.4	0.4	0.4	0.4	0.4
	1,1-Dichloroethane	0.4	0.4	0.4	0.4	0.4	0.4
	1,2-Dichloroethane	0.4	0.4	0.4	0.4	0.4	0.4
	1,1-Dichloroethene	0.4	0.4	0.4	0.4	0.4	0.4
	cis-1,2-Dichloroethene	0.4	0.4	0.4	0.4	0.4	0.4
	trans-1,2-Dichloroethene	0.4	0.4	0.4	0.4	0.4	0.4
	1,2-Dichloropropane	0.4	0.4	0.4	0.4	0.4	0.4
	1,3-Dichloropropane	0.4	0.4	0.4	0.4	0.4	0.4
	2,2-Dichloropropane	0.4	0.4	0.4	0.4	0.4	0.4
	1,1-Dichloropropene	0.4	0.4	0.4	0.4	0.4	0.4
	cis-1,3-Dichloropropene	0.4	0.4	0.4	0.4	0.4	0.4
	trans-1,3-Dichloropropene	0.4	0.4	0.4	0.4	0.4	0.4
	Hexachlorobutadiene	0.4	0.4	0.4	0.4	0.4	0.4
	Isopropylbenzene	0.4	0.4	0.4	0.4	0.4	0.4
	4-Isopropyltoluene	0.4	0.4	0.4	0.4	0.4	0.4
	Methylene chloride	7.5	0.4	0.4	1230	0.4	0.4
	Naphthalene	0.4	0.4	0.4	0.4	0.4	0.4
	n-Propylbenzene	0.4	0.4	0.4	0.4	0.4	0.4
	Styrene	0.4	0.4	0.4	0.4	0.4	0.4
	1,1,1,2-Tetrachloroethane	0.4	0.4	0.4	0.4	0.4	0.4
	1,1,2,2-Tetrachloroethane	0.4	0.4	0.4	0.4	0.4	0.4
	Tetrachloroethene	0.4	0.4	0.4	0.4	0.4	0.4
	1,2,3-Trichlorobenzene	0.4	0.4	0.4	0.4	0.4	0.4
	1,2,4-Trichlorobenzene	0.4	0.4	0.4	0.4	0.4	0.4
	1,1,1-Trichloroethane	0.4	0.4	0.4	0.4	0.4	0.4
	1,1,2-Trichloroethane	0.4	0.4	0.4	0.4	0.4	0.4
	Trichloroethene	0.4	0.4	0.4	0.4	0.4	0.4
	Trichlorofluoromethane	0.4	0.4	0.4	0.4	0.4	0.4
	1,2,3-Trichloropropane	0.4	0.4	0.4	0.4	0.4	0.4
	1,2,4-Trimethylbenzene	0.4	0.4	0.4	0.4	0.4	0.4
	1,3,5-Trimethylbenzene	0.4	0.4	0.4	0.4	0.4	0.4
	Vinyl chloride	0.4	0.4	0.4	0.4	0.4	0.4
	Benzene	0.4	0.4	0.4	0.4	0.4	0.4
	Toluene	0.4	0.4	0.4	0.4	0.4	0.4
	Ethylbenzene	0.4	0.4	0.4	0.4	0.4	0.4
	p/m-Xylene	0.4	0.4	0.4	0.4	0.4	0.4
	o-Xylene	0.4	0.4	0.4	0.4	0.4	0.4
	Chloroform	0.4	0.4	0.4	0.4	0.4	0.4

		RBS185-IN	RBS185-IN	RBS185-IN	RBS185-OUT	RBS185-OUT	RBS185-OUT
	date	3/12/2012	10/15/2012	6/20/2012	3/12/2012	10/14/2012	6/20/2012
	Bromodichloromethane	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
	Dibromochloromethane	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
	Bromoform	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
	Acetone	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
	2-Butanone	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
	2-Hexanone	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
	4-Methyl-2-Pentanone	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
	Carbon Disulfide	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
	2-Chloroethylvinylether	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
Herbicides	Dicamba	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**
	2,4-D	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**
	2,4-DP	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**
	2,4,5-TP	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**
	2,4,5-T	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**
	Dinoseb	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**
	Dalapon	**0.500**	**0.500**	**0.500**	**0.500**	**0.500**	**0.500**
	2,4-DB	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**	**0.400**
	MCPP	**8.00**	**8.00**	**8.00**	**8.00**	**8.00**	**8.00**
	MCPA	**8.00**	**8.00**	**8.00**	**8.00**	**8.00**	**8.00**

APPENDIX G

Groundwater Quality Criteria

Washington State Groundwater Standards (WAC 173-200-040)

Contaminant	Value	Unit
Conventionals		
Chloride	250	mg/L
Color	15	CU
Fluoride	4	mg/L
Foaming Agents	0.5	mg/L
Nitrate (as N)	10	mg/L
Odor	3	TOU
pH	6.5-8.5	
Sulfate	250	mg/L
Total Dissolved Solids	500	mg/L
Microbiological		
Total Coliform Bacteria	1	CFU/100 mL
Metals (total)		
Arsenic	0.05	ug/L
Barium	1.0	mg/L
Cadmium	0.01	mg/L
Chromium	0.05	mg/L
Copper	1.0	mg/L
Iron	0.30	mg/L
Lead	0.05	mg/L
Manganese	0.05	mg/L
Mercury	0.002	mg/L
Selenium	0.01	mg/L
Silver	0.05	mg/L
Zinc	5.0	mg/L
Radionuclides		
Gross Alpha Particle Activity	15	pCi/L
Gross Beta Activity	50	pCi/L
Radium 226 & 228	5	pCi/L
Radium -226	3	pCi/L
Strontium-90	8	pCi/L
Tritium	20,000	pCi/L
Volatile Organic Compounds		
1,1 Dichloroethane	1.0	ug/L
1,1,1-Trichloroethane	0.20	mg/L
1,2 Dibromoethane	0.001	ug/L
1,2 Dichloroethane (ethylene chloride)	0.5	ug/L
1,2 Dichloropropane	0.6	ug/L
1,3 Dichloropropene	0.2	ug/L
Acrylonitrile	0.07	ug/L
Benzene	1.0	ug/L
Bromodichloromethane	0.3	ug/L
Bromoform	5	ug/L
Carbon tetrachloride	0.3	ug/L

Washington State Groundwater Standards (WAC 173-200-040)

Contaminant	Value	Unit
Chlorodibromomethane	0.5	ug/L
Chloroform	7.0	ug/L
Methylene chloride (dichloromethane)	5	ug/L
Tetrachloroethylene (perchloroethylene)	0.8	ug/L
Trichloroethylene	3	ug/L
Vinyl chloride	0.02	ug/L
Semivolatile Organic Compounds		
1,4 Dichlorobenzene	4	ug/L
1,4 Dioxane	7.0	ug/L
2,4 Dinitrotoluene	0.1	ug/L
2,4,6-Trichlorophenol	4	ug/L
2,6 Dinitrotoluene	0.1	ug/L
3,3' Dichlorobenzidine	0.2	ug/L
Aniline	14	ug/L
Azobenzene	0.7	ug/L
Benzidine	0.0004	ug/L
Benzo(a)pyrene	0.008	ug/L
Bis(2-ethylhexyl) phthalate	6.0	ug/L
Bis(chloroethyl)ether	0.07	ug/L
Bis(chloromethyl)ether	0.0004	ug/L
Carbazole	5	ug/L
N-Nitrosodimethylamine	0.002	ug/L
N-Nitroso-di-n-propylamine	0.01	ug/L
N-Nitrosodiphenylamine	17	ug/L
PAH	0.01	ug/L
Trimethyl phosphate	2	ug/L
Chlorinated Pesticides		
Aldrin	0.005	ug/L
Chlordane	0.06	ug/L
DDT (includes DDE and DDD)	0.3	ug/L
Dieldrin	0.005	ug/L
Endrin	0.0002	mg/L
Heptachlor Epoxide	0.009	ug/L
Heptachlor	0.02	ug/L
Hexachlorobenzene	0.05	ug/L
Lindane	0.06	ug/L
Methoxychlor	0.1	mg/L
Mirex	0.05	ug/L
Toxaphene	0.08	ug/L
Chlorinated Herbicides		
2,4,5-TP Silvex	0.01	mg/L
2-4 D	0.10	mg/L
OP Pesticides		

Washington State Groundwater Standards (WAC 173-200-040)

Contaminant	Value	Unit
Dichlorvos	0.3	ug/L
PCBs		
PCBs	0.01	ug/L
Dioxin/Furan		
2,3,7,8-Tetrachlorodibenzo- p-dioxin	0.0000006	ug/L
Benzidine Based Dyes		
Direct Black 38	0.009	ug/L
Direct Blue 6	0.009	ug/L
Direct Brown 95	0.009	ug/L
Other Miscellaneous Organic Compounds		
1,2 Dimethylhydrazine	60	ug/L
1,2 Diphenylhydrazine	0.09	ug/L
2 Methoxy-5-nitroaniline	2	ug/L
2 Methylaniline hydrochloride	0.5	ug/L
2 Methylaniline	0.2	ug/L
2,4 Toluenediamine	0.002	ug/L
3,3' Dimethoxybenzidine	6	ug/L
3,3 Dimethylbenzidine	0.007	ug/L
4 Chloro-2-methyl analine hydrochloride	0.2	ug/L
4 Chloro-2-methyl aniline	0.1	ug/L
4,4' Methylene bis(N,N'-dimethyl) aniline	2	ug/L
Acrylamide	0.02	ug/L
Aramite	3	ug/L
Benzotrichloride	0.007	ug/L
Benzyl chloride	0.5	ug/L
Chlorothalonil	30	ug/L
Epichlorohydrin	8	ug/L
Ethyl acrylate	2	ug/L
Ethylene dibromide	0.001	ug/L
Ethylene thiourea	2	ug/L
Folpet	20	ug/L
Furazolidone	0.02	ug/L
Furium	0.002	ug/L
Furmecyclox	3	ug/L
Hexachlorocyclohexane (alpha)	0.001	ug/L
Hexachlorocyclohexane (technical)	0.05	ug/L
Hexachlorodibenzo-p-dioxin, mix	0.00001	ug/L
Hydrazine/Hydrazine sulfate	0.03	ug/L
Nitrofurazone	0.06	ug/L
N-Nitrosodiethanolamine	0.03	ug/L
N-Nitrosodiethylamine	0.0005	ug/L
N-Nitroso-di-n-butylamine	0.02	ug/L

Washington State Groundwater Standards (WAC 173-200-040)

Contaminant	Value	Unit
N-Nitroso-N-methylethylamine	0.004	ug/L
N-Nitrosopyrrolidine	0.04	ug/L
o-Chloronitrobenzene	3	ug/L
o-Phenylenediamine	0.005	ug/L
o-Toluidine	0.2	ug/L
p,α,α,α-Tetrachlorotoluene	0.004	ug/L
PBBs	0.01	ug/L
p-Chloronitrobenzene	5	ug/L
Propylene oxide	0.01	ug/L
Diallate	1	ug/L

APPENDIX H

Laboratory Reports

Soil Quality Data

Washington State Department of Transportation

Request for Approval of Material

Contract	FA Number	SR	Date
101197			11/2/2011

Section	County
185th Ave. NE Extension	King

Contractor	Subcontractor
Scarsella Brothers, Inc.	Terra Dynamics, Inc.

This form shall be completed prior to submittal. If this form is not complete at time of submittal it may be returned for information that was omitted.
For assistance in completing, see Instructions and Example

For WSDOT Use Only
RAM #

Bid Item No.	Material or Product/Type	Name and Location of Fabricator, Manufacturer or Pit Number	Specification Reference	PE/QPL Code	Hdqtr./QPL Code
17	Bioretention Soil	Red-E Topsoil Redmond, WA	2-03.3(9)	1,2	
61	Topsoil Type A	Red-E Topsoil Redmond, WA	9-14.1(1)	1,2	
62	Fine Compost	Cedar Grove Composting Everett, WA	9-14.4(8) See QPL	1,2	
62	Wood Chip Mulch/Shredded Mulch	Rainier Wood Recyclers Fall City, WA	9-14.4(3)	1,2	
74	Soil Amendment- Fine Compost	Cedar Grove Composting Everett, WA	9-14.4(8) See QPL	1,2	
75	Deep Root UB 18-2 Root Barrier	Deep Root San Francisco, CA	8-02.3(8)A See Cat Cut	3	

Project Engineer	Date	State Materials Engineer	Date
	11/9/11		

Acceptance Action Codes for use by Project Engineer and State Materials Laboratory

1. Acceptance Criteria: Acceptance based upon 'Satisfactory' Test Report for samples of materials to be incorporated into project.
2. Acceptance Criteria: Mfg. Cert. of Compliance for 'Acceptance' prior to use of material.
3. Acceptance Criteria: Catalog Cuts for 'Acceptance' prior to use of material. Catalog Cut Approved ☑ Yes ☐ No
4. Acceptance Criteria: Submit Shop Drawings for 'Approval' prior to fabrication of material.
5. Acceptance Criteria: Only 'Approved for Shipment', 'WSDOT Inspected' or 'Fabrication Approved Decal' material shall be used.
6. Acceptance Criteria: Submit Certificate of Materials Origin to Project Engineer Office.
7. Acceptance Criteria: Request Transmitted to State Materials Laboratory for Approval Action.
8. Source Approved: _____
9. Approval Withheld: Submit samples for preliminary evaluation.
10. Approval Withheld:
11. Miscellaneous Acceptance Criteria.

Remarks:

Project Engineer Distribution
☐ Contractor
☐ Region Operations Engineer
☐ Fabrication Inspection
☐ Region Materials
☐ State Materials Lab M/S 47365

State Materials Engineer Distribution
☐ General File
☐ Signing Inspection
☐ Other _____

DOT Form 350-071 EF
Revised 12/2008

TERRA DYNAMICS INC.
PO Box 2479 • Auburn, WA 98071
253-880-3100 • Fax: 253-880-3109

LETTER OF TRANSMITTAL

Scarsella Bros., Inc.	
PO Box 68697	
Seattle, WA 98168-0697	
Phone: 253-872-7173	
Fax: 253-395-1209	

Date:	11/3/11	Job No.	TD-112
ATTN:			
RE:	185th Ave NE Extension		
	Contract# 101197		
	Transmittal# 12		

We are transmitting the following to you: ☒Enclosed ☐Under Separate Cover Via _____

☐Drawings ☐Plans ☐Specifications ☒Product Data ☐Samples

☒Copy of Letter ☒Submittal ☐Contract ☐Change Order

CityofRedmond
WASHINGTON

Department of Public Works

- [X] No Exceptions
- [ ] Approved with corrections noted
- [ ] Disapproved – Revise & Resubmit

Signature

ber	Description
	REVISED RAM & Submittal packages for BI # 17, 61, 62, 74, 75

ow:

☒For Approval
☐For your Use
☐As requested
☐Approved as Submitted
☐Approved as Noted
☐For Review and Comment
☐

Remarks: Please forward to City for review and responses
Emailed SBI & City 11/3/11
Sent via:

Signed: *Karen Abrahamson*

C-101197
B1#17
Bioretention Soil

11/2/2011

To: Terre Dynamics
From: Red-E Topsoil
Project: 185th Ave NE Extension - Redmond
Subject: Bioretention Soil

Red-E Topsoil certifies that the Bioretention soil to be provided for this project will meet the specification under special provisions 2-03.3(9) from page 2.4 to 2.6. The Bioretention soil will be thoroughly blended with a front end loader to provide a homogenous blend of sixty percent mineral aggregate and forty percent compost. See attached for required soil test, sand gradation and compost report.

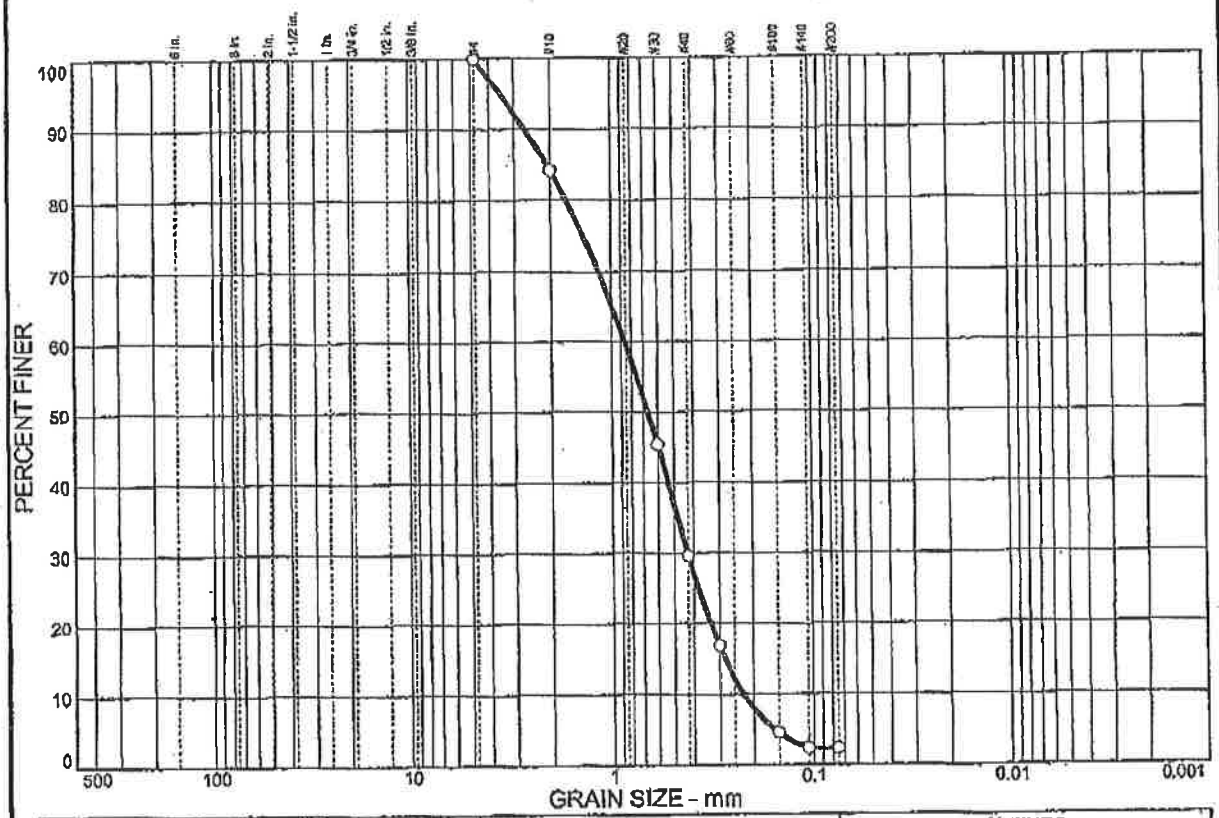
Regards,

Kyle Sanders
Sales Associate

18816 Northeast 80th Street • Redmond, Washington 98052 • (425) 868-6500 • Fax: (425) 868-2218

C-101197
Bl#17 Bioretention Soil

ASTM C117/136 Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
			15.8	54.5	27.3	2.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	99.9		
#10	84.1		
#30	45.3		
#40	29.6		
#50	16.8		
#100	4.5		
#140	2.3		
#200	2.3		

(no specification provided)

Soil Description

C-33
Supplied by client on 10-18-2011

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 2.08 D_{60}= 0.863 D_{50}= 0.669
D_{30}= 0.429 D_{15}= 0.281 D_{10}= 0.226
C_u= 3.82 C_c= 0.94

Classification

USCS= SP AASHTO= A-1-b

Remarks

F.M.=2.34

Sample No.: 9975 **Source of Sample:** **Date:** 10-20-2011
Location: C-33 **Elev./Depth:**

CASCADE TESTING LABORATORY, INC.
TESTING & INSPECTION / ENGINEERS
12919 NE 126TH PLACE
KIRKLAND, WASHINGTON 98034 (206) 823-8800

Client: Red-E Topsoil
Project: 2011 Laboratory Testing
Project No: 1101-02

Robert Alkman
Robert Alkman

10/20

C-101197
B1#17
Bioretention
Soil

CASCADE TESTING LABORATORY, INC.
TESTING & INSPECTION
12919 N.E. 126TH PLACE
KIRKLAND, WASHINGTON 98034
KIRKLAND: (425) 823-9800
FAX: (425) 823-2203
SEATTLE: (206) 525-6700
EVERETT: (425) 259-0817

January 19th, 2011
Cert No. 1101-02

Red-E Topsoil
18816 NE 80th St.
Redmond, Washington 98052

Reference: Laboratory Testing

Gentlemen;

The following represents the results of laboratory tests as performed on a sample of Bio-Retention Soil as supplied by you to our laboratory facility.

The sample as submitted was tested for determination of Water Permeability Rate and Unit Weight with the material fully saturated prior to the test.

The results of the tests are as follows;

Laboratory Sample Number:	9698
Soil Identification:	Bio-Retention Soil
Saturated Unit Weight:	100.2 pounds per cubic foot
Water Permeability Rate:	1.65 inches per hour

We hope this will answer any questions you may have, if any should aries or we can be of further assistance please do not hesitate to give us a call.

Respectfully;

CASCADE TESTING LABORATORY, INC.

Nick Averill
Laboratory Manager

Test results apply only to the item herein tested. This report shall not be reproduced except in full, without the written approval of Cascade Testing Laboratory, Inc.

BI #17 Bioretention Soil

NORTHERN LIGHTS
LABORATORY TESTING - CONSULTING

NORTHERN LIGHTS ANALYTICAL & CONSULTING INC.

Head Office
December 16, 2010
Job No. 10678 Lab. No. 10-342-0047

Attention: Dale Scilley
RED-E TOPSOIL
18816 NE 80th
Redmond, WA 98052

DECEMBER MAIL-IN ANALYSES (BIO RETENTION SOIL)

On an attached data sheet are results of the fertility and appraisal testing for the above referenced soil sent direct to the laboratory by you. Data interpretations and comments follow.

Soil fertility/suitability: Data indicate a slightly acid soil reaction at 6.5 on the pH scale and in a favorable range. Salinity (ECe) is safe at 1.2 dS/m. Agricultural suitability analyses indicate that the sodium ion is well balanced by other positively charged ions in the water extract solution and thus poses no hazard to plants at an estimated sodium adsorption ratio of SAR 1.1.

Calcium is moderately low, but all other major elements are within satisfactory availability ranges. The availabilities of all metallic micronutrients are in slightly elevated ranges. Boron is slightly low.

Soil appraisal: Appraisal testing shows a modest amount of gravel sized particles totaling 10.4% by weight of the sample received that passed a ½ inch screen. Because the sieve process does not differentiate between organic versus mineral particles, it is unknown what fraction of these particles may be originating from larger organic matter particles as opposed to mineral gravel per se.

Of those particles passing the 2 millimeter sieve, the majority falls into the desired medium to very fine sand category (51.3%). Combined silt and clay content is low, totaling only 7.4% by weight of those particles passing the 2 millimeter sieve. As such, this soil is classified sand based on USDA standards.

Organic matter content is a favorable range at 4.8 % based on the dry weight of the soil blend.

Based on these data, the soil should readily drain and would benefit from added boron and calcium either before planting or during initial post-plant fertility maintenance.

If there are any questions regarding this report please contact me.

Best Regards,
Dirk W. Muntean, M.A.

DWM/dwm

Distribution: Email: dscilley@hotmail.com; ksanders@red-e.biz

Attachments: DATA SHEET JOB 10678

P.O Box 673 Ravensdale, WA 98051-673 Phone: 253-653-5770 E-Mail: dirkmuntean@hotmail.com

C-101197
B1 #17 Bioretention Soil

Red-E-Topsoil
18816 NE 80th

Redmond WA 98052

Soil & Plant Laboratory, Inc.

Leaders in Soil & Plant Testing Since 1946

4741 E. Hunter Ave, Suite A Anaheim, CA 92807 714-282-8777 (phone) 714-282-8575 (fax)
www.soilandplantlaboratory.com

Project : Bio-Retention Soil

COMPREHENSIVE SOIL ANALYSIS

Report No : **10-342-0047**
Purchase Order :
Date Recd : 12/08/2010
Date Printed : 12/15/2010
Page : 1 of 1

Sample Description - Sample ID	Half Sat %	pH	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
	TEC	Qual Lime		Sufficiency Factors											
Bio-Retention Soil	17	6.5	1.2	9	22	28	357	657	182	2.4	6.3	18	89	4.8	26853
	56	None		0.9		1.4	3.6	0.7	1.4	3.3	2.2	3.9	3.2		

Saturation Extract Values						SAR	Gravel %		Percent of Sample Passing 2 mm Screen					USDA Soil Classification	Lab No.
									Sand			Silt	Clay		
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L		Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	.002-.05	0-.002		
3.1	2.5	1.9	3.1	0.17	2.4	1.1	4.2	5.2	9.4	31.8	51.3	5.0	2.4	Sand	26853

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH

Nov. 1. 2011 9:29AM RED-E-TOPSOIL No. 7718 P. 9

C-101197
Bl#17 Bioret. Soil

CASCADE TESTING LABORATORY, INC.
TESTING & INSPECTION
12919 N.E. 126TH PLACE
KIRKLAND, WASHINGTON 98034
KIRKLAND: (425) 823-9800
FAX: (425) 823-2203
SEATTLE: (206) 525-6700
EVERETT: (425) 259-0817

January 13th, 2011
Cert No. 1101-02

Red-E Topsoil
18816 NE 80th St.
Redmond, Washington 98052

Reference: Laboratory Testing

Gentlemen;

The following represents the results of laboratory tests as performed on a sample of Bio-Retention Soil as supplied by you to our laboratory facility.

The sample as submitted was tested for determination of Organic Content.

The results of the tests are as follows;

Laboratory Sample Number:	9697
Soil Identification:	Bio-Retention Soil
Percent Organics by Weight:	12.89 %
Percent Organics by Volume:	36.16 %

Results based on the assumed specific gravities of the organics (0.70) and sand (2.68).

We hope this will answer any questions you may have, if any should arise or we can be of further assistance please do not hesitate to give us a call.

Respectfully;

CASCADE TESTING LABORATORY, INC.

Nick Averill
Laboratory Manager

Test results apply only to the item herein tested. This report shall not be reproduced except in full, without the written approval of Cascade Testing Laboratory, Inc.

Washington State Department of Transportation

November 3, 2011

Qualified Product List

Contractor Product Information

Contractor: Scarsella Brothers, Inc. **Contract No:** 101197

Sub Contractor: Terra Dynamics, Inc. **Date:** 11/3/11

Bid Item: (#17) 61, 62, & 74

Manufacturer: Cedar Grove Composting, Inc. - Seattle, WA

Product Name: Compost; Coarse, Medium and Fine

Standard Spec : 9-14.4(8), Erosion Control - Mulch and Amendments - Compost

Product Description : Compost; coarse, medium and fine
Product Restriction :
(Reapproved 1-18-11)

Acceptance Code : 1135
Code Description : Receipt of a sample and satisfactory Test Report, dated within 90 calendar days of application of the material, from an independent STA program certified laboratory indicating that the lot(s) meets the requirements of the specifications under which it is listed. The Test Report must be received prior to incorporating the material into the project.

Last Updated : Jan 18, 2011

To be completed by the field inspector:

Quantity: _____ **Verified By:** _____ **Date:** _____

C-101197
BI #17 Bioretention
Soil

Cedar Grove Composting

2011 Letter of Certification Fine Compost

www.cgcompost.com • 877-764-5748

This letter certifies that the compost being used for the job referenced meets the following requirements.

Company Name: **Terra Dynamics**

Job Reference: **185th Extension**

1. Cedar Grove compost production, standards, and product quality complies in the areas as specified in the new Washington State Department of Ecology Administrative Code WAC-173-350-220.

2. The pH is between 6.0-8.5 when tested in accordance with TMECC 04.11-A, "Slurry PH"

3. Manufactured inert material (plastic, concrete, metal etc.) are less than 1.0 percent by weight in accordance with TMECC 3.08-A "Classification of inerts by Sieve Size"

4. Minimum organic matter in the compost is 40 percent dry weight basis as determined by TMECC "Loss-On-Ignition Organic Matter Method".

5. Soluble salt content is less than 4.0mmhos/cm tested in accordance with TMECC 04.10-A

6. Maturity is greater than 80% in accordance with TMECC 05.05A "Germination and Root Elongation".

7. Stability is 8 or below in accordance with TMECC O5.08B "Carbon Dioxide Evolution Rate".

8. A copy of the required lab analysis as described under WAC 173-350-220 is attached, and is less than 90 days old. A copy of our Seal of Testing Assurance as issued by the U.S. Composting Council is attached.

9. The compost consists of 80-85% recycled yard waste, 6-15% pre-consumer & post-consumer food waste and 1-5% wood waste.

10. Cedar Grove Composting is in compliance with regulations under solid waste (Seattle-King County Department of Public Health), Water (DOE) and Air (Puget Sound Clean Air Agency) rules. Our permits with all three agencies are in good standing.

Please contact us is you have any questions.

Sincerely,

Date: 11/1/2011

Jami Burke
Cedar Grove Composting
206-832-3068

SNOHOMISH
HEALTH
DISTRICT

ENVIRONMENTAL HEALTH DIVISION
3020 Rucker Avenue, Suite 104
Everett, WA 98201-3900
425.339.5250 FAX: 425.339.5254
Deaf/Hard of Hearing: 425.339.5252 (TTY)

SOLID WASTE FACILITY PERMIT #SW-182

Issued by the Snohomish Health District in accordance with the provisions of Chapter 70.95 of the Revised Code of Washington (RCW), Chapter 173-350 of the Washington Administrative Code (WAC) and the Snohomish Health District Sanitary Code, Chapters 3.1 and 3.2 (Adopted text of WAC 173-350).

PERMIT PERIOD: JULY 1, 2011 TO JUNE 30, 2012

PERMITTEE AND ADMINISTRATIVE INFORMATION

NAME OF FACILITY:	Cedar Grove Composting
FACILITY LOCATION:	3620 36th Place NE, Everett, Washington 98201
FACILITY OWNER:	Cedar Grove, Inc.
FACILITY OPERATOR:	Jerry Bartlett
PHONE:	206.832.3000
PERMIT TYPE:	Waste Recycling / Composting
ANNUAL FEE:	$4160.00

The conditions of this permit are contained on the following pages. This permit is the property of the Snohomish Health District and may be suspended or revoked upon violation of any rules and regulations applicable hereto. This permit is not transferable to a different site, and must be renewed annually. This permit or a legible copy must be displayed or stored in a manner, which allows easy access by operating personnel.

Aran Enger, R.S.
Solid Waste and Toxics Section
Environmental Health Division

29 JUNE 2011
Date of Issuance

C# 101197
BI #17
Bioretention Soil

Cedar Grove Composting
Compost Quality Assurance Program 2011

Cedar Grove Fine Grade Compost

Cedar Grove Compost is made from 100% locally recycled yard and food trimmings, and clean wood waste. Cedar Grove Compost is made at facilities that are in compliance with Washington Department of Ecology (WDOE) requirements for compost process and product quality (WAC 173-350-220). Cedar Grove also voluntarily meets the US Composting Council's Seal of Testing Assurance (STA) and Washington Department of Transportation (WDOT) standards. Results of tests for horticultural values are shown in Chart 1, along with applicable WDOT standards. WDOE compost quality requirements and Cedar Grove Compost results are in Chart 2.

Chart 1. Cedar Grove Fine Grade Compost Horticultural Values

		WDOT Standard	Cedar Grove (7/18/2011)
Organic Matter		>40%	61.8%
Carbon to Nitrogen Ratio			17
Conductivity		<4 mmhos/cm	3.7 mmhos/cm
Seedling Emergence		>80%	100%
Seedling Vigor		>80%	100%
Compost Stability		<7 mg CO_2/gr. OM/day	3.1 - "Stable"
Viable Weed Seeds			No Viable Weed Seed Detected
Dry weight			27 lbs / cu. Ft.
Major Nutrients	Total Nitrogen		1.7%
	Phosphorous (P_2O_5)		0.86%
	Potassium (K_2O)		0.84%
	Sulfate		120 mg/kg
	Calcium		1.8%
	Magnesium		0.31%

Chart 2. Compost Quality Requirements - Washington Administrative Code *173-350 Sect. 220*

	WAC 173-350-220 Standard	Cedar Grove Compost (7/18/2011)
Metals	*Parts per million (mg/kg), dry wt.*	
Arsenic	<=20	8.2
Cadmium	<=10	<1.0
Copper	<=750	61
Lead	<=150	54
Mercury	<=8	<1.0
Molybdenum	<=9	5.7
Nickel	<=210	37
Selenium	<=18	<1
Zinc	<=1400	180
pH	5-10 (range)	6.19
Salmonella (Pathogen indicator)	< 3 MPN / 4 grams of total solids	Pass
Sharps	0 percent	None Detected
Manufactured Inerts	< 1 percent	< 0.5 percent

Chart 3. WDOT Particle Size Specifications by Compost Grade

Sieve size	WDOT "Fine" Compost	Cedar Grove (7/18/2011)
1"	95-100%	100%
5/8"	90-100%	93.9%
¼"	75-100%	84.4%

US Composting Council
Seal of Testing Assurance

All tests performed by Soil Control Laboratories, Watsonville, CA; using TMECC/STA specified methods.

US COMPOSTING COUNCIL

Seal of Testing Assurance

Cedar Grove Compost
Martin Okoli
17825 Cedar Grove Rd. SE
Maple Valley
WA 98038 (425) 432-2395

Product Identification	Compost
MV 49 7/1/11	

Date Sampled/Received: 30 Jun. 11 / 01 Jul. 11

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 tel: 831.724.5422 fax: 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	53.4	
Organic Matter Content	%, dry weight basis	61.8	
pH	units	6.19	
Soluble Salts *(electrical conductivity EC $_5$)*	dS/m (mmhos/cm)	3.7	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	3.1	Stable
	mg CO_2-C/g TS/day	1.9	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	100.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Not tested	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Jul.11 A1 Laboratory Number: 1070004-4/5

Analyst: Assaf Sadeh

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Cedar Grove Compost
Martin Okoli
17825 Cedar Grove Rd. SE
Maple Valley
WA 98038 (425) 432-2395

Product Identification	Compost
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COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 tel: 831.724.5422 fax: 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.78	1.7
Phosphorus	P_2O_5	0.41	0.86
Potassium	K_2O	0.39	0.84
Calcium	Ca	0.84	1.8
Magnesium	Mg	0.14	0.31
Moisture Content	%, wet weight basis	53.4	
Organic Matter Content	%, dry weight basis	61.8	
pH	units	6.19	
Soluble Salts *(electrical conductivity EC $_5$)*	dS/m (mmhos/cm)	3.7	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	93.9	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g·OM/day	3.1	Stable
	mg CO_2-C/g TS/day	1.9	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	100.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Not tested	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group:	Jul.11 A1	Laboratory Number:	1070004-4/5
Analyst: Assaf Sadeh		www.compostlab.com	

US COMPOSTING COUNCIL

Seal of Testing Assurance

Washington State Department of Transportation

Cedar Grove Compost
Martin Okoli
17825 Cedar Grove Rd. SE
Maple Valley WA 98038 (425) 432-2395

Product Identification:
MV 49 7/1/11

Date Sampled/Received: 30 Jun. 11 / 01 Jul. 11

Compost Technical Data Sheet for Washington State DOT Projects

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	Specification Requirements			Test Results	
	%, dry weight passing through			%, dry weight passing through	
Size Classification	**Sieve Size**	**Fine**	**Medium**	**Coarse**	**Sieve Size**
TMECC 02.02-B	3"	100	100	100	3" 100.0
	2"	100	100		2" 100.0
	1"	95 – 100	95 – 100	90 – 100	1" 100.0
	¾"			70 – 100	¾" 100.0
	5/8"	90 – 100	90 – 100		5/8" 93.9
	¼"	75 - 100	75 – 85	40 – 60	¼" 84.4
	Maximum Particle Length 6"				**Maximum Particle Length Less than 6"**
pH TMECC 04.11-A 1:5 slurry	**6.0 min. and 8.5 max.**				**6.19**
Manufactured Inerts TMECC 03.08-A % dry weight basis	**1.0 max.**				**< 0.5**
Organic Matter Content TMECC 05.07 A Loss-on-Ignition % dry weight basis	**40 min.**				**61.8**
Soluble Salts TMECC 04.10-A 1:5 Slurry dS/m (mmohs/cm)	**4.0* max.**				**3.7**
Maturity Indicator TMECC 05.05 A Cucumber Bioassay % average of control	**Germination: 80% or greater**				**Germination: 100**
	Vigor: 80% or greater				**Vigor: 100**
Stability Indicator TMECC 05.08-B Carbon Dioxide Evolution Rate	**7 or below** mg CO2-C/g OM/day				**3.1**

**Check for special provisions in Columbia River basin*

"This compost product has been sampled and tested by the Seal of Testing Assurance Program of the United States Composting Council (USCC), using certain methods from the Test Methods for the Examination of Compost and Composting Manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use."

Laboratory Group: Jul.11 A1 No.31 Laboratory Number: 1070004-4/5-2192

Analyst: Assaf Sadeh

www.compostlab.com

Date Reported: 18-Jul-11

ANALYTICAL CHEMISTS and BACTERIOLOGISTS Approved by State of California

SOIL CONTROL LAB

42 PLANCARS WAY WATSONVILLE CALIFORNIA 95076 USA

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 1070004-4/5-2192
Group: Jul.11 A1 #31
Reporting Date: July 18, 2011

Cedar Grove Compost
17825 Cedar Grove Rd. SE
Maple Valley, WA 98038
Attn: Martin Okoli

Date Received: 01 Jul. 11
Sample Identification: MV 49 7/1/11
Sample ID #: 1070004 - 4/5

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.7	0.78	%
Ammonia (NH_4-N):	600	280	mg/kg
Nitrate (NO_3-N):	3.1	1.5	mg/kg
Org. Nitrogen (Org.-N):	1.6	0.75	%
Phosphorus (as P_2O_5):	0.86	0.40	%
Phosphorus (P):	3800	1800	mg/kg
Potassium (as K_2O):	0.84	0.39	%
Potassium (K):	7000	3200	mg/kg
Calcium (Ca):	1.8	0.84	%
Magnesium (Mg):	0.31	0.14	%
Sulfate (SO_4-S):	120	55	mg/kg
Boron (Total B):	25	12	mg/kg
Moisture:	0	53.4	%
Sodium (Na):	0.15	0.070	%
Chloride (Cl):	0.16	0.077	%
pH Value:	NA	6.19	unit
Bulk Density :	21	46	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	3.7	NA	mmhos/cm
Organic Matter:	61.8	28.8	%
Organic Carbon:	28.0	13.0	%
Ash:	38.2	17.8	%
C/N Ratio	17	17	ratio
AgIndex	> 10	> 10	ratio

Metals	Dry wt.	EPA Limit	units
Alumnium (Al)	6300	-	mg/kg
Arsenic (As):	8.2	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	78	1200	mg/kg
Cobalt (Co)	3.5	-	mg/kg
Copper (Cu):	61	1500	mg/kg
Iron (Fe):	11000	-	mg/kg
Lead (Pb):	54	300	mg/kg
Manganese (Mn):	270	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	5.7	18	mg/kg
Nickel (Ni):	37	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	180	2800	mg/kg

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	3.1	5.2
mg CO_2-C/g TS/day	1.9	3.2
Stability Rating	*stable*	*stable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	100	100
Description of Plants	*mushroom*	*mushroom*

Pathogens	Results	Units	Rating
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 01 Jul. 11

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	6.1	7.1	0.25
6.3 to 9.5	9.5	12.4	0.23
4.0 to 6.3	2.9	3.8	0.22
2.0 to 4.0	20.1	27.0	0.22
< 2.0	61.5	49.7	0.37

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

*Sample was received and handled in accordance with TMECC procedures.

C-101197
BI #61
SP 9-14.1(1)

11/1/2011

To: Terra Dynamics
From: Red-E Topsoil
Project: 185th Ave NE Extension - Redmond
Subject: Topsoil Type A

Red-E Topsoil certifies that the Topsoil Type A for this project will meet the following specification, "A quality topsoil product is at a minimum a loam soil with fine compost amendments, rich in nutrients, free draining and weed free."

Sincerely,

Kyle Sanders
Sales Associate

18816 Northeast 80th Street • Redmond, Washington 98052 • (425) 868-6500 • Fax: (425) 868-2218

Soil & Plant Laboratory, Inc
Leaders in Soil & Plant Testing Since 1948
www.soilandplantlaboratory.com

C-101197
BI #61
Topsoil Type A

Locations:

352 Mathew St.
Santa Clara, CA 95050
(408) 727-0330

4741 E. Hunter Ave., Suite A
Anaheim, CA 92807
(714) 282-8777

Anaheim office
Lab No: 11-122-0055
May 12, 2011

Red-E-Topsoil
18816 NE 80th
Redmond, WA 98052

Attn: Kyle Sanders

2/3-1/3 (LOAM/COMPOST)

Attached are the results of the analysis performed on a soil sample that was received by Soil and Plant Laboratory on May 2, 2011. This sample was analyzed for nutrient levels and soil suitability in preparation for its use as an import topsoil.

Analytical Results:

The reaction of the soil is slightly acidic at 6.4 on the pH scale and qualitative lime is favorably absent. This is ideal for most plants. The organic content of the soil is ideal at 5.4% of the sample by dry weight.

Salinity (ECe) is safely low. The low and safe sodium adsorption ratio (SAR) indicates that the small amount of sodium present is properly balanced by calcium and magnesium. Boron is safely low, yet sufficient for plant nutritional purposes.

Nitrogen, phosphorous and potassium are well supplied. Calcium is moderate and magnesium is optimum. Although not at problematic levels, all of the micronutrients are high, ranging from approximately 4 to 45 times full sufficiency. In areas where this material comprises the root zone of plants, micronutrients will not require supplementation for a very long time.

The texture of the soil is 'loamy sand' according to USDA classification standards. 19% of the sample is gravel that is greater than 2.0 mm in diameter, earning this sample the label "gravelly" and indicating that it will have some tendency to compact.

Comments

Soil fertility is excellent and there were no chemical hazards discovered in this analysis that would be expected to have a negative effect on plant establishment and growth. The organic content of the soil is optimum. In areas where this soil comprises the root zone of plants, no preplant amendments or fertilizers will be necessary.

The silt and clay content are favorably low, indicating that this soil would be a good textural match for a broad range of native soils. Screening the material to 2.0 mm minus prior to blending with organic amendment would decrease the gravel content and result in less of a tendency for the soil to compact.

C-101197
B1#61 Topsoil A

Red-E-Topsoil
18816 NE 80th

Redmond WA 98052

Soil & Plant Laboratory, Inc.
Leaders in Soil & Plant Testing Since 1946
4741 E. Hunter Ave, Suite A Anaheim, CA 92807 714-282-8777 (phone) 714-282-8575 (fax)
www.soilandplantlaboratory.com

Project : 2/3-1/3 (Loam/Compost)

Report No : 11-122-0055
Purchase Order : 4558
Date Recd : 05/02/2011
Date Printed : 05/12/2011
Page : 1 of 1

COMPREHENSIVE SOIL ANALYSIS

Sample Description - Sample ID	Half Sat %	pH	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
	TEC	Qual Lime		Sufficiency Factors											
Soil Sample	31	6.4	1.3	16	46	38	556	1081	247	6.4	97.3	24	130	5.4	28328
	89	None		1.0		1.0	3.1	0.7	1.2	7.3	21.9	2.4	3.0		

Saturation Extract Values							Gravel %		Percent of Sample Passing 2 mm Screen							
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L	SAR	Coarse 5 - 12	Fine 2 - 5	Sand Very Coarse 1 - 2	Sand Coarse 0.5 - 1	Sand Med. to Very Fine 0.05 - 0.5	Silt .002 - 05	Clay 0 - .002	USDA Soil Classification	Lab No.
2.9	2.1	3.4	4.7	0.17	2.0	2.2	4.9	14.1	15.1	25.5	41.3	10.9	7.1	Gravelly Loamy Sand	28328

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH

Nov. 1. 2011 9:29AM RED-E-TOPSOIL No. 7718 P. 6

Washington State Department of Transportation

November 3, 2011

Qualified Product List

Contractor Product Information

Contractor: Scarsella Brothers, Inc. **Contract No:** 101197

Sub Contractor: Terra Dynamics, Inc. **Date:** 11/3/11

Bid Item: #17, 61, 62, & 74

Manufacturer: Cedar Grove Composting, Inc. - Seattle, WA

Product Name: Compost; Coarse, Medium and Fine

Standard Spec : 9-14.4(8), Erosion Control - Mulch and Amendments - Compost

Product Description : Compost; coarse, medium and fine
Product Restriction :
(Reapproved 1-18-11)

Acceptance Code : 1135
Code Description : Receipt of a sample and satisfactory Test Report, dated within 90 calendar days of application of the material, from an independent STA program certified laboratory indicating that the lot(s) meets the requirements of the specifications under which it is listed. The Test Report must be received prior to incorporating the material into the project.

Last Updated : Jan 18, 2011

To be completed by the field inspector:

Quantity: _____ **Verified By:** _____ **Date:** _____

C-101197
B1 #61 Topsoil A
Compost Component

Cedar Grove Composting

2011 Letter of Certification Fine Compost

www.cgcompost.com • 877-764-5748

This letter certifies that the compost being used for the job referenced meets the following requirements.

Company Name: **Terra Dynamics**

Job Reference: **185th Extension**

1. Cedar Grove compost production, standards, and product quality complies in the areas as specified in the new Washington State Department of Ecology Administrative Code WAC-173-350-220.
2. The pH is between 6.0-8.5 when tested in accordance with TMECC 04.11-A, "Slurry PH"
3. Manufactured inert material (plastic, concrete, metal etc.) are less than 1.0 percent by weight in accordance with TMECC 3.08-A "Classification of inerts by Sieve Size"
4. Minimum organic matter in the compost is 40 percent dry weight basis as determined by TMECC "Loss-On-Ignition Organic Matter Method".
5. Soluble salt content is less than 4.0mmhos/cm tested in accordance with TMECC 04.10-A
6. Maturity is greater than 80% in accordance with TMECC 05.05A "Germination and Root Elongation".
7. Stability is 8 or below in accordance with TMECC 05.08B "Carbon Dioxide Evolution Rate".
8. A copy of the required lab analysis as described under WAC 173-350-220 is attached, and is less than 90 days old. A copy of our Seal of Testing Assurance as issued by the U.S. Composting Council is attached.
9. The compost consists of 80-85% recycled yard waste, 6-15% pre-consumer & post-consumer food waste and 1-5% wood waste.
10. Cedar Grove Composting is in compliance with regulations under solid waste (Seattle-King County Department of Public Health), Water (DOE) and Air (Puget Sound Clean Air Agency) rules. Our permits with all three agencies are in good standing.

Please contact us is you have any questions.

Sincerely,

Date: 11/1/2011

Jami Burke
Cedar Grove Composting
206-832-3068

SNOHOMISH
HEALTH
DISTRICT

ENVIRONMENTAL HEALTH DIVISION
3020 Rucker Avenue, Suite 104
Everett, WA 98201-3900
425.339.5250 FAX: 425.339.5254
Deaf/Hard of Hearing: 425.339.5252 (TTY)

SOLID WASTE FACILITY PERMIT #SW-182

Issued by the Snohomish Health District in accordance with the provisions of Chapter 70.95 of the Revised Code of Washington (RCW), Chapter 173-350 of the Washington Administrative Code (WAC) and the Snohomish Health District Sanitary Code, Chapters 3.1 and 3.2 (Adopted text of WAC 173-350).

PERMIT PERIOD: JULY 1, 2011 TO JUNE 30, 2012

PERMITTEE AND ADMINISTRATIVE INFORMATION

NAME OF FACILITY:	Cedar Grove Composting
FACILITY LOCATION:	3620 36th Place NE, Everett, Washington 98201
FACILITY OWNER:	Cedar Grove, Inc.
FACILITY OPERATOR:	Jerry Bartlett
PHONE:	206.832.3000
PERMIT TYPE:	Waste Recycling / Composting
ANNUAL FEE:	$4160.00

The conditions of this permit are contained on the following pages. This permit is the property of the Snohomish Health District and may be suspended or revoked upon violation of any rules and regulations applicable hereto. This permit is not transferable to a different site, and must be renewed annually. This permit or a legible copy must be displayed or stored in a manner, which allows easy access by operating personnel.

Aran Enger, R.S.
Solid Waste and Toxics Section
Environmental Health Division

29 JUNE 2011
Date of Issuance

C# 101197
BI #61
Topsoil Type A
Compost

Cedar Grove Composting
Compost Quality Assurance Program 2011

Cedar Grove Fine Grade Compost

Cedar Grove Compost is made from 100% locally recycled yard and food trimmings, and clean wood waste. Cedar Grove Compost is made at facilities that are in compliance with Washington Department of Ecology (WDOE) requirements for compost process and product quality (WAC 173-350-220). Cedar Grove also voluntarily meets the US Composting Council's Seal of Testing Assurance (STA) and Washington Department of Transportation (WDOT) standards. Results of tests for horticultural values are shown in Chart 1, along with applicable WDOT standards. WDOE compost quality requirements and Cedar Grove Compost results are in Chart 2.

Chart 1. Cedar Grove Fine Grade Compost Horticultural Values

		WDOT Standard	Cedar Grove (7/18/2011)
Organic Matter		>40%	61.8%
Carbon to Nitrogen Ratio			17
Conductivity		<4 mmhos/cm	3.7 mmhos/cm
Seedling Emergence		>80%	100%
Seedling Vigor		>80%	100%
Compost Stability		<7 mg CO_2/gr. OM/day	3.1 - "Stable"
Viable Weed Seeds			No Viable Weed Seed Detected
Dry weight			27 lbs / cu. Ft.
Major Nutrients	Total Nitrogen		1.7%
	Phosphorous (P_2O_5)		0.86%
	Potassium (K_2O)		0.84%
	Sulfate		120 mg/kg
	Calcium		1.8%
	Magnesium		0.31%

Chart 2. Compost Quality Requirements - Washington Administrative Code *173-350 Sect. 220*

	WAC 173-350-220 Standard	Cedar Grove Compost (7/18/2011)
Metals	*Parts per million (mg/kg), dry wt.*	
Arsenic	<=20	8.2
Cadmium	<=10	<1.0
Copper	<=750	61
Lead	<=150	54
Mercury	<=8	<1.0
Molybdenum	<=9	5.7
Nickel	<=210	37
Selenium	<=18	<1
Zinc	<=1400	180
pH	5-10 (range)	6.19
Salmonella (Pathogen indicator)	< 3 MPN / 4 grams of total solids	Pass
Sharps	0 percent	None Detected
Manufactured Inerts	< 1 percent	< 0.5 percent

Chart 3. WDOT Particle Size Specifications by Compost Grade

Sieve size	WDOT "Fine" Compost	Cedar Grove (7/18/2011)
1"	95-100%	100%
5/8"	90-100%	93.9%
¼"	75-100%	84.4%

US Composting Council
Seal of Testing Assurance

All tests performed by Soil Control Laboratories, Watsonville, CA; using TMECC/STA specified methods.

US COMPOSTING COUNCIL

Seal of Testing Assurance

Cedar Grove Compost
Martin Okoli
17825 Cedar Grove Rd. SE
Maple Valley
WA 98038 (425) 432-2395

Date Sampled/Received: 30 Jun. 11 / 01 Jul. 11

Product Identification Compost
MV 49 7/1/11

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 tel: 831.724.5422 fax: 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	53.4	
Organic Matter Content	%, dry weight basis	61.8	
pH	units	6.19	
Soluble Salts *(electrical conductivity EC $_5$)*	dS/m (mmhos/cm)	3.7	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	3.1	Stable
	mg CO_2-C/g TS/day	1.9	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	100.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Not tested	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Jul.11 A1 Laboratory Number: 1070004-4/5

Analyst: Assaf Sadeh

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Cedar Grove Compost
Martin Okoli
17825 Cedar Grove Rd. SE
Maple Valley
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Product Identification	Compost
MV 49 7/1/11	

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COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 tel: 831.724.5422 fax: 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.78	1.7
Phosphorus	P_2O_5	0.41	0.86
Potassium	K_2O	0.39	0.84
Calcium	Ca	0.84	1.8
Magnesium	Mg	0.14	0.31
Moisture Content	%, wet weight basis	53.4	
Organic Matter Content	%, dry weight basis	61.8	
pH	units	6.19	
Soluble Salts *(electrical conductivity EC $_5$)*	dS/m (mmhos/cm)	3.7	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	93.9	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	3.1	Stable
	mg CO_2-C/g TS/day	1.9	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	100.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Not tested	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
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Laboratory Group: Jul.11 A1 Laboratory Number: 1070004-4/5

Analyst: Assaf Sadeh

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Washington State Department of Transportation

Cedar Grove Compost
Martin Okoli
17825 Cedar Grove Rd. SE
Maple Valley WA 98038 (425) 432-2395

Product Identification:
MV 49 7/1/11
Date Sampled/Received: 30 Jun. 11 / 01 Jul. 11

Compost Technical Data Sheet for Washington State DOT Projects

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	Specification Requirements				Test Results	
	%, dry weight passing through				%, dry weight passing through	
Size Classification	**Sieve Size**	**Fine**	**Medium**	**Coarse**	**Sieve Size**	
TMECC 02.02-B	3"	100	100	100	3"	100.0
	2"	100	100		2"	100.0
	1"	95 – 100	95 – 100	90 – 100	1"	100.0
	¾"			70 – 100	¾"	100.0
	5/8"	90 – 100	90 – 100		5/8"	93.9
	¼"	75 - 100	75 – 85	40 – 60	¼"	84.4
	Maximum Particle Length 6"				**Maximum Particle Length Less than 6"**	
pH TMECC 04.11-A 1:5 slurry	**6.0 min. and 8.5 max.**				**6.19**	
Manufactured Inerts TMECC 03.08-A % dry weight basis	**1.0 max.**				**< 0.5**	
Organic Matter Content TMECC 05.07 A Loss-on-Ignition % dry weight basis	**40 min.**				**61.8**	
Soluble Salts TMECC 04.10-A 1:5 Slurry dS/m (mmohs/cm)	**4.0* max.**				**3.7**	
Maturity Indicator TMECC 05.05 A Cucumber Bioassay % average of control	**Germination: 80% or greater** **Vigor: 80% or greater**				**Germination:** 100 **Vigor:** 100	
Stability Indicator TMECC 05.08-B Carbon Dioxide Evolution Rate	**7 or below** mg CO2-C/g OM/day				**3.1**	

**Check for special provisions in Columbia River basin*

"This compost product has been sampled and tested by the Seal of Testing Assurance Program of the United States Composting Council (USCC), using certain methods from the Test Methods for the Examination of Compost and Composting Manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use."

Laboratory Group: Jul.11 A1 No.31 Laboratory Number: 1070004-4/5-2192

Analyst: Assaf Sadeh

www.compostlab.com Date Reported: 18-Jul-11

ANALYTICAL CHEMISTS and BACTERIOLOGISTS Approved by State of California

SOIL CONTROL LAB

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 1070004-4/5-2192
Group: Jul.11 A1 #31
Reporting Date: July 18, 2011

Cedar Grove Compost
17825 Cedar Grove Rd. SE
Maple Valley, WA 98038
Attn: Martin Okoli

Date Received: 01 Jul. 11
Sample Identification: MV 49 7/1/11
Sample ID #: 1070004 - 4/5

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.7	0.78	%
Ammonia (NH_4-N):	600	280	mg/kg
Nitrate (NO_3-N):	3.1	1.5	mg/kg
Org. Nitrogen (Org.-N):	1.6	0.75	%
Phosphorus (as P_2O_5):	0.86	0.40	%
Phosphorus (P):	3800	1800	mg/kg
Potassium (as K_2O):	0.84	0.39	%
Potassium (K):	7000	3200	mg/kg
Calcium (Ca):	1.8	0.84	%
Magnesium (Mg):	0.31	0.14	%
Sulfate (SO_4-S):	120	55	mg/kg
Boron (Total B):	25	12	mg/kg
Moisture:	0	53.4	%
Sodium (Na):	0.15	0.070	%
Chloride (Cl):	0.16	0.077	%
pH Value:	NA	6.19	unit
Bulk Density :	21	46	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	3.7	NA	mmhos/cm
Organic Matter:	61.8	28.8	%
Organic Carbon:	28.0	13.0	%
Ash:	38.2	17.8	%
C/N Ratio	17	17	ratio
AgIndex	> 10	> 10	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	3.1	5.2
mg CO_2-C/g TS/day	1.9	3.2
Stability Rating	*stable*	*stable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	100	100
Description of Plants	*mushroom*	*mushroom*

Pathogens	Results	Units	Rating
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 01 Jul. 11

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Alumnium (Al)	6300	-	mg/kg
Arsenic (As):	8.2	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	78	1200	mg/kg
Cobalt (Co)	3.5	-	mg/kg
Copper (Cu):	61	1500	mg/kg
Iron (Fe):	11000	-	mg/kg
Lead (Pb):	54	300	mg/kg
Manganese (Mn):	270	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	5.7	18	mg/kg
Nickel (Ni):	37	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	180	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	6.1	7.1	0.25
6.3 to 9.5	9.5	12.4	0.23
4.0 to 6.3	2.9	3.8	0.22
2.0 to 4.0	20.1	27.0	0.22
< 2.0	61.5	49.7	0.37

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

*Sample was received and handled in accordance with TMECC procedures.

C 101197
BI # 62.
Wood Chip Mulch

November 2, 2011

TO: Terra Dynamics
ATTN: Karen Abrahamson
PHONE: 253-880-3100
FAX: 253-880-3109

RAINIER WOOD RECYCLERS
INCORPORATED

FROM: Bob Sargent

Material Certification

185th Ave NE Extension

Wood Chip Mulch

We, the manufacturer, certify that the material will satisfy the spec fort he Washington Dept. of Transportation, Section 9-14.4 Shredded Mulch of the Special Provisions and SP 9-14.4(3).

Please call me with questions, if any: 253-350-1291

Washington State Department of Transportation

November 3, 2011

Qualified Product List

Contractor Product Information

Contractor: Scarsella Brothers, Inc. **Contract No:** 101197

Sub Contractor: Terra Dynamics, Inc. **Date:** 11/3/11

Bid Item: #17, 61, 62, & 74

Manufacturer: Cedar Grove Composting, Inc. - Seattle, WA

Product Name: Compost; Coarse, Medium and Fine

Standard Spec : 9-14.4(8), Erosion Control - Mulch and Amendments - Compost

Product Description : Compost; coarse, medium and fine
Product Restriction :
(Reapproved 1-18-11)

Acceptance Code : 1135
Code Description : Receipt of a sample and satisfactory Test Report, dated within 90 calendar days of application of the material, from an independent STA program certified laboratory indicating that the lot(s) meets the requirements of the specifications under which it is listed. The Test Report must be received prior to incorporating the material into the project.

Last Updated : Jan 18, 2011

To be completed by the field inspector:

Quantity: _____ **Verified By:** _____ **Date:** _____

C#101197
BI#74 Soil Amendmt
FINE Compost

Cedar Grove Composting

2011 Letter of Certification Fine Compost

www.cgcompost.com • 877-764-5748

This letter certifies that the compost being used for the job referenced meets the following requirements.

Company Name: **Terra Dynamics**

Job Reference: **185th Extension**

1. Cedar Grove compost production, standards, and product quality complies in the areas as specified in the new Washington State Department of Ecology Administrative Code WAC-173-350-220.

2. The pH is between 6.0-8.5 when tested in accordance with TMECC 04.11-A, "Slurry PH"

3. Manufactured inert material (plastic, concrete, metal etc.) are less than 1.0 percent by weight in accordance with TMECC 3.08-A "Classification of inerts by Sieve Size"

4. Minimum organic matter in the compost is 40 percent dry weight basis as determined by TMECC "Loss-On-Ignition Organic Matter Method".

5. Soluble salt content is less than 4.0mmhos/cm tested in accordance with TMECC 04.10-A

6. Maturity is greater than 80% in accordance with TMECC 05.05A "Germination and Root Elongation".

7. Stability is 8 or below in accordance with TMECC 05.08B "Carbon Dioxide Evolution Rate".

8. A copy of the <u>required</u> lab analysis as described under WAC 173-350-220 is attached, and is less than 90 days old. A copy of our Seal of Testing Assurance as issued by the U.S. Composting Council is attached.

9. The compost consists of 80-85% recycled yard waste, 6-15% pre-consumer & post-consumer food waste and 1-5% wood waste.

10. Cedar Grove Composting is in compliance with regulations under solid waste (Seattle-King County Department of Public Health), Water (DOE) and Air (Puget Sound Clean Air Agency) rules. Our permits with all three agencies are in good standing.

Please contact us is you have any questions.

Sincerely,

Date: 11/1/2011

Jami Burke
Cedar Grove Composting
206-832-3068

SNOHOMISH
HEALTH
DISTRICT

ENVIRONMENTAL HEALTH DIVISION
3020 Rucker Avenue, Suite 104
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SOLID WASTE FACILITY PERMIT #SW-182

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PERMIT PERIOD: JULY 1, 2011 TO JUNE 30, 2012

PERMITTEE AND ADMINISTRATIVE INFORMATION

NAME OF FACILITY:	Cedar Grove Composting
FACILITY LOCATION:	3620 36th Place NE, Everett, Washington 98201
FACILITY OWNER:	Cedar Grove, Inc.
FACILITY OPERATOR:	Jerry Bartlett
PHONE:	206.832.3000
PERMIT TYPE:	Waste Recycling / Composting
ANNUAL FEE:	$4160.00

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Aran Enger, R.S.
Solid Waste and Toxics Section
Environmental Health Division

29 JUNE 2011
Date of Issuance

C# 101197
BI #74
FINE Compost
Soil Amendment

Cedar Grove Composting
Compost Quality Assurance Program 2011

Cedar Grove Fine Grade Compost

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		WDOT Standard	Cedar Grove (7/18/2011)
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Seedling Vigor		>80%	100%
Compost Stability		<7 mg CO_2/gr. OM/day	3.1 - "Stable"
Viable Weed Seeds			No Viable Weed Seed Detected
Dry weight			27 lbs / cu. Ft.
Major Nutrients	Total Nitrogen		1.7%
	Phosphorous (P_2O_5)		0.86%
	Potassium (K_2O)		0.84%
	Sulfate		120 mg/kg
	Calcium		1.8%
	Magnesium		0.31%

Chart 2. Compost Quality Requirements - Washington Administrative Code *173-350 Sect. 220*

	WAC 173-350-220 Standard	Cedar Grove Compost (7/18/2011)
Metals	*Parts per million (mg/kg), dry wt.*	
Arsenic	<=20	8.2
Cadmium	<=10	<1.0
Copper	<=750	61
Lead	<=150	54
Mercury	<=8	<1.0
Molybdenum	<=9	5.7
Nickel	<=210	37
Selenium	<=18	<1
Zinc	<=1400	180
pH	5-10 (range)	6.19
Salmonella (Pathogen indicator)	< 3 MPN / 4 grams of total solids	Pass
Sharps	0 percent	None Detected
Manufactured Inerts	< 1 percent	< 0.5 percent

Chart 3. WDOT Particle Size Specifications by Compost Grade

Sieve size	WDOT "Fine" Compost	Cedar Grove (7/18/2011)
1"	95-100%	100%
5/8"	90-100%	93.9%
¼"	75-100%	84.4%

US Composting Council Seal of Testing Assurance

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US COMPOSTING COUNCIL

Seal of Testing Assurance

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Martin Okoli
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LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 tel: 831.724.5422 fax: 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	53.4	
Organic Matter Content	%, dry weight basis	61.8	
pH	units	6.19	
Soluble Salts *(electrical conductivity EC $_s$)*	dS/m (mmhos/cm)	3.7	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	3.1	Stable
	mg CO_2-C/g TS/day	1.9	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	100.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Not tested	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Jul.11 A1 Laboratory Number: 1070004-4/5

Analyst: Assaf Sadeh

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

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Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.78	1.7
Phosphorus	P_2O_5	0.41	0.86
Potassium	K_2O	0.39	0.84
Calcium	Ca	0.84	1.8
Magnesium	Mg	0.14	0.31
Moisture Content	%, wet weight basis	53.4	
Organic Matter Content	%, dry weight basis	61.8	
pH	units	6.19	
Soluble Salts *(electrical conductivity EC 5)*	dS/m (mmhos/cm)	3.7	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	93.9	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	3.1	Stable
	mg CO_2-C/g TS/day	1.9	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
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		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

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US COMPOSTING COUNCIL

Seal of Testing Assurance

Washington State Department of Transportation

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Martin Okoli
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Date Sampled/Received: 30 Jun. 11 / 01 Jul. 11

Compost Technical Data Sheet for Washington State DOT Projects

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	Specification Requirements			Test Results	
Size Classification TMECC 02.02-B	**%, dry weight passing through**			**%, dry weight passing through**	
	Sieve Size	**Fine**	**Medium**	**Coarse**	**Sieve Size**
	3"	100	100	100	3" 100.0
	2"	100	100		2" 100.0
	1"	95 – 100	95 – 100	90 – 100	1" 100.0
	¾"			70 – 100	¾" 100.0
	5/8"	90 – 100	90 – 100		5/8" 93.9
	¼"	75 - 100	75 – 85	40 – 60	¼" 84.4
	Maximum Particle Length 6"				**Maximum Particle Length** Less than 6"
pH TMECC 04.11-A 1:5 slurry	**6.0 min. and 8.5 max.**				**6.19**
Manufactured Inerts TMECC 03.08-A % dry weight basis	**1.0 max.**				**< 0.5**
Organic Matter Content TMECC 05.07 A Loss-on-Ignition % dry weight basis	**40 min.**				**61.8**
Soluble Salts TMECC 04.10-A 1:5 Slurry dS/m (mmohs/cm)	**4.0* max.**				**3.7**
Maturity Indicator TMECC 05.05 A Cucumber Bioassay % average of control	**Germination: 80% or greater** **Vigor: 80% or greater**				**Germination:** 100 **Vigor:** 100
Stability Indicator TMECC 05.08-B Carbon Dioxide Evolution Rate	**7 or below** mg CO2-C/g OM/day				**3.1**

*Check for special provisions in Columbia River basin

"This compost product has been sampled and tested by the Seal of Testing Assurance Program of the United States Composting Council (USCC), using certain methods from the Test Methods for the Examination of Compost and Composting Manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use."

Laboratory Group: Jul.11 A1 No.31 Laboratory Number: 1070004-4/5-2192

Analyst: Assaf Sadeh

www.compostlab.com

Date Reported: 18-Jul-11

ANALYTICAL CHEMISTS and BACTERIOLOGISTS
SOIL CONTROL LAB

TEL: 831-724-5422
FAX: 831-724-3188
www.composttlab.com

Account #: 1070004-4/5-2192
Group: Jul.11 A1 #31
Reporting Date: July 18, 2011

Cedar Grove Compost
17825 Cedar Grove Rd. SE
Maple Valley, WA 98038
Attn: Martin Okoli

Date Received: 01 Jul. 11
Sample Identification: MV 49 7/1/11
Sample ID #: 1070004 - 4/5

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.7	0.78	%
Ammonia (NH_4-N):	600	280	mg/kg
Nitrate (NO_3-N):	3.1	1.5	mg/kg
Org. Nitrogen (Org.-N):	1.6	0.75	%
Phosphorus (as P_2O_5):	0.86	0.40	%
Phosphorus (P):	3800	1800	mg/kg
Potassium (as K_2O):	0.84	0.39	%
Potassium (K):	7000	3200	mg/kg
Calcium (Ca):	1.8	0.84	%
Magnesium (Mg):	0.31	0.14	%
Sulfate (SO_4-S):	120	55	mg/kg
Boron (Total B):	25	12	mg/kg
Moisture:	0	53.4	%
Sodium (Na):	0.15	0.070	%
Chloride (Cl):	0.16	0.077	%
pH Value:	NA	6.19	unit
Bulk Density :	21	46	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	3.7	NA	mmhos/cm
Organic Matter:	61.8	28.8	%
Organic Carbon:	28.0	13.0	%
Ash:	38.2	17.8	%
C/N Ratio	17	17	ratio
AgIndex	> 10	> 10	ratio

Metals	Dry wt.	EPA Limit	units
Alumnium (Al)	6300	-	mg/kg
Arsenic (As):	8.2	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	78	1200	mg/kg
Cobalt (Co)	3.5	-	mg/kg
Copper (Cu):	61	1500	mg/kg
Iron (Fe):	11000	-	mg/kg
Lead (Pb):	54	300	mg/kg
Manganese (Mn):	270	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	5.7	18	mg/kg
Nickel (Ni):	37	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	180	2800	mg/kg

*Sample was received and handled in accordance with TMECC procedures.

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	3.1	5.2
mg CO_2-C/g TS/day	1.9	3.2
Stability Rating	*stable*	*stable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	100	100
Description of Plants	*mushroom*	*mushroom*

Pathogens	Results	Units	Rating
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 01 Jul. 11

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Size & Volume Distribution			
MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	6.1	7.1	0.25
6.3 to 9.5	9.5	12.4	0.23
4.0 to 6.3	2.9	3.8	0.22
2.0 to 4.0	20.1	27.0	0.22
< 2.0	61.5	49.7	0.37

Bulk Density Description: <.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

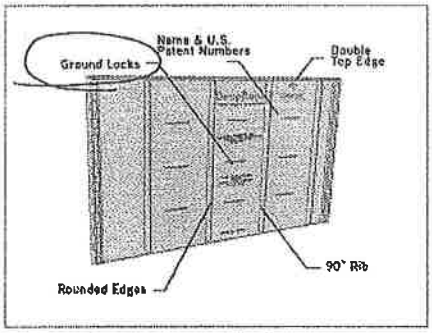
Analyst: Assaf Sadeh

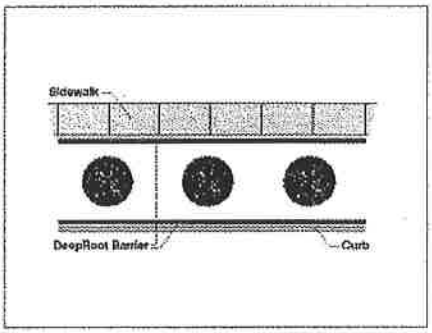
B1#75
Root Barrier

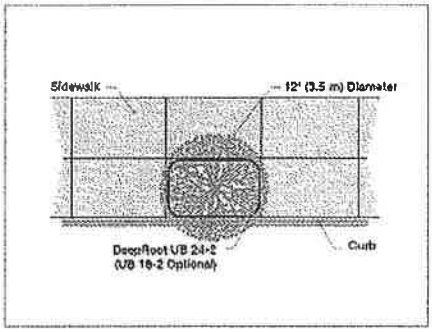
18" UNIVERSAL GUIDE - UB 18-2

18" high x 24" wide (46 cm x 61 cm) panels for Linear Applications, Surround Applications and Root Pruning. Our UB 18-2 panels include our patented, integrated zipper joining mechanism for easy assembly. The 18" (46 cm) height is ideal for protection from invasive roots in sidewalk, driveway, patio and many other planting situations.

ROOT BARRIER







APPLICATION STYLES

Product #	Linear	Surround	Root Pruning	Specialty
UB 12-2	•		•	
UB 18-2	•	•	•	
UB 24-2	•	•	•	•
UB 36-2	•		•	•
UB 48-2	•		•	•

PRODUCT USES

Product #	Sidewalks	Curbs & Gutters	Paths	Medians	Patios	Specialty
UB 12-2				•		
UB 18-2	•		•		•	
UB 24-2	•	•	•	•	•	•
UB 36-2						•
UB 48-2						•

FEATURES

- Instant assembly
- Slide one panel into the next
- Universal Guide
- Use either in linear or surround application
- Sizing adjustable in 2' (61 cm) modules
- 1/2" (1.2 cm) raised 90° molded root deflecting ribs
- Patented ground lock tabs to prevent lifting by tree
- Patented double top edge for strength, safety, appearance and root overgrowth protection
- Manufactured in USA with 50% post-consumer recycled plastic
- DeepRoot products are patented under one or more of the following U.S. Patents : 5,070,642; 5,305,549 and 5,528,857

PANEL DIMENSIONS

UB 18-2: 18" H x 24"W (46 cm x 61 cm)

MATERIAL AND MANUFACTURING PROCESS

- Copolymer Polypropylene of 0.080" (2.032 mm) thickness
- 50% Post-consumer recycled plastic
- Injection molded
- ISO 9002 certified
- Made in USA

PACKAGING

UB 18-2: 26 Panels (52 linear feet / 16 m) per carton
20 cartons per pallet, approximately 43 lbs. (19.5 kg) per carton

SPECIFICATIONS PROPERTIES:

TEST	ASTM TEST METHOD	VALUE COPOLYMER POLYPROPYLENE
Tensile stress @ yield	D638	3800 PSI (26,200 kPa or kN/m²)
Elongation @ yield	D638	6.3%
Flexural Modulus	D790B	155,000 PSI (1,068,687 kPa or kN/m²)

Notched Izod Impact	D256A	7.1
Rockwell Hardness r-scale	D785A	68

UB 18-2

18" Universal Barrier

Specified tree root barriers are mechanical barriers and root deflectors to prevent tree roots from damaging hardscapes and landscapes. Assembled in 2' (61cm) long modules for linear applications directly beside a hardscape adjacent to one side of the trees or to create varying sizes of cylinders for surrounding root balls (surround planting style).

A. MATERIALS

1. **The contractor shall furnish and install tree root guides as specified.** The tree root guides shall be product # UB 18-2 as manufactured by Deep Root Partners, L.P. 530 Washington Street, San Francisco, CA 94111 (800/458.7668), or approved equal. The barrier shall be black, injection molded panels, of .080"(2.03mm) wall thickness in modules 24" (61cm) long by 18"(46cm) deep; manufactured with a minimum 50% post consumer recycled polypropylene plastic with added ultraviolet inhibitors; recyclable. Each panel shall have:

   Not less than 4 molded integral vertical root deflecting ribs of at least 0.06"(1.52mm) thickness protruding 1/2"(12.7mm) at 90° from interior of the barrier panel, spaced 6"(15.24mm) apart (see panel drawing below).

   A double top edge consisting of two parallel, integral, horizontal ribs at the top of the panel of a minimum 0.06"(1.52mm) thickness 3/8"(9.53mm) wide and 1/4"(6.35mm) apart with the lower rib attached to the vertical root deflecting ribs (see Detail A).

   A minimum of 9 anti-lift ground lock tabs consisting of integral horizontal ridges of a minimum 0.06"(1.52mm) thickness in the shape of a segment of a circle, the 2 1/4"(57mm) chord of the segment joining the panel wall and the segment, protruding 3/8"(9.53mm) from the panel. The nine ground locks on each panel shall be about equally spaced between each of the vertical root deflecting ribs (3 between each set of ribs, see Detail B).

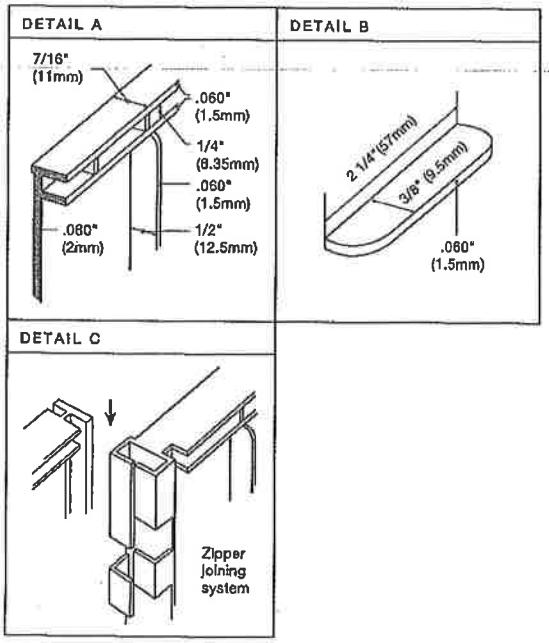
   An integrated zipper joining system providing for instant assembly by sliding one panel onto another (see Detail C).

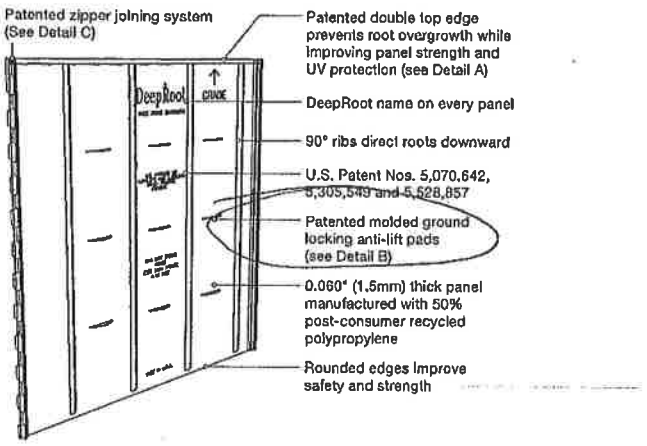
2. **The basic properties of the material shall be:**

Test	ASTM Test Method	Value Copolymer Polypropylene
Tensile strength @ yield Wall	D638	2,383 PSI
Tensile strength @ yield Hinge	D638	2,483 PSI
Yield Elongation–Wall	D638	7.71%
Yield Elongation–Hinge	D638	7.58%
Flexural Modulus	D790B	120,785 PSI
Notched Izod Impact–Wall	D256A	2.54 (ft-lbs.)
Rockwell Hardness r. scale–Wall	D785A	84.1

B. CONSTRUCTION AND INSTALLATION

1. **The contractor shall install the tree root barriers with the number of panels and in the manner shown on the drawings.** The vertical root deflecting ribs shall be facing inwards to the root ball and the top of the double edge shall be 1/2" (12.7mm) above grade. Each of the required number of panels shall be connected to form a circle around the root ball or joined in a linear fashion and placed along the adjacent hardscape.
2. **Excavation and soil preparation shall conform to the drawings.**





Washington State Department of Transportation

November 3, 2011

Qualified Product List

Contractor Product Information

Contractor: Scarsella Brothers, Inc. **Contract No:** 101197
Sub Contractor: Terra Dynamics, Inc. **Date:** 11/3/11
Bid Item: #17, 61, 62 & 74

Manufacturer: Cedar Grove Composting, Inc. - Seattle, WA

Product Name: Compost; Coarse, Medium and Fine

Standard Spec : 9-14.4(8), Erosion Control - Mulch and Amendments - Compost

Product Description : Compost; coarse, medium and fine
Product Restriction :
(Reapproved 1-18-11)

Acceptance Code : 1135
Code Description : Receipt of a sample and satisfactory Test Report, dated within 90 calendar days of application of the material, from an independent STA program certified laboratory indicating that the lot(s) meets the requirements of the specifications under which it is listed. The Test Report must be received prior to incorporating the material into the project.

Last Updated : Jan 18, 2011

To be completed by the field inspector:

Quantity: _____ **Verified By:** _____ **Date:** _____

C#101197
BI#62

Cedar Grove Composting

2011 Letter of Certification Fine Compost

www.cgcompost.com • 877-764-5748

This letter certifies that the compost being used for the job referenced meets the following requirements.

Company Name: **Terra Dynamics**

Job Reference: **185th Extension**

1. Cedar Grove compost production, standards, and product quality complies in the areas as specified in the new Washington State Department of Ecology Administrative Code WAC-173-350-220.

2. The pH is between 6.0-8.5 when tested in accordance with TMECC 04.11-A, "Slurry PH"

3. Manufactured inert material (plastic, concrete, metal etc.) are less than 1.0 percent by weight in accordance with TMECC 3.08-A "Classification of inerts by Sieve Size"

4. Minimum organic matter in the compost is 40 percent dry weight basis as determined by TMECC "Loss-On-Ignition Organic Matter Method".

5. Soluble salt content is less than 4.0mmhos/cm tested in accordance with TMECC 04.10-A

6. Maturity is greater than 80% in accordance with TMECC 05.05A "Germination and Root Elongation".

7. Stability is 8 or below in accordance with TMECC 05.08B "Carbon Dioxide Evolution Rate".

8. A copy of the required lab analysis as described under WAC 173-350-220 is attached, and is less than 90 days old. A copy of our Seal of Testing Assurance as issued by the U.S. Composting Council is attached.

9. The compost consists of 80-85% recycled yard waste, 6-15% pre-consumer & post-consumer food waste and 1-5% wood waste.

10. Cedar Grove Composting is in compliance with regulations under solid waste (Seattle-King County Department of Public Health), Water (DOE) and Air (Puget Sound Clean Air Agency) rules. Our permits with all three agencies are in good standing.

Please contact us is you have any questions.

Sincerely,

Date: 11/1/2011

Jami Burke
Cedar Grove Composting
206-832-3068

SNOHOMISH
HEALTH
DISTRICT

ENVIRONMENTAL HEALTH DIVISION
3020 Rucker Avenue, Suite 104
Everett, WA 98201-3900
425.339.5250 FAX: 425.339.5254
Deaf/Hard of Hearing: 425.339.5252 (TTY)

SOLID WASTE FACILITY PERMIT #SW-182

Issued by the Snohomish Health District in accordance with the provisions of Chapter 70.95 of the Revised Code of Washington (RCW), Chapter 173-350 of the Washington Administrative Code (WAC) and the Snohomish Health District Sanitary Code, Chapters 3.1 and 3.2 (Adopted text of WAC 173-350).

PERMIT PERIOD: JULY 1, 2011 TO JUNE 30, 2012

PERMITTEE AND ADMINISTRATIVE INFORMATION

NAME OF FACILITY:	Cedar Grove Composting
FACILITY LOCATION:	3620 36th Place NE, Everett, Washington 98201
FACILITY OWNER:	Cedar Grove, Inc.
FACILITY OPERATOR:	Jerry Bartlett
PHONE:	206.832.3000
PERMIT TYPE:	Waste Recycling / Composting
ANNUAL FEE:	$4160.00

The conditions of this permit are contained on the following pages. This permit is the property of the Snohomish Health District and may be suspended or revoked upon violation of any rules and regulations applicable hereto. This permit is not transferable to a different site, and must be renewed annually. This permit or a legible copy must be displayed or stored in a manner, which allows easy access by operating personnel.

Aran Enger, R.S.
Solid Waste and Toxics Section
Environmental Health Division

29 JUNE 2011
Date of Issuance

C# 101197
BI #62
FINE Compost for Mulch

Cedar Grove Composting
Compost Quality Assurance Program 2011

Cedar Grove Fine Grade Compost

Cedar Grove Compost is made from 100% locally recycled yard and food trimmings, and clean wood waste. Cedar Grove Compost is made at facilities that are in compliance with Washington Department of Ecology (WDOE) requirements for compost process and product quality (WAC 173-350-220). Cedar Grove also voluntarily meets the US Composting Council's Seal of Testing Assurance (STA) and Washington Department of Transportation (WDOT) standards. Results of tests for horticultural values are shown in Chart 1, along with applicable WDOT standards. WDOE compost quality requirements and Cedar Grove Compost results are in Chart 2.

Chart 1. Cedar Grove Fine Grade Compost Horticultural Values

		WDOT Standard	Cedar Grove (7/18/2011)
Organic Matter		>40%	61.8%
Carbon to Nitrogen Ratio			17
Conductivity		<4 mmhos/cm	3.7 mmhos/cm
Seedling Emergence		>80%	100%
Seedling Vigor		>80%	100%
Compost Stability		<7 mg CO_2/gr. OM/day	3.1 - "Stable"
Viable Weed Seeds			No Viable Weed Seed Detected
Dry weight			27 lbs / cu. Ft.
Major Nutrients	Total Nitrogen		1.7%
	Phosphorous (P_2O_5)		0.86%
	Potassium (K_2O)		0.84%
	Sulfate		120 mg/kg
	Calcium		1.8%
	Magnesium		0.31%

Chart 2. Compost Quality Requirements - Washington Administrative Code *173-350 Sect. 220*

	WAC 173-350-220 Standard	Cedar Grove Compost (7/18/2011)
Metals	*Parts per million (mg/kg), dry wt.*	
Arsenic	<=20	8.2
Cadmium	<=10	<1.0
Copper	<=750	61
Lead	<=150	54
Mercury	<=8	<1.0
Molybdenum	<=9	5.7
Nickel	<=210	37
Selenium	<=18	<1
Zinc	<=1400	180
pH	5-10 (range)	6.19
Salmonella (Pathogen indicator)	< 3 MPN / 4 grams of total solids	Pass
Sharps	0 percent	None Detected
Manufactured Inerts	< 1 percent	< 0.5 percent

Chart 3. WDOT Particle Size Specifications by Compost Grade

Sieve size	WDOT "Fine" Compost	Cedar Grove (7/18/2011)
1"	95-100%	100%
5/8"	90-100%	93.9%
¼"	75-100%	84.4%

US Composting Council Seal of Testing Assurance

All tests performed by Soil Control Laboratories, Watsonville, CA; using TMECC/STA specified methods.

US COMPOSTING COUNCIL

Seal of Testing Assurance

Cedar Grove Compost
Martin Okoli
17825 Cedar Grove Rd. SE
Maple Valley
WA 98038 (425) 432-2395

Product Identification	Compost
MV 49 7/1/11	

Date Sampled/Received: 30 Jun. 11 / 01 Jul. 11

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 tel: 831.724.5422 fax: 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	53.4	
Organic Matter Content	%, dry weight basis	61.8	
pH	units	6.19	
Soluble Salts *(electrical conductivity EC $_5$)*	dS/m (mmhos/cm)	3.7	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	3.1	Stable
	mg CO_2-C/g TS/day	1.9	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	100.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Not tested	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Jul.11 A1 Laboratory Number: 1070004-4/5

Analyst: Assaf Sadeh

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Cedar Grove Compost
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Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.78	1.7
Phosphorus	P_2O_5	0.41	0.86
Potassium	K_2O	0.39	0.84
Calcium	Ca	0.84	1.8
Magnesium	Mg	0.14	0.31
Moisture Content	%, wet weight basis	53.4	
Organic Matter Content	%, dry weight basis	61.8	
pH	units	6.19	
Soluble Salts *(electrical conductivity EC $_5$)*	dS/m (mmhos/cm)	3.7	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	93.9	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	3.1	Stable
	mg CO_2-C/g TS/day	1.9	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	100.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Not tested	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Jul.11 A1 Laboratory Number: 1070004-4/5

Analyst: Assaf Sadeh

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Washington State Department of Transportation

Cedar Grove Compost
Martin Okoli
17825 Cedar Grove Rd. SE
Maple Valley WA 98038 (425) 432-2395

Product Identification:
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Compost Parameters	Specification Requirements				Test Results	
	%, dry weight passing through				%, dry weight passing through	
Size Classification	**Sieve Size**	**Fine**	**Medium**	**Coarse**	**Sieve Size**	
TMECC 02.02-B	3"	100	100	100	3"	100.0
	2"	100	100		2"	100.0
	1"	95 – 100	95 – 100	90 – 100	1"	100.0
	¾"			70 – 100	¾"	100.0
	5/8"	90 – 100	90 – 100		5/8"	93.9
	¼"	75 - 100	75 – 85	40 – 60	¼"	84.4
	Maximum Particle Length 6"				**Maximum Particle Length Less than 6"**	
pH TMECC 04.11-A 1:5 slurry	**6.0 min. and 8.5 max.**				**6.19**	
Manufactured Inerts TMECC 03.08-A % dry weight basis	**1.0 max.**				**< 0.5**	
Organic Matter Content TMECC 05.07 A Loss-on-Ignition % dry weight basis	**40 min.**				**61.8**	
Soluble Salts TMECC 04.10-A 1:5 Slurry dS/m (mmohs/cm)	**4.0* max.**				**3.7**	
Maturity Indicator TMECC 05.05 A Cucumber Bioassay % average of control	**Germination: 80% or greater** **Vigor: 80% or greater**				**Germination: 100** **Vigor: 100**	
Stability Indicator TMECC 05.08-B Carbon Dioxide Evolution Rate	**7 or below** mg CO2-C/g OM/day				**3.1**	

**Check for special provisions in Columbia River basin*

"This compost product has been sampled and tested by the Seal of Testing Assurance Program of the United States Composting Council (USCC), using certain methods from the Test Methods for the Examination of Compost and Composting Manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use."

Laboratory Group: Jul.11 A1 No.31 Laboratory Number: 1070004-4/5-2192

Analyst: Assaf Sadeh

www.compostlab.com

Date Reported: 18-Jul-11

ANALYTICAL CHEMISTS and BACTERIOLOGISTS Approved by State of California

SOIL CONTROL LAB

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 1070004-4/5-2192
Group: Jul.11 A1 #31
Reporting Date: July 18, 2011

Cedar Grove Compost
17825 Cedar Grove Rd. SE
Maple Valley, WA 98038
Attn: Martin Okoli

Date Received: 01 Jul. 11
Sample Identification: MV 49 7/1/11
Sample ID #: 1070004 - 4/5

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.7	0.78	%
Ammonia (NH_4-N):	600	280	mg/kg
Nitrate (NO_3-N):	3.1	1.5	mg/kg
Org. Nitrogen (Org.-N):	1.6	0.75	%
Phosphorus (as P_2O_5):	0.86	0.40	%
Phosphorus (P):	3800	1800	mg/kg
Potassium (as K_2O):	0.84	0.39	%
Potassium (K):	7000	3200	mg/kg
Calcium (Ca):	1.8	0.84	%
Magnesium (Mg):	0.31	0.14	%
Sulfate (SO_4-S):	120	55	mg/kg
Boron (Total B):	25	12	mg/kg
Moisture:	0	53.4	%
Sodium (Na):	0.15	0.070	%
Chloride (Cl):	0.16	0.077	%
pH Value:	NA	6.19	unit
Bulk Density :	21	46	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	3.7	NA	mmhos/cm
Organic Matter:	61.8	28.8	%
Organic Carbon:	28.0	13.0	%
Ash:	38.2	17.8	%
C/N Ratio	17	17	ratio
AgIndex	> 10	> 10	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	3.1	5.2
mg CO_2-C/g TS/day	1.9	3.2
Stability Rating	*stable*	*stable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	100	100
Description of Plants	*mushroom*	*mushroom*

Pathogens	Results	Units	Rating
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 01 Jul. 11

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Alumnium (Al)	6300	-	mg/kg
Arsenic (As):	8.2	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	78	1200	mg/kg
Cobalt (Co)	3.5	-	mg/kg
Copper (Cu):	61	1500	mg/kg
Iron (Fe):	11000	-	mg/kg
Lead (Pb):	54	300	mg/kg
Manganese (Mn):	270	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	5.7	18	mg/kg
Nickel (Ni):	37	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	180	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	6.1	7.1	0.25
6.3 to 9.5	9.5	12.4	0.23
4.0 to 6.3	2.9	3.8	0.22
2.0 to 4.0	20.1	27.0	0.22
< 2.0	61.5	49.7	0.37

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

*Sample was received and handled in accordance with TMECC procedures.

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 11, 2011

Dylan Ahearn
Herrera Environmental Consultants, Inc.
2200 6th Avenue, Suite 1100
Seattle, WA 98121

Re: Analytical Data for Project 09-04540-000
Laboratory Reference No. 1111-019

Dear Dylan:

Enclosed are the analytical results and associated quality control data for samples submitted on November 3, 2011.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

Case Narrative

Samples were collected on November 3, 2011 and received by the laboratory on November 3, 2011. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

TOTAL METALS
EPA 6020

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-019-02					
Client ID:	**BSM**					
Copper	**21**	0.12	6020	11-3-11	11-3-11	
Zinc	**48**	1.2	6020	11-3-11	11-3-11	
Lab ID:	11-019-03					
Client ID:	**QA**					
Copper	**25**	0.12	6020	11-3-11	11-3-11	
Zinc	**51**	1.2	6020	11-3-11	11-3-11	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

TOTAL METALS
EPA 6020
METHOD BLANK QUALITY CONTROL

Date Extracted:	11-3-11
Date Analyzed:	11-3-11
Matrix:	Soil
Units:	mg/kg (ppm)
Lab ID:	MB1103SM2

Analyte	Method	Result	PQL
Copper	6020	**ND**	0.10
Zinc	6020	**ND**	1.0

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

TOTAL METALS
EPA 6020
DUPLICATE QUALITY CONTROL

Date Extracted: 11-3-11
Date Analyzed: 11-3-11

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 11-019-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Copper	**21.0**	**20.1**	5	0.10	
Zinc	**43.1**	**41.5**	4	1.0	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

TOTAL METALS
EPA 6020
MS/MSD QUALITY CONTROL

Date Extracted: 11-3-11
Date Analyzed: 11-3-11

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 11-019-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Copper	50	**71.0**	100	**71.5**	101	1	
Zinc	100	**146**	102	**147**	104	1	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

TOTAL PHOSPHOROUS
EPA 365.1

Date Analyzed: 11-8-11

Matrix: Soil
Units: mg/kg

Client ID	Lab ID	**Result**	PQL
BSM	11-019-02	**660**	12
QA	11-019-03	**580**	12

This report pertains to the samples analyzed in accordance with the chain of custody,
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Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

TOTAL PHOSPHOROUS
EPA 365.1
QUALITY CONTROL

Date Analyzed: 11-8-11

Matrix: Soil
Units: mg/kg

METHOD BLANK QUALITY CONTROL

Lab ID	Result	PQL
MB1108S1	ND	0.50

SPIKE BLANK QUALITY CONTROL

Lab ID	Result	Spiked Amount	Percent Recovery	Control Limit	Flag
SB1108S1	12.5	12.5	100	75-125	

MATRIX SPIKE QUALITY CONTROL

Lab ID	Result	Spiked Amount	Percent Recovery	Control Limit	Flag
11-019-03	485				
Matrix Spike	500	12.5	120	75-125	

DUPLICATE QUALITY CONTROL

Lab ID	Sample Result	Duplicate Result	RPD	Control Limit	Flag
11-019-03	485	467	4	20	

This report pertains to the samples analyzed in accordance with the chain of custody,
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Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

TOTAL ORGANIC CARBON
EPA 9060

Matrix: Soil
Units: % Carbon

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**BSM**					
Laboratory ID:	11-019-02					
Total Organic Carbon	**2.2**	0.056	9060	11-4-11	11-4-11	
Client ID:	**QA**					
Laboratory ID:	11-019-03					
Total Organic Carbon	**2.3**	0.071	9060	11-4-11	11-4-11	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

TOTAL ORGANIC CARBON
EPA 9060
QUALITY CONTROL

Matrix: Soil
Units: % Carbon

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1104S1					
Total Organic Carbon	**ND**	0.042	9060	11-4-11	11-4-11	

Analyte	Result		PQL	RPD	Limit	Flags
DUPLICATE						
Laboratory ID:	11-019-03					
	Sample	Duplicate				
Total Organic Carbon	**2.34**	**1.96**	0.071	18	20	

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	Flags
SPIKE BLANK						
Laboratory ID:	SB1104S1					
Total Organic Carbon	**46.7**	42.1	ND	**111**	80-120	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: November 11, 2011
Samples Submitted: November 3, 2011
Laboratory Reference: 1111-019
Project: 09-04540-000

% MOISTURE

Date Analyzed: 11-3-11

Client ID	Lab ID	% Moisture
BSM	11-019-02	17
QA	11-019-03	16

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

Y - Sample extract treated with an acid/silica gel cleanup procedure.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Nov 9 2011
On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister

Dear David Baumeister:

Enclosed please find the analytical data for your project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
Sand	Soil	11-A016096	GRAIN SIZE
BSM	Soil	11-A016097	CEC-s
QA	Soil	11-A016098	CEC-s

Your samples were received on Thursday, November 3, 2011. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Method Detection Limits (MDL's), as opposed to Practical Quantitation Limits (PQL's).

If you should have any questions pertaining to the data package, please feel free to conact me.

Sincerely,

Aaron W. Young
Laboratory Manager

Project #: 09-04540-000
PO Number: 11-019

BACT = Bacteriological
CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project #: 09-04540-000
PO Number: 11-019
All results reported on an as received basis.

Date Received: 11/03/11
Date Reported: 11/ 9/11

AMTEST Identification Number **11-A016096**
Client Identification **Sand**
Sampling Date **11/03/11, 09:20**

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
	4.75	0.30 %	GRAVEL	16.6	ASTM D422	MO	11/04/11
- 2	4.00	0.10 %			ASTM D422	MO	11/04/11
-1	2.00	16.2 %			ASTM D422	MO	11/04/11
0	1.00	16.4 %	SAND	82.2	ASTM D422	MO	11/04/11
+1	0.50	30.3 %			ASTM D422	MO	11/04/11
+ 2	0.25	23.9 %			ASTM D422	MO	11/04/11
+ 3	0.125	10.1 %			ASTM D422	MO	11/04/11
+ 4	0.063	1.50 %			ASTM D422	MO	11/04/11
+ 5	0.032	< 0.1 %	SILT	1.10	ASTM D422	MO	11/04/11
+ 6	0.016	0.40 %			ASTM D422	MO	11/04/11
+ 7	0.008	0.70 %			ASTM D422	MO	11/04/11
+ 8	0.004	< 0.1 %			ASTM D422	MO	11/04/11
+ 9	0.002	< 0.1 %	CLAY	1.10	ASTM D422	MO	11/04/11
+ 10	0.001	< 0.1 %			ASTM D422	MO	11/04/11
> + 10	< 0.001	1.10 %			ASTM D422	MO	11/04/11

AMTEST Identification Number **11-A016097**
Client Identification **BSM**
Sampling Date **11/03/11, 09:30**

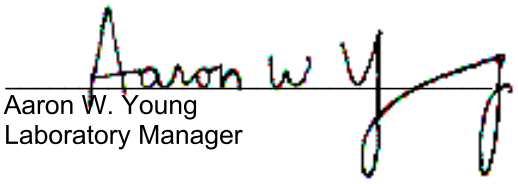
Miscellaneous

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE
Cation Exchange Capacity	10.	meq/100g		0.5	SW-846 9081	HL	11/09/11

AMTEST Identification Number **11-A016098**
Client Identification **QA**
Sampling Date **11/03/11, 09:30**

Miscellaneous

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE
Cation Exchange Capacity	11.	meq/100g		0.5	SW-846 9081	HL	11/09/11



Aaron W. Young
Laboratory Manager

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

QC Summary for sample numbers: 11-A016096 to 11-A016098

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
11-A016097	Cation Exchange Capacity	meq/100g	10.	12.	18.
11-A016096		%	0.30	0.50	50.
11-A016096	- 2	%	0.10	0.90	160
11-A016096	-1	%	16.2	14.0	15.
11-A016096	0	%	16.4	17.6	7.1
11-A016096	+1	%	30.3	32.7	7.6
11-A016096	+ 2	%	23.9	21.6	10.
11-A016096	+ 3	%	10.1	9.80	3.0
11-A016096	+ 4	%	1.50	0.50	100
11-A016096	+ 5	%	< 0.1	0.20	
11-A016096	+ 6	%	0.40	< 0.1	
11-A016096	+ 7	%	0.70	1.10	44.
11-A016096	+ 8	%	< 0.1	< 0.1	
11-A016096	+ 9	%	< 0.1	< 0.1	
11-A016096	+ 10	%	< 0.1	< 0.1	
11-A016096	> + 10	%	1.10	1.10	0.00

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Cation Exchange Capacity	meq/100g	10.	10.	100. %

BLANKS

ANALYTE	UNITS	RESULT
Cation Exchange Capacity	meq/100g	< 0.5

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 · (425) 883-3881

RUSH

Laboratory Reference #: 11-019

Subcontract Laboratory: AmTest Laboratories

Turnaround Request:

Project Manager: David Baumeister

Attention: Aaron Young

1 Day (2 Day) 3 Day

email: dbaumeister@onsite-env.com

13600 NE 126th Pl Kirkland, WA 98034

Standard

Project Number: 09-04540-000

Phone Number: (425) 885-1664

Other: _____

Project Name: _____

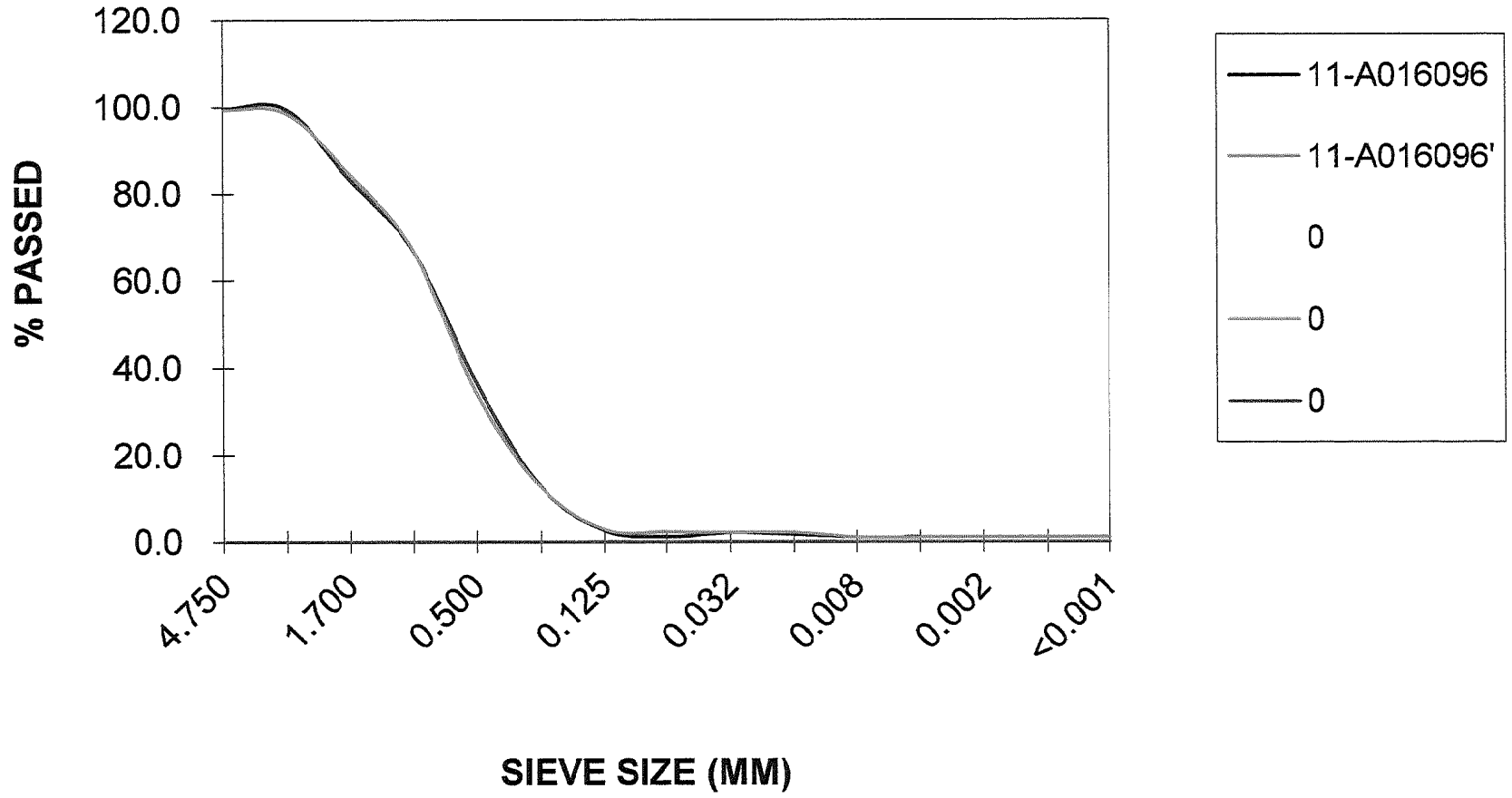
Date/Time: _____

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analysis
	Sand 160096	11/3/11	920	S	3	Grain size D422 (Sieve / Hydrometer) Rush *
	BSM 160097	↓	930	↓	1	CEC 5.10.10 } Standard
	QA 160098	↓	930	↓	1	↓

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by:		OnSite Env	11/3/11	1205	
Received by:		Amtest	11/3/11	12:05	
Relinquished by:					
Received by:					
Relinquished by:					
Received by:					

AMTEST LABORATORIES

GRAIN SIZE ANALYSIS



Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

19

Company: Herrera Inc
Project Number: 09-04540-000
Project Name: 185th Ave
Project Manager: D. Ahearn
Sampled by: D. Ahearn

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ ~~1 Day~~
- ☒ ~~2 Days~~ (METALS GRAINSIZE ONLY)
- ☐ 3 Days
- ☒ ~~Standard (7 Days) (TPH analysis 5 Days)~~ (remainder)
- ☐ _____ (other)

Laboratory Number: 11-019

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	No. of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260B	Halogenated Volatiles 8260B	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081A	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	~~Total MTCA Metals~~	TCLP Metals	~~HEM (oil and grease) 1664~~	% moisture	Grain size D422	Copper 6020	Zinc 6020	total Phosphorus 365.1	TOC 9060	% Moisture	CEC S. 10.10
1	Sand	11/3/11	9:20	So:l	4																X								
2	BSM	11/3/11	9:30	So:l	1														X				X	X	X	X	X		
3	QA	11/3/11	9:30	So:l	1														X				X	X	X	X	X		

	Signature	Company	Date	Time
Relinquished		Herrera	11/3/11	10:45
Received			11/3/11	1045
Relinquished				
Received				
Relinquished				
Received				

Comments/Special Instructions

Reviewed/Date

Reviewed/Date

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☐ _____

Analytical Resources, Incorporated
Analytical Chemists and Consultants

18 May 2012

Dylan Ahearn
Herrera Environmental Consultants, Inc.
2200 Sixth Avenue, Suite 1100
Seattle, WA 98121-1823

RE: Project – Redmond Biofiltration Swale – 09-04540-000
ARI Job No. US21

Dear Dylan:

Please find enclosed the original chain of custody (COC) record and the final results for the samples from the project referenced above. Analytical Resources, Inc. (ARI) accepted four soil samples in good condition on April 30, 2012. The samples were analyzed for NO2+NO3, total phosphorous and dissolved metals as requested. The analyses of the conventional parameters were performed following DI water extractions. The analyses for dissolved metals were performed following SPLP extractions.

These analyses proceeded without incident of note.

An electronic copy of these reports will be kept on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark Harris
Project Manager
markh@arilabs.com
206/695-6210

Enclosures

cc: file US21

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

US21

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Dan Bennett		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: ARI	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 4
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Nitrate+nitrite- EPA 353 2	Total phosphorus - EPA 365 3	Copper, dissolved - EPA 200 8	Zinc, dissolved - EPA 200 8
Mulch	4/ 27 /12	13:15	Mulch		x	x	x	x
Compost	4/ 27 /12	13:15	Compost		x	x	x	x
Sand	4/ 27 /12	13:15	Sand		x	x	x	x
BSM	4/ 27 /12	13:20	BSM (Compost + Sand)		x	x	x	x

Notes: Run SPLP extraction and analyze leachate for above analysis.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Dan Bennett/Herrera		~~4/27/12~~ 4-30-12 (1:00)	Mark Harris ARI		4/30/12 1100
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client Hervera | Project Name: Redmond Swale Biofiltration

COC No(s): _____ (NA) | Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No US21 | Tracking No: _____ (NA)

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc)	(YES)	NO
Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)	16.2	
If cooler temperature is out of compliance fill out form 00070F	Temp Gun ID#:	90941619

Cooler Accepted by: MH (AV) Date: ~~4/30/12~~ 4/30/12 Time: 1100

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used?	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:		
Was sufficient ice used (if appropriate)?	NA	YES	(NO)
Were all bottles sealed in individual plastic bags?		YES	(NO)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	(NA)	YES	NO
Were all VOC vials free of air bubbles?	(NA)	YES	NO
Was sufficient amount of sample sent in each bottle?		(YES)	NO
Date VOC Trip Blank was made at ARI	(NA)		

Was Sample Split by ARI: (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: AV Date: 4/30/12 Time: 1130

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By Date

Small Air Bubbles ~2mm	Peabubbles 2-4 mm	LARGE Air Bubbles > 4 mm	Small → "sm"
			Peabubbles → "pb"
			Large → "lg"
			Headspace → "hs"

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: US21
Client: Herrera
Project Event: 09-04540-000
Project Name: Redmond Biofiltration Swale

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	Mulch	US21A	12-7650	Soil	04/27/12 13:15	04/30/12 11:00
2.	Compost	US21B	12-7651	Soil	04/27/12 13:15	04/30/12 11:00
3.	Sand	US21C	12-7652	Soil	04/27/12 13:15	04/30/12 11:00
4.	BSM	US21D	12-7653	Soil	04/27/12 13:20	04/30/12 11:00
5.	Mulch	US21E	12-7654	Water	04/27/12 13:15	04/30/12 11:00
6.	Compost	US21F	12-7655	Water	04/27/12 13:15	04/30/12 11:00
7.	Sand	US21G	12-7656	Water	04/27/12 13:15	04/30/12 11:00
8.	BSM	US21H	12-7657	Water	04/27/12 13:20	04/30/12 11:00

US21 : 000004

SAMPLE RESULTS-CONVENTIONALS
US21-Herrera

ANALYTICAL RESOURCES INCORPORATED

Matrix: DI H2O Extract
Data Release Authorized:
Reported: 05/16/12

Project: Redmond Biofiltration Swale
Event: 09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Client ID: Mulch
ARI ID: 12-7654 US21E

Analyte	Date Batch	Method	Units	RL	Sample
Nitrate + Nitrite	05/15/12 051512#1	EPA 353.2	mg-N/L	0.010	0.963
Total Phosphorus	05/09/12 050912#1	EPA 365.2	mg-P/L	0.040	2.20

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
US21-Herrera

ANALYTICAL RESOURCES INCORPORATED

Matrix: DI H2O Extract
Data Release Authorized:
Reported: 05/16/12

Project: Redmond Biofiltration Swale
Event: 09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Client ID: Compost
ARI ID: 12-7655 US21F

Analyte	Date Batch	Method	Units	RL	Sample
Nitrate + Nitrite	05/15/12 051512#1	EPA 353.2	mg-N/L	1.00	67.8
Total Phosphorus	05/09/12 050912#1	EPA 365.2	mg-P/L	0.040	2.56

RL Analytical reporting limit
U Undetected at reported detection limit

US21 : 000685

SAMPLE RESULTS-CONVENTIONALS
US21-Herrera

ANALYTICAL RESOURCES INCORPORATED

Matrix: DI H2O Extract
Data Release Authorized:
Reported: 05/16/12

Project: Redmond Biofiltration Swale
Event: 09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Client ID: Sand
ARI ID: 12-7656 US21G

Analyte	Date Batch	Method	Units	RL	Sample
Nitrate + Nitrite	05/15/12 051512#1	EPA 353.2	mg-N/L	0.010	0.023
Total Phosphorus	05/09/12 050912#1	EPA 365.2	mg-P/L	0.008	0.008

RL Analytical reporting limit
U Undetected at reported detection limit

US21 : 000007

SAMPLE RESULTS-CONVENTIONALS
US21-Herrera

ANALYTICAL RESOURCES INCORPORATED

Matrix: DI H2O Extract
Data Release Authorized:
Reported: 05/16/12

Project: Redmond Biofiltration Swale
Event: 09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Client ID: BSM
ARI ID: 12-7657 US21H

Analyte	Date Batch	Method	Units	RL	Sample
Nitrate + Nitrite	05/15/12 051512#1	EPA 353.2	mg-N/L	0.200	14.1
Total Phosphorus	05/09/12 050912#1	EPA 365.2	mg-P/L	0.016	1.07

RL Analytical reporting limit
U Undetected at reported detection limit

US21 : 000000

METHOD BLANK RESULTS-CONVENTIONALS
US21-Herrera

ANALYTICAL RESOURCES INCORPORATED

Matrix: DI H2O Extract
Data Release Authorized:
Reported: 05/16/12

Project: Redmond Biofiltration Swale
Event: 09-04540-000
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Nitrate + Nitrite	EPA 353.2	05/15/12	mg-N/L	< 0.010 U	FB
		05/15/12		< 0.010 U	FB

FB Filtration Blank

STANDARD REFERENCE RESULTS-CONVENTIONALS
US21-Herrera

ANALYTICAL RESOURCES INCORPORATED

Matrix: DI H2O Extract
Data Release Authorized:
Reported: 05/16/12

Project: Redmond Biofiltration Swale
Event: 09-04540-000
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Nitrate + Nitrite ERA #20034	EPA 353.2	05/15/12	mg-N/L	0.492	0.500	98.4%
Total Phosphorus ERA #3303093	EPA 365.2	05/09/12	mg-P/L	0.102	0.100	102.0%

US21 : 08616

REPLICATE RESULTS-CONVENTIONALS
US21-Herrera

ANALYTICAL RESOURCES INCORPORATED

Matrix: DI H2O Extract
Data Release Authorized:
Reported: 05/16/12

Project: Redmond Biofiltration Swale
Event: 09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: US21E Client ID: Mulch						
Nitrate + Nitrite	EPA 353.2	05/15/12	mg-N/L	0.963	0.964	0.1%
Total Phosphorus	EPA 365.2	05/09/12	mg-P/L	2.20	2.22	0.9%

US21 : 00011

MS/MSD RESULTS-CONVENTIONALS
US21-Herrera

ANALYTICAL RESOURCES INCORPORATED

Matrix: DI H2O Extract
Data Release Authorized:
Reported: 05/16/12

Project: Redmond Biofiltration Swale
Event: 09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: US21E Client ID: Mulch							
Total Phosphorus	EPA 365.2	05/09/12	mg-P/L	2.20	2.44	0.200	120.0%

US21 : 00012

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
SPLP METALS
Page 1 of 1

Sample ID: Mulch
SAMPLE

Lab Sample ID: US21A
LIMS ID: 12-7650
Matrix: Soil
Data Release Authorized:
Reported: 05/11/12

QC Report No: US21-Herrera
Project: Redmond Biofiltration Swale
09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
1312	05/02/12	200.8	05/08/12	**7440-50-8**	**Copper**	0.0005	**0.0050**	
1312	05/02/12	200.8	05/08/12	**7440-66-6**	**Zinc**	0.004	**0.009**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
SPLP METALS

Sample ID: Mulch
DUPLICATE

Lab Sample ID: US21A
LIMS ID: 12-7650
Matrix: Soil
Data Release Authorized:
Reported: 05/11/12

QC Report No: US21-Herrera
Project: Redmond Biofiltration Swale
09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Copper	200.8	0.0050	0.0053	5.8%	+/- 20%	
Zinc	200.8	0.009	0.009	0.0%	+/- 0.004	L

Reported in mg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

US21 : 00814

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
SPLP METALS **Sample ID: Mulch**
Page 1 of 1 **MATRIX SPIKE**

Lab Sample ID: US21A
LIMS ID: 12-7650
Matrix: Soil
Data Release Authorized:
Reported: 05/11/12

QC Report No: US21-Herrera
Project: Redmond Biofiltration Swale
09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Copper	200.8	0.0050	0.0295	0.0250	98.0%	
Zinc	200.8	0.009	0.078	0.080	86.2%	

Reported in mg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked or diluted near or below detection limit

Percent Recovery Limits: 75-125%

US21:00015

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
SPLP METALS
Page 1 of 1

Sample ID: Compost
SAMPLE

Lab Sample ID: US21B
LIMS ID: 12-7651
Matrix: Soil
Data Release Authorized:
Reported: 05/09/12

QC Report No: US21-Herrera
Project: Redmond Biofiltration Swale
09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
1312	05/02/12	200.8	05/08/12	**7440-50-8**	**Copper**	0.0005	**0.0093**	
1312	05/02/12	200.8	05/08/12	**7440-66-6**	**Zinc**	0.004	**0.012**	

U-Analyte undetected at given RL
RL-Reporting Limit

US21 : 66616

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
SPLP METALS
Page 1 of 1

Sample ID: Sand
SAMPLE

Lab Sample ID: US21C
LIMS ID: 12-7652
Matrix: Soil
Data Release Authorized:
Reported: 05/09/12

QC Report No: US21-Herrera
Project: Redmond Biofiltration Swale
09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
1312	05/02/12	200.8	05/08/12	**7440-50-8**	**Copper**	0.0005	**0.0065**	
1312	05/02/12	200.8	05/08/12	**7440-66-6**	**Zinc**	0.004	**0.006**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
SPLP METALS
Page 1 of 1

Sample ID: BSM
SAMPLE

Lab Sample ID: US21D
LIMS ID: 12-7653
Matrix: Soil
Data Release Authorized:
Reported: 05/09/12

QC Report No: US21-Herrera
Project: Redmond Biofiltration Swale
09-04540-000
Date Sampled: 04/27/12
Date Received: 04/30/12

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
1312	05/02/12	200.8	05/08/12	**7440-50-8**	**Copper**	0.0005	**0.0061**	
1312	05/02/12	200.8	05/08/12	**7440-66-6**	**Zinc**	0.004	**0.007**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
SPLP METALS **Sample ID: METHOD BLANK**

Lab Sample ID: US21MB
LIMS ID: 12-7651
Matrix: Soil
Data Release Authorized:
Reported: 05/09/12

QC Report No: US21-Herrera
Project: Redmond Biofiltration Swale
09-04540-000
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
1312	05/02/12	200.8	05/08/12	7440-50-8	Copper	0.0005	0.0005	U
1312	05/02/12	200.8	05/08/12	7440-66-6	Zinc	0.004	0.004	U

U-Analyte undetected at given RL
RL-Reporting Limit

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

March 5, 2013

Andy Rheaume
Environmental Planner/Public Works
Department of Natural Resources
City of Redmond
15670 NE 85th Street
Redmond, WA 98073-9710

Re: Analytical Data for Project Potting Soil Testing
Laboratory Reference No. 1302-173

Dear Andy:

Enclosed are the analytical results and associated quality control data for samples submitted on February 22, 2013.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

Case Narrative

Samples were collected on February 22, 2013 and received by the laboratory on February 22, 2013. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP METALS
EPA 1312/6010C

Matrix: SPLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-173-01					
Client ID:	**DOGWOOD 1**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	
Lab ID:	02-173-02					
Client ID:	**DOGWOOD 2**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	
Lab ID:	02-173-03					
Client ID:	**HONEYSUCKLE 1**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	
Lab ID:	02-173-04					
Client ID:	**HONEYSUCKLE 2**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	
Lab ID:	02-173-05					
Client ID:	**BOX WOOD 1**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	
Lab ID:	02-173-06					
Client ID:	**BOX WOOD 2**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP METALS
EPA 1312/6010C

Matrix: SPLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-173-07					
Client ID:	**DAY LILY 1**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	
Lab ID:	02-173-08					
Client ID:	**DAY LILY 2**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	
Lab ID:	02-173-09					
Client ID:	**CINQUE FOIL 1**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	
Lab ID:	02-173-10					
Client ID:	**CINQUE FOIL 2**					
Copper	**ND**	0.040	6010C	2-28-13	2-28-13	
Zinc	**ND**	0.10	6010C	2-28-13	2-28-13	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP METALS
EPA 1312/6010C
METHOD BLANK QUALITY CONTROL

Date Prepared:	2-26-13
Date Extracted:	2-28-13
Date Analyzed:	2-28-13
Matrix:	SPLP Extract
Units:	mg/L (ppm)
Lab ID:	MB0228SP1

Analyte	Method	Result	PQL
Copper	6010C	**ND**	0.040
Zinc	6010C	**ND**	0.10

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP METALS
EPA 1312/6010C
DUPLICATE QUALITY CONTROL

Date Prepared: 2-26-13
Date Extracted: 2-28-13
Date Analyzed: 2-28-13

Matrix: SPLP Extract
Units: mg/L (ppm)

Lab ID: 02-173-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Copper	**ND**	**ND**	NA	0.040	
Zinc	**ND**	**ND**	NA	0.10	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP METALS
EPA 1312/6010C
MS/MSD QUALITY CONTROL

Date Prepared: 2-26-13
Date Extracted: 2-28-13
Date Analyzed: 2-28-13

Matrix: SPLP Extract
Units: mg/L (ppm)

Lab ID: 02-173-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Copper	2.00	**2.13**	106	**2.11**	106	1	
Zinc	4.00	**4.33**	108	**4.33**	108	0	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP NITRATE + NITRITE (as Nitrogen)
EPA 1312/353.2

Matrix: SPLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**DOGWOOD 1**					
Laboratory ID:	02-173-01					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	
Client ID:	**DOGWOOD 2**					
Laboratory ID:	02-173-02					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	
Client ID:	**HONEYSUCKLE 1**					
Laboratory ID:	02-173-03					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	
Client ID:	**HONEYSUCKLE 2**					
Laboratory ID:	02-173-04					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	
Client ID:	**BOX WOOD 1**					
Laboratory ID:	02-173-05					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	
Client ID:	**BOX WOOD 2**					
Laboratory ID:	02-173-06					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	
Client ID:	**DAY LILY 1**					
Laboratory ID:	02-173-07					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP NITRATE + NITRITE (as Nitrogen)
EPA 1312/353.2

Matrix: SPLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**DAY LILY 2**					
Laboratory ID:	02-173-08					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	
Client ID:	**CINQUE FOIL 1**					
Laboratory ID:	02-173-09					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	
Client ID:	**CINQUE FOIL 2**					
Laboratory ID:	02-173-10					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP NITRATE + NITRITE (as Nitrogen)
EPA 1312/353.2
QUALITY CONTROL

Matrix: SPLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0226SP1					
Nitrate+Nitrite	**ND**	1.0	EPA 353.2	2-26-13	3-4-13	

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	02-173-02							
	ORIG DUP							
Nitrate+Nitrite	**ND** **ND**	NA	NA	NA	NA	NA	11	
MATRIX SPIKE								
Laboratory ID:	02-173-02							
	MS	MS		MS				
Nitrate+Nitrite	**2.22**	2.00	ND	111	81-122	NA	NA	
SPIKE BLANK								
Laboratory ID:	SB0226SP1							
	SB	SB		SB				
Nitrate+Nitrite	**1.98**	2.00	NA	99	86-114	NA	NA	

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Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP TOTAL PHOSPHOROUS
EPA 1312/365.1

Matrix: SPLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**DOGWOOD 1**					
Laboratory ID:	02-173-01					
Total Phosphorus	**10**	0.20	EPA 365.1	2-25-13	2-28-13	
Client ID:	**DOGWOOD 2**					
Laboratory ID:	02-173-02					
Total Phosphorus	**3.4**	0.10	EPA 365.1	2-25-13	2-28-13	
Client ID:	**HONEYSUCKLE 1**					
Laboratory ID:	02-173-03					
Total Phosphorus	**1.9**	0.10	EPA 365.1	2-25-13	2-28-13	
Client ID:	**HONEYSUCKLE 2**					
Laboratory ID:	02-173-04					
Total Phosphorus	**1.5**	0.10	EPA 365.1	2-25-13	2-28-13	
Client ID:	**BOX WOOD 1**					
Laboratory ID:	02-173-05					
Total Phosphorus	**2.9**	0.10	EPA 365.1	2-25-13	2-28-13	
Client ID:	**BOX WOOD 2**					
Laboratory ID:	02-173-06					
Total Phosphorus	**4.9**	0.10	EPA 365.1	2-25-13	2-28-13	
Client ID:	**DAY LILY 1**					
Laboratory ID:	02-173-07					
Total Phosphorus	**0.51**	0.10	EPA 365.1	2-25-13	2-28-13	

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Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP TOTAL PHOSPHOROUS
EPA 1312/365.1

Matrix: SPLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**DAY LILY 2**					
Laboratory ID:	02-173-08					
Total Phosphorus	**0.36**	0.010	EPA 365.1	2-25-13	2-28-13	
Client ID:	**CINQUE FOIL 1**					
Laboratory ID:	02-173-09					
Total Phosphorus	**2.7**	0.10	EPA 365.1	2-25-13	2-28-13	
Client ID:	**CINQUE FOIL 2**					
Laboratory ID:	02-173-10					
Total Phosphorus	**2.9**	0.10	EPA 365.1	2-25-13	2-28-13	

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Date of Report: March 5, 2013
Samples Submitted: February 22, 2013
Laboratory Reference: 1302-173
Project: Potting Soil Testing

SPLP TOTAL PHOSPHOROUS
EPA 1312/365.1
QUALITY CONTROL

Matrix: SPLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0225SP1					
Total Phosphorus	**ND**	0.010	EPA 365.1	2-25-13	2-28-13	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-173-08								
	ORIG	DUP							
Total Phosphorus	**0.356**	**0.343**	NA	NA	NA	NA	4	13	
MATRIX SPIKE									
Laboratory ID:	02-173-08								
	MS		MS		MS				
Total Phosphorus	**0.638**		0.250	0.356	113	92-115	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0225SP1								
	SB		SB		SB				
Total Phosphorus	**0.272**		0.250	NA	109	89-110	NA	NA	

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OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

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Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: CITY OF REDMOND
Project Number:
Project Name: POTTING SOIL TESTING
Project Manager: ANDY RHEAUME
Sampled by: ANDY RHEAUME

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☒ ~~ASAP~~ (other)

Laboratory Number: 02-173

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/ MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A		SPLP Cu, Zn	SPLP Nitrate-Nitrite	SPLP Phosphorous			% Moisture
1	DOGWOOD 1	2/22/13	13:00	SOIL	2																	X	X	X			
2	DOGWOOD 2																										
3	HONEYSUCKLE 1																										
4	HONEYSUCKLE 2																										
5	~~ESCALLONIA 1~~ BOX WOOD																										
6	~~ESCALLONIA 2~~ BOX WOOD																										
7	DAYLILY 1																										
8	DAYLILY 2																										
9	CINQUEFOIL 1																										
10	CINQUEFOIL 2																										

	Signature	Company	Date	Time
Relinquished		CITY OF REDMOND	2/22/13	1627
Received		OSE	2/22/13	1627
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ _____

Water Quality Data

January 13, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-29**	**PAGE 1**	
REPORT DATE:	**02/08/12**		
DATE SAMPLED:	**01/13/12**	**DATE RECEIVED:**	**01/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/l)	SRP (mg/l)
RBS185-IN-QA	0.005	<0.001
RBS185-OUT-QA	0.002	<0.001

	DISSOLVED METALS		TOTAL METALS	
SAMPLE ID	COPPER (mg/l)	ZINC (mg/l)	COPPER (mg/l)	ZINC (mg/l)
RBS185-IN-QA	<0.0010	<0.005	0.0033	<0.005
RBS185-OUT-QA	<0.0010	<0.005	0.0023	<0.005

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REPORT DATE: **02/08/12**

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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/l)	SRP (mg/l)
METHOD	EPA 365.1	EPA 365.1
DATE ANALYZED	01/16/12	01/13/12
DETECTION LIMIT	0.002	0.001
DUPLICATE		
SAMPLE ID	RBS185-OUT-QA	RBS185-OUT-QA
ORIGINAL	0.002	<0.001
DUPLICATE	0.002	<0.001
RPD	0.00%	NC
SPIKE SAMPLE		
SAMPLE ID	RBS185-OUT-QA	RBS185-OUT-QA
ORIGINAL	0.002	<0.001
SPIKED SAMPLE	0.052	0.021
SPIKE ADDED	0.050	0.020
% RECOVERY	100.00%	105.00%
QC CHECK		
FOUND	0.089	0.034
TRUE	0.090	0.033
% RECOVERY	98.89%	103.03%
BLANK	<0.002	<0.001

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS		TOTAL METALS	
QC PARAMETER	COPPER (mg/l)	ZINC (mg/l)	COPPER (mg/l)	ZINC (mg/l)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	02/06/12	02/06/12	02/03/12	02/03/12
DETECTION LIMIT	0.0010	0.005	0.0010	0.005
DUPLICATE				
SAMPLE ID	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA
ORIGINAL	<0.0010	<0.005	0.0023	<0.005
DUPLICATE	<0.0010	<0.005	0.0021	<0.005
RPD	NC	NC	9.09%	NC
SPIKE SAMPLE				
SAMPLE ID	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA
ORIGINAL	<0.0010	<0.005	0.0023	<0.005
SPIKED SAMPLE	0.0496	0.056	0.0473	0.058
SPIKE ADDED	0.0500	0.050	0.0500	0.050
% RECOVERY	99.20%	112.00%	90.00%	116.00%
QC CHECK				
FOUND	0.0545	0.053	0.0494	0.045
TRUE	0.0500	0.050	0.0500	0.050
% RECOVERY	109.00%	106.00%	98.80%	90.00%
BLANK	<0.0010	<0.005	<0.0010	<0.005

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
~~Hydro International Up-Flo Filter~~ RBS Bioswale	~~09-04207-000~~ 09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Dan Bennett		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspened Sediemnt - SM 2540D	Suspended Sediment Concentrations-SM D3977	Total volatile solids - EPA 160.4	Particle size Distribution - ASTM 3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Hardness as CaCO3-SM 2340B	Specific gravity - ASTM D891	Copper, dissolved - EPA 200.8	Copper, total - EPA 200.8	Zinc, dissolved - EPA 200.8	Zinc, total - EPA 200.8	TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx		
RBS185 IN QA	1/13/12	12:03	Stormwater Composite in 20-L HDPE bottle	1					X	X			X	X	X	X				
RBS185 OUT QA	1/13/12	12:05	Stormwater Composite in 20-L HDPE bottle	1					X	X			X	X	✓	X				
			Stormwater grab sample in 1L glass jar																	
			Stormwater grab sample in 1L glass jar																	

REMARKS: TP, ~~TSS, NO3/NO2 field preserved with H2SO4, Hardness and Total Cu/Zn field preserved with HNO3, Orthophosphate field filtered and preserved with H2SO4, Dissolved Cu/Zn field filtered and field preserved with HNO3.~~ DB

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENNETT/HEC		1/13/12			1/13/12

February 17, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-37** **PAGE 1**

REPORT DATE: **03/08/12**

DATE SAMPLED: **02/17/12** **DATE RECEIVED:** **02/18/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RB185-IN	0.368	0.056	28.1	3.91	236	7.20	207
RB185-OUT	4.68	3.56	170	29.3	120	0.60	180

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RB185-IN	0.0010	0.0307	0.0155	<0.0002	0.198	2.31	3.56
RB185-OUT	0.0010	0.0587	0.0162	<0.0002	0.083	29.4	89.7

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RB185-IN	<0.0003	0.0034	<0.0010	<0.0002	0.012
RB185-OUT	0.0003	0.0220	0.0024	<0.0002	0.025

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CASE FILE NUMBER: **HER077-37** **PAGE 2**

REPORT DATE: **03/08/12**

DATE SAMPLED: **02/17/12** **DATE RECEIVED:** **02/18/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	02/23/12	02/19/12	02/21/12	03/08/12	02/21/12	02/24/12	02/24/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.075	0.004	53.0	34.2	36		
DUPLICATE	0.071	0.004	53.6	35.2	38		
RPD	5.48%	0.00%	1.13%	2.88%	5.41%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.075	0.004	53.0	34.2			
SPIKED SAMPLE	0.124	0.024	71.7	45.0			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	98.00%	100.00%	93.50%	108.00%	NA	NA	NA
QC CHECK							
FOUND	0.090	0.034	39.5	28.5	9.5		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	100.00%	103.03%	98.75%	95.00%	95.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	02/22/12	02/22/12	02/22/12	02/22/12	02/22/12	02/28/12	02/18/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0004	<0.0010	<0.0010	<0.0002	<0.005	1.23	0.671
DUPLICATE	0.0004	<0.0010	<0.0010	<0.0002	<0.005	1.05	0.678
RPD	0.00%	NC	NC	NC	NC	15.79%	1.04%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0004	<0.0010	<0.0010	<0.0002	<0.005	1.23	0.671
SPIKED SAMPLE	0.0595	0.0571	0.0543	0.0017	0.060	3.22	0.868
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	118.20%	114.20%	108.60%	85.00%	120.00%	99.50%	98.50%
QC CHECK							
FOUND	0.0535	0.053	0.0520	0.0021	0.054	5.63	0.402
TRUE	0.0500	0.050	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	107.00%	106.00%	104.00%	105.00%	108.00%	97.24%	98.53%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-37** **PAGE 4**

REPORT DATE: **03/08/12**

DATE SAMPLED: **02/17/12** **DATE RECEIVED:** **02/18/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	02/22/12	02/22/12	02/22/12	02/22/12	02/22/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0549	0.0520	0.0504	0.0019	0.051
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	109.80%	104.00%	100.80%	95.00%	102.00%
QC CHECK					
FOUND	0.0508	0.050	0.0498	0.0020	0.051
TRUE	0.0500	0.050	0.0500	0.0020	0.050
% RECOVERY	101.60%	100.00%	99.60%	100.00%	102.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA
ENVIRONMENTAL
CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: ~~Redmond City Center~~ BSIEIN SWMP	PROJECT NUMBER: 10-04884-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: DB, AS		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen- EPA 351.2	Nitrate+nitrite EPA 353.2	Chloride SM 4500-CL-C	Hardness as CaCO3 SM 2340C	Dissolved Metals: (Cd, Cu, Pb, Hg, Zn) - EPA 200.8	Total Metals: (Cd, Cu, Pb, Hg, Zn) - EPA 200.8
RBSIES-IN	2/17/12	1840	Stormwater Composite in 20-L HDPE bottle	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RBSIES-OUT	2/17/12	1730	Stormwater Composite in 20-L HDPE bottle	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Pour entire contents of both bottles for each site into churn-splitter. Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSE/HEC		2/18/12 1200	ANIKA/ARI		2/18/12 1200

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-38**	**PAGE 1**	
REPORT DATE:	**03/12/12**		
DATE SAMPLED:	**02/17/12**	**DATE RECEIVED:**	**02/18/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RB185-IN	<0.05	0.92	33
RB185-OUT	<0.16	0.44	55

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-38**

REPORT DATE: **03/12/12**

DATE SAMPLED: **02/17/12** **DATE RECEIVED:** **02/18/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	02/24/12	02/24/12	
DATE ANALYZED	03/09/12	03/09/12	02/18/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			BATCH
ORIGINAL			400
DUPLICATE			480
RPD	NA	NA	18.18%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.23	0.48	
TRUE	0.25	0.50	
% RECOVERY	92.00%	96.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: 18574 ~~Redmond City Center~~ BIOFILTRA SAMPLE	PROJECT NUMBER: 10-04884-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: DB, AS		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 4
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen- EPA 351.2	Nitrate+nitrite EPA 353.2	Chloride SM 4500-CL-C	Hardness as CaCO3 SM 2340C	Dissolved Metals: (Cd, Cu, Pb, Hg, Zn) - EPA 200.8	Total Metals: (Cd, Cu, Pb, Hg, Zn) - EPA 200.8	FECAL COLIFORM BACT SM 9222D	TPH(DIESEL) NWTPH-DX	TPH(MOTOR OIL) NWTPH-DX	SEMIVOLATILE ORGANIC COMPOUNDS EPA 8270C		
			Stormwater Composite in 20-L HDPE bottle	2 AS																
			Stormwater Composite in 20-L HDPE bottle	2 AS																
RBS1ES-IN	2/17/12	1930	GRAB SAMPLE (STORMWATER)	1											X					
RBS1ES-OUT	2/17/12	1945	"	1											X					
RBS1ES-IN	2/17/12	1930	"	1												X	X	X		
RBS1ES-OUT	2/17/12	1945	✓	1												X	X	X		

Notes: ~~Pour entire contents of both bottles for each site into churn-splitter. Use churn-splitter to apportion composite sample into smaller bottles.~~ AS

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSEN/HERR		2/18/12 1200	MIKE		2/18/12 1200

db \\herrera\hecnet\herrera\proj\y2010\10-04884-000\draft text\city center monitoring project\city center qapp\draft text\cocs\coc composite ari redmond city center 10-04884-000.docx

February 20, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-43**	**PAGE 1**	
REPORT DATE:	**03/12/12**		
DATE SAMPLED:	**02/21/12**	**DATE RECEIVED:**	**02/21/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.05	1.09	250
RBS185-OUT	<0.05	0.31	23

AQUATIC RESEARCH INCORPORATED

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-43**

REPORT DATE: **03/12/12**

DATE SAMPLED: **02/21/12** **DATE RECEIVED:** **02/21/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	02/24/12	02/24/12	
DATE ANALYZED	03/09/12	03/09/12	02/21/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			BATCH
ORIGINAL			110
DUPLICATE			150
RPD	NA	NA	30.77%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.23	0.48	
TRUE	0.25	0.50	
% RECOVERY	92.00%	96.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svensson		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 4
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS1ES-IN	2/21/12	1312	Stormwater grab 1-L amber	1	~~X~~ AS	X	X
RBS1ES-OUT	2/21/12	1316	Stormwater grab 1-L amber	1	~~X~~ AS	X	X
RBS1ES-IN	2/21/12	1312	Stormwater grab 250-mL amber	1	X		
RBS1ES-OUT	2/21/12	1316	Stormwater grab 250-mL amber	1	X		

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Alex Svensson / HEC		2/21/12 1420	S Nielson HEC		2/21/12 1420
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

February 24, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-46**	**PAGE 1**	
REPORT DATE:	**03/21/12**		
DATE SAMPLED:	**02/25/12**	**DATE RECEIVED:**	**02/26/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.126	0.061	15.0	1.56	29	<0.50	25
RBS185-OUT	5.35	4.10	251	41.1	53	2.0	48

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0046	0.0019	<0.0002	0.053	1.73	0.084
RBS185-OUT	0.0005	0.0542	0.0178	<0.0002	0.080	47.6	125

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	<0.0010	<0.0010	<0.0002	0.017
RBS185-OUT	<0.0003	0.0261	0.0033	<0.0002	0.029

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-46** **PAGE 2**

REPORT DATE: **03/21/12**

DATE SAMPLED: **02/25/12** **DATE RECEIVED:** **02/26/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	03/02/12	02/27/12	03/12/12	03/08/12	03/02/12	03/03/12	03/03/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.032	0.011	23.1	34.2	47		
DUPLICATE	0.033	0.011	23.8	35.2	46		
RPD	3.08%	0.00%	2.99%	2.88%	1.08%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.032	0.011	23.1	34.2			
SPIKED SAMPLE	0.086	0.031	43.0	45.0			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	108.00%	100.00%	99.50%	108.00%	NA	NA	NA
QC CHECK							
FOUND	0.091	0.033	39.1	28.5	9.3		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.11%	100.00%	97.75%	95.00%	93.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
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NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-46** **PAGE 3**

REPORT DATE: **03/21/12**

DATE SAMPLED: **02/25/12** **DATE RECEIVED:** **02/26/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	03/06/12	03/06/12	03/06/12	03/06/12	03/06/12	03/02/12	02/27/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0003	0.0387	0.0073	<0.0002	0.206	1.66	0.146
DUPLICATE	<0.0003	0.0361	0.0069	<0.0002	0.196	1.69	0.141
RPD	NC	6.95%	5.63%	NC	4.98%	1.79%	3.48%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0003	0.0387	0.0073	<0.0002	0.206	1.66	0.146
SPIKED SAMPLE	0.0571	0.0885	0.0600	0.0020	0.263	3.65	0.348
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	113.60%	99.60%	105.40%	100.00%	114.00%	99.50%	101.00%
QC CHECK							
FOUND	0.0521	0.052	0.0516	0.0019	0.052	5.74	0.411
TRUE	0.0500	0.050	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	104.20%	104.00%	103.20%	95.00%	104.00%	99.14%	100.74%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-46** **PAGE 4**

REPORT DATE: **03/21/12**

DATE SAMPLED: **02/25/12** **DATE RECEIVED:** **02/26/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	02/27/12	02/27/12	02/27/12	02/27/12	02/27/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	0.104
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	0.102
RPD	NC	NC	NC	NC	1.94%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	0.104
SPIKED SAMPLE	0.0502	0.0466	0.0467	0.0024	0.161
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	100.40%	93.20%	93.40%	120.00%	114.00%
QC CHECK					
FOUND	0.0510	0.051	0.0506	0.0021	0.049
TRUE	0.0500	0.050	0.0500	0.0020	0.050
% RECOVERY	102.00%	102.00%	101.20%	105.00%	98.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: ALEX SVENDSEN		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS1E5-IN	2/25/12	0929	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS1E5-OUT	2/25/12	1502	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X

Notes: If two sample containers are used for a sample station, pour entire contents of both bottles into churn-splitter. Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSEN/HEC		2/26/12 0930	HARTENGMONSE/ARI		2/26/12 0936
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-45**	**PAGE 1**	
REPORT DATE:	**03/12/12**		
DATE SAMPLED:	**02/24/12**	**DATE RECEIVED:**	**02/24/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.05	0.84	59
RBS185-OUT	<0.05	0.83	18

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-45**

REPORT DATE: **03/12/12**

DATE SAMPLED: **02/24/12** **DATE RECEIVED:** **02/24/12**

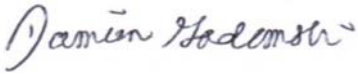
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	03/02/12	03/02/12	
DATE ANALYZED	03/09/12	03/09/12	02/25/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			18
DUPLICATE			14
RPD	NA	NA	25.00%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.23	0.48	
TRUE	0.25	0.50	
% RECOVERY	92.00%	96.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: ALEX SVENDSEN		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 4
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS1ES-IN	2/24/12	1520	Stormwater grab 1-L amber	1	X	X	
RBS1ES-OUT	↓	1620	Stormwater grab 1-L amber	1	X	X	
RBS1ES-IN		1520	Stormwater grab 250-mL amber	1			X
RBS1ES-OUT	↓	1620	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSEN/HEC		2/24/12 1710	KATHLEEN GRADOWSKI/AES		02/24/12 1710
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

March 2, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-49** **PAGE 1**

REPORT DATE: **03/26/12**

DATE SAMPLED: **03/02/12 AND 03/03/12** **DATE RECEIVED:** **03/03/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS 185 IN	0.072	0.007	29.7	12.1	40	0.60	36
RBS 185 OUT	4.76	3.03	217	36.7	70	<0.50	62

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS 185 IN	<0.0003	0.0081	0.0033	<0.0002	0.182	1.01	0.160
RBS 185 OUT	0.0006	0.0525	0.0139	<0.0002	0.062	12.0	123

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS 185 IN	<0.0003	0.0027	<0.0010	<0.0002	0.027
RBS 185 OUT	<0.0003	0.0263	0.0024	<0.0002	0.022

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-49** **PAGE 2**

REPORT DATE: **03/26/12**

DATE SAMPLED: **03/02/12 AND 03/03/12** **DATE RECEIVED:** **03/03/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	03/09/12	03/05/12	03/24/12	03/23/12	03/09/12	03/07/12	03/07/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.116	0.058	109	326	1360		
DUPLICATE	0.119	0.057	110	328	1400		
RPD	2.55%	1.74%	0.91%	0.61%	2.90%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.116	0.058	109	326			
SPIKED SAMPLE	0.165	0.077	129	335			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	98.00%	95.00%	100.00%	90.00%	NA	NA	NA
QC CHECK							
FOUND	0.090	0.034	39.1	28.6	9.5		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	100.00%	103.03%	97.75%	95.33%	95.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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CASE FILE NUMBER: **HER077-49**

REPORT DATE: **03/26/12**

DATE SAMPLED: **03/02/12 AND 03/03/12** **DATE RECEIVED:** **03/03/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	03/23/12	03/23/12	03/23/12	03/23/12	03/23/12	03/14/12	03/05/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	RBS 185 IN
ORIGINAL	<0.0003	0.0091	0.0024	<0.0002	0.224	0.943	0.160
DUPLICATE	<0.0003	0.0091	0.0024	<0.0002	0.227	0.997	0.163
RPD	NC	0.00%	0.00%	NC	1.33%	5.57%	1.86%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	RBS 185 IN
ORIGINAL	<0.0003	0.0091	0.0024	<0.0002	0.224	0.943	0.160
SPIKED SAMPLE	0.0562	0.0649	0.0534	0.0021	0.278	2.87	0.362
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	112.40%	111.60%	102.00%	105.00%	108.00%	96.35%	101.00%
QC CHECK							
FOUND	0.0489	0.049	0.0509	0.0019	0.048	5.69	0.410
TRUE	0.0500	0.050	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	97.80%	98.00%	101.80%	95.00%	96.00%	98.27%	100.49%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-49** **PAGE 4**

REPORT DATE: **03/26/12**

DATE SAMPLED: **03/02/12 AND 03/03/12** **DATE RECEIVED:** **03/03/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	03/07/12	03/07/12	03/07/12	03/07/12	03/07/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0004	0.0047	<0.0010	<0.0002	<0.005
DUPLICATE	0.0004	0.0047	<0.0010	<0.0002	<0.005
RPD	0.00%	0.00%	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0004	0.0047	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0529	0.0522	0.0478	0.0017	0.058
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	105.00%	95.00%	95.60%	85.00%	116.00%
QC CHECK					
FOUND	0.0513	0.051	0.0505	0.0020	0.051
TRUE	0.0500	0.050	0.0500	0.0020	0.050
% RECOVERY	102.60%	102.00%	101.00%	100.00%	102.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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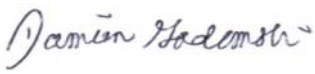
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HER077-49

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: D. Ahearn		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE: 3/3/12	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS 185 IN	3/2/12	21:41	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS 185 OUT	3/3/12	1:21	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X

Notes: If two sample containers are used for a sample station, pour entire contents of both bottles into churn-splitter. Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Dylan Ahearn/HEC		3/3/12 10:00	JANE GARRISON/AE		3/3/12 10:00
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

March 5, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-50** **PAGE 1**

REPORT DATE: **03/21/12 REVISED 04/06/12**

DATE SAMPLED: **03/05/12** **DATE RECEIVED:** **03/06/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages. The report has been revised to reflect the reanalysis of RB 185 OUT for NO3+NO2.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RB185 IN	0.078	0.001	27.0	6.30	46	2.8	38
RB185 OUT	4.63	3.22	201	34.2	70	<0.50	80

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RB185 IN	<0.0003	0.0167	0.0028	<0.0002	0.137	0.590	0.107
RB185 OUT	0.0004	0.0514	0.0114	<0.0002	0.055	13.6	84.0

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RB185 IN	<0.0003	0.0027	<0.0010	<0.0002	0.044
RB185 OUT	<0.0003	0.0243	0.0031	<0.0002	0.029

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-50** **PAGE 2**

REPORT DATE: **03/21/12 REVISED 04/06/12**

DATE SAMPLED: **03/05/12** **DATE RECEIVED:** **03/06/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	03/09/12	03/07/12	03/12/12	03/08/12	03/15/12	03/12/12	03/12/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	RB185 OUT	BATCH		
ORIGINAL	0.116	0.008	23.1	34.2	76		
DUPLICATE	0.119	0.008	23.8	35.2	72		
RPD	2.55%	0.00%	2.99%	2.88%	5.41%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	RB185 OUT			
ORIGINAL	0.116	0.008	23.1	34.2			
SPIKED SAMPLE	0.165	0.029	43.0	45.0			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	98.00%	105.00%	99.50%	108.00%	NA	NA	NA
QC CHECK							
FOUND	0.090	0.034	39.1	28.5	9.7		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	100.00%	103.03%	97.75%	95.00%	97.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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AQUATIC RESEARCH INCORPORATED

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CASE FILE NUMBER: **HER077-50**

REPORT DATE: **03/21/12 REVISED 04/06/12**

DATE SAMPLED: **03/05/12** **DATE RECEIVED:** **03/06/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	03/14/12	03/14/12	03/14/12	03/14/12	03/14/12	03/14/12	03/07/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0003	0.0387	0.0073	<0.0002	0.206	0.943	0.047
DUPLICATE	<0.0003	0.0361	0.0069	<0.0002	0.196	0.997	0.045
RPD	NC	6.95%	5.63%	NC	4.98%	5.57%	4.35%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0003	0.0387	0.0073	<0.0002	0.206	0.943	0.047
SPIKED SAMPLE	0.0571	0.0885	0.0600	0.0020	0.263	2.87	0.245
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	113.60%	99.60%	105.40%	100.00%	114.00%	96.35%	99.00%
QC CHECK							
FOUND	0.0508	0.051	0.0510	0.0020	0.051	5.69	0.439
TRUE	0.0500	0.050	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	101.60%	102.00%	102.00%	100.00%	102.00%	98.27%	107.60%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-50**

REPORT DATE: **03/21/12 REVISED 04/06/12**

DATE SAMPLED: **03/05/12** **DATE RECEIVED:** **03/06/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	03/07/12	03/07/12	03/07/12	03/07/12	03/07/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0004	0.0047	<0.0010	<0.0002	<0.005
DUPLICATE	0.0004	0.0047	<0.0010	<0.0002	<0.005
RPD	0.00%	0.00%	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0004	0.0047	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0529	0.0522	0.0478	0.0017	0.058
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	105.00%	95.00%	95.60%	85.00%	116.00%
QC CHECK					
FOUND	0.0513	0.051	0.0505	0.0020	0.051
TRUE	0.0500	0.050	0.0500	0.0020	0.050
% RECOVERY	102.60%	102.00%	101.00%	100.00%	102.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HER077-50

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS 1455 IN	3-5-12	9:03	Stormwater Composite 20-L HDPE	1	V	V	V	V	V	V	V	V	V	V
RBS 1550 JT	3-5-12	13:51	Stormwater Composite 20-L HDPE	1	V	V	V	V	V	V	V	V	V	V

Notes: If two sample containers are used for a sample station, pour entire contents of both bottles into churn-splitter. Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENNETT - HERRERA		3-6-12 8:30	KAREN GOODMAN		3/6/12 0830
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

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March 9, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-54**	**PAGE 1**	
REPORT DATE:	**04/05/12 REVISED 04/14/12**		
DATE SAMPLED:	**03/10/12**	**DATE RECEIVED:**	**03/10/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages. The report has been revised to reflect the reanalysis of TSS.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
185-IN	0.053	0.011	24.8	2.93	19	12	17
185-OUT	4.13	2.59	188	23.5	54	3.2	58
185-OUT-QA	3.76	2.57	186	24.0	50	2.2	64

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
185-IN	0.0003	0.0056	0.0015	<0.0002	0.165	0.686	2.40
185-OUT	0.0005	0.0433	0.0098	<0.0002	0.056	9.76	93.3
185-OUT-QA	0.0005	0.0435	0.0098	<0.0002	0.055	11.1	89.7

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
185-IN	<0.0003	0.0021	<0.0010	<0.0002	0.057
185-OUT	<0.0003	0.0174	0.0018	<0.0002	0.015
185-OUT-QA	<0.0003	0.0175	0.0020	<0.0002	0.016

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-54** **PAGE 2**

REPORT DATE: **04/05/12 REVISED 04/14/12**

DATE SAMPLED: **03/10/12** **DATE RECEIVED:** **03/10/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	03/16/12	03/12/12	03/23/12	03/23/12	03/16/12	03/17/12	03/17/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.046	0.010	10.2	326	28		
DUPLICATE	0.045	0.010	10.2	329	28		
RPD	2.20%	0.00%	0.00%	0.92%	0.00%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.046	0.010	10.2	326			
SPIKED SAMPLE	0.097	0.032	28.5	335			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	102.00%	110.00%	91.50%	90.00%	NA	NA	NA
QC CHECK							
FOUND	0.094	0.033	39.1	28.6	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	104.44%	100.00%	97.75%	95.33%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-54** **PAGE 3**

REPORT DATE: **04/05/12 REVISED 04/14/12**

DATE SAMPLED: **03/10/12** **DATE RECEIVED:** **03/10/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12	03/14/12	03/12/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0124	0.0050	<0.0002	0.066	0.638	0.489
DUPLICATE	<0.0003	0.0115	0.0044	<0.0002	0.060	0.598	0.496
RPD	NC	7.53%	12.77%	NC	9.52%	6.47%	1.42%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0124	0.0050	<0.0002	0.066	0.638	0.489
SPIKED SAMPLE	0.0531	0.0634	0.0522	0.0018	0.124	2.65	0.686
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	106.20%	102.00%	94.40%	90.00%	116.00%	100.60%	98.50%
QC CHECK							
FOUND	0.0525	0.0526	0.0507	0.0091	0.052	5.69	0.410
TRUE	0.0500	0.0500	0.0500	0.0100	0.050	5.79	0.408
% RECOVERY	105.00%	105.20%	101.40%	91.00%	104.00%	98.27%	100.49%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: HER077-54 **PAGE 4**
REPORT DATE: 04/05/12 REVISED 04/14/12
DATE SAMPLED: 03/10/12 **DATE RECEIVED:** 03/10/12
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	03/14/12	04/02/12	03/14/12	03/14/12	03/14/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	185-OUT-QA	BATCH	185-OUT-QA	185-OUT-QA	185-OUT-QA
ORIGINAL	<0.0003	0.0080	0.0020	<0.0002	0.016
DUPLICATE	<0.0003	0.0078	0.0020	<0.0002	0.016
RPD	NC	2.53%	0.00%	NC	0.00%
SPIKE SAMPLE					
SAMPLE ID	185-OUT-QA	BATCH	185-OUT-QA	185-OUT-QA	185-OUT-QA
ORIGINAL	<0.0003	0.0080	0.0020	<0.0002	0.016
SPIKED SAMPLE	0.0484	0.0551	0.0455	0.0018	0.069
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	96.80%	94.20%	87.00%	90.00%	106.00%
QC CHECK					
FOUND	0.0508	0.0526	0.0510	0.0098	0.051
TRUE	0.0500	0.0500	0.0500	0.0100	0.050
% RECOVERY	101.60%	105.20%	102.00%	98.00%	102.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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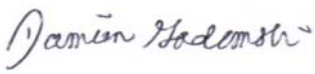
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HER077-53

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond City Center	10-04884-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RW	3-10-12	10:31	Stormwater Composite 20-L HDPE	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RW-QA	3-10-12	10:31	Stormwater Composite 20-L HDPE	1	✓	✓	✓	✓	✓	✓	✓			✓
LW	3-10-12	820	11	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Pour entire contents of both bottles (if necessary) into churn-splitter. Use churn-splitter to apportion composite sample into smaller bottles.
RW-QA is made by transfering Smpl RW in Churn Spl. Hrs.
RW = 6L
LW = 4.5L

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Dan Bonner/Herrera		3-10-12 1400	Aileen Gadoua		3/10/12 1400
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-55**	**PAGE 1**	
REPORT DATE:	**03/30/12**		
DATE SAMPLED:	**03/09/12**	**DATE RECEIVED:**	**03/10/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
185-IN	<0.05	0.39	18
185-OUT	<0.08	0.79	5
185-OUT-QA	<0.10	0.82	18

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-55**

REPORT DATE: **03/30/12**

DATE SAMPLED: **03/09/12** **DATE RECEIVED:** **03/10/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	03/23/12	03/23/12	
DATE ANALYZED	03/29/12	03/29/12	03/10/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			BATCH
ORIGINAL			1200
DUPLICATE			950
RPD	NA	NA	23.26%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.23	0.53	
TRUE	0.25	0.50	
% RECOVERY	92.00%	106.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
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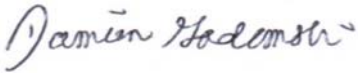
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HER 077-55

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
185-IN	3-9-12	10:30	Stormwater grab 1-L amber	1	✓	✓	
185-OUT	3-9-12	11:15	Stormwater grab 1-L amber	1	✓	✓	
185-IN	3-9-12	10:30	Stormwater grab 250-mL amber	1			✓
185-OUT	3-9-12	11:15	Stormwater grab 250-mL amber	1			✓
185 DUP-A	3-9-12	11:20	1-L	1	✓	✓	
185-DUP-A	3-9-12	11:20	250 mL	1			✓

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Dan Bennett / Herrera		3-10-12 1400	William Gibbons		3/10/12 1400
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

March 12, 2012

1311 N. 35th St.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Aquatic Research, Inc
Damien Gadomski
3927 Aurora Ave. N
Seattle, Washington 98103

RE: Herbicides
Lab ID: 1203107

March 27, 2012

Attention Damien Gadomski:

Fremont Analytical, Inc. received 4 sample(s) on 3/16/2012 for the analyses presented in the following report.

Herbicides by EPA Method 8151A

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Michael Dee
Sr. Chemist / Principal

Date: *03/27/2012*

CLIENT: Aquatic Research, Inc
Project: Herbicides
Lab Order: 1203107

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1203107-001	RW	03/12/2012 12:00 AM	03/16/2012 10:42 AM
1203107-002	LW	03/12/2012 12:00 AM	03/16/2012 10:42 AM
1203107-003	RBS185-IN	03/12/2012 12:00 AM	03/16/2012 10:42 AM
1203107-004	RBS185-OUT	03/12/2012 12:00 AM	03/16/2012 10:42 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1203107**
Date: **3/27/2012**

CLIENT: Aquatic Research, Inc
Project: Herbicides

I. SAMPLE RECEIPT:
All samples were received intact. The internal ice chest temperatures were measured on receipt and are recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1203107**
Date Reported: **3/27/2012**

Client: Aquatic Research, Inc
Collection Date: 3/12/2012
Project: Herbicides
Lab ID: 1203107-001
Matrix: Water
Client Sample ID: RW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Herbicides by EPA Method 8151A				Batch ID: 2124		Analyst: MD
Dicamba	ND	0.400		µg/L	1	3/26/2012 7:32:42 PM
2,4-D	ND	0.400		µg/L	1	3/26/2012 7:32:42 PM
2,4-DP	ND	0.400		µg/L	1	3/26/2012 7:32:42 PM
2,4,5-TP (Silvex)	ND	0.400		µg/L	1	3/26/2012 7:32:42 PM
2,4,5-T	ND	0.400		µg/L	1	3/26/2012 7:32:42 PM
Dinoseb	ND	0.400		µg/L	1	3/26/2012 7:32:42 PM
Dalapon	ND	0.500		µg/L	1	3/26/2012 7:32:42 PM
2,4-DB	ND	0.400		µg/L	1	3/26/2012 7:32:42 PM
MCPP	ND	8.00		µg/L	1	3/26/2012 7:32:42 PM
MCPA	ND	8.00		µg/L	1	3/26/2012 7:32:42 PM
Surr: 2,4-Dichlorophenylacetic acid	71.6	50-135		%REC	1	3/26/2012 7:32:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1203107**
Date Reported: **3/27/2012**

Client: Aquatic Research, Inc
Collection Date: 3/12/2012
Project: Herbicides
Lab ID: 1203107-002
Matrix: Water
Client Sample ID: LW

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Herbicides by EPA Method 8151A				Batch ID: 2124		Analyst: MD
Dicamba	ND	0.400		µg/L	1	3/26/2012 8:16:42 PM
2,4-D	ND	0.400		µg/L	1	3/26/2012 8:16:42 PM
2,4-DP	ND	0.400		µg/L	1	3/26/2012 8:16:42 PM
2,4,5-TP (Silvex)	ND	0.400		µg/L	1	3/26/2012 8:16:42 PM
2,4,5-T	ND	0.400		µg/L	1	3/26/2012 8:16:42 PM
Dinoseb	ND	0.400		µg/L	1	3/26/2012 8:16:42 PM
Dalapon	ND	0.500		µg/L	1	3/26/2012 8:16:42 PM
2,4-DB	ND	0.400		µg/L	1	3/26/2012 8:16:42 PM
MCPP	ND	8.00		µg/L	1	3/26/2012 8:16:42 PM
MCPA	ND	8.00		µg/L	1	3/26/2012 8:16:42 PM
Surr: 2,4-Dichlorophenylacetic acid	87.2	50-135		%REC	1	3/26/2012 8:16:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1203107**
Date Reported: **3/27/2012**

Client: Aquatic Research, Inc
Collection Date: 3/12/2012
Project: Herbicides
Lab ID: 1203107-003
Matrix: Water
Client Sample ID: RBS185-IN

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Herbicides by EPA Method 8151A				Batch ID: 2124		Analyst: MD
Dicamba	ND	0.400		µg/L	1	3/26/2012 8:39:42 PM
2,4-D	ND	0.400		µg/L	1	3/26/2012 8:39:42 PM
2,4-DP	ND	0.400		µg/L	1	3/26/2012 8:39:42 PM
2,4,5-TP (Silvex)	ND	0.400		µg/L	1	3/26/2012 8:39:42 PM
2,4,5-T	ND	0.400		µg/L	1	3/26/2012 8:39:42 PM
Dinoseb	ND	0.400		µg/L	1	3/26/2012 8:39:42 PM
Dalapon	ND	0.500		µg/L	1	3/26/2012 8:39:42 PM
2,4-DB	ND	0.400		µg/L	1	3/26/2012 8:39:42 PM
MCPP	ND	8.00		µg/L	1	3/26/2012 8:39:42 PM
MCPA	ND	8.00		µg/L	1	3/26/2012 8:39:42 PM
Surr: 2,4-Dichlorophenylacetic acid	55.4	50-135		%REC	1	3/26/2012 8:39:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1203107**
Date Reported: **3/27/2012**

Client: Aquatic Research, Inc
Collection Date: 3/12/2012
Project: Herbicides
Lab ID: 1203107-004
Matrix: Water
Client Sample ID: RBS185-OUT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Herbicides by EPA Method 8151A				Batch ID: 2124		Analyst: MD
Dicamba	ND	0.400		µg/L	1	3/26/2012 9:01:42 PM
2,4-D	ND	0.400		µg/L	1	3/26/2012 9:01:42 PM
2,4-DP	ND	0.400		µg/L	1	3/26/2012 9:01:42 PM
2,4,5-TP (Silvex)	ND	0.400		µg/L	1	3/26/2012 9:01:42 PM
2,4,5-T	ND	0.400		µg/L	1	3/26/2012 9:01:42 PM
Dinoseb	ND	0.400		µg/L	1	3/26/2012 9:01:42 PM
Dalapon	ND	0.500		µg/L	1	3/26/2012 9:01:42 PM
2,4-DB	ND	0.400		µg/L	1	3/26/2012 9:01:42 PM
MCPP	ND	8.00		µg/L	1	3/26/2012 9:01:42 PM
MCPA	ND	8.00		µg/L	1	3/26/2012 9:01:42 PM
Surr: 2,4-Dichlorophenylacetic acid	53.4	50-135		%REC	1	3/26/2012 9:01:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: *3/27/2012*

Work Order: 1203107
CLIENT: Aquatic Research, Inc
Project: Herbicides

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID: **MB-2124** SampType: **MBLK** Units: **µg/L** Prep Date: **3/18/2012** RunNo: **3751**
Client ID: **MBLKW** Batch ID: **2124** Analysis Date: **3/26/2012** SeqNo: **67306**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	ND	0.400									
2,4-D	ND	0.400									
2,4-DP	ND	0.400									
2,4,5-TP (Silvex)	ND	0.400									
2,4,5-T	ND	0.400									
Dinoseb	ND	0.400									
Dalapon	ND	0.500									
2,4-DB	ND	0.400									
MCPP	ND	8.00									
MCPA	ND	8.00									
Surr: 2,4-Dichlorophenylacetic acid	18.4		16.00		115	50	135				

Sample ID: **LCS-2124** SampType: **LCS** Units: **µg/L** Prep Date: **3/18/2012** RunNo: **3751**
Client ID: **LCSW** Batch ID: **2124** Analysis Date: **3/26/2012** SeqNo: **67307**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	17.7	0.400	16.00	0	111	50	150				
2,4,5-T	18.7	0.400	16.00	0	117	50	150				
2,4-DB	17.4	0.400	16.00	0	108	50	150				
Surr: 2,4-Dichlorophenylacetic acid	11.7		16.00		73.0	50	135				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: *3/27/2012*

Work Order: 1203107
CLIENT: Aquatic Research, Inc
Project: Herbicides

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID: **1203106-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **3/18/2012** RunNo: **3751**
Client ID: **BATCH** Batch ID: **2124** Analysis Date: **3/26/2012** SeqNo: **67309**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	18.1	0.400	16.00	0	113	50	150				
2,4,5-T	11.7	0.400	16.00	0	73.3	50	150				
2,4-DB	17.0	0.400	16.00	0	106	50	150				
Surr: 2,4-Dichlorophenylacetic acid	14.2		16.00		88.5	50	135				

Sample ID: **1203107-001ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **3/18/2012** RunNo: **3751**
Client ID: **RW** Batch ID: **2124** Analysis Date: **3/26/2012** SeqNo: **67318**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	ND	0.400						0	0	50	
2,4-D	ND	0.400						0	0	50	
2,4-DP	ND	0.400						0	0	50	
2,4,5-TP (Silvex)	ND	0.400						0	0	50	
2,4,5-T	ND	0.400						0	0	50	
Dinoseb	ND	0.400						0	0	50	
Dalapon	ND	0.500						0	0	50	
2,4-DB	ND	0.400						0	0	50	
MCPP	ND	8.00						0	0	50	
MCPA	ND	8.00						0	0	50	
Surr: 2,4-Dichlorophenylacetic acid	8.86		16.00		55.4	50	135		0		

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name: **AQUATIC**	Work Order Number: **1203107**
Logged by: **Troy Zehr**	Date Received: **3/16/2012 10:42:00 AM**

Chain of Custody

1.	Were custodial seals present?	Yes	☐	No	☐	Not Required	☑
2.	Is Chain of Custody complete?	Yes	☑	No	☐	Not Present	☐
3.	How was the sample delivered?	Client					

Log In

4.	Coolers are present?	Yes	☑	No	☐	NA	☐
5.	Was an attempt made to cool the samples?	Yes	☑	No	☐	NA	☐
6.	Were all coolers received at a temperature of >0° C to 10.0°C	Yes	☑	No	☐	NA	☐
7.	Sample(s) in proper container(s)?	Yes	☑	No	☐		
8.	Sufficient sample volume for indicated test(s)?	Yes	☑	No	☐		
9.	Are samples properly preserved?	Yes	☑	No	☐		
10.	Was preservative added to bottles?	Yes	☐	No	☑	NA	☐
11.	Is there headspace present in VOA vials?	Yes	☐	No	☐	NA	☑
12.	Did all sample containers arrive in good condition?(unbroken)	Yes	☑	No	☐		
13.	Does paperwork match bottle labels?	Yes	☑	No	☐		
14.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No	☐		
15.	Is it clear what analyses were requested?	Yes	☑	No	☐		
16.	Were all holding times able to be met?	Yes	☑	No	☐		

Special Handling (if applicable)

17.	Was client notified of all discrepancies with this order?	Yes	☐	No	☐	NA	☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

18. Additional remarks/Disrepancies

Item Information

Item #	Temp ºC	Condition
Cooler	4.0	Good

Aquatic Research Incorporated

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715 1203107

CHAIN-OF-CUSTODY RECORD

CLIENT: AQUATIC RESEARCH
SAMPLING DATE: 3/12/12
SAMPLERS:

SHEET ____ OF ____
PROJECT ID:
CASE FILE NO.:
DATA RECORDED BY:

SAMPLE INFORMATION

PLEASE SEND REPORT & INVOICE TO DAMIEN GADOMSKI

DAMIENG@JEHINC.COM

SAMPLE ID	DATE/TIME COLLECTED	PARAMETERS: EPA 515.1	CHLORINATED HERBICIDES	BOTT #	NOTES
RW	3/12/12	X			
LW	↓	X			
RBS 185-IN		X			
RBS185-OUT		X			

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name	DAMIEN GADOMSKI	3/16/12 10:47	[illegible]	3/16/12 10:47
Signature	[signature]			
Affiliation	ARI			

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name				
Signature				
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.):

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-59B**	**PAGE 1**	
REPORT DATE:	**04/25/12**		
DATE SAMPLED:	**03/12/12**	**DATE RECEIVED:**	**03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	TOTAL METALS						
SAMPLE ID	ANTIMONY (mg/L)	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CADMIUM (mg/L)	COPPER (mg/L)	CHROMIUM (mg/L)	LEAD (mg/l)
RBS185-OUT	0.0015	0.0237	<0.0010	0.0005	0.0427	0.0100	0.0146
RBS185-IN	0.0012	<0.0010	<0.0010	<0.0003	0.0099	0.0039	0.0044

	TOTAL METALS						DISS METALS
SAMPLE ID	MERCURY (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)	ZINC (mg/L)	ANTIMONY (mg/L)
RBS185-OUT	<0.0002	0.013	<0.005	<0.0010	<0.0010	0.071	0.0015
RBS185-IN	<0.0002	<0.005	<0.005	<0.0010	<0.0010	0.055	<0.0010

	DISSOLVED METALS						
SAMPLE ID	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CHROMIUM (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)
RBS185-OUT	0.0206	<0.0010	0.0013	<0.005	<0.005	<0.0010	<0.0010
RBS185-IN	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-59B** **PAGE 2**

REPORT DATE: **04/25/12**

DATE SAMPLED: **03/12/12** **DATE RECEIVED:** **03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	ANTIMONY (mg/L)	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CADMIUM (mg/L)	COPPER (mg/L)	CHROMIUM (mg/L)	LEAD (mg/l)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12
DETECTION LIMIT	0.0010	0.0010	0.0010	0.0003	0.0010	0.0010	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0013	<0.0010	<0.0002	<0.0003	0.0105	0.0042	0.0049
DUPLICATE	0.0013	<0.0010	<0.0002	<0.0003	0.0104	0.0042	0.0049
RPD	0.00%	NC	NC	NC	0.96%	0.00%	0.00%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0013	<0.0010	<0.0002	<0.0003	0.0105	0.0042	0.0049
SPIKED SAMPLE	0.0498	0.0549	0.0522	0.0550	0.0564	0.0488	0.0539
SPIKE ADDED	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
% RECOVERY	97.00%	109.80%	104.40%	110.00%	91.80%	89.20%	98.00%
QC CHECK							
FOUND	0.0540	0.0504	0.0534	0.0534	0.0525	0.0452	0.0508
TRUE	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
% RECOVERY	108.00%	100.80%	106.80%	106.80%	105.00%	90.40%	101.60%
BLANK	<0.0010	<0.0010	<0.0010	<0.0003	<0.0010	<0.0010	<0.0010

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-59B** **PAGE 3**

REPORT DATE: **04/25/12**

DATE SAMPLED: **03/12/12** **DATE RECEIVED:** **03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						DISS METALS
QC PARAMETER	MERCURY (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)	ZINC (mg/L)	ANTIMONY (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12
DETECTION LIMIT	0.0002	0.005	0.005	0.0010	0.0010	0.005	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0002	<0.005	<0.005	<0.0010	<0.0010	0.064	<0.0010
DUPLICATE	<0.0002	<0.005	<0.005	<0.0010	<0.0010	0.062	<0.0010
RPD	NC	NC	NC	NC	NC	3.17%	NC
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0002	<0.005	<0.005	<0.0010	<0.0010	0.064	<0.0010
SPIKED SAMPLE	0.0018	0.048	0.060	0.0235	0.0499	0.126	0.0520
SPIKE ADDED	0.0020	0.050	0.050	0.0250	0.0500	0.050	0.0500
% RECOVERY	90.00%	96.00%	120.00%	94.00%	99.80%	124.00%	104.00%
QC CHECK							
FOUND	0.0097	0.047	0.050	0.0504	0.0500	0.052	0.0495
TRUE	0.0100	0.050	0.050	0.0500	0.0500	0.050	0.0500
% RECOVERY	97.00%	94.00%	100.00%	100.80%	100.00%	104.00%	99.00%
BLANK	<0.0002	<0.005	<0.005	<0.0010	<0.0010	<0.005	<0.0010

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-59B** **PAGE 4**

REPORT DATE: **04/25/12**

DATE SAMPLED: **03/12/12** **DATE RECEIVED:** **03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS						
QC PARAMETER	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CHROMIUM (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12	04/02/12
DETECTION LIMIT	0.0010	0.0010	0.0010	0.005	0.005	0.0010	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010
DUPLICATE	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010
RPD	NC	NC	NC	NC	NC	NC	NC
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010
SPIKED SAMPLE	0.0508	0.0470	0.0515	0.045	0.053	0.0533	0.0474
SPIKE ADDED	0.0500	0.0500	0.0500	0.050	0.050	0.0500	0.0500
% RECOVERY	101.60%	94.00%	103.00%	90.00%	106.00%	106.60%	94.80%
QC CHECK							
FOUND	0.0460	0.0478	0.0491	0.051	0.049	0.0536	0.0489
TRUE	0.0500	0.0500	0.0500	0.050	0.050	0.0500	0.0500
% RECOVERY	92.00%	95.60%	98.20%	102.00%	98.00%	107.20%	97.80%
BLANK	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

Aquatic Research, Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

ORGANOCHLORINE PESTICIDES SAMPLE REPORT

Results of Analysis by EPA Method 8081B

Measurement of Organochlorine Pesticides by GC/ECD/ECD

Case File Number:	HER07759A1	**Matrix:**	Water
Sample ID No.:	RBS185-OUT	**Sample Vol. (ml)**	540
Date Collected:	3/12/2012	**Dilution Factor:**	1
Date Received:	3/13/2012	**Final Volume**	10.0
Date Extracted:	3/19/2012	**Prep Analyst:**	TM
Date Analyzed	3/30/2012	**Analyst:**	JDS
Date of Report:	4/2/2012	**Supervisor's Initials:**	

Sample Notes: Surrogate recovery is low due to sediment in sample plugging extractor after only 540 mL of 990 mL had been extracted.

Chlorinated Pesticides

Parameter	Result ug/L	RL ug/L	Parameter	Result ug/L	RL ug/L
Aldrin	< 1.0	1.0	Dieldrin	< 1.0	1.0
a-BHC	< 1.0	1.0	Endosulfan I	< 1.0	1.0
b-BHC	< 1.0	1.0	Endosulfan II	< 1.0	1.0
g-BHC (Lindane)	< 1.0	1.0	Eudosulfan Sulfate	< 1.0	1.0
d-BHC	< 1.0	1.0	Endrin	< 1.0	1.0
a-chlordane	< 1.0	1.0	Endrin Aldehyde	< 1.0	1.0
y-chlordane	< 1.0	1.0	Endrin Ketone	< 1.0	1.0
p,p'-DDD	< 1.0	1.0	Heptachlor	< 1.0	1.0
p,p'-DDE	< 1.0	1.0	Heptachlor epoxide	< 1.0	1.0
p,p'-DDT	< 1.0	1.0	Methoxychlor	< 1.0	1.0

Surrogate Compounds

Parameter	% Rec.	LCL	UCL	Parameter	% Rec.	LCL	UCL
Decachlorobiphenyl (DCB)	48%	70%	130%				

MCL: Maximum Contaminant Level
RL: Reporting Limit
LCL: Lower Control Limit
UCL: Upper Control Limit

Aquatic Research Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	**3/19/12-MB**	Matrix:	Water
Sample ID No.:	**Method Blank**	Sample Vol. (ml)	**1000**
Date Collected:	**n/a**	Final Volume (ml)	**2.0**
Date Received:	**n/a**	Dilution Factor:	**1**
Date Extracted:	**03/19/12**		
Date Analyzed	**04/11/12**	Analyst:	**T. Meadows**
Date of Report:	**04/12/12**	Supervisor's Initials:	
Data File Path:	**D:\5975 Data\PAM\2012\041012\ 01901019.D**		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
55-18-5	N-nitrosodiethylamine	0.80	U	86-73-7	Fluorene	0.80	U
76-01-7	Pentachloroethane	0.80	U	84-66-2	Diethyl phthalate	0.80	U
62-53-3	Aniline	0.80	U	100-01-6	4-Nitroaniline	0.80	U
108-95-2	Phenol	0.80	U	7005-72-3	4-Chlorophenyl phenyl ether	0.80	U
111-44-4	Bis(2-chloroethyl) ether	0.80	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.80	U
95-57-8	2-Chlorophenol	0.80	U	86-30-6	N-Nitrosodiphenyl amine	0.80	U
541-73-1	1,3-Dichlorobenzene	0.80	U	103-33-3	Azobenzene	0.80	U
106-46-7	1,4-Dichlorobenzene	0.80	U	101-55-3	4-Bromophenyl phenyl ether	0.80	U
95-50-1	1,2-Dichlorobenzene	0.80	U	319-84-6	a-BHC	0.80	U
100-51-6	Benzyl Alcohol	0.80	U	118-74-1	Hexachlorobenzene	0.80	U
95-48-7	2-Methyl phenol	0.80	U	319-85-7	b-BHC	0.80	U
108-60-1	Bis(2-chloroisopropyl) ether	0.80	U	87-86-5	Pentachlorophenol	0.80	U
98-86-2	Acetophenone	0.80	U	58-89-9	g-BHC (Lindane)	0.80	U
67-72-1	Hexachloroethane	0.80	U	85-01-8	Phenanthrene	0.80	U
621-64-7	N-Nitroso-n-propyl amine	0.80	U	120-12-7	Anthracene	0.80	U
106-44-5	4-Methyl phenol	0.80	U	319-86-8	d-BHC	0.80	U
98-95-3	Nitrobenzene	0.80	U	84-74-2	Di-n-butyl phthalate	0.80	U
100-75-4	N-nitrosopiperidine	0.80	U	76-44-8	Heptachlor	0.80	U
78-59-1	Isophorone	0.80	U	309-00-2	Aldrin	0.80	U
88-75-5	2-Nitrophenol	0.80	U	1024-57-3	Heptachlor epoxide	0.80	U
105-67-9	2,4-Dimethylphenol	0.80	U	206-44-0	Fluoranthrene	0.80	U
65-85-0	Benzoic Acid	0.80	U	129-00-0	Pyrene	0.80	U
111-91-1	Bis(2-chloroethoxy) methane	0.80	U	959-98-8	Endosulfan I	0.80	U
120-83-2	2,4-Dichlorophenol	0.80	U	92-87-5	Benzidine	0.80	U
120-82-1	1,2,4-Trichlorobenzene	0.80	U	72-55-9	4,4'-DDE	0.80	U
91-20-3	Naphthalene	0.80	U	60-57-1	Dieldrin	0.80	U
106-47-8	4-Chloroaniline	0.80	U	72-20-8	Endrin	0.80	U
87-68-3	Hexachlorobutadiene	0.80	U	33213-65-	Endosulfan II	0.80	U
924-16-3	N-nitrosodi-n-butylamine	0.80	U	72-54-8	4,4'-DDD	0.80	U
59-50-7	4-Chloro-3-methyl phenol	0.80	U	7421-92-4	Endrin aldehyde	0.80	U
91-57-6	2-Methyl naphthalene	0.80	U	85-68-7	Butyl benzenyl phthalate	0.80	U
95-94-3	1,2,4,5-Tetrachlorobenzene	0.80	U	1031-07-8	Endosulfan sulfate	0.80	U
77-47-4	Hexachlorocylcopentadiene	0.80	U	50-29-3	4,4'-DDT	0.80	U
88-06-2	2,4,6-Trichlorophenol	0.80	U	56-55-3	Benzo(a)anthracene	0.80	U
95-95-4	2,4,5-Trichlorophenol	0.80	U	218-01-9	Chrysene	0.80	U
91-58-7	2-Chloronaphthalene	0.80	U	91-94-1	3,3'-Dichlorobenzidine	0.80	U
88-74-4	2-Nitroaniline	0.80	U	72-43-5	Methoxychlor	0.80	U
131-11-3	Dimethyl phthalate	0.80	U	117-81-7	Bis(2-ethylhexyl) phthalate	0.80	U
208-96-8	Acenaphthylene	0.80	U	117-84-0	Di-n-octyl phthalate	0.80	U
606-20-2	2,6-Dinitrotoluene	0.80	U	205-97-2	Benzo(b)fluoranthrene	0.80	U
99-09-2	3-Nitroaniline	0.80	U	207-08-9	Benzo(k)fluoranthrene	0.80	U

Aquatic Research Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	**3/19/12-MB**	Matrix:	Water
Sample ID No.:	**Method Blank**	Sample Vol. (ml)	**1000**
Date Collected:	**n/a**	Final Volume (ml)	**2.0**
Date Received:	**n/a**	Dilution Factor:	**1**
Date Extracted:	**03/19/12**		
Date Analyzed	**04/11/12**	Analyst:	**T. Meadows**
Date of Report:	**04/12/12**	Supervisor's Initials:	
Data File Path:	**D:\5975 Data\PAM\2012\041012\ 01901019.D**		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
83-32-9	Acenaphthene	0.80	U	50-32-8	Benzo(a)pyrene	0.80	U
51-28-5	2,4-Dinitrophenol	0.80	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.80	U
132-64-9	Dibenzofuran	0.80	U	53-70-3	Dibenzo(a,h)anthracene	0.80	U
100-02-7	4-Nitrophenol	0.80	U	91-24-2	Benzo(g,h,i)perlyene	0.80	U
121-14+2	2,4-Dinitrotoluene	0.80	U				
58-90-2	2,3,4,6-Tetrachlorophenol	0.80	U				

FLAGS:

U	Indicates compound was analyzed for, but not detected at the specified detection limit.
B	Blank contaminated with this analyte.
J	Estimated value - compound positively identified, but below specified detection limit.
E	Estimated value - compound exceeded calibration range.
D	Compound analyzed at a secondary dilution factor of _____ from data file: _____
PP	Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tenatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc.

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

		QC limits	
Surrogate Recoveries	%Rec.	**Water**	**Soil**
2-Fluorophenol	99%	24-132%	65-135%
Phenol-d5	85%	0-105%	65-135%
Nitrobenzene-d5	83%	24-136%	65-135%
2-Fluorobiphenyl	86%	41-134%	65-135%
2,4,6-Tribromophenol	48%	0-183%	65-135%
p-Terphenyl-d14	104%	80-141%	65-135%

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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	**3/26/12-MB**	Matrix:	Water
Sample ID No.:	**Method Blank**	Sample Wt/Vol. (gm/ml)	**25.0**
Date Collected:	**n/a**	Dilution Factor:	**1**
Date Received:	**n/a**		
Date Analyzed	**03/26/12**	Analyst:	**T. Meadows**
Date of Report:	**03/26/12**	Supervisor's Initials:	
Data File Path:	**C:\HPCHEM\1\DATA\VOA\120326**	**0401004.D**	

CAS#	Name of Compound	Amount (ppb)	Flag
108-86-1	Bromobenzene	0.4	U
74-97-5	Bromochloromethane	0.4	U
74-83-9	Bromomethane	0.4	U
104-51-8	n-Butylbenzene	0.4	U
135-98-8	sec-Butylbenzene	0.4	U
98-06-6	tert-Butylbenzene	0.4	U
56-23-5	Carbon tetrachloride	0.4	U
108-90-7	Chlorobenzene	0.4	U
75-00-3	Chloroethane	0.4	U
74-87-3	Chloromethane	0.4	U
95-49-8	2-Chlorotoluene	0.4	U
106-43-4	4-Chlorotoluene	0.4	U
96-12-8	1,2-Dibromo-3-Chloropropa	0.4	U
106-93-4	1,2-Dibromoethane	0.4	U
74-95-3	Dibromomethane	0.4	U
95-50-1	1,2-Dichlorobenzene	0.4	U
541-73-1	1,3-Dichlorobenzene	0.4	U
106-46-7	1,4-Dichlorobenzene	0.4	U
75-71-8	Dichlorodifluoromethane	0.4	U
75-34-3	1,1-Dichloroethane	0.4	U
107-06-2	1,2-Dichloroethane	0.4	U
75-35-4	1,1-Dichloroethene	0.4	U
156-59-4	cis-1,2-Dichloroethene	0.4	U
156-60-5	trans-1,2-Dichloroethene	0.4	U
78-87-5	1,2-Dichloropropane	0.4	U
142-28-9	1,3-Dichloropropane	0.4	U
590-20-7	2,2-Dichloropropane	0.4	U
563-58-6	1,1-Dichloropropene	0.4	U
10061-01-	cis-1,3-Dichloropropene	0.4	U
10061-02-	trans-1,3-Dichloropropene	0.4	U
87-68-3	Hexachlorobutadiene	0.4	U
98-82-8	Isopropylbenzene	0.4	U
99-87-6	4-Isopropyltoluene	0.4	U
75-09-2	Methylene chloride	0.4	U
91-20-3	Naphthalene	0.4	U
103-65-1	n-Propylbenzene	0.4	U
100-42-5	Styrene	0.4	U

CAS#	Name of Compound	Amount (ppb)	Flag
630-20-6	1,1,1,2-Tetrachloroethane	0.4	U
79-34-5	1,1,2,2-Tetrachloroethane	0.4	U
127-18-4	Tetrachloroethene	0.4	U
87-61-6	1,2,3-Trichlorobenzene	0.4	U
120-82-1	1,2,4-Trichlorobenzene	0.4	U
71-55-6	1,1,1-Trichloroethane	0.4	U
79-00-5	1,1,2-Trichloroethane	0.4	U
79-01-6	Trichloroethene	0.4	U
75-69-4	Trichlorofluoromethane	0.4	U
96-18-4	1,2,3-Trichloropropane	0.4	U
95-63-6	1,2,4-Trimethylbenzene	0.4	U
108-67-8	1,3,5-Trimethylbenzene	0.4	U
75-01-4	Vinyl chloride	0.4	U

	BTEX		
71-43-2	Benzene	0.4	U
108-88-3	Toluene	0.4	U
100-41-4	Ethylbenzene	0.4	U
	p/m-Xylene	0.4	U
95-47-6	o-Xylene	0.4	U

	TRIHALOMETHANES (THM)		
67-66-3	Chloroform	0.4	U
75-27-4	Bromodichloromethane	0.4	U
124-48-1	Dibromochloromethane	0.4	U
75-25-2	Bromoform	0.4	U

	KETONES, CS2, 2-CEVE		
67-64-1	Acetone	0.4	U
78-93-3	2-Butanone	0.4	U
591-78-6	2-Hexanone	0.4	U
108-10-1	4-Methyl-2-Pentanone	0.4	U
75-15-0	Carbon Disulfide	0.4	U
110-75-8	2-Chloroethylvinylether	0.4	U

Surrogate Recoveries	%Rec.	QC limits **Water**	**Soil**
Dibromofluoromethane	102%	66-118%	66-118%
Toluene-d8	104%	51-143%	51-143%
4-Bromofluorobenzene	93%	63 - 119	63 - 119%

Aquatic Research Inc.
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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	**3/26/12-MB**	Matrix:	Water
Sample ID No.:	**Method Blank**	Sample Wt/Vol. (gm/ml)	**25.0**
Date Collected:	**n/a**	Dilution Factor:	**1**
Date Received:	**n/a**		
Date Analyzed	**03/26/12**	Analyst:	**T. Meadows**
Date of Report:	**03/26/12**	Supervisor's Initials:	
Data File Path:	**C:\HPCHEM\1\DATA\VOA\120326**	**0401004.D**	

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
107-13-1	Acrylonitrile	0.4	U	126-98-7	Methacrylonitrile	0.4	U
107-05-1	Allyl Chloride	0.4	U	96-33-3	Methyl Acrylate	0.4	U
109-69-3	1-Chlorobutane	0.4	U	1634-04-4	Methyl-t-Butyl Ether	0.4	U
110-57-6	trans-1,4-Dichloro-2-Butene	0.4	U	80-62-6	Methyl methacrylate	0.4	U
60-29-7	Diethyl Ether	0.4	U	98-95-3	Nitrobenzene	0.4	U
97-63-2	Ethyl Methacrylate	0.4	U	79-46-9	2-Nitropropane	0.4	U
67-72-1	Hexachloroethane	0.4	U	76-01-7	Pentachloroethane	0.4	U
74-88-4	Iodomethane	0.4	U				

FLAGS:

U	Indicates compound was analyzed for, but not detected at the specified detection limit.
B	Blank contaminated with this analyte.
J	Estimated value - compound positively identified, but below specified detection limit.
E	Estimated value - compound exceeded calibration range.
D	Compound analyzed at a secondary dilution factor of _____ from data file: _____
PP	Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppb Amounts are in µg/L or µg/KG dry weight.

Tenatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc.

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: AS / DB		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 16
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Fecal coliform bacteria - SM 9222D [a]	TPH (diesel) - NWTPH-Dx [b]	TPH (motor oil) - NWTPH-Dx [b]	Semivolatile organic compounds - EPA 8270D [c]	Volatile organic compounds - EPA 524.2 [d]	Polycyclic aromatic hydrocarbons - EPA 8270 [e]	Polychlorinated-biphenyls - EPA 8082 [f]	Chlorinated pesticides - EPA 8081 [g]	Chlorinated herbicides - EPA 8151A [h]	Dissolved Metals: (Sb, As, Be, Cr, Ni, Se, Ag, Tl) - EPA 200.8 [i]	Total Metals: (Cd, Cu, Pb, Hg, Zn, Sb, As, Be, Cr, Ni, Se, Ag, Tl) - EPA 200.8 [i]
RBS185-OUT	3/12/12	1735	250 mL glass bottle[a], 1-L glass bottle[b]	2	X	X	X								
RBS185-IN	"	1715	3x40 mL vials[d]	3					X						
RBS185-OUT	"	1735	3x40 mL vials[d]	3					X						
RBS185-IN	"	1715	1-L glass bottle[c/e, f/g, h]	3				X		X	X	X	X		
RBS185-OUT	"	1735	1-L glass bottle[c/e, f/g, h]	3				X		X	X	X	X		
RBS185-IN	"	1715	250 mL HDPE bottle[i]	1										X	X
RBS185-OUT	"	1735	250 mL HDPE bottle[i]	1										X	X

Notes: ONE OF THE TRIPLICATE 8270/8270D BOTTLES WAS BROKEN DURING SHIPMENT

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Alex Svendsen/HEC		3/13/12 0920			3/13/12 1120

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-57A**	**PAGE 1**	
REPORT DATE:	**04/05/12**		
DATE SAMPLED:	**03/12/12**	**DATE RECEIVED:**	**03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Four water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.082	0.001	10.9	0.94	61	18	43
RBS185-CB1	0.091	0.003	10.5	0.98	75	34	53
RBS185-CB2	0.079	0.002	10.6	1.13	44	25	35
RBS185-CB3	0.094	<0.001	10.2	0.98	71	26	51

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0105	0.0044	<0.0002	0.049	0.559	0.094
RBS185-CB1	<0.0003	0.0127	0.0051	<0.0002	0.076	0.627	0.150
RBS185-CB2	<0.0003	0.0077	0.0032	<0.0002	0.035	0.543	0.080
RBS185-CB3	<0.0003	0.0116	0.0051	<0.0002	0.060	0.638	0.081

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0058	<0.0010	<0.0002	0.008
RBS185-CB1	<0.0003	0.0054	<0.0010	<0.0002	0.010
RBS185-CB2	<0.0003	0.0024	<0.0010	<0.0002	0.006
RBS185-CB3	<0.0003	0.0040	<0.0010	<0.0002	0.009

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-57A**

REPORT DATE: **04/05/12**

DATE SAMPLED: **03/12/12** **DATE RECEIVED:** **03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	03/16/12	03/14/12	03/23/12	03/23/12	03/16/12	03/19/12	03/19/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	RBS185-CB3	BATCH	BATCH		
ORIGINAL	0.046	<0.001	10.2	326	28		
DUPLICATE	0.045	<0.001	10.2	329	28		
RPD	2.20%	NC	0.00%	0.92%	0.00%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	RBS185-CB3	BATCH			
ORIGINAL	0.046	<0.001	10.2	326			
SPIKED SAMPLE	0.097	0.021	28.5	335			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	102.00%	105.00%	91.50%	90.00%	NA	NA	NA
QC CHECK							
FOUND	0.094	0.033	39.1	28.6	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	104.44%	100.00%	97.75%	95.33%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-57A** **PAGE 3**

REPORT DATE: **04/05/12**

DATE SAMPLED: **03/12/12** **DATE RECEIVED:** **03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	03/21/12	03/21/12	03/21/12	03/21/12	03/21/12	03/14/12	03/14/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3	BATCH
ORIGINAL	<0.0003	0.0116	0.0051	<0.0002	0.060	0.638	0.068
DUPLICATE	<0.0003	0.0110	0.0048	<0.0002	0.056	0.598	0.066
RPD	NC	5.31%	6.06%	NC	6.90%	6.47%	2.99%
SPIKE SAMPLE							
SAMPLE ID	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3	BATCH
ORIGINAL	<0.0003	0.0116	0.0051	<0.0002	0.060	0.638	0.068
SPIKED SAMPLE	0.0532	0.0606	0.0583	0.0018	0.120	2.65	0.266
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	106.40%	98.00%	106.40%	90.00%	120.00%	100.60%	99.00%
QC CHECK							
FOUND	0.0503	0.0518	0.0532	0.0098	0.049	5.69	0.404
TRUE	0.0500	0.0500	0.0500	0.0100	0.050	5.79	0.408
% RECOVERY	100.60%	103.60%	106.40%	98.00%	98.00%	98.27%	99.02%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-57A**

REPORT DATE: **04/05/12**

DATE SAMPLED: **03/12/12** **DATE RECEIVED:** **03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	03/15/12	03/15/12	03/15/12	03/15/12	03/15/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0033	<0.0010	<0.0002	0.040
DUPLICATE	<0.0003	0.0035	<0.0010	<0.0002	0.038
RPD	NC	5.88%	NC	NC	5.13%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0033	<0.0010	<0.0002	0.040
SPIKED SAMPLE	0.0520	0.0493	0.0497	0.0016	0.098
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	104.00%	92.00%	99.40%	80.00%	116.00%
QC CHECK					
FOUND	0.0550	0.0488	0.0474	0.0100	0.049
TRUE	0.0500	0.0500	0.0500	0.0100	0.050
% RECOVERY	110.00%	97.60%	94.80%	100.00%	98.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-57B**	**PAGE 1**	
REPORT DATE:	**04/05/12**		
DATE SAMPLED:	**03/12/12**	**DATE RECEIVED:**	**03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Four water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.05	0.98	750
RBS185-CB1	0.05	0.99	250
RBS185-CB2	<0.05	0.71	350
RBS185-CB3	0.06	1.93	350

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-57B**

REPORT DATE: **04/05/12**

DATE SAMPLED: **03/12/12** **DATE RECEIVED:** **03/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	03/23/12	03/23/12	
DATE ANALYZED	03/29/12	03/29/12	03/13/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			RBS185-CB3
ORIGINAL			350
DUPLICATE			250
RPD	NA	NA	33.33%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.23	0.53	
TRUE	0.25	0.50	
% RECOVERY	92.00%	106.00%	NA
BLANK	<0.05	<0.10	< 2

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: Redmond Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: AS / DB		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 12
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D			
RBS185-IN	3/12/12	1715	Stormwater Composite 10-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-CB1		1650	Stormwater Composite 10-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-CB2		1710	Stormwater Composite 10-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-CB3		1720	Stormwater Composite 10-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-IN		1715	Stormwater grab 1-L amber	1											X	X				
RBS185-CB1		1650	Stormwater grab 1-L amber	1											X	X				
RBS185-CB2		1710	Stormwater grab 1-L amber	1											X	X				
RBS185-CB3		1720	Stormwater grab 1-L amber	1											X	X				
RBS185-IN		1715	Stormwater grab 250-mL amber	1													X			
RBS185-CB1		1650	Stormwater grab 250-mL amber	1													X			
RBS185-CB2		1710	Stormwater grab 250-mL amber	1													X			
RBS185-CB3	↓	1720	Stormwater grab 250-mL amber	1													X			

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Alex Swanson/HEC		3/13/12 1320	S. Hanson/HEC		3/13/12 1320
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

April 19, 2012

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-72**	**PAGE 1**	
REPORT DATE:	**05/03/12**		
DATE SAMPLED:	**04/20/12**	**DATE RECEIVED:**	**04/20/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.085	0.003	16.0	0.81	36	10	19
RBS185-OUT	4.17	2.88	88.7	7.33	104	<0.50	96

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0104	0.0023	<0.0002	0.067	0.969	0.158
RBS185-OUT	0.0005	0.0438	0.0111	<0.0002	0.054	15.0	12.9

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0027	<0.0010	<0.0002	0.021
RBS185-OUT	<0.0003	0.0133	0.0012	<0.0002	0.011

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-72** **PAGE 2**

REPORT DATE: **05/03/12**

DATE SAMPLED: **04/20/12** **DATE RECEIVED:** **04/20/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	04/26/12	04/20/12	05/01/12	05/02/12	04/24/12	04/24/12	04/24/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	RBS185-IN	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.085	0.040	38.9	3.71	28		
DUPLICATE	0.086	0.040	39.3	3.71	26		
RPD	1.17%	0.00%	1.02%	0.00%	7.41%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	RBS185-IN	BATCH	BATCH	BATCH			
ORIGINAL	0.085	0.040	38.9	3.71			
SPIKED SAMPLE	0.130	0.059	58.6	13.3			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	90.00%	95.00%	98.50%	95.90%	NA	NA	NA
QC CHECK							
FOUND	0.091	0.033	38.7	28.8	9.7		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.11%	100.00%	96.75%	96.00%	97.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-72** **PAGE 3**

REPORT DATE: **05/03/12**

DATE SAMPLED: **04/20/12** **DATE RECEIVED:** **04/20/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	04/27/12	04/27/12	04/27/12	04/25/12	04/27/12	04/26/12	04/20/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-IN
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	1.25	0.158
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	1.23	0.159
RPD	NC	NC	NC	NC	NC	1.61%	0.63%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-IN
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	1.25	0.158
SPIKED SAMPLE	0.0548	0.0468	0.0476	0.0021	0.049	3.32	0.352
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	109.60%	93.60%	95.20%	105.00%	98.00%	103.50%	97.00%
QC CHECK							
FOUND	0.0490	0.0494	0.0480	0.0092	0.050	5.81	0.409
TRUE	0.0500	0.0500	0.0500	0.0100	0.050	5.79	0.408
% RECOVERY	98.00%	98.80%	96.00%	92.00%	100.00%	100.35%	100.25%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: HER077-72 **PAGE 4**
REPORT DATE: 05/03/12
DATE SAMPLED: 04/20/12 **DATE RECEIVED:** 04/20/12
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	04/24/12	04/24/12	04/24/12	04/25/12	04/24/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0510	0.0489	0.0486	0.0019	0.047
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	102.00%	97.80%	97.20%	95.00%	94.00%
QC CHECK					
FOUND	0.0480	0.0454	0.0460	0.0092	0.049
TRUE	0.0500	0.0500	0.0500	0.0100	0.050
% RECOVERY	96.00%	90.80%	92.00%	92.00%	98.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: AS		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS185-IN	4/20/12	1040	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS185-OUT	4/20/12	1330	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X

ANALYSES REQUESTED

Notes: If two sample containers are used for a sample station, pour entire contents of both bottles into churn-splitter. Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
HEC		4/20/12 1535	S. MILLERSONS HERRERA		4/20/12 1535
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-69**	**PAGE 1**	
REPORT DATE:	**05/04/12**		
DATE SAMPLED:	**04/19/12**	**DATE RECEIVED:**	**04/20/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
185-IN	<0.05	0.59	982
185-OUT	<0.05	0.22	32

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-69**

REPORT DATE: **05/04/12**

DATE SAMPLED: **04/19/12** **DATE RECEIVED:** **04/20/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	04/25/12	04/25/12	
DATE ANALYZED	05/03/12	05/03/12	04/20/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			185-OUT
ORIGINAL			32
DUPLICATE			36
RPD	NA	NA	11.76%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.26	0.53	
TRUE	0.25	0.50	
% RECOVERY	104.00%	106.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
135-IN	4-19-12	13:50	Stormwater grab 1-L amber		V	V	
135-OUT	4-14-12	19:00	Stormwater grab 1-L amber		V	V	
135-IN	4-14-12	13:50	Stormwater grab 250-mL amber				V
135-OUT	4-15-12	19:00	Stormwater grab 250-mL amber				V

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
RANDY NAGLE/HEC			S. HIKOSOLOME		4/20/12
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

May 21, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-85** **PAGE 1**

REPORT DATE: **06/05/12**

DATE SAMPLED: **05/21/12** **DATE RECEIVED:** **05/22/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.199	0.004	23.1	1.76	95	12	76
RBS185-OUT	4.25	2.48	72.8	3.53	88	<0.50	86

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0215	0.0057	<0.0002	0.139	0.616	0.152
RBS185-OUT	<0.0003	0.0326	0.0067	<0.0002	0.035	3.50	4.30

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0056	<0.0010	<0.0002	0.041
RBS185-OUT	<0.0003	0.0128	<0.0010	<0.0002	0.009

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-85** **PAGE 2**

REPORT DATE: **06/05/12**

DATE SAMPLED: **05/21/12** **DATE RECEIVED:** **05/22/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	05/25/12	05/23/12	05/30/12	06/01/12	05/29/12	05/28/12	05/28/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.214	0.032	39.5	2.49	42		
DUPLICATE	0.212	0.034	39.3	2.35	44		
RPD	0.94%	6.06%	0.51%	5.79%	4.65%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.214	0.032	39.5	2.49			
SPIKED SAMPLE	0.261	0.054	58.6	11.8			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	94.00%	110.00%	95.50%	93.10%	NA	NA	NA
QC CHECK							
FOUND	0.091	0.032	39.1	29.2	9.7		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.11%	96.97%	97.75%	97.33%	97.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-85** **PAGE 3**

REPORT DATE: **06/05/12**

DATE SAMPLED: **05/21/12** **DATE RECEIVED:** **05/22/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	05/29/12	05/29/12	05/29/12	06/04/12	05/29/12	06/01/12	05/23/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-OUT	BATCH
ORIGINAL	0.0003	0.0275	0.0034	<0.0002	0.076	3.50	0.138
DUPLICATE	<0.0003	0.0270	0.0033	<0.0002	0.075	3.33	0.137
RPD	NC	1.83%	2.99%	NC	1.32%	4.98%	0.73%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-OUT	BATCH
ORIGINAL	0.0003	0.0275	0.0034	<0.0002	0.076	3.50	0.138
SPIKED SAMPLE	0.0493	0.0729	0.0478	0.0018	0.127	5.48	0.333
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	98.00%	90.80%	88.80%	90.00%	102.00%	99.00%	97.50%
QC CHECK							
FOUND	0.0497	0.0521	0.0500	0.0097	0.054	5.62	0.412
TRUE	0.0500	0.0500	0.0500	0.0100	0.050	5.79	0.408
% RECOVERY	99.40%	104.20%	100.00%	97.00%	108.00%	97.06%	100.98%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-85** **PAGE 4**

REPORT DATE: **06/05/12**

DATE SAMPLED: **05/21/12** **DATE RECEIVED:** **05/22/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	05/29/12	05/29/12	05/29/12	05/29/12	05/29/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0094	<0.0010	<0.0002	0.065
DUPLICATE	<0.0003	0.0092	<0.0010	<0.0002	0.061
RPD	NC	2.15%	NC	NC	6.35%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0094	<0.0010	<0.0002	0.065
SPIKED SAMPLE	0.0480	0.0549	0.0427	0.0017	0.119
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	96.00%	91.00%	85.40%	85.00%	108.00%
QC CHECK					
FOUND	0.0497	0.0521	0.0500	0.0090	0.054
TRUE	0.0500	0.0500	0.0500	0.0100	0.050
% RECOVERY	99.40%	104.20%	100.00%	90.00%	108.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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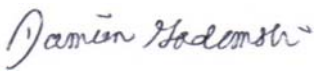
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: D. BENNETT		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBSIBS-IN	5/21/12	1334	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBSIBS-OUT	5/21/12	1657	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X

Notes: If two sample containers are used for a sample station, pour entire contents of both bottles into churn-splitter. Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSEN/HERR		5/22/12 1045	SMITH/FLSEVIER		5/22/12 10:15
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-82**	**PAGE 1**	
REPORT DATE:	**05/31/12**		
DATE SAMPLED:	**05/21/12**	**DATE RECEIVED:**	**05/21/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	0.18	1.49	>20000
RBS185-OUT	<0.05	0.19	1200

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-82**

REPORT DATE: **05/31/12**

DATE SAMPLED: **05/21/12** **DATE RECEIVED:** **05/21/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	05/23/12	05/23/12	
DATE ANALYZED	05/29/12	05/29/12	05/21/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			BATCH
ORIGINAL			11200
DUPLICATE			10300
RPD	NA	NA	8.37%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.26	0.54	
TRUE	0.25	0.50	
% RECOVERY	104.00%	108.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: A. SVENDSEN		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 4
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	5/21/12	1055	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT		1100	Stormwater grab 1-L amber	1	X	X	
RBS185-IN		1055	Stormwater grab 250-mL amber	1			X
RBS185-OUT	↓	1100	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSEN / HEC		5/21/12 1350	S. HEWITT / ARI		5/21/12 1350
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

June 22, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER077-90**	**PAGE 1**	
REPORT DATE:	**07/16/12**		
DATE SAMPLED:	**06/22/12**	**DATE RECEIVED:**	**06/22/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.05	1.24	3100
RBS185-OUT	<0.05	0.34	1400

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-90**

REPORT DATE: **07/16/12**

DATE SAMPLED: **06/22/12** **DATE RECEIVED:** **06/22/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	07/05/12	07/05/12	
DATE ANALYZED	07/13/12	07/13/12	06/23/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			1400
DUPLICATE			1300
RPD	NA	NA	7.41%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.26	0.55	
TRUE	0.25	0.50	
% RECOVERY	104.00%	110.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERC07-90

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond 185th Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:

LAB USE:

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	6-22-12	1320	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	6-22-12	1330	Stormwater grab 1-L amber	1	X	X	
RBS185-IN	6-22-12	~~1320~~ 1320	Stormwater grab 250-mL amber	1			X
RBS185-OUT	6-22-12	1330	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Jim Bennett/HERA		6-22-12	15:30 S. Allgood/AMEC		6/22/12 1530

July 2, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-91** **PAGE 1**

REPORT DATE: **07/25/12**

DATE SAMPLED: **07/03/12** **DATE RECEIVED:** **07/03/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.063	0.006	11.7	0.98	45	8.6	36
RBS185-OUT	3.53	2.77	76.4	3.42	82	18	62

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0078	0.0027	<0.0002	0.074	0.525	0.092
RBS185-OUT	<0.0003	0.0412	0.0061	<0.0002	0.031	5.56	2.62

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0012	<0.0010	<0.0002	0.019
RBS185-OUT	<0.0003	0.0151	<0.0010	<0.0002	<0.005

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CASE FILE NUMBER: **HER077-91** **PAGE 2**

REPORT DATE: **07/25/12**

DATE SAMPLED: **07/03/12** **DATE RECEIVED:** **07/03/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	07/06/12	07/05/12	07/16/12	07/13/12	07/06/12	07/10/12	07/10/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.011	0.008	37.9	241	52		
DUPLICATE	0.012	0.008	38.3	243	56		
RPD	8.70%	0.00%	1.05%	0.83%	7.41%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.011	0.008	37.9	241			
SPIKED SAMPLE	0.062	0.029	57.5	250			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	102.00%	105.00%	98.00%	90.00%	NA	NA	NA
QC CHECK							
FOUND	0.090	0.033	38.7	28.4	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	100.00%	100.00%	96.75%	94.67%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

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CASE FILE NUMBER: **HER077-91** **PAGE 3**

REPORT DATE: **07/25/12**

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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	07/19/12	07/19/12	07/19/12	07/19/12	07/19/12	07/13/12	07/05/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0257	0.0182	<0.0002	0.166	0.534	0.011
DUPLICATE	<0.0003	0.0255	0.0177	<0.0002	0.163	0.531	0.012
RPD	NC	0.78%	2.79%	NC	1.82%	0.56%	8.70%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0257	0.0182	<0.0002	0.166	0.534	0.011
SPIKED SAMPLE	0.0511	0.0787	0.0677	0.0024	0.223	2.36	0.211
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	102.20%	106.00%	99.00%	120.00%	114.00%	91.30%	100.00%
QC CHECK							
FOUND	0.0520	0.0548	0.0499	0.0103	0.055	5.85	0.407
TRUE	0.0500	0.0500	0.0500	0.0100	0.050	5.79	0.408
% RECOVERY	104.00%	109.60%	99.80%	103.00%	110.00%	101.04%	99.75%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER077-91** **PAGE 4**
REPORT DATE: **07/25/12**
DATE SAMPLED: **07/03/12** **DATE RECEIVED:** **07/03/12**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	07/18/12	07/18/12	07/18/12	07/11/12	07/18/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0028	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	0.0028	<0.0010	<0.0002	<0.005
RPD	NC	0.00%	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0028	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0560	0.0467	0.0499	0.0018	0.045
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	112.00%	87.80%	99.80%	90.00%	90.00%
QC CHECK					
FOUND	0.0521	0.0521	0.0531	0.0096	0.048
TRUE	0.0500	0.0500	0.0500	0.0100	0.050
% RECOVERY	104.20%	104.20%	106.20%	96.00%	96.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Hydro International Up-Flo Filter	09-04207-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Dan Bennett		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 4
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations-SM D3977	Total volatile solids - EPA 160.4	Particle size Distribution - ASTM 3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Hardness as CaCO3-SM 2340B	Specific gravity - ASTM D854	Copper, dissolved - EPA 200.8	Copper, total - EPA 200.8	Zinc, dissolved - EPA 200.8	Zinc, total - EPA 200.8	TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx		
NUFF-IN	7/3/12	0652	Stormwater Composite in 20-L HDPE bottle	1	X	X	X	X	X	X	X	X	X	X	X	X				
NUFF-OUT	7/3/12	0652	Stormwater Composite in 20-L HDPE bottle	1	X	X	X	X	X	X	X	X	X	X	X	X				
NUFF-IN	~~7/3/12~~ 7/3/12	4:30	Stormwater grab sample in 1L glass jar	1													X	X		
NUFF-OUT	7-3-12	4:35	Stormwater grab sample in 1L glass jar	1													X	X		

Notes: Use churn splitter to apportion large samples into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSEN/HEC		7/3/12 1515	S. Hilesca/ AM		7/3/12 1515

September 10, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-05** **PAGE 1**

REPORT DATE: **09/27/12**

DATE SAMPLED: **09/10/12** **DATE RECEIVED:** **09/10/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.210	0.089	45.4	1.75	32	5.3	32
RBS185-OUT	3.63	2.54	92.8	14.7	50	3.9	50

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0217	0.0011	<0.0002	0.198	3.22	0.521
RBS185-OUT	<0.0003	0.0268	0.0049	<0.0002	0.023	9.62	2.29

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0174	<0.0010	<0.0002	0.185
RBS185-OUT	<0.0003	0.0197	<0.0010	<0.0002	0.012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-05** **PAGE 2**

REPORT DATE: **09/27/12**

DATE SAMPLED: **09/10/12** **DATE RECEIVED:** **09/10/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	09/13/12	09/11/12	09/24/12	09/18/12	09/17/12	09/17/12	09/17/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.007	0.003	58.6	3.71	104		
DUPLICATE	0.007	0.003	59.0	3.62	108		
RPD	0.00%	0.00%	0.68%	2.46%	3.77%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.007	0.003	58.6	3.71			
SPIKED SAMPLE	0.057	0.021	78.2	12.9			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	100.00%	90.00%	98.00%	91.90%	NA	NA	NA
QC CHECK							
FOUND	0.093	0.033	37.5	28.4	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	103.33%	100.00%	93.75%	94.67%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	09/18/12	09/18/12	09/18/12	09/18/12	09/18/12	09/12/12	09/12/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	BATCH	BATCH
ORIGINAL	<0.0003	0.0268	0.0049	<0.0002	0.023	6.36	<0.010
DUPLICATE	0.0003	0.0273	0.0052	<0.0002	0.024	6.25	<0.010
RPD	NC	1.85%	5.94%	NC	4.26%	1.74%	NC
SPIKE SAMPLE							
SAMPLE ID	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	BATCH	BATCH
ORIGINAL	<0.0003	0.0268	0.0049	<0.0002	0.023	6.36	<0.010
SPIKED SAMPLE	0.0523	0.0668	0.0522	0.0017	0.069	8.49	0.210
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	104.60%	80.00%	94.60%	85.00%	92.00%	106.50%	105.00%
QC CHECK							
FOUND	0.0485	0.0491	0.0488	0.0011	0.051	5.80	0.403
TRUE	0.0500	0.0500	0.0500	0.0010	0.050	5.79	0.408
% RECOVERY	97.00%	98.20%	97.60%	110.00%	102.80%	100.17%	98.77%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-05** **PAGE 4**
REPORT DATE: **09/27/12**
DATE SAMPLED: **09/10/12** **DATE RECEIVED:** **09/10/12**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	09/25/12	09/25/12	09/25/12	09/25/12	09/25/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0228	<0.0010	<0.0002	0.300
DUPLICATE	<0.0003	0.0230	<0.0010	<0.0002	0.325
RPD	NC	0.87%	NC	NC	8.00%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0228	<0.0010	<0.0002	0.300
SPIKED SAMPLE	0.0545	0.0825	0.0547	0.0016	0.349
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	109.00%	119.40%	109.40%	77.50%	98.00%
QC CHECK					
FOUND	0.0476	0.0498	0.0502	0.0010	0.051
TRUE	0.0500	0.0500	0.0500	0.0010	0.050
% RECOVERY	95.20%	99.60%	100.40%	100.00%	102.20%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HERO78-05

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-Cl.-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS185-IN	9-10-12	5:19	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS185-OUT	9-10-12	08:30	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X

Notes: Use churn-splitter to apportion composite sample into smaller bottles. IN - 40 AL. 39 OUT- 129 AL ~~128~~ - 91

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Dan Bam H/HEC		9-10-12 1400	S. HIERSON KCHC		9/10/12 1400

September 13, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-07**	**PAGE 1**	
REPORT DATE:	**10/01/12**		
DATE SAMPLED:	**09/13/12**	**DATE RECEIVED:**	**09/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Four water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)
RBS185-IN-QA1	<0,.002	<0.001
RBS185-OUT-QA1	<0.002	<0.001
RBS185-IN-QA2	<0.002	<0.001
RBS185-OUT-QA2	<0.002	<0.001

	TOTAL METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN-QA1	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RBS185-OUT-QA1	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RBS185-IN-QA2	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RBS185-OUT-QA2	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN-QA1	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RBS185-OUT-QA1	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RBS185-IN-QA2	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RBS185-OUT-QA2	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

REPORT DATE: **10/01/12**

DATE SAMPLED: **09/13/12** **DATE RECEIVED:** **09/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)
METHOD	EPA 365.1	EPA 365.1
DATE ANALYZED	09/21/12	09/13/12
DETECTION LIMIT	0.002	0.001
DUPLICATE		
SAMPLE ID	BATCH	BATCH
ORIGINAL	<0.002	0.002
DUPLICATE	<0.002	0.002
RPD	NC	0.00%
SPIKE SAMPLE		
SAMPLE ID	BATCH	BATCH
ORIGINAL	<0.002	0.002
SPIKED SAMPLE	0.051	0.021
SPIKE ADDED	0.050	0.020
% RECOVERY	102.00%	95.00%
QC CHECK		
FOUND	0.093	0.032
TRUE	0.090	0.033
% RECOVERY	103.33%	96.97%
BLANK	<0.002	<0.001

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-07**

REPORT DATE: **10/01/12**

DATE SAMPLED: **09/13/12** **DATE RECEIVED:** **09/13/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	09/21/12	09/21/12	09/21/12	09/21/12	09/21/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	0.020
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	0.020
RPD	NC	NC	NC	NC	0.00%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	0.020
SPIKED SAMPLE	0.0529	0.0519	0.0519	0.0021	0.076
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	105.80%	103.80%	103.80%	105.00%	112.00%
QC CHECK					
FOUND	0.0473	0.0501	0.0493	0.0010	0.048
TRUE	0.0500	0.0500	0.0500	0.0010	0.050
% RECOVERY	94.60%	100.20%	98.60%	100.00%	96.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-07** **PAGE 4**
REPORT DATE: **10/01/12**
DATE SAMPLED: **09/13/12** **DATE RECEIVED:** **09/13/12**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	09/27/12	09/27/12	09/27/12	09/27/12	09/27/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	RBS185-IN-QA1	RBS185-IN-QA1	RBS185-IN-QA1	RBS185-IN-QA1	RBS185-IN-QA1
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	RBS185-IN-QA1	RBS185-IN-QA1	RBS185-IN-QA1	RBS185-IN-QA1	RBS185-IN-QA1
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0477	0.0484	0.0489	0.0022	0.056
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	95.40%	96.80%	97.80%	110.00%	112.00%
QC CHECK					
FOUND	0.0474	0.0505	0.0500	0.0010	0.051
TRUE	0.0500	0.0500	0.0500	0.0010	0.050
% RECOVERY	94.80%	101.00%	100.00%	100.00%	102.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HER078.07

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS185-IN-QA1	9/13/12	11:00	WATER	2	X	X	X	X
RBS185-OUT-QA1	9/13/12	~~11:30~~ 11:30	"	2	X	X	X	X
RBS185-IN- QA2	9/13/12	2:00	"	2	X	X	X	X
RBS185-OUT-QA2	9/13/12	2:30	"	2	X	X	X	X

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENN/HEC		9/13/12 1500	S. ALLISON/ARI		9/13/12 1500

October 14, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-15**	**PAGE 1**	
REPORT DATE:	**10/29/12**		
DATE SAMPLED:	**10/14/12**	**DATE RECEIVED:**	**10/15/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-OUT	<0.05	<0.10	230
RBS185-QA3	<0.05	<0.10	210
RBS185-IN	<0.05	0.60	1350

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-15**	**PAGE 2**	
REPORT DATE:	**10/29/12**		
DATE SAMPLED:	**10/14/12**	**DATE RECEIVED:**	**10/15/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	10/16/12	10/16/12	
DATE ANALYZED	10/23/12	10/23/12	10/15/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			RBS185-IN
ORIGINAL			1350
DUPLICATE			1700
RPD	NA	NA	22.95%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.52	0.97	
TRUE	0.50	1.00	
% RECOVERY	104.00%	97.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERO78·15

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: AS | DB		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D	ANALYSES REQUESTED
~~RBS185-IN~~			~~Stormwater grab 1-L amber~~	~~1~~	~~X~~	~~X~~		AS
RBS185-OUT	10/14/12	1740	Stormwater grab 1-L amber	1	X	X		
~~RBS185-IN~~			~~Stormwater grab 250-mL amber~~	~~1~~			~~X~~	AS
RBS185-OUT	10/14/12	1740	Stormwater grab 250-mL amber	1			X	
RBS185-QAB	10/14/12	1800	SW GRAB 1-L	1	X	X		
RBS185-QAB	10/14/12	1800	SW GRAB 250 ML	1			X	
RBS185-IN	10/14/12	1715	SW 1L		X	X		
RBS185-IN	10/14/12	17:15	SW 750ml				X	

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BARTH		10.15.12 1130	SHICKSON HERR		10/15/12 1100

1311 N. 35th St.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Aquatic Research, Inc
Damien Gadomski
3927 Aurora Ave. N
Seattle, Washington 98103

RE: Herbicides
Lab ID: 1210161

November 06, 2012

Attention Damien Gadomski:

Fremont Analytical, Inc. received 2 sample(s) on 10/18/2012 for the analyses presented in the following report.

Herbicides by EPA Method 8151A

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Michael Dee
Sr. Chemist / Principal

Date: *11/06/2012*

CLIENT: Aquatic Research, Inc
Project: Herbicides
Lab Order: 1210161

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1210161-001	RBS185-IN	10/14/2012 5:15 PM	10/18/2012 9:48 AM
1210161-002	RBS185-OUT	10/14/2012 5:40 PM	10/18/2012 9:48 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1210161**
Date: **11/6/2012**

CLIENT: Aquatic Research, Inc
Project: Herbicides

I. SAMPLE RECEIPT:
All samples were received intact. The internal ice chest temperatures were measured on receipt and are recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1210161**
Date Reported: **11/6/2012**

Client: Aquatic Research, Inc
Collection Date: 10/14/2012 5:15:00 PM
Project: Herbicides
Lab ID: 1210161-001
Matrix: Water
Client Sample ID: RBS185-IN

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Herbicides by EPA Method 8151A				Batch ID: 3540		Analyst: MD
Dicamba	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
2,4-D	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
2,4-DP	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
2,4,5-TP (Silvex)	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
2,4,5-T	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
Dinoseb	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
Dalapon	ND	0.500		µg/L	1	10/29/2012 2:48:00 PM
2,4-DB	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
MCPP	ND	8.00		µg/L	1	10/29/2012 2:48:00 PM
MCPA	ND	8.00		µg/L	1	10/29/2012 2:48:00 PM
Surr: 2,4-Dichlorophenylacetic acid	103	50-135		%REC	1	10/29/2012 2:48:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1210161**
Date Reported: **11/6/2012**

Client: Aquatic Research, Inc
Collection Date: 10/14/2012 5:40:00 PM
Project: Herbicides
Lab ID: 1210161-002
Matrix: Water
Client Sample ID: RBS185-OUT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Herbicides by EPA Method 8151A				Batch ID: 3540		Analyst: MD
Dicamba	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
2,4-D	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
2,4-DP	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
2,4,5-TP (Silvex)	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
2,4,5-T	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
Dinoseb	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
Dalapon	ND	0.500		µg/L	1	10/29/2012 2:48:00 PM
2,4-DB	ND	0.400		µg/L	1	10/29/2012 2:48:00 PM
MCPP	ND	8.00		µg/L	1	10/29/2012 2:48:00 PM
MCPA	ND	8.00		µg/L	1	10/29/2012 2:48:00 PM
Surr: 2,4-Dichlorophenylacetic acid	118	50-135		%REC	1	10/29/2012 2:48:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Work Order: 1210161
CLIENT: Aquatic Research, Inc
Project: Herbicides

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID: **MB-C-3540**	SampType: **MBLK**			Units: **µg/L**		Prep Date: **10/20/2012**		RunNo: **6425**			
Client ID: **MBLKW**	Batch ID: **3540**					Analysis Date: **10/29/2012**		SeqNo: **127624**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	ND	0.400									
2,4-D	ND	0.400									
2,4-DP	ND	0.400									
2,4,5-TP (Silvex)	ND	0.400									
2,4,5-T	ND	0.400									
Dinoseb	ND	0.400									
Dalapon	ND	0.500									
2,4-DB	ND	0.400									
MCPP	ND	8.00									
MCPA	ND	8.00									
Surr: 2,4-Dichlorophenylacetic acid	2.32		2.000		116	50	135				

Sample ID: **LCS-C-3540**	SampType: **LCS**			Units: **µg/L**		Prep Date: **10/20/2012**		RunNo: **6425**			
Client ID: **LCSW**	Batch ID: **3540**					Analysis Date: **10/29/2012**		SeqNo: **127625**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	2.44	0.400	2.000	0	122	50	150				
2,4,5-T	1.45	0.400	2.000	0	72.3	50	150				
Dalapon	11.3	0.500	10.00	0	113	50	150				
2,4-DB	2.36	0.400	2.000	0	118	50	150				
MCPP	80.9	8.00	100.0	0	80.9	50	150				
MCPA	117	8.00	100.0	0	117	50	150				
Surr: 2,4-Dichlorophenylacetic acid	1.85		2.000		92.3	50	150				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Work Order: 1210161
CLIENT: Aquatic Research, Inc
Project: Herbicides

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID: **1210167-002DUP** SampType: **DUP** Units: **µg/L** Prep Date: **10/20/2012** RunNo: **6425**
Client ID: **BATCH** Batch ID: **3540** Analysis Date: **10/29/2012** SeqNo: **127631**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	ND	0.400						0	0	50	
2,4-D	ND	0.400						0	0	50	
2,4-DP	ND	0.400						0	0	50	
2,4,5-TP (Silvex)	ND	0.400						0	0	50	
2,4,5-T	ND	0.400						0	0	50	
Dinoseb	ND	0.400						0	0	50	
Dalapon	ND	0.500						0	0	50	
2,4-DB	ND	0.400						0	0	50	
MCPP	ND	8.00						0	0	50	
MCPA	ND	8.00						0	0	50	
Surr: 2,4-Dichlorophenylacetic acid	1.72		2.000		86.2	50	135		0		

Sample ID: **1210167-003AMS** SampType: **MS** Units: **µg/L** Prep Date: **10/20/2012** RunNo: **6425**
Client ID: **BATCH** Batch ID: **3540** Analysis Date: **10/29/2012** SeqNo: **127633**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	1.22	0.400	2.000	0	61.2	50	150				
2,4,5-T	1.45	0.400	2.000	0	72.3	50	150				
Dalapon	8.52	0.500	10.00	0	85.2	50	150				
2,4-DB	1.41	0.400	2.000	0	70.3	50	150				
MCPP	61.4	8.00	100.0	0	61.4	50	150				
MCPA	89.7	8.00	100.0	0	89.7	50	150				
Surr: 2,4-Dichlorophenylacetic acid	1.45		2.000		72.3	50	150				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name: **AQUATIC**	Work Order Number: **1210161**
Logged by: **Clare Griggs**	Date Received: **10/18/2012 9:48:00 AM**

Chain of Custody

1.	Were custodial seals present?	Yes	☐	No	☐	Not Required	☑
2.	Is Chain of Custody complete?	Yes	☑	No	☐	Not Present	☐
3.	How was the sample delivered?	Client					

Log In

4.	Coolers are present?	Yes	☐	No	☑	NA	☐
	Sample received directly from Aquatic Research						
5.	Was an attempt made to cool the samples?	Yes	☐	No	☐	NA	☑
6.	Were all coolers received at a temperature of >0° C to 10.0°C	Yes	☐	No	☐	NA	☑
7.	Sample(s) in proper container(s)?	Yes	☑	No	☐		
8.	Sufficient sample volume for indicated test(s)?	Yes	☑	No	☐		
9.	Are samples properly preserved?	Yes	☑	No	☐		
10.	Was preservative added to bottles?	Yes	☐	No	☑	NA	☐
11.	Is there headspace present in VOA vials?	Yes	☐	No	☐	NA	☑
12.	Did all sample containers arrive in good condition?(unbroken)	Yes	☑	No	☐		
13.	Does paperwork match bottle labels?	Yes	☑	No	☐		
14.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No	☐		
15.	Is it clear what analyses were requested?	Yes	☑	No	☐		
16.	Were all holding times able to be met?	Yes	☑	No	☐		

Special Handling (if applicable)

17.	Was client notified of all discrepancies with this order?	Yes	☐	No	☐	NA	☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

18. Additional remarks/Disrepancies

Item Information

Aquatic Research Incorporated 1210161

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715

CHAIN-OF-CUSTODY RECORD

CLIENT: AQUATIC RESEARCH

SAMPLING DATE: 10/14/12

SAMPLERS:

SHEET _____ OF _____

PROJECT ID:

CASE FILE NO.:

DATA RECORDED BY:

SAMPLE INFORMATION

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	CHLORINATED HYDROCARBONS	EPA 9/5/A	BOTT #	NOTES
RBS185-IN	10/14/12 1715	X			
RBS185-OUT	" 1740	X			

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name	DAMIEN GADOMSKI	10/18/12		10/18/12 9:48
Signature				
Affiliation	ARI		EAI	

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name		10/18/12 9:48		
Signature				
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.): RESULTS & INVOICE TO DAMIEN AT

DAMIEN@EHINC.COM

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-18**	**PAGE 1**	
REPORT DATE:	**11/17/12**		
DATE SAMPLED:	**10/14/12**	**DATE RECEIVED:**	**10/15/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	TOTAL METALS						
SAMPLE ID	ANTIMONY (mg/L)	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CADMIUM (mg/L)	COPPER (mg/L)	CHROMIUM (mg/L)	LEAD (mg/l)
RBS185-IN	0.0011	0.0012	<0.0010	<0.0003	0.0137	0.0048	0.0041
RBS185-OUT	<0.0010	0.0073	<0.0010	<0.0003	0.0142	0.0033	0.0019

	TOTAL METALS						DISS METALS
SAMPLE ID	MERCURY (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)	ZINC (mg/L)	ANTIMONY (mg/L)
RBS185-IN	<0.0002	0.005	<0.005	<0.0010	0.0020	0.059	<0.0010
RBS185-OUT	<0.0002	0.005	<0.005	<0.0010	0.0017	0.016	<0.0010

	DISSOLVED METALS						
SAMPLE ID	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CHROMIUM (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)
RBS185-IN	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010
RBS185-OUT	0.0072	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-18** **PAGE 2**

REPORT DATE: **11/17/12**

DATE SAMPLED: **10/14/12** **DATE RECEIVED:** **10/15/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	ANTIMONY (mg/L)	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CADMIUM (mg/L)	COPPER (mg/L)	CHROMIUM (mg/L)	LEAD (mg/l)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12
DETECTION LIMIT	0.0010	0.0010	0.0010	0.0003	0.0010	0.0010	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0010	0.0859	<0.0010	<0.0003	0.0084	0.0048	<0.0010
DUPLICATE	0.0010	0.0873	<0.0010	<0.0003	0.0079	0.0042	<0.0010
RPD	0.00%	1.62%	NC	NC	6.13%	13.33%	NC
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0010	0.0859	<0.0010	<0.0003	0.0084	0.0048	<0.0010
SPIKED SAMPLE	0.0534	0.1295	0.0482	0.0506	0.0544	0.0550	0.0499
SPIKE ADDED	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
% RECOVERY	104.80%	87.20%	96.40%	101.20%	92.00%	100.40%	99.80%
QC CHECK							
FOUND	0.0492	0.0511	0.0494	0.0484	0.0497	0.0534	0.0512
TRUE	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
% RECOVERY	98.40%	102.20%	98.80%	96.80%	99.40%	106.80%	102.40%
BLANK	<0.0010	<0.0010	<0.0010	<0.0003	<0.0010	<0.0010	<0.0010

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-18** **PAGE 3**

REPORT DATE: **11/17/12**

DATE SAMPLED: **10/14/12** **DATE RECEIVED:** **10/15/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						DISS METALS
QC PARAMETER	MERCURY (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)	ZINC (mg/L)	ANTIMONY (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/16/12
DETECTION LIMIT	0.0002	0.005	0.005	0.0010	0.0010	0.005	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0005	0.006	<0.005	<0.0010	0.0022	0.031	0.0044
DUPLICATE	0.0005	0.006	<0.005	<0.0010	0.0018	0.029	0.0045
RPD	0.00%	0.00%	NC	NC	20.00%	6.67%	2.25%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0005	0.006	<0.005	<0.0010	0.002	0.031	0.0044
SPIKED SAMPLE	0.0023	0.053	0.045	0.0218	0.0557	0.076	0.0497
SPIKE ADDED	0.0020	0.050	0.050	0.0250	0.0500	0.050	0.0500
% RECOVERY	90.00%	94.00%	90.00%	87.20%	107.00%	90.00%	90.60%
QC CHECK							
FOUND	0.0019	0.052	0.051	0.0247	0.0470	0.050	0.0464
TRUE	0.0020	0.050	0.050	0.0250	0.0500	0.050	0.0500
% RECOVERY	95.00%	104.00%	102.00%	98.80%	94.00%	100.00%	92.80%
BLANK	<0.0002	<0.005	<0.005	<0.0010	<0.0010	<0.005	<0.0010

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AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-18** **PAGE 4**

REPORT DATE: **11/17/12**

DATE SAMPLED: **10/14/12** **DATE RECEIVED:** **10/15/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS						
QC PARAMETER	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CHROMIUM (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12
DETECTION LIMIT	0.0010	0.0010	0.0010	0.005	0.005	0.0010	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0010	<0.0010	0.0021	<0.005	<0.005	<0.0010	<0.0010
DUPLICATE	<0.0010	<0.0010	0.0021	<0.005	<0.005	<0.0010	<0.0010
RPD	NC	NC	0.00%	NC	NC	NC	NC
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0010	<0.0010	0.0021	<0.005	<0.005	<0.0010	<0.0010
SPIKED SAMPLE	0.0520	0.0539	0.0512	0.057	0.054	0.0259	0.0443
SPIKE ADDED	0.0500	0.0500	0.0500	0.050	0.050	0.0250	0.0500
% RECOVERY	104.00%	107.80%	98.20%	114.00%	108.00%	103.60%	88.60%
QC CHECK							
FOUND	0.0500	0.0482	0.0455	0.052	0.050	0.0251	0.0465
TRUE	0.0500	0.0500	0.0500	0.050	0.050	0.0250	0.0500
% RECOVERY	100.00%	96.40%	91.00%	104.00%	100.00%	100.40%	93.00%
BLANK	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010

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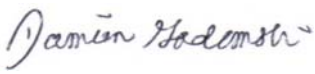
SUBMITTED BY:



Damien Gadomski
Project Manager

Aquatic Research, Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

ORGANOCHLORINE PESTICIDES SAMPLE REPORT

Results of Analysis by EPA Method 8081B

Measurement of Organochlorine Pesticides by GC/ECD/ECD

Case File Number:	HER07818A1	**Matrix:**	Water
Sample ID No.:	RBS185-IN	**Sample Vol. (ml)**	990
Date Collected:	10/14/2012	**Dilution Factor:**	1
Date Received:	10/15/2012	**Final Volume**	10.0
Date Extracted:	10/17/2012	**Prep Analyst:**	TM
Date Analyzed	10/22/2012	**Analyst:**	JDS
Date of Report:	10/23/2012	**Supervisor's Initials:**	DG
Sample Notes:			

Chlorinated Pesticides

Parameter	Result ug/L	RL ug/L	Parameter	Result ug/L	RL ug/L
Aldrin	< 1.0	1.0	Dieldrin	< 1.0	1.0
a-BHC	< 1.0	1.0	Endosulfan I	< 1.0	1.0
b-BHC	< 1.0	1.0	Endosulfan II	< 1.0	1.0
g-BHC (Lindane)	< 1.0	1.0	Eudosulfan Sulfate	< 1.0	1.0
d-BHC	< 1.0	1.0	Endrin	< 1.0	1.0
a-chlordane	< 1.0	1.0	Endrin Aldehyde	< 1.0	1.0
y-chlordane	< 1.0	1.0	Endrin Ketone	< 1.0	1.0
p,p'-DDD	< 1.0	1.0	Heptachlor	< 1.0	1.0
p,p'-DDE	< 1.0	1.0	Heptachlor epoxide	< 1.0	1.0
p,p'-DDT	< 1.0	1.0	Methoxychlor	< 1.0	1.0

Surrogate Compounds

Parameter	% Rec.	LCL	UCL	Parameter	% Rec.	LCL	UCL
Decachlorobiphenyl (DCB)	96%	70%	130%				

MCL: Maximum Contaminant Level
RL: Reporting Limit
LCL: Lower Control Limit
UCL: Upper Control Limit

Aquatic Research Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	**HER07818A1**	Matrix:	Water
Sample ID No.:	**RBS185-In**	Sample Vol. (ml)	**1060**
Date Collected:	**10/14/12**	Final Volume (ml)	**2.0**
Date Received:	**10/15/12**	Dilution Factor:	**1**
Date Extracted:	**10/18/12**		
Date Analyzed	**10/25/12**	Analyst:	**T. Meadows**
Date of Report:	**10/26/12**	Supervisor's Initials:	
Data File Path:	**D:\5975 Data\PAM\2012\102512**	**00601007.D**	

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
55-18-5	N-nitrosodiethylamine	0.75	U	86-73-7	Fluorene	0.75	U
76-01-7	Pentachloroethane	0.75	U	84-66-2	Diethyl phthalate	0.75	U
62-53-3	Aniline	0.75	U	100-01-6	4-Nitroaniline	0.75	U
108-95-2	Phenol	0.75	U	7005-72-3	4-Chlorophenyl phenyl ether	0.75	U
111-44-4	Bis(2-chloroethyl) ether	0.75	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.75	U
95-57-8	2-Chlorophenol	0.75	U	86-30-6	N-Nitrosodiphenyl amine	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U	103-33-3	Azobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U	101-55-3	4-Bromophenyl phenyl ether	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U	319-84-6	a-BHC	0.75	U
100-51-6	Benzyl Alcohol	0.75	U	118-74-1	Hexachlorobenzene	0.75	U
95-48-7	2-Methyl phenol	0.75	U	319-85-7	b-BHC	0.75	U
108-60-1	Bis(2-chloroisopropyl) ether	0.75	U	87-86-5	Pentachlorophenol	8.29	
98-86-2	Acetophenone	0.75	U	58-89-9	g-BHC (Lindane)	0.75	U
67-72-1	Hexachloroethane	0.75	U	85-01-8	Phenanthrene	0.75	U
621-64-7	N-Nitroso-n-propyl amine	0.75	U	120-12-7	Anthracene	0.75	U
106-44-5	4-Methyl phenol	0.75	U	319-86-8	d-BHC	0.75	U
98-95-3	Nitrobenzene	0.75	U	84-74-2	Di-n-butyl phthalate	0.75	U
100-75-4	N-nitrosopiperidine	0.75	U	76-44-8	Heptachlor	0.75	U
78-59-1	Isophorone	0.75	U	309-00-2	Aldrin	0.75	U
88-75-5	2-Nitrophenol	0.75	U	1024-57-3	Heptachlor epoxide	0.75	U
105-67-9	2,4-Dimethylphenol	0.75	U	206-44-0	Fluoranthrene	0.75	U
65-85-0	Benzoic Acid	0.75	U	129-00-0	Pyrene	0.75	U
111-91-1	Bis(2-chloroethoxy) methane	0.75	U	959-98-8	Endosulfan I	0.75	U
120-83-2	2,4-Dichlorophenol	0.75	U	92-87-5	Benzidine	0.75	U
120-82-1	1,2,4-Trichlorobenzene	0.75	U	72-55-9	4,4'-DDE	0.75	U
91-20-3	Naphthalene	0.75	U	60-57-1	Dieldrin	0.75	U
106-47-8	4-Chloroaniline	0.75	U	72-20-8	Endrin	0.75	U
87-68-3	Hexachlorobutadiene	0.75	U	33213-65-	Endosulfan II	0.75	U
924-16-3	N-nitrosodi-n-butylamine	0.75	U	72-54-8	4,4'-DDD	0.75	U
59-50-7	4-Chloro-3-methyl phenol	0.75	U	7421-92-4	Endrin aldehyde	0.75	U
91-57-6	2-Methyl naphthalene	0.75	U	85-68-7	Butyl benzenyl phthalate	0.75	U
95-94-3	1,2,4,5-Tetrachlorobenzene	0.75	U	1031-07-8	Endosulfan sulfate	0.75	U
77-47-4	Hexachlorocylcopentadiene	0.75	U	50-29-3	4,4'-DDT	0.75	U
88-06-2	2,4,6-Trichlorophenol	0.75	U	56-55-3	Benzo(a)anthracene	0.75	U
95-95-4	2,4,5-Trichlorophenol	0.75	U	218-01-9	Chrysene	0.75	U
91-58-7	2-Chloronaphthalene	0.75	U	91-94-1	3,3'-Dichlorobenzidine	0.75	U
88-74-4	2-Nitroaniline	0.75	U	72-43-5	Methoxychlor	0.75	U
131-11-3	Dimethyl phthalate	0.75	U	117-81-7	Bis(2-ethylhexyl) phthalate	2.57	
208-96-8	Acenaphthylene	0.75	U	117-84-0	Di-n-octyl phthalate	0.75	U
606-20-2	2,6-Dinitrotoluene	0.75	U	205-97-2	Benzo(b)fluoranthrene	0.75	U
99-09-2	3-Nitroaniline	0.75	U	207-08-9	Benzo(k)fluoranthrene	0.75	U

Aquatic Research Inc.
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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	**HER07818A1**	Matrix:	Water
Sample ID No.:	**RBS185-In**	Sample Vol. (ml)	**1060**
Date Collected:	**10/14/12**	Final Volume (ml)	**2.0**
Date Received:	**10/15/12**	Dilution Factor:	**1**
Date Extracted:	**10/18/12**		
Date Analyzed	**10/25/12**	Analyst:	**T. Meadows**
Date of Report:	**10/26/12**	Supervisor's Initials:	
Data File Path:	**D:\5975 Data\PAM\2012\102512\ 00601007.D**		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
83-32-9	Acenaphthene	0.75	U	50-32-8	Benzo(a)pyrene	0.75	U
51-28-5	2,4-Dinitrophenol	0.75	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.75	U
132-64-9	Dibenzofuran	0.75	U	53-70-3	Dibenzo(a,h)anthracene	0.75	U
100-02-7	4-Nitrophenol	0.75	U	91-24-2	Benzo(g,h,i)perlyene	0.75	U
121-14+2	2,4-Dinitrotoluene	0.75	U				
58-90-2	2,3,4,6-Tetrachlorophenol	0.75	U				

FLAGS:

U	Indicates compound was analyzed for, but not detected at the specified detection limit.
B	Blank contaminated with this analyte.
J	Estimated value - compound positively identified, but below specified detection limit.
E	Estimated value - compound exceeded calibration range.
D	Compound analyzed at a secondary dilution factor of _____ from data file: _____
PP	Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tenatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc.

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

		QC limits	
Surrogate Recoveries	%Rec.	**Water**	**Soil**
2-Fluorophenol	59%	24-132%	65-135%
Phenol-d5	31%	0-105%	65-135%
Nitrobenzene-d5	67%	24-136%	65-135%
2-Fluorobiphenyl	64%	41-134%	65-135%
2,4,6-Tribromophenol	157%	0-183%	65-135%
p-Terphenyl-d14	103%	80-141%	65-135%

Aquatic Research, Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

VOLATILE ORGANIC COMPOUNDS SAMPLE REPORT

Results of Analysis by EPA Method 524.2

Measurement of Purgeable Organic Compounds by Capillary Column Gas Chromatography/Mass Spectrometry

Case File Number:	HER07818A2	**Matrix:**	Water
Sample ID No.:	RBS185-OUT	**Sample Vol. (ml)**	5.0
Date Collected:	10/14/2012	**Dilution Factor:**	1
Date Received:	10/15/2012		
Date Analyzed	10/26/2012	**Analyst:**	JDS
Date of Report:	10/29/2012	**Supervisor's Initials:**	DG

Sample Notes:

Regulated Volatile Organic Compounds

Parameter	Result ug/L	MCL ug/L	RL ug/L	Parameter	Result ug/L	MCL ug/L	RL ug/L
Benzene	< 0.4	1.0	0.4	Ethylbenzene	< 0.4	300	0.4
Dibromochloromethane	< 0.4		0.4	Methyl-t-Butyl Ether	< 0.4	5	0.4
Bromodichloromethane	< 0.4		0.4	Chlorobenzene	< 0.4	70	0.4
Bromoform	< 0.4		0.4	Styrene	< 0.4	100	0.4
Carbon tetrachloride	< 0.4	0.5	0.4	1,1,2,2-Tetrachloroethane	< 0.4	1	0.4
Chloroform	< 0.4		0.4	Tetrachloroethene	< 0.4	5	0.4
1,2-Dichlorobenzene	< 0.4	600	0.4	Toluene	< 0.4	150	0.4
1,4-Dichlorobenzene	< 0.4	5	0.4	1,2,4-Trichlorobenzene	< 0.4	5	0.4
1,1-Dichloroethane	< 0.4	5	0.4	1,1,1-Trichloroethane	< 0.4	200	0.4
1,2-Dichloroethane	< 0.4	0.5	0.4	1,1,2-Trichloroethane	< 0.4	5	0.4
1,1-Dichloroethene	< 0.4	6	0.4	1,1,2-Trichloro-1,2,2-Trifluoroethane	< 0.4	1.2	0.4
cis-1,2-Dichloroethene	< 0.4	6	0.4				
trans-1,2-Dichloroethene	< 0.4	10	0.4	Trichloroethene	< 0.4	5	0.4
Dichloromethane	< 0.4	5	0.4	Trichlorofluoromethane	< 0.4	150	0.4
1,2-Dichloropropane	< 0.4	5	0.4	Vinyl chloride	< 0.4	0.5	0.4
cis-1,3-Dichloropropene	< 0.4	0.5	0.4	p/m-Xylene	< 0.4		0.4
trans-1,3-Dichloropropene	< 0.4	0.5	0.4	o-Xylene	< 0.4		0.4

Calculated Results

Parameter	Result ug/L	MCL ug/L	RL ug/L	Parameter	Result ug/L	MCL ug/L	RL ug/L
Total 1,3-Dichloropropane	< 0.4	0.5	0.4	Total Xylenes	< 0.4	1750	0.4
Total Trihalomethanes	< 0.4	80	0.4				

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VOLATILE ORGANIC COMPOUNDS SAMPLE REPORT

Results of Analysis by EPA Method 524.2

Measurement of Purgeable Organic Compounds by Capillary Column Gas Chromatography/Mass Spectrometry

Case File Number:	HER07818A2	**Matrix:**	Water
Sample ID No.:	RBS185-OUT	**Sample Vol. (ml)**	5.0
Date Collected:	10/14/2012	**Dilution Factor:**	1
Date Received:	10/15/2012		
Date Analyzed	10/26/2012	**Analyst:**	JDS
Date of Report:	10/29/2012	**Supervisor's Initials:**	DG

Unregulated Volatile Organic Compounds

Parameter	Result ug/L	MCL ug/L	RL ug/L	Parameter	Result ug/L	MCL ug/L	RL ug/L
1,1,1,2-Tetrachloroethane	< 0.4		0.4	tert-Butylbenzene	< 0.4		0.4
1,1-Dichloropropene	< 0.4		0.4	Bromomethane	< 0.4		0.4
1,2,3-Trichlorobenzene	< 0.4		0.4	Chloroethane	< 0.4		0.4
1,2,3-Trichloropropane	< 0.4		0.4	Chloromethane	< 0.4		0.4
1,2,4-Trimethylbenzene	< 0.4		0.4	Dibromomethane	< 0.4		0.4
1,3,5-Trimethylbenzene	< 0.4		0.4	Dichlorodifluoromethane	< 0.4		0.4
1,3-Dichlorobenzene	< 0.4		0.4	Hexachlorobutadiene	< 0.4		0.4
1,3-Dichloropropane	< 0.4		0.4	Isopropylbenzene	< 0.4		0.4
2,2-Dichloropropane	< 0.4		0.4	Naphthalene	< 0.4		0.4
2-Chlorotoluene	< 0.4		0.4	n-Butylbenzene	< 0.4		0.4
4-Chlorotoluene	< 0.4		0.4	n-Propylbenzene	< 0.4		0.4
Bromobenzene	< 0.4		0.4	4-Isopropyltoluene	< 0.4		0.4
Bromochloromethane	< 0.4		0.4	sec-Butylbenzene	< 0.4		0.4

Surrogate Compounds

Parameter	% Rec.	LCL	UCL	Parameter	% Rec.	LCL	UCL
1,2-Dichlorobenzene-d4	89%	70%	130%	4-Bromofluorobenzene	94%	70%	130%

MCL: Maximum Contaminant Level

RL: Reporting Limit

LCL: Lower Control Limit

UCL: Upper Control Limit

Results relate only to the submitted sample.

HER078-18

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: AS/DB		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Fecal coliform bacteria - SM 9222D [a]	TPH (diesel) - NWTPH-Dx [b]	TPH (motor oil) - NWTPH-Dx [b]	Semivolatile organic compounds - EPA 8270D [c]	Volatile organic compounds - EPA 524.2 [d]	Polycyclic aromatic hydrocarbons - EPA 8270 [e]	Polychlorinated-biphenyls - EPA 8082 [f]	Chlorinated pesticides - EPA 8081 [g]	Chlorinated herbicides - EPA 8151A [h]	Dissolved Metals: (Sb, As, Be, Cr, Ni, Se, Ag, Tl) - EPA 200.8 [i]	Total Metals: (Cd, Cu, Pb, Hg, Zn, Sb, As, Be, Cr, Ni, Se, Ag, Tl) - EPA 200.8 [i]
~~RBS185-OUT~~	~~10/14/12~~	~~1740~~	250 mL glass bottle[a], 1-L glass bottle[b]	~~2~~	X	X	X								
RBS185-IN	10/14/12	1715	3x40 mL vials[d]	3					X						
RBS185-OUT	10/14/12	1740	3x40 mL vials[d]	3					X						
RBS185-IN	10/14/12	1715	1-L glass bottle[c/e, f/g, h]					X		X	X	X	X		
RBS185-OUT	10/14/12	1740	1-L glass bottle[c/e, f/g, h]					X		X	X	X	X		
RBS185-IN	10/14/12	1715	250 mL HDPE bottle[i]	1										X	X
RBS185-OUT	10/14/12	1740	250 mL HDPE bottle[i]	1										X	X

Notes:

RELINQUISHED BY (NAME/CO.): DAN BENNETT HC	SIGNATURE:	DATE/TIME: 10-15-12 1100	RECEIVED BY (NAME/CO.): S HIGGINS AMEC	SIGNATURE:	DATE/TIME: 10/15/12 1100

October 15, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-20**	**PAGE 1**	
REPORT DATE:	**11/06/12**		
DATE SAMPLED:	**10/15/12**	**DATE RECEIVED:**	**10/16/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.325	0.015	25.0	1.40	188	1.2	178
RBS185-OUT	2.26	1.76	52.4	5.21	48	6.8	28

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0348	0.0108	<0.0002	0.217	1.04	0.235
RBS185-OUT	<0.0003	0.0231	0.0038	<0.0002	0.028	2.16	0.681

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0070	<0.0010	<0.0002	0.036
RBS185-OUT	<0.0003	0.0130	<0.0010	<0.0002	0.011

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CASE FILE NUMBER: **HER078-20** **PAGE 2**

REPORT DATE: **11/06/12**

DATE SAMPLED: **10/15/12** **DATE RECEIVED:** **10/16/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	10/19/12	10/16/12	10/31/12	10/30/12	10/21/12	10/22/12	10/22/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.021	0.009	52.0	0.98	14		
DUPLICATE	0.020	0.009	52.8	1.10	14		
RPD	4.88%	0.00%	1.49%	11.54%	0.00%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.021	0.009	52.0	0.98			
SPIKED SAMPLE	0.073	0.028	70.4	10.4			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	104.00%	95.00%	91.86%	94.20%	NA	NA	NA
QC CHECK							
FOUND	0.090	0.033	39.9	28.6	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	100.00%	100.00%	99.67%	95.33%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-20** **PAGE 3**

REPORT DATE: **11/06/12**

DATE SAMPLED: **10/15/12** **DATE RECEIVED:** **10/16/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/26/12	10/16/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0083	<0.0010	0.0005	0.031	0.789	0.352
DUPLICATE	<0.0003	0.0079	<0.0010	0.0005	0.029	0.792	0.358
RPD	NC	4.94%	NC	0.00%	6.67%	0.38%	1.69%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0083	<0.0010	0.0005	0.031	0.789	0.352
SPIKED SAMPLE	0.0506	0.0544	0.0499	0.0022	0.076	2.62	0.559
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	101.20%	92.20%	99.80%	85.00%	90.00%	91.55%	103.50%
QC CHECK							
FOUND	0.0480	0.0531	0.0497	0.0022	0.050	5.72	0.401
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	96.00%	106.20%	99.40%	110.00%	100.00%	98.79%	98.36%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-20** **PAGE 4**
REPORT DATE: **11/06/12**
DATE SAMPLED: **10/15/12** **DATE RECEIVED:** **10/16/12**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	11/06/12	11/06/12	11/06/12	11/06/12	11/06/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0094	<0.0010	<0.0002	0.022
DUPLICATE	<0.0003	0.0097	<0.0010	<0.0002	0.023
RPD	NC	3.14%	NC	NC	4.44%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0094	<0.0010	<0.0002	0.022
SPIKED SAMPLE	0.0502	0.0660	0.0492	0.0022	0.081
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	100.40%	113.20%	98.40%	110.00%	118.00%
QC CHECK					
FOUND	0.0473	0.0499	0.0497	0.0010	0.048
TRUE	0.0500	0.0500	0.0500	0.0010	0.050
% RECOVERY	94.60%	99.80%	99.40%	100.00%	96.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERO78-20

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2

LAB USE:

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
					ANALYSES REQUESTED									
RBS185-IN	10-15-12	22:04	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS185-OUT	10-15-12	21:53	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
P. Bunn - Herr		10/16/12 10:25	S. Miller GMI		10/16/12 1025

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-21B**	**PAGE 1**	
REPORT DATE:	**11/06/12**		
DATE SAMPLED:	**10/15/12**	**DATE RECEIVED:**	**10/16/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Five water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.05	2.86	1300
RBS185-CB1	<0.05	3.24	2500
RBS185-CB2	<0.05	3.39	1900
RBS185-CB3	<0.05	2.09	2300
RBS185-OUT	<0.05	0.54	380

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-21B**

REPORT DATE: **11/06/12**

DATE SAMPLED: **10/15/12** **DATE RECEIVED:** **10/16/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	10/16/12	10/16/12	
DATE ANALYZED	10/22/12	10/22/12	10/16/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			BATCH
ORIGINAL			>20000
DUPLICATE			>20000
RPD	NA	NA	NC
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.52	0.97	
TRUE	0.50	1.00	
% RECOVERY	104.00%	97.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
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NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

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CASE FILE NUMBER:	**HER078-21A**	**PAGE 1**	
REPORT DATE:	**11/06/12**		
DATE SAMPLED:	**10/15/12**	**DATE RECEIVED:**	**10/16/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Four water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.310	0.022	30.0	1.96	160	8.9	172
RBS185-CB1	0.260	0.019	25.1	0.98	128	12	126
RBS185-CB2	0.296	0.017	22.5	1.40	160	13	162
RBS185-CB3	0.306	0.019	25.2	0.98	180	10	178

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0403	0.0120	<0.0002	0.183	1.28	0.350
RBS185-CB1	<0.0003	0.0458	0.0089	<0.0002	0.187	1.06	0.293
RBS185-CB2	<0.0003	0.0399	0.0100	<0.0002	0.186	1.18	0.334
RBS185-CB3	<0.0003	0.0411	0.0114	<0.0002	0.177	0.789	0.352

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0002	0.0093	<0.0010	<0.0002	0.018
RBS185-CB1	<0.0002	0.0086	<0.0010	<0.0002	0.027
RBS185-CB2	<0.0002	0.0105	<0.0010	<0.0002	0.031
RBS185-CB3	<0.0002	0.0094	<0.0010	<0.0002	0.022

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-21A** **PAGE 2**

REPORT DATE: **11/06/12**

DATE SAMPLED: **10/15/12** **DATE RECEIVED:** **10/16/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	10/19/12	10/16/12	10/31/12	10/30/12	10/21/12	10/22/12	10/22/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	RBS185-CB3	BATCH	RBS185-CB3	BATCH		
ORIGINAL	0.021	0.019	52.0	0.98	14		
DUPLICATE	0.020	0.018	52.8	1.10	14		
RPD	4.88%	5.41%	1.49%	11.54%	0.00%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	RBS185-CB3	BATCH	RBS185-CB3			
ORIGINAL	0.021	0.019	52.0	0.98			
SPIKED SAMPLE	0.073	0.037	70.4	10.4			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	104.00%	90.00%	91.86%	94.20%	NA	NA	NA
QC CHECK							
FOUND	0.090	0.033	39.9	28.6	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	100.00%	100.00%	99.67%	95.33%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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CASE FILE NUMBER: **HER078-21A** **PAGE 3**

REPORT DATE: **11/06/12**

DATE SAMPLED: **10/15/12** **DATE RECEIVED:** **10/16/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/26/12	10/16/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-CB3	RBS185-CB3
ORIGINAL	<0.0003	0.0083	<0.0010	0.0005	0.031	0.789	0.352
DUPLICATE	<0.0003	0.0079	<0.0010	0.0005	0.029	0.792	0.358
RPD	NC	4.94%	NC	0.00%	6.67%	0.38%	1.69%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-CB3	RBS185-CB3
ORIGINAL	<0.0003	0.0083	<0.0010	0.0005	0.031	0.789	0.352
SPIKED SAMPLE	0.0506	0.0544	0.0499	0.0022	0.076	2.62	0.559
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	101.20%	92.20%	99.80%	85.00%	90.00%	91.55%	103.50%
QC CHECK							
FOUND	0.0480	0.0531	0.0497	0.0022	0.050	5.72	0.401
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	96.00%	106.20%	99.40%	110.00%	100.00%	98.79%	98.36%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-21A** **PAGE 4**
REPORT DATE: **11/06/12**
DATE SAMPLED: **10/15/12** **DATE RECEIVED:** **10/16/12**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	11/06/12	11/06/12	11/06/12	11/06/12	11/06/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3
ORIGINAL	<0.0003	0.0094	<0.0010	<0.0002	0.022
DUPLICATE	<0.0003	0.0097	<0.0010	<0.0002	0.023
RPD	NC	3.14%	NC	NC	4.44%
SPIKE SAMPLE					
SAMPLE ID	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3	RBS185-CB3
ORIGINAL	<0.0003	0.0094	<0.0010	<0.0002	0.022
SPIKED SAMPLE	0.0502	0.0660	0.0492	0.0022	0.081
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	100.40%	113.20%	98.40%	110.00%	118.00%
QC CHECK					
FOUND	0.0473	0.0499	0.0497	0.0010	0.048
TRUE	0.0500	0.0500	0.0500	0.0010	0.050
% RECOVERY	94.60%	99.80%	99.40%	100.00%	96.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HER078.21

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: AS / DB		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D			
RBS185-IN	10/15/12	1730	Stormwater Composite 10-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-CB1	10/15/12	1750	Stormwater Composite 10-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-CB2	10/15/12	1745	Stormwater Composite 10-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-CB3	10/15/12	1740	Stormwater Composite 10-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-IN	10/15/12	1730	Stormwater grab 1-L amber	1											X	X				
RBS185-CB1	10/15/12	1750	Stormwater grab 1-L amber	1											X	X				
RBS185-CB2	10/15/12	1745	Stormwater grab 1-L amber	1											X	X				
RBS185-CB3	10/15/12	1740	Stormwater grab 1-L amber	1											X	X				
RBS185-IN	10/15/12	1730	Stormwater grab 250-mL amber	1													X			
RBS185-CB1	10/15/12	1750	Stormwater grab 250-mL amber	1													X			
RBS185-CB2	10/15/12	1745	Stormwater grab 250-mL amber	1													X			
RBS185-CB3	10/15/12	1740	Stormwater grab 250-mL amber	1													X			
RBS185-OUT	10/15/12	1720	Stormwater grab 1-L amber	1											X	X				
RBS185-OUT	10/15/12	1720	Stormwater grab 250-mL amber	1													X			

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
[illegible] / HEC		10/16/12 10:75	E. Hillman HEC		10/16/12 1025
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:

November 11, 2012

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-29** **PAGE 1**

REPORT DATE: **11/27/12**

DATE SAMPLED: **11/12/12** **DATE RECEIVED:** **11/12/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.096	0.003	19.9	0.91	56	3.7	66
RBS185-OUT	1.22	1.01	36.6	1.56	9.0	1.6	11

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0098	0.0023	<0.0002	0.061	0.476	0.111
RBS185-OUT	<0.0003	0.0089	0.0017	<0.0002	0.011	0.821	0.469

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0014	<0.0010	<0.0002	0.018
RBS185-OUT	<0.0003	0.0047	<0.0010	<0.0002	0.011

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CASE FILE NUMBER: **HER078-29** **PAGE 2**

REPORT DATE: **11/27/12**

DATE SAMPLED: **11/12/12** **DATE RECEIVED:** **11/12/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	11/16/12	11/14/12	11/26/12	11/27/12	11/19/12	11/20/12	11/20/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	RBS185-OUT	BATCH	BATCH		
ORIGINAL	0.043	0.014	36.6	5.87	72		
DUPLICATE	0.044	0.014	35.7	5.38	68		
RPD	2.30%	0.00%	2.49%	8.71%	5.71%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	RBS185-OUT	BATCH			
ORIGINAL	0.043	0.014	36.6	5.87			
SPIKED SAMPLE	0.093	0.034	53.8	15.6			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	100.00%	100.00%	86.00%	97.30%	NA	NA	NA
QC CHECK							
FOUND	0.089	0.033	37.1	28.5	9.5		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	98.89%	100.00%	92.75%	95.00%	95.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	11/14/12	11/14/12	11/14/12	11/14/12	11/14/12	11/16/12	11/14/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0018	<0.0010	0.0006	0.013	24.5	0.032
DUPLICATE	<0.0003	0.0017	<0.0010	0.0006	0.013	23.3	0.029
RPD	NC	5.71%	NC	0.00%	0.00%	5.02%	9.84%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0018	<0.0010	0.0006	0.013	24.5	0.032
SPIKED SAMPLE	0.0472	0.0448	0.0455	0.0016	0.057	26.6	0.227
SPIKE ADDED	0.0500	0.0500	0.0500	0.0010	0.050	2.00	0.200
% RECOVERY	94.40%	86.00%	91.00%	100.00%	88.00%	105.00%	97.50%
QC CHECK							
FOUND	0.0460	0.0481	0.0480	0.0009	0.046	5.92	0.401
TRUE	0.0500	0.0500	0.0500	0.0010	0.050	5.79	0.408
% RECOVERY	92.00%	96.20%	96.00%	90.00%	92.00%	102.25%	98.28%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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CASE FILE NUMBER: **HER078-29** **PAGE 4**

REPORT DATE: **11/27/12**

DATE SAMPLED: **11/12/12** **DATE RECEIVED:** **11/12/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	11/13/12	11/13/12	11/13/12	11/13/12	11/13/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0014	<0.0010	<0.0002	0.018
DUPLICATE	<0.0003	0.0015	<0.0010	<0.0002	0.018
RPD	NC	6.90%	NC	NC	0.00%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0014	<0.0010	<0.0002	0.018
SPIKED SAMPLE	0.0497	0.0515	0.0460	0.0017	0.070
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	99.40%	100.20%	92.00%	85.00%	104.00%
QC CHECK					
FOUND	0.0496	0.0482	0.0494	0.0018	0.049
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	99.20%	96.40%	98.80%	90.00%	98.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERO78-29

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2

LAB USE:

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8						
RBS185-IN	11/12/12	1:25	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-OUT	11/12/12	5:20	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						

Notes: Use churn-splitter to apportion composite sample into smaller bottles. RSB-185 IN Consists of two bottles that need to be mixed proportionally, one part bottle 1 to 2.4 parts Bottle 2.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
HEC		11/12/12 1150	Karinka Sosa		11/12/12 11:50

206.459.1042

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-28**	**PAGE 1**	
REPORT DATE:	**11/17/12**		
DATE SAMPLED:	**11/11/12**	**DATE RECEIVED:**	**11/12/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.05	0.38	18
RBS185-OUT	<0.05	<0.10	27

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-28**

REPORT DATE: **11/17/12**

DATE SAMPLED: **11/11/12** **DATE RECEIVED:** **11/12/12**

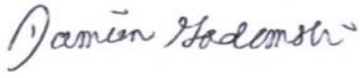
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	11/14/12	11/14/12	
DATE ANALYZED	11/15/12	11/15/12	11/12/12
DETECTION LIMIT	0.05	0.10	2
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			27
DUPLICATE			27
RPD	NA	NA	0.00%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.54	0.99	
TRUE	0.50	1.00	
% RECOVERY	108.00%	99.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HERO78.28

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	11/11/12	0700	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	11/11/12	0715	Stormwater grab 1-L amber	1	X	X	
RBS185-IN			Stormwater grab 250-mL amber	1			X
RBS185-OUT			Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENNETT / HEC		11-12-12 12:00	KARENNA SOSA		11/12/12 1150

December 16, 2012

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-37**	**PAGE 1**	
REPORT DATE:	**01/14/13**		
DATE SAMPLED:	**12/17/12**	**DATE RECEIVED:**	**12/17/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.094	0.002	11.3	0.59	71	9.4	55
RBS185-OUT	2.50	2.08	22.5	1.96	20	<0.50	28

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0133	0.0042	<0.0002	0.088	40.0	0.068
RBS185-OUT	<0.0003	0.0168	0.0040	<0.0002	0.020	52.6	0.262

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	<0.0010	<0.0010	<0.0002	0.014
RBS185-OUT	<0.0003	0.0078	<0.0010	<0.0002	0.008

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CASE FILE NUMBER: **HER078-37** **PAGE 2**

REPORT DATE: **01/14/13**

DATE SAMPLED: **12/17/12** **DATE RECEIVED:** **12/17/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	12/20/12	12/19/12	12/26/12	12/26/12	12/21/12	12/21/12	12/21/12
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.012	0.004	38.1	4.20	6.0		
DUPLICATE	0.013	0.004	37.7	4.00	5.5		
RPD	8.00%	0.00%	1.06%	4.88%	8.70%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.012	0.004	38.1	4.20			
SPIKED SAMPLE	0.062	0.026	56.7	13.6			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	100.00%	110.00%	93.00%	94.00%	NA	NA	NA
QC CHECK							
FOUND	0.091	0.031	37.5	28.7	9.5		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.11%	93.94%	93.75%	95.67%	95.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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CASE FILE NUMBER: **HER078-37** **PAGE 3**

REPORT DATE: **01/14/13**

DATE SAMPLED: **12/17/12** **DATE RECEIVED:** **12/17/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	12/19/12	12/19/12	12/19/12	12/19/12	12/19/12	12/21/12	12/19/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0015	0.0020	<0.0002	0.012	0.727	0.426
DUPLICATE	<0.0003	0.0016	0.0020	<0.0002	0.013	0.722	0.431
RPD	NC	6.45%	0.00%	NC	8.00%	0.69%	1.17%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0015	0.0020	<0.0002	0.012	0.727	0.426
SPIKED SAMPLE	0.0558	0.0527	0.0506	0.0020	0.067	2.71	0.623
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	111.60%	102.40%	97.20%	100.00%	110.00%	99.15%	98.50%
QC CHECK							
FOUND	0.0495	0.0463	0.0501	0.0010	0.051	5.41	0.415
TRUE	0.0500	0.0500	0.0500	0.0010	0.050	5.79	0.408
% RECOVERY	99.00%	92.60%	100.20%	100.00%	102.00%	93.44%	101.72%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
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CASE FILE NUMBER: **HER078-37** **PAGE 4**
REPORT DATE: **01/14/13**
DATE SAMPLED: **12/17/12** **DATE RECEIVED:** **12/17/12**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	12/17/12	12/17/12	12/17/12	12/17/12	12/17/12
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0525	0.0484	0.0503	0.0021	0.050
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	105.00%	96.80%	100.60%	105.00%	100.80%
QC CHECK					
FOUND	0.0491	0.0529	0.0509	0.0010	0.053
TRUE	0.0500	0.0500	0.0500	0.0010	0.050
% RECOVERY	98.20%	105.80%	101.80%	100.00%	105.60%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HERO 78.37

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8						
RBS185-IN	12·17·12	~~1033~~ 1038	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-OUT	12/7/12	~~1140~~ 1130	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN KENNETT/HEC		12-17-12	SAMPLEOU		12/17/12 1245

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-38**	**PAGE 1**	
REPORT DATE:	**12/31/12**		
DATE SAMPLED:	**12/16/12**	**DATE RECEIVED:**	**12/17/12**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.06	0.26	300
RBS185-OUT	<0.05	<0.10	<5

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CASE FILE NUMBER:	**HER078-38**	**PAGE**	**2**
REPORT DATE:	**12/31/12**		
DATE SAMPLED:	**12/16/12**	**DATE RECEIVED:**	**12/17/12**

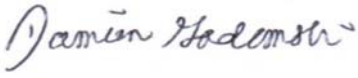
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	12/20/12	12/20/12	
DATE ANALYZED	12/20/12	12/20/12	12/17/12
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			<5
DUPLICATE			<5
RPD	NA	NA	NC
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.25	0.50	
TRUE	0.25	0.50	
% RECOVERY	100.00%	100.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HER078.38

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	12-16-12	1900	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	12.16.12	1915	Stormwater grab 1-L amber	1	X	X	
RBS185-IN	12 16 12	1900	Stormwater grab 250-mL amber	1			X
RBS185-OUT	12/6 12	1915	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENNETT / HEC		12-17-12	S ALLISON AMEC		12/17/12 1245

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January 23, 2013

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-44**	**PAGE 1**	
REPORT DATE:	**02/08/13**		
DATE SAMPLED:	**01/23,24/13**	**DATE RECEIVED:**	**01/24/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.782	0.002	304	275	508	20	444
RBS185-OUT	0.685	0.556	200	165	12	0.60	14

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	0.0007	0.0712	0.0234	<0.0002	0.430	4.21	0.614
RBS185-OUT	<0.0003	0.0096	<0.0010	<0.0002	0.006	1.02	0.900

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0184	<0.0010	<0.0002	0.086
RBS185-OUT	<0.0003	0.0058	<0.0010	<0.0002	<0.005

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-44** **PAGE 2**

REPORT DATE: **02/08/13**

DATE SAMPLED: **01/23,24/13** **DATE RECEIVED:** **01/24/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	01/29/13	01/25/13	02/04/13	02/05/13	01/29/13	01/30/13	01/30/13
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.022	0.010	28.9	67.8	32		
DUPLICATE	0.022	0.010	29.3	68.6	32		
RPD	0.00%	0.00%	1.37%	1.17%	0.00%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH				
ORIGINAL	0.022	0.010	28.9				
SPIKED SAMPLE	0.073	0.031	48.1				
SPIKE ADDED	0.050	0.020	20.0				
% RECOVERY	102.00%	105.00%	96.00%	NA	NA	NA	NA
QC CHECK							
FOUND	0.093	0.033	38.3	28.3	9.3		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	102.91%	100.00%	95.75%	94.33%	93.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-44**

REPORT DATE: **02/08/13**

DATE SAMPLED: **01/23,24/13** **DATE RECEIVED:** **01/24/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	01/29/13	01/29/13	01/29/13	01/29/13	01/29/13	01/25/13	01/25/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0071	<0.0010	<0.0002	<0.005	8.03	0.351
DUPLICATE	<0.0003	0.0074	<0.0010	<0.0002	<0.005	8.85	0.345
RPD	NC	4.14%	NC	NC	NC	9.72%	1.72%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0071	<0.0010	<0.0002	<0.005	8.03	0.351
SPIKED SAMPLE	0.0458	0.0560	0.0452	0.0017	0.050	27.6	0.551
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	20.0	0.200
% RECOVERY	91.60%	97.80%	90.40%	84.50%	100.00%	97.85%	100.00%
QC CHECK							
FOUND	0.0458	0.0476	0.0463	0.0009	0.046	6.01	0.400
TRUE	0.0500	0.0500	0.0500	0.0010	0.050	5.79	0.408
% RECOVERY	91.60%	95.20%	92.60%	90.00%	92.00%	103.80%	98.04%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-44** **PAGE 4**
REPORT DATE: **02/08/13**
DATE SAMPLED: **01/23,24/13** **DATE RECEIVED:** **01/24/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	01/29/13	01/29/13	01/29/13	01/29/13	01/29/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0059	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	0.0060	<0.0010	<0.0002	<0.005
RPD	NC	1.68%	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0059	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0447	0.0526	0.0435	0.0016	0.048
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	89.40%	93.40%	87.00%	80.00%	96.00%
QC CHECK					
FOUND	0.0458	0.0476	0.0463	0.0009	0.046
TRUE	0.0500	0.0500	0.0500	0.0010	0.050
% RECOVERY	91.60%	95.20%	92.60%	90.00%	92.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HER078-44

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: Redmond Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2

LAB USE:

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8						
RBS185-IN	1-23-13	22:05	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-OUT	1-24-13	01:28	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
	DAN BENNETT	1-24-13 14:30		S-NIELSON	1/24/13 1430

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-43**	**PAGE 1**	
REPORT DATE:	**02/06/13**		
DATE SAMPLED:	**01/23/13**	**DATE RECEIVED:**	**01/24/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS 185-IN	<0.05	5.30	4400
RBS 185-OUT	<0.05	0.10	500

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-43**

REPORT DATE: **02/06/13**

DATE SAMPLED: **01/23/13** **DATE RECEIVED:** **01/24/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	02/04/13	02/04/13	
DATE ANALYZED	02/05/13	02/05/13	01/24/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS 185-OUT
ORIGINAL			500
DUPLICATE			700
RPD	NA	NA	33.33%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.25	0.52	
TRUE	0.25	0.50	
% RECOVERY	100.00%	104.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HER078.43

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond 185th Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	1-23-13	16:30	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	"	16:35	Stormwater grab 1-L amber	1	X	X	
RBS185-IN	"	16:30	Stormwater grab 250-mL amber	1			X
RBS185-OUT	"	16:35	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
HERRERA	DAN BENNETT	1-24-13 14:30	S. NIELSON ARE		1/24/13 1430

February 22, 2013

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-57** **PAGE 1**

REPORT DATE: **03/08/13**

DATE SAMPLED: **02/22/13** **DATE RECEIVED:** **02/23/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.694	0.003	35.2	10.4	332	7.9	372
RBS185-OUT	1.69	1.09	46.1	6.35	30	<0.50	34

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	0.0003	0.0560	0.0198	<0.0002	0.337	1.26	0.358
RBS185-OUT	<0.0003	0.0363	0.0032	<0.0002	0.034	1.13	0.898

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0049	<0.0010	<0.0002	0.025
RBS185-OUT	<0.0003	0.0209	<0.0010	<0.0002	0.008

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-57** **PAGE 2**

REPORT DATE: **03/08/13**

DATE SAMPLED: **02/22/13** **DATE RECEIVED:** **02/23/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	02/26/13	02/25/13	03/04/13	03/05/13	02/27/13	03/01/13	03/01/13
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	RBS185-IN	BATCH	BATCH	BATCH		
ORIGINAL	0.056	0.003	<2.00	15.2	108		
DUPLICATE	0.058	0.003	<2.00	16.1	106		
RPD	3.51%	0.00%	NC	6.25%	1.87%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	RBS185-IN	BATCH	BATCH			
ORIGINAL	0.056	0.003	<2.00	15.2			
SPIKED SAMPLE	0.104	0.023	20.1	24.4			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	96.00%	100.00%	100.65%	92.87%	NA	NA	NA
QC CHECK							
FOUND	0.091	0.033	38.3	28.5	9.5		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.11%	100.00%	95.77%	95.00%	95.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-57** **PAGE 3**

REPORT DATE: **03/08/13**

DATE SAMPLED: **02/22/13** **DATE RECEIVED:** **02/23/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	02/26/13	02/26/13	02/26/13	02/26/13	02/26/13	02/28/13	02/25/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0082	<0.0010	<0.0002	0.034	0.205	0.308
DUPLICATE	<0.0003	0.0076	<0.0010	<0.0002	0.032	0.208	0.309
RPD	NC	7.59%	NC	NC	6.06%	1.45%	0.50%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0082	<0.0010	<0.0002	0.034	0.205	0.308
SPIKED SAMPLE	0.0483	0.0556	0.0465	0.0019	0.080	2.13	0.511
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	96.60%	94.80%	93.00%	95.00%	92.00%	96.25%	101.79%
QC CHECK							
FOUND	0.0542	0.0546	0.0531	0.0021	0.053	5.85	0.415
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	108.40%	109.20%	106.20%	105.00%	106.00%	101.04%	101.70%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-57** **PAGE 4**

REPORT DATE: **03/08/13**

DATE SAMPLED: **02/22/13** **DATE RECEIVED:** **02/23/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	02/25/13	02/25/13	02/25/13	02/25/13	02/25/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0480	0.0514	0.0487	0.0018	0.058
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	96.00%	102.80%	97.40%	90.00%	116.00%
QC CHECK					
FOUND	0.0505	0.0512	0.0542	0.0021	0.053
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	101.00%	102.40%	108.40%	105.00%	106.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HER078-57

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS185-IN	2-22-13	23:42	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS185-OUT	2-22-13	23:42	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DRANDEWEG / HEC		2-23-13 1600			2/23/12 KC

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-54**	**PAGE 1**	
REPORT DATE:	**03/13/13**		
DATE SAMPLED:	**02/22/13**	**DATE RECEIVED:**	**02/22/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Due to a large amount of suspended solids in sample RBS185-IN, the sample was not extracted in the one hour time frame. Although no Fecal Coliform bacteria were observed on the sample plates, there was observable growth of some other group(s) of organisms. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	NO DATA	NO DATA	<10
RBS185-OUT	<0.05	0.51	<10
QA-3	<0.05	0.49	<10

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-54**

REPORT DATE: **03/13/13**

DATE SAMPLED: **02/22/13** **DATE RECEIVED:** **02/22/13**

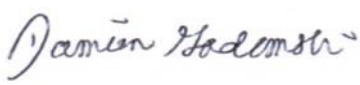
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	03/05/13	03/05/13	
DATE ANALYZED	03/07/13	03/07/13	02/22/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			QA-3
ORIGINAL			<10
DUPLICATE			<10
RPD	NA	NA	NC
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.52	1.04	
TRUE	0.50	1.00	
% RECOVERY	104.00%	104.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HERO78.54

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: DAN BENNETT		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	2-22-13	12:30	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	"	12:45	Stormwater grab 1-L amber	1	X	X	
RBS185-IN	"	1230	Stormwater grab 250-mL amber	1			X
RBS185-OUT	"	12:45	Stormwater grab 250-mL amber	1			X
QA-3	"	1300	grab 1L		X	X	
QA-3	"	1300	grab 250mL				X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME: 2.22.13 1500	RECEIVED BY (NAME/CO.): S. HARRISON HERRERA	SIGNATURE:	DATE/TIME: 2/22/13 1500

March 19, 2013

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-70**	**PAGE 1**	
REPORT DATE:	**04/02/13**		
DATE SAMPLED:	**03/19/13**	**DATE RECEIVED:**	**03/20/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS 185-IN	<0.05	0.33	205
RBS 185-OUT	<0.05	<0.10	23

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-70**

REPORT DATE: **04/02/13**

DATE SAMPLED: **03/19/13** **DATE RECEIVED:** **03/20/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	03/22/13	03/22/13	
DATE ANALYZED	03/26/13	03/26/13	03/20/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS 185-OUT
ORIGINAL			23
DUPLICATE			18
RPD	NA	NA	24.39%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.25	0.52	
TRUE	0.25	0.50	
% RECOVERY	100.00%	104.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERO78-70

HERRERA ENVIRONMENTAL CONSULTANTS

2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	3/19/13	23:00	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	3/19/13	23:15	Stormwater grab 1-L amber	1	X	X	
RBS185-IN	3/19/13	23:00	Stormwater grab 250-mL amber	1			X
RBS185-OUT	3/19/13	23:15	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Dan Bennett/Herrera		3/20/13 10:00		S. Nelson	3/20/13 1000

April 10, 2013

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-87**	**PAGE 1**	
REPORT DATE:	**04/22/13**		
DATE SAMPLED:	**04/10/13**	**DATE RECEIVED:**	**04/10/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.05	2.33	>10000
RBS185-OUT	<0.05	0.20	500

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-87**

REPORT DATE: **04/22/13**

DATE SAMPLED: **04/10/13** **DATE RECEIVED:** **04/10/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	04/11/13	04/11/13	
DATE ANALYZED	04/19/13	04/19/13	04/10/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			500
DUPLICATE			650
RPD	NA	NA	26.09%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.49	0.94	
TRUE	0.50	1.00	
% RECOVERY	98.00%	94.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERO78-87

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	4-10-13	10:15	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT		10:30	Stormwater grab 1-L amber	1	X	X	
RBS185-IN		10:15	Stormwater grab 250-mL amber	1			X
RBS185-OUT		10:30	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENNETT / HEC		4/10/13 1200	SAM IHSAN / ATL		4/10/13 1200

April 18, 2013

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER078-92**	**PAGE 1**	
REPORT DATE:	**05/03/13**		
DATE SAMPLED:	**04/19/13**	**DATE RECEIVED:**	**04/19/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.158	0.003	24.6	1.80	80	10	72
RBS185-OUT	1.07	0.936	45.1	2.09	4.5	<0.50	5.5

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0200	0.0047	<0.0002	0.121	1.15	0.790
RBS185-OUT	<0.0003	0.0058	<0.0010	<0.0002	<0.005	1.41	0.765

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0050	<0.0010	<0.0002	<0.005
RBS185-OUT	<0.0003	0.0040	<0.0010	<0.0002	<0.005

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-92** **PAGE 2**

REPORT DATE: **05/03/13**

DATE SAMPLED: **04/19/13** **DATE RECEIVED:** **04/19/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	04/24/13	04/19/13	05/02/13	04/29/13	04/25/13	04/25/13	04/25/13
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	RBS185-OUT	BATCH		
ORIGINAL	0.012	0.003	44.9	2.09	56		
DUPLICATE	0.012	0.003	46.1	2.15	60		
RPD	0.00%	0.00%	2.64%	2.83%	6.90%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	RBS185-OUT			
ORIGINAL	0.012	0.003	44.9	2.09			
SPIKED SAMPLE	0.062	0.024	64.9	11.4			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	100.00%	105.00%	100.00%	93.10%	NA	NA	NA
QC CHECK							
FOUND	0.090	0.032	39.5	28.7	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	100.00%	96.97%	98.75%	95.67%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER078-92** **PAGE 3**

REPORT DATE: **05/03/13**

DATE SAMPLED: **04/19/13** **DATE RECEIVED:** **04/19/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	04/25/13	04/25/13	04/25/13	04/25/13	04/25/13	04/26/13	04/19/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	BATCH	BATCH
ORIGINAL	<0.0003	0.0058	<0.0010	<0.0002	<0.005	1.98	<0.010
DUPLICATE	<0.0003	0.0055	<0.0010	<0.0002	<0.005	2.03	<0.010
RPD	NC	5.31%	NC	NC	NC	2.49%	NC
SPIKE SAMPLE							
SAMPLE ID	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	BATCH	BATCH
ORIGINAL	<0.0003	0.0058	<0.0010	<0.0002	<0.005	1.98	<0.010
SPIKED SAMPLE	0.0540	0.0557	0.0520	0.0017	0.056	4.06	0.213
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	108.00%	99.80%	104.00%	85.00%	112.00%	104.00%	106.50%
QC CHECK							
FOUND	0.0487	0.0525	0.0508	0.0019	0.053	6.19	0.416
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	97.40%	105.00%	101.60%	95.00%	106.00%	106.91%	101.96%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

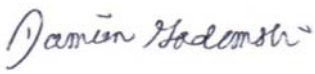
CASE FILE NUMBER: HER078-92 **PAGE 4**
REPORT DATE: 05/03/13
DATE SAMPLED: 04/19/13 **DATE RECEIVED:** 04/19/13
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	04/25/13	04/25/13	04/25/13	04/25/13	04/25/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT
ORIGINAL	<0.0003	0.0040	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	0.0041	<0.0010	<0.0002	<0.005
RPD	NC	2.47%	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT	RBS185-OUT
ORIGINAL	<0.0003	0.0040	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0585	0.0600	0.0553	0.0016	0.060
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	117.00%	112.00%	110.60%	80.00%	120.00%
QC CHECK					
FOUND	0.0487	0.0525	0.0508	0.0019	0.053
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	97.40%	105.00%	101.60%	95.00%	106.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HERO78.92

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8						
RBS185-IN	4-19-13	3:45	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-OUT	4-19-13	7:10	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.): DAN BENNETT HERC	SIGNATURE:	DATE/TIME: 4-19-13 13:30	RECEIVED BY (NAME/CO.): Olga Anciaryan	SIGNATURE:	DATE/TIME: 4-19-13 13:30

June 20, 2013

IEH - AQUATIC RESEARCH

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-17** **PAGE 1**

REPORT DATE: **07/26/13**

DATE SAMPLED: **06/21/13** **DATE RECEIVED:** **06/21/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.604	0.003	23.5	1.40	544	12	414
RBS185-OUT	1.52	1.28	28.1	1.88	64	5.7	64
RBS185-QA	0.624	0.003	23.8	1.56	504	16	390

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	0.0004	0.0412	0.0149	<0.0002	0.199	5.62	0.286
RBS185-OUT	<0.0003	0.0149	0.0030	<0.0002	0.021	2.93	0.759
RBS185-QA	0.0004	0.0455	0.0163	<0.0002	0.216	3.00	0.280

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0043	<0.0010	<0.0002	0.011
RBS185-OUT	<0.0003	0.0091	<0.0010	<0.0002	0.012
RBS185-QA	<0.0003	0.0041	<0.0010	<0.0002	0.012

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LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-17** **PAGE 2**
REPORT DATE: **07/26/13**
DATE SAMPLED: **06/21/13** **DATE RECEIVED:** **06/21/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	06/24/13	06/21/13	07/08/13	06/24/13	06/26/13	06/26/13	06/26/13
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.008	0.028	119	2.07	29		
DUPLICATE	0.008	0.028	115	2.01	30		
RPD	0.00%	0.00%	3.42%	2.94%	3.39%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH		BATCH			
ORIGINAL	0.008	0.028		2.07			
SPIKED SAMPLE	0.061	0.048		11.4			
SPIKE ADDED	0.050	0.020		10.0			
% RECOVERY	106.00%	100.00%	NA	93.30%	NA	NA	NA
QC CHECK							
FOUND	0.090	0.033	39.9	28.5	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	100.00%	100.00%	99.75%	95.00%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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CASE FILE NUMBER: **HER079-17** **PAGE 3**

REPORT DATE: **07/26/13**

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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13	07/10/13	06/21/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-QA	RBS185-QA
ORIGINAL	<0.0003	0.0050	0.0011	<0.0002	0.025	3.00	0.280
DUPLICATE	<0.0003	0.0051	0.0011	<0.0002	0.025	3.21	0.282
RPD	NC	1.98%	0.00%	NC	0.00%	6.76%	0.71%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-QA	RBS185-QA
ORIGINAL	<0.0003	0.0050	0.0011	<0.0002	0.025	3.00	0.280
SPIKED SAMPLE	0.0482	0.0544	0.0469	0.0016	0.075	5.10	0.473
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	96.40%	98.80%	91.60%	80.00%	100.00%	105.00%	96.50%
QC CHECK							
FOUND	0.0478	0.0497	0.0475	0.0018	0.048	6.08	0.415
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	95.60%	99.40%	95.00%	90.00%	96.00%	105.01%	101.72%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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CASE FILE NUMBER: HER079-17 **PAGE 4**
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DATE SAMPLED: 06/21/13 **DATE RECEIVED:** 06/21/13
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0014	<0.0010	<0.0002	0.010
DUPLICATE	<0.0003	0.0015	<0.0010	<0.0002	0.010
RPD	NC	6.90%	NC	NC	0.00%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0014	<0.0010	<0.0002	0.010
SPIKED SAMPLE	0.0437	0.0466	0.0417	0.0016	0.057
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	87.40%	90.40%	83.40%	80.00%	94.00%
QC CHECK					
FOUND	0.0478	0.0497	0.0475	0.0018	0.048
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	95.60%	99.40%	95.00%	90.00%	96.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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SUBMITTED BY:

Damien Gadomski
Project Manager

HERO79.17

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2

LAB USE:

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8						
RBS185-IN			Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-OUT			Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS-185-QA			•1		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y						

Notes: Use churn-splitter to apportion composite sample into smaller bottles. Hand to create QA duplicate from RBS185-IN.
Hold until I call about Analysis that has A.M.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENNETT HEC		6-21-13 9:10	Olga Anataryan		6-21-13 9:00

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER079-14**	**PAGE 1**	
REPORT DATE:	**07/26/13**		
DATE SAMPLED:	**06/20/13**	**DATE RECEIVED:**	**06/20/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185 IN	2.79	2.86	1400
RBS185 OUT	0.14	<0.19	59
RBS185 QA	<0.11	<0.16	64

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CASE FILE NUMBER: **HER079-14** **PAGE 2**
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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	06/24/13	06/24/13	
DATE ANALYZED	07/10/13	07/10/13	06/21/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS185 QA
ORIGINAL			64
DUPLICATE			68
RPD	NA	NA	6.06%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.27	0.50	
TRUE	0.25	0.50	
% RECOVERY	108.00%	100.00%	NA
BLANK	<0.05	<0.10	< 2

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HER079.14

Aquatic Research Incorporated

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715

CHAIN-OF-CUSTODY RECORD

SHEET 1 OF 1

CLIENT: Herrera

PROJECT ID: 09-04540-000

SAMPLING DATE: 6/20/13

CASE FILE NO.:

SAMPLERS: D. Bennett D. Ahearn

DATA RECORDED BY: D. Ahearn

SAMPLE INFORMATION

SAMPLE ID	DATE/TIME COLLECTED	PARAMETERS: TPH	Fecal Coliform	BOTT #	NOTES
RBS 185 IN	6/20/13 14:15	X	X	2	
RBS 185 OUT	6/20/13 14:16	X	X	2	
RBS 185 QA	6/20/13 14:10	X	X	2	

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name	Dylan Ahearn	6/20/13 15:00	SCHLEGEL	6/20/13
Signature				1500
Affiliation	Herrera		ARI	

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name				
Signature				
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.):

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Aquatic Research, Inc
Damien Gadomski
3927 Aurora Ave. N
Seattle, Washington 98103

RE: HERO79.18
Lab ID: 1306177

July 10, 2013

Attention Damien Gadomski:

Fremont Analytical, Inc. received 2 sample(s) on 6/25/2013 for the analyses presented in the following report.

Herbicides by EPA Method 8151A

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Michael Dee
Sr. Chemist / Principal

Date: *07/10/2013*

CLIENT: Aquatic Research, Inc
Project: HERO79.18
Lab Order: 1306177

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1306177-001	RBS185-IN	06/20/2013 7:50 PM	06/25/2013 10:20 AM
1306177-002	RBS185-OUT	06/20/2013 7:00 PM	06/25/2013 10:20 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1306177**
Date: **7/10/2013**

CLIENT: Aquatic Research, Inc
Project: HERO79.18

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Analytical Report

WO#: **1306177**
Date Reported: **7/10/2013**

Client: Aquatic Research, Inc
Collection Date: 6/20/2013 7:50:00 PM
Project: HERO79.18
Lab ID: 1306177-001
Matrix: Water
Client Sample ID: RBS185-IN

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Herbicides by EPA Method 8151A				Batch ID: 4956		Analyst: MD
Dicamba	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
2,4-D	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
2,4-DP	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
2,4,5-TP (Silvex)	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
2,4,5-T	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
Dinoseb	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
Dalapon	ND	0.500		µg/L	1	7/10/2013 4:31:10 PM
2,4-DB	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
MCPP	ND	8.00		µg/L	1	7/10/2013 4:31:10 PM
MCPA	ND	8.00		µg/L	1	7/10/2013 4:31:10 PM
Surr: 2,4-Dichlorophenylacetic acid	107	50-135		%REC	1	7/10/2013 4:31:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1306177**
Date Reported: **7/10/2013**

Client: Aquatic Research, Inc
Collection Date: 6/20/2013 7:00:00 PM
Project: HERO79.18
Lab ID: 1306177-002
Matrix: Water
Client Sample ID: RBS185-OUT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Herbicides by EPA Method 8151A				Batch ID: 4956		Analyst: MD
Dicamba	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
2,4-D	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
2,4-DP	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
2,4,5-TP (Silvex)	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
2,4,5-T	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
Dinoseb	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
Dalapon	ND	0.500		µg/L	1	7/10/2013 4:31:10 PM
2,4-DB	ND	0.400		µg/L	1	7/10/2013 4:31:10 PM
MCPP	ND	8.00		µg/L	1	7/10/2013 4:31:10 PM
MCPA	ND	8.00		µg/L	1	7/10/2013 4:31:10 PM
Surr: 2,4-Dichlorophenylacetic acid	124	50-135		%REC	1	7/10/2013 4:31:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: *7/10/2013*

Work Order: 1306177
CLIENT: Aquatic Research, Inc
Project: HERO79.18

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID: **MB-4956** SampType: **MBLK** Units: **µg/L** Prep Date: **6/27/2013** RunNo: **9178**
Client ID: **MBLKW** Batch ID: **4956** Analysis Date: **7/10/2013** SeqNo: **184495**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	ND	0.400									
2,4-D	ND	0.400									
2,4-DP	ND	0.400									
2,4,5-TP (Silvex)	ND	0.400									
2,4,5-T	ND	0.400									
Dinoseb	ND	0.400									
Dalapon	ND	0.500									
2,4-DB	ND	0.400									
MCPP	ND	8.00									
MCPA	ND	8.00									
Surr: 2,4-Dichlorophenylacetic acid	5.28		4.000		132	50	135				

Sample ID: **LCS-4956** SampType: **LCS** Units: **µg/L** Prep Date: **6/27/2013** RunNo: **9178**
Client ID: **LCSW** Batch ID: **4956** Analysis Date: **7/10/2013** SeqNo: **184496**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	3.87	0.400	4.000	0	96.8	50	150				
2,4,5-T	4.72	0.400	4.000	0	118	50	150				
Dalapon	3.87	0.500	4.000	0	96.8	50	150				
2,4-DB	2.86	0.400	4.000	0	71.6	50	150				
MCPP	20.3	8.00	20.00	0	102	50	150				
MCPA	17.3	8.00	20.00	0	86.4	50	150				
Surr: 2,4-Dichlorophenylacetic acid	3.31		4.000		82.7	50	135				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Work Order: 1306177
CLIENT: Aquatic Research, Inc
Project: HERO79.18

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID: **1306177-001ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **6/27/2013** RunNo: **9178**
Client ID: **RBS185-IN** Batch ID: **4956** Analysis Date: **7/10/2013** SeqNo: **184498**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	ND	0.400						0	0	50	
2,4-D	ND	0.400						0	0	50	
2,4-DP	ND	0.400						0	0	50	
2,4,5-TP (Silvex)	ND	0.400						0	0	50	
2,4,5-T	ND	0.400						0	0	50	
Dinoseb	ND	0.400						0	0	50	
Dalapon	ND	0.500						0	0	50	
2,4-DB	ND	0.400						0	0	50	
MCPP	ND	8.00						0	0	50	
MCPA	ND	8.00						0	0	50	
Surr: 2,4-Dichlorophenylacetic acid	3.02		4.000		75.4	50	135		0		

Sample ID: **1306177-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **6/27/2013** RunNo: **9178**
Client ID: **RBS185-IN** Batch ID: **4956** Analysis Date: **7/10/2013** SeqNo: **184499**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	4.49	0.400	4.000	0	112	50	150				
2,4,5-T	3.74	0.400	4.000	0	93.4	50	150				
Dalapon	2.83	0.500	4.000	0	70.7	50	150				
2,4-DB	3.75	0.400	4.000	0	93.8	50	150				
MCPP	16.7	8.00	20.00	0	83.5	50	150				
MCPA	19.9	8.00	20.00	0	99.6	50	150				
Surr: 2,4-Dichlorophenylacetic acid	4.68		4.000		117	50	135				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name: **AQUATIC**	Work Order Number: **1306177**
Logged by: **Chelsea Ward**	Date Received: **6/25/2013 10:20:00 AM**

Chain of Custody

1.	Were custodial seals present?	Yes	☐	No	☐	Not Required	☑
2.	Is Chain of Custody complete?	Yes	☑	No	☐	Not Present	☐
3.	How was the sample delivered?	Client					

Log In

4.	Coolers are present?	Yes	☐	No	☑	NA	☐
	Sample received at appropriate temperature.						
5.	Was an attempt made to cool the samples?	Yes	☑	No	☐	NA	☐
6.	Were all coolers received at a temperature of >0° C to 10.0°C	Yes	☑	No	☐	NA	☐
7.	Sample(s) in proper container(s)?	Yes	☑	No	☐		
8.	Sufficient sample volume for indicated test(s)?	Yes	☑	No	☐		
9.	Are samples properly preserved?	Yes	☑	No	☐		
10.	Was preservative added to bottles?	Yes	☐	No	☑	NA	☐
11.	Is there headspace present in VOA vials?	Yes	☑	No	☐	NA	☐
12.	Did all sample containers arrive in good condition?(unbroken)	Yes	☑	No	☐		
13.	Does paperwork match bottle labels?	Yes	☑	No	☐		
14.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No	☐		
15.	Is it clear what analyses were requested?	Yes	☑	No	☐		
16.	Were all holding times able to be met?	Yes	☑	No	☐		

Special Handling (if applicable)

17.	Was client notified of all discrepancies with this order?	Yes	☐	No	☐	NA	☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

18. Additional remarks/Disrepancies

Item Information

Item #	Temp ºC	Condition
Sample	9.6	Good

Aquatic Research Incorporated

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715

1300177

CHAIN-OF-CUSTODY RECORD

SHEET 1 OF 1

CLIENT: AQUATIC RESEARCH

PROJECT ID: HER079.18

SAMPLING DATE: 6/20/13

CASE FILE NO.:

SAMPLERS:

DATA RECORDED BY:

SAMPLE INFORMATION

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	EPH 8151M	BOTT #	NOTES
RBS185 - IN	6/20/13 1950	X	2	
RBS185 - OUT	1700	X	1	

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name	SCHLEGEL	6/25/13		6/25/13 10:20
Signature				
Affiliation	HWE			

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name				
Signature				
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.):

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER079-18**	**PAGE 1**	
REPORT DATE:	**08/07/13**		
DATE SAMPLED:	**06/20/13**	**DATE RECEIVED:**	**06/21/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	TOTAL METALS						
SAMPLE ID	ANTIMONY (mg/L)	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CADMIUM (mg/L)	COPPER (mg/L)	CHROMIUM (mg/L)	LEAD (mg/l)
RBS185-IN	<0.0010	<0.0010	<0.0010	<0.0003	0.0047	0.0022	<0.0010
RBS185-OUT	<0.0010	0.0057	<0.0010	<0.0003	0.0130	0.0034	0.0021

	TOTAL METALS						DISS METALS
SAMPLE ID	MERCURY (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)	ZINC (mg/L)	ANTIMONY (mg/L)
RBS185-IN	<0.0002	<0.005	<0.005	<0.0010	<0.0010	0.017	<0.0010
RBS185-OUT	<0.0002	0.005	<0.005	<0.0010	<0.0010	0.012	<0.0010

	DISSOLVED METALS						
SAMPLE ID	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CHROMIUM (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)
RBS185-IN	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010
RBS185-OUT	0.0049	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-18** **PAGE 2**
REPORT DATE: **08/07/13**
DATE SAMPLED: **06/20/13** **DATE RECEIVED:** **06/21/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	ANTIMONY (mg/L)	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CADMIUM (mg/L)	COPPER (mg/L)	CHROMIUM (mg/L)	LEAD (mg/l)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13
DETECTION LIMIT	0.0010	0.0010	0.0010	0.0003	0.0010	0.0010	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0010	<0.0010	<0.0010	<0.0003	0.0050	0.0023	0.0011
DUPLICATE	<0.0010	<0.0010	<0.0010	<0.0003	0.0051	0.0024	0.0011
RPD	NC	NC	NC	NC	1.98%	4.26%	0.00%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0010	<0.0010	<0.0010	<0.0003	0.0050	0.0023	0.0011
SPIKED SAMPLE	0.0463	0.0471	0.0509	0.0482	0.0544	0.0461	0.0469
SPIKE ADDED	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
% RECOVERY	92.60%	94.20%	101.80%	96.40%	98.80%	87.60%	91.60%
QC CHECK							
FOUND	0.0479	0.0491	0.0492	0.0472	0.0519	0.0487	0.0486
TRUE	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
% RECOVERY	95.80%	98.20%	98.40%	94.40%	103.80%	97.40%	97.20%
BLANK	<0.0010	<0.0010	<0.0010	<0.0003	<0.0010	<0.0010	<0.0010

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-18** **PAGE 3**
REPORT DATE: **08/07/13**
DATE SAMPLED: **06/20/13** **DATE RECEIVED:** **06/21/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						DISS METALS
QC PARAMETER	MERCURY (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)	ZINC (mg/L)	ANTIMONY (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13
DETECTION LIMIT	0.0002	0.005	0.005	0.0010	0.0010	0.005	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0002	<0.005	<0.005	<0.0010	<0.0010	0.025	<0.0010
DUPLICATE	<0.0002	<0.005	<0.005	<0.0010	<0.0010	0.025	<0.0010
RPD	NC	NC	NC	NC	NC	0.00%	NC
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0002	<0.005	<0.005	<0.0010	<0.0010	0.025	<0.0010
SPIKED SAMPLE	0.0016	0.045	0.047	0.0234	0.0485	0.075	0.0493
SPIKE ADDED	0.0020	0.050	0.050	0.0250	0.0500	0.050	0.0500
% RECOVERY	80.50%	90.00%	94.00%	93.60%	97.00%	100.00%	98.60%
QC CHECK							
FOUND	0.0018	0.049	0.049	0.0248	0.0470	0.049	0.0490
TRUE	0.0020	0.050	0.050	0.0250	0.0500	0.050	0.0500
% RECOVERY	90.00%	98.00%	98.00%	99.20%	94.00%	98.00%	98.00%
BLANK	<0.0002	<0.005	<0.005	<0.0010	<0.0010	<0.005	<0.0010

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LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-18** **PAGE 4**
REPORT DATE: **08/07/13**
DATE SAMPLED: **06/20/13** **DATE RECEIVED:** **06/21/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS						
QC PARAMETER	ARSENIC (mg/L)	BERYLLIUM (mg/L)	CHROMIUM (mg/L)	NICKEL (mg/L)	SELENIUM (mg/L)	SILVER (mg/L)	THALLIUM (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13	06/26/13
DETECTION LIMIT	0.0010	0.0010	0.0010	0.005	0.005	0.0010	0.0010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010
DUPLICATE	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010
RPD	NC	NC	NC	NC	NC	NC	NC
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010
SPIKED SAMPLE	0.0428	0.0460	0.0474	0.040	0.044	0.0185	0.0411
SPIKE ADDED	0.0500	0.0500	0.0500	0.050	0.050	0.0250	0.0500
% RECOVERY	85.60%	92.00%	94.80%	80.00%	88.00%	74.00%	82.20%
QC CHECK							
FOUND	0.0491	0.0492	0.0487	0.049	0.049	0.0248	0.0470
TRUE	0.0500	0.0500	0.0500	0.050	0.050	0.0250	0.0500
% RECOVERY	98.20%	98.40%	97.40%	98.00%	98.00%	99.20%	94.00%
BLANK	<0.0010	<0.0010	<0.0010	<0.005	<0.005	<0.0010	<0.0010

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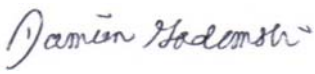
SUBMITTED BY:



Damien Gadomski
Project Manager

Aquatic Research, Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

ORGANOCHLORINE PESTICIDES REPORT

Results of Analysis by EPA Method 8081B

Measurement of Organochlorine Pesticides by GC/ECD/ECD

Case File Number:	HER07918A1	**Matrix:**	Water
Sample ID No.:	RBS185-IN	**Sample Vol. (ml)**	1000
Date Collected:	6/20/2013	**Dilution Factor:**	1
Date Received:	6/21/2013	**Final Volume:**	10.0
Date Extracted:	6/25/2013	**Prep Analyst:**	TM
Date Analyzed	7/2/2013	**Analyst:**	JDS
Date of Report:	7/3/2013	**Supervisor's Initials:**	DG

Chlorinated Pesticides

Parameter	Result ug/L	UCL ug/L	RL ug/L	Parameter	Result ug/L	UCL ug/L	RL ug/L
Aldrin	< 1.0	< 1.0	1.0	Dieldrin	< 1.0	< 1.0	1.0
a-BHC	< 1.0	< 1.0	1.0	Endosulfan I	< 1.0	< 1.0	1.0
b-BHC	< 1.0	< 1.0	1.0	Endosulfan II	< 1.0	< 1.0	1.0
g-BHC (Lindane)	< 1.0	< 1.0	1.0	Eudosulfan Sulfate	< 1.0	< 1.0	1.0
d-BHC	< 1.0	< 1.0	1.0	Endrin	< 1.0	< 1.0	1.0
a-chlordane	< 1.0	< 1.0	1.0	Endrin Aldehyde	< 1.0	< 1.0	1.0
y-chlordane	< 1.0	< 1.0	1.0	Endrin Ketone	< 1.0	< 1.0	1.0
p,p'-DDD	< 1.0	< 1.0	1.0	Heptachlor	< 1.0	< 1.0	1.0
p,p'-DDE	< 1.0	< 1.0	1.0	Heptachlor epoxide	< 1.0	< 1.0	1.0
p,p'-DDT	< 1.0	< 1.0	1.0	Methoxychlor	< 1.0	< 1.0	1.0

Surrogate Compounds

Parameter	% Rec.	LCL	UCL	Parameter	% Rec.	LCL	UCL
Decachlorobiphenyl (DCB)	117%	70%	130%				

MCL: Maximum Contaminant Level
RL: Reporting Limit
LCL: Lower Control Limit
UCL: Upper Control Limit

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VOC FORTIFIED BLANK REPORT

Results of Analysis by EPA Method 524.2

Measurement of Purgeable Organic Compounds by Capillary Column Gas Chromatography/Mass Spectrometry

Case File Number:	V14P11S2	**Matrix:**	Water
Sample ID No.:	CCC	**Sample Vol. (ml)**	5.0
Date Collected:	N/A	**Dilution Factor:**	1
Date Received:	N/A		
Date Analyzed	6/27/2013	**Analyst:**	JDS
Date of Report:	6/28/2013	**Supervisor's Initials:**	

Regulated Volatile Organic Compounds

Parameter	Result ug/L	LCL ug/L	UCL ug/L	Parameter	Result ug/L	LCL ug/L	UCL ug/L
Benzene	5.3	3.5	6.5	Ethylbenzene	4.9	3.5	6.5
Dibromochloromethane	4.2	3.5	6.5	Methyl-t-Butyl Ether	< 0.4	< 0.4	< 0.4
Bromodichloromethane	4.0	3.5	6.5	Chlorobenzene	4.9	3.5	6.5
Bromoform	4.9	3.5	6.5	Styrene	4.4	3.5	6.5
Carbon tetrachloride	5.3	3.5	6.5	1,1,2,2-Tetrachloroethane	4.2	3.5	6.5
Chloroform	4.0	3.5	6.5	Tetrachloroethene	5.6	3.5	6.5
1,2-Dichlorobenzene	5.0	3.5	6.5	Toluene	4.8	3.5	6.5
1,4-Dichlorobenzene	5.2	3.5	6.5	1,2,4-Trichlorobenzene	4.8	3.5	6.5
1,1-Dichloroethane	5.0	3.5	6.5	1,1,1-Trichloroethane	5.4	3.5	6.5
1,2-Dichloroethane	5.1	3.5	6.5	1,1,2-Trichloroethane	5.4	3.5	6.5
1,1-Dichloroethene	5.7	3.5	6.5	1,1,2-Trichloro-1,2,2-Trifluoroethane	< 0.4	< 0.4	< 0.4
cis-1,2-Dichloroethene	5.5	3.5	6.5				
trans-1,2-Dichloroethene	5.3	3.5	6.5	Trichloroethene	5.6	3.5	6.5
Dichloromethane	5.9	3.5	6.5	Trichlorofluoromethane	< 0.4	< 0.4	< 0.4
1,2-Dichloropropane	5.1	3.5	6.5	Vinyl chloride	< 0.4	< 0.4	< 0.4
cis-1,3-Dichloropropene	4.4	3.5	6.5	p/m-Xylene	11.1	7.0	13
trans-1,3-Dichloropropene	4.0	3.5	6.5	o-Xylene	5.2	3.5	6.5

Calculated Results

Parameter	Result ug/L	LCL ug/L	UCL ug/L	Parameter	Result ug/L	LCL ug/L	UCL ug/L
Total 1,3-Dichloropropane	8.4	7.0	13.0	Total Xylenes	16.3	10.5	19.5
Total Trihalomethanes	17.2	14.0	26.0				

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VOC FORTIFIED BLANK REPORT

Results of Analysis by EPA Method 524.2

Measurement of Purgeable Organic Compounds by Capillary Column Gas Chromatography/Mass Spectrometry

Case File Number:	V14P11S2	**Matrix:**	Water
Sample ID No.:	CCC	**Sample Vol. (ml)**	5.0
Date Collected:	N/A	**Dilution Factor:**	1
Date Received:	N/A		
Date Analyzed	6/27/2013	**Analyst:**	JDS
Date of Report:	6/28/2013	**Supervisor's Initials:**	

Unregulated Volatile Organic Compounds

Parameter	Result ug/L	LCL ug/L	UCL ug/L	Parameter	Result ug/L	LCL ug/L	UCL ug/L
1,1,1,2-Tetrachloroethane	4.7	3.5	6.5	tert-Butylbenzene	5.3	3.5	6.5
1,1-Dichloropropene	5.4	3.5	6.5	Bromomethane	< 0.4	< 0.4	< 0.4
1,2,3-Trichlorobenzene	4.7	3.5	6.5	Chloroethane	< 0.4	< 0.4	< 0.4
1,2,3-Trichloropropane	4.9	3.5	6.5	Chloromethane	< 0.4	< 0.4	< 0.4
1,2,4-Trimethylbenzene	5.1	3.5	6.5	Dibromomethane	5.7	3.5	6.5
1,3,5-Trimethylbenzene	5.4	3.5	6.5	Dichlorodifluoromethane	< 0.4	< 0.4	< 0.4
1,3-Dichlorobenzene	5.2	3.5	6.5	Hexachlorobutadiene	5.4	3.5	6.5
1,3-Dichloropropane	4.9	3.5	6.5	Isopropylbenzene	5.4	3.5	6.5
2,2-Dichloropropane	4.6	3.5	6.5	Naphthalene	3.6	2.5	6.5
2-Chlorotoluene	4.7	3.5	6.5	n-Butylbenzene	5.1	3.5	6.5
4-Chlorotoluene	5.0	3.5	6.5	n-Propylbenzene	5.0	3.5	6.5
Bromobenzene	4.8	3.5	6.5	4-Isopropyltoluene	5.3	3.5	6.5
Bromochloromethane	4.6	3.5	6.5	sec-Butylbenzene	5.6	3.5	6.5

Surrogate Compounds

Parameter	% Rec.	LCL	UCL	Parameter	% Rec.	LCL	UCL
1,2-Dichlorobenzene-d4	100%	70%	130%	4-Bromofluorobenzene	106%	70%	130%

LCL: Lower Control Limit

UCL: Upper Control Limit

Aquatic Research Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	**6/25/13-MB**	Matrix:	Water
Sample ID No.:	**Method Blank**	Sample Vol. (ml)	**1000**
Date Collected:	**n/a**	Final Volume (ml)	**2.0**
Date Received:	**n/a**	Dilution Factor:	**1**
Date Extracted:	**06/25/13**		
Date Analyzed	**07/03/13**	Analyst:	**T. Meadows**
Date of Report:	**07/11/13**	Supervisor's Initials:	
Data File Path:	**D:\5975 Data\PAM\2013\070213\ 01401013.D**		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
55-18-5	N-nitrosodiethylamine	0.80	U	86-73-7	Fluorene	0.80	U
76-01-7	Pentachloroethane	0.80	U	84-66-2	Diethyl phthalate	0.80	U
62-53-3	Aniline	0.80	U	100-01-6	4-Nitroaniline	0.80	U
108-95-2	Phenol	0.80	U	7005-72-3	4-Chlorophenyl phenyl ether	0.80	U
111-44-4	Bis(2-chloroethyl) ether	0.80	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.80	U
95-57-8	2-Chlorophenol	0.80	U	86-30-6	N-Nitrosodiphenyl amine	0.80	U
541-73-1	1,3-Dichlorobenzene	0.80	U	103-33-3	Azobenzene	0.80	U
106-46-7	1,4-Dichlorobenzene	0.80	U	101-55-3	4-Bromophenyl phenyl ether	0.80	U
95-50-1	1,2-Dichlorobenzene	0.80	U	319-84-6	a-BHC	0.80	U
100-51-6	Benzyl Alcohol	0.80	U	118-74-1	Hexachlorobenzene	0.80	U
95-48-7	2-Methyl phenol	0.80	U	319-85-7	b-BHC	0.80	U
108-60-1	Bis(2-chloroisopropyl) ether	0.80	U	87-86-5	Pentachlorophenol	0.80	U
98-86-2	Acetophenone	0.80	U	58-89-9	g-BHC (Lindane)	0.80	U
67-72-1	Hexachloroethane	0.80	U	85-01-8	Phenanthrene	0.80	U
621-64-7	N-Nitroso-n-propyl amine	0.80	U	120-12-7	Anthracene	0.80	U
106-44-5	4-Methyl phenol	0.80	U	319-86-8	d-BHC	0.80	U
98-95-3	Nitrobenzene	0.80	U	84-74-2	Di-n-butyl phthalate	0.80	U
100-75-4	N-nitrosopiperidine	0.80	U	76-44-8	Heptachlor	0.80	U
78-59-1	Isophorone	0.80	U	309-00-2	Aldrin	0.80	U
88-75-5	2-Nitrophenol	0.80	U	1024-57-3	Heptachlor epoxide	0.80	U
105-67-9	2,4-Dimethylphenol	0.80	U	206-44-0	Fluoranthrene	0.80	U
65-85-0	Benzoic Acid	0.80	U	129-00-0	Pyrene	0.80	U
111-91-1	Bis(2-chloroethoxy) methane	0.80	U	959-98-8	Endosulfan I	0.80	U
120-83-2	2,4-Dichlorophenol	0.80	U	92-87-5	Benzidine	0.80	U
120-82-1	1,2,4-Trichlorobenzene	0.80	U	72-55-9	4,4'-DDE	0.80	U
91-20-3	Naphthalene	0.80	U	60-57-1	Dieldrin	0.80	U
106-47-8	4-Chloroaniline	0.80	U	72-20-8	Endrin	0.80	U
87-68-3	Hexachlorobutadiene	0.80	U	33213-65-	Endosulfan II	0.80	U
924-16-3	N-nitrosodi-n-butylamine	0.80	U	72-54-8	4,4'-DDD	0.80	U
59-50-7	4-Chloro-3-methyl phenol	0.80	U	7421-92-4	Endrin aldehyde	0.80	U
91-57-6	2-Methyl naphthalene	0.80	U	85-68-7	Butyl benzenyl phthalate	0.80	U
95-94-3	1,2,4,5-Tetrachlorobenzene	0.80	U	1031-07-8	Endosulfan sulfate	0.80	U
77-47-4	Hexachlorocylcopentadiene	0.80	U	50-29-3	4,4'-DDT	0.80	U
88-06-2	2,4,6-Trichlorophenol	0.80	U	56-55-3	Benzo(a)anthracene	0.80	U
95-95-4	2,4,5-Trichlorophenol	0.80	U	218-01-9	Chrysene	0.80	U
91-58-7	2-Chloronaphthalene	0.80	U	91-94-1	3,3'-Dichlorobenzidine	0.80	U
88-74-4	2-Nitroaniline	0.80	U	72-43-5	Methoxychlor	0.80	U
131-11-3	Dimethyl phthalate	0.80	U	117-81-7	Bis(2-ethylhexyl) phthalate	0.80	U
208-96-8	Acenaphthylene	0.80	U	117-84-0	Di-n-octyl phthalate	0.80	U
606-20-2	2,6-Dinitrotoluene	0.80	U	205-97-2	Benzo(b)fluoranthrene	0.80	U
99-09-2	3-Nitroaniline	0.80	U	207-08-9	Benzo(k)fluoranthrene	0.80	U

Aquatic Research Inc.
3927 Aurora Ave. N. , Seattle, WA 98103 | (206) 632-2715

SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	**6/25/13-MB**	Matrix:	Water
Sample ID No.:	**Method Blank**	Sample Vol. (ml)	**1000**
Date Collected:	**n/a**	Final Volume (ml)	**2.0**
Date Received:	**n/a**	Dilution Factor:	**1**
Date Extracted:	**06/25/13**		
Date Analyzed	**07/03/13**	Analyst:	**T. Meadows**
Date of Report:	**07/11/13**	Supervisor's Initials:	
Data File Path:	**D:\5975 Data\PAM\2013\070213\ 01401013.D**		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
83-32-9	Acenaphthene	0.80	U	50-32-8	Benzo(a)pyrene	0.80	U
51-28-5	2,4-Dinitrophenol	0.80	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.80	U
132-64-9	Dibenzofuran	0.80	U	53-70-3	Dibenzo(a,h)anthracene	0.80	U
100-02-7	4-Nitrophenol	0.80	U	91-24-2	Benzo(g,h,i)perlyene	0.80	U
121-14+2	2,4-Dinitrotoluene	0.80	U				
58-90-2	2,3,4,6-Tetrachlorophenol	0.80	U				

FLAGS:

U	Indicates compound was analyzed for, but not detected at the specified detection limit.
B	Blank contaminated with this analyte.
J	Estimated value - compound positively identified, but below specified detection limit.
E	Estimated value - compound exceeded calibration range.
D	Compound analyzed at a secondary dilution factor of _____ from data file: _____
PP	Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tenatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc.

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

		QC limits	
Surrogate Recoveries	%Rec.	**Water**	**Soil**
2-Fluorophenol	87%	24-132%	65-135%
Phenol-d5	28%	0-105%	65-135%
Nitrobenzene-d5	63%	24-136%	65-135%
2-Fluorobiphenyl	44%	41-134%	65-135%
2,4,6-Tribromophenol	26%	0-183%	65-135%
p-Terphenyl-d14	70%	80-141%	65-135%

HER079.18

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:

LAB USE:

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Fecal coliform bacteria - SM 9222D [a]	TPH (diesel) - NWTPH-Dx [b]	TPH (motor oil) - NWTPH-Dx [b]	Semivolatile organic compounds - EPA 8270D [c]	Volatile organic compounds - EPA 524.2 [d]	Polycyclic aromatic hydrocarbons - EPA 8270 [e]	Polychlorinated biphenyls - EPA 8082 [f]	Chlorinated pesticides - EPA 8081 [g]	Chlorinated herbicides - EPA 8151A [h]	Dissolved Metals: (Sb, As, Be, Cr, Ni, Se, Ag, Tl) - EPA 200.8 [i]	Total Metals: (Cd, Cu, Pb, Hg, Zn, Sb, As, Be, Cr, Ni, Se, Ag, Tl) - EPA 200.8 [i]					
~~RBS185-OUT~~	~~6-7-13~~	~~1900~~	~~250 mL glass bottle[a], 1-L glass bottle[b]~~	~~2~~	~~X~~	~~X~~	~~X~~	~~X~~												
RBS185-IN		1950	3x40 mL vials[d]	3					X											
RBS185-OUT		1900	3x40 mL vials[d]	3					X											
RBS185-IN		1950	1-L glass bottle[c/c, f/g, h]	5				X		X	X	X	X							
RBS185-OUT		1900	1-L glass bottle[c/c, f/g, h]	3				X		X	X	X	X							
RBS185-IN		1950	250 mL HDPE bottle[i]	1										X	X					
RBS185-OUT		1900	250 mL HDPE bottle[i]	1										X	X					

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENNETT		6-21-13 845	Olga Anaiaryan		6-21-13 8:45

August 29, 2013

IEH - AQUATIC RESEARCH

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-25** **PAGE 1**

REPORT DATE: **10/10/13**

DATE SAMPLED: **08/29/13** **DATE RECEIVED:** **08/30/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.110	0.004	20.7	1.37	89	3.2	75
RBS185-OUT	1.37	1.36	42.2	7.94	18	<0.50	15
RBS185-QA	1.41	1.38	45.0	7.58	15	<0.50	18

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0200	0.0041	<0.0002	0.098	1.49	0.139
RBS185-OUT	<0.0003	0.0216	0.0012	<0.0002	0.012	3.69	0.597
RBS185-QA	<0.0003	0.0208	0.0012	<0.0002	0.011	3.63	0.589

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0075	<0.0010	<0.0002	0.023
RBS185-OUT	<0.0003	0.0157	<0.0010	<0.0002	0.010
RBS185-QA	<0.0003	0.0160	<0.0010	<0.0002	0.009

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-25** **PAGE 2**
REPORT DATE: **10/10/13**
DATE SAMPLED: **08/29/13** **DATE RECEIVED:** **08/30/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	09/16/13	08/30/13	09/17/13	09/24/13	09/05/13	09/14/13	09/14/13
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.455	0.018	29.3	2.44	32		
DUPLICATE	0.431	0.018	30.1	2.35	36		
RPD	5.41%	2.32%	2.69%	4.08%	11.76%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.455	0.018	29.3	2.44			
SPIKED SAMPLE	0.502	0.039	48.5	11.8			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	93.39%	104.45%	96.00%	93.84%	NA	NA	NA
QC CHECK							
FOUND	0.092	0.033	38.3	28.4	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.89%	98.97%	95.75%	94.82%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-25** **PAGE 3**
REPORT DATE: **10/10/13**
DATE SAMPLED: **08/29/13** **DATE RECEIVED:** **08/30/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	09/10/13	09/10/13	09/10/13	09/10/13	09/10/13	09/18/13	08/30/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0004	0.0295	0.0158	<0.0002	0.176	2.81	0.040
DUPLICATE	0.0004	0.0293	0.0151	<0.0002	0.176	2.77	0.039
RPD	0.00%	0.68%	4.53%	NC	0.00%	1.35%	1.80%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	0.0004	0.0295	0.0158	<0.0002	0.176	2.81	0.040
SPIKED SAMPLE	0.0549	0.0871	0.0703	0.0021	0.232	4.78	0.254
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	109.00%	115.20%	109.00%	105.00%	112.00%	98.55%	107.24%
QC CHECK							
FOUND	0.0482	0.0476	0.0513	0.0020	0.046	5.69	0.402
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	96.40%	95.20%	102.60%	100.00%	92.00%	98.19%	98.46%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-25** **PAGE 4**
REPORT DATE: **10/10/13**
DATE SAMPLED: **08/29/13** **DATE RECEIVED:** **08/30/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	09/10/13	09/10/13	09/10/13	09/10/13	09/10/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0536	0.0479	0.0522	0.0018	0.050
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	107.20%	95.80%	104.40%	91.00%	100.00%
QC CHECK					
FOUND	0.0482	0.0476	0.0513	0.0020	0.046
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	96.40%	95.20%	102.60%	100.00%	92.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HER079.25

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS185-IN	8.29.13	1305	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS185-OUT	8-29-13	2140	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS-185-QA	8.29.13	2	11	1	X	X	X	X	X	X	X	X	X	X

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Alex Svendsen		8.30.13 1720		S-Meesa	8/30/13 1000

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER079-26**	**PAGE 1**	
REPORT DATE:	**10/02/13**		
DATE SAMPLED:	**08/29/13**	**DATE RECEIVED:**	**08/30/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.06	3.31	>10000
RBS185-OUT	<0.05	<0.11	1100

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LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-26**
REPORT DATE: **10/02/13**
DATE SAMPLED: **08/29/13** **DATE RECEIVED:** **08/30/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	09/05/13	09/05/13	
DATE ANALYZED	09/16/13	09/16/13	08/30/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			1100
DUPLICATE			950
RPD	NA	NA	14.63%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.25	0.54	
TRUE	0.25	0.50	
% RECOVERY	100.00%	108.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERO79.26

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	8-29-13	10:15	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	"	10:30	Stormwater grab 1-L amber	1	X	X	
RBS185-IN	"	10:15	Stormwater grab 250-mL amber	1			X
RBS185-OUT	"	10:30	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN Brunt / HEC		8/30/13 1000	S. LITTON KCL		8/30/13 1000

September 5, 2013

IEH - AQUATIC RESEARCH

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-28** **PAGE 1**

REPORT DATE: **10/19/13**

DATE SAMPLED: **09/06/13** **DATE RECEIVED:** **09/06/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.155	0.002	15.4	1.32	108	0.70	122
RBS185-OUT	1.65	1.44	31.3	4.64	23	0.60	28
RBS185-QA	1.64	1.46	29.3	4.64	24	0.70	27

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0177	0.0050	<0.0002	0.103	0.881	0.162
RBS185-OUT	<0.0003	0.0156	<0.0010	<0.0002	0.009	3.01	0.350
RBS185-QA	<0.0003	0.0217	<0.0010	<0.0002	0.015	2.81	0.345

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0029	<0.0010	<0.0002	0.014
RBS185-OUT	<0.0003	0.0133	<0.0010	<0.0002	0.009
RBS185-QA	<0.0003	0.0118	<0.0010	<0.0002	0.008

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-28** **PAGE 2**

REPORT DATE: **10/19/13**

DATE SAMPLED: **09/06/13** **DATE RECEIVED:** **09/06/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	09/16/13	09/06/13	09/17/13	09/24/13	09/13/13	09/14/13	09/14/13
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	RBS185-QA	BATCH	BATCH		
ORIGINAL	0.455	0.020	29.3	2.44	2.2		
DUPLICATE	0.431	0.021	30.1	2.35	2.5		
RPD	5.41%	3.62%	2.69%	4.08%	12.77%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.455	0.020	29.3	2.44			
SPIKED SAMPLE	0.502	0.040	48.5	11.8			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	93.39%	101.69%	96.00%	93.84%	NA	NA	NA
QC CHECK							
FOUND	0.092	0.032	38.3	28.4	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.89%	98.34%	95.75%	94.82%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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CASE FILE NUMBER: **HER079-28** **PAGE 3**
REPORT DATE: **10/19/13**
DATE SAMPLED: **09/06/13** **DATE RECEIVED:** **09/06/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	09/13/13	09/13/13	09/13/13	09/13/13	09/13/13	09/18/13	09/06/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	RBS185-IN	RBS185-IN	RBS185-IN	RBS185-IN	RBS185-IN	BATCH	BATCH
ORIGINAL	<0.0003	0.0177	0.0050	<0.0002	0.103	2.81	0.039
DUPLICATE	<0.0003	0.0177	0.0047	<0.0002	0.100	2.77	0.039
RPD	NC	0.00%	6.19%	NC	2.96%	1.35%	0.23%
SPIKE SAMPLE							
SAMPLE ID	RBS185-IN	RBS185-IN	RBS185-IN	RBS185-IN	RBS185-IN	BATCH	BATCH
ORIGINAL	<0.0003	0.0177	0.0050	<0.0002	0.103	2.81	0.039
SPIKED SAMPLE	0.0455	0.0653	0.0505	0.0016	0.150	4.78	0.228
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	91.00%	95.20%	91.00%	80.00%	94.00%	98.55%	94.46%
QC CHECK							
FOUND	0.0483	0.0526	0.0502	0.0020	0.051	5.69	0.411
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	96.60%	105.20%	100.40%	100.00%	102.00%	98.19%	100.72%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-28** **PAGE 4**
REPORT DATE: **10/19/13**
DATE SAMPLED: **09/06/13** **DATE RECEIVED:** **09/06/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	09/13/13	09/13/13	09/13/13	09/13/13	09/13/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0393	<0.0010	<0.0002	0.034
DUPLICATE	<0.0003	0.0381	<0.0010	<0.0002	0.032
RPD	NC	3.10%	NC	NC	6.06%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0393	<0.0010	<0.0002	0.034
SPIKED SAMPLE	0.0439	0.0858	0.0429	0.0016	0.080
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	87.80%	93.00%	85.80%	80.00%	92.00%
QC CHECK					
FOUND	0.0483	0.0526	0.0502	0.0020	0.051
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	96.60%	105.20%	100.40%	100.00%	102.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERO79.28

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8						
RBS185-IN	9/6/13	1027	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-OUT	↓	1248	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS-185-QA	↓	—	↓	1	X	X	X	X	X	X	X	X	X	X						

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSEN/HEC		9/6/13 1225		SAMPSON HERC	9/6/13 1225

IEH - AQUATIC RESEARCH

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER079-29**	**PAGE 1**	
REPORT DATE:	**10/24/13**		
DATE SAMPLED:	**09/06/13**	**DATE RECEIVED:**	**09/06/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Due to a malfunction with our solid phase extractors there was no sample to analyze. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	NO DATA	NO DATA	CONFLUENT
RBS185-OUT	NO DATA	NO DATA	64

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LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-29**
REPORT DATE: **10/24/13**
DATE SAMPLED: **09/06/13** **DATE RECEIVED:** **09/06/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	09/19/13	09/19/13	
DATE ANALYZED	NA	NA	09/06/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			64
DUPLICATE			50
RPD	NA	NA	24.56%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND			
TRUE			
% RECOVERY	NA	NA	NA
BLANK	NA	NA	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERO79.29

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond 185th Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: A. SVENDSEN		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 4

LAB USE:

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	9/6/13	1115	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	9/6/13	1120	Stormwater grab 1-L amber	1	X	X	
RBS185-IN	9/6/13	1115	Stormwater grab 250-mL amber	1			X
RBS185-OUT	9/6/13	1120	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
ALEX SVENDSEN/HEC		9/6/13 1225	[illegible]		9/6/13 1225

September 22, 2013

IEH - AQUATIC RESEARCH

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-32** **PAGE 1**

REPORT DATE: **10/19/13**

DATE SAMPLED: **09/22/13** **DATE RECEIVED:** **09/23/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.151	0.002	21.5	1.56	76	<0.50	82
RBS185-OUT	0.898	0.853	37.6	3.52	8.0	2.0	11

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0234	0.0036	<0.0002	0.087	1.37	0.061
RBS185-OUT	<0.0003	0.0199	<0.0010	<0.0002	0.008	2.39	0.341

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0084	<0.0010	<0.0002	0.016
RBS185-OUT	<0.0003	0.0169	<0.0010	<0.0002	0.008

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LABORATORY & CONSULTING SERVICES
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CASE FILE NUMBER: **HER079-32** **PAGE 2**
REPORT DATE: **10/19/13**
DATE SAMPLED: **09/22/13** **DATE RECEIVED:** **09/23/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	10/05/13	09/24/13	10/09/13	09/24/13	09/27/13	09/27/13	09/27/13
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.013	0.054	119	2.44	0.80		
DUPLICATE	0.013	0.053	120	2.35	0.93		
RPD	0.00%	1.87%	0.84%	4.08%	15.03%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.013	0.054	119	2.44			
SPIKED SAMPLE	0.059	0.075	138	11.8			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	92.00%	105.00%	95.00%	93.84%	NA	NA	NA
QC CHECK							
FOUND	0.091	0.033	39.1	28.4	9.7		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.11%	100.00%	97.75%	94.82%	97.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

RPD = RELATIVE PERCENT DIFFERENCE.
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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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CASE FILE NUMBER: **HER079-32** **PAGE 3**
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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	09/27/13	09/27/13	09/27/13	09/27/13	09/27/13	10/09/13	09/24/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-OUT	BATCH
ORIGINAL	<0.0003	0.0124	0.0165	<0.0002	<0.005	2.39	0.199
DUPLICATE	<0.0003	0.0123	0.0143	<0.0002	<0.005	2.26	0.199
RPD	NC	0.81%	14.29%	NC	NC	5.59%	0.03%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	RBS185-OUT	BATCH
ORIGINAL	<0.0003	0.0124	0.0165	<0.0002	<0.005	2.39	0.199
SPIKED SAMPLE	0.0515	0.0604	0.0606	0.0019	0.042	4.31	0.413
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	103.00%	96.00%	88.20%	95.00%	84.00%	96.00%	107.25%
QC CHECK							
FOUND	0.0496	0.0472	0.0490	0.0020	0.051	5.79	0.426
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	99.20%	94.40%	98.00%	97.50%	102.00%	100.00%	104.42%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

IEH - AQUATIC RESEARCH
LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: HER079-32 **PAGE 4**
REPORT DATE: 10/19/13
DATE SAMPLED: 09/22/13 **DATE RECEIVED:** 09/23/13
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	09/27/13	09/27/13	09/27/13	09/27/13	09/27/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0459	0.0518	0.0438	0.0017	0.042
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	91.80%	103.60%	87.60%	85.00%	84.00%
QC CHECK					
FOUND	0.0496	0.0472	0.0490	0.0020	0.051
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	99.20%	94.40%	98.00%	97.50%	102.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HERO 79.32

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite– EPA 353.2	Chloride – SM 4500-CL-C	Hardness as CaCO3 – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS185-IN	9.22.13	15:12	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
RBS185-OUT	9.22.13	17:07	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X
[redacted]														

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

47 in 2 bottles

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BANA / HERR		9.23.13 1100	SNIKKSON KBA		9/23/13 1100

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER079-33**	**PAGE 1**	
REPORT DATE:	**10/19/13**		
DATE SAMPLED:	**09/22/13**	**DATE RECEIVED:**	**09/23/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.06	0.12	1100
RBS185-OUT	<0.05	<0.10	100

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CASE FILE NUMBER: **HER079-33** **PAGE 2**
REPORT DATE: **10/19/13**
DATE SAMPLED: **09/22/13** **DATE RECEIVED:** **09/23/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	10/02/13	10/02/13	
DATE ANALYZED	10/11/13	10/11/13	09/23/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			100
DUPLICATE			100
RPD	NA	NA	0.00%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.27	0.52	
TRUE	0.25	0.50	
% RECOVERY	108.00%	104.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

HER079.33

CHAIN OF CUSTODY RECORD

Page ___ of ___

PROJECT NAME: Redmond 185th Biofiltration Swale	PROJECT NUMBER: 09-04540-000	CLIENT: Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY:		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS:
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: TPH (diesel) - NWTPH-Dx	TPH (motor oil) - NWTPH-Dx	Fecal Coliform Bacteria – SM 9222D
RBS185-IN	9-22-13	14:15	Stormwater grab 1-L amber	1	X	X	
RBS185-OUT	"	14:30	Stormwater grab 1-L amber	1	X	X	
RBS185-IN	"	14:15	Stormwater grab 250-mL amber	1			X
RBS185-OUT	"	14:30	Stormwater grab 250-mL amber	1			X

Notes:

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
Jon Bennett / HER		9-23-13/1100	SHIPPING / AM		9/23/13 1100

September 28, 2013

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER079-35**	**PAGE 1**	
REPORT DATE:	**10/22/13**		
DATE SAMPLED:	**09/29/13**	**DATE RECEIVED:**	**09/29/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/l)
RBS185-IN	0.107	0.003	12.1	0.59	73	2.6	78
RBS185-OUT	1.36	1.27	31.9	3.71	17	<0.50	23

	TOTAL METALS						
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
RBS185-IN	<0.0003	0.0160	0.0041	<0.0002	0.095	1.09	0.078
RBS185-OUT	<0.0003	0.0160	<0.0010	<0.0002	0.010	2.49	0.176

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN	<0.0003	0.0022	<0.0010	<0.0002	0.013
RBS185-OUT	<0.0003	0.0094	<0.0010	<0.0002	0.006

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3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-35** **PAGE 2**

REPORT DATE: **10/22/13**

DATE SAMPLED: **09/29/13** **DATE RECEIVED:** **09/29/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)	HARDNESS (mgCaCO3/L)	CHLORIDE (mg/L)	TSS (mg/L)	SSL-COARSE (mg/L)	SSL-FINE (mg/L)
METHOD	EPA 365.1	EPA 365.1	SM18 2340C	SM18 4500CLC	EPA 160.2	ASTM 3977-97C	ASTM 3977-97C
DATE ANALYZED	10/12/13	09/30/13	10/09/13	10/22/13	10/07/13	10/04/13	10/04/13
DETECTION LIMIT	0.002	0.001	2.00	0.50	0.50	0.50	0.50
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH		
ORIGINAL	0.084	0.003	119	1.27	2.2		
DUPLICATE	0.083	0.003	120	1.17	2.5		
RPD	1.20%	0.00%	0.84%	8.20%	12.77%	NA	NA
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH			
ORIGINAL	0.084	0.003	119	1.27			
SPIKED SAMPLE	0.128	0.025	138	10.7			
SPIKE ADDED	0.050	0.020	20.0	10.0			
% RECOVERY	88.00%	110.00%	95.00%	94.30%	NA	NA	NA
QC CHECK							
FOUND	0.091	0.035	39.1	28.5	9.6		
TRUE	0.090	0.033	40.0	30.0	10		
% RECOVERY	101.11%	106.06%	97.75%	95.00%	96.00%	NA	NA
BLANK	<0.002	<0.001	<2.00	<0.50	<0.50	NA	NA

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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CASE FILE NUMBER: **HER079-35** **PAGE 3**
REPORT DATE: **10/22/13**
DATE SAMPLED: **09/29/13** **DATE RECEIVED:** **09/29/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS						
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)	TKN (mg/L)	N03+N02 (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 351.1	SM184500N03F
DATE ANALYZED	10/08/13	10/08/13	10/08/13	10/08/13	10/08/13	10/15/13	10/01/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005	0.200	0.010
DUPLICATE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0231	0.0054	<0.0002	0.140	33.7	0.054
DUPLICATE	<0.0003	0.0232	0.0053	<0.0002	0.151	33.8	0.055
RPD	NC	0.43%	1.87%	NC	7.56%	0.39%	2.07%
SPIKE SAMPLE							
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0231	0.0054	<0.0002	0.140	33.7	0.054
SPIKED SAMPLE	0.0616	0.0777	0.0586	0.0021	0.198	35.6	0.265
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050	2.00	0.200
% RECOVERY	123.20%	109.20%	106.40%	105.00%	116.00%	96.05%	105.54%
QC CHECK							
FOUND	0.0469	0.0473	0.0467	0.0020	0.049	5.48	0.415
TRUE	0.0500	0.0500	0.0500	0.0020	0.050	5.79	0.408
% RECOVERY	93.80%	94.60%	93.40%	100.00%	98.00%	94.66%	101.63%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005	<0.200	<0.010

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OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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CASE FILE NUMBER: HER079-35 **PAGE 4**
REPORT DATE: 10/22/13
DATE SAMPLED: 09/29/13 **DATE RECEIVED:** 09/29/13
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	10/08/13	10/08/13	10/08/13	10/08/13	
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0564	0.0537	0.0504	0.0019	0.061
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	112.80%	107.40%	100.86%	95.00%	122.00%
QC CHECK					
FOUND	0.0469	0.0473	0.0467	0.0020	0.049
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	93.80%	94.60%	93.40%	100.00%	98.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
Project Manager

HER079-35

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: Alex Svendsen		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 2
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	Total Suspended Solids- SM 2540D	Suspended Sediment Concentrations- SM D3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Total Kjeldahl nitrogen – EPA 351.2	Nitrate+nitrite- EPA 353.2	Chloride – SM 4500-CL-C	Hardness as $CaCO_3$ – SM 2340C	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8						
					ANALYSES REQUESTED															
RBS185-IN	9-28	1942	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
RBS185-OUT	9-29	104	Stormwater Composite 20-L HDPE	1	X	X	X	X	X	X	X	X	X	X						
~~RBS-185-QA~~																				

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN KENNETH/HEC		9.29.13 1100	JASON GADOURAS		9/29/13 1100

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LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER079-34**	**PAGE 1**	
REPORT DATE:	**10/19/13**		
DATE SAMPLED:	**09/28/13**	**DATE RECEIVED:**	**09/28/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

	NWTPH-DX		
SAMPLE ID	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
RBS185-IN	<0.05	0.74	650
RBS185-QA	<0.05	0.85	500
RBS185-OUT	<0.05	<0.10	40

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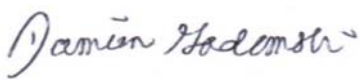
CASE FILE NUMBER: **HER079-34**
REPORT DATE: **10/19/13**
DATE SAMPLED: **09/28/13** **DATE RECEIVED:** **09/28/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	DIESEL (mg/l)	MOTOR OIL (mg/l)	FECAL COLIFORM (#/100mL)
METHOD	NWTPH-DX	NWTPH-DX	SM18 9222D
DATE PREPARED	10/02/13	10/02/13	
DATE ANALYZED	10/11/13	10/11/13	09/28/13
DETECTION LIMIT	0.05	0.10	5
DUPLICATE			
SAMPLE ID			RBS185-OUT
ORIGINAL			40
DUPLICATE			32
RPD	NA	NA	22.22%
SPIKE SAMPLE			
SAMPLE ID			
ORIGINAL			
SPIKED SAMPLE			
SPIKE ADDED			
% RECOVERY	NA	NA	NA
QC CHECK			
FOUND	0.27	0.52	
TRUE	0.25	0.50	
% RECOVERY	108.00%	104.00%	NA
BLANK	<0.05	<0.10	< 2

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:



Damien Gadomski
Project Manager

HER079.34

Aquatic Research Incorporated

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715

CHAIN-OF-CUSTODY RECORD

SHEET (OF (

CLIENT: HERRERA

SAMPLING DATE: 9-28-13

SAMPLERS: D. Bennett

PROJECT ID: RBS185

CASE FILE NO.:

DATA RECORDED BY:

SAMPLE INFORMATION

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	FDH	Fecal Coliforms	BOTT #	NOTES
RBS185IN	11:00	X	X	2	
RBS185QA	11:05	X	X	2	
RBS185DUP	11:15	X	X		

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name	DAN BENNETT	9-28-13 1130	ANDREW GADOMSKI	9/28/13 1:30
Signature				
Affiliation	HEC		ARI	

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name				
Signature				
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.):

October 3, 2013

IEH - AQUATIC RESEARCH

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**HER079-36**	**PAGE 1**	
REPORT DATE:	**10/21/13**		
DATE SAMPLED:	**10/03/13**	**DATE RECEIVED:**	**10/03/13**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-P (mg/L)	SRP (mg/L)
RBS185-IN-QA	<0.002	<0.001
RBS185-OUT-QA	<0.002	<0.001

	TOTAL METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN-QA	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RBS185-OUT-QA	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

	DISSOLVED METALS				
SAMPLE ID	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
RBS185-IN-QA	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RBS185-OUT-QA	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

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LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: **HER079-36** **PAGE 2**
REPORT DATE: **10/21/13**
DATE SAMPLED: **10/03/13** **DATE RECEIVED:** **10/03/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-P (mg/L)	SRP (mg/L)
METHOD	EPA 365.1	EPA 365.1
DATE ANALYZED	10/12/13	10/04/13
DETECTION LIMIT	0.002	0.001
DUPLICATE		
SAMPLE ID	BATCH	BATCH
ORIGINAL	0.084	<0.001
DUPLICATE	0.083	<0.001
RPD	1.20%	NC
SPIKE SAMPLE		
SAMPLE ID	BATCH	BATCH
ORIGINAL	0.084	<0.001
SPIKED SAMPLE	0.128	0.021
SPIKE ADDED	0.050	0.020
% RECOVERY	88.00%	105.00%
QC CHECK		
FOUND	0.091	0.033
TRUE	0.090	0.033
% RECOVERY	101.11%	100.00%
BLANK	<0.002	<0.001

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

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FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	TOTAL METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	10/08/13	10/08/13	10/08/13	10/08/13	10/08/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0231	0.0054	<0.0002	0.140
DUPLICATE	<0.0003	0.0232	0.0053	<0.0002	0.151
RPD	NC	0.43%	1.87%	NC	7.56%
SPIKE SAMPLE					
SAMPLE ID	BATCH	BATCH	BATCH	BATCH	BATCH
ORIGINAL	<0.0003	0.0231	0.0054	<0.0002	0.140
SPIKED SAMPLE	0.0616	0.0777	0.0586	0.0021	0.198
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	123.20%	109.20%	106.40%	105.00%	116.00%
QC CHECK					
FOUND	0.0469	0.0473	0.0467	0.0020	0.049
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	93.80%	94.60%	93.40%	100.00%	98.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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CASE FILE NUMBER: **HER079-36** **PAGE 4**
REPORT DATE: **10/21/13**
DATE SAMPLED: **10/03/13** **DATE RECEIVED:** **10/03/13**
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

	DISSOLVED METALS				
QC PARAMETER	CADMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	MERCURY (mg/L)	ZINC (mg/L)
METHOD	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DATE ANALYZED	10/08/13	10/08/13	10/08/13	10/08/13	10/08/13
DETECTION LIMIT	0.0003	0.0010	0.0010	0.0002	0.005
DUPLICATE					
SAMPLE ID	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
DUPLICATE	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
RPD	NC	NC	NC	NC	NC
SPIKE SAMPLE					
SAMPLE ID	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA	RBS185-OUT-QA
ORIGINAL	<0.0003	<0.0010	<0.0010	<0.0002	<0.005
SPIKED SAMPLE	0.0564	0.0537	0.0504	0.0019	0.050
SPIKE ADDED	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	112.80%	107.40%	100.86%	95.00%	100.00%
QC CHECK					
FOUND	0.0469	0.0473	0.0467	0.0020	0.049
TRUE	0.0500	0.0500	0.0500	0.0020	0.050
% RECOVERY	93.80%	94.60%	93.40%	100.00%	98.00%
BLANK	<0.0003	<0.0010	<0.0010	<0.0002	<0.005

RPD = RELATIVE PERCENT DIFFERENCE.
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SUBMITTED BY:

Damien Gadomski
Project Manager

HER079-36

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
(206) 441-9080
FAX (206) 441-9108

CHAIN OF CUSTODY RECORD

PROJECT NAME:	PROJECT NUMBER:	CLIENT:
Redmond Biofiltration Swale	09-04540-000	Herrera Environmental Consultants
REPORT TO: Dylan Ahearn		COPY TO:
SAMPLED BY: DAN BENNETT		DELIVERY METHOD: Hand/ in cooler with ice
LABORATORY: Aquatic Research	REQUESTED COMPLETION DATE:	TOTAL # OF CONTAINERS: 4
LAB USE:		

SAMPLE ID:	DATE:	TIME:	SAMPLE DESCRIPTION	# OF CONTAINERS:	ANALYSES REQUESTED: Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Dissolved Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8	Total Metals (Cd, Cu, Pb, Hg, Zn) – EPA 200.8
RBS185-IN-QA	10/3/13	1445		1	X	X	X	X
RBS185-OUT- QA	10/3/13	1500		1	X	X	X	X
RBS185-IN- QA	10/3/13	1445		1	X	X	X	X
RBS185-OUT- QA	10/3/13	1500		1	X	X	X	X

Notes: Use churn-splitter to apportion composite sample into smaller bottles.

RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:
DAN BENNETT/HEC		10/3/13 16:45	Sarah Brandell		10/3/13 4:45
RELINQUISHED BY (NAME/CO.):	SIGNATURE:	DATE/TIME:	RECEIVED BY (NAME/CO.):	SIGNATURE:	DATE/TIME: