HON. THOMAS S. ZILLY

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

PUGET SOUNDKEEPER ALLIANCE, Plaintiff, v. ACE METAL CORPORATION, Defendant.	No. 2:17-cv-00524-TSZ CONSENT DECREE

I. STIPULATIONS

Plaintiff Puget Soundkeeper Alliance ("Soundkeeper") sent a sixty day notice of intent to sue letter to defendant Ace Metal Corporation ("Ace") on or about January 30, 2017, and filed a complaint on April 4, 2017, alleging violations of the Clean Water Act, 33 U.S.C. § 1251 et seq., relating to discharges of stormwater from Ace's facility in Mukilteo, Washington and seeking declaratory and injunctive relief, civil penalties, and attorneys' fees and costs.

Soundkeeper and Ace agree that settlement of these matters is in the best interest of the parties and the public, and that entry of this Consent Decree is the most appropriate means of resolving this action.

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(206) 860-2883

Soundkeeper and Ace stipulate to the entry of this Consent Decree without trial, adjudication, or admission of any issues of fact or law regarding Soundkeeper's claims or allegations set forth in its complaint and its sixty-day notice.

DATED this 15th day of June, 2018

GORDON & REES	SMITH & LOWNEY PLLC
By /s/Elizabeth Morrison Elizabeth Morrison, WSBA #43042 Donald Verfurth, WSBA #15554 Attorneys for Defendant Ace Metal Corporation	By /s/Alyssa Englebrecht Alyssa Englebrecht, WSBA #46773 Richard Smith, WSBA #21788 Attorneys for Plaintiff Puget Soundkeeper Alliance
ACE METAL CORPORATION	PUGET SOUNDKEEPER ALLIANCE
By /s/James Yoo James Yoo President	By /s/Chris Wilke Chris Wilke Soundkeeper Executive Director

II. ORDER AND DECREE

THIS MATTER came before the Court upon the Parties' Joint Motion for Entry of Consent Decree, docket no. 17 (the "Motion") and the foregoing Stipulations of the parties. Having considered the Stipulations and the promises set forth below, and the July 31, 2018, letter submitted by the U.S. Department of Justice, docket no. 18, the Court hereby GRANTS the Motion and ORDERS, ADJUDGES, and DECREES as follows:

1. This Court has jurisdiction over the parties and subject matter of this action.

2. Each signatory for the parties certifies for that party that he or she is authorized to enter into the agreements set forth below.

3. This Consent Decree applies to and binds the parties and their successors and assigns.

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4. This Consent Decree and any injunctive relief ordered within applies to the operation, oversight, or both by Defendant Ace Metal Corporation ("Ace") of its Facility at 11110 Mukilteo Speedway #202, Mukilteo, WA 98275 (the "Facility"), which is subject to National Pollutant Discharge Elimination System Permit No. WAR125520 (the "NPDES permit").

5. This Consent Decree is a full and complete settlement and release of all the claims in the complaint, the sixty-day notice and all other claims known and unknown existing as of the date of entry of this Consent Decree that could be asserted under the Clean Water Act, 33 U.S.C. §§ 1251-1387, arising from operations of the Facility. These claims are released and dismissed with prejudice. Enforcement of this Consent Decree is Plaintiff Puget Soundkeeper Alliance's ("Soundkeeper") exclusive remedy for any violation of its terms.

6. This Consent Decree is a settlement of disputed facts and law. It is not an admission or adjudication regarding any allegations by Soundkeeper in this case or of any fact or conclusion of law related to those allegations, nor evidence of any wrongdoing or misconduct on the part of Ace.

7. Ace agrees to the following terms and conditions in full and complete satisfaction of all the claims covered by this decree:

a. Ace will comply fully with all conditions of its National Pollutant Discharge Elimination System Permit No. WAR125520 and any successor, modified, or replacement permit authorizing discharges of stormwater associated with industrial activity from the Facility.

b. For a period of eighteen (18) months after the entry of this Consent Decree, Ace shall, on a quarterly basis, electronically forward to Soundkeeper copies of all

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communications to and/or from the Washington Department of Ecology related to its NPDES permit or stormwater discharges from the facility;

c. By September 30, 2018, Ace will install and have operational the stormwater treatment system proposed and selected in Ace's May 15, 2018, Engineering Report, attached hereto as **Attachment A**. The stormwater treatment system will treat not only runoff from all of the facility, but for a portion of the entrance accessway, as well as runoff from certain upstream parcels occupied by other businesses. Ace will reimburse Soundkeeper's reasonable expenses for its expert review of the May 15, 2018, Engineering Report up to $3,000. Soundkeeper will provide Ace with any comments and/or revisions to the May 15, 2018, Engineering Report not later than fourteen (14) days of entry of this Consent Decree. Within thirty (30) days of completion of construction of the treatment system, Ace will update its stormwater pollution prevention plan ("SWPPP") to reflect the new structure and practices.

d. Within ninety (90) days of receiving all necessary permitting from the City of Mukilteo, Ace will install a covered structure in the southwest corner of the Facility to prevent exposure of bins in this area to precipitation and runoff. Once installed, Ace will store the "Boeing bins" and "5x5 bins" under this covered structure. Within thirty (30) days of completion of construction, Ace will update its stormwater pollution prevention plan ("SWPPP") to reflect the new structure and practices. Until the covered structure is completed and commencing immediately upon entry of this Consent Decree, Ace will place covers on these bins.

e. Within three (3) months of execution of this Consent Decree, Ace will sample and analyze the stormwater runoff from its roof for the parameters required in

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Tables 2 and 3 of NPDES Permit (turbidity, pH, oil sheen, copper, zinc, lead, and petroleum hydrocarbons). If a rain event sufficient to cause a discharge from the roof does not occur within three (3) months of execution of this Consent Decree, Ace will sample and analyze the stormwater runoff from the first such rain event which occurs. Ace will provide the sample results to Soundkeeper within seven (7) days of receiving those results. If the sample results reflect any exceedance(s) of the NPDES Permit benchmarks for any of the parameters in Tables 2 and 3, Ace will install roof downspout filters at each of the three downspouts at the Facility within thirty (30) days of receiving the sample results. Such downspout filters must be of a type reasonably expected to remove pollutants exceeding benchmarks from the roof runoff and to thus reduce pollutant concentrations to below benchmarks. Thereafter, Ace will continue to monitor its roof discharges (whether treated or not) as a separate and distinct point of discharge from its site, and report the results on its quarterly discharge monitoring reports, as required by the Permit.

f. Ace will work with its qualified stormwater consultant to update its SWPPP to reflect the additional BMPs required by this Consent Decree. Initial updates will be completed no later than October 1, 2018. Ace will provide Soundkeeper with an electronic copy of the SWPPP within thirty (30) days of the initial update and any subsequent revisions. Soundkeeper will thereafter have thirty (30) days to provide comments and/or proposed revisions to the revised SWPPP. Ace will consider Soundkeeper's comments in good faith and respond in writing, if a response is required.

8. Not later than thirty (30) days after the entry of this Consent Decree by this Court, Ace will pay $5,000 (FIVE THOUSAND DOLLARS) to the Edmonds Community College

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Foundation for a project being conducted by a group of local students regarding prespawn mortality surveys of salmon in Big Gulch Creek, as described in **Attachment B** to this Consent Decree. The check will be made to the order of Edmonds Community College Foundation and delivered to: Thomas Murphy, Chair of the Dept. of Anthropology, Edmonds Community College, 20000 68th Avenue W, Lynnwood, WA 98036. Payment will include the following reference in a cover letter or on the check: "Consent Decree, Soundkeeper v. Ace Metal, Case No. 2:17-cv-00524-TSZ." A copy of the check and cover letter, if any, will be sent simultaneously to Soundkeeper and its counsel.

9. Within thirty (30) days of entry of this Consent Decree by the Court, Ace will pay $35,000 (THIRTY-FIVE THOUSAND DOLLARS) dollars to cover Soundkeeper's litigation fees, expenses, and costs (including reasonable attorney and expert witness fees) by check payable and mailed to Smith & Lowney, PLLC, 2317 East John St., Seattle, WA 98112, attn: Richard Smith. Ace's payment will be in full and complete satisfaction of any claims Soundkeeper has or may have, either legal or equitable, and of any kind or nature whatsoever, for fees, expenses, and costs incurred in the Litigation.

10. A force majeure event is any event outside the reasonable control of Ace that causes a delay in performing tasks required by this decree that cannot be cured by due diligence. Delay in performance of a task required by this decree caused by a force majeure event is not a failure to comply with the terms of this decree, provided that Ace timely notifies Soundkeeper of the event; the steps that Ace will take to perform the task; the projected time that will be needed to complete the task; and the measures that have been taken or will be taken to prevent or minimize any impacts to stormwater quality resulting from delay in completing the task.

Ace will notify Soundkeeper of the occurrence of a force majeure event as soon as

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reasonably possible but, in any case, no later than fifteen (15) days after Ace becomes aware of the event. In such event, the time for performance of the task will be extended for a reasonable period of time following the force majeure event.

By way of example and not limitation, force majeure events include

a. Acts of God, war, insurrection, or civil disturbance;

b. Earthquakes, landslides, fire, floods;

c. Actions or inactions of third parties over which defendant has no control;

d. Unusually adverse weather conditions;

e. Restraint by court order or order of public authority;

f. Strikes;

g. Any permit or other approval sought by Ace from a government authority to implement any of the actions required by this consent decree where such approval is not granted or is delayed, and where Ace has timely and in good faith sought the permit or approval; and

h. Litigation, arbitration, or mediation that causes delay.

11. This Court retains jurisdiction over this matter. And, while this Consent Decree remains in force, this case may be reopened without filing fee so that the parties may apply to the Court for any further order that may be necessary to enforce compliance with this decree or to resolve any dispute regarding the terms or conditions of this Consent Decree. In the event of a dispute regarding implementation of, or compliance with, this Consent Decree, the parties must first attempt to resolve the dispute by meeting to discuss the dispute and any suggested measures for resolving the dispute. Such a meeting should be held as soon as practical, but must be held within thirty (30) days after notice of a request for such a meeting to the other party and its counsel

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of record. If no resolution is reached at that meeting or within thirty (30) days of the Notice, either party may file a motion with this Court to resolve the dispute. The provisions of section 505(d) of the Clean Water Act, 33 U.S.C. § 1365(d), regarding awards of costs of litigation (including reasonable attorney and expert witness fees) to any prevailing or substantially prevailing party, will apply to any proceedings seeking to enforce the terms and conditions of this Consent Decree.

12. The parties recognize that, pursuant to 33 U.S.C. § 1365(c)(3), no consent judgment can be entered in a Clean Water Act suit in which the United States is not a party prior to forty-five (45) days following the receipt of a copy of the proposed consent judgment by the U.S. Attorney General and the Administrator of the U.S. EPA. Therefore, upon the filing of this Consent Decree by the parties, Soundkeeper will serve copies of it upon the Administration of the U.S. EPA and the Attorney General, with a copy to Ace.

13. This Consent Decree will take effect upon entry by this Court. It terminates two years after that date, or upon completion of all obligations imposed by this Consent Decree, whichever is later.

14. Both parties have participated in drafting this Consent Decree.

15. This Consent Decree may be modified only upon the approval of the Court.

16. If for any reason the Court should decline to approve this Consent Decree in the form presented, this Consent Decree is voidable at the discretion of either party. The parties agree to continue negotiations in good faith in an attempt to cure any objection raised by the Court to entry of this Consent Decree.

17. Notifications required by this Consent Decree must be in writing. The sending party may use any of the following methods of delivery: (1) personal delivery; (2) registered or certified mail, in each case return receipt requested and postage prepaid; (3) a nationally recognized

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overnight courier, with all fees prepaid; or (4) email. For a notice or other communication regarding this decree to be valid, it must be delivered to the receiving party at the one or more addresses listed below or to any other address designated by the receiving party in a notice in accordance with this paragraph 17.

If to Soundkeeper:

Katelyn Kinn
Puget Soundkeeper Alliance
130 Nickerson Street, Suite 107
Seattle, WA 98109
Email: katelyn@pugetsoundkeeper.org

And to:

Alyssa Englebrecht
Richard Smith
Smith & Lowney PLLC
2317 East John St.
Seattle, WA 98112
email: alyssa@smithandlowney.com, richard@smithandlowney.com

If to Ace:

James Yoo
Ace Metal Corporation
1110 Mukilteo Speedway, #202
Mukilteo, WA 98275
Email: james@acemetalco.com; webmaster@acemetalco.com

And to:

Donald Verfurth
Elizabeth Morrison
Gordon & Rees, LLP
701 Fifth Avenue, Suite 2100
Seattle, WA 98104
Email: dverfurth@grsm.com; emorrison@grsm.com

A notice or other communication regarding this Consent Decree will be effective when received unless the notice or other communication is received after 5:00 p.m. on a business day, or

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on a day that is not a business day, then the notice will be deemed received at 9:00 a.m. on the next business day. A notice or other communication will be deemed to have been received: (a) if it is delivered in person or sent by registered or certified mail or by nationally recognized overnight courier, upon receipt as indicated by the date on the signed receipt; or (b) if the receiving party rejects or otherwise refuses to accept it, or if it cannot be delivered because of a change in address for which no notice was given, then upon that rejection, refusal, or inability to deliver; or (c) for notice provided by e-mail, upon receipt of a response by the party providing notice or other communication regarding this Consent Decree.

IT IS SO ORDERED.

DATED this 10th day of August, 2018.

Thomas S. Zilly
United States District Judge

Presented by:

GORDON & REES

By s/Elizabeth Morrison
Elizabeth Morrison, WSBA #43042
Donald Verfurth, WSBA #15554
Attorneys for Defendant
Ace Metal Corporation

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Alyssa Englebrecht, WSBA #46773
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Attorneys for Plaintiff
Puget Soundkeeper Alliance

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Attachment A

FINAL ENGINEERING REPORT

Prepared for:

Ace Metal Company
11110 Mukilteo Speedway #202, Mukilteo, WA 98275

For submittal to:

Washington Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Prepared by: Aspect Consulting, LLC

May 15, 2018

Aspect CONSULTING

earth + water

CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seals, as a professional engineer licensed to practice as such, are affixed below.

Owen G. Reese, PE
Sr. Associate Water Resources Engineer
oreese@aspectconsulting.com

Aspect Consulting, LLC

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Acronyms

Ace Metal	Ace Metal Corporation, dba Ace Metal Company
Aspect	Aspect Consulting, LLC
BMP	best management practice
cfs	cubic feet per second
CESF	Chitosan Enhanced Sand Filtration
DMR	discharge monitoring report
EC	electrocoagulation
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
gpm/sf	gallons per minute per square foot
GULD	General Use Level Designation
HSPF	Hydrologic Simulation Program Fortran
ISGP	Industrial Stormwater General Permit
µg/L	micrograms per liter
MWS	Modular Wetland System
mg/L	milligrams per liter
O&M	operations and maintenance
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
SIC	Standard Industrial Classification
SWMMWW	Stormwater Management Manual for Western Washington
WWHM	Western Washington Hydrology Model 3

1 Introduction

1.1 Background

Ace Metal Corporation, dba Ace Metal Company (Ace Metal), operates a ferrous and nonferrous scrap recycling center, including consumer electronics, located at 11110 Mukilteo Speedway, #202 in Mukilteo, Washington (Facility). On January 1, 2010, the Washington State Department of Ecology (Ecology) issued National Pollutant Discharge Elimination System (NPDES) Industrial Stormwater General Permit (ISGP) Number WAR-125520 to the Facility (Ecology, 2014a). The permit covers stormwater discharges associated with industrial activity at the Facility.

In 2014, the Facility's stormwater quality at monitoring point A2 exceeded the ISGP benchmarks for copper and zinc in three quarters. Accordingly, the ISGP required completion of a Level 3 Corrective Action by September 30, 2015.

The ISGP requires that Ecology review and approve an Engineering Report describing the planned Level 3 Corrective Action prior to implementation. The ISGP requires that an Engineering Report provide the following:

- A brief summary of the treatment alternatives considered, and why the proposed option was selected.
- The basic design data and sizing calculations of the treatment units.
- A description of the treatment process and operation, including a flow diagram.
- The amount and kind of chemicals used in the treatment process, if any.
- Results to be expected from the treatment process, including the predicted stormwater discharge characteristics.
- A statement expressing sound engineering justification through the use of pilot plant data, results from similar installations, and/or scientific evidence that the proposed treatment is reasonably expected to meet the permit benchmarks.
- An Operations and Maintenance (O&M) Manual.
- Certification by a licensed professional engineer.

This Engineering Report was prepared by Aspect Consulting, LLC (Aspect) in accordance with the Guidelines for the Preparation of Industrial Stormwater General Permit Engineering Reports (Ecology, 2013).

Ace Metal has reviewed the Level 3 Corrective Action alternatives and selected BioClean Environmental's Modular Wetland Systems (MWS) as the preferred technology for treating stormwater runoff at the Facility. In addition, roof runoff will be evaluated, and if

concentrations exceed ISGP benchmarks, roof downspout treatment system will be installed. This Engineering Report describes the proposed Level 3 Corrective Action.

1.2 Document Organization

This document is organized into five main sections. Section 1 provides an introduction and background information. Section 2 provides information on the Facility and the existing stormwater management system. Section 3 summarizes the stormwater treatment alternatives that were considered and the option that was selected. Section 4 provides information on the new stormwater management system, including Facility layout and sizing analyses. Section 5 provides the implementation schedule.

The report also contains three appendices:

- Appendix A—Hydrologic Analyses Information
- Appendix B— Roof Downspout Filter Information
- Appendix C— Modular Wetland System Operation and Maintenance Manual

2 Facility Information

2.1 Facility Operation Information

Ace Metal's Facility is located in a commercial and light industrial area of Mukilteo (Figure 1). Ace Metal operates under Standard Industrial Classification (SIC) Code 5093 – Scrap and Waste Metals.

Ace Metal recycles ferrous and nonferrous scrap metal, including consumer electronics. The Mukilteo location is open to the public for drop off of metals and electronics for recycling. The facility also offers container services for businesses recycling bulk amounts of scrap metals. A small fleet of vehicles transports the containers back to the facility for consolidation before shipment off-site for recycling.

The Facility layout, stormwater system, and location of industrial activities performed outdoors are shown on Figure 2. Scrap metals and appliances are received, temporarily stored, and then shipped offsite; these materials are generally not processed (e.g., shredded, disassembled, crushed, etc.) on site. Electronics, particularly TVs and computers, are received on site and are processed. Processing occurs inside the building and consists of disassembly and sorting, as well as draining of lamps from projection TVs. Plastics and circuit boards are baled in a covered location located just outside the building. Glass, plastic cases, and electronics are separated and packaged for off-site recycling. Mercury containing LCD bulbs are removed from TVs and consolidated for shipment in a separate room inside the building. Vehicle recycling is not performed at the facility.

The Facility entrance is located off Mukilteo Speedway on the northeastern side of the Facility. The Facility shares an entrance with several adjacent businesses, including a small retail shop located in the same building. A fence with a gate separates the industrial operations from the neighboring businesses. Traffic enters through the gate and is unloaded near the building.

Recyclables brought in by public customers are transferred to bins. Scrap metal and appliances are weighed at one of two scales – one outside for heavier materials and a smaller scale inside the building. Materials are sorted into bins of various sizes and temporarily stored.

Televisions and computers are disassembled inside the building, and plastic, glass, electronic components and lamps are sorted. Projection TV lamps are further disassembled for recycling, including draining them of oil. The waste oil is collected in drums for recycling. LCD lamps containing mercury are removed in a separate room and packaged for recycling off site. All disassembly work occurs inside the building.

Once sorted, plastic cases and electronic components (e.g., circuit boards) are baled, wrapped, and temporarily stored for recycling. Storage occurs within the building and in containers located in the storage yard. Baled plastics are stored outside.

The building roof is flat and surfaced with thermoplastic polyolefin (TPO). The roof has several skylights and a ventilation fan that is no longer used. Ecology conducted an

assessment of roofing materials, including TPO, in 2013 and 2014 and concluded that concentrations of copper (0.25 J[1] to 0.76 µg/L) and zinc (2.6 J to 7.6 µg/L) in runoff from the TPO panel were well below ISGP benchmarks (Ecology, 2014).

2.2 Contact Information

Contact information for the Facility owner and operator is as follows:

Ace Metal Company

11110 Mukilteo Speedway, #202, Mukilteo, WA

Facility Contact: James Yoo (owner)

- Office: (425) 493-6802
- Email: james@acemetalco.com

2.3 Potential Stormwater Pollutants

Table 1 below summarizes likely stormwater pollutants, identifies potential sources, and rates their potential to come into contact with stormwater.

Table 1. Summary of Potential Stormwater Pollutant Sources

Pollutant	Potential Sources	Potential Contact with Stormwater
Copper, Zinc	Metals accepted for recycling Trucks, customer vehicles, and forklifts, including tire and brake pad wear	High
Zinc	Rooftop materials[1]	High
Oil and Grease, NWTPH-DX	Incidental drips or leakage from vehicles and equipment	Moderate
Turbidity	Particulates tracked on site, carried on by wind, or associated with scrap metal.	Moderate

Note:
1) Roofing materials are unlikely to be a source of metals, but roof runoff has not been separately characterized and the ventilation fan and skylights may be potential sources.

2.2 Existing Stormwater Management System Information

The layout of the stormwater management system is shown on Figure 2. Facility stormwater discharges to the City of Mukilteo's municipal separate storm sewer system (MS4) in Mukilteo Speedway. The City's drainage system conveys water north and ultimately discharges to Big Gulch Creek.

[1] J qualifier indicates that the concentration is an estimate.

The Facility receives off-site stormwater from an approximately 2-acre industrial/commercial development located to the southwest. The stormwater is piped into catch basin A3 as shown on Figure 2. The adjacent development was constructed in 1998, and construction plans obtained from the City of Mukilteo show that the drainage system consists of a pipe and catch basin network that drains to an off-line coalescing plate oil/water separator, then a 194-foot-long, 60-inch-diameter corrugated metal pipe (CMP) detention pipe. The outlet control structure for the detention pipe is located near the western corner of Ace Metal facility, as is connected by pipe to catch basin A3.

The Facility's stormwater system consists of three catch basins and two detention facilities arranged in two branches (as shown on Figure 2). The main branch consists of catch basins A3 and A2 and receives runoff from the majority of the industrial area at the Facility. The pipe between A3 and A2 is designed for detention, and an outlet control structure is located in A2. The outlet control structure consists of a single orifice tee, designed to provide spill control [previously known as a Flow Restrictor Oil Pollution control tee (FROP-T)]. Flows released from A2 travel in a pipe to A1.

The second branch of the stormwater system begins at a detention pond located in the northern corner of the Facility. The detention pond receives limited surface inflows from the vegetated area in front of the buildings and the main facility roof. The main facility roof drains to three downspouts on the northern side of the building. The downspouts are connected to a below-grade pipe that drains toward the detention pond. The detention pond drains to A1.

A second FROP-T style outlet control structure is located in catch basin A1. It detains flows and backs them up to the detention pond and a small portion of the pipe between A2 and A1. The slope between A2 and A1 is moderate (4.8 percent) and there is 2.3 feet of head between the top of the riser and the pipe invert, so water can only back up about 50 feet (approximately 1/3 of the pipe length) toward A2.

The outlet pipe from A1 is connected to the City of Mukilteo's MS4 in Mukilteo Speedway.

2.3 Water Quality Monitoring

Stormwater quality at the Facility is monitored quarterly as required by the ISGP. Prior to 2017, monitoring was conducted at catch basins A1, A2, and A3. In May 2017, Ace Metal updated the sampling program to monitor only at A1, which receives stormwater from all areas of the Facility and is most representative of the discharge from the Facility.

Monitoring results are shown in Table 2. The data shown in Table 2 are based on the Discharge Monitoring Reports (DMRs) submitted by Ace Metal, but have been checked against the original laboratory reports and corrections made, where necessary. In particular, Facility personnel incorrectly interpreted the laboratory reports for total Petroleum Hydrocarbons (NWTPH-Dx) and consistently reported concentrations that were higher than actual by a factor of 1,000. The error occurred because staff did not convert from the report reported in in micrograms per liter (µg/L) on the laboratory report to concentrations in milligrams per liter (mg/L) for the DMR. As a result, the actual NWTPH-Dx concentrations are much lower than represented on the DMRs.

As indicated in Table 2, copper and zinc concentrations have typically exceeded benchmarks, with median concentrations at A1 of 22 µg/L of copper and 240 µg/L of zinc. Turbidity has increased over time, and the four of the last five samples from A1 have exceeded the benchmark of 25 Nephelometric Turbidity Unit (NTU), although two of those samples were only slightly above. Results from the first quarter of 2017 sample appear anomalously high relative to typical conditions and it is likely that conditions during this sampling event are not representative of normal operations.

Total petroleum hydrocarbon concentrations have consistently been below benchmarks. Facility staff reportedly marked Yes for Visible Oil Sheen even though the sampler did not identify sheen, because they felt sheen had to be present based on their misinterpretation of the NWTPH-Dx concentrations relative to benchmark. Thus, the oil sheen results were not reviewed in evaluating stormwater treatment technologies.

3 Stormwater Treatment Alternatives Considered and Selected Option

3.1 Target Treatment System Performance

Targets for treatment system performance are shown in Table 3. These targets were developed based on the highest pollutant concentrations experienced in the past three years of monitoring at A1, excluding the anomalous event in first quarter of 2017.

Table 3. Targets for Treatment System Performance

Parameter	Units	Maximum Concentration in Last 3 Years	ISGP Benchmark	Target Percent Reduction
Turbidity	NTU	53	25	**53%**
Copper	µg/L	86	14	**84%**
Lead	µg/L	94	81.6	**13%**
Zinc	µg/L	380	117	**69%**

3.2 Alternatives Considered

The following treatment best management practices (BMPs) were screened for the Facility:

- Storage and settling with either aboveground ponds and/or tanks
- StormwateRx Aquip
- BioClean Environmental Modular Wetland System
- Chitosan Enhanced Sand Filtration (CESF)
- Electrocoagulation (EC)

These treatment alternatives are discussed below, and a treatment alternatives comparison matrix is provided in Table 4.

3.2.1 Combined Wet Pond/Detention Pond

Retrofit of the existing stormwater detention pond into a combined wet pond/detention pond was evaluated as a passive, nonproprietary treatment technology. The wet pond function would be designed consistent with BMP T10.40 of the 2014 Stormwater Management Manual for Western Washington (SWMMWW; Ecology, 2014c); however, the detention function would remain as designed for compliance with the applicable stormwater regulations for site development in the 1980s.

Creating a combined wet pond/detention pond would require installation of a flow splitter below A2, conveyance of stormwater to the wet pond location, and construction of the wet pond. The wet pond would require excavating to a depth of at least 5 feet and a total volume of 1,700 cubic feet (approximately 13,000 gallons). Treatment performance of a wet pond would likely not be sufficient at the Facility to achieve the target removal rates

identified in Table 3, particularly for copper and zinc. Therefore, this technology was eliminated based on treatment performance.

3.2.2 StormwateRx Aquip

StormwateRx's Aquip technology is a patented, enhanced media filtration system that removes both fine particulates and dissolved pollutants in simple and easy-to-use configurations. Based on Aquip's demonstrated track record successfully treating sites with influent water quality similar to or worse than the Facility; the ease of installation; and relatively low costs, Aquip is a viable treatment alternative at the Facility. However, an Aquip system would require an aboveground installation and pump station, which adds cost, reduces available space, and requires additional maintenance. Ecology has approved the Aquip as a Conditional Use Level Designation (CULD) technology for Enhanced Treatment.

3.2.3 BioClean Environmental Modular Wetland System

BioClean Environmental's Modular Wetland System (MWS) is a media filtration system using horizontal flow to maximize the surface area exposed to stormwater flow, which reduces the footprint required. MWS uses a proprietary biofiltration media named Wetland Media™. The technology also includes a pretreatment chamber with pre-filtration cartridges with BioMediaGREEN media. The pretreatment chamber removes sediment and hydrocarbons through separation, settling, and filtration, extending the life of the primary media. Flow rate through an MWS is controlled by an orifice at the outlet. MWSs can be configured with, or without, an internal high flow bypass weir to provide flow splitting. Plants are not necessary for treatment system performance, so MWSs can be installed below grade. Ecology has approved MWS as a General Use Level Designation (GULD) technology for Enhanced Treatment. It is anticipated that an MWS would result in consistent achievement of ISGP benchmarks. Given the treatment performance, hydraulic feasibility, and relative low cost, a MWS is a viable treatment alternative at the Facility.

3.2.4 Chitosan Enhanced Sand Filtration (CESF)

CESF relies on chemical and physical processes to coagulate fine solids-containing contaminants such as metals, which can then be settled and/or filtered. Liquid chitosan acetate is added as a coagulant at controlled dosing rates depending on the turbidity of the influent water. Ecology has approved CESF as a General Use Level Designation (GULD) technology for Erosion and Sediment Control. It is anticipated that CESF treatment would result in ISGP benchmarks being achieved; however, CESF was not further considered as a treatment alternative at the Facility since it is relatively expensive compared to other viable treatment options.

3.2.5 Electrocoagulation

Electrocoagulation (EC) systems generate a coagulation process by passing electrical current across sacrificial steel or aluminum electrodes. In addition to coagulating solids and precipitating metals, the process can electrochemically oxidize metals and organics. The coagulated solids are subsequently settled and/or filtered using a sand filter. Ecology has approved Water Tectonic's implementation of electrocoagulation as a GULD technology for Erosion and Sediment Control. It is anticipated that EC treatment would

result in ISGP benchmarks at the Facility being achieved; however, EC was not further considered since it is relatively expensive compared to other viable treatment options.

Table 4. Treatment Alternatives Comparison Matrix

	Combined Wet Pond/Detention Pond	StormwateRx Aquip	Modular Wetland System	Chitosan-Enhanced Sand Filtration	Electrocoagulation
Expected Water Quality Performance	• Could lower turbidity and possibly help with metals	• Would lower turbidity and metals concentrations	• Would lower turbidity and metals concentrations	• Would lower turbidity and metals concentrations	• Would lower turbidity and metals concentrations
Advantages	• Passive operation • Relatively lower capital costs • Proven for turbidity in stormwater	• Generally passive operation • Relatively lower capital costs • Proven for turbidity and metals in stormwater • Portable	• Passive operation • Relatively lower capital costs	• Generally passive operation • Proven for turbidity and metals in stormwater • Portable	• Generally unaffected by oils or heavy solids load • Proven for turbidity and metals in stormwater • Portable
Risks	• Not proven for metals • Relatively large space requirements • Significant earthwork	• Susceptible to oil and solids fouling • Requires pump station • No backwash mechanism	• Not portable • Excavation required	• Relatively active control required • Requires pump station • Susceptible to oil and solids fouling • Relatively higher capital costs	• Relatively active control required • Requires pump station • Relatively higher capital costs
Maintenance	• Periodic solids removal and vegetation maintenance	• Solids removal and media replacement	• Solids removal, periodic media replacement, and vegetation management (if planted)	• Solids removal and media replacement	• Cell replacement (approximately every 1 million gallons) • Solids removal and media replacement
Chemicals	• None	• None	• None	• Chitosan acetate	• NaOH • Brine (if needed)
Estimated Approximate Capital Cost	$75,000	$150,000	$125,000	$250,000	$250,000
Additional Comments	• Not selected - performance	• Not selected – cost and space	• Recommended treatment method	• Not selected – cost and space	• Not selected – cost and space

Notes:
N/A = not applicable

3.3 Selected Option

MWS was selected as the preferred treatment technology based on anticipated treatment performance, passive (gravity-driven) operations, lack of chemical addition, and cost.

Ecology's GULD approval for the MWS included findings of fact documenting the following pollutant removal rates:

- **Total Suspended Solids:** removal ranged from 99 percent in laboratory testing to 85 percent in field testing;
- **Copper:** Dissolved copper removal ranged from 93 percent in laboratory testing (at an influent concentration of 757 µg/L) to a lower 95th percentile confidence level of 32.5 percent in field testing (at influent concentrations ranging from 5 to 20 µg/L); and
- **Zinc:** Dissolved zinc removal ranged from 80.5 percent in laboratory testing (at an influent concentration of 950 µg/L) to a lower 95th percentile confidence level of 65 percent (at influent concentrations of 20 to 300 µg/L).

Removal efficiencies for total copper and zinc will meet or exceed the treatment performance for dissolved metals.

Based on these results and the source controls being implemented by Ace Metal, the MWS technology is anticipated to be able to meet ISGP benchmarks.

4 Information on Proposed Stormwater Management System

This section describes the stormwater infrastructure modifications and stormwater treatment system selected for the Facility. The design of the new stormwater management system has been prepared following guidance presented in the Stormwater Management Manual for Western Washington (Ecology, 2014c).

Additional information related to the design of the stormwater management system is provided in Appendix A, Hydrologic Analyses Information.

4.1 Site Layout

The treatment system would be located in a parking space between catch basins A1 and A2, as shown on Figure 3. The treatment system would receive detained runoff from the off-site neighbor (2 acres), detained runoff from A2 and A3, and undetained runoff flowing to a new inlet installed in the treatment system lid. Thus, the treatment system would treat runoff from all industrial areas of the Facility (0.48 acres total) including catch basins A3, A2, and the Facility entrance and loading and unloading area.

4.2 Hydrologic Analyses

The Western Washington Hydrology Model 2012 (WWHM2012) was used to simulate stormwater runoff from the treatment drainage basin (0.48 acres) to determine the required design flow rate for the treatment system and the neighboring property (1.97 acres) to design the diversion system.

WWHM2012 is a continuous-simulation hydrologic model developed by Ecology and based on the U.S. Environmental Protection Agency's (EPA) Hydrologic Simulation Program Fortran (HSPF). The model simulates the hydrology of an area on a 15-minute time-step basis, based on historical precipitation data and user inputs about the land characteristics.

The key model inputs are the location (to determine the most appropriate historical precipitation series) and land-use characteristics of the Facility. Precipitation used to represent conditions at the Facility was from the Everett weather station, with a scaling factor determined by WWHM2012 of 0.8.

The pipe storage detention systems on the neighboring property and at A2 were simulated in WWHM as custom Stage-Storage-Discharge (SSD) tables based on the design shown on their respective record drawings.

WWHM2012 was used to evaluate the following design parameters:

- Water quality treatment flow rate (as required by the 2014 SWMMWW) as the sum of:
    - The 2-year release from the off-site neighbor's detention system,
    - The 2-year release from the A2 detention system, and

- The off-line water quality treatment flow rate (i.e., the rate necessary to treat 91 percent of the total stormwater runoff) for the un-detained runoff entering the new inlet at the treatment system.

- Peak flow rates to evaluate the hydraulic capacity of the diversion piping and internal flow splitter.

The water quality treatment design rate for the Facility is 183 gpm (0.41 cubic feet per second [cfs]). A summary of the hydrologic modeling results is provided in Table 5.

Table 5. Hydrologic Model Results

Parameter	Treatment Basin
Facility:	
Water Quality Flow	0.41 cfs (183 gpm)
100-year Peak Flow	0.45 cfs
Neighboring Property:	
100-year Peak Flow	1.61 cfs

Notes:
cfs = cubic feet per second
gpm = gallons per minute

Details of the hydrologic analysis are provided in Appendix A.

4.3 Treatment System Information

The proposed treatment system is a Modular Wetland System, model number MWS-L-8-16. The treatment system would be located at the downgradient edge of the area of industrial activity at the Facility, as shown on Figure 3.

The treatment system would include the following components:

- Inlet grate in the lid of the pre-treatment chamber;
- Inlet pipe originating from A2;
- Prefiltration cartridge containing a proprietary media, BioMediaGreen;
- Internal flow splitting weir to direct flows in excess of the design flow rate directly to the outlet chamber;
- Biofiltration chamber consisting of:
  - Perimeter void area – after passing through the prefiltration cartridges, flow enters a perimeter void area that distributes water around the sides of the biofiltration media;
  - Biofiltration media, a proprietary blended biofiltration media named Wetland Media™;

  - Vertical underdrain system – creates horizontal flow through the biofiltration media;
  - An outlet orifice to control the flow rate through the treatment system; and
  - Optional lid or vegetative cover. Vegetation is not required for treatment system performance.
- Outlet chamber where treated stormwater and bypassed high flows would reconnect with the drainage system and travel to A1.

The exterior dimensions of treatment unit are about 9 feet wide, 17 feet long, and 7.5 feet deep. The unit contains 7.3 cubic feet of wetland media with a treatment surface area of ~207 square feet. At a hydraulic loading of 1 gpm per square foot (sf), the MWS-L-8-16 is rated for a treatment flow rate of 207 gpm or 0.462 cfs.

In addition to the Modular Wetland System, roof runoff will be monitored. If concentrations exceed the ISGP benchmarks, Grattix roof downspout filters will be installed on the three downspouts from the main building roof. Additional information about Grattix filters is presented in Appendix B.

4.4 Amount and Type of Chemical Used in Treatment Process

No chemicals are proposed in the treatment process.

4.5 Provisions for Emergency Overflow

Stormwater events exceeding the water quality design flow will bypass treatment by flowing over a high-flow bypass weir internal to the treatment system vault.

4.6 Constituent Removal and Disposal

Sediment, media, and other materials collected in the treatment system will be profiled and disposed at a properly licensed off-site disposal facility.

4.7 Anticipated Results

Assuming proper installation, operation, and maintenance of the proposed Level 3 Corrective Action, it is anticipated that effluent concentrations will meet ISGP benchmark values.

4.8 Operation and Maintenance

O&M requirements for MWSs are described in the O&M Manual presented in Appendix C. The primary maintenance requirements are:

1) Removing trash and debris from the pretreatment chamber;
2) Periodically replacing pre-treatment media (typically every 1 to 2 years); and
3) Trimming vegetation.

Replacement of biofiltration media is not anticipated to be routinely required.

5 Implementation Schedule

The primary components of implementation involve:

- Obtain Ecology approval of the Engineering Report;
- Local permitting with City of Mukilteo;
- Material procurement and construction planning; and
- Construction of the new treatment system and related infrastructure.

The target schedule would result in construction completed within 4.5 months, according to the following breakdown: Ecology approval within 60 days of submittal, local permitting concurrent with Ecology's review, then 1 month for contracting and procurement, and finally 1A month for construction and about 15 days of contingent time for schedule delays.

The construction activities will be conducted during summer 2018 with the goal of having the new stormwater treatment system installed and operational by September 30, 2018.

After construction, Ace Metal will own, operate, and maintain the stormwater management system.

Ace Metal does not currently have any future plans for expansion of their Facility, but is pursuing a building permit to construct a covered area to further reduce exposure of stormwater to pollutants. The roof will be located over an existing paved area, so no changes will be necessary to the hydrologic calculations or treatment facility sizing.

The proposed treatment system will comply with all local, state, and federal water pollution control acts or plans, and will improve the quality of stormwater discharged from the Facility by reducing input levels of metals and turbidity.

6 References

Washington State Department of Ecology (Ecology), 2013, Guidelines for the Preparation of Industrial Stormwater General Permit Engineering Reports, Publication no. 13-10-007, Water Quality Program, Washington State Department of Ecology, Olympia, WA, February 2013.

Washington State Department of Ecology (Ecology), 2014a, Industrial Stormwater General Permit, Washington State Department of Ecology, Olympia, WA.

Washington State Department of Ecology (Ecology), 2014b, Roofing Materials Assessment, Investigation of Toxic Chemicals in Roof Runoff, Washington State Department of Ecology, Olympia, WA. Pub No. 14-03-003. February 2014.

Washington State Department of Ecology (Ecology), 2014c, Stormwater Management Manual for Western Washington. Publication No. 04-10-076. Water Quality Program, Washington State Department of Ecology, Olympia, WA.

7 Limitations

Work for this project was performed for Ace Metals Company (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

TABLE

Table 2. Ace Metal Historical Sampling Results

Project No: 170124 - Ace Metal, Mukilteo, WA

Sampling Point - A1

Year	Qtr.	Sample Date	Turbidity in NTU	pH in S.U.	NWTPH-Dx in mg/L	Total Copper in µg/L	Total Lead in µg/L	Total Zinc in µg/L	Visible Oil sheen
	2	No Sample	-	-	-	-	-	-	-
	3	No Sample	-	-	-	-	-	-	-
2012	4	10/30/2012	-	7.15	0.3	**36**	26	**310**	No
	1	3/27/2013	**47**	6.52	0.25 U	6.2	3.7	50	No
	2	6/20/2013	11	6.65	1.1	**140**	26	**570**	No
	3	No Sample	-	-	-	-	-	-	-
2013	4	10/2/2013	6.9	6.56	0.25	10	4.3	**220**	No
	1	1/7/2014	14	6.69	0.54	16	8.3	140	No
		3/28/2014	0 U	6.52	0.57	25	14	120	No
		Average	14	N/A	0.555	**20.5**	11.15	**130**	N/A
	2	No Sample	-	-	-	-	-	-	-
	3	7/24/2014	4.5	6.57	0.36	**40**	8.3	**330**	**Yes**
2014	4	12/19/2014	3.8	6.53	-	11	5	87	No
	1	3/16/2015	6.1	6.32	3.4	**22**	15	**240**	**Yes**
	2	No Sample	-	-	-	-	-	-	-
	3	No Sample	-	-	-	-	-	-	-
2015	4	12/22/2015	4.8	6.65	0.61	**15**	9.8	86	**Yes**
	1	No Sample	-	-	-	-	-	-	-
	2	No Sample	-	-	-	-	-	-	-
	3	9/30/2016	**53**	7.24	0.78	**15**	1.2	54	**Yes**
2016	4	No Sample	-	-	-	-	-	-	-
	1	3/29/2017	**100**	8.32	**20**	**1300**	**2300**	**3400**	**Yes**
	2	5/11/2017	**32**	5.5	2	**52**	45	**250**	No
	3	No Sample	-	-	-	-	-	-	-
2017	4	11/9/2017	**27**	**4**	2.36	**86**	**94**	**380**	No
2018	1	2/2/2018	19	5.5	1.8	**39**	35	**280**	No
Benchmark Value			25	5 to 9	10	14	81.6	117	No
Maximum			100	8.32	20	1300	2300	3400	Yes
Average			25	6.42	2.6	128	185	456	N/A
Median			14	6.55	1.1	22	11.2	240	No
Minimum			3.8	4	0.25	6.2	1.2	50	No
Number of Samples			14	15	14	15	15	15	15

Notes:

- = No Sample or Not Analyzed

Bold = Benchmark Exceedance

N/A = Not applicable - averaging pH and Oil Sheen is not allowed under the ISGP.

NWTPH-Dx = Northwest Total Petroleum Hydrocarbons - Diesel extended range. NWTPH-Dx results shown are the sum of oil- and diesel-range hydrocarbons.

NTU = nephelometric turbidity unit

mg/L = milligrams per liter

S.U. = standard pH units

U = Not detected at given detection limit. Half detection limit used for summary statistics.

µg/L = micrograms per liter

Table 2. Ace Metal Historical Sampling Results

Project No: 170124 - Ace Metal, Mukilteo, WA

Sampling Point - A2

Year	Qtr.	Sample Date	Turbidity in NTU	pH in S.U.	NWTPH-Dx in mg/L	Total Copper in µg/L	Total Lead in µg/L	Total Zinc in µg/L	Visible Oil sheen
	2	No Sample	-	-	-	-	-	-	-
	3	No Sample	-	-	-	-	-	-	-
2012	4	10/30/2012	-	7.15	0.34	**42**	30	**300**	No
	1	3/27/2013	**45**	6.48	0.25 U	7.8	5.5	56	No
	2	6/20/2013	11	6.63	1.3	**26**	3.6	**410**	No
	3	No Sample	-	-	-	-	-	-	-
2013	4	10/2/2013	7	6.62	0.33	**24**	14	**250**	No
		1/7/2014	13	6.73	0.51	14	7.5	**140**	No
	1	3/28/2014	14	6.54	1.07	**25**	14	**120**	No
		Average	13.5	N/A	0.79	**19.5**	10.75	**130**	N/A
	2	No Sample	-	-	-	-	-	-	-
	3	7/24/2014	5.5	6.62	0.51	**50**	12	**390**	**Yes**
2014	4	12/19/2014	5.2	6.53	-	**23**	23	**130**	No
	1	3/16/2015	4.4	6.36	4.3	11	5.8	**140**	**Yes**
	2	No Sample	-	-	-	-	-	-	-
	3	No Sample	-	-	-	-	-	-	-
2015	4	12/22/2015	5.3	6.68	0.46	**17**	12	89	**Yes**
	1	No Sample	-	-	-	-	-	-	-
	2	No Sample	-	-	-	-	-	-	-
	3	9/30/2016	**36**	7.17	0.84	**85**	43	**290**	**Yes**
2016	4	No Sample	-	-	-	-	-	-	-
	1	3/29/2017	-	-	-	-	-	-	-
	2	No Sample - Monitoring Point Removed							
	3	No Sample - Monitoring Point Removed							
2017	4	No Sample - Monitoring Point Removed							
Benchmark Value			25	5 to 9	10	14	81.6	117	No
Maximum			45	7.17	4.3	85	43	410	Yes
Average			15	N/A	1.11	31	16	219	N/A
Median			7	6.62	0.65	23.5	12	195	No
Minimum			4.4	6.36	0.33	7.8	3.6	56	No
Number of Samples			10	11	10	11	11	11	11

Notes:
- = No Sample or Not Analyzed
Bold = Benchmark Exceedance
N/A = Not applicable - averaging pH and Oil Sheen is not allowed under the ISGP.
NWTPH-Dx = Northwest Total Petroleum Hydrocarbons - Diesel extended range. NWTPH-Dx results shown are the sum of oil- and diesel-range hydrocarbons.
NTU = nephelometric turbidity unit
mg/L = milligrams per liter
S.U. = standard pH units
U = Not detected at given detection limit. Half detection limit used for summary statistics.
µg/L = micrograms per liter

Table 2. Ace Metal Historical Sampling Results

Project No: 170124 - Ace Metal, Mukilteo, WA

Sampling Point - A3

Year	Qtr.	Sample Date	Turbidity in NTU	pH in S.U.	NWTPH-Dx in mg/L	Total Copper in µg/L	Total Lead in µg/L	Total Zinc in µg/L	Visible Oil sheen
2015	1	3/16/2015	13	6.72	1.7	**71**	17	**180**	No
	2	No Sample	-	-	-	-	-	-	-
	3	No Sample	-	-	-	-	-	-	-
	4	12/22/2015	5.8	6.69	0.2	**19**	13	91	**Yes**
2016	1	No Sample	-	-	-	-	-	-	-
	2	No Sample	-	-	-	-	-	-	-
	3	9/30/2016	**43**	7.13	0.34	14	1.2	51	**Yes**
	4	No Sample	-	-	-	-	-	-	-
2017	1	No Sample	-	-	-	-	-	-	-
	2	No Sample - Monitoring Point Removed							
	3	No Sample - Monitoring Point Removed							
	4	No Sample - Monitoring Point Removed							
Benchmark Value			25	5 to 9	10	14	81.6	117	No
Maximum			43	7.1	2	71	17	180	Yes
Average			21	N/A	0.75	35	10	107	N/A
Median			13	6.7	0.34	19	13.0	91	No
Minimum			5.8	6.69	0.20	14	1.2	51	No
Number of Samples			3	3	3	3	3	3	3

Notes:

- = No Sample or Not Analyzed

Bold = Benchmark Exceedance

N/A = Not applicable - averaging pH and Oil Sheen is not allowed under the ISGP.

NWTPH-Dx = Northwest Total Petroleum Hydrocarbons - Diesel extended range. NWTPH-Dx results shown are the sum of oil- and diesel-range hydrocarbons.

NTU = nephelometric turbidity unit

mg/L = milligrams per liter

S.U. = standard pH units

µg/L = micrograms per liter

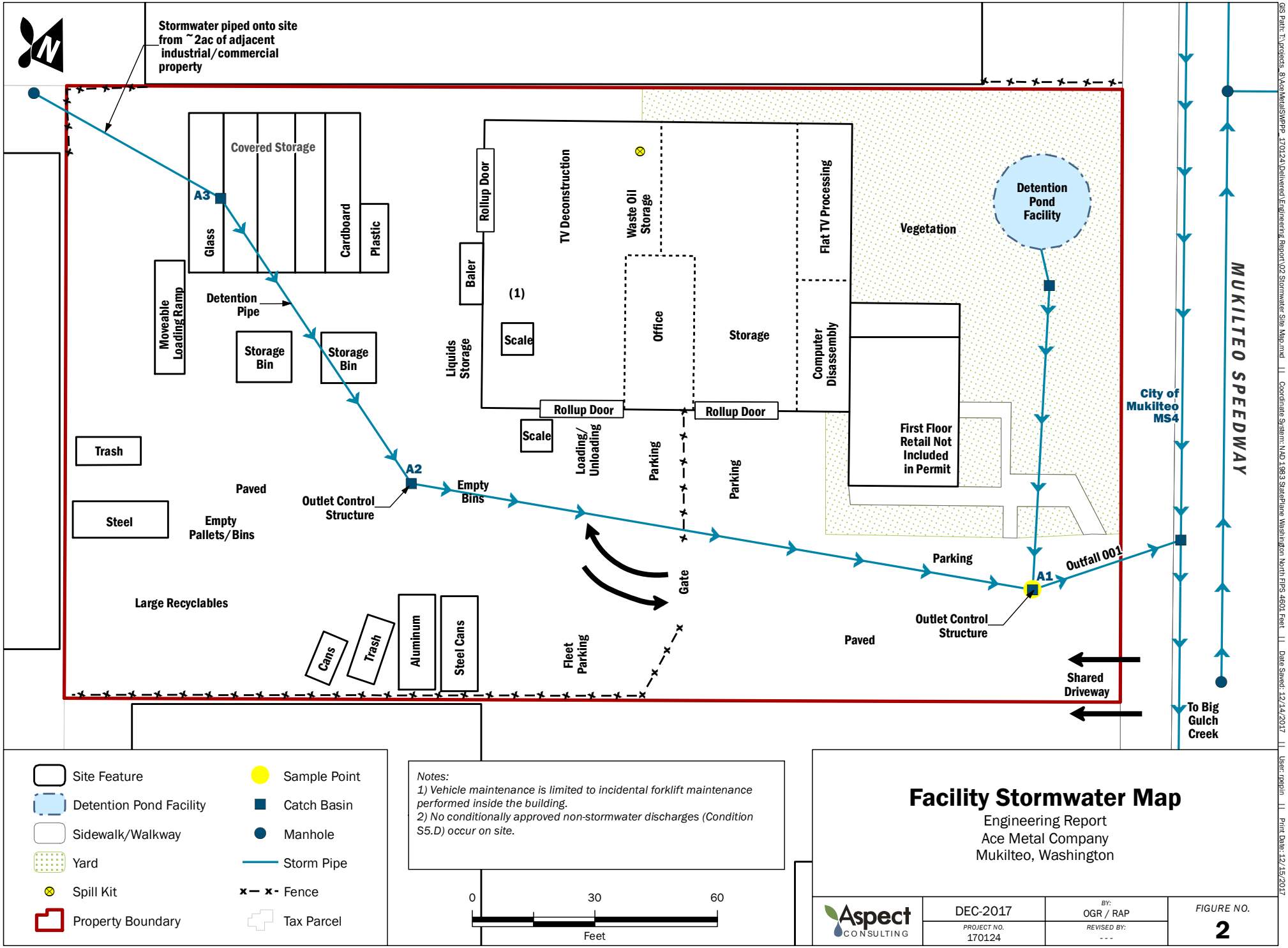
FIGURES

Site Location Map

Engineering Report
Ace Metal Company
Mukilteo, Washington

Aspect CONSULTING	DEC-2017	BY: OGR / KES / RAP	FIGURE NO. 1
	PROJECT NO. 170124	REVISED BY: ---	

GIS Path: T:\projects_8\Ace Metal\SWPP_170124\Delivered\Engineering Report\Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 12/14/2017 || User: mepin || Print Date: 12/15/2017


Stormwater piped onto site from ~2ac of adjacent industrial/commercial property
Covered Storage
Glass
Cardboard
Plastic
A3
Moveable Loading Ramp
Detention Pipe
Storage Bin
Storage Bin
Rollup Door
TV Deconstruction
Waste Oil Storage
Flat TV Processing
Baler
(1)
Liquids Storage
Scale
Office
Storage
Computer Disassembly
Vegetation
Detention Pond Facility
Rollup Door
Rollup Door
Scale
Loading/ Unloading
Parking
Parking
First Floor Retail Not Included in Permit
City of Mukilteo MS4
MUKILTEO SPEEDWAY
Trash
Paved
Steel
Empty Pallets/Bins
Outlet Control Structure
A2
Empty Bins
Gate
Parking
A1
Outfall 001
Large Recyclables
Cans
Trash
Aluminum
Steel Cans
Fleet Parking
Paved
Outlet Control Structure
Shared Driveway
To Big Gulch Creek
Site Feature
Detention Pond Facility
Sidewalk/Walkway
Yard
Spill Kit
Property Boundary
Sample Point
Catch Basin
Manhole
Storm Pipe
Fence
Tax Parcel
Notes:
1) Vehicle maintenance is limited to incidental forklift maintenance performed inside the building.
2) No conditionally approved non-stormwater discharges (Condition S5.D) occur on site.
0
30
60
Feet
Facility Stormwater Map
Engineering Report
Ace Metal Company
Mukilteo, Washington
Aspect CONSULTING
DEC-2017
BY: OGR / RAP
PROJECT NO. 170124
REVISED BY: ---
FIGURE NO. 2
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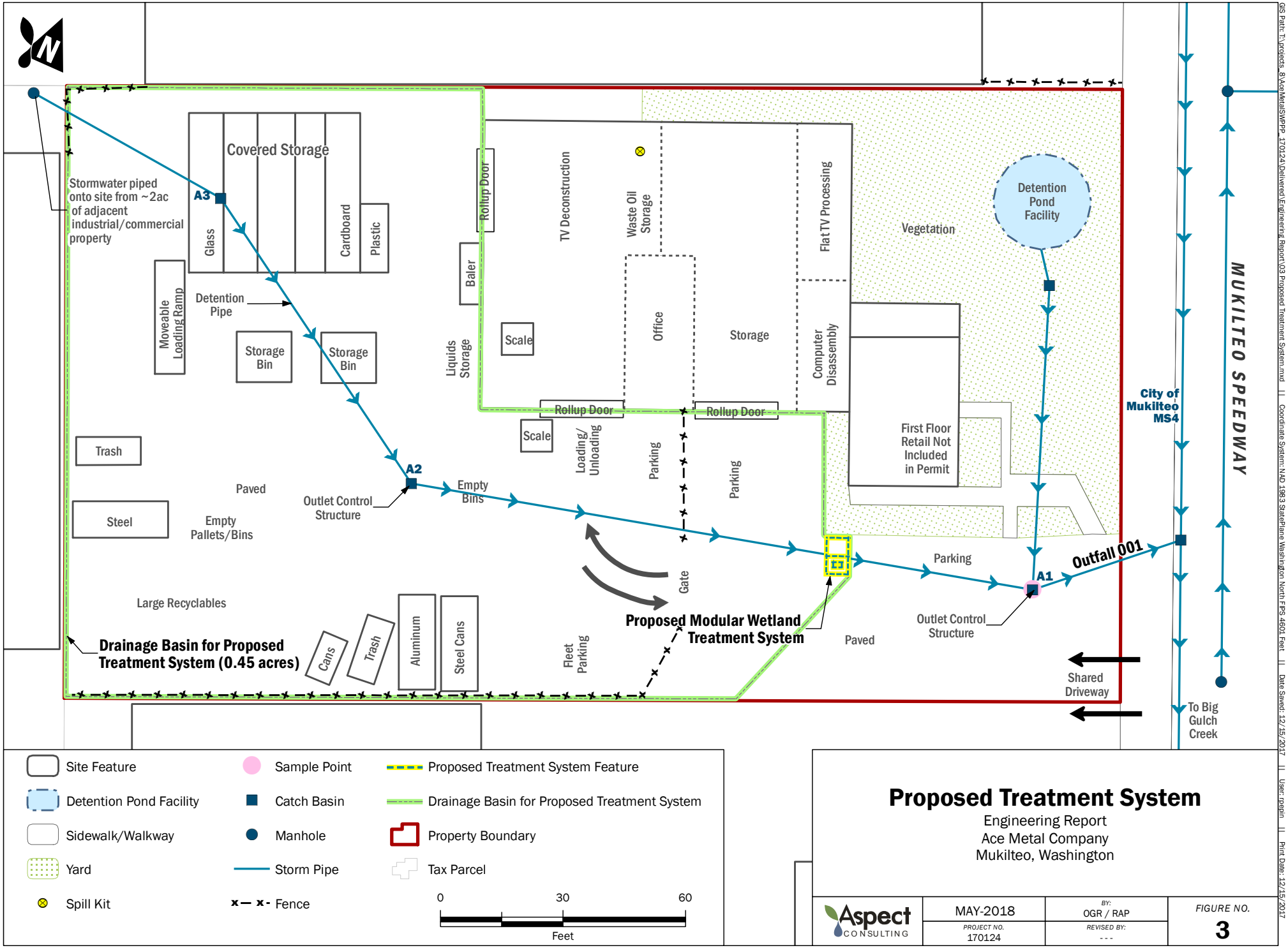


Proposed Treatment System

Engineering Report
Ace Metal Company
Mukilteo, Washington

Aspect CONSULTING	MAY-2018	BY: OGR / RAP	FIGURE NO. 3
	PROJECT NO. 170124	REVISED BY: ---	

GIS Path: T:\projects_8\AceMetals\WPRP_170124\Delivered\Engineering Report\03 Proposed Treatment System.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 12/15/2017 || User: rpgin || Print Date: 12/15/2017

APPENDICES

APPENDIX A

Hydrologic Analyses Information

WWHM2012
PROJECT REPORT

Project Name: Ace Metal Level 3
Site Name: Ace Metal Company
Site Address: 11110 Mukilteo Speedway
City : Mukilteo WA
Report Date: 12/15/2017
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2017/04/14
Version : 4.2.13

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

Low Flow Threshold for POC 2 : 50 Percent of the 2 Year

High Flow Threshold for POC 2: 50 year

Low Flow Threshold for POC 3 : 50 Percent of the 2 Year

High Flow Threshold for POC 3: 50 year

Low Flow Threshold for POC 4 : 50 Percent of the 2 Year

High Flow Threshold for POC 4: 50 year

Low Flow Threshold for POC 5 : 50 Percent of the 2 Year

High Flow Threshold for POC 5: 50 year

PREDEVELOPED LAND USE

Name : West Neighbor
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Lawn, Flat	.067

Pervious Total	**0.067**

Impervious Land Use	**acre**
ROOF TOPS FLAT	**0.829**
PARKING FLAT	**1.076**
Impervious Total	**1.905**
Basin Total	**1.972**

Element Flows To:

Surface	**Interflow**	**Groundwater**
SSD Table 1	SSD Table 1	

Name : A2&A3
Bypass: No

GroundWater: No

Pervious Land Use	**acre**
Pervious Total	**0**

Impervious Land Use	**acre**
ROADS MOD	**0.326**
Impervious Total	**0.326**
Basin Total	**0.326**

Element Flows To:

Surface	**Interflow**	**Groundwater**
SSD Table 2	SSD Table 2	

Name : SSD Table 1
Depth: 542.5895 ft.

Element Flows To:

Outlet 1	**Outlet 2**
SSD Table 2	

SSD Table Hydraulic Table

Stage (feet)	**Area (ac.)**	**Volume (ac-ft.)**	**Manual**	**NotUsed**	**NotUsed**	**NotUsed**	**NotUsed**

536.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000
536.6	0.025	0.000	0.007	0.000	0.000	0.000	0.000
536.7	0.025	0.001	0.010	0.000	0.000	0.000	0.000
536.7	0.025	0.001	0.012	0.000	0.000	0.000	0.000
536.8	0.025	0.001	0.014	0.000	0.000	0.000	0.000
536.8	0.025	0.002	0.016	0.000	0.000	0.000	0.000
536.9	0.025	0.003	0.018	0.000	0.000	0.000	0.000
536.9	0.025	0.003	0.019	0.000	0.000	0.000	0.000
537.0	0.025	0.004	0.020	0.000	0.000	0.000	0.000
537.0	0.025	0.005	0.022	0.000	0.000	0.000	0.000
537.1	0.025	0.006	0.023	0.000	0.000	0.000	0.000
537.2	0.025	0.006	0.024	0.000	0.000	0.000	0.000
537.2	0.025	0.007	0.025	0.000	0.000	0.000	0.000
537.3	0.025	0.008	0.026	0.000	0.000	0.000	0.000
537.3	0.025	0.009	0.027	0.000	0.000	0.000	0.000
537.4	0.025	0.010	0.028	0.000	0.000	0.000	0.000
537.4	0.025	0.011	0.029	0.000	0.000	0.000	0.000
537.5	0.025	0.013	0.031	0.000	0.000	0.000	0.000
537.7	0.025	0.015	0.032	0.000	0.000	0.000	0.000
537.8	0.025	0.017	0.034	0.000	0.000	0.000	0.000
537.9	0.025	0.019	0.035	0.000	0.000	0.000	0.000
538.0	0.025	0.021	0.037	0.000	0.000	0.000	0.000
538.1	0.025	0.024	0.038	0.000	0.000	0.000	0.000
538.2	0.025	0.026	0.039	0.000	0.000	0.000	0.000
538.3	0.025	0.028	0.041	0.000	0.000	0.000	0.000
538.4	0.025	0.031	0.042	0.000	0.000	0.000	0.000
538.5	0.025	0.033	0.043	0.000	0.000	0.000	0.000
538.6	0.025	0.036	0.044	0.000	0.000	0.000	0.000
538.8	0.025	0.038	0.046	0.000	0.000	0.000	0.000
538.9	0.025	0.041	0.047	0.000	0.000	0.000	0.000
539.0	0.025	0.043	0.048	0.000	0.000	0.000	0.000
539.1	0.025	0.046	0.049	0.000	0.000	0.000	0.000
539.2	0.025	0.048	0.050	0.000	0.000	0.000	0.000
539.3	0.025	0.051	0.051	0.000	0.000	0.000	0.000
539.4	0.025	0.053	0.052	0.000	0.000	0.000	0.000
539.5	0.025	0.056	0.053	0.000	0.000	0.000	0.000
539.6	0.025	0.058	0.054	0.000	0.000	0.000	0.000
539.8	0.025	0.061	0.055	0.000	0.000	0.000	0.000
539.9	0.025	0.063	0.056	0.000	0.000	0.000	0.000
540.0	0.025	0.065	0.057	0.000	0.000	0.000	0.000
540.1	0.025	0.068	0.058	0.000	0.000	0.000	0.000
540.2	0.025	0.070	0.058	0.000	0.000	0.000	0.000
540.3	0.025	0.072	0.059	0.000	0.000	0.000	0.000
540.4	0.025	0.074	0.060	0.000	0.000	0.000	0.000
540.5	0.025	0.076	0.061	0.000	0.000	0.000	0.000
540.6	0.025	0.078	0.062	0.000	0.000	0.000	0.000
540.8	0.025	0.080	0.063	0.000	0.000	0.000	0.000
540.9	0.025	0.082	0.064	0.000	0.000	0.000	0.000
541.0	0.025	0.084	0.064	0.000	0.000	0.000	0.000
541.1	0.025	0.085	0.065	0.000	0.000	0.000	0.000
541.2	0.025	0.087	0.066	0.000	0.000	0.000	0.000
541.3	0.025	0.088	0.067	0.000	0.000	0.000	0.000
541.4	0.025	0.089	0.068	0.000	0.000	0.000	0.000
541.5	0.025	0.089	0.068	0.000	0.000	0.000	0.000
541.6	0.025	0.089	0.185	0.000	0.000	0.000	0.000
541.6	0.025	0.089	0.421	0.000	0.000	0.000	0.000
541.7	0.025	0.089	0.730	0.000	0.000	0.000	0.000

541.8	0.025	0.089	1.096	0.000	0.000	0.000	0.000
541.8	0.025	0.089	1.511	0.000	0.000	0.000	0.000
541.9	0.025	0.090	1.968	0.000	0.000	0.000	0.000
541.9	0.025	0.090	2.464	0.000	0.000	0.000	0.000
542.0	0.025	0.090	2.994	0.000	0.000	0.000	0.000
542.0	0.025	0.090	3.556	0.000	0.000	0.000	0.000
542.1	0.025	0.090	4.148	0.000	0.000	0.000	0.000
542.1	0.025	0.091	4.767	0.000	0.000	0.000	0.000
542.2	0.025	0.091	5.413	0.000	0.000	0.000	0.000
542.3	0.025	0.091	6.082	0.000	0.000	0.000	0.000
542.3	0.025	0.091	6.775	0.000	0.000	0.000	0.000
542.4	0.025	0.092	7.489	0.000	0.000	0.000	0.000
542.4	0.025	0.092	8.223	0.000	0.000	0.000	0.000
542.5	0.025	0.092	8.977	0.000	0.000	0.000	0.000
542.5	0.025	0.093	9.750	0.000	0.000	0.000	0.000
542.6	0.025	0.093	10.47	0.000	0.000	0.000	0.000

Name : SSD Table 2
Depth: 110.3 ft.

Element Flows To:
Outlet 1 **Outlet 2**

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac-ft.)	Manual	NotUsed	NotUsed	NotUsed	NotUsed
106.1	1.000	0.000	0.000	0.000	0.000	0.000	0.000
106.1	1.000	0.000	0.011	0.000	0.000	0.000	0.000
106.1	1.000	0.000	0.016	0.000	0.000	0.000	0.000
106.1	1.000	0.000	0.019	0.000	0.000	0.000	0.000
106.1	1.000	0.000	0.022	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.025	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.027	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.030	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.032	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.034	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.035	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.037	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.039	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.040	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.042	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.043	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.045	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.046	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.047	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.049	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.050	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.051	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.053	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.054	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.055	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.056	0.000	0.000	0.000	0.000

106.4	1.000	0.000	0.057	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.058	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.059	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.060	0.000	0.000	0.000	0.000
106.4	1.000	0.001	0.061	0.000	0.000	0.000	0.000
106.4	1.000	0.001	0.062	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.064	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.066	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.068	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.070	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.071	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.072	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.073	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.073	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.075	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.077	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.078	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.080	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.082	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.083	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.085	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.086	0.000	0.000	0.000	0.000
106.8	1.000	0.001	0.087	0.000	0.000	0.000	0.000
106.8	1.000	0.001	0.089	0.000	0.000	0.000	0.000
106.8	1.000	0.001	0.090	0.000	0.000	0.000	0.000
106.8	1.000	0.001	0.092	0.000	0.000	0.000	0.000
106.9	1.000	0.001	0.093	0.000	0.000	0.000	0.000
106.9	1.000	0.001	0.094	0.000	0.000	0.000	0.000
106.9	1.000	0.001	0.096	0.000	0.000	0.000	0.000
106.9	1.000	0.002	0.097	0.000	0.000	0.000	0.000
106.9	1.000	0.002	0.098	0.000	0.000	0.000	0.000
107.0	1.000	0.002	0.100	0.000	0.000	0.000	0.000
107.0	1.000	0.002	0.101	0.000	0.000	0.000	0.000
107.0	1.000	0.002	0.102	0.000	0.000	0.000	0.000
107.0	1.000	0.002	0.103	0.000	0.000	0.000	0.000
107.1	1.000	0.002	0.104	0.000	0.000	0.000	0.000
107.1	1.000	0.002	0.106	0.000	0.000	0.000	0.000
107.1	1.000	0.002	0.107	0.000	0.000	0.000	0.000
107.2	1.000	0.002	0.112	0.000	0.000	0.000	0.000
107.4	1.000	0.002	0.122	0.000	0.000	0.000	0.000
107.6	1.000	0.002	0.131	0.000	0.000	0.000	0.000
107.8	1.000	0.002	0.139	0.000	0.000	0.000	0.000
108.0	1.000	0.002	0.147	0.000	0.000	0.000	0.000
108.2	1.000	0.002	0.155	0.000	0.000	0.000	0.000
108.4	1.000	0.002	0.162	0.000	0.000	0.000	0.000
108.6	1.000	0.002	0.169	0.000	0.000	0.000	0.000
108.8	1.000	0.002	0.175	0.000	0.000	0.000	0.000
108.9	1.000	0.002	0.179	0.000	0.000	0.000	0.000
109.0	1.000	0.002	0.182	0.000	0.000	0.000	0.000
109.1	1.000	0.003	0.509	0.000	0.000	0.000	0.000
109.2	1.000	0.004	1.102	0.000	0.000	0.000	0.000
109.3	1.000	0.004	1.866	0.000	0.000	0.000	0.000
109.4	1.000	0.005	2.764	0.000	0.000	0.000	0.000
109.5	1.000	0.006	3.777	0.000	0.000	0.000	0.000
109.6	1.000	0.007	4.888	0.000	0.000	0.000	0.000
109.7	1.000	0.008	6.088	0.000	0.000	0.000	0.000
109.8	1.000	0.009	7.366	0.000	0.000	0.000	0.000

109.9	1.000	0.010	8.716	0.000	0.000	0.000	0.000
110.0	1.000	0.011	10.13	0.000	0.000	0.000	0.000
110.1	1.000	0.012	11.61	0.000	0.000	0.000	0.000
110.2	1.000	0.013	13.14	0.000	0.000	0.000	0.000
110.3	1.000	0.014	14.71	0.000	0.000	0.000	0.000

Name : Portion of A1 to Treatment
Bypass: No

GroundWater: No

Pervious Land Use	**acre**
Pervious Total	**0**

Impervious Land Use	**acre**
ROADS MOD	**0.146**
Impervious Total	**0.146**
Basin Total	**0.146**

Element Flows To:

Surface	**Interflow**	**Groundwater**

MITIGATED LAND USE

Name : West Neighbor
Bypass: No

GroundWater: No

Pervious Land Use	**acre**
C, Lawn, Flat	**.067**
Pervious Total	**0.067**

Impervious Land Use	**acre**
ROOF TOPS FLAT	**0.829**
PARKING FLAT	**1.076**
Impervious Total	**1.905**
Basin Total	**1.972**

Element Flows To:

Surface	**Interflow**	**Groundwater**

Name : A2&A3
Bypass: No

GroundWater: No

Pervious Land Use	**acre**
Pervious Total	**0**

Impervious Land Use	**acre**
ROADS MOD	**0.326**
Impervious Total	**0.326**

Basin Total	**0.326**

Element Flows To:

Surface	**Interflow**	**Groundwater**
SSD Table 2	SSD Table 2	

Name : SSD Table 1
Depth: 542.5895 ft.

Element Flows To:

Outlet 1	**Outlet 2**

SSD Table Hydraulic Table

Stage (feet)	**Area (ac.)**	**Volume (ac-ft.)**	**Manual**	**NotUsed**	**NotUsed**	**NotUsed**	**NotUsed**
536.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000
536.6	0.025	0.000	0.007	0.000	0.000	0.000	0.000
536.7	0.025	0.001	0.010	0.000	0.000	0.000	0.000
536.7	0.025	0.001	0.012	0.000	0.000	0.000	0.000
536.8	0.025	0.001	0.014	0.000	0.000	0.000	0.000
536.8	0.025	0.002	0.016	0.000	0.000	0.000	0.000
536.9	0.025	0.003	0.018	0.000	0.000	0.000	0.000
536.9	0.025	0.003	0.019	0.000	0.000	0.000	0.000
537.0	0.025	0.004	0.020	0.000	0.000	0.000	0.000
537.0	0.025	0.005	0.022	0.000	0.000	0.000	0.000
537.1	0.025	0.006	0.023	0.000	0.000	0.000	0.000
537.2	0.025	0.006	0.024	0.000	0.000	0.000	0.000
537.2	0.025	0.007	0.025	0.000	0.000	0.000	0.000
537.3	0.025	0.008	0.026	0.000	0.000	0.000	0.000
537.3	0.025	0.009	0.027	0.000	0.000	0.000	0.000

537.4	0.025	0.010	0.028	0.000	0.000	0.000	0.000
537.4	0.025	0.011	0.029	0.000	0.000	0.000	0.000
537.5	0.025	0.013	0.031	0.000	0.000	0.000	0.000
537.7	0.025	0.015	0.032	0.000	0.000	0.000	0.000
537.8	0.025	0.017	0.034	0.000	0.000	0.000	0.000
537.9	0.025	0.019	0.035	0.000	0.000	0.000	0.000
538.0	0.025	0.021	0.037	0.000	0.000	0.000	0.000
538.1	0.025	0.024	0.038	0.000	0.000	0.000	0.000
538.2	0.025	0.026	0.039	0.000	0.000	0.000	0.000
538.3	0.025	0.028	0.041	0.000	0.000	0.000	0.000
538.4	0.025	0.031	0.042	0.000	0.000	0.000	0.000
538.5	0.025	0.033	0.043	0.000	0.000	0.000	0.000
538.6	0.025	0.036	0.044	0.000	0.000	0.000	0.000
538.8	0.025	0.038	0.046	0.000	0.000	0.000	0.000
538.9	0.025	0.041	0.047	0.000	0.000	0.000	0.000
539.0	0.025	0.043	0.048	0.000	0.000	0.000	0.000
539.1	0.025	0.046	0.049	0.000	0.000	0.000	0.000
539.2	0.025	0.048	0.050	0.000	0.000	0.000	0.000
539.3	0.025	0.051	0.051	0.000	0.000	0.000	0.000
539.4	0.025	0.053	0.052	0.000	0.000	0.000	0.000
539.5	0.025	0.056	0.053	0.000	0.000	0.000	0.000
539.6	0.025	0.058	0.054	0.000	0.000	0.000	0.000
539.8	0.025	0.061	0.055	0.000	0.000	0.000	0.000
539.9	0.025	0.063	0.056	0.000	0.000	0.000	0.000
540.0	0.025	0.065	0.057	0.000	0.000	0.000	0.000
540.1	0.025	0.068	0.058	0.000	0.000	0.000	0.000
540.2	0.025	0.070	0.058	0.000	0.000	0.000	0.000
540.3	0.025	0.072	0.059	0.000	0.000	0.000	0.000
540.4	0.025	0.074	0.060	0.000	0.000	0.000	0.000
540.5	0.025	0.076	0.061	0.000	0.000	0.000	0.000
540.6	0.025	0.078	0.062	0.000	0.000	0.000	0.000
540.8	0.025	0.080	0.063	0.000	0.000	0.000	0.000
540.9	0.025	0.082	0.064	0.000	0.000	0.000	0.000
541.0	0.025	0.084	0.064	0.000	0.000	0.000	0.000
541.1	0.025	0.085	0.065	0.000	0.000	0.000	0.000
541.2	0.025	0.087	0.066	0.000	0.000	0.000	0.000
541.3	0.025	0.088	0.067	0.000	0.000	0.000	0.000
541.4	0.025	0.089	0.068	0.000	0.000	0.000	0.000
541.5	0.025	0.089	0.068	0.000	0.000	0.000	0.000
541.6	0.025	0.089	0.185	0.000	0.000	0.000	0.000
541.6	0.025	0.089	0.421	0.000	0.000	0.000	0.000
541.7	0.025	0.089	0.730	0.000	0.000	0.000	0.000
541.8	0.025	0.089	1.096	0.000	0.000	0.000	0.000
541.8	0.025	0.089	1.511	0.000	0.000	0.000	0.000
541.9	0.025	0.090	1.968	0.000	0.000	0.000	0.000
541.9	0.025	0.090	2.464	0.000	0.000	0.000	0.000
542.0	0.025	0.090	2.994	0.000	0.000	0.000	0.000
542.0	0.025	0.090	3.556	0.000	0.000	0.000	0.000
542.1	0.025	0.090	4.148	0.000	0.000	0.000	0.000
542.1	0.025	0.091	4.767	0.000	0.000	0.000	0.000
542.2	0.025	0.091	5.413	0.000	0.000	0.000	0.000
542.3	0.025	0.091	6.082	0.000	0.000	0.000	0.000
542.3	0.025	0.091	6.775	0.000	0.000	0.000	0.000
542.4	0.025	0.092	7.489	0.000	0.000	0.000	0.000
542.4	0.025	0.092	8.223	0.000	0.000	0.000	0.000
542.5	0.025	0.092	8.977	0.000	0.000	0.000	0.000
542.5	0.025	0.093	9.750	0.000	0.000	0.000	0.000

542.6	0.025	0.093	10.47	0.000	0.000	0.000	0.000

Name : SSD Table 2
Depth: 110.3 ft.

Element Flows To:
Outlet 1 **Outlet 2**

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac-ft.)	Manual	NotUsed	NotUsed	NotUsed	NotUsed
106.1	1.000	0.000	0.000	0.000	0.000	0.000	0.000
106.1	1.000	0.000	0.011	0.000	0.000	0.000	0.000
106.1	1.000	0.000	0.016	0.000	0.000	0.000	0.000
106.1	1.000	0.000	0.019	0.000	0.000	0.000	0.000
106.1	1.000	0.000	0.022	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.025	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.027	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.030	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.032	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.034	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.035	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.037	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.039	0.000	0.000	0.000	0.000
106.2	1.000	0.000	0.040	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.042	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.043	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.045	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.046	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.047	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.049	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.050	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.051	0.000	0.000	0.000	0.000
106.3	1.000	0.000	0.053	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.054	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.055	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.056	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.057	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.058	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.059	0.000	0.000	0.000	0.000
106.4	1.000	0.000	0.060	0.000	0.000	0.000	0.000
106.4	1.000	0.001	0.061	0.000	0.000	0.000	0.000
106.4	1.000	0.001	0.062	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.064	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.066	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.068	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.070	0.000	0.000	0.000	0.000
106.5	1.000	0.001	0.071	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.072	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.073	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.073	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.075	0.000	0.000	0.000	0.000

106.6	1.000	0.001	0.077	0.000	0.000	0.000	0.000
106.6	1.000	0.001	0.078	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.080	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.082	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.083	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.085	0.000	0.000	0.000	0.000
106.7	1.000	0.001	0.086	0.000	0.000	0.000	0.000
106.8	1.000	0.001	0.087	0.000	0.000	0.000	0.000
106.8	1.000	0.001	0.089	0.000	0.000	0.000	0.000
106.8	1.000	0.001	0.090	0.000	0.000	0.000	0.000
106.8	1.000	0.001	0.092	0.000	0.000	0.000	0.000
106.9	1.000	0.001	0.093	0.000	0.000	0.000	0.000
106.9	1.000	0.001	0.094	0.000	0.000	0.000	0.000
106.9	1.000	0.001	0.096	0.000	0.000	0.000	0.000
106.9	1.000	0.002	0.097	0.000	0.000	0.000	0.000
106.9	1.000	0.002	0.098	0.000	0.000	0.000	0.000
107.0	1.000	0.002	0.100	0.000	0.000	0.000	0.000
107.0	1.000	0.002	0.101	0.000	0.000	0.000	0.000
107.0	1.000	0.002	0.102	0.000	0.000	0.000	0.000
107.0	1.000	0.002	0.103	0.000	0.000	0.000	0.000
107.1	1.000	0.002	0.104	0.000	0.000	0.000	0.000
107.1	1.000	0.002	0.106	0.000	0.000	0.000	0.000
107.1	1.000	0.002	0.107	0.000	0.000	0.000	0.000
107.2	1.000	0.002	0.112	0.000	0.000	0.000	0.000
107.4	1.000	0.002	0.122	0.000	0.000	0.000	0.000
107.6	1.000	0.002	0.131	0.000	0.000	0.000	0.000
107.8	1.000	0.002	0.139	0.000	0.000	0.000	0.000
108.0	1.000	0.002	0.147	0.000	0.000	0.000	0.000
108.2	1.000	0.002	0.155	0.000	0.000	0.000	0.000
108.4	1.000	0.002	0.162	0.000	0.000	0.000	0.000
108.6	1.000	0.002	0.169	0.000	0.000	0.000	0.000
108.8	1.000	0.002	0.175	0.000	0.000	0.000	0.000
108.9	1.000	0.002	0.179	0.000	0.000	0.000	0.000
109.0	1.000	0.002	0.182	0.000	0.000	0.000	0.000
109.1	1.000	0.003	0.509	0.000	0.000	0.000	0.000
109.2	1.000	0.004	1.102	0.000	0.000	0.000	0.000
109.3	1.000	0.004	1.866	0.000	0.000	0.000	0.000
109.4	1.000	0.005	2.764	0.000	0.000	0.000	0.000
109.5	1.000	0.006	3.777	0.000	0.000	0.000	0.000
109.6	1.000	0.007	4.888	0.000	0.000	0.000	0.000
109.7	1.000	0.008	6.088	0.000	0.000	0.000	0.000
109.8	1.000	0.009	7.366	0.000	0.000	0.000	0.000
109.9	1.000	0.010	8.716	0.000	0.000	0.000	0.000
110.0	1.000	0.011	10.13	0.000	0.000	0.000	0.000
110.1	1.000	0.012	11.61	0.000	0.000	0.000	0.000
110.2	1.000	0.013	13.14	0.000	0.000	0.000	0.000
110.3	1.000	0.014	14.71	0.000	0.000	0.000	0.000

Name : Portion of A1 to Treatment
Bypass: No

GroundWater: No

Pervious Land Use	**acre**

Pervious Total **0**

Impervious Land Use	acre
ROADS MOD	0.146
Impervious Total	0.146
Basin Total	0.146

Element Flows To:

Surface	Interflow	Groundwater

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.067
Total Impervious Area:1.905

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.067
Total Impervious Area:1.905

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.612179
5 year	0.835595
10 year	1.000083
25 year	1.227556
50 year	1.411799
100 year	1.609172

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.612179
5 year	0.835595
10 year	1.000083
25 year	1.227556
50 year	1.411799
100 year	1.609172

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated

1949	0.570	0.570
1950	0.768	0.768
1951	0.651	0.651
1952	0.558	0.558
1953	0.763	0.763
1954	0.955	0.955
1955	0.713	0.713
1956	0.337	0.337
1957	0.576	0.576
1958	1.385	1.385
1959	0.587	0.587
1960	0.511	0.511
1961	1.869	1.869
1962	0.689	0.689
1963	0.832	0.832
1964	0.439	0.439
1965	0.437	0.437
1966	0.447	0.447
1967	1.271	1.271
1968	0.684	0.684
1969	1.228	1.228
1970	0.485	0.485
1971	0.710	0.710
1972	0.909	0.909
1973	0.727	0.727
1974	0.919	0.919
1975	0.696	0.696
1976	0.483	0.483
1977	0.485	0.485
1978	0.379	0.379
1979	0.852	0.852
1980	0.435	0.435
1981	0.484	0.484
1982	0.489	0.489
1983	0.643	0.643
1984	0.576	0.576
1985	0.904	0.904
1986	0.806	0.806
1987	0.719	0.719
1988	0.559	0.559
1989	0.610	0.610
1990	0.415	0.415
1991	0.572	0.572
1992	0.554	0.554
1993	0.434	0.434
1994	0.422	0.422
1995	0.472	0.472
1996	0.586	0.586
1997	0.733	0.733
1998	0.815	0.815
1999	0.377	0.377
2000	1.146	1.146
2001	0.458	0.458
2002	0.426	0.426
2003	0.579	0.579
2004	1.097	1.097
2005	0.521	0.521

2006	0.641	0.641
2007	0.613	0.613
2008	0.505	0.505
2009	0.540	0.540

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	1.8693	1.8693
2	1.3846	1.3846
3	1.2710	1.2710
4	1.2284	1.2284
5	1.1457	1.1457
6	1.0967	1.0967
7	0.9552	0.9552
8	0.9185	0.9185
9	0.9085	0.9085
10	0.9038	0.9038
11	0.8519	0.8519
12	0.8322	0.8322
13	0.8150	0.8150
14	0.8056	0.8056
15	0.7684	0.7684
16	0.7625	0.7625
17	0.7333	0.7333
18	0.7269	0.7269
19	0.7190	0.7190
20	0.7134	0.7134
21	0.7099	0.7099
22	0.6964	0.6964
23	0.6890	0.6890
24	0.6837	0.6837
25	0.6511	0.6511
26	0.6430	0.6430
27	0.6410	0.6410
28	0.6132	0.6132
29	0.6103	0.6103
30	0.5874	0.5874
31	0.5864	0.5864
32	0.5786	0.5786
33	0.5763	0.5763
34	0.5762	0.5762
35	0.5721	0.5721
36	0.5700	0.5700
37	0.5591	0.5591
38	0.5580	0.5580
39	0.5544	0.5544
40	0.5396	0.5396
41	0.5209	0.5209
42	0.5110	0.5110
43	0.5050	0.5050
44	0.4885	0.4885
45	0.4851	0.4851
46	0.4846	0.4846
47	0.4839	0.4839
48	0.4834	0.4834

49	0.4724	0.4724
50	0.4582	0.4582
51	0.4470	0.4470
52	0.4390	0.4390
53	0.4373	0.4373
54	0.4346	0.4346
55	0.4345	0.4345
56	0.4263	0.4263
57	0.4223	0.4223
58	0.4153	0.4153
59	0.3789	0.3789
60	0.3770	0.3770
61	0.3369	0.3369

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3061	1295	1295	100	Pass
0.3173	1138	1138	100	Pass
0.3284	995	995	100	Pass
0.3396	901	901	100	Pass
0.3508	786	786	100	Pass
0.3619	703	703	100	Pass
0.3731	620	620	100	Pass
0.3843	553	553	100	Pass
0.3954	492	492	100	Pass
0.4066	447	447	100	Pass
0.4178	407	407	100	Pass
0.4289	365	365	100	Pass
0.4401	318	318	100	Pass
0.4513	288	288	100	Pass
0.4625	264	264	100	Pass
0.4736	247	247	100	Pass
0.4848	222	222	100	Pass
0.4960	205	205	100	Pass
0.5071	183	183	100	Pass
0.5183	158	158	100	Pass
0.5295	146	146	100	Pass
0.5406	139	139	100	Pass
0.5518	128	128	100	Pass
0.5630	113	113	100	Pass
0.5741	104	104	100	Pass
0.5853	99	99	100	Pass
0.5965	92	92	100	Pass
0.6076	87	87	100	Pass
0.6188	81	81	100	Pass
0.6300	80	80	100	Pass
0.6412	74	74	100	Pass
0.6523	69	69	100	Pass
0.6635	67	67	100	Pass
0.6747	64	64	100	Pass
0.6858	60	60	100	Pass

0.6970	57	57	100	Pass
0.7082	53	53	100	Pass
0.7193	48	48	100	Pass
0.7305	45	45	100	Pass
0.7417	42	42	100	Pass
0.7528	40	40	100	Pass
0.7640	34	34	100	Pass
0.7752	30	30	100	Pass
0.7863	30	30	100	Pass
0.7975	27	27	100	Pass
0.8087	26	26	100	Pass
0.8199	25	25	100	Pass
0.8310	23	23	100	Pass
0.8422	21	21	100	Pass
0.8534	19	19	100	Pass
0.8645	19	19	100	Pass
0.8757	19	19	100	Pass
0.8869	17	17	100	Pass
0.8980	17	17	100	Pass
0.9092	13	13	100	Pass
0.9204	12	12	100	Pass
0.9315	11	11	100	Pass
0.9427	11	11	100	Pass
0.9539	11	11	100	Pass
0.9650	10	10	100	Pass
0.9762	10	10	100	Pass
0.9874	10	10	100	Pass
0.9986	10	10	100	Pass
1.0097	10	10	100	Pass
1.0209	9	9	100	Pass
1.0321	9	9	100	Pass
1.0432	9	9	100	Pass
1.0544	9	9	100	Pass
1.0656	9	9	100	Pass
1.0767	9	9	100	Pass
1.0879	8	8	100	Pass
1.0991	6	6	100	Pass
1.1102	6	6	100	Pass
1.1214	6	6	100	Pass
1.1326	6	6	100	Pass
1.1437	6	6	100	Pass
1.1549	5	5	100	Pass
1.1661	5	5	100	Pass
1.1773	5	5	100	Pass
1.1884	5	5	100	Pass
1.1996	5	5	100	Pass
1.2108	5	5	100	Pass
1.2219	5	5	100	Pass
1.2331	4	4	100	Pass
1.2443	4	4	100	Pass
1.2554	4	4	100	Pass
1.2666	4	4	100	Pass
1.2778	3	3	100	Pass
1.2889	3	3	100	Pass
1.3001	3	3	100	Pass
1.3113	3	3	100	Pass
1.3224	3	3	100	Pass

1.3336	3	3	100	Pass
1.3448	3	3	100	Pass
1.3560	3	3	100	Pass
1.3671	3	3	100	Pass
1.3783	3	3	100	Pass
1.3895	1	1	100	Pass
1.4006	1	1	100	Pass
1.4118	1	1	100	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0.1551 **acre-feet**
On-line facility target flow: 0.2357 **cfs.**
Adjusted for 15 min: 0.2357 **cfs.**
Off-line facility target flow: 0.1342 **cfs.**
Adjusted for 15 min: 0.1342 **cfs.**

LID Report

LID Technique	Used for Percent Water Quality	Total Volumn Percent Treatment?	Comment	Volumn Needs Treatment (ac-ft)	Through Facility (ac-ft)	Infiltration Volumn (ac-ft.)	Cumulative Volumn Infiltration Credit
Total Volume Infiltrated				0.00	0.00	0.00	
0.00	0.00	0%	No Treat. Credit				

Compliance with LID Standard 8
Duration Analysis Result = Passed

Stream Protection Duration

Predeveloped Landuse Totals for POC #2
Total Pervious Area:0.067
Total Impervious Area:1.905

Mitigated Landuse Totals for POC #2
Total Pervious Area:0.067
Total Impervious Area:1.905

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	Flow(cfs)
2 year	0.296064
5 year	0.523815
10 year	0.678232
25 year	0.868255
50 year	1.003332
100 year	1.131761

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	Flow(cfs)
2 year	0.296064
5 year	0.523815
10 year	0.678232
25 year	0.868255
50 year	1.003332
100 year	1.131761

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #2

Year	Predeveloped	Mitigated
1949	0.272	0.272
1950	0.343	0.343
1951	0.290	0.290
1952	0.065	0.065
1953	0.062	0.062
1954	0.202	0.202
1955	0.450	0.450
1956	0.305	0.305
1957	0.576	0.576
1958	0.770	0.770
1959	0.362	0.362
1960	0.447	0.447
1961	0.604	0.604
1962	0.512	0.512
1963	0.346	0.346
1964	0.337	0.337
1965	0.149	0.149
1966	0.066	0.066
1967	0.769	0.769
1968	0.519	0.519
1969	0.442	0.442
1970	0.105	0.105
1971	0.250	0.250
1972	0.737	0.737
1973	0.064	0.064
1974	0.289	0.289
1975	0.156	0.156
1976	0.434	0.434
1977	0.340	0.340
1978	0.059	0.059
1979	0.856	0.856
1980	0.242	0.242
1981	0.143	0.143
1982	0.389	0.389
1983	0.448	0.448
1984	0.325	0.325
1985	0.404	0.404
1986	0.563	0.563
1987	0.709	0.709
1988	0.259	0.259
1989	0.057	0.057
1990	0.169	0.169
1991	0.283	0.283
1992	0.068	0.068
1993	0.253	0.253

1994	0.203	0.203
1995	0.268	0.268
1996	0.541	0.541
1997	0.734	0.734
1998	0.151	0.151
1999	0.195	0.195
2000	0.351	0.351
2001	0.060	0.060
2002	0.256	0.256
2003	0.135	0.135
2004	0.829	0.829
2005	0.269	0.269
2006	0.392	0.392
2007	0.459	0.459
2008	0.506	0.506
2009	0.293	0.293

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	0.8563	0.8563
2	0.8289	0.8289
3	0.7703	0.7703
4	0.7689	0.7689
5	0.7374	0.7374
6	0.7337	0.7337
7	0.7094	0.7094
8	0.6041	0.6041
9	0.5765	0.5765
10	0.5627	0.5627
11	0.5411	0.5411
12	0.5193	0.5193
13	0.5118	0.5118
14	0.5057	0.5057
15	0.4592	0.4592
16	0.4500	0.4500
17	0.4484	0.4484
18	0.4466	0.4466
19	0.4418	0.4418
20	0.4337	0.4337
21	0.4039	0.4039
22	0.3916	0.3916
23	0.3888	0.3888
24	0.3625	0.3625
25	0.3505	0.3505
26	0.3462	0.3462
27	0.3428	0.3428
28	0.3405	0.3405
29	0.3372	0.3372
30	0.3245	0.3245
31	0.3049	0.3049
32	0.2932	0.2932
33	0.2897	0.2897
34	0.2885	0.2885
35	0.2825	0.2825
36	0.2716	0.2716

37	0.2688	0.2688
38	0.2677	0.2677
39	0.2587	0.2587
40	0.2563	0.2563
41	0.2527	0.2527
42	0.2502	0.2502
43	0.2422	0.2422
44	0.2026	0.2026
45	0.2023	0.2023
46	0.1947	0.1947
47	0.1686	0.1686
48	0.1562	0.1562
49	0.1513	0.1513
50	0.1489	0.1489
51	0.1428	0.1428
52	0.1353	0.1353
53	0.1048	0.1048
54	0.0682	0.0682
55	0.0656	0.0656
56	0.0649	0.0649
57	0.0638	0.0638
58	0.0618	0.0618
59	0.0602	0.0602
60	0.0590	0.0590
61	0.0573	0.0573

Stream Protection Duration
POC #2
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1480	1129	1129	100	Pass
0.1567	1041	1041	100	Pass
0.1653	934	934	100	Pass
0.1740	853	853	100	Pass
0.1826	767	767	100	Pass
0.1912	686	686	100	Pass
0.1999	617	617	100	Pass
0.2085	559	559	100	Pass
0.2171	518	518	100	Pass
0.2258	489	489	100	Pass
0.2344	452	452	100	Pass
0.2431	409	409	100	Pass
0.2517	386	386	100	Pass
0.2603	362	362	100	Pass
0.2690	340	340	100	Pass
0.2776	304	304	100	Pass
0.2863	283	283	100	Pass
0.2949	265	265	100	Pass
0.3035	245	245	100	Pass
0.3122	217	217	100	Pass
0.3208	199	199	100	Pass
0.3295	181	181	100	Pass
0.3381	167	167	100	Pass

0.3467	155	155	100	Pass
0.3554	137	137	100	Pass
0.3640	127	127	100	Pass
0.3727	116	116	100	Pass
0.3813	102	102	100	Pass
0.3899	92	92	100	Pass
0.3986	78	78	100	Pass
0.4072	72	72	100	Pass
0.4159	69	69	100	Pass
0.4245	62	62	100	Pass
0.4331	58	58	100	Pass
0.4418	56	56	100	Pass
0.4504	48	48	100	Pass
0.4591	42	42	100	Pass
0.4677	38	38	100	Pass
0.4763	35	35	100	Pass
0.4850	35	35	100	Pass
0.4936	32	32	100	Pass
0.5022	30	30	100	Pass
0.5109	26	26	100	Pass
0.5195	24	24	100	Pass
0.5282	21	21	100	Pass
0.5368	21	21	100	Pass
0.5454	20	20	100	Pass
0.5541	19	19	100	Pass
0.5627	19	19	100	Pass
0.5714	18	18	100	Pass
0.5800	17	17	100	Pass
0.5886	17	17	100	Pass
0.5973	17	17	100	Pass
0.6059	16	16	100	Pass
0.6146	15	15	100	Pass
0.6232	15	15	100	Pass
0.6318	15	15	100	Pass
0.6405	14	14	100	Pass
0.6491	13	13	100	Pass
0.6578	12	12	100	Pass
0.6664	12	12	100	Pass
0.6750	11	11	100	Pass
0.6837	11	11	100	Pass
0.6923	11	11	100	Pass
0.7010	11	11	100	Pass
0.7096	11	11	100	Pass
0.7182	9	9	100	Pass
0.7269	9	9	100	Pass
0.7355	8	8	100	Pass
0.7442	7	7	100	Pass
0.7528	7	7	100	Pass
0.7614	6	6	100	Pass
0.7701	4	4	100	Pass
0.7787	3	3	100	Pass
0.7873	3	3	100	Pass
0.7960	3	3	100	Pass
0.8046	3	3	100	Pass
0.8133	3	3	100	Pass
0.8219	3	3	100	Pass
0.8305	1	1	100	Pass

0.8392	1	1	100	Pass
0.8478	1	1	100	Pass
0.8565	1	1	100	Pass
0.8651	0	0	100	Pass
0.8737	0	0	0	Pass
0.8824	0	0	0	Pass
0.8910	0	0	0	Pass
0.8997	0	0	0	Pass
0.9083	0	0	0	Pass
0.9169	0	0	0	Pass
0.9256	0	0	0	Pass
0.9342	0	0	0	Pass
0.9429	0	0	0	Pass
0.9515	0	0	0	Pass
0.9601	0	0	0	Pass
0.9688	0	0	0	Pass
0.9774	0	0	0	Pass
0.9861	0	0	0	Pass
0.9947	0	0	0	Pass
1.0033	0	0	0	Pass

Water Quality BMP Flow and Volume for POC #2
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Water Quality Treatment?	Total Volumn Percent Needs Treatment (ac-ft)	Volumn Through Facility (ac-ft)	Infiltration Volumn (ac-ft.)	Cumulative Volumn Infiltration Credit	Percent Infiltrated	Comment
SSD Table 1 POC	N	207.40			N	0.00	
Total Volume Infiltrated		207.40	0.00	0.00		0.00	0.00
		0%	No Treat. Credit				

Compliance with LID Standard 8
Duration Analysis Result = Passed

Stream Protection Duration

Predeveloped Landuse Totals for POC #3
Total Pervious Area:0
Total Impervious Area:0.326

Mitigated Landuse Totals for POC #3
Total Pervious Area:0

Total Impervious Area:0.326

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	Flow(cfs)
2 year	0.129539
5 year	0.174392
10 year	0.207064
25 year	0.251863
50 year	0.287874
100 year	0.326221

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	Flow(cfs)
2 year	0.129539
5 year	0.174392
10 year	0.207064
25 year	0.251863
50 year	0.287874
100 year	0.326221

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #3

Year	Predeveloped	Mitigated
1949	0.130	0.130
1950	0.135	0.135
1951	0.169	0.169
1952	0.127	0.127
1953	0.148	0.148
1954	0.201	0.201
1955	0.163	0.163
1956	0.071	0.071
1957	0.109	0.109
1958	0.287	0.287
1959	0.120	0.120
1960	0.121	0.121
1961	0.370	0.370
1962	0.149	0.149
1963	0.145	0.145
1964	0.084	0.084
1965	0.114	0.114
1966	0.114	0.114
1967	0.237	0.237
1968	0.121	0.121
1969	0.250	0.250
1970	0.104	0.104
1971	0.129	0.129
1972	0.174	0.174
1973	0.141	0.141
1974	0.171	0.171
1975	0.138	0.138
1976	0.101	0.101
1977	0.102	0.102
1978	0.077	0.077
1979	0.157	0.157
1980	0.133	0.133

1981	0.102	0.102
1982	0.112	0.112
1983	0.137	0.137
1984	0.126	0.126
1985	0.171	0.171
1986	0.166	0.166
1987	0.151	0.151
1988	0.132	0.132
1989	0.115	0.115
1990	0.102	0.102
1991	0.134	0.134
1992	0.126	0.126
1993	0.101	0.101
1994	0.109	0.109
1995	0.098	0.098
1996	0.164	0.164
1997	0.140	0.140
1998	0.167	0.167
1999	0.067	0.067
2000	0.291	0.291
2001	0.082	0.082
2002	0.089	0.089
2003	0.123	0.123
2004	0.230	0.230
2005	0.099	0.099
2006	0.144	0.144
2007	0.133	0.133
2008	0.118	0.118
2009	0.099	0.099

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	0.3704	0.3704
2	0.2913	0.2913
3	0.2874	0.2874
4	0.2499	0.2499
5	0.2367	0.2367
6	0.2297	0.2297
7	0.2006	0.2006
8	0.1742	0.1742
9	0.1715	0.1715
10	0.1709	0.1709
11	0.1686	0.1686
12	0.1665	0.1665
13	0.1664	0.1664
14	0.1642	0.1642
15	0.1630	0.1630
16	0.1570	0.1570
17	0.1509	0.1509
18	0.1488	0.1488
19	0.1476	0.1476
20	0.1447	0.1447
21	0.1436	0.1436
22	0.1410	0.1410
23	0.1404	0.1404

24	0.1384	0.1384
25	0.1371	0.1371
26	0.1350	0.1350
27	0.1344	0.1344
28	0.1333	0.1333
29	0.1330	0.1330
30	0.1315	0.1315
31	0.1301	0.1301
32	0.1291	0.1291
33	0.1267	0.1267
34	0.1259	0.1259
35	0.1257	0.1257
36	0.1231	0.1231
37	0.1212	0.1212
38	0.1211	0.1211
39	0.1202	0.1202
40	0.1184	0.1184
41	0.1145	0.1145
42	0.1142	0.1142
43	0.1138	0.1138
44	0.1125	0.1125
45	0.1087	0.1087
46	0.1086	0.1086
47	0.1043	0.1043
48	0.1024	0.1024
49	0.1023	0.1023
50	0.1017	0.1017
51	0.1011	0.1011
52	0.1008	0.1008
53	0.0993	0.0993
54	0.0990	0.0990
55	0.0978	0.0978
56	0.0890	0.0890
57	0.0838	0.0838
58	0.0821	0.0821
59	0.0771	0.0771
60	0.0710	0.0710
61	0.0672	0.0672

Stream Protection Duration
POC #3
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0648	888	888	100	Pass
0.0670	784	784	100	Pass
0.0693	705	705	100	Pass
0.0715	624	624	100	Pass
0.0738	561	561	100	Pass
0.0760	505	505	100	Pass
0.0783	441	441	100	Pass
0.0805	397	397	100	Pass
0.0828	367	367	100	Pass
0.0851	334	334	100	Pass

0.0873	298	298	100	Pass
0.0896	279	279	100	Pass
0.0918	252	252	100	Pass
0.0941	240	240	100	Pass
0.0963	221	221	100	Pass
0.0986	203	203	100	Pass
0.1008	189	189	100	Pass
0.1031	168	168	100	Pass
0.1053	150	150	100	Pass
0.1076	142	142	100	Pass
0.1098	132	132	100	Pass
0.1121	123	123	100	Pass
0.1143	114	114	100	Pass
0.1166	108	108	100	Pass
0.1189	101	101	100	Pass
0.1211	97	97	100	Pass
0.1234	90	90	100	Pass
0.1256	84	84	100	Pass
0.1279	77	77	100	Pass
0.1301	68	68	100	Pass
0.1324	63	63	100	Pass
0.1346	56	56	100	Pass
0.1369	52	52	100	Pass
0.1391	47	47	100	Pass
0.1414	44	44	100	Pass
0.1436	41	41	100	Pass
0.1459	37	37	100	Pass
0.1482	34	34	100	Pass
0.1504	32	32	100	Pass
0.1527	31	31	100	Pass
0.1549	31	31	100	Pass
0.1572	29	29	100	Pass
0.1594	27	27	100	Pass
0.1617	26	26	100	Pass
0.1639	23	23	100	Pass
0.1662	21	21	100	Pass
0.1684	18	18	100	Pass
0.1707	17	17	100	Pass
0.1729	14	14	100	Pass
0.1752	13	13	100	Pass
0.1774	13	13	100	Pass
0.1797	13	13	100	Pass
0.1820	12	12	100	Pass
0.1842	12	12	100	Pass
0.1865	11	11	100	Pass
0.1887	11	11	100	Pass
0.1910	11	11	100	Pass
0.1932	11	11	100	Pass
0.1955	10	10	100	Pass
0.1977	9	9	100	Pass
0.2000	9	9	100	Pass
0.2022	8	8	100	Pass
0.2045	8	8	100	Pass
0.2067	8	8	100	Pass
0.2090	8	8	100	Pass
0.2113	8	8	100	Pass
0.2135	8	8	100	Pass

0.2158	8	8	100	Pass
0.2180	8	8	100	Pass
0.2203	8	8	100	Pass
0.2225	8	8	100	Pass
0.2248	8	8	100	Pass
0.2270	8	8	100	Pass
0.2293	8	8	100	Pass
0.2315	7	7	100	Pass
0.2338	7	7	100	Pass
0.2360	6	6	100	Pass
0.2383	5	5	100	Pass
0.2405	5	5	100	Pass
0.2428	5	5	100	Pass
0.2451	5	5	100	Pass
0.2473	5	5	100	Pass
0.2496	5	5	100	Pass
0.2518	4	4	100	Pass
0.2541	4	4	100	Pass
0.2563	4	4	100	Pass
0.2586	4	4	100	Pass
0.2608	4	4	100	Pass
0.2631	4	4	100	Pass
0.2653	4	4	100	Pass
0.2676	4	4	100	Pass
0.2698	4	4	100	Pass
0.2721	4	4	100	Pass
0.2744	4	4	100	Pass
0.2766	4	4	100	Pass
0.2789	4	4	100	Pass
0.2811	4	4	100	Pass
0.2834	4	4	100	Pass
0.2856	4	4	100	Pass
0.2879	3	3	100	Pass

Water Quality BMP Flow and Volume for POC #3
On-line facility volume: 0.0385 **acre-feet**
On-line facility target flow: 0.0671 **cfs.**
Adjusted for 15 min: 0.0671 **cfs.**
Off-line facility target flow: 0.038 **cfs.**
Adjusted for 15 min: 0.038 **cfs.**

LID Report

LID Technique	Used for Water Quality Treatment?	Total Volumn Needs Treatment (ac-ft)	Volumn Through Facility (ac-ft)	Infiltration Volumn (ac-ft.)	Cumulative Infiltration Credit	Percent Water Quality Volumn	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0%	No Treat. Credit

Compliance with LID Standard 8
Duration Analysis Result = Passed

Stream Protection Duration

Predeveloped Landuse Totals for POC #4
Total Pervious Area:0.067
Total Impervious Area:2.231

Mitigated Landuse Totals for POC #4
Total Pervious Area:0
Total Impervious Area:0.326

Flow Frequency Return Periods for Predeveloped. POC #4

Return Period	Flow(cfs)
2 year	0.35069
5 year	0.582626
10 year	0.755356
25 year	0.992065
50 year	1.180333
100 year	1.37787

Flow Frequency Return Periods for Mitigated. POC #4

Return Period	Flow(cfs)
2 year	0.104036
5 year	0.144787
10 year	0.17651
25 year	0.222429
50 year	0.261178
100 year	0.304091

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #4

Year	Predeveloped	Mitigated
1949	0.310	0.095
1950	0.368	0.134
1951	0.334	0.127
1952	0.140	0.090
1953	0.175	0.127
1954	0.221	0.159
1955	0.536	0.126
1956	0.343	0.063
1957	0.686	0.089
1958	0.934	0.262
1959	0.441	0.088
1960	0.512	0.087
1961	0.711	0.364
1962	0.622	0.114
1963	0.419	0.146
1964	0.383	0.073
1965	0.165	0.085
1966	0.112	0.087
1967	0.876	0.212
1968	0.614	0.113

1969	0.529	0.228
1970	0.121	0.078
1971	0.292	0.116
1972	0.860	0.174
1973	0.164	0.116
1974	0.337	0.156
1975	0.164	0.110
1976	0.509	0.077
1977	0.386	0.077
1978	0.110	0.064
1979	1.023	0.144
1980	0.280	0.096
1981	0.157	0.077
1982	0.486	0.082
1983	0.529	0.101
1984	0.368	0.106
1985	0.468	0.154
1986	0.651	0.136
1987	0.793	0.124
1988	0.294	0.093
1989	0.149	0.095
1990	0.191	0.078
1991	0.333	0.104
1992	0.134	0.089
1993	0.290	0.076
1994	0.237	0.080
1995	0.317	0.076
1996	0.633	0.112
1997	0.861	0.122
1998	0.198	0.153
1999	0.228	0.061
2000	0.413	0.215
2001	0.130	0.078
2002	0.306	0.075
2003	0.163	0.099
2004	1.027	0.192
2005	0.304	0.089
2006	0.457	0.108
2007	0.509	0.100
2008	0.589	0.088
2009	0.328	0.086

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #4

Rank	**Predeveloped**	**Mitigated**
1	1.0274	0.3636
2	1.0232	0.2625
3	0.9336	0.2283
4	0.8761	0.2150
5	0.8611	0.2123
6	0.8601	0.1921
7	0.7926	0.1735
8	0.7112	0.1594
9	0.6865	0.1559
10	0.6508	0.1537
11	0.6327	0.1529

12	0.6221	0.1464
13	0.6140	0.1438
14	0.5890	0.1364
15	0.5364	0.1338
16	0.5288	0.1273
17	0.5286	0.1273
18	0.5116	0.1259
19	0.5090	0.1237
20	0.5090	0.1220
21	0.4862	0.1160
22	0.4681	0.1158
23	0.4566	0.1140
24	0.4410	0.1132
25	0.4186	0.1117
26	0.4125	0.1103
27	0.3855	0.1080
28	0.3830	0.1064
29	0.3679	0.1036
30	0.3678	0.1014
31	0.3427	0.0996
32	0.3367	0.0989
33	0.3339	0.0956
34	0.3333	0.0952
35	0.3281	0.0949
36	0.3171	0.0931
37	0.3098	0.0896
38	0.3061	0.0894
39	0.3037	0.0894
40	0.2941	0.0893
41	0.2919	0.0882
42	0.2905	0.0882
43	0.2797	0.0874
44	0.2373	0.0868
45	0.2276	0.0865
46	0.2210	0.0847
47	0.1983	0.0823
48	0.1909	0.0798
49	0.1751	0.0785
50	0.1653	0.0784
51	0.1642	0.0781
52	0.1638	0.0772
53	0.1625	0.0768
54	0.1567	0.0767
55	0.1486	0.0763
56	0.1396	0.0763
57	0.1343	0.0754
58	0.1301	0.0734
59	0.1210	0.0640
60	0.1121	0.0627
61	0.1102	0.0612

Stream Protection Duration
POC #4
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1753	1126	15	1	Pass
0.1855	1029	12	1	Pass
0.1956	914	9	0	Pass
0.2058	833	8	0	Pass
0.2160	752	4	0	Pass
0.2261	646	4	0	Pass
0.2363	587	2	0	Pass
0.2464	548	2	0	Pass
0.2566	509	2	0	Pass
0.2667	474	1	0	Pass
0.2769	449	1	0	Pass
0.2870	408	1	0	Pass
0.2972	383	1	0	Pass
0.3073	342	1	0	Pass
0.3175	318	1	0	Pass
0.3276	297	1	0	Pass
0.3378	273	1	0	Pass
0.3479	260	1	0	Pass
0.3581	231	1	0	Pass
0.3682	208	0	0	Pass
0.3784	193	0	0	Pass
0.3885	177	0	0	Pass
0.3987	163	0	0	Pass
0.4088	148	0	0	Pass
0.4190	131	0	0	Pass
0.4291	119	0	0	Pass
0.4393	108	0	0	Pass
0.4494	99	0	0	Pass
0.4596	90	0	0	Pass
0.4697	79	0	0	Pass
0.4799	75	0	0	Pass
0.4900	66	0	0	Pass
0.5002	59	0	0	Pass
0.5103	54	0	0	Pass
0.5205	48	0	0	Pass
0.5306	45	0	0	Pass
0.5408	41	0	0	Pass
0.5509	39	0	0	Pass
0.5611	34	0	0	Pass
0.5712	33	0	0	Pass
0.5814	32	0	0	Pass
0.5916	27	0	0	Pass
0.6017	25	0	0	Pass
0.6119	25	0	0	Pass
0.6220	22	0	0	Pass
0.6322	21	0	0	Pass
0.6423	20	0	0	Pass
0.6525	18	0	0	Pass
0.6626	18	0	0	Pass
0.6728	18	0	0	Pass
0.6829	18	0	0	Pass
0.6931	16	0	0	Pass
0.7032	15	0	0	Pass
0.7134	14	0	0	Pass
0.7235	14	0	0	Pass

0.7337	14	0	0	Pass
0.7438	14	0	0	Pass
0.7540	14	0	0	Pass
0.7641	14	0	0	Pass
0.7743	14	0	0	Pass
0.7844	12	0	0	Pass
0.7946	11	0	0	Pass
0.8047	10	0	0	Pass
0.8149	10	0	0	Pass
0.8250	9	0	0	Pass
0.8352	8	0	0	Pass
0.8453	8	0	0	Pass
0.8555	8	0	0	Pass
0.8656	6	0	0	Pass
0.8758	6	0	0	Pass
0.8859	4	0	0	Pass
0.8961	4	0	0	Pass
0.9062	4	0	0	Pass
0.9164	4	0	0	Pass
0.9265	4	0	0	Pass
0.9367	3	0	0	Pass
0.9469	3	0	0	Pass
0.9570	2	0	0	Pass
0.9672	2	0	0	Pass
0.9773	2	0	0	Pass
0.9875	2	0	0	Pass
0.9976	2	0	0	Pass
1.0078	2	0	0	Pass
1.0179	2	0	0	Pass
1.0281	0	0	0	Pass
1.0382	0	0	0	Pass
1.0484	0	0	0	Pass
1.0585	0	0	0	Pass
1.0687	0	0	0	Pass
1.0788	0	0	0	Pass
1.0890	0	0	0	Pass
1.0991	0	0	0	Pass
1.1093	0	0	0	Pass
1.1194	0	0	0	Pass
1.1296	0	0	0	Pass
1.1397	0	0	0	Pass
1.1499	0	0	0	Pass
1.1600	0	0	0	Pass
1.1702	0	0	0	Pass
1.1803	0	0	0	Pass

Water Quality BMP Flow and Volume for POC #4
On-line facility volume: 0.1379 **acre-feet**
On-line facility target flow: 0.088 **cfs.**
Adjusted for 15 min: 0.088 **cfs.**
Off-line facility target flow: 0.0554 **cfs.**
Adjusted for 15 min: 0.0554 **cfs.**

LID Report

LID Technique	Used for Water Quality	Total Volumn Percent Treatment?	Volumn Needs Treatment (ac-ft)	Infiltration Through Facility (ac-ft)	Cumulative Volumn Volumn Infiltration (ac-ft.)	Percent Infiltration Credit	Comment
SSD Table 2 POC	N	35.82				N	
Total Volume Infiltrated		35.82	0.00	0.00	0.00	0.00	0.00
Compliance with LID Standard 8		No Treat. Credit					
Duration Analysis Result = Passed							

Stream Protection Duration

Predeveloped Landuse Totals for POC #5
Total Pervious Area:0
Total Impervious Area:0.146

Mitigated Landuse Totals for POC #5
Total Pervious Area:0
Total Impervious Area:0.146

Flow Frequency Return Periods for Predeveloped. POC #5

Return Period	Flow(cfs)
2 year	0.058014
5 year	0.078102
10 year	0.092734
25 year	0.112797
50 year	0.128925
100 year	0.146099

Flow Frequency Return Periods for Mitigated. POC #5

Return Period	Flow(cfs)
2 year	0.058014
5 year	0.078102
10 year	0.092734
25 year	0.112797
50 year	0.128925
100 year	0.146099

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #5

Year	Predeveloped	Mitigated
1949	0.058	0.058
1950	0.060	0.060
1951	0.076	0.076
1952	0.057	0.057
1953	0.066	0.066
1954	0.090	0.090
1955	0.073	0.073

1956	0.032	0.032
1957	0.049	0.049
1958	0.129	0.129
1959	0.054	0.054
1960	0.054	0.054
1961	0.166	0.166
1962	0.067	0.067
1963	0.065	0.065
1964	0.038	0.038
1965	0.051	0.051
1966	0.051	0.051
1967	0.106	0.106
1968	0.054	0.054
1969	0.112	0.112
1970	0.047	0.047
1971	0.058	0.058
1972	0.078	0.078
1973	0.063	0.063
1974	0.077	0.077
1975	0.062	0.062
1976	0.045	0.045
1977	0.046	0.046
1978	0.035	0.035
1979	0.070	0.070
1980	0.060	0.060
1981	0.046	0.046
1982	0.050	0.050
1983	0.061	0.061
1984	0.056	0.056
1985	0.077	0.077
1986	0.075	0.075
1987	0.068	0.068
1988	0.059	0.059
1989	0.051	0.051
1990	0.046	0.046
1991	0.060	0.060
1992	0.056	0.056
1993	0.045	0.045
1994	0.049	0.049
1995	0.044	0.044
1996	0.074	0.074
1997	0.063	0.063
1998	0.075	0.075
1999	0.030	0.030
2000	0.130	0.130
2001	0.037	0.037
2002	0.040	0.040
2003	0.055	0.055
2004	0.103	0.103
2005	0.044	0.044
2006	0.064	0.064
2007	0.060	0.060
2008	0.053	0.053
2009	0.044	0.044

Stream Protection Duration

Ranked Annual Peaks for Predeveloped and Mitigated. POC #5

Rank	Predeveloped	Mitigated
1	0.1659	0.1659
2	0.1305	0.1305
3	0.1287	0.1287
4	0.1119	0.1119
5	0.1060	0.1060
6	0.1029	0.1029
7	0.0898	0.0898
8	0.0780	0.0780
9	0.0768	0.0768
10	0.0766	0.0766
11	0.0755	0.0755
12	0.0746	0.0746
13	0.0745	0.0745
14	0.0735	0.0735
15	0.0730	0.0730
16	0.0703	0.0703
17	0.0676	0.0676
18	0.0666	0.0666
19	0.0661	0.0661
20	0.0648	0.0648
21	0.0643	0.0643
22	0.0632	0.0632
23	0.0629	0.0629
24	0.0620	0.0620
25	0.0614	0.0614
26	0.0604	0.0604
27	0.0602	0.0602
28	0.0597	0.0597
29	0.0596	0.0596
30	0.0589	0.0589
31	0.0583	0.0583
32	0.0578	0.0578
33	0.0567	0.0567
34	0.0564	0.0564
35	0.0563	0.0563
36	0.0551	0.0551
37	0.0543	0.0543
38	0.0542	0.0542
39	0.0538	0.0538
40	0.0530	0.0530
41	0.0513	0.0513
42	0.0512	0.0512
43	0.0509	0.0509
44	0.0504	0.0504
45	0.0487	0.0487
46	0.0487	0.0487
47	0.0467	0.0467
48	0.0459	0.0459
49	0.0458	0.0458
50	0.0456	0.0456
51	0.0453	0.0453
52	0.0451	0.0451
53	0.0445	0.0445
54	0.0443	0.0443
55	0.0438	0.0438

56	0.0399	0.0399
57	0.0375	0.0375
58	0.0368	0.0368
59	0.0345	0.0345
60	0.0318	0.0318
61	0.0301	0.0301

Stream Protection Duration
POC #5
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0290	888	888	100	Pass
0.0300	784	784	100	Pass
0.0310	705	705	100	Pass
0.0320	625	625	100	Pass
0.0330	561	561	100	Pass
0.0341	505	505	100	Pass
0.0351	441	441	100	Pass
0.0361	397	397	100	Pass
0.0371	367	367	100	Pass
0.0381	334	334	100	Pass
0.0391	299	299	100	Pass
0.0401	279	279	100	Pass
0.0411	253	253	100	Pass
0.0421	241	241	100	Pass
0.0431	221	221	100	Pass
0.0441	204	204	100	Pass
0.0452	189	189	100	Pass
0.0462	167	167	100	Pass
0.0472	150	150	100	Pass
0.0482	142	142	100	Pass
0.0492	131	131	100	Pass
0.0502	123	123	100	Pass
0.0512	114	114	100	Pass
0.0522	108	108	100	Pass
0.0532	101	101	100	Pass
0.0542	97	97	100	Pass
0.0552	89	89	100	Pass
0.0563	84	84	100	Pass
0.0573	77	77	100	Pass
0.0583	68	68	100	Pass
0.0593	63	63	100	Pass
0.0603	56	56	100	Pass
0.0613	52	52	100	Pass
0.0623	47	47	100	Pass
0.0633	44	44	100	Pass
0.0643	40	40	100	Pass
0.0653	37	37	100	Pass
0.0664	34	34	100	Pass
0.0674	32	32	100	Pass
0.0684	31	31	100	Pass
0.0694	31	31	100	Pass
0.0704	29	29	100	Pass

0.0714	27	27	100	Pass
0.0724	26	26	100	Pass
0.0734	23	23	100	Pass
0.0744	20	20	100	Pass
0.0754	18	18	100	Pass
0.0764	17	17	100	Pass
0.0775	14	14	100	Pass
0.0785	13	13	100	Pass
0.0795	13	13	100	Pass
0.0805	13	13	100	Pass
0.0815	12	12	100	Pass
0.0825	12	12	100	Pass
0.0835	11	11	100	Pass
0.0845	11	11	100	Pass
0.0855	11	11	100	Pass
0.0865	11	11	100	Pass
0.0875	10	10	100	Pass
0.0886	9	9	100	Pass
0.0896	9	9	100	Pass
0.0906	8	8	100	Pass
0.0916	8	8	100	Pass
0.0926	8	8	100	Pass
0.0936	8	8	100	Pass
0.0946	8	8	100	Pass
0.0956	8	8	100	Pass
0.0966	8	8	100	Pass
0.0976	8	8	100	Pass
0.0986	8	8	100	Pass
0.0997	8	8	100	Pass
0.1007	8	8	100	Pass
0.1017	8	8	100	Pass
0.1027	8	8	100	Pass
0.1037	7	7	100	Pass
0.1047	7	7	100	Pass
0.1057	6	6	100	Pass
0.1067	5	5	100	Pass
0.1077	5	5	100	Pass
0.1087	5	5	100	Pass
0.1097	5	5	100	Pass
0.1108	5	5	100	Pass
0.1118	5	5	100	Pass
0.1128	4	4	100	Pass
0.1138	4	4	100	Pass
0.1148	4	4	100	Pass
0.1158	4	4	100	Pass
0.1168	4	4	100	Pass
0.1178	4	4	100	Pass
0.1188	4	4	100	Pass
0.1198	4	4	100	Pass
0.1209	4	4	100	Pass
0.1219	4	4	100	Pass
0.1229	4	4	100	Pass
0.1239	4	4	100	Pass
0.1249	4	4	100	Pass
0.1259	4	4	100	Pass
0.1269	4	4	100	Pass
0.1279	4	4	100	Pass

0.1289 3 3 100 Pass

Water Quality BMP Flow and Volume for POC #5
On-line facility volume: 0.0119 **acre-feet**
On-line facility target flow: 0.0207 **cfs.**
Adjusted for 15 min: 0.0207 **cfs.**
Off-line facility target flow: 0.0117 **cfs.**
Adjusted for 15 min: 0.0117 **cfs.**

LID Report

LID Technique	Used for Water Quality Treatment?	Percent Treated	Total Volumn Needs Treatment (ac-ft)	Volumn Through Facility (ac-ft)	Infiltration Volumn (ac-ft.)	Cumulative Volumn Infiltration Credit	Percent Infiltrated	Comment
Total Volume Infiltrated			0.00	0.00	0.00			
0.00	0.00	0%	No Treat. Credit					

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

APPENDIX B

Roof Downspout Filter Information

GRATTIX
RAIN GARDEN IN A BOX

Port of Vancouver USA

3103 NW Lower River Road, Vancouver, WA 98660 T: 360.693.3611 F: 360.735.1565 E: info@portvanusa.com www.portvanusa.com

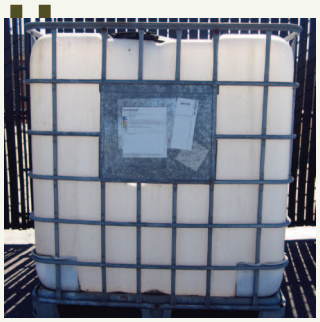
Two talented port employees invented what is basically a rain garden in a box. It's an innovative system that removes zinc pollution in stormwater from galvanized metal roofs and downspouts on the terminal. Matt Graves and Mary Mattix, both members of the port's environmental team, call the new stormwater treatment system the Grattix (a combination of their last names), but many others in the environmental world are calling it innovative, inexpensive, and effective.

Cross Section of a Grattix

The Grattix is built using a food grade plastic tote, approximately 325 gallons. Inside, a perforated underdrain system is installed, followed by a layer of drain rock. A layer of screen is added to maintain a separation between layers. On top of the screen is a layer of pea gravel, followed by another layer of screen. Sand is then added followed by a bioretention soil mix. The finishing touches include adding plantings, a river rock splash pad and bark mulch. The plantings used are rushes and sedges, which can dry out in the summer months and withstand ponding in the winter months. If you have any questions about stormwater protection at the port, please contact Matt Graves at 360-693-3611 or mgraves@portvanusa.com.

Building a Grattix

A 10-STEP GUIDE TO CONSTRUCTING YOUR OWN RAIN GARDEN IN A BOX



STEP 1

Obtain a food grade plastic tote, approximately 325 gallon capacity.

STEP 2

Install a perforated 2-inch PVC pipe underdrain system.

STEP 3

Add 12 inches of 2-3 inch drain rock, double-washed to prevent turbidity/ clogging.

STEP 4

Place a layer of pet-proof window screening.

STEP 5

Next comes 6 inches of pea gravel.

STEP 6

Place another layer of pet-proof window screening over the pea gravel.

STEP 7

On top of the screening, add 6 inches of sand.

STEP 8

Then add 10 inches of bio-retention soil mix (40 percent compost and 60 percent sand).

STEP 9

Plant rushes and sedges, 2 each, and then place 2-3 inches of hard-wood mulch around plants. Position 3-4 large river rocks to create a splash pad.

STEP 10

Position your Grattix under a down spout. For a more finished look, add a wooden exterior.

APPENDIX C

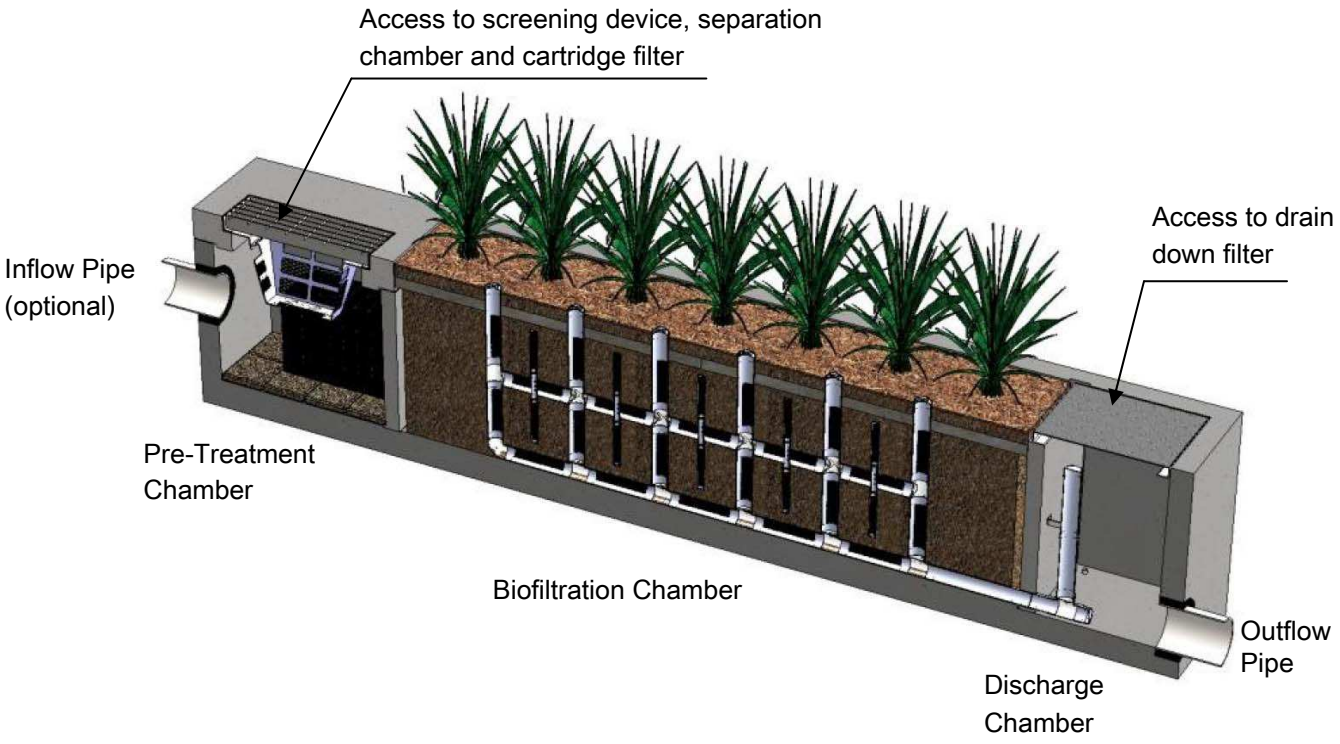
Modular Wetland System Operation and Maintenance Manual

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ___/___/___ Time _____ AM / PM

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes:

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

Addendum - Revised Page 13

- The off-line water quality treatment flow rate (i.e., the rate necessary to treat 91 percent of the total stormwater runoff) for the un-detained runoff entering the new inlet at the treatment system.

- Peak flow rates to evaluate the hydraulic capacity of the diversion piping and internal flow splitter.

The water quality treatment design rate for the treatment facility is 183 gallons per minute (gpm; 0.41 cubic feet per second [cfs]). A summary of the hydrologic model results is provided in Table 5.

Table 5. Hydrologic Model Results

Parameter	Treatment Basin
Portion of Facility Tributary to Treatment System:	
Water Quality Flow	0.112 cfs (50 gpm)
100-year Peak Flow	0.45 cfs
Neighboring Property:	
Water Quality Flow	0.296 cfs (133 gpm)
100-year Peak Flow	1.61 cfs

Details of the hydrologic analysis are provided in Appendix A.

4.3 Treatment System Information

The proposed treatment system is a Modular Wetland System, model number MWS-L-8-16. The treatment system would be located at the downgradient edge of the area of industrial activity at the Facility, as shown on Figure 3.

The treatment system would include the following components:

- Inlet grate in the lid of the pre-treatment chamber;
- Inlet pipe originating from A2;
- Prefiltration cartridge containing a proprietary media, BioMediaGreen;
- Internal flow splitting weir to direct flows in excess of the design flow rate directly to the outlet chamber;
- Biofiltration chamber consisting of:
  - Perimeter void area – after passing through the prefiltration cartridges, flow enters a perimeter void area that distributes water around the sides of the biofiltration media;
  - Biofiltration media, a proprietary blended biofiltration media named Wetland Media™;

Attachment B

EDMONDS COMMUNITY COLLEGE
ANTHROPOLOGY

June 11, 2018

Katelyn Kinn
Puget Soundkeeper Alliance
130 Nickerson Street Suite 107
Seattle, WA 98109

Dear Ms. Kinn,

This letter is intended to provide assurance that I have received the Consent Decree in the matter of *Puget Soundkeeper Alliance v. Ace Metal Corporation*; 2:17-cv-00524-TSZ (W.D. Wash April 4, 2017), and that I am authorized to make the following binding commitments on behalf of Edmonds Community College Foundation:

1) I understand that Edmonds Community College Foundation should receive funds from Ace Metal Corporation as specified in the Consent Decree.
2) Edmonds Community College Foundation shall only use these Ace Metal Corporation funds for a project or projects that benefit the water quality of Big Gulch Creek.
3) After the funds have been disbursed, Edmonds Community College Foundation shall send a report to the Parties describing how the funds were utilized and demonstrating conformance with the nexus of the Consent Decree.
4) Edmonds Community College Foundation is a 501(c)(3) tax exempt organization.

The funds received from Ace Metal Corporation will be used for the project described below:

Big Gulch is one of the largest ravines within the City of Mukilteo and serves as important recreational space for humans and habitat for a wide variety of plants and animals within an urban setting. The creek is home to multiple anadromous salmonids, including coho and chum as well as juvenile stages of the ESA listed chinook. Recognizing the importance of this habitat and its recreational value, the City of Mukilteo and Snohomish County Airport enlisted the aid of students and faculty at Edmonds Community College in the ecological monitoring of Big and nearby Japanese Gulches.

Since 2013 the city and county have provided contracts totaling $27,000 to subsidize scientific surveys of adult salmonids in Big and Japanese Gulch by college students in November and December of each year. The contracts have helped cover the cost of faculty oversight, student survey team leaders, and transportation to and from the sites. The college has complemented these salmon surveys with broader data collection on wildlife presence in and use of the riparian zones along the creeks as well as water quality parameters. These additional data have been

collected by service-learning students under faculty and staff supervision at no cost to the municipal partners. One more year of data collection is planned for this assessment but In 2017 the municipal contract covered less than half of the cost to the college of the project for the academic year. Furthermore, the remaining municipal contract includes no funds for a summary report of the full six years of ecological assessments.

The Anthropology Department at Edmonds CC is proposing to use funds provided by Ace Metal via Puget Soundkeeper Alliance and Edmonds CC Foundation to cover some of the unsubsidized portions of this ecological assessment during the academic year of 2018-2019 and for the preparation of a summary report of the data collected over a six year period. This summary report would include an overall portrait of the ecological health of the Big Gulch basin and recommendations for future restoration priorities and social marketing endeavors with human populations in the watershed necessary for protecting the health of the stream.

Previous technical reports assessing the ecology of Big and Japanese Gulch under the municipal contract as well as human ecological evaluations of other basins in the region can be found at the link below. These would serve as the model for the proposed summary report.

https://edcc.academia.edu/ThomasMurphy/Technical-Reports

Sincerely,

Thomas W Murphy

Dr. Thomas W Murphy, PhD