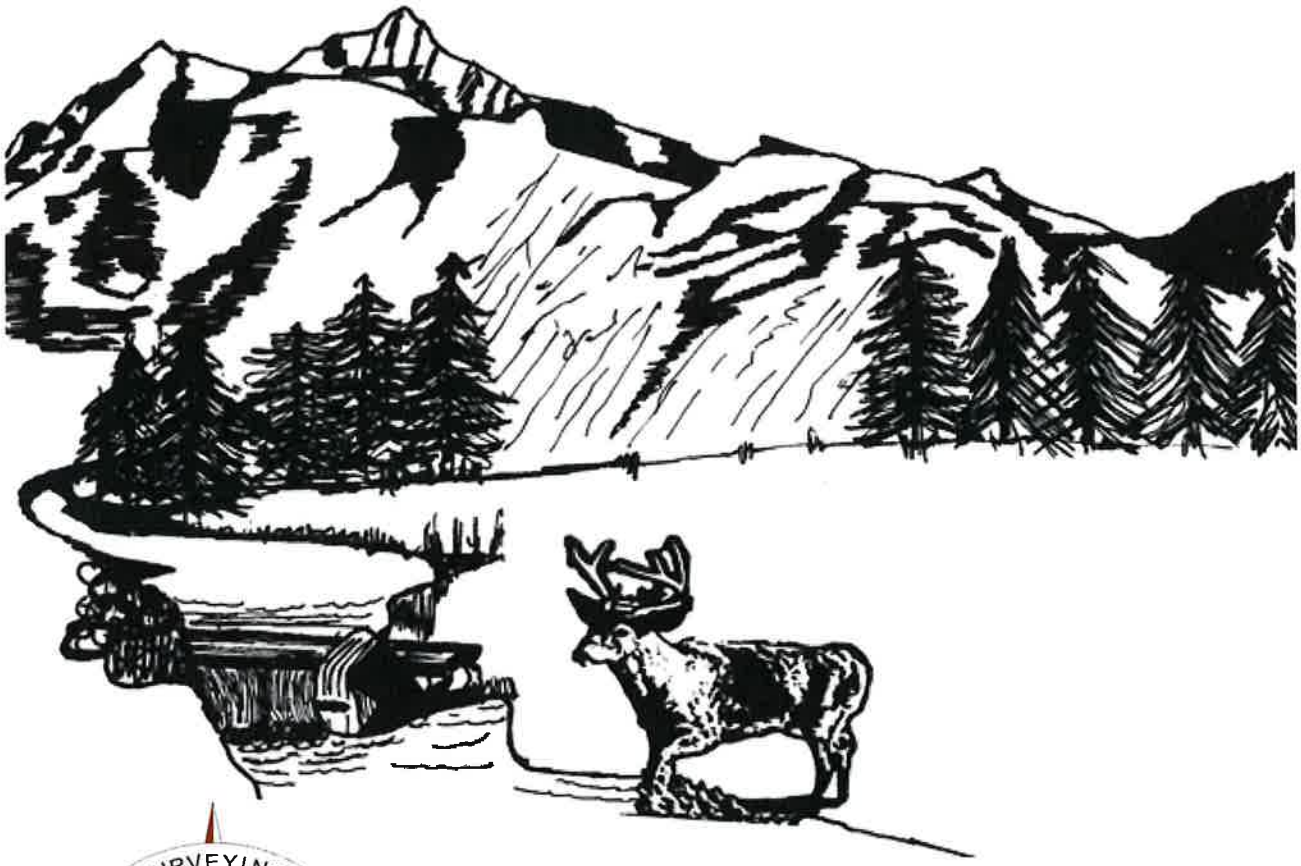
Drainage Report for:

Grandview North LLC – Zahradnik

February 2022



4-14-22

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Executive Summary

The property is located in the City of Arlington at the northwest quadrant of the intersection of SR 9 and SR 531. The proposal is to construct a multi-use development onsite. There will be a gas station with a convenient store and coffee hut, a fast-food restaurant, a drug store, a retail store, mixed used buildings, apartment buildings, and townhomes. The project will implement a design to meet the minimum requirements as outlined below:

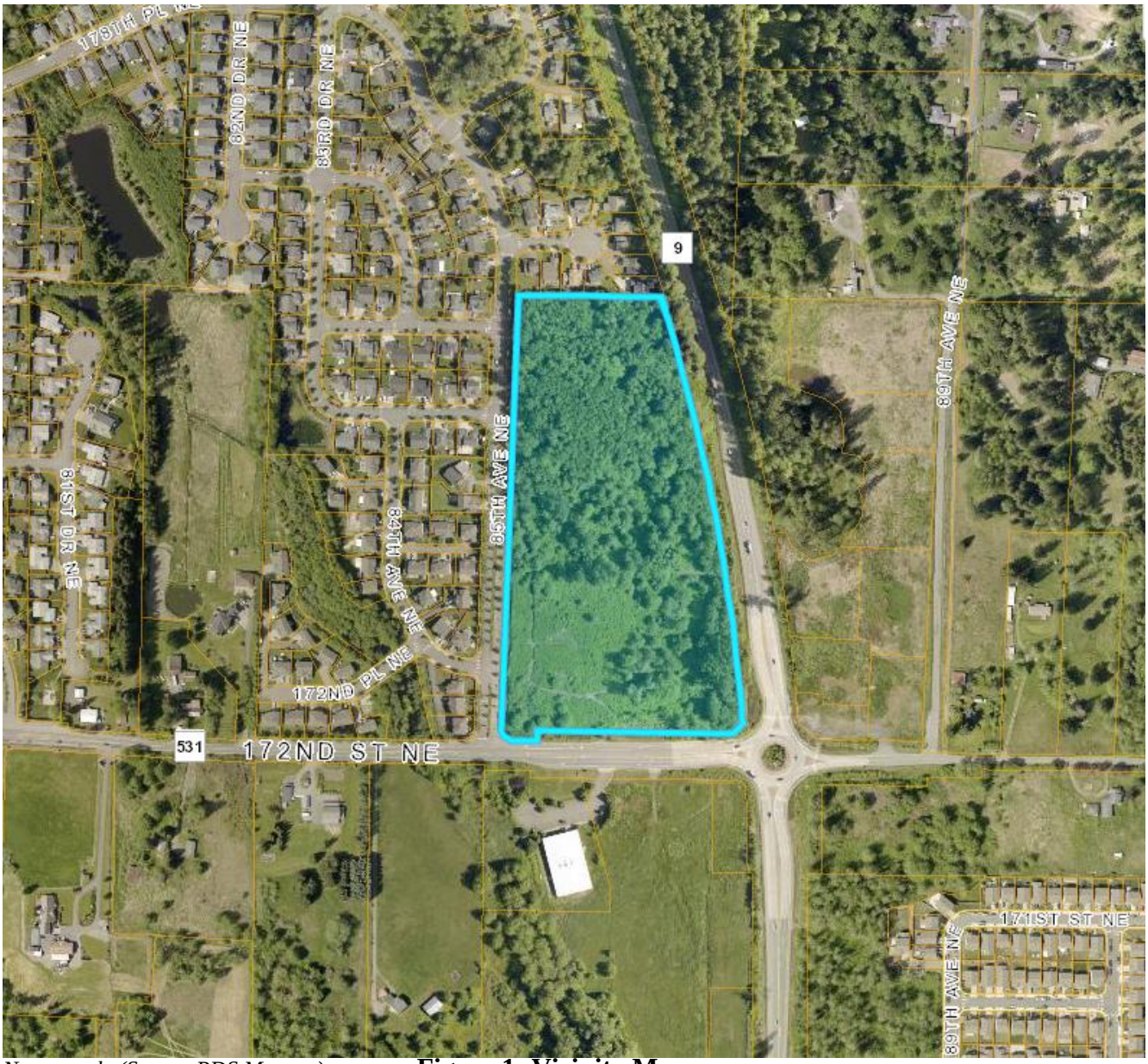
Compliance with Minimum Requirements:

1	*Prepare Stormwater Site Plan*	A stormwater site plan report and drawings are presented in this document.
2	*SWPPP*	A SWPPP will be submitted with the construction plans
3	*Water Pollution Source Control*	BMPs for source control will be noted in the SWPPP.
4	*Preserve Natural Drainage*	The proposed drainage basins match the existing drainage basins as much as possible.
5	*On-site Stormwater Management*	All stormwater runoff from the proposed development will be collected and detained.
6	*Runoff Treatment*	Runoff treatment for the proposed parking lot areas will be provided through Contech stormfilters.
7	*Flow Control*	Flow control for the proposed development will be met using a detention system.
8	*Stormwater Discharge to Wetland*	No stormwater will discharge to wetlands.
9	*Inspection, Operation and Maintenance*	Operation & Maintenance Manual will be provided at civil construction submittal.

Vicinity Map

PROPERTY DESCRIPTION

The project site is in a portion of Section 24, Township 31 North, Range 05 East W.M. More specifically the site is located at the northeast quadrant of the intersection of 172nd St NE and 85th Ave NE Arlington WA 98223. The property is identified by tax parcel #31052400302000 as shown below in Figure 1, highlighted in blue.



Not to scale (Source PDS Mapper) **Figure 1: Vicinity Map.**

DRAINAGE INFORMATION SUMMARY FORM

Project Total Area: **16.80± acres**

Area of Disturbance: **11.10± acres**

Number of Lots (if applies):

Summary Table

Drainage Basin Information	Individual Basin Information
	A
On-site Sub-basin Area (acres)	11.10
Type of Storage Proposed	N/A
Appx. Dead Storage Vol (cf)	N/A
Appx. Live Storage Vol (cf)	N/A
Soil Type(s) (Natural Resource Conservation Service)	Tokul Gravelly Medial Loam
Pre-developed Discharge Rates	
Q (cfs.)	
2 yr.	0.4214
10 yr.	0.8428
50 yr./100 yr.	1.3530/1.6157
Redevelopment Area (acres)	
Post-development Runoff Rates (without quantity controls)	
Q (cfs.)	
2 yr.	1.0048
10 yr.	1.6195
50 yr./100 yr.	2.2647/2.5720
Post-development Runoff Rates (with quantity controls)	
Q (cfs.)	
2 yr.	0.2570
10 yr.	0.4294
50 yr./100 yr.	0.6344/0.7393
Offsite Upstream Area	
Number of acres	0

MR #1 Stormwater Site Plan Narrative

PROJECT DESCRIPTION

The proposal is to construct a multi-use development onsite. There will be a gas station with a convenience store and coffee hut, a fast-food restaurant, a drug store, a retail store, two mixed use buildings, four apartment buildings, and 23 townhomes. A parking area for 513 outside spaces, 23 garage spaces, drive aisles, sidewalks, landscaping, and open space will be constructed as part of the project. Access will be provided to the site through the existing driveway entrance on 172nd St NE and at two proposed driveway entrances on 85th Ave NE at the existing intersections of 84th Ave NE and 175th St NE. The site is currently has thick brush throughout the property with four wetlands onsite.

METHODOLOGY

Drainage calculations for the on-site area have been prepared using the 2019 Department of Ecology Stormwater Management Manual for Western Washington (DOE SMMWW). The proposed impervious surface will be approximately 368,688 sq ft, the development will be required to meet minimum requirements (MRs) 1-9 according to Volume I of the Department of Ecology Stormwater Management Manual for Western Washington (DOE SMMWW).

EXISTING CONDITIONS

The 16.80 acre parcel is in the general commercial with mixed use overlay zoning district in Arlington. The site is bounded by 85th Ave NE to the west, single family residences to the north, 172nd St NE to the south and State Highway Route 9 to the east. There is an existing driveway entrance located on 172nd St NE. Existing frontage improvements in the form of curb, gutter, sidewalk, and landscaping are located along 172nd St NE and 85th Ave NE.

The site has moderate slopes onsite. There are two threshold discharge basins (TBDs) located onsite (See Appendix A). TBD A is located in the southwest portion of the property and will contain the proposed development. TBD A slopes to the southwest corner of the site with elevations ranging from 396 feet to 422 feet. TBD B is located in the northeast portion of the property and is mostly comprised of wetlands. This area slopes towards the wetlands and the wetlands outlets to the ditch on the west side of SR9 in the northeast corner of the property. Elevations range from 408 feet to 422 feet.

A geotechnical engineering report was prepared by Materials Testing and Consulting, Inc. (See separate report). They excavated 15 test pits across the site. Their test pits found a 0.5 to 1 ft topsoil layer, above a layer of silty sand subsoil to a maximum depth of 2.3 feet. Weathered glacial till was encountered below this with unweathered glacial till encountered in all test pits between 3 to 4 feet deep. Groundwater was not encountered in any of the test pits. Washington Department Ecology Well Log Viewer indicates a regional water table in the recessional outwash to be at a depth of 144 to 169 BGS in the vicinity of the site.

According to NRCS the soils onsite are classified as Tokul Gravelly Medial Loam. (Appendix B). Tokul Gravelly Medial Loam is moderately deep, moderately well drained soil. surface

layer is dark brown gravelly loam about 4 inches thick. The subsoil is brown, strong brown, and dark yellowish brown gravelly loam about 18 inches thick. The substratum is light olive brown gravelly fine sandy loam about 9 inches thick. A hardpan is at a depth of about 31 inches. Depth to the hardpan ranges from 20 to 40 inches. Tokul Gravelly Medial Loam is considered a hydraulic soil group B soil. Wetlands are located onsite and the geotechnical engineer recommends an infiltration rate of 0.76 in/hr for shallow facilities.

DEVELOPED CONDITIONS

The proposal is to construct a multi-use development onsite. There will be a gas station with a convenience store and coffee hut, a fast-food restaurant, a drug store, a retail store, two 3-story mixed used buildings with commercial on the ground floor and residential units on the upper floors, four 3-story apartment buildings, and 23 townhomes. This will result in 51,500 sf of commercial space and a total of 334 residential units. A parking area for 513 outside spaces, 23 garage spaces, drive aisles, sidewalks, landscaping, and open space will be constructed as part of the project. Frontage improvements should not be required for this project. See Table 1 below for the breakdown of areas onsite.

Table 1: Proposed Onsite Surfaces

Area Description	Area (square feet)
Roof Area	140,749 sq ft
Asphalt Parking/Drive	197,748 sq ft
Concrete Sidewalk	30,191 sq ft
Landscaping & Pervious Open Space	115,980 sq ft
Total	**484,668 sq ft**

UPSTREAM ANALYSIS

The site is bounded by roads with existing stormwater infrastructure and developed single family residences with installed mitigation measures so no runoff is anticipated to discharge onto the site.

DOWNSTREAM ANALYSIS

The proposed development will occur within TBD A of the drainage basin map. Runoff from the proposed development exits the property via two routes.

1. Vaults A, B, and C discharge to an existing catch basin located on 85th Ave NE and is conveyed through a series of catch basins to a pond located 175th St Ne. This pond will then discharge to the creek to the west of the pond that flows north into Tex Lake more than a 1/4 mile offsite.
2. Vault D will discharge to an existing catch basin on 172nd St NE and is conveyed west in a series of catch basins before being discharges into the same creek that flow north to Tex Lake more than a 1/4 mile offsite.

TBD B contains the onsite wetlands C, and D located in the northeast portion of the property. Runoff will flow into these wetlands and the outlets discharge to the roadside ditch along SR 9 where it will cross under SR9 through a culvert and flows north parallel to SR 9 in a fish habit stream for more than 1/4 mile offsite.

FLOW CONTROL

Flow control has been met through multiple detention systems utilizing Stormtank modules. Specifics about the proposed detention systems are further discussed in MR 7.

RUNOFF TREATMENT

Runoff treatment will be provided though Contech Stormfilter cartridges located either in a vault post-detention or in catch basins pre-detention.

MR #2 Stormwater Pollution Prevention Plan Narrative

SWPP Report will be submitted independent to this report at civil construction review.

MR #3 Water Pollution Source Control

No known pollution generating activities described in volume IV, chapters 3 and 4 of the DOE SMMWW will be performed on-site during construction, or are proposed for the developed site following construction. Any sources of pollution that may result from the construction activity will be controlled according to SWPPP Element #9, Control Pollutants.

MR #4 Preservation of Natural Drainage Patterns

The sites existing threshold discharge basins will be maintained to as much as possible.

MR #5 On-Site Stormwater Management

The parcel is located within the City of Arlington Urban Growth Area. Minimum Requirement #5 requires projects within an UGA to either implement LID BMPs from List #2 or meet LID performance standard and flow control requirements. The project will analyze LID BMP's from List #2 for their feasibility.

- Roof Surface:
    - BMP T5.30 full dispersion or BMP T5.10A Downspout Full Infiltration
        - The developed basin does not have sufficient flowpath to implement full dispersion and the natural drainage patterns do not allow the developed basin to disperse towards the northern basin containing the wetland.
        - Geotechnical report determined the site was infeasible for infiltration.
        - INFEASIBLE
    - BMP T7.30 Bioretention
        - Geotechnical report determined the site was infeasible for infiltration.
        - INFEASIBLE
    - BMP T5.10B Downspout Dispersion Systems
        - Unable to meet minimum required flow path due to the developed conditions of the site. The wetland buffer with potential for dispersion is in a different threshold discharge basin.
        - INFEASIBLE
    - BMP T5.10C Perforated Stub-Out Connections
        - Geotechnical report determined the site was infeasible for infiltration.

        - INFEASIBLE
- Other Hard Surfaces:
    - BMP T5.30 full dispersion
        - The developed basin does not have sufficient flowpath to implement full dispersion and the natural drainage patterns do not allow the developed basin to disperse towards the northern basin containing the wetland.
        - INFEASIBLE
    - BMP T5.15 Permeable pavement
        - The applicant has concerns about the lifespan of these and does not want to use them.
        - INFEASIBLE
    - BMP T7.30 Bioretention
        - Geotechnical report determined the site was infeasible for infiltration.
        - INFEASIBLE
    - BMP T5.12 Sheet Flow Dispersion or BMP T5.11 Concentrated Flow Dispersion
        - Unable to meet minimum required flow path due to the developed conditions of the site. The wetland buffer with potential for dispersion is in a different threshold discharge basin.
        - INFEASIBLE

Conclusion
It has been determined that all BMPs listed under List #2 are infeasible for this project. A detention system utilizing "StormTank" modules is proposed to meet flow control requirements and comply with MR#5. Refer to MR 7 Flow Control for more information on the Stormtank detention system proposed.

BMP T5.13 Post Construction Soil Quality and Depth:
Post Construction Soil Quality and Depth will be used on site to recondition those areas that were impacted due to construction activities. Those areas to be reconditioned have been identified on the construction plans. The existing on-site topsoil will be stockpiled for use to meet the post construction soil standard. If the quantity or quality of the stockpiled on-site topsoil is insufficient, the soil amendment areas can be tilled, and compost added to the soil prior to final seeding. The intent of this BMP is to restore the pre-developed drainage characteristics of the soil. The specific requirements for the post construction soil quality and depth will be detailed on the construction plans.

MR #6 Runoff Treatment

Runoff treatment for the proposed pollution generating hard surfaces will be provided through Contech Stormfilter systems. A Stormfilter Vault will be located downstream of Vault 2 and will treat runoff from the drainage basins of Vault 1 and Vault 2. The remaining pollution generating hard surfaces will implement stormfilter catch basins to treat runoff prior to entering the detention system. Sizing will be provided at civil construction application.

MR #7 Flow Control

Stormtank Detention System

The runoff from the developed area will be mitigated through a detention system consisting of Stormtank modules.

There are four Stormtank detention vaults located on the property. Vaults 1-3 will be a stepped detention system with a control structure separating each system. Vault 3 will discharge to the existing catch basin located on 85th Ave NE. These vaults will mitigate for the majority of the site except the area surrounding the gas station. Vault 4 will detain runoff from the gas station and hard surfaces in its proximity. This will discharge runoff to the existing catch basin on 172nd St NE. The size of detention systems were determined by modelling the systems as vaults with the riser height equal to the height of installed modules to determine the required capacity and outlet structure in WWHM (Appendix D). The outlet is located at the base of the module and the top of the riser is located at the top of the module. The 0.5 ft levelling pad beneath the modules with 40% porosity will be the "dead storage" and the 1 ft of stone above the modules with 40% porosity will be the freeboard. The required capacity at the top of riser was used to size the StormTank system. The size and configuration of modules are shown on the plans. A cross section can be seen in Figure 2 below.

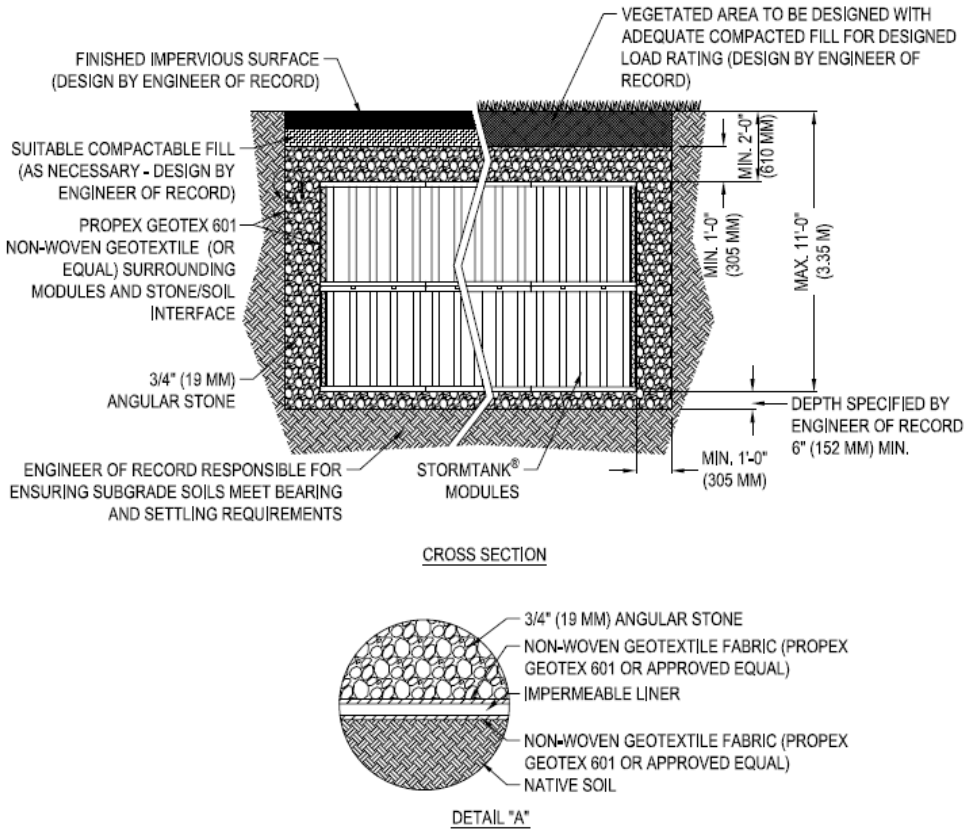


Figure 2: StormTank Detail

MR #8 Wetland Protection

There are four wetlands on site (A,B,C,D) as identified in the Critical Area Study and Mitigation Plan prepared by Wetland Resources (See separate report). Wetlands A and B are located within the proposed developed area. The U.S. Army Corps of Engineers determined that wetlands A and B are not waters of the U.S. There is an agreement between the applicant and City of Arlington to mitigate for these two wetlands offsite. Wetlands C and D will be outside of the proposed development area and the buffers will be averaged so that the proposed buffer line will match the proposed lot lines. Due to the drainage patterns and proposed grading, no runoff is anticipated to disperse towards the wetlands.

MR #9 Operations & Maintenance

An operation and maintenance manual will be provided at civil construction application.

Appendices

Appendix A - NRCS Soils Report

Appendix B - WWHM Report

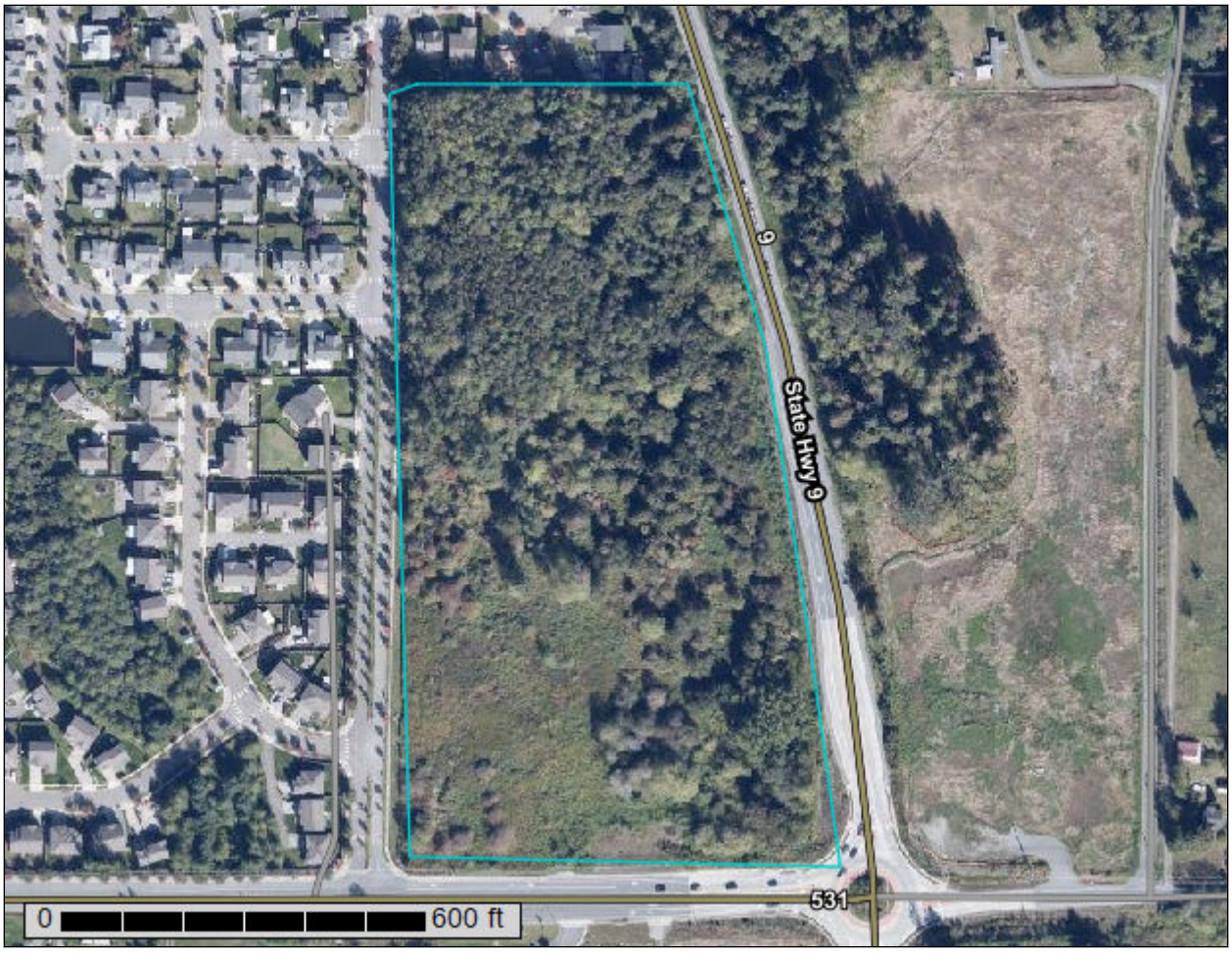
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Snohomish County Area, Washington



June 1, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,290 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Snohomish County Area, Washington
Survey Area Data: Version 22, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 26, 2018—Oct 16, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
72	Tokul gravelly medial loam, 0 to 8 percent slopes	18.3	100.0%
Totals for Area of Interest		**18.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Snohomish County Area, Washington

72—Tokul gravelly medial loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t61k
Elevation: 160 to 1,150 feet
Mean annual precipitation: 45 to 70 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 140 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tokul and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tokul

Setting

Landform: Hillslopes, till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Volcanic ash mixed with loess over glacial till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oa - 1 to 2 inches: highly decomposed plant material
A - 2 to 6 inches: gravelly medial loam
Bs1 - 6 to 9 inches: gravelly medial loam
Bs2 - 9 to 17 inches: gravelly medial loam
Bs3 - 17 to 24 inches: gravelly medial loam
BC - 24 to 33 inches: gravelly medial fine sandy loam
2Bsm - 33 to 62 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 39 inches to cemented horizon; 20 to 39 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: B
Forage suitability group: Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XN302WA)

Other vegetative classification: Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XN302WA)
Hydric soil rating: No

Minor Components

Pastik
Percent of map unit: 5 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Barneston
Percent of map unit: 5 percent
Landform: Kames, eskers, moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Norma
Percent of map unit: 3 percent
Landform: Depressions, drainageways
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Mckenna
Percent of map unit: 2 percent
Landform: Depressions, drainageways
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

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WWHM2012

PROJECT REPORT

General Model Information

Project Name:	22867 PRELIM SIZING 8
Site Name:	ZAHRADNIK
Site Address:	
City:	ARLINGTON
Report Date:	4/5/2022
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.000 (adjusted)
Version Date:	2021/08/18
Version:	4.2.18

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year
Low Flow Threshold for POC3:	50 Percent of the 2 Year
High Flow Threshold for POC3:	50 Year
Low Flow Threshold for POC4:	50 Percent of the 2 Year
High Flow Threshold for POC4:	50 Year

Landuse Basin Data

Predeveloped Land Use

BASIN 1,2,3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	4.926
C, Forest, Mod	4.273
C, Forest, Steep	0.186
SAT, Forest, Flat	0.515
Pervious Total	0

Impervious Land Use	acre
Impervious Total	0
Basin Total	0

Element Flows To:

Surface	Interflow	Groundwater

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	2.478
C, Forest, Mod	2.351
C, Forest, Steep	0.102
SAT, Forest, Flat	0.515
Pervious Total	0

Impervious Land Use	acre
Impervious Total	0
Basin Total	0

Element Flows To:

Surface	Interflow	Groundwater

Basin 1&2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	4.035
C, Forest, Mod	3.574
C, Forest, Steep	0.156
SAT, Forest, Flat	0.515
Pervious Total	0

Impervious Land Use	acre
Impervious Total	0
Basin Total	0

Element Flows To:

Surface	Interflow	Groundwater

Basin 4

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	0.277
C, Forest, Mod	0.501
C, Forest, Steep	0.022
SAT, Forest, Flat	0.361
Pervious Total	0

Impervious Land Use	acre
Impervious Total	0
Basin Total	0

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

BASIN 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	1.136
Pervious Total	0

Impervious Land Use	acre
ROADS FLAT	2.58
ROOF TOPS FLAT	1.442
SIDEWALKS FLAT	0.288
Impervious Total	0
Basin Total	0

Element Flows To:

Surface	Interflow	Groundwater
Vault 1	Vault 1	

Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	0.814
Pervious Total	0

Impervious Land Use	acre
ROADS FLAT	1.181
ROOF TOPS FLAT	0.686
SIDEWALKS FLAT	0.154
Impervious Total	0
Basin Total	0

Element Flows To:

Surface	Interflow	Groundwater
Vault 2	Vault 2	

Basin 3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	0.527
Pervious Total	0

Impervious Land Use	acre
ROADS FLAT	0.234
ROOF TOPS FLAT	0.843
SIDEWALKS FLAT	0.016
Impervious Total	0
Basin Total	0

Element Flows To:

Surface	Interflow	Groundwater
Vault 3	Vault 3	

Basin 4

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	0.221
Pervious Total	0

Impervious Land Use	acre
ROADS FLAT	0.616
ROOF TOPS FLAT	0.26
SIDEWALKS FLAT	0.064
Impervious Total	0
Basin Total	0

Element Flows To:

Surface	Interflow	Groundwater
Vault 4	Vault 4	

Routing Elements
Predeveloped Routing

Mitigated Routing

Vault 1

Width: 116 ft.
Length: 116 ft.
Depth: 7 ft.
Discharge Structure
Riser Height: 6 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 1.53 in. Elevation:0 ft.
Orifice 2 Diameter: 2.49 in. Elevation:3.402 ft.
Orifice 3 Diameter: 1.55 in. Elevation:4.35375000000003 ft.
Element Flows To:
Outlet 1 Outlet 2
Vault 2

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.308	0.000	0.000	0.000
0.0778	0.308	0.024	0.017	0.000
0.1556	0.308	0.048	0.025	0.000
0.2333	0.308	0.072	0.030	0.000
0.3111	0.308	0.096	0.035	0.000
0.3889	0.308	0.120	0.039	0.000
0.4667	0.308	0.144	0.043	0.000
0.5444	0.308	0.168	0.046	0.000
0.6222	0.308	0.192	0.050	0.000
0.7000	0.308	0.216	0.053	0.000
0.7778	0.308	0.240	0.056	0.000
0.8556	0.308	0.264	0.058	0.000
0.9333	0.308	0.288	0.061	0.000
1.0111	0.308	0.312	0.063	0.000
1.0889	0.308	0.336	0.066	0.000
1.1667	0.308	0.360	0.068	0.000
1.2444	0.308	0.384	0.070	0.000
1.3222	0.308	0.408	0.073	0.000
1.4000	0.308	0.432	0.075	0.000
1.4778	0.308	0.456	0.077	0.000
1.5556	0.308	0.480	0.079	0.000
1.6333	0.308	0.504	0.081	0.000
1.7111	0.308	0.528	0.083	0.000
1.7889	0.308	0.552	0.085	0.000
1.8667	0.308	0.576	0.086	0.000
1.9444	0.308	0.600	0.088	0.000
2.0222	0.308	0.624	0.090	0.000
2.1000	0.308	0.648	0.092	0.000
2.1778	0.308	0.672	0.093	0.000
2.2556	0.308	0.696	0.095	0.000
2.3333	0.308	0.720	0.097	0.000
2.4111	0.308	0.744	0.098	0.000
2.4889	0.308	0.768	0.100	0.000
2.5667	0.308	0.792	0.101	0.000
2.6444	0.308	0.816	0.103	0.000
2.7222	0.308	0.840	0.104	0.000
2.8000	0.308	0.864	0.106	0.000
2.8778	0.308	0.889	0.107	0.000

2.9556	0.308	0.913	0.109	0.000
3.0333	0.308	0.937	0.110	0.000
3.1111	0.308	0.961	0.112	0.000
3.1889	0.308	0.985	0.113	0.000
3.2667	0.308	1.009	0.114	0.000
3.3444	0.308	1.033	0.116	0.000
3.4222	0.308	1.057	0.141	0.000
3.5000	0.308	1.081	0.171	0.000
3.5778	0.308	1.105	0.190	0.000
3.6556	0.308	1.129	0.206	0.000
3.7333	0.308	1.153	0.219	0.000
3.8111	0.308	1.177	0.231	0.000
3.8889	0.308	1.201	0.242	0.000
3.9667	0.308	1.225	0.252	0.000
4.0444	0.308	1.249	0.262	0.000
4.1222	0.308	1.273	0.271	0.000
4.2000	0.308	1.297	0.280	0.000
4.2778	0.308	1.321	0.288	0.000
4.3556	0.308	1.345	0.299	0.000
4.4333	0.308	1.369	0.323	0.000
4.5111	0.308	1.393	0.338	0.000
4.5889	0.308	1.417	0.351	0.000
4.6667	0.308	1.441	0.362	0.000
4.7444	0.308	1.465	0.374	0.000
4.8222	0.308	1.489	0.384	0.000
4.9000	0.308	1.513	0.394	0.000
4.9778	0.308	1.537	0.404	0.000
5.0556	0.308	1.561	0.413	0.000
5.1333	0.308	1.585	0.422	0.000
5.2111	0.308	1.609	0.431	0.000
5.2889	0.308	1.633	0.440	0.000
5.3667	0.308	1.657	0.448	0.000
5.4444	0.308	1.681	0.456	0.000
5.5222	0.308	1.705	0.464	0.000
5.6000	0.308	1.729	0.472	0.000
5.6778	0.308	1.753	0.480	0.000
5.7556	0.308	1.777	0.487	0.000
5.8333	0.308	1.802	0.495	0.000
5.9111	0.308	1.826	0.502	0.000
5.9889	0.308	1.850	0.509	0.000
6.0667	0.308	1.874	0.790	0.000
6.1444	0.308	1.898	1.392	0.000
6.2222	0.308	1.922	2.167	0.000
6.3000	0.308	1.946	3.038	0.000
6.3778	0.308	1.970	3.929	0.000
6.4556	0.308	1.994	4.766	0.000
6.5333	0.308	2.018	5.480	0.000
6.6111	0.308	2.042	6.031	0.000
6.6889	0.308	2.066	6.417	0.000
6.7667	0.308	2.090	6.780	0.000
6.8444	0.308	2.114	7.093	0.000
6.9222	0.308	2.138	7.392	0.000
7.0000	0.308	2.162	7.679	0.000
7.0778	0.308	2.186	7.956	0.000
7.1556	0.000	0.000	8.223	0.000

Vault 2

Width: 74.1732507014318 ft.
Length: 74.1732507014318 ft.
Depth: 7 ft.
Discharge Structure
Riser Height: 6 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 1.98 in. Elevation:0 ft.
Orifice 2 Diameter: 3.07 in. Elevation:3.682 ft.
Orifice 3 Diameter: 1.88 in. Elevation:4.30625000000004 ft.
Element Flows To:
Outlet 1 Outlet 2
Vault 3

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.126	0.000	0.000	0.000
0.0778	0.126	0.009	0.029	0.000
0.1556	0.126	0.019	0.042	0.000
0.2333	0.126	0.029	0.051	0.000
0.3111	0.126	0.039	0.059	0.000
0.3889	0.126	0.049	0.066	0.000
0.4667	0.126	0.058	0.072	0.000
0.5444	0.126	0.068	0.078	0.000
0.6222	0.126	0.078	0.083	0.000
0.7000	0.126	0.088	0.089	0.000
0.7778	0.126	0.098	0.093	0.000
0.8556	0.126	0.108	0.098	0.000
0.9333	0.126	0.117	0.102	0.000
1.0111	0.126	0.127	0.107	0.000
1.0889	0.126	0.137	0.111	0.000
1.1667	0.126	0.147	0.114	0.000
1.2444	0.126	0.157	0.118	0.000
1.3222	0.126	0.167	0.122	0.000
1.4000	0.126	0.176	0.125	0.000
1.4778	0.126	0.186	0.129	0.000
1.5556	0.126	0.196	0.132	0.000
1.6333	0.126	0.206	0.136	0.000
1.7111	0.126	0.216	0.139	0.000
1.7889	0.126	0.225	0.142	0.000
1.8667	0.126	0.235	0.145	0.000
1.9444	0.126	0.245	0.148	0.000
2.0222	0.126	0.255	0.151	0.000
2.1000	0.126	0.265	0.154	0.000
2.1778	0.126	0.275	0.157	0.000
2.2556	0.126	0.284	0.159	0.000
2.3333	0.126	0.294	0.162	0.000
2.4111	0.126	0.304	0.165	0.000
2.4889	0.126	0.314	0.167	0.000
2.5667	0.126	0.324	0.170	0.000
2.6444	0.126	0.334	0.173	0.000
2.7222	0.126	0.343	0.175	0.000
2.8000	0.126	0.353	0.178	0.000
2.8778	0.126	0.363	0.180	0.000
2.9556	0.126	0.373	0.182	0.000
3.0333	0.126	0.383	0.185	0.000

3.1111	0.126	0.392	0.187	0.000
3.1889	0.126	0.402	0.190	0.000
3.2667	0.126	0.412	0.192	0.000
3.3444	0.126	0.422	0.194	0.000
3.4222	0.126	0.432	0.196	0.000
3.5000	0.126	0.442	0.199	0.000
3.5778	0.126	0.451	0.201	0.000
3.6556	0.126	0.461	0.203	0.000
3.7333	0.126	0.471	0.263	0.000
3.8111	0.126	0.481	0.299	0.000
3.8889	0.126	0.491	0.326	0.000
3.9667	0.126	0.501	0.348	0.000
4.0444	0.126	0.510	0.367	0.000
4.1222	0.126	0.520	0.385	0.000
4.2000	0.126	0.530	0.402	0.000
4.2778	0.126	0.540	0.417	0.000
4.3556	0.126	0.550	0.453	0.000
4.4333	0.126	0.559	0.479	0.000
4.5111	0.126	0.569	0.502	0.000
4.5889	0.126	0.579	0.522	0.000
4.6667	0.126	0.589	0.541	0.000
4.7444	0.126	0.599	0.558	0.000
4.8222	0.126	0.609	0.575	0.000
4.9000	0.126	0.618	0.591	0.000
4.9778	0.126	0.628	0.607	0.000
5.0556	0.126	0.638	0.622	0.000
5.1333	0.126	0.648	0.636	0.000
5.2111	0.126	0.658	0.650	0.000
5.2889	0.126	0.668	0.664	0.000
5.3667	0.126	0.677	0.677	0.000
5.4444	0.126	0.687	0.690	0.000
5.5222	0.126	0.697	0.702	0.000
5.6000	0.126	0.707	0.715	0.000
5.6778	0.126	0.717	0.727	0.000
5.7556	0.126	0.726	0.739	0.000
5.8333	0.126	0.736	0.750	0.000
5.9111	0.126	0.746	0.762	0.000
5.9889	0.126	0.756	0.773	0.000
6.0667	0.126	0.766	1.057	0.000
6.1444	0.126	0.776	1.664	0.000
6.2222	0.126	0.785	2.442	0.000
6.3000	0.126	0.795	3.317	0.000
6.3778	0.126	0.805	4.212	0.000
6.4556	0.126	0.815	5.053	0.000
6.5333	0.126	0.825	5.771	0.000
6.6111	0.126	0.835	6.325	0.000
6.6889	0.126	0.844	6.715	0.000
6.7667	0.126	0.854	7.081	0.000
6.8444	0.126	0.864	7.398	0.000
6.9222	0.126	0.874	7.700	0.000
7.0000	0.126	0.884	7.991	0.000
7.0778	0.126	0.893	8.271	0.000
7.1556	0.000	0.000	8.541	0.000

Vault 3

Width: 60.3358211851079 ft.
Length: 60.3358211851079 ft.
Depth: 5.5 ft.
Discharge Structure
Riser Height: 4.5 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 2.19 in. Elevation:0 ft.
Orifice 2 Diameter: 3.64 in. Elevation:2.4315 ft.
Orifice 3 Diameter: 2.15 in. Elevation:3.20875000000004 ft.
Element Flows To:
Outlet 1 Outlet 2

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.083	0.000	0.000	0.000
0.0611	0.083	0.005	0.032	0.000
0.1222	0.083	0.010	0.045	0.000
0.1833	0.083	0.015	0.055	0.000
0.2444	0.083	0.020	0.064	0.000
0.3056	0.083	0.025	0.071	0.000
0.3667	0.083	0.030	0.078	0.000
0.4278	0.083	0.035	0.085	0.000
0.4889	0.083	0.040	0.091	0.000
0.5500	0.083	0.046	0.096	0.000
0.6111	0.083	0.051	0.101	0.000
0.6722	0.083	0.056	0.106	0.000
0.7333	0.083	0.061	0.111	0.000
0.7944	0.083	0.066	0.116	0.000
0.8556	0.083	0.071	0.120	0.000
0.9167	0.083	0.076	0.124	0.000
0.9778	0.083	0.081	0.128	0.000
1.0389	0.083	0.086	0.132	0.000
1.1000	0.083	0.091	0.136	0.000
1.1611	0.083	0.097	0.140	0.000
1.2222	0.083	0.102	0.143	0.000
1.2833	0.083	0.107	0.147	0.000
1.3444	0.083	0.112	0.150	0.000
1.4056	0.083	0.117	0.154	0.000
1.4667	0.083	0.122	0.157	0.000
1.5278	0.083	0.127	0.160	0.000
1.5889	0.083	0.132	0.164	0.000
1.6500	0.083	0.137	0.167	0.000
1.7111	0.083	0.143	0.170	0.000
1.7722	0.083	0.148	0.173	0.000
1.8333	0.083	0.153	0.176	0.000
1.8944	0.083	0.158	0.179	0.000
1.9556	0.083	0.163	0.182	0.000
2.0167	0.083	0.168	0.184	0.000
2.0778	0.083	0.173	0.187	0.000
2.1389	0.083	0.178	0.190	0.000
2.2000	0.083	0.183	0.193	0.000
2.2611	0.083	0.189	0.195	0.000
2.3222	0.083	0.194	0.198	0.000
2.3833	0.083	0.199	0.200	0.000

2.4444	0.083	0.204	0.244	0.000
2.5056	0.083	0.209	0.303	0.000
2.5667	0.083	0.214	0.340	0.000
2.6278	0.083	0.219	0.370	0.000
2.6889	0.083	0.224	0.395	0.000
2.7500	0.083	0.229	0.418	0.000
2.8111	0.083	0.234	0.439	0.000
2.8722	0.083	0.240	0.459	0.000
2.9333	0.083	0.245	0.477	0.000
2.9944	0.083	0.250	0.495	0.000
3.0556	0.083	0.255	0.511	0.000
3.1167	0.083	0.260	0.527	0.000
3.1778	0.083	0.265	0.542	0.000
3.2389	0.083	0.270	0.579	0.000
3.3000	0.083	0.275	0.609	0.000
3.3611	0.083	0.280	0.634	0.000
3.4222	0.083	0.286	0.656	0.000
3.4833	0.083	0.291	0.677	0.000
3.5444	0.083	0.296	0.697	0.000
3.6056	0.083	0.301	0.715	0.000
3.6667	0.083	0.306	0.733	0.000
3.7278	0.083	0.311	0.751	0.000
3.7889	0.083	0.316	0.767	0.000
3.8500	0.083	0.321	0.784	0.000
3.9111	0.083	0.326	0.799	0.000
3.9722	0.083	0.332	0.815	0.000
4.0333	0.083	0.337	0.830	0.000
4.0944	0.083	0.342	0.845	0.000
4.1556	0.083	0.347	0.859	0.000
4.2167	0.083	0.352	0.873	0.000
4.2778	0.083	0.357	0.887	0.000
4.3389	0.083	0.362	0.901	0.000
4.4000	0.083	0.367	0.914	0.000
4.4611	0.083	0.372	0.927	0.000
4.5222	0.083	0.377	0.993	0.000
4.5833	0.083	0.383	1.335	0.000
4.6444	0.083	0.388	1.834	0.000
4.7056	0.083	0.393	2.439	0.000
4.7667	0.083	0.398	3.114	0.000
4.8278	0.083	0.403	3.821	0.000
4.8889	0.083	0.408	4.523	0.000
4.9500	0.083	0.413	5.185	0.000
5.0111	0.083	0.418	5.774	0.000
5.0722	0.083	0.423	6.266	0.000
5.1333	0.083	0.429	6.652	0.000
5.1944	0.083	0.434	6.942	0.000
5.2556	0.083	0.439	7.242	0.000
5.3167	0.083	0.444	7.497	0.000
5.3778	0.083	0.449	7.743	0.000
5.4389	0.083	0.454	7.981	0.000
5.5000	0.083	0.459	8.211	0.000
5.5611	0.083	0.464	8.435	0.000
5.6222	0.000	0.000	8.653	0.000

Vault 4

Width: 59.8846832358493 ft.
Length: 59.8846832358493 ft.
Depth: 5.5 ft.
Discharge Structure
Riser Height: 4.5 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 0.81 in. Elevation:0 ft.
Orifice 2 Diameter: 1.35 in. Elevation:2.7015 ft.
Orifice 3 Diameter: 0.86 in. Elevation:3.48625000000003 ft.
Element Flows To:
Outlet 1 Outlet 2

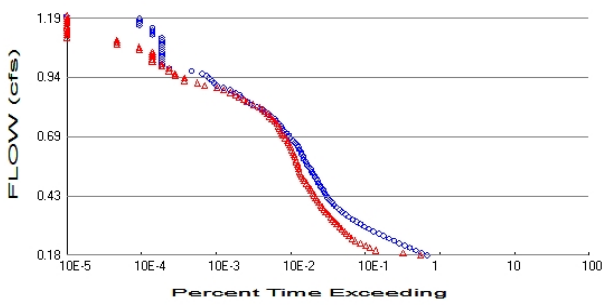
Vault Hydraulic Table

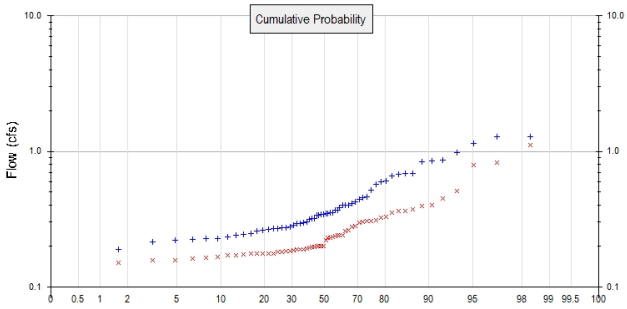
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.082	0.000	0.000	0.000
0.0611	0.082	0.005	0.004	0.000
0.1222	0.082	0.010	0.006	0.000
0.1833	0.082	0.015	0.007	0.000
0.2444	0.082	0.020	0.008	0.000
0.3056	0.082	0.025	0.009	0.000
0.3667	0.082	0.030	0.010	0.000
0.4278	0.082	0.035	0.011	0.000
0.4889	0.082	0.040	0.012	0.000
0.5500	0.082	0.045	0.013	0.000
0.6111	0.082	0.050	0.013	0.000
0.6722	0.082	0.055	0.014	0.000
0.7333	0.082	0.060	0.015	0.000
0.7944	0.082	0.065	0.015	0.000
0.8556	0.082	0.070	0.016	0.000
0.9167	0.082	0.075	0.017	0.000
0.9778	0.082	0.080	0.017	0.000
1.0389	0.082	0.085	0.018	0.000
1.1000	0.082	0.090	0.018	0.000
1.1611	0.082	0.095	0.019	0.000
1.2222	0.082	0.100	0.019	0.000
1.2833	0.082	0.105	0.020	0.000
1.3444	0.082	0.110	0.020	0.000
1.4056	0.082	0.115	0.021	0.000
1.4667	0.082	0.120	0.021	0.000
1.5278	0.082	0.125	0.022	0.000
1.5889	0.082	0.130	0.022	0.000
1.6500	0.082	0.135	0.022	0.000
1.7111	0.082	0.140	0.023	0.000
1.7722	0.082	0.145	0.023	0.000
1.8333	0.082	0.150	0.024	0.000
1.8944	0.082	0.156	0.024	0.000
1.9556	0.082	0.161	0.024	0.000
2.0167	0.082	0.166	0.025	0.000
2.0778	0.082	0.171	0.025	0.000
2.1389	0.082	0.176	0.026	0.000
2.2000	0.082	0.181	0.026	0.000
2.2611	0.082	0.186	0.026	0.000
2.3222	0.082	0.191	0.027	0.000
2.3833	0.082	0.196	0.027	0.000

2.4444	0.082	0.201	0.027	0.000
2.5056	0.082	0.206	0.028	0.000
2.5667	0.082	0.211	0.028	0.000
2.6278	0.082	0.216	0.028	0.000
2.6889	0.082	0.221	0.029	0.000
2.7500	0.082	0.226	0.040	0.000
2.8111	0.082	0.231	0.046	0.000
2.8722	0.082	0.236	0.050	0.000
2.9333	0.082	0.241	0.054	0.000
2.9944	0.082	0.246	0.057	0.000
3.0556	0.082	0.251	0.060	0.000
3.1167	0.082	0.256	0.063	0.000
3.1778	0.082	0.261	0.065	0.000
3.2389	0.082	0.266	0.068	0.000
3.3000	0.082	0.271	0.070	0.000
3.3611	0.082	0.276	0.072	0.000
3.4222	0.082	0.281	0.074	0.000
3.4833	0.082	0.286	0.077	0.000
3.5444	0.082	0.291	0.083	0.000
3.6056	0.082	0.296	0.087	0.000
3.6667	0.082	0.301	0.091	0.000
3.7278	0.082	0.306	0.094	0.000
3.7889	0.082	0.311	0.097	0.000
3.8500	0.082	0.317	0.100	0.000
3.9111	0.082	0.322	0.102	0.000
3.9722	0.082	0.327	0.105	0.000
4.0333	0.082	0.332	0.107	0.000
4.0944	0.082	0.337	0.110	0.000
4.1556	0.082	0.342	0.112	0.000
4.2167	0.082	0.347	0.114	0.000
4.2778	0.082	0.352	0.116	0.000
4.3389	0.082	0.357	0.118	0.000
4.4000	0.082	0.362	0.121	0.000
4.4611	0.082	0.367	0.123	0.000
4.5222	0.082	0.372	0.177	0.000
4.5833	0.082	0.377	0.509	0.000
4.6444	0.082	0.382	0.997	0.000
4.7056	0.082	0.387	1.592	0.000
4.7667	0.082	0.392	2.256	0.000
4.8278	0.082	0.397	2.953	0.000
4.8889	0.082	0.402	3.646	0.000
4.9500	0.082	0.407	4.298	0.000
5.0111	0.082	0.412	4.877	0.000
5.0722	0.082	0.417	5.359	0.000
5.1333	0.082	0.422	5.735	0.000
5.1944	0.082	0.427	6.015	0.000
5.2556	0.082	0.432	6.306	0.000
5.3167	0.082	0.437	6.552	0.000
5.3778	0.082	0.442	6.789	0.000
5.4389	0.082	0.447	7.018	0.000
5.5000	0.082	0.452	7.239	0.000
5.5611	0.082	0.457	7.454	0.000
5.6222	0.000	0.000	7.663	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 9.9
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 2.477
Total Impervious Area: 7.424

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.365234
5 year	0.571636
10 year	0.736833
25 year	0.980795
50 year	1.189926
100 year	1.424093

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.232111
5 year	0.341173
10 year	0.429772
25 year	0.562676
50 year	0.678475
100 year	0.81007

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.351	0.192
1950	0.368	0.196
1951	0.337	0.176
1952	0.265	0.158
1953	0.222	0.166
1954	1.274	0.199
1955	0.518	0.327
1956	0.402	0.326
1957	0.574	0.364
1958	0.422	0.177

1959	0.347	0.201
1960	0.348	0.311
1961	0.688	0.236
1962	0.341	0.189
1963	0.596	0.176
1964	0.402	0.171
1965	0.301	0.200
1966	0.188	0.175
1967	0.398	0.183
1968	0.414	0.352
1969	1.149	0.182
1970	0.248	0.176
1971	0.444	0.263
1972	0.321	0.231
1973	0.278	0.190
1974	0.676	0.190
1975	0.293	0.171
1976	0.270	0.240
1977	0.241	0.185
1978	0.274	0.157
1979	0.836	0.241
1980	0.353	0.162
1981	0.257	0.182
1982	0.366	0.395
1983	0.608	0.184
1984	0.338	0.361
1985	0.460	0.306
1986	0.977	0.788
1987	0.452	0.510
1988	0.232	0.306
1989	0.270	0.150
1990	0.298	0.276
1991	0.345	0.281
1992	0.262	0.199
1993	0.227	0.175
1994	0.224	0.232
1995	0.314	0.303
1996	0.660	0.298
1997	1.275	1.107
1998	0.215	0.165
1999	0.285	0.259
2000	0.226	0.371
2001	0.090	0.148
2002	0.317	0.241
2003	0.244	0.220
2004	0.384	0.447
2005	0.292	0.233
2006	0.866	0.400
2007	0.688	0.198
2008	0.845	0.829
2009	0.273	0.194

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	1.2746	1.1072
2	1.2740	0.8287
3	1.1492	0.7881

4	0.9771	0.5102
5	0.8657	0.4473
6	0.8453	0.3999
7	0.8357	0.3952
8	0.6884	0.3707
9	0.6883	0.3637
10	0.6759	0.3611
11	0.6598	0.3517
12	0.6080	0.3266
13	0.5964	0.3257
14	0.5742	0.3109
15	0.5180	0.3063
16	0.4604	0.3062
17	0.4520	0.3029
18	0.4442	0.2977
19	0.4216	0.2808
20	0.4144	0.2765
21	0.4024	0.2633
22	0.4019	0.2592
23	0.3981	0.2414
24	0.3836	0.2406
25	0.3682	0.2399
26	0.3665	0.2358
27	0.3527	0.2334
28	0.3509	0.2317
29	0.3481	0.2309
30	0.3471	0.2196
31	0.3449	0.2007
32	0.3412	0.1999
33	0.3375	0.1992
34	0.3372	0.1990
35	0.3211	0.1983
36	0.3172	0.1962
37	0.3144	0.1942
38	0.3007	0.1920
39	0.2980	0.1902
40	0.2928	0.1901
41	0.2917	0.1893
42	0.2854	0.1854
43	0.2778	0.1839
44	0.2744	0.1830
45	0.2734	0.1823
46	0.2702	0.1822
47	0.2701	0.1769
48	0.2645	0.1761
49	0.2615	0.1759
50	0.2573	0.1758
51	0.2481	0.1748
52	0.2437	0.1747
53	0.2413	0.1714
54	0.2325	0.1711
55	0.2270	0.1655
56	0.2264	0.1649
57	0.2235	0.1616
58	0.2217	0.1578
59	0.2154	0.1568
60	0.1876	0.1499
61	0.0897	0.1483

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1826	14369	11772	81	Pass
0.1928	12087	6804	56	Pass
0.2030	10158	2947	29	Pass
0.2131	8451	2468	29	Pass
0.2233	7199	2158	29	Pass
0.2335	6124	1848	30	Pass
0.2437	5208	1567	30	Pass
0.2538	4442	1418	31	Pass
0.2640	3775	1283	33	Pass
0.2742	3236	1195	36	Pass
0.2844	2748	1117	40	Pass
0.2945	2387	1036	43	Pass
0.3047	2080	966	46	Pass
0.3149	1852	893	48	Pass
0.3251	1632	831	50	Pass
0.3352	1454	775	53	Pass
0.3454	1286	734	57	Pass
0.3556	1148	682	59	Pass
0.3658	1046	628	60	Pass
0.3759	966	595	61	Pass
0.3861	883	565	63	Pass
0.3963	824	535	64	Pass
0.4065	761	510	67	Pass
0.4166	706	486	68	Pass
0.4268	669	461	68	Pass
0.4370	641	442	68	Pass
0.4472	610	420	68	Pass
0.4573	586	404	68	Pass
0.4675	559	387	69	Pass
0.4777	530	369	69	Pass
0.4879	510	347	68	Pass
0.4980	485	327	67	Pass
0.5082	469	312	66	Pass
0.5184	447	299	66	Pass
0.5286	424	290	68	Pass
0.5387	408	279	68	Pass
0.5489	392	272	69	Pass
0.5591	367	268	73	Pass
0.5693	349	262	75	Pass
0.5794	340	258	75	Pass
0.5896	322	252	78	Pass
0.5998	315	244	77	Pass
0.6100	303	236	77	Pass
0.6201	295	228	77	Pass
0.6303	282	221	78	Pass
0.6405	271	213	78	Pass
0.6507	264	206	78	Pass
0.6608	246	198	80	Pass
0.6710	227	192	84	Pass
0.6812	213	182	85	Pass
0.6914	202	170	84	Pass
0.7015	189	163	86	Pass
0.7117	174	157	90	Pass

0.7219	165	151	91	Pass
0.7321	158	144	91	Pass
0.7422	144	139	96	Pass
0.7524	137	131	95	Pass
0.7626	130	120	92	Pass
0.7728	119	112	94	Pass
0.7829	107	103	96	Pass
0.7931	97	95	97	Pass
0.8033	88	90	102	Pass
0.8135	76	81	106	Pass
0.8236	63	68	107	Pass
0.8338	56	55	98	Pass
0.8440	50	50	100	Pass
0.8542	46	43	93	Pass
0.8643	44	39	88	Pass
0.8745	39	33	84	Pass
0.8847	33	27	81	Pass
0.8949	27	22	81	Pass
0.9050	22	15	68	Pass
0.9152	20	12	60	Pass
0.9254	19	8	42	Pass
0.9356	17	8	47	Pass
0.9457	16	6	37	Pass
0.9559	14	6	42	Pass
0.9661	10	5	50	Pass
0.9763	5	5	100	Pass
0.9864	4	4	100	Pass
0.9966	4	4	100	Pass
1.0068	4	3	75	Pass
1.0170	4	3	75	Pass
1.0271	4	3	75	Pass
1.0373	4	3	75	Pass
1.0475	4	3	75	Pass
1.0577	4	2	50	Pass
1.0678	4	2	50	Pass
1.0780	4	1	25	Pass
1.0882	4	1	25	Pass
1.0984	4	1	25	Pass
1.1085	4	0	0	Pass
1.1187	3	0	0	Pass
1.1289	3	0	0	Pass
1.1391	3	0	0	Pass
1.1492	3	0	0	Pass
1.1594	2	0	0	Pass
1.1696	2	0	0	Pass
1.1798	2	0	0	Pass
1.1899	2	0	0	Pass

Water Quality

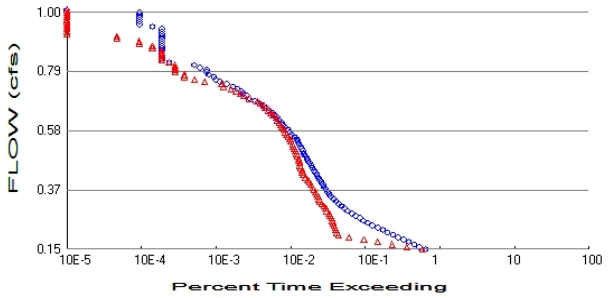
Water Quality BMP Flow and Volume for POC #1

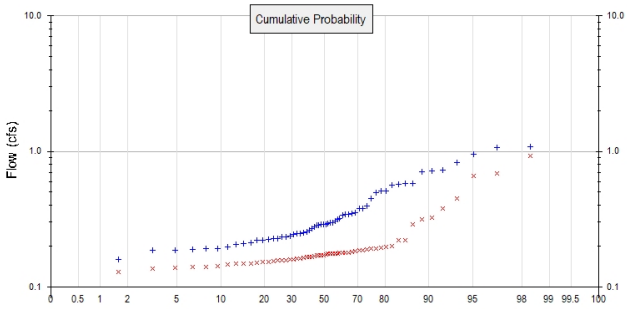
On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Vault 3 POC	☐	1311.09			☐	0.00			
Vault 2	☐	1117.90			☐	0.00			
Vault 1	☐	760.94			☐	0.00			
Total Volume Infiltrated		3189.92	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

POC 2





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 8.28
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 1.95
Total Impervious Area: 6.331

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.309162
5 year	0.482772
10 year	0.621483
25 year	0.826047
50 year	1.001194
100 year	1.197123

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.180969
5 year	0.259061
10 year	0.322472
25 year	0.417539
50 year	0.500345
100 year	0.594445

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**
1949	0.291	0.166
1950	0.306	0.167
1951	0.284	0.152
1952	0.222	0.138
1953	0.186	0.141
1954	1.068	0.170
1955	0.447	0.186
1956	0.341	0.198
1957	0.494	0.193
1958	0.353	0.155
1959	0.290	0.170

1960	0.297	0.187
1961	0.579	0.178
1962	0.289	0.162
1963	0.509	0.153
1964	0.336	0.149
1965	0.253	0.171
1966	0.160	0.148
1967	0.343	0.160
1968	0.346	0.192
1969	0.957	0.157
1970	0.209	0.151
1971	0.377	0.192
1972	0.278	0.177
1973	0.234	0.162
1974	0.569	0.164
1975	0.252	0.147
1976	0.227	0.177
1977	0.210	0.157
1978	0.234	0.137
1979	0.714	0.179
1980	0.296	0.141
1981	0.220	0.157
1982	0.315	0.290
1983	0.509	0.159
1984	0.284	0.316
1985	0.392	0.182
1986	0.823	0.655
1987	0.379	0.447
1988	0.196	0.199
1989	0.228	0.128
1990	0.247	0.183
1991	0.293	0.178
1992	0.224	0.170
1993	0.191	0.149
1994	0.188	0.175
1995	0.261	0.222
1996	0.564	0.189
1997	1.085	0.921
1998	0.186	0.142
1999	0.244	0.179
2000	0.193	0.323
2001	0.078	0.128
2002	0.268	0.177
2003	0.205	0.172
2004	0.318	0.379
2005	0.246	0.176
2006	0.729	0.222
2007	0.583	0.171
2008	0.710	0.687
2009	0.238	0.166

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	1.0847	0.9207
2	1.0681	0.6870
3	0.9573	0.6550
4	0.8234	0.4473

5	0.7285	0.3794
6	0.7142	0.3228
7	0.7102	0.3159
8	0.5833	0.2900
9	0.5790	0.2222
10	0.5693	0.2219
11	0.5639	0.1990
12	0.5093	0.1983
13	0.5087	0.1932
14	0.4941	0.1924
15	0.4465	0.1921
16	0.3923	0.1889
17	0.3791	0.1871
18	0.3766	0.1858
19	0.3527	0.1833
20	0.3455	0.1822
21	0.3427	0.1794
22	0.3412	0.1788
23	0.3359	0.1783
24	0.3182	0.1783
25	0.3155	0.1772
26	0.3064	0.1770
27	0.2971	0.1767
28	0.2958	0.1759
29	0.2926	0.1749
30	0.2909	0.1723
31	0.2901	0.1709
32	0.2885	0.1708
33	0.2844	0.1705
34	0.2838	0.1700
35	0.2783	0.1696
36	0.2679	0.1673
37	0.2611	0.1663
38	0.2534	0.1656
39	0.2518	0.1642
40	0.2470	0.1625
41	0.2463	0.1616
42	0.2437	0.1599
43	0.2376	0.1594
44	0.2341	0.1572
45	0.2337	0.1572
46	0.2276	0.1565
47	0.2266	0.1553
48	0.2235	0.1530
49	0.2216	0.1521
50	0.2203	0.1507
51	0.2102	0.1493
52	0.2087	0.1493
53	0.2048	0.1480
54	0.1958	0.1467
55	0.1925	0.1422
56	0.1914	0.1411
57	0.1880	0.1409
58	0.1862	0.1382
59	0.1858	0.1365
60	0.1597	0.1283
61	0.0783	0.1279

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1546	13676	12406	90	Pass
0.1631	11355	7642	67	Pass
0.1717	9653	4919	50	Pass
0.1802	8091	3127	38	Pass
0.1888	6934	2037	29	Pass
0.1973	5839	1293	22	Pass
0.2059	5005	933	18	Pass
0.2144	4222	896	21	Pass
0.2230	3692	860	23	Pass
0.2315	3110	840	27	Pass
0.2401	2620	815	31	Pass
0.2486	2301	796	34	Pass
0.2572	1994	773	38	Pass
0.2658	1793	757	42	Pass
0.2743	1588	727	45	Pass
0.2829	1428	704	49	Pass
0.2914	1243	655	52	Pass
0.3000	1114	631	56	Pass
0.3085	1019	593	58	Pass
0.3171	933	557	59	Pass
0.3256	867	534	61	Pass
0.3342	805	516	64	Pass
0.3427	742	498	67	Pass
0.3513	698	475	68	Pass
0.3598	665	457	68	Pass
0.3684	630	438	69	Pass
0.3769	603	420	69	Pass
0.3855	582	399	68	Pass
0.3940	551	381	69	Pass
0.4026	526	365	69	Pass
0.4111	501	340	67	Pass
0.4197	480	317	66	Pass
0.4282	457	306	66	Pass
0.4368	441	302	68	Pass
0.4453	416	294	70	Pass
0.4539	405	286	70	Pass
0.4624	383	281	73	Pass
0.4710	362	277	76	Pass
0.4795	350	272	77	Pass
0.4881	331	262	79	Pass
0.4966	320	256	80	Pass
0.5052	310	247	79	Pass
0.5138	301	241	80	Pass
0.5223	287	232	80	Pass
0.5309	277	226	81	Pass
0.5394	266	215	80	Pass
0.5480	257	208	80	Pass
0.5565	239	198	82	Pass
0.5651	222	189	85	Pass
0.5736	209	183	87	Pass
0.5822	194	171	88	Pass
0.5907	181	164	90	Pass
0.5993	168	157	93	Pass

0.6078	161	150	93	Pass
0.6164	149	143	95	Pass
0.6249	140	136	97	Pass
0.6335	129	124	96	Pass
0.6420	123	116	94	Pass
0.6506	109	107	98	Pass
0.6591	100	98	98	Pass
0.6677	89	93	104	Pass
0.6762	81	83	102	Pass
0.6848	70	76	108	Pass
0.6933	59	60	101	Pass
0.7019	55	51	92	Pass
0.7104	49	45	91	Pass
0.7190	46	40	86	Pass
0.7275	41	34	82	Pass
0.7361	36	27	75	Pass
0.7446	30	25	83	Pass
0.7532	24	15	62	Pass
0.7617	21	11	52	Pass
0.7703	20	8	40	Pass
0.7789	17	8	47	Pass
0.7874	16	6	37	Pass
0.7960	16	6	37	Pass
0.8045	13	6	46	Pass
0.8131	11	6	54	Pass
0.8216	5	5	100	Pass
0.8302	4	4	100	Pass
0.8387	4	4	100	Pass
0.8473	4	4	100	Pass
0.8558	4	4	100	Pass
0.8644	4	4	100	Pass
0.8729	4	3	75	Pass
0.8815	4	3	75	Pass
0.8900	4	2	50	Pass
0.8986	4	2	50	Pass
0.9071	4	1	25	Pass
0.9157	4	1	25	Pass
0.9242	4	0	0	Pass
0.9328	4	0	0	Pass
0.9413	4	0	0	Pass
0.9499	3	0	0	Pass
0.9584	2	0	0	Pass
0.9670	2	0	0	Pass
0.9755	2	0	0	Pass
0.9841	2	0	0	Pass
0.9926	2	0	0	Pass
1.0012	2	0	0	Pass

Water Quality

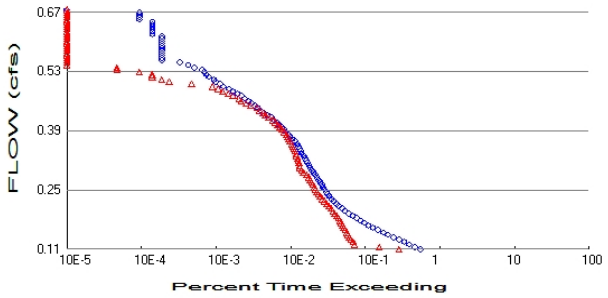
Water Quality BMP Flow and Volume for POC #2

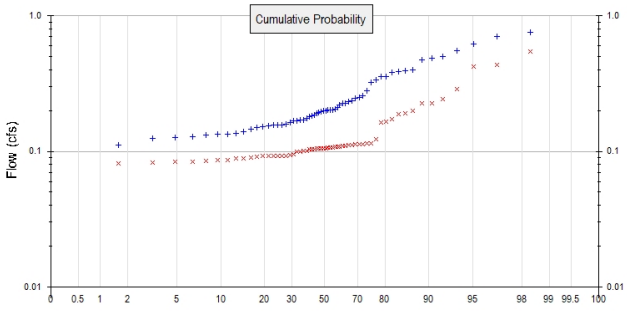
On-line facility volume:	0.2268 acre-feet
On-line facility target flow:	0.1145 cfs.
Adjusted for 15 min:	0.1145 cfs.
Off-line facility target flow:	0.0754 cfs.
Adjusted for 15 min:	0.0754 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Vault 2 POC	☐	1117.90			☐	0.00			
Vault 1	☐	760.94			☐	0.00			
Total Volume Infiltrated		1878.84	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

POC 3





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3
Total Pervious Area: 5.446
Total Impervious Area: 0

Mitigated Landuse Totals for POC #3
Total Pervious Area: 1.136
Total Impervious Area: 4.31

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	0.211362
5 year	0.328297
10 year	0.421349
25 year	0.558134
50 year	0.67492
100 year	0.805275

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	0.113647
5 year	0.167787
10 year	0.212828
25 year	0.281764
50 year	0.34294
100 year	0.413521

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1949	0.186	0.099
1950	0.198	0.105
1951	0.190	0.089
1952	0.146	0.084
1953	0.124	0.086
1954	0.708	0.103
1955	0.321	0.113
1956	0.234	0.163
1957	0.354	0.115
1958	0.238	0.092
1959	0.193	0.104

1960	0.211	0.112
1961	0.388	0.111
1962	0.201	0.096
1963	0.355	0.091
1964	0.221	0.086
1965	0.171	0.105
1966	0.111	0.092
1967	0.246	0.094
1968	0.225	0.114
1969	0.621	0.093
1970	0.140	0.092
1971	0.258	0.166
1972	0.203	0.106
1973	0.157	0.100
1974	0.383	0.101
1975	0.180	0.089
1976	0.150	0.105
1977	0.156	0.099
1978	0.164	0.084
1979	0.502	0.103
1980	0.196	0.082
1981	0.155	0.093
1982	0.226	0.198
1983	0.337	0.093
1984	0.200	0.225
1985	0.278	0.113
1986	0.554	0.421
1987	0.252	0.287
1988	0.132	0.188
1989	0.153	0.082
1990	0.158	0.114
1991	0.201	0.108
1992	0.157	0.107
1993	0.129	0.089
1994	0.126	0.107
1995	0.168	0.190
1996	0.396	0.124
1997	0.753	0.547
1998	0.134	0.086
1999	0.171	0.110
2000	0.134	0.227
2001	0.058	0.076
2002	0.183	0.109
2003	0.137	0.108
2004	0.204	0.243
2005	0.167	0.107
2006	0.488	0.173
2007	0.399	0.109
2008	0.474	0.437
2009	0.175	0.104

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	0.7526	0.5466
2	0.7078	0.4373
3	0.6214	0.4212
4	0.5545	0.2868

5	0.5015	0.2427
6	0.4884	0.2274
7	0.4737	0.2254
8	0.3994	0.1981
9	0.3960	0.1904
10	0.3877	0.1880
11	0.3826	0.1733
12	0.3552	0.1660
13	0.3539	0.1633
14	0.3365	0.1235
15	0.3215	0.1151
16	0.2780	0.1138
17	0.2582	0.1137
18	0.2515	0.1129
19	0.2459	0.1128
20	0.2377	0.1119
21	0.2342	0.1107
22	0.2262	0.1101
23	0.2249	0.1091
24	0.2206	0.1086
25	0.2107	0.1079
26	0.2036	0.1077
27	0.2033	0.1072
28	0.2012	0.1070
29	0.2009	0.1065
30	0.1999	0.1056
31	0.1984	0.1048
32	0.1961	0.1048
33	0.1934	0.1046
34	0.1903	0.1045
35	0.1858	0.1043
36	0.1825	0.1033
37	0.1800	0.1032
38	0.1749	0.1013
39	0.1706	0.1003
40	0.1706	0.0994
41	0.1679	0.0992
42	0.1669	0.0959
43	0.1636	0.0942
44	0.1578	0.0931
45	0.1571	0.0930
46	0.1566	0.0926
47	0.1559	0.0925
48	0.1553	0.0924
49	0.1531	0.0924
50	0.1503	0.0908
51	0.1464	0.0894
52	0.1397	0.0889
53	0.1366	0.0887
54	0.1339	0.0864
55	0.1338	0.0861
56	0.1325	0.0855
57	0.1289	0.0843
58	0.1261	0.0840
59	0.1241	0.0823
60	0.1109	0.0817
61	0.0583	0.0761

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1057	11736	6032	51	Pass
0.1114	9794	3270	33	Pass
0.1172	8209	1539	18	Pass
0.1229	7097	1456	20	Pass
0.1287	5995	1359	22	Pass
0.1344	5067	1298	25	Pass
0.1402	4308	1240	28	Pass
0.1459	3767	1204	31	Pass
0.1517	3161	1146	36	Pass
0.1574	2678	1094	40	Pass
0.1632	2338	1045	44	Pass
0.1689	2094	1020	48	Pass
0.1747	1850	972	52	Pass
0.1804	1634	933	57	Pass
0.1862	1443	882	61	Pass
0.1919	1296	824	63	Pass
0.1977	1139	784	68	Pass
0.2034	1031	743	72	Pass
0.2092	938	689	73	Pass
0.2149	882	649	73	Pass
0.2207	803	607	75	Pass
0.2264	746	563	75	Pass
0.2322	702	529	75	Pass
0.2379	668	499	74	Pass
0.2437	635	474	74	Pass
0.2494	602	456	75	Pass
0.2552	578	440	76	Pass
0.2609	557	424	76	Pass
0.2667	529	407	76	Pass
0.2724	503	390	77	Pass
0.2782	478	371	77	Pass
0.2839	452	345	76	Pass
0.2897	431	316	73	Pass
0.2954	408	297	72	Pass
0.3012	391	284	72	Pass
0.3069	377	280	74	Pass
0.3127	361	274	75	Pass
0.3184	347	269	77	Pass
0.3242	330	263	79	Pass
0.3299	321	258	80	Pass
0.3357	303	250	82	Pass
0.3414	290	243	83	Pass
0.3472	281	235	83	Pass
0.3529	272	227	83	Pass
0.3587	259	218	84	Pass
0.3644	245	210	85	Pass
0.3702	224	202	90	Pass
0.3759	209	195	93	Pass
0.3817	197	187	94	Pass
0.3874	186	176	94	Pass
0.3932	173	163	94	Pass
0.3989	161	154	95	Pass
0.4047	148	143	96	Pass

0.4104	142	134	94	Pass
0.4162	128	123	96	Pass
0.4219	119	109	91	Pass
0.4277	105	98	93	Pass
0.4334	93	91	97	Pass
0.4392	83	82	98	Pass
0.4449	77	75	97	Pass
0.4507	70	62	88	Pass
0.4564	64	54	84	Pass
0.4622	58	46	79	Pass
0.4679	52	43	82	Pass
0.4737	46	36	78	Pass
0.4794	41	31	75	Pass
0.4852	36	26	72	Pass
0.4909	32	23	71	Pass
0.4967	27	19	70	Pass
0.5024	24	10	41	Pass
0.5082	21	5	23	Pass
0.5139	20	4	20	Pass
0.5197	17	3	17	Pass
0.5254	16	3	18	Pass
0.5312	15	2	13	Pass
0.5369	14	1	7	Pass
0.5427	11	1	9	Pass
0.5484	9	0	0	Pass
0.5542	7	0	0	Pass
0.5599	4	0	0	Pass
0.5657	4	0	0	Pass
0.5714	4	0	0	Pass
0.5772	4	0	0	Pass
0.5829	4	0	0	Pass
0.5887	4	0	0	Pass
0.5944	4	0	0	Pass
0.6002	4	0	0	Pass
0.6059	4	0	0	Pass
0.6117	4	0	0	Pass
0.6174	4	0	0	Pass
0.6232	3	0	0	Pass
0.6289	3	0	0	Pass
0.6347	3	0	0	Pass
0.6404	3	0	0	Pass
0.6462	3	0	0	Pass
0.6519	3	0	0	Pass
0.6577	2	0	0	Pass
0.6634	2	0	0	Pass
0.6692	2	0	0	Pass
0.6749	2	0	0	Pass

Water Quality

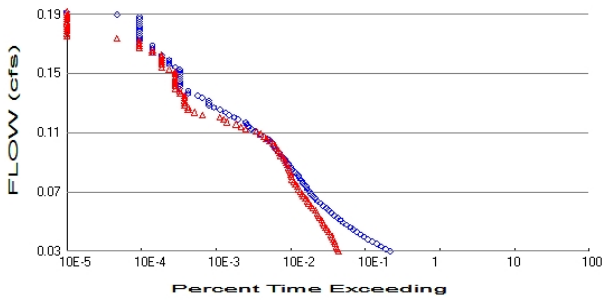
Water Quality BMP Flow and Volume for POC #3

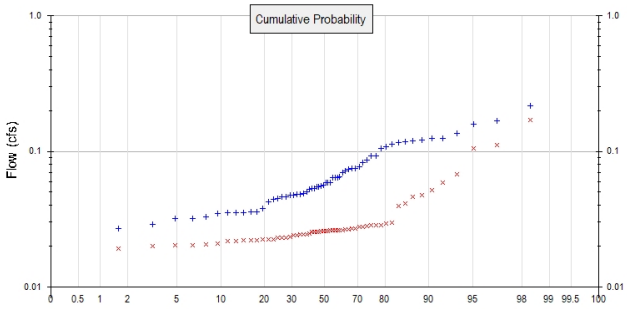
On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Vault 1 POC	☐	760.94			☐	0.00			
Total Volume Infiltrated		760.94	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

POC 4





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #4
Total Pervious Area: 1.161
Total Impervious Area: 0

Mitigated Landuse Totals for POC #4
Total Pervious Area: 0.221
Total Impervious Area: 0.94

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #4

Return Period	**Flow(cfs)**
2 year	0.06005
5 year	0.093183
10 year	0.118958
25 year	0.156085
50 year	0.187188
100 year	0.221358

Flow Frequency Return Periods for Mitigated. POC #4

Return Period	**Flow(cfs)**
2 year	0.027109
5 year	0.040053
10 year	0.050827
25 year	0.067325
50 year	0.081973
100 year	0.098878

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #4

Year	**Predeveloped**	**Mitigated**
1949	0.032	0.024
1950	0.047	0.025
1951	0.047	0.022
1952	0.035	0.020
1953	0.029	0.021
1954	0.159	0.025
1955	0.117	0.027
1956	0.072	0.030
1957	0.117	0.029
1958	0.077	0.022
1959	0.054	0.025

1960	0.075	0.028
1961	0.093	0.026
1962	0.059	0.024
1963	0.105	0.022
1964	0.055	0.022
1965	0.050	0.025
1966	0.032	0.022
1967	0.082	0.023
1968	0.053	0.028
1969	0.121	0.023
1970	0.046	0.022
1971	0.070	0.028
1972	0.087	0.026
1973	0.053	0.025
1974	0.093	0.024
1975	0.059	0.022
1976	0.043	0.026
1977	0.058	0.024
1978	0.049	0.020
1979	0.167	0.026
1980	0.044	0.020
1981	0.048	0.023
1982	0.075	0.046
1983	0.074	0.023
1984	0.064	0.047
1985	0.108	0.027
1986	0.137	0.105
1987	0.065	0.068
1988	0.035	0.029
1989	0.038	0.019
1990	0.027	0.028
1991	0.055	0.027
1992	0.048	0.026
1993	0.036	0.022
1994	0.033	0.026
1995	0.036	0.039
1996	0.120	0.028
1997	0.216	0.171
1998	0.046	0.021
1999	0.064	0.027
2000	0.056	0.052
2001	0.022	0.019
2002	0.053	0.026
2003	0.035	0.026
2004	0.036	0.059
2005	0.045	0.026
2006	0.124	0.042
2007	0.112	0.026
2008	0.125	0.111
2009	0.064	0.025

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #4

Rank	Predeveloped	Mitigated
1	0.2162	0.1713
2	0.1673	0.1109
3	0.1585	0.1048
4	0.1366	0.0677

5	0.1251	0.0590
6	0.1244	0.0517
7	0.1208	0.0472
8	0.1203	0.0460
9	0.1175	0.0415
10	0.1167	0.0392
11	0.1123	0.0299
12	0.1075	0.0292
13	0.1051	0.0285
14	0.0932	0.0284
15	0.0925	0.0283
16	0.0866	0.0281
17	0.0824	0.0276
18	0.0774	0.0276
19	0.0752	0.0271
20	0.0749	0.0268
21	0.0740	0.0267
22	0.0718	0.0266
23	0.0701	0.0263
24	0.0647	0.0261
25	0.0643	0.0261
26	0.0640	0.0261
27	0.0639	0.0261
28	0.0592	0.0260
29	0.0589	0.0259
30	0.0584	0.0258
31	0.0559	0.0258
32	0.0554	0.0258
33	0.0548	0.0255
34	0.0545	0.0255
35	0.0535	0.0253
36	0.0534	0.0253
37	0.0528	0.0246
38	0.0502	0.0245
39	0.0486	0.0243
40	0.0481	0.0243
41	0.0479	0.0241
42	0.0473	0.0239
43	0.0472	0.0233
44	0.0461	0.0231
45	0.0459	0.0230
46	0.0450	0.0230
47	0.0441	0.0225
48	0.0427	0.0224
49	0.0376	0.0223
50	0.0359	0.0222
51	0.0359	0.0222
52	0.0355	0.0221
53	0.0354	0.0219
54	0.0352	0.0217
55	0.0348	0.0210
56	0.0328	0.0206
57	0.0320	0.0204
58	0.0318	0.0202
59	0.0288	0.0201
60	0.0270	0.0192
61	0.0222	0.0188

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0300	4590	931	20	Pass
0.0316	3983	904	22	Pass
0.0332	3465	870	25	Pass
0.0348	3012	843	27	Pass
0.0364	2659	823	30	Pass
0.0380	2310	796	34	Pass
0.0396	2053	767	37	Pass
0.0411	1834	736	40	Pass
0.0427	1650	690	41	Pass
0.0443	1481	658	44	Pass
0.0459	1352	630	46	Pass
0.0475	1199	598	49	Pass
0.0491	1087	578	53	Pass
0.0507	988	554	56	Pass
0.0523	909	522	57	Pass
0.0538	826	504	61	Pass
0.0554	750	483	64	Pass
0.0570	688	458	66	Pass
0.0586	636	423	66	Pass
0.0602	581	399	68	Pass
0.0618	539	375	69	Pass
0.0634	492	359	72	Pass
0.0650	454	339	74	Pass
0.0665	426	318	74	Pass
0.0681	400	301	75	Pass
0.0697	381	288	75	Pass
0.0713	361	276	76	Pass
0.0729	341	263	77	Pass
0.0745	321	248	77	Pass
0.0761	304	235	77	Pass
0.0777	293	224	76	Pass
0.0792	276	219	79	Pass
0.0808	259	214	82	Pass
0.0824	243	211	86	Pass
0.0840	227	205	90	Pass
0.0856	216	199	92	Pass
0.0872	202	192	95	Pass
0.0888	190	187	98	Pass
0.0904	183	179	97	Pass
0.0919	173	172	99	Pass
0.0935	161	158	98	Pass
0.0951	151	154	101	Pass
0.0967	142	146	102	Pass
0.0983	132	140	106	Pass
0.0999	127	133	104	Pass
0.1015	121	123	101	Pass
0.1031	114	112	98	Pass
0.1046	105	101	96	Pass
0.1062	92	94	102	Pass
0.1078	82	84	102	Pass
0.1094	70	74	105	Pass
0.1110	64	53	82	Pass
0.1126	58	46	79	Pass

0.1142	55	40	72	Pass
0.1158	53	30	56	Pass
0.1173	42	27	64	Pass
0.1189	37	24	64	Pass
0.1205	32	14	43	Pass
0.1221	29	11	37	Pass
0.1237	24	9	37	Pass
0.1253	20	9	45	Pass
0.1269	17	8	47	Pass
0.1285	17	8	47	Pass
0.1300	17	8	47	Pass
0.1316	14	8	57	Pass
0.1332	12	8	66	Pass
0.1348	9	7	77	Pass
0.1364	9	7	77	Pass
0.1380	7	6	85	Pass
0.1396	7	6	85	Pass
0.1412	7	6	85	Pass
0.1427	7	6	85	Pass
0.1443	7	6	85	Pass
0.1459	7	6	85	Pass
0.1475	7	6	85	Pass
0.1491	7	6	85	Pass
0.1507	7	5	71	Pass
0.1523	6	4	66	Pass
0.1539	5	4	80	Pass
0.1554	5	4	80	Pass
0.1570	5	4	80	Pass
0.1586	4	4	100	Pass
0.1602	4	4	100	Pass
0.1618	3	3	100	Pass
0.1634	3	3	100	Pass
0.1650	3	2	66	Pass
0.1666	3	2	66	Pass
0.1681	2	2	100	Pass
0.1697	2	2	100	Pass
0.1713	2	1	50	Pass
0.1729	2	0	0	Pass
0.1745	2	0	0	Pass
0.1761	2	0	0	Pass
0.1777	2	0	0	Pass
0.1793	2	0	0	Pass
0.1808	2	0	0	Pass
0.1824	2	0	0	Pass
0.1840	2	0	0	Pass
0.1856	2	0	0	Pass
0.1872	1	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #4

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 Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Vault 4 POC	☐	165.92			☐	0.00			
Total Volume Infiltrated		165.92	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

POC 5

POC #5 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic