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PN PreA21-050  
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**Stormwater Site Plan  
Report  
for  
Gemmer PRD**

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## Acronyms

The following acronyms and abbreviations may or may not be called out within the body of this report.

|              |  |
|--------------|--|
| ○ ASTM       | - American Society for Testing and Materials                   |
| ○ BMPs       | - Best Management Practices                                    |
| ○ CB         | - Catch Basin  |
| ○ CAO        | - Critical Areas Ordinance                                     |
| ○ CESCL      | - Certified Erosion and Sediment Control Lead                  |
| ○ DOE        | - Department of Ecology  |
| ○ EDDS       | - Engineering Design & Development Standards                   |
| ○ FEMA       | - Federal Emergency Management Agency                          |
| ○ HSPF       | - Hydrological Simulation Program—Fortran                      |
| ○ LiDAR      | - Light Detecting And Ranging                                  |
| ○ LDA        | - Land disturbing activity                                     |
| ○ LID        | - Low Impact Development                                       |
| ○ LID Manual | - DOE 2005 LID Technical Guidance Manual for Puget Sound       |
| ○ MRs        | - Minimum Requirements (for Stormwater Management)             |
| ○ MS4        | - Municipal Separate Storm Sewer System                        |
| ○ MSL        | - Mean Sea Level   |
| ○ NAVD88     | - North American Vertical Datum of 1888                        |
| ○ NGVD29     | - National Geodetic Vertical Datum of 1929                     |
| ○ NPDES      | - National Pollutant Discharge Elimination System              |
| ○ NRCS       | - Natural Resources Conservation Service                       |
| ○ NPGIS      | - Non-Pollutant Generating Impervious Surface                  |
| ○ O&M        | - Operations and Maintenance                                   |
| ○ PGIS       | - Pollutant Generating Impervious Surface                      |
| ○ PGPS       | - Pollutant Generating Pervious Surface                        |
| ○ PLSS       | - Public Land Survey System                                    |
| ○ POC        | - Point of Compliance  |
| ○ RCW        | - Revised Code of Washington                                   |
| ○ ROW        | - Right-of-Way   |
| ○ SCDM-2010  | - Snohomish County 2010 Drainage Manual                        |
| ○ SMMWW      | - DOE 2005 Stormwater Management Manual for Western Washington |
| ○ SWPPP      | - Stormwater Pollution Prevention Plan                         |
| ○ TDA        | - Threshold Discharge Area                                     |
| ○ TESC       | - Temporary Erosion and Sediment Controls                      |
| ○ USDA       | - United States Department of Agriculture                      |
| ○ US EPA     | - United States Environmental Protection Agency                |
| ○ WSDOT      | - Washington State Department of Transportation                |
| ○ WWHM       | - Western Washington Hydrology Model                           |

# Section 1 – Report Summary

## 1.1 Project Description

Robinett Brothers, LLC is proposing the development of 29.63-acres of land in Northwest Marysville, WA off of 11<sup>th</sup> Ave NE. The parcel is vacant and vegetated with pasture. The parcel has an onsite wetland and buffer.

The development of the parcel will result in a Planned Residential Development (PRD) with 182-Lots, public road and shared auto court. Each lot is allocated to accept a maximum of 70% total impervious of roof and driveway with the remaining portion consisting of lawn. Open space areas for both passive and active recreation will be located outside of the proposed lots.

The proposed road access for the PRD will be from 11<sup>th</sup> Ave NE at two locations. One of the new public roads will end with a cul-de-sac and will also provide connectivity to other proposed roads within the project. The development consists of public roads, lots, driveways, homes, auto court, on-site recreation and stormwater facilities.

Per NRCS mappings, type “B” Alderwood gravelly sandy loam soils are found throughout the site. No infiltration will be utilized. Infiltration is not feasible in Till soils with infiltration rates less than 0.3 *in/hr*.

The 2014 DOE Stormwater Management Manual for Western Washington will be used for stormwater management guidance. Stormwater management BMPs and engineered designs are specified in this report.

Stormwater facilities will consist of bioretention facilities and rock detention chambers.

The entire developable project area is in two natural discharge areas with two discharge locations. Stormwater BMPs will be employed to mitigate polluted and unpolluted surface water flows.

## **Summary Stormwater Management**

The project qualifies as 'new development' because there are less than 35% of existing impervious areas. The proposed condition of the fully developed site will have more than 5,000sf impervious areas. Per Figure 2.4.1 Vol. 1 of the 2014 SMMWW, all minimum requirements shall apply for this project.

This project triggers MRs 1-9 and is within the City's UGA. The project will choose to adhere to List #2 of MR #5. On-site stormwater BMPs will consist only of BMPT5.13. Feasibility analysis for individual lot BMPs is provided in MR #5 of the report. However, the overall site stormwater management will mirror the requirements and intent of MR #5.

Flow control requirements for the site will be met by detention. The majority of runoff from impervious surfaces and converted surfaces will be detained. A small portion of the frontage bypasses facilities for detention. The site as a whole meets the flow control threshold requirement matching the fully-forested condition.

Water quality will be met by percolating stormwater through bioretention treatment soils. The bioretention cell mitigates polluted stormwater through physical, chemical, and biological treatment processes.

## 1.2 Project Data Summary

Existing and proposed project areas are presented for determination of stormwater management requirements based on prescribed thresholds as outlined in the Marysville Municipal Code (MMC 22C) and the 2014 SMMWW Vol-1, Ch-2, Section 2.4 are summarized in the following tables.

**Table 1 - Project Parcel Summary**

| <b>Project Data:</b>    |   |
|-------------------------|---|
| Applicant               | Robinett Brothers, LLC                                    |
| Site Owner              | Myron Gemmer & Brad Gemmer                                |
| Project Name            | Gemmer PRD  |
| Project T.S.R. Location | TwN 31 N, Rng 5 E, Sec 19, Qtr-SE                         |
| Project Address         | 1125 & 1507 172nd Street NE, Marysville, Washington 98271 |
| Parcel ID(s)            | 310519-004-009-00, 310519-004-011-00                      |
| Watershed               | Snohomish   |
| Basin                   | Snohomish   |
| Sub-Basin               | Quilceda Creek  |
| WRIA Number             | 7-Snohomish   |
| Analysis Standard       | 2014 DOE SMMWW  |

**Table 2 - Project Area Analysis & Activities Summary**

|  |                 |                    |
|--|-----------------|--------------------|
| <b>Existing Conditions:</b>                          |                 |                    |
| Total Site Area                                      | 1,290,592       | sf (29.63 ac)      |
| Existing Impervious Area                             | 0               | sf ( 0.00 ac) 0.0% |
| <b>Proposed Activity:</b>                            |                 |                    |
| Proposed Activity                                    | PRD Subdivision |                    |
| Total Proposed Disturbance Area                      | 1,194,930       | sf (27.43 ac)      |
| Proposed Grading Area                                | 1,194,930       | sf (27.43 ac)      |
| Proposed New NPGIS Onsite (Roof)                     | 383,238         | sf (8.80 ac)       |
| Proposed New PGIS Onsite (Road, Sidewalk & Driveway) | 325,415         | sf (7.47 ac)       |
| Proposed Replaced Impervious Area                    | 0               | sf (0.00 ac)       |
| Native Vegetation convert to Lawn                    | 0               | sf (0.00 ac)       |
| Native Vegetation convert to Pasture                 | 0               | sf (0.00 ac)       |
| Total New Impervious Area Onsite                     | 708,653         | sf (16.27 ac)      |
| Grading is ≤ 2 feet from P/L                         | No              |                    |
| Any excavation 4+' at <1:1 slope to P/L              | No              |                    |
| Fill Slopes 4+' and >33% slope                       | No              |                    |

## **Section 2 - Minimum Requirements**

### **2.1 Assessment of Minimum Requirements and Thresholds**

Minimum requirements and thresholds are established by City of Marysville Municipal Code 14.15.050 – Minimum Requirements. Minimum Requirements for new development and Redevelopment are based on a development’s disturbance area. Existing and proposed project areas for determination of stormwater management requirements are presented in Table 2.

The existing impervious area is less than 35% so this project qualifies as ‘new development’. The proposed condition of the fully developed site will have impervious area in excess of 5,000 sf. This requires construction activities and stormwater management to comply with Minimum Requirements 1 through 9. A full construction SWPPP is also required.

Minimum Requirements per the SCMD:

- MR-1: Prepare Stormwater Site Plan. MMC 14.15.050 (1)
- MR-2: Stormwater Pollution Prevention Plan (SWPPP). MMC 14.15.050 (2)
- MR-3: Water pollution source control for new development. MMC 14.15.050 (3)
- MR-4: Preservation of natural drainage systems and outfalls. MMC 14.15.050 (4)
- MR-5: On-site stormwater management. MMC 14.15.050 (5)
- MR-6: Runoff treatment. MMC 14.15.050 (6)
- MR-7: Flow control requirements. MMC 14.15.050 (7)
- MR-8: Detention or treatment in wetlands and wetland buffers. MMC 14.15.050 (8)
- MR-9: Inspection, operation and maintenance requirements. MMC 14.15.050 (9)

Each Minimum Requirements is described in the following sections. There are no additional requirements to be met.



## **2.2 MR #1: Preparation of Stormwater Site Plans**

This document is the Stormwater Site Plan Report that addresses the requirements of MR-1. This section presents the portion of the Stormwater Site Plan that includes recommendations, calculations, and procedures required to adhere to Minimum Requirement #1. The evaluation of the existing site conditions follows.

### **2.2.1 Site Location**

The site is located in the SE quarter of Section 19 of Township 31 North, Range 5 East. The street address is 1125 & 1507 172nd Street NE, Marysville, Washington 98271 and the parcel is located on the north side of 172<sup>nd</sup> Street NE. See Figure 1 for a vicinity map.

### **2.2.2 Site Description, Existing Conditions**

The project site is a 29.63-*acres* parcel. The parcel is owned by Myron Gemmer & Brad Gemmer. The Snohomish County parcel number is 310519-004-009-00, 310519-004-011-00. It is zoned R-6.5 Multi-Family High and Mixed Use and is located in Snohomish County.

The site is vacant. The existing drainage system(s) are undetermined but largely surface runoff to an existing agriculture ditch over the top silt layer. Surface runoff overall flows southwest and east.

The majority of the site is pasture.

All maps and figures are presented in the Support Data section of this document.

A vicinity map that shows the site location is shown as Figure 1.

A site map that shows the property lines is shown in Figure 2.

A topographic map that shows the site boundaries, study area boundaries, and the downstream flow-paths is also presented in Figure 3.

### **2.2.3 Existing Basin Analysis**

The project is defined by the development within the subject parcel. Existing project flow paths are shown in Figure 2.

The study area is located in the Quilceda Creek sub-basin of the Snohomish Basin in the Snohomish watershed (WRIA-7-Snohomish), which drains to the Puget Sound.

All existing flow assessment and site related basin delineations were established by tracing analysis of a LIDAR surface model.

### **2.2.4 Other Information on the Study Area**

The site is not in or adjacent to a USEPA Sole Source Aquifer.

The site is not in a well-head protection area.

The site is not in a floodway or floodplain.

### **2.2.5 Critical Areas**

There is an onsite Category III wetland on the northwest corner of the site. Category III wetlands carry 75-foot buffer. An offsite Category III wetland is located north of the site. The offsite wetland's buffer encroaches onto the site.

### **2.2.6 Topography**

The site and surrounding topography was analyzed using survey topographic points provided by North Peak Associates. A 3D surface model was generated.

The site has mostly flat slopes with high points around 162 feet MSL in the middle of the site. The site slopes up from the west to a high point 162 feet and then slopes down to the east boundary.

Slopes average in the range of 0 to 5 percent for the majority of the developable area. The site has an average slope of 3.89%.

### **2.2.7 Soils**

Per NRCS mappings, Tokul gravelly sandy loam soils are found throughout the site. Tokul soils are related with glacial Till. Glacial Till is also mapped within the USGS Geologic maps for this site.

Infiltration cannot be used as a primary component of stormwater management due to the relative density of site soils.

Detailed physical and chemical properties of these soils are presented in Section 4.1. The NRCS mapping can be seen in Figure 5.

### **2.2.8 Field Inspection**

The site has not been visited recently. All inspection has been conducted via remote sensing.

### **2.2.9 Upstream Analysis**

The site is at a local high point in the area. No upstream basin flows onto the site.

### **2.2.10 Downstream Analysis**

The downstream area was established by tracing analysis of a LIDAR surface model and evaluation of various GIS data, aerial imagery, and City of Marysville Drainage Inventory. Two onsite basins are present on site. The basins on site are named West and East Basin respective to their location within the site. The Basins meet within West Fork Quilceda Creek more than ¼ mile as measured from the shortest path away.

Stormwater from West Basin flows to the southwest between property lines before reaching an existing ditch, which flows south and is parallel to the west property boundary. The ditch turns east at the southwest corner of the site. There is an existing 8" concrete culvert at the end of the ditch. The ditch is then conveyed through the culvert and across 172<sup>nd</sup> Street NE. Stormwater flows along the storm system within 172<sup>nd</sup> Street NE ROW and then within a bypass conveyance system along 11<sup>th</sup> Ave NE. The storm system eventually discharges to West Fork Quilceda Creek south of the high school stadium.

East Basin flows east to an existing ditch, which is within Burlington Northern RR ROW. Stormwater flows southeast along the ditch and across 172<sup>nd</sup> Street NE ROW via an existing 12" concrete culvert. Stormwater then drains to an existing ditch which flows northeast along the railroad. The two basins eventually meet within West Fork Quilceda Creek which portion flows along the RR ROW.

Figure 3 shows a portion of the downstream flow path.

## 2.3 MR #2: Stormwater Pollution Prevention Plans (SWPPPs)

MMC 14.15.050 (2) specifies the requirements for development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters. Volume I, Chapter 2.5.2 of the 2014 SMMWW specifies that all new development and redevelopment implement a Stormwater Pollution Prevention Plans (SWPPP), which is a list of 13 elements that present measures and methods for all permanent and temporary erosion and sediment control (TESC), pollution prevention, inspection/monitoring activities, and recordkeeping required during the proposed construction project.

Based on the MR#2 thresholds, this project generates more than 2,000 *square feet* of impervious area, so a full SWPPP is required. Required elements for the SWPPP:

- SWPPP element 1: Preserve vegetation/mark clearing limits
- SWPPP element 2: Establish construction access
- SWPPP element 3: Control flow rates
- SWPPP element 4: Install sediment controls
- SWPPP element 5: Stabilize soils
- SWPPP Element 6: Protect slopes
- SWPPP element 7: Protect permanent drain inlets
- SWPPP element 8: Stabilize channels and outlets
- SWPPP element 9: Control pollutants
- SWWP element 10: Control dewatering
- SWPPP element 11: Maintain best management practices
- SWPPP element 12: Manage the project
- SWPPP element 13: Protect On-Site Stormwater Management BMPs for Runoff from Roofs and Other Hard Surfaces

The SWPPP is assembled as a separate document for portability and reproduction purposes. The document is titled “**Stormwater Pollution Prevention Plan for Robinett Brothers, LLC**”, dated 22 February 2022.

## **2.4 MR #3: Source Control of Pollution**

MMC 14.15.050 (3) specifies the requirements for water pollution source control for new development or redevelopment activities in accordance with Volume IV of the SMMWW. These activities are primarily commercial industrial developments that represent significant pollutant generation potential and the associated source control BMPs are designed to suit those activities.

Per Chapter 2.5.3, MR#3 does not apply to residential development, hence such source controls are not specified for this project.

## **2.5 MR #4: Preservation of Natural Drainage Systems and Outfalls**

MMC 14.15.050 (4) specifies the requirements for preservation of natural drainage systems or outfalls for all new development and redevelopment activities under Minimum Requirement 4 in the 2014 SMMWW.

Natural drainage patterns as they once existed shall be retained. Pre-developed conditions experience a sheet drainage pattern to the site's west and east property boundary. Stormwater generated onsite reaches the property boundary through infiltration or surface runoff prior to being intercepted by exiting ditches. Existing discharge location shall be maintained.

## 2.6 MR #5: On-Site Stormwater Management

MMC 14.15.050 (5) specifies requirements for on-site stormwater BMPs. This requirement mandates that on-site stormwater runoff be infiltrated, dispersed, and/or retained to the maximum extent feasible without causing flooding or erosion impacts. Projects triggering Minimum Requirements 1 through 5 must use On-site stormwater management BMPs from List #1 for all surfaces or demonstrate compliance with the LID Performance Standard. Projects triggering Minimum Requirements 1 through 9 must meet the requirements of Table 2.5.1 in Vol. 1 of the 2014 SMMWW. Table 2.5.1 specifies the requirements for new or redevelopment depending on UGA and parcel size to meet the requirements of the LID Performance Standard and/or List #2. List #1 and List #2 specify stormwater BMPs in order of preference. The first BMP determined feasible is required.

This project trigger MR's 1-9. This project is within the City's UGA. This project is required to adhere to the LID Performance Standard or List #2 per Table 2.5.1.

List #1 and #2 contain appropriate BMPs to mitigate a particular developed surface. The surfaces included in the list are Lawn and Landscaped Areas, Roofs, and other hard surfaces (road/driveway/parking).

Lawn/Landscape is required to utilize BMP T5.13, Post-Construction Soil Quality and Depth.

Roofs are required to employ BMP T5.30 Full Dispersion or Downspout Infiltration, Rain Gardens or Bioretention, BMP T5.10A Downspout Dispersion Systems, or perforated stub-out connections. The first feasible BMP in this list must be used.

Other Hard surfaces (Roads, Driveways, Parking Lots, Etc.) must utilize BMP T5.30 Full Dispersion, BMP T5.15 Permeable Pavement, Bioretention, Sheet Flow Dispersion, or Concentrated Flow Dispersion. The first feasible BMP in this list must be used.

Lawn/landscape will utilize BMP T5.13, Post Construction Soil Quality and Depth.

Roofs will not be able to provide BMP T5.30 Full Dispersion. Full Dispersion requires 100-foot flow paths within native areas. The project will not be able to maintain 65% open space.

Individual Lot Infiltration is not feasible based on the low-permeability of native soils. Most roofs will be ultimately routed to bioretention areas for treatment and flow control.

BMP T5.10B Downspout Dispersion will not be utilized as each individual lot lacks the prescriptive flow path length. BMP T5.10C perforated stub out connections are also not feasible due to the close proximity of sewer, water, gas, electricity, and cable utilities on these narrow 40 ft wide lots. Perforated stub outs are also not permitted to be installed beneath driveways.

Onsite stormwater BMPs are infeasible.

Road and Driveway/Parking will be routed to bioretention areas, BMP T7.30. The bioretention cells will treat stormwater through filtering, phytoremediation, and microbial action from within the compost.

Permeable pavement will not be used as the pavement areas are likely to have long-term excessive sediment deposition after construction and homeowner turnover. Permeable pavement

may also be constructed over the top of compacted structural fill that does not exhibit infiltration rates consistent with the requirements for this BMP.

A site plan showing the stormwater management and development can be seen in Figure 4.



## 2.7 MR #6: Runoff Treatment

Minimum Requirement #6 in MMC 14.15.050 (6) specifies the requirements for providing runoff treatment. The threshold for requiring a treatment BMP is 5,000 *square feet* of PGIS (Pollution Generating Impervious Surface) or a total of more than  $\frac{3}{4}$  of an acre of PGPS (Pollution Generating Pervious Surface).

This project is expected to generate 325,415 *square feet* (7.47 *acres*) of PGIS based on road, sidewalk and driveway areas, therefore treatment facility BMPs are required for this project.

Runoff treatment facility selection is outlined in Vol. I, Ch. 4.2, Step V of the 2014 SMMWW. Step V outlines the treatment facility selection flow chart based on the intended use of a project. Treatment selection is based on if the site is a high-use site, if the downstream receiving waters are phosphorous sensitive, and/or if the site is required to provide enhanced treatment. The definitions of high-use, phosphorous control, and enhanced treatment can be found in Step V in Section 4.2 of the 2014 SMMWW.

The project is not a high use site.

The project is not required to treat for phosphorous.

Enhanced treatment is not required for the project.

Enhanced and Basic treatment is provided through the use of a bioretention facility per Vol. III Section 3.3.12 of the 2014 SMMWW. The bioretention specified will provide enhanced treatment. The bio-cell treats stormwater through the infiltration of stormwater through soils and their ability to absorb pollutants. On-site soils are suitable for use. See Vol III. Section 3.3.12 of the 2014 SMMWW for specific soil design criteria.

The project utilizes bioretention cells for treatment. The bioretention cell mitigates polluted stormwater through physical, chemical and biological treatment processes. The treatment process reduces pollutant loads to downstream receiving waters. Stormwater percolates through compost amended soils and plantings to obtain treatment. The total percolated runoff through each bio-cell's amended soils is well over the 91% total runoff volume treatment requirement. See Section 7.

## 2.8 MR #7: Flow Control

Minimum Requirement #7 in MMC 14.15.050 (7) specifies the requirements for runoff flow control. The threshold for requiring Minimum Requirement #7 is 5,000 *square feet* of impervious surface. Flow control shall be provided if the project creates more than 10,000 *square feet* of effective impervious area in a threshold discharge area, converts  $\frac{3}{4}$  of an acre or more of native vegetation to lawn, 2.5 *acres* or more native vegetation is converted to pasture, or a combination of impervious and converted pervious surfaces cause a 0.1 *cfs* increase in the 100-year flow frequency from a continuous simulation runoff model.

The project exceeds this requirement and is required to provide flow control.

All runoff from impervious surfaces and converted surfaces is preferred to be infiltrated if feasible. Standard flow control requires that stormwater discharges match pre-developed discharge durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow to the 50-year peak flow. The pre-developed condition shall be matched to the fully-forested condition (soils and vegetation) to which the Western Washington Hydrologic Model (WWHM) is calibrated, unless reasonable, historic information is provided that indicates the site was prairie prior to Euro-American settlement. This requirement may also be met by Full dispersion and infiltration. This standard requirement is waived for sites that will reliably infiltrate all the runoff from hard surface and converted vegetation areas.

The site stormwater management practices detention of stormwater generated on site. A small portion of the frontage and rooftops bypass facilities for detention. These bypasses are included in the stormwater model. The site as a whole still meets the flow control threshold requirement.

The site is split into two overall basins, West and East.

Stormwater generated in West Basin flows to Bioretention Cell A, C and D. Bioretention Cell A discharges to a 3.0 *ft* thick gravel trench bed. Bioretention Cell C discharges to a 5.5 *ft* thick gravel trench bed. The gravel trench beds release stormwater to a proposed stormwater system within 11<sup>th</sup> Ave NE ROW. Bioretention Cell D also discharges stormwater to the stormwater system.

Stormwater generated in East Basin flows to Bioretention Cell B. The discharge of the cell is to a level spreader.

The combination of bioretention cells A,B and C along with the gravel trenches meet compliance with flow-control standard of 50% of the 2-year to the 50% predeveloped stormwater flows.

All bioretention cells are comprised of 1.5 *feet* of bioretention soil media. Those cells utilize ponded area with freeboard to allow stormwater to percolate through the amended soils. Percolated stormwater drains to a filter layer, and then to a storage chamber consisting of 0.5 *ft* to 2.0 *ft* of rock. They rock layer is drained through a perforated underdrain.

See Section 7 for bioretention cells, planter bioswales and rooftop modeling parameters.

## **2.9 MR #8: Wetlands Protection**

MMC 14.15.050 (8) specifies requirements for discharge of stormwater in wetlands and wetland buffers as well as discharge of stormwater to a stream.

Since there is no detention or treatment in the critical areas, MR-8 does not apply to this project.

## **2.10 MR # 9: Operation and Maintenance**

Minimum Requirement #9 specified MMC 14.15.050 (9) contains requirements for inspection, operation and maintenance of stormwater facilities and BMPs. Specific maintenance standards and requirements are outlined in Volume V of the 2014 SMMWW. The 2014 SMMWW requires the regular maintenance and inspection of drainage facilities.

For portability and reproduction purposes, the Operations and Maintenance Manual is presented in a separate stand-alone document titled “**Operations and Maintenance Manual for Gemmer PRD**”, dated **22 February 2022**. This document will be provided with the construction plan submittal.

# Section 3 - Maps & Figures

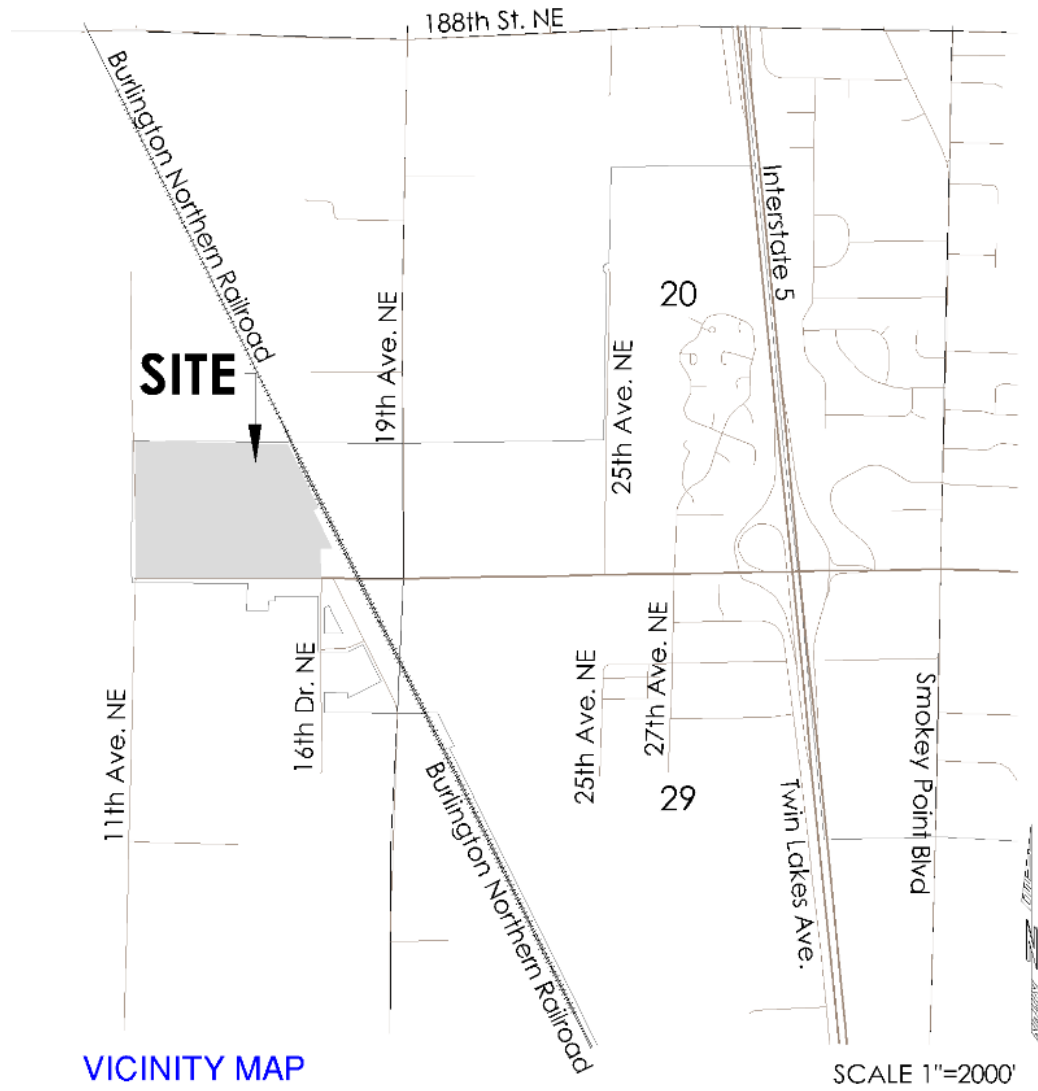


Figure 1 - Vicinity Map



**Figure 2 - Existing Conditions (not to scale)**



**Figure 3 – Downstream Flow Path**



**Figure 4 - Site Plan**



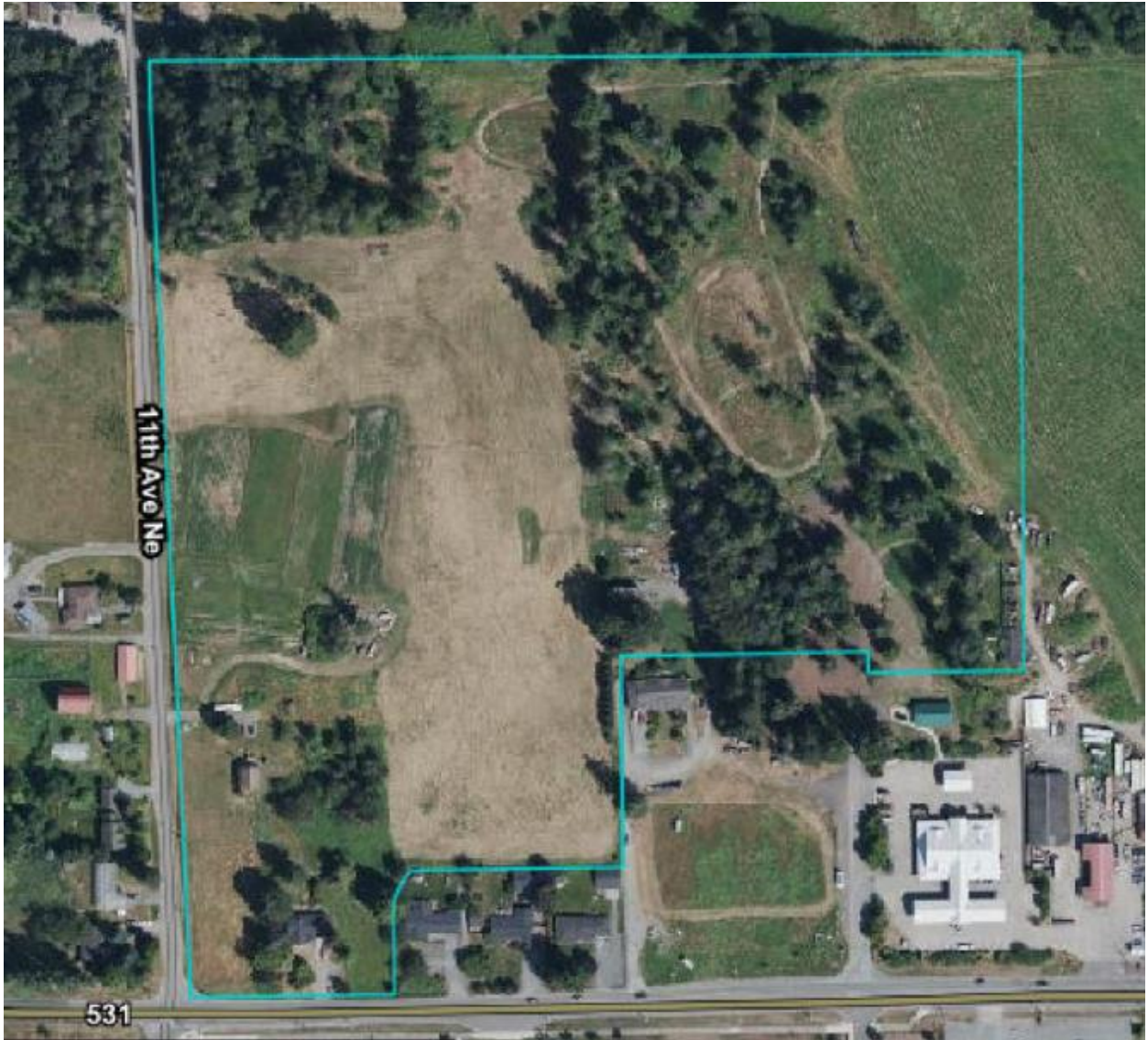


Figure 5 – Soil Map (Not to Scale)

## Section 4 - Support Data

### 4.1 Soils Data

#### 1—Alderwood gravelly sandy loam, 0 to 8 percent slopes

##### Map Unit Setting

*National map unit symbol:* 2t625

*Elevation:* 50 to 800 feet

*Mean annual precipitation:* 25 to 60 inches

*Mean annual air temperature:* 48 to 52 degrees F

*Frost-free period:* 160 to 240 days

*Farmland classification:* Prime farmland if irrigated

##### Map Unit Composition

*Alderwood and similar soils:*85 percent

*Minor components:*15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

##### Description of Alderwood

###### Setting

*Landform:*Hills, ridges

*Landform position (two-dimensional):*Summit

*Landform position (three-dimensional):*Crest, tal

*Down-slope shape:*Convex, linear

*Across-slope shape:*Convex

*Parent material:*Glacial drift and/or glacial outwash over dense glaciomarine deposits

###### Typical profile

*A - 0 to 7 inches:* gravelly sandy loam

*Bw1 - 7 to 21 inches:* very gravelly sandy loam

*Bw2 - 21 to 30 inches:* very gravelly sandy loam

*Bg - 30 to 35 inches:* very gravelly sandy loam

*2Cd1 - 35 to 43 inches:* very gravelly sandy loam

*2Cd2 - 43 to 59 inches:* very gravelly sandy loam

###### Properties and qualities

*Slope:*0 to 8 percent

*Depth to restrictive feature:*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 37 inches

*Frequency of flooding:*None

*Frequency of ponding:*None

*Available water supply, 0 to 60 inches:* Very low (about 2.7 inches)

###### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 4s

*Hydrologic Soil Group:* B

*Ecological site:* F002XA004WA - Puget Lowlands Forest

*Forage suitability group:* Limited Depth Soils (G002XN302WA), Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XS301WA)

*Other vegetative classification:* Limited Depth Soils (G002XN302WA), Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XS301WA)

*Hydric soil rating:* No

**Minor Components**

**Mckenna**

*Percent of map unit:*5 percent

*Landform:*Drainageways, depressions

*Landform position (three-dimensional):*Dip

*Down-slope shape:*Linear, concave

*Across-slope shape:*Concave

*Hydric soil rating:* Yes

**Everett**

*Percent of map unit:*5 percent

*Landform:*Moraines, eskers, kames

*Landform position (two-dimensional):*Summit, shoulder

*Landform position (three-dimensional):*Interfluve, crest

*Down-slope shape:*Convex

*Across-slope shape:*Convex

*Hydric soil rating:* No

**Shalcar**

*Percent of map unit:*3 percent

*Landform:*Depressions

*Landform position (three-dimensional):*Dip

*Down-slope shape:*Concave

*Across-slope shape:*Concave

*Hydric soil rating:* Yes

**Norma**

*Percent of map unit:*2 percent

*Landform:*Drainageways, depressions

*Landform position (three-dimensional):*Dip

*Down-slope shape:*Linear, concave

*Across-slope shape:*Concave

*Hydric soil rating:* Yes

**27—Kitsap silt loam, 0 to 8 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 2hyh

*Elevation:* 0 to 490 feet

*Mean annual precipitation:* 37 inches

*Mean annual air temperature:* 50 degrees F

*Frost-free period:* 160 to 200 days

*Farmland classification:* All areas are prime farmland

**Map Unit Composition**

*Kitsap and similar soils:*85 percent

*Minor components:*5 percent

*Estimates are based on observations, descriptions, and transects of the map unit.*

### **Description of Kitsap**

#### **Setting**

*Landform:*Terraces

*Parent material:*Lacustrine deposits

#### **Typical profile**

*H1 - 0 to 6 inches:* ashy silt loam

*H2 - 6 to 33 inches:* silt loam

*H3 - 33 to 60 inches:* stratified silt to silty clay loam

#### **Properties and qualities**

*Slope:*0 to 8 percent

*Depth to restrictive feature:*More than 80 inches

*Drainage class:*Moderately well drained

*Capacity of the most limiting layer to transmit water (Ksat):*Moderately low to moderately high (0.06 to 0.20 in/hr)

*Depth to water table:*About 18 to 30 inches

*Frequency of flooding:*None

*Frequency of ponding:*None

*Available water supply, 0 to 60 inches:* High (about 11.4 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3w

*Hydrologic Soil Group:* C

*Ecological site:* F002XA004WA - Puget Lowlands Forest

*Forage suitability group:* Soils with Few Limitations (G002XF503WA)

*Other vegetative classification:* Soils with Few Limitations (G002XF503WA)

*Hydric soil rating:* No

#### **Minor Components**

##### **Bellingham, undrained**

*Percent of map unit:*5 percent

*Landform:*Depressions

*Other vegetative classification:*Wet Soils (G002XN102WA)

*Hydric soil rating:* Yes

## Section 5 Works Cited

Mays, L. W. (2011). *Water Resources Engineering*. Hoboken: Wiley & Sons, Inc.

Puget Sound Action Team. (2005, January). Low Impact Development Technical Guidance Manual for Puget Sound. *Publication No. PSAT 05-03*. Washington: Washington State University - Pierce County Extension.

Puget Sound LIDAR Consortium. (2003, April). LIDAR Bare Earth DEM File. q47121h24be.e00. Snohomish County, Washington. Retrieved May 2013, from <http://pugetsoundlidar.ess.washington.edu/index.htm>

Snohomish County Planning and Development Services. (2007, October 1). Aquifer Recharge/Wellhead Protection. Everett, WA.

Snohomish County Surface Water Management Division. (2002, December). Snohomish UGA Drainage Needs Report. Everett, Washington.

### 5.1 Topographic Data

- The various on and off site topography, utilities, and drainage elements were professionally surveyed by Pacific Coast Surveying in 2019.
- Snohomish County 2003 LiDAR survey was used to augment the existing site topography and the downstream and surrounding areas.

The modeled coordinate system:

Lateral - Washington State Plan Plane - North, FIPS 4601;

Vertical – NAVD 88

## **Section 6 - Continuous Simulation Modeling**

### **6.1 Continuous Simulation Background**

HSPF based continuous simulation modeling was used to evaluate the hydrologic performances of the pre-developed and developed sub-basins in order to accurately assess flow rates.

The currently adopted continuous simulation models use the HSPF (Hydraulic Simulation Program in FORTRAN) software engine. The HSPF model uses a robust and detail accounting of the 'water budget', including evaporation, evapotranspiration, interception, interflow, and groundwater. The modeling accounts for and assesses land segment areas that include vegetation or impervious cover, soil types, and slopes. The modeling also uses utilized over 50 years of continuous rainfall data (precipitation) and evaporation data for the area. The HSPF continuous modeling is considered the best available science for hydrologic analysis.

### **6.2 Modeling Methodology**

HSPF modeling was managed via the Western Washington Hydrology Model (WWHM) interface program. The current professional version of WWHM by Clearcreek Solutions, Inc., WWHM-2012 was used. The current data precipitation and evaporation set provided by DOE with the WWHM-2012 software interface was used that includes quantized data in 15-minute time steps from October 1948 to October 2009.

The WWHM program comes packaged with generic, well considered HSPF modeling parameters. These settings allow for the modeling of the majority of the topological conditions found in the Puget Sound area. Where conditions fall reasonably outside the range of the default HSPF parameters, adjustments should be made to more accurately reflect those conditions. These are generally limited to the pervious land segments (IMPLNDS) and are mostly limited to slopes (SLSUR), infiltration rates (INFILT), and length of flow path (LSUR). For this project, HSPF parameters were not adjusted to reflect site conditions.

#### **6.2.1 Existing Conditions**

The surface vegetative cover is assumed fully forested with an average slope of 5% in the area of development, based on the LIDAR based TIN analysis. The LIDAR model represents the pre-graded conditions and is in accordance with the predeveloped requirements to be represented as native vegetation and soils that existed at a site prior to the influence of Euro-American settlement.

The NRCS soil mapping of Tokul gravelly medial loam within the modeled area is listed as Type C hydrologic soils. Land segments of Forest Flat, Mod are representative of the existing site areas. Wetland buffer is mapped as Forest, Flat. The wetland area itself is modeled in the WWHM as Sat Forest, Flat.

## 6.2.2 Developed Conditions

Default mapping for flat road was used for the road areas. Roof was for the rooftop areas. Driveway was for the driveway areas and sidewalk for the paths. Pasture was used for the amended soils from DOE recommendations for amended soils modeling. The intent of the modeling of this site was to determine the infiltration and treatment efficiencies of the bio-retention cell. Flow control modeling took place for the bypass area that is unable to be introduced to street system.

It should be noted that when ponds, bio-swales, or other open detention facilities are used, the corresponding WWHM analysis module includes the ponded area. Consequently, this area is not included in the basin land segment mappings so the total area is often different between the developed and pre-developed conditions.

The current DOE specification for amended soils in 2014 is labeled as 'SMMWW' in the Bio-Swale and other WWHM modules that employ amended soils. The parameters for modeling the SMMWW are preset and based on current state-of-the-art modeling using a combination of the Darcy's and Van Genuchten's equations to account for the variability of permeability and water content as the soils transition from dry or partly damp to saturated conditions as the bio-cell cycles through the process of filling, emptying, and drying out. The SMMWW settings based on the WSU amended soils.

# Section 7 - Software Output

The following WWHM reports in this section represent individual sub-basin analysis for hydrologic flow evaluations. The following heading is common to all reports.

## Western Washington Hydrology Model,

### 7.1 West Basin

**Project Name:** West TDA 0218  
**Site Name:** Gemmer PRD  
**Site Address:** 1125 172nd St NE  
**City** : Marysville, WA  
**Report Date:** 2/18/2022  
**Gage** : Everett  
**Data Start** : 1948/10/01  
**Data End** : 2009/09/30  
**Precip Scale:** 1.00  
**Version Date:** 2019/09/13  
**Version** : 4.2.17

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

High Flow Threshold for POC 1: 50 year

#### PREDEVELOPED LAND USE

**Name** : Basin 1  
**Bypass:** No

**GroundWater:** No

|                          |             |
|--------------------------|-------------|
| <u>Pervious Land Use</u> | <u>acre</u> |
| C, Forest, Flat          | 12.271      |

|                |        |
|----------------|--------|
| Pervious Total | 12.271 |
|----------------|--------|

|                            |             |
|----------------------------|-------------|
| <u>Impervious Land Use</u> | <u>acre</u> |
|----------------------------|-------------|

|                  |   |
|------------------|---|
| Impervious Total | 0 |
|------------------|---|

|             |        |
|-------------|--------|
| Basin Total | 12.271 |
|-------------|--------|



#### Element Flows To:

|         |           |             |
|---------|-----------|-------------|
| Surface | Interflow | Groundwater |
|---------|-----------|-------------|



Name : Onsite Wetland

Bypass: No

GroundWater: No

| <u>Pervious Land Use</u> | <u>acre</u> |
|--------------------------|-------------|
| SAT, Forest, Flat        | .083        |
| C, Forest, Flat          | 1.625       |

Pervious Total 1.708

| <u>Impervious Land Use</u> | <u>acre</u> |
|----------------------------|-------------|
|----------------------------|-------------|

Impervious Total 0

Basin Total 1.708

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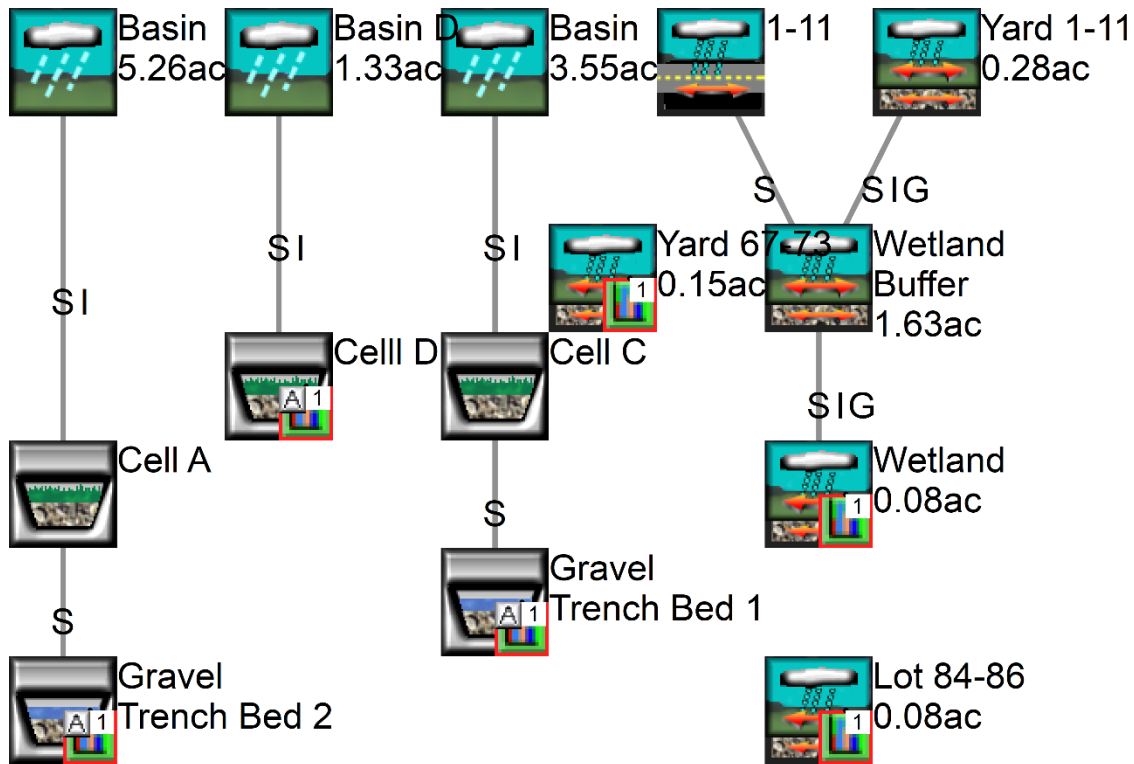
Element Flows To:

Surface

Interflow

Groundwater

---



**MITIGATED LAND USE**

Name : Basin A  
 Bypass: No

GroundWater: No

|                          |             |
|--------------------------|-------------|
| <u>Pervious Land Use</u> | <u>acre</u> |
| C, Pasture, Flat         | 1.792       |

|                |       |
|----------------|-------|
| Pervious Total | 1.792 |
|----------------|-------|

|                            |             |
|----------------------------|-------------|
| <u>Impervious Land Use</u> | <u>acre</u> |
| ROADS FLAT                 | 0.696       |
| ROOF TOPS FLAT             | 1.619       |
| DRIVEWAYS FLAT             | 0.794       |
| SIDEWALKS FLAT             | 0.362       |

|                  |       |
|------------------|-------|
| Impervious Total | 3.471 |
|------------------|-------|

|             |       |
|-------------|-------|
| Basin Total | 5.263 |
|-------------|-------|

**Element Flows To:**

|                |                  |                    |
|----------------|------------------|--------------------|
| <b>Surface</b> | <b>Interflow</b> | <b>Groundwater</b> |
| Surface Cell A | Surface Cell A   |                    |

Name : Cell A  
 Bottom Length: 320.00 ft.

**Bottom Width:** 70.00 ft.  
**Material thickness of first layer:** 1.5  
**Material type for first layer:** SMMWW 12 in/hr  
**Material thickness of second layer:** 0.5  
**Material type for second layer:** Sand  
**Material thickness of third layer:** 0.5  
**Material type for third layer:** GRAVEL

**Underdrain used**

**Underdrain Diameter (feet):** 0.5  
**Orifice Diameter (in.):** 1  
**Offset (in.):** 0  
**Flow Through Underdrain (ac-ft.):** 606.296  
**Total Outflow (ac-ft.):** 659.532  
**Percent Through Underdrain:** 91.93

**Discharge Structure**

**Riser Height:** 1 ft.  
**Riser Diameter:** 12 in.  
**Orifice 1 Diameter:** 0.3 in. **Elevation:** 0.1 ft.  
**Orifice 2 Diameter:** 2 in. **Elevation:** 0.5 ft.

**Element Flows To:**

**Outlet 1**                      **Outlet 2**  
 Gravel Trench Bed 2

**Cell A Hydraulic Table**

| <b>Stage(feet)</b> | <b>Area(ac.)</b> | <b>Volume(ac-ft.)</b> | <b>Discharge(cfs)</b> | <b>Infilt(cfs)</b> |
|--------------------|------------------|-----------------------|-----------------------|--------------------|
| 0.0000             | 0.5142           | 0.0000                | 0.0000                | 0.0000             |
| 0.0440             | 0.5142           | 0.0103                | 0.0000                | 0.0000             |
| 0.0879             | 0.5142           | 0.0207                | 0.0000                | 0.0000             |
| 0.1319             | 0.5142           | 0.0310                | 0.0000                | 0.0000             |
| 0.1758             | 0.5142           | 0.0413                | 0.0000                | 0.0000             |
| 0.2198             | 0.5142           | 0.0517                | 0.0000                | 0.0000             |
| 0.2637             | 0.5142           | 0.0620                | 0.0005                | 0.0000             |
| 0.3077             | 0.5142           | 0.0724                | 0.0007                | 0.0000             |
| 0.3516             | 0.5142           | 0.0827                | 0.0025                | 0.0000             |
| 0.3956             | 0.5142           | 0.0930                | 0.0034                | 0.0000             |
| 0.4396             | 0.5142           | 0.1034                | 0.0047                | 0.0000             |
| 0.4835             | 0.5142           | 0.1137                | 0.0053                | 0.0000             |
| 0.5275             | 0.5142           | 0.1240                | 0.0063                | 0.0000             |
| 0.5714             | 0.5142           | 0.1344                | 0.0068                | 0.0000             |
| 0.6154             | 0.5142           | 0.1447                | 0.0076                | 0.0000             |
| 0.6593             | 0.5142           | 0.1550                | 0.0080                | 0.0000             |
| 0.7033             | 0.5142           | 0.1654                | 0.0086                | 0.0000             |
| 0.7473             | 0.5142           | 0.1757                | 0.0090                | 0.0000             |
| 0.7912             | 0.5142           | 0.1861                | 0.0096                | 0.0000             |
| 0.8352             | 0.5142           | 0.1964                | 0.0099                | 0.0000             |
| 0.8791             | 0.5142           | 0.2067                | 0.0104                | 0.0000             |
| 0.9231             | 0.5142           | 0.2171                | 0.0107                | 0.0000             |
| 0.9670             | 0.5142           | 0.2274                | 0.0112                | 0.0000             |
| 1.0110             | 0.5142           | 0.2377                | 0.0114                | 0.0000             |
| 1.0549             | 0.5142           | 0.2481                | 0.0119                | 0.0000             |
| 1.0989             | 0.5142           | 0.2584                | 0.0121                | 0.0000             |
| 1.1429             | 0.5142           | 0.2688                | 0.0126                | 0.0000             |
| 1.1868             | 0.5142           | 0.2791                | 0.0128                | 0.0000             |
| 1.2308             | 0.5142           | 0.2894                | 0.0132                | 0.0000             |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1.2747 | 0.5142 | 0.2998 | 0.0134 | 0.0000 |
| 1.3187 | 0.5142 | 0.3101 | 0.0139 | 0.0000 |
| 1.3626 | 0.5142 | 0.3204 | 0.0141 | 0.0000 |
| 1.4066 | 0.5142 | 0.3308 | 0.0144 | 0.0000 |
| 1.4505 | 0.5142 | 0.3411 | 0.0146 | 0.0000 |
| 1.4945 | 0.5142 | 0.3514 | 0.0150 | 0.0000 |
| 1.5385 | 0.5142 | 0.3605 | 0.0152 | 0.0000 |
| 1.5824 | 0.5142 | 0.3695 | 0.0156 | 0.0000 |
| 1.6264 | 0.5142 | 0.3786 | 0.0157 | 0.0000 |
| 1.6703 | 0.5142 | 0.3876 | 0.0161 | 0.0000 |
| 1.7143 | 0.5142 | 0.3967 | 0.0163 | 0.0000 |
| 1.7582 | 0.5142 | 0.4057 | 0.0166 | 0.0000 |
| 1.8022 | 0.5142 | 0.4147 | 0.0168 | 0.0000 |
| 1.8462 | 0.5142 | 0.4238 | 0.0171 | 0.0000 |
| 1.8901 | 0.5142 | 0.4328 | 0.0173 | 0.0000 |
| 1.9341 | 0.5142 | 0.4419 | 0.0176 | 0.0000 |
| 1.9780 | 0.5142 | 0.4509 | 0.0177 | 0.0000 |
| 2.0220 | 0.5142 | 0.4603 | 0.0181 | 0.0000 |
| 2.0659 | 0.5142 | 0.4697 | 0.0182 | 0.0000 |
| 2.1099 | 0.5142 | 0.4790 | 0.0390 | 0.0000 |
| 2.1538 | 0.5142 | 0.4884 | 0.0394 | 0.0000 |
| 2.1978 | 0.5142 | 0.4978 | 0.0399 | 0.0000 |
| 2.2418 | 0.5142 | 0.5072 | 0.0403 | 0.0000 |
| 2.2857 | 0.5142 | 0.5166 | 0.0408 | 0.0000 |
| 2.3297 | 0.5142 | 0.5259 | 0.0412 | 0.0000 |
| 2.3736 | 0.5142 | 0.5353 | 0.0417 | 0.0000 |
| 2.4176 | 0.5142 | 0.5447 | 0.0421 | 0.0000 |
| 2.4615 | 0.5142 | 0.5541 | 0.0425 | 0.0000 |
| 2.5000 | 0.5142 | 0.5623 | 0.0429 | 0.0000 |

**Surface Cell A Hydraulic Table**

| <u>Stage(feet)</u> | <u>Area(ac.)</u> | <u>Volume(ac-ft.)</u> | <u>Discharge(cfs)</u> | <u>To Amended(cfs)</u> | <u>Wetted Surface</u> |
|--------------------|------------------|-----------------------|-----------------------|------------------------|-----------------------|
| 2.5000             | 0.5142           | 0.5623                | 0.0000                | 6.2222                 | 0.0000                |
| 2.5440             | 0.5166           | 0.5850                | 0.0000                | 6.2222                 | 0.0000                |
| 2.5879             | 0.5190           | 0.6077                | 0.0000                | 6.5869                 | 0.0000                |
| 2.6319             | 0.5213           | 0.6306                | 0.0004                | 6.7692                 | 0.0000                |
| 2.6758             | 0.5237           | 0.6535                | 0.0007                | 6.9516                 | 0.0000                |
| 2.7198             | 0.5261           | 0.6766                | 0.0008                | 7.1339                 | 0.0000                |
| 2.7637             | 0.5285           | 0.6998                | 0.0010                | 7.3162                 | 0.0000                |
| 2.8077             | 0.5308           | 0.7231                | 0.0011                | 7.4986                 | 0.0000                |
| 2.8516             | 0.5332           | 0.7465                | 0.0012                | 7.6809                 | 0.0000                |
| 2.8956             | 0.5356           | 0.7699                | 0.0013                | 7.8633                 | 0.0000                |
| 2.9396             | 0.5380           | 0.7935                | 0.0014                | 8.0456                 | 0.0000                |
| 2.9835             | 0.5404           | 0.8172                | 0.0015                | 8.2279                 | 0.0000                |
| 3.0275             | 0.5428           | 0.8411                | 0.0196                | 8.4103                 | 0.0000                |
| 3.0714             | 0.5452           | 0.8650                | 0.0307                | 8.5926                 | 0.0000                |
| 3.1154             | 0.5476           | 0.8890                | 0.0386                | 8.7749                 | 0.0000                |
| 3.1593             | 0.5500           | 0.9131                | 0.0452                | 8.9573                 | 0.0000                |
| 3.2033             | 0.5524           | 0.9373                | 0.0508                | 9.1396                 | 0.0000                |
| 3.2473             | 0.5548           | 0.9617                | 0.0559                | 9.3219                 | 0.0000                |
| 3.2912             | 0.5573           | 0.9861                | 0.0606                | 9.5043                 | 0.0000                |
| 3.3352             | 0.5597           | 1.0107                | 0.0649                | 9.6866                 | 0.0000                |
| 3.3791             | 0.5621           | 1.0353                | 0.0690                | 9.8690                 | 0.0000                |
| 3.4231             | 0.5645           | 1.0601                | 0.0728                | 10.051                 | 0.0000                |
| 3.4670             | 0.5670           | 1.0849                | 0.0765                | 10.234                 | 0.0000                |
| 3.5110             | 0.5694           | 1.1099                | 0.0922                | 10.416                 | 0.0000                |
| 3.5549             | 0.5718           | 1.1350                | 0.2197                | 10.598                 | 0.0000                |
| 3.5989             | 0.5743           | 1.1602                | 0.4145                | 10.781                 | 0.0000                |

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 3.6429 | 0.5767 | 1.1855 | 0.6531 | 10.963 | 0.0000 |
| 3.6868 | 0.5792 | 1.2109 | 0.9186 | 11.145 | 0.0000 |
| 3.7308 | 0.5816 | 1.2364 | 1.1945 | 11.328 | 0.0000 |
| 3.7747 | 0.5841 | 1.2620 | 1.4639 | 11.510 | 0.0000 |
| 3.8187 | 0.5865 | 1.2877 | 1.7105 | 11.692 | 0.0000 |
| 3.8626 | 0.5890 | 1.3136 | 1.9212 | 11.875 | 0.0000 |
| 3.9066 | 0.5914 | 1.3395 | 2.0879 | 12.057 | 0.0000 |
| 3.9505 | 0.5939 | 1.3656 | 2.2114 | 12.239 | 0.0000 |
| 3.9945 | 0.5964 | 1.3917 | 2.3042 | 12.422 | 0.0000 |
| 4.0000 | 0.5967 | 1.3950 | 2.4247 | 12.444 | 0.0000 |

**Name** : Surface Cell A

**Element Flows To:**

|                     |                 |
|---------------------|-----------------|
| <b>Outlet 1</b>     | <b>Outlet 2</b> |
| Gravel Trench Bed 2 | Cell A          |

**Name** : Basin C

**Bypass:** No

**GroundWater:** No

|                            |              |
|----------------------------|--------------|
| <u>Pervious Land Use</u>   | <u>acre</u>  |
| C, Pasture, Flat           | .992         |
| <b>Pervious Total</b>      | <b>0.992</b> |
| <u>Impervious Land Use</u> | <u>acre</u>  |
| ROADS FLAT                 | 0.432        |
| ROOF TOPS FLAT             | 1.401        |
| DRIVEWAYS FLAT             | 0.486        |
| SIDEWALKS FLAT             | 0.235        |
| <b>Impervious Total</b>    | <b>2.554</b> |
| <b>Basin Total</b>         | <b>3.546</b> |

**Element Flows To:**

|                |                  |                    |
|----------------|------------------|--------------------|
| <b>Surface</b> | <b>Interflow</b> | <b>Groundwater</b> |
| Surface Cell C | Surface Cell C   |                    |

**Name** : Basin D

**Bypass:** No

**GroundWater:** No

|                          |              |
|--------------------------|--------------|
| <u>Pervious Land Use</u> | <u>acre</u>  |
| C, Pasture, Flat         | .898         |
| <b>Pervious Total</b>    | <b>0.898</b> |

|                            |              |
|----------------------------|--------------|
| <u>Impervious Land Use</u> | <u>acre</u>  |
| ROOF TOPS FLAT             | 0.341        |
| DRIVEWAYS FLAT             | 0.092        |
| <b>Impervious Total</b>    | <b>0.433</b> |
| <b>Basin Total</b>         | <b>1.331</b> |

**Element Flows To:**

|                  |                  |                    |
|------------------|------------------|--------------------|
| <b>Surface</b>   | <b>Interflow</b> | <b>Groundwater</b> |
| Surface Cell11 D | Surface Cell11 D |                    |

**Name** : Cell C  
**Bottom Length:** 605.00 ft.  
**Bottom Width:** 16.00 ft.  
**Material thickness of first layer:** 1.5  
**Material type for first layer:** SMMWW 12 in/hr  
**Material thickness of second layer:** 0.5  
**Material type for second layer:** Sand  
**Material thickness of third layer:** 2  
**Material type for third layer:** GRAVEL 0.45  
Underdrain used  
**Underdrain Diameter (feet):** 0.5  
**Orifice Diameter (in.):** 0.9  
**Offset (in.):** 0  
**Flow Through Underdrain (ac-ft.):** 441.955  
**Total Outflow (ac-ft.):** 459.93  
**Percent Through Underdrain:** 96.09  
Discharge Structure  
**Riser Height:** 1 ft.  
**Riser Diameter:** 12 in.  
**Orifice 1 Diameter:** 0.4 in. **Elevation:** 0.1 ft.

**Element Flows To:**

|                     |                 |
|---------------------|-----------------|
| <b>Outlet 1</b>     | <b>Outlet 2</b> |
| Gravel Trench Bed 1 |                 |

**Cell C Hydraulic Table**

| <u>Stage(feet)</u> | <u>Area(ac.)</u> | <u>Volume(ac-ft.)</u> | <u>Discharge(cfs)</u> | <u>Infilt(cfs)</u> |
|--------------------|------------------|-----------------------|-----------------------|--------------------|
| 0.0000             | 0.2222           | 0.0000                | 0.0000                | 0.0000             |
| 0.0604             | 0.2222           | 0.0061                | 0.0000                | 0.0000             |
| 0.1209             | 0.2222           | 0.0123                | 0.0000                | 0.0000             |
| 0.1813             | 0.2222           | 0.0184                | 0.0000                | 0.0000             |
| 0.2418             | 0.2222           | 0.0246                | 0.0000                | 0.0000             |
| 0.3022             | 0.2222           | 0.0307                | 0.0000                | 0.0000             |
| 0.3626             | 0.2222           | 0.0369                | 0.0012                | 0.0000             |
| 0.4231             | 0.2222           | 0.0430                | 0.0018                | 0.0000             |
| 0.4835             | 0.2222           | 0.0491                | 0.0039                | 0.0000             |
| 0.5440             | 0.2222           | 0.0553                | 0.0050                | 0.0000             |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.6044 | 0.2222 | 0.0614 | 0.0061 | 0.0000 |
| 0.6648 | 0.2222 | 0.0676 | 0.0067 | 0.0000 |
| 0.7253 | 0.2222 | 0.0737 | 0.0074 | 0.0000 |
| 0.7857 | 0.2222 | 0.0798 | 0.0078 | 0.0000 |
| 0.8462 | 0.2222 | 0.0860 | 0.0084 | 0.0000 |
| 0.9066 | 0.2222 | 0.0921 | 0.0087 | 0.0000 |
| 0.9670 | 0.2222 | 0.0983 | 0.0093 | 0.0000 |
| 1.0275 | 0.2222 | 0.1044 | 0.0096 | 0.0000 |
| 1.0879 | 0.2222 | 0.1106 | 0.0101 | 0.0000 |
| 1.1484 | 0.2222 | 0.1167 | 0.0103 | 0.0000 |
| 1.2088 | 0.2222 | 0.1228 | 0.0108 | 0.0000 |
| 1.2692 | 0.2222 | 0.1290 | 0.0110 | 0.0000 |
| 1.3297 | 0.2222 | 0.1351 | 0.0115 | 0.0000 |
| 1.3901 | 0.2222 | 0.1413 | 0.0117 | 0.0000 |
| 1.4505 | 0.2222 | 0.1474 | 0.0121 | 0.0000 |
| 1.5110 | 0.2222 | 0.1528 | 0.0123 | 0.0000 |
| 1.5714 | 0.2222 | 0.1582 | 0.0127 | 0.0000 |
| 1.6319 | 0.2222 | 0.1635 | 0.0129 | 0.0000 |
| 1.6923 | 0.2222 | 0.1689 | 0.0133 | 0.0000 |
| 1.7527 | 0.2222 | 0.1743 | 0.0134 | 0.0000 |
| 1.8132 | 0.2222 | 0.1796 | 0.0138 | 0.0000 |
| 1.8736 | 0.2222 | 0.1850 | 0.0140 | 0.0000 |
| 1.9341 | 0.2222 | 0.1904 | 0.0143 | 0.0000 |
| 1.9945 | 0.2222 | 0.1958 | 0.0145 | 0.0000 |
| 2.0549 | 0.2222 | 0.2017 | 0.0148 | 0.0000 |
| 2.1154 | 0.2222 | 0.2077 | 0.0150 | 0.0000 |
| 2.1758 | 0.2222 | 0.2137 | 0.0153 | 0.0000 |
| 2.2363 | 0.2222 | 0.2197 | 0.0155 | 0.0000 |
| 2.2967 | 0.2222 | 0.2256 | 0.0158 | 0.0000 |
| 2.3571 | 0.2222 | 0.2316 | 0.0160 | 0.0000 |
| 2.4176 | 0.2222 | 0.2376 | 0.0163 | 0.0000 |
| 2.4780 | 0.2222 | 0.2436 | 0.0164 | 0.0000 |
| 2.5385 | 0.2222 | 0.2496 | 0.0165 | 0.0000 |
| 2.5989 | 0.2222 | 0.2555 | 0.0165 | 0.0000 |
| 2.6593 | 0.2222 | 0.2615 | 0.0169 | 0.0000 |
| 2.7198 | 0.2222 | 0.2675 | 0.0176 | 0.0000 |
| 2.7802 | 0.2222 | 0.2735 | 0.0183 | 0.0000 |
| 2.8407 | 0.2222 | 0.2794 | 0.0190 | 0.0000 |
| 2.9011 | 0.2222 | 0.2854 | 0.0197 | 0.0000 |
| 2.9615 | 0.2222 | 0.2914 | 0.0205 | 0.0000 |
| 3.0220 | 0.2222 | 0.2974 | 0.0212 | 0.0000 |
| 3.0824 | 0.2222 | 0.3033 | 0.0218 | 0.0000 |
| 3.1429 | 0.2222 | 0.3093 | 0.0225 | 0.0000 |
| 3.2033 | 0.2222 | 0.3153 | 0.0231 | 0.0000 |
| 3.2637 | 0.2222 | 0.3213 | 0.0238 | 0.0000 |
| 3.3242 | 0.2222 | 0.3272 | 0.0244 | 0.0000 |
| 3.3846 | 0.2222 | 0.3332 | 0.0250 | 0.0000 |
| 3.4451 | 0.2222 | 0.3392 | 0.0256 | 0.0000 |
| 3.5055 | 0.2222 | 0.3452 | 0.0261 | 0.0000 |
| 3.5659 | 0.2222 | 0.3512 | 0.0267 | 0.0000 |
| 3.6264 | 0.2222 | 0.3571 | 0.0272 | 0.0000 |
| 3.6868 | 0.2222 | 0.3631 | 0.0278 | 0.0000 |
| 3.7473 | 0.2222 | 0.3691 | 0.0283 | 0.0000 |
| 3.8077 | 0.2222 | 0.3751 | 0.0288 | 0.0000 |
| 3.8681 | 0.2222 | 0.3810 | 0.0293 | 0.0000 |
| 3.9286 | 0.2222 | 0.3870 | 0.0298 | 0.0000 |
| 3.9890 | 0.2222 | 0.3930 | 0.0303 | 0.0000 |
| 4.0000 | 0.2222 | 0.3941 | 0.0440 | 0.0000 |

**Surface Cell C Hydraulic Table**

| <u>Stage(feet)</u> | <u>Area(ac.)</u> | <u>Volume(ac-ft.)</u> | <u>Discharge(cfs)</u> | <u>To Amended(cfs)</u> | <u>Wetted Surface</u> |
|--------------------|------------------|-----------------------|-----------------------|------------------------|-----------------------|
| 4.0000             | 0.2222           | 0.3941                | 0.0000                | 2.6889                 | 0.0000                |
| 4.0604             | 0.2274           | 0.4077                | 0.0000                | 2.6889                 | 0.0000                |
| 4.1209             | 0.2326           | 0.4216                | 0.0006                | 2.9056                 | 0.0000                |
| 4.1813             | 0.2378           | 0.4358                | 0.0012                | 3.0139                 | 0.0000                |
| 4.2418             | 0.2429           | 0.4503                | 0.0016                | 3.1223                 | 0.0000                |
| 4.3022             | 0.2481           | 0.4651                | 0.0020                | 3.2306                 | 0.0000                |
| 4.3626             | 0.2533           | 0.4803                | 0.0022                | 3.3390                 | 0.0000                |
| 4.4231             | 0.2586           | 0.4958                | 0.0025                | 3.4473                 | 0.0000                |
| 4.4835             | 0.2638           | 0.5116                | 0.0027                | 3.5556                 | 0.0000                |
| 4.5440             | 0.2690           | 0.5277                | 0.0029                | 3.6640                 | 0.0000                |
| 4.6044             | 0.2742           | 0.5441                | 0.0031                | 3.7723                 | 0.0000                |
| 4.6648             | 0.2795           | 0.5608                | 0.0033                | 3.8807                 | 0.0000                |
| 4.7253             | 0.2847           | 0.5779                | 0.0034                | 3.9890                 | 0.0000                |
| 4.7857             | 0.2899           | 0.5952                | 0.0036                | 4.0974                 | 0.0000                |
| 4.8462             | 0.2952           | 0.6129                | 0.0038                | 4.2057                 | 0.0000                |
| 4.9066             | 0.3004           | 0.6309                | 0.0039                | 4.3140                 | 0.0000                |
| 4.9670             | 0.3057           | 0.6492                | 0.0040                | 4.4224                 | 0.0000                |
| 5.0275             | 0.3110           | 0.6679                | 0.0525                | 4.5307                 | 0.0000                |
| 5.0879             | 0.3163           | 0.6868                | 0.2797                | 4.6391                 | 0.0000                |
| 5.1484             | 0.3215           | 0.7061                | 0.5997                | 4.7474                 | 0.0000                |
| 5.2088             | 0.3268           | 0.7257                | 0.9669                | 4.8558                 | 0.0000                |
| 5.2692             | 0.3321           | 0.7456                | 1.3380                | 4.9641                 | 0.0000                |
| 5.3297             | 0.3374           | 0.7658                | 1.6702                | 5.0725                 | 0.0000                |
| 5.3901             | 0.3427           | 0.7864                | 1.9305                | 5.1808                 | 0.0000                |
| 5.4505             | 0.3480           | 0.8073                | 2.1078                | 5.2891                 | 0.0000                |
| 5.5000             | 0.3524           | 0.8246                | 2.2566                | 5.3778                 | 0.0000                |

**Name** : Surface Cell C

**Element Flows To:**

|                     |                 |
|---------------------|-----------------|
| <b>Outlet 1</b>     | <b>Outlet 2</b> |
| Gravel Trench Bed 1 | Cell C          |

**Name** : Cell D

**Bottom Length:** 116.00 ft.

**Bottom Width:** 75.00 ft.

**Material thickness of first layer:** 1.5

**Material type for first layer:** SMMWW 12 in/hr

**Material thickness of second layer:** 0.5

**Material type for second layer:** Sand

**Material thickness of third layer:** 2

**Material type for third layer:** GRAVEL

**Underdrain used**

**Underdrain Diameter (feet):** 0.5

**Orifice Diameter (in.):** 0.5

**Offset (in.):** 0

**Flow Through Underdrain (ac-ft.):** 121.789

**Total Outflow (ac-ft.):** 124.365

**Percent Through Underdrain:** 97.93

**Discharge Structure**

**Riser Height:** 0.75 ft.

**Riser Diameter:** 12 in.



Orifice 1 Diameter: 0.5 in. Elevation: 0.1 ft.  
 Orifice 2 Diameter: 1.2 in. Elevation: 0.5 ft.

Element Flows To:  
 Outlet 1                      Outlet 2

**Cell1 D Hydraulic Table**

| <u>Stage(feet)</u> | <u>Area(ac.)</u> | <u>Volume(ac-ft.)</u> | <u>Discharge(cfs)</u> | <u>Infilt(cfs)</u> |
|--------------------|------------------|-----------------------|-----------------------|--------------------|
| 0.0000             | 0.1997           | 0.0000                | 0.0000                | 0.0000             |
| 0.0577             | 0.1997           | 0.0053                | 0.0000                | 0.0000             |
| 0.1154             | 0.1997           | 0.0105                | 0.0000                | 0.0000             |
| 0.1731             | 0.1997           | 0.0158                | 0.0000                | 0.0000             |
| 0.2308             | 0.1997           | 0.0211                | 0.0000                | 0.0000             |
| 0.2885             | 0.1997           | 0.0263                | 0.0000                | 0.0000             |
| 0.3462             | 0.1997           | 0.0316                | 0.0000                | 0.0000             |
| 0.4038             | 0.1997           | 0.0369                | 0.0000                | 0.0000             |
| 0.4615             | 0.1997           | 0.0422                | 0.0000                | 0.0000             |
| 0.5192             | 0.1997           | 0.0474                | 0.0000                | 0.0000             |
| 0.5769             | 0.1997           | 0.0527                | 0.0000                | 0.0000             |
| 0.6346             | 0.1997           | 0.0580                | 0.0000                | 0.0000             |
| 0.6923             | 0.1997           | 0.0632                | 0.0000                | 0.0000             |
| 0.7500             | 0.1997           | 0.0685                | 0.0000                | 0.0000             |
| 0.8077             | 0.1997           | 0.0738                | 0.0000                | 0.0000             |
| 0.8654             | 0.1997           | 0.0790                | 0.0000                | 0.0000             |
| 0.9231             | 0.1997           | 0.0843                | 0.0000                | 0.0000             |
| 0.9808             | 0.1997           | 0.0896                | 0.0000                | 0.0000             |
| 1.0385             | 0.1997           | 0.0948                | 0.0000                | 0.0000             |
| 1.0962             | 0.1997           | 0.1001                | 0.0000                | 0.0000             |
| 1.1538             | 0.1997           | 0.1054                | 0.0000                | 0.0000             |
| 1.2115             | 0.1997           | 0.1107                | 0.0000                | 0.0000             |
| 1.2692             | 0.1997           | 0.1159                | 0.0000                | 0.0000             |
| 1.3269             | 0.1997           | 0.1212                | 0.0000                | 0.0000             |
| 1.3846             | 0.1997           | 0.1265                | 0.0000                | 0.0000             |
| 1.4423             | 0.1997           | 0.1317                | 0.0000                | 0.0000             |
| 1.5000             | 0.1997           | 0.1363                | 0.0000                | 0.0000             |
| 1.5577             | 0.1997           | 0.1409                | 0.0000                | 0.0000             |
| 1.6154             | 0.1997           | 0.1456                | 0.0000                | 0.0000             |
| 1.6731             | 0.1997           | 0.1502                | 0.0000                | 0.0000             |
| 1.7308             | 0.1997           | 0.1548                | 0.0000                | 0.0000             |
| 1.7885             | 0.1997           | 0.1594                | 0.0000                | 0.0000             |
| 1.8462             | 0.1997           | 0.1640                | 0.0000                | 0.0000             |
| 1.9038             | 0.1997           | 0.1686                | 0.0000                | 0.0000             |
| 1.9615             | 0.1997           | 0.1732                | 0.0000                | 0.0000             |
| 2.0192             | 0.1997           | 0.1780                | 0.0000                | 0.0000             |
| 2.0769             | 0.1997           | 0.1828                | 0.0000                | 0.0000             |
| 2.1346             | 0.1997           | 0.1876                | 0.0000                | 0.0000             |
| 2.1923             | 0.1997           | 0.1923                | 0.0000                | 0.0000             |
| 2.2500             | 0.1997           | 0.1971                | 0.0000                | 0.0000             |
| 2.3077             | 0.1997           | 0.2019                | 0.0000                | 0.0000             |
| 2.3654             | 0.1997           | 0.2067                | 0.0000                | 0.0000             |
| 2.4231             | 0.1997           | 0.2115                | 0.0000                | 0.0000             |
| 2.4808             | 0.1997           | 0.2162                | 0.0000                | 0.0000             |
| 2.5385             | 0.1997           | 0.2210                | 0.0000                | 0.0000             |
| 2.5962             | 0.1997           | 0.2258                | 0.0000                | 0.0000             |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 2.6538 | 0.1997 | 0.2306 | 0.0000 | 0.0000 |
| 2.7115 | 0.1997 | 0.2354 | 0.0000 | 0.0000 |
| 2.7692 | 0.1997 | 0.2402 | 0.0000 | 0.0000 |
| 2.8269 | 0.1997 | 0.2449 | 0.0000 | 0.0000 |
| 2.8846 | 0.1997 | 0.2497 | 0.0000 | 0.0000 |
| 2.9423 | 0.1997 | 0.2545 | 0.0000 | 0.0000 |
| 3.0000 | 0.1997 | 0.2593 | 0.0000 | 0.0000 |
| 3.0577 | 0.1997 | 0.2641 | 0.0000 | 0.0000 |
| 3.1154 | 0.1997 | 0.2689 | 0.0000 | 0.0000 |
| 3.1731 | 0.1997 | 0.2736 | 0.0000 | 0.0000 |
| 3.2308 | 0.1997 | 0.2784 | 0.0000 | 0.0000 |
| 3.2885 | 0.1997 | 0.2832 | 0.0000 | 0.0000 |
| 3.3462 | 0.1997 | 0.2880 | 0.0000 | 0.0000 |
| 3.4038 | 0.1997 | 0.2928 | 0.0000 | 0.0000 |
| 3.4615 | 0.1997 | 0.2975 | 0.0000 | 0.0000 |
| 3.5192 | 0.1997 | 0.3023 | 0.0000 | 0.0000 |
| 3.5769 | 0.1997 | 0.3071 | 0.0000 | 0.0000 |
| 3.6346 | 0.1997 | 0.3119 | 0.0000 | 0.0000 |
| 3.6923 | 0.1997 | 0.3167 | 0.0000 | 0.0000 |
| 3.7500 | 0.1997 | 0.3215 | 0.0000 | 0.0000 |
| 3.8077 | 0.1997 | 0.3262 | 0.0000 | 0.0000 |
| 3.8654 | 0.1997 | 0.3310 | 0.0000 | 0.0000 |
| 3.9231 | 0.1997 | 0.3358 | 0.0000 | 0.0000 |
| 3.9808 | 0.1997 | 0.3406 | 0.0000 | 0.0000 |
| 4.0000 | 0.1997 | 0.3422 | 0.0000 | 0.0000 |

**Surface Cell1 D Hydraulic Table**

| <u>Stage(feet)</u> | <u>Area(ac.)</u> | <u>Volume(ac-ft.)</u> | <u>Discharge(cfs)</u> | <u>To Amended(cfs)</u> | <u>Wetted Surface</u> |
|--------------------|------------------|-----------------------|-----------------------|------------------------|-----------------------|
| 4.0000             | 0.1997           | 0.3422                | 0.0000                | 2.4167                 | 0.0000                |
| 4.0577             | 0.2012           | 0.3537                | 0.0000                | 2.4167                 | 0.0000                |
| 4.1154             | 0.2028           | 0.3654                | 0.0000                | 2.6026                 | 0.0000                |
| 4.1731             | 0.2043           | 0.3771                | 0.0000                | 2.6955                 | 0.0000                |
| 4.2308             | 0.2058           | 0.3890                | 0.0000                | 2.7885                 | 0.0000                |
| 4.2885             | 0.2074           | 0.4009                | 0.0000                | 2.8814                 | 0.0000                |
| 4.3462             | 0.2089           | 0.4129                | 0.0003                | 2.9744                 | 0.0000                |
| 4.4038             | 0.2105           | 0.4250                | 0.0005                | 3.0673                 | 0.0000                |
| 4.4615             | 0.2120           | 0.4372                | 0.0011                | 3.1603                 | 0.0000                |
| 4.5192             | 0.2136           | 0.4495                | 0.0015                | 3.2532                 | 0.0000                |
| 4.5769             | 0.2152           | 0.4618                | 0.0018                | 3.3462                 | 0.0000                |
| 4.6346             | 0.2168           | 0.4743                | 0.0020                | 3.4391                 | 0.0000                |
| 4.6923             | 0.2183           | 0.4868                | 0.0022                | 3.5321                 | 0.0000                |
| 4.7500             | 0.2199           | 0.4995                | 0.0023                | 3.6250                 | 0.0000                |
| 4.8077             | 0.2215           | 0.5122                | 0.0025                | 3.7180                 | 0.0000                |
| 4.8654             | 0.2231           | 0.5250                | 0.0026                | 3.8109                 | 0.0000                |
| 4.9231             | 0.2247           | 0.5380                | 0.0028                | 3.9038                 | 0.0000                |
| 4.9808             | 0.2263           | 0.5510                | 0.0029                | 3.9968                 | 0.0000                |
| 5.0385             | 0.2279           | 0.5641                | 0.0030                | 4.0897                 | 0.0000                |
| 5.0962             | 0.2296           | 0.5773                | 0.0031                | 4.1827                 | 0.0000                |
| 5.1538             | 0.2312           | 0.5906                | 0.0032                | 4.2756                 | 0.0000                |
| 5.2115             | 0.2328           | 0.6039                | 0.0033                | 4.3686                 | 0.0000                |
| 5.2500             | 0.2339           | 0.6129                | 0.0034                | 4.4306                 | 0.0000                |

**Name** : Surface Cell1 D

**Element Flows To:**

**Outlet 1**                      **Outlet 2**  
 Cell1 D

---

Name : 1-11  
Bypass: No  
Impervious Land Use                      acre  
ROOF TOPS FLAT LAT                      0.516

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Element Flows To:  
Outlet 1                      Outlet 2  
Wetland Buffer

---

Name : Yard 1-11  
Bypass: No

GroundWater: No

Pervious Land Use                      acre  
C, Pasture, Flat                      .282

Element Flows To:  
Surface                      Interflow                      Groundwater  
Wetland Buffer                      Wetland Buffer                      Wetland Buffer

---

Name : Wetland Buffer  
Bypass: No

GroundWater: No

Pervious Land Use                      acre  
C, Forest, Flat                      1.625

Element Flows To:  
Surface                      Interflow                      Groundwater  
Wetland                      Wetland                      Wetland

---

Name : Wetland  
Bypass: No

GroundWater: No

Pervious Land Use                      acre  
SAT, Forest, Flat                      .083

Element Flows To:  
Surface                      Interflow                      Groundwater

---

Name : Yard 67-73  
Bypass: No

GroundWater: No

Pervious Land Use                      acre  
C, Pasture, Flat                              .15

Element Flows To:  
Surface                                      Interflow                                      Groundwater

---

Name : Lot 84-86  
Bypass: No

GroundWater: No

Pervious Land Use                      acre  
C, Pasture, Flat                              .08

Element Flows To:  
Surface                                      Interflow                                      Groundwater

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Name : Gravel Trench Bed 1  
Bottom Length: 130.00 ft.  
Bottom Width: 93.00 ft.  
Trench bottom slope 1: 0.1 To 1  
Trench Left side slope 0: 0.1 To 1  
Trench right side slope 2: 0.1 To 1  
Material thickness of first layer: 5.5  
Pour Space of material for first layer: 0.42  
Material thickness of second layer: 0  
Pour Space of material for second layer: 0  
Material thickness of third layer: 0  
Pour Space of material for third layer: 0  
Discharge Structure  
Riser Height: 5.3 ft.  
Riser Diameter: 12 in.  
Orifice 1 Diameter: 0.9 in. Elevation: 0 ft.  
Orifice 2 Diameter: 0.5 in. Elevation: 0.5 ft.  
Orifice 3 Diameter: 0.4 in. Elevation: 4.1 ft.

Element Flows To:  
Outlet 1                                      Outlet 2

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**Gravel Trench Bed Hydraulic Table**

| <u>Stage(feet)</u> | <u>Area(ac.)</u> | <u>Volume(ac-ft.)</u> | <u>Discharge(cfs)</u> | <u>Infilt(cfs)</u> |
|--------------------|------------------|-----------------------|-----------------------|--------------------|
| 0.0000             | 0.277            | 0.000                 | 0.000                 | 0.000              |
| 0.0611             | 0.277            | 0.007                 | 0.005                 | 0.000              |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 0.1222 | 0.277 | 0.014 | 0.007 | 0.000 |
| 0.1833 | 0.277 | 0.021 | 0.009 | 0.000 |
| 0.2444 | 0.277 | 0.028 | 0.010 | 0.000 |
| 0.3056 | 0.277 | 0.035 | 0.012 | 0.000 |
| 0.3667 | 0.277 | 0.042 | 0.013 | 0.000 |
| 0.4278 | 0.278 | 0.049 | 0.014 | 0.000 |
| 0.4889 | 0.278 | 0.057 | 0.015 | 0.000 |
| 0.5500 | 0.278 | 0.064 | 0.017 | 0.000 |
| 0.6111 | 0.278 | 0.071 | 0.019 | 0.000 |
| 0.6722 | 0.278 | 0.078 | 0.020 | 0.000 |
| 0.7333 | 0.278 | 0.085 | 0.022 | 0.000 |
| 0.7944 | 0.278 | 0.092 | 0.023 | 0.000 |
| 0.8556 | 0.278 | 0.099 | 0.024 | 0.000 |
| 0.9167 | 0.278 | 0.107 | 0.025 | 0.000 |
| 0.9778 | 0.278 | 0.114 | 0.026 | 0.000 |
| 1.0389 | 0.278 | 0.121 | 0.027 | 0.000 |
| 1.1000 | 0.278 | 0.128 | 0.028 | 0.000 |
| 1.1611 | 0.278 | 0.135 | 0.029 | 0.000 |
| 1.2222 | 0.278 | 0.142 | 0.030 | 0.000 |
| 1.2833 | 0.278 | 0.150 | 0.030 | 0.000 |
| 1.3444 | 0.278 | 0.157 | 0.031 | 0.000 |
| 1.4056 | 0.279 | 0.164 | 0.032 | 0.000 |
| 1.4667 | 0.279 | 0.171 | 0.033 | 0.000 |
| 1.5278 | 0.279 | 0.178 | 0.034 | 0.000 |
| 1.5889 | 0.279 | 0.185 | 0.034 | 0.000 |
| 1.6500 | 0.279 | 0.192 | 0.035 | 0.000 |
| 1.7111 | 0.279 | 0.200 | 0.036 | 0.000 |
| 1.7722 | 0.279 | 0.207 | 0.036 | 0.000 |
| 1.8333 | 0.279 | 0.214 | 0.037 | 0.000 |
| 1.8944 | 0.279 | 0.221 | 0.038 | 0.000 |
| 1.9556 | 0.279 | 0.228 | 0.038 | 0.000 |
| 2.0167 | 0.279 | 0.236 | 0.039 | 0.000 |
| 2.0778 | 0.279 | 0.243 | 0.040 | 0.000 |
| 2.1389 | 0.279 | 0.250 | 0.040 | 0.000 |
| 2.2000 | 0.279 | 0.257 | 0.041 | 0.000 |
| 2.2611 | 0.279 | 0.264 | 0.042 | 0.000 |
| 2.3222 | 0.279 | 0.271 | 0.042 | 0.000 |
| 2.3833 | 0.280 | 0.279 | 0.043 | 0.000 |
| 2.4444 | 0.280 | 0.286 | 0.043 | 0.000 |
| 2.5056 | 0.280 | 0.293 | 0.044 | 0.000 |
| 2.5667 | 0.280 | 0.300 | 0.045 | 0.000 |
| 2.6278 | 0.280 | 0.307 | 0.045 | 0.000 |
| 2.6889 | 0.280 | 0.315 | 0.046 | 0.000 |
| 2.7500 | 0.280 | 0.322 | 0.046 | 0.000 |
| 2.8111 | 0.280 | 0.329 | 0.047 | 0.000 |
| 2.8722 | 0.280 | 0.336 | 0.047 | 0.000 |
| 2.9333 | 0.280 | 0.343 | 0.048 | 0.000 |
| 2.9944 | 0.280 | 0.351 | 0.048 | 0.000 |
| 3.0556 | 0.280 | 0.358 | 0.049 | 0.000 |
| 3.1167 | 0.280 | 0.365 | 0.049 | 0.000 |
| 3.1778 | 0.280 | 0.372 | 0.050 | 0.000 |
| 3.2389 | 0.280 | 0.379 | 0.050 | 0.000 |
| 3.3000 | 0.280 | 0.387 | 0.051 | 0.000 |
| 3.3611 | 0.281 | 0.394 | 0.051 | 0.000 |
| 3.4222 | 0.281 | 0.401 | 0.052 | 0.000 |
| 3.4833 | 0.281 | 0.408 | 0.052 | 0.000 |
| 3.5444 | 0.281 | 0.415 | 0.053 | 0.000 |
| 3.6056 | 0.281 | 0.423 | 0.053 | 0.000 |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 3.6667 | 0.281 | 0.430 | 0.054 | 0.000 |
| 3.7278 | 0.281 | 0.437 | 0.054 | 0.000 |
| 3.7889 | 0.281 | 0.444 | 0.055 | 0.000 |
| 3.8500 | 0.281 | 0.452 | 0.055 | 0.000 |
| 3.9111 | 0.281 | 0.459 | 0.056 | 0.000 |
| 3.9722 | 0.281 | 0.466 | 0.056 | 0.000 |
| 4.0333 | 0.281 | 0.473 | 0.056 | 0.000 |
| 4.0944 | 0.281 | 0.480 | 0.057 | 0.000 |
| 4.1556 | 0.281 | 0.488 | 0.058 | 0.000 |
| 4.2167 | 0.281 | 0.495 | 0.059 | 0.000 |
| 4.2778 | 0.281 | 0.502 | 0.060 | 0.000 |
| 4.3389 | 0.282 | 0.509 | 0.061 | 0.000 |
| 4.4000 | 0.282 | 0.517 | 0.061 | 0.000 |
| 4.4611 | 0.282 | 0.524 | 0.062 | 0.000 |
| 4.5222 | 0.282 | 0.531 | 0.063 | 0.000 |
| 4.5833 | 0.282 | 0.538 | 0.063 | 0.000 |
| 4.6444 | 0.282 | 0.546 | 0.064 | 0.000 |
| 4.7056 | 0.282 | 0.553 | 0.065 | 0.000 |
| 4.7667 | 0.282 | 0.560 | 0.065 | 0.000 |
| 4.8278 | 0.282 | 0.567 | 0.066 | 0.000 |
| 4.8889 | 0.282 | 0.575 | 0.066 | 0.000 |
| 4.9500 | 0.282 | 0.582 | 0.067 | 0.000 |
| 5.0111 | 0.282 | 0.589 | 0.067 | 0.000 |
| 5.0722 | 0.282 | 0.596 | 0.068 | 0.000 |
| 5.1333 | 0.282 | 0.604 | 0.068 | 0.000 |
| 5.1944 | 0.282 | 0.611 | 0.069 | 0.000 |
| 5.2556 | 0.283 | 0.618 | 0.069 | 0.000 |
| 5.3167 | 0.283 | 0.625 | 0.093 | 0.000 |
| 5.3778 | 0.283 | 0.633 | 0.300 | 0.000 |
| 5.4389 | 0.283 | 0.640 | 0.612 | 0.000 |
| 5.5000 | 0.283 | 0.647 | 0.979 | 0.000 |

---

**Name** : Gravel Trench Bed 2

**Bottom Length:** 107.00 ft.

**Bottom Width:** 80.00 ft.

**Trench bottom slope 1:** 0.1 To 1

**Trench Left side slope 0:** 0.1 To 1

**Trench right side slope 2:** 0.1 To 1

**Material thickness of first layer:** 3

**Pour Space of material for first layer:** 0.42

**Material thickness of second layer:** 0

**Pour Space of material for second layer:** 0

**Material thickness of third layer:** 0

**Pour Space of material for third layer:** 0

**Discharge Structure**

**Riser Height:** 2.8 ft.

**Riser Diameter:** 12 in.

**Orifice 1 Diameter:** 0.9 in. **Elevation:** 0 ft.

**Orifice 2 Diameter:** 0.5 in. **Elevation:** 0.4 ft.

**Orifice 3 Diameter:** 0.5 in. **Elevation:** 1.8 ft.

**Element Flows To:**

**Outlet 1**                      **Outlet 2**

---

**Gravel Trench Bed Hydraulic Table**

| <u>Stage(feet)</u> | <u>Area(ac.)</u> | <u>Volume(ac-ft.)</u> | <u>Discharge(cfs)</u> | <u>Infilt(cfs)</u> |
|--------------------|------------------|-----------------------|-----------------------|--------------------|
| 0.0000             | 0.196            | 0.000                 | 0.000                 | 0.000              |
| 0.0333             | 0.196            | 0.002                 | 0.004                 | 0.000              |
| 0.0667             | 0.196            | 0.005                 | 0.005                 | 0.000              |
| 0.1000             | 0.196            | 0.008                 | 0.007                 | 0.000              |
| 0.1333             | 0.196            | 0.011                 | 0.008                 | 0.000              |
| 0.1667             | 0.196            | 0.013                 | 0.009                 | 0.000              |
| 0.2000             | 0.196            | 0.016                 | 0.009                 | 0.000              |
| 0.2333             | 0.196            | 0.019                 | 0.010                 | 0.000              |
| 0.2667             | 0.196            | 0.022                 | 0.011                 | 0.000              |
| 0.3000             | 0.196            | 0.024                 | 0.012                 | 0.000              |
| 0.3333             | 0.196            | 0.027                 | 0.012                 | 0.000              |
| 0.3667             | 0.196            | 0.030                 | 0.013                 | 0.000              |
| 0.4000             | 0.196            | 0.033                 | 0.013                 | 0.000              |
| 0.4333             | 0.196            | 0.035                 | 0.015                 | 0.000              |
| 0.4667             | 0.196            | 0.038                 | 0.016                 | 0.000              |
| 0.5000             | 0.196            | 0.041                 | 0.017                 | 0.000              |
| 0.5333             | 0.197            | 0.044                 | 0.018                 | 0.000              |
| 0.5667             | 0.197            | 0.046                 | 0.019                 | 0.000              |
| 0.6000             | 0.197            | 0.049                 | 0.020                 | 0.000              |
| 0.6333             | 0.197            | 0.052                 | 0.020                 | 0.000              |
| 0.6667             | 0.197            | 0.055                 | 0.021                 | 0.000              |
| 0.7000             | 0.197            | 0.057                 | 0.022                 | 0.000              |
| 0.7333             | 0.197            | 0.060                 | 0.022                 | 0.000              |
| 0.7667             | 0.197            | 0.063                 | 0.023                 | 0.000              |
| 0.8000             | 0.197            | 0.066                 | 0.024                 | 0.000              |
| 0.8333             | 0.197            | 0.068                 | 0.024                 | 0.000              |
| 0.8667             | 0.197            | 0.071                 | 0.025                 | 0.000              |
| 0.9000             | 0.197            | 0.074                 | 0.025                 | 0.000              |
| 0.9333             | 0.197            | 0.077                 | 0.026                 | 0.000              |
| 0.9667             | 0.197            | 0.080                 | 0.026                 | 0.000              |
| 1.0000             | 0.197            | 0.082                 | 0.027                 | 0.000              |
| 1.0333             | 0.197            | 0.085                 | 0.027                 | 0.000              |
| 1.0667             | 0.197            | 0.088                 | 0.028                 | 0.000              |
| 1.1000             | 0.197            | 0.091                 | 0.028                 | 0.000              |
| 1.1333             | 0.197            | 0.093                 | 0.029                 | 0.000              |
| 1.1667             | 0.197            | 0.096                 | 0.029                 | 0.000              |
| 1.2000             | 0.197            | 0.099                 | 0.030                 | 0.000              |
| 1.2333             | 0.197            | 0.102                 | 0.030                 | 0.000              |
| 1.2667             | 0.197            | 0.104                 | 0.031                 | 0.000              |
| 1.3000             | 0.197            | 0.107                 | 0.031                 | 0.000              |
| 1.3333             | 0.197            | 0.110                 | 0.031                 | 0.000              |
| 1.3667             | 0.197            | 0.113                 | 0.032                 | 0.000              |
| 1.4000             | 0.197            | 0.115                 | 0.032                 | 0.000              |
| 1.4333             | 0.197            | 0.118                 | 0.033                 | 0.000              |
| 1.4667             | 0.197            | 0.121                 | 0.033                 | 0.000              |
| 1.5000             | 0.197            | 0.124                 | 0.034                 | 0.000              |
| 1.5333             | 0.197            | 0.127                 | 0.034                 | 0.000              |
| 1.5667             | 0.197            | 0.129                 | 0.034                 | 0.000              |
| 1.6000             | 0.197            | 0.132                 | 0.035                 | 0.000              |
| 1.6333             | 0.197            | 0.135                 | 0.035                 | 0.000              |
| 1.6667             | 0.197            | 0.138                 | 0.036                 | 0.000              |
| 1.7000             | 0.198            | 0.140                 | 0.036                 | 0.000              |
| 1.7333             | 0.198            | 0.143                 | 0.036                 | 0.000              |
| 1.7667             | 0.198            | 0.146                 | 0.037                 | 0.000              |
| 1.8000             | 0.198            | 0.149                 | 0.037                 | 0.000              |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 1.8333 | 0.198 | 0.151 | 0.039 | 0.000 |
| 1.8667 | 0.198 | 0.154 | 0.040 | 0.000 |
| 1.9000 | 0.198 | 0.157 | 0.040 | 0.000 |
| 1.9333 | 0.198 | 0.160 | 0.041 | 0.000 |
| 1.9667 | 0.198 | 0.163 | 0.042 | 0.000 |
| 2.0000 | 0.198 | 0.165 | 0.042 | 0.000 |
| 2.0333 | 0.198 | 0.168 | 0.043 | 0.000 |
| 2.0667 | 0.198 | 0.171 | 0.043 | 0.000 |
| 2.1000 | 0.198 | 0.174 | 0.044 | 0.000 |
| 2.1333 | 0.198 | 0.176 | 0.045 | 0.000 |
| 2.1667 | 0.198 | 0.179 | 0.045 | 0.000 |
| 2.2000 | 0.198 | 0.182 | 0.046 | 0.000 |
| 2.2333 | 0.198 | 0.185 | 0.046 | 0.000 |
| 2.2667 | 0.198 | 0.188 | 0.047 | 0.000 |
| 2.3000 | 0.198 | 0.190 | 0.047 | 0.000 |
| 2.3333 | 0.198 | 0.193 | 0.048 | 0.000 |
| 2.3667 | 0.198 | 0.196 | 0.048 | 0.000 |
| 2.4000 | 0.198 | 0.199 | 0.048 | 0.000 |
| 2.4333 | 0.198 | 0.201 | 0.049 | 0.000 |
| 2.4667 | 0.198 | 0.204 | 0.049 | 0.000 |
| 2.5000 | 0.198 | 0.207 | 0.050 | 0.000 |
| 2.5333 | 0.198 | 0.210 | 0.050 | 0.000 |
| 2.5667 | 0.198 | 0.213 | 0.051 | 0.000 |
| 2.6000 | 0.198 | 0.215 | 0.051 | 0.000 |
| 2.6333 | 0.198 | 0.218 | 0.052 | 0.000 |
| 2.6667 | 0.198 | 0.221 | 0.052 | 0.000 |
| 2.7000 | 0.198 | 0.224 | 0.052 | 0.000 |
| 2.7333 | 0.198 | 0.226 | 0.053 | 0.000 |
| 2.7667 | 0.198 | 0.229 | 0.053 | 0.000 |
| 2.8000 | 0.198 | 0.232 | 0.054 | 0.000 |
| 2.8333 | 0.199 | 0.235 | 0.119 | 0.000 |
| 2.8667 | 0.199 | 0.238 | 0.237 | 0.000 |
| 2.9000 | 0.199 | 0.240 | 0.388 | 0.000 |
| 2.9333 | 0.199 | 0.243 | 0.565 | 0.000 |
| 2.9667 | 0.199 | 0.246 | 0.759 | 0.000 |
| 3.0000 | 0.199 | 0.249 | 0.964 | 0.000 |

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**ANALYSIS RESULTS**

**Stream Protection Duration**

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**Predeveloped Landuse Totals for POC #1**

**Total Pervious Area:13.979**

**Total Impervious Area:0**

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**Mitigated Landuse Totals for POC #1**

**Total Pervious Area:5.902**

**Total Impervious Area:6.974**

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**Flow Frequency Return Periods for Predeveloped. POC #1**

**Return Period                      Flow(cfs)**



|          |          |
|----------|----------|
| 2 year   | 0.299963 |
| 5 year   | 0.444601 |
| 10 year  | 0.543729 |
| 25 year  | 0.671671 |
| 50 year  | 0.768521 |
| 100 year | 0.866466 |

**Flow Frequency Return Periods for Mitigated. POC #1**

| <u>Return Period</u> | <u>Flow(cfs)</u> |
|----------------------|------------------|
| 2 year               | 0.222017         |
| 5 year               | 0.447881         |
| 10 year              | 0.67173          |
| 25 year              | 1.066495         |
| 50 year              | 1.462            |
| 100 year             | 1.963968         |

**Stream Protection Duration**

**POC #1**

**The Facility PASSED**

**The Facility PASSED.**

| <b>Flow(cfs)</b> | <b>Predev</b> | <b>Mit</b> | <b>Percentage</b> | <b>Pass/Fail</b> |
|------------------|---------------|------------|-------------------|------------------|
| 0.1500           | 22736         | 22929      | 100               | Pass             |
| 0.1562           | 20343         | 19986      | 98                | Pass             |
| 0.1625           | 18463         | 17708      | 95                | Pass             |
| 0.1687           | 16750         | 15359      | 91                | Pass             |
| 0.1750           | 15152         | 13347      | 88                | Pass             |
| 0.1812           | 13548         | 10930      | 80                | Pass             |
| 0.1875           | 12341         | 9172       | 74                | Pass             |
| 0.1937           | 11225         | 7869       | 70                | Pass             |
| 0.2000           | 10213         | 6776       | 66                | Pass             |
| 0.2062           | 9142          | 5758       | 62                | Pass             |
| 0.2125           | 8350          | 5206       | 62                | Pass             |
| 0.2187           | 7599          | 4721       | 62                | Pass             |
| 0.2250           | 6902          | 4182       | 60                | Pass             |
| 0.2312           | 6205          | 3632       | 58                | Pass             |
| 0.2375           | 5685          | 3245       | 57                | Pass             |
| 0.2437           | 5232          | 2917       | 55                | Pass             |
| 0.2499           | 4821          | 2648       | 54                | Pass             |
| 0.2562           | 4363          | 2415       | 55                | Pass             |
| 0.2624           | 4015          | 2246       | 55                | Pass             |
| 0.2687           | 3647          | 2122       | 58                | Pass             |
| 0.2749           | 3335          | 2027       | 60                | Pass             |
| 0.2812           | 2988          | 1914       | 64                | Pass             |
| 0.2874           | 2689          | 1791       | 66                | Pass             |
| 0.2937           | 2468          | 1660       | 67                | Pass             |
| 0.2999           | 2267          | 1541       | 67                | Pass             |
| 0.3062           | 2061          | 1446       | 70                | Pass             |
| 0.3124           | 1914          | 1369       | 71                | Pass             |
| 0.3187           | 1795          | 1305       | 72                | Pass             |
| 0.3249           | 1684          | 1242       | 73                | Pass             |
| 0.3312           | 1550          | 1167       | 75                | Pass             |
| 0.3374           | 1465          | 1117       | 76                | Pass             |
| 0.3437           | 1386          | 1062       | 76                | Pass             |
| 0.3499           | 1319          | 1013       | 76                | Pass             |
| 0.3562           | 1237          | 965        | 78                | Pass             |

|        |      |     |    |      |
|--------|------|-----|----|------|
| 0.3624 | 1179 | 913 | 77 | Pass |
| 0.3687 | 1126 | 874 | 77 | Pass |
| 0.3749 | 1071 | 840 | 78 | Pass |
| 0.3812 | 999  | 800 | 80 | Pass |
| 0.3874 | 937  | 761 | 81 | Pass |
| 0.3936 | 901  | 723 | 80 | Pass |
| 0.3999 | 872  | 699 | 80 | Pass |
| 0.4061 | 831  | 662 | 79 | Pass |
| 0.4124 | 793  | 636 | 80 | Pass |
| 0.4186 | 755  | 617 | 81 | Pass |
| 0.4249 | 728  | 595 | 81 | Pass |
| 0.4311 | 691  | 573 | 82 | Pass |
| 0.4374 | 670  | 559 | 83 | Pass |
| 0.4436 | 650  | 531 | 81 | Pass |
| 0.4499 | 632  | 503 | 79 | Pass |
| 0.4561 | 612  | 487 | 79 | Pass |
| 0.4624 | 598  | 464 | 77 | Pass |
| 0.4686 | 583  | 454 | 77 | Pass |
| 0.4749 | 567  | 436 | 76 | Pass |
| 0.4811 | 555  | 426 | 76 | Pass |
| 0.4874 | 545  | 410 | 75 | Pass |
| 0.4936 | 535  | 399 | 74 | Pass |
| 0.4999 | 521  | 388 | 74 | Pass |
| 0.5061 | 505  | 373 | 73 | Pass |
| 0.5124 | 490  | 368 | 75 | Pass |
| 0.5186 | 468  | 360 | 76 | Pass |
| 0.5249 | 456  | 349 | 76 | Pass |
| 0.5311 | 440  | 336 | 76 | Pass |
| 0.5373 | 433  | 332 | 76 | Pass |
| 0.5436 | 421  | 327 | 77 | Pass |
| 0.5498 | 412  | 323 | 78 | Pass |
| 0.5561 | 399  | 314 | 78 | Pass |
| 0.5623 | 394  | 303 | 76 | Pass |
| 0.5686 | 380  | 295 | 77 | Pass |
| 0.5748 | 372  | 284 | 76 | Pass |
| 0.5811 | 357  | 277 | 77 | Pass |
| 0.5873 | 352  | 269 | 76 | Pass |
| 0.5936 | 341  | 259 | 75 | Pass |
| 0.5998 | 334  | 248 | 74 | Pass |
| 0.6061 | 322  | 239 | 74 | Pass |
| 0.6123 | 315  | 231 | 73 | Pass |
| 0.6186 | 307  | 230 | 74 | Pass |
| 0.6248 | 304  | 227 | 74 | Pass |
| 0.6311 | 296  | 222 | 75 | Pass |
| 0.6373 | 291  | 216 | 74 | Pass |
| 0.6436 | 284  | 213 | 75 | Pass |
| 0.6498 | 281  | 207 | 73 | Pass |
| 0.6561 | 271  | 200 | 73 | Pass |
| 0.6623 | 264  | 200 | 75 | Pass |
| 0.6686 | 257  | 197 | 76 | Pass |
| 0.6748 | 251  | 196 | 78 | Pass |
| 0.6811 | 242  | 194 | 80 | Pass |
| 0.6873 | 234  | 191 | 81 | Pass |
| 0.6935 | 229  | 189 | 82 | Pass |
| 0.6998 | 221  | 188 | 85 | Pass |
| 0.7060 | 209  | 186 | 88 | Pass |
| 0.7123 | 201  | 184 | 91 | Pass |
| 0.7185 | 197  | 183 | 92 | Pass |

|        |     |     |     |      |
|--------|-----|-----|-----|------|
| 0.7248 | 190 | 181 | 95  | Pass |
| 0.7310 | 184 | 175 | 95  | Pass |
| 0.7373 | 178 | 173 | 97  | Pass |
| 0.7435 | 174 | 170 | 97  | Pass |
| 0.7498 | 166 | 168 | 101 | Pass |
| 0.7560 | 161 | 166 | 103 | Pass |
| 0.7623 | 152 | 166 | 109 | Pass |
| 0.7685 | 148 | 164 | 110 | Pass |

## 7.2 East Basin

**Project Name:** East Basin0209  
**Site Name:** Gemmer PRD  
**Site Address:** 1125 172nd St NE  
**City** : Marysville, WA  
**Report Date:** 2/17/2022  
**Gage** : Everett  
**Data Start** : 1948/10/01  
**Data End** : 2009/09/30  
**Precip Scale:** 1.00  
**Version Date:** 2019/09/13  
**Version** : 4.2.17

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

**High Flow Threshold for POC 1:** 50 year

### PREDEVELOPED LAND USE

**Name** : Basin 1  
**Bypass:** No

**GroundWater:** No

| <u>Pervious Land Use</u> | <u>acre</u> |
|--------------------------|-------------|
| C, Forest, Flat          | 9.287       |
| C, Forest, Mod           | 5.501       |

**Pervious Total** 14.788

**Impervious Land Use** acre

**Impervious Total** 0

**Basin Total** 14.788



### Element Flows To:

|         |           |             |
|---------|-----------|-------------|
| Surface | Interflow | Groundwater |
|---------|-----------|-------------|

Name : Basin 2

Bypass: No

GroundWater: No

|                          |             |
|--------------------------|-------------|
| <u>Pervious Land Use</u> | <u>acre</u> |
| C, Forest, Flat          | .465        |

|                |       |
|----------------|-------|
| Pervious Total | 0.465 |
|----------------|-------|

|                            |             |
|----------------------------|-------------|
| <u>Impervious Land Use</u> | <u>acre</u> |
|----------------------------|-------------|

|                  |   |
|------------------|---|
| Impervious Total | 0 |
|------------------|---|

|             |       |
|-------------|-------|
| Basin Total | 0.465 |
|-------------|-------|

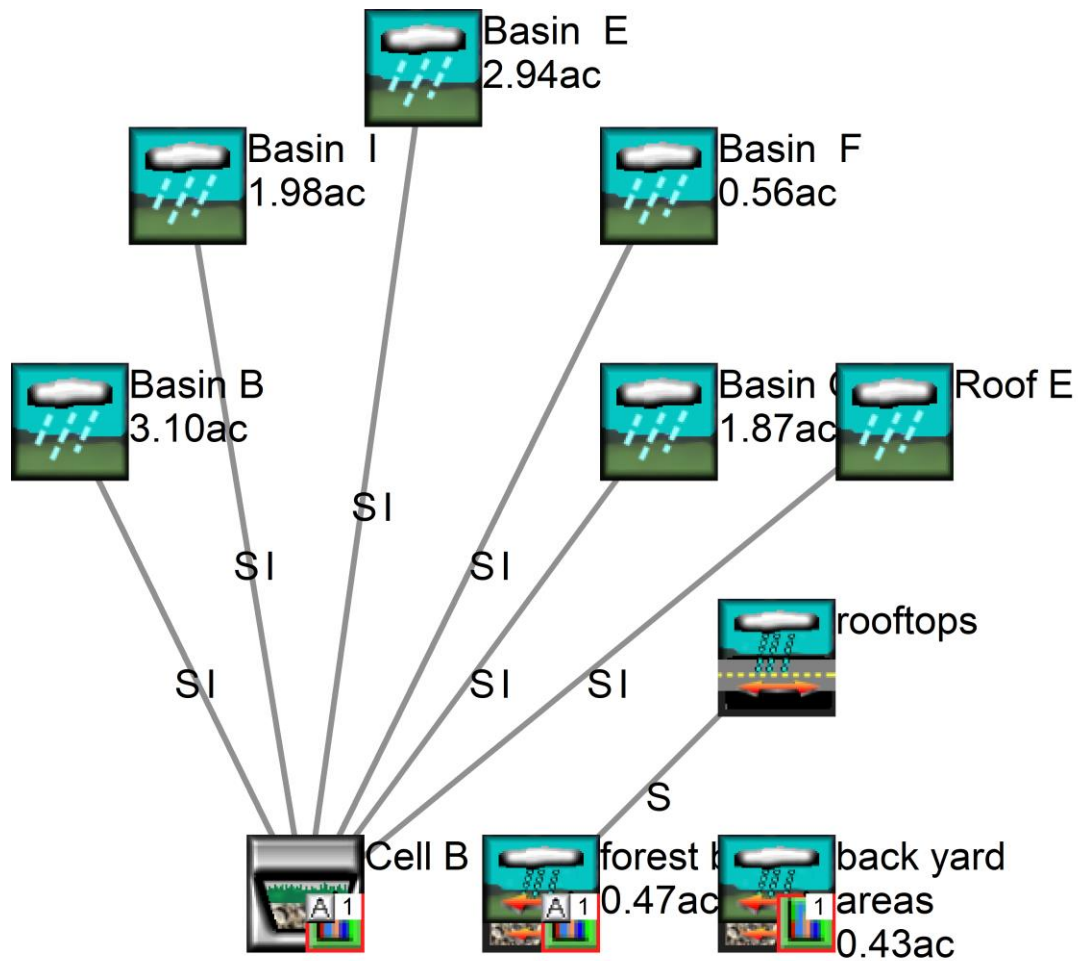
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Element Flows To:

|         |           |             |
|---------|-----------|-------------|
| Surface | Interflow | Groundwater |
|---------|-----------|-------------|

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MITIGATED LAND USE



**Name** : Basin B

**Bypass**: No

**GroundWater**: No

| <u>Pervious Land Use</u> | <u>acre</u> |
|--------------------------|-------------|
| C, Pasture, Flat         | 1.312       |

**Pervious Total** 1.312

| <u>Impervious Land Use</u> | <u>acre</u> |
|----------------------------|-------------|
| ROADS FLAT                 | 0.326       |
| ROOF TOPS FLAT             | 1.087       |
| DRIVEWAYS FLAT             | 0.216       |
| SIDEWALKS FLAT             | 0.163       |

**Impervious Total** 1.792

**Basin Total** 3.104

**Element Flows To:**

| Surface        | Interflow      | Groundwater |
|----------------|----------------|-------------|
| Surface Cell B | Surface Cell B |             |

---

Name : Basin E  
Bypass: No

GroundWater: No

| <u>Pervious Land Use</u>   | <u>acre</u>  |
|----------------------------|--------------|
| C, Pasture, Flat           | 1.414        |
| <b>Pervious Total</b>      | <b>1.414</b> |
| <u>Impervious Land Use</u> | <u>acre</u>  |
| ROADS FLAT                 | 0.699        |
| DRIVEWAYS FLAT             | 0.497        |
| SIDEWALKS FLAT             | 0.333        |
| <b>Impervious Total</b>    | <b>1.529</b> |
| <b>Basin Total</b>         | <b>2.943</b> |

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| Element Flows To: |                |             |
|-------------------|----------------|-------------|
| Surface           | Interflow      | Groundwater |
| Surface Cell B    | Surface Cell B |             |

---

Name : Basin F  
Bypass: No

GroundWater: No

| <u>Pervious Land Use</u>   | <u>acre</u>  |
|----------------------------|--------------|
| C, Pasture, Flat           | .094         |
| <b>Pervious Total</b>      | <b>0.094</b> |
| <u>Impervious Land Use</u> | <u>acre</u>  |
| ROADS FLAT                 | 0.244        |
| ROOF TOPS FLAT             | 0.045        |
| DRIVEWAYS FLAT             | 0.092        |
| SIDEWALKS FLAT             | 0.088        |
| <b>Impervious Total</b>    | <b>0.469</b> |
| <b>Basin Total</b>         | <b>0.563</b> |

---

| Element Flows To: |                |             |
|-------------------|----------------|-------------|
| Surface           | Interflow      | Groundwater |
| Surface Cell B    | Surface Cell B |             |

---

Name : Basin G  
Bypass: No

GroundWater: No

| <u>Pervious Land Use</u>   | <u>acre</u>  |
|----------------------------|--------------|
| C, Pasture, Flat           | .255         |
| <b>Pervious Total</b>      | <b>0.255</b> |
| <u>Impervious Land Use</u> | <u>acre</u>  |
| ROADS FLAT                 | 0.377        |
| ROOF TOPS FLAT             | 0.359        |
| DRIVEWAYS FLAT             | 0.674        |
| SIDEWALKS FLAT             | 0.202        |
| <b>Impervious Total</b>    | <b>1.612</b> |
| <b>Basin Total</b>         | <b>1.867</b> |

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| Element Flows To: |                |             |
|-------------------|----------------|-------------|
| Surface           | Interflow      | Groundwater |
| Surface Cell B    | Surface Cell B |             |

---

Name : Basin I  
Bypass: No

GroundWater: No

| <u>Pervious Land Use</u>   | <u>acre</u>  |
|----------------------------|--------------|
| C, Pasture, Flat           | .697         |
| <b>Pervious Total</b>      | <b>0.697</b> |
| <u>Impervious Land Use</u> | <u>acre</u>  |
| ROADS FLAT                 | 0.144        |
| ROOF TOPS FLAT             | 1.029        |
| DRIVEWAYS FLAT             | 0.044        |
| SIDEWALKS FLAT             | 0.061        |
| <b>Impervious Total</b>    | <b>1.278</b> |
| <b>Basin Total</b>         | <b>1.975</b> |

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| Element Flows To: |                |             |
|-------------------|----------------|-------------|
| Surface           | Interflow      | Groundwater |
| Surface Cell B    | Surface Cell B |             |

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**Name** : Cell B  
**Bottom Length:** 2500.00 ft.  
**Bottom Width:** 12.00 ft.  
**Material thickness of first layer:** 1.5  
**Material type for first layer:** SMMWW 12 in/hr  
**Material thickness of second layer:** 0.5  
**Material type for second layer:** Sand  
**Material thickness of third layer:** 7.5  
**Material type for third layer:** GRAVEL  
**Underdrain used**  
**Underdrain Diameter (feet):** 0.5  
**Orifice Diameter (in.):** 1.625  
**Offset (in.):** 0  
**Flow Through Underdrain (ac-ft.):** 1429.562  
**Total Outflow (ac-ft.):** 1540.376  
**Percent Through Underdrain:** 92.81  
**Discharge Structure**  
**Riser Height:** 0.5 ft.  
**Riser Diameter:** 18 in.  
**Notch Type:** Rectangular  
**Notch Width:** 0.125 ft.  
**Notch Height:** 0.450 ft.  
**Orifice 1 Diameter:** 0.2 in. **Elevation:** -4.75 ft.  
**Orifice 2 Diameter:** 0.5 in. **Elevation:** -0.25 ft.  
**Orifice 3 Diameter:** 0.75 in. **Elevation:** 0.025 ft.

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

**Cell B Hydraulic Table**

| <b>Stage(feet)</b> | <b>Area(ac.)</b> | <b>Volume(ac-ft.)</b> | <b>Discharge(cfs)</b> | <b>Infilt(cfs)</b> |
|--------------------|------------------|-----------------------|-----------------------|--------------------|
| 0.0000             | 0.6887           | 0.0000                | 0.0000                | 0.0000             |
| 0.1154             | 0.6887           | 0.0363                | 0.0000                | 0.0000             |
| 0.2308             | 0.6887           | 0.0727                | 0.0000                | 0.0000             |
| 0.3462             | 0.6887           | 0.1090                | 0.0000                | 0.0000             |
| 0.4615             | 0.6887           | 0.1454                | 0.0037                | 0.0000             |
| 0.5769             | 0.6887           | 0.1817                | 0.0173                | 0.0000             |
| 0.6923             | 0.6887           | 0.2180                | 0.0272                | 0.0000             |
| 0.8077             | 0.6887           | 0.2544                | 0.0332                | 0.0000             |
| 0.9231             | 0.6887           | 0.2907                | 0.0398                | 0.0000             |
| 1.0385             | 0.6887           | 0.3271                | 0.0430                | 0.0000             |
| 1.1538             | 0.6887           | 0.3634                | 0.0462                | 0.0000             |
| 1.2692             | 0.6887           | 0.3997                | 0.0507                | 0.0000             |
| 1.3846             | 0.6887           | 0.4361                | 0.0529                | 0.0000             |
| 1.5000             | 0.6887           | 0.4679                | 0.0553                | 0.0000             |
| 1.6154             | 0.6887           | 0.4997                | 0.0590                | 0.0000             |
| 1.7308             | 0.6887           | 0.5314                | 0.0609                | 0.0000             |
| 1.8462             | 0.6887           | 0.5632                | 0.0618                | 0.0000             |
| 1.9615             | 0.6887           | 0.5950                | 0.0634                | 0.0000             |
| 2.0769             | 0.6887           | 0.6280                | 0.0642                | 0.0000             |
| 2.1923             | 0.6887           | 0.6610                | 0.0669                | 0.0000             |
| 2.3077             | 0.6887           | 0.6939                | 0.0702                | 0.0000             |



|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 2.4231 | 0.6887 | 0.7269 | 0.0719 | 0.0000 |
| 2.5385 | 0.6887 | 0.7599 | 0.0728 | 0.0000 |
| 2.6538 | 0.6887 | 0.7929 | 0.0752 | 0.0000 |
| 2.7692 | 0.6887 | 0.8259 | 0.0764 | 0.0000 |
| 2.8846 | 0.6887 | 0.8588 | 0.0788 | 0.0000 |
| 3.0000 | 0.6887 | 0.8918 | 0.0801 | 0.0000 |
| 3.1154 | 0.6887 | 0.9248 | 0.0825 | 0.0000 |
| 3.2308 | 0.6887 | 0.9578 | 0.0837 | 0.0000 |
| 3.3462 | 0.6887 | 0.9908 | 0.0854 | 0.0000 |
| 3.4615 | 0.6887 | 1.0237 | 0.0863 | 0.0000 |
| 3.5769 | 0.6887 | 1.0567 | 0.0884 | 0.0000 |
| 3.6923 | 0.6887 | 1.0897 | 0.0903 | 0.0000 |
| 3.8077 | 0.6887 | 1.1227 | 0.0928 | 0.0000 |
| 3.9231 | 0.6887 | 1.1556 | 0.0956 | 0.0000 |
| 4.0385 | 0.6887 | 1.1886 | 0.0985 | 0.0000 |
| 4.1538 | 0.6887 | 1.2216 | 0.1014 | 0.0000 |
| 4.2692 | 0.6887 | 1.2546 | 0.1042 | 0.0000 |
| 4.3846 | 0.6887 | 1.2876 | 0.1070 | 0.0000 |
| 4.5000 | 0.6887 | 1.3205 | 0.1098 | 0.0000 |
| 4.6154 | 0.6887 | 1.3535 | 0.1124 | 0.0000 |
| 4.7308 | 0.6887 | 1.3865 | 0.1150 | 0.0000 |
| 4.8462 | 0.6887 | 1.4195 | 0.1176 | 0.0000 |
| 4.9615 | 0.6887 | 1.4524 | 0.1201 | 0.0000 |
| 5.0769 | 0.6887 | 1.4854 | 0.1225 | 0.0000 |
| 5.1923 | 0.6887 | 1.5184 | 0.1249 | 0.0000 |
| 5.3077 | 0.6887 | 1.5514 | 0.1273 | 0.0000 |
| 5.4231 | 0.6887 | 1.5844 | 0.1296 | 0.0000 |
| 5.5385 | 0.6887 | 1.6173 | 0.1319 | 0.0000 |
| 5.6538 | 0.6887 | 1.6503 | 0.1341 | 0.0000 |
| 5.7692 | 0.6887 | 1.6833 | 0.1363 | 0.0000 |
| 5.8846 | 0.6887 | 1.7163 | 0.1385 | 0.0000 |
| 6.0000 | 0.6887 | 1.7493 | 0.1406 | 0.0000 |
| 6.1154 | 0.6887 | 1.7822 | 0.1427 | 0.0000 |
| 6.2308 | 0.6887 | 1.8152 | 0.1448 | 0.0000 |
| 6.3462 | 0.6887 | 1.8482 | 0.1468 | 0.0000 |
| 6.4615 | 0.6887 | 1.8812 | 0.1488 | 0.0000 |
| 6.5769 | 0.6887 | 1.9141 | 0.1508 | 0.0000 |
| 6.6923 | 0.6887 | 1.9471 | 0.1527 | 0.0000 |
| 6.8077 | 0.6887 | 1.9801 | 0.1547 | 0.0000 |
| 6.9231 | 0.6887 | 2.0131 | 0.1566 | 0.0000 |
| 7.0385 | 0.6887 | 2.0461 | 0.1585 | 0.0000 |
| 7.1538 | 0.6887 | 2.0790 | 0.1603 | 0.0000 |
| 7.2692 | 0.6887 | 2.1120 | 0.1622 | 0.0000 |
| 7.3846 | 0.6887 | 2.1450 | 0.1640 | 0.0000 |
| 7.5000 | 0.6887 | 2.1780 | 0.1658 | 0.0000 |
| 7.6154 | 0.6887 | 2.2110 | 0.1676 | 0.0000 |
| 7.7308 | 0.6887 | 2.2439 | 0.1693 | 0.0000 |
| 7.8462 | 0.6887 | 2.2769 | 0.1711 | 0.0000 |
| 7.9615 | 0.6887 | 2.3099 | 0.1728 | 0.0000 |
| 8.0769 | 0.6887 | 2.3429 | 0.1745 | 0.0000 |
| 8.1923 | 0.6887 | 2.3758 | 0.1762 | 0.0000 |
| 8.3077 | 0.6887 | 2.4088 | 0.1779 | 0.0000 |
| 8.4231 | 0.6887 | 2.4418 | 0.1796 | 0.0000 |
| 8.5385 | 0.6887 | 2.4748 | 0.1812 | 0.0000 |
| 8.6538 | 0.6887 | 2.5078 | 0.1828 | 0.0000 |
| 8.7692 | 0.6887 | 2.5407 | 0.1845 | 0.0000 |
| 8.8846 | 0.6887 | 2.5737 | 0.1861 | 0.0000 |
| 9.0000 | 0.6887 | 2.6067 | 0.1877 | 0.0000 |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 9.1154 | 0.6887 | 2.6397 | 0.1892 | 0.0000 |
| 9.2308 | 0.6887 | 2.6726 | 0.1908 | 0.0000 |
| 9.3462 | 0.6887 | 2.7056 | 0.1924 | 0.0000 |
| 9.4615 | 0.6887 | 2.7386 | 0.1939 | 0.0000 |
| 9.5000 | 0.6887 | 2.7496 | 0.2209 | 0.0000 |

**Surface Cell B Hydraulic Table**

| <u>Stage(feet)</u> | <u>Area(ac.)</u> | <u>Volume(ac-ft.)</u> | <u>Discharge(cfs)</u> | <u>To Amended(cfs)</u> | <u>Wetted Surface</u> |
|--------------------|------------------|-----------------------|-----------------------|------------------------|-----------------------|
| 9.5000             | 0.6887           | 2.7496                | 0.0058                | 2.0833                 | 0.0000                |
| 9.6154             | 0.6887           | 2.8291                | 0.0180                | 2.0833                 | 0.0000                |
| 9.7308             | 0.6887           | 2.9085                | 0.0449                | 2.4038                 | 0.0000                |
| 9.8462             | 0.6887           | 2.9880                | 0.0795                | 2.5641                 | 0.0000                |
| 9.9615             | 0.6887           | 3.0675                | 0.1191                | 2.7244                 | 0.0000                |
| 10.077             | 0.6887           | 3.1469                | 0.4735                | 2.8846                 | 0.0000                |
| 10.192             | 0.6887           | 3.2264                | 1.4621                | 3.0449                 | 0.0000                |
| 10.308             | 0.6887           | 3.3059                | 2.7265                | 3.2051                 | 0.0000                |
| 10.423             | 0.6887           | 3.3853                | 4.0197                | 3.3654                 | 0.0000                |
| 10.500             | 0.6887           | 3.4383                | 5.1054                | 3.4722                 | 0.0000                |

**Name** : Surface Cell B

**Element Flows To:**

**Outlet 1**                      **Outlet 2**  
Cell B

**Name** : forest buffer

**Bypass:** No

**GroundWater:** No

|                          |             |
|--------------------------|-------------|
| <u>Pervious Land Use</u> | <u>acre</u> |
| C, Forest, Flat          | .465        |

**Element Flows To:**

**Surface**                      **Interflow**                      **Groundwater**

**Name** : Roof E

**Bypass:** No

**GroundWater:** No

|                          |             |
|--------------------------|-------------|
| <u>Pervious Land Use</u> | <u>acre</u> |
|--------------------------|-------------|

|                       |          |
|-----------------------|----------|
| <b>Pervious Total</b> | <b>0</b> |
|-----------------------|----------|

|                            |             |
|----------------------------|-------------|
| <u>Impervious Land Use</u> | <u>acre</u> |
| ROOF TOPS FLAT             | 1.845       |

|                         |              |
|-------------------------|--------------|
| <b>Impervious Total</b> | <b>1.845</b> |
|-------------------------|--------------|

|                    |              |
|--------------------|--------------|
| <b>Basin Total</b> | <b>1.845</b> |
|--------------------|--------------|

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**Element Flows To:**

|                |                  |                    |
|----------------|------------------|--------------------|
| <b>Surface</b> | <b>Interflow</b> | <b>Groundwater</b> |
| Surface Cell B | Surface Cell B   |                    |

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**Name** : back yard areas

**Bypass:** No

**GroundWater:** No

|                          |             |
|--------------------------|-------------|
| <u>Pervious Land Use</u> | <u>acre</u> |
| C, Pasture, Flat         | .427        |

**Element Flows To:**

|                |                  |                    |
|----------------|------------------|--------------------|
| <b>Surface</b> | <b>Interflow</b> | <b>Groundwater</b> |
|----------------|------------------|--------------------|

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**Name** : rooftops

**Bypass:** No

|                            |             |
|----------------------------|-------------|
| <u>Impervious Land Use</u> | <u>acre</u> |
| ROOF TOPS FLAT LAT         | 0.5         |

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**Element Flows To:**

|                 |                 |
|-----------------|-----------------|
| <b>Outlet 1</b> | <b>Outlet 2</b> |
| forest buffer   |                 |

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**ANALYSIS RESULTS**

**Stream Protection Duration**

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**Predeveloped Landuse Totals for POC #1**

**Total Pervious Area:**15.253

**Total Impervious Area:**0

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**Mitigated Landuse Totals for POC #1**

**Total Pervious Area:**4.664

**Total Impervious Area:**9.025

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**Flow Frequency Return Periods for Predeveloped. POC #1**

|                      |                  |
|----------------------|------------------|
| <u>Return Period</u> | <u>Flow(cfs)</u> |
| 2 year               | 0.332427         |
| 5 year               | 0.497136         |

|          |          |
|----------|----------|
| 10 year  | 0.610759 |
| 25 year  | 0.758097 |
| 50 year  | 0.870063 |
| 100 year | 0.983621 |

**Flow Frequency Return Periods for Mitigated. POC #1**

| <u>Return Period</u> | <u>Flow(cfs)</u> |
|----------------------|------------------|
| 2 year               | 0.208018         |
| 5 year               | 0.390727         |
| 10 year              | 0.574074         |
| 25 year              | 0.903936         |
| 50 year              | 1.242248         |
| 100 year             | 1.681597         |

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**Stream Protection Duration**

**POC #1**

**The Facility PASSED**

**The Facility PASSED.**

**Flow(cfs) Predev Mit Percentage Pass/Fail**

|        |       |       |     |      |
|--------|-------|-------|-----|------|
| 0.1662 | 21838 | 21881 | 100 | Pass |
| 0.1733 | 19740 | 16540 | 83  | Pass |
| 0.1804 | 17776 | 11978 | 67  | Pass |
| 0.1875 | 16012 | 8630  | 53  | Pass |
| 0.1947 | 14399 | 6179  | 42  | Pass |
| 0.2018 | 13015 | 4171  | 32  | Pass |
| 0.2089 | 11779 | 2686  | 22  | Pass |
| 0.2160 | 10699 | 2150  | 20  | Pass |
| 0.2231 | 9494  | 1920  | 20  | Pass |
| 0.2302 | 8609  | 1790  | 20  | Pass |
| 0.2373 | 7794  | 1640  | 21  | Pass |
| 0.2444 | 7022  | 1434  | 20  | Pass |
| 0.2515 | 6365  | 1336  | 20  | Pass |
| 0.2586 | 5807  | 1225  | 21  | Pass |
| 0.2657 | 5298  | 1116  | 21  | Pass |
| 0.2729 | 4860  | 1029  | 21  | Pass |
| 0.2800 | 4436  | 953   | 21  | Pass |
| 0.2871 | 4008  | 887   | 22  | Pass |
| 0.2942 | 3615  | 841   | 23  | Pass |
| 0.3013 | 3281  | 777   | 23  | Pass |
| 0.3084 | 2964  | 724   | 24  | Pass |
| 0.3155 | 2656  | 678   | 25  | Pass |
| 0.3226 | 2432  | 623   | 25  | Pass |
| 0.3297 | 2224  | 567   | 25  | Pass |
| 0.3368 | 2037  | 525   | 25  | Pass |
| 0.3440 | 1887  | 482   | 25  | Pass |
| 0.3511 | 1741  | 451   | 25  | Pass |
| 0.3582 | 1627  | 436   | 26  | Pass |
| 0.3653 | 1515  | 428   | 28  | Pass |
| 0.3724 | 1422  | 418   | 29  | Pass |
| 0.3795 | 1349  | 412   | 30  | Pass |
| 0.3866 | 1277  | 402   | 31  | Pass |
| 0.3937 | 1208  | 398   | 32  | Pass |
| 0.4008 | 1147  | 389   | 33  | Pass |
| 0.4079 | 1086  | 381   | 35  | Pass |
| 0.4150 | 1015  | 373   | 36  | Pass |
| 0.4222 | 947   | 364   | 38  | Pass |

|        |     |     |    |      |
|--------|-----|-----|----|------|
| 0.4293 | 911 | 344 | 37 | Pass |
| 0.4364 | 875 | 338 | 38 | Pass |
| 0.4435 | 839 | 329 | 39 | Pass |
| 0.4506 | 802 | 322 | 40 | Pass |
| 0.4577 | 761 | 313 | 41 | Pass |
| 0.4648 | 731 | 306 | 41 | Pass |
| 0.4719 | 695 | 296 | 42 | Pass |
| 0.4790 | 666 | 289 | 43 | Pass |
| 0.4861 | 648 | 284 | 43 | Pass |
| 0.4933 | 628 | 281 | 44 | Pass |
| 0.5004 | 611 | 275 | 45 | Pass |
| 0.5075 | 596 | 271 | 45 | Pass |
| 0.5146 | 580 | 264 | 45 | Pass |
| 0.5217 | 566 | 252 | 44 | Pass |
| 0.5288 | 552 | 247 | 44 | Pass |
| 0.5359 | 542 | 243 | 44 | Pass |
| 0.5430 | 524 | 239 | 45 | Pass |
| 0.5501 | 511 | 237 | 46 | Pass |
| 0.5572 | 497 | 233 | 46 | Pass |
| 0.5644 | 473 | 229 | 48 | Pass |
| 0.5715 | 458 | 227 | 49 | Pass |
| 0.5786 | 446 | 224 | 50 | Pass |
| 0.5857 | 437 | 220 | 50 | Pass |
| 0.5928 | 425 | 212 | 49 | Pass |
| 0.5999 | 411 | 209 | 50 | Pass |
| 0.6070 | 404 | 202 | 50 | Pass |
| 0.6141 | 392 | 199 | 50 | Pass |
| 0.6212 | 382 | 197 | 51 | Pass |
| 0.6283 | 368 | 190 | 51 | Pass |
| 0.6354 | 357 | 187 | 52 | Pass |
| 0.6426 | 353 | 181 | 51 | Pass |
| 0.6497 | 340 | 174 | 51 | Pass |
| 0.6568 | 335 | 174 | 51 | Pass |
| 0.6639 | 323 | 171 | 52 | Pass |
| 0.6710 | 315 | 169 | 53 | Pass |
| 0.6781 | 307 | 164 | 53 | Pass |
| 0.6852 | 303 | 161 | 53 | Pass |
| 0.6923 | 297 | 159 | 53 | Pass |
| 0.6994 | 290 | 152 | 52 | Pass |
| 0.7065 | 283 | 151 | 53 | Pass |
| 0.7137 | 276 | 149 | 53 | Pass |
| 0.7208 | 269 | 144 | 53 | Pass |
| 0.7279 | 261 | 143 | 54 | Pass |
| 0.7350 | 252 | 142 | 56 | Pass |
| 0.7421 | 245 | 141 | 57 | Pass |
| 0.7492 | 237 | 141 | 59 | Pass |
| 0.7563 | 232 | 141 | 60 | Pass |
| 0.7634 | 224 | 141 | 62 | Pass |
| 0.7705 | 210 | 141 | 67 | Pass |
| 0.7776 | 204 | 139 | 68 | Pass |
| 0.7847 | 197 | 139 | 70 | Pass |
| 0.7919 | 192 | 138 | 71 | Pass |
| 0.7990 | 188 | 138 | 73 | Pass |
| 0.8061 | 179 | 137 | 76 | Pass |
| 0.8132 | 172 | 137 | 79 | Pass |
| 0.8203 | 166 | 136 | 81 | Pass |
| 0.8274 | 161 | 133 | 82 | Pass |
| 0.8345 | 152 | 133 | 87 | Pass |

|        |     |     |     |      |
|--------|-----|-----|-----|------|
| 0.8416 | 146 | 133 | 91  | Pass |
| 0.8487 | 141 | 133 | 94  | Pass |
| 0.8558 | 133 | 133 | 100 | Pass |
| 0.8630 | 126 | 131 | 103 | Pass |
| 0.8701 | 122 | 130 | 106 | Pass |

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