

CHESAPEAKE BAY TMDL ACTION PLAN

September 2023





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List of Abbreviations

| Title | Abbreviation |
|--|--------------|
| Best Management Practice | ВМР |
| Chesapeake Bay Local Assistance Department | CBLAD |
| Chesapeake Bay Preservation Act | СВРА |
| Capital Improvement Project | CIP |
| Virginia Department of Conservation and Recreation | DCR |
| Virginia Department of Environmental Quality | DEQ |
| Department of General Services | DGS |
| Edge of Stream | EOS |
| Environmental Protection Agency | EPA |
| Intensely Developed Area | IDA |
| Leadership in Energy and Environmental Design | LEED |
| Low Impact Design | LID |
| Minimum Control Measure | MCM |
| Minimum Standard | MS |
| Municipal Separate Storm Sewer Systems | MS4 |
| National Pollution Discharge Elimination System | NPDES |
| Pollutant of Concern | POC |
| Resource Protection Area | RPA |
| Stormwater Improvement Project | SIP |
| Stormwater Management | SWM |
| Stormwater Management Masterplan | SWMP |
| Stormwater Pollution Prevention Plan | SWPPP |
| Total Maximum Daily Load | TMDL |
| Total Nitrogen | TN |
| Total Phosphorus | TP |
| Total Suspended Solids | TSS |
| Vanasse Hangen Brustlin | VHB |
| Virginia Institute of Marine Science | VIMS |
| Virginia Erosion and Sediment Control Program | VESCP |
| Virginia Pollution Discharge Elimination System | VPDES |
| Virginia Stormwater Management Handbook | VSMH |
| Virginia Stormwater Management Program | VSMP |
| Watershed Implementation Plan | WIP |



1. Introduction

Purpose

This Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan was written to describe the means and methods by which Virginia Institute of Marine Science (VIMS) intends to meet the Special Condition for the Chesapeake Bay TMDL. This Special Condition is located in the General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems which was effective as of July 1, 2013, and states that Small Municipal Separate Storm Sewer Systems (MS4) must create a TMDL Action Plan and submit the plan to the Virginia Department of Environmental Quality (DEQ).

<u>VIMS' MS4 permit</u> (VAR040052) requires action plans to be implemented for the impaired bodies of water to which it discharges stormwater runoff. The ultimate discharge point for VIMS is the Chesapeake Bay. The entire campus drains to the York River. A TMDL is assigned to determine a waste load allocation to VIMS that establishes the maximum amount of pollutant that can enter an impaired water without violating water quality standards.

The TMDL for the Chesapeake Bay was established by the EPA in 2010 and targets specific Pollutants of Concern (POCs). POCs included in the TMDL are total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS). Virginia developed a Chesapeake Bay TMDL Watershed Implementation Plan (WIP) that implements an outline for meeting the Chesapeake Bay TMDL. The WIP requires a phased approach over three five-year permit cycles for meeting required POC reductions in order to meet the final TMDL target goal. The reductions include a 5% first permit cycle reduction, which will need to be accomplished by the end of the first permit cycle (June 30, 2018), a 35% second permit cycle reduction, which will need to be accomplished by the end of the second permit cycle (June 30, 2023), and a 60% third permit cycle (June 30, 2028). The total reduction thus is 100% of the TMDL requirement.

Reductions are applied to 2009 Edge of Stream (EOS) loading rates for each POC as defined by the Chesapeake Bay Program Watershed Model Phase 5.3.2 for the York River Basin. A target reduction percent in the 2009 EOS loading rates must be met in order meet the TMDL target goal at the end of the third permit cycle. The reduction target percent is defined for each POC by the Chesapeake Bay WIP. Target reduction percentages are further broken into two categories for impervious and pervious cover. Impervious areas must show a reduction of 9.0% for TN loads, 16% for TP loads, and 20% for TSS loads. Pervious areas must show a reduction of 6.0% for TN loads, 7.25% for TP loads, and 8.75% for TSS loads.



This plan will establish how VIMS intends to meet the 5%, 35%, and 60% reduction requirements by the end of the first, second, and third permit cycles to stay in compliance with their MS4 Permit and the Chesapeake Bay TMDL Special Condition Guidance developed by DEQ. This plan follows the order specified in Guidance Memo No. 15-2005 set forth by DEQ and dated May 18, 2015.

The following elements are included within this Action Plan:

- 1. Current Program and Existing Legal Authority
- 2. New or Modified Legal Authority
- 3. Means and Methods to Address Discharges from New Sources
- 4. Estimated Existing Source Loads and Calculated Total Pollutant of Concern Required Reductions
- 5. Means and Methods to Meet the Required Reductions and Schedule
- 6. Means and Methods to Offset Increased Loads From New Sources Initiating Construction Between July 1, 2009 and June 30, 2014
- 7. Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction After July 1, 2014
- 8. List of Future Projects and Associated Acreage that Qualify as Grandfathered
- 9. An Estimate of the Expected Cost to Implement the Necessary Reductions
- 10. Public Comments on Draft Action Plan



MS4 Permit Compliance

Table 1 of this plan provides the requirements of VIMS' MS4 permit and the specific section of this plan where the requirement is met by VIMS' MS4 Program Plan. Additionally, *Table 1* also describes actions VIMS has taken to meet the requirements specified by the MS4 permit.

Table 1: MS4 Permit Compliance

| VIMS TDML Action Plan Section | Element from DEQ TMDL Special Condition Guidance | MS4 General Permit Section | MS4 Permit Requirement |
|-------------------------------------|--|-------------------------------------|---|
| 2 | Part VI.1 - Current Program and Existing Legal Authority | I.C.2.a(1) | A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator's ability to ensure compliance with this special condition |
| 2 | Part VI.2 - New or Modified Legal Authority | I.C.2.a(2) | The identification of any new or modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and interjurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition |



| 3 | Part VI.3 - Means and Methods to Address Discharges from New Sources | I.C.2.a(3) | The means and methods that will be utilized to address discharges into the MS4 from new sources |
|---|--|---------------------------------|---|
| 4 | Part VI.4 - Estimated Existing Source Loads and Calculated Total Pollutants of Concern (POC) Required Reductions | I.C.2.a(4) and I.C.2.a(5) | An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable versions of Tables 2 a-d in this section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the MS4 on June 30, 2009, and the 2009 Edge of Stream (EOS) loading rate. A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable versions of Tables 3 a-d in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the required reduction in loading rate. For the purposes of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4 |
| 5 | Part VI.5 - Means and Methods to Meet the Required Reductions and Schedule | I.C.2.a(6) | The means and methods, such as management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2 a (5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions |



| | 1 | | |
|----|--|-------------|--|
| 6 | Part VI.6 - Means and Methods to Offset Increased Loads from New Sources Initiating Construction between July 1, 2009 and June 30, 2014 | I.C.2.a(7) | The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009, and June 30, 2014, that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The operator shall utilize Table 4 to develop the equivalent pollutant load for TN and TSS. |
| 7 | Part VI.7 - Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction after July 1, 2014 | I.C.2.a(8) | The means and methods to offset the increased loads from projects as grandfathered in accordance with 9VAC25-870-48, that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-development stormwater management facilities. The operator shall utilize Table 4 to develop the equivalent pollutant load for TN and TSS. |
| 8 | Part VI.8 - List of Future Projects and Associated Acreage that Qualify as Grandathered | I.C.2.a(10) | A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48; |
| 9 | Part VI.9 - Estimated Expected Cost to Implement Necessary Reductions | I.C.2.a(11) | An estimate of the expected costs to implement the requirements of this special condition during the state permit cycle. |
| 10 | Part VI.10.a&b - Public Comments on Draft Action Plan | I.C.2.a(12) | An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan. |



Summary

In accordance with the MS4 Permit, VIMS must calculate required permit cycle reductions and offsets for the following:

- Existing sources as of June 30, 2009
- Sources beginning construction between July 1, 2009 and June 30, 2014,
- Grandfathered sources beginning construction after July 1, 2014

Existing best management practices (BMPs) that were constructed simultaneously with pollutant sources will provide offset for the required first permit cycle reductions. BMPs that are outlined in the 2016 VIMS Stormwater Master Plan will provide pollutant offset for the required second and third permit cycle reductions. Total POC Load Reductions required by the permit cycles and associated offsets can be found in Table 2A through Table 2B of this plan. Calculations to determine load reductions can be found in Table 3A through Table 3B of this plan. Offset calculations can be found in Appendix B.



Table 2A: Summary of Required and Achieved Reductions – Second Permit Cycle

| Pollutant of Concern | 2009 POC Load (lbs/yr) | MS4 Target POC Load (lbs/yr) | rget Cycle Required Reduct OC Reduction in Require oad Loading Rate Second P | | Second Permit Cycle POC Load Reduction Achieved (lbs/yr) |
|------------------------------|---------------------------------|------------------------------|--|--------|--|
| Total Nitrogen | 311.31 | 288.91 | 0.391 | 7.84 | 19.05 |
| Total Phosphorus | 38.14 | 33.13 | 0.098 | 1.75 | 1.85 |
| Total Suspended Solids | 9530.81 | 7823.46 | 34.181 | 597.57 | 1545.87 |

Table 2B: Summary of Required and Achieved Reductions – Third Permit Cycle

| Pollutant of Concern | 2009 POC Load (lbs/yr) | MS4 Target POC Load (lbs/yr) | Third Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr) | Third POC Load Reduction Required by First Permit Cycle (lbs/yr) | Third Permit Cycle POC Load Reduction Achieved (lbs/yr) |
|------------------------------|---------------------------------|--|---|--|---|
| Total Nitrogen | 311.31 | 288.91 | 0.670 | 13.44 | 58.70 |
| Total Phosphorus | 38.14 | 33.13 | 0.167 | 3.01 | 4.91 |
| Total Suspended Solids | 9530.81 | 7823.46 | 58.596 | 1024.41 | 4481.13 |



2. Current Program and Legal Authority

Current Program and Existing Legal Authority

As an operator of an MS4, the Virginia Institute of Marine Science must develop, implement, and enforce an MS4 Program Plan as stated in Phase II MS4 regulations. VIMS has created an MS4 Program Plan that is continually updated and monitored to ensure VIMS meets MS4 regulations. This MS4 Program Plan ensures the VIMS is acting in the most effective manner to reduce pollutant discharge, protect water quality, and ensure compliance with water quality standards. Additionally, the MS4 Program Plan ensures that VIMS is adhering to the Clean Water Act, the MS4 permit regulations, and other associated regulations.

The VIMS MS4 Program Plan is managed by the Office of Safety and Environmental Programs in addition to Facilities Management and includes updating the MS4 Program Plan and the MS4 General Permit Annual Report. Six Minimum Control Measures (MCMs) are outlined in the Phase II MS4 General Permit:

- Public Education and Outreach on Stormwater Impacts
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post Construction Stormwater Management
- Pollution Prevention and Good Housekeeping for Municipal Operations

Best Management Practices have been integrated into these six MCMs to assist in protecting the water quality within the regulated acreage that ultimately discharges into the Chesapeake Bay. The VIMS' MS4 Program Plan lists each of the six MCMs and activities that VIMS is pursuing to meet them.

Stormwater policies that have been implemented by VIMS within the MS4 Program Plan to administer the Program and comply with the MCMs. These policies can be found on the <u>VIMS' Stormwater Management Webpage</u>.

- <u>Stormwater Management Master Plan, November 2016</u>
- Illicit Discharge Detection and Elimination Program, September 2016
- Stormwater Pollution Prevention Plans, September 2016

New or Modified Legal Authority

New or modified legal authorities are not required for compliance with the Special Condition for the Chesapeake Bay TMDL. VIMS possesses the authorities necessary to meet pollution reduction goals.



VIMS and neighboring MS4 jurisdictions are responsible for the drainage area within their boundaries. In the event that an agreement is made with a neighboring MS4 operator that provides more easily managed compliance, this TMDL Action Plan will be updated.



3. Means and Methods to Address Discharges from New Sources

VIMS must introduce and implement means and methods to offset pollutant loads from new sources. To offset pollutant loads, provisions of the Virginia Stormwater Management Program (VSMP), as of the 2014 revisions, require that for a redevelopment project site of less than 1 acre, TP loadings from that site be reduced by 10%. For a redevelopment project site of greater than 1 acre, VSMP Regulations require TP loadings from that site be reduced by 20% as compared to the existing developed conditions. VSMP Regulations identify TP loading as the "keystone" indicator of runoff water quality. As TP is present in stormwater runoff in both particulate and soluble form, its concentration in stormwater runoff is considered indicative of the presence of other pollutants (TN, TSS) that exist in either form. VSMP regulations requires all new developments to remove 0.41 pounds of TP per acre per year. The Virginia Stormwater Management Handbook (VSMH) evaluates BMP pollutant removal performance in terms of percentage of TP removed. TP removal loads are used to determine TN and TSS removal loads through use of pollutant loading ratios found in Table 4 of the MS4 General Permit regulations and Appendix B of this plan.

Since VIMS is a graduate school of the College of William and Mary, the ESC and SWM plan approval and application process is governed by the College of William and Mary Annual Standards and Specifications. Construction documents are developed by a design team hired by VIMS which includes surveyors, engineers, and landscape architects. Plans are designed to comply with the Virginia Standards and to comply with the MS4 General Permit regulations.

Following plan approval, general contractors are responsible for obtaining the necessary land disturbance permits and attending preconstruction meetings with VIMS officials. The purpose of the preconstruction meeting is to review all erosion and sediment controls once they are installed on site and to confirm they comply with the approved plans. The contractor is also responsible for maintaining the latest approved set of plans and the SWPPP on-site for each project during the extent of construction. A certified inspector is responsible for making sure each inspection is completed for the site.

A preconstruction meeting is also held prior to installation of any permanent water quality BMPs. Following construction, permanent stormwater facilities are inspected for conformance with plans, specifications, and standards. Annual inspection of stormwater facilities will be conducted with maintenance being performed as required by the contractor, or VIMS Facilities Management staff.

In addition to measures discussed within this TMDL Action Plan, VIMS has a previously completed Stormwater Master Plan previously provided to the Virginia DEQ. This Master Plan outlines several Stormwater Improvement and Capital Improvement projects that can be implemented on campus to meet future Permit Cycle pollutant reduction goals. Campus-wide Stormwater Pollution Prevention Plans



are to be submitted as part of the VIMS' MS4 Program Plan to assist in facilitating the measures for maintaining current and future best management practices.

4. Estimated Existing Source Loads and **Calculated Total Pollutant of Concern** (POC) Required Reductions

MS4 Area Delineation

In order to estimate the existing source loads within VIMS' regulated area, an MS4 boundary for the campus was outlined. The MS4 area delineation as well as areas of pervious and impervious regulated land are determined based on data from the 2016 Stormwater Master Plan (SWMP). Area delineation is calculated in the SWMP using GIS data and survey for the VIMS campus that was generated from an aerial flown in 2016. GIS data was supplemented by various record drawings of completed projects on the VIMS campus. A map of VIMS' MS4 boundary can be found in Appendix A.

In accordance with DEQ's Chesapeake Bay TMDL Special Guidance, VIMS may exclude from its MS4 service area land regulated under any general VPDES permit that addresses industrial stormwater or forested land one half contiguous acre or more that meets specific criteria. VIMS has not identified any property with a VPDES industrial stormwater permit or forested area within its MS4 boundary. If a property within the VIMS campus obtains an industrial stormwater permit, further analysis would be necessary to determine if this property meets specific criteria to be excluded from the MS4 service area delineation.

Existing Source Loads

Existing source loads for TP, TN, and TSS were calculated using 2009 Edge of Stream (EOS) loading rates specified in the MS4 General Permit. Since the VIMS campus is in the York River watershed, 2009 EOS rates were taken from Table 2D of the MS4 General Permit. Loading rates were applied to impervious and pervious cover and summed to determine total existing source loads. See Table 3A through 3B of this plan for existing source load calculations.

Total POC Reduction Requirements

Total pollutant of concern (POC) reduction requirements were calculated using 2009 EOS loading rates that were reduced to meet the final TMDL target goals as required by the Chesapeake Bay Watershed Implementation Plan (WIP). Loading rates for the York River watershed can be found in Table 2D of the MS4 Permit. The loading rate reduction percentage is defined by the Chesapeake Bay WIP for each specific POC and land cover type. MS4 Impervious areas must show a reduction of 9.0% for TN loads, 16% for TP loads, and 20% for TSS loads. MS4 Pervious areas must show a reduction of 6.0% for TN loads, 7.25% for TP loads, and 8.75% for TSS loads. Reduced loading rates were then used to determine reduced final POC loads required at the end of the third permit cycle.



After determining the total net reduction required to meet TMDL target goals, the percent reduction for each POC for each permit cycle was calculated. Reduction required for pervious and impervious cover were summed to determine a total reduction required for each POC for each permit cycle. Table 3A through 3B of this plan summarizes POC reduction requirements.

Total POC Source Loads and Second Permit Cycle Required Load Reductions

2023 VIMS Chesapeake Bay TMDL Action Plan

VHB Project No.: 34588.03

Date: 9/28/2023

Computed By: KMB Checked By: JDH vhb

Two Columbus Center 4500 Main Street, Suite 400 Virginia Beach, VA 23462 (757) 490-0132

Campus MS4 Area: 41.45 acres Impervious MS4 Area: 17.00 acres

Watershed: York River

Table 3: Summary of Existing Source Loads and POC Reduction Required

| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|--|---|--|---------------------------|--|--|---------------------------------|--|---|
| Pollutant of Concern | Impervious Area Served by MS4 (acre) | Pervious Area Served by MS4 (acre) | 2009 EOS Loading Rate (lbs/acre/yr) | 2009 POC Load (lbs/yr) | MS4 Required Loading Rate Reduction (%) | Final MS4 Target Loading Rate (lbs/acre/yr) | MS4 Target POC Load (lbs/yr) | Second Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr) | Total POC Load Reduction Required by Second Permit Cycle (lbs/yr) |
| | 17.00 | | 7.31 | 124.27 | 9.00 | 6.65 | 113.09 | 0.230 | 3.91 |
| | | 24.45 | 7.65 | 187.04 | 6.00 | 7.19 | 175.82 | 0.161 | 3.93 |
| Nitrogen | | | Total: | 311.31 | | | 288.91 | 0.391 | 7.84 |
| Mitrogen | | | | | | | Second Permit C | ycle Total Reduction Achieved*: | 11.94 |
| | | | | | | | Excess First Pe | ermit Cycle Reduction Achieved: | 7.11 |
| | | | | | | | | Total Reduction Achieved*: | 19.05 |
| | | | | | | , | | | |
| | 17.00 | | 1.51 | 25.67 | 16.00 | 1.27 | 21.56 | 0.085 | 1.44 |
| | | 24.45 | 0.51 | 12.47 | 7.25 | 0.47 | 11.57 | 0.013 | 0.32 |
| Phosphorus | | | Total: | 38.14 | | | 33.13 | 0.098 | 1.75 |
| Позрногиз | Second Permit Cycle Total Reduction Achieved*: | | | | | | | | |
| | | | | | | | Excess First Pe | ermit Cycle Reduction Achieved: | 0.72 |
| | | | | | | | | Total Reduction Achieved*: | 1.85 |
| | 17.00 | | 456.60 | 7762.56 | 20.00 | 265.24 | 6210.05 | 21.060 | E 42 4E |
| | 17.00 | 24.45 | 456.68 72.28 | 7763.56 1767.25 | 20.00 8.75 | 365.34 65.96 | 6210.85 1612.61 | 31.968 2.214 | 543.45 54.12 |
| Total | | 24.45 | | | 0.75 | 65.90 | | | |
| Suspended | | Total: 9530.81 7823.46 34.181 | | | | | | | 597.57 |
| Solids | Second Permit Cycle Total Reduction Achieved*: | | | | | | | - | 876.7 |
| Excess First Permit Cycle Reduction Achieved: | | | | | | | 669.17 | | |
| | | | | | | | | Total Reduction Achieved*: | 1545.87 |

- 1. 2009 EOS Loading Rates from Chesapeake Bay Program Watershed Model Phase 5.3.2 for the York River Basin.
- 2. 2009 POC Load is determined by applying the 2009 EOS Loading Rate for impervious and pervious areas to areas within the VIMS Campus MS4 Area. [POC Load] = [MS4 Area] * [2009 EOS Loading Rate].
- 3. MS4 Required Loading Rate Reduction is defined by the Phase II Chesapeake Bay TMDL Watershed Implementation Plan.
- 4. Final MS4 Target Loading Rate is the 2009 EOS Loading Rate after the required loading rate reduction has been applied. [Final MS4 Target Loading Rate] = [2009 EOS Loading Rate] [MS4 Required Loading Rate Reduction]/100 * [2009 EOS Loading Rate].
- 5. MS4 Target POC Load is determined by applying the Final MS4 Target Loading Rate for impervious and pervious areas to areas within the VIMS campus MS4 area. [MS4 Target POC Load] = [MS4 Area] * [Final MS4 Loading Rate].
- 6. A 35% Reduction in the POC Loading Rate is required by the Phase II Chesapeake Bay TMDL Watershed Implementation Plan for the Second Permit Cycle. [Second Permit Cycle Reduction in Loading Rate] = [2009 EOS Loading Rate] [Final MS4 Target Loading Rate] * 35%.
- 7. Total POC Load Reduction Required by Second Permit Cycle is 35% of the total load reduction required by the Phase II Chesapeake Bay TMDL Watershed Implementation Plan for the Second Permit Cycle. [Total POC Load Reduction Required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle. [Total POC Load Reduction Required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle. [Total POC Load Reduction Required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cycle is 35% of the total load reduction required by Second Permit Cy
- * Refer to Appendix B for Achieved Permit Cycle Reductions.

Total POC Source Loads and Third Permit Cycle Required Load Reductions

2023 VIMS Chesapeake Bay TMDL Action Plan

VHB Project No.: 34588.03

Date: 9/28/2023

Computed By: KMB Checked By: JDH



Two Columbus Center 4500 Main Street, Suite 400 Virginia Beach, VA 23462 (757) 490-0132

Campus MS4 Area: 41.45 acres
Impervious MS4 Area: 17.00 acres

Watershed: York River

Table 3: Summary of Existing Source Loads and POC Reduction Required

| Table 5. Janinin | ary of Existing Source | Louds and 1 oc near | action Required | | | | | | | |
|-------------------------|--|---|--|---------------------------|--|--|---------------------------------|---|--|--|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| Pollutant of Concern | Impervious Area Served by MS4 (acre) | Pervious Area Served by MS4 (acre) | 2009 EOS Loading Rate (lbs/acre/yr) | 2009 POC Load (lbs/yr) | MS4 Required Loading Rate Reduction (%) | Final MS4 Target Loading Rate (lbs/acre/yr) | MS4 Target POC Load (lbs/yr) | Third Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr) | Total POC Load Reduction Required by Third Permit Cycle (lbs/yr) | |
| | 17.00 | | 7.31 | 124.27 | 9.00 | 6.65 | 113.09 | 0.395 | 6.71 | |
| | | 24.45 | 7.65 | 187.04 | 6.00 | 7.19 | 175.82 | 0.275 | 6.73 | |
| Nitrogen | | | Total: | 311.31 | | | 288.91 | 0.670 | 13.44 | |
| Mitrogen | | | | | | | Third Permit | Cycle Total Reduction Achieved*: | 47.49 | |
| | | | | | | | Excess Second F | Permit Cycle Reduction Achieved: | 11.21 | |
| | | | | | | | | Total Reduction Achieved*: | 58.70 | |
| | | | | | | | | | | |
| | 17.00 | | 1.51 | 25.67 | 16.00 | 1.27 | 21.56 | 0.145 | 2.46 | |
| | | 24.45 | 0.51 | 12.47 | 7.25 | 0.47 | 11.57 | 0.022 | 0.54 | |
| Phosphorus | | | Total: | 38.14 | | | 33.13 | 0.167 | 3.01 | |
| Поэрногаз | | | | | | | | Cycle Total Reduction Achieved*: | | |
| | | | | | | | Excess Second F | Permit Cycle Reduction Achieved: | 0.10 | |
| | | | | | | | | Total Reduction Achieved*: | 4.91 | |
| | | | | | | | | | | |
| | 17.00 | | 456.68 | 7763.56 | 20.00 | 365.34 | 6210.85 | 54.802 | 931.63 | |
| Total | | 24.45 | 72.28 | 1767.25 | 8.75 | 65.96 | 1612.61 | 3.795 | 92.78 1024.41 | |
| Suspended | | Total: 9530.81 7823.46 58.596 | | | | | | | | |
| Solids | | Third Permit Cycle Total Reduction Achieved*: | | | | | | | | |
| 30.1.03 | | | | | | | Excess Second F | Permit Cycle Reduction Achieved: | | |
| | Total Reduction Achieved*: | | | | | | | | 4481.13 | |

- 1. 2009 EOS Loading Rates from Chesapeake Bay Program Watershed Model Phase 5.3.2 for the York River Basin.
- 2. 2009 POC Load is determined by applying the 2009 EOS Loading Rate for impervious and pervious areas to areas within the VIMS Campus MS4 Area. [POC Load] = [MS4 Area] * [2009 EOS Loading Rate].
- 3. MS4 Required Loading Rate Reduction is defined by the Phase II Chesapeake Bay TMDL Watershed Implementation Plan.
- 4. Final MS4 Target Loading Rate is the 2009 EOS Loading Rate after the required loading rate reduction has been applied. [Final MS4 Target Loading Rate] = [2009 EOS Loading Rate] [MS4 Required Loading Rate Reduction]/100 * [2009 EOS Loading Rate].
- 5. MS4 Target POC Load is determined by applying the Final MS4 Target Loading Rate for impervious and pervious areas to areas within the VIMS campus MS4 area. [MS4 Target POC Load] = [MS4 Area] * [Final MS4 Loading Rate].
- 6. A 60% Reduction in the POC Loading Rate is required by the Phase II Chesapeake Bay TMDL Watershed Implementation Plan for the Third Permit Cycle. [THird Permit Cycle Reduction in Loading Rate] = [2009 EOS Loading Rate] [Final MS4 Target Loading Pate] * 60%
- 7. Total POC Load Reduction Required by Third Permit Cycle is 60% of the total load reduction required by the Phase II Chesapeake Bay TMDL Watershed Implementation Plan for the Third Permit Cycle. [Total POC Load Reduction Required by Third Permit Cycle] = [2009 EOS POC Load [Final MS4 Target POC Load] * 60%.
- * Refer to Appendix B for Achieved Permit Cycle Reductions.



5. Means and Methods to Meet the Required Reductions and Schedules

Best Management Practices

Best Management Practices (BMP) are used extensively by VIMS to offset sources of pollutant loads. It is a common VIMS practice to construct BMPs as part of Capital Improvement Projects (CIPs) and Stormwater Improvement Projects (SIPs) located on campus. These BMPs are intended to provide water quality treatment and to offset increases in pollutant loads that are associated with developments. Additionally, these BMPs provide surplus treatment that can be used to offset future increases in pollutant loads. The sum offset provided by existing condition BMPs provided enough credit to meet the 5% first permit cycle reduction requirements. BMPs that are planned to be constructed with future CIPs and SIPs will provide additional credit to meet the second and third permit cycle reduction requirements. Since TP is considered a "keystone" pollutant, reduction calculations were performed to target solely TP. Pollutant loading ratios found in *Table 4* of the MS4 General Permit regulations were used to calculate required TN and TSS reductions. See *Appendix B* of this plan for a summary of existing BMPs and associated pollutant offsets.

2016 Virginia Institute of Marine Science Master Plan

The 2016 VIMS Stormwater Master Plan (SWMP) has been previously submitted to DEQ in July 2017. The goal of the SWMP is to provide a "menu" of Capital Improvement Projects (CIPs), and Stormwater Improvement Projects (SIPs) that could be implemented to meet TMDL reduction goals using a variety of BMPs. CIPs are projects that have State funding allocated for their construction and typically include buildings, additions, or improvements to the VIMS campus. SIPs are stand-alone projects that improve the VIMS campus water quality performance and are not tied to any CIP budget. The Master Plan outlines the reduction potential for six CIPs and four SIPs on the VIMS campus. These projects provide enough pollutant offset to meet VIMS TMDL goals and will be used towards meeting permit cycle goals.

First Permit Cycle:

The first permit cycle reduction goals have been met with one existing BMP and two proposed BMPs associated with CIPs. Existing BMPs include an infiltration basin that was utilized with the Facilities Management Building project, called the Moat. Proposed BMPs include two bioretention basins that were constructed with the Davis Hall project.

Second Permit Cycle:

The second permit cycle goals have been met with a total of three proposed BMPs, one existing BMP, and a purchase of nutrient credits with the Acuff Center for Aquaculture and Boat Basin CIP project. BMPs include permeable pavement and a hydrodynamic separator. In addition, the manufactured treatment device at Andrews



Hall will receive an increase in drainage area from the CIP project. These BMPs are located in the eastern portion of the VIMS campus.

Third Permit Cycle:

The third permit cycle goals can be met with a combination of seventeen proposed BMPs that are planned to be constructed with four CIPs and three SIPs and the purchase of offsite nutrient credits. BMPs associated with CIPs include permeable pavement and bioretention basins that will be constructed with the proposed Nunally Hall Addition, Watermen's Hall Addition and Amphitheater, and the Field Support Admin Building. An infiltration basin will be installed with the Chesapeake Bay Hall project that is currently under construction. BMPs associated with SIPs include permeable pavement that will be constructed near the Seawater Laboratory and the Boat Basin, and bioretention basins to be constructed near the Wilson House. These BMPs are located in both the western and eastern portions of the VIMS campus.

Calculations for pollutant removal can be found in Appendix B.

Offsite Nutrient Credit Purchases

In addition to using nutrient credits to aid CIPs in meeting their development goals the "General VPDES Permit for Discharges or Stormwater from Small Municipal Separate Storm Sewer Systems" effective November 1, 2018 allows the use of nutrient credits to meet TMDL requirements. Refer to the VIMS MS4 permit (VAR040052) including nutrient credit requirements. If Stormwater Improvement Projects are not constructed to meet the requirements of the 2023 and 2028 permit cycles, VIMS will need to purchase nutrient credits. The approximate rate of nutrient trading for the James River watershed is \$20,000 per pound phosphorus. This is a one-time fee.



6. Means and Methods to Offset Increase Loads from New Sources Initiating Construction between July 1, 2009 and June 30, 2014

No projects with BMPs have been constructed on the VIMS campus between July 1, 2009 and June 30, 2014. No increases in pollutant loads or load offsets were introduced during this time.

7. Means and Methods to Offset Increased Loads from Grandfathered Projects Beginning Construction after July 1, 2014

Grandfathered Projects Beginning Construction after July 1, 2014

VIMS does not have any projects that qualify for grandfathering under 9VAC25-870-48.

Future Projects Beginning Construction after July 1, 2014

VIMS is expecting to begin construction projects after July 1, 2014 as part of the Campus Master Plan.

8. List of Future Projects Qualifying as Grandfathered

VIMS has not identified any projects that qualify to be grandfathered under 9VAC25-870-48



9. Estimated Cost of Compliance

The estimated cost of compliance includes estimated stormwater construction costs in addition to operation and maintenance costs that are required to keep existing BMPs functioning. These costs are summarized in *Table 4* and *5* of this plan. Cost breakdowns can be found in *Appendix C*.

Table 4: Costs of Compliance (Operations and Maintenance)

| | | | | Existing 2023 | | | |
|---------------------------|-----------------------------|--------------------|-----------|---------------|--------------------|-------|--|
| ВМР Туре | Typical Cycle (years) | Cycle | Qty | | tal Cost /year) | | |
| Water Quality Inlet | 1 | 1000 per structure | | 0 | \$ | - | |
| Permeable Pavers | 1 | 3000 | per acre | 0.26 | \$ | 780 | |
| Hydrodynamic Structure | 1 | 1000 per structure | | 3 | \$ | 3,000 | |
| Bioretention Basin | 1 | 2000 per basin | | 4 | \$ | 8,000 | |
| Infiltration Basin | 1 | 2000 | per basin | 1 | \$ | 2,000 | |
| Wet Pond | 1 | 1500 per pond | | 1 | \$ | 1,500 | |
| | 10 | | | | | | |
| | Yearly Cost | | | | | | |

^{*}Existing constructed facilities as per the date of this report.



Table 5: Costs of Compliance (New Projects)

| Permit Cycle | Name/Description | Reduction Means/Methods Estimated Total Cost (\$) | | Phosphorus Removed (lbs) | Estimated Cost per Pound of Phosphorus Removed (\$/lb) | | |
|-----------------|--------------------------|--|-------------------|--------------------------------|---|--|--|
| 2028 | | Permeable | | | | | |
| | Watermen's Hall Addition | Pavement | \$524,683 | 1.04 | \$504,503 | | |
| | and Amphitheater | Bioretention | \$324,003 | 1.04 | | | |
| | | Basins | | | | | |
| 2028 | | Permeable | | | | | |
| | Numally Hall Addition | Pavement | \$419,299 | 0.81 | \$517,653 | | |
| | Nunnally Hall Addition | Bioretention | \$419,299 | 0.61 | | | |
| | | Basin | | | | | |
| 2028 | | Permeable | | | | | |
| | Field Support Admin | Pavement | ¢262.642 | 0.72 | \$366,169 | | |
| | Building | Bioretention | \$263,642 | 0.72 | | | |
| | | Basin | | | | | |
| 2028 | Convertor Laboratory | Permeable | \$337,341 | 0.73 | ¢462 111 | | |
| | Seawater Laboratory | Pavement | 3337,341 | 0.73 | \$462,111 | | |
| 2028 | Boat Basin | Permeable | \$1,943,592 | 2.84 | ¢604.262 | | |
| | DOAL DASIII | Pavement | \$1,545,352 | 2.04 | \$684,363 | | |
| 2028 | Wilson House | Bioretention | \$302,807 | 0.86 | \$352,101 | | |
| | wiison House | Basins | \$302,00 <i>1</i> | 0.00 | | | |
| | · | Permit Cycle | | _ | | | |
| | | Total: | \$3,791,364 | 7.00 | \$541,623 | | |

^{*}Costs are per the VIMS November 2016 Stormwater Masterplan and does not include the Chesapeake Cay Hall CIP due to the project being currently under construction

10. Public Comment

Part of the VIMS' MS4 program includes Public Education and Outreach to students, faculty and staff. As part of this program, this TMDL Action Plan will be available on VIMS' Stormwater Management webpage. A two-week public comment period will take place which will provide an opportunity the VIMS community to provide feedback. Public comments and feedback will be considered and incorporated into this Action Plan before final completion.



CHESAPEAKE BAY TMDL ACTION PLAN

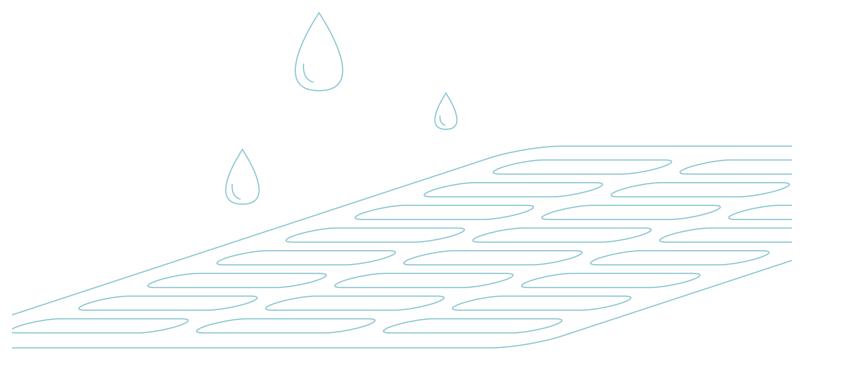
APPENDICES





Appendix A:

Figures



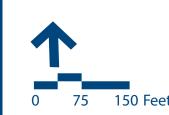




Campus Study Area = ± 41.45 AC

Stormwater Management Master Plan (2017)

Figure 1 Applicable Area









CIP Projects 2018 BMP

- BMP 4 Facilities Management Building Existing "Moat" Infiltration Basin
- EC-1 Consolidated Scientific Research Facility - Bioretention Planters
 CONSTRUCTED

2023 BMP

- EC-2 Oyster Hatchery Building Bioretention Basin
- EC-3 Oyster Hatchery Building Permeable Pavers CONSTRUCTED
- EC-4 Watermen's Hall Addition and Amphitheater - Bioretention Basin
- 2028 EC-5 Watermen's Hall Addition and Amphitheater - Permeable Pavers

2028 BMP

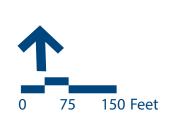
- EC-6 Nunallly Hall Addition **Bioretention Basin**
- EC-7 Nunally Hall Addition
- Permeable Pavers
- WC-1 Field Support Admin Building Bioretention Basin
- WC-2 Field Support Admin Builidng Permeable Pavers

SIP Projects

- EC-8 Wilson House
 - Bioretention Basin Retrofit
- EC-9 Seawater Research Laboratory Permeable Pavement
- EC-10 Chesapeake Bay Hall
 NEW CIP UNDER CONSTRUCTION Water Quality Inlets
- WC-3 Boat Basin Permeable Pavers

Stormwater Management Master Plan (2017)

Figure 5 Proposed Conditions

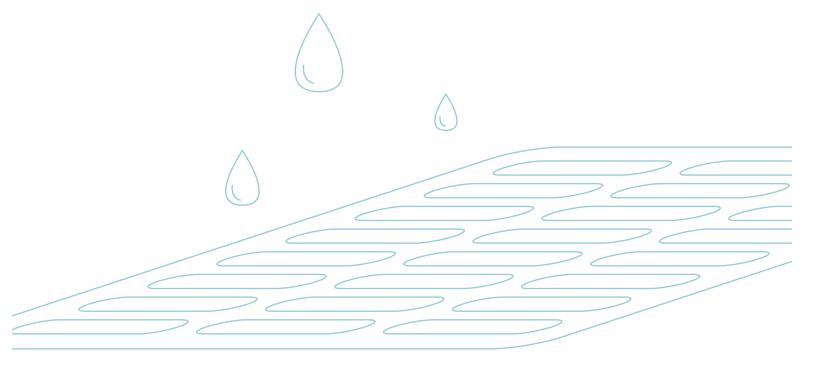






Appendix B:

Permit Cycle Reduction Calculations





POC Removal Conversions



POC Achieved Removal Conversions

2023 VIMS Chesapeake Bay TMDL Action Plan

VHB Project No.: 34588.03

Date: 9/28/2023

Computed By: KMB

Checked By: JDH



4.81

47.49

3532.83

Two Columbus Center 4500 Main Street, Suite 400 Virginia Beach, VA 23462 (757) 490-0132

| | Criccica by. | 3011 | | | | | | | | | | | | | (131) 430 0132 | |
|--------------|--------------|--|---|---------------------------|-----------------------------------|-----------------------------|---------------------------|--------------------------------|---|--------------------------------|-----------------------------|------------------------------|-------------------------------------|-------|----------------|--|
| | | | | | Post Development POC Load (lb/yr) | | | | | | | | Excess POC Removal Achieved (lb/yr) | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | | 6 | | 7 | 8 | 9 | 10 | |
| Permit Cycle | Project Type | Project Name | Reduction Means/Methods | TP Removal Required | TP Load to BMP | Scaled TN Load to BMP | Scaled TSS Load to BMP | TP Removal Achieved (lb/yr) | Excess TP Removal Achieved (lb/yr) | Proportion of TP Removed | TN Removal Efficiency | TSS Removal Efficiency | TP | TN | TSS | |
| 2018 | CIP | Facilities Management Building | Infiltration Basin (the Moat) (Existing) | 2.31 | 4.98 | 47.31 | 2647.37 | 3.23 | 0.92 | 0.28 | 0.57 | 0.95 | 0.92 | 7.68 | 716.35 | |
| 2018 | CIP | Davis Hall | Bioretention Basins | 0.44 | 0.88 | 8.36 | 467.81 | 0.49 | 0.05 | 0.10 | 0.64 | 0.80 | 0.05 | 0.55 | 38.19 | |
| | • | | | | | | | | | | | SUM: | 0.97 | 8.23 | 754.54 | |
| | CIP | Acuff Center for Aquaculture + Boat Basin | Permeable Pavement | 0.85 | 1.36 | 12.92 | 722.98 | 0.80 | -0.05 | -0.06 | 0.59 | 0.85 | -0.05 | -0.48 | -38.41 | |
| 2023 | | | MTD - Hydrodynamic | 0.08 | 0.40 | 3.80 | 212.64 | 0.08 | 0.00 | 0.00 | 0.10 | 0.10 | 0.00 | 0.00 | 0.00 | |
| | | | MTD (Existing) | 0.04 | 0.09 | 0.86 | 47.84 | 0.02 | -0.02 | -1.00 | 0.10 | 0.10 | -0.02 | -0.09 | -4.78 | |
| | | | Nutrient Credits | 0.00 | | | | 1.20 | 1.20 | 1.00 | | | 1.20 | 12.50 | 919.90 | |
| | | | | | | | | | | | | SUM: | 1.13 | 11.94 | 876.70 | |
| 2023 | CIP | Chesapeake Bay Hall | Infiltration Basin | 1.33 | 2.29 | 21.76 | 1217.36 | 2.12 | 0.79 | 0.37 | 0.85 | 0.95 | 0.79 | 6.89 | 430.96 | |
| 2028 | CID | Watermen's Hall Addition and Amphitheater | Permeable Pavement | 0.14 | 0.41 | 3.90 | 217.96 | 0.24 | 0.10 | 0.42 | 0.59 | 0.85 | 0.10 | 0.96 | 77.19 | |
| | CIP | | Bioretention Basins | 0.37 | 1.10 | 10.45 | 584.76 | 0.61 | 0.24 | 0.39 | 0.64 | 0.80 | 0.24 | 2.63 | 184.06 | |
| 2028 | CIP | Nunnally Hall Addition | Permeable Pavement | 0.25 | 0.76 | 7.22 | 404.02 | 0.44 | 0.19 | 0.43 | 0.59 | 0.85 | 0.19 | 1.84 | 148.29 | |
| | CIP | | Bioretention Basin | 0.20 | 0.67 | 6.37 | 356.17 | 0.37 | 0.17 | 0.46 | 0.64 | 0.80 | 0.17 | 1.87 | 130.92 | |
| 2028 | CIP | Field Support Admin Building | Permeable Pavement | 0.11 | 0.28 | 2.66 | 148.85 | 0.17 | 0.06 | 0.35 | 0.59 | 0.85 | 0.06 | 0.55 | 44.65 | |
| 2020 | | | Bioretention Basin | 0.38 | 1.03 | 9.79 | 547.55 | 0.56 | 0.18 | 0.32 | 0.64 | 0.80 | 0.18 | 2.01 | 140.80 | |
| 2028 | SIP | Seawater Laboratory | Permeable Pavement | 0.07 | 1.23 | 11.69 | 653.87 | 0.72 | 0.65 | 0.90 | 0.59 | 0.85 | 0.65 | 6.22 | 501.75 | |
| 2028 | SIP | Boat Basin | Permeable Pavement | 1.27 | 4.83 | 45.89 | 2567.63 | 2.84 | 1.57 | 0.55 | 0.59 | 0.85 | 1.57 | 14.97 | 1206.51 | |
| 2028 | SIP | Wilson House | Bioretention Basins | 0.00 | 1.57 | 14.92 | 834.61 | 0.86 | 0.86 | 1.00 | 0.64 | 0.80 | 0.86 | 9.55 | 667.69 | |

- 1. Total phosphorus removal as required by VSMP Regulations.
- 2. Total TP Load received by BMP. Taken from the Drainage Area sheet of the Runoff Reduction Spreadsheet.
- 3. Scaled Total Nitrogen Removal. Calculated using York River Basin Loading Ratios from Table 4 of Virginia Administration Code Section 9VAC25-890-40.
- 4. Scaled Total Suspended Solids Removal. Calculated using York River Basin Loading Ratios from Table 4 of Virginia Administration Code Section 9VAC25-890-40
- 5. Total Phosphorus Removed for VSMP Regulations using VRRM Spreadsheet. Refer to Runoff Reduction Method Spreadsheets for calculations.
- 6. Proportion of TP Removed calculated as specified in DEQ Guidance Memo 15-2005. [Proportion of TP Removed] = [Excess TP Removal Achieved] / [TP Removal Achieved]
- 7. POC Removal Efficiencies from DEQ Guidance Memo 15-2005, Tables V.A.1 and Tables V.C.1.
- 8. Excess TP Removal Achieved using Virginia Runoff Reduction Method. Refer to Runoff Reduction Method Spreadsheet. [TP] = [TP Removal Achieved] [TP Removal Required]
- 9. TN Removal Achieved Using Methods outlined in DEQ Guidance Memo 15-2005 for Meeting Special Condition 7 Requirements. [TN] = [Proportion of TP Removed] * [Scaled TN Load] * [TN Removal Efficiency]
- 10. TSS Removal Achieved Using Methods outlined in DEQ Guidance Memo 15-2005 for Meeting Special Condition 7 Requirements. [TSS] = [Proportion of TP Removed] * [Scaled TSS Load] * [TSS Removal Efficiency]

From Virginia Runoff Reduction Spreadsheet (VRRM)
Based on Established Efficiencies and Loading Rates

Nitrogen Removal based on Icarus Forest bank ratio to P of 10.42

Assumed TSS credit provided for purchasing Phosphorus Credits for permit cycles after 2018



Phosphorus Removal Calculations





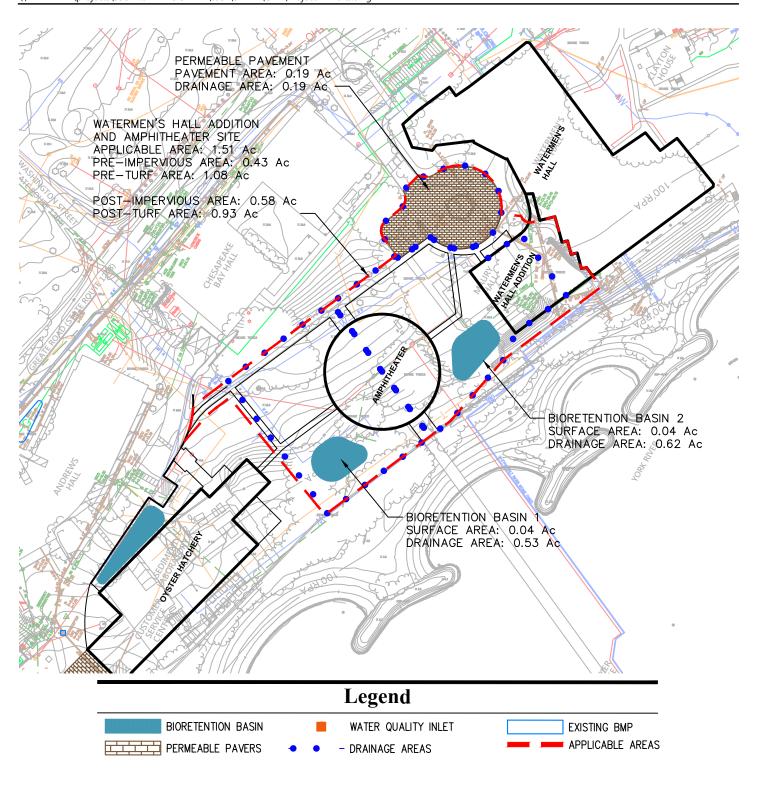
Third Permit Cycle - 2028





Watermen's Hall Addition and Amphitheater









Watermen's Hall Addition and Ampitheter

Permit Cycle: 2018 - 2023 Virginia Institute of Marine Science Stormwater Management Master Plan 2016

| Project Name: | ,,,, | AC CIA/BAD 2010 | - Watermen's Hall | rds and Specifica | | | | data input cells | | | |
|--|---|---|---|--|----------------------|--------------|---|-------------------------------------|----------|--|---------------------------|
| Date: | VIN | | - Watermen's Hall . 0/18/2016 | Addition | | CLEAR | ALL | constant values | | | |
| Date. | | | elopment Project? | No | | | | calculation cells | | | |
| e Information | | | | | | | | final results | | | |
| st-Development Project | (Treatmen | nt Volume a | nd Loads) | | | | | | | | ************************* |
| st-Development Project | (Treatmen | | • | d Area (acres) → | 1.51 | | 5 A A A A A A A A A A A A A A A A A A A | Check: | | | |
| | | | | | | | | cifications List: | | aft Stds & Specs | |
| | | The site's net | | reduction required: ous cover (acres) is: | 20% 0.15 | | Land cover areas en | Linear project? tered correctly? | No ✓ | | |
| | | | | tion for Site (lb/yr): | 0.51 | | | d area entered? | V | | |
| -ReDevelopment Land Cover (acre | | | | | | | | | | | |
| st/Open Space (acres) undisturbed, | A Soils | B Soils | C Soils | D Soils | Totals | 1 | | | | | |
| cted forest/open space or reforested land | 0.00 | | | | 0.00 | | | | | | |
| aged Turf (acres) disturbed, graded for s or other turf to be mowed/managed | 1.08 | | | | 1.08 | | | | | | |
| ervious Cover (acres) | 0.43 | | | | 0.43 | | | | | | |
| | | | | | 1.51 | | 1 | | | | |
| t-Development Land Cover (acres) | | | | | | | | | | | |
| | A Soils | B Soils | C Soils | D Soils | Totals | | | | | | |
| st/Open Space (acres) undisturbed, ected forest/open space or reforested land | 0.00 | | | | 0.00 | | | | | | |
| aged Turf (acres) disturbed, graded for s or other turf to be mowed/managed | 0.93 | | | | 0.93 | | 1 | | | | |
| rvious Cover (acres) | 0.58 | | | | 0.58 | İ | | | | | |
| Area Check | 0.58 OK. | OK. | OK. | OK. | 1.51 | | 1 | | | | |
| | | | | | | | | | | | |
| netante | | | Punoff Cooffi-1 | e (Pu) | | | | | | | |
| nstants ual Rainfall (inches) | 43 | | Runoff Coefficient | A Soils | B Soils | C Soils | D Soils | | | | |
| get Rainfall Event (inches) al Phosphorus (TP) EMC (mg/L) | 1.00 0.26 | | Forest/Open Space Managed Turf | 0.02 0.15 | 0.03 0.20 | 0.04 0.22 | 0.05 0.25 | | | | |
| l Nitrogen (TN) EMC (mg/L) | 1.86 | | Managed Turf Impervious Cover | 0.15 | 0.20 | 0.22 | 0.25 | | | | |
| get TP Load (lb/acre/yr) initless correction factor) | 0.41 | | | | | | | | | | |
| | | OBUEUT. | | | | LAND 00/5 | D OLUMNA DV. D | OOT DEVEL | TOWEN | - | |
| LAND COVER SUMMARY P | RE-REDEVE | LOPMENT | | | | LAND COVE | R SUMMARY PO | OST DEVELO | PMEN | I | |
| Land Cover Sumn | | | | Land Cover Summa | | | Land Cover Sun | . , | | Land Cover Summ | - |
| Pre-ReDevelopment | Listed | Adjusted ¹ | | Post ReDev. & Nev Forest/Open Space Cover | w Impervious | | Post-ReDeve Forest/Open Space | lopment | | Post-Development Ne | w Impervious |
| Forest/Open Space Cover (acres) | 0.00 | 0.00 | | (acres) | 0.00 | | Cover (acres) | 0.00 | | | |
| Weighted Rv(forest) % Forest | 0.00 | 0.00 | | Weighted Rv(forest) % Forest | 0.00 | | Weighted Rv(forest) | 0.00 | | | |
| | | | | % Forest Managed Turf Cover | | | % Forest Managed Turf Cover | | | | |
| Managed Turf Cover (acres) | 1.08 | 0.93 | | (acres) | 0.93 | | (acres) | 0.93 | | | |
| Weighted Rv(turf) | 0.15 | 0.15 | | Weighted Rv (turf) | 0.15 | | Weighted Rv (turf) | 0.15 | | | |
| % Managed Turf | 72% | 68% | | % Managed Turf | 62% | | % Managed Turf | 68% | | | |
| Impervious Cover (acres) | 0.43 | 0.43 | | Impervious Cover (acres) | 0.58 | | ReDev. Impervious Cover | 0.43 | | New Impervious Cover | 0.15 |
| | | | *************************************** | | | | (acres) | | | (acres) | 0.95 |
| Rv(impervious) % Impervious | 0.95 28% | 0.95 32% | | Rv(impervious) % Impervious | 0.95 | | Rv(impervious) % Impervious | 0.95 | | Rv(impervious) | 0.95 |
| Total Site Area (acres) | 1.51 | 1.36 | | Final Site Area (acres) | 1.51 | | Total ReDev. Site Area | 1.36 | | | |
| Site Rv | 0.38 | 0.40 | | Final Post Dev Site Rv | 0.46 | | (acres) ReDev Site Rv | 0.40 | | | |
| Site RV | 0.38 | 0.40 | | Final Post Dev Site RV | 0.46 | | ReDev Site RV | 0.40 | | | |
| Treatment Volume and | d Nutrient Loa | ad | | | | Trea | tment Volume and | Nutrient Loa | t | | |
| Pre-ReDevelopment Treatment Volume | 0.0475 | 0.0457 | | Final Post-Development Treatment Volume | 0.0575 | | Post-ReDevelopment | 0.0457 | | Post-Development Treatment Volume | 0.0119 |
| (acre-ft) | 0.0475 | 0.0437 | | (acre-ft) | | | Treatment Volume (acre-ft) | 0.0457 | | (acre-ft) | |
| (acre-ft) Pre-ReDevelopment Treatment Volume (cubic feet) | 2,071 | 1,989 | | (acre-ft) Final Post-Development Treatment Volume (cubic feet) | 2,507 | | | 1,989 | | Post-Development Treatment Volume (cubic feet) | 517 |
| Pre-ReDevelopment Treatment Volume | | | | Final Post-Development Treatment Volume | | | (acre-ft) Post-ReDevelopment Treatment Volume | | | Post-Development Treatment Volume (cubic | 517 0.33 |
| Pre-ReDevelopment Treatment Volume (cubic feet) Pre-ReDevelopment TP Load | 2,071 | 1,989 | | Final Post-Development Treatment Volume (cubic feet) Final Post- Development TP Load | 2,507 | | Post-ReDevelopment Treatment Volume (cubic feet) Post-ReDevelopment Load (TP) | 1,989 | | Post-Development Treatment Volume (cubic feet) Post-Development TP Load | |
| Pre-ReDevelopment Treatment Volume (cubic feet) Pre-ReDevelopment TP Load (lb/yr) Pre-ReDevelopment TP Load per acre | 2,071 1.30 0.86 | 1,989 | | Final Post-Development Treatment Volume (cubic feet) Final Post- Development TP Load (lib/yr) Final Post- Development TP Load per acre | 2,507 1.57 | | Post-ReDevelopment Treatment Volume (cubic feet) Post-ReDevelopment Load (TP) (lib/yr)* Post-ReDevelopment TP Load per acre | 1,989 | | Post-Development Treatment Volume (cubic feet) Post-Development TP Load | |
| Pre-ReDevelopment Treatment Volume (cubic feet) Pre-ReDevelopment TP Load (ib/yr) Pre-ReDevelopment TP Load per acre (ib/acre/yr) Baseline TP Load (ib/yr) Baseline TP Load (ib/yr) Baseline TP Load (ib/yr) Baseline TP Load (ib/yr) Bul/acre/yr applied to pre-redevelopment area se approposed for new impervious cover. | 2,071 1.30 0.86 dualing pervious land i) | 1,989 1.25 0.92 0.56 | | Final Post-Development Treatment Volume (cubic feet) Final Post- Development TP Load (lib/yr) Final Post- Development TP Load per acre | 2,507 1.57 | | (acre-R) Post-ReDevelopment Treatment Volume (cubic feet) Post-ReDevelopment Load (TP) (lb/yr)* Post-ReDevelopment To Load per acre (lb/acre/yr) Max. Reduction Required (felow Yer- | 1,989 1.25 | | Post-Development Treatment Volume (cubic feet) Post-Development TP Load | |
| Pre-ReDevelopment Treatment Volume (cubic feet) Pre-ReDevelopment TP Load (ib/yr) Pre-ReDevelopment TP Load per acre (Maret/yr) Baseline TP Load (ib/yr) Bu/acre/yr applied to pre-redevelopment area ex proposed for new impervious cover to the company of the cover of the cove | 1.30 0.36 chuding pervious land) d cover (forest/open to creage | 1,989 1.25 0.92 0.56 space or managed (minus acreage of | | Final Post-Development Treatment Volume (cubic feet) Final Post- Development TP Load (lib/yr) Final Post- Development TP Load per acre | 2,507 1.57 | | (acre-ft) Post-ReDevelopment Treatment Volume (cubic feet) Post-ReDevelopment Load (TP) (lb/yr)* Nost-Redevelopment TP Load get acre (lb/acre/yr) Max. Reduction Required (felow Yer- ReDevelopment Load) TP Load Reduction Required for Redeveloped Area | 1,989 1.25 0.92 20% | | Post-Development Treatment Volume (cubic feet) Post-Development TP Load (lb/yr) TP Load Reduction Required for New | 0.33 |
| Pre-ReDevelopment Treatment Volume (cubic feet) Pre-ReDevelopment TP Load (ib/yr) Pre-ReDevelopment TP Load per acre (ib/acre/yr) Baseline TP Load (ib/yr) Lib/acre/yr applied pre-redevelopment are se | 1.30 0.36 chuding pervious land) d cover (forest/open to creage | 1,989 1.25 0.92 0.56 space or managed (minus acreage of | | Final Post-Development (cubic feet) Final Post-Development TP Load (Ib/yr) Final Post-Development TP Load (Ib/yr) Final Post-Development TP Load per sure (Ib/sordyr) | 2,507 1.57 | | (acre-ft) Post-ReDevelopment Treatment Volume (cubic feet) Post-ReDevelopment Load (TP) (lb/yr)* Nost-Redevelopment TP Load get acre (lb/acre/yr) Max. Reduction Required (felow Yer- ReDevelopment Load) TP Load Reduction Required for Redeveloped Area | 1,989 1.25 0.92 20% | | Post-Development Treatment Volume (cubic feet) Post-Development TP Load (lb/yr) TP Load Reduction Required for New | 0.33 |
| Pre-ReDevelopment Treatment Volume (cubic feet) Pre-ReDevelopment TP Load (ib/yr) Pre-ReDevelopment TP Load per acre (ib/arcit/yr) Baseline TP Load (ib/yr) Bal/acrt/yr applied to pre-redevelopment area ex proposed for new impervious cover. Set development and cover muss pervious lond coverage proposed for new impervious cover. Set distribution or equipment and coverage proposed for new impervious covers development and some pervious covers. Set distribution or equipment in the coverage proposed for new impervious covers. | 1.30 0.36 chuding pervious land) d cover (forest/open to creage | 1,989 1.25 0.92 0.56 space or managed (minus acreage of | | Final Post-Development Treatment Volume (cubic feet) Final Post- Development TP Load (lb/yr) Final Post-Development TP Load per acre | 2,507 1.57 1.04 | ite Area | (acre-ft) Post-ReDevelopment Treatment Volume (cubic feet) Post-ReDevelopment Load (TP) (lb/yr)* Nost-Redevelopment TP Load get acre (lb/acre/yr) Max. Reduction Required (felow Yer- ReDevelopment Load) TP Load Reduction Required for Redeveloped Area | 1,989 1.25 0.92 20% | | Post-Development Treatment Volume (cubic feet) Post-Development TP Load (lb/yr) TP Load Reduction Required for New | 0.33 |
| Pre-ReDevelopment Treatment Volume (cubic feet) Pre-ReDevelopment TP Load (lb/yr) Pre-ReDevelopment TP Load per acre (lb/acre/yr) Baseline TP Load (lb/yr) Baseline TP Loa | 1.30 0.36 chuding pervious land) d cover (forest/open to creage | 1,989 1.25 0.92 0.56 space or managed (minus acreage of | | Final Post-Development Treatment Volume (cubic feet) Final Post- Development TP Load (Ib/yr) Final Post-Development TP Load per aire (Ib/see/yr) | 2,507 1.57 1.04 | | (acre-ft) Post-ReDevelopment Treatment Volume (cubic feet) Post-ReDevelopment Load (TP) (lb/yr)* Nost-Redevelopment TP Load get acre (lb/acre/yr) Max. Reduction Required (felow Yer- ReDevelopment Load) TP Load Reduction Required for Redeveloped Area | 1,989 1.25 0.92 20% | | Post-Development Treatment Volume (cubic feet) Post-Development TP Load (lb/yr) TP Load Reduction Required for New | 0.33 |
| Pre-ReDevelopment Treatment Volume (cubic feet) Pre-ReDevelopment TP Load (ib/yr) Pre-ReDevelopment TP Load per acre (ib/arcit/yr) Baseline TP Load (ib/yr) Bal/acrt/yr applied to pre-redevelopment area ex proposed for new impervious cover. Set development and cover muss pervious lond coverage proposed for new impervious cover. Set distribution or equipment and coverage proposed for new impervious covers development and some pervious covers. Set distribution or equipment in the coverage proposed for new impervious covers. | 1.30 0.36 chuding pervious land) d cover (forest/open to creage | 1,989 1.25 0.92 0.56 space or managed (minus acreage of | TP Load | Final Post-Development Treatment Volume (cubic feet) Final Post- Development TP Load (Ib/yr) Final Post-Development TP Load per aire (Ib/see/yr) | 2,507 1.57 1.04 | 0.51 | (acre-ft) Post-ReDevelopment Treatment Volume (cubic feet) Post-ReDevelopment Load (TP) (lb/yr)* Nost-Redevelopment TP Load get acre (lb/acre/yr) Max. Reduction Required (felow Yer- ReDevelopment Load) TP Load Reduction Required for Redeveloped Area | 1,989 1.25 0.92 20% | | Post-Development Treatment Volume (cubic feet) Post-Development TP Load (lb/yr) TP Load Reduction Required for New | 0.33 |

Drainage Area A Land Cover (acres)

| rumage / mea / Lama core. (acres) | | | | | | |
|-----------------------------------|---------|---------|---------|---------|--------|---------------|
| | A Soils | B Soils | C Soils | D Soils | Totals | Land Cover Rv |
| Forest/Open Space (acres) | | | | | 0.00 | 0.00 |
| Managed Turf (acres) | 0.76 | | | | 0.76 | 0.15 |
| Impervious Cover (acres) | 0.58 | | | | 0.58 | 0.95 |
| | | | | Total | 1.34 | |

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr)

1.52

Post Development Treatment Volume in D.A. A (ft³)

2,414

| Stormwater Best Managemen | t Practices | (RR = Run | off Reducti | on) | 1 | T | | | 1 | | | T | Select from dropdown lists |
|---|-----------------------------------|--|--|--|--|--|---|---|--|--|---|--------------------------------------|---------------------------------------|
| Practice | Runoff Reduction Credit (%) | Managed Turf Credit Area (acres) | Impervious Cover Credit Area (acres) | Volume from Upstream Practice (ft ³) | Runoff Reduction (ft ³) | Remaining Runoff Volume (ft ³) | Total BMP Treatment Volume (ft ³) | Phosphorus Removal Efficiency (%) | Phosphorus Load from Upstream Practices (lb) | Untreated Phosphorus Load to Practice (lb) | Phosphorus Removed By Practice (lb) | Remaining Phosphorus Load (lb) | Downstream Practice to be Employed |
| 1. Vegetated Roof (RR) | | | | | | | | | | | | | |
| 1.a. Vegetated Roof #1 (Spec #5) | 45 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 1.b. Vegetated Roof #2 (Spec #5) | 60 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 2. Rooftop Disconnection (RR) | | | | | | | | | | | | | |
| 2.a. Simple Disconnection to A/B Soils (Spec #1) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.b. Simple Disconnection to C/D Soils | 25 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (Spec #1) 2.c. To Soil Amended Filter Path as per | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| specifications (existing C/D soils) (Spec #4) 2.d. To Dry Well or French Drain #1, | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Micro-Infilration #1 (Spec #8) 2.e. To Dry Well or French Drain #2, | | | | | | | | | | | | | |
| Micro-Infiltration #2 (Spec #8) 2.f. To Rain Garden #1, | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Micro-Bioretention #1 (Spec #9) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9) | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.h. To Rainwater Harvesting (Spec #6) | 0 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.i. To Stormwater Planter, Urban Bioretention (Spec #9, Appendix A) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3. Permeable Pavement (RR) | | | | | | | | | | | | | |
| 3.a. Permeable Pavement #1 (Spec #7) | 45 | | 0.19 | 0 | 295 | 360 | 655 | 25 | 0.00 | 0.41 | 0.24 | 0.17 | |
| 3.b. Permeable Pavement #2 (Spec #7) | 75 | | | | 0 | 0 | 0 | 25 | | 0.00 | 0.00 | 0.00 | |
| | | | | | | - | - | | | | | | |
| 4. Grass Channel (RR) | | | | 1 | | | | | | | | 1 | |
| 4.a. Grass Channel A/B Soils (Spec #3) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.b. Grass Channel C/D Soils (Spec #3) | 10 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5. Dry Swale (RR) | | | | | | | | | | | | | |
| 5.a. Dry Swale #1 (Spec #10) | 40 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.b. Dry Swale #2 (Spec #10) | 60 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| | | | | | | | | | | | | | |
| 6. Bioretention (RR) 6.a. Bioretention #1 or Micro-Bioretention #1 or | 40 | 0.70 | 0.00 | | 700 | 4.6== | 4 770 | | 0.00 | | 0.51 | 0.70 | |
| Urban Bioretention (Spec #9) 6.b. Bioretention #2 or Micro-Bioretention #2 | 40 | 0.76 | 0.39 | 0 | 703 | 1,055 | 1,759 | 25 | 0.00 | 1.10 | 0.61 | 0.50 | |
| (Spec #9) | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7. Infiltration (RR) | | | | | | | | | | | | | |
| 7.a. Infiltration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7.b. Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8. Extended Detention Pond (RR) | | | | | | | | | | | | | <u> </u> |
| 8.a. ED #1 (Spec #15) | 0 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| - · /span===/ | | | | | | | | | | | | | |

| Nitrogen Removal Efficiency (%) | Nitrogen Load from Upstream Practices (lbs) | Untreated Nitrogen Load to Practice (lbs) | Nitrogen Removed By Practice (lbs) | Remaining Nitrogen Load (lbs) |
|---------------------------------------|---|---|--|-------------------------------------|
| . Vegetated R | oof (RR) | | | |
| 0 | | 0.00 | 0.00 | 0.00 |
| 0 | | 0.00 | 0.00 | 0.00 |
| | | | | |
| | onnection (RR) | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| | . (22) | | | |
| 3. Permeable P | | 204 | 4.72 | 4.24 |
| 25 | 0.00 | 2.94 | 1.73 | 1.21 |
| 25 | | 0.00 | 0.00 | 0.00 |
| 1. Grass Chann | el (RR) | | | |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| David Completion | ۵) | · | | |
| 5. Dry Swale (R | | 0.00 | 0.00 | 0.00 |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6. Bioretention | (RR) | | | |
| 40 | 0.00 | 7.90 | 5.05 | 2.84 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 Infiltration (I | DP) | | | |
| 7. Infiltration (F | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | 0.00 | |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3. Extended De | tention Pond (RR |) | | |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | | |
|---|----|--|---|---|---|---|---|------|------|------|------|--|
| 9.a. Sheetflow to Conservation Area, A/B Soils (Spec #2) | 75 | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.b. Sheetflow to Conservation Area, C/D Soils (Spec #2) | 50 | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec #2 & #4) | 50 | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |

| 9. Sheetflow to | 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | |
|-----------------|--|------|------|------|--|--|--|--|--|--|--|--|
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | |

TOTAL IMPERVIOUS COVER TREATED (ac) 0.58

TOTAL MANAGED TURF AREA TREATED (ac) 0.76

TOTAL RUNOFF REDUCTION IN D.A. A (ft³) 998

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr) 1.52

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.85

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.67

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

TOTAL RUNOFF REDUCTION IN D.A. A (ft³) 998

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 6.78

SEE WATER QUALITY COMPLIANCE TAB FOR SITE CALCULATIONS (Information Only)

| 10. Wet Swale (no RR) | | | | | | | | | | | | | |
|--|-----|---|---|---|---|----------|---|----|------|------|------|------|---|
| 10.a. Wet Swale #1 (Spec #11) | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 10.b. Wet Swale #2 (Spec #11) | 0 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11. Filtering Practices (no RR) | • | • | • | • | | • | | | • | | | • | |
| 11.a.Filtering Practice #1 (Spec #12) | 0 | | | 0 | 0 | 0 | 0 | 60 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11.b. Filtering Practice #2 (Spec #12) | 0 | | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (0.0 | | | | | | | | | | | | ! | |
| 12. Constructed Wetland (no RR) | | | | | 1 | <u> </u> | | | 1 | | | 1 | T |
| 12.a.Constructed Wetland #1 (Spec #13) | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12.b. Constructed Wetland #2 (Spec #13) | 0 | | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13. Wet Ponds (no RR) | | | | | | | | | | | | | |
| 13.a. Wet Pond #1 (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.b. Wet Pond #1 (Coastal Plain) (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 45 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.c. Wet Pond #2 (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.d. Wet Pond #2 (Coastal Plain) (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14. Manufactured Treatment Devices (no | RR) | | | | | | | | | | | | |
| 14.a. Manufactured Treatment Device- Hydrodynamic | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.b. Manufactured Treatment Device-Filtering | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.c. Manufactured Treatment Device-Generic | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | 10. Wet Swale (C | coastal Plain) (no F | RR) | |
|------------------|------------------|----------------------|------|------|
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| 11. Filtering Pr | actices (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 45 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40.0 | | | | |
| 12. Constructed | Wetland (no RR | | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 55 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13. Wet Ponds | (no BB) | | | |
| 15. Wet Polius | (IIO KK) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | 14. Manufacture | d BMP (no RR) | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |

TOTAL IMPERVIOUS COVER TREATED (ac) 0.58
TOTAL MANAGED TURF AREA TREATED (ac) 0.76

TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr) 0.51

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr) 1.52
TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.00
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.85
TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr) 0.85
TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr) 0.67

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

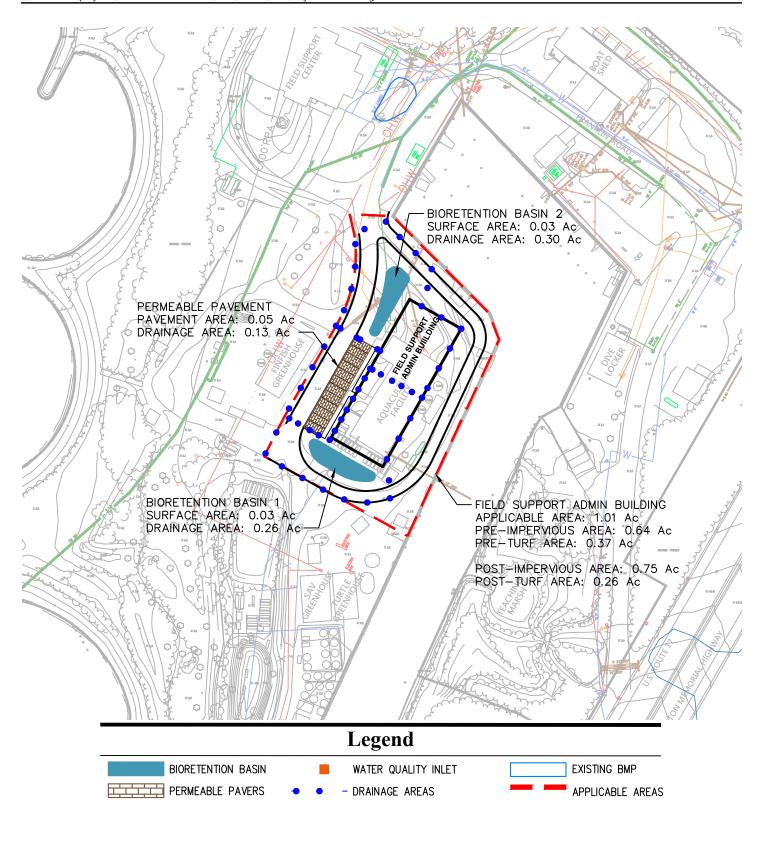
NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.00
TOTAL NITROGEN REMOVED IN D.A. A (lb/yr) 0.00
TOTAL NITROGEN REMOVED IN D.A. A (lb/yr) 0.00

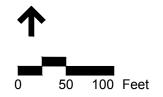
| Site | Results (\ | Water Qualit | y Complian | ce) | | |
|---|---------------|-------------------|------------|--------|--------|------------|
| Area Checks | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | AREA CHECK |
| FOREST/OPEN SPACE (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER (ac) | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER TREATED (ac) | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA (ac) | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA TREATED (ac) | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| AREA CHECK | OK. | OK. | OK. | OK. | OK. | |
| Site Treatment Volume (ft ³) | 2,507 | | | | | |
| Runoff Reduction Volume and TP By Drainage Area | | | | | | |
| | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | TOTAL |
| RUNOFF REDUCTION VOLUME ACHIEVED (ft ³) | 998 | 0 | 0 | 0 | 0 | 998 |
| TP LOAD AVAILABLE FOR REMOVAL (lb/yr) | 1.52 | 0.00 | 0.00 | 0.00 | 0.00 | 1.52 |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.85 |
| TP LOAD REMAINING (lb/yr) | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 6.78 | 0.00 | 0.00 | 0.00 | 0.00 | 6.78 |
| Total Phosphorus | | | | | | |
| FINAL POST-DEVELOPMENT TP LOAD (lb/yr) | 1.57 | | | | | |
| TP LOAD REDUCTION REQUIRED (lb/yr) | 0.51 | | | | | |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.85 | | | | | |
| TP LOAD REMAINING (lb/yr): | 0.73 | | | | | |
| REMAINING TP LOAD REDUCTION REQUIRED (lb/yr): | 0.00 | ** | | | | |
| ** TARGET TP REDUCTION | ON EXCEEDED B | Y 0.34 LB/YEAR ** | | | | |
| Total Nitrogen (For Information Purposes) | | | | | | |
| POST-DEVELOPMENT LOAD (lb/yr) | 11.27 | | | | | |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 6.78 | | | | | |
| REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr) | 4.48 | _ | | | | |
| | | | | | | |
| | | | | | | |



Field Support Admin Building









Field Support Admin Building

Permit Cycle: 2023 - 2028 Virginia Institute of Marine Science Stormwater Management Master Plan 2016

| Project Name: | \/JR.4: | S SWMP 2016 | Field Support Admi | n Ruilding | | | | data input cells | | | |
|--|--|---|---|---|-----------------------------|---------------------|--|--------------------------------------|----------------|--|--------------|
| Date: | VIIVI | 3 SWIVIP 2016 - 1 | 7/18/2016 | n building | | CLEAR | ALL | constant values | | | |
| | | | elopment Project? | No | | | | calculation cells | | | |
| e Information | | | | | | | | final results | | | |
| st-Development Project | (Treatmen | nt Volume a | nd Loads) | | | | | | | | |
| | | | - | d Area (acres) → | 1.01 | | | Check: | | | |
| | | | Maximum | reduction required: | 20% | | | cifications List: Linear project? | 2013 Dra No | aft Stds & Specs | |
| | | The site's net | | ous cover (acres) is: | 0.11 | | Land cover areas en | | √ × | | |
| | | | | tion for Site (lb/yr): | 0.49 | | | d area entered? | √ | | |
| -ReDevelopment Land Cover (acres | | | | | | | | | | | |
| st/Open Space (acres) undisturbed, | A Soils | B Soils | C Soils | D Soils | Totals 0.00 | | | | | | |
| ected forest/open space or reforested land aged Turf (acres) disturbed, graded for | 0.00 | | | | | | | | | | |
| s or other turf to be mowed/managed | 0.37 | | | | 0.37 | | | | | | |
| ervious Cover (acres) | 0.64 | | | | 0.64 | | | | | | |
| | | | | | 1.01 | | | | | | |
| t-Development Land Cover (acres) | | | | | | | | | | | |
| ./2 | A Soils | B Soils | C Soils | D Soils | Totals | | | | | | |
| st/Open Space (acres) undisturbed, cted forest/open space or reforested land | 0.00 | | | | 0.00 | | | | | | |
| aged Turf (acres) disturbed, graded for s or other turf to be mowed/managed | 0.26 | | | | 0.26 | | | | | | |
| ervious Cover (acres) | 0.75 | | | | 0.75 | | | | | | |
| Area Check | OK. | OK. | OK. | OK. | 1.01 | | | | | | |
| | | | | | | | | | | | |
| nstants | | | Runoff Coefficient | s (Rv) | | | | | | | |
| ual Rainfall (inches) | 43 | | | A Soils | B Soils | C Soils | D Soils | | | | |
| get Rainfall Event (inches) al Phosphorus (TP) EMC (mg/L) | 1.00 0.26 | | Forest/Open Space Managed Turf | 0.02 0.15 | 0.03 | 0.04 | 0.05 0.25 | | | | |
| al Nitrogen (TN) EMC (mg/L) get TP Load (lb/acre/yr) | 1.86 0.41 | | Impervious Cover | 0.95 | 0.95 | 0.95 | 0.95 | | | | |
| initless correction factor) | 0.41 | | | | | | | | | | |
| LAND COVER SUMMARY P | RE-REDEVE | OPMENT | | | | LAND COVE | R SUMMARY P | OST DEVELO | PMEN | Т | |
| | | LOT MILIT | | | | LLIND COVE | | | 480038 | | |
| Land Cover Sumn Pre-ReDevelopment | nary-Pre Listed | | | Land Cover Summa Post ReDev. & Ne | | | Land Cover Sun Post-ReDeve | . , | | Land Cover Summ | - |
| | | Adjusted ¹ | | Forest/Open Space Cover | | | Forest/Open Space | | | Post-Development Ne | w impervious |
| Forest/Open Space Cover (acres) | 0.00 | 0.00 | *************************************** | (acres) | 0.00 | | Cover (acres) | 0.00 | | | |
| Weighted Rv(forest) % Forest | 0.00 | 0.00 | | Weighted Rv(forest) % Forest | 0.00 | | Weighted Rv(forest) % Forest | 0.00 | | | |
| Managed Turf Cover (acres) | 0.37 | 0.26 | | Managed Turf Cover | 0.26 | | Managed Turf Cover | 0.26 | | | |
| | | | | (acres) | | | (acres) | | | | |
| Weighted Rv(turf) | 0.15 | 0.15 | | Weighted Rv (turf) | 0.15 | | Weighted Rv (turf) | 0.15 | | | |
| % Managed Turf | 37% | 29% | | % Managed Turf | 26% | | % Managed Turf | 29% | | | |
| Impervious Cover (acres) | 0.64 | 0.64 | | Impervious Cover (acres) | 0.75 | | ReDev. Impervious Cover (acres) | 0.64 | | New Impervious Cover (acres) | 0.11 |
| Rv(impervious) | 0.95 | 0.95 | *************************************** | Rv(impervious) | 0.95 | | Rv(impervious) | 0.95 | | Rv(impervious) | 0.95 |
| % Impervious | 63% | 71% | | % Impervious | 74% | | % Impervious | 71% | | | |
| Total Site Area (acres) | 1.01 | 0.90 | | Final Site Area (acres) | 1.01 | | Total ReDev. Site Area (acres) | 0.90 | | | |
| Site Rv | 0.66 | 0.72 | | Final Post Dev Site Rv | 0.74 | | ReDev Site Rv | 0.72 | | | |
| T | -1 10 -4-14 1 | | | | | T | t | I Mintelle and I am | | | |
| Treatment Volume and | a Nutrient Loa | ad | | | | Trea | tment Volume and | Nutrient Loa | 1 | | |
| Pre-ReDevelopment Treatment Volume (acre-ft) | 0.0553 | 0.0539 | | Final Post-Development Treatment Volume (acre-ft) | 0.0626 | | Post-ReDevelopment Treatment Volume (acre-ft) | 0.0539 | | Post-Development Treatment Volume (acre-ft) | 0.0087 |
| Pre-ReDevelopment Treatment Volume | 2,409 | 2,349 | | Final Post-Development Treatment Volume (cubic feet) | 2,728 | | Post-ReDevelopment Treatment Volume (cubic feet) | 2,349 | | Post-Development Treatment Volume (cubic feet) | 379 |
| (cubic feet) | | | | | | | | | | | |
| (cubic feet) Pre-ReDevelopment TP Load (lb/yr) | 1.51 | 1.48 | | Final Post- Development TP Load (lb/yr) | 1.71 | | Post-ReDevelopment Load (TP) (Ib/yr)* | 1.48 | | Post-Development TP Load (lb/yr) | 0.24 |
| (cubic feet) Pre-ReDevelopment TP Load | 1.51 | 1.48 | | Development TP Load | 1.71 | | Load (TP) | 1.48 | | | 0.24 |
| (cubic feet) Pre-ReDevelopment TP Load (lb/yr) Pre-Rebevelopment TP Load per acre | 1.50 | | | Development TP Load (lb/yr) Final Post-Development TP Load per acre | | | Load (TP) (Ib/yr)* Post-ReDevelopment TP Load per acre | | | | 0.24 |
| (cubic feet) Pre-ReDevelopment TP Load (lb/yr) Pre-ReDevelopment TP Load per acre (lb/acre/yr) Baseline TP Load (lb/yr) 1.50 cluding pervious land c) d cover (forest/open | 0.37 | | Development TP Load (lb/yr) Final Post-Development TP Load per acre | | | Load (TP) (Ib/yr)* Post-ReDevelopment TP Load per acre (Ib/acre/yr) Max. Reduction Required (Below Pre- | 1.64 | | | 0.24 |
| (cubic feet) Pre-ReDevelopment TP Load (ib/yr) Pre-ReDevelopment TP Load per scre (ib/arte/yr) Baseline TP Load (ib/yr) Ba/acre/yr applied to pre-redevelopment area se proposed for new impervious cover to the control of the pre-redevelopment area se company to the cover area of | 1.50 cluding pervious land) d cover (forest/open evelopment acreage | 0.37 one of managed of (minus acreage of | | Development TP Load (lb/yr) Final Post-Development TP Load per acre | | | Load (TP) (lb/yr)* Post-Rebevelopment TP Load per acre (lb/scre/yr) Max. Reduction Required (Below Pre- Rebevelopment Load) TP Load Reduction Required for Redeveloped Area | 20% | | (lb/yr) TP Load Reduction Required for New | |
| (cubic feet) Pre-ReDevelopment TP Load (lb/yr) Pre-ReDevelopment TP Load per are (lb/xre/yr) Baceline TP Load (lb/yr) Baceline TP Load (lb/yr) Bu/acre/yr applied to pre-redevelopment area en proposed for new impervious cover visual cover minus pervious for more perposed for new impervious for more perposed for new impervious cover sted total acreege is consistent with Post-ReDe impervious cover). | 1.50 cluding pervious land) d cover (forest/open evelopment acreage | 0.37 one of managed of (minus acreage of | | Development TP Load (lb/yr) Fruit Post Development TP Load per scre (lb/scrs/yr) | 1.70 | | Load (TP) (lb/yr)* Post-Rebevelopment TP Load per acre (lb/scre/yr) Max. Reduction Required (Below Pre- Rebevelopment Load) TP Load Reduction Required for Redeveloped Area | 20% | | (lb/yr) TP Load Reduction Required for New | |
| (cubic feet) Pre-ReDevelopment TP Load (ib/yr) Pre-ReDevelopment TP Load per acre (ib/arcty/yr) Baseline TP Load (ib/yr) Balacrsfyr applied to pre-redevelopment area ex proposed for new impervious cover acres of the pre-redevelopment area ex proposed for new impervious cover. Set detail acres of the pre-redevelopment area ex proposed for new impervious cover. Set detail acresspe proposed for new impervious covers et detail acresspe proposed for new impervious covers. Set detail acresspe proposed for new impervious covers. In I shows load reduction requirement for new impervious covers. | 1.50 cluding pervious land) d cover (forest/open evelopment acreage | 0.37 one of managed of (minus acreage of | | Development TP Load (lb/yr) Final Post-Development TP Load per acre | 170 | Site Area | Load (TP) (lb/yr)* Post-Rebevelopment TP Load per acre (lb/scre/yr) Max. Reduction Required (Below Pre- Rebevelopment Load) TP Load Reduction Required for Redeveloped Area | 20% | | (lb/yr) TP Load Reduction Required for New | |
| (cubic feet) Pre-ReDevelopment TP Load (lb/yr) Pre-ReDevelopment TP Load per acre (lb/arte/yr) Baseline TP Load (lb/yr) Baylace/yr applied to pre-redevelopment area ex proposed for new impervious cover the proposed for new impervious cover. The dotted acree goes proposed for new impervious cover. The dotted acree goes proposed for new impervious cover. The dotted acree goes proposed for new impervious cover. The dotted acree goes proposed for new impervious cover. Into the proposed for the p | 1.50 cluding pervious land) d cover (forest/open evelopment acreage | 0.37 one of managed of (minus acreage of | TP Load | Development TP Load (Blyr) Fool Park Development TP Load per size (Blysre/yr) Load per size (Blysre/yr) | 1.70 irement for \$ (lb/yr) | 0.49 | Load (TP) (lb/yr)* Post-Rebevelopment TP Load per acre (lb/scre/yr) Max. Reduction Required (Below Pre- Rebevelopment Load) TP Load Reduction Required for Redeveloped Area | 20% | | (lb/yr) TP Load Reduction Required for New | |
| Pre-ReDevelopment TP Load (lb/yr) Pre-ReDevelopment TP Load (lb/yr) Pre-ReDevelopment TP Load (lb/yr) Baseline TP Load (lb/yr) Bu/acrs/yr applied to pre-redevelopment area ex proposed for new impervious cover proposed for new impervious cover. Seted Land Cover Summary: Exted Land Cover Summary: Letted total correage in possed for new impervious cover. Letted total correage is consistent with Post-ReDemerrious cover. Letted total correage is consistent with Post-ReDemerrious cover. Letted total correage is consistent with Post-ReDemerrious cover. | 1.50 cluding pervious land) d cover (forest/open evelopment acreage | 0.37 one of managed of (minus acreage of | TP Load | Development TP Load (lb/yr) Final Proto-Development TP Load per acre (lb/sere/yr) | 1.70 irement for \$ (lb/yr) | 0.49 poses Only) | Load (TP) (lb/yr)* Post-Rebevelopment TP Load per acre (lb/scre/yr) Max. Reduction Required (Below Pre- Rebevelopment Load) TP Load Reduction Required for Redeveloped Area | 20% | | (lb/yr) TP Load Reduction Required for New | |

Drainage Area A Land Cover (acres)

| | A Soils | B Soils | C Soils | D Soils | Totals | Land Cover Rv |
|---------------------------|---------|---------|---------|---------|--------|---------------|
| Forest/Open Space (acres) | | | | | 0.00 | 0.00 |
| Managed Turf (acres) | 0.10 | | | | 0.10 | 0.15 |
| Impervious Cover (acres) | 0.59 | | | | 0.59 | 0.95 |
| | | | | Total | 0.69 | |

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr) 1.31 Post Development Treatment Volume in D.A. A (ft³) 2,089

| Stormwater Best Manageme | nt Practices | s (RR = Run | off Reduction | on) | | | T | | T | T. T. | | T | Select from dropdown lists |
|---|-----------------------------------|--|--|--|--|--|---|---|--|--|---|--------------------------------------|---------------------------------------|
| Practice | Runoff Reduction Credit (%) | Managed Turf Credit Area (acres) | Impervious Cover Credit Area (acres) | Volume from Upstream Practice (ft ³) | Runoff Reduction (ft ³) | Remaining Runoff Volume (ft ³) | Total BMP Treatment Volume (ft ³) | Phosphorus Removal Efficiency (%) | Phosphorus Load from Upstream Practices (lb) | Untreated Phosphorus Load to Practice (lb) | Phosphorus Removed By Practice (lb) | Remaining Phosphorus Load (lb) | Downstream Practice to be Employed |
| 1. Vegetated Roof (RR) | | | | | | | | | | | | | |
| 1.a. Vegetated Roof #1 (Spec #5) | 45 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 1.b. Vegetated Roof #2 (Spec #5) | 60 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 2. Rooftop Disconnection (RR) | | | | | | | | | | | | | |
| 2.a. Simple Disconnection to A/B Soils (Spec #1) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.b. Simple Disconnection to C/D Soils (Spec #1) | 25 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.c. To Soil Amended Filter Path as per specifications (existing C/D soils) (Spec #4) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.d. To Dry Well or French Drain #1, Micro-Infilration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.e. To Dry Well or French Drain #2, | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Micro-Infiltration #2 (Spec #8) 2.f. To Rain Garden #1, | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Micro-Bioretention #1 (Spec #9) 2.g. To Rain Garden #2, | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Micro-Bioretention #2 (Spec #9) 2.h. To Rainwater Harvesting (Spec #6) | 0 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.i. To Stormwater Planter, | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Urban Bioretention (Spec #9, Appendix A) | 40 | | | 0 | 0 | Ŭ | Ŭ | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3. Permeable Pavement (RR) | | | | | | | 1 | | | | | | |
| 3.a. Permeable Pavement #1 (Spec #7) | 45 | | 0.13 | 0 | 202 | 247 | 448 | 25 | 0.00 | 0.28 | 0.17 | 0.12 | |
| 3.b. Permeable Pavement #2 (Spec #7) | 75 | | | | 0 | 0 | 0 | 25 | | 0.00 | 0.00 | 0.00 | |
| 4. Grass Channel (RR) | | | | | | | | | | | | | |
| 4.a. Grass Channel A/B Soils (Spec #3) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.b. Grass Channel C/D Soils (Spec #3) | 10 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5. Dry Swale (RR) | | | | | | | | | | | | | |
| 5.a. Dry Swale #1 (Spec #10) | 40 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.b. Dry Swale #2 (Spec #10) | 60 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6. Bioretention (RR) | | | | | | | | | | | | | |
| 6.a. Bioretention #1 or Micro-Bioretention #1 or | 40 | 0.10 | 0.46 | 0 | 656 | 984 | 1,641 | 25 | 0.00 | 1.03 | 0.57 | 0.46 | |
| Urban Bioretention (Spec #9) 6.b. Bioretention #2 or Micro-Bioretention #2 | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (Spec #9) | | | | | | | - | | | | | | |
| 7. Infiltration (RR) | | | | | | | | | | | | | |
| 7.a. Infiltration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7.b. Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8. Extended Detention Pond (RR) | | | | | | | | | | | | | |
| 8.a. ED #1 (Spec #15) | 0 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8.b. ED #2 (Spec #15) | 15 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |

| Nitrogen Removal iciency (%) | Nitrogen Load from Upstream Practices (lbs) | Untreated Nitrogen Load to Practice (lbs) | Nitrogen Removed By Practice (lbs) | Remaining Nitrogen Load (lbs) |
|------------------------------------|---|---|--|-------------------------------------|
| egetated R | oof (RR) | | | |
| 0 | | 0.00 | 0.00 | 0.00 |
| 0 | | 0.00 | 0.00 | 0.00 |
| oofton Disc | onnection (BB) | | | |
| | onnection (RR) | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| ermeable P | avement (RR) | | | |
| 25 | 0.00 | 2.01 | 1.18 | 0.83 |
| 25 | | 0.00 | 0.00 | 0.00 |
| | | | | |
| rass Chann | | | | |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| ry Swale (R | R) | | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| | () | | | |
| ioretention | | | | 2.55 |
| 40 | 0.00 | 7.37 | 4.71 | 2.65 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| nfiltration (F | RR) | | | |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| vtended De | tention Pond (RR |) | | |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | | |
|---|----|--|---|---|---|---|---|------|------|------|------|--|
| 9.a. Sheetflow to Conservation Area, A/B Soils (Spec #2) | 75 | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.b. Sheetflow to Conservation Area, C/D Soils (Spec #2) | 50 | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec #2 & #4) | 50 | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | |
|--|------|------|------|------|--|--|--|--|--|--|--|
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | |

TOTAL IMPERVIOUS COVER TREATED (ac) 0.59

TOTAL MANAGED TURF AREA TREATED (ac) 0.10

TOTAL RUNOFF REDUCTION IN D.A. A (ft³) 858

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (Ib/yr) 1.31

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 0.73

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 0.58

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

| TOTAL RUNOFF REDUCTION IN D.A. A (ft³) | 858 |
|--|------|
| NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/vr) | 5.90 |

SEE WATER QUALITY COMPLIANCE TAB FOR SITE CALCULATIONS (Information Only)

| 10. Wet Swale (no RR) | | | | | | | | | | | | |
|--|-----|--|---|---|---|---|----|------|------|------|------|--|
| 10.a. Wet Swale #1 (Spec #11) | 0 | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 10.b. Wet Swale #2 (Spec #11) | 0 | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| L1. Filtering Practices (no RR) | | | | | | | | | | | | |
| 11.a.Filtering Practice #1 (Spec #12) | 0 | | 0 | 0 | 0 | 0 | 60 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11.b. Filtering Practice #2 (Spec #12) | 0 | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12. Constructed Wetland (no RR) | | | | | | | | | | | | |
| 12.a.Constructed Wetland #1 (Spec #13) | 0 | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12.b. Constructed Wetland #2 (Spec #13) | 0 | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13. Wet Ponds (no RR) | | | | | | | | | | | | |
| 13.a. Wet Pond #1 (Spec #14) | 0 | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.b. Wet Pond #1 (Coastal Plain) (Spec #14) | 0 | | 0 | 0 | 0 | 0 | 45 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.c. Wet Pond #2 (Spec #14) | 0 | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.d. Wet Pond #2 (Coastal Plain) (Spec #14) | 0 | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14. Manufactured Treatment Devices (no | RR) | | | | | | | | | | | |
| 14.a. Manufactured Treatment Device- Hydrodynamic | 0 | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.b. Manufactured Treatment Device-Filtering | 0 | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.c. Manufactured Treatment Device-Generic | 0 | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | 10. Wet Swale (C | oastal Plain) (no F | RR) | |
|-----------------|------------------|---------------------|------|------|
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11. Filtering P | ractices (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 45 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12. Constructe | d Wetland (no RR |) | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 55 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13. Wet Ponds | (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 14. Manufacture | d BMP (no RR) | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |

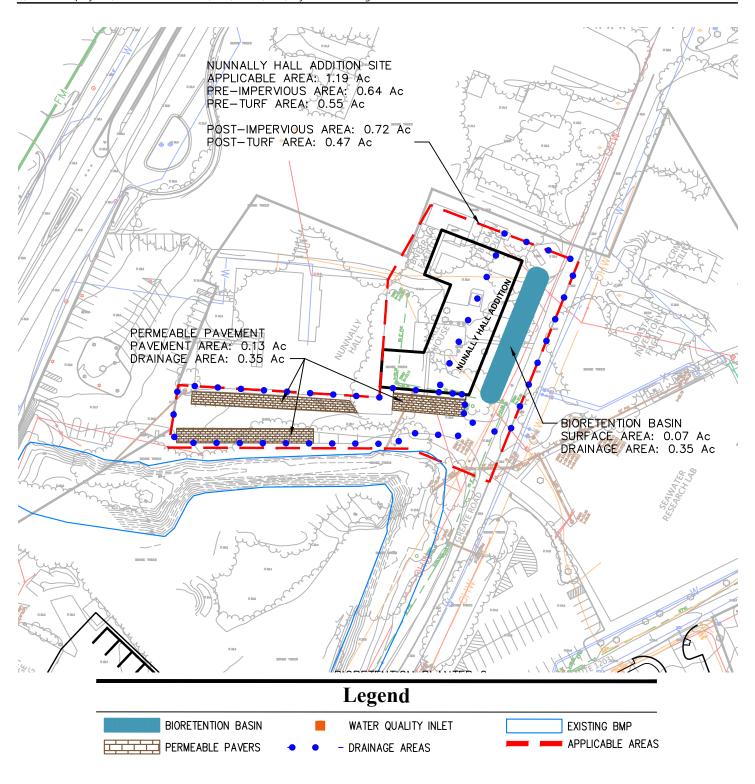
| TOTAL IMPERVIOUS CO | /ER TREATED (ac) | 0.59 | AREA CHECK: OK. | | |
|-----------------------|---------------------|--------------|-------------------|--------------|------|
| TOTAL MANAGED TURF AI | REA TREATED (ac) | 0.10 | AREA CHECK: OK. | | |
| | TOTAL PHOSPH | ORUS REMOV | AL REQUIRED ON | SITE (lb/yr) | 0.49 |
| | TOTAL PHOSPHORUS | AVAILABLE FO | OR REMOVAL IN D. | A. A (lb/yr) | 1.31 |
| TOTAL PHOSPHORUS REMO | VED WITHOUT RUNO | FF REDUCTIO | N PRACTICES IN D. | A. A (lb/yr) | 0.00 |
| TOTAL PHOSPHORUS R | EMOVED WITH RUNO | FF REDUCTIO | N PRACTICES IN D. | A. A (lb/yr) | 0.73 |
| тс | TAL PHOSPHORUS LO | AD REDUCTIO | N ACHIEVED IN D. | A. A (lb/yr) | 0.73 |
| TOTAL PHOSPHORUS REMA | NING AFTER APPLYING | G BMP LOAD | REDUCTIONS IN D. | A. A (lb/yr) | 0.58 |
| SEE WATER QUALITY CO | OMPLIANCE TAB I | FOR SITE C | OMPLIANCE CA | ALCULATIO | vs |
| NITROGEN F | EMOVED WITH RUNO | FF REDUCTIO | N PRACTICES IN D. | A. A (lb/yr) | 5.90 |
| NITROGEN REMO | OVED WITHOUT RUNO | FF REDUCTIO | N PRACTICES IN D. | A. A (lb/yr) | 0.00 |
| | TO | TAL NITROGE | N REMOVED IN D. | A. A (lb/vr) | 5.90 |

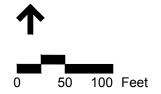
| Area Checks | D.A.A. | D.A.D. | DAG | DAD | D 4 F | ADEA CUEST |
|---|---------------|--------------------|--------|--------|--------|------------|
| | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | AREA CHECK |
| FOREST/OPEN SPACE (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER (ac) | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER TREATED (ac) | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA (ac) | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA TREATED (ac) | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| AREA CHECK | OK. | OK. | OK. | OK. | OK. | |
| Site Treatment Volume (ft ³) | 2,728 | | | | | |
| Runoff Reduction Volume and TP By Drainage Area | | | | | | |
| | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | TOTAL |
| RUNOFF REDUCTION VOLUME ACHIEVED (ft ³) | 858 | 0 | 0 | 0 | 0 | 858 |
| TP LOAD AVAILABLE FOR REMOVAL (lb/yr) | 1.31 | 0.00 | 0.00 | 0.00 | 0.00 | 1.31 |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.73 |
| TP LOAD REMAINING (lb/yr) | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.58 |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 5.90 | 0.00 | 0.00 | 0.00 | 0.00 | 5.90 |
| X - 7 - 7 | | | | | | |
| Total Phosphorus | | | | | | |
| FINAL POST-DEVELOPMENT TP LOAD (lb/yr) | 1.71 | | | | | |
| TP LOAD REDUCTION REQUIRED (lb/yr) | 0.49 | | | | | |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.73 | | | | | |
| TP LOAD REMAINING (lb/yr): | 0.98 | | | | | |
| REMAINING TP LOAD REDUCTION REQUIRED (lb/yr): | 0.00 | ** | | | | |
| ** TARGET TP REDUCTIO | ON EXCEEDED B | 3Y 0.24 LB/YEAR ** | | | | |
| Total Nitrogen (For Information Purposes) | | | | | | |
| POST-DEVELOPMENT LOAD (lb/yr) | 12.26 | | | | | |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 5.90 | | | | | |
| REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr) | 6.36 | | | | | |



Nunnally Hall Addition









Nunnally Hall Addition

Permit Cycle: 2023 - 2028 Virginia Institute of Marine Science Stormwater Management Master Plan 2016

| | DE | Q Virginia Runoj | ff Reduction Metho | od Re-Development | Compliance Sprea | idsheet - Vers | sion 3.0 | | | | |
|--|----------------------|-----------------------|---|--|------------------|---|--|-------------------------------------|---------|--|---|
| 2011 BMP Standards and | Specification | 2013 Dra | ft BMP Standa | rds and Specific | ations | 1 | , | | | | |
| Project Name: | , | | .6 - Nunally Hall Ad | dition | | CLEAR | ALL | data input cells | | | |
| Date: | | | 0/28/2016 | Na | | | | constant values | | | |
| Site Information | | Linear Dev | elopment Project? | No | | | | calculation cells final results | | | |
| Site illiorillation | | | | | | | | linal results | | | |
| Post-Development Project | /Troatmon | t Volume a | nd Loads) | | | | | | | | *************************************** |
| rost-Development Froject | (Treatmen | | • | | | | 5 6 8 8 9 9 9 | | | | |
| | | Ent | er Total Disturbe | d Area (acres) → | 1.19 | | BMP Design Spe | Check: ecifications List: | 2013 Dr | aft Stds & Specs | |
| | | | | reduction required: | | | | Linear project? | | | |
| *************************************** | | | | ious cover (acres) is: tion for Site (lb/yr): | 0.08 0.45 | | Land cover areas en Total disturbe | tered correctly? d area entered? | 1 | | |
| | | | | | | | | | | | |
| Pre-ReDevelopment Land Cover (acre | A Soils | B Soils | C Soils | D Soils | Totals | | Ţ. | | | | |
| Forest/Open Space (acres) undisturbed, | | B 30llS | C Soils | D Soils | 0.00 | | | | | | |
| protected forest/open space or reforested land Managed Turf (acres) disturbed, graded for | 0.00 | | | | 0.55 | | | | | | |
| yards or other turf to be mowed/managed Impervious Cover (acres) | 0.55 | | | | 0.64 | | | | | | |
| impervious cover (acres) | 0.64 | | | | 1.19 | | | | | | |
| | | | | | | | | | | | |
| Post-Development Land Cover (acres) | A Soils | B Soils | C Soils | D Soils | Totals | Ì | | | | | |
| Forest/Open Space (acres) undisturbed, protected forest/open space or reforested land | 0.00 | | | | 0.00 | | | | | | |
| Managed Turf (acres) disturbed, graded for | 0.47 | | | | 0.47 | | | | | | |
| yards or other turf to be mowed/managed Impervious Cover (acres) | 0.47 | | | | 0.72 | | | | | | |
| Area Check | | OK. | OK. | OK. | 1.19 | | | | | | |
| | | | | | | | | | | | |
| Constants | | | Runoff Coefficient | ts (Rv) | | | | | | | |
| Annual Rainfall (inches) Target Rainfall Event (inches) | 43 1.00 | | Forest/Open Space | A Soils 0.02 | B Soils 0.03 | C Soils 0.04 | D Soils 0.05 | | | | |
| Total Phosphorus (TP) EMC (mg/L) | 0.26 1.86 | | Managed Turf | 0.15 0.95 | 0.20 | 0.22 | 0.25 | | | | |
| Total Nitrogen (TN) EMC (mg/L) Target TP Load (lb/acre/yr) | 0.41 | | Impervious Cover | 0.95 | 0.95 | 0.95 | 0.95 | | | | |
| Pj (unitless correction factor) | 0.90 | | | | | | | | | | |
| LAND COVER SUMMARY F | RE-REDEVE | LOPMENT | | | | LAND COVE | R SUMMARY Po | OST DEVELO | PMEN | T | |
| Land Cover Sumn | | 1 | | Land Cover Summ | | | Land Cover Sun | | | Land Cover Sumn | |
| Pre-ReDevelopment | Listed | Adjusted ¹ | | Post ReDev. & Ne Forest/Open Space Cover | | | Post-ReDeve Forest/Open Space | | | Post-Development Ne | w Impervious |
| Forest/Open Space Cover (acres) | 0.00 | 0.00 | *************************************** | (acres) | 0.00 | *************************************** | Cover (acres) | 0.00 | | | |
| Weighted Rv(forest) % Forest | 0.00 | 0.00 | | Weighted Rv(forest) % Forest | 0.00 | | Weighted Rv(forest) % Forest | 0.00 | - | | |
| Managed Turf Cover (acres) | 0.55 | 0.47 | | Managed Turf Cover (acres) | 0.47 | | Managed Turf Cover (acres) | 0.47 | | | |
| Weighted Rv(turf) | 0.15 | 0.15 | | Weighted Rv (turf) | 0.15 | | Weighted Rv (turf) | 0.15 | | | |
| % Managed Turf | 46% | 42% | | % Managed Turf | 39% | | % Managed Turf | 42% | | | |
| Impervious Cover (acres) | 0.64 | 0.64 | | Impervious Cover (acres) | 0.72 | | ReDev. Impervious Cover | 0.64 | | New Impervious Cover | 0.08 |
| | | | | | | | (acres) | | ļ | (acres) | |
| Rv(impervious) % Impervious | 0.95 54% | 0.95 58% | | Rv(impervious) % Impervious | 0.95 61% | | Rv(impervious) % Impervious | 0.95 58% | - | Rv(impervious) | 0.95 |
| Total Site Area (acres) | 1.19 | 1.11 | | Final Site Area (acres) | 1.19 | | Total ReDev. Site Area (acres) | 1.11 | | | |
| Site Rv | 0.58 | 0.61 | | Final Post Dev Site Rv | 0.63 | | ReDev Site Rv | 0.61 | | | |
| Treatment Volume an | d Nutriont Los | nd. | | | | Troa | tment Volume and | Nutriont Loa | d | | |
| rreaunent volume an | d Nutrient Loa | au | | | | IIea | | I NULLIETIC LOA | | | |
| Pre-ReDevelopment Treatment Volume (acre-ft) | 0.0575 | 0.0565 | | Final Post-Development Treatment Volume (acre-ft) | 0.0629 | | Post-ReDevelopment Treatment Volume (acre-ft) | 0.0565 | | Post-Development Treatment Volume (acre-ft) | 0.0063 |
| Pre-ReDevelopment Treatment Volume (cubic feet) | 2,507 | 2,463 | | Final Post-Development Treatment Volume (cubic feet) | 2,739 | | Post-ReDevelopment Treatment Volume (cubic feet) | 2,463 | | Post-Development Treatment Volume (cubic feet) | 276 |
| Pre-ReDevelopment TP Load (lb/yr) | 1.57 | 1.55 | | Final Post- Development TP Load (lb/yr) | 1.72 | | Post-ReDevelopment Load (TP) (lb/yr)* | 1.55 | | Post-Development TP Load (lb/yr) | 0.17 |
| Pre-ReDevelopment TP Load per acre (lb/acre/yr) | 1.32 | 1.39 | | Final Post-Development TP Load per acre (lb/acre/yr) | 1.45 | | Post-ReDevelopment TP Load per acre (lb/acre/yr) | 1.39 | | | |
| Baseline TP Load (lb/yr) (0.41 lbs/acre/yr applied to pre-redevelopment area exproposed for new impervious cove | | 0.46 | | | | | Max. Reduction Required (Below Pre- ReDevelopment Load) | 20% | | | |
| ¹ Adjusted Land Cover Summary: Pre ReDevelopment land cover minus pervious lan turf) acreage proposed for new impervious cover. | d cover (forest/open | space or managed | | | | | TP Load Reduction Required for Redeveloped Area (lb/yr) | 0.31 | | TP Load Reduction Required for New Impervious Area (lb/yr) | 0.14 |
| Adjusted total acreage is consistent with Post-ReD new impervious cover). | evelopment acreage | (minus acreage of | | | | | (10/ 41/ | | | | |
| Column I shows load reduction requriement for ne development load limit, 0.41 lbs/acre/year). | w impervious cover | (based on new | | | | | | | | | |
| | | | | velopment Requ | | | | | | | |
| | | | TP Load | Reduction Required | (lb/yr) | 0.45 | | | | | |
| | | | Ni | trogen Loads (Info | rmational Purp | | | | | | |
| | Pre-ReDevelopme | ent TN Load (lb/yr) | 11.27 | | | Final Post-D (Post-ReDeveloo | evelopment TN Load ment & New Impervious) | 12.31 | | | |
| | | | |] | | | (lb/yr) | -2.31 | | | |

Drainage Area A Land Cover (acres)

8.b. ED #2 (Spec #15)

| · · · · | | | | | | |
|---------------------------|---------|---------|---------|---------|--------|---------------|
| | A Soils | B Soils | C Soils | D Soils | Totals | Land Cover Rv |
| Forest/Open Space (acres) | | | | | 0.00 | 0.00 |
| Managed Turf (acres) | 0.05 | | | | 0.05 | 0.15 |
| Impervious Cover (acres) | 0.70 | | | | 0.70 | 0.95 |
| | | | | Total | 0.75 | |

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr)

1.53

Post Development Treatment Volume in D.A. A (ft³)

2,441

| | | | | Total | 0.75 | | | | Post Developm | ent Treatment Vol | ume in D.A. A (ft³) | 2,441 | |
|---|-----------------------------------|--|--|--|--|--|---|---|--|--|---|--------------------------------------|---------------------------------------|
| Stormwater Best Manageme | nt Practices | s (RR = Run | off Reduction | on) | | | | | | | | | Select from dropdown lists |
| Practice | Runoff Reduction Credit (%) | Managed Turf Credit Area (acres) | Impervious Cover Credit Area (acres) | Volume from Upstream Practice (ft ³) | Runoff Reduction (ft ³) | Remaining Runoff Volume (ft ³) | Total BMP Treatment Volume (ft ³) | Phosphorus Removal Efficiency (%) | Phosphorus Load from Upstream Practices (lb) | Untreated Phosphorus Load to Practice (lb) | Phosphorus Removed By Practice (lb) | Remaining Phosphorus Load (lb) | Downstream Practice to be Employed |
| . Vegetated Roof (RR) | | | | | | | | | | | | | |
| 1.a. Vegetated Roof #1 (Spec #5) | 45 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 1.b. Vegetated Roof #2 (Spec #5) | 60 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 2. Rooftop Disconnection (RR) | | | | | | | | | | | | | |
| 2.a. Simple Disconnection to A/B Soils | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (Spec #1) 2.b. Simple Disconnection to C/D Soils | 25 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (Spec #1) 2.c. To Soil Amended Filter Path as per | 50 | | | 0 | 0 | 0 | 0 | 0 | | | | | |
| specifications (existing C/D soils) (Spec #4) 2.d. To Dry Well or French Drain #1, | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | |
| Micro-Infilration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.e. To Dry Well or French Drain #2, Micro-Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.f. To Rain Garden #1, Micro-Bioretention #1 (Spec #9) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9) | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.h. To Rainwater Harvesting (Spec #6) | 0 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.i. To Stormwater Planter, Urban Bioretention (Spec #9, Appendix A) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3. Permeable Pavement (RR) | | | | | | | | | | | | | |
| 3.a. Permeable Pavement #1 (Spec #7) | 45 | | 0.35 | 0 | 543 | 664 | 1,207 | 25 | 0.00 | 0.76 | 0.45 | 0.31 | |
| 3.b. Permeable Pavement #2 (Spec #7) | 75 | | | | 0 | 0 | 0 | 25 | | 0.00 | 0.00 | 0.00 | |
| I. Grass Channel (RR) | | | | | | | | | | | | | |
| 4.a. Grass Channel A/B Soils (Spec #3) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.b. Grass Channel C/D Soils (Spec #3) | 10 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5. Dry Swale (RR) | | | | | | | | | | | | | |
| 5.a. Dry Swale #1 (Spec #10) | 40 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.b. Dry Swale #2 (Spec #10) | 60 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5. Bioretention (RR) | | | | | | | | | | | | | |
| 6.a. Bioretention #1 or Micro-Bioretention #1 or | 40 | 0.05 | 0.30 | 0 | 425 | 637 | 1,062 | 25 | 0.00 | 0.67 | 0.37 | 0.30 | |
| Urban Bioretention (Spec #9) 6.b. Bioretention #2 or Micro-Bioretention #2 | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (Spec #9) | | | | | | | | | | | | | |
| 7. Infiltration (RR) | F0 | | | | | | 6 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7.a. Infiltration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7.b. Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3. Extended Detention Pond (RR) | | | | | | | | | | | | | |
| 8.a. ED #1 (Spec #15) | 0 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| | | | | | | | | | | | | | |

| Nitrogen Removal Efficiency (%) | Nitrogen Load from Upstream Practices (lbs) | Untreated Nitrogen Load to Practice (lbs) | Nitrogen Removed By Practice (lbs) | Remaining Nitrogen Load (lbs) |
|---------------------------------------|---|---|--|-------------------------------------|
| Vegetated R | oof (RR) | | | |
| 0 | | 0.00 | 0.00 | 0.00 |
| 0 | | 0.00 | 0.00 | 0.00 |
| Roofton Disc | onnection (RR) | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| . Permeable P | avement (RR) | | | |
| 25 | 0.00 | 5.42 | 3.18 | 2.24 |
| 25 | | 0.00 | 0.00 | 0.00 |
| 23 | | 0.00 | 0.00 | 0.00 |
| . Grass Chann | el (RR) | 1 | | |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| . Dry Swale (R | R) | | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2.00 | 0.00 | 0.00 | 0.00 |
| . Bioretention | (RR) | | | |
| 40 | 0.00 | 4.77 | 3.05 | 1.72 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| '. Infiltration (I | RR) | | | |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| . Extended De | tention Pond (RR | (1) | | |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |

0.00

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | | | |
|---|----|--|--|---|---|---|---|---|------|------|------|------|--|
| 9.a. Sheetflow to Conservation Area, A/B Soils (Spec #2) | 75 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.b. Sheetflow to Conservation Area, C/D Soils (Spec #2) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec #2 & #4) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | |
|--|------|------|------|------|--|--|--|--|--|--|
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |

TOTAL IMPERVIOUS COVER TREATED (ac) 0.65

TOTAL MANAGED TURF AREA TREATED (ac) 0.05

TOTAL RUNOFF REDUCTION IN D.A. A (ft³) 968

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (Ib/yr) 1.53

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 0.81

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 0.72

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

| TOTAL RUNOFF REDUCTION IN D.A. A (ft ³) | 968 |
|--|------|
| NITROGEN REMOVED WITH RUNGER REDUCTION PRACTICES IN D.A. A (Ib/yr) | 6.23 |

SEE WATER QUALITY COMPLIANCE TAB FOR SITE CALCULATIONS (Information Only)

| 10. Wet Swale (no RR) | | | | | | | | | | | | | |
|--|---|--|--|---|---|---|---|----|------|------|------|------|--|
| 10.a. Wet Swale #1 (Spec #11) | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 10.b. Wet Swale #2 (Spec #11) | 0 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| L1. Filtering Practices (no RR) | | | | | | | | | | | | | |
| 11.a.Filtering Practice #1 (Spec #12) | 0 | | | 0 | 0 | 0 | 0 | 60 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11.b. Filtering Practice #2 (Spec #12) | 0 | | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2. Constructed Wetland (no RR) | | | | | | | | | | | | | |
| 12.a.Constructed Wetland #1 (Spec #13) | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12.b. Constructed Wetland #2 (Spec #13) | 0 | | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| L3. Wet Ponds (no RR) | | | | | | | | | | | | | |
| 13.a. Wet Pond #1 (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.b. Wet Pond #1 (Coastal Plain) (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 45 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.c. Wet Pond #2 (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.d. Wet Pond #2 (Coastal Plain) (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14. Manufactured Treatment Devices (no RR) | | | | | | | | | | | | | |
| 14.a. Manufactured Treatment Device- Hydrodynamic | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.b. Manufactured Treatment Device-Filtering | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.c. Manufactured Treatment Device-Generic | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | 10 Wet Swale (C | oastal Plain) (no F | DD) | |
|------------------|------------------|---------------------|------|------|
| | | | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11. Filtering Pr | actices (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 45 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12. Constructed | d Wetland (no RR |) | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 55 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13. Wet Ponds | (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 14. Manufacture | d BMP (no RR) | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |

TOTAL IMPERVIOUS COVER TREATED (ac)

TOTAL MANAGED TURF AREA TREATED (ac)

TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (Ib/yr)

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (Ib/yr)

TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (Ib/yr)

TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (Ib/yr)

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

TOTAL NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

TOTAL NITROGEN REMOVED IN D.A. A (Ib/yr)

TOTAL NITROGEN REMOVED IN D.A. A (Ib/yr)

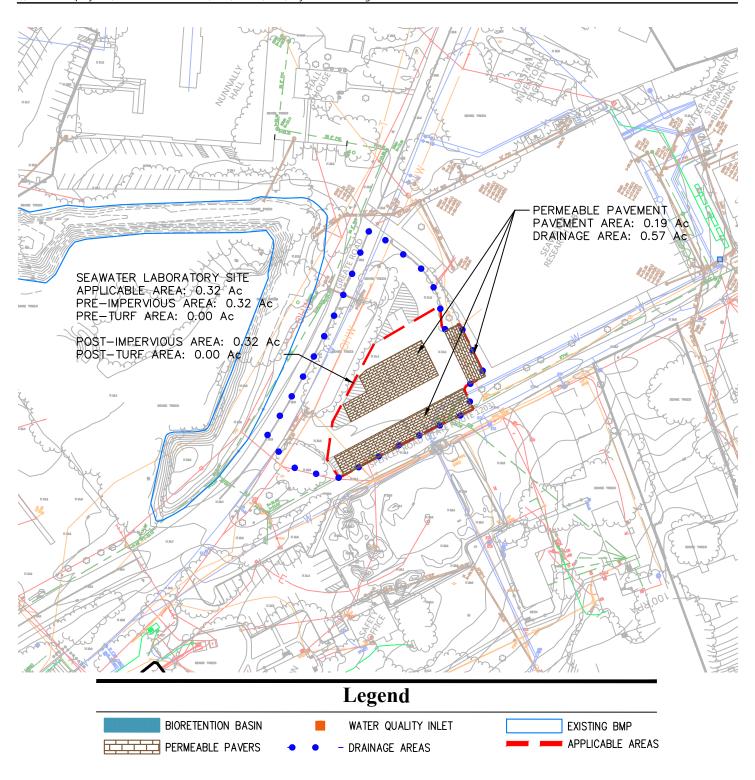
6.23

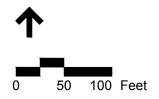
| Area Checks | D.A. A | DA B | DAG | DAD | DAF | ADEA CHECK |
|---|---------------|--------------------|--------|--------|--------|------------|
| | | D.A. B | D.A. C | D.A. D | D.A. E | AREA CHECK |
| FOREST/OPEN SPACE (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER (ac) | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER TREATED (ac) | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA (ac) | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA TREATED (ac) | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| AREA CHECK | OK. | ок. | OK. | OK. | ок. | |
| Site Treatment Volume (ft ³) | 2,739 | | | | | |
| Runoff Reduction Volume and TP By Drainage Area | | | | | | |
| | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | TOTAL |
| RUNOFF REDUCTION VOLUME ACHIEVED (ft ³) | 968 | 0 | 0 | 0 | 0 | 968 |
| TP LOAD AVAILABLE FOR REMOVAL (lb/yr) | 1.53 | 0.00 | 0.00 | 0.00 | 0.00 | 1.53 |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.81 |
| TP LOAD REMAINING (lb/yr) | 0.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.72 |
| | | | | | | |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 6.23 | 0.00 | 0.00 | 0.00 | 0.00 | 6.23 |
| Total Phosphorus | | | | | | |
| FINAL POST-DEVELOPMENT TP LOAD (lb/yr) | 1.72 | | | | | |
| TP LOAD REDUCTION REQUIRED (lb/yr) | 0.45 | | | | | |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.81 | | | | | |
| TP LOAD REMAINING (lb/yr): | 0.91 | | | | | |
| REMAINING TP LOAD REDUCTION REQUIRED (lb/yr): | 0.00 | ** | | | | |
| ** TARGET TP REDUCTION | ON EXCEEDED B | SY 0.36 LB/YEAR ** | | | | |
| Total Nitrogen (For Information Purposes) | | | | | | |
| POST-DEVELOPMENT LOAD (lb/yr) | 12.31 | | | | | |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 6.23 | | | | | |
| REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr) | 6.08 | | | | | |



Seawater Laboratory









Seawater Lab Permeable Pavement

Stormwater Improvement Project Virginia Institute of Marine Science Stormwater Management Master Plan 2016

| re-ReDevelopment Project (T re-ReDevelopment Land Cover (acres) rest/Open Space (acres) undisturbed, overtest freezing-space or referented land anaged Turf (acres) - adsturbed, graded for rids or other turf to be moved/managed or pervious Cover (acres) osst-Development Land Cover (acres) rest/Open Space (acres) undisturbed, otected forest/Open space or referested land anaged Turf (acre) - disturbed, graded for rids or other turf to be moved/managed pervious Cover (acres) Area Check onstants nual Rainfall (inches) reget Rainfall Event (inches) reget Rainfall Event (inches) tall Philosophous (TP) EMC (ing/L) tall Nitrogen (TN) EMC (ing/L) | A Soils 0.00 0.00 0.32 A Soils 0.00 0.00 0.32 0K. 43 1.00 0.26 1.86 0.41 0.90 | 9 Linear Dev | er Total Disturbe Maximum increase in impervi | No No Area (acres) → reduction required: ous cover (acres) is: tion for Site (lb/yr): D Soils D Soils O Soils | 0.32 10% 0 0.07 Totals 0.00 0.32 0.32 0.32 Totals 0.00 0.03 0.32 0.32 | CLEAR | BMP Design Spi Land cover areas en Total disturbed | data input cells constant values calculation cells final results Check: celfications list: Linear project? tered correctly? d area entered? | 2013 Dr No V | off Stds & Specs | |
|--|--|---|--|---|--|--------------|---|--|--------------------|--|--------------|
| re-ReDevelopment Project (T re-ReDevelopment Land Cover (acres) rest/Open Space (acres) - undisturbed, otected forest/open Space (acres) - undisturbed, otected forest/open Space or reforested land anaged Turf (acre) - disturbed, grades for risk or other turf to be mowed/managed appear/ous Cover (acres) still Development Land Cover (acres) still Cover (acres) - undisturbed, otericed forest/open Space (acres) - undisturbed, otericed forest/open Space (acres) - disturbed, grades for risk or other turf to be mowed/managed dispervious Cover (acres) Area Check constants const | A Soils 0.00 0.00 0.32 A Soils 0.00 0.00 0.00 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 EREDEVEL | Linear Dev t Volume a Ent The site's net r Post-Developm B Soils B Soils | elopment Project? Ind Loads) er Total Disturbe Maximum increase in Impervient TP Load Reduct C Soils C Soils OK. Runoff Coefficient Forest/Open Space | d Area (acres) → reduction required: ous cover (acres) is: tition for Site (lb/yr): D Soils D Soils OK. OK. | 10% 0 0.07 Totals 0.00 0.02 0.32 0.32 Totals 0.00 0.00 0.32 0.32 Totals 0.00 0.00 | C Soils | Land cover areas en Total disturbed | final results Check: ecifications List: Linear project? tered correctly? | No ✓ | oft Stds & Specs | |
| e-ReDevelopment Project (T e-ReDevelopment Land Cover (acres) est/Open Space (acres) – undisturbed, tected forest/open space or reforested land and acres of the control | A Soils 0.00 0.00 0.32 A Soils 0.00 0.00 0.00 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 EREDEVEL | Ents The site's net i. Post-Developm B Soils B Soils OK. | er Total Disturbe Maximum increase in impervi ent TP Load Reduce C Soils C Soils C Soils OK. Runoff Coefficient Forest/Open Space | reduction required: ous cover (acres) is: tition for Site (lb/yr): D Soils D Soils OK. OK. | 10% 0 0.07 Totals 0.00 0.02 0.32 0.32 Totals 0.00 0.00 0.32 0.32 Totals 0.00 0.00 | C Soils | Land cover areas en Total disturbed | Check: cifications List: Linear project? tered correctly? | No ✓ | aft Stds & Specs | |
| -ReDevelopment Land Cover (acres) sst/Open Space (acres) - undisturbed, acted forest/open space or reforested land ageed Turi (acres) - disturbed, graded for so or other turit to be moweld/managed ervious Cover (acres) sst-Development Land Cover (acres) sst-Development Land Cover (acres) sst-Open Space (acres) - undisturbed, acted forest/open space or reforested land ageed Turi (acres) - disturbed, graded for so or other turit to be moweld/managed ervious Cover (acres) Area Check Area Check Instants usil Radnafia (inches) er Radnafia (venet) in Hospinous (TP) EMC (mg/L) in Hospinous (TP) EMC (mg/L) LAND COVER SUMMARY - PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted Ref(corest) Weighted Ref(corest) Weighted Ref(corest) | A Soils 0.00 0.00 0.32 A Soils 0.00 0.00 0.00 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 EREDEVEL | Ents The site's net i. Post-Developm B Soils B Soils OK. | er Total Disturbe Maximum increase in impervi ent TP Load Reduce C Soils C Soils C Soils OK. Runoff Coefficient Forest/Open Space | reduction required: ous cover (acres) is: tition for Site (lb/yr): D Soils D Soils OK. OK. | 10% 0 0.07 Totals 0.00 0.02 0.32 0.32 Totals 0.00 0.00 0.32 0.32 Totals 0.00 0.00 | C Soils | Land cover areas en Total disturbed | ecifications List: Linear project? tered correctly? | No ✓ | oft Stds & Specs | |
| -ReDevelopment Land Cover (acres) st/Open Space (acres) - undisturbed, acted forest/Open space or reforested land aced Turing acres - disturbed, graded for so or other turif to be mowed/managed ervious Cover (acres) st/Open Space (acres) - undisturbed, acted forest/Open space or reforested land aged Turi (acres) - disturbed, graded for so or other turif to be mowed/managed ervious Cover (acres) Area Check Area Check ststants all Rainfall (inches) et a fainfall (exent) forest (eng/L) Wrogen (Tipl EMC (eng/L) Wrogen (Tipl EMC (eng/L) LAND COVER SUMMARY PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted Ref(Forest) Veighted Ref(Forest) Veighted Ref(Forest) Veighted Ref(Forest) | A Soils 0.00 0.00 0.32 A Soils 0.00 0.00 0.00 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 EREDEVEL | Ents The site's net i. Post-Developm B Soils B Soils OK. | er Total Disturbe Maximum increase in impervi ent TP Load Reduce C Soils C Soils C Soils OK. Runoff Coefficient Forest/Open Space | reduction required: ous cover (acres) is: tition for Site (lb/yr): D Soils D Soils OK. OK. | 10% 0 0.07 Totals 0.00 0.02 0.32 0.32 Totals 0.00 0.00 0.32 0.32 Totals 0.00 0.00 | C Soils | Land cover areas en Total disturbed | ecifications List: Linear project? tered correctly? | No ✓ | aft Stds & Specs | |
| st/Open Space (acres) — undisturbed, acted forest/Open space or reforested land aged Turf (acres)—disturbed, graded for s or other turf to be mowed/managed envious Cover (acres) — undisturbed, acted forest/Open Space or reforested land aged Turf (acres)—disturbed, graded for s or other turf to be mowed/managed envious Cover (acres) — Area Check Area Check Instanta (inches) — a trainfail (inches | A Soils 0.00 0.00 0.32 A Soils 0.00 0.00 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 -REDEVEL Usted | B Soils B Soils OK. | C Soils C Soils C Soils C Soils C Soils | D Soils D Soils OK. OK. OK. | Totals 0.00 0.07 Totals 0.00 0.00 0.32 0.32 Totals 0.00 0.00 0.32 0.32 Totals 0.00 0.00 | C Soils | Land cover areas en Total disturbed | Linear project? tered correctly? | No ✓ | aft Stds & Specs | |
| st/Open Space (acres) — undisturbed, acted forest/Open space or reforested land aged Turf (acres)—disturbed, graded for s or other turf to be mowed/managed envious Cover (acres) — undisturbed, acted forest/Open Space or reforested land aged Turf (acres)—disturbed, graded for s or other turf to be mowed/managed envious Cover (acres) — Area Check Area Check Instanta (inches) — a trainfail (inches | A Soils 0.00 0.00 0.32 A Soils 0.00 0.00 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 -REDEVEL Usted | B Soils B Soils OK. | C Soils C Soils C Soils C Soils C Soils | D Soils D Soils OK. OK. OK. | Totals 0.00 0.07 Totals 0.00 0.00 0.32 0.32 Totals 0.00 0.00 0.32 0.32 Totals 0.00 0.00 | C Soils | Total disturbed | tered correctly? | ✓ | | |
| Int/Open Space (acres) — undisturbed, ected forest/open space or reforested land ageed Turif (acres)— disturbed, graded for so or other turf to be mowed/managed ervitous cover (acres) Int-Development Land Cover (acres) Area Check Int-Development (inches) Int-Development (| A Soils 0.00 0.00 0.32 A Soils 0.00 0.00 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 -REDEVEL Usted | B Soils B Soils OK. | C Soils C Soils C Soils C Soils C Soils C Soils | D Soils D Soils D Soils OK. Star (Rv) A Soils 0.02 0.15 | 7 totals 0.00 0.00 0.32 0.32 0.32 Totals 0.00 0.00 0.32 0.32 0.33 | C Soils | Total disturbed | | | | |
| est/Open Space (acres) – undisturbed, acted forest/open space or reforested land agaed Turif (acres) – disturbed, graded for so or other turf to be mowed/managed ervitous cover (acres) st-Development Land Cover (acres) est/Open Space (acres) – undisturbed, acted forest/open space or reforested land agaed Turif (acres) – disturbed, graded for so or other turf to be mowed/managed ervitous Cover (acres) Area Check Area Check statants ual Rainfall (inches) est Rainfall Event (inches) et Rainfall (inche) to the turf (inches) et Rainfall (i | 0.00 0.00 0.32 A Soils 0.00 0.00 0.02 0.32 0K. 43 1.00 0.26 1.86 0.41 0.90 | B Soils OK. | C Soils OK. Runoff Coefficient Forest/Open Space | OK. OK. A Soils 0.02 0.15 | 0.00 0.00 0.32 0.32 7otals 0.00 0.00 0.32 0.32 B Soils 0.03 | | | | | | |
| acted forest/open space or reforested land aged Turif (acro.) - disturbed, graded for so or other furt fo be mowed/managed ervious Cover (acres) st-Development Land Cover (acres) st/Open Space (acres) - undisturbed, ected forest/open space or reforested land aged Turif (acro.) - disturbed, graded for so or other turf to be mowed/managed ervious Cover (acres) Area Check Area Check Instants usi Rainfall (inches) et Rainfa | 0.00 0.00 0.32 A Soils 0.00 0.00 0.02 0.32 0K. 43 1.00 0.26 1.86 0.41 0.90 | B Soils OK. | C Soils OK. Runoff Coefficient Forest/Open Space | OK. OK. A Soils 0.02 0.15 | 0.00 0.00 0.32 0.32 7otals 0.00 0.00 0.32 0.32 B Soils 0.03 | | | | | | |
| acted forest/open space or reforested land aged Turif (acro.) - disturbed, graded for so or other furt fo be mowed/managed ervious Cover (acres) st-Development Land Cover (acres) st/Open Space (acres) - undisturbed, ected forest/open space or reforested land aged Turif (acro.) - disturbed, graded for so or other turf to be mowed/managed ervious Cover (acres) Area Check Area Check Instants usi Rainfall (inches) et Rainfa | 0.00 0.32 A Soils 0.00 0.00 0.00 0.02 0.32 0K. 43 1.00 0.26 1.86 0.41 0.90 =-REDEVEL Usted | OK. | OK. Runoff Coefficient Forest/Open Space Managed Turf | OK. IS (RV) A Soils 0.02 0.15 | 0.00 0.32 0.32 Totals 0.00 0.00 0.32 0.32 0.32 | | | | | | |
| so or other turf to be mowed/managed ervlous Cover (acres) st-Development Land Cover (acres) st/Open Space (acres) — undisturbed, exted forest/open space or reforested land anged Turf (acres)—clusturbed, graded for so or other turf to be mowed/managed for so or other turf to be mowed/managed acreal (acres) Area Check Area Check stantats ual Rainfall (inches) get Rainfall Event (inches) get Rainfall Event (inches) get Rainfall Went (mg/L) INTOGEN (TP) EMC (mg/L) LAND COVER SUMMARY — PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted My(forest) % Forest | 0.32 A Soils 0.00 0.00 0.02 0.32 0K. 43 1.00 0.26 1.86 0.41 0.90 E-REDEVEL y-Pre Listed | OK. | OK. Runoff Coefficient Forest/Open Space Managed Turf | OK. IS (RV) A Soils 0.02 0.15 | 0.32 0.32 Totals 0.00 0.00 0.32 0.32 0.32 | | | | | | |
| st-Development Land Cover (acres) est/Open Space (acres) – undisturbed, acted forest/open space or reforested land aged Turif (acres) – disturbed, graded for so or other turf to be mowed/managed ervious Cover (acres) Area Check Area Check sustants usi Rainfall (inches) est Rainfal | A Soils 0.00 0.00 0.02 0.32 0K. 43 1.00 0.26 1.86 0.41 0.90 =-REDEVEL y-Pre Listed | OK. | OK. Runoff Coefficient Forest/Open Space Managed Turf | OK. IS (RV) A Soils 0.02 0.15 | 0.32 Totals 0.00 0.00 0.32 0.32 0.32 B Soils 0.03 | | | | | | |
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| est/Open Space (acres) — undisturbed, acted forest/Open Space (acres) — undisturbed, acted forest/Open space or reforested land anged Turif (acre) — disturbed, graded for so or other turf to be mowed/managed ervious Cover (acres) Area Check Area Check aud Rainfall (inches) est Rainfall Event (inches) est Pload (ind/Eng/L) LAND COVER SUMMARY — PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted fiv/Corest) K Forest | 0.00 0.00 0.32 0K. 43 1.00 0.26 1.86 0.41 0.90 EREDEVEL | OK. | OK. Runoff Coefficient Forest/Open Space Managed Turf | OK. IS (RV) A Soils 0.02 0.15 | 0.00 0.00 0.32 0.32 B Soils 0.03 | | | | | | |
| est/Open Space (acres) — undisturbed, acted forest/Open Space (acres) — undisturbed, acted forest/Open space or reforested land anged Turif (acre) — disturbed, graded for so or other turf to be mowed/managed ervious Cover (acres) Area Check Area Check aud Rainfall (inches) est Rainfall Event (inches) est Pload (ind/Eng/L) LAND COVER SUMMARY — PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted fiv/Corest) K Forest | 0.00 0.00 0.32 0K. 43 1.00 0.26 1.86 0.41 0.90 EREDEVEL | OK. | OK. Runoff Coefficient Forest/Open Space Managed Turf | OK. IS (RV) A Soils 0.02 0.15 | 0.00 0.00 0.32 0.32 B Soils 0.03 | | | | | | |
| aceted forest/open space or reforested land aged Turif (area)—shutzued, graded for so or other turf to be mowed/managed ervious Cover (acres) Area Check Area Check As a Ch | 0.00 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 E-REDEVEL y-Pre Listed | | Runoff Coefficient Forest/Open Space Managed Turf | A Soils 0.02 0.15 | 0.00 0.32 0.32 B Soils 0.03 | | | | | | |
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| Area Check Area Check Area Check Askindia (inches) set Rainfall (inches) set Rainfall Event (inches) in Nitrogen (TN) EMC (ing/L) in Nitrogen (TN) EMC (ing/L) in Nitrogen (TN) EMC (ing/L) LAND COVER SUMMARY — PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted Ry(forest) % Forest | 0.32 OK. 43 1.00 0.26 1.86 0.41 0.90 | | Runoff Coefficient Forest/Open Space Managed Turf | A Soils 0.02 0.15 | 0.32 B Soils 0.03 | | | | | | |
| Area Check Instants usal Rainfall (inches) per Blainfall (inches) LAND COVER SUMMARY — PRE Land Cover Summary Pre-Rebevelopment Forest/Open Space Cover (acres) Weighted fiv(forest) % Forest | 0K. 43 1.00 0.26 1.86 0.41 0.90 E-REDEVEL | | Runoff Coefficient Forest/Open Space Managed Turf | A Soils 0.02 0.15 | 0.32 B Soils 0.03 | | | | | | |
| Instants Justin Rainfail (Inches) Jer Pi Load (Infair) LAND COVER SUMMARY — PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (Lores) Weighted fiv(forest) % Forest | 43 1.00 0.26 1.86 0.41 0.90 E-REDEVEL | | Runoff Coefficient Forest/Open Space Managed Turf | A Soils 0.02 0.15 | B Soils 0.03 | | | | | | |
| usal Rainfall (inches) set Rainfall Event (inches) set Rainfall Event (inches) set Rainfall Event (inches) set Phosphorus (TP) EMC (ing/L) set Norcepar (TN) EMC (ing/L) set Phoso (lip/set/yr) intitles correction factor) LAND COVER SUMMARY — PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted Rv(forest) % Forest | 1.00 0.26 1.86 0.41 0.90 E-REDEVEL | | Forest/Open Space Managed Turf | A Soils 0.02 0.15 | 0.03 | | | | | | |
| usal Rainfall (inches) set Rainfall Event (inches) set Rainfall Event (inches) set Rainfall Event (inches) set Phosphorus (TP) EMC (ing/L) set Norcepar (TN) EMC (ing/L) set Phoso (lip/set/yr) intitles correction factor) LAND COVER SUMMARY — PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted Rv(forest) % Forest | 1.00 0.26 1.86 0.41 0.90 E-REDEVEL | | Forest/Open Space Managed Turf | A Soils 0.02 0.15 | 0.03 | | | | | | |
| get Rainfall Event (inches) al Photopionus (TP McC (mg/L) al Nitrogen (TN) EMC (mg/L) al Nitrogen (TN) EMC (mg/L) get TP Load (libcarrylr) unviless correction factor) LAND COVER SUMMARY — PRE Land Cover Summary Pre-Rebevelopment Forest/Open Space Cover (ares) Weighted Nylorest) % Forest | 1.00 0.26 1.86 0.41 0.90 E-REDEVEL | OPMENT | Managed Turf | 0.02 0.15 | 0.03 | | D Soils | | | | |
| al Nitrogen (TN) EMC (mg/L) get F1 Load (lib/care/yr) unitless correction factor) LAND COVER SUMMARY PRE Land Cover Summary Pre-Rebevelopment Forest/Open Space Cover (acres) Weighted Ry(forest) % Forest | 1.86 0.41 0.90 =-REDEVEL y-Pre | OPMENT | | | 0.20 | | 0.05 | | | | |
| get TP Load (lip/acre/yr) unitless correction factor) LAND COVER SUMMARY PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted fix/forest) % Forest | 0.90 -REDEVEL y-Pre Listed | OPMENT | | 0.55 | 0.95 | 0.22 0.95 | 0.25 0.95 | | | | |
| LAND COVER SUMMARY — PRE Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted Ry(forest) Worset | y-Pre Listed | OPMENT | | | | | | | | | |
| Land Cover Summary Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted Rylforest) % Forest | y-Pre Listed | OPMENT | | | | | | | | *************************************** | |
| Pre-ReDevelopment Forest/Open Space Cover (acres) Weighted Rv(forest) % Forest | Listed | | | | | LAND COVE | R SUMMARY PO | OST DEVELO | PMEN | T | |
| Forest/Open Space Cover (acres) Weighted Rv(forest) % Forest | | | | Land Cover Summa | ry-Post (Final) | | Land Cover Sun | nmary-Post | | Land Cover Summ | nary-Post |
| Weighted Rv(forest) % Forest | 0.00 | Adjusted ¹ | | Post ReDev. & Nev | | | Post-ReDeve | lopment | | Post-Development Ne | w Impervious |
| % Forest | | 0.00 | | Forest/Open Space Cover (acres) | 0.00 | | Forest/Open Space Cover (acres) | 0.00 | | | |
| | 0.00 | 0.00 | *************************************** | Weighted Rv(forest) | 0.00 | | Weighted Rv(forest) | 0.00 | | | |
| Managed Turf Cover (acres) | 0% | 0% | | % Forest | 0% | | % Forest | 0% | | | |
| | 0.00 | 0.00 | | Managed Turf Cover (acres) | 0.00 | | Managed Turf Cover (acres) | 0.00 | | | |
| Weighted Rv(turf) | 0.00 | 0.00 | | Weighted Rv (turf) | 0.00 | | Weighted Rv (turf) | 0.00 | | | |
| % Managed Turf | 0% | 0% | | % Managed Turf | 0% | | % Managed Turf | 0% | | | |
| | | | | | | | ReDev. Impervious Cover | | | New Impervious Cover | 0.00 |
| Impervious Cover (acres) | 0.32 | 0.32 | | Impervious Cover (acres) | 0.32 | | (acres) | 0.32 | | (acres) | 0.00 |
| Rv(impervious) | 0.95 | 0.95 | | Rv(impervious) | 0.95 | | Rv(impervious) | 0.95 | | Rv(impervious) | - |
| % Impervious | 100% | 100% | | % Impervious | 100% | | % Impervious | 100% | | | |
| Total Site Area (acres) | 0.32 | 0.32 | | Final Site Area (acres) | 0.32 | | Total ReDev. Site Area (acres) | 0.32 | | | |
| Site Rv | 0.95 | 0.95 | | Final Post Dev Site Rv | 0.95 | | ReDev Site Rv | 0.95 | | | |
| Treatment Volume and N | Nutrient Load | d | | | | Trea | tment Volume and | Nutrient Loa | d | | |
| Pre-ReDevelopment Treatment Volume (acre-ft) | 0.0253 | 0.0253 | | Final Post-Development Treatment Volume | 0.0253 | | Post-ReDevelopment Treatment Volume | 0.0253 | | Post-Development Treatment Volume | _ |
| (actent) | | | | (acre-ft) | | | (acre-ft) | | | (acre-ft) | |
| Pre-ReDevelopment Treatment Volume (cubic feet) | 1,104 | 1,104 | | Final Post-Development Treatment Volume (cubic feet) | 1,104 | | Post-ReDevelopment Treatment Volume (cubic feet) | 1,104 | | Post-Development Treatment Volume (cubic feet) | - |
| Pre-ReDevelopment TP Load | | | | Final Post- | | | Post-ReDevelopment | | | Post-Development TP Load | |
| (lb/yr) | 0.69 | 0.69 | | Development TP Load (lb/yr) | 0.69 | | Load (TP) (lb/yr)* | 0.69 | | (lb/yr) | - |
| Pre-ReDevelopment TP Load per acre (lb/acre/yr) | 2.17 | 2.17 | | Final Post-Development TP Load per acre (lb/acre/yr) | 2.17 | | Post-ReDevelopment TP Load per acre (lb/acre/yr) | 2.17 | | | |
| Baseline TP Load (lb/yr) 41 lbs/acre/yr applied to pre-redevelopment area excludin proposed for new impervious cover) | ling pervious land | 0.13 | | | | | Max. Reduction Required (Below Pre- ReDevelopment Load) | 10% | | | |
| djusted Land Cover Summary: ReDevelopment land cover minus pervious land cov | was (forest lanen s | rages or managed | | | | | TP Load Reduction Required for | | | TP Load Reduction | 0 |
| acreage proposed for new impervious cover. In the contract of | | | | | | | Redeveloped Area (lb/yr) | 0.07 | | Required for New Impervious Area (lb/yr) | Ü |
| impervious cover). Imn I shows load reduction requriement for new im, | | | | | | | | | | | |
| elopment load limit, 0.41 lbs/acre/year). | | | Post-Dev | velopment Requi | irement for S | ite Area | | | | | |
| | | | | Reduction Required | | 0.07 | | | | | |
| | | | | | | | | | | | |
| | | | Ni | trogen Loads (Info | mational Purp | oses Only) | | | | | |
| | | | | | | | evelopment TN Load | | | | |

Drainage Area A Land Cover (acres)

| | A Soils | B Soils | C Soils | D Soils | Totals | Land Cover Rv |
|---------------------------|---------|---------|---------|---------|--------|---------------|
| Forest/Open Space (acres) | | | | | 0.00 | 0.00 |
| Managed Turf (acres) | 0.00 | | | | 0.00 | 0.00 |
| Impervious Cover (acres) | 0.57 | | | | 0.57 | 0.95 |
| | | | | Total | 0.57 | |

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr)

1.24

Dot Davids most Treatment Volume in D.A. A (ls²)

1.966

| | | | | Total | 0.57 | | ı | | | ent Treatment Vol | | 1,966 | |
|--|-----------------------------------|--|--|--|--|--|---|---|--|--|---|--------------------------------------|----------------------------|
| Stormwater Best Manageme | nt Practices | (RR = Run | off Reduction | on) | | | | | | | | | Select from dropdown lists |
| Practice | Runoff Reduction Credit (%) | Managed Turf Credit Area (acres) | Impervious Cover Credit Area (acres) | Volume from Upstream Practice (ft ³) | Runoff Reduction (ft ³) | Remaining Runoff Volume (ft ³) | Total BMP Treatment Volume (ft ³) | Phosphorus Removal Efficiency (%) | Phosphorus Load from Upstream Practices (lb) | Untreated Phosphorus Load to Practice (lb) | Phosphorus Removed By Practice (lb) | Remaining Phosphorus Load (lb) | Downstream Practice to be |
| 1. Vegetated Roof (RR) | II | | | | | 1 | 1 | ı | | | | | |
| 1.a. Vegetated Roof #1 (Spec #5) | 45 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 1.b. Vegetated Roof #2 (Spec #5) | 60 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 2. Rooftop Disconnection (RR) | | | | | | | | | | | | | |
| 2.a. Simple Disconnection to A/B Soils (Spec #1) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.b. Simple Disconnection to C/D Soils (Spec #1) | 25 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.c. To Soil Amended Filter Path as per specifications (existing C/D soils) (Spec #4) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.d. To Dry Well or French Drain #1, Micro-Infilration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.e. To Dry Well or French Drain #2, Micro-Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.f. To Rain Garden #1, Micro-Bioretention #1 (Spec #9) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9) | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.h. To Rainwater Harvesting (Spec #6) | 0 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.i. To Stormwater Planter, Urban Bioretention (Spec #9, Appendix A) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3. Permeable Pavement (RR) | | | | | | | | | | | | | |
| 3.a. Permeable Pavement #1 (Spec #7) | 45 | | 0.57 | 0 | 885 | 1,081 | 1,966 | 25 | 0.00 | 1.23 | 0.72 | 0.51 | |
| 3.b. Permeable Pavement #2 (Spec #7) | 75 | | | | 0 | 0 | 0 | 25 | | 0.00 | 0.00 | 0.00 | |
| 4. Grass Channel (RR) | | | | | | | | | | | | | |
| 4.a. Grass Channel A/B Soils (Spec #3) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.b. Grass Channel C/D Soils (Spec #3) | 10 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5. Dry Swale (RR) | | | | | | | | | | | | | |
| 5.a. Dry Swale #1 (Spec #10) | 40 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.b. Dry Swale #2 (Spec #10) | 60 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6. Bioretention (RR) | | | | | | | | | | | | | |
| 6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9) | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7. Infiltration (RR) | | | | | | | | | | | | | |
| 7.a. Infiltration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7.b. Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8. Extended Detention Pond (RR) | | | | | | | | | | | | | |
| 8.a. ED #1 (Spec #15) | 0 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8.b. ED #2 (Spec #15) | 15 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |

| Nitrogen Removal Efficiency (%) | Nitrogen Load from Upstream Practices (lbs) | Untreated Nitrogen Load to Practice (lbs) | Nitrogen Removed By Practice (lbs) | Remaining Nitrogen Load (lbs) |
|---------------------------------------|---|---|--|-------------------------------------|
| . Vegetated Ro | oof (RR) | | | |
| 0 | | 0.00 | 0.00 | 0.00 |
| 0 | | 0.00 | 0.00 | 0.00 |
| . Rooftop Disc | onnection (RR) | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| . Permeable P | avement (RR) | | | |
| 25 | 0.00 | 8.83 | 5.18 | 3.64 |
| 25 | | 0.00 | 0.00 | 0.00 |
| . Grass Chann | el (RR) | | | |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| . Dry Swale (R | R) | | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| . Bioretention | (RR) | | | |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| La Character de | 201 | | | |
| . Infiltration (F | | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |

8. Extended Detention Pond (RR)

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | | | |
|---|----|--|--|---|---|---|---|---|------|------|------|------|--|
| 9.a. Sheetflow to Conservation Area, A/B Soils (Spec #2) | 75 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.b. Sheetflow to Conservation Area, C/D Soils (Spec #2) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec #2 & #4) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | |
|--|------|------|------|------|--|--|--|--|--|--|
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |

TOTAL IMPERVIOUS COVER TREATED (ac) 0.57

TOTAL MANAGED TURF AREA TREATED (ac) 0.00

TOTAL RUNOFF REDUCTION IN D.A. A (ft³) 885

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (Ib/yr)

1.24

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

0.51

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

| TOTAL RUNOFF REDUCTION IN D.A. A (ft ³) | 885 |
|--|------|
| NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) | 5.18 |

SEE WATER QUALITY COMPLIANCE TAB FOR SITE CALCULATIONS (Information Only)

| 10. Wet Swale (no RR) | | | | | | | | | | | | | |
|--|-----|--|---|---|---|---|---|----|------|------|------|------|--|
| 10.a. Wet Swale #1 (Spec #11) | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 10.b. Wet Swale #2 (Spec #11) | 0 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1. Filtering Practices (no RR) | | | | | | | | | | | | | |
| 11.a.Filtering Practice #1 (Spec #12) | 0 | | | 0 | 0 | 0 | 0 | 60 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11.b. Filtering Practice #2 (Spec #12) | 0 | | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12. Constructed Wetland (no RR) | | | | | | | | | | | | | |
| 12.a.Constructed Wetland #1 (Spec #13) | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12.b. Constructed Wetland #2 (Spec #13) | 0 | | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13. Wet Ponds (no RR) | | | • | | | | | | | | | | |
| 13.a. Wet Pond #1 (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.b. Wet Pond #1 (Coastal Plain) (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 45 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.c. Wet Pond #2 (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.d. Wet Pond #2 (Coastal Plain) (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14. Manufactured Treatment Devices (no | RR) | | | | | | | | | | | | |
| 14.a. Manufactured Treatment Device- Hydrodynamic | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.b. Manufactured Treatment Device-Filtering | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.c. Manufactured Treatment Device-Generic | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | 10. Wet Swale (C | Coastal Plain) (no F | RR) | | | | | | |
|------------------------------|------------------|----------------------|------|------|--|--|--|--|--|
| 25 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 11. Filtering Pr | actices (no RR) | | | | | | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 45 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 12. Constructed | d Wetland (no RR |) | | | | | | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 55 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 13. Wet Ponds | (no RR) | | | | | | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 14. Manufactured BMP (no RR) | | | | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |

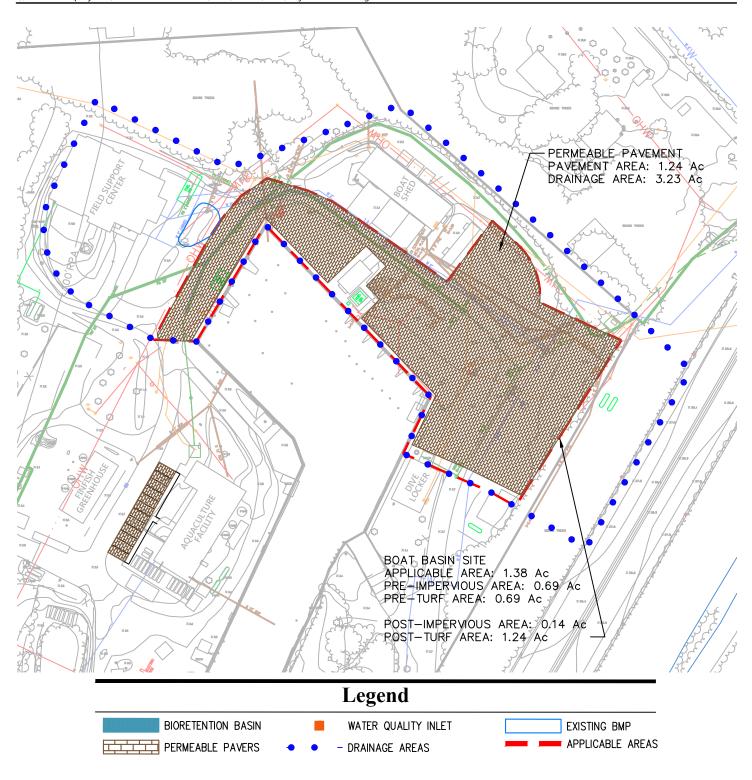
| TOTAL IMPERVIOUS COVER TREATED (ac) 0.57 AREA CHECK: OK. |
|--|
| TOTAL MANAGED TURF AREA TREATED (ac) 0.00 AREA CHECK: OK. |
| TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr) 0.12 |
| TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (Ib/yr) 1.24 |
| TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 0.00 |
| TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 0.72 |
| TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (Ib/yr) 0.72 |
| TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr) 0.51 |
| SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS |
| NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 5.18 |
| NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.00 |
| TOTAL NITROGEN REMOVED IN D.A. A (lb/yr) 5.18 |

| Area Checks | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | AREA CHECK |
|---|--------------------|-------------------------------|---------------|--------|--------|------------|
| <u></u> | | | | | | |
| FOREST/OPEN SPACE (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER (ac) | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER TREATED (ac) | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA TREATED (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| AREA CHECK | OK. | OK. | OK. | OK. | OK. | |
| Site Treatment Volume (ft ³) | 1,966 | | | | | |
| Runoff Reduction Volume and TP By Drainage Area | | | | | | |
| | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | TOTAL |
| RUNOFF REDUCTION VOLUME ACHIEVED (ft ³) | 885 | 0 | 0 | 0 | 0 | 885 |
| TP LOAD AVAILABLE FOR REMOVAL (lb/yr) | 1.24 | 0.00 | 0.00 | 0.00 | 0.00 | 1.24 |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.72 |
| TP LOAD REMAINING (lb/yr) | 0.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.51 |
| NITROGEN LOAD REDUCTION ACHIEVED (Ib/yr) | 5.18 | 0.00 | 0.00 | 0.00 | 0.00 | 5.18 |
| (377) | | | | | | |
| Total Phosphorus | | | | | | |
| FINAL POST-DEVELOPMENT TP LOAD (lb/yr) | -1.24- | | te Data Sheet | | | |
| TP LOAD REDUCTION REQUIRED (lb/yr) | -0.12- | 0.07 (See Si | te Data Sheet |) | | |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.72 | | | | | |
| TP LOAD REMAINING (lb/yr): | -0.51 - | -0.03 | | | | |
| REMAINING TP LOAD REDUCTION REQUIRED (lb/yr): | 0.00 | ** | | | | |
| ** TARGET TP REDUCT | ION EXCEEDED | B Y 0.6 LB/YEAR ** | | | | |
| Total Nitrogen (For Information Purposes) | | | | | | |
| POST-DEVELOPMENT LOAD (lb/yr) | 8.84 | | | | | |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 5.18 | | | | | |
| REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr) | 3.65 | | | | | |



Boat Basin









Boat Basin Permeable Pavement

Stormwater Improvement Project Virginia Institute of Marine Science Stormwater Management Master Plan 2016

| The Information Dear Development Project (Treatment Volume and Loads) Inter Total Districtor Area (cored.) ** Dear Development Project (Treatment Volume and Loads) Inter Total Districtor Area (cored.) ** Dear Development Project (Treatment Volume and Loads) Inter Total Districtor Area (cored.) ** Dear Development Project (Treatment Volume and Loads) Inter Total Districtor Area (cored.) ** Dear Development Project (Treatment Volume and Loads) Inter Total Districtor Area (cored.) ** Dear Development Project (Treatment Volume and Loads) Inter Total Districtor Area (cored.) ** Dear Development Lind Cored (cored.) ** Dear Development L | 2011 BMP Standards and S | | | | | ations | | | 4.4.4 | | | |
|--|---|-----------------------------|-----------------------|---|---|---|------------------|---|-------------------|------|---|--------------|
| The Information Inter-Continuent Project Treatment Volume and Loads Inter-Continuent Project | | VIMS | | | able Pavers | | CLEAR | ALL | data input cells | | | |
| Set Development Project (Freshment Volume and Loads) | Date: | | | | No | | | | | | | |
| Enter rotal Disturbed Arts (prots) 13 | te Information | | Linear Dev | elopment Project? | NO | | | | | | | |
| Exert Full Disturbed Area (process) 1 | | | | | *********************** | | | | | | | |
| Mail | st-Development Project | (Treatmen | | | d Area (ncres) → | 1 20 | | | Check: | | | |
| Part | | | Line | | | | | | cifications List: | | aft Stds & Specs | |
| Microsing point Land Cover Covers | | | | | | | | | | | | |
| March Marc | | | | | | | | | | | *************************************** | |
| March Marc | -ReDevelopment Land Cover (acre | e) | | | | | | | | | | |
| Continued Cont | | | B Soils | C Soils | D Soils | Totals | | | | | | |
| Comment Comm | cted forest/open space or reforested land | 0.00 | | | | 0.00 | | | | | | |
| Contribution Land Cover (prove) Cover (pro | | 0.69 | | | | 0.69 | | | | | | |
| Separation Sep | rvious Cover (acres) | 0.69 | | | | 0.69 | | | | | | |
| | | | | | | 1.38 | | | | | | |
| | t-Development Land Cover (acres) | | | | | | | | | | | |
| Continued and Continued Co | | A Soils | B Soils | C Soils | D Soils | Totals | | | | | | |
| See March See Se | cted forest/open space or reforested land | 0.00 | | | | 0.00 | | | | | | |
| Activation Continues Con | aged Turf (acres) disturbed, graded for | 0.14 | | | | 0.14 | | | | | | |
| Recel Check Sc. DK. DK. DK. DK. DK. DK. DK. DK. DK. DK | | | | | | 1.24 | | | | | | |
| International 1 | Area Check | | OK. | OK. | OK. | 1.38 | | | | | | |
| International 1 | | | | | | | | | | | | |
| In the filt of price price 1.00 | | 42 | | Runoff Coefficient | | 0.0-7- | | D.C-7- | | | | |
| President of the Control | et Rainfall Event (inches) | 1.00 | | | 0.02 | 0.03 | 0.04 | 0.05 | | | | |
| AND COVER SUMMARY — POST DEVELOPMENT Land Cover Summary Pre- Land Cov | | 0.26 | | Managed Turf Impervious Cover | 0.15 | 0.20 | | 0.25 | | | | |
| LAND COVER SUMMARY — PRE-REDEVELOPMENT Lord Cover Summary Peer (Presi) Red Soborologoment (Lord Cover Summary Peer (Presi) Peer Red Cover Summary Peer (Presi) Responded Cover (Presi) | et TP Load (lb/acre/yr) | 0.41 | | , | 2.33 | 2.33 | | | | | | |
| Land Cover Sommony-Pres | | | | | *************************************** | *************************************** | | | | | | |
| Presidencing Description | LAND COVER SUMMARY P | RE-REDEVEL | OPMENT | | | | LAND COVE | R SUMMARY PO | OST DEVELO | PMEN | T | |
| | | nary-Pre | | | | | | Land Cover Sun | nmary-Post | | Land Cover Summ | nary-Post |
| Wedgeto further 0.00 0.0 | Pre-ReDevelopment | Listed | Adjusted ¹ | | | w Impervious | | | lopment | | Post-Development Ne | w Impervious |
| S. Forest | | | | *************************************** | (acres) | | | Cover (acres) | | | | |
| Managed Fur Cover (series) Weighted Righty 0.15 | | | | | | | | | | - | | |
| Weighted Pribury 0.15 | | | | | Managed Turf Cover | | | Managed Turf Cover | | | | |
| Instruction Core force) 0.69 0.69 Imperiod Core (cere) 1.24 Instruction Core (cere) 0.69 Imperiod Core (cere) 0.69 Imperio | | | | | | | | | | | | |
| Impervious Cover (scree) Bright-pervious) Bright-pervious (server (server)) Bright-pervious) Bright-pervious (server (server)) Bright-pervious (server) Bright-pervious | | | | | | | | | | | | |
| Pre-BioDevelopment Treatment Volume and Nutrient Load Treatment V | % Managed Turf | 50% | 1/% | | % Managed Turf | 10% | | | 1/% | - | | |
| Total Site Area (cores) 1.38 | Impervious Cover (acres) | 0.69 | 0.69 | | Impervious Cover (acres) | 1.24 | | (acres) | 0.69 | | (acres) | 0.55 |
| Total Site Area (seres) Site N OSS OSS OSS OSS Treatment Volume and Nutrient Load Treatment Volume and Nutrient Load Fine Red Development Treatment Volume (Sere R) OSS OSS OSS OSS Treatment Volume and Nutrient Load Fine Red Development Treatment Volume (Sere R) Fine Red Development Treatment Volume (Sere Red Development Treatment Volume (Sere R) Fine Red Development Treatment Volume (Sere R) Fi | Rv(impervious) | | 0.95 | *************************************** | Rv(impervious) | 0.95 | | Rv(impervious) | 0.95 | | Rv(impervious) | 0.95 |
| Tread site Area (acres) 1.38 0.33 Final Prior Devisite N 0.57 Rebursite N 0.57 Rebursite N 0.58 Rebu | % Impervious | 50% | 83% | | % Impervious | 90% | | | 83% | | | |
| Treatment Volume and Nutrient Load Pre-Rebevelopment Testment Volume (sore 4) Pre-Rebevelopment Testment Vol | Total Site Area (acres) | 1.38 | 0.83 | | Final Site Area (acres) | 1.38 | | | 0.83 | | | |
| Pre-Re-Development Treatment Volume (scre-ft) O.0633 | Site Rv | 0.55 | 0.82 | | Final Post Dev Site Rv | 0.87 | | ReDev Site Rv | 0.82 | | | |
| Treatment Volume (core fit) (core | Treatment Volume and | d Nutrient Loa | nd | | | | Trea | tment Volume and | Nutrient Loa | d | | |
| Pre-Redbevelopment TP Load (Lib/yr) Raseline TP Load (Redver) Redbevelopment TP Load (Redver) Redverlopped Area (Redverlopped Area (| | 0.0633 | 0.0564 | | Treatment Volume | 0.0999 | | Treatment Volume | 0.0564 | | Treatment Volume | 0.0435 |
| Pre-ReDevelopment TP Load (lb/yr) Restriction Required (lb/yr) Baseline TP Load (lb/ | Pre-ReDevelopment Treatment Volume (cubic feet) | 2,755 | 2,456 | | Treatment Volume | 4,352 | | Treatment Volume | 2,456 | | Treatment Volume (cubic | 1,897 |
| Load per scre ((b/scre/ly) 1.86 ((b/scre/ly) 1.8 | | 1.73 | 1.54 | | Development TP Load | 2.73 | | Post-ReDevelopment Load (TP) (lb/yr)* | 1.54 | | | 1.19 |
| But | | 1.25 | 1.86 | | Load per acre | 1.98 | | Load per acre | 1.86 | | | |
| Required for Redeveloped Area (lb/yr) Required for Redeveloped Area (lb/yr) Required for New Impervious Cover. Required for New Impervi | Llbs/acre/yr applied to pre-redevelopment area ex | cluding pervious land r) | 0.34 | | | | | (Below Pre- | 20% | | | |
| post-Development for new impervious cover (based on new lapment load limit, 0.41 lbs/acre/year). Post-Development Requirement for Site Area TP Load Reduction Required (lb/yr) 1.27 Nitrogen Loads (Informational Purposes Only) | ReDevelopment land cover minus pervious land | d cover (forest/open | space or managed | | | | | Required for Redeveloped Area | 0.31 | | Required for New | 0.97 |
| Post-Development Requirement for Site Area TP Load Reduction Required (lb/yr) 1.27 Nitrogen Loads (Informational Purposes Only) | impervious cover). | | | | | | | | | | | |
| TP Load Reduction Required (lb/yr) 1.27 Nitrogen Loads (Informational Purposes Only) | mn I snows load reduction requriement for new lopment load limit, 0.41 lbs/acre/year). | w impervious cover (| pased on new | | | | | | | | | |
| Nitrogen Loads (Informational Purposes Only) | | | | Post-Dev | velopment Requ | irement for S | ite Area | | | | | |
| | | | | TP Load | Reduction Required | (lb/yr) | 1.27 | | | | | |
| | | | | Ni | trogen Loads (Info | rmational Purp | | | | | | |
| Final Post-Development TN Load Pre-ReDevelopment TN Lo | | Pre-ReDevelopme | ent TN Load (lb/yr) | 12.38 | | | (Post-ReDevelope | ment & New Impervious) | 19.56 | | | |

Drainage Area A Land Cover (acres)

1 of 2

| z.aage /ca / . zama cover (acres) | Talliago Filed Filed Cover (acres) | | | | | | | | | | |
|-----------------------------------|------------------------------------|---------|---------|---------|--------|---------------|--|--|--|--|--|
| | A Soils | B Soils | C Soils | D Soils | Totals | Land Cover Rv | | | | | |
| Forest/Open Space (acres) | | | | | 0.00 | 0.00 | | | | | |
| Managed Turf (acres) | 1.13 | | | | 1.13 | 0.15 | | | | | |
| Impervious Cover (acres) | 2.23 | | | | 2.23 | 0.95 | | | | | |
| | | | | Total | 2 26* | | | | | | |

CLEAR BMP AREAS

| Impervious Cover (acres) | 2.23 | | | | 2.23 | 0.95 | | 1 | Total Phosphorus A | vailable for Remov | al in D.A. A (lb/yr) | 5.22 | |
|--|-------------------------|-----------------------------|------------------------------|---|--|------------------------|--|---------------------------|--------------------|-------------------------------------|----------------------------------|-------------------------|---------------------------------------|
| | | | | Total | 3.36 [*] | | | | Post Developm | ent Treatment Vol | ume in D.A. A (ft ³) | 8,305 | |
| Stormwater Best Manageme | nt Practice: | s (RR = Rune | off Reduction | _{on)} Drai | nage Ar | ea A incl | ludes up | o-gradien | t area fror | n outside | site limits | 3 | Select from dropdown lists |
| | Runoff | Managed | Impervious | Volume from | | Remaining | Total BMP | Phosphorus | Phosphorus Load | | Phosphorus | Remaining | |
| Practice | Reduction Credit (%) | Turf Credit Area (acres) | Cover Credit Area (acres) | Upstream Practice (ft ³) | Runoff Reduction (ft ³) | Runoff Volume (ft³) | Treatment Volume (ft ³) | Removal Efficiency (%) | | Phosphorus Load to Practice (lb) | Removed By Practice (lb) | Phosphorus Load (lb) | Downstream Practice to be Employed |
| 1. Vegetated Roof (RR) | | | | | | | | | | | | | |
| 1.a. Vegetated Roof #1 (Spec #5) | 45 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 1.b. Vegetated Roof #2 (Spec #5) | 60 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 2. Rooftop Disconnection (RR) | | | | | | | | | | | | | |
| 2.a. Simple Disconnection to A/B Soils (Spec #1) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.b. Simple Disconnection to C/D Soils (Spec #1) | 25 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.c. To Soil Amended Filter Path as per specifications (existing C/D soils) (Spec #4) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.d. To Dry Well or French Drain #1, Micro-Infilration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.e. To Dry Well or French Drain #2, Micro-Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.f. To Rain Garden #1, Micro-Bioretention #1 (Spec #9) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9) | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.h. To Rainwater Harvesting (Spec #6) | 0 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.i. To Stormwater Planter, Urban Bioretention (Spec #9, Appendix A) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3. Permeable Pavement (RR) | | | | | | | | | | | | | |
| 3.a. Permeable Pavement #1 (Spec #7) | 45 | | 2.23 | 0 | 3,461 | 4,230 | 7,690 | 25 | 0.00 | 4.83 | 2.84 | 1.99 | |
| 3.b. Permeable Pavement #2 (Spec #7) | 75 | | | | 0 | 0 | 0 | 25 | | 0.00 | 0.00 | 0.00 | |
| 4. Grass Channel (RR) | | | | | | | | | | | | | |
| 4.a. Grass Channel A/B Soils (Spec #3) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.b. Grass Channel C/D Soils (Spec #3) | 10 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5. Dry Swale (RR) | | | | | | | | | | | | | |
| 5.a. Dry Swale #1 (Spec #10) | 40 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.b. Dry Swale #2 (Spec #10) | 60 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6. Bioretention (RR) | | | | | | | | | | | | | |
| 6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9) | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7. Infiltration (RR) | | <u>'</u> | | | | | | | | | | | |
| 7.a. Infiltration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7.b. Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8. Extended Detention Pond (RR) | | | | | | | | | | | | | |
| 8.a. ED #1 (Spec #15) | 0 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8.b. ED #2 (Spec #15) | 15 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| | | | | | | | | | | | | | |

| Nitrogen Removal fficiency (%) | Nitrogen Load from Upstream Practices (lbs) | Untreated Nitrogen Load to Practice (lbs) | Nitrogen Removed By Practice (lbs) | Remaining Nitrogen Load (lbs) |
|--------------------------------------|---|---|--|-------------------------------------|
| Vegetated R | oof (RR) | | | |
| 0 | | 0.00 | 0.00 | 0.00 |
| 0 | | 0.00 | 0.00 | 0.00 |
| Rooftop Disc | connection (RR) | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| Permeable P | avement (RR) | | | |
| 25 | 0.00 | 34.53 | 20.28 | 14.24 |
| 25 | | 0.00 | 0.00 | 0.00 |
| Grass Chann | el (RR) | | | |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dry Swale (R | R) | • | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| D' | (00) | | | |
| Bioretention 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| Infiltration (F | | | | |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| Extended De | tention Pond (RR |) | | |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |

| . Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | | | |
|---|----|--|--|---|---|---|---|---|------|------|------|------|--|
| 9.a. Sheetflow to Conservation Area, A/B Soils (Spec #2) | 75 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.b. Sheetflow to Conservation Area, C/D Soils (Spec #2) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec #2 & #4) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | |
|--|------|------|------|------|--|--|--|--|--|--|
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | |

TOTAL IMPERVIOUS COVER TREATED (ac) 2.23 AREA CHECK: OK.

TOTAL MANAGED TURF AREA TREATED (ac) 0.00 AREA CHECK: OK.

TOTAL RUNOFF REDUCTION IN D.A. A (ft³) 3,461

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (Ib/yr) 5.22

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 2.84

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr) 2.38

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

| TOTAL RUNOFF REDUCTION IN D.A. A (ft ² | 3,461 |
|---|-------|
| NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yi | 20.28 |

SEE WATER QUALITY COMPLIANCE TAB FOR SITE CALCULATIONS (Information Only)

| 10. Wet Swale (no RR) | | | | | | | | | | | | |
|--|-----|--|---|---|---|---|----|------|------|------|------|--|
| 10.a. Wet Swale #1 (Spec #11) | 0 | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 10.b. Wet Swale #2 (Spec #11) | 0 | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11. Filtering Practices (no RR) | | | | | | | | | | | | |
| 11.a.Filtering Practice #1 (Spec #12) | 0 | | 0 | 0 | 0 | 0 | 60 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11.b. Filtering Practice #2 (Spec #12) | 0 | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12. Constructed Wetland (no RR) | | | | | | | | | | | | |
| 12.a.Constructed Wetland #1 (Spec #13) | 0 | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12.b. Constructed Wetland #2 (Spec #13) | 0 | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13. Wet Ponds (no RR) | | | | | | | | | | | | |
| 13.a. Wet Pond #1 (Spec #14) | 0 | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.b. Wet Pond #1 (Coastal Plain) (Spec #14) | 0 | | 0 | 0 | 0 | 0 | 45 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.c. Wet Pond #2 (Spec #14) | 0 | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.d. Wet Pond #2 (Coastal Plain) (Spec #14) | 0 | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14. Manufactured Treatment Devices (no | RR) | | | | | | | | | | | |
| 14.a. Manufactured Treatment Device- Hydrodynamic | 0 | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.b. Manufactured Treatment Device-Filtering | 0 | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.c. Manufactured Treatment Device-Generic | 0 | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | 10. Wet Swale (C | oastal Plain) (no F | RR) | |
|-----------------|------------------|---------------------|------|------|
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11. Filtering P | ractices (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 45 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12. Constructe | d Wetland (no RR |) | | • |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 55 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13. Wet Ponds | (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 14. Manufacture | d BMP (no RR) | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |

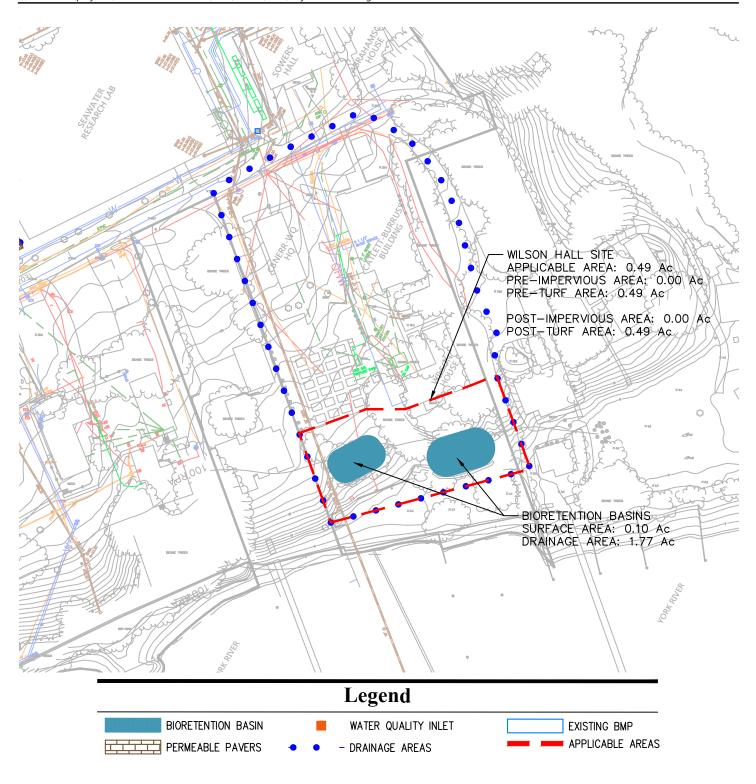
| TOTAL IMPERVIOUS COV | · · · | 2.23 | AREA CHECK: O | K. | |
|------------------------|---------------------|--------------|----------------|----------------|-------|
| TOTAL MANAGED TURF AF | REA TREATED (ac) | 0.00 | AREA CHECK: O | K. | |
| | TOTAL PHOSPHO | ORUS REMOV | AL REQUIRED O | N SITE (lb/yr) | 1.04 |
| | TOTAL PHOSPHORUS | AVAILABLE FO | OR REMOVAL IN | D.A. A (lb/yr) | 5.22 |
| TOTAL PHOSPHORUS REMO | VED WITHOUT RUNO | FF REDUCTIO | N PRACTICES IN | D.A. A (lb/yr) | 0.00 |
| TOTAL PHOSPHORUS R | EMOVED WITH RUNO | FF REDUCTIO | N PRACTICES IN | D.A. A (lb/yr) | 2.84 |
| то | TAL PHOSPHORUS LOA | AD REDUCTIO | N ACHIEVED IN | D.A. A (lb/yr) | 2.84 |
| TOTAL PHOSPHORUS REMAI | NING AFTER APPLYING | BMP LOAD | REDUCTIONS IN | D.A. A (lb/yr) | 2.38 |
| SEE WATER QUALITY CO | OMPLIANCE TAB F | OR SITE C | OMPLIANCE (| CALCULATIO | NS |
| NITROGEN R | EMOVED WITH RUNO | FF REDUCTIO | N PRACTICES IN | D.A. A (lb/yr) | 20.28 |
| NITROGEN REMO | VED WITHOUT RUNO | FF REDUCTIO | N PRACTICES IN | D.A. A (lb/yr) | 0.00 |
| | то | TAL NITROGE | N REMOVED IN | D.A. A (lb/vr) | 20.28 |

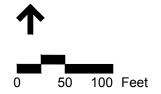
| Area Checks D.A. A D.A. B D.A. C D.A. D D.A. E AREA CHECK | | | | | | | | | | | | |
|---|-------------------|--------------------------------|---------------|--------|--------|-------|--|--|--|--|--|--|
| | | | | | | | | | | | | |
| FOREST/OPEN SPACE (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. | | | | | | |
| IMPERVIOUS COVER (ac) | 2.23 | 0.00 | 0.00 | 0.00 | 0.00 | OK. | | | | | | |
| IMPERVIOUS COVER TREATED (ac) | 2.23 | 0.00 | 0.00 | 0.00 | 0.00 | OK. | | | | | | |
| MANAGED TURF AREA (ac) | 1.13 | 0.00 | 0.00 | 0.00 | 0.00 | OK. | | | | | | |
| MANAGED TURF AREA TREATED (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. | | | | | | |
| AREA CHECK | OK. | OK. | OK. | OK. | OK. | | | | | | | |
| Site Treatment Volume (ft ³) | 8,305 | | | | | | | | | | | |
| | | | | | | | | | | | | |
| unoff Reduction Volume and TP By Drainage Area | | | | | | | | | | | | |
| | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | TOTAL | | | | | | |
| RUNOFF REDUCTION VOLUME ACHIEVED (ft ³) | 3,461 | 0 | 0 | 0 | 0 | 3,461 | | | | | | |
| TP LOAD AVAILABLE FOR REMOVAL (lb/yr) | 5.22 | 0.00 | 0.00 | 0.00 | 0.00 | 5.22 | | | | | | |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 2.84 | 0.00 | 0.00 | 0.00 | 0.00 | 2.84 | | | | | | |
| TP LOAD REMAINING (lb/yr) | 2.38 | 0.00 | 0.00 | 0.00 | 0.00 | 2.38 | | | | | | |
| | | | | | | | | | | | | |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 20.28 | 0.00 | 0.00 | 0.00 | 0.00 | 20.28 | | | | | | |
| Total Phosphorus | | | | | | | | | | | | |
| FINAL POST-DEVELOPMENT TP LOAD (Ib/yr) | -5.22 | 2 73 (See Si | te Data Sheet | | | | | | | | | |
| TP LOAD REDUCTION REQUIRED (lb/yr) | -1.04 | | te Data Sheet | | | | | | | | | |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 2.84 | 1.2. (550 6) | | | | | | | | | | |
| TP LOAD REMAINING (lb/yr): | -2.38- | -0.11 | | | | | | | | | | |
| REMAINING TP LOAD REDUCTION REQUIRED (lb/yr): | 0.00 | ** | | | 1 | 1 | | | | | | |
| ** TARGET TP REDUCTION | ON EXCEEDED E | BY 1.79 LB/YEAR ** | | | | | | | | | | |
| Total Nitrogen (For Information Purposes) | | 1.01 | | | | | | | | | | |
| POST-DEVELOPMENT LOAD (lb/yr) | 37.33 | | | | | | | | | | | |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 20.28 | | | | | | | | | | | |
| REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr) | 17.05 | | | | | | | | | | | |



Wilson House









Wilson House Bioretention Retrofit

Stormwater Improvement Project Virginia Institute of Marine Science Stormwater Management Master Plan 2016

| 2011 BMP Standards and S | | | | _ | | | | data input cells | | | |
|---|-----------------------------|-----------------------|----------------------------------|--|-----------------|-----------------|--|---------------------------------------|----------------|--|--------------|
| Project Name: | ` | | 16 -Bioretention Re | etrofit | | CLEAR | R ALL | constant values | | | |
| Date: | | | /27/2016 elopment Project? | No | | | | calculation cells | | | |
| Site Information | | | | | | | | final results | | | |
| ost-Development Project | (Treatmen | nt Volume a | ınd Loads) | | | | | | | | |
| | | | - | d Area (acres) → | 0.49 | | | Check: | | | |
| | | | Maximum | reduction required: | 10% | | BMP Design Sp | ecifications List: Linear project? | 2013 Dra No | aft Stds & Specs | |
| | | The site's net | | ious cover (acres) is: | 0 | | Land cover areas en | | √ | | |
| | | | | tion for Site (lb/yr): | -0.03 | | | d area entered? | √ | | |
| e-ReDevelopment Land Cover (acres | s) | | | | | | TP LOAD RED | OUCTION NOT RE | QUIRED | | |
| rest/Open Space (acres) undisturbed, | A Soils | B Soils | C Soils | D Soils | Totals | | | | | | |
| stected forest/open space or reforested land snaged Turf (acres) disturbed, graded for | 0.00 | | | | 0.00 | | | | | | |
| ds or other turf to be mowed/managed | 0.49 | | | | 0.49 | | | | | | |
| pervious Cover (acres) | 0.00 | | | | 0.00 | | | | | | |
| | | | | | 0.49 | | | | | | |
| st-Development Land Cover (acres) | | | | | | | | | | | |
| est/Open Space (acres) undisturbed, | A Soils | B Soils | C Soils | D Soils | Totals | | | | | | |
| tected forest/open space or reforested land naged Turf (acres) disturbed, graded for | 0.00 | | | | 0.00 | | | | | | |
| ds or other turf to be mowed/managed | 0.49 | | | | 0.49 | | | | | | |
| pervious Cover (acres) | 0.00 | | | | 0.00 | | | | | | |
| Area Check | OK. | OK. | OK. | OK. | 0.49 | | | | | | |
| | | | | | | | | | | | |
| nstants nual Rainfall (inches) | 43 | | Runoff Coefficient | s (Rv) | D.Caila | CCalle | D.Caile | | | | |
| rget Rainfall Event (inches) | 43 1.00 | | Forest/Open Space | A Soils 0.02 | 8 Soils 0.03 | C Soils 0.04 | D Soils 0.05 | | | | |
| tal Phosphorus (TP) EMC (mg/L) tal Nitrogen (TN) EMC (mg/L) | 0.26 1.86 | | Managed Turf Impervious Cover | 0.15 0.95 | 0.20 0.95 | 0.22 | 0.25 0.95 | | | | |
| get TP Load (lb/acre/yr) unitless correction factor) | 0.41 | | | | | | | | | | |
| | | | | | | | | | | | |
| LAND COVER SUMMARY P | RE-REDEVEL | LOPMENT | | | | LAND COVE | R SUMMARY P | OST DEVELO | PMEN | Т | |
| Land Cover Sumn | | | | Land Cover Summo | | | Land Cover Sur | - | | Land Cover Summ | - |
| Pre-ReDevelopment | Listed | Adjusted ¹ | | Post ReDev. & Ne Forest/Open Space Cover | w Impervious | | Post-ReDeve Forest/Open Space | lopment | | Post-Development Ne | w Impervious |
| Forest/Open Space Cover (acres) | 0.00 | 0.00 | | (acres) | 0.00 | | Cover (acres) | 0.00 | | | |
| Weighted Rv(forest) % Forest | 0.00 | 0.00 | | Weighted Rv(forest) % Forest | 0.00 | | Weighted Rv(forest) % Forest | 0.00 | | | |
| Managed Turf Cover (acres) | 0.49 | 0.49 | | Managed Turf Cover | 0.49 | | Managed Turf Cover | 0.49 | | | |
| | | | | (acres) | | | (acres) | | | | |
| Weighted Rv(turf) | 0.15 | 0.15 | | Weighted Rv (turf) | 0.15 | | Weighted Rv (turf) | 0.15 | | | |
| % Managed Turf | 100% | 100% | | % Managed Turf | 100% | | % Managed Turf | 100% | | | |
| Impervious Cover (acres) | 0.00 | 0.00 | | Impervious Cover (acres) | 0.00 | | ReDev. Impervious Cover (acres) | 0.00 | | New Impervious Cover (acres) | 0.00 |
| Rv(impervious) | 0.95 | 0.95 | | Rv(impervious) | 0.95 | | Rv(impervious) | 0.95 | | Rv(impervious) | - |
| % Impervious | 0% | 0% | | % Impervious | 0% | | % Impervious Total ReDev. Site Area | 0% | | | |
| Total Site Area (acres) | 0.49 | 0.49 | | Final Site Area (acres) | 0.49 | | (acres) | 0.49 | | | |
| Site Rv | 0.15 | 0.15 | | Final Post Dev Site Rv | 0.15 | | ReDev Site Rv | 0.15 | | | |
| Treatment Volume and | d Nutrient Loa | ad | | | | Trea | tment Volume and | Nutrient Loa | d | | |
| Pre-ReDevelopment Treatment Volume (acre-ft) | 0.0061 | 0.0061 | | Final Post-Development Treatment Volume (acre-ft) | 0.0061 | | Post-ReDevelopment Treatment Volume (acre-ft) | 0.0061 | | Post-Development Treatment Volume (acre-ft) | - |
| Pre-ReDevelopment Treatment Volume (cubic feet) | 267 | 267 | | Final Post-Development Treatment Volume (cubic feet) | 267 | | Post-ReDevelopment Treatment Volume (cubic feet) | 267 | | Post-Development Treatment Volume (cubic feet) | |
| Pre-ReDevelopment TP Load (lb/yr) | 0.17 | 0.17 | * | Final Post- Development TP Load (lb/yr) | 0.17 | * | Post-ReDevelopment Load (TP) (lb/yr)* | 0.17 | | Post-Development TP Load (lb/yr) | - |
| Pre-ReDevelopment TP Load per acre (lb/acre/yr) | 0.34 | 0.34 | * | Final Post-Development TP Load per acre (lb/acre/yr) | 0.34 | | Post-ReDevelopment TP Load per acre (lb/acre/yr) | 0.34 | | | |
| Baseline TP Load (lb/yr) 41 lbs/acre/yr applied to pre-redevelopment area ex proposed for new impervious cove | cluding pervious land r) | 0.20 | | | | | Max. Reduction Required (Below Pre- ReDevelopment Load) | 10% | | | |
| djusted Land Cover Summary: ReDevelopment land cover minus pervious lan f) acreage proposed for new impervious cover. | | | | | | * | TP Load Reduction Required for Redeveloped Area (lb/yr) | -0.03 | | TP Load Reduction Required for New Impervious Area (lb/yr) | 0 |
| usted total acreage is consistent with Post-ReDe v impervious cover). umn I shows load reduction requriement for ne | | | | | | * | Reduction below new de limitation not required | velopment load | | | |
| velopment load limit, 0.41 lbs/acre/year). | | | Post-Dev | velopment Requ | irement for | Site Area | | | | | |
| | | | | | (llh fur) | -0.03 | ** | TP LOAD REDUCTI | ON NOT R | EOLUBED | |
| | | | TP Load | Reduction Required | (по/уг) | -0.03 | | TP LOAD REDUCTI | | LQUINED | |
| | | | | Reduction Required | | | | TP LOAD REDUCTI | | EQUILED | |
| | | ent TN Load (lb/yr) | | | | poses Only) | Development TN Load The symmetry of the symmet | 1.20 | | LQUILD | |

Drainage Area A Land Cover (acres)

| | A Soils | B Soils | C Soils | D Soils | Totals | Land Cover Rv |
|---------------------------|---------|---------|---------|---------|--------|---------------|
| Forest/Open Space (acres) | | | | | 0.00 | 0.00 |
| Managed Turf (acres) | 1.24 | | | | 1.24 | 0.15 |
| Impervious Cover (acres) | 0.53 | | | | 0.53 | 0.95 |
| | | | | | 4 | |

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr) 1.57

Total 1.77 * Post Development Treatment Volume in D.A. A (ft³) 2,503

| Stormwater Best Manageme | | | | | nage / ii | | | | t area fror | | | | Select from dropdown lists- |
|---|-----------------------------------|--|--|--|--|--|---|---|--|--|---|--------------------------------------|---------------------------------------|
| Practice | Runoff Reduction Credit (%) | Managed Turf Credit Area (acres) | Impervious Cover Credit Area (acres) | Volume from Upstream Practice (ft ³) | Runoff Reduction (ft ³) | Remaining Runoff Volume (ft ³) | Total BMP Treatment Volume (ft ³) | Phosphorus Removal Efficiency (%) | Phosphorus Load from Upstream Practices (lb) | Untreated Phosphorus Load to Practice (lb) | Phosphorus Removed By Practice (lb) | Remaining Phosphorus Load (lb) | Downstream Practice to be Employed |
| 1. Vegetated Roof (RR) | | | | | | | | | | | | | |
| 1.a. Vegetated Roof #1 (Spec #5) | 45 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 1.b. Vegetated Roof #2 (Spec #5) | 60 | | | | 0 | 0 | 0 | 0 | | 0.00 | 0.00 | 0.00 | |
| 2. Rooftop Disconnection (RR) | | | | | | • | • | | | · | | | |
| 2.a. Simple Disconnection to A/B Soils | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (Spec #1) 2.b. Simple Disconnection to C/D Soils | 25 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (Spec #1) 2.c. To Soil Amended Filter Path as per | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| specifications (existing C/D soils) (Spec #4) 2.d. To Dry Well or French Drain #1, | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Micro-Infilration #1 (Spec #8) 2.e. To Dry Well or French Drain #2, | 50 | | | U | U | 0 | U | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Micro-Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.f. To Rain Garden #1, Micro-Bioretention #1 (Spec #9) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9) | 80 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.h. To Rainwater Harvesting (Spec #6) | 0 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2.i. To Stormwater Planter, Urban Bioretention (Spec #9, Appendix A) | 40 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3. Permeable Pavement (RR) | | | | | | | | | | | | | |
| 3.a. Permeable Pavement #1 (Spec #7) | 45 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3.b. Permeable Pavement #2 (Spec #7) | 75 | | | | 0 | 0 | 0 | 25 | | 0.00 | 0.00 | 0.00 | |
| 4. Grass Channel (RR) | | | | | | | | | | | | | |
| 4.a. Grass Channel A/B Soils (Spec #3) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.b. Grass Channel C/D Soils (Spec #3) | 10 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4) | 20 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5. Dry Swale (RR) | | * | | * | | * | ' | | • | • | | + | |
| 5.a. Dry Swale #1 (Spec #10) | 40 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.b. Dry Swale #2 (Spec #10) | 60 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| C. Diseasterships (DD) | | | | | | | | | | | | | |
| 6. Bioretention (RR) 6.a. Bioretention #1 or Micro-Bioretention #1 or | 40 | 1.24 | 0.53 | 0 | 1,001 | 1,502 | 2,503 | 25 | 0.00 | 1.57 | 0.86 | 0.71 | |
| Urban Bioretention (Spec #9) 6.b. Bioretention #2 or Micro-Bioretention #2 | 80 | 1.27 | 0.55 | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| (Spec #9) | | | | | | | | | | | | | |
| 7. Infiltration (RR) | | | | | | | | | | | | | |
| 7.a. Infiltration #1 (Spec #8) | 50 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7.b. Infiltration #2 (Spec #8) | 90 | | | 0 | 0 | 0 | 0 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8. Extended Detention Pond (RR) | | | | | | | | | | | | | |
| 8.a. ED #1 (Spec #15) | 0 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8.b. ED #2 (Spec #15) | 15 | | | 0 | 0 | 0 | 0 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | | T | | |
|--------------------------------------|---|---|--|-------------------------------------|
| Nitrogen Removal fficiency (%) | Nitrogen Load from Upstream Practices (lbs) | Untreated Nitrogen Load to Practice (lbs) | Nitrogen Removed By Practice (lbs) | Remaining Nitrogen Load (lbs) |
| Vegetated R | oof (RR) | | | |
| 0 | | 0.00 | 0.00 | 0.00 |
| 0 | | 0.00 | 0.00 | 0.00 |
| Roofton Disc | onnection (RR) | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | avement (RR) | | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 25 | | 0.00 | 0.00 | 0.00 |
| Grass Chann | el (RR) | | | |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dry Swale (R | R) | | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |
| Bioretention | | | | |
| 40 | 0.00 | 11.24 | 7.19 | 4.05 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 |
| Infiltration (F | RR) | | | |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | 0.00 | 0.00 | 0.00 |
| Extended De | tention Pond (RR |) | | |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | |

| 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | | | |
|---|----|--|--|---|---|---|---|---|------|------|------|------|--|
| 9.a. Sheetflow to Conservation Area, A/B Soils (Spec #2) | 75 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.b. Sheetflow to Conservation Area, C/D Soils (Spec #2) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec #2 & #4) | 50 | | | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |

| 9. Sheetflow to | 9. Sheetflow to Filter/Open Space (RR) | | | | | | | | | | | |
|-----------------|--|------|------|------|--|--|--|--|--|--|--|--|
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | |

TOTAL IMPERVIOUS COVER TREATED (ac) 0.53

TOTAL MANAGED TURF AREA TREATED (ac) 1.24

TOTAL RUNOFF REDUCTION IN D.A. A (ft³) 1,001

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (Ib/yr)

1.57

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (Ib/yr)

0.71

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

| TOTAL RUNOFF REDUCTION IN D.A. A (ft ³) | 1,001 |
|--|-------|
| NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/vr) | 7 19 |

SEE WATER QUALITY COMPLIANCE TAB FOR SITE CALCULATIONS (Information Only)

| 10. Wet Swale (no RR) | | | | | | | | | | | | | |
|--|-----|--|--|---|---|---|---|----|------|------|------|------|--|
| 10.a. Wet Swale #1 (Spec #11) | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 10.b. Wet Swale #2 (Spec #11) | 0 | | | 0 | 0 | 0 | 0 | 40 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1. Filtering Practices (no RR) | | | | | | | | | | | | | |
| 11.a.Filtering Practice #1 (Spec #12) | 0 | | | 0 | 0 | 0 | 0 | 60 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11.b. Filtering Practice #2 (Spec #12) | 0 | | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12. Constructed Wetland (no RR) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 12.a.Constructed Wetland #1 (Spec #13) | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12.b. Constructed Wetland #2 (Spec #13) | 0 | | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13. Wet Ponds (no RR) | | | | | | | | | | | | | |
| 13.a. Wet Pond #1 (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.b. Wet Pond #1 (Coastal Plain) (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 45 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.c. Wet Pond #2 (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 75 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13.d. Wet Pond #2 (Coastal Plain) (Spec #14) | 0 | | | 0 | 0 | 0 | 0 | 65 | 0.00 | 0.00 | 0.00 | 0.00 | |
| L4. Manufactured Treatment Devices (no | RR) | | | | | | | | | | | | |
| 14.a. Manufactured Treatment Device- Hydrodynamic | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.b. Manufactured Treatment Device-Filtering | 0 | | | 0 | 0 | 0 | 0 | 50 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14.c. Manufactured Treatment Device-Generic | 0 | | | 0 | 0 | 0 | 0 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | 10. Wet Swale (C | Coastal Plain) (no F | RR) | |
|------------------|------------------|----------------------|------|------|
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11. Filtering Pr | actices (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 45 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12. Constructed | d Wetland (no RR |) | | |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 55 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13. Wet Ponds | (no RR) | | | |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 14. Manufacture | d BMP (no RR) | | |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 |

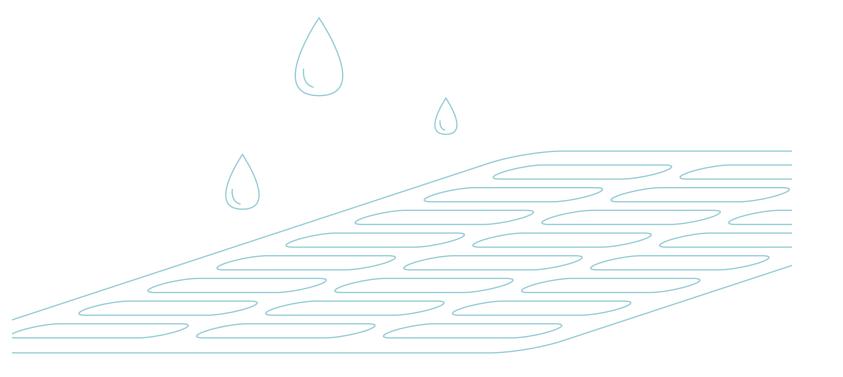
| TOTAL IMPERVIOUS COVER TREATED (ac) 0.53 AREA CHECK: OK. |
|--|
| TOTAL MANAGED TURF AREA TREATED (ac) 1.24 AREA CHECK: OK. |
| TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr) 0.31 |
| TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr) 1.57 |
| TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.00 |
| TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.86 |
| TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr) 0.86 |
| TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr) 0.71 |
| SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS |
| NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 7.19 |
| NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr) 0.00 |
| TOTAL NITROGEN REMOVED IN D.A. A (Ib/yr) 7.19 |

| Area Checks FOREST/OPEN SPACE (ac) IMPERVIOUS COVER (ac) | D.A. A | | | | D 4 F | ADEA CHECK |
|--|--------------------|--|---------------|--------|--------|------------|
| | | D.A. B | D.A. C | D.A. D | D.A. E | AREA CHECK |
| IMPERVIOUS COVER (ac) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| | 0.53 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| IMPERVIOUS COVER TREATED (ac) | | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA (ac) | | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| MANAGED TURF AREA TREATED (ac) | 1.24 | 0.00 | 0.00 | 0.00 | 0.00 | OK. |
| AREA CHECK | OK. | OK. | OK. | OK. | OK. | |
| Site Treatment Volume (ft ³) | 2,503 | | | | | |
| | | | | | | |
| noff Reduction Volume and TP By Drainage Area | | | | | | |
| | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | TOTAL |
| RUNOFF REDUCTION VOLUME ACHIEVED (ft ³) | 1,001 | 0 | 0 | 0 | 0 | 1,001 |
| TP LOAD AVAILABLE FOR REMOVAL (lb/yr) | 1.57 | 0.00 | 0.00 | 0.00 | 0.00 | 1.57 |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.86 |
| TP LOAD REMAINING (lb/yr) | 0.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.71 |
| NITROGEN LOAD REDUCTION ACHIEVED (Ib/yr) | 7.19 | 0.00 | 0.00 | 0.00 | 0.00 | 7.19 |
| NTROGEN LOAD REDUCTION ACHIEVED (ID/YI) | 7.19 | 0.00 | 0.00 | 0.00 | 0.00 | 7.19 |
| Total Phosphorus | | | | | | |
| FINAL POST-DEVELOPMENT TP LOAD (lb/yr) | | | te Data Sheet | | | |
| TP LOAD REDUCTION REQUIRED (lb/yr) | | -0.02 (See S | te Data Sheet |) | | |
| TP LOAD REDUCTION ACHIEVED (lb/yr) | 0.86 | | | | | |
| TP LOAD REMAINING (lb/yr): | -0.71 - | -0.69 | | | | |
| REMAINING TP LOAD REDUCTION REQUIRED (lb/yr): | 0.00 | ** | | | | |
| ** TARGET TP REDUCT | ION EXCEEDED I | BY 0.55 LB/YEAR ** 0 86 | | | | |
| Total Nitrogen (For Information Purposes) | | | | | | |
| POST-DEVELOPMENT LOAD (lb/yr) | 11.25 | | | | | |
| NITROGEN LOAD REDUCTION ACHIEVED (lb/yr) | 7.19 | | | | | |
| REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr) | 4.06 | | | | | |



Appendix C:

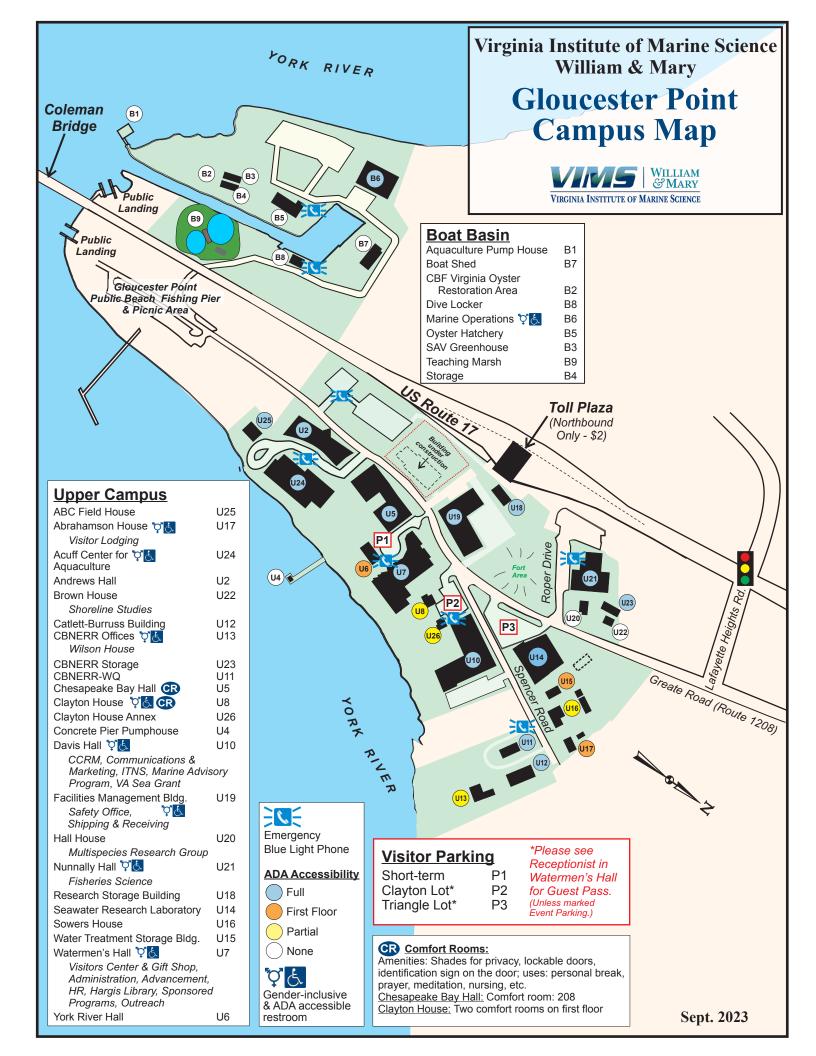
References





Campus Map







Cost Estimates





Capital Improvement Projects



| CIVITA OTO | Stormwater Master Plan | DATE PREPARED : | | | | |
|---|---|--------------------------------------|------------------------------------|--|-----------------------------------|--|
| Construction Cost Opinion | | | | | | |
| ROJECT/PROJEC | | | October 03, 2016 BASIS FOR ESTIMA | NTE: | | |
| OCATION : | <u> </u> | | | STUDY PRELIMINARY DESIGN | | |
| loucester Point, LIENT: irginia Institute | vA of Marine Sciences | | FILE NAME: | FINAL DESIGN \\VABEDATA\projects\33872.04 VIMS SWMP\tech CIP.xls SUMMARY | \SWMP\Cost Estimates\[Cost Opini | |
| ITEM NO | ITEM DESCRIPTION | UNIT | UNIT COST | PHOSPHORUS REMOVAL ACHIEVED (LBS) | COST PER POUND REMOVED (\$/LB) | |
| | CAPITAL IMPROVEMENT PROJECTS | | | | | |
| 2023 | | | | | | |
| 1 | WATERMEN'S HALL ADDITION AND AMPITHEATER (2023) | SUBTOTAL | \$524,683 | 1.04 | \$504,503 | |
| 2 | OYSTER HATCHERY (2023) | SUBTOTAL | \$229,853 | 0.77 | \$298,510 | |
| | | 2023 SUBTOTAL | \$754,536 | 1.81 | \$803,013 | |
| 2028 | | | | | | |
| 3 | FIELD SUPPORT ADMIN BUILDING (2028) | SUBTOTAL | \$263,642 | 0.72 | \$366,170 | |
| 4 | NUNALLY HALL (2028) | SUBTOTAL | \$419,299 | 0.81 | \$517,653 | |
| | | 2023 SUBTOTAL ENT PLAN TOTAL COST | \$682,941 \$1,437,477 | 1.53 | \$883,823 | |
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| VHB - St | tormwater Group Stormwater Master Plan | | | | | |
|-------------|---|----------|--------------------|---|----------------------|--------------------------------------|
| 2016 VIMS | Stormwater Master Plan | | DATE PREPARED : | | | |
| Constructio | nstruction Cost Opinion | | | 6 TMATE: | | |
| | T#: 33872.04 | | BASIS FOR EST X | STUDY | | |
| | CATION : pucester Point, VA | | FILE NAME: | PRELIMINARY DESIGN FINAL DESIGN FILE NAME: \(\VABEDATA\projects\)33872.04 | | |
| | of Marine Sciences | | · | Estimates\[Cost Opinion CIP.xls]\ | Vatermens | |
| ITEM NO | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT COST | SUBTOTAL OF COSTS | COMMENTS |
| | WATERMEN'S HALL ADDITION AND AMPITHEATER (2023) | | | | | |
| 1 | MOBILIZATION | 1 | LS | \$10,000 | \$10,000 | |
| 1 | DEMOLITION | 1 | LS | \$10,000 \$15,000 | \$10,000 \$15,000 | |
| 3 | UTILITY ADJUSTMENTS | 1 | LS | \$25,000 | \$25,000 | |
| 4 | SOUTH BIORETENTION BASIN (MATERIALS & INSTALLATION) | 1,853 | SF | \$35 | \$64,855 | |
| 5 | NORTH BIORETENTION BASIN (MATERIALS & INSTALLATION) | 1,915 | SF | \$35 | \$67,025 | |
| 6 | PERMEABLE PAVEMENT (MATERIALS & INSTALLATION) | 7,933 | SF | \$25 | \$198,325 | |
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| | | | | | | Pounds Phosphorus Removed 1.04 |
| | | | | | | Cost per Pound of Phosphorus Removed |
| | | | | | | \$504,502.79 |
| | | | | | | |
| | | + | | | | |

 TOTAL
 \$380,205

 15% Design Contingency
 \$57,031

 8% General Conditions
 \$30,416

 15% Construction Contingency
 \$57,031

 TOTAL
 \$524,683

| VHB - St | tormwater Group Stormwater Master Plan | | | | | |
|------------------------------|---|----------|--------------------|---|--------------------------|--------------------------------------|
| 2016 VIMS | Stormwater Master Plan | | DATE PREPAREI | D: | | |
| onstructio | n Cost Opinion | | October 03, 2016 | i | | |
| ROJECT/PROJECT | T # : 33872.04 | | BASIS FOR ESTI | MATE: | | |
| | | | Х | STUDY | | |
| OCATION : | | | PRELIMINARY DESIGN | | | |
| loucester Point, \ LIENT: | VA | | FILE NAME: | FINAL DESIGN \\VABEDATA\projects\33872.04 | and Charles - Lichards - | |
| | of Marine Sciences | | TIEE TOATVIE. | Estimates\[Cost Opinion CIP.xls](| | |
| ITEM NO | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT COST | SUBTOTAL OF COSTS | COMMENTS |
| | OYSTER HATCHERY (2023) | | | | 000.0 | |
| - | | | | | | |
| 1 | MOBILIZATION | 1 | LS | \$10,000 | \$10,000 | |
| 2 | DEMOLITION | 1 | LS | \$15,000 | \$15,000 | |
| 3 | UTILITY ADJUSTMENTS | 1 | LS | \$25,000 | \$25,000 | |
| 4 | BIORETENTION BASIN (MATERIALS & INSTALLATION) | 1,641 | SF | \$35 | \$57,435 | |
| 5 | PERMEABLE PAVEMENT (MATERIALS & INSTALLATION) | 2,365 | SF | \$25 | \$59,125 | |
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| | | | 1 | | + | |
| | | | 1 | | + | Pounds Phosphorus Removed |
| | | | 1 | | + | 0.77 |
| | | | 1 | | + | Cost per Pound of Phosphorus Removed |
| | | | | | - | \$298,510.13 |
| | | | | | | \$2.70,J±0.±J |
| | | | + | | | |
| | | | + | | + | |

| TOTAL | \$166,560 |
|------------------------------|-----------|
| 15% Design Contingency | \$24,984 |
| 8% General Conditions | \$13,325 |
| 15% Construction Contingency | \$24,984 |
| TOTAL | \$229.853 |

| VHB - St | tormwater Group Stormwater Master Plan | | | | | |
|-----------------------------|--|----------|--|------------------------------------|--------------------------|--------------------------------------|
| 2016 VIMS | Stormwater Master Plan | | DATE PREPARED : October 03, 2016 BASIS FOR ESTIMATE: | | | |
| Construction | n Cost Opinion | | | | | |
| PROJECT/PROJECT | T # : 33872.04 | | | | | |
| , | | | Х | STUDY | | |
| LOCATION : | | | | PRELIMINARY DESIGN FINAL DESIGN | | |
| Gloucester Point, ' CLIENT: | VA | | FILE NAME: | \\VABEDATA\projects\33872.04 | VIMS SWMP\tech\SWMP\Cost | |
| | of Marine Sciences | | | Estimates\[Cost Opinion CIP.xls] | FSA | |
| ITEM NO | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT COST | SUBTOTAL OF COSTS | COMMENTS |
| | FIELD SUPPORT ADMIN BUILDING (2028) | | | | | |
| | | | | | | |
| | | | | | | |
| 1 | MOBILIZATION | 1 | LS | \$10,000 | \$10,000 | |
| 2 | DEMOLITION | 1 | LS | \$15,000 | \$15,000 | |
| 3 | UTILITY ADJUSTMENTS | 1 | LS | \$25,000 | \$25,000 | |
| 4 | EAST BIORETENTION BASIN (MATERIALS & INSTALLATION) | 1,285 | SF | \$35 | \$44,975 | |
| 5 | WEST BIORETENTION BASIN (MATERIALS & INSTALLATION) | 1,202 | SF | \$35 | \$42,070 | |
| 6 | PERMEABLE PAVEMENT (MATERIALS & INSTALLATION) | 2,160 | SF | \$25 | \$54,000 | |
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| | | | | | | Pounds Phosphorus Removed |
| | | | | | | 0.72 |
| | | | | | | Cost per Pound of Phosphorus Removed |
| | | | | | | \$366,169.58 |
| | | | | | | |
| | | | | | | |
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 TOTAL
 \$191,045

 15% Design Contingency
 \$28,657

 8% General Conditions
 \$15,284

 15% Construction Contingency
 \$28,657

 TOTAL
 \$263,642

| VHB - St | ormwater Group Stormwater Master Plan | | | | | |
|----------------------------|---|----------|---------------------|------------------------------------|--------------------------|--------------------------------------|
| 2016 VIMS | Stormwater Master Plan | | DATE PREPARED : | | | |
| Construction | n Cost Opinion | | October 03, 2016 | | | |
| PROJECT/PROJECT | T#: 33872.04 | | BASIS FOR ESTIMATE: | | | |
| | | | Х | STUDY | | |
| LOCATION : | | | | PRELIMINARY DESIGN FINAL DESIGN | | |
| Gloucester Point, 'CLIENT: | /A | | FILE NAME: | \\VABEDATA\projects\33872.04 | VIMS SWMP\tech\SWMP\Cost | |
| Virginia Institute o | f Marine Sciences | | | Estimates\[Cost Opinion CIP.xls] | Nunally | |
| ITEM NO | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT COST | SUBTOTAL OF COSTS | COMMENTS |
| | NUNALLY HALL (2028) | | | | | |
| | | | | | | |
| | | | | | | |
| 1 | MOBILIZATION | 1 | LS | \$10,000 | \$10,000 | |
| 2 | DEMOLITION | 1 | LS | \$15,000 | \$15,000 | |
| 3 | UTILITY ADJUSTMENTS | 1 | LS | \$25,000 | \$25,000 | |
| 4 | BIORETENTION BASIN (MATERIALS & INSTALLATION) | 3,179 | SF | \$35 | \$111,265 | |
| 5 | PERMEABLE PAVEMENT (MATERIALS & INSTALLATION) | 5,703 | SF | \$25 | \$142,575 | |
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| | | | | | | Pounds Phosphorus Removed |
| | | | | | | 0.81 |
| | | | | | | Cost per Pound of Phosphorus Removed |
| | | | | | | \$517,653.33 |
| | | | | | | |
| | | | | | | |
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 TOTAL
 \$303,840

 15% Design Contingency
 \$45,576

 8% General Conditions
 \$24,307

 15% Construction Contingency
 \$45,576

 TOTAL
 \$419,299



Stormwater Improvement Projects



| 204614 | Stormwater Group | | | | | |
|-------------------------------|--|----------------------|------------------------------------|--|-----------------|--|
| 2016 VIM: | S Stormwater Master Plan | DATE PREPARED : | | | | |
| Construct | Onstruction Cost Opinion DJECT/PROJECT #: 33872.04 | | | | | |
| PROJECT/PROJE | | | | TE: | | |
| | | х | STUDY | | | |
| LOCATION : Gloucester Poin | * \/A | | PRELIMINARY DESIGN FINAL DESIGN | | | |
| CLIENT: | | | | \\VABEDATA\projects\33872.04 VIMS SWMP\tech\SWMP\Cost Estimates\[Cost Opin | | |
| Virginia Institut | ia Institute of Marine Sciences | | | SIP.xls]SUMMARY | | |
| ITEM NO | ITEM DESCRIPTION | UNIT | UNIT COST | PHOSPHORUS REMOVAL | COST PER POUND | |
| | | | | ACHIEVED (LBS) | REMOVED (\$/LB) | |
| | STORMWATER IMPROVEMENT PROJECTS | | | | | |
| 1. | WILSON HALL - Bioretention Basin Retrofit | TOTAL | \$302,807 | 0.86 | \$352,103 | |
| 2. | SEAWATER LABORATORY - Permeable Pavement | TOTAL | \$337,341 | 0.73 | \$462,111 | |
| 3. | CHESAPEAKE BAY HALL - Water Quality Inlets | TOTAL | \$220,800 | 0.47 | \$469,78 | |
| 4. | BOAT BASIN - Permeable Pavement | TOTAL | \$1,943,592 | 2.84 | \$684,363 | |
| | STORMWATER IMPROVE | MENT PLAN TOTAL COST | \$2,804,540 | 4.90 | \$1,968,362 | |
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| VHB - St | tormwater Group | | | | | |
|------------------------------|---|---|------------------|---|------------------------|---|
| 2016 VIMS | Stormwater Master Plan | | DATE PREPARED : | | | |
| Constructio | on Cost Opinion | | October 03, 2016 | | | |
| PROJECT/PROJEC | | | BASIS FOR ESTIN | | | |
| | 550,2101 | | Х | STUDY | | |
| LOCATION : | | | | PRELIMINARY DESIGN | | |
| Gloucester Point, CLIENT: | VA | | FILE NAME: | FINAL DESIGN \\VABEDATA\projects\33872.04 VII | MS SWMP\tech\SWMP\Cost | |
| | of Marine Sciences | | | Estimates\[Cost Opinion SIP.xls]Wi | | |
| ITEM NO | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT COST | COST | COMMENTS |
| | WILSON HALL - Bioretention Basin Retrofit | | | | | |
| | | | | | | |
| 1 | MOBILIZATION | 1 | LS | \$20,000 | \$20,000 | |
| 2 | DEMOLITION | 1 | LS | \$15,000 | \$15,000 | |
| 3 | UTILITY ADJUSTMENTS | 1 | LS | \$25,000 | \$25,000 | |
| 4 | NORTH BIORETENTION (MATERIALS & INSTALLATION) | 2,593 | SF | \$35 | \$90,755 | |
| 5 | SOUTH BIORETENTION (MATERIALS & INSTALLATION) | 1,962 | SF | \$35 | \$68,670 | |
| | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | - | ,,,,, | 1.2.7. | |
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| | | | | | | Pounds Phosphorus Removed 0.86 |
| | | | 1 | | | 5.55 |
| | | | + | + | | Cost per Pound of Phosphorus Removed \$352,101 |
| | | | + | + | | \$352,101 |
| | | | + | + | | |
| | | | 1 | | | |
| | | | | | | |

TOTAL \$219,425
15% Design Contingency \$32,914
8% General Conditions \$17,554
15% Construction Contingency \$32,914

TOTAL \$302,807

| VHB - St | Cormwater Group Stormwater Master Plan | | | | | |
|---------------------------|--|----------|------------------|---|------------------|--------------------------------------|
| 2016 VIMS | Stormwater Master Plan | | DATE PREPAREI | D: | | |
| | n Cost Opinion | | October 03, 2016 | | | |
| PROJECT/PROJEC | T#: 33872.04 | | BASIS FOR ESTI | | | |
| i Noseciji Nosec | 53072.04 | | X | STUDY | | |
| LOCATION : | | | | PRELIMINARY DESIGN | | |
| Gloucester Point, CLIENT: | VA | | FILE NAME: | FINAL DESIGN \\VABEDATA\projects\33872.04 VII | ACCUMUM LIGHTING | |
| | of Marine Sciences | | TIEL TVAIVIE. | Estimates\[Cost Opinion SIP.xls]Sea | | |
| ITEM NO | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT COST | COST | COMMENTS |
| | SEAWATER LABORATORY - Permeable Pavement | | | | | |
| | | | | | | |
| 1 | MOBILIZATION | 1 | LS | \$20,000 | \$20,000 | |
| 2 | DEMOLITION | 1 | LS | \$15,000 | \$15,000 | |
| 3 | UTILITY ADJUSTMENTS | 1 | LS | \$5,000 | \$5,000 | |
| 4 | PERMEABLE PAVEMENT (MATERIALS & INSTALLATION) | 8178 | SF | \$25 | \$204,450 | |
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| | | | | | | Pounds Phosphorus Removed 0.73 |
| | | | | + | | Cost per Pound of Phosphorus Removed |
| | | | | + | | \$462,111 |
| | | | | | | ψτυ Δ,±± ± |
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TOTAL \$244,450
15% Design Contingency \$36,668
8% General Conditions \$19,556
15% Construction Contingency \$36,668
TOTAL \$337,341

| VHB - St | tormwater Group | | | | | |
|---------------------------------|--|----------|-------------------------------------|---|----------------------|--------------------------------------|
| 2016 VIMS | tormwater Group Stormwater Master Plan | | DATE PREPARED : October 03, 2016 | | | |
| Constructio | on Cost Opinion | | | | | |
| PROJECT/PROJEC | T.#: 33872.04 | | BASIS FOR EST | | | |
| | | | Х | STUDY | | |
| LOCATION : Gloucester Point, | VA | | | PRELIMINARY DESIGN FINAL DESIGN | | |
| CLIENT: | of Marine Sciences | | FILE NAME: | \\VABEDATA\projects\33872.04 VIN Estimates\[Cost Opinion SIP.xls]CBH | | |
| ITEM NO | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT COST | COST | COMMENTS |
| | CHESAPEAKE BAY HALL - Water Quality Inlets | | | | | |
| | MODILIZATION | 1 | 1.5 | ¢20,000 | ¢20.000 | |
| 1 | MOBILIZATION DEMOLITION | 1 | LS LS | \$20,000 \$15,000 | \$20,000 | |
| 2 | UTILITY ADJUSTMENTS | 1 | | \$15,000 | \$15,000 \$25,000 | |
| 3 4 | WATER QUALITY INLET (MATERIALS & INSTALLATION) | 1 4 | LS EA | \$25,000 | \$25,000 | |
| 4 | WATER QUALITY INCET (MATERIALS & INSTALLATION) | 4 | EA | \$23,000 | \$100,000 | |
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| | | | | | | Pounds Phosphorus Removed |
| | | | | | | 0.47 |
| - | | | | | | Cost per Pound of Phosphorus Removed |
| | | | | | | \$469,787 |
| | | | | | | |
| | | | | | + | |
| | | | | | 41.00.000 | |

TOTAL 15% Design Contingency \$24,000 8% General Conditions 12,800 15% Construction Contingency TOTAL \$220,800

| VHB - St | tormwater Group | | | | | |
|---------------------------------|---|----------|-----------------|------------------------------------|-------------------------|--|
| 2016 VIMS | Stormwater Master Plan | | DATE PREPARED : | | | |
| Construction | on Cost Opinion | | October 03, 201 | 6 | | |
| PROJECT/PROJEC | T#: 33872.04 | | BASIS FOR EST | | | |
| | | | Х | STUDY | | |
| LOCATION : Gloucester Point, | VΔ | | | PRELIMINARY DESIGN FINAL DESIGN | | |
| CLIENT: | VA. | | FILE NAME: | \\VABEDATA\projects\33872.04 VI | IMS SWMP\tech\SWMP\Cost | |
| Virginia Institute | of Marine Sciences | 1 | | Estimates\[Cost Opinion SIP.xls]Bo | oat Basin | |
| ITEM NO | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT COST | COST | COMMENTS |
| | BOAT BASIN - Permeable Pavement | | | | | |
| | | | | | | |
| 1 | MOBILIZATION | 1 | LS | \$20,000 | \$20,000 | |
| 2 | DEMOLITION | 1 | LS | \$15,000 | \$15,000 | |
| 3 | UTILITY ADJUSTMENTS | 1 | LS | \$25,000 | \$25,000 | |
| 4 | PERMEABLE PAVEMENT (MATERIALS & INSTALLATION) | 53,936 | SF | \$25 | \$1,348,400 | |
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| | | | | | | Pounds Phosphorus Removed 2.84 |
| | | | | | | 2.84 Initial Cost per Pound of Phosphorus Removed |
| | + | | | | | \$684,363 |
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\$1,408,400 \$211,260 TOTAL 15% Design Contingency 8% General Conditions \$112,672 15% Construction Contingency \$211,260 TOTAL

\$1,943,592



Virginia's Major Watersheds



Virginia's Major Watersheds

