# Wake County Stormwater Hybrid Tool Directions

For additional submittal and design guidance, please see Wake County's SW Manual

The Wake County Stormwater Hybrid Tool is required for all stormwater submittals in Wake County jurisdiction. Engineer will input all data requested that is highlighted in **blue**. Engineer may follow provided links to view calculations used in this tool. Calculations for peak flow, runoff, time of concentration, etc. are for individual drainage areas. Engineer should complete a worksheet for each drainage area within a project area.

| | |
|---|---|
| **1** | Complete all inputs on the SITE DATA worksheet. SITE DATA worksheet should be submitted with preliminary plan submittals and modified and submitted for construction plan submittals.<br><br>Residential Stormwater Details should be completed for all residential submittal.<br><br>Stormwater Narrative should describe the site conditions in pre- and post-development conditions including a description of site improvements and proposed stormwater BMPs. |
| **2** | Complete DA worksheets. Most of the site data is inputted by the engineer on the DA worksheets. A Links/Comments column provides details regarding individual inputs. Engineers may also enter comments in this column as needed.<br><br>DA Worksheets will calculate pre and post runoff, time of concentration, peak flow, and volume of runoff per drainage area. Inputs on these sheets will also be used to calculate the site composite curve numbers for pre and post development, Target Curve Number (TCN), and nitrogen and phosphorus loading calculations.<br><br>Offsite values should be included when there is offsite drainage onto the site to ensure that the peak flow is an accurate value. Otherwise, peak flow represents only the site peak flow. Offsite drainage is not used in Target Curve Number or nutrient loading calculations. |
| **3** | SITE SUMMARY worksheet summarizes the pre and post runoff, Tc, and peak flow per drainage area based on inputs from DA worksheets. This worksheet denotes the volume required for management per drainage area based on high density requirements.<br><br>TCN and composite curve numbers for pre and post development are also calculated and summarized. If the TCN is exceeded, this worksheet will calculate total volume to be managed for the entire site based on TCN requirements.<br><br>Nitrogen and Phosphorus Loading: Nitrogen and Phosphorus Loading Rates for the site are calculated based on the land use acreages imputed on DA worksheets. This worksheet calculates the total amount of nitrogen and phosphorus for pre and post development. Nitrogen and phosphorus totals will be used on following BMP worksheets.<br><br>Disconnected Impervious - This area will be used to provide an adjusted post development composite curve number ($CN_{adjusted}$) to allow a credit for the use of disconnected impervious. Site plans should clearly indicate areas of disconnected impervious.<br><br>Note: There is only one engineer input on this sheet and all exeedances from DA worksheets will be flagged in **red**. |
| **4** | DA BMP worksheets require engineer to input proposed BMP information. BMPs are categorized by sub-basins within the drainage area. Engineer should input BMP device name, type, and volume provided. BMP requirements are automatically imported from previous inputs.<br><br>Engineer should input land uses by sub-basin. Off-site drainage to the BMP should be included to ensure that the water quality volume required is calculated correctly.<br><br>BMPs are required in each DA where post-development peak flow is higher than pre-development peak flow by 10%. Note that there is no 10% for projects within the Falls and Jordan Lake Watersheds.<br><br>DA BMP worksheets will ensure that proposed BMPs meet requirements for peak flow, TCN, and for Nitrogen and Phosphorus.<br><br>Engineer must input post-BMP discharge. |
| **5** | BMP SUMMARY worksheet summarizes the pre and post BMP runoff, and peak flow per drainage area based on inputs from DA BMP worksheets.<br><br>Nitrogen and Phosphorus Loading: calculated based on the inputs on DA BMP worksheets.<br><br>Note: There are no engineer inputs on this sheet and all exeedances from DA BMP worksheets will be flagged in **red**. |

# SITE DATA

| Project Information | |
|---|---|
| **Project Name:** | **South Main** |
| **Permit No (if known):** | |
| **Applicant:** | Toy Storage LLC |
| **Applicant Contact Name:** | Allen Massey |
| **Applicant Contact Number:** | 919-604-0505 |
| **Contact Email:** | Storit@AOL.com |
| **Last Modified Date:** | July 26 2022 |
| **Site Data:** | |
| **River Basin:** | Neuse |
| **Regulatory Watershed:** | N/A |
| **Physiographic/Geologic Region:** | Piedmont |
| **Type of Development (Select from Dropdown menu):** | Non-Residential |
| **Zoning:** | General Business |
| **Total Site Area (Ac):** | 2.03 |
| **Existing Lake/Pond Area (Ac):** | 0.00 |
| **Proposed Disturbed Area (Ac):** | 2.16 |
| **Proposed Impervious Surface Area from DA Sheets (acre):** | 1.19 |
| **Percent Built Upon Area (BUA):** | 59% |
| **Is the proposed project a site expansion?** | No |
| **Number of Drainage Areas on Site (Points of Analysis):** | 1 |
| **Annual Rainfall (in):** | 45.41 |
| **One-year, 24-hour rainfall (in):** | 3.00 |
| **Two-year, 24-hour rainfall (in):** | 3.60 |
| **Proposed Residential Stormwater Details (if applicable):** | |
| **Site Square Footage:** | 88,427 |
| **Total Acreage in Lots:** | 2.03 |
| **Lot Square Footage:** | 88,427 |
| **Number of Lots:** | 1 |
| **Average Lot Size (SF):** | 78,408 |
| **Proposed Impervious Surface Area from DA sheets (SF):** | 51,836 |
| **Proposed Impervious Surface Area Devoted to Lots (SF):** | |
| **Total Impervious Surface Area Devoted to Roads (SF):** | |
| **Other Impervious Surface Area (SF):** | |

| Stormwater Narrative (limit to 1,200 characters - attach additional pages with submittal if necessary): |
| --- |
| |

WAKE COUNTY
NORTH CAROLINA

**Project Name:** South Main

## DRAINAGE AREA 1
## STORMWATER PRE-POST CALCULATIONS

| LAND USE & SITE DATA | PRE-DEVELOPMENT | | | | | | | | POST-DEVELOPMENT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Drainage Area (Acres)= | 2.03 | | | | | | | | 2.03 | | | | | | | |
| Site Acreage within Drainage= | 2.03 | | | | | | | | 2.03 | | | | | | | |
| One-year, 24-hour rainfall (in)= | 3.00 | | | | | | | | | | | | | | | |
| **Land Use (acres) by Soil Group:** | **A Soils** | | **B Soils** | | **C Soils** | | **D Soils** | | **A Soils** | | **B Soils** | | **C Soils** | | **D Soils** | |
| **Commercial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | 0.01 | | | | | | | | 0.88 | | | | | |
| Roof | | | | | | | | | | | 0.31 | | | | | |
| Open/Landscaped | | | | | | | | | | | 0.41 | | | | | |
| **Industrial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Transportation** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| High Density (interstate, main) | | | | | | | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Rural | | | | | | | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Sidewalk | | | | | | | | | | | | | | | | |
| **Misc. Pervious** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Managed pervious (Open Space) | | | 2.02 | | | | | | | | 0.43 | | | | | |
| Unmanaged (pasture) | | | | | | | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | | | | | | | |
| **Residential** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Roadway | | | | | | | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | | | | | | | |
| Driveway | | | | | | | | | | | | | | | | |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Sidewalk (Includes Patios) | | | | | | | | | | | | | | | | |
| Lawn | | | | | | | | | | | | | | | | |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | | | | | | | |
| Open water | | | | | | | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 2.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| SITE FLOW | PRE-DEVELOPMENT $T_c$ | POST-DEVELOPMENT Tc |
|---|---|---|
| **Sheet Flow** | | |
| Length (ft)= | 50.00 | 50.00 |
| Slope (ft/ft)= | 0.03 | 0.03 |
| Surface Cover: | Grass | Paved, Gravel, or Bare Soil |
| n-value= | 0.24 | 0.011 |
| $T_t$ (hrs)= | 0.11 | 0.01 |
| **Shallow Flow** | | |
| Length (ft)= | 370.00 | 211.00 |
| Slope (ft/ft)= | 0.03 | 0.03 |
| Surface Cover: | Unpaved | Paved |
| Average Velocity (ft/sec)= | 2.79 | 3.52 |
| $T_t$ (hrs)= | 0.04 | 0.02 |
| **Channel Flow 1** | | |
| Length (ft)= | 50.00 | 160.00 |
| Slope (ft/ft)= | 0.03 | 0.01 |
| Cross Sectional Flow Area ($ft^2$)= | 0.75 | 0.74 |
| Wetted Perimeter (ft)= | 2.50 | 3.16 |
| Channel Lining: | Weeds | Concrete, finished |
| n-value= | 0.04 | 0.012 |
| Hydraulic Radius (ft)= | 0.30 | 0.23 |
| Average Velocity (ft/sec)= | 2.89 | 4.72 |
| $T_t$ (hrs)= | 0.00 | 0.01 |
| **Tc (hrs)=** | | |
| **RESULTS** | **PRE-DEVELOPMENT** | **POST-DEVELOPMENT** |
| Site Impervious Surface Area (Ac) = | 0.01 | 1.19 |
| Lot Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| **1-year, 24-hour storm (Peak Flow)** | | |
| Volume of runoff ($ft^3$) = | 2,778 | 13,071 |
| Volume change ($ft^3$) = | 10,294 | |
| Runoff (inches) = Q*= | 0.3770 | 1.7739 |
| Peak Discharge (cfs)= Q= | | |
| Composite Curve Number (DA)= | 61 | 83 |
| Composite Curve Number (Site only)= | 61 | 83 |

| **DISCONNECTED IMPERVIOUS - Credit given only to residential development with drainage area with less than 30% impervious** | |
|---|---|
| Percent Disconnected Impervious Credit (Residential Only) = | 0% |
| Disconnected impervious area (Ac) = | 0.00 |
| Drainage Area $CN_{adjusted}$= | 83 |
| Site Only $CN_{adjusted}$= | 83 |

WAKE COUNTY
NORTH CAROLINA

**Project Name:** South Main

## DRAINAGE AREA 2
## STORMWATER PRE-POST CALCULATIONS

| LAND USE & SITE DATA | PRE-DEVELOPMENT | POST-DEVELOPMENT |
|---|---|---|
| Drainage Area (Acres)= | 0.00 | 0.00 |
| Site Acreage within Drainage= | 0.00 | 0.00 |
| One-year, 24-hour rainfall (in)= | 3.00 | |

| Land Use (acres) by Soil Group: | A Soils | | B Soils | | C Soils | | D Soils | | A Soils | | B Soils | | C Soils | | D Soils | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Industrial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Transportation** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| High Density (interstate, main) | | | | | | | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Rural | | | | | | | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Sidewalk | | | | | | | | | | | | | | | | |
| **Misc. Pervious** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | | | | | | | |
| **Residential** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Roadway | | | | | | | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | | | | | | | |
| Driveway | | | | | | | | | | | | | | | | |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Sidewalk (Includes Patios) | | | | | | | | | | | | | | | | |
| Lawn | | | | | | | | | | | | | | | | |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | | | | | | | |
| Open water | | | | | | | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| SITE FLOW | PRE-DEVELOPMENT $T_c$ | POST-DEVELOPMENT Tc |
|---|---|---|
| **Sheet Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| n-value= | | |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Shallow Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Channel Flow 1** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Cross Sectional Flow Area ($ft^2$)= | | |
| Wetted Perimeter (ft)= | | |
| Channel Lining: | | |
| n-value= | | |
| Hydraulic Radius (ft)= | 0.00 | 0.00 |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Tc (hrs)=** | 0.00 | 0.00 |
| **RESULTS** | **PRE-DEVELOPMENT** | **POST-DEVELOPMENT** |
| Site Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| Lot Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| **1-year, 24-hour storm (Peak Flow)** | | |
| Volume of runoff ($ft^3$) = | | |
| Volume change ($ft^3$) = | | |
| Runoff (inches) = Q*= | | |
| Peak Discharge (cfs)= Q= | | |
| Composite Curve Number (DA)= | | |
| Composite Curve Number (Site only)= | | |

| **DISCONNECTED IMPERVIOUS - Credit given only to residential development with drainage area with less than 30% impervious** | |
|---|---|
| Percent Disconnected Impervious Credit (Residential Only) = | |
| Disconnected impervious area (Ac) = | 0.00 |
| Drainage Area $CN_{adjusted}$= | |
| Site Only $CN_{adjusted}$= | |

**Project Name:** South Main

## DRAINAGE AREA 3
## STORMWATER PRE-POST CALCULATIONS

| LAND USE & SITE DATA | PRE-DEVELOPMENT | | | | | | | | POST-DEVELOPMENT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Drainage Area (Acres)= | 0.00 | | | | | | | | 0.00 | | | | | | | |
| Site Acreage within Drainage= | 0.00 | | | | | | | | 0.00 | | | | | | | |
| One-year, 24-hour rainfall (in)= | 3.00 | | | | | | | | | | | | | | | |
| **Land Use (acres) by Soil Group:** | **A Soils** | | **B Soils** | | **C Soils** | | **D Soils** | | **A Soils** | | **B Soils** | | **C Soils** | | **D Soils** | |
| **Commercial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Industrial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Transportation** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| High Density (interstate, main) | | | | | | | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Rural | | | | | | | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Sidewalk | | | | | | | | | | | | | | | | |
| **Misc. Pervious** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | | | | | | | |
| **Residential** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Roadway | | | | | | | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | | | | | | | |
| Driveway | | | | | | | | | | | | | | | | |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Sidewalk (Includes Patios) | | | | | | | | | | | | | | | | |
| Lawn | | | | | | | | | | | | | | | | |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | | | | | | | |
| Open water | | | | | | | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| SITE FLOW | PRE-DEVELOPMENT $T_c$ | POST-DEVELOPMENT Tc |
|---|---|---|
| **Sheet Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| n-value= | | |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Shallow Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Channel Flow 1** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Cross Sectional Flow Area ($ft^2$)= | | |
| Wetted Perimeter (ft)= | | |
| Channel Lining: | | |
| n-value= | | |
| Hydraulic Radius (ft)= | 0.00 | 0.00 |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Tc (hrs)=** | 0.00 | 0.00 |
| **RESULTS** | **PRE-DEVELOPMENT** | **POST-DEVELOPMENT** |
| Site Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| Lot Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| **1-year, 24-hour storm (Peak Flow)** | | |
| Volume of runoff ($ft^3$) = | | |
| Volume change ($ft^3$) = | | |
| Runoff (inches) = Q*= | | |
| Peak Discharge (cfs)= Q= | | |
| Composite Curve Number (DA)= | | |
| Composite Curve Number (Site only)= | | |

| **DISCONNECTED IMPERVIOUS - Credit given only to residential development with drainage area with less than 30% impervious** | |
|---|---|
| Percent Disconnected Impervious Credit (Residential Only) = | |
| Disconnected impervious area (Ac) = | 0.00 |
| Drainage Area $CN_{adjusted}$= | |
| Site Only $CN_{adjusted}$= | |

WAKE COUNTY
NORTH CAROLINA

**Project Name:** South Main

## DRAINAGE AREA 4
## STORMWATER PRE-POST CALCULATIONS

| LAND USE & SITE DATA | PRE-DEVELOPMENT | POST-DEVELOPMENT |
|---|---|---|
| Drainage Area (Acres)= | 0.00 | 0.00 |
| Site Acreage within Drainage= | 0.00 | 0.00 |
| One-year, 24-hour rainfall (in)= | 3.00 | |

| Land Use (acres) by Soil Group: | A Soils | | B Soils | | C Soils | | D Soils | | A Soils | | B Soils | | C Soils | | D Soils | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Industrial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Transportation** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| High Density (interstate, main) | | | | | | | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Rural | | | | | | | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Sidewalk | | | | | | | | | | | | | | | | |
| **Misc. Pervious** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | | | | | | | |
| **Residential** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Roadway | | | | | | | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | | | | | | | |
| Driveway | | | | | | | | | | | | | | | | |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Sidewalk (Includes Patios) | | | | | | | | | | | | | | | | |
| Lawn | | | | | | | | | | | | | | | | |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | | | | | | | |
| Open water | | | | | | | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| SITE FLOW | PRE-DEVELOPMENT $T_c$ | POST-DEVELOPMENT Tc |
|---|---|---|
| **Sheet Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| n-value= | | |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Shallow Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Channel Flow 1** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Cross Sectional Flow Area ($ft^2$)= | | |
| Wetted Perimeter (ft)= | | |
| Channel Lining: | | |
| n-value= | | |
| Hydraulic Radius (ft)= | 0.00 | 0.00 |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Tc (hrs)=** | 0.00 | 0.00 |
| **RESULTS** | **PRE-DEVELOPMENT** | **POST-DEVELOPMENT** |
| Site Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| Lot Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| **1-year, 24-hour storm (Peak Flow)** | | |
| Volume of runoff ($ft^3$) = | | |
| Volume change ($ft^3$) = | | |
| Runoff (inches) = Q*= | | |
| Peak Discharge (cfs)= Q= | | |
| Composite Curve Number (DA)= | | |
| Composite Curve Number (Site only)= | | |

| **DISCONNECTED IMPERVIOUS - Credit given only to residential development with drainage area with less than 30% impervious** | |
|---|---|
| Percent Disconnected Impervious Credit (Residential Only) = | |
| Disconnected impervious area (Ac) = | 0.00 |
| Drainage Area $CN_{adjusted}$= | |
| Site Only $CN_{adjusted}$= | |

WAKE COUNTY
NORTH CAROLINA

**Project Name:** South Main

## DRAINAGE AREA 5
## STORMWATER PRE-POST CALCULATIONS

| LAND USE & SITE DATA | PRE-DEVELOPMENT | POST-DEVELOPMENT |
|---|---|---|
| Drainage Area (Acres)= | 0.00 | 0.00 |
| Site Acreage within Drainage= | 0.00 | 0.00 |
| One-year, 24-hour rainfall (in)= | 3.00 | |

| Land Use (acres) by Soil Group: | A Soils | | B Soils | | C Soils | | D Soils | | A Soils | | B Soils | | C Soils | | D Soils | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Industrial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Transportation** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| High Density (interstate, main) | | | | | | | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Rural | | | | | | | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Sidewalk | | | | | | | | | | | | | | | | |
| **Misc. Pervious** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | | | | | | | |
| **Residential** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Roadway | | | | | | | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | | | | | | | |
| Driveway | | | | | | | | | | | | | | | | |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Sidewalk (Includes Patios) | | | | | | | | | | | | | | | | |
| Lawn | | | | | | | | | | | | | | | | |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | | | | | | | |
| Open water | | | | | | | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| SITE FLOW | PRE-DEVELOPMENT $T_c$ | POST-DEVELOPMENT Tc |
|---|---|---|
| **Sheet Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| n-value= | | |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Shallow Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Channel Flow 1** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Cross Sectional Flow Area ($ft^2$)= | | |
| Wetted Perimeter (ft)= | | |
| Channel Lining: | | |
| n-value= | | |
| Hydraulic Radius (ft)= | 0.00 | 0.00 |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Tc (hrs)=** | 0.00 | 0.00 |
| **RESULTS** | **PRE-DEVELOPMENT** | **POST-DEVELOPMENT** |
| Site Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| Lot Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| **1-year, 24-hour storm (Peak Flow)** | | |
| Volume of runoff ($ft^3$) = | | |
| Volume change ($ft^3$) = | | |
| Runoff (inches) = Q*= | | |
| Peak Discharge (cfs)= Q= | | |
| Composite Curve Number (DA)= | | |
| Composite Curve Number (Site only)= | | |

| **DISCONNECTED IMPERVIOUS - Credit given only to residential development with drainage area with less than 30% impervious** | |
|---|---|
| Percent Disconnected Impervious Credit (Residential Only) = | |
| Disconnected impervious area (Ac) = | 0.00 |
| Drainage Area $CN_{adjusted}$= | |
| Site Only $CN_{adjusted}$= | |

WAKE COUNTY
NORTH CAROLINA

**Project Name:** South Main

## DRAINAGE AREA 6
## STORMWATER PRE-POST CALCULATIONS

| LAND USE & SITE DATA | PRE-DEVELOPMENT | POST-DEVELOPMENT |
|---|---|---|
| Drainage Area (Acres)= | 0.00 | 0.00 |
| Site Acreage within Drainage= | 0.00 | 0.00 |
| One-year, 24-hour rainfall (in)= | 3.00 | |

| Land Use (acres) by Soil Group: | A Soils | | B Soils | | C Soils | | D Soils | | A Soils | | B Soils | | C Soils | | D Soils | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Industrial** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | | | | | | | |
| **Transportation** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| High Density (interstate, main) | | | | | | | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Rural | | | | | | | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | | | | | | | |
| Sidewalk | | | | | | | | | | | | | | | | |
| **Misc. Pervious** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | | | | | | | |
| **Residential** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Roadway | | | | | | | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | | | | | | | |
| Driveway | | | | | | | | | | | | | | | | |
| Parking lot | | | | | | | | | | | | | | | | |
| Roof | | | | | | | | | | | | | | | | |
| Sidewalk (Includes Patios) | | | | | | | | | | | | | | | | |
| Lawn | | | | | | | | | | | | | | | | |
| Managed pervious (Open Space) | | | | | | | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | | | | | | | |
| Open water | | | | | | | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| SITE FLOW | PRE-DEVELOPMENT $T_c$ | POST-DEVELOPMENT Tc |
|---|---|---|
| **Sheet Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| n-value= | | |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Shallow Flow** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Surface Cover: | | |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Channel Flow 1** | | |
| Length (ft)= | | |
| Slope (ft/ft)= | | |
| Cross Sectional Flow Area ($ft^2$)= | | |
| Wetted Perimeter (ft)= | | |
| Channel Lining: | | |
| n-value= | | |
| Hydraulic Radius (ft)= | 0.00 | 0.00 |
| Average Velocity (ft/sec)= | 0.00 | 0.00 |
| $T_t$ (hrs)= | 0.00 | 0.00 |
| **Tc (hrs)=** | 0.00 | 0.00 |
| **RESULTS** | **PRE-DEVELOPMENT** | **POST-DEVELOPMENT** |
| Site Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| Lot Impervious Surface Area (Ac) = | 0.00 | 0.00 |
| **1-year, 24-hour storm (Peak Flow)** | | |
| Volume of runoff ($ft^3$) = | | |
| Volume change ($ft^3$) = | | |
| Runoff (inches) = Q*= | | |
| Peak Discharge (cfs)= Q= | | |
| Composite Curve Number (DA)= | | |
| Composite Curve Number (Site only)= | | |

| **DISCONNECTED IMPERVIOUS - Credit given only to residential development with drainage area with less than 30% impervious** | |
|---|---|
| Percent Disconnected Impervious Credit (Residential Only) = | |
| Disconnected impervious area (Ac) = | 0.00 |
| Drainage Area $CN_{adjusted}$= | |
| Site Only $CN_{adjusted}$= | |

**Project Name:** South Main

## DA SITE SUMMARY
## STORMWATER PRE-POST CALCULATIONS

| SITE SUMMARY | | | | | | |
|---|---|---|---|---|---|---|
| **DRAINAGE AREA SUMMARIES** | | | | | | |
| DRAINAGE AREA: | DA1 | DA2 | DA3 | DA4 | DA5 | DA6 |
| **Pre-Development (1-year, 24-hour storm)** | | | | | | |
| Runoff (in)=Q* = | 0.377 | | | | | |
| Peak Flow (cfs)=$Q_{post}$ = | | | | | | |
| **Post-Development (1-year, 24-hour storm)** | | | | | | |
| Proposed Impervious Surface (acre) = | 1.19 | | | | | |
| Runoff (in)=Q* = | 1.774 | | | | | |
| Peak Flow (cfs)=$Q_{post}$ = | | | | | | |

| TARGET CURVE NUMBER (TCN) - Residential Only | | | |
|---|---|---|---|
| **SITE \SOIL COMPOSITION** | | | |
| **HYDROLOGIC SOIL GROUP** | Site Area | % | Target CN |
| A | 0.00 | 0% | N/A |
| B | 2.03 | 100% | N/A |
| C | 0.00 | 0% | N/A |
| D | 0.00 | 0% | N/A |
| Total Site Area (acres) = | 2.03 | | |
| Zoning = | General Business | | |
| Target Curve Number (TCN) = | N/A | | |
| % Impervious = | 59% | | |
| Post Development $CN_{adjusted}$ = | 83 | | |
| Required Volume to be Managed (TCN)= $ft^3$ = | N/A | | |

| SITE NITROGEN AND PHOSPHORUS LOADING | |
|---|---|
| **Nitrogen and Phosphorus Targets (Based on Regulatory Watershed)** | |
| Target Nitrogen Load (lb/ac/yr)= | **3.6** |
| Target Phosphorus Load (Falls and Jordan Lakes Only) (lb/ac/yr)= | **N/A** |
| % N Loading Reduction Option for Expansions (Falls and Jordan Lakes Only) = | N/A |
| % Loading Reduction Nitrogen Target (Falls and Jordan Lakes Only) (lb/ac/yr)= | N/A |
| % P Loading Reduction Option for Expansions (Falls and Jordan Lakes Only) = | N/A |
| % Loading Reduction Phosphorus Target (Falls and Jordan Lakes Only) (lb/ac/yr)= | N/A |
| **Pre Development Nitrogen and Phosphorus Load** | |
| Total Nitrogen (lb/ac/yr)= | **1.64** |
| Total Phosphorus (lb/ac/yr)= | **N/A** |
| **Post Development Nitrogen and Phosphorus Load** | |
| Total Nitrogen (lb/ac/yr)= | **8.28** |
| Total Phosphorus (lb/ac/yr)= | **N/A** |

**Project Name:** South Main

## DRAINAGE AREA 1
## BMP CALCULATIONS

| DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS | | | | |
|---|---|---|---|---|
| DA1 Site Acreage= | 2.03 | | | |
| DA1 Off-Site Acreage= | 0.00 | | | |
| Total Required Storage Volume for Site TCN Requirement ($ft^3$)= | | | | |
| Will site use underground water harvesting? | | Enter % volume reduction in decimal form= | | Note: Supporting information/details should be submitted to demonstrate water usage. |

**ENTER AREA TREATED BY BMP**

| Land Use (acres) | Sub-DA1(a) (Ac) | | Sub-DA1(b) (Ac) | | Sub-DA1(c) (Ac) | | Sub-DA1(d) (Ac) | | Sub-DA1(e) (Ac) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | 0.88 | | | | | | | | | |
| Roof | 0.31 | | | | | | | | | |
| Open/Landscaped | 0.41 | | | | | | | | | |
| **Industrial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Transportation** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| High Density (interstate, main) | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | |
| Rural | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| **Misc. Pervious** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Managed pervious | 0.43 | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | |
| **Residential** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Roadway | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | |
| Driveway | | | | | | | | | | |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| Lawn | | | | | | | | | | |
| Managed pervious | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Off-site | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | |
| Totals (Ac)= | 2.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Sub-DA1(a) BMP(s)**

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BMP 1 | Bioretention with IWS | 4,256 | 1.39 | 8.28 | 0.17 | 1.01 | 1.04 | 3.08 | 0.13 | 0.39 | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | 3.08 | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | 0.39 | |

**Sub-DA1(b) BMP(s)**

If Sub-DA1(b) is connected to upstream sub-basin(s), select all contributing sub-basin(s from dropdown menus):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA1 (c) BMP(s)**

If Sub-DA1(c) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA1 (d) BMP(s)**

If Sub-DA1(d) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA1 (e) BMP(s)**

If Sub-DA1(e) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**DA1 BMP SUMMARY**

| | |
|---|---|
| Total Volume Treated (c.f.)= | 0 |
| DA1 Outflow Total Nitrogen (lb/ac/yr)= | 3.08 |
| DA1 Outflow Total Phosphorus (lb/ac/yr)= | 0.39 |

**1-year, 24-hour storm**

| | |
|---|---|
| Pre Development Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |
| Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |

**Project Name:** South Main

## DRAINAGE AREA 2
## BMP CALCULATIONS

| DRAINAGE AREA 2 - BMP DEVICES AND ADJUSTMENTS | | | | |
|---|---|---|---|---|
| DA2 Site Acreage= | 0.00 | | | |
| DA2 Off-Site Acreage= | 0.00 | | | |
| Total Required Storage Volume for Site TCN Requirement ($ft^3$)= | | | | |
| Will site use underground water harvesting? | | Enter % volume reduction in decimal form= | | Note: Supporting information/details should be submitted to demonstrate water usage. |

**ENTER AREA TREATED BY BMP**

| Land Use (acres) | Sub-DA2(a) (Ac) | | Sub-DA2(b) (Ac) | | Sub-DA2(c) (Ac) | | Sub-DA2(d) (Ac) | | Sub-DA2(e) (Ac) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Industrial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Transportation** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| High Density (interstate, main) | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | |
| Rural | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| **Misc. Pervious** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Managed pervious | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | |
| **Residential** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Roadway | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | |
| Driveway | | | | | | | | | | |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| Lawn | | | | | | | | | | |
| Managed pervious | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Off-site | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Sub-DA2(a) BMP(s)**

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA2(b) BMP(s)**

If Sub-DA2(b) is connected to upstream sub-basin(s), select all contributing sub-basin(s from dropdown menus):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA2 (c) BMP(s)**

If Sub-DA2(c) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA2 (d) BMP(s)**

If Sub-DA2(d) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA2 (e) BMP(s)**

If Sub-DA2(e) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**DA2 BMP SUMMARY**

| | |
|---|---|
| Total Volume Treated (c.f.)= | 0 |
| DA2 Outflow Total Nitrogen (lb/ac/yr)= | |
| DA2 Outflow Total Phosphorus (lb/ac/yr)= | |

**1-year, 24-hour storm**

| | |
|---|---|
| Pre Development Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |
| Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |

**Project Name:** South Main

## DRAINAGE AREA 3
## BMP CALCULATIONS

| DRAINAGE AREA 3 - BMP DEVICES AND ADJUSTMENTS | | | | |
|---|---|---|---|---|
| DA3 Site Acreage= | 0.00 | | | |
| DA3 Off-Site Acreage= | 0.00 | | | |
| Total Required Storage Volume for Site TCN Requirement ($ft^3$)= | | | | |
| Will site use underground water harvesting? | | Enter % volume reduction in decimal form= | | Note: Supporting information/details should be submitted to demonstrate water usage. |

**ENTER AREA TREATED BY BMP**

| Land Use (acres) | Sub-DA3(a) (Ac) | | Sub-DA3(b) (Ac) | | Sub-DA3(c) (Ac) | | Sub-DA3(d) (Ac) | | Sub-DA3(e) (Ac) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Industrial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Transportation** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| High Density (interstate, main) | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | |
| Rural | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| **Misc. Pervious** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Managed pervious | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | |
| **Residential** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Roadway | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | |
| Driveway | | | | | | | | | | |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| Lawn | | | | | | | | | | |
| Managed pervious | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Off-site | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Sub-DA3(a) BMP(s)**

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA3(b) BMP(s)**

If Sub-DA3(b) is connected to upstream sub-basin(s), select all contributing sub-basin(s from dropdown menus):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA3 (c) BMP(s)**

If Sub-DA3(c) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA3 (d) BMP(s)**

If Sub-DA3(d) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA3 (e) BMP(s)**

If Sub-DA3(e) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**DA3 BMP SUMMARY**

| | |
|---|---|
| Total Volume Treated (c.f.)= | 0 |
| DA3 Outflow Total Nitrogen (lb/ac/yr)= | |
| DA3 Outflow Total Phosphorus (lb/ac/yr)= | |

**1-year, 24-hour storm**

| | |
|---|---|
| Pre Development Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |
| Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |

**Project Name:** South Main

## DRAINAGE AREA 4
## BMP CALCULATIONS

| DRAINAGE AREA 4 - BMP DEVICES AND ADJUSTMENTS | | | | |
|---|---|---|---|---|
| DA4 Site Acreage= | 0.00 | | | |
| DA4 Off-Site Acreage= | 0.00 | | | |
| Total Required Storage Volume for Site TCN Requirement ($ft^3$)= | | | | |
| Will site use underground water harvesting? | | Enter % volume reduction in decimal form= | | Note: Supporting information/details should be submitted to demonstrate water usage. |

**ENTER AREA TREATED BY BMP**

| Land Use (acres) | Sub-DA4(a) (Ac) | | Sub-DA4(b) (Ac) | | Sub-DA4(c) (Ac) | | Sub-DA4(d) (Ac) | | Sub-DA4(e) (Ac) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Industrial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Transportation** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| High Density (interstate, main) | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | |
| Rural | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| **Misc. Pervious** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Managed pervious | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | |
| **Residential** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Roadway | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | |
| Driveway | | | | | | | | | | |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| Lawn | | | | | | | | | | |
| Managed pervious | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Off-site | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Sub-DA4(a) BMP(s)**

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA4(b) BMP(s)**

If Sub-DA4(b) is connected to upstream sub-basin(s), select all contributing sub-basin(s from dropdown menus):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA4 (c) BMP(s)**

If Sub-DA4(c) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA4 (d) BMP(s)**

If Sub-DA4(d) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA4 (e) BMP(s)**

If Sub-DA4(e) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**DA4 BMP SUMMARY**

| | |
|---|---|
| Total Volume Treated (c.f.)= | 0 |
| DA4 Outflow Total Nitrogen (lb/ac/yr)= | |
| DA4 Outflow Total Phosphorus (lb/ac/yr)= | |

**1-year, 24-hour storm**

| | |
|---|---|
| Pre Development Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |
| Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |

**Project Name:** South Main

## DRAINAGE AREA 5
## BMP CALCULATIONS

| DRAINAGE AREA 5 - BMP DEVICES AND ADJUSTMENTS | | | | |
|---|---|---|---|---|
| DA5 Site Acreage= | 0.00 | | | |
| DA5 Off-Site Acreage= | 0.00 | | | |
| Total Required Storage Volume for Site TCN Requirement ($ft^3$)= | | | | |
| Will site use underground water harvesting? | | Enter % volume reduction in decimal form= | | Note: Supporting information/details should be submitted to demonstrate water usage. |

**ENTER AREA TREATED BY BMP**

| Land Use (acres) | Sub-DA5(a) (Ac) | | Sub-DA5(b) (Ac) | | Sub-DA5(c) (Ac) | | Sub-DA5(d) (Ac) | | Sub-DA5(e) (Ac) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Industrial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Transportation** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| High Density (interstate, main) | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | |
| Rural | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| **Misc. Pervious** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Managed pervious | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | |
| **Residential** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Roadway | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | |
| Driveway | | | | | | | | | | |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| Lawn | | | | | | | | | | |
| Managed pervious | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Off-site | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Sub-DA5(a) BMP(s)**

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA5(b) BMP(s)**

If Sub-DA5(b) is connected to upstream sub-basin(s), select all contributing sub-basin(s from dropdown menus):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA5 (c) BMP(s)**

If Sub-DA5(c) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA5 (d) BMP(s)**

If Sub-DA5(d) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA5 (e) BMP(s)**

If Sub-DA5(e) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**DA5 BMP SUMMARY**

| | |
|---|---|
| Total Volume Treated (c.f.)= | 0 |
| DA5 Outflow Total Nitrogen (lb/ac/yr)= | |
| DA5 Outflow Total Phosphorus (lb/ac/yr)= | |

**1-year, 24-hour storm**

| | |
|---|---|
| Pre Development Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |
| Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |

**Project Name:** South Main

## DRAINAGE AREA 6
## BMP CALCULATIONS

| DRAINAGE AREA 6 - BMP DEVICES AND ADJUSTMENTS | | | | |
|---|---|---|---|---|
| DA6 Site Acreage= | 0.00 | | | |
| DA6 Off-Site Acreage= | 0.00 | | | |
| Total Required Storage Volume for Site TCN Requirement ($ft^3$)= | | | | |
| Will site use underground water harvesting? | | Enter % volume reduction in decimal form= | | Note: Supporting information/details should be submitted to demonstrate water usage. |

**ENTER AREA TREATED BY BMP**

| Land Use (acres) | Sub-DA6(a) (Ac) | | Sub-DA6(b) (Ac) | | Sub-DA6(c) (Ac) | | Sub-DA6(d) (Ac) | | Sub-DA6(e) (Ac) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Industrial** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Open/Landscaped | | | | | | | | | | |
| **Transportation** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| High Density (interstate, main) | | | | | | | | | | |
| High Density (Grassed Right-of-ways) | | | | | | | | | | |
| Low Density (secondary, feeder) | | | | | | | | | | |
| Low Density (Grassed Right-of-ways) | | | | | | | | | | |
| Rural | | | | | | | | | | |
| Rural (Grassed Right-of-ways) | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| **Misc. Pervious** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Managed pervious | | | | | | | | | | |
| Unmanaged (pasture) | | | | | | | | | | |
| Woods (not on lots) | | | | | | | | | | |
| **Residential** | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site | Site | Off-site |
| Roadway | | | | | | | | | | |
| Grassed Right-of-ways | | | | | | | | | | |
| Driveway | | | | | | | | | | |
| Parking lot | | | | | | | | | | |
| Roof | | | | | | | | | | |
| Sidewalk | | | | | | | | | | |
| Lawn | | | | | | | | | | |
| Managed pervious | | | | | | | | | | |
| Woods (on lots) | | | | | | | | | | |
| **Land Taken up by BMP** | | | | | | | | | | |
| **JURISDICTIONAL LANDS** | Site | Off-site | Site | Offsite | Site | Offsite | Site | Offsite | Site | Offsite |
| Natural wetland | | | | | | | | | | |
| Riparian buffer (Zone 1 only) | | | | | | | | | | |
| Totals (Ac)= | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Sub-DA6(a) BMP(s)**

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA6(b) BMP(s)**

If Sub-DA6(b) is connected to upstream sub-basin(s), select all contributing sub-basin(s from dropdown menus):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA6 (c) BMP(s)**

If Sub-DA6(c) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA6 (d) BMP(s)**

If Sub-DA6(d) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**Sub-DA6 (e) BMP(s)**

If Sub-DA6(e) is connected to upstream sub-basin(s), select all contributing sub-basin(s):

| Device Name (As Shown on Plan) | Device Type | Water Quality Volume (c.f.) | Inflow N EMC (mg/L) | Total Inflow N (lb/ac/yr) | Inflow P EMC (mg/L) | Total Inflow P (lb/ac/yr) | Outflow N EMC (mg/L) | Total Outflow N (lb/ac/yr) | Outflow P EMC (mg/L) | Total Outflow P (lb/ac/yr) | Provided Volume Managed (c.f.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | | | Outflow Total Phosphorus (lb/ac/yr)= | | | | | | | | |

**DA6 BMP SUMMARY**

| | |
|---|---|
| Total Volume Treated (c.f.)= | 0 |
| DA6 Outflow Total Nitrogen (lb/ac/yr)= | |
| DA6 Outflow Total Phosphorus (lb/ac/yr)= | |

**1-year, 24-hour storm**

| | |
|---|---|
| Pre Development Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |
| Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$= | |

**Project Name:** South Main

## DA SITE SUMMARY
## BMP CALCULATIONS

| BMP SUMMARY | | | | | | |
|---|---|---|---|---|---|---|
| **DRAINAGE AREA SUMMARIES** | | | | | | |
| DRAINAGE AREA: | DA1 | DA2 | DA3 | DA4 | DA5 | DA6 |
| **Post-Development (1-year, 24-hour storm)** | | | | | | |
| Peak Flow (cfs)=$Q_{1\text{-year}}$ = | | | | | | |
| **Post-Development with BMPs (1-year, 24-hour storm)** | | | | | | |
| % Impervious = | **59%** | | | | | |
| Volume Managed (CF)= | 0 | | | | | |
| Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$= | | | | | | |
| Have Target Curve Number Requirements been met? | N/A | | | | | |
| **Pre Development Nitrogen and Phosphorus Load** | | | | | | |
| Total Nitrogen (lb/ac/yr)= | 1.64 | | | | | |
| Total Phosphorus (lb/ac/yr)= | N/A | | | | | |
| **Post Development Nitrogen and Phosphorus Load** | | | | | | |
| Total Nitrogen (lb/ac/yr)= | 8.28 | | | | | |
| Total Phosphorus (lb/ac/yr)= | N/A | | | | | |
| **Post-BMP Nitrogen Loading** | | | | | | |
| Outflow Total Nitrogen (lb/ac/yr)= | 3.08 | | | | | |
| Outflow Total Phosphorus (lb/ac/yr)= | 0.39 | | | | | |
| Has site met the Target? | YES | | | | | |
| Has site met requirements for offsetting? | YES | | | | | |

# CALCULATIONS AND REFERENCE

| MAXIMUM CURVE NUMBER AFTER DEVELOPMENT | | | | |
|---|---|---|---|---|
| **ZONING DISTRICT** | **A** | **B** | **C** | **D** |
| R-80W and R-80 | 37 | 60 | 73 | 79 |
| R-40W and R-40 | 41 | 62 | 75 | 80 |
| R-30, R-20, R-15, R-10, R-5, Residential Highway, General Business and Office and Institutional | 43 | 63 | 76 | 81 |

| WEIGHTED CURVE NUMBER | | | | |
|---|---|---|---|---|
| **RUNOFF CURVE NUMBERS FOR URBAN AREAS** | | | | |
| **LAND USE** | **A** | **B** | **C** | **D** |
| **COMMERCIAL** | | | | |
| Parking lot | 98 | 98 | 98 | 98 |
| Roof | 98 | 98 | 98 | 98 |
| Open/Landscaped | 39 | 61 | 74 | 80 |
| **INDUSTRIAL** | | | | |
| Parking lot | 98 | 98 | 98 | 98 |
| Roof | 98 | 98 | 98 | 98 |
| Open/Landscaped | 39 | 61 | 74 | 80 |
| **TRANSPORTATION** | | | | |
| High Density (interstate, main) | 98 | 98 | 98 | 98 |
| Low Density (secondary, feeder) | 98 | 98 | 98 | 98 |
| Rural | 98 | 98 | 98 | 98 |
| Sidewalk | 98 | 98 | 98 | 98 |
| **MISC. PERVIOUS** | | | | |
| Managed pervious | 39 | 61 | 74 | 80 |
| Unmanaged (pasture) | 39 | 61 | 74 | 80 |
| Woods | 30 | 55 | 70 | 77 |
| **RESIDENTIAL** | | | | |
| Roadway | 98 | 98 | 98 | 98 |
| Driveway | 98 | 98 | 98 | 98 |
| Parking lot | 98 | 98 | 98 | 98 |
| Roof | 98 | 98 | 98 | 98 |
| Sidewalk | 98 | 98 | 98 | 98 |
| Lawn | 39 | 61 | 74 | 80 |
| Managed pervious | 39 | 61 | 74 | 80 |
| Woods | 30 | 55 | 70 | 77 |
| **Jurisdictional Lands** | | | | |
| Natural wetland | 30 | 55 | 70 | 77 |
| Riparian buffer | 39 | 61 | 74 | 80 |

## SCS RUNOFF METHOD

$$Q^* = (P-.2S)^2/(P+.8S)$$

Where:

Q*= Runoff (in)

P= Precipitation (in)

S= Potential max retention after runoff begins (in) = (1000/CN)-10

Notes:

Calculations used on Drainage Area Sheets

## DISCRETE RUNOFF METHOD

$$Q = Q^*_{(imp)} \times DA_{(imp)} + Q^*_{(pervious)} \times DA_{(pervious)}$$

$Q^*_{(imp)}$ = Runoff from Impervious Area (in)

$DA_{(imp)}$ = Drainage from impervious area (acre)

$Q^*_{(pervious)}$ = Runoff from pervious area (in)

$DA_{(pervious)}$ = Drainage from pervious area (acre)

## PEAK FLOW

Method: TR-55 Graphical Peak Discharge Method for Type II Distribution

**$Q_p = q_u A_m Q^* F_p$**

Where:

$Q_p$ = Peak Discharge (cfs)

$q_u$ = Unit peak discharge (csm/in) *TR-55 Appendix F*

$A_m$ = Drainage Area ($mi^2$)

$Q^*$ = runoff (inches)

$F_p$ = pond adjustment factor

**$\log(q_u) = C_o + C_1 \log(Tc) + C_2 [\log(Tc)]^2$**

Where:

$C_o$, $C_1$, $C_2$ = coefficient from Table F-1

$T_c$ = time of concentration (hr)

Limitations:

- The watershed must be hydrologically homogeneous
- The watershed may have only one main stream or, if more than one, the branches must have nearly equal $T_c$'s.
- The Fp factor can be applied only for ponds or swamps that are not in the $T_c$ flow path
- This method should be used only if the weighted CN is greater than 40.
- When this method is used to develop estimates of peak discharge for both pre and post development, use the same procedure for estimating Tc.
- $T_c$ values with this method may range from 0.1 to 10 hours.

## TIME OF CONCENTRATION

$$T_t = \frac{L}{3600V}$$

$T_t$ =travel time (hr)
L = flow length (ft)
V = average velocity (ft/s)
3600 = conversion factor from seconds to hours

$T_c$ = sum of $T_t$ values for consecutive flow segments

$$T_c = T_1 + T_2 + T_3 + \ldots T_m$$

$T_c$ = time of concentration (hr)
m = # of flow segments

Note: Tc defaults to 5 minutes if computed value is less

### SHEET FLOW (FOR FLOW LESS THAN 300 FEET)

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}$$

$T_t$ =travel time (hr)
n = Manning's roughness coefficient (Table 3-1)
L = flow length (ft)
$P_2$ = 2-year, 24-hour rainfall, 3.6 inches
s = slope of hydraulic grade line (land slope, ft/ft)

### SHALLOW FLOW

**Surface Cover**

Unpaved: $V = 16.1345(s)^{0.5}$

Paved: $V = 20.3282(s)^{0.6}$

V=Average Velocity (ft/s)
s = slope of hydraulic grade line (watercourse slope, ft/ft)

$$T_t = \frac{L}{3600V}$$

$T_t$ =travel time (hr)
L = flow length (ft)
V = average velocity (ft/s)
3600 = conversion factor from seconds to hours

### OPEN CHANNEL FLOW

$$V = \frac{1.49r^{2/3}s^{1/2}}{n}$$

V=Average Velocity (ft/s)
r = hydraulic radius (ft)
s = slope of hydraulic grade line (channel slope, ft/ft)
n = Manning's roughness coefficient for open channel flow

$$r = \frac{a}{p_w}$$

a = cross sectional flow area (ft2)
$p_w$=wetted perimeter (ft)

$$T_t = \frac{L}{3600V}$$

$T_t$ =travel time (hr)
L = flow length (ft)
V = average velocity (ft/s)
3600 = conversion factor (sec-hrs)

### Modified Table 3-1 for Stormwater Tool

| SURFACE DESCRIPTION | n |
|---|---|
| Paved, Gravel, or Bare Soil | 0.011 |
| Grass | 0.24 |
| Woods | 0.40 |

### TABLE 4-1, TR-55
### $I_a$ values for runoff curve numbers

| CN | $I_a$ (in) | CN | $I_a$ (in) | CN | $I_a$ (in) |
|---|---|---|---|---|---|
| 40 | 3.000 | 60 | 1.333 | 80 | 0.500 |
| 41 | 2.878 | 61 | 1.279 | 81 | 0.469 |
| 42 | 2.762 | 62 | 1.226 | 82 | 0.439 |
| 43 | 2.651 | 63 | 1.175 | 83 | 0.410 |
| 44 | 2.545 | 64 | 1.125 | 84 | 0.381 |
| 45 | 2.444 | 65 | 1.077 | 85 | 0.353 |
| 46 | 2.348 | 66 | 1.030 | 86 | 0.326 |
| 47 | 2.255 | 67 | 0.985 | 87 | 0.299 |
| 48 | 2.167 | 68 | 0.941 | 88 | 0.273 |
| 49 | 2.082 | 69 | 0.899 | 89 | 0.247 |
| 50 | 2.000 | 70 | 0.857 | 90 | 0.222 |
| 51 | 1.922 | 71 | 0.817 | 91 | 0.198 |
| 52 | 1.846 | 72 | 0.778 | 92 | 0.174 |
| 53 | 1.774 | 73 | 0.740 | 93 | 0.151 |
| 54 | 1.704 | 74 | 0.703 | 94 | 0.128 |
| 55 | 1.636 | 75 | 0.667 | 95 | 0.105 |
| 56 | 1.571 | 76 | 0.632 | 96 | 0.083 |
| 57 | 1.509 | 77 | 0.597 | 97 | 0.062 |
| 58 | 1.448 | 78 | 0.564 | 98 | 0.041 |
| 59 | 1.390 | 79 | 0.532 | | |

### TABLE 3-9, TR-55
### *Rational Runoff Coefficients*

| CHANNEL LINING | n |
|---|---|
| Asphalt | 0.016 |
| Concrete, finished | 0.012 |
| Concrete, unfinished | 0.014 |
| Grass | 0.035 |
| Gravel Bottom/riprap sides | 0.033 |
| Weeds | 0.040 |

**DISCONNECTED IMPERVIOUS CALCULATION**

$$CN_{adjusted} = CN_p + [(P_{imp})*(98-CN_p)*(1-(0.5*R))]$$

Where:

$CN_{adjusted}$ = Composite Curve Number

$CN_p$ = Pervious runoff curve number

$P_{imp}$ = Percent Imperviousness

R = ratio of unconnected impervious area to total impervious area

**BMP DETAILS**

**Figure 7, *Jordan/Falls Lake Stormwater Load Accounting Tool User's Manual***

| BMPs | TN Mass Removal % | TN EMC (mg/L) | TP Mass Removal % | TP EMC (mg/L) |
|---|---|---|---|---|
| Bioretention with IWS | 0.55 | 0.95 | 0.6 | 0.12 |
| Bioretention without IWS | 0.55 | 1 | 0.6 | 0.12 |
| Dry Detention Pond | 0.15 | 1.2 | 0.1 | 0.2 |
| Grassed Swale | 0 | 1.21 | 0.5 | 0.258 |
| Green Roof | 0.2 | 1.08 | 0.2 | 0.15 |
| Level Spreader, Filter Strip | 0.6 | 1.2 | 0.45 | 0.154 |
| Permeable Pavement | 0.4 | 1.44 | 0.7 | 0.39 |
| Sand Filter | 0.4 | 0.92 | 0.45 | 0.14 |
| Water Harvesting* | 0 | 1.08 | 0 | 0.15 |
| Wet Detention Pond | 0.28 | 1.01 | 0.45 | 0.113 |
| Wetland | 0.5 | 1.08 | 0.65 | 0.117 |

| Representative TN and TP Concentrations | Impervious Percentage (%) | TN (mg/L) | TP (mg/L) |
|---|---|---|---|
| **COMMERCIAL** | | | |
| Parking lot | 1 | 1.44 | 0.16 |
| Roof | 1 | 1.08 | 0.15 |
| Open/Landscaped | 0 | 2.24 | 0.44 |
| **INDUSTRIAL** | | | |
| Parking lot | 1 | 1.44 | 0.39 |
| Roof | 1 | 1.08 | 0.15 |
| Open/Landscaped | 0 | 2.24 | 0.44 |
| **TRANSPORTATION** | | | |
| High Density (interstate, main) | 1 | 3.67 | 0.43 |
| Low Density (secondary, feeder) | 1 | 1.4 | 0.52 |
| Rural | 1 | 1.14 | 0.47 |
| Sidewalk | 1 | 1.4 | 1.16 |
| **MISC. PERVIOUS** | | | |
| Managed pervious (includes grassed right-of-ways) | 0 | 3.06 | 0.59 |
| Unmanaged (pasture) | 0 | 3.61 | 1.56 |
| Woods | 0 | 1.47 | 0.25 |
| **RESIDENTIAL** | | | |
| Roadway | 1 | 1.4 | 0.52 |
| Driveway | 1 | 1.44 | 0.39 |
| Parking lot | 1 | 1.44 | 0.39 |
| Roof | 1 | 1.08 | 0.15 |
| Sidewalk | 1 | 1.4 | 1.16 |
| Lawn | 0 | 2.24 | 0.44 |
| Managed pervious (includes grassed right-of-ways) | 0 | 3.06 | 0.59 |
| Woods | 0 | 1.47 | 0.25 |
| LAND TAKEN UP BY BMP | 1 | 1.08 | 0.15 |

Note: Adapted from *Jordan/Falls Lake Stormwater Load Accounting Tool User's Manual*