Gloucester County
Site Plan Handbook

Office of Codes Compliance
6582 Main Street
Post Office Box 329
Gloucester, Virginia 23061
(804) 693-4040 (Zoning)
(804) 693-1217 (Environmental Division)

Gloucester County

Revised March 2010
Office of Codes Compliance

SITE PLAN HANDBOOK

This handbook is intended and designed as a site plan submittal guide for persons interested in developing a commercial (or non-residential) project in Gloucester County. Efforts have been made for this handbook to be comprehensive, however, this handbook is not ordinance and applicants should consult applicable County Code for complete requirements.

Gloucester County’s Site Plan Ordinance, Erosion and Sediment Control Ordinance, Chesapeake Bay Preservation Ordinance, Zoning Ordinance, Floodplain Ordinance and Wetlands Zoning Ordinance are administered by the Gloucester County office of Codes Compliance located in the County Administration Building at 6582 Main Street, Gloucester Courthouse, Virginia.

To contact the office of Codes Compliance:
The mailing address is:

P.O. Box 329, Gloucester, Virginia 23061
The phone number for Zoning is (804) 693-4040.
The phone number for the Environmental Division is (804) 693-1217.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>4</td>
</tr>
<tr>
<td>Submittal Requirements and General Information</td>
<td>5</td>
</tr>
<tr>
<td>Site Plan Checklist</td>
<td>6-9</td>
</tr>
<tr>
<td>Erosion and Sediment Control (E&amp;S) Plan</td>
<td>10</td>
</tr>
<tr>
<td>E&amp;S Plan and Narrative Checklist</td>
<td>11-13</td>
</tr>
<tr>
<td>E&amp;S Control Notes</td>
<td>14-15</td>
</tr>
<tr>
<td>Determination of an Adequate Channel</td>
<td>16-25</td>
</tr>
<tr>
<td>Stormwater Management Plan</td>
<td>26</td>
</tr>
<tr>
<td>Quantity &amp; Quality Requirements</td>
<td>27</td>
</tr>
<tr>
<td>SWM Plan Checklist</td>
<td>28</td>
</tr>
<tr>
<td>Chesapeake Bay Stormwater Management Calculations</td>
<td>29-31</td>
</tr>
<tr>
<td>Stormwater Maintenance Agreement</td>
<td>32-34</td>
</tr>
<tr>
<td>BMP Design Criteria &amp; Pollutant Removal Efficiencies</td>
<td>35</td>
</tr>
<tr>
<td>Infiltration Trenches</td>
<td>36-37</td>
</tr>
<tr>
<td>Wet Ponds</td>
<td>38</td>
</tr>
<tr>
<td>Grass Swales &amp; Filter Strips</td>
<td>39-40</td>
</tr>
<tr>
<td>Extended Detention Ponds</td>
<td>41</td>
</tr>
<tr>
<td>Wetland Enhanced Stormwater Ponds</td>
<td>42</td>
</tr>
<tr>
<td>Site Plan Application</td>
<td>43</td>
</tr>
<tr>
<td>Highway Corridor Overlay District Checklist</td>
<td>44-49</td>
</tr>
<tr>
<td>Parking Checklist</td>
<td>50-53</td>
</tr>
</tbody>
</table>
Submittal Requirements & General Information

Site plans are generally required for the construction of any commercial building or structure on any land within Gloucester County and shall be subject to review and approval by the Gloucester County Site Plan Review Committee.

Submittal Requirements

1. The site plan shall be prepared by a professional engineer, land surveyor, or architect licensed in the Commonwealth of Virginia. No person shall prepare or certify design elements of site plans which are outside their professional expertise and license.

Please Note:

<table>
<thead>
<tr>
<th>Number of copies required:</th>
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<tr>
<td>7 copies of a site plan</td>
</tr>
<tr>
<td>3 copies of E&amp;S plan (&amp; narrative)</td>
</tr>
<tr>
<td>10 copies if site plan and E&amp;S plan are combined</td>
</tr>
</tbody>
</table>

2. Site plan sheets should not be cluttered with information & difficult to read. Please use additional sheets when necessary.

3. Complete a Gloucester County Site Plan Application form.

4. Include any supporting documents, such as but not limited to: wetland permits, Chesapeake Bay Stormwater Calculation worksheets, storm sewer design calculations, deed of easements, etc.

5. There is a fee for site plan review. The appropriate amount will be determined at time of submittal. Checks are to be made payable to: Gloucester County.

6. Call (804) 693-4040 for additional assistance.

Please note: Please plan enough time into your project schedule for site plan review and revision. The Gloucester County Site Plan Review Committee has sixty (60) days to review a site plan submittal (45 days for an erosion and sediment control plan submittal). In most cases the Committee will not use the total 60 (or 45) days and will provide comments as soon as possible. However, combined with the time for applicants to revise plans, the total site plan review process may take one month or more.
Site Plan Checklist

PLAN REVIEW CHECKLIST

FOR EROSION AND SEDIMENT CONTROL & STORMWATER MANAGEMENT PLANS

The **Erosion and Sediment Control (ESC) Plan** consists of the **Narrative** (including any supporting calculations) and the **Plan Sheets**, as noted below. This plan will be in accordance with the **Virginia Erosion and Sediment Control Handbook** (VE&SC) (latest edition).

The **Stormwater Management Plan** consists of a concept and final plan.

- All land development projects disturbing one or more acres of land or 2,500 ft² within the Chesapeake Bay watershed (CBPA), as well as all modifications to existing stormwater systems and all illicit discharges, shall comply with the requirements of the Stormwater Management Ordinance. Some exemptions do apply refer the Stormwater Management Ordinance for further details.

- Both plans will be in accordance with the **Virginia Stormwater Management Handbook** (VSWM) (latest edition). If there is a conflict in direction the more stringent document will apply.

Should a land disturbing activity associated with an approved plan not begin during the 180 day period following approval or cease for more than 180 days, the Division may evaluate the existing approved erosion and sediment control plan and stormwater management plan to determine whether the plan still satisfies local program requirements and to verify that all design factors are still valid. If the division finds the previously filed plan to be inadequate, a modified plan shall be submitted and approved prior to the resumption of land disturbing activities.

Revised March 2010
GENERAL

______ Complete set of plans – The E&S and Stormwater Narrative should be included as a separate sheet within the site plan (Small Projects) or as a separate book (Larger Projects) with the Project Title and labeled “E&S and Stormwater Narrative”. The E&S and Stormwater site plan should include all sheets pertaining to the site grading and stormwater and any activities impacting erosion and sediment control and drainage. The E&S and Stormwater site plan should also be clearly labeled with the Project Title and labeled “E&S and Stormwater Site Plan”:

______ Plan Review Checklist – The checklist will be completed and submitted with all plan. All items in the checklist below should be included in the plans. The checklist should include the reference sheet (location of the item) and the page or sheet number where it is located.

______ Maintenance of Stormwater Management Facilities – Parties responsible for the operation and maintenance of a stormwater management facility shall make records of the installation and of all maintenance and repairs, and shall retain the records for at least five years. These records shall be made available to the Division during inspection of the facility and at other reasonable times upon request (IOW SWMO 14A-28).

______ Stormwater Calculations – The applicant should use TR-55 if the watershed analyzed includes wetlands so that the pond-swamp factor is included. TR-55 software does not include this factor, so the calculations may need to be done by hand.

______ Stormwater Calculations – When the Rational Method is used, for the purposes of DETENTION DESIGN ONLY (not for ditches and culvert sizes), require that they use Tables 4-5a,b,c, and d in SWMH Vol II, Pages 4-21 through 4-24.

E & S AND STORMWATER NARRATIVE

REFERENCE SHEET / PAGE #’s

______ Project Description

______ Existing Site Conditions

______ Adjacent Areas

______ Off-site Areas

______ Soils

______ Critical Areas

______ Erosion & Sediment Control Measures

______ Permanent Stabilization

______ Stormwater Runoff Considerations

______ Calculations

______ Maintenance

Revised March 2010
E & S AND STORMWATER SITE PLAN

_____ Mandatory Pre-Construction Meeting – Every project will require a pre-construction meeting prior to land disturbance. Contact the E & S Inspector @ 804-693-1217. (Note on Cover)

_____ Labels and References – Each sheet or page will be labeled and numbered. The ESC and Stormwater practices called out in the Narrative or in detail drawings will reference the corresponding sheet or page of the site plan where the measures are located. All details on the site plan will also reference the pages of the corresponding calculation worksheets.

_____ Professional’s seal - The designer’s original seal, signature, and date are required on the cover sheet of each Narrative and each set of Plan Sheets. A facsimile is acceptable for subsequent Plan Sheets. A Professional Engineers seal is required for all Stormwater systems including calculations and drainage sheets.

_____ Number of plan sets – Plans are distributed through the Planning and Zoning department. This office will retain two sets of the approved ESC Plan.

_____ Variances - Variances requested at the time of plan submission are governed by Section 4VAC50-30-50 of the Virginia Erosion and Sediment Control Regulations. All variances will be submitted in writing to the plan approving authority. If a variance is requested and approved please reference the variance approval letter on the site plan and provide a copy of the approval to the plan approving authority.

_____ Certified Responsible Land Disturber (RLD) - A certified RLD is required during all stages of construction, from the initial land disturbance through final site stabilization. The name of the project RLD must be provided to this office before any land disturbance may begin. Notify this office in a timely manner if the RLD changes during the course of the project. (RLD information block should be shown on the Cover / Title Sheet)
“As-Built” Plans - All applicants are required to submit "as-built" plans and a digital file (CD) containing a CAD and PDF file for any stormwater management practices located on-site after final construction is completed. This comment should be provided as a note on the site plan cover sheet. These submittals will be required for all stormwater aspects of the plan prior to release of the surety.

Cost Estimates - All applicants are required to submit cost estimates for all materials and construction of ESC and Stormwater practices before receiving a land disturbing permit.

Site Plan Considerations

☐ The 10-year post-developed peak rate of runoff from the development site shall not exceed the 10-year pre-developed peak rate of runoff.
☐ All stormwater runoff generated from land development and land use conversion activities shall not discharge untreated stormwater runoff directly into a jurisdictional wetland or local water body without adequate treatment.
☐ The definition of lot coverage states that impervious cover (i.e. does not absorb water) includes, but is not limited to, all areas covered by buildings, parked structures, driveways, roads, sidewalks, and any area of concrete or asphalt.

Site Plan Recommendations

☐ The County recommends taking a soil test on site when the first ESC measures are installed. Test results should determine liming/fertilizer rates to promote successful seeding and permanent stabilization.

Page numbers, Labels and References – Number the pages of the Narrative and all Calculation sheets. In the Narrative please reference where each practice can be located on the site plan and on the calculation pages.

Drainage easements will not be accepted by .

Address all Minimum Standards (MS-1 through MS-19) on the site plan [4VAC50-30-40]. If a written variance has been requested please include the reference to the letter of request [4VAC50-30-50].
NARRATIVE


**N-1 Project description** - Briefly describe the nature and purpose of the land-disturbing activity.

- Identify the Owner of the development

- Include what time of year the project will start and finish? (Construction Sequence)

- How long will it take to complete the project?

- How many acres will be disturbed for completion of this project?

- How much impervious area will the project have in post-developed conditions?

- What will be the ultimate developed conditions of this site?

**REFERENCE SHEET / PAGE #'s**

**N-2 Existing site conditions** - A description of the existing topography (% slopes), ground cover, and drainage (on-site and receiving channels).

- Discuss marking of areas where existing vegetation is to be preserved.

- Discuss size of drainage areas in pre-development and post-development conditions.

- Include any existing drainage or erosion problems and how they can be corrected.

- Pre-development photographs

**REFERENCE SHEET / PAGE #'s**

**N-3 Adjacent areas** - A description of all neighboring areas such as residential developments, agricultural areas, streams, lakes, roads, etc., that might be affected by the land disturbance.

- The potential for off-site damages must be considered and discussed.

- ANY environmentally sensitive areas should be mentioned.

- Other private or public lands adjacent to the site should be described and considered for possible problems during and after construction (traffic problems, dust control, increases in runoff etc.).

- Discuss perimeter controls to be used.

**REFERENCE SHEET / PAGE #'s**

Revised March 2010
**N-4** **Off-site areas** - Describe any off-site land-disturbing activities that may occur (borrow sites, disposal areas, easements, etc.).

- Identify the Owner of the off-site area and the locality responsible for plan review.
- Include a statement that any off-site land-disturbing activity associated with the project must have an approved ESC Plan.
- Submit documentation of the approved ESC Plan for each of these sites.
- List specific locations of all off-site areas.

**REFERENCE SHEET / PAGE #'s**

**N-5** **Soils** - Provide a description of the soils on the site, giving such information as soil name, mapping unit, erodibility, permeability, surface runoff, and a **brief** description of depth, texture and soil structure.

- Provide a copy of a soil survey map.
- Indicate the references for the soil information on the map.
- Check for soils with a high K factor, or poor drainage, low pH etc.
- Include any boring logs and geotechnical reports that have been completed for the site.

**REFERENCE SHEET / PAGE #'s**

**N-6** **Critical areas** - A description of areas on the site that have potentially serious erosion problems or that are sensitive to sediment impacts (e.g., steep slopes, watercourses, wet weather / underground springs, etc.).

- Indicate areas to be left alone until they can be graded and stabilized in favorable conditions.
- Discuss precautions to communicate limits of these areas to contractors and equipment operators.
- Provide downstream hydrographs at critical study points.

**REFERENCE SHEET / PAGE #'s**

**N-7** **Erosion and sediment control (ESC) measures** - A description of the structural and vegetative methods that will be used to control erosion and sedimentation on the site. Controls should satisfy applicable minimum standards and specifications in Chapter 3 of the 1992 *Virginia Erosion and Sediment Control Handbook* (VESCH).
List all controls used, list specification numbers (3.02), the location of practice on the site plan, and the **phases in which they will be operational**.

Discuss why it was selected.

Discuss temporary seeding as a means of erosion control; list the types to be used.

Discuss any erosion controls **that will be converted to permanent** structures.

**N-8 Specifications for ESC measure** - For each ESC measure employed in the plan, include in the Narrative at a minimum the following sections from the standard and specification in the VESCH:

___ Construction Specifications
___ Installation
___ Maintenance
___ Include any approved variances or revisions to the standards and specifications.

**N-9 Management strategies / Sequence of construction** - Address management strategies, the sequence of construction, and any phasing of installation of ESC and Stormwater measures. Include any assumptions made in the design.

___ Management Strategies, Sequence of construction, Removal for each control and who is responsible.

**N-10 Permanent stabilization** - A brief description, including specifications, of how the site will be stabilized after construction is completed.

___ List soil testing requirements.
___ Provide seeding specifications (pure live seed minimums), fertilizer and liming specifications. Seeding tables and rates.
___ Discuss all other areas to be stabilized other than vegetation (gravel, paved, etc.)

**N-11 Maintenance of ESC measures** - A schedule of regular inspections, maintenance, and repair of erosion and sediment control structures should be set forth.

___ Should list who is responsible during construction and who will be responsible once the project is complete.
Should provide a schedule of inspections to be conducted.

List maintenance items to check and perform as well as precautions for large storm events.

N-12 Calculations for temporary erosion and sediment control measures - For each temporary ESC measure, provide the calculations required by the standards and specifications.

Include calculations for pre- and post-development runoff.

Worksheets, assumptions and engineering decisions should be clearly presented.

Calculation methods should be indicated and presented.

N-13 Stormwater management considerations - Will the development of the site cause an increase in peak runoff rates? Will the increase in runoff cause flooding or channel degradation downstream? Describe the strategy to control stormwater runoff:

Provide exhibits showing the drainage divides, the direction of flow, and the size (acreage) of each of the site drainage areas that discharge runoff off-site, both existing and proposed.

Provide calculations for pre- and post-development runoff from these drainage areas. The Rational Method is not to be used for drainage areas that exceed 20 acres.

Ensure that Minimum Standard 19 is satisfied for each off-site receiving channel, including those that receive runoff from stormwater management facilities.

Provide calculations for the design of each permanent stormwater management facility. Hydrographs must be generated using SCS or Modified Rational Method.

Ensure that increased volumes of sheet flows are diverted to a stable outlet, to an adequate channel, pipe or pipe system, or to a stormwater management facility.

Provide adequacy calculations (capacity and erosion resistance) for all on-site stormwater conveyances in accordance with the next checklist item.

N-14 Calculations for stormwater conveyances - For each stormwater conveyance or structure, provide the following design calculations, as applicable:
Drainage area maps (pre- & post-development) with time of concentration ($T_C$) path shown with the different flow sections delineated.

Specify assumptions and coefficients used

$T_C$ calculation(s) for each flow section / nomograph

Locality IDF curve

Composite runoff coefficient or RCN calculation

Peak runoff calculations for Pre and Post-development

Stormwater conveyance channel design calculations

Storm drain and storm sewer system design calculations

Hydraulic Grade Line if any pipe in the system is more than 90% full for a 10-year storm

Culvert design calculations (Including TW)

Drop inlet backwater calculations

Curb inlet length calculations

Outlet protection calculations

Have the calculations shown that downstream properties and waterways have been adequately protected from damage from changes in runoff volume, velocity, and peak flow rate in accordance with Minimum Standard 19?

**N-15 Maintenance of SWM Facilities** – Provide the following for each permanent stormwater management facility:

A description of the requirements for maintenance of the facility and a recommended schedule of inspection and maintenance.

The identification of the person or persons who will be responsible for maintenance.

Provide a schedule for removal of ESC measures once the project is fully stabilized.

**N-16 Specifications for stormwater management facilities, stormwater management structures and earthwork** - Provide specifications for stormwater management facilities and stormwater management structures, i.e., pipe materials, pipe bedding, and stormwater structures. For each best management practice specified, include a completed Design and Plan Review Checklist from Appendix 3 of the *Virginia Stormwater Management Handbook*. 

Revised March 2010
Specifications for SWM facilities, structures and earthwork

N-17 Water Quality – Is the plan in compliance with the water quality criteria (4VAC50-60-60)? Provide supporting calculations.

Include impervious cover tabulation in acres on cover sheet. This should be an itemized list that includes totals for pre- and post-developed areas.

Provide calculations for proper selection of BMP’s based on impervious cover when BMP is required for site development. Include worksheets as shown in VESCH Chapter 3.

Indicate if the plan is located in the CBPA.

Water quality impact assessment (WQIA) might be required for site area within CBPA. Refer to the Chesapeake Bay Preservation Area Ordinance for details.

N-18 Stream Channel Erosion – Is the plan in compliance with the stream channel erosion criteria (4VAC50-60-70)? Address this in Narrative.
SITE PLAN

S-1 Vicinity map - A small map locating the site in relation to the surrounding area. Include any landmarks that might assist in locating the site.

REFERENCE SHEET / PAGE #’s
Cover Sheet

S-2 Indicate north - The direction of north in relation to the site on every sheet

REFERENCE SHEET / PAGE #’s
All Sheets

S-3 Legend - Provide a complete listing of all ESC and Stormwater measures used. Include the VESCH uniform code symbol and the standard and specification number. Include any other items necessary to identify pertinent features in the plan. All line types should be listed as either existing or proposed. Proposed features should have a bold, dark line type.

REFERENCE SHEET / PAGE #’s

S-4 Limits of clearing and grading – Delineate all areas that are to be cleared and graded. Use a separate line type and include in the legend. The limits of clearing/disturbance (LOD) need to outline all areas on the plan that will be disturbed.

REFERENCE SHEET / PAGE #’s

Outline all areas to be disturbed on the site plan.

Provide notes on how areas will be marked.

Provide notes and illustrations to clearly indicate areas NOT to be disturbed.
**S-5 Property lines and easements** - Show all property and easement lines. For each adjacent property, list the tax map/parcel number, zoning classification and the property owner's name. All stormwater systems will require a private easement for inspection.

**S-6 Existing contours** - The existing contours of the site.

Should be shown as dashed light lines in intervals from 1 to 5 feet.

Represent pre-developed drainage areas.

Show potential critical areas (slopes, low spots). Label these areas as critical.

Include any existing structures.

**S-7 Final contours and elevations** - Changes to the existing contours, including final drainage patterns. Note the finished floor elevation (FFE) of all buildings on site, including basements.

Should be shown as heavy solid lines.

Include any proposed structures.

**S-8 Environmental site assessment information** – Environmental areas shall be noted on the site plan and clearly labeled. Wetland delineations and associated buffers need to include the approved permit number and delineation source. Provide copies of all U.S. Army Corps of Engineers (ACOE) and state permits necessary for activities in state waters and wetlands or appropriate waivers of jurisdiction that have been obtained.

Base flood hazard areas (FEMA 100-year floodplain).

Location of all tidal and non-tidal wetlands.

Location of all tidal shores.

Location of all tributary and non-tributary streams.
**S-9 Existing vegetation** - The existing tree lines, grassed areas, or unique vegetation.

Clearly indicate existing tree lines and vegetation areas to remain.

Provide notes on the plan for areas to be undisturbed.

**S-10 Soils Map** – The boundaries of different soil types.

Indicate soil boundaries of all soil types on the site. List soil permeability factor (K) and soil survey classifications (VESC Handbook, page VI-44). Include boring locations if any.

Provide notes of soil properties (texture, etc.).

**S-11 Temporary and Permanent Seeding** – Provide a seeding schedule on the plan.

**S-12 Erosion and sediment control notes** - At a minimum, include the erosion and sediment control notes found in Table 6-1 on page VI-15 of the 1992 *Virginia Erosion and Sediment Control Handbook*. Note that the Virginia Erosion and Sediment Control Regulations are found in section "4VAC50-30" of the Code of Virginia. Ensure that all applicable Minimum Standards not covered elsewhere in the plan have been addressed. Include a note that any off-site land-disturbing activity associated with the project must have an approved ESC Plan.
**S-13 Off-site areas** - Include any off-site land-disturbing activities (e.g., borrow sites, disposal areas, etc.). Show the location of erosion controls. If the off-site activities are covered by a separate approved ESC Plan please reference that plan and the RLD for that Plan.

**S-14 Critical areas** – Areas with potentially serious erosion problems or impacts. Label all critical areas on the plan.

All critical, environmentally sensitive or prohibited areas should be denoted on the plan and notes provided to state reasons for critical nature.

Stream considerations; temporary crossings, other permits, location of stockpiles, trash & debris removal, fuel storage, etc.

Provide notes on plan to indicate how these areas are to be marked in the field

**S-15 Site development** - Show all physical items that could affect or be affected by erosion, sediment, and drainage.

All improvements such as buildings, roads, parking lots, temporary access roads, right-of–ways, temporary easements, etc. should be shown on the plan.

Utility improvements on and off-site should be shown.

Provide profiles of the storm sewer system with the hydraulic grade line (HGL) shown.

**S-16 Location of practices** - The locations of erosion and sediment control and stormwater management practices used on the site. Use the standard symbols and abbreviations in Chapter 3 of the VESCH.

Provide a separate Erosion & Sediment Control sheet for each phase of the plan.

The exact location of all practices including vegetation should be clearly shown on the plans.

Include in the legend all practices used on site.
Include the corresponding construction detail.

Sediment traps and basins shall include top and bottom dimensions, contour lines, and show tie-ins to existing grades.

Reference the details for the practice on the plan

Provide a separate stormwater management plan sheet showing all permanent stormwater and stormwater management facilities

**S-17 Maintenance** - A schedule of regular inspections, maintenance, and repair of temporary erosion and sediment control structures and permanent stormwater management facilities should be set forth.

Indicate who is responsible for maintenance and repair of all E & S measures on the project (RLD).

Indicate who is the primary contact for emergencies or notification of problems (owner), etc.

Provide clean-out maintenance specifications for all major structures such as basins, traps, silt fence etc.

Provide a long-term maintenance plan for the permanent facilities.

**S-18 Detail drawings** – Provide detail drawings of all structural practices used to control erosion and sedimentation for the proposed project. This includes details for all stormwater management structures (including BMP’s).

Details should be provided which are clearly dimensioned and reflect the ability to be “built” in the field according to the proper design criteria.

Alternative E & S measures must have proper drawings to indicate how and where they are to be constructed.

Outlet protection schedules should be provided.

All plan drawings, elevations and cross section drawings should show scales used to prepare the drawings.

Sizes and materials should be shown for all.

All details should list the specification number from the VESCH.

If more than one type of specification is being used (ex. inlet protection) details of all practices shall be provided.

Provide calculations for all channels, basins and outfalls.
Include permanent pool elevation, embankment, etc. If calculations have been provided in the narrative please **include calculation summaries** and reference the calculation location.

The steps required to convert a temporary sediment basin into a permanent stormwater basin after final stabilization must be addressed in the detail.

**S-19 BMP Details** – Views will include:

- Dimensions of basin features: permanent pool, sediment forebay, embankment, etc.
- Location of all conveyance system outfalls into basin (avoid short circuiting)
- Top of bank and basin bottom elevations
- Permanent pool, water quality volume and maximum design water surface elevations for all appropriate design storms and safety storms.
- Side slope (H:V) of storage area and embankment.
- Proper length-to-width ratio as specified in BMP design criteria
- Aquatic Bench if required.
- Riser and barrel materials and dimensions labeled.
- Include BMP maintenance and access details.

**S-20 Adequate Conveyances** – Ensure that stormwater conveyances with adequate capacity and adequate erosion resistance have been provided for all on-site concentrated stormwater runoff. Off-site channels that receive runoff from the site, including those receiving runoff from stormwater management facilities, must be adequate. Increased volumes of sheet flows must be diverted to a stable outlet, adequate channel, pipe or pipe system, or a stormwater management facility.

Verify MS-19 with supporting documentation, including calculations, cross-sections and other applicable information as necessary.
**S-21 Pre- and Post-development drainage area maps** – Provide pre- and post-development drainage area maps (supported by outline contour maps). These maps need to include all on- and off-site drainage.

- Include flow arrows.
- Show the pre- and post-developed time of concentration flow paths for each flow section.
- Include pre- and post-developed land uses with corresponding acreage.
- Provide runoff coefficients for site that reflect the conditions of the ultimate development.

**S-22 Supporting Calculations** – Provide supporting calculations or summaries for the computations of Q2, Q10, Q25, and Q100, for both pre- and post-development. A calculation summary will only be accepted if the calculation has already been provided in a separate document. (Include any assumptions made)

- All calculation summaries provided should reference calculation location by document and page number.

**S-23 Direction of Flow for Conveyances** - Indicate the direction of flow for all stormwater conveyances (storm drains, stormwater conveyance channels).

**S-24 Storm Drain Profiles** - Provide profiles of all storm drains except roof drains. If the type of pipe (RCP, CMP, HDPE, etc.) is not called out on the profiles, then the most conservative pipe material that may be specified for the project must be used in the adequacy calculations.

**S-25 Supporting Calculations for ALL Channels** – Provide supporting calculations for all channels, existing and proposed, natural and man-made, including the following:

- Depth
<table>
<thead>
<tr>
<th>Type of lining</th>
<th>Manning’s ‘n’ value</th>
<th>Typical channel cross sections</th>
<th>Side slope ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Q2, Q10, Q25, Q100, V2, V10, V25, D10</td>
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<td>Longitudinal slope</td>
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<td>Contributing drainage areas</td>
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<td>Flow arrows</td>
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</table>

**S-26 Detention / Retention Basins** – Provide all of the following for all detention / retention basins:

| Construction details for the basin and outlet devices. | Storm routing for the 2, 10, 25 and 100 year storms. | Delineate the approximate 100-year storm elevation | Contributing drainage areas | Completed calculation sheets per the Virginia Stormwater Management Handbook. | Include riser structure, barrel details and emergency spillway calculations as needed. | Provide stage-storage tables and curves. |

**S-27 Culverts** – Provide all of the following for all culverts:

<table>
<thead>
<tr>
<th>Inverts</th>
<th>Length</th>
<th>Type</th>
<th>Headwater depth</th>
<th>Tailwater elevation</th>
<th>Discharge / Outlet protection</th>
<th>Outlet velocity</th>
<th>Diameter</th>
</tr>
</thead>
</table>

REFERENCE SHEET / PAGE #’s
S-28  **Curb and Gutter / Storm Systems**  – Provide all of the following for all curb and gutter / storm sewer systems:

- Depth and spread in gutter
- Length of throats and placement of inlets
- Type of material
- Diameter
- Velocity
- Capacity
- Hydraulic grade line computations noting elevations at key points (drop inlets, manholes, etc.)
- Concrete flume transition details from curb to ditch
- Details of VDOT standard structures (drop inlets, curb/gutter, etc.)
- Provide profile for the storm sewer in conjunction with any road profiles or other utilities.

S-29  **Special design structures**  – Provide details of all special design structures (flumes, basin outlets, energy dissipaters, Low impact development (LID) practices, etc.)

S-30  **Location and description of all existing and proposed drainage structures**  – Provide the location and description of all existing and proposed drainage structures, pipes, roof drains, swales, ditches, curbs, and channels and the direction of flow of each.
Erosion & Sediment Control (E&S) Plan

- Checklist for E&S narrative and plan
- Erosion and Sediment Control Notes
- Determination of an “Adequate Channel”

Erosion and Sediment Control Plan

Please note that sites disturbing 5 or more acres in total must obtain a Stormwater General Construction Permit from the Department of Environmental Quality (DEQ). Please contact Jeff Selengut of DEQ at (804) 527-5095 for more information.

Narrative:
- Project description of the nature and purpose of the land disturbing activity, and the amount of land disturbance
- Description of the existing topography, vegetation, and drainage
- Description of the neighboring areas such as streams, lakes, residential areas, roads, etc. which may be affected by the land disturbance
- Description of any off-site land disturbing activities that will occur
- Description of the soils on site
- Description of the areas on site which will have potentially serious erosion problems (ex. steep slopes, channels, underground springs)
- Description of the methods which will be used to control erosion and sedimentation on site
- Description of how the site will be stabilized after construction is complete

Plan:
- Erosion and sediment control plan is phased appropriately to address all stages of site development (clearing, grading, filling, conditions prior to and after installation of storm sewer system, etc.)
- Legend provided
- Total acreage of land disturbance by clearing and grading
- Existing tree line and grassy areas delineated
- Limits of clearing and/or grading indicated
- Area of land disturbance minimized?
- Natural/existing vegetation preserved?
- Existing contour lines (2’ intervals) of parcel and surrounding vicinity
- Final contour lines (2’ intervals) of parcel and surrounding vicinity
- Description of any filling operations
- Total impervious area indicated
- Impervious area exceed 16%?
- Impervious area minimized on site?
- Total green area
- Description of soils on site – include seasonal water table elevation
- Boundaries of different soil types shown on plan
- Pre-development drainage areas delineated (include size of DA’s)
- Pre-development Q2
- Pre-development Q10
- Post-development drainage areas delineated (include size of DA’s)
- Post-development Q2
- Post-development Q10
- Drainage breaks and direction of flow within the drainage areas provided with flow arrows
- All on-site and receiving channels verified to be adequate
- Verified to resist erosion from the 2-yr storm (velocity)
- Verified to have capacity to convey the 10-yr storm
- Supporting calculations for all channels (existing and proposed) natural and man-made, including the following:
  - depth of channel
  - flow depth
- type of lining
- Manning’s “n” value
- bottom width
- side slope
- longitudinal slope
- contributing drainage area
- flow arrows
- top width
- Cross section
- Location

- Location of erosion and sediment control measures to be used on site identified (Use the standard symbols found in Chapter 3 of the 1992 Virginia Erosion and Sediment Control Handbook)
- Schedule of regular inspection and repair of erosion and sediment control structures
- Detail drawings of structural E&S practices to be used
- Construction entrance shown (all other potential access points blockaded) [Construction access is limited to one access point]
- Settling area, if wash rack is used at construction entrance
- Calculations provided for the design of sediment traps, sediment basins, etc.
- Permanent and temporary seeding schedules provided
- Location and elevations of all existing and proposed drainage structures, pipes, roof drains, swales, ditches, curbs and channels and the direction
- Identification of off-site land disturbing activities and necessary erosion and sediment control measures
- Maintenance plan (schedule of regular inspections and repair of erosion and sediment control structures)
- Name and phone number of contact person responsible for implementation of erosion and sediment control plan
- E&S Notes
**Erosion and Sediment Control Notes**

Contractor shall **not** commence any land disturbing activities prior to posting an erosion and sediment control bond and obtaining a land disturbing permit.

**Erosion and Sediment Control Measures**

Unless otherwise indicted, all vegetation and structural erosion and sediment control practices will be constructed and maintained according to the minimum standards and specification of the *Virginia Erosion and Sediment Control Handbook, 1992*.

**Management Strategies and Sequence of Erosion Control Measures**

The following sequence of events and erosion control measures shall be incorporated into the construction schedule for this project and shall apply to all construction activities.

1. All hard surface public roads shall be clean at the end of each work day. Temporary construction entrance(s) are required at all points of access
where any material may be spilled, dropped, washed, or tracked off site. Additional points of access, not providing a temporary construction entrance, shall have access blocked.

2. Erosion and sediment control devices shall be constructed and installed as a first step in any land disturbing activity and shall be made functional before upslope land disturbance takes place.

3. Right-of-way diversions, sediment barriers, fill diversions, construction entrances and erosion control stone are to be placed during clearing and grubbing.

4. Stabilization measures shall be applied to earthen structures such as dams, dikes, and diversions immediately after installation.

5. Permanent or temporary soil stabilization shall be applied to denuded areas with seven (7) days after final grade is reached on any portion of the site.

6. Temporary soil stabilization shall be applied within seven (7) days to denuded areas that may not be at final grade, but will remain dormant for longer than thirty (30) days.

7. During construction of the project, any soil stock piles, on site or intentionally transported off site, shall be stabilized or protected with sediment trapping measures.

8. Additional erosion and sediment control measures to those found on the plans may be required by Gloucester County, if deemed necessary.

9. All temporary erosion and sediment control measures shall be removed and disposed of within thirty (30) days after final stabilization.

**Temporary Stream Crossings**

All steps necessary shall be taken to prevent sediment (generated by construction or erosion) from entering streams. Construction vehicles shall not be allowed in flowing stream channels or be allowed to damage streambanks. All applicable federal, state and local regulations pertaining to working in or crossing a live water course shall be met. Temporary stream crossings conforming to VE&SC Std. 3.24 (or approved equal) shall be installed in all flowing streams which will have construction traffic crossing them.

**Maintenance**

1. In general, all erosion and sediment control measures shall be checked after each rainfall or weekly, whichever is more frequent (at least daily during periods of prolonged rainfall). Any repairs or clean up necessary
to maintain the effectiveness of the erosion control devices shall be made immediately, according to the VE&SC Handbook.

2. All erosion and sediment control devices shall be in place and functional at all times and if removed for construction progress, shall be replaced by the close of each workday.

Complying with Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations

Determining Adequacy of a Channel
When developing a site in Gloucester County, the Virginia Erosion and Sediment Control Regulations VR 625-02-00 Minimum Standard 19 requires:

a. Concentrated stormwater runoff leaving a development site shall discharge directly into an adequate channel or man-made receiving channel, pipe or storm sewer system. For those sites where runoff is discharged into a pipe or pipe system, downstream stability analysis at the outfall of the pipe or pipe system shall be performed.

b. Adequacy of all channels and pipes shall be verified in the following manner:
   (1) Natural channels shall be analyzed by the use of a two-year storm to verify that stormwater will not overtop channel banks nor cause erosion of channel bed or banks.
   (2) All previously constructed man-made channels shall be analyzed by the use of a ten-year storm to verify that stormwater will not overtop its banks and by the use of two-year storm to demonstrate that stormwater will not cause erosion of channel bed or banks.
   (3) Pipes and storm sewer systems shall be analyzed by the use of a ten-year storm to verify that stormwater will be contained within the pipe or system.

c. All on-site channels must be verified to be adequate.

Information is provided on the following pages on how to determine the adequacy of a natural channel. For more detailed information, please refer to the Virginia Erosion and Sediment Control Handbook, 1992 – Chapter 5.
(Taken from the Alliance for the Chesapeake Bay, “Baybook: A Guide to Reducing Water Pollution at Home: February 1991, page 8)

Determining Adequacy of a Natural Channel

************************

Step 1
Determine the peak runoff rate for the stream channel using the 2-yr storm
Q = C I A    Where Q = peak runoff rate
      C = runoff coefficient (from Chart pg V-29)
      I = intensity (from curve, need to know Tc, use 2-yr line)
      A = acres of contributing post-development drainage area

Step 2
Determine:
- Bankfull cross-sectional area of channel (A) (pg. V-111)
- Hydraulic radius (R) = (A/P) (See page V-111)
- Longitudinal slope (S)
- Permissible velocity in the channel (Table 5-22) for most erodible section.

Step 3
Determine:
Mannings roughness coefficient (n)

Step 4
Determine:
Bankful channel velocity (V)  V = 1.49 R 2/3 S 1/2 (Mannings equation)
Bankful channel capacity (Q)  Q = VA
V = from Mannings equation above
A = cross sectional area from Step 2

Step 5
Compare:
- Bankful channel capacity (Q) (from Step 4) with the actual Q (peak rate from Step 1)
- Bankful channel velocity (V) (from Step 4) with the permissible velocity for channel lining (Table 5-22)

****If the existing channel is NOT adequate with respect to both capacity and erosion resistance, on site measures and/or channel improvements must be incorporated into site design.

(adapted from the Virginia Erosion and Sediment Control Handbook, 1992)
### TABLE 5-2
VALUES OF RUNOFF COEFFICIENT (C) FOR RATIONAL FORMULA

<table>
<thead>
<tr>
<th>Land Use</th>
<th>C</th>
<th>Land Use</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downtown areas</td>
<td>0.70-0.95</td>
<td>Sandy soil, flat, 2%</td>
<td>0.05-0.10</td>
</tr>
<tr>
<td>Neighborhood areas</td>
<td>0.50-0.70</td>
<td>Sandy soil, average, 2-7%</td>
<td>0.10-0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sandy soil, steep, 7%</td>
<td>0.15-0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavy soil, flat, 2%</td>
<td>0.13-0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavy soil, average, 2-7%</td>
<td>0.18-0.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavy soil, steep, 7%</td>
<td>0.25-0.35</td>
</tr>
<tr>
<td><strong>Residential:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single-family areas</td>
<td>0.30-0.50</td>
<td>Agricultural land:</td>
<td></td>
</tr>
<tr>
<td>Multi units, detached</td>
<td>0.40-0.60</td>
<td>Bare packed soil</td>
<td></td>
</tr>
<tr>
<td>Multi units, attached</td>
<td>0.60-0.75</td>
<td>* Smooth</td>
<td>0.30-0.60</td>
</tr>
<tr>
<td>Suburban</td>
<td>0.25-0.40</td>
<td>* Rough</td>
<td>0.20-0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cultivated rows</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Heavy soil, no crop</td>
<td>0.30-0.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Heavy soil, with crop</td>
<td>0.20-0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Sandy soil, no crop</td>
<td>0.20-0.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Sandy soil, with crop</td>
<td>0.10-0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pasture</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Heavy soil</td>
<td>0.15-0.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Sandy soil</td>
<td>0.05-0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Woodlands</td>
<td>0.05-0.25</td>
</tr>
<tr>
<td><strong>Industrial:</strong></td>
<td></td>
<td>Streets:</td>
<td></td>
</tr>
<tr>
<td>Light areas</td>
<td>0.50-0.80</td>
<td>Asphallic</td>
<td>0.70-0.95</td>
</tr>
<tr>
<td>Heavy areas</td>
<td>0.60-0.90</td>
<td>Concrete</td>
<td>0.80-0.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brick</td>
<td>0.70-0.85</td>
</tr>
<tr>
<td><strong>Parks, cemeteries</strong></td>
<td>0.10-0.25</td>
<td>Unimproved areas</td>
<td>0.10-0.30</td>
</tr>
<tr>
<td><strong>Playgrounds</strong></td>
<td>0.20-0.35</td>
<td>Drives and walks</td>
<td>0.75-0.85</td>
</tr>
<tr>
<td><strong>Railroad yard areas</strong></td>
<td>0.20-0.40</td>
<td>Roofs</td>
<td>0.75-0.95</td>
</tr>
</tbody>
</table>

**Note:** The designer must use judgement to select the appropriate "C" value within the range. Generally, larger areas with permeable soils, flat slopes and dense vegetation should have the lowest C values. Smaller areas with dense soils, moderate to steep slopes, and sparse vegetation should be assigned the highest C values.

**Source:** American Society of Civil Engineers

**CHANNEL GEOMETRY**

**V-Shape**

Cross-sectional Area \( (A) = zd^2 \)
Top Width \( (T) = 2dz \)

Hydraulic Radius \( (R) = \frac{zd}{2\sqrt{zd^2 + 1}} \)

**Parabolic Shape**

Cross-sectional Area \( (A) = \frac{2}{3}Td \)
Top Width \( (T) = \frac{1.5A}{d} \)

Hydraulic Radius \( = \frac{7zd}{1.5T^2 + 4d^2} \)

**Trapezoidal Shape**

Cross-sectional Area \( (A) = bd + zd^2 \)
Top Width \( (T) = b + 2dz \)

Hydraulic Radius \( = \frac{bd + zd^2}{b + 2dz^2 + 1} \)

Source: USDA-SCS

Plate 5-28
TABLE 5-8

MANNING’S "n" VALUES

<table>
<thead>
<tr>
<th>Surface</th>
<th>Best</th>
<th>Good</th>
<th>Fair</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncoated cast-iron pipe</td>
<td>0.012</td>
<td>0.013</td>
<td>0.014</td>
<td>0.015</td>
</tr>
<tr>
<td>Coated cast-iron pipe</td>
<td>0.011</td>
<td>0.012*</td>
<td>0.013*</td>
<td></td>
</tr>
<tr>
<td>Commercial wrought-iron pipe, black</td>
<td>0.012</td>
<td>0.013</td>
<td>0.014</td>
<td>0.015</td>
</tr>
<tr>
<td>Commercial wrought-iron pipe, galvanized</td>
<td>0.013</td>
<td>0.014</td>
<td>0.015</td>
<td>0.017</td>
</tr>
<tr>
<td>Riveted and spiral steel pipe</td>
<td>0.013</td>
<td>0.015*</td>
<td>0.017*</td>
<td></td>
</tr>
<tr>
<td>Common clay drainage tile</td>
<td>0.011</td>
<td>0.012*</td>
<td>0.014*</td>
<td>0.017</td>
</tr>
<tr>
<td>Neat cement surfaces</td>
<td>0.010</td>
<td>0.011</td>
<td>0.012</td>
<td>0.013</td>
</tr>
<tr>
<td>Cement mortar surfaces</td>
<td>0.011</td>
<td>0.012</td>
<td>0.013*</td>
<td>0.015</td>
</tr>
<tr>
<td>Concrete pipe</td>
<td>0.012</td>
<td>0.013</td>
<td>0.015*</td>
<td>0.016</td>
</tr>
<tr>
<td>Concrete-lined channels</td>
<td>0.012</td>
<td>0.014*</td>
<td>0.016*</td>
<td>0.018</td>
</tr>
<tr>
<td>Cement-rubble surface</td>
<td>0.017</td>
<td>0.020</td>
<td>0.025</td>
<td>0.030</td>
</tr>
<tr>
<td>Dry-rubble surface</td>
<td>0.025</td>
<td>0.030</td>
<td>0.033</td>
<td>0.035</td>
</tr>
<tr>
<td>Canals and ditches:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth, straight and uniform</td>
<td>0.017</td>
<td>0.020</td>
<td>0.0225*</td>
<td>0.025</td>
</tr>
<tr>
<td>Rock cuts, smooth and uniform</td>
<td>0.025</td>
<td>0.030</td>
<td>0.033</td>
<td>0.035</td>
</tr>
<tr>
<td>Rock cuts, jagged and irregular</td>
<td>0.035</td>
<td>0.040</td>
<td>0.045</td>
<td></td>
</tr>
<tr>
<td>Winding sluggish canals</td>
<td>0.0225</td>
<td>0.025*</td>
<td>0.0275</td>
<td>0.030</td>
</tr>
<tr>
<td>Dredged earth channels</td>
<td>0.025</td>
<td>0.0275*</td>
<td>0.030</td>
<td>0.033</td>
</tr>
<tr>
<td>Canals with rough stony beds, weeds on earth banks</td>
<td>0.025</td>
<td>0.030</td>
<td>0.035*</td>
<td>0.040</td>
</tr>
<tr>
<td>Earth bottom, rubble sides</td>
<td>0.028</td>
<td>0.030*</td>
<td>0.033*</td>
<td>0.035</td>
</tr>
</tbody>
</table>

* Values commonly used in designing.

Source: King
<table>
<thead>
<tr>
<th>Natural Stream Channels:</th>
<th>Surface Description</th>
<th>Best</th>
<th>Good</th>
<th>Fair</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Clean, straight bank, full stage, no rifts or deep pools</td>
<td>0.025</td>
<td>0.0275</td>
<td>0.030</td>
<td>0.033</td>
</tr>
<tr>
<td>2.</td>
<td>Same as #1, but some weeds and stones</td>
<td>0.030</td>
<td>0.033</td>
<td>0.035</td>
<td>0.040</td>
</tr>
<tr>
<td>3.</td>
<td>Winding, some pools and shoals, clean</td>
<td>0.033</td>
<td>0.035</td>
<td>0.040</td>
<td>0.045</td>
</tr>
<tr>
<td>4.</td>
<td>Same as #3, lower stages, more ineffective slope and sections</td>
<td>0.040</td>
<td>0.045</td>
<td>0.050</td>
<td>0.055</td>
</tr>
<tr>
<td>5.</td>
<td>Same as #3, some weeds and stones</td>
<td>0.035</td>
<td>0.040</td>
<td>0.045</td>
<td>0.050</td>
</tr>
<tr>
<td>6.</td>
<td>Same as #4, stony sections</td>
<td>0.045</td>
<td>0.050</td>
<td>0.055</td>
<td>0.060</td>
</tr>
<tr>
<td>7.</td>
<td>Sluggish river reaches, rather weedy or with very deep pools</td>
<td>0.050</td>
<td>0.060</td>
<td>0.070</td>
<td>0.080</td>
</tr>
<tr>
<td>8.</td>
<td>Very weedy reaches</td>
<td>0.075</td>
<td>0.100</td>
<td>0.125</td>
<td>0.150</td>
</tr>
</tbody>
</table>

* Values commonly used in designing.

Source: King
### TABLE 5-22
PERMISSIBLE VELOCITIES FOR UNLINED EARTHEN CHANNELS

<table>
<thead>
<tr>
<th>Soil Types</th>
<th>Permissible Velocity (ft./sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Sand (noncolloidal)</td>
<td>2.5</td>
</tr>
<tr>
<td>Sandy Loam (noncolloidal)</td>
<td>2.5</td>
</tr>
<tr>
<td>Silt Loam (noncolloidal)</td>
<td>3.0</td>
</tr>
<tr>
<td>Ordinary Firm Loam</td>
<td>3.5</td>
</tr>
<tr>
<td>Fine Gravel</td>
<td>5.0</td>
</tr>
<tr>
<td>Stiff Clay (very colloidal)</td>
<td>5.0</td>
</tr>
<tr>
<td>Graded, Loam to Cobbles (noncolloidal)</td>
<td>5.0</td>
</tr>
<tr>
<td>Graded, Silt to Cobbles (noncolloidal)</td>
<td>5.5</td>
</tr>
<tr>
<td>Alluvial Silts (noncolloidal)</td>
<td>3.5</td>
</tr>
<tr>
<td>Alluvial Silts (colloidal)</td>
<td>5.0</td>
</tr>
<tr>
<td>Coarse Gravel (noncolloidal)</td>
<td>6.0</td>
</tr>
<tr>
<td>Cobbles and Shingles</td>
<td>5.5</td>
</tr>
<tr>
<td>Shales and Hard Pans</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Source: American Society of Civil Engineers
<table>
<thead>
<tr>
<th>CHANNEL SLOPE</th>
<th>LINING</th>
<th>PERMISSIBLE VELOCITY*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5%</td>
<td>Bermudagrass</td>
<td>6 ft./second</td>
</tr>
<tr>
<td></td>
<td>Reed canarygrass</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tall fescue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kentucky bluegrass</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grass-legume mixture</td>
<td>5 ft./second</td>
</tr>
<tr>
<td></td>
<td>Red fescue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redtop</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setaria lespedeza</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Annual lespedeza</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small grains (temporary)</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>4 ft./second</td>
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<td>2.5 ft./second</td>
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<td>5 - 10%</td>
<td>Bermudagrass</td>
<td>5 ft./second</td>
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<tr>
<td></td>
<td>Reed canarygrass</td>
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<td></td>
<td>Tall fescue</td>
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<tr>
<td></td>
<td>Kentucky bluegrass</td>
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<tr>
<td></td>
<td>Grass-legume mixture</td>
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<td>3 ft./second</td>
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<tr>
<td>Greater than 10%</td>
<td>Bermudagrass</td>
<td>4 ft./second</td>
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<tr>
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<td>Reed canarygrass</td>
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<td>Tall fescue</td>
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<td></td>
<td>Kentucky bluegrass</td>
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<td>3 ft./second</td>
</tr>
</tbody>
</table>

* For highly erodible soils, permissible velocities should be decreased by 25%. An erodibility factor (K) greater than 0.35 would indicate a highly erodible soil. Erodibility factors (K-factors) for many Virginia soils are listed in Chapter 6.

Source: Soil and Water Conservation Engineering, Schwab, et.al.
Stormwater Management Plan

- Quantity and Quality Requirements
- SWM Plan Checklist
- Chesapeake Bay Stormwater Management Calculations.
- Sample Stormwater Maintenance Agreement
• Quantity Requirements

- Section 15.5-1.7(h) of Gloucester County Code requires that adequate provisions shall be made for the collection, retention, and disposition of all on and off-site stormwater and natural water so as to protect other lands, structures, persons, and property.
- Projects must comply with Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations. Calculations must show that runoff from a proposed development will not damage adjacent properties, or exceed the capacity or cause erosion of receiving streams.

• Quality Requirements

- Gloucester County Chesapeake Bay Preservation ordinance requires that, the post-development non-point source pollutant runoff load shall not exceed the pre-development load for new development sites. (If no combination of BMPs can meet the pollutant removal requirement, consideration must be given to a different site design. Increasing the proportion of site area covered with vegetation is the best way of reducing the pollutant load generated from a site).
- For redevelopment sites, the non-point source pollution load shall be reduced by at least 10 percent.

• Maintenance Agreement

- A stormwater maintenance agreement executed between the landowner and the County is required under Section 5.5-10.D.2 of Gloucester County Code to ensure property construction and adequate maintenance of proposed BMPs. A stormwater maintenance agreement form for projects on single owner properties is enclosed in this handbook.
- Maintenance agreements for multiple owner projects such as subdivisions and shopping centers are different from those for single owner projects. Please contact the office Codes Compliance for more information on these projects. Please also note that surety in addition to an executed maintenance agreement may also be required for projects involving multiple owners.

General Stormwater Management Checklist:

• Chesapeake Bay Stormwater Calculations (including information indicating how pollutant removal requirement will be met)
- Location of existing and proposed BMPs
- Cross sections of ditches, swales, filter strips, infiltration trenches, stormwater management ponds, etc. **with details** (see BMP Design section)
- Delineation of drainage area being served by each BMP
- Number of acres or sq.ft. actually draining to each BMP provided
- Percent or acreage of impervious area within drainage area draining to each BMP provided
- Maintenance Plan-long term schedule for inspection and maintenance of SWM facilities
- Maintenance agreement [Section 5.5-10.D.2 of Gloucester County Code requires a maintenance agreement ensuring proper construction and adequate maintenance of the proposed BMPs]
- Location, width, and recordation information for all existing drainage easements
- Storm sewer drainage calculations [Detail: capacity, HGL]
- Verification of receiving line or channel adequacy (Minimum Standard 19 of the VE&SCR)
- For all culverts:
  - Inverts
  - Length
  - Discharge protection
  - Diameter
  - Headwater depth
  - Outlet velocity
  - Composition: RCP, CMP, PVC, etc.
- Runoff coefficients for the pre-developed and post-developed drainage areas. Post-developed coefficients must reflect the conditions of ultimate development
- Supporting calculations for the computation of Q2 and Q10, (and Q100 suggested), both pre-developed and post-developed
- Time of concentration provided
- Support documentation for any calculations or methods used, but not founding the Virginia E&S Handbook (VESCH)

**Gloucester County Chesapeake Bay Stormwater Management Calculations**

***********************************************************

RE: New Development
Project Name:_________________________________________________

**Step 1: Determine if site must provide BMPs to comply with stormwater requirements.**
A.) Does the site need to provide BMPs to comply with Chesapeake Bay Stormwater Management criteria?
   - If the site contains 16% impervious area or less – stormwater management criteria is met
   - If the site contains greater than 16% impervious area – stormwater management criteria requires BMPs
B.) Determine the imperviousness (I site) of the site:
   Total acreage of site (A)=___________ acres *(acreage of site, not drainage area)
   Impervious Acres (Ia):
   (Please note: Gravel areas are considered impervious area in Gloucester County)
   - structures (buildings) = ____________________ acres
   - parking lot areas = ____________________ acres
   - roads, walkways = ____________________ acres
   - other = ____________________ acres
   TOTAL (Ia) = ____________________ acres

   Percent of site that is impervious (Isite): (Total Ia/A) x 100 = __________ %

   C.) Determine if site must provide BMPs to comply:
   - If Isite from above is < or = to 16% - NO, You are finished.
   - If Isite from above is > 16% - YES, Go to Page 2 and continue with worksheet.

**Step 2: Determine the pollutant removal requirement**
A.) Calculate the pre-development pollutant load (Ipre):
   Ipre = .43 x Acreage of site (A)
   = .43 x ______________
   = ____________________ pounds per year

B.) Calculate the post-development pollutant load (Ipost):
   Ipost = 2.23 x [0.05 + (0.009 x Isite)] x A *(Isite is a whole number, not a %)
   = 2.23 x ______________ x ______________
   = ____________________ pounds per year

C.) Calculate the pollutant removal requirement (RR):
   Pounds of pollutant that must be removed from the site (RR) = Lpost – Lpre
   RR = Lpost – Lpre
   RR = ___________ - ___________
= ___________ pounds per year to be removed from site

Overall BMP efficiency required (RR%):
%RR = RR/Lpost x 100
%RR = (_________/________) x 100
%RR = __________

Note: This is the BMP efficiency required if a single BMP is proposed to treat the entire site. If the entire pollutant runoff load generated from the development is being treated by one BMP, installing a BMP with %RR removal efficiency will satisfy the stormwater removal requirement. However, if one BMP does not treat the entire site or more than one BMP will be used to treat separate drainage areas on site, this overall BMP efficiency rating (RR%) is not relevant. It is incorrect to add up the pollutant removal efficiencies of separate BMPs to determine if the pollutant removal requirement has been met for a site. For example, lets say the overall BMP efficiency required for a project is 85%. Mr. Joe Contractor has proposed two BMPs for this site. An extended detention pond with a pollutant removal efficiency rating of 35% and an infiltration trench with a pollutant removal efficiency of 50%. This combination of BMPs does NOT have an overall efficiency of 85%. The correct way to determine if the pollutant removal requirement of this site has been met is to determine the amount of pollutant load reaching each BMP and multiplying the removal efficiency of the BMP by the load going to it. For example, if 1 pound of pollutants is reaching a BMP and that BMP is 50% efficient, then .5 lbs is being removed by that BMP. To determine the total pollutant load removed is to add up the pollutant loads being removed by each BMP on site (See Step 3).

Step 3: Determine how the pollutant removal requirement will be met.
Type of BMP: ___________ (Wet pond, infiltration trench, filter strip, extended detention pond, grass swale, etc.). (If a BMP is treating the entire site, Step 3 only needs to be computed once. If more than one BMP is serving the site, then step 3 needs to be computed for each BMP).

1) Land area (in acres) draining to the BMP (A): _______________
2) Impervious area of land area draining to BMP (I): _______________
3) Percent imperviousness of area = I/A = ________________ x (100) = Iarea

Determine the pollutant load reaching the BMP:
L = 2.23 x [0.5 + (.009 x Iarea)] x A
L = 2.23 x ___________ x ____________
L = _____________ pounds going to BMP

Determine the pollutant load being removed by the BMP:
Lremoved = L x BMP efficiency %
= ___________ x ____________
= _____________ pollutant load being removed
For example, if the pollutant load reaching the BMP is 5 lbs and the pollutant removal efficiency of the BMP is 30%, the pollutant load being removed by the BMP is:

\[ L_{\text{removed}} = 5 \text{ lbs} \times 0.30 \]
\[ = 1.5 \text{ pounds} \]

Repeat all of Step 3 for each BMP proposed on the site and total the amount of pollutants being removed from the site.

\begin{align*}
L_{\text{removed}} \text{ of BMP#1} &= \\
L_{\text{removed}} \text{ of BMP#2} &= \\
L_{\text{removed}} \text{ of BMP#3} &= \\
L_{\text{removed}} \text{ of BMP#4} &= \\
L_{\text{removed}} \text{ of BMP#5} &= \\
\end{align*}

Total pollutants removed:_____ => Total pollutants required to be removed:_____?

If YES: Criteria are met.
If NO: A new site design, new combination of BMPs, or increased green area on site must be considered.

---

*Stormwater Maintenance Agreement*

This MAINTENANCE AGREEMENT is made this ______ day of ________, 20____, between __________________________ (the “Owner”) and the County of Gloucester, Virginia (the “County”).

WHEREAS, ____________________________ is the Owner of that _______ acre parcel of land (Tax Map Number ______________________) located at
In Gloucester County, Virginia and described as

In the deed recorded at the Gloucester County Circuit Court Clerk’s office as Instrument #

WHEREAS, a Site Plan prepared by ____________________________, dated

WHEREAS, said Site Plan provides for stormwater management facilities for the
treatment and control of stormwater runoff (“the Facilities”) and described as

WHEREAS, the County requires that the Facilities as shown on the Plan prepared by

dated ____________ and entitled ____________________________ be

NOW THEREFORE, in consideration of the foregoing premise, the mutual covenants
contained herein and the following terms and conditions, the parties hereto agree as follows:

1. The Owner shall maintain the facilities in such a manner as to assure good working
order acceptable to the County.
2. The Owner hereby grants permission to the County, its authorized agents and
employees to enter upon the property and to inspect the facilities whenever it deems
necessary. Whenever possible, the County shall notify the Owner prior to entering the
property.
3. In the event the Owner fails to maintain the stormwater management facilities in good working order acceptable to the County, the County may enter upon the property to maintain the said stormwater management facilities. It is expressly understood and agreed that the County is under no obligation to maintain or repair said facilities and in no event shall this agreement be construed to impose any such obligations on the County.

4. In the event the County, pursuant to this agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials and the like, the Owner or its successors shall reimburse the County, upon demand, within 30 days of receipt thereof for all costs incurred by the County hereunder.

5. This Agreement shall be recorded in the Gloucester County Circuit Court Clerk’s office and shall constitute a covenant running with the land.

6. The Owner, its executors, administrators, assigns and other successors of interest shall indemnify and hold the County and its agents and employees harmless for any and all damages, accidents, casualties, occurrences or claims which might arise or be asserted against the County from the construction of the facilities. The Owner hereby agrees to indemnify and save the County harmless from any and all costs, liability, or expense arising from the malfunction of the facility or owner’s failure to repair same in accordance with the requirements hereof.

IN WITNESS WHEREOF, the Owner and the County have entered into this MAINTENANCE AGREEMENT as of this _______ day of __________, 20_____.

By:__________________________(SEAL)

Owner

_____________________________(SEAL)

Type Name

_____________________________(SEAL)

Title (if organization)

COMMONWEALTH OF VIRGINIA,
COUNTY OF GLOUCESTER to wit:

I, a Notary Public, in and for the Commonwealth of Virginia, do hereby certify that
_________________________, whose name is signed to this foregoing stormwater maintenance agreement
bearing the date of ______ day of ______, 20____, has acknowledged the same before me in the
jurisdiction aforesaid.

Given under my hand this ______ day of __________, of 20______.

_________________________________
Notary Public

My commission expires:_____________________

************************************************

County of Gloucester, Virginia

By:__________________________
William H. Whitley
County Administrator

Approved as to form

By:__________________________
Jacob P. Stroman
County Attorney

COMMONWEALTH OF VIRGINIA,
COUNTY OF GLOUCESTER to wit:

I, a Notary Public, in and for the Commonwealth of Virginia, do hereby certify that William H.
Whitley, County Administrator and Jacob P. Stroman, County Attorney, whose names are signed to this
foregoing stormwater maintenance agreement bearing the date of ______ day of ________, 20____,
has acknowledged the same before me in the jurisdiction aforesaid.

Given under my hand this _________ day of ______________, 20_____.

____________________________________
NOTARY PUBLIC

My commission expires:________________________.
BMP Design Criteria and Pollutant Removal Efficiencies

Infiltration Trenches

Design Information:

1) Soil type at location of trench: ________________
2) Infiltration rate (in/hr) of soils: ________________
   (not to be less than .27 in/hr)
3) Maximum storage time of trench (hrs): ________________
(Storage time should not exceed 72 hrs) ______________

4) Seasonal high groundwater table elevation (ft): ______________

5) Minimum distance from trench bottom to groundwater table (ft): ______

6) Contributing drainage area (sq. ft. or acres): ______________

7) Elevation of top of trench (ft): ______________

8) Elevation of bottom of trench (ft): ______________

9) Sizing rule used: (check one)
   * .5 inch of runoff over impervious area (50% eff.) _____________
   * 1 inch of runoff over impervious area (65% eff.) _____________
   * 2 year storm (70% eff.) _____________

(All calculations to be shown and submitted with site plan)

10) Storage Volume Required (cu. ft.): ______________

11) Trench Dimensions: ______________

12) Trench Volume (cu. ft.): ______________

13) Void Ratio of Trench Medium (%): ______________

14) Storage Volume provided (cu. ft.): ______________

Please note: Infiltration facilities are not highly recommended due to Gloucester County soil and water table conditions.

**Infiltration Trench Design Checklist**

- Infiltration rate of soils more than .27 in/hr. (Trenches are not a feasible option in soils with “D” soil infiltration rates less than .27 inch/hr.)
- Seasonal high water table at least 2 feet below the bottom of the infiltration trench
- Infiltration trench fitted with a 4” to 6” perforated PVC pipe observation well to facilitate monitoring the function of the trench. (One well should be provided for each 300 foot of trench.)
- Trench located at least 100 feet from drinking water wells and at least 15 feet from building foundations
- Aggregate stone used is 1 to 3 inch diameter clean washed stone
- A minimum 20 foot wide grass filter strip or a water quality inlet is provided to filter runoff of course sediment, oil, and grease before it enters a trench (for open trenches only)
- Contributing drainage less than 5 acres
- Adequate overflow drainage system provided for excess stormwater. Infiltration trenches are normally designed for water quality purposes and therefore a significant portion of runoff volume will bypass the trench and not be infiltrated.
- Trench is designed to drain within 6 to 72 hours
- Stone subgrade extends below the frost line
- The slope of the bottom of the trench is as close to zero as drainage will permit. Longitudinal slope does not exceed 5% \[\text{Longitudinal slope} = \ \_\_\_\_\_\_\%\]
- Trench will be constructed after site is stabilized
- Proposed trench location is roped off to prevent compacting of soils by heavy equipment or traffic
- If compaction is unavoidable, trench location will be tilled prior to trench construction to restore infiltration capacity of soil
- Bottom and sides of the stone reservoir will be lined with filter fabric to prevent upward pumping of underlying soils
- The trench is designed shallow and broad rather than deep and narrow. Pollutant removal in the trench is enhanced by increasing the surface area of the trench bottom
- Grass in filter strip will not be mowed less than three (3) inches high
- Grass filter strip sides slopes 3:1 or flatter
- Maintenance plan & schedule

Wet Ponds

**Design Information:**
1.) Soil type at location of pond: __________________________
2.) Contributing drainage area (sq. ft. or acres): ________________
3.) Detention time (hours): __________________________
4.) Sizing rule uses: (choice one)
   * .5 inch of runoff over impervious area (35% eff.) __________
   * 2.5 Vr (40% eff.) __________
4.0 Vr (50% eff.)

Vr – Volume of runoff generated by mean storm
Eff. = efficiency

(All calculations to be shown and submitted with site plans)

5.) Water Quality volume required to be stored (cu. ft.): ________________

6.) Storage volume provided (cu. ft.): ________________

7.) Routings through pond to include:
   * inflow hydrograph
   * stage-storage relationship (for the 2- and 10-year storms; 100-year storm optional)
   * stage-discharge relationship (for the 2- and 10-year storms; 100-year storm optional)
   * outflow hydrograph

8.) Construction details for the basin and inlet and outlet devices

9.) 2-, 10-, and 100-year elevations; permanent pool elevation; & pond bottom elevation to be shown on pond detail.

**Wet Pond Design Checklist:**

- Side slopes of pond no greater than 3:1
- Drainage area greater than 10 acres
- Channel below pond outlet lined with rip rap
- Aquatic vegetation established around the perimeter of pond to enhance pollutant removal
- Complete routings through pond provided
- Design calculations provided
- Cross sections & details provided & properly labeled

**Grass Swale Design Checklist:**

- Swale slopes graded as close to zero as drainage will permit
  * Side-slopes no greater than 3:1
  * Longitudinal slope does not exceed 5% (Longitudinal slopes: _______%)
- Swale area will be tilled before grass cover is established to restore infiltration capacity lost as a result of construction activities
- A dense cover of water tolerant, erosion resistant grass such as reed canary grass, will be established. (Dense grasses offer a fine filter for sedimentation of particulates and relatively high friction to reduce velocity and increase residence time).
- Grass maintained at a length of 6 inches or greater to facilitate the filtering and hydraulic functions of the swale. (Effective filtration requires a vertical stand of vegetation higher than the water surface in the swale)
- Permeability or final infiltration rate of underlying soil equal to or greater than .27 inches per hour  
  (Permeability of soil: __________in/hr)
- Check dams installed in swales to promote additional infiltration. (The best method is to sink a railroad tie halfway into the swale, and place stone on the downstream side of the tie to prevent a scour hole from forming).
- Expected peak discharges not to exceed 5 cfs
- Runoff velocities must be non-erodible (in general not to exceed 1.5 fps)
- Seasonal high groundwater table is at least one or two feet below the bottom of the grassed swale. (Most ideal is a ground water surface high enough to provide moisture to vegetation during the dry season, but never so high that long periods of surface soil saturation occur).
- Swale is designed as wide as site conditions will permit
- Maximum ponding time in swale is 24 hours or less.

Filter Strip Design Checklist:
- Level spreader provided for filter strip
- Filter strip plan species provided on plan

Grass Swales

Design Information:
(Gloucester County highly encourages the use of vegetation BMPs)
1. Cross sectional diagram of grass swale provided (to include):
   a. flow depth
   b. flow length
   c. longitudinal slope
   d. side slopes
   e. width
f. flow velocity  
g. type of vegetation lining swale  
h. height of checkdams (if applicable)  
i. distance between checkdams

2. Drainage area being treated by the grass swale  
3. Size of drainage area provided in acres or square feet.  
4. Swale design should provide adequate storage volume to contain .5 inch of runoff per impervious acre in the contributing site area.  
5. Location of proposed grass swales shown on site plan.  
6. Grass swale efficiency:  
   * Minimum 20 feet wide and 100 feet long (no check dams) = 10% eff.  
   * Minimum 20 feet wide and 100 feet long (with check dams) = 20% eff.

Filter Strips

Design Information:
For filter strips:
   a. Runoff from adjacent impervious area must be evenly distributed across the filter strip. If necessary, the filter strip should be equipped with a level spreading device.  
   b. Strips should be densely vegetated with a mix of plan species. Proposed plant species need to be indicated on plan.  
   c. Strips should be graded to a uniform, even, and relatively low slope

Filter strip efficiency:
   Generally strips at least:
   * 50 feet wide and a minimum of 200 feet long = 35% efficiency  
   * 50 feet wide and a minimum of 100 feet long = 30% efficiency  
   * 20 feet wide and a minimum of 200 feet long = 25% efficiency

Extended Detention Ponds

Design Information:

1) Soil type at location of pond: ____________________________  
2) Contributing drainage area (sq. ft. or acres): ________________  
3) Detention time (hours): _________________________________  
4) Sizing rule used: (check one)  
   * .5 inch of runoff over impervious area (20% eff.) ________  
   * 1 inch of runoff over impervious area (30% eff.) ________  
   * 1 inch/imper. area with a shallow marsh bottom (50% eff.) _____  

   eff. = efficiency
(All calculations to be shown and submitted with site plan)

5) If shallow marsh is selected, supporting design and plan information is required (See design guidelines for wetland enhanced extended detention ponds)

6) Water Quality volume required to be stored (cu. ft.): _______________

7) Storage volume provided (cu. ft.) _______________

8) Routings through pond to include:
   * inflow hydrograph
   * stage-storage relationship (for the 2- and 10-year storms; 100-year optional)
   * stage-discharge relationship (for the 2- and 10-year storms; 100-year optional)
   * outflow hydrograph

9) Construction details for the basin and inlet and outlet devices

10) 2-, 10-, and 100-year elevations; pond bottom elevation to be shown on pond detail.

---

**Wetland Enhanced Extended Detention Ponds**

Design Guidelines:

1) A minimum drainage area of 10 acres is recommended to provide the necessary hydrology to support a marsh system.

2) The facility should have several areas of differing hydrology. These areas include a forebay, micropool, low marsh, high marsh, and semi-wet depth areas. These areas should be allocated as follows:

<table>
<thead>
<tr>
<th>Percent of Surface Area</th>
<th>Percent of Treatment Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forebay 5</td>
<td>Forebay 10</td>
</tr>
<tr>
<td>Micropool 5</td>
<td>Micropool 10</td>
</tr>
<tr>
<td>“Low Marsh” 40</td>
<td>“Low Marsh” 20</td>
</tr>
</tbody>
</table>
“High Marsh” 40  “High Marsh” 10
“Semi-Wet” 10  “Semi-Wet” 50

The depth of these areas vary as follows:
- Forebays and micropools – one to six feet below normal pool elevation
- Low Marsh – six to eighteen inches below normal pool elevation
- High Marsh – zero to six inches below normal pool elevation
- Semi-Wet – zero to two feet above normal pool elevation

3) Extended detention may be provided above the permanent pool. The maximum water surface elevation should not be greater than three feet above the normal pool elevation.
4) The wetland planting area should be comprised of the “low marsh”, “high marsh” and “semi-wet” areas. Each area should be planted with wetland vegetation appropriate for its depth zone. Planting five to seven species within each area is recommended.
5) The wetland-to-watershed ratio should be a minimum of 1%.
6) The dry weather flow path through the basin should be maximized.
7) Water quality volume depth should be no greater than 3 feet.
8) Draining time should not exceed 24 hours.
9) A 25-foot wide vegetated buffer strip, measured from the maximum water surface, located adjacent to the stormwater wetland should be provided.

Taken from: Design of Stormwater Wetland Systems: Guidelines for Creating Diverse and Effective Stormwater Wetland Systems in the Mid Atlantic Region
Project Name: ________________________________
Applicant Name: _______________________________________________
Address:______________________________________________________________________
_____________________________________________
Phone#:_____________________

Please note: Only applicant will be sent the site plan review letter and be designated the sole contact person for all matters concerning the submitted site plan).

Project Information:
1.) Proposed Use:____________________________________________
2.) Tax Map # of parcel(s) involved in project review:_________________________________________________
3.) Property Owner:__________________________________________
4.) Address:______________________________________________________________________
5.) Are there any covenants of record or proposed covenants that may affect this project?___________
   If yes, please attach explanation.

I do hereby certify that I have read and am familiar with the requirements for the submission of site plans as provided for under the Site Plan Ordinance (Section 15.5 of Gloucester County Code).

Signature of Applicant:_______________________________
Date:_______________
****************************************

Site Plan Review Fee: $500.00 base fee plus $50.00 per acre of disturbed area or fraction thereof
## Highway Corridor Overlay District Checklist

### Section 6A-2. Establishment
- The parcel is located: on Route 17 on Route 14 in B-4 district

### Section 6A-3. Applicability
- New development OR Redevelopment?
- Is the proposed development part of a shopping center or other larger development?
  - Yes
  - No

### Section 6A-4. Access
- Has an Access Plan been submitted as per 6A-4(1)?
- Is there more than one direct access to an established HCOD Route?
- Direct access defined in Sec. 6A-4(2)c as i) an existing or planned public r/w, a special access street, and/or a private drive; ii) internal circulation of a shopping center, an office complex, or similar group of buildings having access in accordance with an approved access plan; and iii) individual or shared access.

No parcel or lot in existence prior to February 1, 1998 having frontage on an established HCOD Route, shall be permitted more than one (1) direct access to that Route.

No assembly of two (2) or more parcels, in existence prior to February 1, 1998, and subsequently places under one (1) ownership, control, and/or maintenance, shall be permitted more than one (1) direct access to an established HCOD Route.

- Is there an existing or proposed crossover?
- Is there a plan to provide access to adjacent parcels at crossovers?
- Is there internal circulation associated with the access plan?
- Are there pedestrian walkways incorporated into the project?
  - Type: Concrete sidewalk Walking path Other
  - Is a traffic impact analysis included in the package?
    - Director requested OR development will generate >10,000 avg. daily trips
      - a. Does the analysis include the level of service impacts based on a 20-year demand projection?
      - b. Does it address future needs the development will produce?
- Do the required improvements accommodate proposed development in accordance with:
  - 1- the Comprehensive Plan?
  - 2- needs identified by the traffic impact analysis?
  - 3- safe and efficient access?

### Section 6A-5. Architectural Treatment
- Is the front, side or rear of the building visible to any agricultural, residential or office zoning district or public right-of-way?
- Building exteriors are made of
- Is the mechanical equipment (ground level or rooftop) shielded and/or screened from view?
* Architectural Matrix*
Points scored on the architectural treatment matrix may grant reduction in the front yard setback. One foot for each point as long as parking is in the rear of the principal structure.

- **Roof:**
  - Gable roof with pitch 6 over 12 or greater 5 points
  - Cedar shingles 2 points
  - Slate shingles 2 points
  - Architectural grade asphalt 1 point
  - Tin/metal (standing seam) 1 point
  (The primary roof material shall be used in scoring; no accumulation of points) Total:_____

- **Façade:**
  - Brick 5 points
  - Wood clapboard 2 points
  - Stone (excluding concrete block) 1 point
  - Decorative trim 1 point
  (The primary façade material will be used for scoring; no accumulation of points) Total:_____

- **Windows:**
  - Dormers 3 points
  - Vertically proportioned 2 points
  - Window grilles 1 point
  - Wooden shutters 1 point
  Total:_____

*Section 6A-6. Setbacks and Landscaping*
- Setbacks apply to all structures; signs; parking areas; drives (except those necessary for direct access); gasoline pumps and their related drives; as well as product displays such as boats, autos, equipment, and others.

<table>
<thead>
<tr>
<th>PERIMETER LANDSCAPING</th>
<th>FRONT YARD SETBACK</th>
<th>SIDE YARD SETBACK</th>
<th>SIDE YARD SETBACK</th>
<th>REAR YARD SETBACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option “A”</td>
<td>70</td>
<td>20</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Option “B”</td>
<td>60</td>
<td>15</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Option “C”</td>
<td>50</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Architectural Points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Setback</td>
<td>(no less than 40’)</td>
<td>(no less than 10’)</td>
<td>(no less than 10’)</td>
<td>(no less than 20’)</td>
</tr>
</tbody>
</table>
Is there a landscape plan showing the HCOD requirements?  
(Y  N  N/A)  
(Drawn to scale, showing dimensions and distances, delineating all proposed structures, parking areas, and drives, and specifying the location, size and description of all landscaping materials.)

Does the landscape plan have the following notes:

* All plant materials shall be living and in healthy condition when installed.  
  (Y  N)

* The owner, or his agent, shall be responsible for the maintenance, repair and replacement of all landscape materials.  
  (Y  N)

* All plant material shall be tended and maintained in a healthy growing condition and free from refuse and debris at all times.  
  (Y  N)

* All unhealthy, dying or dead plant material shall be replaced during the next planting season.  
  (Y  N)

Does the landscape plan identify existing trees 8 inches DBH or greater to be preserved as per Section 6A-7(2)(c)?  
(Y  N  N/A)

Is the plan using preserved tree credits to meet the HCOD requirements?  
(Y  N  N/A)

<table>
<thead>
<tr>
<th>8”-9” caliper = 2.5 points</th>
<th>No. of trees</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10”-11” caliper = 3.0 points</td>
<td>No. of trees</td>
<td>Total Credits</td>
</tr>
<tr>
<td>12” caliper or greater = 4.0 points</td>
<td>No. of trees</td>
<td>Total Credits</td>
</tr>
</tbody>
</table>

Does the plan show existing tree(s) to be removed?  
(Y  N  N/A)

**Requirements (Use Worksheet on Pages 5 & 6)**

**Perimeter landscaping A:**
- Large deciduous tree – 1 per 50 linear feet.
- Small deciduous tree – 1 per 50 linear feet.
- Evergreen tree – 1 per 30 linear feet.
- Medium shrub – 1 per 15 linear feet
- Low shrubs and ground cover dispersed throughout to avoid large areas of bare ground

**Perimeter landscaping B:**
- Large deciduous tree – 1 per 50 linear feet.
- Small deciduous tree – 1 per 30 linear feet.
- Evergreen tree – 1 per 30 linear feet
- Medium shrub – 1 per 10 linear feet
- Low shrubs and ground cover dispersed throughout to avoid large areas of bare ground

**Perimeter landscaping B (option II):**
- A minimum three feet high undulating berm, landscaped with ground cover and other stabilizing vegetation
- Perimeter Landscaping A.

**Perimeter landscaping C (option I):**
- Large deciduous tree – 1 per 50 linear feet.
• Small deciduous tree – 1 per 30 linear feet.
• Evergreen tree – 1 per 30 linear feet.
• Medium shrub – 1 per 5 linear feet, OR continuous hedgeforms for the entire lot width, OR a continuous picket fence for the entire lot width. *(The fence can be no taller than 4 feet and no shorter than 3 feet).*
• Low shrubs and ground cover dispersed throughout to avoid large areas of bare ground.

**Perimeter landscaping C (option II):**
• A minimum three feet high undulating berm, landscaped with ground cover and other stabilizing vegetation
• Perimeter landscaping B, Option I.

- Is there a text box on the plan showing the HCOD requirements? Y N N/A

Including the internal landscaping and following size requirements:

*Large and small deciduous trees = 2½” caliper*

*Evergreen trees = 5’ tall*

*Medium Shrubs = 2’ tall*

- Does the plan address irrigation for the HCOD landscaping? Y N N/A
- Does the plan show the proposed landscaped area to be enclosed within a visible barrier prior to the start of construction? Y N N/A
- How will the landscaped areas be protected from vehicular encroachment once completed? 
- Will the landscaping be installed prior to the issuance of the C.O.? Y N N/A
  - If no, has the owner or developer provided surety? Y N N/A
  - Has it been noted on the plan that installation will occur the first planting season following the issuance of the C.O.? Y N N/A

**Section 6A-8. Signs**

- Zoning of site _____ On-premises sign style ___________ Required setback _________
- Is the on-premises sign shown on the plan? Y N N/A
- Does the on-premises sign meet the setback? Y N N/A
- Does the landscape plan incorporate plantings around the base of the sign? Y N N/A
- Is there a note on the plan saying a comprehensive sign package must be submitted to the office of Codes Compliance for approval? Y N N/A
**Perimeter Landscaping Worksheet**

**Front Yard:**
- Setback: 
- Perimeter Length: 
- Landscape Option: 

<table>
<thead>
<tr>
<th>Type of Landscaping</th>
<th>Perimeter Length Linear Feet</th>
<th># per linear feet</th>
<th># of Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Deciduous Tree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Deciduous Tree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evergreen Tree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Shrub</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low shrubs and ground cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rear Yard Setback**
- 70’ = Option A
- 60’ = Option B
- 50’ = Option C

**Side Yard A Perimeter Length**

<table>
<thead>
<tr>
<th>20’ = A</th>
<th>20’ = A</th>
</tr>
</thead>
<tbody>
<tr>
<td>15’ = B</td>
<td>15’ = B</td>
</tr>
<tr>
<td>10’ = C</td>
<td>10’ = C</td>
</tr>
</tbody>
</table>

**Side Yard B Perimeter Length**

<table>
<thead>
<tr>
<th>20’ = A</th>
<th>20’ = A</th>
</tr>
</thead>
<tbody>
<tr>
<td>15’ = B</td>
<td>15’ = B</td>
</tr>
<tr>
<td>10’ = C</td>
<td>10’ = C</td>
</tr>
</tbody>
</table>

(Architectural Credits?)

**Front Yard Perimeter Length**

<table>
<thead>
<tr>
<th>30’ = Option A</th>
<th>30’ = Option A</th>
</tr>
</thead>
<tbody>
<tr>
<td>25’ = Option B</td>
<td>25’ = Option B</td>
</tr>
<tr>
<td>20’ = Option C</td>
<td>20’ = Option C</td>
</tr>
</tbody>
</table>

(Architectural Credits?)
### Rear Yard

**Setback:** _____; **Perimeter Length:** _____; **Landscape Option:** _____

<table>
<thead>
<tr>
<th>Type of Landscaping</th>
<th>Perimeter Length</th>
<th># per linear feet</th>
<th># of Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Deciduous Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Deciduous Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evergreen Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Shrub</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low shrubs and ground cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Side Yard A

**Setback:** _____; **Perimeter Length:** _____; **Landscape Option:** _____

<table>
<thead>
<tr>
<th>Type of Landscaping</th>
<th>Perimeter Length</th>
<th># per linear feet</th>
<th># of Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Deciduous Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Deciduous Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evergreen Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Shrub</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low shrubs and ground cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Side Yard B

**Setback:** _____; **Perimeter Length:** _____; **Landscape Option:** _____

<table>
<thead>
<tr>
<th>Type of Landscaping</th>
<th>Perimeter Length</th>
<th># per linear feet</th>
<th># of Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Deciduous Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Deciduous Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evergreen Tree</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Shrub</td>
<td>÷</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low shrubs and ground cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Parking Checklist

Section 11-2. General Requirements.

- The development is New an Addition/Enlargement.
- The use of the structure/site will be _______________________

- Will the use generate a minimum of 1,000 average daily trips? Y N N/A
- Does a transit route exist or will it exist within 12 years? Y N N/A
  If yes, does the plan provide for pull-outs and shelters? Y N N/A
  *If the answer to the above 2 questions is yes, the number of required parking spaces can be reduced by 5%.*

- Will the use generate a minimum of 500 average daily trips or have more than 25 employees on one shift? Y N N/A
  If yes, does the plan provide for bicycle and pedestrian accommodations? Y N N/A

- Will the use support a Transportation Demand Management program? Y N N/A
  What type:
  Rideshare Flexible Schedules On-site child care Telecommuting
  Bike/Pedestrian accommodations (including employee showers and lockers; covered/secured bicycle parking)

  *Each program element permits a 5% reduction in the number of off-street parking spaces.*
  *Total reduction _________*

- If off-street parking credit is given, does the plan show a reserve land area that would accommodate half of the spaces credited if needed in the future? Y N N/A

Section 11-12. Parking and loading space requirements.

USE ______________________
(Shopping centers shall have 1 space per 250 square feet of floor area.)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-street</td>
<td></td>
</tr>
<tr>
<td>Loading</td>
<td></td>
</tr>
<tr>
<td>Bicycle</td>
<td></td>
</tr>
</tbody>
</table>

Calculations:
Gross Floor Area / Parking Square Footage = Total Spaces

Off-street:
Loading:
Bicycle:
Regarding Handicap Accessible Parking, use the following chart:

<table>
<thead>
<tr>
<th>Total Parking in Lot</th>
<th>Required Number of Handicap Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 25</td>
<td>1</td>
</tr>
<tr>
<td>26 – 50</td>
<td>2</td>
</tr>
<tr>
<td>51 – 75</td>
<td>3</td>
</tr>
<tr>
<td>76 – 100</td>
<td>4</td>
</tr>
<tr>
<td>101 – 150</td>
<td>5</td>
</tr>
<tr>
<td>151 – 200</td>
<td>6</td>
</tr>
<tr>
<td>201 – 300</td>
<td>7</td>
</tr>
<tr>
<td>301 – 400</td>
<td>8</td>
</tr>
<tr>
<td>401 – 500</td>
<td>9</td>
</tr>
<tr>
<td>501 – 1000</td>
<td>Two percent of total</td>
</tr>
<tr>
<td>1001 and over</td>
<td>20 plus 1 for each 100 over 1000</td>
</tr>
</tbody>
</table>

Total number of handicap spaces required. ___________

- For uses in the Gloucester County Village area, defined within the following boundaries:
  - “Length” – From the Court Circle (by the Masonic Lodge) to Smith Avenue (between the Courthouse Restaurant and the Exxon gas station).
  - “Width” – 900’ from the centerline of Main Street.

Where any use, by virtue of physical limitations relating to the built-out nature of development in this area, cannot reasonably comply with the parking requirements listed herein, the [zoning] administrator may modify or waive such requirements to the extent necessary.

Will the Zoning Administrator be modifying or waiving the parking requirements? Y N N/A

Section 11-3. Dimensions of parking spaces and aisles

- Are the parking spaces a minimum of 9’ X 18”?
  Y N N/A

- Do the drive aisles meet the following requirements:

<table>
<thead>
<tr>
<th>Angle of Parking</th>
<th>Direction of Traffic</th>
<th>Width of Aisle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel</td>
<td>One-way</td>
<td>12 feet</td>
</tr>
<tr>
<td>45 degrees</td>
<td>One-way</td>
<td>12 feet</td>
</tr>
<tr>
<td>60 degrees</td>
<td>One-way</td>
<td>18 feet</td>
</tr>
<tr>
<td>90 degrees</td>
<td>Two-way</td>
<td>24 feet</td>
</tr>
</tbody>
</table>

Section 11-4. Loading space dimensions.

- Are the loading spaces a minimum of 12” X 25”?
  Y N N/A

- Do the loading spaces have a minimum clearance of 14 feet?
  Y N N/A

Section 11-5. Design requirements for off-street parking and loading requirements.

- Do the parking areas have adequate parking?
  Y N N/A

  Will the lighting shine away from adjoining properties and r/w’s?
  Y N N/A

- Is the parking area(s) located in or adjacent to a residential zoning district?
  Y N N/A

  If yes, is the parking screened on all sides adjoining the residential district by a dense evergreen hedge? (4’-6’ tall evergreen hedge)
  Y N N/A
• Does the parking area contain more than 5 parking spaces? Y N N/A
   If yes, the following are the requirements for internal landscaping:

• For each space, the parking area shall have 20 square feet of internal landscaping
   Number of spaces X 20 s.f. = Required S.F.

• Is there existing vegetation to be credited? Y N N/A
   (Existing trees greater than 8” DBH shall be credited as 2 newly
   planted Large Deciduous trees) Total Credits

• Are the landscaped areas larger than 100 square feet? Y N N/A
• Are the areas an average of 9’ in width at minimum? Y N N/A
• Required trees for the landscaped area:
   1 Small Deciduous per 100 square feet.
   1 Large Deciduous per 200 square feet.

• Is there groundcover on the landscaped islands? Y N N/A
• Are there double rows of parking spaces on the plan? Y N N/A
   If yes, is a landscape island provided for every 8 spaces in a row? Y N N/A

• Are the landscaped areas dispersed throughout the parking area? Y N N/A

• If the parking lot is adjacent to the public r/w, is it screened? Y N N/A
   Either by:
   A continuous evergreen hedgeform no shorter than 3’ tall, OR
   A continuous undulating earthen berm no shorter than 3’ and landscaped
   With groundcover and other stabilizing vegetation; OR
   A continuous picket fence, no shorter than 3’ and no taller than 4’, painted
   white or whitewashed (a plastic composite fence designed to look like a
   picket fence is permitted).

Section 11-6. Maintenance of off-street parking and loading areas.
• The owner of the property used for parking and/or loading shall maintain such area in good
  condition without holes and free of all trash and other debris.

Section 11-7. Location of parking spaces.
• Are there parking spaces within 400 feet of the use being served? Y N N/A
• Are the bicycle spaces within 250 feet of the use? Y N N/A
• Are the handicap spaces within 100 feet of the use? Y N N/A

Section 11-8. Minimum distance and setbacks.
• Is there a dwelling unit, school, hospital, or other institution for
   human care located on an adjoining property? Y N N/A
   If yes, is there any are of parking less than 20’ to the structure? Y N N/A

• Is any parking area less than 4’ from a lot line or r/w? Y N N/A
Section 11-9. Joint use

- Will 2 or more uses jointly share the parking area?  Y  N  N/A
  *(Due to difference in hours of operation.)*

  If yes, does the parking area meet all the requirements?  Y  N  N/A

  If yes, is there a note on the plan referencing a written agreement to be filed with the Zoning Administrator with the zoning permit?  Y  N  N/A

Section 11-10. Access.

- Will vehicles be moving in a forward motion when entering or exiting a parking area?  Y  N  N/A

- Will vehicles entering or exiting a parking area be clearly visible to any pedestrian or motorist approaching the access driveway from a public or private r/w?  Y  N  N/A

Section 11-11. Width of access driveway.

- Are the entrances and exits clearly marked?  Y  N  N/A

- Do the access roads (those roads that do not provide direct access to parking spaces) meet the following width requirements:

  - One-way traffic  12 feet
  - Two-way traffic  24 feet at minimum

- Do the access roads have directional signs or markings?  Y  N  N/A