Florence County MS4

Stormwater Management and Sediment and Erosion Control Plan Review Checklist for Design Professionals

Please indicate the location and page number(s) where each item below can be found in your SWPPP or supporting calculations. If an item is not applicable, put N/A. The Florence County Engineering Division (FCED) reserves the right to modify this checklist at any time.

Checklist Completed by:

Printed name: _____ Signature: _____ Date: _____

1. **CURRENT COMPLETED APPLICATION FORM**
   - Original signatures
   - Signatory authority
   - All items completed and answered
   - Fee Schedule
   - *Note: State and local government projects are not exempt from the plan review fee of $100 per disturbed acre.*
2. **COPIES OF PLANS AND CALCULATIONS**
   - Plans stapled together!
   - For projects that disturb more than 1 acre, or less than or equal to 1 acre but are part of a larger common plan of development or sale (LCP), submit ONE set of plans and ONE set of supporting documentation (report, calculations, maps, etc.) for the initial review package. . [*Note: Upon review completion, you may be required to provide up to 4 additional sets of plans to be stamped for approval.*]
   - Supporting documentation tabbed (e.g., Maps, Pre-Development calculations) and pages numbered [no loose pages]
3. **LOCATION MAP**
   - North arrow and scale
   - Outlined project location
   - Labeled road names
4. **PROJECT NARRATIVE**
   - Scope of project outlined, including a brief description of pre- and post-development conditions
   - Summary table of pre- and post-development flows (at least 2-year, 10-year, and 25-year, 24-hour storm events).
   - Existing flooding problems in the surrounding area described
   - Disturbed area calculations included for subdivision projects or LCP disturbing 1 or more acres

     ➢ For subdivisions if the site is not to be mass-graded, the following formula should be used to determine the amount of disturbance:

     Amount of Disturbance = 2[Max Restricted Building Size][Number of Lots] + Right of Way (ROW) areas {ROW areas include clearing for roads, utilities, easements etc.}

     ➢ If this equation is used, include a note on the **plans** stating: "The site is not to be mass-graded. Only 2 times the footprint is to be cleared as the lots are developed. The assumed disturbance on each lot is _____ sq. ft."
5. **USGS TOPOGRAPHIC MAP**
   - Project boundary outlined
   - Route of runoff from site to nearest waterbody shown
   - Road names adjacent to site labeled
6. **SOILS INFORMATION**
   - Project boundary outlined
   - Predominate soil types found at the site identified on the plans or on a separate map
   - *Note: Soils information is available from the Natural Resource Conservation Service through their website: http://websoilsurvey.nrcs.usda.gov/app/*

7. FLOODWAY MAPS/FEMA FLOOD INSURANCE MAP

- Project boundary outlined, if in close proximity to floodplain/ floodway
- Description of any planned disturbance in floodplain.

8. WATERS OF THE STATE, INCLUDING WETLANDS

- Delineation of all waters of the State (WoS), including wetlands, shown and labeled on plans (delineation not required if a 100-ft undisturbed buffer can be maintained between the WoS and all land-disturbing activities)
- Additional, separate plan sheet that shows all WoS on the site and the impacted areas with a description of the activity(s), whether it is permanent or temporary, and any other relevant information.
- If impacts to WoS, outlined areas of impacts and labeled that no work can begin in this area until all necessary USACOE permits and SCDHEC 401 certifications have been obtained.
- Double row of silt fence provided in all areas where a 50' undisturbed buffer cannot be maintained between the disturbed area and the WoS
- Minimum 10' maintenance buffer provided between last row of silt fence and WoS; or, if buffer not provided, then statement from P.E. on plans indicating how silt fence will be installed and maintained without impacts to WoS
- *Note: If there are proposed impacts to WoS, then it is advised that you contact USACOE (866-329-8187) and/ or S.C. DHEC Water Quality Certification, Standards & Wetlands Programs Section (803-898-4300) to determine additional requirements before submitting the Notice of Intent (NOI).*
- *Note: If WoS are to be impacted, work cannot be performed in these designated areas until all necessary permits have been acquired*
- *Note: If a USACOE permit is required for construction of or access to a temporary or permanent stormwater management structure, NPDES permit coverage cannot be granted until the USACOE permits and S.C. DHEC 401 Section certifications are obtained.*
- *Note: FCED recommends a minimum 20-foot buffer between a sediment trap/basin and WoS.*

9. HYDROLOGIC ANALYIS

- Pre- and post-developed hydrologic analysis calculations for the 2- and 10-year, 24-hour storm events at each outfall point
- Drainage area maps that clearly correspond to the calculations (pre- and post-development)
- Analysis points for comparing runoff rates and the total drainage area analyzed do not change from pre- to post-development, although the immediate drainage areas contributing to each analysis point might shift.
- Post-development discharges less than pre-development discharges for each outfall point (if not, then see "Detention Waiver" section below)
- Analysis performed using SCS 24-hour storm (Rational method is not acceptable)
- Rainfall data from South Carolina DHEC Storm Water Management BMP Handbook (BMP Handbook) used in all calculations
- *Note: The curve number for open water, marshes, etc. should be 98 to 100.*

10. DETENTION ANALYSIS/DESIGN

- **Analysis**
  - Pond routing using a volume-based hydrograph for the 2-year, 10-year, and 25-year, SCS 24-hour storm event (Drain:Edge, ICPR, HEC-1, SedCAD, HYDRAFLOW, etc. perform full pond routings; TR55 does not perform a full pond routing; rational method cannot be used)
  - Hydrologic and hydraulic calculations necessary to determine the impact of hydrograph timing modifications of the proposed land-disturbing activity, with and without the detention structure (results of analysis will determine the need to modify the detention design or eliminate the detention requirement—see note 2 below)
  - Inputs and outputs from analysis program
  - Summary table of the peak inflows, peak outflows, discharge velocities, and maximum water surface elevations (WSE) for the 2- and 10-year, 24-hour storm events for each detention structure
  - Stage-storage-discharge relationship for the outlet structure of each detention structure
  - If a rating curve for the outlet structure must be generated externally from the analysis program (Drain:Edge, HEC-1, etc.), data and equations used to rate the outlet structure
  - As-built of existing detention pond if the site drains to an existing detention pond (see below)
  - *Note: SedCAD users please refer to the SCDHEC memo regarding the input of outlet structures.*
  - *Note: FCED recommends using the 10% rule in performing analysis. The hydrologic analysis should be conducted for the larger drainage area, where the site in question encompasses 10% of the total drainage area. For example, if your site is 10 acres, then the hydrologic analysis should be performed at the point downstream where the contributing drainage area, including your 10-acre site, is approximately 100 acres.*

- **Design**
  - Detail of outlet structure and cross-section of the dam/ berm or pond bank, including elevations and dimensions that correspond to the calculations
  - Orifice constructability considered (do not specify orifice diameters with increments of less than ¼")

- Maximum WSE for the 10-year storm event below the emergency spillway with 0.5-ft of freeboard between maximum WSE for the 10-year storm and the emergency spillway
- Maximum WSE for the 100-year storm event below the embankment with 0.5-ft of freeboard between maximum WSE for the 100-year storm and the embankment
- Dewatering time calculations for the 10-year storm event (dry ponds must drain completely within 72 hours)
- Bottom of all detention and retention ponds graded to have a slope of not less than 0.5%
- If the pond is to be used for sediment control during construction, temporary horseshoe-shaped riprap berm in front of any low level outlets provided during construction and shown on the pond detail
- Permanent maintenance access to all permanent detention structures (easements may be needed for structures surrounded by lots)
- Infiltration systems designed in accordance with S.C. Reg. 72-307.C(11) [specify how items a-j have been addressed]
- *Note: Emergency spillways should not be built on fill slopes.*
- *Note: FCED recommends installation of a trash rack or other debris-screening device on all pond risers.*
- *Note: FCED recommends a maximum slope of 3:1 on pond embankments to allow for ease of maintenance.*
- *Note: FCED recommends installation of sediment forebays at each outfall into the detention/ sediment basin.*

11. AS-BUILTS

- Provided for all previously approved detention ponds that will receive flows from new drainage areas
- Prepared by a South Carolina Licensed Land Surveyor
- Grades/ contours/ depths for pond
- Elevations and dimensions of all outlet structures, including:
  - Pipe and orifice inverts and diameters
  - Weir elevations and dimensions
  - Riser dimensions and elevations
  - Emergency spillway dimensions and elevations
  - Locations and inverts for all pipes discharging into the pond
- If the elevations or dimensions of the structures listed above do not match those used in the approved plans, certification statement signed by the project's Registered Engineer indicating that the pond, as built, will function within all applicable standards provided [new analysis of the pond (routing) may be necessary]
- *Note: As-built survey and /or analysis must be submitted and accepted by FCED before Notice of Termination (NOT) is submitted.*

12. PERMANENT STORMWATER MANAGEMENT STRUCTURE MAINTENANCE

- Signed agreement from the responsible party accepting ownership and maintenance of the structure
- Description of maintenance plan to be used
- Schedule of maintenance procedures (e.g., every 6 months)
- Detailed or manufacturer-specific maintenance items for proprietary control devices (oil-water separators, etc.), underground detention structures, exfiltration systems and non-traditional stormwater controls (constructed wetlands, bioretention, etc.)
- Typical maintenance items to be addressed
  - Grass to be mowed
  - Trees to be removed from within the pond and on the embankment
  - Trash and sediment to be removed from inside of and around the pond outlet structure
  - Orifices to be cleaned and unclogged
  - Outlet pipe to be cleaned, inspected, and repaired
  - Sediment accumulation to be removed from pond
  - Pond bottom to be regraded to provide proper drainage towards the outlet discharge point
  - Energy dissipator to be cleaned and repaired
  - Emergency spillway, if applicable, to be inspected and repaired
  - Erosion on side slopes, if present, to be addressed
  - FCED must be notified in writing of any changes in maintenance responsibility for the stormwater devices at the site (include this statement in agreement).
- *Note: If the entity or person with maintenance responsibility changes, then a new maintenance agreement, signed by the new person responsible for maintenance, must be provided to FCED. If a new, signed maintenance agreement is not provided to FCED, then the entity/ person who signed the most recent maintenance agreement on file with FCED will be considered the responsible entity.*

13. DISCHARGE POINTS

- Storm drainage or pond outfalls carried to an existing drainage outfall such as a pipe, ditch, etc.
- No new point discharges onto adjacent property where there was not a point discharge previously, unless written permission from the adjacent property owner is provided
- Level spreaders, plunge pools, etc. provided when the proposed outlet is near the property line and not directed to an existing outfall, such as a creek or ditch
- Twenty (20)-foot minimum buffer is provided between the property line and the discharge point

- Outlets shall not discharge on fill slopes

14. DETENTION WAIVER

- *Note: If the 2-year, 10-year, and 25-year, 24-hour post-developed flow rates exceed the pre-developed rates, waivers from detention may be granted in accordance with regulation 72-302(B) on a case-by-case basis*
- Justification and a written request, including the following statement: "*the increased flows will not have a significant adverse impact on the downstream/adjacent properties"*
- A project may be eligible for a waiver or variance of stormwater management for water quantity control if the applicant can demonstrate that:
  - The proposed project will have no significant adverse impact on the receiving natural waterway or downstream properties; or
  - The imposition of peak control requirements for rates of stormwater runoff would aggravate downstream flooding
- Waiver signed by the project's Professional Engineer
- *Note: See note in checklist item 10 regarding the 10% rule.*

15. PERMANENT WATER QUALITY REQUIREMENTS

- Permanent water quality addressed
  - Wet ponds designed to catch/store the first ½ inch of runoff from the entire site or the first one (1) inch of runoff from the built upon area, whichever is greater, and release it over at least a 24-hour period
  - Dry ponds designed to catch/store the first one (1) inch of runoff from the entire site, and release it over at least a 24-hour period
  - For areas not draining to a pond, show how permanent water quality requirements were addressed
- Waters of the U.S./State are not used for permanent water quality control (alternative means of treatment must be used if an existing pond is to be used for water quantity control).
- *Note: Other non-traditional stormwater controls such as Bioretention areas, constructed wetlands, etc. may be used. Consult the SCDHEC BMP Handbook for information on the design of these devices.*
- *Note: Pre-fabricated or proprietary treatment devices are approved on a case-by-case basis if adequate removal efficiency can be demonstrated. Provide pollutant removal efficiency data, preferably from a third-party testing company. Type of system selected should be based on the ability to remove the pollutants of concern in that area/situation (bacteria, hydrocarbons, etc.).*

16. SEDIMENTOLOGY

- Trapping efficiency calculations showing that all sediment basins/ traps are capable of achieving a sediment trapping efficiency of at least 80% for the 10-year, 24-hour storm event, if more than 10 disturbed acres drain to a common point (stream, lake, etc.)
- Sediment basins provide storage for the 10-year, 24-hour storm event for disturbed conditions or 3600 ft^3/ acre draining to the basin, if more than 10 disturbed acres drain to a common point (stream, lake, property line, etc.)
- Sediment traps only used for drainage areas of less than 5 acres
- Sediment trap storage calculations, showing that 1800 ft^3/ total acre draining to each trap is provided below the spillway
- If trapping efficiency calculations are required for sediment traps, then provide peak outflow, q_{po}, calculations; the 10-year, 24-hour storm event for construction conditions cannot overtop the trap's spillway
- Sediment basins and traps designed for total area draining to them
- Drainage area map outlining the area draining to each basin/ trap
- Copies of figures used to determine V_{15} (SV-1) and trapping efficiency (ST-1, SB-1, SB-2), if Design Aids from BMP manual are used to determine trapping efficiencies
- Silt fence only used in areas with drainage areas of less than ¼ acre per 100 LF of fence and not used in areas with concentrated flows
- Clean-out stake, marked at ½ the designed sediment storage depth, provided in all sediment basins/ sediment traps
- *Note: Consult the SCDHEC BMP Handbook for information on the design of these and other devices.*
- *Note: The Design Aids in the SCDHEC BMP Handbook cannot be used to determine trapping efficiencies for structures in series. If the flow for the10-year, 24-hour storm for construction conditions overtops the structure or the structure's spillway, then the Design Aids cannot be used. If multiple soil types are in the area draining to the structure, then the soil type with the smallest D_{15} for the appropriate depth should be used to determine the settling velocity, V_{15}; an average D_{15} should not be used.*
- *Note: SedCAD users please refer to the SCDHEC memo regarding the input of outlet structures.*

17. STABLE CHANNEL CALCULATIONS

- All channels and diversion ditches able to handle the 10-year storm event with non-erosive velocities of less than 5 feet per second during construction (use appropriate CN for disturbed areas) and post-construction (if velocity exceeds 5 ft/s, then permanent measures to reduce the velocity to a non-erosive rate must be provided)
- Rock check dams provided in temporary diversions
- Installation detail for erosion control blanket (ECB) or turf reinforcement matting (TRM) if ECBs or TRMs to be used

18. INLET PROTECTION

- Provided at all inlets
- Hay bales not used
- Steel posts and buried fabric shown for filter fabric inlet protection
- Inlet protection details provided for pre-paving and after roadways have been paved
- *Note: FCED recommends that an inlet not have more than one (1) acre draining to it.*

19. ENERGY DISSIPATORS/ OUTLET PROTECTION

- All outlets stabilized
- Riprap aprons sized appropriately
- Riprap detail shows apron dimensions and stone sizes for each pad or each pipe diameter
- Filter fabric installed beneath all riprap

20. FILL SLOPES AND/ OR EMBANKMENTS

- All slopes stabilized
- Slope drains designed in accordance with the SCDHEC BMP Handbook
- Slope drains provided where concentrated flows discharge onto a fill slope
- For all slopes steeper than 1.5:1, identification of stabilization practice (e.g., ECB, TRM)
- *Note: Measures, in addition to grassing or hydroseeding, include synthetic or vegetative matting, diversion berms, temporary slope drains, etc.*
- *Note: If retaining walls or fill slopes are to be constructed at the downstream property line, DPW recommends a 10' buffer to allow for construction and maintenance. If a 10' buffer is not provided, then provide permission from the adjacent property owner for possible land-disturbing activities on his property.*

21. UTILITY LINES

- Limits of disturbance include areas disturbed for water and sewer line installation
- Inlet protection provided at all existing inlets that receive flows from the disturbed areas; also add this as a note on the plans
- For all utility lines crossing WoS, narrative and detail showing sediment and erosion control measures provided on plans
- Note for construction entrances to be provided at all locations where construction traffic accesses a paved roadway

22. TMDL/ 303d IMPAIRED WATERBODIES

- List the nearest SCDHEC Water Quality Monitoring Station (WQMS) that the site's stormwater discharges drain to and the waterbody on which it is located: _____
- Qualitative and quantitative assessment (described in Section 3.4C of SCR100000), if nearest WQMS listed on the 2006 303(d) List of Impaired Waters **and** if site's stormwater construction discharges contain the pollutant of impairment **and** if site disturbs 25 or more acres
- Evaluation of selected BMPs if nearest WQMS listed on the 2006 303(d) List of Impaired Waters **and** if site's stormwater construction discharges contain the pollutant of impairment **and** if site disturbs less than 25 acres
- If Approved TMDL developed for nearest WQMS **and** if site's stormwater construction discharges contain the pollutant of impairment, showed that measures and controls on SWPPP met assumptions and requirements of TMDL (may need to contact Watershed Manager for assistance)
- *Note: Contact FCED staff for guidance on selection of BMPs based on pollutant of impairment.*

23. NAVIGABLE WATERS

- Extra plan sheet showing impacts to navigable water and description of activity included if S.C. Navigable Waters (SCNW) crossing and separate SCNW permit has not been obtained for all activities
- *Note: If project has SCNW crossing and if separate SCNW permit has not been obtained for this crossing, then this item will be reviewed by SCDHEC before NPDES coverage will be granted.*

24. SITE PLANS CHECKLIST

- *Note: FCED may require phased sediment and erosion control plans for large or complicated projects.*
- Location map with site outlined on first plan sheet (map should have enough detail to identify Surface Waters of the State within 1 mile of the site)
- North arrow and scale
- Property lines and adjacent landowners' names
- Legend
- Registered engineer's signed and dated seal
- Engineering Firm's Certificate of Authorization seal
- Existing and proposed contours for entire disturbed area
- Limits of disturbed area
- Locations of off-site material, waste, borrow, or construction equipment storage areas, excluding roll-off containers (*Note: Some off-site disturbed areas may require a separate application for NPDES coverage*)
- Location and identification of any stormwater discharges associated with industrial activity (not construction)

- Delineation of WoS, including wetlands (see checklist item 8)
- Easements
- Road profiles with existing and proposed ground elevations (if no contours are shown on the plans)
- Grassing and stabilization specifications (temporary and permanent)
- Construction sequence (implementation of all stormwater and sediment controls in the first phase of construction; ensure that basins, traps, ponds, etc. can be installed before the area draining to them is cleared and grubbed)
- Standard notes (see following page)
- Temporary and permanent control measures (provide details of all sediment and erosion control measures used; make sure the label or legend on the plans matches the name on the detail)
  Note: Maintenance requirements for each BMP should be listed on the detail.
  Note: If details from the SCDHEC BMP Handbook are used, then the inspection frequency must be changed to be in accordance with the new CGP (see Standard note 3).

25. State/County Road Encroachment Permit

- All approved encroachment permits must be submitted before approval can be granted

Standard Notes

1. If necessary, slopes, which exceed eight (8) vertical feet, should be stabilized with synthetic or vegetative mats, in addition to hydroseeding. It may be necessary to install temporary slope drains during construction. Temporary berms may be needed until the slope is brought to grade.
2. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen (14) days after work has ceased, except as stated below.
   - Where stabilization by the 14th day is precluded by snow cover or frozen ground conditions stabilization measures must be initiated as soon as practicable.
   - Where construction activity on a portion of the Site is temporarily ceased, and earth-disturbing activities will be resumed within 14 days, temporary stabilization measures do not have to be initiated on that portion of the Site.
3. All sediment and erosion control devices shall be inspected every seven (7) days. If site inspections identify BMPs that are damaged or are not operating effectively, maintenance must be performed as soon as practical or as reasonably possible and before the next storm event whenever practicable.

   OR

   All sediment and erosion control devices shall be inspected at least once every fourteen (14) calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater. If site inspections identify BMPs that are damaged or are not operating effectively, maintenance must be performed as soon as practical or as reasonably possible and before the next storm event whenever practicable.
4. Provide silt fence and/or other control devices, as may be required, to control soil erosion during utility construction. All disturbed areas shall be cleaned, graded, and stabilized with grassing immediately after the utility installation. Fill, cover, and temporary seeding at the end of each day are recommended. If water is encountered while trenching, the water should be filtered to remove any sediments before being pumped back into any waters of the State.
5. All erosion control devices shall be properly maintained during all phases of construction until the completion of all construction activities and all disturbed areas have been stabilized. Additional control devices may be required during construction in order to control erosion and/or offsite sedimentation. All temporary control devices shall be removed once construction is complete and the site is stabilized.
6. The contractor must take necessary action to minimize the tracking of mud onto paved roadway(s) from construction areas and the generation of dust. The contractor shall daily remove mud/soil from pavement, as may be required.
7. Residential subdivisions require erosion control features for infrastructure as well as for individual lot construction. Individual property owners shall follow these plans during construction or obtain approval of an individual plan in accordance with S.C Reg. 72-300 et seq. and SCR100000.
8. Temporary diversion berms and/or ditches will be provided as needed during construction to protect work areas from upslope runoff and/or to divert sediment-laden water to appropriate traps or stable outlets.

9. All waters of the State (WoS), including wetlands, are to be flagged or otherwise clearly marked in the field. A double row of silt fence is to be installed in all areas where a 50-foot buffer can't be maintained between the disturbed area and all WoS. A 10-foot buffer should be maintained between the last row of silt fence and all WoS.
10. Litter, construction debris, oils, fuels, and building products with significant potential for impact (such as stockpiles of freshly treated lumber) and construction chemicals that could be exposed to storm water must be prevented from becoming a pollutant source in storm water discharges.