

Appendix C

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

This Plan Review Checklist for Design Professionals has been developed to aid those who prepare Stormwater Pollution Prevention Plans (SWPPs). Adjacent to the headings for most sections are references from the corresponding portions of the NPDES General Permit for Stormwater Discharges from Construction Activities (SCR100000), which was issued on October 15, 2012 and the Clemson Stormwater Design Manual which was issued on September, 1, 2017. SWPPP preparers should not utilize this checklist as a substitute for the language in the permit and should review the permit itself for more information on each specific requirement. SCR100000 can be found at:

<http://www.scdhec.gov/environment/water/swater/docs/CGP-permit.pdf>

and the Clemson Design Manual can be found:

In the space provided 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 Department reserves the right to modify this checklist at any time. Requirements for the Coastal Zone are not applicable for the City of Clemson.

Project Information: *(To be filled out by Contractor)*

Project Name: _____

County: _____

Checklist Completed by: *(To be filled out by the City of Clemson)*

Printed Name: _____

Signature: _____

Date: _____

Plans and Maps

1. Current Completed Application Forms

- Original Signature of individual with signatory authority for the applicant according to requirements set for in R.61-9.122.22
- All Items in both SCR100000 and Clemson Grading Permit completed and answered
- Fee Schedule
- *Note: Local projects are not exempt from the plan review fee.*

2. Copies of Plans and Calculations

- Plans Stapled together.
- For Initial Review all projects require a minimum of **ONE** set of plans and supporting documentation (report, calculations, maps, etc.)
 - Upon Review:
 - For projects less than 1 acre not part of a Larger Common Plans (LCP): **ONE** set of plans and supporting documentation (may be initial submittal if not major edits required)
 - For projects greater than 1 acre but not larger than 2 acres: **THREE** sets of plans and supporting documentations
 - For projects greater than 2 acres: **THREE** sets of plans and supporting documentations.
- If additional approved sets are required please reference the Fee Schedule.

3. Location Map

Location in C-SWPPP: _____

- North arrow and Scale
- Outlined project location
- Labeled road names

4. Project Narrative

Location in C-SWPPP: _____

- Scope of project outlined, including a brief description of pre- and post-development conditions)
 - If a Type 2 re-development the pre-development curve must be as specified in the City of Clemson Design Manual
- Summary table of pre- and post-development flows (at least 2- and 10-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 sites 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, sidewalks, utilities, easements etc.

○ If this equation is to be 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 _____”

5. Topographic Map **Location in C-SWPPP:** _____

- Project Boundary outlined
- Route of runoff from the site to nearest waterbody shown
- Road names adjacent to site labeled

6. Soils Information **Location in C-SWPPP:** _____

- 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.nrces.usda.gov/app/HomePage.htm>

7. Floodway/Floodplains **Location in C-SWPPP:** _____

- Project boundary outlined, if in close/proximity to floodplain/floodway
- Approval from the City of Clemson Building official must be obtained before the review process will continue past this point. If Approval has already be obtained please include in the C-SWPPP
 - *Note: Army Corp. of Engineers may be required as well, the City of Clemson permit may be issued independent other required permits.*

8. Site Plan Checklist: **Location in C-SWPPP:** _____

- 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 landowner’s names
- Legend
- Registered engineer’s signed and dated seal
- Engineers Firm’s Certificate of Authorization seal
- If the SWPPP has been developed by a Registered Professional Engineer, Registered Landscape Architect or Tier B Land Surveyor, the following statement must be included on the site plans;
 - *“I have placed my signature and seal on the design documents submitted signifying that I accept responsibility for the design of the system. Further, I certify to the best of my knowledge and belief that the design is consistent with the requirements of Title 48, Chapter 14 of the Code of Laws of SC, 1976 as amended, pursuant to Regulation 72-300 et seq. (if*

applicable), and in accordance with the terms and conditions of SCR100000."

- 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)
- Location of Concrete Washout and other Pollution Prevention Measures
- Easements
- Road profiles with existing and proposed ground elevations (if no contours are shown on the plans)
- Grassing and stabilization specifications (temporary and permanent)
- Standard notes
- 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)
- Locations of fuel and temporary restroom locations shall be located on the plans and located in areas where if spill may happen will not enter storm drainage or streams
 - Note: Maintenance requirements for each BMP should be listed on the detail.
 - Note: If details from the BMP Handbook are used, then the inspection frequency must be changed to be in accordance with the new CGP (see Standard note 3).

9. Navigable Waters

Location in C-SWPPP: _____

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

10. Construction Sequence

Location in C-SWPPP: _____

- Construction Sequence should accurately reflect the nature and timing of construction activities for the site.

- Sequence should begin with the installation of perimeter controls and end with the removal of sediment and erosion control measures once the site has been finally stabilized.
- Address conversion of any temporary sediment control structures to permanent measures (i.e. , conversion of a sediment basin to a permanent detention basin)
- Sequence should reflect implementation and transition between each phased plan.

11. Phased Sediment & Erosion Control Plans **Location in C-SWPPP: _____**

- Phased Sediment and Erosion Control Plans are not required when land-disturbance is less than 5 acres, the plan does need to show how the project shall be stabilized and protect downstream properties through erosion control.
- For land-disturbance between 5 and 10 acres, a two-phased stormwater management and sediment and erosion controls plan is required for all non-linear projects. Each phase must be shown on a separate plan sheet. Plans should address the transition between phases.
 - Phase 1: Initial Land Disturbance – must include perimeter sediment and erosion control BMPs required prior to initial/mass clearing and other appropriate BMPs needed to maintain compliance with the permit. On some sites, this may include appropriate MPs for demolition of existing structures.
 - Phase 2: Stabilization – Sediment and erosion control BMP’s required during the remainder of grading and construction. Must also include appropriate BMPs for stabilization – grassing, inlet protection, etc.
- For land-disturbance greater than 10 acres, a three-phased stormwater management and sediment and erosion control plan is required for all non-linear projects. Each phase must be shown on a separate plan sheet. Plans should address the transition between phases.
 - Phase 1: Initial Land Disturbance – Must include perimeter sediment and erosion control BMPs required prior to initial/mass clearing and other appropriate BMPs needed to maintain compliance with the permit. On some sites, this may include appropriate BMPs for demolition of existing structures.
 - Phase 2: Construction – Sediment and erosion control BMPs required during the majority of grading and construction activities.
 - Phase 3: Stabilization – Sediment and erosion control BMPs required near the completion of the construction project. Must also include appropriate BMPs for stabilization – grassing, inlet protection, etc.

12. Waters of the State, Including Wetlands **Location in C-SWPPP: _____**

- 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 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 and are effective.
 - *Note: If there are proposed impacts to WoS, then it is advised that you contact USACOE (866-329-8187) and/or SCDHEC Water Quality Certification, Standards & Wetlands Program 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 or access to a temporary or permanent stormwater management structure, NPDES permit coverage cannot be granted until the USACOE permits and SCDHEC 401 Section certifications are obtained.*

13. Buffers

Location in C-SWPPP: _____

- Select Compliance Option A, B, C in Section 3.2.4.C of SCDHEC CGP and provide appropriate documentation:
 - 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 las 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.
- Ensure discharges into a buffer zone are non-channelized and non-concentrated to prevent erosion, and first treated by the construction site's sediment and erosion controls
- Ensure any velocity dissipation measures implemented within a buffer zone comply with SCDHEC CGP 3.2.4.C.III.(d)

14. Flow Control

Location in C-SWPPP: _____

- Control stormwater volume and velocity within the site during construction to minimize erosion within the site
- Control stormwater rates and volume at outlets during construction to minimize erosion to downstream channels and streambank.

15. Sedimentology and Sediment Basin/Trap Design **Location in C-SWPPP:** _____

- Provide a drainage area map outlining the area contributing to sediment basins, traps, and rock sediment dikes
- 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
- Sediment basins provide storage for the 10-year, 24-hour storm event for disturbed conditions or 3600 ft³/ 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 basins of less than 5 acres.
- Sediment traps storage calculations, showing that 1800 ft³/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
- Curve number for construction analysis needs to reflect construction/disturbed conditions. Curve numbers for newly-graded areas are at a minimum:
 - Hydrologic Soil Group "A": 77
 - Hydrologic Soil Group "B": 86
 - Hydrologic Soil Group "C": 91
 - Hydrologic Soil Group "D": 94
- Drainage area map outlining the area drainage to each basin/trap.
- Sediment basins must dewater via an outlet structure that pulls water from the surface. Options for this include skimmers and flashboard risers. Surface dewatering is not required for traps.
- Three rows of porous baffles must be provided in sediment basins.
- Forebays must be installed, unless infeasible.
- Public Safety should be taken into consideration as a factor in design of sediment basins. Alternative BMPs must be utilized where a construction site limitations would preclude a safe design.
- Silt fence only used in areas with drainage areas less than ¼ acre per 100 LF of fence and not used in areas with concentrated flows or not in front of slopes greater than 2:1.
- 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 devices*
 - *Note: The Design Aids in the SCDHEC BMP Handbook cannot be used to determine the trapping efficiency for structures in series. If the flow for*

the 10-year, 24-hour storm for construction conditions overtops the structure or the structure's spillway, then the Design Aids cannot be used.

- *Note: SedCAD users please refer to the SCDHEC memo regarding the input and outlet structures.*

16. Conveyance Measures and Stable Channels **Location in C-SWPPP:_____**

- 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 the post-construction (if velocity exceed 5 ft/s, then permanent measures to reduce the velocity to a non-erosive rate must be provided)
- Stabilization of Conveyance channels is to be completed within 7 days of channel construction
- Rock check dams provided in temporary diversions
- Manufactures Installation detail for erosion control blanket (ECB) or turf reinforcement matting (TRM) if ECBs or TRMs to be used)
- Temporary conveyance channels should be utilized to divert concentrated stormwater flows from running onto and within the disturbed area

17. Inlet Protection **Location in C-SWPPP:_____**

- Provided at all inlets (existing and proposed)
- Inlet protection details provided for pre-paving and after roadways have been paved
- Hay bales are not acceptable
- Steel post and buried fabric shown for filter fabric inlet protection
 - *Note: The Department recommend that an inlet not have more than one (1) acre draining to it.*

18. Energy Dissipaters/Outlet Protection **Location in C-SWPPP:_____**

- All outlets stabilized with appropriately sized riprap apron or other structure
- Riprap detail shows apron dimensions and stone sizes for each pad or each pipe diameter
- Filter fabric installed beneath all riprap
 - *Note: All appropriate outlet protection and energy dissipation is also required for post-construction*

19. Slopes and/or Embankments **Location in C-SWPPP:_____**

- All slopes stabilized
- Minimize disturbance to Steep Slopes (3H:1V) or greater
- Divert concentrated flows around steep slopes using slope drains or temporary diversions

- Utilize appropriate measures to prevent erosion (erosion control blankets, surface roughing, terracing, etc.)
- Slope drains designed in accordance with SCDHEC BMP Handbook.
- Slope Drains provided where concentrated flows discharge onto a fill slope
 - *Note: Measures, in addition to grassing or hydroseeding, including 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, the Department recommends a 10' buffer at allow for construction and maintenance. If a 10' buffer is not provided, then provide permissions from the adjacent property owner for possible land-disturbing activities on his property.*

20. Utility Lines

Location in C-SWPPP: _____

- Limits of disturbance include areas necessary for installation of all utilities (cable, electrical, natural gas, water and sewer), as appropriate
- For instances where the location of cable, electrical, and natural gas has not been determined at the time the SWPP is developed, SWPPP preparer may include a note that the installation of these is to be within the permitted limits of disturbance and that installation outside these areas will require a modification to the permit.
- 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*

21. TMDL/ 303d Impaired Waterbodies

Location in C-SWPPP: _____

- List the nearest SCDHEC Water Quality Monitoring Station (WQMS) that the site drains to: _____ and, the waterbody on which it is located: _____
- Qualitative and quantitative assessment (described in Section 3.4C of SCDHEC SCR100000), if nearest WCMS listed on the current 303(d) List of Impaired Waters – and if the site disturbed 25 acres or more
- Evaluation of selected BMPs if nearest WQMS listed on the current 303(d) List of Impaired Waters and if site's stormwater construction discharges contain the pollutant of impairment and if site disturbs less than 24 acres
- Pollutants of concern include:
 - Turbidity
 - Bio (Macroinvertebrate)
 - TP (Total Phosphorus)

- TN (Total Nitrogen)
- Chlorophyll-A
- May use SCDHEC Water Quality Information Tool
- If an approved TMDL developed for nearest WQMS and if the site’s stormwater construction discharges contain the pollutant of impairment, show that measures and controls on SWPPP met assumptions and requirements of TMDL (may need to contact SCDHEC Watershed Manager for assistance)
- For Turbidity and Bio (Macro invertebrate) consider inclusion of BMPs to reduce sediment load such as: sediment traps and basin designed to meet 80% sediment removal efficiency (regardless of size), additional measures to stabilize site, limit clearing and grading
- For TP (Total Phosphorus), TN (Total Nitrogen), and Chlorophyll-A consider inclusion of BMPs to reduce nutrient load. This could include clearing and grading, soil samples to determine nutrient requirements during grassing
 - *Note: To ensure sufficient Water Quality Monitoring Stations are selected to assess all of the identified parameters for construction stormwater, include monitoring stations that contain assessments for the first twelve parameters. Some stations only assess one parameter and should not be relied upon for the entire 303*d).TMDL assessment for construction stormwater discharges. In addition nutrients and/or chlorophyll must be assessed in lakes/reservoirs.*

22. Hydrologic Analysis

Location in C-SWPPP: _____

- Pre- and Post-development 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 SCDHEC Stormwater BMP handbook used in all calculations, or Precipitation Frequency Data Server from the National Oceanic and Atmosphere Administration (Full print out is required for report)
 - *Note: the curve number for open water, marshes, ext. should be 98.*
 - *Note: the curve number must follow the rules for a type 2 re-development if applicable*

23. Post Construction Hydrologic Analysis

Location in C-SWPPP: _____

- 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 or equal to 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) or other appropriate source used in all calculations
 - *Note: The curve number for open water, marshes, etc. should be 98.*
 - *Note: If a Type 2 redevelopment follow statement guidelines in the Design Manual*

24. Discharge Points

Location in C-SWPPP: _____

- 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 adjacent property owner(s) is provide
- 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
 - *Note: this requirement also applies during construction*

25. Detention Analysis/Design

Location in C-SWPPP: _____

- Pond routing using a volume-based hydrograph for the 2- and 10-year, 24-hour storm event (Drain:Edge, ICPR, HEC-1, SedCAD, HYDROFLOW, etc. perform full pond routings; TR55 does not perform full pond routings; 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 drainage to an existing detention pond
 - *Note 1: SedCAD users please refer to the SCDHEC memo regarding the input of outlet structures.*
 - *Note 2: The City Engineer 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 should be considered (do not specify orifice diameters with increments of less than 1/4")
- Small orifices (those less than 3") are prone to clogging
- 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 event 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 should be 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]
 - a) *Areas draining to these practices must be stabilized and vegetated filters established prior to runoff entering the system. Infiltration practices shall not be used if a suspend solids filter, there shall be, at least a 20 foot length of vegetative filter prior to stormwater runoff entering the infiltration practice;*
 - b) *The bottom of the infiltration practice shall be at least 0.5 feet above the seasonal high water table, whether perched or regional, determined by direct piezometer measurements which can be demonstrated to be representative of the maximum height of the water table on an annual basis during years of normal precipitation, or by the depth in the soil at which mottling first occurs;*
 - c) *The infiltration practice shall be designed to completely drain of water within 72 hours;*
 - d) *Soils must have adequate permeability to allow water to infiltrate. Infiltration practices are limited to soils having an infiltration rate of at least 0.30 inches per hour. Initial consideration will be based on a review of the appropriate soil survey, and the survey may serve as a basis for rejection. On-site soil borings and textural classifications must be accomplished to verify the actual site and seasonal high water table conditions when infiltration is to be utilized;*
 - e) *Infiltration practices greater than three feet deep shall be located at least 10 feet from basement walls;*
 - f) *Infiltration practices designed to handle runoff from impervious parking area shall be a minimum of 150 feet from any public or private water supply well;*
 - g) *The design of an infiltration practice shall provide an overflow system with measures to provide a non-erosive velocity of flow along its length and at the outfall;*
 - h) *The slope of the bottom of the infiltration practice shall not exceed five percent (5%). Also, the practice shall not be installed to fill material as piping along the fill/natural ground interface may cause slope failure;*
 - i) *An infiltration practice shall not be installed on or atop a slope whose natural angle of incline exceed twenty percent (20%)*
 - j) *Clean outs will be provided at a minimum, every 100 feet along the infiltration practices to allow for access and maintenance.*

- Low Impact Development (LID) measure, bioretention cells, infiltration, and other post-construction practices should be installed only after the drainage area of these practices has been stabilized
 - a) *Note 3: Emergency spillways should not be built on fill slopes;*
 - b) *Note 4: the City Engineer recommends installation of a trash rack or other debris-screening device on all pond risers.*
 - c) *Note 5: The City Engineer recommends a maximum slope of 3:1 on pond embankments to allow for ease of maintenance.*
 - d) *Note 6: The City Engineer recommends installation of sediment forebay at each outfall into the detention/sediment basin. This is a requirement during construction.*

26. As-Builts

Location in C-SWPPP: _____

- Provided for all previously approved detention ponds that will receive flows from new construction
- 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
 - Risers dimensions and elevations
 - Emergency spillway dimensions and elevations
 - Locations and inverts for all pipes discharging into the pond
- If the elevations of dimensions of the structures listed above do not mate those used in the approved plans, certifications 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 1: As-built survey and/or analysis must be submitted and accepted by the City Engineer before Notice of Termination (NOT) is submitted.*
- *Note 2: As-built survey must comply with Section 4.10 Digital submittal requirements of the City of Clemson Stormwater Design Manual*

27. Permanent Stormwater Management Structure Maintenance

Location in C-SWPPP: _____

- Signed agreement from the responsibility parting accepting ownership and maintenance of the structure (with proof it has been recorded with the registers of Deeds of the appropriate county and for properties that the structures are located on)
- If maintenance agreement responsibility is transferred after NPDES coverage is granted, an updated agreement should be submitted with the Notice of Termination

- 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;
 - Orifice to be cleaned and unclogged;
 - Outlet pipe to be cleaned, inspected, and repaired;
 - Sediment accumulations to be removed from pond;
 - Pond Bottom to be regraded to provide proper drainage towards the outlet discharge point;
 - Energy dissipater to be cleaned and repaired;
 - Erosion on side slopes, if present, to be addressed; and,
 - The City Engineer shall be notified in writing of any changes in maintenance responsibility for the stormwater devices at the site.
 - *Note 1: 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 the City. If a new, signed maintenance agreement is not provided to the City, then the entity/person who signed the most recent maintenance agreement on file with the City will be considered the responsible entity.*
 - *Note 2: If any proprietary items are used the recorded statement needs to include "If the proprietary item(s) used in our private storm sewer system is ever discontinued or changed the new proprietary item(s) will first be approved by the City of Clemson as an equal replacement to the existing item(s) before installation/replacement" Please include a list of all proprietary item(s) that are used to control water quality/quantity in the project in the deed recorded maintenance agreement.*

28. Detention Waiver

Location in C-SWPPP: _____

- 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 should be signed by the project's Professional Engineer
 - *Note 1: If the 2- and 10-year, 24-hour post-development flow rates exceed the pre-development rates, waivers from detention may be granted in accordance with regulation 72-302(B) on a case-by-case basis*
 - *Note 2: See note 2 in checklist Item 27 regarding the 10% rule*

29. Permanent Water Quality Requirements **Location in C-SWPPP:** _____

- Permanent Water quality addressed (all projects or LCP):
 - Wet ponds designed to catch the first 1/2" of runoff from the entire area draining to the pond and release it over at least a 24-hour period;
 - Dry ponds designed to catch the first 1" of runoff from the entire area draining to the pond and release it over at least a 24-hour period;
 - Infiltration Practices designed to accept, at a minimum, the first 1" of runoff from all impervious areas and designed in accordance with S.C. Reg. 72-307.C(11) [specifically addressing how items a-j have been addressed]; and,
 - For areas not draining to a pond or infiltration practice, show how permanent water quality requirements were addressed.
- Water quality orifices should be a size that is conducive to proper operation and maintenance. Orifices less than 3" in diameter are prone to clogging
- 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 1: 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 2: 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.)*