



## BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM

### CHECKLIST FOR CONSTRUCTION ACTIVITY APPLICATION

The following checklist shows the components that must be provided by the applicant with the completed Construction Activity Application.

The submitted information typically includes three parts: the application, the technical engineering calculations and discussions, and the construction documents (plans, details, specifications).

#### **I. APPLICATION FORM**

- All application items must be completed and answered sufficiently.
- Signatory authority (original signatures) must be provided where requested.

#### **II. TECHNICAL REPORT/ENGINEERING CALCULATIONS**

##### **1 REPORT COMPOSITION:**

- 1.1 Table of Contents
- 1.2 Report should be put together in a manner that facilitates review
- 1.3 Report prepared by licensed professional
- 1.4 One copy to be submitted.

##### **2 MAP(S):**

- 2.1 Include north arrow and scale on all maps.
- 2.2 Outlined project location.
- 2.3 Labeled road names.
- 2.4 Nearest waterbodies, discharge points, and waters of the State.
- 2.5 Location of any nearby protected areas (waters, wetlands, etc.)
- 2.6 Topographic information showing runoff patterns/overland flow paths.
- 2.7 Soil types.
- 2.8 100-year floodplain contours, location of floodway.
- 2.9 Wetlands.

##### **3 PROJECT NARRATIVE:**

- 3.1 A description of the site in general, purposes of the construction activity, issues with upstream, downstream, and adjacent properties, waterbodies receiving stormwater runoff, issues with site soils, existing water quality and flooding issues, anticipated impacts (quality, upstream/downstream structures, etc.) and benefits (open space, treatment, maintenance, etc.), and reasons for waiver request.
- 3.2 A summary table to include at least the following:
  - Total and disturbed area
  - Soil Type(s)
  - Nearest receiving water body(s)

- List of BMPs for water quality and quantity
- 10-year & 100-year flood elevation if located in flood plain.

3.3 A summary table of existing and proposed runoff flows, volumes, and pollutant loads.

3.4 A discussion of issues relating to other State and federal permits needed or regulations to be followed.

3.5 A summary of the maintenance plan and schedule of the stormwater facilities, BMPs, and any improvements on the property for construction site and post-construction, and arrangements for construction site and post-construction maintenance responsibility.

#### **4 WATERS OF THE STATE, INCLUDING WETLANDS:**

4.1 Delineation of all waters of the State (WoS) located on the site, including wetlands, shown and labeled on plans.

4.2 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.

4.3 Double row of silt fence provided in all areas where a 50' undisturbed buffer cannot be maintained between the disturbed area and the WoS.

4.4 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 applicant must contact the USACOE and/or S.C. DHEC Water Quality Certification, Standards & Wetlands Programs Section to determine additional requirements before submitting this 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 USACOE permit is required for construction of a permanent stormwater management structure, County final approval cannot be granted until all applicable State and federal permits have been obtained. A preliminary approval is issued instead.

Note: A 50-foot buffer between a sediment trap/basin and WoS and wetland areas is recommended.

#### **5 HYDROLOGIC ANALYSIS:**

5.1 Drainage area maps clearly delineating the sub basins/watersheds for pre and post developed conditions. The sub basins/watersheds must correspond to the pre and post developed calculations.

5.2 Pre and post developed hydrologic analysis calculations for the 2-year, 10-year, 25-year, 50-year, and 100- year storm events, at each outfall point. Analysis should be performed at the same points and with the same drainage area for both pre and post developed conditions. The analysis must correspond to the delineated drainage area maps for pre and post developed conditions.

5.3 Analysis performed using SCS 24-hour storm (Rational Method not acceptable) or other if acceptable to the County Engineer.

5.4 Use rainfall data from South Carolina DHEC Storm Water Management BMP Handbook.

#### **6 DETENTION ANALYSIS/DESIGN:**

##### **6.1 Analysis**

6.1.1 Pond routing using a volume based hydrograph for the 2-year, 10-year, 25-year, 50-year and 100-year SCS 24-hour rainfall 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).

6.1.2 Hydrologic and hydraulic calculations necessary to determine the impact of hydrograph timing modifications of the proposed land disturbing activity, with and without the pond (results of analysis will determine the need to modify the pond design or eliminate the pond requirement, see note below).

6.1.3 Inputs and outputs from analysis program.

- 6.1.4 Summary table of the peak inflows, peak outflows, and maximum water surface elevations (WSE) for the 2-year, 10-year, 25-year, 50-year and 100-year storm events for each pond.
- 6.1.5 Stage-storage-discharge relationship for the outlet structure of each detention structure.
- 6.1.6 If a rating curve for the outlet structure must be generated externally from the analysis program (Drain:Edge, HEC-1, HydroCAD), data and equations used to rate the outlet structure.

Note: The 10% rule in performing analysis is recommended. 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.

## **6.2 Design**

- 6.2.1 The post-development discharge rates should be less than pre-development discharge rates for each outfall point for the 2-year and 10-year (and in some cases 25-year) storm events. If not, then a detention waiver must be requested.
- 6.2.2 Detail of outlet structure and cross-section of the dam/berm or pond bank, including elevations and dimensions that correspond to the calculations.
- 6.2.3 Orifice constructability considered (do not specify orifice diameters with increments of less than ¼”).
- 6.2.4 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.
- 6.2.5 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.
- 6.2.6 The volume within any structure (i.e., dry ponds etc.) used for water quantity control shall be drained from the structure within 72 hours.
- 6.2.7 Bottom of all detention and retention ponds graded to have a slope of not less than 0.5% and side slopes no steeper than 3:1.
- 6.2.8 If the pond is to be used for sediment control during construction, outlet structure should be sufficiently protected.
- 6.2.9 Permanent maintenance access to all permanent detention structures (easements may be needed for structures surrounded by lots).
- 6.2.10 As a minimum, infiltration systems must be 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: Installation of a trash rack or other debris-screening device is recommended on all pond risers.

Note: Installation of sediment forebays is recommended at each outfall into the detention/ sediment basin.

## **7 HYDRAULIC DESIGN:**

- 7.1 Design calculations for all conveyances, inlets, and outlets based on the contributing area, allowable velocities, and upstream and downstream conditions.
- 7.2 Upstream and downstream analysis showing the project will not impact new and existing structures or reduce downstream system capacity.
- 7.3 Check to make sure the proper design storms were used at the appropriate design points.

## **8 WATER QUALITY REQUIREMENTS:**

- 8.1 All sites which disturb one-half (1/2) acre or greater shall have permanent BMP installed.
- 8.2 Permanent water quality addressed (all projects or LCP that disturb 5 or more acres)
  - 8.2.1 Wet ponds designed to catch the first ½” of runoff from the entire area draining to the pond and release it over at least a 24-hour period.

- 8.2.2 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.
- 8.2.3 For areas not draining to a pond, show how permanent water quality requirements were addressed
- 8.3 Projects disturbing less than five (5) acres but within one-half (1/2) mile of a receiving water body in the Coastal Zone must meet Section III.C.3.XIII.A of the Coastal Zone Management Program Refinements. Designs must show that 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, can be stored onsite.
- 8.4 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).
- 8.5 The WQV requirement may be waived if treatment is instead provided by engineered devices. Applicability of such waivers will be based on submitted information showing that the device(s) has a design pollutant removal efficiency equivalent to a “dry” pond with a WQV of 1-inch. If the project is located within one thousand feet (1000’) of shellfish beds, the pollutant removal equivalency must match a WQV of the first one and one-half inches (1 ½”) of runoff.
- 8.6 BMPs used strictly for water quality that will be capturing one (1) or more acres shall have a pretreatment device as part of the BMP or treatment system, such as a forebay or vault, to remove debris and coarser sediments.
- 8.7 All BMPs must have a maintenance plan and schedule for construction site and post construction. Suggested schedules and routine activities are provided in the SCDHEC BMP Manual (2005).
- 8.8 For projects that discharge either directly or indirectly into an impaired waterbody as determined through SCDHEC’s listing of the waterbody on the most current 303(d) list or by the existence of an adopted TMDL by SCDHEC is discussed in section below (Section II.9) under Special Protection Areas.

The County Engineer reserves the right to require specific effluent limits for any pollutant from a site if necessary to ensure the water quality standards and other State and federal water quality regulations are met

## **9 SPECIAL PROTECTION AREAS:**

- 9.1 List the nearest S.C.DHEC Water Quality Monitoring Station (WQMS) that the site’s stormwater discharges drain to and the waterbody on which it is located.
- 9.2 Qualitative and quantitative assessment (described in Section 3.4C of SCR100000), if nearest WQMS is listed on the most current 303(d) List of Impaired Waters and if site’s stormwater construction discharges contain the pollutant of impairment and if the site disturbance 25 or more acres.
- 9.3 Evaluation of selected BMPs if nearest WQMS listed on the most current 303(d) List of Impaired Waters and if site’s stormwater construction discharges contain the pollutant of impairment and if site disturbance less than 25 acres.
- 9.4 If a TMDL has been developed for the nearest WQMS and if the site’s stormwater construction discharges contain the pollutant of impairment, show that measures and controls meet assumptions and requirements of TMDL (may need to contact DHEC Watershed Manager for assistance).
- 9.5 Where flooding problems exist, explain any anticipated impacts of this project on the adjacent properties and downstream structures. In an effort to relieve existing flooding problems downstream of or adjacent to this site, the following list of design criteria will be required:
  - The post-development, peak discharge rates are restricted to half (½) the pre-development rates for the 2-year and 10-year storm event or to the downstream system capacity, whichever is less.
  - The post-development runoff volumes for the 2-year frequency 24-hour duration storm events above the predevelopment level shall be stored for a period of 24-hours on average before release.

## **10 SEDIMENTOLOGY:**

- 10.1 BMPs should be properly placed (silt fence, inlet protection, construction entrance, rip-rap at outfalls, check dams etc.).
- 10.2 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.)
- 10.3 Sediment basins must be provided for storage for the 10-year, 24-hour storm event for disturbed conditions or 3600 ft<sup>3</sup>/ acre draining to the basin, if more than 10 disturbed acres drain to a common point (stream, lake, property line, etc.).
  - 10.4 Sediment traps only used for drainage areas of less than 5 acres.
  - 10.5 Sediment trap storage calculations, showing that 1800 ft<sup>3</sup>/ total acre draining to each trap is provided below the spillway.
  - 10.6 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.
  - 10.7 Sediment basins and traps designed for total area draining to them.
  - 10.8 Drainage area map outlining the area draining to each sediment basin/ trap.
  - 10.9 Copies of figures used to determine  $V_{15}$  (SV-1) and trapping efficiency (ST-1, SB-1, SB-2), if Design Aids from SCDHEC BMP Manual (2005) are used to determine trapping efficiencies.
  - 10.10 Silt fence only used in areas with drainage areas of less than ¼ acre per 100 linear foot of fence and not used in areas with concentrated flows.
  - 10.11 Clean-out stake, marked at ½ the designed sediment storage depth, provided in all sediment basins/ sediment traps.

Note: Consult the SCDHEC OCRM STORMWATER BMP Handbook for information on the design of these and other devices.

Note: The Design Aids in the SCDHEC OCRM STORMWATER BMP Handbook cannot be used to determine trapping efficiencies 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. 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.

## **11 INLET PROTECTION:**

- 11.1 Provided at all inlets (no hay bales).
- 11.2 Steel posts and buried fabric shown for filter fabric inlet protection.
- 11.3 Inlet protection details provided for pre-paving and after roadways have been paved.

## **12 SLOPE AND/OR CHANNEL STABILIZATION:**

- 12.1 All slopes designed and stabilized properly.
- 12.2 All channels and diversion ditches must be able to handle the 10-year storm event with non-erosive velocities during construction and design storm event for post-construction.
- 12.3 Rock check dams provided in temporary diversion.
- 12.4 Installation detail for erosion control blanket (ECB) or turf reinforcement matting (TRM) if ECBs or TRMs to be used.
- 12.5 Slope drains provided where concentrated flows discharge onto a fill slope.

## **13 DISCHARGE POINTS:**

- 13.1 Storm drainage or pond outfalls are carried to an existing drainage outfall such as a pipe, ditch, easement, etc.
- 13.2 No new point discharges onto adjacent property where there was not a point discharge previously without providing the adjacent property owner's written permission.
- 13.3 Level spreaders, plunge pools, etc. provided when the proposed outlet is near the property line.
- 13.4 Provided a 20-foot minimum buffer between the property line and the end of all pipes or energy dissipation measures are installed.

- 13.5 Outfalls shall not discharge on fill slopes.
- 13.6 All outfalls must be stabilized.
- 13.7 Riprap aprons sized appropriately.
- 13.8 Riprap detail shows apron dimensions and stone sizes.
- 13.9 Filter fabric installed beneath all riprap.

#### **14 UTILITY/LINEAR PROJECTS:**

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

#### **15 POST-CONSTRUCTION MAINTENANCE PLAN AND SCHEDULE:**

- 15.1 Description of maintenance plan to be used
- 15.2 Schedule of maintenance procedures (e.g., every 6 months)
- 15.3 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.)
- 15.4 Typical maintenance items to be addressed
  - Ditches and swales to be cleaned (for sediments, debris, vegetative growth, etc), inspected and repaired.
  - Stormwater drainage pipes, catch basins to be cleaned, inspected and repaired. Clean-out must include the removal and legal disposal of any accumulated sediment and debris.
  - 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.
  - Outfall 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.
- 15.5 Specific maintenance items particular to more complex structures.

#### **16 ACCESS:**

Project layout has considered access for maintenance and inspection of stormwater facilities during and after construction.

#### **17 DETENTION WAIVER:**

- 17.1 If the 2-year and 10-year post development flow rates exceed the pre-development rates, waivers from detention may be granted on a case-by-case basis.
- 17.2 Justification shall be provided in a separate written request and demonstrate that:
  - The proposed project will have no adverse impact on the receiving natural waterway or upstream, downstream or adjacent properties; or

- The imposition of peak control requirement for rates of stormwater runoff would aggravate downstream flooding.
- 17.3 Waiver request signed by the project's Professional Engineer.
- 17.4 Waiver from water quality criteria is not allowed. However, another equivalent method or criteria will be reviewed (applicant should provide all the necessary information to make a decision).

### **III. CONSTRUCTION PLANS**

- One complete set of plans and one complete set of technical report/engineering calculations for review.
- Once review is complete and comments are satisfied the following plans must be submitted to Engineering Department for stamping:
  - Four sets of full size plans
  - One set of half size plans
  - One set of technical report/engineering calculations
  - An electronic copy of the plans in pdf format on a CD-ROM
  - Additional sets if needed by the owner/project engineer

Note: One set of the approved and stamped plans must be on-site at all times during construction.

#### **1. GENERAL ITEMS:**

- 1.1 All sheets 24" x 36".
- 1.2 Engineer stamp and signature on every sheet.
- 1.3 Correct Scale and North Arrow.
- 1.4 Location map.
- 1.5 Property lines, adjacent landowners' names, and existing site conditions (locate buildings, structures, driveways, etc. onsite/offsite), critical or protected area.
- 1.6 Legend.
- 1.7 Existing elevations and contours for the entire site. Contours are to be tied to a known datum (for example, NGVD 29, NAVD 88 datum), no **assumed** elevations, (1' interval is the minimum).
- 1.8 Limits of the disturbed area.
- 1.9 Lot Layout.
- 1.10 Delineation of WoS, including wetlands with letter from US Army Corps of Engineers, if applicable.
- 1.11 All existing and proposed easements.
- 1.12 Construction sequence & details (include implementation of all stormwater, erosion and sediment controls).
- 1.13 Locations and details of all temporary and permanent erosion and sediment control measures.
- 1.14 Construction entrance/exit.
- 1.15 Grassing and stabilization details and specifications.
- 1.16 Individual lot erosion control plan (applicable to all subdivisions).
- 1.17 Roadway plan and profiles with existing and proposed ground elevations.
- 1.18 Revision block utilized.

#### **2. STORMWATER DRAINAGE SHEETS**

- 2.1 Drainage area maps for existing and proposed conditions, outlining delineated sub basins, sub basin characteristics (watershed identifier, Curve Number, Tc, Area length, Slope), and the areas draining to all BMPs on site. Off-site drainage areas must be included on the map.
- 2.2 Labeling must be consistent with Technical Report/Engineering Calculations.
- 2.3 Proposed grading plan for the entire disturbed area.
- 2.4 Catch basin locations must be outside intersection curve radii.
- 2.5 Adequate drainage easements for any and all drainage structures located outside the road rights-of-way.
- 2.6 Adequate maintenance shelf around the entire pond(s) and along ditch(s) must be provided.

- 2.7 Label all storm drainage structures.
- 2.8 Water surface elevation in ponds and basins for all design storm events.
- 2.9 Storm drainage at roadway crossings to have one foot of cover minimum.
- 2.10 Minimum 18-inch RCP pipe under roadway (no decreases in pipe size in the downstream direction).
- 2.11 Crown elevation of inlet pipes equal or greater than crown elevation of outlet pipe.
- 2.12 Steps must be provided for all stormwater drainage boxes greater than 4.5 feet deep.
- 2.13 A minimum of 3'X3' size box is required for all storm drain boxes/inlets.
- 2.14 A table with calculated design flows for each pipe.
- 2.15 Hydraulic grade lines on profiles of storm pipe.
- 2.16 Existing and proposed grade on profiles of storm pipe.
- 2.17 Details of all stormwater drainage facilities and BMPs (catch basins, manholes, junctions boxes, detention basins, retention basins, ponds, pond outfall structures, emergency spillways, ditches, swales, stormwater wetlands, headwalls, rip-rap aprons, water quality buffers, oil/water separators, sand filtering devices, water quality structures, curb and gutter, etc.).
- 2.18 Typical roadway cross section(s), roadway cross sections(s) at wetland crossing

### **3. UTILITY SHEETS**

- 3.1 Water and sewer plans including horizontal alignment of all lines and structures within rights-of-way and easements.
- 3.2 Pipe sizes and materials.
- 3.3 Invert elevations of all sanitary sewer pipes entering and exiting the manholes.
- 3.4 Bottom elevation, top elevation and/or rim elevation of all sanitary sewer manholes.
- 3.5 Water and sewer details.
- 3.6 Utility main(s) and service(s) at roadway crossings to have minimum three feet of cover.
- 3.7 Utility service(s) at ditch crossing to have minimum 18" of separation from the ditch design flow line elevation.
- 3.8 All fire hydrants must be located at/near the right-of-way line.
- 3.9 Manholes, valves or utility boxes must not be located within the curb and gutter section and/or within the roadway pavement section.
- 3.10 No conflict box.

### **4. STANDARD NOTES:**

Notes as required by State and federal agencies and any additional notes for compliance with Berkeley County requirements.

### **IV. DOCUMENTS:**

Following additional documents are needed prior approval of Construction Activity Application:

- A Berkeley County Encroachment Permit Application if applicable.
- A copy of the approved SCDOT Encroachment Permit Application if applicable.
- A copy of a geotechnical report when needed.
- A copy of the recorded Covenants for Permanent Maintenance of Stormwater Systems by the property owner.
- A copy of the maintenance agreement between the operator and property owner where an operator other than the property owner is the responsible party for maintenance activities of stormwater systems.
- A copy of the approved Notice of Intent (NOI) for Stormwater Discharges from Large and Small Construction Activity.
- A copy of SCDHEC's Certificate of Coverage under the Construction General Permit (CGP).