APPENDIX B

REVIEW CHECKLIST

Charleston County Checklist for Design of New and Redevelopment Project

This checklist will be used by Charleston County Plan Reviewers or others employed by the Director, in reviewing proposed construction activities. This checklist shows the components that must be provided by the applicant per the project types.

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

I. APPLICATION FORM — Application Types: ALL

- All application items should be complete and answered sufficiently.
- Signatory authority (original signatures) should be provided where requested.
- Any fees to be returned to applicant.

II. TECHNICAL REPORT/ENGINEERING CALCULATIONS

1. REPORT COMPOSITION: — Application Types: II and III

- Table of Contents included.
- Report should be put together in a manner that facilitates review.
- Report prepared by licensed professional.
- Two copies to be submitted.

2. MAP(S): — Application Types: ALL

- Include north arrow and scale on all maps.
- Outlined project location.
- Labeled road names.
- Nearest waterbodies, discharge points, and waters of the state.
- Location of any nearby protected areas (waters, wetlands, etc.)
- Topographic information showing runoff patterns.
- Soil types.
- 100-year FEMA floodplain contours.
- Wetlands.
- Simple sketches will suffice for SFR, Utility, and Type I applications.

3. PROJECT NARRATIVE: — Application Types: ALL

- A description of the site in general, purposes of the construction activity, any issues with adjacent properties and owners, waterbodies receiving stormwater runoff, any issues with site soils, existing water quality and flooding issues, anticipated impacts (quality, downstream structures, etc.) and benefits (open space, treatment, maintenance, etc.), and reasons for waiver request.
- A summary table of existing and proposed runoff flows, volumes, and pollutant loads.
- A discussion of issues relating to other state and federal permits needed or regulations to be followed.
- A summary of the maintenance of the stormwater system and arrangements for post-construction maintenance responsibility. Maintenance agreements and/or operating permits must be provided in the application or otherwise addressed.

- This narrative should be much more detailed for larger (Types II and III) projects.
- Simple narratives will suffice for SFR, Utility, and Type I applications.

4. **HYDROLOGIC ANALYSIS:** **Application Types: II and III**

- Proper delineation of the site shown on maps or construction plans (preferably on 24" x 36" sheets).
- Pre- and post-development hydrologic analysis calculations for the two (2), ten (10), twenty-five (25), fifty (50), and one hundred (100) year storm events, as necessary, at each outfall point. Analysis should be performed at the same points and with the same drainage area for both pre- and post-development conditions and corresponds to the delineation. Hydrograph calculations should be provided as needed.
- Analysis performed using SCS methodology (Rational method not acceptable for Types II and III applications) or other if acceptable to Public Works.
- Use rainfall data from Chapter 3.

5. **DETENTION ANALYSIS/DESIGN:** **Application Types: II and III**

Analysis

- Pond routing using a volume based hydrograph for the two (2), ten (10) , twenty-five (25), fifty (50), and one hundred (100) 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).
- 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 in item 10).
- Inputs and outputs from analysis program.
- Summary table of the peak inflows, peak outflows, and maximum water surface elevations (WSE) for the (2), ten (10), twenty-five (25), fifty (50), and one hundred (100) year storm events for each pond.
- 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, HydroCAD), data and equations used to rate the outlet structure.

Design

- Detail of outlet structure and cross-section of the dam, including elevations and dimensions that correspond to the calculations.
- Orifice constructability considered (do not specify orifice diameters with increments of less than ¼ inch).
- Maximum WSE for the design storm event below the embankment with one (1) foot of freeboard.
- The volume within any structure used for water quantity control shall be drained from the structure within seventy-two (72) hours.
- Bottom of all detention and retention ponds graded to have a slope of not less than 0.5% and side slopes no steeper than 3.5:1 unless adequately protected.
- If the pond is to be used for sediment control during construction, outlet structure should be sufficiently protected.
- Permanent maintenance access to all permanent detention structures (easements may be needed for structures surrounded by lots).
- Infiltration and underground detention systems designed in accordance with Chapter 3.

- If pond is to be used to meet water quality requirements, a forebay, designed in accordance with this manual or SCDHEC, is required.
- Installation of a trash rack or other debris-screening device is recommended on all pond risers.

6. **HYDRAULIC DESIGN:** **Application Types: II and III**

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

7. **WATER QUALITY REQUIREMENTS:** **Application Types: II and III**

- Permanent water quality addressed (all projects or larger common plans that disturb five [5] or more acres)
- Wet ponds designed to catch the first one half (½) inch of runoff from the entire area draining to the pond and release it over at least a 24-hour period with at least 0.1 cfs still discharging after 24 hours.
- Dry ponds designed to catch the first one (1) inch of runoff from the entire area draining to the pond and release it over at least a 24-hour period with at least 0.1 cfs still discharging after 24 hours.
- For areas not draining to a pond, show how permanent water quality requirements were addressed.
- Waters of the U.S./State 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.

  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 to be used should be based on the ability to remove the pollutants of concern in that area/situation (e.g., bacteria, hydrocarbons, etc.).

8. **INLET PROTECTION:** **Application Types: II and III**

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

9. **DISCHARGE POINTS:** **Application Types: II and III**

- The post-development discharge rates should be less than pre-development discharges for each discharge point for the two (2), ten (10), and twenty-five (25) year storm events. If not, then a detention waiver should be requested.
- Storm drainage or pond outfalls are carried to an existing drainage outfall such as a pipe, ditch, easement, etc.
- No new point discharges onto adjacent property where there was not a point discharge previously without providing the adjacent property owner's written permission.
- Level spreaders, plunge pools, etc. provided when the proposed outlet is near the property line.

- Provided a twenty (20) foot minimum buffer between the property line and the end of all pipes or energy dissipation measures are installed, where applicable.
- Outlets do not discharge on fill slopes.
- Discharge pipes greater than twenty-four (24) inch require headwall with wings.
- Headwalls required in major drainage channels.
- All outlets stabilized.
- Riprap aprons sized appropriately.
- Riprap detail shows apron dimensions and stone sizes.
- Filter fabric installed beneath all riprap.

10. **SLOPE AND/OR CHANNEL STABILIZATION: Application Types: II and III**
- All slopes designed and stabilized properly.
- All channels and diversion ditches must be able to handle the 10-year storm event with non-erosive velocities during construction and post-construction.
- Rock check dams provided in temporary diversion.
- Installation detail for erosion control blanket (ECB) or turn reinforcement matting (TRM) if ECBs or TRMs to be used.
- Slope drains provided where concentrated flows discharge onto a fill slope.
- For all slopes steeper than 3.5:1, 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, a ten (10) foot buffer is recommended for construction and maintenance.

11. **UTILITY/LINEAR LINES: Application Types: II, III, and Utility**
- Limits of disturbance include areas disturbed for water, sewer, gas, and electric line installation.
- Check for coverage by SCDHEC on utility company and for coordination with permit holder.

12. **SEDIMENTOLOGY: Application Types: II and III**
- BMPs should be properly placed (silt fence, inlet protection, construction entrance, rip-rap at outfalls, check dams etc.).
- Trapping efficiency calculations showing that all sediment basins/ traps or other BMPs are capable of achieving a sediment trapping efficiency of eighty (80) percent for suspended solids or 0.5 ML/L peak settable solids concentration, whichever is less. The efficiency shall be calculated for disturbed conditions for the ten (10) year twenty-four (24) hour design event.
- Sediment basins provide storage for the ten (10) year, twenty-four (24) hour storm event for disturbed conditions if ten (1) acre or more drain to a common point (stream, lake, property line, etc.).
- Trapping efficiency calculations should be complete, specifying methods, assumptions, and results.
- Sediment basins and traps designed for total area draining to them.
- Drainage area map should outline the area draining to each basin/trap.
- Copies of any figures used to determine V_{15} and trapping efficiencies. The Design Aids in SCDHEC (2003) can be used for these calculations.
- 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.
- Construction schedule with timeline for each activity.

  Note: SCDHEC (2003) and SCDHEC (2005) provide information on the design of these and other devices.

  Note: The Design Aids in SCDHEC (2003) cannot be used to determine trapping efficiencies for structures in series. If the flow for the ten (10) year, twenty-four (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.

13. **WATERS-OF-THE-STATE, INCLUDING WETLANDS: Application Types: ALL**

- Delineation of all Waters of the State (WoS) located on the site, including wetlands, shown and labeled on plans.
- If impacts to WoS, outlined areas of impacts and labeled that no work can begin in this area until all necessary USACE permits and SCDHEC 401 certifications have been obtained.
- Double row of silt fence provided in all areas where a fifty (50) foot undisturbed buffer cannot be maintained between the disturbed area and the WoS.
- Minimum ten (10) foot 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 UCACE (866-329-8187) and/or S.C. DHEC Water Quality Certification, Standards & Wetlands Programs Section (803-898-4300) 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 USACE permit is required for construction of a permanent stormwater management structure, County permit coverage cannot be granted until all applicable state and federal permits have been obtained.

  Note: A 50-foot buffer between a sediment trap/basin and Waters of the State and wetland areas is recommended.

14. **SPECIAL PROTECTION AREAS: Application Types: I, II and III**

- 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.
- Qualitative and quantitative assessment (described in Section 3.4C of SCR100000), if nearest WQMS is listed on the latest 303(d) List of Impaired Waters and if site's stormwater construction discharges contain the pollutant of impairment and if the site disturbs 25 or more acres.
- Evaluation of selected BMPs if nearest WQMS listed on the latest 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 an Approved TMDL has been developed for the nearest WQMS and if the site's stormwater construction discharges contain the pollutant of concern, then measures and controls on the SWPPP

must meet assumptions and requirements of TMDL (may need to contact DHEC Watershed Manager for assistance).

15. **POST-CONSTRUCTION MAINTENANCE PLAN:** **Application Types: ALL**

- Signed agreement from a responsible party accepting ownership and maintenance of the stormwater management structures (operating permit).
- Description of maintenance plan to be used.
- Schedule of maintenance procedures, including time to replacement.
- Detailed or manufacturer-specific maintenance items for proprietary control devices (oil-water separators, etc.), underground detention structures, and non-traditional stormwater controls (constructed wetlands, bioretention, etc.).
- Typical maintenance items to be addressed:
    - Grass to be mowed.
    - Trees to be removed.
    - Trash to be removed from within and around the pond outlet structure and outlet pipes to be cleaned, inspected, and repaired, sediment accumulation to be removed from pond(s).
    - Energy dissipator to be cleaned and repaired.
    - Pond bottom to be regraded to provide proper drainage towards the outlet discharge point and/or energy dissipater to be cleaned and repaired.
    - Emergency spillway, if applicable, to be inspected and erosion repaired on side slopes, if present.
    - The Public Works Director must be notified in writing of any changes in maintenance responsibility for the stormwater devices at the site (include this statement in agreement).
    - Specific maintenance items particular to more complex structures.

16. **ACCESS:** **Application Types: ALL**

- Project layout has considered access for maintenance and inspection during and after construction.

17. **DETENTION WAIVER:** **Application Types: II and III**

- If the 2- and 10-year post-development flow rates exceed the pre-development rates, waivers from detention may be granted in accordance with Chapter 2 on a case-by-case basis.
- Justification should be provided in a separate written request and 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 requirement for rates of stormwater runoff would aggravate downstream flooding.
- Waiver signed by the project's Professional Engineer.
- 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 **Application Types: ALL**

- One (1) complete sets of plans and one (1) complete set of engineering calculations. One (1) complete set should come to Public Works Director.
- One (1) additional set of plans and calculations. Ask for one additional set (two [2] for municipalities) once review is complete.

1. GENERAL ITEMS:

- Prefer 24" x 36" sheets.
- Engineer stamp and signature on every sheet.
- Engineering firm's Certificate of Authorization seal on grading plan.
- Correct scale and north arrow.
- Existing and proposed contours are to be tied to a known datum, no **assumed** elevations (one (1) foot interval is the minimum).
- Lot layout.
- Property lines, adjacent landowners' names, and land use conditions (locate houses, driveways, etc. onsite/offsite), critical or protected area.
- Legend.
- Existing and proposed contours for entire disturbed area and off-site areas.
- Limits of disturbed area.
- Delineation of waters of the state, including wetlands with letter from US Army Corps of Engineers, if applicable.
- Easements and any offsite easements that will be used.
- Road profiles with existing and proposed ground elevations.
- Construction sequence (include implementation of all stormwater and sediment controls in the first phase of construction).
- Locations of all temporary and permanent control measures.
- Details for all temporary and permanent control measures.
- Grassing and stabilization specifications.
- Construction entrance/exit.
- Location map.
- Individual lot erosion control plan (applicable to subdivisions).
- Revision block utilized.

2. STORMWATER/DRAINAGE SHEETS

- Prefer 24" x 36" sheets.
- Provide drainage area map for existing and proposed conditions, outlining delineated sub-basins, sub-basin characteristics (watershed identifier, curve number, area length, slope), and the areas draining to all BMPs on site. Off-site drainage areas should be included.
- Labeling should be consistent with the technical report.

Conveyance Profiles

- Indicate high and low points for the site.
- Catch basin locations should be outside intersection curve radii, uphill of intersection.
- Easements for storm drainage.
- Twenty (20) foot wide maintenance shelf around entire pond for Charleston County maintenance.
- Access road to pond, dedicated with pond.
- Discharge pipes greater than twenty-four (24) inch require headwall with wing walls.
- Label all storm drainage structures.
- Water surface elevation in pond/BMPs for all necessary storm events.
- Cut/Fill volumes for the site.
- Utility crossings (water, sewer, storm drainage) to have one foot of cover minimum.
- Fifteen (15) inch minimum pipe size (no decreases in pipe size in the downstream direction).
- 0.4% minimum pipe slope.

- 20% maximum pipe slope.
- Crown elevation of inlet pipes equal or greater than crown elevation of outlet pipe.
- Pre-cast storm drainage structures with knock out panels can be no greater than six (6) feet in depth. Pre-cast pipe openings preferred. Knockout panel box not used in depths which exceed six (6) feet deep. Deeper boxes shall be hand-built or use approved pre-cast. Steps required for boxes greater than four (4) feet deep. Minimum inside box measurements are 3'x3'.
- Label calculated design flows on each pipe.
- Hydraulic grade lines on profiles of storm pipe.
- Existing and proposed grade on profiles of storm pipe.
- Catch basins field staked to ensure proper alignment with the street and gutter.

3. DETAILS

- Curb (rolled, barrier, expulsion).
- Typical road cross section(s).
- Silt fence.
- Inlet protection.
- Lot-to-lot sediment and erosion control.
- Headwalls.
- Rip-rap apron.
- Construction entrance.
- Swale/ditch.
- Typical detail for all BMPs (sediment traps, ponds, water quality devices, etc.).
- Catch basins, manholes, junctions, etc.

4. **STANDARD NOTES**:

- Notes as required by state and federal agencies and any additional notes for compliance with Charleston County requirements.