



UNITED STATES MARINE CORPS  
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE  
PSC BOX 20005  
CAMP LEJEUNE NC 28542-0005

MCIEAST-MCB CAMLEJO  
5090.21 G-F/EMD  
15 Jul 24

MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE CAMP LEJEUNE ORDER  
5090.21

From: Commander  
To: Distribution List

Subj: STORMWATER RUNOFF CONTROL ON MARINE CORPS BASE CAMP LEJEUNE AND  
MARINE CORPS AIR STATION NEW RIVER

Ref: (a) National Pollution Discharge Elimination System Municipal  
Separate Storm Sewer System Permit NCS000290  
(b) MCIEAST-MCB CAMLEJ Stormwater Management Plan  
(c) MCIEAST-MCB CAMLEJ Stormwater Outfall Monitoring Plan  
(d) MCIEAST-MCB CAMLEJ Stormwater Pollution Prevention Plan  
(e) MCO 5090.2-V20  
(f) Energy Independence and Security Act of 2007, Public Law  
110-140

Encl: (1) Post-Construction Stormwater Control Program Requirements  
(2) Stormwater Plan Review and Approval Checklist

1. Situation. State of North Carolina stormwater management requirements regulate stormwater discharges to receiving waters from three principal sources: (1) municipal separate storm sewer systems; (2) construction activities; and (3) industrial activities. Most stormwater discharges are considered point sources of water pollution, and the purpose of this Order is to minimize the amount and toxicity of stormwater discharge pollutants from entering receiving waters on Marine Corps Base Camp Lejeune (MCB CAMLEJ) and Marine Corps Air Station New River (MCAS NR). These installations may be collectively referred to as the "Installation" within this Order.

2. Mission. To minimize the amount and toxicity of stormwater discharge pollutants from entering receiving waters on the Installation, this Order establishes Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ) policy for implementing the references.

3. Execution

a. Commander's Intent and Concept of Operations

(1) Commander's Intent. To effectively manage, monitor, and maintain the MCIEAST-MCB CAMLEJ Stormwater Control Program (SCP) to ensure its implementation complies with applicable regulatory requirements, including permit limits and monitoring, recordkeeping, and reporting requirements for stormwater discharges.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

(2) Concept of Operations. Primary tasks and information for SCP implementation are provided below and, in the references, and enclosures.

(a) Reference (a) authorizes MCIEAST-MCB CAMLEJ to discharge stormwater from the Installation Municipal Separate Storm Sewer System (MS4) to receiving waters. The stormwater discharges must be controlled, limited, and monitored in accordance with references (a) and (b).

(b) To reduce pollutants discharged from the Installation MS4, reference (a) and this Order, in part, require the implementation and enforcement of a Post-Construction Stormwater Control Program (PC SCP) to address stormwater runoff from development projects that disturb greater than or equal to one acre, greater than or equal to 10,000 square feet of impervious area or projects less than one acre that are part of a larger common plan of development that discharge into the MS4. PC SCP requirements are listed in enclosure (1) and executed with enclosure (2).

(c) Pursuant to section 438 of reference (f), all proposed development or redevelopment projects with a footprint exceeding 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the project site.

b. Tasks

(1) MCIEAST-MCB CAMLEJ Assistant Chief of Staff (AC/S) G-F. The MCIEAST-MCB CAMLEJ AC/S GF shall:

(a) Oversee the stormwater permitting and compliance team assigned to the facilitate the permitting operation, and maintenance of Stormwater Control Measures (SCMs) and compliance with the PC SCP on the Installation.

(b) Ensure the Environmental Management Division Director oversees, coordinates, and directs the SCP and serves as a general point of contact for regulatory site visits and inspections of the SCMs supporting the Installation.

(c) Ensure the Public Works Division Director oversees, coordinates, and directs the design, construction, and maintenance requirements of the SCP.

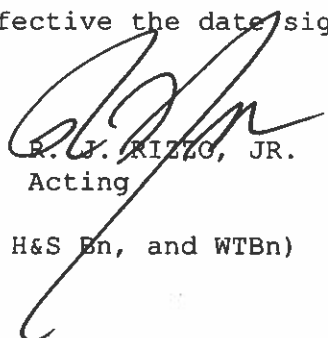
(2) Installation Staff, Tenant Commands, Activities, and Contractors. Installation staff, tenant commands, activities, and contractors shall comply with and support the SCMs and PC SCP requirements that are applicable to their actions on the Installation.

4. Administration and Logistics. Not applicable.

5. Command and Signal

a. Command. This Order is applicable to MCB CAMLEJ and MCAS NR command and staff. It is also applicable to Installation tenant commands, activities, and contractors working on the Installation.

b. Signal. This Order is effective the date signed.



R. J. RIZZO, JR.  
Acting

DISTRIBUTION: A/C (plus MCAS NR, H&S Bn, and WTBn)

Post-Construction Stormwater Control Program Requirements  
(PC SCP)

1. General. The Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ) PC SCP on Marine Corps Base Camp Lejeune (MCB CAMLEJ) and Marine Corps Air Station New River (the Installation) addresses stormwater runoff from development projects that disturb greater than or equal to one acre or install greater than or equal to 10,000 square feet of impervious area including projects less than one acre that are part of a larger common plan of development discharging into the Municipal Separate Storm Sewer System (MS4).

a. The PC SCP complies with North Carolina regulatory requirements 15A NCAC 02H .1017 and .1019, and it includes the following provisions:

(1) MCIEAST-MCB CAMLEJ is implementing 15A NCAC 02H .1019 PC SCP requirements that are applicable to North Carolina coastal counties.

(2) MCIEAST-MCB CAMLEJ is the command that reviewed, approved, and will enforce the PC SCP.

(3) MCIEAST-MCB CAMLEJ began rescinding permits from the Wilmington, North Carolina, Department of Environmental Quality on 1 October 2023. The approval program for all post-construction applications started on 1 January 2024.

(4) MCIEAST-MCB CAMLEJ is responsible for ensuring that all required stormwater permits applicable to the Installation are applied for and obtained, and reference (e) and this Order (MCIEAST-MCB CAMP LEJEUNE ORDER 5090.20.2) and its enclosures constitute the principal authorities for the command to:

(a) Review designs and proposals for development projects on the Installation to determine whether adequate stormwater control measures will be installed, implemented, and maintained;

(b) Request information, such as stormwater plans, calculations, inspection reports, monitoring results, and other information necessary to evaluate compliance with the PC SCP;

(c) Inspect any facilities, equipment, practices, or operations on the Installation related to stormwater discharges to determine compliance with the PC SCP.

(5) Each action proponent/sponsor on the Installation must submit a completed Request for Environmental Impact Review (REIR) to MCIEAST-MCB CAMLEJ environmental planning staff for each proposed action that has potential to impact the human environment.

MCIEAST-MCB CAMLEJ shall use the REIR review process with support of the North Carolina Department of Environmental Quality, Wilmington Regional Office, to properly define and vet each proposed action to avoid or minimize environmental impacts from stormwater. The National Environmental Policy Act (NEPA) process, including the REIR review process, shall be implemented to:

(a) Conduct site plan reviews of all proposed development and redeveloped sites that would disturb greater than or equal to one acre, install 10,000 square feet or more impervious area, and sites that disturb less than one acre that are part of a larger common plan of development (collectively referred to as, "Proposed Development Project"). Each review shall evaluate compliance with 15A NCAC 02H .1017 and .1019;

(b) Ensure that each Proposed Development Project has an Operation and Maintenance Agreement that substantially complies with 15A NCAC 02H .1050(11). The NEPA decision document (e.g., a Finding of No Significant Impact or a Categorical Exclusion Decision Memorandum (DM)) may serve as the Operation and Maintenance Agreement. The NEPA Decision Document will, in part, require the action proponent/sponsor or MCIEAST-MCB CAMLEJ to maintain, repair, or reconstruct the Stormwater Control Measures (SCMs) in accordance with the approved design plans and the DM. The SCMs identified in the NEPA Decision Document shall also be incorporated into any applicable stormwater permits and the MCIEAST-MCB CAMLEJ base master planning process (which will include Global Information System mapping and a supporting stormwater pollution prevention plan database) to ensure that the Proposed Development Project's SCMs will be linked to the Proposed Development Project location and preserved to ensure that each SCM is maintained in a manner consistent with the DM.

(6) The Commanding General, MCIEAST-MCB CAMLEJ, is responsible for the safety, well-being, and efficiency of MCIEAST-MCB CAMLEJ, and the Commanding General may delegate command authority to inspect and enforce PC SCP requirements to:

(a) Conduct post-construction inspections before issuing a Certificate of Occupancy, Temporary Certificate of Occupancy, or an equivalent approval;

(b) Ensure that the Proposed Development Project has been constructed in accordance with the approved plan(s) and the NEPA decision document;

(c) Ensure an annual inspection of each permitted SCM to ensure compliance with permit conditions and the applicable NEPA decision document; and

(d) Require that annual inspections, assessments, or audits be conducted by qualified personnel.

(7) MCIEAST-MCB CAMLEJ records are maintained in accordance with Department of the Navy (DON) Records Management Program policies and procedures (e.g., SECNAV M-5210.1), and any applicable Federal, state, or local regulatory requirements. MCIEAST-MCB CAMLEJ shall maintain adequate documentation and standardized inspection and tracking mechanisms to:

(a) Maintain an inventory of post-construction SCMs and permitted projects;

(b) Document, track, and maintain records of inspections, audits, and enforcement actions. Tracking shall include the ability to identify violations;

(c) Make available all relevant orders, post-construction requirements, design standards, checklists, and/or other materials.

(8) Proposed Development Projects on the Installation that are performed by Government construction contractors, including roads and bridges, must meet the requirements for stormwater management and water quality protection required by Session Law 2008-211, Sections 2.(a), 2.(b), 2.(c), 2.(d), 2.(e) and 2.(f). Roads and bridges must minimize built-upon surfaces, divert stormwater away from surface waters as much as possible, and employ other best management practices to minimize water quality impacts to the maximum extent practicable.

2. Project Density Determination. Proposed Development Projects shall be permitted according to density requirements pursuant to 15A NCAC 02H .1003.

3. Structural Stormwater Control Options. SCMs, which may be approved, can be found in 15A NCAC 02H .1050 - .1062.

4. Operation and Maintenance Plans. Before approval of the Proposed Development Project, MCIEAST-MCB CAMLEJ Environmental Management Division must approve an operation and maintenance plan or a manual for the stormwater systems.

5. System Design. Contracted stormwater systems must be designed by an individual who meets any North Carolina occupational licensing requirements for the type of system proposed. Upon completion of construction, the contracted designer for the type of stormwater system installed must certify that the system was inspected during construction, was constructed in substantial conformity with plans and specifications approved by the Government and complies State stormwater control requirements.

## Stormwater Plan Review and Approval Checklist

Project Name / Number:

**Required Submittal Information**

A completed *Stormwater Authorization to Construct (ATC) Application Form* (including the completed *Supplement EZ Form & O&M EZ Form*) and the required supporting documents must be submitted to the Marine Corps Installations East-Marine Corps Base Camp Lejeune Environmental Management Division (EMD). The required supporting documents are listed in Part G (Submittal Requirements) of the *Stormwater ATC Application Form*.

**Projects Requiring an Approved Stormwater ATC**

The following types of construction projects within Marine Corps Base Camp Lejeune (MCB CAMLEJ) are subject to the regulations provided in 15A NCAC 02H .1019 (Coastal Counties) and require an approved stormwater ATC:

- a) Projects that disturb greater than or equal to one acre, projects less than one acre that are part of a larger common plan of development, and/or projects that require an Erosion and Sediment Control (E&SC) Plan pursuant to NCGS 113A-57.
- b) Projects that require a Coastal Area Management Act (CAMA) Major Development Permit pursuant to North Carolina General Statutes (NCGS) 113A-118.
- c) Projects that add/reduce built upon area (BUA) in existing permitted boundaries.
- d) Projects that do not meet the above criteria, but meet one of the following criteria:
  - i. Nonresidential projects that propose to cumulatively add 10,000 square feet or more of built-upon area; or
  - ii. Residential projects that are within ½ mile of and draining to North Carolina Class SA waters, propose to cumulatively add more than 10,000 square feet of built-upon area, and result in a percentage built-upon area greater than 12 percent.

All applicable checklist items on the following pages shall be submitted for stormwater ATC review.

**Minimum Plan Set Requirements**

(The following items are required on multiple sheets throughout the plan set)

- Date(s)
- Project name/number.
- Design engineer/firm.
- Location map with named streets.
- Legend.

- North arrow.
- Scale.
- Revision number and dates.
- Identify all surface waters on the plans by delineating the normal pool elevation of impounded structures, the banks of streams and rivers, the Mean High Water (MHW) or Normal High Water (NHW) line of tidal waters, and any coastal wetlands landward of the MHW or NHW lines.
- Delineate the vegetated buffer landward from the normal pool elevation of impounded structures, the banks of streams or rivers, and the MHW (or NHW) of tidal waters.
- Dimensioned property/project boundary with bearings & distances.
- Site layout with all BUA identified and dimensioned.
- Existing and proposed structures, paved areas, sidewalks etc.
- Existing contours, proposed contours, spot elevations, finished floor elevations.
- Details of roads, drainage features, collection systems, and stormwater control measures.
- All proposed construction entrances and access points
- Wetlands delineated, or a note on the plans that none exist (wetlands must be delineated by a qualified person. Provide documentation of qualifications and identify the person who made the determination on the plans).
- Existing drainage (including off-site), drainage easements (if applicable), pipe sizes, and runoff calculations.
- Drainage areas delineated (included in the main set of plans, not as a separate document).
- Vegetated buffers (where required).
- Delineate all applicable resource conservation setbacks.
- All flood plain areas with zone and elevation noted (if available).
- All plan sheets signed, sealed, and dated.

**Existing Conditions Plan(s)**

- \_\_\_\_\_ Dimensioned property/project boundary with bearings & distances (per 15A NCAC 02H .1042(2) (g)).
- \_\_\_\_\_ Boundaries of all surface waters, wetlands, regulatory flood zones, protected vegetated setbacks, and protected riparian buffers, or a note on the plans that none exist (per 15A NCAC 02H .1042(2) (g)).
- \_\_\_\_\_ Existing Impervious/BUA Identified (per 15A NCAC 02H .1042(2) (g)).
- \_\_\_\_\_ Tree Survey (*if required for project*).
- \_\_\_\_\_ Existing contours (1' interval) (per 15A NCAC 02H .1042(2) (g)).
- \_\_\_\_\_ Existing drainage features - ditches, streams, drainage easements and pipes (w/ type & size).
- \_\_\_\_\_ All existing utilities (water, sewer, stormwater, electrical, communications, gas, etc.) (per 15A NCAC 02H .1042(2) (g)).

**Site Layout Plan(s)**

- \_\_\_\_\_ Proposed structures, paved areas, sidewalks etc. - all newly constructed impervious area (per 15A NCAC 02H .1042(2)(g)).
- \_\_\_\_\_ Finished floor elevations for all structures.
- \_\_\_\_\_ Dimensions of all structures and impervious area (typical dimensions may be used) (per 15A NCAC 02H .1042(2)(g)).
- \_\_\_\_\_ A completed site data table, including all impervious area listed in square feet (this should match information provided in the *Stormwater ATC Application Form*).

**Grading Plan(s)**

- \_\_\_\_\_ Proposed structures, paved areas, sidewalks etc. (per 15A NCAC 02H .1042(2)(g)).
- \_\_\_\_\_ Existing Contours at 1' increments (grayscale/screened) (per 15A NCAC 02H .1042(2)(g)).
- \_\_\_\_\_ Proposed contours at 1' increments resolved with existing grades (spot elevations acceptable for sites with low relief) (per 15A NCAC 02H .1042(2)(g)).
- \_\_\_\_\_ For parking areas, spot elevations provided at top of curb and edge of pavement at approximately every 100 ft (or reasonable alternative) and at all grade breaks.
- \_\_\_\_\_ For driveways, spot elevations provided along the edge of pavement and along both sides of sidewalks.
- \_\_\_\_\_ Proposed roadways & driveway slopes are specified.
- \_\_\_\_\_ Americans with Disabilities Act of 1990 (ADA) compliant sidewalk and ramps (if part of project) shown with spot elevations to demonstrate constructability.
- \_\_\_\_\_ All proposed stormwater management structures shown (pipes, culverts, swales, ditches, SCM's etc.) (per 15A NCAC 02H .1042(2)(g)).
- \_\_\_\_\_ All proposed stormwater management & conveyance structures have adequate accessibility for future upkeep and maintenance (per 15A NCAC 02H .1003(7)).
- \_\_\_\_\_ Limits of Disturbance (LOD) delineated.
- \_\_\_\_\_ All vegetated side slopes are 3:1 or flatter. Retaining walls, gabion walls, and other engineered surfaces may be steeper than 3:1. Steeper vegetated slopes may be considered if the applicant demonstrates that the soils and vegetation shall remain stable (per MDCs).
- \_\_\_\_\_ Show trees to be removed and preserved. Grading does not conflict with tree preservation plan (if applicable).
- \_\_\_\_\_ Placement of tree protection fencing shown on grading plan.

**Stormwater Drainage Plan(s)**

- \_\_\_\_\_ Sizes, lengths, inverts and slopes shown for all proposed pipes (provide chart if necessary). Details provided for conveyance components (per 15A NCAC 02H .1042(2)(h)).
- \_\_\_\_\_ All stormwater conveyance pipes are greater than 12" in diameter (excluding roof leaders, tile drains, or similar drainage features).
- \_\_\_\_\_ Location (with labels), dimensions, and lining for permanent swales on plans, consistent with calculations. Channel details provided (dimensions, slope, typical cross-section) for all proposed swales (per 15A NCAC 02H .1042(2)(h)).
- \_\_\_\_\_ Location (with labels), dimensions, and details for outlet protection and energy dissipators, consistent with provided calculations (per 15A NCAC 02H .1042(2)(h)). *Note: Outlet protection shall be provided at any concentrated discharge point (including inlets to SCMs) if conveyance calculations indicate discharge to be erosive.*
- \_\_\_\_\_ Overflow or bypass provided for excess flows.
- \_\_\_\_\_ Method of dewatering noted in narrative, if applicable.
- \_\_\_\_\_ Conflicts with utilities are resolved.
- \_\_\_\_\_ Headwalls or flared end sections are provided at all pipe inlets and outlets.
- \_\_\_\_\_ Appropriate outfall provided for each system (per 15A NCAC 02H .1042(2)(h)).

**Drainage Basin Plan(s) (may combined with Stormwater Drainage Plan)**

- \_\_\_\_\_ Existing and proposed contours shown (1' interval) (per 15A NCAC 02H .1042(2)(g)).
- \_\_\_\_\_ Drainage areas labeled and boundaries delineated for each storm drain inlet, ditch, swale, culvert, and SCM (per 15A NCAC 02H .1042(2)(g)).
- \_\_\_\_\_ Pre-development watershed draining to point(s) of hydrologic analysis is identified.
- \_\_\_\_\_ Post-development watershed draining to point(s) of hydrologic analysis is identified.
- \_\_\_\_\_ Soil types identified and their respective areas delineated.
- \_\_\_\_\_ The proposed spot elevations and contours support drainage areas shown.

**SCM Detail(s)**

- \_\_\_\_\_ SCM plan and cross-section views are provided (per 15A NCAC 02H .1042(2)(h)).
- \_\_\_\_\_ Dimensions, side slopes, and elevations with a benchmark for clean-out (if appropriate) are shown (per 15A NCAC 02H .1042(2)(h)).
- \_\_\_\_\_ All conveyance devices, including inlet device, bypass structure, pretreatment area, flow distribution device, underdrains, outlet device, energy dissipater, and level spreader are included (per 15A NCAC 02H .1042(2)(h)).

\_\_\_\_\_ Specifications for materials used in the SCM, such as planting media, filter media, and aggregate are provided (per 15A NCAC 02H .1042(2)(h)).

**Detail Sheet(s)** (per 15A NCAC 02H .1042(2)(h))

\_\_\_\_\_ Appropriate details provided for all proposed drainage structures.

\_\_\_\_\_ Appropriate details provided for all proposed sediment & erosion control features.

**Planting Plan(s)** (per 15A NCAC 02H .1042(2)(i))

\_\_\_\_\_ Plant layout with species names and locations is provided.

\_\_\_\_\_ Total number and sizes of all plant species is provided.

\_\_\_\_\_ For stormwater wetlands, a delineation of planting zones is provided.

\_\_\_\_\_ SCM landscaping meets requirements of NCDEQ Stormwater Design Manual.

\_\_\_\_\_ Temporary and permanent vegetative stabilization methods are provided and including seedbed.

**Stormwater Calculations** (can be provided on plans or separately)

\_\_\_\_\_ Capacity calculations of culverts and storm sewers. *Note: Calculations should include drainage area, C factor, Tc, rainfall intensity, pipe diameter, slope, Manning's n, total flow, and pipe capacity.*

\_\_\_\_\_ Capacity and stability calculations for permanent channels. *Note: Capacity calculations should include drainage area, C factor, Tc, rainfall intensity, channel dimensions, slope, Manning's n, total flow, and normal depth; Stability calculations should include permissible (with references support) and actual velocities or shear stress.*

\_\_\_\_\_ Design calculations of energy dissipators (diameters, apron dimensions, and stone size, etc.).

\_\_\_\_\_ Pre-construction and post-construction runoff calculations complying with either "runoff treatment" or "runoff volume match" requirements of 15A NCAC 02H .1003. *Note: Calculations should include drainage area, runoff curve number (CN), time-of-concentration (Tc), and rainfall intensity. SCM inputs (e.g., dimensions, outlet structure configuration, etc.) must be provided and consistent with plans.*

\_\_\_\_\_ Calculations for design volume for each SCM, following SCM-specific calculation requirements per the NCDEQ Stormwater Design Manual, consistent with compliance method calculations. *Note: Design volume must consider runoff at build out from all surfaces draining to the system.*

\_\_\_\_\_ Inlet and conveyance structure data on plans, calculations, and inlet drainage area map all agree.

\_\_\_\_\_ All rim elevations are above 10-yr hydraulic gradient line (HGL).

\_\_\_\_\_ All proposed swales and pipe outlets have a non-erosive velocity (10-year storm). *Note: maximum permissible velocity should be indicated and is dependent on soil type and groundcover.*

\*Software may be used for stormwater calculations; however, critical input values (items in *italics* above) shall be reported along with results.

**Erosion & Sedimentation Control (E&SC) Permit**

\_\_\_\_\_ An E&SC permit has been issued for this project (requirements for issuance of a Stormwater ATC).

**Stormwater ATC Application Form**

\_\_\_\_\_ The form has been completed, signed, and dated.

**Supplement EZ Form Review**

\_\_\_\_\_ The list of proposed SCMs in the design drawings matches the SCMs accounted for in the provided *Supplement EZ Form*.

\_\_\_\_\_ All individual SCM tables/checklists have been fully completed in the *Supplement EZ Form*.

\_\_\_\_\_ The form has been signed, sealed, and dated.

**O&M EZ Form Review**

\_\_\_\_\_ The list of proposed SCMs in the design drawings matches the SCMs accounted for in the provided *O&M EZ Form*.

\_\_\_\_\_ The form has been signed, dated, and notarized.

**SCM Minimum Design Criteria (MDC) Checklists - fill out for proposed  
SCMs ONLY**

**SCM-Specific: Infiltration Systems**

\_\_\_\_\_ Results of a site-specific soil investigation at the proposed location and elevation of the infiltration system provided, noting hydraulic properties and characteristics.

\_\_\_\_\_ *Note: NCDEQ recommends a minimum of one soil test hole per 5,000 square feet (SF) of infiltration surface area.*

\_\_\_\_\_ Documentation of minimum of 2 feet separation from the seasonal high-water table (SHWT). *Note: May be reduced to one foot if additional requirements are met: See Section C-1 NCDEQ Stormwater Design Manual.*

\_\_\_\_\_ Soil Subgrade less than or equal to 2%. *Note: Can use terraces and baffles to achieve this.*

\_\_\_\_\_ Pretreatment provided to prevent clogging, per Infiltration Minimum Design Criteria (MDC) 4.

\_\_\_\_\_ Calculations provided that demonstrate the ability to dewater design volume within 72 hours or less.

\_\_\_\_\_ Observation port provided for underground infiltration devices.

**SCM-Specific: Bioretention Cell**

\_\_\_\_\_ Documentation of 2 feet separation from the seasonal high water table (SHWT) provided. *Note: May be reduced to one foot if additional requirements are met, see Section C-2 NCDEQ Stormwater Design Manual.*

\_\_\_\_\_ Ponding depth for design volume calculation no greater than 12 inches above planting surface. Ponding depth for peak flow attenuation no greater than 24 inches and peak flow attenuation outlet no more than 18 inches above planting surface. Detail shows ponding depths and is consistent with calculations.

\_\_\_\_\_ Underdrain with internal water storage (IWS) provided. Top of IWS zone minimum of 18 inches below planting surface. Underdrains orientation and cleanout locations (with callout) shown on plans. Minimum one cleanout pipe (with cap) provided on each underdrain line. Detail shows IWS elevation and cleanout with cap. *Note: Underdrains not needed if soil infiltration rate is >2 in/hr with additional documentation needs. See Section C-2 NCDEQ Stormwater Design Manual if IWS is required, void space below IWS elevation may not be used in hydrologic calculations.*

\_\_\_\_\_ Media depth at least 36 inches if shrubs and trees proposed. If no shrubs and trees, minimum 24 inches depth if IWS not required, or 30 inches if IWS required. Shown on plans/details.

Bioretention details include: Media mix matching requirement from Bioretention MDC 6 (including sand specification), media phosphorus index (P-Index) less than 50, and statement that no mechanical compaction of the media will occur.

The bioretention to be maintained in a manner that results in a drawdown of at least one inch per hour at the planting surface.

For bioretention cells with vegetation other than sod, the planting plan is intended to achieve a minimum of 75 percent plant coverage at five years after planting (with a maximum coverage with tree or shrub canopy of 50 percent at five years after planting). If sod is used, non-clumping, deep-rooted species are specified.

For bioretention cells with vegetation other than sod, triple shredded hardwood mulch is used for the portion of the cell that will be inundated. Mulch is specified to be uniformly placed two to four inches deep.

Planting plan is provided that is in accordance with Bioretention MDC 10 of Section C-2 of the NCDEQ Stormwater Design Manual.

**SCM-Specific: Wet Pond**

Main pool sized using Hydraulic Retention Time (HRT) Method or the Surface Area to Drainage Area ratio (SA/DA) and Average Depth Method; calculations provided.

Average main pool depth is 3 to 8 feet below permanent pool elevation; calculations provided. *Note: applicant has the option of excluding the submerged portion of the vegetated shelf from the calculation of average depth.*

At least 6 inches of sediment storage provided in forebay and main pool; this volume is excluded from volume/depth calculations above.

Location of inlet(s) and outlet avoids short circuiting.

Forebay volume is 15-20% main pool volume, calculations provided; forebay entrance deeper than forebay exit; water flowing over or through structure to main pool at non-erosive velocity.

6 feet (min) vegetated shelf around perimeter of main pool, with max 6:1 slope provided; Planted with at least 3 diverse species of herbaceous, native vegetation at least 50 plants per 200 SF.

The design volume draws down to the permanent pool level between two and five days; calculations provided.

Wet pond discharges the runoff from the one-year, 24-hour storm in a manner that minimizes hydrologic impacts to the receiving channel; calculations provided.

If fountains proposed, documentation provided demonstrating they will not suspend sediment or cause erosion.

Trash rack (or other device) provided to prevent large debris from entering outlet system.

Vegetation in and around the wet pond: (a) the dam structure, including front and back embankment slopes, of the pond is vegetated with non-clumping turf grass; trees and woody shrubs are not be allowed; and (b) the vegetated shelf is planted with a minimum of three diverse species of herbaceous, native vegetation at a minimum density of 50 plants per 200 SF of shelf area.

**SCM-Specific: Stormwater Wetland**

Ponding depth for design volume is a maximum of 15 inches above permanent pool; peak flow attenuation ponding may be higher.

Surface area is sufficient to limit the design ponding depth to 15 inches or less.

Note that soil pH, compaction, and other attributes of the first 12 inches depth of the soil shall be adjusted if necessary to promote plant establishment and growth.

Inlet(s) and outlet locations avoid short circuiting.

Forebay is located at inlet of wetland with volume of 10-15% wetland surface area, calculations provided; depth 24-40 inches below permanent pool elevation; forebay entrance deeper than exit.

5-15% wetland surface area are deep pools with depth at least 18 inches (deepest point) below permanent pool elevation, including adjacent to outlet structure; calculations provided.

35-45% wetland surface area is shallow water zone with depth 0-9 inches below permanent pool elevation; calculations provided.

30-45% wetland surface area is temporary inundation zone 0-15 inches above permanent pool elevation; calculations provided.

Design volume draws down to permanent pool elevation in 2-5 days; calculations provided.

Runoff from the one-year, 24-hour storm is discharged in a manner that minimizes hydrologic impacts to the receiving channel.

Landscaping plan showing delineation of planting zones, plant layout with species names and locations, and total number and sizes of all plant species; No cattails.

Shallow water zone plantings: minimum of 3 diverse species of herbaceous, native vegetation at a minimum spacing of 50 plants per 200 SF (equivalent to 2 feet on center spacing).

Temporary inundation zone plantings (either of the following three options is provided): (1) minimum of 3 diverse species of herbaceous, native vegetation at a density of at least 50 plants per 200 SF (equivalent to 2 feet on center spacing); OR (2) minimum of 8 shrubs per 200 SF (equivalent to 5 feet on center spacing); OR (3) minimum of one tree and minimum of 40 grass-like herbaceous plants per 100 SF.

\_\_\_\_\_ Non-clumping turf grass called out for dam structure and  
 \_\_\_\_\_ perimeter fill slopes; no trees or woody shrubs.  
 \_\_\_\_\_ Trash rack (or other device to trap debris) provided on  
 \_\_\_\_\_ piped outlet structure.

**SCM-Specific: Permeable Pavement**

\_\_\_\_\_ If not counted as BUA, designed to infiltrating pavement  
 \_\_\_\_\_ standards.

\_\_\_\_\_ Infiltrating Pavement Only: site-specific soil  
 \_\_\_\_\_ investigation was performed to establish the hydraulic  
 \_\_\_\_\_ properties and characteristics within the proposed footprint  
 \_\_\_\_\_ and at the proposed elevation of the permeable pavement  
 \_\_\_\_\_ system.

\_\_\_\_\_ Documentation of separation from SHWT provided: Infiltrating  
 \_\_\_\_\_ systems - 2 feet separation. *Note: May be reduced to one  
 \_\_\_\_\_ foot if additional requirements are met, see Section C-5  
 \_\_\_\_\_ NCDEQ Stormwater Design Manual; Detention systems - 1 foot  
 \_\_\_\_\_ separation.*

\_\_\_\_\_ Not located where toxic pollutants are stored or handled.

\_\_\_\_\_ Soil subgrade surface less than or equal to 2% slope. *Note:*  
 \_\_\_\_\_ *Can use terraces and baffles to achieve this.*

\_\_\_\_\_ Washed stone aggregate base material specified.

\_\_\_\_\_ Pavement surface infiltration rate of at least 50 in/hr with  
 \_\_\_\_\_ head  $\leq$  4 inches; technical documentation provided.

\_\_\_\_\_ Maximum 1:1 ratio of additional BUA draining to permeable  
 \_\_\_\_\_ pavement; screened rooftop runoff excluded from this ratio.

\_\_\_\_\_ Runoff from adjacent pervious areas prevented from reaching  
 \_\_\_\_\_ permeable pavement; incidental, unavoidable runoff from  
 \_\_\_\_\_ stable vegetated areas allowed.

\_\_\_\_\_ Infiltrating Systems Only: Calculations provided  
 \_\_\_\_\_ demonstrating ability to dewater design volume to the bottom  
 \_\_\_\_\_ of the subgrade surface within 72 hours or less. *Note: In-*  
 \_\_\_\_\_ *situ soils may be removed and replaced with infiltration*  
 \_\_\_\_\_ *media or infiltration media may be placed on top of in-situ*  
 \_\_\_\_\_ *soils if the applicant provides a soils report demonstrates*  
 \_\_\_\_\_ *that the modified soil profile allows for infiltration of*  
 \_\_\_\_\_ *the design volume within 72 hours.*

\_\_\_\_\_ Capped observation well placed at the low point of system;  
 \_\_\_\_\_ if terraced, one well for each terrace.

\_\_\_\_\_ Detention Systems Only: Drawdown of design volume in 2-5  
 \_\_\_\_\_ days; calculations provided.

\_\_\_\_\_ Permeable interlocking concrete pavers (PICP) and grid  
 \_\_\_\_\_ pavers only: Edge restraints provided.

\_\_\_\_\_ Infiltrating Systems Only: Note on plans to only grade when  
 \_\_\_\_\_ there is no precipitation.

\_\_\_\_\_ Note on plans to protect from sediment deposition.

\_\_\_\_\_ Documentation of in-situ infiltration permeability test  
 \_\_\_\_\_ required after site stabilization is provided.

**SCM-Specific: Sand Filter**

- \_\_\_\_\_ Documentation of separation from SHWT: open-bottom designs - 2 feet separation; closed bottom designs - 1 foot separation. *Note: Closed bottom separation may be reduced if additional requirements are met, see Section C-6 NCDEQ Stormwater Design Manual.*
- \_\_\_\_\_ Sediment chamber and sand chamber provided; storage volumes in both chambers are equivalent; sediment chamber may be oversized for peak flow attenuation; calculations provided.
- \_\_\_\_\_ Volume of water stored in sediment chamber and sand chamber above sand surface is 0.75 times treatment volume; elevation of bypass device is set above ponding depth associated with this volume (the bypass device may be designed to attenuate peak flows).
- \_\_\_\_\_ Ponding depth from the top of the sand to the bypass device is 6 feet or less.
- \_\_\_\_\_ Designed to evenly distribute flow over surface of sand chamber.
- \_\_\_\_\_ Sand meeting the specifications of American Society for Testing and Materials Concrete Sand C-33 or equivalent.
- \_\_\_\_\_ Filter bed depth at least 18 inches; sand depth above underdrain pipe at least 12 inches.
- \_\_\_\_\_ Sand filter designed for a drawdown of at least 2 in/hr at the sand surface.
- \_\_\_\_\_ Capped cleanout provided at low point of each underdrain line.

**SCM-Specific: Rainwater Harvesting**

- \_\_\_\_\_ Designed with a collection system, a pretreatment device to minimize gross and coarse solids collection in the tank, a cistern or other storage device, an overflow, and a distribution system.
- \_\_\_\_\_ Captured stormwater is used or discharged in one of the following manners: (a) used to meet a water demand. The usage, type, volume, frequency, and seasonality of water demand is specified/justified; (b) discharged via a passive drawdown device to a vegetated infiltration area or another SCM; or (c) a combination of use and passive discharge.
- \_\_\_\_\_ Water balance calculations provided using the North Carolina State University Rainwater Harvester model or another continuous-simulation hydrologic model that calculates the water balance on a daily or more frequent time-step using a minimum of five representative years of actual rainfall records. The model accounts for withdrawals from the cistern for use, active or passive drawdown, and additions to the cistern by rainfall, runoff and a make-up water source if applicable.
- \_\_\_\_\_ Protocol provided for testing functionality of the distribution system upon completion of the initial system and upon additions to the existing system.

\_\_\_\_\_ Outlets called out to be labeled as "Non-Potable Water"; passive drawdown devices marked with identifying signage or labels.

**SCM-Specific: Green Roof**

\_\_\_\_\_ Maximum organic fraction of media is 10% by volume; media specs provided.

\_\_\_\_\_ Design volume equal to media depth times plant available water (PAW); maximum treated rainfall depth is 1.5 inches; data and calculations provided.

\_\_\_\_\_ Minimum media depth of 4 inches without irrigation, and 3 inches with irrigation; if irrigation provided, irrigation plan included in an Operations and Maintenance (O&M) Plan. Planting plan provided; designed to achieve 75% vegetative cover within 2 years.

\_\_\_\_\_ Slope (or pitch) less than 8%, unless container system designed for greater slope is used.

**SCM-Specific: Level Spreader Filter Strip (LS-FS)**

\_\_\_\_\_ Level spreader length of 10 feet per 1 cubic feet per second (cfs) of stormwater flow directed to it.

\_\_\_\_\_ Sizing requirements: (a) if receiving flow directly from the drainage area, sized based on 0.75 in/hr rainfall; or (b) if receiving flow from a SCM, sized based on draw down rate of design volume of SCM.

\_\_\_\_\_ Flow bypass provided for larger storms if LS-FS is not sized to handle 10-year storm.

\_\_\_\_\_ Blind swale (or other method of ponding water) provided immediately upslope of LS, designed to provide uniform overtopping of LS.

\_\_\_\_\_ Lip of LS provides uniform elevation with construction tolerance of  $\pm 0.25$  inches at any point along length; constructed of concrete or other stable material.

\_\_\_\_\_ LS straight or convex in plan view.

\_\_\_\_\_ Immediately downslope of LS, 1-3 inches of drop followed by a transition zone protected from erosion via aggregate or high-performance turf reinforcement matting; transition zone is a minimum of 12 inches wide.

\_\_\_\_\_ Minimum width of FS is 30 feet (measured perpendicular to the level spreader lip) without draws or channels.

\_\_\_\_\_ FS specifications: (a) Filter strips are graded with a uniform transverse slope of 8% or less; (b) plans note that pH, compaction and other attributes of the first 12 inches of the soil shall be adjusted if necessary to promote plant establishment and growth; (c) the FS and side slopes areas are planted with non-clumping, deep-rooted grass sod; and (d) soils are stabilized with temporary means such as straw or matting until the permanent vegetative cover has taken root, or the runoff is directed elsewhere until vegetation has been established.

**SCM-Specific: Disconnected Impervious Surface**

\_\_\_\_\_ For disconnected roofs: maximum of 500 SF of roof area draining to each disconnected downspout; receiving vegetated area is rectangular in shape with a minimum length in direction of flow of  $0.04x$  (area of roof) and a minimum width of  $0.5x$  (length); downspout discharges in center of upslope end of receiving area; downspout equipped with splash pad; and no BUA in receiving area.

\_\_\_\_\_ For disconnected pavement: length of pavement draining to vegetated receiving area a maximum of 100 feet in direction of flow; length of receiving area a minimum of 10 feet in direction of flow; and no BUA in receiving area (except incidental areas such as utility boxes, signs, and lamp posts).

\_\_\_\_\_ For all vegetated receiving areas: uniform transverse slope a maximum of 8% (except in Hydrologic Soil Group A soils (i.e., loamy sand or sandy loam types of soils) - maximum of 15%); planted with non-clumping, deep-rooted grass species; plans indicate that pH, compaction, and other attributes of the first 8 inches of the soil shall be adjusted if necessary to promote plant establishment and growth; and plans specify that soils are stabilized with temporary means such as straw or matting until the permanent vegetative cover has taken root (or the runoff shall be directed elsewhere until vegetation has established).

**SCM-Specific: Treatment Swale**

\_\_\_\_\_ Swale not excavated below SHWT.

\_\_\_\_\_ Trapezoidal cross-section; bottom width a maximum of 6 feet; side slopes  $< 3:1$ . *Note: steeper vegetated slopes may be considered if it is demonstrated that the soils and vegetation will remain stable in perpetuity.*

\_\_\_\_\_ Longitudinal slope a maximum of 7%; calculations demonstrating  $< 6$  inches of flow depth and minimum of 4-minute hydraulic retention time during the 0.75 in/hr storm.

\_\_\_\_\_ Non-clumping and deep-rooted grass species specified; able to withstand velocity of 4 ft/sec; managed at average 6-inches of height; not to be cut lower than 4-inches of height.

\_\_\_\_\_ Swale designed to non-erosively pass the 10-yr storm.

**SCM-Specific: Dry Pond**

\_\_\_\_\_ Documentation of lowest point of pond a minimum of 6 inches above SHWT.

\_\_\_\_\_ Depth of temporary pool is a maximum of 10 feet.

\_\_\_\_\_ Bottom of dry pond graded uniformly to flow toward outlet structure without low or high spots, other than an optional low flow channel.

\_\_\_\_\_ Inlet(s) and outlet located to avoid short-circuiting.

\_\_\_\_\_ Pretreatment devices, such as gravel verges, filter strips, grass swales, or forebays, provided to settle sediment and prevent erosion.

\_\_\_\_\_ Calculations provided demonstrating design volume draw down between 2 and 5 days.

\_\_\_\_\_ Includes small permanent pool near outlet orifice to reduce clogging and keep floating debris away from orifice; screen or other device provided to prevent large debris from entering outlet structure (including orifices and bypass openings); detail(s) provided.

\_\_\_\_\_ The dam structure, including the front and back embankment slopes is specified as planted with non-clumping turf grass (trees and woody shrubs are not allowed).