NC STATE UNIVERSITY

Stormwater Management

Design Standards

June, 2025

Environmental Health and Safety
Campus Box 8007
2620 Wolf Village Way
Raleigh, NC 27695-8007

Table of Contents

Overview of NC State Stormwater Design Standards

Stormwater Management Plan (SWMP) Permitting Process
Consultation with EHS Stormwater is highly recommended as early as possible and throughout all phases (Planning through Record Drawings). A Schematic Design Meeting is required.
EHS Stormwater reviews and approves all plans with any increase in built upon area (BUA) and all plans with land disturbance greater than 0.1 acre.
EHS Stormwater reviews include requirements for (1) Stormwater Control, (2) Neuse Nutrient Strategy, (3) Neuse Buffer Rule, and (4) Erosion and Sediment Control.
EHS Stormwater will issue an approval letter once all requirements are met; **land disturbance cannot begin without this Stormwater Management Plan (SWMP) Approval and Approval Number.**
If the land disturbance is greater than 1 ac, a Land Disturbance Permit (NCG01) from DEQ is also required before the construction can begin. DEQ only reviews the erosion and sediment control component of the Stormwater Management Plan (SWMP), EHS reviews all 4 components.
The City of Raleigh no longer has any involvement in the stormwater management or erosion and sediment control permitting, inspecting, or approval process.
A pre-construction meeting is required.

Nutrient Management	
Nitrogen Buydown	Nutrients can only be bought down after a primary Stormwater Control Measure (SCM) treats 100% of the new/proposed BUA
Nitrogen Loading Rates	Bioretention, infiltration, and permeable pavers are the preferred SCM. With 100% sizing, nitrogen loading target rates are assumed to be met. SNAPTool analysis is not required for these devices. The new SNAPTool is required for all other SCMs. (Please note that underground detention SCMs are not a permissible SCM.)

Runoff Volume Match	A project may be exempt from nutrient treatment with a report showing no more than 2% increase to the annual runoff volume of the proposed condition relative to the existing condition.
Treatment location	Treatment should be as close to site LOD as possible but is permitted within the precinct boundary as long as peak flow increases do not impact adjacent areas.
SCM Retrofits	"Unregulated" SCMs can be modified and certified to meet MDC criteria and volume can be credited to small projects
	Dry Detention SCMs can be retrofit to a Modified Bioretention

NC State Peak Flow Requirements	
Peak flows	1-, 2-, and 10- year storms managed to existing conditions. No more than a 2% increase is permitted.

Stormwater Control Design Requirements	
General	Add the SCM Design block to the plan with SCM type, WQv and Total volume provided, and Regulatory Requirements check to the first sheet of the SCM Design Plan.
	Add grid ticks (3) with northing/easting for georeferencing the SCM plan.
	No underground facilities permitted.
NC Pond Code 378	Embankments 3ft or greater are dams.
	Filter diaphragm required for all penetrations through the embankment.
	Geotech min 2 soil borings (soils, bearing strength).
	Clay core/materials requirement (Unified Soil Classification MH, ML, SC, SM, CH, or CL material)
	Dam construction compaction (8" lifts, 95% compaction)
	Freeboard (1 ft or 2 ft, see Code 378)

	Flood inundation map is required.
	"No woody veg zone" (15-ft buffer around embankment and control structures)
	Proposed dam height = settled dam height + 10%

Structural/Geotech requirements	Soils material and bearing strength (geotechnical certification during design phase)
	Anti-floatation comps for risers or any hollow structural control (possible structural or geotechnical calculation during design phase)
	Riser construction in single pour or cast in place with rebar and key (geotechnical and structural certifications during construction phase)
	Dam compaction (geotechnical certification during construction phase)
SCM O&M Plan	O&M added directly to design plans and Record Drawing package
	Call-out clean out elevation
	Note the expected design drawdown time
	Delineate a "no woody veg zone" around embankment and control devices in plan view
Storm Drains	All existing storm drain pipes and structures within the limits of disturbance of a project must be replaced or removed unless “good condition” of the storm drain pipes/structures to remain can be demonstrated
	All existing storm drains within the limits of disturbance of a project that connect steam tunnels, mechanical rooms, or other illicit discharge sources must be redirected to the sanitary system.
	10-yr hydraulic grade line (HGL) shown on pipe profiles to ensure no inlet surcharge
	Storm drain pipes coming into an SCM must be level and water tight
	Storm drain pipes must enter an SCM below permanent pond (wet pond) or level with media (dry SCM)

	Storm drain pipes to an SCM or on steep slopes must end with headwalls, no flared end sections
Emergency Spillway	Profile and Cross Section are required

Erosion and Sediment Control Submittal
Add the Stormwater Management Plan block with LOD Area, EX BUA, PR BUA, and Neuse Buffer Zone check to the first sheet of the E&SC Plan
Fabric/Filtration-type erosion and sediment controls must be used to minimize suspended sediment to downslope SCMs or streams
Silt Fence must align with the contour to maintain filtration approach by eliminating stone outlets, where possible
Call-out 10-year velocities on outfalls and conveyance slopes, must be returned to 3 fps at return to existing
Note the DEQ 50 NTU turbidity requirement on plans

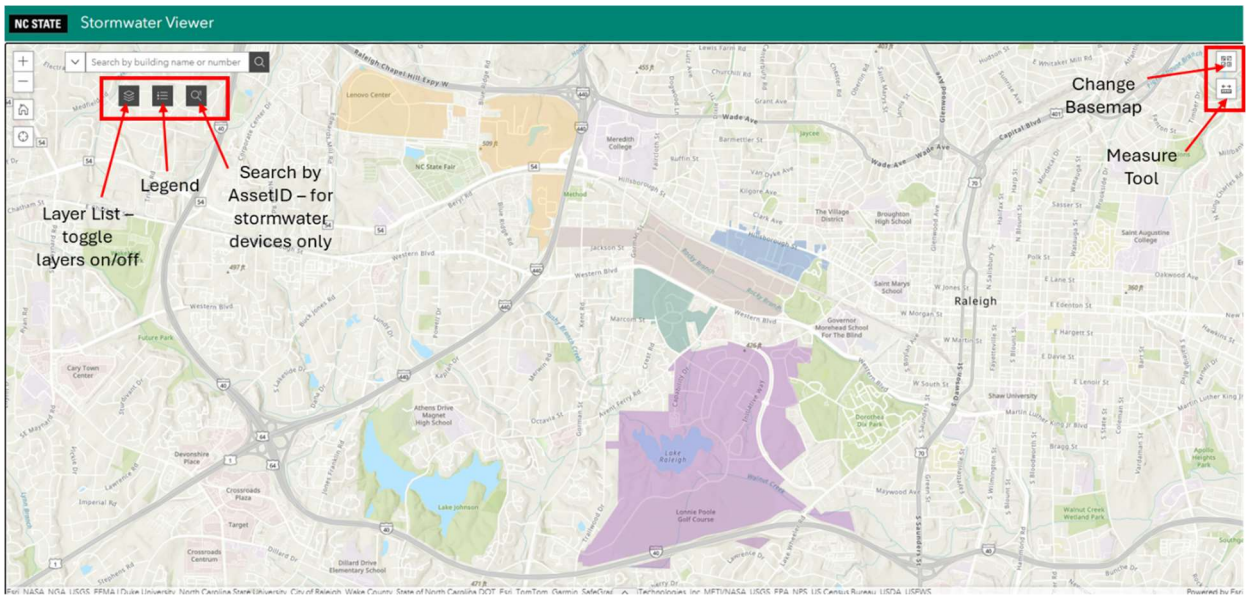
Record Drawing Submittal
The Record Drawing package must be submitted within 30 days of the functional completion of SCM, as determined by the Design Engineer.

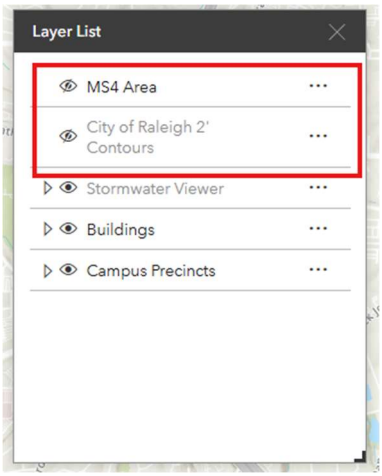
NC State University Stormwater (MS4) Jurisdiction

NC State University has been issued a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit (NCS000376) by the North Carolina Department of Environmental Quality (NCDEQ) on behalf of the Environmental Protection Agency (EPA). Under this permit, responsibility is delegated to NC State University's Environmental Health and Safety for review and approval of development plans for meeting Federal, State, and local stormwater management requirements.

The jurisdictional areas of this permit include North Campus, Central Campus, West Campus, South Campus, Centennial Campus, Centennial Biomedical Campus, and the Carter-Finley Stadium complex.

See NC State University's published Stormwater GIS for the jurisdictional boundaries of our stormwater permit: **Stormwater Viewer-** https://go.ncsu.edu/ncstate-stormwater-viewer**.** Note that the "MS4 area" must be selected in the Layer List by clicking on the eye to enable them:




Layer List
MS4 Area
City of Raleigh 2' Contours
Stormwater Viewer
Buildings
Campus Precincts

Stormwater Management Plan (SWMP) Approval Process

DESIGN PHASE

All projects with any increase in build upon area (BUA) and all plans with a land disturbance of 0.1 acre or greater require a Stormwater Management Plan (SWMP), approved by NC State. The four parts of a SWMP include:

(1) Stormwater Controls,

(2) Nutrient Management,

(3) Neuse Buffer Rule, and

(4) Erosion and Sediment Controls.

Before the final SWMP approval letter can be issued, a General Permit (NCG01) from the Department of Environmental Quality (DEQ) is also required for any land disturbance activities resulting in an area greater than or equal to 1 acre. **No land disturbance can begin without the issuance of a SWMP approval letter from Environmental Health and Safety (EHS).**

Although all four parts of the SWMP may not apply to every project, each component must be addressed by demonstrating compliance with State and local criteria or providing justification for non-applicability. The Stormwater Management Plan (SWMP) block, shown below, must be added to the erosion and sediment control plan. In some cases, the SWMP block showing that the proposed built upon area (PR-BUA) is less than or equal to the existing built upon area (EX-BUA) may be satisfactory justification to address the Stormwater Controls and Nutrient Management components. Similarly, if the project is outside of the Neuse buffers, justification for the Neuse Buffer Rule can be addressed by the SWMP block. Neuse Buffer Zones 1 and/or 2, if within 100' of the limit of disturbance (LOD) must also be delineated on the plans. For more complex situations, a stormwater management report with rationale and data justification will be required.

STORMWATER MANAGEMENT PLAN (SWMP)

LOD AREA: _____SF

EX BUA: _____SF

PR BUA: _____SF

IS PROJECT WITHIN THE NEUSE BUFFER ZONES 1 OR 2 (Y/N): _____

Early and ongoing consultation with EHS Stormwater is strongly recommended to ensure alignment throughout all project phases. Comment responses must be included with each design submission. **For projects following the NC State Formal or Informal Design processes, the EHS Stormwater requirements for the Design Development Project Phase must be approved prior to moving forward to the Contract Documents Project Phase.**

Note: The EHS Stormwater review process may take up to 30 days.

Once all components of the SWMP have been satisfactorily addressed, EHS will issue a SWMP approval

letter and SWMP number. All approved plans and permit approval letters are required to be kept on site at all times during construction. **Any changes to the SWMP must be resubmitted to EHS Stormwater for approval.**

SUBMITTAL DELIVERABLES

Comment responses and completed checklists are required with each submittal. Checklists can be found in Appendix A. Unless otherwise specified below, **one paper copy and one pdf copy of each deliverable must be submitted to EHS Stormwater.**

Schematic Design Phase

- Project Summary
- Project Location
- SCM type(s) and location(s)
- Schematic Design Meeting (to be scheduled within 4 weeks of receipt of deliverables above)

Design Development Phase

- Stormwater Management Design Report
- Stormwater Management Plans
- Erosion and Sediment Control Plans
- Shapefiles to be submitted: (1) drainage area(s), (2) dam breach inundation area

Contract Document Phase

- Stormwater Management Design Report, if any changes have been made
- Stormwater Management Plans
- Erosion and Sediment Control Plans
- Full project plans - all disciplines (paper copy of all-discipline plans not required, pdf only is acceptable)
- Stormwater Maintenance Agreement (see Maintenance and Inspections section below)
- Nutrient Offset Fees, if applicable
- For projects with an LOD of 1 acre or greater:
    - NCDEQ Letter of Plan Approval
    - NCDEQ Certificate of Coverage
    - Financial Responsibility/Ownership Form

Record Drawing Submittal

- Stamped and signed Record Drawings, certifying that the as-built conditions meet the design standards and satisfy the intent of the stormwater management design
- Revised volume calculations for all SCMs
- Stormwater Acceptance and Transfer of Maintenance Responsibility Form (see Appendix B), signed by the Engineer

CONSTRUCTION PHASE

EHS Stormwater must be notified at least 2 weeks prior to the intended commencement of any land disturbance so that a preconstruction meeting can be scheduled. If the project also requires NCDEQ Sediment and Erosion Control Inspections, the contractor must also contact the NCDEQ Inspector to attend the preconstruction meeting.

Erosion and sediment controls must be in place and approved by the NC State Erosion and Sediment

Control Inspector prior to beginning work. All approved plans and permit approval letters are required to be kept on site at all times during construction. Any changes to the plan must be resubmitted to EHS for approval.

The EHS Stormwater Inspector may require weekly site meetings through the duration of the site work. Post-storm event and weekly self-inspection reporting must be performed by the Contractor and emailed to EHS Stormwater.

PROJECT CLOSEOUT PROCEDURES

The Record Drawing package must be submitted to EHS within 30 days of the functional completion of SCM, as determined by the Design Engineer and specified in the Engineer's Inspection Chart. EHS will schedule a final inspection with the Owner and Contractor to discuss any issues or punchlist items. Upon satisfactory completion of the project and Record Drawings, EHS will issue a Letter of Stormwater Acceptance and Transfer of Maintenance Responsibilities that will serve as final approval and closeout of the project.

A project cannot be closed out without Certified Record Drawings, signed and stamped by the Engineer, and a Letter of Stormwater Acceptance and Transfer of Maintenance Responsibility as final approval by EHS Stormwater.

INSPECTIONS AND MAINTENANCE

The NC State MS4 Permit requires all SCMs and storm drain infrastructure within the jurisdiction to be maintained and inspected. Minimum inspections and maintenance requirements are below:

- Dry weather outfall assessments, exposure assessments, and illicit discharge detection and elimination investigations are to be performed by EHS Stormwater across the entire MS4 jurisdiction.
- SCM inspections must be conducted by a NC Cooperative Extension Certified Stormwater SCM Inspection & Maintenance Professional. These inspections must include the following:
    - Post-storm inspections (within 24 hours of a 24-hr rainfall event of 1" or more)
    - Monthly inspections
    - Annual inspection
- SCM maintenance and repairs must be performed such that the SCM can maintain status of "functioning as designed", per NCDEQ Stormwater Design Manual and as noted in the Contract Documents (SCM design plans and report)
- Storm drain inspections must include the following:
    - Annual above-ground visual inspection along storm drain lines
    - Video inspections, per results of above-ground visual inspection or upon suspected issue
    - Annual catch basin inspections
- Regular catch basin cleanouts and structural storm drain maintenance and repairs must be made to maintain good condition of the infrastructure.

NC State-maintained SCM and storm drain devices must be accepted by NC State Campus Operations and Maintenance for maintenance, inspections, and renewals under the MS4 Operations and Maintenance Program (storm drains) and the SCM Operations and Maintenance Program (SCM).

All other infrastructure will require a formal agreement to ensure compliance with our MS4 permit requirements.

Annual Certifications of Inspections and Maintenance must be submitted each year to EHS by July 1.

General Stormwater Design Criteria

Exemptions

Stormwater controls are not required if all the following criteria are met:

- No changes to the drainage area of the site area are proposed.
- No changes to the storm drain system are proposed.
- No major grading changes are proposed.
- No net increases in built upon area are proposed.

Hydrology

- Soils information can be found using the Natural Resources Conservation Service's (NRCS) Web Soil Survey.
- Hydrological analysis must use the NRCS Discrete Curve Number Method.
- Curve numbers should be based on NRCS Technical Release 55 (TR-55), *Urban Hydrology for Small Watersheds* publication, Table 2-2.
- Overland flow paths must be no longer than 100 feet.
- NOAA Atlas 14 should be used for rainfall-intensity-duration data

Peak Flows

- The point(s) of analysis for peak flow evaluation is the limit of disturbance (LOD) area.
- Peak flows for the 1-, 2-, and 10- yr storms must remain within 2% of existing peak flows or mitigation is required.

Nutrient Loading

- The site area for nutrient management evaluation is the LOD.
- The proposed built upon area (PR-BUA) from all new development must be fully treated by a primary Stormwater Control Measure (SCM). Infiltration, bioretention, and permeable paver SCMs assume full nitrogen treatment. For all other SCM types, nitrogen calculations are required through SNAPTool v 4.2.0.
- Nitrogen buydown can only be used after a primary SCM treats 100% of the PR-BUA
- Runoff Volume Match is acceptable only with less than a 2% increase to the existing runoff volume.

Operation and Maintenance

- Operation and Maintenance Schedule and Details must be included on the plan sheets.

Storm Drain System

- All storm drain end treatments to an SCM must be headwall. No flared end sections.
- All existing storm drain pipes and structures within the limit of disturbance of the project must be

replaced or removed unless good condition of the storm drain pipes/structures to remain can be demonstrated.

- Profiles with 10-year hydraulic grade lines must be provided.

ILLICIT DISCHARGES

- All existing storm drains within the limit of disturbance of a project that connects steam tunnels, mechanical rooms, or other illicit discharge sources must be redirected to the sanitary system.
- Dumpsters must not be located within fifty feet of a storm drain inlet.
- No discharges of pollutants or other non-stormwater materials are permissible to the storm drain system or via overland flow or direct placement of materials into a channel, pipe, catch basin, or inlet. Permissible incidental discharges are limited to the following list:
    - All other discharges that are authorized by a non-stormwater NPDES permit,
    - Uncontaminated groundwater,
    - Foundation drains,
    - Air –conditioner or air compressor condensate without added chemicals,
    - Springs,
    - Discharges of uncontaminated potable water,
    - Waterline and fire hydrant flushing,
    - Water from footing drains,
    - Flows from riparian habitats and wetlands,
    - Irrigation drainage,
    - Landscape watering,
    - Pavement wash water which does not use detergents and no spills or leaks, or toxic or hazardous materials have occurred,
    - Routine external building wash down which does not use detergents,
    - Incidental windblown mist from cooling towers that collect on rooftops, and
    - Discharges resulting from firefighting training without chemical additives or from firefighting.

SCM-Specific Design Criteria

(beyond the Minimum Design Criteria in the NCDEQ Stormwater Design Manual, https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/stormwater-program/stormwater-design-manual)

BIORETENTION FACILITIES

INCOMING FLOWS

- Flows higher than the design storm must bypass the bioretention area.
- Concentrated flows must enter at or below any SCM bottom through drop structures and level, rigid watertight pipes.

PIPE END TREATMENTS

- All storm drain end treatments to an SCM must be headwall. No flared end sections.

STILLING BASINS

- Stilling basins must be lower than the bottom of the facility such that the top of the stilling basin is level with the top of the media.
- Underdrain must extend to the stilling basin media.

UNDERDRAINS

- No 57 stone must surround the underdrain from 3” below to 3” above the pipe, with a 3” layer of no 8 stone stacked on top of the 57 stone.
- Standard angle elbow joints must be specified.

SOIL TESTING

- Soil testing of the media must be included in the construction specifications. Testing results must be submitted to EHS Stormwater.

OUTFALLS

- Outflow channels must be protected until the 10-year velocity is at or below 3 feet per second.
- Outfalls must be accessible for maintenance.

LINES OF SIGHT

- Lines of sight must be maintained from 2-6 feet above roadways.

SOD

- Sod must have been grown on sandy loam (no clay).

SURFACE BASINS (WET OR DRY) IMPOUNDING STORM FLOWS GREATER THAN A THREE-FOOT DEPTH

INCOMING FLOWS

- Flows higher than the design storm must bypass the SCM.
- Concentrated flows must enter at or below any dry surface SCM bottom using a drop structure such that the entering pipe is 0.5% or less.
- Concentrated flows must enter any wet retention facility below the permanent pool surface elevation, and below the vegetative bench.
- Pipes entering a stormwater facility must be watertight.
- Riprap inflow ditches down internal or external facility slopes are not allowed.

PIPE END TREATMENTS

- All storm drain end treatments to an SCM must be headwall. No flared end sections.

CONTROL STRUCTURES

- Control structures must be cast-in place or pre-cast in one piece.
- All holes in risers or weir walls must be framed with additional reinforcing steel; minimum #4 rebar, six inches on center.
- Low flow orifice must be located through a removable threaded cap in the downstream structure.
- Anti-flotation computations must be provided for risers.
- Sliding and overturning computations must be provided for weir walls.

TRASH RACKS

- Trash racks must have a 1:1 extension on top opening inlet structures. No flat trash racks.
- Trash racks with a 12-18” overhang are preferred.
- Galvanized aluminum and removable or lockable access must be provided through trash rack.

DAM EMBANKMENT REQUIREMENTS

- NC Pond Code 378 requirements must be met.
- See Pond Code 378 for emergency spillway and freeboard requirements.
- An impervious core trench must be a minimum of 2 ft depth.
- Impervious core material must extend up to the 10-yr storm.
- Core material must be impervious, Unified Soil Classification MH, ML, SC, SM, CH, or CL material.
- Impervious core compaction must be done in 8-inch lifts with a sheepsfoot roller to 95% AASHTO T-99 or equivalent.
- The constructed height of the dam must be increased by at least 10% to ensure the settled top of the dam equals or exceeds the design top elevation.

FILTER DIAPHRAGM

- A filter diaphragm is required for all penetrations through the dam.
- The filter diaphragm must extend to the normal pool elevation (wet pond) or to the 10-yr WSEL (dry pond) and have a minimum of 2’ of cover.
- A concrete cradle and pressure relief drain pipe must also be included.

DAM BREACH INUNDATION AREA

- The dam breach inundation area must be delineated downslope from existing or proposed dams until the dam breach flood wave enters the floodplain at the confluence with a larger stream system, is captured by a closed storm drain system, or is reduced to a depth less than six inches.

ENGINEER’S INSPECTION CHART

- An Engineer’s Inspection Chart must be provided on the plans, specifying sign-off elements for the Engineer, Geotech, or Surveyor to sign and date during construction.
- Inspection items must include a minimum of liner installation, rebar placement, concrete pours, filter diaphragm installation, materials testing and core compaction.
- Geotechnical test results of concrete, soils, or media must be submitted to EHS Stormwater.

EMERGENCY SPILLWAY

- If water passes more frequently through the emergency spillway at the 10-year storm or more frequently, armor is required.
- Cover riprap spillway with four inches of topsoil and sod.

OUTFALLS

- Outflow channels must be protected until the 10-year velocity is at or below 3 feet per second.
- Outfalls must be accessible for maintenance.

OPEN CONVEYANCE CHANNELS

- Conveyance channels must have a maximum of 4:1 side slopes.

MAINTENANCE AND ACCESS

- Control devices must be accessible for maintenance.
- Risers must be set back into the embankment to the maximum extent possible and designed to allow for inspection from top to bottom.
- SCM maintenance access to all forebays and control structures should be 8 feet wide, 3:1 side slopes, and 17% maximum grade.
- Provide a minimum elevation of 24” for cleanout in forebays.
- A "No woody vegetation" zone must be delineated on the plan,15 feet from internal and external toe of the embankment and 15 feet from any control structure.

- Operation and Maintenance Schedule and Details must be added to the Design Plan and Record Drawings.

PERMEABLE PAVEMENT

ADJACENT USES

- Permeable pavers must be designed away from overhanging vegetation or an additional management plan must be provided.
- Transition from adjacent surfaces must protect permeable pavers from sedimentation.
- Drainage area to the permeable pavement must be stabilized prior to installation.

UNDERGROUND DETENTION

UNDERGOUND DETENTION IS NOT PERMITTED

GREEN ROOFS

ACCESS POINTS

- Roof hatches must be properly guarded.
- Permanent fall-protection must be installed, including standard guard rails and stair rails, where applicable.
- Access points for visual inspection must be established for safe inspection during and after rainfall events.
- Access points for maintenance of overflow devices and downstream connections must be established.
- Easy access to each outlet control, low-flow discharge point, and overflow connection must be established to permit debris removal under saturated conditions.

STRUCTURAL

- A structural analysis by a licensed design professional must confirm roof load capacity and roof membrane warranty, accounting for full vegetative growth.
- Roof slopes greater than 2% require partitions to prevent excessive ponding depths.
- Wind lift safety measures must be installed.
- Install debris covers on all drains to prevent blockages.
- Unrestricted overflow outlets must be used to ensure that there will be no standing water in excess of the maximum design ponding depths.
- Minimum setbacks for rooftop devices: 1-foot from electrical and HVAC systems, 2-feet from perimeter of the roof, 1-foot around all roof penetrations.

WATERPROOFING

- Perform leak detection testing after installing waterproof membrane and prior to acceptance of device.

APPENDIX A:

Stormwater Management

Checklists

Stormwater Management Design Report Submittal Checklist

Satisfactory completion of the full list of items below, in addition to the required items indicated for Design Development phase on the Stormwater Control Plan Submittal Checklist are required prior to moving forward to the Contract Documents project phase.

GENERAL DESIGN CRITERIA

- ☐ SCMs must meet all Minimum Design Criteria (MDC) requirements.
- ☐ Flows higher than the design storm must bypass the SCM.

PEAK FLOWS

- ☐ The analysis point for the peak flow evaluation is the location(s) where the flow leaves the LOD.
- ☐ Peak flows for the 1-, 2-, and 10- yr storms must be within **2% of existing** peak flows or treatment is required.

NUTRIENT LOADING

- ☐ The site area for nutrient management evaluation is the LOD.
- ☐ The proposed built upon area (PR-BUA) from all new development is fully treated by a primary SCM. Infiltration, bioretention, and permeable paver SCMs assume full nitrogen treatment. For all other SCM types, nitrogen calculations use the SNAPTool v 4.2.0.
- ☐ Nitrogen buydown is used only after a primary SCM treats 100% of the PR-BUA.
- ☐ Runoff Volume does not increase by more than **2% over the existing** runoff volume for the runoff volume match.
- ☐ Runoff volume match for nutrient loading uses the 90th percentile storm event.

NARRATIVE

- ☐ Site description and project overview
- ☐ Goals and constraints of the project
- ☐ Proposed facility and rationale
- ☐ Vicinity map
- ☐ FEMA map with site area located
- ☐ Web Soil Survey Map with the site boundary
- ☐ NOAA Atlas 14 Point Precipitation Frequency Estimates and hydrographs
- ☐ Nutrient analysis results summary: BUA determination and nitrogen load and assumptions made.
- ☐ Peak Flow Analysis results summary discussion: peak flow comparisons and assumptions made.
- ☐ Summary table with existing and proposed 1-, 2-, and 10-yr peak flows
- ☐ Summary table with existing and proposed water surface elevations (1-, 2-, and 10- yr) inside the facility

- ☐ Hydrology method is NRCS Discrete Curve Method. The rational method may also be used for storm drains not draining to an SCM.
- ☐ Hydraulic controls used, methods of analysis.
- ☐ Summary table of required and proposed volume (WQv and Cpv) requirements
- ☐ Design volume(s) and corresponding event.
- ☐ SCM drawdown time, 3-days

NUTRIENT TREATMENT AREA MAP

- ☐ North arrow
- ☐ Scale
- ☐ Basemap includes physical and environmental features such as roads, buildings, streams, trees, SCMs, etc.
- ☐ LOD area is delineated.
- ☐ Existing Built Upon Areas (EX-BUA) within LOD are shown.
- ☐ Proposed Built Upon Areas (PR-BUA) within the LOD are shown.
- ☐ Legend with summary of area quantities

DRAINAGE AREA MAPS

- ☐ North arrow
- ☐ Scale
- ☐ Legend
- ☐ Contours
- ☐ Buildings and roads
- ☐ Natural channels
- ☐ Stormwater conveyance systems with structures labeled
- ☐ SCMs located and labeled
- ☐ Land Use/Land Cover boundaries labeled
- ☐ Soil boundaries labeled
- ☐ Delineated drainage area(s), including offsite areas of contributing stormwater runoff.
- ☐ Drainage areas are labeled.
- ☐ Points of Analysis (POAs) labeled and located at the downstream edges of the LOD.
- ☐ Segmented Time of Concentration (Tc) paths are shown and labeled with flow type and lengths.
- ☐ Overland flow paths are no longer than 100’.
- ☐ Summary chart with each drainage area and the total contributing acres.

ANALYSES AND COMPUTATIONS

- ☐ EX- and PR-BUA determination
- ☐ SNAPTool Spreadsheet (v 4.2.0) (Not required for bioretention, infiltration, or permeable paver SCMs)
- ☐ Curve number derivation
- ☐ Time of Concentration (Tc) Computations
- ☐ Routing computations, schematics, and control structure diagram
- ☐ Required volume computations
- ☐ Peak discharge computations with model inputs and output tables
- ☐ Stage/storage tables, forebay volume computations, storage/discharge tables
- ☐ Infiltration calculations
- ☐ Emergency spillway stability computations
- ☐ Outfall stability computations
- ☐ Anti-flotation computations
- ☐ Sliding and overturning computations if a weir wall is proposed

DAM BREACH MAP

- ☐ North arrow
- ☐ Scale
- ☐ Legend
- ☐ Property lines
- ☐ Basemap with physical and environmental features.
- ☐ Stormwater conveyance systems with structures labeled
- ☐ SCMs located and labeled
- ☐ Dam breach inundation area is delineated downslope from existing or proposed dams until the dam breach flood wave enters the floodplain at the confluence with a larger stream system, is captured by a closed storm drain system, or is reduced to a depth less than six inches.

GEOTECH REPORT, IF REQUIRED BY MDC OR IF A DAM 3 FT IN HEIGHT OR GREATER IS PROPOSED

- ☐ Dams must have a minimum of 2 boring samples: 1 along dam centerline in fill to the elevation of the bottom of the clay core and 1 in the SCM at deepest cut location.
- ☐ Boring locations map
- ☐ Boring log
- ☐ Unified Soil Classification (USC) determinations
- ☐ Presence of bedrock or groundwater noted
- ☐ Seasonal High-Water Table (SHWT) location
- ☐ Infiltration test

- ☐ Seepage potential
- ☐ Bearing strength determination
- ☐ Determination of soil/concrete friction coefficient, if weir wall is proposed

STORM DRAIN SYSTEM

- ☐ Calculations for each proposed storm drain pipe, inlet, and channel

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Professional Engineer Signature Date

Stormwater Management Plan Submittal Checklist

Design Development phase submittal requirements are shown in ***bold***. Satisfactory completion of these items in bold, in addition to the approved Stormwater Control Design Report (see Stormwater Control Design Report Checklist for list of requirements) are required prior to moving forward to the Contract Documents project phase. The full list below, including the non-bold items, must be satisfactorily completed during the Contract Documents phase, prior to approval of the Stormwater Management Plan. The NC State review period is 30 days.

TITLE SHEET

- ☐ ***NC State project name, job number, and longitude/latitude***
- ☐ ***Design professional name, address, and phone number***
- ☐ ***Vicinity map with major roads identified and site delineated***
- ☐ ***Sheet Index***
- ☐ Professional Engineer's certification block, seal, signature, and date
- ☐ Stormwater As-built Certification block placeholder:

STORMWATER AS-BUILT CERTIFICATION

SEAL:

_____
_____
PROFESSIONAL ENGINEER DATE

I HEREBY CERTIFY THAT THE AS-BUILT CONDITIONS HEREIN HAVE BEEN VERIFIED TO MEET ALL STATE AND LOCAL STORMWATER DESIGN STANDARDS. THE AS-BUILT CONDITIONS FULLY SATISFY THE INTENT OF THE DESIGN.

- ☐ ***SCM Design Block with SCM type, WQv Provided, Total Volume provided, and Regulatory Requirements Met:***

SCM DESIGN

SCM TYPE:

WQv PROVIDED:

TOTAL VOLUME PROVIDED:

REGULATORY REQUIREMENTS MET (Y/N):

GENERAL, ALL SHEETS

- ☐ ***Minimum 3 grid ticks with Northing/Easting on plan sheets***
- ☐ ***North arrow***
- ☐ ***Match lines are labeled and referenced.***
- ☐ Profiles, details, and cross-sections are drawn to scale.

PLAN VIEW

- ☐ ***Legend***
- ☐ ***Environmental features, including Waters of the US, wetlands, and Neuse Buffer Zones 1 and 2 are delineated and labeled.***
- ☐ ***FEMA floodplain is delineated.***
- ☐ ***Existing and proposed utilities are identified and include pipe sizes and materials.***
- ☐ ***All existing and proposed improvements including locations of buildings, SCMs, structures, impervious surfaces, storm drain infrastructure, and all grading***
- ☐ ***Existing and proposed contours with index contours clearly labeled***
- ☐ ***Limit of Disturbance***
- ☐ ***Locations of any test borings from design phase***

STORMWATER CONVEYANCE ITEMS

- ☐ ***All storm drains have headwalls inside the SCM.***
- ☐ ***Concentrated flows enter at or below any dry surface SCM bottom using a drop structure such that the entering pipe slope is 0.5% or less.***
- ☐ ***Concentrated flows enter any wet retention facility below the permanent pool surface elevation, and below the vegetative bench.***
- ☐ ***Storm drains entering a stormwater facility are watertight.***
- ☐ ***10-year velocities are called out for all proposed concentrated flow conveyances at the outfall and upon return to existing conditions.***
- ☐ ***Outflow channels are protected until the 10-year velocity is at or below 3 feet per second.***
- ☐ ***Proposed storm drains have Structure Schedules.***
- ☐ ***All existing storm drain pipes and structures within the limit of disturbance of a project are replaced unless in good condition.***
- ☐ ***All existing storm drain within the limit of disturbance of a project that connects steam tunnels, mechanical rooms, or other illicit discharge sources are redirected to the sanitary system.***

SCM ITEMS

- ☐ ***SCM maintenance access to all forebays and control structures is 8 feet wide, 3:1 side slopes, and 17% maximum grade.***
- ☐ Trash racks are shown on all riser structures.

- ☐ Limits of liner, if applicable
- ☐ Limits of vegetative bench, if applicable

DAM EMBANKMENT ITEMS

- ☐ A centerline of the SCM from the inlet through the principal spillway/embankment shows stationing to match the SCM Profile.
- ☐ A centerline of the embankment shows stationing to match the Dam Through-Section.
- ☐ A centerline of the emergency spillway shows stationing to match the Emergency Spillway Profile.
- ☐ A "No woody vegetation" zone must be delineated 15 feet from the internal and external toe of embankment and 15 feet from any control structure.
- ☐ The limits of the impervious core are shaded or hatched.

SCM PROFILE

(from inlet through embankment along riser/barrel or through weir)

- ☐ ***Existing and proposed ground surface***
- ☐ ***No slopes steeper than 3:1***
- ☐ ***Embankment top width 10' minimum; top elevations noted: constructed and settled.***
- ☐ Control structure
- ☐ Trash rack
- ☐ ***Bedding materials are shown to scale.***
- ☐ ***Outfalls are accessible for maintenance.***
- ☐ ***Design velocities are called out at outfall and where flows meet existing ground.***

DAM ITEMS

- ☐ The constructed dam height is at least 10% higher than settled dam height.
- ☐ The impervious core trench is a minimum of 2' min deep.
- ☐ The impervious core extends up to 10-year water surface elevation (WSEL).
- ☐ ***A minimum of 24" cleanout elevation is provided in forebays.***
- ☐ ***1-, 2-, 10-, and 100- WSELs are called out inside the SCM.***
- ☐ ***Permanent pool WSEL is called out, if applicable.***
- ☐ ***Control structure openings show dimensions.***
- ☐ ***Principal spillway pipe shows dimensions, slope, inverts, and material.***
- ☐ Watertight joints are specified up to the higher of the emergency spillway or the top of the riser.
- ☐ Filter diaphragm is shown, if applicable
- ☐ ***Freeboard requirements are met.***
- ☐ Liner shown, if applicable

DAM THROUGH-SECTION

- ☐ Existing and proposed ground surfaces
- ☐ Constructed and settled top of the dam elevations are called out.
- ☐ The principal spillway is shown.
- ☐ The crest elevation of the emergency spillway is shown.
- ☐ The proposed top of dam extends to existing ground on both ends, and the projected ground line is shown in the pond.
- ☐ The top of the impervious core is at or above the 10-year WSEL, with elevations called out and limits shaded or hatched.
- ☐ The bottom of impervious core trench is a minimum of 2 ft depth; the elevation is called out and limits shaded or hatched.
- ☐ The proposed 1-, 2-, 10-, and 100- year WSELs are shown.
- ☐ Freeboard requirements are met.
- ☐ Core material is specified as impervious, Unified Soil Classification MH, ML, SC, SM, CH, or CL material.
- ☐ Impervious core compaction is specified to be constructed in 8-inch lifts with a sheepsfoot roller to 95% AASHTO T-99 or equivalent.
- ☐ Geotechnical certifications are included in Engineer's Inspection Chart for materials certification and compaction, as well as for filter diaphragm items completed during the construction phase.
- ☐ A filter diaphragm is shown for all penetrations through the dam.
- ☐ Principal and Auxiliary Spillways meet NC Code 378 requirements.

FILTER DIAPHRAGM DETAIL

- ☐ Drain material is noted as ASTM C-33 (natural sand).
- ☐ The filter diaphragm extends to the normal pool WSEL (wet pond) or 10-year WSEL (dry pond).
- ☐ Filter diaphragm dimensions are shown and labeled
- ☐ A minimum of 2 ft cover is provided over the filter diaphragm.
- ☐ A pressure relief perforated drain pipe with diameter and material is shown.
- ☐ Items for inspection are listed in the Engineer's Inspection Chart.

EMERGENCY SPILLWAY PROFILE AND CROSS SECTION

- ☐ ***Existing and proposed ground surfaces***
- ☐ ***Invert elevations for inlet, control, and outlet sections***
- ☐ ***Length of inlet, control, and outlet sections***
- ☐ ***Slopes of inlet, control, and outlet sections***
- ☐ ***Velocity and discharge of the design channel at steepest section is called out.***
- ☐ ***Cross section detail of the emergency spillway with invert elevation, 100-yr WSEL, bottom***

width, existing and proposed ground surface, and side slopes labeled.

- ☐ If water passes more frequently through the emergency spillway at the 10-year storm or more frequently, the cross section is armored to the top of the embankment.
- ☐ The riprap spillway is covered with 4-inches of topsoil and sod.
- ☐ ***The outfall channel is protected, and material type and size are specified.***

CONTROL STRUCTURE DETAIL

- ☐ Control structure material is specified and is the same material as principal spillway pipe.
- ☐ The control structure is specified as cast in place or pre-cast in one piece.
- ☐ If cast in place, key-in joint reinforcement and water stop detail are included.
- ☐ If cast in place, the Engineer's Inspection Chart items are described for the Engineer to sign and date during construction.
- ☐ The control structure is accessible for maintenance.
- ☐ ***The riser are set back in the embankment to the maximum extent possible and designed to allow for inspection from top to bottom.***
- ☐ ***Riser or weir crest elevation and invert elevations of all openings are labeled.***
- ☐ ***All openings are dimensioned.***
- ☐ Concrete collars are shown and labeled.
- ☐ All holes in risers or weir walls are framed with additional reinforcing steel.
- ☐ Riser or weir base material, length, width, and thickness is shown to scale and dimensioned.
- ☐ Low flow orifice pipe diameter and type are labeled. A removable threaded cap with orifice in downstream structure is shown.
- ☐ Dewatering devices are shown and labeled.
- ☐ Trash racks are shown and labeled.

TRASH RACK DETAIL

- ☐ Galvanized aluminum and removable or lockable access is provided through the trash rack.
- ☐ Manhole rungs are under the access door to the bottom of the riser.
- ☐ Opening sizes are dimensioned.
- ☐ The trash rack has a 1:1 extension on the top opening inlet structures.
- ☐ Trash racks with a 12-18" overhang from the riser structure are preferred.

STORMWATER CONVEYANCE PROFILES

- ☐ ***Existing and proposed ground is shown along centerlines of pipe.***
- ☐ ***Structures are numbered and stationed.***
- ☐ ***Size and inverts of all pipes are provided at the structure.***
- ☐ ***Structure inverts are labeled upstream and downstream at each structure.***

- ***10- yr hydraulic grade lines shown and labeled.***
- ***All existing storm drain pipes and structures within the limit of disturbance of a project are replaced unless the existing structures are in good condition.***
- Open conveyance channels have 4:1 or flatter side slopes.
- Open conveyance profiles and cross sections are also shown.

ENGINEER'S INSPECTION CHART

- An Engineer's Inspection Chart is provided, specifying sign-off elements for the Engineer to sign and date during construction. All steps of construction when an Engineer, Geotech, or Surveyor must be contacted are stated.
- Inspection items include a minimum of liner installation, rebar placement, concrete pours, filter diaphragm installation, materials testing and core compaction.
- Geotechnical test results of concrete, soils, or media must be submitted to EHS Stormwater.
- The Design Engineer must pre-determine which construction step indicates "functional completion" of the SCM and note that the Record Drawing package must be submitted within 30 days to EHS Stormwater.
- The final survey steps for wet ponds are included in two phases: one phase when the pond bottom and forebays are at final grade, but before becoming inundated with water, and a second phase upon final completion of grading and control devices.

OPERATION AND MAINTENANCE SCHEDULE AND DETAILS

- Designed dewatering time is noted.
- Cleanout elevations are called out.
- Required maintenance and frequency are listed.
- Components of SCM requiring inspection are listed.
- Common problems and their resolution are noted.
- Specific potential areas of concern are noted.

NOTES

GENERAL STORMWATER NOTES

1. DUMPSTERS MUST NOT BE LOCATED WITHIN 50 FEET OF A STORM DRAIN INLET.
2. A WRITTEN SPILL PLAN, HELD BY THE CONTRACTOR, MUST BE IN PLACE. ANY SPILLS MUST BE REPORTED TO NC STATE STORMWATER.

NOTES FOR WOODY VEGETATION REMOVAL ON EXISTING EMBANKMENTS

1. ALL WOODY VEGETATION ON THE EMBANKMENT OR WITHIN 15 FEET OF THE TOE OF SLOPE ON EITHER SIDE OF THE EMBANKMENT SHOULD BE REMOVED.
2. WOODY VEGETATION SMALLER THAN 6" DBH CAN BE FLUSH CUT AND TREATED WITH WATERPROOF SEALANT TO PROLONG DECAY.
3. WOODY VEGETATION 6" DBH OR LARGER MUST BE REMOVED BY EXCAVATION.

4. WHERE REMOVAL BY EXCAVATION INTO THE EMBANKMENT IS REQUIRED (6"DBH AND LARGER), EXCAVATION SHOULD BE MINIMIZED AS MUCH AS POSSIBLE BUT MUST INCLUDE ALL ROOTS 1/2 INCH DIAMETER OR GREATER.
5. NEW FILL SHOULD BE PLACED IN THE EMBANKMENT IN LIFTS NO GREATER THAN 8 INCHES AND COMPACTED TO THE ASTM D698 STANDARD PROCTOR (95% DRY DENSITY). MATERIAL MUST BE UNIFIED SOIL CLASSIFICATION OF MH, ML, SC, SM, CH, OR CL MATERIAL, FREE OF STUMPS, ROOTS, RUBBISH, OR STONES.

Professional Engineer Signature Date

Erosion and Sediment Control Submittal Checklist

General Site Erosion & Sediment Controls

- ☐ Erosion protection must be provided in interim and final designs
- ☐ Steep slopes must be protected from erosion
- ☐ Areas of concentrated flow must be protected from erosion
- ☐ Surface interfaces must be protected from erosion
- ☐ Calculations for sized controls, if required, must be provided in the Stormwater Management Plan Report

Phased Erosion & Sediment Control Plans

- ☐ Stormwater Management Plan (SWMP) block:

STORMWATER MANAGEMENT PLAN (SWMP)
LOD AREA: _____SF
EX BUA: _____SF
PR BUA: _____SF
IS PROJECT WITHIN THE NEUSE BUFFER ZONES 1 OR 2 (Y/N): _____

- ☐ Delineation of Neuse Buffer Zones 1 and 2 (Plan) if within 100’ of the Limits of Disturbance
- ☐ Delineation of the Limits of Disturbance (LOD)
- ☐ Stabilized Construction Entrance, min length 30'
- ☐ Fabric/Filtration-type Inlet Protection preferred for greater turbidity control
- ☐ Perimeter Controls - silt fencing should follow contour as much as possible to avoid need for stone outlets
- ☐ Concrete Washout
- ☐ Tree Protection Fencing
- ☐ Tree Removal Areas
- ☐ Staging/Stockpile areas
- ☐ Dewatering Controls
- ☐ Stabilized stockpile areas or note that soil stockpiles must be covered at the end of the day
- ☐ Any areas of altered concentrated flow will require a call-out with the 10-yr discharge velocity (must be stabilized to below 3 ft/s at return to existing)

Erosion & Sediment Control Details

- ☐ Stabilized Construction Entrance, min length 30'
- ☐ Fabric/Filtration-type Inlet Protection preferred for greater turbidity control

- ☐ Perimeter Controls - silt fencing should follow contour as much as possible to avoid the need for stone outlets
- ☐ Concrete Washout
- ☐ Tree Protection Fencing
- ☐ Tree Removal Areas
- ☐ Staging/Stockpile areas
- ☐ Dewatering Controls
- ☐ Stabilized stockpile areas or note that soil stockpiles must be covered at the end of the day
- ☐ Vegetative Stabilization
- ☐ NCG01 Ground Stabilization and Materials Handling
- ☐ NCG01 Self-Inspection, Recordkeeping, and Reporting

CONCENTRATED FLOW E&S CONTROLS, IF ANY DRAINAGE CHANGES ARE PROPOSED

- ☐ Downstream Flow Protection: All flows must leave the site better than or equal to the existing condition.
- ☐ Existing and proposed utilities must be labeled, including pipe size, pipe material, structure locations.
- ☐ Existing and proposed surface water runoff calculations, including velocity/shear, cross sections, and supporting data must be provided for each outlet from the site.
- ☐ Call out the 10-year velocity for all proposed concentrated flow conveyances at the outfall and upon return to existing conditions. Outflow pipe and channels must be protected until the 10-year velocity is at or below 3 feet per second.
- ☐ Pipe profiles must include 10-yr HGL on pipes and must show no surcharge.
- ☐ All outfalls must be protected against erosion.

NOTES

EROSION & SEDIMENT CONTROL NOTES

1. THE CONTRACTOR MUST SCHEDULE A PRECONSTRUCTION MEETING WITH NC STATE, ENVIRONMENTAL HEALTH AND SAFETY, STORMWATER AT LEAST 5 DAYS PRIOR TO BEGINNING ANY LAND DISTURBING ACTIVITIES.
2. A COPY OF THE STORMWATER MANAGEMENT PLAN (SWMP) APPROVAL LETTER AND THE APPROVED PLANS AND PERMITS MUST BE MAINTAINED ON THE SITE AT ALL TIMES.
3. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO CLEARING AND/OR LAND DISTURBANCE.
4. SOIL STOCKPILES MUST BE HAULED IMMEDIATELY OFF SITE OR COVERED AT THE END OF THE DAY.
5. THE CONTRACTOR MUST INSTALL AND MAINTAIN THROUGHOUT THE PROJECT CONSTRUCTION ALL EROSION CONTROL MEASURES SHOWN WITHIN THESE PLANS IN ACCORDANCE WITH APPLICABLE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY (NCDEQ) AND NC STATE EROSION AND SEDIMENT CONTROL REGULATIONS.

6. SELF-INSPECTIONS ARE REQUIRED AT LEAST ONCE PER 7 CALENDAR DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT EQUAL TO OR GREATER THAN 1.0 INCH PER 24 HOUR PERIOD. REPORTS MUST BE SENT TO NCSU EROSION AND SEDIMENT CONTROL INSPECTOR. DEMLR MONITORING FORM, INSPECTION AND MONITORING RECORDS FOR ACTIVITIES UNDER STORMWATER GENERAL PERMIT NCGO1 AND SELF-INSPECTION RECORDS FOR LAND DISTURBING ACTIVITIES PER G.S. 113A-54.1 OR SIMILAR MAY BE USED.
7. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED ROAD SURFACE, THE ROAD SURFACE MUST BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT MUST BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING MUST BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER.
8. DURING DEWATERING OPERATIONS, WATER MUST BE PUMPED INTO AN APPROVED FILTERING DEVICE PRIOR TO DISCHARGE TO RECEIVING OUTLET.
9. TURBIDITY IN THE RECEIVING WATER MUST NOT EXCEED 50 NEPHELOMETRIC TURBIDITY UNITS (NTU). ADDITIONAL BEST MANAGEMENT PRACTICES MAY BE REQUIRED BEYOND THOSE SHOWN ON THE PLAN.
10. ANY AREAS OF EXPOSED SOILS THAT WILL NOT BE DISTURBED WITHIN 14 DAYS MUST BE STABILIZED.

VEGETATIVE ESTABLISHMENT NOTES

1. ALL PERMANENT PERVIOUS AREAS MUST BE TILLED TO A DEPTH OF 12 INCHES IMMEDIATELY PRIOR TO LANDSCAPING ACTIVITIES. THESE AREAS MUST NOT BE SUBJECT TO COMPACTION.
2. ALL SEEDED AREAS MUST BE COVERED IN BIODEGRADABLE EROSION CONTROL MATTING. IF MORE THAN ONE FABRIC WIDTH IS REQUIRED, A MINIMUM OVERLAP OF 6” MUST BE PROVIDED.
3. STRAW BLANKETS MUST BE INSTALLED ON ALL FLAT, SEEDED AREAS. STRAW FIBERS MUST BE DRY AND FREE OF MOLD, WITH THE STRAW FIBERS EVENLY DISTRIBUTED THROUGH THE BLANKET SUCH THAT NO BARE AREAS ARE PRESENT.
4. DRAINAGE DITCHES AND SLOPES UP TO 3:1 GRADE MUST BE PROTECTED WITH AN EROSION CONTROL BLANKET COMPOSED OF 80% WOOD OR CELLULOSE FIBERS. THE FIBERS MUST BE 6-INCHES IN LENGTH AND EVENLY DISTRIBUTED THROUGH THE BLANKET WITH NO BARE AREAS. NETTING MUST HAVE A 1” X 2” GRID.
5. NATURAL FIBER MATTING MUST BE USED IN AREAS WITH HIGH VELOCITY FLOW OR AREAS WITH SLOPES GREATER THAN 3:1 GRADE. THE MATTING MUST HAVE AN OPEN WEAVE THAT IS UNIFORM AND CONSISTENT, WITH A MINIMUM WIDTH OF 6.5’ AND A MINIMUM WEIGHT OF 11.8 OZ PER SQUARE YARD.

Professional Engineer Signature Date

Record Drawing Submittal Package Checklist

RECORD DRAWINGS

- ☐ Record Drawing package must be submitted within 30 days of functional completion of SCM
- ☐ As-built (in red) overlaid on the proposed black contours on Plan View and Profiles of the Construction Set, verified by the Engineer
- ☐ Engineer's Inspection Charts, signed and dated
- ☐ Updated Storm Drain Structure Schedules
- ☐ As-built control elevations, noted in red and verified by the Engineer
- ☐ Top of embankment and spillway elevations noted in red and verified by the Engineer
- ☐ Design drawdown time(s) and tolerance(s), revised if necessary
- ☐ Clean-out elevation(s), revised if necessary
- ☐ No Woody Vegetation Zone, 15' from toe of embankment and around control devices
- ☐ SCM Design Details, included in Record Drawing Submittal Set
- ☐ Operation and Maintenance Plan, included in Record Drawing Submittal Set
- ☐ Signed Stormwater As-Built Certification block:

STORMWATER AS-BUILT CERTIFICATION

SEAL:

_____ _____

PROFESSIONAL ENGINEER DATE

I HEREBY CERTIFY THAT THE AS-BUILT CONDITIONS HEREIN HAVE BEEN VERIFIED TO MEET ALL STATE AND LOCAL STORMWATER DESIGN STANDARDS. THE AS-BUILT CONDITIONS FULLY SATISFY THE INTENT OF THE DESIGN.

FINAL COMPUTATIONS AND SUMMARY REPORT

- ☐ As-Built Volume Computations
- ☐ Engineer's Inspection Reports

Professional Engineer Signature Date

APPENDIX B:

Stormwater Forms

NC STATE UNIVERSITY

June 2025

Stormwater Management Plan Submittal for Minor Land Disturbance Projects

Projects with less than 1 acre of land disturbance and are exempt from stormwater design criteria may provide the minimum criteria detailed below. Exemptions from stormwater design criteria must propose no change to the drainage area, no change to the storm drain system, no major grading changes, and no net increase in built upon area.

Any project with a land disturbance area of 0.1 acre or greater requires a Stormwater Management Plan (SWMP), approved by Environmental Health and Safety (EHS) Stormwater. No land disturbance can begin without the issuance of a SWMP approval letter.

PROJECT NAME		LOD AREA (SF)	
SUBMITTAL DATE		NET INCREASE IN BUILT UPON AREA (SF)*	
PROJECT MANAGER		IS LOD WITHIN THE NEUSE BUFFER ZONE?	
CONSTRUCTION START DATE		APPROXIMATE CONSTRUCTION DURATION	

* NET INCREASE IN BUILT UPON AREA MUST BE 0 SF OR A STORMWATER CONTROL MEASURE (SCM) DESIGN IS REQUIRED.

PROJECT DESCRIPTION

_____
_____
_____
_____
_____

SUBMITTAL REQUIREMENTS

- Erosion and Sediment Control Plan - *show all applicable E&SC controls*
- Stabilization Plan - *show final stabilization condition (hardwood mulch, seed, sod, other plantings)*
- Standard Details
- Sequence of Construction
- Erosion and Sediment Control Notes
- Vegetation Establishment Notes

EROSION AND SEDIMENT CONTROLS FOR PLAN

- ☐ Limits of Disturbance (LOD)
- ☐ Tree Protection
- ☐ Construction Entrance
- ☐ Inlet Protection
- ☐ Silt Fence
- ☐ Stockpile Area(s)

STANDARD DETAILS TO BE ATTACHED

- ☐ Tree Protection
- ☐ Construction Entrance
- ☐ Silt Sock/Wattle for Inlet Protection
- ☐ Silt Fence
- ☐ Concrete Washout Detail
- ☐ Dewatering Device (Pump and Filter Bag) Detail
- ☐ Temporary Seeding Recommendations
- ☐ Permanent Seeding Recommendations
- ☐ NCG-01 Self-Inspection Detail
- ☐ NCG-01 Recordkeeping and Reporting Detail
- ☐ NCG-01 Ground Cover Detail
- ☐ NCG-01 Materials Handling Detail

SEQUENCE OF CONSTRUCTION

1. HOLD A PRECONSTRUCTION MEETING WITH EHS STORMWATER, THE NC STATE PROJECT MANAGER, AND THE CONTRACTOR.
2. INSTALL ALL EROSION AND SEDIMENT CONTROLS PRIOR TO ANY LAND DISTURBANCE.
3. CONDUCT SITE WORK.
4. CONTRACTOR TO PERFORM SELF-INSPECTIONS WEEKLY AND WITHIN 24 HOURS OF RAINFALL EVENTS GREATER THAN 1.0 INCH. SELF-INSPECTION FORMS SHALL BE EMAILED TO EHS STORMWATER.
5. ONCE SITE WORK HAS BEEN COMPLETED, STABILIZE SITE AREA.
6. UPON PERMANENT STABILIZATION OF SITE, HOLD A SITE MEETING WITH EHS STORMWATER, THE NC STATE PROJECT MANAGER, AND THE CONTRACTOR.
7. WITH APPROVAL, REMOVE EROSION AND SEDIMENT CONTROLS. REQUEST SITE CLOSEOUT WITH EHS STORMWATER.

EROSION & SEDIMENT CONTROL NOTES

1. THE CONTRACTOR MUST SCHEDULE A PRECONSTRUCTION MEETING WITH NC STATE, ENVIRONMENTAL HEALTH AND SAFETY, STORMWATER AT LEAST 5 DAYS PRIOR TO BEGINNING ANY LAND DISTURBING ACTIVITIES.
2. A COPY OF THE STORMWATER MANAGEMENT PLAN (SWMP) APPROVAL LETTER AND THE APPROVED PLANS AND PERMITS MUST BE MAINTAINED ON THE SITE AT ALL TIMES.
3. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO CLEARING AND/OR LAND DISTURBANCE.
4. SOIL STOCKPILES MUST BE HAULED IMMEDIATELY OFF SITE OR COVERED AT THE END OF THE DAY.
5. THE CONTRACTOR MUST INSTALL AND MAINTAIN THROUGHOUT THE PROJECT CONSTRUCTION ALL EROSION CONTROL MEASURES SHOWN WITHIN THESE PLANS IN ACCORDANCE WITH APPLICABLE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY (NCDEQ) AND NC STATE EROSION AND SEDIMENT CONTROL REGULATIONS.
6. SELF-INSPECTIONS ARE REQUIRED AT LEAST ONCE PER 7 CALENDAR DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT EQUAL TO OR GREATER THAN 1.0 INCH PER 24 HOUR PERIOD. REPORTS MUST BE SENT TO NCSU EROSION AND SEDIMENT CONTROL INSPECTOR. DEMLR MONITORING FORM, INSPECTION AND MONITORING RECORDS FOR ACTIVITIES UNDER STORMWATER GENERAL PERMIT NCGO1 AND SELFINSPECTION RECORDS FOR LAND DISTURBING ACTIVITIES PER G.S. 113A-54.1 OR SIMILAR MAY BE USED.
7. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED ROAD SURFACE, THE ROAD SURFACE MUST BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT MUST BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING MUST BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER.
8. DURING DEWATERING OPERATIONS, WATER MUST BE PUMPED INTO AN APPROVED FILTERING DEVICE PRIOR TO DISCHARGE TO RECEIVING OUTLET.
9. TURBIDITY IN THE RECEIVING WATER MUST NOT EXCEED 50 NEPHELOMETRIC TURBIDITY UNITS (NTU). ADDITIONAL BEST MANAGEMENT PRACTICES MAY BE REQUIRED BEYOND THOSE SHOWN ON THE PLAN.
10. ANY AREAS OF EXPOSED SOILS THAT WILL NOT BE DISTURBED WITHIN 14 DAYS MUST BE STABILIZED.

VEGETATION ESTABLISHMENT NOTES

1. ALL PERMANENT PERVIOUS AREAS MUST BE TILLED TO A DEPTH OF 12 INCHES IMMEDIATELY PRIOR TO LANDSCAPING ACTIVITIES. THESE AREAS MUST NOT BE SUBJECT TO COMPACTION.
2. ALL SEEDED AREAS MUST BE COVERED IN BIODEGRADABLE EROSION CONTROL MATTING. IF MORE THAN ONE FABRIC WIDTH IS REQUIRED, A MINIMUM OVERLAP OF 6” MUST BE PROVIDED.
3. STRAW BLANKETS MUST BE INSTALLED ON ALL FLAT, SEEDED AREAS. STRAW FIBERS MUST BE DRY AND FREE OF MOLD, WITH THE STRAW FIBERS EVENLY DISTRIBUTED THROUGH THE BLANKET SUCH THAT NO BARE AREAS ARE PRESENT.
4. DRAINAGE DITCHES AND SLOPES UP TO 3:1 GRADE MUST BE PROTECTED WITH AN EROSION CONTROL BLANKET COMPOSED OF 80% WOOD OR CELLULOSE FIBERS. THE

FIBERS MUST BE 6-INCHES IN LENGTH AND EVENLY DISTRIBUTED THROUGH THE BLANKET WITH NO BARE AREAS. NETTING MUST HAVE A 1” X 2” GRID.

5. NATURAL FIBER MATTING MUST BE USED IN AREAS WITH HIGH VELOCITY FLOW OR AREAS WITH SLOPES GREATER THAN 3:1 GRADE. THE MATTING MUST HAVE AN OPEN WEAVE THAT IS UNIFORM AND CONSISTENT, WITH A MINIMUM WIDTH OF 6.5’ AND A MINIMUM WEIGHT OF 11.8 OZ PER SQUARE YARD.

NC STATE UNIVERSITY

June 2025

Stormwater Acceptance and Transfer of Maintenance Responsibility

PROJECT NAME:

SWMP NUMBER:

DATE:

The Record Drawing package has been submitted to EHS Stormwater, certifying that the as-built conditions meet the design standards and satisfy the intent of the stormwater management design. EHS Stormwater has inspected this project and accepts it under the NC State University Stormwater Management Plan for the following actions (check all that apply):

EROSION AND SEDIMENT CONTROLS

☐ Permanent stabilization and/or planting has been completed; erosion and sediment control permits are closed out.

☐ Permanent stabilization and/or planting has not yet been completed. The owner is responsible for the following outstanding permit requirements:

- ☐ Accepting responsibility for erosion and sediment controls as required by NC Department of Environmental Quality and EHS Stormwater, including maintenance of erosion and sediment controls, weekly self-inspections and any outstanding requirements of the NCG01 permit and approved Stormwater Management Plan*
- ☐ Establishment of permanent vegetation, ground cover and/or other permanent stabilization
- ☐ Final removal of temporary erosion and sediment controls
- ☐ Closeout of erosion and sediment control permits

*If the NCG01 permit has not yet been closed out, the Project Manager must notify the NC Department of Environmental Quality of new project contact(s) and responsibility.

STORMWATER INFRASTURCTURE

For compliance with the NC State University's National Pollutant Discharge Elimination System (NPDES) Permit No. NCS000376 and Stormwater Management Plan, all SCM and storm drain infrastructure is required to be inspected and maintained. Inspections and maintenance agreements in place for this infrastructure must now begin or resume. Stormwater design, control elevations, and operation and maintenance details are included in the Record Drawings. Annual Certifications of Inspections and Maintenance must be submitted each year to EHS Stormwater by July 1.

Stormwater Control Measures

☐ This project was exempt from providing any stormwater control measures (SCMs).

☐ The owner assumes responsibility for the installation of specialized plantings for the SCMs in accordance with the approved plans.

☐ The owner assumes responsibility for required post-storm, monthly, and annual inspections and maintenance requirements of the SCMs.

Stormwater Conveyance

☐ This project did not include any stormwater conveyance or storm drain infrastructure.

☐ The owner assumes responsibility for final flushing and collection of fines from storm drain infrastructure.

☐ The owner assumes responsibility for ongoing inspection and maintenance of the storm drain infrastructure.

☐ Other: _____

_____

_____

PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that the as-built conditions herein have been verified to meet all state and local stormwater design standards. The as-built conditions fully satisfy the intent of the design.

_____
Professional Engineer's Signature

_____
Printed Name

_____
Date

_____
License No. *Exp Date*

STORMWATER ACCEPTANCE

EHS Stormwater Representative

_____
Signature

_____
Printed Name

_____
Date

Owner/Representative of Maintenance Responsibility

_____
Signature

_____
Printed Name

_____
Department or Company

_____
Date

NC STATE UNIVERSITY

June 2025

Annual Certification of Stormwater Inspections and Maintenance

Stormwater control measures (SCMs) and storm drain infrastructure within the NC State University MS4 jurisdiction are required to be inspected, maintained and functioning per design. The University requires documentation in the form of an Annual Certification of Stormwater Inspections and Maintenance. ***The certification of SCMs must be completed by a NC Cooperative Extension Certified Stormwater SCM Inspection & Maintenance Professional.***

Privately managed facilities that do not comply by performing routine inspections and following the approved Operation & Maintenance Manual for each SCM may be subject to state and/or federal compliance and enforcement, and may also be required to contract with the University to provide operation and maintenance services in order to maintain compliance.

This annual certification covers the fiscal year (July 1 – June 30) and must be submitted prior to July 1 of each year for inclusion in the University's annual stormwater permit reporting process. A certification form is required for each device. Submit completed certification(s) to Environmental Health and Safety Stormwater, Campus Box 8007, 2620 Wolf Village Way, Raleigh, NC 27695-8007.

PART I: GENERAL INFORMATION

Facility Name	
Facility Address	
Facility Contact Information *(name, phone, e-mail)*	
Stormwater Conveyance System: Total Length (LF):_____ Inlets (qty):_____ Outfalls (qty):_____	
Stormwater Control Measure Type(s): ☐ Wet Detention ☐ Bioretention ☐ Wetland ☐Other *(specify)*: _____	
SCM Device Location or Identifier	

PART II: STORMWATER CONVEYANCE INSPECTIONS

For the fiscal year period (July 1 – June 30) preceding the date of this certification, I hereby certify that the following stormwater conveyance inspections and maintenance activities have been performed *(check all that apply)*:

- ☐ An above-ground visual inspection along the entire storm drain and/or open channel conveyance system within the property boundaries.
- ☐ Video inspections of all storm drain segments with potential issues noted during the above-ground visual inspection or upon other suspected issue.
- ☐ Annual catch basin and outfall inspections.
- ☐ Regular catch basin cleanouts and structural maintenance and repairs, as needed.
- ☐ Maintenance in accordance with the Operation and Maintenance Manual, generally accepted industry practices and regulatory requirements.
- ☐ I am unable to certify the unchecked requirements above

For any deficiencies, note maintenance needed and required corrective actions below:

_____

_____

_____

_____

PART III: SCM DEVICE PHOTOGRAPHS (TAKEN WITHIN SEVEN (7) CALENDAR DAYS OF THE INSPECTION DATE.)

INSERT PHOTOS HERE, INCLUDE ATLEAST ONE OF THE OVERALL DEVICE, ONE OF THE CONTROL STRUCTURE, AND ONE AT THE OUTFALL FROM THE DEVICE.

PART IV: SCM COMPLIANCE CERTIFICATION STATEMENT

By my signature below, I certify under penalty of law that this Annual Stormwater Control Measure Certification was prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information. The information provided is, to the best of my knowledge and belief, certified to be true, accurate, and complete. I am aware that there are significant penalties for providing false information, including the possibility of fines and imprisonment for knowing violations.

For the fiscal year period (July 1 – June 30) preceding the date of this certification, I hereby certify that this stormwater control measure has been *(check all that apply)*:

- ☐ Inspected at least once per month.
- ☐ Inspected after each rainfall event of 1-inch or more.
- ☐ Operated and maintained in accordance with the Operation and Maintenance Manual, generally accepted industry practices and regulatory requirements.
- ☐ Functioning as designed.
- ☐ I am unable to certify the unchecked requirements above

For any deficiencies, note maintenance needed and required corrective actions below:

_____

_____

_____

_____

NC Cooperative Extension Certified Stormwater SCM Inspection & Maintenance Professional Information			
Name			
Contact Information			
Signature		Date	
Certification Number		Expiration Date	