



STORMWATER MANAGEMENT PERMIT

| |
|----------------------------------------------|
| Fee Paid: _____ |
| Date Paid: _____ |
| Permit #: _____ |
| Approved By: _____ |
| Approval Date: _____ |
| <i>(for use by stormwater division only)</i> |

Department of Public Works
 Suite 53, City Hall,
 101 North Main Street,
 Winston-Salem, N.C. 27101
 Telephone: (336) 747-7480
 Fax: (336) 748-3173

APPLICATION

1. Project/Site Information

Project/Site Name: _____

Project Location (Address): _____

PIN(s): _____

Total Site Area (ac): _____ Total Proposed Disturbed Area (ac): _____

Existing Built-Up Area, BUA (ac): _____ Proposed BUA (ac): _____ Proposed BUA (%): _____

For Subdivisions: Number of lots _____ Lot density _____

Site within a Water-Supply Watershed: Y N Low Density Development: Y N

2. Applicant/Engineer/Designer Information

Applicant Name: _____ NC PE License #: _____

Applicant Company/Firm: _____

Applicant Company/Firm Address: _____

Office Phone: _____ Cell Phone: _____ Fax: _____

E-mail: _____

Applicant Signature: _____ Date: _____

3. Project Owner Information (if different from Applicant)

Owner Name: _____

Owner Company/Firm: _____

Owner Company/Firm Address: _____

Office Phone: _____ Cell Phone: _____ Fax: _____

E-mail: _____

Owner Signature: _____ Date: _____

4. Contractor Information

Contractor Name: _____

Contractor Company/Firm: _____

Contractor Company/Firm Address: _____

Office Phone: _____ Cell Phone: _____ Fax: _____

E-mail: _____

5. Posting of Financial Security for Required Stormwater Control Structure(s)

[Applicant/Owner must provide adequate financial assurance in the form of a performance bond and/or other cash security for required stormwater control structure(s) prior to issuance of SWM Permit.]

Applicant/Owner shall file with the City of Winston-Salem one of the following (check one):

- Performance bond
- Irrevocable letter of credit issued by a bank
- Deposit of funds in escrow under the same terms and conditions applicable to bonds

Amount of Financial Security Posted: \$ _____

Date Financial Security provided to City of Winston-Salem: _____

Not applicable [No required stormwater control structure(s)]

6. Information Needed for SWM Concept Meeting

- Plan of the proposed development site with approximate locations of property boundaries, roads, land use, topographic features, streams, water bodies, wetlands and any feature related to stormwater
- Drainage area map showing approximate location of proposed development and pertinent drainage areas, including off-site areas draining to the proposed development
- A conceptual plan for proposed stormwater management features that would enable the site to meet stormwater quantity and quality regulations. Note that this concept plan need only indicate what the designer plans to do to manage stormwater. For simple sites, a verbal description may suffice.

7. Submittal Requirements for Evaluation of No Adverse Impact

- Hydrologic information (including maps and plans), data, and quantities for pre- and post-project conditions
 - Site and watershed topography
 - Drainage areas (mapped and quantified)
 - Land uses (mapped and quantified)
 - Soils types (mapped and quantified, include hydrologic types)
 - Drainage paths and lengths (mapped and quantified)
 - Precipitation data (most recent data from NOAA website)
- Time of concentration (T_c) calculations for existing and proposed site conditions and drainage features
- Curve Number (CN) and/or Rational C analysis and determinations for existing and proposed site conditions (also show on the SWM Plan or separate map)
- Peak flows and hydrographs (as applicable) to analyze and design site stormwater management features
- Calculations and procedures used to design permanent structural stormwater BMPs/controls (note: analysis and design of stormwater quality BMPs must be based on State of NC DENR Stormwater BMP Guidance Manual)
- Provide hard copy summary information, digital hydrologic and hydraulic models, and any other stormwater analysis and design calculations as appropriate for the site to satisfy ordinance requirements

Hydraulic performance analyses for off-site impacts.

- Analyze to at least the downstream 10% point

- Evaluate road crossings for changes in service level due to proposed development
- Evaluate impacts to existing and/or off-site impounding structures
- Evaluate potential increases in structural flooding impacts

8. Phase 1 – Hydrologic and Hydraulic Analysis Report for Non-Exempt Sites

Note: Upon mutual agreement with Designer, City will review hydrologic data and analysis prior to hydraulic analysis and design.

- Cover sheet with project title; project name and address; owner's name, address, email and phone number; preparer's name, address, email, and phone number; and preparer's seal, signature and date
- Table of contents (with sequential numbering of pages) showing report sections, appendices, tables and figures
- Project narrative – brief description of project, pre- and post-development site conditions, hydrologic and hydraulic study, and proposed SWM plan
- Description of the methodologies, assumptions and procedures used in preparing the analysis
- Summary of any previous hydrologic/hydraulic studies or other information which may pertain to the development of the property

Hydrologic Section

- Hydrologic information (including maps and plans), data, and quantities for pre- and post-project conditions
 - Location map showing project in relation to adjacent properties, streets and nearby water features
 - Site and watershed topography
 - Drainage areas and site outfalls (mapped and quantified)
 - Land uses (mapped and quantified)
 - Soils types (mapped and quantified, include hydrologic types)
 - Drainage paths and lengths (mapped and quantified)
 - Precipitation data (most recent data from NOAA website)
- Time of concentration (T_c) calculations for existing and proposed site conditions and drainage features
- Curve Number (CN) and/or Rational C analysis and determinations for existing and proposed site conditions (also show on the SWM Plan or separate map)
- Peak flows and hydrographs (as applicable) to analyze and design site stormwater management features

- Calculations and procedures used to design permanent structural stormwater BMPs/controls (note: analysis and design of stormwater quality BMPs must be based on State of NC DENR Stormwater BMP Guidance Manual)
- Hydrologic data sheets, for both pre and post development conditions for each runoff concentration point including time of concentration calculations, rainfall intensities, runoff coefficients and curve numbers and peak discharges
- Summary table listing all runoff concentration points, corresponding drainage area, calculated peak discharges for pre and post development conditions and differences in discharges
- Summary table for the downstream hydrologic analysis, including drainage area, calculated peak discharges for pre and post development conditions and differences in discharges at the outfall(s) of the site, each downstream tributary junction and each public or major private downstream stormwater conveyance structure to the point(s) in the stormwater system where the area of the portion of the site draining into the system is less than or equal to 10% of the total drainage area above that point

Hydraulics Section

- Open channel design and capacity computations
- Design computations for all culverts, storm drains and inlets. Storm drain design shall include a labeled schematic of the storm drain network, design discharges, pipe capacities, pipe sizes, slopes and lengths, profiles, outlet velocity, upstream and downstream invert elevations and hydraulic grade line
- All supporting data, printouts, tables, nomographs, etc., which are referenced in the report
- Rip-rap length, width, depth and D50 size
- Provide hard copy summary information, digital hydrologic and hydraulic models, and any other stormwater analysis and design calculations as appropriate for the site to satisfy ordinance requirements

Stormwater Management System Section

- Description of how the overall stormwater management plan and facilities design(s) will comply with the City of Winston-Salem's post construction stormwater ordinance regarding water quality, water quantity and release rates and channel protection.

Water Quality

- Does the development or redevelopment cumulatively disturb less than one acre and is not part of a larger common plan of development or sale. (If yes then development is exempt from water quality requirements).
- Does the development or redevelopment cumulatively disturb less than one acre but the activity is part of a larger common plan of development or sale, even though multiple, separate or distinct activities take place at different times and on different schedules. (If yes then development is not exempt from water quality requirements)
- Is the structural BMP(s) designed to treat the runoff volume leaving the project site for the first 1" of rain. Provide detailed calculations in the report.

- Is the runoff drawdown time no less than 48 hours but no more than 120 hours? Provide detailed calculations in the report.
- Is the BMP designed to have a minimum of 85% TSS (Total Suspended Solids removed)?
- Are all volume and surface area calculations provided?
- Is data such as total site area and total impervious surface area provided?
- Is there an overflow device or emergency spillway provided?
- Are all built upon areas a minimum of 30 feet landward of all perennial and intermittent surface waters?
- Is the site located within the Salem lake Water Supply Watershed? (If yes all requirements associated with the water supply watershed ordinance must be met.)
- Is the BMP an approved device listed in the State of North Carolina BMP manual (latest edition applies)?

Water Quantity

- Does this development or redevelopment cumulatively disturb less than 20,000 square feet for both residential and non-residential uses? (If yes, then development is exempt from quantity management)
- If the project is a redevelopment activity, is the proposed impervious area equal to or less than the preexisting impervious area? (If yes, then development is exempt from quantity management.)
- Is the BMP designed to manage the 2, 10 and 25 year storm events of minimum 6 hour duration? Provide detailed calculations in the report.
- Is the BMP designed to limit the post development peak discharge rates to equal to or less than the pre development rates for the 2, 10 and 25 year storm events? Provide detailed calculations in the report.
- Is the BMP designed to detain the stormwater runoff volume equal to the difference between the pre and post development volume for the 25 year storm of 6 hour duration and is the volume detained released over a period of no less than 48 hours but no longer than 120 hours? Provide detailed calculations in the report.
- Does the development of the site increase flooding impacts to affected structures in the 100-year flood event for properties upstream and downstream of the site?
- Description and calculations provided of measures taken to prevent discharge from any stormwater collection system or structure into any natural or surface drainage channel or feature that may cause damage to the receiving system? If designer anticipates no damage then adequate calculations must be provided to validate his/her opinion.
- Has the receiving natural channel or water body (on site and/or off site) been evaluated to ensure that downstream conveyances are not eroded and/or degraded by altered stormwater flows from the development or redevelopment? Mitigation measures shall be implemented where the volume of runoff from a post development 2 year, 1 hour rainfall event is 10% greater than the volume of the runoff from a predevelopment 2 year, 1 hour rainfall event. Calculations must be provided to validate no impacts.
- Detailed reservoir routing calculation sheets for all required design storms provided.
- Plotted inflow and outflow hydrographs (preferable superimposed) provided.
- Are any water impounding structures (dams) designed in accordance with NC Dam Safety standards and if required reviewed and approved by the NC Dam Safety Engineer?

- If retaining walls are utilized, are free body diagrams showing all forces, moments and computations provided for determining factors of safety against sliding and overturning.

9. Phase 2 – Detailed Design of Site/SWM Plan

Please review and check items below indicating that the proposed Site/SWM Plan contains the following minimum information. More information may be required by the City of Winston-Salem as directed.

- Plan sheet(s) clearly labeled as “Stormwater Management Plan(s)”
- Sealed and certified plan set: All plan sheets shall be signed and sealed by a professional engineer or landscape architect, to the extent that the General Statutes, Chapter 89A, allow
- Date(s) of preparation and all revisions
- Vicinity map (upper right corner of top sheet)
- North arrow
- Appropriate scale
- Boundary lines, lot lines and street right of way lines
- Existing and proposed zoning and land use
- Location(s) of existing easements (temporary and permanent, public and private).
- Proposed access locations/easements for future maintenance of stormwater management facilities (15-ft minimum maintenance access easement required for all permanent stormwater BMPs, maintenance access easement must connect to a public right-of-way)
- Existing and proposed utilities
- Existing and proposed stormwater discharge points (surface and subsurface flows)
- Existing and proposed drainage basins, sub basins and land use boundaries. (*Contributing basins that extend beyond the site boundaries may be delineated on a separate map*)
- Streams, lakes, ponds, impoundments, drainage swales, conveyances, floodplains (including 100-year floodplain, floodway fringe, 50% flood fringe line (also called the “floodplain no fill line”, etc.)) wetlands, natural storage and other physical or environmentally sensitive features within or adjacent to the project area.
- Delineation of all existing and proposed impervious surfaces including locations of buildings, roads, parking areas and other permanent impervious structures or ground coverings.
- Existing and proposed site topography showing existing and proposed drainage patterns, including drainage area boundaries and flow patterns (Note: utilize a contour interval appropriate for the site conditions, typically 2-ft unless specific site conditions dictate otherwise, and extend contours a minimum of 200 feet beyond the limits of the proposed development.)

- Location and cross-section of all proposed major and minor stormwater management conveyance systems (*Indicate type and size, e.g. grass swale, diversion, lines channel, storm sewer etc.*)
- Roof drainage directions and roof leader locations
- Proposed limits of disturbance
- Estimated seasonal high groundwater elevation in areas to be used for stormwater retention, detention or infiltration
- Hydraulic data summary for all proposed pipes and/or channels
- Construction notes, specifications and design details for any existing stormwater system components
- Recommendations from any soils engineering or engineering geology report incorporated in the plans and/or specifications
- Dates and reference number of the soils report(s) together with the names, addresses and phone numbers of the firm(s) or individual(s) who prepared the report(s)
- Established benchmark of known elevation to which every other elevation is referenced
- Details of all components of the proposed stormwater management system including:
 - Plan views showing the proposed BMP locations, in combination with the site plan map.
 - Detailed cross-sections and profiles for each BMP showing critical design features, side slopes, structural components, soil profiles, design elevations including seasonal high water table.
 - Forebay size (and % of pool size) and depth.
 - Average water depth
 - Permanent pool surface area
 - Details of inlet pipes/conveyances.
 - Proposed outfall conveyance system with size, lengths, slopes and grades.
 - Aquatic shelf dimensions and planting specifications.
 - Detailed construction notes explaining necessary procedures to be followed to properly implement the plan, including planting and landscaping specifications, timing and sequencing of construction and any temporary measures needed to protect BMP's during the construction phase.
 - The following statement is required on all stormwater management plans "The developer shall contact the City Stormwater Engineer when the best management practice(s) are constructed and about to become operational so an inspection to determine compliance with the approved plan can be performed".
 - The following statement is required on all stormwater management plans "Adequate drainage, erosion and sediment control measures, best management practice(s) and/or other stormwater management facilities shall be provided and maintained at all times during construction. Damages to adjacent property and/or the construction site caused by the contractor's or property owner's failure to provide and maintain adequate drainage and erosion/sediment control for the construction area shall be the responsibility of the property owner and/or contractor".

- Appropriate legend identifying features and layers on the Site/SWM Plan
- Property boundaries for the proposed development/redevelopment site along with adjacent properties (include lot lines and right-of-way lines)
- Show ownership information for site and adjacent properties
- Show existing and proposed built-upon areas and other proposed site improvements
- Note existing and proposed built-upon area in terms of total acreage and % built-upon area
- Designated water-supply watershed classification, if applicable
- Note allowable limits on BUA %
- Show stream buffer widths along streams (where required)
- Regulatory floodways and floodplains (as applicable). Identify and label 100-year Base Flood Elevations (BFEs) where available. Show limits of both the floodway and floodplain along with BFEs where available.
- Note if site drains to a 303(d) listed stream identified by the North Carolina Division of Water Quality (see NC DWQ Website for more information - <http://h2o.enr.state.nc.us/tmdl/>)
- Identify and note the watershed area for any off-site runoff that flows onto the proposed development site (note: applicant must also provide watershed delineation and mapping for any off-site runoff that flows onto the proposed site)
- Identify and label proposed stormwater drainage system including but not limited to storm drainage inlets, catch basins, junction boxes, storm drainage pipes, natural vegetated conveyances, infiltration areas, swales, energy dissipaters, and/or structural stormwater BMPs/controls such as wet ponds
- Details and profiles of proposed storm drainage systems
- Details of proposed permanent structural stormwater BMPs/controls, where applicable
- Identify and delineate drainage areas and flow paths of runoff to each structural stormwater BMP/control, where applicable
- Show and label where runoff from the developed site (including outflows from BMPs, where applicable) safely connects into downstream receiving drainage systems and/or open stream channels
- Envisioned sequence of construction for permanent stormwater BMPs/controls, where applicable
- Identification of the entity responsible for long-term maintenance of permanent structural stormwater BMPs/controls, where applicable
- Stormwater Control Operations & Maintenance Lien & Easement Agreement* between the Developer and City, where applicable (refer to Attachment A of the ordinance for an example Agreement)

- Note: A signed and sealed *Agreement* must be provided as part of the SWM Permit Application Package prior to City issuance of a SWM Permit. The Agreement must also be filed and recorded with the Forsyth County Register of Deeds, in accordance with the ordinance requirements, prior to City issuance of a SWM Occupancy Permit, per Section 7 of this form.
- Operation & Maintenance Plan* for each permanent structural stormwater BMPs/controls, where applicable, to accompany the *Stormwater Control Operations & Maintenance Lien & Easement*
 - Note: The *Operation & Maintenance Plan* shall be provided by the applicant/developer for each stormwater control structure, indicating what operation and maintenance actions are needed, what specific quantitative criteria will be used for determining when those actions are to be taken and, consistent with the *Operation & Maintenance Agreement*, who is responsible for those actions. The Plan shall also clearly indicate the steps that will be taken for restoring a stormwater control structure to design specifications if a failure occurs.
 - Note: *Annual maintenance inspection and report required* – The owner of a permitted structural stormwater BMP/control shall annually submit a maintenance and inspection report for each BMP to the City of Winston-Salem Stormwater Director. Annual inspections shall begin within one year of the recordation of any deed(s) showing stormwater BMPs/control structures. The *Operation & Maintenance Agreement and Plan* shall include and specify the owner responsibilities and requirements for the annual maintenance and inspection report.
- Separate Erosion and Sediment Control (E&SC) Plan sheet(s), where required, with site construction sequence and E&SC details
 - Note: Applicant/Owner is responsible for applying for the appropriate Land Disturbing Permit from Winston-Salem/Forsyth County Inspections. City SWM Plan review shall commence upon receipt of City SWM Permit application requirements which include a copy of the E&SC Plan submitted to City/County Inspections. In addition to meeting all City SWM Permit requirements, the City shall not issue the SWM Permit until the applicant/owner has satisfied City/County Inspection requirements for approval of the Land Disturbing Permit. City/County Inspections will notify the City of Winston-Salem once the Applicant/Owner has satisfied E&SC requirements associated with the Land Disturbance Permit. Applicant/Owner is then responsible for providing the City with a copy of the final E&SC Plan that satisfies City/County Inspection requirements.
 - Note: On the E&SC Plan, be sure to label E&SC features which are also intended to become permanent structural stormwater BMPs/controls, if any, and note the process for transitioning the device from a temporary E&SC measure to a permanent stormwater control feature.

10. Requirements Prior to Issuance of Certificate of Occupancy

- City of Winston-Salem Stormwater Management Permit
- Certified as-built drawings of the site and stormwater management BMPs/controls
- Stormwater Control Operations & Maintenance Lien & Easement Agreement(s)* and any other legal documents and recordations must be properly filed and recorded with the Forsyth County Register of Deeds
- Final inspection of the site and stormwater management BMPs/controls scheduled with and completed by the City Stormwater Director
- Copies of any/all applicable local, state, and federal permits/permit applications (note: this would include 404/401 permits for work in regulated waters/wetlands, State Dam Safety permits, floodplain development permits, and/or other as applicable)

11. Other Items

- Review fee of \$XXXX
- Operation and Maintenance Agreement that complies with Section 4, 75-402 of the Post Construction Stormwater Ordinance