

NC STATE UNIVERSITY

Stormwater & Nutrient Management Requirements New Development and Re-Development



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TABLE OF CONTENTS

1.0 INTRODUCTION

- 1.1 Purpose
- 1.2 Scope and Applicability

2.0 PLAN SUBMITTAL AND REVIEW

- 2.1 Duty to Comply
- 2.2 Plan Review and Approval Process
- 2.3 Time Limit/Expiration
- 2.4 Right of Appeal
- 2.5 Filing of Appeal and Procedures
- 2.6 Design Standards
- 2.7 Plan Content and Technical Requirements
- 2.8 Determination of Adequacy – Assumptions and Alternatives
- 2.9 Plan Reviews
- 2.10 Stormwater Management Plan Review Fees
- 2.11 Low Impact Development
- 2.12 Designer Professionals
- 2.13 Concept Plan and Pre-Design Meeting

3.0 FINAL APPROVAL

4.0 CONTACT INFORMATION

APPENDICES

- A. Stormwater Management Plan Submittal Checklist
- B. Stormwater Management Plan Components
- C. Pre-Design Meeting Information Requirements

1.0 INTRODUCTION

1.1 Purpose

In accordance with the North Carolina State University's (NCSU) current National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit NCS000376 and associated Management Plan (Permit), the University requires stormwater management techniques be applied to all development projects in the form of structural and non-structural Best Management Practices (BMPs). Stormwater management involves an integrated approach that addresses the environmental issues of pollutant control, capture and treatment affecting both water quality and quantity associated with urban development.

1.2 Scope and Applicability

This document was developed as a guidance document for the environmental planning and design of stormwater management plans applicable to all development projects on the campuses of North Carolina State University subject to the Permit. This document presents a set of minimum environmental standards that must be incorporated at the onset of the initial planning and design phase for each project. Additional design and documentation requirements may be required by the Stormwater Program Manager, as deemed necessary to maintain compliance with the MS4 Permit. The Stormwater Program Manager will notify the University project manager through the plan review process of additional environmental design and permit requirements, based on the available information. It is the responsibility of the University project manager to ensure that all permits have been obtained prior to beginning construction.

Stormwater infrastructure issues, including system capacity and erosion potential, are briefly addressed in this document and may be addressed in reviews. References to stormwater infrastructure issues are as necessary to maintain conformance with environmental standards. Additional on- or off- site measures may need to be implemented to meet the site conditions and local standards of performance. Stormwater infrastructure issues remain the responsibility of the designer.

Applicability

Any proposed project with a total project area that exceeds 0.1 acre (4356 sqft) must submit a Stormwater Management Plan to the NC State Stormwater Program, regardless of whether the project proposes to increase or decrease total impervious surface area, relative to initial conditions.

Any proposed project which proposes a new stormwater device or affects an existing stormwater device, must receive approval from the Stormwater Program Manager prior to initiating work.

2.0 PLAN SUBMITTAL AND REVIEW

2.1 Duty to Comply

The stormwater management plan (SWMP or Plan) must demonstrate that the requirements and criteria in the NPDES MS4 Permit, the associated Management Plan and this document are being fully incorporated and that opportunities are being taken to minimize adverse stormwater runoff impacts during construction and post-development.

No project subject to the Permit shall begin any phase of construction prior to receiving written stormwater management plan approval. The Stormwater Program Manager may require copies of other applicable documentation, permits and/or approvals before Plan approval can be granted.

In all cases, compliance with this document does not preclude the requirement to comply with all other applicable federal and state regulations and laws.

2.2 Plan Review and Approval Process

For subject projects, the University project manager is responsible for submitting to the Stormwater Program Manager all required information (i.e. calculations and plan sheets) relating to the design of the stormwater management system. The Plan must be sealed by a Professional Engineer (PE) licensed in the state of North Carolina. A Stormwater Management Plan Submittal Checklist, which is Appendix A of this document, must accompany the submittal packet.

The Stormwater Program Manager is responsible for reviewing the SWMP and providing each project with formal written plan approval. Plan review comments and subsequent approval will be provided to the University project manager and the Plan designer/engineer.

The official design review process will not commence until the Stormwater Program Manager has received all components of the SWMP listed on the submittal checklist. The Stormwater Program Manager will perform a completeness determination within five working days of receiving the Plan submittal package. The SPM will notify the Project Manager of any additional information necessary to proceed with review or notify the Project Manager of acceptance for review. The review period will not exceed 30 working days from the date the Stormwater Program Manager receives the complete SWMP packet. Incomplete submittals will not be included as part of the 30 day review period.

If the design is acceptable and all other required documentation has been received, the Stormwater Program Manager will provide a formal written approval letter to the University project manager and Plan designer/engineer. If the design is not acceptable, the University project manager will receive a written evaluation citing the plan's deficiencies and/or areas of concern. All comments, question and/or concerns must be sufficiently addressed in writing then resubmitted to the Stormwater Program Manager for final review.

Plan approvals are based solely on the information provided and are only valid for the purpose and design described in the stormwater management plan. Should the project have significant changes, the University project manager must submit updated information and plans to the Stormwater Program Manager for review.

Approval authorizes the applicant to go forward with only the specific plans and activity authorized in the permit. The approval shall not be construed to exempt the applicant from obtaining other applicable approvals from local, state, and federal authorities.

2.3 Time Limit/Expiration

An approved plan shall become null and void if the applicant has failed to make substantial progress on the site within one year after the date of approval. The Stormwater Administrator may grant a single, one-year extension of this time limit, for good cause shown, upon receiving a written request from the applicant before the expiration of the approved plan. In granting an extension, the Stormwater Administrator may require compliance with standards adopted since the original application was

submitted unless there has been substantial reliance on the original permit and the change in standards would infringe the applicant's vested rights.

2.4 Right of Appeal

A Project Manager may appeal any decision, order, requirement, or determination relating to the interpretation or application of this Plan and made by the Stormwater Administrator may file an appeal to the SWMAC within 30 days.

2.5 Filing of Appeal and Procedures

Appeals shall be taken within the specified time period by filing a written notice of appeal and specifying the grounds for appeal. All appeals shall be directed to the Stormwater Administrator, who shall forthwith transmit to the SWMAC all documents constituting the record on which the decision appealed was taken. The hearing conducted by the SWMAC shall be conducted in the nature of a quasi-judicial proceeding with all findings of fact supported by competent, material evidence.

2.6 Design Standards

All stormwater control measures and stormwater treatment practices (also referred to as Best Management Practices, or BMPs) required under this Plan shall be evaluated according to the policies, criteria, and information, including technical specifications and standards and the specific design criteria for each stormwater practice, contained in the current version of the NC DENR Division of Water Quality, Stormwater Best Management Practices Design Manual (Manual).

2.7 Plan Content and Technical Requirements

Stormwater Plan content and requirements is described in Appendix B.

2.8 Determination of Adequacy - Assumptions and Alternatives

Stormwater treatment practices that are designed, and constructed, and maintained in accordance with the criteria and specifications in the Manual will be presumed to meet the minimum water quality and quantity performance standards of this Plan. Whenever an applicant proposes to utilize a practice or practices not designed and constructed in accordance with the criteria and specifications in the Manual, the applicant shall have the burden of demonstrating that the practice(s) will satisfy the minimum water quality and quantity performance standards of the Manual. In such a case, the applicant will be required to present such documentation, calculations, and examples as necessary for the Stormwater Program Manager to determine whether such an affirmative showing is made.

2.9 Plan Reviews

Reviewers of NC State University Stormwater Plans are required to have successfully completed the BMP Reviewer Certification Program and have currently active certificate.

2.10 Stormwater Management Plan Review Fees

The average cost of the Plan review is between \$1,000.00 and \$1,500.00 depending on the project. Project managers should include this cost in the project's budget. Additional fees may be charged for services such as multiple on-site visits and excessive re-submittals, which may be beyond the original scope of work.

2.11 Low Impact Development

An additional type of BMP, is to prevent the generation of excess stormwater in the first place, by applying low impact development principles, or non-structural best management practices to planned development. For example, reducing street widths, the size of parking spaces or maintaining natural areas throughout the design will minimize problems before they begin.

The basic principles of low impact development for stormwater management should be incorporated into the site design process. During site evaluation and design the following principles should be considered and integrated into the process:

Using existing natural stormwater management systems on a site and integrating them into the proposed development by identifying environmentally sensitive resources and assessing the existing site hydrology before site design.

Designing proposed developments to prevent or at least reduce stormwater runoff by clustering and reducing building footprints, reducing impervious surface area, and minimizing earth disturbance.

Treating stormwater runoff close to the source by creating smaller watershed areas, flattening slopes and lengthening flow paths, and maintaining the natural open drainage system.

Strategies for low impact development include the non-structural as well as the structural BMPs to handle the volume and peak rate reduction and the runoff water quality. Structural BMPs for low impact development may include any of the designs found in the Manual.

2.12 Designer Professionals

The use of the phrase “design professional” is a generic title given to a qualified, registered, North Carolina professional engineer, surveyor, soil scientist or landscape architect, performing services only in his or her area of competence.

The design professional is responsible for the design and construction of a properly developed stormwater management plan that meets all of the applicable regulations, including water quality objectives, and that considers all the unique conditions of an individual site. Furthermore, it is the responsibility of the design professional to ensure that techniques utilized are appropriate for a given situation.

2.13 Concept Plan and Pre-Design Meeting

Before a stormwater management plan application is deemed complete, the Stormwater Program Manager may request a consultation on a concept plan for the post-construction stormwater management system to be utilized in the proposed development project. This pre-design meeting should take place as soon as possible in the planning and design phase of the project. The purpose of the pre-design meeting is to discuss the post-construction stormwater management measures necessary for the proposed project, as well as to discuss and assess constraints, opportunities and potential approaches to stormwater management designs before formal site design engineering commences.

Projects proposing complex stormwater management systems and/or include impacts outside the project limits may be subject to additional review and approval by the SWMAC.

Information requirements for the pre-design meeting are listed in Appendix B

3.0 FINAL APPROVAL

Upon completion of a project, the design professional under contract shall certify that the completed project was constructed in accordance with the approved stormwater management plans and designs, and shall submit a signed and sealed certificate of completion form and actual “as built” plans for all stormwater management devices or practices after final construction is completed.

The plans shall show the final design specifications for all stormwater management devices and practices and the field location, size, depth, and planted vegetation of all measures, controls, and devices, as installed. The designer of the stormwater management measures and plans shall certify, under seal, that the as-built stormwater measures, controls, and devices are in compliance with the approved stormwater management plans and designs and with the requirements of this Plan.

One set of As-Built drawings of the final approved stormwater management system must be submitted to the Stormwater Program Manager as soon as they become available.

4.0 CONTACT INFORMATION

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**APPENDIX A
Stormwater Management Plan Submittal Checklist**

Project Name:	Date:
University Project Manager:	Designer/Engineer:

Pre-Design Meeting

No Meeting Scheduled Date of Meeting: _____
Attendees: _____

Stormwater Management Plan Components

Common Address and Legal Description	Offset Payment Fee Calculations
Vicinity Maps	Landscaping and Open Space Plan
Narrative and Scaled Drawings	Inspection and Maintenance Procedures
Existing Conditions Hydrologic Analysis	Technical Specifications for Best Management Practices
Post-Development Hydrologic Analysis	Permit Tracking Form
Nutrient Management Calcs and Summaries	Other:
Hydraulic and Hydrology Calculations	Other:

Comments:

For Environmental Affairs Use Only

Draft Plans Received:	Received By:	Packet Complete: YES NO	Sent to Consultant:
Review Comments Received:	Re-submittal Date:	Plan Approved: YES NO	

APPENDIX B

Stormwater Management Plan Components

The stormwater management plan shall detail how stormwater runoff during construction and post-development will be controlled or managed and how the proposed project will meet the requirements of this document.

The stormwater management plan shall consist of maps, narratives and supporting design calculations (hydrologic and hydraulic) for the proposed stormwater management system. The SWMP shall include, at a minimum, the information listed below. A submittal checklist is provided in the Appendix of this document and should be completed and attached to the submittal packet.

1. Common address and legal description of the site
2. Vicinity Map
3. Narrative & Scaled Drawings

The description and scaled drawings for the proposed stormwater management plan, which shall include the following:

- a) A map and/or drawing or sketch of the stormwater BMPs, including the location of non-structural site design features and the placement of existing and proposed structural stormwater controls, including design water surface elevations, storage volumes available from zero to maximum head, location of inlet and outlets, location of bypass and discharge systems, and all orifice/restrictor sizes;
 - b) A narrative describing how the selected structural stormwater controls will be appropriate and effective. The narrative shall include summaries of pre- and post-peak flow rates and statements of compliance for each design requirement.
 - c) Cross-section and profile drawings and design details for each of the structural stormwater controls in the system, including supporting calculations and summaries to show that the BMPs are designed according to the applicable design criteria.
4. Existing Conditions Hydraulic and Hydrologic Analyses

The existing conditions hydrologic analysis for stormwater runoff rates, volumes and velocities, which shall include:

- a) A topographic map of existing site conditions with the drainage basin boundaries and outfalls indicated; flow paths and travel time estimation parameters; acreage, soil type and land cover of areas for each subbasin affected by the project;
- b) All perennial and intermittent streams, buffers, floodplains, and other surface water features;
- c) All existing stormwater conveyances and structural controls, direction of flow and exits from the site; Slopes, pipe sizes, channel cross sections, and impoundment depths;
- d) Analysis of runoff provided by off-site areas upstream of the project site; and
- e) Methodologies, assumptions, site parameters and supporting design calculations used in analyzing the existing conditions site hydrology. The NRCS (TR-55) method, with a Type II storm distribution, shall be utilized for routing models. Computer generated

models will be accepted, provided documentation verifying the models were based on the NRCS method is provided.

- f) For redevelopment sites, pre-development conditions shall be modeled using the established guidelines for the entire site.

5. Post-Development Hydraulic and Hydrologic Analyses

The post-development hydrologic analysis for stormwater runoff rates, volumes, and velocities, which shall include:

- a) A topographic map of developed site conditions with the post-development drainage basin boundaries and outfalls indicated; flow paths and travel time estimation parameters;
- b) All existing and proposed stormwater conveyances and structural controls, direction of flow and exits from the site; Slopes, pipe sizes, channel cross sections, and impoundment depths;
- c) Inlet contributing area maps, including areas and runoff coefficients; Applicable V10 and V25 velocities, stage heights, shear stress calculations and channel linings for conveyances and dissipaters;
- d) Total area of post-development impervious surfaces and other land cover areas for each subbasin affected by the project; Stormwater management device contributing area maps;
- e) Calculations for determining the runoff volumes that need to be addressed for each subbasin for the development project to meet the post-development stormwater management performance criteria; Treatment volume and drawdown calculations; Downstream capacity analysis in accordance with local infrastructure design standards;
- f) Location and boundaries of proposed natural feature protection and conservation areas;
- g) Documentation and calculation for any applicable site design credits that are being utilized; Plans, cross-sections, details and Operation and Maintenance manuals for each stormwater management technique or device;
- h) Methodologies, assumptions sited parameters and supporting design calculations used in analyzing the proposed conditions site hydrology. The NRCS (TR-55) method, with a Type II storm distribution, shall be utilized for routing models. Computer generated models will be accepted, provided documentation verifying the models were based on the NRCS method is provided.

6. Hydraulic and Hydrology Calculations

All projects constructed on Main Campus and the Centennial Biomedical Campus shall have no net increase in peak flow leaving the site from pre-development conditions for the 1-year, 24-hour storm. Additionally, projects constructed on Centennial Campus and within the Spring Hill District shall meet the pre-development conditions for the 2-year and 10-year design storms.

Peak runoff rate attenuation is subject to calculations based on the immediate project limits only. The designer is responsible for addressing any project-related downstream effects.

Projects meeting both of the conditions below do not have to meet the peak flow requirements. However, the Stormwater Program Manager and/or Stormwater Committee will make final decisions regarding exemptions.

- a) The increase in peak flow between pre- and post-development conditions does not exceed ten percent.
- b) The proposed new development meets the following criteria:
 - i. Overall impervious surface is less than fifteen percent, **and**
 - ii. The remaining pervious portions of the site are utilized to the maximum extent practical to convey and control the stormwater runoff

The following model methodologies are preferred to calculate peak flow; however, alternative approaches may be used if they can be demonstrated to be equivalent.

- The Rational Method
- The Peak Discharge Method as described in USDA Soil Conservation Service's Technical Release Number 55 (TR-55).
- The Putnam Method

The same method must be used for both the pre- and post-development conditions. The average rainfall depth for the 1-year, 24-hour storm for the Raleigh area is 3 inches.

Impact design data for the rainfall depth and intensities are as follows:

1 year – 24-hour storm depth (TR-55)	3.00 inches
1 year – 6-hour storm depth (Malcolm)	2.10 inches

1 year intensity $I = g/(h+t)$

where: I = intensity in inches/hour

t = time of concentration in minutes

g = 104

h = 18

Routing and storage calculations shall be performed as described in USDA Soil Conservation Service's Technical Release Number 55 (TR-55). Computer generated models will be accepted, provided documentation verifying the models were based on the NRCS method is provided. All calculation worksheets and details must be submitted with the SWMP packet. Additional information shall be supplied as necessary to support the information provided.

7. Nutrient Management Requirements

- a) Development projects shall provide 85% removal of Total Suspended Solids (TSS) by implementing planning considerations and best management practices.
- b) Development projects shall meet the 30% nitrogen reduction goal by implementing planning considerations and best management practices.
- c) All construction shall meet the nitrogen-loading limit of 3.6 pounds per acre per year (lbs/ac/yr).
- d) Development projects shall detain and treat the stormwater runoff generated by the first inch of rainfall, as calculated by the Simple Method.
- e) Development project will be granted an allowance for the replacement of existing impervious surface area. When impervious surface area exists within the project limits of a proposed development site, the project is required to include 50% of the existing impervious surface area in the total impervious surface area for appropriate calculations.

8. Approved Best Management Practices

- a) The Plan is required to use structural stormwater controls and allowed removal rates as specified in the current version of the NC DENR Division of Water Quality Stormwater Best Management Practices Manual. Any deviation from these design standards will require a letter from the NC DENR DWQ, that the design is sufficient. The designer will incur any additional cost to the University for review of designs not based on this standard.
- b) If the project contributes greater than 3.6 lbs/ac/yr of nitrogen, but less than 10.0 lbs/ac/yr (6.0 lbs/ac/yr for residential), then the following options are available.
 - i. Install BMPs to remove enough nitrogen to bring the development down to 3.6 lbs/ac/yr.
 - ii. Pay a one-time offset payment to bring the nitrogen down to the 3.6 lbs./ac/yr. This payment is to be determined by the committee.
 - iii. Do a combination of BMPs and offset payment to achieve a 3.6 lbs/ac/yr export.
- c) If the computed export is greater than 10.0 lbs/ac/yr (commercial, industrial) or 6.0 lbs/ac/yr (residential) then the owner must use on-site BMPs to bring the development's export down to 10.0 lbs/ac/yr or 6.0 lbs/ac/yr. Then, the project may use on of the three options above to achieve the reduction from 10.0 or 6.0 and 3.6 lbs/ac/yr.
- d) If more than one BMP is installed in series on a development, then the removal rate shall be determined through a serial calculation. For example, if a wet detention pond discharges through a riparian buffer, then the removal rate shall be estimated to be 47.5%. The pond removes 25% of the nitrogen and discharges 75% to the buffer. The buffer then removes 30% of the nitrogen that discharges from the pond, which is

22.5%. The sum of the percent removed by the pond (25%) and the percent removed by the buffer (22.5%) is 47.5%.

- e) Diffuse flow of runoff shall be maintained in the riparian buffer by dispersing concentrated flow and reestablishing vegetation. Concentrated runoff from ditches or manmade conveyances shall be converted to diffuse flow before the runoff enters Zone 2 of the riparian buffer. More than one device may be required to maintain diffuse into the buffer. If diffuse flow cannot be achieved, the stormwater must pass through an approved best management practices for a total nitrogen reduction of 30% or greater.

9. Computing Total Nitrogen Export

- a) In order to determine the required level of water quality control, the nitrogen export from the development must be calculated. The total nitrogen (TN) export will be calculated in pounds per acre per year (lbs/ac/yr). The method described below shall be used for residential, commercial and industrial developments based upon the entire footprint and any other built-upon area shown on the site plans. All calculations and details must be submitted with the SWMP packet.

Quantifying TN Export for New Development & Redevelopment Projects (Table 1)

Step 1: Determine area for each type of land use and enter in Column 2.

Step 2: Total the areas for each type of pre- and post-development land use and enter at the bottom of column 2.

Step 3: Multiply the areas in Column 2 by the TN export coefficients in Column 3 and enter in Column 4.

Step 4: Total the TN exports for each type of land use and enter at the bottom of Column 4.

Step 5: Determine the export coefficient for site by dividing the total TN export from uses at the bottom of Column 4 by the total area at the bottom of Column 2.

Please note that a separate spreadsheet needs to be completed for each drainage area on the project site. For this multiple-drainage area situation, the project totals are computed using the individual drainage area results.

Table 1: TN Export Calculation Spreadsheet

(1) Type of Land Cover	(2) Site Area (acres)	(3) TN Export Coeff. (lbs/ac/yr)	(4) TN Export by Land Use (lbs/yr)	(5) TN Export from Site (lbs/ac/yr)
Permanently Preserved Undisturbed Open Space (forest, unmown meadow)		0.6		
Permanently Preserved Managed Open Space (grass, landscaped areas)		1.2		
Existing Impervious Surface Area (roads, parking lots, driveways, roofs, etc.)		10.6*		
Additional Impervious Surface Area** (roads, parking lots, driveways, roofs, etc.)		21.2		
TOTAL				
AVERAGE FOR SITE				

* Represents fifty percent of the TN Export Coefficient

** If the additional impervious surface area change is negative, enter zero into Column 2.

10. Offset Payments

North Carolina State University was granted authority by NC DENR to collect internal offset payments. The minimum fee is **\$450.00** per pound per acre. An invoice for the applicable offset payment will be included with the SWMP approval letter. Nutrient offset payments shall be payable to the North Carolina State University Offset Payment Fund.

11. Technical Specification for Structural BMPs

Technical specifications for the proper design, installation and maintenance of structural BMPs can be found in the *NC DENR Stormwater BMP Manual* and/or downloaded at the following website:

http://h2o.enr.state.nc.us/su/PDF_Files/SW_Documents/BMP_Manual.PDF

Additionally, NC DENR has published a draft revision to the BMP Manual. The title of the draft manual revision is *Updated Draft Manual of Stormwater Best Management Practices – Public Comment Version* and may be downloaded at the following website:

http://h2o.enr.state.nc.us/su/bmp_updates.htm

The final version was not available as of the publish date of this manual. All requirements herein will be subject to the more of conservative of this document and the final published NCDENR minimum standards.

12. Green Space Apportionment for Multi-Parcel Development

For individual projects developed on larger tracts of land or multiple parcels with an existing Master Plan Build-Out, it is acceptable to design a stormwater management plan based on apportionment of available green space for the entire tract. For this situation, each Plan will be required to show compliance at full build-out conditions with the nutrient management requirements given in Sections 6 and 9.

Apportionment of green space distributes credit to each proposed project within the entire tract. This method includes the proportional distribution of claimed open space based on the ratio of proposed impervious to the sum of proposed and existing impervious areas.

It is also acceptable to develop a master stormwater plan for the entire tract utilizing individual and regional stormwater management devices in coordination with the existing Master Plan for the tract.

The Stormwater Program Manager should be informed as early in the design phase as possible when a project will be designing a stormwater management plan utilizing apportionment or master stormwater planning. In either case, the Plan will need to be reviewed and approved by the Stormwater Committee.

APPENDIX C

Pre-Design Meeting Information Requirements

For large projects, sensitive projects or those projects that may exhibit special consideration, it is recommended, but not required, that the University project manager and Plan designer/engineer meet with the Stormwater Program Manager to discuss the proposed stormwater management plan concept. Design requirements, additional parameters, feasibility of the design concept, innovative approaches, calculation methodologies, and submittal requirements will be discussed at the pre-design meeting. No form of final approval will be obtained at the pre-design meeting.

Projects proposing complex stormwater management systems and/or include impacts outside the project limits may be subject to review and approval by the Stormwater Committee. University project managers will be notified when Committee review/approval is required.

In either case, the following information should be submitted to the Stormwater Program Manager at least one week prior to a scheduled meeting:

A. Existing Conditions / Proposed Site Plans

Existing conditions and proposed site layout sketch plans, which illustrate at a minimum: existing and proposed topography; perennial and intermittent streams; buffer limits; floodplain limits; setback limits; mapping of predominant soils from soil surveys (when available); boundaries of existing predominant vegetation and proposed limits of clearing and grading; and location of existing and proposed roads, stormwater outfalls, utilities, buildings, parking areas and other impervious surfaces.

B. Natural Resources Inventory

A written or graphic inventory of the natural resources at the site and surrounding area as it exists prior to the commencement of the project. This description should include a discussion of soil conditions, forest cover, topography, wetlands, and other native vegetative areas on the site, as well as the location and boundaries of other natural feature protection and conservation areas such as wetlands, lakes, ponds, floodplains, stream buffers and other setbacks (e.g., drinking water well setbacks, septic setbacks, etc.). Particular attention should be paid to environmentally sensitive features that provide particular opportunities or constraints for development. Documentation shall include partial copies of the USGS quad maps, soil survey maps, and watershed basin topography maps depicting the site limits.

C. Stormwater Management System Concept Plan

A written or graphic concept plan of the proposed stormwater management plan including: preliminary selection and location of proposed structural stormwater controls; location of existing and proposed conveyance systems such as grass channels, swales, and storm drains; flow paths; location of floodplain/floodway limits; relationship of site to upstream and downstream properties and drainages; and preliminary location of proposed stream channel modifications, such as bridge or culvert crossings. Approximately scaled limits of stormwater control devices and BMPs, including approximate 25-year storm backwater elevations, shall be included on the plans.

