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334200 - Stormwater Management

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SECTION 33 4200 – STORMWATER MANAGEMENT

1.1 SUMMARY

A. The University makes every effort to mitigate stormwater discharge to the utility system. Low Impact Development (LID) site planning and design strategies must be used to the maximum extent practicable in order to reduce the generation of the water runoff volume for both new and redevelopment projects. Projects must document why LID strategies are not appropriate if not used to manage stormwater. Please visit the University and NH DES Stormwater sites for additional information.

1. http://www.unh.edu/erg/cstev/pubs_specs_info/stormwater_guide.pdf
2. http://des.nh.gov/organization/divisions/water/stormwater/manual.htm

B. Section Includes:

1. Definitions.
2. General Requirements.
3. Stormwater Management Plan.
4. Design Standards.

C. See Chapter 5, Division 01, Section 017700.1.1.B.1.i Closeout Procedures - Project Record Documents for equipment list requirements for all equipment provided in this section.

1.2 DEFINTIONS

A. Best Management Practices (BMP): Methods and means described in the most current edition of the New Hampshire Stormwater Manual (all volumes) for preventing or reducing pollution and detrimental impacts from stormwater runoff.

B. Buffer: A vegetated area separating a development from a sensitive resource or neighboring property in which proposed development is restricted or prohibited.

C. Development: Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations.

D. Disconnected Impervious Cover: The sum of the proposed areas of impervious cover and pavement that receive precipitation and, by means of implementing BMPs and LID strategies, is designed to capture and filtrate the precipitation from a 1-inch 24-hour rain event.

E. Disturbance: Any activity that significantly alters the characteristics of the terrain in such a manner as to impede or alter the hydrology or natural runoff pattern, or creates an unnatural runoff.

F. Effective Impervious Area (EIA): The total impervious cover area less the area of disconnected impervious cover.

G. Hydrologic Soil Group (HSG): A Natural Resource Conservation Service classification system in which soils are categorized into four runoff potential groups. The groups range from "A" soils, with high permeability and little runoff production, to "D" soils, which have low permeability rates and produce much more runoff.

H. Impervious Surface: A material with low permeability that impedes the natural infiltration of moisture into the ground so that the majority of the precipitation that falls on the surface runs off or is not absorbed into the ground. Common impervious surfaces include, but are not limited to, roofs, concrete or bituminous paving such as sidewalks, patios, driveways, roads, parking spaces or lots, storage areas, compacted gravel including drives and parking areas, oiled or compacted earthen materials, stone, concrete or composite pavers, wood, and swimming pools.

I. Low Impact Development (LID): Site planning and design strategies intended to maintain or replicate predevelopment hydrology through the use of source control and relatively small-scale measures integrated throughout the site to disconnect impervious surfaces and enhance filtration, treatment, and management of stormwater runoff as close to its source as possible. Examples of LID strategies are pervious pavement, rain gardens, green roofs, bioretention basins and swales, filtration trenches, and other functionally similar BMPs located near the runoff source.

J. Maximum Extent Practicable (MEP): To show that a proposed development has met a standard to the maximum extent practicable, the project must demonstrate the following: (1) all reasonable efforts have been made to meet the standard, (2) a complete evaluation of all reasonable management measures has been performed, and (3) if full compliance cannot be achieved, the highest practicable level of management is being implemented.

K. Native plants: Plants that are indigenous to the region, adapted to the local soil and rainfall conditions, and require minimal supplemental watering, fertilizer, and pesticide application.

L. Pavement: Areas of a site that are covered with pervious and/or impervious asphalt and concrete.

M. Porous Media: Material with open connected pore spaces that allows water to percolate through it such as granular soils, crushed stone, pervious pavements, and woven and non-woven geosynthetics.

N. Redevelopment: Any man-made change to previously improved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, and drilling operations.

O. Riparian: Referring to anything connected or immediately adjacent to the shoreline or bank of a stream, river, pond, lake, bay, estuary or other similar body of water.

P. Runoff: Stormwater that does not infiltrate into the ground and flows toward a below-ground or surface discharge location.

Q. Site: A lot, tract or parcel of land that includes but is not limited to the proposed area of disturbance and development activities.

R. Stormwater: Water that originates from precipitation events and accumulates on land.

S. Stormwater Management Plan: A written plan describing the proposed methods and measures to be implemented to prevent or minimize impacts to water quality and quantity from stormwater associated with a development or redevelopment project both during and after construction. It shall identify selected BMPs, LID strategies, and treatment practices to address those potential impacts, and contains the engineering design plans, specifications, and calculations of the management and treatment practices, and maintenance requirements for proper performance of the proposed practices.

T. Water Quality Treatment: the capture of sediment, nutrients, metals and hydrocarbons suspended in stormwater runoff from impervious surfaces before being conveyed to a storm sewer network or to another water quality treatment system. In most cases where no other local water body impairments exist, adequate treatment refers to documenting the treatment systems ability to remove 80% of the total suspended solids (TSS) on an annual basis. Where water quality impairments do exist adequate treatment refers to a system's ability to meet maximum load allocations or not further impair the receiving water.

U. Water Quality Volume (WQv): The storage volume needed to capture and treat the runoff from the 1-inch 24-hour rainstorm for a specific contributing area. WQv shall be calculated using the following equation: WQv = (P)(Rv)(A), where: P = 1 inch, Rv = the unitless runoff coefficient, Rv = 0.05 + 0.9(I), where I = the percent impervious cover draining to the discharge point, in decimal form, and A = total site area draining to the discharge point.

1.3 GENERAL REQUIREMENTS

A. All developments shall provide adequate management of stormwater runoff and prevent the discharge of stormwater runoff from creating or contributing to a water quality impairment. Developments that disturb 10,000 or more square feet must submit for review and approval, a Stormwater Management Plan (Plan) describing all proposed stormwater management system elements, practices, and associated designs, including all calculations and analyses of said designs. The University reserves the right to require any development that disturbs less than 10,000 square feet to submit and then implement an approved Stormwater Management Plan (complete as described below or abbreviated) to prevent degradation of local water resources. All elements of the Plan must be designed/prepared by a New Hampshire Registered Professional Engineer in accordance with the Design Standards below. The Plan must contain the following parts and presented in the order listed below:

1.4 STORMWATER MANAGEMENT PLAN

A. An Existing Conditions Site Plan showing all pre-development surface water bodies and wetlands, drainage patterns, and watershed boundaries, buffer zones, topographic contours with minimum 2-foot intervals, scale bar, north arrow, title block with project name, designer's stamp and wetland scientist's stamp (if applicable), legend, locus plan, benchmarks, and appropriate notes with datum and other plan references,

instructions, and detail descriptions. The Existing Conditions Site Plan shall be such that all important site and hydrologic features are easily recognized. Existing buildings, structures, pavement, utilities, and soils information with coding as HSG-A, B, C, or D shall be included on the Existing Conditions Site Plan. High Intensity Soil Survey (HISS) mapping may be required.

B. A Proposed Conditions Site Plan showing all proposed post-development temporary and permanent stormwater management system elements and erosion and sediment control BMPs and all important hydrologic features. The Proposed Conditions Site Plan must be at the same scale as the Existing Conditions Site Plan with consistent title block, plan features, and descriptors including but not limited to the following:

1. Existing and proposed topographic contours (2-foot minimum contour interval; 1-foot contour intervals may be required for sites with limited relief and/or where proposed stormwater outfalls are located adjacent to buffer zones).
2. Proposed areas of disturbance with total area of disturbance clearly labeled in square feet.
3. Existing and proposed buildings and structures.
4. Stormwater discharge locations keyed to drainage analyses.
5. Plan references and notes (including sequence of soil disturbance).
6. Proposed and existing public and private utilities.
7. Proposed project components to become property of or the responsibility of the University shall be labeled as such.
8. Existing and proposed impervious surfaces and pavements with areas used to calculate EIA clearly identified and the square footage of each type identified and labeled.

C. Drainage Analysis that includes calculations comparing Pre- and Post-Development stormwater runoff rates (cubic feet per minute) and volumes (cubic feet) based on a 1-inch rainstorm, and the 2-year, 10-year, and 25-year 24-hour frequency storms. Calculations shall include, but not be limited to, the sizing of all structures and BMPs including of sizing of emergency overflow structures based on assessment of the 100-year 24-hour frequency storm discharge rate. Phased applications apply as though the development of the entire parcel were proposed in one application at one time.

D. Drainage Analysis Results Summary tabulated for each proposed outfall or catchment outlet point including runoff rates and volumes for each storm event analyzed above.

E. An Erosion and Sediment Control Plan for all proposed construction activities in accordance with New Hampshire Stormwater Manual Volume 3 (December 2008 or later version).

F. Copies of any additional permits or plans required for compliance with Environmental Protection Agency (EPA) and/or New Hampshire Department of Environmental Services (NHDES).

G. A comprehensive Operation and Maintenance Plan for long-term maintenance of all proposed stormwater management elements and BMPs including the proposed schedule of inspections and anticipated maintenance.

1.5 DESIGN STANDARDS

A. The Stormwater Management Plans submitted shall meet the following minimum requirements:

1. Where applicable, the Plan must comply with the EPA Phase II Stormwater Rules and the University's MS4 Stormwater Discharge Permit, as amended.
2. All proposed measures shall be in accordance with the NH Stormwater Management Manual volume (December 2008 or future revision) a copy of which is available from NHDES:

    a. des.nh.gov/organization/divisions/water/stormwater/manual.htm

3. Water Quality Protection: All aspects of the application shall be designed to protect the water quality of the University's water bodies as follows:

    a. No person shall locate, store, discharge, or permit the discharge of any treated, untreated, or inadequately treated liquid, gaseous, or solid materials of such nature, quantity, noxiousness, toxicity, or temperature that may run off, seep, percolate, or wash into surface or groundwaters so as to contaminate, pollute, harm, impair or contribute to an impairment of such waters.
    b. All storage facilities for fuel, chemicals, chemical or industrial wastes, and biodegradable raw materials shall meet the standards of the New Hampshire Department of Environmental Protection (NHDES), Water Supply and Pollution Control.
    c. All projects under review by the University of such magnitude as to require a stormwater permit from EPA or NHDES shall comply with the standards of EPA and/or NHDES AOT program, with respect to the export of total suspended solids and other pollutants.

4. Stormwater Management For New Development: All proposed stormwater management and treatment systems shall meet the following performance standards:
    a. Existing surface waters, including lakes, ponds, rivers, perennial and intermittent streams (natural or channelized), and wetlands shall be protected by the minimum buffer setback distances specified by State law. Stormwater and erosion and sediment control BMPs shall be located outside the specified buffer zone. Alternatives to stream and wetland crossings that eliminate or minimize environmental impacts shall be considered whenever possible. When necessary, as determined by the University, stream and wetland crossings shall comply with state recommended design standards to minimize impacts to flow and enhance animal passage (see University of New Hampshire Stream Crossing Guidelines May 2009, as amended:

        1) http://www.unh.edu/erg/stream_restoration/nh_stream_crossing_guidelines_unh_web_rev_2.pdf

b. LID site planning and design strategies shall be used to the MEP in order to reduce the generation of the stormwater runoff volume for both new and redevelopment projects. A project must document why LID strategies are not appropriate if not used to manage stormwater.
c. All stormwater treatment areas shall be planted with native plantings appropriate for the site conditions: grasses, shrubs and/or other native plants in sufficient numbers and density to prevent soil erosion and to promote proper treatment of the proposed runoff.
d. All areas that receive rainfall runoff must be designed to drain within a maximum of 72 hours for vector control.
e. Snow and salt storage areas shall be covered or located such that no direct untreated discharges to receiving waters are possible from the storage site. Runoff from snow and salt storage areas shall enter treatment areas as specified above before being discharged to receiving waters or allowed to infiltrate into the groundwater.
f. Runoff shall be directed into recessed vegetated and landscape areas designed for treatment and/or filtration to the MEP to minimize EIA and reduce the need for irrigation systems.
g. The Plan shall make provisions to retain stormwater on the site by using the natural flow patterns of the site. Effort shall be made to utilize natural filtration and/or infiltration BMPs (i.e., bioretention areas, bioswales, subsurface filtration/infiltration systems, etc).
h. Measures shall be taken to control the post-development peak rate runoff so that it does not exceed pre-development runoff for the 2-year, 10-year and 25-year, 24-hour storm events. Similar measure shall be taken to control the post-development runoff volume to filtrate the WQv according to the following ratios of Hydrologic Soil Group (HSG) type versus infiltration rate multiplier: HSG-A: 1.0; HSG-B: 0.75; HSG-C: 0.4; HSG-D: 0.15. For sites where infiltration is limited or not practicable, the project must demonstrate that the project will not create or contribute to a water quality impairment.
i. Measures shall be taken to protect against on- and off-site downstream channel erosion and provide for sufficient capacity to convey the proposed flow without adverse effects.
j. The biological and chemical properties of the receiving waters shall not be degraded by the stormwater runoff from the development site.
k. The design of the stormwater drainage system shall provide for the disposal of stormwater without flooding or functional impairment to streets, adjacent properties, downstream properties, soils, or vegetation.
l. The design of the stormwater management systems shall take into account upstream and upgradient runoff that flows onto, over, or through the site to be developed or re-developed and provide for this contribution of runoff.
m. Appropriate erosion and sediment control measures shall be installed prior to any soil disturbance such that the area of disturbance shall be kept to a minimum. Disturbed areas remaining idle for more than 30 days shall be stabilized.
n. Measures shall be taken to control erosion within the project area. Sediment in runoff water shall be trapped and retained within the project area using BMPs. Wetland areas and surface waters shall be protected from sediment.

o. All temporary control measures shall be removed after final site stabilization. Trapped sediment and other disturbed soil areas resulting from the removal of temporary measures shall be permanently stabilized prior to removal of temporary control measures.
p. All areas that receive rainfall must be designed to drain within a maximum of 72 hours for vector control.
q. Pervious parking surfaces shall be used as an alternative to impervious asphalt or concrete for general and overflow parking areas to the MEP. Pervious pavement shall be appropriately sited and designed for traffic and vehicle loading conditions.
r. Whenever practical, native site vegetation shall be retained, protected, or supplemented. Any stripping of vegetation shall be done in a manner that minimizes soil erosion.
s. All subsurface filtration BMPs shall include perforated underdrains positioned a minimum of 8-inches above the bottom of the filter bed to prevent extended periods of saturated conditions.

5. Redevelopment Project Requirements: Because redevelopment may present a wide range of constraints and limitations, an evaluation of options may be proposed to work in conjunction with broader state watershed goals and University Sustainability Initiatives. Stormwater requirements for redevelopment vary based upon the surface area of the site that is covered by existing impervious surfaces. In order to determine the stormwater requirements for redevelopment projects, the percentage of the site covered by existing impervious areas must be calculated.

   For sites meeting the definition of a redevelopment project and having less than 40% existing impervious surface coverage, the stormwater management requirements will be the same as other new development projects with the important distinction that the project can meet those requirements either on-site or at an approved off-site location within the same subwatershed provided the project satisfactorily demonstrates that impervious area reduction and LID strategies and BMPs have been implemented on-site to the MEP.

   For redevelopment sites with more than 40% existing impervious surface coverage, stormwater shall be managed for water quality in accordance with one or more of the following techniques, listed in order of preference:

   a. Implement measures onsite that result in an EIA of at least 30% of the existing impervious surfaces and pavement areas, and 50% of the additional proposed impervious surfaces and pavement areas through the application of porous media; or
   b. Implement other LID techniques onsite to the MEP to provide treatment for at least 50% of the redevelopment area; or
   c. Implement off-site BMPs to provide adequate water quality treatment for an area equal to or greater than 50% of redevelopment areas may be used to meet these requirements provided that the project satisfactorily demonstrates that impervious area reduction, LID strategies, and/or onsite BMPs have been implemented to the MEP. An approved off-site location must be identified, the specific management measures identified, and an implementation schedule developed in accordance with University

review. The project must also demonstrate that there is no downstream drainage or flooding impacts as a result of not providing on-site management for large storm events. To comply with University watershed objectives the mitigation site should be situated in the same subwatershed as the development and impact the same receiving water.

6. Impervious Surfaces can negatively impact surface and ground water quality in a number of ways. Impervious surfaces, such as paved parking lots decrease infiltration and recharge of groundwater, provide an express route for runoff to reach waterways, provide a surface upon which pollutants can accumulate, and prevent the natural processing of pollutants in soil, plants, and wetlands. Therefore, all projects shall minimize the area of impervious surfaces, and address the potential negative impact of impervious surfaces on surface and groundwater resources.

   The recommended total overall impervious cover of a site shall not exceed 30%. For purposes of complying with this requirement, impervious cover draining to green roofs (with living vegetation), porous pavements, or other Low Impact Development filter treatment systems can be subtracted from the calculation of total impervious cover.

7. University Sustainability Initiatives including the University the Biodiversity Education Initiative and the Culture and Sustainability Initiative shall be considered be considered with the development of stormwater management plans.
8. Plan Approval and Review: The University shall approve the Stormwater Management Plan if it complies with the requirements of these guidelines and other requirements as provided by law. The technical review shall be performed by a qualified professional.

END OF SECTION 33 4200