

Watershed Protection Ordinances: Research

Case Study

Town of Weston, MA

Online References:

- Stormwater Permitting Authority:
http://www.weston.govoffice.com/index.asp?Type=B_BASIC&SEC=%7bAA1209C5-6A84-479E-A4A3-7663301B8058%7d&DE=%7bCC7422FF-63BE-43D9-A087-357107600B1D%7d
- Scenic Roads And Residential Gross Floor Area:
http://www.weston.govoffice.com/index.asp?Type=B_BASIC&SEC=%7b1EE7BC64-1782-4726-A82C-00F7CDBC87AA%7d&DE=%7bC22E95DF-BA37-4B70-AB2E-7A3AB08A8E9D%7d
 - Helpful Guidelines:
http://www.weston.govoffice.com/index.asp?Type=B_BASIC&SEC=%7b1EE7BC64-1782-4726-A82C-00F7CDBC87AA%7d&DE=%7bFA6F57C9-3B2B-42D8-B5D5-0158C43ADE96%7d
- Zoning By-Laws: http://www.weston.govoffice.com/vertical/sites/%7B264E11B6-4A4A-4EC0-B631-35FE907B479E%7D/uploads/Zoning_By-Law_Dec_13.pdf

The town of Weston has a **Stormwater Permitting Authority (SWPA)** that enforces the **Stormwater and Erosion Control By-Law**.

Stormwater Permitting Authority

The Stormwater Permitting Authority (SWPA) is responsible for administering, implementing and enforcing the Stormwater and Erosion Control By-law. **The purpose of the By-law is to ensure that new development, redevelopment, and certain land disturbance activities do not increase stormwater runoff.** The SWPA consists of five members: Town Engineer, Town Planner, Conservation Administrator, Public Health Director, and one resident.

A Stormwater Management Permit (SMP) is required if a project exceeds SMP thresholds. Permit issuance is required prior to any site altering activity. When design standards *cannot* be met a public hearing is required.

Overview of Regulations

These Regulations apply to all activities subject to the Applicability Section of the Stormwater and Erosion Control By-Law.

First, at a minimum, all projects must comply (to the maximum extent practicable) with the performance standards of the Massachusetts Stormwater Standards and Stormwater Management Handbook. For example:

- Environmentally sensitive site design as outlined in DEP handbook
- Attempt to reproduce natural hydrologic conditions (ground/surface waters)
- Consideration of LID
- Water quality volume for sizing of BMPs is based on 1" of runoff from tributary area
- Projects are to be designed so that the peak rate of runoff and volumes in post-development is LESS than in pre-development conditions (see below)

Second, Projects must design for mitigation of peak stormwater runoff rates.

- **Projects must use a hydrologic analysis method (e.g., TR-55/TR-20) for the entire project site include ding any off site areas that drain to/through the project site**

- **Analyses to be conducted for the 1” and 2-,10-,25-, and 100-year design storms under pre- and post-development conditions on a sub-watershed basis with designated control points at each location where runoff leaves the site.** The 24-hour rainfall amounts for the 2/10/25/100 year storms are to be based on the Northeast Regional Climate Center Atlas.
- The same area shall be used to compare pre and post conditions
- The total volume of discharge AND peak rate shall be evaluated at each control point. **The analysis must demonstrate that the design achieves a net reduction of volume and peak flow rate in all design storms compared to existing conditions.**
- Stormwater infiltration systems may be needed to provide storage for mitigation (there are specifications for these)

Additionally:

- All public/private roadway projects must provide improvement in stormwater conditions.
- An erosion and sediment control plan must be approved.

When a Permit is required

- 1) **Where a project is subject to Site Plan Approval, Definitive Subdivision or Special Permit Approval from the Planning Board**, the Stormwater Regulations adopted by the Planning Board shall apply and the stormwater review shall be completed as part of the Planning Board process provided that the Planning Board also finds that the activity is in compliance with any additional performance standards contained in the Regulations promulgated to implement this By-Law.
- 2) For projects not subject to Site Plan Approval, Definitive Subdivision or Special Permit Approval from the Planning Board, this By-Law shall be applicable to **all new development and redevelopment, land disturbance and any other activity that may result in an increased amount of stormwater runoff or pollutants, or changes to drainage characteristics causing an increases in runoff, flowing from a parcel of land, unless exempt pursuant to Section V of this By-Law.** This By-Law shall apply to land or parcels of land that are held in common ownership (including ownership by related or jointly-controlled persons or entities) as of the effective date of this By-Law, if the total land-disturbing activities on said land or parcels, considered as a whole, would presently or ultimately exceed the minimum thresholds in Section IV.B and are not exempted by Section V. A development shall not be segmented or phased in a manner to avoid compliance with this By-Law.

Storm Water Management Permit Thresholds (Section IV.C)

A Storm Water Management Permit shall be required for any of the following, except for an activity exempt per Section V:

1. Minor Permit

- 1) The creation of new impervious area, or expansion of existing impervious area, greater than 750 square feet and not exceeding 2,500 square feet.
- 2) Repair, replacement, expansion of septic systems provided the work does not exceed the thresholds in Section IV.C.2.d.
- 3) The addition or on-site redistribution of more than 250 cubic yards, but not exceeding 500 cubic yards, of earth materials including, but not limited to, sand, gravel, stone, soil, loam, clay, sod, fill and mineral products.

2. Major Permit

- 1) Construction of any new dwelling or new dwelling replacing an existing dwelling in conformance with Article VIII, Section V.B.1.a and Section V.C.1.a of the Weston Zoning By-Laws;
- 2) Any land disturbance exceeding an area of 5,000 square feet, or more than 20% of a parcel or lot, whichever is less, other than activities described in section IV.B.4.
- 3) Creation of new impervious surface area greater than 2,500 square feet.

- 4) The addition or on-site redistribution of more than 500 cubic yards of earth materials including, but not limited to, sand, gravel, stone, soil, loam, clay, sod, fill and mineral products.
- 5) Reconstruction of public or private way.
- 6) Reconstruction or replacement of existing non-residential parking lots, including associated

When a Permit is NOT Required (Section IV.B)

- 1) **Land Disturbance not to exceed 5,000 square feet** in area other than work described in Section IV.B.4 and Section IV.C.1.
- 2) The creation of **new impervious area**, or **expansion of existing impervious area, not to exceed 750 square feet.**
- 3) **Repair**, replacement or reconstruction of an **existing driveway.**
- 4) **Restoration of existing lawn areas** provided that any imported material is spread at a thickness no greater than four inches and the total **imported material does not exceed 250 cubic yards.**
- 5) **The addition or on-site redistribution of up to 250 cubic yards of material.**
- 6) **Demolition of a structure provided that any land disturbance, including the area of the structure, does not exceed 5,000 square feet.**
- 7) **Routine maintenance and improvement of institutional open space, and recreational uses, provided that an annual letter or plan is filed with and approved by the SWPA describing the work to be done.**

Exemptions (Section V)

Exemptions from this By-Law apply to the following activities, provided that a project is solely comprised of any one of these activities:

- 1) Normal maintenance and improvement of land in agricultural use as defined by the Wetlands Protection Act Regulations at 310 CMR 10.04 ("Agricultural") and the conversion of additional land to agricultural use, when undertaken in such a manner as to prevent erosion and siltation through the use of Best Management Practices recommended by the U.S. Department of Agriculture Natural Resources Conservation Service or the Massachusetts Department of Agricultural Resources.
- 2) Any work or projects for which all necessary approvals and permits were issued before the effective date of this By-Law.
- 3) Normal maintenance of existing landscaping, gardens or lawn areas
- 4) Construction of any fence that will not alter existing terrain or drainage patterns.
- 5) Construction of utilities (gas, water, sanitary sewer, electric, telephone, cable television, etc.) other than drainage which will not alter terrain, ground cover, or drainage patterns, so long as BMPs are used to prevent erosion, sedimentation and release of pollutants.
- 6) Emergency repairs to any existing utilities (gas, water, sanitary sewer, electric, telephone, cable television, etc.) and emergency repairs to any stormwater management facility that poses a threat to public health or safety, designated by the SWPA. Where such activity is subject to the jurisdiction of the Conservation Commission, the work shall not proceed without the issuance of an Emergency Certification by the Commission.
- 7) The maintenance or resurfacing (not including reconstruction) of any public or private way.

Submission Procedures For Site Plan Approval For Scenic Roads And Residential Gross Floor Area

The Town of Weston also has submission guidelines for construction on a scenic road **or for homes over a certain size on any road**, according to the following sections in the Weston Zoning By-Law:

- 1) Under Section II. and Section V.B.2. c. for new or replacement construction on a Scenic Road
- 2) Under Section V.B.2.d. and Section XI for new or replacement structures under Residential Gross Floor Area ("RGFA")
 - a. RGFA Definition: RESIDENTIAL GROSS FLOOR AREA ("RGFA") The sum of the horizontal area(s) of the above-grade floors in the residential building(s) on a lot, excluding unfinished attics but including attached or detached garages. The RGFA shall be measured from the exterior face of the exterior walls.
 - b. "The Residential Gross Floor Area "RGFA" of any new or replacement single family dwelling use constructed pursuant to a building permit issued on or after October 29, 1998, **may not exceed the greater of 3,500 s.f. or 10% of the lot area up to a maximum of 6,000 s.f.**

Required Stormwater Plans:

Stormwater Plans and calculations should be prepared by a Professional Engineer. **Post-development peak rates of runoff from a site must be equal to or less than pre-development peak rates of runoff for the 2, 10 and 100 year storm events.** Provide supporting plans, details and calculations . Best management practices as described in the MA DEP Stormwater Policy Handbook and general engineering practice should be followed in the design of storm water controls.

Stormwater controls should be incorporated into the site design so that they complement and do not detract from the rest of the site. Clearing, grading and additional disturbance to the site should be minimized. Stormwater controls should, whenever possible, be constructed in previously disturbed areas. Due to their impacts on the site and lack of aesthetic quality, detention basins are discouraged. Infiltration of runoff as a means of controlling the peak rate of runoff is highly encouraged.

From Zoning By-Laws:

"Storm water runoff from impervious surfaces must be controlled on your lot. Storm water controls should be incorporated into the site design so that they complement and do not detract from the rest of the site. Clearing, grading and additional disturbance should be minimized. Infiltration of runoff as a means of controlling the peak rate of runoff is highly encouraged."

Case Study

Town of Gloucester, MA

Implemented a **Watershed Protection Overlay District** which is considered as overlaying other zoning districts. Uses not permitted in the portions of the districts so overlaid shall also be prohibited in this district.

The Watershed Protection Overlay **District includes all lands lying adjacent to water courses and surface water bodies which contribute to the city's water supply, and which create the catchment or drainage areas of such water courses and bodies, as part of their natural drainage system.** The map defining the Watershed Protection Overlay District boundaries, entitled "**Public Water Supply Watershed Boundary Maps, City of Gloucester**" drawn at a scale of 1 inch to 100 feet, are hereby adopted by the City Council and are incorporated herein by reference and are on file in the City Planning Office.

Prohibited Uses within District

Dry cleaning establishments, junk and salvage yards, car washes except when located on public water and sewer, boat and motor vehicle service/storage repair establishments, industrial uses that discharge processed wastewater, commercial removal/relocation of earth materials, feedlots/pastures less than 5 acres within 100' of the centerline of rivers, landfills, disposal of salt and road de-icing agents, outdoor storage of fertilizers/herbicides/pesticides/outdoor uncovered manure, burial in any cemetery (with exceptions), disposal of solid waste other than brush/stumps, disposal of leachable wastes, dumping of snow contaminated by de-icing chemicals brought in from outside the district, storage/disposal of hazardous waste/petroleum (heating oil should be stored within the buildings which it will heat), discharge of water used for cooking/washing/etc unless of household origin and processed through treatment system, privy, dry well, etc. Also any building or structure located within 50 feet of the banks of all rivers or within 50 feet from the normal highwater line of lakes/ponds/marshes.

For any use involving the application of fertilizers, pesticides, or herbicides, the applicant must obtain a report from the Board of Health Agent stating that all necessary precautions shall be taken to prevent hazardous concentrations of pesticides in the water and on the land within the district as a result of such application and submit it to the permit granting authority. Such precautions include, but are not limited to, erosion control techniques, the control of runoff water (or the use of pesticides having low solubility in water), the prevention of volatilization and redeposition of pesticides and the lateral displacement (i.e. wind drift) of pesticides. The application of fertilizers for non-domestic or non-agricultural uses will be approved only if the applicant can prove that such application shall be made in such manner as to minimize adverse impacts on surface and groundwater due to nutrient transport and deposition and sedimentation.

For the issuance of special permits

Applications must include:

- Provisions to control soil erosion and sedimentation, soil compaction, and to prevent seepage from sewer pipes
- Drainage recharge features and provisions to prevent loss of recharge
- Amount of impervious surface proposed for the lot

Case Study

Town of Paxton, MA

Created **stormwater bylaw** that is administered by the **Stormwater Authority (the Planning Board)**.

Applicability

This bylaw shall be applicable to **all new development and redevelopment, including site plan applications and subdivision applications**. The Bylaw shall apply to **any activities that will result in an increased amount of stormwater runoff or pollutants from a parcel of land, or that will alter the drainage characteristics of a parcel of land**, unless exempt under Section 5.C of this Bylaw. **All new development and redevelopment under the jurisdiction of this Bylaw shall be required to obtain a Stormwater Management Permit.**

In addition: **an alteration, redevelopment, or conversion of land use to a hotspot** (as determined by the Stormwater Authority in conformance with Standard 5 of the Massachusetts Stormwater Management Policy) such as: auto salvage yards, auto fueling facilities, fleet storage yards, **commercial parking lots with high intensity use**, road salt storage areas, commercial nurseries and landscaping, outdoor storage and loading areas of hazardous substances, or marinas, shall require a Stormwater Management Permit.

Exemptions

- 1) **Any activity that will disturb an area less than 10,000 (gross) square feet of a property.**
- 2) Normal maintenance and improvement of land in agricultural use as defined by the Wetlands Protection Act regulation 310 CMR 10.04 and MGL Chapter 40A Section 3;
- 3) Conversion of land to agricultural use for crops and/or pasture;
- 4) Maintenance of existing landscaping, gardens or lawn areas associated with a single family dwelling;
- 5) Repair or replacement of an existing roof of a single-family dwelling;
- 6) **Construction of a single-family family dwelling, where approval is not required, as defined in the Subdivision Control Law, unless the associated land disturbance activity exceeds 10,000 (gross) square feet.** Prior to land disturbance activities, **persons constructing single-family dwellings are strongly encouraged to consult with the Town's Superintendent of the Department of Public Works about actions to reduce stormwater impacts during and after construction.** It is also recommended that individuals constructing single-family dwellings prepare and grade lots in such a manner that development of the lot does not cause detrimental drainage on another lot or onto streets either during construction or upon completion. **Persons constructing single-family dwellings are strongly encouraged to use stormwater control and site planning methods described in the Town of Paxton Best Development Practices Guidebook.**
- 7) **Repair or replacement of an existing septic system.** Persons repairing or replacing septic systems are strongly encouraged to consult with the Town Board of Health about actions to reduce stormwater impacts during and after construction.
- 8) The construction of any fence that will not alter existing terrain or drainage patterns;
- 9) **Construction of a deck, patio, retaining wall, expansion of an existing driveway, construction of a shed, swimming pool, tennis or basketball court associated with a single-family dwelling;**
- 10) Construction of utilities (gas, water, electric, telephone, etc.) other than drainage, which will not alter terrain, ground cover, or drainage patterns;
- 11) Emergency repairs to any stormwater management facility or practice that poses a threat to public health or safety, or as deemed necessary by the Stormwater Authority; and
- 12) Any work or projects for which all necessary approvals and permits have been issued before the effective date of this Bylaw.

Objectives

1. Establish regulations for land development activities that preserve the health of water resources;
2. **Require that the amount and quality of stormwater from new development is equal to or better than pre-development conditions in order to reduce flooding, stream erosion, pollution, property damage and harm to aquatic life;**
3. **Establish stormwater management standards and design criteria to control the quantity and quality of stormwater runoff;**
4. Encourage the use of “low impact development practices”, such as reducing impervious cover and preserving greenspace and other natural areas;
5. Establish maintenance provisions to ensure that stormwater treatment practices will continue to function as designed and pose no threat to public safety;
6. Establish procedures for the Town’s review of stormwater management plans and for the Town’s inspection of approved stormwater treatment practices.

Case Study

Town of Webster, MA

Created a **watershed protection district** (<http://ecode360.com/9233849>). In addition to the prohibition of many uses, the following require a special permit from the Special Permit Granting Authority:

- **Covering with impervious surface more than 40% of the portion of lot area within the Lake Watershed Protection District.**
- **Removal of existing groundcover vegetation from more than 70% of lot area.**
- Discharge to surface water requiring a permit under 314 CMR 3.00 ('NPDES' permit).
- Stable, barn, or similar confinement for four or more horses, cows, goats, and/or sheep, or more than 50 poultry, or a number of other animals equivalent to the above in waste production.
- Contractor's yard.

The following design and operations guidelines shall be observed in all new construction except for single-family dwellings:

- **Safeguards.** Provisions shall be made to protect against hazardous materials discharge or loss through corrosion, accidental damage, spillage, or vandalism through such measures as provision for spill control in the vicinity of chemical or fuel delivery points, secure storage areas for hazardous materials, and indoor storage provisions for corrodible or dissolvable materials.
- **Location.** Where the premises are partially outside of the Lake Watershed Protection District, such potential pollution sources as on-site waste disposal systems shall, to the degree feasible, be located outside the District.
- **Disposal.** Provisions shall be made to assure that any waste disposed on the site shall contain no hazardous materials, or shall be disposed in strict accordance with 310 CMR 30, Hazardous Waste Regulations.
- **Drainage.**
 - **Provision shall be made for on-site recharge of all stormwater runoff from impervious surfaces** unless, in cases where such surfaces are no more than 15% of lot area or 2,500 square feet, whichever is larger, the Planning Board in conducting Site Plan Review and following consultation with the Conservation Commission, determines that either recharge is infeasible because of site conditions or is undesirable because of uncontrollable risks to water quality from such recharge following consultation with the Conservation Commission.
 - **Recharge shall be by surface infiltration through vegetative surfaces** unless otherwise approved by the Planning Board following consultation with the Conservation Commission. Dry wells shall be used only where other methods are infeasible and shall employ oil, grease, and sediment traps. Drainage from transfer areas for hazardous materials shall be separately collected for safe disposal.
- **Sewerage.** Sanitary sewers within the Lake Watershed Protection District shall be designed and constructed in a manner such that groundwater levels, flows, and/or recharge will not be significantly lowered, diverted, or otherwise altered by such construction, and that risk of leakage is minimized.

Case Study

Town of Medfield, MA

Implemented a **Watershed Protection District** that is superimposed over any other District established by the Bylaw. The Watershed Protection District is defined as all land area along the streams and brooks for a horizontal distance of at least 25 feet from the normal high water line and from adjacent low, marshy areas AND all land that lies within a horizontal distance of 25 feet from the normal high water line of particular major water bodies.

Within the district:

- No building permit shall be issued nor any building wall, dam or other structure shall be erected, constructed, altered, enlarged, or otherwise created or moved for any purpose unless a Special Permit is issued by the Board of Appeals.
- Dumping, filling, excavating or transferring of any earth material within the District is prohibited unless a Special Permit is issued by the Board of Appeals.
- No ponds or pools shall be created or other changes in water courses allowed whether for swimming, fishing, or other recreational uses, agricultural uses, scenic features or drainage improvements or any other uses unless a Special Permit is issued by the Board of Appeals.

Case Study

Town of Westford, MA

The Planning Board is designated as the Stormwater Authority.

The Stormwater Management bylaw is hereby established in the Town of Westford, Massachusetts. This bylaw is adopted under authority granted by the Home Rule Amendment of the Massachusetts Constitution, the Home Rule statutes, and pursuant to the rules and regulations of the federal Clean Water Act found at 40 CFR 122.34.

Applicability

This bylaw shall be applicable to the following activities:

- 1) **Any Subdivision as defined in the Massachusetts Subdivision Control Law** (Massachusetts General Laws, chapter 41, sections 81K – 81GG) requiring a Definitive Plan;
- 2) **Any activities that result in a land disturbance of one acre or greater** within the Town of Westford. Land disturbance shall mean any action that causes vegetation clearing (including tree cutting); or a change in the position, location, or arrangement of soil, sand, rock, gravel or similar earth material; and
- 3) **Any activities that result in a land disturbance less than one acre if the project is part of a larger common plan of development which will disturb one acre or more** within the Town of Westford. Plans that do not require approval under the Subdivision Control Law, hereafter referred to as “Approval Not Required or ANR lots”, and meet one or more of the applicability criteria described herein are subject to the provisions of this bylaw and shall obtain a Stormwater Management Permit.

Exemptions

Exemptions: No person who meets the applicability of this bylaw shall alter land within the Town of Westford without having obtained a **Stormwater Management Permit (SMP)** with the following exceptions:

1. Ground disturbances in the course of customary cemetery use and regular maintenance,
2. Maintenance of landscaping, gardens or lawn areas,
3. Normal maintenance and improvement of land in agricultural use as defined by the Wetlands Protection Act 310 CMR 10.04 and Massachusetts General Laws chapter 40A, section 3.
4. Any work or projects for which the required permit applications have been submitted to the Planning Board, Zoning Board of Appeals, and Conservation Commission before the effective date of this bylaw. For proposed Subdivisions, a Definitive Plan must have been submitted to be considered exempt from this bylaw.
5. Emergency repairs to any stormwater management facility or practice, such that the original design location, size, and technology remain the same, that poses a threat to public health or safety, or as deemed necessary by the Planning Board or its authorized agent.
6. Municipal roadway maintenance when conducted in accordance with an approved Stormwater Pollution Prevention Plan, prepared in accordance with the Stormwater Management regulations

Requirements for Stormwater Management Permit

Stormwater Report Contents

1. **The application for a STORMWATER MANAGEMENT PERMIT shall include the submittal of a Stormwater Report to the Planning Board prepared in accordance with the MASSACHUSETTS STORMWATER HANDBOOK** and the criteria established in these Regulations. This Stormwater Report shall document compliance with each of the STORMWATER MANAGEMENT STANDARDS as provided in the

HANDBOOK and shall contain sufficient information for the Planning Board to evaluate the environmental impact, effectiveness, and acceptability of the SITE planning process and the measures proposed by the applicant for reducing adverse impacts from stormwater RUNOFF. The Stormwater Report shall remain on file with the Planning Board.

2. The Stormwater Report shall fully describe the project in drawings, narrative, and calculations. To demonstrate compliance with these Regulations to the Planning Board, the applicant shall include the following in addition to the Stormwater Report requirements in the HANDBOOK:

- a) Locus Map;
- b) Existing SITE Plan;
- c) The existing zoning, and land use at the SITE and abutting properties;
- d) The proposed land use;
- e) The location(s) of existing and proposed easements;
- f) The location of existing and proposed utilities;
- g) The SITE's existing & proposed topography with contours at 2-foot intervals;
- h) The existing SITE hydrology (both groundwater RECHARGE and surface RUNOFF);
- i) A description and delineation of existing stormwater conveyances, impoundments, wetlands, drinking water protection areas, swimming beaches, and other protected RESOURCE AREAs, on or adjacent to the SITE or into which stormwater flows;
- j) A delineation of 100-year flood plains, if applicable;
- k) The existing and proposed vegetation and ground surfaces with RUNOFF coefficients for each; (including all IMPERVIOUS COVER – parking, driveways, etc.)
- l) A drainage area map showing pre- and post-construction watershed boundaries (as governed by topography, not the property line), drainage areas, time of concentration (tc) path, and stormwater flow paths, including MUNICIPAL STORM DRAIN SYSTEM flows;
- m) A description and drawings of all components of the proposed Stormwater Management system including:
 - i. All measures for the detention, retention or INFILTRATION of water;
 - ii. Description of non-structural BMPs;
 - iii. All measures for the protection of water quality;
 - iv. The structural details for all components of the proposed drainage systems and Stormwater Management facilities;
 - v. Notes on drawings specifying materials to be used, construction specifications, and expected hydrology with supporting calculations;
 - vi. Proposed SITE plan including location of buildings or other structures, impervious surfaces, and drainage facilities, if applicable;
 - vii. Any other information requested by the Planning Board.
- n) **Hydrologic and hydraulic design calculations for the PRE-DEVELOPMENT and POST-DEVELOPMENT conditions for the design storms specified in the MASSACHUSETTS STORMWATER HANDBOOK.** Such calculations shall include:
 - i. Description of the design storm frequency, intensity and duration;
 - ii. Time of concentration;
 - iii. Soil Runoff Curve Number (RCN) based on land use and soil hydrologic group;
 - iv. Peak RUNOFF rates and total RUNOFF volumes for each watershed area;
 - v. Provisions for protecting, during construction, the INFILTRATION capacity of the soil where INFILTRATION is proposed;
 - vi. INFILTRATION rates, where applicable;
 - vii. Culvert capacities;
 - viii. Flow velocities;
 - ix. Data on the increase in rate and volume of RUNOFF for the specified design storms, and
 - x. Documentation of sources for all computation methods and field test results.
- o) Landscaping plan describing the woody and herbaceous vegetative stabilization and management techniques to be used within and adjacent to the stormwater practice.

3. If, in the applicant's opinion, one or more of the Stormwater Management Standards or other requirements cannot be reasonably met, the applicant shall provide a detailed explanation in the Stormwater Report. This narrative shall include reasons that the requirement or Standard could not be met and a description of potential consequences if no mitigating measures are provided.

Performance Standards

A) For compliance with Performance Standards of these Regulations, the applicant must meet all standards of the Massachusetts Department of Environmental Protection's STORMWATER MANAGEMENT STANDARDS and HANDBOOK using current Best Management Practices (BMPs).

B) Additional Design Criteria

1. Landscape Design

SITE plans and landscape plans for all proposed projects **must take appropriate steps to minimize water use for irrigation and to allow for natural RECHARGE of groundwater. Native species and habitat-creating species shall be used in all landscape plans to the maximum extent possible as SITE conditions allow.** INVASIVE SPECIES shall not be planted in the Town of Westford under any circumstances.

2. Hydrologic Basis for Design

For stormwater facility sizing criteria, the basis for hydrologic and hydraulic evaluation of development and REDEVELOPMENT SITES are as follows:

- a) All hydrological calculations shall be completed and certified by a Massachusetts Registered Professional Engineer licensed to practice in this field. Typically the procedures to follow will include Technical Release Number 55 (TR55) and/or TR20 (as amended); with pipe design flows calculated using the Rational Method.
- b) The rainfall amounts shall be determined using Type III 24-hour storm precipitation as referenced in Technical Release Number 55 and 20. Precipitation amounts shall be defined by the Northeast Regional Climate Center "Atlas of Precipitation Extremes for the Northeastern United States and Southeastern Canada."
- c) The minimum time of concentration for street drainage (Rational Method) shall be five (5) minutes.
- d) Water velocities in pipes and gutters shall be between two (2) and ten (10) feet per second , and not more than four (4) feet per second in vegetated areas.
- e) IMPERVIOUS COVER is measured from the SITE plan and includes any material or structure on or above the ground that prevents water from infiltrating through the underlying soil.
- f) Off-site areas shall be assessed based on their "pre-developed condition" for computing the WATER QUALITY VOLUME (i.e., treatment of only onsite areas is required). However, if an offsite area drains to a proposed BMP, flow from that area must be accounted for in the sizing of a specific practice.
- g) Off-site areas draining to a proposed facility should be modeled as "present condition" for peak-flow attenuation requirements.
- h) The length of sheet flow used in time of concentration calculations is limited to no more than 50 feet.
- i) Detention time is defined as the time between the center of mass of the inflow hydrograph and the center of mass of the outflow hydrograph.
- j) For purposes of choosing a Runoff Curve Number, all pervious lands in the SITE shall be assumed prior to development to be in "good" hydrologic condition regardless of conditions existing at the time of computation.
- k) Flooding and channel erosion impacts to receiving streams due to land development projects shall be determined at each point of discharge from the development project and such determination shall include any RUNOFF from the balance of the watershed which also contributes to that point of discharge.
- l) Proposed residential, commercial, or industrial subdivisions or ANRs shall apply these Stormwater Management criteria to the land development as a whole. Individual lots in new subdivisions shall not be considered separate land development projects, but rather the entire subdivision shall be considered a single land development project. Hydrologic parameters shall reflect the ultimate land development and shall be used in all engineering calculations.

3. Sensitive Areas – Additional Design Criteria

Stormwater discharges to Critical Areas with sensitive resources as defined in the Massachusetts STORMWATER MANAGEMENT STANDARD No. 6 are subject to additional criteria, and may need to utilize or restrict certain STORMWATER MANAGEMENT practices at the discretion of the Planning Board. The Planning Board has also designated the following Sensitive Areas with specific design criteria. The Planning Board may designate additional Sensitive Areas and specific criteria for these areas by amending these Regulations.

- a) Cold Water Fisheries

Stormwater BMPs must mitigate potential temperature impacts of development and land use conversions to Cold Water Fisheries. Elevated temperatures are caused by reduced shading in developed riparian areas, warming of stormwater as it runs over hot roofs and pavement, and heating of water stored in STORMWATER MANAGEMENT ponds. Traditional peak reduction outlet structures and simple spillway outlets do nothing to cool the water before discharge. To address this problem, alternative BMPs, such as buffers, INFILTRATION or under-drained filters can be used, or, if ponds are required, under-drained outlet structures can provide effective cooling. Equally important to maintaining cool stream temperature is preservation and/or restoration of riparian trees and shrubs to provide shade.

Cold Water Fisheries located in the Town of Westford include, but are not limited to, Reed Brook. The Town of Westford Engineering Department has current maps of Westford's watersheds and the locations of Cold Water Fisheries.

b) Discharges to Water Quality Impaired Waters

The Applicant must determine whether stormwater discharges from the proposed SITE will contribute, either directly or indirectly, to an IMPAIRED WATER body. Structural and non-structural stormwater BMPs shall be selected that will control the discharge of the pollutants of concern and ensure that the discharges will not cause an instream exceedances of applicable water quality standards. Pollutants of concern refer to the pollutant identified as causing the impairment. For information on impaired waterbodies and the most recent Integrated List of Impaired Waterbodies, see MassDEP's TMDL website.

Case Study

Town of Wellesley, MA

The text below includes excerpts from the Town's Municipal stormwater drainage system rules and regulations.

Permission to use the municipal system requires storm quantity considerations:

On-site stormwater management BMP's shall be used to infiltrate, disperse, and retain stormwater runoff on-site to the maximum extent practicable. The requirement for maximum on site infiltration shall be waived where there is a demonstrated and documented threat to public health.

For permanent private drain connection permits, the applicant shall submit runoff calculations substantiating the anticipated volume of discharge. In the case of development or redevelopment projects, discharge quantity shall be limited to preconstruction amounts. If the 10-year storm peak discharge is greater than 0.5 c.f.s., then the effect on the downstream and upstream capacity of the stormwater system shall be investigated. The applicant may be required, at his own expense, to construct improvements to the Town's stormwater system to accommodate his connection.

For temporary permits, the discharge quantity and impacts shall be determined on a case-by-case basis. Discharges entirely from private drain connections from residential basement sumps or sump pumps shall be exempt from the requirements of this section.

Permission to use the municipal system also requires storm quality considerations:

Stormwater Quality Considerations:

Treatment of discharge shall be required for private drain connections in the following cases:

1. Commercial or industrial activities.
2. Parking lots.
3. Disturbance of pervious areas of 1.0-acre or more.
4. Creation of 10,000 sq.ft. or more of impervious area.
5. Land uses involving the storage, fueling, or maintenance of vehicles or heavy equipment.
6. All other sites that may have the potential for higher pollutant loadings.

Treatment shall be required for stormwater to be infiltrated on-site as well as stormwater to be discharged to the municipal stormwater drainage system.

Specific BMP's and the following measurable criteria will be required for discharges having the potential to contain the following pollutants with quantities indicating required levels of pollutant reduction:

1. Total suspended solids (must achieve 80% removal, unless monitoring of TSS indicates a concentration consistently less than 20mg/l).
2. Oil & grease (no visible sheen and less than 15 mg/l of total petroleum hydrocarbons (TPH),
3. Nutrients (phosphorous, nitrogen) (must achieve 50% reduction of phosphorous, 35% nitrogen),
4. Pesticides and toxic chemicals (public awareness program),
5. Salts (program to restrict use of road salt),
6. Heavy metals (to the maximum extent possible based on current practice),
7. Floatable materials (to the maximum extent possible), and
8. Bacteria and viruses (achieve 75-90% removal).

Each application for a private drain connection permit shall include a description of the BMP's proposed and calculations indicating the anticipated reduction in pollutants. Applications that fail to demonstrate substantially reduced pollutant loadings will not be approved for connection to the Town's stormwater drainage system.

If structural BMP's are selected, then a plan for maintenance and inspection shall be included with the application. The Town shall be granted access to inspect BMP's through written agreements or easements.

After construction of the BMP, an annual report shall be submitted to the Department of Public Works indicating dates of inspections and maintenance actions taken.