Massachusetts Stormwater Management Regulations
Outreach for Commonly Occurring Problems
310 CMR 10.05(6)(k) through (q) of the Massachusetts Wetlands Protection Act Regulations and
314 CMR 9.06(5) & (6)(a) through (f) of the Massachusetts Clean Waters Act Regulations

Dear Recipients:

The Massachusetts Department of Environmental Protection's Western Region Wetlands Program Circuit Rider (hereinafter "the Department") has identified your company as having submitted one or more Notices of Intent per 310 CMR 10.05(4) of the Massachusetts Wetlands Protection Act Regulations which were subject to the Stormwater Management Regulations at 310 CMR 10.05(6)(k) through (q), effective January 2, 2008. The attached outreach document is offered to let your firm know of the expectations the Department has in terms of demonstrating compliance with 310 CMR 10.05(6)(k) through (q). Project applications utilizing this guidance and containing the requisite information as set forth below will facilitate efficient processing of requested permits.

Some or all of the paragraphs below may apply to future projects your firm will work on. It is intended that these comments be used in conjunction with the Department's *Massachusetts Stormwater Handbook* (MassDEP 2008) (the "*Handbook*").

General Stormwater Management Requirements

1. A Registered Professional Engineer (RPE) licensed to do business in the Commonwealth of Massachusetts pursuant to MGL Chapter 112, Section 81R should be retained by the applicant, and should prepare or review the preparation of all documents related to compliance with 310 CMR 10.05(6)(k) through (q), inclusive. Said RPE should affix her or his stamp, with signature, on all plans and documents submitted under this regulatory citation.

2. If some of the proposed structural "Stormwater Best Management Practices (BMPs)" (as defined at 310 CMR 10.04) are not specifically listed in the *Handbook* (it is a "proprietary BMP"), then the RPE should verify that the proposed proprietary BMP is appropriately documented in Volume 2, Chapter 4 of the *Handbook*. Additionally, the aforementioned RPE should submit a copy of the TARP Report and/or STEP Report, where available. The RPE should also provide sufficient data justifying the proposed use of the proprietary BMP at the Site, given site conditions.

3. The RPE should always specifically report that each proposed structural "Stormwater Best Management Practice" (BMP) meets each "Special Feature", "Design Consideration", "Site Criteria", "Construction Criteria", and "Maintenance Criteria" specified within the *Handbook* for each proposed structural BMP. Any deviation from

any criterion may disqualify a project from presumed Total Suspended Solids (TSS) removal rates specified in the *Handbook.*

4. Per 310 CMR 10.05(6)(n), applicants are required to consider "environmentally sensitive site design" (as defined at 310 CMR 10.04) as part of any proposed development. Based upon a review of many Notices of Intent filed since January 2, 2008, the Department notes that 310 CMR 10.05(6)(n) is often not fully considered. Many project applications are submitted either without consideration of environmentally sensitive site design elements, or the project final design is modified to include a few elements in the design where they fit in. Consideration of environmentally sensitive site design needs to be an essential part of the project design and planning process at the earliest stage. Additionally, the Department considers the potential applicability of "environmentally sensitive site design" to most projects to be both practicable and pursuable. Therefore, given the extent of available non-jurisdictional upland at most project sites, and per the requirements of "environmentally sensitive site design" (as defined at 310 CMR 10.04) at 310 CMR 10.05(6)(o); 310 CMR 10.05(6)(b); and 310 CMR 10.53(1), the RPE should always prepare a written alternatives analysis for an alternative in which no "point sources" of "stormwater discharge" (each as defined in the *Handbook*) are proposed within the Department's jurisdiction. This analysis should utilize the following methodologies and technologies to the extent practicable, as demonstrated in writing:

a. Removal of all proposed work and/or impervious surfaces from the Department's jurisdiction;
b. Division of the upper portion of the subject catchments into smaller subcatchments, where resultant stormwater discharges should be completely infiltrated and/or retained;
c. Maintaining existing drainage patterns and not mixing country drainage with untreated stormwater;
d. Treatment of remaining stormwater at or proximate to its source within these subcatchments;
e. Installation of "qualifying pervious areas" (See *Handbook*, Volume 3, Chapter 1, p. 42) to accept stormwater discharge from roads and driveways within each subcatchment;
f. Installation of dry wells for acceptance of roof drainage;
g. Disconnection of roof drainage;
h. Installation of discrete structural Best Management Practices at relatively high elevations in each subcatchment. For instance, canting access road surfaces into grassed channels, water quality swales, vegetated filter strips, bioretention areas, sand and organic filters, drainage swales, level spreaders, etc. which terminate outside of the Department's jurisdiction;
i. If a redesign based upon the above requirements still results in a "point source" of "stormwater discharge" into the Department's jurisdiction, then further assessment of the following should be included in the written analysis:
    - Reduction in impervious surfaces;

- Reduction in the number of proposed lots, proposed housing units, and/or allied appurtenances;
- Road width and length reductions;
- Clustering of impervious surfaces;
- Addition of planted materials and landscaped areas;
- Re-grading of landscaped areas away from jurisdictional Resource Areas and their Buffer Zones;
- Preservation of vegetated areas within the Buffer Zone, and immediately proximate to jurisdictional resource areas;

Successfully screened alternatives should be presented with adequate cross-sectional and/or site plans and supporting data. All practicable existing technologies and methodologies should be addressed in this manner, and those alternatives identified as impracticable should be supported by sufficient and specific evidence. This analysis can only end upon exhaustion of all practicable alternatives. Detailed data, such as building code citations, projected dollar costs, etc., should be provided. Easements, rights-of-way, and "zone setbacks" may constitute legitimate legal logistical constraints. However, these should be thoroughly documented by the applicant through citation and correspondence. Arguments based upon the concept of "prohibitive cost" must be justified by project-specific economic analysis and comparison to other local and regional projects of a similar nature, as well as industry or sector-based assessments.

STANDARD 1

5. The RPE should demonstrate, through calculations of "stormwater discharge velocity" and "erosion resistance" of the receiving substrate, that all **new** "point sources of discharge" (as defined in Volume 1, Chapter 2, p. 2 of the *Handbook*) will not cause or contribute to erosion and resultant sedimentation within "Resource Areas" (as defined at 310 CMR 10.04 Resource Area). **New** "point sources of discharge" include proposed enlargements, lengthening, and significant modifications to existing "point sources of discharge". Consideration in the use of level spreaders prior to the discharge of treated stormwater should be evaluated. Detailed construction specifications need to be submitted documenting how such structures will be constructed to function as intended.

PREPARATION FOR STANDARDS 2 and 3

6. The RPE should prepare a "Site Catchments Plan" for the footprint of all **proposed** impervious surfaces, with the assistance of a Competent Soils Professional ("CSP") (as defined in the *Handbook*) if the RPE is not also the CSP. *This site plan will be used for analysis of the proposed project under both Standards 2 and 3*. This site plan should be appropriately scaled, and should have the following features, at a minimum:

a. The boundaries of the lot or lots on which the project is proposed to take place (the "Site");

b. The boundaries (as defined at 310 CMR 10.04 Boundary) of all jurisdictional Resource Areas and their respective Buffer Zones (each as defined at 310 CMR 10.04);

c. The boundary of all **proposed** "catchments", as defined on page 4-11 of *Hydrology Handbook for Conservation Commissioners* (MassDEP March 2002) tributary to a proposed new point source subject to jurisdiction under 310 CMR 10.05(6)(k) through (q);

d. The boundaries (extent of footprint) of all **proposed** impervious surfaces [surfaces paved with concrete, asphalt, or solid pavers (composite stone, concrete, brick, stone, etc.), including roads, parking lots, and sidewalks; the roofs of buildings; porous pavement; and green roofs] (as defined on page 15 of Chapter 1, Volume 3 of the *Handbook*). Portions of the Site that are presently impervious should not be shown;

e. Upon completion of the above-described site plan, said plan should be taken into the field by the CSP as part of the required "Soil Evaluation" (as described in the *Handbook*, Volume 3, Chapter 1, pages 7 through 32). Using this plan, the CSP should conduct a "Hydrologic Soil Groups" analysis per the *National Engineering Handbook, Part 630 Hydrology, Chapter 7, Hydrologic Soil Groups* (USDA NRCS May 2007) at http://policy.nrcs.usda.gov/media/pdf/H_210_630_7.pdf http://soils.usda.gov/technical/handbook/contents/part618.html#67. Such an analysis should be accomplished by the CSP by first consulting relevant published data, including NRCS county soil surveys, USGS Surficial Geology Maps, USGS topographic quadrangles, etc. With the general information garnered from published data, the CSP should then establish and sample a sufficient number of standard "soil test holes" to a minimum depth sufficient to properly characterize the soil along each readily identifiable catena within each mapped catchment (This depth should generally be a minimum of 48"). CSP soil investigations shall be undertaken in conformance with the USDA Soil Conservation Service, (NRCS) Soil Survey Division Staff, 1993 Soil Survey Manual, Soil Conservation Service, U.S. Department of Agriculture Handbook 18. (*Soil Survey Handbook).* The number of "soil test holes" should be sufficient to adequately characterize the catena, and to support the HSG assignments made by the CSP, and *used to demonstrate compliance with Standards 2 and 3*. Each soil test hole should be located **ONLY** within areas that are **presently pervious** and in which **proposed** impervious surfaces are to be located.

f. Upon the opening of each soil test hole, the CSP should first analyze said hole for "free water", and for "saturated soils" [each as defined on page 35 of *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act* (MassDEP 1995)] and the following:

- *Field Indicators for Identifying Hydric Soils in New England*, NEIWPCC, Version 3, April 2004
- the *Soil Survey Handbook*

- *MassDEP Soil Evaluator Course Materials, Chapter 2 available at http://170.68.97.68/dep/water/compliance/sech2.pdf*

The CSP should report the depth from the surface to any "free water" or "saturated soils", and the depth to "seasonal high groundwater" from the surface. For purposes of compliance with the *Handbook*, "seasonal high groundwater" roughly equals the "Estimated Average Seasonal High Water Table" (EASHWT). EASHWT is the depth at which a CSP identifies "the presence of low chroma colors covering over 5% of the surface area exposed in a soil" test hole. In western Massachusetts, it is possible that this boundary may be difficult to ascertain in the presence of red parent materials, at elevations in the Berkshires above 1,100 feet AMSL (spodosols), when one or more "rust lines" is encountered, in drained soils, and in fill profiles (see Fletcher, P.C. and Veneman, P.L.M., *Soil Morphology as an Indicator of Seasonal High Water Tables*, http://nesoil.com/properties/eshwt.htm).

h. The CSP should then analyze the soils from the soil test hole to determine the depth to any water impermeable soil horizons (eg, fragipans and duripans), in addition to soil structure and consistency. The CSP should report the depth from the surface to "water impermeable soil horizons";

i. The CSP should then examine each soil "horizon" within each soil test hole, and using "Field Methods for Determining Soil Textural Classes", classify each horizon into a "Soil Textural Class". The CSP should report the "Soil Textural Class" of each horizon;

j. Based upon the field data collected per the above, the CSP should make HSG assignments by reference to Tables 7-1 and 7-2 of *National Engineering Handbook, Part 630 Hydrology, Chapter 7, Hydrologic Soil Groups* (USDA NRCS May 2007). Specifically, the CSP should review the HSG descriptions on pages 7-2 and 7-3 of Chapter 7, in concert with other relevant published materials described above; and then propose an initial HSG using Table 7-1 or 7-2. The CSP should then compare the measured "depth to water impermeable layer" and "depth to high water table" collected for the "soil test hole" per the above to the criteria in Table 7-1 or 7-2. The CSP should then confirm or adjust the assignment of an HSG to the "soil test hole";

k. The Site Catchments Plan shall be used to depict various field confirmed HSG areas. This plan should then be used to calculate the areal extent of all such **proposed** impervious surfaces in each **proposed** catchment tributary to a proposed new point source subject to jurisdiction under 310 CMR 10.05(6)(k) through (q), and the areal extent of each occupied by different HSG classifications.

STANDARD 2

7. Per Step 3, page 4-11 of *Hydrology Handbook for Conservation Commissioners, A Guide to Understanding Hydrologic and Hydraulic Data and Calculations Under the Massachusetts Wetlands Protection Act* (MassDEP March 2002), the RPE should prepare scaled site plan(s) showing those portions of each catchment that occur beyond the Site (land beyond parcel boundaries) (hereinafter the "Off-site Catchments Plan") . This should be completed for all existing and proposed "catchments" [as defined in Appendix A of *Hydrology Handbook for Conservation Commissioners, A Guide to Understanding Hydrologic and Hydraulic Data and Calculations Under the Massachusetts Wetlands Protection Act* (MassDEP March 2002)] as determined through topographic mapping;

8. The "Off-site Catchments Plan", and those portions of the Site **not** mapped on the "Site Catchments Plan" (portions of the Site substantially beyond proposed impervious surfaces) should have the appropriate scaled Sheet from the county soil survey (Natural Resources Conservation Service) accurately georeferenced and superimposed over the boundaries of each catchment. Each "soil map unit" so displayed should clearly reference the HSG assigned to that "soil map unit", per the county soil survey;

9. Both the "Site Catchments Plan" and the "Off-site Catchments Plan" should have a land cover map layer accurately georeferenced and superimposed over the boundaries of each catchment. Land cover should be generated by use of the "MassGIS Land Use Datalayer", or equivalent. If the applicant chooses to prepare a project-specific land cover map, said map should be developed by reference to *A Land Use and Land Cover Classification System for Use with Remote Sensor Data* (USGS Professional Paper 964 (USGS 1976) or equivalent;

10. The RPE should then ***cartographically join*** the "Site Catchments Plan" and the "Off-site Catchments Plan", with the county soil survey and land cover superimpositions, into a "Composite Map", which should clearly display each land cover unit intersected by each soil map unit intersected by said catchment boundaries;

11. The RPE should then designate the lowest surface elevation of each catchment upon the Site as an "analysis point" [as defined in Step 2, page 4-10 of *Hydrology Handbook for Conservation Commissioners, A Guide to Understanding Hydrologic and Hydraulic Data and Calculations Under the Massachusetts Wetlands Protection Act* (MassDEP March 2002)], and as required in the *Handbook,* Volume 1, Chapter 1, p. 5;

12. All analysis of pre- and post-development discharge rates should then be based upon the "Composite Map". Specifically, the areal extent of each mapped distinct HSG/land cover polygon bounded within an individual catchment should be used to generate an NRCS Runoff Curve Number (CN) for that polygon;

13. The RPE should submit a fully completed "Worksheet 2: Runoff Curve Number and Runoff" (210-VI-TR-55, Second Edition, June 1986), or more modern equivalent, for each "analysis point" (see Attachment A).

STANDARD 3

14. Using the data derived from the "Site Catchments Plan", the RPE shall calculate a total Required Recharge Volume (Rv) for each proposed catchment subject to jurisdiction by multiplying the area of proposed impervious surfaces by the designated *Factor* (*F*) set forth in the *Handbook,* Volume 3, Chapter 1, p. 16**.**

15. The RPE should typically determine "Saturated Hydraulic Conductivity" at the location of any jurisdictional "Infiltration Best Management Practices" for design purposes via the "Static Method", unless a specific written request with adequate justification is provided to the issuing authority;

16. The CSP should conduct a Field Analysis for appropriate exfiltration capacity for all proposed "Infiltration Best Management Practices" (Dry Wells, Infiltration Basins, Infiltration Trenches, Leaching Catch Basins, Subsurface Structures, and Exfiltrating Bioretention Areas--each as described in Volume 2, Chapter 2 of the *Handbook*) within catchments subject to jurisdiction. Each proposed footprint of each proposed Infiltration Best Management Practice ("BMP") for the "proposed site" should be analyzed in the following manner:

Chronological Order for Field Analysis

a. The proposed "bottom" or operating elevation (the "design elevation") of the proposed Infiltration BMP should be located by topographic survey in the field;
b. If said elevation is presently covered by overburden, the overburden should be satisfactorily removed to the level of the design elevation at the specific location of a "soil test hole", as required below (with all requisite permits/determinations in hand);
c. When the appropriate design elevation has been located and prepared, the CSP should install one (1) standard "soil test hole" [per bullets 5, 8, 11, 12, and 13 of "Procedure for Evaluating Soils", Chapter 4, Page 32 of *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act* (MassDEP 1995)], to a depth of 24 inches below the design elevation, for any Dry Well, Leaching Catch Basin, Subsurface Structure, or Exfiltrating Bioretention Area; or one (1) soil test hole for every 5,000 square feet of Infiltration Basin [with a minimum of at least three (3) soil test holes]; or at least two (2) soil test holes for an Infiltration Trench, with one (1) additional soil test hole for any Infiltration Trench over 100 feet in length, for each 50 foot increment thereafter;
d. Upon the opening of each soil test hole, the CSP should first analyze said hole for free groundwater, and for saturated soils on the exposed faces of the soil test hole, including capillary fringe saturation [see 3.37.2) on page 17, Part III of *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* USFWS, et al 1989] and the methods listed above under paragraph 6.f.

e. If any free groundwater or saturated soils are documented within 24 inches of the design elevation, in any soil test hole, the proposed site is **not** suitable for an Infiltration BMP;

f. If no free groundwater and no saturated soils are document within 24 inches from the design elevation within any soil test hole, the CSP should then analyze the soils from the soil test hole to determine the depth to "seasonal high groundwater" (which should be determined per paragraph 6.f.);

g. If the CSP documents a "seasonal high groundwater" elevation within 24 inches from the design elevation, in any soil test hole, the proposed site is **not** suitable for an Infiltration BMP;

h. If no "seasonal high groundwater" elevation is documented within 24 inches from the design elevation within any soil test hole, the CSP should then examine each soil "horizon" within each soil test hole within 24 inches of the design elevation, and using "Field Methods for Determining Soil Textural Classes", classify each horizon into a "Soil Textural Class";

i. Upon completion of this exercise for each soil test hole, the resulting "Soil Textural Class" classifications for each horizon should be compared to the 1982 Rawls Rates, Table 2.3.3., Volume 3, Chapter 1, Page 22 of *Handbook*;

j. The horizon with a "Soil Textural Class" that has the lowest "Infiltration Rate" from Table 2.3.3 should be used for the "Exfiltration Analysis", unless the "Infiltration Rate" determined from Table 2.3.3. is less than 0.17 inches per hour, in which case the proposed site is **not** suitable for an Infiltration BMP;

k. If the proposed "bottom" or operating elevation (the "design elevation") of the proposed Infiltration BMP would occur above the present ground surface, please consult the Department for project specific advice;

l. The RPE shall select a design for each "Infiltration Best Management Practice" that conforms to the Recharge Volume (Rv) required to be infiltrated in each catchment subject to jurisdiction, and size the structures such that the bottom surface area, porosity of the underlying soil, and drawdown time of less than 72 hours conforms to the requirement in the *Handbook*, Volume 3, Chapter 1, Step 5, pp. 25-29.

17. The RPE should **not** include *existing* impervious surfaces in any calculation of "Required Recharge Volume". Additionally, use of "Capture Area Adjustment" calculations, as described on page 27 of Chapter 1, Volume 3 of the *Handbook*, can only apply to and be provided for each catchment at a Site subject to jurisdiction. Transference of Required Recharge Volumes between catchments does not comply with Standard 3.

STANDARD 4

18. The RPE should provide a "TSS Removal Calculation Worksheet" (using the Excel Spreadsheet made available by the Department) for **each** "stormwater management

train" with a "point source of discharge" to a Buffer Zone and/or jurisdictional resource area (each as defined at 310 CMR 10.04). The RPE shall adequately demonstrate that all pre-treatment requirements for TSS removal have been met prior to any proposed discharge to any "Infiltration Best Management Practices";

19. The RPE should provide a "Long-Term Pollution Prevention Plan" for the entirety of the project area, both within and external of the Department's limits of geographic jurisdiction;

20. The RPE should calculate the Required Water Quality Volume (V_{WQ}) for each "stormwater management train" with a "point source of discharge" to a Buffer Zone and/or jurisdictional resource area (each as defined at 310 CMR 10.04). Any such calculation should use a value for A_{IMP} equal to the **net** sum of existing impervious surfaces *within a given catchment* on the Site and proposed impervious surfaces *within a given catchment* on the Site.

STANDARD 5

21. If a facility has a high probability of being classified as a "Land Use with Higher Potential Pollutant Load" (LUHPPL), the RPE should formally determine whether the facility, or any portion thereof, meets the definition of a LUHPPL at 314 CMR 9.02; and design the project so that it meets Standard 5.

STANDARD 6

22. 310 CMR 10.04 defines "Cold-water Fishery" as "…waters in which the mean of the maximum daily temperature over a seven day period generally does not exceed 68ºF (20ºC) and, when other ecological factors are favorable (such as habitat) are capable of supporting a year round population of cold-water stenothermal aquatic life such as trout. Waters *designated as cold-water fisheries by the Department in 314 CMR 4.00* and waters *designated as cold-water fishery resources by the Division of Fisheries and Wildlife* **are cold-water fisheries**. Waters where there is evidence based on a fish survey that a cold-water fish population and habitat exist are also cold-water fisheries…" (Emphasis added). Therefore, RPEs should always refer to both 314 CMR 4.00 and the Massachusetts Division of Fisheries and Wildlife web page at: http://www.mass.gov/dfwele/dfw/fisheries/conservation/cfr/cfr_home.htm when proposed work is proximate to streams, and Standard 6 may be applicable.

23. Karner Brook Watershed Area of Critical Environmental Concern (ACEC), located in the towns of Egremont and Mount Washington, is the only ACEC designated as an Outstanding Resource Water per 314 CMR 4.00 in the Department's Western Region. Standard 6 applies to jurisdictional projects within the Karner Brook Watershed ACEC.

STANDARD 7

23. The RPE should develop a site plan which clearly shows the footprint of all **existing** impervious surfaces within each catchment upon the Site;

24. Standard 7 only applies to the footprint of the **existing** impervious surfaces as identified above. Areas of existing **pervious** surfaces are **not** subject to Standard 7;

25. For the existing impervious surfaces subject to Standard 7, Standard 2 and Standard 3 do not apply;

26. Standard 1 only applies for **new** and proposed reconstructed "point sources of discharges" and only if the proposed "point source of discharge" is located on **existing** impervious surfaces;

27. Standards 4 through 6 apply to the "maximum extent practicable" per 310 CMR 10.05(6)(k)7. and 310 CMR 10.05(6)(o); save that 310 CMR 10.05(6)(k)4.a. fully applies to projects subject to 310 CMR 10.05(6)(k)7.;

28. Per 310 CMR 10.05(6)(o), the RPE should complete a written alternatives analysis assessing the following, at a minimum:

a. Reduction of the areal extent of presently impervious surfaces upon the Site;
b. Provision of plantings for any viable areas of impervious surface removal, including proposals to plant and maintain woody vegetation;
c. Elimination of proposed "point sources of discharge" within the Department's jurisdiction, through retention of stormwater at its source;
d. Collection and discharge of all stormwater runoff from roofs of proposed and existing buildings (within the footprint of presently impervious surfaces) to the ground, and in the immediate vicinity of the roof drip line;
e. Collection and discharge of all stormwater runoff from proposed and existing paved surfaces (within the footprint of presently impervious surfaces) to the ground, and in the immediate vicinity of the pavement edge;
f. Alternatives that are eliminated must be demonstrated to:
    1. present a "prohibitive cost"; and/or
    2. present a "legal logistical constraint" such that said alternative would not comply with a federal, state, and/or municipal statute, regulation, ordinance, or bylaw; and/or
    3. present a "physical logistical constraint" such as inappropriate soil conditions, contaminated soils; and/or
    4. not allow for the construction of the "general project purpose", which could include "economic viability" and "legitimate governmental purposes" arguments.
g. All means of improving the quality and quantity of stormwater entering Resource Areas or the Buffer Zone at "point sources of discharge" identified as "practicable" per such an alternatives analysis **should** be implemented by the applicant.

STANDARDS 6, 8, 9, and 10

29. Each Standard should be fully documented per the *Handbook*.

The above list does not constitute a complete description of requirements necessary to comply with 310 CMR 10.05(6)(k) through (q), and the regulations and *Handbook* must be consulted and followed for any project subject to the Stormwater Management Regulations. However, providing the above information when filing a Notice of Intent will lead to more efficient filings with better protection of the environment. The Department's Circuit Riders can provide more detail and can answer any further questions you may have.