

# Appendices

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*Appendix A*  
Plant List





## Appendix A: Plant List

### I. Salt-Tolerant Plants

These plant species are suitable for planting within 80 feet of a roadside that is subject to de-icing and anti-icing application of salts.

#### Trees

White Oak (*Quercus alba*)  
Red Oak (*Quercus rubra*)  
White Poplar (*Populus alba*)  
Blue Spruce (*Picea pungens*)  
Green Ash (*Fraxinus pennsylvanica*)  
Eastern Cottonwood (*Populus deltoides*)  
Eastern White Pine (*Pinus strobus*)  
Hawthorn (*Crataegus spp.*)  
Pitch Pine (*Pinus rigida*)  
Honeylocust (*Gleditsia triacanthos*)

#### Shrubs

Forsythia (*Forsythia x intermedia*)  
Buttonbush (*Cephalanthus occidentalis*)  
Bayberry (*Myrica pennsylvanica*)  
Black Chokeberry (*Aronia melanocarpa*)  
Red Chokeberry (*Aronia arbutifolia*)  
Marsh Elder or High Tide Bush (*Iva frutescens*)  
Groundsel (*Baccharis halimifolia*)

#### Grasses/Herbs

Birdsfoot trefoil (*Lotus corniculatus*)  
Perennial ryegrass (*Lolium perenne*)  
Switchgrass (*Panicum virgatum*)  
Tall Fescue (*Festuca arundinacea*)  
Alfalfa (*Medicago sativa*)  
Cattails (*Typha domingensis*)

### 2. Native Plants/Xeriscaping

These plant species are native or adapted to southern New England. Information on these species and others that may be suitable for xeriscaping may be found in the references at the end of this appendix, including the Connecticut Native Tree and Shrub Availability List (DEP).

#### Trees

Eastern Red Cedar (*Juniperus virginiana*)  
Flowering Dogwood (*Cornus florida*)  
Hackberry (*Celtis occidentalis*)  
Hawthorn (*Crataegus spp.*)  
Hickories (*Carya spp.*)  
Oaks (*Quercus spp.*)  
Walnuts (*Juglans spp.*)  
Atlantic White Cedar (*Chamaecyparis thyoides*)

Black Spruce (*Picea mariana*)  
White Pine (*Pinus strobus*)  
Black Cherry (*Prunus serotina*)  
Choke Cherry (*Prunus virginiana*)

#### Shrubs

##### For Dry, Sunny Areas

Bayberry (*Myrica pennsylvanica*)  
Lowbush Blueberry (*Vaccinium augustifolium*)  
Ground Juniper (*Juniperus communis*)  
New Jersey Tea (*Ceanothus americanus*)  
Sweet Fern (*Comptonia peregrina*)

##### For Shaded Areas

Hazelnut (*Corylus americana*, *C. cornuta*)  
Mountain Laurel (*Kalmia latifolia*)  
Swamp Azalea (*Rhododendron viscosum*)  
Viburnums (*V. acerfolium*, *V. cassinoides*, *V. alnifolium*)

##### For Moist Sites

Dogwoods (*Cornus spp.*)  
Elderberry (*Sambucus canadensis*)  
Highbush Blueberry (*Vaccinium corymbosum*)  
Pussy Willow (*Salix discolor*)  
Shadbush Serviceberry (*Amelanchier canadensis*)  
Spicebush (*Lindera benzoin*)  
Spirea (*Spirea latifolia*)  
Swamp azalea (*Rhododendron viscosum*)  
Sweet Pepperbush (*Clethra alnifolia*)  
Viburnums (*Viburnum spp.*)  
Winterberry (*Ilex verticillata*)  
Witch Hazel (*Hamamelis virginiana*)

#### Perennials

Wild red columbine (*Aquilegia canadensis*)  
Bearberry, kinnickinick (*Arctostaphylos uva-ursi*)  
Wild ginger (*Asarum canadense*)  
Butterfly weed (*Asclepias tuberosa*)  
White wood aster (*Aster divaricatus*)  
New England aster (*Aster novae-angliae*)  
Marsh marigold (*Caltha palustris*)  
Wild geranium (*Geranium maculatum*)  
Cardinal flower (*Lobelia cardinalis*)  
Solomon's plume (*Maianthemum racemosum*, syn. *Smilacina racemosa*)  
Partridgeberry (*Mitchella repens*)  
Wild blue phlox (*Phlox divaricata*)  
Bloodroot (*Sanguinaria canadensis*)  
Foamflower (*Tiarella cordifolia*)

#### Grasses

Big bluestem (*Andropogon gerardii*)  
Switchgrass (*Panicum virgatum*)  
Little bluestem (*Schizachyrium scoparium*, syn. *Andropogon scoparius*)



### 3. Stormwater Ponds and Wetlands Plant List

This section contains planting guidance for stormwater ponds and wetlands. The following lists emphasize the use of plants native to Connecticut and southern New England and are intended as general guidance for planning purposes. Local landscape architects and nurseries may provide additional information, including plant availability, for specific applications.

Plantings for stormwater ponds and wetlands should be selected to be compatible with the various hydrologic zones within these treatment practices (NYDEC,

2001). The hydrologic zones reflect the degree and duration of inundation by water. Plants recommended for a particular zone can generally tolerate the hydrologic conditions that typically exist within that zone. **Table A-1** summarizes recommended plantings (trees/shrubs and herbaceous plants) within each hydrologic zone. This list is not intended to be exhaustive, but includes a number of recommended native species that are generally available from commercial nurseries. Other plant species may be acceptable if they can be shown to be appropriate for the intended hydrologic zone.

**Table A-1 Plant List for Stormwater Ponds and Wetlands**

Hydrologic Zone	Zone Description	Plant Name and Form	
Zone 1 Deep Water Pool	<ul style="list-style-type: none"> <li>o 1 to 6 feet deep, permanent pool</li> <li>o Submergent plants (if any at all)</li> <li>o Not routinely planted due to limited availability of plants that can survive in this zone and potential clogging of outlet structure</li> <li>o Plants reduce resuspension of sediments and improve oxidation/aquatic habitat</li> </ul>	<p><b>Trees and Shrubs</b> Not recommended</p> <p><b>Herbaceous Plants</b> Coontail (<i>Ceratophyllum demersum</i>) Duckweed (<i>Lemna sp.</i>) Pond Weed, Sago (<i>Potamogeton Pectinatus</i>) Waterweed (<i>Elodea canadensis</i>) Wild Celery (<i>Valisneria Americana</i>)</p>	<p>Submergent Submergent/Emergent Submergent Submergent Submergent</p>
Zone 2 Shallow Water Bench	<ul style="list-style-type: none"> <li>o 1 foot below the normal pool (aquatic bench in stormwater ponds)</li> <li>o Plants partially submerged</li> <li>o Emergent wetland plants</li> <li>o Plants reduce resuspension of sediments, enhance pollutant removal, and provide aquatic and nonaquatic habitat</li> </ul>	<p><b>Trees and Shrubs</b> Buttonbush (<i>Cephalanthus occidentalis</i>)</p> <p><b>Herbaceous Plants</b> Arrow arum (<i>Peltandra virginica</i>) Arrowhead, Duck Potato (<i>Sagittaria latifolia</i>) Blue Flag Iris (<i>Iris versicolor</i>) Blue Joint (<i>Calamagrotis canadensis</i>) Broomsedge (<i>Andropogon virginicus</i>) Bushy Beardgrass (<i>Andropogon glomeratus</i>) Cattail (<i>Typha sp.</i>) Common Three-Square (<i>Scirpus pungens</i>) Duckweed (<i>Lemna sp.</i>) Giant Burreed (<i>Sparganium eurycarpum</i>) Long-leaved Pond Weed (<i>Potamogeton nodosus</i>) Marsh Hibiscus (<i>Hibiscus moscheutos</i>) Pickerelweed (<i>Pontederia cordata</i>) Rice Cutgrass (<i>Leersia oryzoides</i>) Sedges (<i>Carex spp.</i>) Soft-stem Bulrush (<i>Scirpus validus</i>) Smartweed (<i>Polygonum spp.</i>) Soft Rush (<i>Juncus effusus</i>) Spatterdock (<i>Nuphar luteum</i>) Switchgrass (<i>Panicum virgatum</i>) Sweet Flag (<i>Acorus calamus</i>) Wild Rice (<i>Zizania aquatica</i>) Wool Grass (<i>Scirpus cyperinus</i>)</p>	<p>Deciduous shrub</p> <p>Emergent Emergent Emergent Emergent Perimeter Emergent Emergent Submergent/Emergent Emergent Rooted Submerged Aquatic Emergent Emergent Emergent Emergent Emergent Emergent Emergent Perimeter Herbaceous Emergent Emergent</p>











**Table A-I Plant List for Stormwater Ponds and Wetlands** (continued)

Hydrologic Zone	Zone Description	Plant Name and Form	
		Pin Oak ( <i>Quercus palustris</i> ) Red Maple ( <i>Acer rubrum</i> ) Shadowbush, Serviceberry ( <i>Amelanchier canadensis</i> ) Sweetgum ( <i>Liquidambar styraciflua</i> ) Sycamore ( <i>Platanus occidentalis</i> ) Tulip Tree ( <i>Liriodendron tulipifera</i> ) White Ash ( <i>Fraxinus Americana</i> )	Deciduous tree Deciduous tree Deciduous shrub Deciduous tree Deciduous tree Deciduous tree Deciduous tree
		<b>Herbaceous Plants</b> Birdfoot deervetch ( <i>Lotus Corniculatus</i> ) Cardinal flower ( <i>Labelia cardinalis</i> ) Switchgrass ( <i>Panicum virgatum</i> )	Perimeter Perimeter Perimeter

Source: Adapted from NYDEC, 2001; New England Wetland Plants, Inc.

## References

Connecticut Botanical Society Website. URL: <http://www.ct-botanicalsociety.org/garden/index.html#grasses>

Connecticut Department of Environmental Protection (DEP). *Connecticut Native Tree and Shrub Availability List*. URL: <http://www.conncoll.edu/ccrec/greennet/arbo/treeavailability.pdf>.

Dreyer, G.D. 1990. *Connecticut's Notable Trees*. Memoirs of the Connecticut Botanical Society, No. 2, 1989. 2nd ed. Available from the DEP Store, 79 Elm Street, Hartford, CT (860-424-3540).

Henderson, C.L. 1987. *Landscaping for Wildlife*. Minnesota Department of Natural Resources. Available from Minnesota Department of Natural Resources, 500 Lafayette Rd., Box 7, St. Paul, MN 55155-4007.

Hightshoe, Gary L. 1988. *Native trees, shrubs, and vines for urban and rural America : a planting design manual for environmental designers*. Van Nostrand Reinhold, New York.

Mehrhoff, L.J., K.J. Metzler, and E.E. Corrigan. 2001. *Non-native and Potentially Invasive Vascular Plants in Connecticut*. Center for Conservation and Biodiversity, University of Connecticut, Storrs, CT.

New York State Department of Environmental Conservation (NYDEC). 2001. *New York State Stormwater Management Design Manual*. Prepared by Center for Watershed Protection. Albany, New York.

Picone, P. *Connecticut Native Tree and Shrub Availability List*. Connecticut Department of Environmental Protection (DEP). Bureau of Natural Resources. Wildlife Division.

Rhode Island Sustainable Plant List, Third Edition. 1999. URL: <http://www.uri.edu/research/sustland/spl1.html>.

Salsedo, C.A. and H.M. Crawford. 2001. Fact Sheet 7: *Going Native – Rethinking Plant Selection for the Home Landscape*. URL: <http://www.seagrant.uconn.edu>. Available from: Connecticut Sea Grant, 1084 Shennecossett Rd., Groton, CT 06340.

Taylor, S.L., Dreyer, G. and William Niering. 1987. *Native Shrubs for Landscaping*. The Connecticut College Arboretum. New London, CT. Bulletin #30. Available from the DEP Store, 79 Elm Street, Hartford, CT (860-424-3540).

U.S. Department of Agriculture. Natural Resources Conservation Service. Plants Database. URL: [http://plants.usda.gov/cgi\\_bin/](http://plants.usda.gov/cgi_bin/).



*Appendix B*  
Water Quality Flow (WQF)  
and Flow Diversion Guidance





## Water Quality Flow Calculation

The water quality flow (WQF) is the peak flow rate associated with the water quality design storm. This section describes the recommended procedure for calculating the water quality flow (WQF) for the design of:

- Grass drainage channels (not water quality swales, which should be designed based on water quality volume - WQV)
- Pre-manufactured stormwater treatment devices (e.g., hydrodynamic separators, catch basin inserts, and media filters)
- Flow diversion structures for off-line stormwater treatment practices

The WQF should be calculated using the WQV described in Chapter Seven. This WQV, converted to watershed inches, should be substituted for the runoff depth ( $Q$ ) in the Natural Resources Conservation Service (formerly Soil Conservation Service), TR-55 Graphical Peak Discharge Method. The procedure is based on the approach described in Claytor and Schueler, 1996.

1. Compute the NRCS Runoff Curve Number (CN) using the following equation, or graphically using **Figure 2-1** from TR-55 (USDA, 1986) (reproduced below):

$$CN = \frac{1000}{[10 + 5P + 10Q - 10(Q^2 + 1.25QP)^{1/2}]}$$

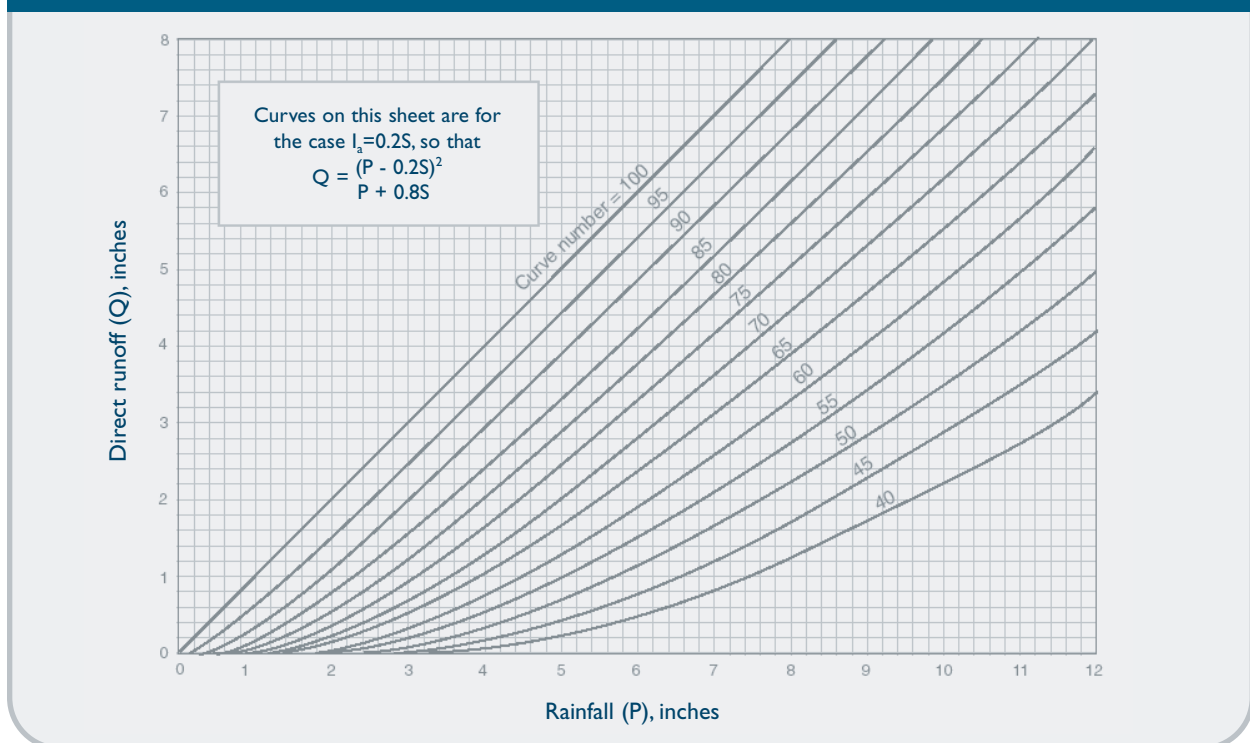
where:  $CN$  = Runoff Curve Number

$P$  = design precipitation, inches  
(1" for water quality storm)

$Q$  = runoff depth (in watershed inches)

$$= \frac{[WQV(acre - feet) \times [12(inches/foot)]]}{Drainage Area (acres)}$$

### Figure 2-1 Solution of Runoff Equation





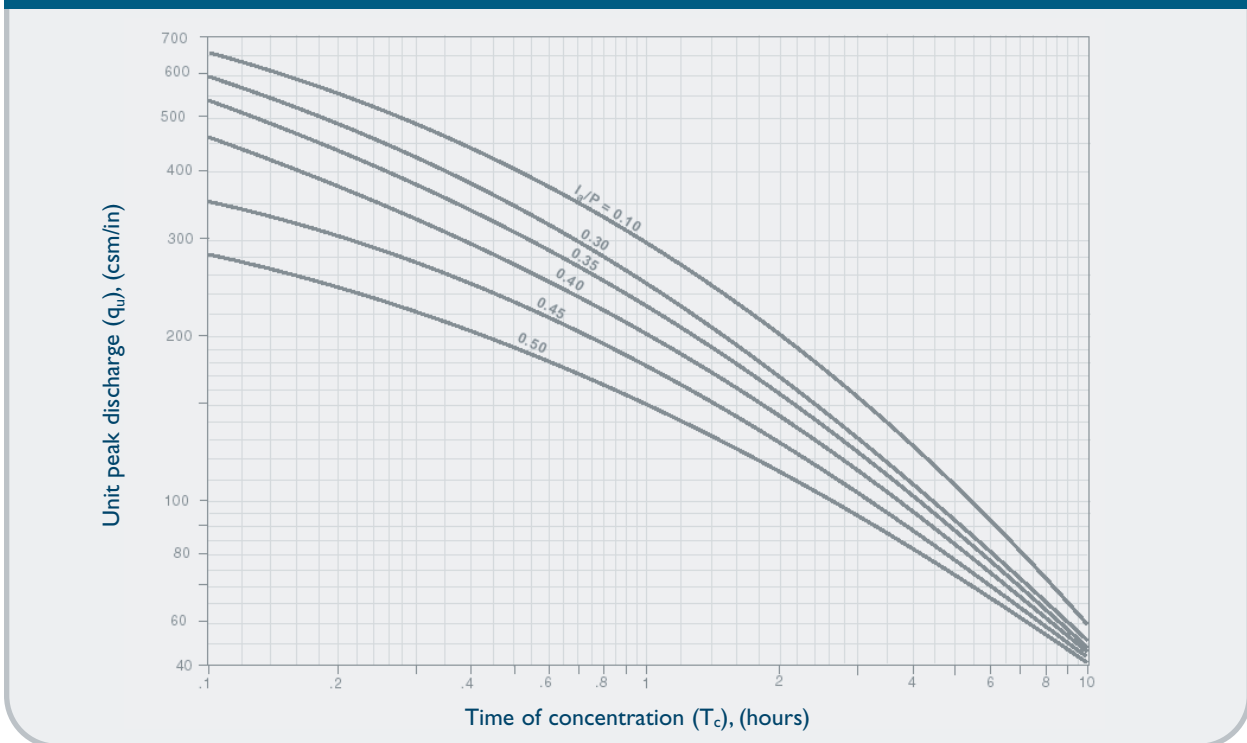
2. Compute the time of concentration ( $t_c$ ) based on the methods described in Chapter 3 of TR-55. A minimum value of 0.167 hours (10 minutes) should be used. For sheet flow, the flow path should not be longer than 300 feet.
3. Using the computed CN,  $t_c$ , and drainage area (A) in acres, compute the peak discharge for the water quality storm (i.e., the water quality flow [WQF]), based on the procedures described in Chapter 4 of TR-55.
  - Read initial abstraction ( $I_a$ ) from Table 4-1 in Chapter 4 of TR-55 (reproduced below); compute  $I_a/P$

**Table 4-1  $I_a$  values for runoff curve numbers**

Curve number	$I_a$ (in)	Curve number	$I_a$ (in)	Curve number	$I_a$ (in)	Curve number	$I_a$ (in)
40	3.000	55	1.636	70	0.857	85	0.353
41	2.878	56	1.571	71	0.817	86	0.326
42	2.762	57	1.509	72	0.778	87	0.299
43	2.651	58	1.448	73	0.740	88	0.273
44	2.545	59	1.390	74	0.703	89	0.247
45	2.444	60	1.333	75	0.667	90	0.222
46	2.348	61	1.279	76	0.632	91	0.198
47	2.255	62	1.226	77	0.597	92	0.174
48	2.167	63	1.175	78	0.564	93	0.151
49	2.082	64	1.125	79	0.532	94	0.128
50	2.000	65	1.077	80	0.500	95	0.105
51	1.922	66	1.030	81	0.469	96	0.083
52	1.846	67	0.985	82	0.439	97	0.062
53	1.774	68	0.941	83	0.410	98	0.041
54	1.704	69	0.899	84	0.381		

- Read the unit peak discharge ( $q_u$ ) from Exhibit 4-III in Chapter 4 of TR-55 (reproduced below) for appropriate  $t_c$

**Exhibit 4-III Unit peak discharge ( $q_u$ ) for NRCS (SCS) type III rainfall distribution**





- *Substituting the water quality volume (WQV), converted to watershed inches, for runoff depth (Q), compute the water quality flow (WQF) from the following equation:*

$$WQF = (q_u)(A)(Q)$$

where: WQV = water quality flow (cfs)

$q_u$  = unit peak discharge (cfs/mi<sup>2</sup>/inch)

$A$  = drainage area (mi<sup>2</sup>)

$Q$  = runoff depth (in watershed inches)

$$= \frac{[WQV(\text{acre-foot}) \times [12(\text{inches/foot})]]}{\text{Drainage Area (acres)}}$$

Other peak flow calculation methods may be used for determining the WQF, such as those recommended by manufacturers of proprietary treatment systems, provided that the WQF calculated by other methods is equal to or greater than the WQF calculated using the above NRCS Graphical Peak Discharge Method.

## Flow Diversion Structures

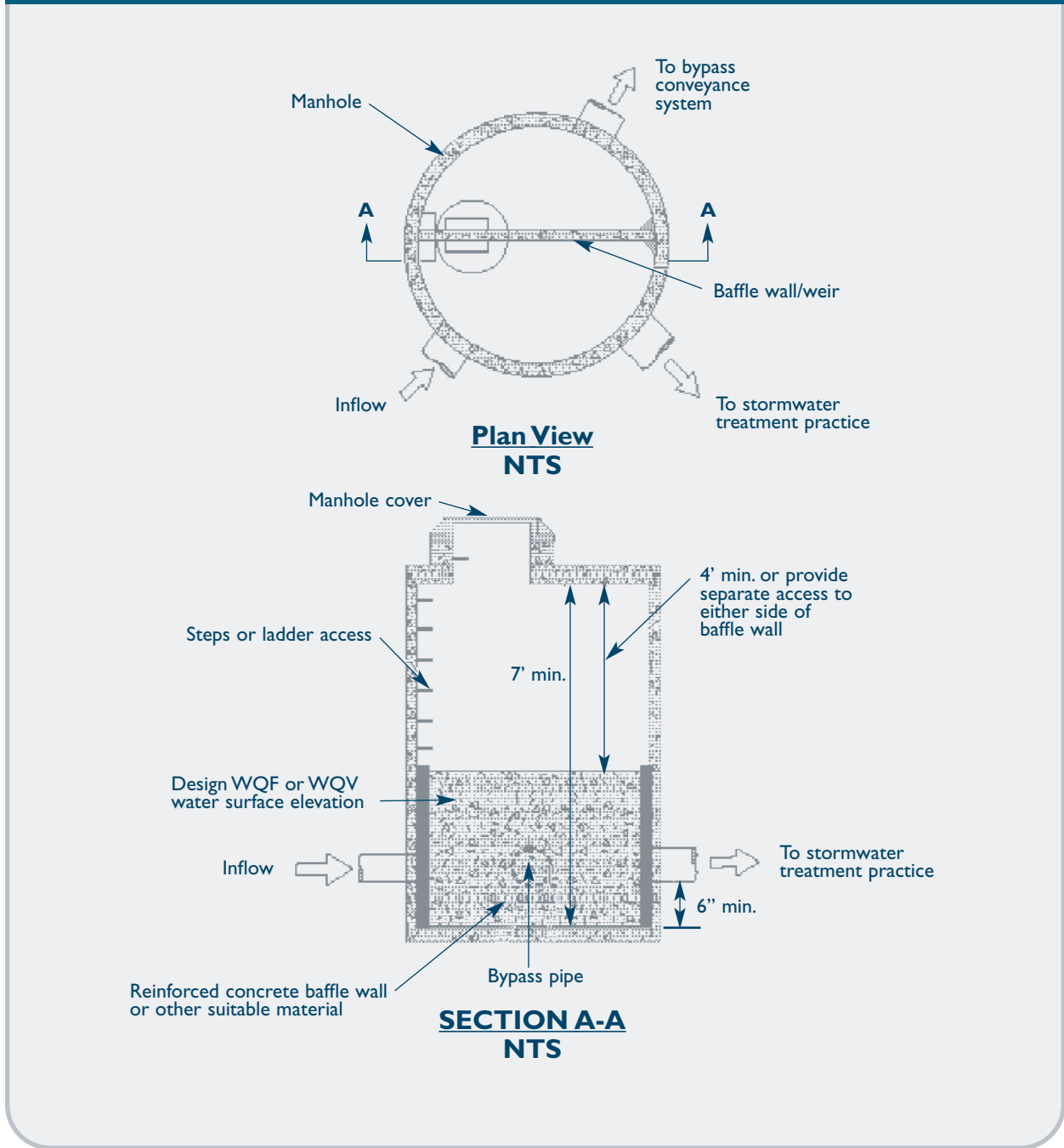
Flow diversion structures, also called flow splitters, are designed to deliver flows up to the design water quality flow (WQF) or water quality volume (WQV) to off-line stormwater treatment practices. Flows in excess of the WQF or WQV are diverted around the treatment facility with minimal increase in head at the flow diversion structure to avoid surcharging the treatment facility under higher flow conditions. Flow diversion structures are typically manholes or vaults equipped with weirs, orifices, or pipes to bypass excess runoff. A number of design options exist. **Figures B-1** through **B-3** show common examples of flow diversion structures for use upstream of stormwater treatment practices. Other equivalent designs that achieve the result of diverting flows in excess of the WQF or WQV around the treatment facility, including bypasses or overflows located inside the facility, are also acceptable.

The following general procedures are recommended for design of flow diversion structures:

- *Locate the top of the weir or overflow structure at the maximum water surface elevation associated with the WQF, or the water surface elevation in the treatment practice when the entire WQV is being held, whichever is higher.*
- *Determine the diversion structure dimensions required to divert flows in excess of the WQF using standard equations for a rectangular sharp-crested weir, uniform flow in pipes or channels, or orifice depending on the type of diversion structure.*
- *Provide sufficient freeboard in the stormwater treatment practice and flow splitter to accommodate flow over the diversion structure.*
- *Limit the maximum head over the flow diversion structure to avoid surcharging the stormwater treatment practice under high flow conditions. Flow to the stormwater treatment practice at the 100-year water surface elevation should not increase the WQF by more than 10 percent.*
- *Design diversion structures to withstand the effects of freezing, frost in foundations, erosion, and flotation due to high water conditions. These structures should be designed to minimize clogging potential and to allow for ease of inspection and maintenance.*



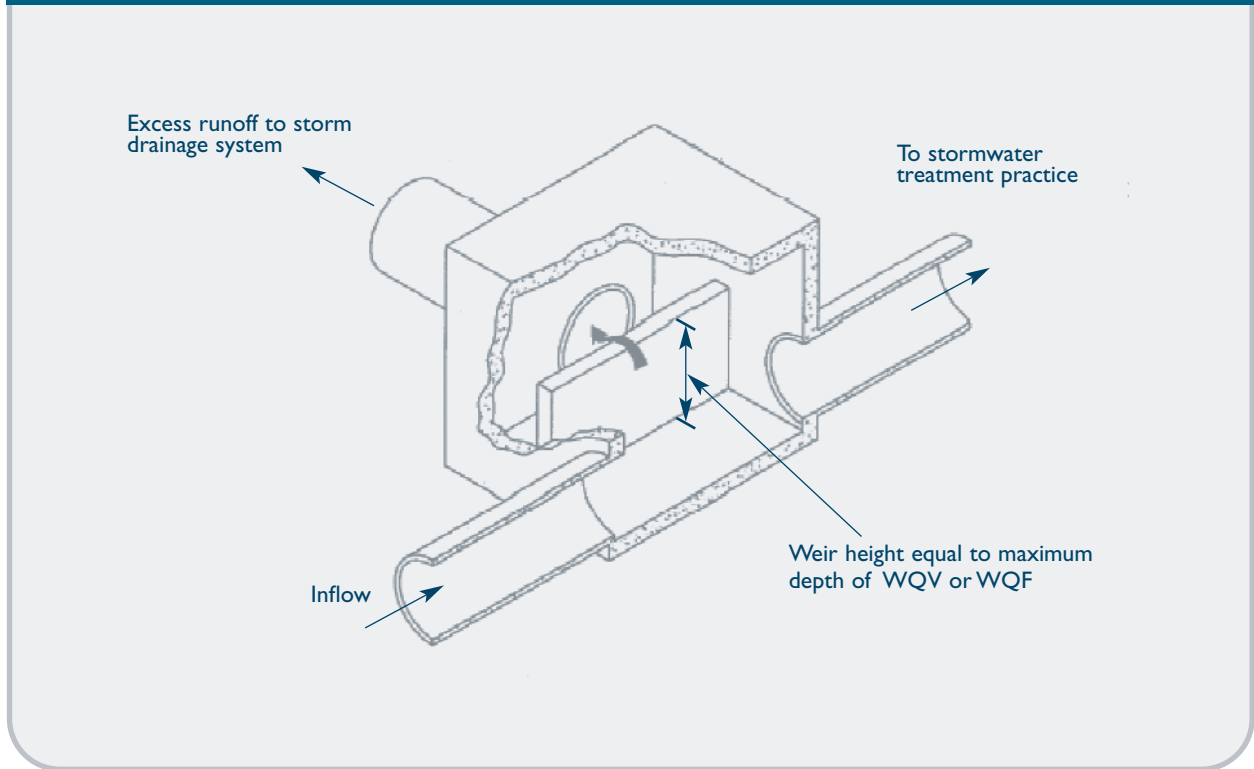
**Figure B-1 Flow Diversion Structure Design Option I**



Source: Adapted from Washington, 2000.



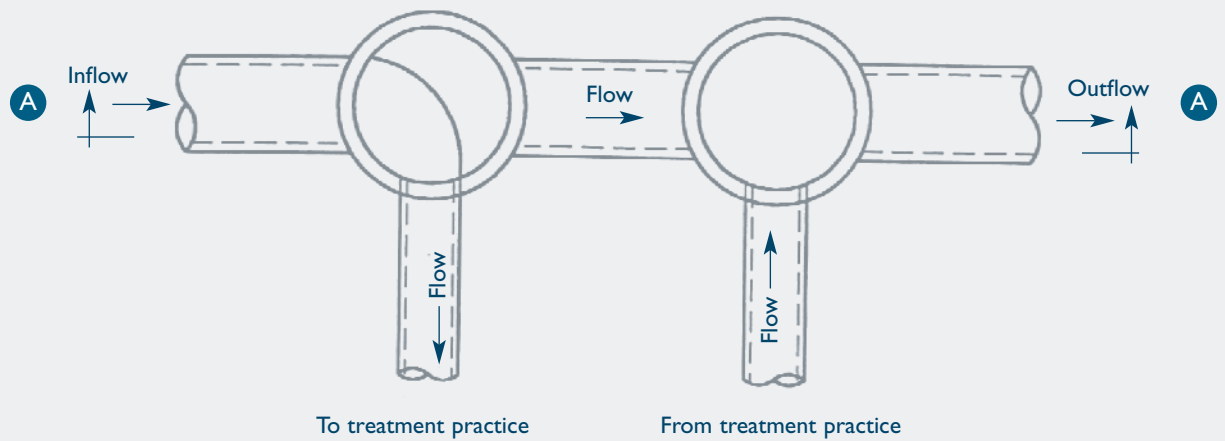
**Figure B-2 Flow Diversion Structure Design Option 2**



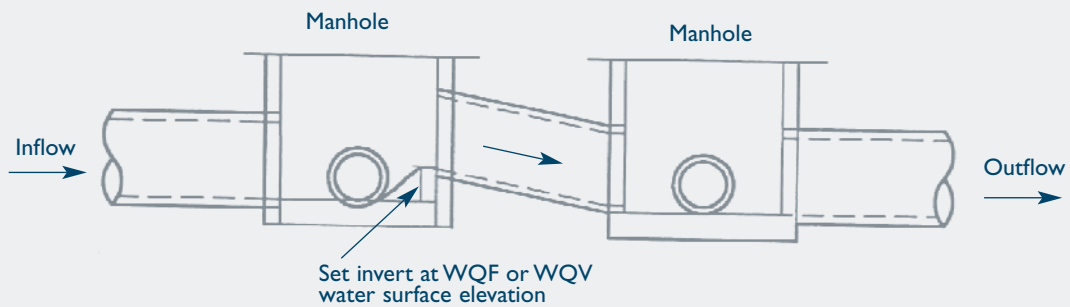
Source: Adapted from City of Sacramento, 2000.



**Figure B-3 Flow Diversion Structure Design Option 3**



**Plan**



**Section A-A**

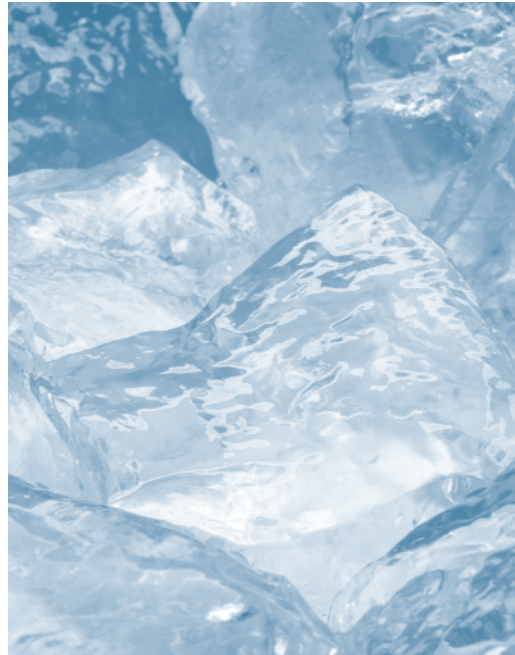
**References**

U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), *Urban Hydrology for Small Watersheds, Technical Release No. 55*, Washington, D.C., June 1986.

Claytor, R.A. and T.R. Schueler, *Design of Stormwater Filtering Systems*, The Center for Watershed Protection, Silver Spring, Maryland, December 1996.



*Appendix C*  
Model Ordinances





This Appendix contains model ordinances for:

- *Illicit Discharge Detection and Elimination (USEPA, 2002)*
- *Stormwater Operation and Maintenance (CWP, 2002)*

A model ordinance that was developed for protection of Long Island Sound is included, as well as examples of specific ordinances or sections of ordinances that have been adopted by various Connecticut municipalities. These model ordinances and examples are not exhaustive and are not necessarily appropriate for adoption in their entirety without modification.

## References

Center for Watershed Protection (CWP). 2002a. *Operation and Maintenance*. URL <http://www.stormwatercenter.net/>.

Cromwell, Town of. Zoning Regulations. [http://www.cromwellct.com/regs/zregs\\_03.pdf](http://www.cromwellct.com/regs/zregs_03.pdf)

Cromwell, Town of. Subdivision Regulations. [http://www.cromwellct.com/regs/Subdivision\\_11\\_01.pdf](http://www.cromwellct.com/regs/Subdivision_11_01.pdf)

DEP. 1996. Coastal Water Quality Protection: A Guide for Local Officials.

East Lyme Plan of Conservation and Development 1999 <http://www.eltownhall.com/newindex1.htm> (see link to “Plan of Development”)

Enfield, Town of. Zoning Regulations. <http://www.enfield.org/PlanZone/Enfield%20Zoning%20Regs%20On-Line2.pdf>

Farmington, Town of. Zoning Regulations <http://www.farmington-ct.org/government/zoningregulations.pdf>

Glastonbury, Town of. Planning and Zoning Regulations <http://www.glasct.org/communitydevelopment/commtemplateDIV.htm>

South Windsor, Town of. Zoning Regulations. <http://www.southwindsor.org/TownHall/ZBA/zoning%20regs.pdf>

USEPA. 2002. Model Ordinances to Protect Local Resources: Illicit Discharges. <http://www.epa.gov/owow/nps/ordinance/discharges.htm>

Windsor, Town of. Zoning Regulations. <http://townofwindsorct.com/Planning/zoning.pdf>

Woodbury, Town of. Subdivision Regulations. <http://www.woodburyct.org/SubdivisionRegulations041002.pdf>



## Model Illicit Discharge and Connection Stormwater Ordinance I

ORDINANCE NO. \_\_\_\_\_

### Section 1. Purpose/Intent.

The purpose of this ordinance is to provide for the health, safety, and general welfare of the citizens of (\_\_\_\_\_) through the regulation of non-storm water discharges to the storm drainage system to the maximum extent practicable as required by federal and state law. This ordinance establishes methods for controlling the introduction of pollutants into the municipal separate storm sewer system (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process. The objectives of this ordinance are:

- (1) To regulate the contribution of pollutants to the municipal separate storm sewer system (MS4) by stormwater discharges by any user
- (2) To prohibit Illicit Connections and Discharges to the municipal separate storm sewer system
- (3) To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this ordinance

### Section 2. Definitions.

For the purposes of this ordinance, the following shall mean:

**Authorized Enforcement Agency:** employees or designees of the director of the municipal agency designated to enforce this ordinance.

**Best Management Practices (BMPs):** schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

**Clean Water Act.** The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

**Construction Activity.** Activities subject to NPDES Construction Permits. Currently these include construction projects resulting in land disturbance of 1 acre or more. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

**Hazardous Materials.** Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

**Illegal Discharge.** Any direct or indirect non-storm water discharge to the storm drain system, except as exempted in Section X of this ordinance.

**Illicit Connections.** An illicit connection is defined as either of the following:

Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the storm drain system including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an authorized enforcement agency or, Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

**Industrial Activity.** Activities subject to NPDES Industrial Permits as defined in 40 CFR, Section 122.26 (b)(14).

**National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit.** means a permit issued by EPA (or by a State under authority delegated pursuant to 33 USC § 1342(b)) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general areawide basis.

**Non-Storm Water Discharge.** Any discharge to the storm drain system that is not composed entirely of storm water.

**Person.** means any individual, association, organization, partnership, firm, corporation or other entity recognized by law and acting as either the owner or as the owner's agent.

**Pollutant.** Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordinances, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides,



and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.

**Premises.** Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

**Storm Drainage System.** Publicly-owned facilities by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.

**Storm Water.** Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation, and resulting from such precipitation.

**Stormwater Pollution Prevention Plan.** A document which describes the Best Management Practices and activities to be implemented by a person or business to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to Stormwater, Stormwater Conveyance Systems, and/or Receiving Waters to the Maximum Extent Practicable.

**Wastewater** means any water or other liquid, other than uncontaminated storm water, discharged from a facility.

### Section 3. Applicability.

This ordinance shall apply to all water entering the storm drain system generated on any developed and undeveloped lands unless explicitly exempted by an authorized enforcement agency.

### Section 4. Responsibility for Administration.

The \_\_\_\_\_ [authorized enforcement agency] shall administer, implement, and enforce the provisions of this ordinance. Any powers granted or duties imposed upon the authorized enforcement agency may be delegated in writing by the Director of the authorized enforcement agency to persons or entities acting in the beneficial interest of or in the employ of the agency.

### Section 5. Severability.

The provisions of this ordinance are hereby declared to be severable. If any provision, clause, sentence, or paragraph of this Ordinance or the application thereof

to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this Ordinance.

### Section 6. Ultimate Responsibility.

The standards set forth herein and promulgated pursuant to this ordinance are minimum standards; therefore this ordinance does not intend nor imply that compliance by any person will ensure that there will be no contamination, pollution, nor unauthorized discharge of pollutants.

### Section 7. Discharge Prohibitions.

#### Prohibition of Illegal Discharges.

No person shall discharge or cause to be discharged into the municipal storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water. The commencement, conduct or continuance of any illegal discharge to the storm drain system is prohibited except as described as follows:

- (1) The following discharges are exempt from discharge prohibitions established by this ordinance: water line flushing or other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, non-commercial washing of vehicles, natural riparian habitat or wetland flows, swimming pools (if dechlorinated – typically less than one PPM chlorine), fire fighting activities, and any other water source not containing Pollutants.
- (2) Discharges specified in writing by the authorized enforcement agency as being necessary to protect public health and safety.
- (3) Dye testing is an allowable discharge, but requires a verbal notification to the authorized enforcement agency prior to the time of the test.
- (4) The prohibition shall not apply to any non-storm water discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval



has been granted for any discharge to the storm drain system.

**Prohibition of Illicit Connections.**

- (1) The construction, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited.
- (2) This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.
- (3) A person is considered to be in violation of this ordinance if the person connects a line conveying sewage to the MS4, or allows such a connection to continue.

**Section 8. Suspension of MS4 QAccess.**

**Suspension due to Illicit Discharges in Emergency Situations**

The \_\_\_\_\_ [authorized enforcement agency] may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, or to the health or welfare of persons, or to the MS4 or Waters of the United States. If the violator fails to comply with a suspension order issued in an emergency, the authorized enforcement agency may take such steps as deemed necessary to prevent or minimize damage to the MS4 or Waters of the United States, or to minimize danger to persons.

**Suspension due to the Detection of Illicit Discharge**

Any person discharging to the MS4 in violation of this ordinance may have their MS4 access terminated if such termination would abate or reduce an illicit discharge. The authorized enforcement agency will notify a violator of the proposed termination of its MS4 access. The violator may petition the authorized enforcement agency for a reconsideration and hearing.

A person commits an offense if the person reinstates MS4 access to premises terminated pursuant to this Section, without the prior approval of the authorized enforcement agency.

**Section 9. Industrial or Construction Activity Discharges.**

Any person subject to an industrial or construction activity NPDES storm water discharge permit shall comply with all provisions of such permit. Proof of

compliance with said permit may be required in a form acceptable to the \_\_\_\_\_ [authorized enforcement agency] prior to the allowing of discharges to the MS4.

**Section 10. Monitoring of Damages.**

- 1. Applicability.

This section applies to all facilities that have storm water discharges associated with industrial activity, including construction activity.

- 2. Access to Facilities.

(1) The \_\_\_\_\_ [authorized enforcement agency] shall be permitted to enter and inspect facilities subject to regulation under this ordinance as often as may be necessary to determine compliance with this ordinance. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to representatives of the authorized enforcement agency.

(2) Facility operators shall allow the \_\_\_\_\_ [authorized enforcement agency] ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records that must be kept under the conditions of an NPDES permit to discharge storm water, and the performance of any additional duties as defined by state and federal law.

(3) The \_\_\_\_\_ [authorized enforcement agency] shall have the right to set up on any permitted facility such devices as are necessary in the opinion of the authorized enforcement agency to conduct monitoring and/or sampling of the facility's storm water discharge.

(4) The \_\_\_\_\_ [authorized enforcement agency] has the right to require the discharger to install monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure stormwater flow and quality shall be calibrated to ensure their accuracy.

(5) Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the operator at the written or oral request of the \_\_\_\_\_ [authorized enforcement agency].





ment agency] and shall not be replaced. The costs of clearing such access shall be borne by the operator.

- (6) Unreasonable delays in allowing the \_\_\_\_\_ [authorized enforcement agency] access to a permitted facility is a violation of a storm water discharge permit and of this ordinance. A person who is the operator of a facility with a NPDES permit to discharge storm water associated with industrial activity commits an offense if the person denies the authorized enforcement agency reasonable access to the permitted facility for the purpose of conducting any activity authorized or required by this ordinance.
- (7) If the \_\_\_\_\_ [authorized enforcement agency] has been refused access to any part of the premises from which stormwater is discharged, and he/she is able to demonstrate probable cause to believe that there may be a violation of this ordinance, or that there is a need to inspect and/or sample as part of a routine inspection and sampling program designed to verify compliance with this ordinance or any order issued hereunder, or to protect the overall public health, safety, and welfare of the community, then the authorized enforcement agency may seek issuance of a search warrant from any court of competent jurisdiction.

### **Section 11. Requirement to Prevent, Control, and Reduce Storm Water Pollutants by the Use of Best Management.**

[Authorized enforcement agency] will adopt requirements identifying Best Management Practices for any activity, operation, or facility which may cause or contribute to pollution or contamination of storm water, the storm drain system, or waters of the U.S. The owner or operator of a commercial or industrial establishment shall provide, at their own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses through the use of these structural and non-structural BMPs. Further, any person responsible for a property or premise, which is, or may be, the source of an illicit discharge, may be required to implement, at said person's expense, additional structural and non-structural BMPs to prevent the further discharge of pollutants to the municipal separate storm sewer system. Compliance with all terms and conditions of a valid NPDES permit authorizing the discharge of storm water associated with industrial activity, to the extent

practicable, shall be deemed compliance with the provisions of this section. These BMPs shall be part of a stormwater pollution prevention plan (SWPP) as necessary for compliance with requirements of the NPDES permit.

### **Section 12. Watercourse Protection.**

Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris, excessive vegetation, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

### **Section 13. Notification of Spills.**

Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into storm water, the storm drain system, or water of the U.S. said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the authorized enforcement agency in person or by phone or facsimile no later than the next business day. Notifications in person or by phone shall be confirmed by written notice addressed and mailed to the \_\_\_\_\_ [authorized enforcement agency] within three business days of the phone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

### **Section 14. Enforcement.**

1. Notice of Violation.

Whenever the \_\_\_\_\_ [authorized enforcement agency] finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, the authorized enforcement agency may order compliance by



written notice of violation to the responsible person. Such notice may require without limitation:

- (a) The performance of monitoring, analyses, and reporting;
- (b) The elimination of illicit connections or discharges;
- (c) That violating discharges, practices, or operations shall cease and desist;
- (d) The abatement or remediation of storm water pollution or contamination hazards and the restoration of any affected property; and
- (e) Payment of a fine to cover administrative and remediation costs; and
- (f) The implementation of source control or treatment BMPs.

If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator.

### **Section 15. Appeal of Notice of Violation.**

Any person receiving a Notice of Violation may appeal the determination of the authorized enforcement agency. The notice of appeal must be received within \_\_\_ days from the date of the Notice of Violation. Hearing on the appeal before the appropriate authority or his/her designee shall take place within 15 days from the date of receipt of the notice of appeal. The decision of the municipal authority or their designee shall be final.

### **Section 16. Enforcement Measures After Appeal.**

If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, or , in the event of an appeal, within \_\_\_ days of the decision of the municipal authority upholding the decision of the authorized enforcement agency, then representatives of the authorized enforcement agency shall enter upon the subject private property and are authorized to take any and all measures necessary to abate the violation and/or restore the property. It shall be unlawful for any person, owner, agent or person in possession of any premises to refuse to allow the government agency or designated contractor to enter upon the premises for the purposes set forth above.

### **Section 17. Cost of Abatement of the Violation.**

Within \_\_\_ days after abatement of the violation, the owner of the property will be notified of the cost of abatement, including administrative costs. The property owner may file a written protest objecting to the amount of the assessment within \_\_\_ days. If the amount due is not paid within a timely manner as determined by the decision of the municipal authority or by the expiration of the time in which to file an appeal, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment. Any person violating any of the provisions of this article shall become liable to the city by reason of such violation. The liability shall be paid in not more than 12 equal payments. Interest at the rate of \_\_\_ percent per annum shall be assessed on the balance beginning on the \_\_\_ st day following discovery of the violation.

### **Section 18. Injunctive Relief.**

It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this Ordinance. If a person has violated or continues to violate the provisions of this ordinance, the authorized enforcement agency may petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

### **Section 19. Compensatory Actions.**

In lieu of enforcement proceedings, penalties, and remedies authorized by this Ordinance, the authorized enforcement agency may impose upon a violator alternative compensatory actions, such as storm drain stenciling, attendance at compliance workshops, creek cleanup, etc.

### **Section 20. Violations Deemed a Public Nuisance.**

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this Ordinance is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

### **Section 21. Criminal Prosecution.**

Any person that has violated or continues to violate this ordinance shall be liable to criminal prosecution to the fullest extent of the law, and shall be subject to





a criminal penalty of \_\_\_\_\_ dollars per violation per day and/or imprisonment for a period of time not to exceed \_\_\_\_\_ days. The authorized enforcement agency may recover all attorney’s fees court costs and other expenses associated with enforcement of this ordinance, including sampling and monitoring expenses.

**Section 22. Remedies Not Exclusive.**

The remedies listed in this ordinance are not exclusive of any other remedies available under any applicable federal, state or local law and it is within the discretion of the authorized enforcement agency to seek cumulative remedies.

**Section 23. Adoption of Ordinance.**

This ordinance shall be in full force and effect \_\_ days after its final passage and adoption. All prior ordinances and parts of ordinances in conflict with this ordinance are hereby repealed.

PASSED AND ADOPTED this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by the following vote:

**Stormwater Operation and Maintenance Model Ordinance**

*Unlike other model ordinances, the Operation and Maintenance ordinance language is not “stand-alone.” Operation and Maintenance language would be a part of a broader stormwater ordinance.*

**Section I. Definitions**

*Stormwater Treatment Practice:* Structural device, measure, facility, or activity that helps to achieve stormwater management control objectives at a designated site.

*Site Stormwater Management Plan:* A document approved at the site design phase that outlines the measures and practices used to control stormwater runoff at a site.

**Section II. Design**

1. All stormwater BMPs shall be designed in a manner to minimize the need for maintenance and reduce the chances of failure. Design guidelines are outlined in the most recent version of \_\_\_\_\_ (local or state stormwater manual).

*Rather than incorporate specific stormwater design or maintenance standards into the ordinance itself, it is best to reference “the most recent version” of a stormwater manual. This way, tech-*

*nical information can remain up-to-date without making legal changes to the ordinance.*

2. Stormwater easements and covenants shall be provided by the property owner for access for facility inspections and maintenance. Easements and covenants shall be recorded with (stormwater agency) prior to the issuance of a permit.
3. Final design shall be approved by (stormwater agency)

**Section III. Routine Maintenance**

1. All stormwater BMPs shall be maintained according to the measures outlined in the most recent version of \_\_\_\_\_ (local or state stormwater manual), and as approved in the permit.
2. The person(s) or organization(s) responsible for maintenance shall be designated in the plan. Options include
  - Property owner
  - Homeowner’s association, provided that provisions for financing necessary maintenance are included in deed restrictions or other contractual agreements
  - \_\_\_\_\_ (stormwater management agency)
3. Maintenance agreements shall specify responsibilities for financing maintenance.

**Section IV. Nonroutine Maintenance**

1. Nonroutine maintenance includes maintenance activities that are expensive but infrequent, such as pond dredging or major repairs to stormwater structures.
2. Nonroutine maintenance shall be performed on an as-needed basis based on information gathered during regular inspections.
3. If nonroutine maintenance activities are not completed in a timely manner or as specified in the approved plan, \_\_\_\_\_ (stormwater agency) may complete the necessary maintenance at the owner’s/operator’s expense.

**Section V. Inspections**

1. The person(s) or organization(s) responsible for maintenance shall inspect stormwater BMPs on a regular basis as outlined in the plan.



2. Authorized representatives of \_\_\_\_\_ (stormwater agency) may enter at reasonable times to conduct on-site inspections or routine maintenance.
3. For BMPs maintained by the property owner or homeowner's association, inspection and maintenance reports shall be filed with \_\_\_\_\_ (stormwater agency) as provided for in the plan.
4. Authorized representatives of \_\_\_\_\_ inspections to confirm the information in the reports filed under Section V(3).

## Model Ordinance for Stormwater Management<sup>1</sup>

### Background

In 1991, the Connecticut General Assembly passed Public Acts 91-398 (amending CGS Section 8-23(a)) and 91-170 (amending CGS Sections 8-2(b), 8-3b and 8-35a). These acts require, in part, that zoning regulations and plans of conservation and development adopted by coastal municipalities be made with reasonable consideration for greater protection of Long Island Sound water quality. In particular, the Acts required municipalities to adopt regulations and plans with reasonable consideration and protection of the ecosystem and habitat of Long Island Sound and to design them to reduce hypoxia, pathogens, toxic contaminants and floatable debris in Long Island Sound. It is well documented that improperly managed stormwater flows do make significant contributions to coastal pollution, resulting in hypoxic (low dissolved oxygen) conditions and increases in pathogens, toxic contaminants and floatable debris. Therefore, improved stormwater management and treatment will result in decreases in these pollutants.

In order to assist municipalities in meeting the substantive as well as legal requirements of this legislation, the Connecticut Department of Environmental Protection's Office of Long Island Sound Programs developed this Model Stormwater Ordinance for municipal use. The approach of providing a model ordinance as opposed to zoning regulations was selected due to the need for consistent approaches to stormwater management in various municipal regulations such as zoning regulations, wetlands regulations, coastal site plan review and aquifer protection regulations. Thus, rather than provide model site plan regulations, which may conflict with existing municipal regulations, an ordinance provides a more appropriate means of ensuring consistency among various municipal regulations.

Depending upon the current format of your regulations, portions of this ordinance can be inserted where appropriate. Therefore, the first task is to identify appropriate sections. For example, should your regulations have an environmental section, this may be the most appropriate place for incorporation; however, you may have a drainage section that would be more appropriate. Since the system of regulations varies from town to town, this model may have to be reorganized in order to match an existing format. Prior to adopting any stormwater regulations, the municipality's corporation counsel should be consulted.

Although this model ordinance was initially developed for use by coastal municipalities in meeting a legislative requirement, it is clear that stormwater must be better controlled statewide. Therefore, all Connecticut municipalities can adopt this ordinance, which can also help municipalities meet requirements contained in state stormwater general permits for municipal separate stormwater sewer systems. In reviewing the model ordinance, please note that suggested ordinance language is in normal type; explanations or commentary are in italics.

### Purpose and Authority

In accordance with the provisions of Chapters 98, 124, 126, 440, 444, and 446h of the General Statutes of the State of Connecticut, as amended, the Town of \_\_\_\_\_ hereby adopts the following Stormwater Management Ordinance for the following purposes:

Increased development without proper consideration of stormwater impacts can be a significant source of pollution to Long Island Sound, its tributaries, and other waters of the state. The state's water resources are valuable natural, economic, recreational, cultural and aesthetic resources. The protection and preservation of these waters is in the public interest and is essential to the health, welfare and safety of the citizens of the state. It is, therefore, the purpose of this ordinance to protect and preserve the waters within (town name) from nonpoint sources of pollution through the proper management of stormwater flows and minimization of inputs of suspended solid, pathogens, toxic contaminants, nitrogen and floatable debris to these flows.

<sup>1</sup>Excerpted from *Coastal Water Quality Protection: A Guide for Local Officials* (DEP, 1996).



## Definitions

**aquifer** – a geologic formation, group of formations or part of a formation that contains sufficient saturated, permeable materials to yield significant quantities of water to wells and springs

**BMPs** – best management practices - techniques or structural devices that are effective practical ways of preventing or reducing pollution

**“first inch of rain”** – the first inch of rainfall during a single event. The initial runoff from the first inch of rain contains higher pollutant concentrations than the subsequent runoff, due to initial washing off of dry weather deposits in significantly higher concentrations than those washed off later in a storm. This effect is particularly pronounced with initial heavy rainfalls.

**groundwater** – water found beneath the ground surface that completely fills the open spaces between particles of sediment and within rock formations

**impervious surface** – material or structure on, above or below the ground that does not allow precipitation or surface water to penetrate directly into the soil

**site** – a single parcel, together with any adjacent waters, which is the subject of an application for zoning approval, subdivision approval, coastal site plan review, or an inland wetlands permit

**sediment** – solid material, either mineral or organic, that is in suspension, is transported, or has been moved from its site or origin by erosion

**trash hood** – feature in a catch basin which traps debris such as litter and keeps it from being discharged from the catch basin

**urban stormwater runoff** – precipitation that falls onto the surfaces of roofs, streets, parking lots, roads and the grounds of developed areas. Urban precipitation is not absorbed by the ground or retained in its surface, but collects and runs off, carrying a wide variety of pollutants such as oil-based contaminants, heavy metals (copper and lead), nutrients and bacteria

## Application Requirements

*Stormwater management plans should be strongly encouraged for all land use and development projects, even where they are not required.* A stormwater management plan shall be included as a part of any application for zoning approval, subdivision approval, coastal site plan review, or an inland wetlands permit where:

1. the application pertains to a development or construction project disturbing one or more acres of total land area on a site; *Applicants should be made aware that any development which calls for*

*a total disturbance of over 5 acres also requires the submission of registration to the Connecticut DEP under the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities.*

2. the application pertains to any site with one acre or more of impervious cover;
3. the application proposes new residential development of three or more units;
4. the application pertains to any new industrial or commercial project; or
5. the commission which has jurisdiction over the application has required submission of a stormwater management plan pursuant to written findings that the activity proposed in the application has the potential to cause significant nonpoint source pollution to groundwater or surface water drinking supplies, or to Long Island Sound or any other waters of the state. Such findings may be based upon a written request by the Commissioner of Environmental Protection.

If the commission determines that the activity proposed in an application may result in significant nonpoint source pollution to groundwater or surface water drinking supplies, or to Long Island Sound or any other waters of the state, it may refer the application, including the stormwater management plan, to the Commissioner of Environmental Protection for a determination as to whether a discharge permit under section 22a-430 of the General Statutes, or other state authorization, is required.

## Contents of stormwater management plan:

Where a stormwater management plan is required, such plan shall provide, at a minimum, the following information:

1. Soil characteristics of the site.
2. Location of the closest surface water bodies and wetlands to the site, and the depth to any groundwater or aquifer areas on or adjacent to the site. In the case of tidal waters, provide the mean high water and high tide elevations.
3. DEP ground and surface water quality classification of waterbodies on and adjacent to the site.
4. Identification of any waterbodies on and adjacent to the site documented by DEP as not meeting water quality standards. *The list of impaired waterbodies, documented by DEP pursuant to Section 303(d) of the Federal Clean Water Act, and can be accessed online at <http://www.dep.state.ct.us/wtr/wq/impaired2002.pdf>*



5. Location and description of all proposed stormwater control BMPs for both construction activities and post-construction long-term stormwater control.
6. Proposed maintenance and operation manual or schedule for any trash hoods, catchbasins, or other BMP devices used to prevent runoff, encourage sheet flow or infiltration, or treat stormwater.
7. Calculations of stormwater runoff rates, suspended solids removal rates, and soil infiltration rates before and after completion of the activity proposed in the application.
8. A hydrologic study of pre-development site conditions. Hydrology studies shall be conducted at a level of detail commensurate with the probable impact of the proposed activity and should extend downstream to the point where the proposed activity causes less than a five percent change in the peak flow rates.

#### **Standards and Criteria for Decision**

In order to approve any application for which a stormwater management plan is required, the commission shall find the stormwater management plan consistent with the following criteria. If such application is also subject to the requirements of an aquifer protection overlay zone or any other requirements for nonpoint source pollution control, the more stringent requirements shall control.

1. Direct channeling of untreated surface water runoff into adjacent ground and surface waters shall be prohibited.
2. No net increase in urban stormwater runoff from the site, to the maximum extent possible, shall result from the proposed activity.
3. Design and planning for site development shall provide for minimal disturbance of pre-development natural hydrologic conditions, and shall reproduce such conditions after completion of the proposed activity, to the maximum extent feasible.
4. Pollutants shall be controlled at their source to the maximum extent feasible in order to contain and minimize contamination. *Such an approach is not only cost-effective but more efficient, by reducing the need for extensive restoration efforts.*

*Methods include but are not limited to sweeping of streets and parking lots, especially in the early spring, the use of oil traps and sediment basins prior to infiltration, the use of pervious surfaces and encouragement of sheet flow to filter strips.*

5. Stormwater management systems shall be designed and maintained to manage site runoff in order to eliminate surface and groundwater pollution, prevent flooding and, where required, control peak discharges and provide pollution treatment.
6. Stormwater management systems shall be designed to collect, retain and treat the first inch of rain on-site, so as to trap floating material, oil and litter. *BMP techniques to achieve treatment of the first inch of rainfall include oil and grit separators, and trash hoods.*
7. On-site storage of stormwater shall be employed to the maximum extent feasible. *On-site storage methods include but are not limited to landscaped depressions, grass swales, infiltration trenches and retention or detention basins.*
8. Post-development runoff rates and volumes shall not exceed pre-development rates and volumes. Stormwater runoff rates and volumes shall be controlled by slowing runoff velocities and encouraging infiltration. *BMP methods for controlling runoff and encouraging infiltration include the minimization of impervious surfaces, minimization of curbing and collection, the use of grass or vegetative filter zones, landscape depressions, slotted curb spacers, perforated pipes for conveying stormwater, establishment of buffers from streams, wetlands and waterbodies, and any combination of methods, where appropriate.*
9. Stormwater treatment systems shall be employed where necessary to ensure that the average annual loadings of total suspended solids (TSS) following the completion of the proposed activity at the site are no greater than such loadings prior to the proposed activity. Alternatively, stormwater treatment systems shall remove 80% of TSS from the site on an average annual basis. *BMP methods for stormwater treatment include infiltration through vegetative strips, grass swales and detention basins.*





## Excerpts from Local Regulations

### From Cromwell SECTION XI – SPECIAL REGULATIONS

#### 11.2 STORMWATER RUNOFF CONTROL REGULATION

- a. Stormwater Runoff Control Plans. Site Plans shall be accompanied by plans providing measures for detention and controlled release of stormwater runoff when proposed developments contain an area of five (5) acres or more or the impervious area is 60.0% or greater. All other developments may be required to provide such measures if deemed necessary to protect the public health, safety and well-being by the Planning and Zoning

#### Commission.

1. When required, measures for the detention and controlled release of stormwater runoff shall meet the following standards:
  - a. Release rate shall not exceed the rate of runoff for the same site in its undeveloped state for all intensities and durations of rainfall.
  - b. Required volume for stormwater detention shall be calculated on the basis of runoff from a 50-year frequency rainfall, as published by the National Weather Service or other recognized agency. The detention volume required shall be that necessary to handle the runoff of a 50-year frequency rainfall, for any and all durations, from the proposed development less that volume discharged during the same duration at the approved release rate as specified above.
  - c. In all cases, runoff shall be computed in accordance with *Technical Release #55*, Engineering Division, Soil Conservation Service, USDA, January, 1975, as amended.
2. The ability to retain and maximize the ground water recharge capacity is encouraged. Design of the stormwater runoff control system shall give consideration to providing ground water recharge.
3. All on-site facilities shall be properly maintained by the owner such that they do not become nuisances.
4. All runoff control structures located on private property shall be accessible at all times for Town inspection.

### From Cromwell, Section 300 Regulations, j. STORMWATER RUNOFF CONTROL:

The use of “best management practices” (BMPs) to minimize nonpoint source pollution shall be considered by the applicant, including but not limited to those BMPs discussed in the “Nonpoint Source Pollution Management Plan for the Town of Cromwell” dated October 1992. A written description of this consideration shall be submitted with the application.

### From East Lyme Plan of Conservation and Development, Section Seven - Transportation From Parking Recommendations:

Promote the use of permeable lot paving materials that will reduce surface water runoff into the municipal waste water treatment system. Best management practices for roads and parking areas should be examined to include minimized use of curbing where appropriate, minimized disturbance when building new or improving existing roads, minimizing impervious surfaces in new roads and parking areas, regular sweeping of parking areas and roadways and routine catch basin maintenance.

### From Enfield, ARTICLE X SITE DEVELOPMENT REGULATIONS

#### Section 10.10 Off Street Parking and Loading Regulations

##### 10.10.6 Parking Design, Layout, and Location

(The standards of this section shall apply to all parking areas that serve three (3) or more vehicles or two (2) or more uses.)

All off street parking areas and driveways shall be designed, to include drainage design, and constructed to the standards of the Director of Public Works. The Commission may allow an alternate surface to be used for the parking area when such surface is designed to minimize storm water runoff. In such situations, a maintenance plan for the surface must be approved by the Commission.

### From Farmington Zoning Regulations: Article IV, Special Regulations

#### Section 25. STORMWATER SYSTEMS

- A. Stormwater systems designed and installed in conjunction with the development of land must receive the approval of the Commission in consultation with the Town Engineer.
- B. Stormwater systems shall be designed for the following objectives:
  1. Prevent flooding of onsite or offsite property.
  2. Feed and recharge inland wetlands, surface and subsurface waters.



3. Minimize pollutant loads in stormwater runoff into inland wetlands, surface and subsurface waters.
4. Maintain the hydrology of existing sub watersheds including wetlands and watercourses.
- C. The Commission may withhold the approval of a storm water system design if it fails to meet the above objectives.
- D. The maintenance of a private storm water system is the responsibility of the property owner. The Commission may require that a maintenance program be developed and submitted to them for approval. The Commission may require that a bond be posted and/or that periodic reports be filed with the Town to ensure that the required maintenance has been performed.

**From Glastonbury, Zoning Regulations 10.0 Street and Highway Standards**

Where permanent cul-de-sac streets are included in a residential subdivision, they shall not exceed fifteen hundred (1500) feet in length. A permanent cul-de-sac shall contain a turnaround which has a minimum right-of-way radius of fifty-five (55) feet and a minimum outside pavement radius of forty-five (45) feet except where a permanent cul-de-sac has classification “Light Local” or “Limited Local” the Commission may permit a turnaround which has a minimum right-of-way radius of fifty (50) feet and a minimum outside pavement radius of forty-five (45) feet. A twenty-five (25) foot pavement width shall be provided around cul-de-sac islands located on “Light Local” or “Limited Local” streets. Low maintenance cul-de-sac islands may be permitted.

**From South Windsor Zoning Regulations: SECTION XIII: OFF-STREET PARKING AND LOADING**

**13.4.1 Modification of Minimum Required Parking Spaces**

A reduction in parking spaces will be allowed when the Planning and Zoning Commission deems the reduction to be in the best interest of the Town, according to the following:

- a. The changes in topography of the land can be minimized by reducing the number of parking spaces.
- b. The cutting of trees and other desirable plants can be minimized by reducing the number of parking spaces.
- c. The increase in stormwater run-off rate shall be held to a minimum by reducing the parking spaces.

**From Windsor Zoning Regulations SECTION V: USE REGULATIONS, COMMERCIAL ZONES, I-291 CORRIDOR DEVELOPMENT ZONE**

**5.9.6 Infrastructure Improvements**

**5.9.6.D Stormwater Management**

1. Design of the stormwater management system shall be consistent with the standards of the Public Improvement Specifications manual. Zero net increase in stormwater runoff (ZIRO) between pre- and post-development conditions is to be maintained for the 2, 10, 25 and 100 year storms, unless it can be demonstrated that there will be no deleterious downstream effects.
2. The applicant shall employ the best available technology in design of the closed drainage system, including oil and sediment separation devices, filtration and discharge techniques.

The Town encourages the use of on-site natural filtration functions as a part of currently accepted Best Management Practices in the reduction of sediment and pollutants.

3. The applicant shall employ, as appropriate, the extended wet-bottom detention basin technique for metering site generated storm runoff prior to discharge to off-site drainage systems.

When accessible, the applicant shall utilize Town-owned lands for construction of the wet basin. Such basins will be ultimately sized to accommodate more than one user. Where location of a detention facility on Town land is not feasible due to distance or access problems, the applicant is encouraged to enter into an easement agreement with adjacent lots to create a shared-use detention facility. Consolidated parcels will share a detention facility.

4. Clean Water: Clean water is defined as that stormwater runoff generated from roof flows collected in roof gutter or other pickup systems and transported via risers to underground pipes and out to a discharge point. These flows may not need to be attenuated (meet ZIRO requirements) if the volume of runoff can be dissipated by infiltration into the groundwater table.
5. Dirty Water: Dirty water is defined as that storm runoff generated from parking and road pavements that carry sands, road salts, oils, etc. These flows are initially treated at catch basins where some heavy particulates are trapped in basin sumps. Prior to discharge, flows will pass through a “water quality inlet” where sediment and oil chambers can provide for secondary separation of particulates and oils. Discharges would then either be directed offsite or into a wet detention basin in accordance with ZIRO requirements for that portion of the site.



**From Windsor Zoning Regulations SECTION 3.  
SITE DEVELOPMENT**

**3.4 OFF-STREET PARKING**

**3.4.1 General Provisions**

**G**

The Commission may, depending on the parking needs of a particular use, authorize a phased development of the off-street parking area in compliance with the following criteria:

1. The total number of spaces required to be shown on the Site Plan shall be determined in accordance with the standards for that particular use.
2. The construction of the parking area and installation of the spaces may be phased according to short- and long-term needs of a particular use. Not less than 50 percent of the total required spaces shall be constructed as part of the short term, except that for buildings housing computer equipment and operations, and for wholesale or warehouse uses, this percentage may be reduced to not less than 30 percent. This approval shall become null and void if the use changes.
3. The spaces which are not intended for construction as part of the short term shall be labeled "Reserve Parking" on the plan and shall be properly designed and shown as an integral part of the overall parking layout and must be located on land suitable for parking area development.
4. If at any time after the Certificate of Use and Occupancy is issued the Zoning Enforcement Officer determines that additional spaces may be needed, he shall notify the Commission and the owner of the property concerning his finding.
5. The Commission may, after reviewing the Zoning Enforcement Officer's report, require that all or any portion of the spaces shown on the approved Site Plan as "Reserve Parking" be constructed.

**From Woodbury Subdivision Regulations,  
SECTION IV - DESIGN AND CONSTRUCTION  
STANDARDS**

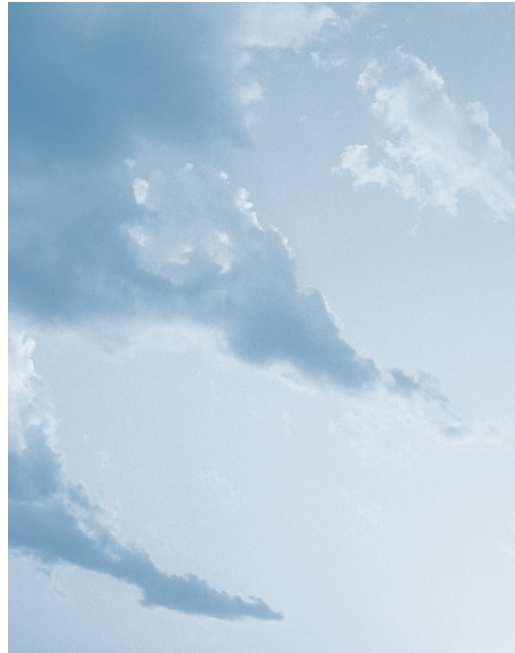
**4.18 Watershed/Viewshed Regulated Area  
(Effective 4/1/98)**

4.18.1 Intent: The Watershed/Viewshed Regulated Area is adopted in order to:

- a. Promote the goals and objectives of the Woodbury Plan of Conservation and Development.
- b. Encourage the most appropriate use of land.
- c. Preserve the natural environment of distinctive ridgeline areas as a visual and historic asset for the benefit of the community.
- d. Protect the groundwater recharging function and capacity of the ridges by minimizing the potential for pollution and preserving open areas for groundwater recharge.
- e. Prevent the creation of any safety or health hazard including, but not limited to, soil erosion, excessive drainage runoff, and degradation of water quality.
- f. Minimize the adverse effect of development upon both the visual and functional role of the natural landscape to preserve Woodbury's quality of life.



*Appendix D*  
Site Stormwater Management  
Plan Checklist





## 1. Applicant/Site Information

Applicant name, legal address, telephone/fax numbers

Common address and legal description of site

Site locus map

## 2. Project Narrative

Project description and purpose (for existing and proposed conditions)

- *Natural and manmade features at the site, including, at a minimum, wetlands, water-courses, floodplains, and development (roads, buildings, and other structures)*
- *Site topography, drainage patterns, flow paths, and ground cover*
- *Impervious area and runoff coefficient*
- *Site soils as defined by USDA soil surveys including soil names, map unit, erodibility, permeability, depth, texture, and soil structure*
- *Stormwater discharges from the site, including quality and known sources of pollutants and sediment loadings*
- *Critical areas, buffers, and setbacks established by the local, state, and federal regulatory authorities*
- *Water quality classification of on-site and adjacent waterbodies*
- *Identification of any on-site or adjacent waterbodies included on the Connecticut 303(d) list of impaired waters*

### Potential stormwater impacts

- *Potential pollution sources (e.g., erosive soils, steep slopes, vehicle fueling, vehicle washing)*
- *Types of anticipated stormwater pollutants and the relative or calculated load of each pollutant*
- *Summary of calculated pre- and post-development peak flows*
- *Summary of calculated pre- and post-development groundwater recharge*

### Critical on-site resources

- *Wells, aquifers*
- *Wetlands, streams, ponds*
- *Public drinking water supplies*

Critical off-site (adjacent to or downstream of site) resources

- *Neighboring land uses*
- *Wells, aquifers*
- *Wetlands, streams, ponds*
- *Public drinking water supplies*

### Proposed stormwater management practices

- *Source controls and pollution prevention*
- *Alternative site planning and design*
- *Stormwater treatment practices*
- *Flood control and peak runoff attenuation management practices*

### Site plan (for existing and proposed conditions) (see Item 4. below for appropriate format)

- *Topography, drainage patterns, drainage boundaries, and flow paths*
- *Locations of stormwater discharges*
- *Perennial and intermittent streams*
- *USDA soil types*
- *Proposed borehole investigations*
- *Vegetation and proposed limits of clearing and disturbance*
- *Resource protection areas such as wetlands, lakes, ponds, and other setbacks (stream buffers, drinking water well setbacks, septic setbacks, etc.)*
- *Roads, buildings, and other structures*
- *Utilities and easements*
- *Temporary and permanent conveyance systems (grass channels, swales, ditches, storm drains, etc.) including grades, dimensions, and direction of flow*
- *Location of floodplain and floodway limits and relationship of site to upstream and downstream properties and drainage systems*
- *Location, size, maintenance access, and limits of disturbance of proposed structural stormwater management practices (treatment practices, flood control facilities, stormwater diversion structures, etc.)*
- *Final landscaping plans for structural stormwater management practices and site revegetation*

- *Locations of non-structural stormwater management practices (i.e., source controls)*

#### **Construction Schedule**

### **3. Calculations**

#### **Pollutant Reduction**

- *Water Quality Volume (WQV)*
- *Water Quality Flow (WQF)*
- *Pollutant Loads*

#### **Groundwater Recharge**

- *Groundwater Recharge Volume (GRV)*

#### **Runoff Capture (for new stormwater discharges to tidal wetlands)**

- *Runoff Capture Volume*

#### **Peak Flow Control**

- *Hydrologic and hydraulic design calculations (pre- and post-development conditions)*
  - *Description of the design storm frequency, intensity, and duration*
  - *Watershed map with locations of design points and watershed areas (acres) for runoff calculations*
  - *Time of concentration (and associated flow paths)*
  - *Imperviousness of the entire site and each watershed area*
  - *NRCS runoff curve numbers or volumetric runoff coefficients*
  - *Peak runoff rates, volumes, and velocities for each watershed area (24-hour storm)*
    - ◇ *Stream Channel Protection: 2-year frequency (“over-control” of 2-year storm)*
    - ◇ *Conveyance Protection: 10-year frequency*
    - ◇ *Peak Runoff Attenuation: 10-year, 25-year, and 100-year frequency (other as required by local review authority)*
    - ◇ *Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm*
  - *Hydrograph routing calculations*

- *Culvert capacities*
- *Infiltration rates, where applicable*
- *Dam breach analysis, where applicable*
- *Documentation of sources for all computation methods and field test results*
- *Downstream analysis, where detention is proposed*
- *Drainage systems and structures*

### **4. Design Drawings and Specifications**

**Recommended size (no larger than 24” x 36” and no smaller than 8-1/2” x 11”)**

**Recommended scale (maximum scale of 1” = 40’, larger scales up to 1” = 100’ may be used to represent overall site development plans or for conceptual plans)**

**Design details (cross-sections, elevation views, and profiles as necessary)**

#### **Specifications**

- *Construction materials*
- *Stormwater control product designations (if applicable)*
- *Methods of installation*
- *Reference to applicable material and construction standards*

#### **Cover sheet with sheet index**

#### **Title block**

#### **Legend**

#### **North arrow**

**Property boundary of subject property (including parcels, or portions thereof, of abutting land and roadways within one hundred feet of the property boundary)**

**Site locus map (recommended scale 1” = 1,000’) with a north arrow**

**Seals of licensed professionals (original design plans, calculations, and reports)**

#### **Survey plans**

- *Prepared according to the Minimum Standards for Surveys and Maps in Connecticut*
- *The class of survey represented on the plan*
- *Stamped by a professional land surveyor*
- *Depict topography at contour intervals of two feet*

- *The referenced or assumed elevation datum*
- *Two (2) benchmarks on the site within one hundred feet of the proposed construction*
- *Outside limits of disturbances*
- *Plan references*

## 5. Construction Erosion and Sediment Controls

Erosion and sediment control plan that complies with the requirements of the current version of *Connecticut Guidelines for Soil Erosion and Sediment Control*, DEP Bulletin 34.

## 6. Supporting Documents and Studies

Provide other sources of information used in the design of construction and post-construction stormwater controls for the site development, as applicable:

Soil maps, borings/test pits

Infiltration test results

Groundwater impacts for proposed infiltration structures

Reports on wetlands and other surface waters (including available information such as Maximum Contaminant Levels [MCLs], Total Maximum Daily Loads [TMDLs], 303(d) or 305(b) listings, etc.)

Water quality impacts to receiving waters and biological/ecological studies

Flood study/calculations

## 7. Other Required Permits

Evidence of acquisition of all applicable federal, state, and local permits or approvals (e.g., copies of DEP permit registration certificates, DEP Dam Safety Registration certificate for stormwater impoundments, DPH approval letter for stormwater discharges within 100 feet of a watercourse within a public water supply watershed or aquifer protection area, local approval letters, etc.)

## 8. Operation and Maintenance

Detailed inspection and maintenance requirements/tasks

Inspection and maintenance schedules

Parties legally responsible for maintenance (name, address, and telephone number)

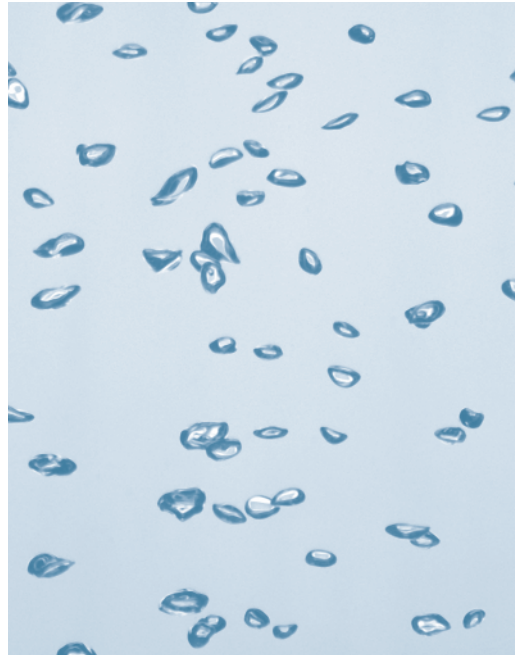
Provisions for financing of operation and maintenance activities

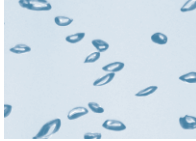
As-built plans of completed structures

Letter of compliance from designer

Post-construction documentation to demonstrate compliance with maintenance activities.

*Appendix E*  
Maintenance Inspection Checklist





## Stormwater Ponds and Wetlands

Project/Location: \_\_\_\_\_

“As Built” Plans Available? \_\_\_\_\_

Date/Time: \_\_\_\_\_

Days Since Previous Rainfall and Rainfall Amount: \_\_\_\_\_

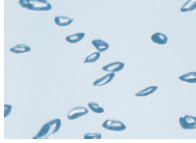
Inspector: \_\_\_\_\_

Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>1. Embankment and Emergency Spillway</b>			
○ Vegetation and ground cover adequate			
○ Embankment erosion			
○ Animal burrows			
○ Unauthorized planting			
○ Cracking, bulging, or sliding of embankment/dam			
a. Upstream face			
b. Downstream face			
c. At or beyond toe			
d. Emergency spillway			
○ Pond, toe & chimney drains clear and functioning			
○ Seeps/leaks on downstream face			
○ Slope protection or riprap failure			
○ Vertical/horizontal alignment of top of dam “As-Built”			
○ Emergency spillway clear of obstructions and debris			
○ Other (specify)			
<b>2. Riser and Principal Spillway</b>			
○ Low flow orifice obstructed			
○ Low flow trash rack obstructed with debris			
○ Weir trash rack obstructed with debris			
○ Excessive sediment accumulation insider riser			
○ Concrete/masonry condition riser and barrels			
a. Cracks or displacement			
b. Minor spalling (<1”)			
c. Major spalling (rebars exposed)			
d. Joint failures			
e. Water tightness			
○ Metal pipe condition			



Maintenance Item	Satisfactory	Unsatisfactory	Comments
○ Control valve			
a. Operational/exercised			
b. Chained and locked			
○ Pond drain valve			
a. Operational/exercised			
b. Chained and locked			
○ Outfall channels functioning			
○ Other (specify)			
<b>3. Permanent Pool (Wet Ponds)</b>			
○ Undesirable vegetative growth			
○ Floating or floatable debris removal required			
○ Visible pollution			
○ Shoreline problem			
○ Other (specify)			
<b>4. Sediment Forebay</b>			
○ Sedimentation noted			
○ Greater than 50% of storage volume remaining			
<b>5. Dry Pond Areas</b>			
○ Vegetation coverage adequate			
○ Undesirable vegetative growth			
○ Undesirable woody vegetation			
○ Low flow channels clear of obstructions			
○ Standing water or wet spots			
○ Sediment and/or trash accumulation			
○ Other (specify)			
<b>6. Condition of Outfalls</b>			
○ Riprap failures			
○ Slope erosion			
○ Storm drain pipes			
○ Endwalls/Headwalls			
○ Other (specify)			
<b>7. Other</b>			
○ Complaints from residents (odors, insects, other)			
○ Aesthetics (graffiti, algae, other)			
○ Conditions of maintenance access routes			
○ Signs of hydrocarbon build-up			
○ Any public hazards (specify)			





Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>8. Wetland Vegetation</b>			
o Vegetation healthy and growing			
o Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)			
o Survival of desired wetland plant species distribution according to landscaping plan?			
o Evidence of invasive species			
o Maintenance of adequate water depths for desired wetland plant species.			
o Harvesting of emergent plantings needed			
o Have sediment accumulations reduced pool volume significantly or are plants choked with sediment?			
o Other (specify)			
<b>Actions to Be Taken:</b>			
<b>To Be Completed By (Date):</b>			

Source: Adapted from Watershed Management Institute, Inc. 1997. *Operation, Maintenance, and Management of Stormwater Management Systems*, in cooperation with U.S. Environmental Protection Agency, Office of Water. Washington, D.C.



## Infiltration Basins and Trenches

Project/Location: \_\_\_\_\_

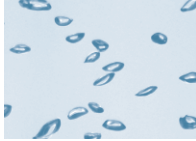
“As Built” Plans Available? \_\_\_\_\_

Date/Time: \_\_\_\_\_

Days Since Previous Rainfall and Rainfall Amount: \_\_\_\_\_

Inspector: \_\_\_\_\_

Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>1. Debris Cleanout</b>			
○ Basin bottom or trench surface clear of debris			
○ Inlet/Inflow pipes clear of debris			
○ Overflow spillway clear of debris			
○ Outlet clear of debris			
<b>2. Sediment Traps or Forebays</b>			
○ Sedimentation noted			
○ Greater than 50% of storage volume remaining			
<b>3. Vegetation (Basins)</b>			
○ Mowing performed as necessary			
○ No evidence of erosion			
<b>4. Dewatering</b>			
○ Basin/Trench dewaterers between storms			
○ Drawdown time does not exceed 36 to 48 hours			
<b>5. Sediment Accumulation</b>			
○ Approximate depth of accumulated sediment			
<b>6. Inlets</b>			
○ Good condition			
○ No evidence of erosion			
<b>7. Outlet/Overflow Spillway</b>			
○ Good condition, no need for repair			
○ No evidence of erosion			
<b>8. Aggregate Repairs (Trench)</b>			
○ Surface of aggregate clean			
○ Top layer of stone does not need replacement			
○ Trench does not need rehabilitation			



Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>9. Structural Repairs</b>			
○ Embankment in good repair			
○ Site slopes are stable			
○ No evidence of erosion			
<b>10. Fences/Access Repairs</b>			
○ Fences in good condition			
○ No damage which would allow undesired entry			
○ Access point in good condition			
○ Locks and gate function property			
<b>Actions to Be Taken:</b>			
<b>To Be Completed By (Date):</b>			

Source: Adapted from Watershed Management Institute, Inc. 1997. Operation, Maintenance, and Management of Stormwater Management System, in cooperation with U.S. Environmental Protection Agency, Office of Water. Washington, D.C.



## Filtering Practices – Sand and Organic Filters

Project/Location: \_\_\_\_\_

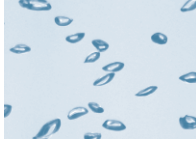
“As Built” Plans Available? \_\_\_\_\_

Date/Time: \_\_\_\_\_

Days Since Previous Rainfall and Rainfall Amount: \_\_\_\_\_

Inspector: \_\_\_\_\_

Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>1. Debris Cleanout</b>			
○ Filtration facility clean of debris			
○ Inlet and outlets clear of debris			
<b>2. Oil and Grease</b>			
○ No evidence of filter surface clogging			
○ Activities in drainage area minimize oil and grease entry			
<b>3. Vegetation</b>			
○ Contributing drainage area stabilized			
○ No evidence of erosion			
○ Area mowed and clipping removed			
<b>4. Water Retention</b>			
○ Water holding chambers at normal pool			
○ Filter chamber dewaterers between storms			
○ No evidence of leakage			
<b>5. Sediment Accumulation</b>			
○ Approximate depth of accumulated sediment			
○ Depth of sediment in forebay or sump should not be more than 12 inches or 10 percent of the pretreatment volume			
○ Sediment accumulation on filter bed does not exceed 1" or drawdown time does not exceed 36 to 48 hours			
<b>6. Structural Components</b>			
○ No evidence of structural deterioration			
○ Grates are in good condition			
○ No evidence of spalling or cracking of structural parts			
<b>7. Outlet/Overflow Spillway</b>			
○ Good condition, no need for repairs			
○ No evidence of erosion (if draining into a natural channel)			



Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>8. Overall Function of Facility</b>			
○ No evidence of flow bypassing facility			
○ No noticeable odors outside facility			
<b>Actions to Be Taken:</b>			
<b>To Be Completed By (Date):</b>			

Source: Adapted from Watershed Management Institute, Inc. 1997. Operation, Maintenance, and Management of Stormwater Management Systems, in cooperation with U.S. Environmental Protection Agency, Office of Water. Washington, D.C.



## Filtering Practices - Bioretention

Project/Location: \_\_\_\_\_

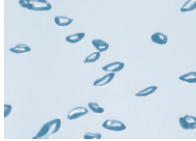
“As Built” Plans Available? \_\_\_\_\_

Date/Time: \_\_\_\_\_

Days Since Previous Rainfall and Rainfall Amount: \_\_\_\_\_

Inspector: \_\_\_\_\_

Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>1. Debris Cleanout</b>			
○ Bioretention and contributing areas clean of debris			
○ No dumping of yard wastes into practice			
○ Litter (branches, etc.) has been removed			
<b>2. Vegetation</b>			
○ Plant height not less than design water depth			
○ Fertilized per specifications			
○ Plant composition according to approved plans			
○ No placement of inappropriate plants			
○ Grass height not greater than 6 inches			
○ No evidence of erosion			
<b>3. Check Dams/Energy Dissipaters/Sumps</b>			
○ No evidence of sediment buildup			
○ No evidence of erosion at downstream toe of drop structure			
<b>4. Dewatering</b>			
○ Dewaterers between storms			
○ No evidence of standing water			
<b>5. Sediment Accumulation</b>			
○ Approximate depth of accumulated sediment			
○ Depth of sediment in forebay or sump should not be more than 12 inches or 10 percent of the pretreatment volume			
○ Sediment accumulation on filter bed does not exceed 1" or drawdown time does not exceed 36 to 48 hours			



Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>6. Outlet/Overflow Spillway</b>			
○ Good condition, no need for repair			
○ No evidence of erosion			
○ No evidence of any blockages			
<b>7. Integrity of Filter Bed</b>			
○ Filter bed has not been blocked or filled inappropriately			
<b>Actions to Be Taken:</b>			
<b>To Be Completed By (Date):</b>			

Source: Adapted from Watershed Management Institute, Inc. 1997. *Operation, Maintenance, and Management of Stormwater Management Systems*, in cooperation with U.S. Environmental Protection Agency, Office of Water. Washington, D.C.



## Water Quality Swales

Project/Location: \_\_\_\_\_

“As Built” Plans Available? \_\_\_\_\_

Date/Time: \_\_\_\_\_

Days Since Previous Rainfall and Rainfall Amount: \_\_\_\_\_

Inspector: \_\_\_\_\_

Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>1. Debris Cleanout</b>			
<ul style="list-style-type: none"> <li>No excessive trash and debris in contributing areas, forebay, or channel</li> </ul>			
<b>2. Check Dams or Energy Dissipators</b>			
<ul style="list-style-type: none"> <li>No evidence of flow going around structures</li> <li>No evidence of erosion at downstream toe</li> </ul>			
<b>3. Vegetation</b>			
<ul style="list-style-type: none"> <li>Mowing performed as necessary (to maintain grass height of 4 to 6 inches during growing season)</li> <li>No evidence of erosion (channel bottom or side slopes)</li> <li>Fertilized per specification</li> </ul>			
<b>4. Dewatering</b>			
<ul style="list-style-type: none"> <li>Dewaters between storms (dry swales)</li> </ul>			
<b>5. Sediment Accumulation</b>			
<ul style="list-style-type: none"> <li>Approximate depth of accumulated sediment</li> <li>Sediment accumulation is less than 25% of forebay or channel capacity (cleaning recommended otherwise)</li> </ul>			
<b>6. Outlet/Overflow Spillway</b>			
<ul style="list-style-type: none"> <li>Good condition, no need for repairs</li> <li>No evidence of erosion</li> </ul>			
<b>Actions to Be Taken:</b>			
<b>To Be Completed By (Date):</b>			

Source: Adapted from Watershed Management Institute, Inc. 1997. Operation, Maintenance, and Management of Stormwater Management Systems, in cooperation with U.S. Environmental Protection Agency, Office of Water. Washington, D.C.



*Appendix F*  
Glossary





Some definitions in this glossary are adapted from definitions in applicable sections of the Connecticut General Statutes and the Regulations of Connecticut State Agencies, as well as related guidance documents such as the *Connecticut Guidelines for Soil Erosion and Sediment Control*. Refer to these sources for complete definitions.

<b>Advanced Treatment</b>	Pollutant removal techniques typically used in drinking water treatment processes but with potential for application as advanced treatment options for stormwater. These treatment techniques include ion exchange, reverse osmosis, disinfection, ultrafiltration, alum injection, and use of water-soluble anionic polyacrylamide (PAM).
<b>Agricultural Runoff</b>	Runoff from land utilized for agricultural practices including growing crops and raising livestock.
<b>Alternative Site Design</b>	Innovative site design practices have been developed as alternatives to traditional development to control stormwater pollution and protect the ecological integrity of developing watersheds. Research has demonstrated that alternative site design can reduce impervious cover, runoff volume, pollutant loadings, and development costs when compared to traditional development.
<b>Alum Injection</b>	Injection of aluminum phosphate (alum), which has been used extensively as a flocculent in pond and lake management applications, for reducing concentrations of fine sediment and phosphorus in stormwater discharges to eutrophic water bodies.
<b>Aquatic Bench</b>	A ten-foot wide bench located around the inside perimeter of a permanent pool that is normally vegetated with aquatic plants to provide pollutant removal.
<b>Aquifer</b>	A porous water-bearing formation of permeable rock, sand or gravel capable of yielding economically significant quantities of groundwater.
<b>Baseflow</b>	The portion of streamflow that is not due to storm runoff but is the result of groundwater discharge or discharge from lakes or similar permanent impoundments of water.
<b>Biochemical Oxygen Demand (BOD)</b>	A measure of the quantity of organic material that can be decomposed through oxidation by micro-organisms.
<b>Bioretention</b>	A practice to manage and treat stormwater runoff by using a specially designed planting soil bed and planting materials to filter runoff stored in a shallow depression. The areas consist of a mix of elements each designed to perform different functions in the removal of pollutants and attenuation of stormwater runoff.
<b>Building Setbacks</b>	The distance between a structure and a property boundary (front, rear, or side) of the lot on which the structure is located.
<b>Catch Basin Inserts</b>	A structure, such as a tray, basket, or bag, that typically contains a pollutant removal medium (i.e., filter media) and a method for suspending the structure in the catch basin. They are placed directly inside of existing catch basins where stormwater flows into the catch basin and is treated as it passes through the structure.
<b>Catch Basin</b>	A structure placed below grade to conduct water from a street or other paved surface to the storm sewer.



<b>Check Dams</b>	Small temporary dams constructed across a swale or drainage ditch to reduce the velocity of concentrated stormwater flows.
<b>Chemical Oxygen Demand (COD)</b>	A measure of the amount of organic material that can be chemically oxidized.
<b>Cisterns</b>	Containers that store larger quantities of rooftop stormwater runoff and may be located above or below ground. Cisterns can also be used on residential, commercial, and industrial sites. See also Rain Barrel.
<b>Coagulant</b>	A chemical added to wastewater or stormwater that destabilizes the surface charge of fine particles, allowing the particles to come together to form larger particles that can be more easily removed by gravity settling and other physical treatment processes. Alum is a common coagulant used in lake management applications and sometimes used for stormwater treatment.
<b>Coastal Area</b>	As defined in CGS §22a-94(a), land and water within the towns listed in Table 1-2 of this Manual.
<b>Coastal Boundary</b>	As defined in CGS §22a-94(b), a region within the coastal area delineated by the contour elevation of the one hundred year frequency coastal flood zone, as defined and determined by the National Flood Insurance Act; or a one thousand foot linear setback measured from the mean high water mark in coastal waters; or a one thousand foot linear setback measured from the inland boundary of tidal wetlands mapped under C.G.S. §22a-20, whichever is farthest inland.
<b>Combined Sewer Overflows (CSOs)</b>	Combined sewers collect both stormwater runoff and sanitary wastewater in a single set of sewer pipes. When combined sewers do not have enough capacity to carry all the runoff and wastewater or the receiving water pollution control plant cannot accept all the combined flow, the combined wastewater overflows from the collection system into the nearest body of water, creating a CSO.
<b>Darcy's Law</b>	An equation stating that the rate of fluid flow through a porous medium is proportional to the potential energy gradient within the fluid. The constant of proportionality is the hydraulic conductivity, which is a property of both the porous medium and the fluid moving through the porous medium.
<b>Deep Sump Catch Basins</b>	Storm drain inlets that typically include a grate or curb inlet and a sump to capture trash, debris and some sediment and oil and grease. Also known as an oil and grease catch basin.
<b>Deicers</b>	Materials applied to reduce icing on paved surfaces. These consist of salts and other formulated materials that lower the melting point of ice, including sodium chloride, calcium chloride, calcium magnesium acetate, and blended products consisting of various combinations of sodium, calcium, magnesium, chloride, and other constituents.
<b>Deicing Constituents</b>	Additives included in deicing materials to prevent caking and inhibit corrosion.
<b>Dissolved Pollutants</b>	Non-particulate pollutants typically removed through removal mechanisms such as adsorption, biological uptake, chemical precipitation or ion exchange.



<b>Downstream Analysis</b>	Calculation of peak flows, velocities, and hydraulic effects at critical downstream locations to ensure that proposed projects do not increase post-development peak flows and velocities at these locations.
<b>Dry Detention Pond</b>	Stormwater basin designed to capture, temporarily hold, and gradually release a volume of stormwater runoff to attenuate and delay stormwater runoff peaks. Dry detention ponds provide water quantity control (peak flow control and stream channel protection) as opposed to water quality control. Also known as “dry ponds” or “detention basins”.
<b>Dry Well</b>	Small excavated pits or trenches filled with aggregate that receive clean stormwater runoff primarily from building rooftops. Dry wells function as infiltration systems to reduce the quantity of runoff from a site. The use of dry wells is applicable for small drainage areas with low sediment or pollutant loadings and where soils are sufficiently permeable to allow reasonable rates of infiltration.
<b>Emergency Spillway</b>	Auxiliary outlet to a water impoundment that transmits floodwater exceeding the capacity of the primary spillway.
<b>Erosion</b>	The wearing away of land surface by running water, wind, ice or other geological agents, including such processes as gravitational creep.
<b>Erosion and Sediment Control</b>	A device placed, constructed on, or applied to the landscape that prevents or curbs the detachment of soil, its movement and/or deposition.
<b>Failing Septic System</b>	An on-site wastewater disposal system that discharges effluent into the ground at concentrations that exceed water quality standards. Failing systems can be significant sources of nutrients, especially nitrogen, and microbial pathogens to both surface water and groundwater.
<b>Filter Strip</b>	A strip or area of vegetation for removing sediment, organic material, nutrients and chemicals from runoff or wastewater. They are typically located downgradient of stormwater outfalls and level spreaders to reduce flow velocities and promote infiltration/filtration.
<b>Filtering Practices</b>	Practices that capture and store stormwater runoff and pass it through a filtering media such as sand, organic material, or soil for pollutant removal. Stormwater filters are primarily water quality control devices designed to remove particulate pollutants and, to a lesser degree, bacteria and nutrients.
<b>Floodplain</b>	Any land susceptible to being inundated by water, usually adjacent to a stream, river or water body and usually associated with a particular design flooding frequency (e.g., 100-year floodplain).
<b>Flow Splitter</b>	An engineered, hydraulic structure designed to divert a percentage of stormwater to a treatment practice located outside of the primary channel or to direct stormwater to a parallel pipe system or to bypass a portion of baseflow around a treatment practice.
<b>Fourth Order Stream</b>	Stream order indicates the relative size of a stream based on Strahler's (1957) method. Streams with no tributaries are first order streams, represented as the start of a solid line on a 1:24,000 USGS Quadrangle Sheet. A second order stream is formed at the confluence of two first order streams, and so on.



<b>Fresh-tidal Wetland</b>	A tidal wetland with an annual average salinity of less than 0.5 parts per thousand.
<b>Full Sedimentation Design</b>	Stormwater filter system design involving storage and pretreatment of the entire water quality volume.
<b>Grass Drainage Channels</b>	Traditional vegetated open channels, typically trapezoidal, triangular, or parabolic in shape, whose primary function is to provide non-erosive conveyance, typically up to the 10-year frequency design flow. They provide limited pollutant removal through filtration by grass or other vegetation, sedimentation, biological activity in the grass/soil media, as well as limited infiltration if underlying soils are pervious.
<b>Groundwater Recharge</b>	The process by which water that seeps into the ground, eventually replenishing groundwater aquifers and surface waters such as lakes, streams, and the oceans. This process helps maintain water flow in streams and wetlands and preserves water table levels that support drinking water supplies.
<b>Groundwater Recharge Volume (GRV)</b>	The post-development design recharge volume (i.e., on a storm event basis) required to minimize the loss of annual pre-development groundwater recharge. The GRV is determined as a function of annual pre-development recharge for site-specific soils or surficial materials, average annual rainfall volume, and amount of impervious cover on a site.
<b>Heavy Metals</b>	Metals such as copper, zinc, barium, cadmium, lead, and mercury, which are natural constituents of the Earth's crust. Heavy metals are stable and persistent environmental contaminants since they cannot be degraded or destroyed.
<b>Hydraulic Conductivity</b>	The rate at which water moves through a saturated porous media under a unit potential-energy gradient. It is a measure of the ease of water movement in soil and is a function of the fluid as well as the porous media through which the fluid is moving.
<b>Hydraulic Head</b>	The kinetic or potential energy of a unit weight of water expressed as the vertical height of water above a reference datum.
<b>Hydrocarbons</b>	Inorganic compounds consisting of carbon and hydrogen, including petroleum hydrocarbons derived from crude oil, natural gas, and coal.
<b>Hydrodynamic Separators</b>	A group of stormwater treatment technologies designed to remove large particle total suspended solids and large oil droplets, consisting primarily of cylindrical-shaped devices that are designed to fit in or adjacent to existing stormwater drainage systems. The most common mechanism used in these devices is vortex-enhanced sedimentation, where stormwater enters as tangential inlet flow into the side of the cylindrical structure. As the stormwater spirals through the chamber, the swirling motion causes the sediments to settle by gravity, removing them from the stormwater.
<b>Hydrograph</b>	A graph showing the variation in discharge or depth of a stream of water over time.
<b>Hydrologic Cycle</b>	The distribution and movement of water between the earth's atmosphere, land, and water bodies.



<b>Hydrologic Zones</b>	Planting zones that reflect the degree and duration of inundation by water, consisting of a deep water pool, shallow water bench, shoreline fringe, riparian fringe, floodplain terrace, and upland slopes.
<b>Illicit Discharges</b>	Unpermitted discharges to waters of the state that do not consist entirely of stormwater or uncontaminated groundwater except certain discharges identified in the DEP Phase II Stormwater General Permit.
<b>Impaired Waters [303(d) List]</b>	Those water bodies not meeting water quality standards. This list of impaired waters within each state is referred to as the “303(d) List” and is prepared pursuant to Section 303(d) of the Federal Clean Water Act.
<b>Impervious Surfaces</b>	Surfaces that cannot infiltrate rainfall, including rooftops, pavement, sidewalks, and driveways.
<b>Infiltration Practices</b>	Stormwater treatment practices designed to capture stormwater runoff and infiltrate it into the ground over a period of days, including infiltration trenches and infiltration basins.
<b>Infiltration Rate</b>	A soil characteristic determining or describing the maximum rate at which water can enter the soil under specific conditions.
<b>Instantaneously Mixed Reservoir</b>	A hypothetical model of a natural water body or impoundment in which the contents are sufficiently well-mixed as to be uniformly distributed.
<b>Integrated Pest Management (IPM)</b>	An approach to pesticide usage that combines monitoring; pest trapping; establishment of action thresholds; use of resistant varieties and cultivars; cultural, physical, and biological controls; and precise timing and application of pesticide treatments to avoid the use of chemical pesticides when possible and use the least toxic pesticide that targets the pest of concern, when pesticide usage is unavoidable.
<b>Low Flow Orifice</b>	Principal outlet of a stormwater treatment practice to convey flows above the permanent pool elevation.
<b>Low Impact Development (LID)</b>	Low impact development is a site design strategy intended to maintain or replicate predevelopment hydrology through the use of small-scale controls integrated throughout the site to manage runoff as close to its source as possible.
<b>Media Filters</b>	These devices consist of media, such as pleated fabric, activated charcoal, perlite, amended sand and perlite mixes, or zeolite placed within filter cartridges that are typically enclosed in concrete vaults. Stormwater is passed through the media, which traps particulates and/or soluble pollutants
<b>Micropool</b>	A smaller permanent pool that is incorporated into the design of a larger stormwater pond to avoid resuspension of particles.
<b>Municipal Separate Storm Sewer System (MS4)</b>	Conveyances for stormwater, including, but not limited to, roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains owned or operated by any municipality, sewer or sewage district, fire district, State agency or Federal agency and discharging directly to surface waters of the state.
<b>Native Plants</b>	Plants that are adapted to the local soil and rainfall conditions and that require minimal watering, fertilizer, and pesticide application.





<b>Nitrate</b>	One of the forms of nitrogen found in aquatic ecosystems. It is produced during nitrification and denitrification by bacteria. Nitrate is the most completely oxidized state of nitrogen commonly found in water, and is the most readily available state utilized for plant growth.
<b>Nitrite</b>	A form of nitrogen that is the end product of nitrification, which is produced by <i>Nitrobacter spp.</i> Nitrate is also the initial substrate for denitrification.
<b>Nonpoint Source Pollution</b>	Pollution caused by diffuse sources that are not regulated as point sources and are normally associated with precipitation and runoff from the land or percolation.
<b>Non-Routine Maintenance</b>	Corrective measures taken to repair or rehabilitate stormwater controls to proper working condition. Non-routine maintenance is performed as needed, typically in response to problems detected during routine maintenance and inspections.
<b>Non-Structural Controls</b>	Pollution control techniques, such as management actions and behavior modification that do not involve the construction or installation of devices.
<b>Oil/Particle Separators</b>	Consist of one or more chambers designed to remove trash and debris and to promote sedimentation of coarse materials and separation of free oil (as opposed to emulsified or dissolved oil) from stormwater runoff. Oil/particle separators are typically designed as off-line systems for pre-treatment of runoff from small impervious areas, and therefore provide minimal attenuation of flow. Also called oil/grit separators, water quality inlets, and oil/water separators.
<b>Open Space Development</b>	A compact form of development that concentrates density in one portion of the site in exchange for reduced density elsewhere. Also known as cluster or conservation development.
<b>Optical Brighteners</b>	Fluorescent white dyes that are additives in laundry soaps and detergents and are commonly found in domestic wastewater.
<b>Partial Sedimentation Design</b>	Stormwater filter system design involving storage and pretreatment of a portion of the water quality volume.
<b>Peak Flow Control</b>	Criteria intended to address increases in the frequency and magnitude of a range of potential flood conditions resulting from development and include stream channel protection, conveyance protection, peak runoff attenuation, and emergency outlet sizing.
<b>Performance Monitoring</b>	Collection of data on the effectiveness of individual stormwater treatment practices.
<b>Permanent (Wet) Pool</b>	An area of a detention basin or flood control project that has a fixed water surface elevation due to a manipulation of the outlet structure.
<b>Permeable Paving Materials</b>	Materials that are alternatives to conventional pavement surfaces and that are designed to increase infiltration and reduce stormwater runoff and pollutant loads. Alternative materials include modular concrete paving blocks, modular concrete or plastic lattice, cast-in-place concrete grids, and soil enhancement technologies. Stone, gravel, and other low-tech materials can also be used as alternatives for low traffic applications such as driveways, haul roads, and access roads.



<b>Phase II Stormwater</b>	The second phase of the NPDES program which specifically targets certain regulated small MS4s and construction activity disturbing between one and five acres of land.
<b>Plug Flow</b>	A hypothetical model of a natural water body or impoundment in which advection dominates (i.e., substances are discharged in the same sequence in which they enter).
<b>Point Source</b>	Any discernible, confined and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged.
<b>Porous Pavement</b>	Porous pavement is similar to conventional asphalt or concrete but is formulated to have more void space for greater water passage through the material.
<b>Pretreatment</b>	Techniques used in stormwater management to provide storage and removal of coarse materials, floatables, or other pollutants before the primary treatment practice.
<b>Primary Stormwater Treatment Practice</b>	Stormwater treatment practices that are capable of providing high levels of water quality treatment as stand-alone devices; can be grouped into five major categories stormwater ponds, stormwater wetlands, infiltration practices, filtering practices, and water quality swales.
<b>Principal Spillway</b>	The primary pipe or weir that carries baseflow and storage flow through the embankment.
<b>Quality Assurance Project Plan (QAPP)</b>	A document describing the planning, implementation, and assessment procedures for a particular project, as well as any specific quality assurance and quality control activities. It integrates all the technical and quality assurance and control aspects of the project to provide a comprehensive plan for obtaining the type and quality of environmental data and information needed for a specific decision or use.
<b>Rain Barrels</b>	Barrels designed to retain small volumes of runoff for reuse for gardening and landscaping. They are applicable to residential, commercial, and industrial sites and can be incorporated into a site's landscaping plan. The size of the rain barrel is a function of rooftop surface area and the design storm to be stored.
<b>Rain Garden</b>	Functional landscape elements that combine plantings in depressions that allow water to pool for only a few days after a rainfall then be slowly absorbed by the soil and plantings.
<b>Rainwater Harvesting</b>	The collection and conveyance of rainwater from roofs and storage in either rain barrels or cisterns. Depending on the type and reuse of the rainwater, purification may be required prior to distribution of the rainwater for reuse. Harvested rainwater can be used to supply water for drinking, washing, irrigation, and landscaping.
<b>Rational Equation</b>	An equation that may be appropriate for estimating peak flows for small urbanized drainage areas with short times of concentration, but does not estimate runoff volume and is based on many restrictive assumptions regarding the intensity, duration, and aerial coverage of precipitation.



<b>Retention (or Residence) Time</b>	The average length of time that a “parcel” of water spends in a stormwater pond or other water body.
<b>Riser</b>	A vertical pipe extending from the bottom of a pond that is used to control the discharge rate for a specified design storm.
<b>Routine Maintenance</b>	Maintenance performed on a regular basis to maintain proper operation and aesthetics.
<b>Runoff Capture Volume (RCV)</b>	The runoff capture volume is equivalent to the water quality volume (WQV) and is the stormwater runoff volume generated by the first inch of rainfall on the site.
<b>Safety Bench</b>	A flat area above the permanent pool and surrounding a stormwater pond or wetland to provide separation from the pool and adjacent slopes.
<b>Seasonally High Groundwater Table</b>	The highest elevation of the groundwater table typically observed during the year.
<b>Secondary Stormwater Treatment Practices</b>	Stormwater treatment practices that may not be suitable as stand-alone treatment because they either are not capable of meeting the water quality treatment performance criteria or have not yet received the thorough evaluation needed to demonstrate the capabilities for meeting the performance criteria.
<b>Sediment Chamber or Forebay</b>	A underground chamber or surface impoundment (i.e., forebay) designed to remove sediment and/or floatables prior to a primary or other secondary stormwater treatment practice.
<b>Sensitive Watercourse</b>	Streams, brooks, and rivers that are classified by DEP as Class A (fishable, swimmable, and potential drinking water), as well as their tributary watercourses and wetlands, that are high quality resources that warrant a high degree of protection.
<b>Shallow Marsh</b>	The portion of a stormwater wetland that consists of aquatic vegetation within a permanent pool ranging in depth from 6” to 18” during normal conditions.
<b>Shared Parking</b>	A strategy that reduces the number of parking spaces needed by allowing adjacent land uses with different peak parking demands to share parking lots.
<b>Site Planning and Design</b>	Techniques of engineering and landscape design that maintaining predevelopment hydrologic functions and pollutant removal mechanisms to the extent practical.
<b>Site Stormwater Management Plan</b>	Plan describing the potential water quality and quantity impacts associated with a development project both during and after construction. It also identifies selected source controls and treatment practices to address those potential impacts, the engineering design of the treatment practices, and maintenance requirements for proper performance of the selected practices.
<b>Soil Infiltration Capacity</b>	The maximum rate at which water can infiltrate into the soil from the surface.



<b>Soluble Phosphorus</b>	Soluble phosphorus is present predominantly as the ionic species orthophosphate and is thought to be the form readily taken up by plants, i.e., “bioavailable.”
<b>Source Controls</b>	Practices to limit the generation of stormwater pollutants at their source.
<b>Stormwater</b>	Water consisting of precipitation runoff or snowmelt.
<b>Stormwater Hotspots</b>	Land uses or activities with potential for higher pollutant loads.
<b>Stormwater Pollution Prevention Plan (SWPPP)</b>	Identifies potential sources of pollution and outlines specific management activities designed to minimize the introduction of pollutants into stormwater.
<b>Stormwater Ponds</b>	Vegetated ponds that retain a permanent pool of water and are constructed to provide both treatment and attenuation of stormwater flows.
<b>Stormwater Retrofits</b>	Modifications to existing development to incorporate source controls and structural stormwater treatment practices to remedy problems associated with, and improve water quality mitigation functions of, older, poorly designed, or poorly maintained stormwater management systems.
<b>Stormwater Treatment Practices</b>	Devices constructed for primary treatment, pretreatment or supplemental treatment of stormwater.
<b>Stormwater Treatment Train</b>	Stormwater treatment practices, as well as site planning techniques and source controls, combined in series to enhance pollutant removal or achieve multiple stormwater objectives.
<b>Stormwater Wetlands</b>	Shallow, constructed pools that capture stormwater and allow for the growth of characteristic wetland vegetation.
<b>Street Sweepers</b>	Equipment to remove particulate debris from roadways and parking lots, including mechanical broom sweepers, vacuum sweepers, regenerative air sweepers and dry vacuum sweepers.
<b>Structural Controls</b>	Devices constructed for temporary storage and treatment of stormwater runoff.
<b>Submerged Aquatic Vegetation (SAV)</b>	Includes rooted, vascular, flowering plants that live permanently submerged below the water in coastal, tidal and navigable waters.
<b>Synthetic Organic Chemicals</b>	Chemicals that contain carbon, but are not naturally occurring.
<b>Technology Acceptance and Reciprocity Partnership (TARP)</b>	TARP was formed by the states of California, Illinois, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, and Virginia to develop standard protocols for the collection and evaluation of performance data for new environmental technologies.
<b>Tidal Wetland</b>	As defined in CGS §22a-29(2), those areas that border on or lie beneath tidal waters whose surface is at or below an elevation of one foot above local extreme high water and upon which may grow or be capable of growing some, but not necessarily all, of a list of specific plant species.
<b>Time of Concentration</b>	The time required for water to flow from the most distant point to the downstream outlet of a site. Runoff flow paths, ground surface slope and roughness, and channel characteristics affect the time of concentration.



<b>Total Kjeldahl Nitrogen (TKN)</b>	The sum of the ammonia nitrogen and the organic bounded nitrogen; nitrates and nitrites are not included.
<b>Total Maximum Daily Load (TMDL)</b>	A calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources, including a margin of safety.
<b>Total Nitrogen</b>	The sum of total Kjeldahl nitrogen, nitrate, and nitrite. Nitrogen is typically the growth-limiting nutrient in estuarine and marine systems.
<b>Total Organic Carbon</b>	A measure of the organic matter content. The amount of organic matter content affects biogeochemical processes, nutrient cycling, biological availability, chemical transport and interactions and also has direct implications in the planning of wastewater treatment and drinking water treatment.
<b>Total Phosphorus</b>	Sum of orthophosphate, metaphosphate (or polyphosphate) and organically bound phosphate. Phosphorus is typically the growth-limiting nutrient in freshwater systems.
<b>Total Suspended Solids</b>	The total amount of particulate matter that is suspended in the water column.
<b>Technical Release Number 55 (TR-55)</b>	A watershed hydrology model developed by the Soil Conservation Service (now Natural Resources Conservation Service) used to calculate runoff volumes, peak flows, and simplified routing for storm events through ponds.
<b>Trash Rack</b>	A structural device (e.g., screen or grate) used to prevent debris from entering a spillway, channel, drain, pump or other hydraulic structure.
<b>Underground Detention Facilities</b>	Vaults, pipes, tanks, and other subsurface structures designed to temporarily store stormwater runoff for water quantity control and to drain completely between runoff events. They are intended to control peak flows, limit downstream flooding, and provide some channel protection.
<b>Underground Infiltration Systems</b>	Structures designed to capture, temporarily store, and infiltrate the water quality volume over several days, including premanufactured pipes, vaults, and modular structures. Used as alternatives to infiltration trenches and basins for space-limited sites and stormwater retrofit applications.
<b>Urban Stormwater Runoff</b>	Stormwater runoff from developed areas.
<b>Vegetated Buffer</b>	An area or strip of land in permanent undisturbed vegetation adjacent to a water body or other resource that is designed to protect resources from adjacent development during construction and after development by filtering pollutants in runoff, protecting water quality and temperature, providing wildlife habitat, screening structures and enhancing aesthetics, and providing access for recreation.
<b>Vegetated Filter Strips and Level Spreaders</b>	Uniformly graded vegetated surfaces (i.e., grass or close-growing native vegetation) located between pollutant source areas and downstream receiving waters or wetlands. A level spreader is usually located at the top of the slope to distribute overland flow or concentrated runoff (see the maximum overland flow length guidelines above) evenly across the entire length of the filter strip.



<b>Vegetated Roof Covers</b>	Multilayered, constructed roof systems consisting of a vegetative layer, media, a geotextile layer, and a synthetic drain layer installed on building rooftops. Rainwater is either intercepted by vegetation and evaporated to the atmosphere or retained in the substrate before being returned to the atmosphere through transpiration and evaporation. Also referred to as green roofs.
<b>Water Balance</b>	Equation describing the input, output, and storage of water in a watershed or other hydrologic system.
<b>Water Quality Flow (WQF)</b>	The peak flow associated with the water quality volume calculated using the NRCS Graphical Peak Discharge Method.
<b>Water Quality Swales</b>	Vegetated open channels designed to treat and attenuate the water quality volume and convey excess stormwater runoff. Dry swales are primarily designed to receive drainage from small impervious areas and rural roads. Wet swales are primarily used for highway runoff, small parking lots, rooftops, and pervious areas.
<b>Water Quality Volume (WQV)</b>	The volume of runoff generated by one inch of rainfall on a site.
<b>Watershed Management</b>	Integrated approach addressing all aspects of water quality and related natural resource management, including pollution prevention and source control.
<b>Xeriscaping</b>	Landscaping to minimize water usage (“xeri” is the Greek prefix meaning “dry”) by using plants that are adapted to the local climate and require minimal watering, fertilizer, and pesticide application, and improving soils by adding soil amendments or using mulches to reduce the need for watering by increasing the moisture retained in the soil.