United States Environmental Protection Agency (EPA)
National Pollutant Discharge Elimination System (NPDES)

GENERAL PERMITS FOR STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act (CWA), as amended (33 U.S.C. §1251 *et seq.*), any operator of a small municipal separate storm sewer system whose system

- Is located in the areas described in Part 1.1;
- Is eligible for coverage under Part 1.2 and Part 1.9; and
- Submits a complete and accurate Notice of Intent in accordance with Part 1.7 of this permit and receives written authorization from EPA

is authorized to discharge in accordance with the conditions and the requirements set forth herein.

The following appendices are also included as part of these permits:
Appendix A – Definitions, Abbreviations, and Acronyms;
Appendix B – Standard permit conditions applicable to all authorized discharges;
Appendix C – Endangered Species Act Eligibility Guidance;
Appendix D – National Historic Preservation Act Eligibility Guidance;
Appendix E – Information required for the Notice of Intent (NOI);
Appendix F – Requirements for NH Small MS4s Subject to Approved TMDLs;
Appendix G – Impaired Waters Monitoring Parameter Requirements; and
Appendix H – Requirements related to discharges to certain impaired waterbodies

These permits become effective on **July 1, 2018.**

These permits and the authorization to discharge expire at midnight on June 30, 2023.

Signed this 18th day of January, 2017

Ken Moraff, Director
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1.0 Introduction

This document consists of three (3) general permits listed in Part 1.1. Each general permit is applicable to a particular type of municipal system within New Hampshire. Many of the permit terms and conditions are applicable across all regulated entities, and therefore are presented just once in Parts 1-2, Part 4, and Appendices A through E. Other conditions are applicable to a particular set of authorized entities; these terms and conditions are included in Parts 3, 5 and 6 and Appendices F through H. Throughout the permit, the terms “this permit” or “the permit” will refer to all three general permits.

1.1 Areas of Coverage

This permit covers small municipal separate storm sewer systems (MS4s) located in the State of New Hampshire:

- Traditional Cities and Towns (NPDES Permit No. NHR041000)
- State, federal, county and other publicly owned properties (Non-traditional) (NHR042000)
- State transportation agency (NHR043000)

1.2 Eligibility

The MS4 shall meet the eligibility provisions described in Part 1.2.1 and Part 1.9 to be eligible for authorization under this permit.

1.2.1 Small MS4s Covered

This permit authorizes the discharge of stormwater from small MS4s as defined at 40 CFR § 122.26(b)(16) and Appendix A. This includes MS4s described in 40 CFR §122.32(a)(1) or (a)(2). An MS4 is eligible for authorization under this permit if it is:

a. An MS4 (see definition in Appendix A) within the permit areas described in Part 1.1;
b. Not a large or medium MS4 as defined in 40 CFR §§122.26(b)(4) or (7); and
c. Either:
    1. Located fully or partially within an urbanized area as determined by the 2010 Decennial Census by the Bureau of Census; or
    2. Located in a geographic area designated by EPA as requiring a permit.

If the small MS4 is not located entirely within an urbanized area, only the portion of the MS4 that is located within the urbanized area is regulated consistent with 40 CFR §122.32(a)(1).

1.3 Limitations on Coverage

This permit does not authorize the following:

a. Stormwater discharges mixed with sources of non-stormwater, unless the non-stormwater discharges are either (1) authorized under a separate NPDES permit, or (2) allowed under Part 1.4.

b. Stormwater discharges associated with industrial activity as defined in 40 CFR §122.26 (b) (14) (i)-(ix) and (xi).

c. Stormwater discharges associated with construction activity as defined in 40 CFR §122.26(b) (14) (x) or (b) (15).

d. Stormwater discharges currently covered under another NPDES permit, including discharges covered under other regionally issued general permits.

e. Stormwater discharges or discharge related activities that are likely to adversely affect any species that are listed as endangered or threatened under the Endangered Species Act (ESA) or result in the adverse modification or destruction of habitat that is designated as critical under the ESA. The permittee shall follow the procedures detailed in Appendix C to make a determination regarding eligibility. The permittee shall certify compliance with this provision on the submitted NOI.

f. Stormwater discharges whose direct or indirect impacts do not prevent or minimize adverse effects on any Essential Fish Habitat.

g. Stormwater discharges, allowable non-stormwater discharges, or stormwater discharge-related activities that have an effect on a property that is listed or eligible for listing on the National Register of Historic Properties (NRHPS). The permittee shall follow the procedures detailed in Appendix D to make a determination regarding eligibility. The permittee shall certify compliance with this provision on the submitted NOI.

h. Stormwater discharges to territorial seas, the waters of the contiguous zone, or the oceans.

i. Stormwater discharges prohibited under 40 CFR § 122.4.

j. Stormwater discharges to the subsurface subject to state Underground Injection Control (UIC) regulations at N.H. Code Admin. R. Part Env-Wq 404. Although the permit includes provisions related to infiltration and groundwater recharge, structural controls that dispose of stormwater into the ground may be subject to UIC regulation requirements. Authorization for such discharges shall be obtained from the New Hampshire Department of Environmental Services, Groundwater Discharge Permitting and Registration Program.

1.4 Allowable Non-Stormwater Discharges

The following categories of non-stormwater discharges are allowed under this permit unless the permittee, EPA, or the state agency identifies any category of non-stormwater discharge in Part 1.4.a-r as a significant contributor of pollutants to the MS4, then that category is not allowed under Part 1.4, but rather shall be deemed an “illicit discharge” under Part 2.3.4.1. and the permittee shall address that category as part of the Illicit Discharge Detection and Elimination (IDDE) Program described in Part 2.3.4 of this permit.

a. Water line flushing
b. Landscape irrigation

c. Diverted stream flows
d. Rising ground water
e. Uncontaminated ground water infiltration (as defined at 40 CFR § 35.2005(20))
f. Uncontaminated pumped ground water
g. Discharge from potable water sources
h. Foundation drains
i. Air conditioning condensation
j. Irrigation water, springs
k. Water from crawl space pumps
l. Footing drains
m. Lawn watering
n. Individual resident car washing
o. Flows from riparian habitats and wetlands
p. De-chlorinated swimming pool discharges
q. Street wash waters
r. Residential building wash waters without detergents

Discharges or flows from fire fighting activities are allowed under this permit need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

1.5 Permit Compliance

Any non-compliance with any requirement of this permit constitutes a violation of the permit and the CWA and may be grounds for an enforcement action and may result in the imposition of injunctive relief and/or penalties.

1.6 Continuation of this Permit

If this permit is not reissued prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedure Act and remain in force and effect for discharges that were authorized prior to expiration. If a small MS4 was granted permit authorization prior to the expiration date of this permit, it will automatically remain authorized by this permit until the earliest of:

- Authorization under a reissued general permit following timely and appropriate submittal of a complete and accurate NOI requesting authorization to discharge under the reissued permit; or
- Issuance or denial of an individual permit for the MS4's discharges; or
- Authorization or denial under an alternative general permit.

If the MS4 operator does not submit a timely, appropriate, complete and accurate NOI requesting authorization to discharge under the reissued permit, or a timely request for authorization under an individual or alternative general permit, authorization under this permit will terminate on the due date for the NOI under the reissued permit unless otherwise specified in the reissued permit.

1.7 Obtaining Authorization to Discharge

1.7.1 How to Obtain Authorization to Discharge

To obtain authorization under this permit, a small MS4 shall:

1. Be located in the areas listed in Part 1.1 of this permit;
2. Meet the eligibility requirements in Part 1.2 and Part 1.9;
3. Submit a complete and accurate Notice of Intent (NOI) in accordance with the requirements of Part 1.7.2; and
4. Receive written authorization from EPA.

1.7.2 Notice of Intent

a. Operators of Small MS4s seeking authorization to discharge under the terms and conditions of this permit shall submit a Notice of Intent that contains the information identified in Appendix E[1].

b. Operators of Small MS4s that have developed Alternative Pollutant Reduction Plan(s) to meet TMDL Waste Load Allocations in accordance with Appendix F Part I.2, II.2, and/or III.2 shall attach their proposed NHDES-approved Alternative Pollutant Reduction Plan(s) to their NOI.

c. The NOI shall be signed by an appropriate official (see Appendix B Subparagraph 11).

d. The NOI shall contain the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print the name and title of the official, followed by signature and date.

e. The NOI shall be submitted within 90 days of the effective date of the permit. If EPA notifies an MS4 that it is designated under 40 CFR §122.32(a) (2) or (b), the NOI shall be submitted within 180 days of receipt of notice unless granted a longer period of time by EPA.

1.7.3 Submission of Notice of Intent

a. All small MS4s shall submit a complete and accurate Notice of Intent to EPA-Region 1 at the following address:

[1] This includes operators of small MS4s that were previously authorized under the May 1, 2003 small MS4 general permit (MS4-2003)

United States Environmental Protection Agency
ATTN: Stormwater and Construction Permits Section
5 Post Office Square – Suite 100
Mail Code – OEP06-1
Boston, Massachusetts 02109-3912

b. New Hampshire Department of Environmental Services (NHDES) may request that a permittee submit their NOI to NHDES, upon receipt of such request the small MS4s must also submit a copy of the NOI at the following address:

New Hampshire Department of Environmental Services
Water Division – Wastewater Engineering Bureau
P.O. Box 95
Concord, New Hampshire 03302-0095
ATTN: Stormwater Permits Coordinator

c. Late notification: A small MS4 is not prohibited from submitting an NOI after the dates provided in Part 1.7.2.e. However, if a late NOI is submitted, authorization is only for discharges that occur after permit authorization is granted. EPA reserves the right to take enforcement actions for any unpermitted discharges.

1.7.4 Effective Date of Coverage

a. Based on a review of an NOI, EPA may grant authorization under this permit or deny authorization under this permit and require submission of an application for an individual or alternative NPDES permit (see Part 1.8). A small MS4 operator will be authorized to discharge under the terms and conditions of this permit upon written receipt of notice of authorization from EPA.

b. For operators of small MS4s that submitted Alternative Pollutant Reduction Plan(s) seeking operator-specific permit requirements (see Appendix F Part I.2, II.2, and/or III.2) EPA will provide a public notice and opportunity for comment on the Alternative Pollutant Reduction Plan(s) as well as operator-specific permit requirements. The public comment period will be a minimum of 30 calendar days and will be conducted in accordance with 40 CFR §§ 124.10 through 124.13 (excluding § 124.10(c)(2)). Based on a review of the Alternative Pollutant Reduction Plan(s), comments received, and other relevant information, EPA will issue a response to all significant comments received consistent with 40 CFR §124.17 and may grant or deny authorization to discharge under the proposed operator-specific permit requirements (see Appendix F Part I.2, II.2, and III.2) via written correspondence and will post the final operator-specific permit requirements on EPA's website.

c. Permittees whose authorization to discharge under the MS4-2003 which expired on May 1, 2008 has been administratively continued in accordance with the Administrative Procedures Act (5 U.S.C. 558(c)) and 40 CFR § 122.6, who wish to obtain coverage

under this permit, must submit a new complete and accurate NOI requesting permit coverage in accordance with the requirements of Part 1.7 of this permit to EPA within 90 days after the effective date of this permit. For enforcement purposes, permittees whose authorization to discharge under the expired MS4-2003 was administratively continued, who fail to submit a timely, complete and accurate NOI requesting authorization to discharge under the reissued permit or an application for an individual NPDES permit within 90 days after the effective date of this permit, will be considered to be discharging without a permit.

1.8 Individual Permits and Alternative General Permits

a. EPA may require a small MS4 to apply for and obtain authorization under either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition EPA in accordance with the provisions of 40 CFR §122.26(f) to require a small MS4 to apply for and/or obtain authorization under either an individual NPDES permit or an alternative NPDES general permit. If EPA requires a small MS4 to apply for an individual or alternative NPDES permit, EPA will notify the small MS4 in writing that a permit application is required. This notification will include a brief statement of the reasons for this decision and will provide application information and an application deadline. If a small MS4 is authorized under the MS4-2003 or this permit and fails to submit an individual NPDES or an alternative general permit NPDES permit application as required by EPA, then the authorization under the MS4-2003 or this permit to the small MS4 is automatically terminated at the end of the date specified by EPA as the deadline for application submittal. EPA reserves the right to take enforcement action for any unpermitted discharge.

b. A small MS4 may request to be excluded from this general permit by applying for an individual permit or authorization under an alternative general permit. In such a case, a small MS4 shall submit an individual permit application in accordance with the requirements of 40 CFR §122.33(b) (2) (i) or §122.33(b) (2) (ii), with reasons supporting the request, to EPA at the address listed in Part 1.7.3 of this permit. The request may be granted by issuance of an individual permit or authorization under an alternative general permit if EPA determines that the reasons stated by the small MS4 are adequate to support the request. (See 40 CFR § 122.28(b) (3)).

c. When an individual NPDES permit is issued, or a small MS4 is authorized to discharge under an alternative NPDES general permit, authorization under this permit automatically terminates on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit.

1.9 Special Eligibility Determinations

1.9.1 Documentation Regarding Endangered Species

EPA will work with the U.S. National Marine Fisheries Service (NMFS) directly to fulfill ESA requirements of this permit related to species under their jurisdiction. The small MS4 shall certify eligibility regarding federally listed endangered or threatened species (or critical habitat) under the jurisdiction of the U.S. Fish and Wildlife Service in the NOI required by Part 1.7.2.

The Stormwater Management Program (SWMP) shall include documentation supporting the permittee's eligibility determination with regard to federal Endangered and Threatened Species and Critical Habitat Protection, including:

a. Information on whether federally listed endangered or threatened species, or critical habitat are found in proximity to the MS4's stormwater outfalls, or activities or structures involved in stormwater best management practices (BMPs);
b. Whether such species or habitat are likely to be adversely affected by the stormwater discharges or stormwater discharge-related activities, e.g., BMP installation;
c. Results of the Appendix C endangered species screening determinations; and
d. If any such species or habitat are present, a description of the measures the MS4 shall implement to protect federally listed endangered or threatened species, or critical habitat, including any conditions imposed by the U.S. Fish and Wildlife Service. If a permittee fails to document and implement such measures, those discharges are ineligible for coverage under this permit.

1.9.2 Documentation Regarding Historic Properties

The small MS4 shall certify eligibility regarding historic properties on the NOI required by Part 1.7.2. The SWMP shall include documentation supporting the MS4's eligibility determination with regard to Historic Properties Preservation, including:

a. Information on whether the permittee's stormwater discharges, allowable non-stormwater discharges, or stormwater discharge-related activities would have an effect on a property that is listed or eligible for listing on the National Register of Historic Properties (NRHP);
b. Where such effects may occur, any documents received by the permittee or any written agreements the permittee has made with the State Historic Preservation Officer (SHPO) representative to mitigate those effects;
c. Results of the Appendix D historic property screening investigations; and
d. If applicable, a description of the measures the permittee shall implement to avoid or minimize adverse impacts on places listed, or eligible for listing, on the NRHP, including any conditions imposed by the SHPO. If the permittee fails to document and implement such measures, those discharges are ineligible for coverage under this permit.

1.10 Stormwater Management Program (SWMP)

a. The permittee shall develop, implement, and enforce a written SWMP (hardcopy or electronic). The SWMP shall be signed in accordance with Appendix B, Subsection 11, including the date of signature. A signature and date is required for initial program preparation and for any significant revision to the program. The initial written SWMP shall be completed within one (1) year of the effective date of the permit and be updated as necessary to include necessary elements to ensure compliance with schedules and requirements contained in this permit.

   The SWMP is the document used by the permittee to describe the activities and measures that will be implemented to meet the terms and conditions of the permit. The initial SWMP shall accurately describe the permittee's plans and activities as described in the notice of intent and be updated as needed. The document shall be updated and/or

modified during the permit term as the permittee's activities change and to comply with schedules and requirements contained in the permit.

b. Permittees authorized by the MS4-2003 shall modify or update their existing Best Management Practices (BMPs) and measurable goals to meet the terms and conditions of this permit within one (1) year of the effective date of the permit. These modifications and updates shall be reflected in the written SWMP. Permittees authorized by the MS4-2003 shall continue to implement their existing SWMP until the program has been updated.

c. Implementation of one or more of the permit requirements may be shared with another entity (including another interconnected MS4) or the other entity may fully implement the measure or requirement, if the following requirements are satisfied:
   - The other entity, in fact, implements the required task or program.
   - The particular task or program undertaken by the other entity is at least as stringent as the corresponding permit requirement.
   - The other entity agrees to implement the task or program on the permittee's behalf. The annual reports must specify that the permittee is relying on another entity to satisfy some of its permit obligations and specify what those obligations are. The permittee remains responsible for reporting compliance with all permit obligations.
   - See Part 2.3.1. for further requirements related to the permit's 6 minimum control measures.

1.10.1 Stormwater Management Program Availability

a. The permittee shall retain a copy of the current SWMP required by this permit at the office or facility of the person listed as the program contact on the submitted Notice of Intent (NOI). The SWMP shall be immediately available to representatives from EPA; a State agency; the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) at the time of an onsite inspection or upon request.

b. The permittee shall make the SWMP available to the public during normal business hours. The permittee may charge a reasonable fee for copy requests. The permittee is encouraged to satisfy this requirement by posting the SWMP online or making it available on written request.

1.10.2 Contents of the Stormwater Management Program for Permittees Covered Under the 2003 Permit

a. The following information must be included in the SWMP within one (1) year of the permit effective date and updated annually thereafter, as necessary:
   1. Identification of names and titles of people responsible for program implementation. If a position is currently unfilled, list the title of the position and modify the SWMP with the name once the position is filled;
   2. Listing of all receiving waterbody segments, their classification under the applicable state water quality standards, any impairment(s) and associated

pollutant(s) of concern, applicable TMDLs and WLAs, and number of outfalls from the MS4 that discharge to each waterbody. In addition to the receiving water, the permittee shall document in the SWMP all public drinking water sources (surface water and groundwater) that may be impacted by MS4 discharges;

3. Documentation of compliance with Part 1.9.1;
4. Documentation of compliance with Part 1.9.2;
5. The map of the separate storm sewer system required by Part 2.3.4.6;
6. Listing of all discharges identified pursuant to Part 2.1.1.d. and description of response;
7. Description of practices to achieve compliance with Part 2.3 (MEP requirements); For each permit condition in Part 2.3 identify:
    a. The person(s) or department responsible for the measure;
    b. The BMPs for the control measure or permit requirement;
    c. The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal shall have a measure of assessment associated with it.
8. Description of measures to avoid or minimize impacts to public and known private drinking water sources (surface water and groundwater). The permittee is also encouraged to include provisions to notify public water supplies in the event of an emergency. For more information or assistance, contact: New Hampshire Department of Environmental Services, Drinking Water Source Protection Program. Description of activities to achieve compliance with Part 3.0;
9. Annual program evaluation (Part 4.1). Update annually and maintain copies.

b. The following information must be included in the SWMP within two (2) years of the permit effective date and updated annually thereafter, as necessary:
    1. Listing of all interconnected MS4s and other separate storm sewer systems receiving a discharge from the permitted MS4, the receiving waterbody segment(s) ultimately receiving the discharge, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and the number of interconnections;
    2. Written procedures (hardcopy or electronic) to require submission of as-built drawings and ensure long term operation and maintenance in accordance with Part 2.3.6.b.
    3. The map of the separate storm sewer system required by Part 2.3.4.5.

c. The following information must be included in the SWMP within four (4) years of the permit effective date and updated annually thereafter, as necessary:
        1. Report(s) assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover.

d. The following information must be included in the SWMP concurrent with the applicable deadlines in Appendix F and H and updated annually thereafter, as necessary:
    1. Description of practices to achieve compliance with Part 2.2.1 (TMDL requirements) including:
        a. The person(s) or department responsible for the measure;
        b. The BMPs for the control measure or permit requirement;
        c. The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment.
    2. Description of practices to achieve compliance with Part 2.2.2 (discharges to certain water quality limited waters subject to additional requirements) including:
        a. The person(s) or department responsible for the measure;
        b. The BMPs for the control measure or permit requirement;
        c. The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment;
    3. Description of any other practices to achieve compliance with Part 2.1 (water quality based requirements).

1.10.3 Contents and Timelines of the Stormwater Management Program for New Permittees

Permittees seeking authorization for the first time shall meet all deadlines contained in this permit except the following:

1. Timelines for public education requirements in Part 2.3.2.c shall be extended by one (1) year and need to include one (1) message to each audience over the permit term;
2. The ordinances, by-laws, or other regulatory mechanisms required by Parts 2.3.4, 2.3.5 and 2.3.6 shall be completed as soon as possible, but no later than three (3) years from the permit effective date; and
3. All other deadlines in Part 2.3.4.4 through 2.3.4.11 shall be extended by three (3) years.
4. All other deadlines in Part 2.3.5, 2.3.6 and 2.3.7 shall be extended by two (2) years.
5. All deadlines for discharges to water quality limited waters without a TMDL under Part 2.2.2 shall be extended by two (2) years.

Contents of the Stormwater Management Program for New Permittees

a. The following information must be included in the SWMP within one (1) year of the permit effective date and updated annually thereafter, as necessary:

    1. Identification of names and titles of people responsible for program

implementation. If a position is currently unfilled, list the title of the position and modify the SWMP with the name once the position is filled;
2. Documentation of compliance with Part 1.9.1;
3. Documentation of compliance with Part 1.9.2;
4. Documentation of authorization of all new or increased discharges granted by NHDES in compliance with Part 2.1.2;
5. Listing of all discharges identified pursuant to Part 2.1.1 and description of response;
6. Description of practices to achieve compliance with Part 2.3 (MEP requirements) identified in the permittee's NOI and any updates to those BMPs within the first year; For each permit condition in Part 2.3 identify:
    a. The person(s) or department responsible for the measure;
    b. The BMPs for the control measure or permit requirement;
    c. The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal shall have a measure of assessment associated with it;
7. Description of measures to avoid or minimize impacts to public surface waterbody drinking water supplies. The permittee is also encouraged to include provisions to notify public water supplies in the event of an emergency. New Hampshire Department of Environmental Services, Drinking Water Source Protection Program. Description of activities to achieve compliance with Part 3.0;
8. Annual program evaluation (Part 4.1). Update annually and maintain copies.

b. The following information must be included in the SWMP within three (3) years of the permit effective date and updated annually thereafter, as necessary:

    1. Written procedures for site inspections and enforcement of sediment and erosion control procedures in accordance with Part 2.3.5;
    2. Written operation and maintenance procedures for municipal activities in Part 2.3.7.a.ii;
    3. Written program detailing the activities and procedures the permittee will implement so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4 in accordance with Part 2.3.7.a.iii.1;
    4. Written procedures to require submission of as-built drawings and ensure long term operation and maintenance in accordance with Part 2.3.6.a.iii;

c. The following information must be included in the SWMP within four (4) years of the permit effective date and updated annually thereafter, as necessary:

    1. Outfall and interconnection inventory;
    2. Sanitary Sewer Overflow (SSO) inventory including all of the information required in Part 2.3.4.4.b;

3. Written IDDE Program pursuant to Part 2.3.4.6.

d. The following information must be included in the SWMP within five (5) years of the permit effective date and updated annually thereafter, as necessary:

    1. Phase 1 of the map of the separate storm sewer system required by Part 2.3.4.5;
    2. Listing of all receiving waterbody segments, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and number of outfalls from the MS4 that discharge to each waterbody. In addition to the receiving water, the permittee shall document in the SWMP all surface public drinking water sources that may be impacted by MS4 discharges;
    3. Listing of all interconnected MS4s and other separate storm sewer systems receiving a discharge from the permitted MS4, the receiving waterbody segment(s) ultimately receiving the discharge, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and the number of interconnections;

e. The following information must be included in the SWMP within six (6) years of the permit effective date and updated annually thereafter, as necessary:

    1. Report(s) assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover.

f. The following information must be included in the SWMP concurrent with the applicable deadlines in Appendix F and H (extended by two (2) years) and updated annually thereafter, as necessary:

    1. Description of practices to achieve compliance with Part 2.2.1 (discharges subject to requirements related to approved TMDLs) including:
        a. The person(s) or department responsible for the measure;
        b. The BMPs for the control measure or permit requirement;
        c. The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment.
    2. Description of practices to achieve compliance with Part 2.2.2 (discharges to certain water quality limited waters subject to additional requirements) including:
        a. The person(s) or department responsible for the measure;
        b. The BMPs for the control measure or permit requirement;
        c. The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or

quality associated with its endpoint. Each goal must have an associated measure of assessment;

3. Description of any other practices to achieve compliance with Part 2.1 (water quality based requirements).

2.0 Non-Numeric Effluent Limitations

The permittee shall develop, implement and enforce a program to reduce the discharge of pollutants from the MS4 to the maximum extent practicable; to protect water quality and to satisfy the appropriate water quality requirements of the Clean Water Act and the New Hampshire Water Quality Standards.

2.1 Water Quality Based Effluent Limitations

Pursuant to Clean Water Act 402(p)(3)(B)(iii), this permit includes provisions to ensure that discharges from the permittee's small MS4 do not cause or contribute to an exceedance of water quality standards, in addition to requirements to reduce the discharge of pollutants to the maximum extent practicable. The requirements found in this Part and Part 2.2 constitute the water quality based effluent limits of this permit. Requirements to reduce the discharge of pollutants to the maximum extent practicable are set forth in Part 2.3.

2.1.1 Requirement to Meet Water Quality Standards

a. The permittee shall reduce the discharge of pollutants such that discharges from the MS4 do not cause or contribute to an exceedance of water quality standards.

b. If there is a discharge from the MS4 to a waterbody (or its tributaries in some cases) that is subject to an approved TMDL identified in Part 2.2.1, the permittee is subject to the requirements of Part 2.2.1 and Appendix F of this permit and the permittee shall comply with all applicable schedules and requirements in Appendix F for that discharge. A permittee's compliance with all applicable requirements and BMP implementation schedules in Appendix F applicable to it will constitute compliance with Part 2.1.1.a. of the Permit.

c. If there is a discharge from the MS4 to a waterbody (or its tributaries in some cases) that is water quality limited (see definition in Appendix A) due to nutrients (total nitrogen or total phosphorus), metals (cadmium, copper, iron, lead, or zinc), solids (sedimentation/siltation or turbidity), bacteria/pathogens (E. Coli, Enterococcus or fecal coliform), chloride or oil and grease (Oil Slicks, Benzo(a) pyrene (PAHs)) and is not subject to an approved TMDL, or the MS4 is located within a municipality listed in Part 2.2.2.a.-b., the permittee is subject to the requirements of Part 2.2.2 and Appendix H of this permit and the permittee shall comply with all applicable schedules and requirements in Appendix H for that discharge. A permittee's compliance with all applicable requirements and BMP implementation schedules in Appendix H applicable to it will constitute compliance with Part 2.1.1.a. of the Permit.

d. Except where a pollutant of concern in a discharge is subject to the requirements of Part 2.2.1 and/or Part 2.2.2 of this permit or is the result of an illicit discharge and subject to Part 2.3.4 of this permit, if a pollutant in a discharge from the MS4 is causing or

contributing to a violation of applicable water quality criteria[2] for the receiving water, the permittee shall, as expeditiously as possible, but no later than 60 days of becoming aware of the situation, reduce or eliminate the pollutant in its discharge such that the discharge meets applicable water quality criteria.

2.1.2 Increased Discharges

a. Any increased discharge (including increased pollutant loadings) through the MS4 to waters of the United States is subject to New Hampshire antidegradation regulations. The permittee shall comply with the provisions of N.H. Code Admin. R. Part Env-Wq 1708.04 and 1708.06 including information submittal requirements and obtaining authorization for increased discharges where appropriate. Any authorization of an increased discharge by NH DES shall be incorporated into the permittee's SWMP. If an applicable NH DES approval specifies additional conditions or requirements, then those requirements are incorporated into this permit by reference. The permittee must comply with all such requirements[3].

b. There shall be no new or increased discharges from the MS4 to *impaired waters* listed in categories 5 or 4b on the most recent EPA-approved New Hampshire Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) unless the permittee demonstrates that there is no net increase in loading from the MS4 to the impaired water of the pollutant(s) for which the waterbody is impaired. The permittee may demonstrate compliance with this provision by *either:*

   1. Documenting that the pollutant(s) for which the waterbody is impaired is not present in the MS4's discharge and retain documentation of this finding with the SWMP; *or*

   2. Documenting that the total load of the pollutant(s) of concern from the MS4 to any impaired portion of the receiving water will not increase as a result of the activity and retain documentation of this finding in the SWMP. Unless otherwise determined by the Permittee, USEPA or by NH DES that additional demonstration is necessary, compliance with the requirements of Part 2.2.2 and Part 2.3.6 of this permit, including all reporting and documentation requirements, shall be considered as demonstrating no net increase as required by this Part.

c. The requirements of this section are independent of permit conditions requiring reduction in discharges of pollutants as set forth in Parts 2.1.1 and 2.2 (water quality based requirements) and 2.3 (requirements to reduce discharge of pollutants to the maximum extent practicable). Permittees remain subject to requirements to reduce the discharge of pollutants from the MS4 as set forth in those Parts.

2.2 Discharges to Certain Impaired Waters

[2] Applicable water quality criteria are part of the state standards that have been federally approved as of the effective date of this permit and are compiled by EPA at http://www.epa.gov/waterscience/standards/wqslibrary/
[3] For information regarding compliance with N.H. Code Admin. R. Part Env-Wq 1708.04 and 1708.06 , contact the NHDES Watershed Management Bureau.

The permittee shall identify in the SWMP and Annual Reports all discharges, including both outfalls and interconnections to other MS4 or other separate storm sewer systems, that:

a. Are subject to an approved Total Maximum Daily Load (TMDL) as identified in Part 2.2.1;
b. Are subject to additional requirements to protect water quality as identified in Part 2.2.2.

The discharge location from an interconnection shall be determined based on the receiving water of the ultimate outfall in the interconnected system.

2.2.1 Discharges Subject to Requirements Related to an Approved TMDL

a. "Approved TMDLs" for discharges from the permittee's MS4 are those that have been approved by EPA as of the issuance date of this permit.

b. For those TMDLs that specify a wasteload allocation or other requirements either individually or categorically for the MS4 discharge, the permittee shall comply with the applicable requirements of Appendix F. Appendix F identifies, by section, the provisions and schedules the permittee shall comply with to be consistent with the terms of the approved TMDL.

c. The "TMDL for 158 Acid Impaired Ponds and 21 Aluminum Impaired Lakes" and the "Northeast Regional Mercury TMDL" do not specify wasteload allocations or other requirements either individually or categorically for the MS4 discharges and specify that load reductions are to be achieved through reduction in atmospheric deposition sources. No requirements related to these TMDLs are imposed on MS4 discharges under this Part. However, if the permittee becomes aware, or EPA or NHDES determines, that an MS4 discharge is causing or contributing to such impairments to an extent that cannot be explained by atmospheric deposition (e.g. chemical spill, acid landfill leachate or other sources), the permittee shall comply with the requirements of Part 2.1.1.d.

d. The following is a list of municipalities that contain waters subject to an approved TMDL for chlorides:

1.
DERRY
LONDONDERRY
SALEM
WINDHAM

The operators of MS4s located in municipalities listed above that discharge to Beaver Brook, Dinsmore Brook, North Tributary to Canobie Lake, or Policy-Porcupine Brook and any other MS4 that discharges directly to Beaver Brook, Dinsmore Brook, North Tributary to Canobie Lake, or Policy-Porcupine Brook shall meet the requirements of Appendix F Part I with respect to reduction of chloride discharges from their MS4.

e. The following is a list of municipalities that contain waters subject to an approved TMDL for bacteria or pathogens.

1.

ALLENSTOWN	MILFORD
AMHERST	MILTON
ATKINSON	NASHUA
AUBURN	NEW CASTLE
BEDFORD	NEWMARKET
DERRY	NORTH HAMPTON
DOVER	PELHAM
DURHAM	PLAISTOW
EXETER	PORTSMOUTH
GOFFSTOWN	RAYMOND
GREENLAND	ROCHESTER
HAMPSTEAD	ROLLINSFORD
HAMPTON	RYE
HOLLIS	SALEM
HOOKSETT	SANDOWN
HUDSON	SEABROOK
KINGSTON	SOMERSWORTH
LITCHFIELD	STRATHAM
LONDONDERRY	WILTON
MANCHESTER	WINDHAM
MERRIMACK	

The operators of MS4s located in municipalities listed above that discharge to a waterbody segment listed on Table F-1 in Appendix F and any other MS4 that discharges directly to a waterbody segment listed on Table F-1 in Appendix F shall meet the requirements of Appendix F, Part II with respect to reduction of bacteria/pathogens discharges from their MS4.

f. The following is a list of municipalities that contain a lake or pond subject to an approved lake or pond phosphorus TMDL,

1.
AMHERST
BEDFORD
DERRY
HOLLIS
HUDSON
KINGSTON
MANCHESTER
MERRIMACK
NEWTON

RAYMOND
SANDOWN

The operators of MS4s located in municipalities listed above that discharge to a waterbody segment listed on Table F-2 in Appendix F or their tributaries, and any other permittee that discharges to waterbodies listed on Table F-2 in Appendix F or their tributaries, shall meet the requirements of Appendix F, Part III with respect to reduction of phosphorus discharges from their MS4.

2.2.2 Discharge to Certain Water Quality Limited Waters without an Approved TMDL

For purposes of this permit, a 'water quality limited water body' is any water body that does not meet applicable water quality standards, including but not limited to waters listed in categories 5 or 4b on the most recent EPA-approved New Hampshire Clean Water Act section 303(d) list or New Hampshire Integrated Report under Clean Water Act section 305(b).

If there is a discharge from the MS4 to a water quality limited waterbody where pollutants typically found in stormwater (specifically nutrients (Total Nitrogen or Total Phosphorus), solids (Sedimentation/Siltation or Turbidity), bacteria/pathogens (Enterococcus, fecal coliform, or Escherichia Coli), chloride (Chloride), metals (Cadmium, Copper, Iron, Lead or Zinc) and oil and grease (Oil Slicks, Benzo(a) pyrene (PAHs)) are the cause of the impairment and there is not an approved TMDL, or the MS4 is located in a town listed in Part 2.2.2.a.-e. the permittee shall comply with the provisions in Appendix H applicable to it.

In the absence of a defined pollutant reduction target and where no approved TMDL has been established, this permit Part and Appendix H define an iterative approach addressing pollutant reductions to waterbodies where the permittee's discharge is causing or contributing to an excursion above water quality standards due to nutrients (nitrogen or phosphorus), solids, bacteria/pathogens, chloride, metals or oil and grease (Oil Slicks, Benzo(a) pyrene (PAHs)).

a. Discharges to water quality limited waterbodies where nitrogen (Total Nitrogen) is the cause of the impairment, or their tributaries

    i. The requirements of this Part are applicable to:

        1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to nitrogen, or their tributaries.

            DANVILLE
            DERRY
            DOVER
            DURHAM
            EXETER
            GREENLAND
            HAMPSTEAD

HAMPTON
KINGSTON
MILTON
NEW CASTLE
NEWMARKET
NORTH HAMPTON
PORTSMOUTH
RAYMOND
ROCHESTER
ROLLINSFORD
RYE
SANDOWN
SOMERSWORTH
STRATHAM

2. Any permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is impaired due to nitrogen, or a tributary of such water.

ii. Permittees subject to Part 2.2.2.a.i above shall meet the requirements of Appendix H Part I with respect to the control of nitrogen discharges from their MS4;

iii. During development of their Notice of Intent, the permittee may determine that there are no regulated discharges of stormwater to a waterbody (or a tributary to a waterbody) on the most recent EPA-approved New Hampshire 303(d) list (as of the effective date of this permit) where Nitrogen ("Total Nitrogen) is the cause of impairment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of Part 2.2.2.a.i and Appendix H Part I.

b. Discharges to water quality limited waterbodies where phosphorus (Total Phosphorus) is the cause of the impairment, or their tributaries

i. The requirements of this Part are applicable to:

1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to phosphorus, or their tributaries.

ATKINSON
DERRY
DOVER
GOFFSTOWN
HAMPSTEAD
KINGSTON

LITCHFIELD
MANCHESTER
NEWTON
PELHAM
RAYMOND
ROLLINSFORD
SALEM
SANDOWN
SOMERSWORTH
WINDHAM

2. Any permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to phosphorus, or to a tributary of such water.

ii. The permittees subject to Part 2.2.2.b.i. above shall meet all requirements of Appendix H Part II with respect to the control of phosphorus discharges from the MS4.

iii. During development of their Notice of Intent, the permittee may determine that all discharges from the regulated area through their MS4 are outside of a watershed with a downstream segment on the most recent EPA-approved New Hampshire 303(d) list (as of the effective date of this permit) where phosphorus ("Total Phosphorus) is listed as the cause of impairment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of Part 2.2.2.b.i and Appendix H Part II.

c. Discharges to water quality limited waterbodies where bacteria or pathogens (Enterococcus, fecal coliform, or Escherichia Coli) is the cause of the impairment

i. The requirements of this Part are applicable to:

1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to bacteria or pathogens.

DERRY
EXETER
HOLLIS
HUDSON
KINGSTON
MANCHESTER
MILTON

NEW CASTLE
NORTH HAMPTON
ROCHESTER
RYE
SALEM
WINDHAM

2. Any permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to bacteria or pathogens

ii. The permittees subject to Part 2.2.2.c.i. shall meet all requirements of Appendix H Part III with respect to reduction of bacteria or pathogens discharges from the MS4.

iii. During development of their Notice of Intent, the permittee may determine that all discharges from the regulated area through their MS4 are not discharging directly to an impaired waterbody on the most recent EPA-approved New Hampshire 303(d) list where bacteria or pathogens (E. Coli, Enterococcus or Fecal Coliform) is the cause of the impairment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of Part 2.2.2.c.i and Appendix H Part III.

d. Discharges to water quality limited waterbodies where chloride (Chloride) is the cause of the impairment

i. The requirements of this Part are applicable to:

1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to chloride.

BEDFORD
DERRY
DOVER
DURHAM
EXETER
GOFFSTOWN
GREENLAND
HOOKSETT
LONDONDERRY
MANCHESTER
NASHUA
PORTSMOUTH
RYE

SALEM
SEABROOK
STRATHAM

2. Any permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to chloride.

ii. The permittees subject to Part 2.2.2.d.i. shall meet all requirements of Appendix H Part IV with respect to reduction of chloride discharges from the MS4.

iii. During development of their Notice of Intent, the permittee may determine that all discharges from the regulated area through their MS4 are not discharging directly to an impaired waterbody on the most recent EPA approved New Hampshire 303(d) list where chloride (Chloride) is the cause of the impairment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of Part 2.2.2.d.i and Appendix H Part IV.

e. Discharges to water quality limited waterbodies where solids (Total Suspended Solids (TSS) or Turbidity), metals (Cadmium, Copper, Iron, Lead or Zinc) and oil and grease (Oil Slicks, Benzo(a) pyrene (PAHs)), is the cause of the impairment

i. The requirements of this Part are applicable to:

1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to solids, oil and grease (Oil Slicks, Benzo(a) pyrene (PAHs)) or metals.

DERRY
DOVER
EXETER
GOFFSTOWN
GREENLAND
HAMPTON
LONDONDERRY
MANCHESTER
MERRIMACK
NASHUA
NEWMARKET
PORTSMOUTH
RAYMOND
ROCHESTER
SEABROOK

STRATHAM
WILTON

2. Any permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to solids, oil and grease (Oil Slicks, Benzo(a) pyrene (PAHs))or metals.

ii. The permittees subject to Part 2.2.2.e.i. shall meet all requirements of Appendix H Part V with respect to reduction of solids, oil and grease (Oil Slicks, Benzo(a) pyrene (PAHs)) or metals discharges from the MS4.

iii. During development of their Notice of Intent, the permittee may determine that all discharges from the regulated area through their MS4 are not discharging directly to an impaired waterbody on the most recent EPA approved New Hampshire 303(d) list where oil and grease (Oil Slicks, Benzo(a) pyrene (PAHs)), solids (TSS or Turbidity) or metals (Cadmium, Copper, Iron, Lead or Zinc) is the cause of the impairment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of Part 2.2.2.e.i and Appendix H Part V.

2.3 Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)

The permittee shall reduce the discharge of pollutants from the MS4 to the maximum extent practicable (MEP), as set forth in Parts 2.3.2 through 2.3.7.

2.3.1 Control Measures

a. Permittees authorized under the MS4-2003 shall continue to implement their existing SWMPs while updating their SWMPs pursuant to this permit. This permit does not extend the compliance deadlines set forth in the MS4-2003.

b. Implementation of one or more of the minimum control measures described in Parts 2.3.2- 2.3.7 or other permit requirements may be shared with another entity (including another interconnected MS4) or the other entity may fully implement the measure or requirement, if the following requirements are satisfied:

1. The other entity, in fact, implements the control measure.
2. The particular control measure or component thereof undertaken by the other entity is at least as stringent as the corresponding permit requirement.
3. The other entity agrees to implement the control measure on the permittee's behalf. The annual reports must specify that the permittee is relying on another entity to satisfy some of its permit obligations and specify what those obligations are.
4. If the permittee is relying on another governmental entity regulated under 40 CFR §122 to satisfy all of its permit obligations, including the obligation to file annual reports, the permittee shall note that fact in its NOI, but is not required to file annual reports.

5. The permittee remains responsible for compliance with all permit obligations if the other entity fails to implement the control measures (or component thereof). The permittee may enter into a legally binding agreement with the other entity regarding the other entity's performance of control measures, but the permittee remains ultimately responsible for permit compliance.

2.3.2 Public Education and Outreach

Objective: The permittee shall implement an education program that includes educational goals based on stormwater issues of significance within the MS4 area. The ultimate objective of a public education program is to increase knowledge and change behavior of the public so that pollutants in stormwater are reduced.

2.3.2.1 - The permittee shall continue to implement the public education program required by the MS4-2003 by distributing educational material to the MS4 community. The educational program shall define educational goals, express specific messages, define the targeted audience for each message, and identify responsible parties for program implementation. If appropriate for the target audience, materials may be developed in a language other than English. At a minimum, the program shall provide information concerning the impact of stormwater discharges on water bodies within the community, especially those waters that are impaired or identified as priority waters. The program shall identify steps and/or activities that the public can take to reduce the pollutants in stormwater runoff and their impacts to the environment.

a. The educational program shall include education and outreach efforts for the following four audiences: (1) residents, (2) businesses, institutions (private colleges, private schools, hospitals), and commercial facilities, (3) developers (construction), and (4) industrial facilities, unless one or more of these audiences is not present in the MS4 community. In such a situation, the MS4 must document in both the NOI and SWMP which audience(s) is(are) absent from the community. No educational messages are required to the absent audience(s).

b. Beginning the first year of the permit the permittee shall distribute a minimum of two (2) educational messages over the permit term to each audience identified in Part 2.3.2.1.a.. (The permittee shall distribute at least eight educational messages during the permit term). The distribution of materials to each audience shall be spaced at least a year apart. Educational messages may be printed materials such as brochures or newsletters; electronic materials such as websites; mass media such as newspaper articles or public service announcement (radio or cable); or displays in a public area such as town/city hall. The permittee may use existing materials if they are appropriate for the message the permittee chooses to deliver or the permittee may develop its own educational materials. The permittee may partner with other MS4s, community groups or watershed associations to implement the education program. Some EPA educational materials are available at: http://cfpub.epa.gov/npstbx/index.html.

c. The permittee shall at a minimum consider the topics listed in paragraphs 2.3.2.1c.i. – iv. when developing the outreach/education program. The topics are not exclusive and the permittee shall focus on those topics most relevant to the community.

i. Residential program: effects of outdoor activities such as lawn care (use of pesticides, herbicides, and fertilizers) on water quality; benefits of appropriate on-site infiltration of stormwater; effects of automotive work and car washing on water quality; proper disposal of swimming pool water; proper management of pet waste; maintenance of septic systems. If the small MS4 area has greater than thirty percent of its residents serviced by septic systems, the permittee shall include maintenance of septic systems as part of its education program.

iv. Business/Commercial/Institution program: proper lawn maintenance (use of pesticides, herbicides and fertilizer); benefits of appropriate on-site infiltration of stormwater; building maintenance (use of detergents); use of salt or other de-icing and anti-icing materials (minimize their use); proper storage of salt or other de-icing/anti-icing materials (cover/prevent runoff to storm system and contamination to ground water); proper storage of materials (emphasize pollution prevention); proper management of waste materials and dumpsters (cover and pollution prevention); proper management of parking lot surfaces (sweeping); proper car care activities (washing of vehicles and maintenance); and proper disposal of swimming pool water by entities such as motels, hotels, and health and country clubs (discharges must be dechlorinated and otherwise free from pollutants).

v. Developers and Construction: proper sediment and erosion control management practices; information about Low Impact Development (LID) principles and technologies; and information about EPA's construction general permit (CGP). This education can also be a part of the Construction Site Stormwater Runoff Control measure detailed in Part 2.3.5.

vi. Industrial program: equipment inspection and maintenance; proper storage of industrial materials (emphasize pollution prevention); proper management and disposal of wastes; proper management of dumpsters; minimization of use of salt or other de-icing/anti-icing materials; proper storage of salt or other de-icing/anti-icing materials (cover/prevent runoff to storm system and ground water contamination); benefits of appropriate on-site infiltration of stormwater runoff from areas with low exposure to industrial materials such as roofs or employee parking; proper maintenance of parking lot surfaces (sweeping); and requirements for coverage under EPA's Multi-Sector General Permit.

2.3.2.2 - An effective program shall show evidence of focused messages for specific audiences as well as evidence that progress toward the defined educational goals of the program has been achieved. The permittee shall identify methods that it will use to evaluate the effectiveness of the educational messages and the overall education program. Any methods used to evaluate the effectiveness of the program shall be tied to the defined goals of the program and the overall objective of changes in behavior and knowledge.

2.3.2.3 - The permittee shall modify any ineffective messages or distribution techniques for an audience prior to the next scheduled message delivery.

2.3.2.4 - The permittee shall document in each annual report the messages for each audience; the method of distribution; the measures/methods used to assess the effectiveness of the messages, and the method/measures used to assess the overall effectiveness of the education program in the annual report.

2.3.3 Public Involvement and Participation

Objective: The permittee shall provide opportunities to engage the public to participate in the review and implementation of the permittee's SWMP.

2.3.3.1 - All public involvement activities shall comply with state public notice requirements (NH: RSA Chapter 91-A). The SWMP (consistent with Part 1.10.1) and all annual reports shall be available to the public. The permittee is encouraged to satisfy this requirement by posting records online.

2.3.3.2 - The permittee shall annually provide the public an opportunity to participate in the review and implementation of the SWMP.

2.3.3.3 - The permittee shall report on the activities undertaken to provide public participation opportunities including compliance with Part 2.3.3.1. Public participation opportunities pursuant to Part 2.3.3.2 may include, but are not limited to, websites; hotlines; clean-up teams; monitoring teams; or an advisory committee.

2.3.4. Illicit Discharge Detection and Elimination (IDDE) Program

Objective: The permittee shall implement an IDDE program to systematically find and eliminate sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges.

a. Legal Authority - The IDDE program shall include adequate legal authority to: prohibit illicit discharges; investigate suspected illicit discharges; eliminate illicit discharges, including discharges from properties not owned by or controlled by the MS4 that discharge into the MS4 system; and implement appropriate enforcement procedures and actions. Adequate legal authority consists of a currently effective ordinance, by-law, or other regulatory mechanism. For permittees authorized by the MS4-2003 permit, the ordinance, by-law, or other regulatory mechanism was a requirement of the MS4-2003 permit and was required to be effective by May 1, 2008. For new permittees the ordinance, by-law, or other regulatory mechanism shall be in place within 3 years of the permit effective date.

b. During the development of the new components of the IDDE program required by this permit, permittees authorized by the MS4-2003 permit must continue to implement their existing IDDE program required by the MS4-2003 permit to detect and eliminate illicit discharges to their MS4.

2.3.4.1. Definitions and Prohibitions

The permittee shall prohibit illicit discharges and sanitary sewer overflows (SSOs) to its MS4 and require removal of such discharges consistent with Parts 2.3.4.2 and 2.3.4.4 of this permit.

An SSO is a discharge of untreated sanitary wastewater from a municipal sanitary sewer.

An illicit discharge is any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

2.3.4.2. Elimination of Illicit Discharges

a. Upon detection of an illicit discharge, the permittee shall locate, identify and eliminate the illicit discharge as expeditiously as possible. Upon identification of the illicit source the MS4 notify all responsible parties for any such discharge and require immediate cessation of improper disposal practices in accordance with its legal authorities. Where elimination of an illicit discharge within 60 days of its identification as an illicit discharge is not possible, the permittee shall establish an expeditious schedule for its elimination and report the dates of identification and schedules for removal in the permittee's annual reports. The permittee shall immediately commence actions necessary for elimination. The permittee shall diligently pursue elimination of all illicit discharges. In the interim, the permittee shall take all reasonable and prudent measures to minimize the discharge of pollutants to and from its MS4.

b. The period between identification and elimination of an illicit discharge is not a grace period. Discharges from an MS4 that are mixed with an illicit discharge are not authorized by this Permit (Part 1.3.a) and remain unlawful until eliminated.

2.3.4.3. Non-Stormwater Discharges

The permittee may presume that the sources of non-stormwater listed in Part 1.4 of this permit need not be addressed. However, if the permittee identifies any of these sources as significant contributors of pollutants to the MS4, then the permittee shall implement measures to control these sources so they are no longer significant contributors of pollutants, and/or eliminate them entirely, consistent with Part 2.3.4.

2.3.4.4. Sanitary Sewer Overflows

a. Upon detection of an SSO the permittee shall eliminate it as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from its MS4 until elimination is completed.

b. The permittee shall identify all known locations where SSOs have discharged to the

MS4 within the previous five (5) years. This shall include SSOs resulting, during dry or wet weather, from inadequate conveyance capacities, or where interconnectivity of the storm and sanitary sewer infrastructure allows for communication of flow between the systems. Within one (1) year of the effective date of the permit, the permittee shall develop an inventory of all identified SSOs indicating the following information, if available:

1. Location (approximate street crossing/address and receiving water, if any);
2. A clear statement of whether the discharge entered a surface water directly or entered the MS4;
3. Date(s) and time(s) of each known SSO occurrence (i.e., beginning and end of any known discharge);
4. Estimated volume(s) of the occurrence;
5. Description of the occurrence indicating known or suspected cause(s);
6. Mitigation and corrective measures completed with dates implemented; and
7. Mitigation and corrective measures planned with implementation schedules.

The permittee shall maintain the inventory as a part of the SWMP and update the inventory annually, all updates shall include the information in Part 2.3.4.4.b.1-7.

c. In accordance with Paragraph B.12 of Appendix B of this permit, upon becoming aware of an SSO to the MS4, the permittee shall provide oral notice to EPA within 24 hours. Additionally, the permittee shall provide written notice to EPA and NHDES within five (5) days of becoming aware of the SSO occurrence and shall include the information in the updated inventory. The notice shall contain all of the information listed in Part 2.3.4.4.b. Where common notification requirements for SSOs are included in multiple NPDES permits issued to a permittee, a single notification may be made to EPA as directed in the permittee's wastewater or CSO NPDES permit and constitutes compliance with this Part.

d. The permittee shall include and update the SSO inventory in its annual report, including the status of mitigation and corrective measures implemented by the permittee to address each SSO identified pursuant to this Part.

e. The period between detection and elimination of a discharge from the SSO to the MS4 is not a grace period. Discharges from an MS4 that are mixed with an SSO are not authorized by this Permit (Part 1.3.a) and remain unlawful until eliminated.

2.3.4.5. System mapping

The permittee shall revise their system mapping required by the MS4-2003 permit to include more detailed system information. This revised map of the MS4 shall be completed in two phases as outlined below. The mapping shall include a depiction of the permittee's separate storm sewer system in the permit area. The mapping is intended to facilitate the identification of key infrastructure and factors influencing proper system operation, and the potential for illicit sanitary sewer discharges.

a. Phase I: The system map shall be updated within two (2) years of the permit effective date to include the following information:

- Outfalls and receiving waters (required by MS4-2003 permit)
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm sewer systems
- Municipally-owned stormwater treatment structures (e.g., detention and retention basins, infiltration systems, bioretention areas, water quality swales, gross particle separators, oil/water separators, or other proprietary systems)
- Waterbodies identified by name and indication of all use impairments as identified on the most recent EPA approved New Hampshire Integrated List of waters report pursuant to Clean Water Act section 303(d) and 305(b)
- Initial catchment delineations. Any available system data and topographic information may be used to produce initial catchment delineations. For the purpose of this permit, a catchment is the area that drains to an individual outfall or interconnection.

b. Phase II: The system map shall be updated annually as the following information becomes available during implementation of catchment investigation procedures in Part 2.3.4.8. This information must be included in the map for all outfalls within ten (10) years of the permit effective date:

- Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
- Pipes
- Manholes
- Catch basins
- Refined catchment delineations. Catchment delineations shall be updated to reflect information collected during catchment investigations
- Municipal sanitary sewer system (if available)
- Municipal combined sewer system (if applicable).

c. Recommended elements to be included in the system map as information becomes available:

- Storm sewer material, size (pipe diameter) and age
- Sanitary sewer system material, size (pipe diameter) and age
- Privately-owned stormwater treatment structures
- Where a municipal sanitary sewer system exists, properties known or suspected to be served by a septic system, especially in high-density urban areas
- Area where the permittee's MS4 has received or could receive flow from septic system discharges (e.g., areas with poor soils, or high ground water elevations unsuitable for conventional subsurface disposal systems)

- Seasonal high water table elevations impacting sanitary alignments
- Topography
- Orthophotography
- Alignments, dates and representation of work completed (with legend) of past illicit discharge investigations (e.g., flow isolation, dye testing, CCTV)
- Locations of suspected, confirmed and corrected illicit discharges (with dates and flow estimates).

d. The mapping may be produced by hand or through computer-aided methods (e.g. GIS). The required scale and detail of the map shall be appropriate to facilitate a rapid understanding of the system by the permittee, EPA and the state. In addition, the mapping shall serve as a planning tool for the implementation and phasing of the IDDE program and demonstration of the extent of complete and planned investigations and corrections. The permittee shall update the mapping as necessary to reflect newly discovered information and required corrections or modifications.

e. The permittee shall report on the progress towards the completion of the system map in each annual report.

2.3.4.6. Written Illicit Discharge Detection and Elimination Program

The IDDE program shall be recorded in a written (hardcopy or electronic) document. The IDDE program shall include each of the elements described in Parts 2.3.4.7 and Part 2.3.4.8, unless the permittee provides a written explanation within the IDDE program as to why a particular element is not applicable to the permittee.

Notwithstanding the permittee's explanation, EPA may at any time determine that a particular element is in fact applicable to the permittee and require the permittee to add it to the IDDE program. The written (hardcopy or electronic) IDDE program shall be completed within one (1) year of the effective date of the permit and updated in accordance with the milestones of this Part. The permittee shall implement the IDDE program in accordance with the goals and milestones contained in this Part.

a. The written (hardcopy or electronic) IDDE program shall include a reference or citation of the authority the permittee will use to implement all aspects of the IDDE program.

b. Statement of IDDE Program Responsibilities - The permittee shall establish a written (hardcopy or electronic) statement that clearly identifies responsibilities with regard to eliminating illicit discharges. The statement shall identify the lead municipal agency(ies) or department(s) responsible for implementing the IDDE Program as well as any other agencies or departments that may have responsibilities for aspects of the program (e.g., board of health responsibilities for overseeing septic system construction; sanitary sewer system staff; inspectional services for enforcing plumbing codes; town counsel responsibilities in enforcement actions, etc.). Where multiple departments and agencies have responsibilities with respect to the IDDE

program specific areas of responsibility shall be defined and processes for coordination and data sharing shall be established and documented.

c. Program Procedures – The permittee shall include in the IDDE program all written (hardcopy or electronic) procedures developed in accordance with the requirements and timelines in Parts 2.3.4.7 and 2.3.4.8 below. At a minimum this shall include the written procedures for dry weather outfall screening and sampling and for catchment investigations.

2.3.4.7. Assessment and Priority Ranking of Outfalls/Interconnections

The permittee shall assess and priority rank the outfalls in terms of their potential to have illicit discharges and SSOs and the related public health significance. This ranking will determine the priority order for screening of outfalls and interconnections pursuant to Part 2.3.4.7.b, catchment investigations for evidence of illicit discharges and SSOs pursuant to Part 2.3.4.8, and provides the basis for determining permit milestones of this Part.

a. Outfall/Interconnection Inventory and Initial Ranking:
An initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information shall be completed within one (1) year from the effective date of the permit; an updated inventory and ranking will be provided in each annual report thereafter. The inventory shall be updated annually to include data collected in connection with the dry weather screening and other relevant inspections conducted by the permittee.

i. The outfall and interconnection inventory will identify each outfall and interconnection discharging from the MS4, record its location and condition, and provide a framework for tracking inspections, screenings and other activities under the permittee's IDDE program.

- An outfall means a point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. (40 CFR § 122.26(b)(9)). However, it is strongly recommended that a permittee inspect all accessible portions of the system as part of this process. Culverts longer than a simple road crossing shall be included in the inventory unless the permittee can confirm that they are free of any connections and simply convey waters of the United States.
- An interconnection means the point where the permittee's MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the United States or to another storm sewer system and eventually to a water of the United States.

ii. The permittee shall classify each of the permittee's outfalls and interconnections into one of the following categories:

- Problem Outfalls: Outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information shall be designated as Problem Outfalls. This shall include any outfalls/interconnections where previous screening indicates likely sewer input.[4] Problem Outfalls need not be screened pursuant to Part 2.3.4.7.b.
- High Priority Outfalls: Outfalls/interconnections that have not been classified as Problem Outfalls and that are:
  - discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds;
  - determined by the permittee as high priority based on the characteristics listed below or other available information;
- Low Priority Outfalls: Outfalls/interconnections determined by the permittee as low priority based on the characteristics listed below or other available information.
- Excluded outfalls: outfalls/interconnections with no potential for illicit discharges may be excluded from the IDDE program. This category is limited to roadway drainage in undeveloped areas with no dwellings and no sanitary sewers; drainage for athletic fields, parks or undeveloped green space and associated parking without services; cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.

iii. The permittee shall priority rank outfalls into the categories above (except for excluded outfalls), based on the following characteristics of the defined initial catchment area where information is available:

- Past discharge complaints and reports.
- Poor receiving water quality- the following guidelines are recommended to identify waters as having a high illicit discharge potential: exceeding water quality standards for bacteria; ammonia levels above 0.5 mg/l; surfactants levels greater than or equal to 0.25 mg/l.
- Density of generating sites- Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to, car dealers; car washes; gas stations;

[4] Likely sewer input indicators are any of the following:
- Olfactory or visual evidence of sewage,
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine.

garden centers; and industrial manufacturing areas.

- Age of development and infrastructure – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.
- Sewer conversion – contributing catchment areas that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.
- Historic combined sewer systems – contributing areas that were once serviced by a combined sewer system, but have been separated may have a high illicit discharge potential.
- Surrounding density of aging septic systems – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.
- Culverted streams – any river or stream that is culverted for distances greater than a simple roadway crossing may have a high illicit discharge potential.
- Water quality limited waterbodies that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.
- The permittee may also consider additional relevant characteristics, including location-specific characteristics; if so, the permittee shall include the additional characteristics in its written (hardcopy or electronic) IDDE program.

b. Dry Weather Outfall and Interconnection Screening and Sampling

All outfalls/interconnections (excluding Problem and excluded Outfalls) shall be inspected for the presence of dry weather flow within three (3) years of the permit effective date. The permittee shall screen all High and Low Priority Outfalls in accordance with their initial ranking developed at Part 2.3.4.7.a.

i. Written procedure: The permittee shall develop an outfall and interconnection screening and sampling procedure to be included in the IDDE program within one (1) year of the permit effective date. This procedure shall include the following procedures for:

- sample collection,
- use of field kits,
- storage and conveyance of samples (including relevant hold times), and
- field data collection and storage.

An example screening and sampling protocol (*EPA New England Bacterial Source Tracking Protocol*) can be found on EPA's website.

ii. Weather conditions: Dry weather screening and sampling shall proceed only when

no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring.

iii. Screening requirements: For each outfall/interconnection:

1. The permittee shall record all of the following information and include it in the outfall/interconnection inventory and priority ranking:

    - unique identifier,
    - receiving water,
    - date of most recent inspection,
    - dimensions,
    - shape,
    - material (concrete, PVC),
    - spatial location (latitude and longitude with a minimum accuracy of +/-30 feet,
    - physical condition,
    - indicators of potential non-stormwater discharges (including presence or evidence of suspect flow and sensory observations such as odor, color, turbidity, floatables, or oil sheen).

2. If an outfall/interconnection is inaccessible or submerged, the permittee shall proceed to the first accessible upstream manhole or structure for the observation and sampling and report the location with the screening results.

3. If no flow is observed, but evidence of illicit flow exists, the permittee shall revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow (proceed as in iv. below).

4. Where dry weather flow is found at an outfall/interconnection, at least one (1) sample shall be collected, and:

    a) Samples shall be analyzed at a minimum for:

        - ammonia,
        - chlorine,
        - conductivity,
        - salinity,
        - *E. coli* (freshwater receiving water) or enterococcus (saline or brackish receiving water),
        - surfactants (such as MBAS),
        - temperature, and

- pollutants of concern[5]

b) All analyses with the exception of indicator bacteria and pollutants of concern can be performed with field test kits or field instrumentation and are not subject to 40 CFR Part 136 requirements. Sampling for bacteria and pollutants of concern shall be conducted using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136. Sampling for ammonia and surfactants must use sufficiently sensitive methods to detect those parameters at or below the threshold indicator concentrations of 0.5 mg/L for ammonia and 0.25 mg/L for surfactants. Sampling for residual chlorine must use a method with a detection limit of 0.02 mg/L or 20 ug/L.

iv. The permittee may rely on screening conducted under the MS4-2003 permit, pursuant to an EPA enforcement action, or by the state or EPA to the extent that it meets the requirements of Part 2.3.4.7.b.iii.4. All data shall be reported in each annual report. Permittees that have conducted substantially equivalent monitoring to that required by Part 2.3.4.7.b as part of an EPA enforcement action can request an exemption from the requirements of Part 2.3.4.7.b by submitting a written request to EPA and retaining exemption approval from EPA as part of the SWMP. Until the permittee receives formal written approval of the exemption from Part 2.3.4.7.b from EPA the permittee remains subject to all requirements of Part 2.3.4.7.b.

v. The permittee shall submit all screening data used in compliance with this Part in its Annual Report.

c. <u>Follow-up ranking of outfalls and interconnections</u>:

i. The permittee's outfall and interconnection ranking (2.3.4.7.a) shall be updated to reprioritize outfalls and interconnections based on information gathered during dry weather screening (Part 2.3.4.7.b).

ii. Outfalls/interconnections where relevant information was found indicating sewer input to the MS4 or sampling results indicating sewer input[6] shall be considered highly likely to contain illicit discharges from sanitary sources, and such

[5] Where the discharge is directly into a water quality limited water or a water subject to an approved TMDL as indicated in Appendix F; the sample shall be analyzed for the pollutant(s) of concern identified as the cause of the impairment as specified in Appendix G

[6] Likely sewer input indicators are any of the following:
- Olfactory or visual evidence of sewage,
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine.

outfalls/interconnections shall be ranked at the top of the High Priority Outfalls category for investigation. At this time, permittees may choose to rank other outfalls and interconnections based on any new information from the dry weather screening.

iii. The ranking can be updated continuously as dry weather screening information becomes available, but shall be completed within three (3) years of the effective date of the permit.

2.3.4.8. Catchment Investigations

The permittee shall develop a systematic procedure to investigate each catchment associated with an outfall or interconnection within their MS4 system.

a. Timelines:

- A written catchment investigation procedure (hardcopy or electronic) shall be developed within 18 months of the permit effective date in accordance with the requirements of Part 2.3.4.8.b below.
- Investigations of catchments associated with Problem Outfalls shall begin no later than two (2) years from the permit effective date.
- Investigations of catchments associated with High and Low Priority Outfalls shall follow the ranking of outfalls updated in Part 2.3.4.7.c.
- Investigations of catchments associated with Problem Outfalls shall be completed within seven (7) years of the permit effective date
- Investigations of catchments where any information gathered on the outfall/interconnection identifies sewer input[7] shall be completed within seven (7) years of the permit effective date.
- Investigations of catchments associated with all High- and Low-Priority Outfalls shall be completed within ten (10) years of the permit effective date.

*For the purposes of these milestones, an individual catchment investigation will be considered complete if all relevant procedures in Part 2.3.4.8.c. and 2.3.4.8.d. below have been completed.

b. A written catchment investigation procedure shall be developed that:

i. **Identifies maps, historic plans and records, and other sources of data**, including but not limited to plans related to the construction of the storm drain and of sanitary sewers, prior work performed on the storm drains or sanitary sewers, board of health or other municipal data on septic system failures or

[7] Likely sewer input indicators are any of the following:
- Olfactory or visual evidence of sewage,
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and detectable levels of chlorine.

required upgrades, and complaint records related to SSOs, sanitary sewer surcharges, and septic system breakouts. These data sources will be used in identifying system vulnerability factors within each catchment.

ii. **Includes a manhole inspection methodology** that shall describe a storm drain network investigation that involves systematically and progressively observing, sampling (as required below) and evaluating key junction manholes (see definition in Appendix A) in the MS4 to determine the approximate location of suspected illicit discharges or SSOs. The manhole inspection methodology may either start from the outfall and work up the system or start from the upper parts of the catchment and work down the system or be a combination of both practices. Either method must, at a minimum, include an investigation of each key junction manhole within the MS4, even where no evidence of an illicit discharge is observed at the outfall. The manhole inspection methodology must describe the method the permittee will use. The manhole inspection methodology shall include procedures for dry and wet weather investigations.

iii. **Establishes procedures to isolate and confirm sources of illicit discharges** where manhole investigations or other physical evidence or screening has identified that MS4 alignments are influenced by illicit discharges or SSOs. These shall include isolation of the drainage area for implementation of more detailed investigations, inspection of additional manholes along the alignment to refine the location of potential contaminant sources, and methods such as sandbagging key junction manhole inlets, targeted internal plumbing inspections, dye testing, video inspections, or smoke testing to isolate and confirm the sources.

c. <u>Requirements for each catchment investigation associated with an outfall/interconnection</u>:

i. For each catchment being investigated, the permittee shall review relevant mapping and historic plans and records gathered in accordance with Part 2.3.4.8.b.i. This review shall be used to identify areas within the catchment with higher potential for illicit connections. The permittee shall identify and record the presence of any of the following specific **System Vulnerability Factors (SVFs)**:

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages;
- Common or twin-invert manholes serving storm and sanitary sewer alignments;
- Common trench construction serving both storm and sanitary sewer alignments;
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system;
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system;
- Inadequate sanitary sewer level of service (LOS) resulting in regular

surcharging, customer back-ups, or frequent customer complaints;
- Areas formerly served by combined sewer systems;
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

EPA recommends the permittee include the following in their consideration of System Vulnerability Factors:

- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs;
- Any sanitary sewer and storm drain infrastructure greater than 40 years old;
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance);
- History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance);

The permittee shall document the presence or absence of System Vulnerability Factors for each catchment, retain this documentation as part of its IDDE program, and report this information in Annual Reports. Catchments with a minimum of one (1) System Vulnerability Factor are subject to wet weather sampling requirements of Part 2.3.4.8.c.ii.2.

ii. For each catchment, the permittee must inspect key junction manholes and gather catchment information on the locations of MS4 pipes, manholes, and the extent of the contributing catchment.

1. <u>For all catchments</u>
   a) Infrastructure information shall be incorporated into the permittee's mapping required at Part 2.3.4.5; the permittee will refine their catchment delineation based on the field investigation where appropriate.
   b) The SVF inventory for the catchment will be updated based on information obtained during the inspection, including common (twin invert) manholes, directly piped connections between storm drains and sanitary sewer infrastructure, common weir walls, sanitary sewer underdrain connections and other structural vulnerabilities where sanitary discharges could enter the storm drain system during wet weather.
      1) **Where a minimum of one (1) SVF is identified based on previous information or the investigation, a wet weather investigation must be conducted at the associated outfall (see**

below).

c) During dry weather, key junction manholes[8] shall be opened and inspected systematically for visual and olfactory evidence of illicit connections (e.g., excrement, toilet paper, gray filamentous bacterial growth, or sanitary products present).
   1) If flow is observed, the permittee shall sample the flow at a minimum for ammonia, chlorine and surfactants and can use field kits for these analyses.
   2) Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs, the area draining to the junction manhole shall be flagged for further upstream investigation.

d) Key junction and subsequent manhole investigations will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes. If no evidence of an illicit discharge is found, catchment investigations will be considered complete upon completion of key junction manhole sampling.

2. <u>For all catchments with a minimum of one (1) SVF identified</u>
   a) The permittee shall meet the requirements above for dry weather screening
   b) The permittee shall inspect and sample under wet weather conditions to the extent necessary to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in discharges of sanitary flow to the MS4.
      1) The permittee shall conduct at least one wet weather screening and sampling at the outfall that includes the same parameters required during dry weather screening, Part 2.3.4.7.b.iii.4.
      2) Wet weather sampling and screening shall proceed during or after a storm event of sufficient depth or intensity to produce a stormwater discharge. EPA strongly recommends sampling during the spring (March through June) when groundwater levels are relatively high.
      3) The permit does not require a minimum rainfall event prior to wet weather screening. However, permittees may incorporate provisions that assist in targeting such discharges, including avoiding sampling during the initial period of discharge ("first flush") and/or identifying minimum storm event intensities likely to trigger sanitary sewer interconnections.
   c) This sampling can be done upon completion of any dry weather investigation but must be completed before the catchment investigation is

[8] Where catchments do not contain junction manholes, the dry weather screening and sampling shall be considered as meeting the manhole inspection requirement. In these catchments, dry weather screenings that indicate potential presence of illicit discharges shall be further investigated pursuant to part 2.3.4.8.d. Investigations in these catchments may be considered complete where dry weather screening reveals no flow; no evidence of illicit discharges or SSOs is indicated through sampling results or visual or olfactory means; and no wet weather System Vulnerability Factors are identified.

marked as complete.

iii. All data collected as part of the dry and wet weather catchment investigations shall be recorded and reported in each annual report.

d. Identification/Confirmation of illicit source
Where the source of an illicit discharge has been approximated between two manholes in the permittee's MS4, the permittee shall isolate and identify/confirm the source of the illicit discharge using more detailed methods identified in their written procedure (2.3.4.8.b.iii). For outfalls that contained evidence of an illicit discharge, catchment investigations will be considered complete upon confirmation of all illicit sources.

e. Illicit discharge removal
When the specific source of an illicit discharge is identified, the permittee shall exercise its authority as necessary to require its removal pursuant to Part 2.3.4.2 or 2.3.4.3.

i. For each confirmed source the permittee shall include in the annual report the following information:

- the location of the discharge and its source(s);
- a description of the discharge;
- the method of discovery;
- date of discovery;
- date of elimination, mitigation or enforcement action OR planned corrective measures and a schedule for completing the illicit discharge removal; and
- estimate of the volume of flow removed.

ii. Within one year of removal of all identified illicit discharges within a catchment area, confirmatory outfall or interconnection screening shall be conducted. The confirmatory screening shall be conducted in dry weather unless System Vulnerability Factors have been identified, in which case both dry weather and wet weather confirmatory screening shall be conducted. If confirmatory screening indicates evidence of additional illicit discharges, the catchment shall be scheduled for additional investigation.

2.3.4.9. Indicators of IDDE Program Progress

The permittee shall define or describe indicators for tracking program success and evaluate and report on the overall effectiveness of the IDDE program in each annual report. At a minimum the permittee shall document in each annual report:

- the number of SSOs and illicit discharges identified and removed,
- the number and percent of total outfall catchments served by the MS4

evaluated using the catchment investigation procedure,
- all dry weather and wet weather screening and sampling results and
- the volume of sewage removed

2.3.4.10 Ongoing Screening

Upon completion of all catchment investigations pursuant to Part 2.3.4.8.c and illicit discharge removal and confirmation (if necessary) pursuant to paragraph 2.3.4.8.e, each outfall or interconnection shall be reprioritized for screening in accordance with Part 2.3.4.7.a and scheduled for ongoing screening once every five years. Ongoing screening shall consist of dry weather screening and sampling consistent with Part 2.3.4.7.b; wet weather screening and sampling shall also be required at outfalls where wet weather screening was required due to SVFs and shall be conducted in accordance with Part 2.3.4.8.c.ii. All sampling results shall be reported in the permittee's annual report.

2.3.4.11 Training

The permittee shall, at a minimum, annually provide training to employees involved in IDDE program about the program, including how to recognize illicit discharges and SSOs. The permittee shall report on the frequency and type of employee training in the annual report.

2.3.5 Construction Site Stormwater Runoff Control

Objective: The objective of an effective construction stormwater runoff control program is to minimize or eliminate erosion and maintain sediment on construction sites so that it is not transported in stormwater and allowed to discharge to a water of the U.S. through the permittee's MS4.

The construction site stormwater runoff control program required by this permit is a separate and distinct program from EPA's stormwater construction permit program (see https://www.epa.gov/npdes/stormwater-discharges-construction-activities#cgp for further information).

2.3.5.1 – Permittees shall implement and enforce a program to reduce pollutants in any stormwater runoff discharged to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. The permittee's program shall include disturbances less than one acre if that disturbance is part of a larger common plan of development or sale that would disturb one acre or more. Permittees authorized under the MS4-2003 shall continue to implement their existing programs and shall modify them as necessary to meet the requirements of this Part.

2.3.5.2 - The permittee does not need to apply its construction program requirements to projects that receive a waiver from EPA under the provisions of 40 CFR § 122.26(b) (15) (i).

2.3.5.3 - The construction site stormwater runoff control program shall include the elements in Paragraphs a. through e. of this Part:

a. An ordinance or other regulatory mechanism that requires the use of sediment and erosion control practices at construction sites. In addition to addressing sediment and erosion control, the ordinance must include controls for other wastes on constructions sites such as demolition debris, litter and sanitary wastes. Development of an ordinance or other regulatory mechanism was a requirement of the MS4-2003 (See Part III.B.4) and was required to be effective by May 1, 2008.

b. Written procedures (hardcopy or electronic) for site inspections and enforcement of sediment and erosion control measures. If not already existing, these procedures shall be completed within one (1) year from the effective date of the permit. The procedures shall clearly define who is responsible for site inspections as well as who has authority to implement enforcement procedures. The program shall provide that the permittee may, to the extent authorized by law, impose sanctions to ensure compliance with the local program. These procedures and regulatory authorities shall be documented in the SWMP.

c. Requirements for construction operators to implement a sediment and erosion control program. The program shall include BMPs appropriate for the conditions at the construction site. The program may include references to BMP design standards in state manuals or design standards specific to the MS4. EPA supports and encourages the use of design standards in local programs. Examples of appropriate sediment and erosion control measures for construction sites include local requirements to:

    - minimize the amount of disturbed area and protect natural resources;
    - stabilize sites when projects are complete or operations have temporarily ceased;
    - protect slopes on the construction site;
    - protect all storm drain inlets and armor all newly constructed outlets;
    - use perimeter controls at the site;
    - stabilize construction site entrances and exits to prevent off-site tracking; and
    - inspect stormwater controls at consistent intervals.

d. Requirements to control wastes, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes. These wastes may not be discharged to the MS4.

e. Written procedures (hardcopy or electronic) for site plan review. If not already existing, the procedure for site plan review shall be completed within one (1) year from the effective date of the permit. Site plan review shall include a review by the permittee of the site design, the planned operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development. The review procedure shall incorporate procedures for the consideration of potential water quality impacts; procedures for pre-construction review; and procedures

for receipt and consideration of information submitted by the public. Site plan review procedure shall include evaluation of opportunities for use of low impact design and green infrastructure. When the opportunity exists, the permittee shall encourage project proponents to incorporate these practices into the site design. The permittee shall track the number of site reviews, inspections, and enforcement actions. This information shall be included as part of each annual report required by Part 4.4.

2.3.6 Stormwater Management in New Development and Redevelopment (Post Construction Stormwater Management)

Objective: The objective of this control measure is to minimize the water quality impact from new development and reduce the water quality impact due to stormwater runoff from a redeveloped site.

a. Permittees shall develop, implement, and enforce a program to address post-construction stormwater runoff from all new development and redevelopment projects that disturb a minimum of one or more acre(s) and discharge into the permittees MS4 at a minimum. Permittees authorized under the MS4-2003 permit shall continue to implement and enforce their program and modify as necessary to meet the requirements of this Part.

   i. The permittee's new development/ redevelopment program shall include projects less than one acre if the project is part of a larger common plan of development or redevelopment which disturbs one or more acre.

   ii. The permittee shall develop or modify, as appropriate, an ordinance or other regulatory mechanism within two (2) years of the effective date of the permit to be consistent with Section 4 Element C and Element D of the Southeast Watershed Alliance's Model Stormwater Standards for Coastal Watershed Communities[9]; OR contain provisions that are as least as stringent as the following:

      a) Low Impact Development (LID) site planning and design strategies must be used to the maximum extent feasible in order to reduce the discharge of stormwater from new development.

      b) Salt storage areas on commercial and industrial new and redevelopment sites shall be covered and loading/offloading areas shall be designed and maintained in accordance with NH DES published guidance (Fact Sheets WD-WMB-4[10] and WD-DWGB-22-30[11]) such that no untreated discharge to receiving waters results. Snow storage areas shall be located in

[9] Model Stormwater Standards for Coastal Watershed Communities, Southeast Watershed Alliance, December 2012. http://southeastwatershedalliance.org/wp-content/uploads/2013/05/Final_SWA_SWStandards_Dec_20121.pdf.
[10] Environmental Fact Sheet: Road Salt and Water Quality, New Hampshire Department of Environmental Services, 2016. http://des.nh.gov/organization/commissioner/pip/factsheets/wmb/documents/wmb-4.pdf.
[11] Environmental Fact Sheet: Storage and Management of Deicing Materials, New Hampshire Department of Environmental Services, 2011. http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-22-30.pdf.

accordance with NH DES published guidance (Fact Sheets WD-WMB-4 and WD-DWGB-22-30) such that no direct untreated discharges to receiving waters are possible from the storage site. Runoff from snow and salt storage areas shall enter treatment areas as specified above before being discharged to receiving waters or allowed to infiltrate into the groundwater.

c) The selection and design of treatment and infiltration practices shall follow the guidance in Volume 2 of the New Hampshire Stormwater Manual[12], where applicable.

d) Post construction stormwater runoff from new development sites shall be controlled by:

1) Retention or treatment of stormwater runoff to the MS4 by one of the following:
   a. Require BMPs that are designed to retain the Water Quality Volume calculated in accordance with N.H. Code Admin. R. Part Env-Wq 1504.10. OR
   b. Require BMPs that are designed to remove 90% of the average annual load of Total Suspended Solids (TSS) generated from the total post-construction impervious area[13] AND 60% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious area[14]. Pollutant removal shall be evaluated consistent with Attachment 3 to Appendix F and the Stormwater Best Management Practices (BMP) Performance Analysis[15] or other tools provided by EPA Region 1 consistent with these resources. If EPA Region 1 tools do not address the planned or installed BMP performance any federally or State approved[16] BMP design guidance or performance standards (e.g. State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance.
2) Implement long term maintenance practices of BMPs in accordance with N.H. Code Admin. R. Part Env-Wq 1507.08.

[12] New Hampshire Stormwater Manual Volume 2: Post-Construction Best Management Practices Selection & Design, New Hampshire Department of Environmental Services, December, 2008. http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-08-20b.pdf.
[13] The required removal percentage is not required for each storm, it is the average removal over a year that is required
[14] The required removal percentage is not required for each storm, it is the average removal over a year that is required
[15] Stormwater Best Management Practices (BMP) Performance Analysis, Tetra Tech, Inc. for U.S. EPA Region 1, Rev. March 2010. https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/BMP-Performance-Analysis-Report.pdf.
[16] State approved includes any state in the United States, including, but not limited to, approved guidance by the State of New Hampshire

e) Post construction stormwater runoff from redevelopment sites shall be controlled by:

1) Retention or treatment of stormwater runoff from the disturbed portion of the redevelopment site to the MS4 by one of the following:
   a. Require BMPs that are designed to retain or treat the Water Quality Volume calculated in accordance with N.H. Code Admin. R. Part Env-Wq 1504.10 and be designed to remove pollutants in accordance with N.H. Code Admin. R. Part Env-Wq 1507.03; OR
   b. Require BMPs that remove 80% of the average annual load of Total Suspended Solids (TSS) generated from the total post-construction impervious area[17] AND 50% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface[18]. Pollutant removal shall be calculated consistent with EPA Region 1's BMP Performance Extrapolation Tool or other BMP performance evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP performance, any federally or State approved[19] BMP design guidance or performance standards (e.g. State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance.
2) Implement long term maintenance practices of BMPs in accordance with N.H. Code Admin. R. Part Env-Wq 1507.08.
3) Offsite mitigation within the same USGS HUC10 or smaller watershed as the redevelopment site may be used to meet the pollutant removal equivalent of the requirements in Part 2.3.6(a)ii.(e)(1)b. and the equivalent groundwater recharge requirements of Part 2.3.6(a)ii.(e)(2) above.

f) Redevelopment that disturbs greater than 1 acre and is exclusively maintenance and improvement of existing roadways shall be exempt from Part 2.3.6(a)ii.(e). Roadway maintenance or improvements that increase the amount of impervious area on the redevelopment site shall meet the requirements of Part 2.3.6(a)ii.(e) fully.

b. For projects subject to the ordinances required by this Part the permittee shall require the submission of as-built drawings within a specified time frame, not to exceed two years from completion of construction projects at a minimum. The as-built drawings must

[17] The required removal percentage is not required for each storm,it is the average removal over a year that is required
[18] The required removal percentage is not required for each storm,it is the average removal over a year that is required
[19] State approved includes any state in the United States, including, but not limited to, approved guidance by the State of New Hampshire

depict all on-site controls designed to manage the stormwater associated with the completed site (post-construction stormwater management). The new development/redevelopment program shall have procedures to ensure adequate long-term operation and maintenance of stormwater management practices that remain in place after the completion of a construction project. These procedures may include the use of dedicated funds or escrow accounts for development projects or the acceptance of ownership by the permittee of all privately owned BMPs. These procedures may also include the development of maintenance contracts between the owner of the BMP and the permittee. Alternatively, these procedures may include the submission of an annual certification documenting the work that has been done over the last 12 months to properly operate and maintain the stormwater control measures. The procedures to require submission of as-built drawings and ensure long term operation and maintenance shall be a part of the SWMP. The permittee shall report in the annual report on the measures that the permittee has utilized to meet this requirement.

c. Within four (4) years of the effective date of this permit, the permittee shall develop a report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover. This assessment shall be used to provide information to determine if the design standards for streets and parking lots can be modified to support low impact design options. If the assessment indicates that changes can be made, the assessment shall include recommendations and proposed schedules to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs. The permittee shall implement all recommendations, in accordance with the schedules contained in the assessment. The permittee shall involve any local planning boards and local transportation boards in this assessment to the extent feasible. The permittee shall report in each annual report on the status of this assessment including any planned or completed changes to local regulations and guidelines.

d. Within four (4) years from the effective date of the permit, the permittee shall develop a report assessing existing local regulations including, but not limited to, zoning and construction codes to determine the feasibility of making, at a minimum, the following green infrastructure practices allowable when appropriate site conditions exist:
    1. Green roofs;
    2. Infiltration practices such as rain gardens, curb extensions, planter gardens, porous and pervious pavements, and other designs to manage stormwater using landscaping and structured or augmented soils; and
    3. Water harvesting devices such as rain barrels and cisterns, and the use of stormwater for non-potable uses.

    The assessment shall indicate whether and under what circumstances the practices are allowed in the MS4 jurisdiction. If the practices are not allowed, the permittee shall identify impediments to the use of these practices, and what changes in local regulations may be made to make them allowable, and provide a schedule for implementation of recommendations. The permittee shall implement all recommendations, in accordance with the schedules contained in the assessment. The permittee shall report in each annual

report on its findings and progress towards making the practices allowable. (Information available at: http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/AddressingBarrier2LID.pdf)

e. Within four (4) years from the effective date of this permit, the permittee shall complete an inventory and priority ranking of permittee-owned property and existing infrastructure that could be retrofitted with BMPs designed to reduce the frequency, volume and pollutant loads of stormwater discharges to its MS4 through the mitigation of impervious area. Properties and infrastructure for consideration shall include those with the potential for mitigation of on-site impervious area, as well as those that could provide mitigation of off-site impervious area. At a minimum, permittees shall consider municipal property with significant impervious area (including parking lots, buildings, and maintenance yards) that could be mitigated, and open space and undeveloped land available to mitigate impervious area and associated stormwater from proximate offsite properties. MS4 infrastructure to be considered includes existing street right-of-ways, outfalls and conventional stormwater conveyances and controls (including swales and detention practices) that could be readily modified to provide reduction in frequency, volume or pollutant loads of such discharges through the mitigation of impervious cover. The permittee may also include in its inventory properties and infrastructure that are privately-held or that do not contribute stormwater to its MS4.

   The inventory and priority ranking shall, at minimum, be a screening level ranking that may be based on existing or readily obtainable data. In determining the potential for retrofitting particular properties, the permittee shall consider, on a screening level and subject to availability of data, factors such as access for maintenance purposes; subsurface geology; depth to water table; site slope and elevation; and proximity to aquifers and subsurface infrastructure including sanitary sewers and septic systems. The permittee may consider public safety when evaluating potential retrofits and any other information the permittee deems relevant to the ranking. In determining its priority ranking, the permittee shall consider, on a screening level and subject to availability of data, factors such as schedules for planned capital improvements to storm and sanitary sewer infrastructure and paving projects; current storm sewer level of service; and control of discharges to impaired waters, first or second order streams, and critical receiving waters; the complexity and cost of implementation; and opportunities for public use and education. For the purposes of this Part, critical receiving waters include public swimming beaches, public drinking water supply sources, outstanding resource waters, cold water fisheries, and shellfish growing areas.

   Beginning with the fifth year annual report and in each subsequent annual report, the permittee shall report on those permittee-owned properties and infrastructure inventoried pursuant to Part 2.3.6.e. that have been retrofitted with BMPs to mitigate impervious area. The permittee may also include in its annual report non-MS4 owned property that has been retrofitted with BMPs to mitigate impervious area.

2.3.7 Good House Keeping and Pollution Prevention for Municipal Operations

Objective: The permittee shall implement an operations and maintenance program for permittee

operations that includes a training component and has a goal of preventing or reducing pollutant runoff and protecting water quality from all permittee operations.

2.3.7.1 - Operations and Maintenance (O & M) Programs
Within two (2) years from the effective date of the permit, the permittee shall develop, if not already developed, written (hard copy or electronic) operations and maintenance procedures for the municipal activities listed below in Parts 2.3.7.1.a–c. These written O & M procedures shall be included as part of the SWMP.

The permittee must develop an inventory of all such facilities within two (2) years of the effective date of this permit. The permittee shall review this inventory annually and update as necessary.

a. Parks and open space: Establish procedures to address the proper use, storage, and disposal of pesticides, herbicides, and fertilizers (PHF) including minimizing the use of these products and using them only in accordance manufacturer's instruction. Evaluate lawn maintenance and landscaping activities to ensure practices are protective of water quality. Protective practices include reduced use of PHFs, integrated pest management (IPM), recycling or proper disposal of lawn clippings and other vegetative waste, and use of native and drought resistant landscaping materials. Establish procedures for management of trash containers at parks (scheduled cleanings; sufficient number), and for placing signage in areas concerning the proper disposal of pet wastes. Establish procedures to address waterfowl congregation areas where appropriate to reduce waterfowl droppings from entering the MS4. Establish procedures to address erosion or poor vegetative cover when the permittee becomes aware of it; especially if the erosion is within 50 feet of a surface water.

b. Buildings and facilities where pollutants are exposed to stormwater runoff: This includes schools (to the extent they are permittee-owned or operated), town offices, police, and fire stations, municipal pools and parking garages and other permittee-owned or operated buildings or facilities. Evaluate the use, storage, and disposal of petroleum products and other potential stormwater pollutants. Provide employee training as necessary so that those responsible for handling these products know proper procedures. Ensure that Spill Prevention Plans are in place, if applicable, and coordinate with the fire department as necessary. Develop management procedures for dumpsters and other waste management equipment. Sweep parking lots and keep areas surrounding the facilities clean to reduce runoff of pollutants.

c. Vehicles and Equipment: Establish procedures for the storage of permittee vehicles. Vehicles with fluid leaks shall be stored indoors or containment shall be provided until repaired. Evaluate fueling areas owned by the permittee or used by permittee vehicles. If possible, place fueling areas under cover in order to minimize exposure. Establish procedures to ensure that vehicle wash waters are not discharged to the municipal storm sewer system or to surface waters. This permit does not authorize such discharges.

d. Infrastructure Operations and Maintenance

i. The permittee shall establish within two (2) years of the effective date of the permit a written program (hardcopy or electronic) detailing the activities and procedures the permittee will implement so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4. If the permittee has an existing program to maintain its MS4 infrastructure in a timely manner to reduce or eliminate the discharge of pollutants from the MS4, the permittee shall document the program in the SWMP.

ii. The permittee shall conduct routine inspections, cleaning and maintenance of catch basins such that the following conditions are met:

- Establish a schedule with the goal that the frequency of routine cleaning will ensure that no catch basin at any time will be more than 50% full. A catch basin sump is more than 50% full if the contents within the sump exceed one half the distance between the bottom interior of the catch basin to the invert of the deepest outlet of the catch basin.
- Prioritize a 50% full limit for any catch basins serving catchments draining to impaired waters where the pollutant of concern is sedimentation/siltation, Nitrogen (Total) or Phosphorus (Total). If the majority of the waters are impaired, the permittee shall prioritize cleaning efforts based on the cause of the impairment and the potential for the MS4 to contribute to the impairment. The permittee shall document its prioritization in the SWMP.
- Prioritize inspection and maintenance for catch basins located near construction activities (roadway construction, residential, commercial, or industrial development or redevelopment). Clean catch basins in such areas more frequently if inspection and maintenance activities indicate excessive sediment or debris loadings.
- If a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events, the permittee shall document that finding, investigate the contributing drainage area for sources of excessive sediment loading, and to the extent practicable, abate contributing sources. The permittee shall describe any actions taken in its annual report.
- The permittee shall document in the SWMP and in the first annual report its plan for optimizing catch basin cleaning, inspection plans, or its schedule for gathering information to develop the optimization plan. Documentation shall include metrics and other information used to reach the determination that the established plan for cleaning and maintenance is optimal for the MS4. The permittee shall keep a log of catch basins cleaned or inspected.
- The permittee shall report in each annual report the total number of catch basins, number inspected, number cleaned, and the total volume or mass of material removed from all catch basins.

iii. The permittee shall establish and implement procedures for sweeping and/or cleaning streets and permittee-owned parking lots. All streets with curbing and/or

catch basins in the MS4 regulated area shall be swept and/or cleaned a minimum of once per year in the spring (following winter activities such as sanding). The procedures shall also include more frequent sweeping of targeted areas determined by the permittee on the basis of pollutant load reduction potential, based on inspections, pollutant loads, catch basin cleaning or inspection results, land use, impaired or TMDL waters or other relevant factors as determined by the permittee. The permittee shall report in each annual report the number of miles cleaned and the volume or mass of material removed.

iv. The permittee shall ensure proper storage of catch basin cleanings and street sweepings prior to disposal or reuse such that they do not discharge to receiving waters.

v. The permittee shall establish and implement procedures for winter road maintenance including the use and storage of salt and sand; minimize the use of sodium chloride and other salts, and evaluate opportunities for use of alternative materials; and ensure that snow disposal activities do not result in disposal of snow into waters of the United States. See NHDES, Fact Sheet WMB-3 Snow Disposal, for guidance as to selection and maintenance of snow disposal areas. For purposes of this MS4 Permit, salt shall mean any chloride-containing material used to treat paved surfaces for deicing, including sodium chloride, calcium chloride, magnesium chloride, and brine solutions.

vi. The permittee shall establish and implement inspection and maintenance frequencies and procedures for the storm drain systems and for all stormwater treatment structures such as water quality swales, retention/detention basins, infiltration structures, proprietary treatment devices or other similar structures. All permittee-owned stormwater treatment structures (excluding catch basins) shall be inspected annually at a minimum.

e. The permittee shall report in the annual report on the status of the inventory required by this Part and any subsequent updates; the status of the O&M programs for the permittee-owned facilities and activities in Parts 2.3.7.1.a. – d. of this section; and the maintenance activities associated with each.

f. The permittee shall keep a written record (hardcopy or electronic) of all required activities including but not limited to maintenance activities, inspections and training required by Part 2.3.7.1. The permittee shall maintain, consistent with Part 4.2.1, all records associated with maintenance and inspection activities required by Part 2.3.7.1

2.3.7.2 - Stormwater Pollution Prevention Plan (SWPPP)
The permittee shall develop and fully implement a SWPPP for each of the following permittee-owned or operated facilities: maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater. If facilities are located at the same property, the permittee may develop one SWPPP for the entire property. The SWPPP is a separate and different document from the SWMP required in Part 1.10. A SWPPP

does not need to be developed for a facility if the permittee has either developed a SWPPP or received a no exposure certification for the discharge under the Multi-Sector General Permit or the discharge is authorized under another NPDES permit.

a. No later than two years from the effective date of the permit, the permittee shall develop and implement a written SWPPP for the facilities described above. The SWPPP shall be signed in accordance with the signatory requirements of Appendix B – Subparagraph 11.

b. The SWPPP shall contain the following elements:

i. Pollution Prevention Team
Identify the staff on the team, by name and title. If the position is unstaffed, the title of the position will be included and the SWPPP updated when the position is filled. The role of the team is to develop, implement, maintain, and revise, as necessary, the SWPPP for the facility.

ii. Description of the facility and identification of potential pollutant sources. The SWPPP shall include a map of the facility and a description of the activities that occur at the facility. The map shall show the location of the stormwater outfalls, receiving waters, and any structural controls. Identify all activities that occur at the facility and the potential pollutants associated with each activity including the location of any floor drains. These may be included as part of the inventory required by Part 2.3.7.1.

iii. Identification of stormwater controls. The permittee shall select, design, install, and implement the control measures detailed in paragraph iv below to prevent or reduce the discharge of pollutants from the permittee owned facility.

The selection, design, installation, and implementation of the control measures shall be in accordance with good engineering practices and manufacturer's specifications. The permittee shall also take all reasonable steps to control or address the quality of discharges from the site that may not originate at the facility.

If the discharge from the facility is to an impaired water and the facility has the potential to discharge the pollutant identified as causing the impairment, the permittee shall identify the control measures that will be used to address this pollutant at the facility so that the discharge does not cause or contribute to a violation of a water quality standard.

iv. The SWPPP shall include the following management practices:

Minimize or Prevent Exposure: The permittee shall to the extent practicable either locate materials and activities inside, or protect them with storm-resistant coverings in order to prevent exposure to rain, snow, snowmelt and runoff (although significant enlargement of impervious surface area is not recommended). Materials do not need to be enclosed or covered if stormwater

runoff from affected areas will not be discharged directly or indirectly to surface waters or to the MS4 or if discharges are authorized under another NPDES permit.

Good Housekeeping: The permittee shall keep clean all exposed areas that are potential sources of pollutants, using such measures as sweeping at regular intervals. Ensure that trash containers are closed when not in use, keep storage areas well swept and free from leaking or damaged containers; and store leaking vehicles needing repair indoors.

Preventative Maintenance: The permittee shall regularly inspect, test, maintain, and repair all equipment and systems to avoid situations that may result in leaks, spills, and other releases of pollutants in stormwater to receiving waters. Inspections shall occur at a minimum once per quarter.

Spill Prevention and Response: The permittee shall minimize the potential for leaks, spills, and other releases that may be exposed to stormwater and develop plans for effective response to such spills if or when they occur. At a minimum, the permittee shall have procedures that include:

- Preventive measures such as barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling.
- Response procedures that include notification of appropriate facility personnel, emergency agencies, and regulatory agencies, and procedures for stopping, containing, and cleaning up leaks, spills and other releases. Measures for cleaning up hazardous material spills or leaks shall be consistent with applicable Resource Conservation and Recovery Act (RCRA) regulations at 40 CFR Part 264 and 40 CFR Part 265. Employees who may cause, detect, or respond to a spill or leak shall be trained in these procedures and have necessary spill response equipment available. If possible, one of these individuals shall be a member of the Pollution Prevention Team; and
- Contact information for individuals and agencies that shall be notified in the event of a leak, spill, or other release. Where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period, the permittee shall notify the National Response Center (NRC) at (800) 424-8802 in accordance with the requirements of 40 CFR Part 110, 40 CFR Part 117, and 40 CFR Part 302 as soon as the permittee has knowledge of the discharge. State or local requirements may necessitate reporting spills or discharges to local emergency, public health or drinking water supply agencies, and owners of public drinking water supplies. Contact information shall be in locations that are readily accessible and available.

Erosion and Sediment Control: The permittee shall use structural and non-

structural control measures at the facility to stabilize and contain runoff from exposed areas and to minimize or eliminate onsite erosion and sedimentation. Efforts to achieve this may include the use of flow velocity dissipation devices at discharge locations and within outfall channels where necessary to reduce erosion.

Management of Runoff: The permittee shall manage stormwater runoff from the facility to prevent or reduce the discharge of pollutants. This may include management practices which divert runoff from areas that are potential sources of pollutants, contain runoff in such areas, or reuse, infiltrate or treat stormwater to reduce the discharge of pollutants.

Salt Storage Piles or Piles Containing Salt: For storage piles of salt or piles containing salt used for deicing or other purposes (including maintenance of paved surfaces) for which the discharge during precipitation events discharges to the permittee's MS4, any other MS4 or to a Water of the United States, the permittee shall prevent exposure of the storage pile to precipitation by enclosing or covering the storage piles. Such piles shall be enclosed or covered within two (2) years of the permit effective date. The permittee shall implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile. The permittee is encouraged to store piles in such a manner as not to impact surface water resources, ground water resources, recharge areas, and wells.

Employee Training: The permittee shall regularly train employees who work in areas where materials or activities are exposed to stormwater, or who are responsible for implementing activities identified in the SWPPP (e.g., inspectors, maintenance personnel), including all members of the Pollution Prevention Team. Training shall cover both the specific components and scope of the SWPPP and the control measures required under this Part, including spill response, good housekeeping, material management practices, any best management practice operation and maintenance, etc. EPA recommends annual training.

The permittee shall document the following information for each training:

- The training date, title and training duration;
- List of municipal attendees
- Subjects covered during training

Maintenance of Control Measures: The permittee shall maintain all control measures, required by this permit in effective operating condition. The permittee shall keep documentation onsite that describes procedures and a regular schedule for preventative maintenance of all control measures and discussions of back-up practices in place should a runoff event occur while a control measure is off-line. Nonstructural control measures shall also be diligently maintained (e.g., spill response supplies available, personnel trained).

v. The permittee shall conduct the following inspections:

Site Inspections: Inspect all areas that are exposed to stormwater and all stormwater control measures. Inspections shall be conducted at least once each calendar quarter. More frequent inspections may be required if significant activities are exposed to stormwater. Inspections shall be performed when the facility is in operation. At least one of the quarterly inspections shall occur during a period when a stormwater discharge is occurring.

The permittee shall document the following information for each facility inspection:

- The inspection date and time;
- The name of the inspector;
- Weather information and a description of any discharge occurring at the time of the inspection;
- Identification of any previously unidentified discharges from the site;
- Any control measures needing maintenance or repair;
- Any failed control measures that need replacement.
- Any SWPPP changes required as a result of the inspection.

vi. If during the inspections, or any other time, the permittee identifies control measures that need repair or are not operating effectively, the permittee shall repair or replace them before the next anticipated storm event if possible, or as soon as practicable following that storm event. In the interim, the permittee shall have back-up measures in place.

c. The permittee shall report the findings from the Site Inspections in the annual report.

d. The permittee must keep a written record (hardcopy or electronic) of all required activities including but not limited to maintenance, inspections, and training required by Part 2.3.7.2. The permittee shall maintain all records associated with the development and implementation of the SWPPP required by this section consistent with the requirements of Part 4.2.1.

3.0 Additional State Requirements

3.1 Requirements for MS4s in New Hampshire

The permittee shall evaluate physical conditions, site design, and best management practices to promote ground water recharge and infiltration where feasible in the implementation of the control measures described in Part 2.3. The permittee shall address recharge and infiltration for the control measures, as well as any reasons for electing not to implement recharge and infiltration. Loss of annual recharge to ground water should be minimized through the use of infiltration to the maximum extent practicable. Any subsurface disposal of stormwater shall be in accordance with applicable groundwater, source water protection and underground injection control requirements (see Part 1.3.j).

3.1.1. Infiltration through stormwater practices shall be prohibited under certain circumstances, including:

a. When stormwater originates from gasoline dispensing areas at locations with state registered underground storage tanks (UST) and above ground storage tanks (AST);
b. Within groundwater protection areas (defined under N.H. Code Admin. R. Part Env-Wq 1502.24) when stormwater originates from land uses considered a “high load area” under N.H. Code Admin. R. Part Env-Wq 1502.26; and
c. Within areas that have contaminants in groundwater above the ambient groundwater quality standards established in N.H. Code Admin. R. Part Env-Or 603.03 or in soil above site-specific soil standards developed pursuant to Env-Or 600.

3.1.2. MS4s that discharge to coastal waters with public swimming beaches shall consider these waters a priority in implementation of the stormwater management program.

3.1.3. When updating stormwater ordinances as required in Part 2.3.6, permittees must consider adding the provisions identified in N.H. Code Admin. R. Part Env-Wq 1507.04 for groundwater recharge, N.H. Code Admin. R. Part Env-Wq 1507.05 for channel protection, and N.H. Code Admin. R. Part Env-Wq 1507.06 for peak runoff control. The last two will help communities to address concerns about streambank erosion and flooding which may cause both water quality violations and significant property damage or loss of life.

3.2 New Hampshire Public Drinking Water Requirements

3.2.1 MS4s that discharge to public drinking water sources and their source protection areas must consider these sources priority resources when implementing the control measures of Part 2.3.

3.2.2 Discharge to public drinking water supply sources and their protection areas must provide pretreatment and spill control suitable to protect drinking water sources to the extent feasible.

3.2.3 – The permittee shall avoid direct discharges to groundwater and surface water drinking water sources and ensure any discharges near source protection areas of water supply wells or intakes comply with the applicable state requirements. Stormwater systems shall meet the minimum discharge setback requirements of N.H. Code Admin. R. Part Env-Wq 1500 unless exempt under N.H. Code Admin. R. Part Env-Wq 1508.02(c). The following minimum setbacks apply to certain drinking water supply resources, including:

a. Discharge setbacks from water supply wells in accordance with N.H. Code Admin. R. Part Env-Wq 1508.02(a); and
b. Discharge setback of 100 feet within water supply intake protections areas as specified under N.H. Code Admin. R. Part Env-Wq 1508(b).

In groundwater protection areas and water supply intake protection areas, infiltration and filtration practices shall provide additional vertical separation to the seasonal high water table in accordance with N.H. Code Admin. R. Part Env-Wq 1500 within local regulations for projects not subject to N.H. Code Admin. R. Part Env-Wq 1500.

The permittee is encouraged to adopt similar requirements or reference these state rule requirements under N.H. Code Admin. R. Part Env-Wq 1500 within local regulations for projects not subject to N.H. Code Admin. R. Part Env-Wq 1500.

3.2.4 – The permittee shall develop and implement a plan to notify public water suppliers in the event of an emergency which has the potential to impact a water supply.

4.0 Program Evaluation, Record Keeping, and Reporting

4.1 Program Evaluation

4.1.1 The permittee shall annually self-evaluate its compliance with the terms and conditions of this permit. The permittee shall maintain the annual evaluation documentation as part of the SWMP.

4.1.2 The permittee shall evaluate the appropriateness of the selected BMPs in achieving the objectives and requirements of each control measure and the defined measurable goals. The permittee may change BMPs in accordance with the following provisions:

a. Changes adding (but not subtracting or replacing) components or controls may be made at any time.
b. Changes replacing an ineffective or infeasible BMP specifically identified in the SWMP with an alternative BMP may be made if the proposed changes meet the criteria below:

4.1.3 BMP modification documentation shall include the following information and all documentation shall be kept in the SWMP:

a. An analysis of why the BMP is ineffective or infeasible;
b. Expectations on the effectiveness of the replacement BMP; and
c. An analysis of why the replacement BMP is expected to achieve the defined goals of the BMP to be replaced.

The permittee shall indicate BMP modifications along with a brief explanation of the modification in each Annual Report.

4.1.4 EPA or the state agency may require the permittee to add, modify, repair, replace or change BMPs or other measures described in the annual reports as needed:

a. To address impacts to receiving water quality caused or contributed to by discharges from the MS4; or
b. To satisfy conditions of this permit.

Any changes requested by EPA or the state agency will be in writing and will set forth the schedule for the permittee to develop the changes and will offer the permittee the opportunity to propose alternative program changes to meet the objective of the requested modification.

4.2 Record Keeping

4.2.1 The permittee shall keep all records required by this permit for a period of at least five years. Records include information used in the development of any written program required by this permit, any monitoring results, copies of reports, records of screening, follow-up and elimination of illicit discharges; maintenance records; inspection records; and data used in the development of the notice of intent, SWMP, SWPPP, and annual reports. This list provides examples of records that should be maintained, but is not all inclusive.

4.2.2 Records other than those required to be included in the annual report, Part 4.4, shall be submitted only when requested by the EPA or the state agency.

4.2.3 The permittee shall make the records relating to this permit, including the written (hardcopy or electronic) stormwater management program, available to the public. The public may view the records during normal business hours. The permittee may charge a reasonable fee for copying requests. The permittee is encouraged to satisfy this requirement by posting records online.

4.3 Outfall monitoring

4.3.1. The permittee shall monitor and sample its outfalls at a minimum through sampling and testing at the frequency and locations required in connection with IDDE screening under Part 2.3.4.8.d. through g. and 2.3.4.9.

i. IDDE screening shall include collection of grab samples and analysis of said samples for E. coli (for freshwater receiving waters) or enterococcus (for saline or brackish receiving waters). Bacteria analysis shall be conducted using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136. Other IDDE screening parameters shall be considered field screening and are not subject to 40 CFR §136 requirements.

ii. If the discharge is directly into an impaired water, or if the discharge is subject to a waste load allocation in an approved TMDL as indicated in Appendix F, grab samples shall be collected concurrently with the IDDE investigation required by Part 2.3.4.8.e.(b) and analyzed for the pollutants identified as the cause of the impairment. The required pollutant analyses in connection with causes of impairment are provided in Appendix G.

iii. The monitoring program may also include additional outfall and interconnection monitoring as determined by the permittee in connection with assessment of SWMP effectiveness pursuant to Part 4.1; evaluation of discharges to impaired waters pursuant to Part 2.2; assessment of BMP effectiveness pursuant to Part 2.2 or 2.3; or otherwise.

4.3.2. The permittee shall document all monitoring results each year in the annual report. The report shall include the date, outfall or interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results of all analyses. The annual report shall include all of this information and data for the current reporting period and may include all data for the entire permit period.

4.3.3. The permittee shall also include in the annual report results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period. If such monitoring or studies were conducted on behalf of the permittee, or if monitoring or studies

conducted by other entities were reported to the permittee, a brief description of the type of information gathered or received shall be included in the annual report(s) covering the time period(s) the information was received.

4.4 Annual Reporting

4.4.1 The permittee shall submit an annual report. The reporting period will be a one year period commencing on July 1, 2018, and subsequent anniversaries thereof, except that the first annual report under this permit shall also cover the period from May 1, 2018 to July 1, 2018. The annual report is due ninety days from the close of each reporting period.

4.4.2 The annual reports shall contain the following information:

4.4.2.1 A self-assessment review of compliance with the permit terms and conditions.

4.4.2.2 An assessment of the appropriateness of the selected BMPs.

4.4.2.3 The status of the any plans or activities required by Part 2.1 and/ or Part 2.2, including:

a. For discharges subject to TMDLs, a description of BMPs implemented to comply with the applicable Part(s) of Appendix F;
b. For discharges to certain impaired waters (and their tributaries for nutrient-impaired waters), a description of BMPs implemented to comply with the applicable Part(s) of Appendix F

4.4.2.4 An assessment of the progress towards achieving the measurable goals and objectives of each control measure in Part 2.3 including:

a. Evaluation of the public education program including a description of the targeted messages for each audience; method of distribution and dates of distribution; methods used to evaluate the program; and any changes to the program.
b. Description of the activities used to promote public participation including documentation of compliance with state public notice regulations.
c. Description of the activities related to implementation of the IDDE program including: status of the map; status and results of the illicit discharge potential ranking and assessment; identification of problem catchments; status of all protocols described in Parts 2.3.4. (program responsibilities and systematic procedure); number and identifier of catchments evaluated; number and identifier of outfalls screened; number of illicit discharges located; number of illicit discharges removed; gallons of flow removed; identification of tracking indicators and measures of progress based on those indicators; and employee training.
d. Evaluation of the construction runoff management including number of project plans reviewed; number of inspections; and number of enforcement actions.
e. Evaluation of stormwater management for new development and redevelopment including status of ordinance development and review and status of the street design assessment.
f. Status of the O&M Programs required by Part 2.3.7.1.
g. Status of SWPPP required by Part 2.3.7.2 including inspection results.

h. Any additional reporting requirements in Part 3.0.

4.4.2.5 All outfall screening and monitoring data collected by or on behalf of the permittee during the reporting period, including but not limited to all data collected pursuant to Parts 2.3.4 and 4.3. The permittee shall also provide a description of any additional monitoring data received by the permittee during the reporting period.

4.4.2.6 Description of activities for the next reporting cycle.

4.4.2.7 Description of any changes in identified BMPs or measurable goals.

4.4.2.8 Description of activities undertaken by any entity contracted for achieving any measurable goal or implementing any control measure.

4.4.3 Reports must be submitted to EPA following address:

United State Environmental Protection Agency
Stormwater and Construction Permits Section (OEP06-1)
Five Post Office Square, Suite 100
Boston, MA 02109

NHDES may request that the permittee submit reports to NHDES, upon receipt of this request the reports shall be sent to the following address:

NH Department of Environmental Services
Wastewater Engineering Bureau
Permits and Compliance Section
P.O. Box 95
Concord, NH 03302-0095

5.0 Non-Traditional MS4s

Non-traditional MS4s are MS4s owned and operated by the State of New Hampshire, counties or other public agencies within the State of New Hampshire, and properties owned and operated by the United States (Federal Facilities) within the States of New Hampshire. This Part addresses all non-traditional MS4s except MS4s that are owned or operated by transportation agencies, which are addressed in Part 6.0 below.

5.1. Requirements for Non-Traditional MS4s

All requirements and conditions of Parts 1 – 4 above apply to all Non-traditional MS4s, except as specifically provided below:

5.1.1 Public education: For the purpose of this permit, the audiences for a Non-traditional MS4 include the employees, clients and customers (including students at education MS4s) or visitors to the property, and any contractors working at the facility where the MS4 is located. The permittee may use some of the educational topics included in Part 2.3.2.1.c. as appropriate, or may focus on topics specific to the MS4. The permittee shall document the educational topics for each target audience in the SWMP and annual reports.

5.1.2 Ordinances and regulatory mechanisms: Some MS4s may not have authority to enact an ordinance, by-law, or other regulatory mechanisms. MS4s without the authority to enact an ordinance shall ensure that written policies or procedures are in place to address the requirements of Part 2.3.4.6.a., Part 2.3.5.3.a., Part 2.3.6.a., and Part 2.3.6.b. They may rely on EPA, the State environmental agency or State Attorney General Office for enforcement assistance.

5.1.3 Assessment of Regulations: Non-traditional MS4s do not need to meet the requirements of Part 2.3.6.c and Part 2.3.6.d. Non-traditional MS4s shall instead evaluate opportunities to include green infrastructure practices in new development and redevelopment at their facilities. Non-traditional MS4s shall evaluate opportunities to reduce the amount of impervious cover due to parking areas and walkways. Non-traditional MS4s shall report on these efforts in each annual report. The permittee shall also ensure adequate long-term operation and maintenance of stormwater management practices installed by the non-traditional MS4 or its agents.

5.1.4 New Dischargers

New MS4 facilities are subject to additional water quality-based requirements if they fall within the definition of "new dischargers" under 40 CFR § 122.2: "A new discharger is any building, structure, facility or installation (a) from which there is or may be a 'discharge of pollutants' (b) that did not commence the 'discharge of pollutants' at a particular 'site' prior to August 13, 1979; (c) which is not a 'new source'; and (d) which never received a finally effective NPDES permit for discharges at that 'site.' The term "site" is defined in §122.2 to mean "the land or water area where any 'facility or activity' is physically located or conducted including adjacent land used in connection with the facility or activity."

Consistent with these definitions, a Non-traditional MS4 is a "new discharger" if it discharges stormwater from a new facility with an entirely new separate storm sewer system that is not

physically located on the same or adjacent land as an existing facility and associated system operated by the same MS4.

Any Non-traditional MS4 facility that is a "new discharger" and discharges to waterbody listed in category 5 or 4b on the most recent EPA approved New Hampshire Integrated Report of waters listed pursuant to Clean Water Act, section 303(d) and 305(b) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead, or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enteroccus or Fecal Coliform), chloride (Chloride) or oil and grease (Oil Slicks or Benzo(a) pyrene (PAHs), or discharges to a waterbody with an approved TMDL for any of those pollutants, is not eligible for coverage under this permit and shall apply for an individual permit.

Any Non-traditional MS4 facility that is a "new discharger" and discharges to a waterbody that is in attainment is subject to New Hampshire antidegradation regulations at N.H. Code Admin. R. Part Env-Wq 1708. The permittee shall comply with the provisions of N.H. Code Admin. R. Part Env-Wq 1708.04 and N.H. Code Admin. R. Part Env-Wq 1708.06 including information submittal requirements and obtaining authorization for new discharges as appropriate[20]. Any authorization of new discharges by NHDES shall be incorporated into the permittee's SWMP. If an applicable NHDES approval specifies additional conditions or requirements, then those requirements are incorporated into this permit by reference. The permittee must comply with all such requirements.

[20] Contact NHDES for guidance on compliance.

6.0 Requirements for Transportation Agencies

A transportation agency is the state agency responsible for operation and maintenance of the state owned roadways (New Hampshire Department of Transportation -NHDOT). All requirements and conditions of this permit apply with the following exceptions:

6.1 Public education: For the purpose of this permit, the audiences for a transportation agency education program include the general public (users of the roadways), employees, and any contractors working at the location. The permittee may use some of the educational topics included in Part 2.3.2.1.c. as appropriate, or may focus on topics specific to the agency. The permittee shall document the educational topics for each target audience in the SWMP and annual reports.

6.2 Ordinances and regulatory mechanisms: The transportation agency may not have authority to enact an ordinance, by-law or other regulatory mechanisms. The agency shall ensure that written agency policies or procedures are in place to address the requirements of Part 2.3.4.6.a., Part 2.3.5.3.a., Part 2.3.6.a., and Part 2.3.6.b. These agencies may rely on EPA or the State environmental agency for enforcement assistance.

6.3 Assessment of regulations: The requirements of Part 2.3.6.c. and Part 2.3.6.d. do not apply. The agency shall instead evaluate opportunities to include green infrastructure practices in new development and redevelopment at the facility. The agency shall evaluate opportunities to reduce the amount of impervious cover due to parking areas and walkways. The permittee shall report on these efforts in each annual report. The permittee shall also ensure adequate long-term operation and maintenance of stormwater management practices installed by the agency or its agents.

6.4 New Dischargers

New MS4 facilities are subject to additional water quality-based requirements if they fall within the definition of "new dischargers" under 40 CFR § 122.2: "A new discharger is any building, structure, facility or installation (a) from which there is or may be a 'discharge of pollutants' (b) that did not commence the 'discharge of pollutants' at a particular 'site' prior to August 13, 1979; (c) which is not a 'new source'; and (d) which never received a finally effective NPDES permit for discharges at that 'site.' The term "site" is defined in §122.2 to mean "the land or water area where any 'facility or activity' is physically located or conducted including adjacent land used in connection with the facility or activity."

Consistent with these definitions, a new transportation MS4 is a "new discharger" if it discharges stormwater from a new facility with an entirely new separate storm sewer system that is not physically located on the same or adjacent land as an existing facility and associated system operated by the same MS4.

Any transportation MS4 facility that is a "new discharger" and discharges to a waterbody listed as impaired in category 5 or 4b on the most recent EPA approved New Hampshire Integrated Report of waters listed pursuant to Clean Water Act section 303(d) or 305(b) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids

(TSS or Turbidity), bacteria/pathogens (E. Coli, Enteroccus or Fecal Coliform), chloride (Chloride) or oil and grease (Oil Slicks or Benzo(a) pyrene (PAHs)) or discharges to a waterbody with an approved TMDL for any of those pollutants, is not eligible for coverage under this permit and shall apply for an individual permit.

Any transportation MS4 facility that is a "new discharger" and discharges to a waterbody that is in attainment is subject to New Hampshire antidegradation regulations at N.H. Code Admin. R. Part Env-Wq 1708. The permittee shall comply with the provisions of N.H. Code Admin. R. Part Env-Wq 1708.04 and N.H. Code Admin. R. Part Env-Wq 1708.06 including information submittal requirements and obtaining authorization for new discharges as appropriate[21]. Any authorization of new discharges by NHDES shall be incorporated into the permittee's SWMP. If an applicable NHDES approval specifies additional conditions or requirements, then those requirements are incorporated into this permit by reference. The permittee must comply with all such requirements.

[21] Contact NHDES for guidance on compliance.

Appendix A

Definitions, Abbreviations and Acronyms

Definitions

Best Management Practices (BMPs) - schedules of activities, practices (and prohibitions of practices), structures, vegetation, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Control Measure - refers to any BMP or other method (including effluent limitations) used to prevent or reduce the discharge of pollutants to waters of the United States.

Director - a Regional Administrator of the Environmental Protection Agency or an authorized representative.

Discharge - when used without qualification, means the "discharge of a pollutant."

Discharge of a pollutant - any addition of any “pollutant” or combination of pollutants to “waters of the United States” from any “point source,” or any addition of any pollutant or combination of pollutants to the waters of the “contiguous zone” or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

Discharge-related activities - activities which cause, contribute to, or result in stormwater and allowable non-stormwater point source discharges, and measures such as the siting, construction and operation of BMPs to control, reduce, or prevent pollution in the discharges.

Disturbance - action to alter the existing vegetation and/or underlying soil of a site, such as clearing, grading, site preparation (e.g., excavating, cutting, and filling), soil compaction, and movement and stockpiling of top soils.

Existing Discharger – an operator applying for coverage under this permit for discharges covered previously under an NPDES general or individual permit.

Facility or Activity - any NPDES “point source” or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the NPDES program.

Federal Facility – Any buildings, installations, structures, land, public works, equipment, aircraft, vessels, and other vehicles and property, owned by, or constructed or manufactured for the purpose of leasing to, the federal government.

Illicit Discharge - any discharge to a municipal separate storm sewer that is not composed entirely of stormwater except discharges pursuant to a NPDES permit (other than the NPDES

permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Impaired Water – A water is impaired if it does not meet one or more of its designated use(s). For purposes of this permit, 'impaired' refers to categories 4 and 5 of the five part categorization approach used for classifying the water quality standards attainment status for water segments under the TMDL program. Impaired waters compilations are also sometimes referred to as "303(d) lists". Category 5 waters are impaired because at least one designated use is not being supported or is threatened and a TMDL is needed. Category 4 waters indicate that at least one designated use is not being supported but a TMDL is not needed (4a indicates that a TMDL has been approved or established by EPA; 4b indicates other required control measures are expected in result in the attainment of water quality standards in a reasonable period of time; and 4c indicates that the non-attainment of the water quality standard is the result of pollution (e.g. habitat) and is not caused by a pollutant. See *USEPA's 2006 Integrated Report Guidance, July 29, 2005* for more detail on the five part categorization of waters [under EPA National TMDL Guidance http://www.epa.gov/owow/tmdl/policy.html]).

Impervious Surface- Any surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include but is not limited to: roads, driveways, parking areas and other areas created using non porous material; buildings, rooftops, structures, artificial turf and compacted gravel or soil.

Industrial Activity - the 10 categories of industrial activities included in the definition of "stormwater discharges associated with industrial activity", as defined in CFR § 122.26(b)(14)(i)-(ix) and (xi).

Industrial Stormwater - stormwater runoff associated with the definition of "stormwater discharges associated with industrial activity."

Junction Manhole - For the purposes of this permit, a junction manhole is a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments. Manholes with inlets solely from private storm drains, individual catch basins, or both are not considered junction manholes for these purposes.

Key Junction Manhole - For the purposes of this part, key junction manholes are those junction manholes that can represent one or more junction manholes without compromising adequate implementation of the illicit discharge program. Adequate implementation of the illicit discharge program would not be compromised if the exclusion of a particular junction manhole as a key junction manhole would not affect the permittee's ability to determine the possible presence of an upstream illicit discharge. A permittee may exclude a junction manhole located upstream from another located in the immediate vicinity or that is serving a drainage alignment with no potential for illicit connections.

Municipal Separate Storm Sewer - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a combined sewer; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

New Development – any construction activities or land alteration resulting in total earth disturbances greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) on an area that has not previously been developed to include impervious cover. (see part 2.3.6. of the permit)

New Source - any building, structure, facility, or installation from which there is or may be a "discharge of pollutants," the construction of which commenced:

- after promulgation of standards of performance under section 306 of the CWA which are applicable to such source, or
- after proposal of standards of performance in accordance with section 306 of the CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal.

New Source Performance Standards (NSPS) – Technology-based standards for facilities that qualify as new sources under 40 CFR 122.2 and 40 CFR 122.29.

No exposure - all industrial materials or activities are protected by a storm-resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff.

Owner or operator - the owner or operator of any "facility or activity" subject to regulation under the NPDES program.

Outfall – a point source as defined by 40 CFR 122.2 (and below) at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

Person - an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

Point source - 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. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

Pollutant - dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agricultural waste discharged into water.

Pollutant of concern – A pollutant which causes or contributes to a violation of a water quality standard, including a pollutant which is identified as causing an impairment in a State's 303(d) list.

Reportable Quantity Release – a release of a hazardous substance at or above the established legal threshold that requires emergency notification. Refer to 40 CFR Parts 110, 177, and 302 for complete definitions and reportable quantities for which notification is required.

Redevelopment – for the purposes of part 2.3.6., any construction, land alteration, or improvement of impervious surfaces resulting in total earth disturbances greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) that does not meet the definition of new development (see above).

Runoff coefficient - the fraction of total rainfall that will appear at the conveyance as runoff.

Significant materials - includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with stormwater discharges.

Site – for the purposes of part 2.3.6., the area extent of construction activities, including but not limited to the creation of new impervious cover and improvement of existing impervious cover (e.g. repaving not covered by 2.3.6.a.ii.4.d.)

Small Municipal Separate Storm Sewer System – means all separate storm sewer systems that are (i) owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district, or drainage district, or similar entity or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States. (ii) Not defined as “large” or “medium” municipal separate storm sewer system pursuant to paragraphs 40 CFR 122.26 (b)(4) and (b)(7), or designated under paragraph 40 126.26(a) (1)(v). (iii) This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. This term does not include separate storm sewers in very discrete areas, such as individual buildings.

Small MS4 – means a small municipal separate storm sewer system.

Stormwater - stormwater runoff, snow melt runoff, and surface runoff and drainage.

Stormwater Discharges Associated with Construction Activity - a discharge of pollutants in stormwater runoff from areas where soil disturbing activities (e.g., clearing, grading, or excavating), construction materials, or equipment storage or maintenance (e.g., fill piles, borrow areas, concrete truck washout, fueling), or other industrial stormwater directly related to the construction process (e.g., concrete or asphalt batch plants) are located. (See 40 CFR 122.26(b)(14)(x) and 40 CFR 122.26(b)(15).

Stormwater Discharges Associated with Industrial Activity - the discharge from any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under Part 122. For the categories of industries identified in this section, the term includes, but is not limited to, stormwater discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at part 401 of this chapter); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and final products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to stormwater. For the purposes of this paragraph, material handling activities include storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with stormwater drained from the above described areas. Industrial facilities include those that are federally, State, or municipally owned or operated that meet the description of the facilities listed in Appendix D of this permit. The term also includes those facilities designated under the provisions of 40 CFR 122.26(a)(1)(v).

Total Maximum Daily Loads (TMDLs) - A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL includes wasteload allocations (WLAs) for point source discharges; load allocations (LAs) for nonpoint sources and/or natural background, and must include a margin of safety (MOS) and account for seasonal variations. (See section 303(d) of the Clean Water Act and 40 CFR §130.2 and §130.7).

Water Quality Limited Water – for the purposes of this permit, a water quality limited water is any waterbody that does not meet applicable water quality standards, including but not limited to waters listed in categories 5 or 4b on the most recent (as of the permit effective date) EPA-approved New Hampshire Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b).

Water Quality Standards: A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States and EPA adopt WQS to protect

public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (See CWA sections 101(a)2 and 303(c)).

ABBREVIATIONS AND ACRONYMS

BMP – Best Management Practice

BPJ – Best Professional Judgment

CGP – Construction General Permit

CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 *et seq*)

DCIA – Directly Connected Impervious Area

EPA – U. S. Environmental Protection Agency

ESA – Endangered Species Act

FWS – U. S. Fish and Wildlife Service

IA – Impervious Area

IDDE – Illicit Discharge Detection and Elimination

LA – Load Allocations

MOS – Margin of Safety

MS4 – Municipal Separate Storm Sewer System

MSGP – Multi-Sector General Permit

NAICS – North American Industry Classification System

NEPA – National Environmental Policy Act

NHPA – National Historic Preservation Act

NMFS – U. S. National Marine Fisheries Service

NOI – Notice of Intent

NPDES – National Pollutant Discharge Elimination System

NRC – National Response Center

NRHP – National Register of Historic Places

NSPS – New Source Performance Standard

NTU – Nephelometric Turbidity Unit

OMB – U. S. Office of Management and Budget

ORW – Outstanding Resource Water

PCP – Phosphorus Control Plan

POTW – Publicly Owned Treatment Works

RCRA – Resource Conservation and Recovery Act

RQ – Reportable Quantity

SHPO – State Historic Preservation Officer

SIC – Standard Industrial Classification

SPCC – Spill Prevention, Control, and Countermeasure

SWMP – Stormwater Management Program

SWPPP – Stormwater Pollution Prevention Plan

TMDL – Total Maximum Daily Load

TSS – Total Suspended Solids

USGS – United States Geological Survey

WLA – Wasteload Allocation

WQRP – Water Quality Response Plan

WQS – Water Quality Standard

Appendix B

Standard Permit Conditions

Standard Permit Conditions

Standard permit conditions in Appendix B are consistent with the general permit provisions required under 40 CFR 122.41.

B.1. Duty To Comply

You must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

A. You must comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

B. Penalties for Violations of Permit Conditions: The Director will adjust the civil and administrative penalties listed below in accordance with the Civil Monetary Penalty Inflation Adjustment Rule (61 FR 252, December 31, 1996, pp. 69359-69366, as corrected in 62 FR 54, March 20, 1997, pp.13514-13517) as mandated by the Debt Collection Improvement Act of 1996 for inflation on a periodic basis. This rule allows EPA's penalties to keep pace with inflation. The Agency is required to review its penalties at least once every 4 years thereafter and to adjust them as necessary for inflation according to a specified formula. The civil and administrative penalties following were adjusted for inflation starting in 1996.

1. *Criminal Penalties*.

   a. *Negligent Violations*. The CWA provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation or by imprisonment of not more than two years, or both.

   b. *Knowing Violations.* The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both. In the case of a

second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

c. *Knowing Endangerment.* The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he or she is placing another person in imminent danger of death or serious bodily injury shall upon conviction be subject to a fine of not more than $250,000 or by imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision be subject to a fine of not more than $1,000,000 and can fined up to $2,000,000 for second or subsequent convictions.

d. *False Statement.* The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

2. *Civil Penalties.* The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $32,500 per day for each violation).

3. *Administrative Penalties.* The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows:

3.1. *Class I Penalty.* Not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $11,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $32,500).

3.2. *Class II Penalty.* Not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $11,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $157,500).

B.2. Duty to Reapply

If you wish to continue an activity regulated by this permit after the expiration date of this permit, you must apply for and obtain a new permit.

B.3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for you in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

B.4. Duty to Mitigate

You must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

B.5. Proper Operation and Maintenance

You must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by you to achieve compliance with the conditions of this permit, including the requirements of your SWPPP. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by you only when the operation is necessary to achieve compliance with the conditions of this permit.

B.6. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. Your filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

B.7. Property Rights

This permit does not convey any property rights of any sort, or any exclusive privileges.

B.8. Duty to Provide Information

You must furnish to EPA or an authorized representative (including an authorized contractor acting as a representative of EPA), within a reasonable time, any information which EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. You must also furnish to EPA upon request, copies of records required to be kept by this permit.

B.9. Inspection and Entry

You must allow EPA or an authorized representative (including an authorized contractor acting as a representative of EPA), upon presentation of credentials and other documents as may be required by law, to:

A. Enter upon your premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

B. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

C. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

D. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

B.10. Monitoring and Records

A. Samples and measurements taken for the purpose of monitoring must be representative of the volume and nature of the monitored activity.

B. You must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of EPA at any time.

C. Records of monitoring information must include:

1. The date, exact place, and time of sampling or measurements;
2. The individual(s) who performed the sampling or measurements;
3. The date(s) analyses were performed

4. The individual(s) who performed the analyses;

5. The analytical techniques or methods used; and

6. The results of such analyses.

D. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.

E. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

B.11. Signatory Requirements

A. All applications, including NOIs, must be signed as follows:

1. For a corporation: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

2. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

3. For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

B. All reports, including SWPPPs, inspection reports, annual reports, monitoring reports, reports on training and other information required by this permit must be signed by a person described in Appendix B, Subsection 11.A above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described in Appendix B, Subsection 11.A;

2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

3. The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

C. Changes to Authorization. If an authorization under Appendix B, Subsection 11.B is no longer accurate because a different operator has responsibility for the overall operation of the industrial facility, a new NOI satisfying the requirements of Subsection 11.B must be submitted to EPA prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Any person signing documents required under the terms of this permit must include the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

E. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

B.12. Reporting Requirements

A. Planned changes. You must give notice to EPA as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR §122.42(a)(1).

B. Anticipated noncompliance. You must give advance notice to EPA of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C. Transfers. This permit is not transferable to any person except after notice to EPA. EPA may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See 40 CFR §122.61; in some cases, modification or revocation and reissuance is mandatory.)

D. Monitoring reports. Monitoring results must be reported at the intervals specified elsewhere in this permit.

1. Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms (paper or electronic) provided or specified by EPA for reporting results of monitoring of sludge use or disposal practices.

2. If you monitor any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by EPA.

3. Calculations for all limitations which require averaging of measurements must use an arithmetic mean and non-detected results must be incorporated in calculations as the limit of quantitation for the analysis.

E. Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.

F. Twenty-four hour reporting.

1. You must report any noncompliance which may endanger health or the environment. Any information must be provided orally within 24 hours

from the time you become aware of the circumstances. A written submission must also be provided within five days of the time you become aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The following shall be included as information which must be reported within 24 hours under this paragraph.

   a. Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)

   b. Any upset which exceeds any effluent limitation in the permit

   c. Violation of a maximum daily discharge limitation for any of the pollutants listed by EPA in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)

3. EPA may waive the written report on a case-by-case basis for reports under Appendix B, Subsection 12.F.2 if the oral report has been received within 24 hours.

G. Other noncompliance. You must report all instances of noncompliance not reported under Appendix B, Subsections 12.D, 12.E, and 12.F, at the time monitoring reports are submitted. The reports must contain the information listed in Appendix B, Subsection 12.F.

H. Other information. Where you become aware that you failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Permitting Authority, you must promptly submit such facts or information.

B.13. Bypass

A. Definitions.

1. Bypass means the intentional diversion of waste streams from any portion of a treatment facility

2. Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

B. Bypass not exceeding limitations. You may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential

maintenance to assure efficient operation. These bypasses are not subject to the provisions of Appendix B, Subsections 13.C and 13.D.

C. Notice.

1. Anticipated bypass. If you know in advance of the need for a bypass, you must submit prior notice, if possible at least ten days before the date of the bypass.

2. Unanticipated bypass. You must submit notice of an unanticipated bypass as required in Appendix B, Subsection 12.F (24-hour notice).

D. Prohibition of bypass.

1. Bypass is prohibited, and EPA may take enforcement action against you for bypass, unless:

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

c. You submitted notices as required under Appendix B, Subsection 13.C.

2. EPA may approve an anticipated bypass, after considering its adverse effects, if EPA determines that it will meet the three conditions listed above in Appendix B, Subsection 13.D.1.

B.14. Upset

A. Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond your reasonable control. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

B. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Appendix B, Subsection 14.C are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

C. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that you can identify the cause(s) of the upset;
2. The permitted facility was at the time being properly operated; and
3. You submitted notice of the upset as required in Appendix B, Subsection 12.F.2.b (24 hour notice).
4. You complied with any remedial measures required under Appendix B, Subsection 4.

D. Burden of proof. In any enforcement proceeding, you, as the one seeking to establish the occurrence of an upset, has the burden of proof.

APPENDIX F

REQUIREMENTS OF APPROVED TOTAL MAXIMUM DAILY LOADS

I. Chloride TMDLs

Permittees that operate regulated MS4s in the municipalities identified in Derry, Londonderry, Salem and Windham that discharge to Beaver Brook; Dinsmore Brook; North Tributary to Canobie Lake; Policy-Porcupine Brook, and any other permittee that discharges to those waterbodies, shall reduce chloride discharges to support achievement of the WLA included in the applicable approved TMDL[1] by complying with EITHER Appendix F Part I.1 or Appendix F Part I.2 below.

1. The permittee shall develop a Chloride Reduction Plan that includes specific actions designed to achieve chloride reduction on municipal roads and facilities, and on private facilities that drain to the MS4. The Chloride Reduction Plan shall be completed within one (1) year of the effective date of the permit and shall include, at a minimum:

    a. For municipally maintained surfaces:

        i. Tracking of the amount of salt applied to all municipally owned and maintained surfaces and reporting of salt use using the UNH Technology Transfer Center online tool (http://www.roadsalt.unh.edu/Salt/) beginning in the year 2 annual report;
        ii. Planned activities for salt reduction on municipally owned and maintained surfaces, which may include but are not limited to:
            • Operational changes such as pre-wetting, pre-treating the salt stockpile, increasing plowing prior to de-icing, monitoring of road surface temperature, etc.;
            • Implementation of new or modified equipment providing pre-wetting capability, better calibration rates, or other capability for minimizing salt use;
            • Training for municipal staff and/or contractors engaged in winter maintenance activities;
            • Adoption of guidelines for application rates for roads and parking lots (see NHDES, Chloride Reduction Implementation Plan for Dinsmore Brook, App. J and K (February 2011); Winter Parking Lot and Sidewalk Maintenance Manual (Revised edition June 2008); and the application guidelines on page 17 of Minnesota Snow and Ice Control: Field Handbook for Snow Operators (September 2012) for examples);
            • Regular calibration of spreading equipment;
            • Designation of no-salt and/or low salt zones;

[1] Total Maximum Daily Load (TMDL) Study For Waterbodies in the Vicinity of the I-93 Corridor from Massachusetts to Manchester, NH: Beaver Brook in Derry and Londonderry, NH (2008), Total Maximum Daily Load (TMDL) Study For Waterbodies in the Vicinity of the I-93 Corridor from Massachusetts to Manchester, NH: Dinsmore Brook in Windham, NH (2008), Total Maximum Daily Load (TMDL) Study For Waterbodies in the Vicinity of the I-93 Corridor from Massachusetts to Manchester, NH: North Tributary to Canobie Lake in Windham, NH (2008), Total Maximum Daily Load (TMDL) Study For Waterbodies in the Vicinity of the I-93 Corridor from Massachusetts to Manchester, NH: Policy-Porcupine Brook in Salem and Windham, NH (2008)

- Public education regarding impacts of salt use, methods to reduce salt use on private property, modifications to driving behavior in winter weather, etc.; and
- Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff; and

iii. An estimate of the total tonnage of salt reduction expected by each activity; and
iv. A schedule for implementation of planned activities including immediate implementation of operational and training measures, continued annual progress on other measures, and full implementation of the Plan by the end of the permit term.

b. For privately maintained facilities that drain to the MS4:
   i. Identification of private parking lots with 10 or more parking spaces draining to the MS4;
   ii. Requirements for private parking lot owners and operators and private street owners and operators (1) that any commercial salt applicators used for applications of salt to their parking lots or streets be trained and certified in accordance with Env-Wq 2203, and (2) to report annual salt usage within the municipal boundaries using the UNH Technology Transfer Center online tool (http://www.roadsalt.unh.edu/Salt/) or report salt usage directly to the permittee, in which case this information should be reported on the permittees annual report.
   iii. Requirements for new development and redevelopment to minimize salt usage, and to track and report amounts used using the UNH Technology Transfer Center online tool (http://www.roadsalt.unh.edu/Salt/).

c. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part I.1.a-b. as follows.
   i. The permittee is relieved of its additional requirements as of the date when the following conditions are met:
      1. The applicable TMDL has been modified or revised and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of chloride are necessary for the permittee's discharge based on wasteload allocations in the newly approved TMDL
   ii. When the criteria in Appendix F part I.1.c.i. are met, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part I.1.a.-b. as of that date and the permittee shall comply with the following:
      1. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part.I.1.a.-b. to date to reduce chloride in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
      2. The permittee shall continue to implement all requirements of Appendix F part I.a.-b. required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications,

2. The MS4 operator shall work with NHDES to develop an Alternative Chloride Reduction Plan consistent with the applicable TMDL. The MS4 operator shall submit a NHDES-approved Alternative Chloride Reduction Plan that is consistent with the TMDL Implementation Plan and includes schedules and milestones to meet applicable Waste Load Allocations, with their Notice of Intent (NOI) as an alternative to the requirements described in Appendix F part I.1. above.
    a. The Alternative Chloride Reduction Plan shall be subject to EPA review and the public comment period consistent with the NOI procedures at part 1.7.4.b. of the permit.
    b. The permittee shall keep the written plan (hardcopy or electronic) as part of their SWMP.
    c. The permittee shall implement all operator-specific permit requirements included in the permittee's authorization letter from EPA based on the Alternative Chloride Reduction Plan.
    d. Unless the operator-specific permit requirements related to the Alternative Chloride Reduction Plan are authorized by EPA, the permittee is subject to the requirements described in Appendix F part I.1. above.

II. Bacteria TMDLs

Permittees that operate regulated MS4s in the municipalities identified on Table F-1 that discharge to waterbodies listed on Table F-1 in Appendix F, and any other permittee that discharges to waterbodies listed on Table F-1 in Appendix F, shall reduce bacteria or pathogen discharges to support achievement of the WLA included in the approved TMDLs[2] by complying with EITHER Appendix F Part II.1 or Appendix F Part II.2 below.

1. Traditional and non-traditional MS4s operating in the municipalities listed in Table F-1 and/or that discharge to a waterbody listed on Table F-1 shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below:

    a. Enhancement of BMPs required by part 2.3 of the permit that shall be implemented during this permit term:

        i. Part 2.3.3. Public Education: The permittee shall replace its Residential program with an annual message encouraging the proper management of pet waste, including noting any existing ordinances where appropriate, at a minimum. The permittee or its agents shall disseminate educational materials to dog owners at the time of issuance or renewal of a dog license, or other appropriate time. Education materials shall describe the detrimental impacts of improper management of pet waste, requirements for waste collection and disposal, and penalties for non-compliance. The permittee shall also provide information to owners of septic systems about proper maintenance in any catchment that discharges to a water body impaired for bacteria or pathogens.

        ii. Part 2.3.4 Illicit Discharge: The permittee shall implement the illicit discharge program required by this permit. Catchments draining to any waterbody impaired for bacteria or pathogens shall be designated either Problem Catchments or HIGH priority in implementation of the IDDE program.

    b. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part II.1.a., as follows:
        i. The permittee is relieved of its additional requirements as of the date when the following conditions are met:
            1. The applicable TMDL has been modified or revised and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of bacteria/pathogens are necessary for the permittee's discharge based on wasteload allocations in the newly approved TMDL

[2] Hampton/Seabrook Harbor Bacteria TMDL, May 2004, Little Harbor Bacteria TMDL, June 2006, Final Report New Hampshire Statewide TMDL for Bacteria Impaired Waters, September 2010, Final Report TMDL Report for 58 Bacteria Impaired Waters in New Hampshire, August2011, Final TMDL Report for 44 Bacteria Impaired Waters in New Hampshire, September 2013, Final TMDL Report for 3 Bacteria Impaired Waters in New Hampshire, September 2015, Bacteria TMDL Report for Camp Hadar Beach on Captain Pond in Salem, NH, September 2016

ii. When the criteria in Appendix F Part II.1.b.i. are met, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F Part II.1.a. as of that date and the permittee shall comply with the following:
    1. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F Part II.1.a. to date to reduce bacteria/pathogen in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
    2. The permittee shall continue to implement all requirements of Appendix F Part II.1.a. required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications

2. The MS4 operator shall work with NHDES to develop an Alternative Bacteria/Pathogens Reduction Plan consistent with the applicable TMDL. The MS4 operator shall submit a NHDES-approved Alternative Bacteria/Pathogens Reduction Plan that is consistent with the TMDL Implementation Plan and includes schedules and milestones to meet applicable Waste Load Allocations, with their Notice of Intent (NOI) as an alternative to the requirements described in Appendix F Part II.1. above.

a. The Alternative Bacteria/Pathogens Reduction Plan shall be subject to EPA review and the public comment period consistent with the NOI procedures at Part 1.7.4.b. of the permit.
b. The permittee shall keep the written plan (hardcopy or electronic) as part of their SWMP.
c. The permittee shall implement all operator-specific permit requirements included in the permittee's authorization letter from EPA based on the Alternative Bacteria/Pathogens Reduction Plan.
d. Unless the operator-specific permit requirements related to the Alternative Bacteria/Pathogens Reduction Plan are authorized by EPA, the permittee is subject to the requirements described in Appendix F Part II.1. above.

Table F-1 – Waterbodies and Primary Municipalities subject to a Bacteria TMDL.

Towns	Waterbody Name	Assessment Unit #	Impairment
ALLENSTOWN	CATAMOUNT POND - BEAR BROOK STATE PARK BEACH	NHLAK700060503-02-02	Escherichia coli
AMHERST	BABOOSIC LAKE - TOWN BEACH	NHLAK700060905-01-02	Escherichia coli
AMHERST; MILFORD	SOUHEGAN RIVER	NHRIV700060906-16	Escherichia coli
AMHERST; MERRIMACK	BABOOSIC LAKE	NHLAK700060905-01-01	Escherichia coli
BEDFORD	PATTEN BROOK	NHRIV700060803-12	Escherichia coli
BEDFORD	MCQUADE BROOK	NHRIV700060905-13	Escherichia coli

Towns	Waterbody Name	Assessment Unit #	Impairment
GOFFSTOWN; BEDFORD	RIDDLE BROOK	NHRIV700060905-18	Escherichia coli
DERRY	ISLAND POND - CHASE'S GROVE	NHLAK700061101-01-02	Escherichia coli
DERRY	BEAVER LAKE - GALLIEN'S BEACH	NHLAK700061203-02-02	Escherichia coli
DERRY	HOODS POND - TOWN BEACH	NHLAK700061203-03-02	Escherichia coli
DERRY	RAINBOW LAKE - KAREN-GENA BEACH	NHLAK700061203-05-02	Escherichia coli
DERRY	BEAVER BROOK	NHRIV700061203-09	Escherichia coli
DERRY	TAYLOR BROOK	NHRIV700061101-05	Escherichia coli
DOVER; ROLLINSFORD	SALMON FALLS RIVER	NHEST600030406-01	Enterococcus
DOVER; ROLLINSFORD	SALMON FALLS RIVER	NHEST600030406-01	Fecal coliform
DOVER	COCHECO RIVER	NHEST600030608-01	Enterococcus
DOVER	COCHECO RIVER	NHEST600030608-01	Fecal coliform
DOVER	DOVER WWTF SZ-NH	NHEST600031001-01-02	Enterococcus
DOVER	COCHECO RIVER - CENTRAL AVE DAM	NHIMP600030608-04	Escherichia coli
DOVER	BELLAMY RIVER - SAWYERS MILL DAM POND	NHIMP600030903-02	Escherichia coli
DOVER; ROLLINSFORD	FRESH CREEK POND	NHLAK600030608-01	Escherichia coli
ROCHESTER; SOMERSWORTH; DOVER	BLACKWATER BROOK-CLARK BROOK	NHRIV600030608-02	Escherichia coli
ROCHESTER; DOVER	COCHECO RIVER	NHRIV600030608-03	Escherichia coli
DOVER	REYNERS BROOK	NHRIV600030608-04	Escherichia coli
DOVER	COCHECO RIVER	NHRIV600030608-05	Escherichia coli
DOVER	INDIAN BROOK	NHRIV600030608-06	Escherichia coli
DOVER	BERRY BROOK	NHRIV600030608-15	Escherichia coli
DOVER	JACKSON BROOK	NHRIV600030608-16	Escherichia coli
DOVER	BELLAMY RIVER	NHRIV600030903-09	Escherichia coli
DOVER	VARNEY BROOK - CANNEY BROOK	NHRIV600030903-11	Escherichia coli
DOVER	GARRISON BROOK	NHRIV600030903-13	Escherichia coli
DOVER	BELLAMY RIVER NORTH	NHEST600030903-01-01	Fecal Coliform

Towns	Waterbody Name	Assessment Unit #	Impairment
DOVER	UPPER PISCATAQUA RIVER-NH-NORTH	NHEST600031001-01-01	Fecal coliform
DOVER	UPPER PISCATAQUA RIVER-NH-SOUTH	NHEST600031001-01-03	Fecal coliform
DOVER	BELLAMY RIVER SOUTH1	NHEST600030903-01-02	Enterococcus/Fecal Coliform
DOVER	COCHECO RIVER - WATSON-WALDRON DAM POND	NHIMP600030608-02	Escherichia coli
DURHAM	OYSTER RIVER	NHEST600030902-01-03	Enterococcus
DURHAM	ADAMS POINT SOUTH - COND APP1	NHEST600030904-04-06	Enterococcus/Fecal Coliform
DURHAM	OYSTER RIVER	NHIMP600030902-04	Escherichia coli
DURHAM	BEARDS CREEK	NHIMP600030902-06	Escherichia coli
DURHAM	OYSTER RIVER	NHRIV600030902-05	Escherichia coli
DURHAM	LONGMARSH BROOK - BEAUDETTE BROOK	NHRIV600030902-06	Escherichia coli
DURHAM	HAMEL BROOK	NHRIV600030902-08	Escherichia coli
DURHAM	COLLEGE BROOK	NHRIV600030902-09	Escherichia coli
DURHAM	RESERVOIR BROOK	NHRIV600030902-10	Escherichia coli
DURHAM	LITTLEHOLE CREEK	NHRIV600030902-11	E coli
DURHAM	CROMMENT CREEK	NHEST600030904-04-02	Fecal Coliform
DURHAM	ADAMS POINT TRIB	NHEST600030904-06-11	Fecal Coliform
DURHAM	OYSTER RIVER MOUTH	NHEST600030904-06-17	Fecal Coliform
EXETER	EXETER RIVER - EXETER RIVER DAM I	NHIMP600030805-04	Escherichia coli
EXETER	EXETER RIVER	NHRIV600030805-02	Escherichia coli
EXETER	NORRIS BROOK	NHRIV600030806-01	Escherichia coli
GOFFSTOWN; MANCHESTER	NAMASKE LAKE	NHLAK700060607-02	Escherichia coli
GOFFSTOWN	HARRY BROOK	NHRIV700060607-15	Escherichia coli
GOFFSTOWN	CATAMOUNT BROOK	NHRIV700060607-20	Escherichia coli
GOFFSTOWN	GLEN LAKE - PUBLIC (STATE OWNED) BEACH	NHLAK700060607-01-02	Escherichia coli
GREENLAND	UNKNOWN RIVER - WINNICUT RIVER DAM POND	NHIMP600030901-02	Escherichia coli
GREENLAND	HAINES BROOK	NHRIV600030901-03	Escherichia coli
GREENLAND	NORTON BROOK	NHRIV600030901-06	E coli
GREENLAND	FOSS BROOK	NHRIV600030904-05	E coli

Towns	Waterbody Name	Assessment Unit #	Impairment
GREENLAND	SHAW BROOK	NHRIV600030904-13	Escherichia coli
GREENLAND	UNNAMED BROOK	NHRIV600030904-21	Escherichia coli
GREENLAND	WINNICUT RIVER	NHEST600030904-01	Fecal coliform
GREENLAND; STRATHAM; NORTH HAMPTON	WINNICUT RIVER-BARTON BROOK-MARSH BROOK-THOMPSON BROOK	NHRIV600030901-02	Escherichia coli
HAMPSTEAD	WASH POND - TOWN BEACH	NHLAK700061101-03-02	Escherichia coli
HAMPSTEAD	SUNSET LAKE - SUNSET PARK BEACH	NHLAK700061101-03-03	Escherichia coli
HAMPTON	HAMPTON RIVER MARINA SZ	NHEST600031004-09-08	Enterococcus
HAMPTON	ATLANTIC OCEAN - HAMPTON BEACH STATE PARK BEACH	NHOCN000000000-02-10	Enterococcus
HAMPTON	TAYLOR RIVER	NHEST600031003-03	Fecal Coliform
HAMPTON	HAMPTON FALLS RIVER	NHEST600031004-01-03	Fecal Coliform
HAMPTON	TAYLOR RIVER (LOWER)	NHEST600031004-02-02	Fecal Coliform
HAMPTON	HAMPTON RIVER 2, R, 65.60, AC	NHEST600031004-04-02	Enterococcus
HAMPTON; SEABROOK	HAMPTON HARBOR SEG. 04-03	NHEST600031004-04-03	Fecal Coliform
HAMPTON; SEABROOK	HAMPTON HARBOR SEG. 09-01	NHEST600031004-09-01	Fecal Coliform
HAMPTON	HAMPTON/SEABROOK HARBOR 02	NHEST600031004-09-02	
HOLLIS	SILVER LAKE - STATE PARK BEACH	NHLAK700061001-02-02	Escherichia coli
AMHERST; MILFORD; HOLLIS	WITCHES BROOK	NHRIV700061001-02	Escherichia coli
HOLLIS	FLINTS BROOK,	NHRIV700040402-03	Escherichia coli
HOOKSETT	MESSER BROOK	NHRIV700060802-09	E coli
HOOKSETT; MANCHESTER	MERRIMACK RIVER	NHRIV700060802-14-02	Escherichia coli
HUDSON	ROBINSON POND	NHLAK700061203-06-01	Escherichia coli
HUDSON	ROBINSON POND - TOWN BEACH	NHLAK700061203-06-02	Escherichia coli
HUDSON	LAUNCH BROOK	NHRIV700061203-26	Escherichia coli

Towns	Waterbody Name	Assessment Unit #	Impairment
KINGSTON	COUNTRY POND - LONE TREE SCOUT RESV. BEACH	NHLAK700061403-03-03	Escherichia coli
KINGSTON	GREAT POND - KINGSTON STATE PARK BEACH	NHLAK700061403-06-02	Escherichia coli
KINGSTON	GREAT POND - CAMP BLUE TRIANGLE BEACH	NHLAK700061403-06-03	Escherichia coli
KINGSTON	Park Association Beach, Great Pond	NHLAK700061403-06-05	Escherichia coli
MANCHESTER	MERRIMACK RIVER - AMOSKEAG DAM	NHIMP700060802-04	Escherichia coli
MANCHESTER	CRYSTAL LAKE-TOWN BEACH	NHLAK700060703-02-02	Escherichia coli
GOFFSTOWN; MANCHESTER	UNNAMED BROOK - TO PISCATAQUOG RIVER	NHRIV700060607-35	E coli
MANCHESTER; AUBURN; LONDONDERRY	COHAS BROOK - LONG POND BROOK	NHRIV700060703-05	Escherichia coli
MANCHESTER	UNNAMED BROOK - FROM PINE ISLAND POND TO MERRIMACK RIVER	NHRIV700060703-09	Escherichia coli
MANCHESTER	RAYS BROOK	NHRIV700060802-15	E coli
MANCHESTER; BEDFORD	MERRIMACK RIVER	NHRIV700060803-14-02	Escherichia coli
MERRIMACK	NATICOOK LAKE - WASSERMAN PARK BEACH	NHLAK700061002-04-02	Escherichia coli
MANCHESTER; BEDFORD; MERRIMACK; LITCHFIELD	MERRIMACK RIVER	NHRIV700060804-11	Escherichia coli
AMHERST; MERRIMACK	SOUHEGAN RIVER	NHRIV700060906-18	Escherichia coli
AMHERST; MERRIMACK; NASHUA; HOLLIS	PENNICHUCK BROOK - WITCHES BROOK	NHRIV700061001-07	Escherichia coli
MERRIMACK; LITCHFIELD	MERRIMACK RIVER	NHRIV700061002-13	Escherichia coli
MERRIMACK	SOUHEGAN RIVER	NHRIV700060906-25	Escherichia coli
MILFORD	SOUHEGAN RIVER - MCLANE DAM	NHIMP700060906-08	Escherichia coli

Towns	Waterbody Name	Assessment Unit #	Impairment
MILFORD	PURGATORY BROOK	NHRIV700060904-07	Escherichia coli
WILTON; MILFORD	SOUHEGAN RIVER	NHRIV700060904-14	Escherichia coli
MILFORD	GREAT BROOK - OX BROOK	NHRIV700060906-12	Escherichia coli
MILFORD	SOUHEGAN RIVER	NHRIV700060906-13	Escherichia coli
MILTON	MILTON POND - MILTON POND REC AREA BEACH	NHLAK600030404-01-03	Escherichia coli
MILTON	DAMES BROOK	NHRIV600030601-07	Escherichia coli
MILTON	JONES BROOK	NHRIV600030402-04	Escherichia coli
NASHUA	NASHUA RIVER - NASHUA CANAL DIKE	NHIMP700040402-03	E coli
NASHUA	NASHUA RIVER - JACKSON PLANT DAM POND	NHIMP700040402-05	Escherichia coli
NASHUA	NASHUA RIVER	NHRIV700040402-08	Escherichia coli
NASHUA	NASHUA RIVER	NHRIV700040402-09	Escherichia coli
MERRIMACK; LITCHFIELD; HUDSON; NASHUA	MERRIMACK RIVER	NHRIV700061002-14	Escherichia coli
NASHUA	SALMON BROOK - HASSELLS BROOK - OLD MAIDS BROOK - HALE BROOK	NHRIV700061201-05	Escherichia coli
NASHUA	SALMON BROOK	NHRIV700061201-07	Escherichia coli
HUDSON; NASHUA	MERRIMACK RIVER	NHRIV700061206-24	Escherichia coli
NEW CASTLE	ATLANTIC OCEAN - NEW CASTLE BEACH	NHOCN000000000-02-02	Enterococcus
NEWMARKET; GREENLAND; STRATHAM	GREAT BAY PROHIB SZ1	NHEST600030904-02	Enterococcus
NEWMARKET	LAMPREY RIVER	NHEST600030709-01	Enterococcus
NORTH HAMPTON; HAMPTON	LITTLE RIVER	NHEST600031004-10	Fecal coliform
NORTH HAMPTON	ATLANTIC OCEAN - STATE BEACH1	NHOCN000000000-02-09	Enterococcus/Fecal Coliform
NORTH HAMPTON	CHAPEL BROOK	NHEST600031002-03	Fecal coliform
NORTH HAMPTON	TRIBUTARY TO CHAPEL BROOK	NHRIV600031002-23	Escherichia coli

Towns	Waterbody Name	Assessment Unit #	Impairment
NORTH HAMPTON	CHAPEL BROOK	NHRIV600031002-24	Escherichia coli
PELHAM	LONG POND - TOWN BEACH	NHLAK700061205-02-02	Escherichia coli
WINDHAM; HUDSON; PELHAM	BEAVER BROOK	NHRIV700061203-22	Escherichia coli
PELHAM	BEAVER BROOK - TONYS BROOK	NHRIV700061205-01	Escherichia coli
HAMPSTEAD; PLAISTOW; ATKINSON	KELLY BROOK - SEAVER BROOK	NHRIV700061401-04	Escherichia coli
PORTSMOUTH; NEW CASTLE	LOWER PISCATAQUA RIVER - SOUTH	NHEST600031001-02-02	Enterococcus
PORTSMOUTH	UPPER SAGAMORE CREEK	NHEST600031001-03	Fecal coliform
PORTSMOUTH	UPPER SAGAMORE CREEK	NHEST600031001-03	Enterococcus
PORTSMOUTH; NEW CASTLE; RYE	LOWER SAGAMORE CREEK	NHEST600031001-04	Enterococcus
PORTSMOUTH	SOUTH MILL POND	NHEST600031001-09	Enterococcus
PORTSMOUTH	NORTH MILL POND	NHEST600031001-10	Enterococcus
PORTSMOUTH; GREENLAND	PICKERING BROOK	NHRIV600030904-06	Escherichia coli
PORTSMOUTH	SAGAMORE CREEK	NHRIV600031001-03	Escherichia coli
PORTSMOUTH	LOWER HODGSON BROOK	NHRIV600031001-04	Escherichia coli
PORTSMOUTH	UPPER HODGSON BROOK	NHRIV600031001-05	Escherichia coli
PORTSMOUTH	PAULS BROOK - PEASE AIR FORCE BASE	NHRIV600031001-07	Escherichia coli
PORTSMOUTH	BORTHWICK AVE TRIBUTARY	NHRIV600031001-09	Escherichia coli
PORTSMOUTH	NEWFIELDS DITCH	NHRIV600031001-10	Escherichia coli
RAYMOND	LAMPREY RIVER - CARROLL LAKE BEACH	NHRIV600030703-07-02	Escherichia coli
ROCHESTER	SALMON FALLS RIVER - BAXTER MILL DAM POND	NHIMP600030405-04	Escherichia coli
ROCHESTER	COCHECO RIVER - GONIC DAM POND	NHIMP600030607-02	Escherichia coli
ROCHESTER	COCHECO RIVER	NHRIV600030603-06	Escherichia coli

Towns	Waterbody Name	Assessment Unit #	Impairment
ROCHESTER	COCHECO RIVER	NHRIV600030603-08	Escherichia coli
ROCHESTER	WILLOW BROOK	NHRIV600030603-10	Escherichia coli
ROCHESTER	ISINGLASS RIVER	NHRIV600030607-10	E coli
ROCHESTER	COCHECO RIVER - CITY DAM 1	NHIMP600030603-01	Escherichia coli
ROCHESTER	COCHECO RIVER - HATFIELD	NHIMP600030603-02	Escherichia coli
ROCHESTER	AXE HANDLE BROOK - HOWARD BROOK	NHRIV600030602-03	Escherichia coli
ROLLINSFORD	SALMON FALLS RIVER - SOUTH BERWICK DAM	NHIMP600030406-04	Escherichia coli
SOMERSWORTH; ROLLINSFORD	FRESH CREEK - TWOMBLY BROOK	NHRIV600030608-08	Escherichia coli
ROLLINSFORD	ROLLINS BROOK	NHRIV600030608-10	Escherichia coli
DOVER; ROLLINSFORD	FRESH CREEK	NHRIV600030608-11	Escherichia coli
RYE	WITCH CREEK1	NHEST600031002-01-01	Enterococcus/Fecal Coliform
RYE	BERRYS BROOK1	NHEST600031002-01-02	Enterococcus/Fecal Coliform
NEW CASTLE; RYE	LITTLE HARBOR	NHEST600031002-02	Total Fecal; Enterococcus
RYE	PARSONS CREEK	NHEST600031002-05	Fecal coliform
RYE	ATLANTIC OCEAN - PIRATES COVE BEACH	NHOCN000000000-02-04	Enterococcus
RYE	ATLANTIC OCEAN - CABLE BEACH	NHOCN000000000-02-05	Enterococcus
RYE	ATLANTIC OCEAN - SAWYER BEACH1	NHOCN000000000-02-06	Enterococcus/Fecal Coliform
RYE	ATLANTIC OCEAN - JENNESS BEACH	NHOCN000000000-02-07	Enterococcus
RYE; NORTH HAMPTON	BASS BROOK BEACH OUTFALL AREA1	NHOCN000000000-03-01	Enterococcus/Fecal Coliform
NORTH HAMPTON	ATLANTIC OCEAN - BASS BEACH1	NHOCN000000000-03-02	Enterococcus/Fecal Coliform
PORTSMOUTH; GREENLAND; RYE	BERRY'S BROOK	NHRIV600031002-01	Escherichia coli
RYE	UNNAMED BROOKS - TO ATLANTIC OCEAN AT CONCORD POINT	NHRIV600031002-03	Escherichia coli

Towns	Waterbody Name	Assessment Unit #	Impairment
RYE	UNNAMED BROOK TO BASS BEACH	NHEST600031002-04	Fecal coliform
RYE	UNNAMED BROOK - FROM EEL POND TO ATLANTIC OCEAN RYE OUTFALL	NHRIV600031002-10	Escherichia coli
SALEM	ARLINGTON MILL RESERVOIR-SECOND ST BEACH	NHLAK700061101-04-02	E coli
SALEM	CAPTAIN POND - CAPTAIN'S BEACH	NHLAK700061102-03-02	Escherichia coli
SALEM	CAPTAIN POND - CAMP OTTER SWIM AREA BEACH	NHLAK700061102-03-03	Escherichia coli
SALEM	MILLVILLE LAKE - TOWN BEACH	NHLAK700061102-06-02	E coli
SALEM	Merrimack River	NHRIV700061102-03-06	Escherichia coli
SALEM	ARLINGTON MILL RESERVOIR-ARLINGTON POND IMPROVEMENT ASSOC	NHLAK700061101-04-03	Escherichia coli
SALEM	SALEM TOWN BEACH-HEDGEHOG POND	NHLAK700061102-13	Escherichia coli
SANDOWN	EXETER RIVER	NHRIV600030802-03	Escherichia coli
SEABROOK	MILL CREEK	NHEST600031004-07	Enterococcus
SEABROOK	MILL CREEK	NHEST600031004-07	Enterococcus
SEABROOK	BLACKWATER RIVER	NHEST600031004-08-04	Enterococcus
SEABROOK	SEABROOK HARBOR BEACH	NHEST600031004-09-05	Enterococcus
SEABROOK	ATLANTIC OCEAN - SEABROOK TOWN BEACH	NHOCN000000000-02-11	Enterococcus
SEABROOK	CAINS BROOK - NOYES POND	NHIMP600031004-06	E coli
SEABROOK	CAIN'S BROOK	NHRIV600031004-10	Escherichia coli
SEABROOK	CAIN'S BROOK	NHRIV600031004-12	Escherichia coli
SEABROOK	UNNAMED BROOK TO CAINS MILL POND	NHRIV600031004-21	E coli
SEABROOK	Hunts Island Creek, P/Uc, 15.99, Ac	NHEST600031004-06	Fecal Coliform
SEABROOK	BLACKWATER RIVER 1, R, 69.47, AC	NHEST600031004-08-01	Enterococcus

Towns	Waterbody Name	Assessment Unit #	Impairment
SEABROOK	BLACKWATER RIVER 2, R, 71.07, AC	NHEST600031004-08-02	Enterococcus
SOMERSWORTH	SALMON FALLS RIVER - LOWER GREAT FALLS DAM	NHIMP600030406-02	Escherichia coli
SOMERSWORTH; DOVER	WILLAND POND	NHLAK600030405-03	E coli
ROCHESTER; SOMERSWORTH	SALMON FALLS RIVER	NHRIV600030405-14	Escherichia coli
SOMERSWORTH	SALMON FALLS RIVER	NHRIV600030406-03	Escherichia coli
STRATHAM; EXETER	WHEELWRIGHT CREEK - PARKMAN BROOK	NHRIV600030806-04	Escherichia coli
STRATHAM	TRIB TO SQUAMSCOTT RIVER - STUART DAIRY FARM	NHRIV600030806-14	Escherichia coli
STRATHAM	SQUAMSCOTT RIVER	NHEST600030806-01	Enterococcus
WILTON	CAMP ANN JACKSON GIRL SCOUT POND SWIMMING AREA	NHIMP700060902-13-02	E coli
WILTON	SOUHEGAN RIVER - PINE VALLEY MILL	NHIMP700060904-08	Escherichia coli
WILTON	SOUHEGAN RIVER - TUCKER BROOK	NHRIV700060902-05	Escherichia coli
WILTON	SOUHEGAN RIVER	NHRIV700060902-13	Escherichia coli
WILTON	STONY BROOK - TOWN BEACH (GOSS PARK)	NHRIV700060903-16-02	Escherichia coli
WILTON	SOUHEGAN RIVER - STONY BROOK	NHRIV700060904-13	Escherichia coli
WINDHAM	TOWN BEACH - COBBETTS POND	NHLAK700061204-01-03	Escherichia coli

III. Lake and Pond Phosphorus TMDLs

Permittees that operate regulated MS4s in the municipalities identified on Table F-2 that discharge to waterbodies listed on Table F-2 in Appendix F or their tributaries, and any other permittee that discharges to waterbodies listed on Table F-2 in Appendix F or their tributaries, shall reduce phosphorus discharges to support achievement of the WLA included in the approved TMDLs complying with EITHER Appendix F Part III.1 or Appendix F Part III.2 below.

1. The permittee shall develop a Lake Phosphorus Control Plan (LPCP) designed to reduce the amount of phosphorus in stormwater discharges from its MS4 to the impaired waterbody or its tributaries consistent with assumptions and requirements of the WLA for the phosphorous loadings published in the applicable phosphorus TMDL (see Table F-2 for TMDL names and links to applicable phosphorus TMDLs). Table F-2, Appendix F provides the percent reductions in stormwater total phosphorus load for each municipality to be consistent with the assumptions and requirements of the WLA

Table F-2: Waterbodies and Primary Municipalities subject to a Lake or Pond Phosphorus TMDL

Towns	Water Body Name	% Reduction In TP Load for all Sources	TMDL Link
Amherst; Merrimack	Baboosic Lake	44%	Baboosic TMDL
Merrimack	Horseshoe Pond	76%	Horseshoe TMDL
Manchester	Nutt Pond	71%	Nutt TMDL
Manchester	Pine Island Pond	64%	Pine Island TMDL
Hudson	Robinson Pond	48%	Robinson TMDL
Bedford	Sebbins Pond	64%	Sebbins TMDL
Sandown	Showell Pond	69%	Showell TMDL
Manchester	Stevens Pond	50%	Stevens TMDL
Derry	Hoods Pond	76%	Hoods TMDL
Kingston	Halfmoon Pond	74%	Halfmoon TMDL
Kingston	Greenwood Pond	69%	Greenwood TMDL
Hollis	Flints Pond	40%	Flints TMDL
Manchester	Dorrs Pond	62%	Dorrs TMDL
Kingston; Newton	Country Pond	52%	Country TMDL
Raymond	Governors Lake	47%	Governors TMDL
Bedford	Sandy Pond	51%	Sandy TMDL

   a. The permittee shall develop a Lake Phosphorous Control Plan (LPCP) as part of its written SWMP and update the LPCP in annual reports pursuant to Part 4.4 of

the Permit. The LPCP shall describe measures the permittee will undertake to reduce the amount of phosphorous in MS4 discharges.

b. The LPCP shall be implemented in accordance with the following schedule and contain the following elements:

i. LPCP Implementation Schedule – The permittee shall complete the implementation of its LPCP as soon as possible but no later than 15 years after the effective date of the permit.

ii. The LPCP shall be implemented in accordance with the following schedule and contain the following elements:

Number	LPCP Component and Milestones	Completion Date
1	Legal Analysis	2 years after permit effective date
2	Funding source assessment	3 years after permit effective date
3	Define LPCP scope (LPCP Area)	4 years after permit effective date
4	Calculate Baseline Phosphorus, Allowable Phosphorus Load and Phosphorus Reduction Requirement	4 years after permit effective date
5	Description of planned nonstructural and structural controls	5 years after permit effective date
6	Description of Operation and Maintenance (O&M) Program	5 years after permit effective date
7	Implementation schedule	5 years after permit effective date
8	Cost and Funding Source Assessment	5 years after permit effective date
9	Complete written LPCP	5 years after permit effective date
10	Full implementation of nonstructural controls.	6 years after permit effective date
11	Performance Evaluation.	6 and 7 years after permit effective date
12	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (P_{exp}) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(P_{allow}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.80 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.80)$	8 years after permit effective date
13	Performance Evaluation	9 years after permit effective date

14	1. Performance Evaluation. 2. Update LPCP 3. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (P_{exp}) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(P_{allow}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.60 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.60)$ OR that the permittee has reduced their phosphorus export rate by 30kg/year (whichever is greater, unless full Phosphorus Reduction Requirement has been met)	10years after permit effective date
15	Performance Evaluation	11 and 12 years after permit effective date
16	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (P_{exp}) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(P_{allow}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.30 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.30)$	13years after permit effective date
17	Performance Evaluation	14 years after permit effective date
18	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (P_{exp}) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(P_{allow}) $P_{exp} \leq P_{allow}$	15years after permit effective date

Table F-3: LPCP components and milestones

iii. Description of LPCP Components:

Legal Analysis- The permittee shall develop and implement an analysis that identifies existing regulatory mechanisms available to the MS4 such as by-laws and ordinances and describe any changes to these regulatory mechanisms that may be necessary to effectively implement the LPCP. This may include the creation or amendment of financial and regulatory authorities. The permittee shall adopt necessary regulatory changes by the end of the permit term.

Scope of the LPCP (LPCP Area) - The permittee shall indicate the area in which the permittee plans to implement the LPCP, this area is known as the "LPCP Area". The permittee must choose one of the following: 1) to implement its LPCP in the entire area within its jurisdiction discharging to the impaired waterbody (for a municipality this would be the municipal boundary) or 2) to implement its LPCP in only the urbanized area portion of its jurisdiction discharging to the impaired waterbody. If the permittee chooses to implement the LPCP in its entire jurisdiction discharging to the impaired waterbody, the permittee may demonstrate compliance with the Phosphorus Reduction Requirement and Allowable Phosphorus Load requirements applicable to it through structural and non-structural controls on discharges that occur both inside and outside the urbanized area. If the permittee chooses to implement the LPCP in its urbanized area only discharging to the impaired waterbody, the permittee must demonstrate compliance with the Phosphorus Reduction Requirement and Allowable Phosphorus Load requirements applicable to it through structural and non-structural controls on discharges that occur within the urbanized area only.

Calculate Baseline Phosphorus Load (P_{base}), Phosphorus Reduction Requirement (P_{RR}) and Allowable Phosphorus Load (P_{allow}) –Permittees shall calculate their numerical Allowable Phosphorus Load and Phosphorus Reduction Requirement in mass/yr by first estimating their Baseline Phosphorus Load in mass/yr from its LPCP Area consistent with the methodology in Attachment 1 to Appendix F or the applicable TMDL, the baseline shall only be estimated using land use phosphorus export coefficients in Attachment 1 to Appendix F or the applicable TMDL methodology and not account for phosphorus reductions resulting from implemented structural BMPs completed to date. Table F-2 contains the percent phosphorus reduction required from urban stormwater consistent with the TMDL of each impaired waterbody. The permittee shall apply the applicable required percent reduction in Table F-2 to the calculated Baseline Phosphorus Load to obtain the permittee specific Phosphorus Reduction Requirement in mass/yr. The Phosphorus Reduction Requirement load shall then be subtracted from the Baseline Phosphorus Load to obtain the permittee specific Allowable Phosphorus Load..

Description of planned non-structural controls – The permittee shall describe the non-structural stormwater control measures to be implemented to support the achievement of the milestones in Table F-3. The description of non-structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions that are expected to result from their implementation. Annual phosphorus reduction from non-structural BMPs shall be calculated consistent with Attachment 2 to Appendix F. The permittee shall update the description of planned non-structural controls as needed to support the achievement of the milestones in Table F-3, including an update in the updated written LPCP 10 years after the permit effective date.

Description of planned structural controls – The permittee shall develop a priority ranking of areas and infrastructure within the municipality for

potential implementation of phosphorus control practices. The ranking shall be developed through the use of available screening and monitoring results collected during the permit term either by the permittee or another entity and the mapping required pursuant to Part 2.3.4.6 of the Permit. The permittee shall also include in this prioritization a detailed assessment of site suitability for potential phosphorus control measures based on soil types and other factors. The permittee shall coordinate this activity with the requirements of Part 2.3.6.e. of the Permit. A description and the result of this priority ranking shall be included in the LPCP. The permittee shall describe the structural stormwater control measures necessary to support achievement of the milestones in Table F-3. The description of structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions in units of mass/yr that are expected to result from their implementation. Structural measures to be implemented by a third party may be included in the LPCP. Annual phosphorus reduction from structural BMPs shall be calculated consistent with Attachment 3 to Appendix F. The permittee shall update the description of planned structural controls as needed to support the achievement of the milestones in Table F-3, including an update in the updated written LPCP 10 years after the permit effective date.

Description of Operation and Maintenance (O&M) Program for all planned and existing structural BMPs – The permittee shall establish an Operation and Maintenance Program for all structural BMPs being claimed for phosphorus reduction credit as part the LPCP. This includes BMPs implemented to date as well as BMPs to be implemented. The Operation and Maintenance Program shall become part of the PCP and include: (1) inspection and maintenance schedule for each BMP according to BMP design or manufacturer specification and (2) program or department responsible for BMP maintenance.

Implementation Schedule – An initial schedule for implementing the BMPs, including, as appropriate: funding, training, purchasing, construction, inspections, monitoring, O&M and other assessment and evaluation components of implementation. Implementation of planned BMPs must begin upon completion of the LPCP, and all non-structural BMPs shall be fully implemented within six years of the permit effective date. Where planned structural BMP retrofits or major drainage infrastructure projects are expected to take additional time to construct, the permittee shall within four years of the effective date of the permit have a schedule for completion of construction consistent with the reduction requirements in Table F-3. The permittee shall complete the implementation of its LPCP as soon as possible or at a minimum in accordance with the milestones set forth in Table F-3. The implementation schedule shall be updated as needed to support the achievement of the milestones in Table F-3, including an update in the updated written LPCP 10 years after the permit effective date.

Cost and funding source assessment – The permittee shall estimate the cost for implementing its LPCP and describe known and anticipated funding mechanisms. The permittee shall describe the steps it will take to implement its funding plan. This may include but is not limited to

conceptual development, outreach to affected parties, and development of legal authorities.

Complete written LPCP – The permittee must complete the written LPCP 5 years after permit effective date. The complete LPCP shall include item numbers 1-8 in Table F-3. The permittee shall make the LPCP available to the public for public comment during the LPCP development. EPA encourages the permittee to post the LPCP online to facilitate public involvement. The LPCP shall be updated as needed with an update 10 years after the permit effective date at a minimum to reflect changes in BMP implementation to support achievement of the phosphorus export milestones in Table F-3. The updated LPCP shall build upon the original LPCP and include additional or new BMPs the permittee will use to support the achievement of the milestones in Table F-3.

Performance Evaluation – The permittee shall evaluate the effectiveness of the LPCP by tracking the phosphorus reductions achieved through implementation of structural and non-structural BMPs[3] and tracking increases in phosphorus loading from the LPCP Area beginning six years after the effective date of the permit. Phosphorus reductions shall be calculated consistent with Attachment 2 (non-structural BMP performance), Attachment 3 (structural BMP performance) and Attachment 1 (reductions through land use change), to Appendix F for all BMPs implemented to date[4]. Phosphorus load increases resulting from development shall be calculated consistent with Attachment 1 to Appendix F. Phosphorus loading increases and reductions in units of mass/yr shall be added or subtracted from the calculated Baseline Phosphorus Load to estimate the yearly phosphorous export rate from the LPCP Area in mass/yr. The permittee shall also include all information required in Part III.1.c. of this Appendix in each performance evaluation.

c. Reporting. Beginning 6 years after the permit effective date, the permittee shall include the following in each annual report submitted pursuant to Part 4.4 of the Permit:
   i. All non-structural control measures implemented during the reporting year along with the phosphorus reduction in mass/yr (P_{NSred}) calculated consistent with Attachment 2 to Appendix F
   ii. Structural controls implemented during the reporting year and all previous years including:
      1. Location information of structural BMPs (GPS coordinates or street address)

[3] In meeting its phosphorus reduction requirements a permittee may quantify phosphorus reductions by actions undertaken by another entity, except where those actions are credited to another permittee identified in Appendix F Table F-2

[4] Annual phosphorus reductions from structural BMPs installed in the LPCP Area prior to the effective date of this permit shall be calculated consistent with Attachment 3 to Appendix F. Phosphorus Reduction Credit for previously installed BMPs will only be given if the Permittee demonstrates that the BMP is performing up to design specifications and certifies that the BMP is properly maintained and inspected according to manufacturer design or specifications. This certification shall be part of the annual performance evaluation during the year credit is claimed for the previously installed BMP.

2. Phosphorus reduction from all structural BMPs implemented to date in mass/yr (P_{Sred}) calculated consistent with Attachment 3 to Appendix F
3. Date of last completed maintenance for each Structural control

iii. Phosphorus load increases due to development over the previous reporting period and incurred to date (P_{DEVinc}) calculated consistent with Attachment 1 to Appendix F.

iv. Estimated yearly phosphorus export rate (P_{exp}) from the LPCP Area calculated using Equation 1. Equation 1 calculates the yearly phosphorus export rate by subtracting yearly phosphorus reductions through implemented nonstructural controls and structural controls to date from the Baseline Phosphorus Load and adding loading increases incurred through development to date. This equation shall be used to demonstrate compliance with the phosphorus reduction milestones required as part of each phase of the LPCP.

$$P_{exp}\left(\frac{mass}{yr}\right) = P_{base}\left(\frac{mass}{yr}\right) - \left(P_{Sred}\left(\frac{mass}{yr}\right) + P_{NSred}\left(\frac{mass}{yr}\right)\right) + P_{DEVinc}\left(\frac{mass}{yr}\right)$$

Equation 1. Equation used to calculate yearly phosphorus export rate from the chosen LPCP Area. P_{exp}=Current phosphorus export rate from the LPCP Area in mass/year. P_{base}=baseline phosphorus export rate from LPCP Area in mass/year. P_{Sred}= yearly phosphorus reduction from implemented structural controls in the LPCP Area in mass/year. P_{NSred}= yearly phosphorus reduction from implemented non-structural controls in the LPCP Area in mass/year. Area in mass/year. P_{DEVinc}= yearly phosphorus increase resulting from development since the year baseline loading was calculated in the LPCP Area in mass/year.

v. Certification that all structural BMPs are being inspected and maintained according to the O&M program specified as part of the PCP. The certification statement shall be:

I certify under penalty of law that all source control and treatment Best Management Practices being claimed for phosphorus reduction credit have been inspected, maintained and repaired in accordance with manufacturer or design specification. I certify that, to the best of my knowledge, all Best Management Practices being claimed for a phosphorus reduction credit are performing as originally designed.

d. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F Part III.1.a - b as follows.

i. The permittee is relieved of its additional requirements as of the date when the following conditions are met:
   1. The applicable TMDL has been modified or revised and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee's discharge based on wasteload allocations in the newly approved TMDL

ii. When the criteria in Appendix F part III.1.d.i. are met, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of

any remaining requirements of Appendix F part III.1.a.-b. as of that date and the permittee shall comply with the following:

1. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part III.1.a.-b. to date to reduce phosphorus in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
2. The permittee shall continue to implement all requirements of Appendix F part III.1.a.-b. required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications, and the reporting requirements of Appendix F part III.1.c. remain in place.

2. The MS4 operator shall work with NHDES to develop an Alternative Phosphorus Reduction Plan consistent with the applicable TMDL. The MS4 operator shall submit a NHDES-approved Alternative Phosphorus Reduction Plan that is consistent with the TMDL Implementation Plan and includes schedules and milestones to meet applicable Waste Load Allocations consistent with the schedules and milestones contained in Appendix F part III.1 above, with their Notice of Intent (NOI) as an alternative to the requirements described in Appendix F part III.1 above.

a. The Alternative Phosphorus Reduction Plan shall be subject to EPA review and the public comment period consistent with the NOI procedures at part 1.7.4.b. of the permit.
b. The permittee shall keep the written plan (hardcopy or electronic) as part of their SWMP.
c. The permittee shall implement all operator-specific permit requirements included in the permittee's authorization letter from EPA based on the Alternative Phosphorus Reduction Plan.
d. Unless the operator-specific permit requirements related to the Alternative Phosphorus Reduction Plan are authorized by EPA, the permittee is subject to the requirements described in Appendix F part III.1 above.

ATTACHMENT 1 TO APPENDIX F

Method to Calculate Baseline Phosphorus Load, Phosphorus Reduction Requirements and Phosphorus load increases due to development (P_{DEVinc})

The methods and annual phosphorus load export rates presented in Attachments 1, 2 and 3 are for the purpose of measuring load reductions for various stormwater BMPs treating runoff from different site conditions (i.e. impervious or pervious) and land uses (e.g. commercial, industrial, residential, etc.). The estimates of annual phosphorus load and load reductions due to BMPs are intended for use by the permittee to measure compliance with its Phosphorus Reduction Requirement under the permit.

This attachment provides the method to calculate a baseline phosphorus load discharging in stormwater for the impaired municipalities subject to Lakes and Ponds TMDL. A complete list of municipalities subject to these TMDLs is presented in Appendix F, Table F-2. This method shall be used to calculate the following annual phosphorus loads:

1) Baseline Phosphorus Load for Permittees
2) Phosphorus Reduction Requirement

This attachment also provides the method to calculate stormwater phosphorus load increases due to increases in impervious cover from development within the applicable watershed area for the municipalities subject to the Lakes & Ponds TMDL requirements:

3) Phosphorus Load Increases Due to Increases in Impervious Cover from Development

The **Baseline Phosphorus Load** is a measure of the annual phosphorus load discharging in stormwater from the impervious and pervious areas of the impaired Lake Phosphorus Control Plan (LPCP) Area.

The **Baseline Phosphorus Pounds Reduction** referred to as the permittee's **Phosphorus Reduction Requirement in mass/year** represents the required reduction in annual phosphorus load in stormwater to meet the WLA for the impaired watershed. The percent phosphorus reduction for each watershed (identified in Appendix F, Table F-2) is applied to the Baseline Phosphorus Load to calculate the Phosphorus Reduction Requirement.

The **Phosphorus load increases due to development (P_{DEVinc})** is the stormwater phosphorus load increases due to development within the Lake Phosphorus Control Plan (LPCP) area over the previous reporting period and incurred to date. Increases in stormwater phosphorus load from development will increase the permittee's baseline phosphorus load and therefore, the phosphorus reduction requirement. Installation of new BMPs including decreases in impervious cover and all associated phosphorus load reductions shall be accounted for as BMPs in accordance with the calculation methodologies in Attachment 3 to Appendix F.

Examples are provided to illustrate use of the methods. Table 1-1 below provides annual composite phosphorus load export rates (PLERs) by land use category for calculating the Baseline Phosphorus Load and the Phosphorus Reduction Requirement. The permittee shall select the land use category that most closely represents the actual use of the watershed. For watersheds with institutional type uses, such as government properties, hospitals, and schools, the permittee shall use the commercial land use category for the purpose of calculating phosphorus loads.

Table 1-2 below provides annual PLERs by land use category for impervious and pervious areas. The permittee shall select the land use category that most closely represents the actual use of the watershed. For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value. If the HSG is not known, assume HSG C conditions for the phosphorus load export rate. For watersheds with institutional type uses, such as government properties, hospitals, and schools, the permittee shall use the commercial/industrial land use category for the purpose of calculating phosphorus loads. Table 1-3 below provides a crosswalk table of land use categories in Tables 1-1 and 1-2 and the codes used NH GRANIT and those used in the TMDL reports.

The composite PLERs in Table 1-1 to be used for calculating Baseline Phosphorus Load are based on the specified directly connected impervious area (DCIA). If the permittee determines through mapping and site investigations that the overall DCIA for the collective area for each land use category is different than the corresponding values in Table 1-1, then the permittee is encouraged to submit this information in its annual report and request EPA to recalculate the composite PLERs for the permittees to use in refining the Baseline Phosphorus Load calculation for the LPCP.

(1) Baseline Phosphorus Load: The permittee shall calculate the **Baseline Phosphorus Load** by the following procedure:

1) Determine the total MS4 drainage area (acre) associated with the impaired watershed or the permittee's chosen Lake Phosphorus Control Plan (LPCP) area;

2) Sort the total area associated with the watershed into land use categories;

3) Calculate the annual phosphorus load associated with each land use category by multiplying the total area of land use by the appropriate land use-based composite phosphorus load export rate provided in Table 1-1; and

4) Determine the Baseline Phosphorus Load by summing the land use loads.

Example 1-1 to determine Baseline Phosphorus Load:
LPCP area A is 18.0 acres, with 11.0 acres of industrial area ($_{IND}$) (e.g. access drives, buildings, and parking lots), 3.0 acres of medium-density residential ($_{MDR}$) and 4.0 acres of unmanaged wooded area ($_{FOR}$).

The **Baseline Phosphorus Load** = (Baseline P Load $_{IND}$) + (Baseline P Load $_{MDR}$) + (Baseline P Load $_{FOR}$)

Where:
Baseline P Load $_{IND}$ = (TA_{IND}) x (PLER for industrial use (Table 1-1))
= 11.0 acre x 1.27 lbs/acre/year
= 14.0 lbs P/year

Baseline P Load $_{MDR}$ = (TA_{MDR}) x (PLER for medium density residential (Table 1-1))
= 3.0 acre x 0.49 lbs/acre/year
= 1.5 lbs P/year

Baseline P Load $_{FOR}$ = (TA_{FOR}) x (PLER for forest (Table 1-1))

= 4.0 acre x 0.12 lbs/acre/year
= 0.5 lbs P/year

Baseline P Load = 14.0 lbs P/year + 1.5 lbs P/year + 0.5 lbs P/year
= **16.0 lbs P/year**

(2) Baseline Phosphorus Pounds Reduction (Phosphorus Reduction Requirement): The Baselines Phosphorus Reduction requirement is the amount of reduction in annual phosphorus load (in pounds) that the permittee is required to achieve in the contributing MS4 drainage area or the permittee's chosen LPCP area. The permittee shall calculate the **Phosphorus Reduction Requirement** by multiplying the **Baseline Phosphorus Load** by the applicable percent phosphorus reduction for that watershed specified in Table F-2 (Appendix F).

Example 1-2 to determine Watershed Phosphorus Reduction Requirement:
Table F-2 identifies LPCP area A's percent phosphorus reduction as 45%; therefore the LPCP Phosphorus Reduction Requirement is:

Phosphorus Reduction Requirement = (Baseline Phosphorus Load) x (0.45)
= (16.0 lbs P/year) x (0.45)
= **7.2 lbs P/year**

(3) Phosphorus load increases due to development (P_{DEVinc}): To estimate the increases in stormwater phosphorus load due to development in the LPCP Area, the permittee will use the procedure described below. Alternatively, the permittee may provide an alternative analysis that uses applicable distinct PLERs provided in Table 1-2 to calculate increases in phosphorus load:

1) Determine the total area in which new development has occurred since the most recent baseline phosphorus (P) load analysis and distribute the area according to the land use categories (see Table 1-1) used in the most recent baseline P load analysis;

2) Calculate the pre-new development baseline load from each area by land use category using the composite PLERs in Table 1-1 and sum the P loads to determine baseline P load for the area prior to new-development ($P_{BL\text{-}PreDEV}$);

3) Distribute the total new-development area into impervious and pervious subareas according to the most representative land use land use categories (see Table 1-2) for the new-development use categories;

4) Calculate the P load for each new-development land use-based impervious and pervious subarea by multiplying the subarea by the appropriate distinct PLERs provided in Table 1-2 and sum the P loads to determine the new P load for the total area in which new development has occurred ($P_{New\text{-}DEV}$); and

5) Determine the P load increase due to development (P_{DEVinc}) by subtracting the baseline P load from the new-development P load ($P_{DEVinc} = P_{New\text{-}DEV} - P_{BL\text{-}PreDEV}$).

Note: If structural BMPs are installed as part of new development to treat runoff, then the revised Phosphorus Reduction Requirement will be subsequently reduced by the amount of BMP load reduced by that BMP as calculated in Attachment 3 and will be tracked and accounted for as an

implemented BMP. For the purpose of the phosphorus load reduction requirment in the permit, the removal of impervious cover in the LPCP area shall be treated as a BMP and shall be accounted for using the methods in Attachment 3 to Appendix F.

Example 1-3 to determine phosphorus load increases due to new development: A Permittee has tracked a total area of 14.5 acres of new development in the LPCA area since the previous Baseline P load calculation. Tables 1-3-1 and 1-3-2 summarize the necessary information for the pre-development areas and resulting new development areas, respectively, to calculate the phosphorus load increase due to new development in the LPCP area.

Table 1-3-1: Pre-development baseline phosphorus loads for new-development areas within LPCP area.

Land Use prior to new development	Area of new development (acres)	Pre-Dev PLER (lbs/acre/yr)*	$P_{BL\text{-}PreDEV}$ Pre-Dev Baseline P load (lbs/yr)	New development Land Use created
Commercial	6.7	1.13	7.6	Commercial
Industrial	4.8	1.27	6.1	Industrial
Forest	3.0	0.12	0.4	High Density Residential
			∑ = 14.1 lbs/yr	

*From Table 1-1

Table 1-3-2: Phosphorus loads from new-development areas within LPCP area.

New Development Land Use	New impervious cover (IC) area (acres)	New pervious cover (PC) area & HSG (acres - HSG)	IC PLER** (lbs/acre/yr)	PC PLER** (lbs/acre/yr)	$P_{New\text{-}DEV}$ New development P load (lbs/yr)
Commercial	6.1	0.6 - B	1.78	0.12	10.9
Industrial	4.4	0.4 - C	1.78	0.21	7.9
High Density Residential	2.1	0.9 - B	2.32	0.12	5.0
					∑ = 23.8 lbs/yr

**From Table 1-2

The increased phosphorus load due to new development in the LPCP area is:

P_{DEVinc} = $P_{New\text{-}DEV}$ - $P_{BL\text{-}PreDEV}$
= 23.8 lbs/yr – 14.1 lbs/yr
= **9.3 lbs P/yr increase**

The increased phosphorus load of 9.3 lbs/yr due to new development in the LPCP area shall be added to the permittee's Baseline Phosphorus Load and the Phosphorus Reduction Requirement shall be increased by multiplying the 9.3 lbs/yr times the applicable percent reduction value from Table F-2. For example, if the percent reduction value is 30% then the increase to the Phosphorus Reduction Requirement ($PRR_{increase}$) would be:

$PRR_{increase}$ = 9.3 lbs/yr x 0.30
= **2.8 lbs/yr**

Table 1-1. Annual composite phosphorus load export rates

Land Cover	Representative DCIA, %	Composite PLERs, lb/ac/yr	Composite PLERs, kg/ha/yr
Commercial	**57**	**1.13**	**1.27**
Industrial	**67**	**1.27**	**1.42**
High Density Residential	**36**	**1.04**	**1.16**
Medium Density Residential	**16**	**0.49**	**0.55**
Low Density Residential	**11**	**0.30**	**0.34**
Highway/Freeway	**44**	**0.73**	**0.82**
Forest	**0.1**	**0.12**	**0.13**
Open Space	**8**	**0.26**	**0.29**
Agriculture	**0.4**	**0.45**	**0.50**

Table 1-2: Average annual distinct P Load export rates for use in estimating P Load reduction credits for the NH MS4 Permit

Phosphorus Source Category by Land Use	Land Surface Cover	P Load Export Rate, lbs/acre/year	P Load Export Rate, kg/ha/yr
Commercial (Com) and Industrial (Ind)	Directly connected impervious	1.78	2.0
	Pervious	See* DevPERV	See* DevPERV
Multi-Family (MFR) and High-Density Residential (HDR)	Directly connected impervious	2.32	2.6
	Pervious	See* DevPERV	See* DevPERV
Medium -Density Residential (MDR)	Directly connected impervious	1.96	2.2
	Pervious	See* DevPERV	See* DevPERV
Low Density Residential (LDR) - "Rural"	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	1.34	1.5
	Pervious	See* DevPERV	See* DevPERV
Forest (For)	Directly connected impervious	1.52	1.7
	Pervious	0.13	0.13

Open Land (Open)	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (Ag)	Directly connected impervious	1.52	1.7
	Cover Crop/Grazing	0.7	0.8
	Row Crop	2.0	2.2
	Hayland- no manure	0.4	0.4
*Developed Land Pervious (DevPERV)- Hydrologic Soil Group A	Pervious	0.03	0.03
*Developed Land Pervious (DevPERV)- Hydrologic Soil Group B	Pervious	0.12	0.13
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group C	Pervious	0.21	0.24
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group C/D	Pervious	0.29	0.33
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group D	Pervious	0.37	0.41

Table 1-3: Crosswalk of land use groups for NH MS4 P Load Calculations to NH GRANIT and ENSR-LRM (Lake P TMDL Analysis)

Description of Land Use (LU) Groups for Calculating P Load Using PLERs	NH GRANIT LU Category Codes [2]	ENSR-LRM LU[1]
Commercial	1210-1290, 1442, 1146, 1520-30, 1590, 1610-90, and 1790	Urban 3 and 5
Industrial,	1300, 1370, 1410-20, 1460-80, 1510, and 1580	Urban 4
High Density Residential	1110-1120, 1140	Urban 2
Medium Density Residential	1130 and 1150	
Low Density Residential	1190	Urban 1
Highway/Freeway	1440-45, 1447-50 and 1490	Urban 4
Forest	3000, 4000, 6000, 190	Forest 1-4, Open 1
Open Land	1710-90, 1800	Open 2 and 3
Agriculture	2000 and 2900	Agric 1-4

[1]Land use codes from lake/pond phosphorus TMDLs
[2]See Table 1, page 4 at following link:
http://www.granit.unh.edu/resourcelibrary/GRANITresources/standards/LUStandards-I93-061107.pdf

ATTACHMENT 2 TO APPENDIX F

Phosphorus and Nitrogen Reduction Credits for Selected Enhanced Non-Structural BMPs

The permittee shall use the methods explained below to calculate phosphorus and nitrogen (nutrient) load reduction credits for the following enhanced non-structural control practices implemented in the Watershed:

1) Enhanced Street/Pavement Cleaning Program;
2) Catch Basin Cleaning;
3) Turf Grass Fertilizer Management with No Applications of Fertilizers that Contain Phosphorus*; and
4) Organic Waste and Leaf Litter Collection program

* "Phosphorus free" fertilizers that contain no more than 0.67% phosphorus shall be considered a fertilizer that does not contain phosphorus and applicable for earning this credit.

The methods include the use of default phosphorus and nitrogen reduction factors that EPA has determined are acceptable for calculating phosphorus load reduction credits for these practices.

The methods and annual nutrient load export rates presented in this attachment are for the purpose of counting load reductions for various BMPs treating storm water runoff from varying site conditions (i.e., impervious or pervious surfaces) and different land uses (e.g. industrial and commercial) within the applicable watershed. Respectively, Tables 2-1 and 2-2 below provide annual phosphorus load and nitrogen export rates by land use category for impervious and pervious areas. The estimates of annual phosphorus loads and load reductions resulting from BMP implementation are intended for use by the permittee to measure compliance with its Phosphorus Reduction Requirement in accordance with Appendix F to the permit. The estimates of annual nitrogen load and load reductions resulting from BMP implementation are intended for use by the permittee to track and account for nitrogen load reductions in accordance with Appendix H to the permit.

Examples are provided to illustrate use of the methods and area applicable to both phosphorus and nitrogen, except for turf grass fertilizer management, which applies only to phosphorus at this time. In calculating nutrient loads, the permittee shall select the land use category that most closely represents the actual use for the area in question. For watersheds with institutional type uses, such as government properties, hospitals, and schools, the permittee shall use the commercial land use category for the purpose of calculating phosphorus and nitrogen loads. Table 2-3 provides a crosswalk table of nutrient load export rate (PLER and NLER) land use categories in Tables 2-1 and 2-2, and the corresponding land use category codes used in NH GRANIT. For pervious areas, permittees should use the appropriate value for the hydrologic soil group (HSG) if known, otherwise, assume HSG C conditions.

Alternative Methods and/or Nutrient Reduction Factors: A permittee may propose alternative methods and/or nutrient reduction factors for calculating phosphorus and nitrogen load reduction credits for these non-structural practices. EPA will consider alternative methods and/or nutrient reduction factors, provided that the permittee submits adequate supporting documentation to EPA. At a minimum, supporting documentation shall consist of a description of the proposed method, the technical basis of the method, identification of alternative nutrient reduction factors, supporting calculations, and identification of references and sources of information that support the use of the alternative method and/or factors in the applicable watershed areas. If EPA determines that the alternative methods and/or factors are not adequately supported, EPA will notify the permittee, and the permittee may receive no phosphorus or nitrogen reduction credit other than a reduction credit calculated by the permittee following the methods in this attachment for the identified practices.

Table 2-1: Average annual distinct phosphorus (P) load export rates for use in estimating P load reduction credits in the NH MS4 Permit

Phosphorus Source Category by Land Use	Land Surface Cover	P Load Export Rate, lbs./acre/year	P Load Export Rate, kg/ha/yr.
Commercial (COM) and Industrial (IND)	Directly connected impervious	1.78	2.0
	Pervious	See* DevPERV	See* DevPERV
Multi-Family (MFR) and High-Density Residential (HDR)	Directly connected impervious	2.32	2.6
	Pervious	See* DevPERV	See* DevPERV
Medium -Density Residential (MDR)	Directly connected impervious	1.96	2.2
	Pervious	See* DevPERV	See* DevPERV
Low Density Residential (LDR) - "Rural"	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	1.34	1.5
	Pervious	See* DevPERV	See* DevPERV
Forest (FOR)	Directly connected impervious	1.52	1.7
	Pervious	0.13	0.13
Open Land (OPEN)	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (AG)	Directly connected impervious	1.52	1.7
	Pervious	0.45	0.5
*Developed Land Pervious (DevPERV) – HSG A	Pervious	0.03	0.03
*Developed Land Pervious (DevPERV) – HSG B	Pervious	0.12	0.13
*Developed Land Pervious (DevPERV) – HSG C	Pervious	0.21	0.24
*Developed Land Pervious (DevPERV) – HSG C/D	Pervious	0.29	0.33

*Developed Land Pervious (DevPERV) – HSG D	Pervious	0.37	0.41

Notes:
- For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value from this table. If the HSG is not known, assume HSG C conditions for the phosphorus load export rate.
- Agriculture includes row crops, actively managed hay fields, and pasture lands. Institutional land uses, such as government properties, hospitals and schools, are to be included in the commercial and industrial land use grouping for the purpose of calculating phosphorus loading.
- Impervious surfaces within the forest land use category are typically roadways adjacent to forested pervious areas.

Table 2-2: Average annual distinct nitrogen (N) load export rates for use in estimating N load reduction credits in the NH MS4 Permit

Nitrogen Source Category by Land Use	Land Surface Cover	N Load Export Rate, lbs./acre/year	N Load Export Rate, kg/ha/yr.
Commercial (COM) and Industrial (IND)	Directly connected impervious	15.0	16.9
	Pervious	See* DevPERV	See* DevPERV
All Residential	Directly connected impervious	14.1	15.8
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	10.5	11.8
	Pervious	See* DevPERV	See* DevPERV
Forest (FOR)	Directly connected impervious	11.3	12.7
	Pervious	0.5	0.6
Open Land (OPEN)	Directly connected impervious	11.3	12.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (AG)	Directly connected impervious	11.3	12.7
	Pervious	2.6	2.9
*Developed Land Pervious (DevPERV) – HSG A	Pervious	0.3	0.3
*Developed Land Pervious (DevPERV) – HSG B	Pervious	1.2	1.3
*Developed Land Pervious (DevPERV) – HSG C	Pervious	2.4	2.7
*Developed Land Pervious (DevPERV) – HSG C/D	Pervious	3.1	3.5
*Developed Land Pervious (DevPERV) – HSG D	Pervious	3.6	4.1

Notes:
- For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value from this table. If the HSG is not known, assume HSG C conditions for the phosphorus load export rate.
- Agriculture includes row crops. Actively managed hay fields and pasture lands. Institutional land uses such as government properties, hospitals and schools are to be included in the commercial and industrial land use grouping for the purpose of calculating phosphorus loading.
- Impervious surfaces within the forest land use category are typically roadways adjacent to forested pervious areas.

Table 2-3: Crosswalk of land use groups for NH MS4 P Load calculations to land use codes in NH GRANIT

Description of Land Use (LU) Groups for Calculating P Load Using PLERs	NH GRANIT LU Category Codes [1]
Commercial	1210-1290, 1442, 1146, 1520-30, 1590, 1610-90, and 1790
Industrial,	1300, 1370, 1410-20, 1460-80, 1510, and 1580
High Density Residential	1110, 1120 and1140
Medium Density Residential	1130 and 1150
Low Density Residential	1190
Highway/Freeway	1440-45, 1447-50 and 1490
Forest	3000, 4000, 6000, 190
Open Land	1710-90, 1800
Agriculture	2000 and 2900

[1]NH GRANIT land use categories can be found at the following link (See Table 1, page 4): http://www.granit.unh.edu/resourcelibrary/GRANITresources/standards/LUStandards-I93-061107.pdf

(1) Enhanced Street/Pavement Cleaning Program: The permittee may earn a phosphorus or a nitrogen reduction credit for conducting an enhanced cleaning program of impervious surfaces. Table 2-2 below outlines the default phosphorus removal factors for enhanced street/pavement cleaning programs. The credit shall be calculated by using the following equation:

$$\text{Phosphorus Credit}_{\text{P sweeping}} = \text{IA}_{\text{swept}} \times \text{PLER}_{\text{IC-land use}} \times \text{PRF}_{\text{sweeping}} \times \text{AF} \quad \textbf{(Equation 2-1)}$$

$$\text{Nitrogen Credit}_{\text{N sweeping}} = \text{IA}_{\text{swept}} \times \text{NLER}_{\text{IC-land use}} \times \text{NRF}_{\text{sweeping}} \times \text{AF} \quad \textbf{(Equation 2-2)}$$

Where:

$\text{Credit}_{\text{sweeping}}$ = Amount of nutrient load removed by enhanced sweeping program (lbs./year)

IA_{swept} = Area of impervious surface that is swept under the enhanced sweeping program (acres)

$\text{PLER}_{\text{IC-land use}}$ = Phosphorus Load Export Rate for impervious cover and specified land use (lb./acre/yr.) (see Table 2-1)

$\text{NLER}_{\text{IC-land use}}$ = Nitrogen Load Export Rate for impervious cover and specified land use (lb./acre/yr.) (see Table 2-2)

$\text{PRF}_{\text{sweeping}}$ = Phosphorus Reduction Factor for sweeping based on sweeper type and frequency (see Table 2-4).

$\text{NRF}_{\text{sweeping}}$ = Nitrogen Reduction Factor for sweeping based on sweeper type and frequency (see Table 2-4).

AF = Annual Frequency of sweeping. For example, if sweeping does not occur in Dec/Jan/Feb, the AF would be 9 mo. /12 mo. = 0.75. For year-round sweeping, AF=1.0[1]

As an alternative, the permittee may apply a credible sweeping model of the applicable watershed and perform continuous simulations reflecting build-up and wash-off of phosphorus and/or nitrogen using long-term local rainfall data.

Table 2-4: Nutrient reduction efficiency factors for sweeping impervious areas ($PRF_{sweeping}$ & $NRF_{sweeping}$)

Frequency[1]	Sweeper Technology	$PRF_{sweeping}$	$NFR_{sweeping}$
2/year (spring and fall)[2]	Mechanical Broom	0.01	0.01
2/year (spring and fall)[2]	Vacuum Assisted	0.02	0.02
2/year (spring and fall)[2]	High-Efficiency Regenerative Air-Vacuum	0.02	0.02
Monthly	Mechanical Broom	0.03	0.03
Monthly	Vacuum Assisted	0.04	0.04
Monthly	High Efficiency Regenerative Air-Vacuum	0.08	0.08
Weekly	Mechanical Broom	0.05	0.06
Weekly	Vacuum Assisted	0.08	0.07
Weekly	High Efficiency Regenerative Air-Vacuum	0.10	0.10

Example 2-1: Calculation of enhanced street/pavement cleaning program phosphorus load reduction credit (Credit $_{P\ sweeping}$): A permittee proposes to implement an enhanced street/pavement cleaning program and perform monthly cleaning from March 1 – December 1 (9 months), using a high efficiency regenerative air-vacuum assisted sweeper on 20.3 acres of parking lots and roadways in a high-density residential area of the LPCP area. For this site the needed information to calculate the **phosphorus** load reduction is:

IA_{swept} = 20.3 acres
$PLER_{IC\text{-}HDR}$ = 2.32 lb./acre/yr. (from Table 2-1)
$PRF_{sweeping}$ = 0.08 (from Table 2-4)
AF = (9 months / 12 months) = 0.75

Substitution into equation 2-2 yields a $Credit_{sweeping}$ of 2.8 pounds of phosphorus removed per year.

$Credit_{P\ sweeping}$ = IA_{swept} x $PLER_{land\ use}$ x $PRF_{sweeping}$ x AF
= 20.3 acres x 2.32 lbs./acre/yr. x 0.08 x 0.75
= 2.8 lbs./yr.

The corresponding **nitrogen** load reduction credit ($Credit_{N\ sweeping}$) for the same sweeping program in the specified LPCP area is calculated as follows:

IA_{swept} = 20.3 acres
$NLER_{IC\text{-}HDR}$ = 14.1 lb./acre/yr. (from Table 2-2)

[1]For full credit for monthly and weekly frequency, sweeping must be conducted year round. Otherwise, the credit should be adjusted proportionally based on the duration of the sweeping season (using AF factor).

[2] In order to earn credit for semi-annual sweeping the sweeping must occur in the spring following snow-melt and road sand applications to impervious surfaces and in the fall after leaf-fall and prior to the onset to the snow season.

$NRF_{sweeping}$ = 0.08 (from Table 2-4)
AF = (9 months / 12 months) = 0.75

Substitution into equation 2-2 yields a $Credit_{sweeping}$ of 17.2 pounds of nitrogen removed per year.

$Credit_{N\ sweeping}$ = IA_{swept} x $NLER_{land\ use}$ x $NRF_{sweeping}$ x AF
= 20.3 acres x 14.1 lbs./acre/yr. x 0.08 x 0.75
= 17.2 lbs./yr.

(2) Catch Basin Cleaning: The permittee may earn a nutrient reductions credit for phosphorus and nitrogen, $Credit_{CB}$, by removing accumulated materials from catch basins (i.e., catch basin cleaning) in the Watershed such that a minimum sump storage capacity of 50% is maintained throughout the year. The credit shall be calculated by using the following equations for phosphorus and nitrogen:

$$Credit_{P\ CB} = IA_{CB} \times PLER_{IC\text{-}land\ use} \times PRF_{CB} \quad \textbf{(Equation 2-3)}$$

$$Credit_{N\ CB} = IA_{CB} \times NLER_{IC\text{-}land\ use} \times NRF_{CB} \quad \textbf{(Equation 2-4)}$$

Where:

$Credit_{CB}$ = Amount of nutrient load removed by catch basin cleaning (lb. /year)
IA_{CB} = Impervious drainage area to catch basins (acres)
$PLER_{IC\text{-}land\ use}$ = Phosphorus Load Export Rate for impervious cover and specified land use (lb./acre/yr.) (see Table 2-1)
$NLER_{IC\text{-}land\ use}$ = Nitrogen Load Export Rate for impervious cover and specified land use (lb./acre/yr.) (see Table 2-2)
PRF_{CB} = Phosphorus Reduction Factor for catch basin cleaning (See Table 2-5)
NRF_{CB} = Nitrogen Reduction Factor for catch basin cleaning (See Table 2-5)

Table 2-5: Phosphorus reduction efficiency factor (PRF_{CB}) for catch basin cleaning

Practice	PRF_{CB}	NRF_{CB}
Catch Basin Cleaning to maintain 50% free-storage capacity in CB sump	0.02	0.06

Example 2-2: Calculation for catch basin cleaning credit ($Credit_{CB}$):
A permittee will conduct a CB maintenance program that will remove accumulated sediments and contaminants captured in the CBs. The program will maintain at least a 50% free-storage capacity in CB sumps in the same LPCA area as specified in Example 2-1. Catch basins in the applicable watershed drains runoff from 20.3 acres of HDR impervious area. For this site the needed information to calculate the **phosphorus** load reduction credit is:

IA_{CB} = 20.3 acre
$PLER_{IC\text{-}HDR}$ = 2.32 lbs./acre/yr. (from Table 2-1)

PRF_{CB} = 0.02 (from Table 2-5)

Substitution into equation 2-3 yields a $Credit_{P\ CB}$ of 0.9 pounds of phosphorus removed per year:

$Credit_{P\ CB}$ = IA_{CB} x $PLER_{IC\text{-}HDR}$ x PRF_{CB}
= 20.3 acre x 2.32 lbs./acre/yr. x 0.02
= 0.9 lbs. P/yr.

Note: The same methodology is applicable for calculating the nitrogen load reduction credit ($Credit_{N\ CB}$).

(3) Turf Grass Fertilizer Management with No Applications of Fertilizers that Contain Phosphorus: If a permittee has historically and regularly used fertilizer containing phosphorus in LPCA watershed area, the permittee may earn a phosphorus reduction credit by not applying fertilizers that contain phosphorus to turf grass pervious areas within the LPCP area. The application of any fertilizers containing phosphorus to turf grass areas within the LPCP area at any time during the reporting year by the permittee or any contractor or subcontractor acting on behalf of the permittee shall preclude the permittee from earning this credit for such areas for the reporting year. Note: "Phosphorus free" fertilizers that contain no more than 0.67% phosphorus shall be considered a fertilizer that does not contain phosphorus and is applicable for earning this credit. The permittee must provide written certification to EPA annually that no fertilizers containing phosphorus have been applied by the permittee or its agents (including contractors and subcontractors) to turf grass areas within the LPCP area for which the permittee is claiming credit ($Credit_{no\ P\ fertilizer}$). The $Credit_{no\ P\ fertilizer}$ shall be determined using the following equation:

$$Credit_{no\ P\ fertilizer} = (Area_{turf\ grass\ no\ P}) \times (PLER_{PC\text{-}HSG}) \times (0.33) \quad \textbf{(Equation 2-5)}$$

Where:

$Credit_{no\ P\ fertilizer}$ = Amount of phosphorus load reduction credit for not applying fertilizers containing phosphorus (lbs./year)

$Area_{turf\ grass\ no\ P}$ = All applicable turf grass area (acre) within LPCP area which have not received applications of phosphorus containing fertilizers

$PLER_{PC\text{-}HSG}$ = Phosphorus Load Export Rate for pervious cover and HSG (lbs./acre/yr.) (see Table 2-1)

0.33 = 33% phosphorus reduction factor for not applying fertilizers containing phosphorus

Example 2-3: Calculation for no phosphorus fertilizer credit for turf grass areas ($Credit_{no\ P\ fertilizer}$): A permittee has the option of applying phosphorus free fertilizer to the lawns and landscaped areas of municipally owned facilities located within the LPCP area. The municipality has determined through soil tests that additional phosphorus is not needed to support healthy turf grass growth for 19.1 acre of turf grass associated with the facilities. The HSG for all of the 19.1 acres of turf grass is presently unknown (assume HSG C). The needed information to calculate the $Credit_{no\ P\ fertilizer}$ for the 19.1 acres of turf grass area is:

Area $_{\text{turf grass no P}}$ = 19.1 acres; and
PLER $_{\text{PC-HSG C}}$ = 0.21 lbs./ac/yr. (from Table 2-1)

Substitution into equation 2-5 yields a Credit $_{\text{no P fertilizer}}$ of 2.1 pounds of phosphorus removed per year.

Credit $_{\text{no P fertilizer}}$ = (19.1 acres) x (0.21 lbs./acre/yr.) x (0.33)
= 1.3 lbs./yr.

(4) Enhanced Organic Waste and Leaf Litter Collection program: The permittee may earn phosphorus and nitrogen reduction credits by performing regular gathering, removal and proper disposal of landscaping wastes, organic debris, and leaf litter from impervious surfaces within applicable watershed areas (i.e., LPCP area or Great Bay watershed). In order to earn this credit (Credit $_{\text{leaf litter}}$), the permittee must gather and remove all landscaping wastes, organic debris, and leaf litter from impervious roadways and parking lots at least once per week during the period of September 1 to December 1 of each year. Credit can only be earned for those impervious surfaces that are cleared of organic materials in accordance with the description above. The gathering and removal shall occur immediately following any landscaping activities in the applicable watershed and at additional times when necessary to achieve a weekly cleaning frequency. The permittee must ensure that the disposal of these materials will not contribute pollutants to any surface water discharges. The permittee may use an enhanced sweeping program (e.g., weekly frequency) as part of earning this credit provided that the sweeping is effective at removing leaf litter and organic materials. The Credit $_{\text{leaf litter}}$ for phosphorus and nitrogen load reductions shall be determined by equations 2-6 and 2-7, respectively:

Credit $_{\text{P leaf litter}}$ = (IA $_{\text{leaf litter}}$) x (PLER $_{\text{IC-land use}}$) x (0.05) **(Equation 2-6)**

Credit $_{\text{N leaf litter}}$ = (IA $_{\text{leaf litter}}$) x (NLER $_{\text{IC-land use}}$) x (0.05) **(Equation 2-7)**

Where:

Credit $_{\text{leaf litter}}$ = Amount of nutrient load reduction credit for organic waste and leaf litter collection program (lb. /year)

IA $_{\text{leaf litter}}$ = Impervious area (acre) in applicable watersheds that are subject to enhanced organic waste and leaf litter collection program

PLER $_{\text{IC-land use}}$ = Phosphorus Load Export Rate for impervious cover and specified land use (lbs./acre/yr.) (see Table 2-1)

NLER $_{\text{IC-land use}}$ = Phosphorus Load Export Rate for impervious cover and specified land use (lbs./acre/yr.) (see Table 2-1)

0.05 = 5% nutrient reduction factor for organic waste and leaf litter collection program in the applicable watershed

Example 2-4: Calculation for organic waste and leaf litter collection program credit (Credit $_{\text{leaf litter}}$): A permittee will implement an organic waste and leaf litter collection program by sweeping the parking lots and access drives at a minimum of once per week using a mechanical broom sweeper for the period of September 1 to December 1 over

12.5 acres of impervious roadways and parking lots in an industrial/commercial area of the LPCP area. Also, the permittee will ensure that organic materials are removed from impervious areas immediately following all landscaping activities in the area. For this site the needed information to calculate the Credit $_{\text{leaf litter}}$ for **phosphorus** is:

$IA_{\text{leaf litter}}$ = 12.5 acres; and
$PLER_{\text{IC-commercial}}$ = 1.78 lbs./acre/yr. (from Table 2-1)
Substitution into equation 2-6 yields:

$Credit_{\text{P leaf litter}}$ = (12.5 acre) x (1.78 lbs./acre/yr.) x (0.05)
= **1.1 lbs. P/yr.**

Note: The same methodology is applicable for calculating the nitrogen load reduction credit ($Credit_{\text{N leaf litter}}$) for the specified organic waste leaf litter collection program.

Associated Street/Pavement Cleaning Credit

The permittee also may earn a phosphorus reduction credit for enhanced cleaning of roads and parking lot areas (i.e., $Credit_{\text{P sweeping}}$) for using the mechanical broom sweeper weekly during the three month leaf litter collection program.

Using equation 2-1, $Credit_{\text{P sweeping}}$ is:
$Credit_{\text{P sweeping}} = IA_{\text{swept}} \times PLER_{\text{IC-land use}} \times PRF_{\text{sweeping}} \times AF$ **(Equation 2-1)**
IA_{swept} = 12.5 acre
$PLE_{\text{IC-commercial}}$ = 1.78 lbs./acre/yr. (from Table 2-1)
PRF_{sweeping} = 0.05 (from Table 2-4)
AF = 3 mo./12 mo. = 0.25

Substitution into equation 2-1 yields a $Credit_{\text{P sweeping}}$ of 0.3 pounds of phosphorus removed per year.

$Credit_{\text{P sweeping}} = IA_{\text{swept}} \times PLER_{\text{IC-commercial}} \times PRF_{\text{sweeping}} \times AF$
= 12.5 acre x 1.78 lbs./acre/yr. x 0.05 x 0.25
= 0.3 lbs. P/yr.

ATTACHMENT 3 TO APPENDIX F

Methods to Calculate Phosphorus and Nitrogen Load Reductions for Structural Stormwater Best Management Practices

List of Tables

List of Figures

Methods to Calculate Phosphorus and Nitrogen Load Reductions for Structural Stormwater Best Management Practices in the Watershed

This attachment provides methods to determine design storage volume capacities and to calculate phosphorus and nitrogen (nutrient) load reductions for the following structural Best Management Practices (structural BMPs) for a LPCP area or watershed tributary to Great Bay:

1) Infiltration Trench;
2) Surface Infiltration Practices (i.e., basins, rain gardens and bio-retention);
3) Bio-filtration Practice;
4) Gravel Wetland System;
5) Enhanced Bio-filtration with Internal Storage Reservoir (ISR);
6) Sand Filter;
7) Porous Pavement;
8) Wet Pond or wet detention basin;
9) Dry Pond or detention basin; and
10) Dry Water Quality Grass Swale with Detention.

Additionally, this attachment provides methods to design and quantify associated nutrient load reduction credits for the following four types of semi-structural BMPs

11) Impervious Area Disconnection through Storage (e.g., rain barrels, cisterns, etc.);
12) Impervious Area Disconnection;
13) Conversions of Impervious Area to Permeable Pervious Area; and
14) Soil Amendments to Enhance Permeability of Pervious Areas.

Methods and examples are provided in this Attachment to calculate phosphorus and nitrogen (nutrient) load reductions for structural BMPs for the four following purposes:

1) To determine the design volume of a structural BMP to achieve a known nutrient load reduction target when the contributing drainage area is 100% impervious;
2) To determine the nutrient load reduction for a structural BMP with a known design volume capacity when the contributing drainage area is 100% impervious;
3) To determine the design volume of a structural BMP to achieve a known nutrient load reduction target when the contributing drainage area has impervious and pervious surfaces; and
4) To determine the nutrient load reduction for a structural BMP with a known design volume capacity when the contributing drainage area has impervious and pervious surfaces.

Examples are also provided for estimating nutrient load reductions associated with the four semi-structural/non-structural BMPs.

Also, this attachment provides the methodology for calculating the annual stormwater phosphorus and/or nitrogen load that will be delivered to BMPs for treatment (BMP Load) and to be used for quantifying phosphorus and/or nitrogen load reduction credits. The methods and annual nutrient export load rates presented in this Attachment are for the purpose of calculating load reductions for various BMPs treating storm water runoff from varying site conditions (i.e.,

impervious or pervious surfaces) and different land uses (e.g. commercial and institutional). The estimates of annual phosphorus load and load reductions resulting from BMP implementation are intended for use by the permittee to demonstrate compliance with its Phosphorus Reduction Requirement in accordance with Appendix F to the permit. The estimates of annual nitrogen load and load reductions resulting from BMP implementation are intended for use by the permittee to track and account for nitrogen load reductions in accordance with Appendix H to the permit.

Structural BMP performance credits: For each structural BMP type identified above (BMPs 1-10), long-term cumulative performance information is provided to calculate phosphorus and nitrogen load reductions or to determine needed design storage volume capacities to achieve a specified reduction target (e.g., 65% phosphorus load reduction). The performance information is expressed as cumulative phosphorus and/or nitrogen load removed (% removed) depending on the physical storage capacity of the structural BMP (expressed as inches of runoff from impervious area) and is provided at the end of this Attachment (see Tables 3-5 through 3-25 and performance curves Figures 3-1 through 3-20). Multiple tables and performance curves are provided for the infiltration practices to represent cumulative phosphorus load reduction performance for six infiltration rates (IR), 0.17, 0.27, 0.53, 1.02, 2.41, and 8.27 inches/hour. These infiltration rates represent the saturated hydraulic conductivity of the soils. The permittee may use the performance curves provided in this attachment to interpolate phosphorus and nitrogen load removal reductions for field measured infiltration rates that are different than the infiltration rates used to develop the performance curves. Otherwise, the permittee shall use the performance curve for the IR that is nearest, but less than, the field measured rate.

The Design Storage Volume or physical storage capacity (as referred to on the x-axis of performance curves) equals the total physical storage volume of the control structure to contain water at any instant in time. Typically, this storage capacity is comprised of the surface ponding storage volume prior to overflow and subsurface storage volumes in storage units and pore spaces of coarse filter media. Table 3-5 provides the formulae to calculate physical storage capacities for the structural control types for using the performance curves.

Semi-Structural/Non-structural BMP performance credits: For each semi-structural/non-structural BMP type identified above (BMPs 11-14), long-term cumulative performance information is provided to calculate phosphorus and/or nitrogen load reductions or to determine needed design specifications to achieve a desired reduction target (e.g., 50% phosphorus load reduction). The performance information is expressed as cumulative runoff volume reduction (% removed) depending on the design specifics and actual field conditions. Cumulative percent runoff volume reduction is being used as a surrogate to estimate both the cumulative phosphorus load and nitrogen load reduction credits for these BMPs.

To represent a wide range of potential conditions for implementing these types of BMPs, numerous performance tables and curves have been developed to reflect a wide range of potential conditions and designs such as varying storage volumes (expressed in terms of varying ratios of storage volume to impervious area (0.1 to 2.0 inches)); varying ratios of impervious source area to receiving pervious area based on hydrologic soil groups (HSGs) A, B, C and D (8:1, 6:1, 4:1, 2: 1 and 1:1); and varying discharge time periods for temporary storage (1, 2 or 3

days). The credits are provided at the end of this Attachment (see Tables 3-26 through 3-33 and performance curves Figures 3-21 through 3-41).

EPA will consider phosphorus and/or nitrogen load reductions calculated using the methods provided below to be valid for the purpose of demonstrating compliance with the terms of this permit for BMPs that have not been explicitly modeled, if the desired BMP has functionality that is similar to one of the simulated BMP types. Regarding functionality, only the surface infiltration, the infiltration trench and the four semi-structural/non-structural BMP types were simulated to direct storm water runoff into the ground (i.e., infiltration). All other simulated BMPs represent practices that are not hydraulically connected to the sub-surface soils (i.e., no infiltration) and have either under-drains or impermeable liners. Following are some simple guidelines for selecting the BMP type and/or determining whether the results of any of the BMP types provided are appropriate for another BMP of interest.

Infiltration Trench is a practice that provides temporary storage of runoff using the void spaces within the soil/sand/gravel mixture that is used to backfill the trench for subsequent infiltration into the surrounding sub-soils. Performance results for the infiltration trench can be used for all subsurface infiltration practices including systems that include pipes and/or chambers that provide temporary storage. Also, the results for this BMP type can be used for bio-retention systems that rely on infiltration when the majority of the temporary storage capacity is provided in the void spaces of the soil filter media and porous pavements that allow infiltration to occur. General design specifications for infiltration trench systems are provided in the most recent version of *the New Hampshire Stormwater Manual, Volume 2: Post-Construction Best Management Practices Selection and Design*. (http://des.nh.gov/organization/divisions/water/stormwater/manual.htm).

Surface Infiltration represents a practice that provides temporary surface storage of runoff (e.g., ponding) for subsequent infiltration into the ground. Appropriate practices for use of the surface infiltration performance estimates include infiltration basins, infiltration swales (not conveyance swales), rain gardens and bio-retention systems that rely on infiltration and provide the majority of storage capacity through surface-ponding. If an infiltration system includes both surface storage through ponding and a lessor storage volume within the void spaces of a coarse filter media, then the physical storage volume capacity used to determine the long-term cumulative phosphorus removal efficiency from the infiltration basin performance curves would be equal to the sum of the surface storage volume and the void space storage volume. General design specifications for various surface infiltration systems are provided in the most recent version of *the New Hampshire Stormwater Manual, Volume 2: Post-Construction Best Management Practices Selection and Design*. (http://des.nh.gov/organization/divisions/water/stormwater/manual.htm).

Bio-filtration is a practice that provides temporary storage of runoff for filtering through an engineered soil media. The storage capacity is typically made of void spaces in the filter media and temporary ponding at the surface of the practice. Once the runoff has passed through the filter media it is collected by an under-drain pipe for discharge. The performance curve for this control practice assumes zero infiltration. If a filtration system has subsurface soils that are suitable for infiltration, then user should use the either performance curves for the infiltration

trench or the infiltration basin depending on the predominance of storage volume made up by free standing storage or void space storage. Depending on the design of the filter media manufactured or packaged bio-filter systems such as tree box filters may be suitable for using the bio-filtration performance results. Design specifications for bio-filtration systems are provided in the most recent version of *the New Hampshire Stormwater Manual, Volume 2: Post-Construction Best Management Practices Selection and Design*. (http://des.nh.gov/organization/divisions/water/stormwater/manual.htm).

Gravel Wetland performance results should be used for practices that have been designed in accordance or share similar features with the design specifications for subsurface gravel wetland systems provided in the report prepared by the University of New Hampshire Stormwater Center entitled *Design and Maintenance of Subsurface Gravel Wetland Systems* and dated February 4, 2015 (https://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/NHDOT_SGW_02-06-15_Final_Report.pdf).

Enhanced Bio-filtration with Internal Storage Reservoir (ISR) is a practice that provides temporary storage of runoff for filtering through an engineered soil media, augmented for enhanced phosphorus removal, followed by detention and denitrification in a subsurface internal storage reservoir (ISR) comprised of gravel. Runoff flows are routed through filter media and directed to the underlying ISR via an impermeable membrane for temporary storage. An elevated outlet control at the top of the ISR is designed to provide a retention time of at least 24 hours in the system to allow for sufficient time for denitrification and nitrogen reduction to occur prior to discharge. The design storage capacity for using the cumulative performance curves is comprised of void spaces in the filter media, temporary ponding at the surface of the practice and the void spaces in the gravel ISR. The cumulative phosphorus load reduction curve for this control is intended to be used for systems in which the filter media has been augmented with materials designed and/or known to be effective at capturing phosphorus. If the filter media is not augmented to enhance phosphorus capture, then the phosphorus performance curve for the Bio-Filter should be used for estimating phosphorus load reductions. The University of New Hampshire Stormwater Center (UNHSC) developed the design of this control practice and a design template can be found at UNHSC's website (https://www.unh.edu/unhsc/news/unhsc-innovative-bioretention-template-pollutant-reductions-great-bay-estuary-watershed).

Sand Filter performance results should be used for practices that have been designed in accordance or share similar features with the design specifications for sand filter systems provided in the most recent version of *the New Hampshire Stormwater Manual, Volume 2: Post-Construction Best Management Practices Selection and Design*. (http://des.nh.gov/organization/divisions/water/stormwater/manual.htm).

Porous Pavement performance results represent systems with an impermeable under-liner and an under-drain. *If porous pavement systems do not have an impermeable under-liner so that filtered runoff can infiltrate into sub-soils, then the performance results for an infiltration trench may be used for these systems.* Design specifications for porous pavement systems are provided in the most recent version of *the New Hampshire Stormwater Manual, Volume 2: Post-Construction Best Management Practices Selection and Design*. (http://des.nh.gov/organization/divisions/water/stormwater/manual.htm).

Extended Dry Detention Pond performance results should only be used for practices that have been designed in accordance with the design specifications for extended dry detention ponds provided in the most recent version of *the New Hampshire Stormwater Manual, Volume 2: Post-Construction Best Management Practices Selection and Design*. (http://des.nh.gov/organization/divisions/water/stormwater/manual.htm).

Water Quality Grass Swale with Detention performance results should only be used for practices that have been designed in accordance with the design specifications for a water quality swale with check dams to temporarily store the target storage volume capture provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf)

Impervious Area Disconnection using Storage (e.g., rain barrels, cistern, etc.) performance results are for collecting runoff volumes from impervious areas such as roof tops, providing temporary storage of runoff volume using rain barrels, cisterns or other storage containers, and discharging stored volume to adjacent permeable pervious surfaces over an extended period of time. Such practices should be designed in accordance with the design specifications for applicable buffers (e.g., developed area buffers) provided in the most recent version of *the New Hampshire Stormwater Manual, Volume 2: Post-Construction Best Management Practices Selection and Design*. (http://des.nh.gov/organization/divisions/water/stormwater/manual.htm)

Impervious Area Disconnection performance results are for diverting runoff volumes from impervious areas such as roadways, parking lots and roof tops, and discharging it to adjacent vegetated permeable surfaces that are of sufficient size with adequate soils to receive the runoff without causing negative impacts to adjacent down-gradient properties. Careful consideration must be given to the ratio of impervious area to the pervious area that will receive the discharge. Also, devices such as level spreaders to disperse the discharge and provide sheet flow should be employed whenever needed to increase recharge and avoid flow concentration and short circuiting through the pervious area. Soil testing is needed to classify the permeability of the receiving pervious area in terms of HSG. Such practices should be designed in accordance with the design specifications for applicable buffers (e.g., developed area buffers) provided in the most recent version of *the New Hampshire Stormwater Manual, Volume 2: Post-Construction Best Management Practices Selection and Design*. (http://des.nh.gov/organization/divisions/water/stormwater/manual.htm)

Conversion of Impervious Area to Permeable Pervious Area nutrient load reduction credits are for replacing existing impervious surfaces (such as traditional pavements and buildings with roof tops) with permeable surfaces. To be eligible for credit, it is essential that the area previously covered with impervious surface be restored to provide natural or enhanced hydrologic functioning so that the surface is permeable. Sub-soils beneath pavements are typically highly compacted and will require reworking to loosen the soil and the possible addition of soil amendments to restore permeability. Soil testing is needed to classify the permeability (in terms of HSG) of the restored pervious area.

Soil Amendments to Increase Permeability of Pervious Areas performance results are for the practice of improving the permeability of pervious areas through incorporation of soil amendments, tilling and establishing dense vegetation. This practice may be used to compliment other practices such as impervious area disconnection to improve overall performance and increase reduction credits earned. Soil testing is needed to classify the permeability (in terms of HSG) of the restored pervious area.

Alternative Methods:

A permittee may propose alternative long-term cumulative performance information or alternative methods to calculate phosphorus and/or nitrogen load reductions for the structural BMPs identified above or for other structural BMPs not identified in this Attachment.

EPA will consider alternative long-term cumulative performance information and alternative methods to calculate phosphorus and/or load reductions for structural BMPs provided that the permittee provides EPA with adequate supporting documentation. At a minimum, the supporting documentation shall include:

Results of continuous BMP model simulations representing the structural BMP, using a verified BMP model and representative long-term (i.e., 10 years) climatic data including hourly rainfall data;

Supporting calculations and model documentation that justify use of the model, model input parameters, and the resulting cumulative phosphorus load reduction estimate;

If pollutant removal performance data are available for the specific BMP, model calibration results should be provided; and

Identification of references and sources of information that support the use of the alternative information and method.

If EPA determines that the long-term cumulative phosphorus and/or nitrogen load reductions developed based on alternative information are not adequately supported, EPA will notify the permittee in writing, and the permittee may receive no phosphorus reduction credit other than a reduction credit calculated by the permittee using the default phosphorus and/or nitrogen reduction factors provided in this Attachment for the identified practices. The permittee is required to submit to EPA valid phosphorus load reductions for structural BMPs in the LPCP area in accordance with the submission schedule requirements specified in the permit and Appendix F.

Method to Calculate Annual Phosphorus and/or Nitrogen Load Delivered to BMPs (BMP Load)

The **BMP Load** is the annual phosphorus and/or nitrogen load from the drainage area to each proposed or existing BMP used by permittee to claim credit against its stormwater phosphorus load reduction requirement (i.e., Phosphorus Reduction Requirement) or for tracking and accounting for nitrogen load reductions in the Great Bay watershed. The BMP Load is the starting point from which the permittee calculates the reduction in phosphorus load achieved by each existing and proposed BMP.

Examples are provided to illustrate use of the methods. Tables 3-1 and 3-2 below provide annual nutrient load export rates by land use category for impervious and pervious areas for phosphorus (PLERs) and nitrogen (NLER), respectively. The examples are applicable for both phosphorus and nitrogen. The permittee shall select the land use categories that most closely represents the actual uses of the drainage areas tributary to BMP. For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value. If the HSG is not known, assume HSG C conditions for the phosphorus and/or nitrogen load export rate. For drainage areas with institutional type uses, such as government properties, hospitals, and schools, the permittee shall use the commercial/industrial land use category for the purpose of calculating phosphorus and/or nitrogen loads. Table 3-3 provides a crosswalk table of nutrient load export rate (PLER and NLER) land use categories in Tables 3-1 and 3-2, and the corresponding land use category codes used in NH GRANIT.

Table 3-1: Average annual distinct phosphorus (P) load export rates for use in estimating P load reduction credits in the NH MS4 Permit

Phosphorus Source Category by Land Use	Land Surface Cover	P Load Export Rate, lbs./acre/year	P Load Export Rate, kg/ha/yr.
Commercial (COM) and Industrial (IND)	Directly connected impervious	1.78	2.0
	Pervious	See* DevPERV	See* DevPERV
Multi-Family (MFR) and High-Density Residential (HDR)	Directly connected impervious	2.32	2.6
	Pervious	See* DevPERV	See* DevPERV
Medium -Density Residential (MDR)	Directly connected impervious	1.96	2.2
	Pervious	See* DevPERV	See* DevPERV
Low Density Residential (LDR) - "Rural"	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	1.34	1.5
	Pervious	See* DevPERV	See* DevPERV
Forest (FOR)	Directly connected impervious	1.52	1.7
	Pervious	0.13	0.13
Open Land (OPEN)	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (AG)	Directly connected impervious	1.52	1.7
	Pervious	0.45	0.5
*Developed Land Pervious (DevPERV) – HSG A	Pervious	0.03	0.03
*Developed Land Pervious (DevPERV) – HSG B	Pervious	0.12	0.13
*Developed Land Pervious (DevPERV) – HSG C	Pervious	0.21	0.24
*Developed Land Pervious (DevPERV) – HSG C/D	Pervious	0.29	0.33

*Developed Land Pervious (DevPERV) – HSG D	Pervious	0.37	0.41

Notes:
- For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value from this table. If the HSG is not known, assume HSG C conditions for the phosphorus load export rate.
- Agriculture includes row crops, actively managed hay fields, and pasture lands. Institutional land uses, such as government properties, hospitals and schools, are to be included in the commercial and industrial land use grouping for the purpose of calculating phosphorus loading.
- Impervious surfaces within the forest land use category are typically roadways adjacent to forested pervious areas.

Table 3-2: Average annual distinct nitrogen (N) load export rates for use in estimating N load reduction credits in the NH MS4 Permit

Nitrogen Source Category by Land Use	Land Surface Cover	N Load Export Rate, lbs./acre/year	N Load Export Rate, kg/ha/yr.
Commercial (COM) and Industrial (IND)	Directly connected impervious	15.0	16.9
	Pervious	See* DevPERV	See* DevPERV
All Residential	Directly connected impervious	14.1	15.8
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	10.5	11.8
	Pervious	See* DevPERV	See* DevPERV
Forest (FOR)	Directly connected impervious	11.3	12.7
	Pervious	0.5	0.6
Open Land (OPEN)	Directly connected impervious	11.3	12.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (AG)	Directly connected impervious	11.3	12.7
	Pervious	2.6	2.9
*Developed Land Pervious (DevPERV) – HSG A	Pervious	0.3	0.3
*Developed Land Pervious (DevPERV) – HSG B	Pervious	1.2	1.3
*Developed Land Pervious (DevPERV) – HSG C	Pervious	2.4	2.7
*Developed Land Pervious (DevPERV) – HSG C/D	Pervious	3.1	3.5
*Developed Land Pervious (DevPERV) – HSG D	Pervious	3.6	4.1

Notes:
- For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value from this table. If the HSG is not known, assume HSG C conditions for the phosphorus load export rate.
- Agriculture includes row crops. Actively managed hay fields and pasture lands. Institutional land uses such as government properties, hospitals and schools are to be included in the commercial and industrial land use grouping for the purpose of calculating phosphorus loading.
- Impervious surfaces within the forest land use category are typically roadways adjacent to forested pervious areas.

Table 3-3. Crosswalk of land use groups for NH MS4 P Load calculations to land use codes in NH GRANIT

Description of Land Use (LU) Groups for Calculating P Load Using PLERs	NH GRANIT LU Category Codes [1]
Commercial	1210-1290, 1442, 1146, 1520-30, 1590, 1610-90, and 1790
Industrial,	1300, 1370, 1410-20, 1460-80, 1510, and 1580
High Density Residential	1110, 1120 and1140
Medium Density Residential	1130 and 1150
Low Density Residential	1190
Highway/Freeway	1440-45, 1447-50 and 1490
Forest	3000, 4000, 6000, 190
Open Land	1710-90, 1800
Agriculture	2000 and 2900

[1]NH GRANIT land use categories can be found at the following link (See Table 1, page 4): http://www.granit.unh.edu/resourcelibrary/GRANITresources/standards/LUStandards-I93-061107.pdf

BMP Load: To estimate the annual phosphorus and/or nitrogen load reduction for a given stormwater BMP, it is first necessary to estimate the amount of annual stormwater phosphorus and/or nitrogen load that will be directed to the BMP (BMP Load).

For a given BMP:

1) Determine the total drainage area to the BMP;

2) Distribute the total drainage area into impervious and pervious subareas by land use category as defined by Tables 3-1, 3-2 and 3-3;

3) Calculate the nutrient load for each land use-based impervious and pervious subarea by multiplying the subarea by the appropriate nutrient load export rate (i.e., PLER or NLER) provided in Tables 3-1 and 3-2; and

4) Determine the total annual phosphorus and/or nitrogen loads to the BMP by summing the calculated impervious and pervious subarea phosphorus and/or nitrogen loads.

Example 3-1 to determine phosphorus and nitrogen loads to a proposed BMP: A permittee is proposing a surface stormwater infiltration system that will treat runoff from an industrial site within the LPCP area that has a total drainage area of 12.87 acres comprised of 10.13 acres of impervious cover (e.g., roadways, parking areas and rooftops), 1.85 acres of landscaped pervious area and 0.89 acres of wooded area both with HSG C soils. The drainage area information for the proposed BMP is:

BMP Subarea ID	Land Use Category	Cover Type	Area (acres)	PLER (lb/acre/yr)*	NLER (lb/acre/yr)**
1	Industrial	impervious	10.13	1.78	15.0
2	Landscaped (HSG C)	pervious	1.85	0.21	2.4
3	Forest (HSG C)	pervious	0.89	0.12	0.5

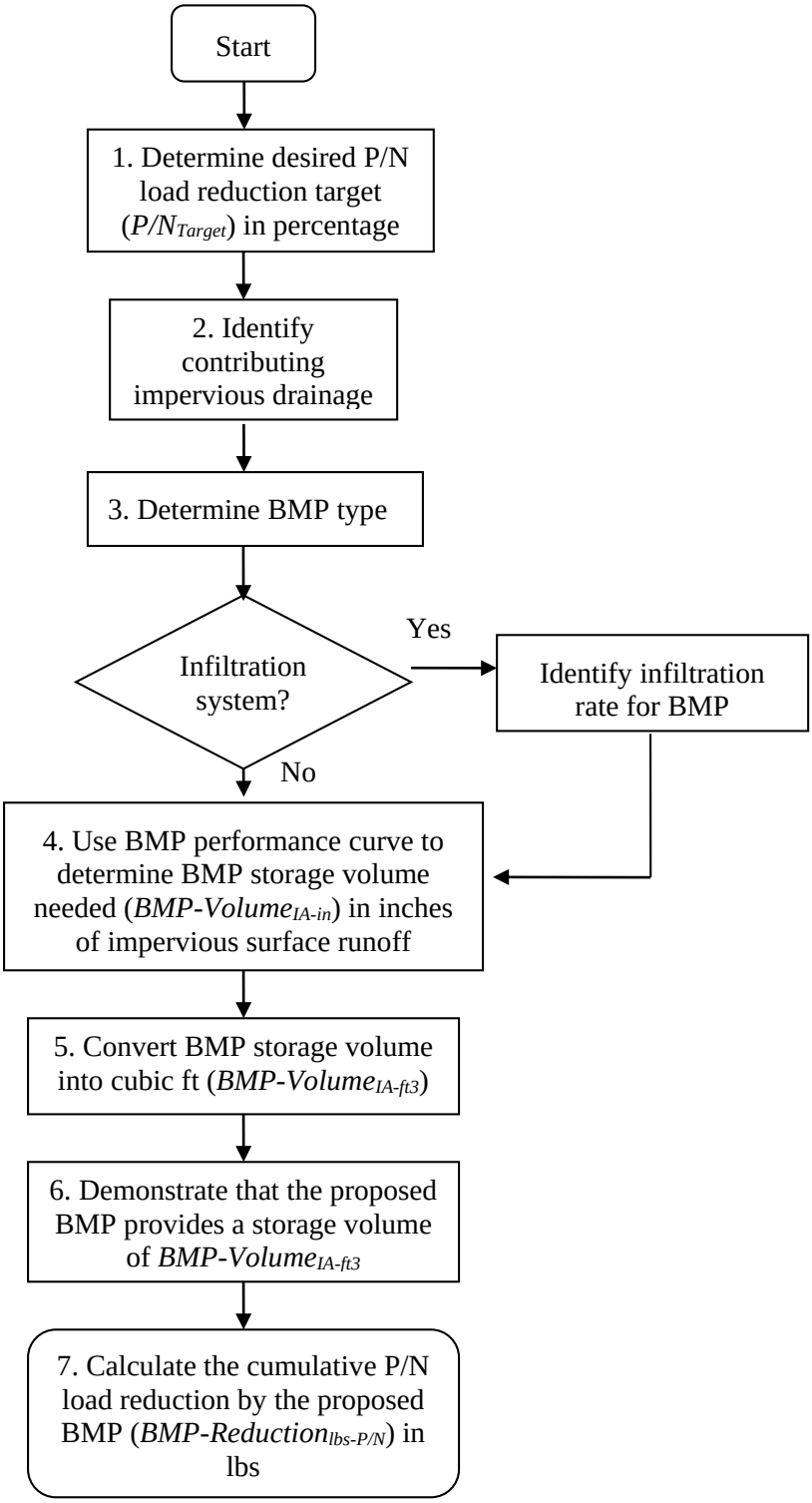
*From Table 3-1
**From Table 3-2

The phosphorus load to the proposed BMP (BMP Load $_P$) is calculated as:
BMP Load $_P$ = (IA_{Ind} x $PLER_{Ind}$) + (PA_{Ind} x $PLER_{Ind}$) + (PA_{FOREST} x $PLER_{For}$)
= (10.13 x 1.78) + (1.85 x 0.21) + (0.89 x 0.12)
= 18.53 lbs P/year

The nitrogen load to the proposed BMP (BMP Load $_N$) is calculated as:
BMP Load $_N$ = (IA_{Ind} x $NLER_{Ind}$) + (PA_{Ind} x $NLER_{Ind}$) + (PA_{FOREST} x $NLER_{For}$)
= (10.13 x 15.0) + (1.85 x 2.4) + (0.89 x 0.5)
= 156.9 lbs N/year

(1) Method to determine the design volume of a structural BMP to achieve a known phosphorus and/or nitrogen (P/N) load reduction target when the contributing drainage area is 100% impervious:

Flow Chart 1 illustrates the steps to determine the design volume of a structural BMP to achieve a known phosphorus and/or nitrogen (P/N) load reduction target when the contributing drainage area is 100% impervious.



Flow Chart 1: Method to determine BMP design volume to achieve a known phosphorous load reduction when contributing drainage area is 100% impervious.

1) Determine the desired cumulative phosphorus and/or nitrogen load reduction target (P/N_{target}) in percentage for the structural BMP;

2) Determine the contributing impervious drainage area (IA) in acres to the structural BMP;

3) Determine the structural BMP type (e.g., infiltration trench, gravel wetland). For infiltration systems, determine the appropriate infiltration rate for the location of the BMP in the Watershed;

4) Using the cumulative phosphorus and/or nitrogen removal performance curves for the selected structural BMP (Figures 3-1 through 3-20), determine the storage volume for the BMP (BMP-Volume $_{IA\text{-}in}$), in inches of runoff, needed to treat runoff from the contributing IA to achieve the reduction target;

5) Calculate the corresponding BMP storage volume in cubic feet (BMP-Volume $_{IA\text{-}ft^3}$) using BMP-Volume $_{IA\text{-}in}$ determined from step 4 and equation 3-1:

BMP-Volume $_{IA\text{-}ft^3}$ = IA (acre) x BMP-Volume $_{IA\text{-}in}$ x 3630 ft^3/ac-in **(Equation 3-1)**

6) Provide supporting calculations using the dimensions and specifications of the proposed structural BMP showing that the necessary storage volume capacity, BMP-Volume $_{IA\text{-}ft^3}$, determined from step 5 will be provided to achieve the P/N $_{Target}$; and

7) Calculate the cumulative P/N load reduction in pounds of P/N (BMP-Reduction $_{lbs\text{-}P/N}$) for the structural BMP using the BMP Load (as calculated from the procedure in Attachment 1 to Appendix F) and P/N $_{target}$ by using equation 3-2:

BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P/N $_{target}$ /100) **(Equation 3-2)**

Example 3-2 to determine design storage volume capacity of a structural BMP for a 100% impervious drainage area to achieve a known phosphorus load reduction target*:
*Note: The approach used in this example is for phosphorus and is equally applicable for nitrogen.

A permittee is considering a surface infiltration practice to capture and treat runoff from 2.57 acres (1.04 ha) of commercial impervious area in the LPCP area that will achieve a 70% reduction in average annual phosphorus load. The infiltration practice would be located adjacent to the impervious area. The permittee has measured an infiltration rate (IR) of 0.39 inches per hour (in/hr) in the vicinity of the proposed infiltration practice. Determine the:

A) Design storage volume needed for an surface infiltration practice to achieve a 70% reduction in annual phosphorus load from the contributing drainage area (BMP-Volume $_{IA\text{-}ft^3}$); and

B) Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction $_{lbs\text{-}P}$)

Solution:

1) Phosphorus load reduction target (P $_{target}$) = 70%

Solution continued:

2) Contributing impervious drainages area (IA) = 2.57 acres;

3) BMP type is a surface infiltration practice (i.e., basin) with an infiltration rate (IRBMP type is a surface infiltration practice (i.e., basin) with an infiltration rate (IR) of 0.39 in/hr

4) The performance curve for the infiltration basin (i.e., surface infiltration practice), Figure 3-8, IR = 0.27 in/hr is used to determine the design storage volume of the BMP (BMP-Volume $_{IA\text{-}in}$) needed to treat runoff from the contributing IA and achieve a P $_{target}$ = 70%. The curve for an infiltration rate of 0.27 in/hr is chosen because 0.27 in/hr is the nearest simulated IR that is less than the field measured IR of 0.39 in/hr. From Figure 3-8, the BMP-Volume $_{IA\text{-}in}$ for a P $_{target}$ = 70% is 0.36 in.

5) The BMP-Volume $_{IA\text{-}in}$ is converted to cubic feet (BMP-Volume $_{IA\text{-}ft^3}$) using Equation 3-1:

BMP-Volume $_{IA\text{-}ft^3}$ = IA (acre) x BMP-Volume $_{IA\text{-}in}$ x 3,630 ft^3/acre-in
BMP-Volume $_{IA\text{-}ft^3}$ = 2.57 acre x 0.36 in x 3,630 ft^3/acre-in
= **3,359 ft^3**

6) A narrow trapezoidal infiltration basin with the following characteristics is proposed to achieve the P $_{Target}$ of 70%. As indicated in Table 3-5, the Design Storage Volume (DSV) of a surface infiltration practice is equal to the volume of surface ponding:

DSV = (L x ((W_{bottom}+$W_{top@Dmax}$)/2) x D) (Table 3-5: Surface Infiltration)

Length (ft)	Design Depth (ft)	Side Slopes	Bottom area (ft^2)	Pond surface area (ft^2)	Design Storage Volume (ft^3)
355	1.25	3:1	1,387	4,059	3,404

The proposed DSV of 3,404 ft^3 exceeds the BMP-Volume $_{IA\text{-}ft^3}$ needed, 3,359 ft^3 and therefore is sufficient to achieve the P Target of 70%.

7) The cumulative phosphorus load reduction in pounds of phosphorus for the infiltration practice (BMP-Reduction $_{lbs\text{-}P}$) is calculated using Equation 3-2. The BMP Load is first determined using the method described above.

BMP Load = IA x impervious cover PLER for commercial use (see Table 3-1)
= 2.57 acres x 1.78 lbs/acre/yr
= 4.58 lbs/yr

BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P $_{target}$ /100)
BMP-Reduction $_{lbs\text{-}P}$ = 4.58 lbs/yr x (70/100)
= **3.21 lbs/yr**

Solution continued:

Alternate Solution: Alternatively, the permittee could determine the design storage volume needed for an IR = 0.39 in/hr by performing interpolation of the results from the surface

infiltration performance curves for IR = 0.27 in/hr and IR = 0.52 in/hr as follows (replacing steps 3 and 4 on the previous page):

Using the performance curves for the infiltration basin (i.e., surface infiltration practice), Figures 3-8, IR = 0.27 in/hr and 3-9, IR = 0.52 in/hr, interpolate between the curves to determine the design storage volume of the BMP (BMP-Volume $_{IA\text{-}in}$) needed to treat runoff from the contributing IA and achieve a P_{target} = 70%.

First calculate the interpolation adjustment factor (IAF) to interpolate between the infiltration basin performance curves for infiltration rates of 0.27 and 0.52 in/hr:

$$IAF = (0.39 - 0.27)/ (0.52 – 0.27) = 0.48$$

From the two performance curves, develop the following table to estimate the general magnitude of the needed storage volume for an infiltration swale with an IR = 0.39 in/hr and a P_{target} of 70%.

Table Example 3-1-1: Interpolation Table for determining design storage volume of infiltration basin with IR = 0.39 in/hr and a phosphorus load reduction target of 70%

BMP Storage Volume	% Phosphorus Load Reduction IR = 0.27 in/hr ($PR_{IR=0.27}$)	% Phosphorus Load Reduction IR = 0.52 in/hr ($PR_{IR=0.52}$)	Interpolated % Phosphorus Load Reduction IR = 0.39 in/hr ($PR_{IR=0.39}$) **$PR_{IR=0.39}$= IAF($PR_{IR=0.52}$ – $PR_{IR=0.27}$) + $PR_{IR=0.27}$**
0.3	64%	67%	65%
0.4	74%	77%	75%
0.5	79%	82%	80%

As indicated from Table Example 3-1, the BMP-Volume $_{IA\text{-}in}$ for $PR_{IR=0.39}$ of 70% is between 0.3 and 0.4 inches and can be determined by interpolation:

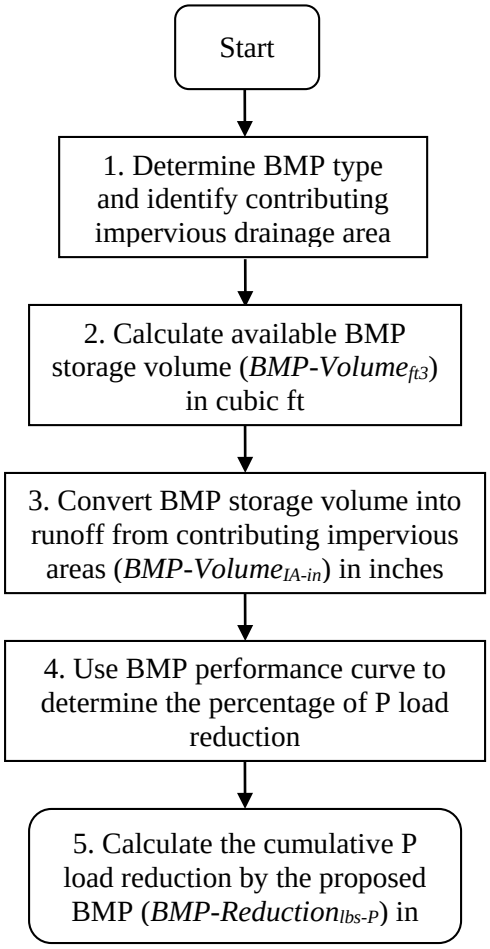
BMP-Volume $_{IA\text{-}in}$ = (70% - 65%)/ (75% - 65%) x (0.4 in – 0.3 in) + 0.3 in
= 0.35 inches

5 alternative) Convert the resulting BMP-Volume $_{IA\text{-}in}$ to cubic feet (BMP-Volume $_{IA\text{-}ft^3}$) using equation 3-1:

BMP-Volume $_{IA\text{-}ft^3}$ = 2.57 acre x 0.35 in x 3,630 ft^3/acre-in
= 3,265 ft^3

(2) <u>Method to determine the phosphorus and/or nitrogen (N/P) load reduction credit for a structural BMP with a known design storage volume when the contributing drainage area is 100% impervious:</u>

Flow Chart 2 illustrates the steps to determine the phosphorus and/or nitrogen (N/P) load reduction for a structural BMP with a known design volume when the contributing drainage area is 100% impervious.



Flow Chart 2: Method to determine the phosphorus and/or nitrogen load reduction for a BMP with a known design volume when contributing drainage area is 100% impervious.

1) Identify the structural BMP type and contributing impervious drainage area (IA);

2) Document the available storage volume (ft^3) of the structural BMP (BMP-Volume $_{ft}^3$) using the BMP dimensions and design specifications (e.g., maximum storage depth, filter media porosity);

3) Convert BMP-Volume $_{ft}^3$ into inches of runoff from the contributing impervious area (BMP-Volume $_{IA\text{-}in}$) using equation 3-3:

BMP-Volume $_{IA\text{-}in}$ = BMP-Volume $_{ft}^3$/ IA (acre) x 12 in/ft x 1 acre/43560 ft^2 **(Equation 3-3)**

4) Determine the % P/N load reduction for the structural BMP (BMP Reduction $_{\%\text{-P}}$) using the appropriate BMP performance curve (Figures 3-1 through 3-20) and the BMP-Volume $_{\text{IA-in}}$ calculated in step 3; and

5) Calculate the cumulative P/N load reduction in pounds for the structural BMP (BMP Reduction $_{\text{lbs-P/N}}$) using the BMP Load as calculated from the procedure described above and the percent P/N load reduction determined in step 4 by using equation 3-4:

$$\text{BMP Reduction}_{\text{lbs-P/N}} = \text{BMP Load} \times (\text{BMP Reduction}_{\%\text{-P/N}}/100) \quad \textbf{(Equation 3-4)}$$

Example 3-2: Determine the nitrogen load reduction for a structural BMP with a known storage volume capacity when the contributing drainage area is 100% impervious*:
*The approach used in this example is for nitrogen and is equally applicable for phosphorus.

A permittee is considering an Enhanced Bio-filtration w/ISR system to treat runoff from 1.49 acres of high density residential (HDR) impervious area. Site constraints would limit the enhanced bio-filtration system to have a surface area of 1200 ft^2 and the system would have to be located next to the impervious drainage area to be treated. The design parameters for the enhanced bio-filtration w/ ISR system are presented in Table Example 3-2-1.

Table Example 3-2-1: Design parameters for bio-filtration system for Example 3-2

Components of representation	Parameters	Value
Ponding	Maximum depth	0.5 ft
	Surface area	1200 ft^2
	Vegetative parameter[a]	85-95%
Soil mix	Depth	2.0 ft
	Porosity	0.35
	Hydraulic conductivity	4 inches/hour
Gravel layer	Depth	2.0 ft
	Porosity	0.45
Orifice #1	Diameter	0.08 ft

[a] Refers to the percentage of surface covered with vegetation

Determine the:

A) Percent nitrogen load reduction (BMP Reduction $_{\%\text{-N}}$) for the specified enhanced bio-filtration w/ISR system and contributing impervious HDR drainage area; and

B) Cumulative nitrogen reduction in pounds that would be accomplished by the system (BMP-Reduction $_{\text{lbs-N}}$)

Solution:

1) The BMP is an enhanced bio-filtration w/ISR system that will treat runoff from 1.49 acres of HDR impervious area (IA = 1.49 acre);

2) The available storage volume capacity (ft^3) of the enhanced bio-filtration system (BMP-Volume $_{\text{BMP-ft}^3}$) is determined using the surface area of the system, depth of ponding, and the porosities of the filter media and subsurface gravel ISR:

Solution continued:

BMP-Volume $_{BMP\text{-}ft^3}$ = (surface area x pond maximum depth) + (surface area x ((soil mix depth x soil layer porosity) + (gravel layer depth x gravel layer porosity))
= (1,200 ft^2 x 0.5 ft) + (1,200 ft^2 x ((2.0 x 0.35) + (2.0 x 0.45))
= 600 + 1920
= 2,520 ft^3

3) The available storage volume capacity of the enhanced bio-filtration system in inches of runoff from the contributing impervious area (BMP-Volume $_{IA\text{-}in}$) is calculated using equation 3-3:

BMP-Volume $_{IA\text{-}in}$ = (BMP-Volume $_{ft^3}$/ IA (acre) x 12 in/ft x 1 acre/43560 ft^2
BMP-Volume $_{IA\text{-}in}$ = (2520 ft^3/1.49 acre) x 12 in/ft x 1 acre/43560 ft^2
= 0.47 in

4) Using the enhanced bio-filtration performance curve shown in Figure 3-15, a **61%** nitrogen load reduction (BMP Reduction %-N) is determined for the system with a design storage capacity of 0.47 inches for treating runoff from 1.49 acres of impervious area; and

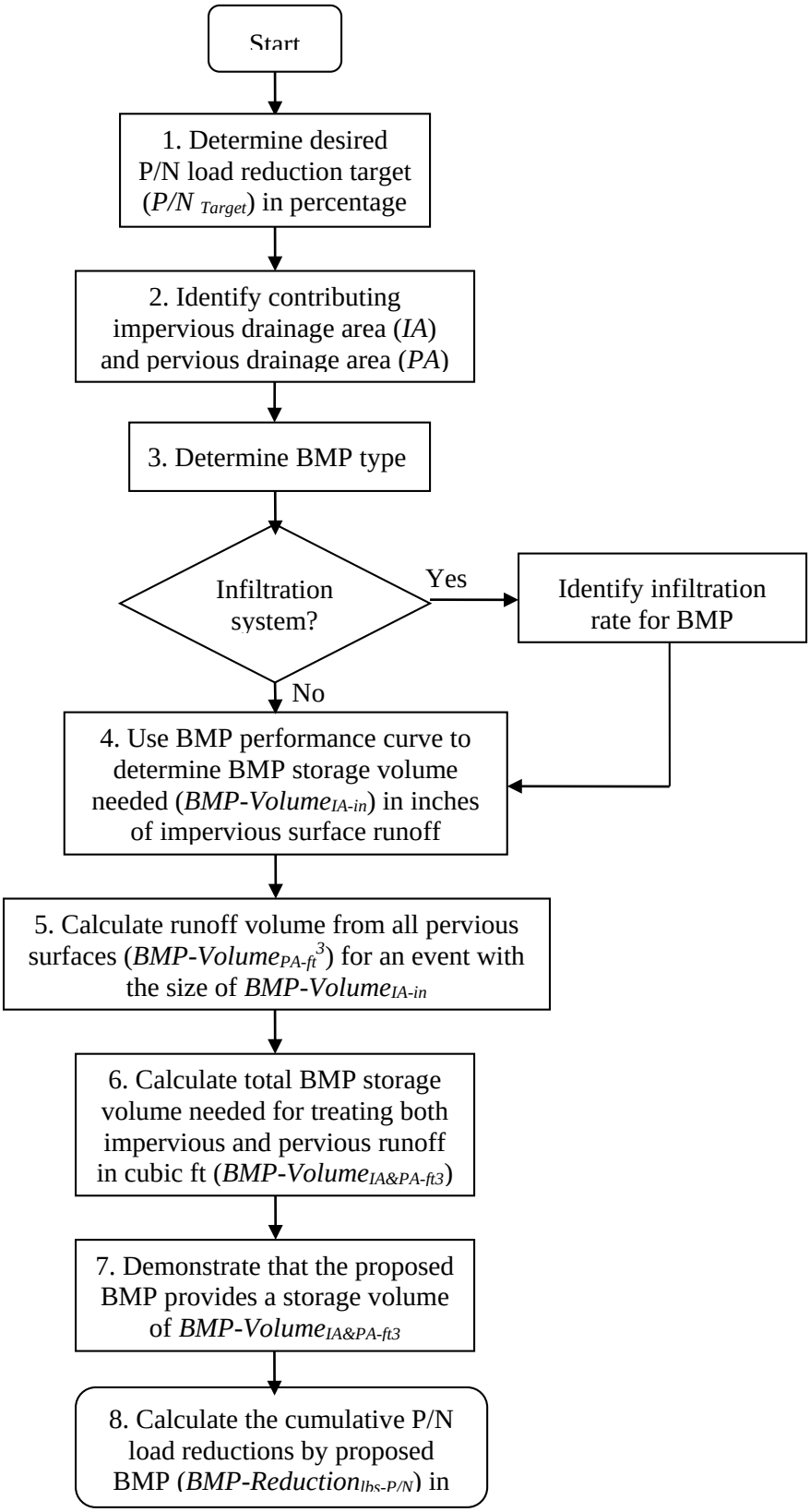
5) Calculate the cumulative nitrogen load reduction in pounds of for the enhanced bio-filtration w/ISR system (BMP Reduction $_{lbs\text{-}N}$) using the BMP Load as calculated from the procedure described above and the BMP Reduction $_{\%\text{-}N}$ determined in step 4 by using equation 3-4. First, the BMP Load is determined as specified above:

BMP Load $_N$ = IA x impervious cover nitrogen export loading rate for HDR (see Table 3-2)
= 1.49 acres x 15.8 lbs/acre/yr
= 23.5 lbs/yr

BMP Reduction $_{lbs\text{-}N}$ = BMP Load x (BMP Reduction $_{\%\text{-}P}$/100)
BMP Reduction $_{lbs\text{-}N}$ = 23.5 lbs/yr x (61/100)
= **14.4 lbs/yr**

(3) Method to determine the design storage volume of a structural BMP to achieve a known phosphorus and/or nitrogen load reduction target when the contributing drainage area has impervious and pervious surfaces:

Flow Chart 3 illustrates the steps to determine the design storage volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area has impervious and pervious surfaces.


Start
1. Determine desired P/N load reduction target (*P/N Target*) in percentage
2. Identify contributing impervious drainage area (*IA*) and pervious drainage area (*PA*)
3. Determine BMP type
Infiltration system?
Yes
Identify infiltration rate for BMP
No
4. Use BMP performance curve to determine BMP storage volume needed (*BMP-Volume$_{IA\text{-}in}$*) in inches of impervious surface runoff
5. Calculate runoff volume from all pervious surfaces (*BMP-Volume$_{PA\text{-}ft}^{3}$*) for an event with the size of *BMP-Volume$_{IA\text{-}in}$*
6. Calculate total BMP storage volume needed for treating both impervious and pervious runoff in cubic ft (*BMP-Volume$_{IA\&PA\text{-}ft3}$*)
7. Demonstrate that the proposed BMP provides a storage volume of *BMP-Volume$_{IA\&PA\text{-}ft3}$*
8. Calculate the cumulative P/N load reductions by proposed BMP (*BMP-Reduction$_{lbs\text{-}P/N}$*) in

Flow Chart 3: Method to determine the design storage volume of a BMP to reach a known P/N load reduction when both impervious and pervious drainage areas are present.

1) Determine the desired cumulative P/N load reduction target (P/N_{target}) in percentage for the structural BMP;
2) Characterize the contributing drainage area to the structural BMP by identifying the following information for the impervious and pervious surfaces:
   Impervious area (IA) - Area (acre) and land use (e.g., commercial)
   Pervious area (PA) – Area (acre), land use and hydrologic soil group (HSG).
3) Determine the structural BMP type (e.g., infiltration trench, gravel wetland). For infiltration systems, determine the appropriate infiltration rate for the location of the BMP in the Watershed;
4) Using the cumulative P/N removal performance curve for the selected structural BMP, determine the storage volume capacity of the BMP in inches needed to treat runoff from the contributing impervious area (BMP-Volume $_{IA\text{-}in}$);
5) Using Equation 3-5 below and the pervious area runoff depth information from Table 3-4, below, determine the total volume of runoff from the contributing pervious drainage area in cubic feet (BMP Volume $_{PA\text{-}ft^3}$) for a rainfall size equal to the sum of BMP Volume $_{IA\text{-}in}$, determined in step 4. The runoff volume for each distinct pervious area must be determined;
   BMP-Volume $_{PA\ ft^3} = \sum$ (PA x (runoff depth) x 3,630 ft^3/acre-in) $_{(PA1,\ PAn)}$ **(Equation 3-5)**

> Table 3-4 provides values of runoff depth from pervious areas for various rainfall depths and HSGs. Soils are assigned to an HSG on the basis of their permeability. HSG A is the most permeable, and HSG D is the least permeable. HSG categories for pervious areas in the drainage area shall be estimated by consulting local soil surveys prepared by the National Resource Conservation Service (NRCS) or by a storm water professional evaluating soil testing results from the drainage area. If the HSG condition is not known, a HSG C soil condition should be assumed.

6) Using equation 3-6 below, calculate the BMP storage volume in cubic feet (BMP-Volume $_{IA\&PA\text{-}ft^3}$) needed to treat the runoff depth from the contributing impervious (IA) and pervious areas (PA);

   BMP-Volume $_{IA\&PA\text{-}ft^3}$ = BMP Volume $_{PA\text{-}ft^3}$ + (BMP Volume $_{IA\text{-}in}$ x IA (acre) x 3,630 ft^3/acre-in) **(Equation 3-6)**

7) Provide supporting calculations using the dimensions and specifications of the proposed structural BMP showing that the necessary storage volume determined in step 6, BMP-Volume $_{IA\&PA\text{-}ft^3}$, will be provided to achieve the P/N_{Target}; and
8) Calculate the cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction $_{lbs\text{-}P/N}$) for the structural BMP using the BMP Load (as calculated in example 1) and the P/N_{target} by using equation 3-2:

   BMP-Reduction $_{lbs\text{-}P/N}$ = BMP Load x (P_{target} /100) **(Equation 3-2)**

Table 3- 4: Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups (HSGs)

Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups					
Rainfall Depth, Inches	Runoff Depth, inches				
	Pervious HSG A	Pervious HSG B	Pervious HSG C	Pervious HSG C/D	Pervious HSG D
0.10	0.00	0.00	0.00	0.00	0.00
0.20	0.00	0.00	0.01	0.02	0.02
0.40	0.00	0.00	0.03	0.05	0.06
0.50	0.00	0.01	0.05	0.07	0.09
0.60	0.01	0.02	0.06	0.09	0.11
0.80	0.02	0.03	0.09	0.13	0.16
1.00	0.03	0.04	0.12	0.17	0.21
1.20	0.04	0.05	0.14	0.27	0.39
1.50	0.08	0.11	0.39	0.55	0.72
2.00	0.14	0.22	0.69	0.89	1.08

Notes: Runoff depths derived from combination of volumetric runoff coefficients from Table 5 of *Small Storm Hydrology and Why it is Important for the Design of Stormwater Control Practices*, (Pitt, 1999), and using the Stormwater Management Model (SWMM) in continuous model mode for hourly precipitation data for Boston, MA, 1998-2002.

Example 3-3: Determine the design storage volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area has impervious and pervious surfaces*:

*The approach used in this example for phosphorus is equally applicable for nitrogen.

A permittee is considering a gravel wetland system to treat runoff from a high-density residential (HDR) site. The site is 7.5 acres of which 4.0 acres are impervious surfaces and 3.50 acres are pervious surfaces. The pervious area is made up of 2.5 acres of lawns in good condition surrounding cluster housing units and 1.0 acre of stable unmanaged woodland. Soils information indicates that all of the woodland and 0.5 acres of the lawn is hydrologic soil group (HSG) B and the other 2.0 acres of lawn are HSG C. The permittee wants to size the gravel wetland system to achieve a cumulative phosphorus load reduction (P_{Target}) of 55% from the entire 7.5 acres.

Determine the:

A) Design storage volume needed for a gravel wetland system to achieve a 55% reduction in annual phosphorus load from the contributing drainage area (BMP-Volume $_{IA\&PA\text{-}ft^3}$); and

B) Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction $_{lbs\text{-}P}$)

Example 3-3 continued:
Solution:

1) The BMP type is gravel wetland system.

2) The phosphorus load reduction target (P_{Target}) = 55%.

3) Using the cumulative phosphorus removal performance curve for the gravel wetland system shown in Figure 3-14, the storage volume capacity in inches needed to treat runoff from the contributing impervious area (BMP Volume $_{IA\text{-}in}$) is 0.71 in;

Using equation 3-5 and the pervious runoff depth information from Table 3-4, the volume of runoff from the contributing pervious drainage area in cubic feet (BMP Volume $_{PA-ft^3}$) for a rainfall size equal to 0.71 in is summarized in Table Example 3-3-A. As indicated from Table 3-4, the runoff depth for a rainfall size equal to 0.71 inches is between 0.6 and 0.8 inches and can be determined by interpolation (example shown for runoff depth of HSG C):

Runoff depth (HSG C) = (0.71 – 0.6)/(0.8 – 0.6) x (0.09 in – 0.06 in) + 0.06 in
= 0.07 inches

Table Example 3-3-A: Runoff contributions from pervious areas for HDR site

ID	Type	Pervious Area (acre)	HSG	Runoff (in)	Runoff = (runoff) x PA (acre-in)	Runoff = Runoff (acre-in) x 3630 ft^3/acre-in (ft^3)
PA1	Grass	2.00	C	0.07	0.14	508
PA2	Grass	0.50	B	0.01	0.0	0.0
PA3	Woods	1.00	B	0.01	0.0	0.0
Total	-----	**3.50**	-----	-----	**0.14**	**508**

4) Using equation 3-6, determine the BMP storage volume in cubic feet (BMP-Volume $_{IA\&PA\text{-}ft^3}$) needed to treat 0.71 inches of runoff from the contributing impervious area (IA) and the runoff of 0.14 acre-in from the contributing pervious areas, determined in step 5 is:

BMP Volume$_{IA\&PA\text{-}ft^3}$ = BMP Volume $_{PA\ ac\text{-}in}$ + (BMP Volume $_{IA\text{-}in}$ x IA (acre)) x 3,630 ft^3/acre-in)

BMP Volume$_{IA\&PA\text{-}ft^3}$ = (508 ft^3+ ((0.71 in x 4.00 acre) x 3,630 ft^3/acre-in)
= 10,817 ft^3

5) Table Example 3-3-B provides design details for of a potential gravel wetland system

Solution continued:

Table Example 3-3-B: Design details for gravel wetland system

Gravel Wetland System Components	Design Detail	Depth (ft)	Surface Area (ft^2)	Volume (ft^3)
Sediment Forebay	**10% of Treatment Volume**			
Pond area	----	1.33	896	1,192
Wetland Cell #1	**45% of Treatment Volume**	----------	----------	----------
Pond area	----	2.00	1,914	3,828
Gravel layer	porosity = 0.4	2.00	1,914	1,531
Wetland Cell #2	**45% of Treatment Volume**	----------	----------	----------
Pond area	----	2.00	1,914	3,828
Gravel layer	porosity = 0.4	2.00	1,914	1,531

The total design storage volume for the proposed gravel wetland system identified in Table Example 3-3-C is 11,910 ft^3. This volume is greater than 11,834 ft^3 ((BMP-Volume $_{IA\&PA\text{-}ft^3}$), calculated in step 4) and is therefore sufficient to achieve a P_{Target} of 55%.

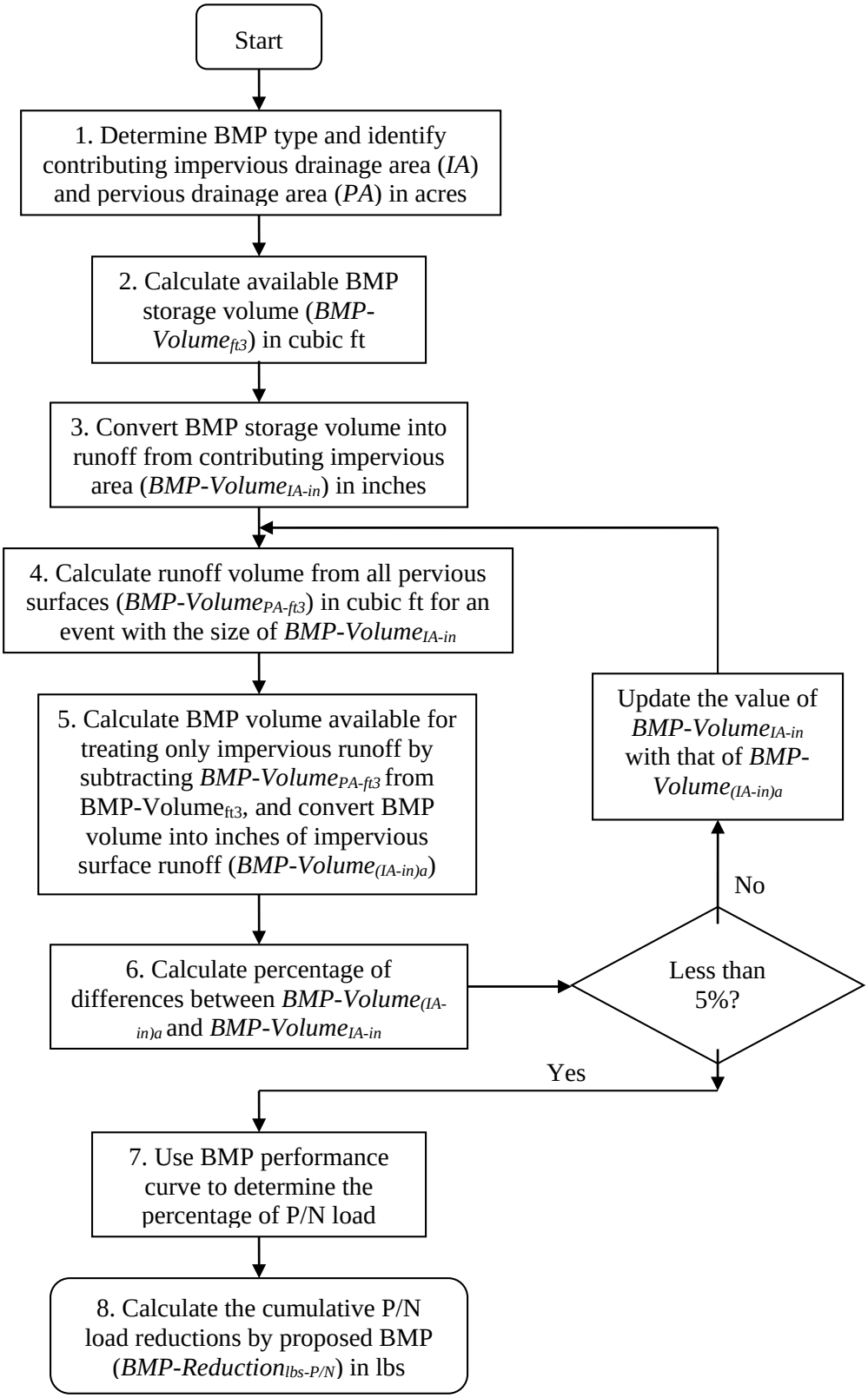
6) The cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction $_{lbs\text{-}P}$) for the proposed gravel wetland system is calculated by using equation 3-2 with the BMP Load and the P_{target} = 55%.

BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P_{target} /100) (**Equation 3-2**)

Using Table 3-1, the BMP Load is calculated:
BMP Load = (IA x PLER $_{IC\ HDR}$) + (PA lawn $_{HSG\ B}$ x PLER $_{HSG\ B}$) + (PA lawn $_{HSG\ C}$ x PLER $_{HSG\ C}$) + (PA forest x PA PLER $_{For}$)
= (4.00 acre x 2.32 lbs/acre/yr) + (0.50 acres x 0.12 lbs/acre/yr) + (2.00 acre x 0.21 lbs/acre/yr) + (1.00 acres x 0.13)
= 9.68 lbs/yr
BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P_{target} /100)
BMP-Reduction $_{lbs\text{-}P}$ = 9.68 lbs/yr x 55/100
= **5.32 lbs/yr**

(4) Method to determine the phosphorus and/or nitrogen load reduction for a structural BMP with a known storage volume when the contributing drainage area has impervious and pervious surfaces:

Flow Chart 4 illustrates the steps to determine the phosphorus and/or nitrogen (P/N) load reduction for a structural BMP with a known storage volume when the contributing drainage area has impervious and pervious surfaces.


Start
1. Determine BMP type and identify contributing impervious drainage area (*IA*) and pervious drainage area (*PA*) in acres
2. Calculate available BMP storage volume (*BMP-Volume*$_{ft3}$) in cubic ft
3. Convert BMP storage volume into runoff from contributing impervious area (*BMP-Volume*$_{IA\text{-}in}$) in inches
4. Calculate runoff volume from all pervious surfaces (*BMP-Volume*$_{PA\text{-}ft3}$) in cubic ft for an event with the size of *BMP-Volume*$_{IA\text{-}in}$
5. Calculate BMP volume available for treating only impervious runoff by subtracting *BMP-Volume*$_{PA\text{-}ft3}$ from BMP-Volume$_{ft3}$, and convert BMP volume into inches of impervious surface runoff (*BMP-Volume*$_{(IA\text{-}in)a}$)
6. Calculate percentage of differences between *BMP-Volume*$_{(IA\text{-}in)a}$ and *BMP-Volume*$_{IA\text{-}in}$
Less than 5%?
No
Update the value of *BMP-Volume*$_{IA\text{-}in}$ with that of *BMP-Volume*$_{(IA\text{-}in)a}$
Yes
7. Use BMP performance curve to determine the percentage of P/N load
8. Calculate the cumulative P/N load reductions by proposed BMP (*BMP-Reduction*$_{lbs\text{-}P/N}$) in lbs

Flow Chart 4: Method to determine the P/N load reduction for a BMP with known storage volume when both pervious and impervious drainage areas are present.

1) Identify the type of structural BMP and characterize the contributing drainage area to the structural BMP by identifying the following information for the impervious and pervious surfaces:

Impervious area (IA) – Area (acre) and land use (e.g., commercial)

Pervious area (PA) – Area (acre), land use, and hydrologic soil group (HSG

2) Determine the available storage volume (ft^3) of the structural BMP (BMP-Volume $_{ft^3}$) using the BMP dimensions and design specifications (e.g., maximum storage depth, filter media porosity);

3) To estimate the P/N load reduction of a BMP with a known storage volume capacity, it is first necessary to determine the portion of available BMP storage capacity (BMP-Volume $_{ft^3}$) that would treat the runoff volume generated from the contributing impervious area (IA) for a rainfall event with a depth of *i* inches (in). This will require knowing the corresponding amount of runoff volume that would be generated from the contributing pervious area (PA) for the same rainfall event (depth of *i* inches). Using equation 3-6a below, solve for the BMP capacity that would be available to treat runoff from the contributing imperious area for the unknown rainfall depth of *i* inches (see equation 3-6b):

$$\text{BMP-Volume}_{ft^3} = \text{BMP-Volume}_{(IA\text{-}ft^3)i} + \text{BMP-Volume}_{(PA\text{-}ft^3)i} \quad \textbf{(Equation 3-6a)}$$

Where:

BMP-Volume $_{ft^3}$= the available storage volume of the BMP;

BMP-Volume $_{(IA\text{-}ft^3)i}$ = the available storage volume of the BMP that would fully treat runoff generated from the contributing impervious area for a rainfall event of size *i* inches; and

BMP-Volume $_{(PA\text{-}ft^3)i}$ = the available storage volume of the BMP that would fully treat runoff generated from the contributing pervious area for a rainfall event of size *i* inches

Solving for BMP-Volume $_{(IA\text{-}ft^3)i}$:

$$\text{BMP-Volume}_{(IA\text{-}ft^3)i} = \text{BMP-Volume}_{ft^3} - \text{BMP-Volume}_{(PA\text{-}ft^3)i} \quad \textbf{(Equation 3-6b)}$$

To determine BMP-Volume $_{(IA\text{-}ft^3)i}$, requires performing an iterative process of refining estimates of the rainfall depth used to calculate runoff volumes until the rainfall depth used results in the sum of runoff volumes from the contributing IA and PA equaling the available BMP storage capacity (BMP-Volume $_{ft^3}$). For the purpose of estimating BMP

performance, it will be considered adequate when the IA runoff depth (in) is within 5% IA runoff depth used in the previous iteration.

For the first iteration (1), convert the BMP-Volume $_{ft^3}$ determined in step 2 into inches of runoff from the contributing impervious area (BMP Volume $_{(IA\text{-}in)1}$) using equation 3-7a.

BMP-Volume $_{(IA\text{-}in)1}$ = (BMP-Volume$_{ft^3}$/ IA (acre)) x (12 in/ft /43,560 ft^2/acre) **(Equation 3-7a)**;

For iterations 2 through n (2…n), convert the BMP Volume $_{(IA\text{-}ft^3)2\ldots n}$, determined in step 6) below, into inches of runoff from the contributing impervious area (BMP Volume $_{(IA\text{-}in)2\ldots n}$) using equation 3-7b.

BMP-Volume $_{(IA\text{-}in)2\ldots n}$ = (BMP-Volume $_{(IA\text{-}ft^3)2\ldots n}$ / IA (acre)) x (12 in/ft /43,560 ft^2/acre) **(Equation 3-7b)**;

4) For 1 to n iterations, use the pervious runoff depth information from Table 3-4 (repeated below) and equation 3-8 to determine the total volume of runoff (ft^3) from the contributing PA (BMP Volume $_{PA\text{-}ft^3}$) for a rainfall size equal to the sum of BMP-Volume $_{(IA\text{-}in)1}$, determined in step 3. The runoff volume for each distinct pervious area must be determined.

BMP Volume $_{(PA\text{-}ft^3)1\ldots n}$ = $\sum$ ((PA x (runoff depth) $_{(PA1,\ PA2..PAn)}$ x (3,630 ft^3/acre-in) **(Equation 3-8)**

Table 3-4 provides values of runoff depth from pervious areas for various rainfall depths and HSGs. Soils are assigned to an HSG on the basis of their permeability. HSG A is the most permeable, and HSG D is the least permeable. HSG categories for pervious areas in the drainage area shall be estimated by consulting local soil surveys prepared by the National Resource Conservation Service (NRCS) or by a storm water professional evaluating soil testing results from the drainage area. If the HSG condition is not known, a HSG C soil condition should be assumed.

Table 3- 4: Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups (HSGs) (reprinted for ease of use in example)

Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups					
Rainfall Depth, Inches	Runoff Depth, inches				
	Pervious HSG A	Pervious HSG B	Pervious HSG C	Pervious HSG C/D	Pervious HSG D
0.10	0.00	0.00	0.00	0.00	0.00
0.20	0.00	0.00	0.01	0.02	0.02
0.40	0.00	0.00	0.03	0.05	0.06
0.50	0.00	0.01	0.05	0.07	0.09
0.60	0.01	0.02	0.06	0.09	0.11
0.80	0.02	0.03	0.09	0.13	0.16
1.00	0.03	0.04	0.12	0.17	0.21

1.20	**0.04**	**0.05**	**0.14**	**0.27**	**0.39**
1.50	**0.08**	**0.11**	**0.39**	**0.55**	**0.72**
2.00	**0.14**	**0.22**	**0.69**	**0.89**	**1.08**

Notes: Runoff depths derived from combination of volumetric runoff coefficients from Table 5 of *Small Storm Hydrology and Why it is Important for the Design of Stormwater Control Practices*, (Pitt, 1999), and using the Stormwater Management Model (SWMM) in continuous model mode for hourly precipitation data for Boston, MA, 1998-2002.

5) For iteration 1, estimate the portion of BMP Volume that is available to treat runoff from only the IA by subtracting BMP-Volume $_{PA\text{-}ft^3}$, determined in step 4, from BMP-Volume $_{ft^3}$, determined in step 2, and convert to inches of runoff from IA (see equations 3-9a and 3-9b):

BMP-Volume $_{(IA\text{-}ft^3)2}$ = ((BMP-Volume$_{ft^3}$- BMP Volume $_{(PA\text{-}ft^3)1}$) **(Equation 3-9a)**

BMP-Volume $_{(IA\text{-}in)2}$ = (BMP-Volume $_{(IA\text{-}ft^3)2}$/IA (acre)) x (12 in/ft x 1 acre/43,560 ft^2) **(Equation 3-9b)**

If additional iterations (i.e., 2 through n) are needed, estimate the portion of BMP volume that is available to treat runoff from only the IA (BMP-Volume $_{(IA\text{-}in)3..n+1}$) by subtracting BMP Volume $_{(PA\text{-}ft^3)2..n}$, determined in step 4, from BMP Volume $_{(IA\text{-}ft^3)3..n+1}$, determined in step 5, and by converting to inches of runoff from IA using equation 3-9b):

6) For iteration a (an iteration between 1 and n+1), compare BMP Volume $_{(IA\text{-}in)a}$ to BMP Volume $_{(IA\text{-}in)a\text{-}1}$ determined from the previous iteration (a-1). If the difference in these values is greater than 5% of BMP Volume $_{(IA\text{-}in)a}$ then repeat steps 4 and 5, using BMP Volume $_{(IA\text{-}in)a}$ as the new starting value for the next iteration (a+1). If the difference is less than or equal to 5 % of BMP Volume $_{(IA\text{-}in)a}$ then the permittee may proceed to step 7;

7) Determine the % P/N load reduction for the structural BMP (BMP Reduction $_{\%\text{-}P/N}$) using the appropriate BMP performance curve and the BMP-Volume $_{(IA\text{-}in)n}$ calculated in the final iteration of steps 5 and 6; and

8) Calculate the cumulative P/N load reduction in pounds for the structural BMP (BMP Reduction $_{lbs\text{-}P/N}$) using the BMP Load as calculated Example 3-1 above and the percent P/N load reduction (BMP Reduction $_{\%\text{-}P/N}$) determined in step 7 by using equation 3-4:

BMP Reduction $_{lbs\text{-}P/N}$ = BMP Load x (BMP Reduction $_{\%\text{-}P/N}$/100) **(Equation 3-4)**

Example 3-4: Determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area has impervious and pervious surfaces:*

*The approach used in this example for phosphorus is equally applicable for nitrogen.

A permittee is considering an infiltration basin to capture and treat runoff from a portion of the medium density residential area (MDR). The contributing drainage area is 16.55 acres and has 11.75 acres of impervious area and 4.8 acres of pervious area (PA) made up mostly of lawns and landscaped areas that is 80% HSG D and 20% HSG C. An infiltration basin with the following specifications can be placed at the down-gradient end of the contributing drainage area where soil testing results indicates an infiltration rate (IR) of 0.28 in/hr:

Table Example 3-4-A: Infiltration basin characteristics

Structure	Bottom area (acre)	Top surface area (acre)	Maximum pond depth (ft)	Design storage volume (ft^3)	Infiltration Rate (in/hr)
Infiltration basin	0.65	0.69	1.65	48,155	0.28

Determine the:

A) Percent phosphorus load reduction (BMP Reduction $_{\%-P}$) for the specified infiltration basin and the contributing impervious and pervious drainage area; and

B) Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction $_{lbs-P}$)

Solution:

1) A surface infiltration basin is being considered. Information for the contributing impervious (IA) and pervious (PA) areas are summarized in Tables Example 3-4-A and Example 3-4-B, respectively.

Table Example 3-4-B: Impervious area characteristics

ID	Land use	Area (acre)
IA1	MDR	11.75

Table Example 3-4-C: Pervious area characteristics

ID	Area (acre)	Hydrologic Soil Group (HSG)
PA1	3.84	D
PA2	0.96	C

2) The available storage volume (ft^3) of the infiltration basin (BMP-Volume $_{ft^3}$) is determined from the design details and basin dimensions; BMP-Volume $_{ft^3} = 48{,}155\ ft^3$.

3) To determine what the BMP design storage volume is in terms of runoff depth (in) from IA, an iterative process is undertaken:

Solution Iteration 1

For the first iteration (1), the BMP-Volume$_{ft^3}$ is converted into inches of runoff from the contributing impervious area (BMP Volume $_{(IA\text{-}in)1}$) using equation 3-7a.

BMP Volume $_{(IA\text{-}in)1}$ = (48,155 ft^2/ 11.75 acre) x (12 in/ft /43,560 ft^2/acre)
= 1.13 in

4-1) The total volume of runoff (ft^3) from the contributing PA (BMP Volume $_{PA\text{-}ft^3}$) for a rainfall size equal to the sum of BMP Volume $_{(IA\text{-}in)1}$ determined in step 3 is determined for each distinct pervious area identified in Table Example 3-4-C using the information from Table 3-4 and equation 3-5. Interpolation was used to determine runoff depths.

BMP Volume $_{(PA\text{-}ft^3)1}$ = ((3.84 acre x (0.33 in) + (0.96 acre x (0.13 in)) x 3,630 ft^3/acre-in
= 5052 ft^3

5-1) For iteration 1, the portion of BMP Volume that is available to treat runoff from only the IA is estimated by subtracting the BMP Volume $_{(PA\text{-}ft^3)1}$, determined in step 4-1, from BMP Volume$_{ft^3}$, determined in step 2, and converted to inches of runoff from IA:

BMP Volume $_{(IA\text{-}ft^3)\,2}$ = 48,155 ft^3 – 5052 ft^3
= 43,103 ft^3
BMP Volume $_{(IA\text{-}in)\,2}$ = (43,103 ft^3/11.75 acre) x (12 in/ft x 1 acre/43,560 ft^2)
= 1.01 in

6-1) The % difference between BMP Volume $_{(IA\text{-}in)\,2}$, 1.01 in, and BMP Volume $_{(IA\text{-}in)1}$, 1.13 in is determined and found to be significantly greater than 5%:

% Difference = ((1.13 in – 1.01 in)/1.01 in) x 100
= 12%
Therefore, steps 4 through 6 are repeated starting with BMP Volume $_{(IA\text{-}in)\,2}$ = 1.01 in.

Solution Iteration 2

4-2) BMP-Volume $_{(PA\text{-}ft^3)2}$ = ((3.84 acre x 0.21 in) + (0.96 acre x 0.12 in)) x 3,630 ft^3/acre-in
= 3,345 ft^3

5-2) BMP-Volume $_{(IA\text{-}ft^3)\,3}$ = 48,155 ft^3 – 3,345 ft^3
= 44,810 ft^3
BMP-Volume $_{(IA\text{-}in)\,3}$ = (44,810 ft^3/11.75 acre) x (12 in/ft x 1 acre/43,560 ft^2)
= 1.05 in

6-2) % Difference = ((1.05 in – 1.01 in)/1.05 in) x 100
= 4%

The difference of 4% is acceptable.

7) The % phosphorus load reduction for the infiltration basin (BMP Reduction $_{\%-P}$) is determined by using the infiltration basin performance curve for an infiltration rate of 0.27 in/hr and the treatment volume (BMP-Volume $_{Net\ IA-in}$ = 1.05 in) calculated in step 5-2 and is **BMP Reduction $_{\%-P}$ = 93%**.

The performance curve for IR = 0.27 is used rather than interpolating between the performance curves for IR = 0.27 in/hr and 0.52 in/hr to estimate performance for IR = 0.28 in/hr. An evaluation of the performance curves for IR = 0.27 in/hr and IR = 0.52 in/hr for a design storage volume of 1.05 in indicate a small difference in estimated performance (BMP Reduction $_{\%-P}$ = 93% for IR = 0.27 in/hr and BMP Reduction $_{\%-P}$ = 95% for IR = 0.52 in/hr).

8) The cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction $_{lbs-P}$) for the proposed infiltration basin is calculated by using equation 3-2 with the BMP Load and the P $_{target}$ of 93%.

BMP-Reduction $_{lbs-P}$ = BMP Load x (P $_{target}$ /100) **(Equation 3-2)**

Using Table 3-1, the BMP load is calculated:
BMP Load = (IA x impervious cover phosphorus export loading rate for industrial)
+ (PA $_{HSG\ D}$ x pervious cover phosphorus export loading rate for HSG D)
+ (PA $_{HSG\ C}$ x pervious cover phosphorus export loading rate for HSG C)

BMP Load = (11.75 acre x 1.96 lbs/acre/yr) + (3.84 acre x 0.37 lbs/acre/yr)
+ (0.96 acre x 0.21 lbs/acre/yr)
= 24.65 lbs/yr

BMP-Reduction $_{lbs-P}$ = 24.65 lbs/yr x 93/100 = **22.92 lbs/yr**

Example 3-5: Determine the phosphorus and nitrogen load reductions for disconnecting impervious area using storage with delayed release:

A commercial operation has an opportunity to divert runoff from 0.75 acres of impervious roof top to a 5000 gallon (668.4 ft^3) storage tank for temporary storage and subsequent release to 0.09 acres of pervious area (PA) with HSG C soils.
Determine the:

A) Percent phosphorus and nitrogen load reduction rates (BMP Reduction $_{\%-P\&N}$) for the specified impervious area (IA) disconnection and storage system assuming release times of 1, 2 and 3 days for the stored volumes to discharge to the pervious area; and
B) Cumulative phosphorus and nitrogen load reductions in pounds that would be accomplished by the system (BMP-Reduction $_{lbs-P\&N}$) for the three storage release times, 1, 2 and 3 days.

Solution:

1. Determine the storage volume in units of inches of runoff depth from contributing impervious area:
   Storage Volume $_{IA\text{-}in}$ = (668.4 ft^3/(0.75 acre x 43.560 ft^2/acre)) x 12 inch/ft
   = 0.25 inches

2. Determine the ratio of the contributing impervious area to the receiving pervious area:
   IA:PA = 0.75 acres/0.09 acres
   = 8.3
3. Using Table 3-26 or Figure 3-23 for a IA:PA ratio of 8:1, determine the phosphorus and nitrogen load reduction rates for a storage volume of 0.25 inches that discharges to HSG C with release rates of 1, 2 and 3 days: Using interpolation the reduction rates are shown in Table 3-5-A:

Table Example 3-5-A: P&N Reduction Rates

Percent Phosphorus & Nitrogen load reduction for IA disconnection with storage to PA HSG C			
Storage Volume $_{IA\text{-}in}$	Storage release rate, days		
	1	2	3
0.25	39%	42%	43%

4. The cumulative phosphorus and nitrogen load reductions in pounds of phosphorus for the IA disconnection with storage (BMP-Reduction $_{lbs\text{-}P/N}$) is calculated using Equation 3-2. The BMP Loads for phosphorus and nitrogen are first determined using the method presented in Example 3-1.

Phosphorus:

BMP Load $_{P}$ = IA (acre) x PLER $_{IC\text{-}Com}$ (see Table 3-1)
= 0.75 acres x 1.78 lbs/acre/yr
= 1.34 lbs/yr
BMP Reduction $_{lbs\text{-}P}$ = BMP Load x (BMP Reduction $_{\%\text{-}P}$/100)
BMP Reduction $_{lbs\text{-}P}$ = 1.34 lbs/yr x (39/100)
= **0.53 lbs/yr**

Table Example 3-5-B presents the BMP Reduction $_{lbs\text{-}P}$ for each of the release rates:

Table Example 3-5-B: P Reduction Loads

Phosphorus load reduction for IA disconnection with storage to PA HSG C, lbs			
Storage Volume $_{IA\text{-}in}$	Storage release rate, days		
	1	2	3
0.25	0.53	0.56	0.58

Nitrogen:

BMP Load $_{N}$ = IA (acre) x NLER $_{IC\text{-}Com}$ (see Table 3-2)
= 0.75 acres x 15.0 lbs/acre/yr
= 11.3 lbs/yr
BMP Reduction $_{lbs\text{-}N}$ = BMP Load x (BMP Reduction $_{\%\text{-}P}$/100)
BMP Reduction $_{lbs\text{-}N}$ = 11.3 lbs/yr x (39/100)
BMP Reduction $_{lbs\text{-}N}$ = **4.4 lbs/yr**

Table Example 3-5-C presents the BMP Reduction $_{lbs\text{-}N}$ for each of the release rates:

Table Example 3-5-C: N Reduction Loads

Nitrogen load reduction for IA disconnection with storage to PA HSG C, lbs			
Storage Volume $_{IA\text{-}in}$	Storage release rate, days		
	1	2	3
0.25	4.4	4.7	4.9

Example 3-6: Determine the phosphorus load reduction for disconnecting impervious area with and without soil augmentation in the receiving pervious area:*

*The approach used in this example for phosphorus is equally applicable for nitrogen

The same commercial property as in Example 3-5 wants to evaluate disconnecting drainage from the 0.75 acre impervious roof top and discharging it directly to 0.09 acres of pervious area (PA) with HSG C. Also, the property has the opportunity to purchase a small adjoining area (0.06 acres), also HSG C, to increase the size of the receiving PA from 0.09 to 0.15 acres and to allow the property owner to avoid having to install a drainage structure to capture overflow runoff from the PA. The property owner has been informed that the existing PA soil can be tilled and augmented with soil amendments to support denser vegetative growth and improve hydrologic function to approximate HSG B.

Determine the:

A) Percent phosphorus load reduction rates (BMP Reduction $_{\%\text{-}P}$) for the specified impervious area (IA) disconnection to both the 0.09 and 0.15 acre receiving PAs with and without soil augmentation; and
B) Cumulative phosphorus reductions in pounds that would be accomplished by the IA disconnection for the various scenarios (BMP-Reduction $_{lbs\text{-}P}$).

Solution:

1. Determine the ratio of the contributing impervious area to the receiving pervious area:
   IA:PA = 0.75 acres/0.09 acres
   = 8.3
   IA:PA = 0.75 acres/0.15 acres
   = 5.0
2. Using Table 3-31 and Figure 3-41 for a IA:PA ratios of 8:1 and 5:1, respectively, determine the phosphorus load reduction rates for IA disconnections to HSG C and HSG B:

Table Example 3-6-A: Reduction Rates

Percent Phosphorus load reduction rates for IA disconnection		
Receiving PA	**IA:PA**	
	8:1	5:1
HSG C	7%	14%
HSG B (soil augmentation)	14%	22%

3. The cumulative phosphorus load reduction in pounds of phosphorus for the IA disconnection with storage (BMP-Reduction $_{lbs-P}$) is calculated using Equation 3-2. The BMP Load was calculated in example 3-5 and is 1.34 lbs/yr.

   BMP Reduction $_{lbs-P}$ = BMP Load x (BMP Reduction $_{\%-P}$/100)
   For PA of 0.09 acres HSG C the BMP Reduction $_{lbs-P}$ is calculated as follows:
   BMP Reduction $_{lbs-P(0.09ac- HSG C)}$ = 1.34 lbs/yr x (7/100)
   = **0.09 lbs/yr**
   Table Example 3-6-B presents the BMP Reduction $_{lbs-P}$ for each of the scenarios:

Table Example 3-6-B: Reduction

Pounds Phosphorus load reduction for IA disconnection, lbs/yr		
Receiving PA	**Area of Receiving PA, acres**	
	0.09	**0.15**
HSG C	0.09	0.19
HSG B (soil augmentation)	0.19	0.29

Example 3-7: Determine the phosphorus load reduction for converting impervious area to permeable/pervious area:*
*The approach used in this example for phosphorus is equally applicable for nitrogen.

A municipality is planning upcoming road reconstruction work in medium density residential (MDR) neighborhoods, and has identified an opportunity to convert impervious surfaces to permeable/pervious surfaces by narrowing the road width of 3.7 miles (mi) of roadway from 32 feet (ft) to 28 ft and eliminating 3.2 miles of 4 ft wide paved sidewalk (currently there are sidewalks on both sides of the roadways targeted for restoration). The newly created permeable/pervious area will be tilled and treated with soil amendments to support vegetated growth in order to restore hydrologic function to at least HSG B.
Determine the:

A) Percent phosphorus load reduction rate (BMP Reduction $_{\%-P}$) for the conversion of impervious area (IA) to permeable/pervious area (PA); and

B) Cumulative phosphorus reduction in pounds that would be accomplished by the project (BMP-Reduction $_{lbs\text{-}P}$).

Solution:

1. Determine the area of IA to be converted to PA:

   New PA = (((3.7 mi x 4 ft) + (3.2 mi x 4 ft)) x 5280 ft/mi)/43,560 ft^2/acre
   = 3.35 acres

2. Using Table 3-32, the phosphorus load reduction rate for converting IA to HSG B is 94.1%
3. The BMP Load is first determined using the method described above.

   BMP Load = IA x phosphorus export loading rate for MDR IA (see Table 3-1)
   = 3.35 acres x 1.96 lbs/acre/yr
   = 6.57 lbs/yr
4. The cumulative phosphorus load reduction in pounds of phosphorus for the IA conversion (BMP-Reduction $_{lbs\text{-}P}$) is calculated using Equation 3-2.

   BMP Reduction $_{lbs\text{-}P}$ = BMP Load x (BMP Reduction $_{\%\text{-}P}$/100)
   BMP Reduction $_{lbs\text{-}P}$ = 6.57 lbs/yr x (94.1/100)
   = 6.18 lbs/yr

Table 3-5 Method for determining stormwater control design volume (DSV) (i.e., capacity) using long-term cumulative performance curves

Stormwater Control Type	Description	Applicable Structural Stormwater Control Performance Curve	Equation for calculating Design Storage Capacity for Estimating Cumulative Reductions using Performances Curves
Infiltration Trench	Provides temporary storage of runoff using the void spaces within the soil/sand/gravel mixture that is used to backfill the trench for subsequent infiltration into the surrounding sub-soils.	Infiltration Trench (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = void space volumes of gravel and sand layers DSV = $(L \times W \times D_{stone} \times n_{stone}) + (L \times W \times D_{sand} \times n_{sand})$
Subsurface Infiltration	Provides temporary storage of runoff using the combination of storage structures (e.g., galleys, chambers, pipes, etc.) and void spaces within the soil/sand/gravel mixture that is used to backfill the system for subsequent infiltration into the surrounding sub-soils.	Infiltration Trench (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Water storage volume of storage units and void space volumes of backfill materials. Example for subsurface galleys backfilled with washed stone: $DSV = (L \times W \times D)_{galley} + (L \times W \times D_{stone} \times n_{stone})$
Surface Infiltration	Provides temporary storage of runoff through surface ponding storage structures (e.g., basin or swale) for subsequent infiltration into the underlying soils.	Infiltration Basin (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Water volume of storage structure before bypass. Example for linear trapezoidal vegetated swale $DSV = (L \times ((W_{bottom}+W_{top@Dmax})/2) \times D)$
Rain Garden/Bio-retention (no underdrains)	Provides temporary storage of runoff through surface ponding and possibly void spaces within the soil/sand/gravel mixture that is used to filter runoff prior to infiltration into underlying soils.	Infiltration Basin (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Ponding water storage volume and void space volumes of soil filter media. Example for raingarden: $DSV = (A_{pond} \times D_{pond}) + (A_{soil} \times D_{soil} \times n_{soil\ mix})$
Tree Filter (no underdrain)	Provides temporary storage of runoff through surface ponding and void spaces within the soil/sand/gravel mixture that is used to filter runoff prior to infiltration into underlying soils.	Infiltration Trench (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Ponding water storage volume and void space volumes of soil filter media. $DSV = (L \times W \times D_{ponding}) + (L \times W \times D_{soil} \times n_{soil\ mix})$
Bio-Filtration (w/underdrain)	Provides temporary storage of runoff for filtering through an engineered soil media. The storage capacity includes void spaces in the filter media and temporary ponding at the surface. After runoff has passed through the filter media it is collected by an under-drain pipe for discharge. Manufactured or packaged bio-filter systems such as tree box filters may be suitable for using the bio-filtration performance results.	Bio-filtration	DSV = Ponding water storage volume and void space volume of soil filter media. Example of a linear biofilter: $DSV = (L \times W \times D_{ponding}) + (L \times W \times D_{soil} \times n_{soil})$
Enhanced Bio-filtration w/ Internal Storage Reservoir (ISR) (no infiltration)	Based on design by the UNH Stormwater Center (UNHSC). Provides temporary storage of runoff for filtering through an engineered soil media, augmented for enhanced phosphorus removal, followed by detention and denitrification in a subsurface internal storage reservoir (ISR) comprised of gravel. An elevated outlet control at the top of the ISR is designed to provide a retention time of at least 24 hours in the system to allow for sufficient time for denitrification and nitrogen reduction to occur prior to discharge. The design storage capacity for using the cumulative performance curves is comprised of void spaces in the filter media, temporary ponding at the surface of the practice and the void spaces in the gravel ISR.	Enhanced Bio-filtration w/ISR	DSV = Ponding water storage volume and void space volume of soil filter media and gravel ISR. $DSV = (A_{bed} \times D_{ponding}) + (A_{bed} \times D_{soil} \times n_{soil}) + (A_{ISR} \times D_{gravel} \times n_{gravel})$
Gravel Wetland	Provides temporary surface ponding storage of runoff in a vegetated wetland cell that is eventually routed to an underlying saturated gravel internal storage reservoir (ISR) for nitrogen treatment. Outflow is controlled by an elevated orifice that has its invert elevation equal to the top of the ISR layer and provides a retention time of at least 24 hours.	Gravel Wetland	DSV = pretreatment volume + ponding volume + void space volume of gravel ISR. $DSV = (A_{pretreatment} \times D_{preTreatment}) + (A_{wetland} \times D_{ponding}) + (A_{ISR} \times D_{gravel} \times n_{gravel})$
Porous Pavement with subsurface infiltration	Provides filtering of runoff through a filter course and temporary storage of runoff within the void spaces of a subsurface gravel reservoir prior to infiltration into subsoils.	Infiltration Trench (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = void space volumes of gravel layer DSV = $(L \times W \times D_{stone} \times n_{stone})$
Porous pavement w/ impermeable underliner w/underdrain	Provides filtering of runoff through a filter course and temporary storage of runoff within the void spaces prior to discharge by way of an underdrain.	Porous Pavement	Depth of Filter Course = D_{FC}
Sand Filter w/underdrain	Provides filtering of runoff through a sand filter course and temporary storage of runoff through surface ponding and within void spaces of the sand and washed stone layers prior to discharge by way of an underdrain.	Sand Filter	DSV = pretreatment volume + ponding volume + void space volume of sand and washed stone layers. $DSV = (A_{pretreatment} \times D_{preTreatment}) + (A_{bed} \times D_{ponding}) + (A_{bed} \times D_{sand} \times n_{sand}) + (A_{bed} \times D_{stone} \times n_{stone})$
Wet Pond	Provides treatment of runoff through routing through permanent pool.	Wet Pond	DSV= Permanent pool volume prior to high flow bypass $DSV = A_{pond} \times D_{pond}$ (does not include pretreatment volume)
Extended Dry Detention Basin	Provides temporary detention storage for the design storage volume to drain in 24 hours through multiple out let controls.	Dry Pond	DSV= Ponding volume prior to high flow bypass $DSV = A_{pond} \times D_{pond}$ (does not include pretreatment volume)
Dry Water Quality Swale/Grass Swale	Based on MA design standards. Provides temporary surface ponding storage of runoff in an open vegetated channel through permeable check dams. Treatment is provided by filtering of runoff by vegetation and check dams and infiltration into subsurface soils.	Water Quality Grass swale	DSV = Volume of swale at full design depth $DSV = L_{swale} \times W_{swale} \times D_{ponding\ swale}$

Definitions: **DSV**= Design Storage Volume = physical storage capacity to hold water; **VSV** = Void Space Volume; **L** = length, **W** = width, **D** = depth at design capacity before bypass, **n** = porosity fill material, **A**= average surface area for calculating volume; **Infiltration rate** = saturated soil hydraulic conductivity

Table 3- 6: Infiltration Trench (IR = 0.17 in/hr) BMP Performance Table

Infiltration Trench (IR = 0.17 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	15%	28%	49%	64%	75%	82%	92%	95%
Cumulative Phosphorus Load Reduction	18%	33%	57%	73%	83%	90%	97%	99%
Cumulative Nitrogen Load Reduction	56%	72%	87%	93%	96%	98%	99%	100%

Figure 3- 1: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.17 in/hr)

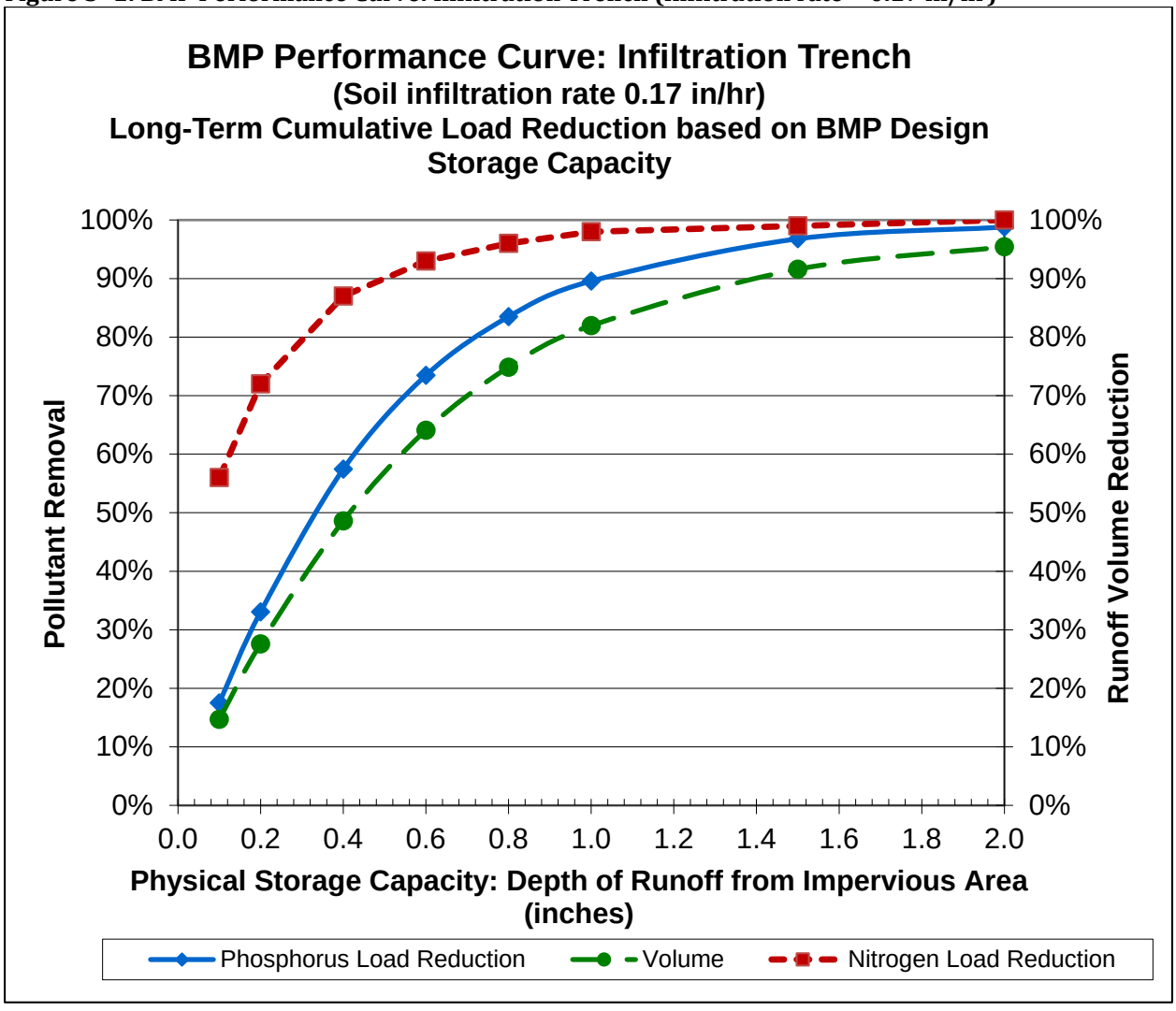


Table 3- 7: Infiltration Trench (IR = 0.27 in/hr) BMP Performance Table

Infiltration Trench (IR = 0.27 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	17.8%	32.5%	55.0%	70.0%	79.3%	85.2%	93.3%	96.3%
Cumulative Phosphorus Load Reduction	20%	37%	63%	78%	86%	92%	97%	99%
Cumulative Nitrogen Load Reduction	57%	74%	88%	94%	97%	98%	99%	100%

Figure 3- 2: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.27 in/hr)

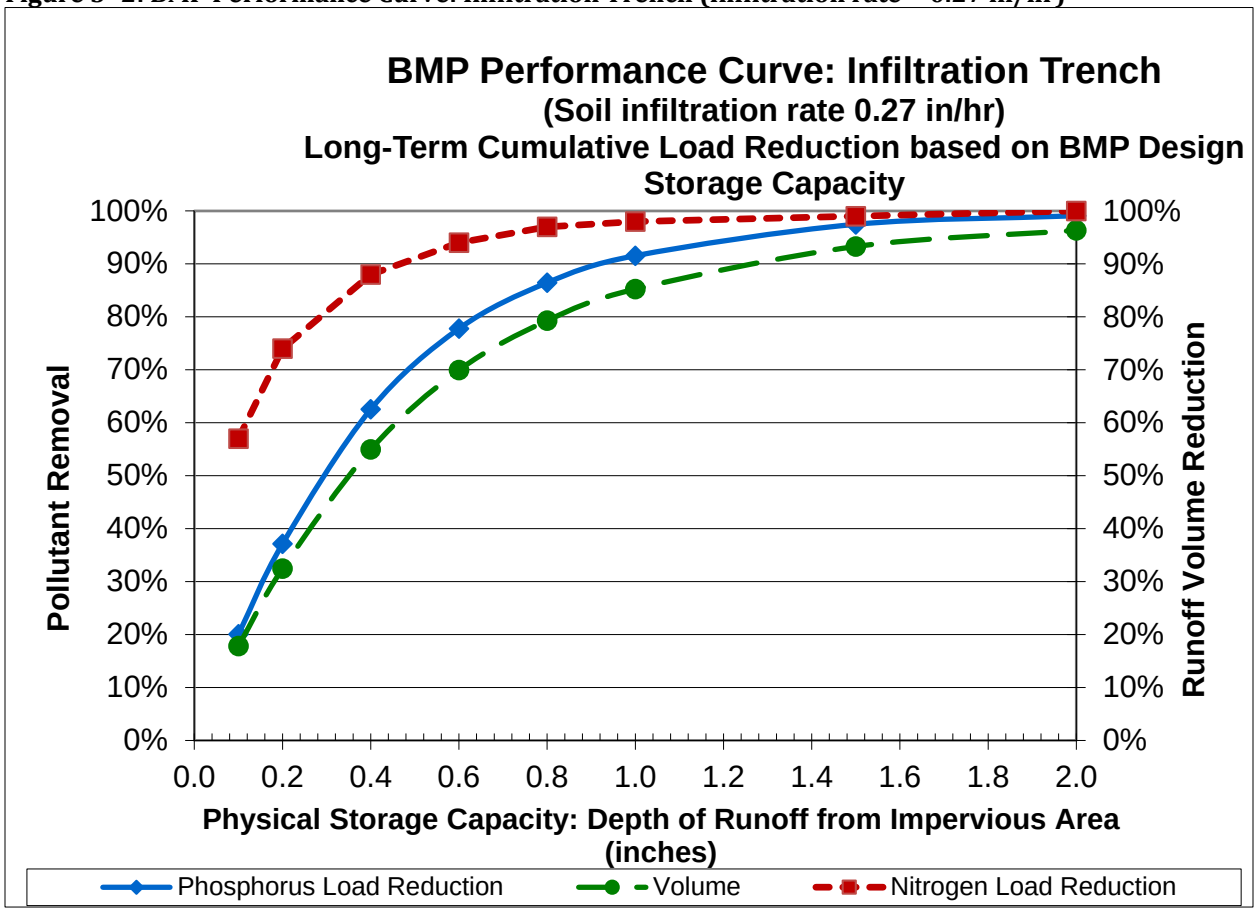


Table 3- 8: Infiltration Trench (IR = 0.52 in/hr) BMP Performance Table

Infiltration Trench (IR = 0.52 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	22.0%	38.5%	61.8%	75.7%	83.7%	88.8%	95.0%	97.2%
Cumulative Phosphorus Load Reduction	23%	42%	68%	82%	89%	94%	98%	99%
Cumulative Nitrogen Load Reduction	59%	76%	90%	95%	98%	99%	100%	100%

Figure 3- 3: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.52 in/hr)

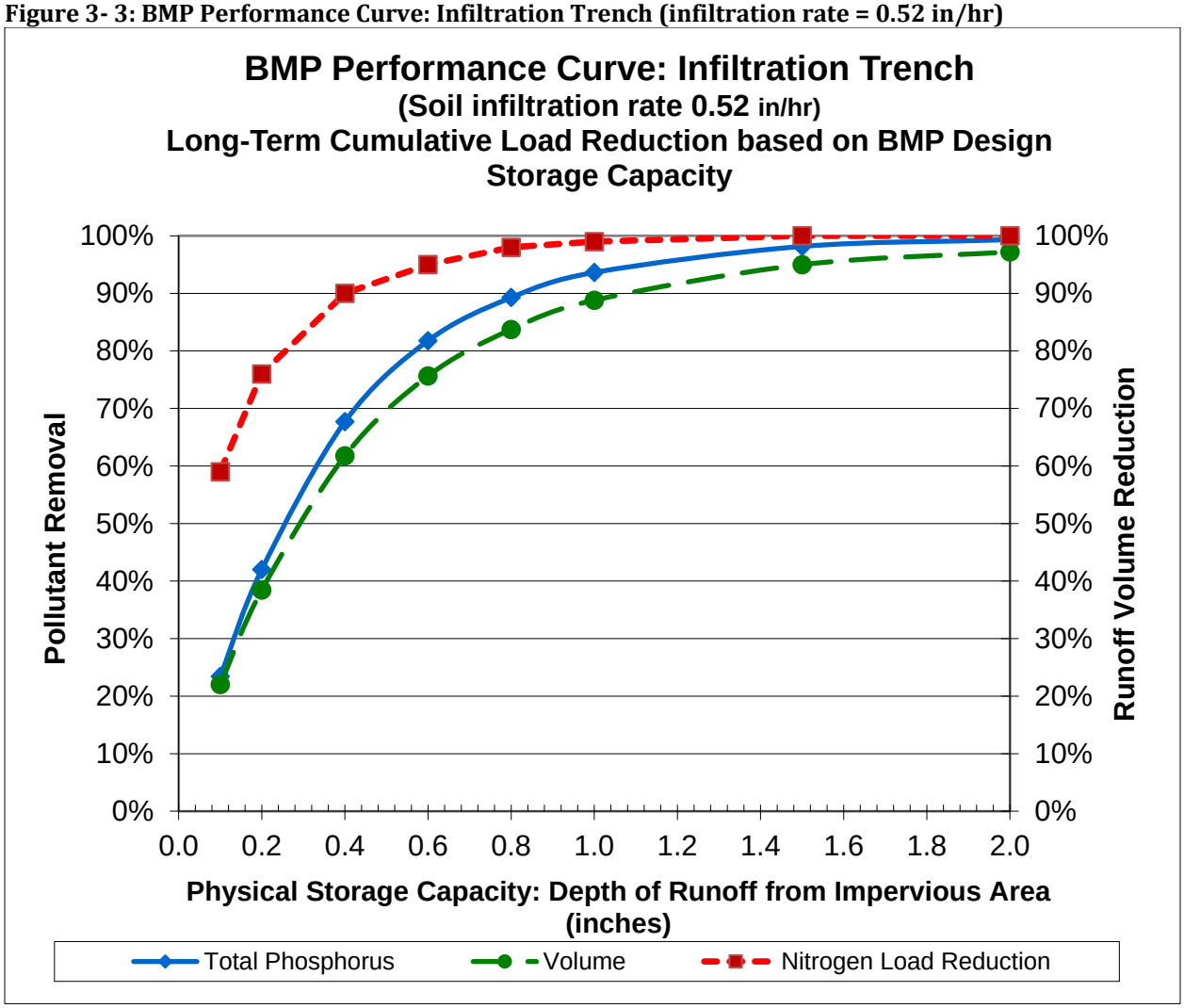


Table 3- 9: Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table

Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	26.3%	44.6%	68.2%	81.0%	88.0%	92.1%	96.5%	98.3%
Cumulative Phosphorus Load Reduction	27%	47%	73%	86%	92%	96%	99%	100%
Cumulative Nitrogen Load Reduction	61%	78%	92%	97%	98%	99%	100%	100%

Figure 3- 4: BMP Performance Curve: Infiltration Trench (infiltration rate = 1.02 in/hr)

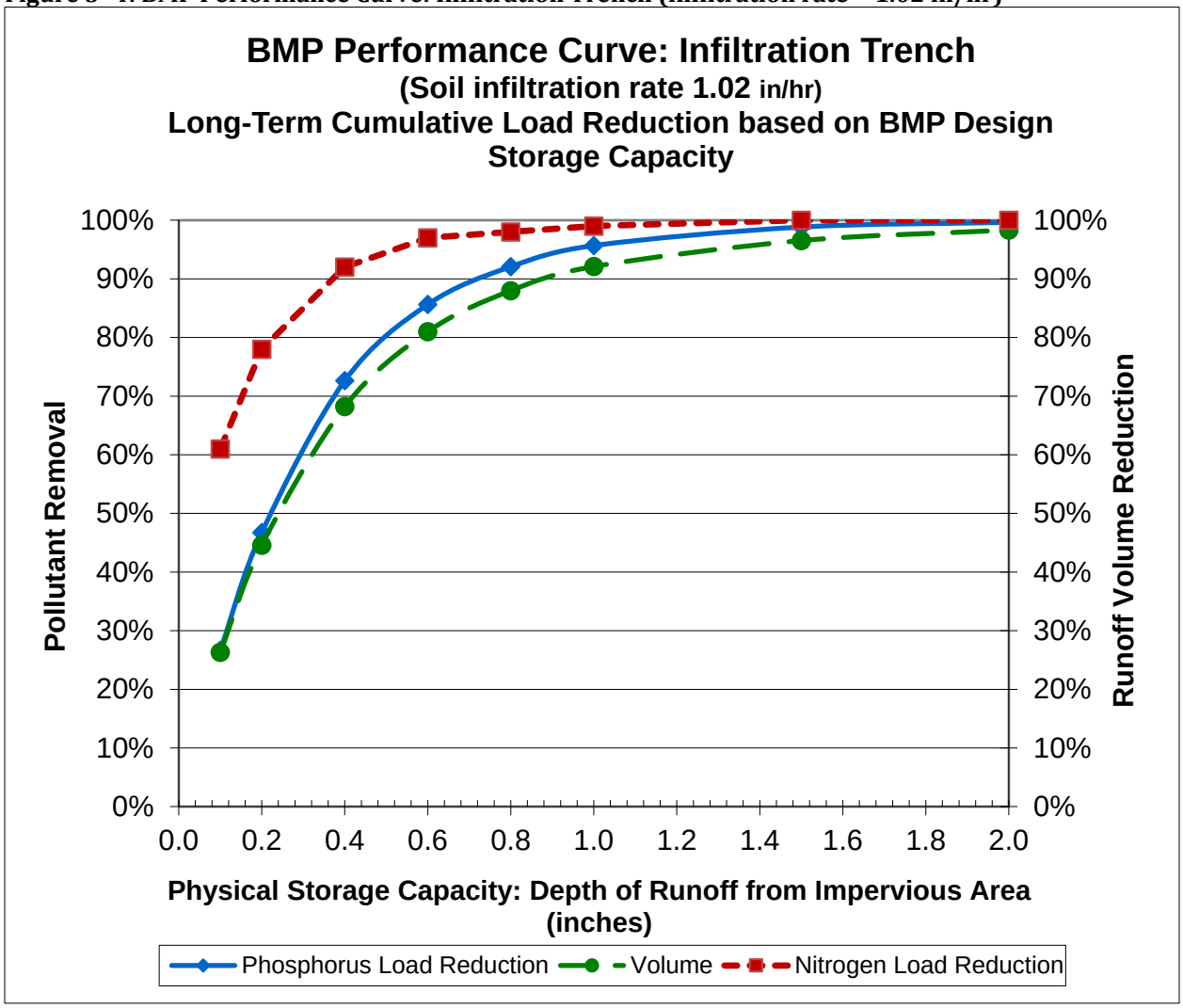


Table 3- 10: Infiltration Trench (IR = 2.41 in/hr) BMP Performance Table

Infiltration Trench (IR = 2.41 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	34%	55%	78%	88%	93%	96%	99%	100%
Cumulative Phosphorus Load Reduction	33%	55%	81%	91%	96%	98%	100%	100%
Cumulative Nitrogen Load Reduction	65%	83%	95%	98%	99%	100%	100%	100%

Figure 3- 5: BMP Performance Curve: Infiltration Trench (infiltration rate = 2.41 in/hr)

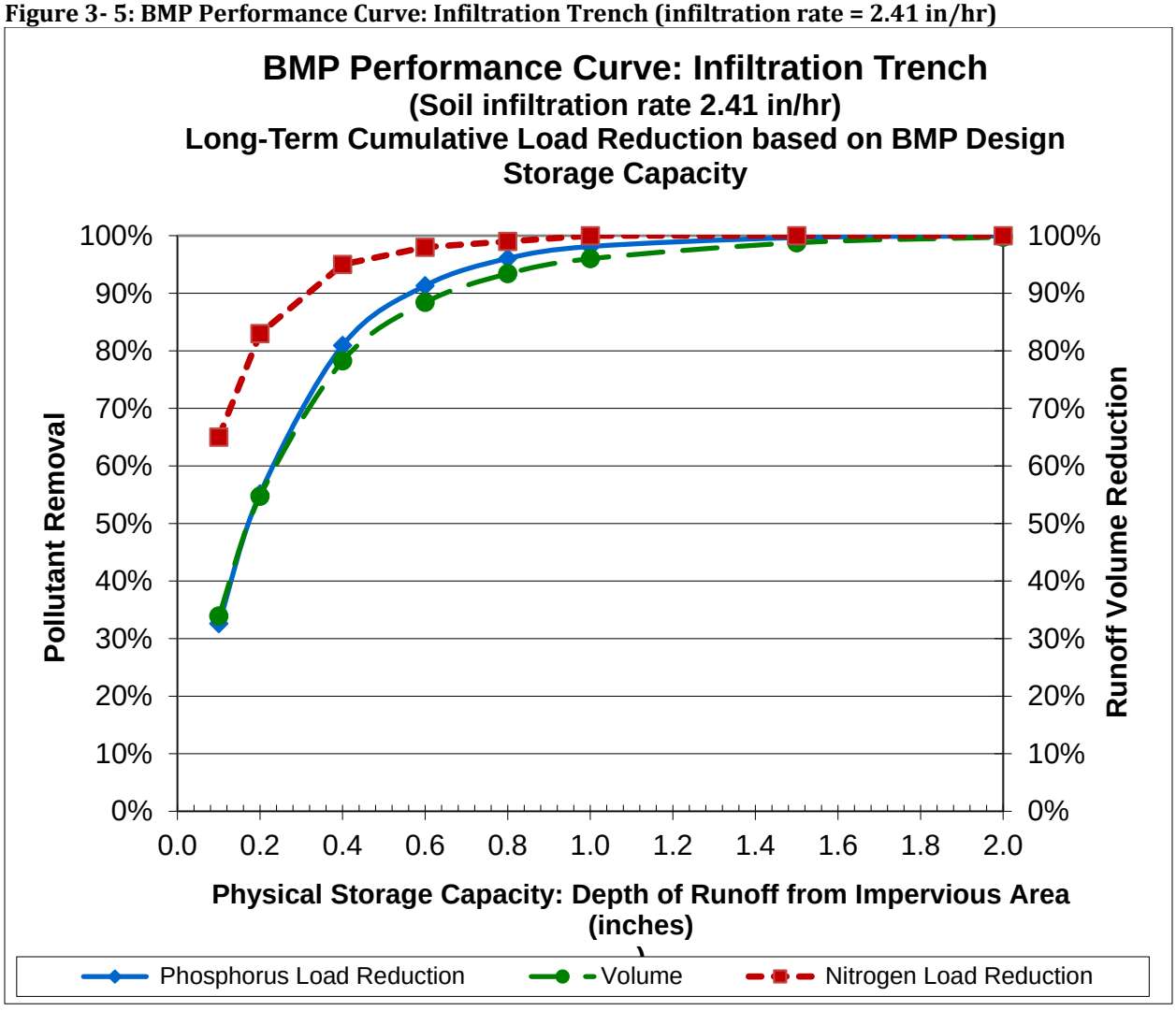


Table 3- 11: Infiltration Trench (8.27 in/hr) BMP Performance Table

Infiltration Trench (8.27 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	53.6%	76.1%	92.6%	97.2%	98.9%	99.5%	100.0%	100.0%
Cumulative Phosphorus Load Reduction	50%	75%	94%	98%	99%	100%	100%	100%
Cumulative Nitrogen Load Reduction	76%	92%	98%	100%	100%	100%	100%	100%

Figure 3- 6: BMP Performance Curve: Infiltration Trench (infiltration rate = 8.27 in/hr)

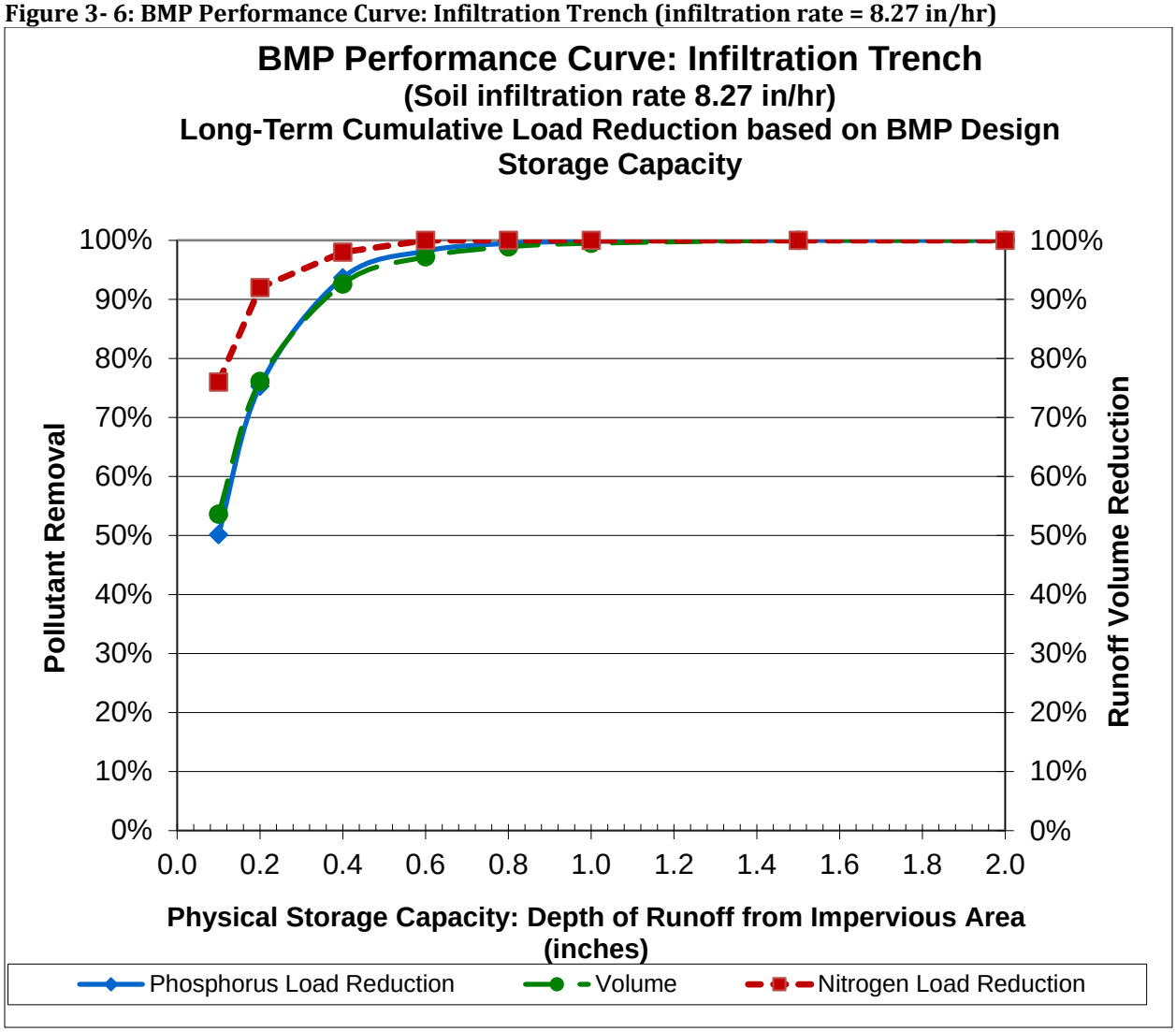


Table 3- 12: Surface Infiltration (0.17 in/hr) BMP Performance Table

Surface Infiltration (0.17 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	13%	25%	44%	59%	71%	78%	89%	94%
Cumulative Phosphorus Load Reduction	35%	52%	72%	82%	88%	92%	97%	99%
Cumulative Nitrogen Load Reduction	52%	69%	85%	92%	96%	98%	99%	100%

Figure 3- 7: BMP Performance Curve: Infiltration Basin (infiltration rate = 0.17 in/hr)

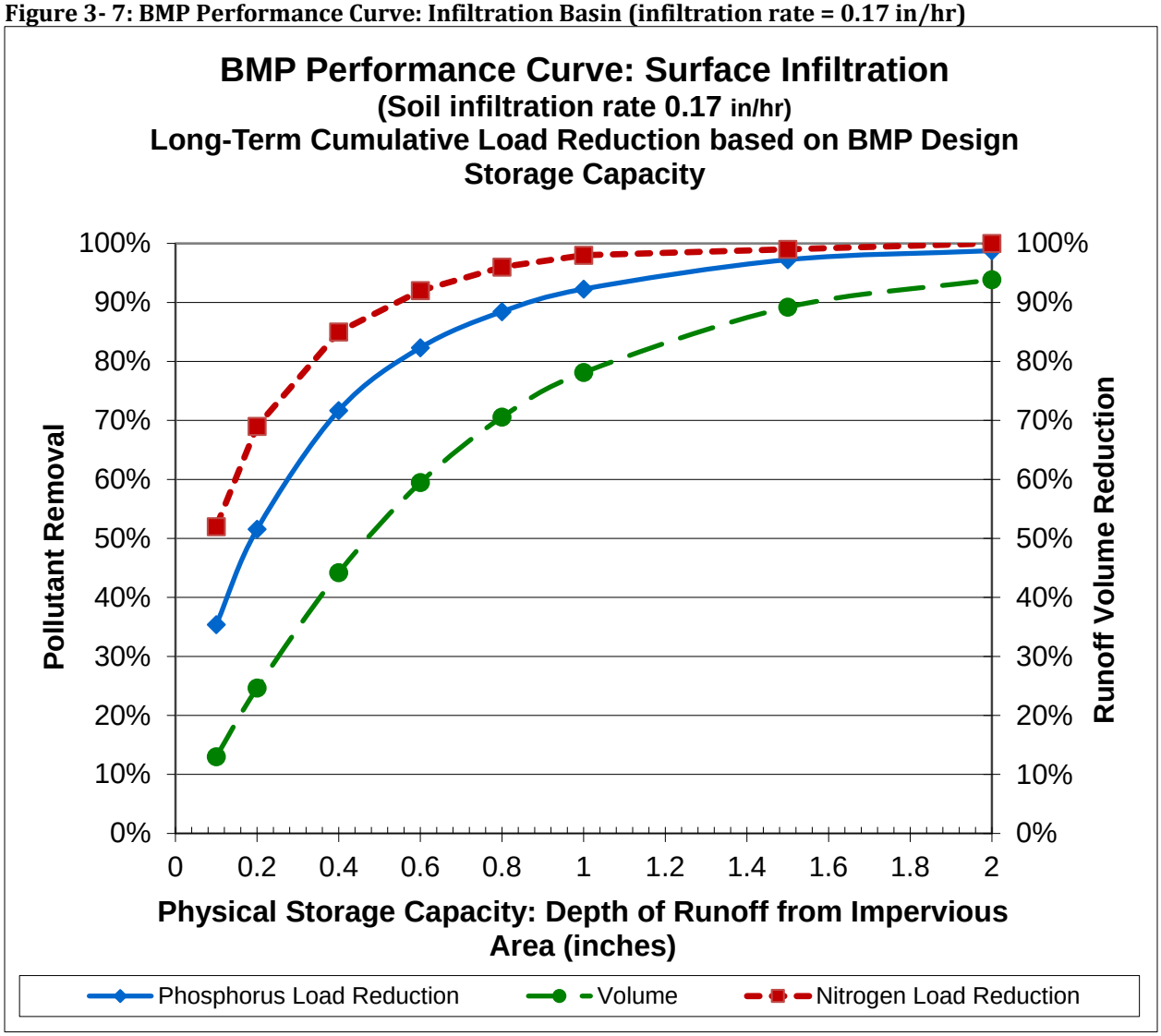


Table 3- 13: Infiltration Basin (0.27 in/hr) BMP Performance Table

Surface Infiltration (0.27 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	16%	30%	51%	66%	76%	82%	91%	95%
Cumulative Phosphorus Load Reduction	37%	54%	74%	85%	90%	93%	98%	99%
Cumulative Nitrogen Load Reduction	54%	71%	87%	93%	97%	98%	99%	100%

Figure 3- 8: BMP Performance Curve: Surface Infiltration (infiltration rate = 0.27 in/hr)

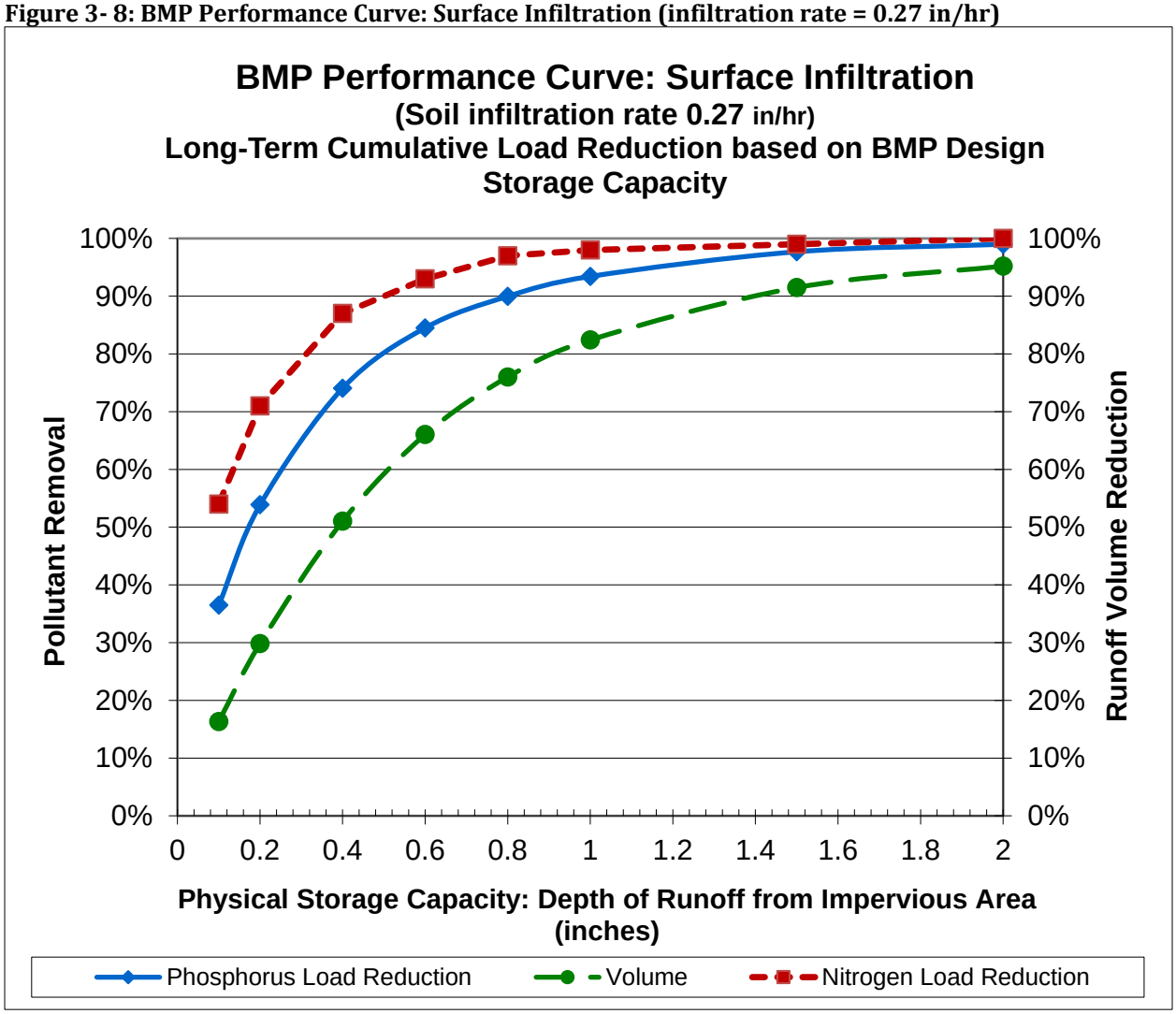


Table 3- 14: Infiltration Basin (0.52 in/hr) BMP Performance Table

Surface Infiltration (0.52 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	20%	36%	58%	73%	81%	87%	94%	97%
Cumulative Phosphorus Load Reduction	38%	56%	77%	87%	92%	95%	98%	99%
Cumulative Nitrogen Load Reduction	56%	74%	89%	94%	98%	99%	100%	100%

Figure 3- 9: BMP Performance Curve: Surface Infiltration (infiltration rate = 0.52 in/hr)

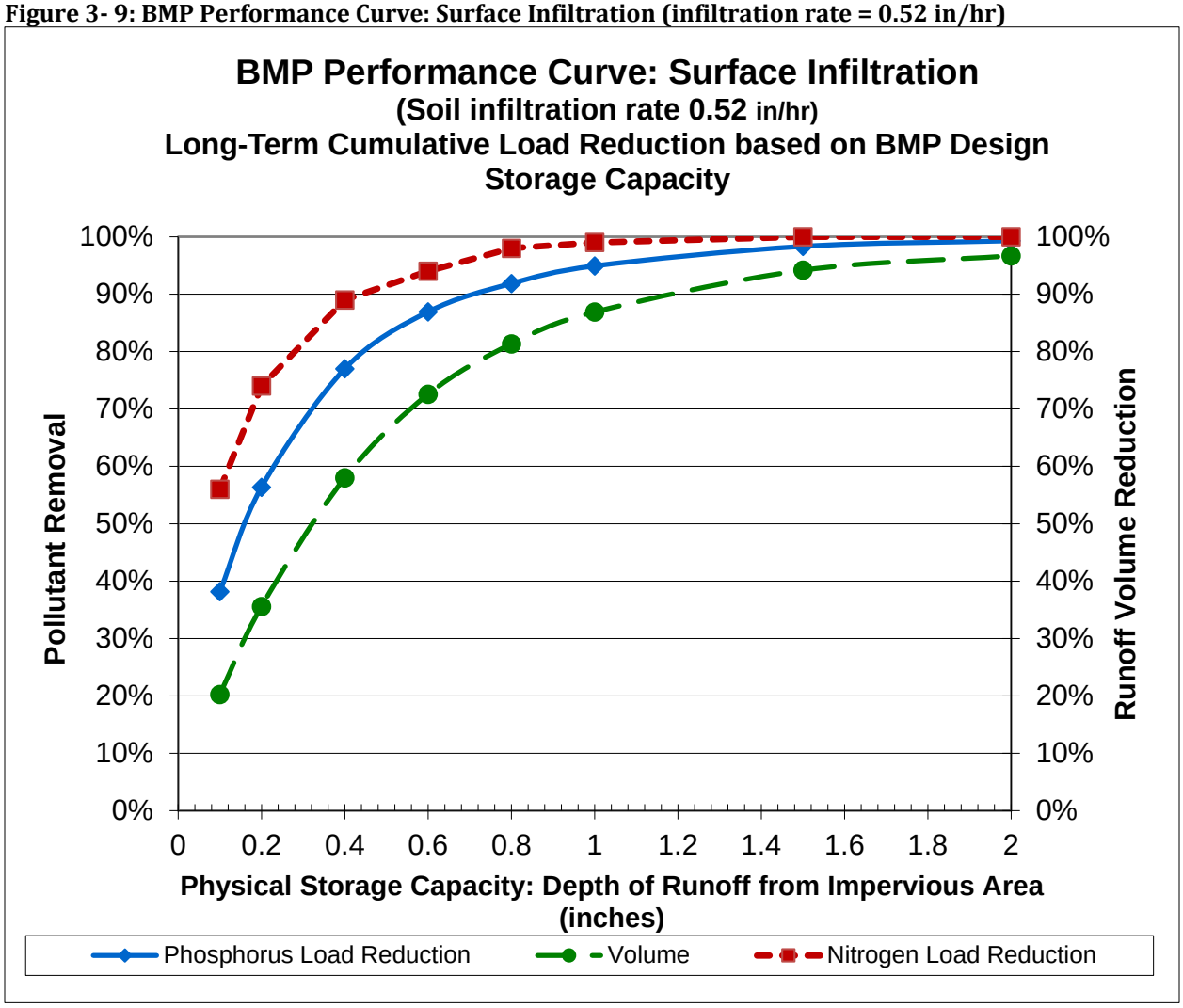


Table 3-15: Infiltration Basin (1.02 in/hr) BMP Performance Table

Surface Infiltration (1.02 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	24.5%	42.0%	65.6%	79.4%	86.8%	91.3%	96.2%	98.1%
Cumulative Phosphorus Load Reduction	41%	60%	81%	90%	94%	97%	99%	100%
Cumulative Nitrogen Load Reduction	59%	77%	92%	96%	98%	100%	100%	100%

Figure 3- 10**: BMP Performance Curve: Surface Infiltration (Soil infiltration rate = 1.02 in/hr)**

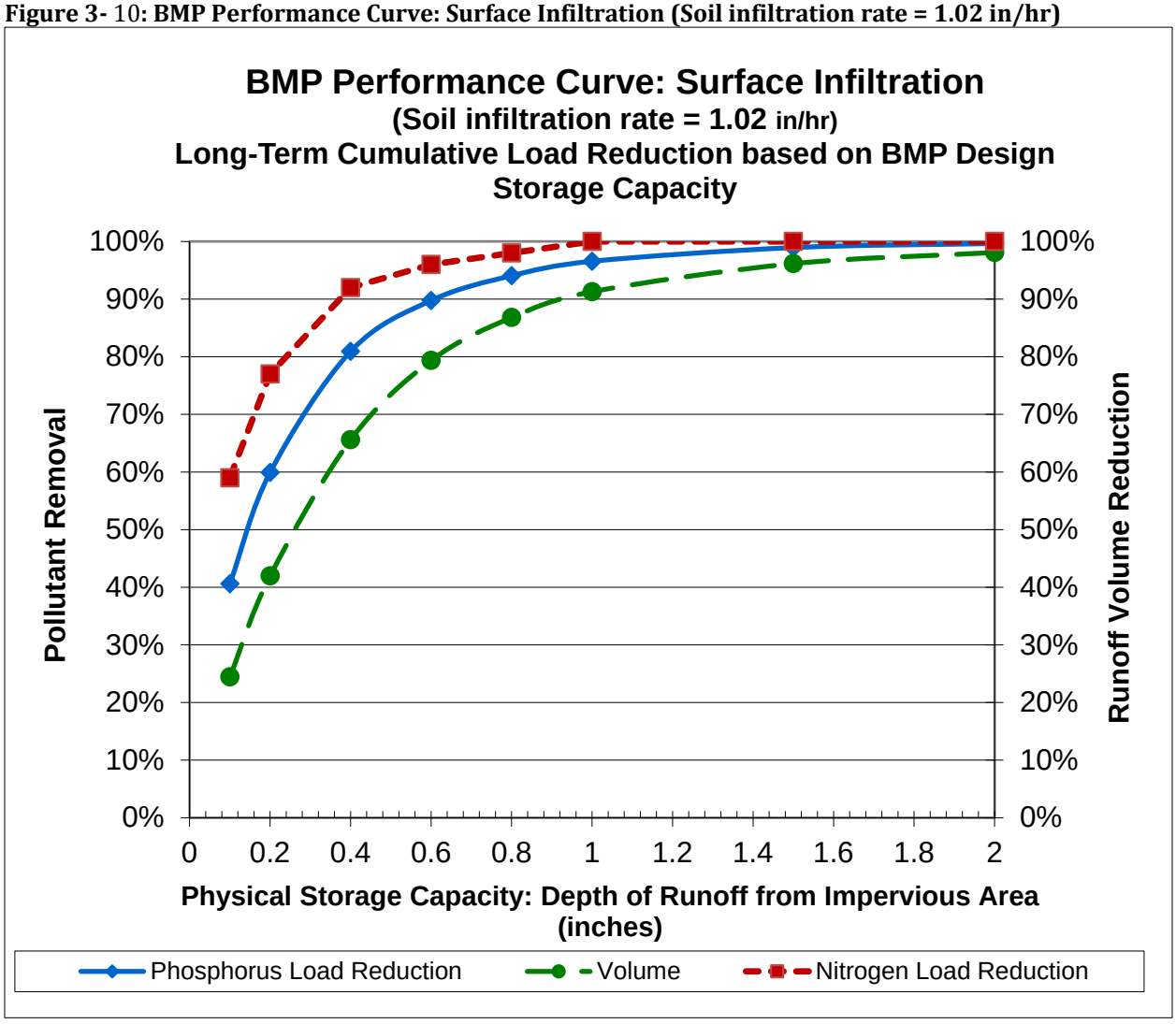


Table 3- 16: Surface Infiltration (2.41 in/hr) BMP Performance Table

Surface Infiltration (2.41 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	32.8%	53.8%	77.8%	88.4%	93.4%	96.0%	98.8%	99.8%
Cumulative Phosphorus Load Reduction	46%	67%	87%	94%	97%	98%	100%	100%
Cumulative Nitrogen Load Reduction	64%	82%	95%	98%	99%	100%	100%	100%

Figure 3- 11: BMP Performance Curve: Infiltration Basin (infiltration rate = 2.41 in/hr)

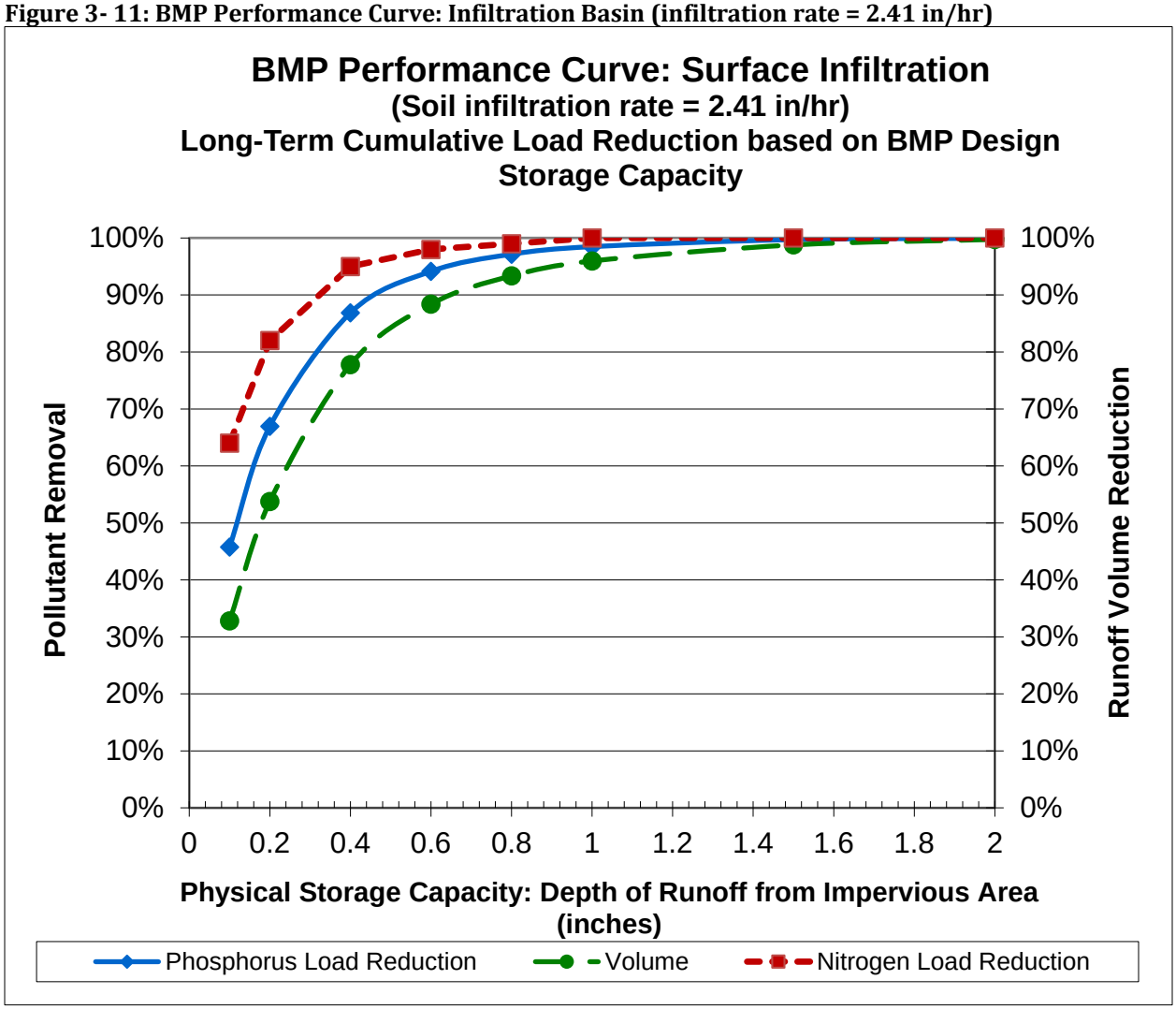


Table 3- 17: Surface Infiltration (8.27 in/hr) BMP Performance Table

Surface Infiltration (8.27 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	54.6%	77.2%	93.4%	97.5%	99.0%	99.6%	100.0%	100.0%
Cumulative Phosphorus Load Reduction	59%	81%	96%	99%	100%	100%	100%	100%
Cumulative Nitrogen Load Reduction	75%	92%	99%	100%	100%	100%	100%	100%

Figure 3- 12: BMP Performance Curve: Surface Infiltration (infiltration rate = 8.27 in/hr)

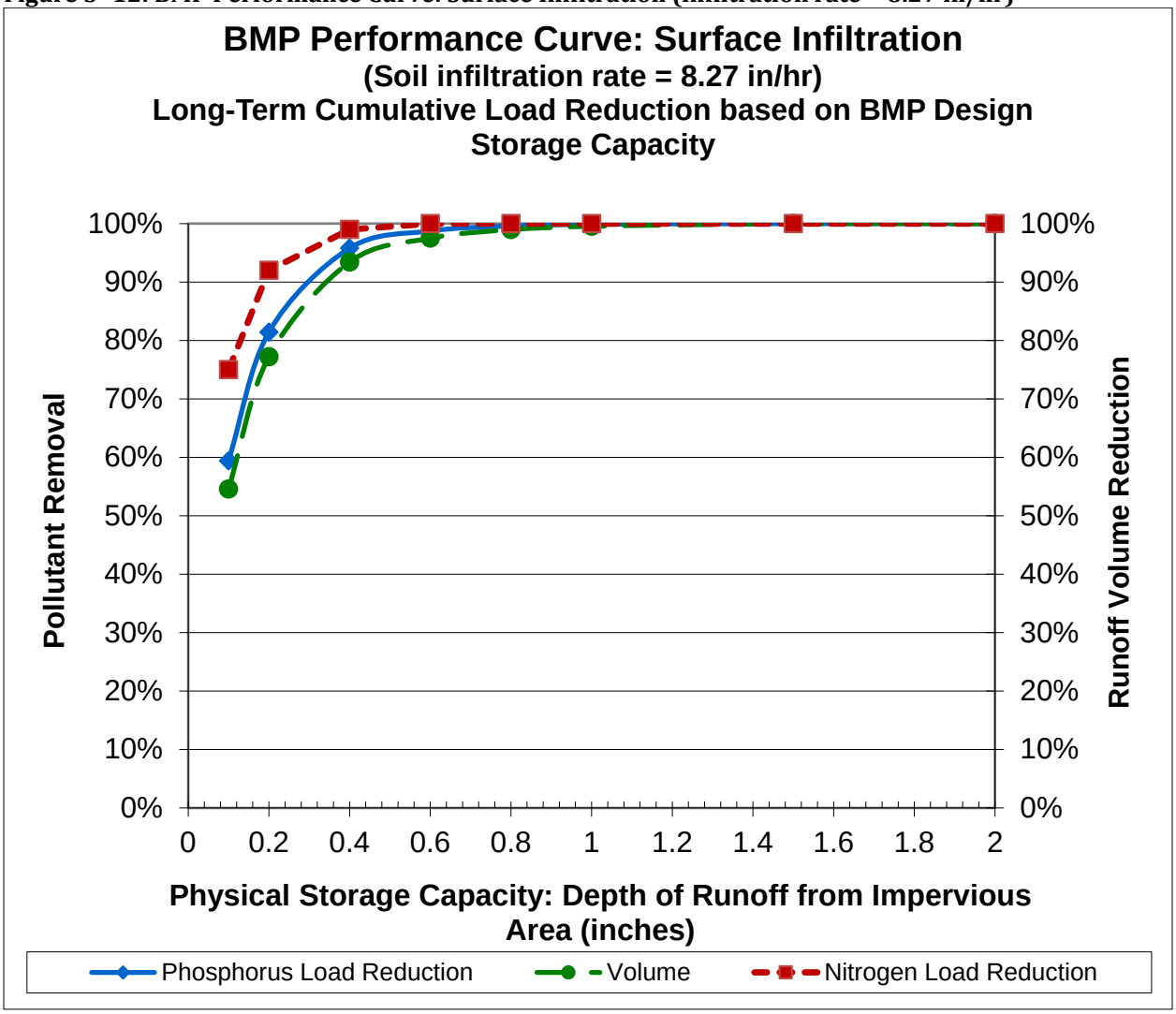


Table 3-18: Bio-filtration BMP Performance Table

Bio-filtration BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	19%	34%	53%	64%	71%	76%	84%	89%
Cumulative Nitrogen Load Reduction	9%	16%	23%	28%	31%	32%	37%	40%

Figure 3- 13: BMP Performance Curve: Bio-filtration

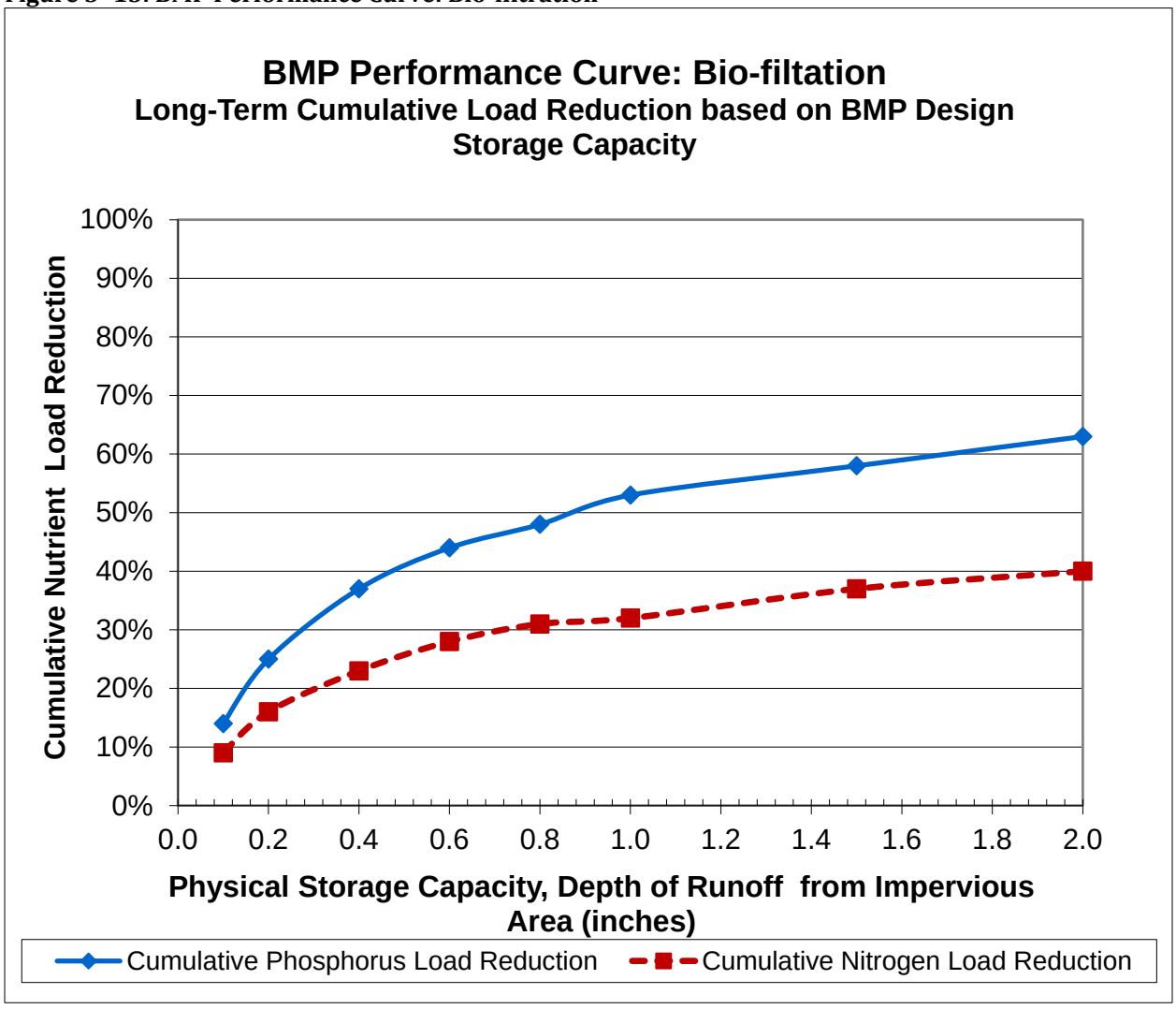


Table 3- 19: Gravel Wetland BMP Performance Table

Gravel Wetland BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	19%	26%	41%	51%	57%	61%	65%	66%
Cumulative Nitrogen Load Reduction	22%	33%	48%	57%	64%	68%	74%	79%

Figure 3- 14: BMP Performance Curve: Gravel Wetland

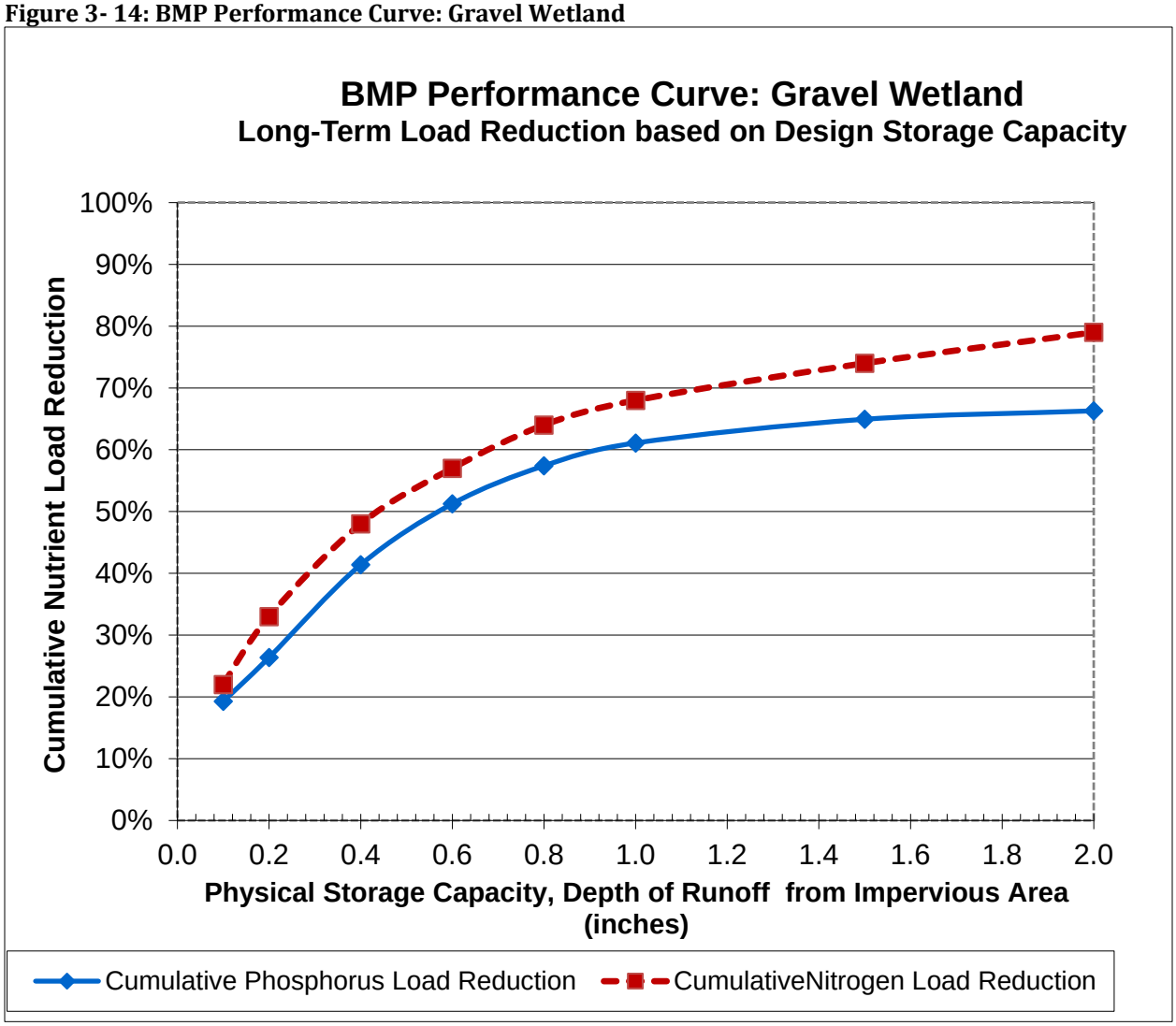


Table 3- 20: Enhanced Bio-filtration* with Internal Storage Reservoir (ISR) BMP Performance Table

Enhanced Bio-filtration* w/ ISR BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction

BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	19%	26%	41%	51%	57%	61%	65%	66%
Cumulative Nitrogen Load Reduction	22%	33%	48%	57%	64%	68%	74%	79%

***Filter media augmented with phosphorus sorbing materials to enhance phosphorus removal.**

Figure 3-15: BMP Performance Curve: Enhanced Bio-filtration with Internal Storage Reservoir (ISR) BMP Performance Table

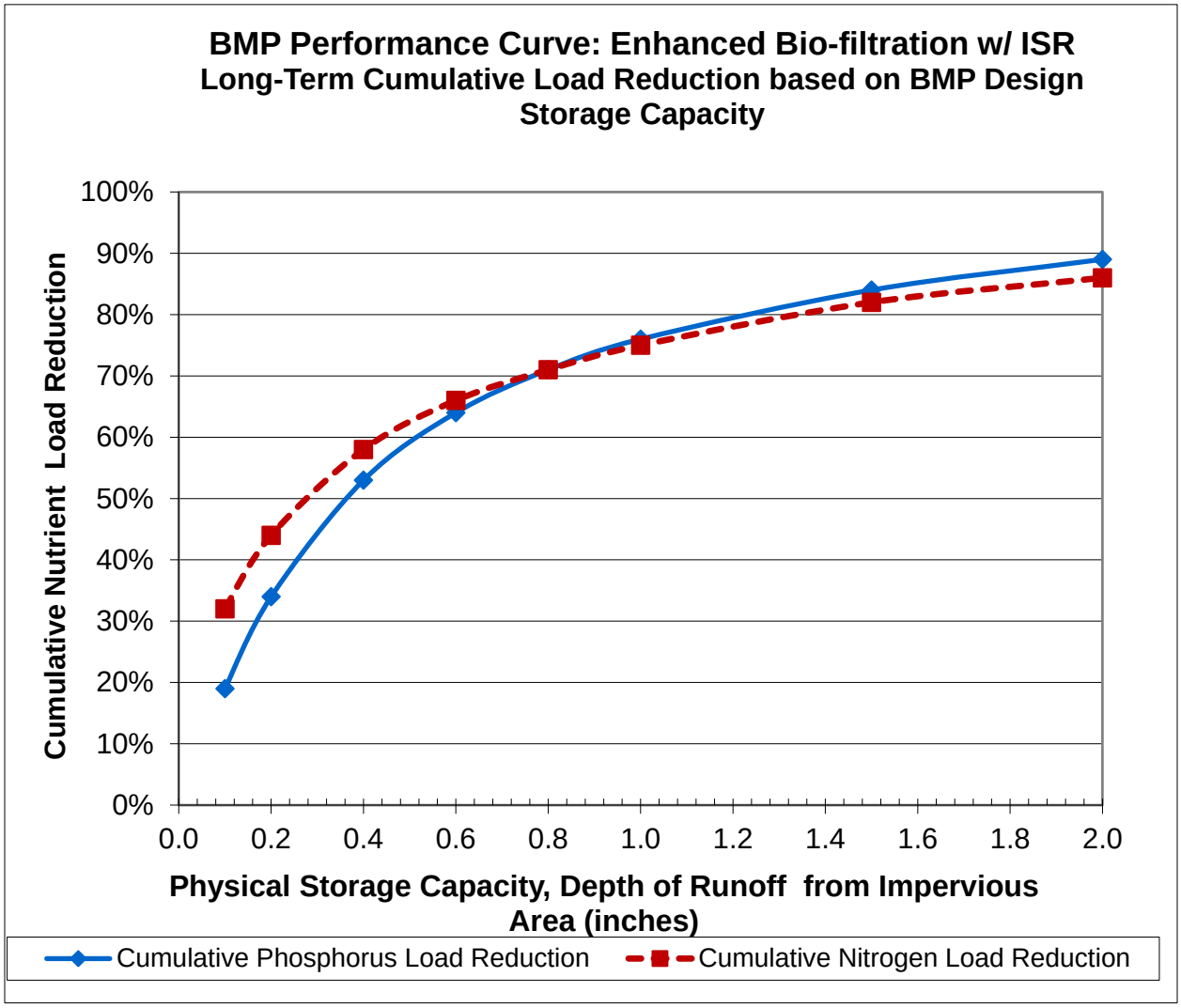


Table 3-21: Sand Filter BMP Performance Table

Sand Filter BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction

BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	19%	34%	53%	64%	71%	76%	84%	89%
Cumulative Nitrogen Load Reduction	9%	16%	23%	28%	31%	32%	37%	40%

Figure 3-16: BMP Performance Curve: Sand Filter

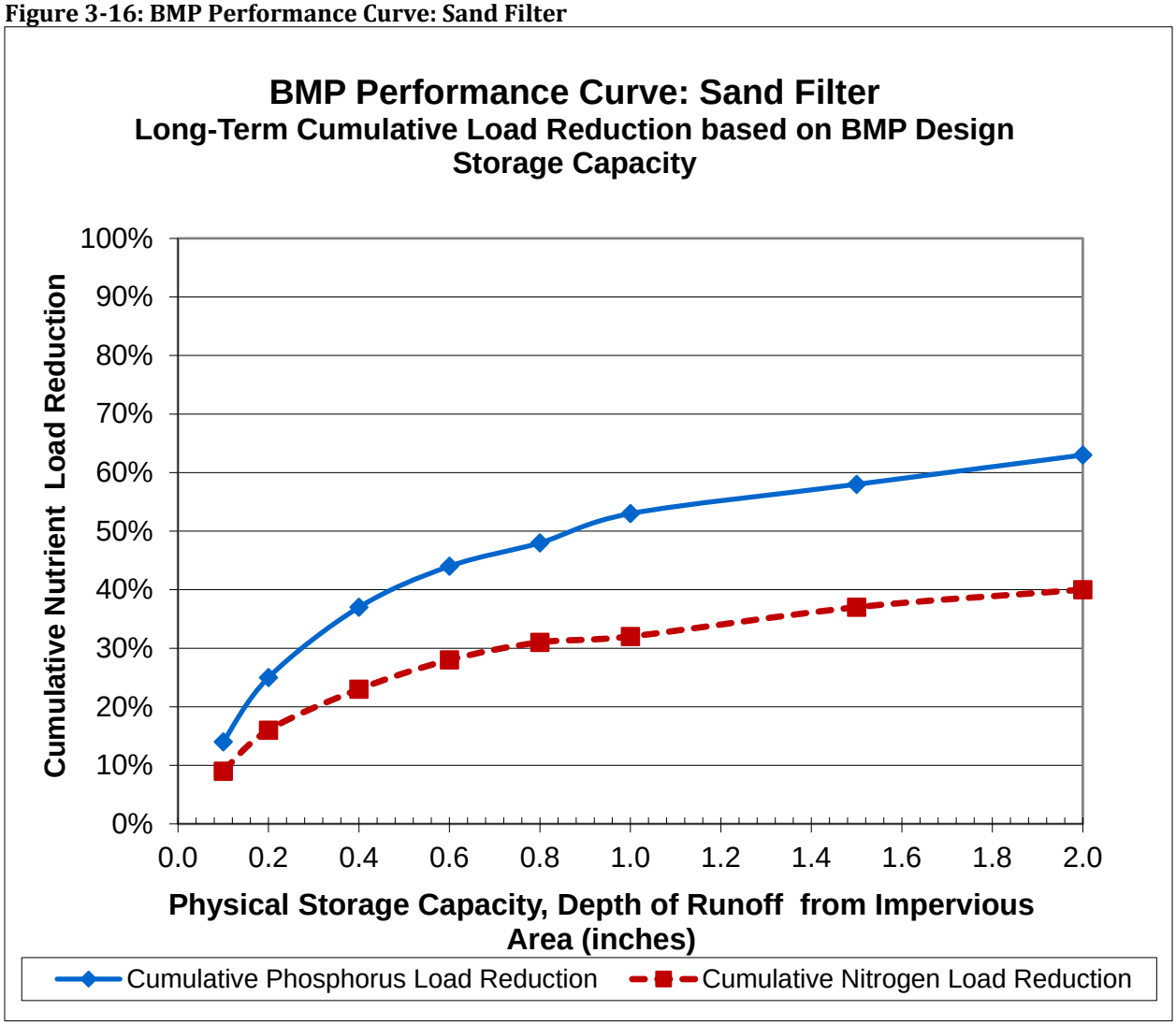


Table 3- 22 Porous Pavement BMP Performance Table

Porous Pavement BMP Performance Table: Long-Term Phosphorus Load Reduction

BMP Capacity: Depth of Filter Course Area (inches)	12.0	18.0	24.0	32.0
Cumulative Phosphorus Load Reduction	62%	70%	75%	78%
Cumulative Nitrogen Load Reduction	76%	77%	77%	79%

Figure 3- 17: BMP Performance Curve: Porous Pavement

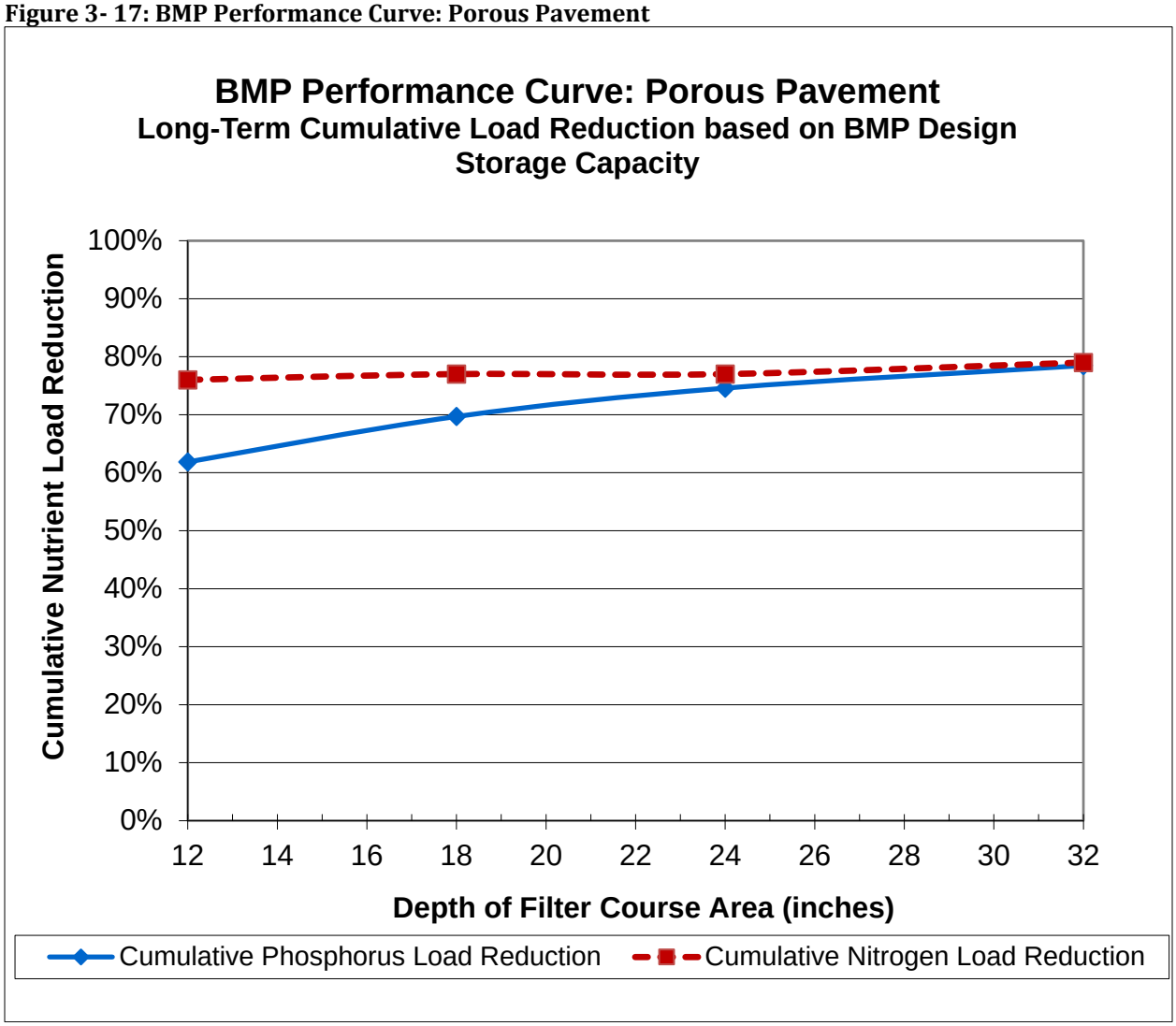


Table 3- 23: Wet Pond BMP Performance Table

Wet Pond BMP Performance Table: Long-Term Phosphorus Load Reduction

BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	14%	25%	37%	44%	48%	53%	58%	63%
Cumulative Nitrogen Load Reduction	9%	16%	23%	28%	31%	32%	37%	40%

Figure 3-18: BMP Performance Curve: Wet Pond

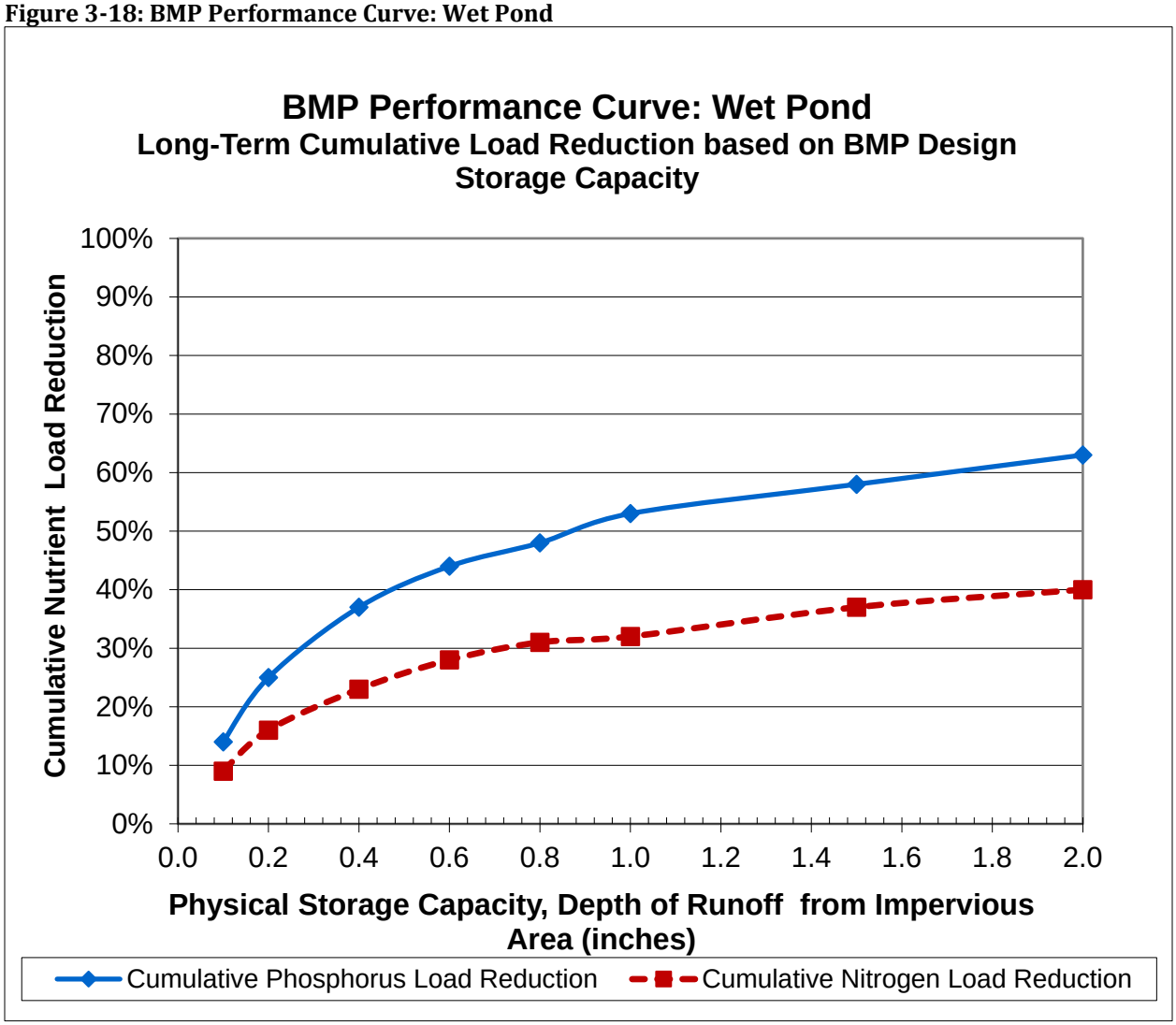


Table 3-24: Dry Pond BMP Performance Table

Dry Pond BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction

BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	2%	5%	9%	13%	17%	21%	29%	36%
Cumulative Nitrogen Load Reduction	1%	3%	6%	9%	11%	13%	19%	23%

Figure 3- 19: BMP Performance Curve: Dry Pond

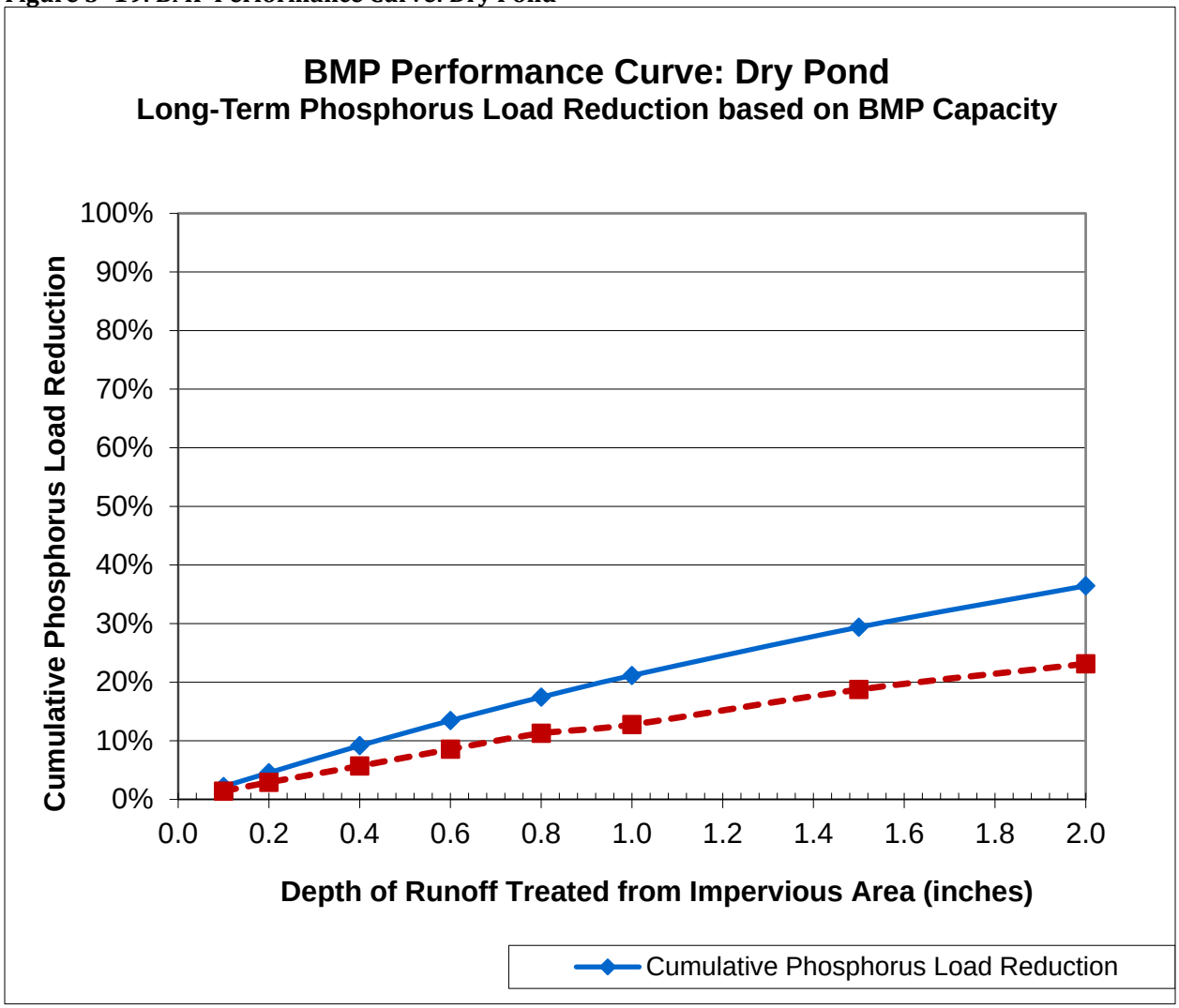


Table 3- 25: Water Quality Grass Swale with Detention BMP Performance Table

Water Quality Grass Swale with Detention BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction

BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Phosphorus Load Reduction	2%	5%	9%	13%	17%	21%	29%	36%
Nitrogen Load Reduction	1%	3%	6%	9%	11%	13%	19%	23%

Figure 3-20: BMP Performance Curve: Water Quality Grass Swale with Detention

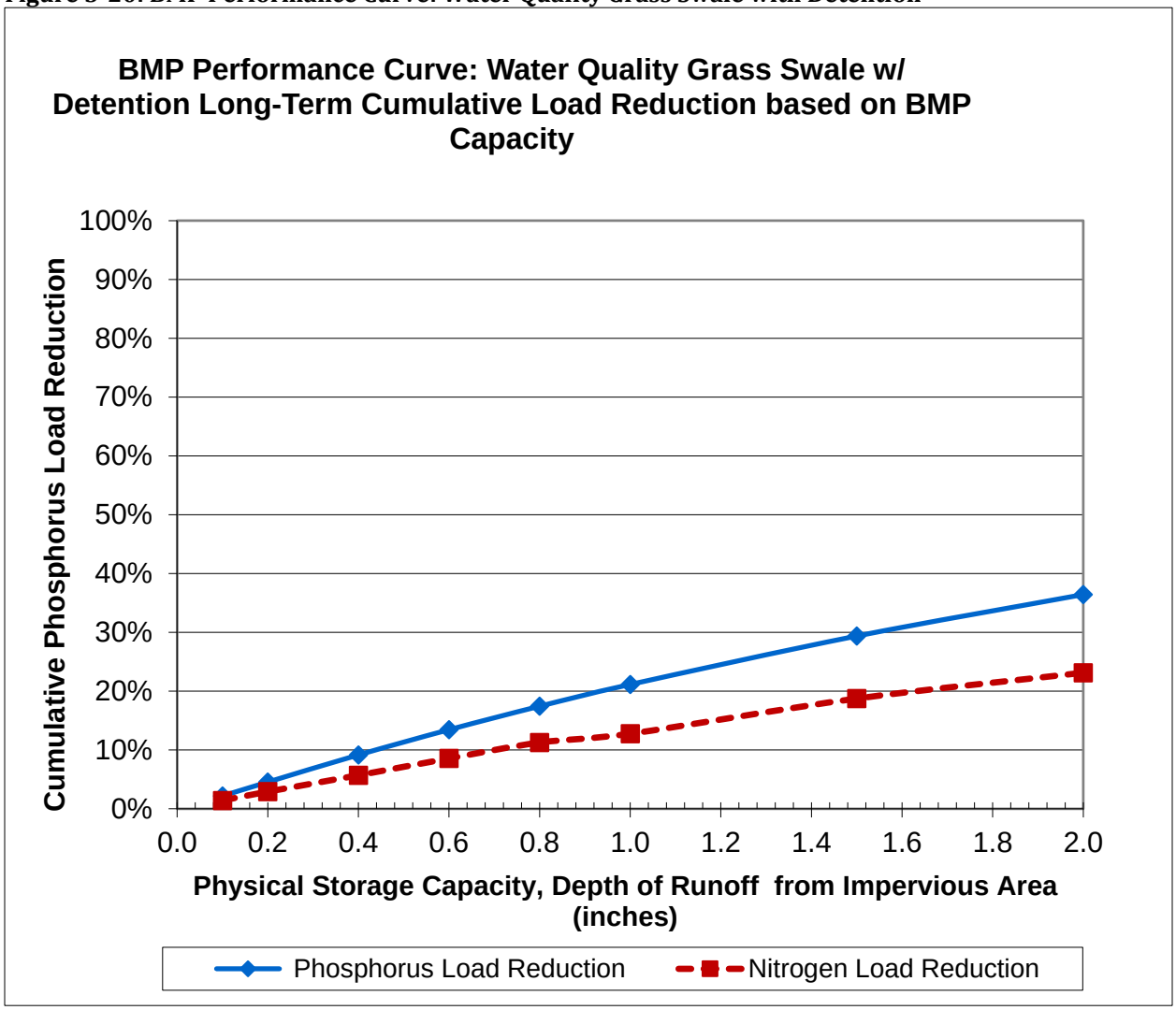


Table 3- 26: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1

Impervious Area Disconnection through Storage : Impervious Area to Pervious Area Ratio = 8:1	
	Total Runoff Volume (TP) Reduction Percentages

Storage volume to impervious area ratio	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	22%	22%	21%
0.2 in	40%	38%	37%	40%	38%	37%	37%	38%	37%	24%	26%	27%
0.3 in	52%	50%	49%	52%	50%	49%	40%	46%	49%	24%	26%	27%
0.4 in	61%	59%	58%	59%	59%	58%	40%	48%	54%	24%	26%	27%
0.5 in	67%	66%	64%	62%	66%	64%	40%	48%	56%	24%	26%	27%
0.6 in	70%	71%	70%	62%	70%	70%	40%	48%	56%	24%	26%	27%
0.8 in	71%	78%	77%	62%	73%	77%	40%	48%	56%	24%	26%	27%
1.0 in	71%	80%	80%	62%	73%	79%	40%	48%	56%	24%	26%	27%
1.5 in	71%	81%	87%	62%	73%	81%	40%	48%	56%	24%	26%	27%
2.0 in	71%	81%	88%	62%	73%	81%	40%	48%	56%	24%	26%	27%

Figure 3- 21: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG A Soils

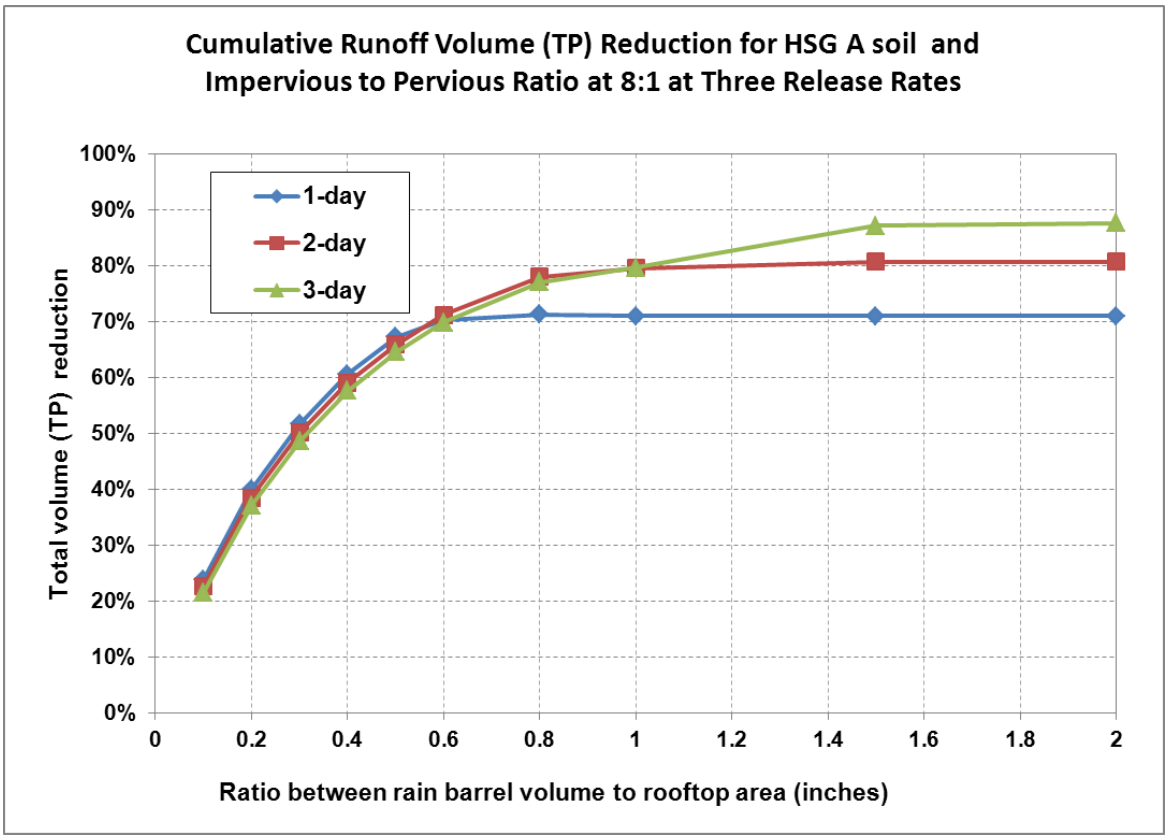


Figure 3- 22: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG B Soils

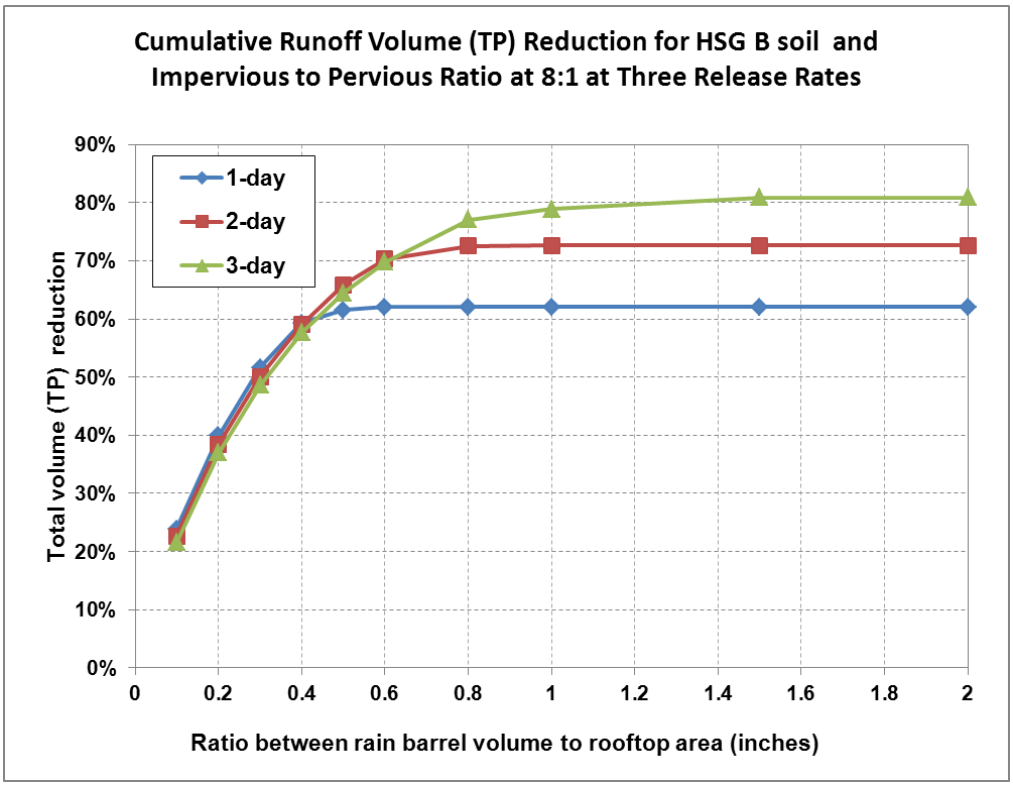


Figure 3- 23: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG C Soils

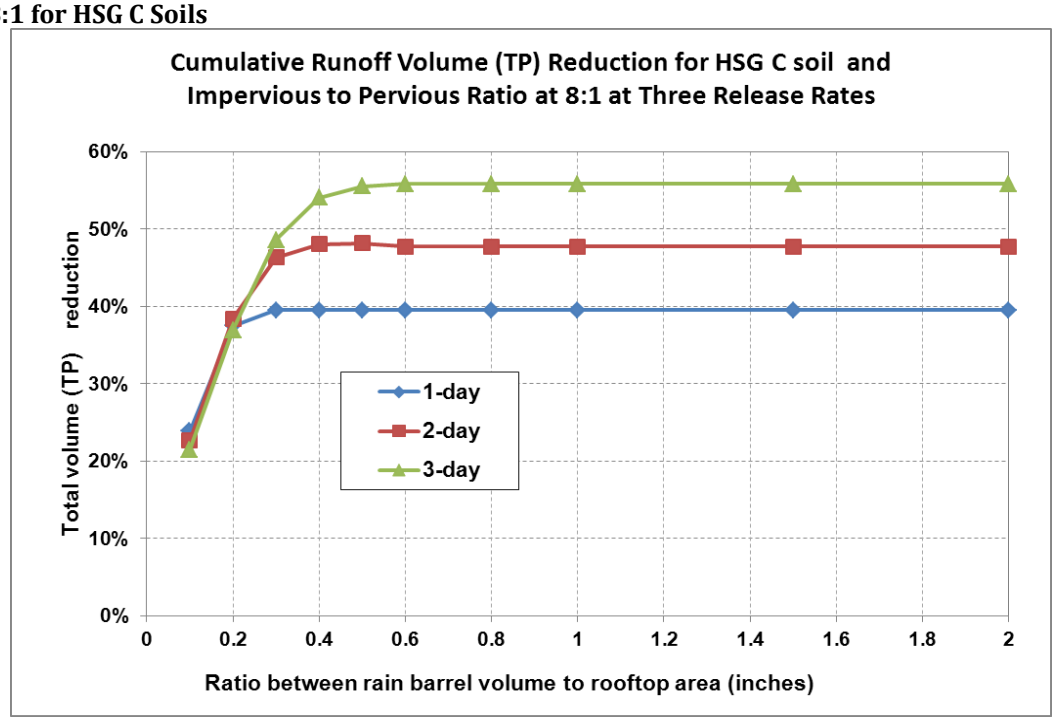


Figure 3- 24: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG D Soils

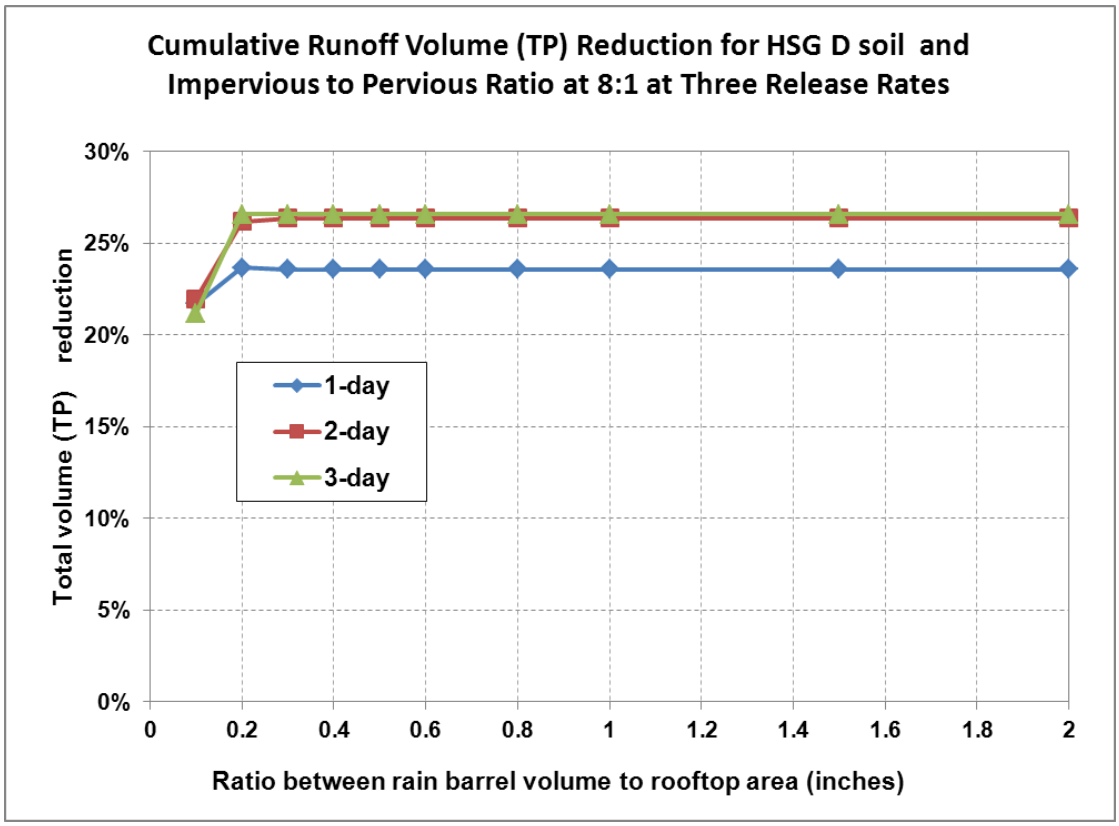


Table 3- 27: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1

Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1												
Rain barrel volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	23%	23%	22%
0.2 in	40%	38%	37%	40%	38%	37%	40%	38%	37%	28%	30%	33%
0.3 in	52%	50%	49%	52%	50%	49%	47%	50%	49%	29%	31%	34%
0.4 in	61%	59%	58%	61%	59%	58%	48%	55%	58%	29%	31%	34%
0.5 in	67%	66%	64%	67%	66%	64%	48%	57%	63%	29%	31%	34%
0.6 in	73%	71%	70%	70%	71%	70%	48%	57%	65%	29%	31%	34%
0.8 in	78%	78%	77%	71%	78%	77%	48%	57%	66%	29%	31%	34%
1.0 in	79%	81%	80%	71%	79%	80%	48%	57%	66%	29%	31%	34%
1.5 in	79%	87%	88%	71%	80%	87%	48%	57%	66%	29%	31%	34%
2.0 in	79%	87%	91%	71%	80%	87%	48%	57%	66%	29%	31%	34%

Figure 3- 25: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG A Soils

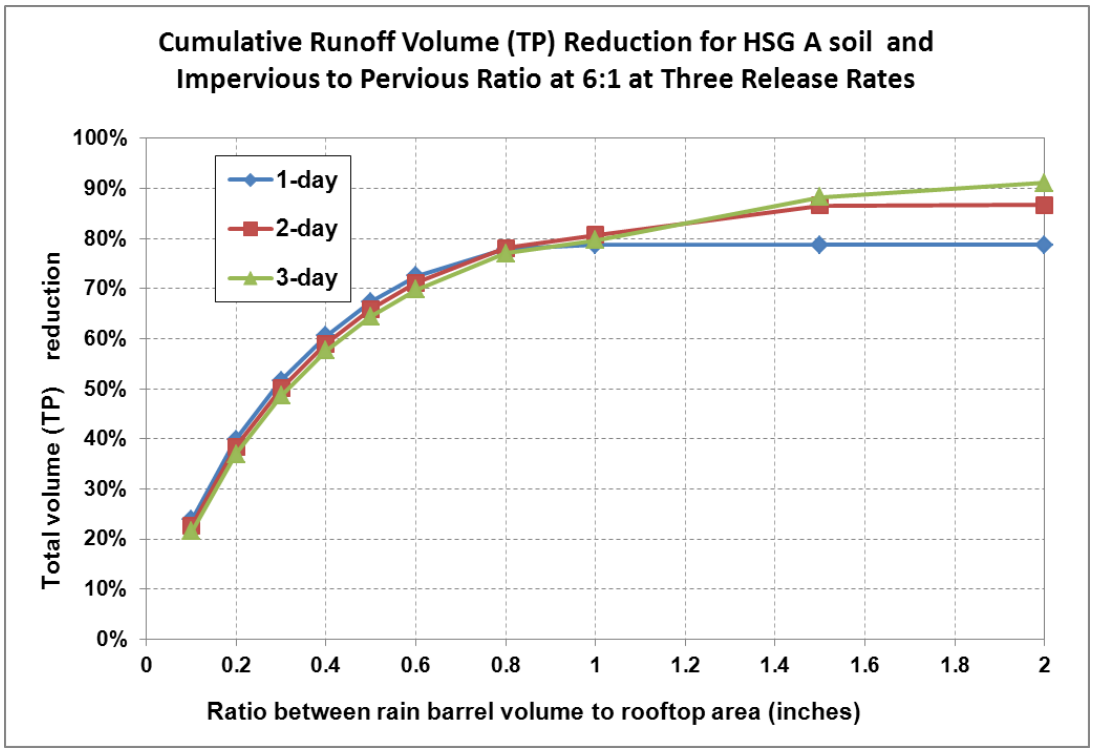


Figure 3- 26: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG B Soils

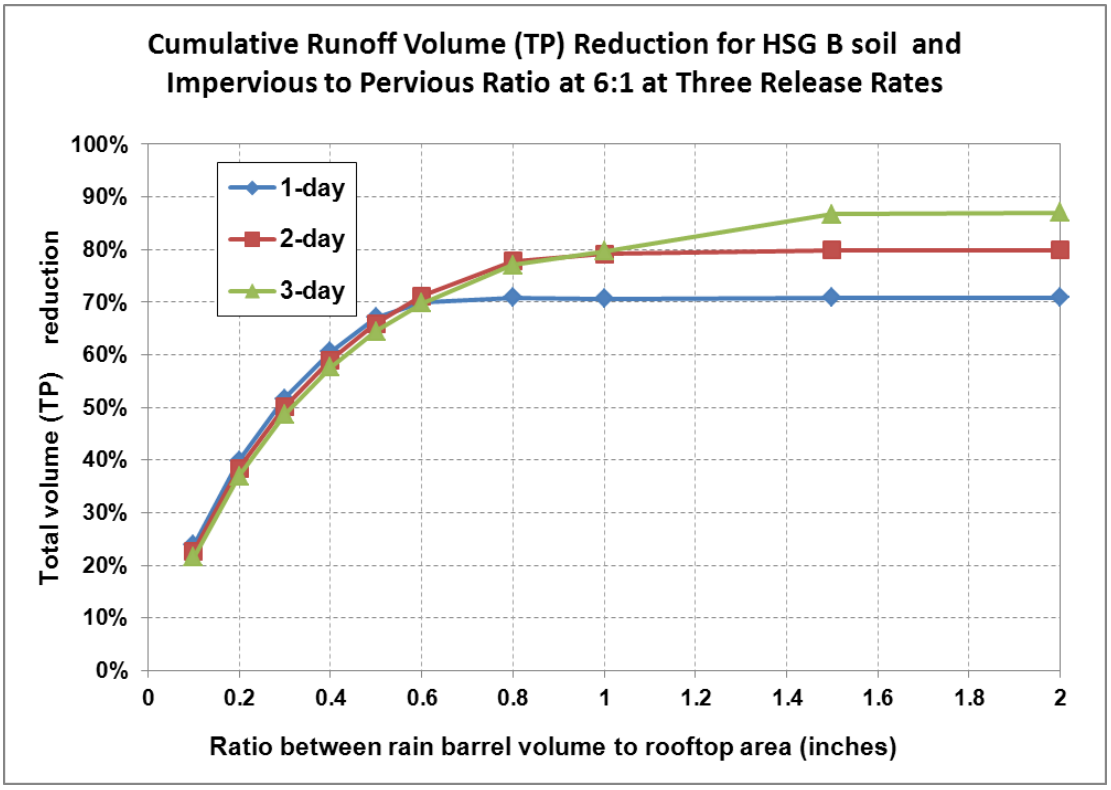


Figure 3- 27: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG C Soils

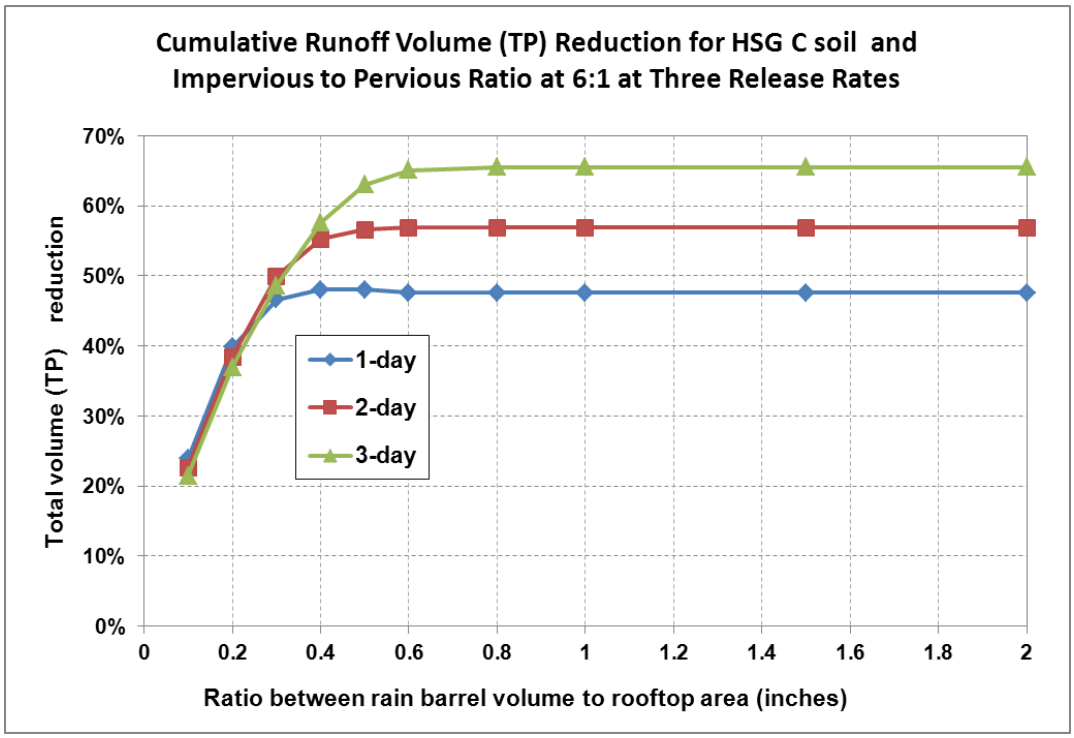


Figure 3- 28: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG D Soils

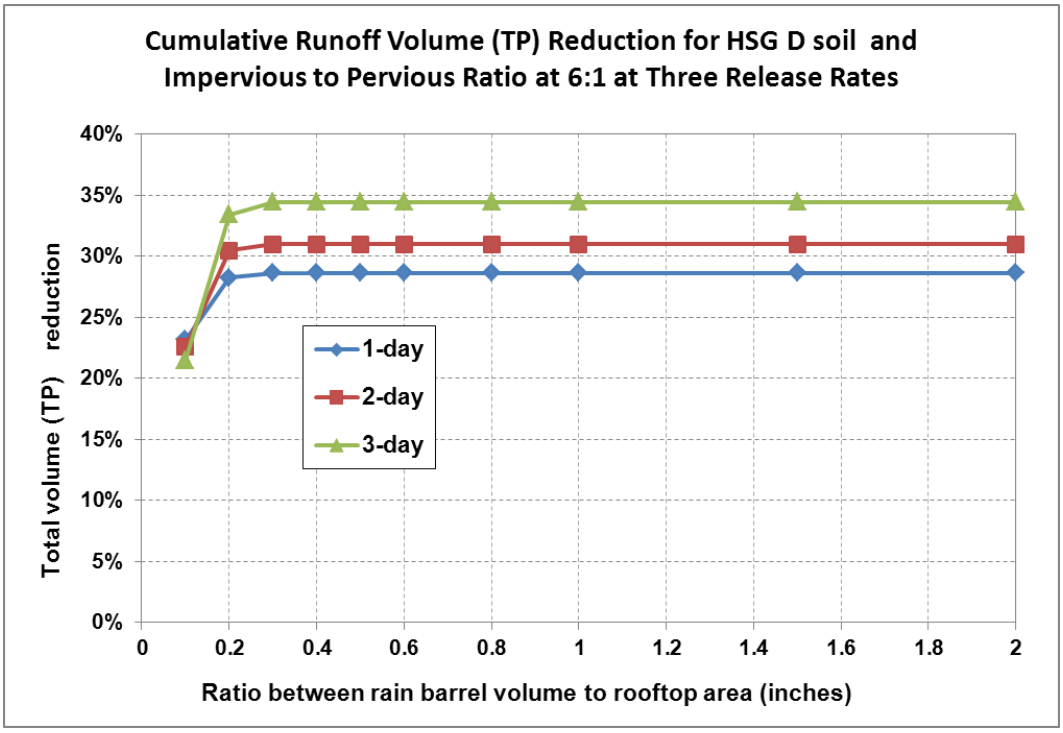


Table 3- 28: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1

Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1												
Storage volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	24%	23%	22%
0.2 in	40%	38%	37%	40%	38%	37%	40%	38%	37%	37%	37%	37%
0.3 in	52%	50%	49%	52%	50%	49%	52%	50%	49%	39%	42%	45%
0.4 in	61%	59%	58%	61%	59%	58%	58%	59%	58%	39%	42%	47%
0.5 in	67%	66%	64%	67%	66%	64%	60%	65%	64%	40%	42%	47%
0.6 in	73%	71%	70%	73%	71%	70%	61%	68%	70%	40%	42%	47%
0.8 in	79%	78%	77%	79%	78%	77%	61%	69%	75%	40%	42%	47%
1.0 in	82%	81%	80%	80%	81%	80%	61%	69%	76%	40%	42%	47%
1.5 in	87%	89%	88%	80%	87%	88%	61%	69%	76%	40%	42%	47%
2.0 in	87%	91%	91%	80%	88%	91%	61%	69%	76%	40%	42%	47%

Figure 3- 29: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG A Soils

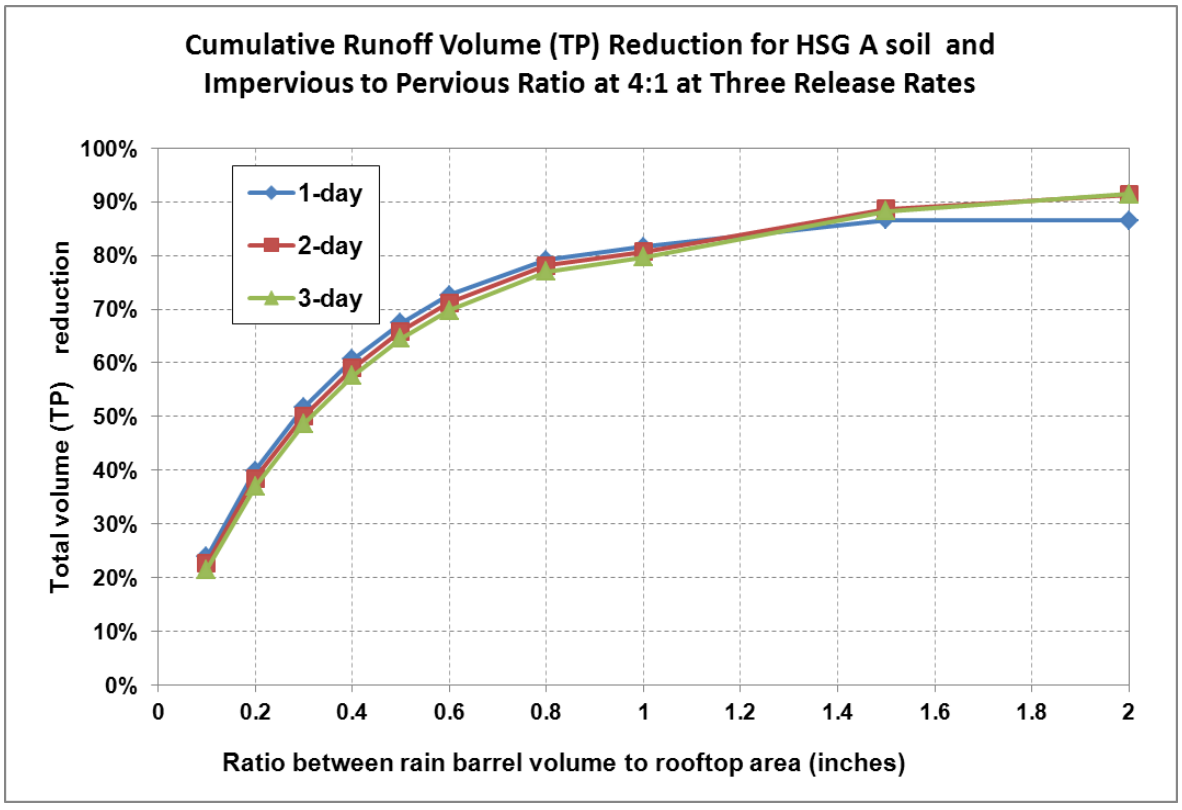


Figure 3- 30: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG B Soils

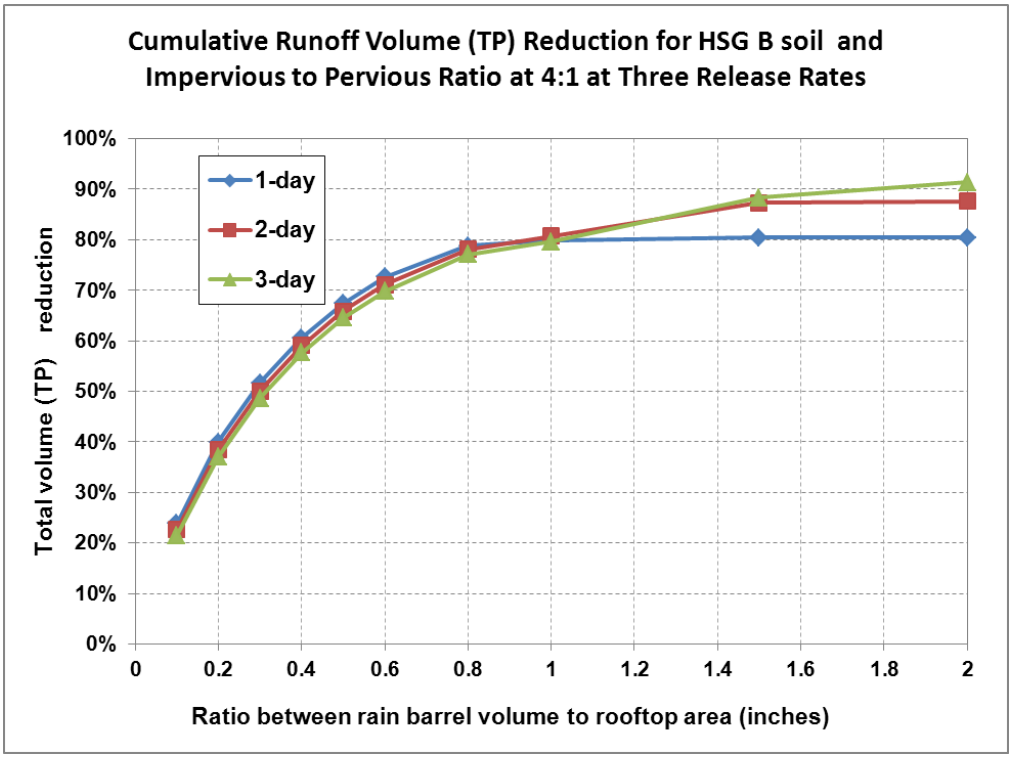


Figure 3- 31: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG C Soils

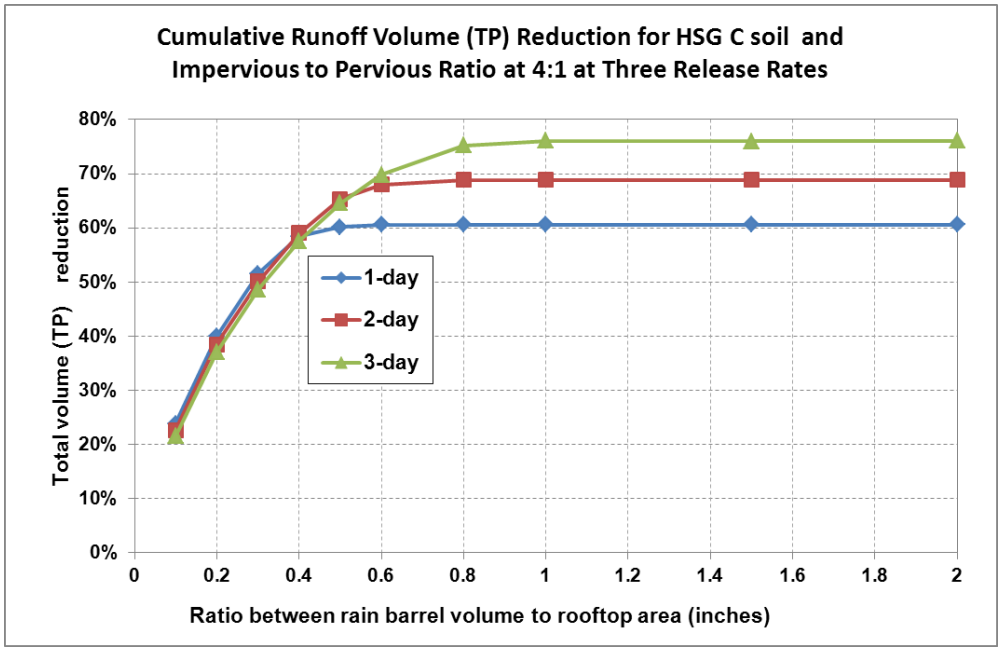


Figure 3- 32: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG D Soils

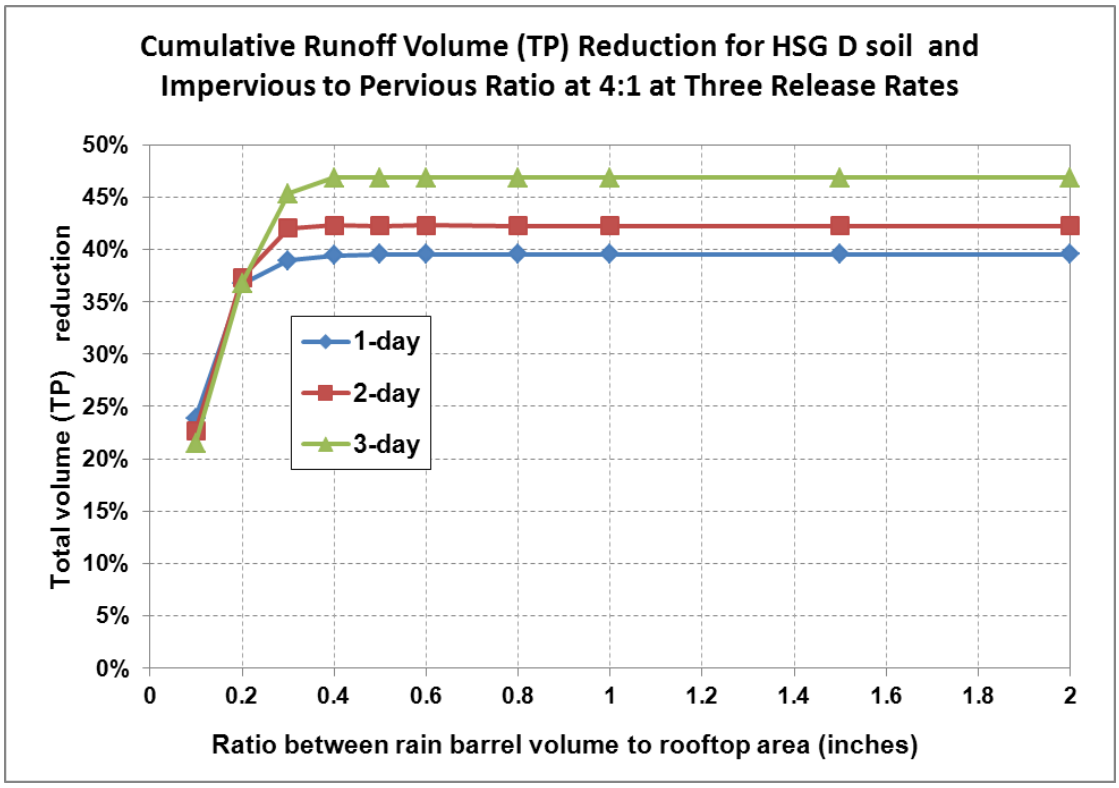


Table 3- 29: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 2:1

Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 2:1												
Storage volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	24%	23%	22%
0.2 in	40%	38%	37%	40%	38%	37%	40%	38%	37%	40%	38%	37%
0.3 in	52%	50%	49%	52%	50%	49%	52%	50%	49%	51%	50%	49%
0.4 in	61%	59%	58%	61%	59%	58%	61%	59%	58%	57%	58%	57%
0.5 in	67%	66%	64%	67%	66%	64%	67%	66%	64%	59%	62%	63%
0.6 in	73%	71%	70%	73%	71%	70%	72%	71%	70%	59%	62%	67%
0.8 in	79%	78%	77%	79%	78%	77%	77%	78%	77%	59%	62%	67%
1.0 in	82%	81%	80%	82%	81%	80%	78%	81%	80%	59%	62%	67%
1.5 in	89%	89%	88%	89%	89%	88%	78%	84%	88%	59%	62%	67%
2.0 in	92%	92%	91%	91%	92%	91%	78%	84%	89%	59%	62%	67%

Figure 3- 33: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG A Soils

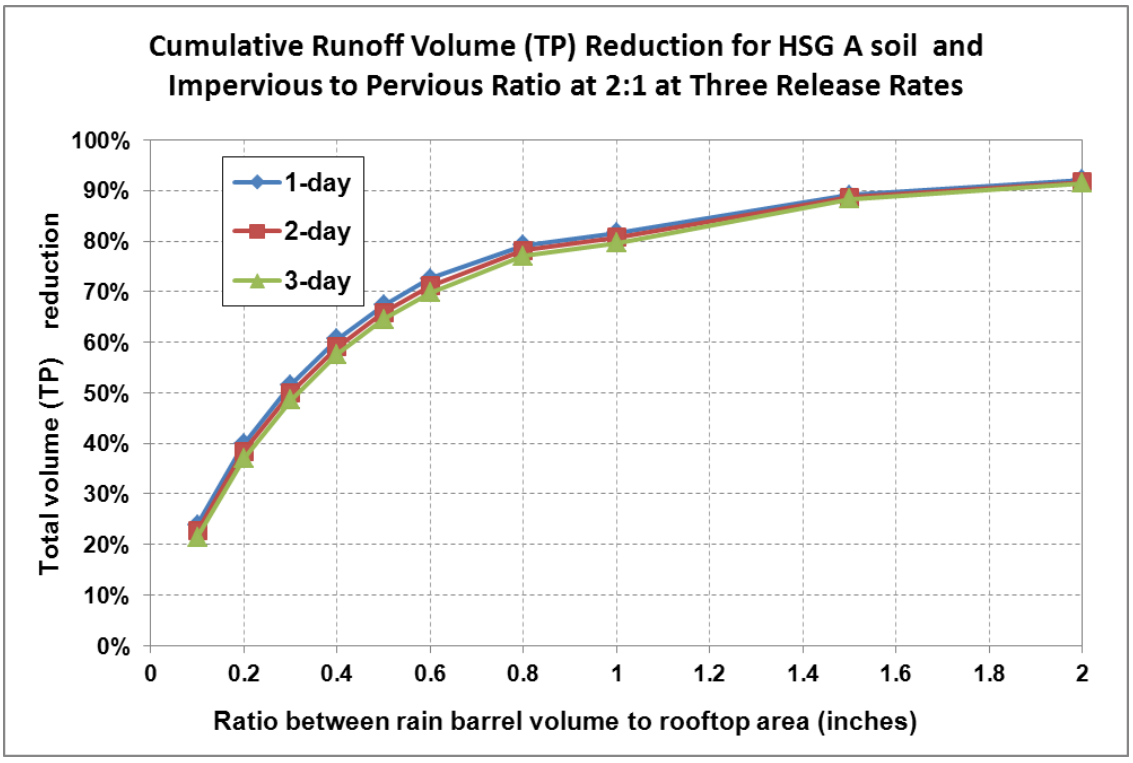


Figure 3- 34: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG B Soils

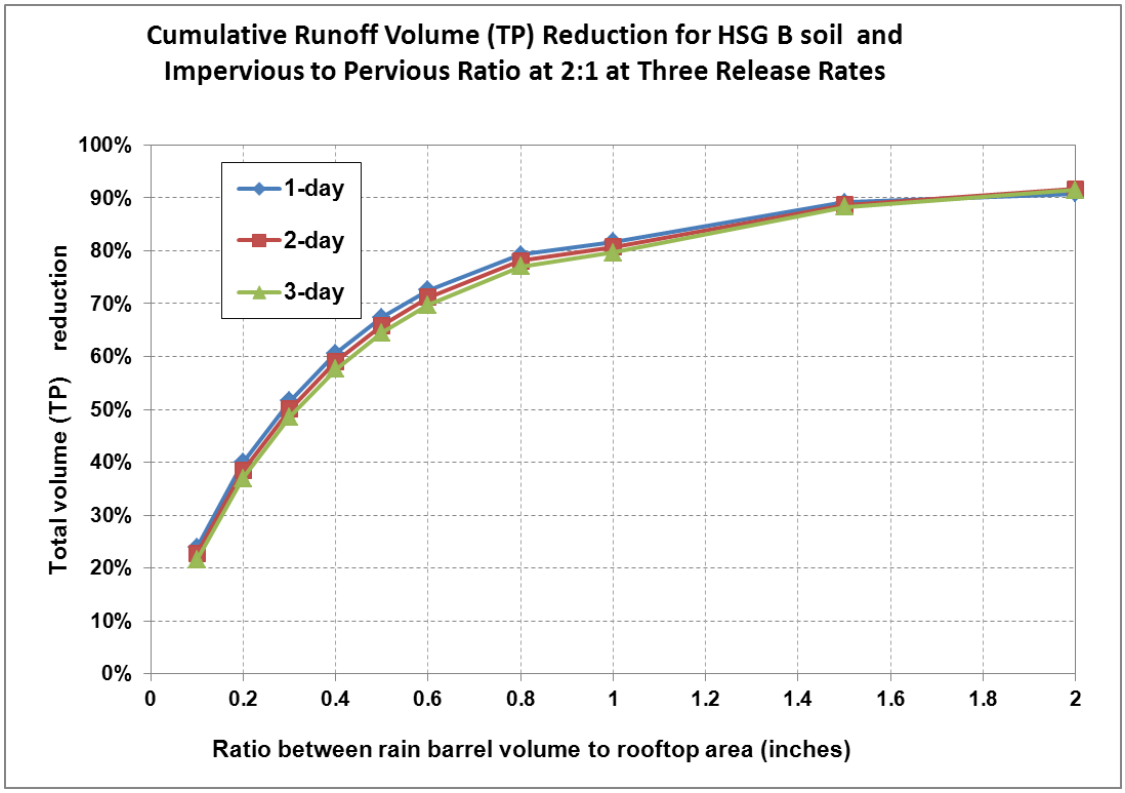


Figure 3- 35: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG C Soils

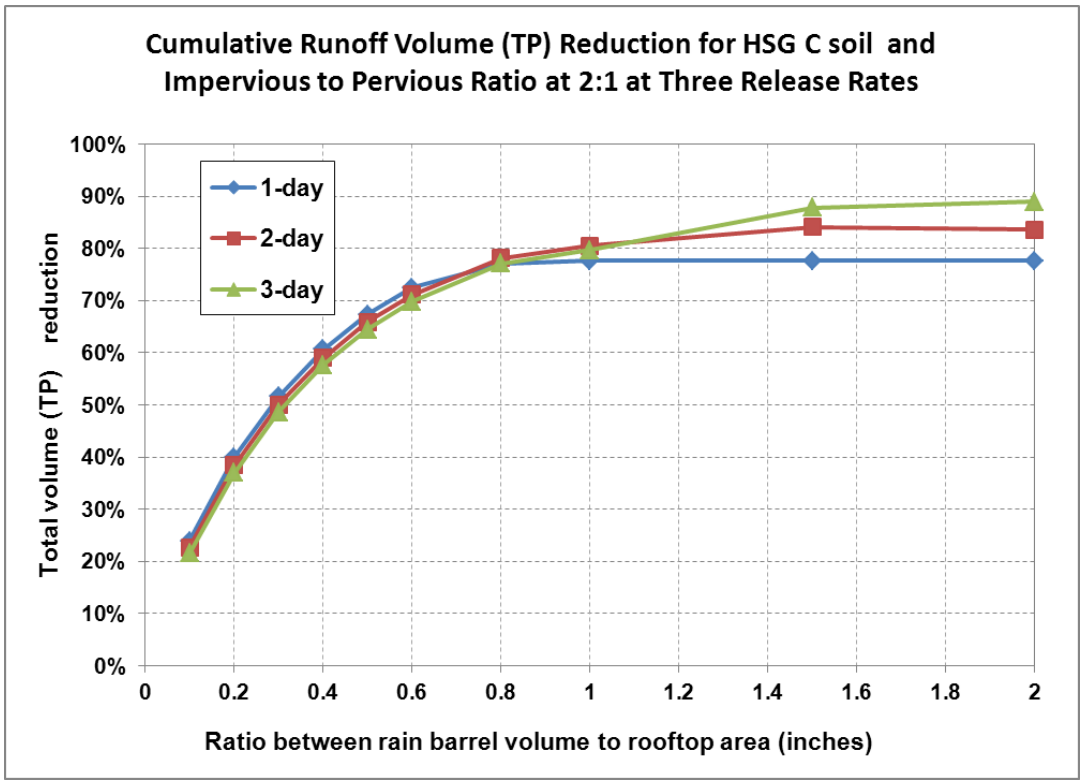


Figure 3- 36: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG D Soils

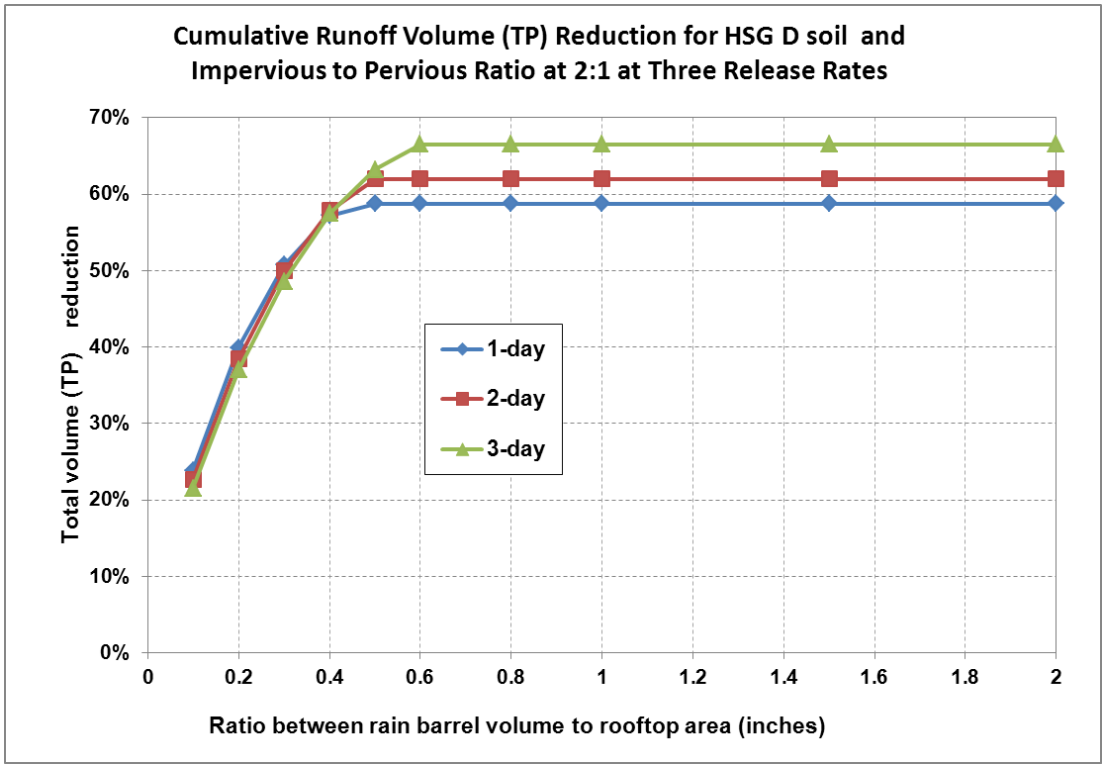


Table 3- 30: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1

Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1												
Storage volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	24%	23%	22%
0.2 in	40%	38%	37%	40%	38%	37%	40%	38%	37%	40%	38%	37%
0.3 in	52%	50%	49%	52%	50%	49%	52%	50%	49%	52%	50%	49%
0.4 in	61%	59%	58%	61%	59%	58%	61%	59%	58%	61%	59%	58%
0.5 in	67%	66%	64%	67%	66%	64%	67%	66%	64%	67%	66%	64%
0.6 in	73%	71%	70%	73%	71%	70%	73%	71%	70%	72%	71%	70%
0.8 in	79%	78%	77%	79%	78%	77%	79%	78%	77%	78%	78%	77%
1.0 in	82%	81%	80%	82%	81%	80%	82%	81%	80%	79%	80%	80%
1.5 in	89%	89%	88%	89%	89%	88%	89%	89%	88%	80%	82%	86%
2.0 in	92%	92%	91%	92%	92%	91%	91%	92%	91%	80%	82%	86%

Figure 3- 37: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG A Soils

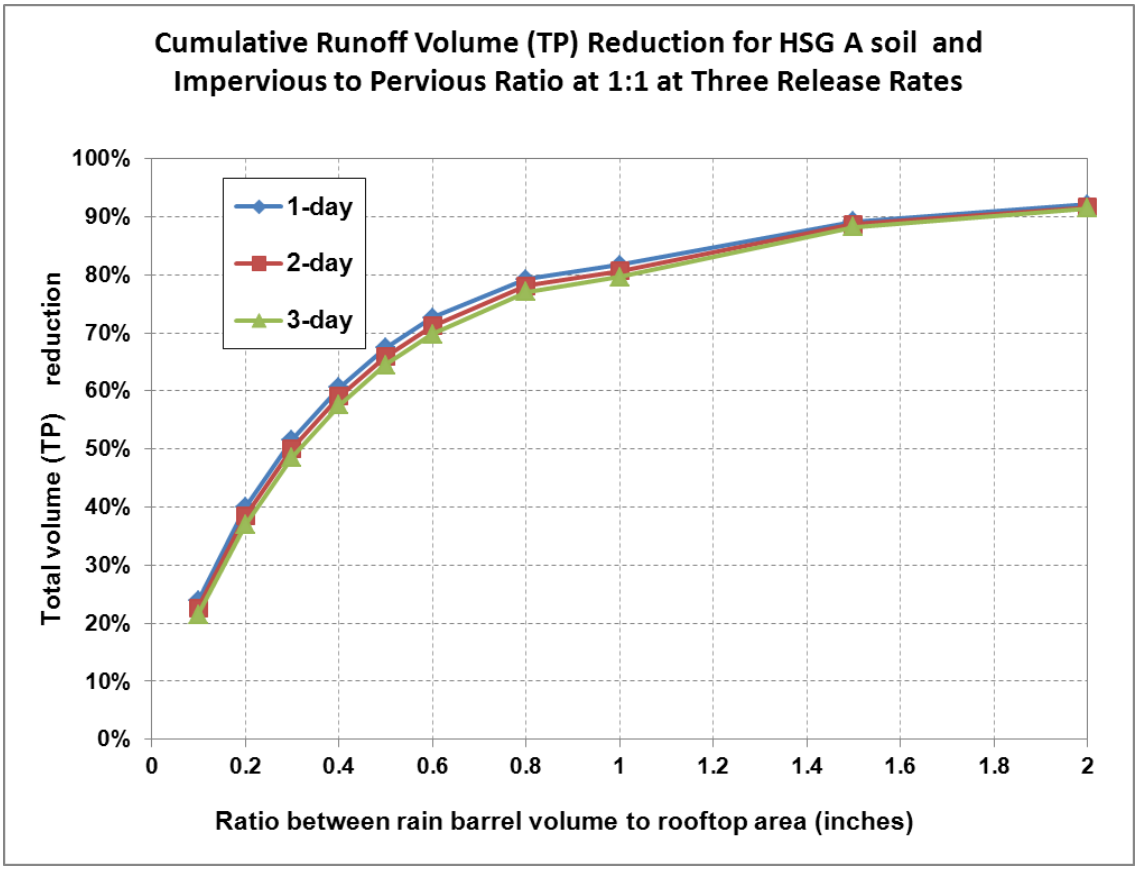


Figure 3- 38: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG B Soils

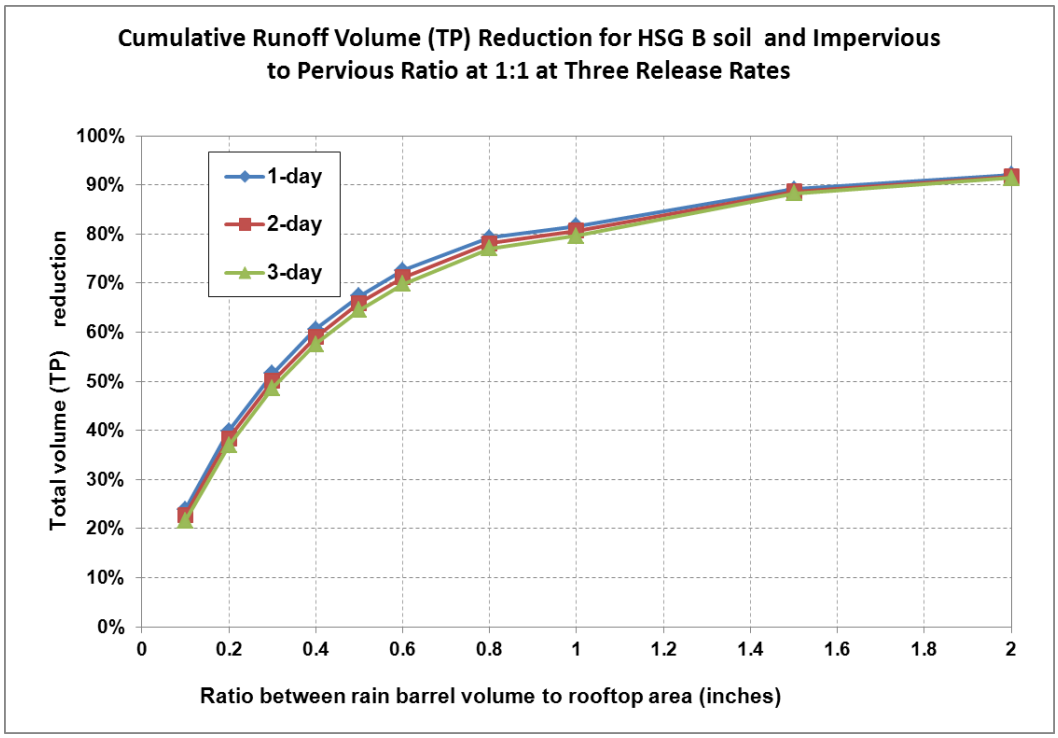


Figure 3- 39: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG C Soils

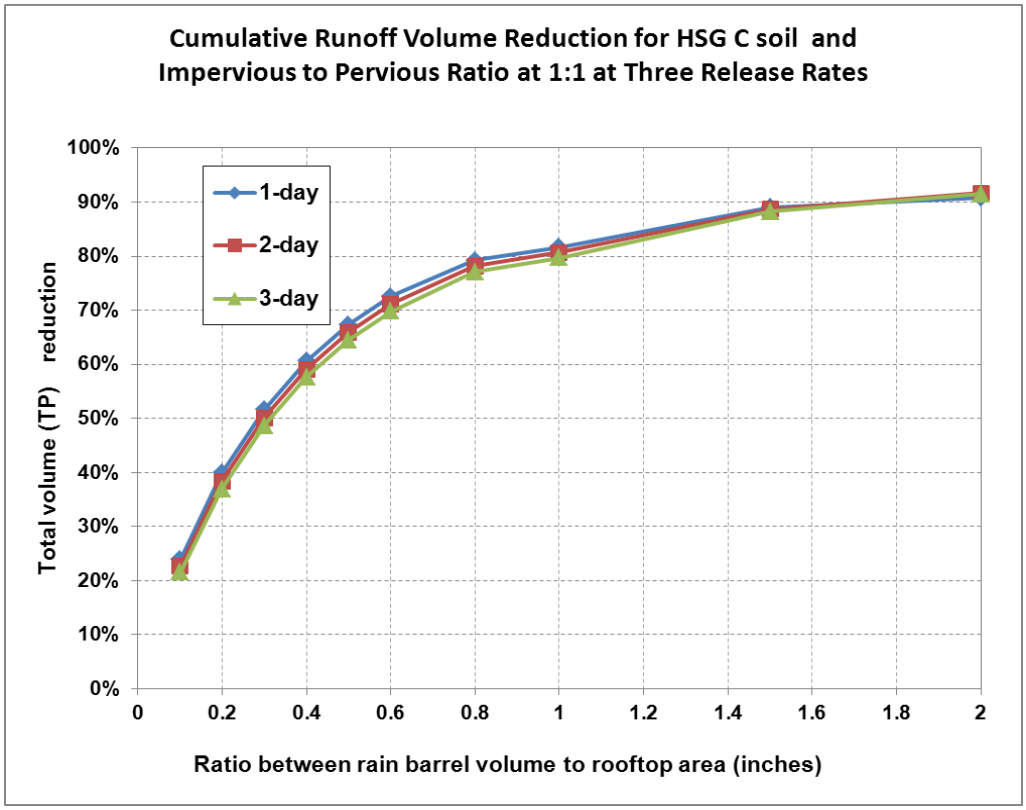


Figure 3- 40: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG D Soils

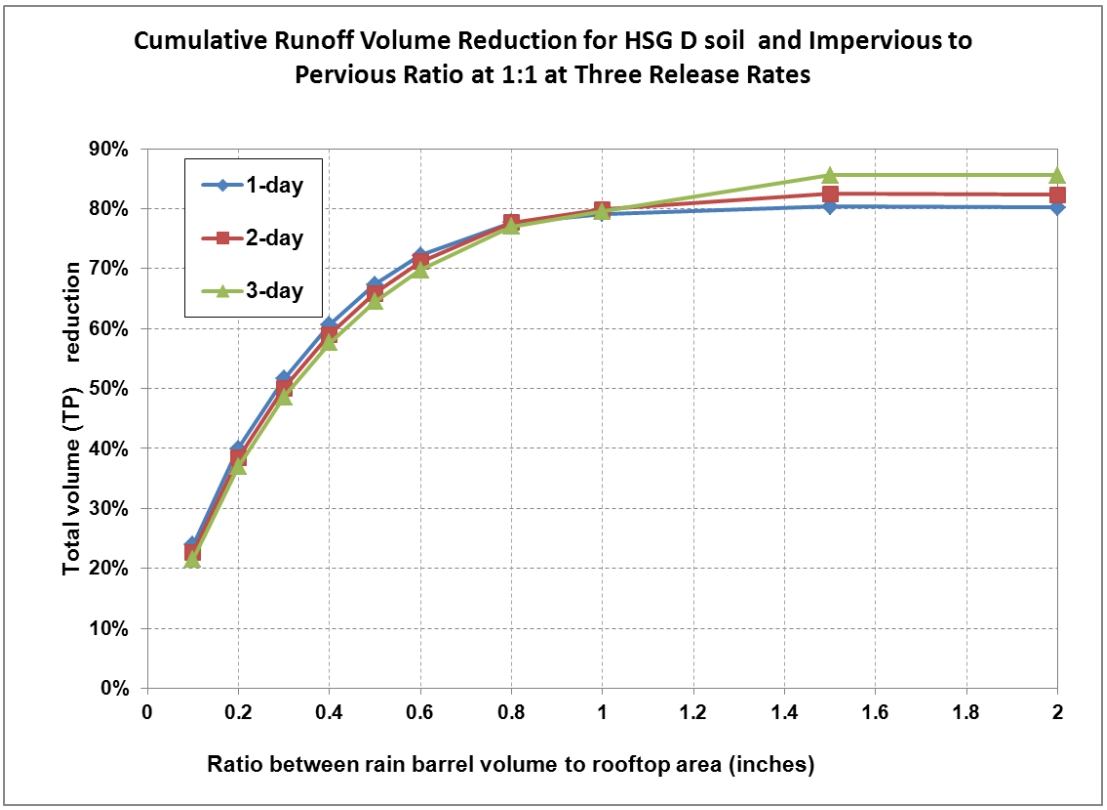


Table 3- 31: Impervious Area Disconnection Performance Table

Impervious area to pervious area ratio	Soil type of Receiving Pervious Area			
	HSG A	HSG B	HSG C	HSG D
8:1	30%	14%	7%	3%
6:1	37%	18%	11%	5%
4:1	48%	27%	17%	9%
2:1	64%	45%	33%	21%
1:1	74%	59%	49%	36%
1:2	82%	67%	60%	49%
1:4	85%	72%	67%	57%

Figure 3- 41: Impervious Area Disconnection Performance Curves

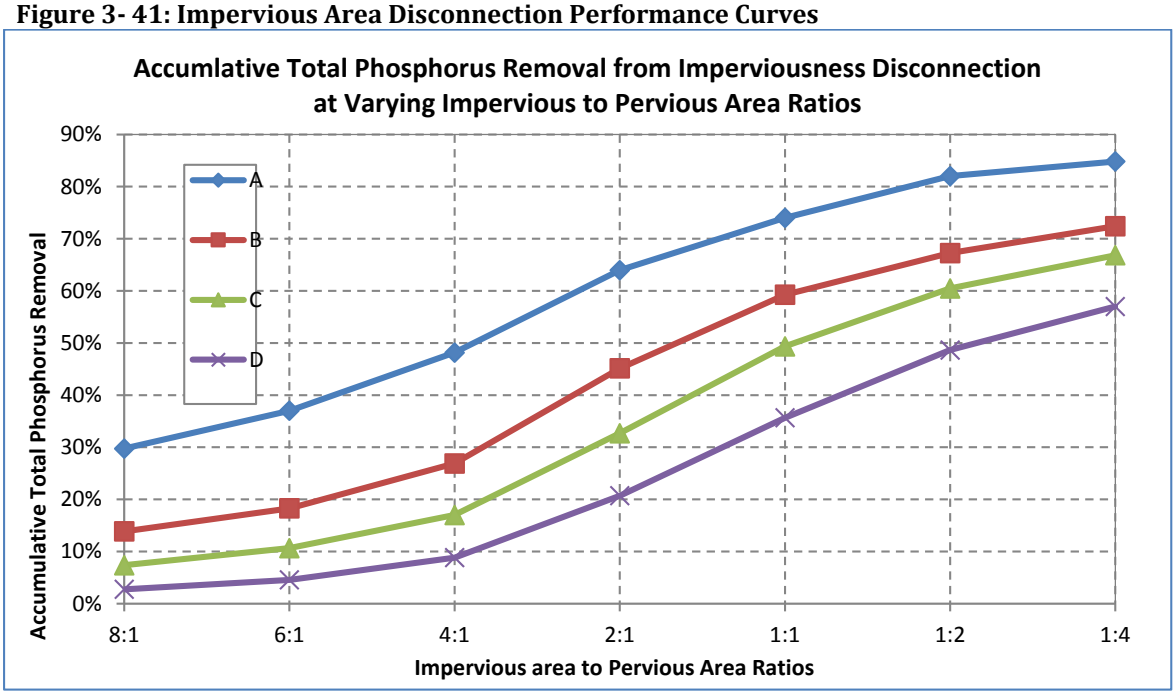


Table 3- 32: Performance Table for Conversion of Impervious Areas to Pervious Area based on Hydrological Soil Groups

Land-Use Group	Cumulative Reduction in Annual Stormwater Phosphorus Load				
	Conversion of impervious area to pervious area-HSG A	Conversion of impervious area to pervious area-HSG B	Conversion of impervious area to pervious area-HSG C	Conversion of impervious area to pervious area-HSG C/D	Conversion of impervious area to pervious area-HSG D
Commercial (Com) and Industrial (Ind)	98.5%	93.5%	88.0%	83.5%	79.5%
Multi-Family (MFR) and High-Density Residential (HDR)	98.8%	95.0%	90.8%	87.3%	84.2%
Medium -Density Residential (MDR)	98.6%	94.1%	89.1%	85.0%	81.4%
Low Density Residential (LDR) - "Rural"	98.2%	92.4%	85.9%	80.6%	75.9%
Highway (HWY)	98.0%	91.3%	84.0%	78.0%	72.7%
Forest (For)	98.2%	92.4%	85.9%	80.6%	75.9%
Open Land (Open)	98.2%	92.4%	85.9%	80.6%	75.9%
Agriculture (Ag)	70.6%	70.6%	70.6%	70.6%	70.6%

Table 3- 33: Performance Table for Conversion of Low Permeable Pervious Area to High Permeable Pervious Area based on Hydrological Soil Group

Land Cover	Cumulative Reduction in Annual SW Phosphorus Load from Pervious Area				
	Conversion of pervious area HSG D to pervious area-HSG A	Conversion of pervious area HSG D to pervious area-HSG B	Conversion of pervious area HSG D to pervious area-HSG C	Conversion of pervious area HSG C to pervious area-HSG A	Conversion of pervious area HSG C to pervious area-HSG B
Developed Pervious Land	92.7%	68.3%	41.5%	83.5%	79.5%

Appendix G
New Hampshire Small MS4 Permit Monitoring Requirements
For Discharges into Impaired Waters - Parameters

See https://www.epa.gov/cwa-methods for approved EPA test methods under 40 CFR Part 136.

Pollutant Causing Impairment[1]	Monitoring Parameter[2]
2-Methylnapthalene	2-Methylnapthalene and all other PAHs
Acenaphthene	Acenaphthene and all other PAHs
Acenaphthylene	Acenaphthylene and all other PAHs
Aluminum	Aluminum, Total
Ammonia (Un-ionized)	Ammonia – Nitrogen
Anthracene	Anthracene and all other PAHs
Arsenic	Arsenic, Total
Benthic-Macroinvertebrate Bioassessments (Streams)	Contact NHDES Watershed Management Bureau for requirements
Benzo[a]anthracene	Benzo[a]anthracene and all other PAHs
Benzo[a]pyrene	Benzo[a]pyrene and all other PAHs
Benzo[b]fluoranthene	Benzo[b]fluroanthene and all other PAHs
Benzo[g,h,i] perylene	Benzo[g,h,i] perylene and all other PAHs
Benzo[k]fluoranthene	Benzo[k]fluoranthene and all other PAHs
Biphenyl	Biphenyl and all other PAHs
BOD, Biochemical oxygen demand	NMR
Cadmium	Cadmium, Total
Chloride	Chloride
Chlorophyll-a	Total Phosphorus (freshwater) Total Nitrogen (marine waters)
Chromium	Chromium, Total
Chrysene	Chrysene (C1-C4) and all other PAHs
Copper	Copper, Total
Cyanobacteria hepatotoxic microsystins	Total Phosphorus (freshwater) Total Nitrogen (marine waters)
DDD	NMR
DDE	NMR
DDT	NMR
Dibenz[a,h]anthracene	Dibenz[a,h]anthracene and all other PAHs
Dieldrin	Dieldrin
Dioxin (including 2,3,7,8-TCDD)	NMR
Dissolved oxygen saturation	Dissolved Oxygen Temperature BOD_5 Total Phosphorus (freshwater) Total Nitrogen (marine waters)
E. coli	E. coli
Endrin	Endrin
Enterococcus	Enterococcus
Estuarine Bioassessments	Total Nitrogen
Excess Algal Growth	Total Phosphorus (freshwater) Total Nitrogen (marine waters)
Fecal Coliform	Fecal Coliform
Fishes Bioassessments (Streams)	Contact NHDES Watershed Management Bureau for requirements

Fluoranthene	Fluoranthene and all other PAHs
Fluorene	Fluorene and all other PAHs
Foam/Flocs/Scum/Oil Slicks	Contact NHDES Watershed Management Bureau for requirements
Habitat Assessment (Streams)	Contact NHDES Watershed Management Bureau for requirements
Heptachlor	Heptachlor
Indeno[1,2,3-cd]pyrene	Indeno[1, 2, 3-cd] pyrene and all other PAHs
Invasive Aquatic Algae	Total Phosphorus (freshwater) Total Nitrogen (marine waters)
Iron	Iron, Total
Lead	Lead, Total
Lindane	Lindane
Low flow alterations	NMR
Manganese	Total Manganese
Mercury	NMR unless potentially present such (e.g., salvage yards crushing vehicles with Hg switches)
Napthalene	Napthalene and all other PAHs
Nitrogen (Total)	Nitrogen, Total
Non-Native (Aquatic) Plants	NMR
Other flow regime alterations	NMR
Oxygen, Dissolved	Dissolved Oxygen Temperature BOD_5 Total Phosphorus (freshwater) Total Nitrogen (marine waters)
pH	pH
Phenanthrene	Phenanthrene and all other PAHs
Phosphorus (Total)	Phosphorus, Total
Physical substrate habitat alterations	Contact NHDES Watershed Management Bureau for requirements
Polychlorinated biphenyls	NMR
Pyrene	Pyrene and all other PAHs
Sedimentation/Siltation	Total Suspended Solids
Taste, odor, color	NMR
Turbidity	Total Suspended Solids and Turbidity
Zinc	Zinc, Total

[1] New Hampshire 2012 Section 305(b) and 303(d) Surface Water Quality Report

[2] "NMR" indicates no monitoring required

"Total Phosphorus (freshwater)" indicates monitor for total phosphorus where a stormwater discharges to a water body that is freshwater

"Total Nitrogen (marine water)" indicates monitor for total nitrogen where a stormwater discharges to a water body that is a marine or estuarine water

APPENDIX H

Requirements Related to Discharges to Certain Water Quality Limited Waterbodies

Table of Contents

I. Discharges to water quality limited waterbodies and their tributaries where nitrogen is the cause of the impairment

1. Part 2.2.2.a.i. of the permit identifies the permittees subject to additional requirements to address nitrogen in their stormwater discharges because they discharge to waterbodies that are water quality limited due to nitrogen, or their tributaries, without an EPA approved TMDL. Permittees identified in Part 2.2.2.a.i of the permit must identify and implement BMPs designed to reduce nitrogen discharges in the impaired catchment(s). To address nitrogen discharges each permittee shall comply with the following requirements:

    a. Additional or Enhanced BMPs

        i. The permittee remains subject to all the requirements of Part 2.3. of the permit and shall include the following enhancements to the BMPs required by Part 2.3 of the permit:

            1. Part 2.3.2, Public Education and Outreach: The permittee shall replace its Residential and Business/Commercial/Institution program with annual timed messages on specific topics, at a minimum. The permittee shall distribute an annual message in the spring (April/May) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the Fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of nitrogen to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP.

            2. Part 2.3.6, Stormwater Management in New Development and Redevelopment: the requirement for adoption/amendment of the permittee's ordinance or other regulatory mechanism shall include a requirement that new development and redevelopment stormwater management BMPs be optimized for nitrogen removal; retrofit inventory and priority ranking under 2.3.6.e shall include consideration of BMPs to reduce nitrogen discharges.

            3. Part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: establish requirements for use of slow release fertilizers on permittee owned property currently using fertilizer, in addition to reducing and managing fertilizer use as provided in 2.3.7.1; establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces; increased street sweeping frequency of all municipal owned streets and parking lots to a minimum of two times per year, once in the spring (following winter activities such as sanding) and at least once in the fall (following leaf fall). Permittees

may also choose, in lieu of post-leaf drop street sweeping, to implement a fall leaf litter collection program to effectively minimize leaf litter on impervious surfaces and in stormwater drainage structures. Either choice will be outlined in the permittee's SWMP.

b. Nitrogen Source Identification Report

i. Within four years of the permit effective date the permittee shall complete a Nitrogen Source Identification Report. The report shall include the following elements:

1. Calculation of total MS4 area draining to the water quality limited water segments or their tributaries, incorporating updated mapping of the MS4 and catchment delineations produced pursuant to Part 2.3.4.6,
2. All screening and monitoring results pursuant to Part 2.3.4.7.d., targeting the receiving water segment(s)
3. Impervious area and DCIA for the target catchment
4. Identification, delineation and prioritization of potential catchments with high nitrogen loading
5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment

ii. The final Nitrogen Source Identification Report shall be submitted to EPA as part of the year 4 annual report.

c. Potential Structural BMPs

i. Within five years of the permit effective date, the permittee shall evaluate all permittee-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation under permit Part 2.3.6.e.. or identified in the Nitrogen Source Identification Report that are within the drainage area of the impaired water or its tributaries. The evaluation shall include:

1. The next planned infrastructure, resurfacing or redevelopment activity planned for the property (if applicable) OR planned retrofit date;
2. The estimated cost of redevelopment or retrofit BMPs; and
3. The engineering and regulatory feasibility of redevelopment or retrofit BMPs.

ii. The permittee shall provide a listing of planned structural BMPs and a plan and schedule for implementation in the year 5 annual report. The permittee shall plan and install a minimum of one structural BMP as a demonstration project within the drainage area of the water quality limited water or its tributaries within six years of the permit effective date. The demonstration project shall be installed targeting a catchment with high nitrogen load potential. The permittee shall install the

remainder of the structural BMPs in accordance with the plan and schedule provided in the year 5 annual report.

iii. Any structural BMPs listed in Attachment 3 to Appendix F installed in the regulated area by the permittee or its agents shall be tracked and the permittee shall estimate the nitrogen removal by the BMP consistent with Attachment 3 to Appendix F. The permittee shall document the BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated nitrogen removed in mass per year by the BMP in each annual report.

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part I.1. applicable to it when in compliance with this part.

   a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
      i. The receiving water and all downstream segments are determined to no longer be impaired due to nitrogen by NH DES and EPA concurs with such determination.
      ii. An EPA approved TMDL for the receiving water or downstream receiving water indicates that no additional stormwater controls for the control of nitrogen are necessary for the permittee's discharge based on wasteload allocations as part of the approved TMDL.
   b. In such a case, the permittee shall document the date of the determination provided for in paragraph a. above or the approved TMDL date in its SWMP and is relieved of any additional requirements of Appendix H part I.1. as of the applicable date and the permittee shall comply with the following:
      i. The permittee shall identify in its SWMP all activities that have been implemented in accordance with the requirements of Appendix H part I.1. as of the applicable date to reduce nitrogen in its discharges, including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
      ii. The permittee shall continue to implement all requirements of Appendix H part I.1. required to be done prior to the date of determination or the date of the approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

II. Discharges to water quality limited waterbodies and their tributaries where phosphorus is the cause of the impairment

1) Part 2.2.2.b.i. of the permit identifies the permittees subject to additional requirements to address phosphorus in their stormwater discharges because they discharge to waterbodies that are water quality limited due to phosphorus, or their tributaries, without an EPA approved TMDL. Permittees identified in Part 2.2.2.b.i. of the permit must identify and implement BMPs designed to reduce phosphorus discharges in the impaired catchment(s). To address phosphorus discharges each permittee shall comply with the following requirements:

   a. Additional or Enhanced BMPs

      i. The permittee remains subject to the requirements of Part 2.3. of the permit and shall include the following enhancements to the BMPs required by Part 2.3 of the permit:

         1. Part 2.3.2, Public education and outreach: The permittee shall replace its Residential and Business/Commercial/Institution program with annual timed messages on specific topics, at a minimum. The permittee shall distribute an annual message in the spring (March/April) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release and phosphorous-free fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of phosphorous to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP.

         2. Part 2.3.6, Stormwater Management in New Development and Redevelopment: the requirement for adoption/amendment of the permittee's ordinance or other regulatory mechanism shall include a requirement that new development and redevelopment stormwater management BMPs be optimized for phosphorus removal; retrofit inventory and priority ranking under 2.3.6.e. shall include consideration of BMPs that infiltrate stormwater where feasible.

         3. Part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: Establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces; increased street sweeping frequency of all municipal owned streets and parking lots to a minimum of two times per year, once in the spring (following winter activities such as sanding) and at least once in the fall (following leaf fall). Permittees may also choose, in lieu of post-leaf drop street sweeping, to implement a fall leaf litter collection program to effectively minimize leaf litter on impervious surfaces and in stormwater

drainage structures. Either choice will be outlined in the permittee's SWMP.

b. Phosphorus Source Identification Report

i. Within four years of the permit effective date the permittee shall complete a Phosphorus Source Identification Report. The report shall include the following elements:

1. Calculation of total MS4 area draining to the water quality limited receiving water segments or their tributaries, incorporating updated mapping of the MS4 and catchment delineations produced pursuant to Part 2.3.4.6,
2. All screening and monitoring results pursuant to Part 2.3.4.7.d., targeting the receiving water segment(s)
3. Impervious area and DCIA for the target catchment
4. Identification, delineation and prioritization of potential catchments with high phosphorus loading
5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment, including the removal of impervious area of permittee-owned properties

ii. The final phosphorus source identification report shall be submitted to EPA as part of the year 4 annual report.

c. Potential Structural BMPs

i. Within five years of the permit effective date, the permittee shall evaluate all permittee-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation under permit Part 2.3.6.e or identified in the Phosphorus Source Identification Report that are within the drainage area of the water quality limited water or its tributaries. The evaluation shall include:

1. The next planned infrastructure, resurfacing or redevelopment activity planned for the property (if applicable) OR planned retrofit date;
2. The estimated cost of redevelopment or retrofit BMPs; and
3. The engineering and regulatory feasibility of redevelopment or retrofit BMPs.

ii. The permittee shall provide a listing of planned structural BMPs and a plan and schedule for implementation in the year 5 annual report. The permittee shall plan and install a minimum of one structural BMP as a demonstration project within the drainage area of the water quality limited water or its tributaries within six years of the permit effective date. The demonstration project shall be installed targeting a catchment with high phosphorus load potential. The permittee shall install the

remainder of the structural BMPs in accordance with the plan and schedule provided in the year 5 annual report.

iii. Any structural BMPs installed in the regulated area by the permittee or its agents shall be tracked and the permittee shall estimate the phosphorus removal by the BMP consistent with Attachment 3 to Appendix F. The permittee shall document the BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated phosphorus removed in mass per year by the BMP in each annual report.

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part II.1. applicable to it when in compliance with this part.

a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
   i. The receiving water and all downstream segments are determined to no longer be impaired due to phosphorus by NH DES and EPA concurs with such determination.
   ii. An EPA approved TMDL for the receiving water or downstream receiving water indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee's discharge based on wasteload allocations as part of the approved TMDL.

b. In such a case, the permittee shall document the date of the determination provided for in paragraph a. above or the approved TMDL date in its SWMP and is relieved of any additional requirements of Appendix H part II.1. as of the applicable date and the permittee shall comply with the following:
   i. The permittee shall identify in its SWMP all activities that have been implemented in accordance with the requirements of Appendix H part II.1. as of the applicable date to reduce phosphorus in its discharges, including implementation schedules for non structural BMPs and any maintenance requirements for structural BMPs
   ii. The permittee shall continue to implement all requirements of Appendix H part II.1. required to be done prior to the date of determination or the date of the approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

III. Discharges to water quality limited waterbodies where bacteria or pathogens is the cause of the impairment

1. Part 2.2.2.c.i. of the permit identifies the permittees subject to additional requirements to address bacteria or pathogens (Enterococcus or Escherichia Coli) in their stormwater discharges because they discharge to waterbodies that are water quality limited due to bacteria or pathogens without an EPA approved TMDL. Permittees identified in Part 2.2.2.c.i. of the permit must identify and implement BMPs designed to reduce bacteria or pathogens discharges in the impaired catchment(s). To address bacteria or pathogens discharges each permittee shall comply with the following requirements:

    a. Additional or Enhanced BMPs

        i. The permittee remains subject to the requirements of Part 2.3. of the permit and shall include the following enhancements to the BMPs required by Part 2.3 of the permit:

            1. Part 2.3.2. Public Education: The permittee shall replace its Residential program with an annual message encouraging the proper management of pet waste, including noting any existing ordinances where appropriate, at a minimum. The permittee or its agents shall disseminate educational materials to dog owners at the time of issuance or renewal of a dog license, or other appropriate time. Education materials shall describe the detrimental impacts of improper management of pet waste, requirements for waste collection and disposal, and penalties for non-compliance. The permittee shall also provide information to owners of septic systems (if applicable) about proper maintenance in any catchment that discharges to a water body impaired for bacteria or pathogens.

            2. Part 2.3.4 Illicit Discharge: The permittee shall implement the illicit discharge program required by this permit. Catchments draining to any waterbody impaired for bacteria or pathogens shall be designated either Problem Catchments or HIGH priority in implementation of the IDDE program.

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part III.2. applicable to it when in compliance with this part.

    a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
        i. The receiving water is determined to be no longer impaired due to bacteria or pathogens by NH DES and EPA concurs with such a determination.
        ii. An EPA approved TMDL for the receiving water indicates that no additional stormwater controls are necessary for the control of bacteria or pathogens from the permittee's discharge based on wasteload allocations as part of the approved TMDL.

iii. The permittee's discharge is determined to be below applicable water quality criteria[1] and EPA agrees with such a determination. The permittee shall submit data to EPA that accurately characterizes the concentration of bacteria or pathogens in their discharge. The characterization shall include water quality and flow data sufficient to accurately assess the concentration of bacteria or pathogens in all seasons during storm events of multiple sizes and for the duration of the storm events including the first flush, peak storm flow and return to baseflow.

b. In such a case, the permittee shall document the date of the determination, date of approved TMDL or date of EPA concurrence that the discharge meets water quality criteria in its SWMP and is relieved of any additional requirements of Appendix H part III.2. as of that date and the permittee shall comply with the following:
   i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix H part III.2. to date to reduce bacteria or pathogens in its discharges, including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
   ii. The permittee shall continue to implement all requirements of Appendix H part III.3. required to be done prior to the date of determination date, date of approved TMDL, or date of EPA concurrence that the discharge meets water quality criteria, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications

.

[1] Applicable water quality criteria are the state standards that have been federally approved as of the effective date of this permit and are compiled by EPA at http://www.epa.gov/waterscience/standards/wqslibrary/

IV. <u>Discharges to water quality limited waterbodies where chloride is the cause of the impairment</u>

1. Part 2.2.2.d.i. of the permit identifies the permittees subject to additional requirements to address chloride in their stormwater discharges because they discharge to waterbodies that are water quality limited due to chloride without an EPA approved TMDL. Permittees identified in Part 2.2.2.d.i. of the permit must identify and implement BMPs designed to reduce chloride discharges in the impaired catchment(s). To address chloride discharges each permittee shall comply with the following requirements.

2. Permittees discharging to a waterbody listed as impaired due to chloride in categories 5 or on the most recent EPA approved New Hampshire Clean Water Act section 303(d) list or New Hampshire Integrated Report under Clean Water Act section 305(b)4b shall develop a Salt Reduction Plan that includes specific actions designed to achieve salt reduction on municipal roads and facilities, and on private facilities that discharge to its MS4. The Salt Reduction Plan shall be completed within three years of the effective date of the permit and include the BMPs in Part IV 4) below. The Salt Reduction Plan shall be fully implemented five years after the effective date of the permit.

3. Permittees that, during the permit term, become aware that their discharge is to a waterbody that is impaired due to chloride must update their Salt Reduction Plan within 60 days of becoming aware of the situation to include salt reduction practices targeted at lowering chloride in discharges to the impaired waterbody. If the permittee does not have a Salt Reduction Plan already in place, then the permittee shall complete a Salt Reduction Plan that includes the BMPs in Part IV 4) below within 3 years of becoming aware of the situation and fully implement the Salt Reduction Plan within 5 years of becoming aware of the situation.

   a. Additional or Enhanced BMPs

      i. For municipally maintained surfaces:

(i) Tracking of the amount of salt applied to all municipally owned and maintained surfaces and reporting of salt use using the UNH Technology Transfer Center online tool (http://www.roadsalt.unh.edu/Salt/) beginning in the year 2 annual report;
(ii) Planned activities for salt reduction on municipally owned and maintained surfaces, which may include but are not limited to:

- Operational changes such as pre-wetting, pre-treating the salt stockpile, increasing plowing prior to de-icing, monitoring of road surface temperature, etc.;
- Implementation of new or modified equipment providing pre-wetting capability, better calibration rates, or other capability for minimizing salt use;
- Training for municipal staff and/or contractors engaged in winter maintenance activities;
- Adoption of guidelines for application rates for roads and parking lots (see NHDES, Chloride *Reduction Implementation Plan for Dinsmore*

Brook, App. J and K (February 2011), http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-13.pdf ;: *Winter Parking Lot and Sidewalk Maintenance Manual (Revised edition June 2008)* http://www.pca.state.mn.us/publications/parkinglotmanual.pdf; and the application guidelines on page 17 of *Minnesota Snow and Ice Control: Field Handbook for Snow Operators (September 2012)* http://www.mnltap.umn.edu/publications/handbooks/documents/snowice.pdf for examples);

- Regular calibration of spreading equipment;
- Designation of no-salt and/or low salt zones;
- Public education regarding impacts of salt use, methods to reduce salt use on private property, modifications to driving behavior in winter weather, etc.; and
- Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff; and

(iii) An estimate of the total tonnage of salt reduction expected by each activity; and

(iv) A schedule for implementation of planned activities including immediate implementation of operational and training measures, continued annual progress on other measures, and full implementation of the Plan by the end of the permit term.

b. For privately maintained facilities that drain to the MS4:

(i) Identification of private parking lots with 10 or more parking spaces draining to the MS4;

(ii) Requirements for private parking lot owners and operators and private street owners and operators (1) that any commercial salt applicators used for applications of salt to their parking lots or streets be trained and certified in accordance with Env-Wq 2203, and (2) to report annual salt usage within the municipal boundaries using the UNH Technology Transfer Center online tool (http://www.roadsalt.unh.edu/Salt/) or report salt usage directly to the permittee, in which case this information should be reported on the permittees annual report.

(iii) Requirements for new development and redevelopment to minimize salt usage, and to track and report amounts used using the UNH Technology Transfer Center online tool (http://www.roadsalt.unh.edu/Salt/).

4. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part IV as follows:

a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
   i. The receiving water is determined to be no longer impaired due to chloride by NH DES and EPA concurs with such a determination.

ii. An EPA approved TMDL for the receiving water indicates that no additional stormwater controls are necessary for the control of chloride from the permittee's discharge based on wasteload allocations as part of the approved TMDL.

iii. The permittee's discharge is determined to be below applicable water quality criteria[2] and EPA agrees with such a determination. The permittee shall submit data to EPA that accurately characterizes the concentration of chloride in their discharge during the deicing season (November – March). The characterization shall include water quality and flow data sufficient to accurately assess the concentration of chloride in the deicing season during storm events of multiple sizes and for the duration of the storm events including the first flush, peak storm flow and return to baseflow and include samples collected during deicing activities.

b. In such a case, the permittee shall document the date of the determination, date of approved TMDL or date of EPA concurrence that the discharge meets water quality criteria in its SWMP and is relieved of any additional requirements of Appendix H part IV as of that date and the permittee shall comply with the following:

i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix H part IV to date to reduce chloride in its discharges, including implementation schedules for non-structural BMPs

ii. The permittee shall continue to implement all requirements of Appendix H part IV required to be done by the date of determination date, date of approved TMDL, or date of EPA concurrence that the discharge meets water quality criteria, including ongoing implementation of identified non-structural BMPs

[2] Applicable water quality criteria are the state standards that have been federally approved as of the effective date of this permit and are compiled by EPA at http://www.epa.gov/waterscience/standards/wqslibrary/

V. Discharges to water quality limited waterbodies and their tributaries where solids, oil and grease (hydrocarbons), or metals is the cause of the impairment

1. Part 2.2.2.e.i. of the permit identifies the permittees subject to additional requirements to address solids (Sedimentation/Siltation or Turbidity), metals (Cadmium, Copper, Iron, Lead or Zinc) and oil and grease (Benzo(a)pyrene (PAHs))in their stormwater discharges because they discharge to waterbodies that are water quality limited due to solids, metals, or oil and grease, without an EPA approved TMDL. Permittees identified in Part 2.2.2.e.i. of the permit must identify and implement BMPs designed to reduce solids, metals, or oil and grease discharges in the impaired catchment(s). To address solids, metals, or oil and grease discharges each permittee shall comply with the following requirements:

    a. Additional or Enhanced BMPs

        i. The permittee remains subject to the requirements of Part 2.3. of the permit and shall include the following enhancements to the BMPs required by Part 2.3 of the permit:

            1. Part 2.3.6, Stormwater Management in New Development and Redevelopment: stormwater management systems designed on commercial and industrial land use area draining to the water quality limited waterbody shall incorporate designs that allow for shutdown and containment where appropriate to isolate the system in the event of an emergency spill or other unexpected event. EPA also encourages the permittee to require any stormwater management system designed to infiltrate stormwater on commercial or industrial sites to provide the level of pollutant removal equal to or greater than the level of pollutant removal provided through the use of biofiltration as calculated using the methodologies contained in the EPA document: Stormwater Best Management Practices (BMP) Performance Analysis (2010). of the same volume of runoff to be infiltrated, prior to infiltration.

            2. Part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: increased street sweeping and catch basin cleaning frequency of all municipal owned streets and parking lots to a schedule determined by the permittee to target areas with potential for high pollutant loads. This may include, but is not limited to, increased street sweeping frequency in commercial areas and high density residential areas, or drainage areas with a large amount of impervious area. Each annual report shall include the street sweeping schedule determined by the permittee to target high pollutant loads.

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part V.2. applicable to it when in compliance with this part.

    a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
        i. The receiving water is determined to be no longer impaired due to solids, metals, or oil and grease (hydrocarbons) by NH DES and EPA concurs with such a determination.

ii. An EPA approved TMDL for the receiving water indicates that no additional stormwater controls are necessary for the control of solids, metals, or oil and grease (hydrocarbons) from the permittee's discharge based on wasteload allocations as part of the approved TMDL.

iii. The permittee's discharge is determined to be below applicable water quality criteria and EPA agrees with such a determination[3]. The permittee shall submit data to EPA that accurately characterizes the concentration of solids, metals, or oil and grease (hydrocarbons) in their discharge. The characterization shall include water quality and flow data sufficient to accurately assess the concentration of solids, metals, or oil and grease (hydrocarbons) in all seasons during storm events of multiple sizes and for the duration of the storm events including the first flush, peak storm flow and return to baseflow.

b. In such a case, the permittee shall document the date of the determination, date of approved TMDL or date of EPA concurrence that the discharge meets water quality criteria in its SWMP and is relieved of any additional requirements of Appendix H part V.2. as of that date and the permittee shall comply with the following:

i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix H part V.2. to date to reduce solids, metals, or oil and grease (hydrocarbons) in its discharges, including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs

ii. The permittee shall continue to implement all requirements of Appendix H part V.3. required to be done by the date of determination date, date of approved TMDL, or date of EPA concurrence that the discharge meets water quality criteria, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications

[3] Applicable water quality criteria are the state standards that have been federally approved as of the effective date of this permit and are compiled by EPA at http://www.epa.gov/waterscience/standards/wqslibrary/