Unified Stormwater Rule & NYC Stormwater Manual

Informational Briefing

December 20, 2021

NYC Environmental Protection

Agenda

Mikelle Adgate
SENIOR ADVISOR, PUBLIC AFFAIRS & COMMUNICATIONS

NYC Environmental Protection

- **Welcome** – Mikelle Adgate
- **Unified Stormwater Rule Regulatory Context**– Pinar Balci
- **What's Changing?** - Peg O'Connor
- **NYC Stormwater Manual –** Melissa Enoch
  - **Manual Appendices** - Gareth King
- **Next Steps** – Mikelle Adgate

USWR Regulatory Context

Pinar Balci
ASSISTANT COMMISSIONER, ENVIRONMENTAL PLANNING & ANALYSIS

NYC Environmental Protection

Regulatory Context – Today's Rules

Ch. 19.1
Water Quality Requirements

Stormwater Construction Permit

- Applies to **MS4 projects** that disturb 1 acre or more of soil
- Must comply with NYC Stormwater Design Manual
- Manage volume of 1.5-inch rainfall event

Ch. 31
Stormwater Quantity and Flow Rates

Site/House Connection Proposal

- Release rate and volume requirements based on allowable flow for site
- Additional release rate requirements for **CSS projects,** per 2012 Stormwater Rule
- Maximum discharge rate, often 0.25 cfs while rainfall event is being managed
- Must comply with NYCDEP 2012 SW Rule and guidelines for detention facility design

USWR Overview

- Aligns the RCNY Chapter 31 stormwater quantity and flow rate requirements with the RCNY Chapter 19.1 Construction/Post-Construction permitting program water quality requirements.

- Extends DEP's permitting, inspection and enforcement program for development projects from only MS4 areas to CSS areas, including requirements, standards and penalties for construction and post-construction stormwater controls.

- Updates sewer connection volume requirements and maximum stormwater release rates for both CSS and MS4 areas.

- Lowers DEP's current lot size threshold for the construction/post-construction stormwater permitting program from one-acre (43,560 square feet) to 20,000 square feet (sf) and adding the creation of 5,000 SF of impervious area as an additional trigger.

- Encourages development projects greater than or equal to 20,000 sf to use green infrastructure to meet requirements of both Chapter 31 and 19.1.

- Allows greater flexibility in stormwater management design options, while simplifying the rules and making them consistent across the city, regardless of the borough.

- References the new NYC Stormwater Manual in both Chapter 31 and 19.1 for applicable stormwater technical requirements, including Stormwater Management Practice Hierarchies and Stormwater Management Practice Selection Checklists.

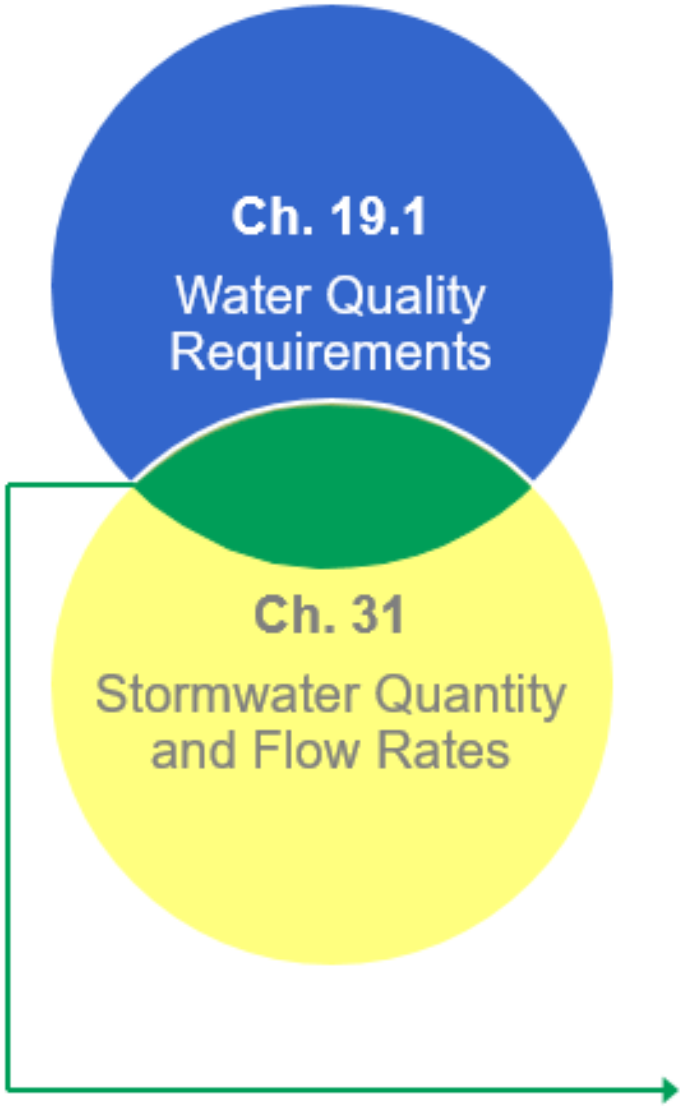
What's Changing?

Peg O'Connor

DIRECTOR, STORMWATER CONSTRUCTION PERMITTING

NYC Environmental Protection

Unified Stormwater Rule:



Stormwater Construction Permit

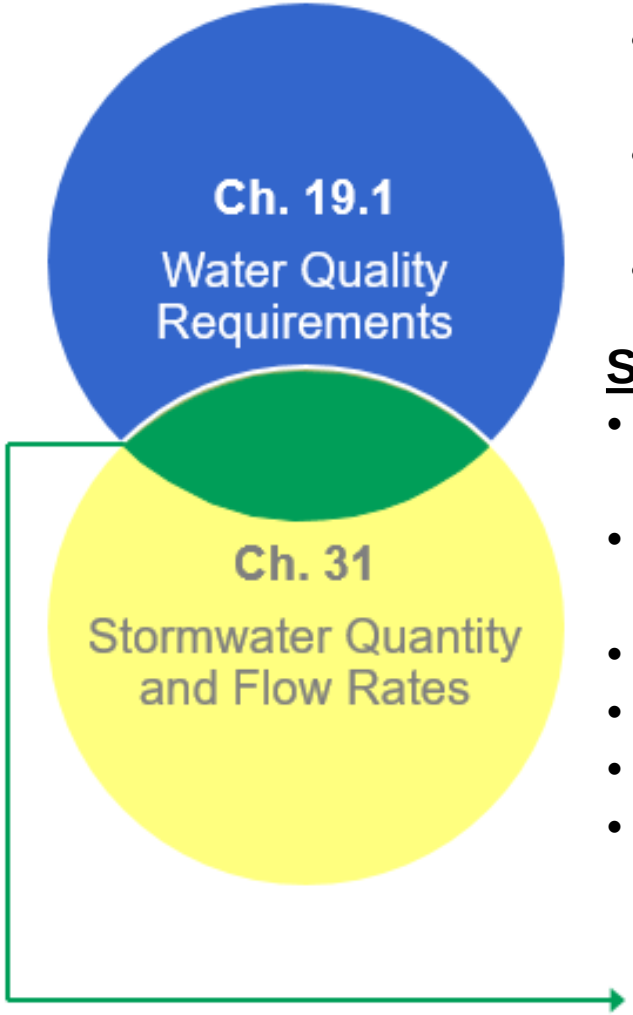
- Applies to **CSS/MS4 projects** that disturb 20,000 sf or more of soil, OR add 5,000 sf or more of new impervious surface
- Must comply with Unified Stormwater Rule
- Manage volume of 1.5-inch rainfall event

Site/House Connection Proposal

- Applies to **CSS/MS4 projects** that require a site/house connection proposal
- Must comply with Unified Stormwater Rule
- Provide specified detention volume and maximum-release rate based on project type:
  - CSS-site: 1.85” volume, greater of 0.1 cfs/acre or 0.046 cfs
  - CSS-house: 1.50” volume, greater of 0.1 cfs/acre or 0.046 cfs
  - MS4-site: 1.50” volume, greater of 1.0 cfs/acre or 0.046 cfs
  - MS4-house: 1.10” volume, greater of 1.0 cfs/acre or 0.046 cfs

Green infrastructure framework that supports application of practices to meet both objectives

What's Changing?



Stormwater Construction Permit

- Expanded to CSS area projects
- Reduces soil disturbance threshold from 1 acre to 20,000 sf
- New threshold for 5,000 sf or more of new impervious surface
- Creates clear SMP hierarchy for CSS/MS4 areas

Site/House Connection Proposal

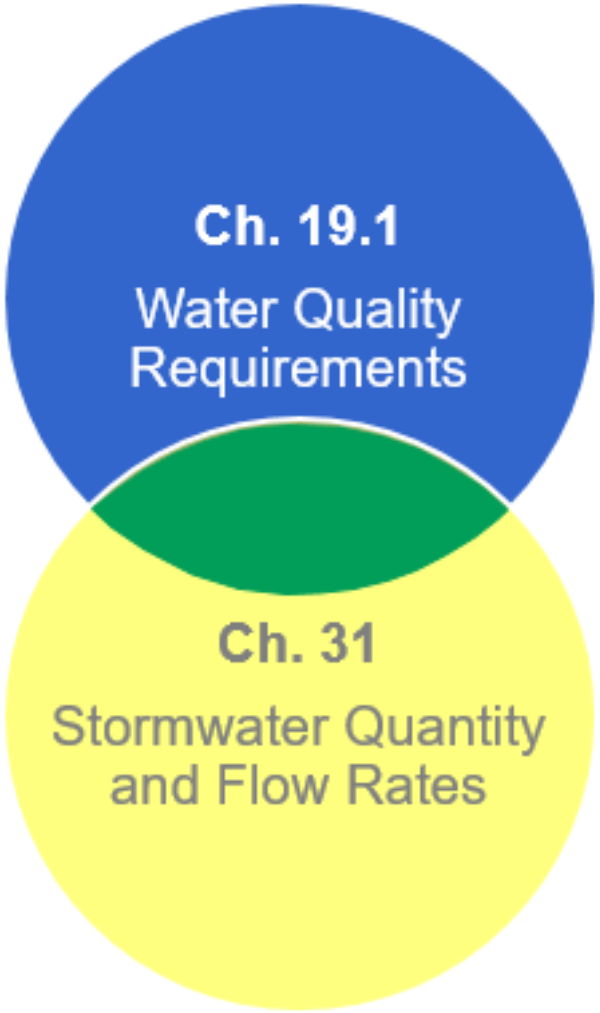
- Aligns release rate requirements with Stormwater Construction Permit requirements
- Simplifies requirements to determine volume and release rate
- Provides maximum discharge rate scales by project area
- Reduces the maximum release rate from sites in all cases
- Lowers minimum orifice size to 1-inch diameter
- Defines house connections as 1-3 family (fee simple) homes <20,000 sf

Clear guidance on how green infrastructure volume can be applied towards multiple goals

New NYC Stormwater Manual Replaces:

- 2018 NYC MS4 Manual
- 2012 Stormwater Rule Manual
- 2012 Guidelines for Design of Detention Facilities

USWR Requirements:



Stormwater Construction Permit

- When permit applies, prepare a stormwater pollution prevention plan (SWPPP) that meets up to four requirements, as needed:
  - **Erosion and sedimentation (ESC)** – to minimize the discharge of pollutants during construction activities.
  - **Water quality (WQ)** – to manage runoff from small, frequent storm events that can significantly impact the quality of receiving waters in both MS4 and CSS areas.
  - **Runoff reduction (RR)** – to maintain a minimum level of runoff reduction during small storms to preserve natural hydrologic functions.
  - **No-net increase (NNI)** – to reduce pollutants of concern in MS4 sewershed areas that discharge to an impaired waterbody.

Site/House Connection Proposal

- When permit applies, prepare a site/house connection proposal that meets the following requirement:
  - **Sewer operations (Vv)** – aims to manage runoff from larger storm events to maintain optimal flow rates in the City's sewer system and, in turn, improve overall sewer operations. Volume from SWPPP facilities will count towards this Vv requirement.

Chapter 19.1 Effectiveness (Summary):

New 19.1-03 does not apply to:

A. MS4 development activity ≥ 1 acre
   1. If NYSDEC issued one of the following prior to 6/1/2019: 1) letter of acknowledgment of NOI under NYS CGP or 2) individual SPDES permit for construction activity.
   2. If DEP issued MS4 SWPPP Acceptance Form within 2 years prior to effective date of USWR.

B. CSS development activity ≥ 1 acre
   1. If applied to DOB or SBS for construction document approval before 3/26/21.

C. MS4 and CSS covered development project < 1 acre
   1. not located in a rezoned area: if applied to DOB or SBS for construction document approval before effective date of USWR.
   2. located in a rezoned area and developing the site pursuant to the rezoning: if DOB or SBS issued a permit for construction of the project before 12/10/2021.

Chapter 31 Effectiveness (Summary):

New § 31-09:
Does not apply to any site with a sewer availability certification issued prior to the effective date of USWR.

Except that
Does apply to any site located in a **rezoned area** and developing the site pursuant to the rezoning, even if applied for or received certification prior to effective date of USWR.

Hydrology & Hydraulics for Rezoned Areas

- Projects proposed within areas that have been rezoned recently require additional assessment.

- The existing practice is to require a Hydrology and Hydraulics (H&H) analysis be complete prior to review.

- The combined and sanitary sewers in areas that have been rezoned may be substantially undersized compared to the new proposed densities.

USWR Requirement Applicability

Figure 2.3: *for determining applicable requirements of the stormwater construction permit.*

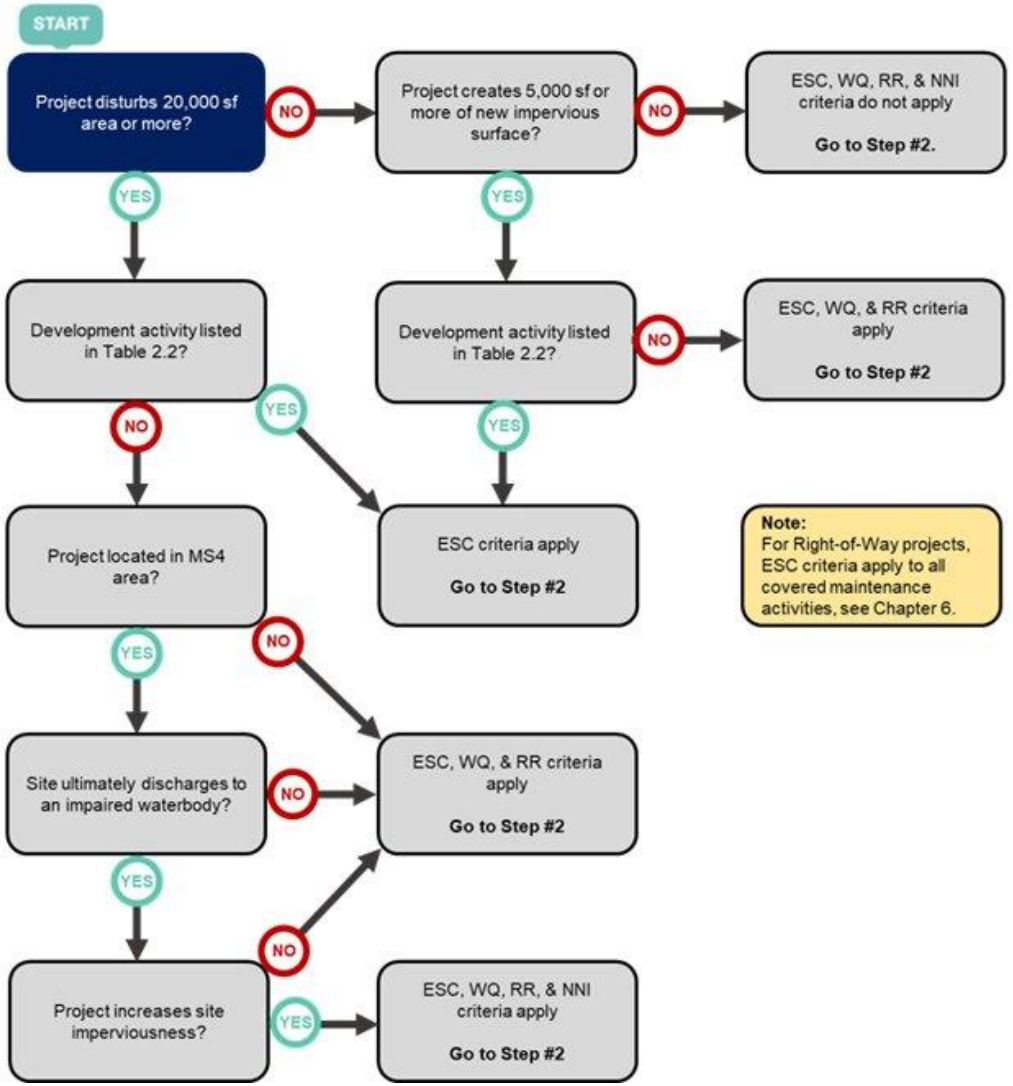
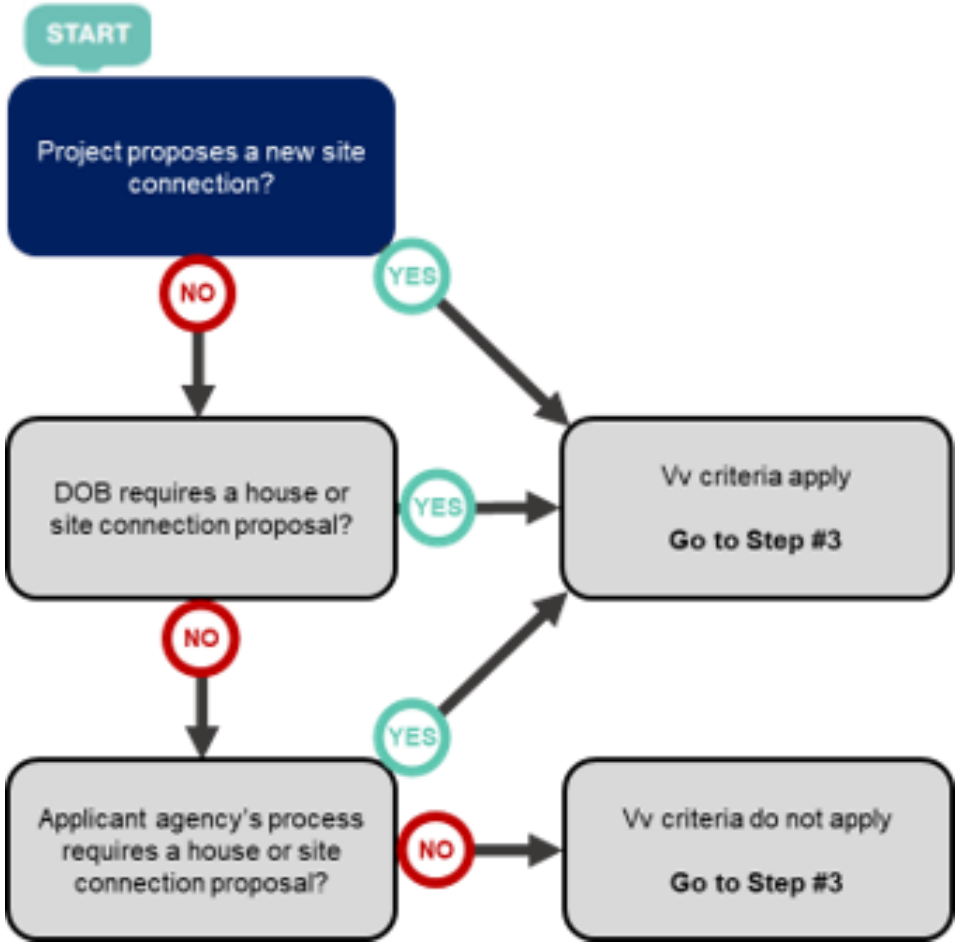


Table 2.2: *Covered development activities that require the preparation of a SWPPP that only includes erosion and sediment control requirements.*

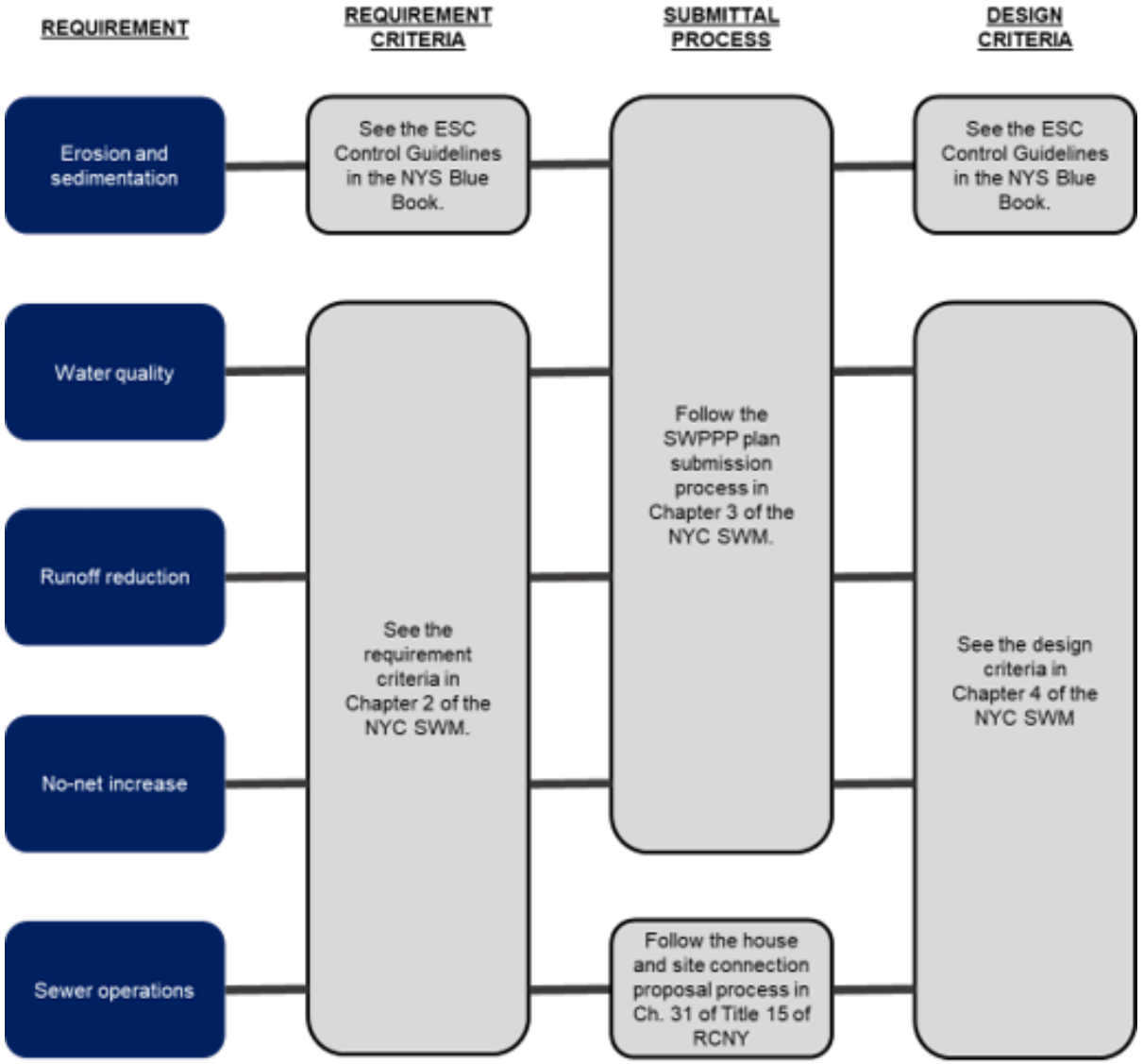
Covered Development Activity
Installation of underground, linear utilities such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
Pond construction
Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover
Cross-country ski trails and walking/hiking trails
Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development;
Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that include incidental shoulder or curb work along an existing highway to support construction of the sidewalk, bike path or walking path.
Slope stabilization projects
Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics
Spoil areas that will be covered with vegetation
Vegetated open space projects (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) excluding projects that alter hydrology from pre- to post-development conditions,
Athletic fields (natural grass) that do not include the construction or reconstruction of impervious area and do not alter hydrology from pre to post development conditions
Demolition project where vegetation will be established, and no redevelopment is planned
Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with impervious cover
Temporary access roads, median crossovers, detour roads, lanes, or other temporary impervious areas that will be restored to pre-construction conditions once the construction activity is complete
Road reconstruction projects where the total soil disturbance from all activities is less than 1-acre

USWR Requirement Applicability

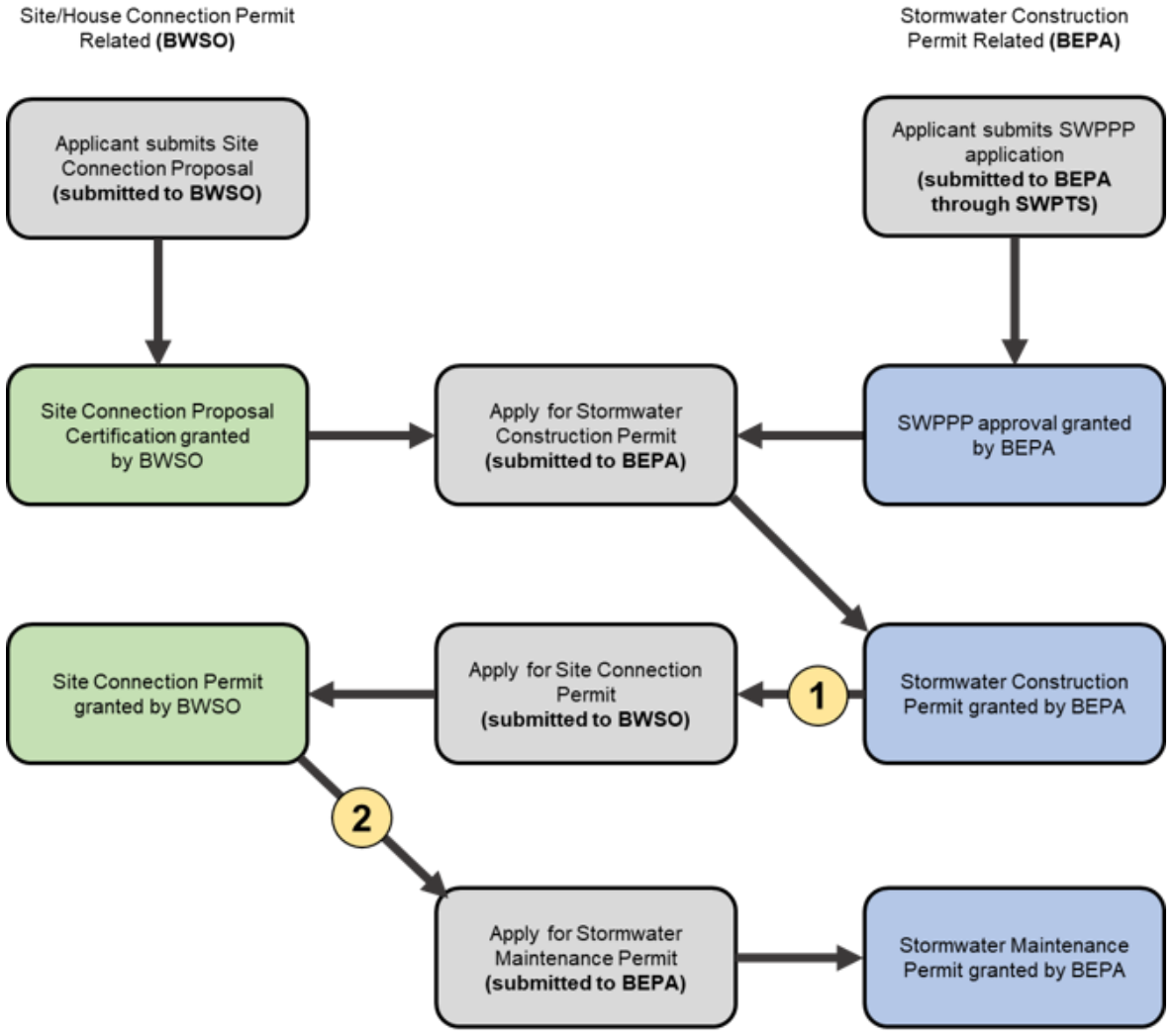
Flow diagram #2: *for determining applicable requirements of the site/house connection proposal.*



Flow diagram #3: *which indicates procedures for the applicable requirements.*



USWR Permit Process

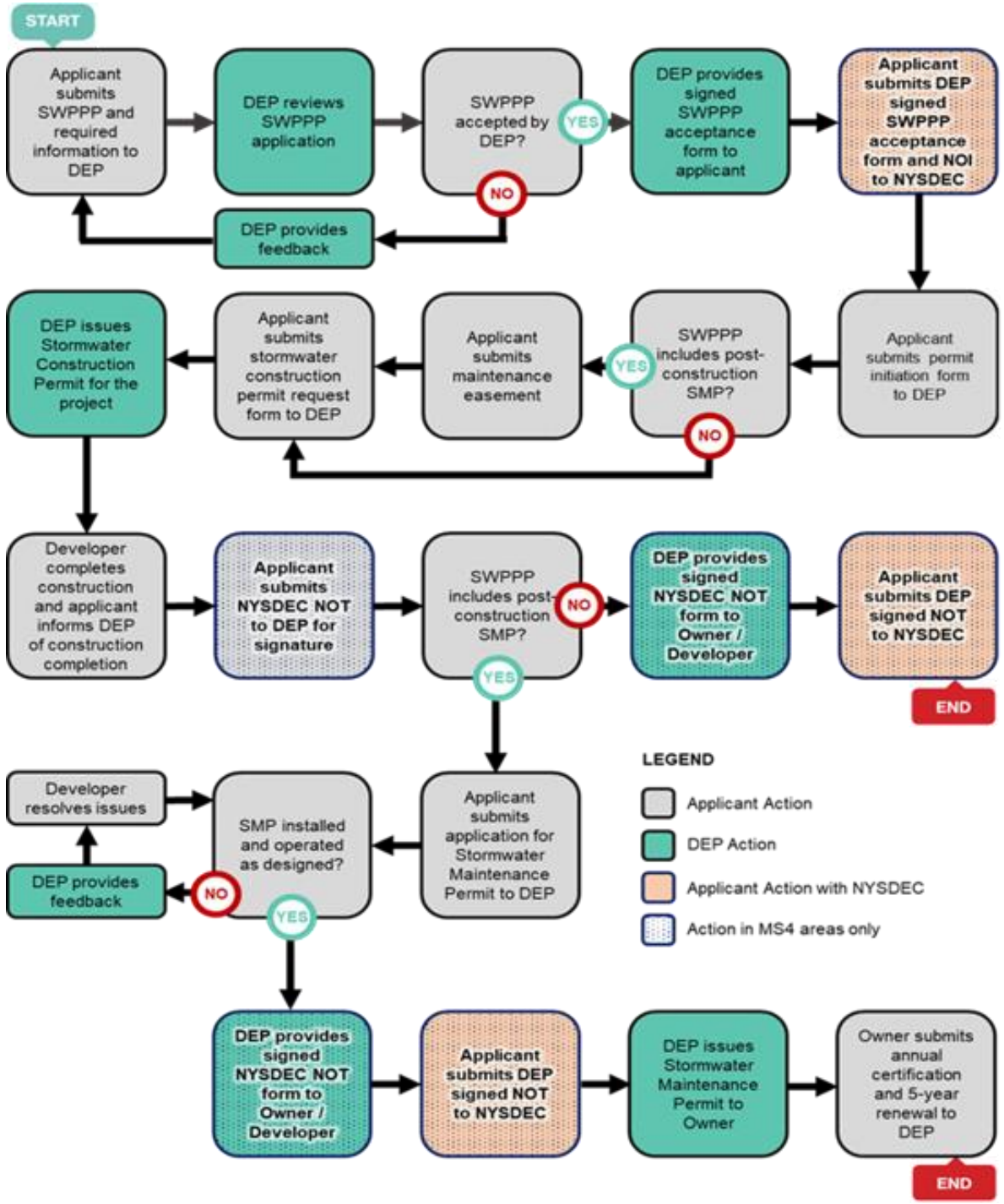


1 Construction work may begin, contingent on any other required permits

2 Site connection work may begin

Flow diagram #4: *inter-relationship between the stormwater construction permit and site/house connection proposal process, when both are applicable*

USWR Permit Process



Flow diagram #5: *detailed process for stormwater construction permits*

NYC Stormwater Manual

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MANAGING DIRECTOR, GI PLANNING & PARTNERSHIPS

NYC Environmental Protection

NYC Stormwater Manual Chapters

1: Introduction

2: Stormwater Management Requirements

- Stormwater Construction Permit (Chapter 19.1)
- Site/House Connection Proposal (Chapter 31)

3: City Development & Review Requirements

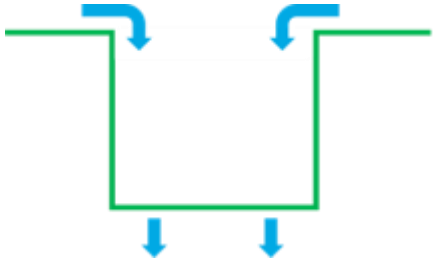
- Workflow for projects that trigger both Chapter 19.1 & 31 Permits
- Entire process for Chapter 19.1 Permits

4: SMP Selection & Design

5: Post-Construction Stormwater Management Requirements

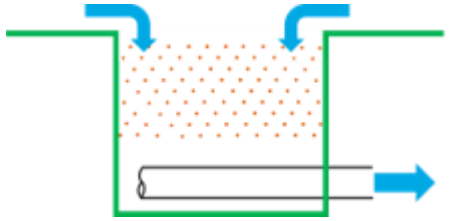
6: Right-of-Way Stormwater Management Requirements

Chapter 4: SMP Function Types



Infiltration

- Water is captured and infiltrated into the underlying soils, which is sometimes referred to as exfiltration.
- Relies on sufficient permeability rates of underlying soils. Practices do not use outlet pipes to drain water.
- Example: Bioretention, no outlet pipe

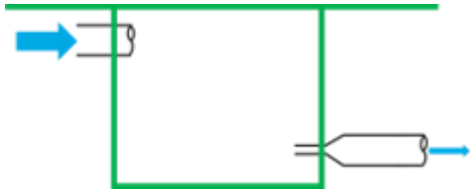


Filtration

- Water passes through a filtration media to remove various pollutants.
- Relies on steady flow of water through the filtration media. Practices have an outlet pipe to support filtration.
- Example: Sand filter

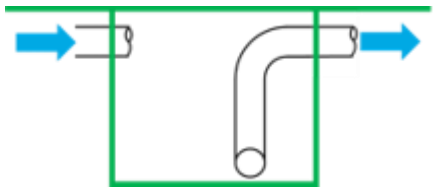
Evapotranspiration

- Water is captured and evaporated or transpired back into the atmosphere.
- Relies on ET occurring between rainfall events. Practices are usually shallow and have no or limited ability to infiltrate water.
- Example: Green roof



Detention

- Water is temporarily stored and released at a lower flow rate.
- Relies on ability to control release rate. Practices have a controlled-flow device, such as an orifice.
- Example: Detention tank



Reuse

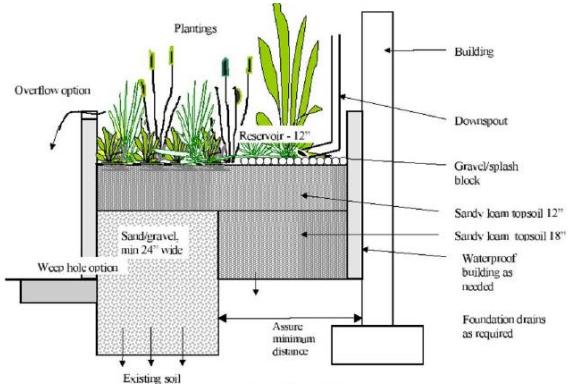
- Water is captured and reused for non-irrigation purposes.
- Relies on continuous reuse of water. Practices can be integrated into existing non-potable and non-contact water uses.
- Example: Reuse in cooling tower

Chapter 4: Benefits of Function Framework

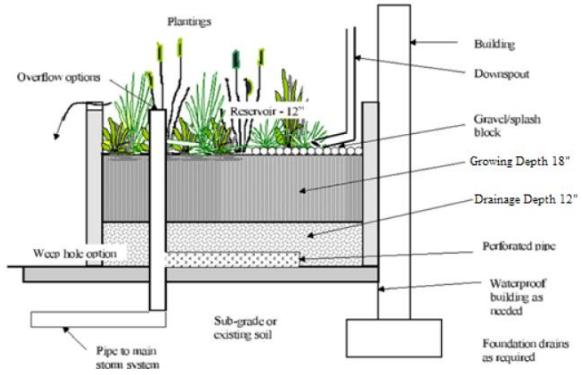
- Framework allows a wide range of potential configurations:
  - Practices may change function based on design components (see right)
  - Supports innovative systems, such as hybrid or dual functions

- Guidance that may be specified by function type:
  - Hierarchy (i.e., retention vs. treatment vs. detention)
  - Sizing (i.e., 100% runoff reduction vs. 40%)
  - Design criteria (i.e., min. infiltration rate or media depth)
  - Components (i.e., no outlet pipes vs. with outlet pipes)

Planter Box Example

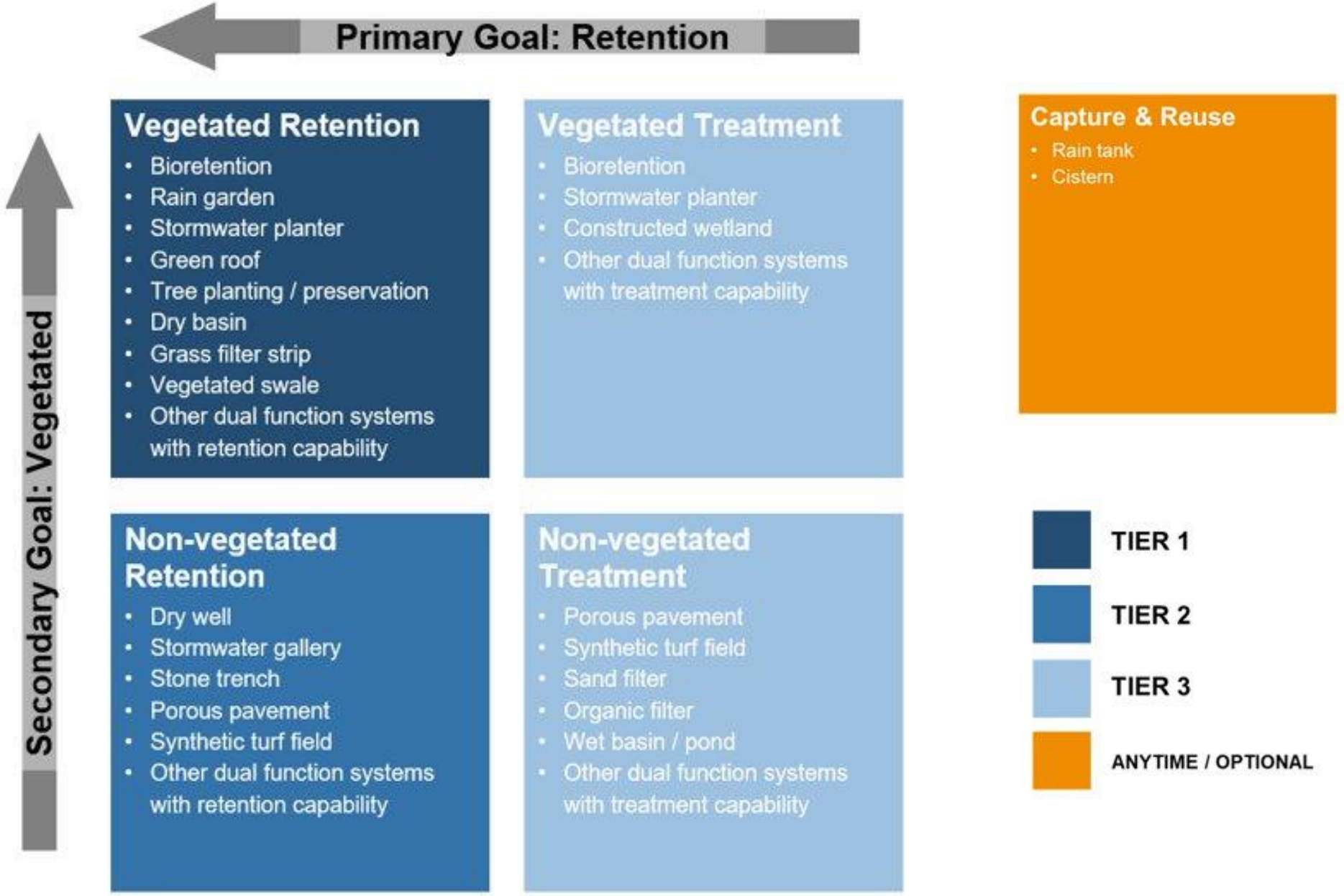


Infiltration

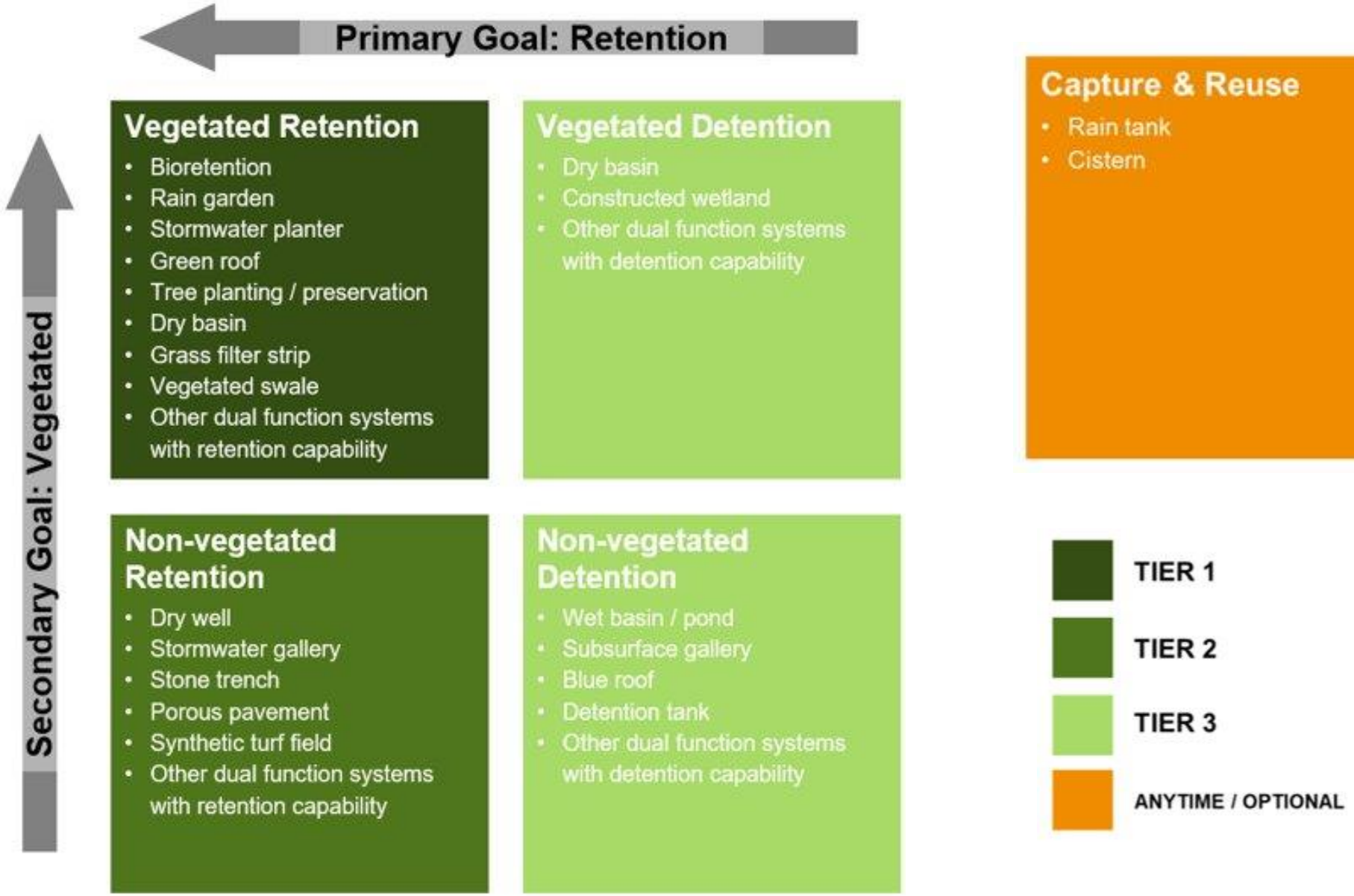


Filtration

Chapter 4: MS4 Area Hierarchy



Chapter 4: CSS Area Hierarchy



Chapter 4: Constraints

SMP HIERARCHY CHECKLIST - CSS AREAS

Tier[c]	Function Type[d]	Practice Type[e]	Percent of SMP volume applied[a]			Site constraints that limit SMP feasibility[b]				
			WQv	RRv	Vv	Soil	Subsurface	Hotspot	Surfaces	Space
Tier 1	Infiltration (Vegetated)	Bioretention	100	100	50	×	×	×	×	×
		Rain garden	100	100	50	×	×	×	×	×
		Stormwater planter	100	100	50	×	×	×	×	×
		Tree planting / preservation	SC	SC	0					
		Dry basin	100	100	50	×	×	×	×	×
		Grass filter strip	SC	SC	0	×	×	×	×	×
		Vegetated swale	SC	SC	0	×	×	×	×	×
	Evapotranspiration[f]	Rain garden	100	100	0		×		×	×
		Stormwater planter	100	100	0				×	
		Tree planting / preservation	SC	SC	0					
		Green roof	100	100	0					
Tier 2	Infiltration (Non-vegetated)	Dry well	100	100	50	×	×	×		×
		Stormwater gallery	100	100	50	×	×	×		×
		Stone trench	100	100	50	×	×	×	×	×
		Porous pavement	100	100	50	×	×	×		×
		Synthetic turf field	100	100	50	×	×	×	×	×
Anytime / Optional	Reuse	Rain tank	100	100	SC					
		Cistern	100	100	SC					
Tier 3	Detention[g,h,i]	Dry basin	100	0	100		×		×	×
		Constructed wetland	100	0	100		×		×	×
		Wet basin / pond	100	0	100		×		×	×
		Stormwater gallery	100	0	100		×			×
		Blue roof	100	0	100					
		Detention tank	100	0	100					

Soil constraints – permeability tests indicate that soil infiltration rates are less than 0.5 in/hr, which limits the use of infiltration practices.

Subsurface constraints – boring tests indicate that the bottom of practice would be less than three feet from the groundwater table or bedrock, which limits the use of most practices, except those enclosed in concrete with adequate anchoring as determined by an engineer.

Hotspot constraints – land use or soil conditions increase the risk of runoff contamination, which limits the use of infiltration practices, or those without liners. Specific criteria for demonstrating hotspot constraints are outlined in Chapter 4.

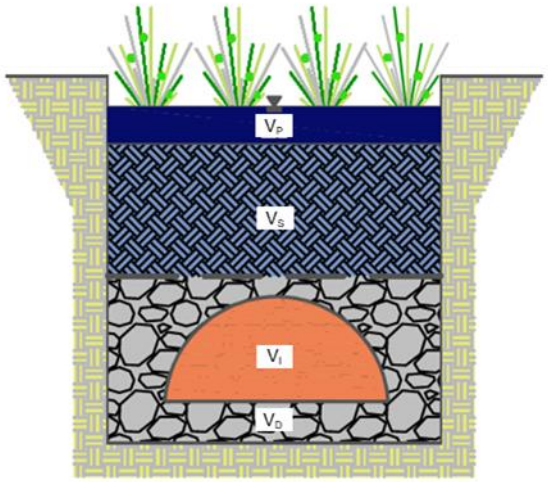
Surface constraints – regulations require the use of paved surfaces, which limits the use of vegetated practices. As an example, regulations for parking and/or egress requirements.

Space constraints – required setbacks from structures, utilities, property lines, existing trees, or other site features limits the use of practices at the ground level. General siting criteria for on-site projects can be found in Appendix C.

Chapter 4: Sizing

General steps:

- Calculate volume of practice
- Apply volume to applicable criteria
- Confirm drawdown time is acceptable



EQ4.1:

$$V_{SMP} = V_P + V_S + V_I + V_D$$

where:

V_{SMP} = storage volume of SMP (cf)
V_P = volume of surface ponding (cf)
V_S = volume of voids in the soil media layer (cf)
V_I = volume of voids created by internal structures such as chambers or pipes (cf)
V_D = volume of voids in the drainage media (cf)

	Percent of SMP Volume Applied to Requirement (F_A)		
SMP Function	**WQv**	**RRv**	**Vv**
Infiltration	100	100	50
Evapotranspiration	100	100	0
Reuse[A]	100	100	50
Filtration	100[B]	40[C]	0
Detention	100[D]	0	100

[A] Designers must demonstrate continuous and reliable capacity throughout the year (see Section 4.11)
[B] Applies to MS4 areas only
[C] Applies to practices with engineered soils only
[D] Applies to CSS areas and select detention practices with treatment abilities in MS4 areas

NYC Stormwater Manual Appendices

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CIVIL ENGINEER II, WATER & SEWER OPERATIONS

NYC Environmental Protection

Appendices

A. SMP Hierarchy Checklist

B. NNI Calculator Guide

C. SMP Siting Criteria

D. SMP Sizing Examples

E. Site Design Example

F. Controlled-Flow Pump Workbook

G. Detention in Series Workbook and Examples

H. ROW Guidance Materials

Appendix F: Controlled Flow Pump Workbook

Pump Head Losses

Reviewer: C. Moskos
Date: 11/24/2021

Example:
- 1 pump
- Fittings: 1 strainer, 1 swing check valve, 3 ball valves, 3 standards elbows, 1 45° elbow, 1 'flow thru run' tee, 1 'side to run' tee
- Pump start level: 152.08'
- Pump stop level: 151.75'
- Force main discharge elevation: 162'
- Detention volume: 1919 ft³
- Detention tank footprint: 366 ft²
- Force main diameter: 3"
- Force main length: 62'
- Hazen-Williams coefficient: 130*

*Choosing Hazen-Williams Coefficient:
New Wrought or Cast Iron, Steel, Ductile Iron, Vitrified: 130
New Concrete: 120

1. Input number of fittings in system.

Fittings	Losses # in System	
Strainer	320	1
Globe Valve, Open	340	
Angle Valve, Open	170	
Swing Check Valve, Open	80	1
Gate Valve, Open	7	
Ball Valve, Open	4	3
Standard Elbow	32	3
Medium Sweep Elbow	27	
Long Sweep Elbow	20	
45° Elbow	15	1
Flow through Wye	30	
Tee - Flow thru Run	20	1
Standard Tee - Side to Run	65	1
Tee - Side to Run, With Throat	45	
Enlargement, d/D = 1/4	32	
Enlargement, d/D = 1/2	20	
Enlargement, d/D = 3/4	7	
Contraction, d/D = 1/4	15	
Contraction, d/D = 1/2	12	
Contraction, d/D = 3/4	7	

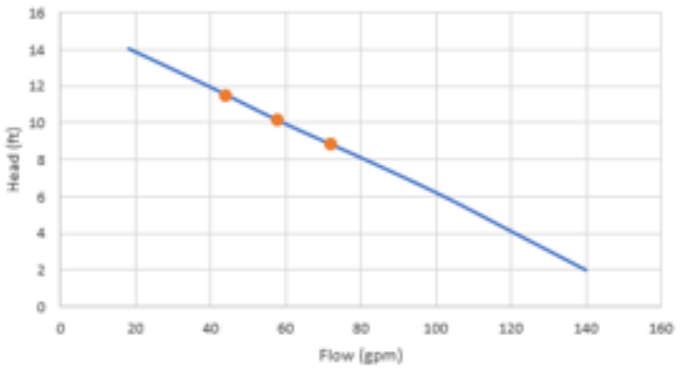
2. Input design information.

Pump start level	152.08	ft
Pump stop level	151.75	ft
Force main discharge elevation	162.00	ft
Detention volume	1919	ft³
Detention tank footprint	366	ft²
Force main diameter	3.0	in
Force main length	62.00	ft
Hazen-Williams coefficient	130	--

3. Build pump curve (from manufacturer).

Head (ft)	Flow (gpm)
2	140
4	121
6	102
8	81
10	59
12	39
14	18

Pump Performance Curve**



Manufacturer:	Flygt
Duty Point: Flow (gpm):	58.0
Duty Point: Head (ft):	9.8
Product:	NZ 3085.060 SH
Curve Number:	63-498-00-3856
Impeller Diameter (mm):	102

4. Change minimum and maximum flow rates until points align with pump curve.

	Head (ft)	Flow (gpm)
Maximum	8.81	72
Minimum	11.44	44
Average	10.12	58

Calculations:

Equivalent length of pipe for fittings	152	ft
Minimum static lift	5.01	ft
Maximum static lift	9.92	ft
Provided storage depth	5.24	ft
Maximum water level	156.99	ft
Maximum pump rate	0.160	cfs
Minimum pump rate	0.098	cfs
Average rate	0.129	cfs
$V^2/2g$	0.17	ft

*Note that applicants must include the pump curve on the site plan, along with all of the necessary

Key
- user input
- provided pump curve information
- calculation

Flow Rate

1. Input values:	Pipe diameter		in
	Hazen-Williams C		--
	Pipe length		ft
	Head loss		ft
2. Results:	Flow rate Q	#DIV/0!	cfs
		#DIV/0!	gpm
	$V^2/2g$	#DIV/0!	ft

Head Loss

1. Input values: ("Flow rate can be entered in either cfs or gpm, or both.)	Pipe diameter		in
	Hazen-Williams C		--
	Flow rate Q**		cfs
			gpm
	Pipe length		ft
2. Results:	Head loss % (Q, cfs)	#DIV/0!	%
	Head loss % (Q, gpm)	#DIV/0!	%
	Head loss	#DIV/0!	ft
	$V^2/2g$	#DIV/0!	ft

Equivalent Pipe Length (Pipes in Parallel)

1. For two pipes in parallel to be replaced by a single pipe of equivalent capacity, input:	Pipe 1 diameter		in
	Pipe 1 length		ft
	Pipe 2 diameter		in
	Pipe 2 length		ft
	Assumed head loss		ft
	Diameter of proposed eq. pipe		in
2. Equivalent pipe length:		#DIV/0!	ft

Equivalent Pipe Length (Pipes in Series)

1. For two pipes connected in series to be replaced by a single pipe of equivalent capacity, input:	Pipe 1 diameter		in
	Pipe 1 length		ft
	Pipe 2 diameter		in
	Pipe 2 length		ft
	Assumed flow rate Q		cfs
	Diameter of proposed eq. pipe		in
2. Equivalent pipe length:		#DIV/0!	ft

Appendix G: Detention in Series Workbook & Examples

Application of SMPs Toward Vv Criteria

	Percent of SMP Volume Applied to Requirement (F_A)		
SMP Function	**WQv**	**RRv**	**Vv**
Infiltration	100	100	50
Evapotranspiration	100	100	0
Reuse[A]	100	100	50
Filtration	100[B]	40[C]	0
Detention	100[D]	0	100

[A]Designers must demonstrate continuous and reliable capacity throughout the year (see Section 4.11)
[B]Applies to MS4 areas only
[C]Applies to practices with engineered soils only
[D]Applies to CSS areas and select detention practices with treatment abilities in MS4 areas

Detention in Series Workbook

PROJECT NAME
PROJECT ID
ADDRESS

Notes: Use this form to determine the required storage volumes for detention systems in series. There are two parts to this form. In the first part, users input properties of the downstream detention system. In the second part, users input properties of each individual upstream area that drains to the downstream detention system. Inputs are entered in the yellow cells and outputs are shown in the gray cells.

ERRORS: None

DOWNSTREAM SYSTEM

INPUTS			OUTPUTS	
Permit Type	Total Contributing Area	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	cfs	cf	#
CSS - SCP	40000	0.092	3883	0.63

UP STREAM SYSTEM

INPUTS					OUTPUTS	
TDA ID	TDA Area	C-value	Detention System Type	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	#	name	cfs	cf	#
1	20000	0.95	Blue Roof	0.5	1829	0.41
2	20000	0.85	None			0.85

Next Steps

Mikelle Adgate

SENIOR ADVISOR, PUBLIC AFFAIRS & COMMUNICATIONS

NYC Environmental Protection

Public Briefings and Comments

Event	Date/Time	Virtual Meeting
Informational Briefing #1	December 20, 2021 4:00PM	Zoom
Informational Briefing #2	January 4, 2022 10:00AM	Zoom
Public Hearing	January 10, 2022 11:00AM	Microsoft Teams

Resources

1. Unified Stormwater Rule Overview
2. Chapter 31
3. Chapter 19.1
4. NYC Stormwater Manual

Questions?

Send comments/questions to nycrules@dep.nyc.gov

NYC Environmental Protection