

Understanding Detroit's Stormwater Management Regulations* Workshop

April 30, 2019

Hosted by Detroit Water and Sewerage Department (DWSD)
at Southeast Michigan Council of Governments (SEMCOG)

*(formerly known as PCSWMO)





Workshop Agenda

- 9:00 am Welcome, Introduction, **Workshop Goals**
- 9:10 am Introduction to the **Stormwater Management Regulations** and the **Stormwater Management Design Manual**
- 9:25 am Determining **Applicability** of the Stormwater Management Regulations
- 9:45 am Understanding and **Applying** Stormwater Management **Performance Standards**
- 10:30 am Developing and Submitting a **Post-Construction Stormwater Management Plan**
- 11:00 am **Alternative Compliance** Options
- 11:30 am Plan **Review and Approval** Process
- Noon Adjourn

Workshop Goals

- **Assist developers, and consultants** in understanding **how to comply** with Detroit's Stormwater Management Regulations
- Provide understanding of **available technical resources**, including Detroit's Stormwater Management Design Manual
- **Answer** participant questions or **document questions** to provide answers after workshop



What This Workshop Won't Cover

Technical Details on
Nonresidential Drainage Charge Credits

(Visit DWSD's Website for Drainage Charge Credit
Resources)

detroitmi.gov/departments/water-and-sewerage-department

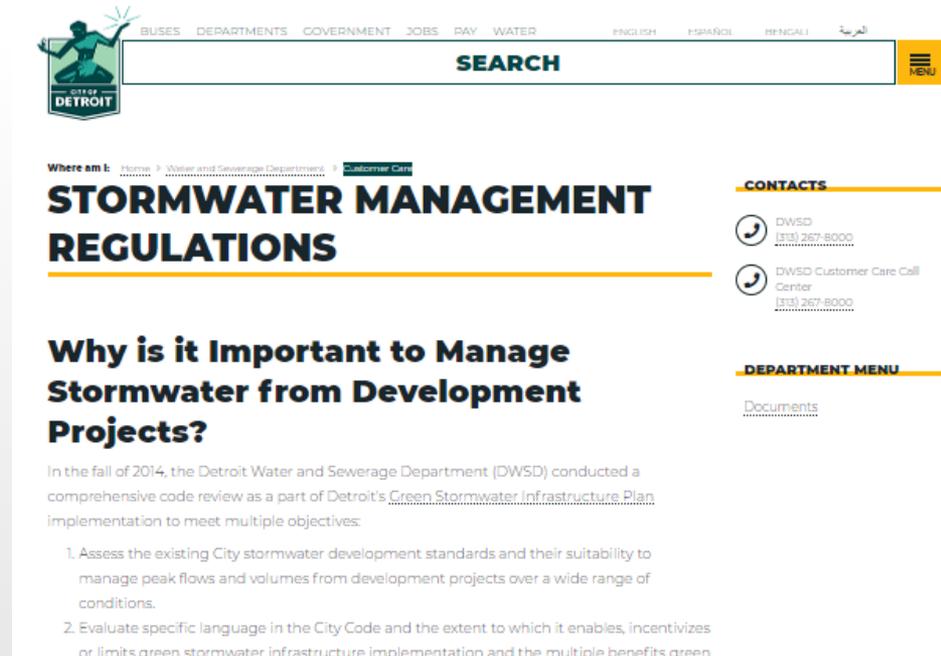
Resources for Today and Beyond

Handouts

- Agenda
- Evaluation Form

Online

- Detroit's Stormwater Management Design Manual
- Checklists
- Fact Sheet
- Contact Info



The screenshot shows the City of Detroit website's navigation bar with links for BUSES, DEPARTMENTS, GOVERNMENT, JOBS, PAY, WATER, ENGLISH, ESPAÑOL, BENGALI, and العربية. A search bar is present with the word "SEARCH" in red. Below the navigation is a breadcrumb trail: "Where am I: Home > Water and Sewerage Department > Customer Care". The main heading is "STORMWATER MANAGEMENT REGULATIONS" in large, bold, black letters. To the right, there is a "CONTACTS" section with two entries: "DWSD (313) 267-8000" and "DWSD Customer Care Call Center (313) 267-8000". Below that is a "DEPARTMENT MENU" section with a link for "Documents". The main content area starts with the heading "Why is it Important to Manage Stormwater from Development Projects?" followed by a paragraph: "In the fall of 2014, the Detroit Water and Sewerage Department (DWSD) conducted a comprehensive code review as a part of Detroit's Green Stormwater Infrastructure Plan implementation to meet multiple objectives:". This is followed by a numbered list of two points: "1. Assess the existing City stormwater development standards and their suitability to manage peak flows and volumes from development projects over a wide range of conditions." and "2. Evaluate specific language in the City Code and the extent to which it enables, incentivizes or limits green stormwater infrastructure implementation and the multiple benefits green".

detroitmi.gov/departments/water-and-sewerage-department

Introduction to the Stormwater Management Regulations and the Stormwater Management Design Manual

Why Does Detroit Need Stormwater Management Regulations?

- **Historically no requirements** to manage stormwater from site development in the City of Detroit
- Combined sewer overflow (**CSO**) program to eliminate untreated overflows is **not complete**
- National Pollutant Discharge Elimination System (NPDES) **permit** (joint with GLWA) **requires** DWSD and GLWA to develop a *“stormwater control requirement for areas of new and/or redevelopment”*



What are the Goals of the Stormwater Management Regulations?

- **Meet permit obligations** to develop stormwater controls
- **Reduce** the amount of **stormwater entering the combined sewer**
- Reduce or **prevent untreated CSOs**
- Decrease the **discharge of polluted runoff** into area waterways
- **Reduce** localized **flooding** and basement back-ups
- **Increase** the **infiltration** of runoff into groundwater systems to replicate more **natural conditions**



Overview of the Stormwater Management Regulations

- **Passed by City Council** on November 13, 2018
 - Found under Chapter 56, of the 1984 Detroit City Code, Utilities, Article III, Sewers and Drains, Division 4, Stormwater Management
 - Now effective, so technically Stormwater Management Regulations
- **Applies** to projects that meets **applicability threshold**; some projects exempt
- Establishes **performance standards**
- Requires **approved** Post-Construction Stormwater Management **Plan** (PCSWMP)
- Requires periodically **inspections**

Detroit Stormwater Management Design Manual

- **Technical resource** for developers and property owners
- Includes stormwater management site **design guidance** to meet Stormwater Management requirements
- Enables Detroit depts. to **maintain uniformity** with stormwater design standards and to conduct **effective and efficient design reviews**
- Assists developers to **select appropriate** stormwater control measures (**SCM**) for their project
- Available on the **city website**

What You'll Find Inside



THE CITY OF DETROIT
Water and Sewerage Department

Stormwater Management Design Manual



- Regulatory Requirements
- Hydrologic Procedures
- Drainage Conveyance
- Soil & Aggregates
- SCM Design Specifications:
 - Detention Practices
 - Bioretention
 - Infiltration Practices
 - Permeable Pavement
 - Rainwater Harvesting
 - Living Roofs and Walls
 - Stormwater Wetlands
 - Manufactured Treatment System
 - Trees for Stormwater Management

Stormwater Management Regulations: Key Definitions

Impervious

Any surface area that **prevents** or substantially impedes the **entry of water into the soil** in a manner that such water entered the soil **under natural conditions** pre-existent to development, or which cause water to run off the surface in greater quantities or at an increased rate of flow than that present under natural conditions pre-existent of development, including but not limited to **roofs, parking lots, driven on (compacted) gravel and dirt, driveways, sidewalks and storage areas.**



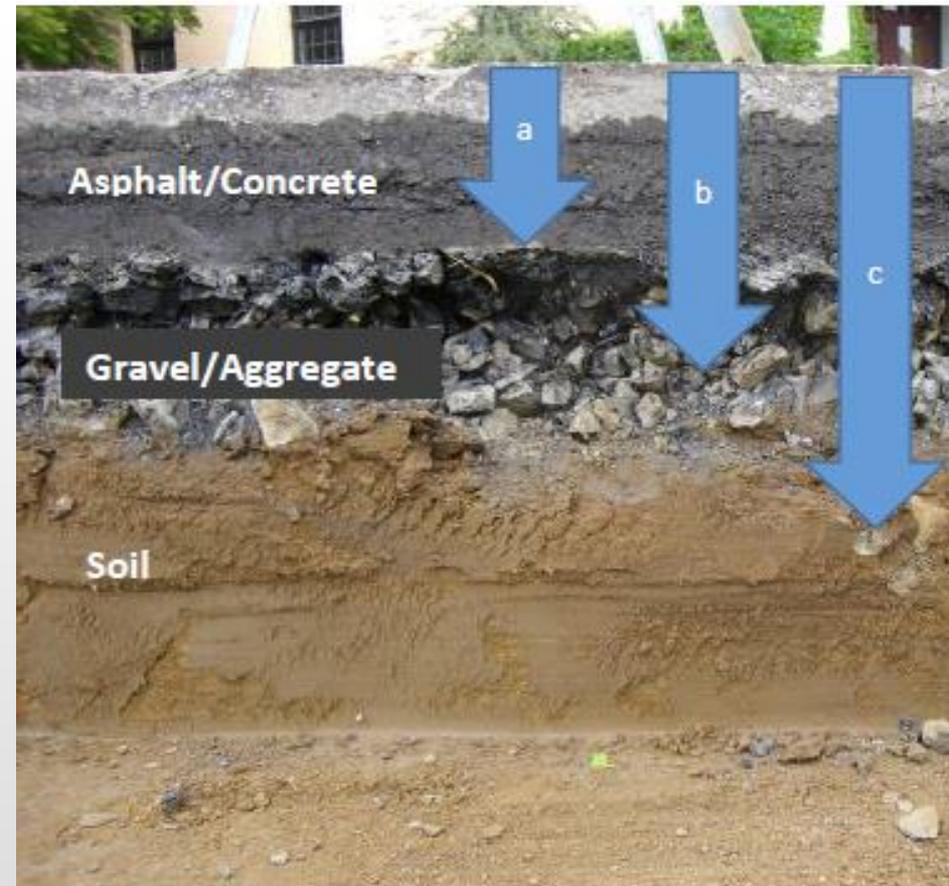
Regulated Construction Activity

A human-made activity, including without limitation **clearing, grading, excavating, construction and paving**, that results in a **change** in the **existing cover** or topography of land, including any external demolition, modification or alteration of a site or the footprint of a building. **Does not include re-surfacing** of an asphalt, concrete or similar parking lot that does not expose the subgrade.



Rehabilitation versus New or Redevelopment

- If project does not reach or exceed depth “a”
 - **DOES NOT** trigger ordinance
- If project exposes depths “b” and “c”
 - **DOES** trigger ordinance



Stormwater Management Regulations: Applicability Threshold

Applicability Threshold

- Any new or redevelopment project which creates or replaces **0.5 acres** (21,780 square feet) or more of **impervious surface** will be considered a regulated construction activity and will be subject to the stormwater management requirements



Exemptions

- The construction of *one* **Single Family** Detached Dwelling as defined in Zoning Ordinance (not part of a common plan of development)
- **Emergency maintenance** work performed to protect public health/safety
- A Regulated Construction Activity that discharges stormwater directly **to the Detroit River or Rouge River** via any conveyance not owned by the City



Determining Applicability

Will development create or replace ½ acre (21,780 square feet) of impervious surface?

No

Stormwater Management Regulations do not apply.

Yes

Is the development defined as any of the following?

- Single family detached dwelling unit
- Emergency maintenance/access only
- Regulated construction activity that discharges directly to the Detroit River or Rouge River through a non-DWSD conveyance

No

Stormwater Management Regulations apply.
Proceed to determining applicable stormwater management performance standards.

Yes

Stormwater Management Regulations do not apply.

If Stormwater Management Regulations apply to a project, site owner must:

- **Comply** with performance standards
 - Onsite
 - Offsite (alternative compliance)
- **Develop and submit** a Post-Construction Stormwater Management Plan (**PCSWMP**) to DWSD for review and approval
- **Pay** required **fees**
- **Implement** approved PCSWMP
- Conduct periodic **inspections**

Questions?

Understanding and Applying Stormwater Management Performance Standards

Purpose of Stormwater Management Performance Standards

- Improve water quality
- Protect integrity of DWSD's infrastructure
- Protect channels of receiving waters
- Control localized flooding



How Do Performance Standards Work?

- Stormwater Management Regulations require stormwater management control(s) that retain, detain, and treat stormwater runoff from the regulated area of a site
- Performance standards establish requirements to guide stormwater management control selection by specifying:
 - Volume that shall be retained permanently on-site (e.g. infiltrated into the ground, reuse/recycle) and treated
 - Volume that must be detained temporarily
 - Rate at which that detained water can eventually be conveyed to DWSD's sewer system and receiving waters

Regulated Area for Performance Standard Compliance

- Regulated Area = portion of a development site used as the basis to determine compliance with performance standards
- Varies based on:
 - Site discharge location (combined v. separate sewer areas)
 - Amount of construction activity disturbance on site



Volume-related Definitions for Performance Standards

- Regulatory volume is the quantity of water that has to be retained
- Water quality volume is the amount of water that has to be treated

Overview of Stormwater Management Performance Standards

- Three types of performance standards
 - Flood Control
 - Water Quality Standards
 - Infrastructure and Channel Protection
- Standards and Regulated Area vary depend on site discharge location
 - Combined sewer system (97% of Detroit)
 - Separate storm sewer system (some of the fringe areas immediately adjacent to the Rouge River, the Detroit River, and the canals)
 - Check with DWSD if uncertain
 - DWSD may separate some combined sewers over time



Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

Overview

Discharge To	Water Quality	Infrastructure / Channel Protection	Flood Control
Combined Sewer System	Match natural conditions for peak flow and volume for the 90 th percentile storm event.	The peak flow rate of stormwater runoff shall not exceed the predevelopment peak flow rate for the 2-year, 24-hour storm.	*Peak flow only
	Remove a minimum of 80% of the total suspended solids compared to the uncontrolled runoff or to a discharge concentration ≤ 80 mg/L of total suspended solids.	Regulated Area: Entire development site	Drainage Area < 5 acres, manage 10-year, 24-hour storm
Separate Sewer System	Regulated Area: Construction activity < 50 percent of development site = construction activity area		Drainage Area > 5 acres, manage 100-year, 24-hour storm
	Construction activity > 50 percent of development site = entire development site		Release rate of 0.15 cfs/acre
Separate Sewer System	Remove a minimum of 80% of the total suspended solids compared to the uncontrolled runoff or to a discharge concentration ≤ 80 mg/L of total suspended solids.	*Peak flow and volume	Regulated Area: Entire development site
	Regulated Area: Regulated construction activity	Match natural conditions for peak flow and volume for the 2-year, 24-hour storm event	
		Regulated Area: Regulated construction activity	



Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

Combined Sewer System: Water Quality Standards

- Core Requirements:
 1. Match **natural conditions** for **volume and peak** flow for 90th percentile storm event (or **1-inch** storm)
 2. Water quality volume must be treated to remove 80% of TSS compared to uncontrolled runoff (or 80 mg/L discharge concentration)
- Regulated Area based on area of construction activity
- If Regulated Construction Activity disturbs:
 - 50% or more of the Development Site, the Regulated Area = Entire Development Site
 - Less than 50% of the Development Site, the Regulated Area = the area of the Regulated Construction Activity

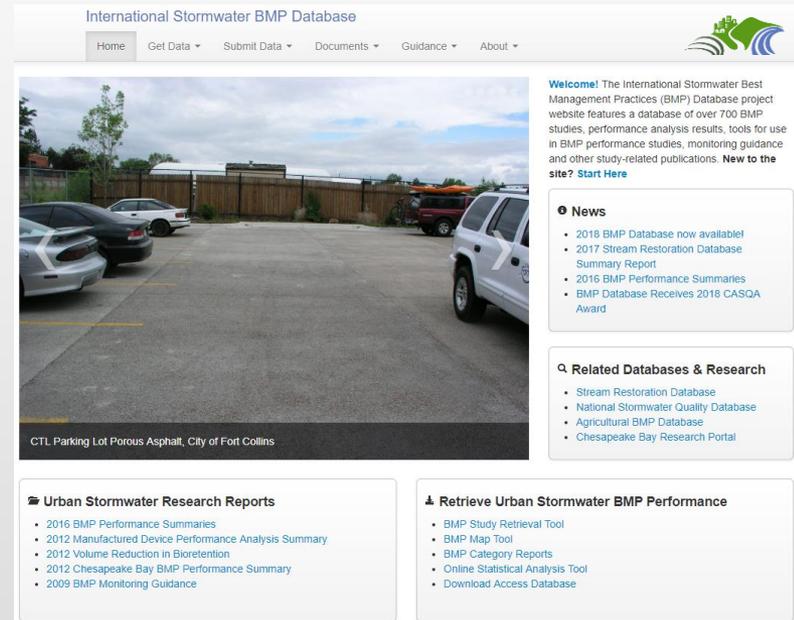
Natural Conditions

- Natural Condition: Land covered in a good stand of brush, forb, and grass mix
- Small Storm Hydrology (Design Manual Section 4.2.4)
 - $Rv = 0.05 + 0.009 * I$ (Eqn. 4.11)
 - where I = percent impervious (0-100)
- Design Manual Section 4.2.5 Curve Number Method
 - Small Storms: As a general guideline, runoff from rainfall events smaller than 1 to 1.5 inches should be computed with a method other than the CN method
 - Design Manual: Table 4-12 Curve Number Coefficients

Land Cover Description	Hydrologic Soil Group			
	A	B	C	D
Brush, Forb, Grass Mix, Good vegetation cover	30	48	65	73

Sediment Removal

- Assumed met if water soaked in the ground
- Literature values assumed for green infrastructure practices
 - International BMP database.
 - <http://www.bmpdatabase.org/>
- Refer to Design Manual Chapter 14 for Manufactured Treatment Devices



The screenshot shows the homepage of the International Stormwater BMP Database. The page features a navigation menu with links for Home, Get Data, Submit Data, Documents, Guidance, and About. A large image of a parking lot with a permeable asphalt surface is displayed, with the caption "CTL Parking Lot Porous Asphalt, City of Fort Collins". To the right of the image is a "Welcome!" message and a "News" section with several bullet points. Below the news section is a "Related Databases & Research" section with links to various databases. At the bottom of the page, there are two sections: "Urban Stormwater Research Reports" and "Retrieve Urban Stormwater BMP Performance", each with a list of links to specific reports and tools.

International Stormwater BMP Database

Home Get Data Submit Data Documents Guidance About

Welcome! The International Stormwater Best Management Practices (BMP) Database project website features a database of over 700 BMP studies, performance analysis results, tools for use in BMP performance studies, monitoring guidance and other study-related publications. **New to the site? [Start Here](#)**

News

- 2018 BMP Database now available!
- 2017 Stream Restoration Database Summary Report
- 2016 BMP Performance Summaries
- BMP Database Receives 2018 CASQA Award

Related Databases & Research

- Stream Restoration Database
- National Stormwater Quality Database
- Agricultural BMP Database
- Chesapeake Bay Research Portal

Urban Stormwater Research Reports

- 2016 BMP Performance Summaries
- 2012 Manufactured Device Performance Analysis Summary
- 2012 Volume Reduction in Bioretention
- 2012 Chesapeake Bay BMP Performance Summary
- 2009 BMP Monitoring Guidance

Retrieve Urban Stormwater BMP Performance

- BMP Study Retrieval Tool
- BMP Map Tool
- BMP Category Reports
- Online Statistical Analysis Tool
- Download Access Database

CTL Parking Lot Porous Asphalt, City of Fort Collins

Site Example: Existing Conditions

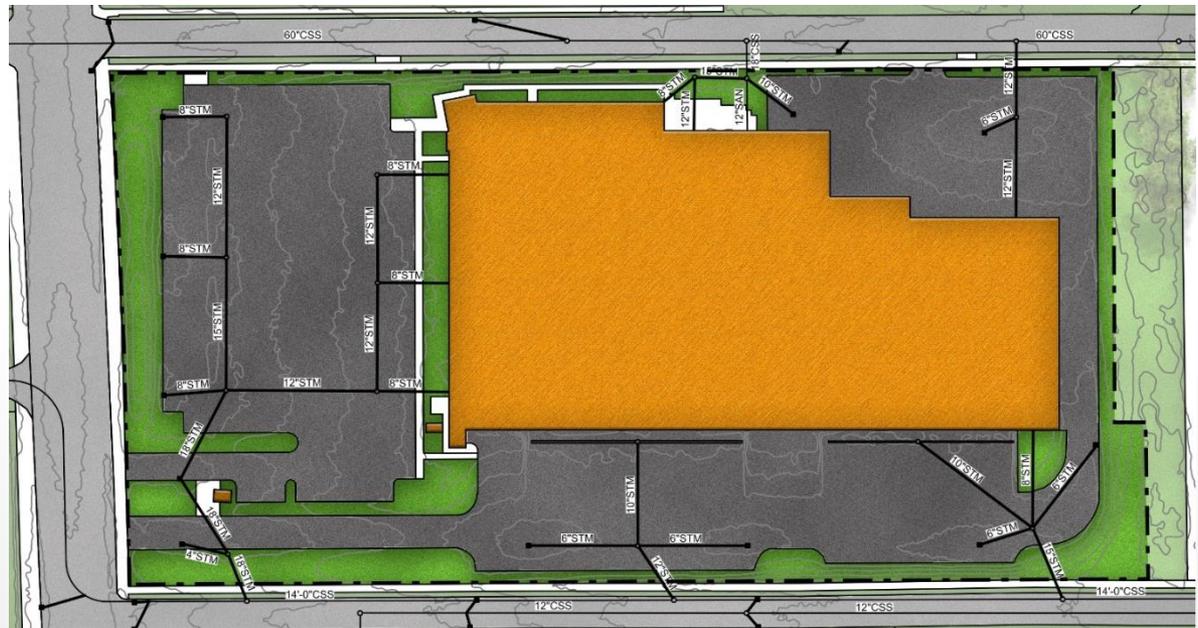


The information is current as of the DWSD Workshop held on April 30, 2019.



Site Example: Existing Conditions

Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

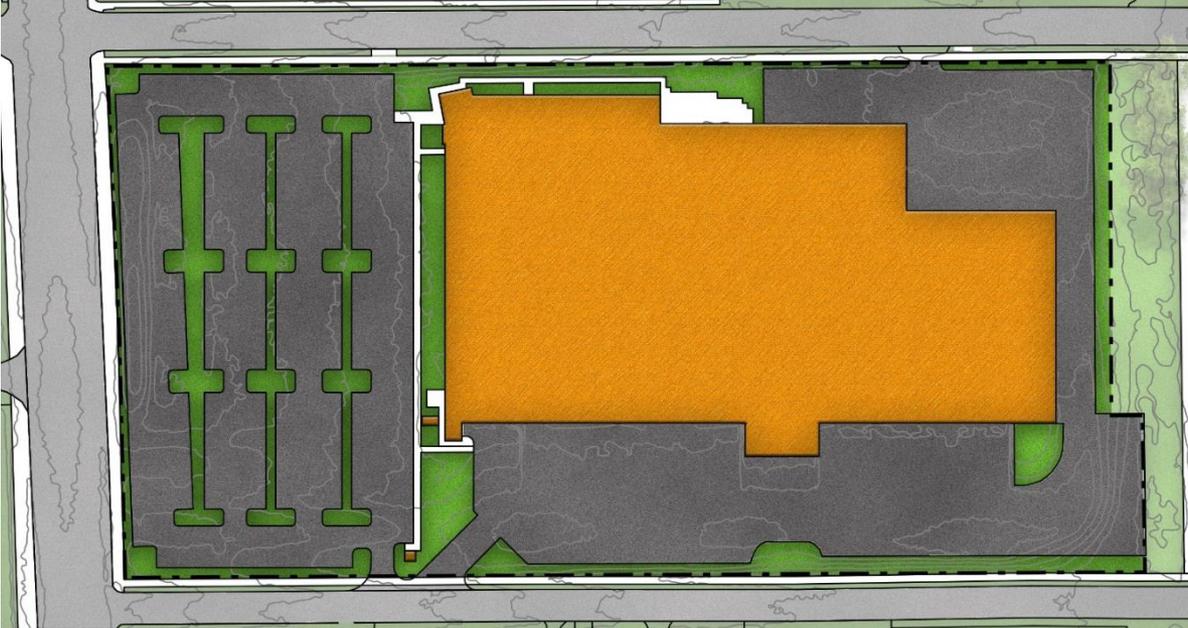


Land Cover		Area (sf)	Area (ac)	Percent
Impervious	Building	148,584	3.41	33.1%
	Asphalt	206,154	4.73	46.0%
	Concrete	9,042	0.21	2.0%
	<i>Subtotal</i>	<i>363,780</i>	<i>8.35</i>	<i>81.2%</i>
Pervious		84,499	1.94	18.8%
Total		448,279	10.29	100%

The information is current as of the DWSD Workshop held on April 30, 2019.



Site Example: Proposed Conditions



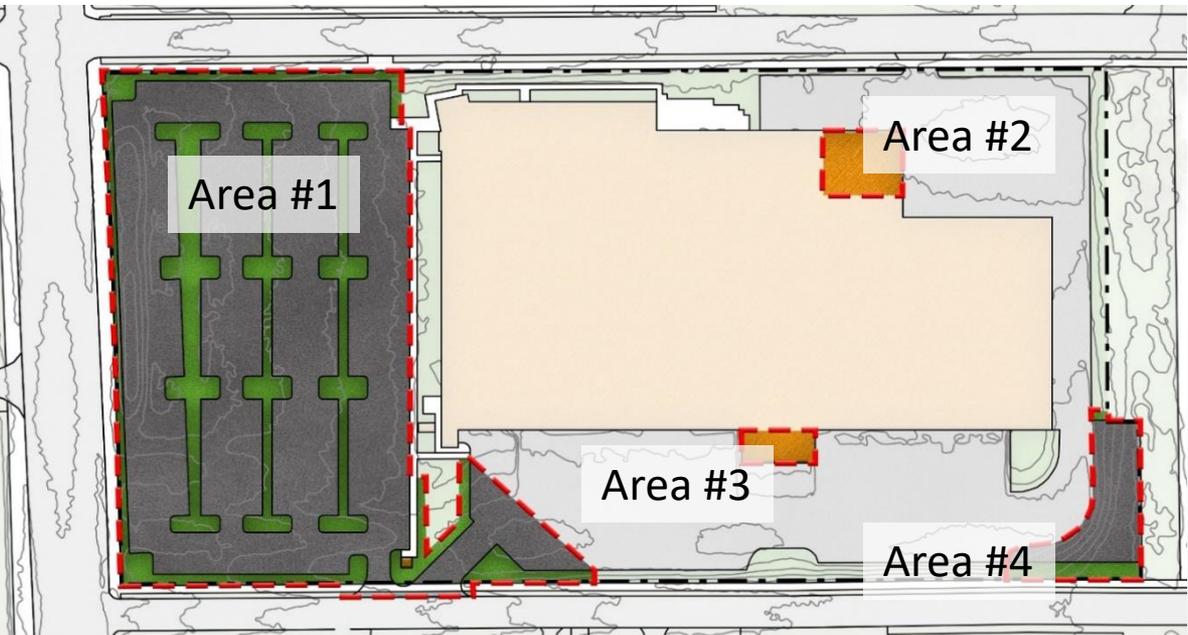
Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

Land Cover		Area (sf)	Area (ac)	Percent
Impervious	Building	148,584	3.41	34.6%
	Asphalt	206,154	4.73	47.5%
	Concrete	9,042	0.21	1.8%
	<i>Subtotal</i>	<i>363,780</i>	<i>8.35</i>	<i>84.0%</i>
Pervious		84,499	1.94	16.0%
Total		448,279	10.29	100%

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Site Example: Proposed Conditions



Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

Construction Activity

- 162,093 sf / 448,279 sf
- 36% of site

Regulated Area

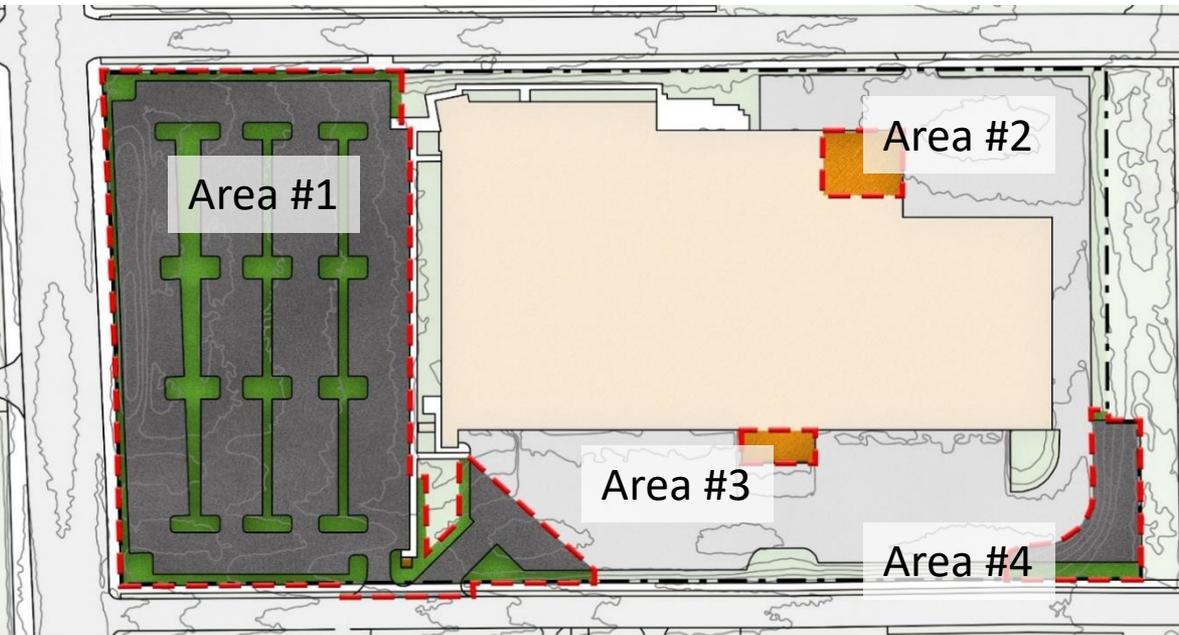
- <50% of site
- Therefore regulated area = construction activity area
- 162,093 sf (3.72 ac)

	Area #1	Area #2	Area #3	Area #4	Total
Impervious (sf)	108,615	4,570	2,010	7,760	122,955
Pervious (sf)	36,840	0	0	2,298	39,138
Total (sf)	145,455	4,570	10,058	10,058	162,093

The information is current as of the DWSD Workshop held on April 30, 2019.



Site Example: Proposed Conditions



Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

Water Quality Volume

- Eqn 4.11
- $R_v = 0.05 + 0.009 * I$
- Developed $R_v = 0.73$
- Natural $R_v = 0.05$
- Change $R_v = 0.68$
- Volume Runoff
- $R_v * P * A$
- $0.68 * 1 \text{ inch} * 162,093 \text{ sf}$
- 9,222 cf

Side Note

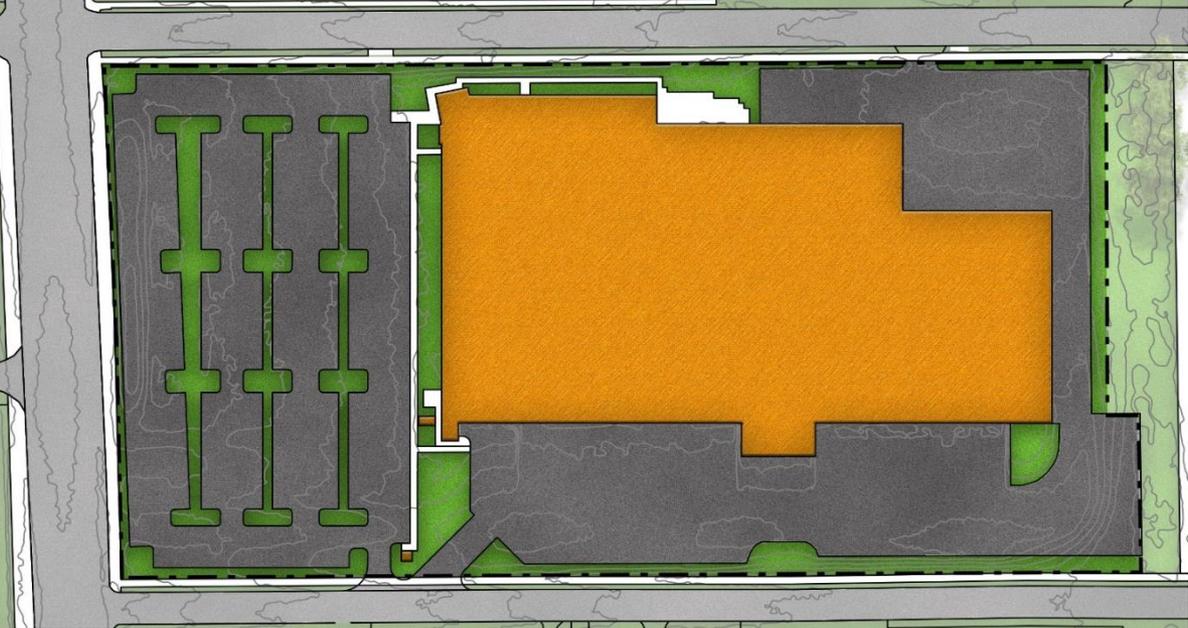
- *Equation 4.10 and 4.11 can be written*
- *$WQv = 0.90 \text{ inches} * \text{impervious area}$*
- *$0.9 \text{ in} * 122,955 \text{ sf}$*
- *9,222 cf*

	Area #1	Area #2	Area #3	Area #4	Total
Impervious (sf)	108,615	4,570	2,010	7,760	122,955
Pervious (sf)	36,840	0	0	2,298	39,138
Total (sf)	145,455	4,570	10,058	10,058	162,093
Percent Impervious	75%	100%	100%	77%	76%
R_v Post Dev. (Eqn 4.11)	0.72	0.95	0.95	0.74	0.73
Runoff Volume Post (Eqn 4.10) (cf)	8,752	362	159	624	9,897
R_v Natural	0.05	0.05	0.05	0.05	0.05
Runoff Volume Natural (Eqn 4.10) (cf)	606	19	8	42	675
Water Quality Volume to Retain (cf)	8,146	343	151	582	9,222



Site Example: Proposed Conditions

Discharge To	Water Quality	Infra/Channel	Flood Control
Combined			
MS4			



Summary

- Regulated Area = construction area since < 50% of site
- Water Quality Volume = 9,222 cf
 - Soak this into the ground to match natural conditions
 - Based on Eqn 4.10 and 4.11, other approaches are acceptable
- TSS criteria met if water quality volume soaked into the ground

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Discharge To	Water Quality	Infra/Channel	Flood Control
Combined			
MS4			

Simple Approach Example

Soaking Water into the Ground

- Water Quality Volume = 9,222 cf

Infiltration Rate

- Measure it (refer to Chapter 6)
- Say measured rate is 0.10 inches per hour
- Safety factor = 2
- Rate for calculations = $0.10 / 2 = 0.05$ inches/hour

Water Depth for Soaking in the Ground

- Total allowable duration = 72 hrs.
- Water depth = $72 \text{ hr} * 0.05 \text{ in/hr} = 3.6 \text{ in}$
- Surface water duration = 24 hrs.
- Water depth = $24 \text{ hr} * 0.05 \text{ in/hr} = 1.2 \text{ in}$
- Subsurface depth = $3.6 \text{ in} - 1.2 \text{ in} = 2.4 \text{ in}$

Bioretention Cross Section

- Soil effective porosity = 20%
- Equivalent water depth = 2.4 in
- Soil depth = $2.4 \text{ in} / 0.20 = 12 \text{ in}$
- Ponding depth = 1.2 in

Bioretention Surface Area

- Surface Area = Volume / equiv. water depth
- Surface Area = $9,222 \text{ cf} / 3.6 \text{ in}$
- Surface Area = 30,740 sf

Just one quick example idea, many other possibilities are available

Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

Combined Sewer System: Infrastructure Protection Standards

- **Peak flow** rate of runoff shall not exceed the **predevelopment** peak flow rate for 2-year, 24-hour storm
- Regulated Area = **Entire Development Site**



Design Storms

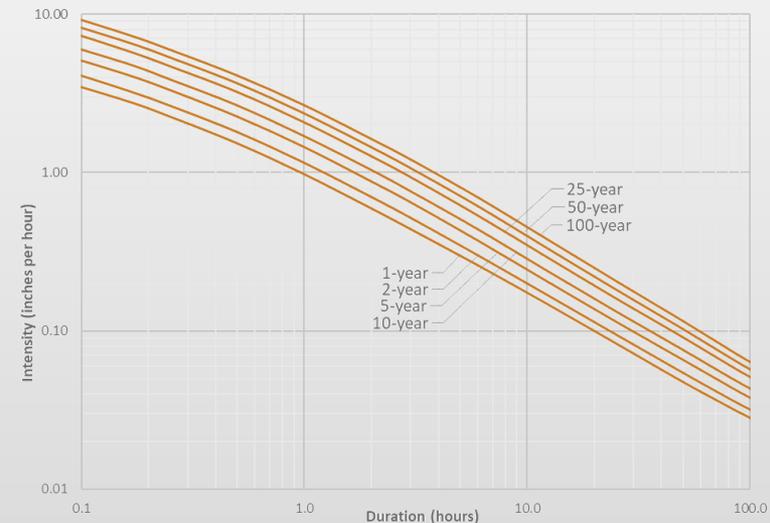
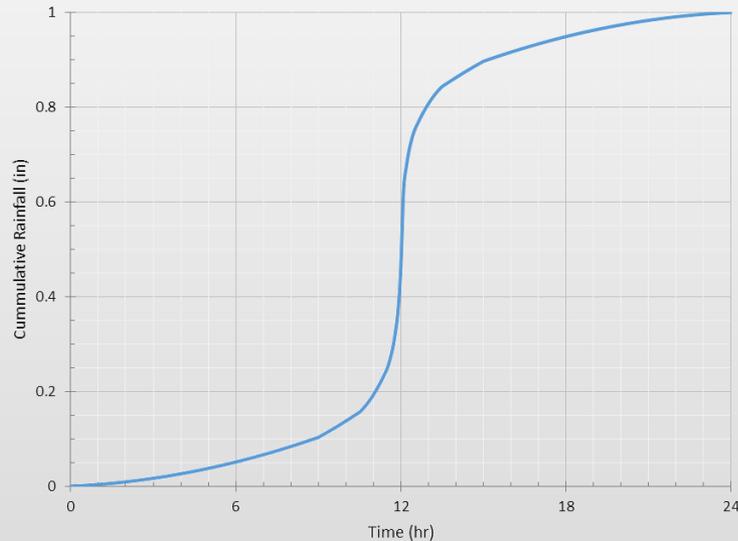
Design Manual Chapter 4 Hydrology

- Section 4.1.1 contains Intensity-Duration-Frequency (IDF) table, curve, and equation
- Section 4.1.4 MSE3 rainfall distribution

$$i = \frac{38.4164T^{0.2082}}{(12.3258+D)^{0.8405}} \quad (4.1)$$

where i = design rainfall intensity, in/hr.
 T = return period, yr.
 D = duration, min

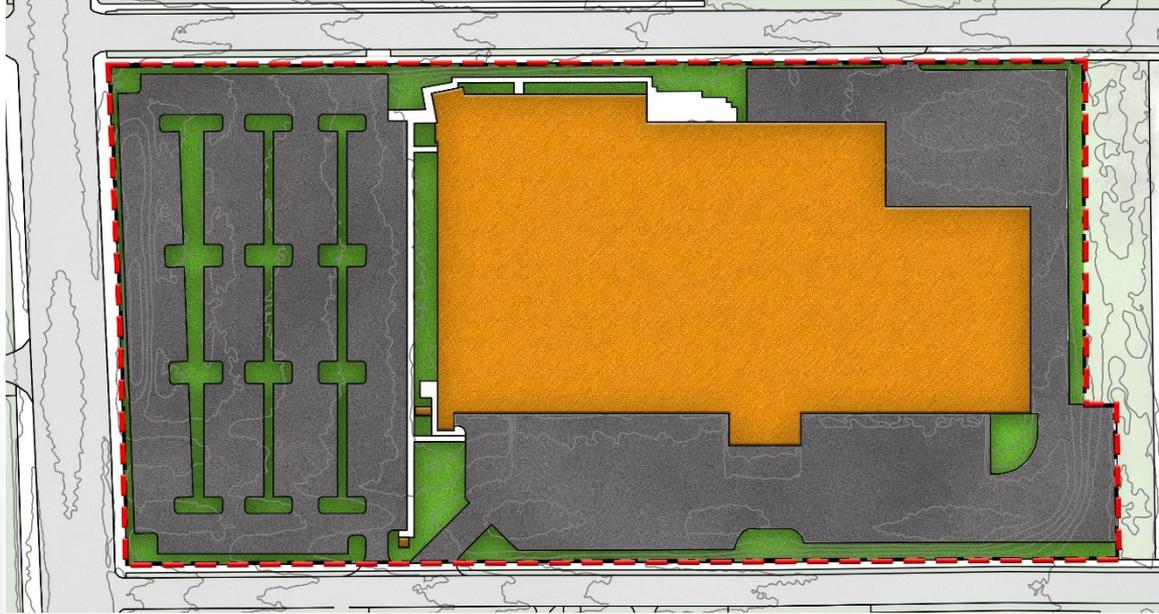
Duration	2 year	10 year	100 year
5 min	0.37	0.54	0.83
10 min	0.54	0.80	1.22
15 min	0.66	0.97	1.49
30 min	0.90	1.33	2.05
1 hour	1.15	1.70	2.66
2 hour	1.40	2.08	3.26
3 hour	1.55	2.29	3.63
6 hour	1.80	2.64	4.19
12 hour	2.06	2.94	4.65
24 hour	2.35	3.31	5.15





Site Example: Proposed Conditions

Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			



Land Cover	Predevelopment {Existing} (ac)	Proposed (ac)
Impervious	8.35	8.64
Pervious	1.94	1.65
Total	10.29	10.29

- Regulated Area = Entire Development Site
- **Peak flow** rate of runoff shall not exceed the **predevelopment** peak flow rate for 2-year, 24-hour storm
- Calculate peak flow for predevelopment (existing) site development conditions
 - Rational Method
 - CN Method with unit hydrograph and MSE3 distribution
- Design storage for the 2-year storm event with a release rate not to exceed the predevelopment peak flow
- *Typically easiest to design storage with the flood control requirements*

The information is current as of the DWSD Workshop held on April 30, 2019.

Discharge To	Water Quality	Infra/Channel	Flood Control
Combined			
MS4			

Separate Sewer System: Water Quality Standards

- Core Requirement: Water quality volume treated to **remove 80% of TSS** compared to uncontrolled runoff (or 80 mg/L discharge concentration)
- **Regulated Area** = area of the **Regulated Construction Activity**



Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

Separate Sewer System: Channel Protection Standards

- Match runoff volume and peak flow rate to natural conditions for the 2-year 24-hour storm event.
- Regulated Area = Regulated Construction Activity





Site Example: Proposed Conditions

Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			



Regulated Area

- Construction Activity
- 162,093 sf = 3.72 ac
- 36% of site

Calculate Natural Conditions

- CN with unit hydrograph and rainfall distribution
- Peak flow and volume

Calculate Proposed

- CN with unit hydrograph and rainfall distribution
- Peak flow and volume

Typically once you match the volume requirement, the peak flow requirement is met

	Area #1	Area #2	Area #3	Area #4	Total
Impervious (sf)	108,615	4,570	2,010	7,760	122,955
Pervious (sf)	36,840	0	0	2,298	39,138
Total (sf)	145,455	4,570	10,058	10,058	162,093
Natural (Table 4-12, Eqn 4.18)	CN 73		Q (in) 0.49		
Lawn (Table 4-12, Eqn 4.18)	CN 80		Q (in) 0.79		
Pavement/Roof (Table 4-12, Eqn 4.18)	CN 98		Q (in) 2.12		
Post Development Runoff (cf)	21,619	808	355	1,523	24,305
Natural Conditions Runoff (cf)	5,920	186	82	409	6,597
Retention Volume Required (cf)	15,699	622	274	1,113	17,708

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Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

Where Storm Sewer Channel Protection Standards Don't Apply

- Discharge via a DWSD owned separate storm sewer system to Detroit River or Rouge River downstream of the Rouge Turning Basin
- Remember: Stormwater management regulations don't apply at all if site doesn't discharge via DWSD infrastructure





Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			

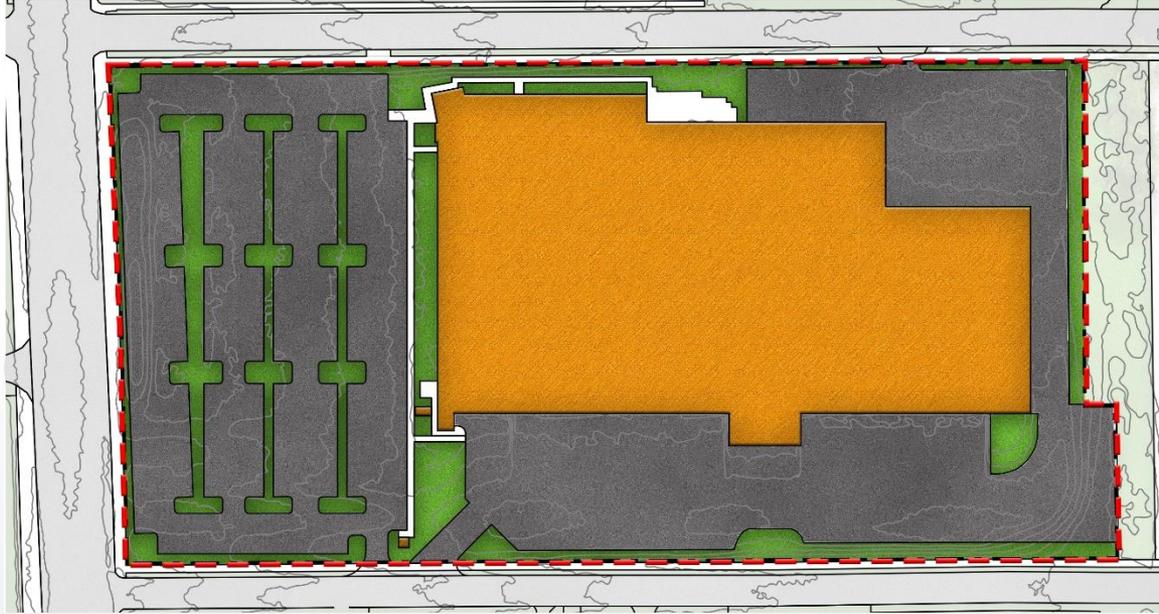
Flood Control Performance Standard

- Limits discharge rate from medium to large storm events to help manage flow rates in the combined sewer system and prevent flooding
- Core Requirements for Peak Flow
 - Drainage areas < 5 acres, detain the 10-year, 24-hour storm, release at 0.15 cfs/acre
 - Drainage areas > 5 acres, detain the 100-year, 24-hour storm, release at 0.15 cfs/acre
- Regulated Area: Entire development site (for both combined and separate sewer)



Site Example: Proposed Conditions

Discharge To	Water Quality	Infra/ Channel	Flood Control
Combined			
MS4			



Land Cover	Site (ac)
Impervious	8.64
Pervious	1.65
Total	10.29

- Regulated Area = Entire Development Site
- Site > 5 acres, therefore provide detention for the 100-year storm

Detention Volume Sizing

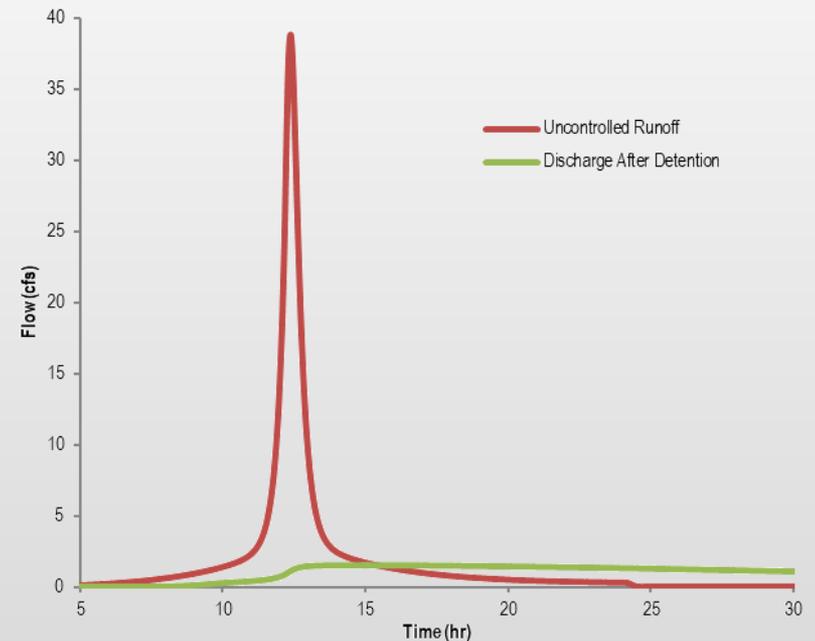
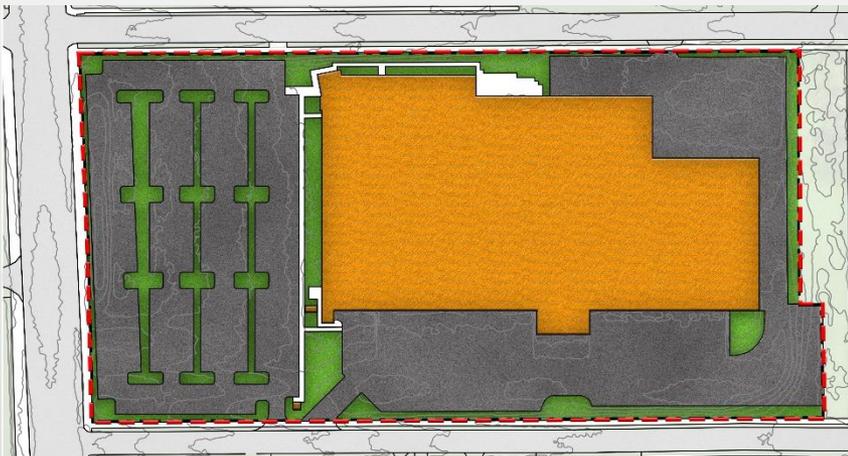
Modified Rational is suitable for conceptual design but not for final design calculations (Table 4-6)

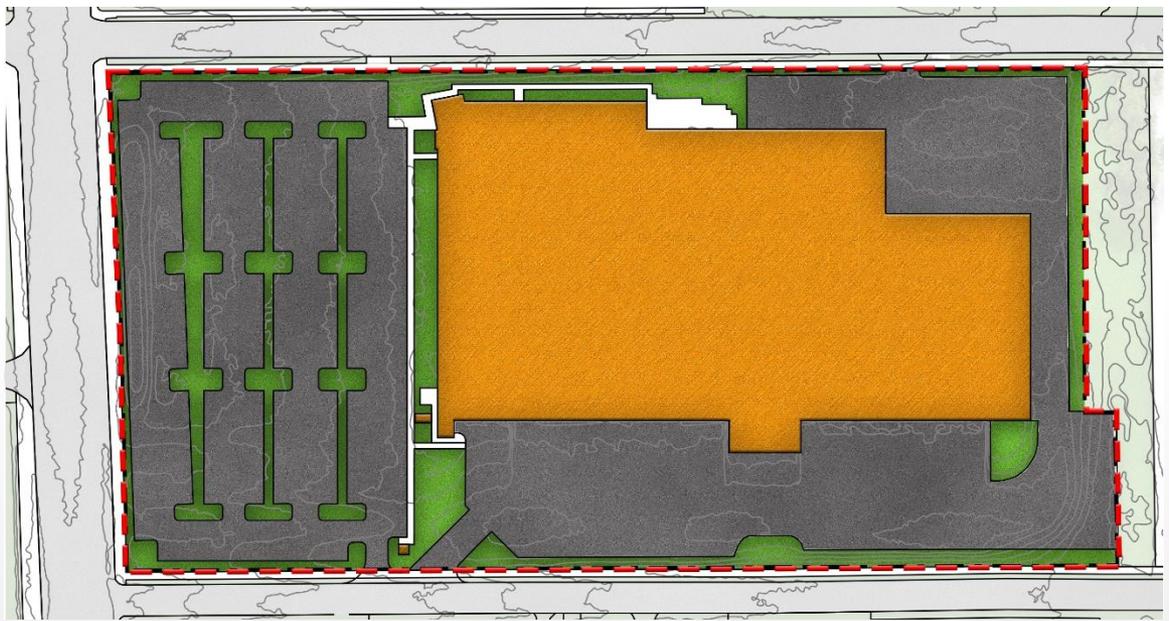
- Design Manual Section 4.2.3

Runoff Coefficient (C) Multiplier for 100-yr storm event		1.25	Table 4-10
	Area (ac)	C	C Adjusted
Impervious Area	8.64	0.95	1.00
Pervious Area	1.65	0.20	0.25
Total	10.29	Weighted C	0.88
Allowable Discharge Rate Q_R (cfs/ac)		0.15	Given
Critical Storm Duration (min)		285	Equation 4.8
Rainfall Intensity (in/hr)		0.84	Equation 4.1
Estimated Detention Volume (cf)		104,106	Equation 4.9

Detention Volume Sizing

- Compute and route a complete hydrograph
- Manage peak flow and total dewatering time





Land Cover	Site (ac)
Impervious	8.64
Pervious	1.65
Total	10.29

Summary

Discharge To	Water Quality	Infrastructure/Channel	Flood Control
Combined	Retain 9,222 cf TSS removal from 162,093 sf	Detain TBD*	Detain ~104,106 cf
MS4	TSS removal from 162,093 sf	Retain 17,708 cf	

* Allowable release rate for the 2-year storm was calculated to be greater than the allowable release rate for the 100-year storm. Therefore detention for flood control will satisfy the infrastructure requirement in this example

The information is current as of the DWSD Workshop held on April 30, 2019.



Other Requirements: Natural Wetlands

- Overview of requirements in Chapter 2 of Stormwater Management Design Manual
- Obtain all necessary wetland permit approvals from EGLE (previously known as MDEQ) and City before approval of the final site plan
- Any alteration of drainage patterns that may affect water levels require prior approval and all applicable permits from the MDEQ and/or DWSD

Other Requirements: Floodplain

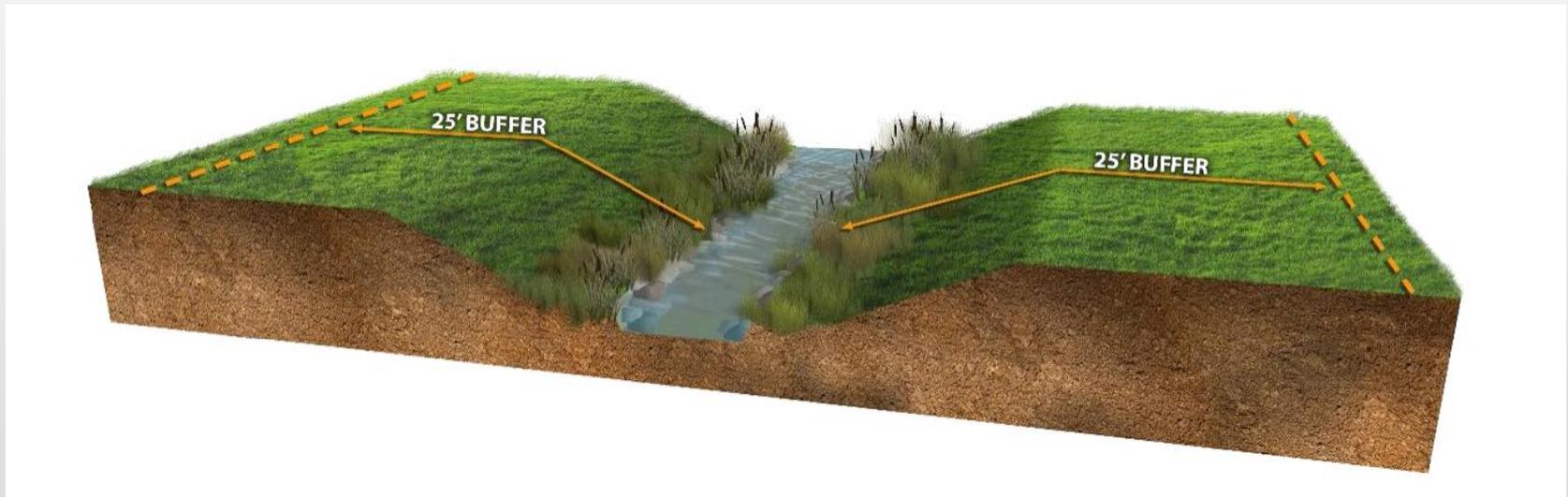
Obtain all necessary floodplain permit approvals from EGLE and provide elevation certificate for structures to BSEED before approval of the final site plan

Construction Site Soil and Erosion Control Requirements

- City of Detroit's soil erosion and sedimentation control (SESC) program
 - Administered by Wayne County Department of Public Services – Environmental Services Group
 - Projects which meet the county's threshold requirements must apply for a Wayne County SESC permit before any earthwork can begin
- MDEQ's Permit-by-Rule
 - Projects in Detroit which have earth disturbance greater than 1 acre and have a point source discharge of stormwater to waters of the state (either directly or through a separate storm sewer)
 - Stormwater discharges to Detroit's combined sewers are not required to follow the MDEQ Permit-by-Rule

Buffer Requirement for Projects Near Surface Waters or Regulated Wetlands

A buffer with a minimum width of 25 feet must be established and maintained, or preserved, along the edge of any surface water and any regulated wetland



Questions?

Developing and Submitting a Post-Construction Stormwater Management Plan (PCSWMP)

Intro to the Post-Construction Stormwater Management Plan (PCSWMP)

- Documents compliance with the Stormwater Management Regulations Submitted as a part of an applicant's site plan
- DWSD reviews and approves all PCSWMPs
- Approval is necessary prior to the approval of a site plan by the City

PCSWMP Submittal Requirements

- Complete and submit PCSWMP application
- Complete PCSWMP checklist and submit all supporting documentation
- Application and checklist to be part of Stormwater Management Design Manual

PCSWMP Application

- Basic Project Location/Contact Information
 - Owner/Developer
 - Engineer/Landscape Architect
- Discharge Location
- Compliance Method
 - Onsite
 - Offsite
 - In-lieu fee
- Alternative Compliance Pre-Approval for Standards

PCSWMP Checklist: Cover Page

- Project Name
- Property Owner
- Development Site Address
- Submission Date
- Company/Professional Responsible for SCM Design
- Designer's Original Seal, Signature, and Date
- Total Area of Impervious Surfaces Created/Replaced
- Copy of Completed Checklist



PCSWMP Checklist: Project Description

- Area of Development Site
- Total Area of Regulated Construction Activity
- Receiving Sewer System(s)
- Applicable Stormwater Management Performance Standards



PCSWMP Checklist: Compliance with Performance Standards

- Design methodology
- Volumes and rates of stormwater generated
 - Natural conditions
 - Post-construction scenarios
- Volume and rates of stormwater managed
- All necessary certifications and calculations



PCSWMP Checklist: Operation & Maintenance Plan

- Maintenance requirements for each SCM
- Inspection procedures or checklists
- Certification statement
- Designers original seal, signature, and date



PCSWMP Required Components: Legal Documents to Ensure SCM Access

- Preparation and property recording of legal documents to ensure access for SCM O&M, inspection, repair, and/or replacement
- Future site modifications consistent with approved PCSWMP
- Easement recording requirements (Section 56-3-110 and 56-3-111 of the City Municipal Code)

PCSWMP Checklist: Attachments

- Pre-development and post-development calculations or modeling
- Infiltration test results or geotechnical report
- Environmental site assessment, if available
- Applicable state and federal permits
- Certification that applicant has met or will meet other city, county, state, and federal requirements



PCSWMP Checklist: Plan Sheets - Boundaries

- Development Site boundaries
- Common plan of development boundaries (if applicable)
- All delineated regulated areas
- Any no-build or non-disturbance area boundaries
- Existing easements or other encumbrances boundaries
- Location of any required buffers
- Boundary of 100-year floodplain and regulated wetlands
- Points of egress from the Development Site to a public ROW
- Locations and descriptions of access drive easements



PCSWMP Checklist: Plan Sheets - Surface Features

- Created or replaced impervious cover
- Existing and proposed topography
- Locations of all existing surface water features
 - Streams
 - Ditches
 - Swales
 - Ponds
 - Wetlands
- Locations of geotechnical investigations



PCSWMP Checklist: Plan Sheets - Stormwater Management Features

- Location, numbering, and size of all conveyance and SCMs
- Identification and location of all proposed and existing stormwater conveyance and storage features
- Details and sections of SCMs
- Details of all proposed structures



PCSWMP Checklist: Plan Sheets - Stormwater Management Features (cont.)

- Details and profile of stormwater conveyance systems
 - Pipe networks
 - Swales and drains
- Planting plans for all vegetated stormwater features
- Location of existing and proposed roof drains and yard drains



PCSWMP Checklist: Plan Sheets - Stormwater Management Features (cont.)

- Post-development stormwater flow direction arrows, drainage areas, and discharge points from the site
 - Type of discharge
 - Tributary drainage areas to stormwater features
- Spot elevations

Questions?

Alternative Compliance for Performance Standards

What if stormwater can't be put on site?

- Widespread soil contamination
- High groundwater table
- High bedrock
- Zero lot line with adjacent basements



Alternative Compliance for Performance Standards

- Must **demonstrate** to DWSD **extraordinarily difficult site conditions for detaining/retaining water onsite**
- DWSD may grant **alternative compliance** for up to **100 percent** of the required volume
- Options
 - **Offsite mitigation**: construct stormwater control measure elsewhere in the City
 - **In-lieu fee**: paying a one-time fee to the City in lieu of constructing stormwater control measure
 - **Other**



What are Extraordinarily Difficult Site Conditions?

- **Sub-surface condition** limiting infiltration
 - Soil contamination
 - Shallow depth to bedrock or groundwater
- **Unique topographic or geologic** conditions that would require substantial re-grading for stormwater controls
- **Potential** for off-site **basement flooding**
- Conditions that **require pumping** of stormwater
- Other conditions that present a substantial **barrier** to the **safe and effective construction or operation of SCMs** (in judgment of DWSD)

Alternative Compliance: Request Process

- **DWSD's APPROVAL IS REQUIRED** for alternative compliance
- To **request**, complete Alternative Compliance Request Application and Checklist (Appendix 2A of Design Manual)
- **Provide** thorough **supporting documentation**, including:
 - Hydrological analysis
 - Site plans
 - Geotechnical reports
 - Environmental site assessments
 - Engineering analysis
- **Submit** all request information **as early as possible** in the development process



Minimum 30% Site Plan for Alternative Compliance

- **Boundaries**
 - Development Site boundaries
 - Common plan of development boundaries (if applicable)
 - All delineated regulated areas
 - No-build or non-disturbance areas
 - Existing easements or other encumbrances
 - Locations of required buffers
 - Floodplain and regulated wetlands (where applicable)
- Footprint of **proposed development** buildings, parking garages, surface parking and green space
- General **locations** of proposed **stormwater practices** that will be included onsite
- Existing **topography** (minimum of 2-foot contours, 1-foot contours recommended)
- Locations of all **existing surface water features**, including streams, ditches, swales, and ponds



Alternative Compliance Request Submittal

- Cover
- Project Description
- Extraordinarily Difficult Site Conditions
 - **Narrative** describing the nature of existing site conditions which **prevent** construction of **on-site SCM**
 - **Alternatives** that were **considered**
 - **Hydrologic analysis**, including volumes and rates of stormwater generated by development site for applicable design storms for both natural condition and post-construction scenarios
 - **Geotechnical** reports
 - **Environmental Site Assessments**, if applicable
 - All **necessary engineering analyses** demonstrating the difficulty of the site conditions



Alternative Compliance Request Submittal (cont.)

- Alternative Compliance Request
 - **Describe** the stormwater management **performance standards requested** for alternative compliance
 - **Describe** the method **requested** to comply (i.e. **offsite mitigation, fee in-lieu, other**)
- Offsite Mitigation (If Applicable)
 - Property owner
 - Offsite location address
 - Parcel number(s)
 - Site map of proposed offsite location showing;
 - Existing land cover (impervious and pervious)
 - Existing site grading (minimum 2-ft contours)
 - Locations available for mitigation practices

Offsite Mitigation

- **Must** construct stormwater control measure on **land within the City of Detroit**
- **Private** property **owned or not owned** (with permission) **by the applicant** on land with **equivalent or greater impervious surface** that can be managed and sufficient space for a stormwater practice

Offsite Mitigation Project Conditions Subject to Approval

- **Develop** and submit a **PCSWMP**
- **Provide land rights**, access agreements or easements, and a maintenance agreement and plan to ensure long-term maintenance
- **Install** offsite mitigation project at **earliest date**
 - **Within two (2) years** from the date that the stormwater management design plan is approved
- OR
- **Prior to full completion** of the **development project** related to the off-site mitigation project
- Must construct **NEW** stormwater practice
- All **requirements** for **on-site** stormwater management **apply**
 - Stormwater management design plan
 - Inspections
 - Maintenance
 - Performance bonds

Alternative Compliance: In-lieu Fee

**Required volume (gallons) * Unit Cost (\$/gallon) =
One-time In-lieu Fee**

Unit Cost = currently set at \$8/gallon,
but can change year-to-year

PCSWMP for Approved Alternative Compliance

- Onsite Submit:
 - Copy of approved alternative compliance request
 - Submit a PCSWMP for the development site
- If offsite mitigation, also submit:
 - Submit a PCSWMP for the offsite location
 - Signed agreement to install offsite mitigation project within two years from the date the stormwater management design plan is approved, or prior to full completion of the development project related to the offsite mitigation, whichever is earlier
 - Signed maintenance agreement if property is not owned by applicant



Remember...

Alternative Compliance is the **EXCEPTION**

Questions?



PCSWMP Review, Approval, and Enforcement Process

PCSWMP Submittal Process

- PCSWMP is a part of your overall site plan
- Submit PCSWMP with application and checklist to DWSD via to BSEED online
 - eLaps (Accela) for application submittal
<https://aca3.accela.com/DETROIT/Default.aspx>
 - ePlans (ProjectDox) for uploading of documents for review
<https://detroit-mi-us.avolvecloud.com/ProjectDox/>

DWSD PCSWMP Submittal Fees

- Separate DWSD PCSWMP Review Fee (\$2,550) that covers:
 - Preliminary plan review meeting
 - Initial review of the plans/comment letter
 - As-built plan review
 - Inspection of the as-built project
- Additional plan review (\$400) or inspections (\$750) available if required
- Fees paid directly to DWSD
 - Email swgroup@detroitmi.gov after submitting the PCSWMP online
 - Coordinate payment method with DWSD

DWSD Inspection & Enforcement

- BSEED and DWSD conducts onsite inspections for final approval/certification of installed SCMs
- CofO contingent on final approval/certification of installed practices (as well as other BSEED requirements)
- DWSD conducts regular inspections
 - During construction
 - Periodically after certificate of occupancy
- DWSD has authority to require a performance bond
- DWSD also has right to enter a property when there is a reasonable basis to believe a violation is occurring



Notice Procedures if SCMs Fail Self-Inspections...

- If any SCM is found to be arranged, damaged, clogged, or in such disrepair, as to impede, obstruct, or hinder the flow of surface water in a manner which conflicts with acceptable engineering practices

OR

- If a planned and permitted stormwater control measure has not been installed per an approved Post Construction Stormwater Management Plan within 30 days of inspection

THEN

- Give written notice to DWSD of:
 - Conditions found
 - Actions necessary to bring conditions into conformance with the approved Operation and Maintenance Plan
 - Timeframe for completion



Notice Procedures if SCMs Fail DWSD Inspections...

- If DWSD finds any SCM arranged, damaged, clogged, or in such disrepair, as to impede, obstruct, or hinder the flow of surface water in a manner which conflicts with acceptable engineering practices

OR

- If a planned and permitted stormwater control measure has not been installed per an approved Post Construction Stormwater Management Plan within 30 days of inspection

THEN

- DWSD will provide written notice to property owners:
 - Inspections findings
 - Actions necessary for compliance
 - Timeframe for completion
 - Potential for additional action under civil penalty or other penalty or remedy in Section 56-3-118 of code

Penalties and Remedies for Non-Compliance

- DWSD can
 - Compel compliance through court proceedings
 - Use penalties under NPDES permit/Clean Water Act
 - Make SCM operational and bill property owner for repairs
- BSEED can
 - Refuse to issue CofO
 - Suspend or revoke approvals
- DWSD and BSEED may disapprove any request for a permit or site plan approval or authorization provided by this ordinance or the zoning, subdivision, or other building regulations, as appropriate for the land on which the violation occurs

Appeals Process

- Any applicant who disagrees with DWSD's determination may appeal to the DWSD Dispute Review Panel (only for engineering, not billing)
- Dispute Review Panel will consist of:
 - Two engineers from the academic sector
 - Two engineers from the private sector
 - One stormwater management expert
- Appointed by the Director and confirmed by the Board of Water Commissioners
- Applicant shall submit appeal in writing, within 30 days of determination



Approved PCSWMP SCMs and Drainage Charge Credits



PCSWMP SCMs and Drainage Charge Credits

- If you're complying onsite, don't forget to apply
- Submit to drainage@detroitmi.gov

<https://detroitmi.gov/departments/water-and-sewerage-department/drainage-charge/nonresidential-drainage-credits>

Questions?