



RIDOT's Stepwise Approach for Integrating Stormwater Mitigation into Capital Improvement Projects

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**ACEC/VTrans Transportation Technical Workshop #5
March 11, 2020**

Presentation Overview

1. Background
2. Objectives & Overview
3. Study & Development of Stormwater Management
4. Final Design
5. Questions?



Background

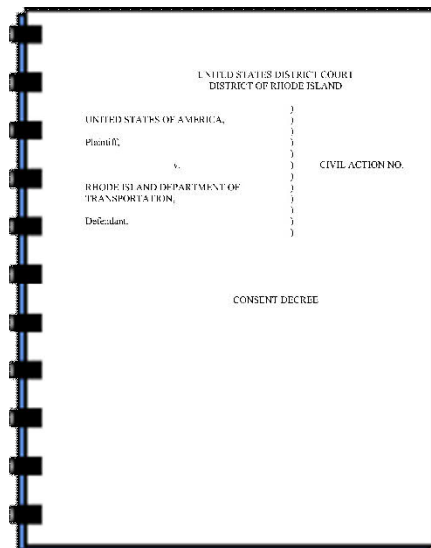
Stormwater Design – Rhode Island

RUNOFF → TREATMENT
(RI SW RULES) → WATERBODY

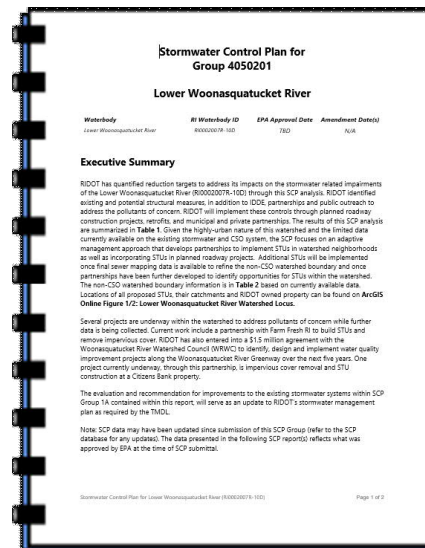


USEPA & RIDOT Consent Decree

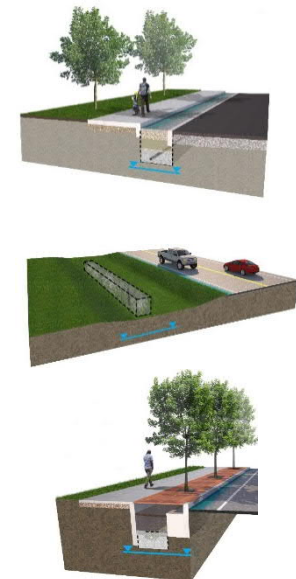
CONSENT DECREE



STORMWATER CONTROL PLANS (SCPs)



STUs (BMPs)

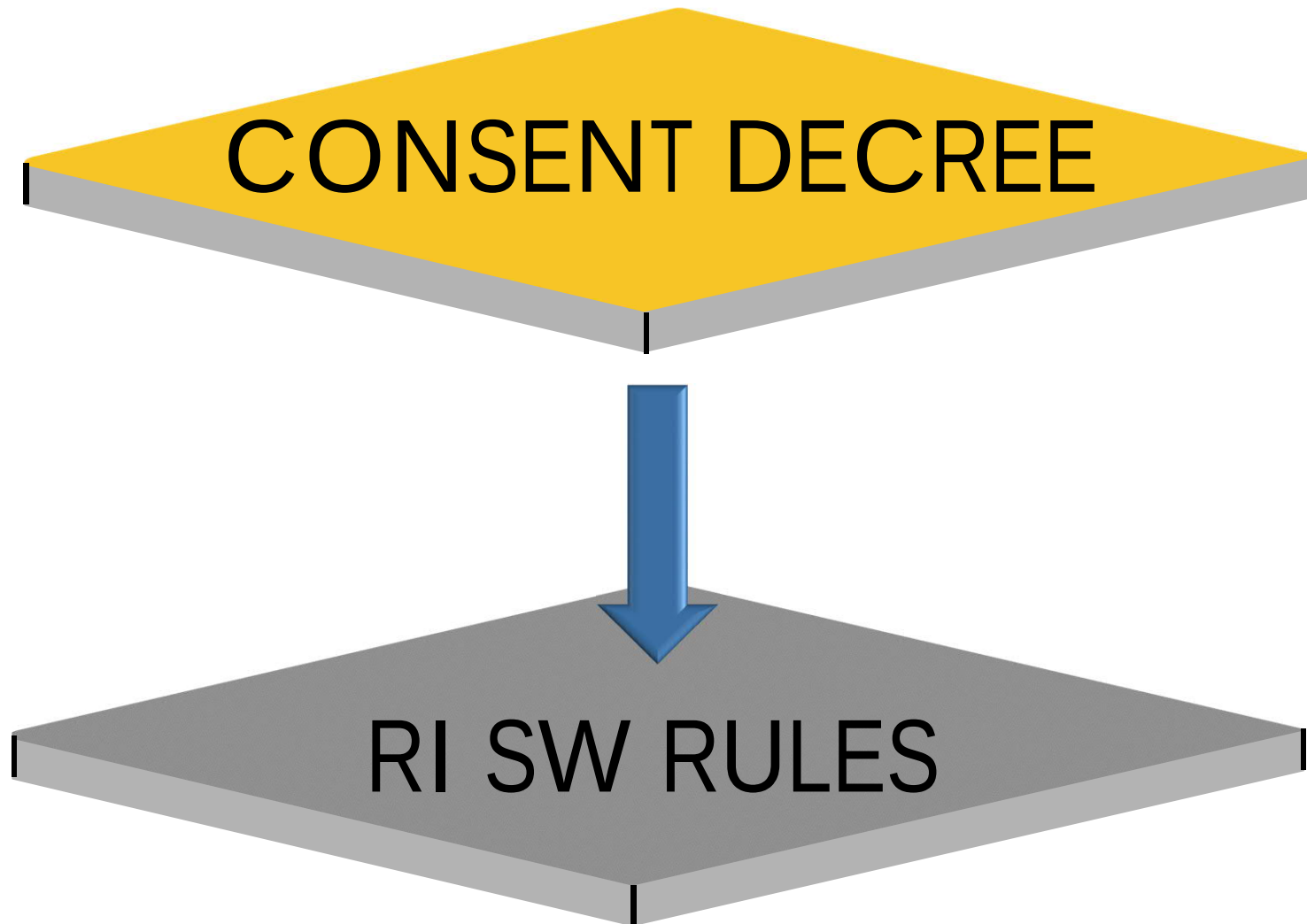


RIDOT's Approach

- Include stormwater mitigation as part of transportation projects vs. constructing independent water quality retrofit projects



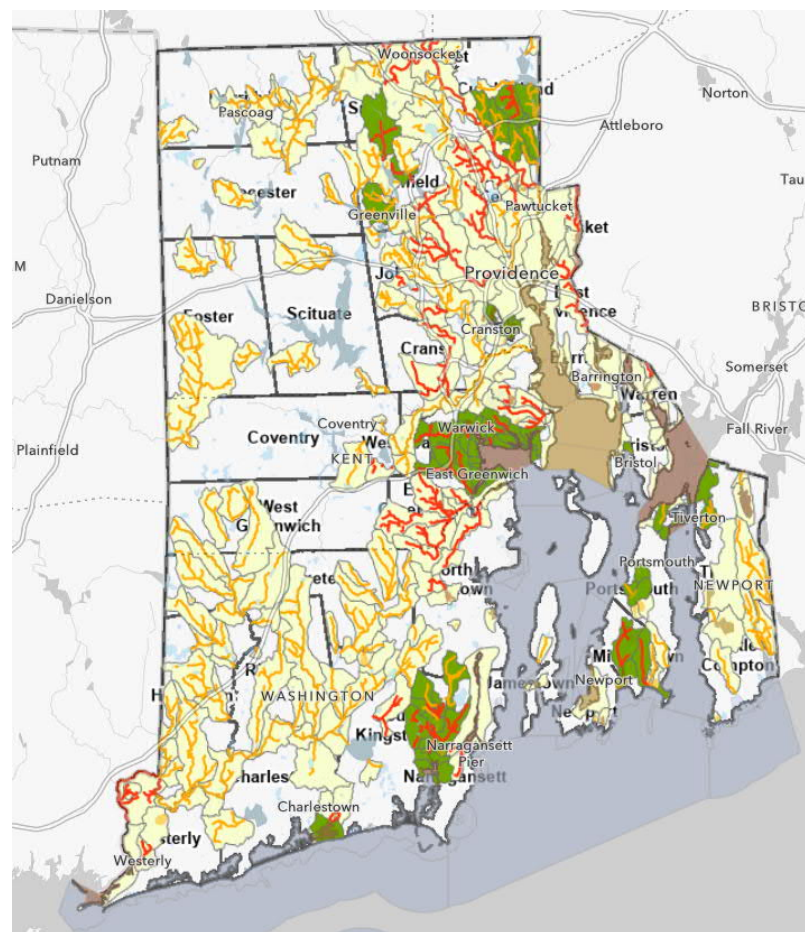
RI Stormwater Rules & Consent Decree



Maximum Extent Practicable

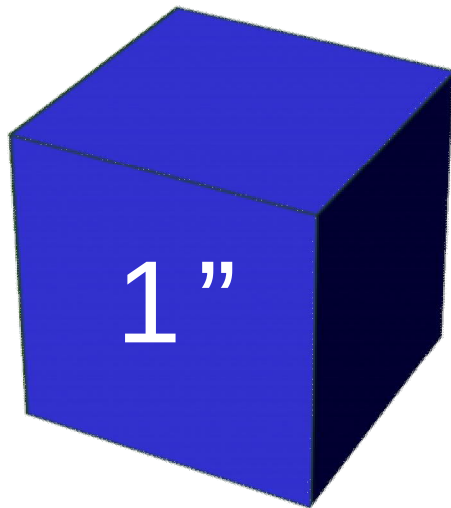
UNITED STATES DISTRICT COURT DISTRICT OF RHODE ISLAND	
UNITED STATES OF AMERICA,	)
Plaintiff,	)
v.	)
RHODE ISLAND DEPARTMENT OF TRANSPORTATION,	)
Defendant.	)
CIVIL ACTION NO.	

CONSENT DECREE

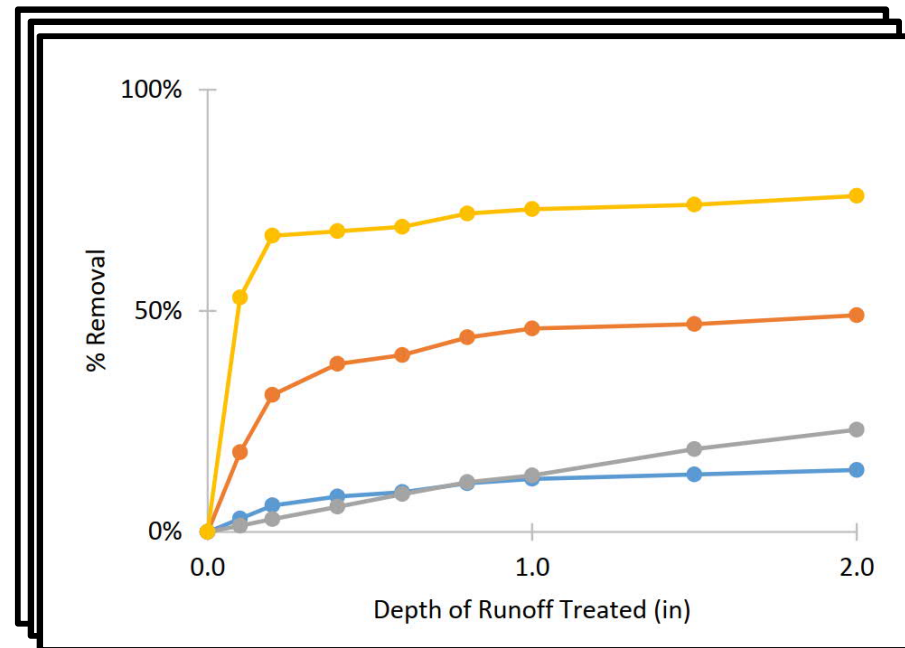


RI Stormwater Rules vs. Consent Decree

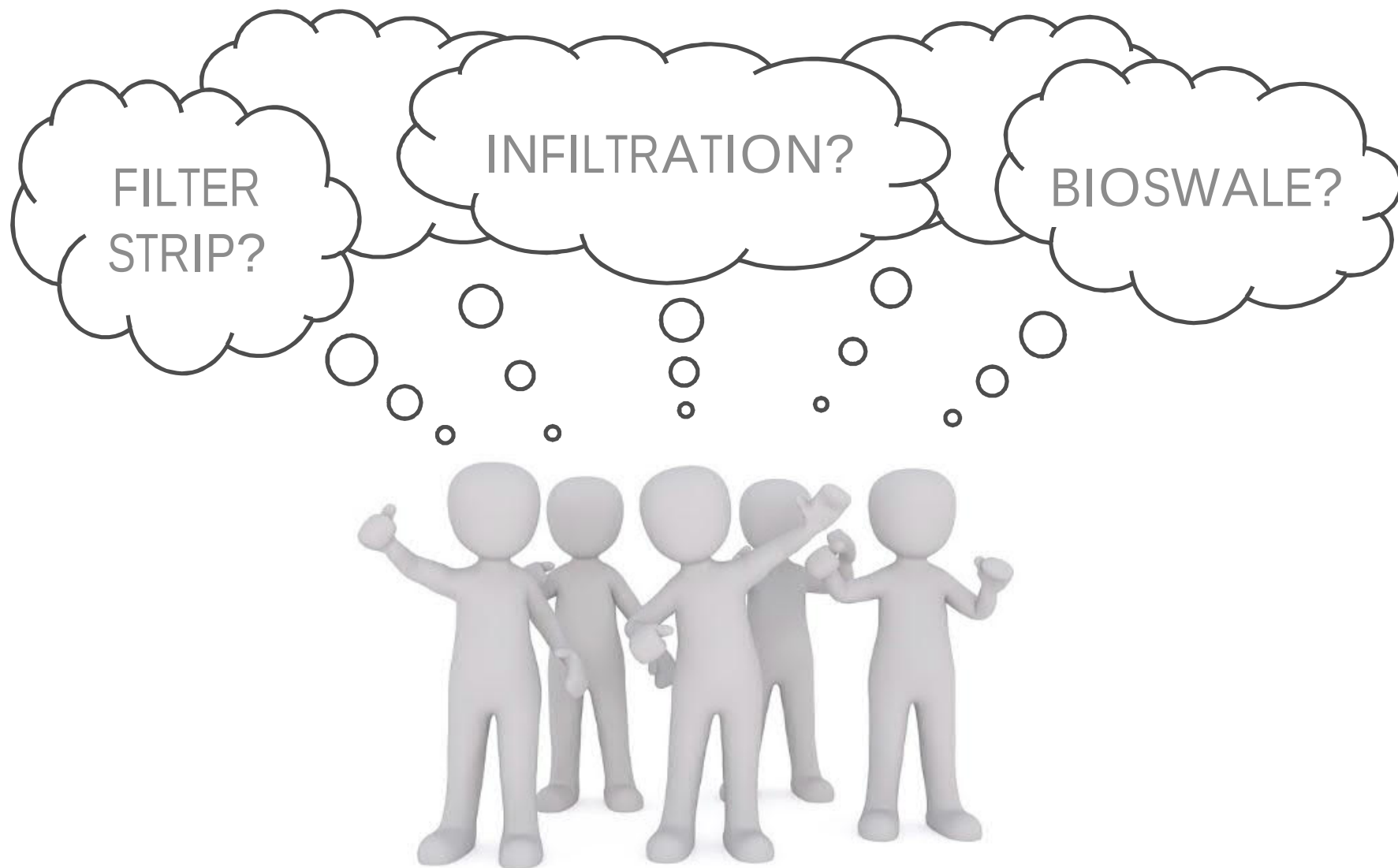
RI STORMWATER RULES



CONSENT DECREE



BMP Selection



RIDOT Work Breakdown Structure (WBS)

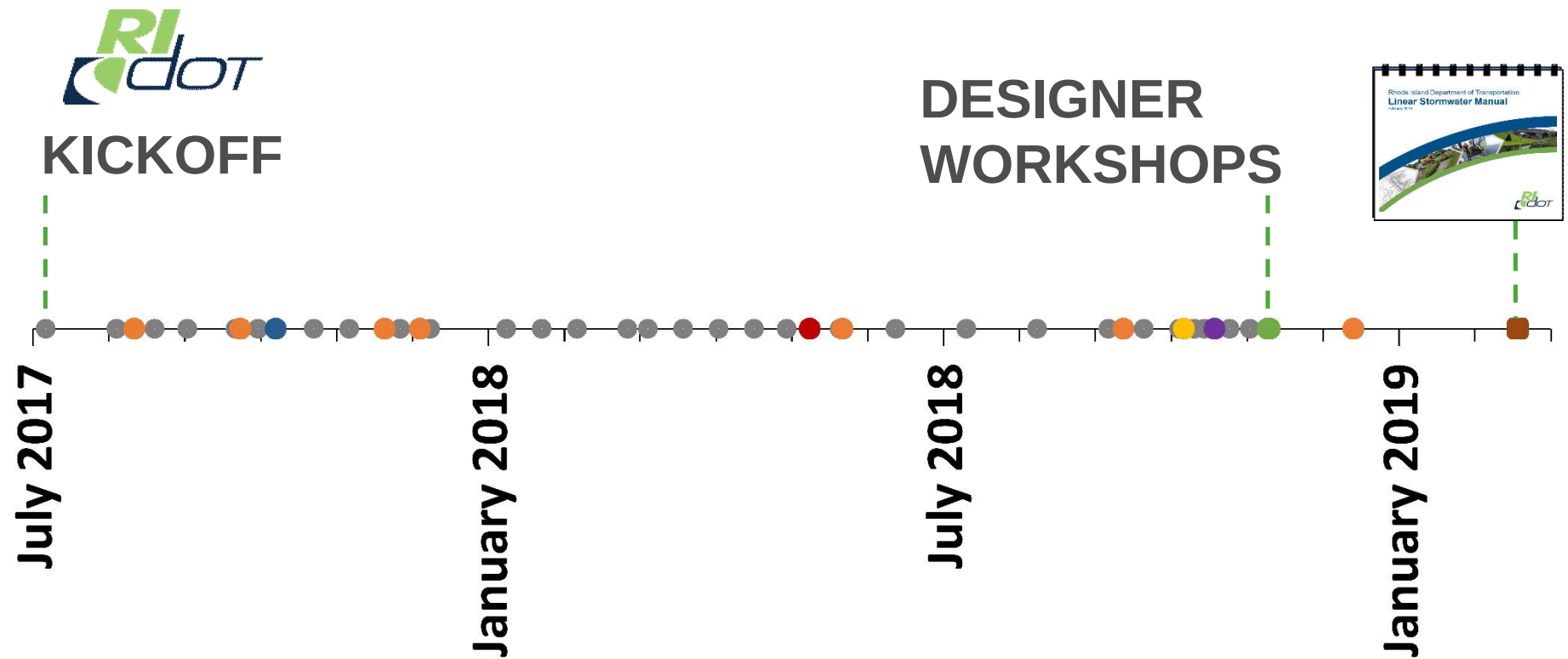
WBS Code	WBS Description
1	Study & Development
1.01	<i>Project Management</i>
1.02	<i>Preparation of Base Mapping</i>
1.03	<i>Analysis of Existing Conditions</i>
1.04	<i>Traffic and Safety Analysis</i>
1.05	<i>Site Contamination Assessments (Non-Analytical)</i>
1.06	<i>Cultural Resources Section</i>
1.07	<i>Landscape Architecture</i>
1.08	<i>Conceptual Highway Plans</i>
1.09	<i>Bridge Evaluation and Report</i>
1.10	<i>NEPA Documentation</i>
1.11	<i>Wetland & Water Quality Pre-Permitting Coordination</i>
1.12	<i>Preliminary Right-of-Way (ROW)</i>
1.13	<i>Preliminary Subsurface Exploration</i>
1.14	<i>Storm Water Management</i>
1.15	<i>Bridge Type Study Report</i>
1.16	<i>Design Study Report</i>
1.17	<i>Highway/Traffic Plans & Profiles (Selected Alternative)</i>
1.18	<i>Bridge Plans of Selected Alternative</i>
1.19	<i>Utilities</i>
1.20	<i>Value Analysis</i>

Objectives & Overview

Objectives of the RIDOT Linear SW Manual

1. Provide a clear, predictable & repeatable approach
2. Simplify relationship between RIDOT work breakdown structure & stormwater design
3. Standardize stormwater infrastructure & maintenance
4. Resolve differing requirements between Consent Decree & RI Stormwater Rules
5. Define stormwater treatment goals

Timeline



Stakeholders

RIDOT OFFICE OF SW MANAGEMENT (Fuss & O'Neill)

RIDOT DEPTS.

Maintenance
Natural Resources
Project Managers
Designers

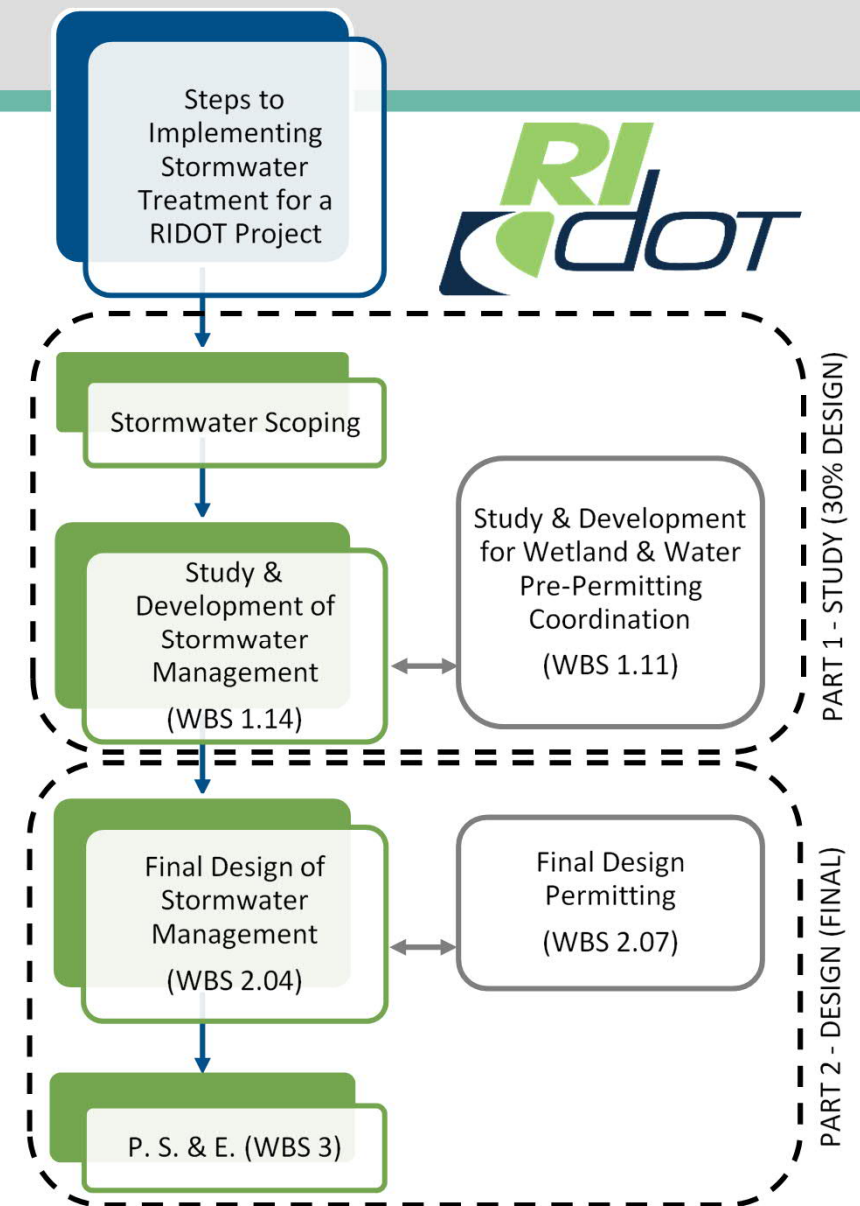
OTHER GROUPS

Audubon Society of RI
Green Infrastructure Coalition
Clean Water Action
The Nature Conservancy

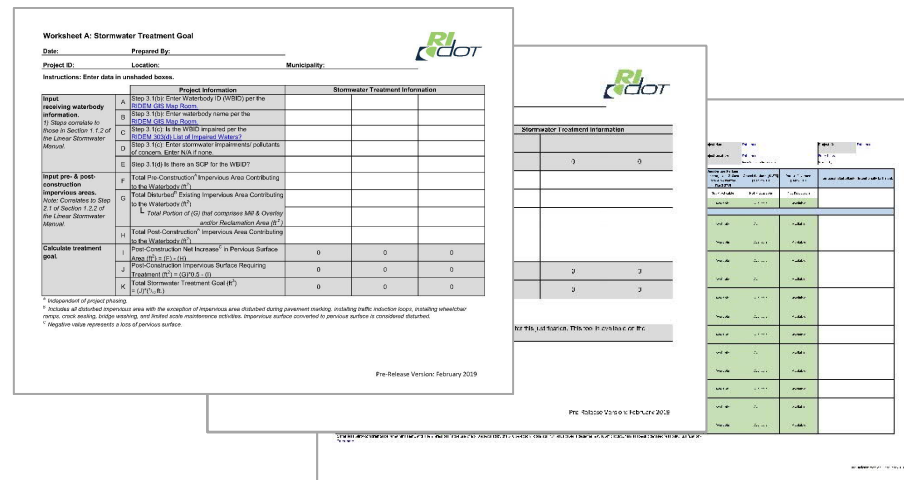
REGULATORY AGENCIES

US Environmental Protection Agency (USEPA)
RI Dept. of Environmental Management (RIDEM)
Coastal Management Resources Council (CRMC)

Organization



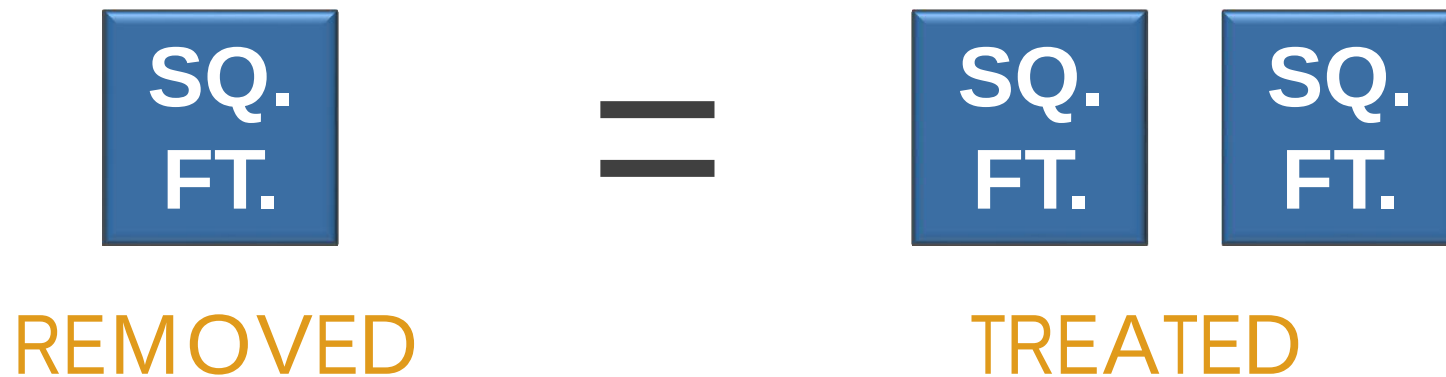
4-Step Process



Study & Development of Stormwater Management

Step 1

- Identify Pavement Reduction Opportunities & Disconnected Areas



Step 2

- Utilize Worksheet A to identify the treatment goal for each Waterbody ID.

WATERBODY INFORMATION

PRE & POST IMPERVIOUS
SURFACE AREAS

TREATMENT GOAL



WATERBODY ID



Worksheet A: Stormwater Treatment Goal

Date: _____ Prepared By: _____

Project ID: _____ Location: _____ Municipality: _____

Instructions: Enter data in unshaded boxes.



		Project Information	Stormwater Treatment Information		
Input receiving waterbody information. 1) Steps correlate to those in Section 1.1.2 of the Linear Stormwater Manual.	A	Step 3.1(a): Enter Waterbody ID (WBID) per the RIDEM GIS Map Room.			
	B	Step 3.1(b): Enter waterbody name per the RIDEM GIS Map Room.			
	C	Step 3.1(c): Is the WBID impaired per the RIDEM 303(d) List of Impaired Waters?			
	D	Step 3.1(c): Enter stormwater impairments/ pollutants of concern. Enter N/A if none.			
	E	Step 3.1(d): Is there an SCP for the WBID?			
Input pre- & post-construction impervious areas. Note: Correlates to Step 2.1 of Section 1.2.2 of the Linear Stormwater Manual.	F	Total Pre-Construction ^a Impervious Area Contributing to the Waterbody (ft ²)			
	G	Total Disturbed ^b Existing Impervious Area Contributing to the Waterbody (ft ²)			
	L	Total Portion of (G) that comprises Mill & Overlay and/or Reclamation Area (ft ²)			
	H	Total Post-Construction ^a Impervious Area Contributing to the Waterbody (ft ²)			
Calculate treatment goal.	I	Post-Construction Net Increase ^c in Pervious Surface Area (ft ²) = (F) - (H)	0	0	0
	J	Post-Construction Impervious Surface Requiring Treatment (ft ²) = (G) * 0.5 - (I)	0	0	0
	K	Total Stormwater Treatment Goal (ft ³) = (J) * 1.0	0	0	0

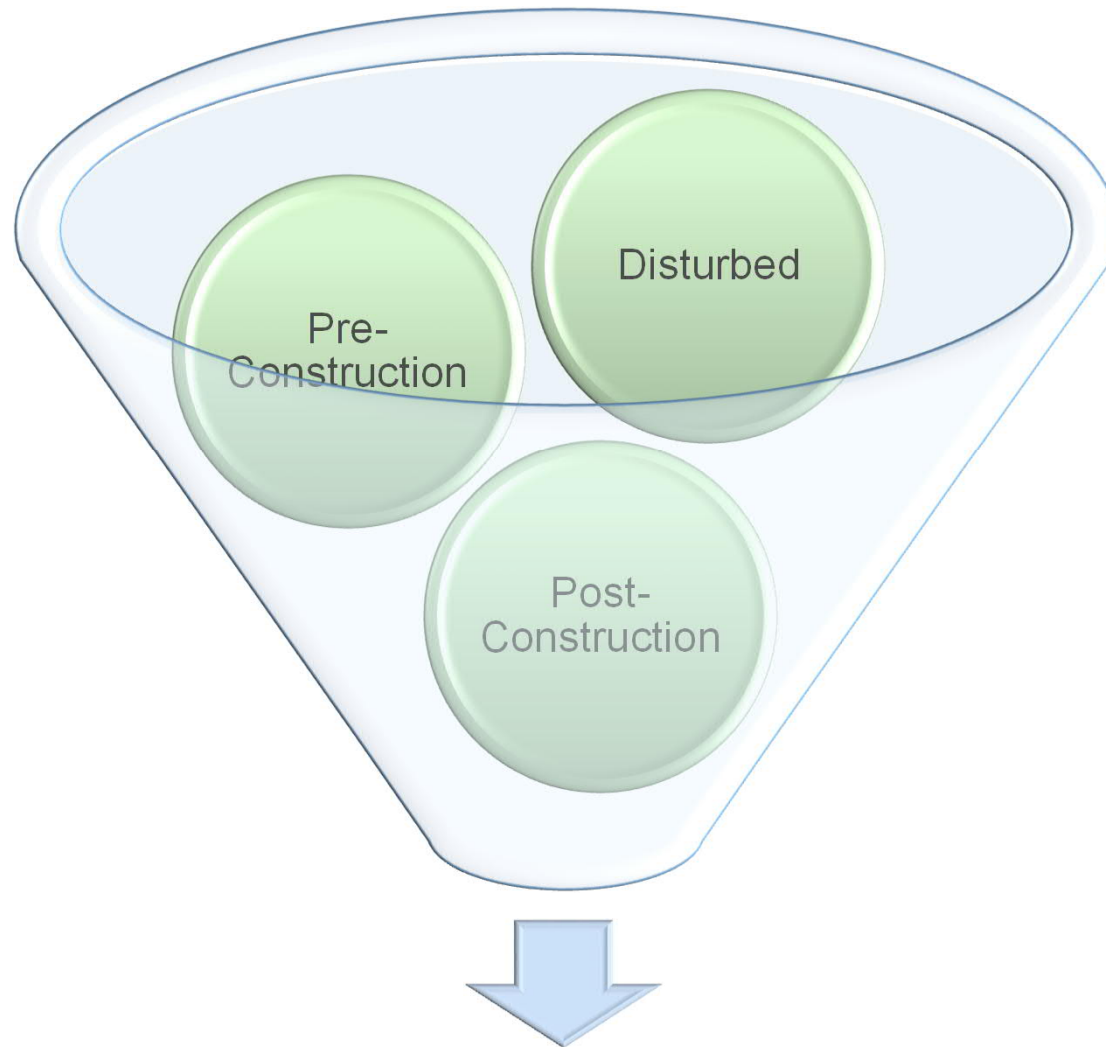
^a Independent of project phasing.

^b Includes all disturbed impervious area with the exception of impervious area disturbed during pavement marking, installing traffic induction loops, installing wheelchair ramps, crack sealing, bridge washing, and limited scale maintenance activities. Impervious surface converted to pervious surface is considered disturbed.

^c Negative value represents a loss of pervious surface.

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Step 2



TREATMENT GOAL (CF)

Step 3

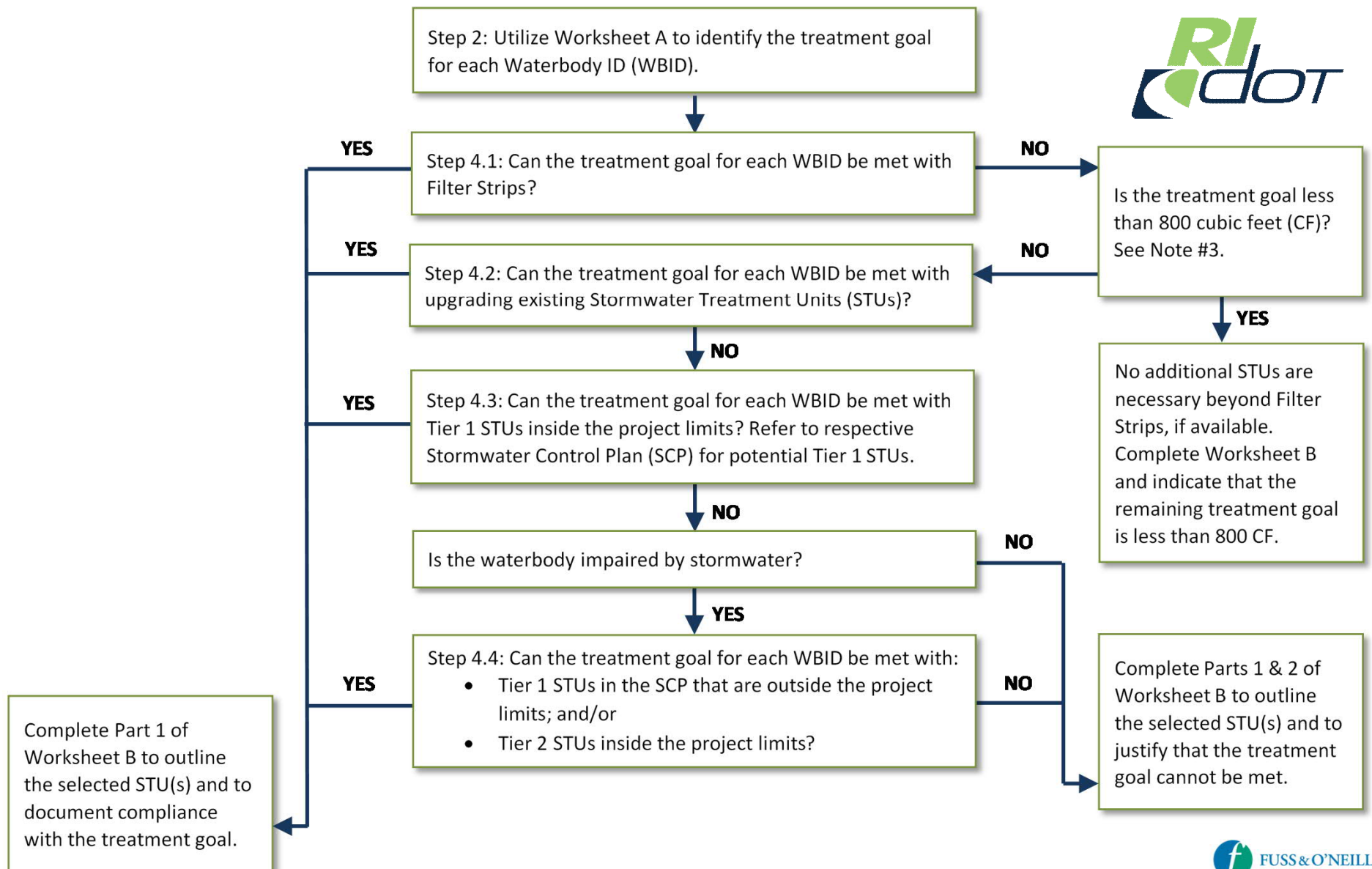
- Identify Site Conditions
- Identify Soil Conditions
- Identify Potential Locations for BMPs



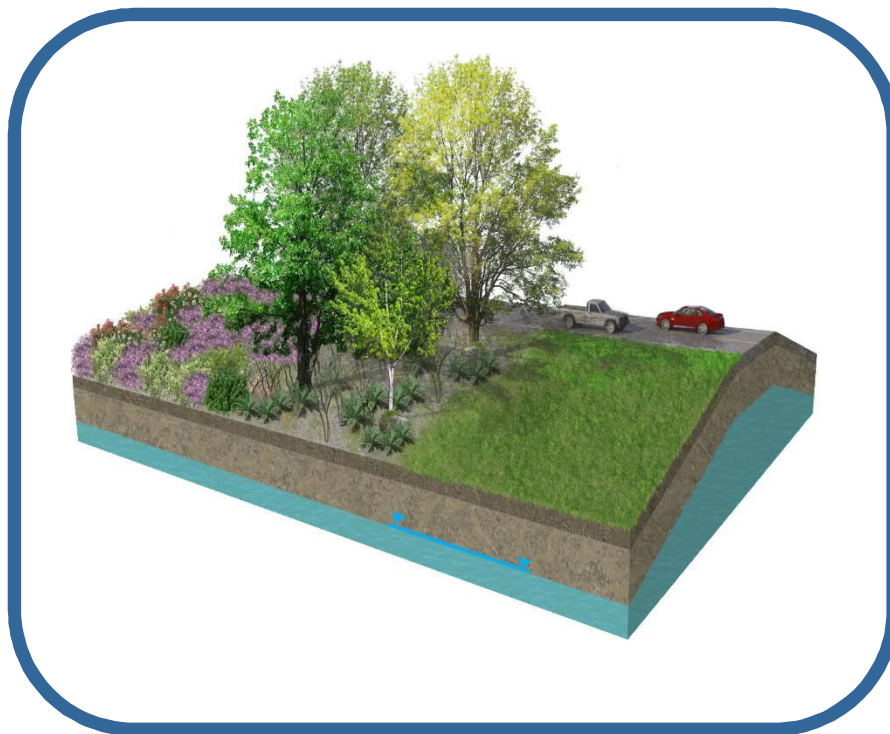
RIGIS

RHODE ISLAND
GEOGRAPHIC INFORMATION SYSTEM

Step 4



- Can the treatment goal be met with Filter Strips?



NO → <800CF?

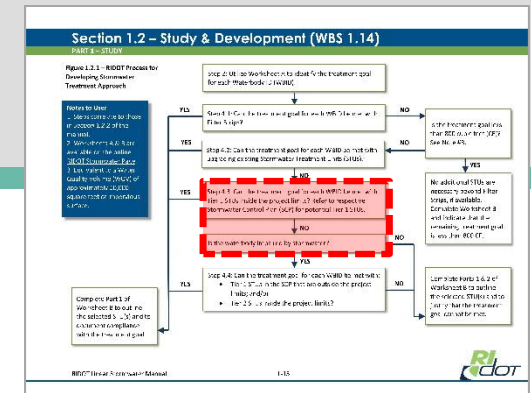
NO =
STEP 4.2

- Can the treatment goal be met with upgrading existing BMPs?

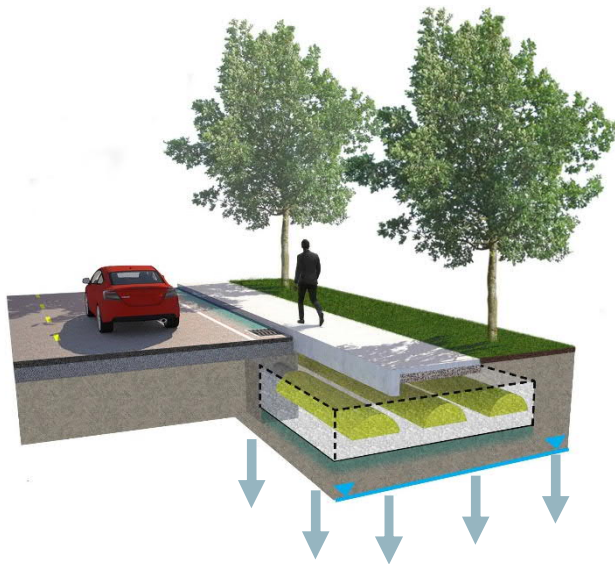


NO = Step 4.3

- Tier 1 & Tier 2 BMPs

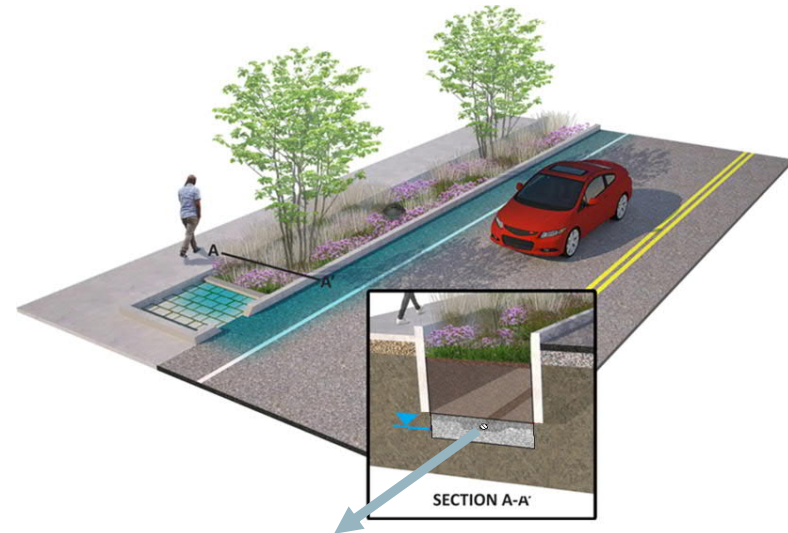


TIER 1



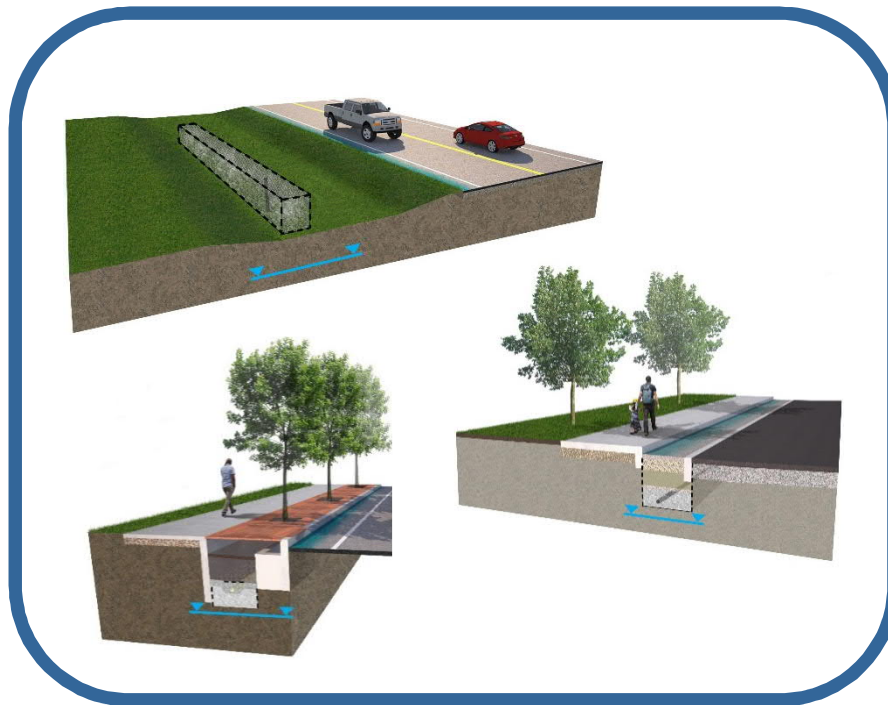
INFILTRATION

TIER 2



LINER & UNDERDRAIN

- Can the treatment goal be met with Tier 1 BMPs inside the project limits?



YES = ☒

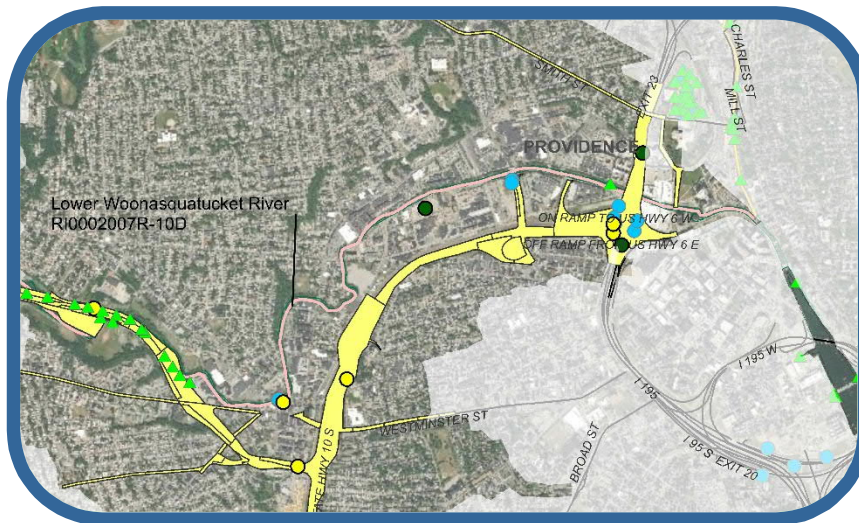
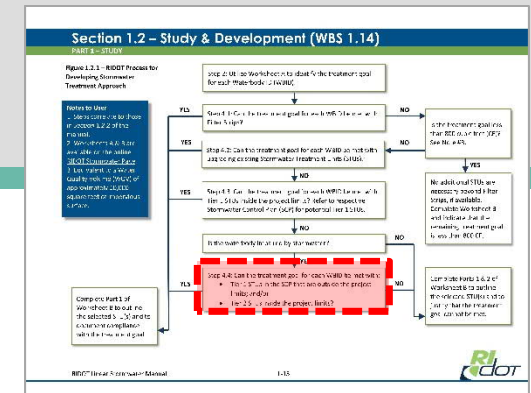
NO → Impaired?

NO = 

YES =
STEP
4.4

Step 4.4

- Can the treatment goal be met with Tier 1 BMPs outside the project limits and/or Tier 2 STUs inside the project limits?



YES =

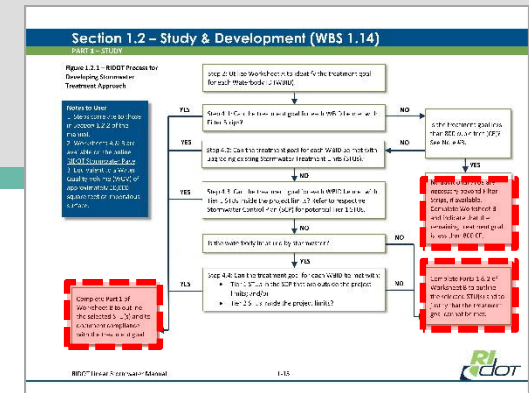


NO →



Documentation

- Utilize Worksheet B to document compliance with the treatment goal.



WATERBODY ID

TREATMENT GOAL



BMP TREATMENT VOLUMES



Worksheet B: Treatment Provided by STUs

Date: _____ Prepared By: _____

Project ID: _____ Location: _____ Municipality: _____

Instructions: Enter data in unshaded boxes.

PART 1		Project Information	Stormwater Treatment Information			
Information from Worksheet A.	A	Waterbody ID (WBID)				
	B	Total Stormwater Treatment Goal (ft ³)	0	0	0	
Input STU Treatment Volumes. Notes: 1) Steps correlate to those in Section 1.2.2 of the Linear Stormwater Manual. 2) Items F & G apply only to waterbodies that are impaired by stormwater.	C	Step 4.1: Total Volume to Filter Strips (ft ³)				
	D	Step 4.2: Total Volume of Stormwater Treated by Upgrading Existing STUs (ft ³)				
	E	Step 4.3: Total Volume of Stormwater Treated by Tier 1 STUs Inside the Project Limits (ft ³)				
	F	Step 4.4: Total Volume of Stormwater Treated by Tier 2 STUs Inside the Project Limits (ft ³)				
	G	Step 4.4: Total Volume of Stormwater Treated by Tier 1 STUs Outside the Project Limits (ft ³)				
Calculate Total Treatment Provided.		H	Total Volume of Stormwater Treated (ft ³) = Sum of Items in Step 2	0	0	0
Calculate Treatment Surplus/Deficit.		I	Total Volume ^a of Remaining Stormwater Requiring Treatment (ft ³) = (B) - (H)	0	0	0

^a Negative value indicates a surplus of treatment.

PART 2 (treatment deficit only)
Attach justification to this worksheet for treatment deficit. Utilize the STU Selection Tool as a basis for this justification. This tool is available on the [RIDOT Stormwater Page](#).

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- Utilize STU Selection Tool to justify treatment goal cannot be met.



FUSS & O'NEILL

- Utilize STU Selection Tool to justify treatment goal cannot be met.



FUSS & O'NEILL

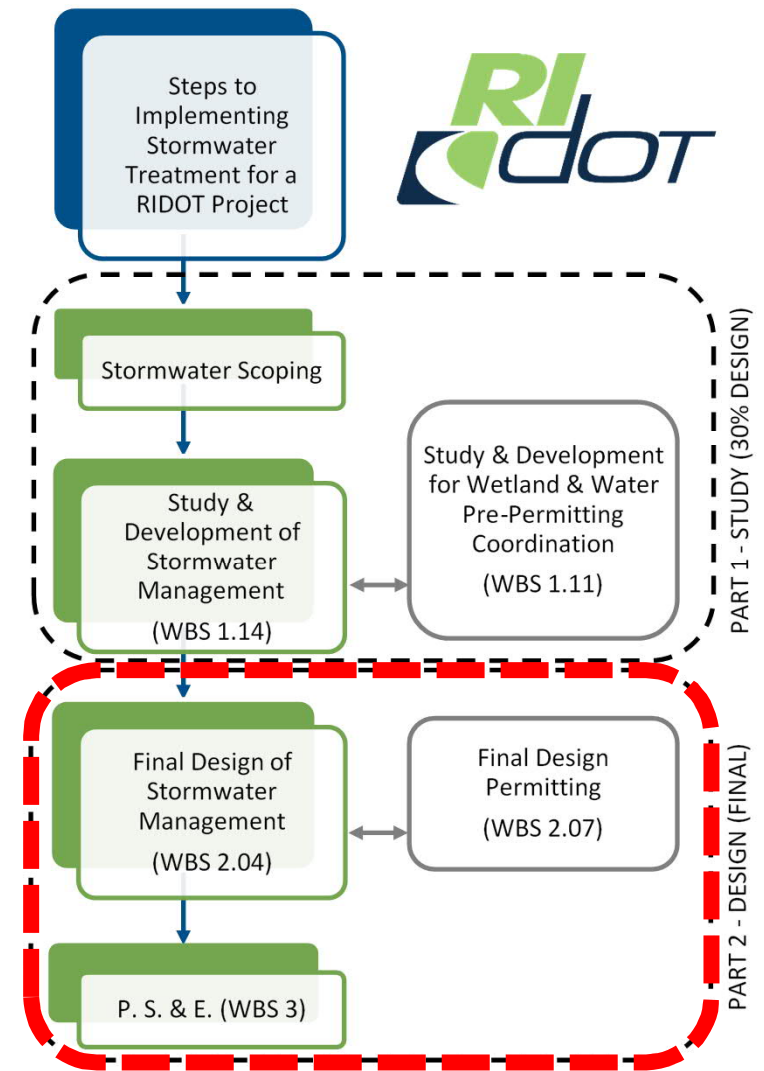
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- ✓ **Provide a clear, predictable & repeatable approach**
- ✓ **Simplify relationship between RIDOT work breakdown structure & stormwater design**
 - Standardize stormwater infrastructure & maintenance
- ✓ **Resolve differing requirements between Consent Decree & RI Stormwater Rules**
- ✓ **Define stormwater treatment goals**

Final Design

Design Sections

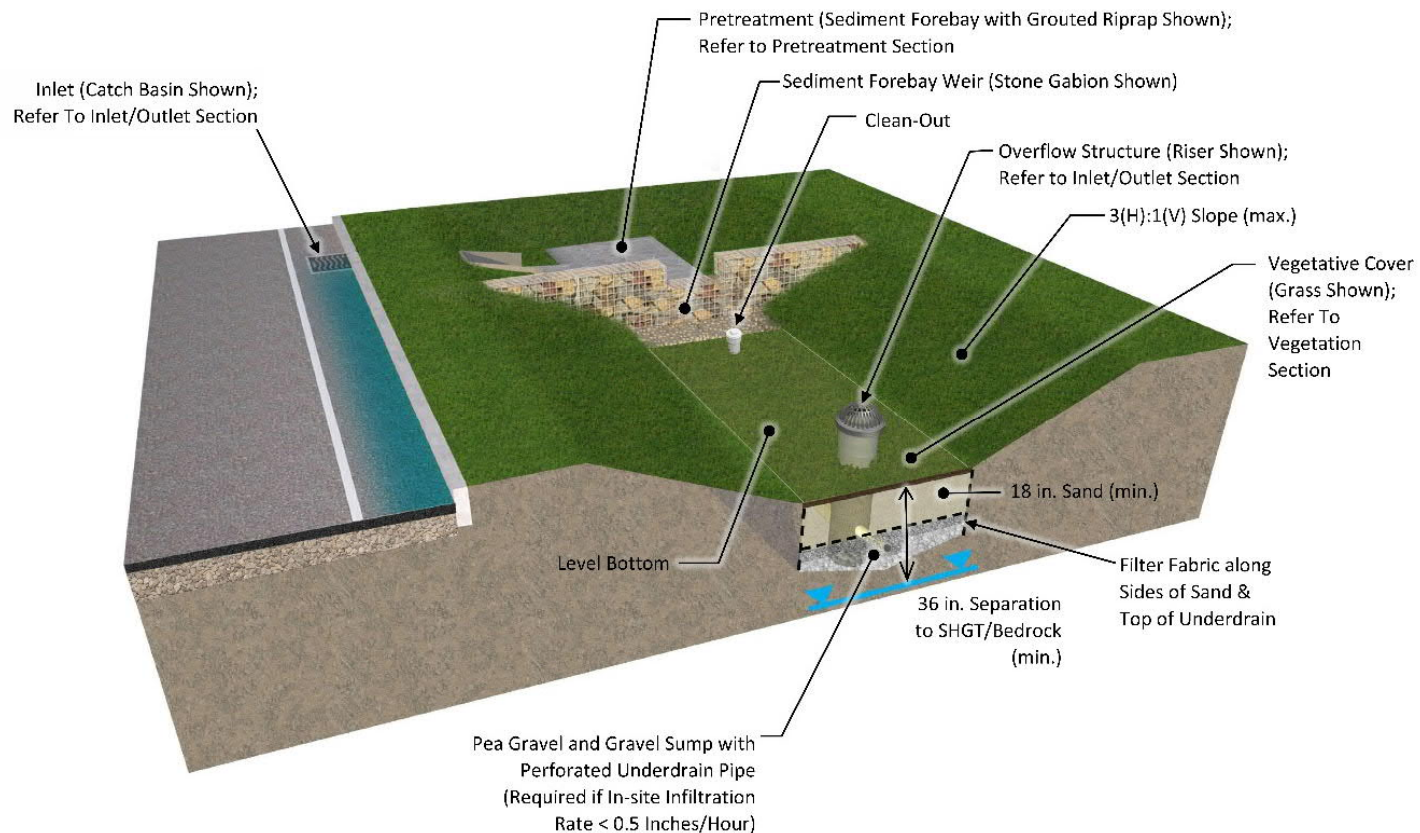
- Pretreatment*
- Inlet & Outlet Controls*
- BMPs*
- Maintenance
- Upgrading BMPs
- Vegetation
- Utility Management



BMP Design Sections

Section 2.3.5 – Sand Filter

PART 2 – DESIGN



Maintenance

Underground Infiltration

MAINTENANCE

#1



#1



*Image numbers refer to those in table.

O&M Number*	System Component	Inspection Measure	Maintenance Activity
#1	Inlet / Pretreatment Structure	- Inspect for accumulated debris/sediment at the surface (e.g., grate) and surrounding the inlet. - Inspect for accumulated debris/ sediment within the pretreatment structure. - Remove grate and inspect for damage.	- Remove debris/sediment around the outside of the inlet. - Remove debris/sediment within the pretreatment structure. - Restore damaged areas to their original condition.
#2	Subsurface Reservoir	Inspect for standing water in inspection ports.	Record depth of water and notify the RIDOT Office of Stormwater Management if standing water is observed beyond 2-3 days since the last rainfall event.





Questions?

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