Overview of Proposed GI BMPs

SWM Rules Nonstructural Subgroup

DRAFT – September 26, 2019

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Stormwater Rule Management Goals

- Mimic existing hydrology
- Reduce proposed peak runoff rates
- Reduce increase in runoff volume
- Promote recharge
- Support stream baseflow
- Mitigate water quality (TSS, nutrients, thermal, etc.)

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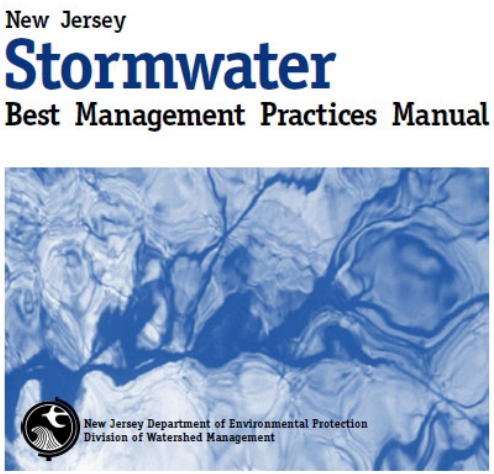
BMPs Should Support Goals

Proposed Updates/Additions to BMP Manual Chapter 9:

1. Forested BMP
2. Meadow BMP
3. Update/Expand Bioretention Soil Specification



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Forested Bioretention

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Types of Forested Bioretention

1. Preserve Existing
2. Reforestation
   - Native tree species
3. With and Without Constructed Berms
4. Reforested Bioretention

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“Credit” for Forested Bioretention

- GI - LID
- Recharge
- Water Quality
- Quantity
- Infiltration Counts
- Meet Tree Replacement Requirements

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Advantages Forested Bioretention

- Low Maintenance
- Nutrient Uptake
- Shade Reduces Thermal Pollution
- More Aesthetic
- Reduce Constr. Cost

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Case Study: Forested Bioretention

- 2013
- Forested
- Sandy Soils
- Planned Tennis Court Expansion Project

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Case Study: Forested Bioretention

- 2014
- Installed
- Basins Clear Cut
- Infiltration or Wet Pond?

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Case Study: Forested Bioretention

- 2016
- Fixed, But…
- Money Wasted
- More Maintenance Required
- Not as Effective:
  - Nutrient
  - Thermal
  - Evapotranspiration

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Case Study: Forested Bioretention

- In the Future
- Why not Keep Forested & Berm Around?
- Better Infiltration and Water Quality
- Less Cost

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Meadow Bioretention

Source: New Jersey Developers' Green Infrastructure Guide Pg. 17

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Meadow Bioretention

- Replace “Lawn”
- No Fertilizer
- No Pesticides
- Excellent Infiltration
- Water Quality
- Recharge
- Bees Please

Source: Sue Barton, Ph.D., University of Delaware
https://canr.udel.edu/blog/ud-professor-touts-benefits-of-adding-meadows-to-landscapes/

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Meadow Bioretention

- Address “nuisance” vegetation ordinances to make sure won’t be an impediment to Meadow Planting
- Defer to BMP O&M instead of Ordinance
  - Change in law?
  - Address in MS4 Permit conditions?

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All GI SWM Will "Count"

- Need to define modeling approach for each type
  - Complacent – Violent Curve Number runoff response?
  - CN method applicable at all?
- Specific permit conditions
- Deed notice of permit and protected area
- Specific O & M Manual Section

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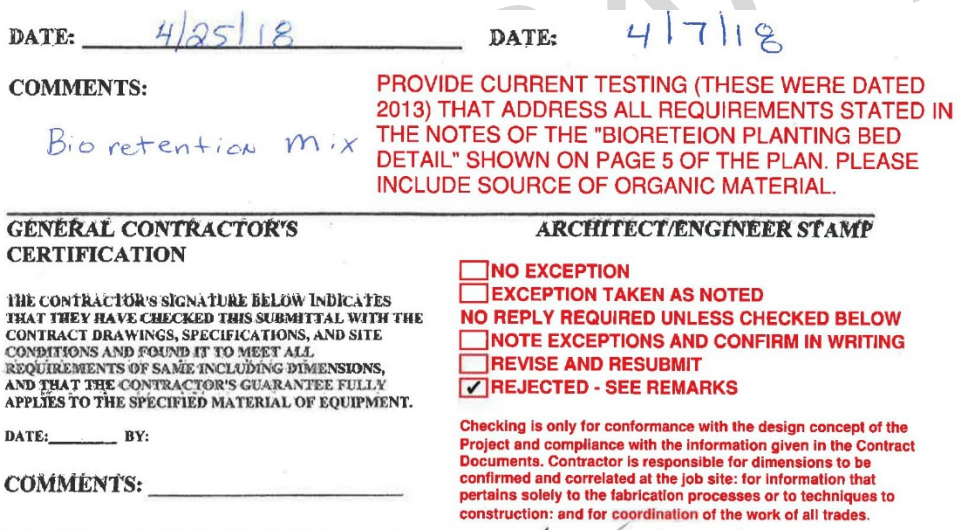
Bioretention Soil Mix Spec Refinement

- Prevailing source of organics: Manure and Biosolids
- Problem: MORE phosphorous going out than coming in!



DRAFT

DATE: 4/25/18 DATE: 4/7/18

COMMENTS:

Bio retention mix

PROVIDE CURRENT TESTING (THESE WERE DATED 2013) THAT ADDRESS ALL REQUIREMENTS STATED IN THE NOTES OF THE "BIORETEION PLANTING BED DETAIL" SHOWN ON PAGE 5 OF THE PLAN. PLEASE INCLUDE SOURCE OF ORGANIC MATERIAL.

GENERAL CONTRACTOR'S CERTIFICATION

THE CONTRACTOR'S SIGNATURE BELOW INDICATES THAT THEY HAVE CHECKED THIS SUBMITTAL WITH THE CONTRACT DRAWINGS, SPECIFICATIONS, AND SITE CONDITIONS AND FOUND IT TO MEET ALL REQUIREMENTS OF SAME INCLUDING DIMENSIONS, AND THAT THE CONTRACTOR'S GUARANTEE FULLY APPLIES TO THE SPECIFIED MATERIAL OF EQUIPMENT.

DATE:_____ BY:

COMMENTS: _____

ARCHITECT/ENGINEER STAMP

☐ NO EXCEPTION
☐ EXCEPTION TAKEN AS NOTED
NO REPLY REQUIRED UNLESS CHECKED BELOW
☐ NOTE EXCEPTIONS AND CONFIRM IN WRITING
☐ REVISE AND RESUBMIT
☑ REJECTED - SEE REMARKS

Checking is only for conformance with the design concept of the Project and compliance with the information given in the Contract Documents. Contractor is responsible for dimensions to be confirmed and correlated at the job site: for information that pertains solely to the fabrication processes or to techniques to construction: and for coordination of the work of all trades.

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Bioretention Soil Mix Spec Refinement

- Organic matter – plant based materials
- NO manure or biosolids
- Phosphorous 25 to 100 mg/kg by Mehlich-3

Results and Interpretations

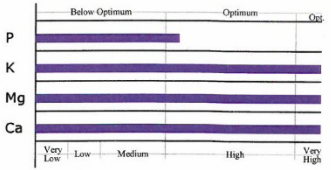
Sand

pH: 7.38 Slightly alkaline; above optimum pH for most plants.

Macronutrients (pounds per acre)

by Mehlich 3 extraction

Phosphorus:	78	(Optimum)
Potassium:	389	(Above Optimum)
Magnesium:	487	(Above Optimum)
Calcium:	3181	(Above Optimum)



Micronutrients (parts per million)

Zinc(Zn)	Copper(Cu)	Manganese(Mn)	Boron(B)	Iron(Fe)
8.07 (Adequate)	1.41 (Adequate)	26.03 (Adequate)	2.45 (Adequate)	130.50 (High)

Special Tests Results

Visual Description: Moist Color: Very Dark Brown. As received: Moist, Loose, Coarse-loamy Material. Coarse rock fragments: Few (maximum size less than 1/2 inch). Organic detritus: Few Stem fragments, Sticks.

Soluble Salts- Electrical conductivity= 0.24 mmho/cm (Satisfactory)

Organic Matter by Carbon Analysis: Organic Matter=4.7%

Very High for Sand

Soil Test Report for Lab # 2018-66874 Page 1/2 RULIMS-ST V5.6

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Bioretention Soil Mix Spec Refinement

- Aggregate mix is important too
- Max 25% fine/very fine sand
- Min Coarse%?

Gravel Content- Larger than 2mm: 9.1%

Mechanical Analysis- Sand= 88% Silt=6% Clay= 6% Texture: Sand

USDA sieve analysis of sand fraction:

Very Coarse	Coarse	Medium	Fine	Very Fine
1-2mm	0.5-1mm	0.25-0.5mm	0.1-0.25mm	0.05-0.1mm
12.0%	26.3%	37.0%	19.4%	5.4%

Measured Cation Exchange Capacity: 10.34 meq/100g

Total Nitrogen= 0.13%

Inorganic Nitrogen- Nitrate-N: 18 ppm Ammonium-N: 7 ppm

Acid Producing Soil: Oxidized pH = 5.00 Acid Sulfate Score = 1

Conclusion: This material does NOT classify as acid producing soil

Acid sulfate is evaluated on a scale of 0-4.

Note: Conclusion only allows for "positive" or "negative" response. For negative cases in which ph-after-oxidation is near 3.0 and sulfate is >=2, the possibility of some amount of acid sulfide material in the sample should be considered

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