Wisconsin Department of Natural Resources

NEWSC

WDNR Technical Standard

1002 - Site Evaluation for Stormwater Infiltration

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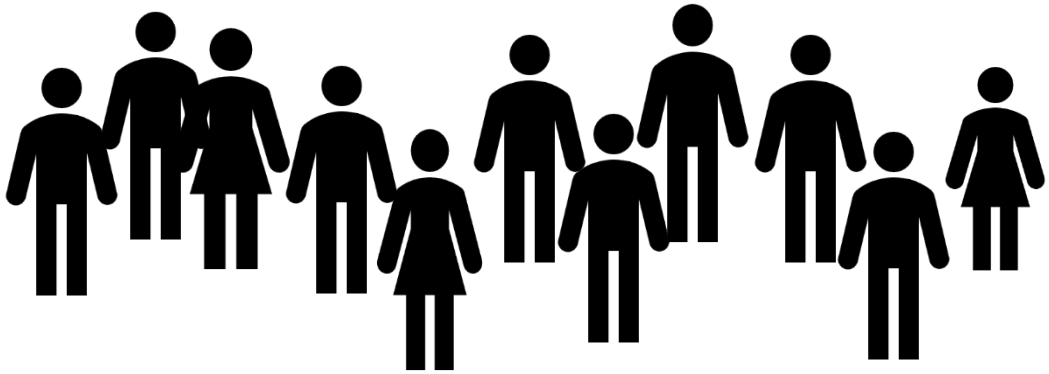
- There is no life without water Because water is needed to make coffee

Contents

- Purpose
- Key Take-Aways
- Site Evaluation for Storm Water Infiltration
- Questions

Purpose

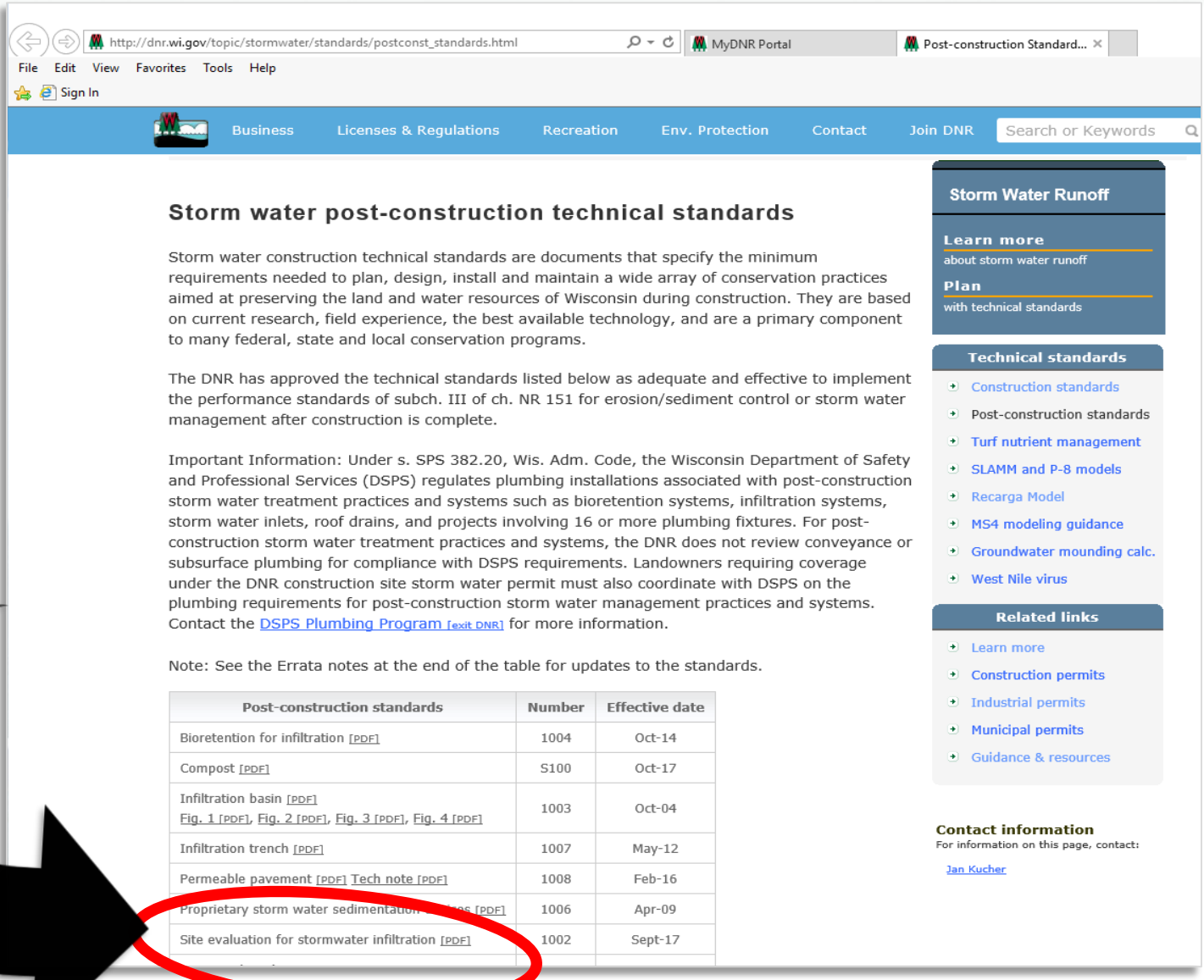
- Provide municipalities and engineers with facility infiltration investigation methods to aid in storm water facility design.



Key Take-Aways

- Goal: protect our waters
- Investigation methods
- Phased evaluation
- Field infiltration testing
- Wrap up findings in report to be used for design


Suspicious Water Fountain?


http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html
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Search or Keywords
Storm water post-construction technical standards
Storm water construction technical standards are documents that specify the minimum requirements needed to plan, design, install and maintain a wide array of conservation practices aimed at preserving the land and water resources of Wisconsin during construction. They are based on current research, field experience, the best available technology, and are a primary component to many federal, state and local conservation programs.
The DNR has approved the technical standards listed below as adequate and effective to implement the performance standards of subch. III of ch. NR 151 for erosion/sediment control or storm water management after construction is complete.
Important Information: Under s. SPS 382.20, Wis. Adm. Code, the Wisconsin Department of Safety and Professional Services (DSPS) regulates plumbing installations associated with post-construction storm water treatment practices and systems such as bioretention systems, infiltration systems, storm water inlets, roof drains, and projects involving 16 or more plumbing fixtures. For post-construction storm water treatment practices and systems, the DNR does not review conveyance or subsurface plumbing for compliance with DSPS requirements. Landowners requiring coverage under the DNR construction site storm water permit must also coordinate with DSPS on the plumbing requirements for post-construction storm water management practices and systems. Contact the DSPS Plumbing Program [exit DNR] for more information.
Note: See the Errata notes at the end of the table for updates to the standards.
Post-construction standards | Number | Effective date
Bioretention for infiltration [PDF] | 1004 | Oct-14
Compost [PDF] | S100 | Oct-17
Infiltration basin [PDF] Fig. 1 [PDF], Fig. 2 [PDF], Fig. 3 [PDF], Fig. 4 [PDF] | 1003 | Oct-04
Infiltration trench [PDF] | 1007 | May-12
Permeable pavement [PDF] Tech note [PDF] | 1008 | Feb-16
Proprietary storm water sedimentation [PDF] | 1006 | Apr-09
Site evaluation for stormwater infiltration [PDF] | 1002 | Sept-17
Storm Water Runoff
Learn more about storm water runoff
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Post-construction standards
Turf nutrient management
SLAMM and P-8 models
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Guidance & resources
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Jan Kucher

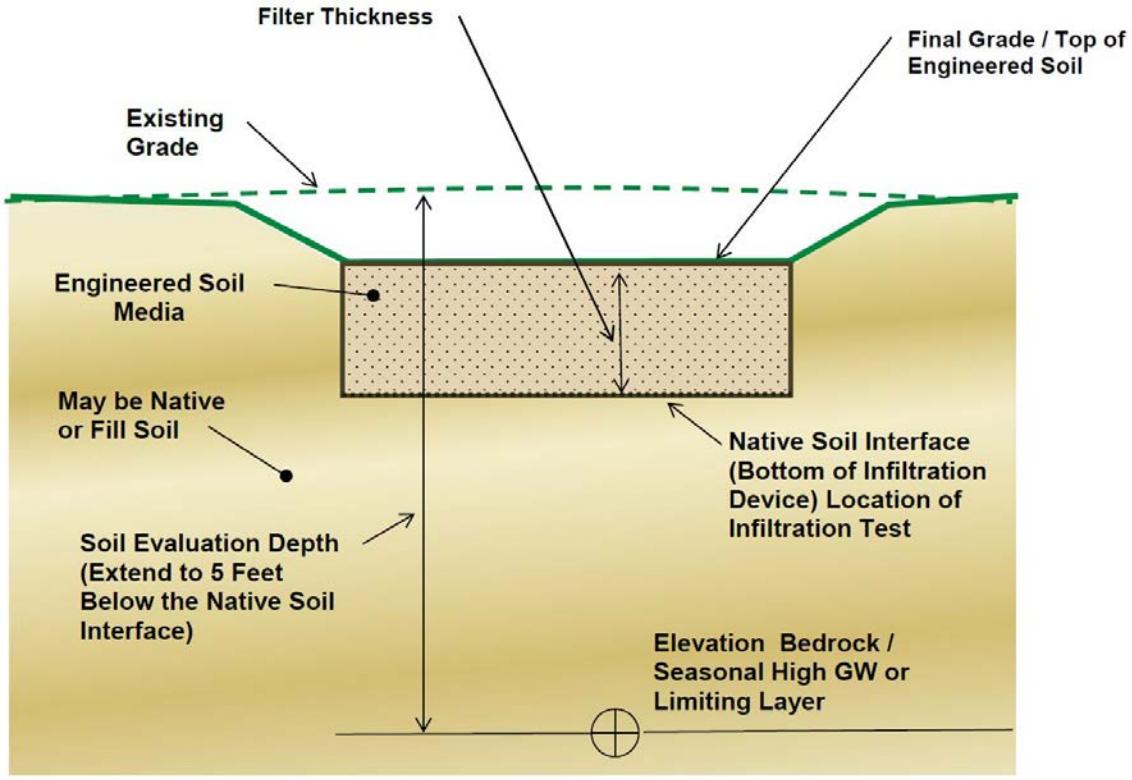

FIGURE 2 - EXAMPLE BIORETENTION BASIN SECTION

Not to Scale

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- Steps
  - A - Initial Site Screening
  - B – Preliminary Field Verification of Initial Screening
  - C – Establishment of Design Infiltration Rate
  - D – Soil and Site Evaluation Report

Note that if water is moving (dynamic), the infiltration rate is divided by 2, as noted in the vegetated swale standard

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Step A - Initial Site Screening – Paper Study

- Wetlands, waterways
- Well location and setbacks
- Karst geologic features
- Topography, soils, groundwater
- Endangered species

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Step B – Preliminary Field Verification of the Initial Site Screening

- Soil borings
- Depth to groundwater and bedrock
- Soil texture
- Verify potential exemptions (coarse sand not acceptable)

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Step C – Establishment of Design Infiltration Rate

- Step C.1. – Field Evaluation of Specific Infiltration Areas
- Step C.2. – Infiltration Rate Exemption
- Step C.3. – Infiltration Rate Determination Options 1-3

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Step C.1. – Field Evaluation of Specific Infiltration Areas

- Test pits – Table 1
- Test pit to 5 ft below native soil interface – Figure 2
- Morphological soil profile
- Proximity to bedrock, groundwater, or seasonal high groundwater

Table 1. Evaluation Requirements to Proposed Infiltration Devices [Note 1]

Infiltration Device (Technical Standard [Note 2, Note 3]**)**	**Tests Required**	**Minimum Number of Test Pits Required** [Note 4, Note 5]
Rain Garden	Soil texture evaluation or infiltration test	N/A
Infiltration Trenches (1007)	Test pits	1 test pit/100 linear feet of trench with a minimum of 2 test pits, and sufficient to determine / confirm variability
Vegetated Swale (1005)	Test pits	1 test pit/ 500 linear feet of swale with a minimum of 2 test pits, and sufficient to determine / confirm variability
Bioretention Systems (1004)	Test pits	1 test pit or a number sufficient to assess infiltration potential, and sufficient to determine / confirm variability
Surface Infiltration Basins (1003)	Test pits	2 test pits then an additional test pit /10,000 square feet and sufficient to determine / confirm variability
Subsurface Dispersal Systems (N/A) greater than 15 feet in width	Test pits	2 test pits then an additional test pit /10,000 square feet and sufficient to determine / confirm variability
Permeable Pavement Systems (1008)	Test pits	2 test pits then an additional test pit /10,000 square feet and sufficient to determine / confirm variability

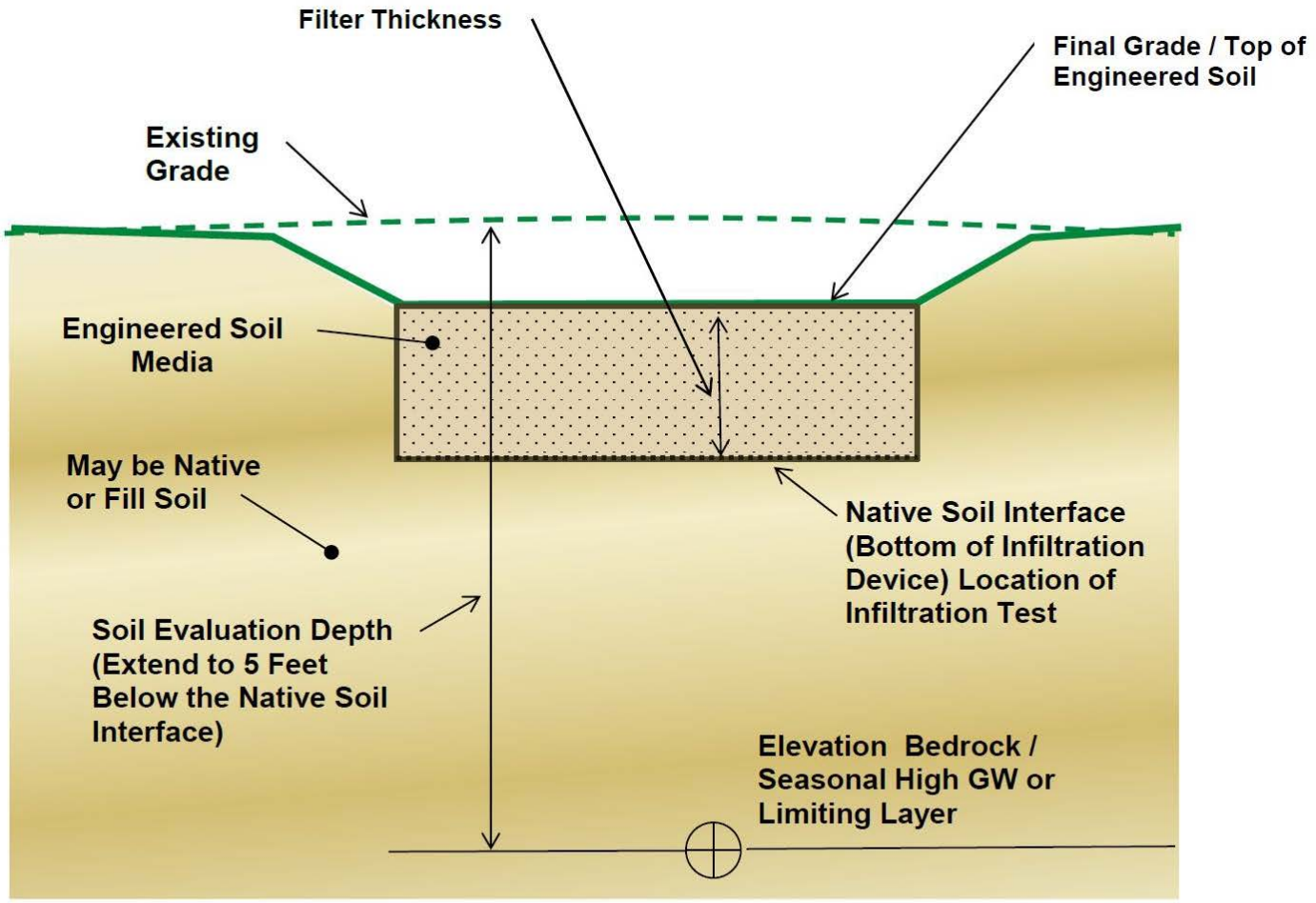

FIGURE 2 - EXAMPLE BIORETENTION BASIN SECTION

Not to Scale

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Step C.2. – Infiltration Rate Exemption

- 3 infiltration tests at the native soil interface
- Representative areas
- Exempt if 2/3 of measured infiltration tests are less than 0.6 in/hr

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Step C.3. – Infiltration Rate Measurement

- Infiltration Option 1 – Infiltration rate not measured, soil compaction mitigated
- Infiltration Option 2 - Infiltration rate measured with in-field device, soil compaction mitigated
- Infiltration Option 3 – Infiltration rate not measured, soil compaction not mitigated

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Step C.3.

Option 1 – Infiltration rate not measured, soil compaction mitigated

- Infiltration rate = the lowest infilt rate from Table 2 within 5 ft of the native soil interface

- Example - if lowest infiltration rate is 0.13 in/hr (silt loam) at 2 ft below the native soil interface, then soil infiltration rate is 0.13 in/hr

Table 2. Design Static Infiltration Rates for Soil Textures Receiving Storm Water Note 1

Soil Texture	Design Static Infiltration Rate Without Measurement (Inches/Hour) Note 2
Coarse sand or coarser	3.60
Loamy coarse sand	3.60
Sand	3.60
Loamy sand	1.63
Sandy loam, fine sand, loamy sand, very fine sand, and loamy fine sand	0.50
Loam	0.24
Silt loam	0.13
Sandy clay loam	0.11
Clay loam	0.03
Silty Clay loam	0.04 Note 3
Sandy clay	0.04
Silty clay	0.07
Clay	0.07

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Step C.3.

Infiltration Option 2 - Infiltration rate measured with in-field device, soil compaction mitigated

- Two 2-hour Double-Ring Infiltration tests at 5 water depths (total of 10 tests) at the native soil interface
- Calculate the geometric mean
- Determine the textural infiltration rate (TN) at the native soil interface (Table 2)

Double Ring Infiltrometer

Double Ring Infiltrometer

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Step C.3.

Infiltration Option 2 - Infiltration rate measured with in-field device, soil compaction mitigated

- Determine the lowest textural infiltration rate (TL) within 5 ft below the native soil interface (Table 2)
- Divide TN by TL = R and Table 3 to determine the correction factor (A)
- The infiltration rate is the geometric mean (G) / the correction factor

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Step C.3.

Infiltration Option 2 - Infiltration rate measured with in-field device, soil compaction mitigated

- Example
- Geometric mean = G = 1.45
- Textural infiltration rate = TN = 0.5 (sandy loam Table 2)
- Lowest infiltration rate within 5 ft of the native soil interface TL = 0.24 (loam Table 2)
- Ratio = R = TN / TL = 0.5 / 0.24 = 2.08
- Correction factor from Table 3 for ratio of 2.08 = 3.5
- Infiltration rate = G / correction factor = 1.45 / 3.5 = 0.41 in / hr

Table 3. Correction Factors for Measured Infiltration Rates at Infiltration Devices [Note 1]

Ratio of Textural Infiltration Rates (*R*)	Correction Factor (*A*)
1	2.5
1.1 to 4.0	3.5
4.1 to 8.0	4.5
8.1 to 16.0	6.5
16.1 or greater	8.5

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Step C.3.

Infiltration Option 3 – Infiltration rate not measured, soil compaction not mitigated

- Multiply the textural infiltration rate TL (Table 2) within 5 ft of the native soil interface by the correction factor from Table 4
- Example – for sandy loam TL = 0.5 (Table 2)
- Correction factor for sandy loam is 0.4 (Table 4)
- Design infiltration rate = TL x correction factor

  = 0.5 x 0.4 = 0.2 in / hr

Table 2. Design Static Infiltration Rates for Soil Textures Receiving Storm Water Note 1

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Silt loam	0.13
Sandy clay loam	0.11
Clay loam	0.03
Silty Clay loam	0.04 Note 3
Sandy clay	0.04
Silty clay	0.07
Clay	0.07

Table 4. Static Infiltration Rate Correction Factor for Incidental Soil Compaction [Note 1]

Compacted Soil Type		Correction Factor (*B*)
Sand	Coarse Sand or Coarser	0.9
	Loamy Coarse Sand	
	Sand	
	Loamy Sand	
Loam	Sandy Loam	0.4
	Loam	
	Silt Loam	
	Sandy Clay Loam	
Clay	Clay Loam	0.2
	Silty Clay Loam	
	Sandy Clay	
	Silty Clay	
	Clay	

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D – Soil and Site Evaluation Report

- Map with key info
- Soil profile
- Proposed infiltration surface and rate for design
- Submit with construction plan submittal for permit coverage

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Qualifications

- Steps A and B – licensed professional with experience in soil investigations, interpretation, and classification acceptable to the authority having jurisdiction

- Step C – licensed professional soil scientist, licensed professional geologist, or other licensed professional with 5 years of experience acceptable to the authority until December 31, 2022, after December 31, 2022 Step C is to be performed by a professional soil scientist or professional geologist

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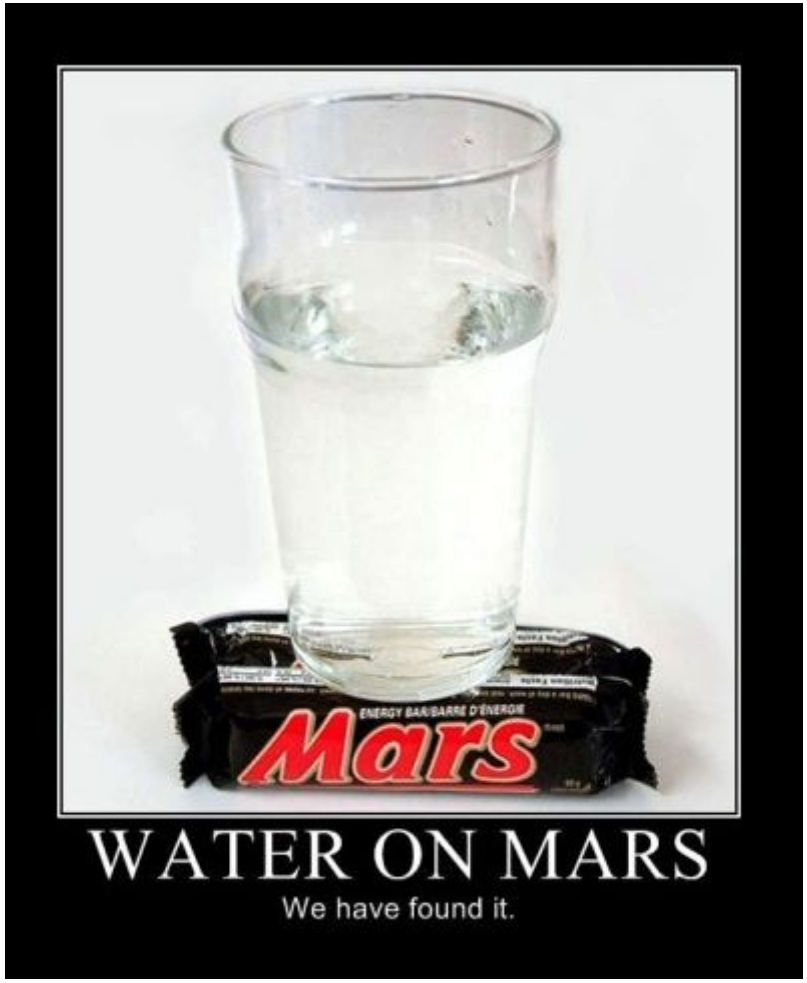
Summary

- Perform preliminary info gathering
- Gather soils information with test pits
- Prepare soil profile information
- Estimate infiltration rate for design
- Prepare evaluation report


ENERGY BAR/BARRE D'ÉNERGIE
Mars
WATER ON MARS
We have found it.

Resources

- Post Construction Technical Standards
- Construction Technical Standards
- Department Stormwater Guidance
- Proposed Guidance (all programs)
- WDNR website for technical standards and guidance
  https://dnr.wi.gov/topic/Stormwater/standards

Questions

Thank you for your attendance!

All questions are Good

Contact Info

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