# RIDEM Guidance on Siting Stormwater Management Practices on Properties with Subsurface Contamination

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## What Changed?

- In Rhode Island, two recent changes have increased the need to provide infiltration of runoff on sites being redeveloped
  - The 2010 RI Stormwater Design and Installation Standards Manual (RISDISM)
  - The goals of the Narragansett Bay Commission of reducing flow to the combined sewer systems discharging to combined sewage outfalls (CSOs)

# Rhode Island Stormwater Design and Installation Standards Manual (RISDISM)

- Prior to 2010, RISDISM redevelopment did not require providing stormwater management practices.
- For new construction, there was no requirement to provide recharge

# RISDISM

- In 2010, the RIDEM Office of Water Resources adopted a stormwater design manual – RISDISM
- Full depth reconstruction of existing impervious cover has a requirement for treating 50% of impervious cover with water quality and recharge practices
- New construction requires treatment of 100% of impervious area and recharge (if feasible)

## RISDISM

- The redevelopment standard requires that water quality treatment be provided for 50% of the area runoff of full depth reconstructed impervious cover.
- This would apply to:

  - pavement areas that are disturbed down to erodible soils

  - buildings that would have their foundations removed and replaced.
- This does not apply to:

  - pavement mill and overlay work

  - building renovations where the foundation remains intact

## RISDISM

- RISDISM also requires the recharge of a portion of the water quality volume (WQV). The fraction of the WQV to be recharged varies based on soil hydrologic group, with greatest amounts required for hydrologic soil group A (sand, loamy sand).

# Narragansett Bay Commission

- NBC was created by RI legislature in 1980 to improve and take over Providence's failing Field's Point WWTF, along with associated sewer infrastructure. Bucklin Point Facility was also acquired in 1992.
- A large amount of this sewer infrastructure consists of combined sanitary and storm sewer systems. These systems have relief outlets, known as combined sewer overflows (CSOs), that discharge the combined sewage to surface waters in moderate to large storm events
- www.narrabay.com/


# NBC – Storage Tunnel

- A CSO project went on-line with Phase I & II in 2008 and 2014 respectively. Phase I consisted of a 66 m.g. sewage storage tunnel; Phase II involved connection to this tunnel to greatly reduce CSO discharges to surface waters
- In 1992 NBC was given authority of another large WWTF (Bucklin Point) that discharges to the Seekonk River. A Phase III project is planned to include another tunnel and additional reductions in flows to CSOs. Phase III will include a green infrastructure component

## NBC –Stormwater Mitigation Program

- Implemented in 2003, it requires projects to reduce flows to their combined sewer systems. This need for disconnection places a priority on stormwater infiltration
- Since 2003, these environmentally friendly stormwater strategies have reduced, by over 8 m.g., the amount of stormwater entering the NBC system during a 3-month storm event (1.65" in 6 hours)
- This creates additional capacity in the 66 m.g. tunnel for collection of combined sewage overflows that would otherwise flow directly into the rivers and upper Narragansett Bay
- https://www.narrabay.com/programs-and-initiatives/stormwater-mitigation-program/

## RISDISM

- "Infiltration practices should not be used where subsurface contamination is present from prior land use due to the increased threat of pollutant migration associated with increased hydraulic loading from infiltration systems, unless the contamination is removed and the site has been remediated, or if approved by RIDEM on a case by case basis."

# RISDISM Recharge and Associated Water Quality Benefits

- One of the major benefits of recharge is to restore groundwater flow to mimic the natural hydrologic cycle. This may have a lesser overall value in many urban settings
- However, in areas with impaired waters and TMDLs, higher rates of stormwater treatment are needed, especially for bacteria
- The pollutant removal rates associated with stormwater practices that involve infiltration are typically higher than those involving lined & sub-drained sand filters and lined & sub-drained bioretention practices

- Portion of table from 150-10-8.38.D Pollutant Loading Analyses from the RI Rules and Regulations

D. Pollutant Removal Efficiency Rating Values for Water Quality BMPs.

| Water Quality BMPs (Those Meeting Minimum Standard 5, § 8.9 of this Part) | | Median Pollutant Removal Efficiency (%) | | | |
|---|---|---|---|---|---|
| | | TSS | TP | TN | Bacteria |
| Infiltration Practices | Infiltration Basin | 90%[1] | 65%[1] | 65%[1] | 95%[1] |
| | Infiltration Trench | 90%[1] | 65%[1] | 65%[1] | 95%[1] |
| | Subsurface Chambers | 90%[1] | 55%[1] | 40%[1] | 90%[1] |
| | Dry Well | 90%[1] | 55%[1] | 40%[1] | 90%[1] |
| | Permeable Paving | 90%[1] | 40%[1] | 40%[1] | 95%[1] |
| Filters | Sand Filter | 86%[1] | 59%[1] | 32%[1] | 70%[1] |
| | Organic Filter | 90%[1] | 65%[1] | 50%[1] | 70%[1] |
| | Bioretention | 90%[1] | 30%[4] | 55%[1] | 70%[1] |
| | Tree Filter | 90%[1] | 30%[4] | 55%[1] | 70%[1] |

1. UNHSC, Roseen, R., T. Ballestero, and Houle, J. 2007b. UNH Stormwater Center 2007 Annual Report. University of New Hampshire, Cooperative Institute for Coastal and Estuarine Environmental Technology, Durham, NH.

2. Center for Watershed Protection. 2007. Urban Stormwater Retrofit Practices, Urban Subwatershed Restoration Manual Series - Manual 3. Ellicott City, Maryland.

3. Foley-McNeal, T. Schueler, R. Winer., 2007. National Pollutant Removal Performance Database, v. 3. Center for Watershed Protection. Ellicott City, MD.

4. Prescribed value based on general literature values and/or policy decision.

5. 50% of reported values of low end for extended detention basins.

6. Presumed equivalent to bioretention; will require diligent pollutant source control to manage pet wastes in residential areas.

# Summary

Reasons for Infiltration:

- RISDISM Redevelopment Regs and Impaired Waters/TMDL goals, especially for new impervious area
- NBC disconnecting from combined sewer systems
- RIDOT and/or municipal stormwater infrastructure capacity issues
- Grant money

# The Problem With Infiltration

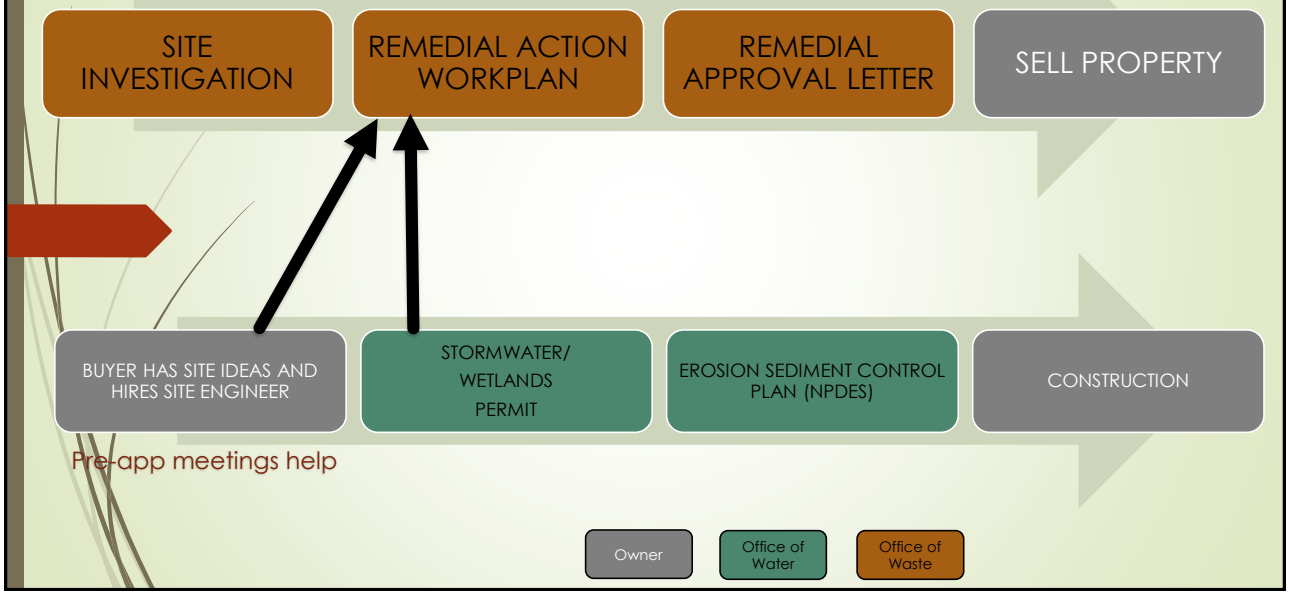
**What we have:**
–Properties with residual contamination that have the potential for reuse, restoration or redevelopment.

**What we want:**
–To better manage storm water onsite.

**What we don't want:**
–To cause further environmental damage by infiltrating storm water through contaminated soils.

*-Jessica Dominques,*
*Sustainable Reuse Lead*
*Brownsfields Program*
*EPA Region 1*
***2017 Presentation "Green Meets Brown"***

## The Issue: Two Process Paths




## RIDEM Develops Guidance to Infiltrate Where Feasible

- Guidance was developed by Alisa Diaz Richardson, MS, P.E., PMP, during her tenure as Supervising Sanitary Engineer at RIDEM Office of Water Resources/ Stormwater Program, in conjunction with Kelly Owens, Supervisor of the Site Remediation Program of RIDEM Office of Waste Management
- RIDEM Water Resources did not want to automatically exclude properties having areas of contamination without further examining of the specific limitations associated with these properties
- In some cases environmental land use restrictions (ELURs) may be placed on entire parcels simply because defining the exact limits of contamination would require additional survey costs

# General Principles to Follow

1. Differentiate between groups of contaminants
2. Keep non-contaminated storm water separate from contaminated soils and water
3. Prevent soil erosion
4. Minimize runoff on all new development within and adjacent to the site

# RIDEM

- RIDEM Office of Water Resources coordinates with RIDEM Office of Waste Management to develop the following:
  - RISDISM Subsurface Contamination Guidance
- The department has simplified the stormwater infiltration practice siting options based on the potential migration of subsurface contamination due to hydraulic loading

# RIDEM

- Step 1

  - If the proposed site is a state listed site with the Office of Waste Management, it is crucial that there is enough information about the site to assign the level of hydraulic loading allowed to protect critical clean-up systems and prevent further contamination.

  - Therefore, it is recommended that you not apply for a Stormwater Permit until you have at least received a Remedial Decision Letter

# RIDEM

- Step 2

  - Provide a Remedial Decision Letter or Remedial Action Work Plan approval as part of your submission to the Office of Water Resources for a Stormwater Permit

  and

  - Provide the Hydraulic Designation Loading as reviewed by Office of Waste Management


## Red-yellow-green CRITERIA TO PROTECT GROUNDWATER

RED – Typically determined by active fluid remediation under the site that contains a mobile plume.

Yellow – direct precipitation and infiltration is allowed. No concentrated flow unless lined, however, pervious pavers may be used

Green – Concentrated Hydraulic Loading Allowed

Note - Yellow can be turned to green in certain cases.

Green – if Class A Groundwater Standard, the soils must meet GA leachability standards.

- If Class B or C Groundwater, the soils must meet GB leachability standards. But if near an Environmentally sensitive area, it must meet GA leachability standards.

http://www.dem.ri.gov/programs/benviron/water/permits/swcoord/pdf/wastswgu.pdf

## Subsurface Contamination: Red

- Areas designated as "red" are those where no hydraulic loading is allowed. These are areas that have high levels of contamination and/or have contamination that would be readily mobilized and transported by infiltration of any amount
- No hydraulic loading areas are required to have an engineered hard/impervious cap by the Office of Waste Management
- Any stormwater practices in "red" areas would likely be:
  - Lined and sub-drained sand filters
  - Lined and sub-drained bioretention practices
  - Lined detention (for peak flow management only)

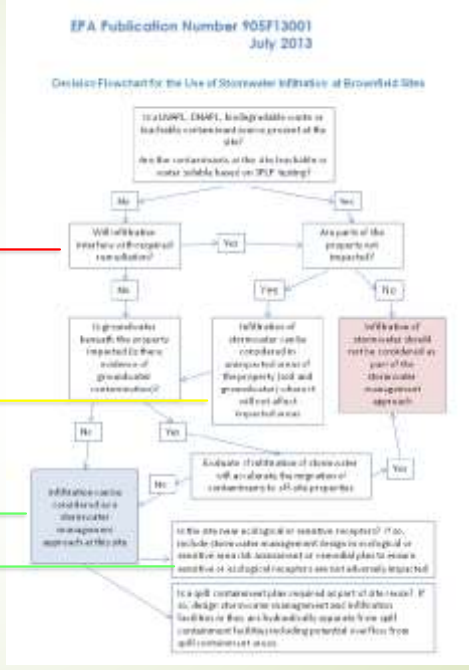
## Subsurface Contamination: Yellow

- "Yellow"/direct precipitation allowed areas are those where flow from concentrated stormwater practices could degrade groundwater quality by mobilizing contamination within the soils. However, these areas do not require an impervious cap
- Stormwater practices that are appropriate for "yellow" areas would be:
  - Pervious pavement
  - Pervious paver systems

## Subsurface Contamination: Green

- Areas designated "green" / unrestricted hydraulic loading / concentrated-hydraulic-loading-allowed are those allowed to accept any stormwater directed to them
- They can accept direct precipitation, sheet flow from adjacent areas, and collected runoff discharged into an engineered infiltration system
- Green areas are still subject to infiltration rate restrictions and sizing criteria
- Typical stormwater practices would be:
  - Underground infiltration system (chambers in a stone bed)
  - Surface infiltration basin
  - Infiltrating sand filter
  - QPA: broad areas of pervious soils typically with grass cover that receive runoff from adjacent impervious areas in a dispersing manner

- RED – Typically determined by active fluid remediation under the site that contains a mobile plume.
- Yellow – direct precipitation and infiltration is allowed. No concentrated flow unless lined, however, pervious pavers may be used
- Green – if Class A Groundwater Standard, the soils must meet GA leachability standards.
- If Class B or C Groundwater, the soils must meet GB leachability standards. But if near an Environmentally sensitive area, it must meet GA leachability standards.




# Groundwater Classification

- 150-05-3.9 A.1-A.3: Dept. Of Water Resources, Water Quality, Groundwater Quality Rules
- GAA: suitable for public drinking water use without treatment. Located within groundwater reservoirs, wellhead protection areas for community water supply wells and groundwater dependent areas that are physically isolated from reasonable alternative water supplies and the existing groundwater supply warrants the highest level of protection
- GA: suitable for public or private drinking water use without treatment and not located within above locations
- GB: not suitable for public or private drinking water use without treatment due to known or presumed degradation. Located in highly urbanized area with dense concentrations of historic industrial and commercial activity, a permanent waste disposal area at sites of historically permitted or approved inactive landfills and inactive land disposal sites, active sites permitted for the land disposal of sewage sludge and the area immediately surrounding the GB area or the GC area
- GC: more suitable for certain waste disposal practices than for development as a drinking water supply. Located at licensed solid waste landfills and areas that have been reclassified for solid waste landfills and facilities for the disposal of hazardous waste

## Infiltration BMPs/Green Areas/GAA or GA

- If a stormwater BMP is in a GAA or GA area, all soils to the groundwater table in the detention/infiltration area need to meet GA Leachability Standards per Table 2 of the remediation regulations for VOCs, SVOCs, pesticides, PCBs and inorganics
- Includes SPLP analysis for inorganic contaminants and the GA TPH Leachability Criteria per Rule 8.02(A)(iv)(2) of the remediation regulations

## Infiltration BMPs/Green Areas/GB or GC

- If the proposed BMP is in a GB or GC area, all soils to the groundwater table in the detention/infiltration area need to meet GB Leachability Standards as listed in Table 2 of the Remediation regulations for VOCs and PCBs, unless the infiltration area is within 200 ft of an environmentally sensitive area
- This also includes the GB TPH Leachability Criteria per Rule 8.02(A)(iv)(2) of the Remediation regulations

# Infiltration BMPs/Green Areas/GB or GC, within 200 ft of environmentally sensitive area

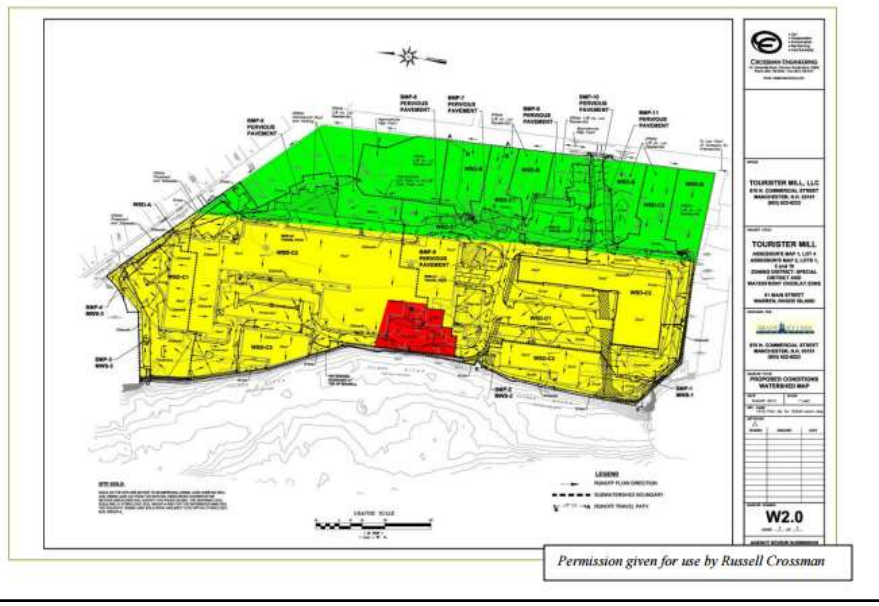
- If the proposed BMP is in a GB or GC area but also within 200 ft of an environmentally sensitive area, all soils must meet GA leachability standards.
- A waiver may be submitted if:

  A) Sufficient number of SPLP samples are taken of the soil to prove all contaminants of concern are not leaching out of soil into groundwater

  and

  B) Groundwater samples show said contaminants of concern are not above applicable standards

# Example Site



# Pre-Application Meetings

- In order to encourage the siting and design of stormwater management practices on properties having contamination, RIDEM offers pre-application meetings
- RIDEM Office of Technical and Customer Assistance (OTCA) arranges and facilitates these meetings

# Pre-App Meetings

- Parties typically present:
  - RIDEM OTCA Facilitator
  - Owner or Buyer and/or their representatives
  - Stormwater Design Engineer
  - A waste management professional
  - RIDEM Office of Waste Management Professional Staff
  - RIDEM Stormwater Program Engineer
  - RIDEM Freshwater Wetlands Supervisor (if needed)

## Pre-App Meetings

- Items of discussion:
  - The project being proposed in general
  - Stormwater management requirements and goals for
    - ~ RIDEM
    - ~ Local and NBC Requirements
  - What level of environmental site assessment has been done to evaluate site contamination
  - Options available for infiltration
  - Additional testing needs
  - Providing guidance for arriving at a (hopefully)workable solution

## Maximum extent practicable

- Goals of a workable solution:
  - Avoid spread of contamination
  - Where possible and if feasible, provide stormwater management including infiltration to the maximum extent practicable (MEP)
- If not possible, advise how best to document a technical justification of the design present and justify that it represents MEP

# Questions?

http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/