Storm Water Infiltration on Sites with Contaminated Soils

Strategies for Implementation & Sustainable Reuse

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Green Infrastructure & Brownfields Bootcamp
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BROWNFIELDS 101

EPA Brownfields Background

- Love Canal to present
  - CERCLA & NPL sites
- Council of Mayors (1990s)
  - Asked EPA "What about small sites?"
  - Real Estate market cannot deal with perception of contamination
- Began BF pilot grants thru CERCLA assessment ability
  - Started in 1994 – Bridgeport & Boston
  - Assessments help resolve uncertainty and get sites moving
- Goes beyond remediation to support
  - Smart Growth
  - Low Impact Development (LID) – Green Infrastructure
  - Sustainability
  - Transit-Oriented Development (TOD)
  - Resiliency & Extreme Weather Adaptation

Small Business Liability Relief & Brownfields Revitalization Act of 2002

- This Federal Law Contains Two Major Elements:
  1. Small Business Liability Relief
  2. Brownfields Revitalization
     - **Grant Program**
     - Brownfields Liability Clarifications
     - Establishes Interim Standards for AAI (Finalized in November 2006)
     - State Response Programs

- Authorizes funding up to $250M/year
  - Including $50M for states (non-competitive)
  - Including funds for petroleum assessment and cleanup

Types of EPA Assistance Grants

Amounts Available to Request in Each Grant Category

Assessment Grants
$200,000 - $600,000

Revolving Loan Fund
$1,000,000

Cleanup Grants
$200,000 per parcel

Targeted Brownfields Assessments
Grant of Service

Job Training Grants
$200,000

Area-Wide Planning Grants
$200,000

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GREEN MEETS BROWN

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.

Brownfield Constraints

- **Residual contamination** often requires capping and containment measures.
- Complete **infiltration of storm water is not always possible or desirable** in these situations.
- Rather than complete infiltration, think of **maximizing onsite treatment and storage of storm water**; combining infiltration, evapotranspiration and reuse strategies.

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

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WHAT DRIVES GREEN INFRASTRUCTURE DECISIONS?

EPA Policies

Greener Cleanup Policy and ASTM Standard:

- Minimize
  - Energy & Water Use
  - Air Emissions
  - Impacts to Natural Resources
- Sustainable Materials Management
- Support Sustainable Redevelopment
- BMPs Available
- January 2014 ASTM Standard

Bioswale construction
(for stormwater management)

Sustainable Redevelopment:

- Renewable energy
- Green Infrastructure
- Sustainable Products
- Transit-Oriented Development
- Low-Impact Development
- Use of Existing Infrastructure

Addressing Extreme Weather Adaptation in the Analysis of Brownfield Cleanup Alternatives:

- **Identify observed and potential extreme weather conditions** for the area in which the cleanup project is located.
  (Review an authoritative resource such as the USGS Web site, state or local resources)

- Given the pertinent concerns, **identify the site-specific risk factors**, taking into account site location and conditions.
  (e.g., proximity to the ocean, property affected by a revised FEMA flood plain map, infrastructure vulnerabilities, vulnerability of soil type due to moisture and hydraulic changes, ground and surface drinking water vulnerabilities)

- **Include in your effectiveness evaluation** how well each alternative can accommodate the identified risk factors.
  (Considering all stages of the cleanup and long-term reuse of the site.)

Note: EPA does not expect grant recipients to generate new site-specific measurements to complete this analysis. Through the ABCA, grant recipients must demonstrate they have reviewed available current and authoritative information for the cleanup analysis. The level of analysis expected depends on the complexity of the project and the degree of risk involved given the feasible remedial options and targeted reuse of the site.

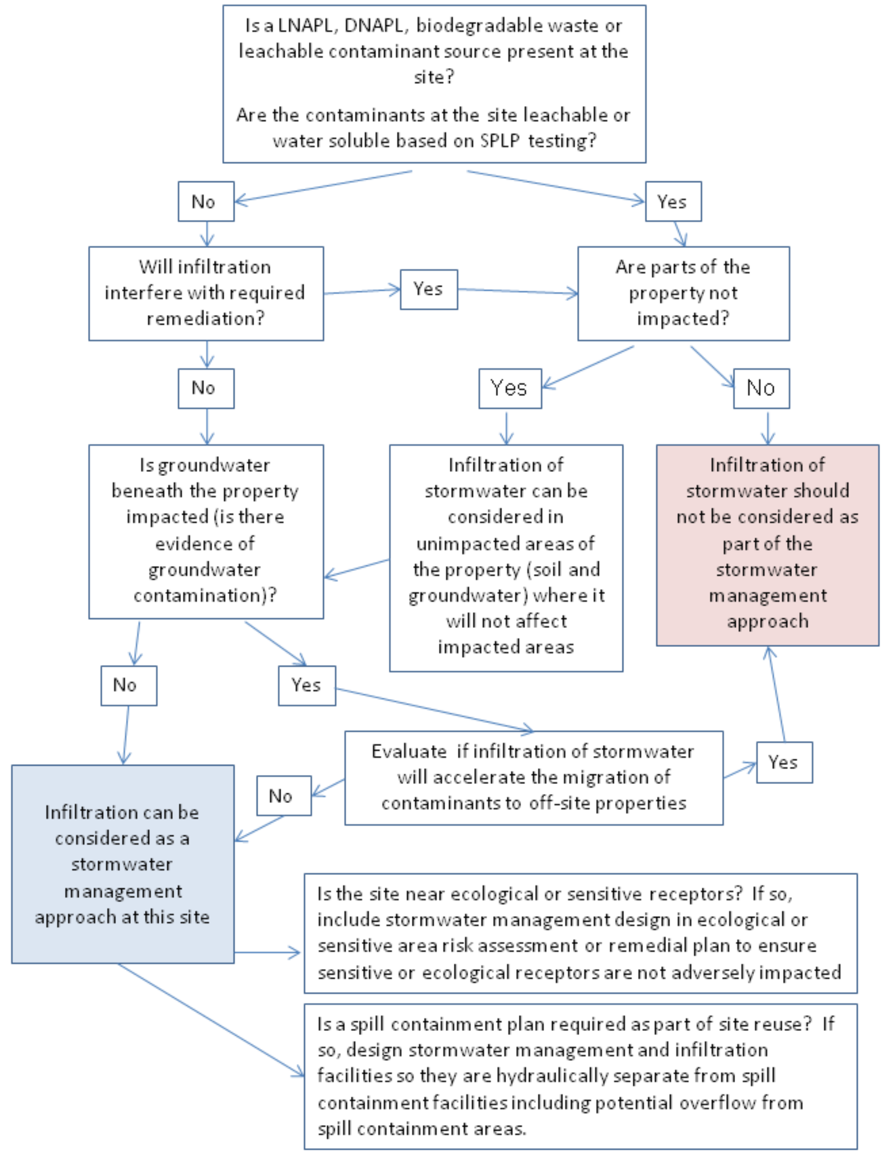
EPA United States Environmental Protection Agency

EPA Publication Number 905F13001
July 2013

Implementing Stormwater Infiltration Practices at Vacant Parcels and Brownfield Sites

When is Infiltration Appropriate???

Decision Flowchart for the Use of Stormwater Infiltration at Brownfield Sites



And in addition to the flow chart….

- **What are the drivers?**
- **What is the best technology for the sustainable reuse of the site at large?**

Public Drivers for GI on Brownfields

- Cost Savings
- Public Relations
- Restoration of Ecosystem Services
- Local or State Regulations
- Desire by Project Proponent to “Do the Right Thing”
- Phytotechnology efficiencies and “two-fors”

Phytotechnology

- The use of plants to cleanup, control or mitigate pollutants.
  - Think both CWA and CERCLA

- Developing Field

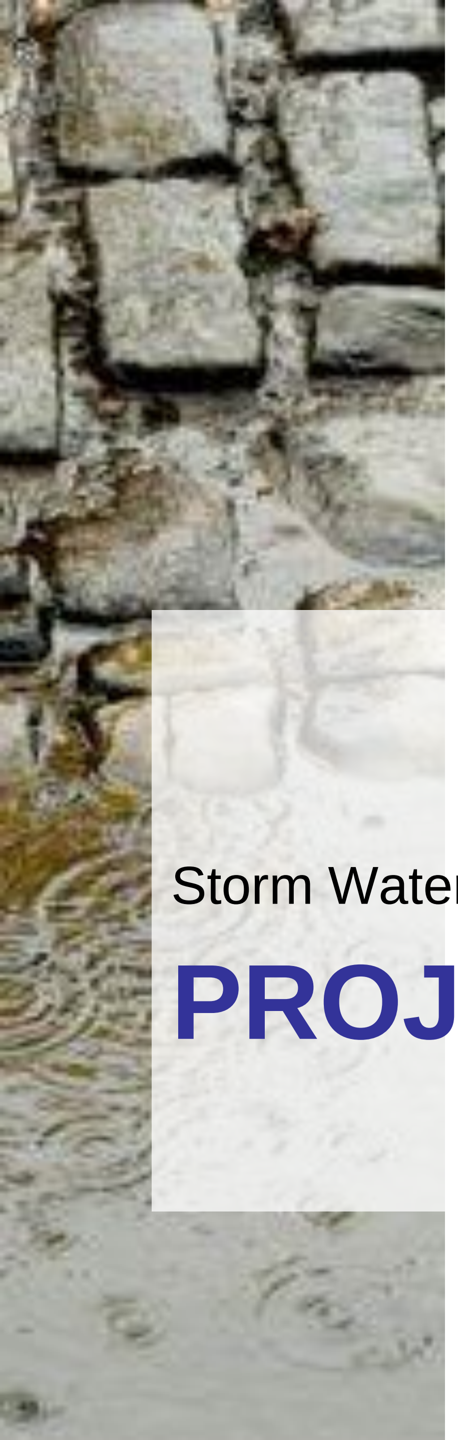
- Clu-In Training

Example:

Festival Pier – Pawtucket, RI

Further Phytotechnology Guidance

- Ecological Reuse: The Importance of Ecological Reuse (21MB/5:42/MP4)
- CLU-IN Phytotechnologies Focus Area
- CLU-IN Ecotools Focus Area
- Guidance on Soil Bioavailability at Superfund Sites
- ITRC Phyto Team (4.6MB/PDF)



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PROJECT EXAMPLES

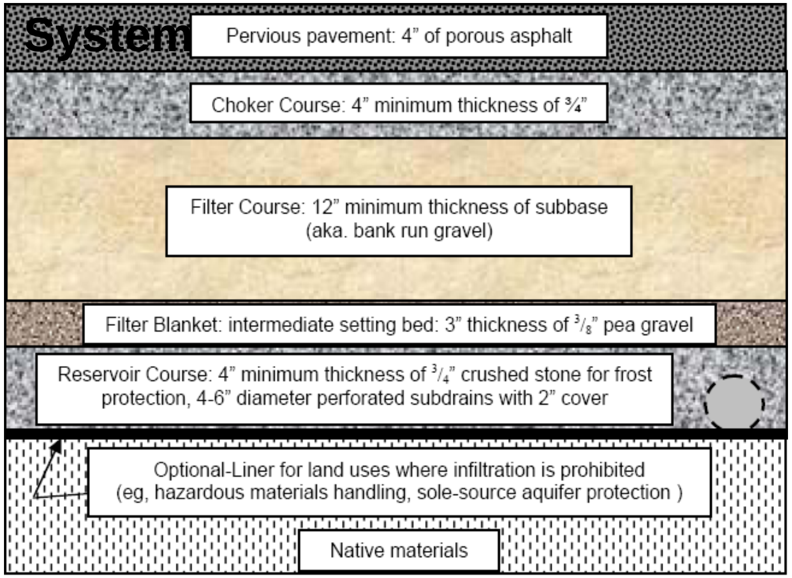
Urban Edge – Boston, MA

- FY 08 Brownfields Grantee
- Densely built, 11-acre urban site
- Contamination largely needed to be capped and contained onsite.
- **Goal:** to minimize the need for underground detention areas that will displace contaminated soil.
- **Solution:** maximize green roof & onsite storm water management potential as part of the remediation design.

PSNH Energy Park
Manchester, NH

- **Goal:** install UNHSC's pervious pavement system in a new parking lot.
- Construction generated more PAH contaminated soil than anticipated. (approximately 3,300 tons of soil)
- Offsite disposal was cost prohibitive.
- Onsite remediation prohibited thicker pervious pavement use.
- **Solution:** DES worked with PSNH to develop a better option for the contaminated soil
  - Further testing of the soil revealed coal ash as the primary source of contamination.
  - Coal ash contaminated soils can be handled as solid waste instead of hazardous waste.
  - This allowed the soil to be used as daily cover at the PSNH's coal ash landfill and the pervious pavement system to be installed.

Typical Cross-Section for UNHSC Pervious Pavement System



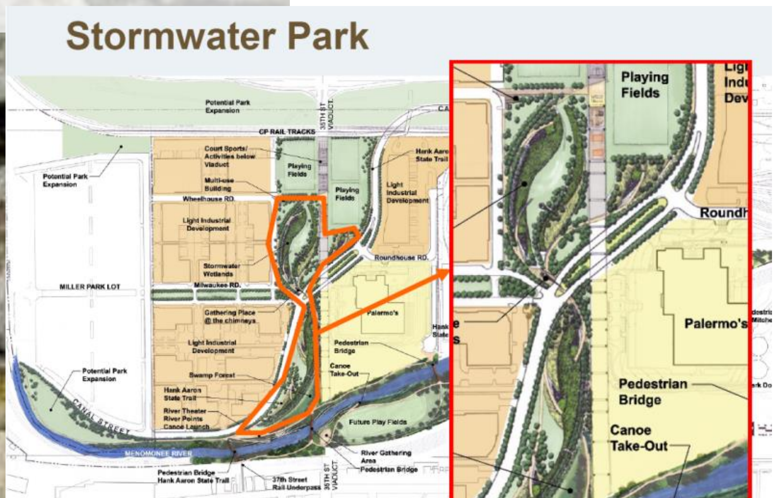
Source: **UNHSC Design Specifications for Porous Asphalt Pavement and Infiltration Beds**, July 2007, Rev. 10/07 http://www.unh.edu/erg/cstev/pubs_specs_info/unhsc_pa_apec_07_07_final.pdf

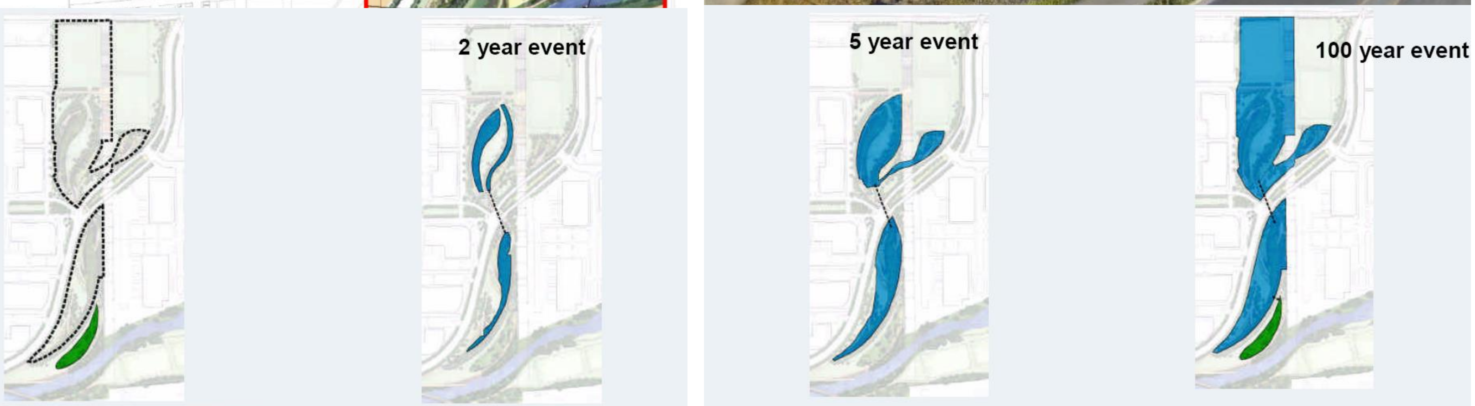
Menomonee Valley – Milwaukee, WI

- Contaminated and soft soils in a floodplain
- Goal: no sewer treatment of storm water
- 6-month national design competition
- Solution: Stormwater Park

NALGEP and BCN Web Cast (4/16/08): Brownfields and Stormwater (http://www.nalgep.org/calendar/Index.cfm?Page=1&EventsID=6035)

Stormwater Park





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WaterFire Arts Center

WaterFire Arts Center – Providence, RI

https://artscenter.waterfire.org/

Green Infrastructure driven by local stormwater regulation, but designed with an artist/architectural eye.

WATERFIRE
PROVIDENCE

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CHALLENGES & FURTHER INFORMATION

Challenges in New England

- Small Project Areas
- Disposal of Contaminated Soil
- High Density Development
- Volume of Storm Water
- Layered History of Contamination
- Changing Established Work Practices
- Increasing Frequency of Extreme Weather Events

Sources of Further Information

- EPA Stormwater Management on Contaminated Soils Fact Sheets (4/08)
  - Design Principles (http://www.epa.gov/brownfields/publications/swdp0408.pdf)
  - Case Studies (http://www.epa.gov/brownfields/publications/swcs0408.pdf)

- Implementing Stormwater Infiltration Practices at Vacant Parcels and Brownfield Sites (https://www.epa.gov/sites/production/files/2015-10/documents/brownfield_infiltration_decision_tool.pdf)

- EPA Soak Up the Rain Program: https://www.epa.gov/soakuptherain

- NH Soak Up the Rain program: https://www4.des.state.nh.us/SoakNH/

- UNH Stormwater Center (http://www.unh.edu/erg/cstev/)

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