GREEN INFRASTRUCTURE and STORM WATER PERMITS

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Linebach Funkhouser Inc.
OVERVIEW

- What is Green Infrastructure?
- Where is it Required, and Who is requiring it?
- Combined Sewer Systems.
- Example of a Green Commercial Parking Lot.
What is Green Infrastructure?

Green Infrastructure is a term used to describe an array of materials, technologies and practices that use natural systems—or engineered systems that mimic natural processes—to enhance overall environmental quality of storm water runoff. As a general principal, green infrastructure techniques use soils and vegetation to infiltrate, evapo-transpirate and/or recycle storm-water runoff.

The Environmental Protection Agency (EPA) defines green infrastructure similarly and recognizes green infrastructure as a means to manage storm-water runoff.

Sometimes Green Infrastructure is referred to as LOW IMPACT DEVELOPMENT when it is applied to new construction.
Examples of Green Infrastructure
Include:

- Green roofs,
- Porous Asphalt, Permeable Pavers, Pervious Concrete
- Rain gardens and vegetated swales
- Rainwater Harvesting
- Vegetated Buffers and Vegetated Swales
- Underground Storage and Infiltration Trenches
Old School vs. Green Infrastructure
MORE OLD SCHOOL
Commercial/Industrial Development
Porous Asphalt

Figure 2. Infiltration of 30 gallons per minute from a 2-inch hose at UNH. Image courtesy University of New Hampshire Stormwater Center.
Turf Grid
INфильтрацiя Trench
Curb cuts for planters.
Rain Gardens, Main Street, Lexington, Kentucky
Bioretention Cell, Downtown Lexington, Kentucky
More Tree Planters
Landscaping and Green Infrastructure
Bio-swale, Kosair Children’s Medical Center, Louisville, Kentucky
GREEN INFRASTRUCTURE
RIGHT OF WAY BIOSWALE
When is Green Infrastructure Required?

The KPDES MS4 permitting program is promulgated through Phase I and Phase II permits.

In Kentucky, a Phase I MS4 requires an individual permit for storm-water discharges from large and medium urban areas serving a population of 100,000 residents or more. Urban areas covered by Phase I MS4 permits are required to develop BMPs that reduce storm-water pollution impacts to the “maximum extent possible” (MEP).
LOUISVILLE MSD APPROACH

MSD updated their Wastewater/Storm-water Discharge Regulations (WDRs) to include Clean Water Act (CWA) requirements for long-term storm-water quality for new development, effective August 1, 2013.

Like many similar communities across the country, Louisville is mandated to apply the storm-water quality requirements. In Kentucky, the Kentucky Division of Water (KDOW) administers the program for the Environmental Protection Agency (EPA). The core requirements are mandated by EPA and KDOW through the MS4 stormwater quality permit.

New development must:
- Use on-site green infrastructure / Green Management Practices (GMPs) to treat storm-water runoff at new construction projects disturbing one or more acres.
- Participate in a long-term operation and maintenance agreement.
The Site Disturbance Permit process is described below:

- The Application.
- EPSC Plans.
  - EPSC Detailed Construction Plan Checklist.
  - Pre-construction site meetings. (If required)
  - Site Disturbance Bond. (If required)
  - Notice of Construction.
- Issuance of a Site Disturbance Permit.

The process for the release of a Site Disturbance Permit is described below:

- Final Stabilization :
- Letter of Completion.
- Release of the Site Disturbance Permit.
- Release of the Site Disturbance Bond.
Detailed EPSC plans shall comply with the following standards and review criteria:

- Sediment Tracking Control.
- Construction Dewatering Operations.
- Crossings of waterways during construction
- Topsoil stockpiled and preserved
- Temporary Stabilization Measures.
- Final Stabilization.
- Temporary Structural Controls

- All Permanent Structural Controls, including drainage facilities such as channels, storm sewer inlets, and detention basins, shall be designed according to the standards set forth in the this Manual, the Standard Specifications and Drawings.
Other Places Green Infrastructure is Used

- LUFCG uses economic incentives to encourage LID. BMPs in the LFUCG Storm-water Manual include LID.
- Northern Kentucky SD1 requires a Land Disturbance Permit to manage post construction storm water management. Requires Volume Control BMPs for new developments and as an option for redevelopments.
- Philadelphia, the first inch of rainfall must be managed on site through infiltration (if feasible) in all new development and redevelopment projects with at least 15,000 square feet of earth disturbance.
- Washington D.C., Pittsburgh, and Aurora, IL, and states such as California and New Jersey, have already approved and implemented ordinances and statutes to improve retention standards for their communities to support green infrastructure.
The Bad Old Days (before Sewers)
1850 – First underground sewers constructed in Louisville (some still in service)
1906 – Commissioners of Sewerage begin constructing combined sewer system (most still in service)
1906 – 1944 Sewer service extended to Watterson
1946 – MSD formed by State legislature
1958 – Fort Southworth Wastewater Treatment plant (now Morris Forman) begins operation
1946 - 1980s – Building results in sewer system expansion by land development companies
1980 – 2000s – MSD begins service area expansion, elimination of remote treatment plants
TYPICAL COMBINED SEWER SYSTEM
WHERE ARE THE COMBINED SEWERS?
CSO Control Accomplished Through Many Approaches

- Sewer Separation
- Source control and “green infrastructure”
- Storage
  - In-line Storage
  - Off-line Storage
- Conveyance and Treatment
  - Centralized at Morris Forman plant
  - Regional
  - Local

Optimal solution usually involves a combination of all these approaches.
So What Do They Look Like?
Combined Sewer Overflow Fact Sheet

**Record #:** 12364-5
- **MSD Atlas:** BA222
- **Map #:** MAL19
- **Project #:** L_SO_MF_092_M_09B
- **Project Name:** Logan Street and Breckinridge Street Storage Basin

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*Maps not to scale.*
* REGULATOR REMOVED
OCTOBER 2006

* Revised Elevations per JTL Survey, Oct 2005 - July 2006 (NGVD.29)

** SEE SHEET 2 FOR DETAIL OF
OUTLET STRUCTURE.**

** NOTE: ELEVATIONS SHOWN
WERE TAKEN DIRECTLY
FROM PLANS & ARE NOT
FIELD VERIFIED.**

** Revisions as of FALL 2008

COMBINED SEWER
OVERFLOW STUDY

MSD
Louisville and Jefferson County
Metropolitan Sewer District
400 South Sixth Street Louisville, Kentucky 40202

SOUTHEASTERN INTERCEPTOR
- Sanitary Diversion and Siphon
PROFILE

PLAN

*Revisions as of FALL 2008*
Newberg Rd. and Trevilian Way
ELI BROWN PROJECT
Well #1

(33) SKETCH MAP:

[Map showing well location with annotations]

(34) PUMP DATA: Was a pump installed?: (X) Yes ( ) No
Date installed: 09/21/05

Pump Type:
( ) Submersible
( ) Jet
( ) Turbine
( ) Hand
( ) Bailer/Bucket
( ) Other
Horsepower: XX 15
Rating (gpm): 250
Pump intake set at 90.75 feet below ground surface

(35) LITHOLOGIC LOG:

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<th>Water Quality and GPM</th>
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<td>101</td>
<td>Sand &amp; Large Gravel</td>
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<tr>
<td>102</td>
<td>Sand &amp; Pea Gravel</td>
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</tr>
<tr>
<td>122</td>
<td>Bottom</td>
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Note: 0.060"
Louisville Aquifer
During and After Construction
Hiccups
ECONOMICS

LOUISVILLE MSD INCENTIVES

$7.28 per 2500 sq ft drainage fee for existing impervious surfaces (roofs, parking lots, etc)

MSD will pay landowners up to $1.50/ sq ft to modify existing parking lots so that instead of the storm water runoff going into the combined sewer, it infiltrates into the ground.

Additionally, 50% -25% off your drainage fees for 10 -20 years.

NOT AVAILABLE FOR NEW CONSTRUCTION
Green Infrastructure is now required for new construction
LFUCG INCENTIVES

In January 2010, LFUCG instituted the Water Quality Management Fee (WQMF). The fee is applied to non farm and residential parcels based upon the amount of pervious area on the parcel.

Use of certain LID practices can provide an added benefit to a non-residential property owner by lowering the WQMF on any given parcel. Surface areas classified by LFUCG as having an “Engineered Pervious Surface”, meaning that they are engineered to function with a permeability rate equal or greater than a typical grassed pervious surface, are excluded when calculating the WQMF.
KEY ISSUE FOR INFILTRATION GALLERIES

- MSD Design Manual 18.5.20 Infiltration Trenches

- “Native soils should have an infiltration rate of 0.5 inches per hour or greater. It should be noted that 0.5 inches per hour is the minimum infiltration rate, however higher infiltration rates are recommended.”

- Designed to drain in 24-48hrs

- Sand = 14.4 – 1.44 inches per hr
- Silt = 1.44 – 0.014 inches per hr
- Clay = less than .0014 inches per hr.