



Low Impact Development

The Ultimate Best Management Practice for Storm Water!



Sustainability



- FACT: 71% of the earth is covered in water
 - Only 3% is fresh water
- FACT: 2/3 of water on earth is frozen in the polar ice caps
 - That leaves us 1% of the entire amount of water available on earth for us to use, cleanup, and reuse!
- Due to the amount and nature of the pollutants, it is becoming more difficult to treat the water we have
 - More people = more pollution!
- Non-Point Source pollution is the greatest threat to our water supply
 - Examples include: sediment, litter, yard waste, pet waste, fertilizer, herbicides, pesticides, vehicle and equipment washing, vehicle fluid drips, etc.

Principles of Storm Water Management

- Plan first
- Prevent, then mitigate
- Minimize the disturbance
- Manage storm water as a resource, not as a waste
- Mimic the natural water cycle
- Disconnect, decentralize, distribute
- Integrate natural systems
- Maximize multiple benefits
- Make maintenance a priority



Green Lawn Care Management Techniques



- Landscape with native trees, plants, grasses, and flower species.
 - A native lawn reduces or eliminates the need for lawn chemicals.
- Test the soil for nutrient deficiencies before using fertilizers.
- Read labels on lawn chemicals carefully and always apply products sparingly.
 - Using extra product does not provide extra benefit.
 - Allow proper drying time for liquid chemicals, and never use lawn chemicals before a heavy rainfall is expected.

Low Impact Development

- Modeled after nature
- Manage rainfall at the source
- Allows for greater development potential, while creating fewer environmental impacts
- Use multiple methods for a multi-layered approach
- Helps to achieve a better balance between nature and development



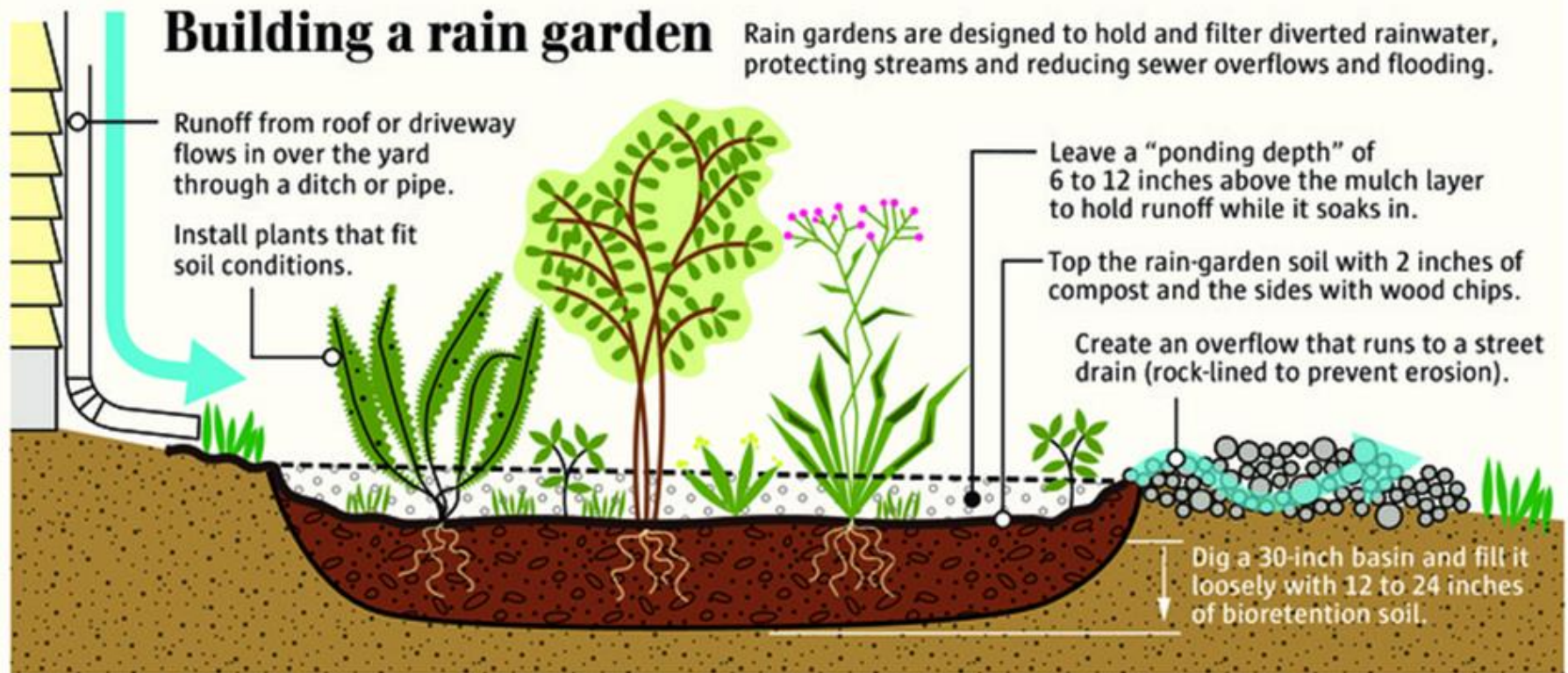
Rain Garden



- Rain gardens can be an inexpensive, simple, and environmentally sound solution to urban storm water runoff.
- Properly designed, rain gardens can provide many potential benefits:
 - Increase beneficial insects that eliminate pest insects
 - Filter runoff pollution
 - Recharge local groundwater
 - Conserve water
 - Improve water quality
 - Protect rivers and streams
 - Remove standing water in your lawn
 - Reduce mosquito breeding
 - Reduce potential of home flooding
 - Create habitat for birds & butterflies
 - Survive drought seasons
 - Reduce garden maintenance
 - Enhance sidewalk appeal
 - Increase garden enjoyment



Rain Garden design



Source: Seattle Public Utilities

DAVID MILLER/THE SEATTLE TIMES

Rain Barrel/Cistern

- Connect rain gutter downspouts to device
- Utilize collected water for irrigation
 - Can save up to 40% of average water bill expense for irrigation



www.UpCycle-Products.com
www.homedepot.com

Rain Barrel Event

Recycle
the
Rain

ONLY
\$63.50



Central Oklahoma
Storm Water Alliance

Member Organizations

City of Bethany
City of Choctaw
City of Del City
City of Edmond
Town of Jones
City of Midwest City
City of Moore
City of Mustang
City of Norman
City of Oklahoma City
City of Yukon

A rain barrel promotes conservation and saves you money on water bills by harvesting rain water for your garden

Using Rain Barrel Water

- Water your flowers, trees, shrubs, and lawn
- Wash your car
- Rinse tools or muddy boots
- Wash house windows

Advantages

- Saves money
- Helps reduce stormwater pollution
- Conserves water resources
- Better for plants and gardens

Online orders must be received by the Sunday prior to the pickup date

For online orders and additional information
www.upcycle-products.com

2019 Pickup Events and Locations
Bring Order Confirmation to Pickup Event

Yukon (405) 354-6676

1035 Industrial Drive, Yukon
March 8th

Edmond (405) 359-4763

2012 Old Timbers Drive, Edmond
March 9th

Norman (405) 329-2524

668 E. Lindsey Street, Norman
April 5th and April 6th

Midwest City (405) 739-1040

8726 SE 15th Street, Midwest City
April 26th and April 27th

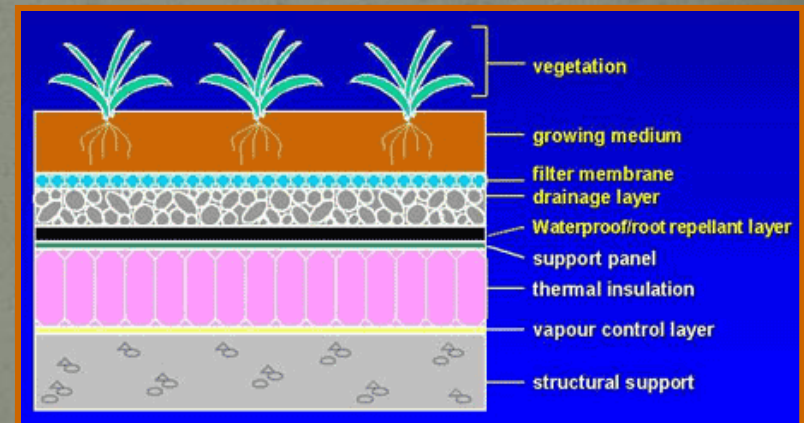
Oklahoma City (405) 297-1797

1621 S. Portland, Oklahoma City
May 17th and 18th



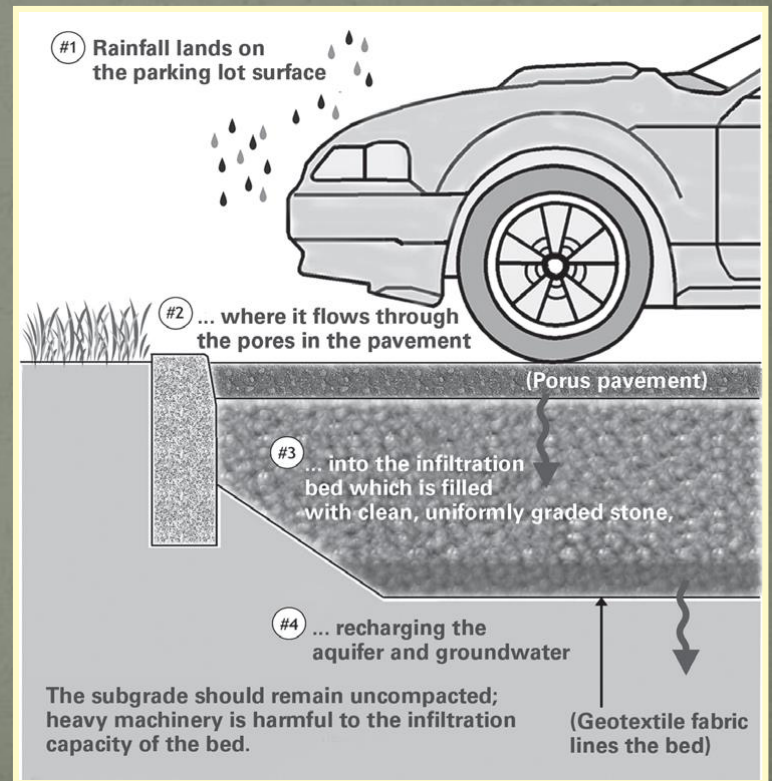
Green Roof

- Reduces impervious surfaces
- Multilayered construction:
 - Vegetative layer
 - Utilize drought-tolerant, low-maintenance plantings
 - Growth media
 - Geotextile layer (waterproof)
 - Synthetic drain (overflow)
 - Support structure
- Extends roof life
- Reduces building's energy costs



Porous Pavement

- Concrete or Asphalt, designed for water to drain through with up to 25% porosity
- Reduces the volume of runoff



Permeable Pavers/Paving Systems

- Space between pavers, allowing rain water to soak in
 - Reduces runoff
 - Reduces pollution
- Support structure for grass/gravel systems



www.invisiblestructures.com
www.belgard.com

Grass Swale

- Flexible and inexpensive.
- Function to reduce runoff velocity, filter sediment and pollutants, allow for greater infiltration, and reduce erosion potential.



Soil Amendment

- Improves infiltration and retention of storm water runoff
- Can use as part of a multilayered approach
- Reduces erosion potential
- Natural, fibrous amendments/additions to soil are most effective:
 - Peat Moss
 - Wood Chips
 - Tree Bark
 - Straw, etc.





Alternative BMP Options

Nifty Gizmos and Useful Tools That You May Not Have Heard Of Before Today!

Storm Drain Inserts

www.inletfilters.com

www.dawginc.com

www.newpig.com

www.absorbentsonline.com

www.suntreetech.com

www.biocleanenvironmental.com

www.unitedstormwater.com

www.thebmpstore.com

www.kristar.com



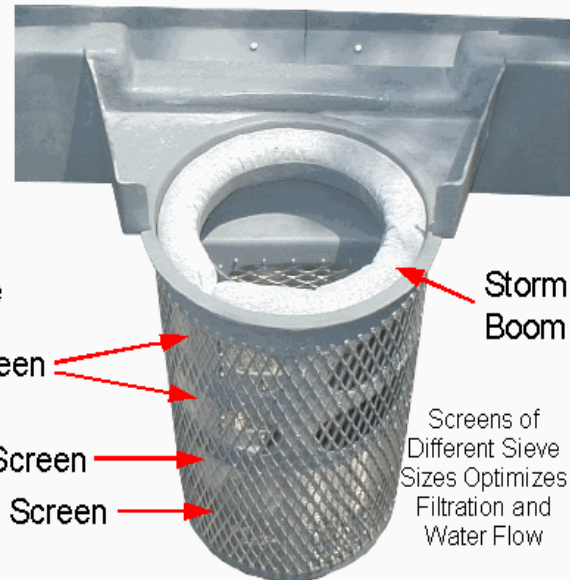
For Use In Deeper
Catchbasins

The Round Basket
Optimizes the Fit
Through the Manhole

Coarse Sieve Screen

Medium Sieve Screen

Fine Sieve Screen



Storm
Boom

Screens of
Different Sieve
Sizes Optimizes
Filtration and
Water Flow



Curb Inlet Screen Covers



www.unitedstormwater.com
www.suntreetech.com
www.biocleanenvironmental.com

Hydrodynamic Separator

- Stormwater quality control – trash, debris, sediment, and hydrocarbon removal.
- Inlet and outlet protection.
- Pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting, and Low Impact Development designs.
- Maintenance can be accomplished using a vacuum truck.

www.forterrabp.com

www.rinkerstormceptor.com

www.contech-cpi.com

www.kristar.com



Filtration Systems

- Jellyfish Filter Manhole



www.imbriumsystems.com

- Bioretention Filtration Systems



www.filterra.com

www.contech-cpi.com/stormwater/13

www.biocleanenvironmental.com

Downspout Filtration

- Roof Runoff Filter
 - 10 year warranty
 - In-Line Design
 - High Treatment Flow Rate
 - High Bypass Flow Rate
 - Performance:
 - 93% removal of TSS
 - 87% removal of hydrocarbons
 - Media available to remove:
 - Metals
 - Nutrients
 - Bacteria



Drum Covers



www.grainger.com

www.mscdirect.com

Drain Covers

www.newpig.com



Fast protection when a spill is heading right for your drain!



Spill Containment

- Flexible spill berm
- Tank containment
- Pop-up pool
- Drip pan with absorbent media
- Spill deck with oil and grease absorbent media



www.newpig.com

www.dawginc.com

Spill Containment

- Spill control valve
- Existing topography



Portable Drum Containment

- Collapsible sidewalls — so you can drive your truck or forklift right inside
- Sides stay rigid and upright — even in the wind



Filtration Speed Bump

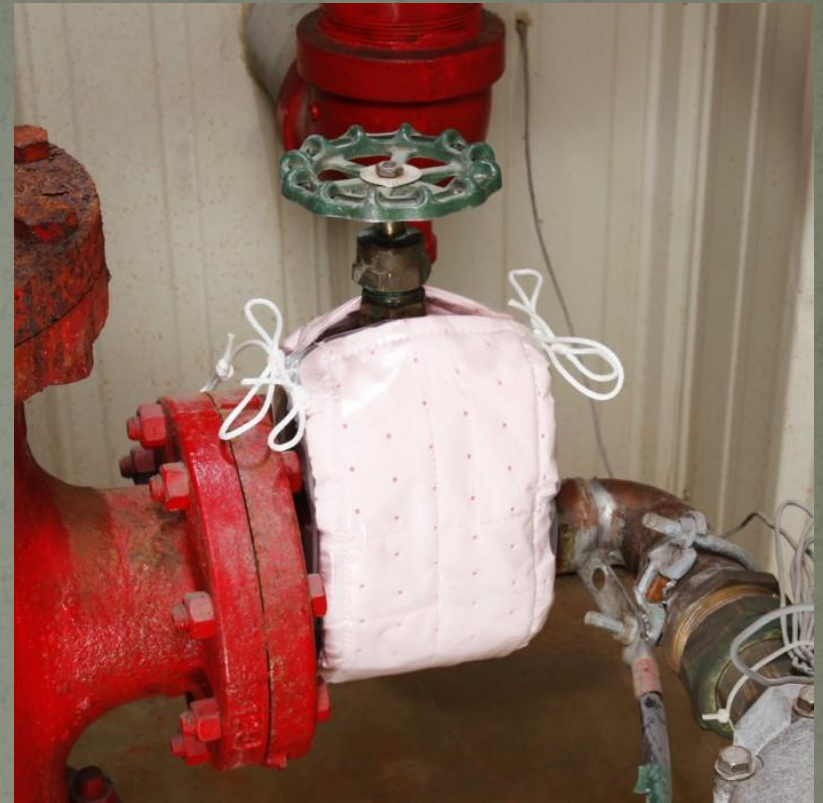
- Heavy duty steel construction
- 4-foot sections
- 80,000 lbs drive over capacity
- Captures runoff contaminants



www.stormwaterremediation.com

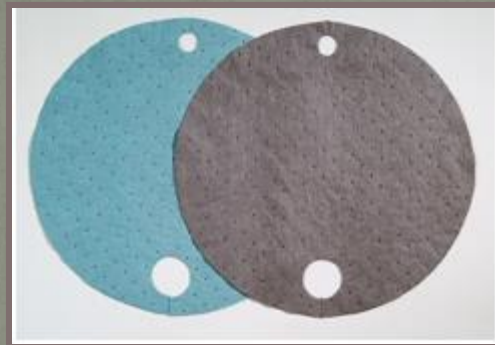
Contact Roy Kaufmann for additional information – the website is no longer in use. 562-209-5916

Valve Wrap



www.newpig.com

Absorbents and Spill Kits



www.absorbentsonline.com
www.bestvalsup.com
www.EnviroCleanPS.com
<http://outpak.com/products.html>
www.newpig.com
www.biocleanenvironmental.com

Specialty Products



- C.I.Agent® instantly solidifies hydrocarbons upon contact, turning them into a non-toxic, non-hazardous mass that floats on water.
 - The rubber-like mass can then easily be disposed of or reused in various industrial applications.
 - Oil absorbent material also incorporated into their other products, including booms, fabrics, and water filtration socks.



Slurry Solution

- Outpak Slurry Solution is “an innovative product that makes your slurry waste cleanup easy and efficient.”
- “Just mix Outpak Slurry Solution into the slurry waste, wait a few minutes to solidify and throw away in any standard waste container.”
- The material becomes landfill ready in minutes.

<http://outpak.com/products.html>



Concrete Washout Containment



www.outpak.com
www.maxokc.com





Sediment Filtration & Erosion Control

Best Management Practice Options

Triangular Silt Dike

- Designed as an effective and economical alternative to straw bales, silt fence and rock check dams.
- Aprons on either side of the Dike prevent erosion and failure of the structure. Optional, U-shaped wire staples help secure unit in place and conform to rough terrain.
- Lightweight and durable construction — installs in minutes.
- Multiple units can be installed side-by-side for larger areas.

www.tri-siltdike.com
www.spillcontainment.com
www.maxokc.com



Rice Straw Fiber Rolls (Wattles)

- Alternative to traditional silt fencing
- Reduces runoff velocity
- Controls or captures eroded sediment
- Lighter than straw bales
- Easier to install than silt fencing
- Must be trenched in and staked down



www.earth-savers.com
www.maxokc.com

Erosion Eel

- Geotextile bag filled with filter media consisting of:
 - Wood chips
 - Recycled shredded tire rubber
- Multiple functions:
 - Silt fence alternative
 - Check dam
 - Inlet protection
- Flexible
- Reusable and recyclable

www.erosioneel.com



Compost for Erosion Control?! YES!

SEDIMENT CONTROL

In nature, rainfall is detained and infiltrated into the ground where it can be naturally filtered. SiltSoxx™ Mimic Nature® by replicating this filtration on the surface. Filtrexx® SiltSoxx™ use composted green residuals inside a patented mesh containment system to remove sediment and pollutants through filtration and deposition. SiltSoxx can also be used to slow runoff flow velocities on sloped surfaces, thereby reducing the transport of sediment and soluble pollutants.

APPLICATIONS



PERIMETER CONTROL
[View »](#)



INLET PROTECTION
[View »](#)



CHECK DAM
[View »](#)



CONCRETE WASHOUT
[View »](#)



SLOPE INTERRUPTION
[View »](#)



RUNOFF DIVERSION
[View »](#)



SEDIMENT TRAP
[View »](#)



- Multiple products available
- Filled with compost (think easy disposal)
- Don't need to be trenched in
- Last 6+ months

www.filtrexx.com

www.flextraninc.com

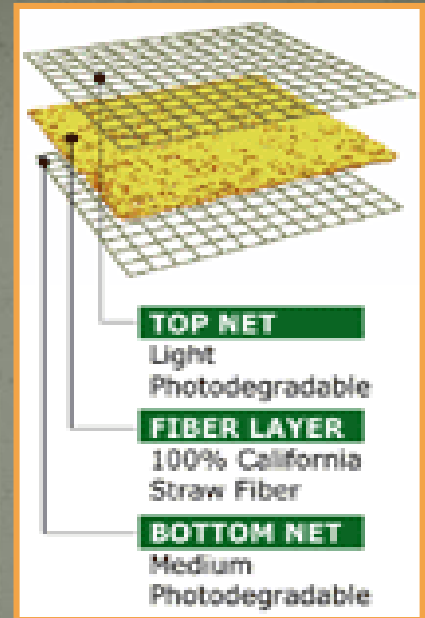
Flexamat



www.flexamat.com
www.triangularsiltdike.com

Erosion Control Blankets

- Provide erosion protection
- Assist with vegetation establishment
- Installed after grading and seeding have taken place
 - Blankets are securely fastened to the ground
- Seed and soil are protected from wind and rain
- Helps create optimal conditions for seed germination and growth



Hydroseeding

- A planting process utilizing a slurry of seed and mulch
 - Slurry is sprayed over prepared ground in an even layer
 - Indicator dye to minimize overlap
 - Mulch helps retain moisture
- An effective alternative to the traditional process of broadcasting or sowing dry seed
 - Promotes quick germination
 - Inhibits soil erosion

www.turfconnection.com
www.homedepot.com



Dewatering Filtration

- Outlet protection devices
 - Filters sediment from a pump discharge
 - For use when dewatering sediment-laden areas.
- Available in both single-use or multiple-use models.

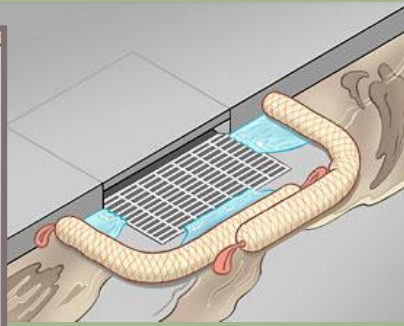
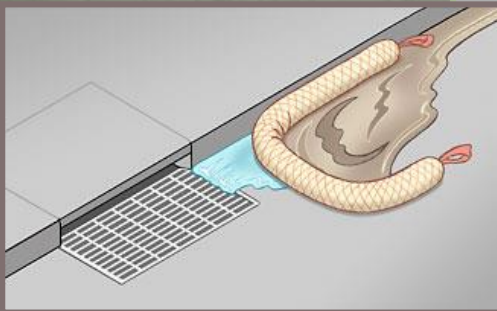


spillsource.org

www.ciagent.com

www.interstateproducts.com

Sediment Filtration



chemtexinc.com
www.suntreetech.com
kristar.com
newpig.com
spillsources.org
spillcontainment.com
www.maxokc.com

QUESTIONS?

Revised 10/16/2018

Green Infrastructure (GI)

EPA Green Infrastructure

- www.epa.gov/green-infrastructure

Low Impact Development (LID)

Green Country Storm Water Alliance

- www.stormwaterok.net

Great Plains LID

- www.greatplainslid.org/

Urban Design Tools – Low Impact Development

- www.lid-stormwater.net/index.html

EPA Polluted Runoff (Nonpoint Source Pollution), Urban-NPS Categories, LID

- www.epa.gov/nps/lid

Natural Resources Defense Council (NRDC) Water-Smart Cities

- www.nrdc.org/issues/water-smart-cities

Low Impact Development Center

- www.lowimpactdevelopment.org

Center for Watershed Protection

- www.cwp.org

Rain Gardens and Bioretention

Rain Garden Network

- www.raingardennetwork.com

Rain Gardens of West Michigan

- wmeac.org/raingardens/

Soak Up the Rain: Rain Gardens (EPA)

- www.epa.gov/soakuptherain/soak-rain-rain-gardens

Revised 09/27/2018

Alternative Best Management Practices and Products*

Companies with multiple products available, including: absorbents, spill kits, spill pallets, drain covers, filtration devices, storm drain inserts, spill berms, portable containment, erosion control devices, and/or bioremediation products.

BioClean (A Forterra Company)

- www.biocleanenvironmental.com

Chemtex Solutions in Spill Control – Storm Water Management

- www.chemtexinc.com/stormwater.html

C.I.Agent Solutions – hydrocarbon management and storm water diversion

- www.ciagent.com

DAWG (Doing Away With Grime)

- www.dawginc.com

Enviro Clean Services, LLC

- www.EnviroCleanPS.com

Forterra

- www.forterabp.com

Gator International

- www.gatorinternational.com

For more information, this presentation and both resource pages are on the workshop CD!