New York's Stormwater Management is Now Green

NYS Department of Environmental Conservation

Why does this matter to municipalities?
Stormwater Impacts from Erosion and Increased Runoff

Property Damage
Damage to Roads and Bridges
Beach Closures

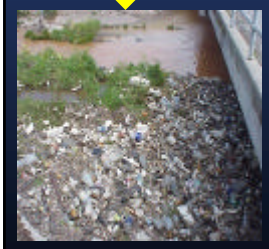
Loss of Aquatic Habitat
Drinking Water Contamination
Streambank Erosion

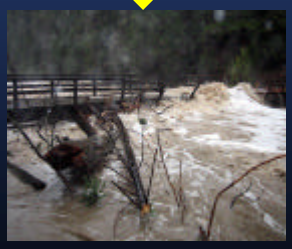
DEC's Current Regulations…

- SPDES Construction Stormwater General Permit (GP-0-10-001)
  - *Requires **RUNOFF REDUCTION***
- NYS Stormwater Management Design Manual (August 2010)
  - *Incorporates **Runoff Reduction** and **Green Infrastructure***

NYS Stormwater Management Requirements:

Treat Water Quality — Control Runoff Rate and Volume





Stormwater Management Design Steps

Old Way

1. Treat Water Quality
2. Control Runoff Rate

New Way

1. Reduce Runoff Volume
2. Treat Water Quality
3. Control *Remaining* Runoff Rate and Volume

Okay, so how do we do it?. . .

Basic design concept: We no longer want to pave over as much as possible and send water down the pipe as fast as we can

More Recharge = Less Runoff

Stormwater Planning and Design Using Source Controls

1. Conserve Natural Areas and Reduce Impervious Cover
2. Calculate Water Quality Volume (WQv)
3. Determine Runoff Reduction Volume (RRv) by applying Green Infrastructure and Green Planning to reduce the site area contributing to runoff volume
   - Subtract RRv from WQv
4. Design Standard Water Quality Treatment practice to treat the remaining Water Quality Volume
5. Design Water Quantity Control practice

Stormwater Planning and Design Steps

1. Conserve Natural Areas and Reduce Impervious Cover

Preserve undisturbed areas

Preserve buffers

Reduce clearing and grading limits

Avoid sensitive site location

Use conservation design

Reduce roadway lengths and widths

Reduce sidewalks

Reduce driveway lengths and widths

Reduce cul-de-sacs

Reduce building footprint

Reduce parking space size and number

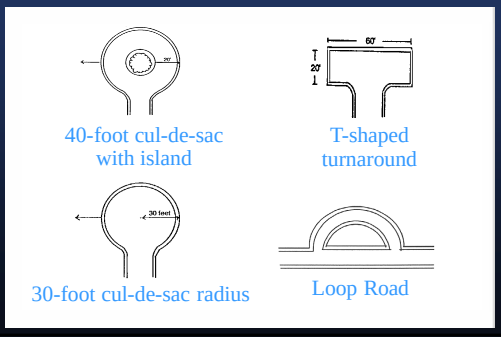
Roadway Reduction

- Minimize roadway ***lengths***
- Minimize roadway ***widths***

Note car size

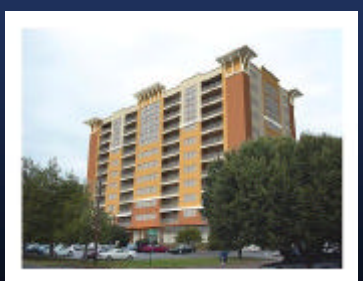
Cul-de-Sac Reduction

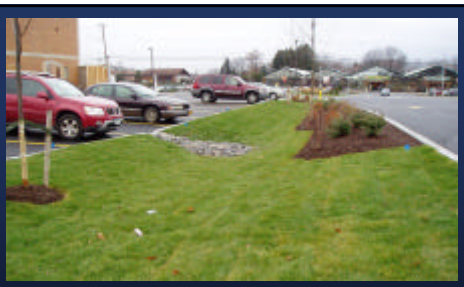
Require alternative cul-de-sac designs to minimize impervious surface



Reduce Building Footprint – build higher, not wider

Revise building height restrictions to allow smaller footprints





Reduce Parking Lot Imperviousness

- Reduce dimensions in designated spaces for compact cars
- Reduce number of required spaces (set maximums rather than minimums)

Stormwater Planning and Design Steps

2. Calculate Water Quality Volume (WQv)

The Water Quality Volume is partially based on the acreage of impervious cover on the site – which we just reduced in Step 1 – so less impervious cover means less water to be treated!

Less impervious cover = Smaller stormwater management practice

Stormwater Planning and Design Steps

3. Determine Runoff Reduction Volume (RRv) by applying Green Infrastructure and Green Planning to reduce the site area contributing to runoff volume

Runoff reduction by *Area*:

- Conserve natural areas, wetlands, stream buffers
- Vegetated buffer / filter strip / reforestation
- Vegetated open channels
- Tree planting / tree boxes
- Rooftop disconnection
- Stream daylighting

These practices reduce required runoff treatment by allowing rainwater to infiltrate soils

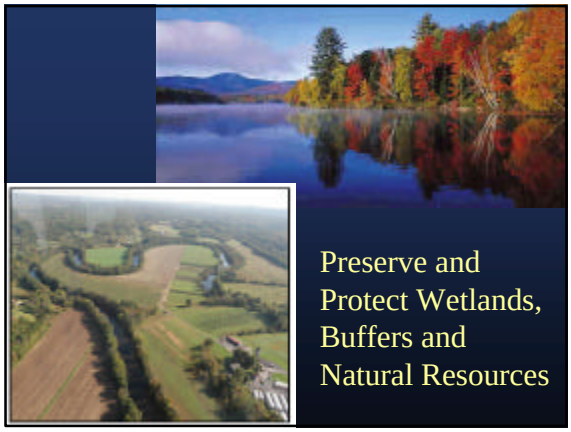
Runoff Reduction

- Restore groundwater recharge
- Reduce stormwater treatment facility size
- Increase open space
- Increase property values

Avoid Impacts Preferred

Reduce Impacts

Manage Impacts Less acceptable



Preserve and Protect Wetlands, Buffers and Natural Resources

Install vegetated filter strips or areas

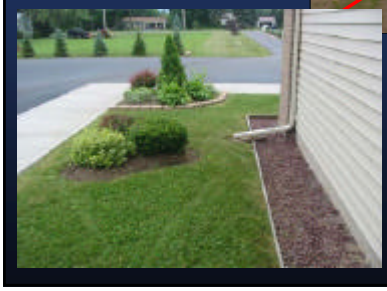
Tree planting and riparian reforestation

- Stabilize streambanks
- Revegetate buffer areas
- Increase property values
- Lower heating and cooling costs

Convert closed drainage systems to open vegetated channels

Open drainage allows runoff to infiltrate and reduces the size of treatment facilities

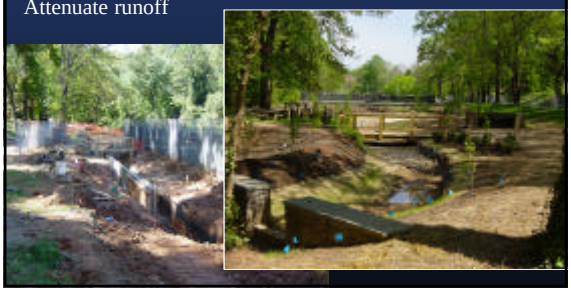
Disconnect roof runoff from storm sewer system



Letting roof runoff flow over lawns and gardens filters pollutants and increases groundwater recharge

"Daylight" streams

Restore habitat
Restore groundwater recharge
Reduce pollutant loads
Attenuate runoff



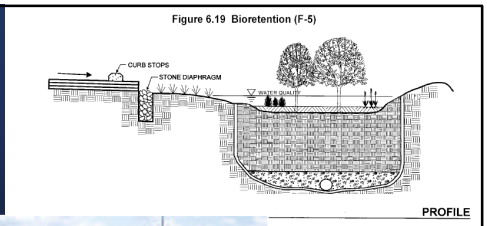
Stormwater Planning and Design Steps

3. Determine Runoff Reduction Volume (RRv) by applying Green Infrastructure and Green Planning to reduce the site area contributing to runoff volume

Runoff reduction by *Volume*:

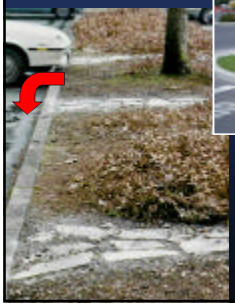
- Rain gardens
- Green roofs
- Stormwater planters
- Cisterns / rain barrels
- Permeable paving
- Infiltration on more permeable soils

These practices provide required water quality treatment by intercepting and filtering runoff



Convert raised parking lot islands to recessed Bioretention Areas or Infiltration Trenches

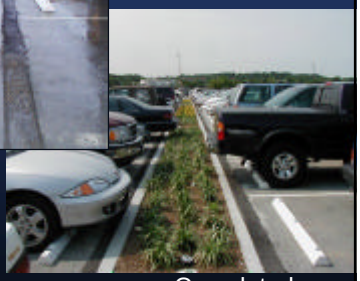
Raised island vs. Bio-Retention cell



- Bio-Retention cell: stormwater infiltrates, pollutants are treated before discharge to storm sewer
- Raised island: stormwater runs off island, carries pollutants directly to storm drain

Bio-Retention

Under construction

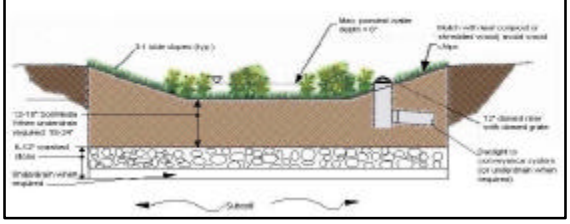


Completed

Rain Gardens

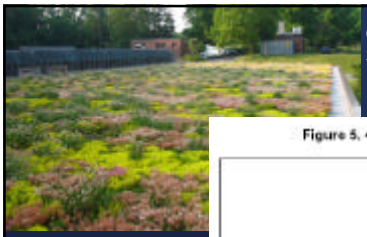
For small drainage areas

Figure 5. 42 Profile of a typical rain garden



Bio-Retention & Rain Gardens

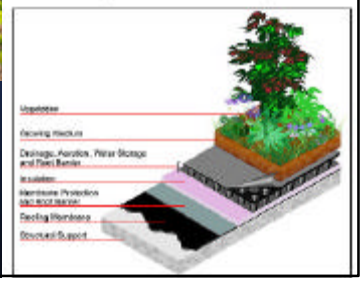
- Better infiltration from small drainage areas
- Saves costs – combines landscaping & stormwater treatment
- Less thermal impact
- Improves aesthetics
- Maintenance costs significantly lower than stormwater ponds



Green Roof at SUNY-ESF

Green Roofs

Figure 5. 46 Green roof layers

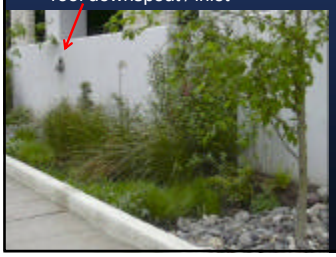


Green Roofs

- Provide treatment of water quality volume
- Reduce total annual runoff volumes
- Reduce the urban heat island effect
- Create habitat, aesthetically pleasing
- Insulation from the heat and cold, energy conservation

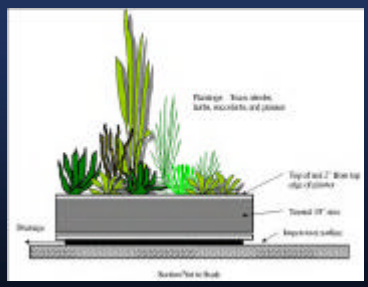
Stormwater Planters

roof downspout / inlet



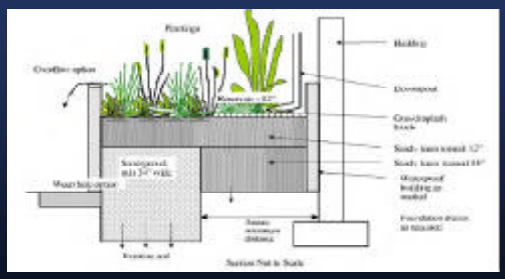
- Uses infiltration or filtration to improve water quality
- Reduction of discharge volume and velocity from impervious areas
- Aesthetic landscape element
- Micro-habitat
- Overflow needs to be directed to a secondary treatment system

Stormwater Planters



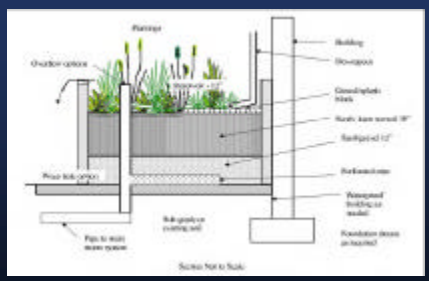
Contained Stormwater Planter

Stormwater Planters



Infiltration Stormwater Planter

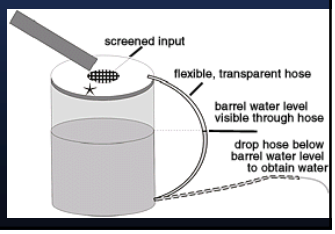
Stormwater Planters



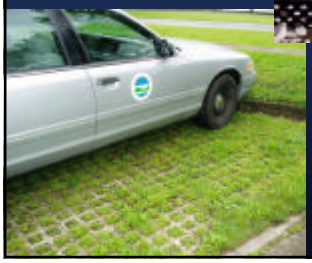
Flow through stormwater planter

Rain Barrels and Cisterns

- Rain Barrel: ~ 100 gallons
- Cistern: thousands of gallons
- Store runoff to reduce peak flows
- Use for irrigation or grey water

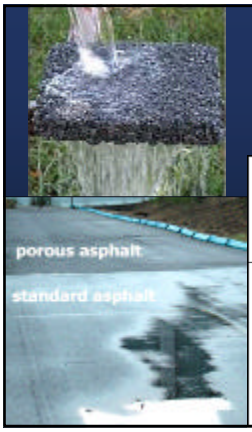


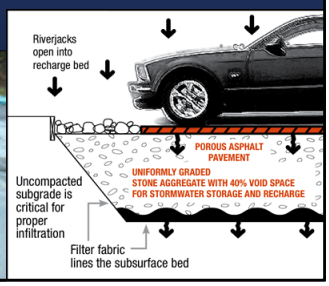
Permeable Pavers and Paver Grids



- Use in overflow or low-use driving lanes
- Allows water to infiltrate
- Reduces size of stormwater basins
- Pollutants are filtered in underlying soil

Porous Pavement





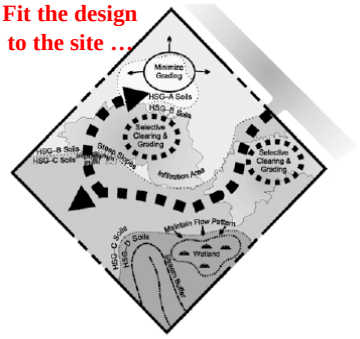
Environmentally Sensitive Development

Preserve natural hydrology and site topography

Use more permeable soils* for infiltration

Reduce land disturbance

Fit the design to the site …

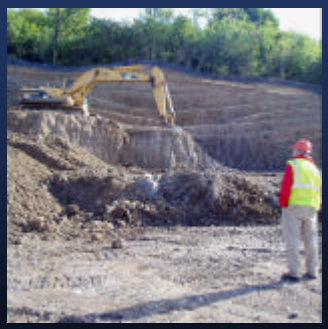


Environmentally Sensitive Development

Preserve natural hydrology and site topography

Use more permeable soils* for infiltration

Reduce land disturbance



…not the other way around

Stormwater Planning and Design Steps

3. Determine Runoff Reduction Volume (RRv) by applying Green Infrastructure and Green Planning to reduce the site area contributing to runoff volume
   - Subtract RRv from WQv
   - WQv – RRv = volume to be treated with a standard stormwater management practice

Runoff Reduction practices selected from the previous slides reduce the Water Quality Volume that needs to be treated with a typical pond, wetland, filter, swale, etc.

Stormwater Planning and Design Steps

4. Design Standard Water Quality Treatment practice to treat the remaining Water Quality Volume

Standard Water Quality Management Practices:
- Ponds
- Wetlands
- Filters and Bioretention
- Infiltration
- Enhanced Swales

Because you used Runoff Reduction methods, the remaining Water Quality Volume will be less than it would have been using the "old way" of designing

Stormwater Planning and Design Steps

5. Design Water Quantity Control practice

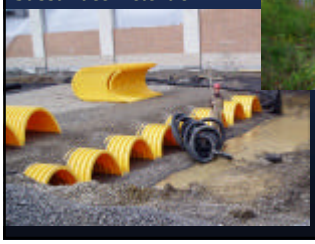
Standard Peak Rate Control (Water Quantity) Practices:
- Infiltration Basins
- Detention Systems – ponds, wetlands
- Subsurface Detention

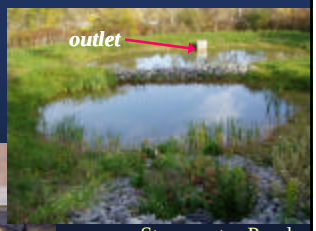
These practices can be greatly reduced in size when overall site runoff is reduced

Standard Stormwater Quantity Control

Use subsurface detention to retrofit redevelopment sites with no stormwater controls

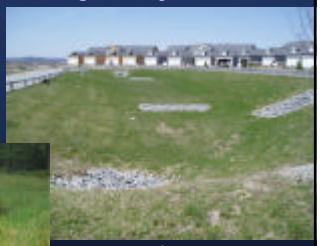
Subsurface Detention



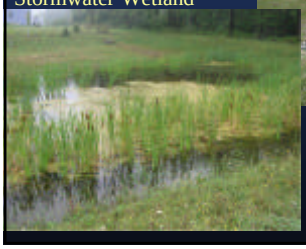


Stormwater Pond with controlled outlet

Standard Stormwater Quantity Control



Stormwater Wetland



Infiltration Basin

Retrofit old detention basins to infiltration basins or ponds or wetlands

DEC Stormwater on the Web

- DEC Division of Water Stormwater Web Page
  http://www.dec.ny.gov/chemical/8468.html
- Stormwater Construction Toolbox
  http://www.dec.ny.gov/chemical/8694.html
- MS4 Stormwater Toolbox
  http://www.dec.ny.gov/chemical/8695.html
- DEC Stormwater Training Calendar
  http://www.dec.ny.gov/chemical/8699.html

Additional Training & Information

- Central New York Regional Planning and Development Board
  http://www.cnyrpdb.org/stormwater/
- Certified Professional in Erosion and Sediment Control, Inc. http://www.cpesc.org
- International Erosion Control Association
  http://www.ieca-nechapter.org
- Center for Watershed Protection
  http://www.cwp.org
- Stormwater Manager's Resource Center
  http://www.stormwatercenter.net

NYS DEC Regional Stormwater Contacts

Region 1:	631-444-0409	Nassau, Suffolk
Region 2:	718-482-4933	Bronx, Kings, New York, Queens, Richmond
Region 3:	914-332-1835 ext. 359	Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester
Region 4:	518-357-2045	Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady, Schoharie
Region 5:	518-623-1200	Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren, Washington

NYS DEC Regional Stormwater Contacts

Region 6:	315-785-2524	Herkimer, Jefferson, Lewis, Oneida, St. Lawrence
Region 7:	315-426-7504	Broome, Cayuga, Chenango, Cortland, Madison, Onondaga, Oswego, Tioga, Tompkins
Region 8:	585-226-5450	Chemung, Genesee, Livingston, Monroe, Ontario, Orleans, Schuyler, Seneca, Steuben, Wayne, Yates
Region 9:	716-851-7070	Allegany, Cattaraugus, Chautauqua, Erie, Niagara, Wyoming

Questions?

Ellen Hahn, CPESC, CPSWQ, CMS4S
NYS Department of Conservation
Region 7 Division of Water
exhahn@gw.dec.state.ny.us
(315) 426-7504