# STORMWATER MANAGEMENT

For Project Review Board Members

# Program overview

- Runoff
- Impacts of unmanaged stormwater
- Phase I and Phase II stormwater regulations
- Land use tools and stormwater management
- Role of “project review boards”
- On-site management practices
- Resources

# Acronyms

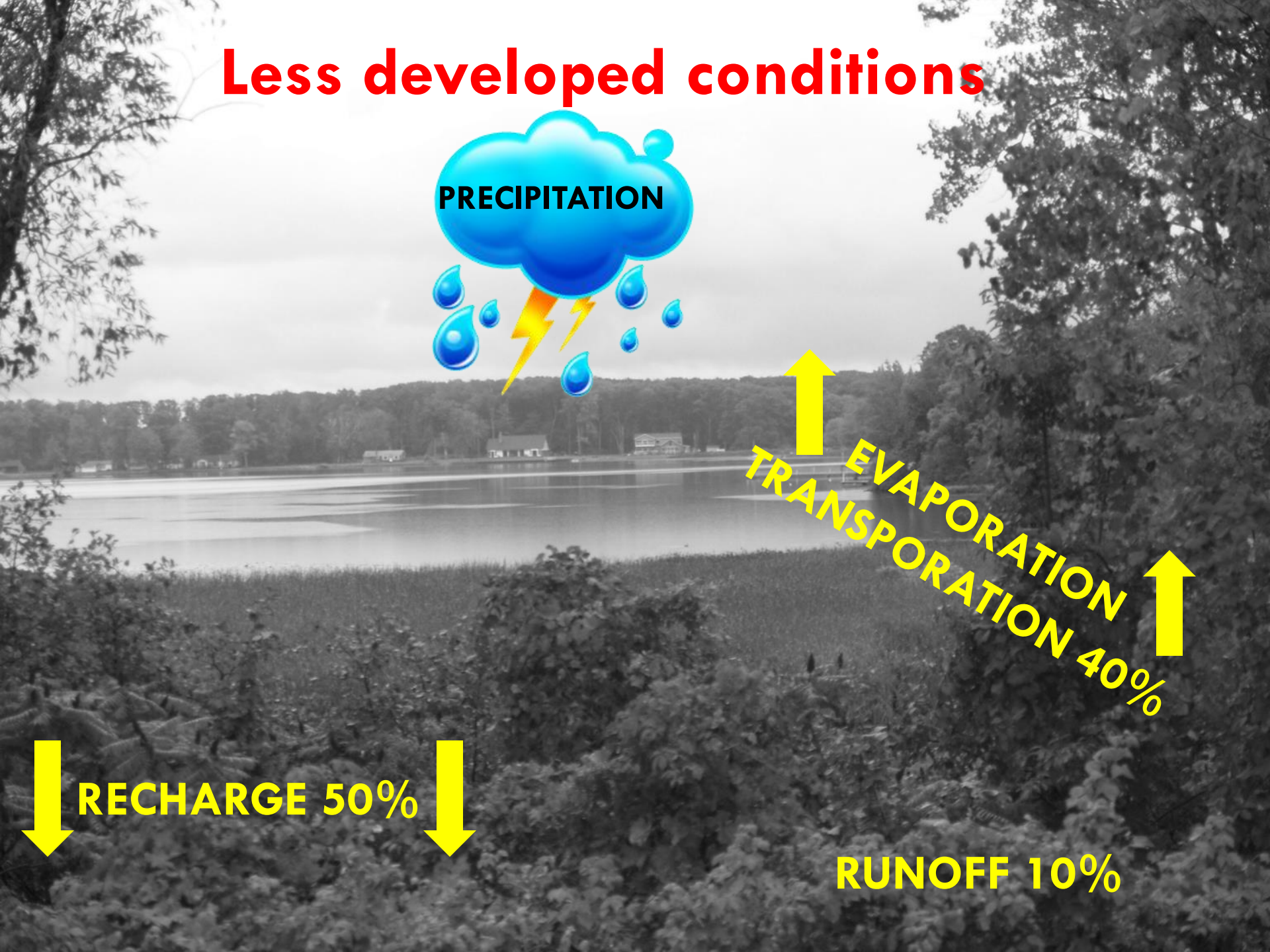
- MS4: Municipal Separate Storm Sewer System
- CSO: Combines Sewer Output
- NOI: Notice of Intent
- NPDES: National Pollutant Discharge Elimination System
- SPDES: State Pollutant Discharge Elimination System
- SEQRA: State Environmental Quality Review Act
- SWMP: Stormwater Management Plan
- SWPPP: Stormwater Pollution Prevention Plan

# Runoff

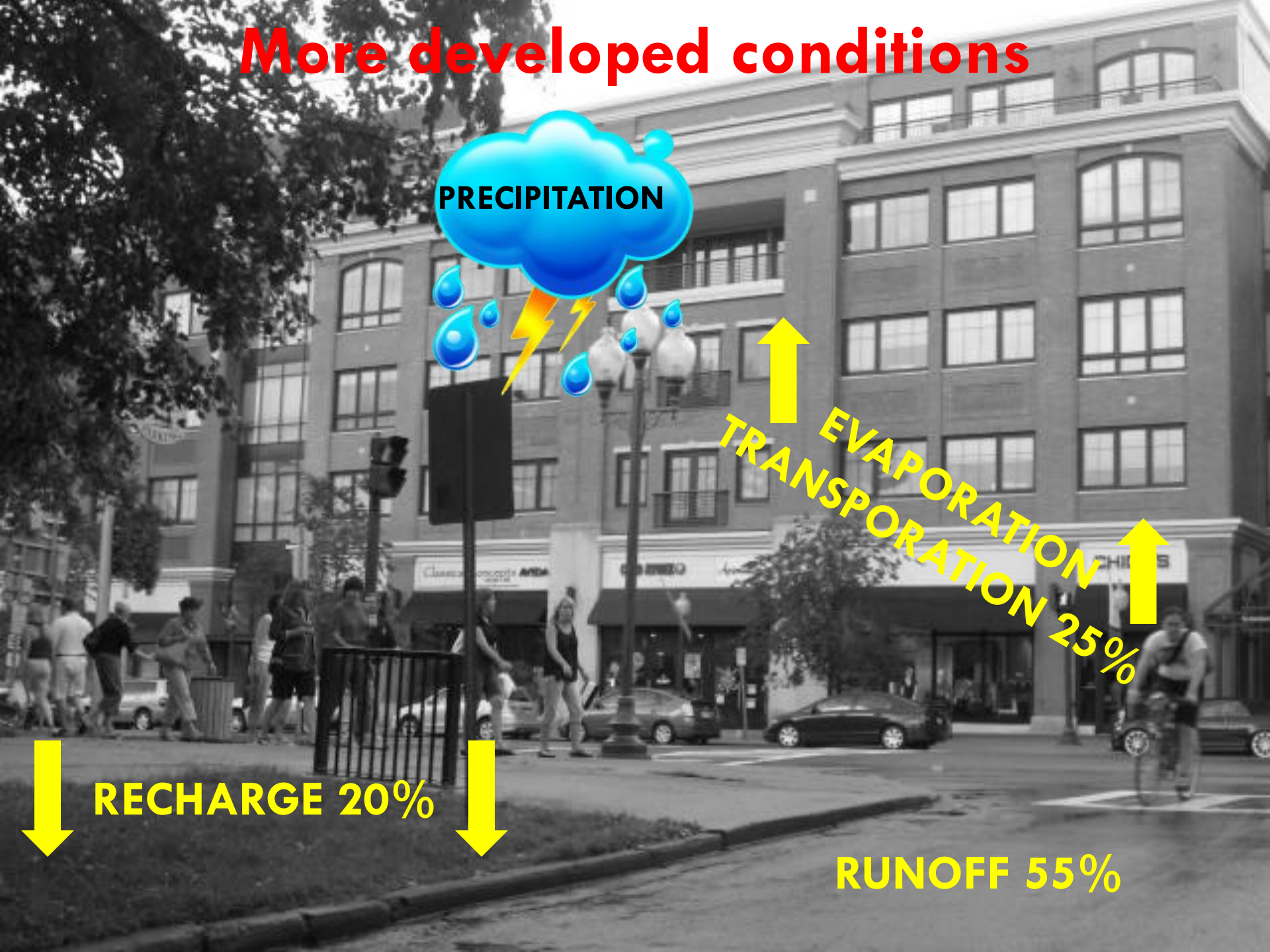
**Less developed conditions**

**Highly developed conditions**

# Less developed conditions



# More developed conditions



# Impacts of unmanaged stormwater

# Erosion

# Deposition

# Sedimentation

# Pollution transport

Photo credit: Steven Trinkaus, PE, CPESC, CPSWQ

# Waste storage

# Junk

# Economic/recreational loss

# Potential liability

- Action to recover damages from private property losses
- Liability from State or Federal regulatory action
- Citizen suits under Federal Clean Water Act §505
  - Fines: $37,500 per violation per day

# Stormwater management benefits

**Best management practices mitigate environmental, economic, and public health impacts**

- Sustainable development
- Savings from loss prevention
- Enhanced property values
- Protection of valuable water resources
- Improved quality of life
- Potential legal challenges

# The regulatory context for stormwater management

# Federal stormwater regulations

- Clean Water Act (1972)
- Title 40 CFR (Code of Federal Regulations) Parts 122-124
- EPA stormwater Regulations for Phase I and Phase II construction projects

# State stormwater regulations

- DEC Regulations
  6 NYCRR

- NYS Pollutant Discharge Elimination System (SPDES)

# SPDES Permits

**DEC State Pollutant Discharge Elimination System (SPDES)**

Two general permits govern <u>how</u> and <u>when</u> run-off is managed during construction

**1. "General permit for construction activity"**

- For construction subdivisions disturbing 1+ acres where runoff can reach State surface waters

**2. "General Permit for stormwater Discharges from MS4 communities"**

- Adopt local law requiring developers to prepare SWPPP

# Types of SPEDES permits

- Individual (factories; sewage treatment plants)

- General
- CAFO (Concentrated animal feeding operations)
- SSO (Sanitary sewer overflows)
- CSO (Combined sewer overflows)
- MS4 (Municipal separated storm sewer system)
- Construction (land disturbance >1 acre)
- Multi-Sector (industrial)

# SPDES exempt activities

- No SPDES if ground water discharges (sewage-wastewater with no industrial or other non-sewage wastes) are less than 1,000 gallons per day

- May still need prior approval for cesspool, septic system, etc., from:
  - City health department
  - County health department
  - NYS Department of Health district office

# MS4 defined

## Municipal Separate Storm Sewer System

- Public entity that collects or conveys stormwater (gutters, pipes, ditches) and discharges into waters

- **Not** combined sewer (CSO) or part of publicly owned treatment works (i.e. sewage treatment plant)

Check the interactive map to determine MS4 boundaries:
http://www.dec.ny.gov/imsmaps/stormwater/viewer.htm

# MS4 permits

**Issued by EPA, but administered by NYSDEC**

Municipality must:

- develop, implement and enforce SMP to reduce pollutant discharge to <u>maximum extent practicable</u>
- provide Annual Report to NYSDEC summarizing progress made on goals of permit in six areas:
  1. Public education and outreach
  2. Public involvement and participation
  3. Illicit discharge detection and elimination
  4. Construction site stormwater runoff control
  5. Post-construction stormwater management
  6. Pollution prevention/good housekeeping for municipal operations

# Phase II stormwater regulations

**For:**

- Operators of small **MS4s** in "urbanized areas"
- Operators of **small construction** activities disturbing >1 but <5 acres statewide

**Purpose:**

- Control stormwater from small MS4s
- On-site stormwater management from small construction projects

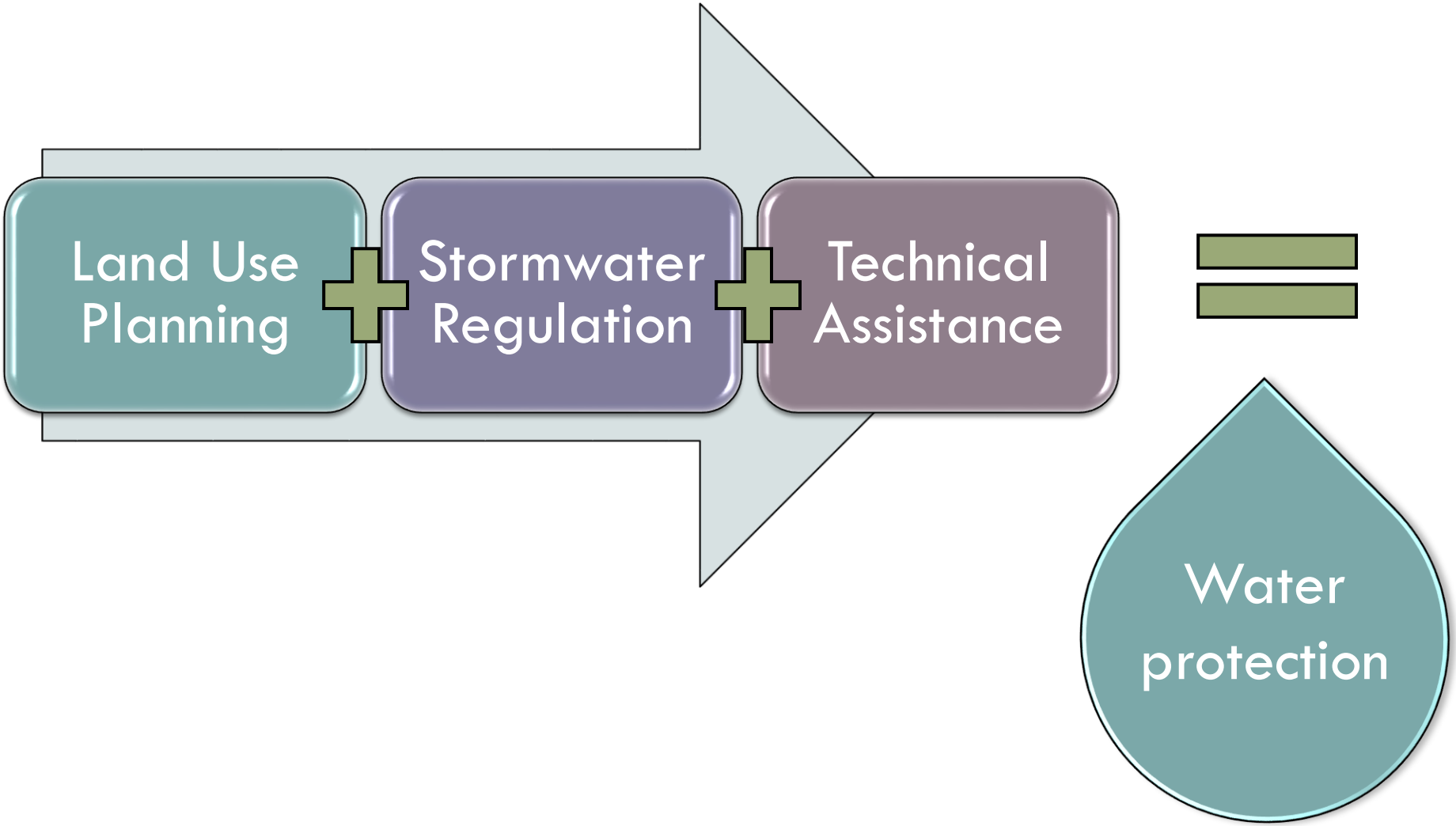
**Process:**

- Operators submit comprehensive SMP and NOI to DEC <u>and</u> comply with local or other regulations

# Integrating stormwater management

## with local planning

# Water quality protection process



# Comprehensive planning

- Inventory
  - Examine existing land uses (both natural and built)
- Analyze
  - Determine if environmental conditions support development
  - Identify appropriate areas for new development
- Recommend
  - Strategize to balance development with environmental protection and community goals (e.g., land use regulations)
- Implement
  - Adopt tools for stormwater control
  - Ensure maintenance for infrastructure

Town Law §272-a
Village Law §7-722
General City Law §28-a

# Watershed planning

## Opportunities for intermunicipal cooperation

Watersheds are shared resources

- Identify common issues & goals
- Develop partnerships
- Create efficiency in implementing solutions
- Help expand potential funding sources

# Connect Comprehensive Plan & Watershed Planning

## Think holistically of the "whole system"

- Include engineered elements (infrastructure) and natural resources into green infrastructure
- Include maps of watersheds, waterways, storm systems
- Include policy statements:
  - on active participation with watershed groups
  - on areas for more intensive growth (infrastructure) and less intensive growth

# Zoning

Provides structure for regulating stormwater impacts:
(percentage of pervious surface, parking, landscaping)

- Construction standards
- Design guidelines
- Performance criteria
- Best management practices
- Special use permits
- Environmental Protection Overlay Districts

**Zoning:**
General City Law §20
Town Law §261
Village Law §7-700

**Special Use Permit**
General City Law §27-b
Town Law §274-b
Village Law §7-725-b

# Municipal officials' responsibilities

Establishing and running SWMPs involves many municipal players:

- Local governing board
- Planning board
- Zoning board of appeals
- Environmental review
- Code enforcement officer
- Public works department
- County officials
- Municipal attorneys, engineers, planners and consultants

# Local governing board

- Adopts and amends local laws, comprehensive plans
- Creates special districts, tax incentives, cost share funding
- Implements SMPs in MS4 municipalities
  - Authorizes other municipal officials to manage stormwater
- Conducts education programs

# State Environmental Quality Review Act

- GB, PB, or ZBA may do SEQR (depends on which board has jurisdiction over permit or funding approval)
- Include requirement to develop SWPPP
- Project approvals/conditions support mitigation measures identified in environmental review
- Include role for Conservation Advisory Council

# Code enforcement officer

- Inform builders & developers about land use controls
- If authorized:
  - Apply land use laws,
  - Issue building and other permits,
  - Enforce law

- If directed:
  - Ensure SWPPP is submitted with application
  - Inspect construction/post-construction stormwater management practices

# CEO: Residential building code

## § 401.3 Drainage

- Divert surface water to storm sewer or other approved point of collection
- Grade lots so water drains away from foundation walls
  - Minimum slope from foundation: 6” fall within the first 10’
  - If not possible, use drains and swales for drainage away from the structure

# CEO: Residential building code

## § 324 Flood resistant construction

- **Structural systems:**
  Design, connect, and anchor to resist flotation, collapse or permanent lateral movement from flooding
- **Flood-resistant construction**
  Use methods and practices to minimize flood damage in flood prone areas
- **Establish design flood elevation:**
  Base flood elevation with at least 1% (100-year flood) chance of being equaled or exceeded in any given year.

**Also covers:**

- Lowest floor enclosures
- Mechanical and electrical systems protections
- Water supply and sanitary sewage systems protections

# CEO: Residential building code

**Plumbing Code Chapter 11**

Governs materials, design, construction, and installation of storm drainage, including:

- Where required and prohibited
- Tests
- Continuous flow
- Fittings
- Roof design and roof drains
- Cleanouts required;
- Backwater valves, etc.

# Public works department

- Installs and maintains storm drain systems and other stormwater management facilities
- Addresses erosion problems on roads/bridges
- Carries out emergency maintenance
- Training is an important component of SWP, may be done cooperatively with other municipalities

# County officials

- County Soil & Water Conservation District, Planning Department, and Environmental Council are excellent sources for natural resource maps—crucial for design and operation of SWMP
- Can provide other forms of technical assistance
- Coordinates with regional planning councils, watershed groups, U.S. Dept. of Agriculture Natural Resource Conservation Service, and others

# Municipal staff and consultants

- Municipal attorney: develops laws for stormwater management that related to other laws and ordinances in the local code; enforces terms of SWPPP

- Municipal engineer/planner: reviews SWPPPs and provides comments to review boards
  - Reviewers should have training and experience in hydrology

# Who is responsible for what?

- PB or ZBA:
  reviews SWPPP for completeness

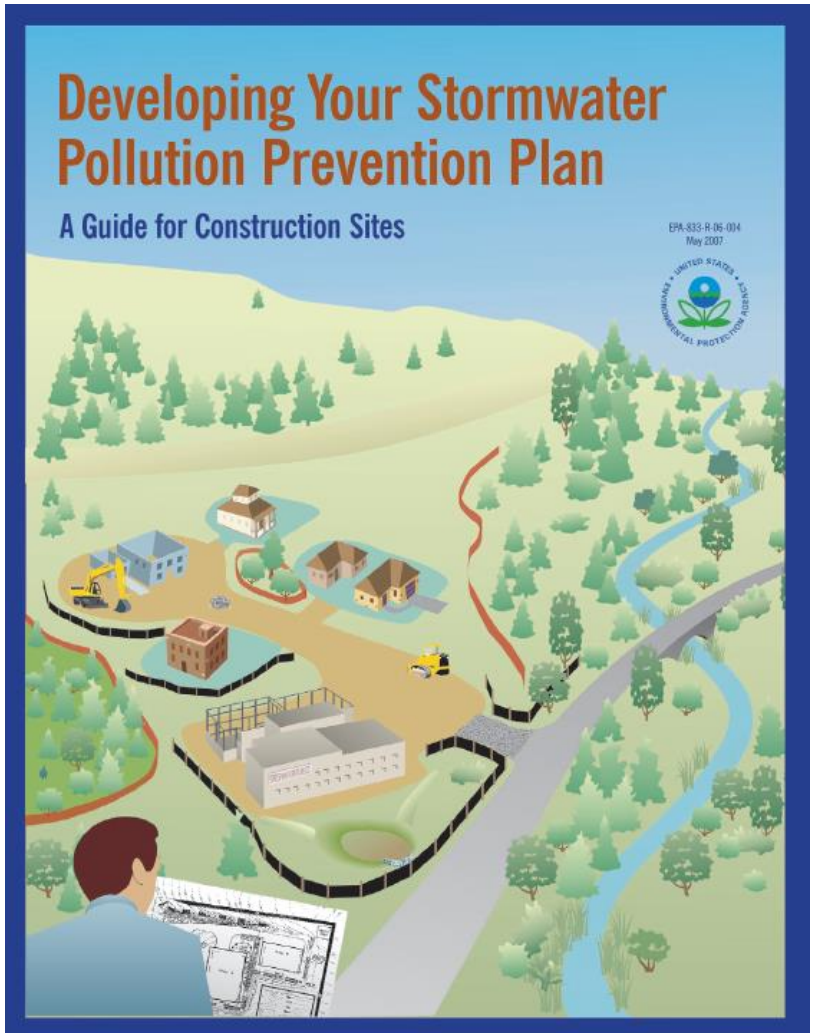
- Municipality:
  certifies permit requirements are met
  (may seek technical or legal review)

- Owner and engineer:
  liable for calculations and design elements

# SWPPP

stormwater pollution prevention plan

- Required for construction permits
- Includes site description and sources of stormwater discharges
- Identifies and reduces discharges using structural and nonstructural measures




www.epa.gov/npdes/pubs/sw_swppp_guide.pdf

# SWPPP components

- Narrative report
- Location and resources maps
- Existing conditions plans
- Future conditions plans
- Construction sequence
- Practice specifications and details
- Site log/certifications
- Routine inspections by qualified inspector
- Post-construction stormwater management design/details
- Hydrologic analysis
- Runoff reduction practices

# Plan review process

SWPPP happens through:

- Subdivision review
- Site plan review
- PB or Code Enforcement Office review

Remember:
Review board does not decide to accept SWPPP

# Paying for project review services

**Local officials should not review SWPPPs without professional assistance**

- Review costs may be charged to applicant, if locally allowed
- Local regulations can specify pre-established fees
- Possible municipal budget item
- Staff training

# Plan review process

- Pre-submission conference with applicant
  - Discuss stormwater and drainage-related concerns prior to SWPPP development
- Preliminary subdivision plat or site development plan
  - Project layout and stormwater practices detailed
  - Developer and municipality identify & resolve potential areas of conflict
  - Draft SWPPP submitted now

# Plan review process

- Planning staff should perform comprehensive site plan and/or plat review
- Technical experts may review SWPPP design
- SEQR determination made
  - EIS required if significant adverse environmental impact is determined (SWPPP assessed in detail)
- Public hearing held, SWPPP comments accepted
- Decision to grant tentative approval (or not)

# Final plat/site development plan phase

- Review board performs final check on tentatively approved site plan or plat (and SWPPP)
- Verify if any required modifications were incorporated, such as SWPP changes:
  - Site layout and rationale
  - Water quality and quantity calculations
  - Practice selection and location
  - Documentation or certification issues

# Final plat/site development plan phase

- Public hearing held
- Final plat determination made
- Review board may require post-performance bond, letter of credit, or cash escrow
- Towns and counties can establish drainage districts
  - Cities & villages cannot create districts
  - User fees by those property owners
  - Funds stormwater management maintenance/repair
    - Important because $$ needed for best practices!

# SWPPP in MS4 communities

**Step 1** owner submits SWPPP to MS4 reviewer

**Step 2** reviewer signs "MS4 SWPPP Acceptance"

**Step 3** owner submits NOI & Acceptance to DEC

**Step 4** DEC issues permit*

* Permit begins in 5 business days if MS4 reviewer accepts it

# SWPPP in non-MS4 communities

**Projects in unregulated MS4s take one of two paths:**

If SWPPP conforms to DEC standards:

- owner submits NOI to DEC
- DEC grants permit (5 business day authorization)

--or--

If SWPPP doesn't conform:

- owner submits NOI to DEC
- DEC grants permit (60 business day authorization) AND submits SWPPP to Regional DEC for review

# Why SWPPP local review is needed

- <u>Because DEC doesn't review all SWPPPs, local review may be the only review</u>
- Assures quality/longevity of stormwater management systems
  - Protects local infrastructure
- Locality is responsible to mitigate stormwater impacts
  - Protects natural resources

# No DEC SWPPP review needed for:

- Linear utility projects not creating impervious surface
- Agricultural BMPs and buildings disturbing less than 5 acres
- Athletic fields with no associated impervious surface
- Environmental enhancement or slope stabilization projects
- Spoil stockpiling or demolition where site will be re-vegetated
- Bicycle/walking trails, sidewalks not associated with other improvements

And….

# No DEC SWPPP review needed for:

- Single-family residential projects that:
  - Disturb 1-5 acres total
  - Less than 25% of site is impervious at construction end
  - Not in Total Maximum Daily Load watershed or discharging to waterbody on 303(d) list

Construction General Permit, Appendix B contains more details:

www.dec.ny.gov/chemcial/43133.html

# Site plan review

**Site Plan Review regulations must:**

- Specify information to be included on plans submitted for approval
- Specify "elements" to be reviewed
  - Green infrastructure
  - Snow storage
  - Natural berms

- General City Law §27-a
- Town Law §274-a
- Village Law §7-725-a

# Subdivision review

Reviews design & improvements:

- lot configuration
- street and sidewalk construction
- adequacy of drainage systems
- low impact development

- General City Law §32 and §33
- Town Law §276 and §277
- Village Law §7-728 and §7-730

# Cluster subdivision

Changes lot size and layout – not number of lots–
to preserve open space

- Identify development within suitable areas
  - Minimize construction footprint
  - Preserve natural areas
  - Avoid sensitive areas (wetlands, steep slopes)
- Identify natural systems to aid stormwater management
  - Undisturbed forest land
  - Protected stream corridor
  - Natural vegetation swaths
- Reduce percentage of impervious surface

- Village Law §7-738
- Town Law §278
- General City Law §37

# Putting the plan into action

# Best management practices

## Low impact development

Mimic natural landscape drainage patterns to capture and infiltrate stormwater runoff close to its source

- Conserve natural resources
- Minimize impacts
- Maintain natural drainage patterns
- Minimize and disconnect impervious surfaces

# Best management practices

## Green infrastructure

Natural & engineered ecosystems act as living infrastructure:

- Planned and managed for stormwater management
- Social, economic, and environmental benefits:
  - Habitats for birds, butterflies, and wildlife
  - Beautifies communities and increases land value
  - Reduces energy consumption and costs
  - Provides more recreational space
  - Improves air quality and human health
  - Filters runoff pollution and eliminates standing water

# Best management practices

## Preserve existing vegetation

- Plants have functional and aesthetic value
- Will they be protected or incorporated into design?

# Best management practices

## Phase in and sequence construction operations

- Will separate erosion and sediment control plans be required for each phase?
- Avoid tearing up entire site
- Develop and restore in manageable sections

# On-site controls practices

- **Erosion Control**
  - Control runoff to prevent soil disturbance (e.g. maintain existing vegetation; stabilize soil)
- **Sediment Control**
  - Capture sediment; manage erosion
- **Stormwater Management**
  - Control water quantity and quality

For more management practices see NYS stormwater Design Manual

# Swale

Permanent or temporary excavated drainage way

**Purpose:**
Prevents runoff from entering disturbed areas

# Permanent diversion

Drainage way with supporting ridge on lower side constructed across slope

**Purpose:**
Intercepts and conveys water by slowing it down

# Stable outlet

Outlet with permanent material lining

**Purpose:**
Provides for disposal of concentrated runoff without erosion or flooding

# Check dam

Small, temporary dam of stone or manufactured material across drainage way

**Purpose:**
Reduces erosion by
lessening velocity in channel

# Mulching & seeding

Applying plant residues and seed to the soil surface

**Purpose:**
Reduces runoff and erosion by enabling plant cover establishment

# Rolled erosion control products (RECPs)

Temporary or permanent material fabricated into rolls, designed to reduce erosion and enhance vegetative growth

**Purpose:**
Protects steep slopes

# Channel lining

Permanent lining of stone, concrete, or geotextile (filter fabric) in channel

**Purpose:**
Conveys high velocity runoff without causing erosion

# Catch basin protection

Permeable barrier around inlet

**Purpose:**
Strains and/or settles out sediment, reducing the sediment load of water passing through to the drainage system

# Silt fence

A temporary barrier of geotextile fabric

**Purpose:**
Intercepts sediment-laden runoff from small areas of disturbed soil; reduces runoff velocity and effects deposition of sediment at barrier

# Sediment trap

Temporary excavation or embankment

**Purpose:**
Intercepts sediment-laden runoff and causes deposition of sediment in the excavation or behind the embankment

# Straw bale dike

Temporary straw barrier embedded in soil at toe of slope or along contour, with bale end tightly abutting each other

**Purpose:**
Intercepts sediment-laden runoff from small areas of disturbed soil

# “Wet” (Retention) Pond

Permanent pool for collection of stormwater without release except by evaporation, infiltration, or flow over a spillway

**Purpose:**
Attenuates peak flow and achieves some pollutant removal

**Avoid because water is not encouraged to filter naturally (stagnation)**

# “Dry” (Detention) Pond

Collection of stormwater runoff in temporary pool of water that drains after each storm

**Purpose:**
Absorbs peak flow
but ineffective for pollutant removal

# Constructed wetland

Area inundated or saturated by water at frequency and duration sufficient to support wetland vegetation

**Purpose:**
Absorbs peak flow and acts as biological filter to remove pollutants

# Infiltration practices

stormwater retention for full or partial absorption into soil

**Purpose:**
Reduce runoff volume and peak discharge rate; replenish groundwater; remove pollutants

# Sand filter

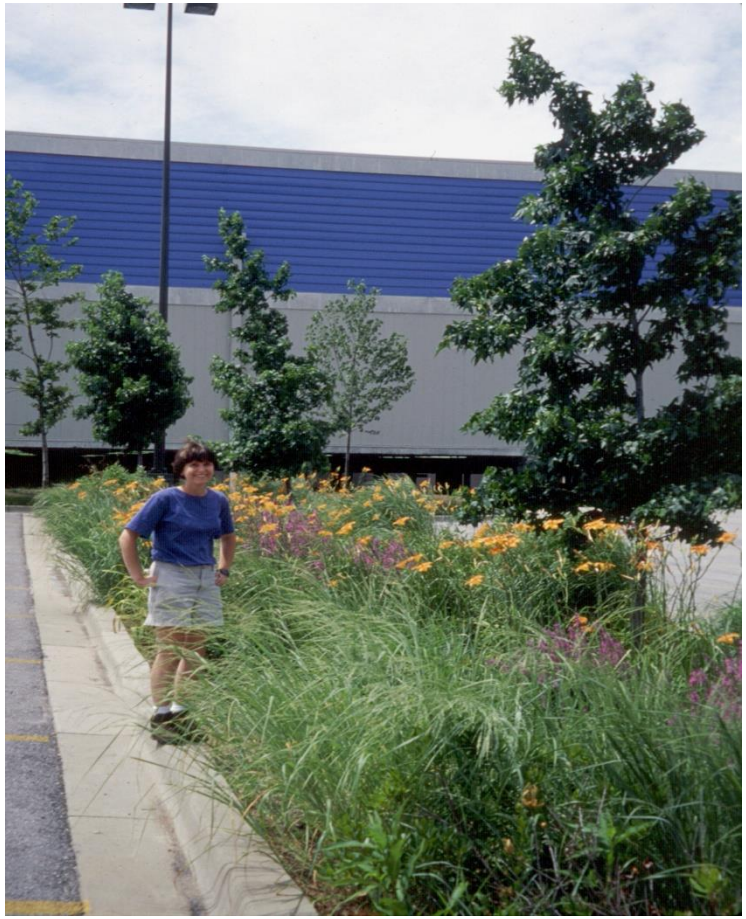
Sand bed through which stormwater percolates

**Purpose:**
provides significant pollutant removal

# Bio-retention filter

Densely planted vegetation at edge of impervious stormwater catchment area or disturbed area

**Purpose:**
Slows flow, enabling solids removal; may also remove soluble pollutants, particularly nutrients



# L.I.D. & Green infrastructure

examples

# Sustainable parking lot

Lindenhurst Memorial Library
funded through Green Innovations Grant Program (GIGP)

- Bioswales
  - mimic natural hydrology by removing silt and pollutants
  - aesthetic alternative to conventional drains
  - alleviate stress on sewage systems
- Reduced urban heat island effect
  - Pavers reflect thermal energy from sun so surface air temps stay cooler
- Solar lights
  - Single charge powers for 10 days without full sun

Source: www.greenprojectexchange.org/gpe/projects.html?action=detail&skuvar=24

# Rain garden

## Tully Street Rain Garden

Driveway replaced with part Flexipave, part rain garden

- Low income property beautified
- 44% impervious cover to 0%
- No stormwater into CSO system or into Onondaga Lake
- Precedent for future neighborhood green infrastructure projects
  - Showed residents that asphalt could be converted into green space

# Tree protection ordinance

Village of Southampton

Benefits:

- aesthetic value
- physiological:
  - reduce noise, crime, and even heart rate and blood pressure (lowering stress)
- environmental:
  - remove air and water pollutants
  - control stormwater runoff
  - reduce urban heat island effect and building heating/cooling needs

# Professional Associations & Training

- Stormwater Manager's Resource Center
  www.stormwatercenter.net
- Center for Watershed Protection
  www.cwp.org
- International Erosion Control Association
  www.ieca.org
- Syracuse U. Continuing Ed., Stormwater Management Program
  www.suce.syr.edu/Programs/exec/STORM/
- Non-point Education for Municipal Officials
  www.nemo.uconn.edu
- NYS Floodplain and Stormwater Managers Association
  www.nysflood.org (under development)

# Funding

- Nonagricultural Nonpoint Source Projects
  - Clean Water/ Clean Air Bond Act
  - Water Quality Improvement and Environmental Protection Fund
  - Clean Water State Revolving Fund:
    - www.nysefc.org
- Funding Sources and Tips on Grant Applications for Watershed Protection and Restoration:
    - www.dec.state.ny.us/website/dow/fundingwebpg.html
- EPF Local Waterfront Revitalization Program
  - NYS Department of State Division of Coastal Resources
    - www.dos.ny.gov/communitieswaterfronts/grantOpportunities/epf_lwrpGrants.html

# Contacting the Department of State

(518) 473-3355 Training Unit

(518) 474-6740 Legal Department

(800) 367-8488 Toll Free

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Website: www.dos.ny.gov