

**Jamaica Bay Watershed Protection Plan  
PRIORITIZED STRATEGIES  
WORKSHOP**

**Kingsborough  
Community College  
Building U, Room 220**

**June 21, 2007**



# TONIGHT'S AGENDA

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6:30 pm Open House & Sign-in

6:45 pm Where We Are In The Planning Process

7:00 pm Stormwater Best Management Practices  
(Esther Siskind, DEP)

7:45 pm Restoration Ecology & Water Quality  
(John McLaughlin, DEP)

8:30 pm What You Can Do To Protect Jamaica Bay?  
(Shino Tanikawa, NYCSWCD)

9:00 pm Conclusion of Workshop



# JAMAICA BAY WATERSHED PROTECTION PLAN

## *Local Law 71 (LL71 of 2005)*

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- Directs DEP to develop a Watershed Protection Plan for the watershed/sewershed of Jamaica Bay.
- Plan to develop strategies to address:
  - Wetland Loss, Habitat Loss and Ecological Degradation
  - Water Quality

### *Schedule:*

- March 1, 2007: Draft Plan delivered to City Council
- October 1, 2007: Final Plan to be delivered to City Council



# WHERE WE ARE IN THE PLANNING PROCESS

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- Draft Plan contained 76 potential strategies in areas of:
  - Water quality
  - Restoration ecology
  - Land use
  - Public access
  - Public outreach
- Since March Draft, NYCDEP has continued evaluation of potential strategies
  - Environmental feasibility
  - Technical feasibility
  - Legal feasibility
  - Economic feasibility



# WHERE WE ARE IN THE PLANNING PROCESS

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- Additional progress since March 1 Draft:
  - Obtained funding and further developed pilot projects for stormwater best management practices (BMPs)
  - Substantially completed designs for BMPs to be constructed for Rockaway and Paerdaget Bridges as part of NYCDOT's Belt Parkway Bridges Project
  - Participating in the Mayor's PlaNYC BMP Interagency Task Force
  - Reviewed Advisory Committee's final recommendations submitted to City Council on June 1



# WHERE WE ARE IN THE PLANNING PROCESS

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- Prior to October 1, NYCDEP will:
  - Complete feasibility evaluations of management strategies including water quality modeling
  - Select recommended strategies based on completed evaluations
  - Develop implementation measures for recommended strategies including:
    - Schedule and milestones
    - Responsible entity(ies)
    - Funding needs
    - Monitoring and updating the Plan
  - Explore partnerships for plan implementation and coordination



# STORMWATER BEST MANAGEMENT PRACTICES



# STORMWATER BEST MANAGEMENT PRACTICES

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- Two types:
  - On-site BMPs
  - Off-site BMPs





# ON-SITE STORMWATER BMPS

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- On-site stormwater measures
  - Rain barrels
  - Rooftop/subsurface detention/cisterns
  - Rain planters
  - Infiltration/Bioinfiltration
  - Dry wells
  - Green roof
- Reducing impervious surfaces
  - Porous pavement
  - Impervious surfaces requirements
- Water Conservation
  - 5% over five years



# ON-SITE BMP EXAMPLES

*Infiltration Strip on Residential Driveway  
in the Jamaica Bay Watershed*

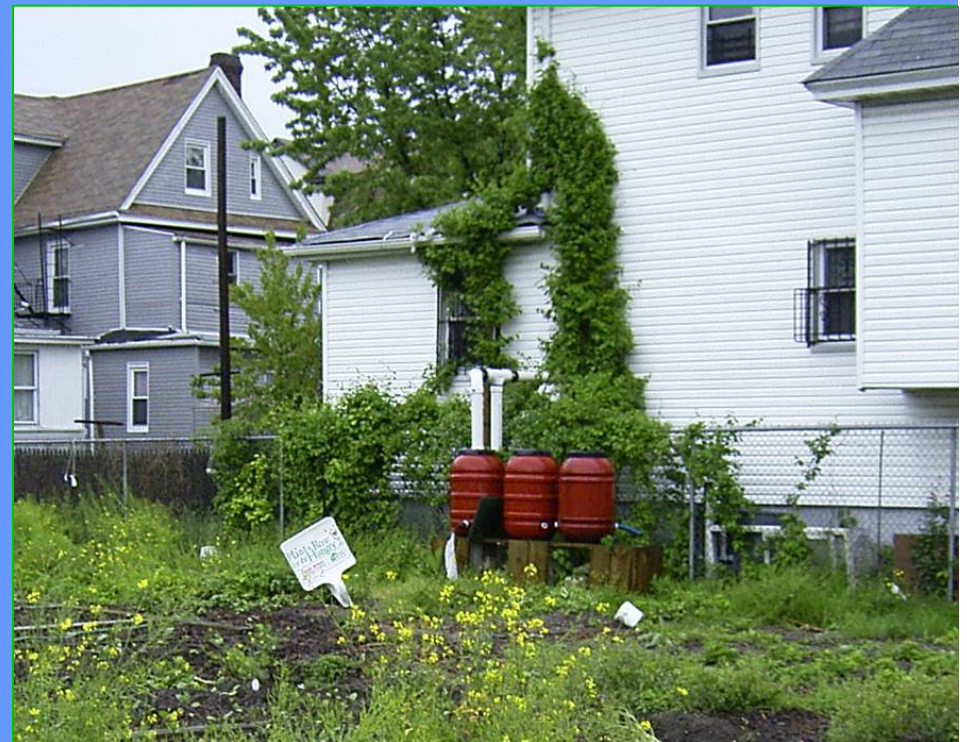


*Rain Barrels for Stormwater Detention &  
Reuse in the Jamaica Bay Watershed*

*Jamaica Bay Watershed Photo Credits: Biohabitats, Inc. 2007.*



*A Rain Garden  
from The Chicago  
Green Alley  
Handbook (2007)*



# GREEN ROOFS

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- Identify appropriate locations.
- Best opportunities: larger facilities (e.g., box stores, industrial buildings) with flat roofs.

★ Gaia Study Green Roof Pilot Project



One of Gaia's greenroof projects in the NYC area.

# PARKING LOT BIORETENTION: ZONING TEXT CHANGE



- Most stormwater absorbed on site
- Natural filter for oil, heavy metals and other pollutants
- Natural irrigation better ensures planting remains lush and green

# EXAMPLE OF POROUS PAVEMENT

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Pervious Basketball Court on Recreation Department Site:



Along with the stormwater benefits of this pervious basketball court, it has the additional advantage of minimizing the sound of the bouncing ball, which the neighborhood greatly appreciates. As the picture shows, the court is being actively used.

# BMP MODELING

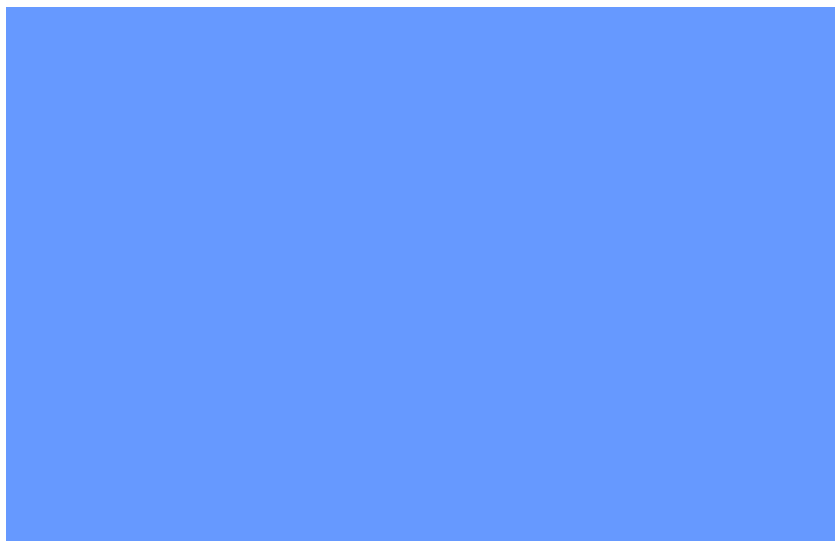
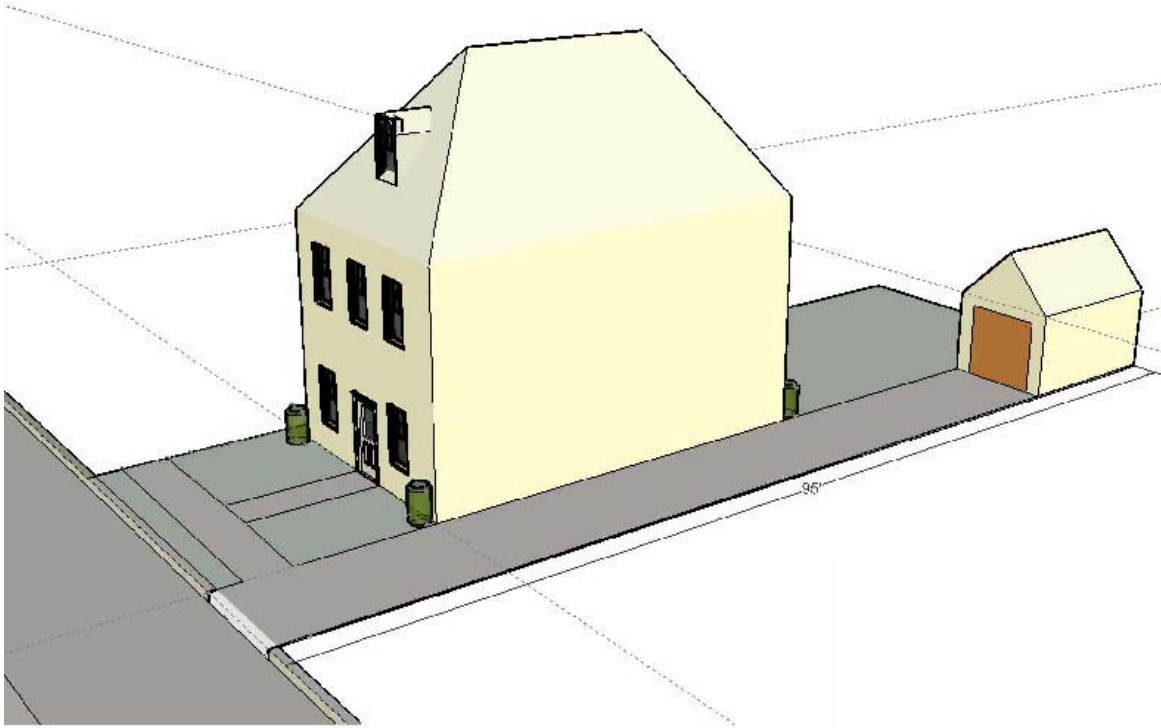
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## *Modeling the effects of BMPs on CSOs*

- Develop land use prototypes
  - Low density residential
  - Medium and high density residential/commercial
  - Big box commercial and industrial
  - Schools and other institutional
- Evaluate rainfall events & stormwater volumes on lot:
  - 2.5" rainfall event = 4,634 gallons
  - 1.2" rainfall event = 2,225 gallons
  - 0.4" rainfall event = 742 gallons
- New vs. Existing Development
- Low Cost vs. High Cost BMPs



Single Family Residential Prototype with 4 Rain Barrels  
(Low Capture for Existing Development)



# BMP MODELING

*Example of a prototype and BMP scenario (cont.):*

*Prototype:  
single family  
residential  
(e.g., R2 or R3)*

|                                      | Existing Development |              | New Development |              |
|--------------------------------------|----------------------|--------------|-----------------|--------------|
|                                      | Low Capture          | High Capture | Low Capture     | High Capture |
| <b>BMP Capture Volume</b>            | 224 g                | 449 g        | 1137 g          | 2304 g       |
| <b>Average rainfall event (0.4")</b> | 30%                  | 60%          | +100%           | +100%        |
| <b>90%ile rainfall event (1.2")</b>  | 10%                  | 20%          | 50%             | +100%        |



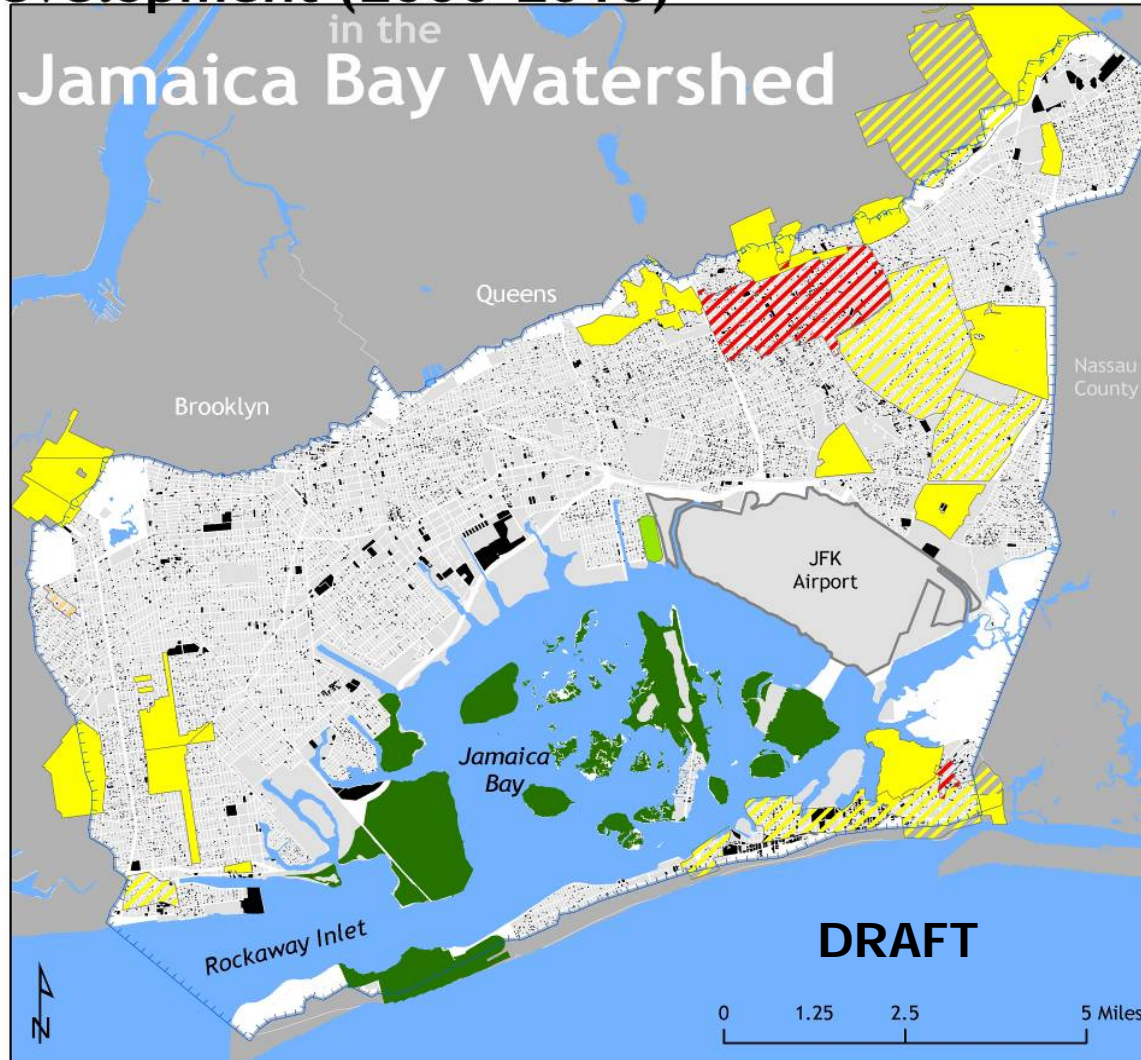


# BMP MODELING: PENETRATION RATES

Data from:

- DOB
- DCP
- EDC
- HPD
- SCA
- DDC

## Development (2000-2010)



# ADDITIONAL NYCDEP PILOTS AND MAYOR'S PLANYC INITIATIVES

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- ★ Rain Barrels distribution: gauge public acceptance and maintenance
- ★ Porous Pavement: evaluate urban maintenance issues



# ADMINISTRATIVE AUTHORITY & CODES

| NYC Agency                                   | Authority as Related to Disposal of Stormwater  | Legislative Authority   |
|--|---|---|
| Department of Environmental Protection (DEP) | <ul style="list-style-type: none"> <li>• Establish Drainage Plan - sets sewer sizes in relation to development established in City Map</li> <li>• Assess the capacity of the sewer system to accept stormwater from new development or altered development</li> <li>• Issues permits for the connection of the building house sewer</li> </ul>  | <ul style="list-style-type: none"> <li>• Administrative Code, Title 24 (24-503)</li> <li>• Administrative Code, Title 24 (24-526) and Reference Standard 16 (P110.0)</li> <li>• Administrative Code, Title 24 (24-507)</li> </ul>             |
| Department of Buildings                      | <ul style="list-style-type: none"> <li>• Develops Building Code – sets standards for construction practices on individual lots in accordance with land uses and zoning</li> <li>• Reviews new building or alternation applications and associated drainage and plumbing. Can issue permit for connection of building house sewer in conjunction with a permit for construction or alteration of a structure.</li> <li>• Authority for Plumbing Code which allows retention and recycling of stormwater</li> </ul> | <ul style="list-style-type: none"> <li>• Administrative Code, Title 27 (27-102)</li> <li>• Administrative Code, Title 27 (27-901, 27-909, 27-916 and 27-2027)</li> <li>• Administrative Code, Title 28 (28-1101.2, 1110.1, C101.1)</li> </ul> |
| Department of City Planning (DCP)            | <ul style="list-style-type: none"> <li>• Establish City Map – establishes land uses and population densities in districts (zones) around City</li> <li>• Develop Zoning Resolution - controls open space on lots and other factors such as floor area ratios that impact use of individual lots</li> </ul>  | <ul style="list-style-type: none"> <li>• City Charter (Section 198)</li> <li>• City Charter (Section 200)</li> </ul>  |
| Department of Transportation                 | <ul style="list-style-type: none"> <li>• Responsible for roadways and sidewalks and associated storm drainage</li> <li>• Can become involved with site grading</li> </ul>   | <ul style="list-style-type: none"> <li>• Administrative Code, Title 17</li> <li>• Administrative Code, Title 19 (19-137)</li> </ul>   |
| Department of Health and Mental Hygiene      | <ul style="list-style-type: none"> <li>• Enforces drainage on property when poor drainage impacts public health</li> </ul>  | <ul style="list-style-type: none"> <li>• Administrative Code, Title 17 (17-119)</li> </ul>  |



# SUMMARY OF EXISTING SEWER CODES

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The rules are constructed:

- to prevent water borne diseases created by standing water;
- to prevent street flooding;
- to prevent disputes between homeowners created by storm drainage being routed across property boundaries; and
- to promote safe walking conditions by not having water flow across sidewalks.



# BMP CONSISTENCY WITH CURRENT CODES

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- *Current Codes*
  - Storm drainage from impervious surfaces must generally be conveyed directly to a storm or combined sewer especially when within 200 feet of the property.
  - Detention must be provided when sewer capacity is inadequate.
  - Revised Plumbing Code allows retention with controlled release, beneficial use and recycling of stormwater in accordance with NYCDEP requirements.
- *Review other Municipality Codes*
- *Determine constraints and potential need for revisions*
  - Facilitate BMPs while ensuring flooding and standing water issues are addressed



# POSSIBLE BMP IMPLEMENTATION STRATEGIES

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- Code Review
- BMP design manual
- Design standards for parking lots
- Financial incentives
- City agency projects
- BMP pilot projects



# OFF-SITE STORMWATER BMPS

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- Capture and infiltration of runoff from **roadways and sidewalks**
- Use of **vacant parcels** for stormwater management
- Use of **parks** for stormwater management



# ROADWAY AND SIDEWALK BMPs

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- Types:
  - Infiltration swales in medians and along curbs
  - Infiltration basins within streets and sidewalks
  - Adjacent land areas for detention/retention
  - Increased street-side planting including enhanced tree opening
- Creates street trees, greenways, and open space



## Pilot Projects:

- Gaia Study: GreenStreets for Stormwater Capture
- Includes 3-years of data collection and monitoring





# INFILTRATION SWALES ALONG MEDIANS OR CURBS



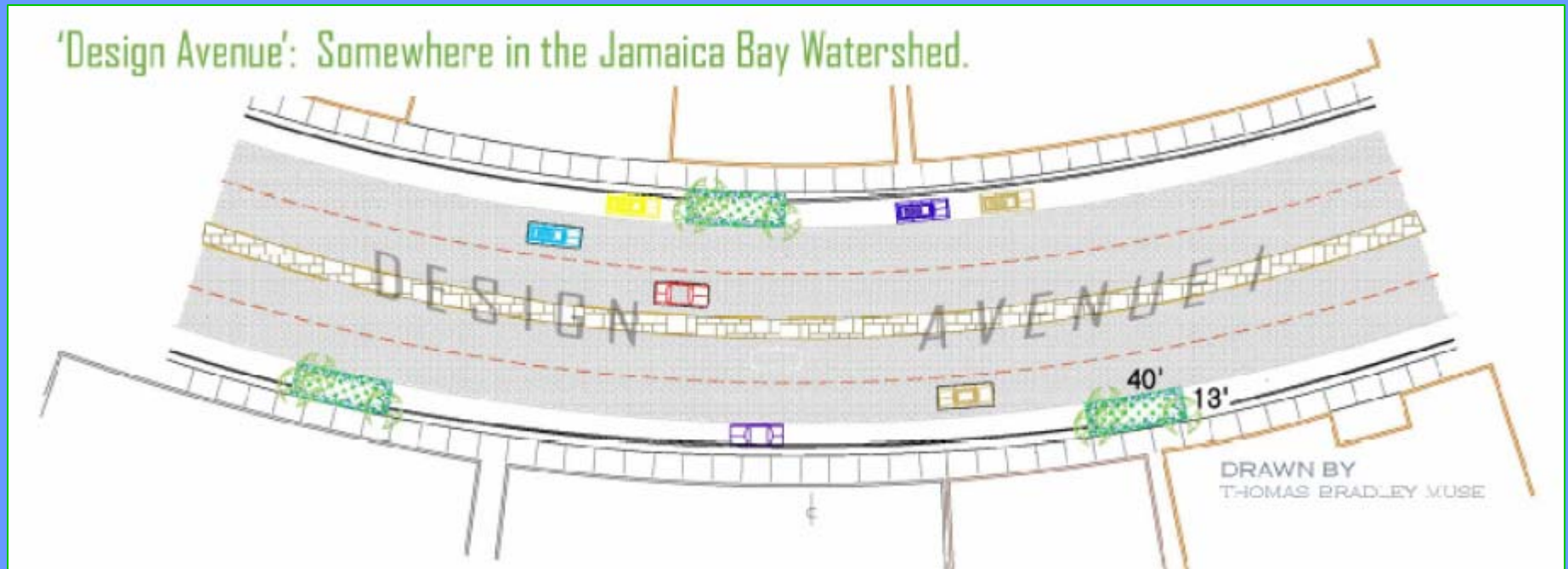
*Cross-section of roadway and sidewalk BMP.*



*Bioinfiltration swale along roadway median. Photo credit: Biohabitats, Inc., 2007.*



# INFILTRATION SWALES ALONG MEDIANS OR CURBS



Conceptual example of roadway and sidewalk BMP. More opportunities exist on wider streets with greater potential for increased volume.

# ROADWAY & SIDEWALK BMPS

## *Street Trees*

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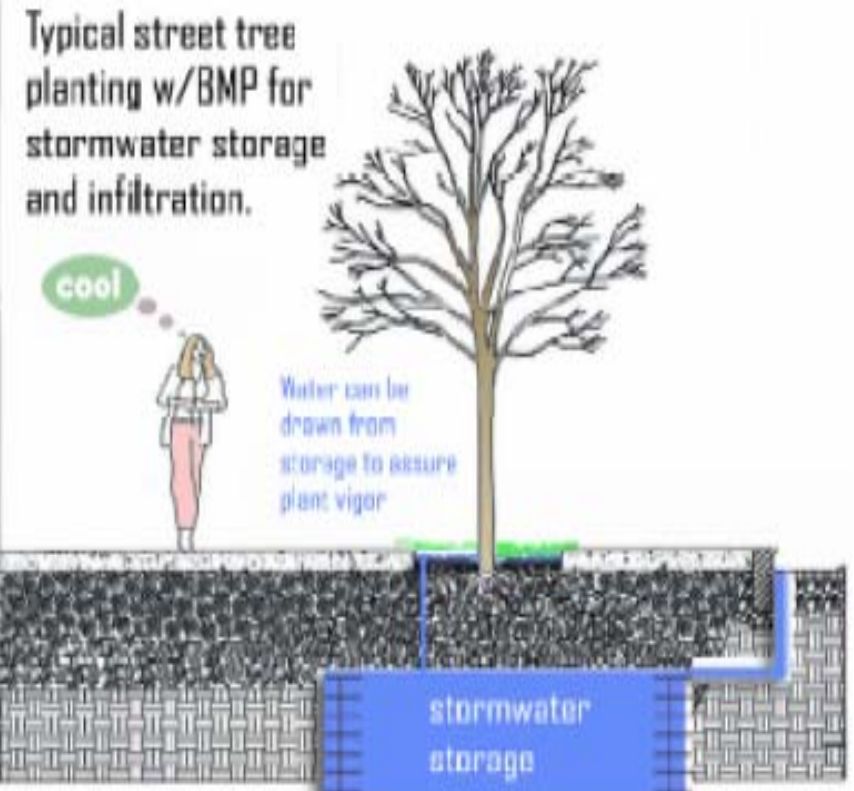
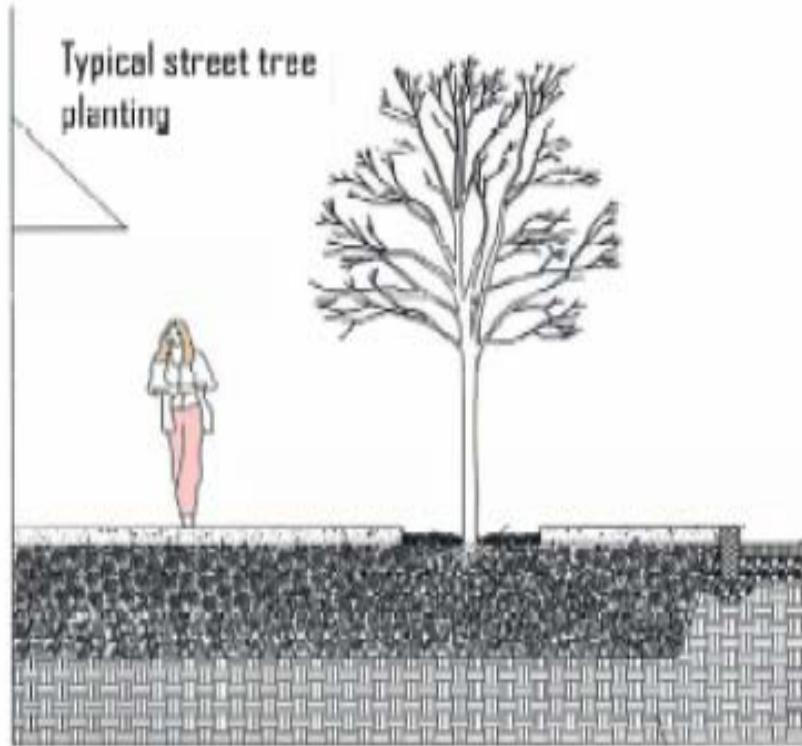
- NYC Department of Parks & Recreation to plant 1 million trees.

★ NYCDEP will do pilot to look at enhanced tree pit design:

- Largest practical street tree sidewalk opening
- Satisfactory soil growing medium
- Capture and storage of stormwater for later use by tree through soil moisture sensors and solar activated pumps.
- Healthier trees and reduced overall mortality rates.



# ENHANCED STREET TREE PILOT WITH ADDITIONAL WATER STORAGE

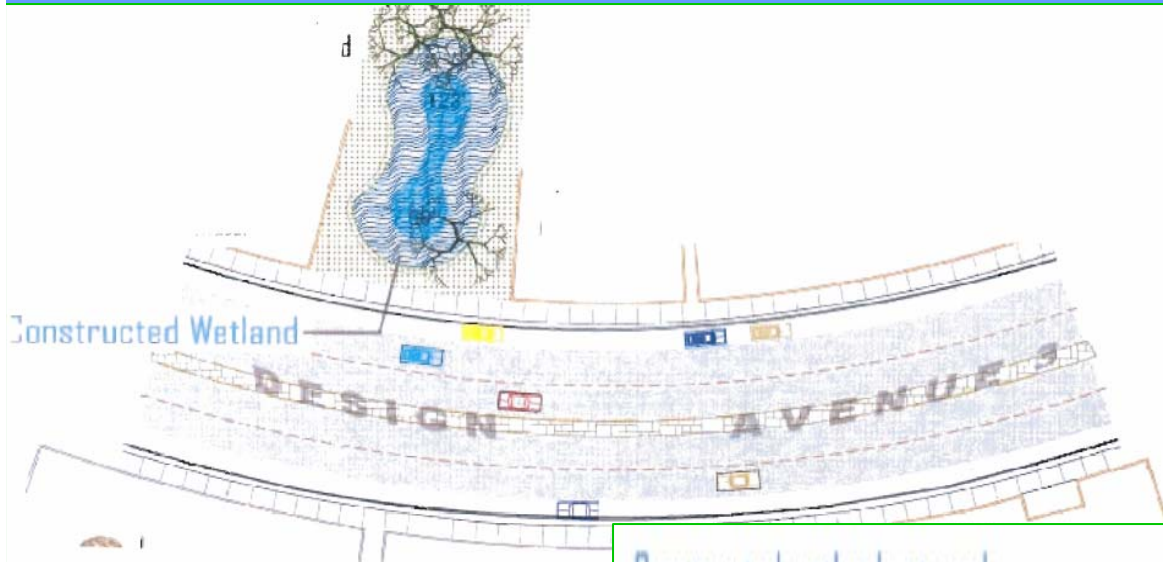


DRAWN BY:  
THOMAS BRADLEY MUSE

CREATENATURE.COM

# ROADWAY & SIDEWALK BMPS

## *Roadway Adjacent Areas*



This type of system (e.g., standing water) is likely not possible in many residential areas but is better suited along highways.

Return pipe to sewer system required to prevent potential flooding.

Constructed wetlands at work ...



# VACANT PARCELS FOR STORMWATER PARKS

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- Investigate use of vacant parcels for stormwater retention/ detention (“Stormwater Parks”)
- Stormwater runoff reduction at a City-block scale (parcels & streets)
- Opportunity to provide urban green spaces
- Opportunity to bring some surface water features to watershed
- Opportunity for additional upland habitat
- Public demonstration of stormwater BMPs



*Detention Pond in Residential Area of Kings County, WA*



# VACANT PARCELS FOR STORMWATER PARKS

## *Design Criteria*

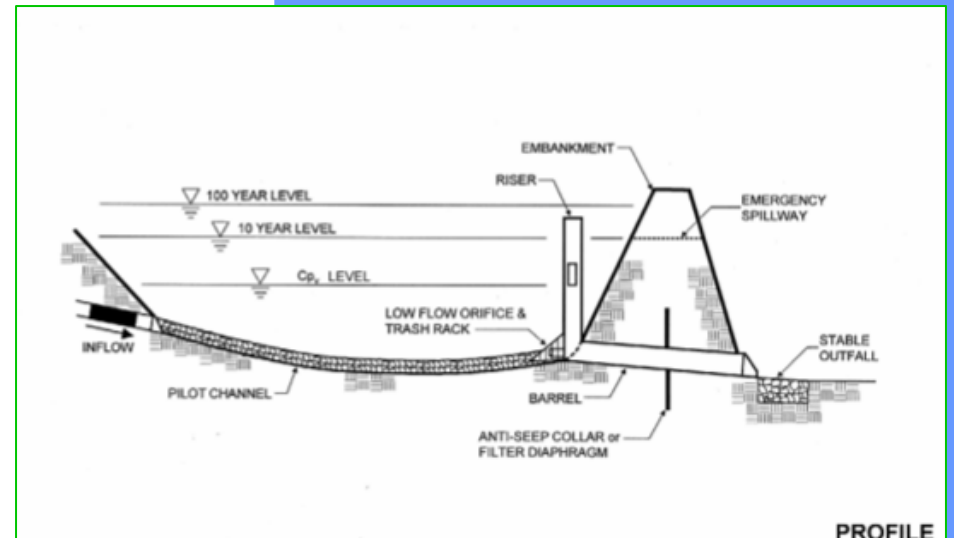
- Potential conflicts with existing utilities, neighboring property uses, high groundwater table.
- Capture of roof runoff from adjacent parcels – would require installing a “feeder pipe” from the roof leaders of each house to direct flow into stormwater parcel
- Ponded water may be considered a health hazard – measures to encourage infiltration or use sub-surface storage

### RUNOFF STORAGE POTENTIAL

|                         |         |         |
|-------------------------|---------|---------|
| Average lot size:       | 10,000  | sq ft   |
| Usable area:            | 80%     |         |
| Usable area:            | 8,000   | sq ft   |
| Average storage depth:  | 2       | ft      |
| Average storage volume: | 16,000  | cu ft   |
| Average storage volume: | 120,000 | gallons |

### AVERAGE RUNOFF PER BLOCK

|                            |         |       |                         |
|----------------------------|---------|-------|-------------------------|
| Average block area:        | 150,000 | sq ft |                         |
| Assume 90% impervious area |         |       |                         |
| 2.5 inch event:            | 28,125  | cu ft | <- ~50% runoff captured |
| 1.2 inch event:            | 13,500  | cu ft | <- all runoff captured  |
| .4 inch event:             | 4,500   | cu ft | <- all runoff captured  |





# VACANT PARCELS FOR STORMWATER PARKS

## *Next Steps*

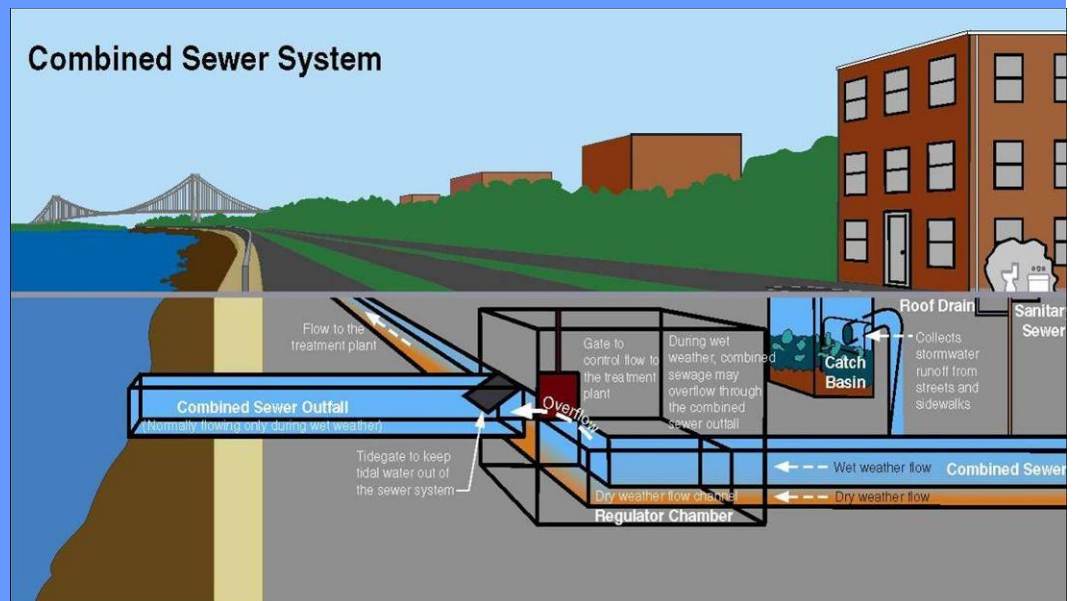
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- Identify 3 priority sites
- Evaluate drainage and infiltration for each site
- Create concept designs
- Develop planning-level cost estimates
- Model water quality/CSO effects



# MAXIMIZE EXISTING SEWER INFRASTRUCTURE

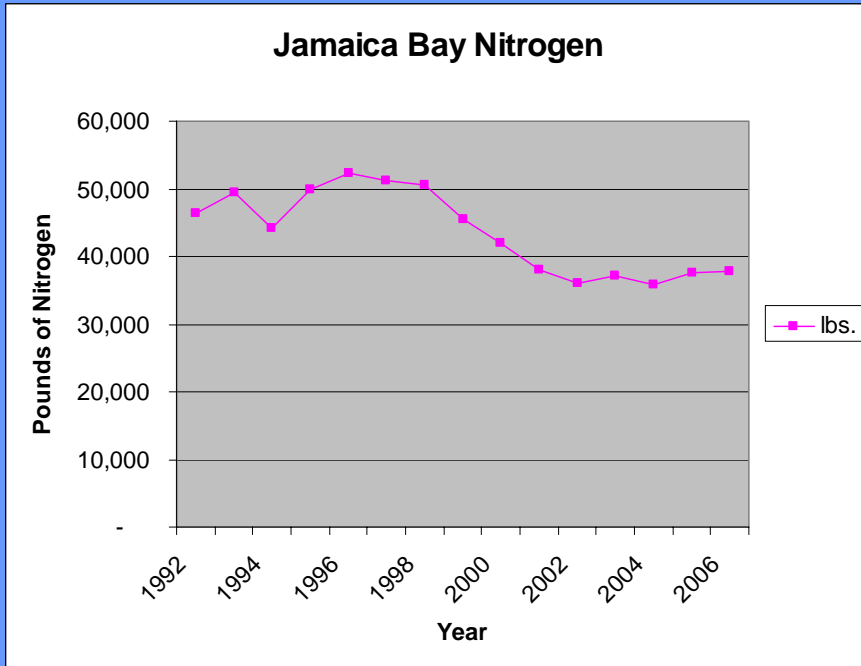
- **Catch Basins:** first line of defense
  - Regularly inspect and clean catch basins (3 year cycle)
  - Hooding program to reduce floatables entering system
- **Sewers:** conveyance system
  - Enhancing cleaning program to remove sediment
- **Regulators:** divert flow to CSO when interceptor/WPCP limit is reached
  - Inspection one to four times per month
- **Interceptors:** convey flow from sewers to WPCP
  - Exploring program to inspect and assess need for cleaning



# Water Quality Improvements Through Ecological Restoration



# Nitrogen Discharges

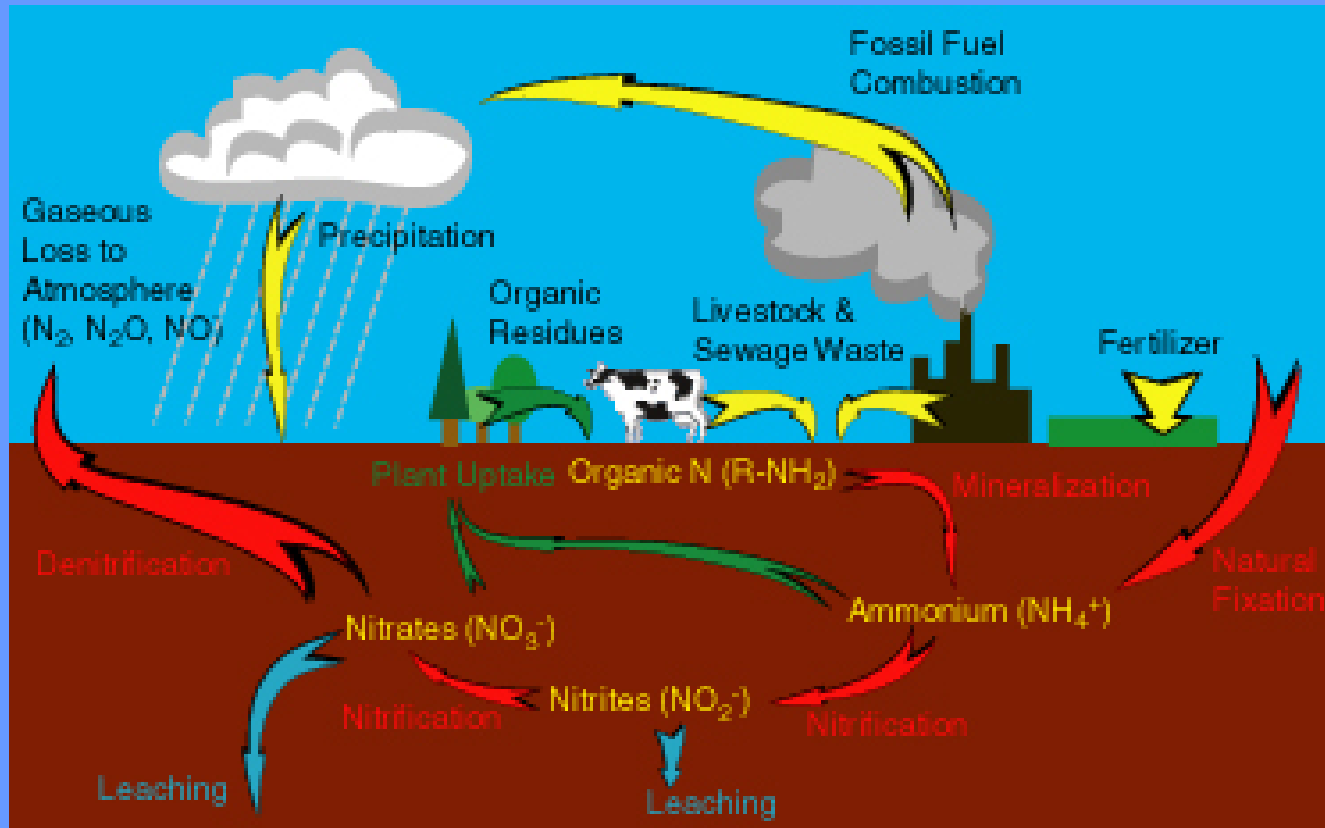


Since 1996 nitrogen discharges to Jamaica Bay have been reduced by 30%.

Ongoing efforts within Jamaica Bay:

- Jamaica Bay Watershed Protection Plan
- Long Term Control Plan
- Jamaica Bay Comprehensive Water Quality Plan

# Nitrogen Cycle



Graphic Credit: John Arthur Harrison, Ph.D. "The Nitrogen Cycle: Of Microbes and Men," Visionlearning Vol. EAS-2 (4), 2003.

# Water Quality and Ecological Issues of Jamaica Bay

- ***Objective: Water Quality***
  - Reduce Nitrogen
  - Increase Dissolved Oxygen
- ***Objective: Restoration Ecology***
  - Restore salt marsh islands
  - Parcel acquisitions and restorations
  - Remove shoreline debris and restore
  - Removal of anthropogenic soils
  - Removal of invasive vegetation
  - Greater scientific study
    - more local involvement required
- Possible development of Harbor Estuary Program (HEP) sub-workgroup to coordinate specific management strategy options of the Watershed Protection Plan



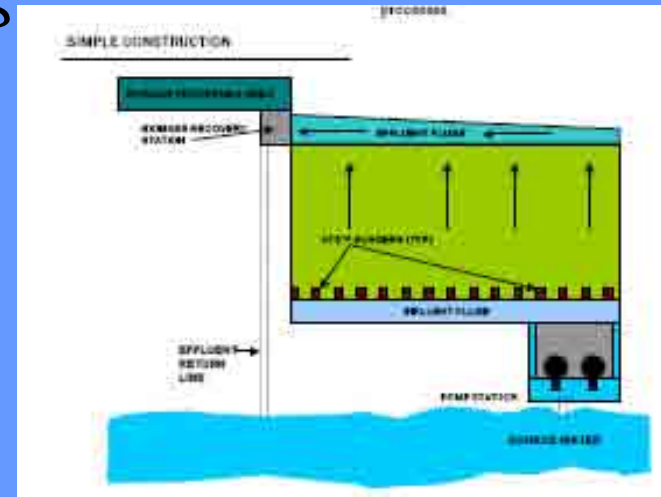
# Presentation overview of Pilot Studies and existing restoration projects of Jamaica Bay

- Algal turf scrubbers
- Algae harvesting
- Oyster and eelgrass restoration
- Marsh island wave attenuators
- Existing ecological restorations
- GPS of existing shoreline debris piles
- Shoreline debris removal and restoration



# • Algal Turf Scrubbers (ATS)

- Nitrogen and phosphorus uptake driven by high rates of photosynthesis
- Patented technology developed by Dr. Walter Adey & held by Smithsonian Institution
- Requires only 3-5% of the land area of comparable treatment wetlands
- Less effective during colder months
- Harvested algae could be used to produce biodiesel



Graphic Credit: Hydromentia, Inc.





# • Algae Harvesting

- Can produce 30 times more biodiesel than the current sources (e.g., corn, soy, etc...)
- High oil content (~ 50% by weight)
- New Zealand company produced one million liters of biodiesel from algae
- Algae grow rapidly resulting in high production.
- Possible dual use of existing NYCDEP skimmer boats



*Photo Credit: Aquarius Systems*

# • Oyster Restoration

- Keystone species and known as the “ecosystem engineer”
- Can filter up to 2.5-gallons per hour or ~ 35-gallons per day
- Chesapeake Bay was once filtered every 3 or 4 days.
- 20% removal rate of nitrogen and natural wave attenuator
- In 1609, oyster reefs covered 350 square miles
- Potentially important and valuable component of eelgrass restoration
- November 2001, AREAC determined survivability

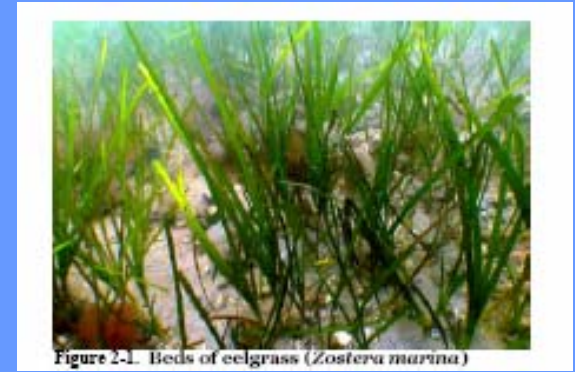


*Photo Credit: Maryland  
Sea Grant*



Photo Credit: Hudson  
River Foundation

# Eelgrass (*Zostera mariana*)



## Function

- Canopy Structure
- Primary Production
- Epibenthic and benthic Cover
- Nutrient filtration
- Nutrient regeneration
- Sediment trapping
- Oxygen production
- Wave and current dampening
- Seed and vegetative expansion
- Self-sustaining ecosystem

## Value

- Habitat, refuge, nursery and support of fisheries
- Food for herbivores and wildlife
- Support of food web and fisheries
- Protection from predators
- Improved water quality
- Support of primary production
- Improved water quality
- Improved water quality
- Dampen resuspension, increase sedimentation
- Self-maintenance of habitat
- Recreation, education, landscape level biodiversity

# Wave Attenuators

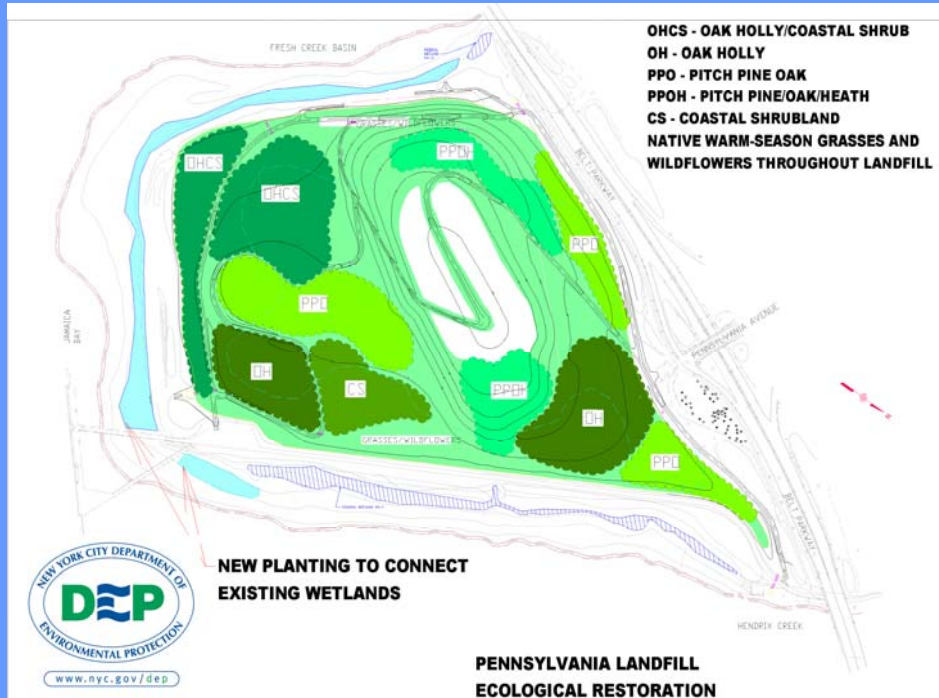


- Temporary Floating Breakwater Systems to dissipate wave energy, but allow sediment to pass through and be captured.



*Photo Credit: Elemental Innovation, Inc.*

# Landfill Restorations



Largest Restoration undertaken in New York City in over 100-years

- Contract growing of plant material
- Promote use of seed grown plants
- Developed soil specifications to “mimic” that of plant community types
- Use of smaller plant material
- Use of varying plant sizes
- Limited provenance of plants to within 150-mile radius of site
- Mycorrhizal soil inoculations



Pennsylvania Landfill Restoration – In Progress





Walking trails on Pennsylvania landfill to observe Jamaica Bay from a unique vantage point and a chance to come close to the various plant communities

# Video Clip of Restoration...







NYCDEP tidal wetland restoration completed in 2004 along eastern shoreline of Paerdegat Basin



# Paerdegat Basin Restoration



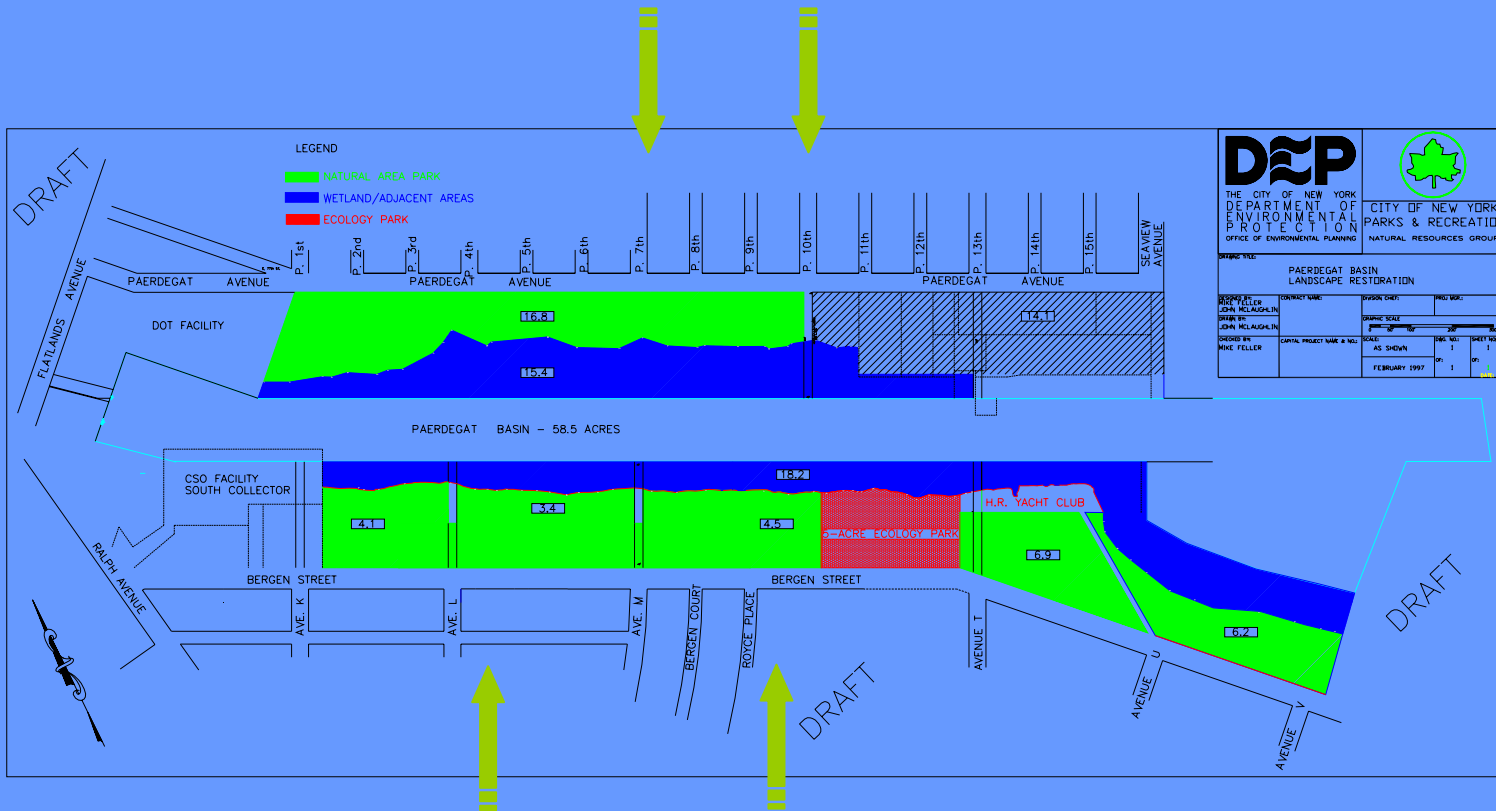
Recently completed NYCDEP (May 2007) tidal wetland and upland buffer restoration along eastern shoreline of Paerdegat Basin



Excavated sand from CSO facility stockpiled for later re-use in larger restoration of both eastern and western shorelines of Paerdegat Basin

# Natural Area Restoration of Paerdegat Basin

Diverting stormwater from adjacent streets



Diverting stormwater from adjacent streets





# Stormwater Management for portions of Belt Parkway

Will begin to treat roadway runoff and attenuate direct discharges

# Acquisition – Brooklyn

A strategy under the Watershed Protection Plan, is to evaluate the extent of remaining vacant land for possible acquisition. The following sites were identified in Buffer the Bay and have been under the jurisdiction of New York City Parks for some time:

- Four Sparrow Marsh
- Paerdegat Basin
- Fresh Creek
- Spring Creek



# Acquisition – Queens

A strategy under the Watershed Protection Plan, is to evaluate the extent of remaining vacant land for possible acquisition. The following sites were identified in Buffer the Bay and have been under the jurisdiction of New York City Parks for some time:

- Norton Conch/Basins
  - In discussion with HPD and DPR for possible transfer of unprogrammed properties
- Edgemere Landfill (under NYCDOS jurisdiction)
- Dubos Point
- Vernam Barbadoes Peninsula



# Norton/Conch Basin Shorelines



As part of the analysis of potential vacant land for acquisition and restoration, NYCDEP will continue to review existing GIS vacant parcel (public and private) data to prioritize those parcels with the highest ecological importance and/or potential for restoration.



# GPS Mapping of Shoreline Debris



In coordination with the American Littoral Society, NYCDEP has started to GPS locate debris piles around the perimeter of Jamaica Bay.



**Plumb Beach  
BEFORE cleanup.**

*Photo Credit: Don Riepe/ Jamaica Bay Guardian*

It does make a difference! Many volunteers gave their time to make this possible!



**Plumb Beach AFTER cleanup**

*Photo Credit: Don Riepe/ Jamaica Bay Guardian*



**Four Sparrow Marsh, Brooklyn ...before cleanup**



*Photo Credit: Don Riepe/ Jamaica Bay Guardian*

During the last 9-months, NYCDEP has participated in several shoreline and ecology improvement projects at Plum Beach and sections of Far Rockaway – approximately 2,300 plants were planted and more than 250 cy's of debris were removed.

By simply just removing the debris, wetland systems respond positively and bounce.

**Four Sparrow Marsh, Brooklyn ...after cleanup**



*Photo Credit: Don Riepe/ Jamaica Bay Guardian*





[www.nyc.gov/dep](http://www.nyc.gov/dep)

# Watershed Stewardship: What You Can Do To Protect Jamaica Bay

*Jamaica Bay Watershed Protection Plan  
Prioritized Strategies Workshop  
June 21, 2007*

*Shino Tanikawa, District Manager*

New York City Soil and Water Conservation District





**I don't control  
development...**

**I don't  
litter...**

**I'm only  
one person...**

**I don't run  
a factory...**

**So what can I  
do to make  
a difference??!**

# Current Efforts of Local Organizations

- Education Programs
- Beach Cleanups
- Advocacy
- Research and Monitoring
- Restoration
- Outreach

# What is our Message?

- WHY: Jamaica Bay is an invaluable natural resource that needs to be protected and restored
- WHAT: The Bay and its Watershed
- HOW: With YOUR help.
  - Educate and provide outreach
  - Protect and restore the ecosystems
  - Reduce damaging behavior within the watershed
  - Engage in eco-friendly habits
- WHEN: Now!
- WHERE: At home, in the yard, at the office, and on the Bay.

# Youth Education

- As part of Jamaica Bay Watershed Protection Plan, NYCDEP initiated the Jamaica Bay Education Coordinating Committee
- The focus of the committee has been to develop the priority strategy for multi-disciplinary, inquiry-based environmental education K-12th grade curricula
- The Committee is developing a resource directory of existing curriculum based on "what we want young people to know about Jamaica Bay"
- In the future, the Committee could discuss other K-12 education strategies such as informal or non-school based education programs, multi-media resources, etc.



# Reduce Damaging Behavior

- Priority strategy includes creating a targeted campaign to provide information about how to protect Jamaica Bay through:
  - On-site stormwater management (i.e., BMPs)
  - Wise use of household chemicals
  - Water conservation
- Continue NYC outreach campaigns (e.g., proper disposal of waste materials, landscaping, etc.)



# How to Protect the Bay *(from where you live and work)*

- Capture Rain
  - Rain barrels
  - Rain gardens
- Restore your lot
  - Native plants
  - Gravel
  - Porous pavement/  
pavers
- Use storm water planters
- Good for small areas
- Install a green roof



# You Know Your Community!

- Identify existing open space for stormwater BMPs
  - Wide sidewalks
  - Existing open space
- Work with local schools, universities, and community organizations to find these locations and map them!



*Photo Credits: NYCDEP, 2007*

# How Do We Translate Our Message?

- Priority strategy: State of the Bay Conference
  - Bring together scientists, resource managers, agencies, involved organizations, etc.
  - Share research results related to Jamaica Bay
  - Use proceedings to update the Jamaica Bay Watershed Protection Plan
- Other strategies: a “Common Gateway”
  - Centralized mechanism for disseminating data
  - Promote access and use of JBI’s library

# Build Volunteer Programs for a Healthy Bay

- American Littoral Society
  - Beach Cleanups
  - Wildlife Census
- Bay Improvement Group
  - Beach Cleanups
  - Community Gardening
- Friends of Gateway
  - Beach Cleanups
  - Community Planting
- Jamaica Bay Watershed Alliance
  - Litter Cleanups
  - Tree Planting
- New York City Department of Environmental Protection
  - Beach cleanups
  - Street cleanups with New York City Department of Sanitation
- New York City Department of Parks & Recreation
  - Park Cleanups
  - Gardening
- Salt Marsh Nature Center (Urban Park Rangers)
  - Beach Cleanups
  - Plantings

# Where do we put our message?

"Drip, Drip, Drip, Drip, Drip, Drip"

- Need for many diverse outreach mechanisms
  - Newsletters
  - Public meetings
  - Listservs
  - Brochures
  - Websites
  - Stormwater or Impact Calculator
  - Signage
  - Media

# Who are our Audiences?

- Students
- Teachers
- Elected Officials
- **W**atershed Organizations (i.e. places of worship, community boards)
- Agencies
- Residents
- Developers
- **S**mall Businesses
  - Auto repair shops
  - Restaurants
  - Cleaning (dry cleaners, car washes/lots, etc.)
  - Health Care

# How To Learn More About Jamaica Bay?

## Jamaica Bay Institute

National Park Service  
U.S. Department of the Interior  
Gateway National Recreation Area



### Join the Journey

to become  
a recognized steward of Jamaica Bay



Diamondback Terrapin

- Chose from a variety of topics across three activity groups.
- Attend an event and collect your stewardship stamp.
- Redeem your validation card annually with the Institute for a special award.

*Check the JBI website, [www.nature.nps.gov/jbi](http://www.nature.nps.gov/jbi), or call the Stewardship Series hotline, 718-338-3338 ext. xxx, throughout the year for updates to the schedule of events and details on how to redeem your card.*



## Jamaica Bay Institute

National Park Service  
U.S. Department of the Interior  
Gateway National Recreation Area



### Jamaica Bay Stewardship Series

*Creating natural resource stewards  
through understanding and knowledge*



The Jamaica Bay Institute is proud to promote a series of lectures, excursions, and field service opportunities to foster an interest in and understanding of Jamaica Bay. Each event you attend will earn you a stewardship stamp which collectively can be redeemed with the Institute on an annual basis for a distinctive award.



Jamaica Bay Institute  
Floyd Bennett Field  
HQ Bldg. #69  
Brooklyn, NY 11234

### Stewardship Series Validation Card

For more information, contact the  
Science Education Coordinator

Jamaica Bay Institute  
718-338-3338, ext. 223  
[www.nature.nps.gov/jbi](http://www.nature.nps.gov/jbi)



# Questions for Discussion

- Who should be our priority audiences?
- What else can we do to spread the message?
- What additional partnerships will help us reach our priority audiences?
- What types of incentive programs need to be in place to encourage eco-friendly habits?
- How do we organize and promote volunteer monitoring on JB ecosystems?