BioswaleCare

Handbook

What's Inside:

- What is a Right Of Way Bioswale?
- How does a Right Of Way Bioswale Work?
- The 5 Categories of Care
- What to Avoid…
- Planting Palette
- List of Key Offenders
- Why is the City building Right Of Way Bioswales?

millionTreesNYC
A PLANYC INITIATIVE WITH NYC PARKS AND NEW YORK RESTORATION PROJECT
GIVE A LITTLE LC
NYC Environmental Protection

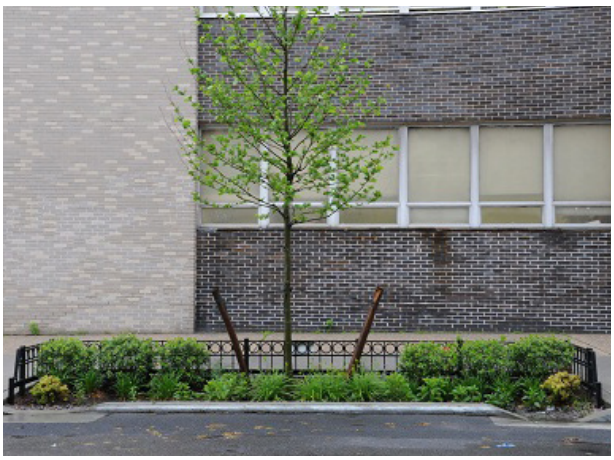
What is a ROW Bioswale?

Right of Way (ROW) Bioswales look a lot like street tree beds you see around New York City. If you look carefully, though, you'll notice that ROW Bioswales are significantly different from typical flower beds at the base of street trees. These differences are important because they ensure that the ROW Bioswales will be able to collect stormwater flowing down the streets and sidewalk when it rains.

The Right-of-Way, or ROW, is the distance between property lines on either side of the street and encompasses the two sidewalks, parking lanes, and paved roadway.

The word *Bioswale* is generally used to describe planted areas that collects stormwater.

The New York City Department of Environmental Protection (DEP) uses the term *ROW Bioswale* to describe planted areas in the sidewalk that are designed to collect and manage stormwater, or rainwater, that runs off the streets and sidewalks.



How does a ROW Bioswale Work?

1) ROW Bioswales aren't located just anywhere along the sidewalk. Instead, they are often built very close to catch basins. ROW Bioswales are primarily constructed just upstream of the catch basins so that by design they can partially collect the stormwater flowing down the street and sidewalk before it goes into the catch basin and ends up in the sewer system. By partially catching stormwater in the ROW Bioswale first, this water is used as a resource to help trees and plants grow, rather than going into an overwhelmed sewer system.

2) There are different standard sizes for ROW Bioswale beds and they are usually filled with one tree and different types of plants and shrubs. The tree and plants are carefully chosen so they can survive on a busy New York City street and absorb a lot of stormwater. These plants also don't mind when stormwater stands for a short time in the slight depression at the center of the ROW Bioswale.

What's a Catch Basin?
You may not have heard the term catch basin before, but you've seen one almost every time you cross the street in New York City! A catch basin is a type of drain structure, located next to the curb that collects all stormwater that falls on the street. There are more than 144,000 catch basins in the City of New York! This system of catch basins is designed to alleviate street flooding and efficiently capture the stormwater that falls on the street and discharge it into the sewer system.

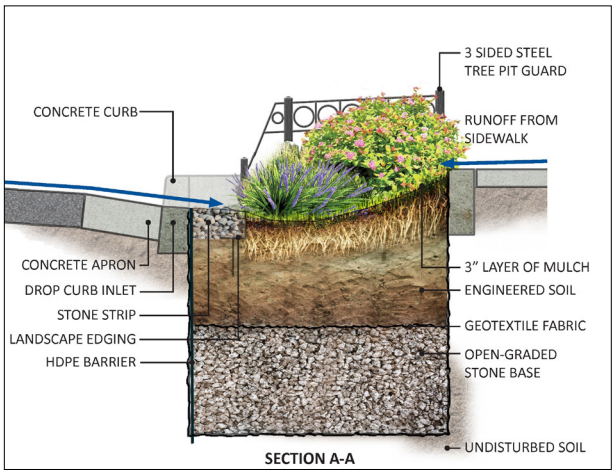
Environmental Protection

3) Each ROW Bioswale has a short metal fence, known as a tree guard, that goes along three sides of the planting bed. These tree guards are not just for decoration, they also protect the ROW Bioswale from people (and dogs!) that may accidently walk inside of the bed and damage the plants.

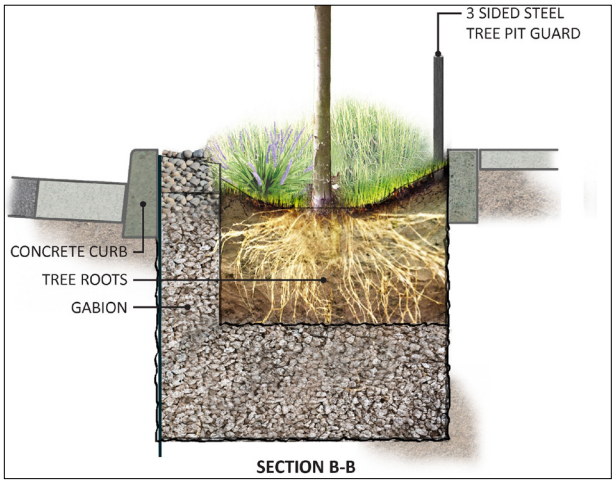
4) ROW Bioswales also have an inlet and an outlet which are openings - or "curb-cuts" - in the curb. You can tell which one is the inlet because it is the curb-cut that is farthest away from the catch basin. When it rains this inlet lets the water flowing down the street into the ROW Bioswale. The outlet is the curb-cut closest to the catch basin. If there is a very intense rainstorm, or if it rains for a long time, the ROW Bioswale may fill to its capacity. At those times, the outlet lets excess water flow out of the ROW Bioswale so that it can flow into the catch basin the way it normally would.

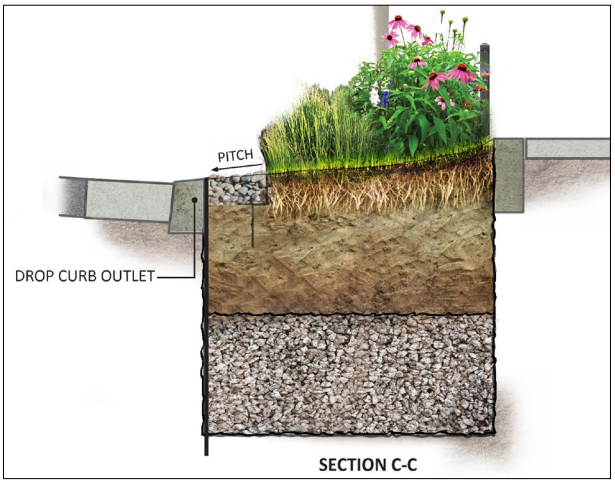
Photo: Inlet and outlet of a Bioswale

5) ROW Bioswales also have a one-foot wide strip of small stones along the curb to protect the plants from car doors that are opening.



What you can't see Beneath the ground each ROW Bioswale is almost five feet deep. The layers underneath the ROW Bioswale include sandy soils and stones that store stormwater and allow it to seep into the ground gradually. This process is called "infiltration." The tree and plants also absorb the stormwater and release it from their leaves into the air as water vapor. This process is called "evapotranspiration." Each ROW Bioswale can collect an average of 2,244 gallons of water per rain storm! That's about 45 bathtubs worth of water!





Caption: Images explaining all of the layers beneath the ground. You can see sandy soil ("engineered soil"), geotextile fabric, ("drainage fabric") and stone layers. All of these layers are necessary for the ROW Bioswale absorb water that has been collected from the street.

The 5 Categories of Care

Tools you can use:

- Gardening gloves
- Hand tools for digging and weeding, such as a fork or trowel
- Bucket/hose
- Trash bag

1. Communicate

PURPOSE

Most people do not know the difference between a ROW Bioswale and a regular street tree pit.

HOW TO

Tell your friends and neighbors about ROW Bioswales, and explain what they are and how they work. Plus, the more people know about ROW Bioswales, the better they will treat yours! Make sure to check out your ROW Bioswale during a rainstorm so that you can see how it works. You may even want to take photos or videos.

2. Clean Out Litter

PURPOSE

Unfortunately, ROW Bioswales can quickly become filled with debris and litter. Garbage can be washed in from the street, blown in from the wind, or thrown in by people. This trash is harmful because it clogs the inlets and outlets and prevents the ROW Bioswale from collecting water properly.

HOW TO

Clear litter from your ROW Bioswale often. Remove any food scraps, dead plants, and animal waste because it can hurt the plants and attract pests. Make sure all trash has been removed from:

- The inlets and outlets. This is how water comes and goes from the ROW Bioswale so make sure they aren't clogged by debris and sediment.

- In and around the tree guard. The ROW Bioswale is designed to take in stormwater from the sidewalk as well and cannot function properly if there is litter blocking the tree guard.

- In and around the stone strip.

Photo: Litter in a Bioswale

3. Inspect the Soil and Plants

PURPOSE

The soil and plants are specifically chosen to help the ROW Bioswale manage stormwater. They should be inspected to make sure they are working the way they are supposed to.

HOW TO

Important things to look for:

- Soil erosion (areas where the soil has washed away) – the special soil in your ROW Bioswale is designed to absorb water quickly and is placed in the ROW Bioswale in a very specific way that creates a channel to direct the flow of water. Heavy rain fall events cause the top soil and mulch to get washed away, clog the channel, and expose the roots of your plants. Make sure to inspect your ROW Bioswale for those types of signs of soil erosion after a storm. People and animals walking or running in your ROW Bioswale may also cause soil erosion. If you can see the roots of the plants, or you see sand, debris or excess soil that has filled up the channel or buried the plants below, you should call 311. (More info is the Resources section.)

Photo: Example of soil erosion

- Vegetative health – without thick healthy plants, the ROW Bioswale will not function properly. Make sure the plants of your Bioswale are healthy and dense.

4. Weed Often

PURPOSE

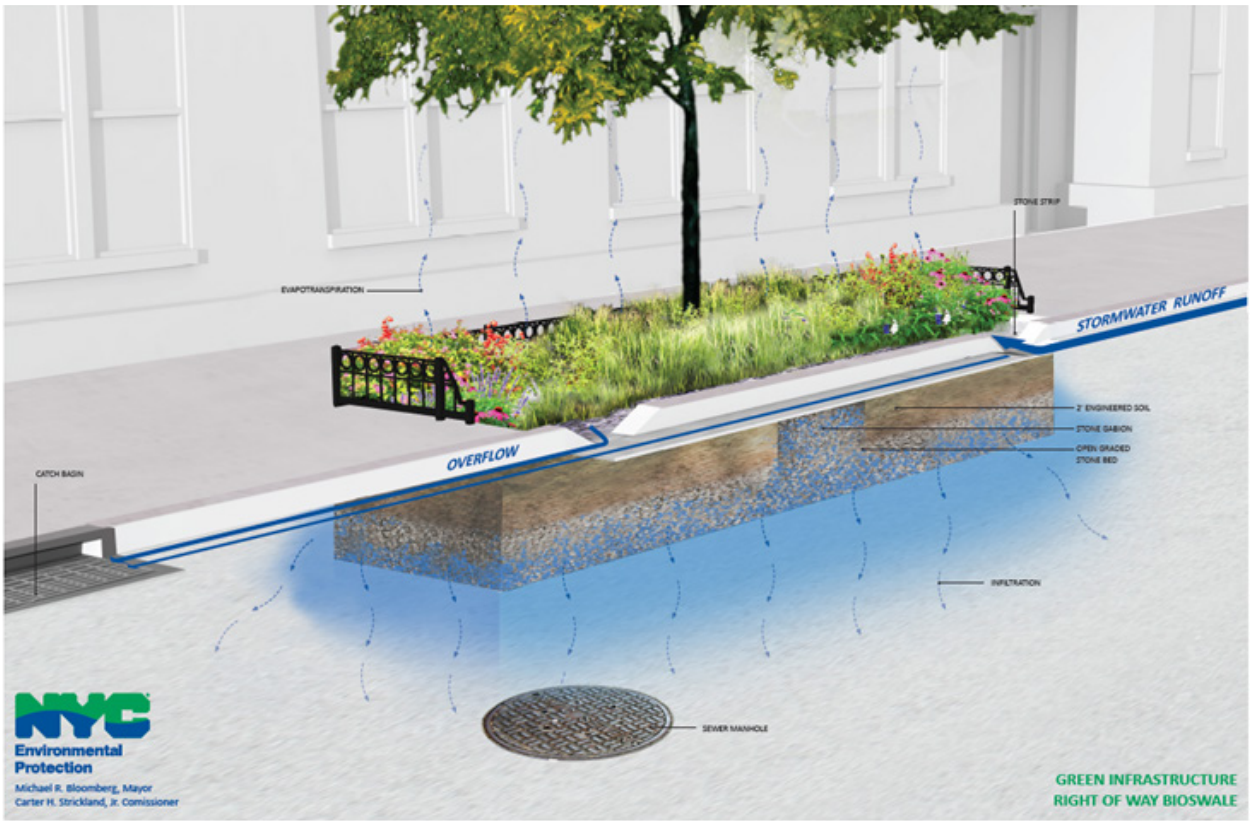
Weeding your ROW Bioswale is important to keep the plants healthy. Weeds are not only unsightly but they crowd the plants, making it hard for them to absorb water and grow strong.

HOW TO

Identify the plants that were planted in your ROW Bioswale and pull out any foreign plants you see growing around them. But be careful! Only pull out the weeds or you can damage healthy plants and harm your ROW Bioswale's ability to work. Weed whackers and herbicides like RoundUP should not be used.

- Weeding should be done at least once per month during the growing season – from May 15th to October 31st.

- When pulling out the weeds, make sure you have pulled out the whole weed, roots included. This can be done by gripping the plant at the base and pulling or using a weeding fork or spade and digging the roots out. This is also easiest when the soil is slightly moist. The smaller the weed, the easier it is to remove, so frequent weeding makes the task much easier.



What you see here is a ROW Bioswale diverting stormwater ("stormwater runoff") flowing down the curb. You can also see infiltration and evapotranspiration taking place. Most of the runoff is being directed into the inlet. During some rainstorms, water may go past the inlet and go straight to the catch basin. If the ROW Bioswale fills to capacity, then water comes out of the outlet. This water is called the "overflow."

5. Water When It's Hot or Dry

PURPOSE

Even though your ROW Bioswale is designed to collect rain water, it may need additional water during hot and dry periods. Watering is necessary for the plant root systems to become established and grow. If one week goes by with little to no rain and very high temperatures, or if the soil looks dry and dusty, then you should water your ROW Bioswale thoroughly.

HOW TO

The best way to water is to spray the water slowly and evenly over the ROW Bioswale soil, not directly on top of the plants. You can even use a bucket to pour water through the inlet! Do not dump large amounts of water at once, it will uproot the plants and contribute to soil erosion.

What to avoid:

- Don't add your own plants or flowers to the ROW Bioswale. All of the plants are specially chosen to survive life on a busy NYC street. Planting other vegetation can prevent the special plants from working in the ROW Bioswale, and foreign plants may suffer in the extremely wet environment of the ROW Bioswale.

- Don't prune the plants or the trees. Be aware that only permitted arborists or contracted landscapers are authorized to prune trees in NYC. You can contact Trees New York to earn a Citizen Pruning Permit or find a Citizen Pruner. In addition, the NYC Department of Parks and Recreation prunes street trees on a regular cycle.

- Don't take out the plants in your ROW Bioswale. Without them, it will not work correct ly! If you see dead or dying plants please call 311.

- Don't compact the soil. Try not to step on the soil inside your ROW Bioswale at all or as little as possible. People and animals walking around inside compacts the soil and impairs its ability to quickly absorb water. Most of the maintenance can be done by kneeling outside the tree guard and reaching into the ROW Bioswale. Keep this in mind as you clean and weed your ROW Bioswale.

- Don't apply any kind of herbicide or pesticide to your ROW Bioswale. It is preferable to manually remove weeds before their abundant growth requires herbicide application.

- Don't add mulch, wood chips or Christmas tree branches to your ROW Bioswale. The City will apply mulch regularly, paying special attention to the required grading and design. We need your help to prevent the mulch from blocking or clogging drainage features (such as inlets and outlets) within the ROW Bioswales.

- Don't modify the channel created by the soil and mulch in any way, as it will reduce its ability to collect stormwater.

Resources

You should contact the City if:

- The tree or plants have been damaged or removed
- The ROW Bioswale has been vandalized
- The soil has eroded or if water is not flowing in

There are special maintenance crews that care for all of the ROW Bioswales. If you observe any of the issues above or for any other reason, you may contact the City by calling 311 or emailing sustainability@dep.nyc.gov. If you call 311 make sure to use terms like "ROW Bioswale" and "green infrastructure" so that the dispatcher can direct you correctly. Make sure you tell the dispatcher which borough you're in and where on the street your ROW Bioswale is located.

NYC Environmental Protection

Planting Palette

Below is a list of some plants and flowers that may be in your Bioswale. REMEMBER: this is not a full list, so the flowers and grasses may look different than the ones below. If you are not sure about a plant or weed, do not pull it!

Summersweet Clethra
Clethra alnifolia

Red Twig Dogwood
Cornus sericea

Swamp Milkweed
Asclepias incarnata

New England Aster
Aster novae-angliae

Pennsylvania Sedge
Carex pensylvanica

Catmint
Nepeta faassenii

Cranesbill
Geranium sanguineum

Black Eyed Susan
Rudbeckia fulgida

Northern Blue Flag
Iris versicolor

Sea Oats
Chasmanthium latifolium

Coneflower
Echinacea purpurea

Sedge
Carex morrowii

List of Key Offenders

Below is a list of some of the most common weeds and intruders that may show up in your Bioswale. If you see these weeds growing inside your Bioswale, consult the "How To" in Step 4 of the Categories of Care to learn how to remove them.

Garlic Mustard
Allaria petiolata

Common Pigweed
Amaranthus spp

Common Pokeweed
Phytolacca americana

Common Burdock
Arctium minus

Mugwort
Artemesia vulgaris

Canada Thistle
Circium arvense

Catchweed Bedstraw
Galium aparine

Ground Ivy
Glechoma hederacea

Smartweed
Polyginum spp.

Dandelion
Taraxacum officinale

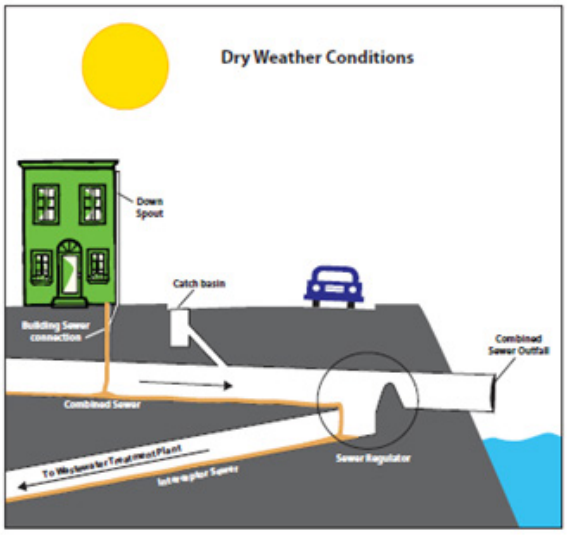
Lambsquarters
Chenopodium album

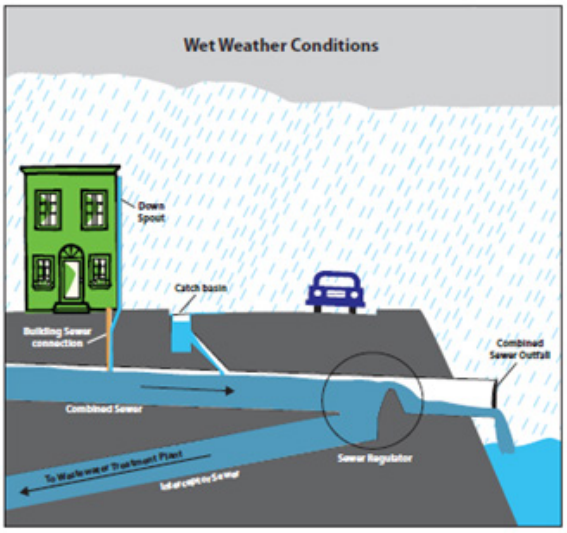
Common Mullein
Verbascum thapsus

Why is the City building ROW Bioswales?

When it rains in a forest the rainwater absorbs into the ground to nourish the trees and plant life and replenish the water table. In New York City's ultra-urban environment of buildings, streets, and sidewalks, the surfaces are hard and "impervious." This means that when it rains, the water does not absorb into the ground the way it would in a forest. Instead, this water goes down drains that are in parking lots, downspouts on the sides of buildings, and especially into catch basins on streets. All of this water gets collected into the sewer system. New York City, like other older cities, has a combined sewer system. This system is collecting both the rainwater flowing off the streets and buildings and the "sanitary" flow that comes out of buildings from flushing the toilet, running the shower, or doing the laundry.

New York City's Department of Environmental Protection (DEP) manages the sewer system and the Waste Water Treatment Plants (WWTPs) that collect and clean or "treat" sanitary flow and stormwater runoff. On a nice, sunny day, the Waste Water Treatment Plants can treat all of the sanitary flow that is generated by buildings and homes. On very rainy days, or when a lot of rain falls in a short period of time, the stormwater and sanitary flows mix together in the combined sewer pipes, called a "combined flow." If the rainfall is too great, the WWTPs cannot handle the additional amount of water. To avoid street flooding, prevent sewer backups and prevent damage to the WWTP, the sewer system will release the untreated combined flow from pipes, or "outfalls" along the waterfront. This is called a "Combined Sewer Overflow."





New York City's efforts to improve water quality are a critical part of PlaNYC, Mayor Bloomberg's blueprint for a greener, greater city. Already the New York City harbor is cleaner than it has been in over 100 years, and millions of people enjoy the City's waterfront and waterways every year. Currently, 93% of our local waterways meet water-quality standards. The largest remaining challenge for the other 7% of waterways is to further reduce combined sewer overflows. DEP has invested millions of dollars on large tanks that store the combined sewage until the Waste Water Treatment Plants can treat it. These tanks are often called "gray infrastructure." In 2010 the City released the NYC Green Infrastructure Plan which proposed

projects that collect or "manage" stormwater before it goes into the sewer system. Green infrastructure projects can be built on buildings, roads, sidewalks, parking lots and other locations to absorb or detain rainwater right where it falls. Green infrastructure includes projects such as green roofs, rain gardens, permeable pavers and ROW Bioswales. By collecting rainwater before it goes into the sewer system green infrastructure is helping to further reduce combined sewer overflows and improve the water quality in our waterways. Green infrastructure has other benefits related to the sustainability of the City because it uses less energy to construct than grey infrastructure, can help cool temperatures in the hot summer months, and beautifies neighborhoods. Green infrastructure also saves New Yorkers money because it is cheaper to construct than gray infrastructure projects and it uses water as a resource rather than a waste.

Thank you for signing up to care for a ROW Bioswale! Together we will beautify our neighborhood, improve water quality in our rivers, and protect the environment!

Photo: Bioswale on 4th Avenue and Dean Street

NYC Environmental Protection

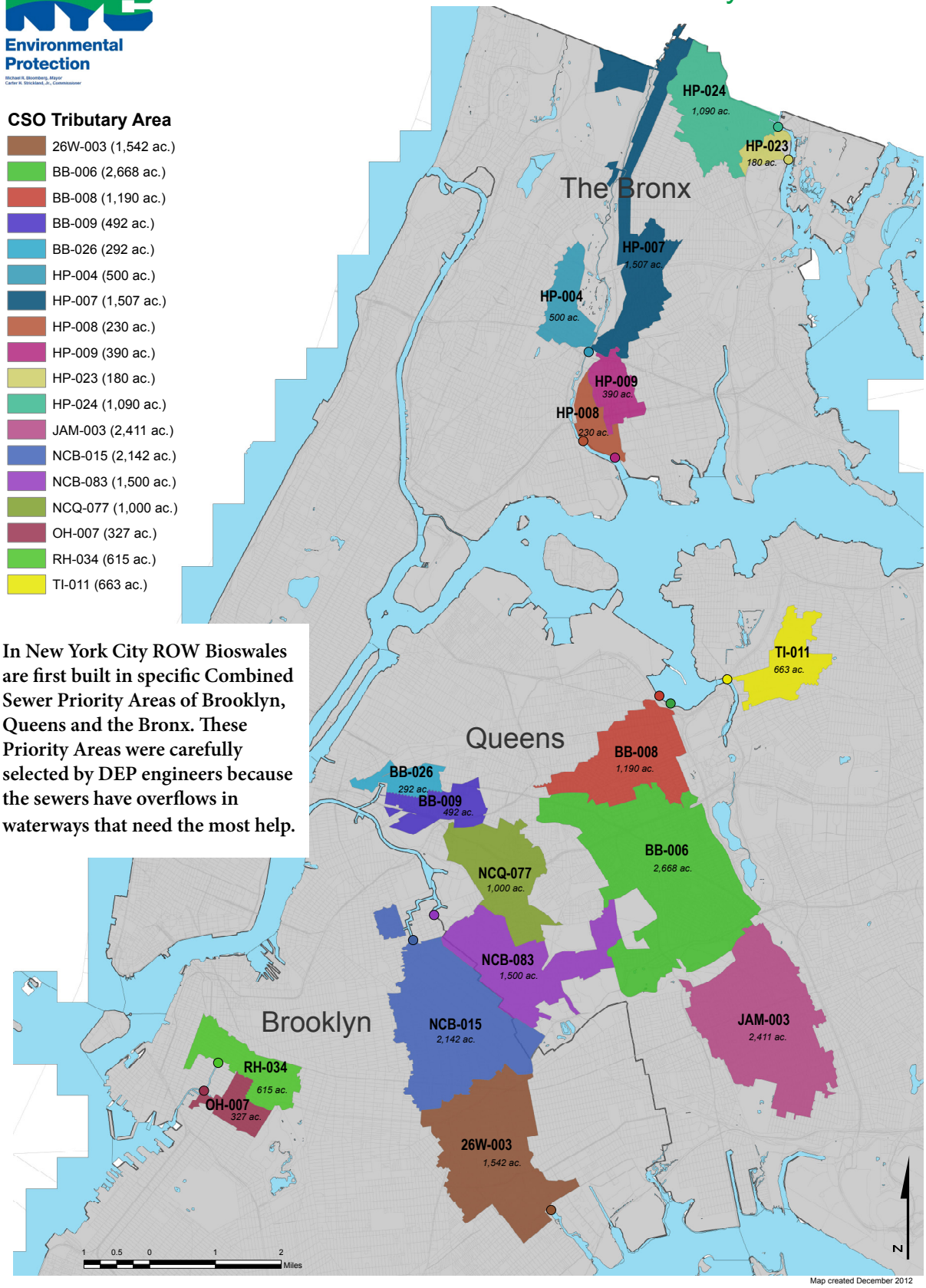
Office of Green Infrastructure Priority Areas

Environmental Protection

Michael R. Bloomberg, Mayor
Carter H. Strickland, Jr., Commissioner

CSO Tributary Area

- 26W-003 (1,542 ac.)
- BB-006 (2,668 ac.)
- BB-008 (1,190 ac.)
- BB-009 (492 ac.)
- BB-026 (292 ac.)
- HP-004 (500 ac.)
- HP-007 (1,507 ac.)
- HP-008 (230 ac.)
- HP-009 (390 ac.)
- HP-023 (180 ac.)
- HP-024 (1,090 ac.)
- JAM-003 (2,411 ac.)
- NCB-015 (2,142 ac.)
- NCB-083 (1,500 ac.)
- NCQ-077 (1,000 ac.)
- OH-007 (327 ac.)
- RH-034 (615 ac.)
- TI-011 (663 ac.)



In New York City ROW Bioswales are first built in specific Combined Sewer Priority Areas of Brooklyn, Queens and the Bronx. These Priority Areas were carefully selected by DEP engineers because the sewers have overflows in waterways that need the most help.

Map created December 2012

Environmental Protection

Workshop Notes