



Green Infrastructure on Private Properties in New York City

Sustainable Stormwater Management Program of the
New York City Soil & Water Conservation District
2010



Introduction

The New York City Soil & Water Conservation District was created to assist New Yorkers in making wise use of the City's soil, water and related natural resources. The District has focused much of its programming on outreach and education for abating non-point sources of pollution and managing stormwater through partnerships with community organizations, regional and national non-profits, government agencies and institutions of higher learning.

With small grants the District has recently taken on installing Green Infrastructure projects in the City. Because the City has begun implementing Green Infrastructure projects on city-owned properties, the District has focused its efforts on private properties. By installing pilot projects as widely as possible, it is hoped that more property owners will begin choosing Green Infrastructure. Working with private property owners, thus, has the potential for implementing wide spread Green Infrastructure without public funding.

This booklet features brief summaries of the Green Infrastructure projects followed by a report on our outreach and education efforts in sustainable stormwater management.

Left: Blue Stemmed Goldenrod and Blue Wood Aster in full bloom in stormwater capture planters.



Stormwater Capture Planters

Location: 245 West 74th Street, New York, NY 10023

Type of Property: Cooperative apartment building with approximately 50 units

Size of the Backyard: Approximately 15' x 100'

GI Type: Backyard retrofit with detention/retention

Project Partners: eDesign Dynamics (design and construction), Landmark West (outreach and communication), Alfie Arms Corp. Board of Directors (property owner)

Funding Source: Conservation Project Assistance from the Environmental Protection Fund (NYS)

Grant Amount: \$26,000

Project Installation: July, 2009

This was our first GI project. We wanted to install a GI retrofit that will 1) detain and/or retain stormwater and 2) create a green space in an otherwise grey environment. We solicited applications from property owners on the Upper West Side and conducted site visits.

Although the building has a downspout from the roof, the location made it impossible to use it as the stormwater conduit. As is typical of many backyards in the city, this site is in the shade much of the day. Furthermore, neither the budget nor the schedule allowed replacing the concrete on the ground for potential infiltration. Thus we were very limited in the scope of the project.

eDesign Dynamics developed a “greenroof on the ground” design with custom built lined planters with overflow pipes. Three of the four planters are 4' x 4' x 1.5'. The largest planter is L-shaped with a total length of 30', with the elbow of the L being 10'. It has the same width and depth. We lined all the planters with geotextile and pond liner and placed a perforated 1.5” PVC pipe on the bottom as drain pipes, which were connected to a vertical PVC pipe of the same diameter on the outside of the planters.

The conceptual design was shared with the Coop Board to solicit residents’

input. Sitting nooks were added to the L-shaped planter so that residents can sit. We also added a trellis at the far end to visually demarcate the project area from the rest of the yard.

Planters were built onsite over three days. Eleven cubic yards of soil was trucked to the street and wheel barreled down and up two sets of stairs to the backyard.

Shade tolerant native species were purchased from the NYC Greenbelt Native Plant Center. Because of the timing of the installation (early July), the plants required watering on a regular basis. However, these are plants adapted to the local climate and once established, watering will not be required.

Plant Species List:

Christmas Fern (*Polystichum ascrostichoides*)

Virginia Creeper (*Parthenocissus quinquefolia*)

Little Bluestem (*Schizachyrium scoparium*)

Blue Wood Aster (*Symphotrichum cordifolium*)

BlueStemmed Goldenrod (*Solidago caesia*)

Maintenance

The District worked closely with the Co-op board in the design of the planters. The residents who used the backyard frequently maintained the planters. The building superintendent was asked by the Co-op board to water the plants during the first summer. During the summer of 2010, the superintendent only watered them when there was a dry period. Because the plants are native species, they require very little maintenance.



Above: the project site before construction had very little greenery. Below: three small planters and one large planter were constructed. The large planter has integrated benches. All plants are native shade tolerant species. Far left: Blue wood Aster thriving in a planter.





Rain Barrels with Green Wall:A Retrofit

Location: 122-130 West 83rd Street, New York, NY 10024

Type of Property: Multiple mixed use buildings with low-income housing, commercial tenants, a not-for-profit preschool and a common backyard

Size of the Backyard: Approximately 10' x 70' (plus a preschool play yard of approximately 30' x 20')

GI Type: Backyard retrofit with detention

Project Partners: eDesign Dynamics (design and construction), Sustainable Yards (outreach and communication), Church of St. Matthew St. Timothy (property owner)

Funding Source: NY NJ Harbor Estuary Program (federal)

Grant Amount: \$31,500

Project Installation: June 2010

For the second GI project, the District wanted to find a property owned by a non-profit organization. With assistance from Sustainable Yards, the District selected the backyard of a low-income housing complex owned by the St. Matthews & St. Timothy's Church on West 83rd Street.

About a third of the backyard is used as a play yard by a preschool, which rents part of the ground floor. The rest was used infrequently. There were six small (~1' x 2.5') tree pits spaced along the property line wall with metal fences around them. The project was to be installed on the section of the backyard not used regularly by the children. However, the project incorporated educational elements for the children. The District originally planned to involve the residents of the low-income housing, but was informed that the preschool would be more appropriate for the education component.

The existence of an external downspout, draining a roof approximately 4,000 square feet, prompted eDesign Dynamics to develop a detention system consisting of twenty rain barrels connected in series. Because the site gets very little sun and the ground is paved with the exception of the tree pits, we would not be able to plant enough vegetation for a retention system. However, to enhance the educational components of the project, the District

requested a green wall in the design, with one of the barrels as a rain water harvest barrel with a spigot.

The green wall was installed using Wally Pockets fastened to a wooden frame. Because the ownership of the wall was unclear, we decided not to install the Wally Pockets directly to the wall. We installed eight pockets across in four rows and planted three species of native ferns and the Virginia Creeper.

In addition to the green wall, the tree pits were also revived. We cut and removed the metal fences and removed the bricks and refuse in the pits. We dug down to about two feet and mixed the existing soil with potting soil and planted butterfly bushes.

Plant Species List:

In Wally Pockets

- Christmas Fern (*Polystichum ascrostichoides*)
- Marginal Woodfern (*Dryopteris marginalis*)
- Ostrich Fern (*Matteuccia struthiopteris*)
- Virginia Creeper (*Parthenacissus quinquefolia*)

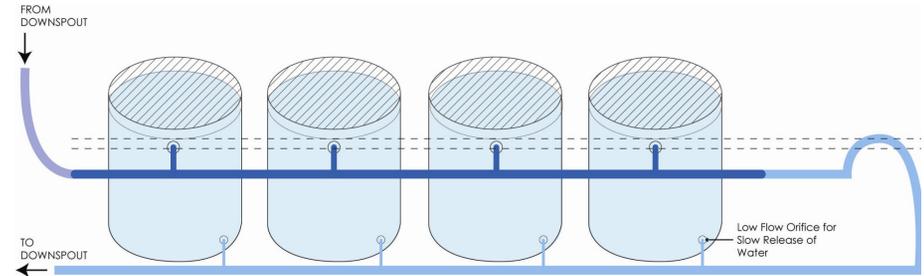
In tree pits:

- Summersweet (*Clethra alnifolia*)
- Virginia Sweetspire (*Itea virginica*)

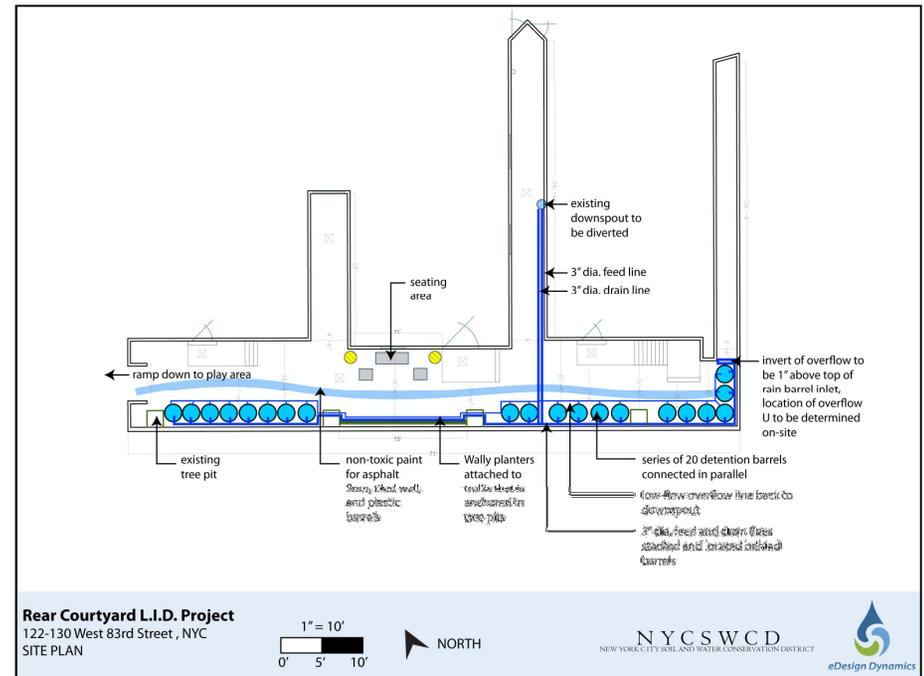
Maintenance

The District developed an education curriculum for the pre-school which covers maintenance of the plants in the tree pits and the Wally Pockets. The diverter routing the water into the barrels needed to be shut off in late November. The building superintendent shut off the valve upon request from the District staff.

The District staff will visit the site in spring and summer in 2011 to evaluate the condition of the plants. There was evidence of digging in the tree pits. The superintendent informed us of feral cats that frequent the backyard. To prevent animals from digging into the tree pits, small fences might be installed. The District’s Education Coordinator will work with the preschool teachers to institutionalize the plant maintenance in 2011.



Above: twenty barrels were connected in a series as shown in the schematic. The last barrel furthest from the downspout was designed to be a rainwater harvest barrel without a low flow orifice. Below: a plan view of the project site. Far left: beyond installation of the rain barrels and the green wall, the project team incorporated educational elements. A mural depicting non-point sources of pollution and plants as water purifier was painted. The ground was also painted to depict water to reinforce the importance of water to our lives (see cover photo).





Central Harlem Rain Garden

Location: 281 West 150th Street, New York, NY 10039

Type of Property: Non-profit owned low-income housing with 15 units

Size of the Backyard: 20' x 70'

GI Type: Vacant lot conversion to rain garden

Project Partners: eDesign Dynamics (design and construction), Community Assisted Tenant Controlled Housing (CATCH, resident engagement), Central Harlem Bradhurst LP (property owner)

Funding Source: Conservation Project Assistance from the Environmental Protection Fund (NYS)

Grant Amount: \$26,000

Project Installation: July 2010

This site is a vacant lot adjacent to a low-income apartment building, operated by CATCH, a not-for-profit organization, which owns the lot through a Limited Partnership. The lot had been fenced off to prevent access and has been severely neglected. It was dense with mugwort and other non-native weeds and strewn with trash. We were first approached by CATCH to create an open space amenity on the vacant lot. Some of the residents were also interested in rehabilitating the lot so that they could use the space as a garden.

The design team took advantage of the external roof drain and designed a constructed wetland fed by water from the roof routed through a series of ten rain barrels. The roof area is approximately 2,600 square feet with two roof drains, only one of which was used for the project.

The lot is set back from the street, flanked by an L-shaped private park belonging to the adjacent building. The lot is also below grade level from the sidewalk. Because we could not access the lot directly from the street, we were unable to use earth moving machinery. Thus, excavation was done manually with the staff from the project team and volunteers. This also meant that we were not able to either replace the soil or bring in new top soil.

The existing top layer of the soil on the lot comprised of construction debris: bricks and pieces of concrete and asphalt dominated the layer. Below this layer, we uncovered loamy fine sand on the western half of the lot. On the eastern half buried under the top layer of debris was a slab of concrete running almost the entire length of the lot. We used a jack hammer to drill holes to place soil and plant plugs in this area.

A ditch approximately 3' wide, 2' deep and 54' long (approximate volume = 2,400 gallons) was hand dug and planted with wetland species. At the north end of the ditch, we placed a perforated rain barrel as a "sump" connected to the series of rain barrels fed by the roof drain. Barrels are filled in series starting from the one closest to the roof drain. When all barrels are full, excess water is routed to the ditch. When the water reaches the maximum level inside the ditch, the float inside the sump triggers a shutoff valve, routing any additional excess water to drain directly into the original drain pipe connected to the sewer system.

Plant Species list:

Upland Species

- Big Bluestem (*Andropogon gerardii*)
- Blue Mistflower (*Eupatorium coelestinum*)
- Boneset (*Eupatorium perfoliatum*)
- Wild Bergamot (*Monarda fistulosa*)
- Spotted Beebalm (*Monarda punctata*)
- Switchgrass (*Panicum virgatum*)
- Orange Cone Flower (*Rudbeckia fulgida*)
- Broomsedge Bluestem (*Andropogon virginicus*)
- Indiangrass (*Sorghastrum nutans*)

Wetland Species

- New England Aster (*Aster novae-angliae*)
- New York Aster (*Aster novi-belgii*)
- Virginia Wild Rye (*Elymus virginicus*)
- Swamp-rose Mallow (*Hibiscus moscheutos*)
- Blue Flag (*Iris versicolor*)



Above: the site was infested with Mugworts nearly five feet high and strewn with trash. Below: after weeding, a ditch was dug out for a wetland. Holes on the left were dug with a jackhammer. Because of the location of the site, removal of the top layer of soils was not possible. Far left: the site was planted with all native species. Inside the ditch, wetland species were planted.





Above: 2" plugs were planted into holes with a mixture of native soil and mulch. The site was irrigated for several weeks. Below: by October, most plants were thriving. However, small patches of mugworts were also returning. The barrel in the middle is a sump that controls the flow of rainwater from the rain barrels outside the fence. Below right: after a rain, the ditch is filled with rainwater, which infiltrates into the ground. When the sump signals the maximum volume, a valve shuts off the flow to the sump and barrels begin to fill. When both the wetland and barrels are at capacity, the flow is diverted back to its original course (directly into the sewer system).



Soft Rush (*Juncus effusus*)
Cardinal Flower (*Lobelia cardinalis*)
Woolgrass (*Scirpus cyperinus*)
Common 3 Square (*Scirpus pungens*)

Maintenance

The District worked with the building's Tenants Association initially. Some residents were very interested in having garden. However, the building superintendent did not want to promote the use of the garden by the residents. He was concerned that residents would use the garden as an outdoor party space. The District will reach out to the CATCH, which owns and operates several other buildings in Central Harlem and create a gardening committee of residents from this as well as other buildings to ensure the site is maintained properly.

The District will be overseeing the maintenance at least in 2011, if not beyond. Invasives removal and mulching will be necessary for a few years until the native plants are well established.



Outreach and Education

Green Infrastructure Cost & Maintenance Workshop

In December, the District, in partnership with the Environmental Systems Management Program at Pratt Institute, hosted a four-hour workshop on Green Infrastructure Cost & Maintenance, geared towards practitioners of GI. The program featured three presentations followed by a moderated panel discussion. The presentations were:

- Linking the Economic Benefits of LID and Community Decision by Robert Roseen, University of New Hampshire Stormwater Center
- Leveraging Fees and Private Development to Install and Maintain LID in Public Space by Jeffrey Seltzer, District Department of Environment, Washington DC
- Green Infrastructure for Green Economies: How Infrastructure Supports Community Businesses, Create Green Jobs, and Build Local Support by Omar Freilla, Green Worker Cooperatives

The panel discussion was moderated by Aaron Koch from the Mayor's Office of Long Term Planning and Sustainability.

The workshop was attended by more than 50 people, who represented diverse professions: landscape architects, natural resources managers, engineers, project managers, educators and students among others. This workshop was the first of a series of GI workshops in partnership with Pratt Institute, which is developing a Green Infrastructure Certificate Program.

Stormwater Phase II Four-hour Construction Site Inspection Training

As part of the NPDES Stormwater Phase II regulations, the District has hosted training sessions for professionals responsible for inspecting construction site erosion and sediment control practices. The training is given by a CPESC who is authorized by the NYS Dept of Environmental Conservation and attendees receive certificates of training. The District has hosted public training sessions as well as private sessions in response to requests.



Above: the speakers from the Cost & Maintenance Workshop spoke about the need for more data on Green Infrastructure and opportunities for jobs for local residents. Below: educating the residents and the preschool families at West 834d Street was an important part of the project. The District developed a curriculum for the preschool teachers and offered a workshop for teachers.





New York City Soil & Water Conservation District

121 Sixth Avenue, Suite 501, New York, NY 10013

212.431.9676

www.nycswcd.net