

**National Fish and Wildlife Foundation
Closure Memo**

To: Jessica Lillquist
From: Claire Flynn
Date: January 2, 2018

Project: Green Infrastructure at Mamaroneck Town Center to Improve Water Quality in Long Island Sound (NY)
Number: 1401.15.049098
Grantee: Town of Mamaroneck

Project Description:

The Town of Mamaroneck installed 8,400 sq. ft. of green infrastructure at Mamaroneck Town Center (Center). The Center is situated less than ¼ miles from Mamaroneck Harbor with all stormwater from the site currently untreated.

Major activities included:

- 1) Installing 23,250 sq. ft. of permeable pavers, 2,044 sq. ft. of porous pavement in the parking lot, permeable pedestrian sidewalks, a rainwater harvesting system, a biofilter retention area, two raingardens, and eight catch basin filter baskets;
- 2) Monitoring project performance;
- 3) Providing public education about the project to 161,000 residents including: at Town Board meetings and work sessions, public meetings, community events, a ribbon cutting and press event to announce project completion, on public access television and in social and local media; and
- 4) Installing five signs that identify and explain green infrastructure benefits to hundreds of residents who visit this central municipal facility.

After project installation surface water from the entire property will flow through the green infrastructure reducing nutrient and sediment pollution into the Harbor and Long Island Sound.

Project partners include Town of Mamaroneck: Board, Engineer, Sustainability Coordinator, Sustainability Collaborative, Building Department, Highway Department; and Village of Mamaroneck Building Department, and Larchmont/Mamaroneck Coastal Zone Management Commission.

Final Products:

- **10 workshops, webinars, meetings**
 - o Grant workshop presented by the town - 2/24/15
 - The Town presented this workshop at the Town's Courtroom
 - o Sustainability collaborative meetings - 7/20/16 and 7/27/16
 - Town officials and the project's engineering design consultant presented proposed site improvements that addressed items described in the grant, including detailing where specific green infrastructure practices were intended to be installed
 - Attendees included: Town Administrator, Town Supervisor, Town Engineer, two members of the Town's design consultant team, and members of the Town's Sustainability Collaborative.

Commented [JL1]: No ribbon cutting, no press event

- The Town's Sustainability Collaborative members commented on practice application and placement, long term sustainability, landscaping, signage, parking, and non-motorized vehicle access
 - Town Board meetings with design sub-consultant present (3 total);
 - Town design consultant presented visual aids detailing where specific green infrastructure practices were intended to be installed, which were updated after the Town's Sustainability Collaborative
 - Project costs and available grant money also discussed
 - Supervisor shared project info at Westchester County Town Supervisor meetings (2 total)
 - Town Supervisor presented the project verbally, describing the project goal and construction progress at various times throughout the life of the project.
 - Specifically, the Supervisor presented the project to:
 - Westchester Municipal Officials Association (WMOA) executive committee on June 22, 2017 (25 or so elected and appointed officials at the meeting),
 - Westchester-Putnam Association of Town Supervisors (WPATS) twice in 2017 (approximately 12 Supervisors were present at each meeting),
 - Long Island Sound Study Citizens Advisory Committee (LISS CAC) twice in 2016 and twice in 2017 (approximately 35 CAC members were presented to),
 - 15 members of the Darien Garden Club on November 16, 2017 who visited the site and given a tour, and
 - Sustainable Westchester executive committee at various meetings (the meetings were held at the Town Center so the 8 to 10 attendees could witness the project in progress).
 - Supervisor updates at Town Board Meetings (more than 3 total)
 - Supervisor and the Town Administrator provided project information including; discussion of project progression, cost estimates, potential project alternatives, and distribution of the grant application to Board members; discussion of the total grant award and the types of infrastructure proposed on the site; awarding of the contract to the low bidder, and passage of a resolution to begin construction; status updates of construction; mentioning of the town center project in the Supervisor's state of the town report; and progression of paving, landscaping, and reason for work at the Town Center.

- **15,000 people targeted and 11,000 people with increased knowledge**

The Town reached out to residents via the Town website, e-mail blasts, and press releases (1, on November 12, 2015). The Town center shares its building with the police department, both of which are open for business week days with exception to national holidays. A central parking lot accommodates vehicle overflow giving additional exposure to people who wouldn't normally visit the police department or Town hall.

○ **7 website/social media tools**

The Town has used their website and Facebook page (which has 902 followers) to provide project information

○ Links to the Town of Mamaroneck Board meeting minutes are included below:

- <http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 10072015-218>
- <http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 01062016-149>
- <http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 11162016-233>
- <http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 12072016-242>

Commented [JL2]: A copy of the Facebook Post is included in the Addendum

- http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/_01092017-248
 - http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/_06212017-297
- Links to the Town of Mamaroneck Board meeting minutes are included below:
 - http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/_10072015-218
 - http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/_01062016-149
 - http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/_11162016-233
 - http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/_12072016-242
 - http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/_01092017-248
 - http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/_06212017-297
- The Town issued one (1) press release on November 12, 2015 describing the project. A copy of the press release has been included with this addendum.

Commented [JL3]: A copy of the press release is in the addendum

- **698,662 gallons treated or reduced and source of stormwater**

The porous asphalt pavement, porous pavers, bioretention, and dry swale and raingarden areas were considered in this calculation. A PDF of calculations has been provided with this addendum. The area of porous pavement (pavers) was reduced compared to what was included in the original proposal due to site constraints.

○ **4 rainbarrels and 2 raingardens installed**

- The raingarden section consists of 18" of bioretention type material on top of 12" of graded crushed stone that was enveloped in non-woven geotextile fabric. The raingarden on the north side of the site receives stormwater from paved surfaces via a meandering dry swale. The raingarden located north of the Municipal Center was not able to be constructed due to the cost exceeding the available local and grant funding amount. However, the Town has proposed to include landscaping in this area that will accept stormwater.
- Four rain barrels were positioned along the north side of the Municipal Center adjacent to existing gutter downspouts. Three rain barrels were designed to be larger and utilitarian while the fourth rain barrel was designed to be smaller and functional but primarily for demonstration purposes near the main entrance. Two of the larger utilitarian rain barrels were removed from the contract due to the cost exceeding the available funding amount.
 - Two different types of rain barrels were installed on the site, one to the west and one to the east of the building's main entrance. The first, 50 gallon rain barrel installed to the west of the main entrance is smaller, has a decorative appearance, and is view for use as a demonstration for Town residents. The second, 350 gallon rain barrel installed to the east of the main entrance is larger, has a utilitarian appearance, and is adjacent to a pedestrian walkway to the back side of the building.
 - Both rain barrels have water spigots on the bottom for watering of flower beds. No pumps are provided with the rain barrels but their positioning is higher in elevation compared to the existing flower beds. Existing downspouts were modified to direct rain water into the barrels. Overflow piping prevents the rain barrels from overflowing. A diverter at the downspouts allows stormwater to be redirected away from the rain barrels during winter months.
- The area of porous pavement (pavers) was reduced compared to what was included in the original proposal due to site constraints. The western side of the site is heavily vegetated with trees and leaf litter that would eventually

clog pores and voids of porous pavements. Additionally, the maximum grade of porous pavement is 5% but the existing grade is approximately 9%. A portion of the pedestrian walkway around the east side of the building was designed with conventional asphalt but was changed after construction bidding because the installed price for pavers versus asphalt was approximately the same. Although this addition was included after bidding, the total area was lower than what was estimated during the grant proposal writing.

- Seven (7) inlet filters were installed at existing drainage structures within conventional asphalt pavement. Due to the overall bid prices for the project no federal funds could be used for the installation of the inlet filters. The federal funds were applied toward the bioretention area, porous pavement, rain garden, and porous (permeable) pavers. The cost for the inlet filters had to be included under the Town's matching share.

- **6 educational signs installed**

- Five (5) storm water management practice signs were installed adjacent to the raingarden, bioretention, porous pavement, and dry swale areas, and for the rainbarrel. One (1) green infrastructure sign, containing pictures and descriptions of each practice has been design and will be placed outside of the main entrance to Town hall.
- Strategic placement of signs included:
 - A smaller sized parking lot, located in front of the Town Center, positions visitors on or immediately adjacent to the porous pavement, rain garden, porous pavers, and rain barrels.
 - The central parking lot, located on the western side of the site, requires people to walk past the bioretention area, porous pavers, catch basin inlet inserts, and a rain barrel on their way into the Town Center's main entrance.
 - Town residents accessing the police department typically park in the central parking lot previously mentioned and are exposed to the bioretention area and porous pavers.
 - Signs, which identify each practice, have been installed immediately adjacent to each element.
 - Additionally, visitors walk over top of or near these elements on their way into the Town Center's main entrance or police department entrance.
 - One (1) large sign, describing all of the employed practices and their benefits, has been designed (under a different contract) and will positioned outside of the main entrance to the Town Center. This sign, and other general site signs not specific to green infrastructure, are going to be installed this coming spring. The size of the sign is 4' wide by 2.5' tall.

- **5 monitoring programs established or underway**

The Town will monitor the post construction functionality of the green infrastructure practices. Rain barrels will be drained prior to winter and inlet valves diverted to prevent inflow of storm water during winter months. Catch basin inlet filters will be inspected and cleaned twice per year. Porous asphalt pavement, porous pavers, bioretention, and raingarden areas will be inspected after rainfall events to ensure absorption of stormwater

- **279.60 lbs of floatable debris prevented from entering system**

- Seven (7) filters were installed in areas of conventional pavement. The Town has installed inlet filters throughout the Town and observed the proportion of solids to floatables as 80% to 20%. Filters will be cleaned twice per year. The target value was 319.60 lbs.

- Seven (7) inlet filters were installed at existing drainage structures within conventional asphalt pavement. Due to the overall bid prices for the project no federal funds could be used for the installation of the inlet filters. The federal funds were applied toward the bioretention area, porous pavement, rain garden, and porous (permeable) pavers. The cost for the inlet filters had to be included under the Town's matching share.
- **2,044 sq. ft. porous pavement in parking lot, permeable pedestrian sidewalks, rainwater harvesting system, biofilter retention area, 2 rain gardens, eight basin filter baskets**
 - o Porous asphalt pavement (approximately 2,200 square feet) was installed in locations that were feasible. Steep parking lot grades and areas that would receive heavy leave litter were avoided to ensure a high probability of success over the long term. Installation of porous asphalt pavement to accommodate parking for 11 vehicles.
 - o Approximately 4,950 square feet of porous pavers were installed around the site. The specific product used is PaveDrain (<http://www.pavedrain.com/>) and it was installed around the north, west, and east sides of the building.
 - o With exception to the sidewalk from Boston Post Road to the southeast side of the porous asphalt pavement, the pedestrian walkways within the project site was constructed with porous pavers (approximately 2,200 square feet). A large area of pedestrian walkway around the eastern side of the Municipal Center, originally proposed to receive conventional asphalt pavement, was revised during the bid analysis period to also include porous pavers and the above mentioned section (target goal was 26,656 sq ft impervious surface removed).
 - o Porous pavers replaced the existing concrete sidewalk and asphalt walkways that that were around the building. No porous pavers were installed in locations where detectable warning units were placed. Concrete panels were installed around the detectable warning units for easier installation and long term durability. The overall area of pedestrian walkway was reduced (still a 5 ft. minimum though) but access to all existing entrances and exits were maintained.
 - o Areas included in the impervious surface removal calculation are: existing conventional asphalt pavement that has been replaced by porous asphalt pavement; existing sidewalk and pedestrian walkways that are now porous pavers; ground that was conventional asphalt but is now bioretention area; and ground that was conventional asphalt but is now grass. Of the areas previously mentioned, only the bioretention area and grass are vegetated.
 - o Plantings in the bioretention area include Fox Sedge, Buttonbush, Foamflower, Columbine, Northern Sea Oats, Spotted Geranium, Virginia Bluebells, Prairie Skies' Switchgrass, Big Bluestem, Arrowwood Viburnum, Spicebush, Hummingbird Dwarf Summersweet, and 'Goldsturm' Black Eyed Susan.
 - o Areas that were converted from asphalt to grass have had the pavement structure removed including the subbase and have received 3" of topsoil. The grass seed consists of a mix containing 33% bluegrass, 33% red fescue, and 32% perennial ryegrass. The remaining 2% contains inert matter and other non-weed seed.
 - o **1,965 sq ft of bioretention installed**
 - Bioretention areas were designed to receive stormwater from paved surfaces through curb cuts. The bioretention section consists of 48" of bioretention type (sand and organics, trace clay) material on top of 12" of crushed uniformly graded stone that was enveloped in non-woven geotextile fabric. Three relatively smaller bioretention areas were not able to be constructed

Commented [JL4]: Pictures included in addendum

due to the cost exceeding the available local and grant funding amount (target value was 8,400 sq ft).

- Four bioretention areas were design but only one large one was installed during construction due to complaints that parking spaces were going to be eliminated. The bioretention area installed has an area of 1,965 square feet.
- **Green Infrastructure:** Original target value: 8,400 square feet; Actual value: 8,185 square feet
 - The total area of green infrastructure installed is 8,185 square feet (585 sf. rain garden + 2,200 sf. porous asphalt + 4,950 sf. permeable pavers + 450 sf. of roof area directed to rain barrels.
- **Original target value: 26,656 square feet; Actual value: 8,550 square feet**
 - The language in the original grant request described implementation of porous asphalt over a larger portion of the project site. During final design, the design consultant informed the Town that porous asphalt exposed to heavy leaf or grass clipping litter, located steeper grades, exposed to offsite sources of sediment laden stormwater, or exposed to a high volume of turning vehicles would have a high probability of failure. It was recommended that porous asphalt pavement only be installed in areas that had a high probability of success.
 - In exchange, a larger area of conventional sidewalk/pavement, used as pedestrian walkway, was converted to impervious ground with porous pavers.
 - Additionally, stormwater from a portion of asphalt on the north side of the building (approximately 6,930 square feet) was directed into a meandering dry swale and rain garden that would allow for treatment and infiltration and asphalt on the west side of the site (approximately 11,830 square feet) was directed into the bioretention area that would allow for treatment and infiltration.
 - Approximately 585 square feet of rain garden has been installed. The plants installed are as follows: Serviceberry, Dwarf Fountain Grass, Purple Dome Aster, Double Purple Coneflower, Happy Returns Daylily, Sweet William Dianthus, Isanti Red Twig Dogwood, Gro-Low Fragrant Sumac.
 - Approximately 115 ft. of dry swale was installed. The dry swale accepts concentrated curb stormwater flow on the upstream side and connects to a rain garden on the downstream side. The dry swale acts as pretreatment for the rain garden. The approximate area of dry swale is 330 square feet. The detail below show the dry swale.
- **1.55 acres under BMP**

Target value was 3.32 acres.
- **6 trees planted**

In addition to the 6 trees, the following were also planted: 5 deciduous shrubs and 495 herbaceous plants. These plants were installed in the raingarden and bioretention areas.

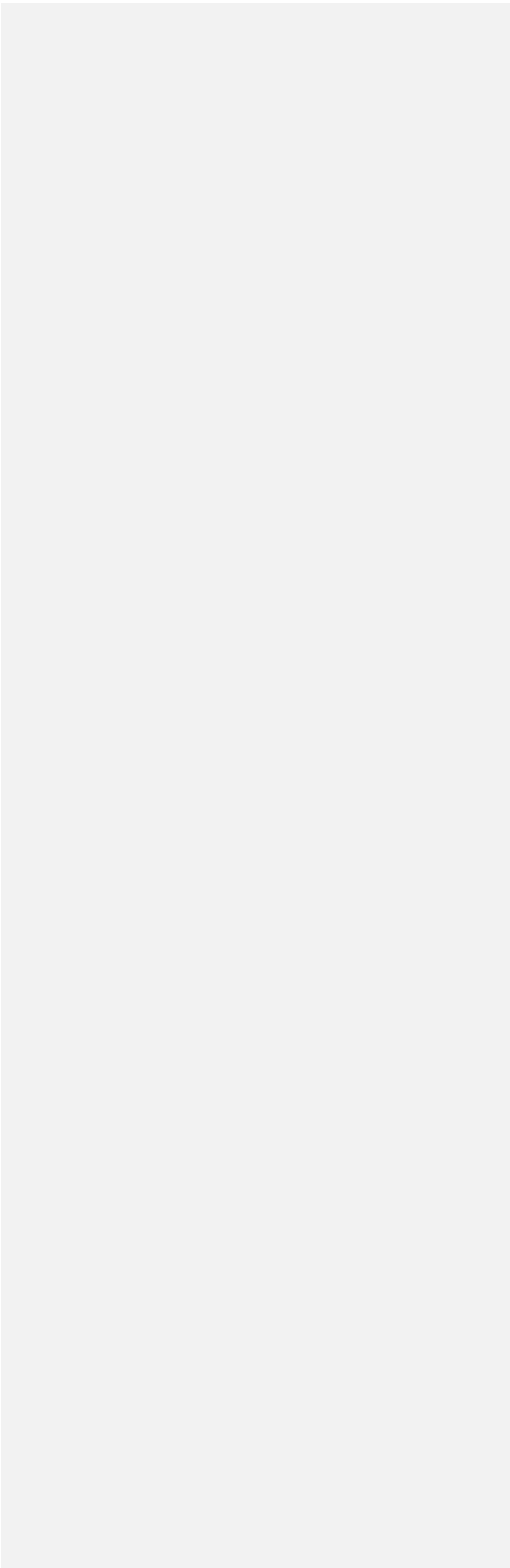
NFWF award: \$149,876

NFWF funds spent: \$149,876

Match requirement: \$431,634

Match spent: \$550,900.82 (NonFed)

I recommend closing this grant.



ADDENDUM TO THE FINAL PROGRAM REPORT

49098 Green Infrastructure at Mamaroneck Town Center to Improve Water Quality in Long Island Sound (NY), Town of Mamaroneck

Instructions: Thank you for your final project report. We would appreciate receiving more detail about elements of this interesting project. Please respond to the questions which follow below and provide this additional reporting to Claire.Flynn@nfwf.org.

1. The final report metrics indicate that ten workshops, webinars and meetings were conducted associated with project delivery specifically:

- Grant workshop 2/24/2015. Did the Town present this workshop or was this the National Fish and Wildlife Foundation grant workshop? [The Town presented this workshop in the Town's Court Room](#). If yes the NFWF workshop it should not be counted towards the total of meetings conducted under this grant.
- Two sustainability collaborative meetings - 7/20/16 and 7/27/16. Please describe the purpose of these meetings, who attended and number of attendees? [The Town of Mamaroneck and their engineering design consultant presented proposed site improvements that addressed items described in the grant. Attendees of the meeting included, the Town Administrator, Town Supervisor, Town Engineer, two members of the Town's design consultant team, and members of the Town's Sustainability Collaborative. At each meeting there were approximately 9 to 12 attendees. The Town's design consultant prepared visual aids depicting where specific green infrastructure practices were intended to be installed. The Town's Sustainability Collaborative members commented on practice application and placement, long term sustainability, landscaping, signage, parking, and non-motorized vehicle access.](#)
- Three Town Board Meetings involving the design sub-consultant. Discuss what was presented to the Town Board by the design sub-consultant? [The Town's design consultant presented the same visual aids described above. It should be noted that the visual aids were updated after discussions with the Town's Sustainability Collaborative. Additional items presented/discussed were project costs and grant money available.](#)
- Three Supervisor updates at Town Board meetings.
 - Were the three supervisor updates at the same 3 Town Board Meetings or 3 different Town Board Meetings? Is there double-counting of Board Meeting presentations? [The Supervisor and the Town Administrator discussed the Town Center parking lot project in at least six \(6\) different Town Board meetings between 2015 and 2017, specifically, 10/7/2015, 1/6/2016, 11/16/2016, 12/7/2016, 1/9/2017, and 6/21/2017. Links to the Town of Mamaroneck Board meeting minutes are included below:](#)

<http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 10072015-218>
<http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 01062016-149>

<http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 11162016-233>
<http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 12072016-242>
<http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 01092017-248>
<http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 06212017-297>

- Links to the Town of Mamaroneck Board meeting minutes are included below:

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<http://www.townofmamaroneck.org/AgendaCenter/ViewFile/Minutes/ 06212017-297>

- What information did the Supervisor updates provide about the project to the Town Board? The Supervisor and the Town Administrator provided project information at the board meetings including; discussion of project progression, cost estimates, potential project alternatives, and distribution of the grant application to Board members; discussion of the total grant award and the types of infrastructure proposed on the site; awarding of the contract to the low bidder, and passage of a resolution to begin construction; status updates of construction; mentioning of the town center project in the Supervisor's state of the town report; and progression of paving, landscaping, and reason for work at the Town Center.
- Two Westchester County Town Supervisor meeting presentation by the Mamaroneck Town Supervisor. What information did the Supervisor updates provide about the project to the other Town Supervisors? The Town Supervisor presented the project verbally, describing the project goal and construction progress at various times throughout the life of the project. Specifically, the Supervisor presented the project to:
 - the Westchester Municipal Officials Association (WMOA) executive committee on June 22, 2017 (25 or so elected and appointed officials at the meeting),
 - the Westchester-Putnam Association of Town Supervisors (WPATS) twice in 2017 (approximately 12 Supervisors were present at each meeting),
 - the Long Island Sound Study Citizens Advisory Committee (LISS CAC) twice in 2016 and twice in 2017 (approximately 35 CAC members were presented to),
 - 15 members of the Darien Garden Club on November 16, 2017 who visited the site and given a tour, and
 - the Sustainable Westchester executive committee at various meetings (the meetings were held at the Town Center so the 8 to 10 attendees could witness the project in progress).
- 2. **The original project proposal indicated public education about the project would be offered to 161,000 residents via public meetings, community events, a ribbon cutting, at a press event to announce project completion, and on public access television.**
- Beyond what was described in question #1, provide specific detail about how information was shared with the public in each of these forums i.e., public meetings, community events, ribbon cutting, press event announcement, and public access TV. [Information at](#)

public meetings was presented to the public/board members/town staff/sustainability collaborative verbally and with demonstration boards. The initial meetings presented alternatives that could be employed and collectively as a group the final alternative was selected which aligned with grant requirements and town funding. Representatives of the Darien Garden Club and the Center of the Urban River at Beczak (see email attachments) were introduced to the Town Supervisor. The Center of the Urban River at Beczak (CURB) is an environmental nonprofit group in Yonkers, NY who looks for opportunities to implement green infrastructure projects. It is a working field station and lab that supports academic research, environmental monitoring, and citizen science programs focused on the Hudson River and urban watersheds. No other outlets have been utilized to disperse information.

- Discuss the type of people engaged/educated (residents, students etc.) and/or target audiences and approximate number of people who were reached by this public education? Primarily, residents doing business at the Town Center and/or Police Department will be exposed to the new infrastructure. The parking lot is also utilized by town residents on weekends who have children participating in a youth soccer league. Parking is at a premium in the village so the Town has granted access to their parking lot for these types of occasions. Although a fence restricts points onto the field, which is located immediately adjacent to the parking lot improvements, the entire parking lot capacity is almost always utilized. Although it is unlikely that these parking lot users will see the sign at the main entrance, they still will be exposed to the other smaller signs that are positioned in front of each practice. CURB provides an opportunity for students who participate at Sarah Lawrence College the ability to focus on ways to improve water quality in urban environments.
- 3. The final report indicates there was outreach to 15,000 people to increase knowledge about the project via the Town website, email blasts, and press releases. It also states people were exposed to the project because of their visits to the police department and because of their use of the central parking lot.**
- Please provide the link to the Town website showing the link to information about the project? Links are provided in the fourth bullet of item one (see above). These links are for Town Board and Sustainability Collaborative meeting minutes.
 - How many email blasts were sent out regarding the project? How many people received the emails? Who were the recipients of the email? With exception to site visit coordination emails between the Town Supervisor, the Darien Garden Club, and the representative from the environmental non-profit group no other emails were distributed about the project. No email blasts were distributed.
 - Discuss how people were exposed to the project during their visits to the police department and use of the central parking lot? For example give more information about strategic placement of the signs to engage/education the most people relative to the police department and central parking lot? A smaller sized parking lot, located in front of the Town Center, positions visitors on or immediately adjacent to the porous pavement, rain

garden, porous pavers, and rain barrels. The central parking lot, located on the western side of the site, requires people to walk past the bioretention area, porous pavers, catch basin inlet inserts, and a rain barrel on their way into the Town Center's main entrance. Town residents accessing the police department typically park in the central parking lot previously mentioned and are exposed to the bioretention area and porous pavers. Signs, which identify each practice, have been installed immediately adjacent to each element. Additionally, visitors walk over top of or near these elements on their way into the Town Center's main entrance or police department entrance. One (1) large sign, describing all of the employed practices and their benefits, has been designed (under a different contract) and will be positioned outside of the main entrance to the Town Center. This sign, and other general site signs not specific to green infrastructure, are going to be installed this coming spring. The size of the sign is 4' wide by 2.5' tall.

- How many press releases were issued about the project and to what media and community outlets? Please do not cite the Long Island Sound Study press release in your description. This was not produced by the Town as part of the project. The Town issued one (1) press release on November 12, 2015 describing the project. A copy of the press release has been included with this addendum.
- 4. **Use of Social Media. The final report indicates the Town use Facebook to inform residents about the project.**
 - How many followers does the Facebook page engage from the community? What type of information about the project was posted on Facebook? There are 902 followers of the Town's Facebook page. The initial post mentioned the grant money awarded to the Town and a link to the LISS website. A copy of the post has been provided with this addendum.
- 5. **The original proposal stated that the following green infrastructure would be installed... 1) 23,250 sq. ft. permeable pavers, 2) 2,044 sq. ft. of porous pavement in the parking lot, 3) permeable pedestrian sidewalks, 4) a rainwater harvesting system, 5) a biofilter retention area, 6) 2 rain gardens, and 7) eight catch basin filter baskets.**

The final report states:

- Porous asphalt was installed in the vehicle parking area. How much (sq. ft.) of porous asphalt was installed? Approximately 2,200 square feet of porous asphalt pavement was installed on site. The porous asphalt was installed only in an area that had the greatest possibility of success, specifically, it was not on a steep grade and would not be exposed to heavy leaf litter.
- Porous pavers installed? How much (sq. ft.) of porous pavers was installed? Where were these pavers installed? Were they installed as pedestrian sidewalks? If not, discuss why sidewalks were not installed? Approximately 4,950 square feet of porous pavers were installed around the site. The specific product used is PaveDrain (<http://www.pavedrain.com/>) and it was installed around the north, west, and east

sides of the building. A few pictures have been shown below which show the product installed.

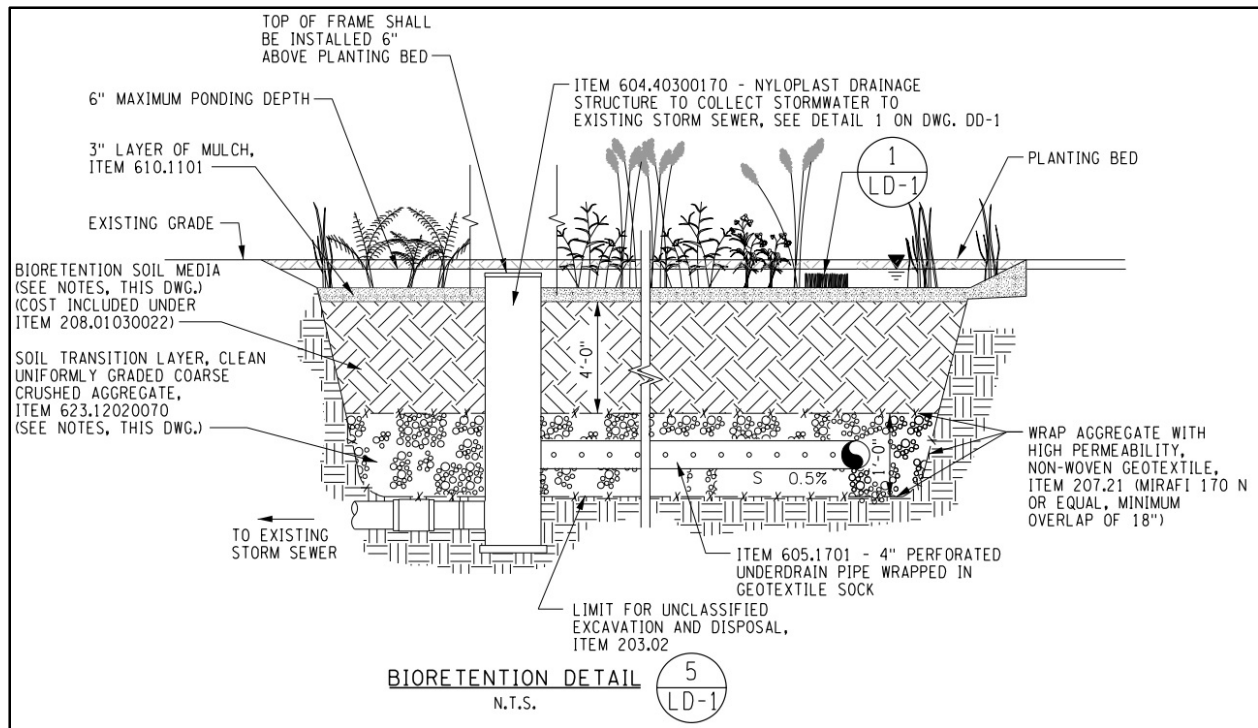


The porous pavers replaced the existing concrete sidewalk and asphalt walkways that were around the building. No porous pavers were installed in locations where detectable warning units were placed. Concrete panels were installed around the detectable warning units for easier installation and long term durability. The overall area of pedestrian walkway was reduced (still a 5 ft. minimum though) but access to all existing entrances and exits were maintained.

- 8,550 sq. ft. impervious surface removed with porous asphalt installed. What is now in place where impervious surface removed but no porous asphalt? Vegetation? Bare ground? If vegetation what type (native plants)? Areas included in the impervious surface removal calculation are: existing conventional asphalt pavement that has been replaced by porous asphalt pavement; existing sidewalk and pedestrian walkways that are now porous pavers; ground that was conventional asphalt but is now bioretention area; and ground that was conventional asphalt but is now grass. Of the areas previously mentioned, only the bioretention area and grass are vegetated. Plantings in the bioretention area include Fox Sedge, Buttonbush, Foamflower, Columbine, Northern Sea Oats, Spotted Geranium, Virginia Bluebells, Prairie Skies' Switchgrass, Big Bluestem, Arrowwood Viburnum, Spicebush, Hummingbird Dwarf Summersweet, and 'Goldsturm' Black Eyed Susan. Areas that were converted from asphalt to grass have had the pavement structure removed including the subbase and have received 3" of topsoil. The grass seed consists of a mix containing 33% bluegrass, 33% red fescue, and 32% perennial ryegrass. The remaining 2% contains inert matter and other non-weed seed.
- Original target value for impervious surface removal was 26,656. 8,550 removed is a significant reduction. Discuss the reason for this reduction? The language in the original grant request described implementation of porous asphalt over a larger portion of the project site. During final design, the design consultant informed the Town that porous asphalt exposed to heavy leaf or grass clipping litter, located steeper grades, exposed to offsite sources of sediment laden stormwater, or exposed to a high volume of turning vehicles would have a high probability of failure. It was

recommended that porous asphalt pavement only be installed in areas that had a high probability of success. In exchange, a larger area of conventional sidewalk/pavement, used as pedestrian walkway, was converted to impervious ground with porous pavers. Additionally, stormwater from a portion of asphalt on the north side of the building (approximately 6,930 square feet) was directed into a meandering dry swale and rain garden that would allow for treatment and infiltration and asphalt on the west side of the site (approximately 11,830 square feet) was directed into the bioretention area that would allow for treatment and infiltration.

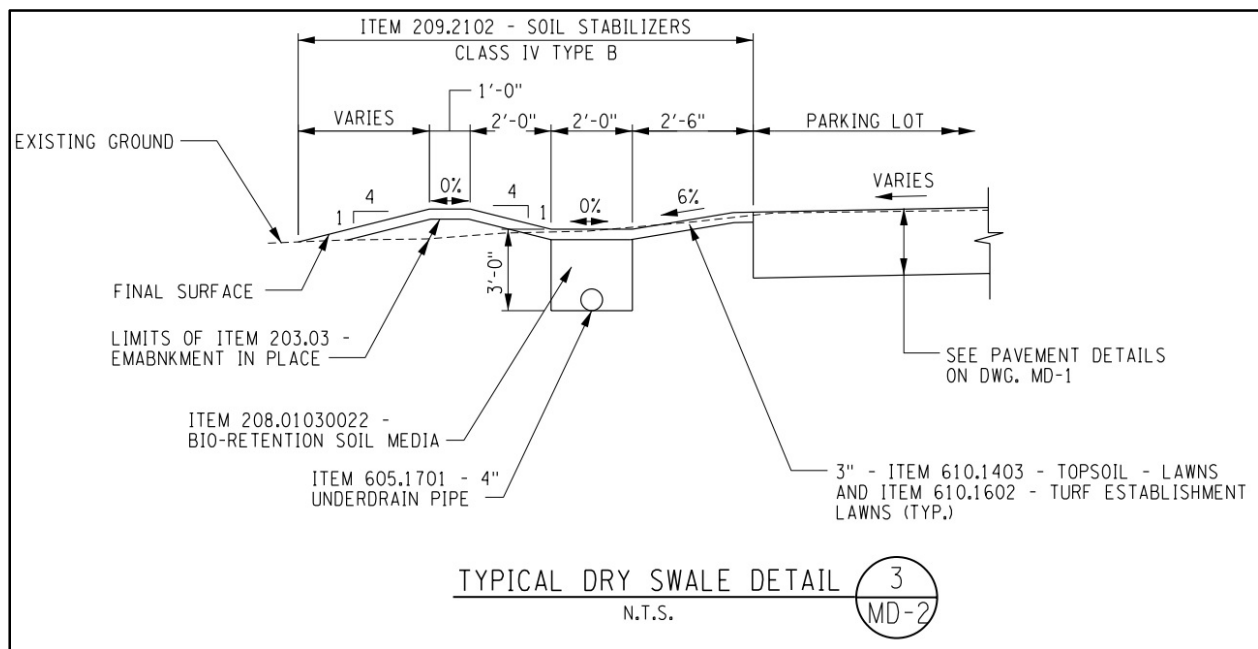
- Bioretention areas were designed to receive stormwater from paved surfaces through curb cuts. How much (sq. ft.) of bioretention area was installed? The metrics section states 1,965 sq. ft.? How many bioretention areas were installed (4?)? Four bioretention areas were design but only one large one was installed during construction due to complaints that parking spaces were going to be eliminated. The bioretention area installed has an area of 1,965 square feet.
- Describe what is meant by bioretention area in more detail? A traditional green infrastructure bioretention area captures and treat stormwater, allowing the water to filter through soil and vegetation with some designed with an underdrain to connect to a storm drain system. The retained runoff allows heavier sediments to fall to the bottom of the basin where it is filtered by plants, natural decomposition, and evapotranspiration. Further filtering takes place as the runoff slowly seeps through the underlying soils before reaching groundwater. In addition, there are often native plants installed in and around the basin native to this area with filtering capabilities, and to attract birds, butterflies and wildlife. Describe these bioretention areas in similar terms? The bioretention area designed and included in the plans was in accordance with the detail shown below. Stormwater from pavement areas is directed into this bioretention area via curb cuts. The back side of the curb cuts have been stabilized with crushed stone to reduce the velocity of the stormwater entering the bioretention area. Plantings (described in the third bullet of #5) and mulch have been placed on top of a deep soil media that will filter out impurities from the stormwater. Situated below the soil media is a 12" deep section of stone with underdrain piping connecting to a Nyloplast (plastic) drainage structure. The Nyloplast structure is connected to the existing stormwater drainage system already on site. Additionally, the Nyloplast structure has a grate that acts as an over flow during larger storm events.



- One rain garden installed to receive stormwater overflow from rooftop gutters and dry swale. How much (sq. ft.) of rain garden was installed? Were native plants used in the rain garden? Provide a list of the plantings used in the rain garden?

Approximately 585 square feet of rain garden has been installed. The plants installed are as follows: Serviceberry, Dwarf Fountain Grass, Purple Dome Aster, Double Purple Coneflower, Happy Returns Daylily, Sweet William Dianthus, Isanti Red Twig Dogwood, Gro-Low Fragrant Sumac.
- One dry swale was installed. How much (sq. ft.) of dry swale was installed? Describe in more detail what is meant by a dry swale? What is its purpose?

Approximately 115 ft. of dry swale was installed. The dry swale accepts concentrated curb stormwater flow on the upstream side and connects to a rain garden on the downstream side. The dry swale acts as pretreatment for the rain garden. The approximate area of dry swale is 330 square feet. The detail below show the dry swale.



- Two rain barrels installed? Where were the rain barrels installed? Why were they installed at those locations? What is the capacity of the rain barrels to harvest water? How is the Town using the harvested rainwater? Two different types of rain barrels were installed on the site, one to the west and one to the east of the building's main entrance. The first, 50 gallon rain barrel installed to the west of the main entrance is smaller, has a decorative appearance, and is view for use as a demonstration for Town residents. The second, 350 gallon rain barrel installed to the east of the main entrance is larger, has a utilitarian appearance, and is adjacent to a pedestrian walkway to the back side of the building. Both rain barrels have water spigots on the bottom for watering of flower beds. No pumps are provided with the rain barrels but their positioning is higher in elevation compared to the existing flower beds. Existing downspouts were modified to direct rain water into the barrels. Overflow piping prevents the rain barrels from overflowing. A diverter at the downspouts allows stormwater to be redirected away from the rain barrels during winter months.
- Seven inlet filters installed in areas of conventional pavement. Were these inlet filters installed with funds from this project? If yes, describe the purpose of the inlet filters within the larger project. It appears these were catch basin filter inserts? If not, why were catch basin filter inserts not installed? Seven (7) inlet filters were installed at existing drainage structures within conventional asphalt pavement. Due to the overall bid prices for the project no federal funds could be used for the installation of the inlet filters. The federal funds were applied toward the bioretention area, porous pavement, rain garden, and porous (permeable) pavers. The cost for the inlet filters had to be included under the Town's matching share.
- The Town integrated eight different green infrastructure practices. Please list the eight green infrastructure practices installed? The number of practices was

incorrectly stated in the Final Program Report. The following green infrastructure practices have been installed on the site.

- Rain Garden
- Rain Barrels
- Porous Pavement
- Bioretention area, porous pavers, dry swale, and reduction of impervious sidewalk areas were incorrectly included in the original count.
- Provide a total of the square footage of green infrastructure installed? The original projected amount to be installed was to be 8,400 sq. ft. The total area of green infrastructure installed is 8,185 square feet (585 sf. rain garden + 2,200 sf. porous asphalt + 4,950 sf. permeable pavers + 450 sf. of roof area directed to rain barrels.

6. Please provide the calculations used to establish the stormwater reduction of 283,302 gallons of stormwater reduced for all practices. The original proposal stated a reduction of 698,662 gallons. Discuss in detail why the significant reduction in volume of stormwater reduced? A PDF of calculations has been provided with this addendum.

The area of porous pavement (pavers) was reduced compared to what was included in the original proposal due to site constraints. The western side of the site is heavily vegetated with trees and leaf litter that would eventually clog pores and voids of porous pavements. Additionally, the maximum grade of porous pavement is 5% but the existing grade is approximately 9%. A portion of the pedestrian walkway around the east side of the building was designed with conventional asphalt but was changed after construction bidding because the installed price for pavers verses asphalt was approximately the same. Although this addition was included after bidding, the total area was lower than what was estimated during the grant proposal writing.

November 12, 2015

Contact: Mamaroneck Town Supervisor Nancy Seligson (914) 381-7805

FOR IMMEDIATE RELEASE

Mamaroneck Town Awarded Grant to Improve Water Quality

Mamaroneck, NY - The Town of Mamaroneck was awarded a Long Island Sound Futures Fund Grant to implement green infrastructure in the renovation of the Town Center parking lot. The \$150,000 grant will be applied to the total project cost and will enable the Town to include permeable pavement, rainwater harvesting, a biofilter, two raingardens and eight catch basin filters in the renovations. These improvements will reduce and improve the water quality of the stormwater runoff from the Town Center running into Mamaroneck Harbor.

Mamaroneck Town Center is across the Boston Post Road from Harbor Island Park and just 800 feet from the West Basin of Mamaroneck Harbor. As such, all of the stormwater runoff from the site travels directly to the Harbor untreated. Mamaroneck Harbor does not meet New York State designated water quality standards. Town Supervisor, Nancy Seligson felt it was critical to retrofit the Town Center parking lot with green infrastructure during renovation if possible. "Mamaroneck has been a leader in environmental initiatives and this was an opportunity to improve water quality in Mamaroneck Harbor." Town Administrator Steve Altieri added, "The time to implement these green infrastructure retrofits is during construction, so this grant is very timely."

The Town Center serves as the community's government center and police station. The Town's municipal offices and public service departments are housed here. Portions of the facility's infrastructure are in serious disrepair and in need of improvement. Without this grant money, the Town would not have had the necessary funds to implement the green infrastructure elements into the renovations.


The Town of Mamaroneck's residents frequent the Town Center to apply for permits, attend meetings, pay taxes, attend court, register for recreational programs and more. The Town looks forward to informing residents about the principles and practices of green infrastructure and explaining how this project's results will improve their quality of life with a harbor they can more fully enjoy.

###

Town of Mamaroneck Environmental Information

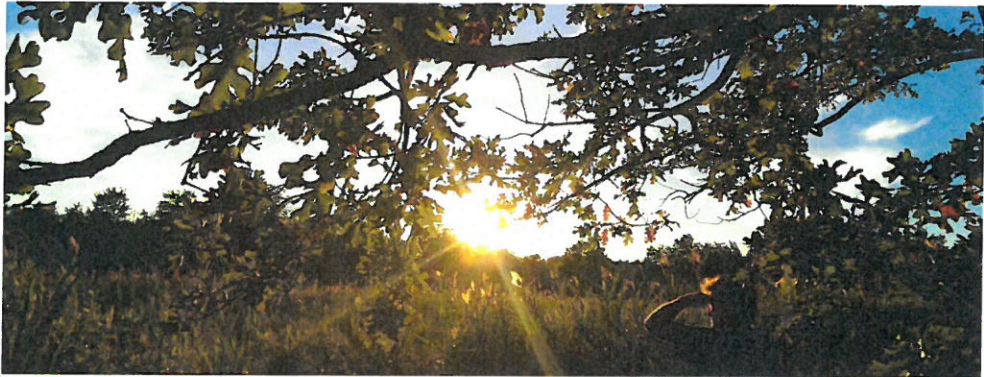
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Town of Mamaroneck Environmental Information
Published by Nancy Seligson · November 12, 2015 ·

Mamaroneck, New York
Mamaroneck Town Awarded Grant to Improve Water Quality!
We were awarded a Long Island Sound Futures Fund Grant to implement green infrastructure in the renovation of the Town Center's parking lot. The exciting details available at 12noon!
[#LongIslandCleanWater http://longislandsoundstudy.net/.../our-miss.../management-plan/](http://longislandsoundstudy.net/.../our-miss.../management-plan/)





The Comprehensive Conservation and Management Plan « Long Island Sound Study
The Comprehensive Conservation and Management Plan « Long Island Sound Study

39 people reachedBoost Post

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1

Write a comment...



Town of Mamaroneck Environmental Information added 3 new photos.
Published by Sue Broslaw Odierna · November 17, 2016 ·

On Monday, top federal and state environmental officials including EPA Regional Administrator Judith Enck announced 25 grants totaling \$1.3 million to local government and community groups in NY and CT to improve

green infrastructure

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Chat (6)

https://www.facebook.com/pg/townofmamaroneckenvironment/posts/?ref=page_internal

1/10/2018

the health of Long Island Sound. The grant program combines funds from the EPA, the National Fish and Wildlife Foundation (NFWF) and the U.S. Fish and Wildlife Service and is funded through the Long Island Sound Futures Fund. #acleanersound Town Supervisor Nancy Seligson hosted the event at Town Center. Last year's recipients of this grant program included the Town for \$150,000 for the installation of green infrastructure as part of a comprehensive reconstruction of the Town Center Parking Lot to be completed in 2017.



59 people reached

Boost Post

3

Top Comments



Write a comment...



Lynn Dwyer Great work Town of Mamaroneck a leader on Green Infrastructure to help Long Island Sound.

1

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Town of Mamaroneck Environmental Information

Published by Nancy Seligson · November 12, 2015 ·

November 12, 2015

Mamaroneck Town Awarded Grant to Improve Water Quality

#Mamaroneck, NY - The Town of Mamaroneck was awarded a Long Island Sound Futures Fund Grant to implement green infrastructure in the renovation of the Town Center parking lot. The \$150,000 grant will be applied to the total project cost and will enable the Town to include permeable pavement, rainwater harvesting, a biofilter, two raingardens and eight catch basin filters in the renovations. These improvements will reduce and improve the water quality of the stormwater runoff from the Town Center running into Mamaroneck Harbor. See full length press release at <https://www.townofmamaroneck.org/sustainability>



Town of Mamaroneck NY |

Welcome to the new and updated Town of Mamaroneck website. I hope that you find it helpful, interesting, attractive and easy to use. Many stakeholders contributed to the new website. More and new information should be easier to find on the

TOWNOFMAMARONECK.ORG

36 people reached

Boost Post

1

Chat (6)

Peter J. Christiano

From: Odierna, Sue <SOdierna@TownofMamaroneckNY.org>
Sent: Thursday, February 16, 2017 4:24 PM
To: Ryan Palmer; Seligson, Nancy
Cc: Seligson, Nancy
Subject: RE: Meeting on green infrastructure

Hi Ryan,

Thank you for your message.

I am responding on behalf of Nancy as she is away until February 24th. Nancy has two meetings on March 2nd during that time period and cannot make the Saw Mill River Summit.

How does the week after the Summit work for you?

Thank you,

Sue

Sue Odierna

Confidential Secretary to the Town Supervisor
and Sustainability Coordinator

Town of Mamaroneck
740 W. Boston Post Road
Mamaroneck, NY 10543
914.381.7816
sodierna@townofmamaroneckny.org

From: Ryan Palmer [<mailto:rpalmer@sarahlawrence.edu>]
Sent: Thursday, February 16, 2017 11:25 AM
To: Seligson, Nancy <Supervisor@TownofMamaroneckNY.org>
Cc: Odierna, Sue <SOdierna@TownofMamaroneckNY.org>
Subject: RE: Meeting on green infrastructure

Hi Nancy,

The week of the 27th I'll be pretty tied up making last minute preparations for a Saw Mill River Summit we're hosting on the 2nd. Perhaps you'd like to join? See attached.

Ryan

From: Seligson, Nancy [<mailto:Supervisor@TownofMamaroneckNY.org>]
Sent: Wednesday, February 15, 2017 9:54 PM

To: Ryan Palmer <rpalmer@sarahlawrence.edu>
Cc: Odierna, Sue <SOdierna@TownofMamaroneckNY.org>
Subject: RE: Meeting on green infrastructure

Dear Ryan:

Thanks for your email. Nice to "e" meet you. I'm trying to engage two other people to join us, but don't have commitments from them yet. I', traveling for the next week and a half. Let's connect the week of Feb. 27th.

Nancy Seligson

Nancy Seligson

Supervisor, Town of Mamaroneck
740 West Boston Post Road
Mamaroneck, NY 10543
(914) 381-7805
supervisor@townofmamaroneckny.org

From: Ryan Palmer [<mailto:rpalmer@sarahlawrence.edu>]
Sent: Wednesday, February 08, 2017 1:33 PM
To: Laura Rossi <lrossi@wcf-ny.org>; Seligson, Nancy <Supervisor@TownofMamaroneckNY.org>
Cc: Tara Seeley <tseeley@wcf-ny.org>
Subject: RE: Meeting on green infrastructure

Thank you Laura and Tara.

And nice to e-meet you Nancy. I've been meaning to get in touch so this is timely. I met with Bob Elliot a few weeks back and he said he'd introduce us so we could talk about the water working group of Sustainable Westchester. Must have slipped his mind!

I'd be happy to meet sometime soon.

Looking forward,

Ryan Palmer
Director, Center for the Urban River at Beczak
Sarah Lawrence College
35 Alexander St., Yonkers, NY 10701

Office: (914) 377 - 1900 x15
Cell: (845) 849 - 4486
Email: rpalmer@sarahlawrence.edu

www.centerfortheurbanriver.org

From: Laura Rossi [<mailto:lrossi@wcf-ny.org>]
Sent: Wednesday, February 08, 2017 11:11 AM

To: Seligson, Nancy <Supervisor@TownofMamaroneckNY.org>; Ryan Palmer <rpalmer@sarahlawrence.edu>
Cc: Tara Seeley <tseeley@wcf-ny.org>
Subject: Meeting on green infrastructure

Dear Nancy and Ryan,

This is to introduce you to one another.

Ryan, [Nancy Seligson](#) is the Supervisor of the Town of Mamaroneck and an expert on water, storm water, and green infrastructure. She has been actively involved with the Long Island Sound Study and is currently implementing a green infrastructure project in Mamaroneck.

Nancy, [Ryan Palmer](#) heads Beczak, an environmental nonprofit in Yonkers, which in 2013 launched CURB – the Center for Urban Rivers at Beczak. Ryan he is looking at opportunities to implement green infrastructure projects.

Tara and I think it would be mutually beneficial for you to meet one another to discuss water and green infrastructure work in your communities. We would welcome the opportunity to also learn about your current and potential initiatives with the goal of exploring opportunities to foster continued collaboration and learning on water-related issues in the region. We are happy to host at our offices Hartsdale.

If you are amenable, let us know and I will ask Connie of my office to reach out to you to schedule at a date and time that makes sense for all.

Best,

Laura

Laura Rossi, Esq.
Executive Director
Westchester Community Foundation
210 North Central Avenue Suite 310
Hartsdale, NY 10530
(914) 948-5166 Ext. 3
(914) 948-5197 (fax)
lrossi@wcf-ny.org
www.wcf-ny.org

Always connect.

Peter J. Christiano

From: Odierna, Sue <SOdierna@TownofMamaroneckNY.org>
Sent: Monday, November 13, 2017 5:45 PM
To: 'Lesley Sandison'
Cc: Seligson, Nancy
Subject: RE: Darien Garden Club Conservation

You are most welcome.

Have a nice evening.

Sue Odierna

Confidential Secretary to the Town Supervisor
and Sustainability Coordinator

Town of Mamaroneck
740 W. Boston Post Road
Mamaroneck, NY 10543
914.381.7816
sodierna@townofmamaroneckny.org

From: Lesley Sandison [mailto:lesleysandison66@gmail.com]
Sent: Monday, November 13, 2017 5:43 PM
To: Odierna, Sue <SOdierna@TownofMamaroneckNY.org>
Subject: Re: Darien Garden Club Conservation

Fantastic, thanks Sue.

Regards,
Lesley

On Nov 13, 2017, at 5:39 PM, Odierna, Sue <SOdierna@TownofMamaroneckNY.org> wrote:

Hi Lesley,

Thursday works for 2:30pm. You can come to the address below, 2nd floor, Supervisor's Office and then Nancy will walk you down to the parking lot. As mentioned previously, please be aware that the signage is not up yet.

If the weather is bad and you'd like to postpone the visit, please let us know. However, if it is raining or the roads are wet from a morning rain, it will actually be easier to see the porous pavement "in action" so you might want to still come -- just bring the umbrellas!

Thanks,
Sue

Sue Odierna
Confidential Secretary to the Town Supervisor

and Sustainability Coordinator

Town of Mamaroneck
740 W. Boston Post Road
Mamaroneck, NY 10543
914.381.7816
sodierna@townofmamaroneckny.org

-----Original Message-----

From: Lesley Sandison [<mailto:lesleysandison66@gmail.com>]
Sent: Sunday, November 12, 2017 2:55 PM
To: Odierna, Sue <SOdierna@TownofMamaroneckNY.org>
Cc: Mary Rooney <mwrooney@optonline.net>
Subject: Darien Garden Club Conservationnservation

Dear Sue,
Thank you for your call on Friday evening. I have discussed the times you suggested with my co chair and we should like to visit and meet Nancy on Thursday, November 16th at 2.30pm. We have sent out an email inviting members from our club. Could you perhaps give me the exact address of the location where we should meet?
We really appreciate the time both you and Nancy are affording us.
Kind regards,
Lesley
Lesley Sandison

Improving Water Quality in Mamaroneck Harbor and Long Island Sound through Green Infrastructure at the Mamaroneck Town Center

Engineering Estimates and Design Calculations LISFF Feasibility Study – 2015

I. Design Parameters: Determination of Surface Areas and Rain Runoff

- The average annual rainfall for Mamaroneck in 2012 as recorded by the weather stations in Mamaroneck was 42 inches average total. The mean number of rain days per year is 118 for 2012. Average rainfall per day is 0.36 inches.
- The field measure areas calculated for rain runoff on the property are the following: parking lot, sidewalk, roof area, lawn areas and miscellaneous (ledge rock and paved pathways).

Existing Area Determinations:

Lot Total Area = 144,619 SF (3.32 Acres)

Impervious Areas:

Asphalt Parking Lot Area = 59,000 SF (1.35 Acres)

Concrete Sidewalk Area = 5,450 SF (0.13 Acres)

Projected Roof Area = 19,907 SF (0.46 Acres)

Miscellaneous Impervious = 9,055 SF (0.21 Acres)

Pervious Areas:

Lawn Area = 51,207 SF (1.17 Acres)

Highlighted items have
not been duplicated in
calculation for final
metrics

Proposed Area Determinations:

Impervious Areas:

Asphalt Parking Lot Area = 35,750 SF (0.82 Acres)

Concrete Sidewalk Area = 2,044 SF (0.047 Acres)

Pervious Areas:

Porous Brick Pavement = 23,250 SF (0.53 Acres)

Permeable Sidewalk Pavers = 2,044 SF (0.047 Acres)

- Calculated runoff volumes are determined using a simplified approach using the *Runoff Volume Equation* taking consideration for each respective runoff coefficient.

$$\text{Volume (Q)} = C \times P \times A \times (1/12)$$

where C = Coefficient of Runoff

P = Annual Rainfall (inches)

A = Drainage Surface Area (s.f.)

Q = Volume (c.f.)

1 c.f. = 7.48 U.S. gallons

Assumed Runoff Coefficients (C)

Asphalt Parking Lot = 0.90

Concrete Walkways = 0.92

Roof Areas = 0.85

Sloped Lawn Areas = 0.20

Misc. Impervious = 0.78

Porous Brick Pavement = 0.10

Permeable Brick Pavers = 0.35

Biofilter System = 0.25

II. Runoff Reduction for Parking Lot Improvements with Porous Brick Pavement System

A. Annual Volumetric Runoff for Existing Asphalt Concrete

$$\text{Volume (Q)} = C \times P \times A (1/12)$$

$$Q = (0.9)(42'')(59,000)(1/12)$$

$$Q = 185,850 \text{ cubic feet (1,390,158 U.S. Gallons)}$$

B. Annual Volumetric Runoff for Porous Pavement System

$$\text{Porous Pavement Volume (Q)} = C \times P \times A (1/12)$$

$$Q = (0.10)(42'')(23,250\text{s.f.})(1/12)$$

$$Q = 8,139 \text{ cubic feet (60,869 U.S. Gallons)}$$

C. Annual Volumetric Runoff for Conventional Asphalt Concrete

$$\text{Conventional Asphalt Volume (Q)} = C \times P \times A (1/12)$$

$$Q = (0.9)(42'')(35,750\text{s.f.})(1/12)$$

$$Q = 112,613 \text{ cubic feet (842,342 U.S. Gallons)}$$

D. Net Reduction of Rain Runoff for Proposed Parking Lot Improvements

$$\text{Runoff Reduction} = \text{Pre-Existing Runoff} - \text{Post Constructed Runoff}$$

$$Q (\text{reduced}) = 185,850 \text{ c.f.} - (8,139 \text{ c.f.} + 112,613 \text{ c.f.})$$

$$Q (\text{reduced}) = 65,098 \text{ cubic feet (486,933 U.S. Gallons)}^{**}$$

**** The introduction of porous asphalt materials to the Town Center Facility reduces surface runoff from the existing asphalt concrete parking lot by 35%.**

III. Runoff Reduction for Sidewalk Improvements with Permeable Pavement

A. Annual Volumetric Runoff for Existing Concrete Sidewalks

$$\text{Volume (Q)} = C \times P \times A (1/12)$$

$$Q = (0.92)(42'')(5,450\text{s.f.})(1/12)$$

$$\underline{Q = 17,549 \text{ cubic feet (131,267 U.S. Gallons)}}$$

B. Annual Volumetric Runoff for Proposed Walkways Including Permeable Pavers

The proposed improvements were to reconstruct all of the building perimeter sidewalks with a combination of permeable pavers and conventional Portland cement concrete. The differing materials were to be proportioned 50% each. The footprint of the proposed sidewalk system is also reduced by 25% from the original.

$$\text{Volume (Q)} = C \times P \times A (1/12) + C \times P \times A (1/12)$$

(Paver) (Concrete)

$$Q = 0.75[(0.92)(42'')(2,725\text{s.f.})(1/12) + (0.35)(42'')(2,725\text{s.f.})(1/12)]$$

$$\underline{Q = 9,084 \text{ cubic feet (90,602 U.S. Gallons)}}$$

C. Net Reduction of Rain Runoff for Proposed Sidewalk Improvements

$$\text{Runoff Reduction} = \text{Pre-Existing Runoff} - \text{Post Constructed Runoff}$$

$$Q (\text{reduced}) = 17,549 \text{ c.f.} - 9,084 \text{ c.f.}$$

$$\underline{Q (\text{reduced}) = 8,465 \text{ cubic feet (63,318 U.S. Gallons)}}$$

**** The introduction of permeable brick paver materials to the Town Center Facility reduces surface runoff from the existing concrete sidewalks by 48%.**

IV. Roof Area Runoff and Rain Harvesting Cisterns - Volume of Captured Rain Water

Annual Volumetric Rain Captured with the Proposed Rain Harvesting Cisterns

Each proposed cistern is rated at 350 gallons. The units will be installed at a single down spout location and shall include an option for bypass overflow should the unit reach capacity. The estimated volume of rainfall available for an average rain event is determined as the following:

$$\text{Average Daily Rainfall} = \text{Total Annual Rainfall} / \text{Avg. \# Rain Events}$$

$$\text{Average daily Rainfall} = 42'' \text{ Annual Rain} / 118 \text{ Rain Events}$$

$$\text{Average Daily Rainfall} = 0.36 \text{ Inches}$$

The estimated projected roof areas are as follows.

$$\text{Southerly Pitched Roof} = \frac{1}{2} (20' \times 80') = 800 \text{ s.f.}$$

$$\text{Southeasterly Pitched Roof} = \frac{1}{2} (40' \times 45') = 900 \text{ s.f.}$$

The available runoff estimated for capture and re-use in onsite irrigation for each average rain event is the following with an assumed runoff coefficient of 0.97.

$$\begin{aligned} \text{Q Cistern \#1} &= (0.97)(0.36'')(800\text{s.f.}) \times \frac{1}{2} \text{ trib. area} = 140 \text{ c.f.} \\ &\quad (1,045 \text{ U.S.Gallons}) \end{aligned}$$

$$\begin{aligned} \text{Q Cisterns \#2 \& \#3 Combined} &= (0.97)(0.36'')(900\text{s.f.}) = 315 \text{ c.f.} \\ &\quad (2,351 \text{ U.S. Gallons}) \end{aligned}$$

V. Biofilter Drainage System - Volume of Captured and Treated Rain Water

Proposed along the northerly section of the property along the low laying topographical area of the main parking lot is a biofilter collection system. The intent and realized benefit of installing this unit is to capture surface runoff water from asphalt, filter out pollutants and to allow natural infiltration of water into the existing soils thus reducing loads on the existing storm water system.

Annual Volumetric Runoff for the Surface Areas of Parking Lot Captured

- Pavement Area #1 = 300' x 28' = 8,400 s.f.
- Assumed Runoff Coefficient Biofilter = 0.25
- Assumed Runoff Coefficient Pavement = 0.90

$$\text{Volume (Q)} = C \times P \times A (1/12) \times (1 - \text{CN Biofilter})$$

$$\text{Volume (Q)} = (0.9) \times (42'') \times (8,400 \text{ s.f.}) \times (1/12) (1 - 0.25)$$

$$\text{Volume (Q)} = 19,845 \text{ c.f. (148,441 U.S. Gallons)}$$

VI. Vegetative Rain Gardens - Volume of Captured Rain Water

Proposed along the south easterly area of the property within low laying topographical areas are two 15 foot by 20 foot vegetative rain gardens connected in series. Though aesthetically pleasing, the primary function for these small ponds would be to perform “first flush” treatment to collected storm water flows prior to terminal discharge into the municipal storm system along Boston Post Road. It is estimated that 80% of all the surface water flows from the impervious sidewalks and pavements on the site would be collected though new storm catch basins a drain piping leading to the rain gardens. The balance of 20% would account for high intensity rain events where “overflow” condition occurs.

The annualized runoff volumes as listed in Items II. And III. And V. above are the following:

$$Q (\text{Asphalt Concrete}) = 112,613 \text{ c.f.}$$

$$Q (\text{Porous Pavement}) = 8,139 \text{ c.f.}$$

$$Q (\text{Permeable Sidewalks}) = 1,884 \text{ c.f.}$$

$$Q (\text{Concrete Sidewalk}) = 6,581 \text{ c.f.}$$

$$Q (\text{Biofilter}) = 19,845 \text{ c.f. (Deduction)}$$

The treated flow through volume of collected surface runoff passing through the rain gardens over the course of a single year is estimated as the following.

$$\text{Treated Storm Water} = (112,613\text{c.f.}+8,139\text{c.f.}+1,884 \text{ c.f.}+6,581\text{c.f.}-19,845\text{c.f.}) \times 0.8$$

$$Q (\text{treated}) = 87,498 \text{ cubic feet (654,482 U.S. Gallons)}$$

VII. Catch Basin Filter Systems - Volume of Captured Pollutant from Treated Rain Water

Proposed for each of the catch basins stated for replacement is the installation of catch basin “retrofit” basket filters. The intention of this improvement is to address water quality by removing large sediments, suspended solids, oil, grease, trash, hydrocarbons, bacteria, nitrogen and other pollutants from storm water runoff before it enters the site’s storm water system which discharges into the municipal system and ultimately Long Island Sound body of water. In 2011, the Town installed completed the installation of 69 catch basin filters. On average during semiannual servicing, each basket has been recorded to capture 2.2 cubic feet of solid pollutant, equating to approximately 100 pounds of material (wet density = 45.4lb/cf). The proportion of solids to floatables was estimated as approximately 80% to 20% in mass.

Extrapolating this actual data, we anticipate the same outcome of the eight proposed filters

$$\text{Captured Pollutant} = 8 \text{ Filters} \times 2.2\text{c.f.} \times (45.4 \text{ lbs/cf}) \times 2 \text{ times/yr} = 1,598\text{lbs/yr}$$

Runoff Reduction for Porous asphalt

Existing Volumetric Runoff

$$\begin{aligned} Q &= C \times P \times A \times 1/12 \\ &= 0.9(42'')(2200)(1/12) \\ &= 6930 \text{ cf} \quad (51836.4 \text{ gallons}) \end{aligned}$$

Proposed Volumetric Runoff

$$\begin{aligned} Q &= 0.10(42'')(2200)(1/12) \\ &= 770 \text{ cf} \quad (5,760 \text{ gallons}) \end{aligned}$$

$$\text{Runoff reduction} = (6930 - 770) \text{ cf} = 6160 \text{ cf} \quad (46,077 \text{ gallons})$$

Runoff Reduction for porous pavers

Existing Volumetric Runoff

$$\begin{aligned} Q &= C \times P \times A \times 1/12 \\ &= 0.92(42)(4950 \text{ sf})(1/12) \\ &= 15,939 \text{ cf} \end{aligned}$$

Proposed Volumetric Runoff

$$\begin{aligned} Q &= C P A (1/12) \\ &= 0.35(42'')(4950)(1/12) \\ &= 6,054 \text{ cf} \end{aligned}$$

$$\text{Runoff reduction} = (15,939 - 6,054) \text{ cf} = 9,885 \text{ cf} \quad (73,940 \text{ gal})$$

Runoff reduction for Biofilter Rangorden.

$$Q = CPA(Y_{12})$$

$$(0.90)(42") (6930 \text{ SF}) \times 1/12$$

$$= 21,830 \text{ cF } (163,285 \text{ gallons})$$

Volume of stormwater reduced

$$(46,077 + 73,940 + 163,285) \text{ gal} = 283,302 \text{ gal}$$

Project Period	3/02/2015 - 7/28/2017
Project Location Description (from Proposal)	Mamaroneck Town Center, 740 West Boston Post Road, Mamaroneck, Westchester County, NY a part of the NY Metropolitan area. Mamaroneck is an urban cluster area on Western Long Island Sound. The Town Center is across the street from the West Basin of Mamaroneck Harbor, a NYS impaired waterbody.
Project Summary (from Proposal)	Install 8,400 sq. ft. of green infrastructure in the Town of Mamaroneck, New York. Project will result in treatment of 698,662 gal. of polluted stormwater runoff and prevent 319.6 lbs. of floatables flowing annually from the Mamaroneck Town Center into Mamaroneck Harbor to improve water quality in the Harbor and Long Island Sound.
Project Status and Accomplishments	<p>The Town of Mamaroneck in in the process of acquiring engineering services to complete the final design, prepare bid specifications and oversee actual construction. The Town of Mamaroneck has issued a request for proposals for engineering services. The proposals will be received on April 22, 2016. The plan is to evaluate the proposals and award an engineering contract during the first two weeks of May, 2016</p> <p>The Town of Mamaroneck received proposals for engineering services and selected Barton & Loguidice, D.P.C. (B&L) out of Albany, New York in May, 2016 to perform topographical land survey phase, engineering for preliminary plans and specification phase, engineering for the final design, specification and contract phase, bid letting and evaluation phase, and the construction inspection phase.</p> <p>Topographical site survey was completed by TEC Land Surveying PC out of Beacon, New York in late June, 2016. B&L began preliminary design in July, 2017. Preliminary designs were presented to the Town, the Sustainability Collaborative, and public through various workshops and design meetings. Final bid documents, which included construction plans and specifications, were completed in September, 2016.</p> <p>Bid documents were available for potential bidders for four (4) weeks. A pre-bid meeting was held at the Town Center on October 17, 2017. The bid opening was on October 27, 2016 at the Town Center. Eight (8) construction companies submitted bids. A bid analysis was completed by the Town and all bids were found to be higher than the combined allotted grant funding and matching Town funds. Proposed construction operations/work items were reduced to align with project funds and agreed upon by the apparent low bidder. DeRosa Sports Construction Inc. out of Mamaroneck, New York was the apparent low bidder and signed an agreement with the Town to perform construction.</p> <p>Construction began at the project site in December, 2016 and continued to June, 2017. Part time construction inspection was completed by Calgi Construction Company, Inc. out of White Plains, New York. The project was constructed according to plan and specification. A list of punch list items was formulated by the construction inspector and presented to the contractor. Punch list items were completed in October, 2017.</p>
Lessons Learned	<ol style="list-style-type: none">1. Parking lot reconstruction, at a facility that is open to the public daily, is difficult without alternative parking accommodations. Additional time was necessary to complete construction for certain operations. In the future, it may be necessary to put language into the specifications for construction operations to take place on weekends or nights.

Activities and Outcomes

Funding Strategy: Capacity, Outreach, Incentives

Metric: LISFF - Outreach/ Education/ Technical Assistance - # websites, social media tools

Required: Recommended

Description: Enter # websites, Facebook, Twitter, blogs etc.

Starting Value	3.00 # websites, social media tools
Value To Date	7.00 # websites, social media tools
Target value	7.00 # websites, social media tools

Note: The Town has used their website, e-mail blasts, and Facebook to provide project information

Funding Strategy: Capacity, Outreach, Incentives

Metric: LISFF - Outreach/ Education/ Technical Assistance - # workshops, webinars, meetings

Required: Recommended

Description: Enter #, type and purpose of events.

Starting Value	0.00 # workshops, webinars, meetings
Value To Date	10.00 # workshops, webinars, meetings
Target value	10.00 # workshops, webinars, meetings

Note: Grant workshop - 2/24/15; sustainability collaborative meetings - 7/20/16 and 7/27/16; Town Board meetings with design sub-consultant present (3 total); Supervisor shared project info at Westchester County Town Supervisor meetings (2 total); Supervisor updates at Town Board Meetings (more than 3 total)

Funding Strategy: Capacity, Outreach, Incentives

Metric: LISFF - Outreach/ Education/ Technical Assistance - # people with knowledge

Required: Recommended

Description: Provide # and type of participant. In notes, Describe expected results, % increase in awareness or knowledge, from the outreach and education

Starting Value	0.00 # people with knowledge
Value To Date	11000.00 # people with knowledge
Target value	11000.00 # people with knowledge

Note: The Town has reached out to residents via the Town website, e-mail blasts, and press releases. The Town center shares its building with the police department, both of which are open for business week days with exception to national holidays. Adjacent to the Town center is an athletic field that hosts youth soccer. The parking lot accommodates vehicle overflow giving additional exposure to people who wouldn't normally visit the police dept. or Town hall.

Funding Strategy: Capacity, Outreach, Incentives

Metric: LISFF - Outreach/ Education/ Technical Assistance - # people targeted

Required: Recommended

Description: Enter # of people and community targeted i.e., farmers. students, municipal officials etc.

Starting Value	0.00 # people targeted
Value To Date	15000.00 # people targeted
Target value	15000.00 # people targeted

Note: The green infrastructure improvements are intended to target or bring awareness to all residents of the Village and Town who do business at the Town facility

Funding Strategy: Habitat Management

Metric: LISFF - BMP implementation for stormwater runoff - Volume stormwater prevented

Required: Recommended

Description: Enter volume (gal.) treated or reduced and source of stormwater e.g., parking lot, rooftop, street etc.

Starting Value	0.00 Volume stormwater prevented
Value To Date	283302.00 Volume stormwater prevented
Target value	698662.00 Volume stormwater prevented

Note: The porous asphalt pavement, porous pavers, bioretention, and dry swale and raingarden areas were considered in this calculation.

Funding Strategy: Capacity, Outreach, Incentives

Metric: LISFF - Outreach/ Education/ Technical Assistance - # of edu signs installed

Required: Recommended

Description: Enter # and content of the signs.

Starting Value	0.00 # of edu signs installed
Value To Date	6.00 # of edu signs installed
Target value	5.00 # of edu signs installed

Note: Five (5) storm water management practice signs were installed adjacent to the raingarden, bioretention, porous pavement, and dry swale areas, and for the rainbarrel. One (1) green infrastructure sign, containing pictures and descriptions of each practice has been design and will be placed outside of the main entrance to Town hall.

Funding Strategy: Planning, Research, Monitoring

Metric: LISFF - Monitoring - # monitoring programs

Required: Recommended

Description: Enter # monitoring programs established or underway. Describe type of monitoring to occur i.e., parameters, species.

Starting Value	0.00 # monitoring programs
Value To Date	5.00 # monitoring programs
Target value	5.00 # monitoring programs

Note: The Town will monitor the post construction functionality of the green infrastructure practices. Rain barrels will be drained prior to winter and inlet valves diverted to prevent inflow of storm water during winter months. Catch basin inlet filters will be inspected and cleaned twice per year. Porous asphalt pavement, porous pavers, bioretention, and raingarden areas will be inspected after rainfall events to ensure absorption of stormwater

Funding Strategy: Capacity, Outreach, Incentives

Metric: LISFF - Outreach/ Education/ Technical Assistance - # gov't entities participating

Required: Recommended

Description: Enter # and specific government entities targeted i.e., Town of Brookhaven, Town of Greenwich, Suffolk County etc.

Starting Value	0.00 # gov't entities participating
Value To Date	3.00 # gov't entities participating
Target value	3.00 # gov't entities participating

Note: Town and Village of Mamaroneck, Village of Larchmont

Funding Strategy: Habitat Management

Metric: LISFF - BMP implementation for stormwater runoff - Lbs of floatables reduced

Required: Recommended

Description: Enter lbs. of floatable debris prevented from entering system.

Starting Value	0.00 Lbs of floatables reduced
Value To Date	279.60 Lbs of floatables reduced
Target value	319.60 Lbs of floatables reduced

Note: Seven (7) filters were installed in areas of conventional pavement. The Town has installed inlet filters throughout the Town and observed the proportion of solids to floatables as 80% to 20%. Filters will be cleaned twice per year.

Funding Strategy: Habitat Management

Metric: LISFF - Green Infrastructure - Sq ft of bioretention installed

Required: Recommended

Description: Enter the square footage of bioretention BMP installed. Provide # and specific type of green infrastructure to be installed.

Starting Value	0.00 Sq ft of bioretention installed
Value To Date	1965.00 Sq ft of bioretention installed
Target value	8400.00 Sq ft of bioretention installed

Note:

Funding Strategy: Habitat Management

Metric: LISFF - Green Infrastructure - Sq ft impervious surface removed

Required: Recommended

Description: Enter sq. ft. of impervious surface removed.

Starting Value	0.00 Sq ft impervious surface removed
Value To Date	8550.00 Sq ft impervious surface removed
Target value	26656.00 Sq ft impervious surface removed

Note: Porous asphalt pavement was installed in locations that were feasible. Steep parking lot grades and areas that would receive heavy leave litter were avoided to ensure a high probability of success over the long term.

Funding Strategy: Habitat Management

Metric: LISFF - BMP implementation for nutrient or sediment reduction - Acres under BMPs

Required: Recommended

Description: Enter the number of acres under Best Management Practices (BMPs)

Starting Value	0.00 Acres under BMPs
Value To Date	1.55 Acres under BMPs
Target value	3.32 Acres under BMPs

Note:

Funding Strategy: Habitat Management

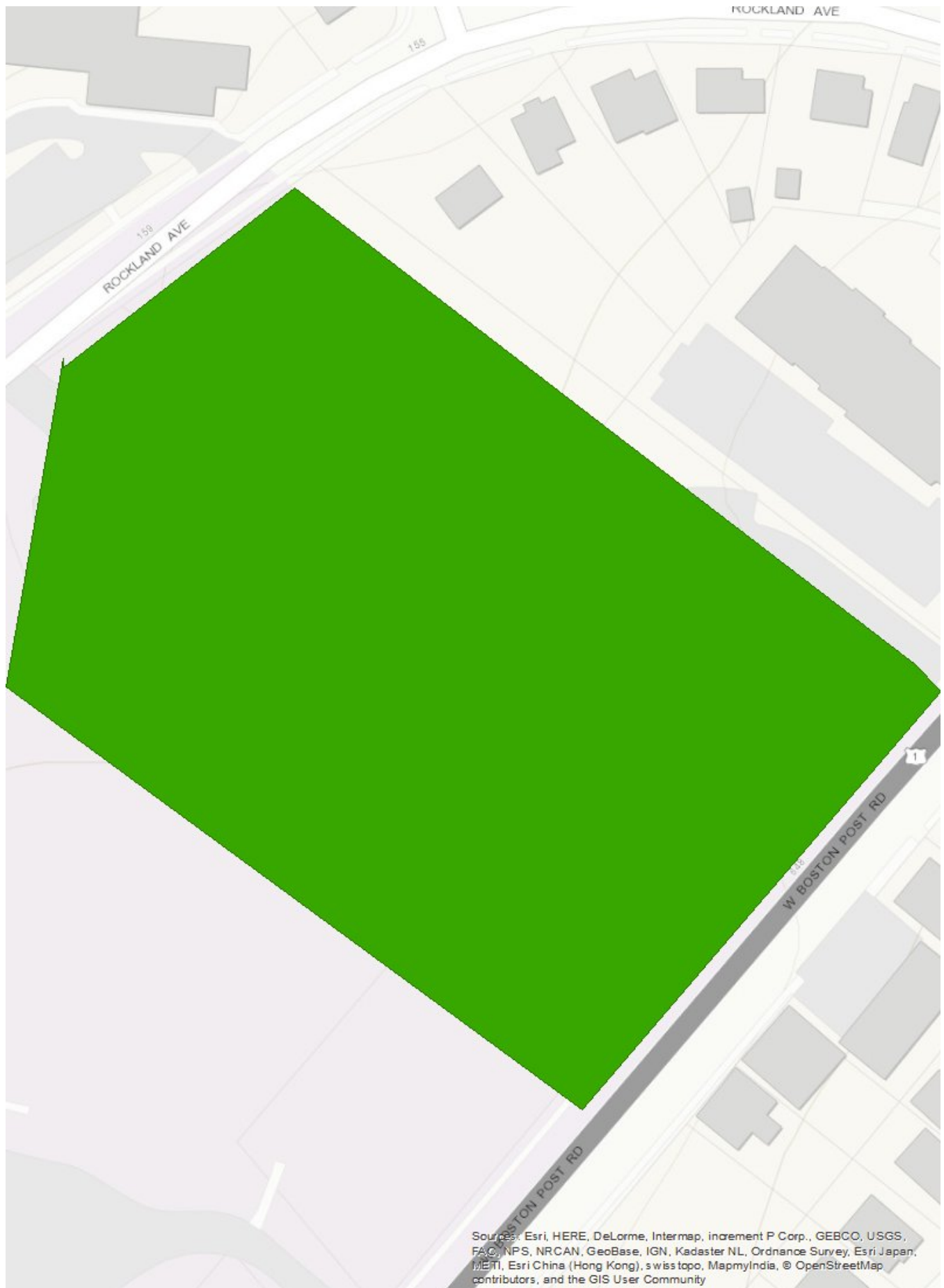
Metric: LISFF - Green Infrastructure - # trees planted

Required: Recommended

Description: Trees or other vegetation.

Starting Value	0.00 # trees planted
Value To Date	6.00 # trees planted
Target value	6.00 # trees planted

Note: In addition to the 6 trees, the following were also planted; 5 deciduous shrubs and 495 herbaceous plants. These plants were installed in the raingarden and bioretention areas.



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

The following pages contain the uploaded documents, in the order shown below, as provided by the grantee:

Upload Type	File Name	Uploaded By	Uploaded Date
Final Report Narrative - Standard	49098 Final Programmatic Report Narrative.doc	Baird, Thomas	10/26/2017
Photos - Jpeg	Photo 01_Rainbarrel.JPG	Baird, Thomas	10/27/2017
Photos - Jpeg	Photo 02_Porous Pavers.JPG	Baird, Thomas	10/27/2017
Photos - Jpeg	Photo 03_Bioretention Area.jpg	Baird, Thomas	10/27/2017
Photos - Jpeg	Photo 04_Porous Pavement.jpg	Baird, Thomas	10/27/2017
Photos - Jpeg	Photo 05_Porous Pavement.jpg	Baird, Thomas	10/27/2017
Photos - Jpeg	Photo 06_Raingarden.jpg	Baird, Thomas	10/27/2017
Photos - Jpeg	Photo 07_Raingarden.jpg	Baird, Thomas	10/27/2017
Photos - Jpeg	Photo 08_Porous Pavers.jpg	Baird, Thomas	10/27/2017
Other Documents	Picture Descriptions.pdf	Baird, Thomas	10/27/2017
Other Documents	Picture Location Map.pdf	Baird, Thomas	10/27/2017
Other Documents	Press Release 01.pdf	Baird, Thomas	10/27/2017
Other Documents	Product Submittal 01_Drainage Structure Inlet Filter.pdf	Baird, Thomas	10/27/2017
Other Documents	Product Submittal 02_Rain Barrel.pdf	Baird, Thomas	10/27/2017
Other Documents	Product Submittal 03_Rain Barrel.pdf	Baird, Thomas	10/27/2017
Other Documents	Product Submittal 04_Signs.pdf	Baird, Thomas	10/27/2017
Other Documents	Green Infrastructure Educational Sign.pdf	Baird, Thomas	10/27/2017

The following uploads do not have the same headers and footers as the previous sections of this document in order to preserve the integrity of the actual files uploaded.



Final Programmatic Report Narrative

Instructions: Save this document on your computer and complete the narrative in the format provided. The final narrative should not exceed ten (10) pages; do not delete the text provided below. Once complete, upload this document into the on-line final programmatic report task as instructed.

The Town of Mamaroneck, Westchester County, New York is pleased to submit this final report narrative for the National Fish and Wildlife Foundation LISFF Grant Program (Easy Grants ID 49098) dated October 25, 2017.

1. Summary of Accomplishments

In four to five sentences, provide a brief summary of the project's key accomplishments and outcomes that were observed or measured.

The Town of Mamaroneck is looking to improve water quality in Mamaroneck Harbor (part of Western Long Island Sound) through the use of green infrastructure practices. Installation of green infrastructure practices at the Town's Municipal Center would help improve stormwater quality flowing into the Harbor but would also be an opportunity to demonstrate and educate the Town residents who do business at the Municipal Center. Actual application of green infrastructure improvements along with their benefit to the environment are demonstrated on site. The Town has successfully installed porous asphalt pavement, porous concrete pavers, two (2) rain barrels, a dry swale, bioretention and raingarden areas, seven (7) catch basin debris filters, and performed impervious pavement reductions by reducing the area of impervious sidewalk system. Each practice has been identified through signage (at each practice) and an educational interpretive panel will be installed at the main entrance to the Municipal Center (See Attached).

2. Project Activities & Outcomes

Activities

- Describe and quantify (using the approved metrics referenced in your grant agreement) the primary activities conducted during this grant.

Construction plans and specifications were produced for the Town of Mamaroneck for the installation of green infrastructure technology on the grounds of the existing Municipal Center. The construction plans called for the construction of the following:

- *Porous asphalt pavement vehicle parking area*
Installation of porous asphalt pavement to accommodate parking for 11 vehicles. The pavement section includes washed, crushed uniformly graded stone enveloped with geotextile fabric, positioned beneath two layers of porous asphalt pavement. Positioned within the stone base is underdrain piping that during heavy rain events will convey stormwater overflows into an adjacent drainage structure if the reservoir course becomes inundated. The underdrain invert is 6 inches above the bottom of the crushed stone base which is above the water quality volume level.
- *Four (4) Bioretention areas*
Bioretention areas were designed to receive stormwater from paved surfaces through curb cuts. The bioretention section consists of 48" of bioretention type (sand and organics, trace clay) material on top of 12" of crushed uniformly graded stone that was enveloped in non-woven geotextile fabric. Three relatively smaller bioretention areas were not able to be constructed due to the cost exceeding the available local and grant funding amount.
- *Two (2) Raingardens*
Raingardens were designed to receive stormwater overflow from rooftop gutters and stormwater from a dry swale. Similar to the bioretention section, just not as deep, the raingarden section consists of 18" of bioretention type material on top of 12" of uniformly graded crushed stone that was enveloped in non-

woven geotextile fabric. The raingarden on the north side of the site receives stormwater from paved surfaces via a meandering dry swale.

The raingarden located north of the Municipal Center (between the porous pavers and building face) was not able to be constructed due to the cost exceeding the available local and grant funding amount. However, the Town has proposed to include landscaping in this area that will accept stormwater under a separate project.

- **Four (4) Rain Barrels**

Rain barrels were positioned along the north side of the Municipal Center adjacent to existing gutter downspouts. Three (3) rain barrels were designed to be larger and utilitarian while the fourth rain barrel was designed to be smaller and functional but primarily for demonstration purposes near the main entrance.

Two (2) of the larger utilitarian rain barrels were removed from the contract due to the cost exceeding the available local and grant funding amount.

- **Porous paver pedestrian walkway**

With exception to the sidewalk from Boston Post Road to the southeast side of the porous asphalt pavement (see green infrastructure educational sign) the pedestrian walkways within the project site was constructed with porous pavers. A deep pavement section includes 16" of washed, crushed uniformly graded stone, separated by 12" of sand enveloped in geotextile fabric, followed by 8" of washed, crushed uniformly graded stone. A large area of pedestrian walkway around the eastern side of the Municipal Center, originally proposed to receive conventional asphalt pavement, was revised during the bid analysis period to also include porous pavers and the above mentioned section.

- **Pavement Reduction**

In the process of constructed the porous paver walkways, 8,550 SF of impervious area was removed from the project site.

- Briefly explain discrepancies between the activities conducted during the grant and the activities agreed upon in your grant agreement.

As part of the NFWF/LISFF Grant Application Process, the Town submitted various estimated degrees of measurable metrics such as costs, educational aspects, volume of stormwater contained on site, area of green infrastructure practices installed, trees planted, etc. During the post award follow through, the Town was able to compare the actual findings to those submitted on the grant application. The following comparisons were made:

Estimated Measureable Improvements

- # Websites, social media tools – 7 each
- # Workshops, webinars, meetings – 10 each
- # People with knowledge – 11,000 people
- # People targeted – 15,000 people
- Volume stormwater prevented – 698,662 gallons
- # of educational signs installed – 5 each
- # of monitoring programs – 5 each
- # of government entities participating – 3 each
- Pounds of floatables reduced – 319.60 lb.
- Square feet of bioretention installed – 8,400 sf
- Square feet of impervious surface removed – 26,656 sf
- Acres under BMPs – 3.32 acre
- # of trees planted – 6 each

Actual Measureable Improvements

- 7 each
- 10 each
- 11,000 people
- 15,000 people
- 283,302 gallons
- 6 each (Includes Large Illustrated Panel)
- 5 each
- 3 each
- 279.6 lb.
- 1,965 sf
- 8,550 sf
- 1.55 acre
- 6 each

Estimated Measureable Cost

- Budget Grand Total – \$581,634.00

Actual Measureable Cost

- \$700,776.82

Outcomes

- Describe and quantify progress towards achieving the project outcomes described in your grant agreement. (Quantify using the approved metrics referenced in your grant agreement or by using more relevant metrics not included in the application.)

The total area of porous asphalt pavement was reduced for a number of reasons. The surrounding area is heavily vegetated with trees and the leaf litter would prove very difficult to remove from the pores of the asphalt and therefore the functionality would not be sustainable. The maximum grade of porous asphalt is 5%, the parking lot grade approaches 9%. The parking area, in most locations, requires multiple turning movements for most drivers (as observed) to maneuver in and out of a space. In these types of “tighter” or more highly stressed parking areas it is not recommended that porous asphalt be used. However, the one area where porous asphalt was used is appropriate and is working very well. In an effort to offset that lost treatment ability the design consultant explored other options for stormwater treatment and infiltration. Additional bioretention areas were designed in addition to installation of a proprietary stormwater treatment hydrodynamic separator. However, higher than anticipated bid results ultimately inhibited the installation of the hydrodynamic separator. With exception to the main entrance roadway, the section of pavement east of the porous asphalt pavement, and the parking lot in the southwestern side of the site all other impervious ground is filtered by drainage structure inlet filters, the bioretention area, or a dry swale followed by a raingarden. On the southern side of the site, the existing impervious pavement is sloped towards a vegetated grass slope and a flat vegetated area via sheet flow where infiltration occurs.

- Briefly explain discrepancies between what actually happened compared to what was anticipated to happen.
 1. *A greater area of porous asphalt pavement was proposed in the original grant submission, however, it was not installed to site constraints, high risk of clogging, it is a high pavement stress location, and the grade is too steep. Porous asphalt pavement was placed in the area that would have a high rate of success and sustainability, and as a demonstration to all that visit and work at the Town Center. The reduction in porous asphalt pavement resulted in the lower area of impervious pavement removed and the lower volume of stormwater prevented.*
 2. *One less drainage structure inlet filter was placed during construction which resulted in an estimated reduction of pounds of floatable removed. A structure in the middle of the parking lot (not on a curb line) was selected to not receive an inlet filter during the bid analysis due to the higher than anticipated bid prices received.*
 3. *The total area of proposed bioretention was reduced in comparison to what was shown in the original grant submission due to existing site conditions. In three (3) areas that were to receive bioretention treatment there was underlying bed rock outcrops that would prevent the full section to be installed primarily due to the high cost of bed rock removal.*
 4. *The total acres under BMPs is less than what was proposed in the original grant submission due to site constraints, topography, and in part of the use of the site. The south and east sides of the site do not naturally drain to the north of the Municipal Center and could not reasonably or practically be accommodated in the green infrastructure practices. On the east side of the site, the pedestrian path was converted from impervious pavement to porous pavement (porous pavers) as a result of lower bid prices for that item of work and to increase infiltration of stormwater as much as possible on this side of the property.*
- Provide any further information (such as unexpected outcomes) important for understanding project activities and outcome results.
 1. *The proximity of bedrock/rock outcrop below the surface that wasn't apparent during design since sample borings were not part of the scope of work. This resulted in the elimination of three (3) smaller bioretention areas.*
 2. *Even with a limited budget, the Town strived to include at least one example of each practice described in the original grant application. This goal was successful as the project includes Eight (8) different*

practices for water quantity and quality improvements. Additionally, the practices were located and constructed to be as prominent as possible in order to maximize the exposure and to showcase the educational component of the work that was completed to users and visitors to the Town Center. The project can be a model for other municipalities.

3. Lessons Learned

Describe the key lessons learned from this project, such as the least and most effective conservation practices or notable aspects of the project's methods, monitoring, or results. How could other conservation organizations adapt their projects to build upon some of these key lessons about what worked best and what did not?

- 1. The least effective conservation practice for this project is the rain barrel. With large roof areas, even the largest of rain barrels need to have overflows that have a backup system. This was designed into the project for construction but only because the elevations of this site were favorable for this practice.*
- 2. The most effective conservation practices for this project are the bioretention and raingarden (with dry swale) areas. The project site contains existing grade that will facilitate surface flows of large areas of pavement toward proposed bioretention and raingarden areas. It is important to utilize any pre-treatment possible and be creative as the sustainability factor rises greatly when pretreatment can be provide, In this case, we used a dry swale system wherever possible.*
- 3. A notable aspect of the project's method for green infrastructure siting is that a majority of the site is not conducive for porous pavements due to grade, leaf litter, and parking operations. These areas were avoided during design in order to provide a high probability of success for each practice. Porous asphalt pavement and paver areas were kept away from known areas of leaf litter, concentrated flow, mulch, or tracking of offsite materials from pedestrians (dirt from athletic field) and vehicles (sand). This consideration attributed to the reduction of porous asphalt pavement on the site compared to what was proposed in the grant application. It is important to protect your investment by reducing the risk of damage and contamination and in understanding the limitations of your stormwater practices. No two locations jobs are entirely alike.*
- 4. Long term maintenance efforts and costs should be considered prior to design and implementation of any stormwater practice. The Town has embraced the goal to improve water quality in the Harbor and has taken efforts to provide stormwater cleaning practices that require use of vacuum equipment, which is owned by the Town. For other municipalities considering implementation of green infrastructure practices, the long term maintenance costs (equipment purchase, manpower, etc.) should be explored during initial planning to avoid neglect after construction.*
- 5. One of the best results is that the Town was faced with funding shortfall but was still able to integrate Eight (8) different practices into the project. With careful placement, they can also be observed from one vantage point in front of the Town Center building next to a large permanently mounted interpretive sign.*

4. Dissemination

Briefly identify any dissemination of lessons learned or other project results to external audiences, such as the public or other conservation organizations.

The project is complete and is visible to visitors and employees of the Town and the adjacent Police Department. A green infrastructure interpretive panel has been designed (see PDF of sign uploaded with this report) and will be prominently displayed at the front entrance to the Town Center. The Town plans to showcase the project at upcoming Westchester County Town Supervisor meetings and at Town Board meetings and seek out recognition in publications and other media.

Message to external audiences: It is important to know the limitations of each practice to be employed, as these limitations usually also involve outside factors. Care in selection and implementation creates a long term successful and sustainable project that will promote the use of these practices and the continued increase in protection of our natural resources.

5. Project Documents

Include in your final programmatic report, via the Uploads section of this task, the following:

- 2-10 representative photos from the project. Photos need to have a minimum resolution of 300 dpi and must be accompanied with a legend or caption describing the file name and content of the photos;

Attached are pictures showing final conditions of green infrastructure practices.

- report publications, GIS data, brochures, videos, outreach tools, press releases, media coverage;

Attached is a press release from the Long Island Sound Study, identifying the intent of the project and grant amount. Additional project outreach will include submission into awards competitions and/or publications such as Stormwater Solutions Magazine and the American Public Works Association. Other attachments include the educational signs that are prominently displayed around the project site and product details that were utilized.

- any project deliverables per the terms of your grant agreement.

None.

POSTING OF FINAL REPORT: *This report and attached project documents may be shared by the Foundation and any Funding Source for the Project via their respective websites. In the event that the Recipient intends to claim that its final report or project documents contains material that does not have to be posted on such websites because it is protected from disclosure by statutory or regulatory provisions, the Recipient shall clearly mark all such potentially protected materials as “PROTECTED” and provide an explanation and complete citation to the statutory or regulatory source for such protection.*

















Picture Descriptions

Photo 01_Rain Barrel.jpg (P1) – Decorative rain barrel adjacent to the main entrance of the Municipal Center. A diverter pipe connects the existing downspout to the rain barrel. During colder months the diverter valve prevents stormwater from entering the rain barrel. This decorative rain barrel is an example product that town residents could utilize on their property.

Photo 02_Porous Pavers.jpg (P2) – A view looking west at a close up view of the porous pavers with the bioretention area in the background.

Photo 03_Bioretention Area.jpg (P3) – A view looking north toward the bioretention area. The green infrastructure sign is shown in this view.

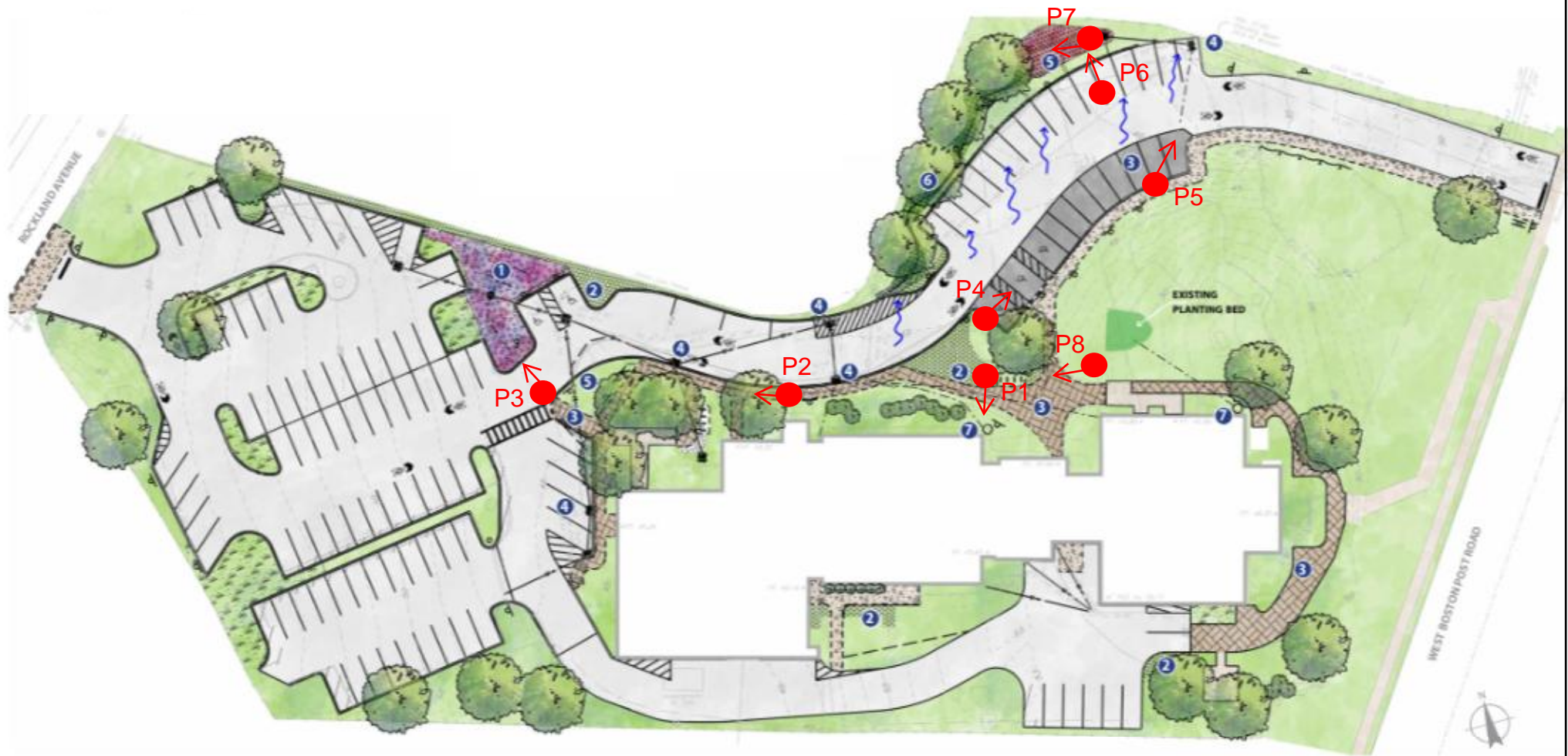
Photo 04_Porous Pavement.jpg (P4) – A view looking northeast over western end of the porous asphalt pavement. The porous asphalt pavement is the approximate length of the parking bay (edge of pavement striping).

Photo 05_Porous Pavement.jpg (P5) – A view looking northeast over the eastern end of the porous asphalt pavement.

Photo 06_Raingarden.jpg (P6) – A view looking north toward the raingarden. A break in the concrete curb is shown that allows surface runoff into the raingarden.

Photo 07_Raingarden.jpg (P7) – A view looking west over the planting bed of the raingarden.

Photo 08_Porous Pavers.jpg (P8) – A view looking west over the porous asphalt pavers. The main entrance is on the left hand side of the Municipal Center. Please note that the rain barrel shown in P1 was not installed at the time this photo was taken. The rain barrel has been installed on the left hand side of the downspout shown in the center of this photo.



Note:

See description of picture locations
in separate document.

Picture Location Map NTS



Long Island Sound Study > About Us > Grants > Long Island Sound Futures Fund > 2015 Large Grants

2015 Large Grants Projects

CONNECTICUT

CLEAN WATER AND HEALTHY WATERSHEDS

City-wide Green Infrastructure Siting, Installation and Training

Recipient: New Haven Urban Resources Initiative

LISFF Grant: \$91,232.28 (EPA)

Matching Funds: \$104,690.00

Total Project Funds: \$195,922.28

Project Area: Newhallville Neighborhood and New Haven

New Haven Urban Resources Initiative will develop a tool to optimize site selection for green infrastructure bioswales, and train community members in bioswale maintenance and educate them about green infrastructure. The activities will guide installation of 200 bioswales downtown to treat 710,000 gallons of polluted stormwater draining to New Haven Harbor and Long Island Sound from combined sewers. Major activities: 1) develop a GIS-based tool to optimize site selection for bioswales to be installed in a 600-acre section of New Haven; 2) engage 150 Yale students to do fieldwork and data entry; 3) involve six high-school students and 12 ex-offenders in installing and monitoring six 5' by 15' bioswales and in testing different designs for swales in a compact residential sub-sewershed to demonstrate and adapt their use city-wide; 4) engage the community in selecting plants for the bioswales to develop an understanding of how bioswales work and foster buy-in to maintaining the swales; 5) deliver two workshops training 32 individuals from civic organizations, non-profits, and others interested in bioswale maintenance; and 6) conduct an outreach to 22,500 people using social media, workshops and signs aimed at raising awareness and improving public understanding about how green infrastructure works. Partners: Common Ground High School, Emerge, Inc., the Yale School of Forestry and Environmental Studies, City of New Haven, and the Greater New Haven Water Pollution Control Authority.

Tracking Down Pollution Sources Impacting Water Quality in 4 Connecticut Rivers and Long Island Sound

Recipient: Earthplace – the Nature Discovery Center, Inc.

LISFF Grant: \$44,557.10 (EPA)

Matching Funds: \$40,212.00

Total Project Funds: \$84,769.10

Project Area: Mill River, Sasco Brook, Norwalk, and Noroton Rivers, Western Long Island Sound

Earthplace—The Nature Discovery Center's program HarborWatch will conduct water quality monitoring and sewage track down surveys in four watersheds which discharge into Long Island Sound in Fairfield County, CT. The project will identify and support remediation of "point" sources of pollution to improve water quality conditions in rivers that follow into the Sound. Currently, the watersheds lack robust monitoring to identify "point" sources of pollution although designated as impaired waters. With establishment of this program approximately four point sources are likely to be identified and efforts engaged to resolve problems. Major project activities: 1) ten citizen-scientists will conduct surveys of five water quality parameters specifically E. coli bacteria, dissolved oxygen, conductivity, and water temperature at 73 monitoring sites; 2) build cohesive and long-term datasets for the watersheds to help inform trends analysis of water quality; 3) provide data to municipalities to help them resolve pollution problems; 4) provide the CT Department of Energy and Environmental Protection (CTDEEP) with data to establish a water quality threshold to help with management of the Noroton River; and 5) provide information about the monitoring on a website and in technical reports. Partners: CTDEEP, Stamford, Westport, Norwalk, and Fairfield, Sasco Brook Pollution Abatement Committee, Norwalk River Watershed Initiative, Westport Shellfish Commission, and Copps Island Oysters.

Developing a Plan to Assess and Reduce Nitrogen in Saugatuck River Watershed Communities

Recipient: The Nature Conservancy, Connecticut

LISFF Grant: \$64,980.67 (EPA)

Matching Funds: \$48,235.00

Total Project Funds: \$113,215.67

Project Area: Saugatuck River Watershed: Bethel, Danbury, Easton, Fairfield, Newtown, Norwalk, Redding, Ridgefield, Weston, Westport, and Wilton

The Nature Conservancy will develop a consensus-based, community-driven Nitrogen Load Model (NLM) Assessment and Reduction Plan working with 11 towns, residents and community stakeholders in three sub-watersheds of the Saugatuck River, Fairfield County, CT. Nitrogen pollution from home septs and cesspools, fertilizers, sewage treatment plants, stormwater and a

myriad of other point and nonpoint sources continues to reduce water quality, degrade habitat and diminish ecosystem function in the marine and coastal environment of the Sound. This project will use the NLM to identify watershed-specific issues, needs and alternatives for addressing nonpoint pollution sources and reducing nitrogen loads to the Saugatuck River and the Sound and set the stage for on-the-ground implementation of techniques necessary to measurably reduce nitrogen from watersheds that feed the Sound. Major activities include: 1) collecting and data for the NLM; 2) convening local residents and community stakeholders to discuss: the sources of nitrogen and the impact of too much nitrogen on the health and living resources of the Saugatuck River and the Sound, and the purposes and use of NLM model; and to seek their feedback, and knowledge to be incorporated into the modeling; and 3) assess the feasibility, cost and effectiveness of traditional and non-traditional technologies and techniques for nonpoint source nitrogen pollution reduction and develop a prioritized list of acceptable options.

THRIVING HABITATS AND ABUNDANT WILDLIFE

Stratford Point Living Shoreline: Restoring Coastal Habitats to Maintain Resiliency and Function

Recipient: Sacred Heart University

LISFF Grant: \$148,753.75 (EPA, FWS)

Matching Funds: \$80,000.00

Total Project Funds: \$228,753.75

Project Area: Stratford Point, Lordship Peninsula, Town of Stratford

Sacred Heart University will restore the function and value of a 28-acre coastal ecosystem by creating a "living shoreline" at Stratford Point, Stratford, CT. The Stratford Point peninsula juts out into Long Island Sound on the flight path of thousands of migrating birds. It is surrounded by natural areas including: Stewart B. McKinney National Wildlife Refuge, Long Beach/Pleasure Beach, Charles Island, and Silver Sands State Park. Currently, there is very little food to support the birds and vegetation to protect them from storms because of changes in habitat over the past few decades. Biologists at Sacred Heart University will partner with DuPont, Audubon Connecticut and Roger Torey Peterson Institute to restore the site by creating a "Living Shoreline." Major activities include: 1) restore two acres of coastal forest with native coastal trees and shrubs. This will shade out invasive plants, create a windbreak, supply food and shelter to migrating birds and resident bird species; 2) install a 2-acre meadow with native flowering plants and grasses for pollinators and species like the monarch butterfly; 3) enhance a 0.5-acre vernal pool with native wetland plants; 4) monitor the restoration activities; and 5) use the "living shoreline" as a demonstration area by providing education to three high schools and college students; disseminating information about the resources on signs and in social media, and by engaging 100 volunteers in restoration.

Restoring Fish Passage on the Noroton River

Recipient: Connecticut Fund for the Environment

LISFF Grant: \$150,000.00 (EPA, FWS)

Matching Funds: \$156,927.00

Total Project Funds: \$306,927.00

Project Area: Noroton River and Interstate 95 (I-95) at Town of Darien and City of Stamford

Connecticut Fund for the Environment will modify side-by-side perched culverts which now create a barrier to upstream fish passage from Long Island Sound on the Noroton River at the bridge over I-95 between the Town of Darien and City of Stamford, CT. When the Connecticut Department of Transportation constructed I-95 in the 1950s, the Noroton River was routed through a series of concrete culverts. During normal flow conditions, the barrier varies from around six inches at high tide to 21 inches at low tide. In addition to the obstruction to upstream passage, the culverts themselves, approximately 200 feet long, create very low sheet flow conditions. Major activities include: 1) construction of twenty sets of concrete baffles within one of the three culverts; 2) construction of a rock ramp on the downstream side of the river left culvert; 3) construction of a concrete weir wall on the upstream side of the center and river right culverts to direct flow into the baffled culvert; 4) installation of a sign concerning the project; 5) dissemination of information about the project in organizational blogs and Listserves to 18,300 members and interested individuals; and 6) conducting a restoration, cleanup and ribbon-cutting event at project completion. These modifications will restore 4.9 miles of fish passage during both high and low flow for river herring and American shad. Project partners: Connecticut Department of Energy and Environmental Protection, Darien Land Trust, and NOAA.

Fishway Rehabilitation at the Versailles Pond Dam

Recipient: Thames Valley Chapter of Trout Unlimited

LISFF Grant: \$22,000.30 (EPA, FWS)

Matching Funds: \$22,402.00

Total Project Funds: \$44,402.30

Project Area: Versailles Pond, Village of Versailles

The Thames Valley Chapter of Trout Unlimited will replace rotting Denil baffles and other wooden components of the Versailles Pond Dam Fishway (Fishway) in the Village of Versailles, Connecticut to restore passage for fish including alewife, blueback herring, American shad and sea-run brown trout to 1.75 miles and 65 acres of spawning and nursery habitat. The Fishway currently does not provide effective passage to anadromous fish due to deteriorating wooden baffles that have reached the end of their lifespan. Prior to this deterioration, the fishway was functional. The solution is to replace the rotting wooden baffles with aluminum baffles, which will not deteriorate and have a lifespan of 50 years. Major activities include: 1) purchasing materials and using volunteer labor to fabricate and install new aluminum baffles into the fishway. These baffles have a 50-year lifespan and will ensure that this problem does not re-occur in the future; 2) replace other deteriorating wooden components including weirboard channels and trash racks; and 3) conduct public outreach about the rehabilitation project, anadromous fish, and fishways using the Connecticut Department of Energy and Environmental Protection (DEEP) website and blog, the Trout Unlimited website and with an onsite educational sign. Partners: CTDEEP and International Paper.

EDUCATING TO ENGAGE SUSTAINABLE AND RESILIENT COMMUNITIES

Creating a Network of Schoolyard Habitats to Engage Students in Conservation of Long Island Sound

Recipient: National Audubon Society, Audubon Connecticut**LISFF Grant:** \$34,993.56 (EPA, FWS)**Matching Funds:** \$46,935.00**Total Project Funds:** \$81,928.56**Project Area:** Cities of Stamford and New Haven

Connecticut Audubon will support 10 enrolled and expand the Schoolyard Habitats program to three elementary schools and in the broader community of New Haven and Stamford, CT. Many barriers exist for Connecticut residents to directly connect with Long Island Sound along urban waterfronts; and students in urban communities often have limited opportunities to engage in outdoor, hands-on experiential learning in their curriculum, or to steward natural resources in their communities. Major project activities to address these challenges: 1) enhancing 1.3 acres of habitat in 13 urban schoolyards; 2) providing 60 teachers with professional development about using the outdoors as living classrooms and fostering development of student work that addresses real-world problems related to the Sound; 3) exposing 4,000 members of the public to a "call to action" concerning the Sound by conducting 31 events including Stewardship Team meetings, workdays, a leadership workshop and a Schoolyard Habitat Summit where Audubon and project partners will present program information; 3) fostering and evaluating increases in knowledge and sharing best practices among 1,250 students, teachers and 22 Leadership and Summit attendees; and 4) engaging 80 Schoolyard Habitat Stewardship Team members and 600 volunteers comprised of students, parents, and community members in training to create and maintain the sites. Project partners: US Fish and Wildlife Service, Common Ground High School, and Yale Peabody Museum.

A Student Urban Field-study of Water Quality and Species Diversity along the Long Island Sound Coast

Recipient: SoundWaters**LISFF Grant:** \$33,935.66 (EPA, FWS)**Matching Funds:** \$18,415.00**Total Project Funds:** \$52,350.66**Project Area:** Cove Island Park and Boccuzzi Park, Stamford

SoundWaters will engage 1,100 6th graders from six urban middle schools in a year-long urban field study with presentations comparing water quality and species diversity at two coastal sites on Long Island Sound in Stamford, Connecticut. Maintaining the Long Island Sound as a healthy ecosystem while balancing human uses, presents a challenge as pollution and development pose a continuing challenge to water and habitat quality and species diversity particularly in the urban western Sound. This project aims to develop citizens that are educated about the science and equipped with the skills to communicate information to increase awareness and participation among peers, public officials and communities to protect and restore the Sound. Major activities: 1) classroom distance learning about the Sound watershed and natural resources; 2) field studies at Cove Island Park and Boccuzzi Park to collect and analyze data about water, soil, species, and human activities to develop knowledge about the science of problems facing the Sound; 3) a survey to gauge students' knowledge about healthy watersheds, clean water and wildlife abundance; 4) social media posts and blogs, and three presentations of project results to a panel, convened by the Mayor of Stamford, of municipal administrators, to the Stamford School District, and to more than 1,500 participants at STEMfest, a city-wide science education fair. Middle school partners include: Cloonan, Dolan, Rippowam, Rogers International, Scofield Magnet, and Turn of River.

NEW YORK

CLEAN WATER AND HEALTHY WATERSHEDS

Green Infrastructure at Mamaroneck Town Center to Improve Water Quality in Long Island Sound (NY)

Recipient: Town of Mamaroneck**LISFF Grant:** \$149,876.00 (EPA)**Matching Funds:** \$431,634.00**Total Project Funds:** \$581,510.00**Project Area:** Mamaroneck Town Center at the West Basin of Mamaroneck Harbor

The Town of Mamaroneck will install 8,400 sq. ft. of green infrastructure at Mamaroneck Town Center (Center). The Center is situated less than one-quarter mile from Mamaroneck Harbor with all stormwater from the site currently untreated. Major activities include: 1) installing 23,250 sq. ft. of permeable pavers, 2,044 sq. ft. of porous pavement in the parking lot, permeable pedestrian sidewalks, a rainwater harvesting system, a biofilter retention area, two rain gardens, and eight catch basin filter baskets; 2) monitoring project performance; 3) conducting public education about the project to 161,000 residents including: at Town Board meetings and work sessions, public meetings, community events, a ribbon cutting and press event to announce project completion, on public access television and in social and local media; and 4) installing five signs that identify and explain green infrastructure benefits to hundreds of residents who visit this central municipal facility. After project installation surface water from the entire property will flow through the green infrastructure reducing nutrient and sediment pollution into Mamaroneck Harbor and Long Island Sound. Project partners include Town of Mamaroneck: Board, Engineer, Sustainability Coordinator, Sustainability Collaborative, Building Department, Highway Department; and Village of Mamaroneck Building Department, and Larchmont/Mamaroneck Coastal Zone Management Commission.

Green Infrastructure to Reduce Stormwater Pollution at the Centerport Beach Recreation Facility

Recipient: Town of Huntington
LISFF Grant: \$137,322.26 (EPA)
Matching Funds: \$137,322.26
Total Project Funds: \$274,644.52
Project Area: Centerport Beach Recreation Facility, Town of Huntington, Village of Centerport

Town of Huntington will install green infrastructure at the Centerport Beach Recreation Facility (Facility) creating a demonstration project to reduce storm water run-off from entering Northport Bay and Long Island Sound at a large public bathing beach and park. The Huntington/Northport Bay Complex is an area in the coastal boundary of the Sound with documented problems of excessive stormwater discharges causing hypoxia, and beach and shellfish harvesting closures. The Facility currently funnels all stormwater to a pipe that discharges into Northport Bay. Major activities include: 1) removing 6,700 sq. ft. of impervious asphalt and concrete and then installing pipes, five catch basins, and bioretention soil and swales with water absorbing native plants; 3) installing permeable brick pavers to further treat stormwater and provide for public access; and 4) creating signage, an interpretive kiosk, a how-to video about project construction, 5,000 educational brochures, 40 social media posts and tweets, and conducting a press event and other outreach to local media to educate 5,000+ residents and 25,000+ members of the public about the benefits of green infrastructure to the Sound's watershed. After project installation, 80 percent of the stormwater from the Facility will be treated by the green infrastructure treat 314,697 gallons of stormwater annually. Project partners include: Town of Huntington and Citizens Campaign Fund for the Environment.

Hempstead Harbor 2015 Water Quality Monitoring Program

Recipient: Incorporated Village of Sea Cliff
LISFF Grant: \$45,000.00 (EPA)
Matching Funds: \$82,603.00
Total Project Funds: \$127,603.00
Project Area: Hempstead Harbor, Nassau County

The Incorporated Village of Sea Cliff, New York will conduct water quality monitoring of a suite of pollution indicators in the inner and outer Hempstead Harbor aligned with Long Island Sound Study monitoring of the open waters of Long Island Sound in Hempstead Harbor, Nassau County, NY. Major project activities include: 1) eight volunteers will monitor parameters such as dissolved oxygen, salinity, pH, turbidity/secchi, ammonia/nitrate/nitrate and water temperature, and collect data about water quality trends and the impact of improvements in different parts of the Harbor; 2) analyze data to help nine local government detect and respond to illicit discharges; and 3) post project results on a website and through social media to be shared with the public and with municipal government participating in the Hempstead Harbor Protection Committee. Project partners include: the Town of Oyster Bay, the Town of North Hempstead, the City of Glen Cove, the Village of Sea Cliff, the Village of Roslyn Harbor, the Village of Roslyn, the Village of Flower Hill, and the Village of Sands Point.

THRIVING HABITATS AND ABUNDANT WILDLIFE

Coastal Habitat Restoration at Alley Pond

Recipient: City Parks Foundation
LISFF Grant: \$149,938.00 (EPA, FWS)
Matching Funds: \$ 551,766.31
Total Project Funds: \$701,704.31
Project Area: Alley Creek, Alley Pond Park, Little Neck Bay

City Parks Foundation will establish 0.23 acres of tidal pools over 15 acres of contiguous salt marsh part of a complex of 75 acres of fresh and tidal marsh; and remove 5.5 acres of invasive plants in coastal forest and vernal pool habitat on the shores of Little Neck Bay and Long Island Sound. The tidal pools have increased in size more than five times since 1974 resulting in marsh loss. As pools get bigger, and new pools formed, marsh is fragmented and limited in value as habitat, buffers to sea-level rise and filters to water pollution. This loss represents a trend in New York City where 160 acres of shoreline marsh have disappeared over 40 years. Major activities involve: 1) piloting an innovative approach to place sediment within these pools and planting to restore appropriate tidal elevations and re-establish salt marsh vegetation; 2) removing invasive vegetation to prepare for seeding and planting of native species; 3) conducting a project design meeting with community members and partners; 4) training 20 volunteers to assist with sediment placement and planting; and 5) providing project updates on two websites. These activities will re-establish ecological characteristics to improve water quality and provide habitat for fish and wildlife; and development of a tool to address loss of fringe marshes that buffer shoreline communities from sea-level rise. Project partners: Natural Areas Conservancy and the New York City Department of Parks and Recreation, Natural Resources Group.

Restoring Fish Passage at Beaver Lake and Beaver Brook

Recipient: The Nature Conservancy, Connecticut
LISFF Grant: \$149,999.99 (EPA, FWS)
Matching Funds: \$148,237.00
Total Project Funds: \$298,236.99
Project Area: Beaver Brook at Beaver Lake, Village of Mill Neck

The Nature Conservancy, Connecticut Chapter, will install a steep pass fishway to provide access to 1.5 miles of riverine spawning habitat for sea-run trout and alewife including in the 111-acre Beaver Lake above the Beaver Brook dam. A number of years ago, a homemade fish ladder was constructed without proper engineering for fish migrating upstream from Long Island Sound. Major activities include: 1) installing a replacement fishway designed to be passable at all flows; 2) conducting pre- and post-construction monitoring and data analysis involving pit-tagging and releasing alewife with receivers upstream in Beaver Brook and downstream at the entrance of the fishway, and video monitoring at the fishway exit to evaluate fish entering the lake through the fishway and moving upstream to riverine habitat above the dam; and 3) educational outreach to 200 residents and members of the public using social media, email blasts, websites and local media to inform them about the project and why river restoration and fish passage is important. The project will yield increases in populations of migratory fish contributing to the

restoration of a healthy Sound. Partners: New York State Department of Environmental Conservation, Friends of the Bay, Village of Mill Neck, Hofstra University, Cornell Cooperative Extension of Suffolk County, North Shore Land Alliance, The Nature Conservancy, New York Chapter, and Seatuck Environmental Association.

EDUCATING TO ENGAGE SUSTAINABLE AND RESILIENT COMMUNITIES

Student Scientist Monitoring of American Eel and River Herring on the Bronx River

Recipient: Rocking the Boat

LISFF Grant: \$35,000.00 (EPA, FWS)

Matching Funds: \$19,002.45

Total Project Funds: \$54,002.45

Project Area: Rocking the Boat facility, Hunts Point Riverside Park, Concrete Plant Park, River Park, and New York Botanical Garden, Bronx County

Rocking the Boat will engage 185 middle and high school students in monitoring river herring and American eel, two species which indicate the biological health of Long Island Sound in Bronx, NY. With the installation of a fish ladder at the East 182nd Street Dam in 2015, it is important to monitor the success of the ladder in pass fish, and to monitor the success of an eel ramp being constructed in the same location to aid eel migration upstream to the northern section of the Bronx River. Additionally, students in urban communities often have limited opportunities to engage in outdoor, hands-on experiential learning or to steward natural resources in their neighborhoods. Major project activities include: 1) student scientists rowing to sites using wooden boats built by them at Rocking the Boat; 2) monitoring the fish ladder for blueback herring and alewife, keeping the ladder clear of debris, and checking water levels and flow; 2) monitoring eels by collecting eel mop data to assess presence and abundance; 3) the New York City Department of Parks and Recreation, Natural Resources Group (NRG) will provide two training sessions about ladder maintenance and fish monitoring; and Wildlife Conservation Society and Queens College scientists will provide two trainings and one wrap-up session about eel monitoring; and 4) project results will be shared with the public at four events, and students will formally present their findings with the NRG staff to other scientists.

Planting for Clean Water in Long Island Sound Program

Recipient: Nassau County Soil and Water Conservation District

LISFF Grant: \$34,513.50 (EPA)

Matching Funds: \$36,879.43

Total Project Funds: \$ 71,392.93

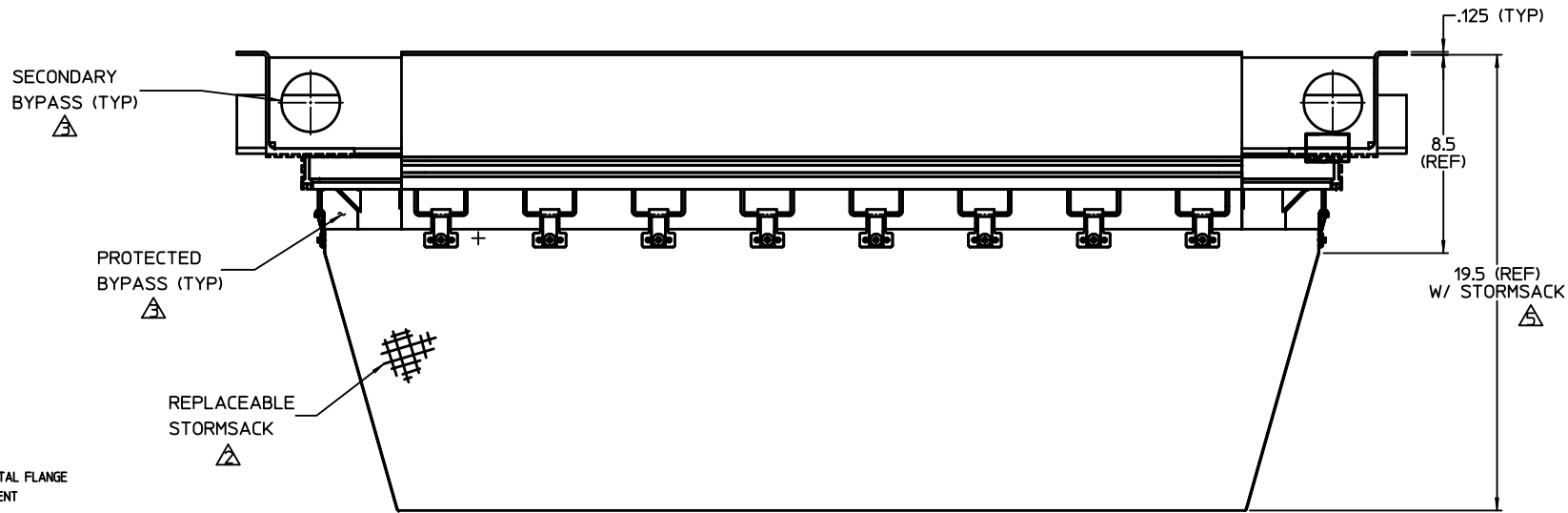
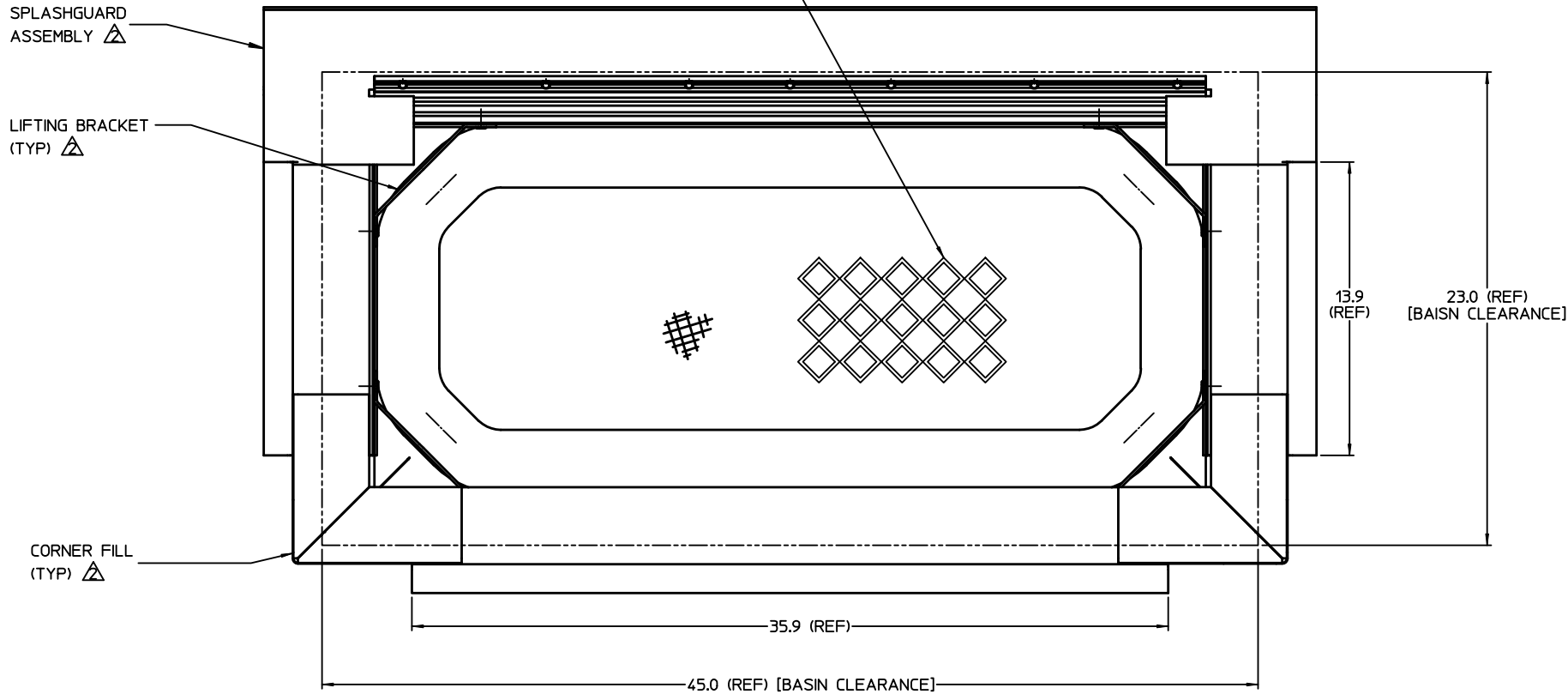
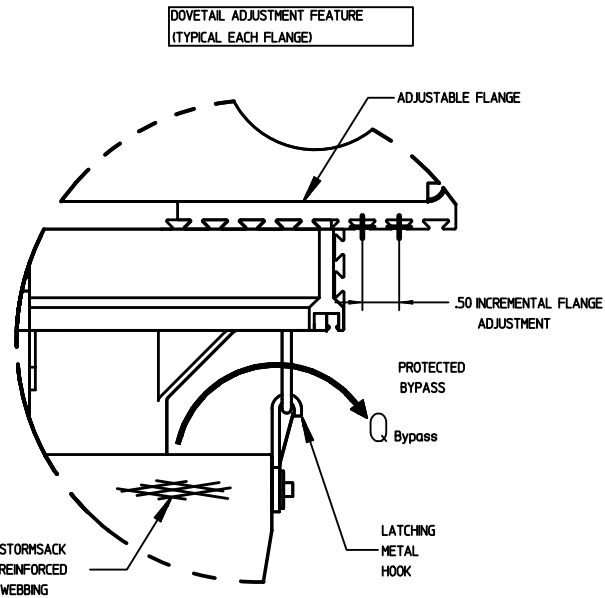
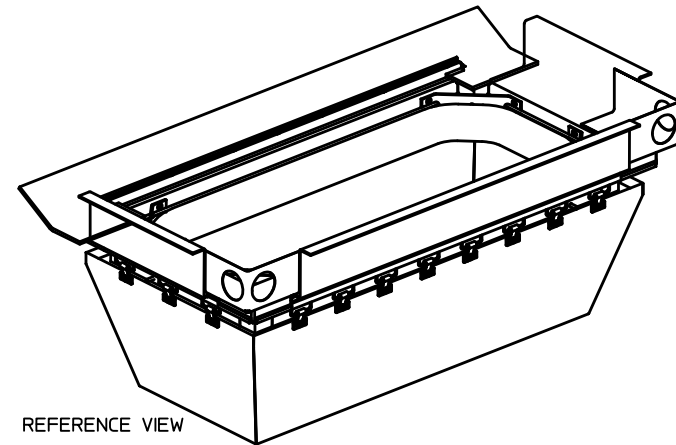
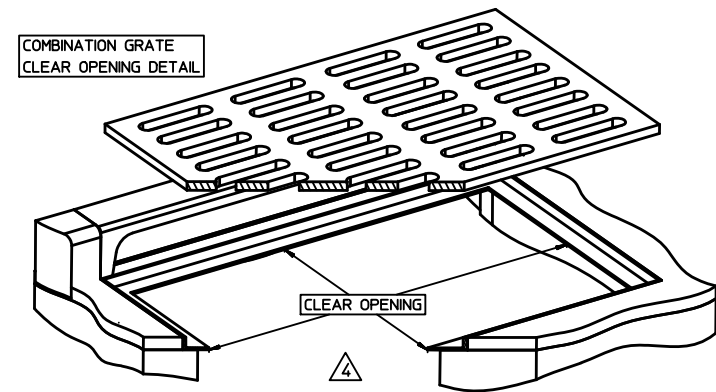
Project Area: Village of Bayville, Village of Centre Island, Cedarmere Preserve, Roslyn

Nassau County Soil and Water Conservation District will construct three demonstration rain gardens and use them to educate residents, visitors and municipalities about installation of them in Nassau County, NY. One significant threat to the water quality is the increase in the volume of polluted stormwater runoff entering waterways like Hempstead Harbor and Long Island Sound from surrounding communities. The significant amount of impervious surfaces such as roads and parking lots decreases the capacity of soils to naturally capture, filter, and treat polluted stormwater. Green infrastructure like rain gardens remove pollution from the stormwater before it flows or infiltrates into surface and groundwater. Major project activities: 1) 150 local volunteers, including municipal employees and students from four schools, will construct 500 sq. ft. demonstration rain gardens at the Village of Centre Island's Main Entrance, at the Village of Bayville's Village Hall and at Cedarmere Preserve; 2) educate 1,000 members of the public about how rain gardens work to reduce stormwater through 30 Quick Response informational signs that digitally link visitors to a website for more information about rain gardens; 3) providing a brochure to help visitors understand how rain gardens work and identifying the plants in the gardens; and 3) educate 75 members of the public about design, construction and benefits of rain gardens to the natural resources of Long Island Sound at three hands-on workshops. Partners: Villages Nassau County, Town of Oyster Bay, Hempstead Harbor Protection Committee, and Friends of Cedarmere.

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NOTES:

1. WEIGHT (EMPTY): 25 LB MAX
2. MATERIAL:
 - A) ADJUSTABLE FLANGE AND DEFLECTOR ALUMINUM ALLOY 6063-T6
 - B) SPLASH GUARD: NEOPRENE RUBBER (TRIM TO FIT)
 - C) STORMSACK: GEOTEX 117F, REINFORCEMENT RIBBON
 - D) MESH LINER: HDPE, DIAMOND PATTERN
 - E) LIFTING TABS: ALUMINUM ALLOY: 5052-H32
 - F) CORNER FILL: ALUMINUM ALLOY: 5052-H32
 - G) SUPPORT HARDWARE: CRES 300 SERIES
 - H) OIL BOOM: POLYPROPYLENE, 3" DIAMETER
3. PERFORMANCE CHARACTERISTICS (TYP):
 - A) DEBRIS CAPACITY: 7.8 CU-FT.
 - B) FILTERED FLOW RATE (INITIAL): 2686 GPM (5.9 CFS)
 - C) PRIMARY BYPASS FLOW RATE: 2147 GPM. (4.8 CFS)
 - D) SECONDARY BYPASS FLOW RATE: 164 GPM. (.37 CFS)
 - E) TOTAL BYPASS FLOW RATE: 2311 GPM (5.1 CFS)
 - F) OIL BOOM ABSORPTION CAPACITY: 410 OZ (3.2 GAL)
4. CLEAR OPENING RANGE (.5 INCH INCREMENTS):
 - A) MINIMUM SIZE: 23.0 X 45.0
 - B) MAXIMUM SIZE: 28.0 X 50.0
5. RECOMMENDED MINIMUM VAULT DEPTH: 2-IN BELOW STORMSACK
6. TYPICAL INSTALLATION: REMOVE STORM GRATE, MEASURE CATCH BASIN CLEAR OPENING AND ADJUST FLANGES TO REST ON GRATE SUPPORT LEDGE, INSTALL STORMSACK WITH SPLASH GUARD UNDER CURB OPENING AND SO THE ADJUSTABLE FLANGES ARE RESTING ON THE GRATE SUPPORT LEDGE, INSTALL CORNER FILL PIECES, REINSTALL STORM GRATE DIRECTLY ON STORMBASIN SUPPORT FLANGES.
7. USE WITH FABCO REPLACEABLE STORMSACK ONLY, FABCO PART NO: 9749-1-200.



NO		QTY	PART NUMBER	DESCRIPTION	REMARKS
BILL OF MATERIALS					
UNLESS OTHERWISE SPECIFIED REMOVE ALL BURLS BREAK SHARP EDGES .002 - .020 FILLET .020 MAX DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES DO NOT SCALE THIS DRAWING		TOLERANCES: DEC .00 + .01 DEC .000 + .005 FRACT ± 1/16 ANGLE ± 2° Rd FINISH ✓		APPROVALS	DATE
		OWN		N.NEUWIRTH	02/18/08
		CHKR		ENGR J. PETERS	02/18/08
		APVD			
MATERIAL		SEE NOTES		FABCO INDUSTRIES, INC. 66 CENTRAL AVENUE FARMINGDALE, NY 11735 WWW.FABCO-INDUSTRIES.COM	
MODEL LINK		9749-1E_ASSY2		TITLE STORMSACK, TYPE E FLANGE	
SIZE		CAGE CODE	DWG NO	REV	
D		1P8A4	9749-1E-000	F	
SCALE		1/4	WT	SHEET 1 OF 1	



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Flat Back Woodgrain Rain Barrel - 50 Gallons



Save 50 gallons of clean, soft rainwater and adorn your garden with this elegant faux woodgrain flat-back plastic rain barrel. Includes inlet screen and spigot.

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[Print Brochure](#)

Connect multiple barrels together with the [flat-back rain barrel link](#) kit to save even more water!

Details:

- ▶ Authentic oak barrel appearance - faux woodgrain finish
- ▶ Heavy duty rotational molded construction lasts for years
- ▶ Flat back, space-saving design fits flush against a wall for added safety
- ▶ Linkable to other barrels in series for additional capacity
- ▶ Screen at top keeps out debris, critters and insects
- ▶ Plastic resin will not rot, crack or peel like real wood barrels
- ▶ Brass spigot for hose hook up
- ▶ Dual overflow ports
- ▶ Do not allow water to freeze inside unit during coldest months
- ▶ Optional Link Kit allows linkage to other barrels for increased water storage capacity
- ▶ Shut off valve for hose hook-up
- ▶ Rain barrels are children, pet, and wildlife resistant

Specifications:

- ▶ Dimensions: 33" Tall x 23" Wide x 18" Deep
- ▶ Capacity: 50 U.S. gallons
- ▶ Weight: 21.5 lbs (empty)
- ▶ Composition: UV stabilized plastic resin
- ▶ Usage: water catchment and storage of rain water
- ▶ Key Features: heavy duty rotational molded construction; faux wood grain finish resembles weathered wood
- ▶ Warranty: 1 year warranty



[Scroll to Top](#)

Installation instructions and maintenance for the GRAF rainwater reservoir Top-Tank

GRAF Top-Tank

Order Nr.: 323002



The points described in these instructions must be followed correctly. If not correctly observed, any right to claim on the guarantee may be refused. For all additional Graf articles purchased there are separate installation instructions enclosed in the transportation packing.

Any missing instructions must be requested directly from us.

A complete check of all the items/components for possible damage must be carried out before the assembly or installation begins.

The installation must be carried out by a professional firm.

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1. General notes

1.1 Safety

The relevant accident prevention regulations according to BGV C22 have to be observed when conducting any works. Especially when inspecting tanks a second person is required for safety reasons.

Furthermore, the relevant regulations and standards have to be observed during installation, assembly, maintenance, repair, etc. You will find information about this in the related sections of these instructions.

During all works on the system respectively on system components the overall system has to be decommissioned and secured against unintentional restart at all times.

The tank cover has to be closed at all times, except when conducting works on the tank, otherwise there is a very high risk of accident. Only original GRAF covers or covers approved by the company GRAF in writing are to be used.

The company GRAF offers a comprehensive portfolio of accessories that are aligned with each other and can be developed into complete systems. Using deviating accessories can lead to impairments of the functionality of the system and thus to the liability for damages resulting thereof expiring.

1.2 Identification obligation

All lines and tapping points of process water have to be labelled with the words "**No drinking water**" in writing or visually (DIN 1988 part 2, section 3.3.2.) in order to avoid an accidental connection to the drinking water network even after years. Even when there are correct labels, irritations are possible, e.g. through children. That is why all tapping points of process water have to be installed with **child-proof** valves.

2. Installation set up requirements

2.1 Assembly above ground

- The tanks must be installed on an appropriate level and compacted surface that is free from sharp objects and stones.
- Notice must be taken that the tanks when filled will weigh 1,350 kg
- When there is a danger of frost the tanks must be completely emptied.
- When the tanks are to be installed in a closed room, it is necessary to ensure that there is a floor drainage system.
- Children must be supervised in the vicinity of the containers.

3. Transport and storage

3.1 Transport

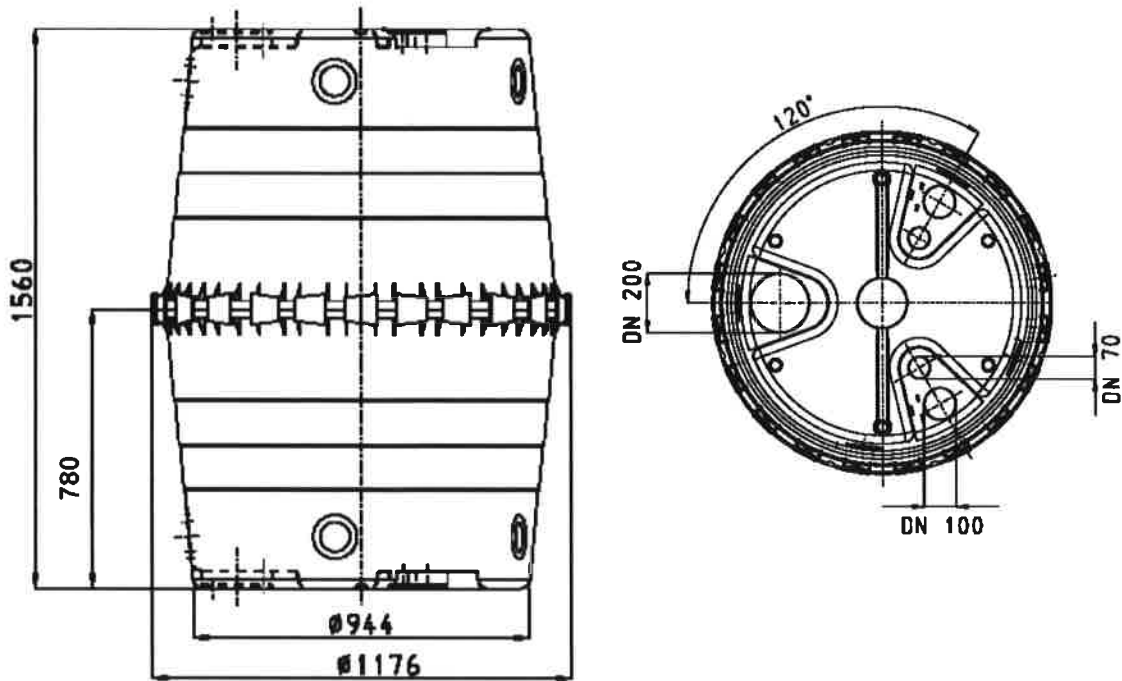
The transport of the tanks may only be undertaken with the appropriate transport machinery. During the transport the tanks are to be secured against slipping or falling. If the tanks are secured for transportation with webbing straps, it is to be ensured that the tanks remain undamaged. Dragging or lifting the tanks with steel cables or chains is not permitted.

Stress and excess loading caused by impact are to be avoided. Under no circumstances are the tanks to be rolled or slid over the ground surface.

3.2 Storage

Any necessary temporary storage of the tanks must be on an appropriate level surface without sharp objects. During the storage it is important to avoid damage caused by the surrounding environment or foreign objects. Unauthorized persons must be kept away from the tanks.

4. Technical data



5. Assembly

5.1 Trial installation

The container should be assembled on a trial basis before the final assembly to determine the position the following connections:

- Inlet
- Overflow

After opening the connections it is important to remove and clean all the drilling and sawing swarf from the tank.

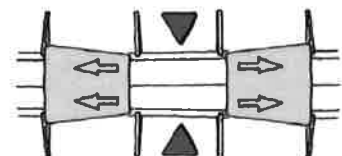
5.2 Tank assembly

The tanks consist of two identically constructed halves. For the assembly, the half with the closed side is positioned on the compacted and level ground surface. The profiled sealing ring is then well coated with lubricating soft soap and pressed with the ribbed side into the continuous perimeter of the inner seat recess. Before the second half of the tank is set in position, the seal and the seat recess of the upper half must also be well coated with the lubricating soft soap. During the assembly it is important to ensure that the seal does not slip out of the seat recess.

To secure the two halves, the connection clips are fitted first in a counter-clockwise direction and then in a clockwise direction. To assist in the assembly it may be necessary to press the two tank halves together with a number of G-clamps. To do this, position 3 to 4 G-clamps at equal intervals around the lip of the tank and then begin to tighten them evenly. Finally position the connection clips by hand and then drive them securely into place using a hammer with a piece of wood in between, the clips will then locate in the final engaged position.



Marking upper tank half



Marking lower tank half

6. Assembly above ground

When installing the tanks above ground it is important to ensure that they are completely emptied when there is any danger of frost. Furthermore, the tanks must be installed on an appropriate level and compacted surface that is free from sharp objects and stones. Notice must be taken when installing the tanks that the total weight when filled will be 1,350 kg. The tanks should also be installed in a shaded area. When the tanks are to be installed in a closed room, it is necessary to ensure that there is a floor drainage system on hand. The tanks are not designed to work under pressure and therefore it is important to ensure that the overflow outlet has the same diameter as the inlet.

6.1 Joining multiple vessels

The coupling of two or more tanks is achieved by means of assembly areas moulded into the bases of the tanks using GRAF special seals and canalisation pipes. The openings are only to be undertaken with the special GRAF core drills (hole saw) in the appropriate sizes. It is important to note that the distance between the tanks is a minimum of 10 cm. The pipes must extend into the tank at least 20 cm. If more than two tanks are to be connected to one another then in addition to the lower connection (inlet) there must also be an upper connection to ensure ventilation.

6.2 Laying connections

The connection of the inlet and overflow is by means of the pre-drilled openings of the tank or by means of the pre-molded connection points intended for opening.

All the suction and pressure control lines must be installed and connected **above** the maximum water level.

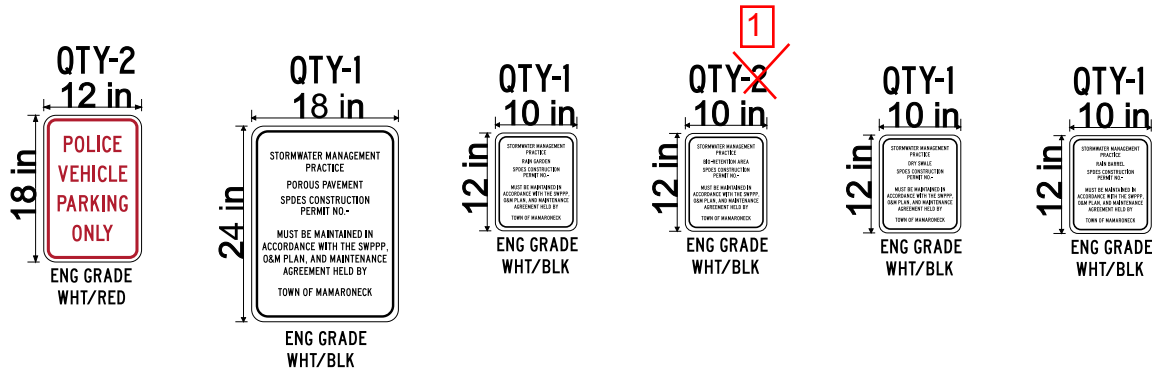
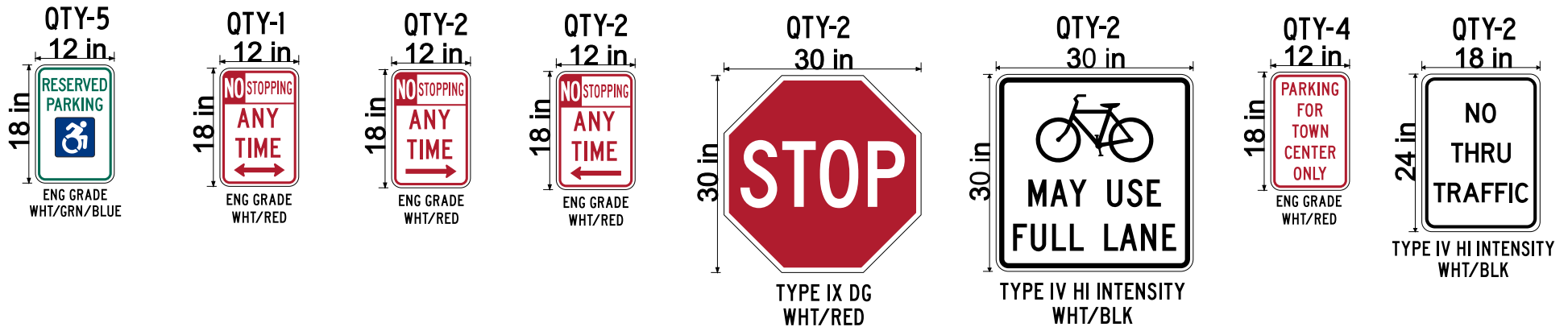
7. Service and maintenance

The system as a whole has to be checked for leaks, cleanliness, and stability at least every three months.

The system as a whole should be maintained every 5 years. In doing so, all system components have to be cleaned and checked for functionality. Maintenance works should be conducted as follows:

- empty tank completely
- remove immovable residua using a pressure washer through the tank head
- remove all contaminations from the tank
- check all installation parts for proper seat

.100 ALUMINUM SIGNS



Approved as Noted _____

Signature _____ Date _____
 Fax back to 845-228-5450

DEROSA SPORT CONST



Job No.:	Date:
Order Date:	Salesperson:
Sign Dimensions:	Estimate: \$
Comments:	
10/5/2016	

Customer:	
Company:	
Address:	
City:	State/ZIP:
Phone:	
Fax:	



MAMARONECK TOWN CENTER

PARKING LOT & GROUNDS IMPROVEMENT PROJECT



Town Supervisor: Ms. Nancy Seligson
Town Administrator: Mr. Stephen V. Altieri

Town Board Members:
Ms. Nancy Seligson
Mr. Thomas A. Murphy
Ms. Jaine Elkind Eney
Mr. Ernie Odierna
Ms. Abby Katz



STORMWATER MANAGEMENT & GREEN INFRASTRUCTURE PRACTICES

1 BIO-RETENTION

These multi-functional green spaces filter and manage stormwater runoff while providing benefits including effective breakdown and removal/immobilization of pollutants, increased infiltration time, increased wildlife habitat and biodiversity, and decreased reliance on existing stormwater infrastructure and treatment facilities.

2 PAVEMENT REDUCTIONS

Increases pervious area and reduces stormwater runoff quantities.

3 PERMEABLE PAVEMENTS (POROUS ASPHALT & PRE-CAST POROUS CONCRETE PAVERS)

Designed to infiltrate rainfall through the pavement surface, thereby reducing stormwater runoff quantities. Newly installed permeable pavements include a porous asphalt parking spaces and a PavéDrain® porous paver pedestrian circulation system.

4 CATCH BASIN FILTERS

Point source catch basin inserts are designed to capture pollutants such as sediments, trash, and organic debris but provide easy maintenance operations.

5 VEGETATED SWALE & RAIN GARDEN

The linear vegetated swale collects stormwater runoff, increasing filtration and managing stormwater runoff. The rain garden incorporates native plantings, and provides benefits including effective breakdown and removal/immobilization of pollutants, increased infiltration time, increased wildlife habitat and biodiversity, and decreased reliance on existing stormwater infrastructure and treatment facilities.

7 RAINBARRELS

Rain barrels capture and collect storm water runoff from roof surfaces decreasing overall storm water quantity and providing water for irrigation.

DID YOU KNOW?

This Project will treat 32,000 gallons of stormwater (the approximate volume of an average in ground residential swimming pool) during a typical rainfall event. The system here at the Town Center is filtering pollutants, sediment, litter, pet waste, automotive fluids and windborne materials from the parking lot, roadway, sidewalks and rooftop. By capturing these pollutants and treating them, the habitats of plants and animals is improved as well as the overall quality of our drinking water. The systems here also collect and temporarily store stormwater for infiltration and to reduce the peak flows during a storm event.

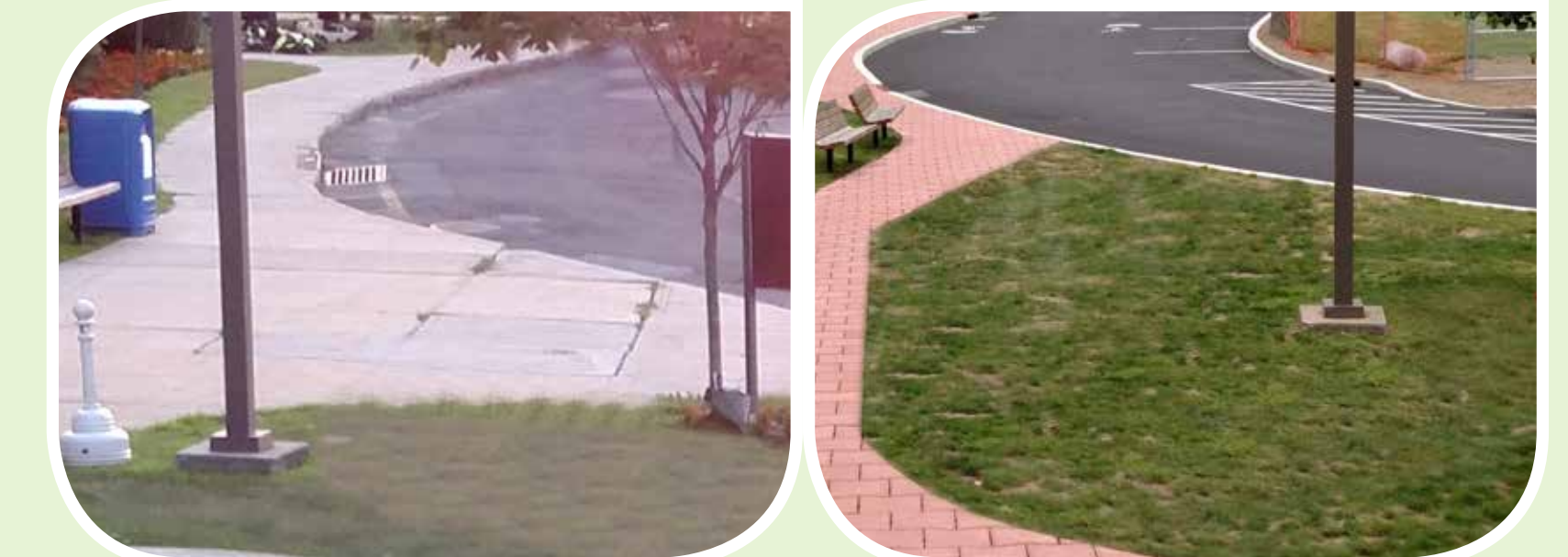
PROTECTING LONG ISLAND SOUND

The Mamaroneck Town Center Parking Lot & Grounds Improvement Project was funded by the Town of Mamaroneck and the National Fish and Wildlife Foundation (NFWF) Long Island Sound Futures Fund (LISFF). This Fund supports projects that improve water quality, provide habitats and promote resilient communities along the coastline of Long Island Sound.

Through stormwater infiltration and filtering this project reduces pollution and flooding, while creating habitat for songbirds, pollinators and other wildlife, promoting a more resilient local ecology and providing aesthetic benefits.



1 BIO-RETENTION



2 PAVEMENT REDUCTIONS



3 POROUS ASPHALT PAVEMENT



3 PRE-CAST POROUS CONCRETE PAVERS

4 CATCH BASIN CARTRIDGE INSERTS



5 RAIN GARDEN



7 RAINBARRELS

