



**Testimony of**  
**Vincent Sapienza**  
**Chief Operating Officer**  
**New York City Department of Environmental Protection**  
  
**before the**  
**New York City Council**  
**Committee on Resiliency and Waterfronts**  
  
**Oversight Hearing**  
**The Billion Oyster Project and Nature-Based Solutions**  
  
**December 1, 2022**

Good afternoon, Chair Kagan and the Members of the Resiliency and Waterfronts committee. My name is Vincent Sapienza; I am the Chief Operating Officer at the Department of Environmental Protection (DEP). I am here today to speak about some of DEP's nature-based solutions for various challenges that the city has been facing. DEP has long-standing nature-based infrastructure programs. In fact, DEP is running one of the most advanced nature-based programs in the country.

DEP's green infrastructure (GI) and Bluebelt programs are designed to manage stormwater. The first goal of the program was to improve harbor water quality by keeping stormwater out of combined sewer systems during rain events. This management reduces the volume of wastewater that might have to be released untreated during rain events, keeping pollutants out of the waterways. Newer GI systems are focused on managing stormwater in areas that are prone to flooding. DEP's most common stormwater management tools are Green Infrastructure and Bluebelts, so I would like to tell you a little bit about both of these programs.

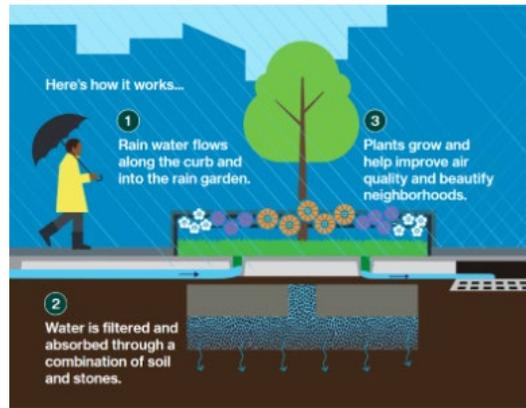
*Green Infrastructure*

Green infrastructure collects and manages stormwater outside of the traditional stormwater sewer system. They use or mimic nature. By absorbing stormwater before it enters the sewer system, GI reduces the amount of untreated wastewater and stormwater that could contribute to combined sewer overflows.

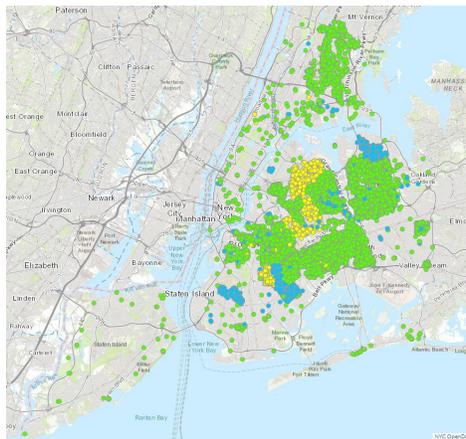
GI comes in many forms and ranges in size from rain barrels at individual homes to uncovering streams that have long been buried underground. I would like to take a minute to walk you through some of the most common types of GI we have in the city.

1. Rain Gardens, Stormwater Greenstreets, and Infiltration Basins

These three systems look different on the surface but have similar below ground engineering to capture stormwater. Each of these installations, or assets, allows water to flow in and then seep through layers of engineered soil and stone into the ground underneath. This process is called "infiltration."



Since 2011, DEP has constructed more than 11,000 of these infiltration assets, “greening” more than 2,000 acres around the city.



DEP GI Program Map

Rain gardens and stormwater greenstreets have vegetative tops, whereas infiltration basins are installed without gardens, so the tops look like grass or sidewalk.



Rain Garden in Rego Park, Queens  
by NYC Water



Infiltration Basin  
by NYC Water

Stormwater greenstreets are the largest of these assets. They are located in roadways instead of on the sidewalk, so they can vary in size and depths as the location allows.



Stormwater Greenstreet  
by NYC Water

## 2. Green Roofs

Green roofs are rooftops that have been designed to capture and retain stormwater. These roofs are different from simple rooftop gardens because they have engineered soil and drainage layers to maximize rain absorption.



Green Roof at Brooklyn Navy Yard  
by NYC Water

## 3. Blue Roofs, Subsurface Detention Systems, and Rain Barrels

Each of these asset types function by catching and storing stormwater. Unlike the systems I just mentioned, these assets do not immediately infiltrate water through soil systems. They hold water in place until the rain event has passed and then release it gradually.



Blue Roof in the South Bronx  
by NYC Water

Rain barrels work on smaller scales. They are connected to the existing downspout of a roof and collect water that homeowners can later use for watering plants and other landscaping. DEP works with elected officials and community organizations to hold rain barrel distribution events each summer. We have already partnered with many of your offices to distribute rain barrels and look forward to more events in 2023.



Rain Barrel Distribution in Morris Park, Bronx  
by NYC Water

#### 4. Permeable Pavement

Traditionally, paving an area makes it “impermeable,” meaning water cannot drain through it. This is why water is absorbed by dirt but flows off of streets. Permeable pavement, however, allows water to seep through to the ground, where it can be absorbed. Areas with permeable paving have less stormwater runoff than areas with traditional paving.

In particular, we have been expanding porous pavement, which is one type of permeable pavement. Porous pavement is special roadway paving that is designed to collect and manage stormwater that runs off the streets and sidewalks when it rains. Typical installations include porous concrete panels in the parking lanes in non-commercial areas.



Porous pavement in parking lane  
by NYC Water

Overall, GI uses rainwater as a resource instead of treating it as waste. These systems help the sewer system function more effectively, keeping our harbor waters clean and helping reduce ponding on

the streets. Assets like rain gardens also provide shade, cool and clean air, provide habitats for wildlife, and beautify neighborhoods.

### *Bluebelts*

Bluebelts are networks of engineered waterbodies that capture and treat stormwater. They preserve natural drainage corridors such as streams, ponds, and wetlands, and connect them to new storm sewer networks. These systems mitigate street flooding while improving water quality and ecosystem health. Some Bluebelts detain water from the sewer network and then slowly drain back into the sewer system when the rain event has passed and the system has the capacity to manage it. Other Bluebelts near shores provide stormwater storage then release water into the harbor when the tide goes out. Bluebelts allow DEP to provide proper street drainage without expensive pumping.

Because Bluebelts use wetlands and ponds to manage stormwater, they are primarily sited at locations with existing waterbodies and separate storm sewer networks. Most of them are on Staten Island because Staten Island has more intact watercourses and waterbodies than the other boroughs. Over the last ten years DEP has built Bluebelts for approximately one third of Staten Island's land area. DEP has also created some Bluebelts in Queens and is looking to expand the program in other boroughs.



Bluebelt, Staten Island  
by NYC Water

Bluebelts are true community assets. In addition to reducing flooding and improving water quality, they provide open green space landscaped with native vegetation and diverse wildlife. They provide benefits to communities beyond stormwater detention. As we face rising sea levels and heavier and more frequent rain events, Bluebelts offer a natural and effective solution for stable and sound stormwater management.

### **Looking Forward**

For decades, New York and other cities have been growing by working against our natural surroundings, turning vibrant ecosystems into concrete jungles. We have finally come to understand that the most effective way to live in our environment is to embrace it and incorporate natural systems into our city infrastructure.



Even as we expand our stormwater sewer network in some areas, we are focused on new and innovative solutions, including nature-based solutions. These tools are important because there many challenges that traditional (gray) infrastructure alone cannot meet. They are key to preparing the city for the future.

## **Testimony of the Resilient Coastal Communities Project on the Billion Oyster Project and Nature-Based Solutions**

The Columbia Climate School's [Resilient Coastal Communities Project](#) (RCCP)<sup>1</sup> respectfully submits this written testimony in connection with the December 1, 2022 oversight hearing held by the New York City Council, Committee on Resiliency and Waterfronts, regarding "The Billion Oyster Project and Nature-Based Solutions."

It is essential that our region take a comprehensive and holistic approach to implementing nature-based solutions to deal with flooding threats and make the most of the other benefits these solutions can achieve. The role of nature-based solutions is increasingly recognized at a national and international level, as demonstrated by President Biden's recent statement at COP27 and the new [Federal Roadmap for Nature-Based Solutions](#).

Currently, there are several efforts underway in New York City, including the Billion Oyster Project, to bring nature-based solutions to bear on flooding problems. However, we are falling short in several key areas:

1. We are not achieving success, as measured by state compliance agreements signed by the city, in using nature-based and green infrastructure approaches to manage stormwater.
2. The US Army Corps of Engineers' "NY-NJ Harbor and Tributaries Study" (HATS), our region's most important flood protection plan, does not employ nature-based solutions in a proactive manner, choosing instead to use them mainly to mitigate the damage that their proposed structural flood control techniques will cause.
3. Because we are not employing nature-based solutions in a comprehensive and holistic manner, we are not achieving the many "co-benefits" these solutions can provide.

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<sup>1</sup> The RCCP is a partnership between the Columbia Climate School and the [New York City Environmental Justice Alliance](#) seeking to foster new collaborations between environmental justice communities, practitioners, and researchers, as envisioned in Columbia's [Task Force Report on Directed Action](#), to help develop actionable, fundable, and equitable solutions to flood risks that also deliver complementary benefits, like habitat restoration, job creation, and greater community cohesion – and put into practice the Climate School's commitment to [fairness, social justice, and anti-racism](#). The RCCP also unequivocally advocates for increased community voice in flood planning and response in New York City to deliver better and more just solutions.

## **Failure to achieve nature based/green infrastructure stormwater management goals**

In recent years, the New York-New Jersey metropolitan area has seen rainfall records repeatedly exceed, with rainfall rates as high as 3.15 inches of rain per hour during Tropical Storm Ida. Many of the inland areas affected by flash floods during storm events like Ida were originally waterways, and daylighting small waterways throughout New York City is one nature-based solution with excellent potential to remediate flood risk.

More broadly, nature-based solutions are well known for their contribution to capturing stormwater via the infiltration of rainwater through permeable surfaces, through a method known as “Green Infrastructure.” This term covers solutions such as rain gardens and green roofs; porous surfaces in parks, housing and commercial properties; and, stormwater management techniques such as bioswales and stormwater detention ponds. Other critical types of nature-based solutions include oyster reefs, such as those constructed by the Billion Oyster Project, and restored wetlands, which reduce the impacts of flooding and storm surge by holding stormwater that otherwise would spill over into our streets and buildings. Wetlands also filter stormwater pollution before it can flow into our rivers and other waterways.

It’s essential that we deploy more nature-based and green infrastructure solutions to our stormwater overflow problems, as one-tenth of an inch of rainwater is often all it takes to exceed the capacity of the “Combined Sewer Overflow” stormwater management system utilized across most of New York City. Such overflows result in discharge of untreated wastewater to the city’s waterways, with detrimental effects on our ecosystems, and also generally correlate with inland pollution as well, as polluted floodwaters often back up or flow into city homes and businesses, with serious adverse impacts on human health (sometimes even causing fatalities, as with Hurricane Ida) and property.

As stated above, the use of nature-based solutions can detain stormwater, reduce run-off, and thereby limit the amount of excess water entering the Combined Sewer Overflow (CSO) system. The NYC Green Infrastructure Program, while commendable, does not go far enough to deliver the full potential benefits available through the holistic implementation of nature-based solutions, nor is the city anywhere near to achieving the commitments to green infrastructure that are required under a [2012 consent order](#) with the State Department of Environmental Conservation. In fact, the city [missed both its 2015 and 2020 green infrastructure installation](#) milestones under the 2012 consent order.

Allocation of additional funds toward parks and NYC Housing Authority Properties to increase the implementation of nature based green infrastructure would help the city catch up to its commitments in this area. Incentivizing such solutions by [restructuring water rates to fund more aggressive stormwater management](#) is another approach that has been studied for years and should be put into practice. Resources and partnerships to support ongoing maintenance of green infrastructure are also necessary.

These partnerships may be fruitfully pursued with community groups, as many community-led plans demonstrate a strong preference for green infrastructure and nature-based solutions, and some of the groups behind these plans are already working to support local nature-based solutions within the city. An informative [map](#) linking the plans produced within different areas of New York City has recently been developed by the Regional Planning Association in partnership with these community groups.

Finally, institutional compartmentalization means that many agencies are not resourced or motivated to consider and implement nature-based solutions during infrastructure construction and maintenance, despite the fact that these solutions often could be implemented at relatively low cost if a holistic approach were taken. For example, for areas smaller than one acre, the Department of Transportation is not mandated to consider nature-based solutions such as permeable paving, which would allow stormwater infiltration and reduce flooding in areas like pedestrian islands, median strips or the spaces at the center of traffic circles. When viewed holistically on a city-wide scale, addressing a significant number of these areas could have a large and beneficial impact on our city's flooding problems.

### **Failure to proactively use nature-based solutions in the HATS Resilience Study**

The institutional compartmentalization referred to above also affects the proposals outlined within the New York-New Jersey Harbor and Tributaries Study (NY-NJ HATS), which is presently under consultation by the US Army Corps of Engineers (USACE). For example, the USACE does not actively consider stormwater in the HATS study, despite the significant contribution to flooding that stormwater causes and a 2020 congressional directive to address the issue.

The NY-NJ HATS proposes some Natural and Nature-Based Features as part of its plan to deal with storm surge<sup>2</sup>. However, the main goal of such efforts is to compensate for the additional flooding that some communities will experience because of the construction of seawalls and storm surge barriers at the mouths of area waterways like

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<sup>2</sup>The details and locations of these Natural and Nature-Based Features are to be more fully described in future stages of the NY-NJ HATS, but are not well-detailed in the HATS "Tentatively Selected Plan" recently published for public comment. They are likely to include constructed dunes and wetlands.

Newtown Creek and Jamaica Bay. Four areas identified by the US Army Corps of Engineers as likely to suffer from induced flooding due to the proposed storm surge barriers include Breezy Point, southern Bronx (along Harlem River), Inwood, and Kips Bay.<sup>3</sup>

The Army Corps, by proposing in the HATS to deploy nature-based solutions mainly to mitigate the impacts of their proposal to build barriers and other structural measures to protect communities from storm surge, is missing out on the far greater opportunity to deploy nature-based solutions *proactively*, to address storm surge, sea level rise and stationary storm systems, in the more comprehensive manner described earlier in this testimony. Unfortunately, while the Army Corps was directed by Congress to take such a proactive and comprehensive approach, in the Water Resources Development Act of 2020<sup>4</sup>, the Corps continues to focus almost exclusively on storm surge and only tangentially on sea level rise and stationary storm systems, which pose very different risks which are evident when you compare the ways that Hurricane Ida ravaged low lying areas throughout the city while Superstorm Sandy caused greatest destruction through storm surge in coastal-facing areas.

The Resilient Coastal Communities Project urges the New York City Council to advocate to the USACE for a more holistic approach to flood mitigation, to protect the city from storm surge, stationary storms and sea level rise. And, in furtherance of such an holistic approach, we urge the Army Corps to deploy nature-based solutions comprehensively around the city to help protect our communities from stationary storms and rising seas through expansion of wetlands, bioswales, roof gardens and porous pavement in parks and NYCHA properties, as well as protecting citizens from storm surge through initiatives like the Billion Oyster Project and Living Breakwaters.

### **Missed opportunities to achieve “co-benefits” from nature-based solutions**

There are a range of related benefits associated with the use of nature-based solutions, including improved air quality, urban cooling, carbon sequestration and biodiversity benefits, as well as benefits to society such as improved health outcomes, job creation and reduced energy consumption. On the jobs front: New York City Environmental Justice Alliance and The Nature Conservancy, through their [Just Nature NYC](#)

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<sup>3</sup> There is potential to advocate for these Induced Flooding Mitigation Measures to include a greater reliance on nature-based solutions, as the initial plans include pumps, swales and detention ponds which could be implemented in ways that incorporate green infrastructure.

<sup>4</sup> Specifically, The Water Resources Development Act of 2020 states, at Section 163 (4): “The study for flood and storm damage reduction for the New York and New Jersey Harbor and Tributaries project ... is modified to require the Secretary [of the Army] to— **evaluate and address the impacts of low-frequency precipitation and sea-level rise on the study area...**” (Emphasis added).

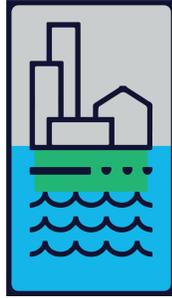
partnership, released [Opportunities for Growth: Nature-Based Jobs In NYC](#), which illustrates just how many jobs there are in City government that revolve around nature-based solutions and illustrate the societal benefits those jobs help create. And, this report, [Nature-Based Solutions for Climate Change in the UK](#), while prepared overseas, is extremely relevant and useful in building an understanding of how valuable nature can be in helping us fight climate change.

### Conclusion

Thank you for this opportunity to submit testimony on the issue of the Billion Oyster Project and nature-based solutions. For the reasons stated above, we urge the New York City Council to advocate for a more proactive and comprehensive approach to the use of these very valuable techniques, to reduce stormwater pollution, make our communities safer from flooding and reduce other climate-related risks, restore our damaged ecosystems; and, create job opportunities and other co-benefits. We hope you will [contact us](#) if we can be of further assistance in connection with our recommendations.

Respectfully submitted,

Paul Gallay  
Director, Resilient Coastal Communities Project, Columbia Climate School



# Metro Flood Defense

## **Testimony for City Council Hearing 12/1/22**

### ***Committee on Resiliency and Waterfronts***

Sam Jackson

Metro Flood Defense

My name is Sam Jackson, I am co-president of Metro Flood Defense and a member of the NY NJ Storm Surge Working Group. I will start by saying that my colleagues and I are longtime admirers of the Billion Oyster Project. I harvest oysters recreationally and I have seen firsthand how effective oyster beds can be in cleaning harbor waters. Metro Flood Defense and the Storm Surge Working Group support nature based solutions and we believe that green systems like oyster beds are a key element contributing to the flood defense of New York Harbor. But, they can only protect against small storms, not extreme events like Superstorm Sandy.

To protect our region from extreme storms and rising sea levels, the so-called gray and green communities (engineers and conservationists) will need to work together much more closely. The perimeter walls and levees favored by the Corps and the Mayor's Office have many inherent flaws, including limiting access to, and destroying the openness of nature-based waterfront parks that have been added to New York City's waterfront over the past fifty years. At the same time, locating walls between waterfront parks and nearby protected buildings would allow those parks to be inundated with sea water, killing trees and other vegetation and impounding flood waters and precipitation behind 20 foot walls. The Corps' and the Mayor's plan would also leave many neighborhoods completely unprotected for generations to come.

When it comes to protecting our region from extreme storm surges, we believe there is one solution that far outweighs the rest. That solution takes advantage of the natural geographic setting of New York City and its Harbor. All 500-plus miles of NYC coastline flood through two openings adding up to only six miles in width (Lower Bay/Verrazano Narrows and Throgs Neck, western Long Island Sound). And that's not to mention hundreds more miles in NJ and up the Hudson River that also flood through those

same openings. Taking advantage of this geography and blocking storm surge from even entering the harbor is the only cost effective and non-destructive solution for the next 100 years. This is why we firmly believe a layered defense will prevent the next storm from the scale of catastrophic destruction to our region caused by Sandy.

Metro Flood Defense and the Storm Surge Working Group call for a system of “layered defense” that takes advantage of these natural topographic features and is designed to protect virtually the entire metro region for the next century and beyond from storm surges and sea level rise. This proposal is based in part on the experience of numerous flood barrier systems built in the U.S. (Stamford CT, Providence RI, New Bedford MA, New Orleans LA) and overseas (London UK, The Netherlands, Venice Italy, St Petersburg Russia), and input from experienced Dutch engineers who enjoy the world’s longest track record of protecting major population centers from storm surges and sea level rise.

This layered defense alternative’s three main components include:

1. *Offshore movable sea gates*, opened for 99.9% of the time during settled weather that take advantage of the unique geography of the metropolitan area and allow for the Dutch principle of “shortening the coastline.” protecting several hundreds of miles of shoreline with only a few miles of moveable offshore barriers —either a six-mile Outer Harbor Barrier stretching from Breezy Point to Sandy Hook or a shorter barrier stretching from Coney Island to Staten Island, combined with a one-mile long movable barrier near the Throgs Neck Bridge.
2. *Low onshore levees or dunes* of a few feet in height to protect against routine flooding and slow sea level rise.
3. *Green systems* —Natural defenses, including rehabilitated wetlands and oyster beds to dampen wave action while also improving water quality and estuarine ecosystems.

We invite any and all elected officials, community groups and stakeholders to continue this discussion with us. I will be available after the hearing and I have included my contact information in my written testimony. Thank you for your time and consideration.

Sam Jackson  
*Co-President, Metro Flood Defense*  
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THE CITY OF NEW YORK**

Appearance Card

I intend to appear and speak on Int. No. \_\_\_\_\_ Res. No. \_\_\_\_\_

in favor  in opposition

Date: \_\_\_\_\_

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I represent: Billion Oyster Project

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in favor  in opposition

Date: 12/1/22

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I represent: DEP

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