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The Gaia Institute

17 October 2006

Honorable James F. Gennaro
Chair of the New York City Council
Committee on Environmental Protection
City Hall
New York, NY 10007

Re: Combined Sewers and Environmental Quality

Dear Chair Gennaro and Members of the Committee on Environmental Protection,

New York City has developed by creating dwellings and economic enterprises on the landscape at the edges of the Hudson, East, Harlem and Bronx River, Jamaica Bay and Long Island Sound. This protects us from the damage of water to living and working structures. This essential function needs our continued support.

At the same time, 450 combined sewers in the City of New York discharge some 40 billion gallons of combined sewer discharge into the estuaries around New York City, carrying with it health risks to the populace and putting stresses on fish and invertebrates in these water bodies.

The City is home to some half a million trees, which have the capacity to move tens of billions of gallons of water from the ground into the atmosphere each year, providing benefits to the citizens of this City.

The City is covered with about 30,000 acres of soil, with capacities of infiltrating between part of a billion to several billion gallons of precipitation per hour. Since an inch of rainfall over the 300 square miles of the City equals about 5 billion gallons, this infiltration capacity merits investigation and testing to evaluate its capacity to incorporate runoff and eliminate or regulate discharge into the combined sewer.

The Parks Department is already on this path, in what I count to be one of the most forward thinking and finest community greening and tree support programs in the country in their modification of the GreenStreet program for enhanced stormwater capture. I have been fortunate to play a small role in working with Parks to look at curb and storage modifications, but the modularity and ready

The work of the Gaia Institute couples ecological engineering and restoration with the integration of human communities in natural systems. While much environmental engineering has the worthy aim of minimizing harm, the Gaia Institute explores, through research and development, design and construction, how human activities and waste products can be treated to increase ecological productivity, biodiversity, environmental quality, and economic well being.



GreenStreet Park at Hunts Point and Randall Avenues in the Bronx

constructability of these traffic island and street edge greenspaces provides the basic means of quickly transforming impervious infrastructure into a sustaining abode for soil and plant life.

Greening neighborhoods contributes to more than aesthetics. While 40 billion gallons of combined sewer discharge only carries negative impacts with it, on the land, a billion gallons of water can support the growth and development of trees, shrubs, and meadows for a week in 20,000 acres of landscape. A billion gallons of water, evaporated from plant leaves, is the equivalent of two hundred million tons of air conditioning. These kinds of mass flows of cool air could potentially be enough to reverse the negative impacts of the brutally hot days in the City, which suffered some 35 mortalities from the heat wave this past summer.

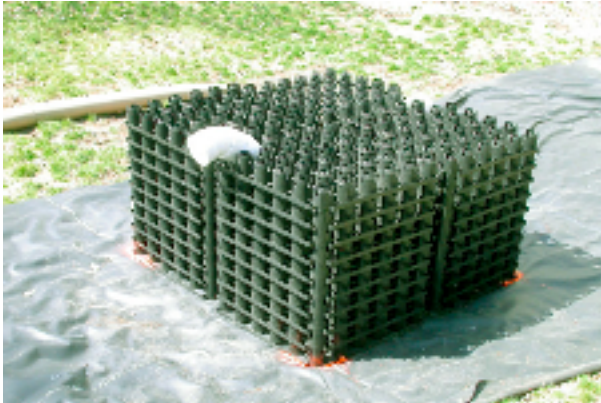
At critical times, the New York City Department of Environmental Protection has been capable of innovation in the realm of stormwater. The award winning Bluebelt in Staten Island is a case in point, where the agency added value to local properties and the entire landscape by addressing flooding, erosion, and damage to infrastructure by conserving and enhancing forested landscapes and wetlands, while using ecological technologies to stabilize stream banks and hillsides.

We now have the opportunity, even the necessity, to address stormwater in other areas of Staten Island, and also the Jamaica Bay and Bronx River watersheds, as well as in the stormsewersheds of each of the 14-wastewater treatment plants. What the New York City Soil Survey has shown to be especially germane here is that while wetland soils are distributed in a relatively few areas, glacial soils and outwash zones with substantial infiltration rates are distributed throughout much, if not most, of the 300 square miles of New York City.

Because of the glacial history of New York, opportunities exist in all of the stormsewersheds to create enhanced tree plantings, GreenStreet type parks, as well as other greenspaces which can be designed to

capture, hold, and infiltrate quantities of water which can significantly and favorably impact the combined sewer problem.

For example, with the help of the Parks Department and DEP, we were able to construct, with the community at El Jardin del Paraiso, a stormwater capture park. While aspects of the landscape are unique, the commercially available RainStore, pictured below, would be applicable to create catchment and storage capacity of approximately 200 gallons per square meter adjacent to street tree plantings.



The structure shown above occupies 4 square meters on the surface, 4 cubic meters below grade, and holds nearly a thousand gallons. It serves as a cistern at El Jardin del Paraiso to receive and store water from an adjacent 5,000 square foot roof, and is manufactured by Invisible Structures from recycled plastic.

An even more cost-effective structure that can be installed under sidewalks, parking lots, and/or adjacent to plantings is the StormChamber.



These structures will help to:

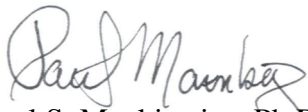
- 1) remove nutrients from stormwater;
- 2) increase infiltration;
- 3) increase groundwater recharge; and
- 4) decrease combined sewer discharge.

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StormChambers can be installed under parking lots, providing a large storage area for stormwater. About a million gallons of water could be captured beneath a one-acre parking lot. The capital cost here or beneath side walks next to GreenStreet plantings could be as little as a dollar per gallon of water captured, compared to the \approx \$8 per gallon cost of the tanks at Flushing, Paerdegat, and elsewhere.

More than a century ago, Frederick Law Olmstead pointed out in practice that verdant green added values to real estate in New York City. NYC DPR and DEP have furthered this insight and cause with their GreenStreets and Bluebelts. Tests to evaluate the scale of application to the combined sewer problem could be put in place at multiple locations by constructing a number of prototypes. From experience with the GreenStreet Parks, I believe that many of these could be constructed by late winter or spring. Political will and commitment to testing and monitoring could provide a means of assessing how the City might address at once issues of combined sewers, urban heat island, and the protection of the health of it's citizens.

A handwritten signature in black ink, appearing to read "Paul S. Mankiewicz". The signature is fluid and cursive, with the first name "Paul" being particularly prominent.

Paul S. Mankiewicz, Ph.D.
Executive Director