

Weighing Sea Barriers as Protection for New York

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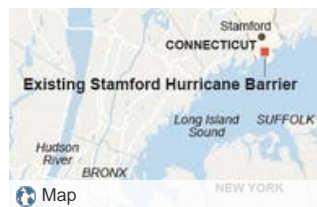
As the storm chugged toward the Eastern Seaboard at 3 p.m. on Oct. 27, an engineering crew in Stamford, Conn., was at the ready. It was time.



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U.S. Army Corps of Engineers
An aerial view of the hurricane barrier site in Stamford, Conn., in 1986. An expert estimates that any such barrier system to block storm surges in the low-lying areas of New York City would cost at least \$10 billion to \$17 billion.

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With the click of a computer mouse, machinery on the seafloor groaned into action and a gate was slowly pulled from the deep, locking into place high above the surge from Long Island Sound.

Two days later, when storm waters from Hurricane Sandy ripped through the East Coast, much of Stamford, a city of 124,000, sat securely behind a 17-foot-high barrier that easily blocked an 11-foot surge.

The Army Corps of Engineers estimates that the two-mile-long barrier system, completed in 1969, helped prevent about \$25 million in damage to businesses and homes. The protected area encompasses about 600 acres, including downtown Stamford.

Stamford's mayor, Michael A. Pavia, said: "It was extremely effective in protecting areas that would have been flooded completely by this storm. It made all the difference in the world."

The technology of movable sea barriers, from Stamford's modest flap gate to London's mighty 10-gate system in the River Thames, has long intrigued engineers and planners contemplating a solution for low-lying areas of New York City. The notion is that such a system could one day block surges from Long Island Sound and the Atlantic Ocean into the East River and New York Harbor.

Now, in the aftermath of the devastating storm, one question is front and center: Should New York armor itself with steel and concrete at a cost of billions of dollars?

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Experts whose barrier designs and studies from a conference in 2009 were issued on Monday in book form argue that anything short of sea gates would be a "Band-Aid" approach.

Mayor Michael R. Bloomberg has expressed wariness about the barrier proposal, saying he is not sure the gates would work well enough. Yet, it is clear that his administration's view is evolving.

Jeroen Aerts, a researcher with the University of Amsterdam in the Netherlands who was hired by New York in 2009 to assess flood risks and protections, said officials initially preferred to focus on cheaper and less-intrusive options like flood-proofing buildings and expanding wetlands to absorb more water.

The assumption, he said, was that unlike New Orleans, New York City is far enough above sea level and skilled enough at evacuations that it could prevent a major loss of lives.

The turning point was Tropical Storm Irene, which in August 2011 mostly skirted the city but pummeled other coastal areas in the region. After that storm, the mayor's Office of Long-Term Planning and Sustainability asked Dr. Aerts, a geographer and an expert on water risk management and climate, to compare the costs and benefits of barriers with those of smaller-scale changes like building levees around sewage treatment plants and elevating subway stations.

Dr. Aerts, who is expected to present a draft of his findings in January, estimates that any barrier system would cost \$10 billion to \$17 billion. New York would need \$10 billion to \$12 billion more to shore up the areas on the sides of the barriers, he added. Still, he said, the city should consider building the barriers.

Brian A. Colle, a professor of atmospheric science who is part of the Storm Surge Research Group at Stony Brook University, contends that barriers would have made a big difference when the storm pounded the area last week.

He said that if gates had been placed in strategic spots like the Arthur Kill, between Staten Island and New Jersey, they would have protected some of the areas that were swamped by floodwaters, including the edges of Lower Manhattan, low-lying areas of Brooklyn and Queens and the western part of Staten Island, as well as Jersey City and Hoboken, N.J.

"The idea is that you raise these barriers, and anywhere inside of that you're basically protected," Dr. Colle said, adding, "With a solid barrier, we basically can have business as usual in Lower Manhattan."

But vexing questions remain. Would industries tolerate immense disruption from the construction of barriers in the city's busy waterways? Would residents object to the



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marring of vistas? With climate change advancing, can scientists accurately predict the size of hurricanes that the sea gates would one day have to withstand?

And where would the \$10 billion-plus in construction money come from? Even a study — taking into account the complexity of New York waterways, projections in the rise in sea levels and other factors — would take years and millions of dollars.

The scientists and engineers who have worked on conceptual designs for the city say a comprehensive study is needed on what would be the most effective locations and the most practical type of barriers — whether they swing close like a driveway gate or pivot up from the ocean floor, for example.

A feasibility study by the Army Corps of Engineers, which would have jurisdiction, would require authorization from Congress.

“A lot of things need to be taken into consideration before we throw up a giant wall,” said Chris Gardner, a spokesman for the corps.

Beyond the enormous potential cost, there is no question that there are drawbacks to sea barriers. A barrier that blocks the surge on one side would cause water levels on the other to rise close to a foot, Dr. Colle said, potentially worsening flooding in other areas.

“You could have about 20 percent more water on the other side of the barrier,” he said.

Furthermore, pollution from the runoff of storm water mixed with sewage would be trapped behind a barrier, with nowhere to go while the sea gate is closed.

There is also considerable concern about the environmental costs of disrupting tidal flows and salinity for fish and other aquatic life by building permanent infrastructure in New York Harbor and in the metropolitan area’s rivers.

“The harbor, the Hudson, the Hackensack and Raritan Rivers, Arthur Kill all have thriving ecosystems that benefit us economically and in terms of recreation,” said [Paul Gallay](#), president of the environmental group [Riverkeeper](#). “We understand everything needs to be on the table dealing with the new normal, but storm surge barriers may end up doing more harm than good.”

In Stamford, where a barrier was built at a cost of \$14.5 million, it took experience with deadly hurricanes to make the investment. It has been used hundreds of times for storms and high tides.

The storm last week, some skeptics argue, was not bad enough for barriers to become part of the preventive mix in New York.

“People won’t accept these dramatic changes to the environment,” said [Philip Orton](#), a storm surge research scientist with the [Stevens Institute of Technology](#) in Hoboken. “I don’t think we’ve had our big disaster where hundreds of people die to make this palatable. But it certainly will change the debate.”

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