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## **Manufacturing Islands; Superstorm-Protection Plans Weigh the Possibility of Adding Land to the Harbor**

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Protecting New York City from future superstorms might be a job for artificial islands built in and around its vulnerable harbor.

A preliminary report prepared by the NYS 2100 commission, one of four post-Sandy panels appointed by New York Gov. Andrew Cuomo to envision ways to gird the region against natural disasters, includes a proposal to add islands to the harbor, according to one commissioner familiar with the document. The 170-page preliminary report hasn't been made public.

On Thursday, Mr. Cuomo discussed specific recommendations from two of the other disaster-preparedness panels, which include training a civilian volunteer corps, preparing National Guard troops for electrical-repair work and requiring gas stations to keep emergency-backup generators.

"We haven't done any financial analysis but it's going to be very, very expensive," Mr. Cuomo said on Thursday of the ideas suggested by the panels.

The governor said he would detail additional recommendations from the commissions in next week's State of the State address.

A spokesman for the governor said the NYS 2100 report wasn't final.

The possibility of protecting the city with artificial islands or other barriers has long intrigued waterfront engineers, who have tinkered with proposals for years. And man-made land has succeeded in the past: The 92-acre Battery Park City neighborhood was generated from excavated land and rocks.

The most expensive and wide-ranging idea likely comes from Malcolm Bowman, an oceanographer at Stony Brook University who has proposed a \$17 billion barrier that would stretch from Sandy Hook, N.J., to Breezy Point in Queens. He concedes the plan needs millions of cubic feet of sand and faces regulatory hurdles and financing problems that could span decades.

Still, Mr. Bowman said in an interview Thursday that the engineering involved is "not rocket science." Functional models for man-made barriers that would work to stave off flooding exist in St. Petersburg, Russia, across the Netherlands and in nearby cities such as Stamford, Conn.

Louisiana officials have spent more than \$2 billion on two barriers since Hurricane Katrina in 2005, a state spokesman said.

"We can continue to patch things up and respond to catastrophes as they happen," Mr. Bowman said. "Or we can decide, 'This is no way to run a city,' and that we have to be serious about this."

Susannah Drake, a New York-based landscape architect, has envisioned a less-expensive solution involving some three-dozen bean bags, each measuring more than 75 feet long and filled with dredge from the waterfront. The bags would be topped with plants and placed in the shallows near Manhattan's shoreline, creating a wetlands-like wall around areas flooded by Sandy.

"You're putting together a bunch of pieces like Legos with organic matter, and they'll accrete over time and you'll end up having an expanded system," Ms. Drake explained.

Her design firm, dlandstudio, mapped out the proposal in a project commissioned by the Metropolitan Museum of Modern Art, and she later served on a city panel on waterfront issues.

Adam Freed, an executive with the Nature Conservancy and a former official in the Bloomberg administration, cautioned that it is impossible to endorse any plan for artificial barriers without testing.

"It all depends what you're designing for and how they're designed," Mr. Freed said. "You don't know what the next storm will look like, whether it will have 13 inches of rain like Hurricane Irene or 13 feet of surge like Hurricane Sandy."

Others experts remain skeptical over the potential protection offered by manufactured islands.

"The short answer is man-made barriers in the harbor won't work," said Jeroen Aerts, a professor at the Institute of Environmental Studies in Amsterdam who is consulting on the city's waterfront plans.

Mr. Aerts said barriers would likely be more effective in coastal areas beyond Lower Manhattan under threat from surging waves, including Coney Island, Staten Island and the Rockaways. But inside the harbor itself, he said, the greater worry should be slowly rising waters.

There is also the question locating enough fill material to fabricate barriers. Such a project would require a "tremendous amount of sand and a tremendous amount of energy," said Jay Tanski, a coastal geologist at New York Sea Grant.

The Army Corps of Engineers has held discussions with city and state officials about post-Sandy infrastructure solutions, said spokesman Chris Gardner, but the agency hasn't been asked to study the New York Harbor.

Mr. Gardner also made it clear that artificial islands probably won't become "the hottest new beach with the greatest view in the world." Islands designed to be inhabited by civilians would need to meet strict environmental standards.

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