Howard Beach
Program Information Meeting
Committee Meeting #4

November 25, 2013
Infrastructure Concepts

The following projects address the problems that happened during Superstorm Sandy:

1. **Surge and Flooding**
2. **Power Outage**
3. **Sewer Backup**
4. **Protection of Vulnerable Populations**
Surge Protection Calculation

- How high you build your surge protection in depends on:
  - The flood event you are protecting against +
  - The existing elevation +
  - Sea Level Rise +
  - Freeboard
What are we protecting against?

What do we do? Types of Strategies

Storm Surge
*Protect against storm surge*

Wave Action
*Reduce wave energy / Minimize upland wave zones*

High Tides, Sea Level Rise, Water Currents
*Raise coastal edge elevations*

Storm Surge

To completely keep out the 100 year storm surge this is what we are up against …
Regional Surge Protection: City-wide surge barriers

Various options for city-wide surge barriers have been studied in the past

- **Pros**
  - Provides Harbor-wide protection (to a point)

- **Concerns**
  - Extremely expensive: $20-25 Billion to construct with ongoing maintenance costs
  - Requires extensive coordination among, city, state, and federal agencies
  - Likely to have significant negative environmental and hydrologic impacts
  - Would still require large-scale coastal protection infrastructure on the ocean-side of the Rockaways

Sandy-hook to rockaway surge barrier (including connecting levees / walls in NY and NJ) + Surge Barrier at Throgs Neck

Source: A Stronger, More Resilient New York
Gateway National Park & Jamaica Bay

Gateway National Park
Jamaica Bay Unit

- Gateway National Park Land
- Gateway National Park Legislative Boundary
- NY Rising Community Planning Areas
Rockaway Peninsula and Jamaica Bay

Coastal Protection Projects
## What is being done already?

<table>
<thead>
<tr>
<th>Project / study name</th>
<th>Agency</th>
<th>Anticipated Completion</th>
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<tbody>
<tr>
<td>Jamaica Bay Feasibility Study</td>
<td>USACE</td>
<td>July 2014 (draft report)</td>
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<tr>
<td>Reevaluation of ecological restoration projects for potential coastal protection benefit</td>
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<tr>
<td>East Rockaway to Rockaway Inlet Reformulation Study</td>
<td>UCACE</td>
<td>Phase 1: October 2014 (draft)</td>
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<td>Phase 1 – Ocean side - Beach Renourishment &amp; additional erosion control</td>
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<td>Phase 2: October 2015 (draft)</td>
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<td>Phase 2 – Bay Side -</td>
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<td>Rockaway Boardwalk</td>
<td>NYC DPR</td>
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<td>NYCDPR has developed a plan to rebuild the boardwalk in concrete with a bulkhead that is NOT wave-resistant</td>
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<td>Atlantic Side Beach Dune</td>
<td>USACE &amp; NYC DPR</td>
<td>Beach 19 to Beach 149 ongoing Rockaway Inlet to Ft. Tilden: Memorial Day 2014</td>
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<td>From Beach 19 to Beach 149, working with the city to create a dune (ongoing) From Rockaway East Inlet to Ft. Tilden: USACE constructing 200' beach berm + 16' sand dune. City will then cover with burlap and plantings. This will be complete by Memorial Day 2014</td>
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Regional Combined Strategies

Large Scale Habitat Restoration in Jamaica Bay

OPPORTUNITY: JAMAICA BAY MODIFIED SHALLOWING

The modified shallowing approach looks at restoring
undertimized deepwater channels into shallow water habitat.
Natural footprints of tidal marshlands, salt flats, and shallow
water areas are restored where possible, and deepwater
channels that remain are narrowed. A single deepwater
channel is preserved that serves the wastewater treatment
plants, Howard Beach fire station, and JFK airport. Even in
the modified scenario, significant reductions in water levels
are visible. See ABSORBITIVE EDGES and DREDGE WETLANDS.

ADGIDC modeling with Donna shows that the combination
of modified shallowing, marshland broadening, and dawn
construction at the Rockaways yielded significant reduction
in flood heights within the west and south sides of the
Rockaway peninsula, as well as flood water levels on the
west side (0.8 ft) and east side (1.5 ft) of the bay. Waves were
reduced by 0.9% but were increased in some zones. Flood
water levels were slightly increased (inches) at the Cross Bay
Parkway. Further study is required.
Regional Strategies Surge Protection

Jamaica Bay Surge Barrier

“A Stronger, More Resilient New York” South Queens Initiative #1:
“Call for USACE to develop an implementation plan to mitigate inundation risks through Rockaway Inlet, exploring Surge Barrier and alternative measures”
Complete protection against surge

A coordinated approach that requires each agency, government entity, and private owners to implement a continuous edge protection strategy.

PROS

- Uses multiple methods tailored to ownership and geomorphological condition, and other considerations
- Provides comprehensive protection if fully implemented

CONS

- Requires every owner and/or entity to coordinate if protection is to be comprehensive
- Unlikely to be implemented in the short term
- Very costly
Local Coastal Protection – Protect the Edge

- Deployable barrier/raised road
- Landscaped berm/wall
- 100 year floodplain
- 500 year floodplain

Howard Beach Planning Committee Meeting
Hurricane Barrier Precedents

New England and New Jersey hurricane barriers

Figure 1. New England and New Jersey hurricane barriers.

Hurricane Barriers in New England and New Jersey — History and Status After Four Decades
Tide Gate

Examples of large tide gate

Figure 42. Aerial photograph of Stamford hurricane barrier (photograph courtesy of New England District).

Figure 43. Stamford hurricane barrier (photograph courtesy of New England District).

Hurricane Barriers in New England and New Jersey — History and Status After Four Decades
Strategies to Protect Against Storm Surge

- Deployable Floodwalls
- Floodbreak
- Permanent Floodwalls
- Sea Walls
- Flood Walls
- Levees
- Deployable Floodwalls
Local Coastal Protection – Attenuate Wave Action
Strategies to Reduce Wave Action

Floating Breakwater

Constructed Wetlands

Reefs

Groins

Artificial Reef

Breakwaters

Living Shorelines

Constructed Breakwater Islands
Strategies to Raise Coastal Edge Elevations

Bulkheads

Revetments
Edge Conditions

Shoreline and Piers Type

- Bulkhead
- Natural
- On Piles
- Riprap
Existing/ongoing Plans & Projects
Local Coastal Protection

*Keep the water out for more frequent storms and reduce the extent of flooding in a 100 year storm*

*Seawalls / Berms + Local Surge Barriers or tidegates + Raised Bulkheads*
Local Coastal Protection

*Keep the water out for more frequent storms and reduce the extent of flooding in a 100 year storm*

Seawalls / Berms + Local Surge Barriers or tidegates + Raised Bulkheads

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**Scenario with low range of existing elevation**

- Future high tide: BFE + 31" SLR (12.6)
- Raise Bulkhead 6.6
- Existing elevation (4.0)

**Scenario with high range of existing elevation**

- Future high tide: BFE + 31" SLR (12.6)
- Raise Bulkhead 4.6
- Existing elevation (8.0)
Local Coastal Protection

*Keep the water out for more frequent storms and reduce the extent of flooding in a 100 year storm*

*Seawalls / Berms + Local Surge Barriers or tidegates + Raised Bulkheads*

Howard Beach
Shellbank Basin: Raise Bulkheads

- Raised bulkhead
- Flood proof storm drain with backflow preventor
- Tide gate
- Deployable barrier/raised road
- Flood protection on land
- High ground

Flood proof storm drain with backflow preventor
Raise bulkheads
Local Coastal Protection – Keep the water out (100 year storms)

*Berms + Breakwaters + Channel Closure + Local Surge Barriers + tide gates*
Local Coastal Protection – Keep the water out (100 year storms)

*Berms + Breakwaters + Channel Closure + Local Surge Barriers + tide gates*
Tide Gates

SRT In Normal Tide Sequence

1. SRT ACTING AS NORMAL FLAP GATE ALLOWING ESTUARY DRAINAGE
2. RISING TIDE FLOATS GATE UP ALLOWING INCOMING TIDE TO FLOOD ESTUARY BASIN
3. TIDE BEGINS TO CLOSE GATE LIMITING ESTUARY FLOOD LEVEL
4. NORMAL HIGH TIDE GATE FULLY CLOSED
5. COVER FLOATING ON FALLING TIDE LOWERS ESTUARY FLOOD LEVEL
6. GATE ACTING AS normal FLAP ESTuARY DRAINAGE RESUMES

Tide Gates Catalog: Golden Harvest, Inc.
**Tide Gates**

**SRT In Storm Sequence**

1. SRT acting as normal flap gate allowing estuary drainage
2. Rising tide floats gate up allowing incoming tide to flood estuary basin
3. Tide begins to close gate limiting estuary flood level
4. Normal high tide gate fully closed
5. When tide exceeds normal high tide level, gate locks in closed position to prevent gate action due to surges
6. Eceeding tide — side flaps open to allow drainage of estuary — main gate cover restricted to partially open until next tide
7. Next incoming tide — gate unlocks & resumes normal tide sequence

Tide Gates Catalog: Golden Harvest, Inc.
A tide gate installed in the NJ Meadowlands
Tide Gates Catalog: Golden Harvest, Inc.
Dock Reconfiguration, Dredging, and Storm Protection Habitat Islands

1. Veterans Park
2. Community Center
3. Amphitheater
4. Art Gallery
5. Boat Ramp Area
6. Tourist Information Center
7. Tiki Bar
8. Marina Square
9. New Public Library
Precedent: City of Fort Pierce Marina Island Breakwater Creation

- 12 Island Breakwaters & 1 Peninsular Structure
  - Total of 14.66 Acres
- Ecological Enhancements
  - > 12 Acres
    - Oyster Recruitment
    - Mangrove Habitat
    - Juvenile Fish Habitat
    - Shore Bird Habitat
- $18.9 Million Construction Cost
  - NTP Issued February 2012
  - Construction Finishes End of May 2013
Local Coastal Protection – Keep the water out (100 year storms)

Berms + Breakwaters + Channel Closure + Local Surge Barriers + tide gates
Local Coastal Protection – Keep the water out (100 year storms)

*Seawalls / Berms + Local Surge Barriers + tide gates*
Local Coastal Protection – Keep the water out (100 year storms)

*Seawalls / Berms + Local Surge Barriers + tide gates*
Navigable Tide Gate
Allow Commercial Boats

Navigable Tide Gate
Allow Small Pleasure Craft

Shinnecock Locks, Ray Kelly
Local Coastal Protection – Keep the water out (100 year storms)

Seawalls / Berms + Local Surge Barriers + tide gates
How the System Works

- **Generation, Transmission, Distribution** - Plants generate electricity

- **High-voltage transmission lines carry electricity long distances**

- **Substations decrease voltage levels**

- **Underground or overhead feeder lines carry electricity to the end user**

- **Service lines connect to electrical equipment in homes and businesses**
What Happened in Sandy

Most electrical outages during Sandy were caused by damage to the electricity distribution system

- All three area substations knocked out by seawater from storm surge.
- Toppled trees and intense winds damaged overhead power lines.
- Individual household/apartment building equipment was flooded from seawater and took longer to get back on line after power was restored.
Potential Strategies: Protect Distribution System

*Protect substations from future flood damage*

- Floodwalls to protect perimeters
- Raise equipment
- Install backup generators, flood sensors, submersible equipment, etc.
- Install backup connections to be ready for temporary mobile substations

ConEdison has made temporary repairs and identified long-term mitigation and permanent projects for the three area substations.
Protect Our Power Sources

Con Ed Substation (79th St & 151st Ave)

Con Ed Substation (84th St & 160th Ave)

Con Ed Substation (Cross Bay Blvd. & 157th Ave)
Protect Our Substations

- All Howard Beach substations are in the flood plain areas
- ConEdison has procured temporary water barriers (Tiger Dam) that can be deployed prior to a storm
- ConEdison is also making additional cosmetic improvements to its substation sites in Howard Beach


Typical tiger dam construction

ConEdison sub station located at 84th St and 150th Ave
Potential Strategies: Protect Distribution System

Protect service lines

- Strengthen/relocate power lines
- Proper tree maintenance
- Relocate some/all of system underground
- Install smart-grid technologies to reduce number of citizens affected if/when powerlines go down
Potential Strategies: Protect Distribution System

*Protect home equipment*

- Get it out of harm’s way
  - Raise switches, sockets, breakers, and wiring
- Make it floodable
  - Replace with submersible equipment
Potential Strategies

Independent Energy Sources: SOLAR

- Functions when grid goes out
- Retains benefit of using grid power during normal operations
- Panels on individual buildings or covering parking areas

Components
- Panel for generation
- Battery for storage and smoothing fluctuation
- Connection to grid
- Smart inverters
Potential Strategies

*Independent Energy Sources - WIND*

- Should be combined with energy storage system
- Functions when grid goes out
- Feeds into grid during normal operations

*Three types of wind power*
  - Small-wind
  - On-shore
  - Off-shore
Potential Strategies: Independent Energy Sources

NATURAL GAS POWERED SMALL GENERATORS

- Natural gas system are more reliable than liquid fuels
Potential Strategies: Independent Energy Sources

**MICROGRID**

- Smaller portion of the larger electrical grid
- Can be disconnected from the larger grid during emergency
- Contains independent power generation sources and load balancing within micro-grid

A micro-grid acts as a self-sufficient unit when the larger grid is compromised.
Representative Strategies

Infrastructure:
• Develop a protection strategy for local power stations
• Increase access to isolated sections of the community – especially Hamilton Beach
• Raise low-lying streets

Natural and Cultural
• Protect the edge

Health and Social Services
• Expand healthcare and social infrastructure to support the community’s senior population
• Build dual- or multi-purpose service center(s)
• Enhance the resiliency of the New York Fire Department and NYPD Harbor Unit facility on Cross Bay Blvd. and the West Hamilton Beach Volunteer Fire Department

Economic
• Protect commercial areas and corridors, such as Cross Bay Boulevard and Lindenwood commercial area
• Surge protection for Coleman Square
• Training and communication programs around rebuilding program and financing options

Housing
• Project: Low-cost financing to help residents fund housing resiliency improvements
Howard Beach – Preliminary Projects

**INFRASTRUCTURE / NATURAL + CULTURAL**

- Citywide/Jamaica Bay Regional Protection Strategy
- Local Wave Attenuation Strategy
- Local/Temporary Surge Protection Strategy
- Additional Protection for local Electrical Substations
- Increase Howard Beach JFK AirTrain platform
- Raise 102nd - 106th Street access into Hamilton Beach
- Create new Pedestrian access (tied in with tidegate) between Hamilton Beach and Old Howard Beach
- Develop a strategy to stop sewer back-ups (beyond City efforts to protect local pump station)

**HOUSING / HEALTH + SOCIAL / ECONOMIC**

- Develop brochure with tips and check-off list of mitigation strategies specific to Howard Beach housing stock
- Provide experts to visit individual homes to recommend appropriate mitigation measures
- Develop and fund a program to implement home resilience projects
- Develop short-term business resiliency strategies
- Develop long-term resiliency strategies for business corridors
- Develop an approach for data gathering for vulnerable populations
- Develop an emergency/recovery center to support the existing network of Howard Beach community centers
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