SUFFOLK COUNTY LEGISLATURE

SUPERSTORM SANDY REVIEW TASK FORCE

Report to the Legislature: Looking to the Past to Prepare for the Future

Issued October 2019

Commissioned by

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A Letter from
Suffolk County Legislature Presiding Officer
DuWayne Gregory

On October 29, 2012, Superstorm Sandy made landfall on the East Coast of the United States, becoming the deadliest and most destructive storm of the 2012 hurricane season and the second most costly on record in the United States.

The storm, which began as a low-pressure system, impacted 24 states – most along the eastern seaboard – with flooding and wind, fallen trees, lost power in homes, businesses, government offices, electrical substations and schools, and waste-treatment plants dumping billions of gallons of garbage, sand, oil and sewage into homes and businesses throughout Long Island.

The devastation and destruction, which amounted to upwards of $60 billion dollars, left homeowners on Long Island reeling, struggling to navigate the path to recovery and the many layers of bureaucracy, unsure of how to access funding that could be used to rebuild or repair their homes, and uncertain of who to trust and whom to believe.

Five years after Superstorm Sandy, the Governor's Office of Storm Recovery compiled data that assessed the damage on Long Island to more than 64,000 homes and 8,000 businesses. Some $1.15 billion in funding was awarded and approximately $1 billion disbursed to single-family homeowners. Approximately 11,000 households were assisted with rebuilding and repairs and more than 1,400 mandatory and optional elevations had been completed with $410 million supporting elevation of homes in flood zones.

In addition, more than $40 million was disbursed to 1,500 households as part of the Interim Mortgage Assistance Program; 900 low-to-moderate-income rental units were constructed through the Affordable Housing Fund; and more than 650 properties were purchased by New York State and returned to the land as part of the NY Rising Buyout Program. Private insurers, FEMA and the Small Business Administration also provided financial assistance.

While the financial and emotional tolls have been enormous for communities throughout Long Island, the resiliency shown by residents and business owners has played a significant role in the region's recovery.

Still, there is more to be done.

In 2017, I sponsored legislation to create the Superstorm Sandy Review Task Force, a 17-member panel of county, town and village officials, community members versed in land use and engineering, representatives from labor, a not-for-profit, and higher education with the goal of creating a roadmap for Suffolk County should another storm of this magnitude present itself.

The task force, under the chairmanship of David Calone, met monthly to gather information and recommend best practices for pre-storm resiliency, create an infrastructure mitigation plan, coordinate storm response among emergency services at all levels, and institute a storm recovery and reconstruction template.

This report is a result of the work of the Superstorm Sandy Review Task Force. The analysis provides important information for how to ensure that Long Island has in place the infrastructure needed to protect vital resources that provide essential services, like electricity and water. It evaluates emergency services and discusses ways in which response should be coordinated to ensure access and to avoid inconsistencies and duplication. The report offers a roadmap for accessing the funding options that are available to repair and rebuild homes, and websites to secure information relating to services and programs that can assist residents.

I believe this report represents a much-needed assessment of pre-storm Long Island and post-storm Long Island. It is a compilation of testimony from hundreds of individuals who have been impacted personally and professionally. I want to thank all the members of the Superstorm Sandy Review Task Force for their time and commitment to this important project. Through their dedication and commitment we are on our way to a better, more secure future.

A Letter from Suffolk County Executive

STEVE BELLONE

Superstorm Sandy struck at the heart of Long Island, leaving devastation in its wake and creating untold financial hardship and stress for those who were impacted by the winds and flooding associated with its storm surge. The aftermath brought out the very best of the collective human spirit as people banded together to lift up one another up in their time of need. We worked together to coordinate an unprecedented storm response, to clean up storm debris, restore power, and to help people rebuild their homes which is ongoing.

Once Suffolk went from response mode into recovery, the County conducted an After Action Review to identify how we might improve our response to the next major event. Five years later, the presiding officer established the Superstorm Sandy Task Force to evaluate where we're at and what specifically we should be addressing in terms of response, recovery, resiliency and infrastructure mitigation.

One of the principle fronts on which the County has already taken action is to reduce the nitrogen loading that has contributed to the degradation of our second line of defense against storm surges – the wetlands. The Suffolk County Coastal Resiliency Initiative is applying substantial federal and state grants to connect key south shore communities that currently do not treat their wastewater to sewers. Another program through Reclaim Our Water is extending grants from the state and county to homeowners so they can afford to replace non-performing cesspools and septics with innovative, alternative on-site waster systems that greatly reduce nitrogen emissions. The five east end towns are providing further funding from their Community Preservation Fund.

We expect that, as a result of this task force report, there will be further impetus to more completely prepare Suffolk County for future storm events and gird against sea-level rise.

A Letter From Task Force Chair

DAVID CALONE

The Superstorm Sandy Review Task Force worked for more than a year to review and assess the impact of Sandy, improvements in storm preparedness since 2012, and steps that can be taken to improve our readiness for future natural disasters.

Members of the task force are particularly grateful to Suffolk County Legislature Presiding Officer DuWayne Gregory for conceiving of the task force and recognizing the need to look back so we can prepare going forward. Suffolk County Executive Steve Bellone also deserves thanks for not only having several members of his administration serve on the task force but also personally contributing to the work of the task force. I am grateful to our vice chair, Suffolk County Chief Recovery Officer Dorian Dale, for his guidance and leadership from the earliest days of the task force. Finally, we could not have completed this endeavor without the strong support of the Presiding Officer's staff, in particular Lora Gellerstein, and Christina DeLisi and former staff member Josh Slaughter.

Sandy represented the most acute and visible impact that our region has faced as a result of the global threat of climate change and sea level rise. It won't be the last. In October 2018, during the course of the task force's work, the United Nations Intergovernmental Panel on Climate Change released its "Doomsday" report detailing the devastating effects of increased global warming. Long Island's location puts us in the crosshairs of future devastating storms.

The spirit of the people of Suffolk County proved stronger than Sandy but, as this report outlines, we must learn from Sandy and remain ever vigilant to enhance our capabilities when it comes to our response, recovery and reconstruction, resilient adaptation, and infrastructure. In so doing, we will better prepare for whatever nature next brings our way.

INTRODUCTION

Sticking out more than 100 miles into the ocean with nearly 1,000 miles of coastline and no continental land mass to buffer the impact of northward-moving coastal storms, Suffolk County is on the front lines of the rising sea levels and increasingly ferocious and numerous storm events that global warming is generating.

As damaging as it was, Superstorm Sandy ("Sandy") was not "the big one." The October 2012 storm turned toward New Jersey and avoided making a direct hit on Long Island. It did not have a major rain impact on Long Island, and the winds were below hurricane force when they arrived. Nevertheless, Sandy teaches us that climate change is magnifying the effects of severe weather such that even storm surge generated by a glancing blow can be devastatingly impactful.

While Sandy was one of our region's worst experiences, it brought out the best in Long Islanders: neighbor helping neighbor, stranger helping stranger, and utility workers and first responders working in difficult and sometimes dangerous conditions to respond to the disaster. In the months and years since, an unprecedented investment of federal and state dollars coordinated through the New York State Governor's Office of Storm Recovery (GOSR) has led to major infrastructure improvements, thousands of homes raised, businesses back on their feet, and more natural protection as a result of property buyouts.

Nonetheless, there is much work left to do – not only to finish recovering from Sandy but also to make sure that our region is better prepared for the next disaster. This preparation includes improving governmental processes, enhancing man-made infrastructure, and bolstering natural protections. Importantly, studies show that these are investments well worth making. The National Institute of Building Sciences estimated in 2017 that every $1 spent by the government on hazard mitigation projects resulted in a $6 reduction in future costs. [1]

These investments must be made while simultaneously starting to plan for the reality that some places on Long Island will never beat Mother Nature, and thus, building restrictions in some locations will have to be enhanced. At the same time, we will need leadership to ensure that what has been called "strategic retreat" will be more than merely "ad hoc retreat."

Sandy is both a historical fact and – nearly seven years later – an ongoing impediment to many Suffolk residents and businesses. However, enough time has gone by that we now can look back to help us look forward. The next regional disaster will not be the same as Sandy – in fact, it may not even be a storm – but as we learn lessons from Sandy we will be preparing for many different kinds of emergencies. The challenges for our county are how best to prepare ahead of time for an uncertain future incident, to minimize impacts to the greatest extent possible, and to put ourselves in the best position to bounce back when the inevitable next severe weather event occurs. In so doing, we must continually strive to build a safer and more resilient Suffolk County keeping in mind that preparation is not a one-time thing; it is an ongoing act and state of mind. If we are doing it right, we will never be done.

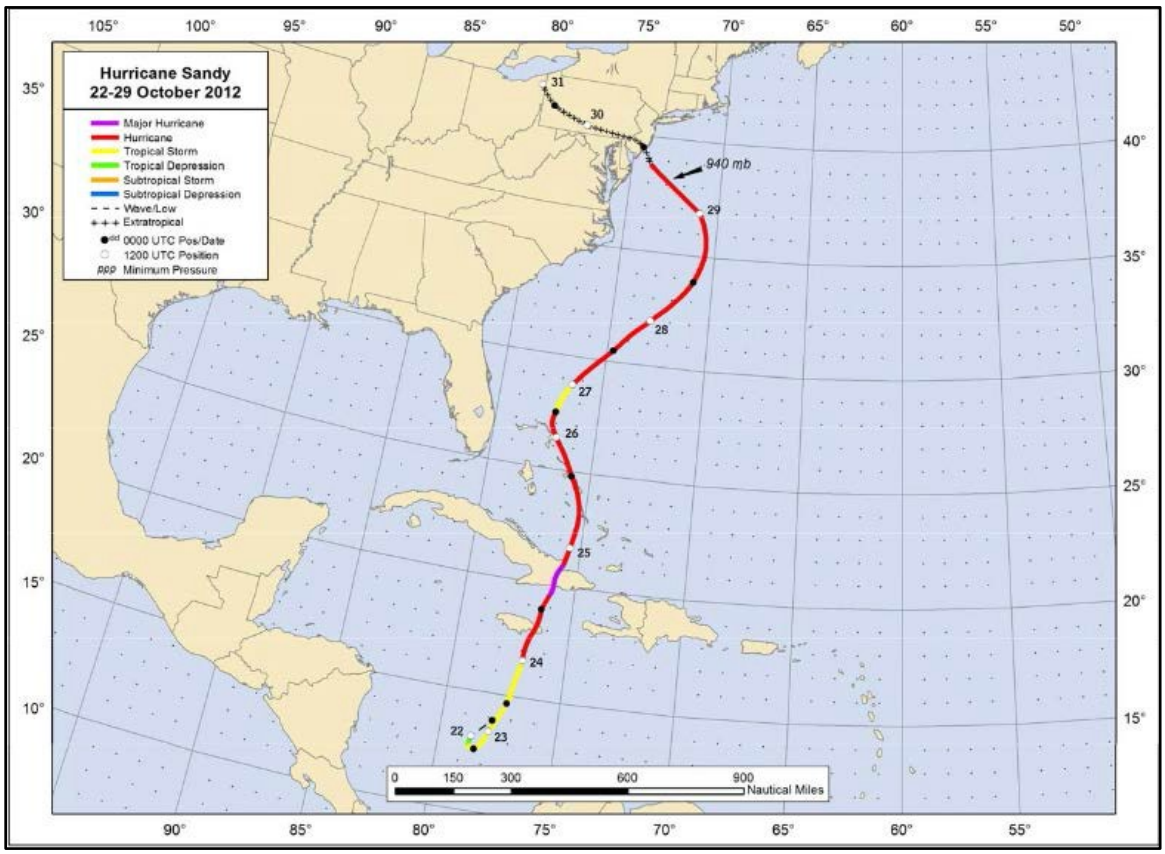
[1] www.nibs.org/page/mitigationsaves

Mastic Beach after Superstorm Sandy hit. Photo courtesy of Tina Schneyer.

SUPERSTORM SANDY

Sandy hit Long Island on October 29, 2012 with tropical force winds contained in a massive system that covered 932 miles in diameter, encompassing the entirety of Suffolk County.[2] Sandy was the largest Atlantic storm in recorded history, fueled by unprecedented late-season ocean-expanding warmth (+5°F) augmented by elevated levels of atmospheric moisture. Following decades of hurricanes spinning up the 45-degree angle of the New Jersey coast and then sliding eastward out to sea, Sandy's movements caught many by surprise when, driven by a "3-sigma" blocking high over Greenland following the largest Arctic sea ice melt in human history, the storm turned left and headed west towards New York harbor.

[2] "Hurricane Sandy's Huge Size: Freak of Nature or Climate Change?" www.wunderground.com/blog/JeffMasters/hurricane-sandys-huge-size-freak-of-nature-or-climate-change.html

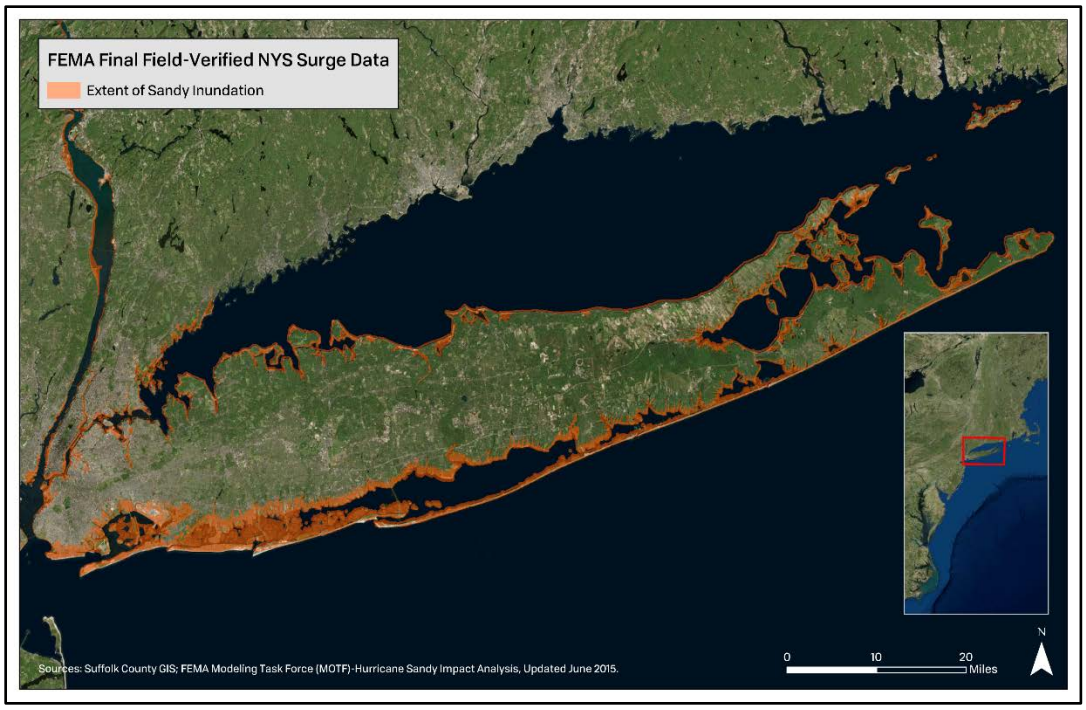


The path of Superstorm Sandy. Image courtesy of the National Hurricane Center.[3]

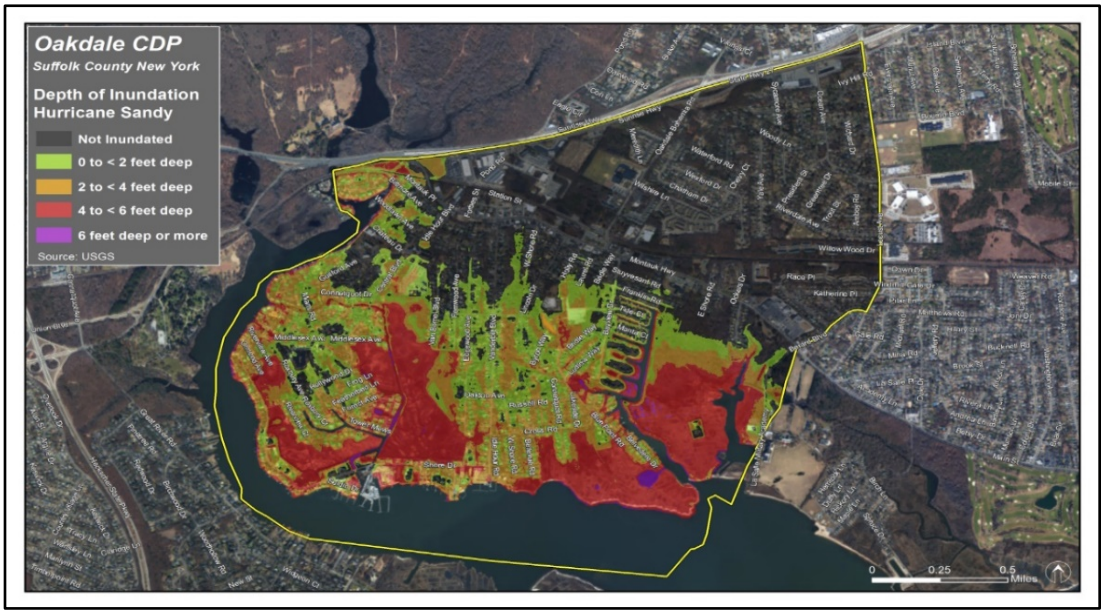
As a result of the storm's track, Suffolk experienced maximum wind gusts between 66 miles per hour in East Hampton and 96 miles per hour in Eaton's Neck, according to the National Weather Service. The storm surge reached several feet along the entire coast of Suffolk, measuring at over 9 feet at Bergen Point in Babylon, over 5 feet in Montauk, and over 4 feet in Greenport.[4] The aftermath of Sandy resulted in prolonged power outages from downed wires, school and business closings, flooding, fuel shortages, downed trees across the county, and millions of cubic yards of debris.

[3] www.weather.gov/okx/HurricaneSandy#Track

[4] www.weather.gov/okx/HurricaneSandy



Surge impact of Superstorm Sandy on Long Island. Image courtesy of Suffolk County.



Illustrative impact of Superstorm Sandy on Oakdale. Image courtesy of U.S. Geological Survey.

CREATION OF THE SUFFOLK COUNTY LEGISLATURE'S SUPERSTORM SANDY REVIEW TASK FORCE

The Superstorm Sandy Review Task Force ("SSRTF") was the brainchild of Suffolk County Legislature Presiding Officer DuWayne Gregory. The task force was established through legislation sponsored by Presiding Officer Gregory, unanimously adopted by the legislature, and signed by County Executive Steve Bellone on December 26, 2017.

Through this legislation, Presiding Officer Gregory sought to prepare for future storms by analyzing the challenges Superstorm Sandy presented and how those challenges were met by federal, state and local governments, public utilities, not-for-profit organizations and the private sector. The goal was that reviewing and analyzing the preparation for, response to and recovery from Superstorm Sandy would help ensure that infrastructure, utilities, first responders and government agencies are in the best position to withstand future named storms and extreme weather events. Thus, the SSRTF was tasked with performing "an in-depth review of the preparation for and provision of services before, during and after Superstorm Sandy by government agencies, first responders, not-for-profit organizations and private sector entities to determine which measures were effective and what actions must be taken to increase resiliency and improve response to future extreme weather events." [5]

Pursuant to the legislation, members representing various skill sets, stakeholders and levels and functions of government were appointed to serve on the task force. Those members were sworn in at the SSRTF's first meeting in February 2018. At that time, the task force members selected David Calone, former chair of the Suffolk County Planning Commission, to chair the SSRTF, and Dorian Dale, Suffolk County's Chief Recovery Officer and Director of Sustainability, to serve as SSRTF's Vice Chair.

In addition to regularly scheduled SSRTF meetings, the SSRTF had four public hearings in 2018 to solicit input, ideas and comments from the public (*See* Appendix, Exhibit B). These hearings were held at Stony Brook University, Southampton Town Hall, Patchogue-Medford High School and Babylon Town Hall. More than 60 members of the public addressed the SSRTF at the hearings. The SSRTF also met with the Suffolk County Town Supervisors Association and held a listening session with Suffolk County residents who served on the one of the locality-based NY Rising Community Reconstruction Zone Planning Committees.

[5] Suffolk County Legislature Resolution No. 1156-2017.

GOALS AND METHODOLOGY OF THE TASK FORCE

From their first meeting, SSRTF members decided to focus on making recommendations that were doable in the short term and in the next five years while being cognizant that any recommendations need to be in the context of both longer-term regional goals and funding constraints.

To organize its work, the SSRTF established four broad areas of inquiry: storm response, storm recovery and reconstruction, natural resiliency, and infrastructure. Working groups were established to investigate and address each of these areas – each of which resulted in a chapter of this report. The recommendations of each working group appear in their corresponding chapters and were reviewed by the entire SSRTF prior to the finalization of this report.

NOTES ON THIS REPORT

With a topic as broad as Sandy, the SSRTF had to make choices as to what aspects to focus on. In doing so, the members tried to emphasize those areas that fell within the broad personal expertise of the group and that reflected mitigations that would help prepare our county for a "100 year" storm or greater. As such, while every effort was made to provide citations throughout this report, since SSRTF members provided certain input based on their lived experience and since this report is not intended to be an academic work but rather a guide for policymakers, the SSRTF decided to include certain information even if it was not citable to an outside source.

Following Sandy, the County undertook a self-assessment as to the Sandy response and recovery which resulted in a robust "Suffolk County After Action Review" that carefully detailed County operational successes and areas for improvement along with clear assignments of operational responsibility within the County government. The After Action Review is included as Exhibit C in the Appendix to this report.

The SSRTF acknowledges the self-reflection on the part of the Governor's Office of Storm Recovery throughout this process and notes the valuable assistance of GOSR personnel in the SSRTF's work.

CHAPTER I
STORM RESPONSE

The key is not to fight the last war.

– Jon Kaiman, formerly the Governor's Special Advisor for LI Storm Recovery

The immediate aftermath of Superstorm Sandy saw the largest emergency response effort ever in Suffolk County's history. Several thousand Suffolk County employees from the Department of Fire, Rescue and Emergency Services (FRES), the Department of Public Works (DPW), the Police Department and many other departments, along with thousands of additional employees from municipalities and local utilities were tasked with keeping Suffolk residents safe, clearing debris and restoring power and heat. Volunteers played critical roles in the immediate response as well as in the longer-term recovery.

While one can always look back at a specific incident and try to figure out how the response could have been improved, the simple fact is that we don't know what kind of major storm or other natural emergency will hit Suffolk next. Thus, the need for broad-based preparedness is critical. In that regard, since Sandy, Suffolk County government has done an admirable job in creating broad-based emergency management plans including revisions to the County's Comprehensive Emergency Management Plan, it's Multi-Jurisdictional Hazard Mitigation Plan and its Multi-Jurisdictional Debris Management Plan. The County also created a comprehensive After Action Review (*See* Appendix, Exhibit C) in the fall of 2013 to review the actions of County government during Sandy and to establish recommendations and procedures to allow the County to be even better prepared in the future for a broad range of emergencies.

Downed power lines in Westhampton Beach after Superstorm Sandy. Photo courtesy of Tina Schneyer.

COMPREHENSIVE EMERGENCY MANAGEMENT PLAN AND MULTIJURISDICTIONAL HAZARD MITIGATION PLAN

Fallen trees in East Moriches after Superstorm Sandy hit. Photo courtesy of Tina Schneyer.

Background

The goal of Suffolk County FRES's Office of Emergency Management (OEM) is to assist Suffolk residents in preparing for a minimum of three days without public services. OEM was in the process of updating Suffolk County's Comprehensive Emergency Management Plan (CEMP) when Sandy hit with wind gusts reaching 90 miles per hour and up to 9 feet of storm surge. As a result of Sandy, OEM officials determined that some improvements and changes to the CEMP were necessary in order to ensure the continuity of services, the safety of Suffolk's residents, and the responsiveness of Suffolk's employees and first responders.

Since Superstorm Sandy

In December 2017, the OEM completed the update of the CEMP – essentially the operation plan for the County's Emergency Operations Center (EOC) – in accordance with

nationally accepted best practices. One of the biggest changes implemented as part of the revised CEMP was the adoption of the Emergency Support Functions (ESFs). ESFs, established by the Federal Emergency Management Agency (FEMA) National Response Framework, are a way of organizing emergency response into 15 nationally recognized functions. In this way, Suffolk is now aligned with federal and state organizations and can speak the same language when it comes to structuring its response. Importantly, the OEM also has revised the EOC's software "E-Team" and its incident management program to reflect the CEMP and align itself with the ESFs and the National Response Framework.

The update of the Suffolk County Multi-Jurisdictional Hazard Mitigation Plan (HMP) was also greatly impacted by Sandy. The HMP covers the 10 towns, 32 villages and two tribal nations within Suffolk County's borders. The goal of the plan is to provide a detailed analysis of Suffolk's natural hazards and to outline Suffolk County government's goals for eliminating future damage in part by identifying municipal projects that would reduce hazards within the county – for instance, elevating a frequently washed out road. The HMP, which was completed in 2014, has identified approximately 750 hazard mitigation projects that could be done within Suffolk County. Going forward, these projects can now be funded through federal grants as 10 percent of FEMA funding to disaster areas can be spent on future hazard mitigation projects.

Since Sandy, Suffolk's OEM also:

- developed an emergency preparedness registry of functional needs individuals;
- expanded the County's "Code Red" outbound mass notification capabilities to allow better ability to communicate to Suffolk's 400,000 homes and businesses;
- addressed a shortcoming in the National Weather Services' flood prediction data by adding two new tidal gauges – one at Watch Hill on Fire Island and the other in Moriches Bay at the Moriches Coast Guard Station – to complement the one other tidal gauge on the South Shore and the one on the North Shore;
- expanded Suffolk's central warehouse capacity to house emergency response equipment and supplies including Meals, Ready-to-Eat (MREs), bottled water, cots, generators, etc.;
- created a standing request that weather forecasters from the National Weather Service staff Suffolk's EOC during major weather events;
- improved weather notifications and forecasting and modeling;
- integrated Smart911 technology (including an opt-in ability for citizens to provide additional information about their homes) into the county's 911 database; and
- created a new website (https://gis3.suffolkcountyny.gov/shelterlocator) so citizens can determine flood zone boundaries and shelter locations.

Recommendations

Outside experts consulted by the SSRTF, including former Deputy Commissioner of New York City's Office of Emergency Management Rich Rotanz, have indicated that the new Suffolk County CEMP is a "model" document.

1) Now that Suffolk has taken the important step of aligning itself with FEMA's protocols, the appropriate departments of Suffolk County need to ensure that the County's emergency

plans are continually updated and revised as national best practices continue to evolve over time. In particular, since the Suffolk County HMP expires in 2019, additional support in terms of federal and state grants are needed to help fund an updated version.

2) Since water level information is critical for storm response, if the US Geological Survey is not able to continue funding the Watch Hill and Moriches Bay water level gauges, appropriate departments of Suffolk County should seek alternative funding for the $84,000 per year needed to operate and maintain the gauges.

3) As technology continues to advance, Suffolk should create a multi-jurisdictional and cross-department team (perhaps in conjunction with Nassau County) to annually review new technologies that can assist in storm response. Recent advances in just the last few years that are worthy of review for potential utilization include:
    - new flood warning/mapping tech like the MIT-developed RiskMap.us that gathers real-time, crowd-sourced flood reporting;
    - new data driven dashboards for officials and emergency managers, such as Geospiza which uses predictive analytics and real time data including from Internet of Things (IoT) devices to help improve resource allocation during emergencies/natural disasters; and
    - use of drones and commercial satellite imagery to assess damage and danger.

DEBRIS MANAGEMENT

Background

Sandy created the largest debris incident that Suffolk County has ever faced. Most of the debris was vegetative waste – comprising 99 percent of the total debris by volume and 53 percent by weight, according to data from the Suffolk Multi-Jurisdictional Debris Management Plan, Table 2.6.

Jurisdiction	Vegetative Debris		Construction & Demolition (C&D)		Household Hazardous Waste (HHW)		White Goods		E-Goods		Mixed Debris		Total	
	CY	TONS	CY	TONS	CY	TONS	CY	TONS	CY	TONS	CY	TONS	CY	TONS
Babylon	1,535	17,163	1,644	60,720	0	63	0	0	0	0	0	135	**3,179**	**78,081**
Brookhaven	282,136	0	0	0	0	0	0	0	0	0	82	0	**290,983**	**0**
East Hampton	17,043	0	0	0	0	0	0	0	0	0	0	0	**17,043**	**0**
Huntington	417,723	0	0	0	0	0	0	0	0	0	273	0	**417,996**	**0**
Islip	6,930	18,090	181	821	0	0	0	0	0	0	288	1,504	**7,399**	**20,415**
Riverhead	17,291	4,314	11	6	0	0	0	0	0	0	0	0	**17,302**	**4,320**
Shelter Island	2,500	8	0	0	0	0	0	0	0	0	0	0	**2,500**	**0**
Smithtown	1,624	30,614	0	0	0	0	0	0	0	0	0	0	**1,624**	**30,614**
Southampton	119,936	899	0	0	0	0	163	0	0	0	360	0	**120,459**	**899**
Southold	125,980	0	3,632	0	0	0	0	0	0	0	0	0	**129,612**	**0**
Suffolk County	465,352	0	0	0	0	0	0	0	0	0	0	0	**465,352**	**0**
Total	**1,458,050**	**71,088**	**14,233**	**61,547**	**0**	**63**	**163**	**0**	**0**	**0**	**1,003**	**1,639**	**1,473,449**	**134,337**

Notes: Total debris generated from DR-4085 calculated as 284,067 tons – based on conversion factors of: 10 CY per ton of vegetative debris; and 4 CY per ton of C&D and other debris.

Table from the Suffolk County Multi-Jurisdictional Debris Management Plan illustrating debris production totals generated by Superstorm Sandy.

The Division of Material Management for Region 1 of the New York State Department of Environmental Conservation (DEC) estimated that, for Suffolk and Nassau combined, 2 million cubic yards of vegetative waste was created along with 400,000 cubic yards of mixed storm debris and 100,000 containers (1,360 cubic feet each) of household hazardous waste. In addition, 125,000 cubic yards of sand were sifted and 100,000 damaged cars were cleared. Across Suffolk and Nassau, the DEC provided emergency authorizations to establish 52 vegetative debris staging areas and 36 mixed debris staging areas. Additional emergency authorizations allowed additional rail and barge sites to be created for handling such debris.

It took 15 months to fully clear all of the Sandy debris out of Suffolk County. FEMA debris management specialists were brought in to advise the County. The Army Corps of Engineers was particularly helpful in removing debris on Fire Island. This was handled through a direct federal contract that ultimately entailed hiring over 400 workers and 100 pieces of machinery which were barged over from the mainland.[6]

To help with clearing out the vegetative debris, the County initially used four burn boxes at the Brookhaven Town Landfill that were operating 24 hours a day and required constant EPA monitoring. Due to environmental and community concerns, the burning operation was reduced to 14 hours per day and eventually transitioned to chipping.[7]

[6] DPW
[7] *Ibid.*

The post-Sandy debris is piled high on Fire Island. Photo courtesy of Tina Schneyer.

Since Superstorm Sandy

The Suffolk County Multi-Jurisdictional Debris Management Plan (DMP) was created by the Suffolk County OEM in 2016 based in large part on the lessons learned from Sandy. The DMP provides an organizational structure and standardized guidelines for the clearance, removal, staging, reduction, recycling, processing, and disposal of debris caused by natural and man-made events. The DMP is consistent with FEMA guidelines and functions within the framework of the DEC's Storm Debris Management guidelines.

Among the lessons learned from Sandy that are incorporated in the Suffolk County DMP are the need for temporary debris staging areas across the county and the need for longer-term debris management sites. In response, Suffolk County has pre-identified six sites for this purpose that are accessible by truck from the Long Island Expressway or Sunrise Highway, according to DPW. Perhaps most importantly, DPW has created a new competitively bid disaster recovery contract covering equipment and personnel needed to deal with debris management in the aftermath of storms. As per Section 1.1.5.2 of the DMP, this contract can be used by all of Suffolk's towns and villages at their discretion to help them meet their storm recovery needs. This effort is consistent with federal policy adopted by Congress after Hurricane Katrina in 2005, which called for FEMA to assist localities in arranging contracts for goods and services like debris removal, housing, inspections, and electrical installations ahead of disasters to speed up response and reduce costs.[8]

[8] *See* "Action Needed to Better Ensure More Effective Use and Management of Advance Contracts," U.S. Government Accountability Office, December 6, 2018.

Recommendations

1) Continual updating of the Suffolk County DMP and ongoing resources for training regarding its implementation are critical to ensure not only that storm-caused debris can be expeditiously removed so that residents can return to their lives but also so that long-term environmental damage can be avoided. In particular, man-made debris and materials can be harmful to coastal ponds and waterways, tidal wetlands and barrier beaches – and may also be washed further inland. The release of toxic materials contained and carried in this debris by storm events is potentially hazardous and can create long-term threats to life, safety and property.

2) While the DEC can allow the use of air curtain burners in certain extreme situations, given ongoing air quality concerns in Suffolk, the County should emphasize chipping and grinding vegetative debris and should encourage municipalities in Suffolk to do the same. Chipping and grinding, while not only more environmentally sensitive, also reduces the volume of the waste by 75 percent and allows vegetative debris to be recycled as mulch for use in agriculture, erosion control, and landscaping. Emphasizing chipping and grinding allows vegetative debris to be managed within each municipality, avoiding the costs of shipping out of the immediate area for disposal. Suffolk County has approximately the same amount of chipping equipment as it did at the time of Sandy. Appropriate departments of Suffolk County should evaluate whether additional tub grinders and other chipping equipment should be purchased in order for the County (and, via loan or other arrangement, local municipalities) to be able to more rapidly clear and dispose of vegetated debris. As part of this analysis, the County should do a countywide municipal inventory of existing chipping equipment and determine whether additional shareable resources are needed in the region.

ELECTRICAL RESTORATION AND COMMUNICATION

Background

Sandy caused the largest storm-related electrical outages in U.S. history, knocking out power to approximately 8.5 million people across 17 states. Approximately, one million people on Long Island were without power for some length of time. Due to Sandy and the nor'easter that hit Long Island the following week, it took more than two weeks – until November 14 – for the last Long Islanders to get their power back on. The herculean effort to battle through downed power lines, damaged electrical equipment, flooding and gasoline shortages was undertaken by more than 15,000 workers including National Grid workers (led by IBEW 1049) and mutual aid contractors from as far away as Ontario.[9]

[9] "Unprecedented: Personal Reflections on Superstorm Sandy by Employees of National Grid," published in 2013.

The management of any disaster or emergency event is a complicated and multi-faceted endeavor, and one of the most important parts of any efficient response is the effective exchange of information between those responding to and those impacted by the incident. The dissemination of timely and credible information can help residents understand the extent of the emergency and accelerate the recovery phase while minimizing the overall impact of the disaster on the community. This is especially true when it comes to the restoration of power, which is the essential first step to recovery.

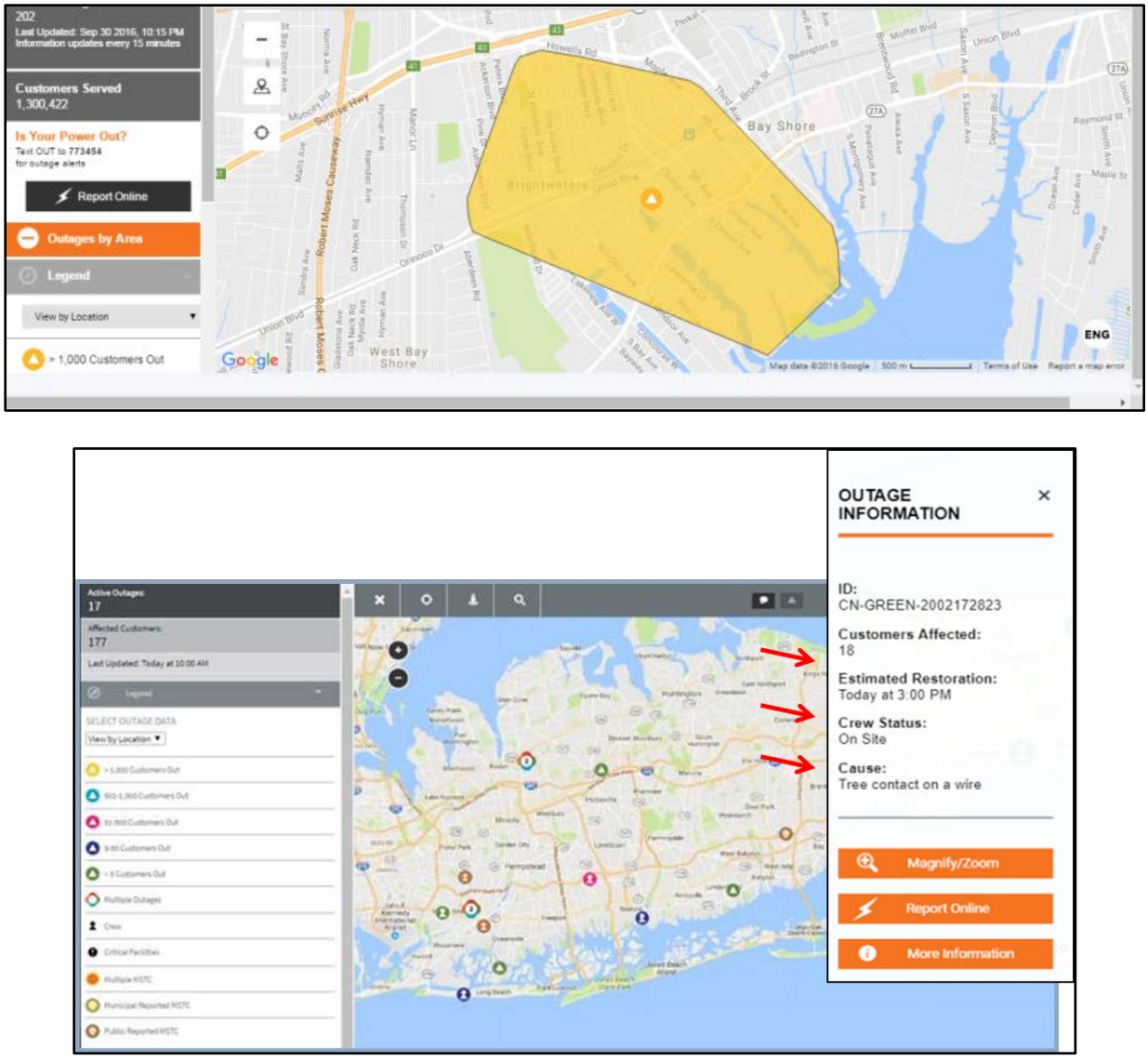
While the impact of Superstorm Sandy left significant challenges in terms of repairing and rebuilding the electrical transmission and distribution system due to the widespread devastation, it also created challenges from a utility communications perspective. During Sandy, communications efforts by National Grid, which operated the Long Island electrical transmission and distribution system on behalf of the Long Island Power Authority (LIPA) at the time, were inadequate to meet the challenges of the widespread devastation of Sandy, which knocked out service to approximately 90 percent of LIPA customers.

Since Superstorm Sandy

As a result of a reorganization requested and approved by the LIPA Board of Trustees prior to Sandy, PSEG Long Island took over the distribution and transmission of most of Long Island's electricity beginning in 2014. In reaction to the challenges experienced during Sandy, PSEG Long Island has made significant strides in improving storm response communications with the public and all levels of government. Harnessing new technologies, PSEG Long Island has implemented a number of initiatives to enhance the way it communicates with customers and key stakeholder groups not only in advance of and during major storm events but throughout the year so that Long Islanders are better prepared and informed when storms do occur. Efforts have been focused on refining processes associated with the development and timely communication of estimated times of restoration (ETRs), increased contact and coordination with municipal and elected officials, and expanded outreach to the public.

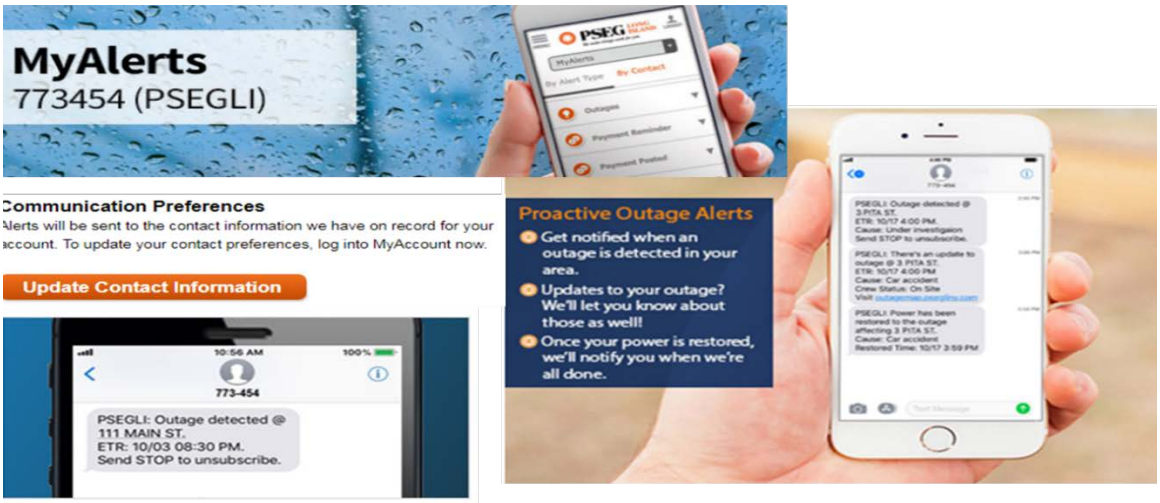
Important improvements implemented under PSEG Long Island's Comprehensive Storm Communications Plan include:

- a revamped "Storm Center" website with easy access to key storm-related information including storm preparation activities, safety information, videos, and links to various emergency response agency websites. Banners on the company's homepage, mobile site and Outage Center webpage are updated continuously during storms to relay the most up-to-date information available;
- an updated Outage Map website that displays outage-related information including ETRs, number of customers without power, crew status, and cause of outage (when known);



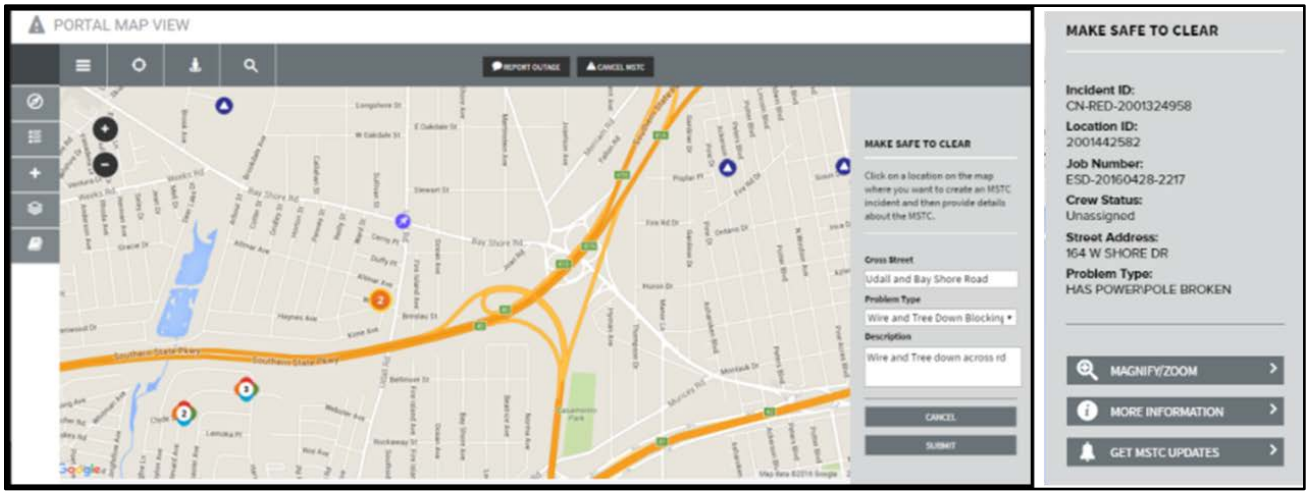
Customer facing outage and restoration information. Images courtesy of PSEG-Long Island.

- implementing a new Outage Management System (OMS) to significantly improve PSEG Long Island's ability to identify and manage outage conditions, communicate with customers, and maximize the effectiveness of repair crews. The OMS allows for "one click" customer reporting of outages via mobile phone and for the proactive notification of all customers affected by an outage, including providing alerts and status updates to the customer regarding damage identification/cause of outage, status of repairs, and ETR changes. Customers can receive notification via phone, text and email when the power is restored;



Mobile outage alerts. Image courtesy of PSEG-Long Island

- enhanced usage of social media platforms and text and email communications to provide restoration updates and situational awareness, including PSEG Long Island personnel dedicated to responding to all incoming Facebook and Twitter messages.
- implemented new technologies including a new outage prediction model to allow for earlier estimation of storm damage based on weather forecast and past experiences and a new flood monitoring/prediction tool to help identify neighborhoods that will potentially be impacted during storms;
- enhanced proactive outreach to Life Support Equipment (LSE) customers advising them of impending severe weather with potential prolonged electrical outages. Communication with these customers continues throughout a storm in conjunction with local Emergency Operations Center (EOCs) including performing "wellness checks" for those LSE customers with continuing electrical outages;
- improved municipal coordination including dedicated liaison staff providing local presence/information flow at the town and village level, a new Municipal Portal that allows municipalities to directly input outages and road blocking wire downs into the OMS and to obtain tracking and restoration updates, dedicated crews assigned to road-blocking wire down jobs reported by the municipalities, and new means to provide information to municipal leaders and elected officials to enhance information flow to/from the public;



Municipal outage portal. Image courtesy of PSEG-Long Island

- introduced and socialized a standardized flood protocol that outlines the process to re-energize local areas and homes and businesses in flooded areas after major storm flooding events;
- enhanced interaction with the public in the field through the introduction of four Long Island-dedicated mobile command centers which serve as community information points and charging stations, and the use of dedicated outreach liaisons to staff community outreach centers and to deploy to areas where restoration may be extensive in order to interact with customers and provide information and supplies;

New PSEG mobile command center. Photo courtesy of PSEG-Long Island.

- deployed new mobile application and mobile units to allow better communication with repair crews (including non-PSEG Long Island personnel such as out-of-area crews and contractors) allowing more timely assignment of repair jobs and real time access to job status changes, outage causes and ETRs.

Recommendations

1) PSEG Long Island has made demonstrable progress in utilizing new technologies and procedures to improve communication with Suffolk's residents during storm events and to improve the flow of information with both municipal officials and restoration workers in the field. While these improvements have not yet been subject to a widespread major impact event, there is significant reason to believe that one of the primary weaknesses of the regional response to Sandy will now be one of its strengths. Of course, as technology evolves, PSEG Long Island must continue to optimize its communication abilities. For instance, once the new 5G wireless standard is rolled out on Long Island in the next few years, there will be enhanced opportunities for crowdsourcing information both from people and devices (IoT) and for further enhanced two-way communication with customers and employees in the field.

COMMUNITY INFORMATION CENTERS

Background

In the immediate aftermath of Sandy, Suffolk County worked to establish disaster recovery centers near the hardest-hit areas. The County quickly had to identify relevant sites and negotiate Memorandums of Understanding (MoUs) with those locations. Ultimately, five such centers were established soon after the storm and they were open into 2013. The locations were at the Lindenhurst Library (which was moved to Copiague in March 2013 and remained open there until April 2013), Islip Town Hall, the Riverhead Firehouse, the Dennison Building in Hauppauge, and the Town of Brookhaven's Mastic Recreation Center.[10] The centers were staffed by New York State and FEMA and primarily served as places where people could go for FEMA intake, information on flood insurance issues, and rental and housing assistance.

Since Superstorm Sandy

The Suffolk County FRES has been contemplating ways to pre-plan the Disaster Recovery Center effort.

Recommendations

1) Suffolk County should initiate a Community Information Center (CIC) program under the auspices of FRES and with organizational and operational leadership provided by the Volunteer Organizations Active in Disaster (VOAD) in conjunction with Community Organizations Active in Disaster (COADs) in the various areas. The CICs would be non-shelter locations where victims of a widespread storm emergency would be able to obtain information in multiple languages on home damage mitigation and repair, charge their electronic devices, and connect to the Internet through WiFi. Victims should be able to reach the CICs by walking if necessary and therefore the

[10] FRES

centers should be spaced every 3 to 4 miles along the South Shore, the North Shore and the middle of the island. The CICs would be a staging place for neighborhood well-being checks and should include a volunteer center run in conjunction with local COADs.

2) Suffolk County FRES, working through the VOAD, should pre-identify sites that would be potential CICs in the areas most vulnerable to a major storm event. Ideal locations would be centrally located in these vulnerable areas and have backup power. Potential locations could include firehouses, village/town halls, churches, community centers and civic organization halls.

3) FRES should create an MoU to be used with potential CIC locations when the need arises and periodically should discuss the MoU with potential CICs.

4) The CICs should be coordinated with PSEG Long Island to ensure that PSEG Long Island can use the CICs as community outreach centers to provide information on electrical outages and restoration plans.

5) FRES should ensure that all of the CICs have accessible information to assist those with disabilities to obtain the information they need. All written information distributed should be available in appropriate formats, including audible, large print, and Braille. People who are trained to support those with particular kinds of disabilities (e.g., sign language interpreters) should be available in certain key locations where possible as well as remotely via technology.

6) With the assistance of New York State, at least one regional CIC/Support Center in both eastern Suffolk and in western Suffolk should be created to provide more robust services for people with certain disabilities who may face long-term impacts from storms and other emergency situations. One such CIC/Support Center could be located in far western Suffolk – perhaps using state land on Route 110 in Farmingdale – and thus be able to serve residents of Nassau County as well. Such a location would also allow the facility to serve as a regional emergency management joint operations center if desired.

IMMEDIATE HUMANITARIAN RESPONSE

Background

The Red Cross coordinates Suffolk County's shelters and has worked with the county to pre-identify nearly 150 potential shelter locations across the county. During Sandy, emergency shelters were established in 24 locations across the county and served more than 2000 residents.[11]

[11] Suffolk County Superstorm Sandy After Action Review.

Long Island's regional food banks – Long Island Cares and Island Harvest – played a critical role in the aftermath of Sandy. Suffolk-based Long Island Cares provided nearly 2 million pounds of food over a six-month period after the storm. Its Hauppauge warehouse was open seven days a week for more than a month after Sandy to assist in the distribution of needed supplies to residents and first responders. These supplies included not just food but also cleaning supplies, small appliances, household supplies, personal care products, pet food and gift cards.

Importantly, starting a week after Sandy, Long Island Cares started working through local elected officials to help get supplies out to impacted residents. This proved to be a very effective means of distribution as residents in need would often reach out to their local elected officials for help.[12] Similarly, Nassau-based Island Harvest reported working across the region to provide more than 3.5 million pounds of food to Sandy victims through the American Red Cross Disaster Relief Food program.[13]

Since Superstorm Sandy

Both major Long Island food banks have enhanced their capacity to serve Suffolk residents since Sandy. Long Island Cares opened a Lindenhurst storefront in 2013 and Island Harvest built out its Hauppauge warehouse facility, which had opened just four months before Sandy hit.

Recommendations

1) Given the success that Long Island Cares had in working through local elected officials, county legislators and town and village elected officials (in conjunction with Suffolk OEM) should coordinate with the regional food banks ahead of time to set up plans to service their jurisdictions.

2) Given frustrations about the need for multiple daily conference calls to coordinate relief efforts, federal, state and county agencies along with the VOAD should look at utilizing new asynchronous communication platforms like Slack and Voxer to help streamline communication efforts.

3) Suffolk OEM should work with the major food bank organizations to define specific areas of service to avoid duplication of effort.

4) In the case of future storms with significant water damage like Sandy, all levels of government must help get the word out ahead of time about the need for not just food donations but cleaning supplies donations as well.

[12] "The Hurricane Sandy Report," Long Island Cares.
[13] islandharvest.org

PORTABLE EMERGENCY GENERATORS

Background

Suffolk County has 23 portable 25kw emergency generators that were purchased prior to Sandy for approximately $27,000 each using grant funding. Ten of these generators are permanently pre-staged – one in each of Suffolk's 10 towns.

Since Superstorm Sandy

Local municipalities – particularly on the South Shore – have obtained additional portable generators since Sandy. For instance, the Town of Babylon received federal funding to pay for three light towers/portable generators. According to FRES, in 2018 Suffolk County bought three light towers for use across the county when needed.

Recommendations

1) Since portable generators are infrequently used, appropriate departments of Suffolk County and local municipalities should ensure that a regular, twice-per-year testing protocol is adhered to in order to ensure that the portable generators are in good working condition when needed.

SHARED SERVICES DURING EMERGENCY RESPONSE

Background

Emergency disaster response is managed under New York State Executive Law Article 2- B, the Suffolk County Charter, and federal emergency response guidelines. The federal Stafford Act requires FEMA to set standards for emergency preparedness and response and to oversee the process of disaster mitigation assistance, including reimbursing qualifying response activities. FEMA requires that mutual aid agreements or MoUs be in place prior to a declared disaster in order for responding agencies to qualify for federal reimbursement. Before, during, and in the aftermath of Sandy, Suffolk County worked with other town emergency management offices through longstanding mutual aid agreements, according to the County Executive's Office.

Since Superstorm Sandy

In 2018, Suffolk County created the Suffolk County Shared Services Plan (SCSSP) in response to a state-wide call to action from Governor Andrew Cuomo. According to the SCSSP, "the plan includes both inter-county and intra-county aspects of emergency

management, and builds on existing mutual aid relationships and process." According to Section 9(f), within the County, Suffolk will "expand upon intermunicipal coordination relating to emergency management" and "coordinate intermunicipal acquisition and maintenance of emergency management related equipment and supplies." Similarly, with regard to inter-County projects, Section 10(c) the plan indicates that Suffolk County will join with other New York counties through "intermunicipal agreements to share emergency personnel, equipment and supplies when needed and available" and work on "joint training opportunities."[14] A critical part of the SCSSP is the SuffolkShare web portal which allows for real-time communications between all of the approximately 100 local governments participating in the shared services initiative. According to the County Executive's Office, this communication and enhanced coordination through the SCSSP is expected to build on the cooperative efforts of emergency preparation and recovery through existing MoUs.

Recommendations

1) As Suffolk County looks to implement the SCSSP as it relates to emergency management, it should consider the idea of Rich Rotanz (former Deputy Commissioner of New York City's Office of Emergency Management during 9/11) that Suffolk and Nassau create a "Long Island Emergency Management Cooperative" comprised of OEM leadership from both counties that, within the context of home rule, will coordinate mitigation and preparedness activities for effective response to and recovery from the myriad threats facing Long Island's three million residents. Such an organization could: coordinate research and training among Long Island's over 100 municipalities; keep an inventory of facilities, management and personnel; handle the maintenance and updating of MoUs; create uniform public education programs; and coordinate the response to island-wide emergency events. In this regard, a Long Island Emergency Management Cooperative could play a coordinating and regional leadership role with regard to emergency management like the Long Island Regional Planning Council does with regard to planning.

2) The reimbursement protocols of the federal government for storm recovery are exacting and difficult to adhere to. As a result, towns and villages in Suffolk and elsewhere have found it difficult to comply and, in some cases, have not received federal reimbursement because of their deficiencies in following the guidelines. As a service to Suffolk's towns and villages, appropriate departments of Suffolk County should hold online training sessions to provide high-level guidance to the municipalities regarding best practices for abiding by federal reimbursement processes in terms of reporting and accounting. If there is interest among municipalities, Suffolk County could also consider providing more in-depth, fee-based consulting services to municipalities in this regard.

[14] *See* www.dos.ny.gov/lg/countywide_services/county-plans/Suffolk Plan.pdf

CHAPTER II
STORM RECOVERY AND RECONSTRUCTION

What happened in a matter of hours would now take months and years to replace, rebuild and recover.

– Long Island Cares[15]

The most vulnerable people are the most at risk.

– Sammy Chu, former Suffolk County Director of Operations[16]

The recovery from Sandy began in the hours after the storm passed and it continues to this day. Some people will never fully recover from Sandy's destruction. They will simply move on as best they can to a new chapter in their lives.

All levels of government played critical, though at times imperfect, roles in the Sandy recovery. Following delayed Congressional action, the federal government was the key financier of the recovery. However, federal funding rules and standards were often not a good fit for suburban Long Island. State officials ultimately served as quarterback for the local recovery, working to get federal programmatic funds into the hands of homeowners and business owners while trying to meet rigid and sometimes shifting federal regulations.

The state needed to overcome organizational issues typical of rapidly expanding organizations while grappling with how to interface in a consistent way with the public in a changing funding environment. Suffolk County and the local municipal governments were the boots on the ground implementing where possible and improvising where necessary in order to provide recovery support to their citizens.

The unsung heroes of the Sandy recovery were the volunteers across Long Island who pitched in to help their neighbors in need. Volunteers played critical roles in distributing food and water, staffing shelters, providing family support, removing debris, leading environmental clean-ups, and hands-on rebuilding. According to the LI Volunteer Center, based on the reports from 166 Long Island organizations active in the Sandy recovery effort, 51,662 volunteers spent 521,829 hours supporting the Sandy recovery between November 2012 and June 2016.

[15] "The Hurricance Sandy Report"
[16] Testimony to the SSRTF, June 20, 2018.

PUBLIC COMMUNICATION

Background

Disasters are, by definition, chaotic. While two-way communication between government/utilities and the public under these circumstances is subject to disarray and disruption, it is nonetheless critical. During the SSRTF's hearings, residents described how their attempts to recover both in Sandy's immediate aftermath and in the longer-term were complicated by mixed messages, misleading information, and inadequate management of expectations.[17] (*See* Appendix, Exhibit B). Without one centralized location that provided updates and real-time comprehensive guidance, residents were confused about the timing of relief and the immediate and long term resources and support available.

One of the post-Sandy communications success stories was the United Way of Long Island's (UWLI) 211 call system. The UWLI 211 system – in place to address non-emergency health and human services issues – was used in Sandy's immediate response phase and in the long-term recovery phase as a way to identify and address residents' needs. For example, the UWLI 211 call system was the primary means for the Long Term Recovery Group (LTRG) to gather information on the mucking out needs of South Shore households. Additionally, New York Rising (NYR) utilized the 211 system to provide consistent information to low and medium income residents about their eligibility to participate in NYR programs.

Recommendations

Public information needs to be better coordinated to provide guidance and manage expectations with regard to recovery and rebuilding. To ensure optimal communication coordination:

1) Suffolk County and Nassau County should jointly create an information hub ("the HUB") perhaps in conjunction with New York State and/or a private not-for-profit third party. The HUB should be the go-to place for residents to obtain accurate up to date information and guidance on preparing for natural disasters (i.e. how to access flood insurance, purchasing homeowners insurance, etc.) and recovering from them (i.e. vetting contractors, information on the parameters and processes of federal programs run by the Federal Emergency Management Agency (FEMA), the U.S Department of Housing and Urban Development (HUD) and the U.S. Small Business Administration (SBA)). Post disaster, the HUB could also be the entrée to an online application center for government benefits and programs. The HUB information should be disseminated via all major modern communications platforms including web sites, mobile apps, social media, and traditional media. In Suffolk County, the HUB could be paid for via a permanent "Community Information and Support Center" line item in the SC FRES/OEM budget.

2) In conjunction with the HUB, an integrated, non-emergency local call center, like the UWLI 211 call system or New York City's 311 system should be instituted prior to

[17] *See* "Summary of Public Testimony from Task Force Hearings," in Appendix, Exhibit A of this report.

the next major storm event. Such a system can be another effective tool to ensure timely, consistent and relevant information is provided to residents.

HARNESSING THE SUPPORT OF THE COMMUNITY

Background

While government's role is essential in recovering from disasters, the role of volunteers and not-for-profits cannot be overstated. Long Island has a strong ethos of volunteerism and mutual support, evidenced by post-Sandy assistance provided by neighbor to neighbor that still continues to this day.

The primary coordinator of institutional not-for-profit recovery efforts is the Long Island Voluntary Organizations Active in Disaster (LI VOAD) — a coalition of nearly 100 charitable service groups that work together to plan and prepare for regional disasters. The role of the LI VOAD — guided by the core principles of cooperation, communication, coordination, and collaboration — is to bring together human services organizations, not for profits, disaster response agencies, and other community partners to prepare for, respond to, and recover from disaster. Convened and led by the Health and Welfare Council of Long Island (HWCLI) for nearly two decades, the LI VOAD serves as a liaison between federal, state, county and local government and national and local non-profit organizations and communities. As part of a larger, national VOAD network, the LI VOAD is able to leverage national best practices and resources. Standing committees of the LI VOAD include: the LTRG (Long Term Recovery Group, which activates to meet the needs of a specific disaster), Volunteer Management, Donations Management, Housing and Personal Disasters, and the COADs (Community Organizations Active in Disaster). Following Sandy, the LI VOAD – working with key partners like UWLI, the Community Development Corporation of Long Island (CDCLI), the Long Island Housing Partnership (LIHP), the Long Island Volunteer Center (LIVC), the American Red Cross, the Archdiocese of New York, the Salvation Army, Family Service League, FEGS and the Association of Mental Health and Wellness – coordinated tens of thousands of volunteers; provided professional crisis counseling to more than 164,000 affected residents through Project Hope; coordinated disaster case management for more than 10,000 families; created and managed a disaster recovery and training center near the Suffolk/Nassau border; in conjunction with the LIVC and national partners, trained volunteers on appropriate mucking and gutting rehabilitation for storm damaged homes; established a volunteer housing facility on the campus of NYIT in Central Islip which housed thousands of volunteers from across the country; and, through the Unmet Needs Roundtable, raised more than $15 million to directly assist the most vulnerable and at-risk populations impacted by Sandy.

COADs – volunteer community groups that seek to respond to disasters and enhance readiness in their areas by coordinating cooperative efforts among individuals, organizations, faith-based institutions and businesses – reflect the immediate grassroots needs of local neighborhoods and communities and were critical contributors to the Sandy response and recovery efforts. Ad hoc community groups like Camp Bulldog in Lindenhurst were quickly

organized and provided meals to hungry residents who had lost their homes. In the aftermath of Sandy, nearly a dozen COADs have formed across Long Island including in the communities of Babylon and Shirley/Mastic.

Since Superstorm Sandy

Following the LI VOAD's critical role in the Sandy recovery efforts, Suffolk County has recognized the group's importance by providing the LI VOAD with a standing seat at the County's EOC, including the LI VOAD in the County's annual emergency management table top exercises, and by having OEM representatives attend LI VOAD meetings throughout the year. The LI VOAD recently has also completed two plans for the Suffolk County OEM – one for spontaneous volunteer management and the other for donation management.

Recommendations

The question in preparing for the next storm is not how to replace this volunteer energy and empathy, but rather to determine what can be done to harness this human power most efficiently next time.

1) Suffolk OEM should continue to partner with the LI VOAD by maintaining close working relationships, coordinating communication, partnering on trainings/workshops and attending all LI VOAD meetings.

2) Suffolk OEM should work with the LI VOAD and the National VOAD to establish a compendium of best practices and a start-up toolkit for COADs while working to support (including a small amount of monetary support to assist with pre-organization) and train COADs in particularly vulnerable areas of the county.

3) Suffolk OEM should host an annual meeting in each township to enable county legislators and municipal officials to connect with their local COAD and the LI VOAD so that the officials can be aware of the available resources and community capacity to assist with storm recovery.

4) Suffolk OEM and other appropriate departments of Suffolk County should partner with the LI VOAD and its affiliates to maintain and regularly update lists of volunteers who are specially trained and "on call" to perform certain high skill recovery roles, for instance, electrical inspection.

5) Suffolk County departments other than OEM should also engage with the LI VOAD to ensure that residents' needs are being met most efficiently through a coordinated public/private response.

6) Since the federal census determines infrastructure dollars and funding levels from federal agencies such as FEMA and programs such as HUD's Community Development Block Grant (CDBG), Suffolk County should take a leadership role in promoting and funding census work in the county. An accurate count is critical when a disaster occurs.

7) Suffolk County, through its elected officials, should advocate for greater philanthropic funding for our region. While NYC-based foundations rarely fund on Long Island, the Robin Hood Foundation did support Suffolk residents recovering from Sandy.

The County is in a unique position to elevate the understanding of our region and its needs in order to attract new funding sources to address regional issues and crises.

GETTING BACK INTO THE HOME

Funds and services available to homeowners come from multiple federal, state, and local sources and agencies.[18] At its hearings, the SSRTF heard from Suffolk residents about a wide range of issues that homeowners grappled with at every stage of their return home after Sandy; including shelter during the disaster, temporary housing during displacement, essential repairs to structures and in-home utilities, and larger mandatory or optional resiliency projects. In addition, homeowners grappled with an insufficient stock of affordable temporary housing for displaced homeowners, difficulty understanding recovery program requirements and calculations for grant funds, challenges securing adequate and accurate flood insurance settlements, managing relationships with contractors, and contractor fraud. Helping mitigate against these difficulties were several programs that were developed locally and which should be part of any plan for addressing housing needs in future disaster situations.

1. The "Sheltering and Temporary Essential Power" (STEP) Program

In mid-November 2012, with Sandy's wrath leaving many homes unable to receive electrical power and a devastating nor'easter just having hit Long Island, FEMA and the Town of Hempstead OEM in conjunction with the Long Island Builders' Institute and local electrical unions conceived of the STEP pilot program. The program made temporary repairs to a home's electrical, heating and/or hot water systems, thus allowing the homeowners to shelter in their own homes – rather than seek limited alternative housing options – until more long-term permanent repairs could be completed. FEMA formally launched the program on November 16, 2012.[19]

Suffolk quickly mobilized to launch a county-wide STEP Program and turned to the CDCLI to administer it. CDCLI performed assessments on 477 homes and ultimately performed repairs on 184 homes. The majority of the repairs were completed in November and December 2012. The final home was completed in March 2013. The program allowed hundreds of Suffolk residents to be able to return to their homes before the winter.[20]

Recommendations

1) While the STEP program was a significant benefit to the recipients, the fact that this was the first time this program had ever been implemented meant that there were some lessons learned. Perhaps the most impactful of these is that residents moving back into their damaged homes often dealt with extremely high utility bills.[21] One solution is for

[18] "Rebuilding After a Hurricane: Why Does it Take So Long?," The New York Times, October 26, 2018; www.nytimes.com/2018/10/26/nyregion/rebuild-home-hurricane.html
[19] www.fema.gov/media-library-data/20130726-1858-25045-8258/step_pilot_program_final_111612.pdf
[20] Suffolk County Office of the Comptroller, Audit Report; www.suffolkcountyny.gov/Portals/2/documents/2014-21CDCFEMASTEPProgram.pdf
[21] "Many Sandy Victims Decide to Skip STEP," *Newsday*, January 17, 2013; www.newsday.com/long-island/many-sandy-victims-decide-to-skip-step-1.4460126

appropriate departments of Suffolk County to work with LIPA and other utilities to create a special reduced rate for those in the STEP program. Another possibility is to include in the state's Action Plan to the federal government a request to allocate some resources to assisting those participating in the STEP program with their utility bills for a defined period of time.

2) Appropriate departments of Suffolk County should pre-identify a list of contractors with proper insurance and licenses who are made aware of the STEP program and pre-trained in its particulars. This will limit homeowner frustration by reducing the time from property inspection to actual work authorization. Similarly, the County should keep a list of suppliers who can provide needed equipment as one difficulty that the STEP program faced was a limited supply of hot water heaters and permanent furnaces.

3) The federal Stafford Disaster Relief and Emergency Assistance Act limited the impact of the STEP program because, for instance, workers could not be paid under this program to rip out moldy sheetrock while they were making the heating upgrades.[22] Suffolk County should join with other localities who have implemented the STEP program to lobby for a change to the Stafford Act to make it less restrictive and easier to qualify for aid.

2. Electrical Inspection Coordination Planning/Pre-Training

Background

Before the electric/gas to a household is reconnected following an outage, utility companies need clearance from the local municipality that it is in fact safe and allowable to do so. While it was the public's perception and the belief of many municipal officials that LIPA could simply re-energize damaged homes, this was not the case. The electric utility is responsible for the transmission and distribution (T&D) system – a responsibility that ends at the point of connection to a building's service meter.

Everything from the meter into the building is the responsibility of the authority having jurisdiction and building code oversight – which is the village or town. After Sandy, reconnections were delayed because municipalities lacked the trained electricians or qualified inspectors to provide clearance to National Grid on behalf of LIPA to turn the power back on. As Sammy Chu testified to the SSRTF, "there was a lack of jurisdictional understanding and intra-municipal cooperation. Unfortunately, the lack of understanding was exposed at a very critical time."[23] At the direction of County Executive Bellone, Chu, a former union electrician, worked with IBEW 25, volunteer fire departments, electrical inspection agencies and others to organize a fleet of certified inspectors. This initiative led to 6000 damaged homes being reviewed within two weeks.[24]

Since Superstorm Sandy

PSEG LI, now running the Long Island T&D system on behalf of LIPA, has adopted a Standardized Neighborhood Flood Protocol which provides a more specific process for re-energizing homes and businesses in flooded areas after major storms. The protocol has been shared with local municipalities so that they understand their role in the re-energizing process.

[22] Sammy Chu testimony to SSRTF, June 20, 2018.
[23] Testimony to SSRTF, June 20, 2018.
[24] *Ibid.*

Recommendations

1) Appropriate departments of Suffolk County should coordinate with the municipalities and PSEG LI to run a training program to make sure there are adequate qualified electrical inspectors available to expand municipal capacity following future large storms. Unions, private electrical contractors, volunteer fire departments and the LI VOAD should all help to recruit potential inspectors. While in-person training should be required for all initial certifications, an online course should be created for recertification and for briefing already qualified inspectors so that they can be quickly and inexpensively activated when needed. A key issue that will need to be resolved based on the circumstances of the next disaster is how to handle indemnification for those inspectors who are not municipal employees.

2) Appropriate departments of Suffolk County should consider issuing an RFP in coordination with the towns and villages to obtain pre-storm bids for critical recovery services such as temporary housing, inspections, electrical installations, and excavating equipment. Such an RFP could be re-bid every three years to refresh prices and suppliers. This would be in keeping with best practice guidelines from the federal government.[25]

3. Bridge Loan Program

Background

At its inception following Sandy, the NY Rising housing program provided a portion of a homeowner's award upfront with the remainder to be paid after certain repair benchmarks were accomplished. This was a challenge for many low and moderate income households who didn't have access to sufficient capital to front the money needed to complete the repairs.

To ease this situation, CDCLI and the Unmet Needs Roundtable created a bridge loan program for households with incomes at or below 80% Long Island's average median income (AMI). Bank of America made a $1 million line of credit available to provide these revolving loans to homeowners. The loan required 0% interest for eligible households. Fifteen households utilized this bridge loan program before NY Rising recognized this gap and provided for additional interim payments as repairs progressed. Nonetheless, some families needed a funding bridge even between these more frequent interim payments.[26]

Recommendations

1) While the parameters of NY Rising changed over time making the bridge loan program less necessary, this revolving loan model can be replicated by CDCLI or other leading Long Island not-for-profits in future disasters to help certain income-eligible survivors take advantage of federal and/or state programs with phased payment schedules. A key aspect to establishing such a program in the future will be the willingness of local financial institutions, investors or philanthropists to earmark capital for such a disaster response.

[25] "GAO Report: Action Needed to Better Ensure More Effective Use and Management of Advance Contracts," December 6, 2018; www.gao.gov/products/GAO-19-93

[26] NY Rising

2) Given the huge costs of some renovations such as elevating a house, even those families with incomes above 80% of AMI struggled to come up with the funds needed to get necessary repair work started. Future supplemental housing recovery programs should allow up-front grants to pay a larger percentage of the project costs provided that homeowners take adequate steps to prevent contractor fraud, including agreeing with their contractors on a written payment for performance schedule. If additional up front financing is needed, the programs should work with local lending institutions and provide them with grant guarantees so that homeowners can obtain personal loans for this purpose at reasonable interest rates.

4. Sheltering in Place

Background

In the wake of Sandy, there were 38,000 Long Island families needing contractors to repair, rehabilitate and/or raise their substantially damaged houses. Most contractors provided quality work in a timely fashion, but the SSRTF heard from numerous residents who suffered long delays in getting back into their homes due to contractor overwork or neglect. Many of these families had to stay in hotels for extended periods of time – often far from their homes and workplaces.

Example of temporary housing – a Hunter Shelter.[27]

Since Superstorm Sandy

Hunter Shelters are 288 square foot modular houses that provide on-site emergency shelter after natural disasters which make homes temporarily uninhabitable. The shelters, built by a company located in Suffolk County, are flood resistant, hurricane-hardened reusable structures that come equipped with solar-powered battery storage and a water purification system. They can be erected in just a few hours on any property. The estimated cost of $40,000 each for these temporary homes is substantially less than "FEMA trailers" and can be significantly cheaper than the cumulative cost of hotels. In addition, by sheltering in place, families can remain better connected to their local support systems as well as their schools and work. A prototype Hunter Shelter has been used in Amityville as it is deemed a "temporary storage unit" under Town of Babylon code.

[27] www.huntershelters.com

Recommendations

1) Local municipalities should review their codes and amend them if necessary to allow residents to use Hunter Shelters and other temporary structures as a "temporary storage unit" in order to allow people to quickly shelter on their own property following a disaster.

2) Suffolk County should consider purchasing a few Hunter Shelters for use across the region and such use should be contemplated in any future state Action Plan.

CONTRACTOR MALFEASANCE

1. Preventing Fraud and Abuse

Background

The SSRTF heard from numerous residents at its hearings about how they were cheated by unscrupulous contractors as they sought to have their homes repaired and/or elevated following Sandy. As Nassau District Attorney Madeline Singas noted, "Cases involving crooked contractors are especially disheartening because scam artists tend to target homeowners who are in dire straits."[28]

Residents' individual grievances described to the SSRTF are corroborated by official government statistics as well. For instance, statistics from the Suffolk County Division of Consumer Affairs (SC DCA) indicate they fielded more than 1,550 complaints in 2013 and in 2014, up from just over 1,200 in each of the two years before Sandy. In addition, as of September 2019 the Governor's Office of Storm Recovery (GOSR) reported that it had determined that 233 fraud claims on Long Island have merit and have impeded the applicant's ability to advance their recovery project. In response to this contractor fraud, the State has provided more than $12 million in additional relief which has enabled 98 homes to have completed construction, 52 additional homes to complete their elevations, and the vast majority of the remaining homeowners to have resumed construction.

The Suffolk County District Attorney's office is still active in prosecuting fraud cases against Sandy repair contractors. For instance, in July 2018, Suffolk District Attorney Tim Sini's office prosecuted a Smithtown contractor for taking more than $62,000 from two Sandy-affected homeowners and failing to make the agreed upon repairs.[29]

In Suffolk, the District Attorney's Office frequently relies on referrals from the SC DCA which is the licensing authority for home improvement contractors and handles initial complaints (other than for contractors working in the towns of Southampton, East Hampton and Shelter

[28] "Sandy Contractor Disputes Bedevil LI Homeowners," *Newsday*, March 21, 2018; www.newsday.com/long-island/sandy-contractor-1.17460002

[29] "Sandy Contractor gets 5 Years Probation, to Pay $31G in Fraud Scheme," *Newsday*, July 31, 2018; www.newsday.com/long-island/crime/superstorm-sandy-contractor-sentence-1.20227574

Island). Prior to the issuance of a home improvement license, County law requires that the applicant pass a written test on county and state law relating to business and sales practices, provide a certificate of liability and property insurance (with extra insurance required for those engaging in home lifting/elevating), provide a Worker's Compensation certificate, and complete an application which includes background information. As the SC DCA notes with regard to the home improvement license, "Home improvement is a very broad term that includes, but is not limited to the following areas of work: Arborists, Awnings, Basements, Cabinet Makers, Carpentry, Dormers, Driveways, Excavating, Extensions, Exterminating, Flag Poles, Flooring, Fumigation, Garages, Insulation, Kitchens, Landscapers, Masonry, Painting, Railings, Roofing, Siding, Storms & Screens, Swimming Pools, Tennis Courts, Termite Control, Tile Installers, Tree Services, Waterproofing, and Weatherproofing."[30]

Recommendations

1) Since the best protection against being scammed by a contractor is self-protection, appropriate departments of Suffolk County and local municipalities should work to educate residents about precautionary steps they can take. New York State has produced a list of self-protection best practices focusing on researching contractors, getting contracts and work plans in writing, and having an inspection of the work done before making final payments.[31]

2) A Statewide /inter-County shared contractor database should be created to allow consumers to research contractor license information, complaints, and loss of license, among other things. All individuals/business entities that have received contracting licenses from any of the counties in New York State should appear in this database in order to allow a consumer to do proper research before hiring a contractor. As many construction-related regulations are established by New York State law and not County legislation, it might be most effective if such a database is maintained by the New York State Attorney General's Office. The contractor database should note which contractors have specialized experience in projects utilizing universal design and/or on behalf of people with disabilities. Municipal building departments should be required to post relevant information to the database, including if a contractor's projects repeatedly have failed inspections. Recovery Advocates (discussed below) and other disaster management case workers should also be able to report issues that clients have with contractors to the database.

3) In order to receive payment on a project that is being funded by a homeowner pursuant to a federal or state recovery program, a contractor should be required to (a) be licensed, (b) be in good standing on the statewide/regional database, and (c) have proof of insurance and a performance bond. Establishing such a requirement would entail a partnership between the SC DCA and the entity dispersing the funds.

4) New York State law should be amended to allow a homeowner facing a situation of contractor non-performance to seek damages through a contractor performance bond and/or insurance if a contractor has declared bankruptcy, re-incorporated as a new business after losing a previous license, or left the state.

[30] www.suffolkcountyny.gov/Departments/Consumer-Affairs/Licensing
[31] The complete list of recommendations can be found at www.dhses.ny.gov/oem/event/sandy/sandy-scams.cfm

5) New York State law requires a contractor to place customer funds in an escrow account or, in the alternative, to provide bond insurance.[32] However, the SSRTF learned that after Sandy these requirements were not adequately regulated and enforced, as the post-disaster influx overwhelmed the capacity of many municipal building departments. Municipalities should prioritize stricter monitoring and/or enforcement of this requirement particularly at the permit application stage. Future State Action Plans should include funding for enhanced enforcement of this critical safeguard.

6) Suffolk County does not require continuing education for holders of home improvement licenses. However, such a requirement should be considered as a way to remind contractors of their obligations to their customers under the law. Currently, while contractors have to renew their licenses every two years, they do not have to retake the test on compliance with county and state business practices after they pass it to initially get their license.

7) Following Sandy, there was so much repair and rebuilding work to be done that there were not enough licensed local contractors to handle all of it. This led to significant delays in residents being able to get back into their homes and opened the door for unlicensed contractors to prey on those who were desperate for help. As Lori Bacigalupo of Island Park put it, "Many of us were at the point where you took what you could get, and you crossed your fingers."[33] One way to help combat this lack of capacity problem is for appropriate departments of Suffolk County to help coordinate a regional approach to emergency trade licensure reciprocity. This could include temporary recognition of trade licenses across county lines, across town lines (currently Southampton, East Hampton and Shelter Island have their own contracting licenses), and across village lines as certain smaller villages only license a limited number of certain specific trade contractors to work in their jurisdiction. Consideration could even be given to recognizing trade licenses across state lines.

8) The SSRTF learned that numerous Long Island contractors have lost their license in Nassau or Suffolk County due to failure to perform work or theft of funds but have remained permitted to work in the other county. Suffolk County and Nassau County should coordinate to ensure that this does not happen and that losing a license in one county causes the loss of one's license (or at a minimum probation and close scrutiny) in the other county.

9) The Nassau County Legislature and NY State Senator John Brooks are exploring additional ways to enhance penalties for home improvement contractor malfeasance. Among the areas that should be discussed is whether the state criminal laws can be amended to establish the requisite *mens rea* for criminal negligence in situations where a contractor has failed to perform contracted work for multiple homeowners. The Nassau County Legislature has informed the SSRTF of their desire to work with the Suffolk County Legislature on this issue to see what changes can be made on the county level and what mutual efforts can be put towards lobbying to change state law. The SSRTF supports this joint approach and recommends that both County Executives and both District Attorneys be involved as well.

[32] Home Improvement Fact Sheet New York Attorney General Office; https://ag.ny.gov/consumer-frauds/home-improvement-fact-sheet

[33] "After the Hurricane Came the Con," *The New York Times*, October 26, 2018.

2. Mechanic Lien Reform

Background

If a contractor has not been paid for work on a property, they may place a "Mechanic's Lien" on the property by filing a notice with the county clerk's office and notifying the homeowner within 30 days. The lien lasts for one year unless it is renewed for one final year. Once properly filed, a mechanic's lien – like an outstanding mortgage – is an impediment to clear title. If a mechanic's lien has been placed on a piece of property, the owner cannot transfer the property or obtain financing on it until the payment dispute is resolved.[34]

Since Superstorm Sandy

Following Sandy, numerous unlicensed general contractors filed mechanic liens for improper contract values in circumstances where there was no written contract and/or no written change orders. In addition, in many cases, unlicensed general contractors failed to properly pay their subcontractors, who then filed mechanics liens against the home when the general contractor declared bankruptcy or was judgment proof. Often in these situations, the homeowner had already paid the general contractor in full and had no knowledge of the failure to pay the subcontractor – or even the fact that a subcontractor worked on the project.[35]

Recommendations

1) New York State law should be changed to require that a contractor filing a mechanic's lien should have to provide documentary proof that a contract exists between the lien holder and the homeowner, that work was completed and/or materials provided, that payments were requested, and whether any payments have been made. In the alternative, each county within New York State should be permitted to impose additional filing requirements when mechanic's liens are filed with their respective county clerk's offices.

2) Another alternative would be to have New York State law more closely conform with the law in New Jersey which requires the contractor to take some preliminary steps before filing a construction lien. For instance, the contractor must first file a Notice of Unpaid Balance with the property owner and the county clerk indicating the amount the contractor says is owed. After that, the contractor must submit the proposed lien – along with supporting documentation – to the American Arbitration Association for a "mini- arbitration hearing" which determines whether the lien is warranted and the appropriate amount owed. Only then can the lien be filed against the property.

3) The Suffolk County Clerk should require as part of its filing process for mechanic's liens that staff will review the newly required documentation and also cross reference the SC DCA database of licensed contractors to ensure that the contractor is licensed or was licensed at the time the work was allegedly completed/materials were supplied. Alternatively, the filing of mechanic's liens can be moved from the County Clerk's office to the SC DCA which can then perform the substantive review with a more thorough background and knowledge base than the County Clerk's office.

[34] NY State Construction Lien Law, § 3 *et seq.*
[35] Touro Law Center Disaster Relief Clinic.

INTERGOVERNMENTAL DATA COORDINATION

Background

One of the difficulties faced during the Sandy recovery regarded GIS location data incompatibilities between FEMA, National Grid, Suffolk County and other municipalities. These entities used different data systems and, to make matters worse, it took three months for FEMA to share data with the other governmental agencies. If there had been one unified GIS database for all of the agencies, relief efforts would have progressed much faster.[36]

Recommendations

1) Suffolk County and Nassau County should jointly organize a data management conference including the various levels of government, agencies and leading client-facing not for profits with the goal of setting a data standard that all can use for intake, resource allocation and mapping. In addition, data sharing agreements should be put in place to allow the seamless sharing of information between the various governmental and utility entities.

MAKING OPTIMAL USE OF FEDERAL AND STATE RECOVERY RESOURCES

While recognizing that all levels of government and their partners continue to work with residents toward a full recovery, the SSRTF gained valuable insights from a review of the implementation of federal and state recovery programs - including HUD's Community Development Block Grant – Disaster Recovery (CDBG-DR) as well as FEMA's National Flood Insurance Program (NFIP) and Hazard Mitigation Grant Program (HMGP). Understanding the policy objectives and funding source regulations of government-funded recovery programs as well as the impact of those regulations on program implementation enabled the SSRTF to determine successes, constraints and potential improvements in order to foster informed decision-making for future program planning.

Following the federal government's approval of Sandy relief legislation totaling approximately $60 billion in January 2013, Governor Cuomo established the Governor's Office of Storm Recovery (GOSR) to coordinate New York State's recovery and resiliency programs under the umbrella of the "New York Rising" program. With the establishment of GOSR, the Governor aimed to address communities' most urgent needs while also encouraging the

[36] Sammy Chu testimony to SSRTF, June 20, 2018.

identification of innovative and enduring solutions to strengthen the State's infrastructure and critical systems.

GOSR has utilized approximately $4.4 billion in funding made available by HUD's CDBG-DR program to concentrate aid to four main areas: Housing Recovery, Small Business, Community Reconstruction, and Infrastructure. Paired with additional federal funding that has been awarded to other State agencies and individual property owners – including $1 billion awarded through FEMA Individual Assistance, over $1 billion in SBA loans, and more than $16 billion in FEMA Public Assistance – the CDBG-DR program has aimed to enable homeowners, small businesses and entire communities to build back even better than before.[37]

As of the end of September 2019, the NY Rising Housing Recovery Program has awarded more than $1 billion to homeowners on Long Island. In Suffolk County, 92% of the more than 2600 applicants have completed required repairs and more than 84% of planned property elevations have been completed (1027 elevations completed out of 1217 planned). In addition, more than 500 homeowners in Suffolk received Interim Mortgage Assistance totaling over $14 million.[38]

While GOSR will produce more formal recommendations when the program winds down in the next few years, as part of its Fifth Anniversary Report in 2017, GOSR published an initial set of "Best Practices" regarding the administration of CDBG-Disaster Recovery funds:

> 1. **Centralize interagency coordination:** Using GOSR as the centralized vehicle to drive recovery and resiliency, New York State is promoting the existence of centralized and specialized administrative capacity, as well as a deeper focus on meeting numerous regulatory and geographic constraints specific to this funding source. Thus, our programs can better coordinate with each other and with key stakeholders to respond to new challenges and barriers inherent in any recovery.
>
> 2. **Collaborative planning:** Rebuilding without consideration of assets, hazards, vulnerabilities, and risks dooms communities to cycles of devastating and repetitive loss, and is not a pragmatic way to invest precious and limited disaster recovery resources. The path to true resiliency, therefore, must go through a collaborative planning process that unites local knowledge and expertise about community assets with a deep technical understanding of hazards, vulnerabilities and risks.
>
> 3. **State governments are suited for connecting federal resources to local priorities:** State governments are equipped with knowledge about local hazards and future disaster risks, and have the capacity to foster relationships through grassroots planning activities, facilitation of interagency coordination and different levels of government up and down the decision making chain.
>
> 4. **Data sharing** is critical for disaster recovery and long-term

[37] www.stormrecovery.ny.gov
[38] GOSR

disaster preparedness. Without it there is a decided risk of making misguided policy decisions, issuing incorrect eligibility determinations, and wrongly administering aid to individuals and communities who already received duplicative assistance through other programs. Inadequacies can wreak havoc on recovery operations — making it virtually impossible to decipher whose properties have been damaged, who is eligible for services, or who has already received potentially duplicative funds from the Federal Emergency Management Agency (FEMA) and the Small Business Administration (SBA). Therefore, in addition to establishing responsive and agile recovery programs, a key goal of any disaster response is to ensure that the data partnerships are ready and accurate on day one — or even in advance of a disaster.

5. **Federal regulations — and a lack of federal interagency coordination — decelerate recovery efforts.** New York State, like many recipients before it, quickly discovered that two of the biggest obstacles to administering CDBG-DR funds are that regulations governing use of funds were not initially developed with disaster recovery in mind, and a lack of coordination between multiple federal agencies that may all be involved in recovery efforts. FEMA, SBA, and HUD regulations are often conflicting or contradictory in nature. The process of navigating those ambiguities undoubtedly slows down the pace of recovery, as individuals and communities must submit separate but overlapping applications — as well as federal reviews — for each entity. At the same time, regulatory conflicts between federal agencies has hindered the State's ability to disburse available resources that are within our allocation. This removes the focus from being on those who desperately need help, and puts it on complying with the rules of each diverse funding stream.

6. **Data management** by in-house software developers enables the fast scaling up of programs. The development of agile and responsive systems is a key component of setting up a disaster response. As stated above, solid data sharing and management practices within an agency are critical to getting CDBG-DR funds into the hands of disaster-impacted individuals and communities. From the outset, grantee leadership must collaborate with regulatory experts, policymakers, data analysts, and technologists to select the proper systems that will enhance (rather than detract from) program implementation. The systems must be modular enough to accommodate for the constantly evolving CDBG-DR regulatory environment, but standard enough for software developers to quickly modify them for everyday use. The cost of choosing the wrong application and technological infrastructure can negatively impact the way that a grantee does business throughout the life of its grant.

7. **Open communication with HUD** helps staff keep up with

constantly evolving regulations, like CDBG-DR regulations that make it difficult for staff to design sound and compliant disaster recovery programs. Regulatory conditions often vary by disaster, or may be applicable to only a single recovery effort. Staff who are tasked with managing these programs benefit from open, frequent, and collegial communication with HUD throughout every stage of a recovery process. The steep learning curve requires the proven expertise of dependable and knowledgeable staff members, and conversely, makes it arduous for newcomers to enter the field. Yet, the increasing frequency of disasters throughout the country heightens the difficulty of finding expert staff who are current with the field and who are acutely aware of the subtleties in regulations from disaster to disaster. As one disaster recovery effort winds down to a close, there may be value in maintaining a pre-existing entity that could be useful for retaining and maintaining hard-won CDBG-DR proficiency in anticipation of the next disaster. This also extends to HUD; CDBG-DR funds are a creature of supplemental appropriations, without sufficient capacity and resources to administer these funds — months or years after the event — critical decisions can remain unmade, slowing the disbursement of funds.

8. **Embedded academic researchers** enhance disaster recovery efforts in real-time. In addition to focusing on recovery and resiliency, there is a need to look at the bigger picture and understand how we can do better, informed by the lessons of our predecessors and others. As New York State has seen with its work with the State University of New York's (SUNY) Rockefeller Institute of Government (RIG), embedding academic researchers within disaster recovery offices can enhance efforts in real-time. Collaborating with academics has the dual benefit of both exposing program delivery efforts to rigorous analysis, and providing program staff with relevant data and policy support. Researchers provide a valuable frame of reference for teams that have limited time to reflect on program effectiveness. In the best cases, academics may provide internal support to staff by pointing out blind spots, identifying areas of concern, or highlighting opportunities to exceed requirements. When used accordingly, these functions may assist agencies to incorporate feedback not only once a recovery is complete, but rather, immediately through revisions to its operations and policies.

GOSR's NY Rising program and the federal funding that fueled it, was a tremendous boon for the vast majority of residents working to recover from Sandy. However, as experienced directly by some SSRTF members and as expressed by numerous residents who testified at the SSRTF's public hearings, for some storm victims their experience with the federal and state recovery efforts led to frustration and confusion. Their struggles, some of which are ongoing, generally were derived from communication breakdowns that resulted from case management issues, policy implementation changes over time, and federal program criteria that did not fit with the circumstances of post-Sandy Long Island.

1. Communication, Information and Case Management

Background

After Sandy, there were multiple federal funding sources – FEMA, SBA, and HUD CDGB-DR – that were utilized by the federal and state governments to provide relief to impacted residents. Each of these funding sources has its own requirements, eligibility guidelines and unique regulations. Seeing one's way through these rules can be a quagmire, even for the most experienced paper jugglers. The challenges of managing paperwork and application submission through FEMA, insurance companies, and the SBA, along with changing Federal/state requirements, municipal regulations, and dealing with potential contractor fraud, proved to be overwhelming for many Long Island residents – especially for the most vulnerable.

The primary resource available to help the public wade through this morass have been Disaster Case Managers (DCMs), which have included NY Rising employees and staff hired by local non-profit organizations such as Catholic Charities of Rockville Centre, FEGS, Family Service League, and Lutheran Social Services, using federal funding provided under the Stafford Act. The vast majority of these caseworkers provided excellent service to recovering residents. However, the SSRTF heard from many residents about high staff turnover among DCMs. Some of the primary reasons for this turnover were that on-going interaction with survivors of a natural disaster can be draining; that since DCMs knew that their position was temporary and that ultimately they would have to get jobs elsewhere, when better paying opportunities came up there was little incentive for DCMs to stay; and that since the Stafford Act provides DCM funding for limited periods of time and New York State requests for program extensions would frequently be granted just before the program expired, many trained staff looked for other work because of the lack of certainty about program continuation.

Among other negative effects, the high turnover of DCMs slowed down the application process for many residents and led to inefficiencies in terms of lost paperwork and replacement caseworkers needing to get up to speed relative to individual circumstances. One Suffolk resident complained at an SSRTF hearing that his application had been significantly delayed by the fact that he had nine different people handling his case since Sandy. Another resident pointed out that her paperwork went missing more than once resulting in the need to submit voluminous business documents several times. This changed after NY Rising implemented a centralized digital repository of all applicant documents and communications in 2014.

This information and case management challenge was compounded at times by inaccurate and misleading information being provided to residents seeking help. For example, in the immediate aftermath of Sandy many residents were advised by federal representatives to take quickly available SBA loans only to be apprised after-the-fact that such loans were considered a "Duplication of Benefits" that later prevented those residents from being eligible to receive CDBG-DR grants. While there was a 2011 Federal Register Notice indicating the CDBG-DR grants must supplement, rather than replace or pay off SBA loans, this information was not always communicated to residents during the loan application period. In some situations, this led to residents applying both loans and grants towards repairs only to later find out that their grants were subject to recapture as a duplication of benefits. Other residents learned, after they had signed on with a contractor at a higher price, that their NY Rising grant award would be cut back due to a reduction in state approved unit costs for repair.[39]

[39] Testimony to SSRTF at Babylon Public Hearing, May 2, 2018.

Recommendations

1) As described above, prior to the next disaster, Suffolk County and Nassau County – perhaps in conjunction with New York State and/or a private not-for-profit third party – should jointly create "the HUB", an information portal on pre-storm preparation and post-storm recovery. The HUB would be the "go to" source for critical information about recovery programs including details on the grant and loan application process. If the HUB existed when Sandy hit, residents would have been provided information on critical issues faced by victims such as how "Duplication of Benefits" analysis works and how "substantial damage" determinations are made and the implication of such a determination under FEMA rules.

2) A permanent Reconstruction Advocate (RA) program should be created by New York State that would assist residents in navigating multiple governmental and private (insurance companies, contractors, not-for-profits) resources and programs. For instance, the RA could help residents in dealing with funding for contractors from the state and reviewing contractor licensing with the county. By providing consistency and multi-jurisdictional expertise, the RA program would help homeowners understand complex federal program rules and requirements thus streamlining the recovery process and optimizing public funds. Because different programs and applicant needs require different areas of expertise, the RA program would need to be staffed with highly knowledgeable people who, for instance, can direct applicants to a case manager regarding documents needed to process mortgage assistance, a technical advisor to discuss specifics of construction plans, a customer service representative to check on project status, or an appeals/hardship specialist to review and discuss disagreements with program policy. Funding for this RA case management effort should be integrated into the state Action Plan related to disaster recovery efforts.

3) Given advances in document management and customer relationship management (CRM) tools since Sandy, there is no reason why a modern cloud-based database management/CRM system should not be set-up ahead of the next disaster (perhaps with FEMA's national leadership) so that resident data and documents immediately are captured and secured. A Chief Data Officer should be appointed by the state to help ensure that data is safeguarded and duplication avoided.

4) A structure/mechanism should be established through which Long Island non-profit organizations proficient in case management service provision can stand-up a more robust case-management program immediately following a disaster.

2. CRZ Process and Results

The NY Rising Community Reconstruction (NYRCR) Program was created in April 2013 to utilize $700 million in federal funding with the goal of creating a planning and implementation program to provide rebuilding and resiliency assistance to communities severely damaged by Sandy and other storms. The NYRCR Program sought to be "a unique combination of bottom-up community participation and State-provided technical expertise." The NYRCR established nine Community Reconstruction Zones (CRZs) in hard-hit Suffolk County South Shore communities and created citizen panels to run the planning process with support "from GOSR, planners from the New York State (NYS) Department of State and NYS Department of Transportation, and consultants from world-class planning firms that specialize in engineering, flood mitigation

solutions, and green infrastructure, and more."[40]

Suffolk Community Reconstruction Plan locations. Image courtesy of NYS Dept. of Planning.[41]

Ultimately, eight CRZ reports were created in Suffolk County: Amityville/Copiague, Babylon/West Babylon, Fire Island, Mastic Beach/Shirley, Bay Shore, Lindenhurst, West Gilgo/Captree and Oakdale/Sayville.[42] The New York Rising Community Reconstruction (NYRCR) Program is a participatory recovery and resiliency initiative established to assist 124 New York State communities damaged by Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. The backbone of the program is a community-driven planning process – which from 2013-2015 – empowered local residents and business owners to represent their communities on NYRCR Committees. Over the course of 650 planning meetings and 250 public engagement events across the State, these stakeholders engaged their neighbors to discuss strategies for recovery and resiliency that consider specific needs and assets.

The Covernor's Office of Storm Recovery (GOSR) is currently implementing nearly approximately 30 Community Reconstruction projects in Suffolk County through partnerships with the Towns of Babylon and Islip, the Village of Amityville and the Dormitory Authority of the State of New York. These projects, which range from essential infrastructure investments to critical public services, will help communities recover and become more physically, economically and socially resilient.

Even with three years remaining until the expenditure deadline, nearly half of the Community Reconstruction projects are either being bid out for construction, in construction, or complete. The remaining projects in design are currently on schedule to be completed in advance of the September 2022 expenditure deadline.

[40] www.stormrecovery.ny.gov/nyrcr/final-plans

[41] NYS Dept. Planning and Development - Community Risk and Resiliency; www.dos.ny.gov/opd/sser/community_risk.html

[42] GOSR

To be sure, over 30 projects (approximately one-third of which are generator projects) are moving forward at a total cost of approximately $50 million, including an $8.5 million project to replace two historic bridges and allow for emergency vehicle access in the appropriately named "American Venice" in Copiague; a $1.1 million shoreline stabilization project in Babylon that will reduce the risk of flooding and shoreline erosion on Araca Road; and an $800,000 reconstruction of evacuation travel routes on Fire Island. (*See* Appendix, Exhibit D: NY Rising Community Reconstruction Program, Suffolk County Projects).

Recommendations

1) If there is another CRZ program in the future, the State could seek federal approval to provide block grants to municipalities for lower cost local resiliency projects, like generators, to allow them to be obtained more quickly and reserve the CRZ process for larger more regional projects which would require municipal buy-in up front.

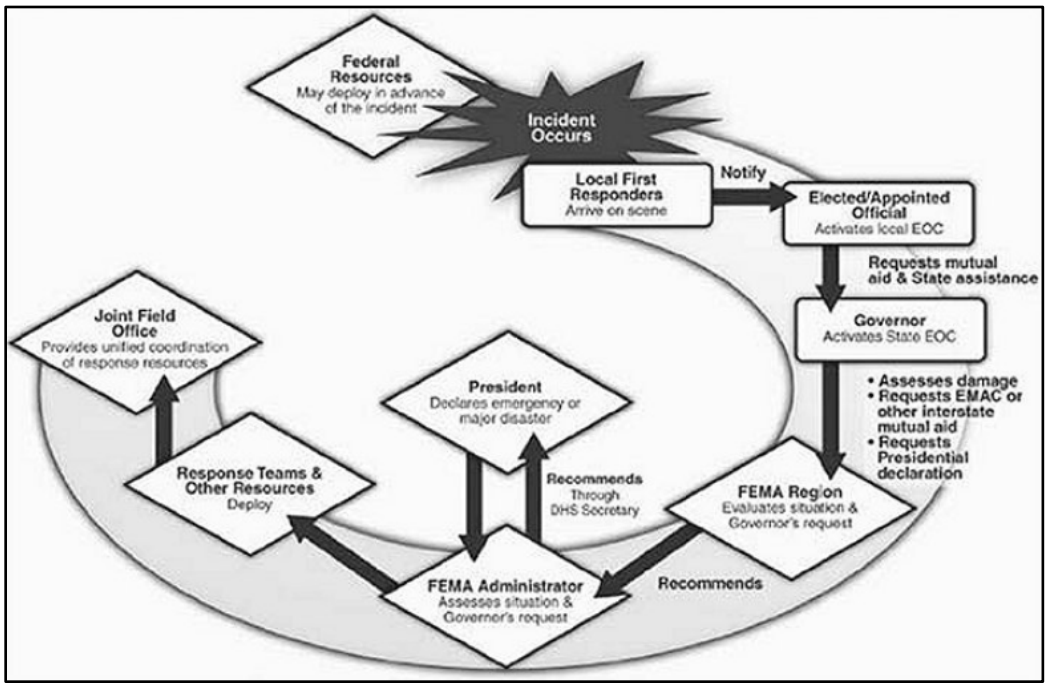
2) Given the significant time and effort that went into creating thoughtful community-based plans, the CRZ reports should be used in the future by municipalities and other organizations in applying for grants from entities such as the NY State Regional Economic Development Council. Municipalities should also continue to consult the reports as a future resiliency roadmap for their area. At the conclusion of the CRZ implementation process, appropriate departments of Suffolk County should be sure to inventory those projects identified in the CRZ reports that do not get funding as they are still important resiliency projects which, if they are incorporated into the SC DMP, may be able to be funded via FEMA's Hazard Mitigation Grant Program or Pre-Disaster Mitigation Program or other sources.

3) Given the strict federal funding timelines, Suffolk County and New York State should consider making investments in similar community-based planning efforts in vulnerable communities during blue sky days so that plans are developed with stakeholder buy-in and ready for implementation when new funding becomes available whether through disaster recovery allocations or through pre-disaster FEMA hazard mitigation funds.

3. Duplication of Benefits Analysis

Background

Enacted in 1988, the Stafford Act gives FEMA the authority to release grants in a time of a major disaster, such as a major storm event.



Federal duplication of benefits analysis chart.[43]

The Stafford Act requires that recipients of Federal disaster recovery funding make certain that no "person, business concern or other entity" will be paid more than once for assistance. Because disaster assistance to each person varies widely based on insurance coverage and eligibility for Federal funding, a "duplication of benefits" analysis must be conducted for each applicant. This analysis determines the applicant's total post-disaster need and then determines what other assistance has been given including "all benefits available to the person, including cash and other resources such as insurance proceeds, grants, and SBA loans."[44] In order to avoid duplication of benefits, each agency is required to follow a delivery sequence list provided by FEMA in order to determine "the order in which a program should provide assistance and what other resources it must consider before it does so."[45] Agencies that are higher in the order are expected to provide assistance prior to assistance from agencies lower on the sequence list. The hierarchy is as follows:

1. Volunteer agencies' emergency assistance programs (Salvation Army, etc.);
2. FEMA Home Repair and Replacement;
3. Flood and hazard insurance;
4. SBA and Department of Agriculture disaster loans;
5. FEMA Individual and Households Program assistance; and
6. Other federal, state, and local government agency programs (HUD and CDBG-DR grants).

Following Sandy, many homeowners accepted SBA loans, at the urging of FEMA, unaware that this would limit the amount of grants they would be able to receive through CDBG programs. Years later, these homeowners found themselves unable to receive the full amount of assistance from CDBG assistance programs that they needed to finish rebuilding their homes.

[43] USACE/FEMA – Stafford Act, slide 7; www.nab.usace.army.mil/Portals/63/docs/EMO/Stafford%20Act%20&%20FEMA.pdf
[44] HUD Notice, 76 FR 71060, November 16, 2011.
[45] SBA Disaster Assistance Program Standard Operating Procedure Sec. 4.3, www.sba.gov/sites/default/files/2018-06/SOP 50 30 9-FINAL.PDF

Since Superstorm Sandy

Among several bills introduced to rectify shortcomings in the duplication of benefits policy, it was H.R.302 - FAA Reauthorization Act of 2018 that became law.[46] This legislation amends the Stafford Act's "Duplication of Benefits" section to establish that the President may not determine that a loan is a duplication of assistance, provided that all federal assistance is used toward a loss suffered as a result of a major disaster or emergency. However, this provision only applies to disasters occurring between 2016 and 2021.

Recommendations

1) Long Island's members of Congress should work to make permanent the duplication of benefits policy amended by the FAA Reauthorization Act. The SBA and Department of Agriculture loans are the only forms of assistance on the list of duplication of benefits analysis that are not a grant. Loans are not grants and shouldn't be offset in the same way that grants are.

2) Long Island's Congressional delegation should work to pass a bill that retroactively would apply this elimination of loans from the duplication of benefits analysis. An example of this type of legislation is the Disaster Survivor Benefit Clarification Act of 2015 that was proposed by New Jersey Congressman Tom McArthur.[47] The bill would amend the Stafford Act to generally provide that "an SBA disaster loan made on or after January 1, 2012, shall not be considered financial assistance for purposes of the prohibition on receiving duplicative disaster assistance."

3) If Congress is not willing to change the duplication of benefits law retroactively, Long Island's members of Congress should work to pass a bill requiring the federal government to forgive SBA disaster loans. A potential model for such legislation is the Disaster Assistance Recoupment Fairness Act of 2015.[48]

4. The National Flood Insurance Program (NFIP) and Community Rating System (CRS)

Background

The federal NFIP was created to mitigate the effects of flooding on structures owned by individuals and businesses by providing flood insurance and by encouraging communities "to adopt and enforce floodplain management regulations." [49] FEMA created the CRS as a means to recognize and incentivize voluntary community floodplain management activities that exceed the minimum NFIP requirements with the goal of reducing flood damages to insurable property and encouraging a comprehensive approach to floodplain management thereby strengthening the NFIP. The CRS "has been developed to provide incentives in the form of premium discounts for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding."[50]

Under the CRS program, communities earn "credit points" for engaging in 18 different activities recognized as effective for minimizing a community's exposure to floods. The

[46] H.R. 302 FAA Reauthorization Act of 2018, 115th Congress (2017-2018); www.congress.gov/bill/115th-congress/house-bill/302

[47] H.R.2594 - Disaster Survivor Benefit Clarification Act of 2015, 114th Congress (2015-2016); www.congress.gov/bill/114th-congress/house-bill/2594

[48] H.R.797 - Disaster Assistance Recoupment Fairness Act of 2015, 114th Congress (2015-2016); www.congress.gov/bill/114th-congress/house-bill/797

[49] www.fema.gov/national-flood-insurance-program

[50] www.fema.gov/media-library-data/1523648898907090 56f549d51efc72fe60bf4999e904a/20_crs_508_apr2018.pdf

activities are organized under four main categories: Public Information, Mapping and Regulation, Flood Damage Reduction, and Flood Preparedness. As a community earns more points, more of a premium discount is available to resident policyholders – ranging from a 0% discount at the lowest level of CRS up to a 45% discount at the highest level.[51]

Suffolk municipalities have had no real success with the program as the vast majority of them have not participated and the towns of Babylon and Southampton as well as the Village of Brightwaters were in the program during the 1990s but never achieved enough credit points to earn a discount. The municipalities that made the effort to participate indicated that compliance was more arduous than it was worth. However, two Nassau villages – Freeport and Bayville – have earned discounts of 15% and 10% respectively for their residents. Other coastal municipalities have had success with the program, including Pinellas County, Florida which has earned a 25% discount for its residents.[52]

Since Superstorm Sandy

After initial NFIP payments resulting from Sandy damage, policyholders on Long Island complained of widespread underpayment by FEMA. A subsequent 2015 FEMA review showed that more than half of those who questioned their NFIP payment were indeed underpaid by an average of more than $15,000 each.[53]

In 2019, FEMA announced that it will be rolling out a new version of NFIP effective in October 2020. Currently, all homeowners in a town or village pay the same amount of premium for flood coverage. This new version will more accurately access risk by incorporating the size of the home and its proximity to the water into the premium calculation. This change will affect the pricing for all 90,000 Long Islanders who have flood insurance through the federal government. Some experts believe that most Long Islanders will see a reduction in their rates because Suffolk and Nassau are among the relatively small number of counties in the country with a surplus in their NFIP accounts.[54]

Recommendations

1) Given the widespread underpayment of flood insurance claims following Sandy, the New York State Department of Financial Services should appoint a dedicated advocate in the wake of the next major flood event to oversee FEMA's calculations and advocate for NFIP policyholders when circumstances call for it.

2) Appropriate departments of Suffolk County should make sure that municipalities are aware of the CRS program and should consider hosting a meeting of interested municipalities to determine if regional resources and technical assistance might allow more municipalities to participate in the program to the benefit of Suffolk County residents.

[51] www.edf.org/sites/default/files/documents/Cunniff_Shore%20and%20Beach_Spring%202018.pdf
[52] www.pinellascounty.org/flooding/pdf/New_Owners_brochure.pdf
[53] "More than Half of Sandy Victims in FEMA Review Underpaid on Insurance," *Newsday*, September 4, 2015; www.newsday.com/business/more-than-half-of-sandy- victims-in-fema-review-underpaid-on-insurance-1.10808650
[54] "How 2020 Revamp of Federal Flood Insurance Rates Could Affect You," *Newsday*, April 6, 2019; www.newsday.com/long-island/national-flood-insurance-program-1.29448927

5. FEMA Building Code Review

Background

Following Sandy, FEMA's Mitigation Assessment Team (MAT) reviewed the role of New York State's building codes in preventing damage from the storm. The MAT report[55] found that:

- Buildings on strong foundations elevated above the flood level performed well, but those below the flood level either sustained inundation damage (inland and sheltered water shoreline areas) or were damaged by hydrodynamic, wave, or floating debris loads associated with high-energy storm surge (buildings near the oceanfront).
- Although dune erosion was widespread throughout the region, the presence of wide beaches and tall, wide dune fields reduced damage to both low-rise buildings and other buildings and infrastructure situated landward of the dunes. Low and narrow beaches and dunes were completely eroded in many areas, and buildings and infrastructure landward of these dunes were subject to damaging wave action and/or high-velocity flow.
- The effectiveness of erosion control structures (e.g., bulkheads, seawalls, revetments) varied widely, depending on the height, age, and condition of the structures, and on the beach condition seaward of the structures.

The MAT report (pg. 3-34) also analyzed the impact of building standards on the ability of homes to withstand Sandy's impact on Fire Island:

> *Houses along the beachfront on Fire Island were situated directly behind the dune system before Hurricane Sandy struck. Many of these houses had foundation-to-building connections, but the connectors were corroded either completely or to a degree that uplift and shear resistance would have been compromised. In some cases, the connectors had been replaced, and in others, the houses lacked a continuous load path. Figure 3-46 is an aerial photograph showing two homes, labeled House A and House B, before and after Hurricane Sandy. Figure 3-47 shows a close-up of these same two houses. House A did not have a continuous load path, and the house slid off its wooden pile foundation onto the sand (Figure 3-48). Although much of the damage observed to House A was likely from floodwater that exceeded the elevation of the house, the house next door (House B), which was similar in construction, remained in place. The MAT observed that House B had more load path connectors still intact after the storm event.*

[55] FEMA 2013 MAT Report for NY/NJ; www.fema.gov/media-library/assets/documents/85922

Flood Hazard Data: FIRM = Zone VE (16 feet)
ABFE = Not available. ABFEs were not released for Suffolk County because the FIRMs are up to date.
Sandy floodwater elevation = 14 feet NAVD88

Figure 3-46: Pre- and post-Hurricane Sandy aerial photographs of two Fire Island, NY, houses visited by the MAT; floodwater rose to 14 feet at this location
SOURCE: USGS

Figure 3-47:
House A was unable to maintain a continuous load path because of significant corrosion of the connections between the foundation beams and floor joists (see Figure 3-48). House B had some corroded connections, but several had been replaced, and the continuous load paths were sufficient to enable relatively good performance (Fire Island, NY).

Structural Analysis from the 2013 FEMA MAT NY/NJ Report.

Recommendations

1) As suggested by the MAT report, the DEC should work with its counterpart, the New Jersey Department of Environmental Protection, to evaluate the FEMA model floodplain management ordinance (which was developed to coordinate with building codes) and adopt a coordinated ordinance to enhance local enforcement.

2) As noted in the MAT report, "Unless constrained by State requirements, communities that enforce building codes with NFIP-consistent provisions have two primary tools to regulate development in flood hazard areas: (1) building codes that govern the design and construction of buildings and structures and (2) either Appendix G of the International Building Code (IBC) or local floodplain management regulations. These tools are designed to work together to result in buildings, structures, and all other development that are resistant to flood loads and flood damage." Suffolk's municipalities should review the FEMA MAT report recommendations and determine if their building codes should be enhanced.

6. Substantial Damage Determination

Background

For communities that participate in the National Flood Insurance Program (NFIP), "substantial damage" determinations are required by local floodplain-management ordinances. A building has "substantial damage" if the cost to repair such damage is 50% or more of the building's pre-storm value. If a building in a floodplain is determined to be "substantially damaged" it must be brought into compliance with local floodplain management regulations, typically by either elevating the structure or relocating/demolishing the building. Importantly, the decision about whether a building is "substantially damaged" is not made by FEMA (though FEMA damage assessment teams often provide damage data on which such a decision can be based), but rather is made at the local municipal level, generally by a building department official or floodplain manager.[56]

Following Sandy, numerous Long Island homeowners were not informed by their local municipality that their homes were considered to be "substantially damaged" and only found out years later. They thus were unable to later sell their homes without first bringing them into compliance by elevating them or re-constructing them. For instance, in June 2015 a homeowner in East Rockaway who had repaired her home after Sandy learned when putting her home up for sale that her property had been deemed substantially damaged. As the application period for applying for assistance from NY Rising ended in April 2014, the homeowner was unable get any assistance. Similarly, in 2016 an elderly veteran and his wife from the Town of Hempstead found out that their home had been determined to be substantially damaged and were too late to apply for NY Rising benefits. As a result, the couple was forced to sell their home "as-is," cash only, for a price that was well below market-value in their neighborhood. While most of these problems seemed to arise in Nassau County, there were similar situations that arose in parts of Suffolk County as well.[57]

Recommendations

1) The determination of what constitutes "substantial damage" is left to municipal building departments to determine based on their estimates of construction costs and their professional judgment. New York State should consider requiring insurance companies to share their damage estimates with local building departments. An insurance payout of greater than 50% would result in the building department automatically issuing a substantial damage letter. Conversely, smaller insurance payouts would help building departments determine that a house is not substantially damaged.

2) Post-Sandy there were significant variations in the procedures that different towns and villages followed for distributing substantial damage letters. Some towns and villages provided them to homeowners at their request while others required a more in-depth submission of documentation and/or inspection to receive a substantial damage letter. New York State should create a state-wide standard for how substantial damage letters will be formatted and provided, how substantial damage determinations can be disputed, and should set a time requirement on the amount of time a municipality has after a disaster to issue a substantial damage letter and provide notice to the building owner.

[56] FEMA Fact Sheet, *NFIP "Substantial Damage" – What Does It Mean?,* September 14, 2017, Release Number FS008.

[57] Touro Law Center Disaster Relief Clinic.

3) Each municipality should create an online portal – similar to wheresmyrefund.com – that would permit a homeowner to track when a substantial determination inspection took place, to obtain a copy of the inspection report and the substantial damage letter (if any), and to dispute any substantial damage letter if a homeowner believes an improper determination is made.

4) Local municipalities should file substantial damage letters in the same building department file as a title report so that a potential homebuyer would have notice of the defect with time to cure or withdraw from a contract to purchase.

5) If there is a future CDBG-DR Buyout program or other program for which one's home must be determined to be substantially damaged in order to qualify, New York State should ensure that the time to enroll in such programs should not end before the required deadline for municipalities to complete substantial damage determinations and inform property owners.

7. Buyouts

Example of Enhanced Buyouts in Bayport; Image Courtesy of the Town of Islip

Background

The Union of Concerned Scientists estimates that more than 32,000 homes in Suffolk County are at risk of becoming chronically inundated by 2100.[58]

[58] www.ucsusa.org/global- warming/global-warming-impacts/sea-level-rise-chronic-floods-and-us-coastal-real-estate-implications#.W-G6QZNKjZs

Since Superstorm Sandy

Operating in select neighborhoods including six locations (Babylon, Bayport-Sayville, Lindenhurst, Oakdale, Patchogue and Southampton) in Suffolk County, New York State's $400 million Enhanced Buyout Program aims to improve resiliency by transforming parcels of land into wetlands, open space, or storm water management systems, thus creating a natural coastal buffer to safeguard against future storms. Locations selected for the program were driven by the cooperation of individual homeowners and consultation with county and local governments.[59] As of October 2019, the program had completed demolition, grading, and seeding of all 155 properties it has purchased. The state intends to continue to evaluate the efficacy of buyouts on a neighborhood by neighborhood basis as homes continue to move through the process from purchase, to demolition completion, and to transfer to municipalities and/or nonprofits for long-term management. [60]

Recommendations

1) While the Enhanced Buyout Program has been generally successful, the voluntary aspect of the program has led to a checkerboard situation in some neighborhoods where now vacant land is interspersed among land held by owners who chose not to participate in the program.[61] One way to mitigate against this is to allow towns and villages (rather than the state) to control which properties will be bought out in order to ensure land use consistency in vulnerable areas. Another tool that should be considered is the use of eminent domain in rare circumstances where there are high risk properties and an unwilling seller. This option should be limited to those situations where a property has negative impacts on surrounding wetlands, where municipal maintenance of roadways that are often underwater is required, and/or where emergency responders can be put at risk if they need to get to the property during a storm event.

2) Suffolk County should consider creating a framework agency (or adding to the responsibilities of an existing agency such as the Suffolk County Land Bank) to administer future buy-outs. Such an agency initially could work with towns that currently facilitate voluntary buyouts and donations and be ready to staff up to be larger after a disaster or other large influx of funding for buyouts. This agency also could forge partnerships among local governments and non-profit organizations engaged in buyouts and facilitate communication with state and federal agencies.

8. Small Businesses

Background

An estimated 8000 Long Island small businesses were located in areas that received flooding of one foot or more.[62] The NY Rising Small Business Program utilized CDBG-DR funds to help support independently-owned and operated small businesses that were impacted by Sandy. The program provided grants of $50,000 or more as well as low-interest loans to help businesses "repair or replace needed equipment or lost inventory, to renovate facilities that were damaged/destroyed, or to provide working capital needed as a direct result of the storm." The state also created a "Business Mentor NY" initiative to help provide free mentoring services to help small businesses through the recovery process.[63]

[59] www.stormrecovery.ny.gov
[60] GOSR
[61] Ed Romaine testimony to SSRTF at Brookhaven Public Hearing, April 26, 2018.
[62] GOSR Fifth Anniversary Report, page 27.
[63] www.stormrecovery.ny.gov/about

Two major issues that Long Island small businesses encountered in trying to access the Small Business Program funds were that:

- In order to qualify for assistance, a small business had to show future viability and stability which was difficult to prove to the required standard for many businesses – particularly after they suffered storm damage and business interruption.
- Included within the required paperwork for funding was proof of the location of the small business. For many small business owners who were operating their business as a limited liability corporation out of their homes, they were not able to provide the proper documentation to show the business was a separate entity which was in fact paying taxes as a small business.

Recommendations

1) New York State should meet with small business owners who went through the CDBG-DR application process to discuss ways to improve the process in the future, including a discussion of alternative ways to demonstrate viability – particularly for self-employed entrepreneurs – and reductions in the volumes of paperwork that need to be submitted.

9. Creating a Pre-Storm Draft Action Plan Template

Background

The federal Appropriation Act[64] requires that prior to the obligation of CDBG-DR funds, a grantee must submit an "Action Plan" detailing the proposed use of funds, including criteria for eligibility and how the use of these funds will address disaster relief, long- term recovery, restoration of infrastructure and housing, and economic revitalization in the most impacted and distressed areas. At the start of the Sandy recovery, New York State created its first Action Plan and, as the state learned from experience and circumstances changed, it has since published 23 Action Plan Amendments which have been approved by HUD and which vary in purpose and substance. All Action Plan Amendments and their summaries are published on the GOSR website at www.stormrecovery.ny.gov

Recommendations

1) In order to permanently capture the lessons learned from GOSR, New York State should create a small standing agency within the NY State Division of Homeland Security and Emergency Services (DHSES) that can be scaled up when a disaster strikes and that would be comprised of individuals familiar with federal recovery programs. Such an agency would be particularly useful in prioritizing pre-disaster mitigation funds that may now come from FEMA as a result of the passage of the 2018 Disaster Recovery Reform Act.[65]

2) In preparation for the next disaster, New York State in conjunction with Suffolk County and other municipalities should create a "Draft Action Plan" (DAP) incorporating both lessons learned from the Sandy recovery and new ideas. The DAP can be used as a jumping off point for structuring the state response following future natural disasters. Suffolk County should host a regional stakeholder conference to

[64] Public Law 113-2.
[65] www.congress.gov/bill/115th-congress/house-bill/4460

brainstorm ideas for the DAP. Based on conversations with former leading recovery officials consideration should be given to including the following items in the DAP:

- Providing for a state of the art data management system to enable the free flow of information to and from residents as it relates to federal programs and case management. Such a system could interface with state/local online information portals such as the HUB and would improve processing times, decrease the need for duplicative filings, and reduce misinformation and inconsistency.
- Allowing town and villages to control enhanced buyouts to ensure land use consistency in each area.
- Creating a Suffolk county-based call center so that local knowledge on the part of staff can enable faster responses to recovery questions; such a center could also serve as a "rapid response" unit for particularly urgent situations.
- Establishing funding for education and outreach by the LI VOAD and other regional VOADs in the state to low and moderate income residents to help them register for programs for which that they are eligible.
- Enhancing disaster case management capabilities by:
    - creating a Reconstruction Advocate program,
    - working with leading local not-for-profits to ensure that trusted community partners are engaged in the recovery process,
    - ensuring adequate numbers of case workers with local knowledge and providing long-term structuring of positions and compensation to reduce turnover.
- Creating a dispute resolution process for residents.
- Bifurcating the CRZ program into a block grant for cheaper items like generators so they can be installed more quickly while maintaining a more formal competitive process for larger regional projects.
- Providing STEP program participants with assistance in paying utility bills for some period of time.
- Changing rules for contractor payments to allow the state to provide more of a project's costs at the beginning to enable contractors to secure necessary materials and manpower, provided that steps are taken to prevent contractor fraud such as homeowners and contractors agreeing on a written payment for performance schedule.
- Purchasing some number of Hunter Shelters or similar types of temporary onsite housing to allow residents to remain in their communities while their homes are being repaired.
- Requiring that residents receiving federal housing funding only use contractors on certified lists of licensed, bonded and insured contractors maintained by the counties (which would need to be constantly updated) since the licensing municipalities have leverage over contractors but individual homeowners do not.
- Providing funding for municipal building department education to ensure awareness as to:
    - municipal responsibilities with respect to substantial damage assessments (including standardized processes and timelines) and FEMA home elevation requirements,
    - the required timing and sequence of inspections needed for specialized recovery-related projects like home elevations,
    - the need to monitor at the permit application stage the contractor's

adherence to escrow or bond insurance requirements.

- Running some aspects of the recovery effort through the counties with regard to certain programs where the county's close involvement with regional and local needs and processes is useful, such as housing reconstruction efforts and the CRZ process.
- Requiring that, when home elevation is required, the additional construction costs needed to provide for residents' medically documented accessibility needs is fully reimbursed. According to the Suffolk County Office for People with Disabilities, Sandy victims did not always receive full reimbursement.

10. Potential Changes in Federal Law

With the benefit of hindsight, it is apparent that certain aspects of federal law should be changed to improve disaster recovery on Long Island.

Recommendations

In addition to the needed retroactive change in the duplication of benefits analysis discussed above, federal policymakers should:

1) Provide counties with the flexibility to help run certain aspects of a recovery as a partner of New York State by changing HUD rules that limit the flexibility of sub-grantees when it comes to procurement and contracting.

2) Modify national HUD income eligibility standards for housing and other assistance as they unnecessarily preclude many people of moderate means from getting assistance in high-cost regions like Long Island.

3) Change FEMA rules that limited STEP program contractors from doing ancillary clean-up work in a home while performing the required electrical and heating tasks.

4) Reduce redundancies and complication by creating a single shared common application for FEMA, SBA and HUD disaster recovery programs to allow victims to simultaneously apply for benefits from all of these agencies given their current separate (but similar) application and eligibility processes.[66]

5) Consider replacing SBA and HUD disaster assistance programs with a new integrated federal disaster assistance paradigm that is centered under one disaster assistance agency and thus allows recovery programs to be more streamlined and coherent.

[66] www.riskcenter.wharton.upenn.edu/digital-dialogues/simplifying-and-speeding-disaster-recovery

CHAPTER III
PRE-STORM RESILIENT ADAPTATION

As an island that juts out into the Atlantic, we are as vulnerable to climate change as any place in the world . . . . This is not an academic exercise for Long Island . . . . This is an existential challenge we are facing.

– Suffolk County Executive Steve Bellone[67]

We live on a glacial terminal moraine - primarily a large heap of sand - that is slowly eroding away. The very low topography and land slopes of many coastal regions of Suffolk County allow easy access to our beaches but put us at greater peril from storms and the increasing threat of sea level rise – which the DEC projects will be between two and six feet by 2100. Given Long Island's precarious location and geological composition, we need to implement measures to take advantage of every natural attribute we have to minimize the impact of the inevitable next major storm and enable us to co-exist with rising waters.

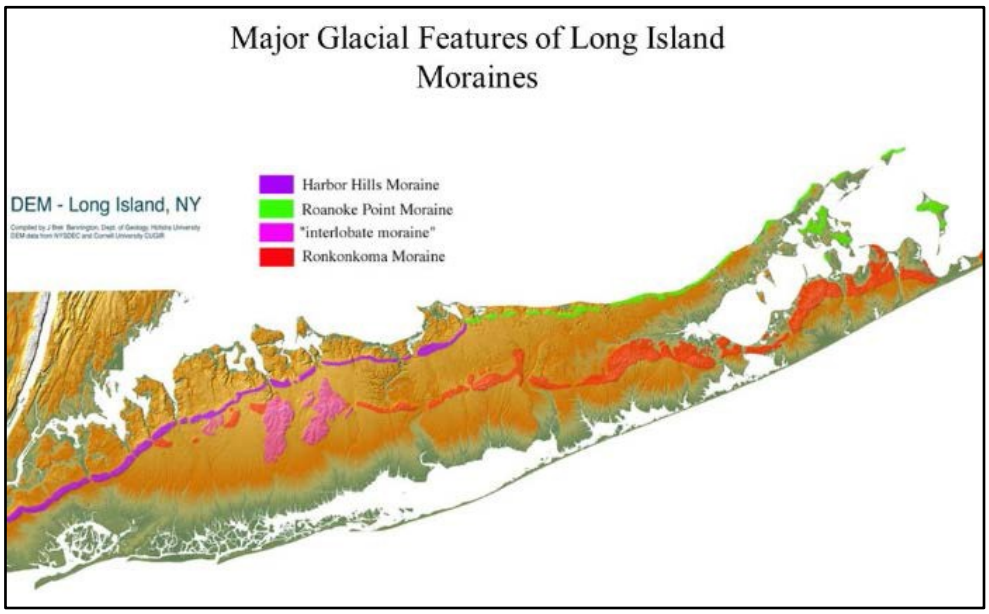


Image courtesy of Hofstra University, Department of Geology.

National Research Council (NRC) defines resilience as "the ability to prepare and plan for, absorb, recover from, or more successfully adapt to actual or potential adverse events."[68] Our coasts have always held both economic and intrinsic value for Long Islanders, but it is only recently that we've come to appreciate the expanse of its defensive role. In its 2014 report "Reducing Coastal Risk on the East and Gulf Coasts," the NRC, in a broad five-year overview of issues for the U.S. Army Corps of Engineers, identifies two strategies for managing coastal storm risks, one for

[67] IBM "Smarter Cities Challenge: Suffolk County, New York" video; smartercitieschallenge.org
[68] *Disaster Resilience: A National Imperative*, August 2012; www.nap.edu/catalog/13457/disaster-resilience-a-national-imperative

remaining in place, the other for retreating:[69]

- "One set of strategies aims to reduce the probability of flooding or wave impact. These include hard structures, such as seawalls, levees, flood walls, and storm surge barriers, and nature-based risk reduction strategies, such as beach nourishment, dune building, and restoration or expansion of natural areas, such as oyster reefs, salt marshes, and mangroves."
- "Another set of strategies aims to reduce the number of people or structures in areas at risk or to make them less vulnerable to coastal storms. These include design strategies, such as elevating or flood proofing buildings and 'non-structural strategies' such as relocation and land use planning to steer future development or redevelopment away from high hazard areas . . . ."

LAND USE AND ZONING POLICIES

One of the primary tools that governments have to protect both our natural environment and our built environment are land use policies and zoning regulations. These policies establish the rules and economic incentives that drive development patterns and practices.

Unfortunately, much of Long Island was developed before it was understood that our climate is changing, major storms are becoming more severe and more frequent, and coastal erosion and flooding are becoming a chronic problem in our developed coastal communities. The Union of Concerned Scientists estimates that more than 32,000 homes in Suffolk County are at risk of becoming chronically inundated by 2100.[70] While this extreme result is several decades into the future, many areas of Suffolk County already are being repeatedly inundated, and many more homes are in danger of storm- induced flooding from increasingly frequent severe weather events. Land use policies need to be implemented to help reduce these risks to Suffolk County's residents, properties, and infrastructure.

1. Coastal/Flood Zone Land Use Regulations

Background

One of the major attractions for people moving to Suffolk County during its heavy population growth periods in the 1960s, 1970s and 1980s was being able to live in proximity to the water. This led to many developments at or near the shoreline, including on barrier islands, in wetlands, and on bluffs.

With land use authority under the jurisdiction of the towns and villages across Suffolk County, the regulation of land use in the flood zone is among the most urgent issues facing local governments today. While Suffolk County does not have the power to change local land use and zoning regulations, regional resources such as the Suffolk County Planning Commission, the Suffolk County Department of Economic Development and Planning, and the Long Island Regional Planning Council can provide assistance to local governments which may lack the resources to

[69] www.nap.edu/catalog/18811/reducing-coastal-risk-on-the-east-and-gulf-coasts, page xi.

[70] www.ucsusa.org/global-warming/global-warming-impacts/sea-level-rise-chronic-floods-and-us-coastal-real-estate-implications#.W-G6QZNKjZs

develop new codes and policies on their own.

Our system of land use regulation treats coastal boundaries as fixed lines on a map. However, in this era of climate change and sea level rise, we now recognize that shorelines are dynamic, not static, and that the boundary between land and water is constantly moving inland. This reality has resulted in strong pressure – often at great financial and environmental cost – to armor shorelines, prevent erosion, and maintain the coastline. However, as discussed later in this chapter, while not often utilized on Long Island, other legal and regulatory mechanisms are available for managing moveable boundaries in a way that acknowledges the inevitable encroachment of the ocean.

Recommendations

1) For too long, development in Suffolk County has occurred in risky places, including barrier islands, wetlands, and bluffs, which puts that development at risk, leads to increased flooding for people and infrastructure, and damages natural resources. Appropriate departments of Suffolk County and local municipalities should discourage further development in floodplains, marsh migration pathways and other areas that put people in harm's way and exacerbate flooding problems. Enabling more building in floodplains and vulnerable coastal areas perpetuates the past problems and is a lost opportunity to secure a safer future.

2) Regional entities such as the Suffolk County Planning Commission, the LI Regional Planning Council and/or the proposed (see below) Long Island Coastal Commission should assist local towns and villages in (a) formulating zoning and land use policies that limit development in sensitive coastal areas, and in (b) reviewing local codes for potential obstacles to recovery, remembering "that laws that make sense at the time, may become barriers to recovery when speed, flexibility and efficiency become paramount."[71]

2. Retreat

Background

While limiting additional coastal development is crucial to avoid putting more people and property in harm's way, many flood-prone areas in Suffolk County are already heavily developed. As sea level rise accelerates, groundwater rises with it, and coastal storms become more extreme, retreating from the heavily developed coast is increasingly being considered in many communities. In some areas, it is the only viable option. Otherwise, future flooding events may leave thousands of homeowners and business owners with stranded assets that they cannot repair or sell; this would be an undesirable outcome for owners as well as the public due to tax base loss. The two primary methods for effectuating retreat are buyouts and transfer of development rights (TDR). Another way to manage retreat over time is through rolling easements.

A great deal of work is needed to develop the plans, programs, and mechanisms to allow retreat to occur on a large scale in Suffolk County. Examples are being developed in some of the most vulnerable communities locally, such as Mastic Beach and Montauk, as well as other similarly vulnerable areas across the country.

[71] www.governing.com/gov-institute/voices/col-local-governments-hidden-barriers-disaster-recovery-zoning-building-codes.html; noting that limitations in Long Island land use codes on elevating houses led to an overwhelming number of variance applications to Long Island zoning boards following Sandy.

a. Buyouts

See "Buyouts" section in Chapter II: Storm Recovery and Reconstruction of this report.

b. Transfer of Development Rights

One mechanism that can be used to facilitate and help fund retreat is a transfer of development rights (TDR) program that would treat flood risk areas as sending areas and safer areas as receiving areas (these areas would facilitate transit oriented development if they are close to LIRR stations).

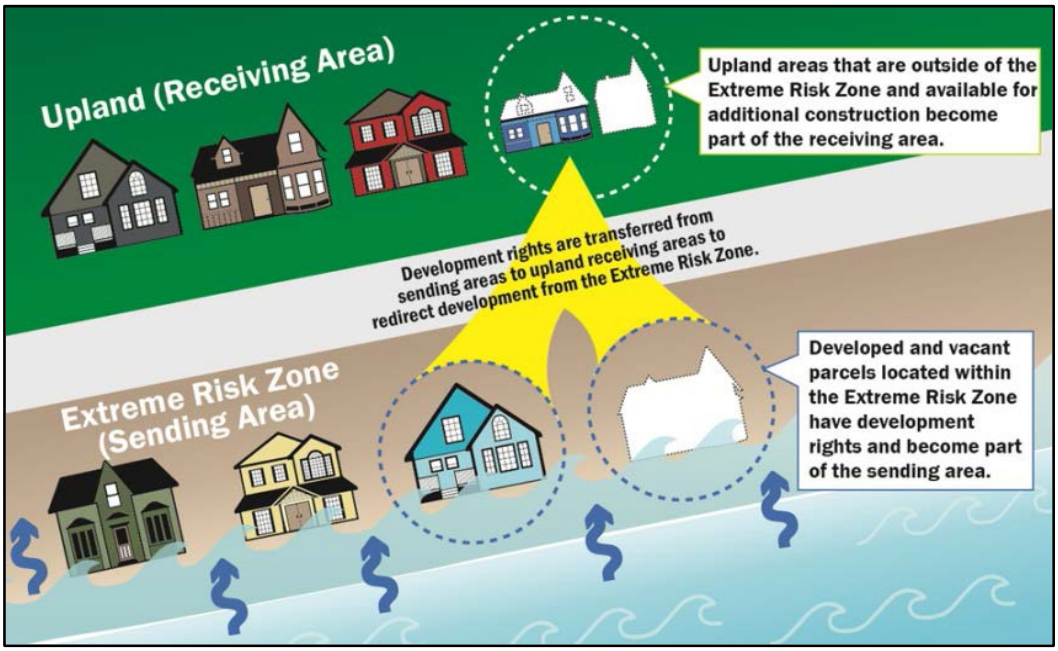


Illustration of transfer of development rights in a coastal setting.[72]

Used successfully in Suffolk County to protect land in the Long Island Pine Barrens, TDR programs are familiar locally and would be a way to use market forces to facilitate coastal retreat. In 2015, more than $8 million was spent on sandbags to protect downtown Montauk. Within four years, and after being buttressed by nearly $1 million in extra sand covering that lasted less than one year, the sandbag structure was partially dismantled by a handful of storms.[73]

As a result, East Hampton is doing initial planning around possible retreat in Montauk. A transfer of development program is part of the current proposal to facilitate buyouts and relocations.[74] According to the Town of East Hampton's 2018 Montauk Hamlet Study[75]:

[72] Generic Environmental Impact Statement for Long Island Transfer of Development Rights Program, NY State Department of State, 2017.

[73] "Contractor Makes Lowest Bid of $8.4 Million for Montauk Shoreline Project," *The Southampton Press*, March 10, 2015, www.27east.com/news/article.cfm/Montauk/98860/Army-Corps-To-Open-Bids-For-Montauk-Project-DEC-Issues-Water-Permit; "Montauk Beach Erosion Surfaces Sooner as Sandbags Relent to Rising Sea Levels," *Newsday*, February 2, 2018, www.newsday.com/long-island/suffolk/montauk-erosion-1.24071066

[74] "Moving Montauk Landward? Some Worry It's Not Happening Fast Enough," *East End Beacon*, December 8, 2018, www.eastendbeacon.com/moving-montauk-landward-some-worry-its-not-happening-fast-enough

[75] ehamptonny.gov/DocumentCenter/View/2788/Montauk-Hamlet-Report-January-31-PDF; pages 36-37.

Hamlet Study - Montauk | Planning & Design Recommendations

The second phase of Downtown improvements would incentivize the relocation of hotel and resort uses from the ocean-side inland and improve the resilience of these businesses to storms. Existing resort zoning is restrictive enough that little or no development has occurred on the ocean-front in recent decades. We propose allowing potential resort/hotel developers to purchase and transfer development rights (hotel or condo units) from ocean-side property owners to the second row of resort uses . . . . This Transfer of Development Rights would be contingent upon incorporating resilience strategies into new hotel designs, such as floodable first floor parking with breakaway walls. Ocean-front parcels and the adjacent right of way, in turn, would be protected from development and renaturalized through dune grass planting and sand fencing.

As sea level continues to rise . . . additional resort and mixed uses would be relocated upland to form a new resort/mixed use corridor along Essex Street. The development of this new corridor would gradually shift the center of downtown toward the intersection of Essex and Montauk Highway – higher ground. This phase also includes elevating Montauk Highway in the low area between Fort Pond and the ocean. We also propose incorporating alternative beach nourishment practices. For example, a "Feeder Beach," where nourishment sand could be deposited on the "updrift" side of the main beaches for downtown and allowed to distribute using natural currents. This has the potential to allow for cost savings in construction hours and to minimize disturbance to the naturalized dune area as the town faces more frequent and costly beach nourishment.

c. Rolling Easements

According to the EPA, a "rolling easement is the process of ensuring that wetlands and beaches can migrate inland, as people remove buildings, roads, and other structures from land as it becomes submerged." It is a long-term retreat strategy that "allow[s] development with the conscious recognition that land will be abandoned if and when the sea rises enough to submerge it. . . . . From now until the land is threatened, valuable coastal land can be put to its highest use . . . . Once the land is threatened, it will convert to wetland or beach as if it had never been developed."[76]

Typical characteristics of rolling easements along eroding beaches may include no shoreline armoring; a rolling design boundary (e.g. dune vegetation line), seaward of which the owner's property rights are reduced; no new structures seaward of the rolling design boundary; encouragement or requirement to remove preexisting structures when erosion leaves them seaward of the rolling design boundary; and an indication whether beach nourishment and adding sand to dunes are allowed. Maine, Massachusetts, and Rhode Island have each adopted some form of "rolling easement" to ensure that wetlands or dunes migrate inland as sea level rises thus reducing the risk of loss of life and property.[77]

[76] "Rolling Easements," J. Titus, 2011, epa.gov/sites/production/files/documents/rollingeasementsprimer.pdf; pages iii, 3 and 4.

[77] Suffolk County Comprehensive Water Resources Management Plan, March 2015, pages 7-11.

Interest	Who can own or enforce it?	Type of Purpose	Objective	Caveat
Shoreline migration conservation easement	Government or land trust	Conservation or recreation	Prohibit shore protection. May also have provisions for removing homes.	May be costly to enforce unless carefully drafted.
Legal covenant	Developer, maybe a neighbor	Any	Prohibit shore protection or provide for access to migrate inland. But court cannot enforce the agreement; only awards provable damages for failure to comply.	Strict rules for when covenant can be created known as "privity." Damages only.
Equitable covenant (equitable servitude)	Developer, maybe a neighbor	Any	Prohibit shore protection or ensure that access migrates inland.	Easier to create than legal covenant, but court may decide not to enforce if harm to owner is greater than benefit to neighbor.
Future interest in land[1]	Anyone	Limit duration of land ownership	Terminate ownership when sea rises or shore retreats enough to submerge parcel.	Abolished in some states. Careful drafting needed to show purpose.
Rolling affirmative easement	Neighbor or state	Any	Access along the shore migrates inland; remove structures that block access	Must be clear about intention to migrate inland.
Rolling boundary	Neighbor	Any	Boundary between landowners migrates with shore; preserve width of road or conservation buffer.	Few examples other than for public trust lands.
Abate nuisance or quiet title in court	Neighbor or state	Abate nuisance or enforce a right	Private owner asks court to prevent shore protection or allow access along shore based on common law.	Requires a court to make new law, which courts usually decline.
Rolling conservation easement[2]	Government or land trust	Conservation or recreation	Amend existing conservation easements to also prohibit shore protection.	May be costly to enforce unless carefully drafted.
Transferable development rights[3]	Government	Any	Compensate owner who yields land to rising sea, with right to develop new coastal lot.	Difficult to define where to transfer the development.

Options for implementing rolling easements.[78]

Recommendations

1) The Suffolk County Planning Commission or another County agency/department should help identify vulnerable communities in Suffolk where, based on federal floodplain maps, strategic retreat may be necessary and should work with local municipalities to begin an initial planning process based on Montauk's experience. A first step could include providing a model code to assist municipalities in adopting some form of "rolling easement" to ensure that wetlands or dunes migrate inland as sea level rises thus reducing the risk of loss of life and property as has been done in parts of Maine, Massachusetts, and Rhode Island.

2) Appropriate Suffolk County departments should seek to partner with research institutions and nonprofits to develop online planning simulation tools that municipalities and civic organizations can use to educate the public about shoreline vulnerability and to explore future planning options such as retreat.

3) The regional financial resources necessary for successful retreat initiatives will require new state and federal coastal funding mechanisms best handled by a regional coastal commission. (*See* further discussion below in this Chapter.)

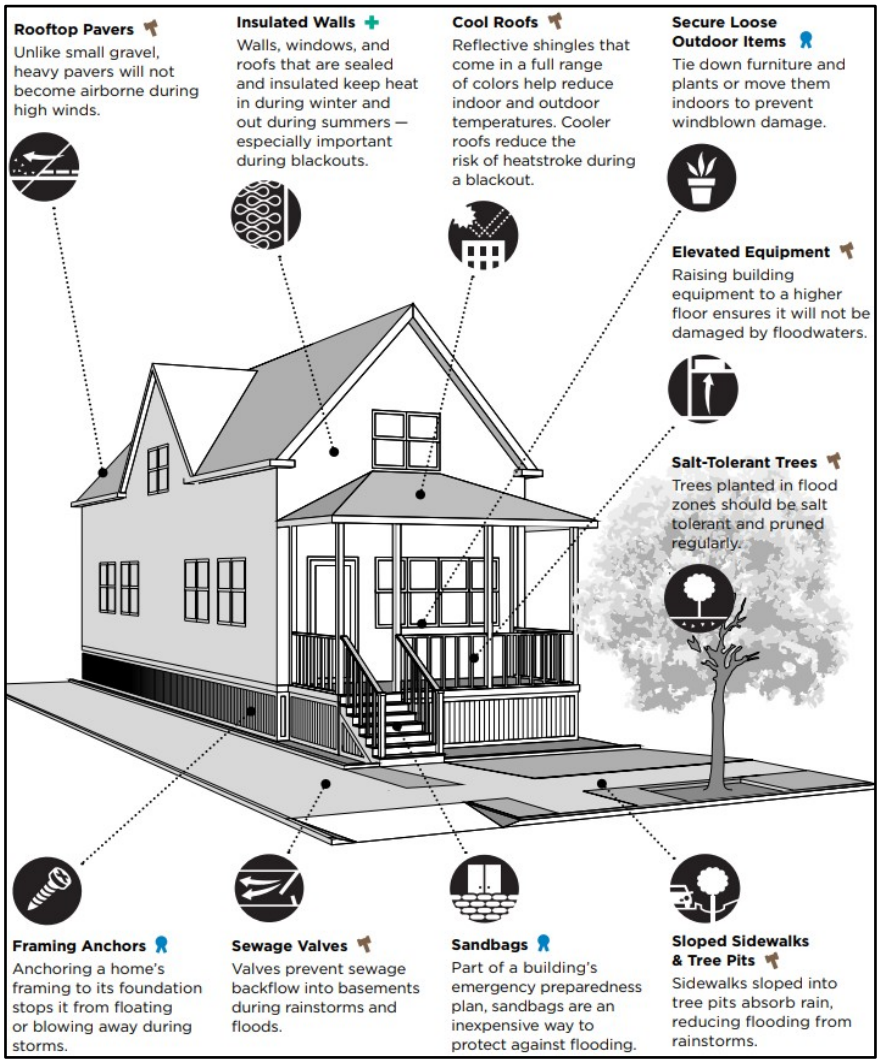
[78] "Rolling Easements," page 63.

3. Building Standards

Background

The wisest and most cost effective method to reduce flood risk is to avoid placing new structures in flood and storm-prone areas and to relocate existing structures or people whenever possible. Even in the case of repair or re-building of existing development, relocation should be the first option considered given the long-term flood risks. Flood-resilient building design regulations should act as a backstop only in those situations in which building or re-building outside the floodplain is not feasible.

Several respected organizations have proposed resilient building design standards to aid municipalities. For instance, the International Building Code lays out various recommended requirements with regard to wind resistance and flood resistance.[79] Other examples of possible flood-resistant design are illustrated in the *Building Resiliency Task Force Report* published in 2013 by the Urban Green Council, the New York Chapter of the US Green Building Council:



Examples of flood resistant residential design.[80]

[79] www.fema.gov/media-library-data/1488284217191c97654abdef952a68a9c7e8fc9282b62/2015_IBC_compilaton_of_wind_resistanc_provisions.pdf; www.fema.gov/media-library/assets/documents/156934

[80] www.urbangreencouncil.org/content/projects/building-resiliency-task-force

Since Super Storm Sandy

Although many municipalities have updated their codes according to FEMA and NY State policy, there may be opportunities to go even further. A recent example of more advanced storm-resilient design occurred in Mexico Beach, Florida when the "Sand Palace" was the only house in the vicinity to withstand Hurricane Michael's 155 mile per hour winds on October 10, 2018. According to the architect, building the Sand Palace to withstand 250 mile-per-hour winds roughly doubles the cost per square foot, compared with ordinary building practices. The house was fashioned from poured concrete, reinforced by steel cables and rebar, with additional concrete bolstering the corners of the house. The space under the roof was minimized so that wind could not sneak in underneath and lift it off. The home's elevation, on high pilings, was meant to keep it above the surge of seawater that usually accompanies powerful hurricanes. [81]

Implementing an array of storm-resistance measures, including some of those advised by the Insurance Institute for Business and Home Safety such as storm shutters, door reinforcements and a backup generator, would add more than $30,000 to the cost of a typical house.[82]

Recommendations

1) The Suffolk County Planning Commission should consider working to develop model building and zoning codes that towns and villages could adopt to incorporate storm and flood considerations for homes along the coast and in floodplains. These might include flood proofing requirements, elevation standards, wind-bracing and anchoring requirements.

2) The Suffolk County Planning Commission in conjunction with the Suffolk County Supervisors Association should make recommendations regarding how municipalities, when they are reviewing permit applications for new developments and re-developments in flood prone locations, should anticipate and seek to avoid negative effects on adjacent areas and any downstream areas due to water-level change, storm surge, or flooding. Consideration of potential effects should include, but not be limited to, impact of diverted floodwaters onto adjacent properties; contamination of surface or ground waters; obstruction of natural sediment transport; and increased erosion of, or risk of damage to, adjacent built or natural areas.

PROTECTING COASTAL WETLANDS

Background

Protection of our remaining coastal wetland communities is essential to the long-term resilience of Long Island. Researchers have estimated that coastal wetlands in New Jersey and

[81] "Among the Ruins of Mexico Beach Stands One House, Built 'for the Big One,'" *The New York Times*, October 14, 2018; www.nytimes.com/2018/10/14/us/hurricane-michael-florida-mexico-beach-house.html

[82] "What Would it Take to Make Your House Truly Storm Proof? A Starter Shopping List," October 29, 2012; www.forbes.com/sites/danbigman/2012/10/29/what-would-it-cost-to-make-your-house-truly-storm-proof-a-starter-shopping-list

New York helped avoid more than $625 million in damages from Sandy.[83] As Governor Cuomo's NYS2100 Commission Report noted in 2013, "Tidal wetlands can protect coastal communities from storm damage by reducing wave energy and amplitude, slowing water velocity, and stabilizing the shoreline through sediment deposition. More than half of normal wave energy is dissipated within the first three meters of marsh vegetation such as cord grass. In addition, given sufficient sediment deposition, wetlands are able to build elevation in response to sea-level rise, providing a buffer against climate change and coastal submergence."[84] The US Army Corps of Engineers has also noted that "[i]t is generally acknowledged that vegetated coastal features such as wetlands can reduce the effects of surge, waves, and tsunami propagation."[85] In addition to absorbing storm surges and reducing erosion, these natural areas offer a wide range of other benefits by helping to filter water, processing excess land-based nutrient pollution, and providing nursery and feeding grounds for many species that support commercial and recreational fisheries, while contributing to public health by providing access to green space.[86]

Unfortunately, our vulnerability has increased as Long Island's estuaries have lost approximately 13% of their tidal wetlands between 1974 and the mid 2000s – including more than 27% loss of the "high marsh" which are the marsh areas most subject to flooding during storms. Individual areas along Suffolk's South Shore saw even more significant high marsh degradation during the period with Captree declining over 65%, Gilgo declining over 35%, Fire Island National Seashore declining over 32%, and Smith Point declining 30%.[87]. In addition to facing assault from waterfront building, salt marshes have been highly impacted by pollution from human development.[88] The existence of Long Island's remaining tidal marshes is threatened by tidal restrictions, waterlogging, extensive mudflat and panne formation (shallow depressions that contain very high concentrations of salt), and invasive plants.[89]

Since Super Storm Sandy

a. Suffolk's Wetlands Stewardship Strategy

In July 2015, County Executive Bellone signed an executive order adopting a new "Wetlands Stewardship Strategy" with the aim of making Suffolk's shoreline more resilient to increasingly severe seasonal storms and higher waters caused by climate change. The effort focuses on improving water circulation in marshes, encouraging marine life and healthy vegetative growth, building up natural sediment to make saltwater marshes better able to absorb wave energy, and ridding areas of destructive invasive species such as phragmites. The County combined local funding with more than $7 million in state and federal funding to begin rehabilitating more than 500 acres of tidal wetlands with the goal of ultimately leveraging additional federal and state aid to allow the county to restore more than 2,500 acres of damaged wetlands. As of 2019, restoration efforts were under way at the first targeted areas in Smith Point County Park (Shirley), Gardiner County Park (West Bay Shore), the Pepperidge Hall Tidal Wetland Area (Oakdale), the Timber Point Tidal

[83] "Coastal Wetlands and Flood Damage Reduction: Using Risk Industry-based Models to Assess Natural Defenses in the Northeastern USA," Lloyd's Tercentenary Research Foundation, 2016.
[84] NYS2100 Commission Report, page 122.
[85] "Laboratory Studies of Wave Attenuation through Artificial and Real Vegetation," 2013, page 1; https://apps.dtic.mil/docs/citations/ADA586333
[86] *See* www.nrcsolutions.org for additional relevant resources.
[87] "Long Island Tidal Wetland Trends Analysis," New England Water Pollution Control Commission, www.dec.ny.gov/docs/fish_marine_pdf/bmrwetlandstrends1.pdf; pages 1, 20, 29, 33.
[88] "Nitrogen Pollution and Adverse Impacts on Resilient Tidal Marshlands," NYS DEC Technical Briefing Summary, April 22, 2014; www.dec.ny.gov/docs/water_pdf/impairmarshland.pdf
[89] Suffolk County Comprehensive Resources Management Plan, March 2015, page 7-27.

Wetlands (Great River), the Jones Beach Island marshes at Gilgo and Gilgo West, Sheep Pen Creek (Mastic Beach), Beaverdam Creek (Brookhaven), and Indian Island County Park (Riverhead).[90]

Pannes in Gardiner County Park. Photo courtesy of Suffolk County.

These locations were selected based on their relevance to coastal resiliency, associated benefits such as control of invasive species and vector (mosquito) control management, tidal feasibility, and partnership with local stake holders and coastal habitat managers. The projects will generally utilize "Integrated Marsh Management" (IMM) techniques which were initially tested and proved successful in a pilot project at Wertheim National Wildlife Refuge in Shirley. These techniques include wetland recovery through the creation of small ponds for additional habitat, of tidal channels to restore tidal flows, and of shallow connecting channels to prevent marsh waterlogging, grant accessibility to ponds, and provide killifish access to the marsh surface to better control mosquito larvae populations.[91]

b. NY Rising's CRZ Program

As noted in Chapter II: Storm Recovery and Reconstruction of this report, NY Rising's CRZ program led to the creation of community developed plans for comprehensive mitigation and resiliency projects including several related to coastal wetland protection. Unfortunately not all of these projects have been embraced by the community at the implementation stage. For instance, despite winning an additional $3 million from New York State for innovative use of green infrastructure to bolster resilience, the Oakdale/Sayville plan's proposal to modify the Oakdale Grand Canal Levee berm to "[i]ncrease tidal exchange within the Pickman-Remmer wetlands east of the Grand Canal Levee berm to restore the marsh, thus increasing its capacity to absorb storm surges and stormwater runoff from upland areas and improving storm resiliency for the area," was strongly opposed by the local community.[92]

[90] "Suffolk to Repair 500 Acres of Tidal Wetlands," *Newsday*, July 14, 2015; www.newsday.com/long-island/suffolk/suffolk-county-to-repair-500-acres-of-tidal-wetlands-1.10642885

[91] 2015 Suffolk County Comprehensive Water Resources Management Plan, page 7-29.

[92] "Alternatives Analysis Report: Oakdale Marsh Restoration and Public Access Project," page 2; stormrecovery.ny.gov/sites/default/files/crp/community/documents/Oakdale%20Marsh%20Restoration%20Alternative%20Analysis%20Report_09062018.pdf

Grand Canal, Oakdale.[93]

c. Living Shorelines

"Living shorelines" are a type of estuarine shoreline erosion control structure that incorporates native vegetation and preserves some native habitat features. Because they provide the ecosystem services associated with natural coastal wetlands while also increasing shoreline resilience, living shorelines are a critical new tool in promoting coastal resiliency. As described by the NYS2100 report, "living shorelines are coastal areas that are designed with salt-tolerant plantings, riprap, and other measures to prevent or reduce shore erosion and dampen wave energy while emulating the physical and biological conditions of naturally occurring, stable shorelines. Several examples of living shorelines exist and are being designed in New York Harbor. Harlem River Park in Manhattan includes oyster beds and eel grass plantings, tidepools, and gabions that step into the water to provide public access as well as strategically placed seawalls to minimize flood risks and improve water quality and public access to the water."[94]

Long Island is beginning to embrace the incorporation of nature-based features such as living shorelines into coastal protection measures.[95] A prime example of this is the expansion of Shorefront Park in Patchogue where hardscaping is being removed to allow the shorefront to better absorb wave and wind energy and where adjacent residential buyout properties are being added to the park.[96] Using private donor funds and more than $2 million in New York State funding, the project includes habitat restoration, a kayak launch, beach access via a 1200 foot timber boardwalk, and the creation of the largest living shoreline project on the South Shore. A key step will be the removal of an existing ineffective bulkhead and the installation of a line of rock sill structures parallel to the shoreline. The new rock sill structures along with a 50-foot-wide planted swath and sand dunes will absorb wave action while allowing bay water to come up with tidal cycles and create a habitat for vegetation and wildlife.[97]

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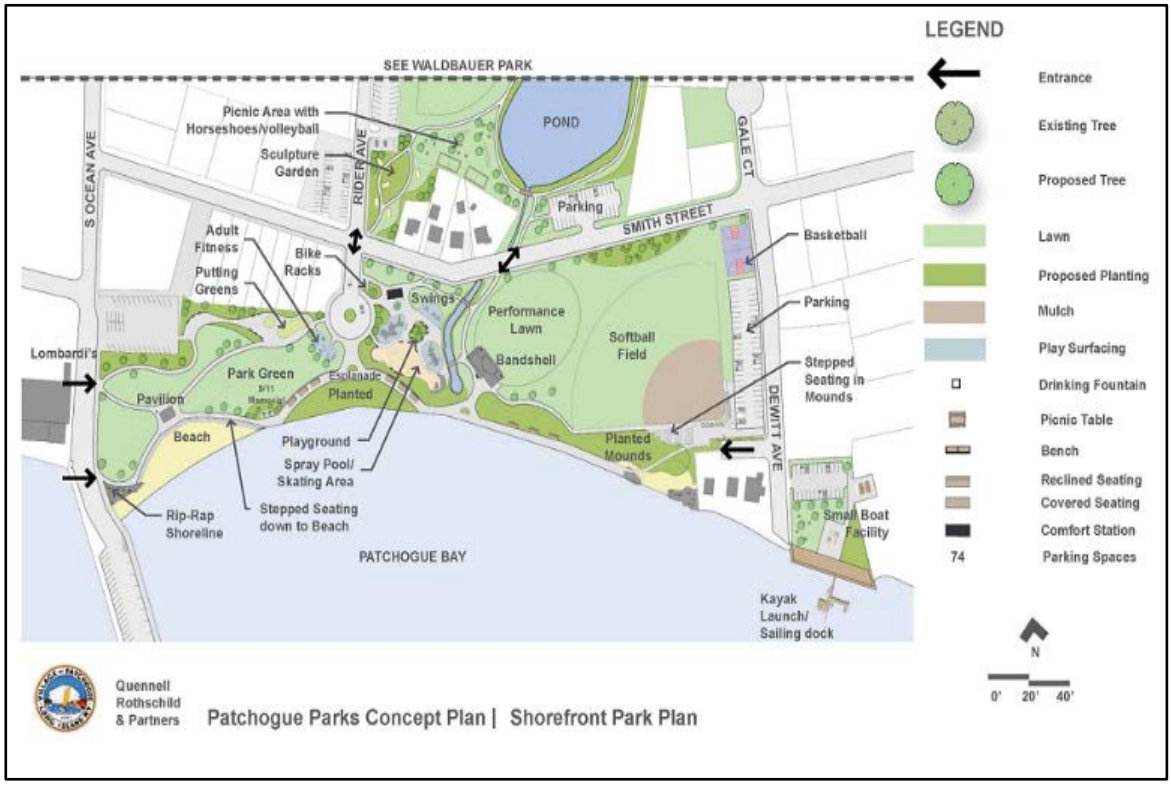
[93] 2015 Suffolk County Comprehensive Water Resources Management Guide, page 7-24.
[94] NYS2100 report, page 122; www.governor.ny.gov/sites/governor.ny.gov/files/archive/assets/documents/NYS2100.pdf
[95] *See* www.hrnerr.org/wp-content/uploads/sites/9/2016/08/Schwanof-Long-Island-Sustainable-Shoreline-Designs-11-18-16.pdf
[96] Rob Calarco testimony to the SSRTF at Patchogue Public Hearing, April 26, 2018.
[97] "Plans Move Forward for Shorefront Park," *The LI Advance*, October 11, 2018, www.longislandadvance.net/5989/Plans-move-forward-for-Shorefront-Park



Patchogue's Shorefront Park plan. Illustration courtesy of Patchogue Village.

While not appropriate in some areas such as high energy coastlines, living shorelines can be an excellent option to maintain some of the ecosystem services provided by natural shorelines while also providing some degree of protection.

Another benefit of living shorelines that is particularly important on Long Island is the role that they can play in carbon/nutrient sequestration. When located between cropland and a watercourse, saturated buffers such as coastal wetlands can create significant nitrate reductions in adjacent water bodies. For instance, a 2013 study in Georgia indicated that "living shorelines can preserve and enhance the ecological integrity of the coastal environment. In general, these environments provide essential water filtration, habitat, and recreational and commercial opportunities." And noted that "[m]arsh grasses have been shown to reduce nutrient pollution by >90% and provide over $6,000 in nutrient reduction services per acre per year in eastern Florida."[98]

Recommendations

1) Wherever possible, natural wetlands should be protected and restored and allowed to migrate inland with rising seas. While engineered solutions are often required to protect critical infrastructure, structures such as bulkheads, riprap revetments, seawalls, jetties and groins have been shown to have an adverse impact on the ecology, coastal processes, and aesthetics of shoreline ecosystems.[99] Where feasible "natural and hybrid approaches may be more cost-effective in the long-run in comparison to built-infrastructure, can strengthen the social, economic and ecological resilience of coasts, maintain the

[98] sagecoast.org/docs/sci_eng/LivingShorelinesAlongtheGeorgiaCoastweb.pdf, page 5.
[99] *See* Griggs, "The Effects of Armoring Shorelines – The California Experience," USGS, 2010; pubs.usgs.gov/sir/2010/5254/pdf/sir20105254_chap8.pdf

provisioning of coastal ecosystem services, and prevent the loss of life and property."[100]

2) The Suffolk County Planning Department's 1997 Narrow Bay Study recommended creating new parkland out of vacant County-owned properties that are within the 100-year flood plain.[101] In 2018, County Legislator Rudy Sunderman proposed a resolution expanding this policy to include County-owned tax-delinquent residential properties in the Mastic Shirley Conservation Area. The resolution suggests that "[w]hen the County of Suffolk takes title to properties when their owners fail to pay their real property taxes, an evaluation should occur to see whether these properties are located within the 100-year flood plain. If tax-delinquent commercial or residential properties are within the 100-year flood plain, then they should be transferred to Parks or a local municipality for wetlands protection and restoration."[102] The SSRTF recommends that Suffolk County extend this policy countywide.

3) The Suffolk County Planning Commission should work with municipalities to develop a model floodplain overlay zoning ordinance to promote floodplain protection as has been done elsewhere in New York.[103]

4) Suffolk County and the local municipalities should protect natural shorelines wherever possible. In areas where some protection has been deemed necessary, living shorelines should be developed where practicable as the preferred alternative to hardened shorelines. Hardened shorelines should only be utilized when protection is necessary and conditions are not conducive to living shorelines such as in high-energy marine environments.

STORMS AND WATER QUALITY

Background

a. Nitrogen Loading

Unfortunately, as noted above, Long Island's wetlands have significantly contracted over the past four decades thus reducing their ability to cushion the impact of major storms.

A major factor in wetland loss is decreasing water quality resulting from increased nitrogen loading into our surface waters.[104] There are more than 350,000 homes in Suffolk

[100] "Future of our Coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies and ecosystems," Environmental Science & Policy, August 2015; www.sciencedirect.com/science/article/pii/S1462901115000799
[101] www.suffolkcountyny.gov/portals/0/formsdocs/planning/Publications/NarrowBay_reportoptr.pdf; page 25.
[102] Suffolk County Legislature Resolution 1157-2019.
[103] *See* www.gflrpc.org/uploads/5/0/4/0/50406319/model_floodplain_protection_overlay_district_intermunicipal_agreement.pdf
[104] "Coastal Eutrophication as a Driver of Salt Marsh Loss" *Nature,* volume 490, pages 388-392, October 18, 2012; www.nature.com/articles/nature11533

County that are on non-performing cesspools and septic systems which cause these homes to contribute nearly 70 percent of the nitrogen loading.[105] Recent modeling has determined that the relative contribution of land-based nitrogen load to study areas within the Shinnecock, Moriches, and Great South Bays is generally 65% from wastewater, 20% from fertilizer, and 15% from atmospheric deposition. It also demonstrated that groundwater was responsible for the transport[106] of more than 90% of the nitrogen load in virtually all sub watersheds.[107]

Septic systems uncovered during a coastal storm[108].

Increasing nitrogen in our bays and estuaries has a negative impact on our health and on our economy including impacts to tourism such as beach closures, restrictions on harvesting of shellfish, harmful algae blooms and fish kills. Perhaps nowhere has our region witnessed the impact of nitrogen pollution in more stark terms than in the Great South Bay. At one time, this bay produced more than half the clams eaten in our country. However, over the past quarter-century, the clam harvest in the Great South Bay has fallen by 93%, destroying an entire industry which once accounted for 6,000 jobs. While clams were once over-harvested, they have largely failed to recover due to recurrent brown tides fed primarily by nitrogen from septic systems and cesspools.[109]

b. Septic Systems at Risk

Storm-induced flooding and climate change-induced rising seas pose significant risks to septic systems due to rising groundwater levels and increasing vulnerability to saltwater infiltration. Functioning septic systems with a drain field rely on wide

[105] www.suffolktimes.timesreview.com/2014/03/46963/bellone-time-to-fix-nitrogen-problem-for-good

[106] It is believed that many other contaminants may follow these same pathways. For instance, the application of fertilizers, herbicides, and pesticides — both residentially and commercially — introduce chemicals and nutrients into both surface and groundwater.

[107] "The Long Island South Shore Estuary Reserve Eastern Bays Project: Nitrogen Loading, Sources and Management Options," 2016, Stony Brook University School of Marine and Atmospheric Sciences; www.dos.ny.gov/opd/sser/pdf/FinalReportEasternBaysNitrogenLoadingSourcesandMgmtOptions.pdf, page 1.

[108] Rhode Island Sea Grant; www.beachsamp.org/relatedprojects/coastalpropertyguide/septic-systems

[109] Suffolk County Comprehensive Water Resources Management Plan, page ES-2; www.scribd.com/document/202551543/Suffolk-County-Comprehensive-Water-Resources-Management-Plan-Executive-Summary

unsaturated soil zones that allow microbes to purify the waste before it reaches the water table. Septic effluent moves more slowly in unsaturated soil than in saturated soil, and, therefore, optimizes treatment time.[110] When sea level rises, saltwater from the ocean intrudes into groundwater reservoirs. The saltwater then displaces the less dense freshwater thus causing the groundwater to rise into the soil profile above it. This limits the amount of unsaturated soil beneath the leach field. As near-shore groundwater tables rise, the separation distance to the leach field base decreases, compromising the system's ability to treat bacteria and pathogens in wastewater.[111]

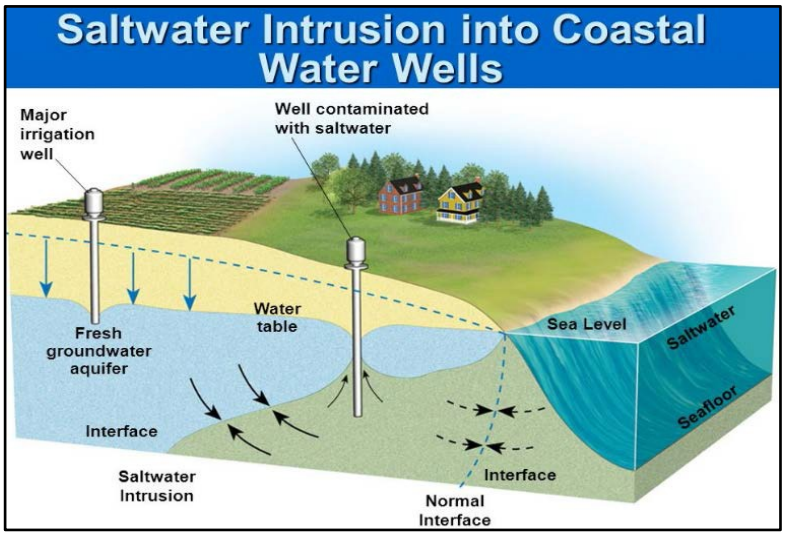


Illustration of salt water intrusion.[112]

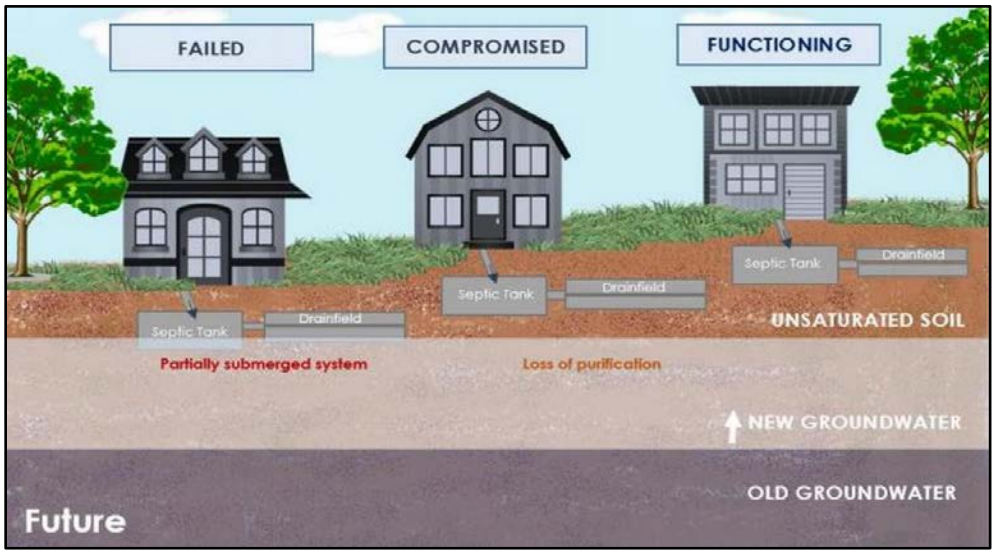


Illustration of impact of rising coastal waters on septic systems.[113]

[110] "Septic Systems Vulnerable to Sea Level Rise," Miami-Dade County, pages 13-14; www.miamidade.gov/green/library/vulnerability-septic-systems-sea-level-rise.pdf

[111] "Avoiding Septic Shock," *Conservation Law Foundation*, February 2017, page 3; www.clf.org/wp-content/uploads/2017/02/Avoiding-Septic-Shock_CLF-White-Paper_2017.pdf; *See also*, "Risks to Coastal Wastewater Collection Systems from Sea-Level Rise and Climate Change," *Journal of Coastal Research Vol.* 27, Issue 4 (2011), pages 652–660; www.jcronline.org/doi/abs/10.2112/JCOASTRES-D-10-00129.1

[112] images.slideplayer.com/5/1591787/slides/slide_26.jpg

[113] www.miamidade.gov/green/library/vulnerability-septic-systems-sea-level-rise.pdf; page 12.

c. Drinking Water

Storm-induced septic failure can also compromise Suffolk's drinking water. Sources of drinking water are recharged largely by surface contribution, including septic discharges. These sources bring a wide variety of human contributed chemicals and nutrients and silt borne contaminants into the aquifer. The Federal Government has established maximum allowable nitrate levels of 10 mg/liter. Currently, the Suffolk County Water Authority (SCWA) may mix well sources, drawn from the aquifers, to provide drinking water below these levels. While private wells in Suffolk County not connected to the SCWA are generally not tested, nearly 70 percent of these wells were rated as high, or very high, for susceptibility to nitrates.[114]

d. Storm Water Runoff

As precipitation travels through the watersheds, it picks up and transports debris, chemicals, and sediments that can impact surface water and groundwater quality. Impervious surfaces in the watershed such as roofs, roads, and parking lots exacerbate storm water runoff and the transport of pollution by minimizing areas where water can infiltrate into the ground and facilitate the filtering of some of the chemicals and nutrients. Transported materials can include litter; animal waste; sediment and chemicals from farms, yards, and construction projects; and oil and grease. (*See* Chapter IV: Storm-Related Infrastructure in this report for more information and recommendations.)

Since Super Storm Sandy

Suffolk County has taken important steps to make Suffolk less susceptible to storm-induced water quality risks. The first step was to identify the problem. County Executive Bellone did that in 2014 by launching the county's "Reclaim Our Water" initiative[115] and stating that, "Nitrogen pollution is public enemy No. 1 for our bays, waterways, drinking supply and the critical wetlands and marshes that protect us from natural disasters like Superstorm Sandy."[116] The DEC bolstered this view by determining that high levels of nitrogen were contributing to degradation of the wetlands and thus increasing the vulnerability of the South Shore to storm surges.[117]

The next step in the Reclaim Our Water initiative was the release of Suffolk County's "Comprehensive Water Resources Management Plan" in 2015. The plan, Suffolk's first water plan in over 25 years, focused on the fact that:

> Water is the single most significant resource for which Suffolk County bears responsibility. As the impact of Superstorm Sandy underscored, more than at any time in our history, we are obliged to come to terms, in every sense, with the water that surrounds us. Suffolk County's water quality is at a tipping point. We face an alarming trend in the quality of the water our families drink, compounded by impairment of many bodies of water in which our families play. Moreover, the source of these impairments has demonstrably degraded the wetlands that serve as our last line of natural defense against storm surge . . . . The vast majority of Suffolk residents rely on on-site wastewater disposal systems that discharge to groundwater. In addition, fertilizer use,

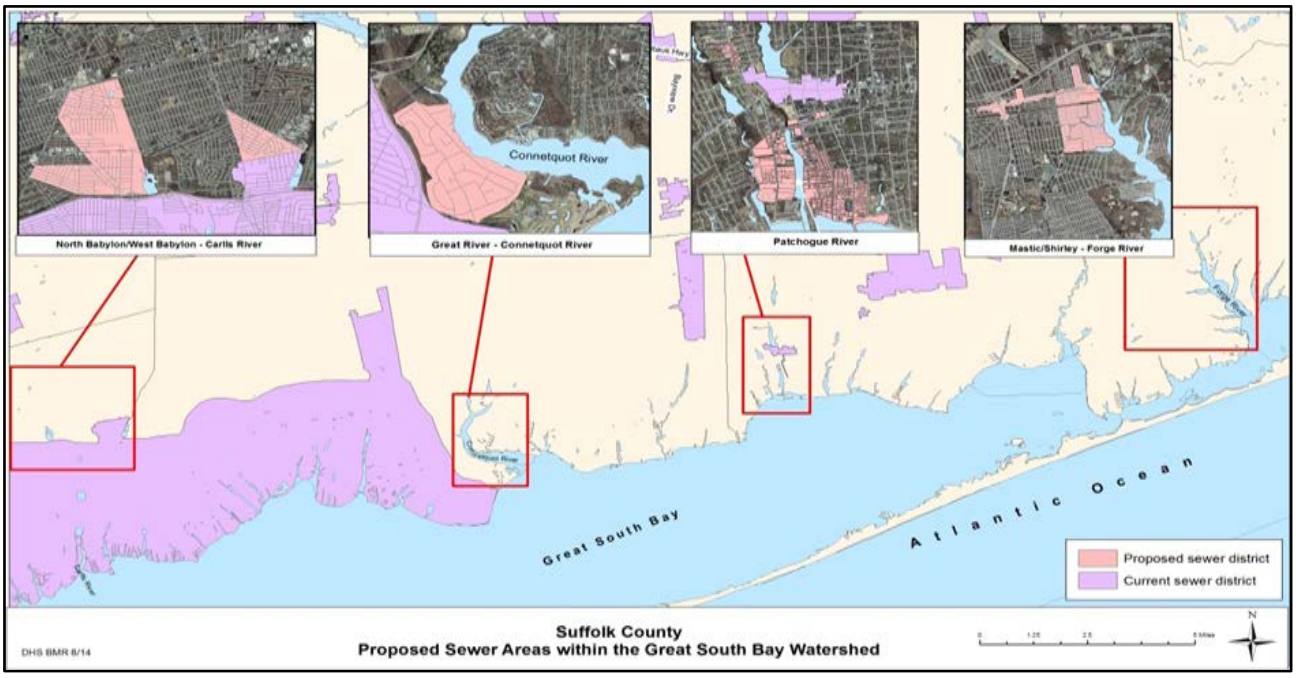
[114] Suffolk County Water Authority; www.scwa.com/environment/source_water_protection
[115] www.reclaimourwater.info
[116] www.suffolktimes.timesreview.com/2014/03/46963/bellone-time-to-fix-nitrogen-problem-for-good)
[117] "Nitrogen Pollution and Adverse Impacts on Resilient Tidal Marshlands," NYS DEC, 2014; www.dec.ny.gov/docs/water_pdf/impairmarshland.pdf

industrial and commercial solvents, petroleum products, pesticides and a host of other manmade contaminants have had profound and long-lasting impacts on groundwater quality, as well as on fresh surface waters and coastal marine waters into which groundwater and storm water runoff discharge. In the face of sea-level rise and extreme weather events, Suffolk County is compelled to devise the means and methods to live and thrive with the water beneath, by and around us.[118]

Regional efforts have centered on two primary means of upgrading wastewater disposal in the county – sewers and alternative on-site wastewater treatment systems.

a. Sewers

In 2015, Gov. Andrew Cuomo announced that $388 million from Sandy recovery funds would be spent on sewering projects in Suffolk County to reduce nitrogen loading into the Forge, Patchogue, Connetquot and Carlls rivers along the South Shore. Cuomo noted that, "This funding allows Suffolk County to improve and expand its sewer system in a way that not only reduces threats to water quality and contamination, but also strengthens Long Island's coast to better withstand future storms".[119]



Suffolk locations initially targeted for sewers supported by Sandy recovery funds.[120]

On January 22, 2019, referendums were held in three Suffolk communities to consider local long-term funding to go along with the state sewer construction funding in the communities. Wyandanch/North Babylon/West Babylon voters approved the program with 88% in favor, 85% of Mastic Beach voters supported the program, but only 43% of

[118] www.scribd.com/document/202551543/Suffolk-County-Comprehensive-Water-Resources-Management-Plan-Executive-Summary; pages ES-1, ES-2.
[119] "Suffolk Will Use $388M in Grants to Extend Sewers to 12,000 South Shore Homes," *Newsday*, September 12, 2015; www.newsday.com/long-island/suffolk/suffolk-will-use-388m-in-grants-to-extend-sewers-to-12-000-south-shore-homes-1.10837378
[120] Suffolk County and *Newsday*.

Great River voters were in favor. Following the Great River rejection, a number of other communities immediately requested the $26.4 million of state funds allocated for Great River with Governor Cuomo deciding to allocate it to Oakdale.[121]

b. Innovative and Alternative Onsite Wastewater Treatment Systems (I/A OWTS)

Because sewers are only financially practical in certain denser parts of the county, in 2017 Suffolk County launched the "Septic Improvement Program" to help those property owners living in proximity to the water to be able to replace their on-site aging and ineffective cesspools with new state-of-the-art systems. To date, the Suffolk County Health Department has approved six different I/A OWTS based on the systems' performance during pilot programs. Importantly, Suffolk County has been consulting with experts from the University of Rhode Island to be sure that the approved systems are suitable for high groundwater (for instance, by having shallow and narrow drain fields) and can withstand storm surges.[122]

Installation of an I/A OWTS in Suffolk. Photo courtesy of Suffolk County.

While costs vary, on average it costs around $22,000 to engineer and install an I/A OWTS. To assist property owners in paying for such a system, Suffolk County has arranged for grant funding from County and state sources that will cover up to $20,000 of the cost. To fund this, Suffolk County is contributing $2 million per year and New York State is allocating $10 million per year over five years from its Septic System Replacement Fund.[123] For those whose systems cost more than the grant, CDCLI has arranged to finance the remaining costs of the system at a 3% interest rate over 15 years.[124] In 2018,

[121] "Mastic, Babylon Approve Sewers Construction; Great River Voters Reject Proposition," *Newsday*, January 23, 2019; www.newsday.com/long-island/suffolk/390-million-sewer-project- voting-1.26281172; "Oakdale to Get $26.4 Million for Sewer Hookups, Cuomo Says," *Newsday*, February 8, 2019; www.newsday.com/business/cuomo-sewers-oakdale-great-river-1.27063407

[122] *See* https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0162104

[123] www.reclaimourwater.info/SepticImprovementProgram.aspx

[124] *Ibid.*

Southampton, East Hampton, and Shelter Island decided to assist property owners installing I/A OWTS in their towns by providing additional rebates.[125] As of October 2019, 497 I/A OWTS have been installed in Suffolk County under all programs – the vast majority of these have been installed on the South Fork and the bulk of these are in the Town of Southampton. Of the total installed systems,187 have been installed under the county's Septic Improvement Program (SIP) and another 156 have been permitted and await installation, while more 500 additional active applicants are moving through the SIP review process.[126]

c. Recurring Funding Sources

Suffolk's Comprehensive Water Resources Management Plan determined that – in addition to new sanitary systems/sewers and the creation of a countywide wastewater management district to oversee them – the other critical component for long term water quality improvement is the creation of a dedicated, recurring funding stream. To add a sense of scale, the IBM Smarter Cities Challenge report for Suffolk County found that the funding needed to provide sewers and advanced on-site systems for the entire 75% of Suffolk that is not currently covered by wastewater treatment is approximately $8 billion.

In 2016, County Executive Bellone proposed a public referendum so the public could vote on whether to impose a $1 per 1000 gallons water use fee in order to create a dedicated revenue stream to establish new wastewater treatment facilities and monitoring. The fee is projected to raise $75 million per year.[127] The SCWA's current rate of less than $2 per 1000 gallons is one of the lowest in the country. As board member Patrick Halpin noted in 2018, Suffolk County residents don't even think about limiting their water use because the SCWA bills are so inexpensive.[128] As of spring 2019, advocates were "considering two strategies to fund grants for needed steps like sewer expansions and high-tech septic systems for homeowners. One would place a fee on water usage through the Suffolk County Water Authority, and requires approval of the State Legislature. The other would create a property tax line." Both of these approaches would require the approval of the public through a county public referendum.[129]

At the local municipal level, the five East End Towns have been leading the way in creating additional funding streams for wastewater treatment. In November 2016, 75% of voters in the East End towns approved a referendum to allocate 20% of the current Community Preservation Fund (financed by an existing 2% real estate transfer tax) to support water quality projects.[130] Each town can determine how it wants to use its funds with possibilities including supporting property owners installing I/A OWTS (as has been done by some East End towns as noted above) as well as initiatives such as wetlands restoration, stormwater infrastructure upgrades, and permeable reactive barriers.

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[125] Southampton provides up to an additional $20,000; Shelter Island provides up to an additional $15,000; and East Hampton provides up to an additional $11,000, with an extra $5,000 on top of that for parcels located within the town's Water Protection District or if the applicant qualifies for affordable housing.

[126] Suffolk County

[127] "Suffolk Wants to Add Water Usage Fee to Fund Nitrogen Effort," *Newsday*, April 23, 2016; www.newsday.com/long-island/suffolk/suffolk-wants-to-add-water-usage-fee-to-fund-nitrogen-effort-1.11724092

[128] "Suffolk Water Authority Approves 3.75 Percent Rate Hike," *Newsday*, March 27, 2018; www.newsday.com/long-island/politics/suffolk-county-water-authority-rate-1.17712110

[129] "Honesty on Septic Issue is Needed from Lawmakers," *Newsday*, April 4, 2019; www.newsday.com/opinion/editorial/suffolk-water-sewer-septic-systems-1.29385037

[130] "East End Decisively Approves Preservation Fund Extension," *The East Hampton Star*, November 8, 2016; www.easthamptonstar.com/News/20161108/East-End-Decisively-Approves-Preservation-Fund-Extension

Recommendations

1) Appropriate departments within Suffolk County should work with local municipalities to evaluate the need to further harden storm water infrastructure in order to manage storm level runoff including identification of areas of rapid water table rise and salt water intrusion.

2) Appropriate departments within Suffolk County should continue to develop and deploy onsite technology such as updated I/A OWTS and cluster systems in high density and high nitrogen contribution areas (using data from the Long Island Nitrogen Action Plan led by the LI Regional Planning Council and the DEC) and define flood impacts on operability to identify short term, post-storm potential health impacts to both surface and groundwater. Sewer cluster systems should be installed in targeted areas that currently suffer from inadequate septic tanks and cesspools and which are at risk of salt water intrusion during storm events due to high water table levels.

3) The Suffolk County Executive and the County Legislature in conjunction with the state government should create a dedicated funding stream for continued implementation of distributed wastewater treatment systems and sewers. While the SSRTF is not in a position to evaluate the pros and cons of the proposed county-wide sewer district and water protection surcharge water fee, it believes that such a dedicated funding stream is essential for long-term storm protection and notes Brookhaven Town Supervisor Ed Romaine's comment about the proposal that, "If there's a better idea out there, I'm still waiting for it."[131] Other ideas that merit review to assist with funding our regional water quality needs include a regional infrastructure bank and tax increment financing.

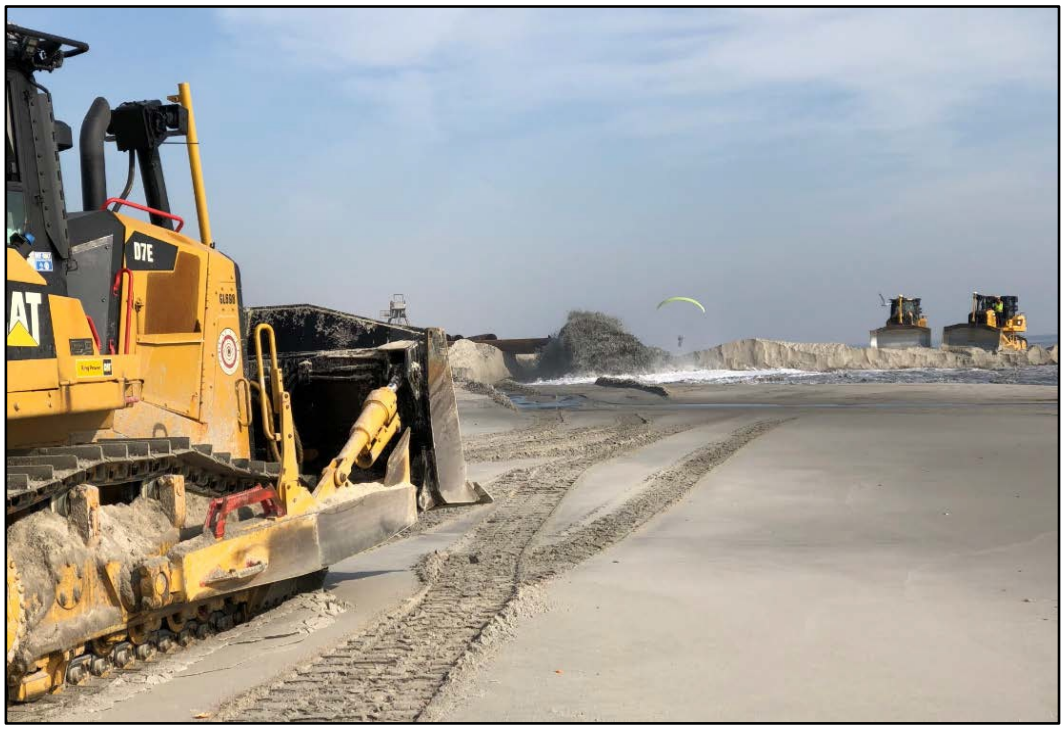
4) To help understand and mitigate the relationship between upland pollutant contributors and coastal resiliency management, appropriate departments within Suffolk County should evaluate the practicability of a comprehensive real time remotely accessible water quality and water dynamics monitoring alert system. Such sensors allow real-time information related to storm surge and debris management, drinking water, wastewater discharge, sources of pollutants to streams and estuaries, transport of nitrates and contaminants in major watersheds, and effectiveness of land-management practices on water quality. Such sensors can also predict hypoxic conditions, developing algal blooms, and the effectiveness of nutrient management options. Unfortunately current methods of measuring nutrient loading are both costly and inadequate. The Alliance for Coastal Technologies, which includes the U.S, Geological Survey (USGS), is currently sponsoring a "Nutrient Sensor Action Challenge" to encourage the development of cost-effective monitoring.[132] Once the challenge is completed, Suffolk County should determine if pilot projects should be launched locally using the most promising technologies.

[131] "Suffolk Wants to Add Water Usage Fee to Fund Nitrogen Effort," *Newsday*, April 23, 2016; www.newsday.com/long-island/suffolk/suffolk-wants-to-add-water-usage-fee-to-fund-nitrogen-effort-1.11724092
[132] www.epa.gov/innovation/nutrient-sensor-action-challenge

PROTECTING BARRIER BEACHES

Background

Most of Suffolk County's southern shore is protected by barrier beaches. These barrier beaches play a critical role in protecting the mainland waterfront communities from the punishing effects of oceanic water in extreme weather events. Sandy had a devastating effect on Long Island's barrier beaches. It has been estimated by the Army Corps of Engineers that, on Fire Island alone, Sandy destroyed 55% of the beach and dunes – equating to a loss of 4.5 million cubic yards of sand.[133] Long Island is not alone in relying on coastal buffers for protection. Pre- and post- Sandy surveys in New Jersey undertaken by the Coastal Research Center, revealed that both beach width and dune height were critical in preventing breaches and overwash.[134] As the Natural Research Council pointed out, "A well-maintained dune in Seaside Park survived the storm, while dunes in nearby municipalities that did not have aggressive dune-building programs suffered overwash, leading to the loss of many homes."[135]



Beach replenishment at Gilgo Beach in February 2019. (Suffolk County)

[133] "FIMI Stabilization Hurricane Sandy Limited Reevaluation Report – June 2014," US Army Corps of Engineers, page 1; www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/ny/coast/fimp/FIMI_Docs/HSLRR/A-FINAL_FIMI_HSLRR_Report.pdf

[134] *See* "Hurricane Sandy: Beach-Dune Performance at New Jersey Beach Profile Network Sites," Coastal Research Center, 2013; www.studylib.net/doc/7414183/hurricane-sandy--beach-dune-performance-at-new-jersey

[135] "Reducing Coastal Risk on the East and Gulf Coasts," National Research Council,2014, page 74; www.floods.org/ace-files/documentlibrary/committees/Coastal/Reducing_Coastal_Risk_on_the_East_and_Gulf_Coasts_NAS-2014.pdf

Since Super Storm Sandy

a. The Fire Island to Montauk Point (FIMP) Project

The U.S. Army Corps of Engineers (USACE) in its June 2014 report, concluded that, "As a consequence of the historically severe coastal erosion during Hurricane Sandy, the dune and berm system along Fire Island is now depleted and particularly vulnerable to overwash and breaching during storm events, which increases the potential for devastating storm damage to shore and particularly back bay communities along Great South Bay and Moriches Bay . . . . The effects of Hurricane Sandy on the barrier island have made project implementation within the Fire Island Inlet to Moriches Inlet imperative to restore and augment the barrier island to a level to provide storm damage protection to both the barrier island and back bay inhabitants."[136]

The Fire Island to Montauk Point (FIMP) project, on the drawing boards since 1964 in various iterations, was allocated approximately $700 million by the federal Super Storm Sandy relief bill. Of that funding, $450 million was to fund road and house elevations, $207 million was to fund a 19 mile-long line of dunes and berms using seven million cubic yards of sand from the Atlantic Ocean, and $60 million was for green infrastructure projects.[137] The FIMP project is currently waiting to proceed pending additional studies and local matching funding.

b. Sand Engine

"Most of the [USACE] efforts related to coastal risk mitigation within the last two decades have focused on beachfront areas, with a heavy reliance on beach nourishment as the primary means of coastal risk reduction."[138] However, credible voices have been raised questioning this approach. Among those who favor a policy of unconditional strategic retreat from coastal areas, there is a concern that near-shore sand borrowing for beach nourishment will reduce the storm mitigation impact of underwater ridges of the seafloor off Long Island. John Goff, from the Institute for Geophysics at the Jackson School of Geosciences at University of Texas, Austin detected these rows of sand ridges, comparable to underwater sand dunes, up to 10 feet high that run parallel to shore for as far as a half-mile. "I think of these ridges as kind of cushioning the blow," Goff notes. "After [Sandy], they were still there and there wasn't any substantial erosion of the shore face."[139]

Nonetheless, a new approach that was recently proposed by the Interboro team as part of their "Living with the Bay, A Comprehensive Regional Resiliency Plan for Nassau County's South Shore" $125 million winning proposal for HUD's Rebuild by Design program may alleviate some of these concerns. One critical component of "Living with the Bay" is the notion of "growing along with sea level rise."[140] Interboro

[136] "FIMI Stabilization Hurricane Sandy Limited Reevaluation Report – June 2014," US Army Corps of Engineers, page 1; www.nan.usace.army.mil/Portals/37/docs/civilworks/projects/ny/coast/Rockaway/Rock Jam Bay RD HSGRR Appendix G Public Engagement_9-28-18.pdf

[137] 2015 Suffolk County Comprehensive Water Resources Management Plan, www.suffolkcountyny.gov/Portals/0/FormsDocs/Health/EnvironmentalQuality/Compreh ensiveWaterResourceManagementPlan/Section%207%20Costal%20Resiliency.pdf

[138] "Reducing Coastal Risk on the East and Gulf Coasts," National Research Council, 2014, page 59; www.nap.edu/catalog/18811/reducing-coastal-risk-on-the-east-and-gulf-coasts

[139] www.jsg.utexas.edu/news/?p=5028; for further discussion see Section 7 of theSuffolk County Comprehensive Water Resources Management Plan.

[140] "Living with the Bay, A Comprehensive Regional Resiliency Plan for Nassau County's South Shore," 2014;

posits that, "to grow along with 3 feet of sea level rise in 2100, both the coastal foundation that holds the beach and dunes in place and the bay bottom need extra sediment. The coastline protecting the urban areas will need 1.97 million cubic yards every five years and the bay demands 5.97 million cubic yards every five years to grow along, unless islands are allowed to shift landwards. Sediment inflow toward the bay can be stimulated by ebb-tidal delta nourishments, stimulating natural overwash and breaches, and by improving the catchment of sediment, for example by catchment structures."[141]

Interboro proposes to provide the needed additional annual sediment by installing a "sand engine" in Jones Inlet that will feed the littoral drift westward to Long Beach. Such a sand engine was deployed along the Netherlands coast in 2011 where it deposited about 28 million cubic yards of sediment in one general area. This sediment has since been spread by wind, waves and current along the coast creating a broader, safer beach and dunes. The sand engine cost about $100 million thus creating sand at a cost of about $3.60 per cubic yard.[142] By comparison, the December 2013 FIMP report calls for an engineered beach and dune structure that will cost $74.4 million to create about 7 million cubic yards of sediment – or about $10.70 per cubic yard. Importantly, the Interboro proposal notes that while "present, beach nourishments are taken from the active foreshore zone and do not result in a net sand addition" to the shoreline and near shoreline (defined as within 65 feet of the shore), the sand engine would take sediment from further offshore "which will result in a net sand addition to the active zone."[143]

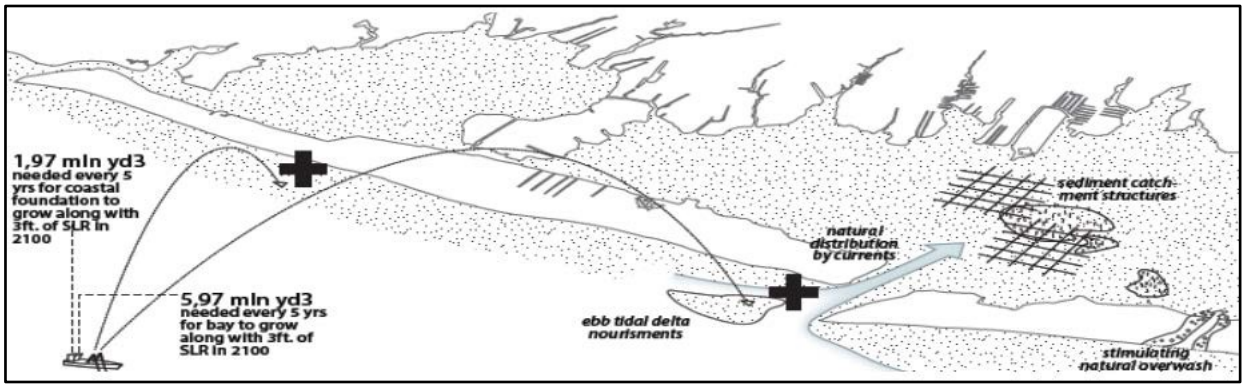


Illustration of how a Sand Engine can support barrier beaches.[144]

Recommendations

1) Given the role that Long Island's barrier beaches play in protecting the densely populated South Shore, it is imperative that Suffolk County pursue policies that will strengthen those critical defenses. While FIMP will address some important immediate needs, the long-term viability of traditional beach nourishment is questionable. To supplement short-term efforts, Suffolk County and Nassau County should evaluate the possibility of seeking funding for a "sand engine" such as the one proposed by

rebuildbydesign.org/data/files/674.pdf
[141] *Ibid.* at page 110.
[142] "The Sand Motor - Passionate Research"; www.youtube.com/watch?v=wtY4_QXcVsM&feature=youtu.be
[143] "Living with the Bay, A Comprehensive Regional Resiliency Plan for Nassau County's South Shore," 2014; rebuildbydesign.org/data/files/674.pdf ; page 110.
[144] *Ibid.*

Interboro which would work in tandem with natural processes to build up our barrier beaches. While much engineering and scientific analysis would need to be done beforehand (and the tracking of beach dynamics would have to be done afterwards on a 10 and 20 year basis), use of a sand engine in the vicinity of both the Jones Inlet in Nassau and the Fire Island Inlet in Suffolk could be a viable option. To defray costs, the sand engine could also be used by other areas in the region such as along the New Jersey shore.

2) In addition to grants, in order to fund a sand engine and other potential long-term protective measures for the barrier beaches, New York State could review the feasibility of implementing a $1 toll on Ocean Parkway for those non-Jones Beach Island residents using the Parkway to commute during rush hours. Such a toll would generate revenue that could be placed in a dedicated fund for barrier beach protection that would in turn preserve the Parkway and, in storm events, the South Shore. If commuters don't want to pay the usage fee they could take alternative routes like the Southern State Parkway or Sunrise Highway.

OFFSHORE REEFS

Background

Coral reefs, oyster reefs and other kinds of natural obstacles are known to dissipate the energy of coastal storm surge. Manmade reefs long have been used in the Gulf of Mexico and other places with the primary purpose of supporting the development of marine life. More recently, ideas have been advanced about using manmade reefs for the additional purpose of limiting coastal storm surge.

Since Super Storm Sandy

In 2014, GOSR established the $60 million Living Breakwaters Project off of Staten Island using HUD CDBG-DR funding that was awarded through the Rebuild By Design competition. The project aims to use "innovative design elements and special oyster reef restoration techniques to construct a 'necklace' of offshore breakwaters to provide critical defenses against coastal erosion." While restoring the natural habitat for sea creatures, "[t]he breakwaters are expected to dissipate destructive wave energy in the Raritan Bay and protect waterfront communities."[145] Meanwhile, the Billion Oyster Project, a New York City based not for profit, is working on the Staten Island project with GOSR and also restoring other reefs in the New York Harbor complex. As the organization notes, "Oyster reefs provide habitat for thousands of species. They can also help to protect New York City from storm damage — softening the blow of large waves, reducing flooding, and preventing erosion along the shorelines."[146]

[145] stormrecovery.ny.gov/sites/default/files/crp/community/documents/Fifth%20Anniversary%20Report.pdf; page 46.
[146] billionoysterproject.org/reefs

Oyster Reef at the Virginia Coastal Reserve used to mitigate nitrogen and storm surge.[147]

Similar projects have been undertaken in Virginia. Using funding from the U.S. Department of Interior's Hurricane Sandy Coastal Resiliency Competitive Grant Program, the U.S. Fish and Wildlife Service (USFWS) and The Nature Conservancy have created a pilot project at the Chincoteague National Wildlife Refuge (NWR) in Virginia to build two oyster reef living shoreline projects using "oyster castles" with the goal of creating natural structures that are "designed to reduce wave energy and make for a more resilient coastline."[148] When finished, there will be an estimated 3,500 feet of living shoreline made from a total of 13,800 marine-friendly oyster castle blocks. Oysters will cling to the castles, growing up the vertical columns. The castles weigh around 30 pounds each and are approximately 18 inches tall, with windows for water to flow through. The whole system creates a functional habitat for oysters and other marine life, including popular species of recreational fish and shorebirds. "The oyster reefs will provide natural benefits such as filtering water and nutrients and promote sediment uptake, so they're vital to our marine areas," said Kevin Holcomb, USFWS wildlife biologist at the Chincoteague NWR. "But there is also growing scientific evidence that coastal habitats such as oyster reefs, tidal salt marshes, and seagrass meadows can offer cost effective risk reduction in the face of rising sea levels and future impacts." In the coming years, as oysters become established on these structures, they will provide increased resilience along the Beach Access Road by reducing erosion associated with wave action.[149]

[147] *See* www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/virginia/Pages/vaeasternshore.aspx

[148] coastalresilience.org/new-oyster-reefs-at-chincoteague-national-wildlife-refure-to-help-protect-coastlines

[149] *Ibid.*

"Oyster castles" at the Chincoteague National Wildlife Refuge.[150]

Recommendations

1) While New York State has dropped parts of the deconstructed Tappan Zee Bridge into Long Island's coastal waters in order to support marine habitats, Long Island has not seen a program similar to those along Staten Island and coastal Virginia with the explicit aim of using marine habitats as breakwaters. The appropriate departments of Suffolk County should monitor the progress and results of the Staten Island and Virginia projects to determine whether similar efforts would be effective along Suffolk's South Shore.

LONG ISLAND (OR TRI-STATE) COASTAL COMMISSION

Background

All ten of Suffolk's towns and nearly all of Suffolk's 32 villages have significant coastal exposure and therefore have decision-making responsibility regarding policies that affect storm preparedness and resilience.

Since Super Storm Sandy

The Regional Plan Association (RPA) has proposed that the New York/New Jersey/Connecticut Tri-State region establish a new inter-governmental Regional Coastal Commission (RCC) that would provide information and guidance to local municipalities and "take a science-based approach and create a regional coastal adaptation plan that would be

[150] *Ibid.*

used to evaluate, prioritize and potentially fund projects along the coastline."[151] County Executive Bellone has been a leading voice behind this idea and wrote an op-ed in *The Daily News* in 2017 with former New Jersey Governor and former US EPA administrator Christie Whitman, endorsing the idea that the region should "[h]unker down for future storms by investing beforehand."[152] An adaptation of this op-ed is included as Exhibit A in the Appendix of this report.

The RCC would work proactively across municipal and state boundaries to "reduce the risks posed and expenses incurred by coastal flooding from storm surge, sea-level rise and heavy precipitation in our region's coastal communities." According to Bellone and Whitman, most critically "we need a fiscally responsible way to pay for this over the long term, [by creating] a sustainable funding mechanism, built and replenished by small surcharges on casualty and property insurance premiums, that would be directly used, or bonded against, to invest in the storm resiliency projects that many of our coastal communities so desperately need."[153]

Recommendations

1) The Suffolk County Executive and Legislature should work with New York State and other regional municipalities to explore the creation of a Regional Coastal Commission.

2) Following conversations with the SSRTF, the RPA also felt that starting the regional commission effort with a Long Island Coastal Commission (LICC) could be a good first step. Therefore, the SSRTF recommends that Suffolk County and its municipalities begin discussions with Nassau County and its municipalities about how such a LICC could be structured and what responsibilities/resources it should have. At a minimum, an LICC could assist municipalities engage in responsible fiscal planning as a part of natural disaster resiliency program and could help municipalities to incorporate resiliency planning in to their land use and infrastructure decisions. This would ensure a more regional approach to protective measures compared with the hyper-local approach of the CRZs. An LICC could also assist Suffolk County and its municipalities better coordinate and communicate on coastal issues with Nassau County, the US Army Corps of Engineers (coastal protection and risk reduction), the US Department of Interior (rivers and streams), the US EPA (water quality), the US Coast Guard (coastal protection and monitoring), NY State Department of State (coastal zone management) and the DEC (environmental protection, fisheries management, etc).

[151] www.rpa.org/adapt
[152] "Hunker Down for Future Storms by Investing Beforehand," *The Daily News*, October 29, 2017; www.nydailynews.com/opinion/hunker-future-storms-investing-article-1.3594218
[153] *Ibid.*

PUBLIC EDUCATION

Background

In order to prepare for a world with a changing climate, resiliency planning requires that scientists and policymakers work with community based groups to determine community assets/strengths, vulnerabilities and goals. Organizations such as FEMA and the University of Hawaii have developed frameworks for a resiliency plan development process. A chief guiding principle of such planning processes is that, "People care about things that are close to them."

Since Super Storm Sandy

Through the CRZ process, many storm-impacted communities on Long Island engaged in community planning efforts that led to recommendations to New York State about priority infrastructure investments that could help mitigate future storms. However, there has not been a comprehensive effort to plan for and educate the public about the kinds of soft resiliency tools that will be needed in an era of increasing storm events.

Recommendations

1) Suffolk County should lead the way to begin the process of creating a county-wide (and possibly Long Island-wide) Resiliency Plan that would focus on community education and preparedness. Such a planning effort could be led by the Suffolk County Planning Commission, perhaps in conjunction with the Nassau County Planning Commission. Relevant resources have been created by Partnerships for Resilience and Empowered Planning,[154] the RAND Corporation,[155] and the EPA.[156]

[154] www.nado.org/wp-content/uploads/2015/08/PREP-Resilience-Planning-Guidance-FINAL_5-8-2015.pdf
[155] www.rand.org/pubs/research_briefs/RB9574.html
[156] www.epa.gov/sites/production/files/2016-05/documents/planning-framework-climate-resilient-economy-508.pdf

CHAPTER IV
STORM-RELATED INFRASTRUCTURE

I remember the smell of oil . . . and the other smell was sewage. You could see the oil slicks in the water, you saw the wires sparking.

– Brookhaven Town Supervisor Ed Romaine[157]

Suffolk County's infrastructure – and that of all of Long Island – was tested like never before during Sandy. The storm also revealed how vulnerable Suffolk County residents are to weaknesses from larger regional infrastructure. While local transportation and gas infrastructure held up reasonably well, the County was greatly impacted by the failure of the Long Island Rail Road (LIRR) tunnels leading into New York City and by gasoline supply issues that were created when gas facilities in New York Harbor became inaccessible. Since Sandy, considerable steps have been taken to harden critical infrastructure and Suffolk County is now far better off from the standpoint of storm-resistant infrastructure than ever before. There are also new infrastructure technologies emerging like ocean inlet barriers and new drainage techniques that, as they develop, may be able to further mitigate future storm impacts.

NATURAL GAS INFRASTRUCTURE

Background

In those areas that flooded as a result of Sandy, it was necessary for National Grid to turn off the main supply lines to prevent hazardous conditions as water pressure outside the supply lines, which was higher than the pressure of the gas inside the supply lines, allowed salt water to intrude into the lines impeding gas flow and creating service disruptions. In Suffolk County, more than 400 miles of main supply line were exposed to flooding with over 20,000 National Grid customers impacted leading to 10,000 shutdowns. The majority of these services were restored within a month of the storm with the help of mutual aid from utilities as far away as Ontario, Canada.[158]

In addition to interrupting service, the salt water intrusion led to corrosion that affected old steel pipelines, service equipment and residents' appliances. Corrosion of supply lines also posed an even bigger issue with leaking gas and the threat of explosion and/or fire. Following Sandy, National Grid saw an 80 percent increase in reported leaks. In addition, gas pipelines needed to be cleaned out of any salt water residue and customer appliances and supply lines needed to be

[157] Testimony to the SSRTF at Patchogue Public Hearing, April 26, 2018; describing touring Mastic Beach after Super Storm Sandy.
[158] National Grid

inspected and serviced.

Long-term impacts on the supply lines included increased risk of corrosion for those parts of the system that had been exposed to salt water, flooding-induced soil movement and uneven soil settlement that created voids around pipes which could compromise the pipe's integrity. In addition, the freezing temperatures that affected Long Island a few days after Sandy led to the risk of water freezing in the pipelines and further compromising the flow of natural gas.[159]

Since Superstorm Sandy

As part of New York State's Reforming Energy Vision (REV), National Grid has implemented a number of upgrades to increase the resiliency of our region's natural gas infrastructure in the face of extreme weather events. In Suffolk County, National Grid is currently executing multiple projects costing more than $40 million and impacting nearly 4000 gas service locations.

According to National Grid, important steps include:

- the replacement of nearly 200 miles (more than one million feet) of aging, leak prone pipe since 2013;
- the replacement of low pressure pipes with more resilient high pressure pipes in flood prone areas – including Babylon (1100 gas service locations at a cost of $17million), Bay Shore (2000 gas service locations at a cost of $18.5 million) and Patchogue (800 gas service locations at a cost of $6 million);
- upgrading National Grid's Liquefied Natural Gas (LNG) facilities in Holtsville and Greenpoint (Brooklyn) to ensure adequate back-up supplies across the region;
- a five year, $55 million program to install remote-controlled shutoff valves affecting 10,000 gas service locations in flood prone areas in Suffolk County, which will allow National Grid to isolate customers in specific flooded zones while eliminating the necessity to shut down entire areas; the shutoff valves have sensors that immediately close the valve when flooding is detected in order to prevent water from flowing further through the system;
- a telecom network to provide real-time information about locations impacted by flooding to allow a more strategic and efficient restoration response to be set-up;
- a new, state-of-the-art natural gas control center on Long Island, which controls the gas transmission and distribution systems for all of New York State.

Recommendations

1) Since an aggressive hardening and resilience plan for natural gas infrastructure, such as the one being executed by National Grid, can create some resistance with regards to logistics and planning, the appropriate departments of Suffolk County should work with National Grid to ensure that there is agreement on how to achieve these regional goals in a timely fashion. This can include working with various levels of government to obtain access to rights of way to perform the work and with towns and villages to obtain necessary permits.

2) The appropriate departments of Suffolk County should lead an effort to ensure that the towns and villages in flood prone areas work with National Grid to periodically review the effectiveness of the remote shut off valves in order to have confidence that they will work as planned.

[159] *Ibid*.

GASOLINE INFRASTRUCTURE

Post Sandy, drivers line up for gas in Eastport. Photo courtesy Tina Schneyer.

Background

Motor fuel supplies in our region began to deplete days before Sandy arrived. Northeast gasoline refining capacity was cut back by two-thirds and pipelines were closed in order to protect these infrastructure assets from anticipated power outages and massive storm surge along the waterways where they are located. These closings included the Phillips 66 Bayway, New Jersey refinery that is nicknamed "the Gasoline Machine" because of the key role that it plays in supplying motor fuel to the New York City area. While major refineries are built to withstand hurricane-force winds, they are vulnerable to power outages which can damage them in the case of a "cold shutdown" and to storm surge that might breach their defenses. At the same time, panic buying depleted much of the stock at fuel pumps days before Sandy's arrival.[160]

The storm itself had a catastrophic impact on the region's gasoline infrastructure. Power was knocked out to several refineries in the Northeast and others were inundated with salt water from storm surge. Storm-damaged tanks in New Jersey leaked diesel fuel and pipelines that help supply thousands of barrels of motor fuel per day were shut due to a lack of power. In addition, fuel barges were unable to bring back-up supplies to the region as New York Harbor was closed for three days because of storm debris.[161]

On Long Island, these systemic issues were compounded by the widespread power outages

[160] "U.S. Taps Reserves to Calm New York, New Jersey Fuel 'Panic' Post Sandy," *Reuters*, November 2, 2012; www.reuters.com/article/us-storm-sandy-hurricane/new-york-rations-gasoline-storm-victims-still-in-the-dark-idUSBRE89N16J20121109

[161] *Ibid.*

that left most gas stations unable to dispense to the public even the supplies that they had on hand. Demand for gasoline also increased when snowfall arrived a few days after Sandy and residents started using generators not only to supply electricity but also to heat their homes. At the same time, the heating oil supply was strained due to increased demand driven by falling temperatures. Short-term fixes such as rationing and easing of fuel standards were put into place. Rationing included policies whereby vehicle owners (with the exception of commercial vehicles, taxis and emergency vehicles, all of which were exempt) with license plates ending in an odd number could only buy gas on odd numbered dates – and vice versa for owners of vehicles with plates ending in even numbers. Meanwhile, the EPA waived clean gasoline and diesel requirements for the region for about six weeks following the storm and low-sulfur requirements were waived for emergency response vehicles and equipment used for disaster recovery. Even with these measures, the gas situation on Long Island did not get back to normal until about a month after Sandy.[162]

Since Superstorm Sandy

a. Backup Power for Gas Stations

In 2013, New York State passed a law requiring larger gas stations located within a half mile of highway exits or along designated evacuation routes to get back-up power generators or install transfer switches that would allow portable generators to be plugged in to power the station. These stations also must be able to deploy and install a generator within 24 hours of losing power during a fuel supply or energy emergency.[163] According to the New York State Energy Research Development Authority (NYSERDA), grants of up to $13,000 were offered to help gas stations defray the cost to install a transfer switch (the approximate cost of which is $18,700) and, at the gas station's option, to purchase and install back-up generators that cost approximately $30,000 - $50,000 depending on the size of the station and building code requirements. As of October 2019, 211 gas retailers in Suffolk have installed a generator transfer switch through NYSERDA's Transfer Switch Program and it is estimated that more than 20 additional Suffolk gas retailers have installed a generator transfer switch on their own.[164]

Once a gas retailer has a transfer switch, they can apply to participate in the "Fuel NY Portable Emergency Generator Program" which allows them to rent generators from the state during a fuel supply emergency if NYSERDA prioritizes their area to receive portable generators. As of October 2019, 161 Suffolk County gas stations have contracts with NYSERDA to participate in the emergency generator program.[165]

In 2016, funding from the FEMA Hazard Mitigation Grant Program allowed New York State to establish a $12 million Permanent Generator Initiative that was used to make competitive grants to strategically located gas stations to offset the costs of purchasing and installing a permanent emergency generator. According to NYSERDA, as of April 2019, 73 gas retailers in Suffolk County have installed permanent generators – of which 55 were funded through the Permanent Generator Initiative and 15 were funded through a separate state program called the "Back-Up Power Program."

[162] "LI Gasoline Supply System Bolstered After Superstorm Sandy," *Newsday*, October 29, 2017; www.newsday.com/long-island/superstorm-gasoline-generators-1.14669344
[163] NYS Fuel NY program; stormrecovery.ny.gov/fuel-ny
[164] NYSERDA
[165] *Ibid.*

b. Fuel Supply Terminals/Pipelines and NYS Strategic Gasoline Reserve

Since Sandy, work has been done to harden critical gas facilities by elevating equipment and pumps, replacing old wiring with water resistant wire, and updating emergency generator power. For flood prone refineries in downstate New York, preventative structures such as berms, levees and/or floodwalls have been installed.[166]

New York State also has established the nation's first Strategic Gasoline Reserve (SGR) which is located in Holtsville and which maintains 2.6 million gallons of gasoline (including ethanol) that can be used if a storm disrupts crucial fuel deliveries.[167] In upstate New York, there is additional storage of approximately 1.4 million gallons of gasoline (including ethanol) and 1.4 million gallons of diesel fuel. When the Governor declares a fuel emergency involving a system disruption that has created a gap in gasoline availability, NYSERDA can authorize the sale of fuel from the reserves to pre-qualified fuel distributors. These distributors will then make the fuel available to emergency responders, municipal customers and retail outlets.[168]

Following initial action by New York State, the federal government established the Northeast Gasoline Supply Reserve (NGSR) which is intended to help strengthen regional fuel availability. The NGSR holds approximately 29 million gallons of gasoline in New York Harbor facilities, as well as additional reserves in New England.[169]

Recommendations

1) Since the need for gas station power backup is infrequent, the County should require that the more than 200 gas stations that have a transfer switch verify with their chosen generator provider on a periodic basis the compatibility of their transfer switch and the generator to be supplied to them.

2) The appropriate departments of Suffolk County should encourage the several dozen Suffolk gas stations that have a transfer switch, but no contract with a generator supplier, to obtain such a contract.

3) The appropriate departments of Suffolk County should maintain an annual updated map of the locations of the gas stations that have a transfer switch and generator contract and should determine which gas stations in the County - that do not have both - should be required to do so based on their proximity to major roadways and evacuation routes.

4) The County and/or State should create a revolving fund that would enable gas stations which are required to or encouraged to install a transfer switch to finance the payment of such an installation.

5) The appropriate departments of Suffolk County should require that the companies providing portable generators to gas stations in Suffolk during an emergency adhere to a regular maintenance schedule for the generators in their inventory.

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[166] *Ibid*.
[167] *Ibid*.
[168] *Ibid*.
[169] *Ibid*.

6) The appropriate departments of Suffolk County should maintain a small number of portable generators that are first designated for use at Suffolk gas stations when necessary. This would be in addition to the Fuel NY Portable Emergency Generator Program and would ensure that the County has sufficient portable generators even if NYSERDA allocates its generators to other areas in New York State.

7) The County should require that generator providers maintain a reserve of fuel supplies (diesel, gas, compressed gas) sufficient to fuel the generators they are contracted to provide for a minimum of five days.

8) Since only prequalified fuel distributors with signed agreements with the state will be allowed to purchase fuel from the SGR, the County and all Towns/Villages should be sure to coordinate with their primary fuel supplier to make sure that the supplier is registered with the SGR and has an appropriate allocation planned for municipal needs.

9) At the time of Sandy, Suffolk County was hindered by the fact that not all fuel stations run by the County for their own fleet of vehicles had backup power. [170] As of 2019, the fuel station at the county's Riverhead facility has back-up generation and the Dennison Building station has a generator that needs to be replaced. The stations at the Old Infirmary in Yaphank and the Legislature Building in Hauppauge do not have back-up generators. Suffolk County should implement a plan to replace the generator at the Dennison Building station, install back-up generation at the Yaphank facility, and explore the cost/benefit of installing a back-up generator at the Legislature Building in Hauppauge.

MUNICIPAL REQUIREMENT FOR RESIDENTIAL AND COMMERCIAL OIL/PROPANE TANK ANCHORING IN FLOOD PRONE AREAS

Background

In the years just prior to Sandy, all ten towns in Suffolk adopted building codes requiring the anchoring of outdoor oil and propane tanks in designated flood zones. For example, the Town of Islip's code requires that, "New structures and substantial improvement to structures in areas of special flood hazard shall be anchored to prevent flotation, collapse, or lateral movement

[170] Sammy Chu testimony to SSRTF, June 20, 2018.

during the base flood. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces."[171]

However, Sandy brought floods that in some parts of Suffolk exceeded the 100-year storm flood zone and thus storm-caused oil spills had a major impact on residential and commercial areas, both inside and outside the flood zone. According to the New York State DEC, there were more than 2600 spills reported in Nassau and Suffolk, with 80% of those attributable to residential heating oil tanks. Most of the spills in Suffolk were in the Town of Babylon, Mastic, and in the Moriches area. The Town of Babylon reported to the DEC that there were more than 300 oil spills resulting from the storm with the primary cause of the spills being the toppling of 275 gallon home heating oil tanks. Because of the buoyancy of the tanks, many of them fell over and floated in the floodwaters, releasing fuel oil. Many of these tanks ended up on other residents' property.

Tank with oil found floating in Great Neck Creek, Copiague. Photo courtesy of the Town of Babylon.

Mastic Beach. Photo courtesy of Tina Schneyer.

Since Superstorm Sandy

The DEC and the EPA played critical roles in assisting the towns in Suffolk County with the cleanup of oil spills caused by Sandy. The DEC responded to the spills with vacuum trucks, oil booms and pads and by pumping tanks and basements. In all, the DEC pumped 225,000 gallons of oil/water from floating, tipped and/or unstable tanks, basements, yards, storm

[171] Town of Islip Zoning Code, Chapter 68, Article XL (Flood Damage Prevention), Sec 68-442 (Construction Standards).

drains and waterways. In a report to DEC, the Town of Babylon indicated most of the spilled oil is believed to have flowed into the bay via the retreating floodwaters and the storm drain system.

Recommendations

1) Suffolk's towns and villages should enact legislation requiring that all homeowners and businesses located within the 100 year flood zone tie down any outdoor oil/gas tanks on their property, even if those tanks are exempt from the current anchoring code because the tanks are not "new structures or substantial improvements" since the codes were adopted about 10 years ago. Suffolk's towns and village should also consider expanding the area covered by the anchoring requirements to extend beyond the 100 year flood zone.

2) The Suffolk County Planning Commission should create a model code for Suffolk municipalities to consider in addressing this anchoring issue including assessing different means of tying down the tanks and creating a timetable for implementation.

3) Consideration should be given to requiring oil/propane providers to act as facilitators of the enforcement of any new anchoring requirements – as well as existing anchoring requirements – by prohibiting those companies from filling any tanks in the 100 year flood zone that are not anchored (providers could presumably provide this anchoring service or property owners could do it themselves). Such a mechanism would provide more effective enforcement than merely relying on building departments to catch violations when doing property inspections and would also quickly catch those who skirt around the permit process for new tanks.

4) If uniformity of codes and enforcement becomes an issue, Suffolk County should consider regulating all sizes of oil/propane tanks on residential and commercial property, as is done in Nassau County. Currently, Suffolk only permits and regulates tanks with capacity greater than 1100 gallons with Suffolk's municipalities handling smaller size tanks.

ELECTRICAL INFRASTRUCTURE

Background

Sandy was the most severe storm to impact Long Island in the modern electric power age. According to the Long Island Power Authority (LIPA), at its peak, Sandy knocked out power to more than one million of its 1,126,633 customers in Suffolk, Nassau and the Rockaway Peninsula. Approximately 40,000 locations on the electric grid were damaged with costs reaching $700 million. It took nearly 16 days to fully restore power to all homes on Long Island that were capable of receiving power following Sandy and the nor'easter that hit Long Island several days after Sandy. This was accomplished through the work of more than 5,000 LIPA/National Grid

employees and 11,000 support workers, including electrical workers and tree trimmers, who were brought in to assist from off of Long Island.[172]

Since Superstorm Sandy

Following Sandy, elected officials at every level recognized the vulnerability of Long Island's electric transmission and distribution (T&D) system to major storms and together worked to provide the resources to undertake a major storm hardening effort. LIPA requested FEMA grant funding under Section 428 of the Stafford Act and received $729 million to harden electrical facilities on Long Island that were damaged during Sandy.[173] PSEG Long Island, which had been selected to take over the operation of Long Island's T&D system as part of a LIPA restructuring plan prior to Sandy, is now implementing the improvement program as part of its contract with LIPA. At the time Sandy hit Long Island and in its immediate aftermath, National Grid was the operator of the T&D system.

The LIPA/PSEG Long Island FEMA-funded Hazard Mitigation Program (HMP) aims to harden the power grid and create an enhanced level of redundancy and reliability to protect against the next devastating weather event. This effort has made Suffolk County – and all of Long Island – markedly better prepared for the next severe weather event and might be the most significant positive action taken for Long Island as a result of Sandy. As evidence of this, during the March 2018 nor'easters, the storm hardened circuits yielded a significant reduction in system outages than would have been expected using the old circuits.

The primary goals of the HMP, which was started in 2015, are to harden LIPA's electric distribution infrastructure to reduce future damage and loss of function by a rate of approximately 20%, across the 1,025 miles of circuits identified by LIPA as the most vulnerable sections of the Sandy-damaged T&D circuits. This is being accomplished by upgrading critical circuits (including by installing taller and stronger poles, trimming trees, and/or rerouting certain circuits to avoid hazards and increase accessibility), rebuilding and storm hardening 12 Sandy- flooded substations, and installing nearly 900 Automatic Sectionalizing Switches (ASUVs). ASUVs can be controlled remotely and allow for damaged areas to be isolated during an outage condition in order to minimize the number of customers affected by the power outage and to permit sections of the grid to be re-energized more quickly. According to PSEG-LI, the addition of the aforementioned switches, in combination with the approximately 1500 existing switches on the system and other automated controls, will greatly enhance functionality and operability of the electrical system which will lead to better resiliency in the face of severe storms.

As of October 2019, PSEG-LI reports that the construction aspects of the HMP are nearing completion. Approximately 91% of the circuit miles upgrades have been completed (938 miles out of 1025 total miles) and 99% of the ASUVs have been installed (887 out of 894 total). Of the five transmission crossing upgrades that are planned, four were completed earlier in 2019 and the final crossing upgrade is expected to be completed in November 2019. It is expected that all of the work on the circuit construction will be completed in the first quarter of 2020.[174]

[172] LIPA
[173] *Ibid.*
[174] PSEG-LI

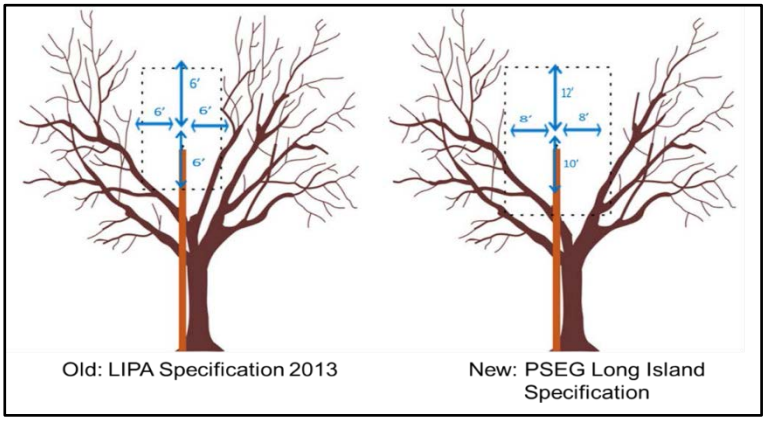
a. Lines and Poles

Comparison of pole construction before and after Sandy. Photo courtesy of PSEG-LI.

Comparison of "Before" and "After" photos illustrates how newer installations use more storm resilient construction standards including shorter cross-arms for reduced profile and less susceptibility to tree caused outages, use of stronger "tree-resistant" wire, and enhanced tree trimming to provide additional clearance around power lines.[175]

In addition, larger utility poles provide much stronger protection from storm impacts, though they have raised aesthetic concerns in several locations, including along County Road 51 in Eastport where community objection led to LIPA agreeing to remove the poles and place electrical wiring underground.[176]

b. Vegetation Management



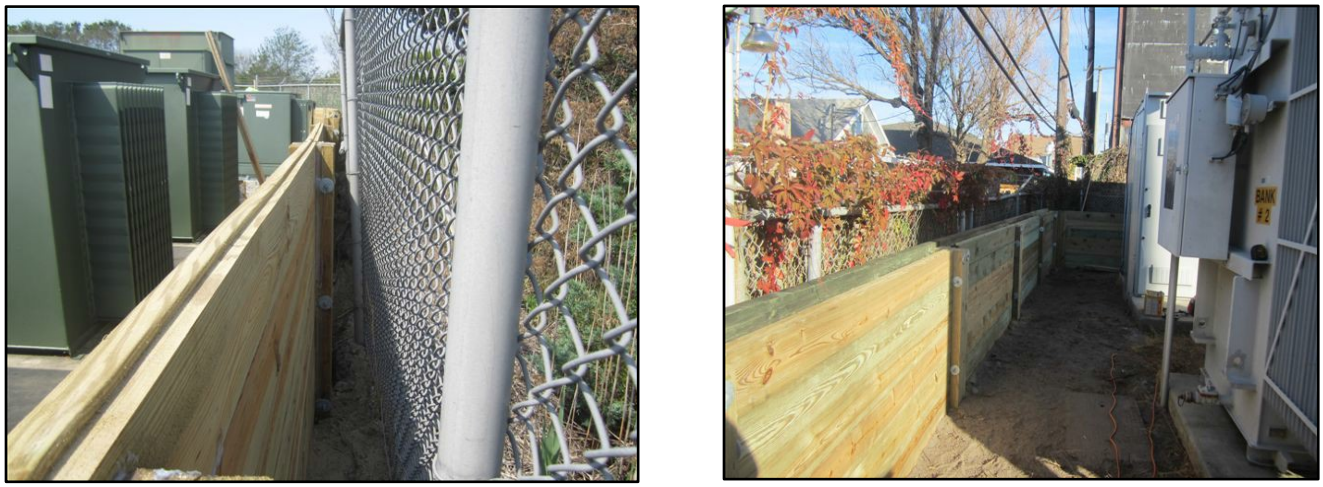
Changes in tree trimming standards. Illustration courtesy of PSEG-LI.

[175] *Ibid.*

[176] "LIPA, PSEG to Remove 24 Steel Poles in Eastport at cost of $13.5 million," *Newsday*, Jan. 5, 2019; www.newsday.com/long-island/suffolk/lipa-pseg-pole-removal-eastport-1.25571045

Trees growing near power lines significantly increase the chance of power outages and are the greatest contributor to electrical outages on the system, especially during storm events. To combat electrical outages and enhance service reliability, PSEG Long Island has implemented an aggressive Vegetation Management Program to clear vegetation from the vicinity of distribution and transmission facilities. Since taking over operations of the Long Island electric system in 2014, PSEG Long Island initiated a four-year tree trimming cycle. The intention is to trim each circuit in the LIPA service territory at least once every four years to minimum specified clearances or, for faster growing vegetation, to even greater clearances to allow for four years of growth without interfering with distribution system operations. The four-year trim cycle incorporates a complete circuit trim approach whereby vegetation along all primary (mains and laterals) and secondary circuits is trimmed to minimum clearance requirements which are now 8 feet to each side, 12 feet above, and 10 feet below the primary conductor(s) (increased from six feet all around) and 3 feet of clearance all around for secondary conductors. Vegetation along services are also trimmed to these clearance requirements when the service wire lies in highway zones, crosses a street, or when the vegetation is changing the natural arc of the service wire. These efforts have helped to mitigate and lessen the effect of tree caused outages on the electrical system.[177]

c. Substation Protection



Captree and Ocean Beach flood walls. Photos courtesy of PSEG-LI.

Another critical part of hardening the electrical system has been enhancing the protection of LIPA's most vulnerable substations. In low-lying parts of southern Nassau County, several substations were raised to protect them from future flooding. In Suffolk, sand bags were replaced by new permanent flood walls around four vulnerable substations on the barrier islands – at Captree, Robert Moses, Fair Harbor and Ocean Beach.

[177] PSEG-LI

Recommendations

1) The enhanced Vegetation Management Program is already funded by FEMA grants, but much of the rest of the ongoing maintenance and upgrades to the T&D system will fall to LIPA ratepayers once the FEMA-funded HMP is completed. Suffolk's federal and state lawmakers should work to secure on-going federal funding and/or other grants to continue to harden Long Island's electrical T&D system. While the current FEMA grants are focused on enhancing the resiliency of the electrical system's most vulnerable areas, these areas only comprise approximately 10% of the circuit miles of Long Island's T&D system.

2) PSEG Long Island and LIPA should continue to identify opportunities to communicate actions being undertaken to increase the resiliency of the T&D system on Long Island and the associated benefit of these efforts. Political leaders at all levels will need to help articulate to ratepayers why these expenses are important and provide a long-term return on investment.

3) LIPA should consider breaking out Storm Preparedness expenses in an itemized line on LIPA bills so the public can see the portion of their bills dedicated to preparing for the next major storm.

4) The Suffolk County Town Supervisors Association and others have called for LIPA to come up with a plan to bury power lines in critical areas of the electrical grid that are in frequent need of repairs. Appropriate departments of Suffolk County should join with the Town Supervisors Association to meet with LIPA and PSEG Long Island to discuss the financial and engineering feasibility of such a plan. Towns and Villages should consider replicating Brookhaven Town's ordinance which requires all new subdivisions with four or more lots to have buried power lines.

5) Where feasible, PSEG-LI should coordinate with other utilities (i.e. cable) whose wires used the same poles to simultaneously trim vegetation around those wires as well.

MANAGING STORM SURGE BY USING OCEAN INLET BARRIERS

Background

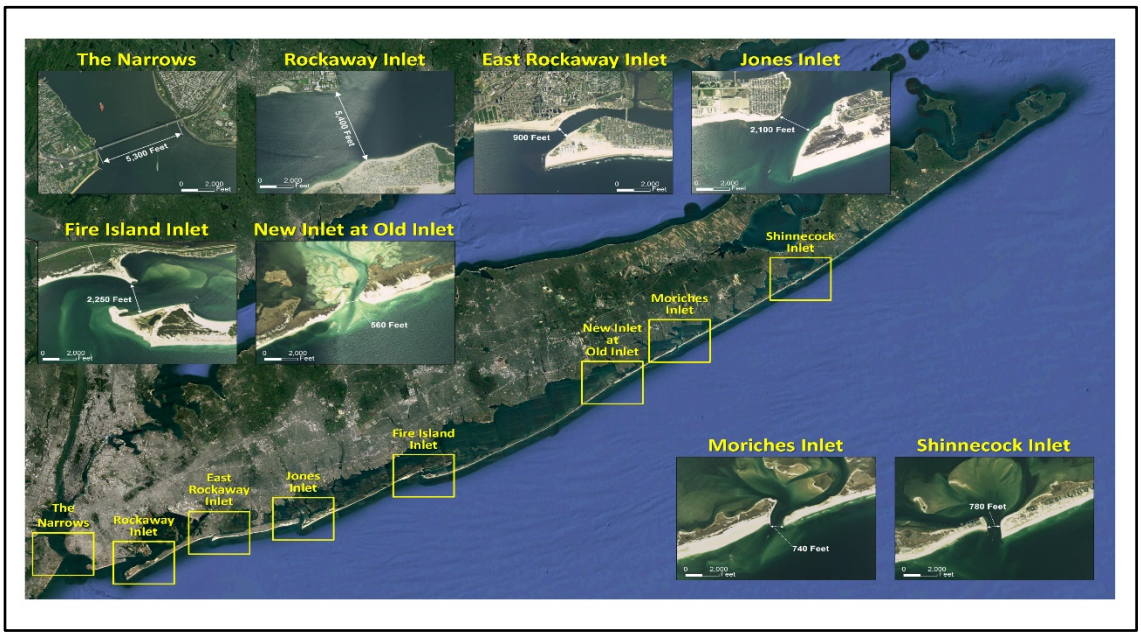
The South Shore of Long Island is protected by a long series of narrow barrier beaches stretching from Southampton in the east to Far Rockaway in the west. These barrier beaches are punctuated by seven distinct tidal inlets – four of which are located in Suffolk County: Shinnecock, Moriches, "New" Old Inlet, and Fire Island. Each of the inlets is less than half a mile wide. The "New" Old Inlet was reopened during Sandy by catastrophic beach erosion. This inlet, located in the Fire Island National Seashore, has stabilized naturally and is still open.

While the barrier beaches offer a measure of protection from oceanic storm surges and extreme wave damage, much of the damage sustained by South Shore communities during Sandy

was due to the storm surge currents streaming through the tidal inlets. Normally, however, the tidal inlets play a very positive role by allowing a healthy flushing of the various back bays in Suffolk County, including Great South, Moriches and Shinnecock Bays.

Since Superstorm Sandy

The Metro NY-NJ Storm Surge Working Group has recommended development of a regional storm surge barrier system across all of Long Island's South Shore inlets. Like swinging saloon doors, the barriers could be held open during normal weather thus allowing the free passage of boats and regular tidal flushing of the back bays but could be closed for a few hours during extreme storm events to keep the surges from pouring through the inlets and inundating South Shore communities.



Long Island's South Shore inlets.[178]

In 2018, NY State Assemblywoman Christine Pellegrino obtained $250,000 in state grant money to fund a study to examine the feasibility of installing a storm barrier at the Fire Island Inlet to protect the Great South Bay. Estimates from Cameron Engineering place the funds needed to do a full engineering feasibility study of the six eastern-most inlets at around $500,000.

Recommendations

1) While the construction of storm surge barriers are likely to be quite expensive and the efficacy of such barriers along softscaped inlets is an open question, in an era of rising sea level and increased storm activity the economic impact of protecting South Shore communities in this way may make sense. A number of other vulnerable locations in more developed areas in the U.S. (i.e. New Bedford, MA; Providence, RI; Stamford, CT; and New Orleans, LA) and around the world (i.e. London, UK; Rotterdam, the Netherlands; Frankfurt, Germany; Venice, Italy; St Petersburg, Russia; Tokyo, Japan; and Shanghai, China) have proceeded with the installation of such barriers. Our region should diligently explore the feasibility of installing storm surge barriers on the South

[178] Metro NY-NJ Storm Surge Working Group.

Shore from the design, engineering, oceanography, sediment transport and erosion, water quality, fisheries and marine ecological health perspectives. Suffolk County should work with Nassau County to obtain the funding needed to complement the already earmarked state grants in order to fund a full study along the South Shore of Long Island.

MANAGING STORMWATER THROUGH DRAINAGE

Background

Runoff from stormwater is defined by the EPA as "generated when precipitation from rain and snowmelt events flows over land or impervious surfaces and does not percolate into the ground. As the runoff flows over the land or impervious surfaces (paved streets, parking lots, and building rooftops), it accumulates debris, chemicals, sediment or other pollutants that could adversely impact water quality if the runoff is discharged untreated."[179]

Stormwater management, as required under federal and state law, addresses these negative impacts by reducing and delaying runoff volumes, enhancing groundwater recharge, reducing the discharge of pollutants in rivers, streams and bays and reducing sewer overflow events.

Suffolk County has long been a leader in promoting environmentally sensitive methods for promoting drainage through the use of "green infrastructure." In 2011, the Suffolk County Planning Commission released its "*Managing Stormwater – Natural Vegetation and Green Methodologies"* guidance document for Suffolk's municipalities. In the publication and in multiple contemporaneous public seminars, the Planning Commission called on municipalities and developers to begin facilitating drainage using natural techniques such as bio-retention basins, bioswales, green roofs, and permeable pavement. Following this effort, a number of developments across Long Island utilized these techniques.

Since Superstorm Sandy

During significant storms, permeable pavement and other green methodologies have proven effective at mitigating storm water runoff and reducing the impact on sewer and hardscaped water infrastructure outside of storm surge areas.[180] Continuing advances in permeable pavement technology created by companies like EcoRaster have led to increased installations across Europe, the United States and elsewhere.

[179] U.S. EPA Stormwater Program; epa.gov

[180] North Carolina Department of Environmental Quality Stormwater Design Manual.

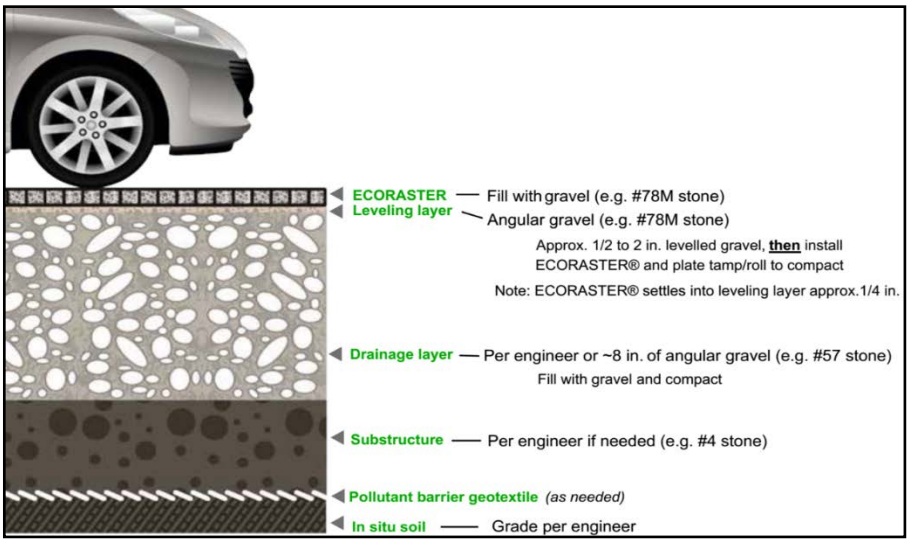


Illustration of permeable pavement construction.[181]


Parking lot constructed using permeable pavement.[182]

Recently, Suffolk County has called for the use of permeable pavement in its renovation of the facilities at Cupsogue Beach County Park. The RFP calls for the "[d]esign of a pervious paving surface for the parking lot in lieu of traditional asphalt pavement. The Consultant shall work with the County and various manufacturers to determine the appropriate pervious product, extent of use in the parking/walking areas, and shall include same in the bidding documents. It should be noted that the design shall include, but not necessarily be limited to, increasing the grade of the existing parking lot surfaces as necessary to accommodate not only the new waste water treatment system but the pervious parking design as well."

[181] www.ecoraster.com/en
[182] *Ibid*.

Cupsogue Beach County Park, site of future permeable pavement parking lot installation.[183]

Another tool to reduce runoff is through the use of green infrastructure recharge basins such as bioswales and rain gardens. When used in parking lots and along roadsides, they can be both aesthetically pleasing and effective in improving infiltration by storing water and reducing the flow of runoff.

Examples of green infrastructure water storage projects.[184]

[183] Suffolk County
[184] "Living with the Bay Resiliency Strategy," GOSR, page 9;

Recommendations

1) Suffolk County should create a policy that it will require the use of permeable pavement where feasible on all development projects on county-owned land.

2) The Suffolk County Planning Commission should create a model code for municipalities with regard to establishing zoning overlays in particularly sensitive areas where permeable pavement and other green methodologies could be required to mitigate storm water runoff. The Planning Commission also should help interested municipalities to develop a site plan review process with respect to green storm water infrastructure to promote and increase deployment of these techniques.

3) Suffolk County in conjunction with New York State should seek funding for a study to identify opportunities for large-scale green infrastructure projects in the County – like those being done on the Lower East Side in Manhattan and on Staten Island – that would enable reduced reliance on municipal storm water systems by encouraging natural percolation through landscaping, pervious paving, open space protection, limits on vegetation clearing, and on site retention. Such an effort could also include demonstration projects to educate residents about opportunities to capture storm water on their own property via systems such as rain gardens.

COMMUNICATIONS INFRASTRUCTURE

Background

Sandy's high winds and coastal and inland flooding wreaked havoc on Long Island's telecommunications system. Nearly 25% of Long Island's cell towers were knocked out due primarily to loss of power. In some cases, even those cell towers that were hooked up to generators ran out of fuel to keep them operating. Flooding in Manhattan submerged a major communications node in four feet of water, temporarily shutting down Verizon's phone and internet service. As this affected a major trunk line, service was interrupted to the providers servicing Long Island as well. Providers faced challenges restoring service due to a lack of power, a lack of backhaul connections and a lack of safe access to cell sites.[185]

The lack of cellular communications had broad reaching impacts as not only were citizens affected in terms of their ability to provide and receive information, but the work of emergency responders and electric workers was hampered as well. As *The New Yorker* pointed out, "During Sandy, emergency workers in New York and New Jersey were unable to communicate with colleagues who came from other states, because there is no nationwide network for first responders, and those from outside the region depended on cellular networks that were down."[186]

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stormrecovery.ny.gov/sites/default/files/crp/community/documents/Objective%205.pdf

[185] "How Carriers are Preparing for the Unthinkable," *Electronic Component News*, September 15, 2015; www.ecnmag.com/article/2015/09/how-carriers-are-preparing-unthinkable

[186] "Adaptation," *The New Yorker*, January 7, 2013; www.newyorker.com/magazine/2013/01/07/adaptation-eric-

According to *The New Yorker* at the time of Sandy "the cellular industry ha[d] resisted efforts to regulate it, as the old telephone network is regulated, and there are no federal laws establishing minimum requirements for backup power during emergencies, no standards for how and when providers will share networks or drop roaming charges to give more people access to information, and no rules for reporting what caused extended outages."

Since Superstorm Sandy

In the seven years since Sandy, mobile devices have become an even more indispensable part of everyday life than they were at the time of the storm. As a result, it is increasingly critical to safeguard the wireless communications systems and reduce their vulnerability to storm impacts.

The federal government has historically been weak when it comes to imposing significant requirements on communications companies' handling of emergency situations. For instance, in 2007, following Hurricane Katrina, the FCC adopted the "Katrina Panel Order" which recommended that most US cell phone towers have at least eight hours of backup power[187] only to see the White House Office of Management and Budget reject the plan.[188]

In December 2016, the FCC adopted Order 16-173A supporting the Wireless Resiliency Cooperative Framework (WRCF) which is "a voluntary industry commitment to promote wireless communications and situational awareness during disasters." The WRCF provided for enhanced coordination during emergencies including providing for "reasonable roaming" during disasters, fostering mutual aid among wireless providers, and enhancing municipal preparedness and restoration by establishing best practices with local government representatives.

In 2017, *Fortune* magazine noted that for years the wireless communications companies have successfully fought proposed regulations that would have required cell tower backup citing inconsistent local regulations on the ability to install generators and the assertion that it is more cost effective to handle tower outages with mobile back-up stations and other means. As Regina Costa of the National Association of State Utility Advocates put it, "The wireless industry has done everything it can to persuade federal regulators and state regulators not to require that backup power be put in place . . . . It's a huge public safety issue — because in order for communications to work there has to be power."[189]

There have been some improvements when it comes to regulations covering 911 service. In December 2013, the FCC passed a rule requiring carriers to provide reliable 911 service via both wireline and wireless calls to 911 call centers.[190] More locally, on November 1, 2018, Suffolk County joined about half of the counties in New York and about a quarter of them nationwide in implementing "text to 911" technology.

klinenberg

[187] FCC Order 07-107, May 31, 2007.

[188] "White House Rejects FCC Rule on Cell Phone Backup Power," Marketwatch.com, December 1, 2008.

[189] "Hurricane Harvey Knocked Out Cell Service. Now Calls for Backup Wireless Power Are Rising," *Fortune*, August 30, 3017.

[190] FCC Order 13-158, December 12, 2013.

Recommendations

In this day and age, a reliable cell phone signal is essential during storm events and other emergencies to ensure that residents can receive information about current storm conditions, available resources, evacuation routes, emergency shelters, and community resource centers, as well as ensure the ability to connect with loved ones and be better prepared.

1) The appropriate departments of Suffolk County should work with local cell tower owners to map the coverage areas of those cell tower locations with battery backup systems or generators capable of providing at least 24 hours of emergency power.

2) The appropriate departments of Suffolk County should work with towns and villages that are considering approving new cell towers to encourage them to require the installation of backup power systems as a condition for approval.

3) During Hurricane Michael in October 2018, AT&T deployed 15 portable cell sites to the most storm-damaged areas of Florida to provide connectivity to residents and first responders.[191] The appropriate departments of Suffolk County should work with Long Island's cell service providers to ensure that such portable cell sites are available here in case of a major storm.

4) As has been recently suggested to the FCC, the cell service provider industry should follow the mutual aid model of electric utilities by pre-positioning a pool of common recovery equipment that is shared across communications service providers.[192] Such equipment could include portable towers, generators, fuel tanks, microwave backhaul equipment, and other types of communications equipment that are commonly used by such providers during recovery and restoration in the aftermath of disasters. Suffolk County should help initiate a regional conversation about the possibility of a public- private partnership in this regard.

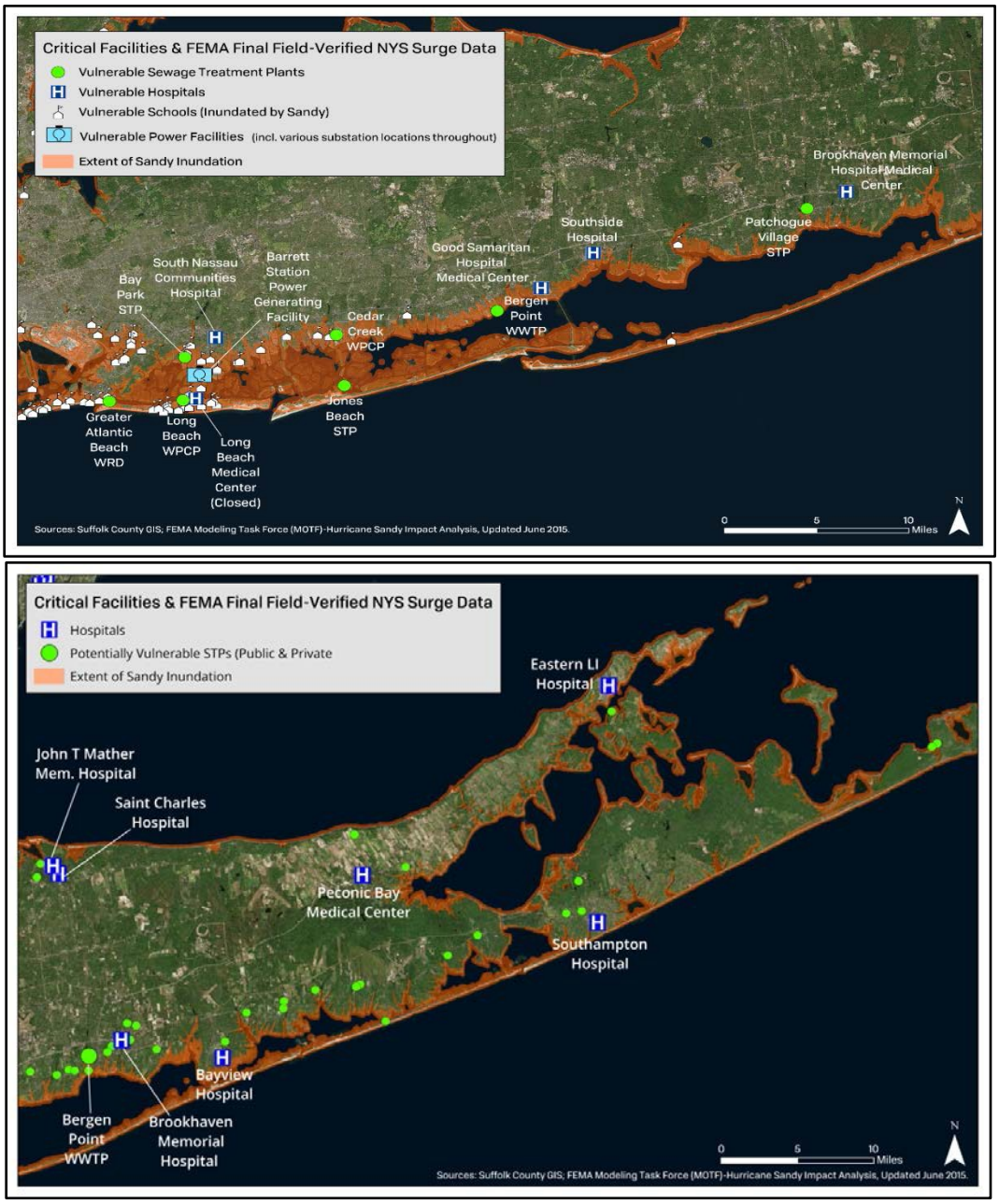
OTHER VULNERABLE INFRASTRUCTURE

Background

Given the low-lying nature of Long Island, many significant infrastructure assets are potentially vulnerable to coastal flooding and other impacts from storms. In addition to gas and electrical assets, among the vulnerable assets in this area are hospitals, Long Island Rail Road equipment/tracks, and wastewater treatment facilitites.

[191] "FCC Chief Calls for Investigation of Florida Cellphone Service Outages," October 16, 2018; npr.org

[192] Comments of the Edison Electric Institute and the Utilities Technology Council before the FCC, December 17, 2018; utc.org/wp-content/uploads/2018/12/EEI-UTC-Comments-PS-Docket-No.-18-339-final.pdf



Critical Long Island infrastructure in or near flood zones.[193]

Since Superstorm Sandy

a. Hospitals

Several Suffolk hospitals are in storm-surge susceptible locations. These include Southside Hospital in Bay Shore, Good Samaritan Hospital in West Islip and Eastern LI Hospital in Greenport.

Good Samaritan Hospital had its front doors blown off by Sandy and sustained extensive roof and water damage necessitating the evacuation of about 100 patients and costing the hospital nearly $11 million. Southside Hospital had much of its first floor

[193] Long Island Regional Planning Council.

covered in water and sustained about $3 million in damage. While hospitals are required to have emergency generators, the new reality of increased storm surge has put the existing generators at both Good Samaritan and Southside at risk. FEMA grant funding after Sandy – more than $20 million for Good Samaritan and more than $23 million for Southside – has been used in each hospital to install flood mitigation measures and to replace generators on the ground floor with new ones on the second floor.[194]

Eastern LI Hospital is the most vulnerable hospital in Suffolk County as it sits on a six acre peninsula in Greenport Harbor. The impact of Sandy led to the hospital becoming an island surrounded by storm water. Sandy's tidal surge overcame the 1100 feet of bulkhead protecting the hospital as well as a system of dykes and pumps safeguarding the hospital's electrical equipment vault and generator in the lower basement level, which is located below sea level. For the first time in the hospital's history water came up through the ground underneath the electrical vault and forced the hospital to evacuate all of its 50 patients. Since Sandy, Eastern LI Hospital has executed a resiliency plan that has seen the 2018 construction of an 850 foot cement seawall that surrounds the hospital and extends three feet above the surface and three feet below (with removable floodgates to allow pedestrian and vehicular access on blue sky days), the installation of new water pumps and alarms to protect the sub-surface electrical vault, and the purchase of a new generator that will be placed five feet above sea level. When FEMA did not contribute to these protective measures, the hospital was lucky to have a family in the area step up to provide the necessary funding.[195]

b. Long Island Rail Road

The evening before Sandy hit the New York region, the Metropolitan Transportation Authority (MTA) shut down all transit services including the Long Island Rail Road (LIRR). This allowed the LIRR to take steps to protect hundreds of rail cars and other assets ahead of Sandy's landfall. The damage to the LIRR's infrastructure in Suffolk County was limited to downed trees and other debris on the tracks. However, the damage in Nassau County and New York City was much more significant and caused system-wide issues that impacted Suffolk County residents for more than a month after Sandy. This damage severely limited the LIRR's ability to bring Long Island commuters to jobs in New York City as well as the ability of freight rail service to deliver supplies to Long Island.[196]

The major damage to the LIRR system occurred in the East River Tunnels, the West Side Yard, the Long Island City Yard, and the Long Beach Branch. The damage in the West Side Yard, the LIRR's largest train storage yard, was significant with tracks, switches, and signal systems submerged under five feet of water. In addition, two of the four East River tunnels were flooded with water over 19 feet deep which damaged the tracks and signal systems.[197]

Since Sandy, the LIRR has made significant investments – funded primarily by the Federal Transit Administration – in infrastructure replacement and major rehabilitations to ensure the long term operational reliability of service in parts of the LIRR system that were

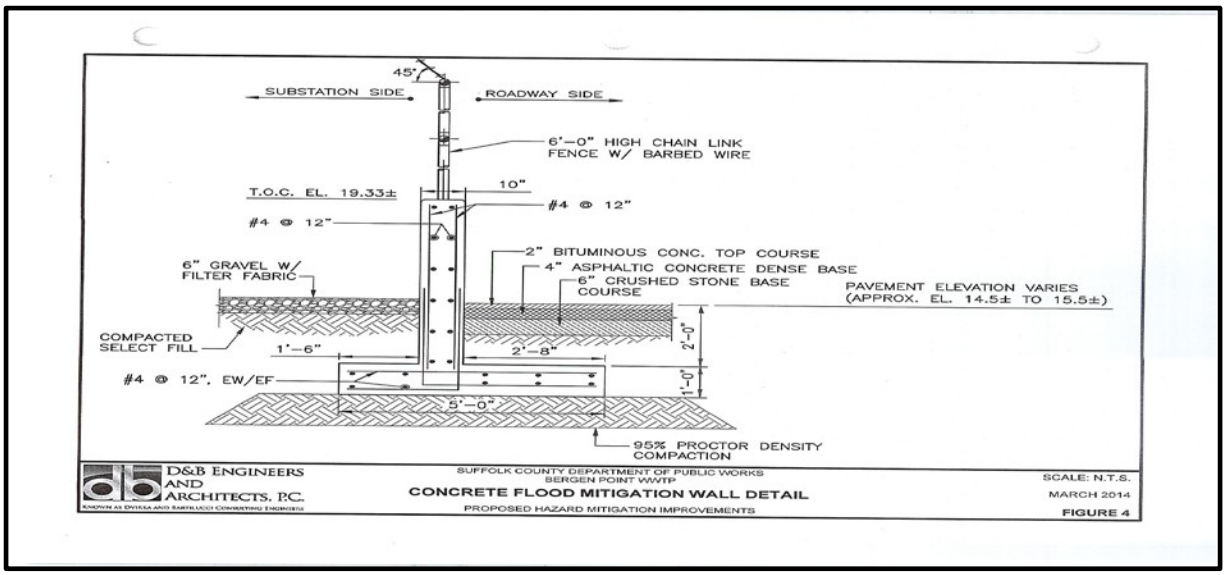
[194] "Good Samaritan, Southside Hospitals to Receive Millions in FEMA Funds," *Newsday*, March 22, 2015; www.newsday.com/news/health/good-samaritan-southside-hospitals-to-receive-millions-in-fema-funds-1.10100406
[195] Eastern LI Hospital
[196] LIRR
[197] *Ibid*.

heaviest hit by Sandy and to protect against the impact of future storms. Major efforts included replacing three substations, removing over 470 tons of storm-related debris that impacted the system, replacing more than 1.5 miles of communication cables and over 23 miles of third rail traction power cables. While the vast majority of the work was done in New York City and Nassau, significant Suffolk efforts included the construction of an emergency generator in Babylon and the creation of a new fueling station in Ronkonkoma.[198]

c. Bergen Point

Located directly on the Great South Bay, Bergen Point is Suffolk's largest and most important wastewater treatment plant – and it's most vulnerable to storm impacts. Bergen Point can process more than 40 million gallons of effluent per day from Suffolk's Southwest Sewer District which covers an area of approximately 57 square miles.

Although storm hardening and resiliency projects had been initiated prior to Sandy (e.g., following significant storms in 2005 and 2010) and the majority of the treatment tanks onsite have 16 foot protective walls, Sandy expanded the scope of mitigation work and vision necessary to ensure that Bergen Point is protected from coastal storms going forward.[199]



Planned flood wall to protect Bergen Point sewage treatment plant from storm surge.[200]

Key storm hardening projects in process to protect the Bergen Point plant and its feeder system from storm surges of up to 16 feet (more than five feet above the storm surge generated by Sandy at the plant per the National Weather Service)[201] include:

- constructing a reinforced concrete flood protective wall around the plant's electric substation to ensure uninterrupted operation of the facility;
- rehabilitating the plant's emergency electric generator in 2019 and then building a gas compressor station to allow the generator to run on natural gas, further reducing the impact of operating restrictions if fuel deliveries are lacking due to

[198] *Ibid.*
[199] DPW
[200] *Ibid.*
[201] www.weather.gov/okx/HurricaneSandy

an inaccessible plant site;

- planning to raise the level of the current access road which is frequently under water during storm events;
- starting design work to harden the existing 3,000 foot shoreline with a large stone revetment;
- purchasing mobile flood protective devices for the building access doors at various buildings on the site;
- installing water tight manhole covers to prevent corrosive saline water from entering the system and impacting equipment at the remote pumping stations as well as at the Bergen Point plant itself;
- installing flood protection systems at the largest pumping station in Bay Shore (Awixa Creek) as well as critical pumping stations in Copiague and Amityville which were reliant on portable emergency generators to continue operating for over 11 days after Sandy due to flooding.

Recommendations

1) Appropriate departments of Suffolk County should do a regional infrastructure vulnerability assessment every two years to help identify major systemic weaknesses among both public and private assets, including municipal and private sewage treatment plants.

2) Suffolk County and its federal and state elected officials should advocate for new infrastructure funding mechanisms such as an infrastructure bank and similar kinds of tools to help support critical resiliency projects like those being undertaken by the LIRR, by vulnerable Suffolk County hospitals, and at Bergen Point and the Southwest Sewer District.

CHAPTER V
A ONE-HUNDRED YEAR VIEW

While this report focuses on what is achievable and doable in the next few years, near-term actions inherently must be taken in the context of a long-term view of what our region needs to do to ensure that our area can be lived in by succeeding generations.

Over the next 100 years, the coastlines and low-lying areas of Suffolk County will undergo significant changes driven by rising sea levels, which recent projections anticipate will rise between 0.2 meters to 2 meters by the end of this century.[202] Additionally, increased storm surges, higher rainfall events, and greater wind velocities will all compound regional economic losses from future storms. Rising temperatures over time will also change the composition of regional vegetation, wildlife, pests, and disease vectors.

Suffolk County must anticipate this geographical and climatological transformation and adapt regional land use and infrastructure practices to prepare for this altered future. The County's long-range planning must emphasize regional resiliency, environmental sustainability, and adaptation to projected environmental changes. This should include exploring long-term strategies to adjust future development patterns, increasing the abundance of locally grown food, and shifting our energy supply from fossil fuels to renewable energy sources. In pursuit of these goals, new models of economic sustainability will need to be explored.

When it comes to storms and sea level rise, our region can: (1) work to keep the water out via sea walls, berms and pumps; (2) learn to live with the water; and/or (3) retreat to higher ground.[203] An important step in implementing these approaches is to determine in what situations the traditional paradigm of local land use and zoning decisions are insufficient to meet the regional challenges of storms and sea level rise. The role of regional planning will need to be enhanced and, at a minimum, the county's many municipal jurisdictions will need to work in a more coordinated fashion to provide a more integrated model of regional management in order to confront these significant regional challenges.[204]

Among the most challenging future issues facing regional planners is limiting new development in vulnerable coastal areas and dealing with development that already exists in those places. Topics like managed retreat and required housing elevations will require public education and dialogue before they can become widespread policy options. An informed public is critical to fostering the understanding that the most effective means of protecting Suffolk County is to let nature do its job by allowing it to rebuild the first line of defenses that have been destroyed by human activity. The same is true for garnering support for large-scale infrastructure projects such as sea gates[205] or offshore dune construction such as the "Blue Dunes" proposal from HUD's Rebuild by Design program.[206]

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[202] "Understanding Sea Level Projections," NASA, 2018; https://sealevel.nasa.gov/understanding-sea-level/projections/empirical-projections

[203] "Under Water: How Sea Level Rise Threatens the Tri-State Region," Regional Plan Association, 2016; http://library.rpa.org/pdf/RPA-Under-Water-How-Sea-Level-Rise-Threatens-the-Tri-State-Region.pdf

[204] *See* "Promoting Regional Resilience," Regional Plan Association, 2016; www.rpa.org/article/promoting-regional-resilience

[205] *See* "Chapter IV: Storm-Related Infrastructure in this report.

[206] "Blue Dunes, Climate Change by Design," Weisz, C. and J.M. Keenan, 2016, www.rebuildbydesign.org

Regional planning also is required over the coming decades to meet changing needs when it comes to food systems. While Suffolk County remains one of New York State's leading counties for food production, most residents rely on national and increasingly international food supply chains to meet their daily needs. These supply chains are heavily dependent upon fossil fuels and environmentally harmful chemical inputs. Food production closer to home can build a stronger public awareness of the connections between public health, environmental protection, and nutrition. Suffolk County should continually reexamine its agricultural policies to encourage more local food production by supporting local agriculture – including newer techniques such as community gardens, rooftop gardens, hydroponic systems, aquaculture, organic farms, biodynamic farms, community supported agriculture, and permaculture systems.

Energy is another area where regional leadership is needed. While it is impossible to project what energy sources will be developed over the next decades, the trend towards greater use of renewable energy sources – for both ecological and cost reasons – and more decentralized energy production will most likely intensify. As towns like Southampton and East Hampton move to get all of their energy needs, including for transportation and home heating in East Hampton, from renewable sources within the next few decades, Suffolk County can play a key role in inter-municipal coordination. Suffolk can also play a role in incentivizing and setting standards for zero energy homes which are likely to grow in importance over the next few decades. Finally, in order to improve electrical system resilience the County should look to encourage the development of microgrids, local networks of energy production and storage.

As society moves towards a better understanding of the totality of costs for different policy choices, new economic models are likely to inform future planning efforts. The challenge for policymakers is to devise systems that provide the energy we seek while supporting and enhancing the planet's and region's living biological systems. This co-evolutionary partnership with nature has as its goal the ability to develop the capabilities of "living systems, social as well as natural, to express their potential for diversity, complexity, and creativity."[207] New economic philosophies such as regenerative economics and "Circular Economy" models[208] provide an important context for breaking past cycles of technological innovation that are followed by shocking discoveries of ecological and human health harms from those technologies. Nature provides some helpful hints: next generation technologies should be diverse, adaptable, resilient and nested systems. With nested systems, localized energy demands are met with local supplies, minimizing dependence upon complex transmission systems.

The past 100 years of growth-driven development in Suffolk County, exemplified by the single family home, celebrated a deeply American spirit of open space and individualism. The County has seen an explosion in its local population and a level of economic, material, and technological affluence of truly historic proportions. The next hundred years will need to chart a different path, one that balances that spirit of individualism with a deep appreciation for our interdependence on each other and the natural world.

[207] "Regenerative Development and Design: A Framework for Evolving Sustainability," Regenesis Group, 2016, page xxvii.
[208] *See* www.ellenmacarthurfoundation.org/circular-economy/concept

APPENDIX

EXHIBIT A

"RESILIENCY MEASURES THAT PAY FOR THEMSELVES"

INSURING AGAINST FUTURE STORMS BY INVESTING BEFOREHAND

By Suffolk County Executive Steve Bellone

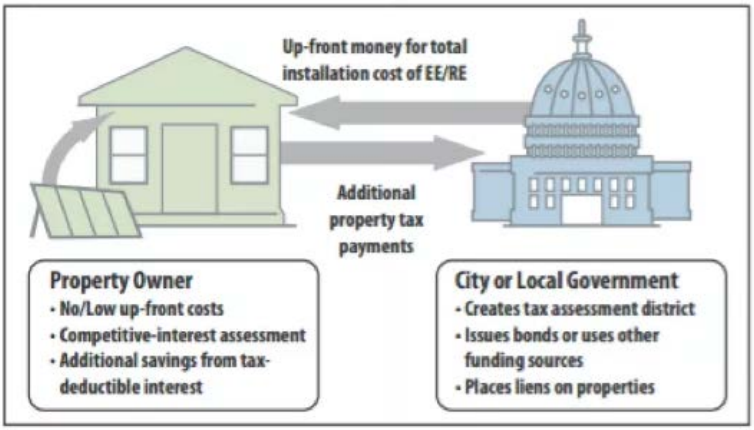
An earlier draft was co-authored with former EPA administrator Christie Whitman and can be found at www.nydailynews.com/opinion/hunker-future-storms-investing-article-1.3594218

(NY Daily News)

Recovery from Superstorm Sandy has borne notable results. Federal funds, primarily from HUD and FEMA, have been adroitly administered through the Governor's Office of Storm Recovery (GOSR), the New York State Department of Environmental Conservation (DEC), the New York State Environmental Facilities Corporation (EFC), the New York State Division of Homeland Security and Emergency Services (DHSES) and other state agencies. Thousands of homes have been restored and elevated, utilities have been hardened, and more emergency generators are in place. Given the substantiated impact of nitrogen loading on shrinking wetlands, Long Island's second line of defense against storm surge, close to $400 million in Recovery funding was allocated to extend sewers to a portion of the 360,000 households in Suffolk that do not treat wastewater. (*See* "Coastal Eutrophication as a Driver of Salt Marsh Loss," Linda Deegan, www.nature.com/articles/nature11533.)

In the wake of evermore extreme weather events, the key question must be posed: How will we pay for priority mitigation/adaptation measures? Answer: Follow the money. Who benefits from resilient adaptation in the face of sea-level rise and powerful storms? Property owners, for one. Companies that insure against property damage and loss for the other. The less damage, the lower the payouts. Many mitigation measures can pay for themselves by employing an insurance-based financial prescription.When the Town of Babylon was launching Long Island

Green Homes in 2008 for energy-efficiency retrofits, Property-Assessed Clean Energy (PACE) was the primary financial prescription that made it work. It became a national model. The key feature of energy efficiency is that it pays for itself from the savings realized on utility bills which cover the capital costs. By securing the homeowner's obligation to the property, as is done with road repair and sewer connections, the senior lien enables a subsequent owner to pick up the balance on property transfer. In effect, energy efficiency is a net neutral investment.



(Pace Nation; pacenation.us)

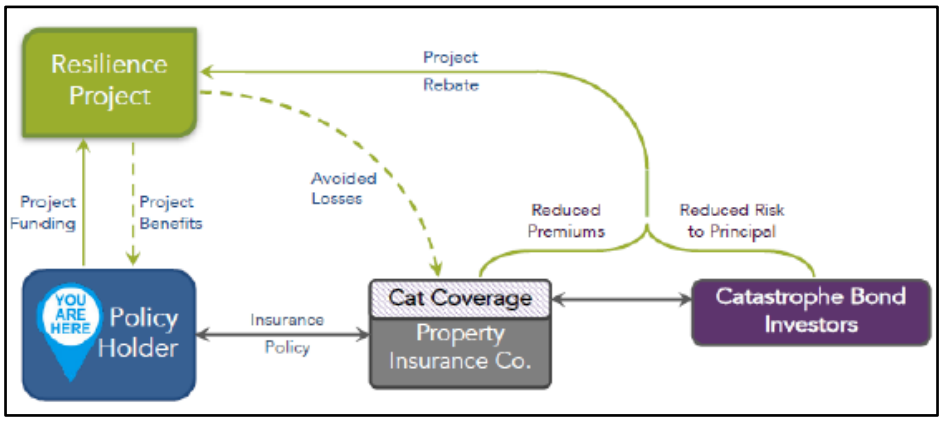
A comparable scenario prevails when insurance payouts are reduced in direct proportion to the expense of mitigating storm-born damage. A statewide insurance program that incents mitigation through a systems benefit charge can drive preparedness. In fact, back in 2009, the New York State Insurance Department tendered "Proposed Insurance Regulation 189" requiring insurers to levy charges for future catastrophe losses, referred to as "catastrophe loads." Pivoting off that premise, a benefit surcharge assigned to the $39 billion per annum of New York State property and casualty insurance would go into a resiliency fund that could finance all variety of mitigation measures, like house elevations and utility hardening, to minimize impacts of storm events. This charge would be akin to the set-aside out of the Regional Greenhouse Gas Initiative that incents renewable installations. A baseline surcharge of $1 per year (or .1%) on a homeowner's insurance policy with a $1,000 annual premium would equate to a Resiliency Reserve Fund of $39 million per year. A $2 or $3 per year surcharge would generate $78 million or $117 million per year. Similar approaches have been taken by Florida, Louisiana, and Texas, though, in these jurisdictions, surcharges on property and casualty policies are generally assessed after an extreme weather event.

<u>Reactive as opposed to proactive</u>

Catastrophe Bonds are reactive insurance for local governments, protecting them from the financial cost post-disasters. Catastrophe bonds are triggered when specific parametric triggers are reached by a disaster, such as storm surge height for a hurricane. The managing director of Alternative Risk Transfer unit for Allianz, one of the world's largest insurance companies, said, "parametric has the advantage," over indemnity policies owing to transparency and the speed of payouts. (www.greenbiz.com/article/how-marsh-and-mclennan-allianz-and- other-insurers-are-responding-climate-change-risks) Cat Bonds, as they are otherwise called, are not designed to limit physical damages on the ground, but instead to reduce the economic disruption of financial losses after the fact. Catastrophe modeling provides the information required for pricing risk, as hurricane-force winds and coastal surge risks are understood and accepted by investors.

Recently conceptualized "Resiliency Bonds" are a proactive variation of Cat Bonds. The principle distinction is that resiliency bonds aim to reduce insurance costs by providing a rebate in support of projects that protect in advance of catastrophic events. Municipal investment based on risk-reduction will realize rate-cuts, and incentivized homeowners will receive premium

reductions that reflect reduced claims post disaster. For instance, FM Global, a U.S. insurance company, helped design a seawall for Boston's MBTA subway facility that enabled the city to avoid a $150,000 increase out of the $1 million annual premium on a $1 billion policy. (Nina Chen email re: climate resilience, The Nature Conservancy, August 10, 2018.) This approach is analogous to health insurance offering rebates for refraining from smoking and for smart watch-documented exercising.



(re:focus Partners/Swiss Re; www.refocuspartners.com)

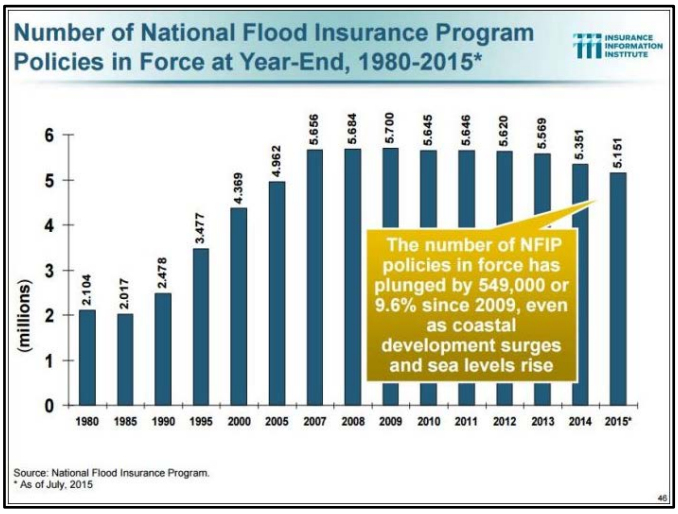
Let's say a municipality is considering a flood barrier: the same catastrophic events are modeled with and without the barrier in place, demonstrating how the project would monetize the benefits. When the municipality goes to buy a multiyear, parametric Cat Bond for flooding, the insurer takes the expected impact of that planned investment into account and lowers the premium. With the savings factored into the budget, the municipality has funding for its flood barrier. (See www.bbc.com/future/story/20170515-resilience-bonds-a-secret-weapon-against-catastrophe.)

A major reinsurance company, Swiss Re, has become a leading advocate for Resiliency Bonds: "If we look at historical precedents, the insurance industry – society's traditional risk manager – should be at the vanguard of these efforts." Moody's March 2018 analysis of P&C Insurance & Reinsurance informs this direction: "We see climate change as having a net negative credit impact on the P&C insurance and reinsurance sectors as the risks associated with climate change outweigh potential opportunities. Not only are the effects of climate trends on the frequency and severity of catastrophic events difficult to predict, but the correlation of climate-exposed risks spans both sides of balance sheets and a number of line items on income statements for P&C (re)insurers." (www.moodys.com/research/Moodys-Climate-change- heightens-key-risks-for-PC-insurance-reinsurance--PR_380898) With the insurance industry adapting to profit from climate risk, significant adaptation measures can effectively be realized as net neutral investments. (See www.refocuspartners.com/wp-content/uploads/2017/02/RE.bound-Program-Report-December-2015.pdf.)

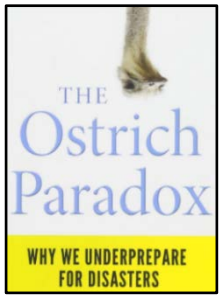
The coral reef off Quintana Roo State in Mexico is a major tourist attraction that also serves to greatly reduce storm surges. The state, working with The Nature Conservancy, developed a Coastal Zone Management Trust to protect the reef. It is funded by beach taxes on hotels combined with parametric insurance that is triggered by hurricane-borne wind speeds. (www.nature.org/en-us/explore/newsroom/the-nature-conservancy-and-the-government-of- quintana-roo-announce-innovativ/) In effect, such financing for maintaining a resource is comparable to charging a usage fee via tolls for beach replenishment that protects a much travelled waterside artery.

The United States was founded on the coast, and more than ever, coastal regions remain key to the U.S. economy. In 2012, the coastal zone counties accounted for 51% of employment in coastal states, 42% of total national employment, 57% of gross domestic product (GDP) in

coastal states, and 48% of national GDP. U.S. coastal states account for 81.5% of the U.S. population and 83.4% of economic output. (National Ocean Economics Program, www.oceaneconomics.org) Within the next 30 years, the number of people living in places at risk of flooding from an extreme storm in the tri-state metro region is likely to double while 59% of the region's energy capacity, ports and major airports are in areas that will be prone to flooding.



There is significant resistance to assuming the costs related to climate change. A national carbon tax has been shelved alongside the BTU tax that was proposed twenty-five years ago. One recent reaction in France sums up the nature of the resistance: "Macron talks about the end of the world; we're just trying to get through to the end of the week." (www.chicagotribune.com/news/nationworld/ct-france-fuel-tax-riots-20181204-story.html?fbclid=IwAR2a2LXdH_m2U1uNd1DD7ZxWWuT0UY54pkh4lba5m-KGTkjDEgzKehMQKV8) In *The Ostrich Paradox*, two Wharton professors, including Howard Kunreuther who is the dean of all-hazards insurance, explain in behavioral economic terms how we underinvest in protecting ourselves.



Given what is at stake, however, we can't afford to do nothing. By using the mechanisms of Property & Casualty insurance delineated above, we can afford to do more than just something. With this dedicated source of capital established, government would have the additional resources necessary to launch infrastructure projects, put people to work and, most importantly, minimize the risk that too many of our coastal communities face from storms and flooding.

EXHIBIT B

Superstorm Sandy Review Task Force Public Hearings Summary

Stony Brook – April 11 @ 6:30pm

Task Force Attendees: Dave Calone, Dorian Dale, John Cifelli, Jennifer Casey, Malcolm Bowman, Frank Krotschinsky, Alison Branco, Zach Tierney, Scott Carlin, Sgt. Mike Romagnoli

Meeting was called to order by Chairman Dave Calone at 6:30pm. After the Pledge of Allegiance and introductions of the task force members, Dave Calone opened the meeting by explaining the purpose of the task force and thanking the attendees for their participation. About 15 members of the public attended, with a majority of those in attendance being Stony Brook students who did not have direct experiences from Sandy to offer. Two elected officials participated, Suffolk County Legislator Kara Hahn and New York State Assemblyman Steve Englebright.

Malcolm Bowman was given time to provide a brief presentation on sea level rise and its threat to Long Island. He educated the audience about the expectations of sea level rise, the potential for future storms and their impacts on property and life. He explained the need to balance natural shoreline solutions with engineering solutions, and the difficulty in getting these two policy perspectives to work together towards the common goal of becoming more resilient and prepared for the growing threat.

Assemblyman Englebright presented his views on global warming and thanked the task force for realizing the need to think ahead and for starting a proactive process of preparing Long Island to become more resilient. He stated that New York State is committed to investing in planning for becoming more resilient, and in the recently approved budget they allotted $250,000 in the Environmental Protection Fund through the leadership of Assemblywoman Christine Pellegrino. Hopeful that engineering solutions will be implemented. North Shore did not see damage that South Shore did, but businesses in Port Jeff had serious flooding, and sea level rise will require all areas to improve. Stated dredge spoil should be stockpiled to be used as fill rather than dumped in Long Island Sound. Dorian Dale suggested the state legislature consider implementing toll usage fee for Ocean Parkway on south shore to raise revenue for resiliency projects. Assemblyman supports idea but described resistance that would arise from elected officials whose district these roadways are located in. He will carry message back to colleagues.

Legislator Hahn addressed the crowd and Scott Carlin asked what the legislature's interest is regarding long-term sea level rise and solutions to the conditions decades from now. Legislator Hahn stressed that both short-term engineering needs and long-term planning policy need to be included in the group's recommendations, but many of the engineering needs will not be possible without State and Federal funding. Jennifer Casey raised the problem of contractors who defrauded consumers resulting in them not being back in their homes yet. Legislator Hahn agreed we need to prevent contractors from repeating this in the future. Zach Tierney explained the State, specifically NY Rising, is a funding agency and not a law enforcement agency. Local consumer affairs offices oversee contractor licensing and local District Attorneys evaluate potential fraud cases. NY Rising does communicate with district attorney and consumer affairs

and refers cases as needed. Sgt. Romagnelli is not aware of specific cases currently, but it would determine if it's civil or criminal action. Josh Slaughter asked Zach T. if NY Rising as a funding agency can track contractors that are repeatedly being reported so that they can be "blacklisted". He stated NY Rising gives funding to homeowners, not contactors, so they are not in a position to do this. Dorian Dale stated that future programs could possibly be organized like past Green Homes programs, which empowered towns and villages to have more oversight of projects, and funding was not blindly given to homeowners. Dave Calone mentioned the solar code the Suffolk County Planning Commission created and LIPA's policy where a list of pre-approved contractors was established and certifications were required. Josh Slaughter stated there has been an idea within the task force working groups of creating "recovery advocates" that can add a layer of oversight for homeowners to ensure contractors are licensed before funding is dispersed. Dorian Dale stated other states have created special licenses for home elevations, rather than it falling under a general contractor because the work requires specific expertise.

Assemblyman Englebright agreed protecting homeowners from unscrupulous contractors in the future is important, but also stressed that we must ask the question as to whether we should even be living in some of these areas. Homes are still being built in flood zones and vulnerable areas, and NYS DEC had a land specialist that was assessing buyouts and acquisitions to determine if homes should be rebuilt or not, but this person has left recently and this needs to be filled as soon as possible considering the critical work that must be accomplished in this field. DEC has lost one third of its personnel since the economic downturn a decade ago.

A student from Stony Brook Ian Passe asked task force members to be mindful that we shouldn't over regulate contractors since additional licensing costs and requirements could hinder new individuals from entering the trades occupations. Working Americans are struggling and blue collar workers need security. Jennifer Casey stated contractors need certain certifications and insurance because there is so much fraud out there, so any scenario where there is specialized work needed and money being provided, we need to have a high level of standards for them. Scott Carlin would like to take a look at worker cooperatives to provide more stability and better pay for workers on Long Island.

Lisa Owens, Coordinator for Response and Recovery representing Long Island Cares, discussed the ongoing needs to communities. There are 30 agencies from the LI VOAD that still meet and LI Cares is still helping families. Families are still not in their homes and have needs. LI CARES just completed its Disaster Recovery Plan. Dave Calone asked for Lisa to send the newly completed plan to the task force. He asked, "What are their needs from a food security perspective to better meet needs in the future?" She deferred to Paul Pachter, who will be coming to Babylon public hearing. Josh Slaughter suggested that the task force have a more detailed discussion with the VOAD in order to determine ongoing issues. It's chaired by Rebecca Sanin from the Health and Welfare Council and Josh will reach out to her.

Brian Zitani, flood plain manager for Town of Babylon, asked the group to take into account the fact that Villages and Towns make the land use and policy decisions regarding where to rebuild stronger and where to retreat from, etc. Babylon has highest density of development in flood zone with most homes built prior to resiliency codes. Less than 10% of existing structures meet flood code even after grant funds from Sandy. There are about 100 miles of shoreline and 95 percent of this is privately owned, so it's difficult to implement programs. It's been much more effective when building code is required at the State level because everyone has to comply. Another issue was the damage assessment process where inspectors labeled homes red for

completely destroyed, yellow tag, green tag, etc. Babylon still has 340 homes that were red tagged and still are vacant and unrepaired. Also, many homes were repaired without permits and were not built to FEMA standards.

Stony Brook student Xlaonzng Wu asked about the impact federal policies and positions have on the local efforts underway. Dave Calone explained the funding all comes from the federal government, so implementation depends greatly on support in Washington. Dorian Dale also mentioned the bureaucracy that results from federal regulations tied to the funding makes it difficult to get things done quickly, and the task force should make recommendations to address these inefficiencies. The public hearing adjourned at 8:40pm.

Southampton– April 18 @ 6:30pm

Task Force Attendees: Dave Calone, Dorian Dale, John Cifelli, Mayor Ralph Scordino, Gwen O'Shea, John Bouvier, Ed Moltzen, Beth Walters, Ed Schneyer, Alison Branco, Scott Carlin

Meeting was called to order by Chairman Dave Calone at 6:30pm. After the Pledge of Allegiance and introductions of the task force members, Dave Calone opened the meeting by explaining the purpose of the task force and thanking the attendees for their participation. Southampton Supervisor Jay Schneiderman spoke first and agreed it's important to look back at what we can do better. The East End dodged a bullet, but we know future storms are coming and this is an important effort.

Legislator Bridget Fleming stated she attended to listen to input from the public and recognizes how important it is to address all opportunities to ensure we are protecting property, and understanding the role of our natural infrastructure in the face of climate change and sea level rise.

Julie Lofstad, Southampton Councilperson and victim of Superstorm Sandy, shared her story of recovering from the storm. She owned 2 commercial fishing boats and a commercial fishing business at the time Sandy hit Suffolk County. 17 days after the storm she submitted an electronic application for disaster aid and submitted in person to Stony Brook Small Business Center documents supporting her claim. Substantial financial and personal information was submitted, which was difficult to compile, but she was able to do so. In early 2013, she was asked to resubmit her application online, which included some new information, but also required her to submit documents that were already given in 2012. She was asked to submit proof of purchase on equipment that was bought almost 20 years prior and proof from NYS DEC that large enough waves had occurred during storm. She was later asked to submit a business plan, which was not easy to create having run a fishing business and never needing one. She submitted it and never got confirmation it was received. In 2014 she was told her application was complete, but after 3 months never heard anything. At that time when she inquired, she was told one application was complete, but two other applications hadn't been submitted and they needed a business plan, which she already had provided. For the next two years, forms kept changing. She received a bridge loan in the meantime to keep her business running. Over the course of five years she attempted to get funding, applications continued to be changed and updated, requiring resubmittal over and over again. At various times she was told that she was eligible for funding. She spoke about the constant turnover in caseworkers. Some were good, others really bad. She did receive a small grant during the process, but after many years of retroactive changes to the

program, lost paperwork and little help, she was forced to return $10k in grant funds because they claimed she wasn't a business since no payroll was presented. How does a self-employed entrepreneur prove they are a business?

Myron Holtz – retired FEMA Reservist who wants to speak from his experiences as a mitigation director. Pre-planning, response and mitigation. Need to adopt smart codes and ensure code enforcement officials enforce code properly since this mitigates and reduces damage most effectively. Perfect example is a code exists that requires propane tanks to be strapped and secured, but during Sandy many floated away because they weren't strapped. It's not being enforced. Possibly consider making it illegal for companies to fill tanks in flood zones unless they are strapped. Also, believes there should be an audit of NY Rising to determine what percentage of funding was spent on soft costs. Scott Carlin asked if he is willing to work closer with task force considering his expertise and he stated he is.

Krae Van Sickle – energy infrastructure for critical services should be better protected through a distributed energy scenario. South Fork does not have its own power generation and will be cut off in the event of a storm. Criticized LPA's offshore wind project because it requires $500 million to be spent on transmission to a central system. Instead, $500 million could have built a state-of-the-art distributed energy system on the East End that would keep services up and running during emergency. Princeton is an example where they were able to be an important hub during Superstorm Sandy because electric remained on due to a micro-grid. LIPA's current policy is to harden its existing grid, which is not the answer. Micro-grids should be built. Case study in Oakland, California was cited as an example for distributed energy and resiliency. John Bouvier stated Southampton has a sustainability working group and they are studying micro-grids, but Town can only do so much. The utility projects usage based on skewed data because of the summer east end activity, and the Town has tried to pass legislation to address these issues, but they can't address it all. We need a regional approach.

Barbara Fair – also worked for FEMA and is retired. FEMA has morphed after Katrina, and there are now many more layers and procedures.

FEMA has Hazard Mitigation Grants, which is a percentage of the money granted by federal government. Southampton had not submitted a Hazard Mitigation Grant Plan, which makes a municipality eligible. There are many projects that can be submitted such as building walls around critical facilities. Need to make sure we have a good plan for Suffolk so we can access funding when next event occurs. Ed Schneyer educated everyone regarding Suffolk's plan that was completed with grant funds. Needs to be renewed in 2019. He stated there are 876 projects listed in our plan. Unfortunately, after Sandy Suffolk County did not get any Hazard Mitigation monies, which is very unusual. He does not know where money went or who made those decisions. Barbara said grant money is available even when an area is not directly hit by storm, but when the state declares an emergency.

She also stated we need to better train our emergency service responders. Suffolk County Community College offers emergency response training. Also, need shelters east of the canal, which she does not believe exists. Ed Schneyer said there are 147 shelters through contract with Red Cross, but not sure about east end locations. Lastly, we need to be able to pump water since fires occur during disasters. Must have back up plan for pump stations.

Myron Holtz added that the Community Rating System (CRS) allows for discounts on flood insurance premiums. East End residents have lost out on these discounts in the past and

need to ensure this is priority. Dave Calone said we need to know what Towns have opted in and we should make sure the right leaders in each municipality know to do this.

Kevin Mcallister – President of Defend H2O, which is a water quality protection non-profit organization. Wants to focus on shoreline protection and coastal resiliency. Concerned about reaction to armor the coast and fortify structures and shoreline through hardening. Stone barriers, bulk heading, etc. These projects impede sand migration. Losing valuable public trust and habitat loss has occurred. Over long-term we will lose vital shorelines and this is the antithesis of resiliency. Beach nourishment is also an issue. It's extremely expensive and sediments are not always compatible. This is not sustainable. Other states have stopped re-nourishment and have begun retreating. We must commit to protecting integrity of natural shoreline. John Bouvier brought the fact that Erosion Control Districts (ECD's) have formed in some places, and wanted to know the long-term feasibility of these. Kevin stated some have been successful (Sagaponac and Bridgehampton), but it's a case by case basis and better when a small area of residents are willing to pay. Ultimately these are stop gap approaches and most areas will require retreat in the long run. Alison Branco stated that while the task force is looking at mitigation based on lessons learned in Sandy, it is also taking into consideration sea level rise and what future storms may look like, so from a cost benefit analysis planning for worsening and more frequent events will be looked at now. Dave Calone suggested that it would be good to start looking at what other Countries and States may already be implementing in regards to retreat plans.

Dieter Von Lehsten – co-chair of Southampton Sustainability Committee. Critical in how we look resiliency. Can't continue to pay for people to stay in harm's way. Erosion control can be futile. Montauk is perfect example where engineers spent hundreds of thousands of dollars and the recent Nor'easters destroyed all that was paid for. We must also look at these issues as a region and not just each community alone.

George Maul – resident of New Suffolk on the North Fork. Majority of the town is in the flood zone. His home was 6ft above sea level. During Sandy he sustained a foot of water in his home. Debris from other properties was a major problem. 6 days after storm he went to Patchogue to apply for NY Rising. After a few months he went back and fill out more forms. Again, several months passed and he did not hear anything. Then there was a forum at the Patchogue Theater he attended where a NY Rising team was there to help. They told him to hire an engineer and submit plans, and then they would help him in a few weeks on next steps. He waited two months and when he called there were all new people there and he filed paperwork again. Over four years he had nine caseworkers. He got multiple estimates on elevating his home. Eventually he was directed to a new contractor who said he would be fast tracked, but he needed to get new plans designed. He did so for another $10k. Shortly after he was informed of a new program through GOSR where NYS would elevate his home for him. He tried to obtain funds for years, but was only getting approved for $60k when all his estimates were over $100k, so he opted into the new program. His NY Rising program manager was good, but he was given a contractor through the program that was bad. Over 10 months work was slow, during that time he was living with family because he wasn't eligible for housing assistance (didn't have a mortgage). The home was eventually elevated and placed back on the foundation, but there was damage sustained during the work. It was not repaired, but was told after it was done he could submit for repairs and contractor would come back, but never did. He was forced under the new program to use this contractor. Took him to small claims court. The contractor came with a release from NY Rising saying work was done and to this day the damage has not been fixed.

He also felt there was no logic behind what was elevated and what was demolished. He is not at 11ft, but empty lots are sporadic throughout his community. This makes no sense. John Bouvier stated that Southampton opted out of NY Rising and bought properties outright where they were able to since living in flooded areas doesn't make sense.

Myron Holtz added one more recommendation. When he was working on recovery centers, he found that victims had not been properly advised of mitigation solutions regarding mold, mildew and other damage issues, but they had already repaired homes. He suggests they be informed while they are in the shelter regarding how they can get back in their homes quickly properly. Need to educate victims early before they leave the shelter and cleanup improperly. This could be done through a video created by a qualified agency. The pubic hearing adjourned at about 8:45pm.

Patchogue– April 26 @ 6:30pm

Task Force Attendees: Dave Calone, Dorian Dale, John Cifelli, Jennifer Casey, Alison Branco, Gwen O'Shea, Rich Humann, Beth Walters, John Bouvier, Ed Moltzen, Marwa Farwaz, Brendan Cunningham.

Meeting was called to order by Chairman Dave Calone at 6:30pm. After the Pledge of Allegiance and introductions of the task force members, Dave Calone opened the meeting by explaining the purpose of the task force and thanking the attendees for their participation.

Supervisor Romaine was introduced and presented the Town of Brookhaven's recommendations to the task force. Unscrupulous contractors were a problem and we need to protect residents with higher standards and higher penalties for fraudulent contractors. FEMA should have a pre-approved list so we have contractors we can trust. Claim process needs to be streamlined and a faster validation of damages. Utility infrastructure needs to be improved and one great way is to create micro-grids. PSEG and LIPA should identify areas that historically are damaged and invest money in burying lines there. Storm damaged properties should not be auctioned, but rather demolished and the land can be preserved. Buyout programs should be funded and this should be done in areas where flooding is always happening. Oil tanks fell over and spilled oil during Sandy, and propane tanks also became loosened. We need regional standards that require these to be secured so this doesn't happen. Debris management was a major challenge; vehicles and vegetative debris caused problems. Burning debris was a bad option and the Town will not allow the County to do this anymore. Damaged cars were even worse. The town filled the amphitheater with cars. Storage of these should be addressed by the insurance companies.

Legislator Rob Calarco was introduced and provided an opportunity to speak. Not all homes have been elevated that are eligible because it's been challenge to access the funds and get these projects done. Lost power for long periods of time and need to push our utilities to better prepare our infrastructure. Has seen PSEG out in force in his district doing this. Shorefront Park is a great buffer in Patchogue to protect homes and Patchogue is lucky to have sewers. Dave Calone asked Legislator Calarco to elaborate more on Shorefront Park and a new project there. He stated several homes there decided to sell and those properties were acquired and added to the park to help increase the buffer, and in addition it is currently bulk headed, but it's being

converted to a living shoreline that will help absorb storm surges. Consultants on the project are VHB, and the monies is a mix of philanthropic donations, grants and Village funding. The project is going to cost about $4 million.

Richard Remmer (Oakdale) – Richard was the co-chair of the Oakdale/West Sayville Community Reconstruction Zone (CRZ) committee. Communication was a serious problem in the Oakdale area, especially regarding power outages. The shelter for their area was in Central Islip and if you went there they didn't have a lot of information. CRZ created a central location in Oakdale where people could go close by after a storm to get information. Wetlands restoration is key and it included buyouts in his community. Oil tanks not being secured caused environmental problems. There was a 1000 gallon propane tank that was compromised during Sandy and shot propane out but luckily did not ignite. Sewers are needed to prevent contamination. Even if you elevate homes there are still problems from septic systems that are compromised. There was confusion regarding the permit process and in some cases it's taken over five years to get permits for rebuilding. Especially when the same footprint is being developed it should be expedited. We should also waive extra fees for these permits.

Ron Tabbitas and Wayne Gutschow (Dynamic Supplier Alignment) – got started by responding to earthquake in Haiti by creating the Hunter Shelter. A 300sq./ft. shelter that can be constructed in four hours. Allows storm victims to shelter in place. It's a lot cheaper than current FEMA trailer option, and unlike trailers, it can be reused for other disasters. They currently do have the capacity to meet FEMA demand and are looking for investments to speed up production. The unit also comes with a solar unit and water purification unit. A demonstration is being offered at BOCES on May 14 in Bellport and task force members are invited to attend. They have a partnership with BOCES and there is a curriculum at BOCES to build these. Great economic opportunity for the region since this product is manufactured on Long Island. Shelter cost $30-40k.

In response to Supervisor Romaine's comments, Dorian Dale pointed out that Suffolk County has worked with the NRCS floodplain easement program to purchase and remediate wetlands in Mastic Beach, and there is an updated debris management plan that came out of the County's after-action report that realized that Air Curtain Destructors were not well liked and the report identified alternative options. He also noted that burying utility lines is a huge expense and if the cost avoidance was realized they would already be doing it, but PSEG reps on task force should be consulted on this issue.

Babylon– May 2 @ 6:30pm

Task Force Attendees: Dave Calone, Dorian Dale, John Cifelli, Mayor Ralph Scordino, Gwen O'Shea, Rich Humann, Beth Walters, Michael Romagnoli, Scott Carlin, Marwa Farwaz, Zach Tierney, Melissa Luckman, Malcolm Bowman, Karyn Kemp-Smith, Lou Debrino, Brendan Cunningham.

Meeting was called to order by Chairman Dave Calone at 6:30pm. After the Pledge of Allegiance and introductions of the task force members, Dave Calone opened the meeting by explaining the purpose of the task force and thanking the attendees for their participation. Presiding Officer DuWayne Gregory spoke first and stressed the importance to look back on our experience and how we can do better in the future. This is the last public hearing and the task force will make recommendations to help make us better prepared.

Dave introduced Legislators Tom Donnelly and Kevin McCaffrey and thanked them for attending. Senator Brooks then spoke about his emergency management experience and his expectations for the task force. He looks forward to hearing everyone's stories. Supervisor Rich Schaffer also spoke and was in attendance.

Dave Calone informed everyone of an e-mail that they can submit comments to at sandytaskforce@suffolkcountyny.gov

Zach Tierney let the audience know that staff from NY Rising is in attendance and forms to fill out regarding ongoing program issues, and he will personally reach out to everyone over next few weeks to help.

Speakers:

Joseph Bosch (Lindenhurst) – proposed an engineered flood mitigation system by installing 48' inch pipes linking the bay to the ocean that can be remotely opened and closed depending on the tide and storm surge. Inlets would need to be controlled as well so that water levels can be managed.

Legislator McCaffrey – His office continues to receive requests for help 5 years later. Programs changed guidelines too often and many residents couldn't meet deadlines so they didn't get to take advantage of programs. Not happy about people being sued for money when there is other money he believes can be reallocated. There should be an audit of all money. State should reopen the program and allow people to elevate homes, etc. Too many stories on contractors taking money but not finishing the job. People told to take SBA loans, which hurt their awards for grants later on.

Jody Banaszak (Blue Point) – was flooded during Sandy. Had flood insurance, but it doesn't cover enough. Only paid for bottom half of cabinets when she has just got new ones right before the storm. Had to cover cost of the rest. Bulk heading was a major problem because she was told it would be covered and to submit paperwork after. She used some flood insurance money to do it, but when she submitted everything it was past a one year deadline that she was never informed of. She spent $20k that she did not get reimbursed for. Program rules always changing. Permits were costly in Brookhaven because she needed to resubmit permits 3 times and paid more money every time. Case managers always changing.

Michele Insinga (Lindenhurst) - Executive Director of Adopt-a-house, non-profit which aids storm victims and they still are actively running social media pages. Started by three women after Sandy who teamed up with Camp Bulldog to help clean-up homes, but then took a new direction to advocate for flood insurance program changes. Victims cannot meet the June 1 deadline for house elevations. Constant changes to program and caseworkers. Had great communication with GOSR, but that ended in 2015.

Ellen Huggins (Lindenhurst) – One story home flooded and 11 days later it burned down. $160/sq. ft. does not cover the cost of building a FEMA compliant home on Long Island. FEMA inspected within a week, but were told FEMA wouldn't help because they have flood insurance. More importantly, were referred to SBA for a loan and told they had to apply for SBA loan in order to be eligible for future grant programs. Found out later when applying for NY Rising that

SBA Loan is duplication of benefits. Have to pay the loan for 30 years. During Hurricane Katrina loans were not duplication and grants were allowed to pay down loans. Asking for loan forgiveness program.

Margaret Stroehlein (Babylon Village) – FEMA directed her to take SBA loan in the beginning and later elevated her home, but expected grants to pay off the loan. Later found out loan penalized her family, when other on the block got NYS Rising grants for more money to elevate homes. No collaboration between federal and state agencies. Gave same paperwork to both.

Jane Letterman (Babylon) – finding a place to go was not easy. Nowhere to go with pets. Gas for cars and generators was not accessible. Tax system should be revised to address total devastation. Her taxes went up after rebuild. NY Rising changing rules all the time. Temporary housing needed.

Cathy & John Fallon (Babylon Village) – Without help of "Rebuilding Together LI" (non-profit) they would not be in their home. Flooding comes up from the drains and prevents her from leaving or coming to her house. They can't get to work sometime. Flooding must be addressed.

Theresa Regante (United Way) – Resources and funds should be put in the hands of local government and cases need to be expedited that are currently still going on. Local municipalities and local human resource organizations are better prepared to handle ever-changing cases. Need to give resources to building departments to handle amount of permits coming to them. Technology should be utilized to better organize information allow everyone to use a single platform.

Phyllis Boland (East Rockaway) – lived in a small hotel room for a year with two children (disabled son). Forced to put dog in an emergency shelter. Has moved four times since Sandy. Flood insurance paid 32K, but this is still being held in escrow by Wells Fargo. Bank put her home in foreclosure due to damage from Sandy and her inability to pay mortgage, rent and/or hotel. She was turned down for SBA loan and was given grant from NY Rising, but contractor gutted first floor, took valuable copper and cast iron radiators and disappeared. Village of East Rockaway did not provide substantial damage letter until 2015. She agreed to a modification with Wells Fargo and through advice of NY Rising entered into the IMA program. Rent assistance she was given in the past was used to reduce the grant and later told she was given misinformation and would be not assisted with IMA any longer. In jeopardy of losing her home.

Patricia Furino (North Babylon) – submitted a plan she created for emergency response after resigning from Red Cross after Sandy because of many mistakes she saw. Would like to see it taken seriously and implemented.

Brian Baer (Elevated Studio, Manhattan) – Sandy was 13th natural disaster he was involved with. Considers his organization as last responders who are there for entire recovery. Staffing in building departments has not been adequate and there is a lack of oversight between design professionals, building departments, homeowners and program officials that has led to contractor fraud. Recommends looking at all disasters, not just hurricanes.

Beth Henry (Massapequa) – oversees several social media support groups for Sandy victims. Road Home program in Louisiana was a blueprint that should have been looked at.

Paule Pachter (Long Island Cares) – Created satellite locations in Lindenhurst and Freeport to provide direct, long-term assistance. Need protocol for social media use to disseminate information. Provided a packet for each task force member.

Kurt Fuchs (Surfrider Foundation Eastern LI Chapter) – Geo-tech wall for hotels in East Hampton has caused erosion and the shoreline hardening has compromised the beaches and re-nourishment has cost over $1.5 million to the town because of the project. Hamlet study has identified managed retreat and this should be pursued seriously. Current solutions to protect Montauk Lighthouse are misguided and more hardening will have negative impacts.

Shannon Bauman (Bay Shore) – had damage from Irene and received funding of $5K, but did not make repairs because estimates were double. Damaged again during Sandy and was told she isn't getting funds for floors because she never repaired from Irene. Got Red Cross funds, which was reduced from insurance as duplication of benefits. Just moved back into house with it still dangerous because IMA was cut off and she cannot afford both rent and mortgage. Contractor fraud a big problem. She had elevation project and Town of Islip passed inspection before house was lowered and now it doesn't fit foundation, which needs to be fixed. Contractor stopped coming, which he has a history of doing to dozens of homeowners. Can't find new contractor and 12th caseworker wants to close case knowing she still hasn't found a contractor. They haven't paid rest of money because she isn't done, but she still needs to pay architect and other expenses.

John Cole (Lindenhurst) – live on canal and original house was destroyed and he has it knocked down. In order to rebuild he needed to repair the bulkhead. Village of Lindenhurst was very hard to get permits and not helpful. Received FEMA money and also used his annuity money as well. Contractors were great and house was set by Westchester module, who took off with $40k when he set the house. Roof was built improperly and first time it rained there was water damage. Battled Westchester module to pay for fixes. Used all his retirement money and taxes now double. NY Rising holding back money until he gets CO.

Chris Koch (Babylon Village) – Task force should focus on oversight of funds. There should be appropriations made as project progresses so contractors are paid for work and project can keep moving forward. Help reduce contractor fraud.

Jon Siebert (Friends of LI) – volunteer groups that arose to help be liaison to residents and government agencies. These groups have been phenomenal but have zero funding from the federal and state governments. There are 11 COAD's that get no funding but these are the groups that helped and continue to help. Need to support these groups for future events so we are prepared.

Jenn Mattison (Wantagh -Sandy home in Copiague) – couldn't get a contractor so volunteers helped her to gut the house that was damaged. She is now in her 6th apartment since Sandy. Her bank refused to release her insurance funds ($87k), which caused her to miss out on a program. Her credit score is 500 because of her mortgage payments. Causing all other costs to go up (car insurance, etc.)

Paul Matulonis (Lindenhurst) – paperwork getting lost all of the time. Need better technology to track documents better. Not a lot to complain about, but turnover was terrible. Need consistent staffing.

Marybeth Donnelly (Babylon) – 250 gallons of oil from neighbor's yard and was told to put cat litter on it. She is still out of her home 5 years later. $160/square foot is not enough. Used $30k from flood insurance to demo house, but NY Rising said was duplication meanwhile they only gave her $5k for reconstruction, so $25k was lost. Identity theft was a big problem. NY Rising

employee handling buyout program contacted them regarding a real estate business knowing they were selling their home.

Andree Marshall (Island Park) – attempted to use 2 contractors that were referred to by NY Rising who are now in jail or took off with money. Need to make sure contractors cannot continue to get work here or in other states when they are found to be fraudulent.

Gitta Newman (Lawrence) – they shut down Sewage Treatment Plant before storm in Lawrence, and raw sewage was in her house. Deadline of June 1 that house needs to be progressing with elevation or you lose the funding. This is not realistic and residents need it extended.

Mia Vogt (Oyster Bay) – in optional elevation program. Signed a contract with Turn Key and elevated house in 2016. Found out foundation was 12 inches too low and didn't follow design plans. Contractor threatened for funding and then she found out he never had town inspection done and it couldn't pass because wasn't done properly. House failed. No one informed her house was not going to pass, but she was paying contractor. Hired independent engineer who found structural defects as well. She reported fraud, but he remained on NY Rising list while her date to meet with NY Rising legal team was pending.

Stephen Brodsky (Farmingdale) – boyfriend of Phyllis Boland and construction attorney. Wants few cases to be grandfathered in.

Susan Goldstone (Oceanside) – Took one year to get a second contractor after first one didn't work out. Signed contract in 2016 and contractor spent 10 months at her house. He asked her to come early one day and emptied her house and told her he isn't wasting anymore time there. Left it with no doors, floors, etc. Disappeared and put a lien on her house.

Bob Kaible (Long Beach) – Change flood insurance law so homeowners get full value for their property. He is also having contractor problems.

Margaret Buonsignore (Baldwin) – Been trying to close case since October and no one calls back or answers emails. Also dealing with contractor fraud. Paying contractor and work moving along. Eventually he stops showing up. Consumer affairs took his license away, but he opened up a new company in Suffolk County.

Elizabeth Treston (Long Beach) - Counties need to work together. Nassau should have a task force too in order to collaborate with Suffolk. She also experienced contractor fraud. She runs the COAD in Long Beach.

EXHIBIT C

SUPERSTORM SANDY AFTER-ACTION REVIEW

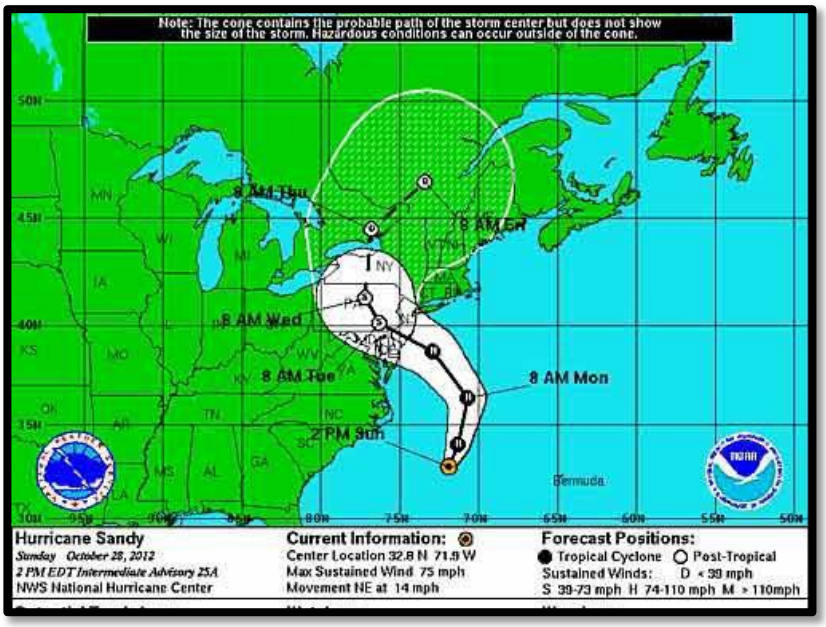
COUNTY OF SUFFOLK

STEVEN BELLONE
Suffolk County Executive

SUPERSTORM SANDY AFTER ACTION REVIEW

Suffolk County

Executive Summary of the Event



As Hurricane Sandy moved north at 105mph following its passage over eastern Cuba, Suffolk County Fire Rescue & Emergency Services (FRES) officially activated the Emergency Operations Center at 9 a.m., Oct. 25, 2012. It began coordinating logistics, personnel, briefings and other activities with other agencies, municipalities, state and federal governments. Urban Search and Rescue (USAR) team and equipment; communications equipment; sheltering locations and supplies; and other county, state and federal resources were located, including but not limited to high-axel vehicles, medical supplies, food supplies, and swift-water rescue apparatus. Early on the morning of Oct. 27, the County Executive declared a state of emergency for Suffolk and announced a mandatory evacuation of Fire Island.

Super Storm Sandy made landfall in Suffolk County on Monday evening, October 29. At 900 miles-wide, Sandy was the largest Atlantic storm in recorded history. It was fueled by unprecedented late-season ocean-expanding warmth (+5°F) and the lowest sea-level pressure ever recorded north of North Carolina augmented by elevated levels of atmospheric moisture which, when it reached New York, was driven into a highly unusual westerly direction by a "3-sigma" blocking high over Greenland following the largest Arctic sea ice melt in human history. The storm surge reached 5.89’ above normal tide levels in Montauk, 5.6’ in Fire Island and 4.5’ in Wading River on the North Shore. In Suffolk County, Post-tropical Cyclone Sandy caused hundreds of millions of dollars’ worth of structural damages to nearly 30,000 homes while leaving more than one million county residents without electricity.

The County response to the devastation wreaked by Superstorm Sandy was broad and solid.

- The lead emergency response agencies affected mandatory and voluntary evacuation of 250,000 residents. In total, some 24 shelters – including shelters for first-responders, special-needs residents, pet-friendly shelters, and general congregate shelters – were opened in collaboration between SCFRES (Fire Response & Emergency Services) and the American Red Cross. During the storm and its immediate aftermath, some 2,150 Suffolk County residents were sheltered at those locations.
- With SCDPW (Public Works) in the lead, 1.4 million cubic yards of vegetative debris was collected and removed from throughout the County, clearing many blocked arteries. DPW played a crucial role in restoration of power and mobility by making the Marine Bureau's fuel pumps operational and rapidly repairing vehicles.
- Calls for SCPD (Police Department) service relating to downed wires and trees, flooding conditions and people in distress were facilitated by an unprecedented mutual aid response from New York State Police. Unique challenges included crime suppression in areas without power, providing security at shelters, widespread traffic light malfunctions and gasoline shortages. The Sheriff's Department, Probation and Park Police deployed critical support.
- In concert with Community Development Corporation of Long Island (CDC-LI), the Department of Labor administered FEMA's pilot program Sheltering and Temporary Essential Power (STEP) which redressed 184 homes of the 485 assessed. The Consumer Affairs Unit received a total of 1,528 complaints regarding storm-related price-gouging.
- All departments of county government contributed where called upon with critical, in-depth roles being played by FEMA and the New York State Emergency Management Office.

An After Action Review (AAR), by definition, is a compilation of lessons learned in preparation for a future storm. Documenting formidable accomplishments in previous events is not, strictly, within its purview. The AAR suggests operational adjustments to communications, staffing and logistics before, during, and immediately following an event. It is a living document, subject to on-going modification. Drawing upon input from the many County agencies that responded and continue to participate in the County's long-term recovery, County Executive staff delineated recommendations and critical needs that follow.

Recommendations:

Ratings: 1+ */no $>ASAP;* **1-** */no $>plan;* **2+** */mdrt$>maybe;* **2-** */mdrt$>stretch;* **3+** *big$/stretch;* **3-** *big$/unlikely*

1. Coordination:

1.1 **Agency:** County Executive's Office

Action Area: Command & Contol **Rating:**___

Observation: While FRES, SCPD, etc have established departmental chain of command, there was no department-wide clear chain of command during the weather event. This caused delays and some deficiencies in decision-making.

Recommendation: There will be one incident commander within the County Executive's office accountable for the overall response and immediate recovery. The Assistant Deputy CE for Public Safety, in consultation with the Chief Deputy CE, will fill that role. The Asst. Dep CE/PS will coordinate all county agencies and brief the CE and senior staff. Pre-designated CE staff will be temporarily assigned in support, for the duration of the event.

Result: _____

1.2 **Agency:** Budget

Action Area: Essential Personnel **Rating:**_____

Observation: There was no inter-departmental reference of "essential personnel" in the event of an emergency or weather event.

Recommendation: Each department will identify "essential personnel," place them on a shared hot list that IDs where they will be assigned and in what primary and secondary capacity. This list will be updated biannually.

Result:_____

1.3 Agency: SCPD

Action Area: Essential Personnel **Rating:**_____

Observation: Hazardous road conditions and gasoline shortages impacted upon the ability of civilian employees to travel to work.

Recommendation:

i. Pre-plan methods to supply gasoline to vital county employees during future shortages.
ii. Consider adding the task of transporting impacted civilian employees to the use of future military surplus vehicles.
iii. Consider providing locations for employees to sleep at work during off duty hours so that they have the option to remain within the headquarters building.
iv. Consider ways to provide food to employees who must work long hours due to limitations on relief or who wish to remain there between tours of duty.

Result:

1.4 **Agency:** Information Technology

Action Area: Staff P(stings **Rating:**

Observation: Regular locales were without power or difficult to access.

Recommendation: Alternate staff locations should be identified and communicated to staff prior to an incident. Facilities with generator power could serve as temporary department staffing staging areas. The administration also allowed staff to volunteer at critical need centers after the storm (health centers, shelters, etc.) a PREPLAN should be implemented for each department that delivers services to the public. Working from home to alleviate congestion on roads, and reduce collisions due to signal outages was also a good idea. The concept of "work from home," using technology that is easily restored after an incident, could be expanded. The use of VPN, Email, or Mobile devices, are all options to explore. The testing of any plan is essential and best practice is to test at a minimum quarterly.

Result:

1.5 **Agency:** Information Technology

Action Area: Building procedures **Rating:**

Observation: Employees at other than DoIT locations on the North County Campus and Dennison did not know how to react to a power outage. Some were milling around the lot, others left, and still others wandered to other buildings causing accountability issues. Had this been an unexpected incident there would be no way of knowing who was on site, who had left and who may be still trapped inside.

Recommendation: DoIT has a procedure and so did the previous Dennison fire coordinator system. Reinstituting the fire coordinator system would allow for the building to be occupied and accountability and communication flow.

Result:

1.6 **Agency:** County Executive's Office

Action Area: Contingency deployment **Rating:**

Observation: Immediately following the storm, emergency postings, in many cases, had not been predetermined and so it was unclear where they should report to if they were unable to access their building.

Recommendation: The CE's office will do an assessment of all departments and determine an automatic back up utilization plan for each. For example if HLD has no power, then the Department of Budget will report to x building and be assigned to assist with the storm in a specified capacity. Deputy CEs will be responsible for assigning their respective departments predetermined support role during the event. Deputy CEs will supervised by the CE's designated incident commander.

Result: _____

1.7 **Agency:** Health Services

Action Area: Work site availability **Rating:** _____

Observation: There were insufficient response-ready staging sites subsequent to event.

Recommendation: Coordinate Damage Assessment Teams to survey county owned-rented buildings to get reliable information to departments about power, structural integrity, and so forth, so that staff and essential services can be assigned and managed more effectively.

Result: _____

1.8 **Agency:** Probation

Action Area: Staffing EOC **Rating:** _____

Observation: Staffing for the Probation Department at EOC was handled by two PO's who rotated 24hr duty. This proved to be too many hours for two officers.

Recommendation: Probation should add a third officer to this duty.

Result: _____

1.9 **Agency:** Probation

Action Area: Staffing call center **Rating:** _____

Observation: Probation was called in to assist with staffing though originally told that it would not be necessary. In past emergencies, Probation staff has also assisted. Probation has a limited number of AME employees and many were not willing or able to report for this duty. It was for that reason that overtime was extended to peace officer staff.

Recommendation: With routine assignment of this duty to Probation staff a secondary decision will be necessary as to whether AME staff or peace officer staff (POA) should be employed.

Result: _____

1.10 **Agency:** Health Services **Rating:** _____

Action Area: OT Authorization and accrual compensation policy to ensure an adequate health services workforce.

Recommendation: Create a process for high level administrators who normally don't accrue compensatory time to accrue and bank time earned in a disaster. Ensure that OT requests are approved expeditiously. Enter into labor agreement that hours accrued by mid-level administrators in excess of normal carry-over accrual limits can be carried over to the new year.

Result: _____

1.9 **Agency:** SCPD

Action Area: Command & Control **Rating:** _____

Observation: The training and experience that police department members have received from participating in the County's IMAT increased their usefulness to the department during the response to the storm, even when not serving with the IMAT.

Recommendation: Ensure that members of the department who are chosen for the IMAT do not have other significant roles during disaster response. Consider use of non- patrol personnel to serve on the IMAT, such as the staff of the Internal Affairs Bureau. Incorporate the use of the IMAT during special events.

Result: _____

1.10 Agency: Sheriff's Office

Action Area: Incident Mgt Assistnc Team (IMAT) **Rating:** _____

Observation: During Sandy, it was difficult to fully staff positions on the team. Deputy Sheriffs are members, along with other county employees, of the Suffolk County Incident Management Assistance Team.

Recommendation: Following Sandy and with a new and fresh experience of dealing with a major incident, the Sheriff's Office added 2 additional Deputy Sheriffs to the IMAT team. All Deputies are now trained to levels required to participate on the team. For the team to be fully operational, additional county employees should be added to the team and fully trained. Currently, the steering committee for IMAT is working on this, but the IMAT team needs full support from administrators.

Result: _____

1.11 **Agency:** SCPD

Action Area: Command & Control **Rating:** _____

Observation: Police Operations Center (POC) was opened and staffed throughout the department's major post storm operational period and served as a single point of contact to meet needs from within and from outside the police department.

Recommendation:

i. Pre-identify staff members who will be assigned to the POC, including the highest ranking members, and continue to train these personnel to perform this function.

ii. Focus on staffing the POC with personnel who do not have another significant role during disaster response.

iii. Continue to improve the technology available in the POC.

iv. Include members of the NYSP in POC training and exercises.

v. Expand the use of Incident Command System (ICS) forms within the POC for documentation.

Result: _____

1.12 **Agency:** SCPD – Probation

Action Area: Command & Control **Rating:**_____

Observation: Use of Probation Officers to provide security in victim shelters freed police officers to perform other tasks. Probation agreed to perform this task.

Recommendation: A decision should be made in advance as to which agency will provide shelter security – Police, Sheriff, or Probation. If Probation will be used for this purpose, a brief training class should be provided by Red Cross personnel to inform Probation Officers who might be used for this duty of the policies and procedures of shelters. Primary responsibility should be determined.

Result: _____

1.13 **Agency:** Budget

Action Area: Temporary Staffing **Rating:**_____

Observation: The County had a difficult time getting straight staff time reimbursed by FEMA. If straight-time will be reimbursed for County staff performing duties outside their normal jobs, a pool of County employees would be required to assist essential departments with staffing (help with purchasing, answering phones, staffing EOC, assisting County Executive staff in the EOC, etc.). ?

Recommendation: A pool of contracted temporary personnel (professional and non-professional) should be created.

Result: _____

1.14 **Agency:** Labor

Action Area: Community Recovery Services **Rating:**_____

Observation: Bringing in surge staff support was problematic.

Recommendation: Establish emergency-related temporary titles under Civil Service rules for the provision of laborers, clerks, account clerks, crew leaders and community service workers (salary range - $14.00-$16.00 per hour) to expedite hiring of individuals to meet emergency program requirements, including: consumer affairs complaints, storm damage assessment, storm damage cleanup and assisting residents with bureaucratic paperwork and related administrative functions.

Result: _____

1.15 **Agency:** Budget

Action Area: MOUs **Rating:**_____

Observation: There were insufficient memorandums of understanding (MOU) in place.

Recommendation: County should update and maintain MOUs with municipalities in order to seamlessly share resources.

Result: _____

1.16 **Agency:** SCPD

Action Area: Command & Control **Rating:** _____

Observation: State Police were deployed effectively to support SCPD

Recommendation: Continue the close working relationship between the SCPD and the NYSP by working together on routine enforcement efforts and disaster exercises.

Result: _____

1.17 **Agency:** SCPD

Action Area: MOUs & IMAs **Rating:** _____

Observation: Positive working relationships with various agencies assisted the department greatly during the response to Hurricane Sandy. The Town of Babylon allowed the First Precinct to utilize town vehicles and to use public works heavy equipment to transport officers into heavily flooded areas. Fire departments across the police district assisted the department as well.

Recommendation: Firm up all working agreements in advance.

Result: _____

1.18 **Agency:** Parks-DPW

Action Area: Contingency plans **Rating:** _____

Observation: Major breaches occurred at both Smith Point and Cupsogue Beach placing the mainland in jeopardy of additional flooding and damage. Public Works was tremendously effective in working with the Army Corps to enact the Breach Contingency Plan to repair these facilities.

Recommendation: As the Breach Contingency Plan saved months of permitting work, the more of these types of agreements in place with all regulatory agencies, the better.

Result: _____

1.19 **Agency:** County Executive's Office

Action Area: Intergovernmental **Rating:** _____

Observation: Power outages and inability to access contacts immediately caused a delay in updating and coordinating with local elected officials and agencies.

Recommendation: The office of Intergovernmental relations has already started creating an emergency contact book for ADH that will contain contact information for all levels of government, both the electeds, EMS point people and additional key contact information needed during and immediately following a storm.

Result: _____

1.20 **Agency:** County Executive's Office

Action Area: Constituent Serv, Intrgvrnmntl **Rating:**_____

Observation: During the storm, there were various constituents' needs that arose and were responded to by individual departments and agencies.

Recommendation: The Director of Constituent Services within Intergovernmental should coordinate the deployment of overall constituent service needs and response in conjunction and at the direction of the assistant deputy CE in charge of the overall response on the ground.

Result: _____

1.21 **Agency:** DPW

Action Area: MOUs & IMAs **Rating:**_____

Observation: There was cooperation but it was not comprehensive

Recommendation: Inter-municipal agreements are elemental to the authorization of County assistance.

Result: _____

1.22 **Agency:** Budget

Action Area: Drill **Rating:**_____

Observation: The County has likely not held a County-wide emergency preparedness drill. The morning of the storm it was clear that many employees did not know what to do, and without power, had not seen news report.

Recommendation: County-wide preparedness drill should be held biennually.

Result: _____

1.23 **Agency:** Labor

Action Area: Liaison Muni, State and Fed **Rating:**_____

Observation: Coordination between other levels of government was, at times, suboptimal

Recommendation: Pre-established contact with specific individuals between emergency response providers operating federal and state programs and local municipalities for the purpose of needs-assessment and resources-assignment will expedite the process of determining where to employ resources and workers based on specific storm predictions and prior storm experience. Maintaining storm relief coordination contracts with municipalities also will enable a smooth implementation of emergency response programs, such as National Emergency Grants.

Result: _____

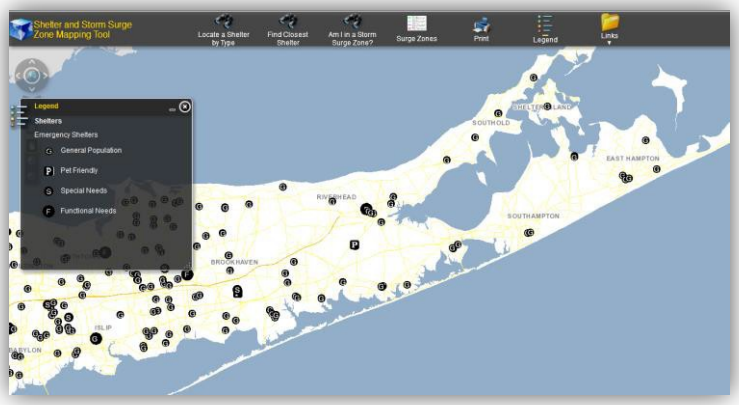
1.25 **Agency:** County Executive's Office

Action Area: Long-term recovery **Rating:**___

Observation: Consultant Witt reports, "Consistent with FEMA's recent policy determination to initiate a Recovery Framework along with the response phase, the County needs to follow with a similar action.

Recommendation: Create a single County Recovery Officer in the County Executive's Office, one to be charged with the responsibility for all recovery operations. Each department should have a person assigned to the County Recovery Officer until department projects are closed out.

Result: Chief Recovery Officer was appointed 2/13 and reports to the CE's office.



2 Communications:

2.1 **Agency:** FRES

Action Area: Incident C3 **Rating:**_____

Observation: The surge in population at the EOC and throughout the building overwhelmed the building's communications capabilities. There were not enough landline telephones to accommodate all personnel; AT&T Wireless and Verizon Wireless Service, due to widespread outages in cell towers, were simply unreliable for cell phone and smart phone users throughout the building.

FRES personnel worked to rapidly address the inadequate communications infrastructure through the acquisition of several dozen radios for use throughout the building. VoIP telephone communication lines were ordered from Cablevision to help stand up the vast amount of FEMA staff responding to FRES Headquarters. Wireless Internet service was ordered from Sprint.

Recommendation:

i. Fixed-timing for press conferences and briefings for media.
ii. Institution of a government liaison between EOC managers and outside leaders who need regular updates and briefings.
iii. Code Red telephone alerts were sent to approximately 200,000 residents advising them of the oncoming storm, but fewer than 50-percent of these were

successful. Greater efforts to validate the database with Verizon on a regular basis will be made.

iv. Consideration will be given to activating a Joint Information Center (JIC) prior to the onset of a storm during future events. JIC needs to be staffed effectively with scheduled press conferences or background-only briefings. Agencies responding to an event should coordinate with FRES public and need common messaging.

v. *Incident Management Assistance Team* (IMAT) to review process for Incident Action Plan (IAP) use in the EOC briefings (timeline for consistency needed). Morning OPS meeting at times contradicted planning objectives and it-reps need to be done more often to reflect changes

vi. Conference calls for briefing should be on schedule and assigned personnel to record each session and save documents in E-team.

vii. County web page was taken down and OEM page was stand-alone and successful. PIO folks dictated products to be posted. Add this to 120-hour timeline for consistency in future responses.

Result: _____

2.2 **Agency:** FRES

Action Area: Emergency call-in **Rating:**_____

Observation: Overflow of calls from PD to FRES to EOC.

Recommendation: Use 311 system and map out-flow of phone calls through Police 911.

Result: _____

2.3 **Agency:** Budget

Action Area: Command & control **Rating:**___

Observation: There was no central phone number for county personnel.

Recommendation: Have a designated call-in number so that department heads can be briefed during an event. Additionally, it is important to have departments also brief the Executive and those in charge what is happening in their departments.

Result: _____

2.4 **Agency:** SCPD

Action Area: Central communications **Rating:**___

Observation: High call volume overwhelmed the communications center despite maximum staffing levels. Many of the calls were of a non-emergency nature.

Recommendation:

i. Proactively push out timely and relevant information through the media and social networks to reduce call volume into the 911 center.

ii. Consider the use of non-police staffed information hotlines outside the traditional 911 and 852-COPS system to create a more manageable work load during major widespread incidents.

iii. Refine protocols for calls that can be transferred to the EOC and handled by volunteer CERT members.

Result: _____

2.5 **Agency:** County I ecutive's Office

Action Area: Communication **Rating:**___

Observation: Various departments, staff and elected officials have voiced concern over lack of communication and instances of conflicting information from senior staff.

Recommendation: Create a "Tiered Conference Call System" that is automatic once the EOC is activated. All calls will have a designated call-in separate from each other's.

The following schedule exemplifies this process:
6:30AM – Senior County executive staff
7:15AM – All department heads/senior department Staff
8:00AM – Suffolk County elected officials call (this minimizes the degree to which staff might be distracted from event duty by individual queries).
8:15AM – All county staff call in to receive direction as to where to report to. (I.e. HLD has no power, all HLD personnel report to x building).
9:00AM – Regularly schedule press call to update the public

Repeat Conference Call tier in the afternoon:
1:30PM – Senior staff
2:15PM – All department heads/senior department staff
3:00PM – Suffolk County elected officials' call (this avoids all legislators calling various staff while they are trying to deal with the storm).
4:00PM – Regularly scheduled press call to update the public

Result: _____

2.6 **Agency:** Probation

Action Area: Call center **Rating:**_____

Observation: Probation was called in to assist with staffing although told in advance that this would not be necessary.

Recommendation: Decision on staffing of emergency call center in Yaphank should be made in advance. If Probation is prompted to provide volunteers, it should be determined whether AME employees, POA employees (peace officers), or a combination of the two as needed to achieve staffing should be utilized.

Result: _____

2.7 **Agency:** SCPD

Action Area: Outreach **Rating:**_____

Observation: The department lacked a strong social media capability to push out relevant information.

Recommendation: Continue to develop the police department's new Nixle social media system to provide useful information to Suffolk County citizens.

Result: _____

2.8 **Agency:** Office of the Aging

Action Area: Outreach logistics **Rating:** _____

Observation: The day after the storm, phone service was spotty, roads were impassable in some areas, and the main office did not have electric and was closed. Some staff made it to Hauppauge and left because the building was closed. Other staff couldn't come to work and could not call anyone. Ultimately, the day after the storm was a "lost day" as senior staff worked the EOC and determined a plan of action for the next day based on known conditions.

On the 2nd day it was determined that approximately 135 clients were not reachable by phone and home visits would be necessary. Availability of county cars and fuel were a problem. Staff resisted being paired up to do home visits (it was decided that two staff should make visits for safety.)

Recommendation: Some parts of the County were closed so a letter from the County Executive's office was drafted to be presented to law enforcement, if necessary.

Result: _____

2.9 **Agency:** Health Services

Action Area: Unified Public Messaging **Rating:** _____

Observation: In many aspects, there messaging to the public was inconstant or absent.

Recommendation: Enhance and Maintain operation of a Joint Information Center (JIC) for public messaging to ensure consistent messaging about health concerns, risks and services available.

Result: _____

2.10 **Agency:** Health Services

Action Area: Powerless Communications **Rating:** _____

Observation: Streamline communications between Health Centers and their respective clients, and ensure paper files available to be used when power outages and telco service outages render computer (electronic medical record) inoperable.

Recommendation: Provide VPN access to administrators so that select administrators can work from home, or from other remote location that has power and TelCo services.

Result: _____

2.11 **Agency:** Health Services

Action Area: Outreach to vulnerable **Rating:**_____

Observation: Outreach to vulnerable populations including older community dwelling adults is short of complete.

Recommendation: Support ongoing efforts to advance the on-line Vulnerable Populations Registry. Expand outreach to prepare all citizens, particularly those identified as vulnerable (special medical needs, age, etc) in community resiliency/family disaster planning. Capitalize on recently acquired National Association of Cities and Counties Health Officials (NACCHO) grant to promote preparedness and provide community education. Enhance relationship with LIPA to identify and track those on the priority restoration list. Consider feasibility of establishing primary care clinics to augment health centers that may be inaccessible for basic health care needs such as prescription renewals, pre-natal monitoring, or follow-up with serious medical conditions. Consider options for supplying transportation to health centers for those in need. Continue Public Health Nursing to currently enrolled homebound clients, and explore opportunity to accept new clients. Maintain and enhance methadone distribution. Maintain and enhance response to ongoing mental health issues.

Result: _____

2.12 **Agency:** Information Technology

Action Area: Down Time/Outages **Rating:**_____

Observation: Departments that claimed to have down time procedures in place for outages proved to be inadequate. DSS down time procedures did not address the delivery of work and instead focused on moving staff and phones from one location to another wasting time and resources from and ultimately no improvement was realized after the moves.

Wide spread power outages caused many staff to be without phone service or email at their homes making communications sporadic. Personal cell phones work until they run out of power and some staff did not have 12 volt chargers. Further, staff also expressed that they were keeping their personal phones for communicating with family during the incident.

Connectivity outages were communicated by our internal What's Up Gold system. Conference calls were helpful in communicating with staff before and after the event, improving the call to include a presentation would provide some more visual information where appropriate (Goto Meeting).

Recommendation:

i. Additional Blackberry devices may be needed to augment the existing devices to provide to staff working the incident. 12 volt chargers should be ordered and distributed to Blackberry users around the County.
ii. Air cards (MiFi) devices or tethering would also assist in communications with staff and allow for internet access when personal connections are unavailable.

iii. Employee communications could be improved, for a surprise incident, by a generic DoIT information line for employees to call into to hear a recorded message would work for us and other locations in the County.

iv. Institute a phone call chain from management to staff – who calls other staff and so on.

v. Buildings that lost power also experienced loss of multi button phones; installation of several single line phones at locations for emergency use would be helpful.

vi. We plan on designing an app for mobile devices to consolidate all our DR plans, contact information, employee notifications, documenting hours worked and a BBM messenger that will help our staff respond with complete information during an event.

vii. Phone systems should be inspected for battery backup condition and dead batteries replaced on a rotating inspection schedule. Small portable generators (Honda 2000i) could be used to keep phone systems going during an outage at least during business hours at key locations or to charge up battery backup devices to accomplish the same thing. Recommend purchasing 3 small 2000 watt generators ($3,000).

Result: _____

2.13 **Agency:** Information Technology

Action Area: Telecommunications **Rating:**___

Observation: Inability to communicate county-wide was a severe liability.

Recommendation: Remote sites in towns and villages can serve as county interface centers and during a disaster as relief centers. Installing County-owned telecomm gear (phones, lines etc.) can remain at the remote locations for future needs. The gear can be safeguarded by locking down the equipment so that only County phone numbers can be dialed until an emergency facilitates the need for unrestricted usage.

2.14 Agency: Labor

Action Area: Cell phones/Media **Rating:**_____

Observation: Equipment outages including telephones, Internet and computers, resulted in the Employment Center being closed to customers and created issues for staff agency wide. Updating the Department website could only take place with the assistance of the Information Technology Department. Blast emails to customers were also not possible.

Recommendation: Institute an alert and update system for communications with employees via cell phones, both county wide and on a departmental basis. Communicate with customers through radio/television public service announcements about the status of employment center and other County operations. Set up cell phone charging stations in facilities powered by generators.

Elected officials, especially chief elected official, uses media exposure to inform public of county agencies and departments that are open and operational.

Result: _____

2.15 **Agency:** SCPD

Action Area: Interoperable communications **Rating:**_____

Observation: Pre-established caches of 800 MHz radios were deployed to the New York State Police personnel assigned to Suffolk County.

Recommendation: Consider pre-deploying radio caches from headquarters to precincts to facilitate this process.

Result: _____

2.16 **Agency:** SCPD

Action Area: Cellular **Rating:**_____

Observation: Cellular service for work and home was substantially impacted by power outages.

Recommendation: Switch the department's cellular phone carrier to one with more reliable service. Ensure proper Wireless Priority Service (WPS) access and familiarize.

Result: _____

3 Procedure:

3.1 **Agency:** County Executive's Office

Action Area: Accountability/Communication **Rating:**_____

Observation: No single person was accountable for overall response and immediate recovery and chain of command during the storm event was unclear. This caused delays and confusion in the decision-making process.

Recommendation: To clarify communications and chain of command, one staff person within the administration will be designated to overseeing the event will be responsible for coordinating county agencies, briefing the CE and the senior staff. The assistant deputy CE for Public Safety, reporting to the Chief Deputy will be that point person. Pre-designated CE staff will be assigned to support during the event.

Result: _____

3.2 **Agency:** DPW

Action Area: Debris Management Plan **Rating:**

Observation: There wasn't a FEMA formalized debris removal plan. Challenges were thus engendered preparing project worksheets to recover costs incurred as a direct result of not having a FEMA approved Debris Management Plan.

Recommendation: DPW has initiated the development of a County Debris Management Plan to submit to FEMA for review and approval before the 2013 Hurricane Season is fully upon us. Failure to do so will result in deigned eligibility, challenges to process and procedure, audit of support documentation and a loss of reimbursement to the County. Simply repeating previous processes is not an option. Production of a Debris Management Plan approved by FEMA is critical to the County's recovery effort. Annual Requirement Contracts for vegetative debris disposal equipment must be in place.

Result: _____

3.3 **Agency:** DPW

Action Area: Debris removal **Rating:** _____

Observation: There were few dedicated staging areas for vegetative debris.

Recommendation: Chipping areas will be established where debris can be brought to be reduced, provided to local communities for reuse as mulch.

Result: _____

3.4 **Agency:** DPW

Action Area: Debris removal **Rating:** _____

Observation: Some project worksheets (PWs) came up short.

Recommendation: Implant staff from Budget within field staff to better translate action during an event into PWs for submission to FEMA/SEMO.

Result: _____

3.5 **Agency:** SCPD

Action Area: Local law **Rating:** _____

Observation: Local law 13-1998 restricts the use of the department's Marine Bureau vessels and Aviation Section helicopters restricts the ability to transport non- enforcement personnel who are performing work in connection with a major event to a period only during the first twelve hours of the incident, an especially restrictive window of time in the wake of a hurricane.

Recommendation: Revise county law 13-1998 to ease the restrictions on the use of Marine Bureau vessels and Aviation Section Helicopters to allow more flexibility during post event response phases.

Result: _____

3.6 **Agency:** SCPD

Action Area: Command & control **Rating:**_____

Observation: Use of the department's large mobile command post as an ad hoc stable police presence in Lindenhurst proved effective in reassuring the public.

Recommendation: Consider incorporating the use of police command posts in areas heavily affected during future disasters.

Result: _____

3.7 **Agency:** SCPD

Action Area: Command & control **Rating:**_____

Observation: Curfews were imposed in areas heavily affected by flooding to assist the police department with crime suppression efforts. . Once power was restored curfews were lifted.

Recommendation: Update the police department's arrest processing system to include appropriate charges for curfew violations.

Result: _____

3.8 **Agency:** SCPD

Action Area: Public safety **Rating:**_____

Observation: Innumerable traffic lights did not function due to power outages. In many cases it wasn't clear who was responsible (state, county or town) for maintaining and, thus, which could be powered by generators.

Recommendation: Compile and maintain a district-wide list of traffic signal lights and update the list on an annual basis. The list should include lights that can be powered by portable generator and the requirements for the generator.

Result: _____

3.9 **Agency:** FRES

Action Area: Evacuation **Rating:**_____

Observation: Evacuations were called at 3 pm, which is less than optimum from a timing perspective. unclear public statements by the National Hurricane Center and the recent memory of Irene's rapid dissipation in 2011 – created a situation that led residents to believe they faced less risk in "toughing it out." More than 100 residents refused to leave mandatory evacuation zones. Too many cars were left in flood zones. More than 100 residents refused to leave mandatory evacuation zones.

Recommendation:

i. FRES may consider stronger, blunter, more simplistic language to communicate evacuation notices to residents Evacuation should not be driven by the media/ news timeline. Follow the 120-hour timeline and Hurrevac recommendations.

ii. Add to public outreach and messaging to encourage moving cars to parking lots in areas of higher ground.

iii. Towns/Villages should look at building codes to secure home fuel/oil tanks.

Result: _____

3.10 **Agency:** SCPD – Labor

Action Area: Shortage of resources **Rating:**_____

Observation: Police department was tasked with compiling a list of gasoline retailers. This list included stations that had power and/or gasoline. Widespread shortage of resources, in general, has the potential to increase civil unrest.

Recommendation: Consider alternative methods to maintain situational awareness using other county agencies, such as Consumer Affairs, to interface with gasoline suppliers to determine the operational capability of retailers for future events. Other resources, such as food or medication, could be in short supply during future disaster scenarios and should be factored for in advance.

Result: _____

3.11 **Agency:** Budget

Action Area: Time Sheets **Rating:**_____

Observation: The County lost money because employees were not properly logged in and out of the EOC. Timesheets were not properly maintained and required additional time to revise and update.

Recommendation: Personnel will make copies and set aside timesheets/overtime slips that relate to a disaster when they are processed to help with claiming. Uniform claim forms will be provided to maintain consistency and accuracy.

Result: _____

3.12 **Agency:** Health Services-FRES

Action Area: Transport coordination **Rating:**___

Observation: Coordinating ambulance, ambulette and multi-passenger vehicle use during health care facilities evacuation and movement of SpN residents to shelters could be enhanced.

Recommendation: Maintain and enhance county's Health Care Facilities Evacuation Plan. Maintain and enhance access to and utilization of Federal Ambulance Contract managed by NY State EMS to bring in needed ambulance resources.

Result: _____

3.13 **Agency:** Information Technology

Action Area: County Vehicles **Rating:**_____

Observation: Fuel became an issue for staff using personal vehicles; some had trouble finding fuel, while others were reluctant to use fuel that became scarce for fear of not having enough to provide for personal travel. DoIT has only one pool car – a hybrid Ford.

Recommendation: Staff reporting to locations and the EOC will require County vehicles to travel. The plan would be to have 12 cars reserved before the event for as long as possible. In the case of a surprise incident, DPW may need to allocate vehicles

to DoIT as things unfold – relaxing the pool reservation system during an incident and allowing staff who must use personal vehicles access to a County supply of fuel may be necessary to facilitate service delivery.

Result: _____

3.14 **Agency:** Health Services

Action Area: Logistical Support **Rating:** _____

Observation: There was **i**nsufficient staff to procure, organize, deliver, maintain records, maintain cold-chain storage and administer vaccine.

Recommendation: Look for opportunities to create manpower pool of available county employees from other departments less involved with response and recovery to serve in a logistics branch for duration of a prolonged recovery period, in this case over a 6-8 week period, including nights and weekends. Enhance current Executive Order 13.

Result: _____

3.15 **Agency:** Health Services

Action Area: Surge staffing **Rating:** _____

Observation: Poor road conditions negatively affected medical staff at health centers and the Jail Medical Units getting to assigned worksite at prescribed time.

Recommendation: Create a policy whereby administrators have the flexibility to bring in extra staff and rotate staff at the site to avoid travel and typical shift changes.

Result: _____

3.16 **Agency:** FRES

Action Area: Labor logs **Rating:** _____

Observation: Failure to sign in and out of EOC creates problems with accountability and leads to auditing problems. ID Badges underutilized at EOC. Staff schedules were erratic and uncertain.

Recommendation: Alternative entrance and designated desk staffer will facilitate sign-in and out. Switch to security access cards. Review CE order #13 and addressed emergency procedures for work schedules (12 hour shifts) to be implemented prior to event.

Result: _____

3.17 **Agency:** Health Services

Action Area: Tracking costs **Rating:** _____

Observation:

Recommendation: Ensure that Department Operating Center (DOC) remains operational for duration of emergency. Establish a Finance Section, per Incident Command System (ICS) expectations to proactively track personnel assignments and costs, procurements of consumables, and damaged equipment/properties.

Result: _____

3.18 **Agency:** Parks

Action Area: Reimbursement records **Rating:**_____

Observation: Parks supervision was asked to do an assessment of each facility. Removing leaning trees and hanging limbs was the top priority.

Recommendation: To get reimbursement from FEMA for these clean-up activities, accurate records are required. The department will be working on standardizing the field reporting process.

Result: _____

3.19 **Agency:** FRES

Action Area: Incident Management **Rating:**___

Observation: E Team is disconnected from NYS D-LAN as well as from other incident management systems. There were issues with record-keeping. Resource requests need to be more intuitive, simpler and specific. IAPs did not reflect chain-of-command with accuracy and their leadership changed without notice to EOC. Personnel were stretched during the event. Temporary and volunteer personnel were assigned to event in non-uniform way. USAR teams first deployment. All went very well. NYS TF assignment was well received and augmented EOC team efforts. More equipment is needed.

Recommendation:

i. Research ways to cross reference resource requests between Eteam and D-LAN and other incident management systems.
ii. Suggest using form from USCG: 213RR which prompts more information in the requisition process.
iii. IAP needs to be proactively engaged by SC POC.
iv. Increase inter-department and cross-departmental cross-training. Consideration should be given to creating a steady, dedicated pool of temporary employees to minimize training time and maximize continuity.
v. Call NYS TF in earlier so they can be prepositioned. Seek funding to purchase additional equipment.

Result: _____

3.20 **Agency:** Budget

Action Area: FEMA/NYS trng: Public Assist. (PA) prgrm **Rating:**_____

Observation: During incident each department did their own PWs absent centralization. Having all departments submit their own PWs was an issue for both the County and FEMA.

Recommendation: Each department needs to have at least one point of contact (POC) who is experienced and knowledgeable with PA program. This POC will be responsible for making sure that all required backup is documented and maintained in order for claiming as well as a general understanding of what expenses will be eligible for reimbursement. Regular PA training will be necessary and should be offered to

secondary department staff where possible. All claiming and reimbursement will be handled by and processed through the County Executive's Budget Office. The County will have one lead agency, making one claim. FEMA's final recommendation was to this effect - making the lead financial department be the designee.

Result: _____

3.21 **Agency:** Budget

Action Area: Eligible Overtime **Rating:** _____

Observation: The County cannot claim for reimbursement from FEMA if they did not incur a "cost" yet the LAW department provided specific guidance related to Sandy activities and we were not able to claim for their time since they are exempt employees (same goes for Commissioners/Department Heads).

Recommendation: Set up agreements with Labor Relations to allow for management employees to accrue compensatory time earned as a result of a disaster. Set up agreements with Labor Relations/unions to allow for overtime to be carried forward later than is customary in the event a disaster close to year's end (as was done for Sandy).

Result: _____

3.22 **Agency:** Budget

Action Area: Inventory & tracking of equip. **Rating:** _____

Observation: The County lost reimbursement because it did not properly track equipment information (operators, hours used, model numbers, etc.).

Recommendation: To receive optimum reimbursement, equipment should be leased, not purchased. Additionally, the equipment needs to be inventoried and tracked using forms developed for County-wide use. Set up agreements with companies to provide equipment and supplies (such as food) at a short notice for leasing/rentals. Make sure equipment purchases are eligible for reimbursement. Ask if equipment is going to eliminate or reduce immediate threat to life, public health or safety or eliminate or reduce immediate threat to significant damage to improve public or private property through cost effective measures.

Result: _____

4 Logistics:

4.1 **Agency:** SCPD

Action Area: Equipment & vehicles **Rating:**_____

Observation: The department did not possess vehicles that could safely drive into areas on the south shore where flooding was occurring. A Highway Patrol Bureau Motor Carrier Safety Section pick-up truck was totaled as a result of exposure to salt water in Lindenhurst.

Recommendation:

i. Continue to obtain specialized response vehicles, such as Humvees, from the military surplus 1033 program to enable the police department to respond to calls for service under severe adverse conditions. These vehicles must be kept operational even though their use may be infrequent.

ii. Consider more widespread use of small Marine Bureau boats to access flooded areas.

iii. Explore the pre-deployment of small Marine Bureau boats into areas that are prone to flooding in advance of future hurricanes.

iv. Consider obtaining some larger trucks with event higher ground clearance from the 1033 program.

v. Restore SUVs to precincts for use as supervisors vehicles so that they are available during inclement and serve weather events.

vi. Consider equipping each precinct with a utility vehicle so that flares, cones, traffic barrels, generators and other equipment can be moved as needed during major disasters. Equipping this vehicle with a snow plow would be desirable.

Result: _____

4.2 **Agency:** SCPD

Action Area: Equipment & vehicles **Rating:**___

Observation: More police officers could have been deployed had there been more marked police units available.

Recommendation: Replace decommissioned and high mileage police cars. Consider creating a program that determines the useful life of vehicles in order to replace the appropriate percentage of the fleet annually.

Result: _____

4.3 **Agency:** SCPD

Action Area: Emergency power **Rating:** _____

Observation: Some department facilities, including both helicopter hangars, lack built in generators; MacArthur refueling pump was depowered. The department also lacks portable generators to supply emergency power where needed, as hundreds of traffic lights went dark requiring deployment of innumerable officers.

Recommendation:

i. Utilize county capital or other funding to install generators at both police helicopter hangars and at other key facilities.
ii. Attempt to obtain suitable portable generators to power traffic signals from the 1033 military surplus program.
iii. Consider retrofitting traffic signal lights at major intersections to readily accept emergency generator power. Install plug in capability and transfer switches if feasible.

Result: _____

4.4 **Agency:** SCPD

Action Area: Aerial assessment **Rating:** _____

Observation: Damage assessments from the police department's helicopters proved invaluable for response planning as well as documentation for FEMA reimbursement. , However, viewing video required that tape or DVD be physically delivered.

Recommendation: Work continues on helicopter microwave system to enhance usefulness. Application port security grant to convert microwave equipment from 2.4 MHz to 6.5 MHz has been made. This frequency has less interference and is compatible with the one used by some other regional law enforcement agencies, including NYPD.

Result: _____

4.5 **Agency:** DPW

Action Area: Debris removal **Rating:** _____

Observation: While Curtain burners are the most effective means of reducing vegetative volume, restrictions have been imposed by both legislative directive and regulatory concerns.

Recommendation: Bids are currently being reviewed to purchase a wood chipper with the intent of eventually placing one in each zone. There will be an evaluation of purchasing v renting equipment for debris removal.

Result: _____

4.6 **Agency:** DPW

Action Area: Debris removal **Rating:**_____

Observation: Pursuant to more complete understanding of FEMA/SEMO, DPW is creating a system to track work force labor and equipment for DMRT in advance of the next event.

Recommendation: Cameras and laptops/tablets will more effectively equip for required documentation.

Result: _____

4.7 **Agency:** FRES

Action Area: Facilities **Rating:**_____

Observation: During Sandy, the EOC operated 24X7 for 30 consecutive days. It supported, at times, almost 100 different agencies with the FRES HQ supporting as many as 500 individual responders and other personnel. FRES shares a facility with Probation and the influx was disruptive to that Department. In the latter stage of response, a critical section of building plumbing failed.

Recommendation: FRES has submitted capital project for dedicated facility.

Result: _____

4.8 **Agency:** FRES

Action Area: Equipment **Rating:**_____

Observation: Computers were failing at a high rate due to age. Network switch needs replacement. There was a lag in printing maps and took too long to be effectively used.

Recommendation: EOC and staff desktop PCs need replacement. Network switch needs to be replaced. Review strength of software & system to produce maps in a timely fashion.

Result: _____

4.9 **Agency:** Sheriff's Office-Probation

Action Area: Fuel for county employees **Rating:**_____

Observation: Fuel issue was problematic for correctional officers and medical staff at the jail. For some time, Sheriff's Office EOC personnel found it difficult to get clear and correct information as to who was authorized to use county gas pumps and the procedure involved. This fuel issue was something new for the County.

Probation learned that staff is not available for this duty if gasoline is not available to them to reach the emergency shelters. In Sandy, a number of officers declined this duty because they had extremely limited gasoline and Probation was not authorized to fill up privately owned cars at the county pumps

Recommendation: Update the County Multi-Jurisdictional and Hurricane plan should to redress this issue. An access card system might be considered.

Result: _____

4.10 **Agency:** Parks

Action Area: Fuel distribu ion policy **Rating:**___

Observation: Transportation was a major issue for employees as was the availability of gas for their cars. A policy regarding gas distribution was put into place but seemed disjointed at times. Some employees were allowed to fill up at County pumps and some were not.

Recommendation: Have a standard policy in place detailing who can fuel up and how much gas should be dispensed.

Result: _____

4.11 **Agency:** Sheriff's Office

Action Area: Satellite Phones **Rating:**_____

Observation: Communication systems operated successfully and remarkably good during the storm, but the department has only one satellite phone.

Recommendation: Recognizing the criticality of communications capabilities during events, the Sheriff's Office is using grant funding to purchase additional satellite phones.

Result: _____

4.12 **Agency:** Information Technology

Action Area: Website **Rating:**___

Observation: For web updates during an event it became clear that DoIT could use dedicated space in the EOC for staff to work from. Additionally a land line phone, desk, computer or laptop, Blackberry, chair, a television for viewing news coverage of the event, and training for 8 staff to enable them to post information to the incident web page throughout the event.

Recommendation: Eight staff members are adequate staffing to provide 24 hour coverage for 2 – 3 days, expertise should include network, website and GIS hardware and software support. A longer duration would require more staff.

The Website will require redesign to allow for more capacity during an incident. The County appears to be using the web site as its primary method to communicate emergency information to residents and as a result the site needs to be bolstered to allow for massive traffic and burst capacity. The flood and shelter map reporting will be redesigned to handle the increased traffic. The site should be optimized to be viewed on mobile devices and IPads and tablets. Testing the site to work on all platforms and be handicapped accessible will require some hardware to be purchased.

Result: _____

4.11 **Agency:** Information Technology

Action Area: Hardware **Rating:**___

Observation: There was insufficient hardware to effectively handle event demands.

Recommendation: The following hardware purchases and on-line presence:

i. Tablets (12) - IPad, and Android 7" and 10.5" form factors
ii. IPhones and smartphones - active sync should also be expanded and security options implemented for BYOD policy.
iii. Laptops – future replacements instead of desktops, allow for staff mobility to alternate locations and as loaners to relief staff that may be posted on site.
iv. 12v charging gear – currently we have none and that became a problem for staff trying to operate from alternate locations that had limited or no power to charge phones and gear.
v. Internet connectivity – acquire some alternate means of connectivity. Opt online, satellite, other.
vi. Domain names – acquire 3 additional non-County hosted web domain names and space to accommodate pop up applications that may be needed during an event and to provide for alternate forwarding of County information in case the primary web site goes down, shed load, etc.

Result: _____

4.12 **Agency:** Labor

Action Area: Power Outages/Com. **Rating:** _____

Observation: Equipment outages including telephones, Internet and computers, resulted in the Employment Center being closed to customers and created issues for staff agency wide. Updating the Department website could only take place with the assistance of the Information Technology Department. Blast emails to clients were also not possible.

Recommendation: As the Information Technology Building (Building 50) is fully powered by generator, including internet service, assign department personnel to a computer station in that building to communicate the status of the employment center and other County services to customers via blast e-mail and on county website. Install fiber line between Building 50 and Building 17 to keep internet service in areas where alternative power is generated. Once the fiber line is connected, powering Rooms 1 and 8 (switching and computer servers) and Rooms 57 and 59 would afford the department approximately 40 computers to use for normal functions, as well as internet access.

Result: _____

4.13 **Agency:** Sheriff's Office

Action Area: High axle/all-wheel drive vehicles **Rating:** _____

Observation: An issue exists with the number of and continued maintenance of high axle and four wheel drive vehicles. This was evident not only during Sandy but also during Snowstorm Nemo. These vehicles are desperately needed during periods of flooding for evacuation in areas such as Mastic and Lindenhurst. The Sheriff's Office evacuated stranded citizens on Fire Island utilizing high water vehicles including the Sheriff's Office 6X6 2 ½ ton military troop carrier and 4X4 truck. The Sheriff's Office also

rescued 5 stranded workers from Bergen Point Sewer plant utilizing 6X6 2 ½ ton military troop carrier. The Sheriff's Office has utilized a military surplus program to obtain Humvees and the 6X6 troop carrier at no cost. However, one Humvee was damaged during the storm to the point it is not worth fixing. Others are in need of maintenance. ***Recommendation:*** The Sheriff's Office is using grant funds to purchase a four wheel drive Gator rescue vehicle with backboard attachment. A review and inventory should take place of all such vehicles in the county, what is required to maintain them, and training involved to operate such vehicles.

Result: _____

4.14 **Agency:** Information Technology

Action Area: Battery backup **Rating:** _____

Observation: Phone systems went dead during prolonged power outages. ***Recommendation:*** Systems should be inspected for battery backup condition and dead batteries replaced on a rotating inspection schedule. Small portable generators (Honda 2000i) could be used to keep phone systems going during an outage at least during business hours at key locations or to charge up battery backup devices to accomplish the same thing. Purchasing 3 small 2000 watt generators ($3,000) would redress.

Result: _____

4.15 **Agency:** Health Services

Action Area: Gasoline Supplies **Rating:** _____

Observation: There debilitating gas shortages.

Recommendation: Develop, implement, and maintain a standard uniform policy for employee access to county gasoline pumps, based on supervisory attestation that employee performs an essential service.

Result: _____

4.16 **Agency:** Information Technology

Action Area: *Generators* **Rating:** _____

Observation: There was a decided shortage of back-up generation. ***Recommendation:*** Generators should be tested prior to an incident and documented, fuel consumption calculated and fuel sources identified. Diesel generators need fuel and during a widespread outage fuel delivery can be limited – topping off the fuel supply for each location should be done prior to the event. Once a generator is started it should remain on until power is restored-flipping on and off can damage equipment and ups devices. Transfer switches can interpret a phase drop incorrectly and transfer back and forth in a failed state.

Result: _____

4.17 **Agency:** Information Technology

Action Area: Equipment augmentation **Rating:**___

Observation: There is dearth of equipment for emergency situations

Recommendation:

i. Staff should have a gear bag or backpack to bring to locations or EOC for clothes and supplies for overnight stays. Keys to Bldg. 50, Bldg. 151, the Dennison, and other locations around the County should be available so staff can gain access in power outages to service gear.

ii. Computers should be available for guests at our Hauppauge and Riverhead locations. For this I recommend laptops that way we can stand them up anywhere for staff to work from.

iii. Several 5 gallon fuel cans to be filled at the County facility to fuel County pool vehicles used to transport tech and telecommunications staff to locations requiring repairs.

iv. When working after hours and weekends it may be impossible to venture out for supplies. Staples like oatmeal, granola bars, energy bars, Ramon noodles, water, etc. should be on hand.

Result:_____

4.18 **Agency:** Information Technology

Action Area: Emergency gear/Inventory Control **Rating:**_____

Observation: There is a shortfall of gear for county personnel involved in overall response.

Recommendation: The County may wish to discuss the purchasing of rapid-deployed emergency equipment and supplies in advance for distribution to various EOC sites. This equipment and supplies should be refreshed and replenished according to shelf life or lack of return from previous event. (example - printer ink). The emergency equipment and supplies should be inventoried and tagged with controlled numbers to identify its distribution to each of the EOC sites they are being shipped to. A designated person from DoIT should be responsible for this distribution. Therefore contact information is necessary which shall include cell phone numbers. A designated person at each EOC site should be identified in advance along with contact information for their securing and stowing of equipment and supplies received. The stowing of equipment and supplies should be on a nightly basis, unless the operation site is on a 24-hour schedule. This person shall also be responsible for the returning of all equipment and supplies back to the DoIT department for future Event needs. Once the DoIT department receives the equipment and supplies he/she shall stow in a designated secured staging area (preferably the cage).

Result:_____

4.19 Agency: SCPD

Action Area: Fuel supply **Rating:**_____

Observation: Marine Bureau facility was heavily affected by the tidal surge and the fuel pumps were off line for a period of time undermining response, particularly to Fire Island. Local marinas were similarly affected and not an option. Fortunately the DPW was able to restore the Marine Bureau's fuel pumps to operational status within a few days of the storm.

Recommendation: Harden the Marine Bureau facility against future coastal storms. Consider the acquisition of a fuel transport vehicle from the military surplus 1033 program and/or a contract with a vendor who could supply fuel on an emergency basis from a mobile platform.

Result: _____

5 Services:

5.1 Agency: FRES

Action Area: Public Safety/Sheltering **Rating:**_____

Observation: Shelter Officer program was successful for the most part. Shelter Officers Program helped and needs to be amplified; CERTs was a great resource but they need to receive Shelter Manager training. However, Red Cross volunteer staff was insufficient to handle the number of shelters opened and staff assigned was from out of region. Surge of first-responders, federal and state agency personnel, insurance adjustors and displaced residents completely depleted the inventory of hotel rooms in Suffolk for several weeks. The County has no, single agency tasked under the county charter with assisting storm-displaced homeowners with short- and intermediate-term housing needs.

Recommendation:

i. Discussions between FRES and ARC have already commenced, with ARC regional officials agreeing to provide regionally familiar staff to Suffolk County EOC in the future.

ii. Consider some County owned shelters to avoid the use of schools as they cannot be closed for long periods. Designate an independent structure or facility. Engage

DSS. And develop alternate residences for long-term personnel such as NYIT and BNL.

iii. Prior to the onset of a storm, FRES should work with Office of Real Estate to develop and maintain an up-to-date inventory of available hotel room stock, and seek to work cooperatively with FEMA and NYS responding agencies to house government personnel appropriately in deference to displaced families.

iv. Consider creation of an ad-hoc Human Needs Task Force, made up of FRES, DSS, Department of Health, and other agency personnel to work with federal and state governments to assist with serious unmet needs including short- and intermediate-term housing.

Result: _____

5.2 **Agency:** Office for People Disabilities

Action Area: Public Safety/Sheltering **Rating:** _____

Observation: The concern is that outreach to the community must be in a format accessible to visually impaired, blind, and deaf persons. FRES has gone a long way towards making the registration process accessible. However, more people must be encouraged to register. It is reported that copper phone lines. This can affect the monitoring of medical alert services and medical equipment such as pacemakers, which can be of particular concern to people with disabilities during emergencies, especially those emergencies which have long term effects like Sandy.

Recommendation: OPD has worked with and will continue to work with FRES on the registry and outreach to the public for preparation for the next disasters.

Result: _____

5.3 **Agency:** Office for People Disabilities

Action Area: R&R logistics & Community Recovery **Rating:** _____

Observation: One of the lessons learned from this storm is that the after effects can be prolonged. We received several calls from people seeking advice regarding how to preserve medicine requiring refrigeration. Another call required advocacy for a mobility impaired person on the second floor of a house who had run out of money and needed food. The call was received on a Friday afternoon, and food banks were not reachable. Furthermore, we became aware of several situations involving people in buildings with inoperable elevators, almost two weeks after the storm.

Recommendation: Remain vigilant and attentive to needs of the disabled.

Result: _____

5.4 **Agency:** Office of the Aging

Action Area: Special Needs Registry **Rating:** ___

Observation: Communication was difficult with some contractors, especially after hours. Incorrect or outdated information was being relayed so it was difficult to know

what resources were available. Refusal of clients to leave homes before or after the storm.

Recommendation: Aging is working with other County Departments to increase the use of the Special Needs Registry maintained by SCFRES. Aging has added emergency preparation questions to the long term care assessments for case management and home delivered meal clients. Aging is continuing shelf stable meals for nutrition clients.

Result: _____

5.5 **Agency:** Office of the Aging

Action Area: Demands on staff **Rating:** _____

Observation: Many extra demands on staff from clients, staffing Disaster Recovery Centers, and assisting other agencies. Aging was inundated with various federal, state and local agencies either offering assistance or requesting assistance. Aging was asked to do home visits for LIPA when they could not reach approximately 100 electric dependent clients. Cars and fuel were an issue since the request was made the Saturday after the storm. LIPA's client list was outdated and unreliable.

Recommendation: LIPA clients should be encouraged to register with the County's special needs registry. There should be a designated number for County Employees to call for up to date information on building closures and instructions for alternate locations.

Result: _____

5.6 **Agency:** Health Services

Action Area: Disease exposure **Rating:** _____

Observation: In this prolonged storm aftermath the likelihood of disease engender from contaminated standing water rose every day.

Recommendation: Ensure adequate supply of TDAP and if applicable, seasonal influenza vaccine is on hand pre-storm, enhance public messaging for avoidance or use of proper personal protection and personal hygiene, and establish rotating schedules for vaccine clinics in at-risk affected areas.

Result: _____

5.7 **Agency:** Health Services

Action Area: Food supply safety in shelters **Rating:** _____

Observation: The integrity of food stored in shelters was undermined by power outages. There are 4,500 permitted food establishments, 310 hotel/motels, 40 mobile home parks, 32 campgrounds, 171 children's camps and 29 migrant farm worker housing facilities.

Recommendation: Maintain and enhance Bureau of Public Health Protection mitigation on-site outreach for food handlers at mass feeding/shelter locations and strictly manage donated foods. Assure safe food supply in Food Service Establishments (FSE) and Temporary Residences (TRs) in the community affected by power outages.

Result: _____

5.8 **Agency:** Health Services

Action Area: Toxic substances in environment **Rating:**_____

Observation: Subsequent to event elevated toxicity levels can be expected in various venues.

Recommendation: To assure protection from toxic substances in the environment DHS Division of Environmental Quality (DEQ) should enhance response and outreach to, and surveillance of, public water suppliers, sewage treatment plants, bathing beach operators and public swimming pool operators. Maintain and enhance contact with Public Information officer (PIO)/Joint Information Center (JIC) to provide timely information to be included in public messaging relative to "Boil Water / Don't Drink Notices," and hazardous materials pollution control. Improve communication with LIPA in order to track power outages and restoration progress. Follow-up with recommendations to water suppliers to review their respective emergency plans to assure updates have been made to sustain their operations, based on lessons learned. Update and maintain emergency contact lists for entities regulated by the Office of Pollution Control, within the DEQ. Pursue back up generation for county buildings where power/refrigeration is needed to support Public Environmental Health Laboratory (PHEL) specimen storage and analysis. Pursue inter-agency laboratory agreements with labs outside the area as back-up.

Result: _____

5.9 **Agency:** Health Services

Action Area: Sheltering options **Rating:**_____

Observation: J.J. Foley Skilled Nursing Facility needs to be replaced as the county's designated Special Needs(SpN) Shelter

Recommendation: Maintain and enhance current federally mandated requirements to transition all American Red Cross-operated shelters and Functional Medical Shelters (FMS), capable of accepting subsets of the SpN population. Work with Emergency Management to modify current triage algorithm to recognize medical limitations in a FMS, in terms of supplies, equipment and staff. Pursue Memorandum of Understanding (MOU) with supplier of Personal Care Aids (PCA) who can be called in an emergency. Maintain and enhance the ranks of the Medical Reserve Corps (MRC), targeting physicians, nurses and clinical assistants who can be called in an emergency. Build a cache of durable and disposable medical supplies and equipment from the now- shuttered JJFSNF to be distributed to shelters in an emergency to support operations.

Result: _____

5.10 **Agency:** Parks

Action Area: Sheltering options **Rating:**_____

Observation: In the aftermath of the storm, the Department of Real Estate asked Parks to assist in making a number of vacant houses in their holdings habitable for displaced families. Parks was able to make the necessary repairs to five homes but,

apparently, never utilized. Parks also offered one of their rental units (Isaac Mills House) which was occupied for two months after the storm. Parks was also asked about the possibility of housing displaced families in our campsites. In the aftermath of the storm, we provided a list of all of our facilities and what amenities they had such as water, electric, restrooms, showers, etc.

Recommendation: To go this route again, it would be in our best interest to have contracts in place detailing utility use, use of the property and payment schedules. A detailed plan needs to be in place. The time of year and the anticipated duration of any encampment needs to be taken into account. These facilities have patrons booked months in advance and camping is one of the largest revenue producers for the department.

Result: _____

5.11 **Agency:** Probation

Action Area: Security/general public shelters **Rating:** _____

Observation: Last year, Probation was deployed as shelter security in a decision made on Friday, November 2nd. We were informed of this at 1:30pm and requested to have staff in place by 3pm. Probation had not been called on in the past to provide this security.

Recommendation: A decision should be made in advance as to which agency will provide shelter security – Police, Sheriff, or Probation. If Probation will be used for this purpose, a brief training class should be provided by Red Cross personnel to inform Probation Officers who might be used for this duty of the policies and procedures of shelters. Primary responsibility should be determined.

Result: _____

5.12 Agency: Probation

Action Area: Sex Offender ID/public shelters **Rating:** _____

Observation: At present, sex offenders reporting to a public shelter are asked to self-identify. Signs are posted in the shelter and the shelter registration form requests that information. Computer look-up may not be sufficient in the event that internet service is knocked out by a storm.

Recommendation: Consideration should be given as to whether any additional identification measures should be adopted. Possible corrective action would be to print the SORA registry and provide copies to Red Cross in advance for distribution to shelter directors when a predicted weather emergency (such as Sandy) is forecasted. Primary responsibility for shelter security needs to be determined as per issue one above.

Result: _____

5.13 Agency: Labor

Action Area: Post Storm Shelter/Pblc Sfty **Rating:** ___

Observation: Many homeowners were displaced as large tracts of home were damaged and made increasingly uninhabitable owing to compromised power and mechanicals which contributed mold manifestation.

Recommendation: Drawing from experiences with the STEP Program, develop a comprehensive plan to expedite power restoration to multi-family and private housing. This includes contracting with organizations to oversee implementation of FEMA programs to assess damage and restore utilities, including emergency on-call electricians, carpenters, plumbers and boiler installers. This will improve customer service and self-service options for affected residents to safely reoccupy their homes.

Result: _____

5.14 **Agency:** Sheriff's Office

Action Area: Shelter Security **Rating:**_____

Observation: Demands in the wake of Sandy, engendered ad hoc security assignments at various shelters throughout the County that were sometimes at variance with County plans. Rather than making security requests through EOC, town employees often went directly to through Sheriff's Office commands. Issues also arose relative to the sheltering of homeless citizens. Of particular concern, are sex offenders are required to identify themselves when attempting to utilize shelters.

Recommendation: All requests for county assets should be directed and controlled through OEM. Advance engagement with the towns, Red Cross, OEM, Sheriff's Office, and SCPD should occur to address these concerns. As Deputies at shelters do not have internet access, a hard copy of Sex Offender Registry, should be printed prior to event.

Result: _____

We are all now first responders.

Addendum:

SCPD Improvement Plan Matrix		(modified)
Narrative	Assigned to	Target Completion
Command and Control		
Properly deploying police department assets	N/A	
Integration of New York State Police Personnel Worked well	See Below	
Continue the close working relationship between the SCPD and the NYSP by working together on routine enforcement efforts and disaster exercises	Chief of Patrol	Ongoing
The Police Operations Center coordinated the department's overall response on a twenty-four hour per day basis and served as a clearing house for law enforcement services	See Below	
Pre-identify staff members who will be assigned to the POC, including the highest ranking members, and continue to train these personnel to perform this function	Office of the Chief of Patrol	October, 2013
Pre-identify staff members who will be assigned to the POC, including the highest ranking members, and continue to train these personnel to perform this function	Office of the Chief of Patrol	October, 2013
Focus on staffing the POC with personnel who do not have another significant role during disaster response	Office of the Chief of Patrol	October, 2013
Continue to improve the technology available in the POC	Office of the Chief of Patrol	Smart Board installed, and computers upgraded. Radio upgrade in progress
Include members of the NYSP in POC training and exercises	Office of the Chief of Patrol	Ongoing

Expand the use of Incident Command System (ICS) forms within the POC for documentation	Office of the Chief of Patrol	In Progress
The County's Incident Management Assistance Team (IMAT) was useful during the response to Hurricane Sandy	See Below	
Ensure that members of the department who are chosen for the IMAT do not have other significant roles during disaster response. Consider use of non-patrol personnel to serve on the IMAT, such as the staff of the Internal Affairs Bureau	Office of the Chief of Patrol	Initial training has been implemented
Incorporate the use of the IMAT during special events	Office of the Chief of Patrol	Ongoing
Equipment & Vehicles		
Lack of robust organic capability to respond into areas that were flooding	See Below	.
Continue to obtain specialized response vehicles, such as Humvees, from the military surplus 1033 program to enable the police department to respond to calls for service under severe adverse conditions. These vehicles must be kept operational even though their use may be infrequent	Homeland Security & Anti-Terrorism Bureau	First Humvees obtained in June 2013 Vehicles must be accepted and fleeted efforts will be ongoing to obtain additional vehicles
Consider more widespread use of small Marine Bureau boats to access flooded areas	Marine Bureau	October, 2013
Explore the pre-deployment of small Marine Bureau boats into areas that are prone to flooding in advance of future hurricanes	Marine Bureau	October, 2013
Consider obtaining some larger trucks with event higher ground clearance from the 1033 program	Homeland Security & Anti-Terrorism Bureau	Review of available equipment is ongoing
Restore SUVs to precincts for use as supervisors vehicles so that they are available during inclement and serve	Chief of Support Services	July, 2014

weather events		
Restore SUVs to precincts for use as supervisors vehicles so that they are available during inclement and serve weather events	Chief of Support Services	July, 2014
Consider equipping each precinct with a utility vehicle so that flares, cones, traffic barrels, generators and other equipment can be moved as needed during major disasters. Equipping this vehicle with a snow plow would be desirable	Chief of Support Services	Transportation Section to research the feasibility, due by October, 2013
The overall status of the police department's marked vehicle fleet impacted upon the number of personnel that could be fielded	See Below	
Replace decommissioned and high mileage police cars. Consider creating a program that determines the useful life of vehicles in order to replace the appropriate percentage of the fleet annually.	Chief of Support Services	In progress. Annual funding will be requested.
Lack of fixed and portable generator capability	See Below	
Utilize county capital or other funding to install emergency back-up generators at both police helicopter hangars and at other key facilities	Chief of Support Services	Seeking FEMA funding or capital projects funding for generators
Attempt to obtain suitable portable generators to power traffic signals from the 1033 military surplus program	Homeland Security & Anti-Terrorism Bureau	Review of available equipment is ongoing
Attempt to obtain suitable portable generators to power traffic signals from the 1033 military surplus program	Homeland Security & Anti-Terrorism Bureau	Review of available equipment is ongoing
Consider retrofitting traffic signal lights at major intersections to readily accept emergency generator power. Install plug in capability and transfer switches if feasible	Office of the Chief of Patrol	Will reach out to NYS DOT, SC DPW to see if this is feasible
Use of police helicopters for damage assessments	See Below	
Continue the use of police helicopters for intelligence	Special Patrol	Ongoing

and damage assessment gathering during major county events	Bureau	
Police helicopter video would be more effective if transmitted to the ground via microwave link	See Below	
Continue work on the helicopter microwave system to increase its usefulness	Special Patrol Bureau Communications Bureau	In progress
Submit port security grant application to convert microwave equipment from 2.4 MHz to 6.5 MHz. This frequency has less interference on it and is compatible with the one used by some other regional law enforcement agencies, including NYPD	Special Patrol Bureau Grants Office	Grant submitted, awaiting results
Cellular communications were poor due to the effect of widespread power outages	See Below	
Switch the department's cellular phone carrier to one with more reliable service	Chief of Support Services	Completed
Encourage proper access to Wireless Priority Service (WPS)	All Divisions	Continuous
Ensure familiarity with the use of WPS	All Divisions	Continuous
The Marine Bureau facility was heavily affected by the tidal surge and the fuel pumps were off line for a period of time	See Below	
Consider the acquisition of a fuel transport vehicle from the military surplus 1033 program	Homeland Security & Anti-Terrorism Bureau	Review of available equipment is ongoing
Consider a contract with a vendor who could supply fuel on an emergency basis from a mobile platform	Chief of Support Services	Assigned to Staff Services Bureau
Harden the Marine Bureau facility against future coastal storms	Chief of Support Services	Assigned to Staff Services Bureau
Response Operations, Tasking & Procedures		

Injuries to department personnel and damage to department vehicles was minimized	N/A	
Injuries to department personnel and damage to department vehicles was minimized	N/A	
Limitations on the use of Marine Bureau vessels and helicopters imposed by county local law were an obstacle to using these resources to conduct relevant storm related missions	See Below	
Revise county law 13-1998 to ease the restrictions on the use of Marine Bureau vessels and Aviation Section Helicopters to allow more flexibility, especially during post event response phases	Office of the Police Commissioner	Legal Bureau to research and Propose to an amendment to County Legislature
Use of Probation Officers to provide security in victim shelters freed police officers to perform other tasks	See Below	
Probation officers who are armed should be used exclusively for providing shelter security	Chief of Department	October, 2013
Use of probation officers as shelter security should be incorporated into future training exercises to ensure proper coordination with the police department	Chief of Department	October, 2013
Use of the department's large mobile command post as an ad hoc stable police presence in Lindenhurst proved effective in reassuring the public	See Below	
Use of the department's large mobile command post as an ad hoc stable police presence in Lindenhurst proved effective in reassuring the public	See Below	
Consider incorporating the use of police command posts in areas heavily affected during future disasters	Office of the Chief of Patrol	Completed
The imposition of curfews in some communities after dark assisted in the ability to suppress crimes of opportunity in heavily affected areas	See Below	
Update the police department's arrest processing system to include appropriate charges for curfew violations	Office of the Chief of Patrol	August, 2013

Ensure that copies of all local laws issued during an emergency are forwarded to and maintained by the police department	Office of the Police Commissioner	Assigned to Legal Bureau
Communicating with the public through enhanced use of social media would have potentially been effective due to increased reliance on smart phones as a result of widespread power failures	See Below	
Continue to develop the police department's new Nixle social media system to provide useful information to Suffolk County citizens	Chief of Support Services Police Technology Section	In progress by Police Technology Section
Consider alternative methods to maintain situational awareness using other county agencies, such as Consumer Affairs	Office of the Police Commissioner	Forward to Emergency Management Section for discussion with FRES OEM
Consider the fact that other resources, such as food or medication, could also be in short supply during future disaster scenarios. Widespread shortage of resources has the potential to increase civil unrest. This would increase the demands placed upon the police department and negate the ability to perform similar non-law enforcement tasks in the future.	Office of the Chief of Patrol	Completed
Consider an interface with gasoline suppliers to determine the operational capability of retailers for future events	Office of the Chief of Patrol	October, 2013
Police must maintain order during commodity shortages	N/A	
Mutual aid assistance is critical to law enforcement response to major disasters	N/A	
Law Enforcement officers must continue to come to work during a disaster despite being personally affected	N/A	
Communications Section Issues		
Answering emergency calls for service is a critical police function	See Below	

Answering emergency calls for service is a critical police function	See Below	
Proactively push out timely and relevant information through the media and social networks to reduce call volume into the 911 center	Public Information Office Communication Bureau	October, 2013
Consider the use of non-police staffed information hotlines outside the traditional 911 and 852-COPS system to create a more manageable work load during major widespread incidents	Communication Bureau	October, 2013
Refine protocols for calls that can be transferred to the EOC and handled by volunteer CERT members	Communication Bureau	October, 2013
Civilian staff members assigned to the Communications Section must get to work under all conditions	See Below	
Pre-plan methods to supply gasoline to vital county employees during future shortages	Office of the Police Commissioner	Assign to Legal Bureau to research further
Consider adding the task of transporting impacted civilian employees to the use of future military surplus vehicles	Office of the Chief of Patrol	October, 2013
Consider providing locations for employees to sleep at work during off duty hours so that they have the option to remain within the headquarters building	Chief of Support Services	Cots now available for use in Headquarters Building Completed
Consider ways to provide food to employees who must work long hours due to limitations on relief or who wish to remain there between tours of duty	Chief of Support Services	Legal Bureau to perform initial research
Interoperable communications with mutual aid partners is critical	See Below	
Consider pre-deploying radio caches from headquarters to precincts to facilitate this process	Communication Bureau	August 2013

FRES Concerns	& Recommendations
Communications	
1. EOC Briefings – need a timeline for consistency.	Schedule Briefings and hold them on time. Assign a scribe / record minutes /attach to Eteam.
2. Inter-office Communications	800 MHz radios worked out well. Install and implement use of the wireless lapel/voice pagers.
3. IAP process needs to be examined. Morning OPS meeting at times contradicted planning objectives.	IMAT to review process for IAP use in the EOC.
4. IMAT – Daily updates are not enough	Sit-reps need to be done more often to reflect changes
5. Government Liaison – a lot of personnel were constantly addressing the County Executive and his staff.	Assign one individual to brief the CE staff; not someone with EOC Command position.
6. EOC Manager position was understaffed	Administrative & Support Staff could fill in if we had more clerical temp assistance – perhaps on reassignment from other departments per existing Executive Order.
7. Info for situational awareness.	Dashboard Concept – develop in E Team & RCPGP.
8. Physical facilities were a shortfall.	Facilities were a limiting factor and hampered ability to manage personnel and issues. Failing infra-structure (sewage leaks, HVAC) unable to accommodate large volume of personnel. Break-out rooms needed for policy/planning groups. Proposal for 404 Mitigation Funding for construction of new EOC/Fusion Center.
9. Conference Calls, to brief officials inside county government and from municipalities, were back-to-back and in some cases overlapping. Many decisions were made that were not documented.	Establish Conference Call meeting schedule and assign personnel as scribes to record each session and save documents in Eteam.
10. Joint Information Center (JIC) was inefficient.	Ramp up JIC prior to landfall.
11. Media Outlets want press conferences.	JIC needs to be staffed effectively with scheduled press conferences, briefing papers or background-only briefings. Agencies responding to an event should coordinate with FRES public statements to be issued and aggregate all statements into a communique – where possible.
12. Code RED – less than 50% success rate in reaching registrants.	Review success rate with Code Red analysts.
13. Send Verizon database to Code RED for validation.	Test system every June 1st to ensure we have the most up-to-date information.
14. Public Information outlets (FB, Twitter, Website) had different messages at times.	Need a common and redundant messaging from only one source/input. Assign a dedicated Social media group. Should be part of new JIC strategy.

	Add to 120-hour preparation timeline.
15. Web Page was a huge success	County web page was taken down and OEM page was stand-alone. PIO folks dictated products to be posted. Add this to 120-hour timeline for consistency in future responses.
Evacuation	
16. Evacuations were called at 3 pm, which is less than optimum from a timing perspective.	Evacuation should not be driven by the media/ news timeline. Follow the 120-hour timeline and Hurrevac recommendations.
17. Too many cars were left in flood zones.	Add to public outreach and messaging to encourage moving cars to parking lots in areas of higher ground.
18. Home fuel oil tanks (above ground), need to be secured, due to environmental concerns.	Towns/Villages should be encouraged to look at building codes.
19. More than 100 residents refused to leave mandatory evacuation zones.	The use of more straightforward language to communicate evacuation orders should be considered for future events.
Sheltering	
20. Red Cross volunteer staff was insufficient to handle the number of shelters opened.	Shelter Officers Program helped and needs to be amplified; CERTs was a great resource but they need to receive Shelter Manager training. ARC needs to increase volunteer pool of active members
21. Shelter Officer program was successful. Shelter Officers Program helped and needs to be amplified; CERTs was a great resource but they need to receive Shelter Manager training.	Must conduct another recruitment and provide additional training.
22. Suffolk ARC Executive Staff sent to Mineola and out-of-region ARC personnel were assigned to Suffolk and unfamiliar with geography and shelters.	Discuss future needs and expectations with ARC management to be assigned to Suffolk during events. Discussions between FRES and ARC have already commenced, with ARC regional officials agreeing to provide regionally familiar staff to Suffolk County EOC in the future.
23. Homeless, gastrointestinal infections, and lack of provisions were some of the extreme issues. Also, schools were the primary locations of the shelters.	Consider some County owned shelters to avoid the use of schools as they cannot be closed for long periods. Designate an independent structure or facility. Engage DSS.
24. Shelter – schools were primary locations of shelters.	Consider some County-owned shelters to avoid the use of schools, as they cannot be closed for long periods. Designate an independent structure or facility.
25. SpNs/JEEP plan needs updating.	Re-Visit JEEP plan and registry.
26. J.J. Foley has served as primary Medical Needs Shelter but is now closed.	Search for new Special Needs shelter facility.

27. Hotel Rooms were inadequate.	Develop alternate residences for long-term personnel such as NYIT and BNL.
28. Insurance Adjustors were delayed because there was nowhere for them to stay.	Private entity issue. FEMA, NFIP, NYS DFS, NYS OEM and larger insurance companies may need engagement to avoid similar delays in the future.
29. Suffolk County has no, single agency tasked under the county charter with assisting storm-displaced homeowners with short- and intermediate-term housing needs.	Consider creation of an ad-hoc Human Needs Task Force, made up of FRES, DSS, Department of Health, and other agency personnel to work with federal and state governments to assist with serious unmet needs including short- and intermediate-term housing.
30. Surge of first-responders, federal and state agency personnel, and displaced residents completely depleted the inventory of hotel rooms in Suffolk County for several weeks.	Prior to the onset of a storm, FRES should work with Office of Real Estate to develop and maintain an up-to-date inventory of available hotel room stock, and seek to work cooperatively with FEMA and NYS responding agencies to house government personnel appropriately in deference to displaced families.
Logistics	
31. Logistics did not use Eteam from beginning to end.	Eteam should be utilized more effectively for more comprehensive resource management.
32. E Team is disconnected from NYS D-LAN as well as from other incident management systems.	Research ways to cross reference resource requests between Eteam and D-LAN and other incident management systems.
33. Issues with record-keeping. Resource requests need to be more intuitive, simpler and specific.	Suggest using form from USCG: 213RR which prompts more information in the requisition process.
34. Blue Med Tent used for housing some of the temporary foreign personnel was consistently running out of fuel.	Procure a mobile fuel tanker, trailer or re-fueling contract with private vendor.
35. Feeding the EOC staff became an issue.	Utilizing a food vendor to supply meals was a great option and provided healthy meals for the long shifts and numerous personnel assigned to event.
36. Supplies check-in area must be addressed; cannot have multitude of deliveries staged in the hallways.	Must review delivery and staging areas.
37. National Disaster Recovery Framework launch almost simultaneous to Sandy; was incorporated as the recovery took place.	Embed Public Assistance teams in County and Towns. Consider development of long-term recovery team in County Executive's Office to address reimbursement, funding and outreach.
Planning	
38. Review IMAT in our plans; IMAT as an important resource is starting up too late.	Add Federal IMAT request into 120-hour timeline. Recruit for IMAT Teams to augment personnel in long term activations.
39. Individual Assistance is not reflected in	This is a FEMA initiative; however, we need to train

our plans (DRC Mobile).	county personnel in IA Outreach and familiarity with FEMA programs.
40. Suffolk has no long-term recovery plan – National Recovery Framework	Embed PA Teams in County & Towns Develop Long Term Recovery Team in CE's office to handle funding and outreach to residents.
Administration	
41. IAPs did not reflect chain-of-command with accuracy.	Unclear who was in charge throughout the day, based on IAP. Leadership changed without notice to EOC.
42. Not enough privacy for decision/policy makers. CE team needs dedicated space.	Create a Situation Room to be used instead of the Commissioner's Office.
43. Issues with Record-Keeping. Resource Requests need to be more intuitive, simpler and specific.	Suggest using form from USCG: 213RR which prompts more information in the requesting process.
44. Emergency Procurement issues included at-times conflicting advice from FEMA representatives; process hindered by massive power and communication outages.	Once SOE is in place, it should be easier to procure from vendors. Need an expedited process.
45. Personnel was stretched during the event. Temporary and volunteer personnel was assigned to event in non-uniform way.	Increase in depth in personnel should be considered, with options including increased inter-department and cross-departmental cross-training. Consideration should be given to creating a steady, dedicated pool of temporary employees to minimize training time and maximize continuity.
46. Failure to sign in and out of EOC creates problems with accountability and leads to auditing problems.	Alternative Entrance and designated desk staffer will help to ensure that everyone signs in and out.
47. ID Badges underutilized at EOC.	Switch to electronic method for accountability.
48. Handwritten notes are important.	Scan personnel's notes into system – Drop Paper Scanner
49. County contracts delayed procurement.	Must research potential use of credit cards for emergency procurements using local vendors.
50. Staff schedules were erratic and uncertain.	Review CE order #13 and addressed emergency procedures for work schedules (12 hour shifts) to be implemented prior to event.
51. Debris Management Plan needs to be refreshed.	Develop a comprehensive debris management plan incorporating all jurisdictions.
52. Logs & Admin Sections had a smooth system.	ICS structure worked well.
53. A desktop PC should be dedicated to running reports.	Create a single point of data collection and reporting.
54. Computers were failing at a high rate due to age.	EOC and staff desktop PC need replacement.
55. Network switch needs replacement.	Take steps to ensure replacement.
Miscellaneous	

56. Geo-coding of new locations needs to be formatted uniformly. This issue affects PA & Short-term housing and other human needs issues.	Towns & Villages need a template and standardized platform.
57. Lag in printing maps. Took too long to be effectively used.	Review strength of software & system to produce maps in a timely fashion.
58. Overflow of calls from PD to FRES to EOC.	Recommend the use of 311 system, also we need to map out flow of phone calls through Police 911
59. Prefabricated grey building in back lots of FRES complex is not being used	This is one way of address the housing of temporary help with the addition of 30 cots
60. USAR teams first deployment. All went very well. NYS TF assignment was well received and augmented our teams efforts. More equipment is needed.	Call NYS TF in earlier so they can be prepositioned. Seek funding to purchase additional equipment.
61. During administration of purchasing, staffing and assessments of damage to county property, FEMA provided county officials with disjointed, at-times contradictory instructions on actions to take that would result in federal reimbursement.	SOP should call for all guidance provided by FEMA in the future to be confirmed in writing by FEMA. Additionally, county purchasing, risk management and budget staff should be required to be present at the EOC during the course of the event. Pre-storm directives should be issued to all department heads by FRES Commissioner and Budget Director with respect to record-keeping and other procedures during the event, with written acknowledgement by department heads that they have received and understand the directives. Importantly: FRES and Budget Office should maintain joint administration of all Project Worksheets for all departments, and all departments should be required to demonstrate to the County Executive regularly that they are administering cost reimbursement uniformly with this directive.

Action Area: Shelter/Housing

Recommendation (1/16/14):

i. Increase the availability of rentals in disaster risk areas along the shores through relaxation of accessory apartment rules,

ii. Encourage all hotels/motels in such disaster risk areas to enroll in the FEMA TSA (Transitional Sheltering

Assistance) Program to enable such hotels/motels to get direct payment from FEMA providing shelter to eligible residents,

iii. Reserve hotel/motel housing for disaster victims as a priority before first renting available rooms to disaster workers, **(We need to have real time access to county facilities and inventory for strong consideration of alternate sheltering sites. This will have an impact of post event return of services for governmental and community services).** *Who would oversee "real time access to county facilities"? I believe DPW and the departments. The question that needs to be addressed is primary county inventory that is used for alternate emergency purposes. Maybe space management could assist with providing the current inventory and descriptions of said inventory. We would also suggest that an ALL Department head survey be developed to identify critical infrastructure capabilities (ADA, Emergency Power, refrigeration, storage, etc.). We would suggest that a similar tool is used with the smaller municipal agencies as well as their projected special/functional needs populations information. This information will afford us the ability to close stop gaps with pre disaster epidemiology.*

iv. Identify alternate sites for government and disaster workers to utilize such as SUNY colleges and universities freeing up the hotels/motels for disaster victims, **(The long term maintenance of this inventory is unrealistic without funding to aid these departments / agencies with maintenance)** *Where do you propose "funding" come from? Is this a priority and possibility? Funding is a huge priority. We cannot foresee telling private business who and how they will operate. The CE staff will have to identify a funding stream for capacity / inventory maintenance and future capacity building.*

v. Identify several local sites in each community to provide temporary transitional housing (e.g., schools). **(The shelter structure is developed for local short term events. The issue is that there is limited inventory of large scale facilities that can provide short term housing within the various regulator requirements i.e. ADA, generator, food services. A Health and Human Service branch must be created within internal county government and expanded to NGO's and faith based groups).** *How would this be realized?* **The CE staff would create a HHS taskforce to afford the working groups ability to leverage social change and the overall work load. The current structural inventory doesn't afford us the opportunity to provide short term housing. This will not change in the current inventory climate. We are working with the red cross to look at several structure for known event sheltering. We need to educate the public and develop capability for congregant community self-sheltering and "stay in place" modeling. There are several executive level decisions that need to be addressed within the emergency sheltering, short term and long term sheltering, and emergency sheltering.** *Which executive level and what kind of decisions?* **If the county wants control of the sheltering outcomes than the County needs to run primary sheltering with red cross support. This will have a huge impact on funding demand. The issue with storage and maintenance of capacity building is overwhelming. We also need to address the purchasing standards and increase our ability to utilize federal and local municipal contracts.**

Additionally, we are ramping up the reporting for health care facilities compliance with the local vulnerable protection citizen act enacted by the CE & Leg body last year. ***How and in what way is this "ramping up" occurring?*** **We have been meeting with internal and external stakeholders to develop a work process. We needed key aspects of this local legislation modified to provide full inclusion. The working group that is co-chaired by health and FRES is preparing for a beta run to upload about 50 locations into our County Emergency Management Software (ETEAM) and GIS locate the facility under critical key infrastructure. This will afford us the ability to push emergency support for community sheltering as a possibility. Update as of 1/2014. Beta testing is complete and we will be releasing notice for the estimated 4000 locations within the county to begin reported.**

Assigned To: FRES, Jill Rosen-Nikoloff, Joel Vetter

Action Area: Sheltering Options

Recommendation: Maintain and enhance current federally mandated requirements to transition all American

Red Cross-operated shelters and Functional Medical Shelters (FMS), capable of accepting subsets of the SpN population. **The Emergency sheltering system within Suffolk County has been meeting this standard. Greater amounts of pushed resources are needed within the shelter system. Just in time training needs to be expanded and disseminated. Improved public perception and understanding is need for the sheltering services. Greater enrollment in to the Emergency Preparedness Registry, Code Red and SMART 911 is needed. Exploring the sheltering opportunities of health care facilities and the pre-written state DOH waiver process is needed. Enrollment of Health department personnel into the NYS SERVE system is key. Formal training for the Incident Response management system is needed for LHD and MRC leadership. Data and GIS information must be collected for thoughts on DRC and POD pre-identification. Formal MOU need to be developed with each location. Several key executive decisions will be needed for regional emergency sheltering.** Work with Emergency Management to modify current triage algorithm to recognize medical ***Rather*** *than simply suggest what "needs" to be done, could you spec out how it goes about getting done. Again, you refer to "key executive decisions" without identifying who that would be and the precise nature of the decisions.* Presently FRES provides educational seminars and support services to various NGO's in support of furthering the communities ability to understand what services are available. I will provide a separate short write up on this and the NACCHO grant funding that has been utilize to address the Senior Population. County Executive decisions need to be made tasking other departments participation in sharing, providing and promoting services.

limitations in a FMS, in terms of supplies, equipment and staff. **(Has been done. Limited funding has forced us to prioritize based on risks which capacity building items are acquired.** Pursue Memorandum of Understanding (MOU)

with supplier of Personal Care Aids (PCA) who can be called in an emergency **Action items to be worked on PCA's, Oxygen vendor, alternate Blue Med shelter contracts and outside regional automatic aid from MRC.** Maintain and enhance the ranks of the Medical Reserve Corps (MRC), targeting physicians, nurses and clinical assistants who can be called in an emergency. **Ongoing - funding limitations has placed a problem on administrative management resources and training.** Build a cache of durable and disposable medical supplies and equipment from the now-shuttered – Update 1/14 - several hundred special needs cots have been purchased and received. Additional deployable assists have been acquired.

JJFSNF to be distributed to shelters in an emergency to support operations. **(Storage and long term funding is needed to maintain the inventory and supplies needed) development of pre contracted items in Push packages are being investigated. Executive decision will be need on a CTY wide asset and inventory management system.** *How do you propose teeing this up an actionable "executive decision?" The current system only inventories equipment greater than $5K. The CE needs to address the supply and inventory change of every department. Currently there is nothing mandating the sharing of centralized information and resource usage / request. This will require CTY funding and Executive order.*

Assigned To: Jill Rosen-Nikoloff, FRES, Department of Health

Debris Management Incident Handbook (abridged)

CHAPTER 1 - PRE-STORM

1. The Emergency Operation Center (EOC) should be manned at least 12 – 24 hours to prep for potential storm.

2. Make initial call out to previous year's crew to get available work schedules, gather cell phone numbers and email addresses to update the roster. Ensure that there is enough Personal Protection Equipment (PPE) available for all personnel that may be involved in storm recovery.

3. Establish phone numbers, fax numbers, and an email address for use by the Debris Management Recovery Team (DMRT). If still being utilized use DMRT@suffolkcountyny.gov, this will allow for open communication between DMRT and a representative from each municipality to request debris removal and/or equipment.

4. Plan to hold a training class/refresher to emphasize safety, regulations and assign job locations. Issue the following PPE's to all personnel:
   a. Vests.
   b. Hard Hats/Safety Glasses.
   c. Gloves.
   d. Rain Jackets.
   e. Monitor Numbers.

Training Room

5. Rotate some personnel through the EOC depending on the severity of the storm, to get staff acquainted with storm management and EOC procedures. Plan on putting crews together based on the size of the storm.

6. Setup staging areas (County yards & townships):
   a. Staging area safety procedures, locations, GPS coordinates.
   b. Establish hours of operation.
   c. Security for overnight hours.
   d. Assign staging area numbers to each site with GPS coordinates.
   e. Assign crews to a staging area and designate a manager for each site.

f. Assign camera for each staging area. (Never operate staging area without a camera.)

Super Storm Sandy Staging Area

7. Decide if flagmen/signalmen required at the site (the rule of thumb is that flagmen/signalmen are required if there is more than one company working at a location, if one company is doing the job, flagmen/signalmen are not necessary).

8. Go through the procedure for filling in the Cubic Yard Load Ticket (DMRT 13-001 see Attachment I) with assigned staging area manager and workers, which is extremely important for FEMA documentation and reimbursement. Have pictures printed to show field staff different levels of grading trucks (see Attachments II-V). **It is extremely important that every box on the ticket is filled in, review tickets and pictures daily.**

9. Although we should never operate in the dark, make sure there are lights available for safety precaution. If no bathrooms are available at site, get porta-potties and consider shelter in case of inclement weather.

10. Make sure all workers are up to speed on where the debris is coming from, who the other monitors are (i.e., State/FEMA/Township), and verify that all incoming trucks are from authorized agencies. Secure staging area overnight to prevent from outside dumping. Post sign that states Official Dumping Only.

Super Storm Sandy Staging Area

11. Establish a nightly check out procedure – just one person to be assigned from the staging area (preferably the staging area manager) to bring back camera, and drop off field day sheet (DMRT 13-002 see Attachment VI), which must be recorded every day.

12. Establish one (1) roving supervisor to assist personnel at all staging areas. They should check on each staging area daily to:
    a. Relieve personnel for break and/or lunch.
    b. Check on equipment (i.e., cameras, batteries, personal protection equipment, etc.)
    c. Report any concerns to DMRT supervisor.

CHAPTER 2A - STORM ASSIGNMENTS ACTIVATION / STAGING AREAS

1. Verify workers are issued a DMRT identification number, everyone has proper ID, vests, glasses, and weather gear. Most important make sure all have been to the storm briefing and understand their role.

2. Set up staging areas under FEMA/County guidelines. Identify each staging area with identification number, GPS coordinates, and point of contact for that staging area. Issue two (2) camera's per staging area and assign a staging area manager.

3. Keep whiteboard in office with areas outlined and have directions printed to get there. Keep team informed of other townships staging areas with same perimeters, always get GPS coordinates, and establish site numbers for all staging areas.

4. Make sure you have proper safety equipment, scissor lifts and light towers at each staging area, and make sure security is in place to stop from independent dumping during the night or on off hours. Make sure signs are in place indicating no public dumping.

Scissor Lift


Light Tower


Safety vest and hard hats

CHAPTER 2B – EQUIPMENT PROCUREMENT

1. As soon as storm is activated, reach out to local contractors to find out what equipment is available and at what rate. (Start a folder for each vendor with point of contact, fax number and email address.) Have each vendor send a fax or email with all rates and available equipment, log in rate sheets and date for accountability. Issue Notice to Proceed (NTP) (DMRT 13-007 see Attachment VII) when authorized, to each vendor and put a copy in the file. Every vendor must have a NTP on file with a copy of said contract.

2. Reach out to all townships officially through email or fax notifying them to request equipment and/or personnel. In accordance with guidelines set by the Office of Emergency Management (OEM) and DMRT team, all requests must be written and signed with a name, address, phone number of the point of contact who will be accountable for resources. **All requests must be written**, absolutely no verbal authorizations for equipment, commitment or pricing. Fill out a Form 213 (see Attachment VIII) for use in tracking and assigning equipment. The 213 is very important to keep track of who requested the equipment, who authorized the equipment, exactly what equipment was assigned, and the point of contact information of the requestor, create and manage a 213 log for accountability.

3. Set up an equipment check in station, where trucks/equipment will be photographed, decaled, and assigned a tracking number. Five (5) photos must be taken of each piece of equipment, all four (4) sides (including the license plate) and the last picture will be the tracking number and /or placard. The start mileage of the truck **must** be logged in to make sure that the trucks do not freelance with our placards. Have safety meeting with truck drivers, vendor contact, and town representatives to exchange phone numbers with all involved parties.

Super Storm Sandy Equipment Check In & Safety Meeting

4. When equipment is reassigned from one township to another, a field representative can approve, but all trucks must be checked in and out, reinspected, photographed, or we will lose the ability to file a claim against the County, State, or Township.

5. Every piece of equipment that checks in will be assigned a tracking number and a tracking card (T-card, see Attachment IX) shall be filled out and logged in for easy viewing in the office. There should be an update every day as to how many pieces are out and where they were. It's very important that there is some kind of tracking system in place to give to the Commissioner on a minutes notice, and to identify the cost per day, per township.

CHAPTER 3A – STORM OPERATIONS

During the storm the most important thing is to monitor and track equipment and debris moved, staged, and processed. Keep records of everything. We have various forms that we will be using for record keeping. The most important form is Cubic Yard Load Ticket (DMRT 13-001). This ticket will provide information regarding the pick-up location, the date and time, type of debris, and most important, who inspected and monitored the load. As this ticket is an important tool used for FEMA reimbursement, **it is very important that the ticket is filled out complete and legibly**.

We will also be taking numerous photographs for FEMA documentation and payment. From staging areas to loads, from stumps to wood chips, the more pictures the better to support FEMA claims. Anything out of the ordinary should be photographed and documented and should be done daily.

Set up weekly phone call with township/village highway superintendents or debris management personnel to go over debris management issues. Gather debris totals, monitor equipment and time sheets, and verify that all parties have the equipment requested.

It is important to log and chart all actions of the storm to be put together later for a post storm report. This includes the amount burned at the burn box, amount chipped, cubic yardage (CY) of vegetative debris hauled, amount of stumps, or overtime hours worked. You should always be prepared with an educated answer or a chart that can be utilized at a moment's notice as questions will be asked by various people from several different agencies.

Photographs are extremely important for FEMA reimbursement. Guidelines for photographing:

- Always have an extra set of batteries, especially in the cold weather.

- Never take pictures in the dark (if it is getting dark you should contact the DMRT office to suspend operation).
- Make sure the date and time are accurate on the camera.
- Always review the picture to insure that they are not blurry or incomplete.
- Always take a picture of the placard or DM# first so it can be identified with the load ticket.
- Make sure that you are in compliance with:
  - Scissor lifts.
  - Lights.
  - Vests.
  - Hats & glasses.
  - Safety harness.

Truck Placard/DM #

Pictures will be downloaded everyday with the field sheets (DMRT 13-002) reviewed, within 24 hours, and recorded on a roster (DMRT 13-004 see Attachment X) by the office in case there are any questions. Office personnel will compile all tickets and daily forms every day and be able to provide an updated DMRT 13-004 for the morning update. This way, we will have up-to-date totals in order to calculate the cost of hauling debris, mileage and fees in accordance with the contracts that have been issued.

There should be a briefing at least once a week to remind field staff of the mission, provide any updates, review safety procedures, review tickets to show what is being done correctly and what needs to be addressed.

During the storm it is most important to keep accurate records on data, numbers, equipment and debris totals using the DMRT 13-005A and DMRT 13-005B (see Attachments XI and XII). These forms will be utilized the most as there are daily briefings on the debris totals.

Establish a yield for cubic yardage (CY) to tonnage. For Super Storm Sandy we used a yield of 5. For example, 1,000 CY of vegetative debris would be equivalent to 200 tons. This is an average and according to FEMA, USACOE, and Suffolk County there are always variables but this gives us valuable information to be used for the burn and/or chip operation.

Brookhaven Landfill February 2013

CHAPTER 3B – BURN BOX/CHIP/STUMP REMOVAL

1. **Burn Box**: Although there is controversy over the burn box operation (Newsday article March 4, 2013 see Attachment XIII), we should discuss it in the case that it is employed again.

If a burn box operation is being used, we must first determine how many are needed based on a twelve (12) hour operating day. They range in size from 500-800 cubic yards of debris per twelve (12) hour operation. In accordance with NYSDEC regulations, ensure that permits are requested and always allow an extra thirty (30) days in case of downed equipment and bad weather.

Wind Meter

The vendor selected for the burn box operation must submit a plan of action. In this plan there should be restrictions for the crew and how to operate the burn boxes safely. Wind speed is one of the most important restrictions. If the wind speed is over 20 mph the operation must be suspended and cannot resume until the wind speed gets down to 15 mph.

During this operation, you should be keeping track of time that the operation was suspended (i.e., the equipment was inoperable or the burn boxes were shut down). This information will be important after the cleanup ends when starting to reconcile the bills and get credit for downtime.

Burn Box Operation Brookhaven Landfill February 2013

Although the Code of Federal Regulations (CFR) states that burn box operations during a disaster recovery mission are not required to use air monitors, you should still find out whether or not air monitors are to be used. You should establish as soon as possible where they will be located and if possible, get them up and running before burning

begins to get a reading prior to burning commencing. Under no circumstances should air monitors be placed at the landfill or near the burn box that would be certain failure. During Super Storm Sandy, we burned 24 hours a day with 4 burn boxes (two - 800 CY & two - 500 CY) for over 30 days and never exceeded the level of concern in the air monitor located in the community surrounding the landfill. The air monitor located on the landfill property exceeded acceptable levels continually and often gave inaccurate readings.

§ 60.2969 What are the requirements for temporary-use incinerators and air curtain incinerators used in disaster recovery?

Your incinerator or air curtain incinerator is excluded from the requirements of this subpart if it is used on a temporary basis to combust debris from a disaster or emergency such as a tornado, hurricane, flood, ice storm, high winds, or act of bioterrorism. To qualify for this exclusion, the incinerator or air curtain incinerator must be used to combust debris in an area declared a State of Emergency by a local or State government, or the President, under the authority of the Stafford Act, has declared that an emergency or a major disaster exists in the area, and you must follow the requirements specified in paragraphs (a) through (c) of this section.

Excerpt from Code of Federal Regulations 40 CFR p. 972

2. **Chip:** As an alternative to the burn boxes, horizontal grinders or tub grinders may be used to assist in clearing vegetative debris. The major concerns with chipping debris will be the wind rows left over and becoming potential fire hazards.

Horizontal Grinder for Chipping

Wood Chips

During Super Storm Sandy, Suffolk County accounted for over one million cubic yards of vegetative debris with over 460,000 CY brought into the Brookhaven Landfill. We burned approximately 250,000 CY and chipped over 210,000 CY all in a four (4) month time period. We also had 100,000 CY of vegetative debris in the Islip Yard that we chipped (in one month). In order to alleviate concerns over the wind rows, we ended up shipping the wood chips to various locations including barging to upstate New York and giving chippings to local farms. This allowed us to leave the Brookhaven Landfill, Islip Yard and all of Suffolk County with virtually no vegetative debris left behind from Super Storm Sandy.

3. **Stump Removal:** The last item that needs to be addressed is the stump removal process. This must be done in accordance with FEMA guidelines. For Super Storm Sandy any stump in the Right of Way (ROW) that was over 24" in diameter qualified for FEMA removal. This regulation must be verified prior to stump removal beginning.

Stump from Super Storm Sandy

An email must be sent to every township asking them to provide a list of stumps that qualify in accordance with FEMA regulations and need to be removed. Make sure you provide a cutoff date for them to get their list to us. The stump removal crew will handle the whole process. They will use the lists from the various townships to mark out stumps, verify that they comply and call in utilities. Once started, a monitor must accompany the stump removal crew to take pictures prior, during and after backfill. Keep a detailed log with address and photo's per township.

CHAPTER 4 - POST STORM WRAP-UP

When the operation begins to wind down (when all the debris is collected for destruction) start to tie up the following loose ends:

1. Completing paperwork, getting accurate debris total from townships, filling in all forms think of a completion date to give towns for requests.

2. Follow up with vendors to make sure all equipment has been checked out and all work tickets have been submitted.

3. Reach out to each township or village for and email confirmation that they require no further assistance with clean-up and/or assets.

4. Start to finalize and total out all accounts with accounting and give final report to all necessary personnel.

5. Hold a debriefing/training class to discuss any issues that may have arisen during the operation and take feedback and recommendations from field staff into consideration.

Post Storm Debriefing/Training Class Super Storm Sandy

6. Take the time to recognize all personnel involved. These people go above and beyond their regular duties and should never go unrecognized.

CHAPTER 5 – BILLING

1. Stay organized, process every bill as it comes across your desk, utilize all the forms and folders you created to close out each township and vendor bill. Confirm that we were credited for any periods of downtime.

2. Setup a share drive with the SCDPW Finance Department which will allow you to go over the bills together.

3. Setup a tracking sheet (DMRT 13-008 see Attachment XIV) to account for all bills processed and paid per vendor, per township. Make sure FEMA gets a copy of every invoice as soon as the County gets it, they do not have to be validated before they start processing the Project Worksheet (PW). The faster they get copies of the invoices, the faster the County can be reimbursed. Most important, stay on top of FEMA by asking them everyday if they need anything to process the PWs.

4. Box up all folders for a minimum of three (3) years for safe keeping. Back up everything storm related from your computer.

Recommendations - Witt|O'Brien's, disaster response and recovery consultants, retained by Suffolk County from March 27 – May 31.

RECOVERY MANAGEMENT

At the encouragement of FEMA County departments registered to become their own applicant working with FEMA autonomously from the County's Executive Office. This approach has fragmented the recovery effort and allowed for inconsistency in approach. Complicating the recovery effort further was the rotation of FEMA personnel assigned to the Departments. With each new project officer came different guidance and approach to the scope of the project thereby delaying a coordinated recovery effort.

The Office of Emergency Management within the Fire, Rescue and Emergency Management structure is suited for the oversight of initial response efforts and management of the Emergency Operations Center. However, similar to FEMA's recent policy determination to initiate a Recovery Framework along with the response phase, the County needs to follow with a similar action.

RECOMMENDATION: Create a single County Recovery Officer in the County Executive's Office, one to be charged with the responsibility for all recovery operations. Each department should have a person assigned to the County Recovery Officer until department projects are closed out.

DEBRIS MANAGEMENT PLAN

Current challenges preparing project worksheets to recover costs incurred to establish, manage and dispose of storm related debris is a direct result of not having a FEMA-approved Debris Management Plan. Failure to do so will result in deigned eligibility, challenges to process and procedure, audit of support documentation and a loss of reimbursement to the County. Simply repeating previous processes is not an option. Production of a Debris Management Plan approved by FEMA is critical to the County's recovery effort.

RECOMMENDATION: Immediately initiate the development of a County Debris Management Plan and submit it to FEMA for review and approval before the 2013 Hurricane Season is fully upon us.

STANDARD OPERATING PROCEDURES

All County Departments need to take time to revise their emergency and recovery operating procedures. Issues and challenges experienced in Super Storm Sandy must be addressed before the coming storm season. Failure to do so will lose the opportunity to prepare effectively for the next event.

It is clear that operational consistency among the County's Departments and Agencies responding to and recovering from Super Storm Sandy has delayed reimbursement of costs incurred because support documentation was not complete in its presentation resulting in lost reimbursement. Recording of actions taken, as well as the cost of labor and expenditures is critical to the recovery of costs incurred. Eligibility determination is dependent on effective operating procedures outlining process and documentation of actions taken.

County Departments and Agencies must have consistency in documenting force labor, equipment and supplies. Information provided in applicant briefings and kick-off meetings must be observed. Further, County Departments must develop forms to account for distribution of equipment and supplies and a plan to effectively record actions. Attempting to manufacture documentation to support cost claimed during the development of project worksheets will always fall under scrutiny.

Lastly, the County must make pre-disaster arrangements with a primary and secondary venders within and outside the county and state and for equipment and supplies used during Super Strom Sandy. Arrangements for renting equipment and supplies, fuel etc. is paramount to defending the purchase of response materials unable for rental.

RECOMMENDATION: There is not one County Department that cannot learn from the experiences of responding to and recovering from Super Storm Sandy. Conduct a Lessons Learned workshop for all Departments and Agencies identified as applicants so as to review current operating procedures and revise them based on the Sandy experience.

EXHIBIT D

NY RISING COMMUNITY RECONSTRUCTION PROGRAM, SUFFOLK COUNTY PROJECTS

NY Rising Community Reconstruction Program, Suffolk County, April 2019

Region	Subrecipient	Project Community	Project Name	Project Description
Long Island	EASTERN FEDERAL LANDS HIGHWAY DIVISION	Fire Island, NY	Reconstruction of Interior Routes for Emergency Travel (IMP.S.012)	Reconstruct the western section of the interior route for emergency travel within the Fire Island National Seashore to ensure safe and reliable evacuation.
Long Island	SUFFOLK COUNTY	Fire Island, NY	Fire Island Back-up Power Generation for Critical Facilities	Design and install fixed, in-place standby backup generators at Village of Ocean Beach Fire Department, Fair Harbor Fire District, Village of Saltaire Water Well #2 and Kismet Fire District. Procure and install emergency communications radio equipment at Ocean Beach Water Town and air compressor to service firefighting breathing apparatus at Kismet Main Fire House.
Long Island	TOWN OF BABYLON	The Community of Captree Island	Shoreline Stabilization Road Elevation – Captree (IMP.S.027)	Raise sections of Captree Road to protect and reduce flooding and erosion during storm surges and in extreme high tides so as to promote safe evacuation during flooding emergencies.
Long Island	TOWN OF BABYLON	The Community of Oak Beach	Shoreline Stabilization/Road Improvements - Oak Beach (IMP.S.925)	Mitigate the effect of storm surge in the area by strengthening the shoreline south of Oak Beach road to reduce on-street flooding and improve drainage.
Long Island	TOWN OF ISLIP HOUSING AUTHORITY	The Hamlet of Bay Shore	Penataquit Village Resiliency Improvements (IMP.S.200)	The proposed project will design and implement green infrastructure drainage interventions at Penataquit Village public housing facility.
Long Island	TOWN OF BABYLON	The Hamlet of Copiague	Copiague American Venice Bridges	Replacement of two spans of the American Venice Bridges over the Santa Barbara Canal. Design started in August 2015 and was completed in 2017. Construction started in 2017.
Long Island	TOWN OF BABYLON	The Hamlet of Gilgo	Improvements to Potable Water and Fire Protection System – Gilgo and West Gilgo (IMP.S.201)	Elevate the existing West Gilgo community potable water supply wellheads as well as selected critical supporting infrastructure above Base Flood Elevation. Improve Fire Protection within the Gilgo community to minimize the distance between fire wells and residential structures.
Long Island	DASNY	The Hamlet of Oakdale	Oakdale/West Sayville Infrastructure Hardening (IMP.S.703)	The project proposes to raise a portion of Shore Drive in Oakdale.
Long Island	TOWN OF ISLIP	The Hamlet of West Islip	West Islip Community-Wide Drainage Study	The study will provide a strategy for drainage infrastructure upgrades to provide solutions for flood mitigation and to ensure a more resilient flood-protected community.
Long Island	TOWN OF ISLIP	The Hamlet of West Islip	West Islip Local Drop In / Distribution Center (IMP.S.125)	The project proposes to install a permanent generator at the West Islip Senior Center/Drop-in Center.
Long Island	TOWN OF ISLIP	The Hamlets of Oakdale and West Sayville	Oakdale/West Sayville Backflow Prevention/Check Valves for Storm Drainage Systems	This project proposes to identify stormwater outfall pipes that are subject to tidal/storm surge inundation. Implementation will include design, engineering, and construction of retrofits in selected locations.
Long Island	TOWN OF ISLIP	The Town of Islip	Greater Bay Shore Generators Resiliency Project	The project proposes to install generators at critical community facilities. The project will increase resiliency by securing continuity of service to support storm preparation, response and recovery.

Region	Subrecipient	Project Community	Project Name	Project Description
Long Island	TOWN OF ISLIP	The Town of Islip	Long-Term Flood Reduction Program - Pump Stations (West Islip) (IMP.S.024)	The project proposes to install a permanent generator at the West Islip Senior Center/Drop-in Center.
Long Island	TOWN OF BABYLON	The Village of Amityville	Village of Amityville Waterfront Resiliency Improvements	Design and install bulkhead and related drainage improvements at 22 public bulkheads throughout the community.
Long Island	TOWN OF BABYLON	Babylon/West Gilgo	Village of Babylon - West Gilgo to Captree Emergency Fixed Generators	Site 1: Design and install fixed, in-place standby backup generators at Village of Babylon's Village Hall, its Department of Public Works and its Cedar Street Fire Station. Site 2: West Gilgo Beach's Cedar Beach Marine Center.
Long Island	TOWN OF BABYLON	The Village of Babylon	Little East Neck Road Shoreline Stabilization (Babylon) (IMP.S.929)	Reduce shoreline erosion and flooding risk to residences and related infrastructure at the terminus of Little East Neck Road.
Long Island	TOWN OF BABYLON	The Village of Babylon	Araca Road (Dalton Point) Shoreline Stabilization (Babylon) (IMP.S.930)	Stabilize the shoreline and incorporate living shoreline elements at the terminus of Araca Road to reduce the frequency and risk of flooding and shoreline erosion at this location.
Long Island	TOWN OF BABYLON	The Village of Babylon and the Community of West Babylon	Village of Babylon/West Babylon Carlls River Tributary / Watershed Project (IMP.S.008)	Design and install recommended flood and stormwater infrastructure projects within the Carlls River tributary/watershed area within West Babylon and Village of Babylon area.
Long Island	TOWN OF BABYLON	The Village of Babylon and the Community of West Babylon	Village of Babylon/W. Babylon Coastal Outfall Backflow Infrastructure (IMP.S.020)	Design and install coastal outfall/backflow devices within the West Babylon and Village of Babylon area.
Long Island	TOWN OF BABYLON	The Village of Lindenhurst	Village of Lindenhurst Comprehensive Drainage Infrastructure Master Study	Comprehensive inventory of the Village's entire drainage system. Design and construction phases of this project will be overseen by the Village of Lindenhurst as subrecipient.
Long Island	VILLAGE OF LINDENHURST	The Village of Lindenhurst	Shore Road Waterfront Park Natural Systems Resiliency Improvements (IMP.S.705)	Project involves stabilizing the shoreline south of Shore Road Park in Lindenhurst to prevent erosion caused by wave action.
Long Island	VILLAGE OF LINDENHURST	The Village of Lindenhurst	Lindenhurst Drainage Improvements: Road Raising (IMP.S.932)	Project involves raising a portion of South 6th Street in Lindenhurst.
Long Island	VILLAGE OF LINDENHURST	The Village of Lindenhurst	Lindenhurst Drainage Improvements: Bulkhead Repair and Check Valve Installation (IMP.S.932a)	Project involves repairing bulkheads, installing check valves and other related drainage infrastructure in various locations in Lindenhurst south of Montauk Highway.
Long Island	VILLAGE OF LINDENHURST	The Village of Lindenhurst	Lindenhurst Drainage Improvements: Culvert and Leaching Structures (IMP.S.932b)	Project involves installing one culvert on Newark Street and multiple leaching structures in various locations in Lindenhurst.

Region	Subrecipient	Project Community	Project Name	Project Description
Long Island	VILLAGE OF LINDENHURST	The Village of Lindenhurst	Rainbow Senior Center Permanent Generator (IMP.S.018a)	Project involves installing an emergency generator in the Rainbow Senior Center in Lindenhurst.
Long Island	DASNY	The Villages of Shirley and Mastic Beach	Mastic Beach/Smith Point of Shirley Stormwater Management Plan and Improvements (IMP.S.004)	The proposed project will be carried out in two phases. Phase I of this project will develop a stormwater improvement study. The study will provide a strategy for drainage infrastructure upgrades to provide solutions for flood mitigation and to ensure a more resilient flood-protected community. In Phase II, the design, plans and specifications will be prepared for project bid and construction.
Long Island	TOWN OF ISLIP HOUSING AUTHORITY	Town of Islip	Oakdale Resiliency Generator (IMP.S.023)	The proposed project will design and implement storm resiliency improvements including an emergency backup generator at the Town of Islip Housing Authority Community Center at Ockers Gardens.
Long Island	VILLAGE OF AMITYVILLE	Village of Amityville	Amityville Storm Sewer and Roadway Drainage Improvements (IMP.S.019)	This project will consist of a preliminary engineering investigation of the storm sewer drainage system throughout the Village of Amityville. Upon completion of the study, the locations in need of improvements to expand the capacity of the existing storm drainage system will be designed and constructed.
Long Island	VILLAGE OF AMITYVILLE	Village of Amityville	Amityville Main Firehouse Permanent Generator (IMP.S.018)	Installation of a permanent emergency generator at the Amityville Fire Department.

EXHIBIT E

Recommendations Grouped by Governing Jurisdiction

All citations have been removed but can be found in the originating Chapter.

I. FEDERAL GOVERNMENT

The following recommendations found in this report have been identified as falling within the purview of the federal government.

From Chapter II: Storm Recovery and Reconstruction

- Long Island's members of Congress should work to make permanent the duplication of benefits policy amended by the FAA Reauthorization Act. The SBA and Department of Agriculture loans are the only forms of assistance on the list of duplication of benefits analysis that are not a grant. Loans are not grants and shouldn't be offset in the same way that grants are.
- Long Island's members of Congress should work to pass a bill that retroactively would apply this elimination of loans from the duplication of benefits analysis. An example of this type of legislation is the Disaster Survivor Benefit Clarification Act of 2015 that was proposed by New Jersey Congressman Tom McArthur. The bill would amend the Stafford Act to generally provide that "an SBA disaster loan made on or after January 1, 2012, shall not be considered financial assistance for purposes of the prohibition on receiving duplicative disaster assistance."
- If Congress is not willing to change the duplication of benefits law retroactively, Long Island's members of Congress should work to pass a bill requiring the federal government to forgive SBA disaster loans. A potential model for such legislation is the Disaster Assistance Recoupment Fairness Act of 2015.
- Federal policymakers should provide counties with the flexibility to help run certain aspects of a recovery as a partner of New York State by changing HUD rules that limit the flexibility of sub-grantees when it comes to procurement and contracting.
- Federal policymakers should modify national HUD income eligibility standards for housing and other assistance as they unnecessarily preclude many people of moderate means from getting assistance in high-cost regions like Long Island.
- Federal policymakers should change FEMA rules that limited STEP program contractors from doing ancillary clean-up work in a home while performing the required electrical and heating tasks.
- Federal policymakers should reduce redundancies and complication by creating a single shared common application for FEMA, SBA and HUD disaster recovery programs to allow victims to simultaneously apply for benefits from all of these agencies given their current separate (but similar) application and eligibility processes.
- Federal policymakers should consider replacing SBA and HUD disaster assistance programs with a new integrated federal disaster assistance paradigm that is centered under one disaster assistance agency and thus allows recovery programs to be more streamlined and coherent.

II. NEW YORK STATE

The following recommendations found in this report have been identified as falling within the purview of New York State.

From Chapter II: Storm Recovery and Reconstruction

- A Statewide /inter-County shared contractor database should be created to allow consumers to research contractor license information, complaints, and loss of license, among other things. All individuals/business entities which have received contracting licenses from any of the counties in New York State should appear in this database in order to allow a consumer to do proper research before hiring a contractor. As many construction-related regulations are established by New York State law and not County legislation, it might be most effective if such a database is maintained by the New York State Attorney General's Office. The contractor database should note which contractors have specialized experience in projects utilizing universal design and/or on behalf of people with disabilities. Municipal building departments should be required to post relevant information to the database, including if a contractor's projects repeatedly have failed inspections. Recovery Advocates (discussed below) and other disaster management case workers should also be able to report issues that clients have with contractors to the database.
- New York State law should be amended to allow a homeowner facing a situation of contractor non-performance to seek damages through a contractor performance bond and/or insurance if a contractor has declared bankruptcy, re-incorporated as a new business after losing a previous license, or left the state.
- New York State law requires a contractor to place customer funds in an escrow account or, in the alternative, to provide bond insurance. However, the SSRTF learned that after Sandy these requirements were not adequately regulated and enforced, as the post-disaster influx overwhelmed the capacity of many municipal building departments. Municipalities should prioritize stricter monitoring and/or enforcement of this requirement particularly at the permit application stage. Future State Action Plans should include funding for enhanced enforcement of this critical safeguard.
- New York State law should be changed to require that a contractor filing a mechanic's lien should have to provide documentary proof that a contract exists between the lien holderand the homeowner, that work was completed and/or materials provided, that payments were requested, and whether any payments have been made. In the alternative, each county within New York State should be permitted to impose additional filing requirements when mechanic's liens are filed with their respective county clerk's offices.
- Another alternative would be to have New York State law more closely conform with the law in New Jersey which requires the contractor to take some preliminary steps before filing a construction lien. For instance, the contractor must first file a Notice of Unpaid Balance with the property owner and the county clerk indicating the amount the contractor says is owed. After that, the contractor must submit the proposed lien – along with supporting documentation – to the American Arbitration Association for a "mini-arbitration hearing" which determines whether the lien is warranted and the appropriate amount owed. Only then can the lien be filed against the property.
- A permanent Reconstruction Advocate (RA) program should be created by New York State that would assist residents in navigating multiple governmental and private

(insurance companies, contractors, not-for-profits) resources and programs. For instance, the RA could help residents in dealing with funding for contractors from the state and reviewing contractor licensing with the county. By providing consistency and multi-jurisdictional expertise, the RA program would help homeowners understand complex federal program rules and requirements thus streamlining the recovery process and optimizing public funds. Because different programs and applicant needs require different areas of expertise, the RA program would need to be staffed with highly knowledgeable people who, for instance, can direct applicants to a case manager regarding documents needed to process mortgage assistance, a technical advisor to discuss specifics of construction plans, a customer service representative to check on project status, or an appeals/hardship specialist to review and discuss disagreements with program policy. Funding for this RA case management effort should be integrated into the state Action Plan related to disaster recovery efforts.

- Given the widespread underpayment of flood insurance claims following Sandy, the New York State Department of Financial Services should appoint a dedicated advocate in the wake of the next major flood event to oversee FEMA's calculations and advocate for NFIP policyholders when circumstances call for it.
- The determination of what constitutes "substantial damage" is left to municipal building departments to determine based on their estimates of construction costs and their professional judgment. New York State should consider requiring insurance companies to share their damage estimates with local building departments. An insurance payout of greater than 50% would result in the building department automatically issuing a substantial damage letter. Conversely, smaller insurance payouts would help building departments determine that a house is not substantially damaged.
- Post-Sandy there were significant variations in the procedures that different towns and villages followed for distributing substantial damage letters. Some towns and villages provided them to homeowners at their request while others required a more in-depth submission of documentation and/or inspection to receive a substantial damage letter. New York State should create a state-wide standard for how substantial damage letters will be formatted and provided, how substantial damage determinations can be disputed, and should set a time requirement on the amount of time a municipality has after a disaster to issue a substantial damage letter and provide notice to the building owner.
- If there is a future CDBG-DR Buyout program or other program for which one's home must be determined to be substantially damaged in order to qualify, New York State should ensure that the time to enroll into such programs should not end before the required deadline for municipalities to complete substantial damage determinations and inform property owners.
- New York State should meet with small business owners who went through the CDBG-DR application process to discuss ways to improve the process in the future, including a discussion of alternative ways to demonstrate viability – particularly for self-employed entrepreneurs – and reductions in the volumes of paperwork that need to be submitted.
- In order to permanently capture the lessons learned from GOSR, New York State should create a small standing agency within the NY State Division of Homeland Security and Emergency Services (DHSES) that can be scaled up when a disaster strikes and that would be comprised of individuals familiar with federal recovery programs, etc. Such an agency would be particularly useful in prioritizing pre-disaster mitigation funds that may

now come from FEMA as a result of the passage of the 2018 Disaster Recovery Reform Act.

- Given advances in document management and customer relationship management (CRM) tools since Sandy, there is no reason why a modern cloud-based database management/CRM system should not be set-up ahead of the next disaster (perhaps with FEMA's national leadership) so that resident data and documents immediately are captured and secured. A Chief Data Officer should be appointed by the state to help ensure that data is safeguarded and duplication avoided.

From Chapter III: Pre-Storm Resilient Adaptation

- In addition to grants, in order to fund a sand engine and other potential long-term protective measures for the barrier beaches, New York State could review the feasibility of implementing a $1 toll on Ocean Parkway for those non-Jones Beach Island residents using the Parkway to commute during rush hours. Such a toll would generate revenue that could be placed in a dedicated fund for barrier beach protection that would in turn preserve the Parkway and, in storm events, the South Shore. If commuters don't want to pay the usage fee they could take alternative routes like the Southern State Parkway or Sunrise Highway.

III. SUFFOLK COUNTY GOVERNMENT

The following recommendations found in this report have been identified as falling within the purview of Suffolk County government.

From Chapter I: Storm Response

- Now that Suffolk has taken the important step of aligning itself with FEMA's protocols, the appropriate departments of Suffolk County need to ensure that the County's emergency plans are continually updated and revised as national best practices continue to evolve over time. In particular, since the SC HMP expires in 2019, additional support in terms of federal and state grants are needed to help fund an updated version.
- Continual updating of the SC DMP and ongoing resources for training regarding its implementation are critical to ensure not only that storm-caused debris can be expeditiously removed so that residents can return to their lives but also so that long-term environmental damage can be avoided. In particular, man-made debris and materials can be harmful to coastal ponds and waterways, tidal wetlands and barrier beaches – and may also be washed further inland. The release of toxic materials contained and carried in this debris by storm events is potentially hazardous and can create long-term threats to life, safety and property.
- While the DEC can allow the use of air curtain burners in certain extreme situations, given ongoing air quality concerns in Suffolk, the County should emphasize chipping and grinding vegetative debris and should encourage municipalities in Suffolk to do the same. While not only more environmentally sensitive, chipping and grinding reduces the volume of the waste by 75% and allows vegetative debris to be recycled as mulch for use in agriculture, erosion control, and landscaping. Emphasizing chipping and grinding allows vegetative debris to be managed within each municipality, avoiding the costs of shipping out of the immediate area for disposal. Suffolk County has approximately the

same amount of chipping equipment as it did at the time of Sandy. Appropriate departments of Suffolk County should evaluate whether additional tub grinders and other chipping equipment should be purchased in order for the County (and, via loan or other arrangement, local municipalities) to be able to more rapidly clear and dispose of vegetated debris. As part of this analysis, the County should do a county-wide municipal inventory of existing chipping equipment and determine whether additional shareable resources are needed in the region.

- The reimbursement protocols of the federal government for storm recovery are exacting and difficult to adhere to. As a result, towns and villages in Suffolk and elsewhere have found it difficult to comply and, in some cases, have not received federal reimbursement because of their deficiencies in following the guidelines. As a service to Suffolk's towns and villages, appropriate departments of Suffolk County should hold online training sessions to provide high-level guidance to the municipalities regarding best practices for abiding by federal reimbursement processes in terms of reporting and accounting. If there is interest among municipalities, Suffolk County could also consider providing more in depth fee-based consulting services to municipalities in this regard.

From Chapter II: Storm Recovery and Reconstruction

- In conjunction with the HUB, an integrated, non-emergency local call center, like the UWLI 211 call system or New York City's 311 system should be instituted prior to the next major storm event. Such a system can be another effective tool to ensure timely, consistent and relevant information is provided to residents.
- Suffolk OEM should continue to partner with the LI VOAD by maintaining close working relationships, coordinating communication, partnering on trainings/workshops and attending all LI VOAD meetings.
- Suffolk OEM should work with the LI VOAD and the National VOAD to establish a compendium of best practices and a start-up toolkit for COADs while working to support (including a small amount of monetary support to assist with pre-organization) and train COADs in particularly vulnerable areas of the county.
- Suffolk OEM and other appropriate departments of Suffolk County should partner with the LI VOAD and its affiliates to maintain and regularly update lists of volunteers who are specially trained and "on call" to perform certain high skill recovery roles, for instance, electrical inspection.
- Suffolk County departments other than OEM should also engage with the LI VOAD to ensure that residents' needs are being met most efficiently through a coordinated public/private response.
- Since the federal census determines infrastructure dollars and funding levels from federal agencies such as FEMA and programs such as HUD's Community Development Block Grant (CDBG), Suffolk County should take a leadership role in promoting and funding census work in the county. An accurate count is critical when a disaster occurs.
- Suffolk County, through its elected officials, should advocate for greater philanthropic funding for our region. While NYC-based foundations rarely fund on Long Island, the Robin Hood Foundation did support Suffolk residents recovering from Sandy. The County is in a unique position to elevate the understanding of our region and its needs in order to attract new funding sources to address regional issues and crises.

- While the STEP program was a significant benefit to the recipients, the fact that this was the first time this program had ever been implemented meant that there were some lessons learned. Perhaps the most impactful of these is that residents moving back into their damaged homes often dealt with extremely high utility bills. One solution is for appropriate departments of Suffolk County to work with LIPA and other utilities to create a special reduced rate for those in the STEP program. Another possibility is to include in the state's Action Plan to the federal government a request to allocate some resources to assisting those participating in the STEP program with their utility bills for a defined period of time.
- Appropriate departments of Suffolk County should pre-identify a list of contractors with proper insurance and licenses who are made aware of the STEP program and pre-trained in its particulars. This will limit homeowner frustration by reducing the time from property inspection to actual work authorization. Similarly, the County should keep a list of suppliers who can provide needed equipment as one difficulty that the STEP program faced was a limited supply of hot water heaters and permanent furnaces.
- Appropriate departments of Suffolk County should coordinate with the municipalities and PSEG LI to run a training program to make sure there are adequate qualified electrical inspectors available to expand municipal capacity following future large storms. Unions, private electrical contractors, volunteer fire departments and the LI VOAD should all help to recruit potential inspectors. While in-person training should be required for all initial certifications, an online course should be created for recertification and for briefing already qualified inspectors so that they can be quickly and inexpensively activated when needed. A key issue that will need to be resolved based on the circumstances of the next disaster is how to handle indemnification for those inspectors who are not municipal employees.
- Appropriate departments of Suffolk County should consider issuing an RFP in coordination with the towns and villages to obtain pre-storm bids for critical recovery services such as temporary housing, inspections, electrical installations, and excavating equipment. Such an RFP could be re-bid every three years to refresh prices and suppliers. This would be in keeping with best practice guidelines from the federal government.
- The Stafford Act limited the impact of the STEP program because, for instance, workers could not be paid under this program to rip out moldy sheetrock while they were making the heating upgrades. Suffolk County should join with other localities who have implemented the STEP program to lobby for a change to the Stafford Act.
- Suffolk County should consider purchasing a few Hunter Shelters for use across the region and such use should be contemplated in any future state Action Plan.
- Suffolk County does not require continuing education for holders of home improvement licenses. However, such a requirement should be considered as a way to remind contractors of their obligations to their customers under the law. Currently, while contractors have to renew their licenses every two years, they do not have to retake the test on compliance with county and state business practices after they pass it to initially get their license.
- The Suffolk County Clerk should require as part of its filing process for mechanic's liens that staff will review the newly required documentation and also cross reference the SC DCA database of licensed contractors to ensure that the contractor is licensed or was

licensed at the time the work was allegedly completed/materials were supplied. Alternatively, the filing of mechanic's liens can be moved from the County Clerk's office to the SC DCA which can then perform the substantive review with a more thorough background and knowledge base than the County Clerk's office.

- Appropriate departments of Suffolk County should make sure that municipalities are aware of the CRS program and should consider hosting a meeting of interested municipalities to determine if regional resources and technical assistance might allow more municipalities to participate in the program to the benefit of Suffolk County residents.
- Suffolk County should consider creating a framework agency (or adding to the responsibilities of an existing agency such as the Suffolk County Land Bank) to administer future buy-outs. Such an agency initially could work with towns that currently facilitate voluntary buyouts and donations and be ready to staff up to be larger after a disaster or other large influx of funding for buyouts. This agency also could forge partnerships among local governments and non-profit organizations engaged in buyouts and facilitate communication with state and federal agencies.
- Given the huge costs of some renovations such as elevating a house, even those families with incomes above 80% of AMI struggled to come up with the funds needed to get necessary repair work started. Future supplemental housing recovery programs should allow up-front grants to pay a larger percentage of the project costs provided that homeowners take adequate steps to prevent contractor fraud, including agreeing with their contractors on a written payment for performance schedule. If additional up front financing is needed, the programs should work with local lending institutions and provide them with grant guarantees so that homeowners can obtain personal loans for this purpose at reasonable interest rates.

From Chapter III: Pre-Storm Resilient Adaptation

- For too long, development in Suffolk County has occurred in risky places, including barrier islands, wetlands, and bluffs, which puts that development at risk, leads to increased flooding for people and infrastructure, and damages our natural resources. Appropriate departments of Suffolk County and local municipalities should discourage further development in floodplains, marsh migration pathways and other areas that put people in harm's way and exacerbate flooding problems. Enabling more building in floodplains and vulnerable coastal areas perpetuates the past problems and is a lost opportunity to secure a safer future.
- The Suffolk County Planning Commission or another County agency/department should help identify vulnerable communities in Suffolk where, based on federal floodplain maps, strategic retreat may be necessary and should work with local municipalities to begin an initial planning process based on Montauk's experience. A first step could include providing a model code to assist municipalities in adopting some form of "rolling easement" to ensure that wetlands or dunes migrate inland as sea level rises thus reducing the risk of loss of life and property as has been done in parts of Maine, Massachusetts, and Rhode Island.
- Appropriate departments of Suffolk County should seek to partner with research institutions and not for profits to develop online planning simulation tools that

municipalities and civic organizations can use to educate the public about Suffolk County's shoreline vulnerability and to explore future planning options such as retreat.

- The Suffolk County Planning Commission should consider working to develop model building and zoning codes that towns and villages could adopt to incorporate storm and flood considerations for homes along the coast and in floodplains. These might include flood proofing requirements, elevation standards, wind-bracing and anchoring requirements.
- The Suffolk County Planning Commission in conjunction with the Suffolk County Supervisors Association should make recommendations regarding how municipalities, when they are reviewing permit applications for new developments and re-developments in flood prone locations, should anticipate and seek to avoid negative effects on adjacent areas and any downstream areas due to water-level change, storm surge, or flooding. Consideration of potential effects should include, but not be limited to, impact of diverted floodwaters onto adjacent properties; contamination of surface or ground waters; obstruction of natural sediment transport; and increased erosion of, or risk of damage to, adjacent built or natural areas.
- Wherever possible, natural wetlands should be protected and restored and allowed to migrate inland with rising seas. While engineered solutions are often required to protect critical infrastructure, structures such as bulkheads, riprap revetments, seawalls, jetties and groins have been shown to have an adverse impact on the ecology, coastal processes, and aesthetics of shoreline ecosystems. Where feasible "natural and hybrid approaches may be more cost-effective in the long-run in comparison to built-infrastructure, can strengthen the social, economic and ecological resilience of coasts, maintain the provisioning of coastal ecosystem services, and prevent the loss of life and property."
- The Suffolk County Planning Department's 1997 Narrow Bay Study recommended creating new parkland out of vacant County-owned properties that are within the 100-year flood plain. In 2018, County Legislator Rudy Sunderman proposed a resolution expanding this policy to include County-owned tax-delinquent residential properties in the Mastic Shirley Conservation Area. The resolution suggests that "[w]hen the County of Suffolk takes title to properties when their owners fail to pay their real property taxes, an evaluation should occur to see whether these properties are located within the 100-year flood plain. If tax-delinquent commercial or residential properties are within the 100-year flood plain, then they should be transferred to Parks or a local municipality for wetlands protection and restoration." The SSRTF recommends that Suffolk County extend this policy countywide.
- Appropriate departments within Suffolk County should work with local municipalities to evaluate the need to further harden storm water infrastructure in order to manage storm level runoff including identification of areas of rapid water table rise and salt water intrusion.
- Appropriate departments within Suffolk County should continue to develop and deploy onsite technology such as updated I/A OWTS and cluster systems in high density and high nitrogen contribution areas (using data from the Long Island Nitrogen Action Plan led by the LI Regional Planning Council and the DEC) and define flood impacts on operability to identify short term, post-storm potential health impacts to both surface and groundwater. Sewer cluster systems should be installed in targeted areas that currently

suffer from inadequate septic tanks and cesspools and which are at risk of salt water intrusion during storm events due to high water table levels.

- To help understand and mitigate the relationship between upland pollutant contributors and coastal resiliency management, appropriate departments within Suffolk County should evaluate the practicability of a comprehensive real time remotely accessible water quality and water dynamics monitoring alert system. Such sensors allow real-time information related to storm surge and debris management, drinking water, wastewater discharge, sources of pollutants to streams and estuaries, transport of nitrates and contaminants in major watersheds, and effectiveness of land-management practices on water quality. Such sensors can also predict hypoxic conditions, developing algal blooms, and the effectiveness of nutrient management options. Unfortunately current methods of measuring nutrient loading are both costly and inadequate. The Alliance for Coastal Technologies, which includes the U.S, Geological Survey (USGS), is currently sponsoring a "Nutrient Sensor Action Challenge" to encourage the development of cost-effective monitoring. Once the challenge is completed, Suffolk County should determine if pilot projects should be launched locally using the most promising technologies.
- While New York State has dropped parts of the deconstructed Tappan Zee Bridge into Long Island's coastal waters in order to support marine habitats, Long Island has not seen a program similar to those along Staten Island and coastal Virginia with the explicit aim of using marine habitats as breakwaters. The appropriate departments of Suffolk County should monitor the progress and results of the Staten Island and Virginia projects to determine whether similar efforts would be effective along Suffolk's South Shore.

From Chapter IV: Storm-Related Infrastructure

- The appropriate departments of Suffolk County should lead an effort to ensure that the towns and villages in flood prone areas work with National Grid to periodically review the effectiveness of the remote shut off valves in order to have confidence that they will work as planned.
- Since the need for gas station power backup is infrequent, the County should require that the more than 200 gas stations that have a transfer switch verify with their chosen generator provider on a periodic basis the compatibility of their transfer switch and the generator to be supplied to them.
- The appropriate departments of Suffolk County should encourage the several dozen Suffolk gas stations that have a transfer switch but no contract with a generator supplier, to obtain such a contract.
- The appropriate departments of Suffolk County should maintain an annual updated map of the locations of the gas stations that have a transfer switch and generator contract and should determine which gas stations in the County that do not have both should be required to do so based on their proximity to major roadways and evacuation routes.
- The appropriate departments of Suffolk County should require that the companies providing portable generators to gas stations in Suffolk during an emergency adhere to a regular maintenance schedule for the generators in their inventory.
- The appropriate departments of Suffolk County should maintain a small number of portable generators that are first designated for use at Suffolk gas stations when necessary. This would be in addition to the Fuel NY Portable Emergency Generator

Program and would ensure that the County has sufficient portable generators even if NYSERDA allocates its generators to other areas in New York State.

- The County should require that generator providers maintain a reserve of fuel supplies (diesel, gas, compressed gas) sufficient to fuel the generators they are contracted to provide for a minimum of five days.
- At the time of Sandy, Suffolk County was hindered by the fact that not all fuel stations run by the County for their own fleet of vehicles had backup power. As of 2019, the fuel station at the county's Riverhead facility has back-up generation and the Dennison Building station has a generator that needs to be replaced. The stations at the Old Infirmary in Yaphank and the Legislature Building in Hauppauge do not have back-up generators. Suffolk County should implement a plan to replace the generator at the Dennison Building station, install back-up generation at the Yaphank facility, and explore the cost/benefit of installing a back-up generator at the Legislature Building in Hauppauge.
- The Suffolk County Planning Commission should create a model code for Suffolk municipalities to consider in addressing this anchoring issue including assessing different means of tying down the tanks and creating a timetable for implementation.
- Consideration should be given to requiring oil/propane providers to act as facilitators of the enforcement of any new anchoring requirements – as well as existing anchoring requirements – by prohibiting those companies from filling any tanks in the 100 year flood zone that are not anchored (providers could presumably provide this anchoring service or property owners could do it themselves). Such a mechanism would provide more effective enforcement than merely relying on building departments to catch violations when doing property inspections and would also quickly catch those who skirt around the permit process for new tanks.
- If uniformity of codes and enforcement becomes an issue, Suffolk County should consider regulating all sizes of oil/propane tanks on residential and commercial property, as is done in Nassau County. Currently, Suffolk only permits and regulates tanks with capacity greater than 1100 gallons with Suffolk's municipalities handling smaller size tanks.
- Suffolk County should create a policy that it will require the use of permeable pavement where feasible on all development projects on county-owned land.
- The Suffolk County Planning Commission should create a model code for municipalities with regard to establishing zoning overlays in particularly sensitive areas where permeable pavement and other green methodologies could be required to mitigate storm water runoff. The Planning Commission also should help interested municipalities to develop a site plan review process with respect to green storm water infrastructure to promote and increase deployment of these techniques.
- The appropriate departments of Suffolk County should work with local cell tower owners to map the coverage areas of those cell tower locations with battery backup systems or generators capable of providing at least 24 hours of emergency power.
- The appropriate departments of Suffolk County should work with towns and villages that are considering approving new cell towers to encourage them to require the installation of backup power systems as a condition for approval.
- During Hurricane Michael in October 2018, AT&T deployed 15 portable cell sites to the most storm-damaged areas of Florida to provide connectivity to residents and first

responders. The appropriate departments of Suffolk County should work with Long Island's cell service providers to ensure that such portable cell sites are available here in case of a major storm.

IV. BI-COUNTY/LONG ISLAND REGIONAL

The following recommendations found in this report have been identified as requiring a bi-county/Long Island regional approach.

From Chapter I: Storm Response

- Since water level information is critical for storm response, if the US Geological Survey is not able to continue funding the Watch Hill and Moriches Bay water level gauges, appropriate departments of Suffolk County should seek alternative funding for the $84,000 per year needed to operate and maintain the gauges.
- Suffolk County should initiate a Community Information Center (CIC) program under the auspices of SC FRES and with organizational and operational leadership provided by the Volunteer Organizations Active in Disaster (VOAD) in conjunction with Community Organizations Active in Disaster (COADs) in the various areas. The CICs would be non-shelter locations where victims of a widespread storm emergency can get to by foot if necessary (so spaced every three to four miles along the South Shore, the North Shore and the middle of the island) and where information in multiple languages on home damage mitigation/ repair can be obtained electronically and/or via bulletin boards, phones can be charged, and wifi is available. The CICs would be a staging place for neighborhood well-being checks and would include a volunteer center run in conjunction with local COADs.
- SC FRES, working through the VOAD, should pre-identify sites that would be potential CICs in the areas in the County most vulnerable to a major storm event. Ideal locations would be centrally located in these vulnerable areas and have backup power. Potential locations could include firehouses, village/town halls, churches, community centers, civic organization halls, etc.
- SC FRES should create an MOU to be used with potential CIC locations when the need arises and periodically should discuss the MOU with potential CICs.
- As technology continues to advance, Suffolk should create a multi-jurisdictional and cross-department team (perhaps in conjunction with Nassau County) to annually review new technologies that can assist in storm response. Recent advances in just the last few years that are worthy of review for potential utilization include:
    - new flood warning/mapping tech like the MIT-developed RiskMap.us that gathers real-time, crowd-sourced flood reporting
    - new data driven dashboards for officials and emergency managers, such as Geospiza which uses predictive analytics and real time data including from Internet of Things (IoT) devices to help improve resource allocation during emergencies/natural disasters
    - use of drones and commercial satellite imagery to assess damage/danger
- As Suffolk County looks to implement the SC SSP as it relates to emergency management, it should consider the idea of Rich Rotanz (former Deputy Commissioner of New York City's Office of Emergency Management during 9/11) that Suffolk and

Nassau create a "Long Island Emergency Management Cooperative" comprised of OEM leadership from both counties that, within the context of home rule, will coordinate mitigation and preparedness activities for effective response to and recovery from the myriad threats facing Long Island's three million residents. Such an organization could coordinate research and training among Long Island's over 100 municipalities; keep an inventory of facilities, management and personnel; handle the maintenance and updating of MOUs; create uniform public education programs; and coordinate the response to Island-wide emergency events. In this regard, a Long Island Emergency Management Cooperative could play a coordinating and regional leadership role with regard to emergency management like the Long Island Regional Planning Council does with regard to planning.

From Chapter II: Storm Recovery and Reconstruction

- Suffolk County and Nassau County should jointly create an information ("the HUB") perhaps in conjunction with New York State and/or a private not-for-profit third party. The HUB should be the go-to place for residents to obtain accurate up to date information and guidance on preparing for natural disasters (i.e. how to access flood insurance, purchasing homeowners insurance, etc.) and recovering from them (i.e. vetting contractors, information on the parameters and processes of federal programs run by the Federal Emergency Management Agency (FEMA), the U.S Department of Housing and Urban Development (HUD) and the U.S. Small Business Administration (SBA)). Post disaster, the HUB could also be the entrée to an online application center for government benefits and programs. The HUB information should be disseminated via all major modern communications platforms including web sites, mobile apps, social media, traditional media, etc. In Suffolk County, the HUB could be paid for via a permanent "Community Information and Support Center" line item in the SC FRES/OEM budget.
- Suffolk County and Nassau County should jointly organize a data management conference including the various levels of government, agencies and leading client-facing not for profits with the goal of setting a data standard that all can use for intake, resource allocation and mapping. In addition, data sharing agreements should be put in place to allow the seamless sharing of information between the various governmental and utility entities.
- As described above, prior to the next disaster, Suffolk County and Nassau County – perhaps in conjunction with New York State and/or a private not-for-profit third party – should jointly create "the HUB", an information portal on pre-storm preparation and post-storm recovery. The HUB would be the "go to" source for critical information about recovery programs including details on the grant and loan application process. If the HUB existed when Sandy hit, residents would have been provided information on critical issues faced by victims such as how "Duplication of Benefits" analysis works and how "substantial damage" determinations are made and the implication of such a determination under FEMA rules.
- While the Enhanced Buyout Program has been generally successful, the voluntary aspect of the program has led to a checkerboard situation in some neighborhoods where now vacant land is interspersed among land held by owners who chose not to participate in the program. One way to mitigate against this is to allow towns and villages (rather than the state) to control which properties will be bought out in order to ensure land use

consistency in vulnerable areas. Another tool that should be considered is the use of eminent domain in rare circumstances where there are high risk properties and an unwilling seller. This option should be limited to those situations where a property has negative impacts on surrounding wetlands, where municipal maintenance of roadways that are often underwater is required, and/or where emergency responders can be put at risk if they need to get to the property during a storm event.

- Following Sandy, there was so much repair and rebuilding work to be done that there were not enough licensed local contractors to handle all of it. This led to significant delays in residents being able to get back into their homes and opened the door for unlicensed contractors to prey on those who were desperate for help. As Lori Bacigalupo of Island Park put it, "Many of us were at the point where you took what you could get, and you crossed your fingers." One way to help combat this lack of capacity problem is for appropriate departments of Suffolk County to help coordinate a regional approach to emergency trade licensure reciprocity. This could include temporary recognition of trade licenses across county lines, across town lines (currently Southampton, East Hampton and Shelter Island have their own contracting licenses), and across village lines as certain smaller villages only license a limited number of certain specific trade contractors to work in their jurisdiction. Consideration could even be given to recognizing trade licenses across state lines.
- The SSRTF learned that numerous Long Island contractors have lost their license in Nassau or Suffolk County due to failure to perform work or theft of funds but have remained permitted to work in the other county. Suffolk County and Nassau County should coordinate to ensure that this does not happen and that losing a license in one county causes the loss of one's license (or at a minimum probation and close scrutiny) in the other county.
- The Nassau County Legislature and NY State Senator John Brooks are exploring additional ways to enhance penalties for home improvement contractor malfeasance. Among the areas that should be discussed is whether the state criminal laws can be amended to establish the requisite *mens rea* for criminal negligence in situations where a contractor has failed to perform contracted work for multiple homeowners. The Nassau County Legislature has informed the SSRTF of their desire to work with the Suffolk County Legislature on this issue to see what changes can be made on the county level and what mutual efforts can be put towards lobbying to change state law. The SSRTF supports this joint approach and recommends that both County Executives and both District Attorneys be involved as well.

From Chapter III: Pre-Storm Resilient Adaptation

- Regional entities such as the Suffolk County Planning Commission, the LI Regional Planning Council and/or the proposed (see below) Long Island Coastal Commission should assist local towns and villages in (a) formulating zoning and land use policies that limit development in sensitive coastal areas, and in (b) reviewing local codes for potential obstacles to recovery, remembering "that laws that seem logical and beneficial today may become barriers to recovery when speed, flexibility and efficiency become paramount."
- The regional financial resources necessary for successful retreat initiatives will require new state and federal coastal funding mechanisms best handled by a regional coastal commission.

- Given the role that Long Island's barrier beaches play in protecting the densely populated South Shore, it is imperative that Suffolk County pursue policies that will strengthen those critical defenses. While FIMP will address some important immediate needs, the long-term viability of traditional beach nourishment is questionable. To supplement short-term efforts, Suffolk County and Nassau County should evaluate the possibility of seeking funding for a "sand engine" such as the one proposed by Interboro which would work in tandem with natural processes to build up our barrier beaches. While much engineering and scientific analysis would need to be done beforehand (and the tracking of beach dynamics would have to be done afterwards on a 10 and 20 year basis), use of a sand engine in the vicinity of both the Jones Inlet in Nassau and the Fire Island Inlet in Suffolk could be a viable option. To defray costs, the sand engine could also be used by other areas in the region such as along the New Jersey shore.
- Following conversations with the SSRTF, the RPA also felt that starting the regional commission effort with a Long Island Coastal Commission (LICC) could be a good first step. Therefore, the SSRTF recommends that Suffolk County and its municipalities begin discussions with Nassau County and its municipalities about how such a LICC could be structured and what responsibilities/resources it should have. At a minimum, an LICC could assist municipalities engage in responsible fiscal planning as a part of natural disaster resiliency program and could help municipalities to incorporate resiliency planning in to their land use and infrastructure decisions. This would ensure a more regional approach to protective measures compared with the hyperlocal approach of the CRZs. An LICC could also assist Suffolk County and its municipalities better coordinate and communicate on coastal issues with Nassau County, the US Army Corps of Engineers (coastal protection and risk reduction), the US Department of Interior (rivers and streams), the US EPA (water quality), the US Coast Guard (coastal protection and monitoring), NY State Department of State (coastal zone management) and the DEC (environmental protection, fisheries management, etc).
- Suffolk County should lead the way to begin the process of creating a county-wide (and possibly Long Island-wide) Resiliency Plan that would focus on community education and preparedness. Such a planning effort could be led by the Suffolk County Planning Commission, perhaps in conjunction with the Nassau County Planning Commission. Relevant resources have been created by Partnerships for Resilience and Empowered Planning, the RAND Corporation and the EPA.

From Chapter IV: Storm-Related Infrastructure

- While the construction of storm surge barriers are likely to be quite expensive and the efficacy of such barriers along softscaped inlets is an open question, in an era of rising sea level and increased storm activity the economic impact of protecting South Shore communities in this way may make sense. A number of other vulnerable locations in more developed areas in the U.S. (i.e. New Bedford, MA; Providence, RI; Stamford, CT; and New Orleans, LA) and around the world (i.e. London, UK; Rotterdam, the Netherlands; Frankfurt, Germany; Venice, Italy; St Petersburg, Russia; Tokyo, Japan; and Shanghai, China) have proceeded with the installation of such barriers. Our region should diligently explore the feasibility of installing storm surge barriers on the South Shore from the design, engineering, oceanography, sediment transport and erosion, water quality, fisheries and marine ecological health perspectives. Suffolk County should work

with Nassau County to obtain the funding needed to complement the already earmarked state grants in order to fund a full study along the South Shore of Long Island.

- ❖ As has been recently suggested to the FCC, the cell service provider industry should follow the mutual aid model of electric utilities by pre-positioning a pool of common recovery equipment that is shared across communications service providers. Such equipment could include portable towers, generators, fuel tanks, microwave backhaul equipment, and other types of communications equipment that are commonly used by such providers during recovery and restoration in the aftermath of disasters. Suffolk County should help initiate a regional conversation about the possibility of a public-private partnership in this regard.
- ❖ Appropriate departments of Suffolk County should do a regional infrastructure vulnerability assessment every two years to help identify major systemic weaknesses among both public and private assets, including municipal and private sewage treatment plants.
- ❖ Suffolk County and its federal and state elected officials should advocate for new infrastructure funding mechanisms such as an infrastructure bank and similar kinds of tools to help support critical resiliency projects like those being undertaken by the LIRR, by vulnerable Suffolk County hospitals, and at Bergen Point and the Southwest Sewer District.

V. TOWN AND VILLAGE GOVERNMENT

The following recommendations found in this report have been identified as falling within the purview of town and village governments.

From Chapter I: Storm Recovery and Reconstruction

- ❖ Local municipalities should review their codes and amend them if necessary to allow residents to use Hunter Shelters and other temporary structures as a "temporary storage unit" in order to allow people to quickly shelter on their own property following a disaster.
- ❖ New York State law requires a contractor to place customer funds in an escrow account or, in the alternative, to provide bond insurance. However, the SSRTF learned that after Sandy these requirements were not adequately regulated and enforced, as the post-disaster influx overwhelmed the capacity of many municipal building departments. Municipalities should prioritize stricter monitoring and/or enforcement of this requirement particularly at the permit application stage. Future State Action Plans should include funding for enhanced enforcement of this critical safeguard.
- ❖ As noted in the MAT report, "Unless constrained by State requirements, communities that enforce building codes with NFIP-consistent provisions have two primary tools to regulate development in flood hazard areas: (1) building codes that govern the design and construction of buildings and structures and (2) either Appendix G of the International Building Code (IBC) or local floodplain management regulations. These tools are designed to work together to result in buildings, structures, and all other development that are resistant to flood loads and flood damage." Suffolk's municipalities should review the FEMA MAT report recommendations and determine if their building codes should be enhanced.

- Local municipalities should file substantial damage letters in the same building department file as a title report so that a potential homebuyer would have notice of the defect with time to cure or withdraw from a contract to purchase.

From Chapter IV: Storm-Related Infrastructure

- Suffolk's towns and villages should enact legislation requiring that all homeowners and businesses located within the 100 year flood zone tie down any outdoor oil/gas tanks on their property, even if those tanks are exempt from the current anchoring code because the tanks are not "new structures or substantial improvements" since the codes were adopted about 10 years ago. Suffolk's towns and village should also consider expanding the area covered by the anchoring requirements to extend beyond the 100 year flood zone.

VI. FEDERAL, STATE, COUNTY & MUNICIPAL GOVERNMENTS

The following recommendations found in this report have been identified as requiring input from all levels of government.

From Chapter II: Storm Recovery and Reconstruction

- Given frustrations about the need for multiple daily conference calls to coordinate relief efforts, federal, state and county agencies along with the VOAD should look at utilizing new asynchronous communication platforms like Slack and Voxer to help streamline communication efforts.
- In the case of future storms with significant water damage like Sandy, all levels of government must help get the word out ahead of time about the need for not just food donations but cleaning supplies donations as well.

VII. FEDERAL AND STATE GOVERNMENTS

The following recommendations found in this report have been identified as requiring federal and state cooperation.

From Chapter II: Storm Recovery and Reconstruction

- In order to receive payment on a project that is being funded by a homeowner pursuant to a federal or state recovery program, a contractor should be required to (a) be licensed, (b) be in good standing on the statewide/regional database, and (c) have proof of insurance and a performance bond. Establishing such a requirement would entail a partnership between the SC DCA and the entity dispersing the funds.
- If there is another CRZ program in the future, it would be advisable for New York State to learn from this first time that this type of planning process has been done by more realistically managing expectations and by balancing out resources more proportionally between the planning stage and the design/implementation stage. Alternatively, the State could seek federal approval to provide block grants to municipalities for lower cost local resiliency projects, like generators, to allow them to be obtained more quickly and reserve the CRZ process for larger more regional projects which would require municipal buy-in up front.

- As suggested by the MAT report, the DEC should work with its counterpart, the New Jersey Department of Environmental Protection, to evaluate the FEMA model floodplain management ordinance (which was developed to coordinate with building codes) and adopt a coordinated ordinance to enhance local enforcement.

From Chapter IV: Storm-Related Infrastructure

- The enhanced Vegetation Management Program is already funded by FEMA grants, but much of the rest of the ongoing maintenance and upgrades to the T&D system will fall to LIPA ratepayers once the FEMA-funded HMP is completed. Suffolk's federal and state lawmakers should work to secure on-going federal funding and/or other grants to continue to harden Long Island's electrical T&D system. While the current FEMA grants are focused on enhancing the resiliency of the electrical system's most vulnerable areas, these areas only comprise approximately 10% of the circuit miles of Long Island's T&D system.

VIII. STATE AND COUNTY GOVERNMENTS

The following recommendations found in this report have been identified as requiring state and county cooperation.

From Chapter II: Storm Recovery and Reconstruction

- Given the difficulty in executing both the planning and implementation stages of the CRZ process under the strict federal funding timelines, Suffolk County and New York State should consider making investments in similar community-based planning efforts in vulnerable communities during blue sky days so that plans are developed with stakeholder buy-in and ready for implementation when new funding becomes available whether through disaster recovery allocations or through pre-disaster FEMA hazard mitigation funds.
- The determination of what constitutes "substantial damage" is left to municipal building departments to determine based on their estimates of construction costs and their professional judgment. New York State should consider requiring insurance companies to share their damage estimates with local building departments. An insurance payout of greater than 50% would result in the building department automatically issuing a substantial damage letter. Conversely, smaller insurance payouts would help building departments determine that a house is not substantially damaged.
- In preparation for the next disaster, New York State in conjunction with Suffolk County and other municipalities, should create a "Draft Action Plan" (DAP) incorporating both lessons learned from the Sandy recovery and new ideas. The DAP can be used as a jumping off point for structuring the state response following future natural disasters. Suffolk County should host a regional stakeholder conference to brainstorm ideas for the DAP. Based on conversations with former leading recovery officials consideration should be given to including the following items in the DAP:

    - Providing for a state of the art data management system to enable the free flow of information to and from residents as it relates to federal programs and case management. Such a system could interface with state/local online

information portals such as the HUB and would improve processing times, decrease the need for duplicative filings, and reduce misinformation and inconsistency.

- Allowing town and villages to control enhanced buyouts to ensure land use consistency in each area.
- Creating a Suffolk county-based call center so that local knowledge on the part of staff can enable faster responses to recovery questions; such a center could also serve as a "rapid response" unit for particularly urgent situations.
- Establishing funding for education and outreach by the LI VOAD and other regional VOADs in the state to low and moderate income residents to help them register for programs for which that they are eligible.
- Enhancing disaster case management capabilities by:
    - creating a Reconstruction Advocate program,
    - working with leading local not-for-profits to ensure that trusted community partners are engaged in the recovery process,
    - ensuring adequate numbers of case workers with local knowledge and providing long-term structuring of positions and compensation to reduce turnover.
- Creating a dispute resolution process for residents.
- Bifurcating the CRZ program into a block grant for cheaper items like generators so they can be installed more quickly while maintaining a more formal competitive process for larger regional projects.
- Providing STEP program participants with assistance in paying utility bills for some period of time.
- Changing rules for contractor payments to allow the state to provide more of a project's costs at the beginning to enable contractors to secure necessary materials and manpower, provided that steps are taken to prevent contractor fraud such as homeowners and contractors agreeing on a written payment for performance schedule.
- Purchasing some number of Hunter Shelters or similar types of temporary onsite housing to allow residents to remain in their communities while their homes are being repaired.
- Requiring that residents receiving federal housing funding only use contractors on certified lists of licensed, bonded and insured contractors maintained by the counties (which would need to be constantly updated) since the licensing municipalities have leverage over contractors but individual homeowners do not.
- Providing funding for municipal building department education to ensure awareness as to:
    - municipal responsibilities with respect to substantial damage assessments (including standardized processes and timelines) and FEMA home elevation requirements,
    - the required timing and sequence of inspections needed for specialized recovery-related projects like home elevations,
    - the need to monitor at the permit application stage the contractor's adherence to escrow or bond insurance requirements.
- Running some aspects of the recovery effort through the counties with

regard to certain programs where the county's close involvement with regional and local needs and processes is useful, such as housing reconstruction efforts and the CRZ process.

- Requiring that, when home elevation is required, the additional construction costs needed to provide for residents' medically documented accessibility needs is fully reimbursed. According to the Suffolk County Office for People with Disabilities, Sandy victims did not always receive full reimbursement.

From Chapter III: Pre-Storm Resilient Adaptation

- The Suffolk County Executive and Legislature should work with New York State and other regional municipalities to explore the creation of a Regional Coastal Commission.
- The Suffolk County Executive and the County Legislature in conjunction with the state government should create a dedicated funding stream for continued implementation of distributed wastewater treatment systems and sewers. While the SSRTF is not in a position to evaluate the pros and cons of the proposed county-wide sewer district and water protection surcharge water fee, it believes that such a dedicated funding stream is essential for long-term storm protection and notes Brookhaven Town Supervisor Ed Romaine's comment about the proposal that, "If there's a better idea out there, I'm still waiting for it." Other ideas that merit review to assist with funding our regional water quality needs include a regional infrastructure bank and tax increment financing.

From Chapter IV: Storm-Related Infrastructure

- Suffolk County in conjunction with New York State should seek funding for a study to identify opportunities for large-scale green infrastructure projects in the County – like those being done on the Lower East Side in Manhattan and on Staten Island – that would enable reduced reliance on municipal storm water systems by encouraging natural percolation through landscaping, pervious paving, open space protection, limits on vegetation clearing, and on site retention. Such an effort could also include demonstration projects to educate residents about opportunities to capture storm water on their own property via systems such as rain gardens.
- The County and/or State should create a revolving fund that would enable gas stations which are required to or encouraged to install a transfer switch to finance the payment of such an installation.

IX. COUNTY AND LOCAL GOVERNMENTS

The following recommendations found in this report have been identified as requiring county and local government cooperation.

From Chapter I: Storm Response

- Given the success that Long Island Cares had in working through local elected officials, County Legislators and Town/Village elected officials (in conjunction with Suffolk OEM) should coordinate with the regional food banks ahead of time to set up plans to service their jurisdictions.

- Since portable generators are infrequently used, appropriate departments of Suffolk County and local municipalities should ensure that a regular twice per year testing protocol is adhered to in order to ensure that the portable generators are in good working condition when needed.

From Chapter II: Storm Recovery and Reconstruction

- Since portable generators are infrequently used, appropriate departments of Suffolk County and local municipalities should ensure that a regular twice per year testing protocol is adhered to in order to ensure that the portable generators are in good working condition when needed.
- Given the success that Long Island Cares had in working through local elected officials, County Legislators and Town/Village elected officials (in conjunction with Suffolk OEM) should coordinate with the regional food banks ahead of time to set up plans to service their jurisdictions.
- Suffolk OEM should host an annual meeting in each township to enable county legislators and municipal officials to connect with their local COAD and the LI VOAD so that the officials can be aware of the available resources and community capacity to assist with storm recovery.
- Given the significant time and effort that went into creating thoughtful community-based plans, the CRZ reports should be used in the future by municipalities and other organizations in applying for grants from entities such as the NY State Regional Economic Development Council. Municipalities should also continue to consult the reports as a future resiliency roadmap for their area. At the conclusion of the CRZ implementation process, appropriate departments of Suffolk County should be sure to inventory those projects identified in the CRZ reports that do not get funding as they are still important resiliency projects which, if they are incorporated into the SC DMP, may be able to be funded via FEMA's Hazard Mitigation Grant Program or Pre-Disaster Mitigation Program or other sources.

From Chapter III: Pre-Storm Resilient Adaptation

- The Suffolk County Planning Commission in conjunction with the Suffolk County Supervisors Association should make recommendations regarding how municipalities, when they are reviewing permit applications for new developments and re-developments in flood prone locations, should anticipate and seek to avoid negative effects on adjacent areas and any downstream areas due to water-level change, storm surge, or flooding. Consideration of potential effects should include, but not be limited to, impact of diverted floodwaters onto adjacent properties; contamination of surface or ground waters; obstruction of natural sediment transport; and increased erosion of, or risk of damage to, adjacent built or natural areas.
- Wherever possible, natural wetlands should be protected and restored and allowed to migrate inland with rising seas. While engineered solutions are often required to protect critical infrastructure, structures such as bulkheads, riprap revetments, seawalls, jetties and groins have been shown to have an adverse impact on the ecology, coastal processes, and aesthetics of shoreline ecosystems. Where feasible "natural and hybrid approaches may be more cost-effective in the long-run in comparison to built-infrastructure, can

strengthen the social, economic and ecological resilience of coasts, maintain the provisioning of coastal ecosystem services, and prevent the loss of life and property."

- ❖ The Suffolk County Planning Commission should work with municipalities to develop a model floodplain overlay zoning ordinance to promote floodplain protection as has been done elsewhere in New York.
- ❖ Suffolk County and the local municipalities should protect natural shorelines wherever possible. In areas where some protection has been deemed necessary, living shorelines should be developed where practicable as the preferred alternative to hardened shorelines. Hardened shorelines should only be utilized when protection is necessary and conditions are not conducive to living shorelines such as in high-energy marine environments.
- ❖ Appropriate departments within Suffolk County should work with local municipalities to evaluate the need to further harden storm water infrastructure in order to manage storm level runoff including identification of areas of rapid water table rise and salt water intrusion.

From Chapter IV: Storm-Related Infrastructure

- ❖ The Suffolk County Town Supervisors Association and others have called for LIPA to come up with a plan to bury power lines in critical areas of the electrical grid that are in frequent need of repairs. Appropriate departments of Suffolk County should join with the Town Supervisors Association to meet with LIPA and PSEG Long Island to discuss the financial and engineering feasibility of such a plan. Towns and Villages should consider replicating Brookhaven Town's ordinance which requires all new subdivisions with four or more lots to have buried power lines.
- ❖ Since only prequalified fuel distributors with signed agreements with the state will be allowed to purchase fuel from the SGR, the County and all Towns/Villages should be sure to coordinate with their primary fuel supplier to make sure that the supplier is registered with the SGR and has an appropriate allocation planned for municipal needs.

X. NON-GOVERNMENT ORGANIZATIONS AND CORPORATIONS

The following recommendations found in this report have been identified as requiring participation from non-government organizations and corporations.

From Chapter I: Storm Response

- ❖ The CICs should be coordinated with PSEG Long Island to ensure that PSEG Long Island can use the CICs as community outreach centers to provide information on electrical outages and restoration plans.
- ❖ PSEG Long Island has made demonstrable progress in utilizing new technologies and procedures to improve communication with Suffolk's residents during storm events and to improve the flow of information with both municipal officials and restoration workers in the field. While these improvements have not yet been subject to a widespread major impact event, there is significant reason to believe that one of the primary weaknesses of the regional response to Sandy will now be one of its strengths. Of course, as technology evolves, PSEG Long Island must continue to optimize its communication abilities. For instance, once the new 5G wireless standard is rolled out on Long Island in the next few years, there will be enhanced opportunities for crowdsourcing information both from

people and devices (IoT) and for further enhanced two-way communication with customers and employees in the field.

From Chapter II: Storm Recovery and Reconstruction

- While the parameters of NY Rising changed over time making the bridge loan program less necessary, this revolving loan model can be replicated by CDCLI or other leading Long Island not-for-profits in future disasters to help certain income-eligible survivors take advantage of federal and/or state programs with phased payment schedules. A key aspect to establishing such a program in the future will be the willingness of local financial institutions, investors or philanthropists to earmark capital for such a disaster response.
- A structure/mechanism should be established through which Long Island non-profit organizations proficient in case management service provision can stand-up a more robust case-management program immediately following a disaster.

From Chapter IV: Storm-Related Infrastructure

- Since an aggressive hardening and resilience plan for natural gas infrastructure, such as the one being executed by National Grid, can create some resistance with regards to logistics and planning, the appropriate departments of Suffolk County should work with National Grid to ensure that there is agreement on how to achieve these regional goals in a timely fashion. This can include working with various levels of government to obtain access to rights of way to perform the work and with towns and villages to obtain necessary permits.
- PSEG Long Island and LIPA should continue to identify opportunities to communicate actions being undertaken to increase the resiliency of the T&D system on Long Island and the associated benefit of these efforts. Political leaders at all levels will need to help articulate to ratepayers why these expenses are important and provide a long-term return on investment.
- LIPA should consider breaking out Storm Preparedness expenses in an itemized line on LIPA bills so the public can see the portion of their bills dedicated to preparing for the next major storm.
- Where feasible, PSEG-LI should coordinate with other utilities (i.e. cable) whose wires used the same poles to simultaneously trim vegetation around those wires as well.