Long Island Regional Planning Council

LIRPC Meeting – November 16, 2022
Zoom Virtual Meeting Summary Minutes

LIPRC Members Present
John D. Cameron, Jr., Chair
Michael White, Vice Chair
Theresa Sanders, Secretary
Supervisor Don Clavin
Mayor Barbara Donno
Nancy Engelhardt
Mayor Robert Kennedy

Staff and Guests Present
Richard V. Guardino, Jr., Executive Director
Elizabeth Cole, Deputy Executive Director
Missy Leder, Executive Assistant
Rachel Titus, Program Coordinator

Kendra Armstead
Alan Belniak
Bill Blanchard
Patti Bourne
Malcolm Bowman
Rob Brodsky
Awaiss Butt
Rob Calarco
Robert Caroppoli
Rob Carpenter
Tony Ceglio
Kevin Denning
Sarah Devine
Daniel Dubois
Emily Durcan
Alan Duckworth
Kathleen Fallon
Charles Flagg
Mary Guardino
Steve Hadjiyane
Katherine Heaviside
Elizabeth Hornstein
Moni John
Ben Johnson
Legislator Al Krupski
Carl LoBue
Hillary Maldonado
Gregory May

Kevin McAllister
Justin McMahon
Erin Molyneux
Maureen Murphy
Pam Panzenbeck
Katia Read
Thomas Schultz
Gwen Schroeder
Manish Shah
Robyn Silvestri
Katy Simpson
Mark Smith
Edmund Smyth
Sol Steinberg
Jessica Sullivan
Corinne Testa
Liz Treston
Mark Wagner
Nathanael Wales
Michael Wright
Rich Zapolski

Meeting Commenced:
John D. Cameron, Jr., opened the meeting at approximately 10am.

John Cameron:
Good morning and welcome to the November meeting of the Long Island Regional Planning Council. Thank you. Our Executive Director, Rich Guardino, will now conduct a roll call.

Rich Guardino:
Welcome, everyone. Thank you all for being with us this morning.

Roll Call
John Cameron
Supervisor Don Clavin
Mayor Barbara Donno
Nancy Engelhardt
Mayor Robert Kennedy
Theresa Sanders
Michael White

Pledge of Allegiance

Alan Belniak:
Thank you for joining us this morning as we have an interesting, exciting, and informative presentation. Shortly, we will introduce our speaker who will present for the better part of 30 to 45 minutes. After that, the comment and question opportunity are given to members of the LIRPC. After the members of

the LIRPC, we will turn to the public to ask questions and share comments in one of two ways. You can use the Q&A function down below. If you move your mouse to the lower section of zoom, the Q&A button will pop up and you can type in your comment, and I will read it aloud. Alternatively, you can use the raise hand feature, which is also down below. That sends a signal to us that you'd like to speak or comment. I'll call out your name, send a command for you to unmute your mic and you'll then have a couple of seconds to share your comment or question. Please note, this meeting is being recorded. With that, I'll turn it back over to John.

John Cameron:
Thank you, Alan. Today we have a very exciting presentation from some very important work. As we all know, just a couple of weeks ago, we celebrated the 10th anniversary of Superstorm Sandy. We all recognize and remember that event which took place here and devastated Long Island and the metropolitan area. I believe over $60 billion in federal funding was applied to the metropolitan area to fund some necessary projects to rebuild. Today you will hear that while there has been some important work done to improve our resiliency and protection, we still have a lot to do. The Island is still very exposed to two major storm events: flood damage and storm surge.

We're very fortunate to have Dr. Malcolm Bowman with us today. Malcolm is a PhD and a licensed professional engineer. He's a Professor of Oceanography and a Distinguished Service Professor at the School of Marine and Atmospheric Sciences at Stony Brook University. For several years, Malcolm has headed up the New York/New Jersey metropolitan areas storm surge working group of which I'm very fortunate to be a member. That is a group of engineers, scientists, and decision makers for the New York metropolitan area looking at ways to protect ourselves and our region not if, but when, a second Superstorm like Sandy occurs. Mayor Robert Kennedy, who is highly knowledgeable in this area, is a Council member and on our panel today. The Village of Freeport was one of the hardest hit areas in the metropolitan area. Mayor Kennedy has significant knowledge and will provide a lot of input also.

Dr. Bowman will be assisted today by Steve Hajime from my office at Cameron Engineering. We've been supporting Dr. Bowman and Stony Brook on this project.

Dr. Malcolm Bowman:
It is great to be here this morning. I'm calling you from my office at Stony Brook. I've been working on the oceanography of the New York region, the coastal waters, the estuaries, and the continental shelf for over 50 years now. I have a good feeling for how the system works. As John said, Superstorm Sandy hit the region 10 years ago and devastated much of New York City, northern New Jersey, and the South Shore of Long Island. After that devastation, a few years later, I had a call from former State Assemblywoman Christine Pellegrino, whose district was on the South Shore near the Robert Moses bridge, and she asked me to do a study of how we might come to grips with protecting our region, particularly the South Shore of Long Island. I said, “Well, what do you want me to do?” She said, “Well, you tell me.” It was basically a gift to me, and I had to design a program. What I'm going to talk about today is a result of computer modeling and I'll explain that as we go along. Steve, we could have the first slide.

Protecting Long Island from future Sandy flood events. South Shore Sea gate study.
So, 10 years since Sandy, the memory fades. Some people say, “Well, Sandy was a freak of nature, it's not going to happen for another 700 years, Malcolm. Stop worrying about it and enjoy life.” But I know it's not going to go away, and problems are going to get worse as time goes by.

Next slide. I want to acknowledge the people at Stony Brook (colleagues and students) who helped with this modeling development and applications. Hamish Bowman, who is my son, did his undergraduate work at Stony Brook and we continue to collaborate by the miracle of the internet. Dr. Keith Roberts, a master's student here at Stony Brook, and now living in Sao Paulo, Brazil also worked on this with me. I should mention that the study was funded by the State Assembly and my assignment was to assess the feasibility of what we call sea gates or operable storm surge barriers built across the inlets of the South Shore of Long Island. By operable we mean gates that can open and close. These gates would remain open 99.9% of the time but could be closed when a huge extreme storm event is on the horizon.

Next slide. This is a map that you're very familiar with. I'm going to focus this morning on the Great South Bay Area, which is very long and technically called a bar-built estuary. The bar is really the barrier beach. It is that long, thin filament of sand that stretches from east to west and includes the city of Long Beach. The far left of course is New York City and Jamaica Bay and there you can see Kennedy Airport. This is New York City, which was not part of the study, but I will speak about it today as we are doing a lot of work in New York Harbor as well. The bay is very elongated and as you can see it stretches from northeast to southwest. The western end, behind the city of Long Beach, is full of little islands and sandbars. I like to call it an archipelago. It's a very complicated area.

Next slide. Long Island storm events don't come on a regular basis. As you can see the 1991 Nor-Easter, the so-called Perfect Storm, and the 1992 Nor-Easter. These are both winter storms and I believe 1992 was the storm that caused a lot of devastation including washing houses into the ocean. There was also a storm in 1993. Three storms in three years and then we jump to 2011 before we have a storm of that significance which was Hurricane Irene followed one year later by Superstorm Sandy. Since Sandy, we haven't really had a major hurricane this far north.

Next slide. Hurricanes have their genesis, or their birth, in the warm tropical waters mainly of the Caribbean Sea and hurricanes derive their energy from the heat of the ocean. That's the engine. The hurricane travels northwards, with the prevailing winds pushing it along, and it could be over the ocean, or it could be over land. Hurricanes gain the strength when they're over hot water. If they come ashore, they slowly fizzle out. Let’s turn back to Sandy which was a multibillion dollar direct and indirect impact on the New York Community including New York City, northern New Jersey, and Long Island. We're talking close to $100 billion. There was a huge impact on the South Shore of Long Island and its economy with thousands of homeowners and businesses displaced. I'm sure you know of these zombie neighborhoods created where people were not able to afford to raise their houses. Many just walked off leaving their communities tax base badly impacted. Then there was delayed and insufficient funding

leading to a slow and kind of piecemeal recovery. There was a lot of heartache and there are still a lot of sad consequences, but we don't hear about it much anymore.

The damage was caused by flooding because of storm surge. Storm surge is when the winds push the water along and create big waves, sometimes giant waves. They also push the waters towards the shore and the water piles up. The extra height above a normal up and down movement of the tides, which is five or six feet, is called storm surge. Sandy was the worst-case scenario we could ever possibly imagine. It was a non-rain event and was mainly the storm surges. The storm was downgraded by the National Weather Service just before it made landfall in northern New Jersey and that has all kinds of legal implications and insurance implications. It was a tough decision to make. It was not really a classical hurricane that was hitting from the east coast, instead it collided with winter noise in the North Atlantic and the two joined together and became the biggest storm event and the biggest diameter storm ever recorded by the National Weather Service at about 1,100 miles from East to West. Here on this slide, you can see the trajectory down to the Caribbean Sea at the bottom. Each of those yellow circles represents a day. That was the track and the weather forecast for classes of storms. In fact, all over the world there was sort of an international competition to see who could get it right. They all started at the same little spot there at the bottom and then tracked across Cuba and the Bahamas and then stayed offshore, very important, gaining heat from the Gulf Stream as it moved north. These were the forecasts day by day and the truth of the matter is most of them are wrong. Many of them had the storm moving over the North Atlantic towards Europe. Instead, the storm had this big turn to the left, and came ashore in northern New Jersey.

Next slide. Alright, so let's move our focus of this morning's meeting which is the South Shore. If you start at the bottom left, that's Verrazano Narrows which is the main entrance to the port of New York. It's also where the Hudson River discharges to the ocean. The next one is Rockaway Inlet which is the entrance to Jamaica Bay and its northeastern corner is JFK airport. These 2 inlets are extremely important. Moving east you see East Rockaway and Jones Inlet and those two inlets sort of frame the City of Long Beach. Moving on to Suffolk County is Fire Island and that's a major recreational inlet. Next is the New Inlet which is not a very romantic name. I like to call it the Flagg inlet after my colleague, Charles Flagg, who's in the building with me here. He studied this inlet which was punched through by Sandy. It just closed itself again, naturally, and it’s part of the Fire Island National Seashore and so it's protected. That means that even though the Army Corps of Engineers might like to fill it back in, the National Park Service knows they agreed to wait and watch as it slowly closes itself. Moving up is Moriches Inlet and then finally Shinnecock Inlet. These inlets tend to be created by major storm events and they can be maintained by humans with jetties, stonewalls, dredging and so forth. They become important access points in and out for commercial boats, fishing boats, and recreational vehicles. This is one of the photographs that Charles Flagg made over the 10 years. Every month, he flew his own plane with a camera underneath. This is looking straight down on the inlet, and you see this kind of white cauliflower like image. All that sand that has been sucked in through the inlet by the tides coming in and out twice a day. The sand came from the east on the bottom right of the picture. There's a general movement of sand from east to west from Montauk all the way into Far Rockaway driven by the waves coming into the beach on an angle. Every time there's a minor storm, and the tides go in and out, sand

moves inside the bay like that, and it eventually closed off. We have about 120 photographs. The Army Corps of Engineers has a responsibility for the maintenance of what we call navigable waterways. A navigable waterway is one where boats can and do get in and out. You might ask, “How small and how big are the boats?” Obviously, the main shipping ports have huge ships and tankers, but they also have fishing boats and recreational boats. They are responsible for keeping these inlets in good condition for all boats, dredging, and building up beaches. This is just one example of some of their studies over the years. It’s a big one, from Fire Island to Montauk point encompassing that whole South Shore region. It's been going on for about 50 years. It's complicated and intermittent and there's controversy. The one I want to draw your attention to this morning is one that's labeled on land, the Nassau County Back Bays Study. A few years ago, the Army Corps took on a study that was basically centered on the City of Long Beach and ended at the Nassau County southern border which is and interesting point because that's a political boundary. The oceans don't respect political boundaries. This study was made more difficult by the fact that they were restricted to what the defined study geographic area was. We'll see as we go along that we were able to kind of build on the core study and realize that we had to go much further west than just the Nassau County border.

Next slide. The Army Corps of Engineers has been very active in the New York - New Jersey Harbor region over the last half dozen years. This study is a $20 million study and it's coming to an end. Just recently, they released what they call a tentatively selected plan and they have come up with a bunch of alternatives. This image is the one that they're currently favoring, and it was just publicly announced a few weeks ago.

Next slide. Let's talk now about what we call a model. Basically, it’s the use of knowledge of physics and geology, and fluid mechanics, and modern high-speed computers to reproduce on the screen, what nature is doing in the real world. It's becoming very sophisticated and amazingly accurate. This has revolutionized the whole science of oceanography worldwide as we can study the planet from our computer desks. This is Great South Bay. Within each little triangle, every few minutes, data is collected about the tides, the currents, the up and down movement of the waves, and the winds. You can see the triangles get very small as you go in through, say Fire Island in the middle of the map. The green area is land. The model also can predict inland flooding. This is a map just to show you how many hundreds of thousands, almost millions, of these tiny little triangles exist. There are areas completely covered with triangles. That means during major storms, they get completely flooded.

Now this is a beautiful picture. The green is Long Island. And you might ask well, “How did you make that Malcolm?” Well, Keith and Hamish use what they call LIDAR which is an aerial kind of photography using lasers from a plane zigzagging over the whole area. It can measure the height of the land very, very accurately. What you're seeing there are the little streams that all fall into Great South Bay, and the green area is land. The dark green represents high spots of vertical and the little gray strips are almost like fingernails along the South Shore communities. The triangles can help us study flooding of these communities.

Here's another beautiful image where we've exaggerated the land. It almost looks like a mountain. It dramatizes that we live on a very flat island and the old rivers lead to the sea. You can see how there's the remnant of the glaciers. There's Kennedy Airport and Jamaica Bay. You can see the East Rockaway Inlet, the City of Long Beach and then moving to Jones. With our model, we can sort of fly around in space as if we're in a space shuttle or high-altitude plane. It almost looks like we have snowcapped mountains there up on the top right. It's not real snow. You can see that all these communities are built on the water's edge or on these little inlets. Looking at these pictures, you realize this wondrous creation of nature, this barrier Beach, and this long strip is a delicate filament that protects ourselves. It's very delicate.

Next slide. So, how on earth do we tap this problem of protecting the South Shore communities in various ways. We were given the assignment of looking at sea gates, think of them as saloon doors, in a bar that can open like this, or they can open different ways. The inlet is open 24 hours a day, 99.9% of the time. But if a big storm is predicted to arrive, say a hurricane coming up the East Coast, before the storm arrives, these gates can be closed. Some flooding comes from the ocean, but it's mostly flooding within the water already in Great South Bay. This is a major issue and where we made a lot of progress.

I'm going to be talking for a few minutes about baffles. A baffle is simply something that's in a tank of fluid that stops the water from sloshing around. A jet airliner does not have just one big gas tank. There are internal little baffles or little walls that stop the fuel from sloshing around which would be quite dangerous. Gasoline tankers on our highways have baffles inside those huge tanks of gasoline. Ships at sea that carry fluid cargo have baffles just to slow down the slushing as the ship rolls left and right. Otherwise, it could be very dangerous and ship overturn. I'm going to very briefly just shoot through seven scenarios we have created by modeling things that could have been done during Superstorm Sandy. Here we've recreated the Sandy strength winds and come up with these pictures. The colors represent the height of the water during the peak of the storm. You can see that all the flooding seems to be concentrated in the far western end. To the very left is a part of Jamaica Bay and Kennedy runway. The scale there is in meters. We're looking at a re-creation of a Sandy Storm with no gates and no baffles. You can see that all the buildup is in the western end. If you look at the large blue area on the eastern end, the water hardly went up at all, maybe up to one foot above normal high tide. So, what's happening there? During this part of the storm, the winds were blowing from the northeast, or from top right to bottom left, and they push the water. The wind pushes the water to the western end and creates waves which creates that massive area of flooding. This is the do-nothing scenario.

Next slide. Now we start playing games. We have put different theoretical gates in place just before the storm arrives. You will see a little black line drawn on the gate on the next few slides in different locations. This scenario has gates placed at East Rockaway, Jones, and Fire Island. Here, as the storm is coming up the east coast, operators will be told to close those three gates. As you see, it doesn't really help at all. In the Western Long Island Sound in fact, it even gets worse. Water is being held by the gates. Scenario two is not good. Let's try another one. This scenario is centered on the City of Long Beach. The red squares indicate the area where the water was predicted by our model to have flooded the land. It's a serious situation. We move on to scenario three which is where we put one baffle where the

Meadowbrook Parkway is. We build a little gate or wall right across that is just a few feet high and holding back that water (that is the red area just to the right of this baffle). Once again this seems to make things worse just east of the baffle. Let's move on to scenario four. Let's shut the gate at Jones and Rockaway. While we really aren't protecting against surge from the ocean, we're dealing with this very important issue called internal rate South Bay flooding. We didn't realize how serious this was until we got to this stage. Even with this baffle, east of the Meadowbrook is still very red so we cross this one off. We move to scenario five. This is very similar to the last one except if you look at very carefully, we've just changed the location from the Meadowbrook to the Loop Parkway and we took the gate out. Our thought was that we could maybe drain this water out to the ocean, so we'd have flow outward even during the storm. That did alleviate some of that orange area. It's good news for that whole area, including Freeport and Long Beach. Let's blow this up. The blue area you see here is Point Lookout. The Point Lookout folks are left completely unprotected and that's one of the dilemmas when you build these kind of modeling games. You draw boundaries someplace and there are going to be winners and losers. Think of this blue area like a medieval fortress. If you're lucky enough to live inside the walls of the castle, you're protected against enemy attack, but if you happen to live outside the walls, well, it's bad news. We move to scenario six. Let's try putting an additional baffle at the Meadowbrook Parkway in addition to the two sea gates at East Rockaway and Jones. It looks like we're on the right track. This is about as far as the Army Corps of Engineers went before they found this study a bit difficult and then moved on. This one is at Robert Moses. So, we have two baffles, and it looks like we're starting to get the surge under control. The Fire Island inlet does not have a gate so water east of that has been able to drain out. We move to scenario seven, which is the gold-plated Cadillac. We have devised a way of protecting the whole of the South Shore within the study area. So, we're very interested in this. The study is a modeling study and not an engineering design study. There's a lot more work to be done. All communities from the Great South Bay study area are well protected in this scenario so we believe it provides the ultimate protection. Of course, it's also at the highest cost. So, the benefits of storm surge barriers are that they provide comprehensive regional protection and can be appropriately activated and deactivated.

Next slide. This is marine engineering. We're going to see that in the US there already are sea gates in New Orleans which were built following Katrina. Stamford, Connecticut has had a sea gate since the 1960s. Providence, Rhode Island and New Bedford, Massachusetts, do also. This gate system was built and operated by the Army Corps of Engineers in the mid-60s. It provides wintertime strong protection for a fleet of over 500 fishing boats inside New Bedford Harbor which is one of the most productive fishing communities in the United States.

Next slide. This is the Fox Point gate in Providence, Rhode Island. It's an interesting system. These gates sort of swing up out of the water. They were used during Sandy. There was no flooding in Providence, Stamford, or New Bedford. Now we jump across to England and the Thames River which has a famous barrier system built and opened in the 1980s called the Thames River barrier. These are sort of like gates that rotate through the horizontal axis.

Next slide. Now, the granddaddy of them all, is the system in St. Petersburg, Russia. St. Petersburg is a beautiful city, but it's built on a river delta, much like New York City is built on a river delta. The Neva River is chronically flooded. These are giant swing gates that were basically a Dutch design and started during the Soviet era. It has been in operation for some years, and it completely protects the city.

Next slide. The Netherlands are the masters and world leaders in coastal protection. Half of their country is below sea level, so they don't mess around with their coastal protection. It is a matter of national security. They use a very complex series of systems. They realize it's part of their cost of living in the Netherlands. This is an example of one which is kind of a heavy-duty system much bigger than we would need on the South Shore.

Next slide. To summarize, this is where we're going. This study is preliminary. The South Shore is vulnerable to storm surges and rising sea levels. No one really knows how high the sea level rise will be. It could be one foot, three feet, or even worst case six feet. That is a very serious problem to the barrier beaches. More studies are needed.

John Cameron:
Thank you, Malcolm. That was extremely informative. The continuous dune system is very interesting. The Army Corp has been working on the Fire Island - Montauk point project for constructing dunes, etc. But to the west, The City of Long Beach fought having an expanded dune system until after Superstorm Sandy when they welcomed the dunes and the federal funding to construct the dunes. Unfortunately, to west of Long Beach all the way down to East Rockaway inlet in the unincorporated areas there is no continuous dune system. What happens is water seeks its own level and it will bypass around the city's dune system, around through East Atlantic Beach, and flood Long Beach again until that dune system is created. Many of the beach clubs oppose the dune system and federal funding because that would inhibit them from limiting the access. To the east, we also still have a lot of work to do.

Alan, please see if any of our Council members have questions and comments, and then we can open it up to the general audience.

Alan Belniak:
Great. Robert Kennedy, you're on mute but your hand is raised if you want to go first and share your comment or question.

Robert Kennedy:
Good morning, everybody. I just want to make a few comments. The Village of Freeport sustained over $250 million in damages due to floods since 1980. During Superstorm Sandy, we had 3,800 homes flooded under four to six feet of saltwater. Hundreds of businesses were damaged or ruined. Probably half of these homes were raised and now I'm knocking them down because they were never finished. It's become a health and safety issue. I'm knocking homes down that were raised before people turned and walked away with the money. I went up to New Bedford, Massachusetts with may officials and the Chamber of Commerce to examine the surge barrier gates installed there. They installed the surge

barrier gates in 1960. I think it was $18 million. The city has never flooded since they installed these gates. They close them two hours before a named storm. They open them up two hours after a named storm. I met with Senator Schumer shortly after that to discuss the surge barrier gates. That was in 2016. He was able to get us $3 million dollars for the Army Corps to perform a North Nassau County surge barrier study or Nassau County flooding study. After numerous public meetings, and exhausting over $3 million dollars, that study was transferred from New York to Philadelphia. The New York Army Corps no longer handles it. On October 23, 2020, I received a letter from Peter Bloom and the Army Corps of Philadelphia and I'm going to quote what he said. “The Philadelphia branch was directed by the Army Corps headquarters to omit the study areas that fall within the Cobra zone. Unfortunately, the Cobra criteria precludes continued study of surge barrier gates in Nassau County.” That's a quote. The feasibility study turned out to say we can't study surge barrier gates for the County at which time I went to a village attorney who investigated the Cobra laws. It turns out that there are exemptions in that law that allow you to build surge barrier gates in the Cobra zone. Subsequently we were told they were going to revisit it and study it again. We are in 2022 and there is no progress. We've exhausted $6 million. We need to put up those surge barrier gates to protect the South Shore of Long Island and fortify the barrier island. That's what needs to be done here.

John Cameron:
Mayor, if I may. I recall the slide which demonstrated where the Army Corps present plan reaches. I believe it stops around the Rockaway Beach area and does not include Nassau and Suffolk counties. It just was addressed for New York City and doesn't even include New Jersey. Frankly, it's not a comprehensive plan but a piecemeal approach which deals with certain areas and certain assets.

Robert Kennedy:
The fact of the matter is Rockaway Beach is not part of the Cobra zone. East of Rockaway Beach is and that's why they precluded the study of surge barrier gates when they found there was an exemption for it. They said we'll reanalyze it. We haven't heard anything yet.

Dr. Malcom Bowman:
Thank you, Mayor. We look forward to further discussion with you. In fact, we're having another session in your village next month. We have such a complicated layer of government bureaucracy, starting the federal government, with the Army Corps, with HUD housing, urban development, with EPA, with all those agencies, down through the states, down through the major cities like New York City, and then the counties, the boroughs, the towns, and the villages. Everybody has their sort of own idea of how to approach this. Everybody thinks they're in charge. But in fact, really, nobody is in charge and it's very frustrating. We haven't yet studied the cost of all this and that needs to be done. This is just the beginning. We use Superstorm Sandy as the worst possible storm, but those other five storms I talked about need to be investigated as well. We're not pretending we have this all figured out, but we think we're on the right track. We're encouraged it can be done if there's the political will.

Robert Kennedy:

I agree, but if you have another Superstorm Sandy, it's going to be a rippling effect. On Long Island, people are going to move away from the waterfront. We would have to pay taxes for people who are moving out and not staying here and then you lose people in central Long Island who can't pay those increased taxes. The rippling effect here is going to be catastrophic. It shouldn't take six years to do a study.

Michael White:
Malcolm, this is really an impressive piece of work. I think you've done a terrific job. One of the questions I have is, where are you with respect to the original funding? Is there a way perhaps the Council can assist in at least being an advocate for this work to continue?

Dr. Malcom Bowman:
This study, which has been going on for almost four years, was seriously delayed by COVID. It ends at the end of next month which is the end of this calendar year. There's so much that needs to be done and as I said, we're just sort of scratching the surface, looking at the feasibility. We need to work on the engineering, the environmental issues, the economic issues, regulations about COBRA, federal legislation. Any support you can give us would be much appreciated.

Michael White:
Dr. Bowman, I was just going to ask you, what do you think the cost of the next phase of the study might run? Do you have any idea?

Dr. Malcom Bowman:
That depends on what you include and what you don't include. I would say over two years including bringing in consultants to help with the expertise that we don't have here at the university, we could be talking about maybe $600,000 over a couple of years. I need to check this. It sounds too low.

Michael White:
I know you mentioned you haven't gotten that far in the study as far as the cost of the various scenarios. We all know the incredible cost and devastation from these storms. Do we have any kind of guesstimate of cost for these scenarios?

Dr. Malcom Bowman:
Well, we haven't worked on estimates, but the Army Corps has done cost estimates for barrier systems in New York Harbor. That's an order of magnitude of larger scale because they're meant to protect the whole Harbor. They're talking about $50 billion for a system that would protect the harbor and the Throgs Neck. They're concentrating on the core perimeter and building barriers and sea walls. A big problem is there will be 20-foot walls around many of the iconic places. There would be walls around Ellis Island and the business district in Lower Manhattan. They also must address both sides of the harbor and up the Hudson River. The Dutch philosophy is you need to shorten the coastline meaning you need to focus on the choke points where that surge comes in. For New York City, it's the Verrazano Narrows, and its surge is coming from Long Island Sound down the East River. For us, it's the South

Shore inlets. We have 120 miles of South Shore, and we have the six inlets. That's where we need to focus our attention and make this cost effective. The Army Corps are restricted by rich regulation about what they can consider to be benefits. They look at depreciated replacement or depreciated infrastructure. The constraint keeps them from looking at the benefit of increased economic activity inside, say, a harbor or an inlet that's protected from ravages of storm. For example, if we talked to the mayor of Stamford, Connecticut, he would tell you that, the economic development of the city inside the barrier has been progressive over many decades because the investors have confidence that their investments will pay off. The Army Corps regulations do not leave room to think about that nor to think about the value of potential lives lost in a devastating storm. But the political pressures are there. If you think of Katrina in New Orleans, 5,000 people perished. That brings political action, and the money follows. During Superstorm Sandy 50 people drowned in the tri-state region. While that is terrible, it doesn't bring the focus and the urgency. We must wait for Sandy number two to come roaring by before we wake up and say this was not a freak of nature.

Sea levels are rising. That's not a theory. It's not just climate change, the whole eastern seaboard is slowly going down. We're going down a foot every 100 years. Estimates vary between two and six feet. I hope it's not six feet by the end of the century. If it's two feet, three feet, I think we can handle that and we can keep our communities safe. Six feet is problematic. It's another great uncertainty.

Alan Belniak:
We have a couple of comments. I'm going to start to read them out. First comment says, “Mother Nature is in charge.” Another asks, “Will this presentation be posted to the LIRPC website so we can share it?”

Rich Guardino:
The answer is, yes. We will have it on our website.

Alan Belniak:
Carl asks, “Does the modeling include large amounts of rain that could come with a storm of this magnitude?”

Dr. Malcom Bowman:
Well, that's a good question. Superstorm Sandy was not what we might call a rain event. Just recently, there was a huge rainfall event that created all kinds of sewer backups in New York City. I think what Carl is asking is if these gates contribute to a flooding event if the rain collects inside. The answer is no, not really. If you do the calculations, the water inside the gates may rise a few inches or more with extreme precipitation, but we can calculate and work with that.

Robert Kennedy:
In New Bedford, Massachusetts, they have pumps to pump the water back over or through the barrier gates into the ocean to prevent flooding on the city side of the barrier gates. They have never failed and

that's what keeps this system dry. Additionally, there are generators in the event of a power outage. These pumps continue to pump the water back into the ocean.

Legislator Krupski:
Thank you. This is very, very interesting and informative. The question I had regards what the modelling cannot take into account, like the fact that Mother Nature does not play by our rules. One of the earlier slides showed the storms where on the east end those Nor'easters led to water build up in the Peconic Gardiners Bay for three days and as a result, a lot of homes were flooded. Many homeowners elevated their homes and then the eastern towns had to deal with stormwater issues. Does this modeling consider that this might not be a storm event like Sandy where it sweeps in and causes havoc and then disappears, but rather leads to days after days of water building up? In trying to hold it back freshwater from stormwater does it all accumulate and have no place to go. My other question is, have you considered this shoreline hardening effect? I think the Army Corps did a very poor job in Montauk with shoreline hardening. They're trying to hold back the Atlantic Ocean, spending an awful lot of taxpayer money trying to keep the beach.

Dr. Malcom Bowman:
This fundamental difference between hurricanes (the hurricane season runs through the end of October from June) and what we call Nor'easter storms is interesting. For many storms a lot depends on the timing. Superstorm Sandy hit the beaches of northern New Jersey at high tide during a full moon. It was a freak event in that the hurricane hit at the very high tide. If it had hit the beach six hours earlier or six hours later, the outcome would have been different. Timing is everything for hurricanes. Other storms can last for several days through several cycles of high tide and low tide. There needs to be sort of development of smart management techniques in opening and closing the gates. There needs to be active management and coordination. The other question that comes up all the time is that if you slam the gate shut in front of a menacing storm surge coming from the ocean, where will the water go? As the Dutch say, you're shortening the coastline. It's not like a tsunami, which is a wall of unstoppable water that will just destroy everything. It's basically an extra high tide. If it does break through, of course, there will be what you might call collateral damage.

Soon after Sandy, I went to the Netherlands, and I visited some of their coastline. We saw the big engineering structures, but we also saw the enhanced dunes. They don't mess around. They have built the dunes up to 30 feet high. The communities, these little, lovely Dutch villages, are all protected and they're safe, but they had to make a big sacrifice.

John Cameron:
It's interesting that you mentioned that folks resist some of these improvements, since they lose their view. That's exactly what happened in Long Beach. They resisted all the improvement with both the jetties and the sand dunes because they wanted to be able to walk down the street and look at the ocean. Within a couple of days after Sandy, that resistance went away, and they realized that they could sacrifice some view to secure their city.

Alan Belniak:
The next question is from Patti Bourne. She asks, “As I understand it, Sandy was a unique storm that did not come from the normal direction of storms. Working for the city of Long Beach, I know that parts of the city were flooded during Sandy that had never flooded before. Does the model work for other potential type major storms?”

Dr. Malcom Bowman:
The answer is yes but we haven't had the time or the resources to completely flush this out. There are six storms where we have very accurate wind meteorological data. The National Weather Service creates (with their computers) a weather forecast with winds and pressure systems blowing over the ocean, blowing up the land. They update their weather forecasting models all the time. So, the ten-day forecast that you see today might look different tomorrow as they are updated constantly. So, we use historical observations of the weather by the National Weather Service and combine that with computer models and we come up with what we call reformulated winds. In other words, we have accurate measure of the winds for those six storms that I mentioned. Now, we've only looked at Sandy, and the other five are quite different and we need to look at those. So, the answer is yes, it could work for other types of storms. Every storm is unique. Every storm has its own signature wind patterns and destruction. Every storm has its uncertainties.

Alan Belniak:
Next is from Citizens Campaign for the Environment and they asked, “Have there been any studies on how the barriers and the baffles would impact restoration efforts in water quality in the South Shore estuary reserve?”

Dr. Malcom Bowman:
Good question. That was beyond our sort of “preliminary study” that we're just completing. There's this philosophical divide between the gray and the green. I am talking about the grays of the engineering community and the green of the environmental community. Both communities are sometimes talking past each other rather than to each other. I sort of come from both. I'm a physicist. I'm an engineer, but I'm also an environmentalist. So, I wouldn't be here talking to you if I felt that the system would wreck the local ecology, but these studies need to be done. They need to be done carefully. The tough decisions have to be made. If we're going to build things, we need to examine where they are going, how big they're going to be, how long they're going to last, and what will be the effect on the on the local ecology. And you know, everything I've talked about shouldn’t negate the so-called “natural solutions.” Things like the Billion Dollar Oyster Project rehabilitation. These are all very important. The problem is when you get to a Sandy scale event with 9–10-foot surges, you have to go beyond just so-called “natural solutions.”

Alan Belniak:
Indeed, and thank you for those comments. I'm scanning one more time. I don't see any additional hands raised from panelist or attendees. I do see one remaining text comment. From Kevin McAllister, “Does the model consider a rising sea level due to climate change?”

Dr. Malcom Bowman:
Good question. Kevin. These gates cannot really protect the South Shore communities from rising sea level because they need to be open 99.99% of the time for the natural title flushing of the estuaries, preservation of water quality, migration of fish, etc. You can't just build gates and keep them closed 90% of the time. We must be aware that there are problems we're creating through global warming, and that is very serious, but there are natural forces at work as well.

John Cameron:
Malcolm, if I could add to that. This is really addressing episodic, potentially catastrophic events. For these episodic storm surge events you need a layered defense system, which the storm surge working group has always talked. We need a layered defense system because climate change and rising sea levels will not be resolved by buying light barriers. We need a combination of storm surge barriers, oyster reefs, elevation of properties, etc. This issue necessitates an integrated solution to deal with the issue of climate change, as well as the episodic events.

Dr. Malcom Bowman:
Well, I like to put this problem in human terms, the storm surge is like a sudden heart attack that comes out of nowhere. It can cause serious damage, but with proper care, your life goes on. That's like the sudden unexpected storm surge. Then you think of chronic diseases as we age. Diseases that are not going to go away. We try and manage them. That's the lesser destructive, but slowly persistent, rising sea level. We all want to live healthy lives as long as we can, right? We go to the doctors, we go to the hospital, we do what we can. But in the end, there's an end to everything right, including us. So, the same thing is true about communities and cities. I think in Europe, they have a different societal sense of being more proactive than reactive. What do I mean by that? The City of London is 2,000 years old. The people who run the City of London realize they need to protect their city. They plan for the future. We are a younger country and operate thinking we can do anything.We are a “put a man on the moon” sort of society. We're also a wealthy country. If a Sandy comes along and is terrible, the federal government chips billions of dollars help fix it. We're not planning. We just wait for the next catastrophe and say, well, we'll fix that and move on.

John Cameron:
Malcolm, thank you very much. Today was extremely informative. This is an important issue. Like you said, the money that has been spent to date has been with a piecemeal approach, and not an integrated or regional approach for solving our issues. Hopefully, we can be talking about addressing these issues in the present rather than always in the future.

Dr. Malcom Bowman:
Thank you. If anybody has any further questions, don't hesitate to get in touch with me out here at Stony Brook.

CHAIRMAN’S REPORT

John Cameron:
In the aftermath of last Tuesday's election, I guess we can say that the only areas that received the long anticipated red wave were Florida and Long Island. Nationally, the anticipated flip of Democratic US Senators didn't occur and the change in Democratic House Representatives was far less than widely projected. That change, however, was sufficient to cause a change of control in the House of Representatives which should result in greater control of federal spending, as well as some anticipated investigations of presidential family members and other governmental agencies. Seventy-five percent of the American public states that they are dissatisfied with the direction of the country but that did not translate into actual vote for change. There has been much speculation from various sources as to the cause of the election results.

Statewide we had the closest gubernatorial election in almost 30 years with Long Island native Lee Zeldin, losing the election by less than 6%. Long Island had a strong red wave voting for Republican candidates in all major statewide elections, including the four congressional races. Some state Senate and Assembly seats also flipped to the Republican side. The passage of the $4.2 billion environmental bond presents significant opportunities to deal with our environmental challenges here on the island as well as the rest of the state. We'll have to wait to see how these changes in our electorate impact how Washington D.C. deals with Long Island particularly with respect to funding and grants. We shall see. This coming year we will have county and town elections in both Nassau and Suffolk. It will be interesting to see which candidates throw their hat in the ring for those positions.

In closing, I believe we all know that we're living in challenging times nationally, statewide, and locally. Crime in our cities has grown out of control. Inflation is a fact and has affected our buying power. Drugs such as fentanyl pose a risk for the safety of our children. We need to hold our elected officials accountable to protect the quality of life that we as Americans deserve and demand.

EXECUTIVE DIRECTOR'S REPORT
Rich Guardino:
Thank you, John. I'd like to just spend a couple of minutes this morning talking about the Long Island Nitrogen Action Plan. Dr. Bowman had some excellent slides showing the Hempstead Bays where we are doing water quality monitoring monthly. This includes the collection of water samples from Hempstead Bay and its tributaries. We also monitor atmospheric nitrogen deposition. All the water quality data for Hempstead Bay from 1976 through 2022 has been uploaded to the Environmental Protection Agency's water quality exchange database. The team at Hofstra and the Town of Hempstead submitted a report on the water quality in Hempstead Bay from 1968 through 2022. The report compares past water quality data with new data collected under our water quality monitoring program, which started in 2019 and continues to date. We're going to be better able to understand recent trends in water quality and put those trends in historical context. We will also observe how the major infrastructure projects that are taking place in the Hempstead Bay are affecting the water quality.

The next thing I wanted to mention is the Long Island Water Quality STEM Challenge. Recognizing the need for greater interaction between professionals engaged in science, technology, engineering, art and

mathematics in our schools, the Council developed a STEAM challenge related to the Long Island Nitrogen Action Plan for Long Island middle schools and high schools. Now in the third year, the goal of the initiative is to connect students, teachers and their communities with issues being addressed by the Nitrogen Action Plan. The challenge invites teams of students to develop and design projects on school grounds which will either reduce the use of fertilizers and pesticides and water consumption or devise methods to treat and collect stormwater runoff from the school property. We started the STEM challenge for 2023. We put out a Request for Expressions of Interest and we're excited that we have 17 letters of interest, 11 from high schools and 5 from middle schools. We were recently at Herricks High School for a ceremony recognizing the students. It was great to be with all those young people and see the improvements they're making to their high school.

We're also working on a Homeowner's Rewards Program, which enables homeowners to be reimbursed for small scale water improvement projects on their properties. This program is currently utilized by the Peconic Estuary Partnership. The Council is working with the New England Interstate Water Control Commission to expand the program island-wide. The Council staff has been working with the Commission to set up the program, the documents, and the website, and we expect to launch the program in the spring of next year.

In September, the Council passed a resolution authorizing an agreement with the Town of Hempstead to transfer Nitrogen Action Plan grant funds to the Town of Hempstead to retain Cashin Associates for preparation of an aquaculture lease license feasibility study. The contracts have been executed and they've already had a kickoff meeting.

We also passed a resolution in September authorizing agreements with Save the Sound for targeted outreach and training for Long Island water quality data generators to participate in the Quick Drops community data platform. Quick Drops makes data easily accessible and facilitates the upload to the United States Environmental Protection Agency's water quality exchange database and makes the data available for download from the portal. Work is expected to begin soon.

Finally, let me mention Nitrogen Smart Communities. The Council and the DEC are in the process of developing a Nitrogen Smart Communities Program, which is part of the LINAP initiative. It encourages municipalities in Nassau and Suffolk counties to take meaningful and effective action to reduce, prevent, and eliminate nitrogen pollution in Long Island's water through community specific plans of action. The Council and DEC have been meeting internally on a bi-weekly basis to work on the program documents. The program will involve understanding analysis of each community’s specific sources of nitrogen and then planning strategic projects that will reduce nitrogen at a local level. The documents are close to being finalized. We'll be approaching two municipalities, one in Nassau and one in Suffolk, to participate as pilot communities. The program will also send a request for proposals out in January to hire a consultant for the pilot phase to assist the municipalities in completing the more challenging steps of the program, as well as providing feedback and lessons learned, to help shape a successful full-scale program. We're excited to get Nitrogen Smart Communities off the ground.

John, that completes my report.

John Cameron:
Thank you, Rich. Do we have any other new business from the from the Council? Are there any questions or comments from the audience? With that we will close the meeting for today. Thank you everyone.

Motion to adjourn. So moved. All in favor.