



Governor's Office of  
Storm Recovery

SUMMARY REPORT



# RESILIENCY STRATEGY

SEPTEMBER 2017















RESILIENCY STRATEGY

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Supplemental Report Information (under separate cover)

Objective #1 - Vision Statement, Purpose, Needs, & Goals Report

Objective #2 - Description/ Assess Waterbodies Report

Objective #3 - Identify Stakeholders & Assess Laws Report

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Objective #5 - Watershed Management Recommendations Report

Objective #6 - Prioritize Projects and Actions Report

Objective #7 - Implementation Strategy & Schedule Report

Objective #8 - Tracking and Monitoring Plan Report









## introduction

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The Mill River watershed, located in southwest Nassau County, is a microcosm of New York's Long Island. The river winds through several communities, buried in pipes and traveling through freshwater lakes, before finally entering Hewlett Bay through a narrow estuary. Although urbanized, the Mill River supports a variety of wildlife and serves as a water access point for local residents.

In response to the devastation of Hurricane Sandy, the US Department of Housing and Urban Development's (HUD's) Rebuild by Design (RBD) program awarded funding to New York State through the Living with the Bay (LWTB) proposal, which promoted a watershed approach to protect and enhance this diverse area. To advance this proposal, a Resiliency Strategy was developed to identify and evaluate projects across approximately 10,000 acres making up the program area.

Early in the process, a framework was created to evaluate flood mitigation interventions throughout coastal areas subjected to tidal and storm surge flooding but also upland areas impacted by stormwater runoff. The process guided the varying stakeholder groups, including seven municipal governments, to consensus on a collection of projects meeting the LWTB Goals – flood mitigation, preserving quality of life, restoring environmental health and water quality, creating and improving waterfront access, and providing water-related education opportunities.

### Living with the Bay Vision Statement

“To improve community resiliency in the program area by mitigating local flood risk from stormwater and storm surge as well as implementing ecological marshland restoration and enhancing public access to the waterfront.” ”



# executive summary

New York State Governor’s Office of Storm Recovery (GOSR) engaged the Tetra Tech team late in 2016 to develop a Resiliency Strategy based on a watershed management approach to identify a program of defined improvements. Early in the process, the team along with GOSR, developed a strategic sequence of activities created to guide the varying dynamic group of stakeholders to consensus of a collection of projects aimed at the LWTB Goals.

Two (2) key issues surround the implementation of the LWTB program. The first includes identifying projects that are effective, catalytic, and prototypical while addressing the LWTB Goals. Another issue includes ownership as well as operation and maintenance. While segments of the program area are publicly owned, a majority of the waterfront lies in private ownership and creates significant challenges for implementation and operation and maintenance responsibilities.

The Resiliency Strategy identifies and prioritizes interventions that independently address problem areas and collectively improve the resiliency of the Mill River corridor. GOSR, along with HUD, has earmarked a portion of the Rebuild by Design competition as the primary funding mechanism for the proposed improvements. However, in

order to accomplish this, the program and projects must adhere to GOSR, HUD, and RBD requirements.

In order to ensure forward progress, the team reviewed several completed past studies and conducted numerous group and one on one meetings with stakeholders. The stakeholders included the public, GOSR, and two (2) separate advisory committees – Citizens Advisory Committee (CAC) and Technical Advisory Committee (TAC). The CAC is comprised of 18 members of the public. The TAC includes members of staff from local municipalities and jurisdictions in the

LWTB program area.

The Mill River communities have an excellent opportunity to redefine infrastructure investments with a focus on resiliency that can serve as a model for Long Island. The combination of federal funding, cross-political collaboration, and a committed community with a valued history creates a unique opportunity. The recommended projects provide the framework to reduce the risk and vulnerability of this area and its valuable assets and provide its residents a more resilient infrastructure and environment with an enhanced quality of life.

Aerial photo with LWTB boundary delineating the 10,000 acres included in the Resiliency Strategy Program Area









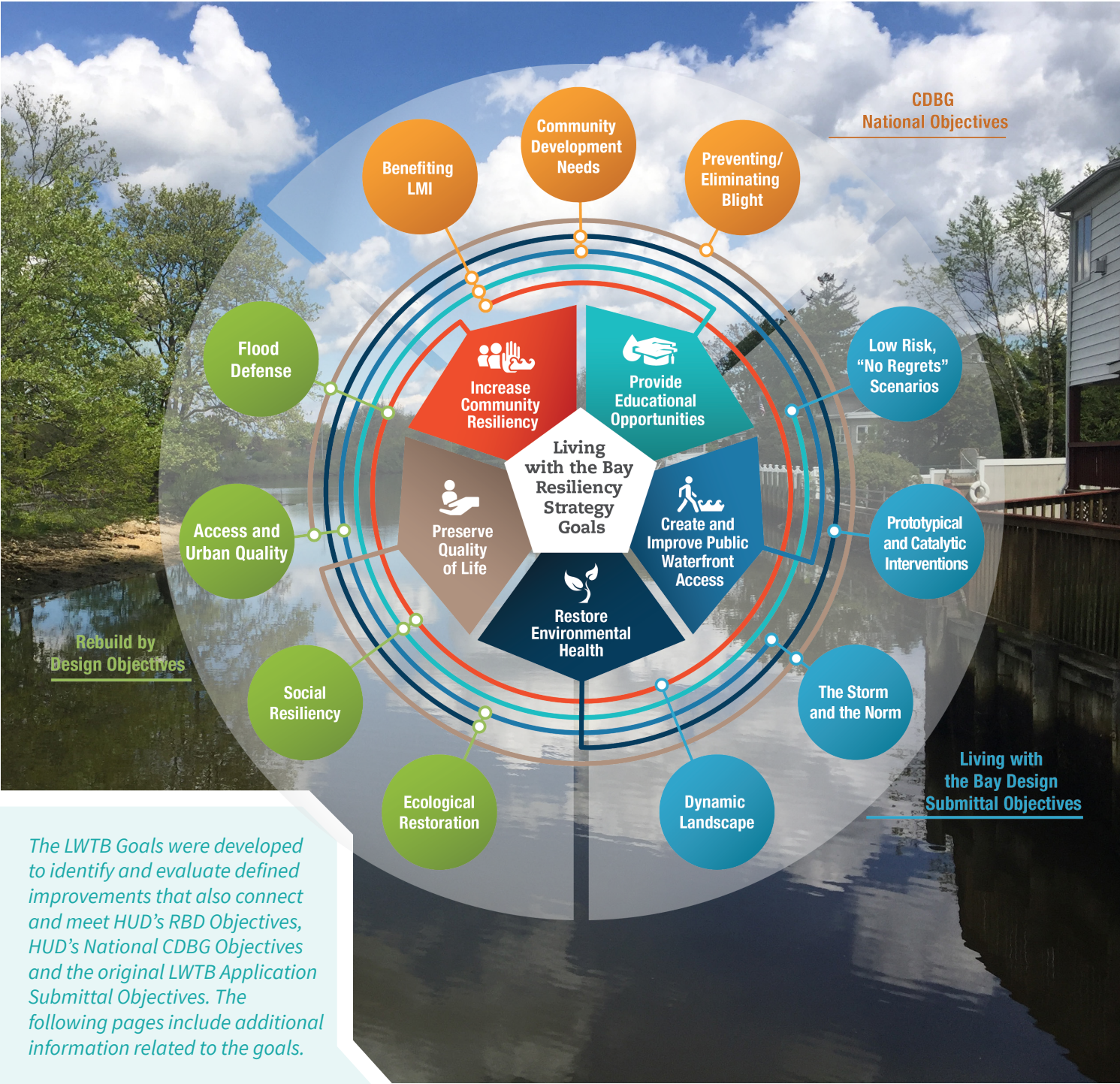
# purpose and goals

The purpose of the LWTB Resiliency Strategy is to identify a plan for the RBD LWTB program to help GOSR administer the HUD Community Development Block Grant-Disaster Recovery (CDBG-DR) funds. More specifically, it is to increase community resilience by mitigating local risk from tidal and stormwater flooding, while incorporating environmental co-benefits such as water quality improvements, ecological restoration, and aquifer recharge. In addition, the purpose includes creating public access to the river, reconnecting communities with the natural environment and providing public education opportunities.

To bring the LWTB Purpose to fruition, specific goals for the Resiliency Strategy were developed based on a watershed basis and include:

## LWTB Goals

 Increase Community Resiliency	<b>Resilience</b> - Increase community resilience with respect to sea level rise and extreme weather events.
 Preserve Quality of Life	<b>Quality of Life</b> - Preserve quality of life in the communities during natural disasters, emergency events, and tidal inundation.
 Restore Environmental Health	<b>Environmental Improvements</b> - Restore the environmental health and water quality in the watershed and surface waters.
 Create and Improve Public Waterfront Access	<b>Waterfront Access</b> - Create and improve public access to the waterfront - lakes, river, and bay.
 Provide Educational Opportunities	<b>Public Education</b> - Provide opportunities to educate the public on the multiple benefits of integrated water management and on safely integrating with shared resources.



The LWTB Goals were developed to identify and evaluate defined improvements that also connect and meet HUD’s RBD Objectives, HUD’s National CDBG Objectives and the original LWTB Application Submittal Objectives. The following pages include additional information related to the goals.





## Increase Community Resiliency

To provide resilience over a broad range of weather events, increased storage and capacity for stormwater systems should be provided during redevelopment, removal and replacement, and capital improvement projects. Increased conveyance and storage measures should be constructed meeting the greatest achievable level of service standard based on existing conditions. Seawalls above flood and storm surge elevations and backflow prevention should also increase the area of protection landward from storm surge.

Proposed projects included in the Resiliency Strategy aim to provide stormwater management and tidal protection infrastructure that reduces the risk and vulnerability. This should be achieved through a variety of approaches that include increased storage and percolation of stormwater runoff through subgrade storage, green infrastructure, and storm surge backflow preventers. The community's risk and vulnerability to waves is further reduced through marsh restoration opportunities that provide wave attenuation.



PHOTOS: TETRA TECH

The goal of Increasing Community Resiliency will be achieved through a variety of measures that include (from L to R), but are not limited to – additional subgrade storage and percolation of stormwater runoff, green infrastructure storage and percolation of stormwater runoff, and wave attenuation through marsh restoration.



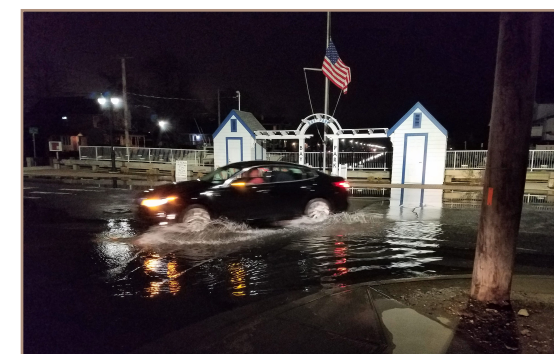
## Preserve Quality of Life

During an emergency, such as a natural disaster, extreme weather event, and/or tidal inundation, the continued operation of infrastructure and life-saving services is paramount. To preserve a consistent quality of life, the Resiliency Strategy identifies protection of critical infrastructure components including roads, water supply, wastewater collection

and treatment, emergency service access and facilities, and evacuation routes to ensure residents have a safe community during major weather events and can return to their homes quickly in the event of an evacuation. Projects related to achieving this goal are prioritized in the Resiliency Strategy.



Protecting critical infrastructure such as roads, water supply, wastewater collection, and emergency service access are examples of the Preserve Quality of Life goal through projects such as (clockwise) – elevating and/or improving existing bulkheads (top photos) and eliminating roadway flooding so that evacuations can occur and emergency vehicles can ingress and egress.



PHOTOS: TETRA TECH / MASSAU COUNTY





# Restore Environmental Health

The natural environment in the program area has significantly decreased as a result of urban sprawl and land development. In addition, as water quality has decreased in the program area from land development, the natural resources and habitat have begun to suffer. Extreme storm events, including hurricanes and nor'easters, have degraded the natural coastal marshlands at the mouth of the river and along the river shoreline. Projects addressing this goal target treating stormwater runoff before it

reaches the receiving waters in the program area. In addition, wetland enhancement projects are focused on providing nutrient removal from the stormwater runoff to reduce nitrogen and phosphorus loads to the River. The ability to retain and allow runoff to percolate into the soil also helps restoring environmental health by using the percolation of the water through the soil as a filter. In addition, the restoration of coastal marshland is a key component by restoring vital ecological habitat.



Restoring the environmental health throughout the program area is a key LWTB goal such as (clockwise from L) Hempstead Lake State Park along marchland, and in the Mill River



PHOTOS: TETRA TECH

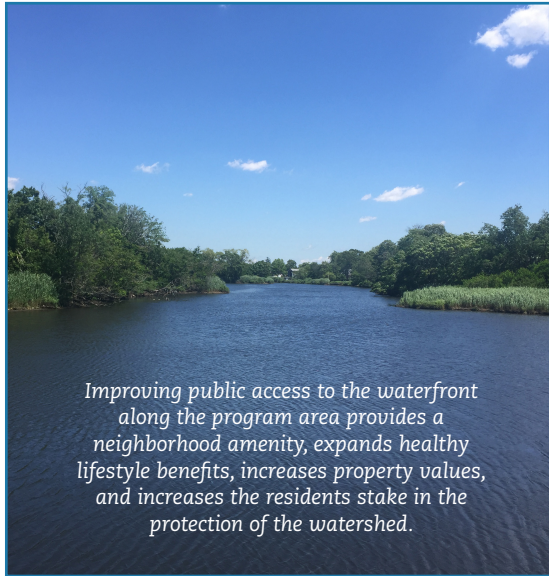


# Create and Improve Public Waterfront Access

The intent of this goal is for the landscapes along Mill River to be interconnected with a strong greenway to improve public accessibility and visibility of the waterfront. It will increase recreational opportunities and improve the overall quality of life for the communities and residents around the river. Providing public access to these waterfront areas links multiple communities, provides neighborhood amenities, increases local property values, expands health benefits, and increases the residents' stake in the protection of the watershed.

The opportunity is that the overall scale and existing land use of the Mill River communities make it ideal for biking, walking, and boating, but existing routes toward or along the lakes, river and bay are ad-hoc and discontinuous, and the adjacent neighborhoods' access to the waterfront is poor.

The project elements proposed include improving existing access points and developing new access points with the goal of a continuous greenway. This would be a strong feature for the suburban layout along and adjacent to the river, thus transforming it into an attractive public amenity.



Improving public access to the waterfront along the program area provides a neighborhood amenity, expands healthy lifestyle benefits, increases property values, and increases the residents stake in the protection of the watershed.

PHOTOS: TETRA TECH





Provide Educational Opportunities

# Provide Educational Opportunities

The approach to managing stormwater and the environment has changed drastically over the past 30 years. Part of this is directly related to a better scientific understanding of the impacts of poor management on communities. As part of the Resiliency Strategy, there is a goal to help educate the public on the importance of managing stormwater and the environment. This is currently ongoing through LTWB programs such as Seatuck and will continue during project implementation and afterwards.

To accomplish better stewardship of our environmental assets and to help foster a new generation with a better

understanding of the benefits of proper stormwater management, the LWTB projects include a variety of public education opportunities. There are projects that take students into the natural environment to take samples and document the findings. Other LWTB projects are directly located on school properties where school-age students will be able to witness firsthand how environmental restoration projects are implemented. Signage describing the history of the river and the importance of the local ecology and how the restoration projects work are also included in the waterfront projects.



From L to R: LWTB program includes fish surveys along the Mill River and public education events such as this fish sampling and transfer into Smith Pond; Example project public information and education sign to be incorporated into LWTB waterfront projects.



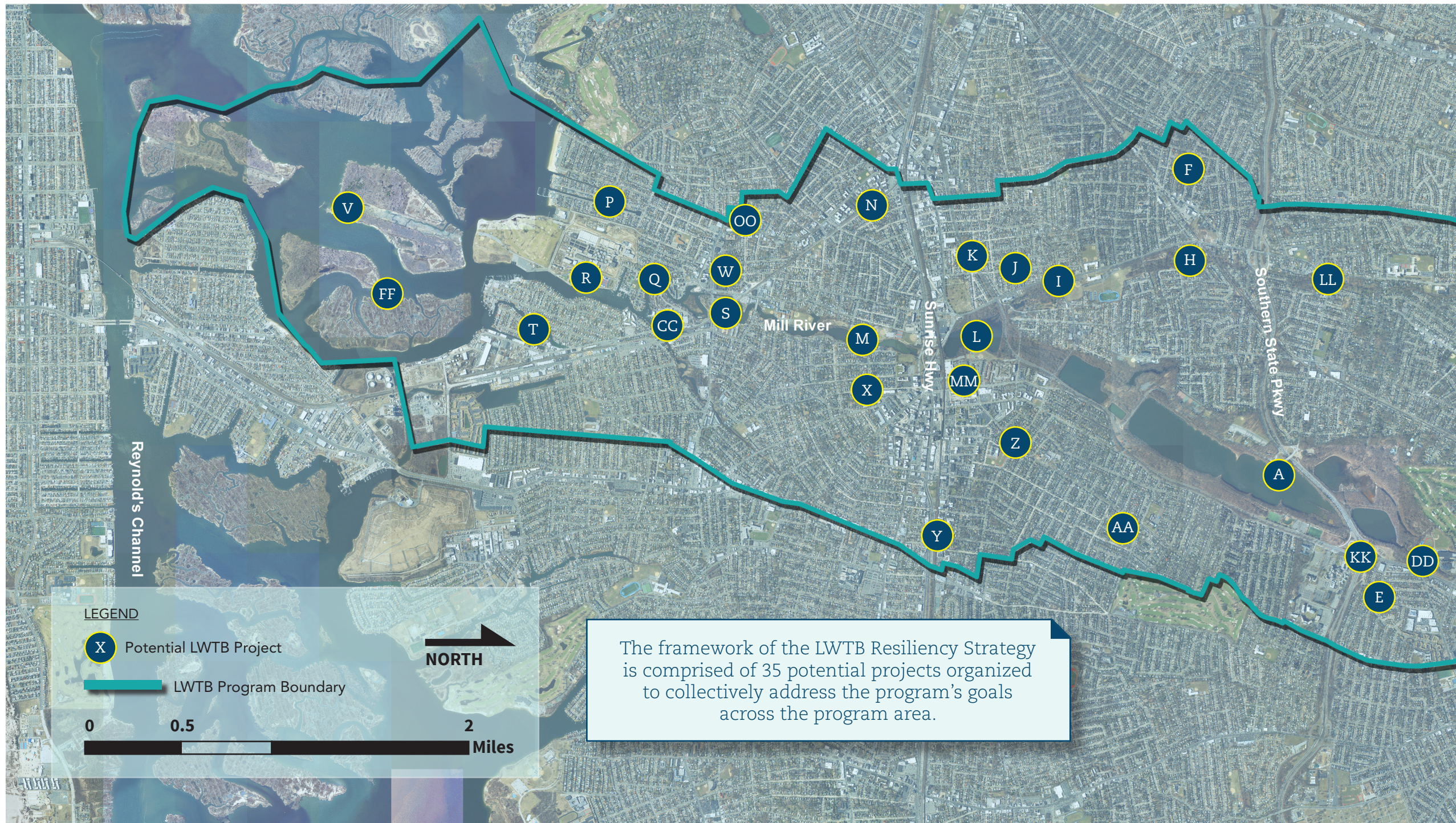
LWTB Goals

Seatuck is currently administering a LWTB public education program for school-age children where samples are collected in the field and documented.

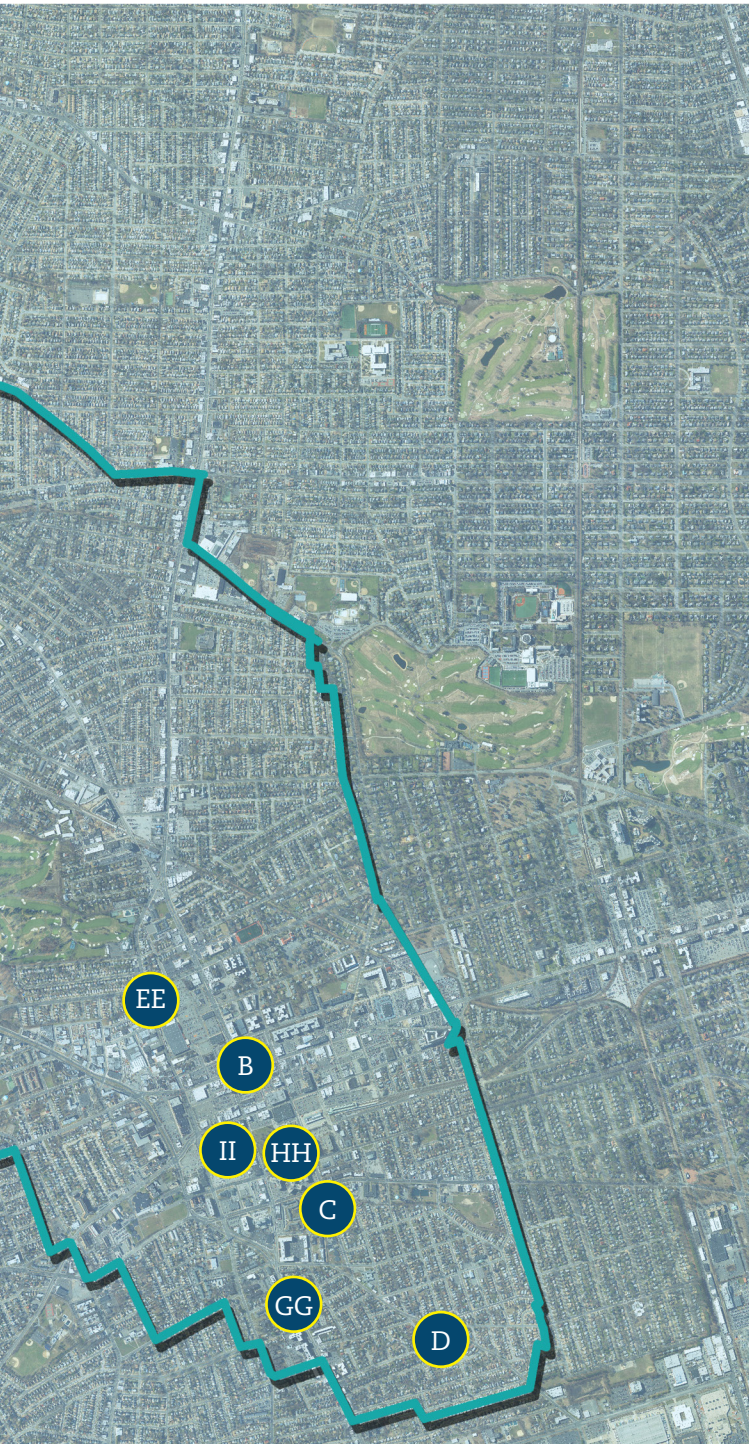
PHOTO: SEATUCK

PHOTOS: TETRA TECH/SEATUCK









See Appendix - Project Description for additional information for each potential LWTB project.

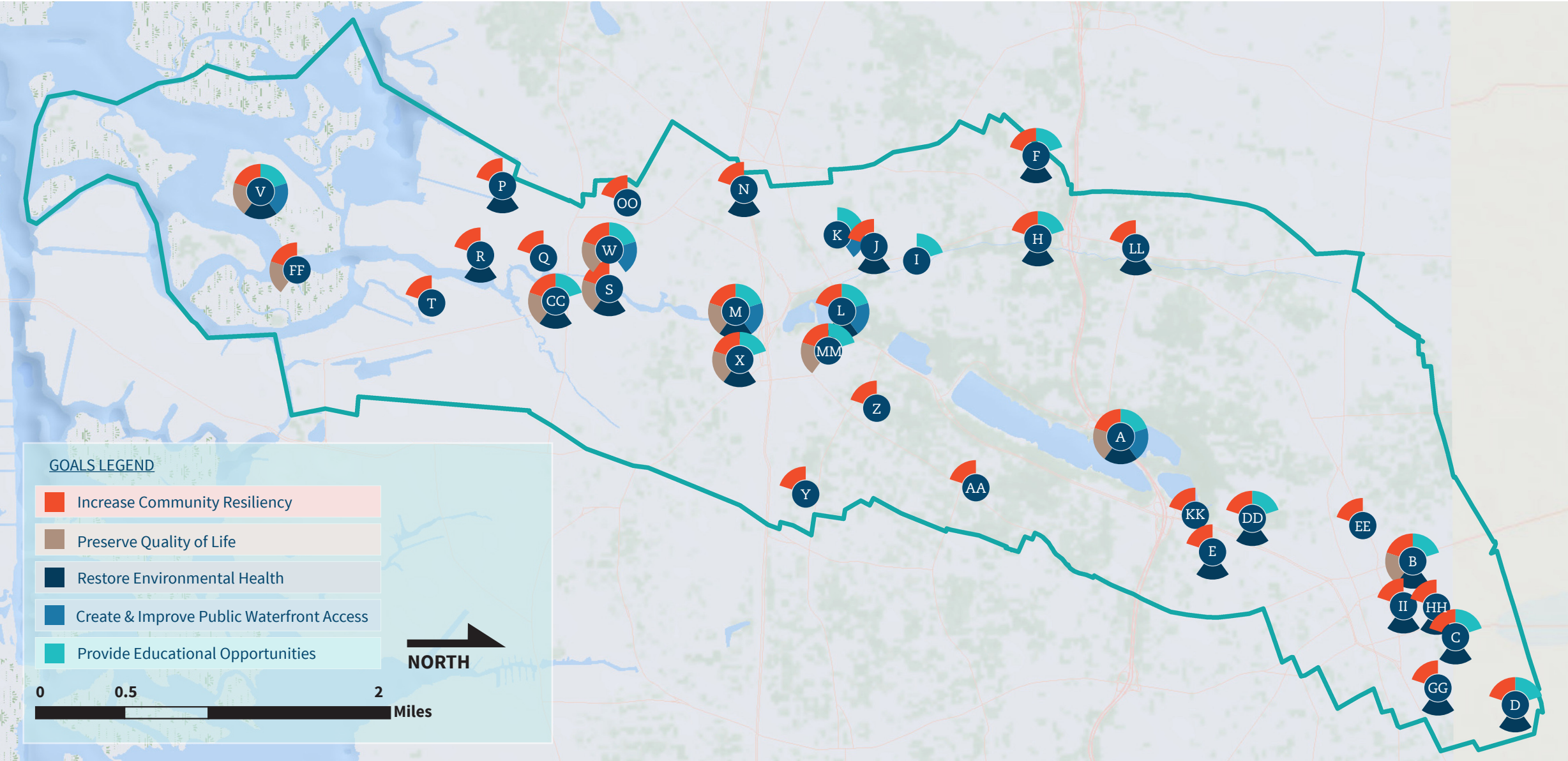
## potential projects

ID	PROJECT NAME	DESCRIPTION
A	Hempstead Lake State Park	Restore North Ponds habitat and install floatables catcher and sediment basin to improve water quality. Repair Hempstead Lake Dam and NW Spillway. Construct Environmental Education and Resiliency Center and portions of Greenway.
AA	Beverly Road	Refurbish existing stormwater pump station.
B	Horsebrook Drain West Branch Recharge Basin	Construct at grade and subgrade recharge basin at Mirschel Park with above ground park improvements.
C	Hempstead Housing Authority	Install floodwall and deployable floodbreak barriers with green infrastructure.
CC	Marina Pointe Marsh Restoration	Restore marsh habitat.
D	Northeast Village of Hempstead Green Streets	Construct green streets with suspended pavement.
DD	Hempstead High School Creek Restoration	Restore creek habitat and stabilize banks to ameliorate the erosion, overgrowth, and debris within the creek.
E	Southwest Village of Hempstead Suspended Pavement Green Streets	Construct green streets incorporated with suspended pavement and pervious pavement.
EE	Covert Street	Regrade street to allow stormwater to drain south and replace sidewalks and curbs.
F	Malverne Bioretention Green Streets	Construct green streets incorporated with bioretention cells and pervious pavement to store and treat stormwater.
FF	Mill River Storm Surge Barrier	Construct storm surge barrier spanning the width of Hewlett Bay and running across coastal marshlands .
GG	Hendrickson Avenue	Construct bioswales and pervious pavement along the street right of way.
H	Malverne High School	Improve wetland upstream of High School to provide stormwater attenuation, improve water quality, and function as a living laboratory.
HH	Nichols Court Stormwater	Install subgrade structures to capture and treat stormwater from street.
I	Lakeview Avenue	Install restroom and lighting at the sports field next to Tanglewood Preserve.
II	Cooper Square Underground Detention	Construct a subgrade recharge basin under existing north parking lot to mitigate flooding .
J	Lynbrook Recharge Basin	Construct recharge basin to alleviate flooding and improve water quality on Buckingham Road.
K	Peninsula Boulevard Greenway	Construct and widen existing pathway with lighting, drinking fountains, and landscaping.

ID	PROJECT NAME	DESCRIPTION
KK	Southern State Parkway Ramp	Replace drainage pipe and inlet at the westbound off ramp to improve drainage collection and mitigate flooding.
L	Smith Pond	Replace weir, install fish ladder, and dredge the pond. Restore habitat, construct pathway and overlook.
LL	Halls Pond Study	Conduct hydrologic/hydraulic study to evaluate alternatives to alleviate flooding.
M	East Rockaway High School/Lister Park	Implement elevated bulkhead, backflow preventers, sports field improvements, teacher parking drainage, and elevated path as part of the Greeway.
MM	Mill River Greenway	Construct a continuous pathway from north to south of program area to increase safety, ecological value, and improve public access.
N	Forest Avenue	Construct bioswales, pervious pavement, and exfiltration pipe to store and treat stormwater.
OO	Waldo Avenue	Raise sidewalks, curbs, and stormwater inlets to mitigate flooding.
P	East Boulevard and West Boulevard	Construct bioswales, raise roads, and install backflow preventers.
Q	Williamson Street	Install backflow preventers with sediment basins to prevent tidal waters and capture sediment and connect individual drainage systems.
R	Bay County Park	Install backflow preventers and construct green infrastructure.
S	East Rockaway Long Island Railroad Station	Install backflow preventers and construct green infrastructure.
T	Lawson Boulevard	Construct drainage inlets, raise roads, and replace drainage pipes with backflow preventers.
V	Coastal Marsh Restoration Project	Implement marsh enhancement to protect edges and create higher elevations.
W	East Rockaway Downtown Resiliency Study	Conduct study to increase resiliency of downtown area by creating comprehensive strategy for improvement of the waterfront, open space plan, implementation, and funding requirements.
X	S Centre Avenue Bioretention Green Street	Construct a green street incorporated with bioretention cells and pervious pavement.
Y	Maple Avenue and Long Beach Road Intersection	Install drainage inlets, manholes, and drainage pipes to provide better stormwater collection and mitigate flooding.
Z	Lakeview Avenue and Hempstead Avenue Intersection	Replace drainage pipes to increase stormwater conveyance capacity and reconstruct end wall to mitigate flooding.



# goals by project









# prioritization framework

Prioritization of projects is needed because the LWTB program was intentionally underfunded as part of the RBD award. Projects were scoped to improve flood conditions caused by the different flow pathways, resulting in a total of nearly \$1 billion worth of capital investment. This is not feasible with the \$125 million available under the LWTB program.


The prioritization framework also aligns with the five LWTB Resiliency Strategy goals but these are not easily quantifiable, making them difficult to use for prioritization. Therefore, five (5) categories were identified that encompass individual metrics consistent with the goals –






**costs**

**benefits**

**vulnerability**

**synergies**

**social resiliency**

Category	Metric	Category Weight	Maximum Score
	Total Costs	100%	25
	Total Costs	100%	25
	Flood Reduction	45%	15.75
	Water Quality	30%	10.50
	Ecosystem/Habitat	25%	8.75
Total Benefits		100%	35
	Health and Safety	40%	6
	Reduced Flooding Risk	40%	6
	Future Adaptability	20%	3
Total Risk and Vulnerability		100%	15
	Program Synergies	30%	3
	Municipal Dependencies	30%	3
	Critical Infrastructure	20%	2
	Leveraged Funds	20%	2
Total Synergies		100%	10
	Improved Quality of Life	33%	5
	Cultural Heritage Preservation	33%	5
	Education Opportunities	33%	5
Total Social Resiliency		100%	15

MAXIMUM PRIORITIZATION SCORE100

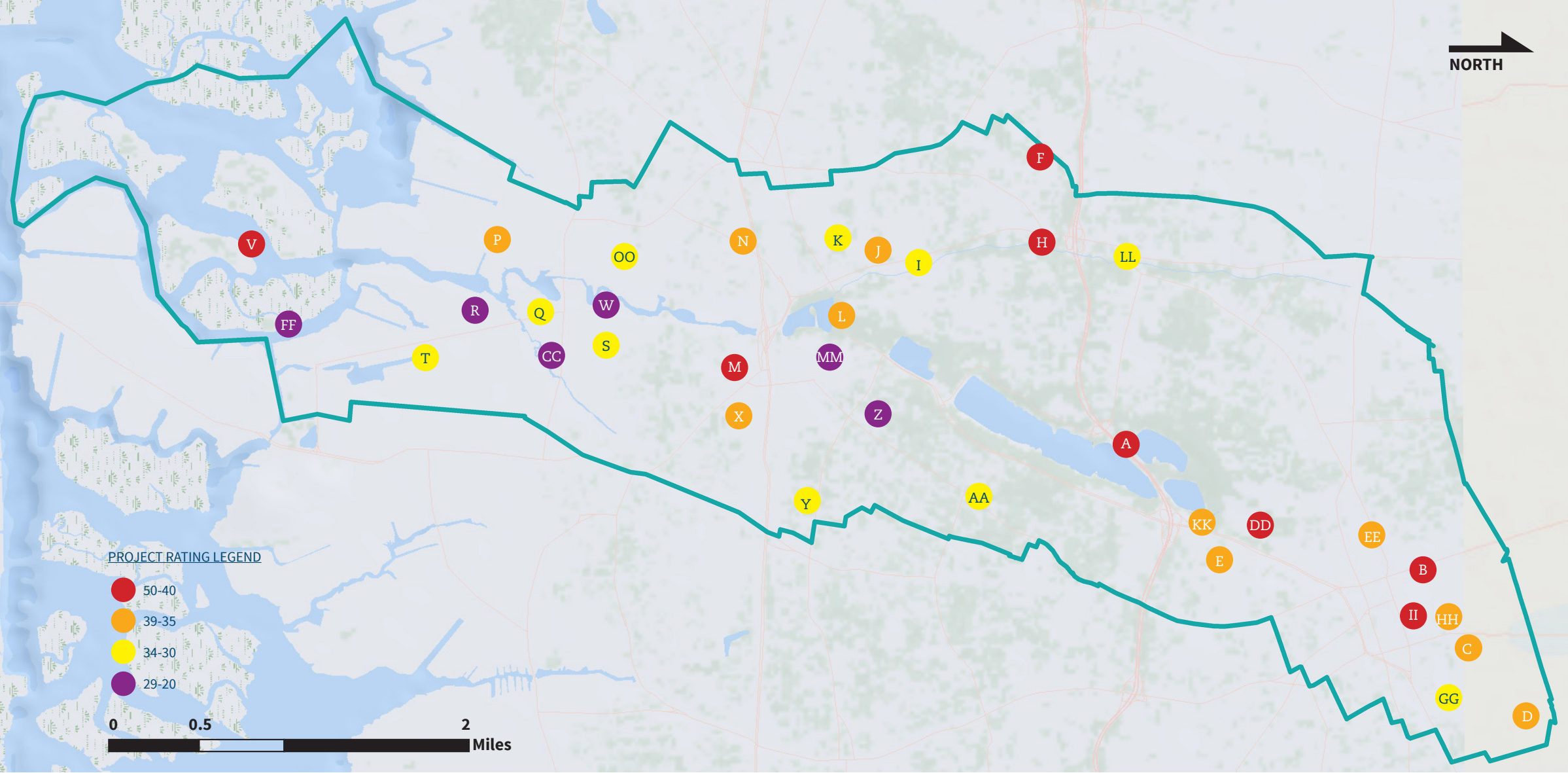
Each project was calculated based on five categories each category with varying metric weights.

PRIORITIZATION RANKING BREAKDOWN							
ID	PROJECT NAME	Costs	Benefits	Risk & Vulnerability	Synergies	Social Resilient	Total Project Rating
V	Coastal Marsh Restoration	0.0	32.4	8.2	3.3	6.6	50.5
B	Horsebrook Drain West Branch Recharge Basin	7.0	25.3	11.4	1.9	0.8	46.4
DD	Hempstead High School Creek Restoration	23.9	7.4	2.2	5.7	5.8	45.0
II	Cooper Square	19.8	14.7	2.3	6.1	0.0	42.9
M	East Rockaway High School/Lister Park	10.3	13.8	6.0	4.9	7.8	42.8
H	Malverne High School	18.0	11.3	2.1	4.8	6.2	42.4
F	Malverne Green Streets	12.1	19.6	3.8	5.3	0.4	41.2
A	Hempstead Lake State Park	0.0	13.6	11.3	5.3	10.7	40.9
L	Smith Pond	12.8	9.1	4.7	5.7	7.4	39.7
C	Hempstead Housing Authority	20.0	8.2	7.2	3.6	0.2	39.2
N	Forest Avenue	22.5	4.9	4.8	6.1	0.4	38.7
P	East Boulevard and West Boulevard	18.8	6.2	6.3	5.4	2.0	38.7
E	Southwest Village of Hempstead Suspended Pavement Green Streets	5.0	22.1	6.1	5.3	0.0	38.5
X	S Centre Avenue Bioretention Green Street	24.5	1.6	2.7	6.1	3.5	38.4
EE	Covert Street	24.5	0.6	5.7	6.8	0.0	37.6
KK	Southern State Parkway Ramp	23.8	3.9	3.4	6.1	0.0	37.2
HH	Nichols Court	24.0	1.3	2.5	6.1	0.0	37.2
J	Lynbrook Recharge Basin	24.7	4.2	3.9	3.6	0.0	37.2
D	Northeast Village of Hempstead	4.1	21.9	6.8	2.5	0.0	35.3

PRIORITIZATION RANKING BREAKDOWN (CONTINUED)							
ID	PROJECT NAME	Costs	Benefits	Risk & Vulnerability	Synergies	Social Resilient	Total Project Rating
GG	Hendrickson Avenue	24.0	1.9	3.0	4.8	0.0	33.9
I	Lakeview Avenue	24.0	0.0	2.4	4.9	0.0	32.9
OO	Waldo Avenue	24.8	1.2	3.9	3.0	0.0	32.9
AA	Beverly Road	24.5	1.6	2.9	3.6	0.0	32.6
K	Peninsula Boulevard Greenway	24.3	0.0	2.4	4.3	0.0	32.6
Y	Maple Avenue and Long Beach Road Intersection	24.3	0.1	2.7	5.2	0.0	32.3
LL	Halls Pond Study	24.5	0.0	2.5	4.9	0.0	31.9
Q	Williamson Street	22.5	3.4	4.4	1.3	0.0	31.6
T	Lawson Boulevard	11.8	9.5	7.1	2.4	0.0	30.8
S	East Rockaway Long Island Railroad Station	23.5	1.2	1.7	3.6	0.0	30.4
R	Bay County Park	23.6	1.1	2.5	1.4	0.0	29.6
FF	Mill River Storm Surge Barrier	0.0	15.8	10.2	3.5	0.0	29.5
MM	Greenway	10.2	0.0	2.0	4.3	0.0	27.2
W	East Rockaway Downtown Study	24.5	0.0	0.0	0.0	0.0	24.5
Z	Lakeview Avenue and Hempstead Avenue Intersection	15.0	0.8	2.6	5.4	0.0	23.8
CC	Marina Pointe Marsh Restoration	11.4	4.6	2.1	2.5	0.0	22.4

The prioritization framework is intended to identify a collection of transformative projects that increase the resiliency of the Mill River corridor. Numerical scores for each metric category were developed (a detailed discussion on category weighting is included in Objective #6 document under separate cover) rather than tangible values such as dollars. Each of the categories was formed so that a higher score indicates a positive, preferred element of the project. No negative scores are included in the prioritization framework.







# order of magnitude cost estimates



PHOTO: BAY PARK - NELSON AND POPE

ID	PROJECT NAME	PROJECT COST	CUMULATIVE COST
V	Coastal Marsh Restoration	\$30,800,000	\$30,800,000
B	Horsebrook Drain West Branch Recharge Basin	\$11,000,000	\$41,800,000
DD	Hempstead High School Creek Restoration	\$450,000	\$42,250,000
II	Cooper Square Underground Detention	\$2,100,000	\$44,350,000
M	East Rockaway High School/Lister Park	\$7,200,000	\$51,550,000
H	Malverne High School	\$2,800,000	\$54,350,000
F	Malverne Bioretention Green Streets	\$5,400,000	\$59,750,000
A	Hempstead Lake State Park	\$34,500,000	\$94,250,000
L	Smith Pond	\$4,900,000	\$99,150,000
C	Hempstead Housing Authority	\$2,000,000	\$101,150,000
N	Forest Avenue	\$1,000,000	\$102,150,000
P	East Boulevard and West Boulevard	\$2,500,000	\$104,650,000
E	Southwest Village of Hempstead Green Streets	\$15,200,000	\$119,850,000
X	S Centre Avenue Bioretention Green Street	\$200,000	\$120,050,000
EE	Covert Street	\$200,000	\$120,250,000
KK	Southern State Parkway Ramp	\$500,000	\$120,750,000
HH	Nichols Court Suspended Pavement Green Streets	\$410,000	\$121,160,000
J	Lynbrook Recharge Basin	\$140,000	\$121,300,000
D	Northeast Village of Hempstead Green Streets	\$20,400,000	\$141,700,000
GG	Hendrickson Avenue	\$410,000	\$142,110,000
I	Lakeview Avenue	\$400,000	\$142,510,000
OO	Waldo Avenue	\$100,000	\$142,610,000
AA	Beverly Road	\$200,000	\$142,810,000
K	Peninsula Boulevard Greenway	\$300,000	\$143,110,000
Y	Maple Avenue and Long Beach Road Intersection	\$280,000	\$143,390,000
LL	Halls Pond Study	\$200,000	\$143,590,000
Q	Williamson Street	\$1,000,000	\$144,590,000
T	Lawson Boulevard	\$5,680,000	\$150,270,000
S	East Rockaway Long Island Railroad Station	\$600,000	\$150,870,000
R	Bay County Park	\$570,000	\$151,440,000
FF	Mill River Storm Surge Barrier	\$723,000,000	\$874,440,000
MM	Mill River Greenway	\$7,350,000	\$881,790,000
W	East Rockaway Downtown Study	\$200,000	\$881,990,000
Z	Lakeview Avenue and Hempstead Avenue Intersection	\$4,000,000	\$885,990,000
CC	Marina Pointe Marsh Restoration	\$6,100,000	\$892,090,000







# citizens advisory committee (CAC) meetings

Citizens Advisory Committee (CAC) Members		
Amy Wolf	James Loglisci	Linda Marshall
Andrew Miller	Jay T. Korth	Raymond Pagano
Arthur Mattson	Jim Ruocco	Shelley Brazley
Brien Weiner	Joseph Forgione*	Thomas Rozakis
Daniel Horn	Joseph Landesberg	Brian Schwagerl
David Stern*	Justin Corbo	Lauren Hill
Gregory Rinn	Leslie Price	* Co-Chair

- **May 24, 2016**  
The CAC was formed in April 2016 with an inaugural meeting held on May 24, 2016. The intent of the meeting was to kick off the CAC with an explanation of the group’s intent to represent both local and regional stakeholders with environmental, educational, government, business and civic backgrounds fulfilling an advisory and community education role.
- **August 22, 2016**  
An update of the LWTB program was provided that included an introduction to the group that prepared the winning RBD application, summary of the social resiliency program, overview of potential projects, and a summary of the total federal funds coordination in the LWTB watershed that was followed with a public comment period.

- **December 20, 2016**  
The methodology and schedule for the development of the Resiliency Strategy and the role and responsibilities of the CAC and the Goals for the LWTB program were presented as well as a public comment period.
- **February 28, 2017**  
Identified Problem Areas and Types of Problems were presented followed by a public comment period and then there were roundtable discussions about the various elements in the LWTB Hempstead Lake State Park (HLSP) project.
- **March 28, 2017**  
Explanations for how the Problem Areas were combined into a Potential Projects list were provided as well as a presentation by Seatuck about ongoing public education activities. This was followed by a working session with the CAC on the prioritization methodology to be used to prioritize LWTB projects and a public comment period.



PHOTO: CAC MEETINGS, JULY 2017 (TOP) - FEBRUARY 2017 (BOTTOM) - TETRA TECH





► **May 23, 2017**

Comments were shared by CAC Members for the benefit of the public to get a better idea of the members and diversity of perspectives they bring to the committee. Project descriptions of the prospective LWTB projects were provided to the CAC with detailed project information at a conceptual level. There was a discussion of the CAC April 2017 Review Comments that specifically addressed how the 35 projects are being connected with the CAC's themes. Next, a working session with the CAC on example LWTB projects and the prioritization scoring examples for those projects was conducted and that was followed with a public comment period.

► **June 20, 2017**

Funding was discussed as it relates to the overall objectives at different levels (HUD, Rebuild

by Design and LWTB objectives). A draft prioritization of projects was reviewed with the CAC and comments were received and discussions were held concerning the prioritization and projects. A public comment period concluded the meeting.

► **July 25, 2017**

There was a review and discussion of the Resiliency Strategy Final Prioritization and a recap of the HLSP Environmental Review Hearing. This was followed by four round table discussions held by Project Managers from HLSP to share an overview of the project components and share changes/additions and more specific details since the February 2017 CAC meeting. Lastly, a summary of the next steps for the implementation of LWTB projects was reviewed and there was time for public comments.



# technical advisory committee (TAC) meetings

Technical Advisory Committee (TAC) Members	
Town of Hempstead	Village of Lynbrook
Village of Malverne	Village of Hempstead
Village of Rockville Centre	Village of East Rockaway
Nassau County	

► **July 18, 2016**

The purpose of this meeting was for the local governments and agencies within the LWTB project area to participate in a preliminary RBD project area- wide discussion. GOSR requested to meet with and attain insight from the local governments and DPW staff to identify needs and improvement strategies for the program area.

► **December 20, 2016**

GOSR shared a brief overview of the LWTB program and the roles and responsibilities of key project members were explained. Tetra Tech was introduced as the lead for the development of creation of a Resiliency Strategy. Tetra Tech described the three phases (Project Initiation, Project Development, and Resiliency Strategy) of the watershed management plan development. A schedule, draft of goals and objectives, purpose and need and vision statement were shared as well as a definition of the program area. It was explained the TAC will work alongside GOSR and Tetra Tech on a prioritization methodology before projects are prioritized and selected. This discussion was followed by a time for questions from TAC Members.

► **January 31, 2017**

Tetra Tech shared a brief project update with a strong focus for all jurisdictions to ensure their respective project information criteria is communicated for project consideration. Phase I (Project Initiation) is being completed and the process is entering Phase II (Project Development). A Project Information Criteria data request sheet was provided to the TAC members for their project concerns. At the next meeting a methodology to be used to prioritize the projects will be finalized and presented. There was a time for questions and comments as the meeting came to a close.

► **February 28, 2017**

A recap of the last meeting was shared and comprehensive description of the seven problem types identified in the LWTB program area were discussed. Following this discussion, the criteria for the project prioritization methodology was reviewed and TAC members were encouraged to find photos that could be used to highlight their specific project concerns. The meeting came to a close with a time for questions and comments.

► **March 28, 2017**

The 80+ problem areas previously reviewed with the TAC have been condensed into approximately 30 projects and Tetra Tech presented the final LWTB project prioritization methodology and framework. The TAC concurred that they would prefer Tetra Tech to perform the prioritization and share the results with them. It was noted that discussions will continue with the TAC members to provide them an opportunity to share any concerns with projects within the program area.



PHOTO: TAC MEETING, MARCH 2017 - TETRA TECH





meeting. There were discussions concerning the prioritization of projects and the importance of agreeing to the identified maintenance entity for each perspective LWTB project. This will allow time to fully consider input from the TAC regarding the re-scoping of projects and complete all one-on-one meetings with the TAC.

► **June 20, 2017**

The final Project Prioritization list was reviewed and additional input was discussed. Information was shared about how the proposed projects connect with the CAC's project strategies (water storage, greener edge, space for the river and the greenway corridor). Following this discussion, there was a time for comments and questions. It was noted that the TAC will continue to assist GOSR on how design phase, procurement, bidding, and construction will be developed and there would continue to be one-on-one meetings with TAC members and subsequent TAC meetings.

► **April 25, 2017**

GOSR and Tetra Tech introduced the Action Plan Amendment and explained how it was developed to embrace the LWTB objectives. The March meeting was recapped and the TAC members were thanked for their participation in identifying the problem areas, problem types, and assistance in helping to reduced 80+ problem areas into 35 projects within the program area. Tetra Tech shared the four project themes that the CAC developed to be connected with the proposed individual projects. TAC members were given draft project descriptions

that included details, location, and Operation & Management responsibility, cost estimate, level of service/protection, project life, and proposed improvements. TAC members were informed that one-on-one meetings will be held with each municipality to review the specific projects in their area.

► **May 23, 2017**

A draft project prioritization list was provided, read and discussed at the TAC. It was explained that the list needed to be vetted with a TAC member in concert with the April TAC





## implementation and next steps

In collaboration with the CAC, TAC, and Mill River communities, the team has identified priority projects to implement as the next steps in the LWTB program. The projects cover a wide geographic range benefitting the program area in the way of flood mitigation, water quality and environmental restoration, public waterfront access, and public education opportunities. The continued stakeholder input by the CAC, TAC, and public is critical for the program's next steps. In addition, acceptance of the operation and maintenance responsibilities have been at the forefront of all discussions with the beneficiaries and their input needs to continue during the design and permitting steps.

The LWTB implementation will require a series of projects to advance through the design and permitting phase followed by a construction phase. Based on the varying scopes of the projects, the designs and permitting of the improvements will advance with different schedules. For some projects, the associated designs are not overly complex and can proceed into regulatory review and permitting with relative ease. Other projects will require extensive evaluation of existing conditions through data collection followed by preliminary design and alternatives evaluation before proceeding into subsequent design, permitting, and construction phases. The diverse project scopes and related time schedules will create an overlap with some projects advancing faster than other slower paced projects. Implementing some of the LWTB projects will require more time than other projects.

Overall, the goal is to implement (design, permit, procure, and construct) and close-out (sign off on construction completion, certify final payments, and finalize releases) projects prior to September 2022. To accomplish this, the design and permitting efforts should commence immediately with construction to follow shortly thereafter. Each construction contract should be competitively bid with public advertisements of requests for bids for a required period of time, sealed bids accepted and publicly opened, and contracts awarded to the lowest and most responsive bidder in accordance with HUD's and the local jurisdictions' procurement requirements.

### DESIGN

The projects have been preliminarily scoped based on the best available information and should now move into the initial phase of implementation – preliminary design. During the preliminary design, additional site-specific data would be collected related to the existing conditions at each site such as topographic and bathymetric surveys, geotechnical borings and laboratory analyses, wetland delineations and environmental habitat mapping, cultural resource surveys, and other applicable data sets. Also during the design, an evaluation of different design alternatives that best achieve the defined project scope would be completed based on the existing conditions data with a recommended refined project scope, schedule and budget. A Preliminary Engineering Report or Memorandum should be prepared summarizing the existing conditions, describing the evaluation of design alternatives, and



providing a recommended detailed design scope of work with schedule and budget.

The next step in the design process would be design development where final designs of projects are developed and used for permitting, bidding, and construction. The typical design deliverables should include partially complete designs such as 30%, 60%, and 90% complete building up to a 100% Final complete design ready for bidding. The design would also include plans, technical specifications, and ‘front-end’ contractual and bidding documents.

The design process should include continued coordination with the CAC, TAC, and the public allowing all parties to continue working together and providing input during the design process. This will also allow GOSR and the designers to inform the stakeholders of design-related items influencing the scope of the projects and track the intended success of projects.

PERMITTING

Regulatory permitting and environmental review in accordance with the National Environmental Policy Act (NEPA) requirements are key elements to the implementation of the priority projects. This includes federal, state, and local permit approvals. At the federal level, there will be permitting related to the US Army Corps of Engineers, US Fish and Wildlife, US Coast Guard, National Oceanic and

Atmospheric Administration, and several more agencies. For New York State, the New York State Department of Environmental Conservation will be the primary regulatory entity but there will be other departments depending on the location and scope of the project. At the local level, Nassau County, Town of Hempstead, and/or local village approvals will be needed depending on the project and associated impacts.

BIDDING AND CONSTRUCTION

The procurement of competitive bids for the projects is currently planned to proceed through each beneficiary procuring the work. This will include public advertising for bids, furnishing bid documents, responding to bidders’ questions, issuing addenda (if required), receiving and opening bids, tabulating bids, and awarding the contracts. Upon contract award, the beneficiaries will proceed with executing contracts for the work and administering and overseeing the work.

The LWTB program will provide funds for the construction administration and management of the projects within industry standards and dollar amounts. This will include inspection of the construction work to confirm that the work is built in accordance with the design and in accordance with the permit conditions. GOSR will be responsible for project closeout with each beneficiary and HUD.

IMPLEMENTATION SCHEDULE

The smaller and more simple projects should be capable of being implemented quicker than larger more complex projects. In addition, government procurement requirements will dictate different start dates for the different project stages.

STAGE	DATES	
	START*	COMPLETION*
<i>Design</i>	Summer 2017 - Winter 2018	Spring 2018 - Fall 2019
<i>Environmental Review</i>	Summer 2017 - Fall 2018	Spring 2018 - Fall 2019
<i>Regulatory Permitting</i>	Summer 2017 - Fall 2018	Spring 2018 - Fall 2019
<i>Bid Procurement</i>	Winter 2017 - Winter 2019	Spring 2018 - Spring 2020
<i>Construction</i>	Spring 2018 - Spring 2020	Spring 2019 - Summer 2022

\* The range of dates shown indicates multiple projects advancing at varying schedules depending on project complexity, environmental and regulatory requirements, and construction duration.



A wide-angle photograph of a river at sunset. The sky is filled with soft, orange and yellow clouds, transitioning into a deep blue. The water reflects the warm colors of the sunset. In the foreground on the right, a wooden post is visible, secured with a metal band. The overall mood is serene and peaceful.

## CONCLUSION

The LWTB program is an opportunity to positively impact the quality of life of the Mill River communities with improvements to make the area more resilient. The opportunity this program provides to implement such a large magnitude of flood mitigation, environmental and water quality restoration, public waterfront access, and public education serves as a new model. The next steps identified provide the Mill River communities a plan for a more resilient future and an enhanced quality of life.





RESILIENCY STRATEGY

# appendix - project descriptions

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ID	PROJECT NAME	PAGE
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PROJECT V

COASTAL MARSH RESTORATION PROJECT DESCRIPTION

Categories: GREENER EDGE  
SPACE FOR THE RIVER  
GREENWAY CORRIDOR



Site Location	
SubWatershed	33, 37
Street Address	Hempstead, NY
Longitude	-73.67
Latitude	40.62
Landowner	Town of Hempstead
Existing Use	Shoreline
O & M Responsibility	Town of Hempstead
Low Moderate Income Area	N/A
Existing Site Description:	The existing marshlands including North Meadow, East Meadow, West Meadow, Pearsalls Hassock, Black Banks Hassock, Simmons Hassock, Hewlett Hassock, Nums Marsh and Cedar Island continue to experience continual loss of marshland habitat due to shoreline erosion.

Proposed Characteristics	
Cost Estimate	\$30,800,000.00
Level of Protection, yr	100
Project Life, yr	50
Focus	Water Quality, Habitat Restoration, Social Resiliency
Problem Areas Addressed	67
Proposed Improvements Description	<ul style="list-style-type: none"><li>Marsh Erosion Protection - protective measures that seek to maintain protective characteristics of the marshes by reducing their edge losses to erosion.</li><li>Marsh Enhancement - increase marsh platform elevations to shift the distribution of the marsh elevation to higher levels for greater resiliency to SLR.</li><li>In-Bay Protective Measures - connect high elevation areas to form a continuous barrier to protect against wave and surge effects.</li><li>Upland Protective Measures - provide localized protection from wave effects and surge flooding.</li></ul>

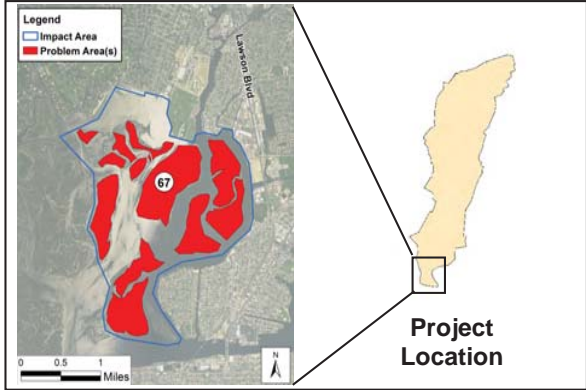
LWTB Goal(s) Met By Project

DRAFT

PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREAS AND IMPACT AREA



SAMPLE PHOTOS

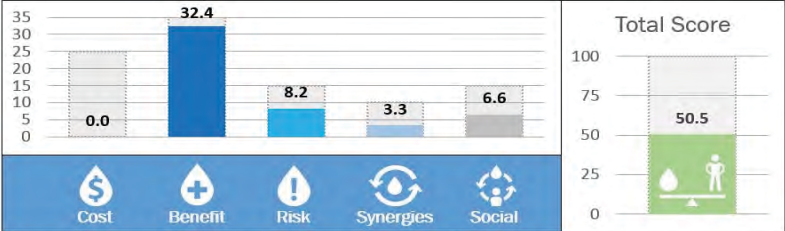


Existing Conditions



Existing Conditions

Project Prioritization Results



Significant benefits provided through habitat restoration and water quality. Project also provides social resiliency by improving quality of life during storm events and generating educational opportunities.



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT B

HORSEBROOK DRAIN WEST BRANCH RECHARGE BASIN PROJECT DESCRIPTION


Site Location	
SubWatershed	1
Street Address	90 Atlantic Avenue, Hempstead, NY
Longitude	-73.63
Latitude	40.71
Landowner	Nassau County, Village of Hempstead
Existing Use	Street
O & M Responsibility	Nassau County (Drainage System), Village of Hempstead (Park)
Low Moderate Income Area	>80%
Existing Site Description:	Six (6) intersections on North Franklin Street, from Bedell Street to Newmans Court, experience localized flooding due to poor conveyance capacity. The flooding areas are within the North Franklin Street drainage system and are connected to the existing stormwater pipe (Horsebrook Drain West Branch) originating from Old Country Road to the north and eventually discharging into Hempstead Lake to the south.

Proposed Characteristics	
Cost Estimate	\$11,000,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense, Water Quality
Problem Areas Addressed	15, 16, 17, 18, 19, 20, 21
Proposed Improvements Description	The proposed subgrade recharge basin (SRB) utilizes Mirschel Community Park, located south of Atlantic Avenue, between Hilton Avenue and North Franklin Street in the Village of Hempstead as additional storage attenuation. The basin will be used to mitigate peak flows upstream of Atlantic Avenue and North Franklin Street to alleviate flooding in the problem areas. The proposed open recharge basin will provide storage, collect debris, and improve water quality. Stormwater first enters the open recharge basin and then overflows into the subgrade recharge basin. A new 1500 LF of 5' x 6' box culvert connects the SRB to the existing stormwater pipe. This project has the opportunity to help revitalize the community with park and recreation improvements desired by the community and become a north node for the Living with the Bay Greenway Corridor (see Project MM).

LWTB Goal(s) Met By Project




Increase Community Resiliency



Preserve Quality of Life

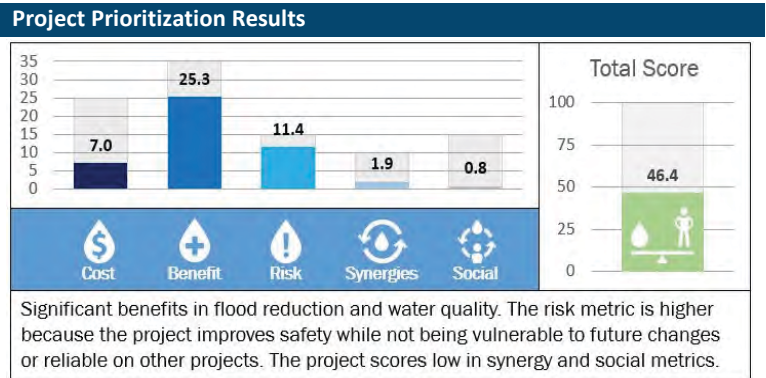
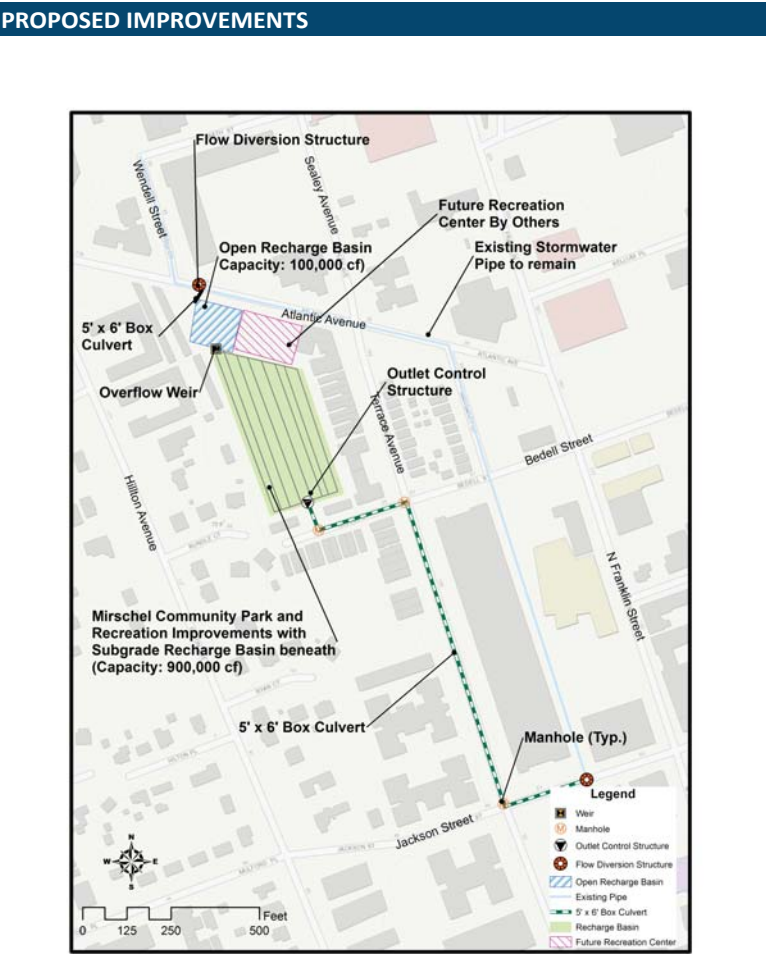


Provide Educational Opportunities



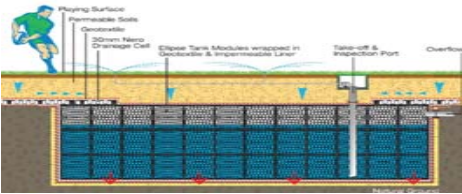
Restore Environmental Health

DRAFT



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA

SAMPLE PHOTOS



Example Cross-Section of Community Park with Subgrade Recharge Basin Beneath



Example Subgrade Recharge Basin



Example Community Park and Recreation Improvements on Top of Recharge Basin



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.






PROJECT DD

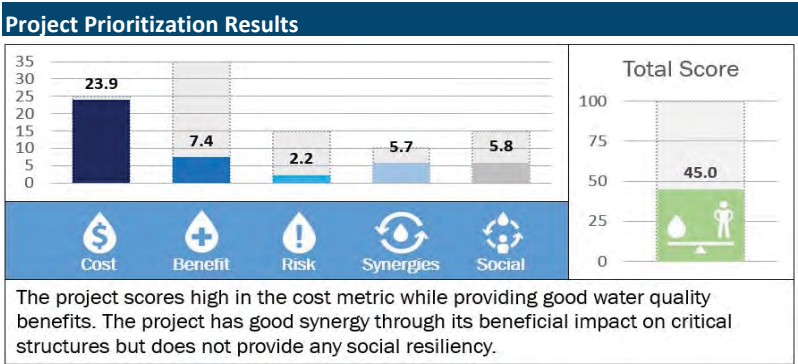
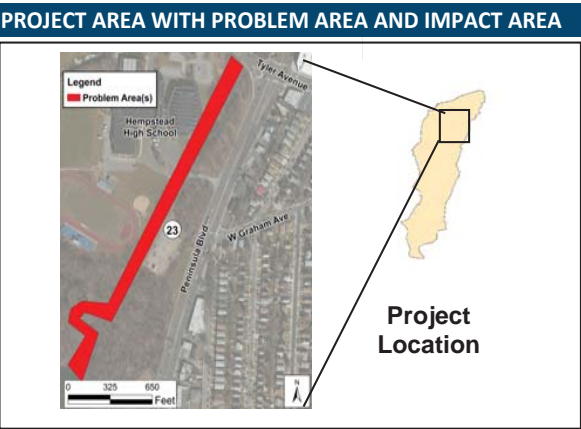
HEMPSTEAD HIGH SCHOOL CREEK RESTORATION PROJECT DESCRIPTION

Categories:

GREENER EDGE  
SPACE FOR THE RIVER  
GREENWAY CORRIDOR



Site Location	
SubWatershed	7
Street Address	646-662 Peninsula Blvd., Hempstead, NY
Longitude	-73.63
Latitude	40.70
Landowner	Hempstead High School
Existing Use	Open Water, Shoreline
O & M Responsibility	Town of Hempstead
Low Moderate Income Area	40% - 60%
Existing Site Description:	The Creek entering North Ponds extends through a wooden parcel from Tyler Avenue and through Hempstead High School property. The Creek experiences major bank erosion, exposed tree roots and trees which have collapsed over the creek. The Creek is also subject to high amounts of bacteria exceeding the limits and increased nitrogen nutrients.
Proposed Characteristics	
Cost Estimate	\$450,000
Level of Protection, yr	N/A
Project Life, yr	50
Focus	Habitat Restoration, Water Quality
Problem Areas Addressed	23
Proposed Improvements Description	The proposed improvements consist of restoration of the creek bottom and side slopes to ameliorate the erosion, overgrowth, and debris within the creek. Geotextile will be installed to provide additional bank stabilization. Sodding will provide cover over the geotextile and additional stabilization. In the vicinity of the school building on the creek, a more robust geotextile will be installed to prevent erosion near the building. The proposed improvements will help mitigate damage caused by flooding in future storm events, while stabilizing creek banks, reducing erosion and decreasing sediment deposit downstream.
LWTB Goal(s) Met By Project	
<div>Increase Community Resiliency</div> <div>Restore Environmental Health</div> <div>Provide Educational Opportunities</div>	DRAFT



The project scores high in the cost metric while providing good water quality benefits. The project has good synergy through its beneficial impact on critical structures but does not provide any social resiliency.

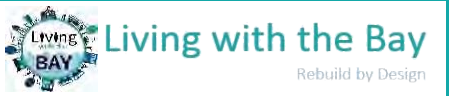


Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT II  
COOPER SQUARE UNDERGROUND DETENTION PROJECT DESCRIPTION

Category: WATER STORAGE



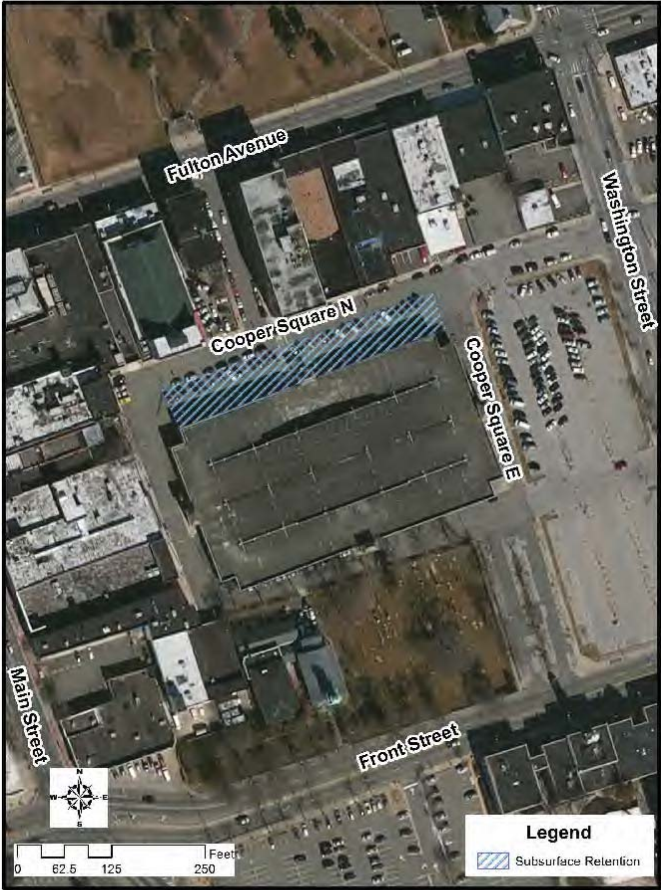
Site Location	
SubWatershed	1
Street Address	Cooper Square, Hempstead, NY 11550
Longitude	-73.62
Latitude	40.71
Landowner	Village of Hempstead
Existing Use	Street
O & M Responsibility	Village of Hempstead
Low Moderate Income Area	60% - 80%
Existing Site Description:	A highly impervious drainage area combined with inadequate collection infrastructure and poor conveyance infrastructure causes localized flooding at the downstream end of Cooper Square in Hempstead, NY. A number of dry wells appear to have been installed to alleviate the problem, but flooding still occurs.

Proposed Characteristics	
Cost Estimate	\$2,100,000
Level of Protection, yr	2
Project Life, yr	30
Focus	Water Quality, Flood Defense
Problem Areas Addressed	14
Proposed Improvements Description	A subsurface retention basin is proposed underneath the parking lot along Cooper Square North, adjacent and to the north of a multistory parking deck. The basin will be used to mitigate stormwater runoff volume and peak flows from the highly impervious drainage area upstream of Cooper Square to alleviate flooding in the problem areas.

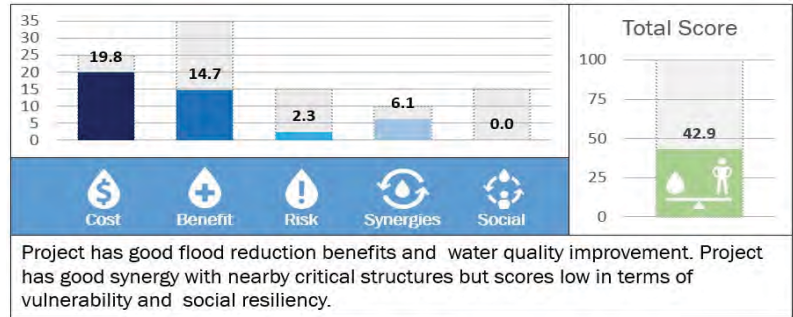
LWTB Goal(s) Met By Project

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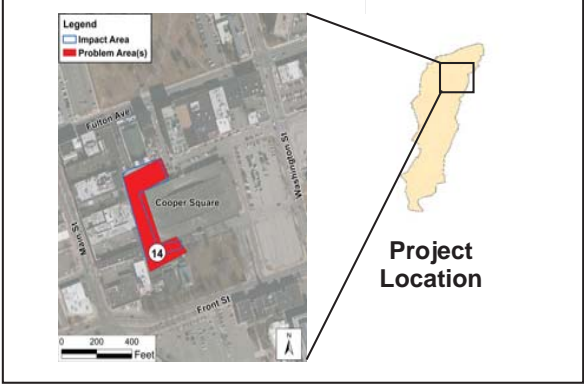
PROPOSED IMPROVEMENTS



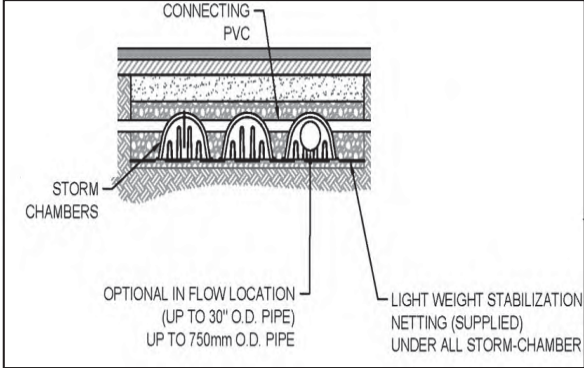
Project Prioritization Results



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Typical Subsurface Retention cross-section



Construction of Subsurface Retention



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT M

EAST ROCKAWAY HIGH SCHOOL /LISTER PARK PROJECT DESCRIPTION

Categories:

WATER STORAGE  
GREENER EDGE  
SPACE FOR THE RIVER  
GREENWAY CORRIDOR

Site Location	
SubWatershed	22, 23, 40
Street Address	443 Ocean Ave, East Rockaway, NY
Longitude	-73.66
Latitude	40.65
Landowner	Town of Hempstead, East Rockaway, Rockville Centre, ERSD
Existing Use	Open Space, Parking Lot, Shoreline, Street
O & M Responsibility	East Rockaway (River Ave.), ERSD (School), Town of Hempstead (Waterview Rd.), ToH Waterways & Conservation (Living Shoreline), Rockville Centre (Parks)
Low Moderate Income Area	40% - 60%
Existing Site Description:	East Rockaway High School is affected by shoreline erosion, tailwater flooding, and Superstorm Sandy flood damage. The bleachers, two story storage, and press box at the sports field are on the verge of falling into the Mill River due to ongoing shoreline erosion. Lister Park's parking lot and the intersection of River Avenue and Waterview Road flood due to tidal and storm surge influences. Areas along the Mill River banks experience shoreline erosion due to high river velocities and tides. Several residential properties along Mill River are affected by Superstorm Sandy inundation.

Proposed Characteristics	
Cost Estimate	\$7,200,000
Level of Protection, yr	100
Project Life, yr	50
Focus	Flood Defense, Water Quality, Habitat Restoration, Social Resiliency
Problem Areas Addressed	33, 34, 39, 43, 53, 68

Proposed Improvements Description	Approximately 1800 LF of bulkhead improvements and installing twelve (12) backflow prevention devices to protect the school's parking lots and sports field from storm surge and tidal flooding. Living shoreline improvements to mitigate shoreline erosion and enhance habitat restoration and creation. A Greenway with elevated sections & pedestrian bridge to bring communities on west bank of the Mill River to the waterfront and to protect 34 homes flooded during Sandy. Elevated berm from Shellbank Ave to DaCosta Ave to protect community on east bank from flooding. Construct bulkhead & install check valve to protect River Ave & Waterview Rd from tidal flooding. Runoff from the parking lots of Lister Park, Centennial Park and Tighe Field will be treated and reduced by Green Infrastructure bioswales. Self-regulating tide gates to protect the wetland behind ERHS from tidal flooding.
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LWTB Goal(s) Met By Project

Increase Community Resiliency

Preserve Quality of Life

Provide Educational Opportunities

Create and Improve Public Waterfront Access

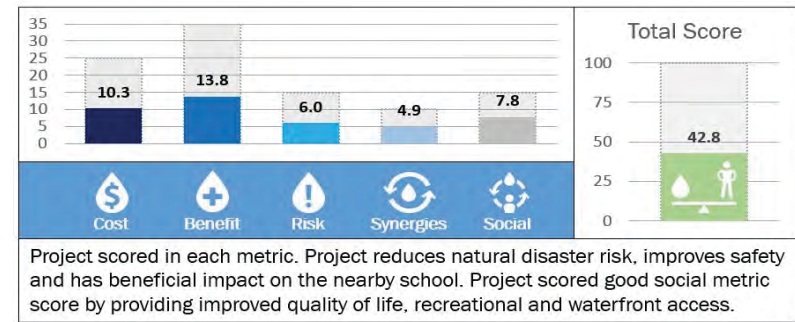
Restore Environmental Health

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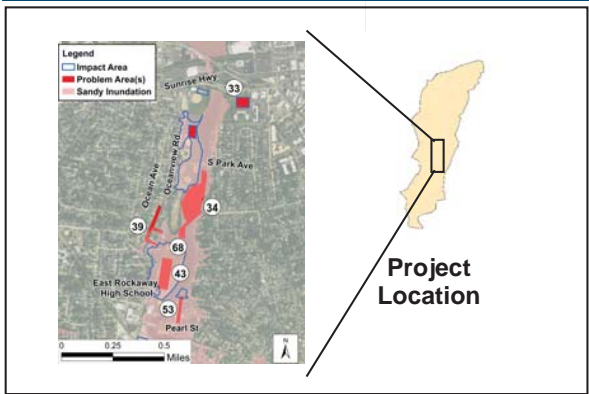
PROPOSED IMPROVEMENTS



Project Prioritization Results



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Example Pathway Berm for Flood Protection



Example Sports Field



Example Bulkheads



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT H

MALVERNE HIGH SCHOOL PROJECT DESCRIPTION

Categories: SPACE FOR THE RIVER  
GREENWAY CORRIDOR



Site Location	
SubWatershed	17
Street Address	80 Ocean Ave., Malverne, NY 11565
Longitude	-73.66
Latitude	40.68
Landowner	Malverne High School
Existing Use	Landscape Area
O & M Responsibility	Malverne Union Free School District/ Nassau County
Low Moderate Income Area	N/A
Existing Site Description:	The project area is at Malverne High School. There is a stream piped underneath the athletic fields that causes wet areas behind the high school. A yard waste site upstream of the school encroaches on the floodplain and significant impervious parking area runoff remains untreated before draining to the athletic fields. The ballfields on the southwest side of the school are constantly wet.

Proposed Characteristics	
Cost Estimate	\$2,800,000
Level of Protection, yr	1
Project Life, yr	30
Focus	Water Quality, Social Resiliency, Habitat Restoration
Problem Areas Addressed	71
Proposed Improvements Description	A stormwater wetland is proposed upstream of Malverne High School, at the corner of Ocean Avenue and Pinebrook Avenue. The wetland will restore floodplain functionality and provide stormwater runoff peak flow attenuation benefits, reducing moisture retention behind the high school and in the athletic fields, as well as water quality benefits downstream. The wetland would function as a living laboratory for the school.

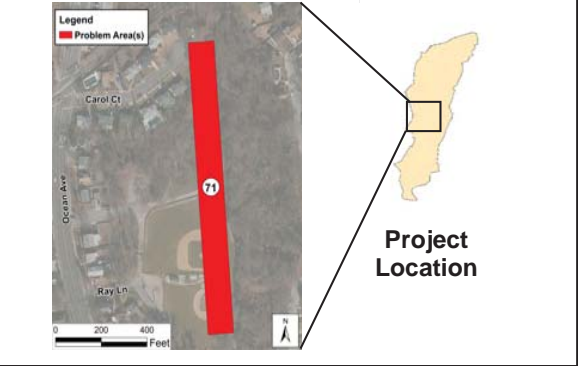
LWTB Goal(s) Met By Project

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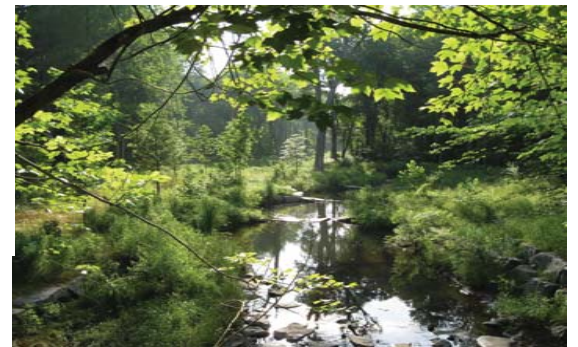
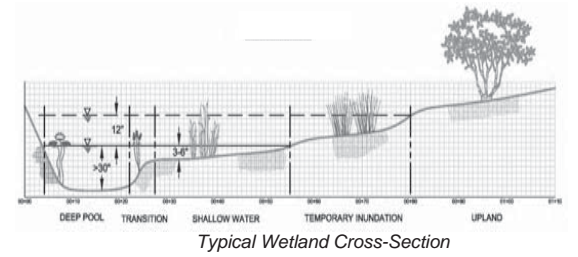
PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREA

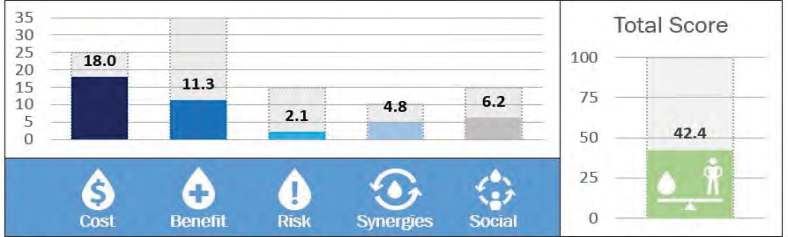


SAMPLE PHOTOS



Example Wetland

Project Prioritization Results



Project scores well in the cost metric while providing good benefits through water quality and habitat restoration. Project provides social resiliency through improving quality of life and providing educational opportunities.



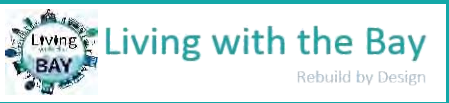
Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT F

MALVERNE BIORETENTION GREEN STREETS PROJECT DESCRIPTION

Categories: WATER STORAGE  
GREENER EDGE



Site Location	
SubWatershed	16
Street Address	Cornwell Ave., Sydney Ave., Nassau Ave., Nottingham Rd., Alnwick Rd., Rider Ave., Charles St., Parkview Pl., Gold Pl., N. King St., Atlas Ave., Lawrence Ave., Malverne Ave., Norwood Ave., Johnson Ave., Wagg Ave., Eimer Ave., William St., Roosevelt Ave., Morris Ave., Ogston Terr., Carrolton Pl., and Burton St., Malverne, NY
Longitude	-73.67
Latitude	40.68
Landowner	Village of Malverne
Existing Use	Street
O & M Responsibility	Village of Malverne
Low Moderate Income Area	N/A
Existing Site Description:	The existing project area includes five sites in The Village of Malverne that experience localized flooding caused by a lack of or undersized storm infrastructure and microtopography. The affected areas are near the intersections of Kenilworth St. and Nottingham Rd.; Eimer Ave. and Alnwick Rd.; Cornwell Ave. and N. King St.; and Sydney Ave. and Burton St.
Proposed Characteristics	
Cost Estimate	\$5,400,000
Level of Protection, yr	0.3
Project Life, yr	30
Focus	Water Quality, Social Resiliency, Flood Defense
Problem Areas Addressed	74, 75, 76, 77, 78, 81, 82
Proposed Improvements Description	The proposed improvements include installation of green streets with incorporated bioretention area. Green streets are a linear network of distributed BMPs located in the street right-of-way that are designed to reduce runoff volume and improve water quality of the runoff both from the street and the adjacent parcels. 1.1 miles of street will be implemented with green streets for this project.

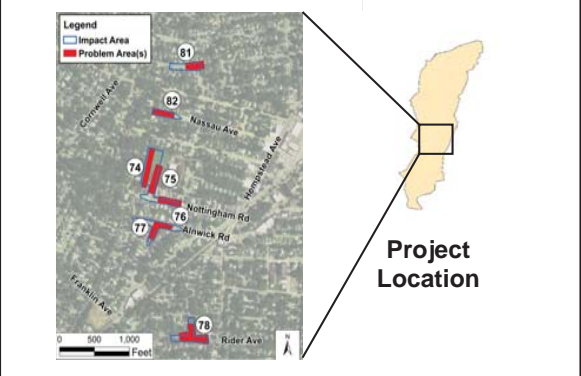
LWTB Goal(s) Met By Project

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PROPOSED IMPROVEMENTS



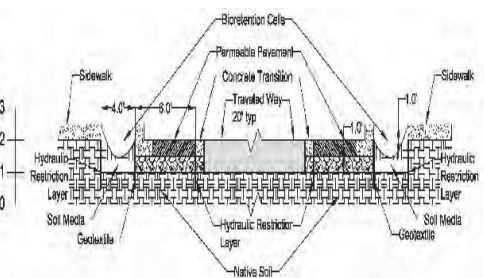
PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS

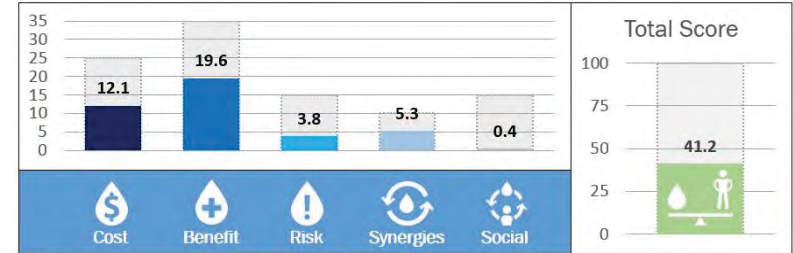


Typical Green Street Layout



Typical Green Street with Bioretention Cross-Section

Project Prioritization Results



Significant benefits provided through water quality improvement, flood reduction, and improved habitat due to the distributed nature of green infrastructure.



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT A

HEMPSTEAD LAKE STATE PARK PROJECT DESCRIPTION

Categories: WATER STORAGE  
GREENER EDGE  
SPACE FOR THE RIVER  
GREENWAY CORRIDOR



Living with the Bay

Rebuild by Design

Site Location	
SubWatershed	7, 19
Street Address	Eagle Avenue, West Hempstead, NY
Longitude	-73.64
Latitude	40.69
Landowner	New York State
Existing Use	Open Space, Open Water, Park, Street
O & M Responsibility	NYS Parks
Low Moderate Income Area	N/A
Existing Site Description:	Hempstead Lake Dam is an earthen dam located within Hempstead Lake State Park and features a gate house with multiple slide gates and overflow weirs. The Lake provides storage and treatment of runoff before discharging downstream to the Mill River. The outlet gates are no longer functional and openings were cut in the two upper gates which serve to maintain the water level of the lake. The North Ponds are subject to large amounts of floatables and heavy sediment loads and the ponds have elevated levels of pollutants. The Northwest Pond Spillway is breached and not functional.
Proposed Characteristics	
Cost Estimate	\$34,500,000
Level of Protection, yr	100
Project Life, yr	50
Focus	Habitat Restoration, Flood Defense, Water Quality, Social Resiliency
Problem Areas Addressed	27, 28, 29
Proposed Improvements Description	<ul style="list-style-type: none"><li>•Hempstead Lake Dam Improvements</li><li>•North Ponds Habitat Restoration</li><li>•Northwest Pond Spillway Repair</li><li>•Environmental Education and Resiliency Center</li><li>•Greenway with Pedestrian Bridges to improve Public Access to the Waterfront and provide a substantial part of the overall Greenway Corridor.</li><li>•Docks and Kayak launches to Improve the Public Access to the Waterfront.</li><li>•Sediment Basin</li><li>•Floatables catcher</li><li>•Hiking, Cycling, and Bridle Path</li></ul>
LWTB Goal(s) Met By Project	

PROPOSED IMPROVEMENTS

Project Prioritization Results

Cost	Benefit	Risk	Synergies	Social
0.0	13.6	11.3	5.3	10.7

Total Score

40.9

Significant benefits in flood reduction, habitat restoration and water quality. The social metric scored higher because of increased access to the waterfront and educational opportunities associated with the project.

PROJECT AREA WITH PROBLEM AREA

SAMPLE PHOTOS

Example Floatables Catcher

Existing Inoperable Hempstead Lake Dam Gatehouse

Environmental Education & Resiliency Center Rendering

North Ponds Restoration Example Images

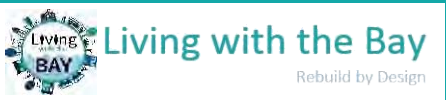


Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT L  
SMITH POND PROJECT DESCRIPTION

Categories: GREENER EDGE  
SPACE FOR THE RIVER  
GREENWAY CORRIDOR



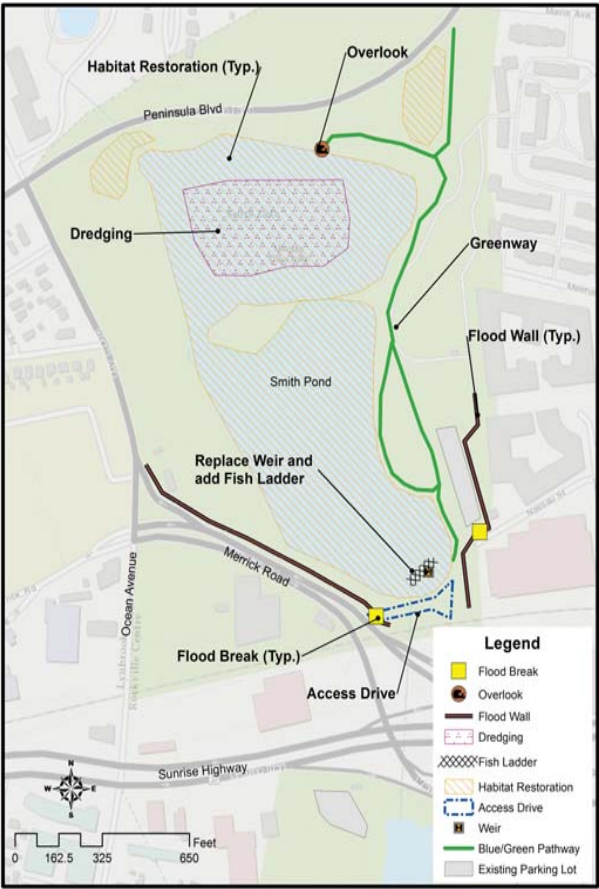
Site Location	
SubWatershed	19
Street Address	Smith Pond, Rockville Centre, NY
Longitude	-73.65
Latitude	40.66
Landowner	Village of Rockville Centre
Existing Use	Open Water, Park Space
O & M Responsibility	Nassau County (Weir), Village of Rockville Centre (Smith Pond)
Low Moderate Income Area	60% - 80%
Existing Site Description:	The Smith Pond is the confluence point of the two primary drainage branches (Pines Brook and Mill River). The Pond also connects upstream freshwater system to the downstream tidal and salt water system. The Pond collects flow and nutrient loads for the entire watershed. The Pond's high nutrient loads, silt, sedimentation, and excessive weed growth affect aquatic life support and recreational uses. The low lying areas along the east and west banks are subject to flooding during 25 year and 100 year storm events.

Proposed Characteristics	
Cost Estimate	\$4,900,000
Level of Protection, yr	100
Project Life, yr	50
Focus	Flood Defense, Water Quality, Habitat Restoration, Social Resiliency
Problem Areas Addressed	32
Proposed Improvements Description	Dredging approximately 33,000 cubic yards from the pond bottom at average dredge depths of 12 -24 inches helps to increase water depths and attain more volume for storage attenuation and creates an opportunity to eliminate invasive plant growth. Replacing weir and installing a fish ladder passage improves the pond habitat for fish. Greenway is proposed on the east of Smith Pond along the shoreline and starts at existing parking lot and continues around the pond with a new overlook on north. The pathway creates public access and improves community recreation activities. A new access drive is proposed to access Smith Pond spillway in order for the spillway to be maintained. Approximately 1800 LF of flood walls with flood breaks.

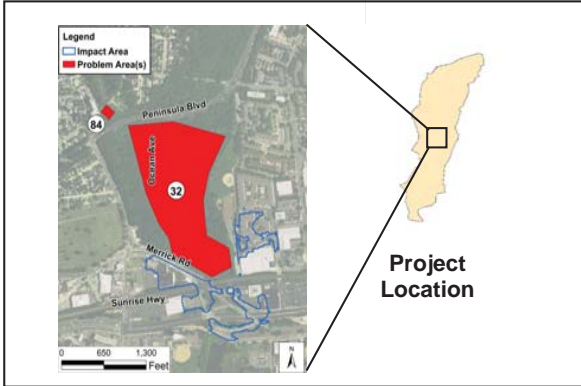
LWTB Goal(s) Met By Project

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PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Existing Smith Pond Weir



Example Pond Overlook

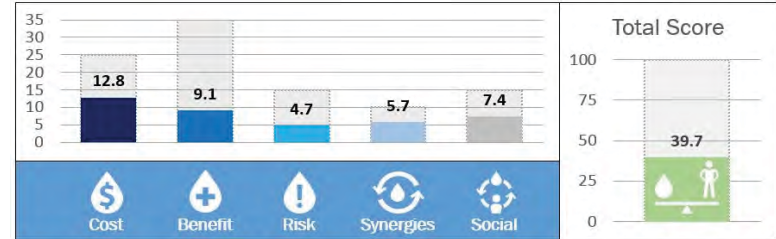


Example Fish Ladder Mechanism



Example Fish Ladder for Smith Pond

Project Prioritization Results



Significant benefits in habitat restoration. The social metric scored good as project provides waterfront access and recreational activities. Improved safety and reduced natural disaster risk generate a good vulnerability score for the project.



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT C

HEMPSTEAD HOUSING AUTHORITY PROJECT DESCRIPTION

Categories: WATER STORAGE  
GREENER EDGE  
SPACE FOR THE RIVER

Site Location	
SubWatershed	1
Street Address	260 Clinton St # 100, Hempstead, NY
Longitude	-73.62
Latitude	40.71
Landowner	Hempstead Housing Authority (HHA), Nassau County (Drain)
Existing Use	Open Water, Parking Lot, Street
O & M Responsibility	Nassau Co. DPW (Horsebrook Drain East Branch), HHA (On-site Drainage)
Low Moderate Income Area	>80%
Existing Site Description:	The Hempstead Housing Authority (HHA) along the east branch of Horsebrook Drain located between Yale Street and Jackson Street floods during a 5-year or greater rainfall event due to inadequate capacity of the open channel and downstream closed channel. The parking lot and ground floor are at low elevations and begin to flood from 2-year flood event, when the surface water profile exceeds the drain's banks according to the County's hydrologic and hydraulic model.

Proposed Characteristics	
Cost Estimate	\$2,600,000
Level of Protection, yr	25
Project Life, yr	50
Focus	Flood Defense, Water Quality
Problem Areas Addressed	9, 10

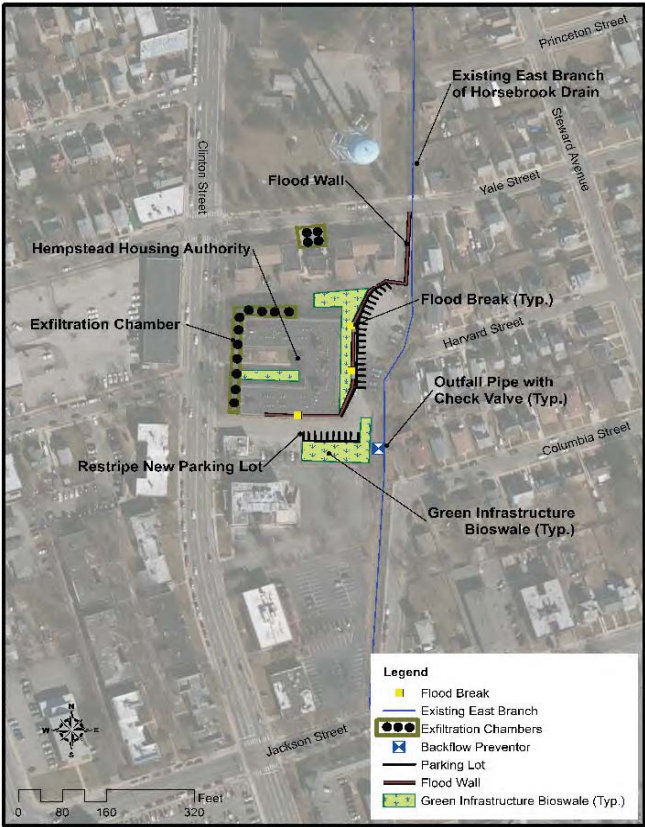
Proposed Improvements Description	Construct approx. 640 LF of new flood wall 4-5 ft above existing grade from Yale St to protect the HHA buildings west of Horsebrook Drain from flooding associated with a 25-yr 24-hr rainfall event or less. Floodbreak barriers installed at building access points will automatically deploy to prevent flooding. Green infrastructure (GI) in the form of bioswales and exfiltration systems will be incorporated on the HHA property so that runoff from 25-yr 24-hr storm event is captured and treated onsite. GI will include additional open space with new rain gardens and swales with 6:1 side slopes. Reconfigure existing parking lot to create GI and restripe parking with zero net difference in total number of parking spots. Redirect building's roof drains to ground surface so runoff will enter the new stormwater management system. Based on the County's modeling, the proposed improvements will protect HHA up to a 25-year storm event and provide on-site storage up to a 25-year rainfall event.
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LWTB Goal(s) Met By Project

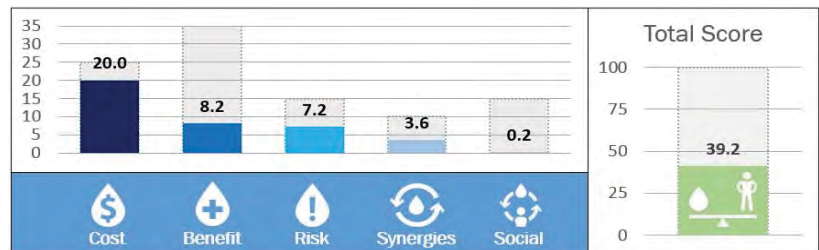


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PROPOSED IMPROVEMENTS

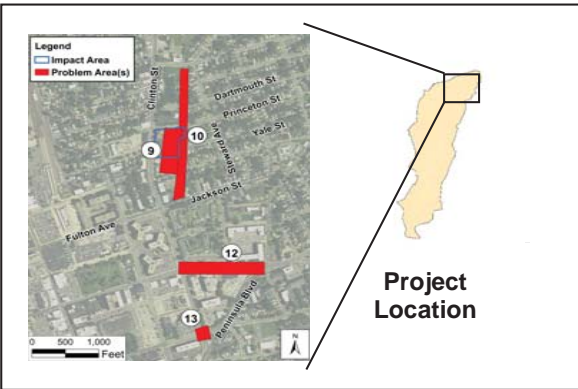


Project Prioritization Results



Project has good flood reduction benefits. Project provided improved safety and reduced natural disaster but does not provide social resiliency.

PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Existing HHA Parking Lot



Example Bioswale for HHA



Example Exfiltration Chamber for HHA On-site Drainage



Example Flood Wall on the Adjacent Property



Site Location	
SubWatershed	26
Street Address	174-210 Forest Ave, Lynbrook, NY
Longitude	-73.67
Latitude	40.65
Landowner	Village of Lynbrook
Existing Use	Street
O & M Responsibility	Village of Lynbrook
Low Moderate Income Area	N/A

Existing Site Description: The area along Forest Avenue between Sunrise Highway and Howard Place floods during heavy rainfall as it is located in a landlocked basin.

Proposed Characteristics	
Cost Estimate	\$1,000,000
Level of Protection, yr	0.5
Project Life, yr	30
Focus	Flood Defense, Water Quality
Problem Areas Addressed	38

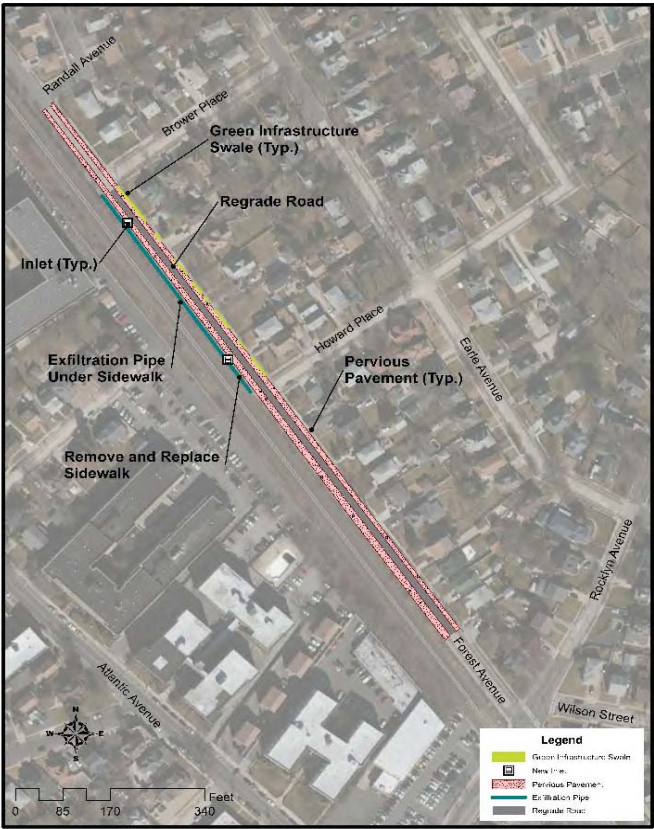
Proposed Improvements Description The proposed improvements include installation of 300 LF green infrastructure bioswales, 1300 LF of pervious pavement and 450 LF of exfiltration pipe. GI bioswales are vegetated channels that provide treatment and storage while moving stormwater from one place to other. Pervious pavements are proposed on the existing street to infiltrate and filter the stormwater runoff. Exfiltration pipe is proposed under sidewalk to provide additional storage and alleviate flooding from the landlocked basin. Regrade the road to provide positive slope and outfall towards Rocklyn Ave during the construction of street to allow stormwater to drain properly.

LWTB Goal(s) Met By Project

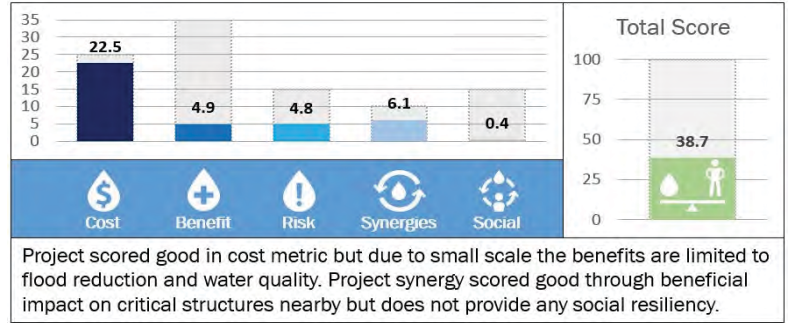


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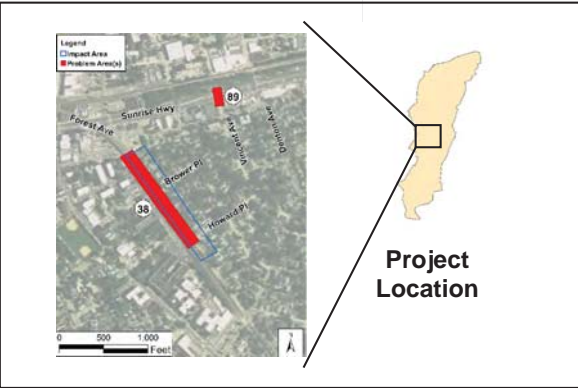
PROPOSED IMPROVEMENTS



Project Prioritization Results



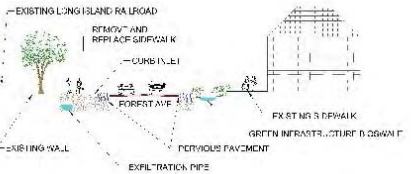
PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Flooding During Heavy Rainfall on Forest Avenue



Example Forest Ave Proposed Cross Section



Example Street with Pervious Pavement



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT P

EAST BOULEVARD AND WEST BOULEVARD PROJECT DESCRIPTION

Categories: WATER STORAGE  
GREENER EDGE



Living with the Bay

Rebuild by Design

Site Location	
SubWatershed	32
Street Address	104-106 West Blvd., East Rockaway, NY.
Longitude	-73.67
Latitude	40.63
Landowner	Town of Hempstead
Existing Use	Street
O & M Responsibility	Town of Hempstead
Low Moderate Income Area	N/A
Existing Site Description:	West Blvd., East Blvd., and cross streets of East Blvd., West Blvd., and Hewlett Point Ave. frequently flood due to tidal backup. The drainage systems in Sperry, Dewey, Sampson, Martin, and Fulton Streets are inadequately designed to convey stormwater for a 10-yr event. Most of the outfalls on West Blvd. are subject to water quality issues and Bay Park Area is subjected to public safety access issues from the tidal and storm surge.
Proposed Characteristics	
Cost Estimate	\$2,500,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense, Water Quality
Problem Areas Addressed	49, 51, 85
Proposed Improvements Description	Install green infrastructure bioswales at end of West Blvd., East Evans St., and East Court St. to improve water quality and mitigate flooding. Install 14 in-line backflow preventers in outfall structures south of Sperry St. on W. Blvd., E. Blvd., Hewlett Point Ave., and Rhame Ave. to prevent tidal water from entering drainage system. Improve drainage system for better conveyance.

LWTB Goal(s) Met By Project

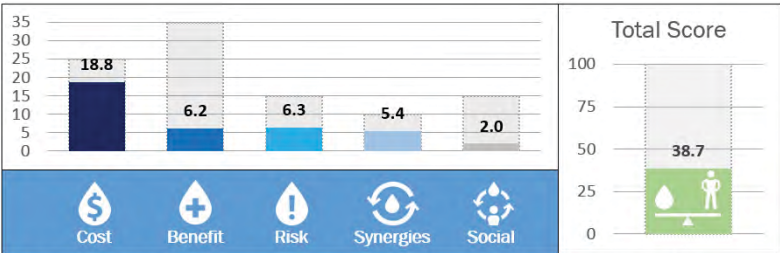


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PROPOSED IMPROVEMENTS

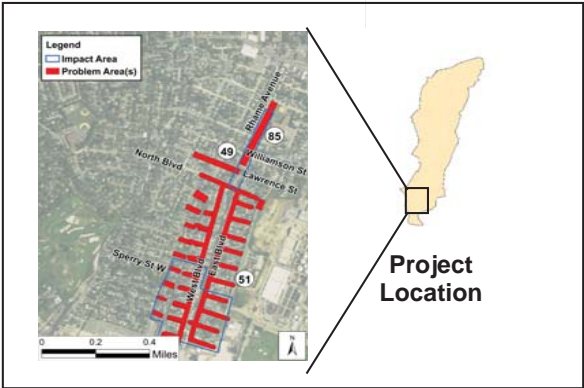


Project Prioritization Results

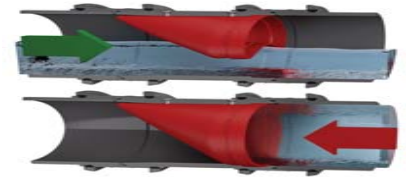


The project scores high in the cost metric while providing good water quality benefits. The project has good synergy through its beneficial impact on critical structures but does not provide any social resiliency.

PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



There are a variety of backflow prevention valves available intended to allow water to flow to open water but preventing tidal water from surcharging the system




Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



Site Location	
SubWatershed	10
Street Address	Green Ave., Grant St., Rose Ave., W Marshall St., Carolina Ave., W Graham Ave., Marton Luther King Dr., Circle Dr., Alabama Ave., Virginia Ave., Mason St., Sutton St., and Flower St., Hempstead, NY
Longitude	-73.63
Latitude	40.69
Landowner	Village of Hempstead
Existing Use	Street
O & M Responsibility	Village of Hempstead
Low Moderate Income Area	40% - 60%
Existing Site Description:	The existing project area includes three sites in The Village of Hempstead that experience localized flooding caused by a lack of or undersized storm drainage infrastructure, microtopography, and substantial upstream contributing areas. The affected areas are near the intersection of Green Ave., Rose Ave., and Grant St.; the intersection of Green Ave. and Marshall St.; and a section of Carolina Ave. off of Virginia Ave.
Proposed Characteristics	
Cost Estimate	\$15,200,000
Level of Protection, yr	0.5
Project Life, yr	30
Focus	Water Quality, Flood Defense
Problem Areas Addressed	24, 25, 26
Proposed Improvements Description	The proposed improvements include installation of suspended pavement green streets. Green streets are a linear network of distributed BMPs located in the street right-of-way that are designed to reduce runoff volume and improve water quality of the runoff both from the street and the adjacent parcels. In this instance, water storage and treatment is integrated under the sidewalk using a suspended pavement system. 1.18 miles of street will be implemented with green streets for this project. 32 dry wells will be installed at the intersections to reduce and treat stormwater runoff.
LWTB Goal(s) Met By Project	
<div><div><div><div></div><div>Increase Community Resiliency</div></div><div><div></div><div>Restore Environmental Health</div></div></div></div>	<div>DRAFT</div>

PROPOSED IMPROVEMENTS



Project Prioritization Results

35	30	25	20	15	10	5	0
5.0	22.1	6.1	5.3	0.0			

Cost

Benefit

Risk

Synergies

Social

Total Score

100

75

50

25

0

38.5

Project has significant flood reduction and water quality benefits but does not score well in the cost metric. Project reduces natural hazard risk and enhances safety but does not provide any additional social resiliency.

PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS

PROPOSED IMPROVEMENTS



Example Suspended Sidewalk Layout



Typical Green Street with Suspended Sidewalk Cross-Section



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT X

S CENTRE AVENUE BIORETENTION GREEN STREET PROJECT DESCRIPTION

Categories: WATER STORAGE  
GREENER EDGE

Site Location	
SubWatershed	21
Street Address	S Centre Avenue, Rockville Centre, NY 11570
Longitude	-73.65
Latitude	40.65
Landowner	Village of Rockville Centre
Existing Use	Street
O & M Responsibility	Village of Rockville Centre
Low Moderate Income Area	40% - 60%
Existing Site Description:	The existing site is at the intersection of South Park Avenue and South Centre Avenue in the Village of Rockville Centre. Localized flooding is occurring near the intersection caused by a lack of or undersized storm drainage infrastructure and flat microtopography.
Proposed Characteristics	
Cost Estimate	\$260,000.00
Level of Protection, yr	0.5
Project Life, yr	30
Focus	Water Quality, Social Resiliency
Problem Areas Addressed	35
Proposed Improvements Description	The proposed improvements include installation of green streets with incorporated bioretention area. Green streets are a linear network of distributed BMPs located in the street right-of-way that are designed to reduce runoff volume and improve water quality of the runoff both from the street and the adjacent parcels. 150 feet of street will be implemented with green streets for this project.

LWTB Goal(s) Met By Project



Increase Community Resiliency



Restore Environmental Health



Preserve Quality of Life

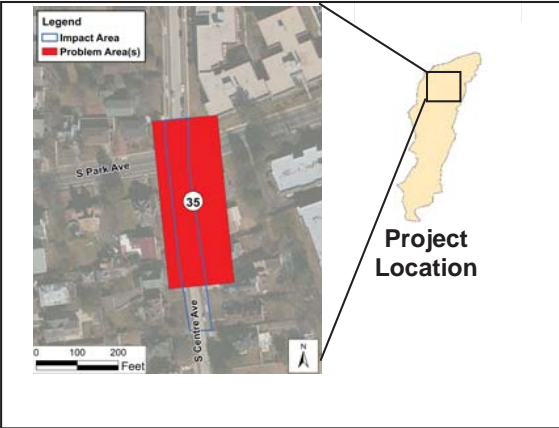
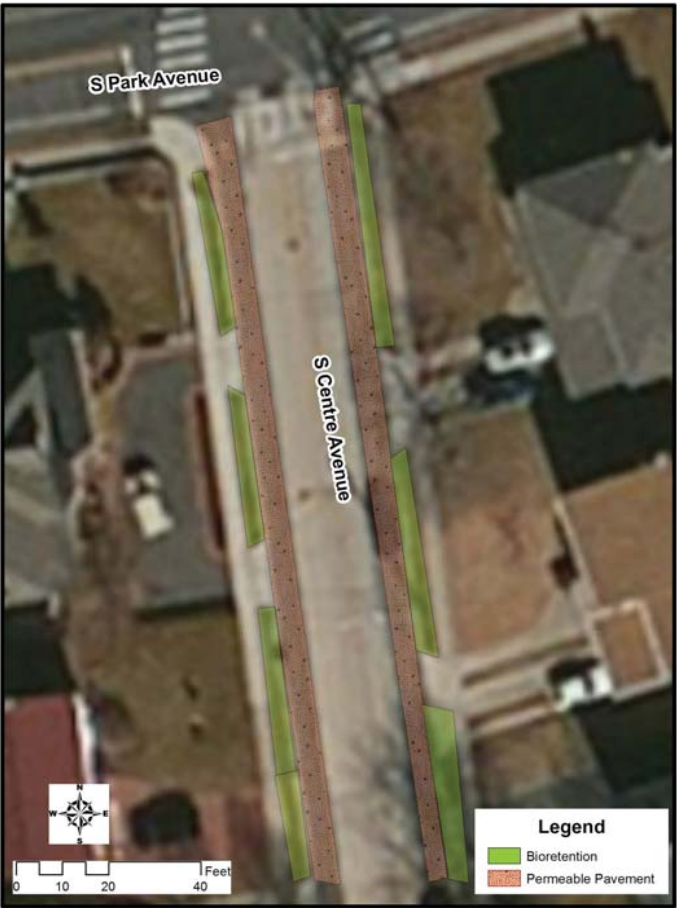


Provide Educational Opportunities

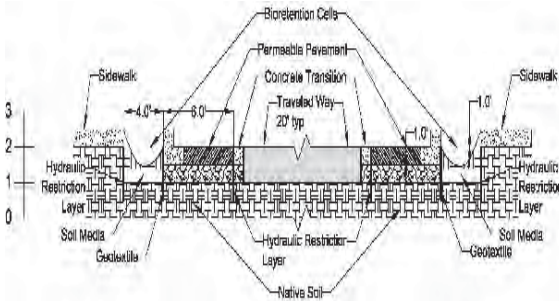
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PROPOSED IMPROVEMENTS

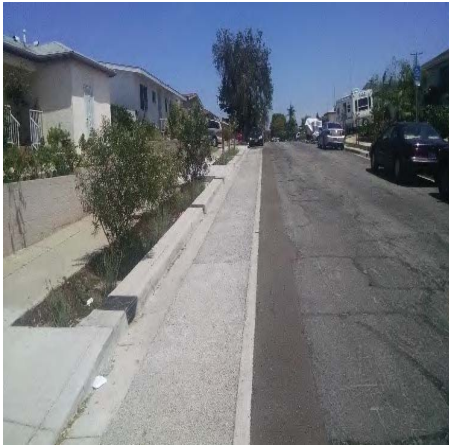
PROJECT AREA WITH PROBLEM AREA



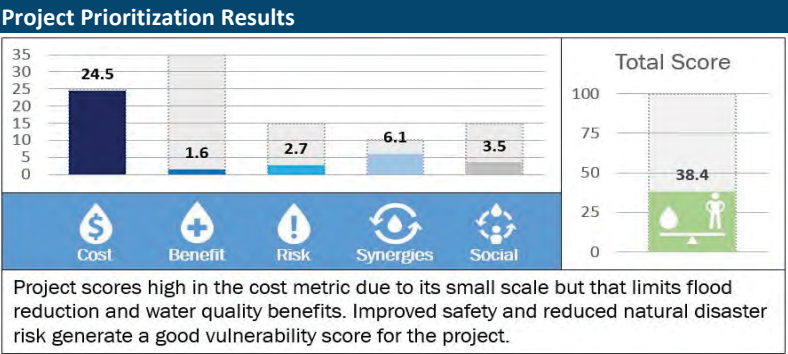
SAMPLE PHOTOS



Typical Green Street with Bioretention Cross-Section



Example Green Street with Bioretention





Site Location	
SubWatershed	1
Street Address	5 Covert Street, Hempstead, NY
Longitude	-73.63
Latitude	40.70
Landowner	Village of Hempstead
Existing Use	Street
O & M Responsibility	Village of Hempstead
Low Moderate Income Area	40% - 60%
Existing Site Description:	The Covert Street/ Front Street intersection floods frequently in heavy rainfall events due to a high point south of the intersection. The lack of inlets at the intersection combined with the ridge on Covert Street causes flooding.
Proposed Characteristics	
Cost Estimate	\$400,000
Level of Protection, yr	1 year
Project Life, yr	25
Focus	Flood Defense
Problem Areas Addressed	22
Proposed Improvements Description	The elevated ridge at the entrance of Covert Street shall be lowered to allow sheetflow down Covert Street so that the stormwater drains south naturally. Replace curbs and sidewalks along the proposed improvement. Mill and resurface 1.5 inches of asphalt on the rest of the street for the proper drainage of sheetflow. Add subgrade exfiltration bed to collect stormwater, provide storage, and improve water quality.
LWTB Goal(s) Met By Project	
<div><div><div><div></div><div>Increase Community Resiliency</div></div></div></div> <div>DRAFT</div>	

PROPOSED IMPROVEMENTS

Map showing proposed improvements for Covert Street. The map includes labels for Front Street, Adam Avenue, Madison Avenue, and Covert Street. The proposed improvements are indicated by colored lines and text: Lower Grade (dashed line), Replace Curbs and Sidewalks (Typ.) (dashed line), Mill and Resurface 1.5" asphalt (solid line), and Subgrade Exfiltration Bed (Typ.) (dashed line). A legend at the bottom right defines the symbols: Mill and Resurface 1.5" asphalt (solid line), Subgrade Exfiltration Bed (dashed line), Replace Curbs and Sidewalk (dashed line), and Lower Grade (dashed line). A scale bar at the bottom left shows distances in feet (0, 55, 110, 220).

Project Prioritization Results

24.5

Cost

0.6

Benefit

5.7

Risk

6.8

Synergies

0.0

Social

Total Score

37.6

Project scores high in cost metric but due to its small scale has limited flood reduction and water quality benefits. Project has good synergy through beneficial impact on nearby critical structures.

PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA

SAMPLE PHOTOS

Existing View of Covert Street

Example Resurface Asphalt for Covert Street



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT KK  
SOUTHERN STATE PARKWAY RAMP PROJECT DESCRIPTION

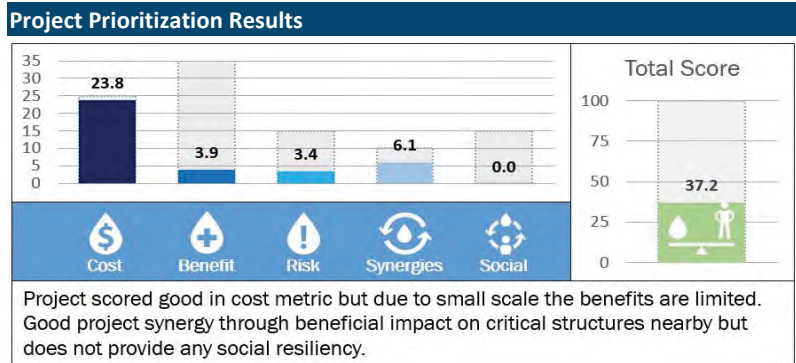
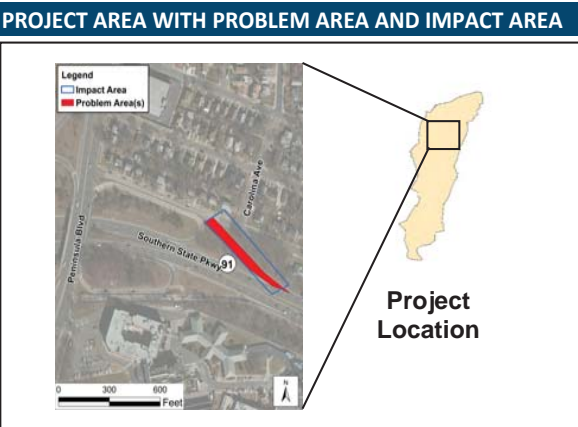
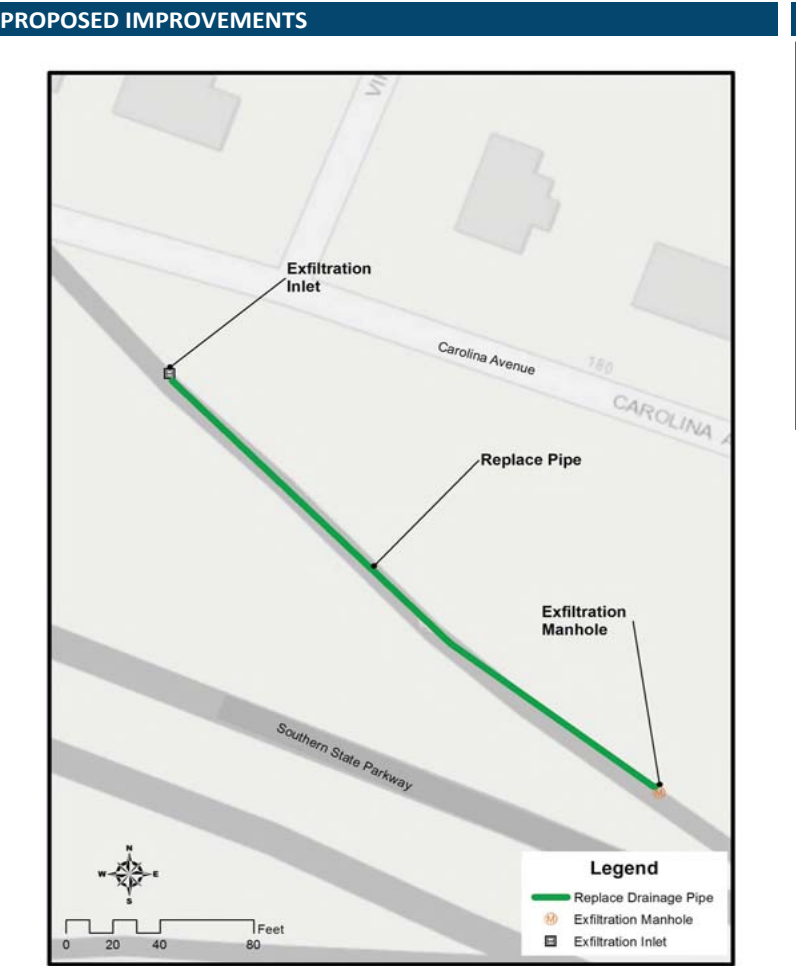
Category: WATER STORAGE

Site Location	
SubWatershed	10
Street Address	Southern State Parkway & Carolina Avenue, Hempstead, NY
Longitude	-73.63
Latitude	40.69
Landowner	NYSDOT
Existing Use	Street
O & M Responsibility	NYSDOT
Low Moderate Income Area	40% - 60%
Existing Site Description:	The Southern State Parkway westbound off ramp to Peninsula Boulevard has an existing inlet and has minor flooding. Due to missing or collapsed catch basin inlet, minor flooding occurs on the road.

Proposed Characteristics	
Cost Estimate	\$500,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense
Problem Areas Addressed	91
Proposed Improvements Description	Add a new exfiltration inlet, exfiltration manhole, and pipe to improve the collection system for proper drainage and prevent flooding during heavy rainfall events.

Increase Community Resiliency

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PROJECT HH  
NICHOLS COURT STORMWATER SUSPENDED PAVEMENT PROJECT DESCRIPTION

Category: WATER STORAGE

Site Location	
SubWatershed	1
Street Address	115-198 Nichols Court, Hempstead, NY 11550
Longitude	-73.62
Latitude	40.71
Landowner	Village of Hempstead
Existing Use	Street
O & M Responsibility	Village of Hempstead
Low Moderate Income Area	>80%

Existing Site Description: The intersection at Nichols Court and Washington Street in Hempstead, NY experiences localized flooding due to inadequate collection, poor conveyance, and microtopography. A portion of the intersection drains away from the intended drainage path, towards an area with no nearby inlets.

Proposed Characteristics

Cost Estimate	\$410,000
Level of Protection, yr	0.7
Project Life, yr	30
Focus	Water Quality, Social Resiliency
Problem Areas Addressed	11

Proposed Improvements Description: The proposed improvements include installation of suspended pavement green streets. Green streets are a linear network of distributed BMPs located in the street right-of-way that are designed to reduce runoff volume and improve water quality of the runoff both from the street and the adjacent parcels. In this instance, water storage and treatment is integrated under the sidewalk using a suspended pavement system. Suspended pavement is proposed along the northern and southern edges of Nichols Court, adjacent to the Hempstead Public Library and Christ's First Presbyterian Church, respectively. 2 dry wells will be installed at the intersection to reduce and treat stormwater runoff.

LWTB Goal(s) Met By Project

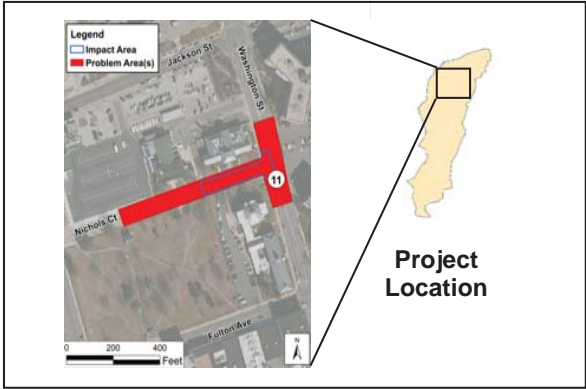


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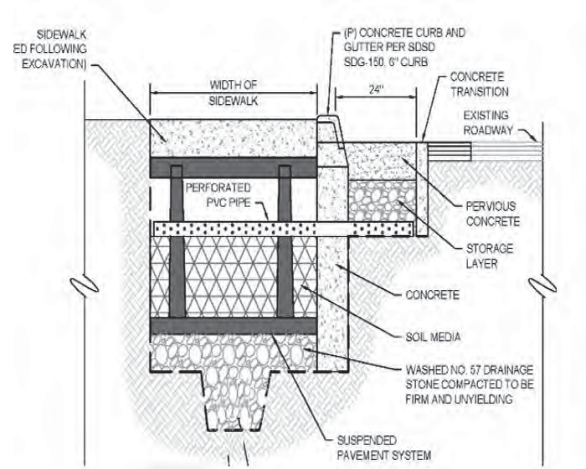
PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA

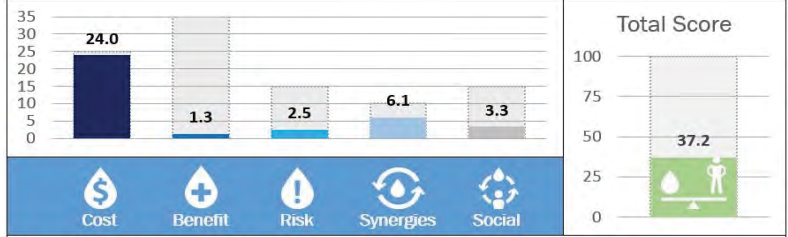


SAMPLE PHOTOS



Typical Green Street with Suspended Sidewalk Cross-Section

Project Prioritization Results



Project scores high in the cost metric while providing good synergy and social resiliency through its beneficial impact on critical and historic structures, but provides little overall benefit to flood reduction, water quality, and habitat.



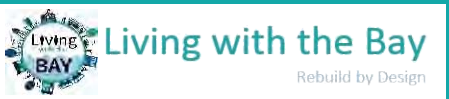
Note: Characteristics are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT J

LYNBROOK RECHARGE BASIN PROJECT DESCRIPTION

Categories: WATER STORAGE  
GREENER EDGE



Site Location	
SubWatershed	19, 26
Street Address	118 Oak St, Lynbrook, NY
Longitude	-73.66
Latitude	40.66
Landowner	Village of Lynbrook
Existing Use	Street
O & M Responsibility	Village of Lynbrook
Low Moderate Income Area	N/A
Existing Site Description:	The existing site is in the right of way between Oak Street and Buckingham Place in The Village of Lynbrook. Localized flooding is occurring on Buckingham Place caused by lack of or undersized storm drainage infrastructure and flat microtopography.

Proposed Characteristics	
Cost Estimate	\$140,000
Level of Protection, yr	0.2
Project Life, yr	30
Focus	Flood Defense, Water Quality
Problem Areas Addressed	37
Proposed Improvements Description	The proposed improvement include construction of new open recharge basin to capture the runoff and alleviate flooding for 0.2 year storm event for Buckingham place. The recharge basin is located at the north east corner of Buckingham Pl. and Oak St. and pops off into existing drianage system after maximum storage. This project helps to reduce runoff and improve water quality for the runoff collected from upstream drainage area.

LWTB Goal(s) Met By Project

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PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



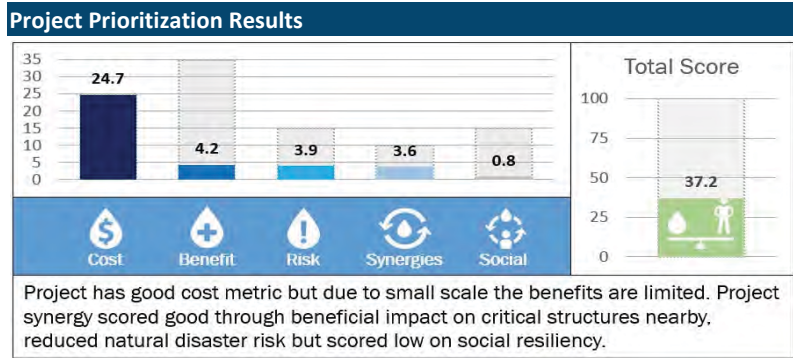
SAMPLE PHOTOS



Existing Street View at Buckingham Pl and Oak St.



Example Open Recharge Basin



Project has good cost metric but due to small scale the benefits are limited. Project synergy scored good through beneficial impact on critical structures nearby, reduced natural disaster risk but scored low on social resiliency.



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT D  
NORTHEAST VILLAGE OF HEMPSTEAD SUSPENDED PAVEMENT GREEN STREETS PROJECT DESCRIPTION

Category: WATER STORAGE

Site Location	
SubWatershed	1
Street Address	Cornell St., Amherst St., Stewart Ave., Remsen Ave., Harriet Ave., Syrray La., Rhodes Ave., Westbury Blvd., Gertrude St., Fairview Blvd., Commander Ave., Byrd St., Chamberlain St., Pilot St., Myrtle Ave., Manor Ave., Warner Ave., Boylston St., James Burrell Ave., Dartmouth St., Wellesley St., Princeton St., Yale St., and Harvard St. , Hempstead, NY
Longitude	-73.61
Latitude	40.71
Landowner	Village of Hempstead
Existing Use	Street
O & M Responsibility	Village of Hempstead
Low Moderate Income Area	60% - 80%
Existing Site Description:	The existing project area includes seven sites in The Village of Hempstead that experience localized flooding caused by a lack of or undersized storm drainage infrastructure, microtopography, and/or substantial upstream contributing areas. The affected intersections are Cornell St. and Boylston St.; Amherst St. and Boylston St.; Stewart Ave. and James LL Burrell Ave.; and Cornell St. and Stewart Ave. Sections of Remsen Ave. north of Westbury Blvd.; Harriet Ave. off of Westbury Blvd.; and Surrey Ln. between Harvard St. and Fulton Ave. are also affected.
Proposed Characteristics	
Cost Estimate	\$20,400,000
Level of Protection, yr	0.4
Project Life, yr	30
Focus	Water Quality, Social Resiliency, Flood Defense
Problem Areas Addressed	1, 2, 3, 4, 5, 6, 7
Proposed Improvements Description	The proposed improvements include installation of suspended pavement green streets. Green streets are a linear network of distributed BMPs located in the street right-of-way that are designed to reduce runoff volume and improve water quality of the runoff both from the street and the adjacent parcels. In this instance , water storage and treatment is integr-ated under the sidewalk using a suspended pavement system. 1.6 miles of street will be implemented with green streets for this project. 32 dry wells will be installed at the intersections to reduce and treat stormwater runoff.

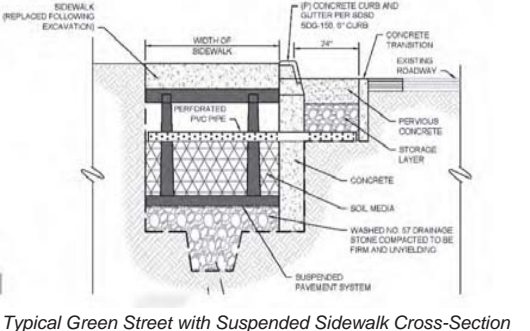
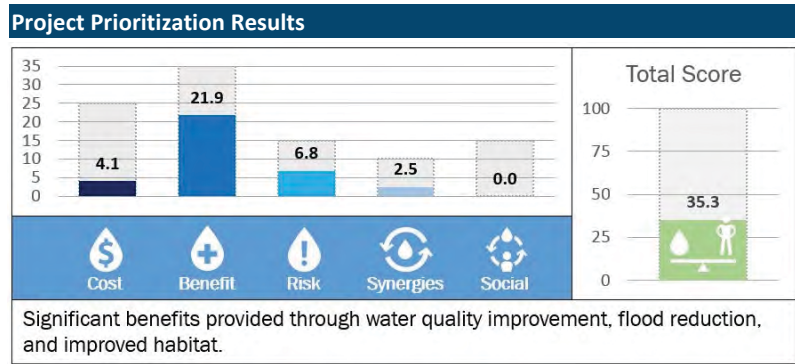
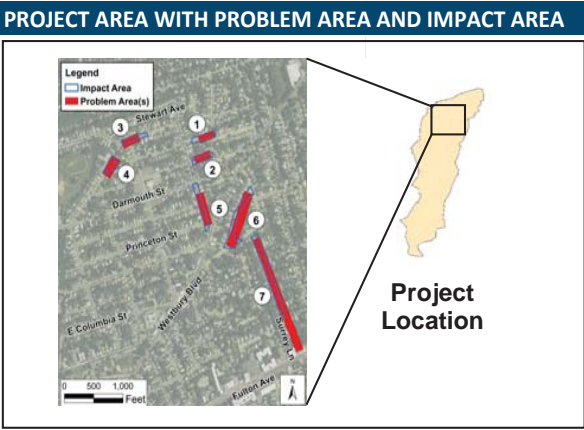
LWTB Goal(s) Met By Project

Increase Community Resiliency

Restore Environmental Health

Provide Educational Opportunities

DRAFT



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT GG  
HENDRICKSON AVENUE PROJECT DESCRIPTION

Categories: WATER STORAGE  
GREENER EDGE

Site Location	
SubWatershed	1
Street Address	37-99 Hendrickson Avenue, Hempstead, NY
Longitude	-73.61
Latitude	40.71
Landowner	Village of Hempstead
Existing Use	Street
O & M Responsibility	Village of Hempstead
Low Moderate Income Area	60% - 80%
Existing Site Description:	Hendrickson Avenue between Devon Road and Front Street floods during heavy rainfall events.

Proposed Characteristics	
Cost Estimate	\$410,000
Level of Protection, yr	0.3
Project Life, yr	30
Focus	Flood Defense, Water Quality
Problem Areas Addressed	8
Proposed Improvements Description	The proposed improvements include installation of 400 LF green infrastructure bioswales, 600 LF of pervious pavement on the east side of existing street. GI bioswales are vegetated channels that provide treatment and storage while moving stormwater from one place to other. Pervious pavements are proposed on the existing street to infiltrate and filter the stormwater runoff. 4 dry wells will be installed at the intersections to collect and treat stormwater runoff.

LWTB Goal(s) Met By Project



Increase  
Community  
Resiliency



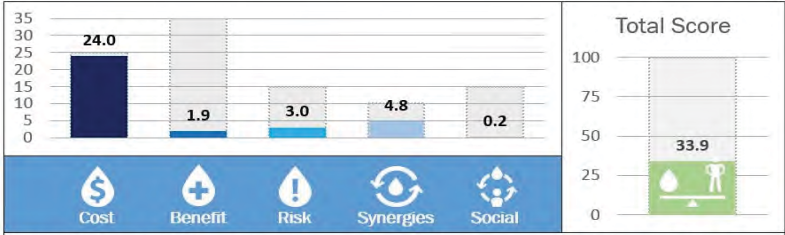
Restore  
Environmental  
Health

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PROPOSED IMPROVEMENTS

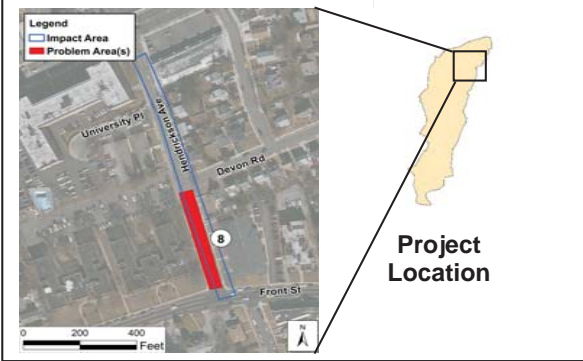


Project Prioritization Results

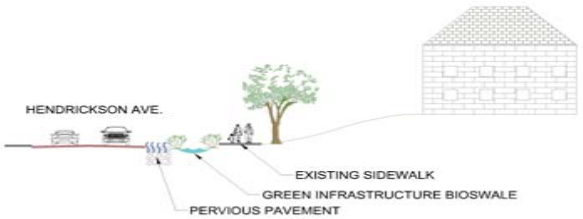


Project has good cost metric but due to small scale has minimal flood reduction and water quality benefits. Project synergy scored good through beneficial impact on critical structures nearby. The project scored low on the social metric.

PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Proposed Cross-Section on Hendrickson Avenue



Example Street with Pervious Pavement



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.




PROJECT I  
LAKEVIEW AVENUE PROJECT DESCRIPTION

Category: N/A

Site Location	
SubWatershed	17
Street Address	4 Ocean Avenue, Lynbrook, NY
Longitude	-73.66
Latitude	40.67
Landowner	Nassau County
Existing Use	Open Space
O & M Responsibility	Nassau County
Low Moderate Income Area	N/A
Existing Site Description:	The existing site is a sports field with no lighting and no restroom facilities and is located adjacent to Tanglewood Preserve that has recreational amenities such as a pond for fishing and a nature center offering educational activities and exhibits.

Proposed Characteristics	
Cost Estimate	\$400,000
Level of Protection, yr	N/A
Project Life, yr	50
Focus	Social Resiliency
Problem Areas Addressed	69
Proposed Improvements Description	Installation of restroom and lighting around the sports field to provide public access and recreation activities, thereby improving the quality of life for the community.

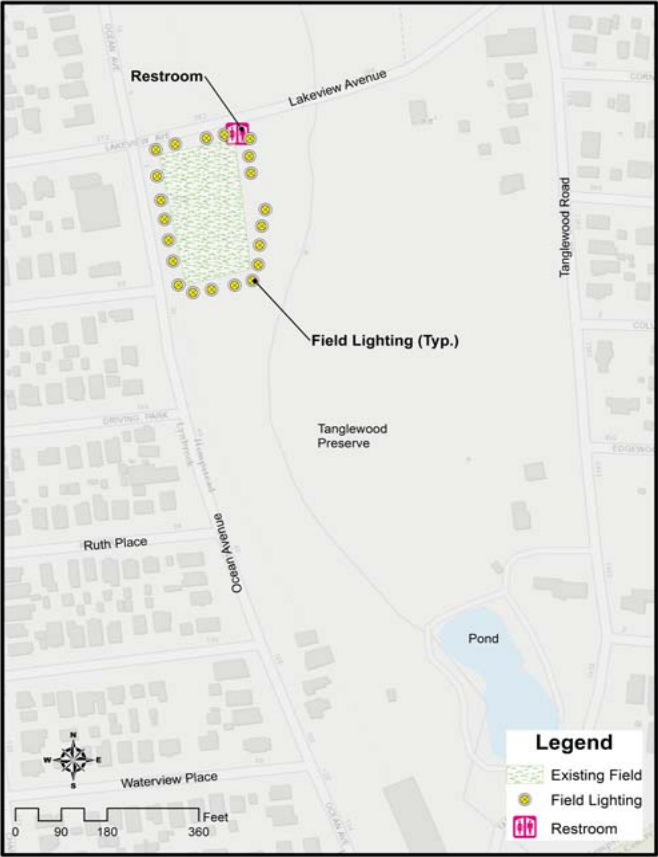
LWTB Goal(s) Met By Project



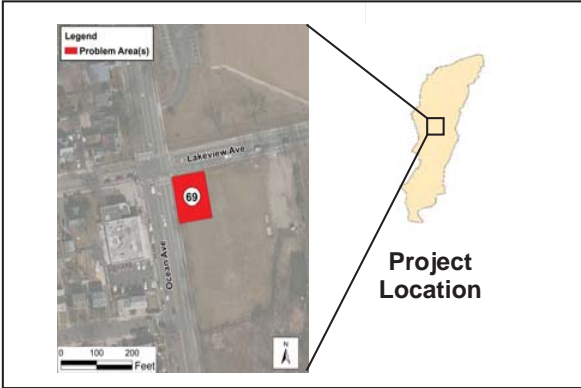
Provide Educational Opportunities

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PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREA



SAMPLE PHOTOS

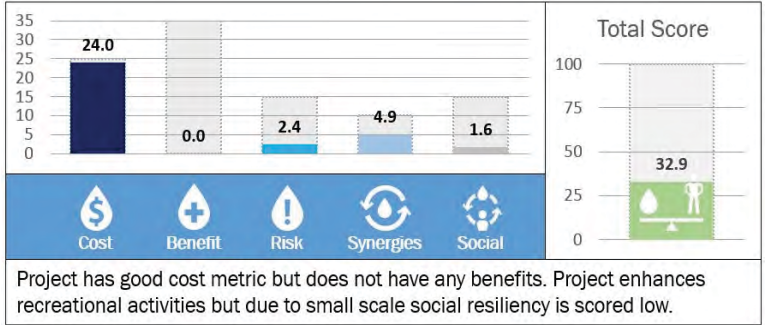


Example Rest Stop



Example Field Lighting

Project Prioritization Results





PROJECT OO  
WALDO AVENUE PROJECT DESCRIPTION

Categories: GREENER EDGE  
WATER STORAGE



Living with the Bay  
Rebuild by Design

Site Location	
SubWatershed	41
Street Address	36-42 Waldo Avenue, East Rockaway, NY
Longitude	-73.66
Latitude	40.64
Landowner	Village of East Rockaway
Existing Use	Street
O & M Responsibility	Village of East Rockaway
Low Moderate Income Area	N/A
Existing Site Description:	Stormwater backs up into the existing drainage system and floods the north end of Waldo Avenue and Maxwell Street intersection due to driving hydraulic head from Atlantic Avenue. A basement of a home floods frequently during heavy rainfall events because of its low-lying elevation.

Proposed Characteristics	
Cost Estimate	\$100,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense, Water Quality
Problem Areas Addressed	41, 42
Proposed Improvements Description	To protect the basement flooding and allow stormwater to drain into Atlantic Ave drainage system raise sidewalks, curbs, and inlets to increase the head difference to drain the stormwater towards Atlantic Avenue. Add Green Infrastructure bioswales with curb-cuts to collect storm water, provide storage, and improve water quality.

LWTB Goal(s) Met By Project

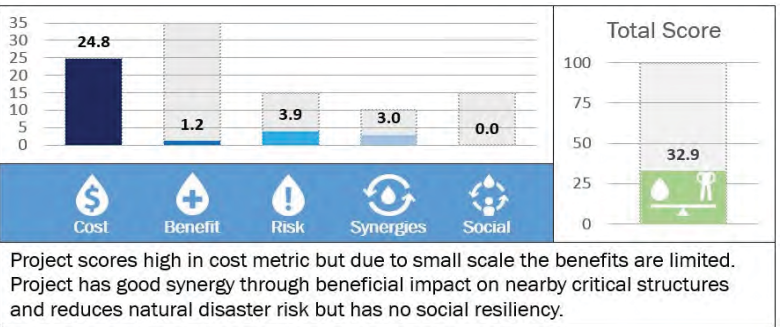


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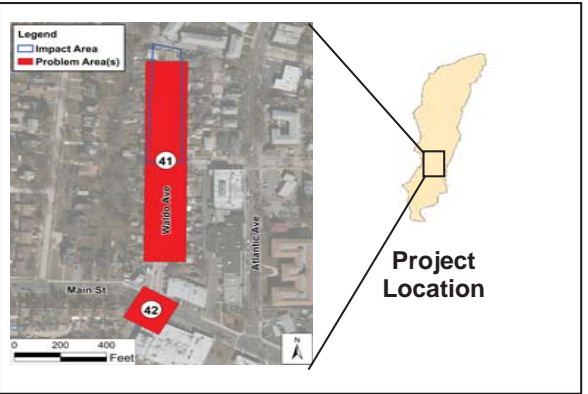
PROPOSED IMPROVEMENTS



Project Prioritization Results



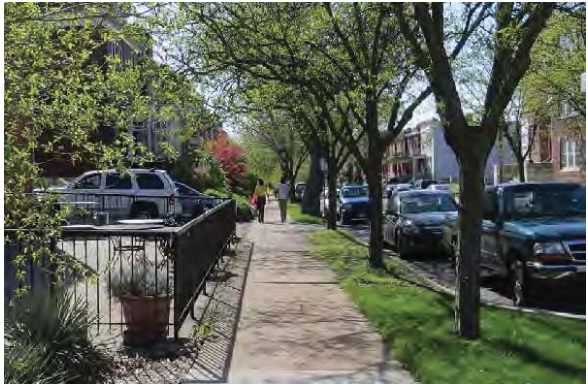
PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Example Waldo Ave and Maxwell St Intersection



Example Raised Sidewalk for Waldo Avenue



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



## PROJECT AA

### BEVERLY ROAD PROJECT DESCRIPTION

Category: **WATER STORAGE**



## Living with the Bay

Rebuild by Design

## Site Location

SubWatershed	38
Street Address	14-98 Beverly Road, Rockville Centre, NY 11570
Longitude	-73.64
Latitude	40.67
Landowner	Village of Rockville Centre
Existing Use	Street
O & M Responsibility	Village of Rockville Centre
Low Moderate Income Area	N/A

### Existing Site Description:

The intersection at Beverly Road and Lehigh Court currently floods during high intensity storm events. There is an existing pump system at the intersection with a capacity of 1200 GPM but additional overland sheet flow from Hempstead Avenue overwhelms the pump station and floods the intersection up to 18 inches routinely.

### Proposed Characteristics

Cost Estimate	\$200,000
Level of Protection, yr	5
Project Life, yr	50
Focus	Flood Defense
Problem Areas Addressed	30

Proposed Improvements	Description
1. Increase the number of staff	Recruit and hire additional staff to handle the increased workload.
2. Streamline processes	Identify and eliminate redundant steps in the workflow to improve efficiency.
3. Implement automation	Use software tools to automate repetitive tasks and data entry.
4. Enhance training	Provide ongoing training and development for staff to improve skills and knowledge.
5. Improve communication	Establish clear lines of communication and regular updates to all stakeholders.
6. Monitor performance	Implement key performance indicators (KPIs) to track progress and identify areas for improvement.
7. Increase transparency	Provide regular reports and updates to the public and stakeholders.
8. Foster a positive culture	Encourage a collaborative and supportive work environment for staff.
9. Invest in technology	Upgrade hardware and software to ensure the system is up-to-date and secure.
10. Seek external expertise	Consult with industry experts or consultants for additional insights and recommendations.

Refurbish the existing pump to be able to pump for additional flow coming from Hempstead Avenue and adjacent parcels. Add two exfiltration junction boxes to collect stormwater and provide storage.

### LWTB Goal(s) Met By Project

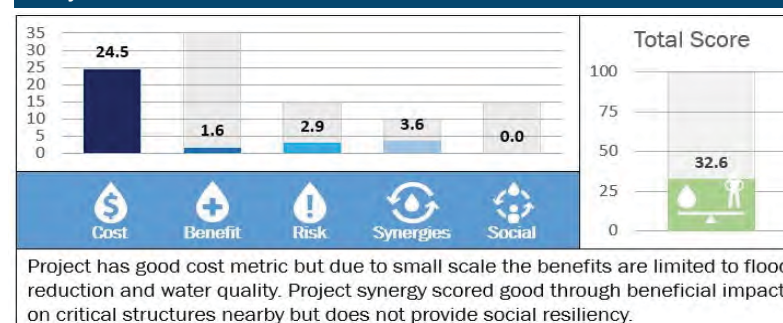


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## PROPOSED IMPROVEMENTS



## Project Prioritization Results



### PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



## SAMPLE PHOTOS



Street View of Beverly Road and Lehigh Court



### Example Pump Station Under Street

Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT K  
PENINSULA BOULEVARD GREENWAY PROJECT DESCRIPTION

Category: GREENWAY CORRIDOR

Site Location	
SubWatershed	19, 26
Street Address	Peninsula Blvd., Lynbrook, NY
Longitude	-73.66
Latitude	40.66
Landowner	Nassau County, Village of Lynbrook
Existing Use	Landscape Area, Sidewalk
O & M Responsibility	Nassau County
Low Moderate Income Area	N/A

Existing Site Description: Peninsula Boulevard located in Village of Lynbrook has an existing 60 ft Right of Way with narrow pathway used for walking.

Proposed Characteristics	
Cost Estimate	\$300,000
Level of Protection, yr	N/A
Project Life, yr	25
Focus	Social Resiliency
Problem Areas Addressed	70

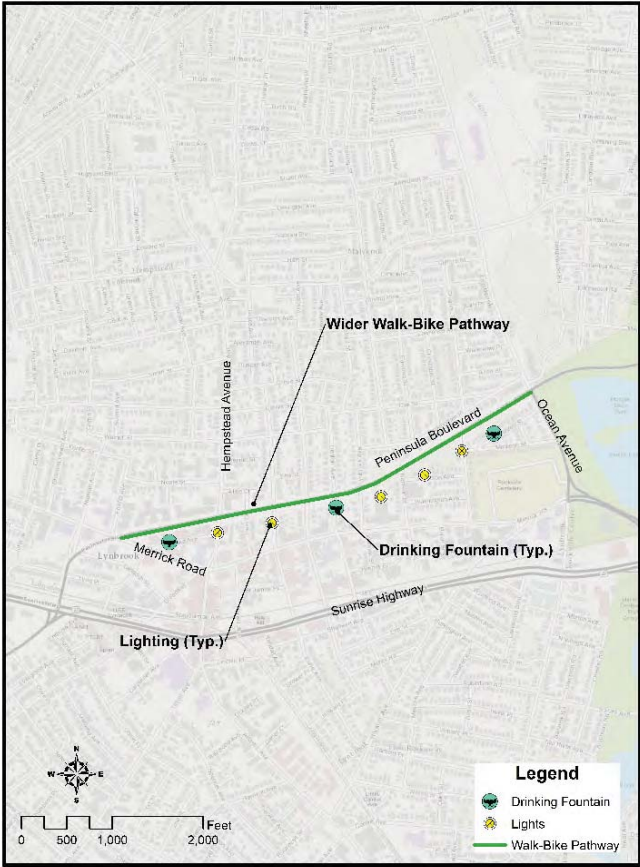
Proposed Improvements Description: Replacing existing asphalt path with wider pathway, lighting, drinking fountains, and landscaping between Ocean Avenue and Merrick Road will improve recreational and health benefits for the community. Local history related to the Mill River can be included along the pathway. The pathway would also provide a key East - West linkage to the Mill River Greenway.

LWTB Goal(s) Met By Project

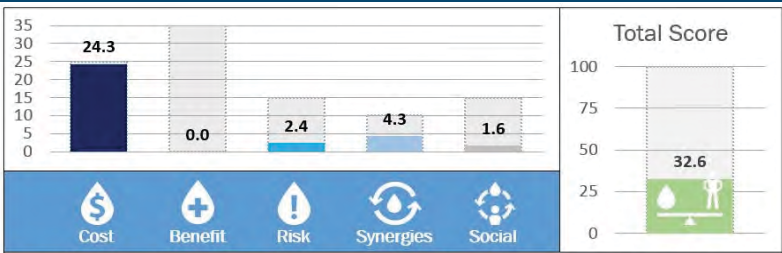


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PROPOSED IMPROVEMENTS

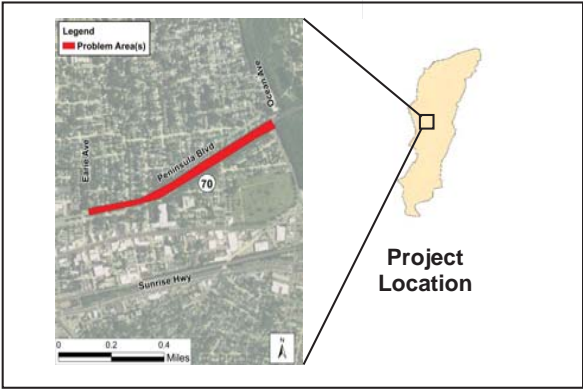


Project Prioritization Results



Project does not provide any flood reduction, water quality or habitat benefits. Project enhances recreational activities but due to small scale social resiliency is scored low.

PROJECT AREA WITH PROBLEM AREA



SAMPLE PHOTOS



Existing Peninsula Boulevard



Example Walk-Bike Pathway



Rendering Walk-Bike Pathway



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT Y

MAPLE AVENUE AND LONG BEACH ROAD INTERSECTION PROJECT DESCRIPTION

Category: WATER STORAGE

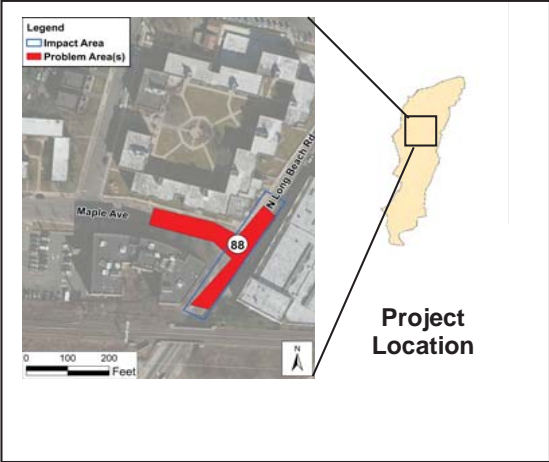
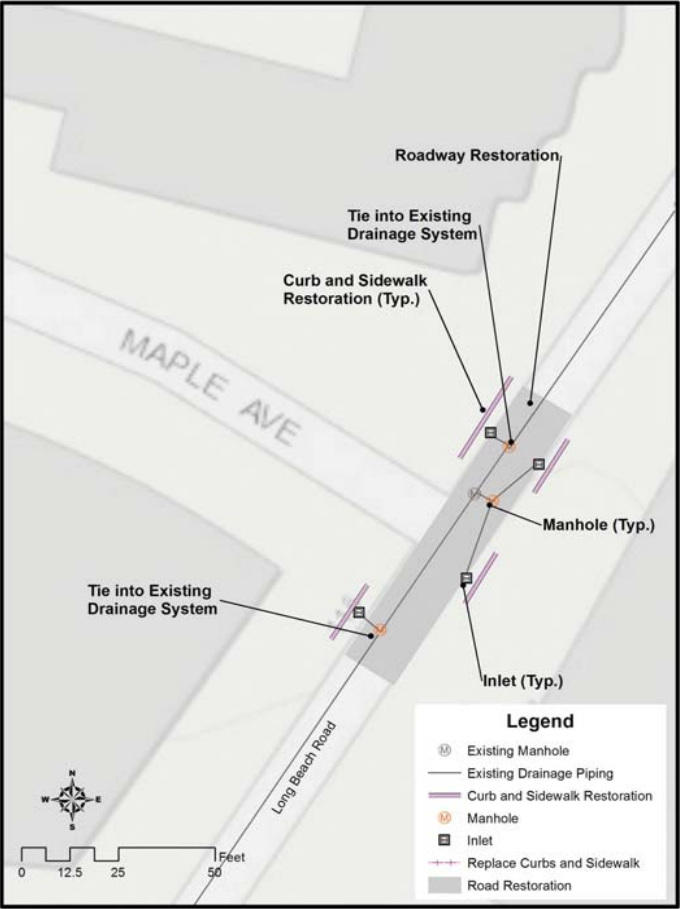
Site Location	
SubWatershed	20
Street Address	285-303 Maple Avenue, Rockville Centre, NY
Longitude	-73.63
Latitude	40.66
Landowner	Nassau County
Existing Use	Street
O & M Responsibility	Nassau County
Low Moderate Income Area	N/A
Existing Site Description:	During heavy rainfall events the runoff from Long Beach Road enters Maple Avenue and floods the intersection.

Proposed Characteristics	
Cost Estimate	\$280,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense
Problem Areas Addressed	88
Proposed Improvements Description	Install four (4) exfiltration inlets and three (3) drainage manholes in vicinity of intersection to provide collection of runoff and 150 LF of 18-inch diameter stormwater pipe. Roadway, curb, and sidewalk shall be removed and replaced. The proposed improvements will provide better runoff collection within the roadway and prevents Maple Avenue flooding from Long Beach Road runoff. The proposed inlets are connected to existing storm-drainage system.

LWTB Goal(s) Met By Project	
 Increase Community Resiliency	DRAFT

PROPOSED IMPROVEMENTS

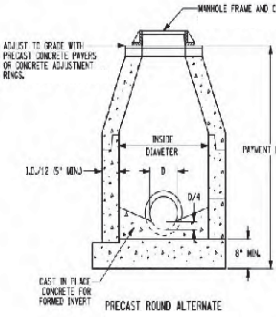
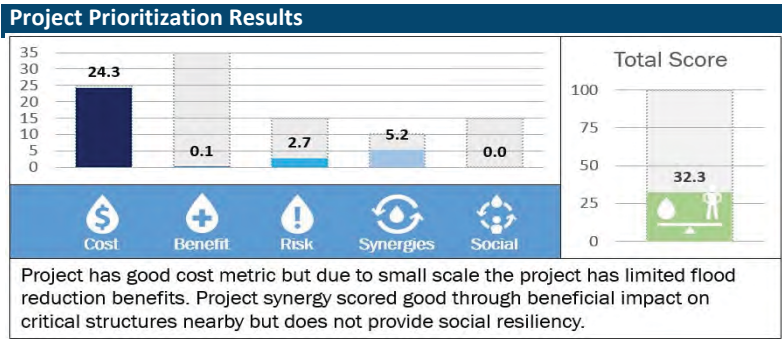
PROJECT AREA WITH PROBLEM AREAS AND IMPACT AREA



SAMPLE PHOTOS



Existing Maple Avenue and Long Beach Road Intersection



Existing Manhole for Maple Avenue and Long Beach Road Intersection



PROJECT LL  
HALLS POND STUDY DESCRIPTION

Category: WATER STORAGE



Living with the Bay

Rebuild by Design

Site Location	
SubWatershed	5
Street Address	671 Nassau Blvd., West Hempstead, NY
Longitude	-73.66
Latitude	40.68
Landowner	Nassau County
Existing Use	Open Water
O & M Responsibility	Nassau County
Low Moderate Income Area	N/A
Existing Site Description:	The 5.5 acre Halls Pond is located on the north west corner of Nassau Blvd and Hempstead Avenue in West Hempstead. During heavy rainfall events the pond overtops and floods adjacent homes and overtops Hempstead Avenue. The pond is controlled by a weir and followed by a 2-barrel 4x10 box culvert under Hempstead Avenue. One barrel is currently blocked and restricts the increased impervious runoff from upstream. This causes flooding within the pond proximity and overtops Hempstead Avenue and floods nearby businesses downstream.
Proposed Characteristics	
Cost Estimate	\$200,000
Level of Protection, yr	25
Project Life, yr	50
Focus	Flood Defense, Water Quality
Problem Areas Addressed	83
Proposed Improvements Description	A detailed study needs to be done to evaluate the alternatives to alleviate the flooding at Halls Pond. The options to be considered will be lowering the weir to a certain percentage and determination of height of the box culvert to be opened to alleviate the flooding upstream and accounting for downstream conditions.

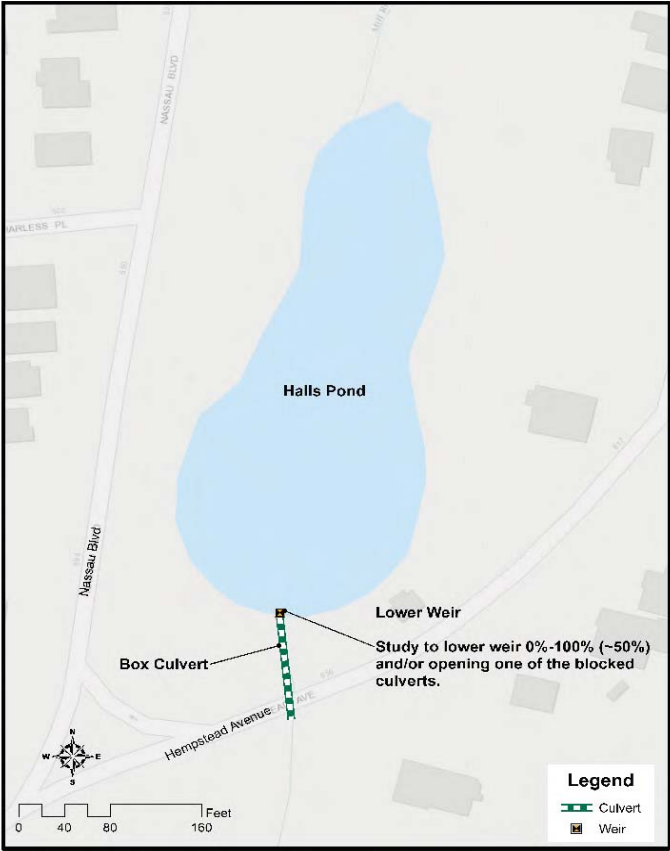
LWTB Goal(s) Met By Project

Increase Community Resiliency

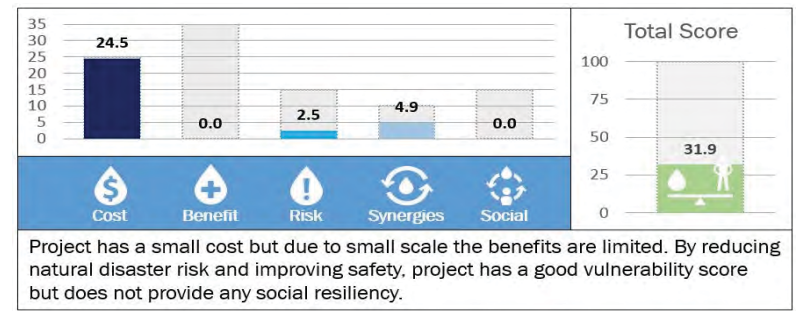
Restore Environmental Health

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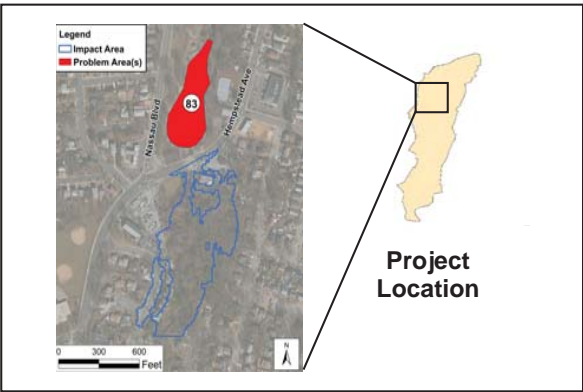
PROPOSED IMPROVEMENTS



Project Prioritization Results



PROJECT AREA WITH PROBLEM AREA



SAMPLE PHOTOS



Existing Halls Pond View



Existing Weir and Blocked Box Culvert at Halls Pond



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



Site Location	
SubWatershed	31
Street Address	70-84 Williamson Street, East Rockaway, NY
Longitude	-73.66
Latitude	40.64
Landowner	Village of East Rockaway, Town of Hempstead
Existing Use	Street
O & M Responsibility	Village of East Rockaway (W. of 6th Ave), Town of Hempstead (E. of 6th Ave)
Low Moderate Income Area	40% - 60%
Existing Site Description:	The low points along Williamson Street and adjacent streets flood during high tides, especially during moon tides when the high tailwater condition fills up the stormwater pipes.

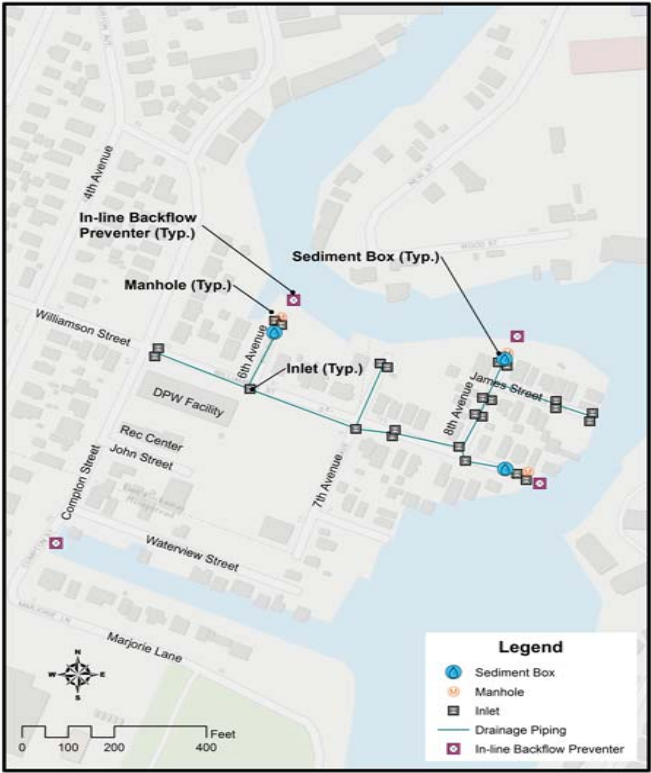
Proposed Characteristics	
Cost Estimate	\$1,000,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense
Problem Areas Addressed	47, 48, 50
Proposed Improvements Description	Install in-line backflow preventers with sediment basins at 6th Avenue and James Street. Combine existing drainage system at 7th Avenue, James Street, and Williamson Street to reduce the risk of allowing tidal backup and lower the cost to install separate check valves. Install in-line backflow preventer at Compton Street. The in-line backflow preventer will prevent tidal water from backing up into the existing drainage system. Floodproofing of DPW facilities will be addressed by the Community Reconstruction program.

LWTB Goal(s) Met By Project

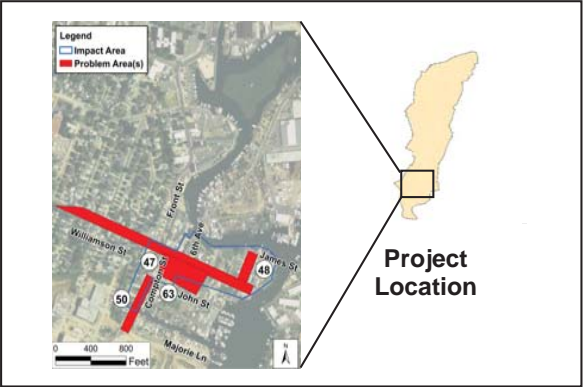
Increase Community Resiliency

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PROPOSED IMPROVEMENTS



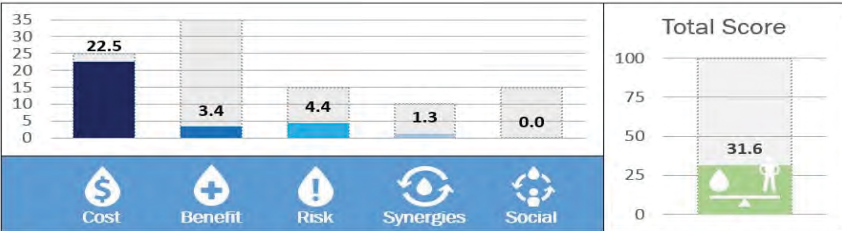
PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



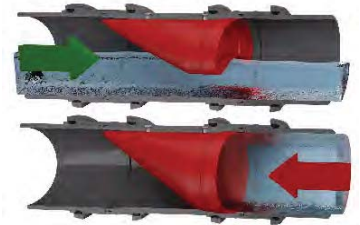
SAMPLE PHOTOS



Project Prioritization Results



Project has good flood reduction benefits but scored comparatively low in cost metric. The synergy score is good through beneficial impact on nearby critical structures but does not provide social resiliency.



There are a variety of backflow prevention valves available intended to allow water to flow to open water but preventing tidal surge from surcharging the system



Note: Characteristics are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT T

LAWSON BOULEVARD PROJECT DESCRIPTION

Category: WATER STORAGE

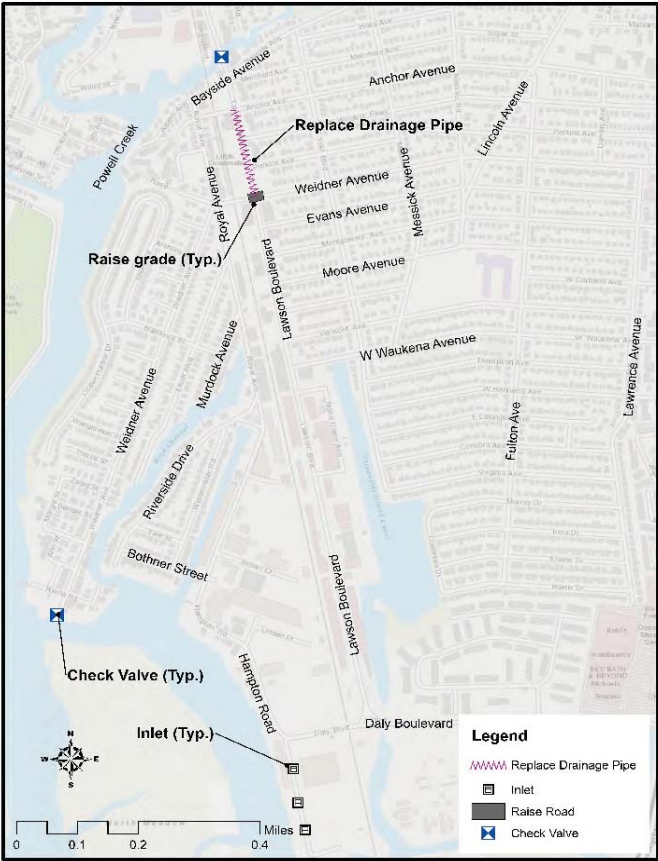
Site Location	
SubWatershed	35, 34
Street Address	3057 Lawson Blvd, Oceanside, NY
Longitude	-73.65
Latitude	40.62
Landowner	Nassau County, Town of Hempstead
Existing Use	Street
O & M Responsibility	Nassau County DPW (Lawson Blvd), Town of Hempstead (Weidner Ave & Hampton Rd)
Low Moderate Income Area	N/A

Existing Site Description:	The problem areas listed along Lawson Blvd. between Weidner Avenue and Powell Creek, Weidner Avenue, and Evans Avenue and Messick Avenue, flood due to high tides. The areas along Hampton Road off Daly Blvd. and the intersection of Moore Avenue and Fulton Avenue flood due to inadequate drainage systems.
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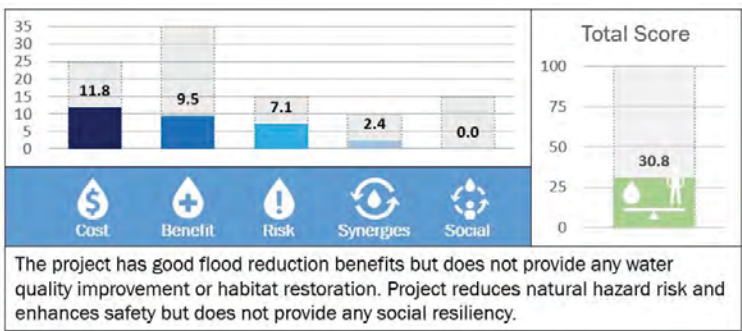
Proposed Characteristics	
Cost Estimate	\$5,680,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense
Problem Areas Addressed	54, 56, 58
Proposed Improvements Description	Install a 36 inch inline check valve at Lawson Blvd. drainage system outfall to prevent tidal water entering from Powell Creek, replace 900 LF of drainage pipe between Weidner Avenue and Anchor Avenue, and raise intersection of Weidner Avenue by 6 inches to avoid flooding. Install a 24 inch check valve on Weidner Avenue outfall, and install three (3) additional inlets at low points along Hampton Road to avoid ponding of storm water. Problem areas 55, 57, and 60 are being addressed through the Community Reconstruction Program.

LWTR Goal(s) Met By Project	
 Increase Community Resiliency	<b>DRAFT</b>

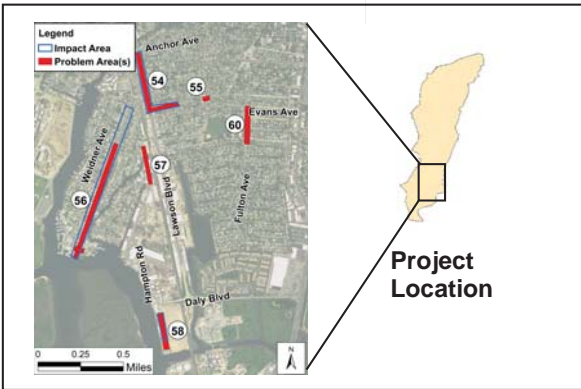
PROPOSED IMPROVEMENTS



Project Prioritization Results



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Example Replacing Drainage Pipe for Lawson Blvd.



Example Check Valve for Lawson Blvd.



Example Raised Intersection for Weidner Ave. and Lawson Blvd.

Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT S

EAST ROCKAWAY LONG ISLAND RAILROAD STATION PROJECT DESCRIPTION

Categories: WATER STORAGE  
GREENER EDGE

Site Location	
SubWatershed	29
Street Address	1-31 Ocean Ave, East Rockaway, NY
Longitude	-73.66
Latitude	40.64
Landowner	Village of East Rockaway
Existing Use	Parking Lot
O & M Responsibility	Village of East Rockaway (NE parking lot)
Low Moderate Income Area	N/A
Existing Site Description:	The parking lots located at the southeast and northwest corner of Ocean Avenue and Long Island Railroad (LIRR) intersection at East Rockaway LIRR station frequently floods during high tide conditions.

Proposed Characteristics	
Cost Estimate	\$600,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense, Water Quality
Problem Areas Addressed	44
Proposed Improvements Description	Install three (3) check valves on parking lot outfalls to prevent tidal waters from entering the drainage systems. Install green infrastructure bioswales for treatment and storage of stormwater before discharging into the Mill River on the parking lots.

LWTB Goal(s) Met By Project

Increase Community Resiliency

Restore Environmental Health

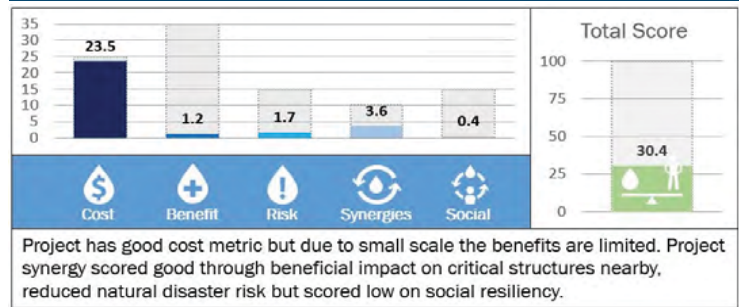
Preserve Quality of Life

DRAFT

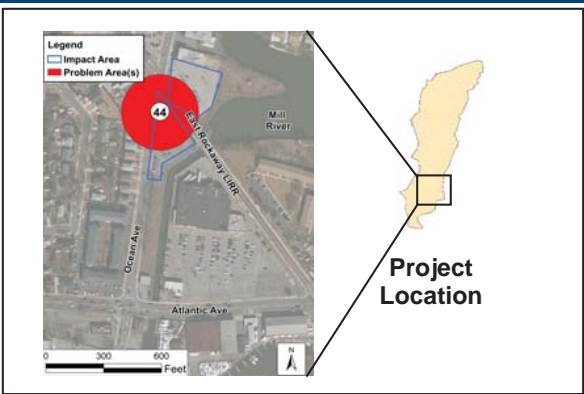
PROPOSED IMPROVEMENTS



Project Prioritization Results



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Example Bioswale Green Infrastructure Project for LIRR Parking Lot

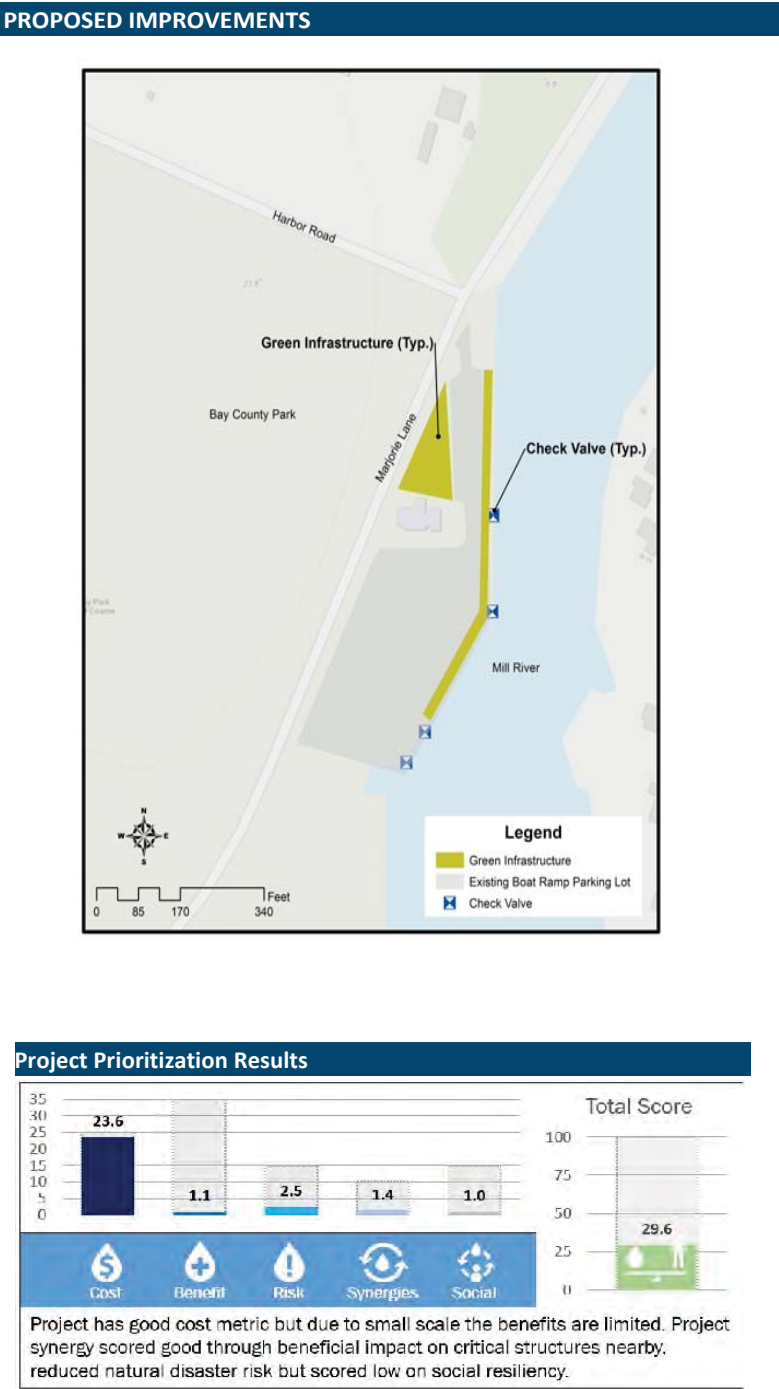


Example Check Valve for LIRR Parking Lot

Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



Site Location	
SubWatershed	31
Street Address	2 Marjorie Lane, East Rockaway, NY
Longitude	-73.66
Latitude	40.63
Landowner	Nassau County
Existing Use	Park
O & M Responsibility	Nassau County DPW
Low Moderate Income Area	N/A
Existing Site Description:	The boat ramp parking lot at Bay County Park floods frequently during tidal conditions as the tidal water enters the drainage system.
Proposed Characteristics	
Cost Estimate	\$570,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense, Water Quality
Problem Areas Addressed	52
Proposed Improvements Description	Install four (4) check valves at the outfalls of parking lot drainage system to prevent tidal water from entering the drainage pipes and install green infrastructure for treatment of stormwater runoff from the boat ramp parking lot.
LWTB Goal(s) Met By Project	
<div><div><div><div></div><div>Increase Community Resiliency</div></div><div><div></div><div>Restore Environmental Health</div></div></div></div> <div>DRAFT</div>	





PROJECT FF  
MILL RIVER STORM SURGE BARRIER PROJECT DESCRIPTION

Category: N/A



Living with the Bay  
Rebuild by Design

Site Location	
SubWatershed	37
Street Address	N/A
Longitude	-73.66
Latitude	40.62
Landowner	Town of Hempstead, Nassau County, Private Landowners
Existing Use	Open Space
O & M Responsibility	Town of Hempstead, Nassau County
Low Moderate Income Area	N/A

Existing Site Description:	Storm and tidal surges caused by hurricanes and tropical storms bring water up the Mill River causing it to overflow its banks and cause flooding in the low lying adjacent areas.
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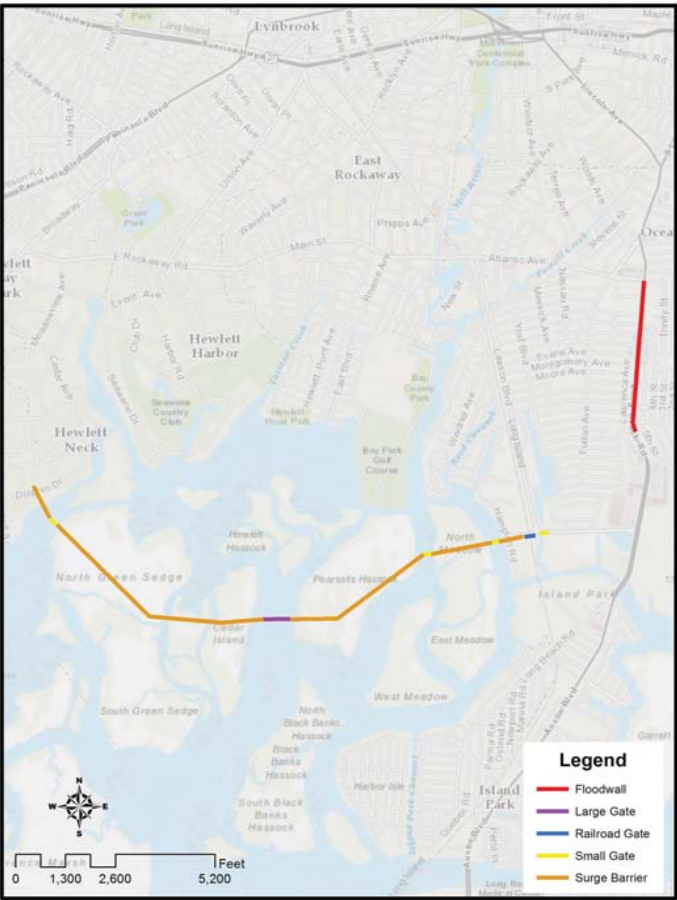
Proposed Characteristics	
Cost Estimate	\$723,000,000
Level of Protection, yr	100
Project Life, yr	50
Focus	Flood Defense
Problem Areas Addressed	Multiple

Proposed Improvements Description	<ul style="list-style-type: none"><li>• The proposed improvements include a storm surge barrier spanning the width of the Mill River watershed. The barrier will run across the marshlands to the south.</li><li>• The barrier will have 1 large gate and multiple small gates at inlets to keep the inlets navigable in normal conditions, while providing the ability to seal the barrier in case of surge events.</li><li>• A rail gate will be installed at the railway tracks to continue the use of the track in normal conditions.</li></ul>
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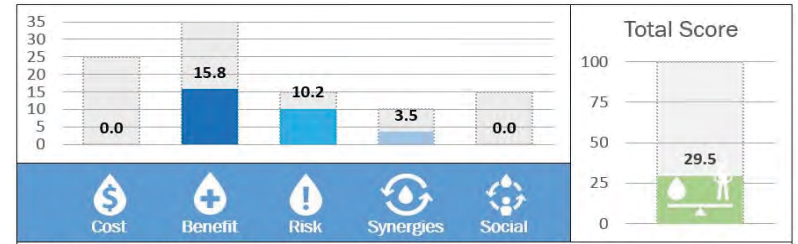
LWTB Goal(s) Met By Project

DRAFT

PROPOSED IMPROVEMENTS

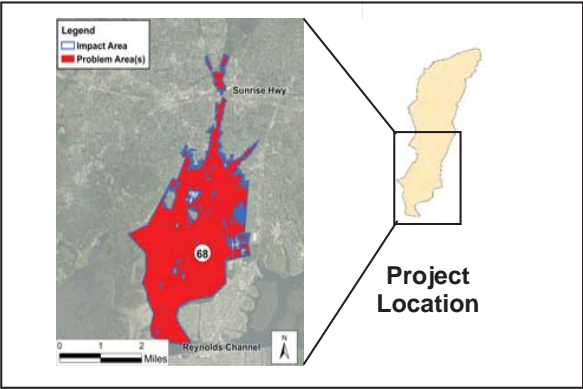


Project Prioritization Results



Although project has significant flood reduction benefits and scores well in the vulnerability metric, it is the most expensive project and does not provide any secondary benefits.

PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Example Open BB Flood Gate



Example Open Sector Gates



Example Closeup Sector Gates



Example Surge Barrier



Example Installation of a Flood Gate



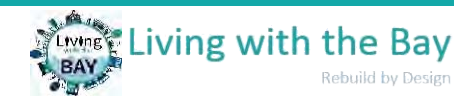
Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT MM

MILL RIVER GREENWAY PROJECT DESCRIPTION

Category: GREENWAY CORRIDOR



Site Location	
SubWatershed	1, 17, 19, 29, 31, 32, 37, 40
Street Address	Hempstead, Malverne, Rockville Centre, Bay Park
Longitude	-73.65
Latitude	40.66
Landowner	Village of Hempstead, Rockville Centre, Town of Hempstead, Malverne
Existing Use	Shoreline, Street, Pathway
O & M Responsibility	Village of Hempstead, Rockville Centre, Town of Hempstead, Malverne
Low Moderate Income Area	Percentage per Pathway Section from N to S (>80%, 60% - 80%, 40% - 60%)

Existing Site Description:

The overall area along Mill River in Nassau County is ideal for biking, walking, and boating but the existing pathway or routes towards or along the river are discontinuous or concentrated within an area. Much of the river's edge has been privatized and the public places that remain are disconnected from pathway network. The riverbanks have degraded as a result of lack of visibility and connectivity. More transportation with automobiles has evolved than by foot, boat or bicycle. Some issues in the Mill River area are dangerous road crossings for pedestrians and bicycles, lack of public access continuous walking and bicycle paths, reduction in use of public parks and play grounds, poor public access to waterways, and loss of natural resources.

Proposed Characteristics	
Cost Estimate	\$7,350,000
Level of Protection, yr	N/A
Project Life, yr	25
Focus	Social Resiliency
Problem Areas Addressed	97

Proposed Improvements Description

Construct a new multi-use pathway, typically 10 feet wide with bioswales, to connect existing pathways along Mill River. The proposed pathway begins at Mirschel Park, Hempstead and connects South Pond to Smith Pond through Tanglewood Greenway, and connects Smith Pond to Living with the Bay Greenway Project along Mill River, and continues from East Rockaway High School, splitting into two branches at Althouse Ave and Front St. which together complete a loop around Bay County Park, and extends towards Malverne High School on the west. Improving public accessibility to Mill River will increase safety, ecological value, and recreational opportunities from communities around the river.

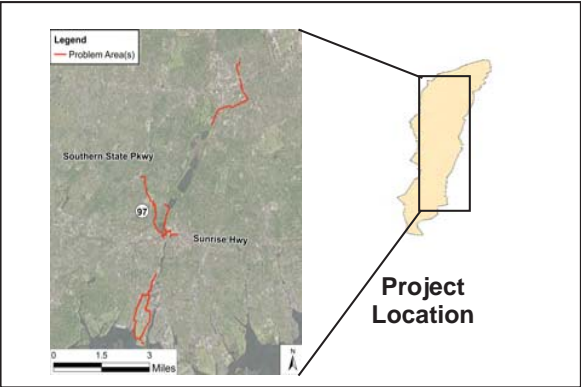
LWTB Goal(s) Met By Project

DRAFT

PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREA



SAMPLE PHOTOS



Example Greenway

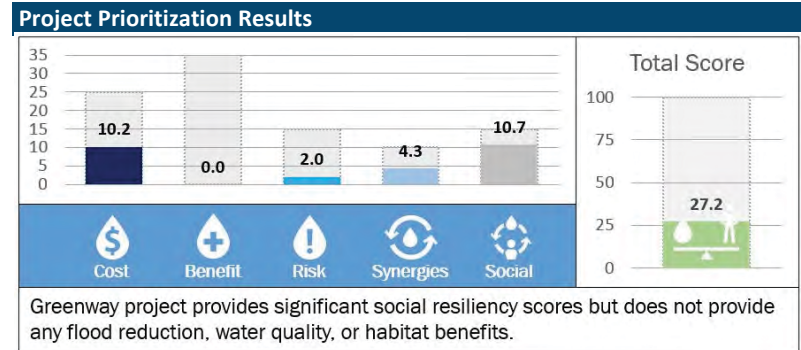
Example Greenway Along Street



Example Greenway Education Sign



Example Greenway

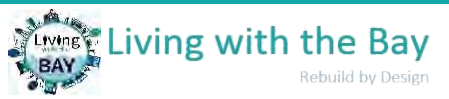


Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT W  
EAST ROCKAWAY DOWNTOWN RESILIENCY STUDY DESCRIPTION

Categories: GREENER EDGE  
SPACE FOR THE RIVER



Site Location	
SubWatershed	29, 40
Street Address	15-25 Main St, East Rockaway, NY
Longitude	-73.66
Latitude	40.64
Landowner	East Rockaway, Nassau County
Existing Use	Shoreline, Street
O & M Responsibility	TBD
Low Moderate Income Area	N/A
Existing Site Description:	The area of Downtown East Rockaway along the Main Street Corridor extending to Lawson Avenue was severely damaged during Superstorm Sandy. This is one of East Rockaway’s two commercial corridors, encompassing retail services that the Village of East Rockaway and the community of Bay Park depend on for daily services. The focus area includes US Post Office, The Fishery and other businesses along Main Street.

Proposed Characteristics	
Cost Estimate	\$200,000
Level of Protection, yr	TBD
Project Life, yr	TBD
Focus	Flood Defense, Social Resiliency
Problem Areas Addressed	N/A

Proposed Improvements Description	Downtown Resiliency and Redevelopment Plan was proposed to increase the resiliency of the Main Street corridor by: identifying new measures for leveraging publicly-owned land along the Mill River’s edge to accommodate tidal surge and establish a larger open space and trail system; identifying opportunities for new redevelopment that can renew downtown as a destination; reestablishing civic pride in downtown. Adopting zoning requirements to protect businesses from flooding. Implement new shoreline improvements along the Mill River's edge redevelopment. A comprehensive strategy for improvement of the Mill River waterfront, open space plan, and implementation and funding recommendations.
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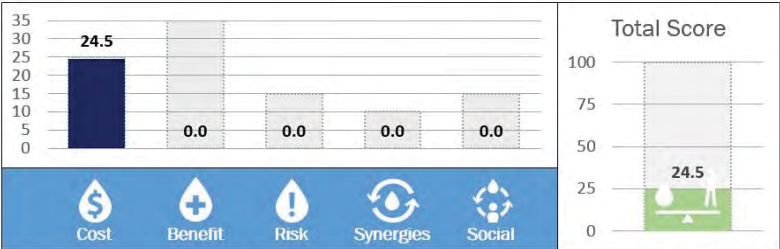
LWTB Goal(s) Met By Project

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PROPOSED IMPROVEMENTS

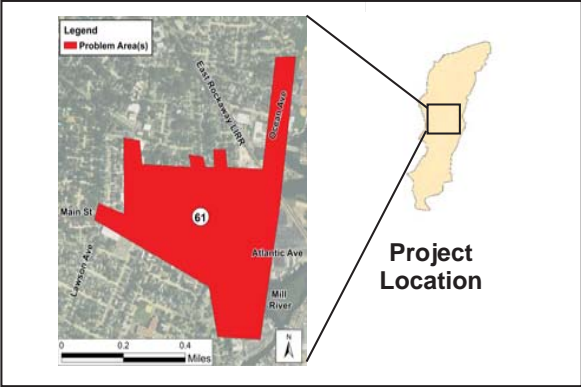


Project Prioritization Results



Project has good cost metric but does not have any flood reduction, water quality, or habitat benefits.

PROJECT AREA WITH PROBLEM AREAS



SAMPLE PHOTOS



Example Boardwalk



Example Dock Street Illustration



Rendering Waterfront Access



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT Z

LAKEVIEW AVENUE AND HEMPSTEAD AVENUE INTERSECTION PROJECT DESCRIPTION

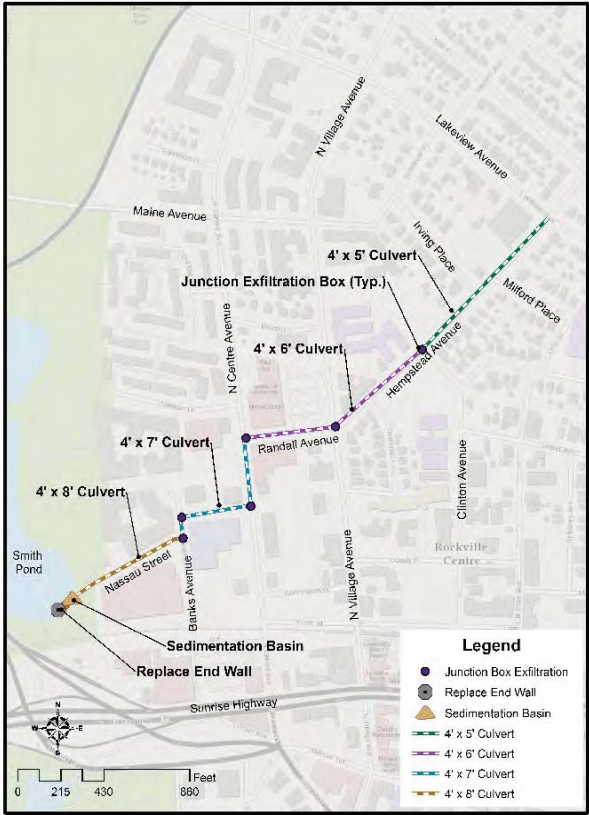
Categories: WATER STORAGE  
SPACE FOR THE RIVER



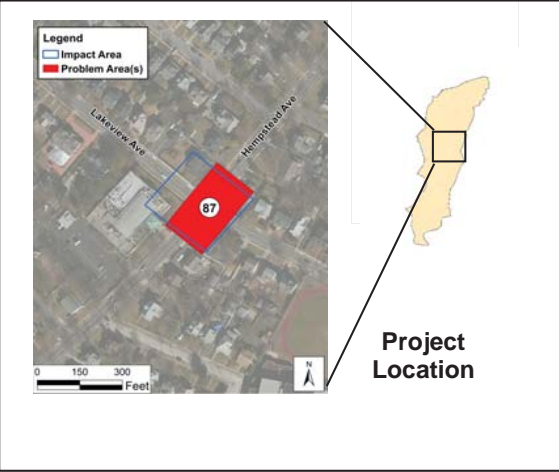
Living with the Bay  
Rebuild by Design

Site Location	
SubWatershed	38
Street Address	120 Hempstead Ave, Rockville Centre, NY
Longitude	-73.64
Latitude	40.66
Landowner	Nassau County, Village of Rockville Centre
Existing Use	Street
O & M Responsibility	Nassau County (Hempstead Ave.), Village of Rockville Centre
Low Moderate Income Area	N/A
Existing Site Description:	The intersection of Hempstead Avenue and Lakeview Avenue is located within the Village of Rockville Centre. A sub-surface drainage system is located along Hempstead Avenue and outfalls into Smith Pond downstream of the existing weir. The intersection floods during heavy rainfall due to inadequate conveyance.
Proposed Characteristics	
Cost Estimate	\$4,000,000
Level of Protection, yr	10
Project Life, yr	50
Focus	Flood Defense
Problem Areas Addressed	87
Proposed Improvements Description	Remove and replace existing 48-inch storm pipe with box culverts of increasing size (4'x5' to 4'x8'). Reconstruct endwall at outfall to Smith Pond. Flooding is mitigated by increasing the pipe capacity downstream to the intersection. Add six (6) exfiltration junction boxes and a sedimentation basin to filter the sediment before discharging into the river.
LWTB Goal(s) Met By Project	
<div><div><div></div><div>Increase Community Resiliency</div></div></div> <div>DRAFT</div>	

PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREAS AND IMPACT AREA



SAMPLE PHOTOS

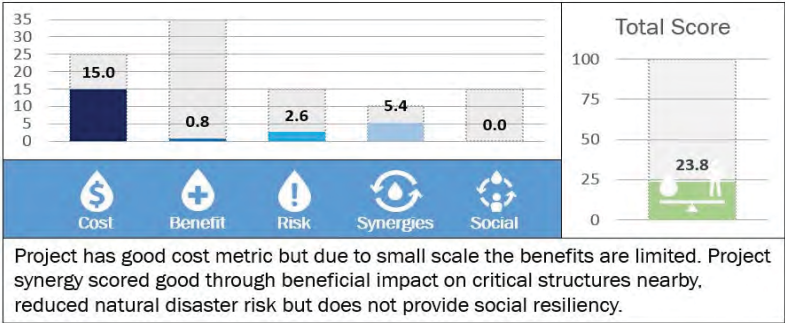


Existing Lakeview Avenue and Hempstead Avenue Intersection



Example Endwall for Hempstead Avenue Drainage System

Project Prioritization Results



Project has good cost metric but due to small scale the benefits are limited. Project synergy scored good through beneficial impact on critical structures nearby, reduced natural disaster risk but does not provide social resiliency.



Note: Characteristic are based on field observations and GIS data resources available at the time of conceptual design analysis. Note that final design characteristics will be dependent on a detailed site survey and could vary from conceptual design characteristics.



PROJECT CC

MARINA POINTE MARSH RESTORATION PROJECT DESCRIPTION

Categories: GREENER EDGE  
SPACE FOR THE RIVER

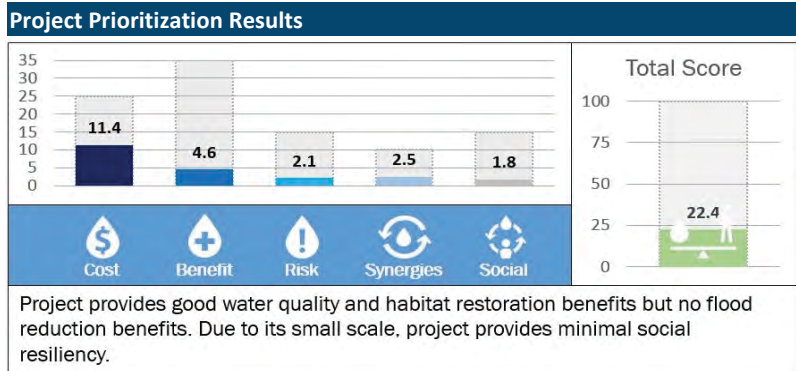
Site Location	
SubWatershed	29, 30
Street Address	Hempstead, NY
Longitude	-73.66
Latitude	40.64
Landowner	Town of Hempstead
Existing Use	Shoreline
O & M Responsibility	Town of Hempstead
Low Moderate Income Area	>80%
Existing Site Description:	The existing marshlands off the shore of Marina Pointe East Rockaway experience continual loss of habitat due to shoreline erosion.

Proposed Characteristics	
Cost Estimate	\$6,100,000
Level of Protection, yr	100
Project Life, yr	50
Focus	Water Quality, Habitat Restoration, Social Resiliency
Problem Areas Addressed	92
Proposed Improvements Description	<ul style="list-style-type: none"><li>Marsh Erosion Protection - protective measures that seek to maintain protective characteristics of the marshes by reducing their edge losses to erosion.</li><li>Marsh Enhancement - increase marsh platform elevations to shift the distribution of the marsh elevation to higher levels for greater resiliency to SLR.</li><li>In-Bay Protective Measures - connect high elevation areas to form a continuous barrier to protect against wave and surge effects.</li><li>Upland Protective Measures - provide localized protection from wave effects and surge flooding.</li></ul>

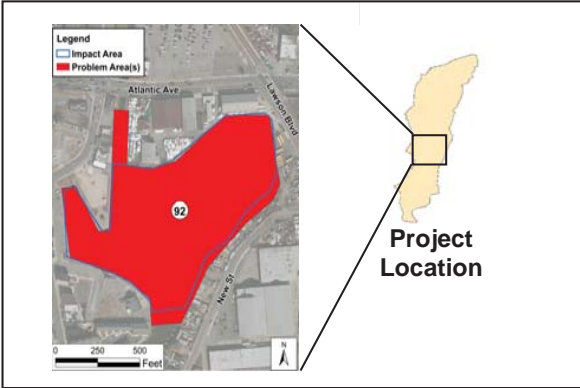
LWTB Goal(s) Met By Project

DRAFT

PROPOSED IMPROVEMENTS



PROJECT AREA WITH PROBLEM AREA AND IMPACT AREA



SAMPLE PHOTOS



Marina Point Street View



Marsh Restoration





# RESILIENCY STRATEGY

PREPARED FOR:



**Governor's Office of  
Storm Recovery**

PREPARED BY:



**TETRA TECH**