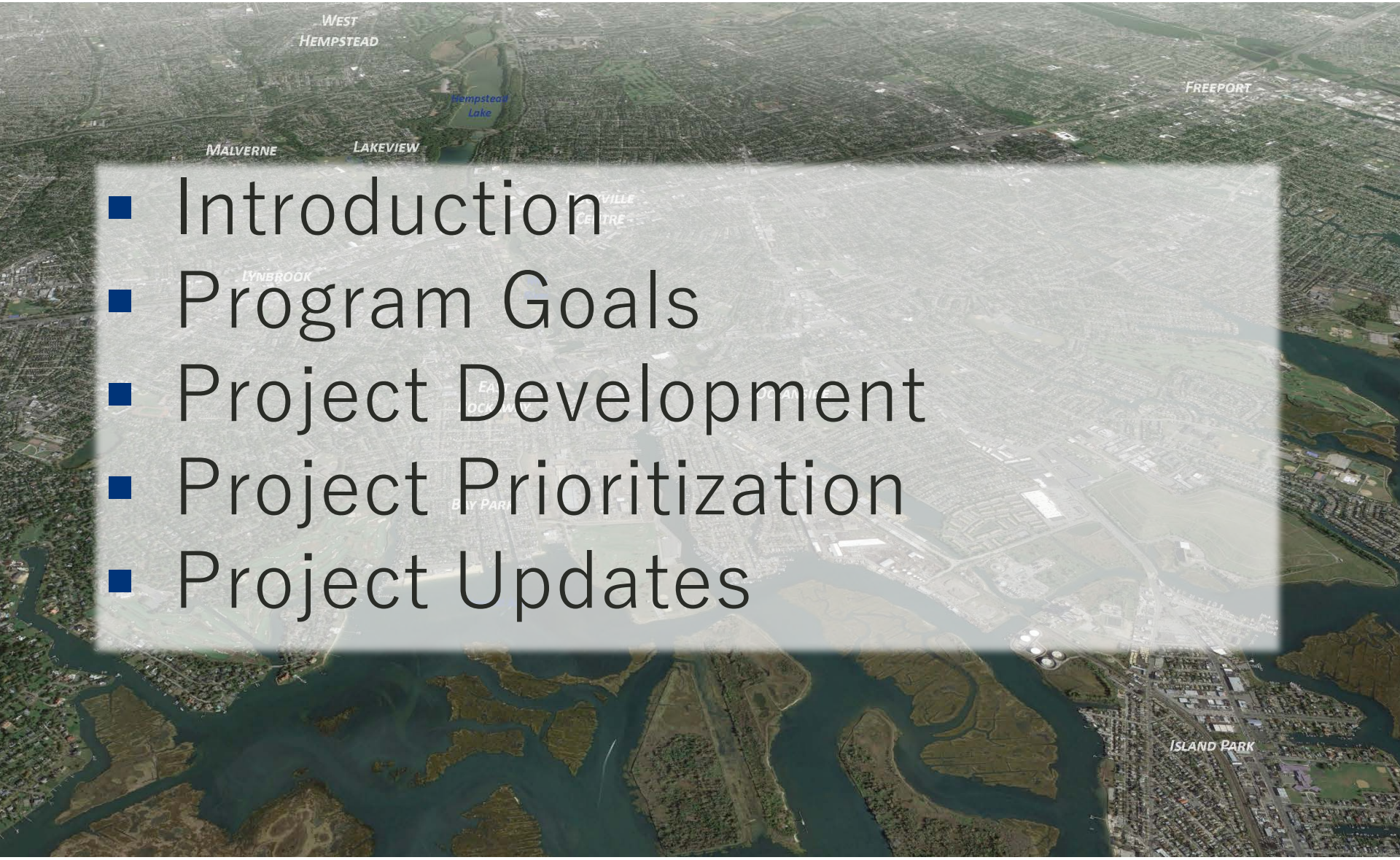
TETRA TECH

Jake Oldenburger, PE, CFM, ENV SP, LEED GA
Jason Hellendrung, ASLA, PLA

complex world | CLEAR SOLUTIONS™

June 2019

AGENDA



- Introduction
- Program Goals
- Project Development
- Project Prioritization
- Project Updates

REBUILD BY DESIGN PROCESS

After Sandy:
What We Know

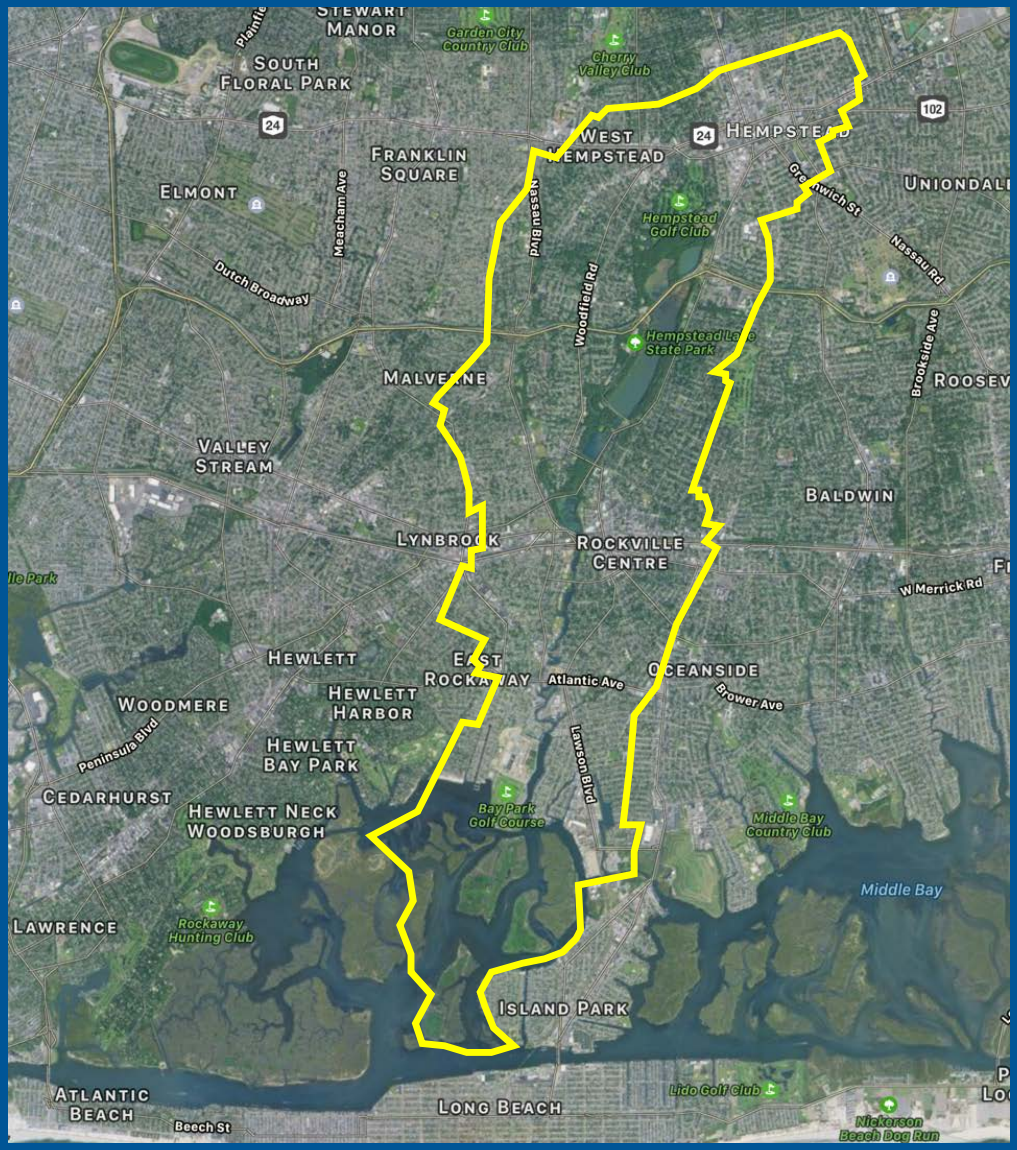
Our communities remain vulnerable

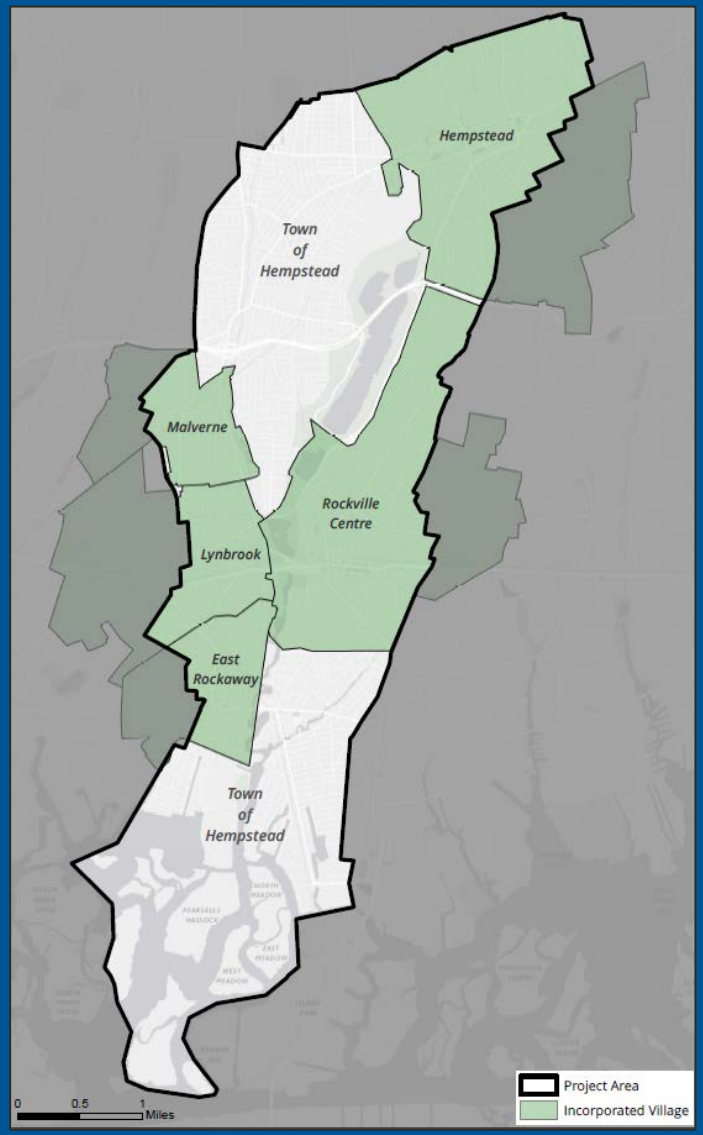
The risks from climate change will persist and grow

We cannot simply rebuild what was there before; we have to rebuild better

LIVING WITH THE BAY LOCATION (LWTB)

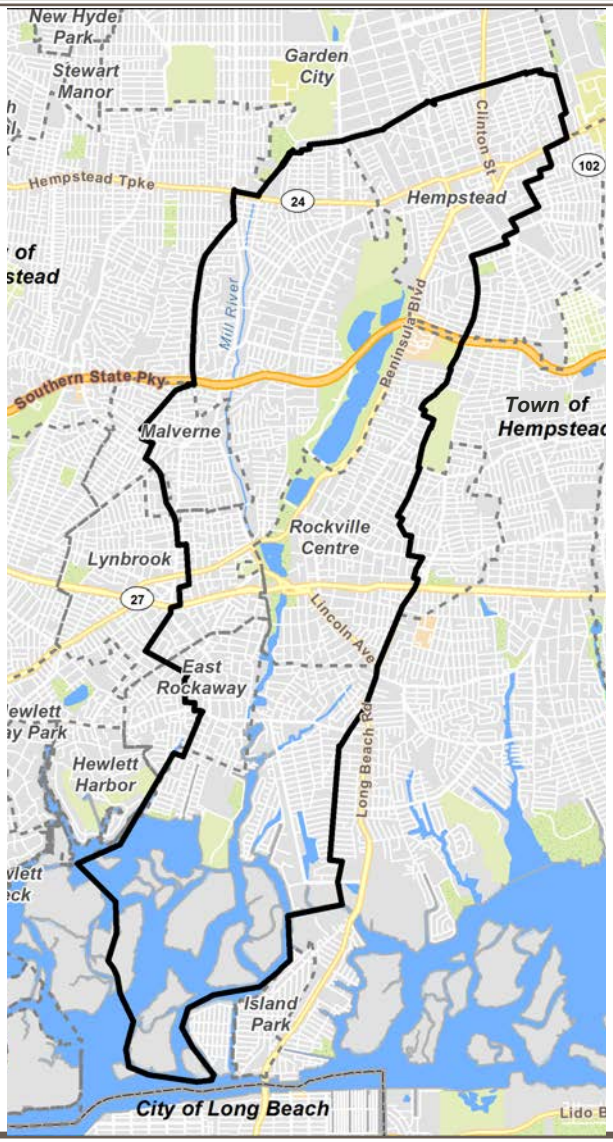
LWTB PROGRAM AREA





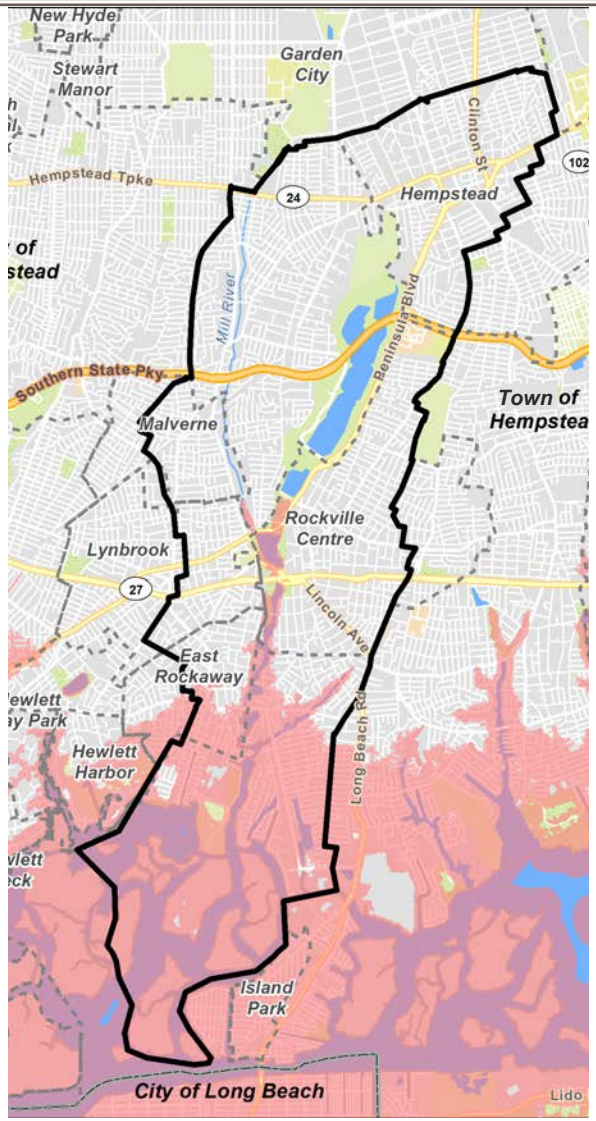
LWTB PROGRAM AREA

- 10,000 Acres
- 28,400 Parcels



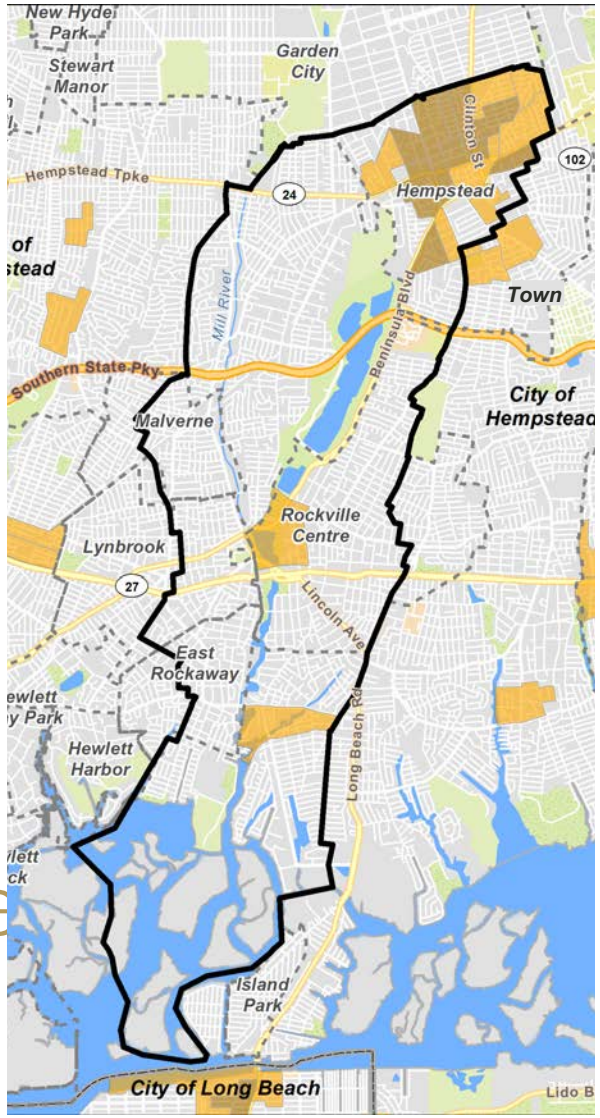
LWTB PROGRAM AREA

- 10,000 Acres
- 28,400 Parcels
- Sandy Impact:
  - 2,500 Acres
  - 4,100 Parcels (80% Residential)

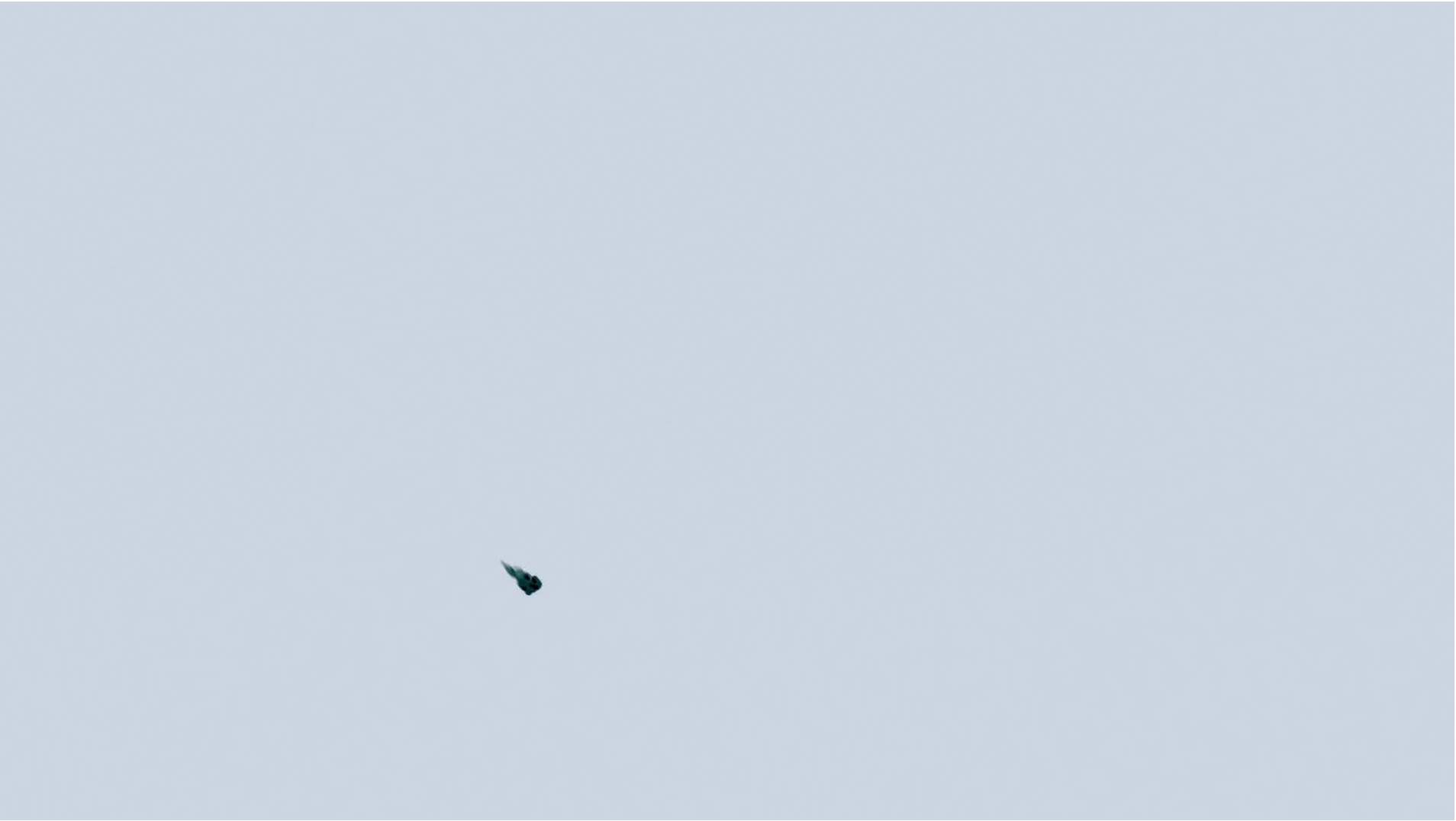


LWTB PROGRAM AREA

- 10,000 Acres
- 28,400 Parcels
- Sandy Impact:
  - 2,500 Acres
  - 4,100 Parcels (80% Residential)
- Low-Moderate Income Areas

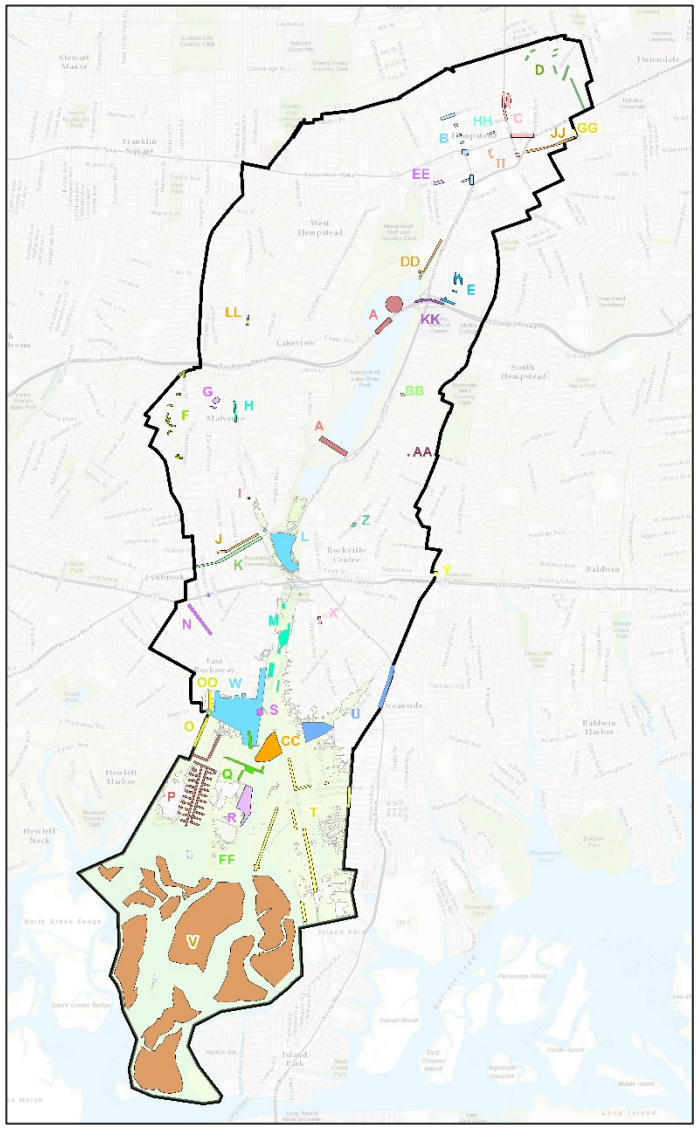


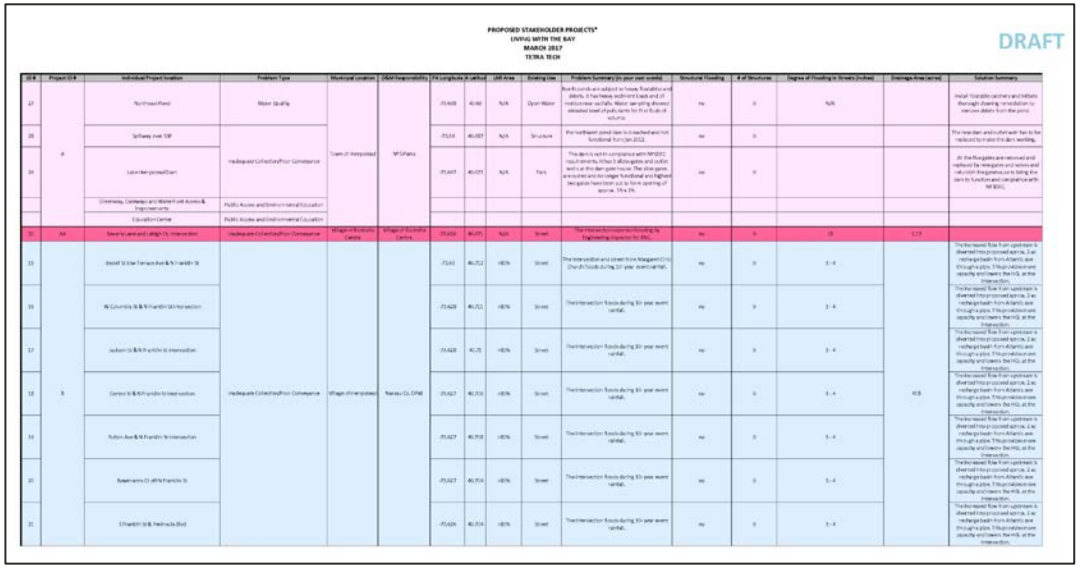
LIVING WITH THE BAY



LWTB TYPES OF PROBLEMS

PROBLEM AREAS TO PROJECTS





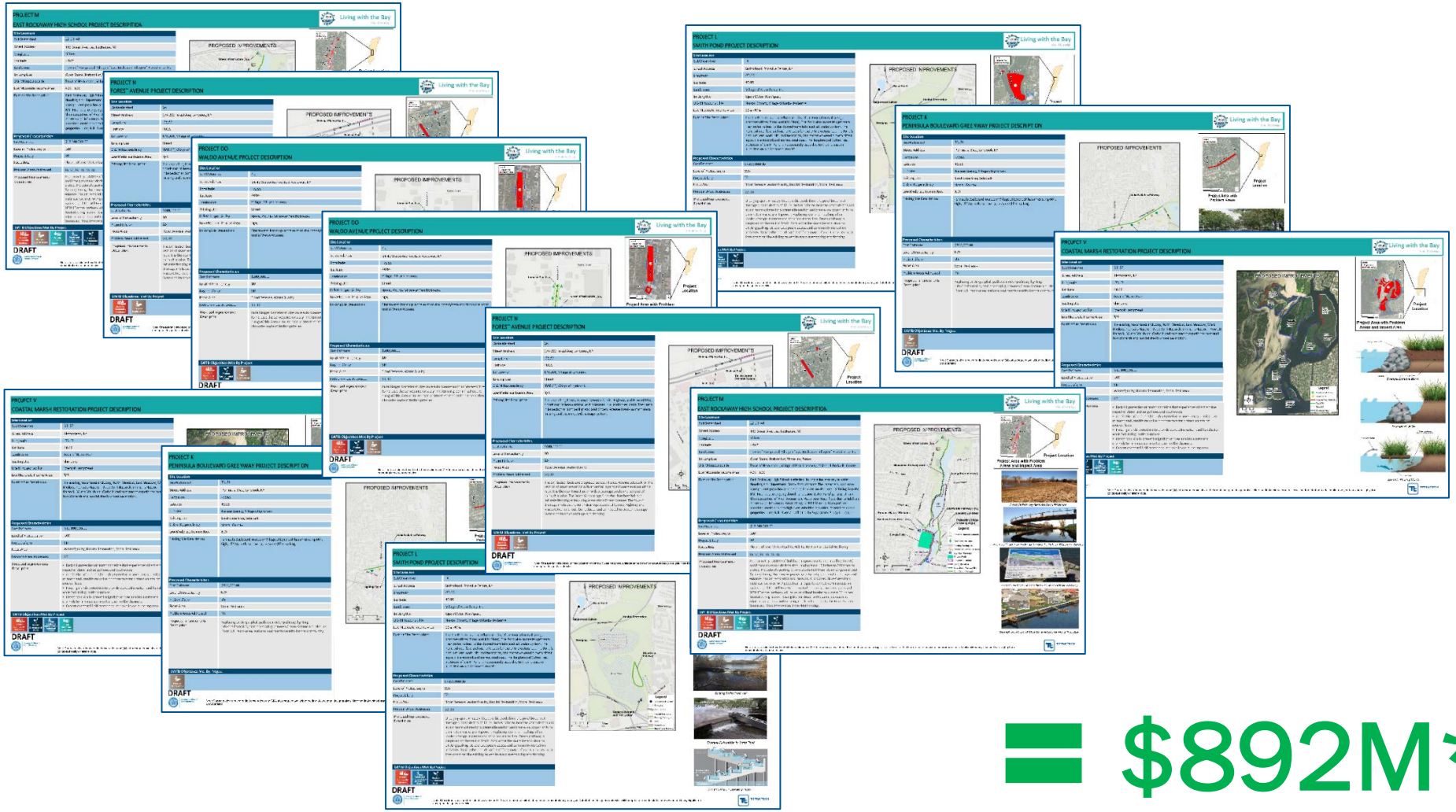
PROPOSED STAKEHOLDER PROJECTS*
LIVING WITH THE BAY
MARCH 2017
TETRA TECH

DRAFT

ID #	Project ID #	Individual Project Location	Problem Type	Municipal Location	O&M Responsibility	Pit Longitude	X Latitude	Unit Area	Existing Use	Problem Summary (in your own words)	Structural Flooding	# of Structures	Degree of Flooding in Streets (inches)	Drainage Area (acres)	Solution Summary
27	A	Northwest Pond	Water Quality	Town of Hempstead	NY State	-73.658	40.66	N/A	Open Water	Non-flood-prone subject to heavy floatables and debris. It has heavy sediment loads and of relatively low vacuity. Water sampling showed elevated level of pollutants for first flush of volume.	no	0	N/A		Install floatable cantinery and initiate thorough cleaning or mediation to remove debris from the pond.
28		Spillway Ave SSP	Inadequate Collection/Poor Conveyance			-73.64	40.687	N/A	Structure	The northwest pond dam is breached and not functional from Jan 2012.	no	0			The new dam and outlet weir has to be replaced to make the dam working.
29		Lake Hempstead Dam				-73.647	40.671	N/A	Park	The dam is not in compliance with NYSDEC requirements. It has 3 dilapidated and outlet weirs at the dam gate house. The dilapidated and no longer functional and highest because have been cut to form opening of approx. 3 ft x 3 ft.	no	0			All the floatgates are removed and replaced by new gates and stones and rebuilt the gate house to bring the dam to functional and compliance with NYSDEC.
		Greenway, Cemetery and Waterfront Access & Improvements	Public Access and Environmental Education												
		Education Center	Public Access and Environmental Education												
30	AA	Sewaty Lane and Lehigh Ct. Intersection	Inadequate Collection/Poor Conveyance	Village of Rockville Centre	Village of Rockville Centre	-73.658	40.675	N/A	Street	The intersection experiences flooding in Engineering Inspector Rd.	no	0	18	1.17	
33	B	Beckett St Star Terrace Ave & N Franklin St	Inadequate Collection/Poor Conveyance	Village of Hempstead	Nassau Co. DPW	-73.63	40.712	<80%	Street	The intersection and street from Maggiant Circle Church Roads during 10 year event rainfall.	no	0	3 - 4	40.8	The increased flow from upstream is diverted into proposed sprinks. 2 sc recharge basin from Atlantic ave through a pipe. This proposed sewer capacity and lowers the HGL at the intersection.
34		N Columbia St & N Franklin St Intersection				-73.628	40.711	<80%	Street	The intersection flooding during 10 year event rainfall.	no	0	3 - 4		The increased flow from upstream is diverted into proposed sprinks. 2 sc recharge basin from Atlantic ave through a pipe. This proposed sewer capacity and lowers the HGL at the intersection.
37		Jackson St & N Franklin St Intersection				-73.628	40.71	<80%	Street	The intersection flooding during 10 year event rainfall.	no	0	3 - 4		The increased flow from upstream is diverted into proposed sprinks. 2 sc recharge basin from Atlantic ave through a pipe. This proposed sewer capacity and lowers the HGL at the intersection.
38		Centre St & N Franklin St Intersection				-73.627	40.716	<80%	Street	The intersection flooding during 10 year event rainfall.	no	0	3 - 4		The increased flow from upstream is diverted into proposed sprinks. 2 sc recharge basin from Atlantic ave through a pipe. This proposed sewer capacity and lowers the HGL at the intersection.
39		Fulton Ave & N Franklin St Intersection				-73.627	40.718	<80%	Street	The intersection flooding during 10 year event rainfall.	no	0	3 - 4		The increased flow from upstream is diverted into proposed sprinks. 2 sc recharge basin from Atlantic ave through a pipe. This proposed sewer capacity and lowers the HGL at the intersection.
40		Beaverwood Ct off N Franklin St				-73.627	40.714	<80%	Street	The intersection flooding during 10 year event rainfall.	no	0	3 - 4		The increased flow from upstream is diverted into proposed sprinks. 2 sc recharge basin from Atlantic ave through a pipe. This proposed sewer capacity and lowers the HGL at the intersection.
41		S Franklin St & Peninsula Blvd				-73.626	40.714	<80%	Street	The intersection flooding during 10 year event rainfall.	no	0	3 - 4		The increased flow from upstream is diverted into proposed sprinks. 2 sc recharge basin from Atlantic ave through a pipe. This proposed sewer capacity and lowers the HGL at the intersection.

90+ Problem Areas → 35 Projects

TOTAL PROJECT COSTS



= $892M*

*$723M identified for 1 of the 36 projects

Program = $125M

PRIORITIZATION RANKING

PRIORITIZATION RANKING BREAKDOWN

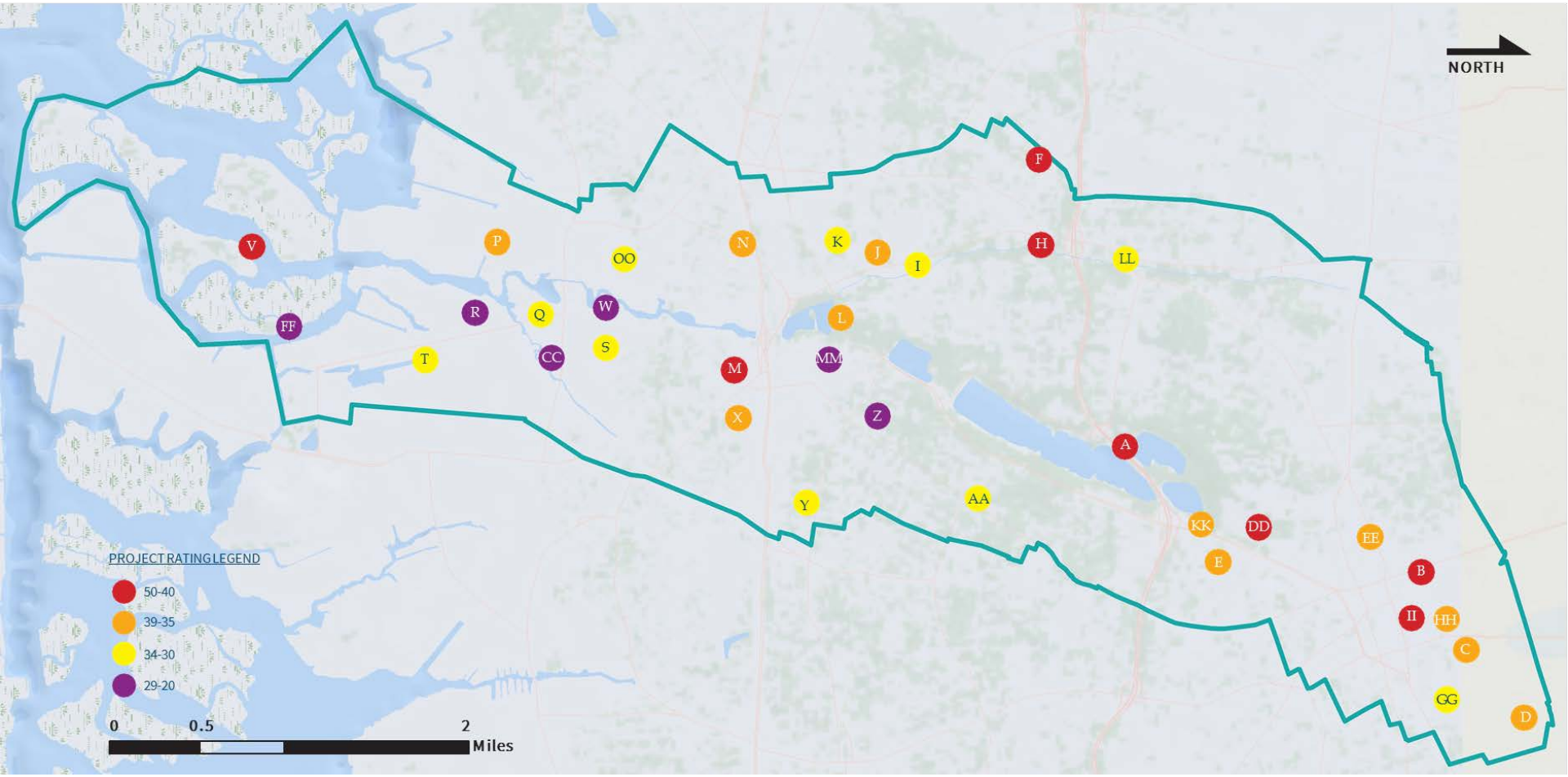
ID	PROJECT NAME	Costs	Benefits	Risk & Vulnerability	Synergies	Social Resilient	Total Project Rating
V	Coastal Marsh Restoration	0.0	32.4	8.2	3.3	6.6	50.5
B	Horsebrook Drain West Branch Recharge Basin	7.0	25.3	11.4	1.9	0.8	46.4
DD	Hempstead High School Creek Restoration	23.9	7.4	2.2	5.7	5.8	45.0
II	Cooper 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.

PRIORITIZATION RANKING



THE PROJECTS

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

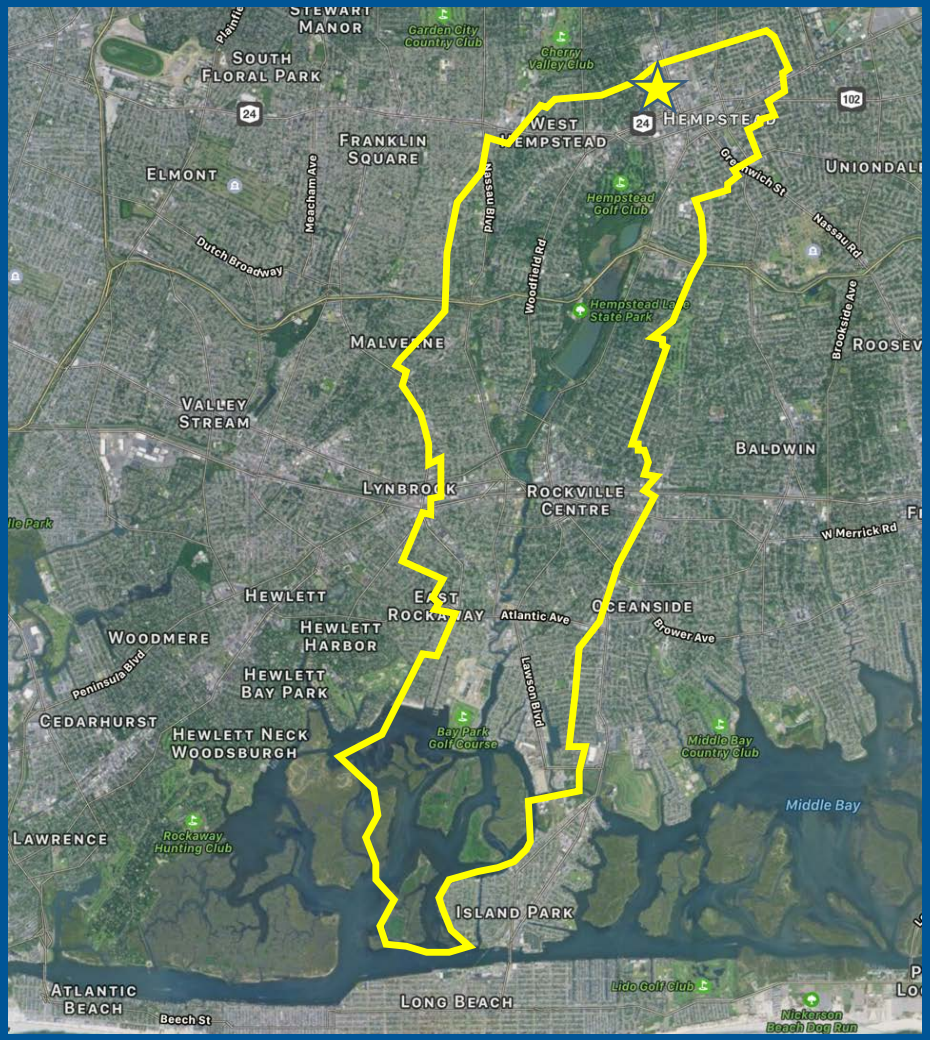
PRIORITIZATION RANKING BREAKDOWN (CONTINUED)

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

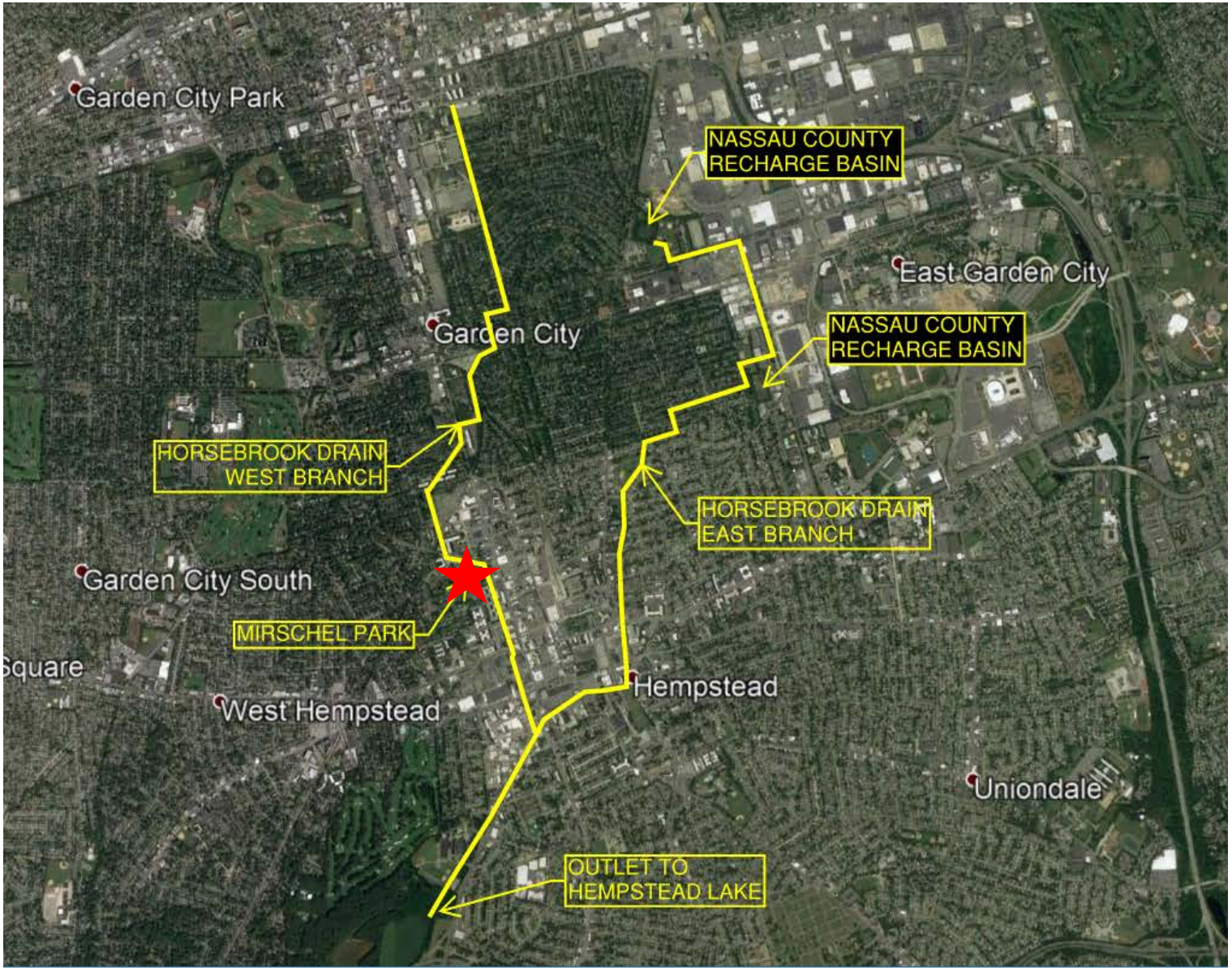
The prioritization framework is intended to identify a collection of transformative projects that increase the resiliency of the Mill River corridor. Numerical scores for each metric category were developed (a detailed discussion on category weighting is included in Objective #6 document under separate 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.

HORSEBROOK DRAIN
WEST BRANCH RECHARGE BASIN

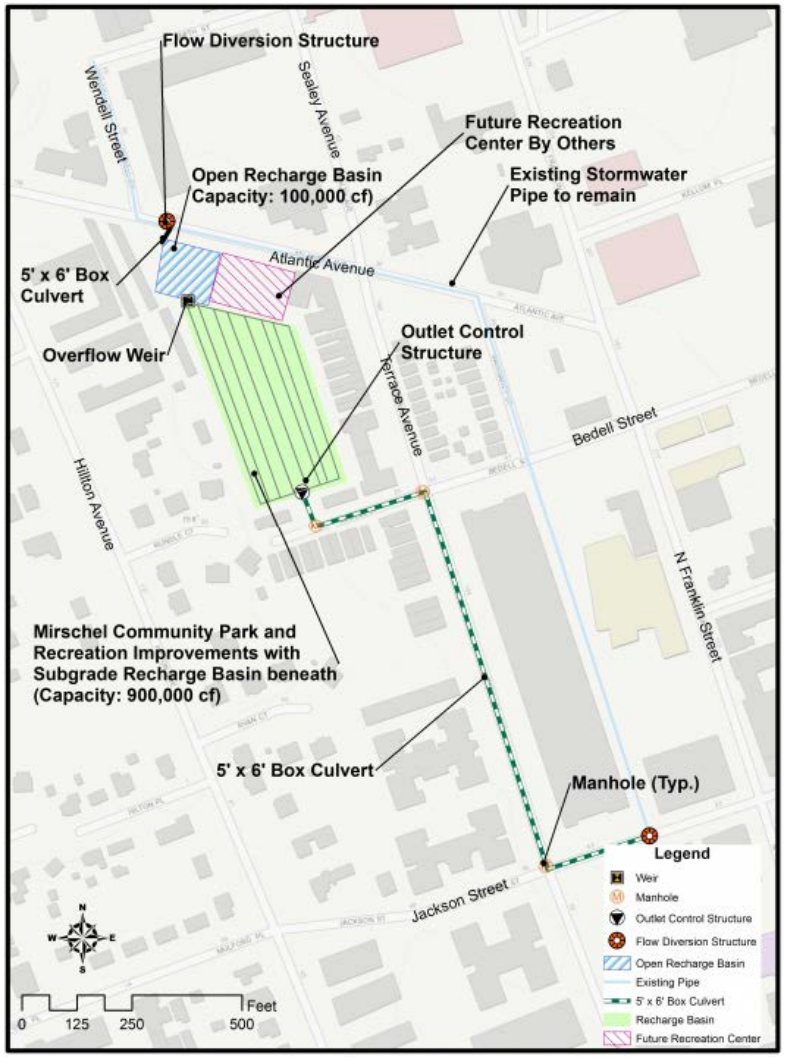
HORSEBROOK DRAIN WEST



HORSEBROOK DRAIN WEST



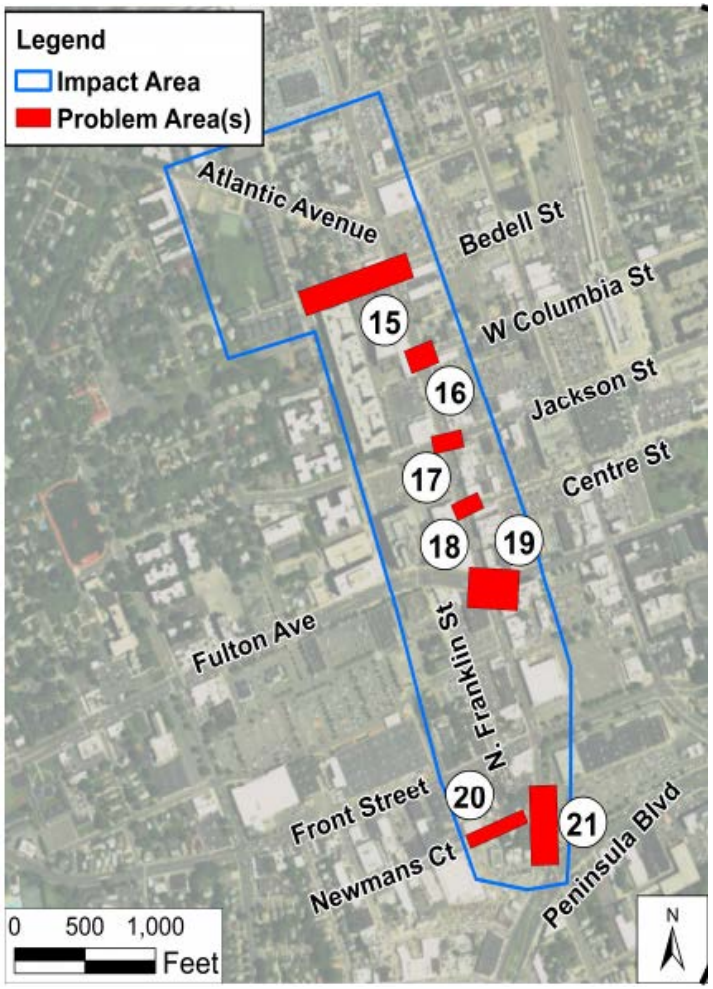
HORSEBROOK DRAIN
PROJECT OBJECTIVES



- ATTENUATE NEARBY FLOODING FOR THE 10-YEAR STORM EVENT
- IMPROVE WATER QUALITY BY INFILTRATION
- PROVIDE COMMUNITY PARK AND RECREATION IMPROVEMENTS

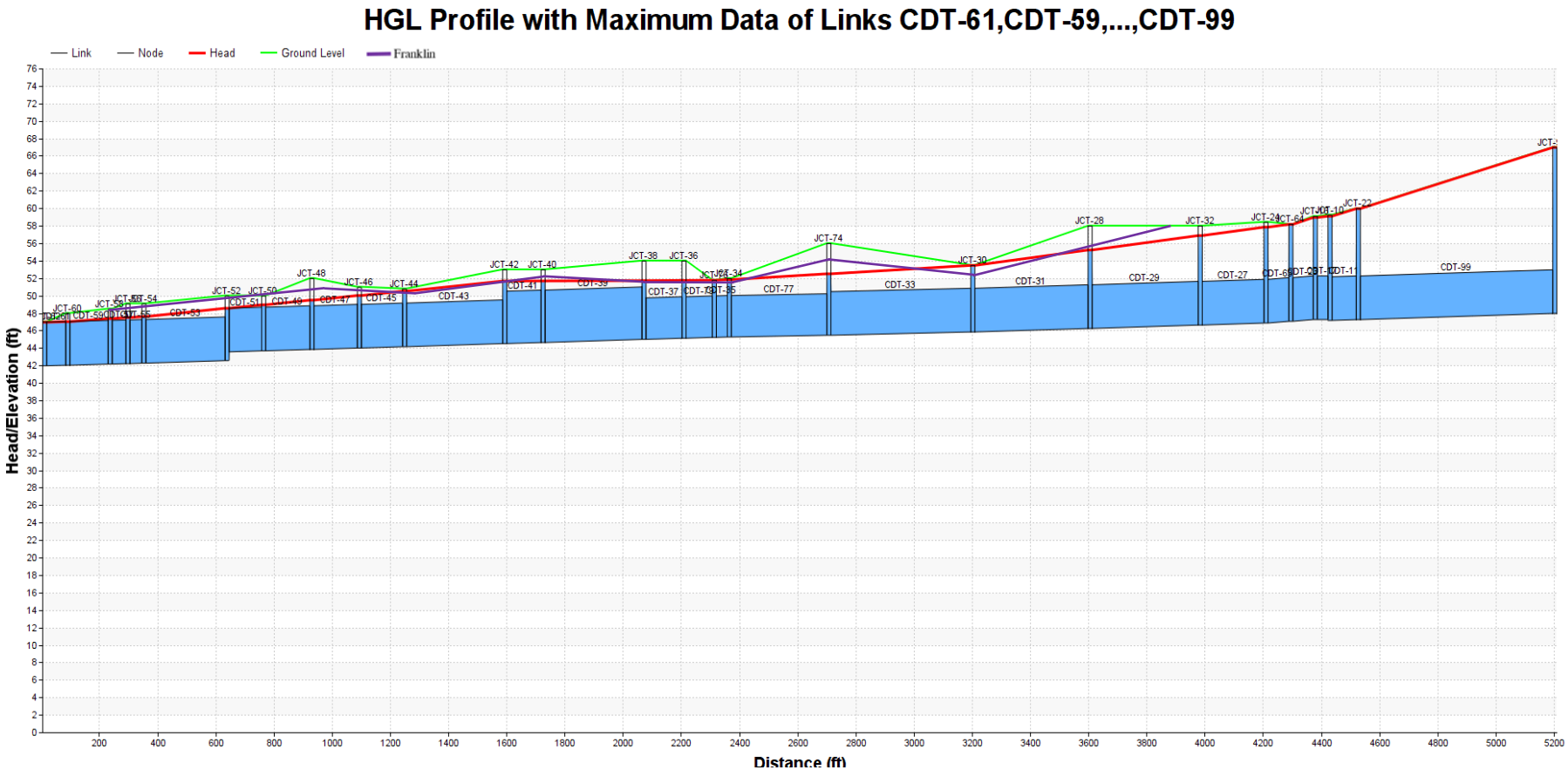
HORSEBROOK DRAIN WEST

MODELING ANALYSIS



HORSEBROOK DRAIN WEST

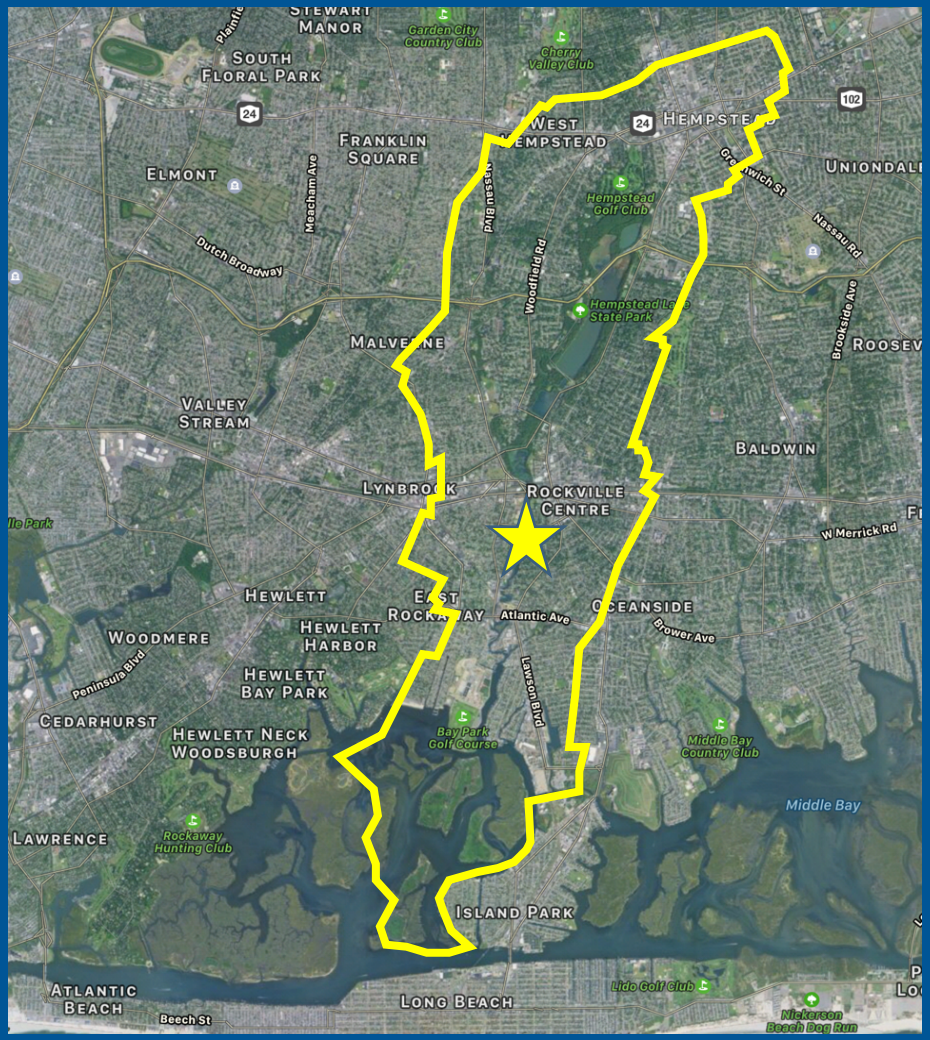
MODELING ANALYSIS



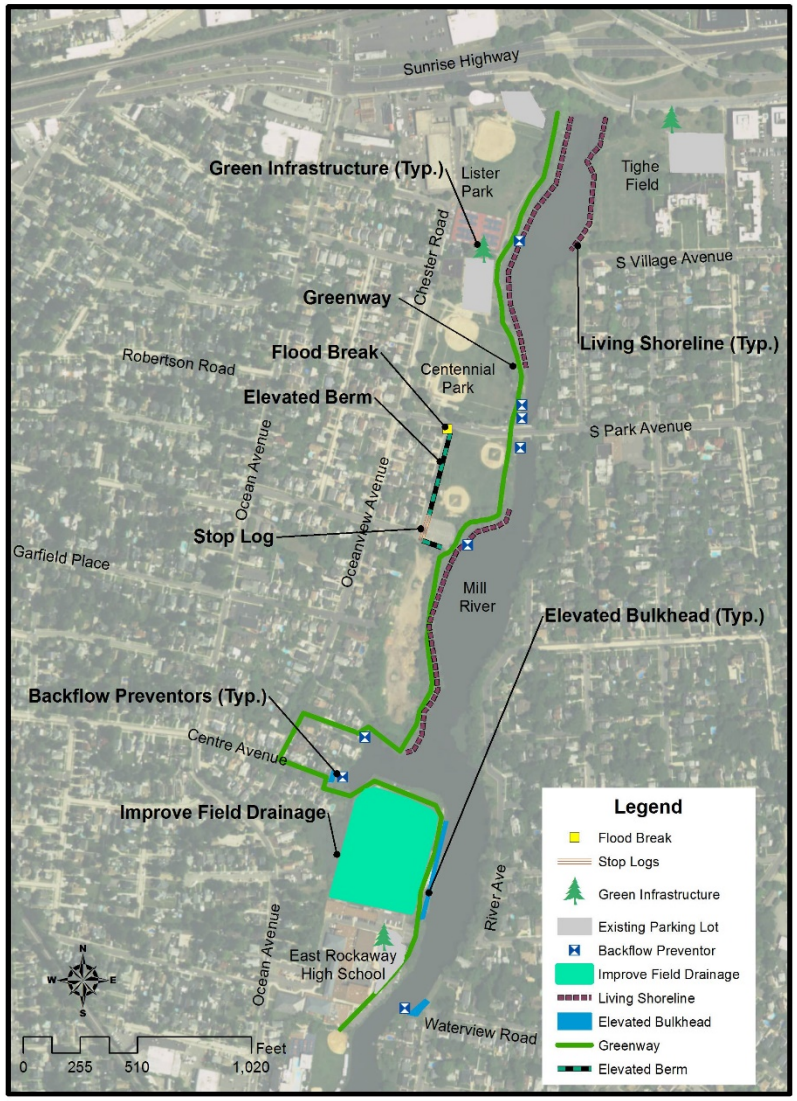
HORSEBROOK DRAIN WEST
MIRSCHEL PARK

EAST ROCKAWAY HIGH SCHOOL / LISTER PARK

ERHS/LISTER PARK



ERHS/LISTER PARK
PROJECT OBJECTIVES

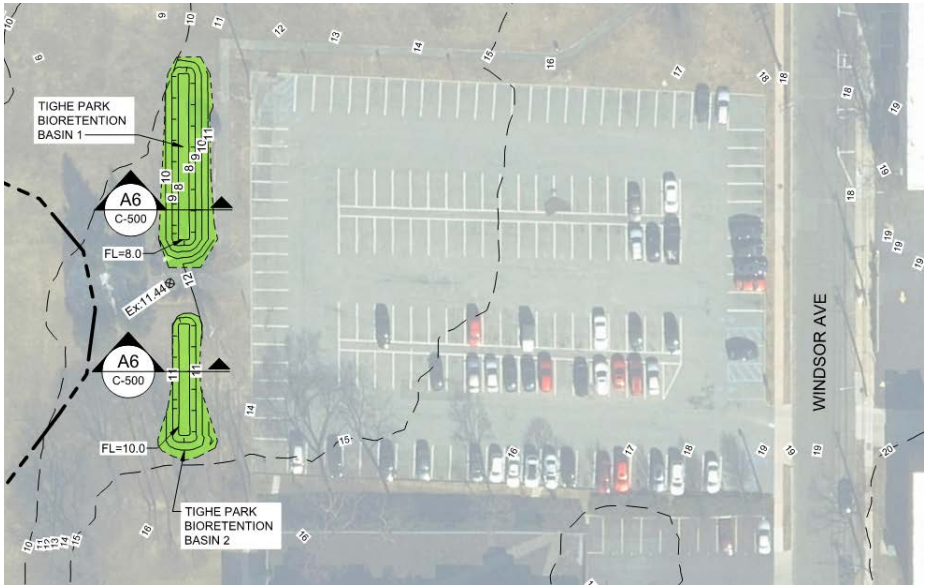


- MITIGATE SURGE/TIDAL FLOODING WITH BACKFLOW PREVENTERS AND FLOOD PROTECTION BERM
- IMPROVE WATER QUALITY WITH GREEN INFRASTRUCTURE
- PROVIDE ACCESS TO THE WATERFRONT WITH EXTENSION OF GREENWAY
- REDUCE SHORELINE EROSION AND ENHANCE HABITAT WITH LIVING SHORELINE IMPROVEMENTS

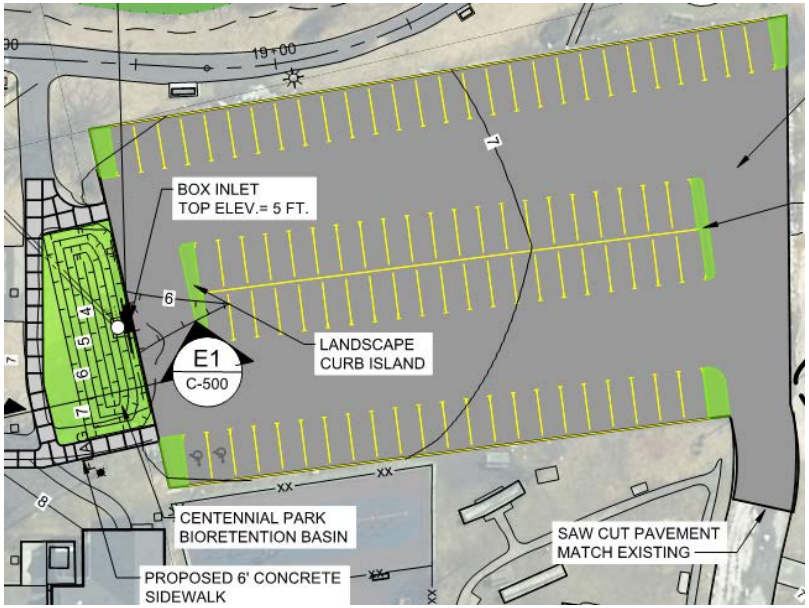
ERHS/LISTER PARK
EXISTING CONDITIONS

ERHS/LISTER PARK
GREEN INFRASTRUCTURE

TIGHE PARK

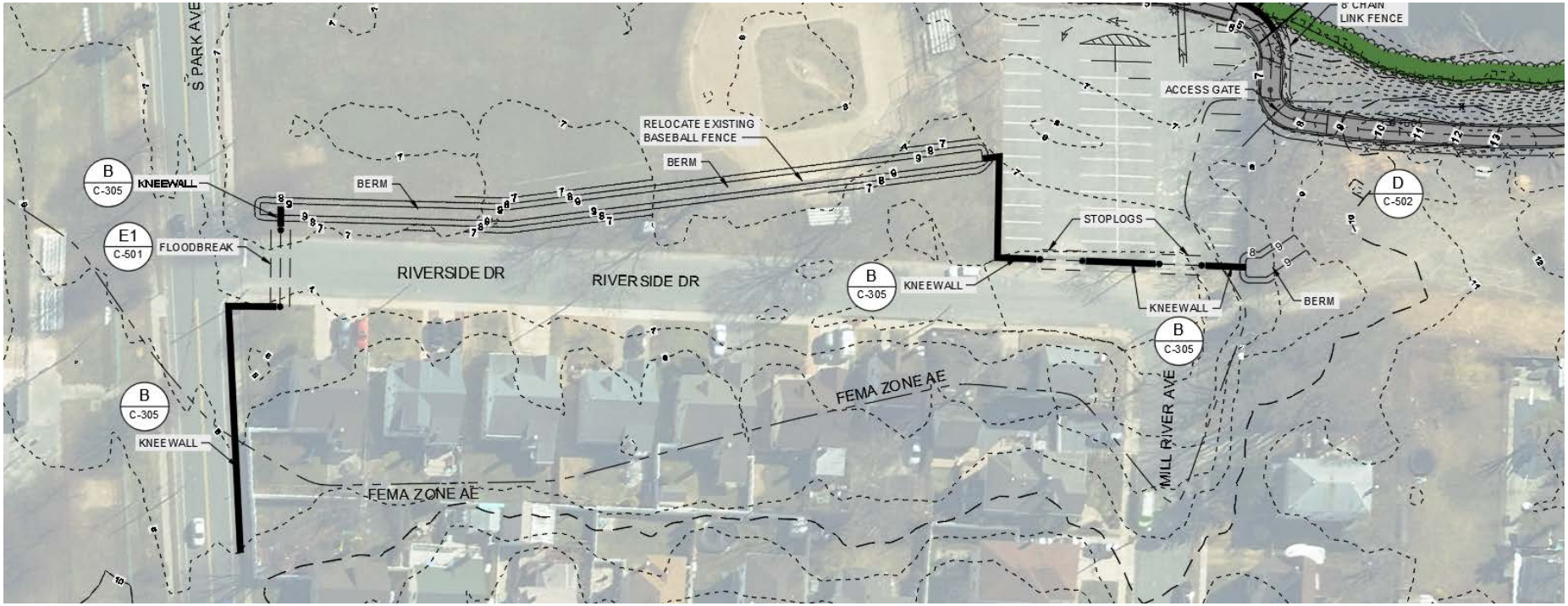


CENTENNIAL PARK



BIORETENTION BASINS DESIGN IN ACCORDANCE WITH NEW YORK STATE STORMWATER DESIGN MANUAL

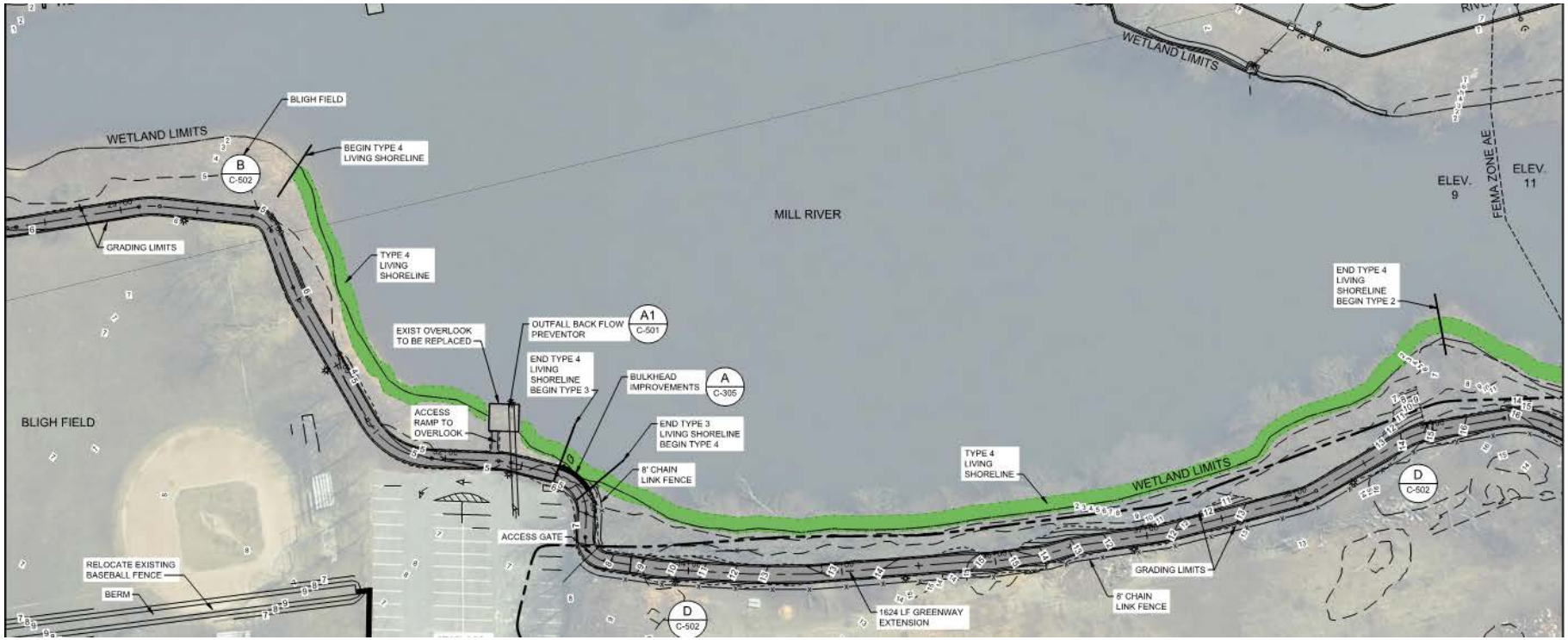
ERHS/LISTER PARK
FLOOD MITIGATION



LEVEL OF SERVICE IS THE FEMA BASE FLOOD ELEVATION

ERHS/LISTER PARK

PUBLIC ACCESS TO THE WATERFRONT



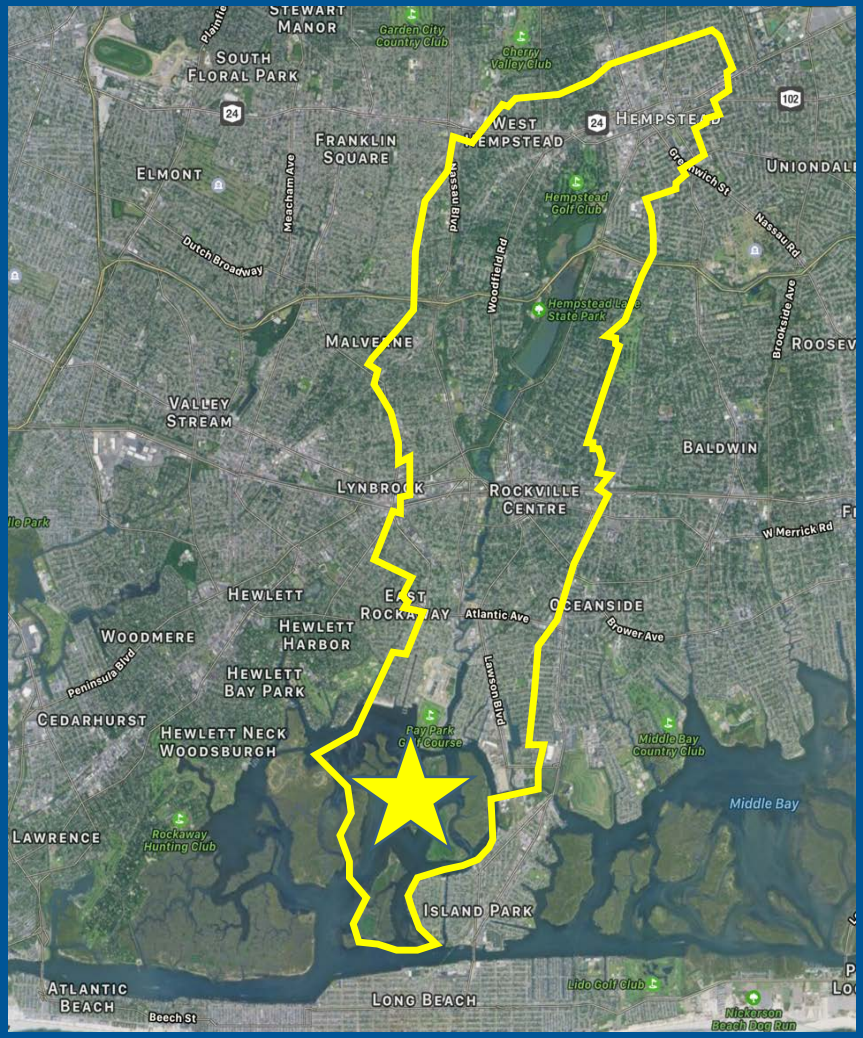
ERHS/LISTER PARK
LIVING SHORELINE – BULKHEAD

BULKHEAD IMPROVEMENTS

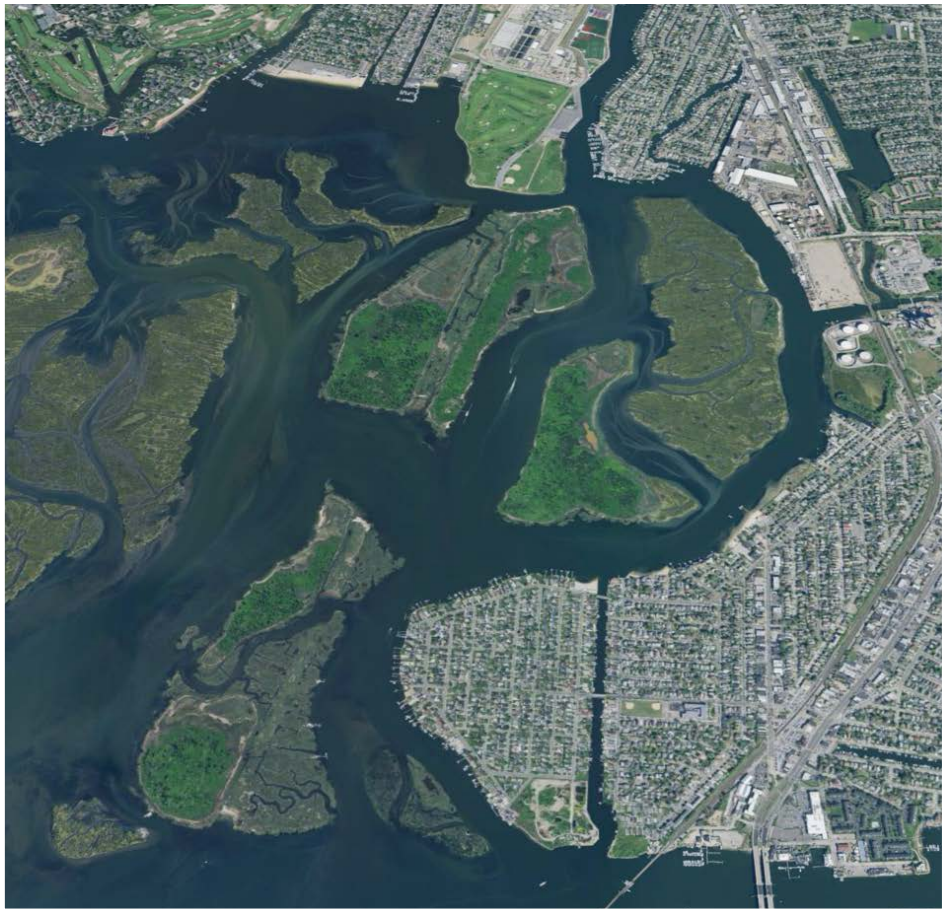
LIVING SHORELINE

COASTAL MARSH RESTORATION

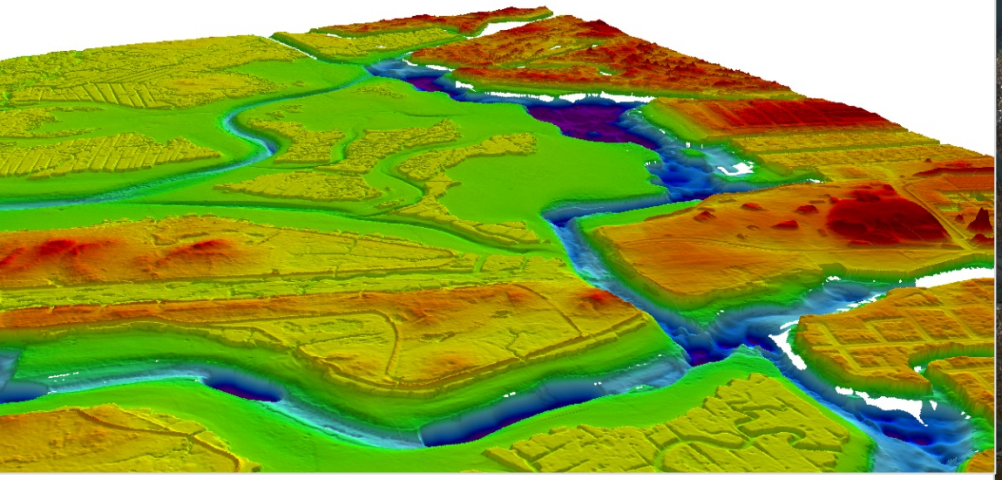
COASTAL MARSH RESTORATION

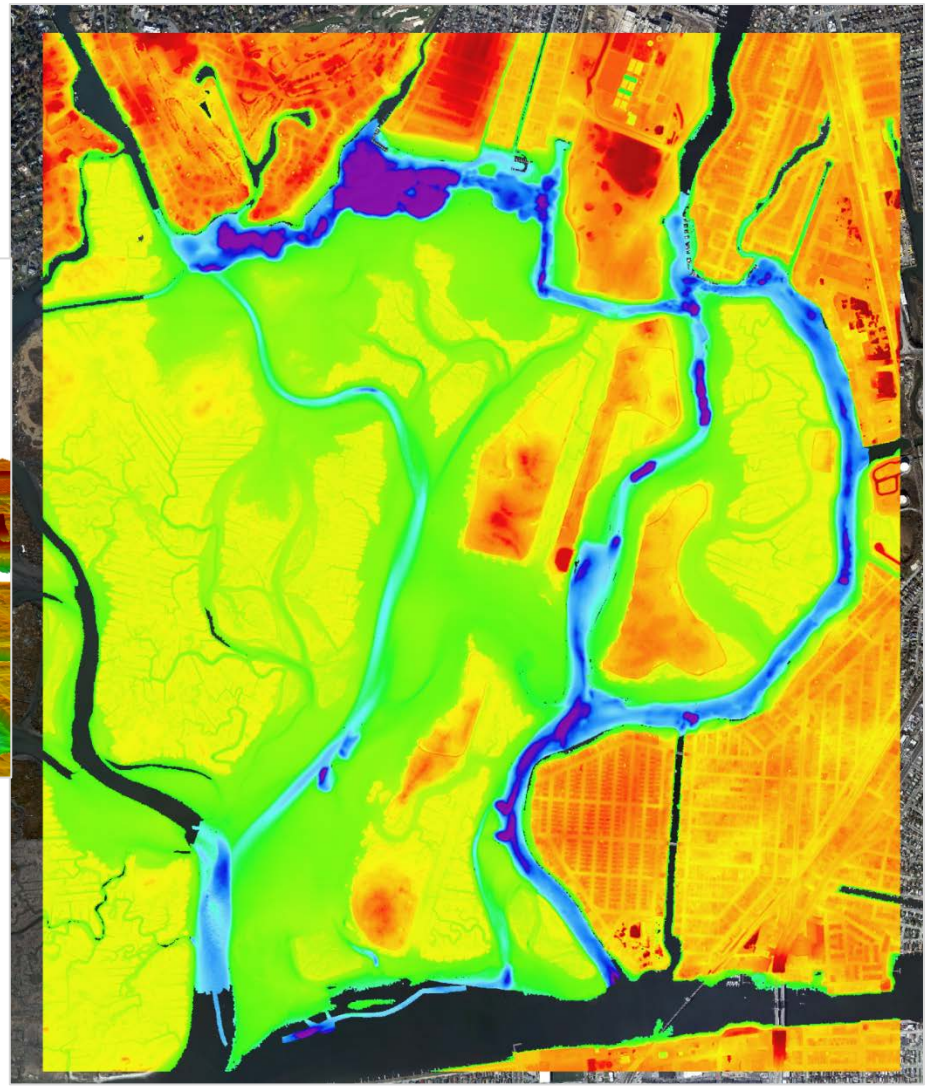


COASTAL MARSH RESTORATION
TOPOGRAPHY – LIDAR REFLECTANCE

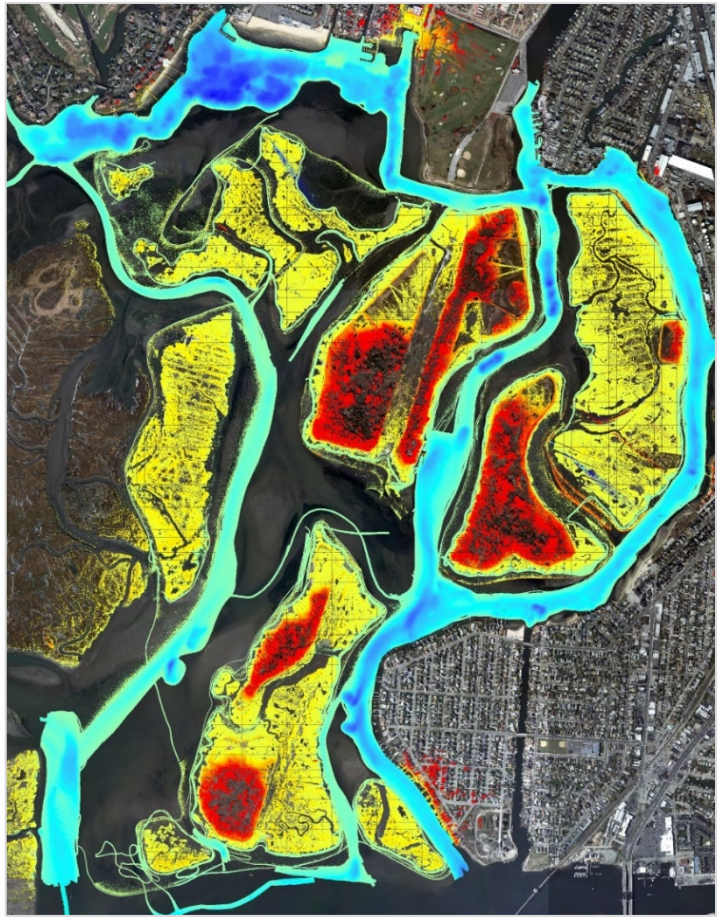


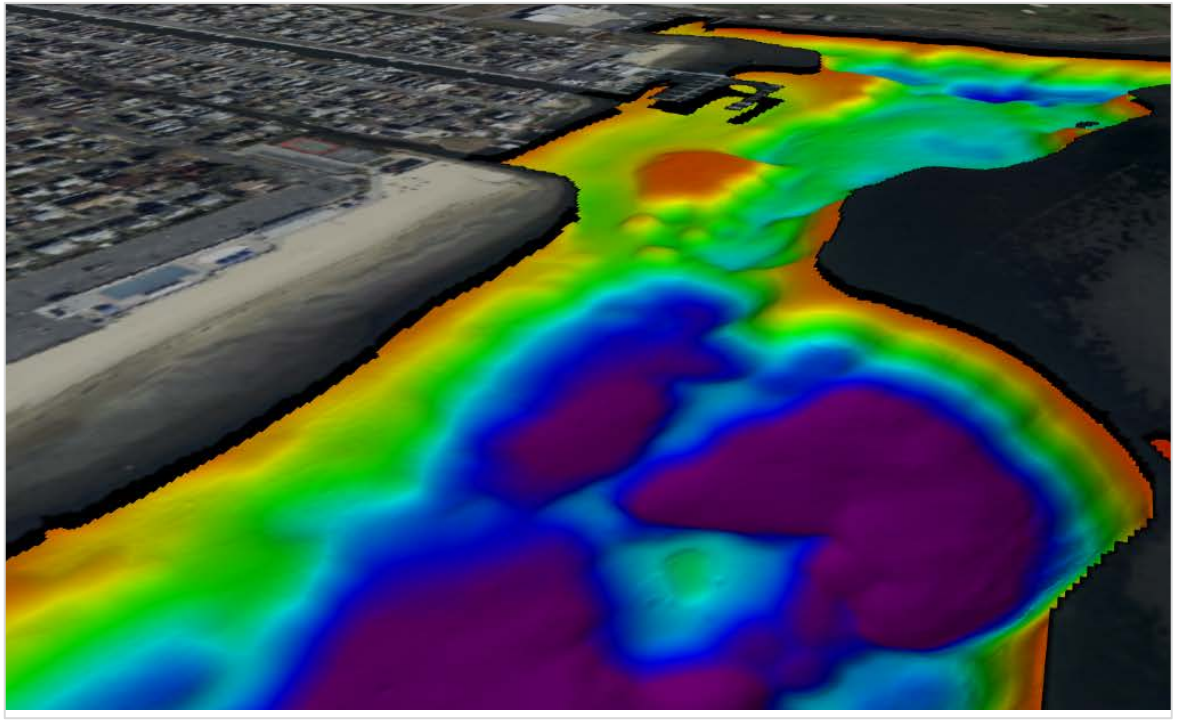
COASTAL MARSH RESTORATION
DIGITAL ELEVATION MODEL





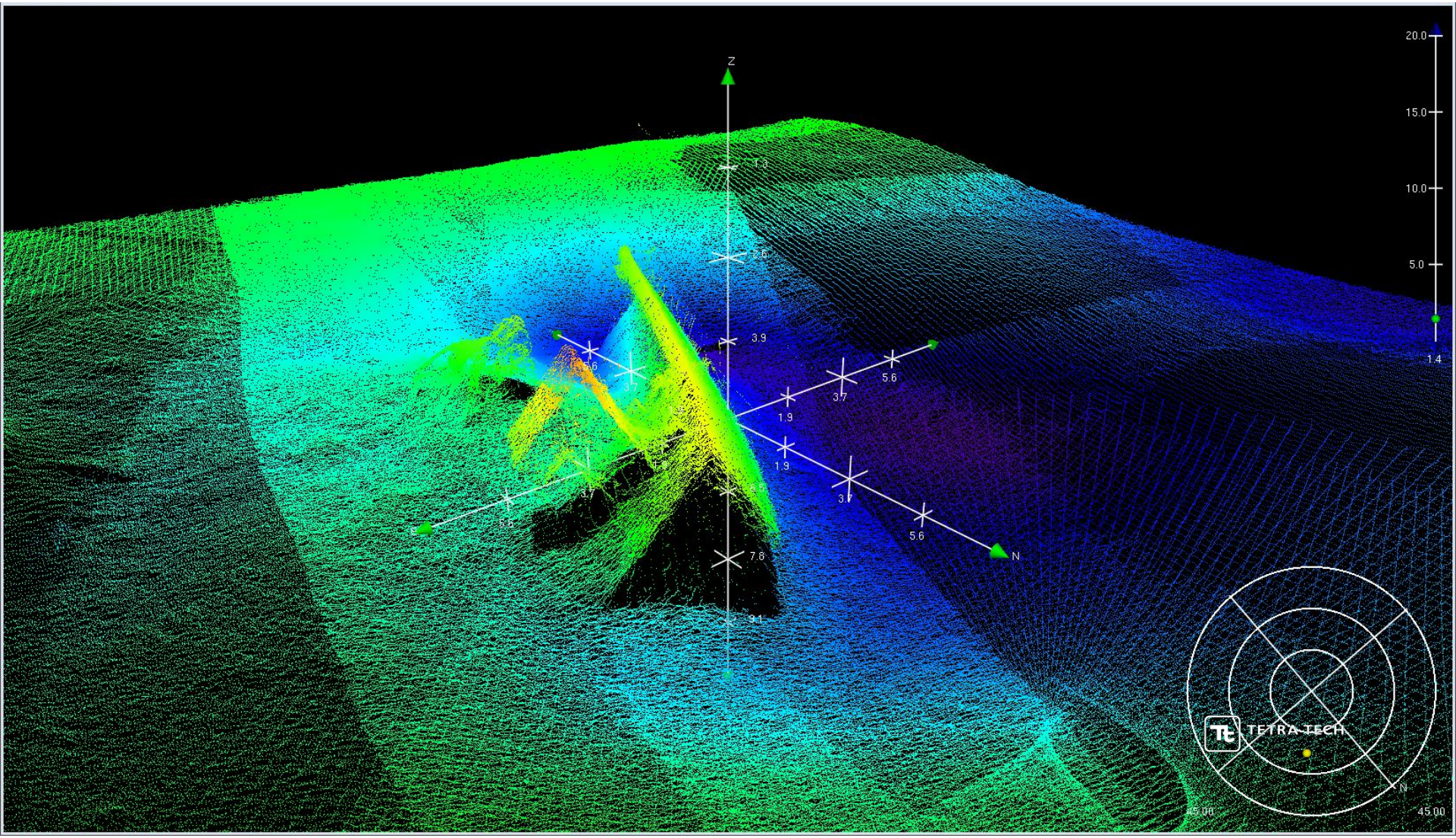
COASTAL MARSH RESTORATION
BATHYMETRY - MULTIBEAM





TETRA TECH

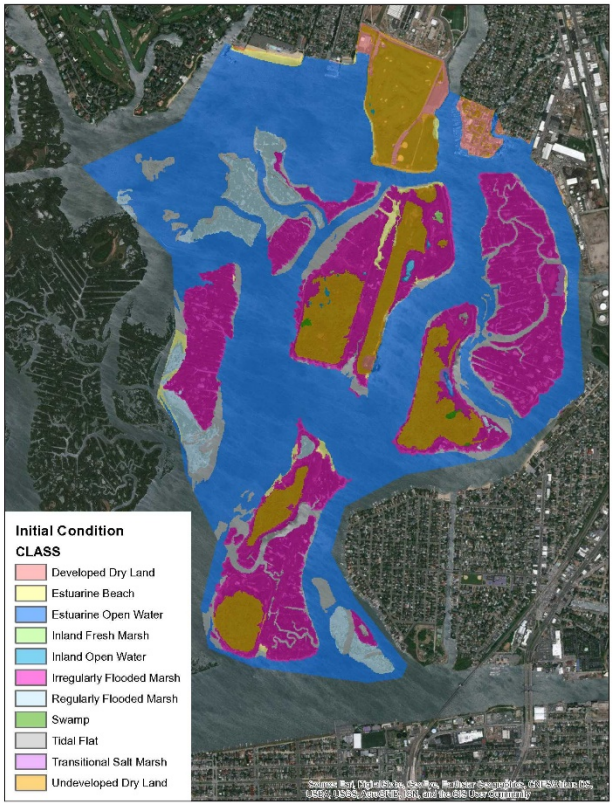
COASTAL MARSH RESTORATION
CULTURAL RESOURCES



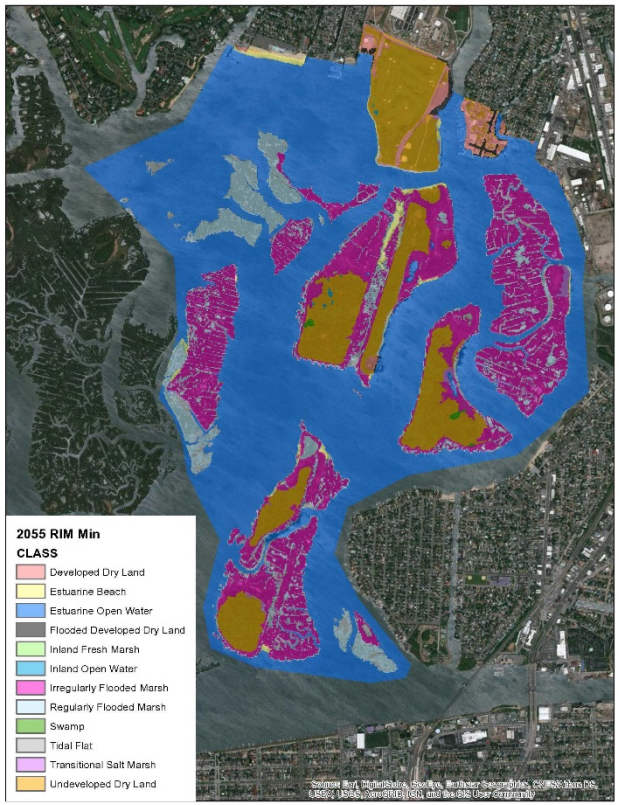
COASTAL MARSH RESTORATION
BIOLOGICAL RESOURCE SURVEY

COASTAL MARSH RESTORATION
SEA LEVEL RISE

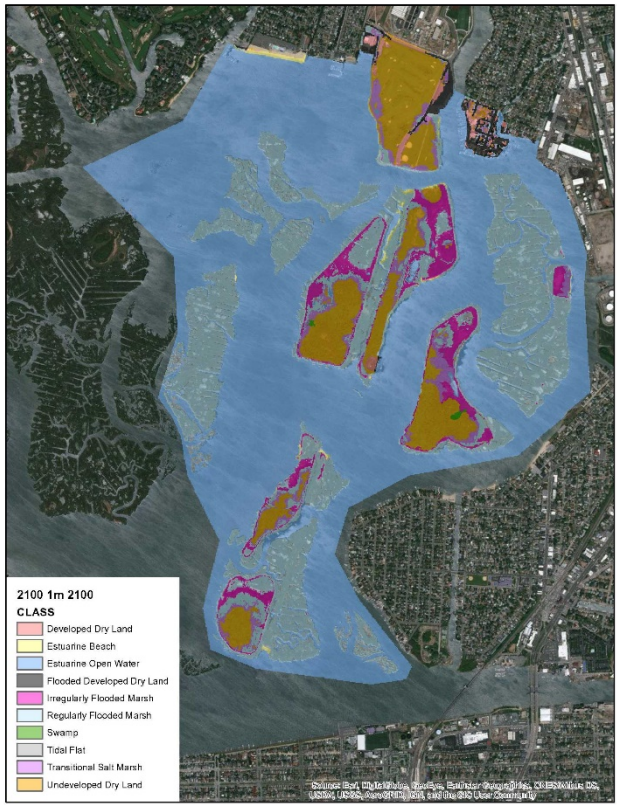
INITIAL CONDITIONS (2004)



2055 (19 INCHES)



2100 (39 INCHES)



COASTAL MARSH RESTORATION
TYPES OF MARSH IMPROVEMENTS

Thin-Layer Placement

Interior Pond Filing / Elevated Platforms

COASTAL MARSH RESTORATION
COASTAL FIELD STATION

COASTAL MARSH RESTORATION
COASTAL FIELD STATION

THANK YOU

TETRA TECH

Jake Oldenburger, PE, CFM, ENV SP, LEED GA
Jason Hellendrung, ASLA, PLA

complex world | CLEAR SOLUTIONS™

June 2019