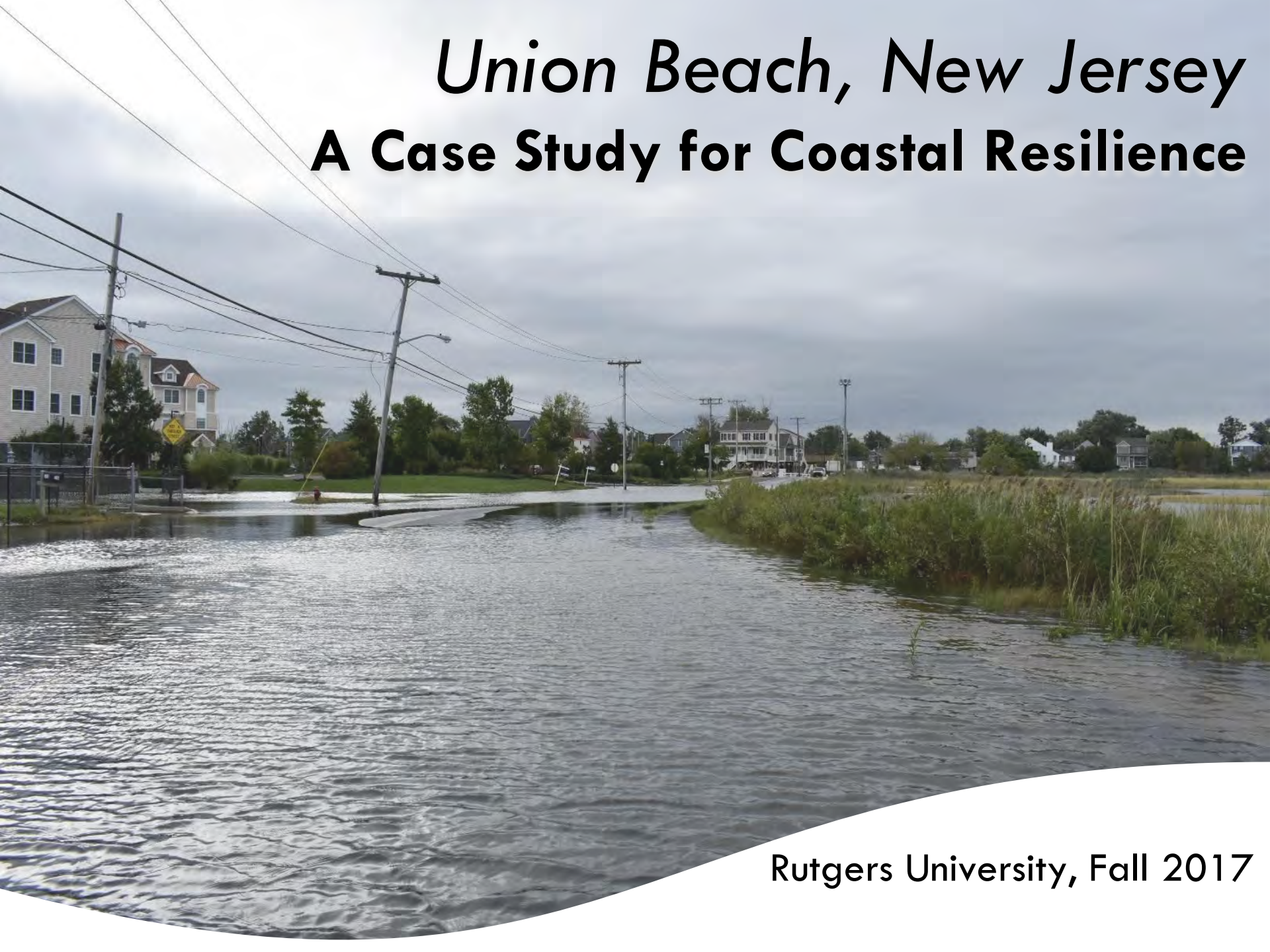

Union Beach, New Jersey

A Case Study for Coastal Resilience

Rutgers University, Fall 2017

Who we are

Coastal Resilience: A Transdisciplinary Approach

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C2R2

RUTGERS
School of Engineering

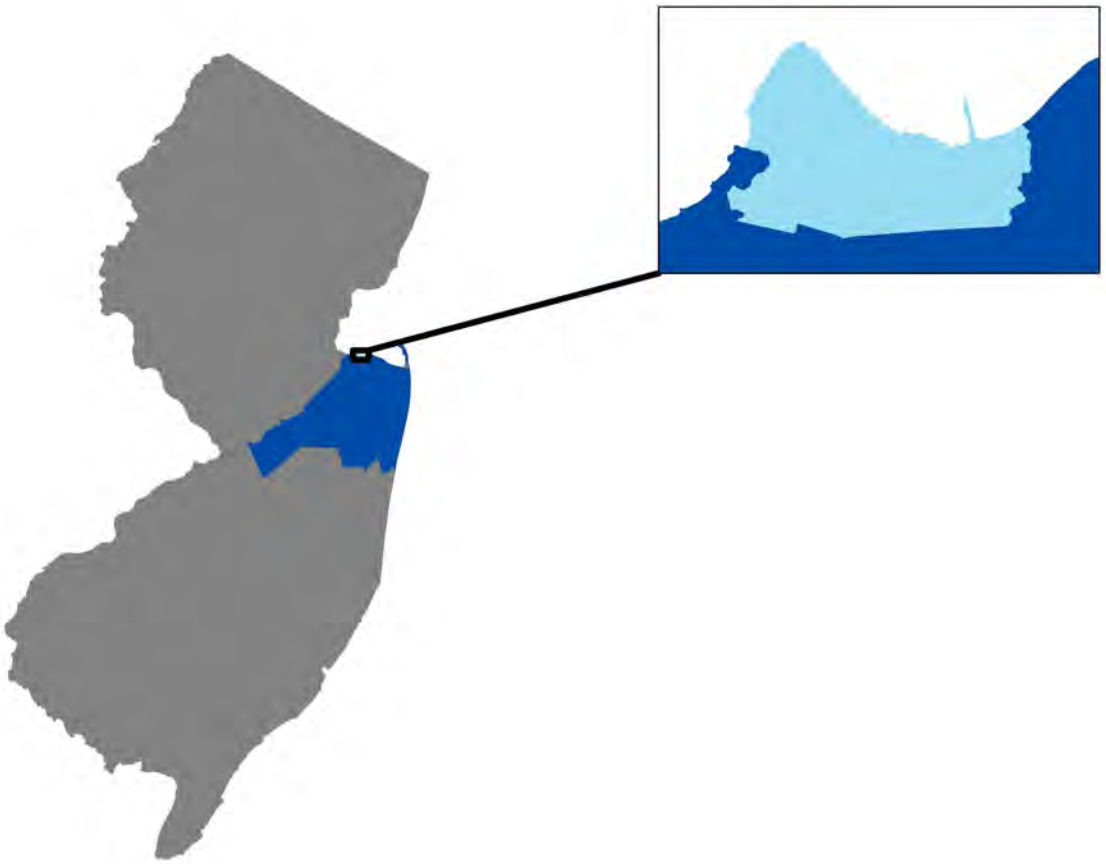
RUTGERS
School of Environmental
and Biological Sciences

NSF

RUTGERS
School of Arts and Sciences

Overview

- Who we are
- Historical context
- Demographics
- Risks
- Existing Conditions
- Vulnerabilities
- Effects of Sandy
- Fiscal Analysis
- Proposed Projects
- Conclusions



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History of the Borough of Union Beach

1925

Establishment of the Borough of Union Beach

Governor George Silzer signed a bill on March 16, 1925 that incorporated Union Beach as an independent borough.

1930s

Great Depression in Union Beach

In its early years, Union Beach struggled to meet financial obligations and retain a business district in town.

Mid-1900s

Coastal Storms

Throughout the middle of the twentieth century, Union Beach was repeatedly battered by coastal storms. The borough showed its resilience in rebuilding and community strength.

Late 1900s

Growth and Expansion

Union Beach continued to expand through the opening of municipal buildings and restoring its beach front.

Overview

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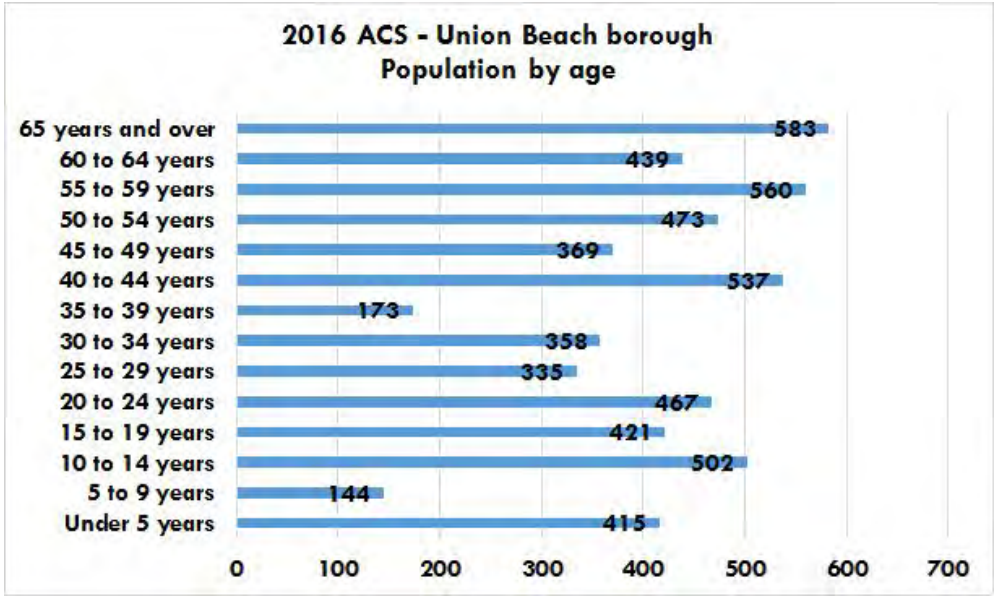
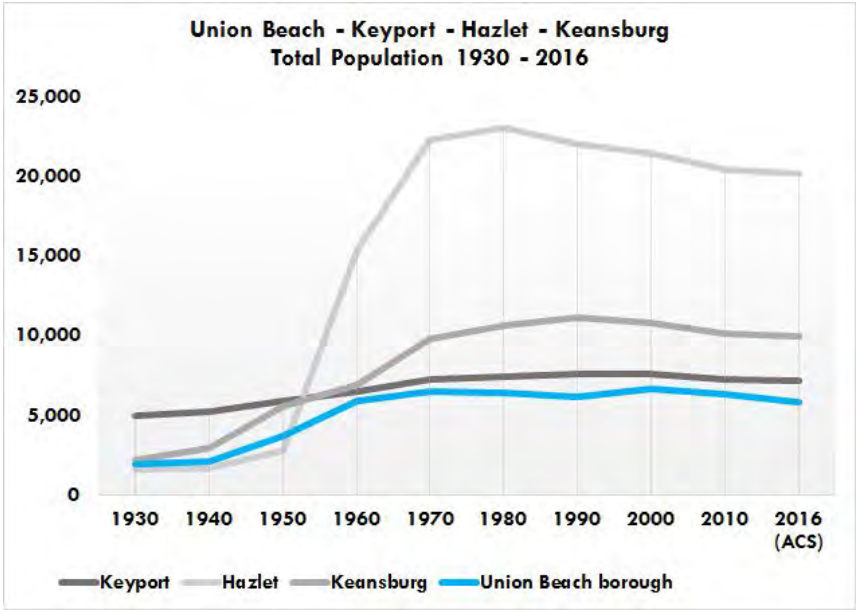
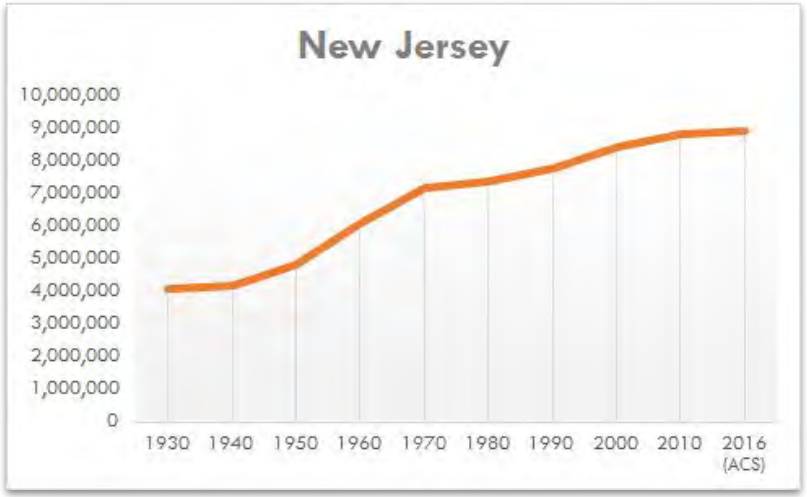
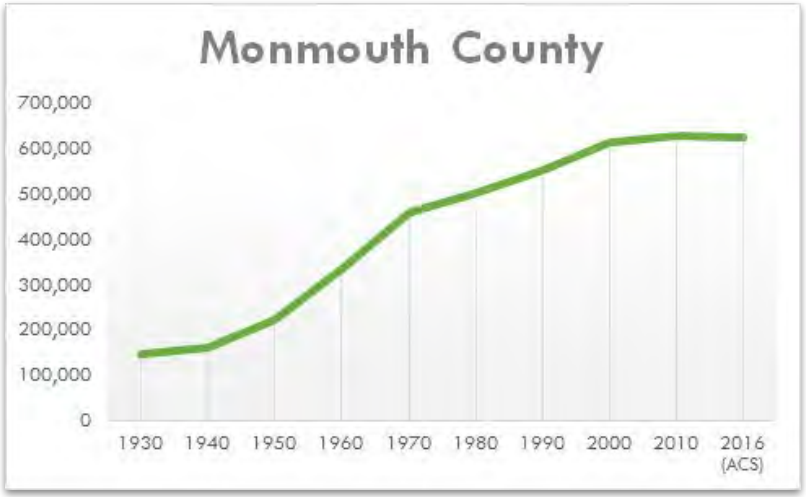
Demographics: Population & Age

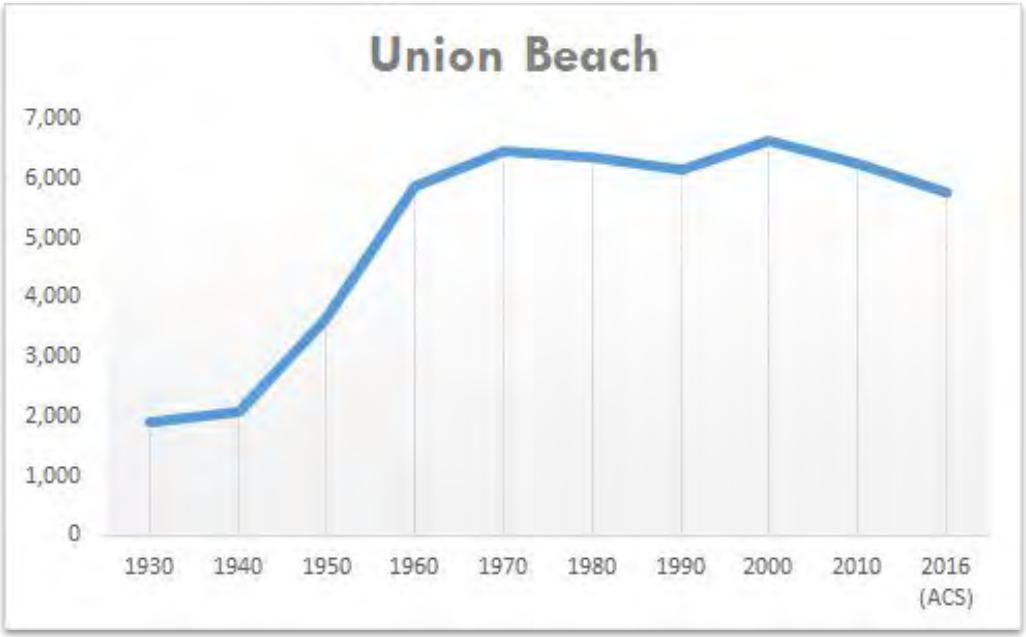




Demographics: Population Growth 1930 - 2016







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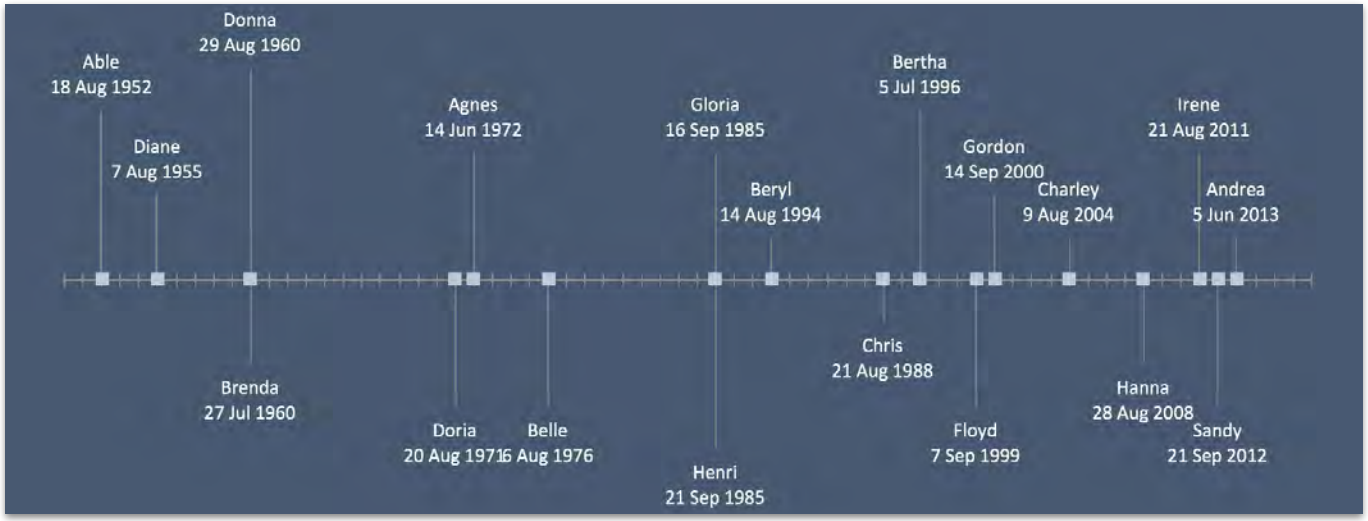
Historical Hurricane Activity in Union Beach



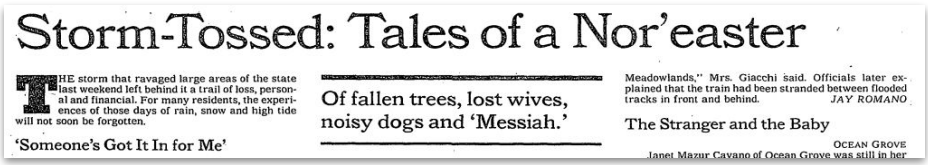

NEW JERSEY WEEKLY

The New York Times

SUNDAY, DECEMBER 20, 1992

Section 13

New Moves


Storm-Tossed: Tales of a Nor'easter

THE storm that ravaged large areas of the state last weekend left behind it a trail of loss, personal and financial. For many residents, the experiences of those days of rain, snow and high tide will not soon be forgotten.

'Someone's Got It In for Me'

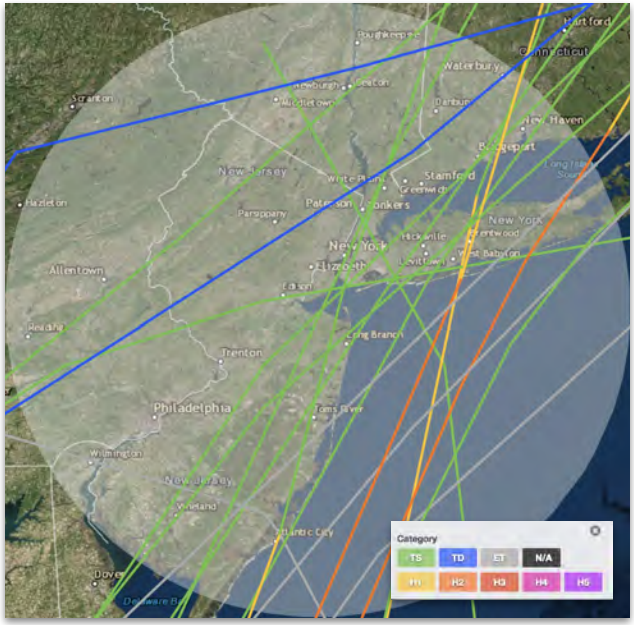
Of fallen trees, lost wives, noisy dogs and 'Messiah.'

Meadowlands," Mrs. Giacchi said. Officials later explained that the train had been stranded between flooded tracks in front and behind. JAY ROMANO

The Stranger and the Baby

OCEAN GROVE

Janet Mazur Cavano of Ocean Grove was still in her



Risks Facing Union Beach: Increased Flooding

Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel

Year	Central Estimate *50% probability SLR meets or exceeds…*	Likely Range *67% probability SLR is between…*	1-in-20 Chance *5% probability SLR meets or exceeds…*	1-in-200 Chance *0.5% probability SLR meets or exceeds…*	1-in-1000 Chance *0.1% probability SLR meets or exceeds…*
2030	0.8 ft	0.6 – 1.0 ft	1.1 ft	1.3 ft	1.5 ft
2050	1.4 ft	1.0 – 1.8 ft	2.0 ft	2.4 ft	2.8 ft
2100 Low emissions	2.3 ft	1.7 – 3.1 ft	3.8 ft	5.9 ft	8.3 ft
2100 High emissions	3.4 ft	2.4 – 4.5 ft	5.3 ft	7.2 ft	10 ft

Within 15 year mortgage lifespan

Within 30 year mortgage lifespan

Extent of lifespan of most infrastructure

Risks Facing Union Beach: Coastal Storms

Superstorm Sandy, 2012

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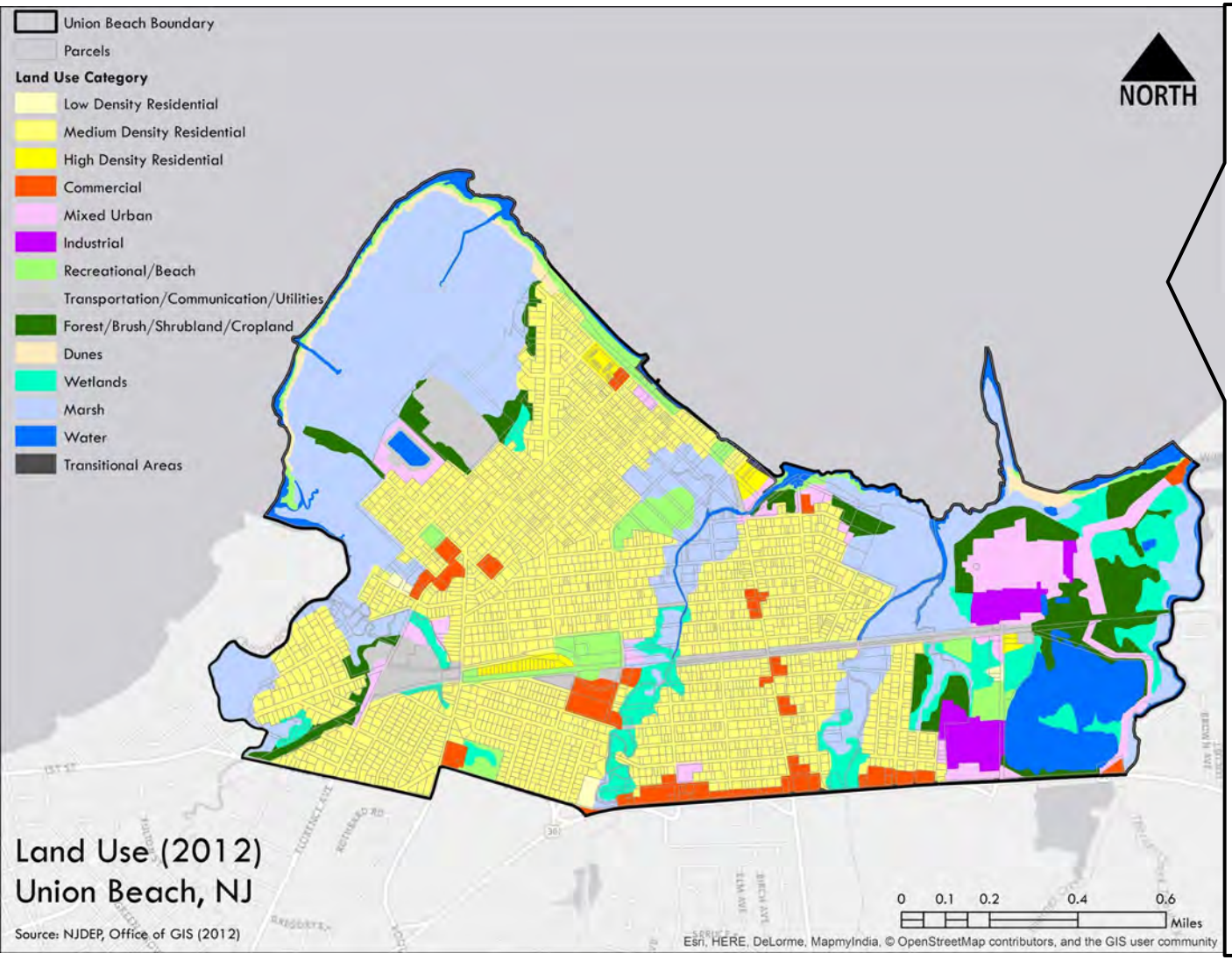
NORTH
Orthophotography
Union Beach, NJ
0 0.075 0.15 0.3 0.45
Miles
FLORENCE AVE
ROTHBARD RD
GREGORYS
BIRCH AVE
BROWN AVE
30

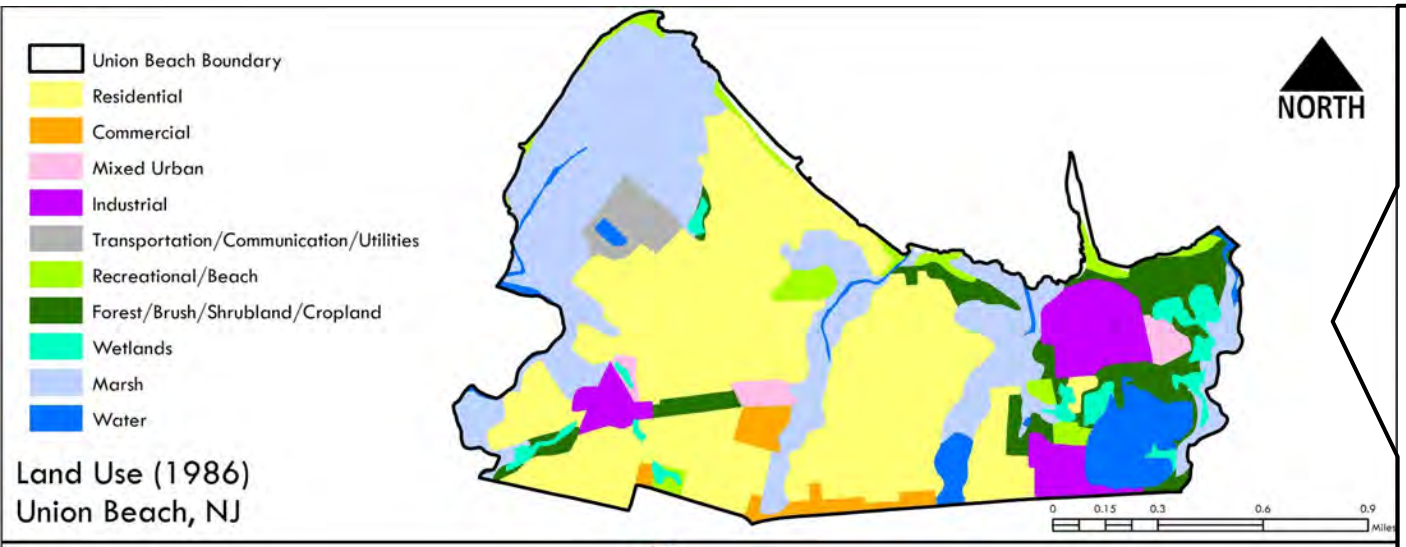


Primarily Residential

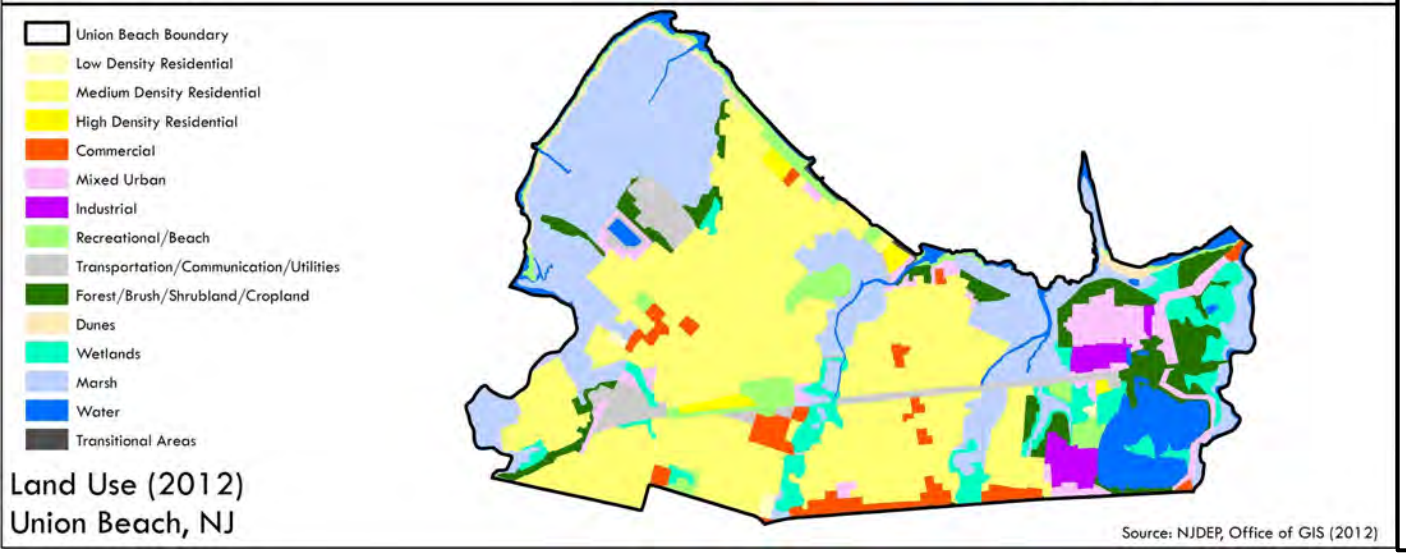
Commercial mostly along Rt. 36

Natural Features: Marshes, Wetlands, Open Space, Natco Lake

IFF Corporate Campus



Land Use (1986)
Union Beach, NJ



Land Use (2012)
Union Beach, NJ

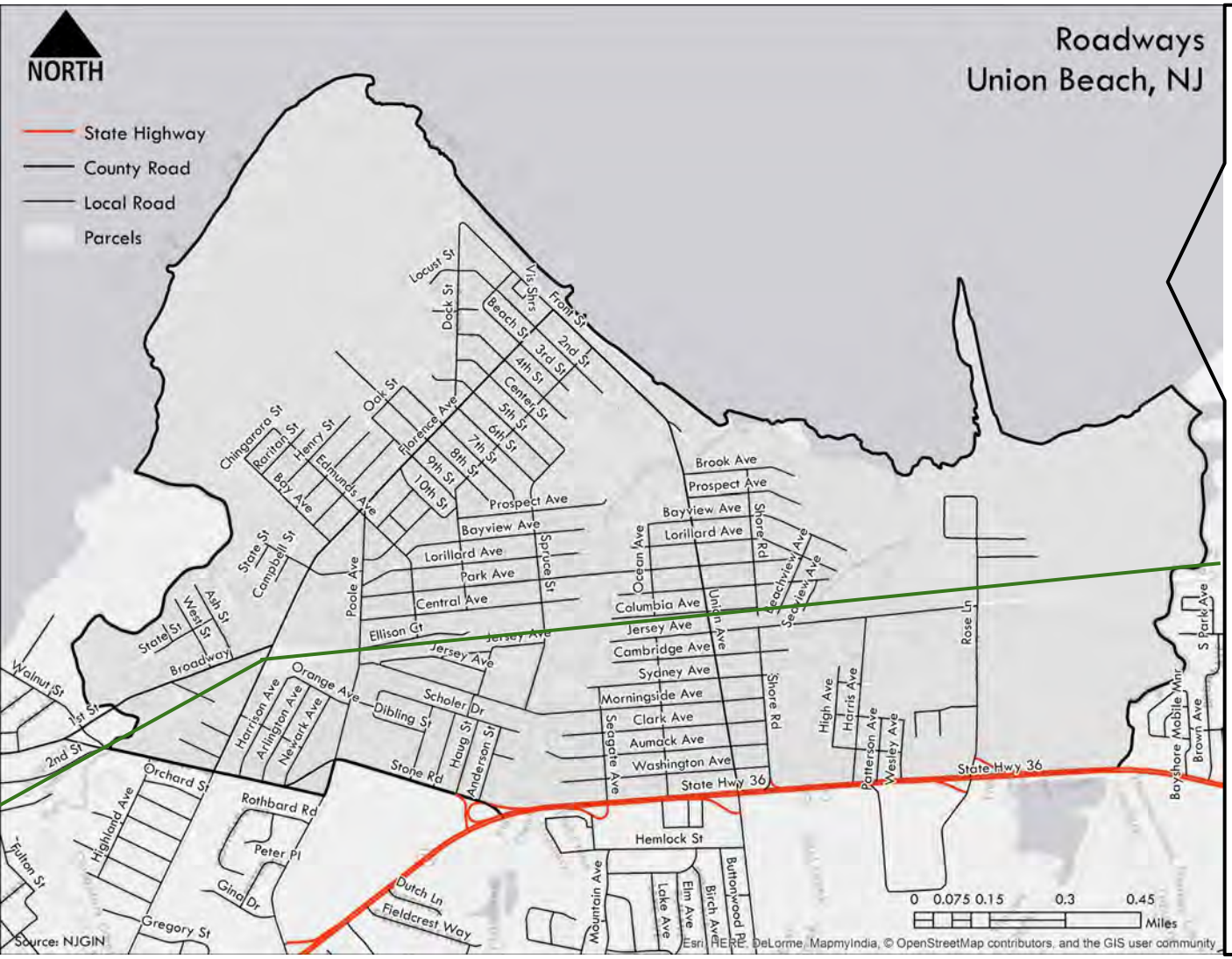
Source: NJDEP, Office of GIS (2012)

Increased Forest/Shrubland in Marsh area → Decreased at IFF Site

More Wetlands

Industrial areas changed to mixed use or utilities

Evidence of re-zoning, development on waterfront

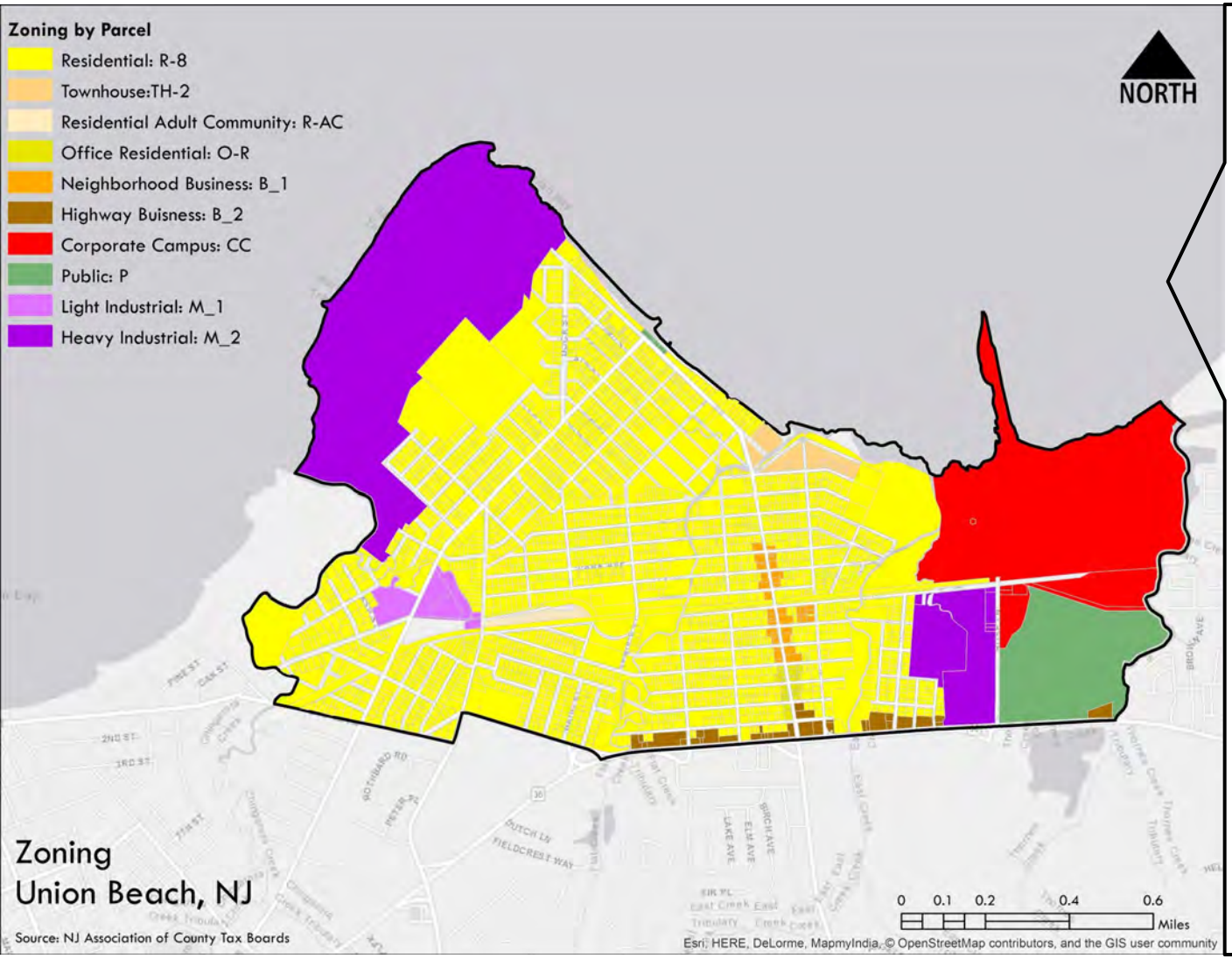


Mostly Local Roads

Connector County Roads

Route 36 Major Road

Henry Hudson Trail

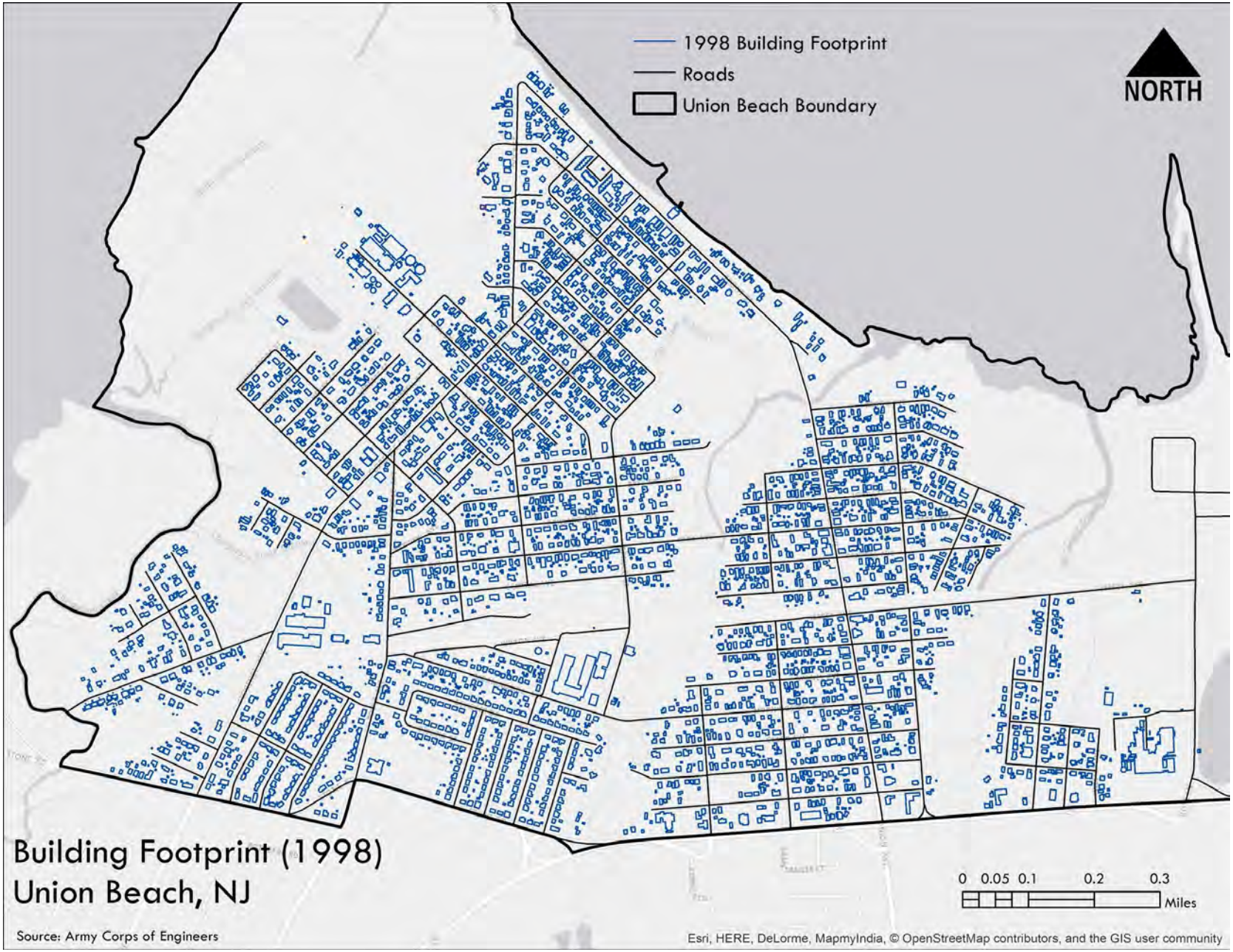


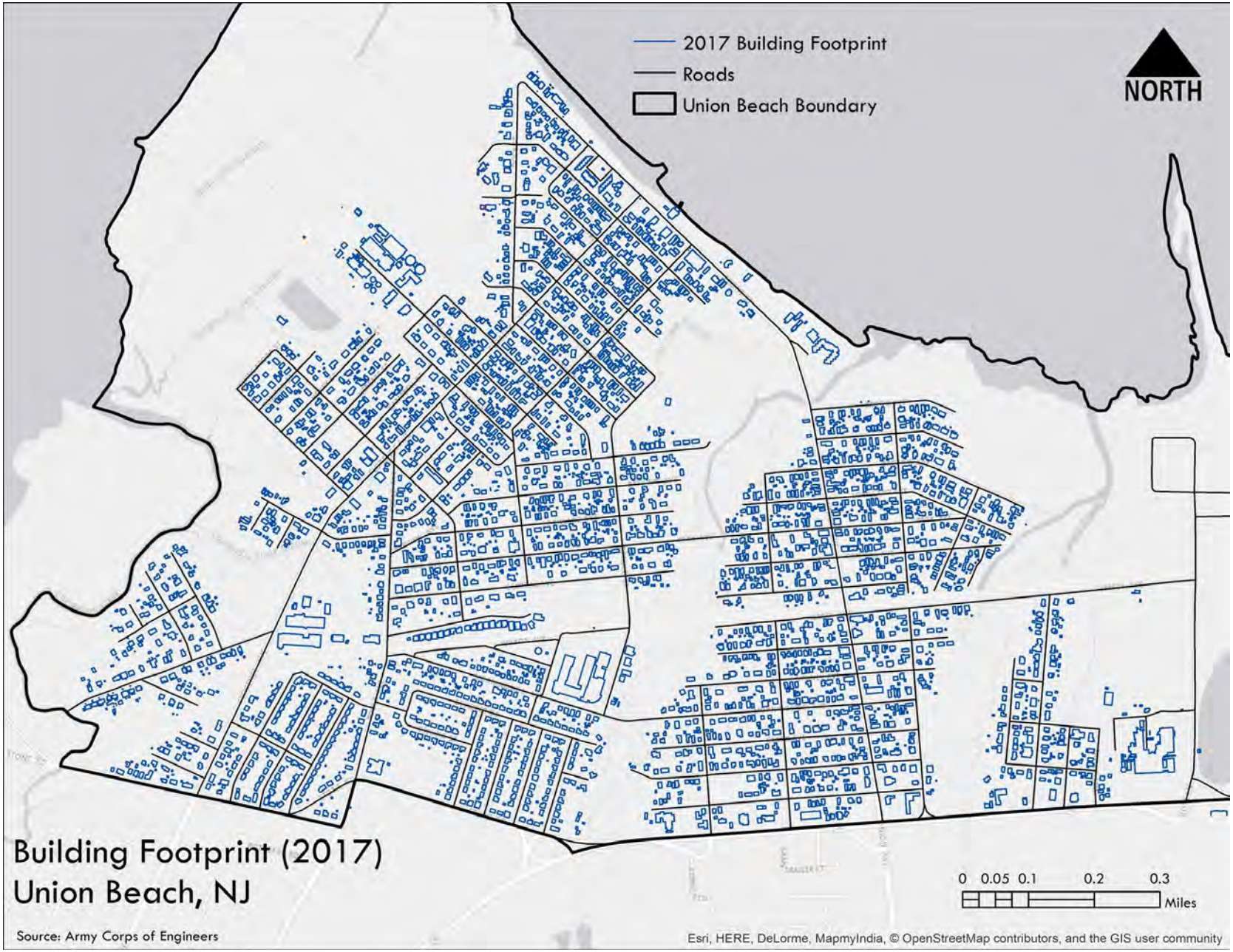
Created based on tax data

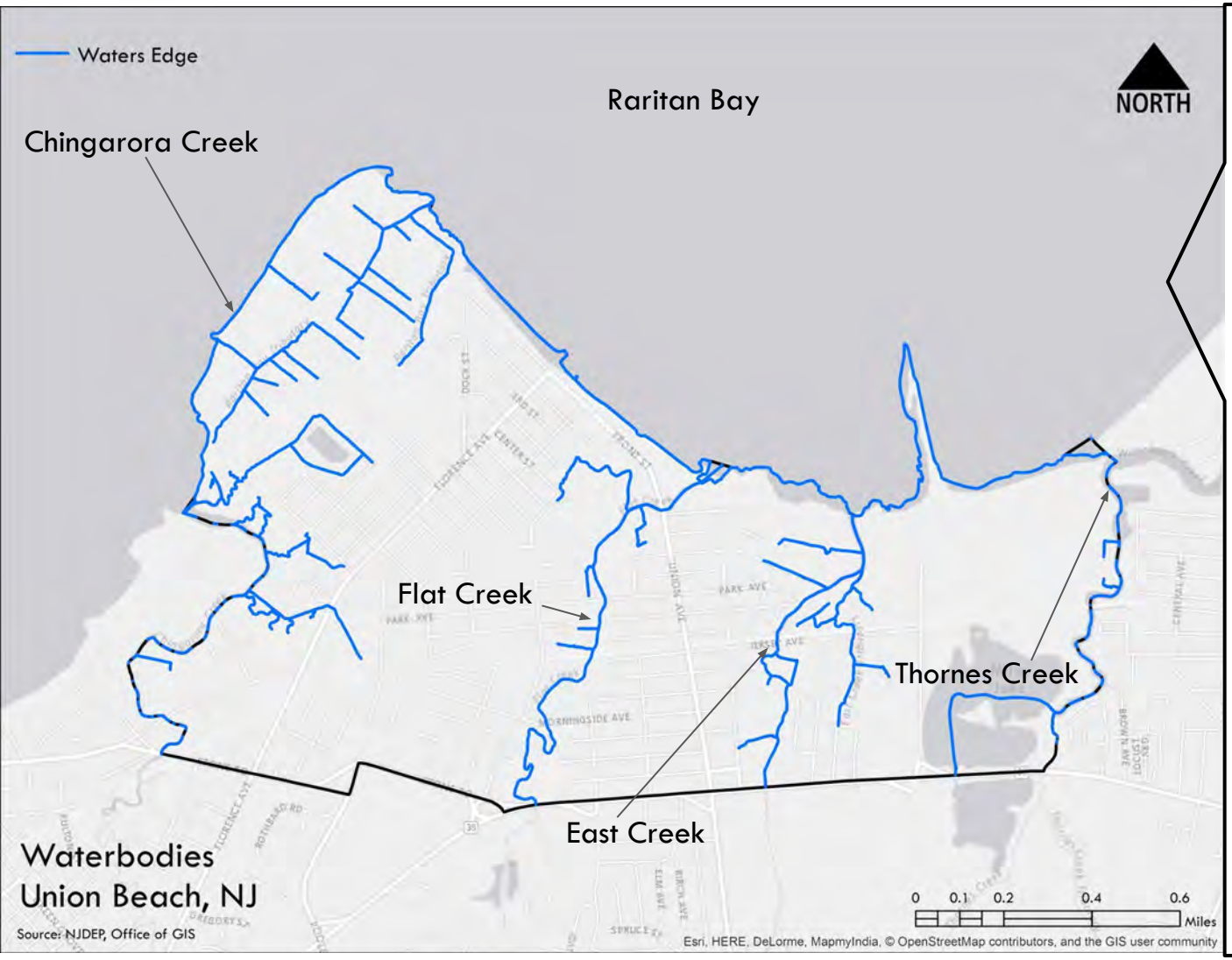
Commercial, DPW, & Brook Ave targeted for redevelopment

Large Corporate Campus

Mixed use throughout residential based on land use & aerial photography


1998 Building Footprint
Roads
Union Beach Boundary
NORTH
Building Footprint (1998)
Union Beach, NJ
0 0.05 0.1 0.2 0.3
Miles
Source: Army Corps of Engineers
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

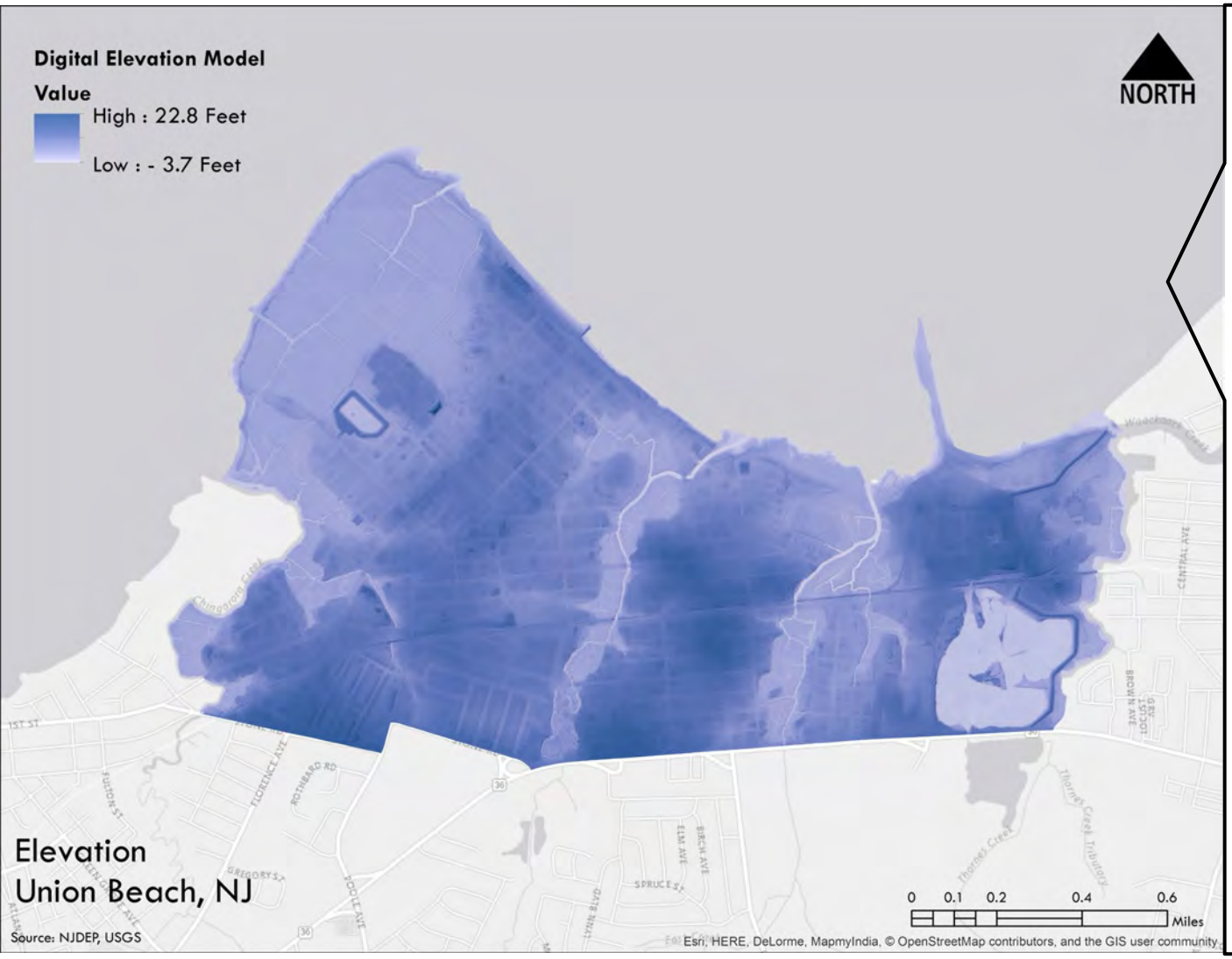

2017 Building Footprint
Roads
Union Beach Boundary
NORTH
Building Footprint (2017)
Union Beach, NJ
0 0.05 0.1 0.2 0.3
Miles
Source: Army Corps of Engineers
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community



Water bodies are prominent throughout the town

Either open or covered by vegetation

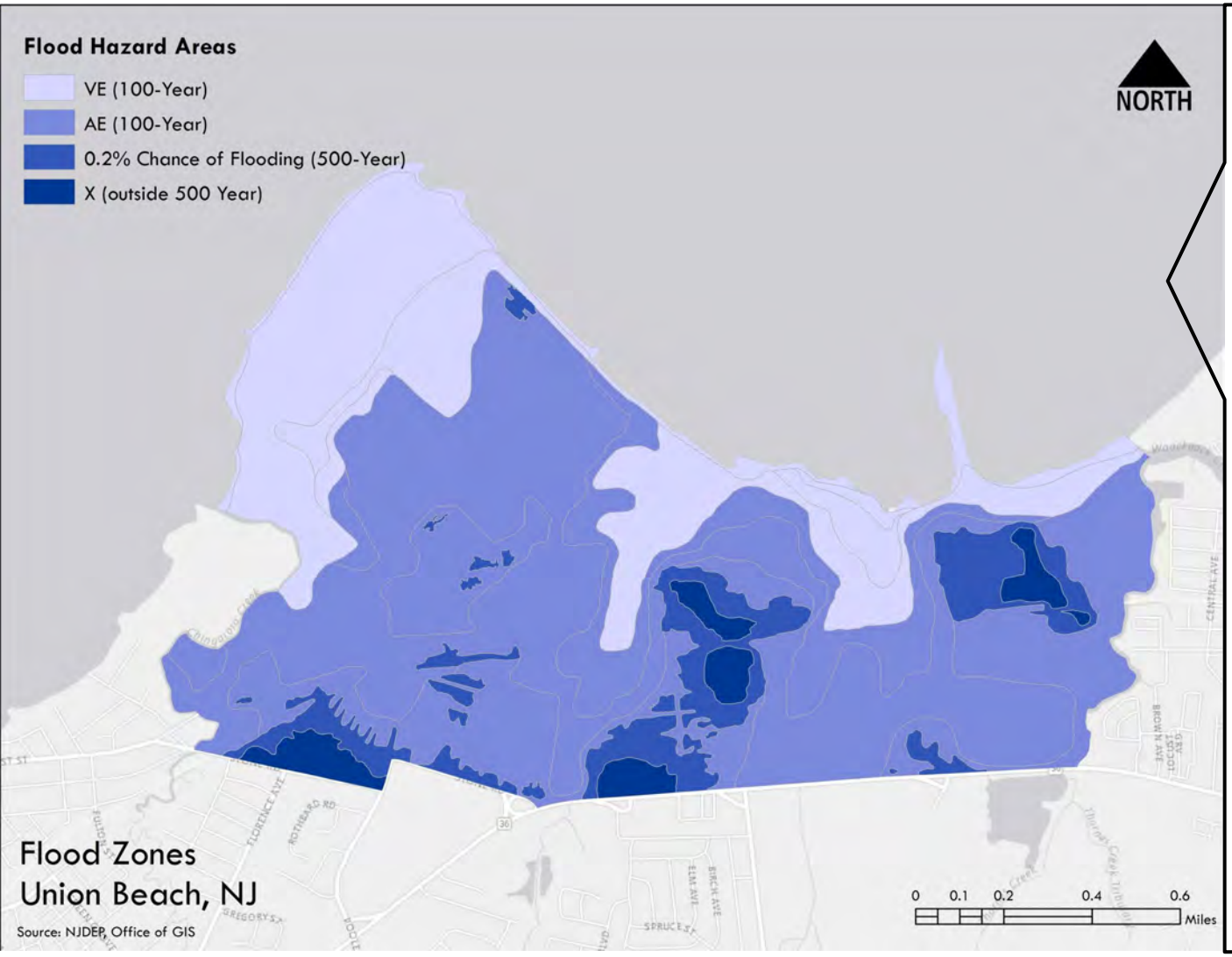
Tidally influenced



Lowest Point: 3.7 Feet below Sea Level

Highest point: 22.8 Feet above Sea Level

Reflected in Flood Zones/Sandy Flood levels



100 year - 1% Chance of this level of flooding
500 year - 0.2% Chance

VE: subject to high velocity water including waves

AE: from VE zone to extent of 100-year flood zone

0.2% Chance: 500-year flood zone

X: least vulnerable to flooding

Dictates what type of **flood insurance** is required

Overview

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Vulnerabilities

Economic

- Small businesses
- Property tax base
- Budget for Emergency Services

Social

- Part time residents
- Elderly residents
- Low income residents
- Minority residents

Environmental

- Homes
- Town buildings
- Coastal wetlands
- Transportation infrastructure

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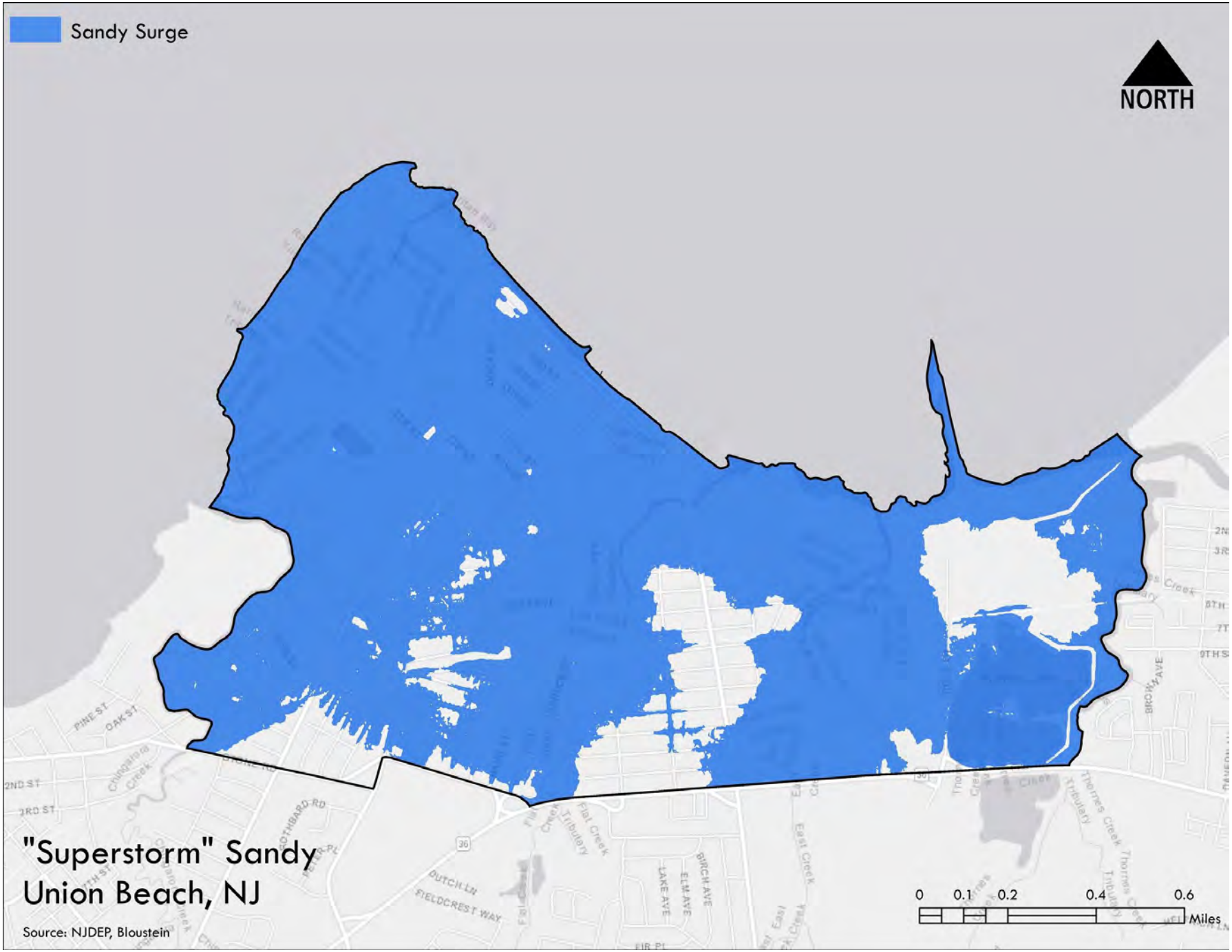

Sandy Surge
NORTH
"Superstorm" Sandy
Union Beach, NJ
Source: NJDEP, Bloustein
0 0.1 0.2 0.4 0.6
Miles

Effects of Sandy

90%
of town covered by floodwaters

2-10
Feet of water depth

60
Properties destroyed

629
Properties damaged

Over 2
Weeks without power

24,000
Tons of storm debris

Source: T&M Associates

Community Engagement

New Moon High Tide Flooding Observations

Community Engagement

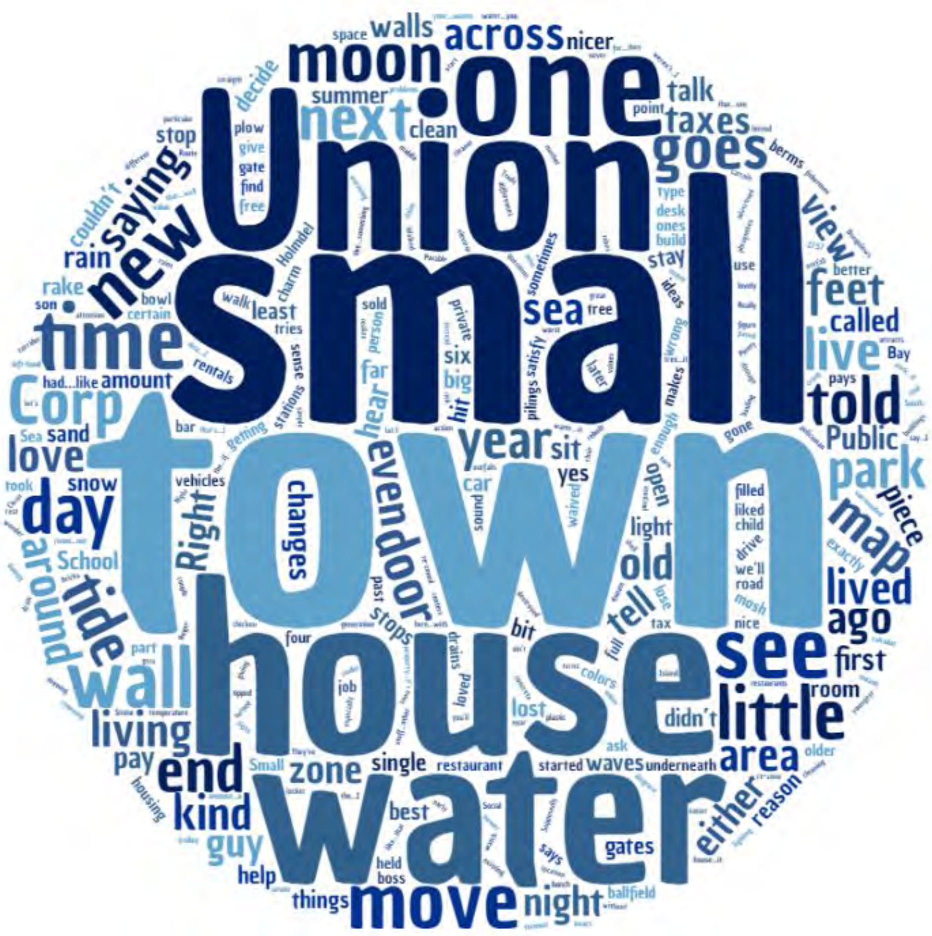
Union Beach Day

Clean Communities Day

Clean Communities Day

Focus Group


RUTGERS
FOCUS
GROUP


small
town
Union
one
house
water
move
moon
across
walls
next
goes
time
Corp
day
around
tide
wall
living
end
kind
zone
see
little
area
told
park
lived
ago
first
feet
live
view
taxes
talk
new
saying
sea
year
love
evendoor
changes
Right
map
old
night
gates
guy
best
single
waves
underneath
either
reason
Public
called

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Does the Price of a Home Decrease in a Flood Zone?

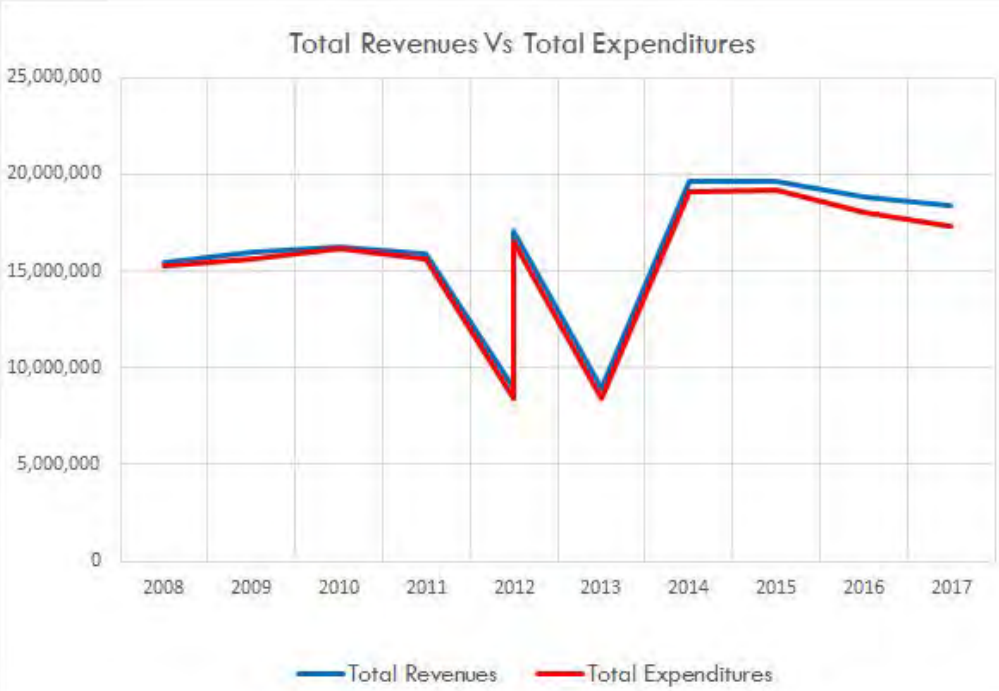
Before and after Hurricane Sandy:

1. **Homes in flood zones A and V sold for significantly more than in zone X.**
2. **A location out of the flood zone reliably delivers a premium sales price.**

Top Five Significant Variables:

Before Sandy	***After Sandy***
Condition	Style Description
Property Class	Condition
Foundation	Flood Zone (X)
Flood Zone (X)	Number of Bathrooms
Number of Bathrooms	Story Height

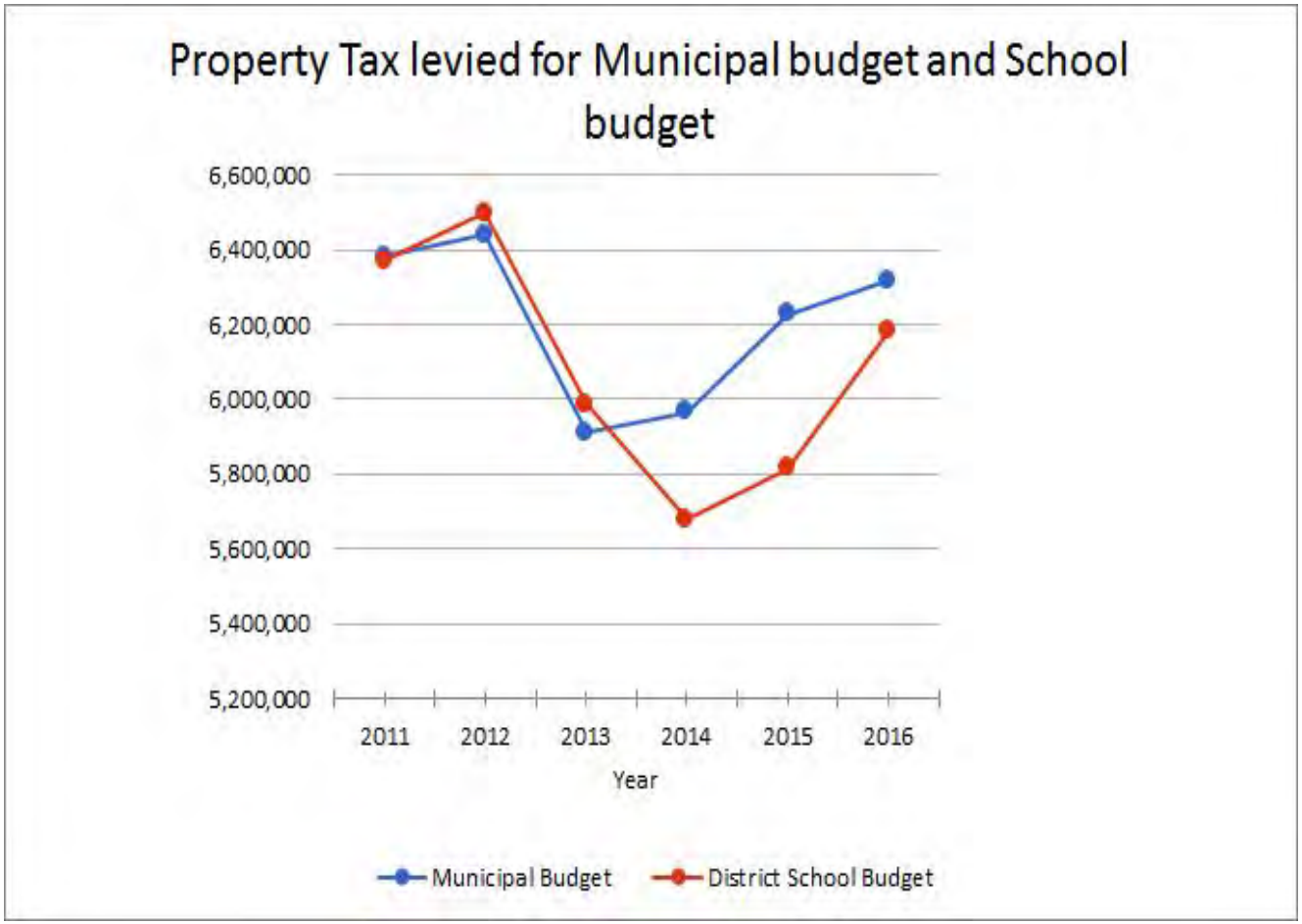
Impact on the Municipal and School Budget



- Revenues in this graph Include:
  - Surplus Balance
  - Current Taxes
  - Delinquent Taxes
  - Other Revenues
- Expenditures for this graph:
  - Municipal Appropriations
  - School Appropriation
  - County Taxes
  - Other Expenditures and Deductions from Income

The Total Revenues and Total Expenditures decreased by about $8,000,000 after Sandy.

Impact on Property Taxes



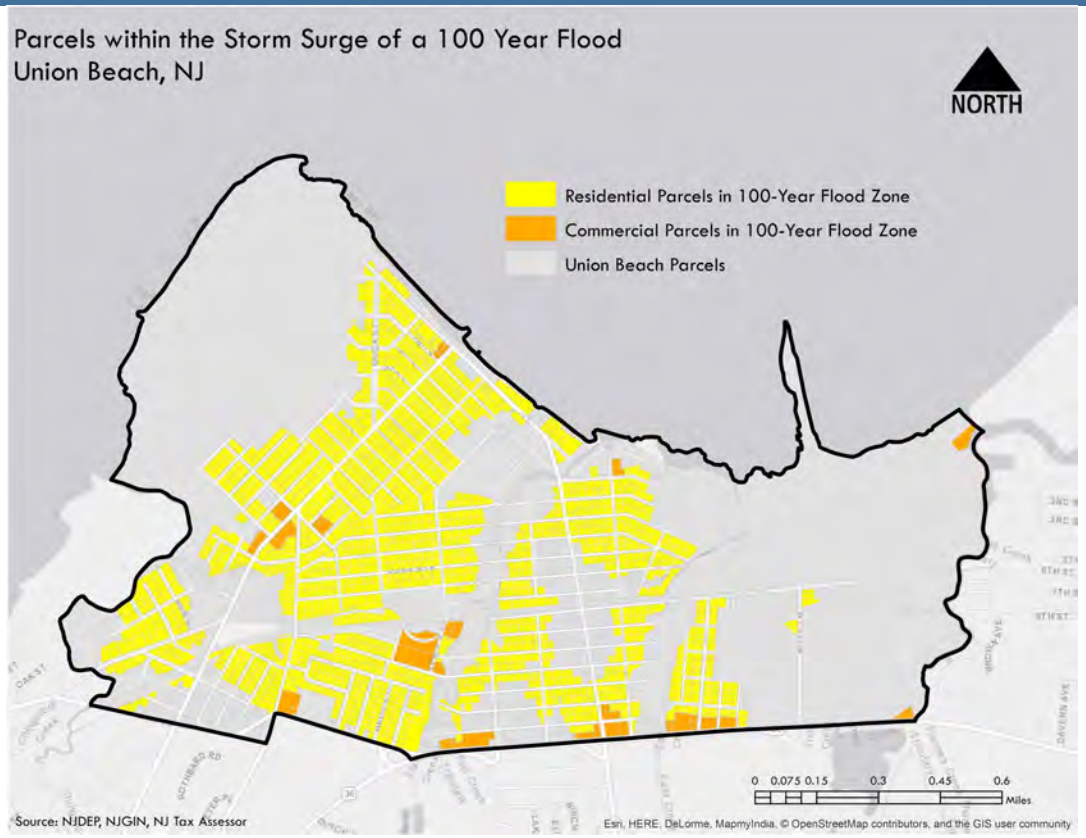
The Property Tax decreased by about
$ 600,000 after Sandy.

Post Sandy Scenarios

- Elevate homes. Assessed Value increases by 37%
- Houses are sold. Assessed Value decreases by 35%
- Minimal Repairs are performed. Assessed Value decreases by 35%
- Houses are Abandoned. Assessed Value decreases by 100%.

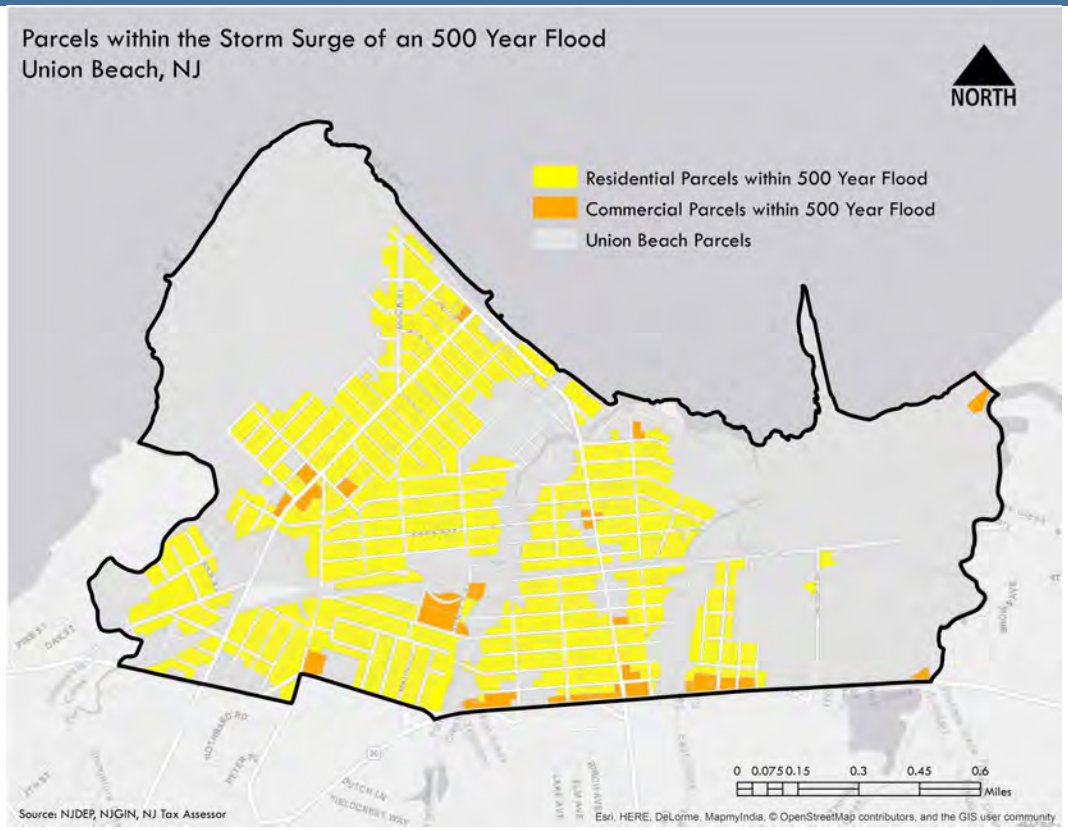
	Baseline (2016)	100 Year Flood	500 Year Flood	1,000 Year Flood
Inputs				
Number of homes that will be elevated	0%	1%	2%	3%
Number of homes sold at 60% of value (50% occupancy)	0%	1%	1%	2%
Number of homes that will not be rebuilt (abandoned)	0%	6%	10%	15%
Number of homes reassessed at 60% of value	0%	7%	10%	15%
Total Percent Affected	0%	15%	23%	35%

Fiscal Impact: 100 Year Flood



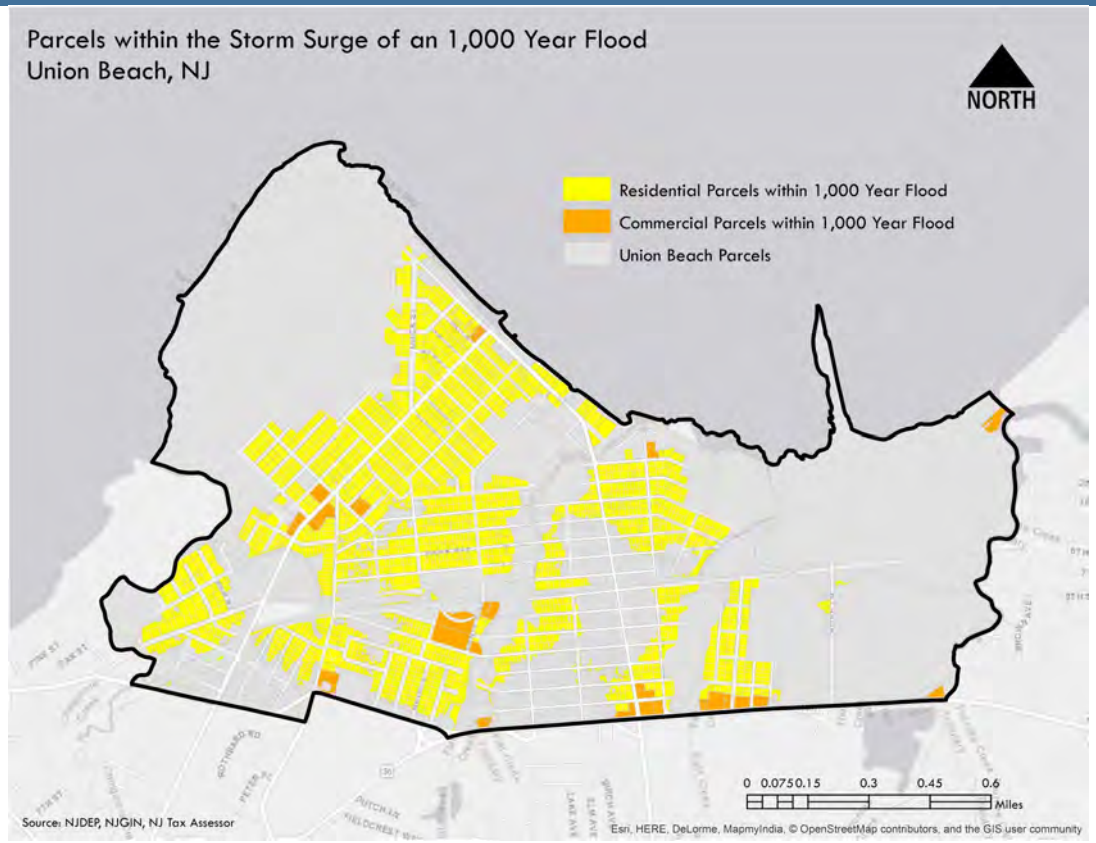
Inputs	Baseline (2016)	100 Year Flood
Net Fiscal Impact on Municipal Budget (Change)		
Change in Total Revenues	$0	-$574,095
Change in Expenditures	$0	-$1,942
Net Fiscal Impact on Municipal Budget	**$0**	**-$572,153**
Net Fiscal Impact on Municipal Budget (Absolute)		
New Total Revenues	$10,702,282	$10,128,187
New Total Expenditures	$9,507,957	$9,506,016
Net Fiscal Impact on Municipal Budget	**$1,194,324**	**$622,171**

Fiscal Impact: 500 Year Flood



Inputs	Baseline (2016)	500 Year Flood
Net Fiscal Impact on Municipal Budget (Change)		
Change in Total Revenues	$0	-$1,035,102
Change in Expenditures	$0	-$9,240
Net Fiscal Impact on Municipal Budget	**$0**	**-$1,025,863**
Net Fiscal Impact on Municipal Budget (Absolute)		
New Total Revenues	$10,702,282	$9,667,179
New Total Expenditures	$9,507,957	$9,498,718
Net Fiscal Impact on Municipal Budget	**$1,194,324**	**$168,461**

Fiscal Impact: 1,000 Year Flood



Inputs	Baseline (2016)	1,000 Year Flood
Net Fiscal Impact on Municipal Budget (Change)		
Change in Total Revenues	$0	-$1,292,233
Change in Expenditures	$0	$13,706
Net Fiscal Impact on Municipal Budget	**$0**	**-$1,305,939**
Net Fiscal Impact on Municipal Budget (Absolute)		
New Total Revenues	$10,702,282	$9,410,048
New Total Expenditures	$9,507,957	$9,521,663
Net Fiscal Impact on Municipal Budget	**$1,194,324**	**-$111,615**

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4 Major Township Projects:

Army Corps

Department of Public Works Site

Brook Avenue Townhomes

Commercial Corridor -4 Areas

Department of Public Works Redevelopment Site
Union Beach, NJ

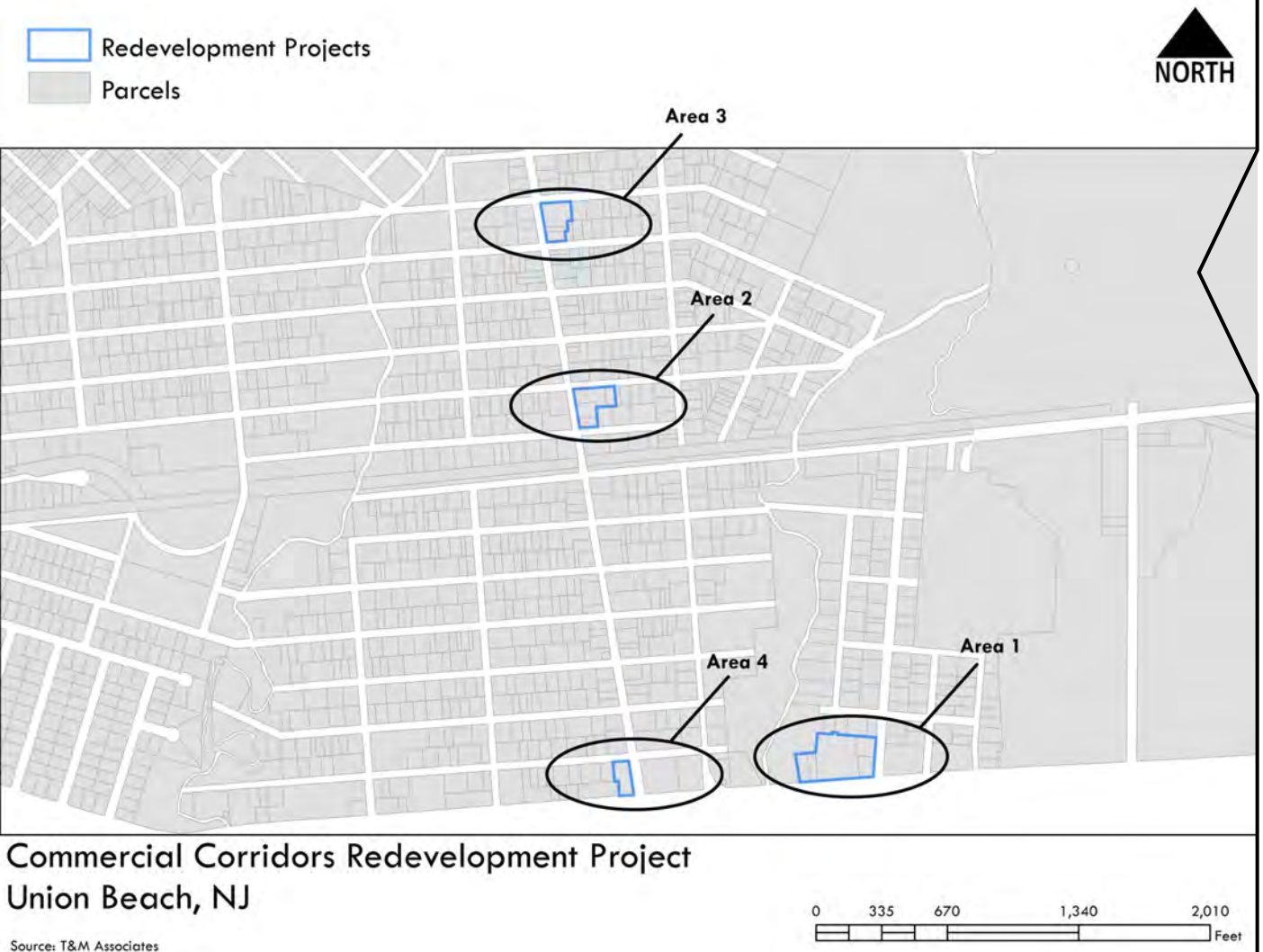
Source: T&M Associates

Block 103, Lots 3 and 3.01

Zoned M-1 Light Industrial

Site Plan: Age-restricted apartment dwelling units
-Restricted to residents 62 years of age or more
-Restricted to the second floor and above

Goal: promote senior housing outside of flood prone areas



Commercial Corridors Redevelopment Project
Union Beach, NJ

Source: T&M Associates

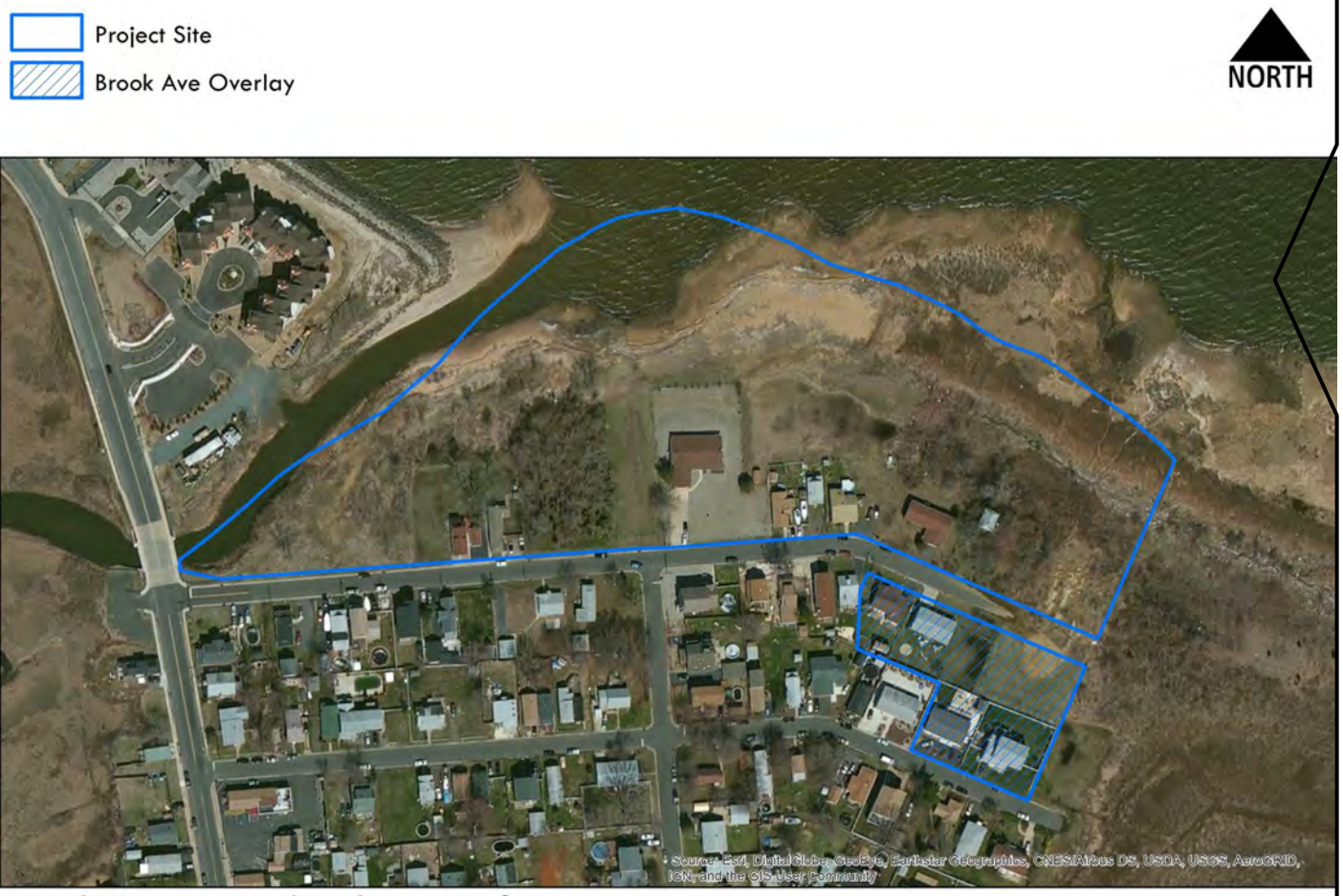
4 areas include 14 parcels, comprising 3.32 acres in total

Mixed use buildings, with residential above ground floor

Area 4: Public space with landscaping

Building standards based on

- storm resiliency
- neighborhood revitalization



Brook Avenue Redevelopment Site
Union Beach, NJ

Source: T&M Associates

30 parcels of varying size and 2 vacated street right of ways on the north side of Brook Avenue

Flat Creek to the west, Raritan Bay to the north, wetlands to the east, and Brook Avenue to the south

Site Plan: Mix of townhomes and multifamily dwelling units, passive recreation, parking below units

In VE & AE (1%) Flood Zones -Army Corps would change designation to AE, allowing for residential units

Brook Avenue Redevelopment

- 120 Units proposed
- Two building types proposed

Single Family Attached

Multi- Family Attached

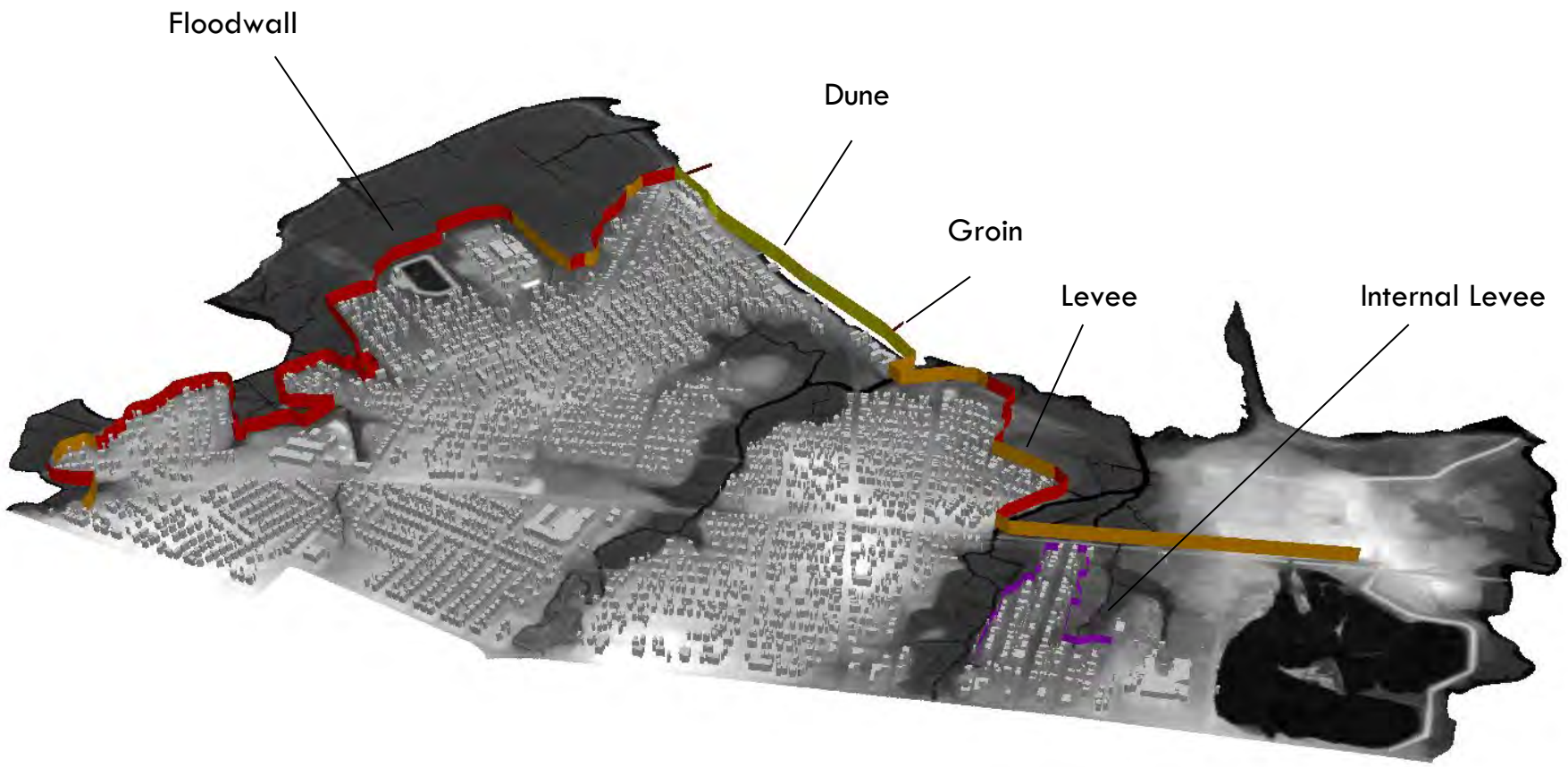
Fiscal Impact Analysis of Brook Ave

Building Type	Number of Units	Minimum Assessed Value
Single Family Attached (2 Bedroom)	19	$145,984
Single Family Attached (3 Bedroom)	29	$199,131
Multi Family Attached (1 Bedroom)	28	$101,783
Multi Family Attached (2 Bedroom)	44	$123,546

Increases the total assessed value of UB by **$16,449,976 (3%)**

Net Fiscal Impact on the Total property tax → **$ 195,718(3%)**

Army Corp of Engineers: Project Overview



SWOT Analysis of Army Corps Project

Strengths

- **Withstands storm surges**
- Changes the flood zone designation (V to A)
- Long term protection

Weaknesses

- **Low Cost-benefit ratio of 1.1**
- **Impeded view of ocean**
- Less Sustainable
- **Nuisance flooding**

Opportunities

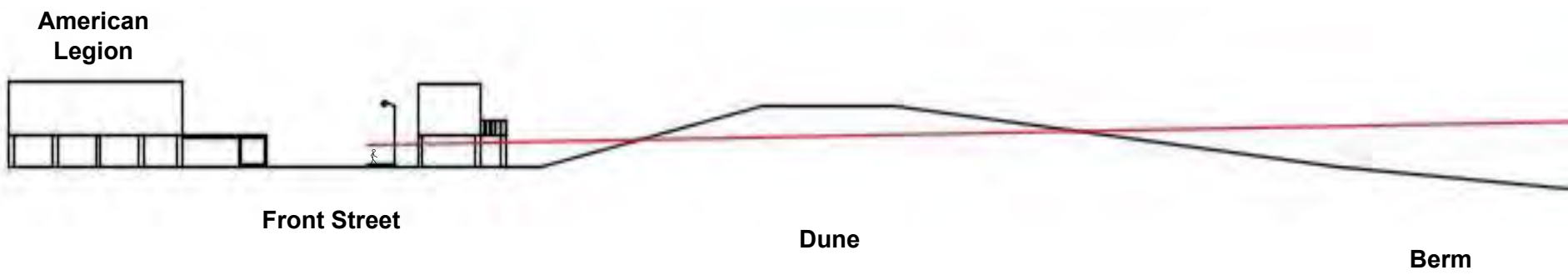
- **Green infrastructure**
- **Brook Avenue Redevelopment**
- Real Estate Investment
- **Lower Insurance Premiums**

Threats

- **High Maintenance**
- Disrupts natural shoreline processes
- Hinder waterfront economic development

Line-of-Sight Analysis

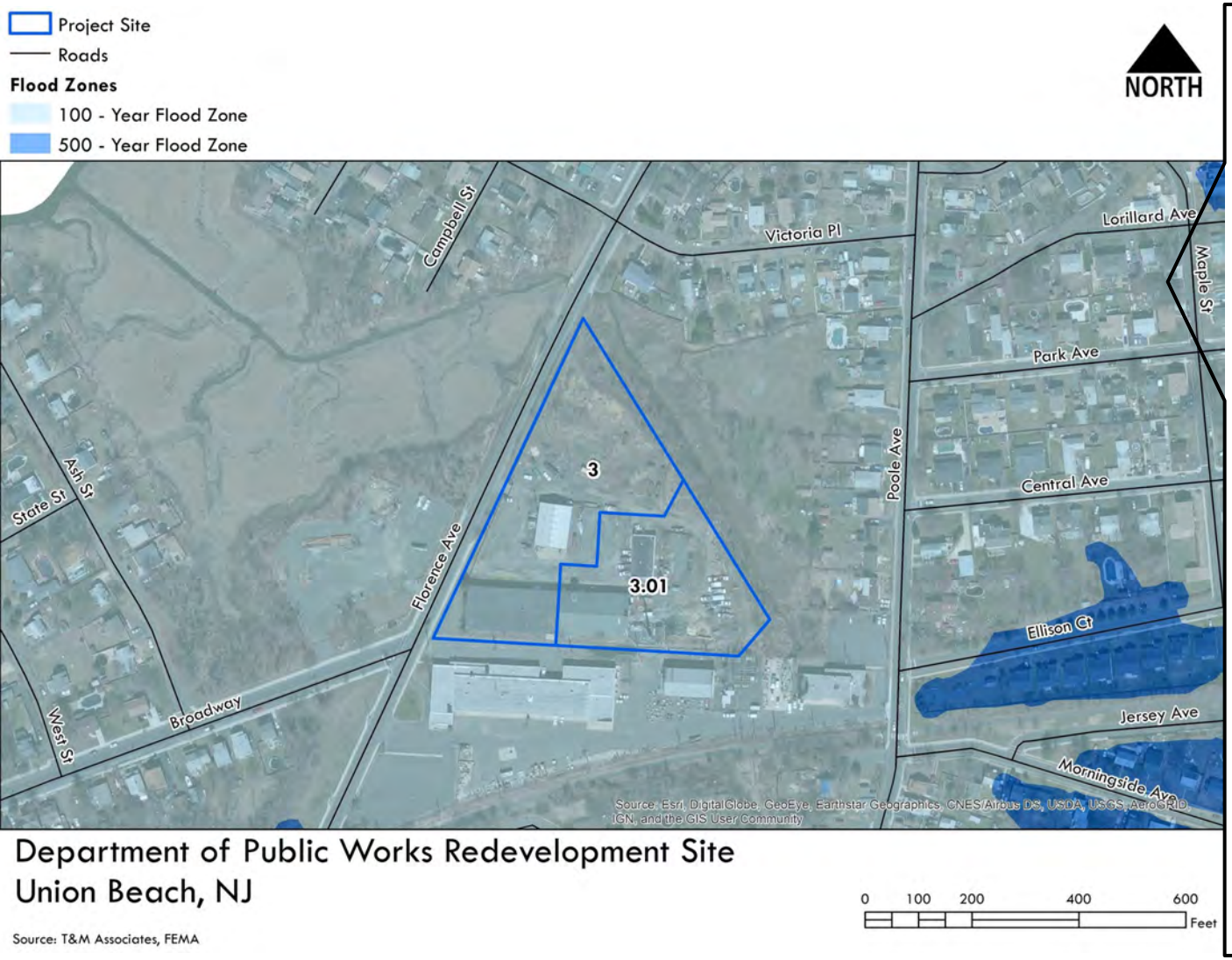
How Army Corps Project will impact views:



An observer standing on Front Street will not be able to view the top of One World Trade Center.

Overview

- Who we are
- Historical context
- Demographics
- Risks
- Existing Conditions
- Vulnerabilities
- Effects of Sandy
- Fiscal Analysis
- Proposed Projects
- **Conclusions**



Department of Public Works Redevelopment Site
Union Beach, NJ

Source: T&M Associates, FEMA

In Flood Zone
Raised
age-restricted=physical limitations

Options
Relocate to Route 36:
-Proximity to Fire Department
-Proximity to Route 36
→ Evacuation
-Further away from Coastline

Preventative measures:
-Raise utilities (backup generator)

Brook Avenue Redevelopment Site
Union Beach, NJ

Source: T&M Associates, FEMA

Utilize green infrastructure

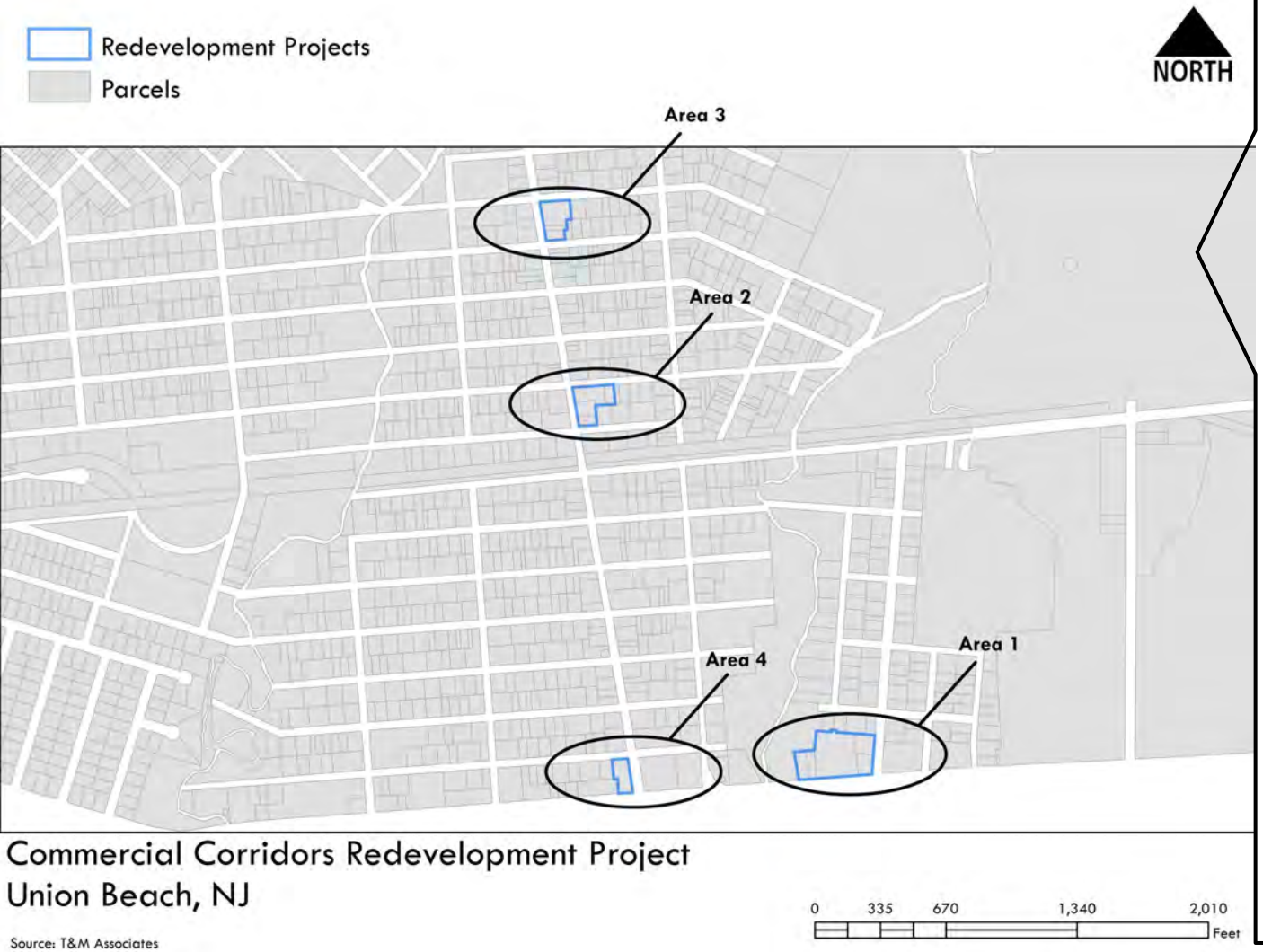
Connect to waterfront through commercial development on Front Street

Dedicate as open space

Green Acres set-aside

Develop more parks

Possible green infrastructure opportunities



Rather than parking lots:
Pocket parks

- Increase public land
- Absorb water

Establish bike paths to connect residents to commercial areas

Expand Commercial development to Front Street

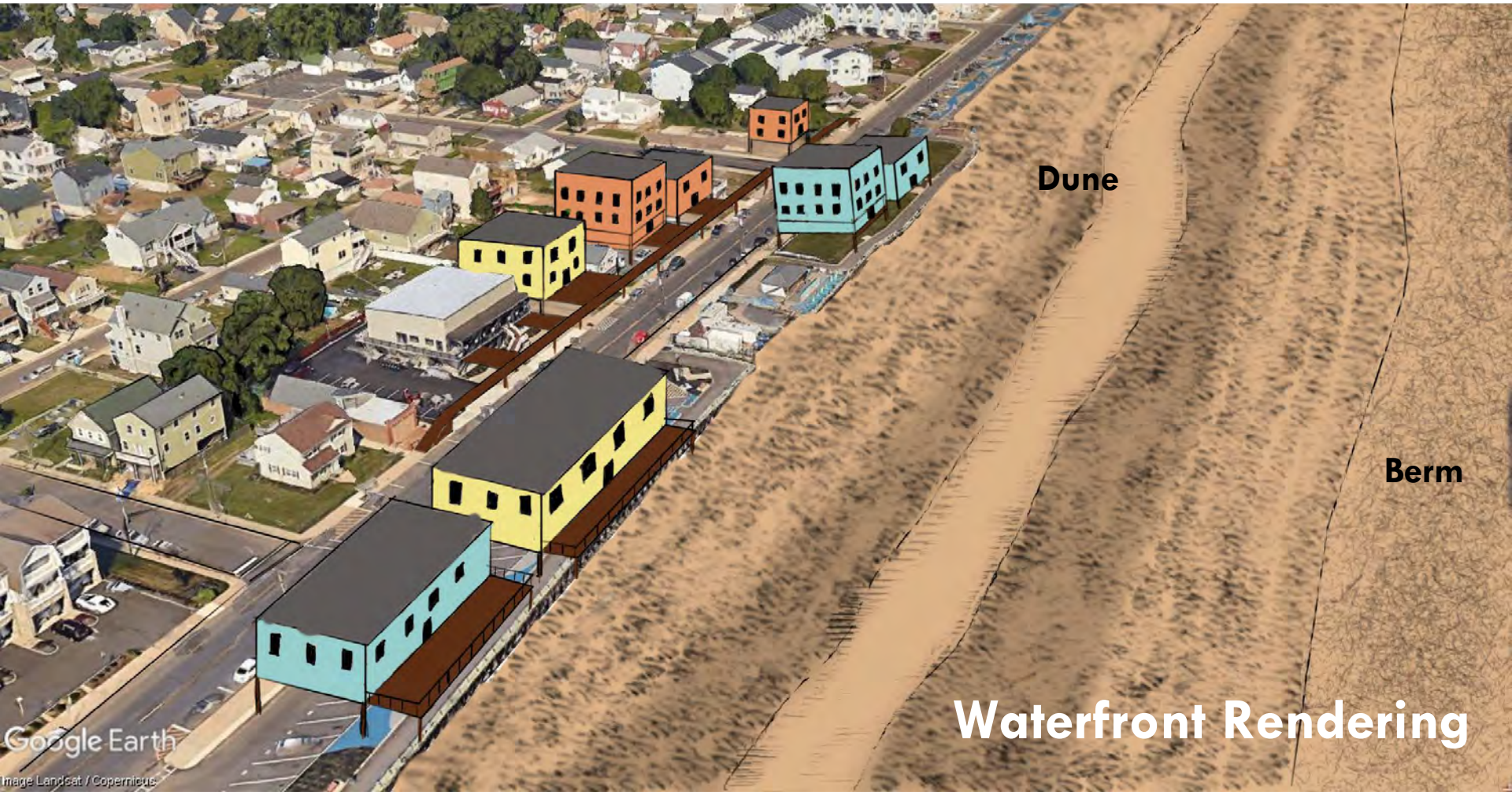
Area 1: Potential site for senior housing


BUSINESS CENTER, UNION BEACH, N.J.
PERRYLAND
RESTAURANT

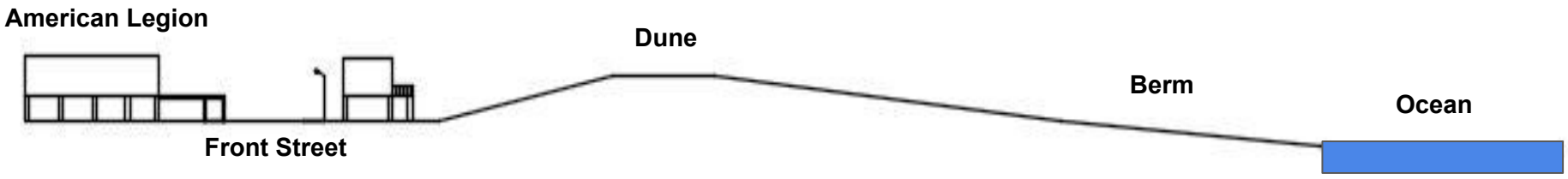
The American Legion (bottom left) is a popular location for social gatherings

Its raised design incorporates resiliency measures

Vacant lots above can be utilized in a similar manner



Waterfront Rendering



Green Infrastructure Considerations

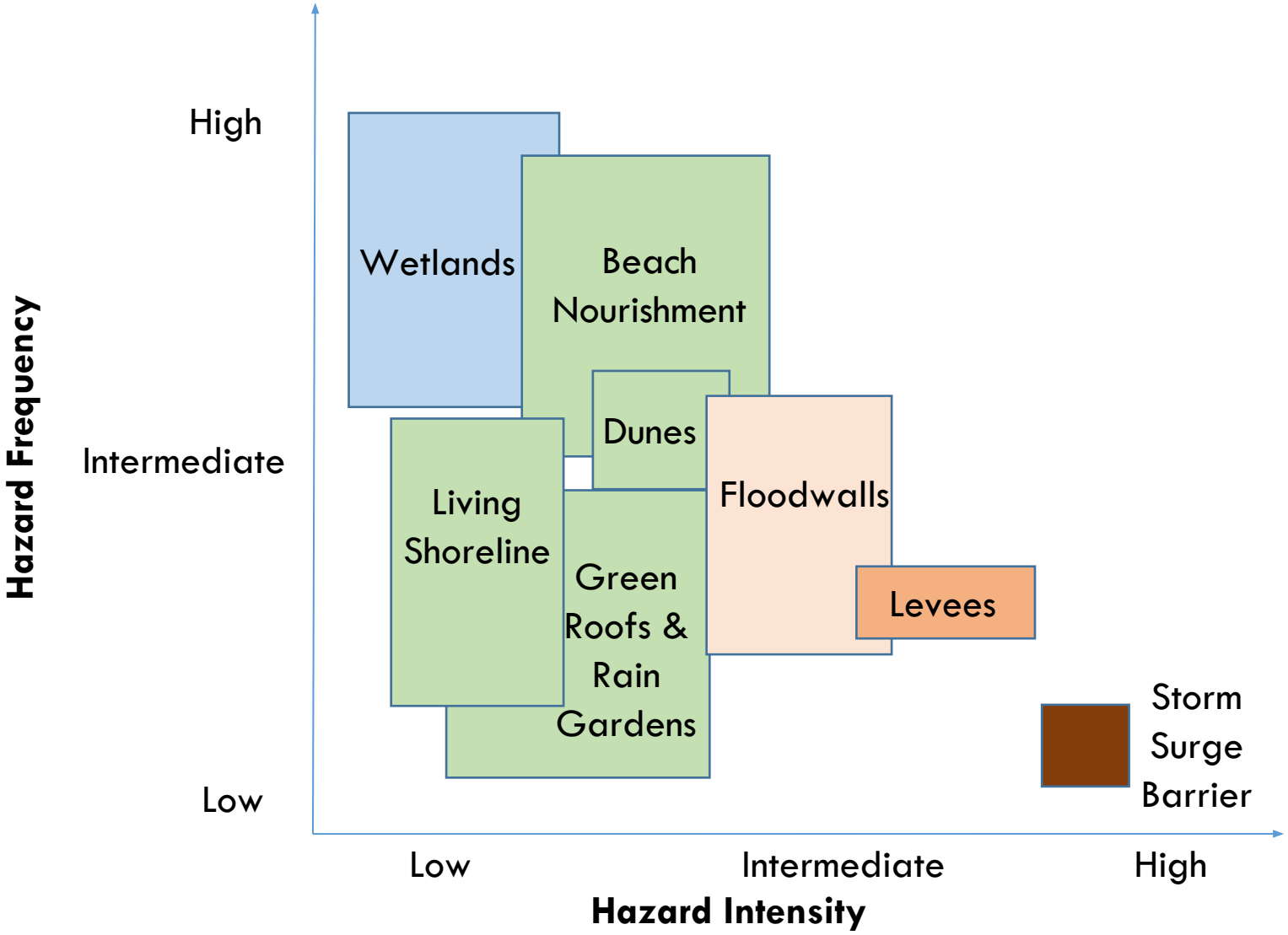
Coastal Protection

- Salt Marshes
- Dunes
- Living Shorelines

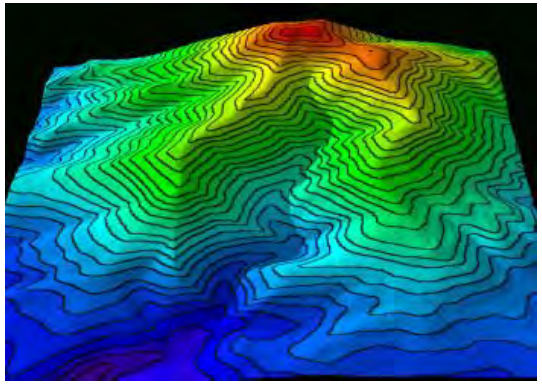
Stormwater Absorption

- Permeable Pavement
- Green Roofs
- Rain Gardens

Infrastructure Effectiveness



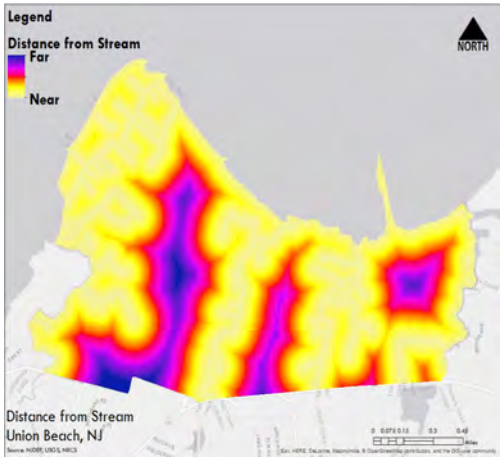
Green Infrastructure Proposal: Suitability Components



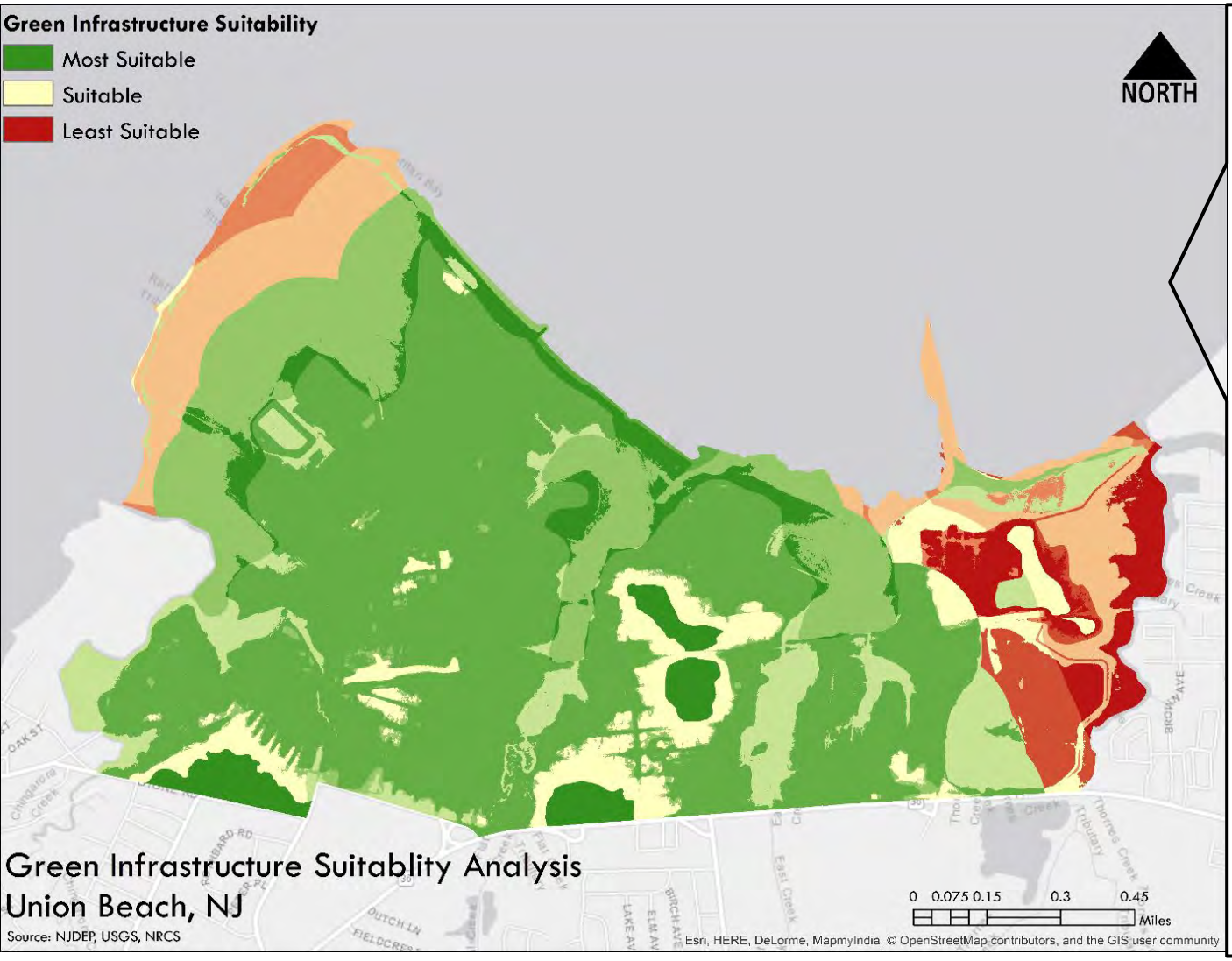
Elevation

Soils

Flood Hazard



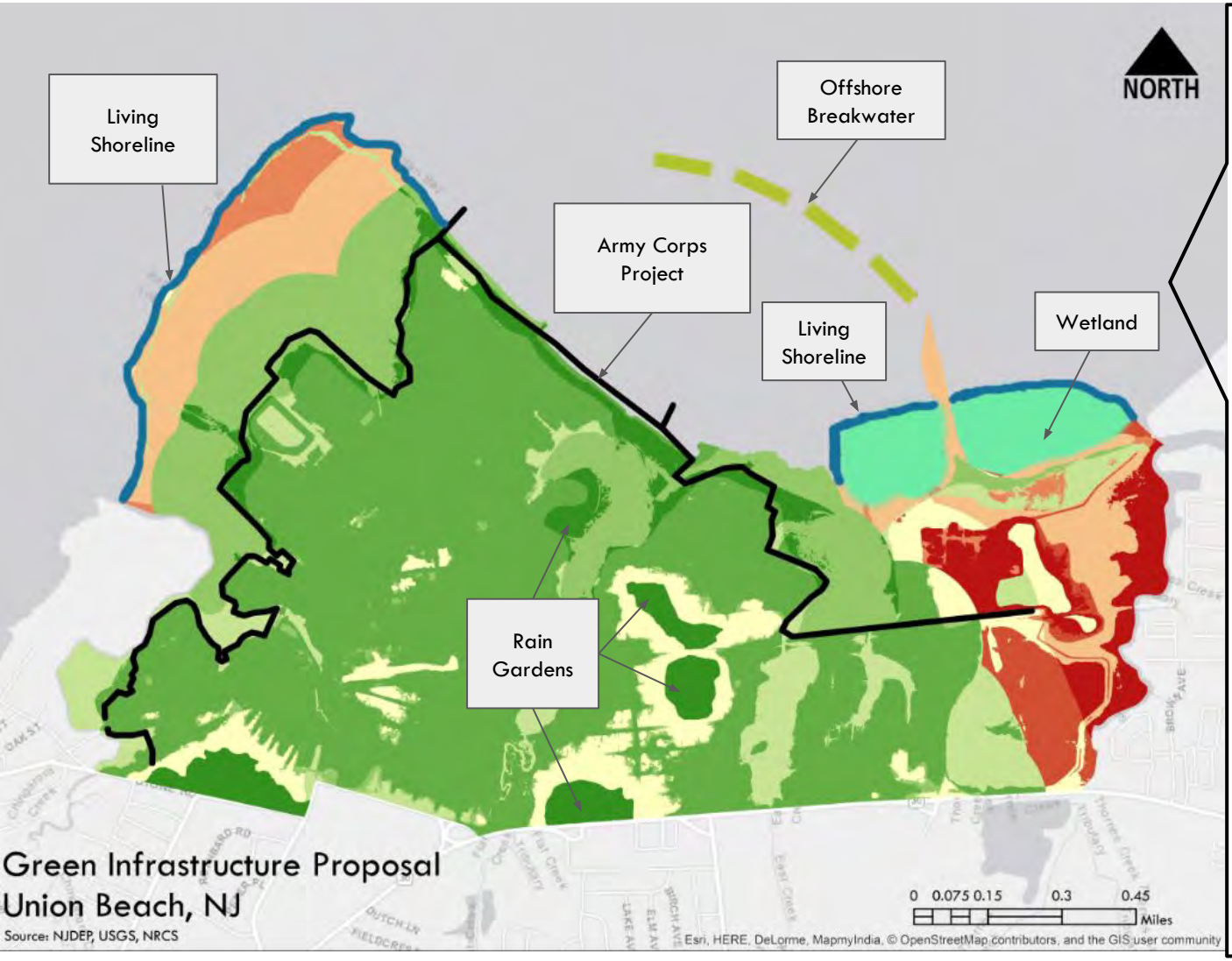
Distance from Stream



Suitable areas for stormwater management

Highly suitable areas:

- Brook Ave.
- Scholer Park
- Chingarora St.



Wetland Creation

Offshore Breakwater

Living Shoreline

Remove Interior Levees

- Elevate all homes in the South-East Region

Rain Gardens (where applicable)

Deployable Floodwalls

SWOT Analysis of Green Infrastructure Proposal

Strengths

- **Withstands storm surges**
- Changes the flood zone designation (V to A)
- Long term protection

- **Reduce stormwater runoff**
- **Sustainable**
- **Resilient to high frequency hazards**

Weaknesses

- **Low Cost-benefit ratio of 1.1**
- **Impeded view of ocean**
- Less Sustainable
- **Nuisance flooding**

Opportunities

- **Brook Avenue Redevelopment**
- Increased willingness to invest in real estate
- **Lower Insurance Premiums**

- **Habitat Creation**
- **Positive Cost-Benefit Impact**

Threats

- **High Maintenance**
- Disrupts natural shoreline processes
- Hinder waterfront economic development

Community Rating System (CRS)

Goal: Earn 454 more points

Goal level: 5
2,500 points

Current level: 6
2,046 points

CLASS	DISCOUNT	POINTS NEEDED
1	45%	4,500 +
2	40%	4,000 - 4,499
3	35%	3,500 - 3,999
4	30%	3,000 - 3,499
5	25%	2,500 - 2,999
6	20%	2,000 - 2,499
7	15%	1,500 - 1,999
8	10%	1,000 - 1,499
9	5%	500 - 999
10	0%	0 - 499

Community Rating System (CRS)

	Current Points	Action	Max Potential Points
Outreach Projects	60	Program for Public Information (PPI)	350
Levee	0	Emergency levee breach plan	235
Map Information Service	30	Add details like erosion risks	90
Natural Floodplain Functions Plan	0	Develop a green infrastructure plan	100
TOTAL	**90**		***775***

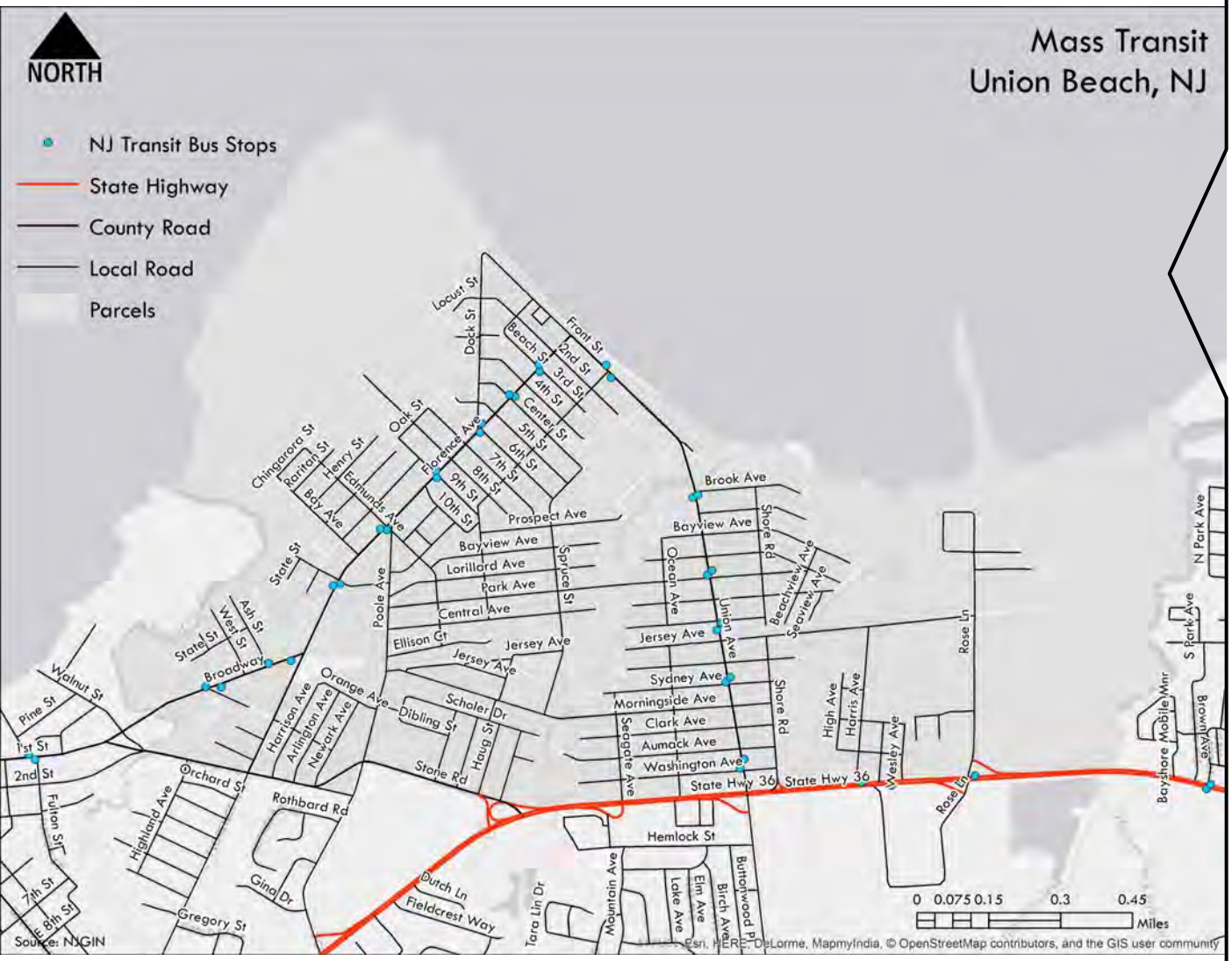
775 - 90 = **685 points available**
(454 Needed)

Thank you!

Union Beach Green Infrastructure Proposal: Cost

Components	First Construction (Labor, Materials)	Annual Average Maintenance (Operations & Maintenance)
Wetland	$565,000/acre	$26,900/acre
Deployable Floodwall	$5,500/ft	$250/ft
Offshore Breakwaters	Varies	Varies
Living Shoreline	$1400/ft	$70/ft
Elevated Homes	Varies	Varies

Cost estimates from the North Atlantic Coast Comprehensive Study

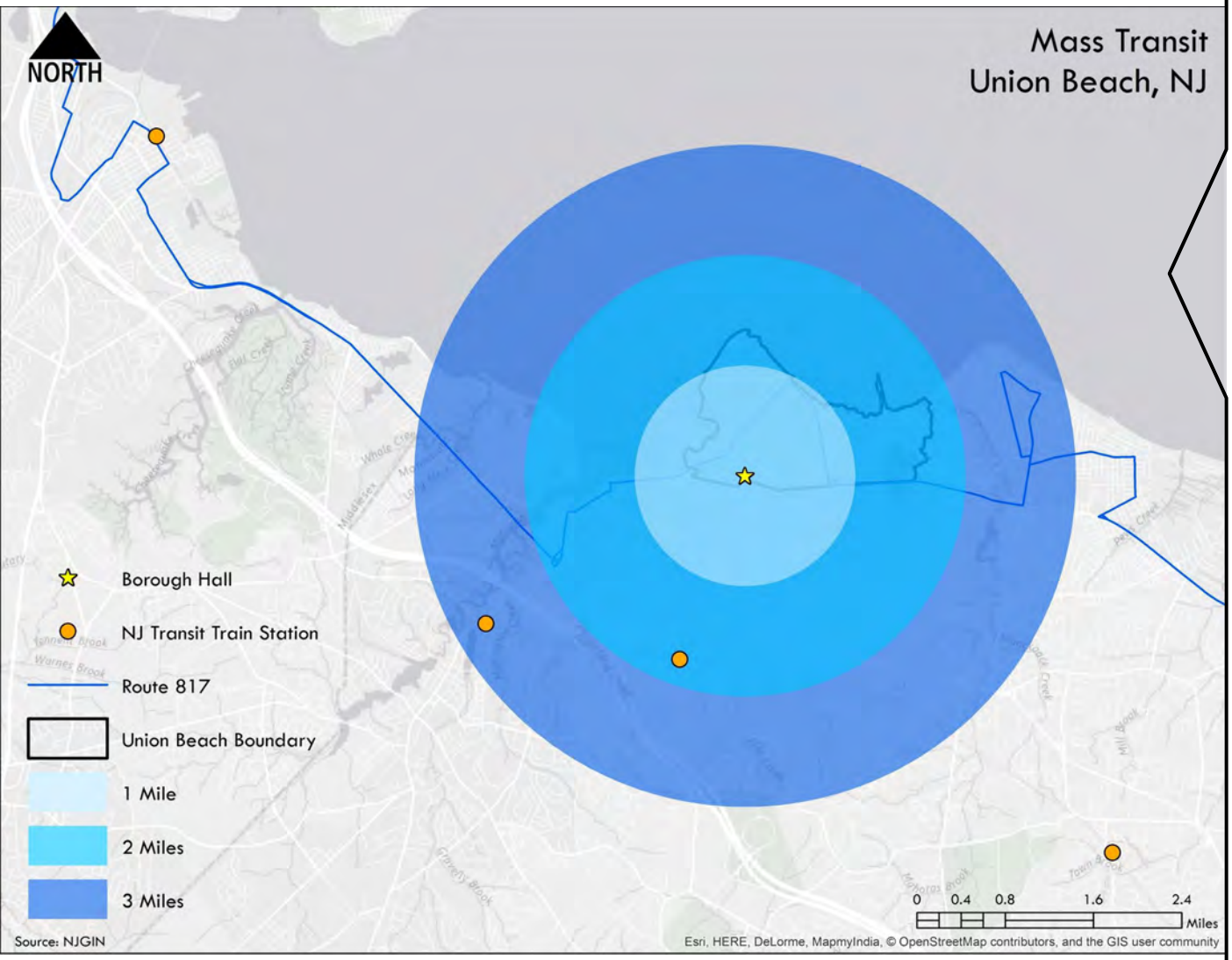


Stops along Florence & Union Ave

Route goes along coastline

Stop at South Amboy Train Station

Transfer at Perth Amboy for route to NYC



Within 2 Miles: Hazlet Station

Within 3 Miles: Aberdeen/Matawan Station

Approx. 5 Miles to Middletown Station

Bus Route to South Amboy