Evolving Resiliency:
Managing Climate Risks in the Northeast

Risk, Vulnerability, and Opportunity in the Sandy Region
HUD Rebuild By Design Competition

Environmental and Energy Study Institute (EESI) Briefing
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Washington, DC

Scott G. Davis
Senior Advisor
U.S. Department of Housing and Urban Development

REBUILD
BY
DESIGN

An Initiative of the President's Hurricane Sandy Rebuilding Task Force

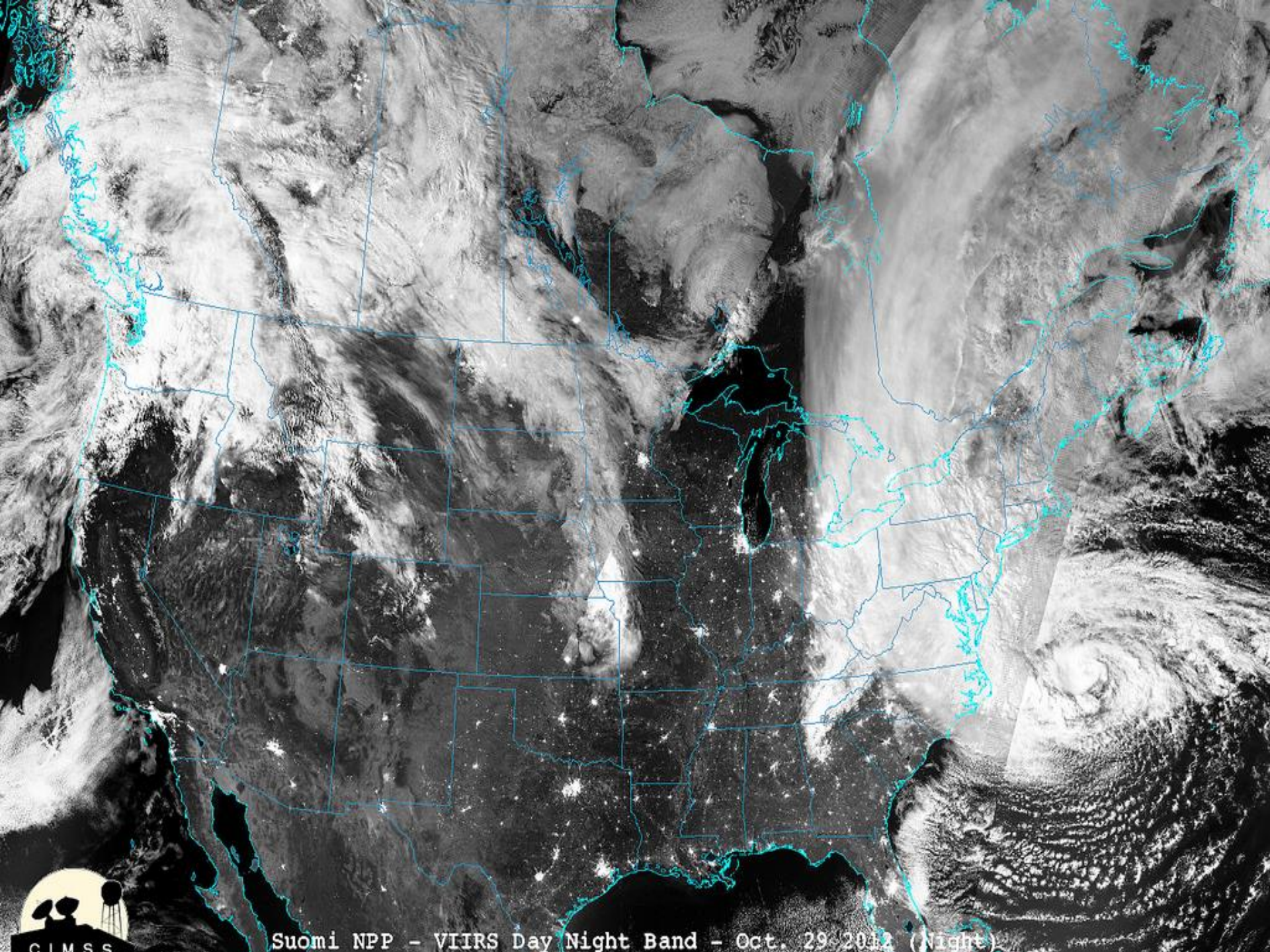
In Collaboration With NYU's Institute for Public Knowledge
Municipal Art Society Regional Plan Association
Van Alen Institute

Lead Supporter
The Rockefeller Foundation

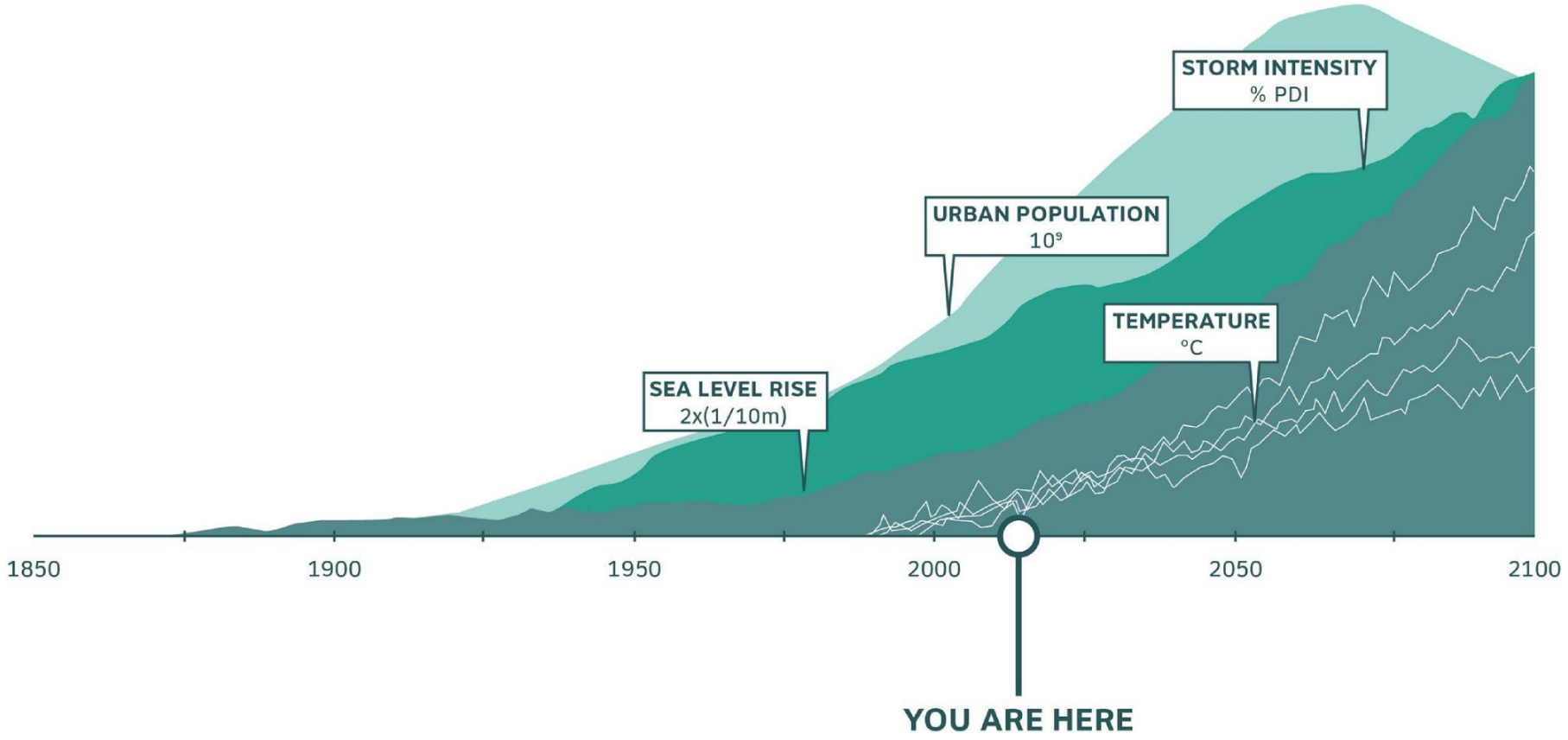
With Support From
Deutsche Bank Americas Foundation
Hearst Foundation
Surdna Foundation
The JPB Foundation
The New Jersey Recovery Fund

What is Rebuild by Design?

•Innovating Together to Create a Resilient Region

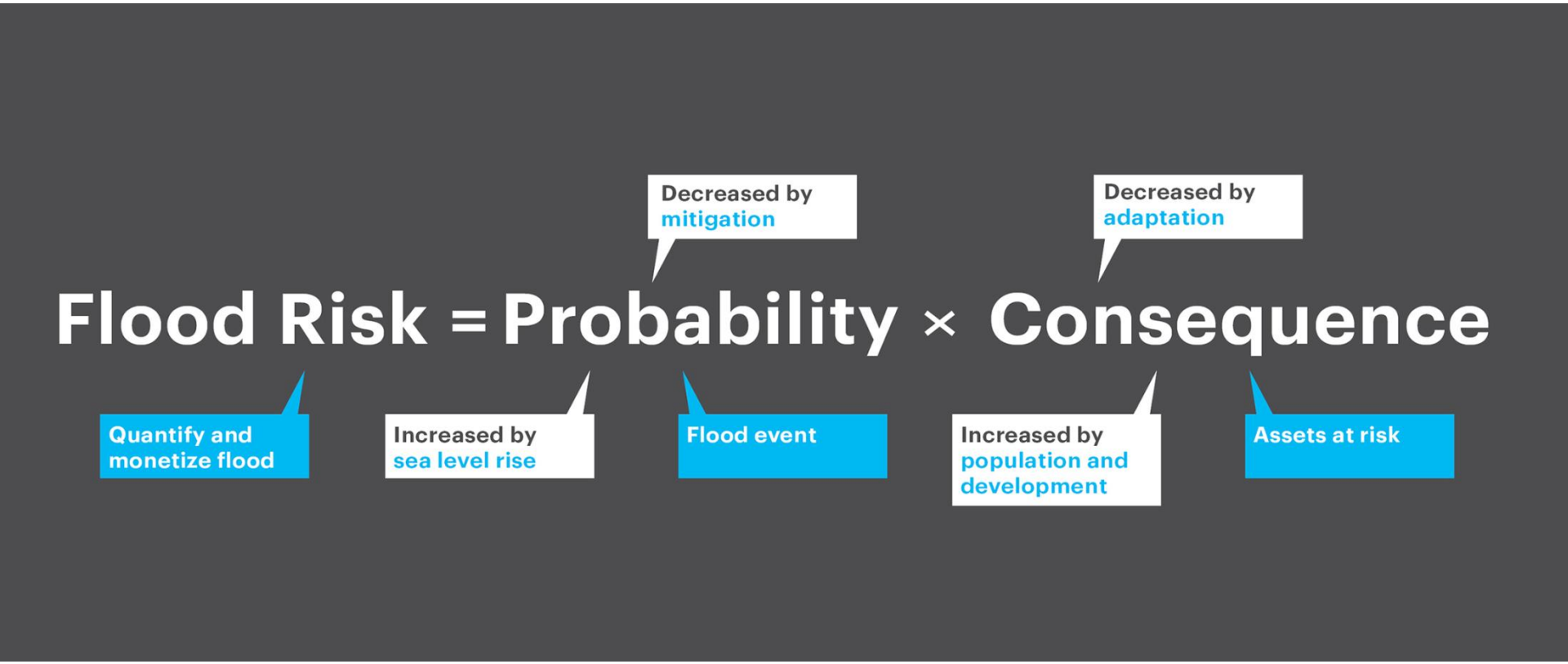

CIMSS
Suomi NPP - VIIRS Day Night Band - Oct. 29 2012 (Night)

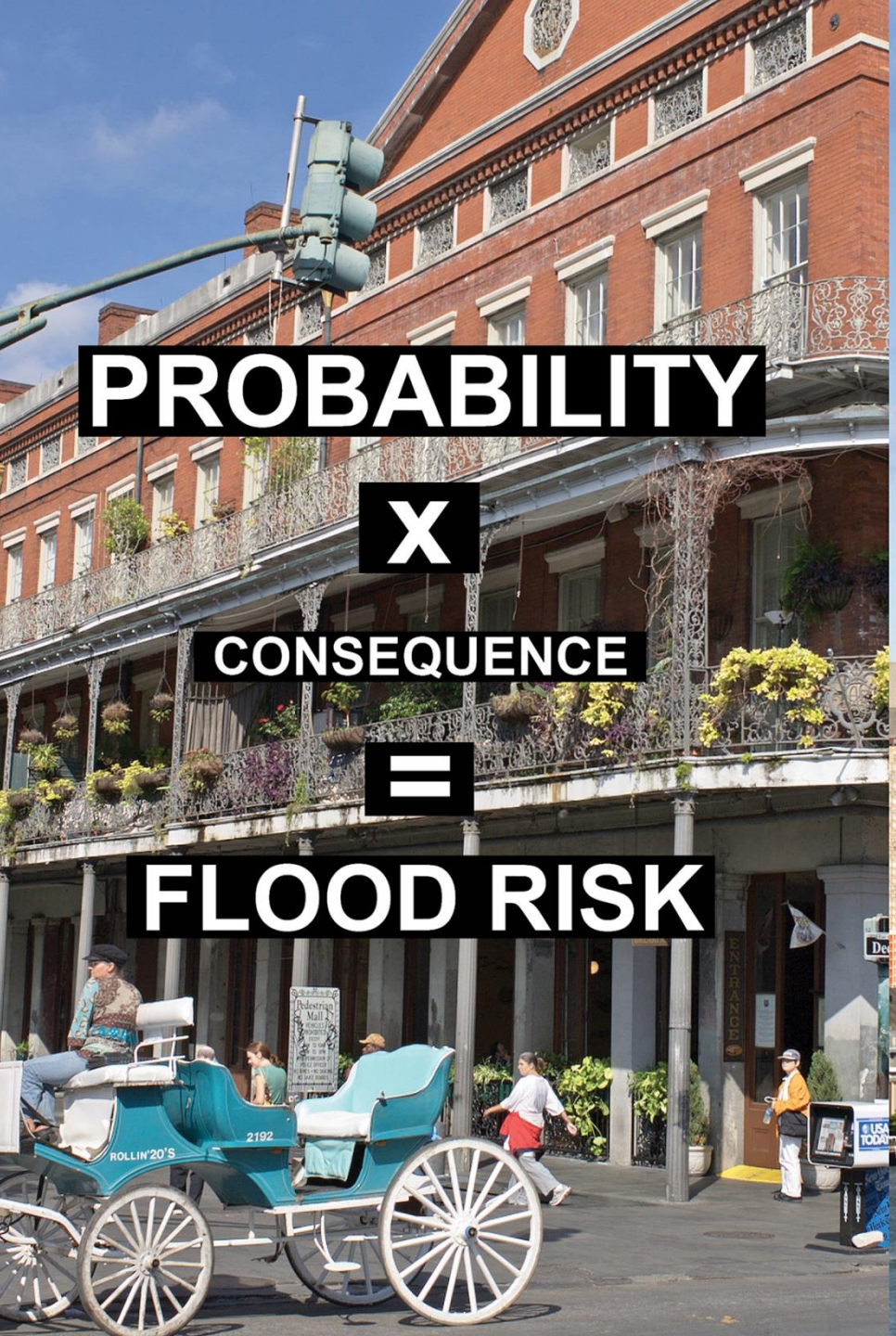
FUTURE

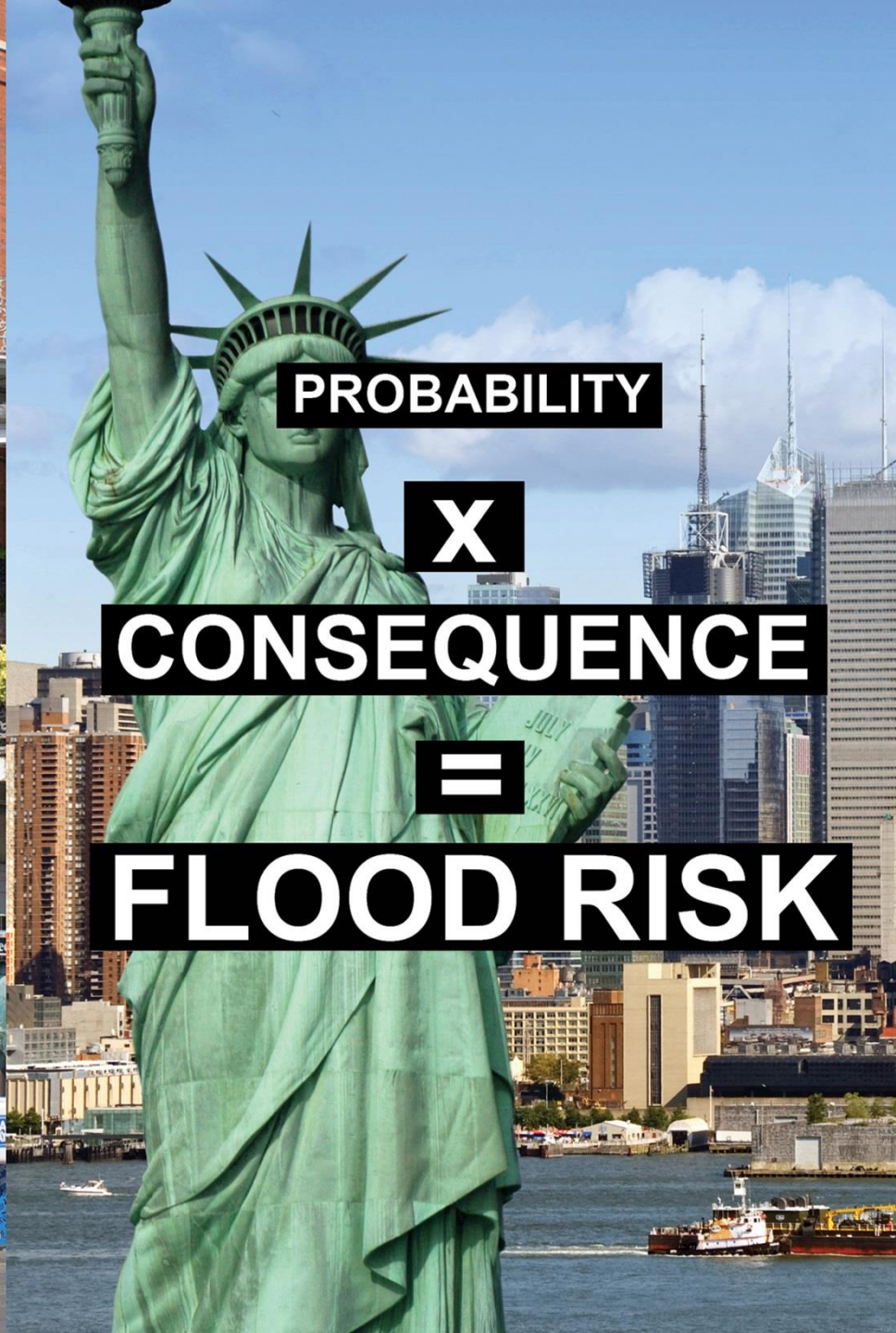


•IMAGE: SCAPE/LANDSCAPE ARCHITECTURE

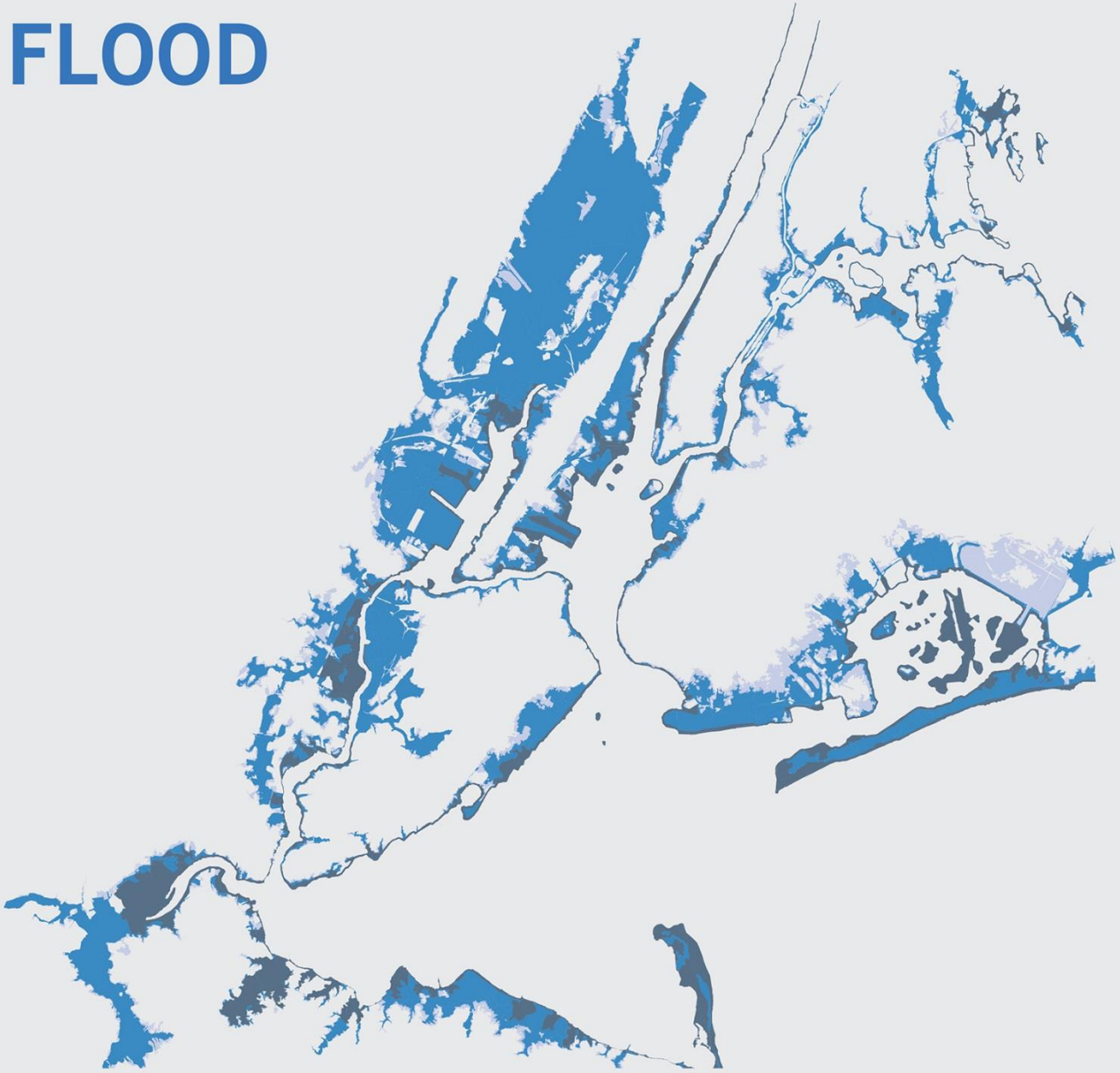
Risk


Decreased by mitigation
Decreased by adaptation
Flood Risk = Probability × Consequence
Quantify and monetize flood
Increased by sea level rise
Flood event
Increased by population and development
Assets at risk


PROBABILITY
X
CONSEQUENCE
=
FLOOD RISK
Pedestrian Mall
ROLLIN'20'S
2192
ENTRANCE
USA TODAY


PROBABILITY
X
CONSEQUENCE
=
FLOOD RISK

FLOOD



2.5

MILLION INHABITANTS IN THE NEW YORK & NEW JERSEY METROPOLITAN AREA LIVE IN THE FLOOD ZONE

FEMA FLOOD ZONES
NEW YORK CITY/
NORTHERN NEW JERSEY REGION

FEMA Designated Flood Zones

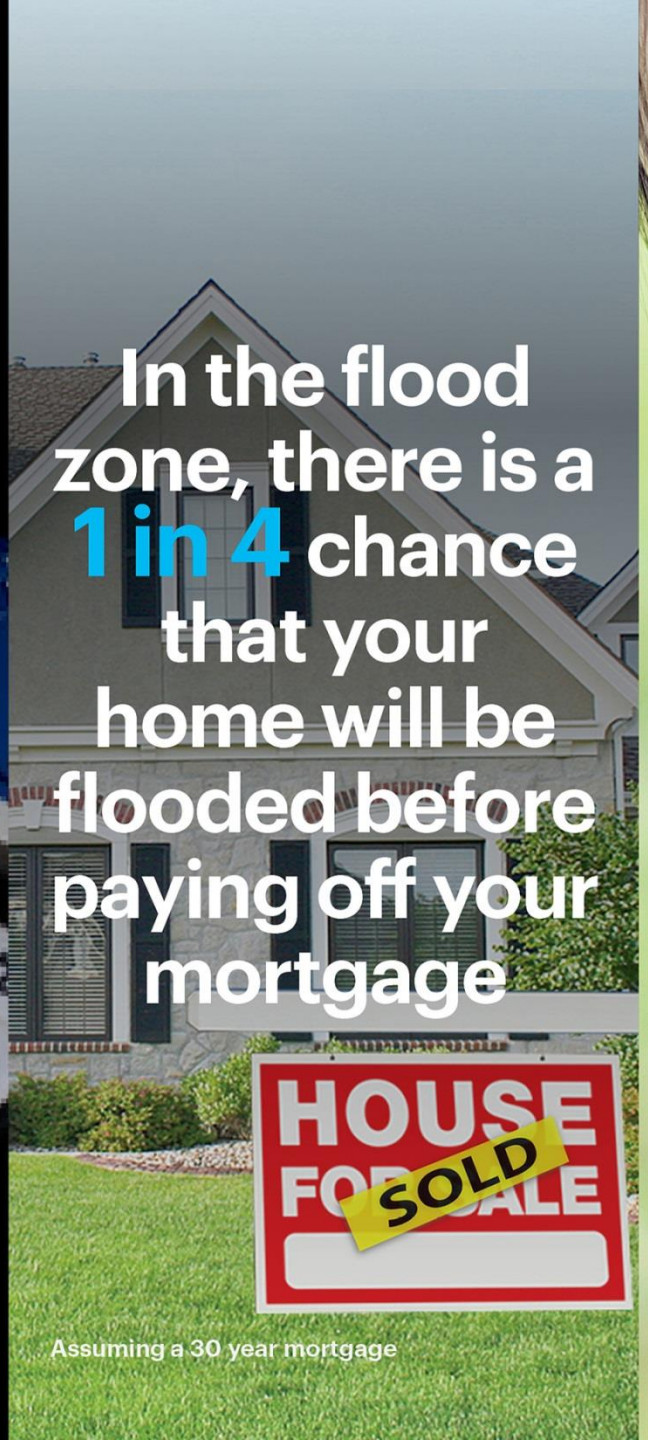
Zone XX – 500-year
Zone A – 100-year
Zone V – 100-year

(FEMA, NOAA) *Digital Flood Data for Nassau County Unavailable ©2013

Experiencing a 100 year flood is about **five** times as likely as getting a flush in poker

For a single game of poker in 1 year, the probability for a flush is 0,197%

In the flood zone, there is a **1 in 4** chance that your home will be flooded before paying off your mortgage

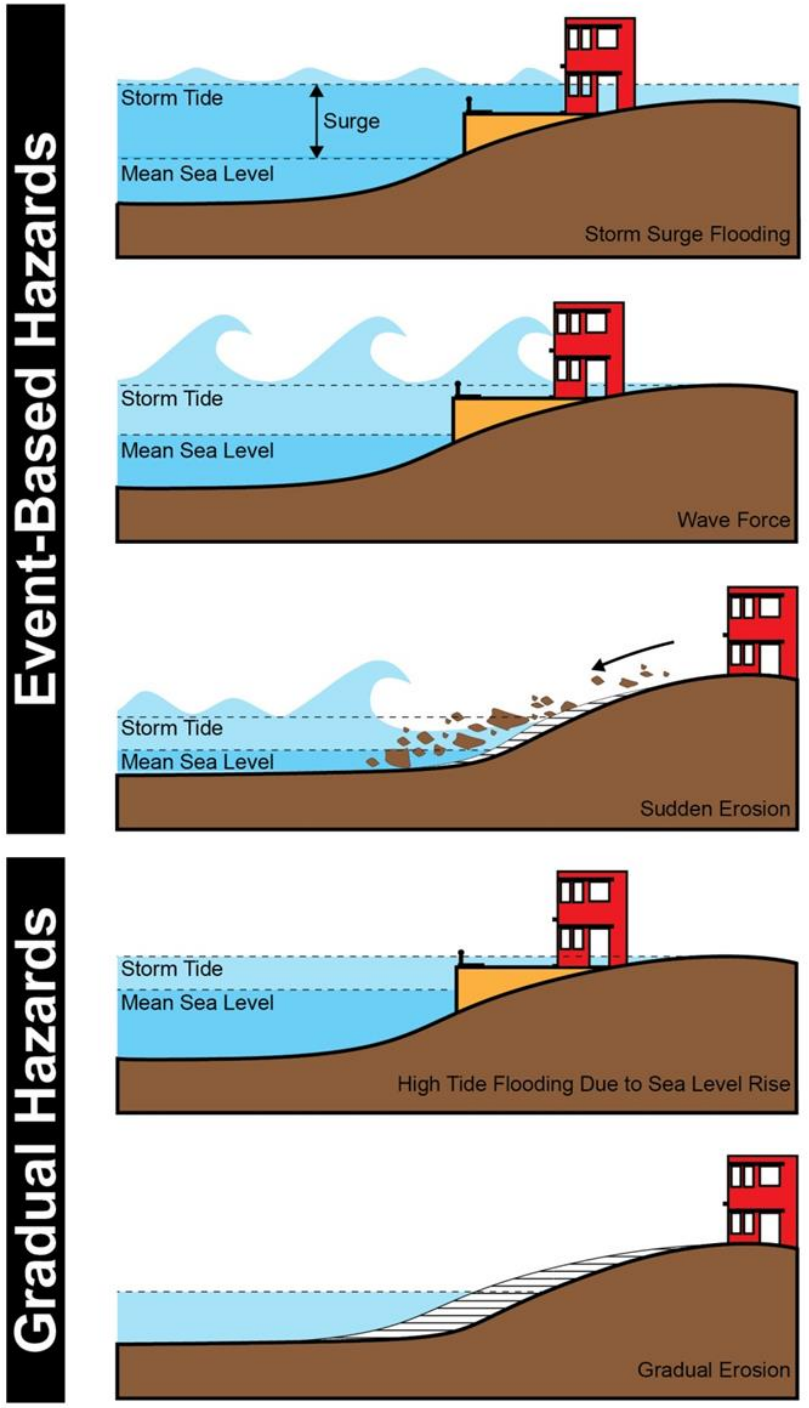


Assuming a 30 year mortgage

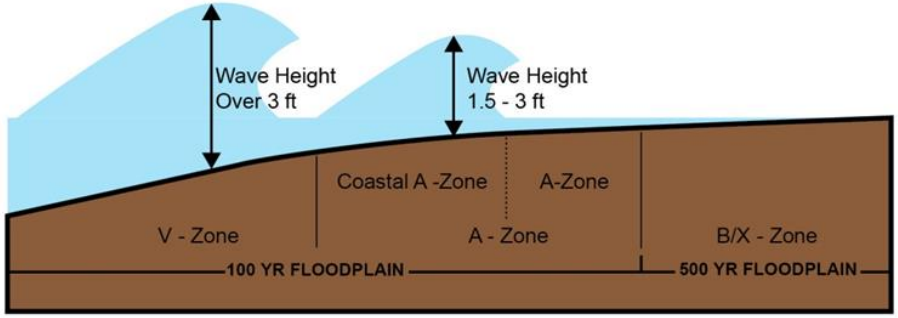
In the flood zone you have a **55%** chance of experiencing a flood in your lifetime

Based on a life expectancy of 75

Coastal hazards can be categorized into sudden events and gradual changes in conditions.



FEMA FIRM (Flood Insurance Rate Map) Designations classify areas according to level of flood risk.

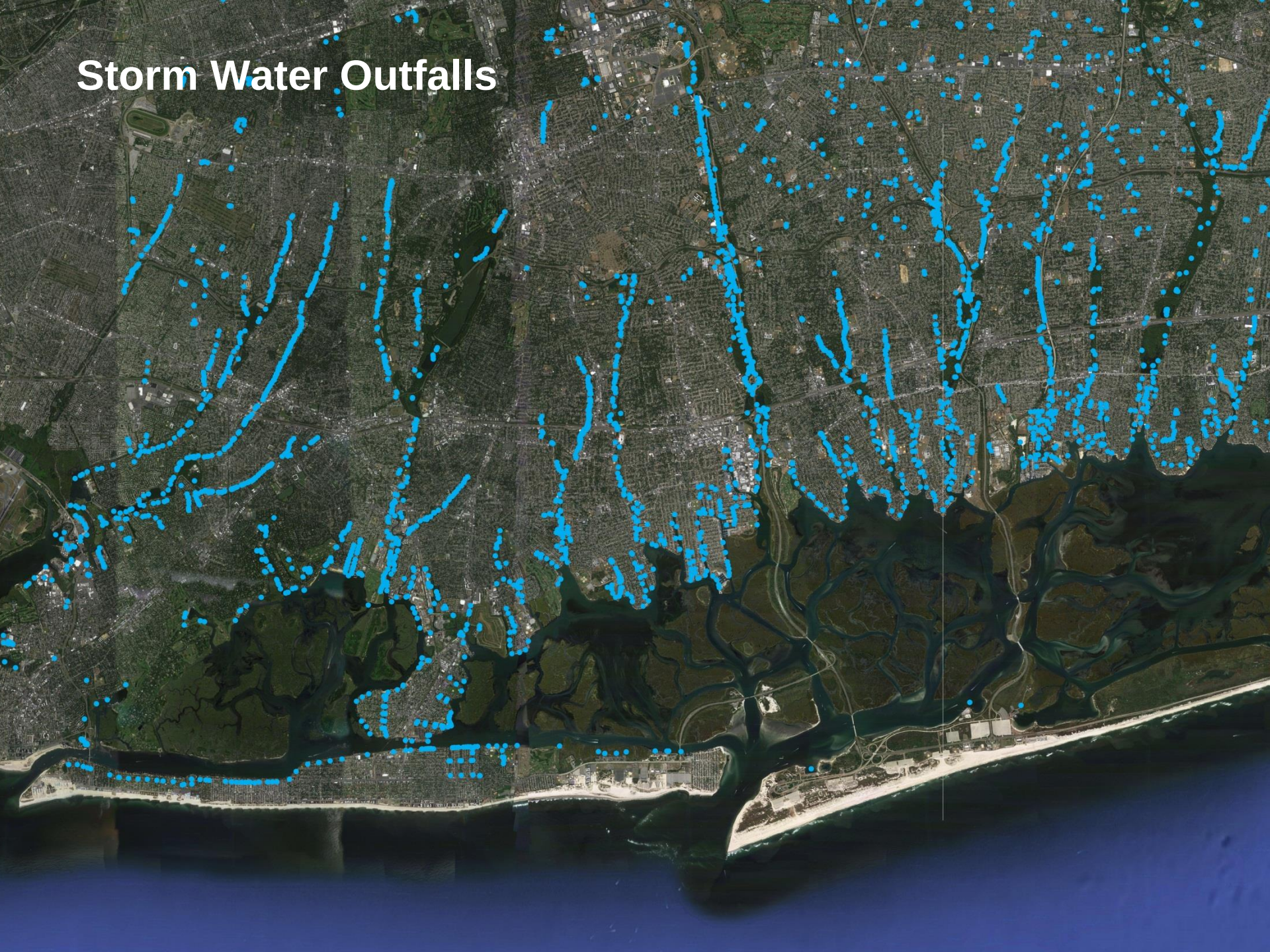


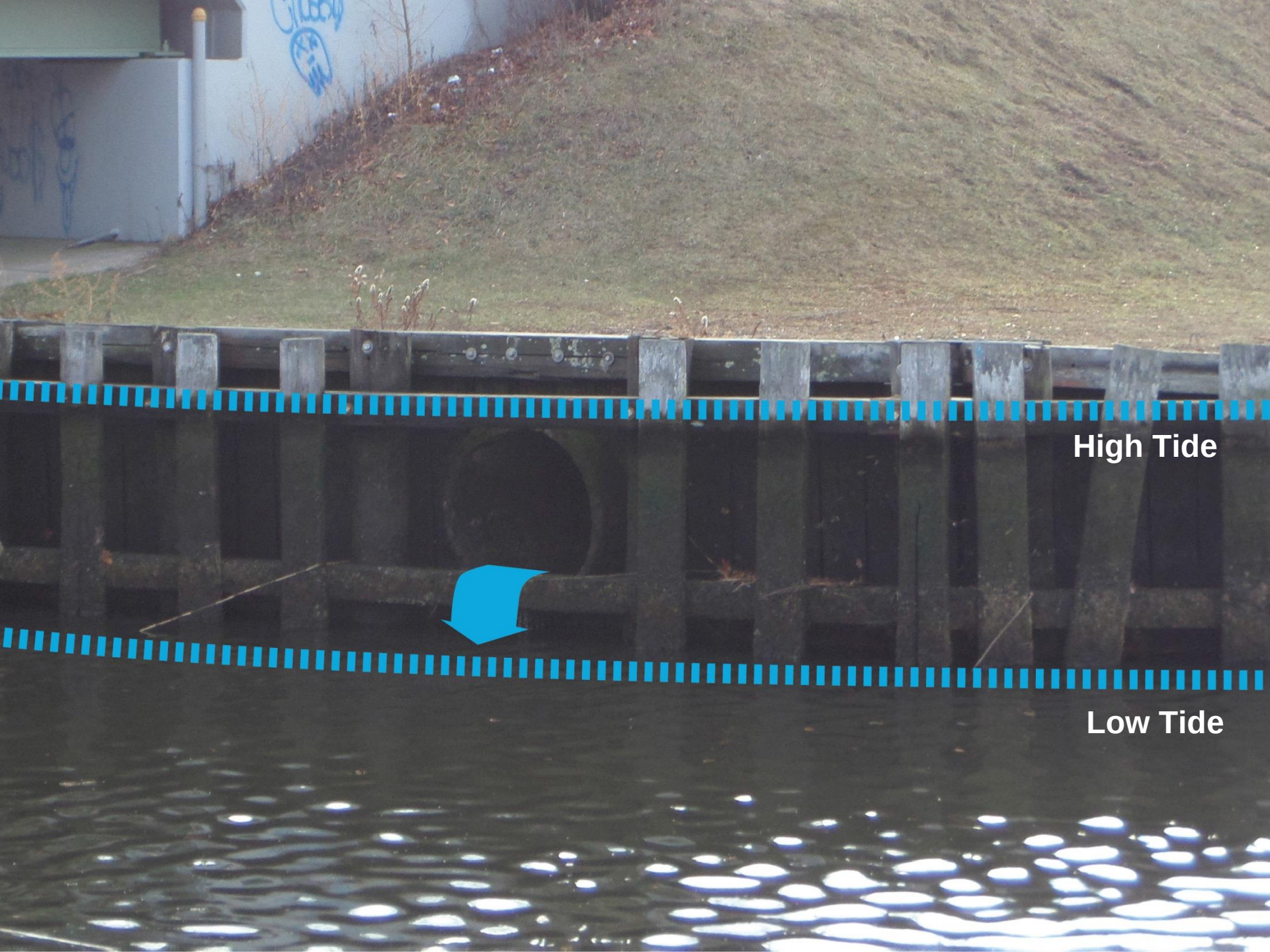

PHYSICAL VULNERABILITY
SANDY STORM SURGE (NJ & NY ONLY)
FEMA FIRM ZONES A-X


Category 2 Surge
113,000 structures in the range of category 2 surge


Category 2 Surge Level
Category 1 Surge Level
Mean High Water Level
Mean Low Water Level

Storm Water Outfalls

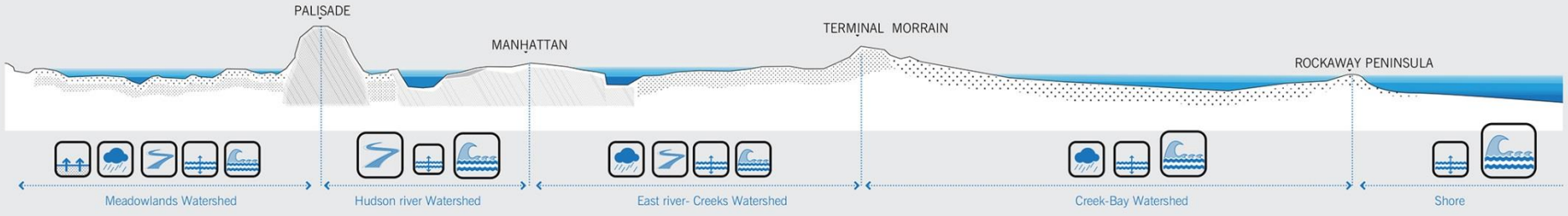



High Tide
Low Tide


STOP
4X4
DODGE

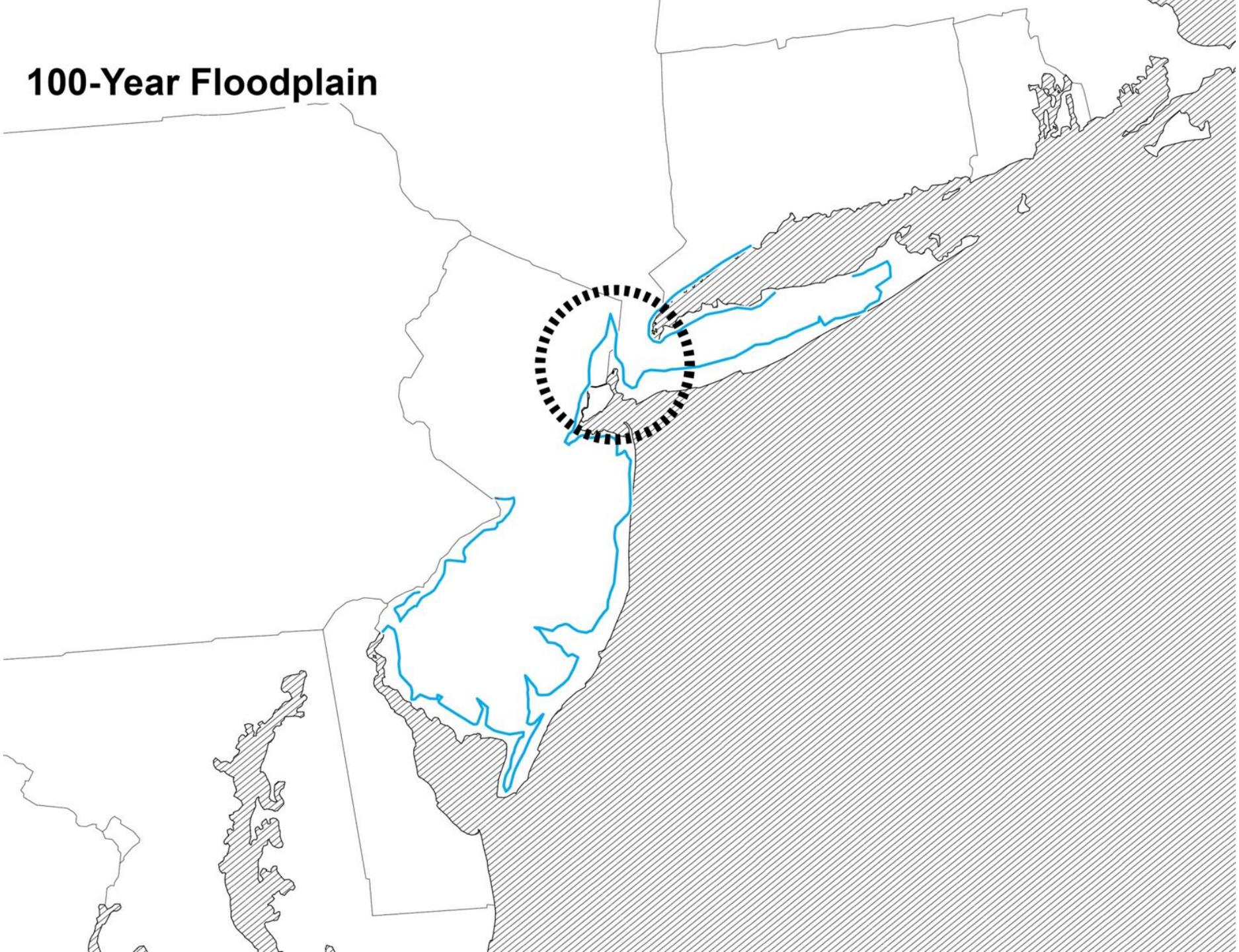
DIFFERENT FLOOD DIRECTIONS

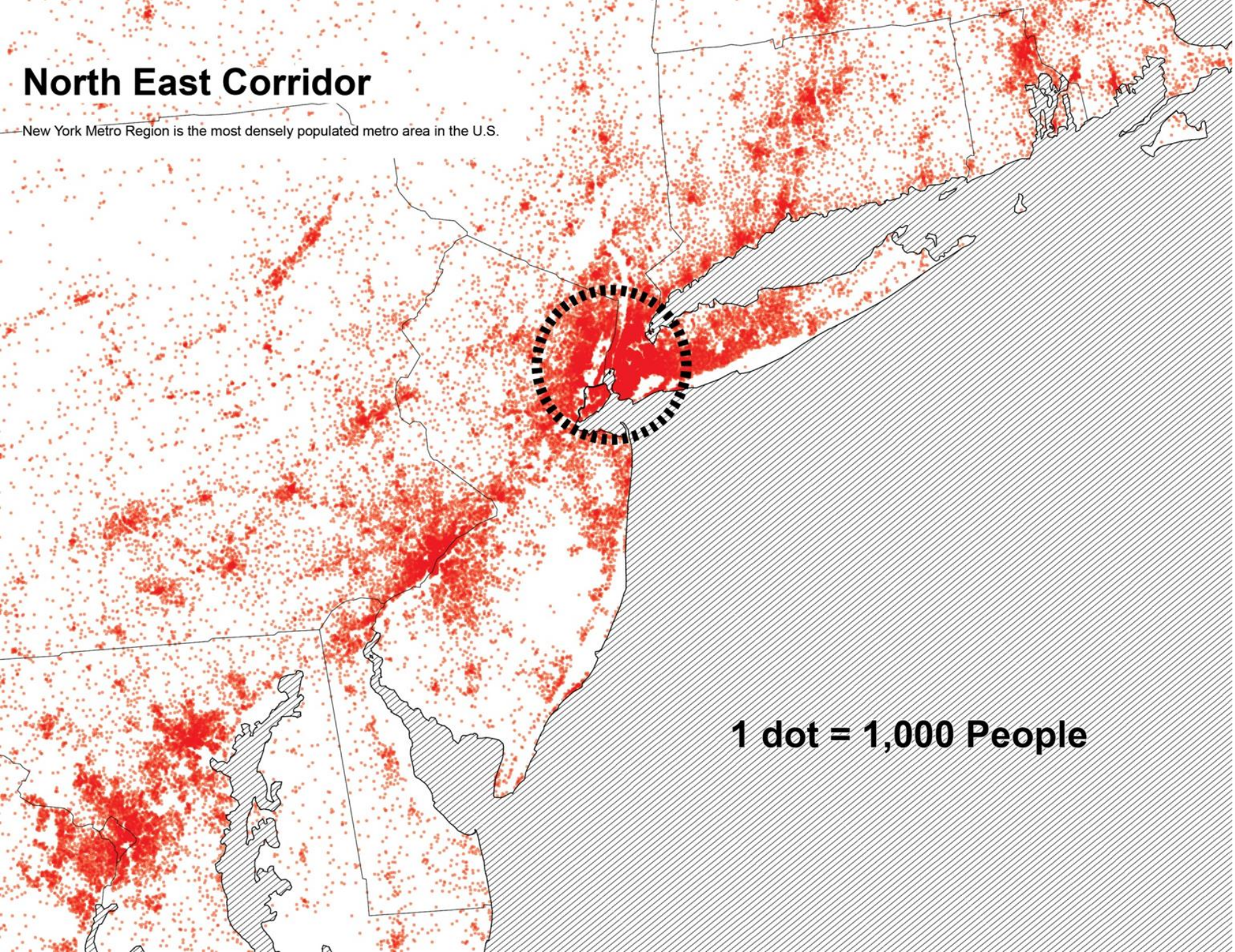
DIFFERENT FLOOD PATTERN

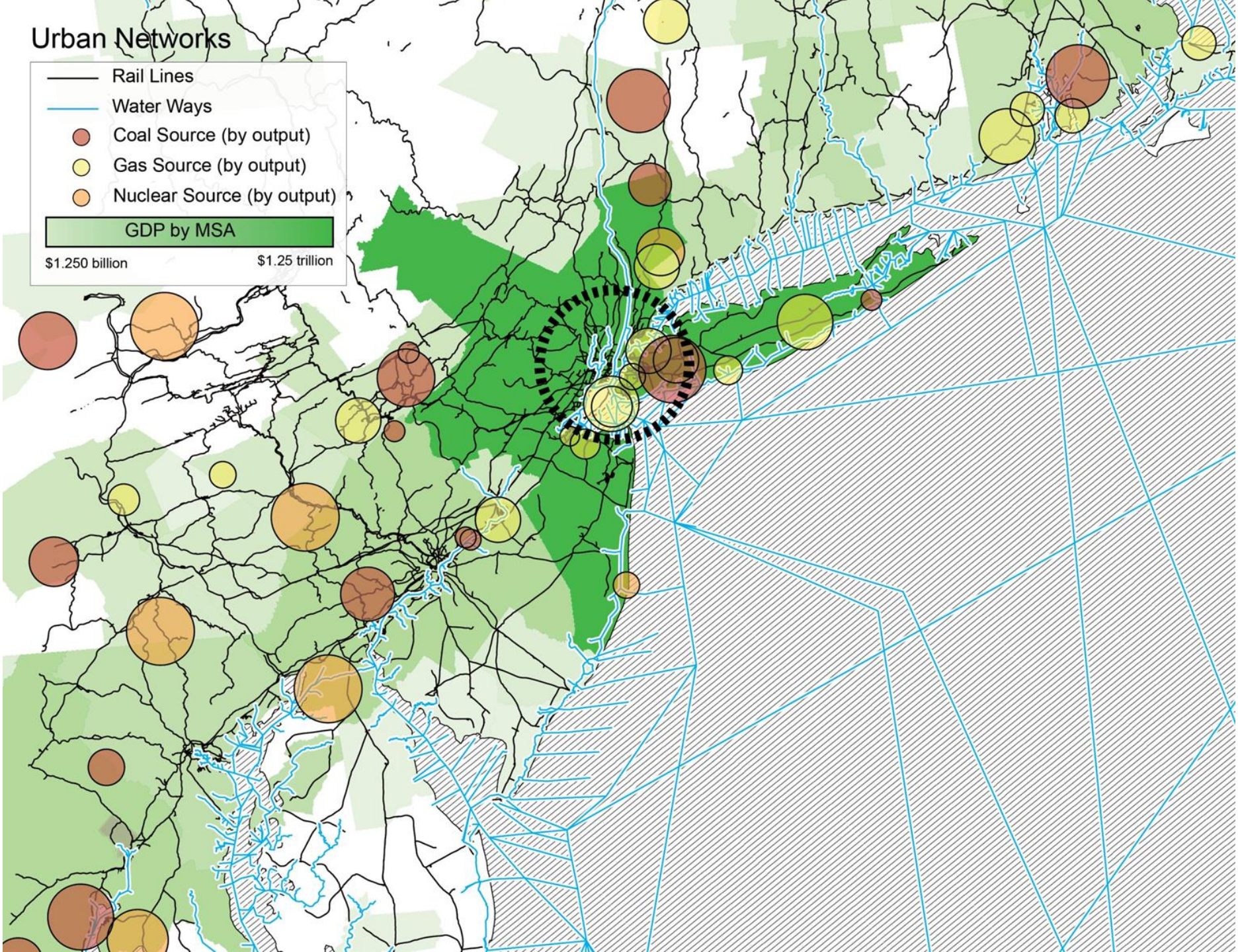


Regional Analysis

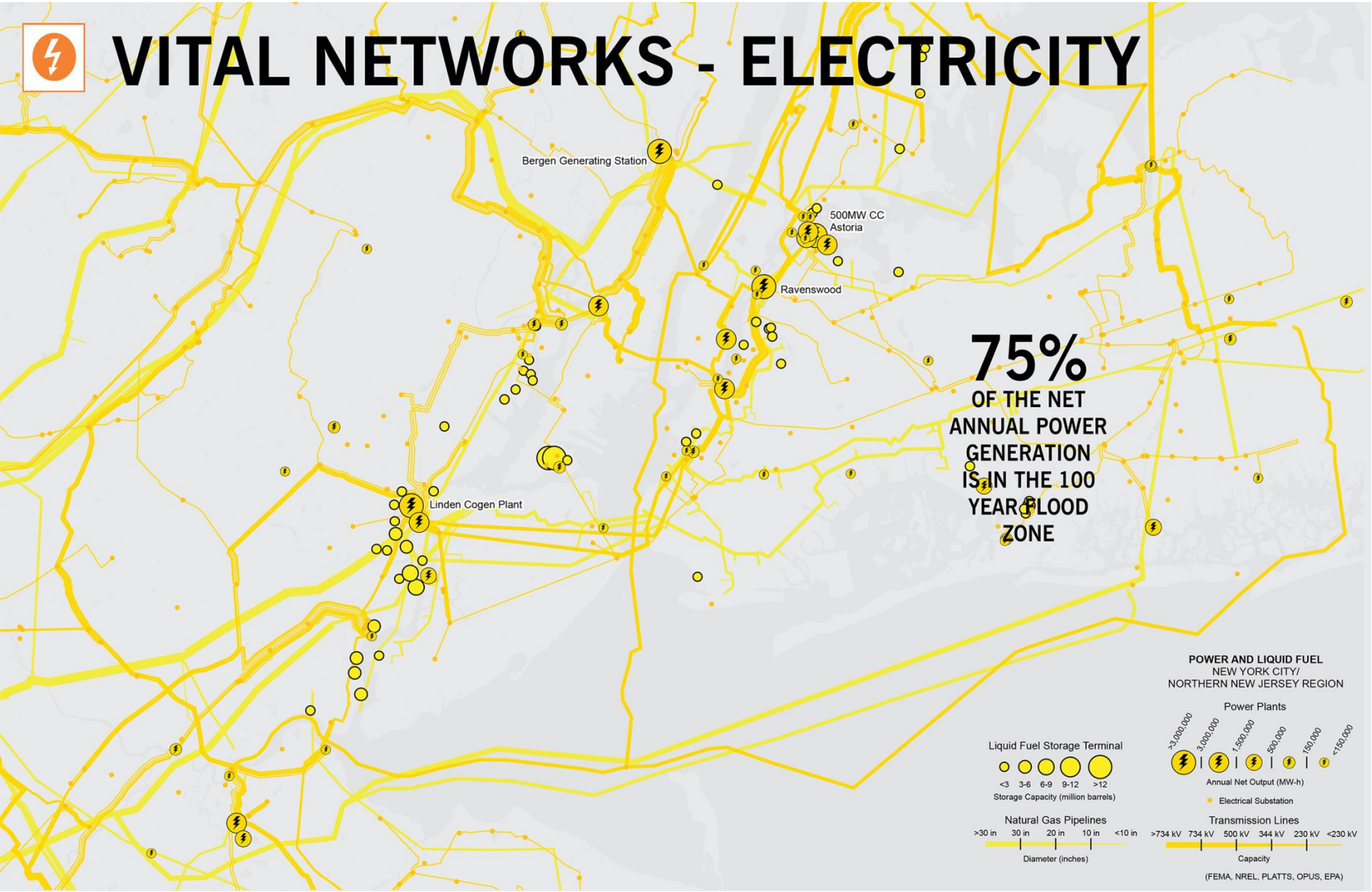
100-Year Floodplain

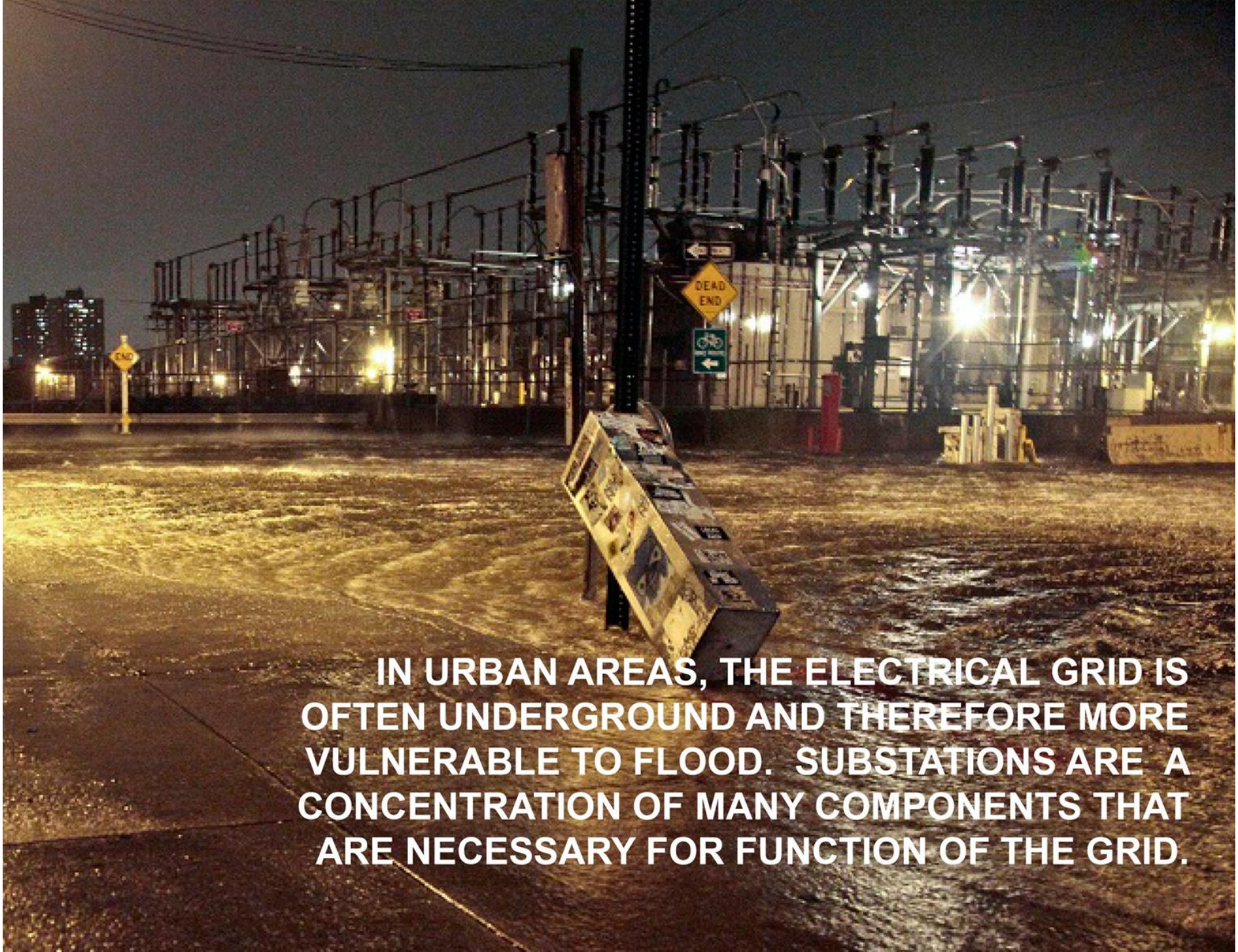



North East Corridor
New York Metro Region is the most densely populated metro area in the U.S.
1 dot = 1,000 People


Urban Networks
Rail Lines
Water Ways
Coal Source (by output)
Gas Source (by output)
Nuclear Source (by output)
GDP by MSA
$1.250 billion
$1.25 trillion

VITAL NETWORKS - ELECTRICITY

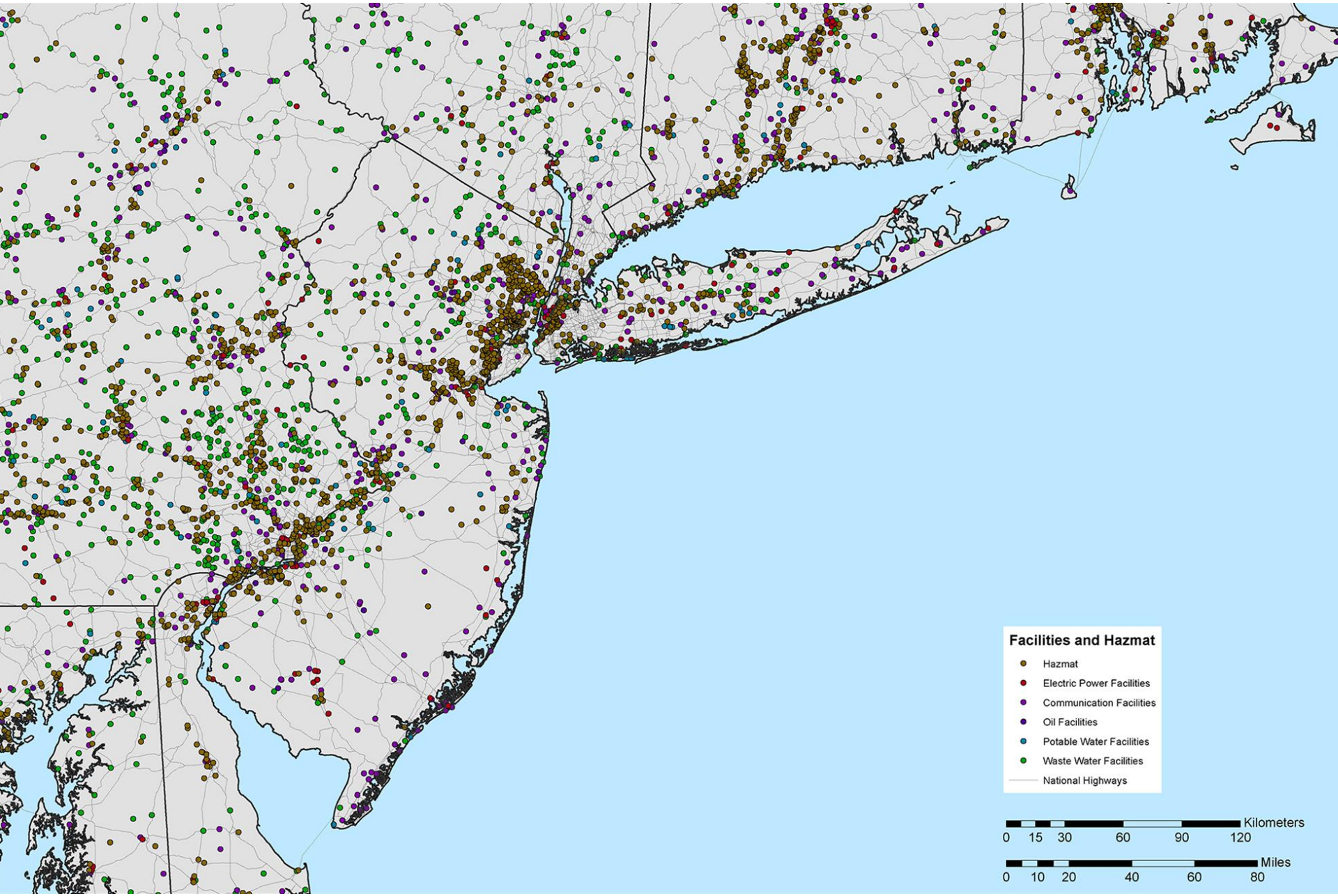




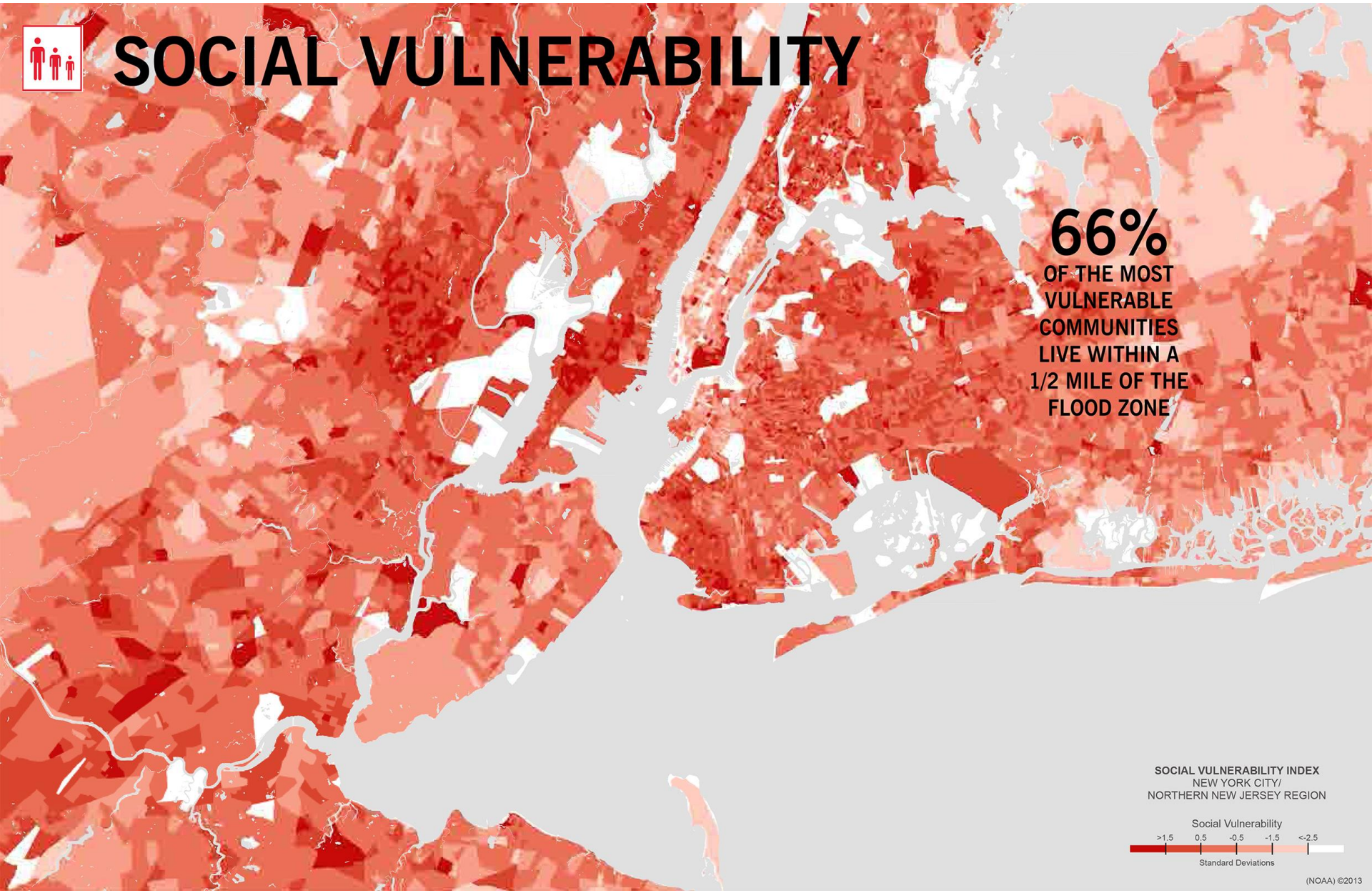
IN URBAN AREAS, THE ELECTRICAL GRID IS OFTEN UNDERGROUND AND THEREFORE MORE VULNERABLE TO FLOOD. SUBSTATIONS ARE A CONCENTRATION OF MANY COMPONENTS THAT ARE NECESSARY FOR FUNCTION OF THE GRID.

POLLUTION

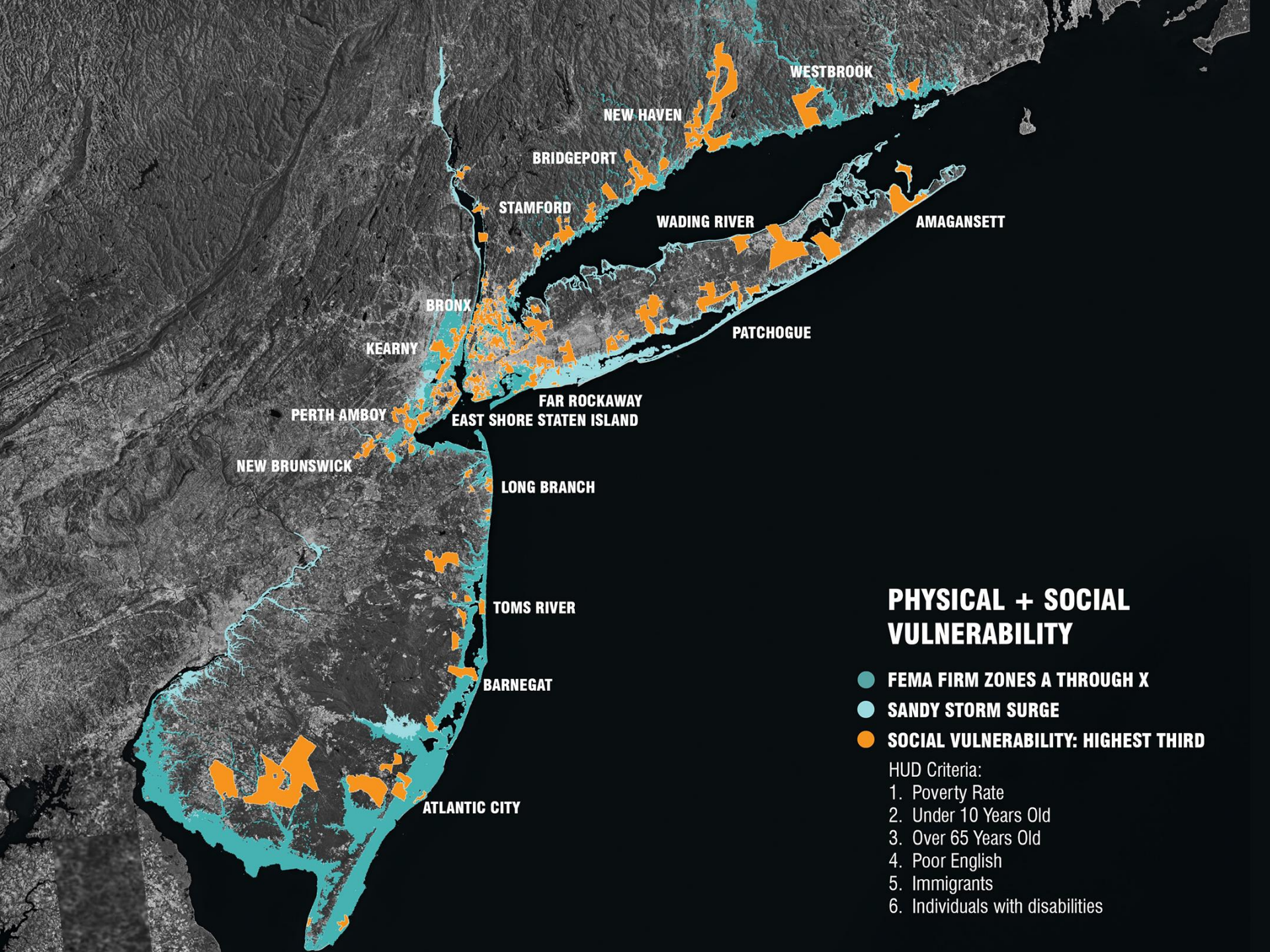

80%
OF THE REGIONAL FUEL STORAGE IS IN THE FLOOD ZONE
SEDIMENT CONTAMINATION
SURFACE - TOP 10 cm
TOTAL PCB
Industrial Land Use
Brownfields Property
Contaminant Spill Control
Superfund Site
CSO
Percentile Concentration
>80% 80% 60% 40% 20% <20%
Percentage of Total Commuters
Contamination Assessment and Reduction Program 2008

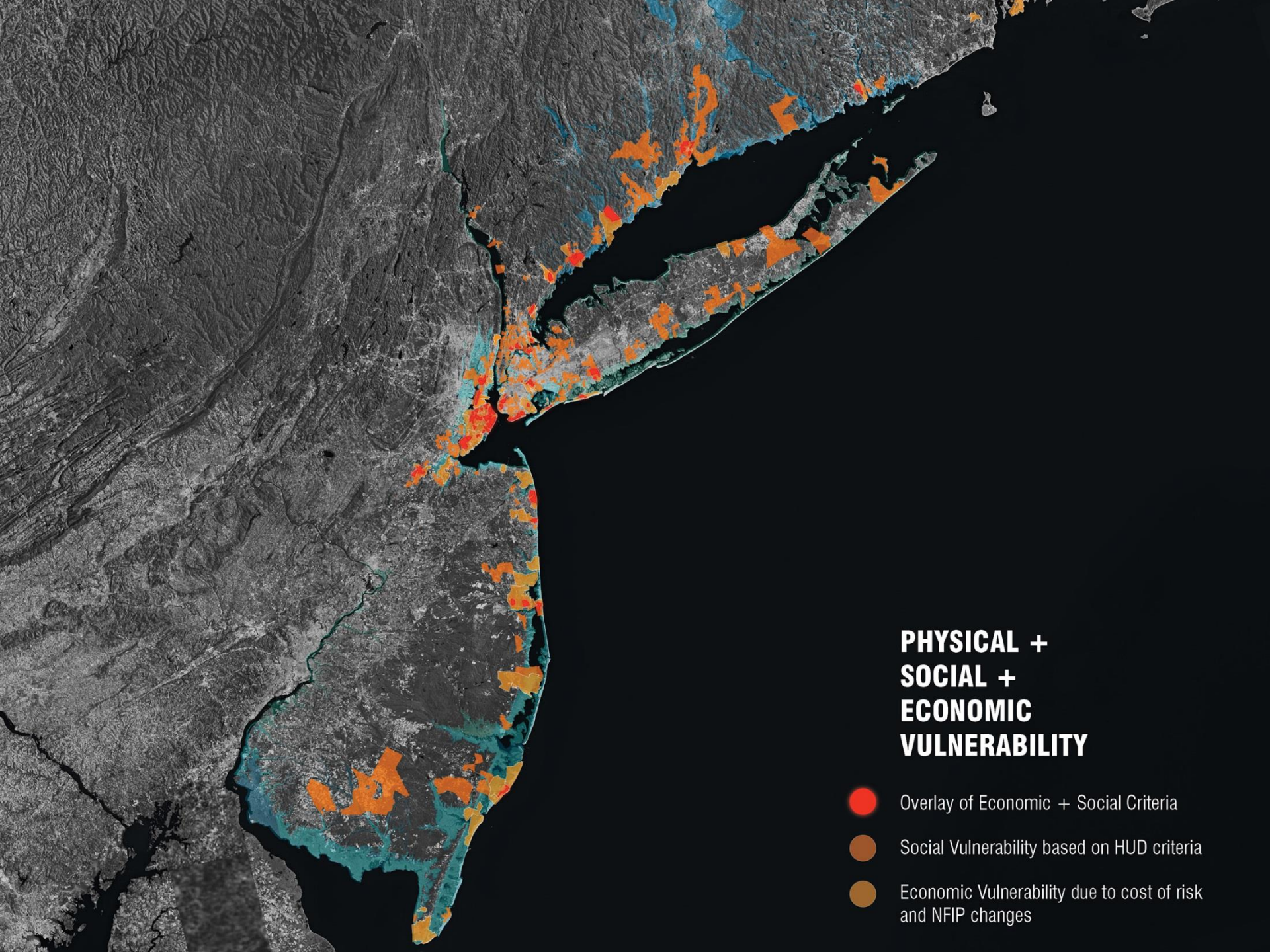

Facilities and Hazmat
Hazmat
Electric Power Facilities
Communication Facilities
Oil Facilities
Potable Water Facilities
Waste Water Facilities
National Highways
Kilometers
0 15 30 60 90 120
Miles
0 10 20 40 60 80

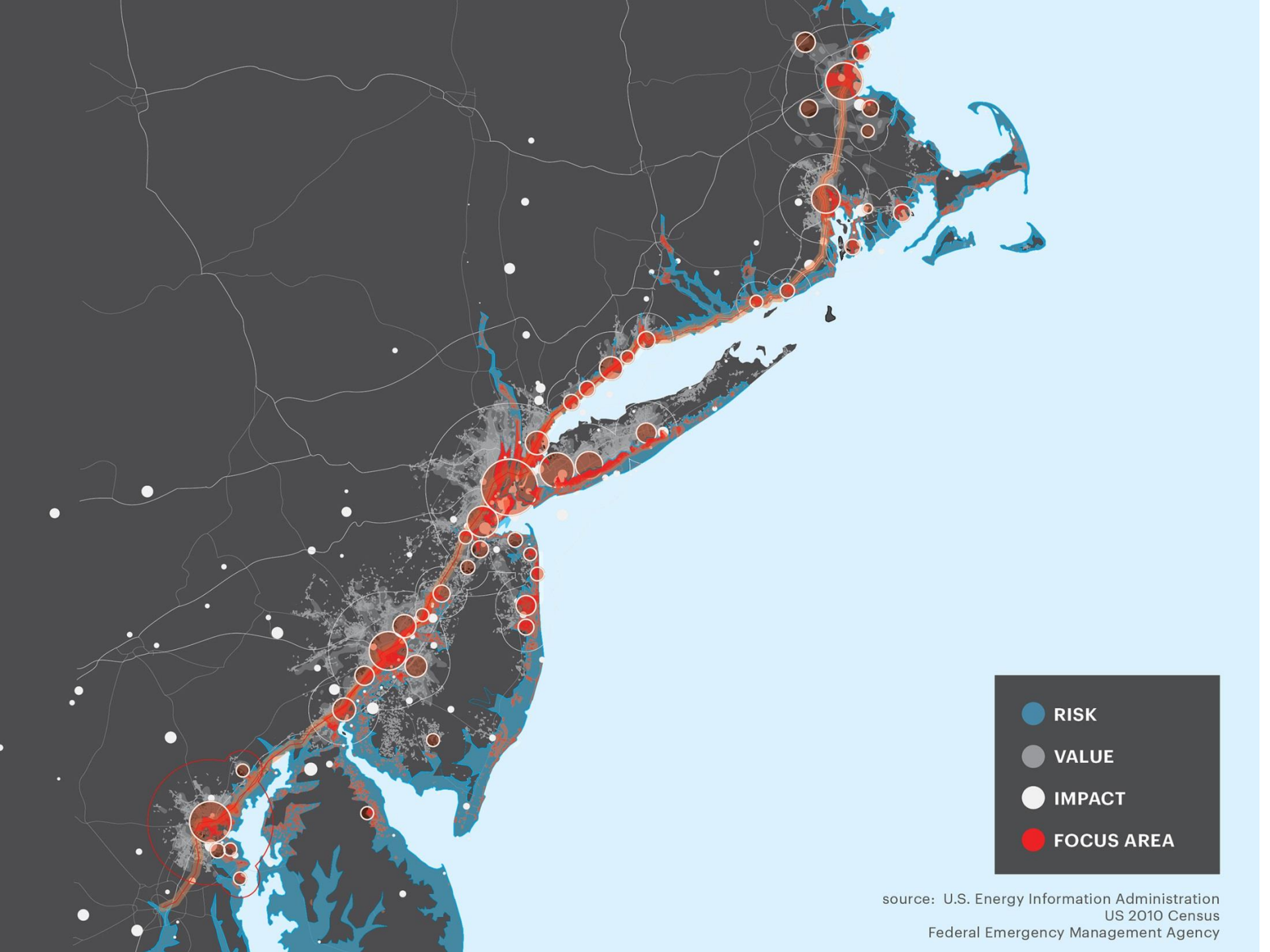
SOCIAL VULNERABILITY




ELLIOT ESTATES
FULTON HOUSES
COMPOS PLAZA
LOWER EAST SIDE HOUSES
RIIS HOUSES
WALD HOUSES
BARUCH HOUSES
GOMPERS HOUSES
VLADECK HOUSES
LA GUARDIA HOUSES
RUTGER'S HOUSES
SMITH HOUSES

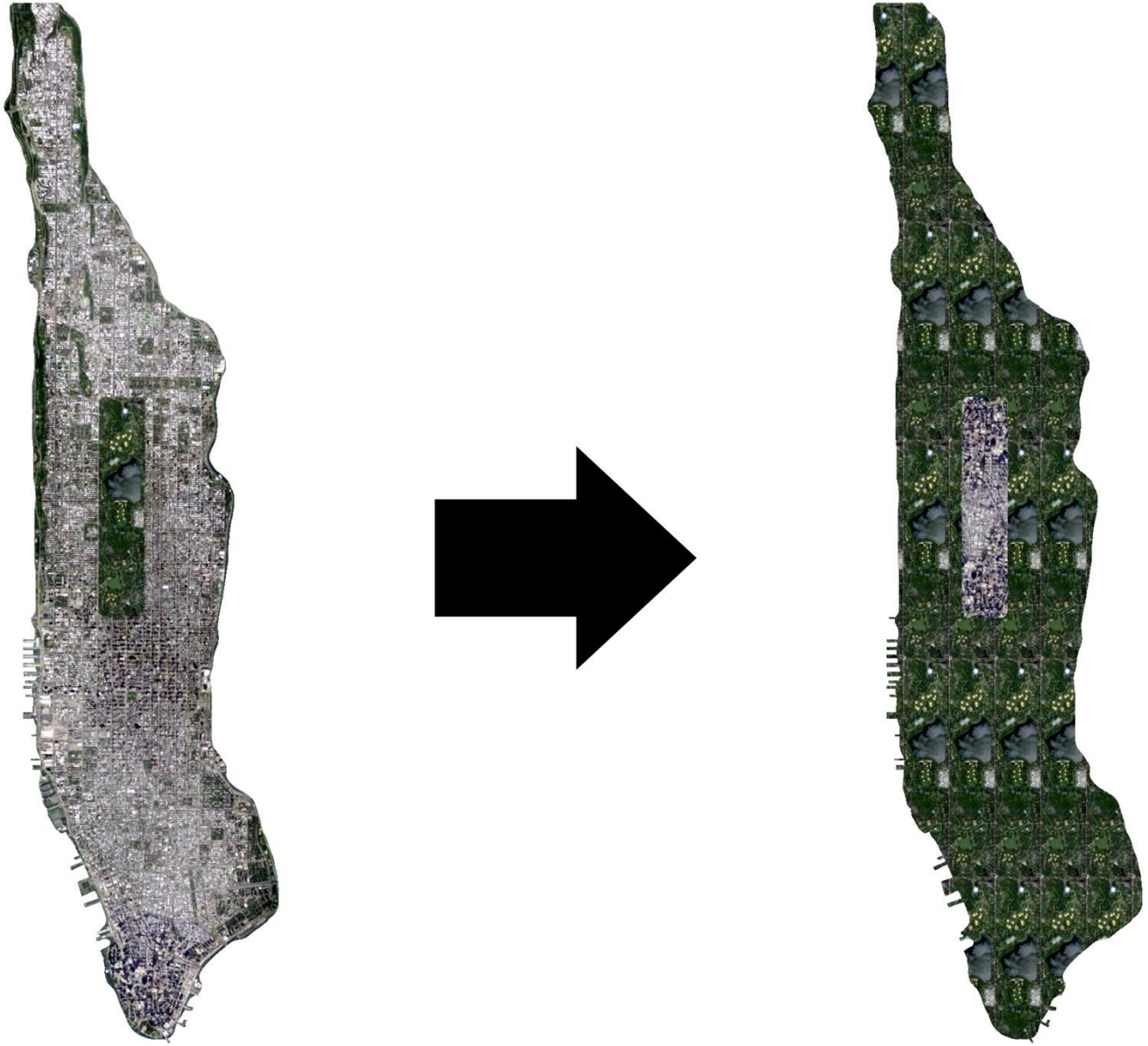

WESTBROOK
NEW HAVEN
BRIDGEPORT
STAMFORD
WADING RIVER
AMAGANSETT
BRONX
KEARNY
PATCHOGUE
FAR ROCKAWAY
PERTH AMBOY
EAST SHORE STATEN ISLAND
NEW BRUNSWICK
LONG BRANCH
TOMS RIVER
BARNEGAT
ATLANTIC CITY
PHYSICAL + SOCIAL VULNERABILITY
FEMA FIRM ZONES A THROUGH X
SANDY STORM SURGE
SOCIAL VULNERABILITY: HIGHEST THIRD
HUD Criteria:
1. Poverty Rate
2. Under 10 Years Old
3. Over 65 Years Old
4. Poor English
5. Immigrants
6. Individuals with disabilities


PHYSICAL +
SOCIAL +
ECONOMIC
VULNERABILITY
Overlay of Economic + Social Criteria
Social Vulnerability based on HUD criteria
Economic Vulnerability due to cost of risk and NFIP changes



source: U.S. Energy Information Administration
US 2010 Census
Federal Emergency Management Agency

Opportunity



DESIGN APPROACHES

Floating and/or amphibious construction

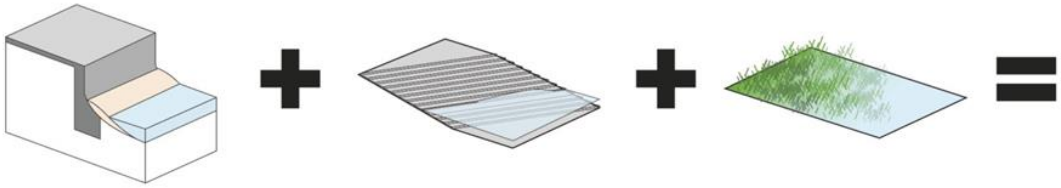
Catch Basin / Retention Pool

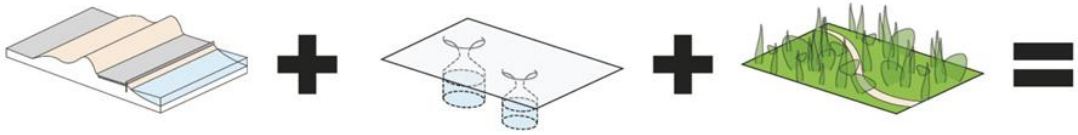
Floodwalls / Dry Floodproofing

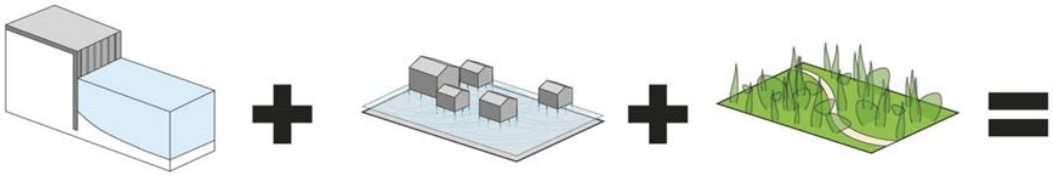
Constructed ecology (wetlands, reef ecosystem, etc)

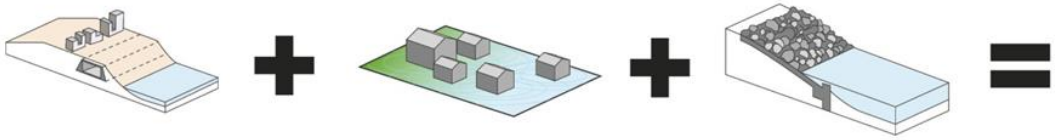
Stacking or combination of program at waters edge

Accessable sloping and or terracing of water edge

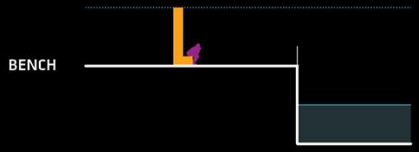


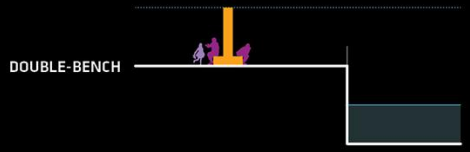


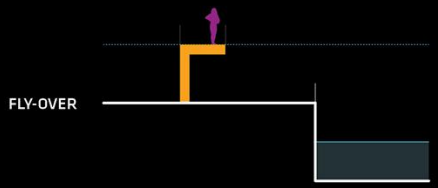


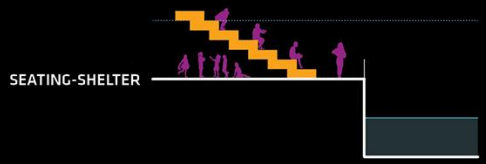


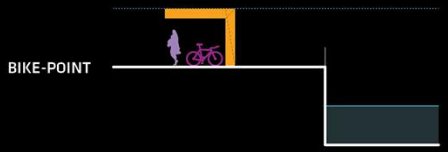
HOW CAN A WALL BE MORE THAN A WALL?

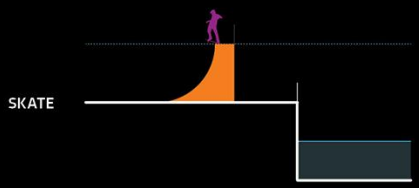


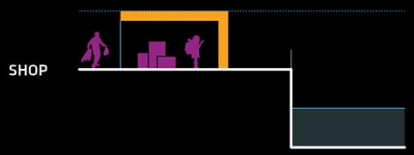


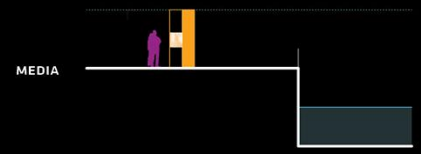


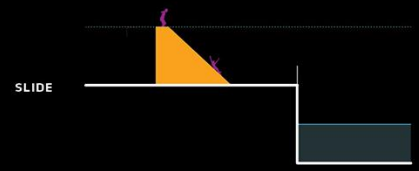




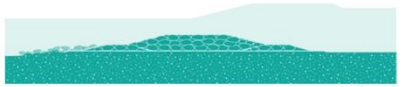








DUNES AND BERMS



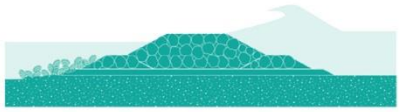
CONSTRUCTED REEFS

TIDAL FLATS

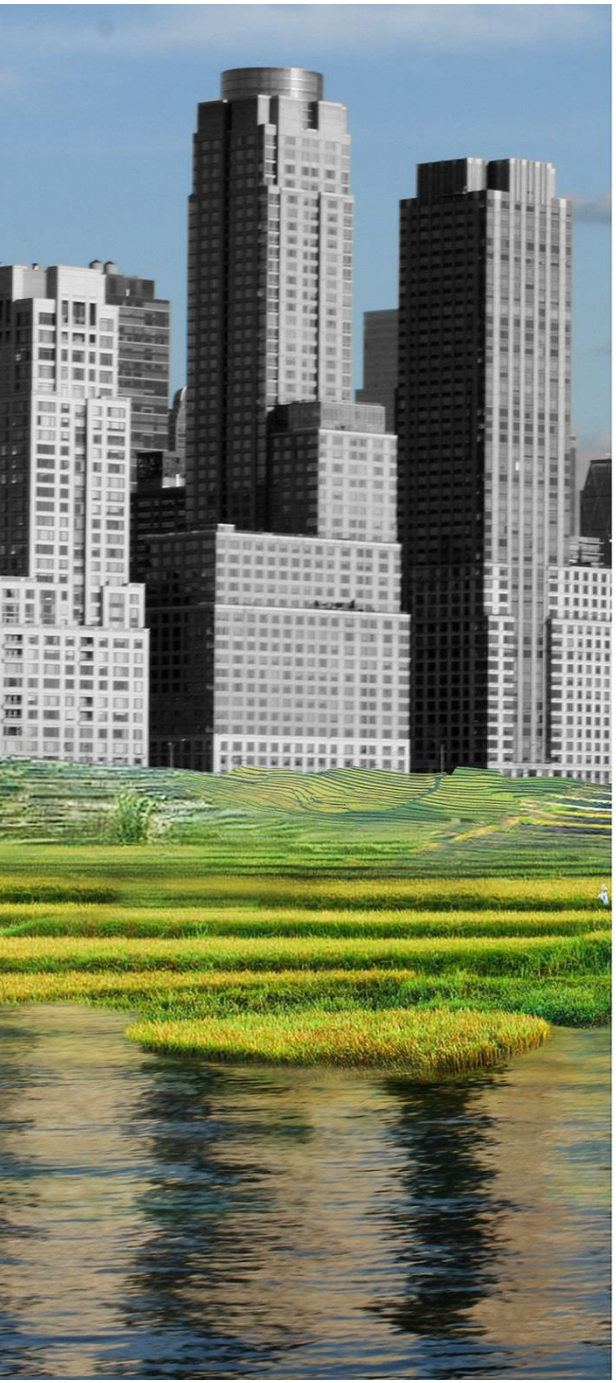
DREDGE WETLANDS

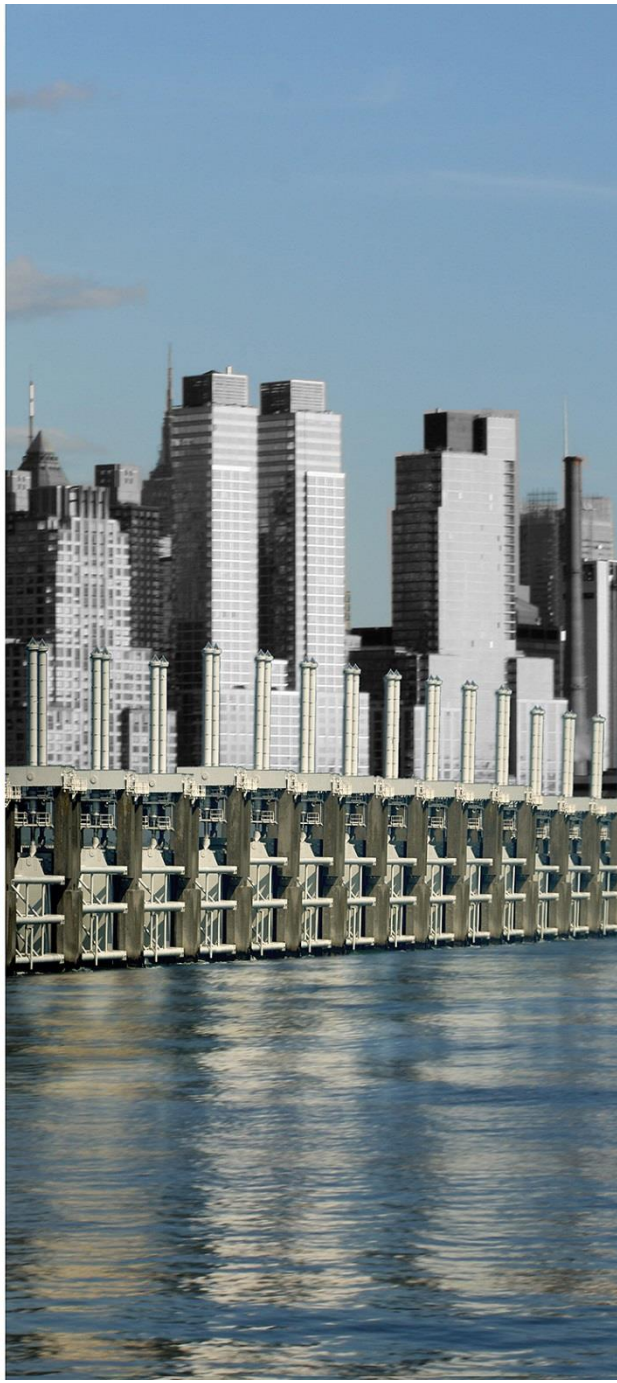
FRICTION FORESTS

ABSORPTIVE EDGES

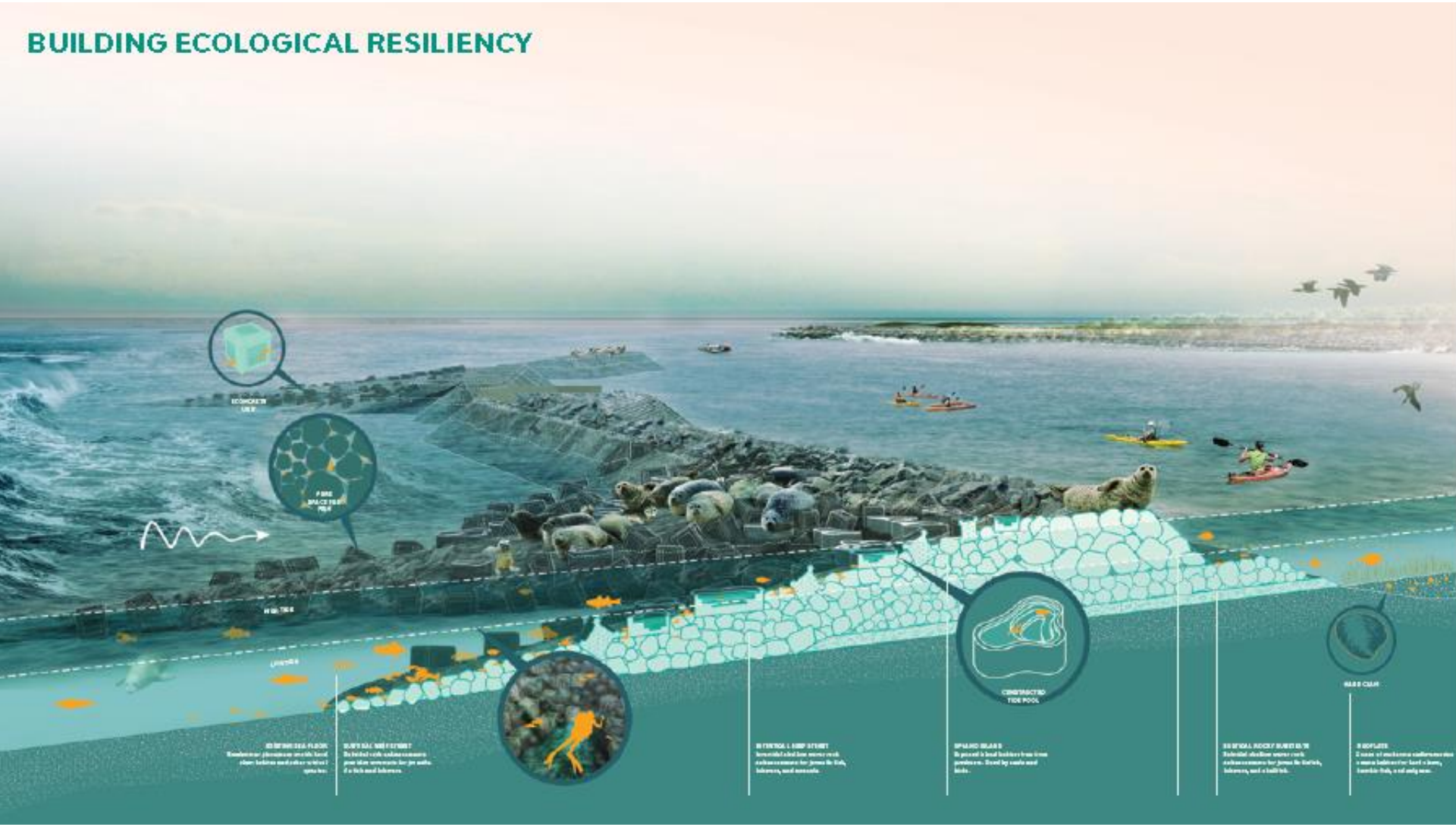


HABITAT BREAKWATERS





BUILDING ECOLOGICAL RESILIENCY



BUILDING SOCIAL RESILIENCY

Questions