

A historical map of New York City, likely from the late 19th or early 20th century, showing the city's layout with streets, parks, and water bodies. Overlaid on the map are various blue and white areas representing flood zones or water levels. The map includes labels for various locations such as 'HUNTS POINT', 'WARDEN'S I.', 'BERGAM'S I.', 'COLLEGE PT. Ferry', 'SANFORDS PT.', 'WATERSIDE', 'COLLEGE POINT', 'STEINWAYS', 'HALETS PT.', 'ASTOR', 'WARDEN'S I.', 'BERGAM'S I.', 'COLLEGE PT. Ferry', 'SANFORDS PT.', 'WATERSIDE', 'COLLEGE POINT', 'STEINWAYS', 'HALETS PT.', 'ASTOR'.

INLAND FLOODING: WHY IT HAPPENS AND HOW WE CAN PREPARE

Created for NYC Faith Sector Climate Adaptation Working Group on 05.09.25

THE WELIKIA PROJECT

Explore the landscape before New York.

Launch the map explorer ↗

ABOUT THIS BLOCK

Welcome to 35th Ave & Northern Blvd between Union St & Leavitt St!
This block used to be an oak-tulip tree forest community.

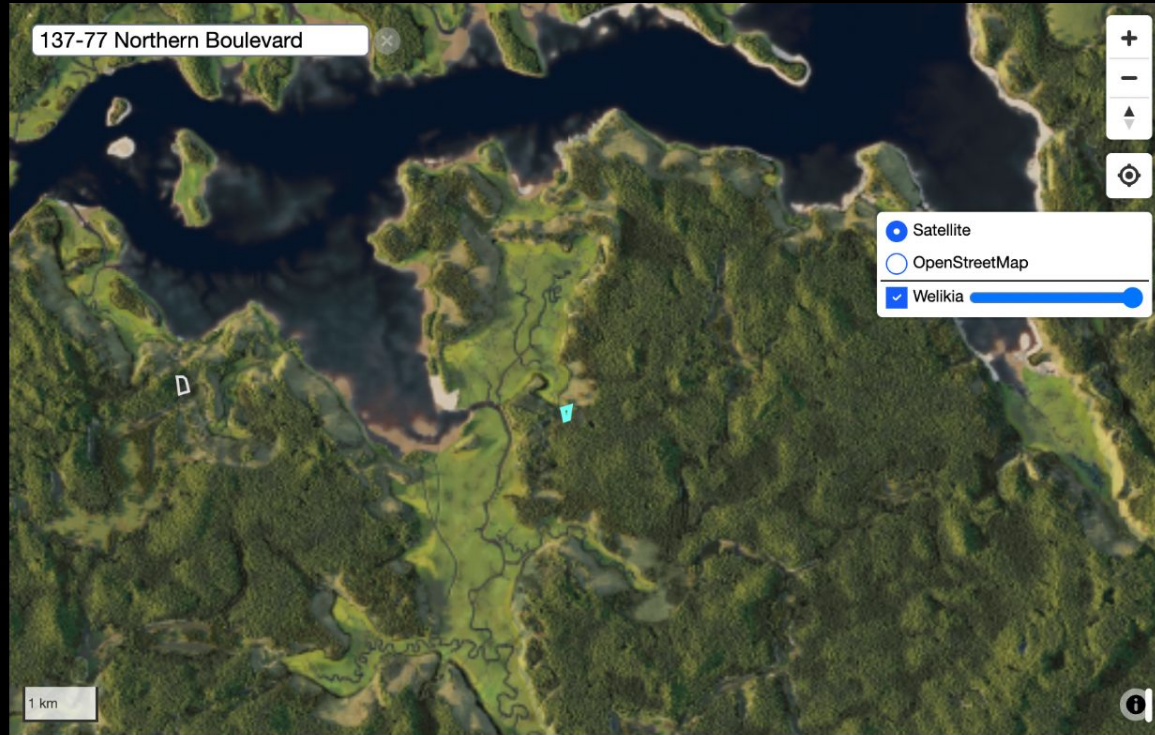


D.J. Evans

Home to plants like red maple, American chestnut, and devil's darning needles and animals like the Meadow Vole, Green Heron, and Redback Salamander, this block was suitable habitat for over 386 species of plants and 51 species of animals.

This block's ecological communities allowed for 97% more plant diversity and 76% more animal diversity than other blocks in the city.

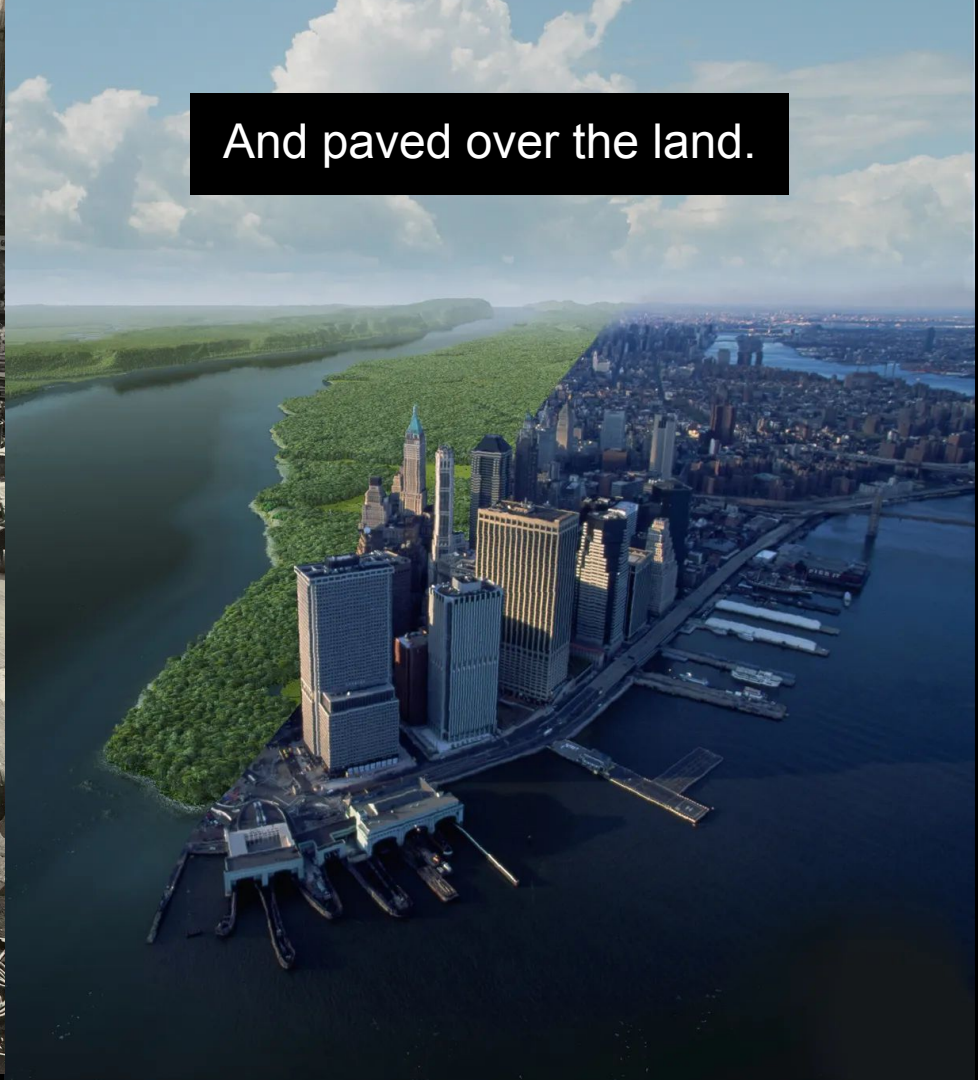
In addition to oak-tulip tree forest community, other ecological communities that existed on this block include coastal oak-hickory



We buried our water.



And paved over the land.





We buried our water.



And paved over the land.

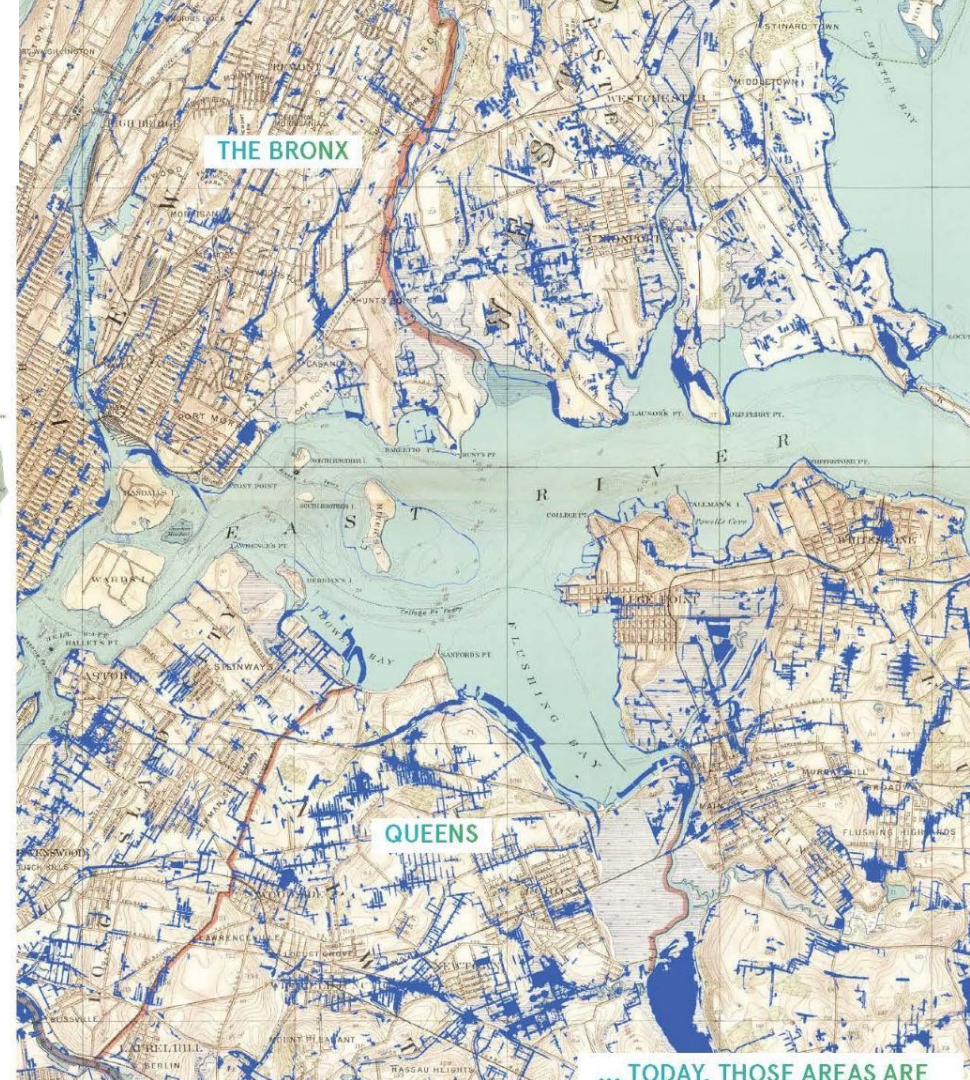
Borough	Impervious
Manhattan	63.09%
Bronx	57.58%
Brooklyn	60.86%
Queens	57.39%
Staten Island	38.00%

But the water remembers.



STATEN ISLAND

WE HAVE BUILT AND PAVED OVER
WETLANDS, MARSHES, RIVERS, AND



THE BRONX

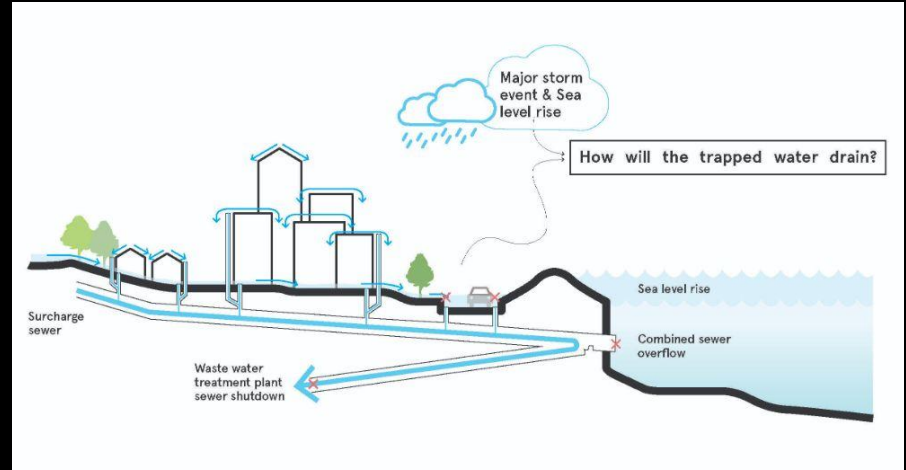
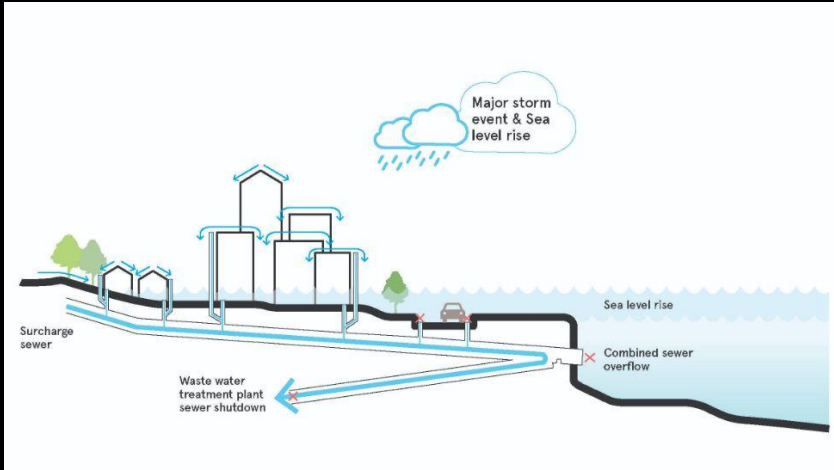
QUEENS

TODAY THOSE AREAS ARE

GROWING CHALLENGES: MORE FREQUENT AND INTENSE RAIN

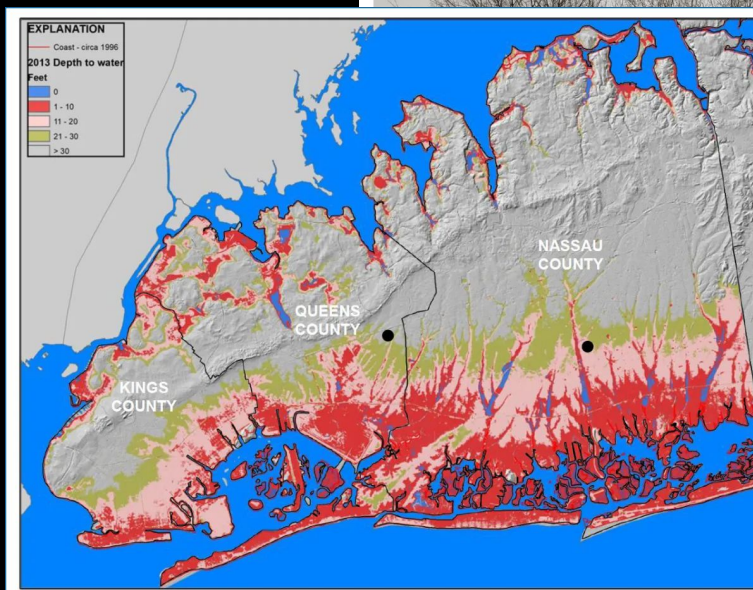


GROWING CHALLENGES: RISING SEA LEVELS



GROWING CHALLENGES: RISING WATER TABLE

- 1887 → 2007 NYC pumped groundwater for drinking water
- When they stopped, the water table began to rise again



CLIMATE CHANGE

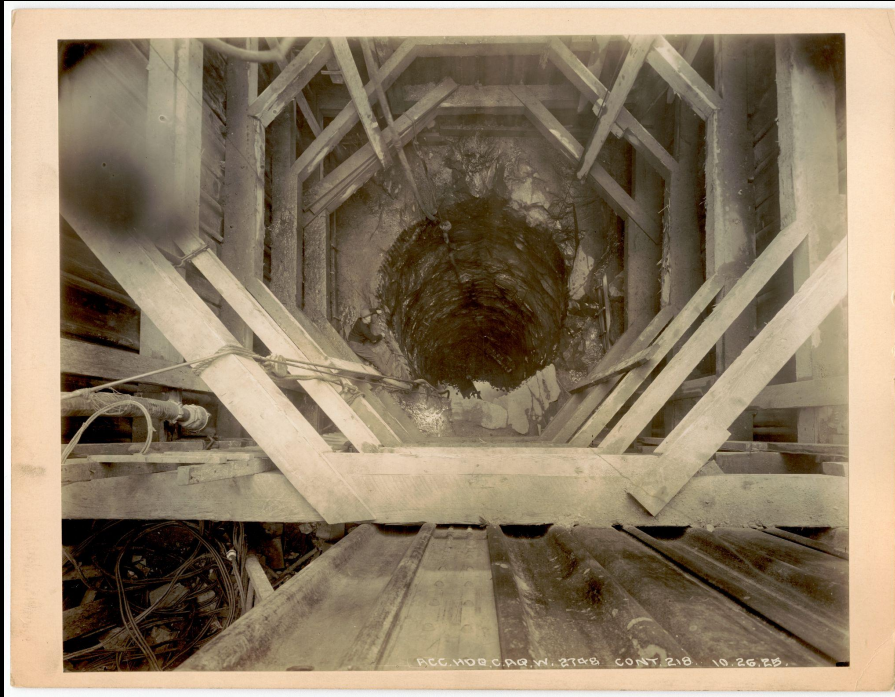
Rising Groundwater Threatens New York City — Researchers to Study How Much

Water tables that rise with sea levels can inundate basements, ruin underground infrastructure and render anti-flooding strategies ineffective. After a nearly decade-long hiatus, the feds are starting up monitoring again.



able to get proper sewage despite fighting for decades, March 27, 2022.

GROWING CHALLENGES: OUTDATED SEWERS



Williamsburg Conduit Shaft, Queens | Source: DEP



Williamsburg Conduit Construction | Source: DEP



CASE STUDY: INLAND FLOODING IN QUEENS, NY

NORTH QUEENS

COLOR CODING ON THIS MAP
REPRESENTS FUTURE RISK

MODERATE
SEVERE
EXTREME
SUBMERGED

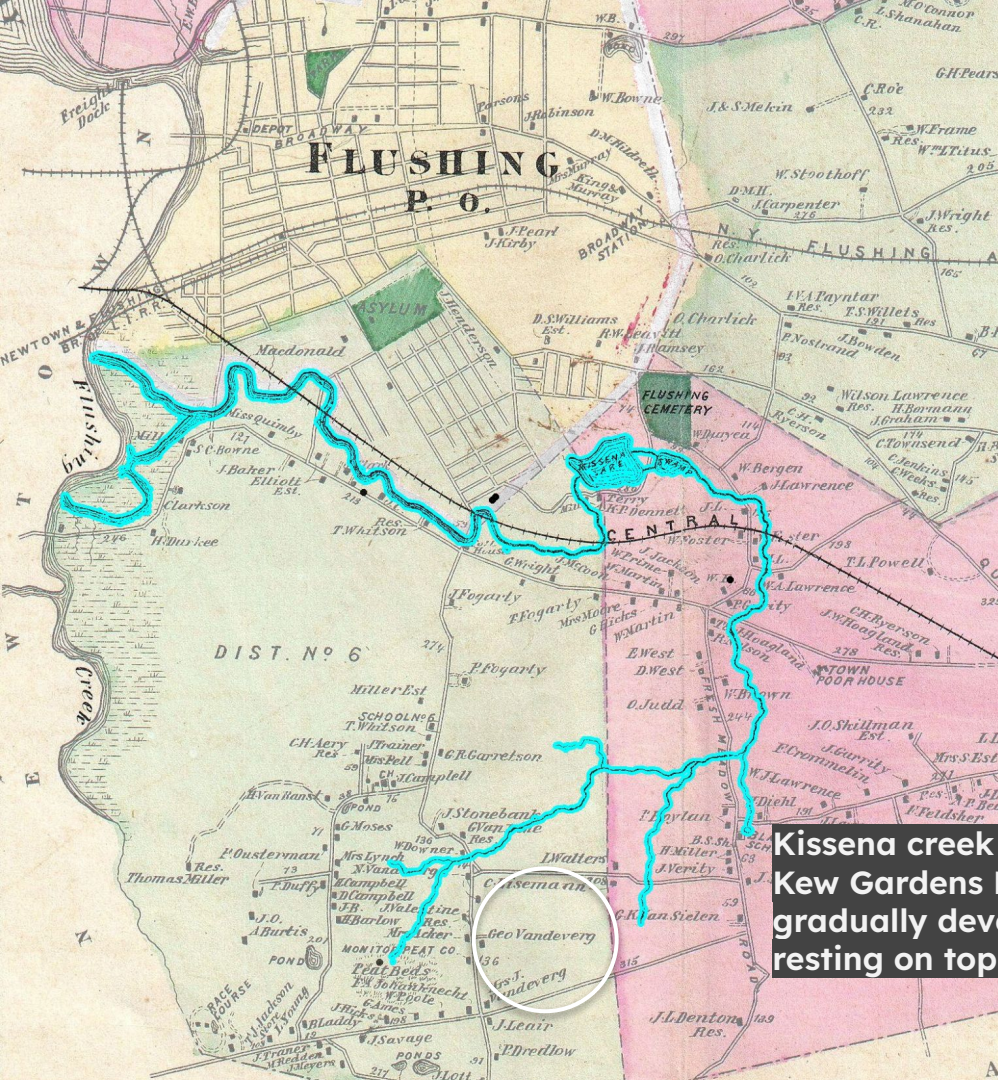


Kissena Creek



REBUILD
BY
DESIGN

From From New York Public Library: NYC Fire Insurance, Topographic and Property Maps;
National Service Center for Environmental Publications (NSCEP)



How did Kissena creek “vanish”?

GUTMAN SWAMP DRAINED

140-Acre Pest Breeding Tract Made Sanitary.

Today the water is flowing through the drain for the Gutman Swamp, situate in the Head-of-Vleigh region. All Flushing people, and, in fact, all of Queens, will be glad to hear that the pest-breeding condition of the area is now a thing of the past. This swamp has been in the minds of the people of this territory for a number of years. Previous to the Civil War, farmers in the locality considered the proposition of taking the ditch across the higher land in the neighborhood of the Peter Meeker property, so that the water could flow on down into Flushing Meadows; thence into Flushing Creek.

The 3-story and basement brownstone dwelling, 883 Union street, between Seventh and Eighth avenues, has been sold by the John Pullman Real Estate Company as broker for Dr. William Brown to Louis Kriescheldorf for occupancy.

Upper Flushing Association united several years ago in an endeavor to eliminate this mosquito-breeding area. Resolutions were adopted, requesting that it be drained, and finally President Connolly took the matter up, had his engineers make a survey, and the drain was laid out, following the course of a street as laid out on the city tentative map. Proceedings were instituted to acquire an easement, as the property owners were not ready at that time to open a real street in this position. After the proceeding was under way, considerable difficulty was encountered in the construction work for the drain. The proceeding was amended in order to permit the use of a wider ditching machine.

Kissena creek begins at what was formerly a swamp in the modern Kew Gardens Hills and Pomonok areas. As Kew Gardens Hills gradually developed, the swamp shrunk in size with the street grid resting on top of it. The swamp was completely drained by 1918.

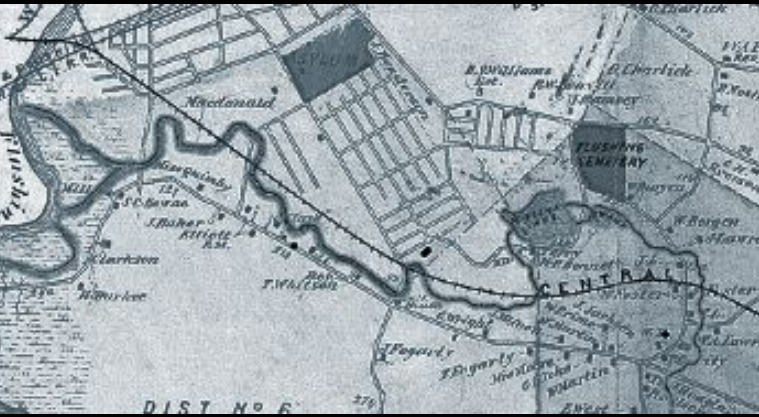
From the New York Times

How did Kissena creek “vanish”?



Evolving Kissena lakes:

Kissena Lake was dredged in 1942 as part of a Works Progress Administration initiative. This transformed Kissena Lake into a "bathtub lake" with a concrete shoreline. Prior to the renovation, Kissena Lake was part of a wetland. The lake suffered a buildup of algae. The western stretch of Kissena Corridor Park was landfilled in the 1950s from dirt excavated for the construction of the Long Island Expressway. These finally made the creek buried.





HURRICANE IDA

They Put Everything Into Their Homes. Not
One Was Spared in the Flood.



WHAT ARE WE TO DO?

They Put Everything Into Their Homes. Not
One Was Spared in the Flood.

WHAT DOES MORE WATER MEAN FOR NYC?

Move our homes higher and
vacate lower floors?



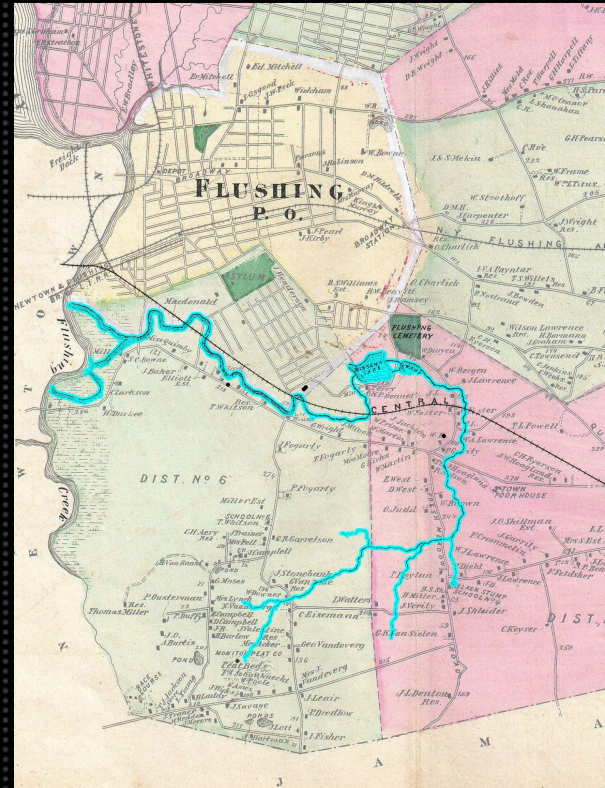
WHAT DOES MORE WATER MEAN FOR NYC?

Move residents out of
basement apartments?



WHAT DOES MORE WATER MEAN FOR NYC?

Prohibit building in areas that used to be marshes, wetlands, lakes streams?



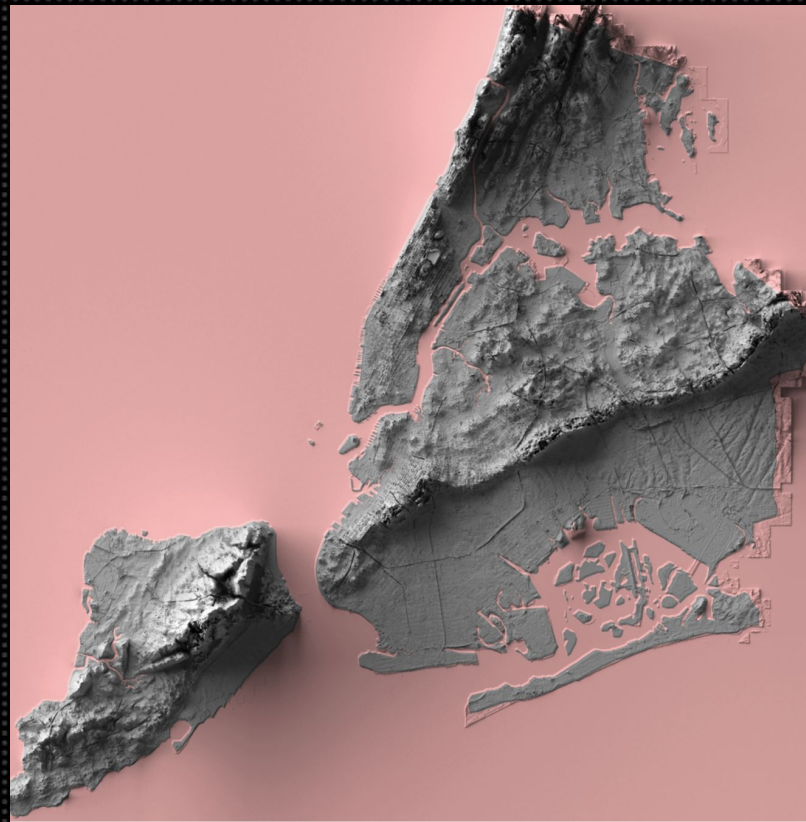
(Bowman et al. 2005)

WHAT DOES MORE WATER MEAN FOR NYC?

Concentrate new
development on higher
ground?

Making room for our
neighbors?

Scott Reinhard
2019



WHAT DOES MORE WATER MEAN FOR NYC?

Bring back former rivers and streams (daylighting)?

Making room for the water.

Before



After



Example: Seoul

WHAT DOES MORE WATER MEAN IN NYC?

- Managed Retreat
- Climate Migration
- Strategically Relocate
- Housing Choice

Call it what you wish, it requires the community to step in



Blue Acres Buyout Program, New Jersey

HOW CAN WE MAKE SPACE FOR OUR NEIGHBORS?



Infill development in Philadelphia



Infill development in the East Village,
Manhattan
Image: NYC HPD

AND MAKE ROOM FOR NATURE?

Investing in nature-based solutions will clean our air, increase public and mental health, enhance our ecology and beautify our neighborhoods

Image: Gotham Gazette





WE CAN....

**MAKE ROOM FOR THE
WATER.**

**MAKE ROOM FOR OUR
NEIGHBORS.**

MAKE ROOM FOR NATURE.

Source: Towards a Rainproof NYC, 2022

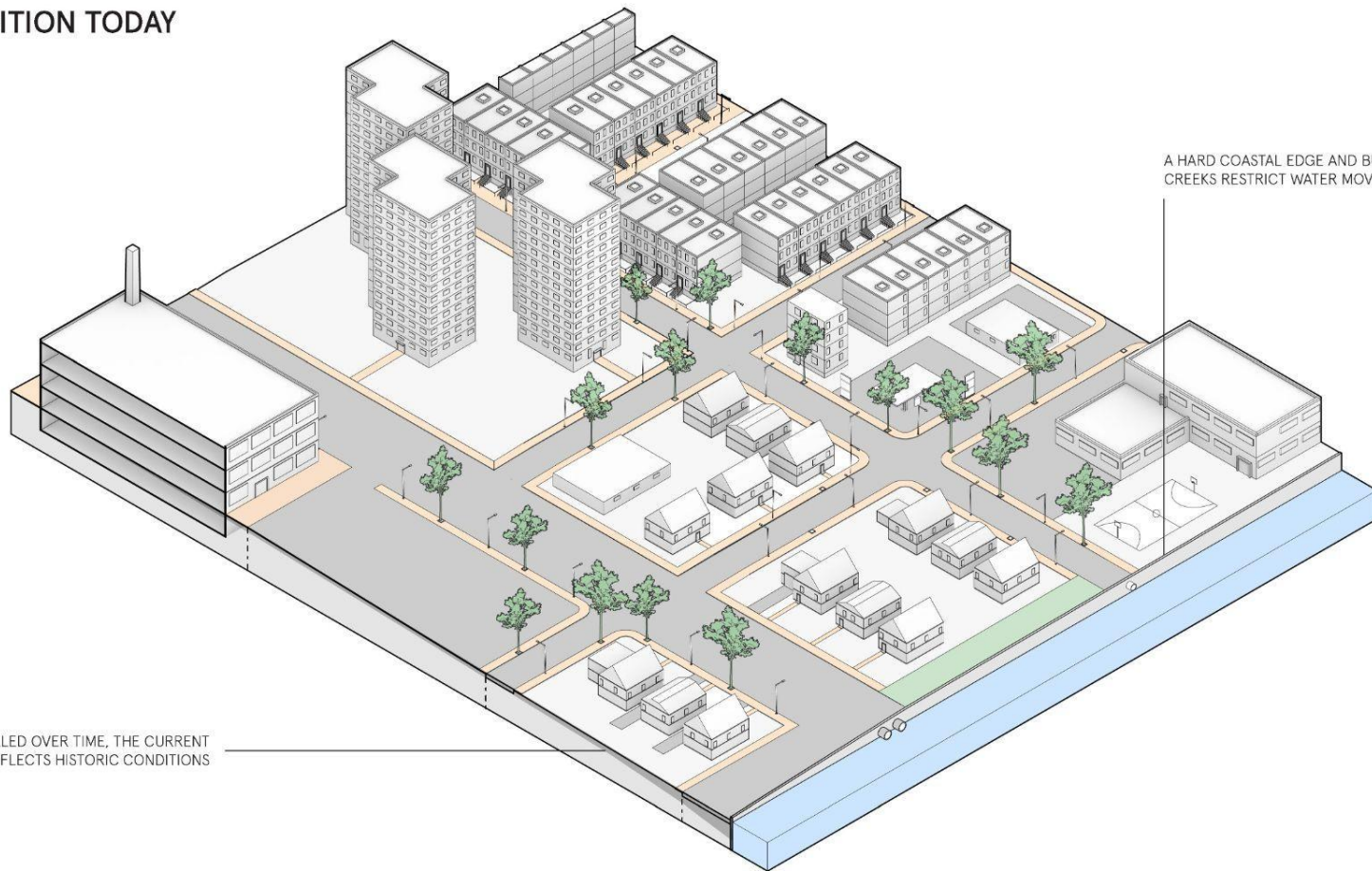
THE ORIGINAL ECOSYSTEM



THE CONDITION TODAY

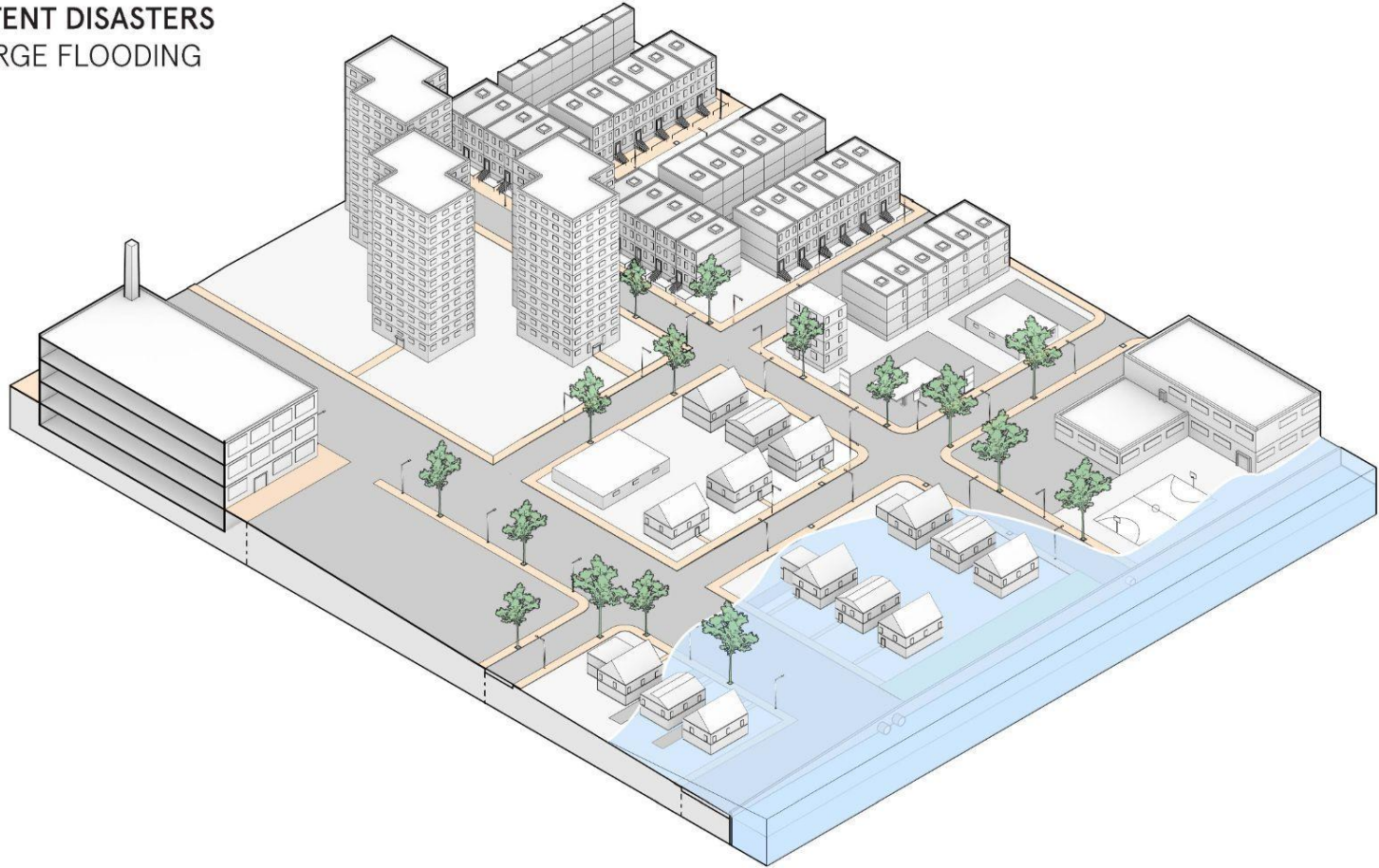
DESPITE BEING FILLED OVER TIME, THE CURRENT
TOPOGRAPHY REFLECTS HISTORIC CONDITIONS

A HARD COASTAL EDGE AND BURIED
CREEKS RESTRICT WATER MOVEMENT

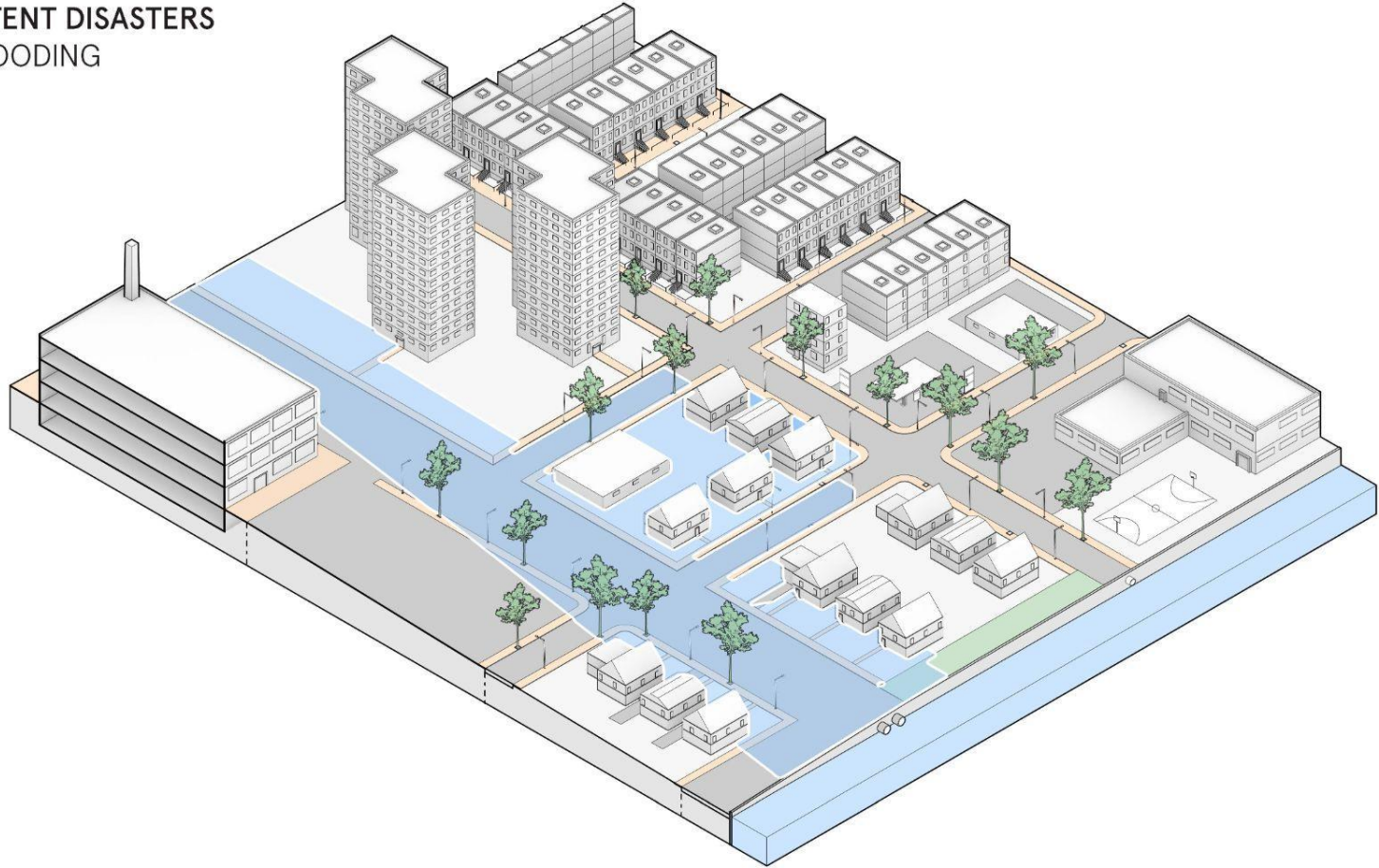


INTERMITTENT DISASTERS

STORM SURGE FLOODING



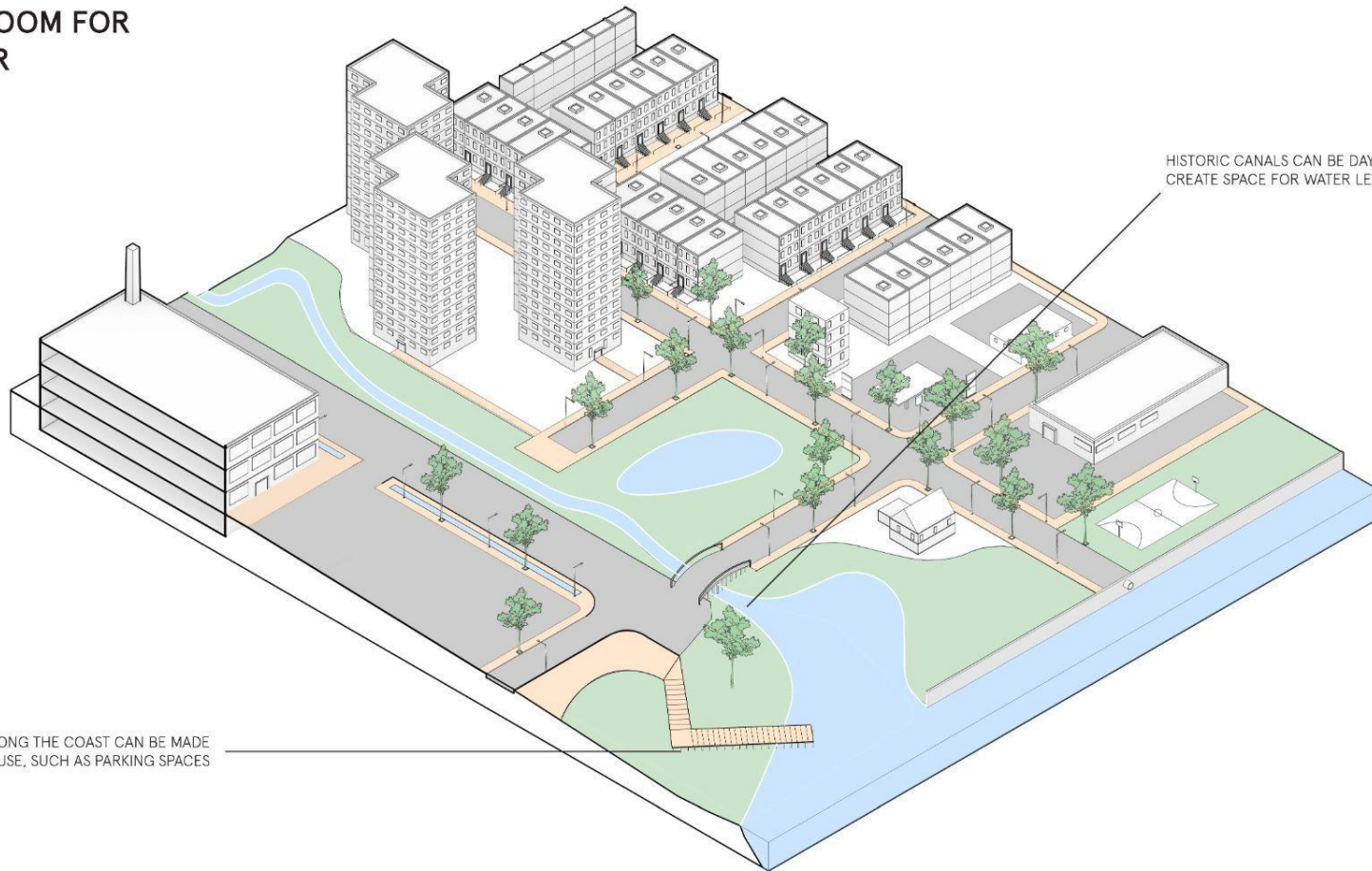
INTERMITTENT DISASTERS URBAN FLOODING



MAKING ROOM FOR THE WATER

LAND USE ALONG THE COAST CAN BE MADE
TO BE LOW USE, SUCH AS PARKING SPACES

HISTORIC CANALS CAN BE DAYLIGHTED TO
CREATE SPACE FOR WATER LEVELS TO RISE



INTERVENTIONS: DAYLIGHTING RIVER

DAYLIGHTING RIVER

Holds stormwater run-off from adjacent streets and properties.
More space for fluctuating water levels.



INTERVENTIONS: RETENTION POND



RETENTION POND

Extra stormwater run-off held temporarily in sunken areas in park.

The pond slowly releases stormwater into the ground for replenishing groundwater.

Example: Strategy for Abandoned Areas Management - Montpellier



INTERVENTIONS: WATER SQUARE



WATER SQUARE

When sub-surface crates are full, sunken playground fills temporarily with additional stormwater run-off. Additional infiltration crates.

Example: "Water Square" in Benthemplein



RESILIENCY PARK: HOBOKEN, NJ



PARK FEATURES:

- 2-MILLION-GALLON UNDERGROUND TANK
- SURFACE-LEVEL RAIN GARDENS
- RECYCLED GRAY WATER FOR IRRIGATION
- MULTI-PURPOSE ATHLETIC FIELD & BASKETBALL COURT
- PLAYGROUND & OPEN LAWN SPACE
- RECREATIONAL WATER FEATURE
- TERRACE PAVILION WITH CAFÉ



RESIST

Hard and soft protective infrastructure

Coastal protection measures like floodwalls, bulkheads, and levees, combined with landscaped berms, provide a physical barrier along the waterfront to protect against storm surge and tidal flooding.



DELAY

Slowing water at the surface

Green infrastructure such as rain gardens, vegetated streetscapes, and permeable surfaces slows stormwater runoff at its source, giving the sewer system more time to manage inflows.



STORE

Holding excess water underground

Underground detention systems like large storage tanks beneath parks which temporarily store millions of gallons of rainwater during a storm to reduce surface flooding and sewer overload.

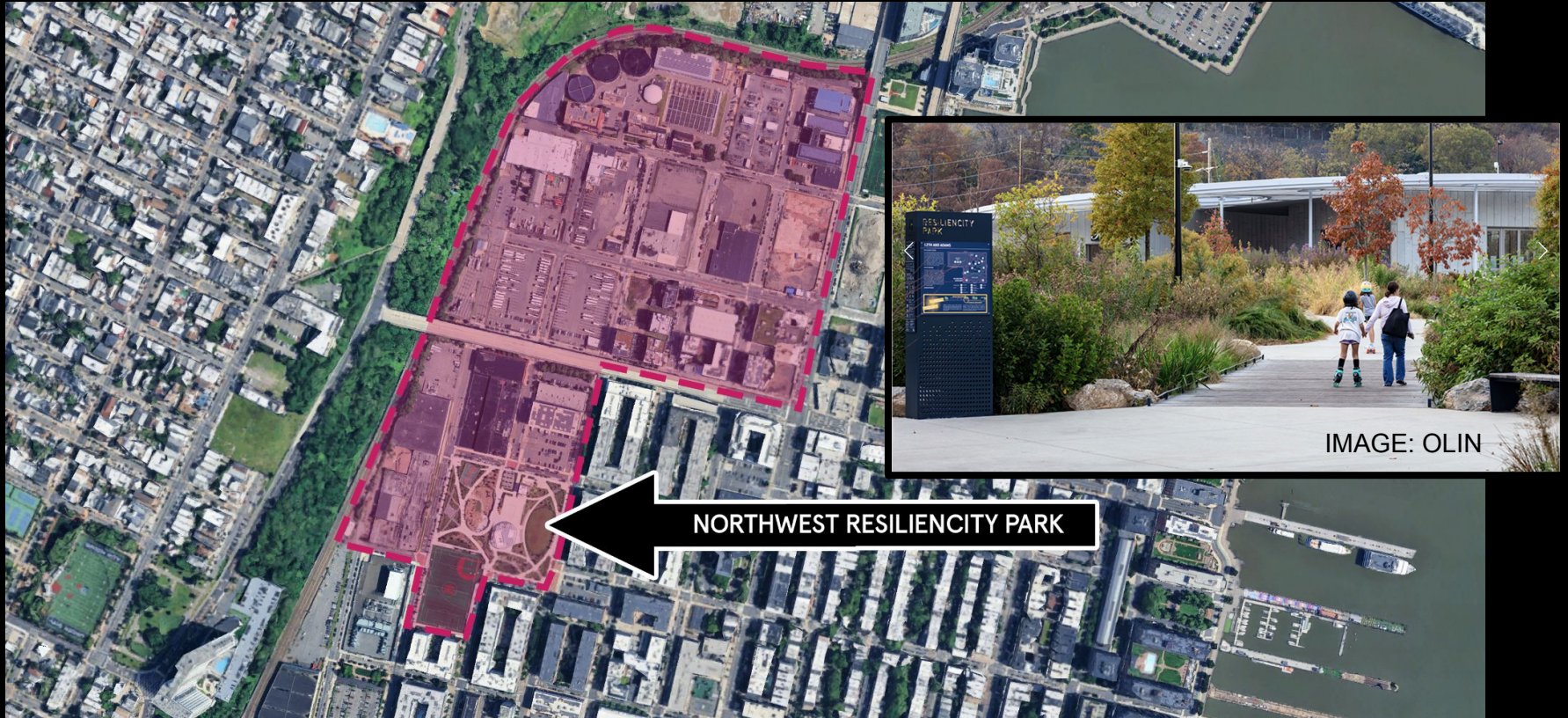


DISCHARGE

Releasing water safely

Pump stations discharge stored stormwater back into the river in a controlled way after the storm passes, reducing combined sewer overflow and protecting water quality.

ONE PARK. 2 MILLION GALLONS. 20 BLOCKS PROTECTED.



MAKING ROOM FOR NATURE

PLANTING ALONG CANALS CAN CREATE COOLING EFFECTS IN WARM WEATHER

GREEN ROOFS CAN HELP CONTRIBUTE TO MIGRATION CORRIDORS FOR ANIMALS



INTERVENTIONS: GREEN & BLUE ROOFS

GREEN & BLUE ROOFS

A Blue Roof temporarily holds a layer of water on the roof.

A Smart Blue-Green Roof with a detention crate under extensive planting connected to the internet will empty prior to a rain event.

Intensive green roof with bigger plants and more soil.



Example: Eco-roof Incentive Programme - Portland (Yellow Roof)



INTERVENTIONS: DEPAVING



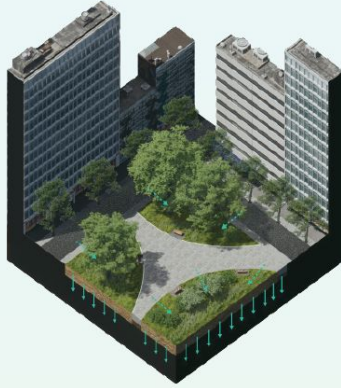
DEPAVING

Add green areas to previously paved squares and pavements. Lowered green areas can temporarily hold stormwater runoff from paved areas.

Example: Repurposing streets to green transit areas - Amsterdam



INTERVENTIONS: DEPAVING



DEPAVING

Add green areas to previously paved squares and pavements. Lowered green areas can temporarily hold stormwater run-off from paved areas.

Example: National Dutch Championship 'Tile-tipping' (NK Tegelwippen)



INTERVENTIONS: GREEN PARKING LOT

GREEN PARKING LOT

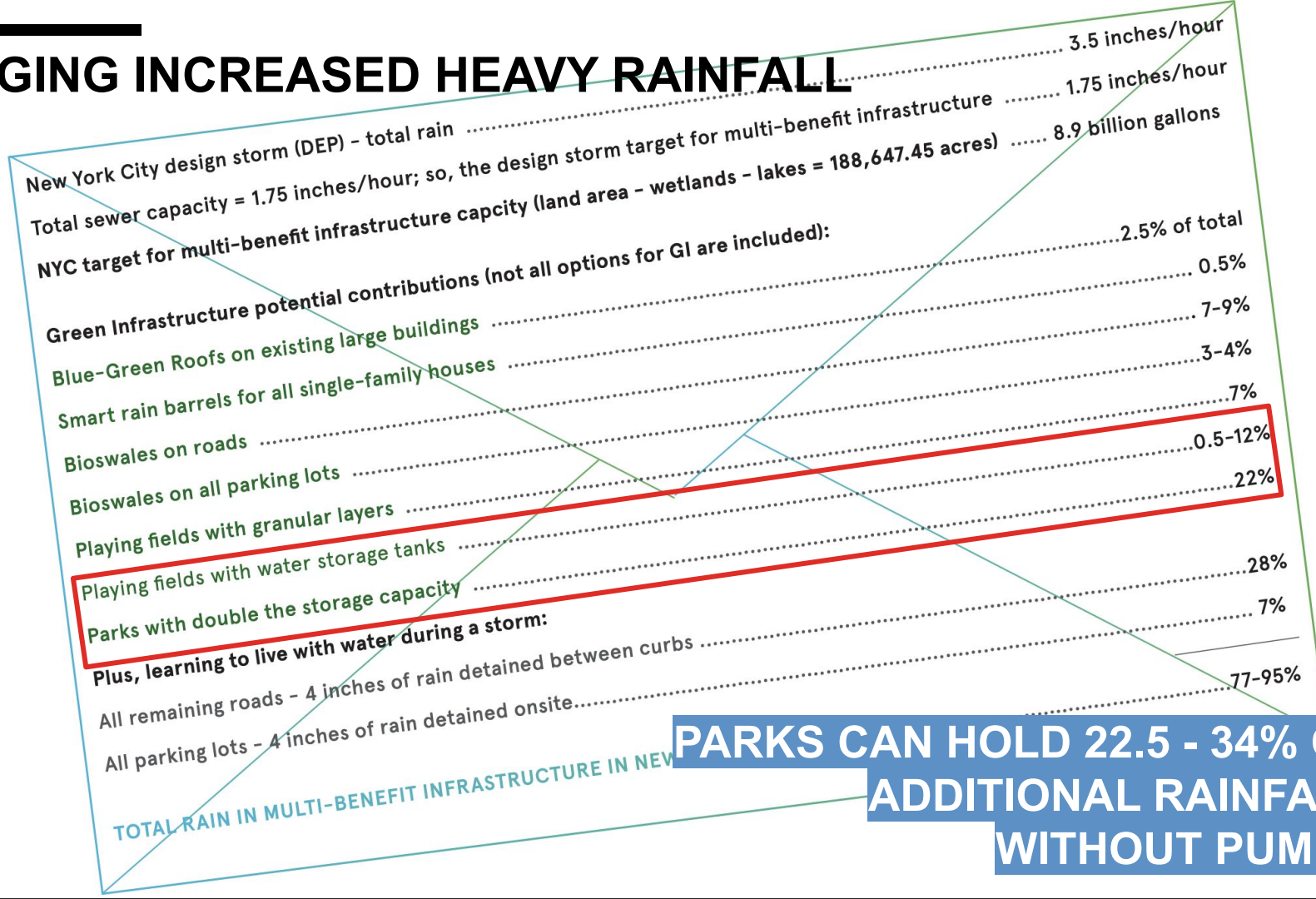
Permeable paving and bioretention strips hold water between curbs during an extreme rain event.



Example: Statute on the design of parking spaces - Chemnitz



MANAGING INCREASED HEAVY RAINFALL



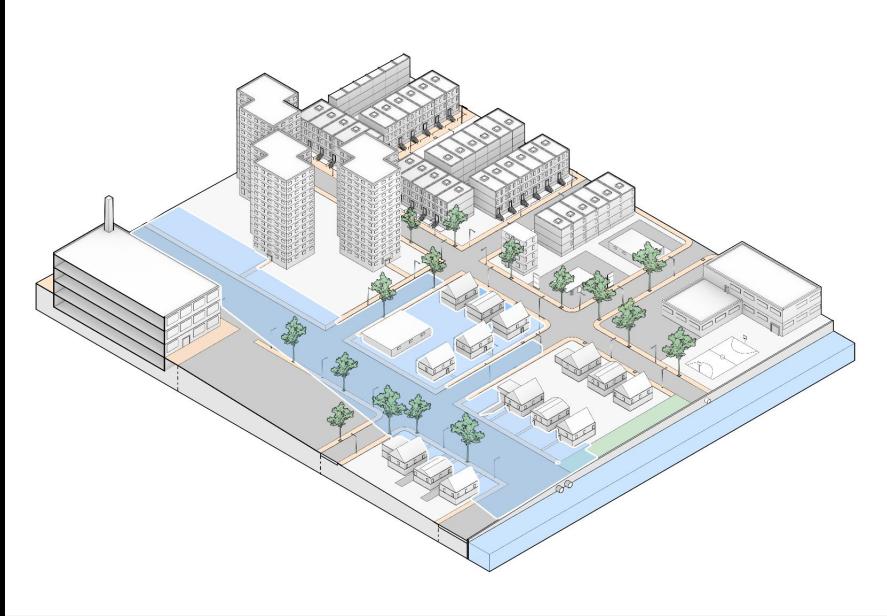
MAKING ROOM FOR OUR NEIGHBORS

VACANT AND PARKING LOTS CAN BE USED
TO STRATEGICALLY ADD RESIDENTIAL USE

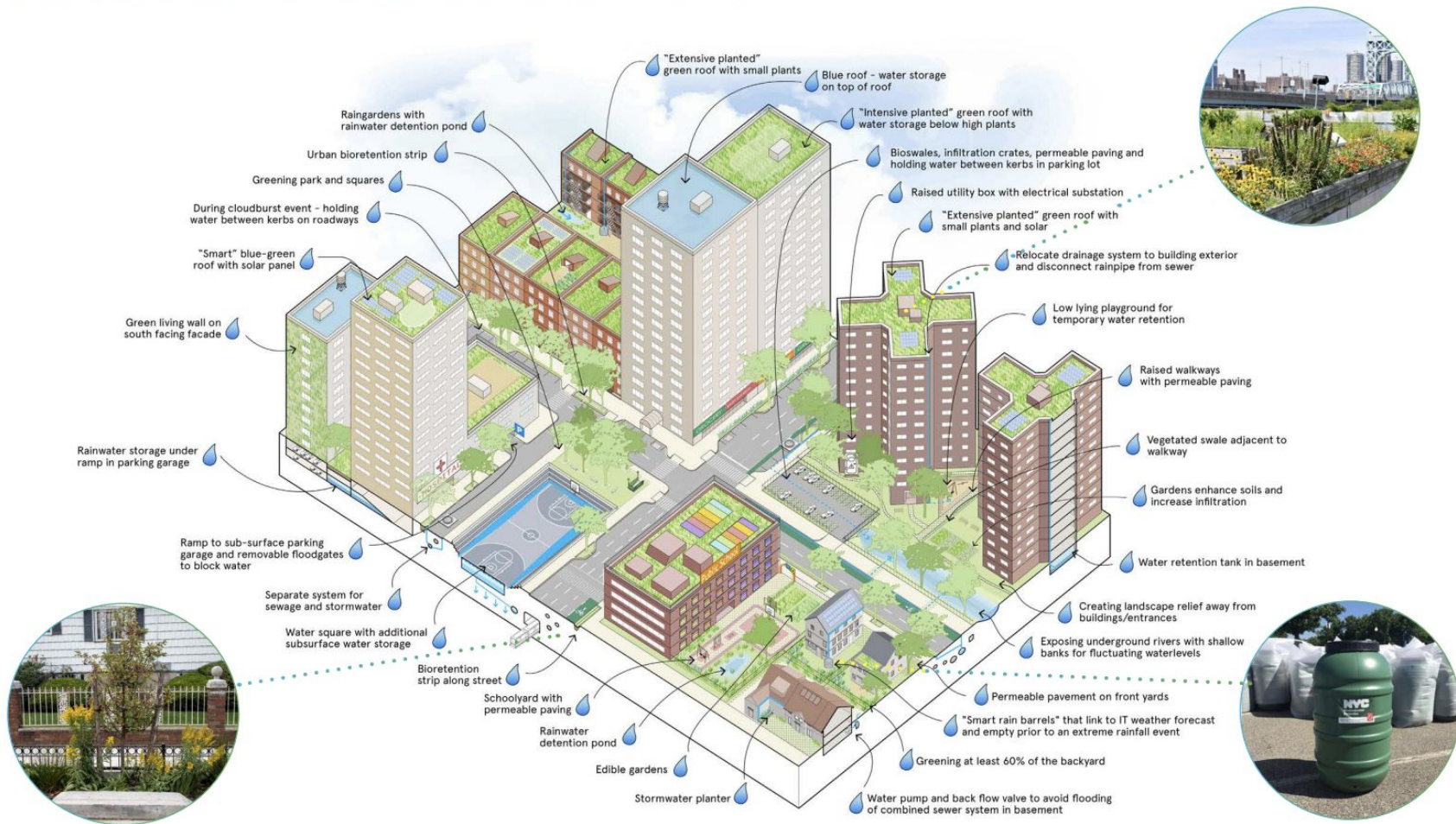
LOW EFFICIENCY LAND USES CAN BE
RELOCATED AND CONVERTED TO HOUSING



DENSITY: MAKING ROOM FOR NEIGHBORS



TOWARD A RAINIPROOF NYC



DISCUSSION

What challenges have you experienced?

What help you need and how can we help each other?

How have you successfully collaborated to address these challenges?