

# **“NEW MANNAHATTA 2100”:** **Re-interpreting the Urban Patterns in Manhattan island, NYC**

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5483646







Madelon Vriesendorp, *Freud Unlimited*, 1976

Source: Architectural Review



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# PROBLEM FIELD



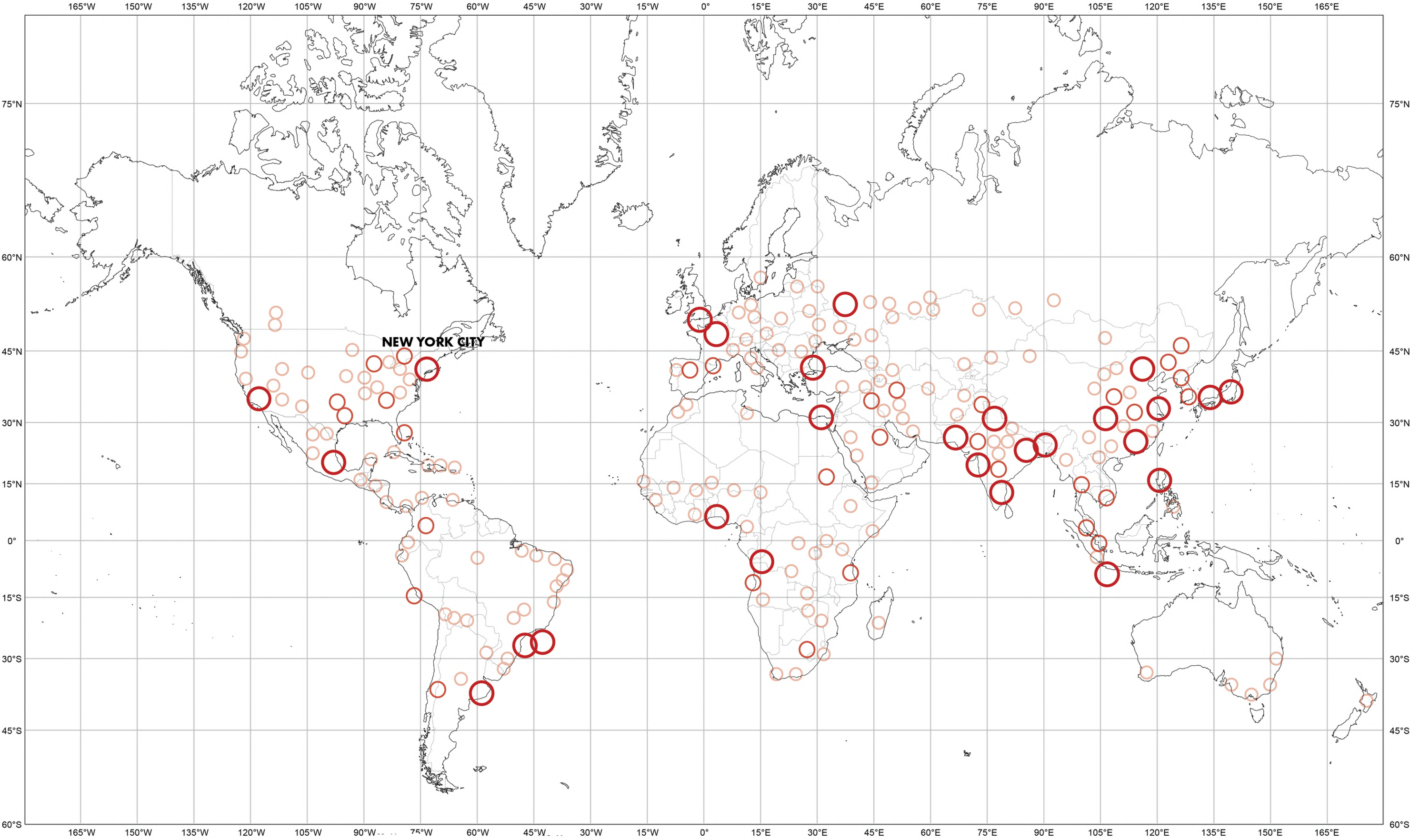
## **PROBLEM STATEMENT**

Manhattan island in New York City suffers from housing crisis, social segregation and flood risk. The limited new horizontal development, social inequalities and the threatening rising sea levels make vital the re-interpretation of the existing urban patterns and the potential for a future expansion.



MEGACITIES

PROBLEM FIELD



City population

10 million or more

5 - 10 million

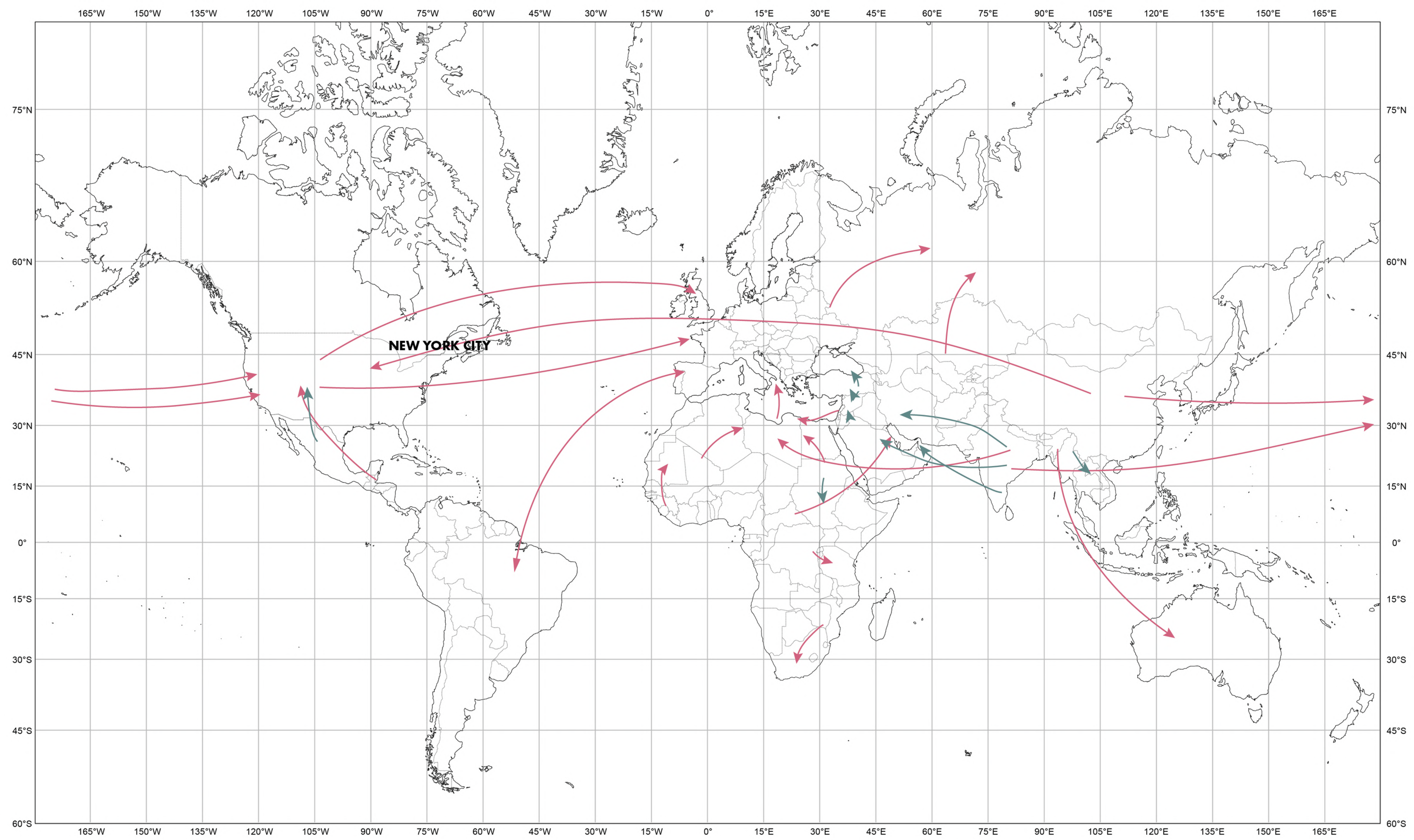
1.5 million

Source: AUTHOR based on United nations, 2014 b



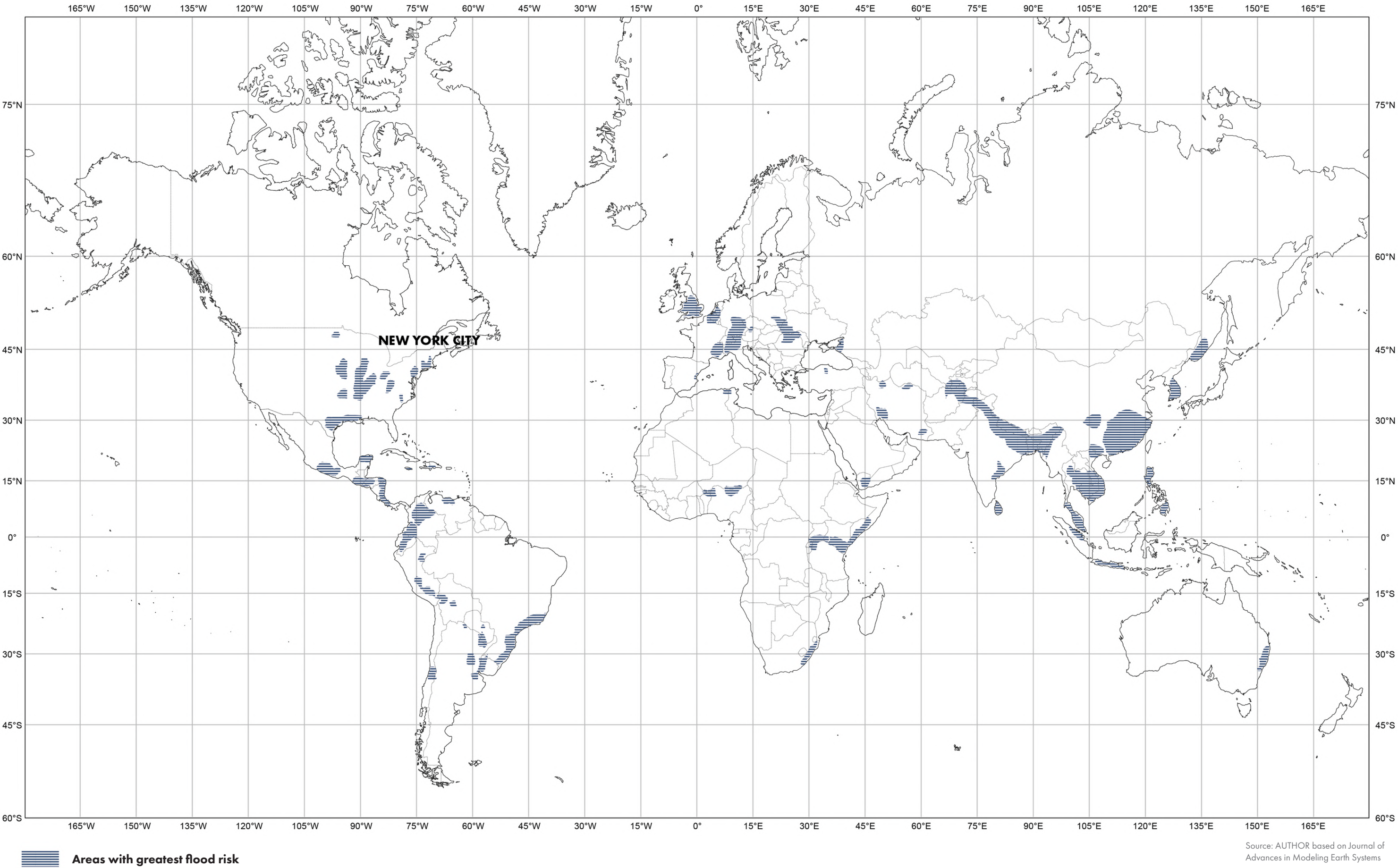
MIGRATION ROUTES

PROBLEM FIELD



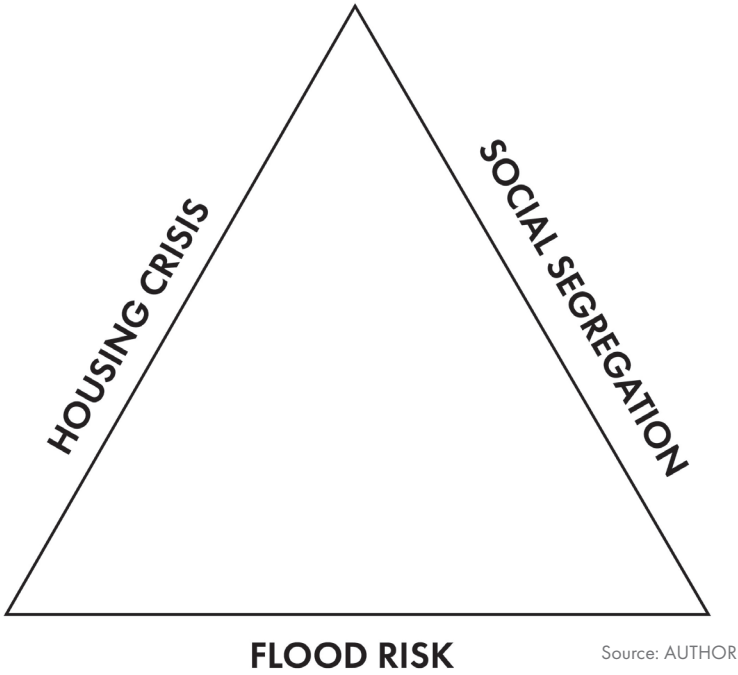
Global Routes       Main international Migration Routes       Top Ten Bilateral Migration Corridors with largest average annual change, 2010 - 2015

Source: AUTHOR based on Economic Forum





THE CHALLENGES



PROBLEM FIELD



Sources: EF Education, Vogue, Daily Mail ( photos edited by AUTHOR)

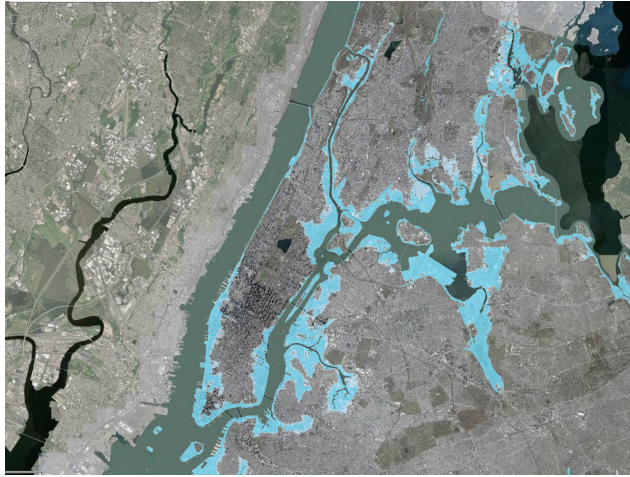


FLOOD RISK



Floodplain 2020

Source: Extracted from  
DCP MAPS ARCGIS



Floodplain 2050

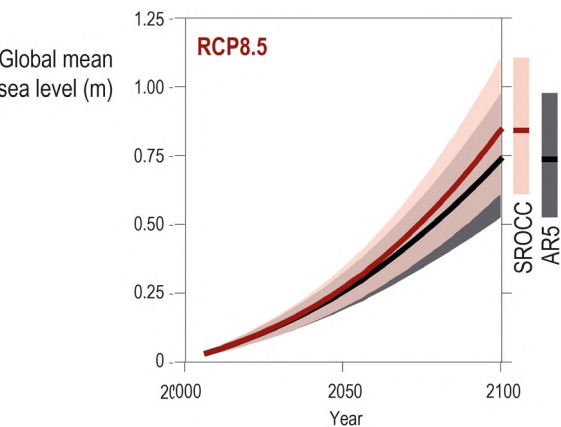
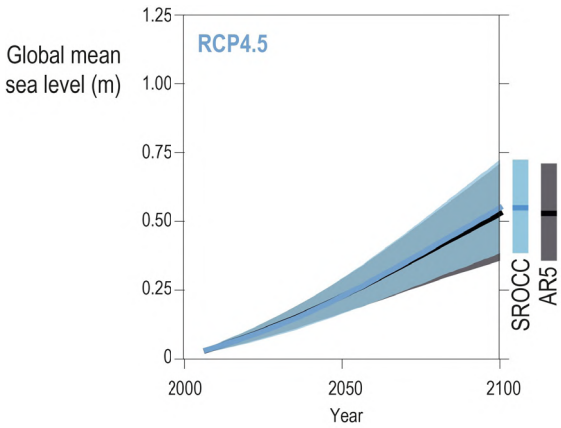
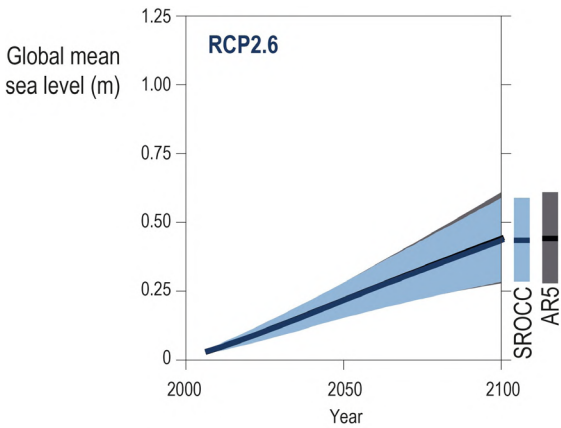
Source: Extracted from  
DCP MAPS ARCGIS



Floodplain 2100

Source: Extracted from  
DCP MAPS ARCGIS

PROBLEM FIELD



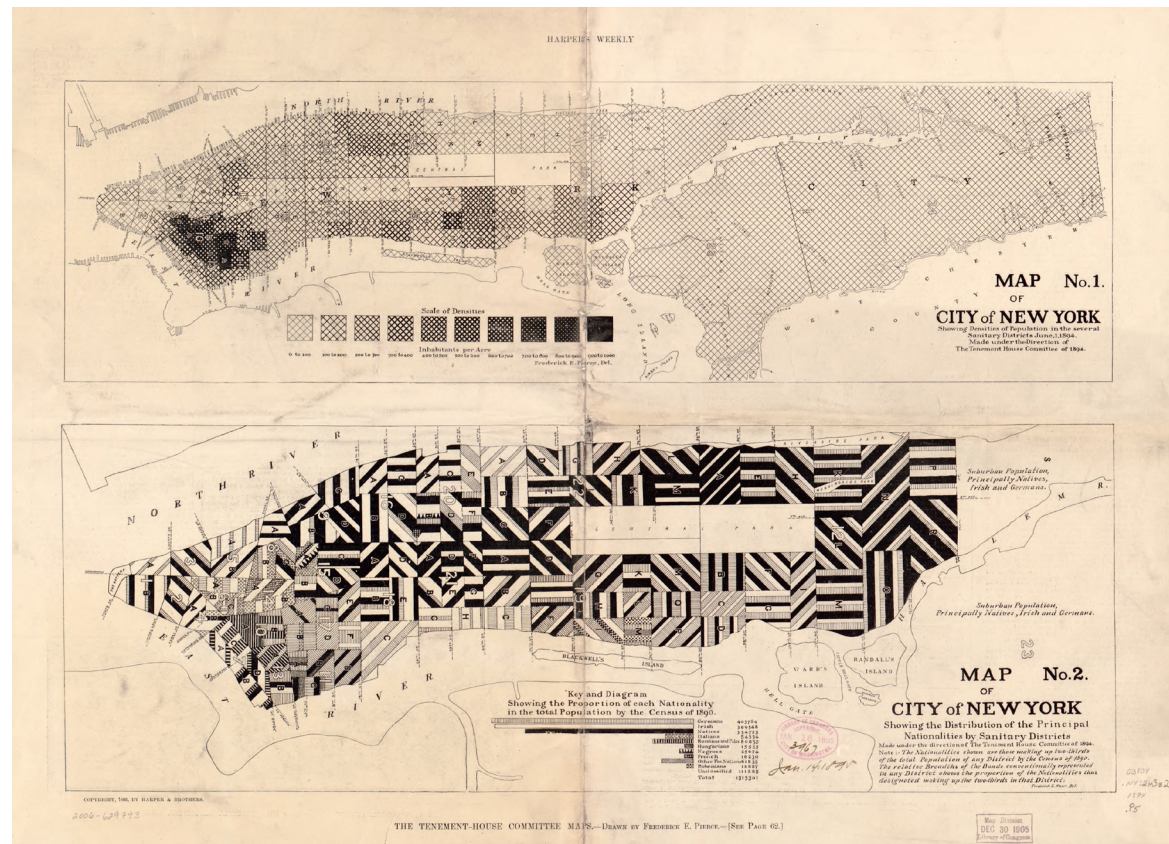
Sea Level Rise Projection

Source: IPCC



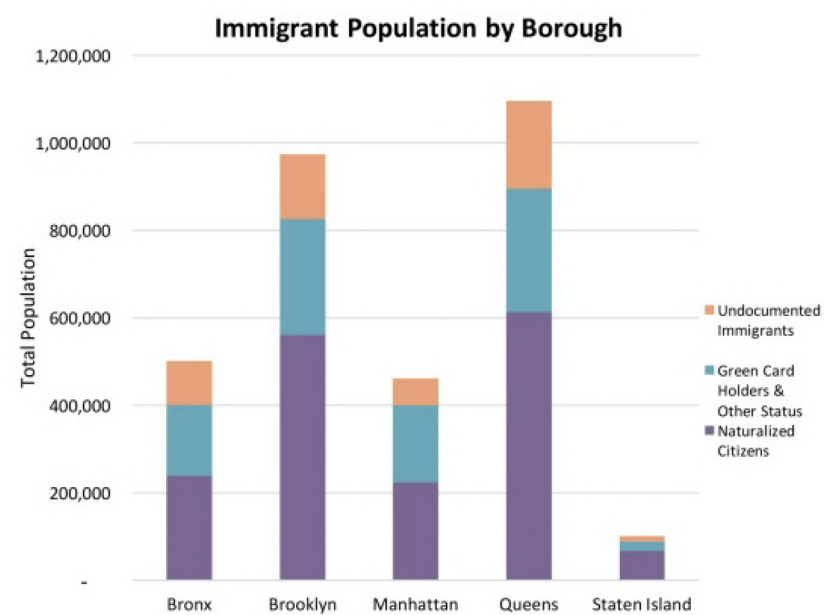
## SOCIAL SEGREGATION

## PROBLEM FIELD



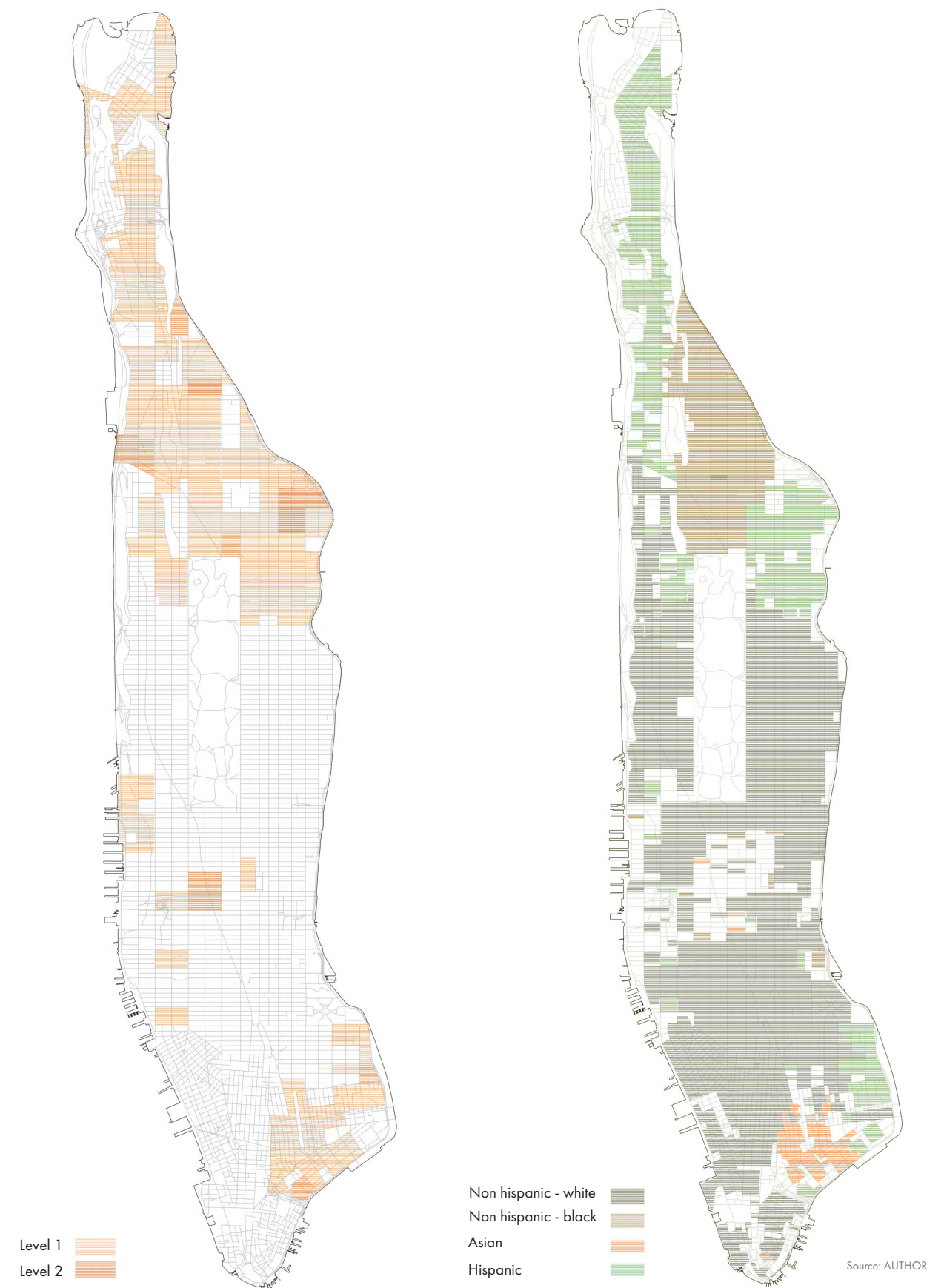
## Population growth and migration patterns

Source: Mapping the Nation



### Immigrant population and number of migrants

Source: NYC gov

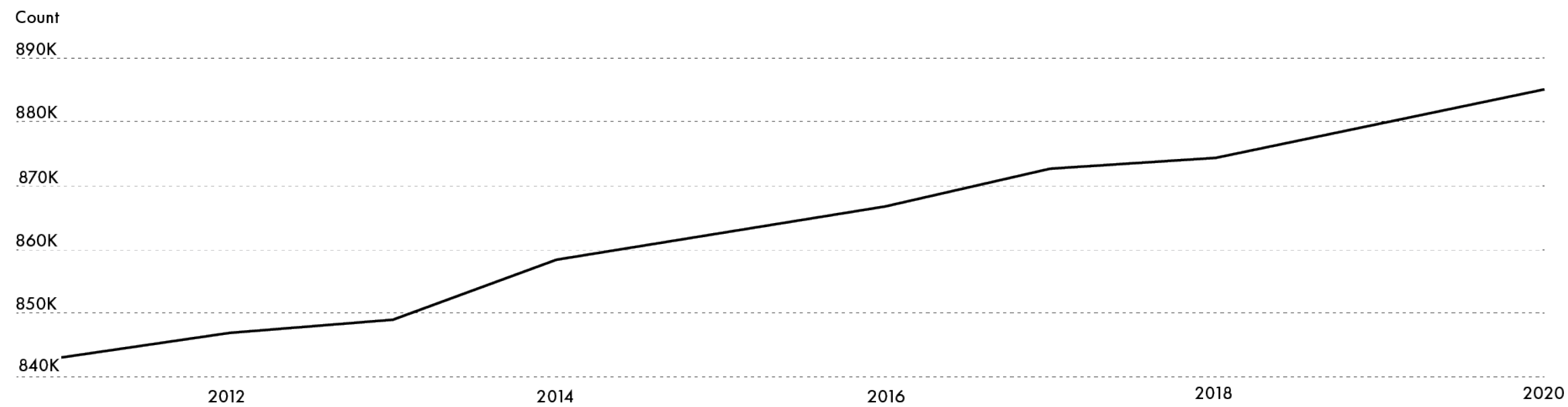


### Poorest Neighborhoods

## Ethnic Diversity

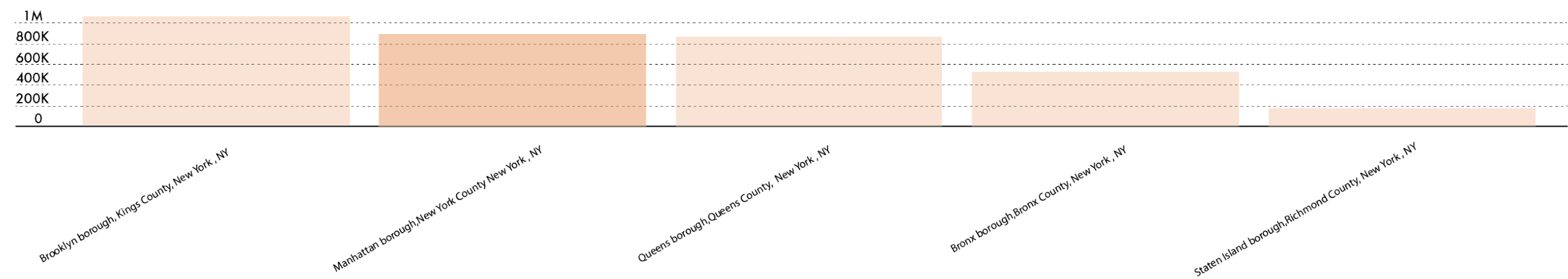
0 1.5 3 km





Count of Housing Units, Manhattan

Source: AUTHOR based on Data Commons



Housing Units by Borough, NYC

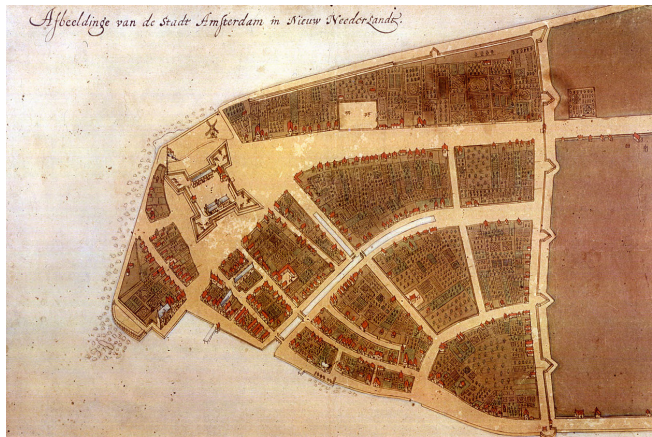
Source: AUTHOR based on Data Commons



# METROPOLITAN CONTEXT

HISTORICAL EVOLUTION OF THE ISLAND

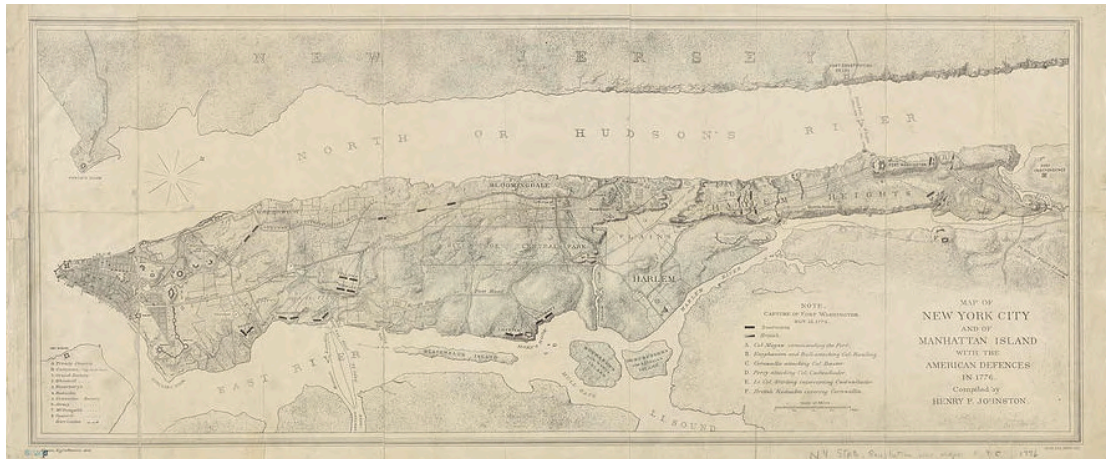
METROPOLITAN CONTEXT



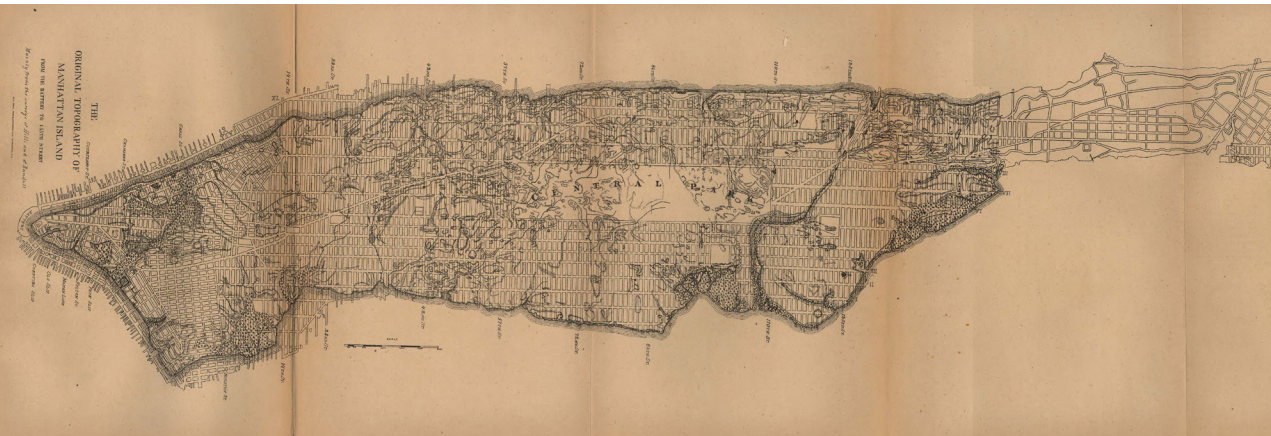
1660 Source: New York Public Library



1865 Source: Library of Congress



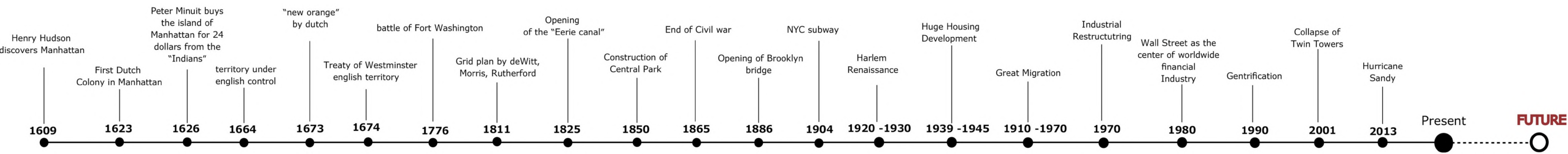
1776 Source: Brooklyn Public Library



1880 Source: Report on the Social Statistics of Cities



Timeline of Events



Source: AUTHOR



Coastline expansion

Source: AUTHOR



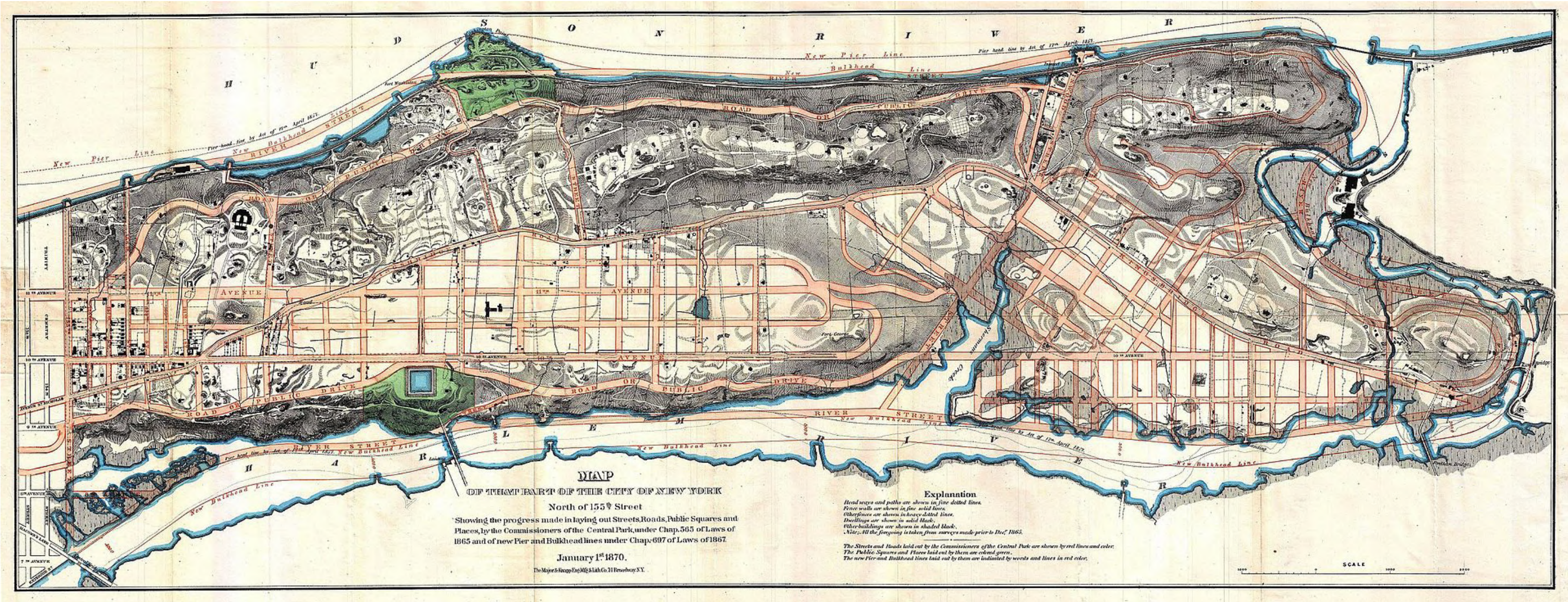
MANHATTAN 1609



MANHATTAN 2022







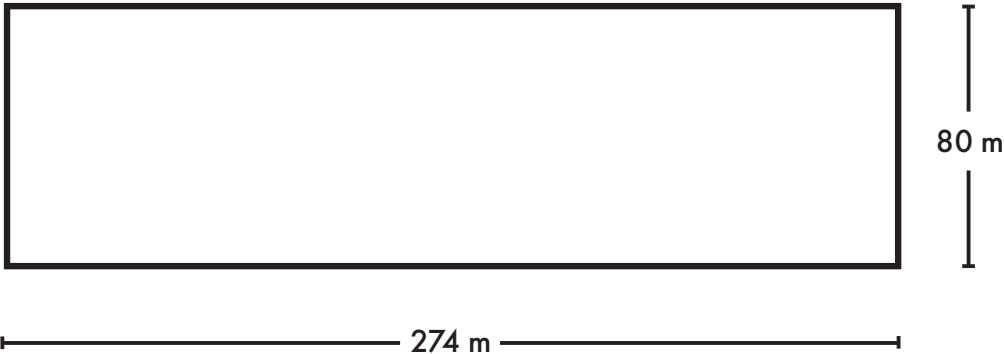
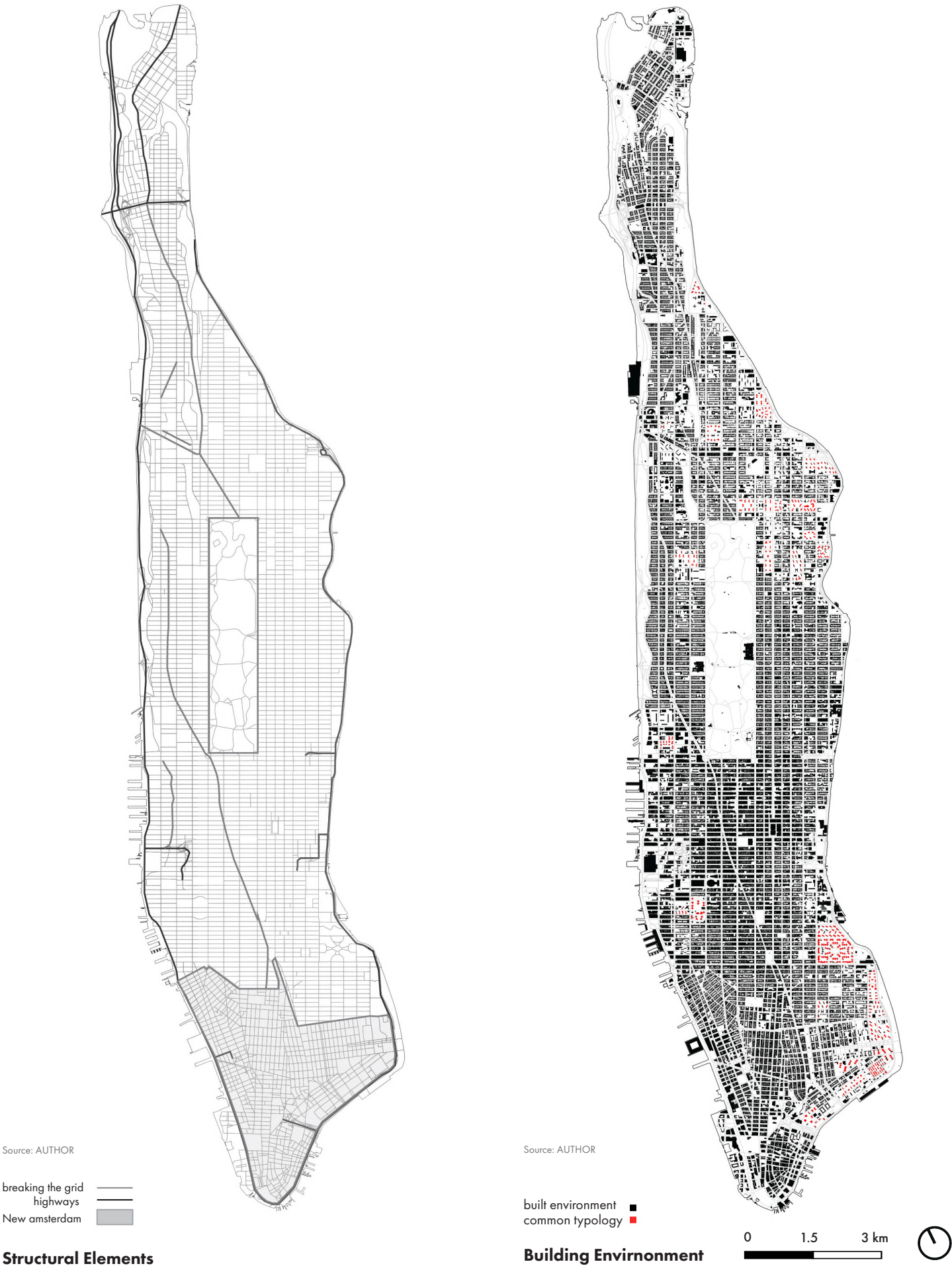
The Knapp map, 1870

Source: Geographicus.com



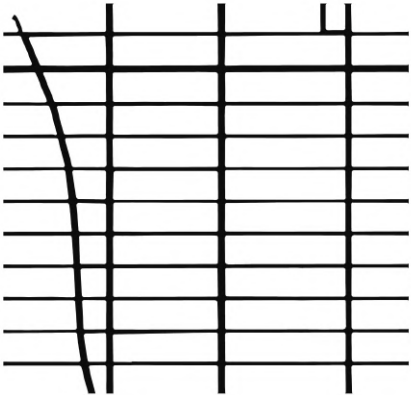
MANHATTAN GRID

METROPOLITAN CONTEXT



Typical Block Dimension

Source: AUTHOR



Grid

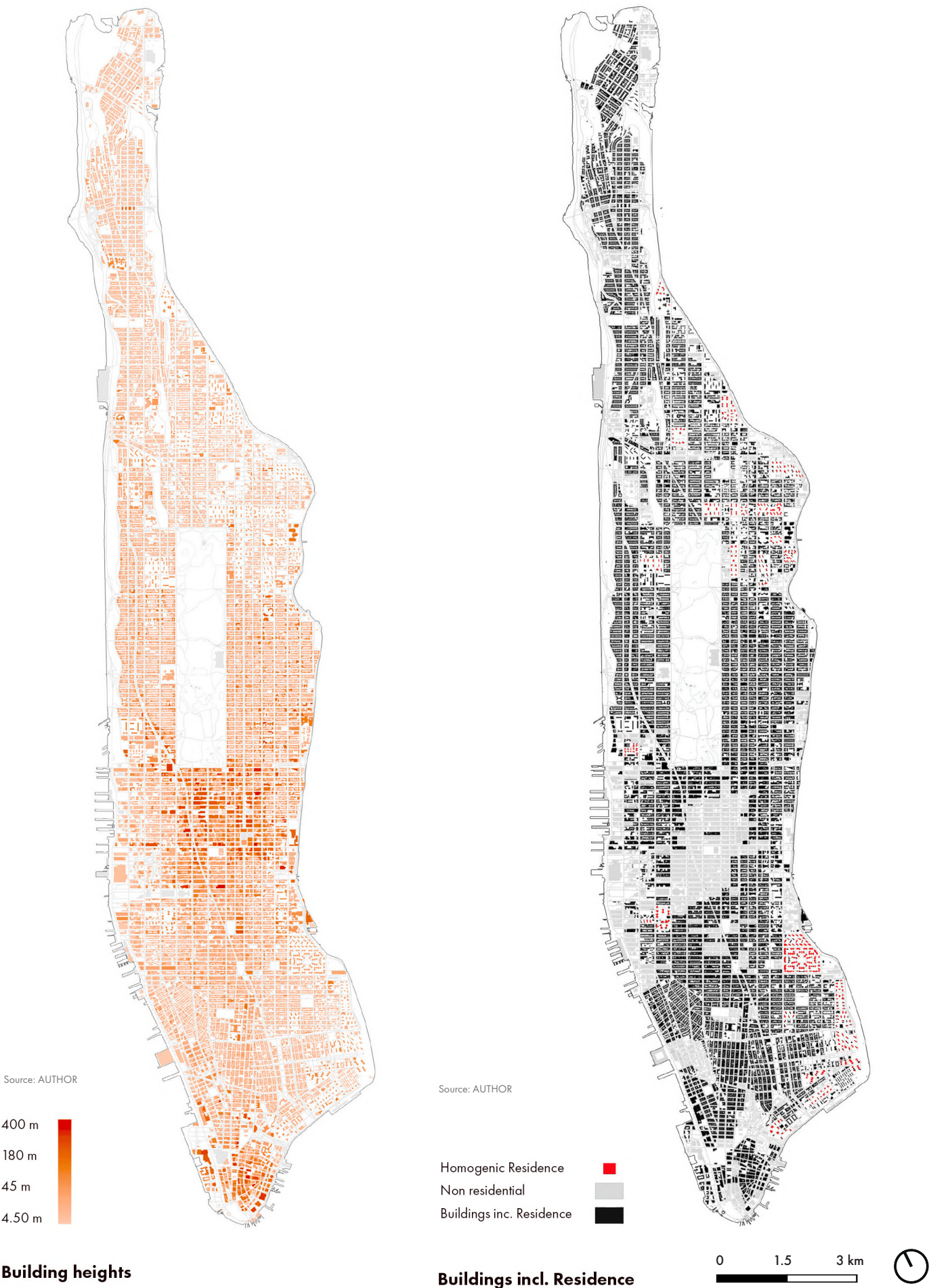


Block Dimension



Program

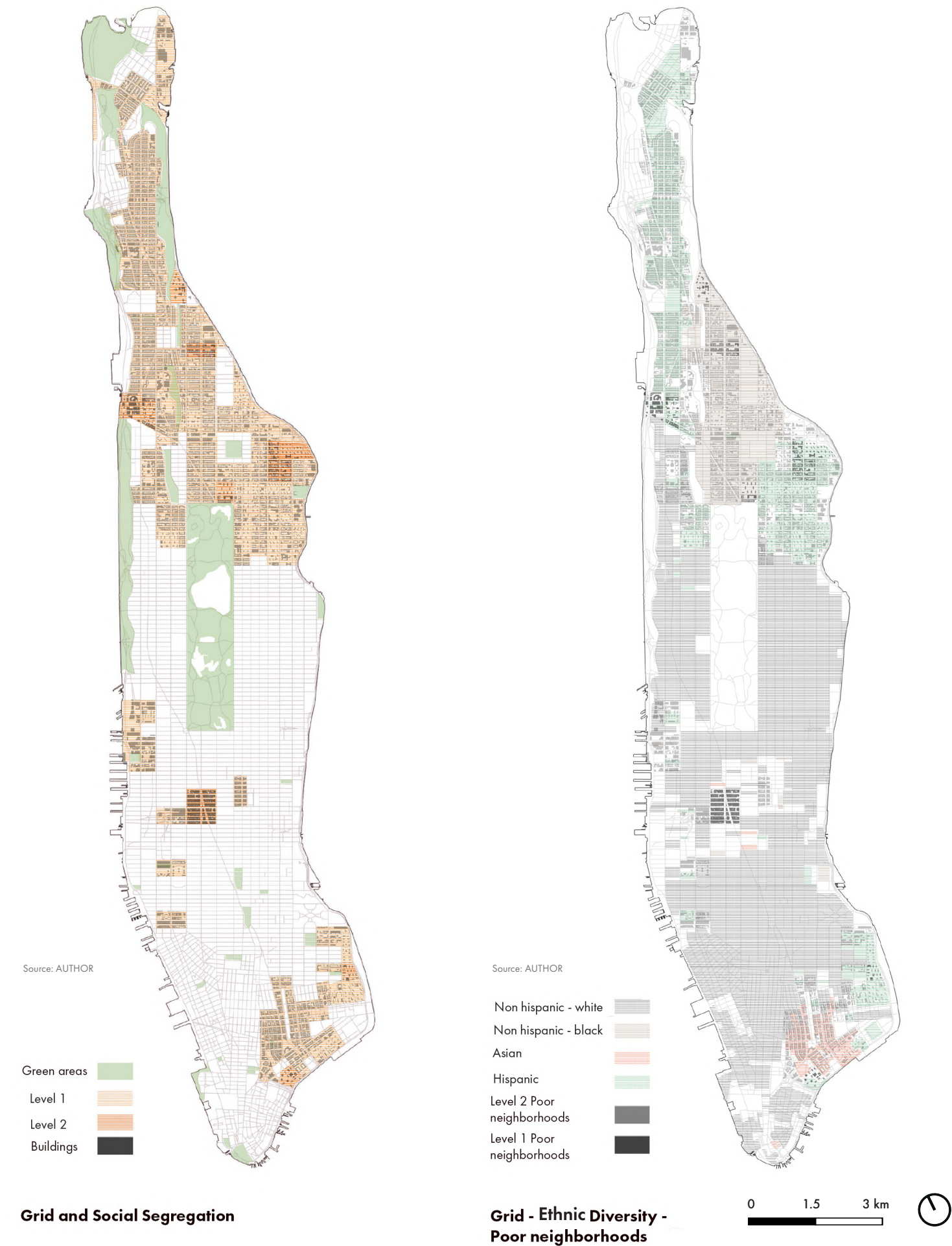




KEY POINTS

- The limited horizontal development created a variety of building densities in the metropolitan region leading to a compact dense building environment with skyscrapers.
- The majority of the tallest buildings are located in the typical grid plan.
- The social housing sites stand as exceptions to the typical grid, forming superblocks.
- The tallest heights in most cases occupy buildings that are not residential.

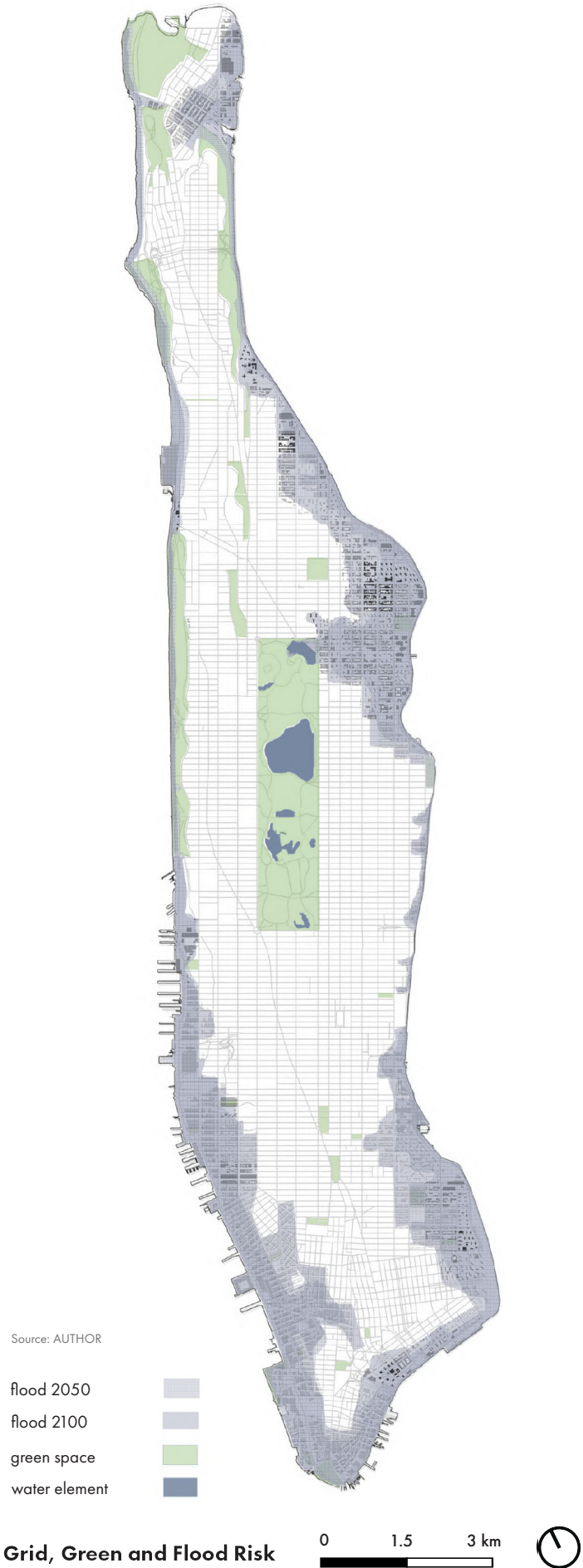




KEY POINTS

- The grid organization has a social impact leaving the poorest neighborhoods on the edges with not enough proximity of public space between leading to segregation.
- The overlapping of poor neighborhoods and the ethnic communities indicate that the typical grid occupied uniformity not only in plan but in social structure with ineffective social mix.
- The block differentiation on the edges questions the potential of the grid in the social mix in Manhattan.
- There is a need for using the grid as an incubator for social interactions between all classes and ethnicities in order to achieve social diversity.

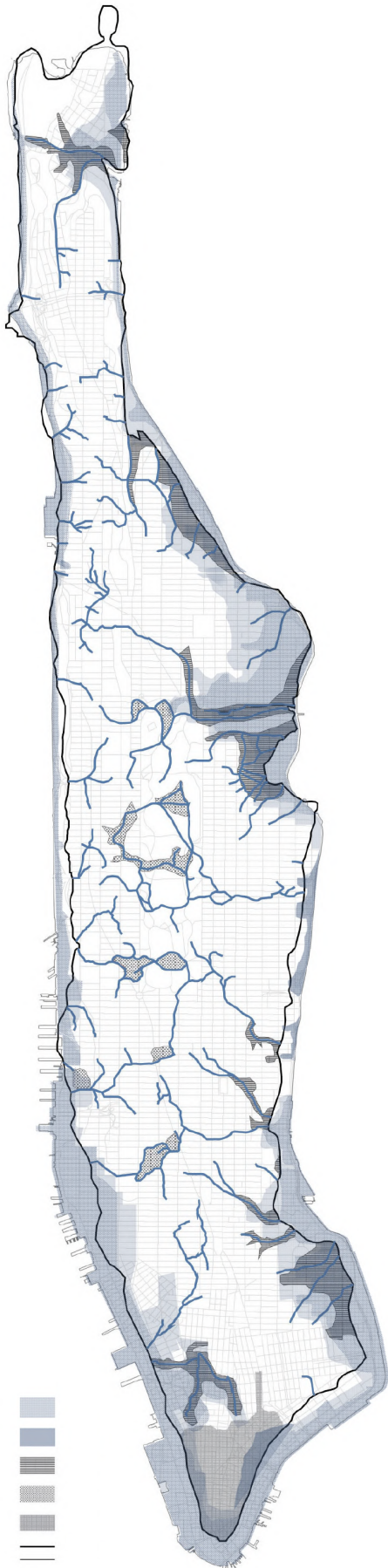




KEY POINTS

- The spatial organization of a city, the water reservoirs and the green patches play a significant role in the resiliency towards flood vulnerability.
- The water presence only in Central Park and the ineffective distribution of green patches in the flood prone areas worsens the water capacity.
- The flood prone areas present differentiation from the typical grid plan.
- In many cases poor neighborhoods are located on the edges in the flood prone areas.





KEY POINTS

- The waterbodies constitute a significant factor towards the mitigation of flood risk in a metropolitan area suffering from severe storm surge events like the one of Manhattan.
- The application of the grid plan did not take into account the natural mechanisms including streams and wetlands.
- The overlapping of the flood prone areas with the past streams and wetlands shows that the floodplain is emergent in the areas were the natural wetlands were located.
- The application of the grid plan led to the burial and concretization of the streams.

Source: AUTHOR

flood 2100  
flood 2050  
saltwater wetlands  
freshwater wetlands  
new amsterdam  
hidden streams

Past Landscape, Grid, Flood Risk

0 1.5 3 km







Viele map, Sanitary & Topographical Map of the City and Island of New York, 1865

Source: Library of Congress



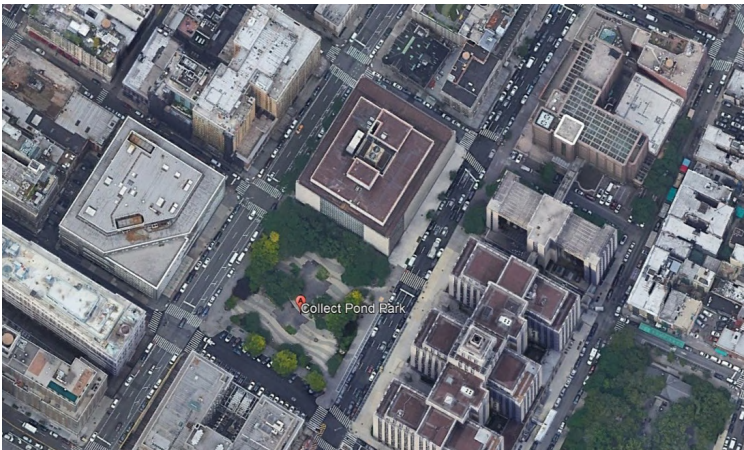
THE PAST STREAMS

METROPOLITAN CONTEXT



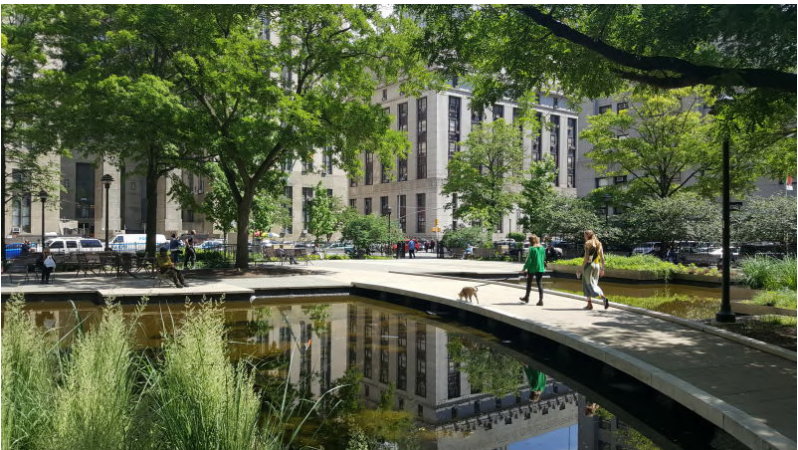
Collective Pond

Source: Extracted from Viele Map



The Park

Source: Extracted from Google Earth



Source: NYC Parks



Canal Street

Source: Extracted from Viele Map



Capsuto Park

Source: Elyn Zimmerman

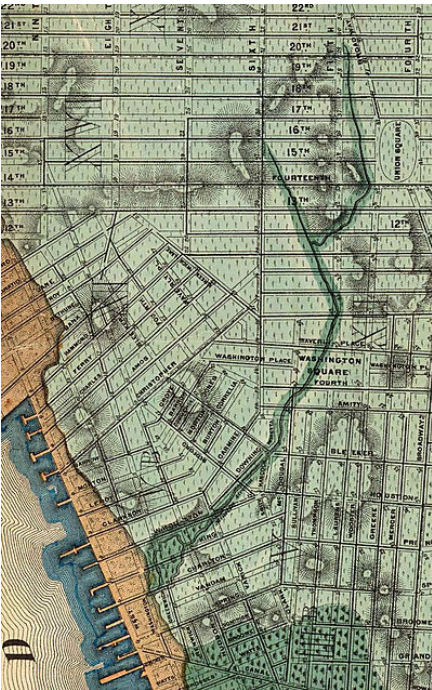


Canal Street

Source: AUTHOR using VR lab



THE PAST STREAMS



Minetta Brook

Source: Extracted from Viele Map



Harlem Creek

Source: Extracted from Viele Map

METROPOLITAN CONTEXT



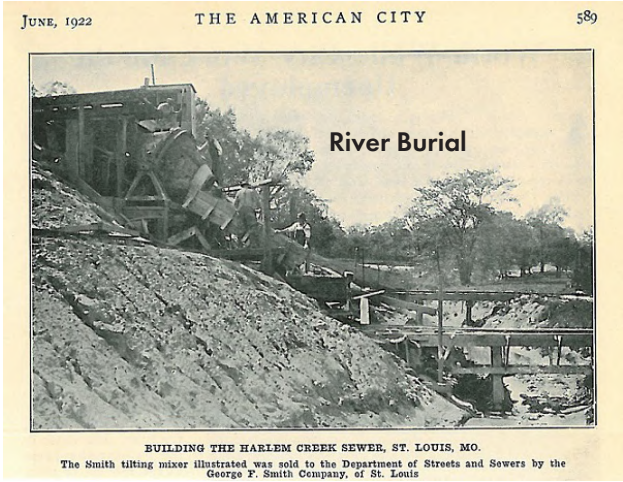
River overflow

Source: ScoutingNY.com



Hidden stream

Source: Untapped Cities.com



River Burial

Source: Hidden Waters Blog



Underground flow

Source: Hidden Waters Blog



## RESEARCH QUESTION

What is the interpretation of the grid in the face of exacerbated climate change in Manhattan in order to achieve a flood adaptive system of interventions?

### Research Sub - questions

- 1) How can the grid reinforce the resilience of the metropolitan area against flood vulnerability?
- 2) How can the grid foster the integration of more inclusive public spaces?
- 3) How can the flood resilience of the grid affect the housing densification strategies?



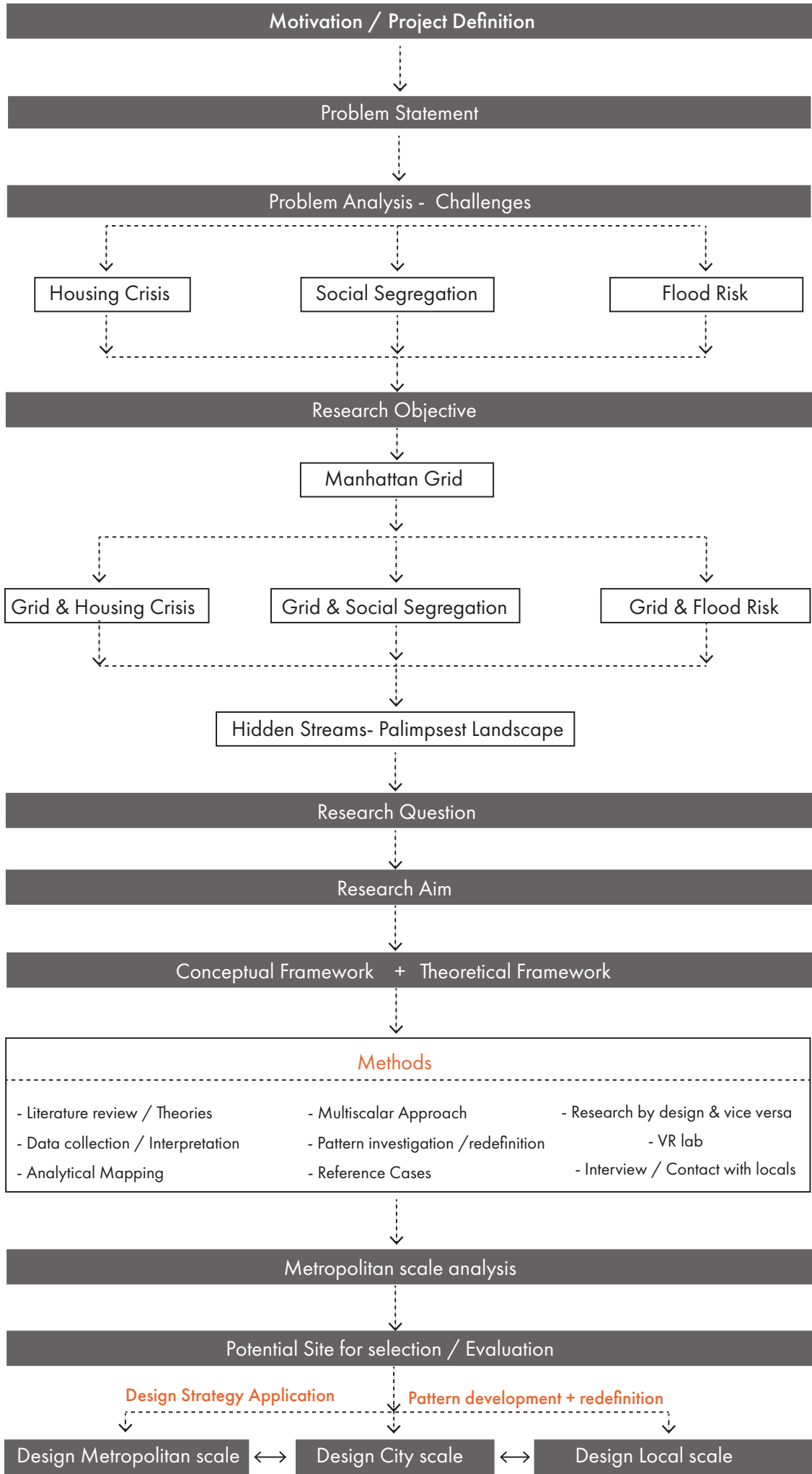
## RESEARCH AIM

The project aims to mitigate the flood risk in Manhattan through the grid interpretation and the unraveling of the forgotten palimpsest natural landscape. The grid redefinition will reconfigure the existing patterns bringing people closer to nature.



# METHODOLOGY



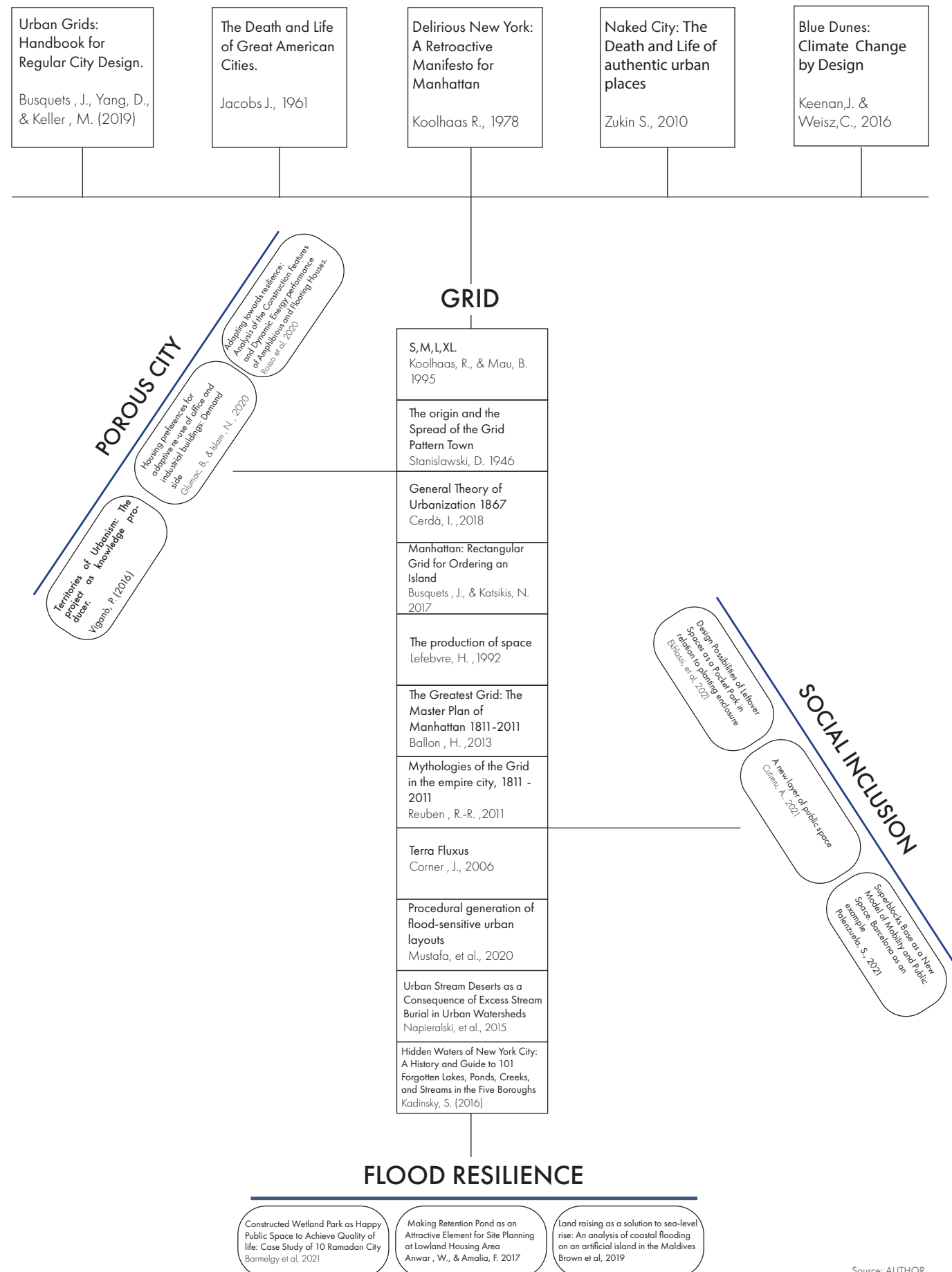






## THEORETICAL FRAMEWORK

## KEY LITERATURE



## METHODOLOGY

<p><b>Zukin, 2010</b></p> <p>"The city does not do enough to protect the poor and the middle class while the social diversity, and not just the diversity of buildings and uses, gives the city its soul.</p>	<p><b>Jacobs, 1961</b></p> <p>"Inert cities do contain the seeds of their own destruction, while lively, diverse and intense cities contain the seeds of their own regeneration".</p>	<p><b>Keenan &amp; Weisz, 2016</b></p> <p>"The current strategies for re-building and defending the region are artificial, while a notable number of experts assumes that the proposed solutions are both ineffective and detrimental"</p>
<p><b>Stanislawski, 1946</b></p> <div><div><p><b>Advantages</b> of the grid</p><ul style="list-style-type: none"><li>- Ideal for the "equitable distribution of property"</li><li>- Efficient use of space</li><li>- Strategic mode of spatial organization.</li></ul></div><div><p><b>Disadvantages</b> of the grid</p><ul style="list-style-type: none"><li>- Lack of accommodation to local topography</li><li>- Conformity of building alignment</li><li>- Radial plan has greater efficiencies in terms of communication from periphery to the center.</li></ul></div></div>		
<div><div><p><b>GRID SUPPORTERS</b></p><p><b>Koolhaas &amp; Mau, 1995</b></p><p>"The theoretical omnipresence of the grid does not imply homogeneous density: it will organize the coexistence of solid and void, density and emptiness. [...] the grid will allow different intensification."</p><p><b>Cerdá, 1867</b></p><p>"Justice demands, requires, imposes this uniformity and equality, which fools call monotony. Justice is always equal and uniform for all.." .</p><p><b>Ballon, 2013</b></p><p>"The gridiron plan provided a remarkably flexible and orienting framework for growth and change".</p><p><b>Joseph, 2013</b></p><p>"The grid embodied a democratic – republican ideal in an aim to provide order in the chaotic madness of the city".</p></div><div><p><b>GRID OPPONENTS</b></p><p><b>Reuben, 2011</b></p><p>"The grid's designers were aiming to promote real estate development and the most economically efficient use of urban space."</p><p><b>Moore, 2015</b></p><p>"The great principle of the plan was to reduce the surface of the earth as nearly as possible and that the natural inequities of the ground are destroyed with the existing water courses disregarded".</p><p><b>Olmsted, 1876</b></p><p>"No city is more unfortunately planned with reference to metropolitan attractiveness"</p><p><b>Sartre, 1946</b></p><p>"In this immense, malevolent space, in this desert of rock that brooks no vegetation I felt lost".</p></div></div>		
<p><b>Viganò, 2016</b></p> <p>"The Porosity has to do with density, ecological rationality and social implications".</p>	<p><b>Luo, et al, 2022</b></p> <p>"Planning for flood resilience should prioritize urban areas and forests, water, grass, and other types of landscape.</p>	<p><b>Pinkham, 2000</b></p> <p>"Returning buried stream channels through stream daylighting is beneficial for flood mitigation".</p>



**Viganò, 2016**

“The Porosity has to do with density, ecological rationality and social implications”.

**Luo, et al, 2022**

“Planning for flood resilience should prioritize urban areas and forests, water, grass, and other types of landscape”.

**Pinkham, 2000**

“Returning buried stream channels through stream daylighting is beneficial for flood mitigation”.

# REFERENCE CASES

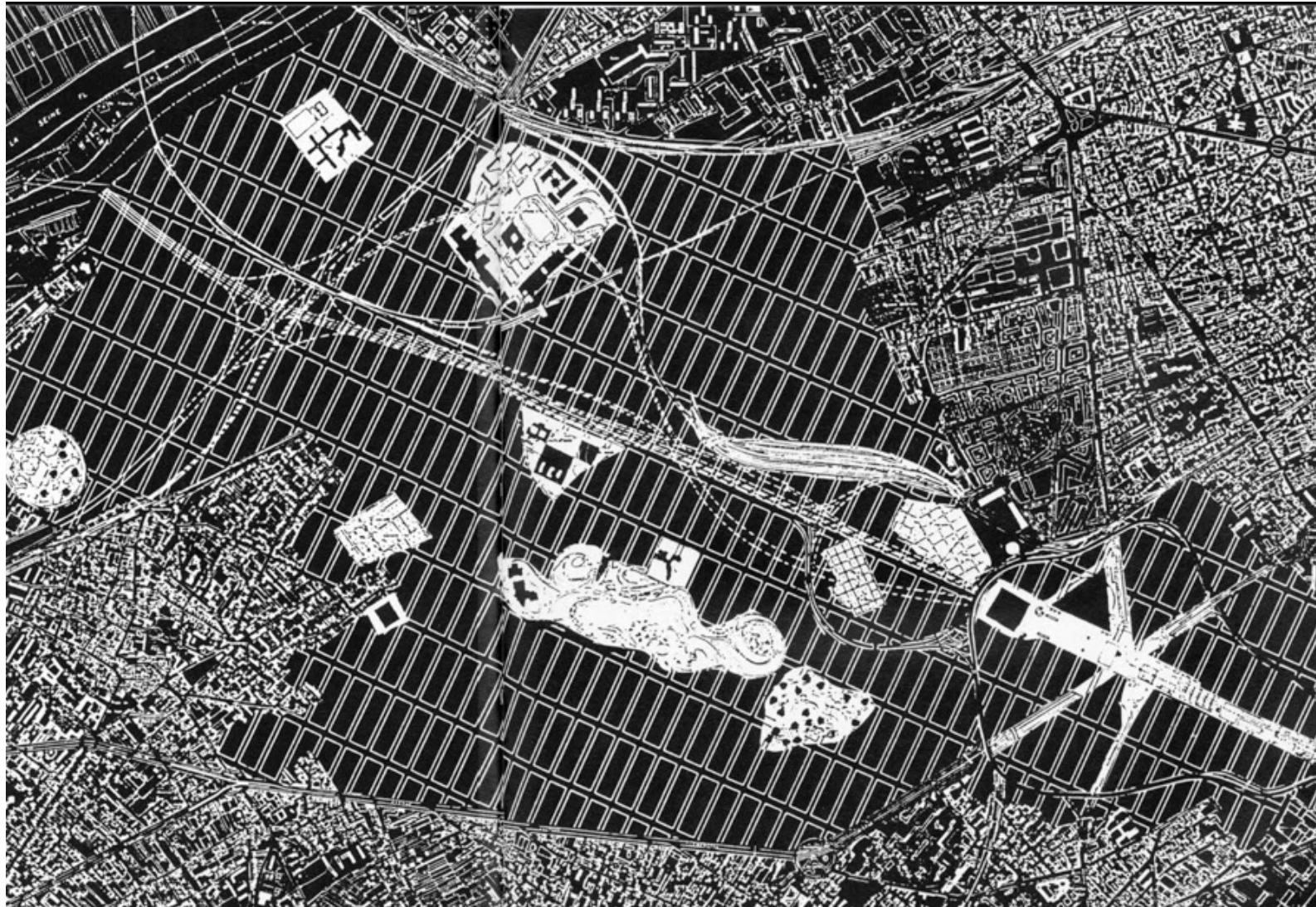


## REFERENCE CASES

GRID POSSIBILITIES

+

PATTERNS



OMA, Mission Grande Axe, Paris, 1991

Source: OMA.com

**What is the inspiration for the project?**

**Grid repurpose through block redefinition**

- Integration of green and blue elements
- Formation of new centralities as public space nodes





Rem Koolhaas, The City of the Captive Globe, 1978

Source: MoMA.org

**What is the inspiration for the project?**

**Block Densification through**

- Incorporation of mixed uses
- Integration of green / blue "cities"





Paul Rudolph, Lower Manhattan Expressway, 1972

Source: Urbanomnibus.net

### What is the inspiration for the project?

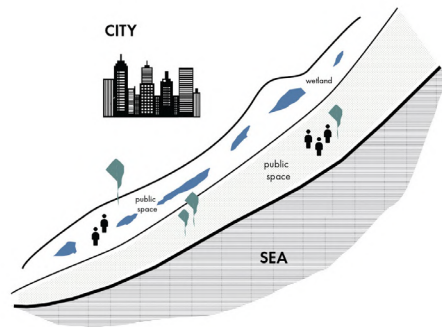
#### Grid Redefinition through Megastructure

- Green - Blue metropolitan Megastructure
- Social Inclusion through interaction of multiple economic and cultural backgrounds / incorporation of public spaces
- The grid as social incubator





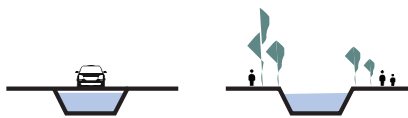
Weiliu Wetland Park, China



Wetlands



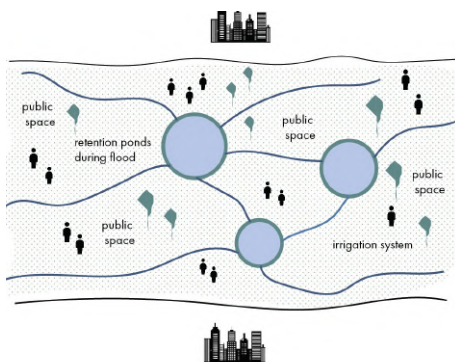
Cheonggyecheon River, Seoul



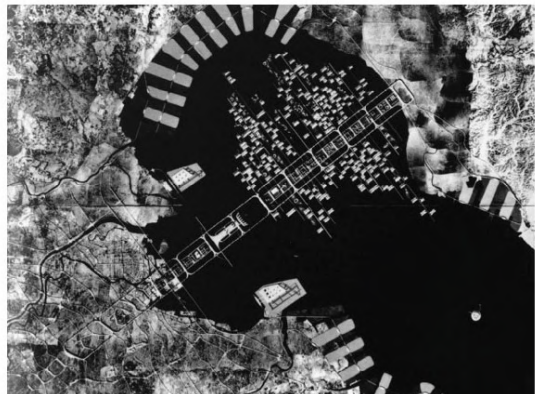
River Daylight



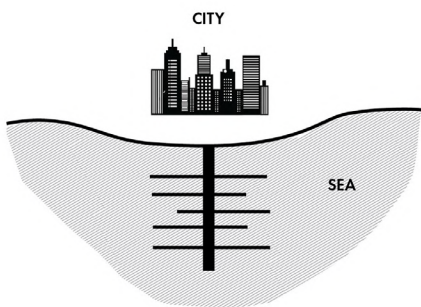
Hans Tavsens Park, Copenhagen



Retention Ponds



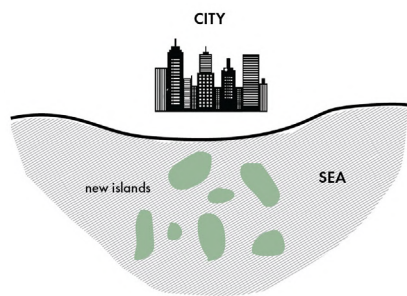
Kenzo Tange Plans for Tokyo



Expansion



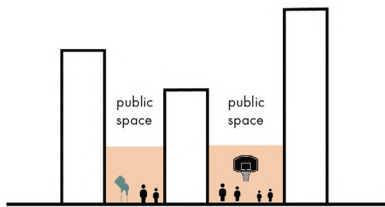
Tidal Basin, Washington DC



Green Islands



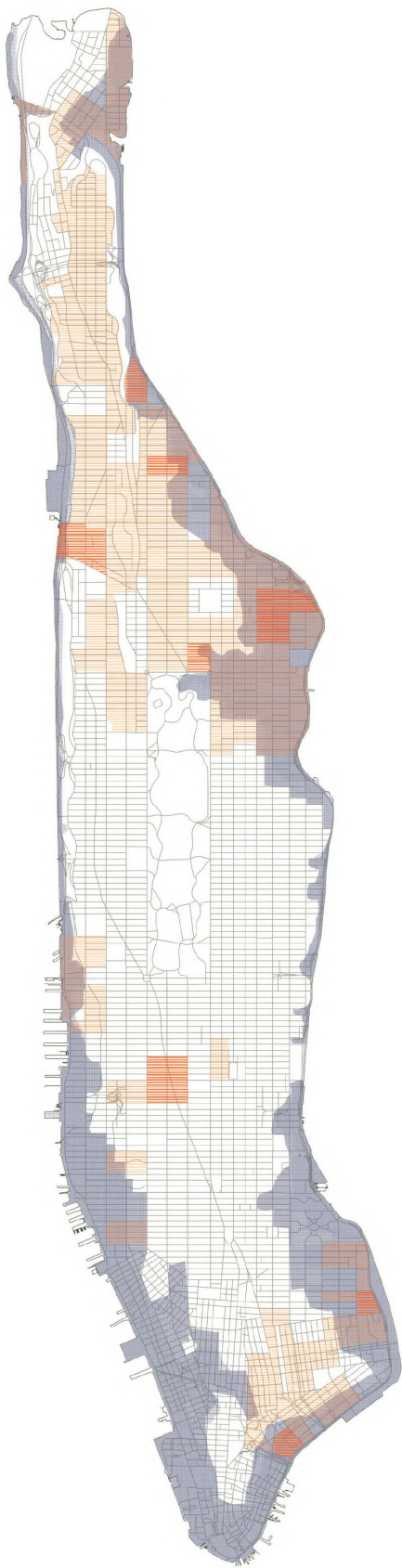
Pigalle Duperré, Paris



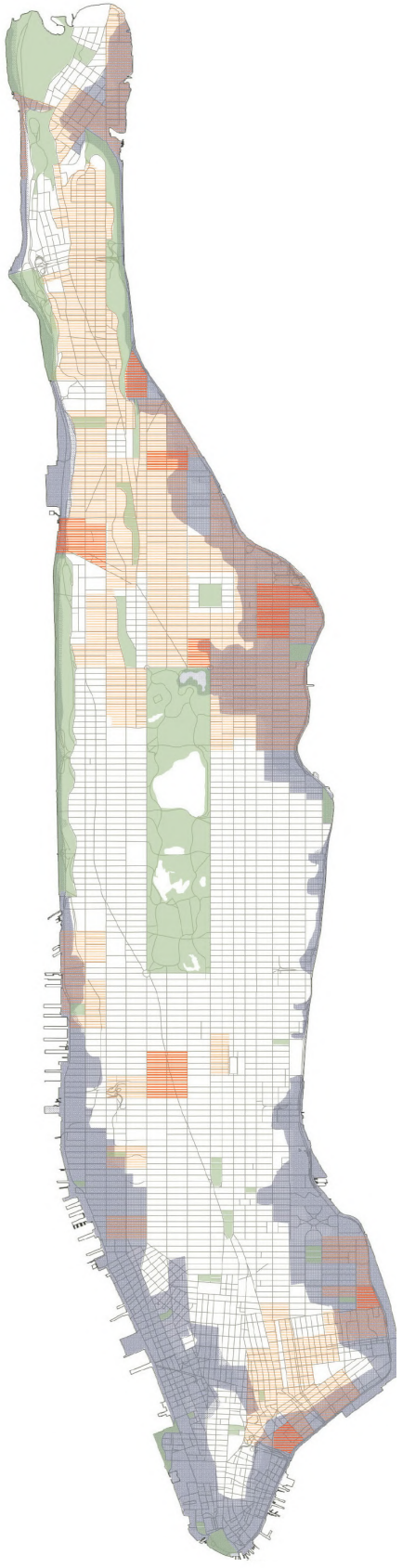
Activating the in between

# VISION & SITE SELECTION

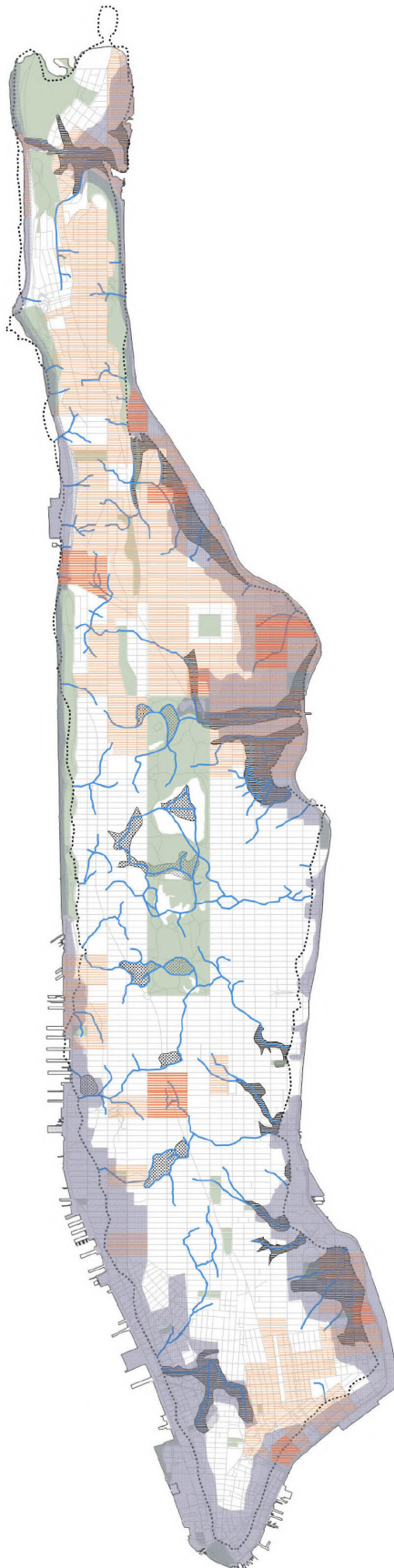




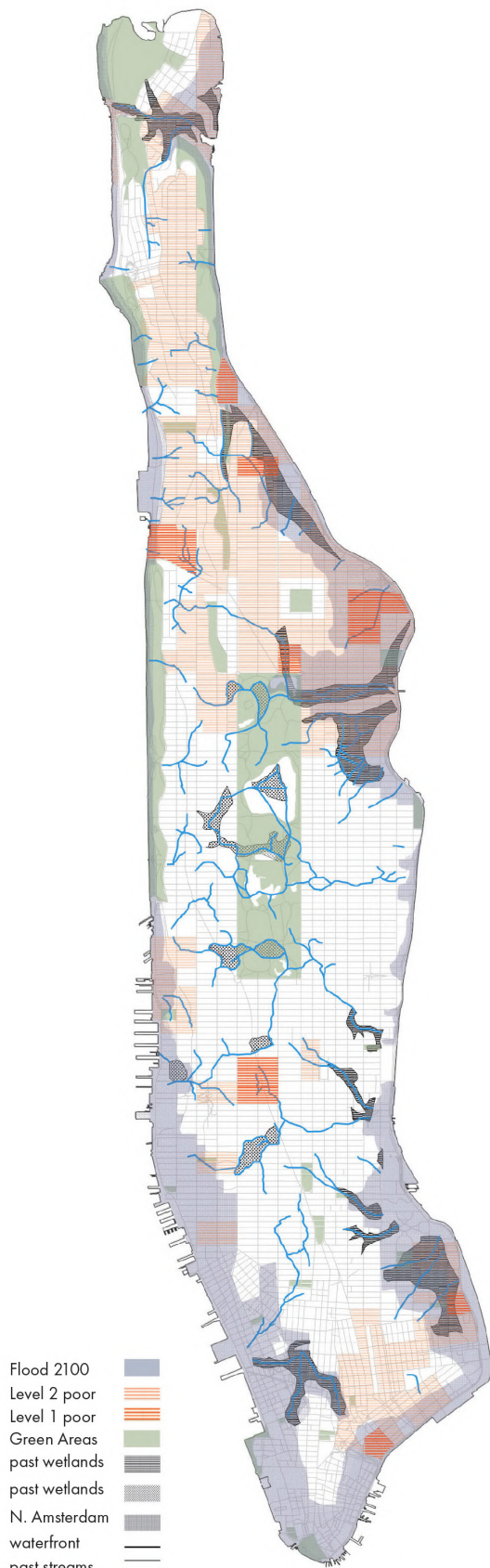
Poor Neighborhoods and flood risk



Poor Neighborhoods, flood risk, green areas



Overlapping the palimpsest landscape



Flood 2100  
Level 2 poor  
Level 1 poor  
Green Areas  
past wetlands  
past wetlands  
N. Amsterdam  
waterfront  
past streams

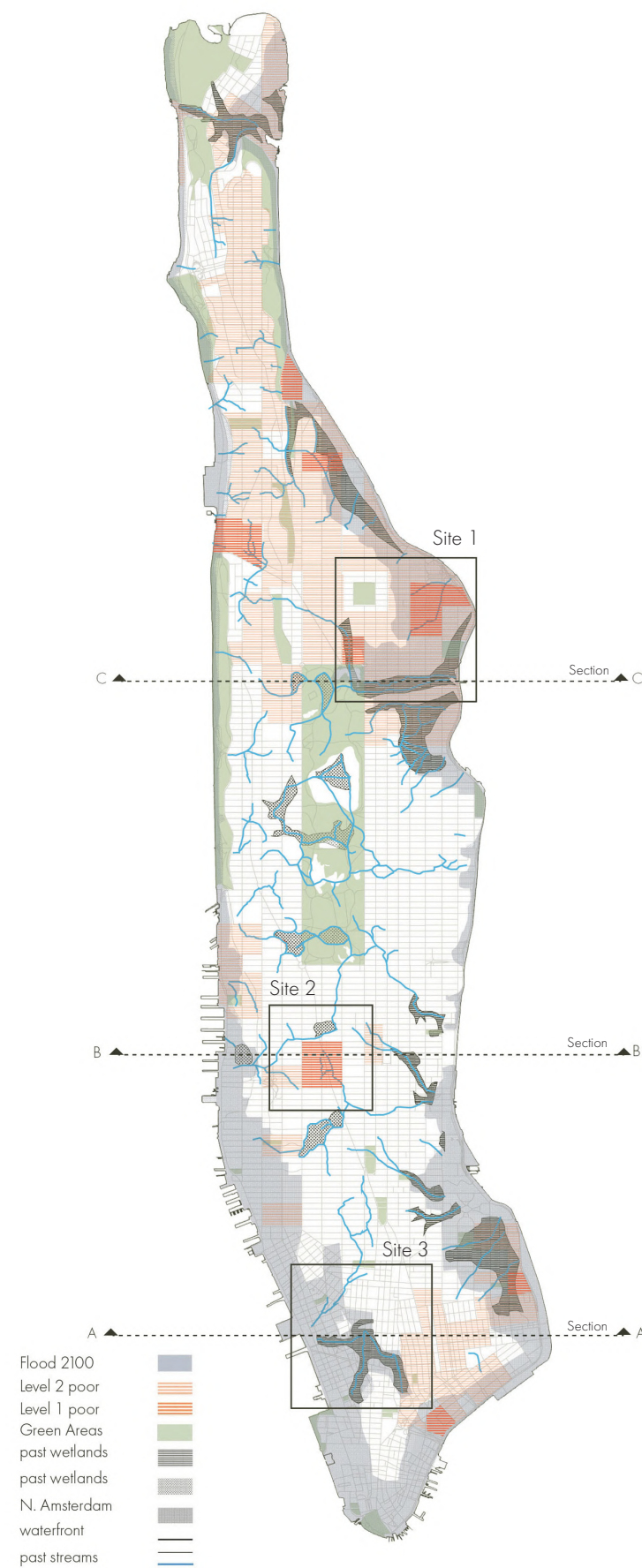
Past - the connecting element

0 1.5 3 km

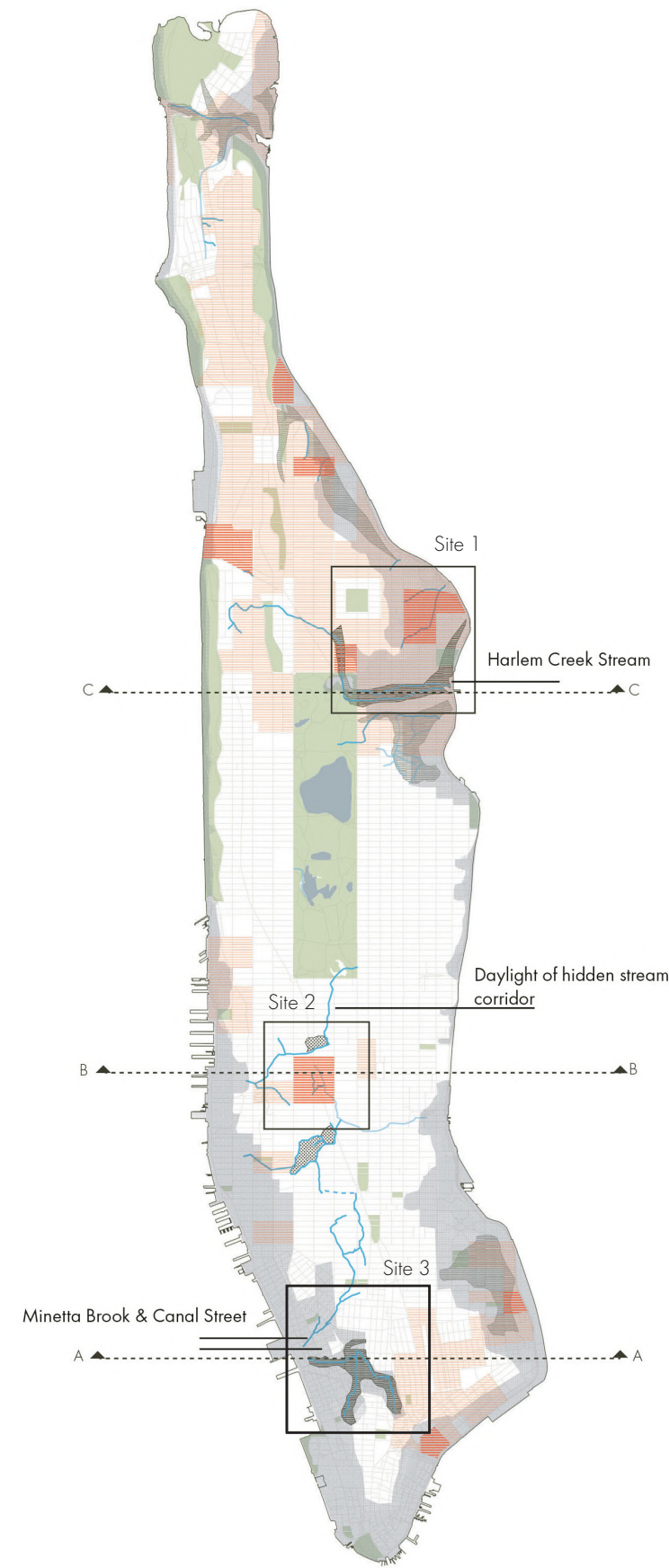


Source: AUTHOR

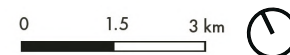




Vision



Focus Area



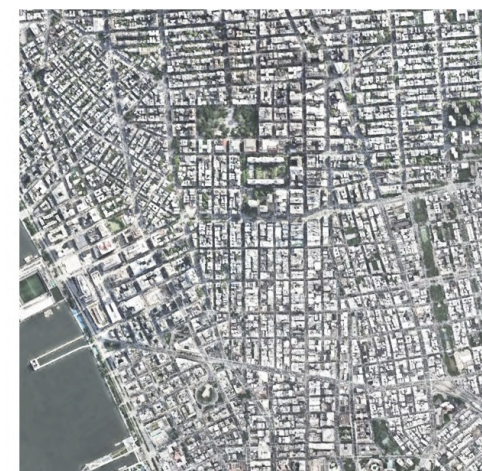
Source: AUTHOR



Site 1



Site 2



Site 3

Source: Extracted by Google Earth  
and edited by AUTHOR

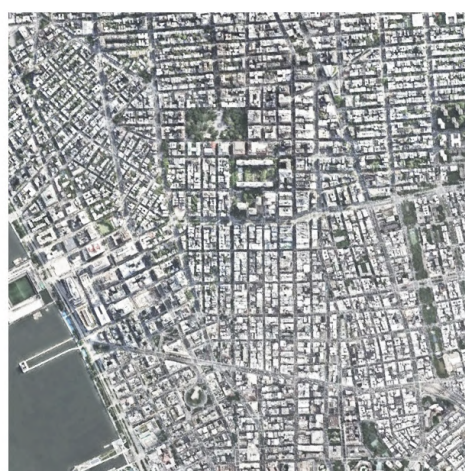




Site 1 - Harlem



Site 2 - Hell's Kitchen

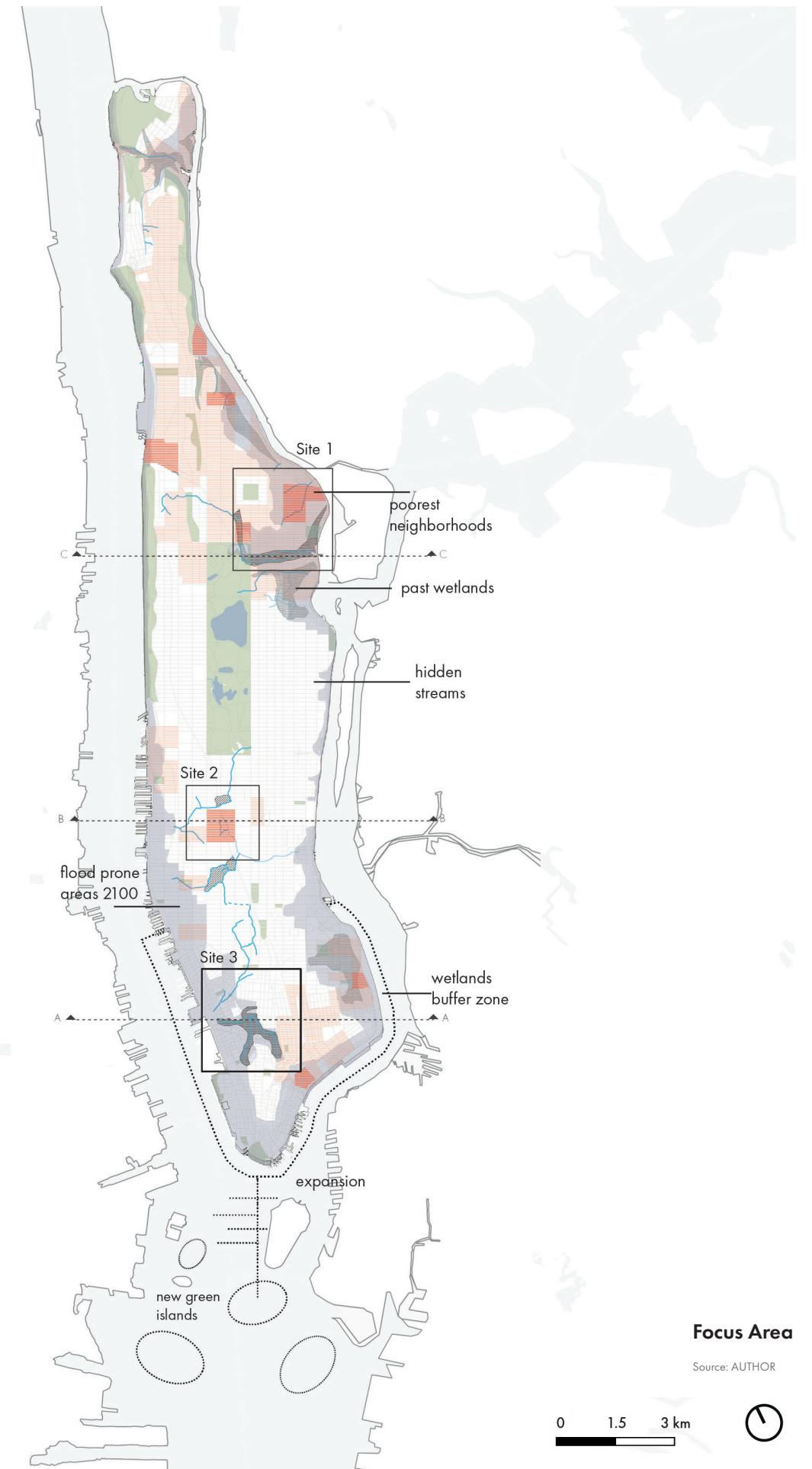
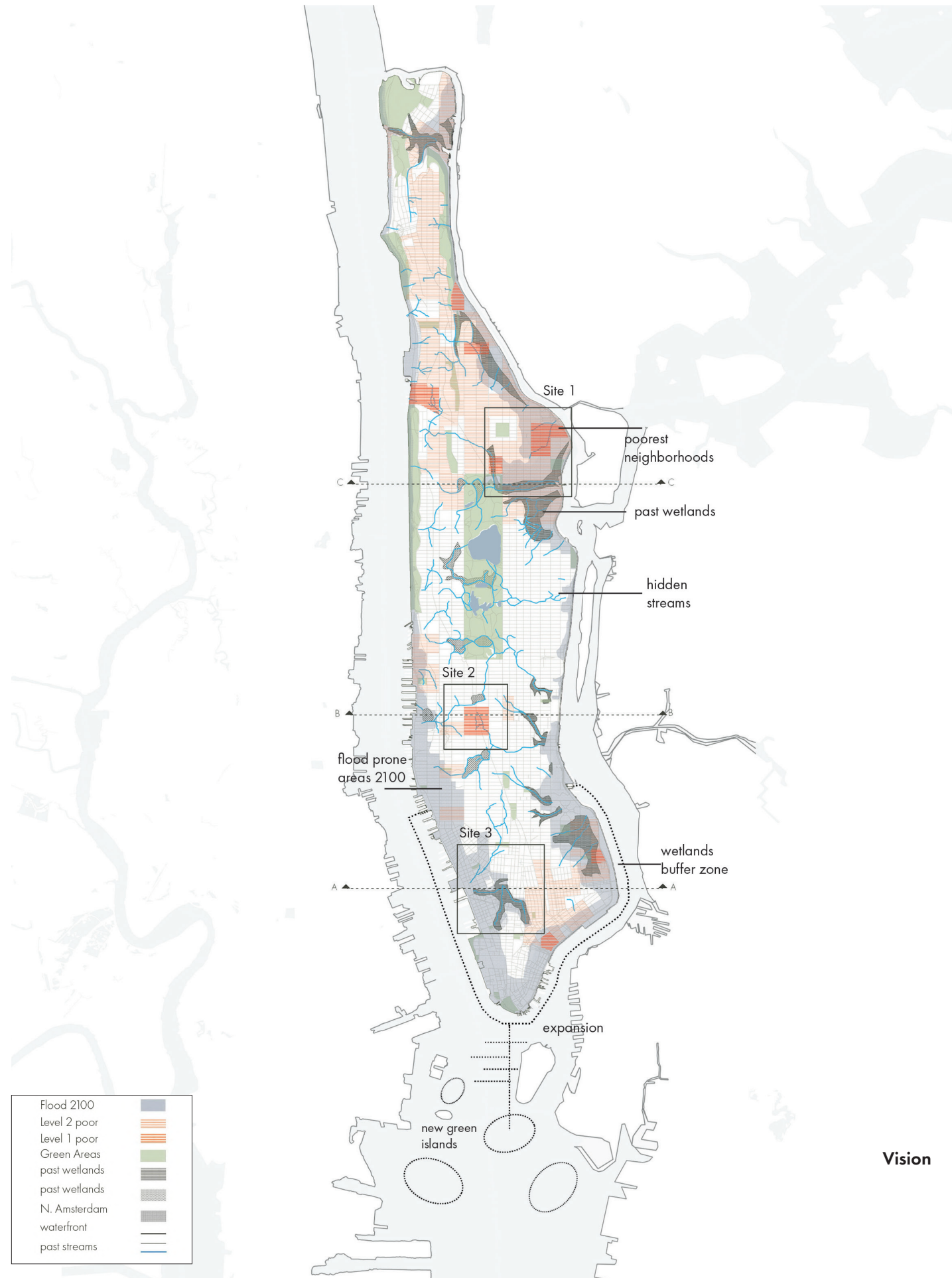


Site 3 - Lower Manhattan



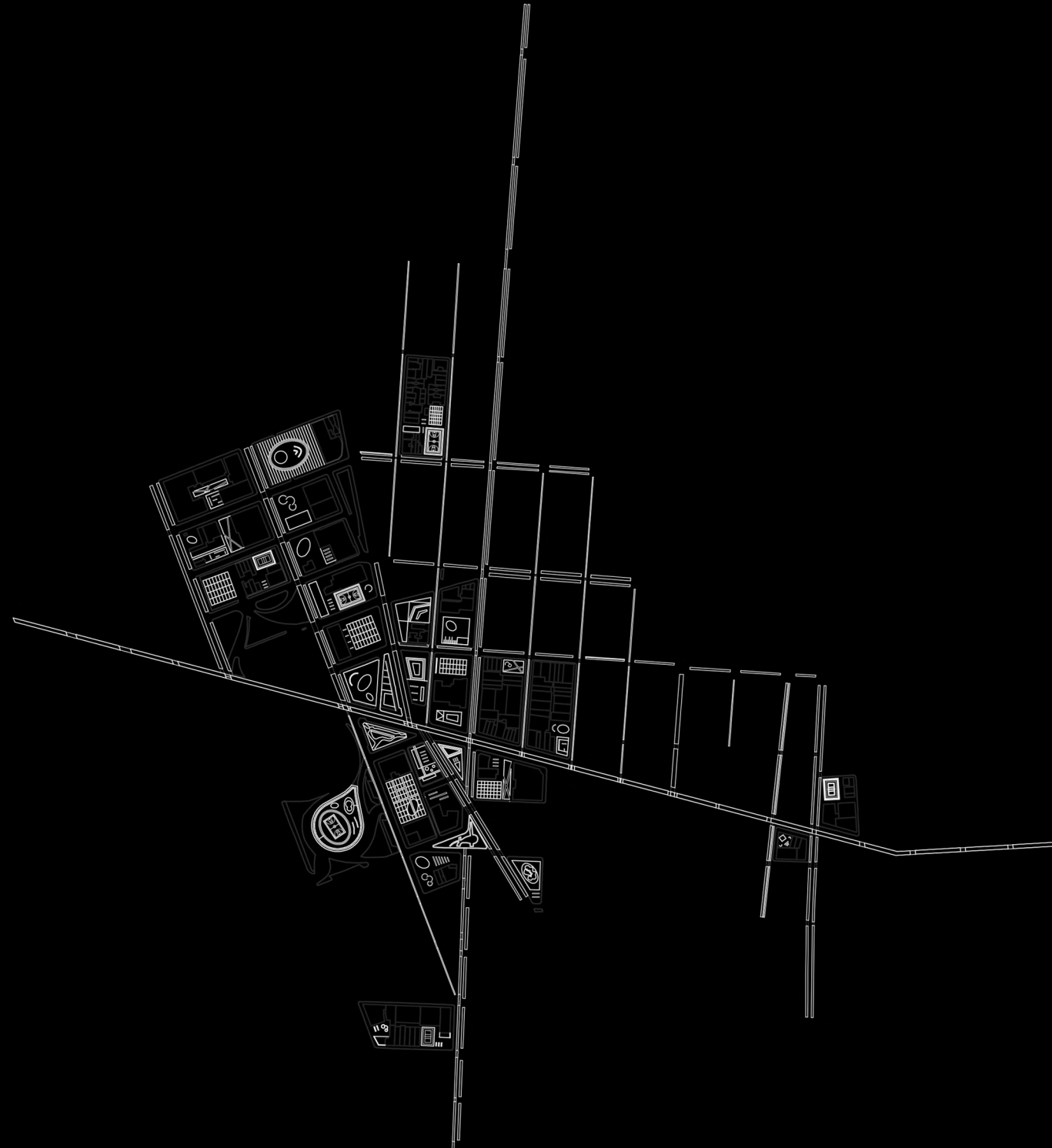
Source: AUTHOR







# DESIGN FOCUS - LOWER MANHATTAN (site no3)







**Flood prone - Green Areas**

Source: AUTHOR



**Past Wetlands**

Source: AUTHOR







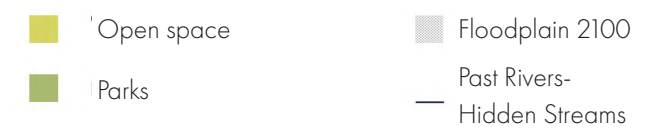
**Specific Neighborhoods**

Source: AUTHOR



**Past Streams**

Source: AUTHOR







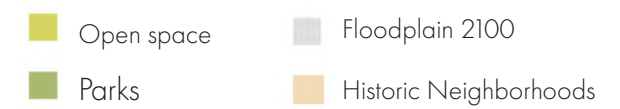
**Parking Spaces**

Source: AUTHOR



**Historic Neighborhoods**

Source: AUTHOR







**Subrail System**

Source: AUTHOR

- Open space
- Parks
- Floodplain 2100
- Subrail



**Vacant Land**

Source: AUTHOR

- Open space
- Parks
- Floodplain 2100
- Vacant Land











Source: Author Using Google Earth





Source: Author Using Google Earth





Source: Author Using Google Earth





Source: Author Using Google Earth

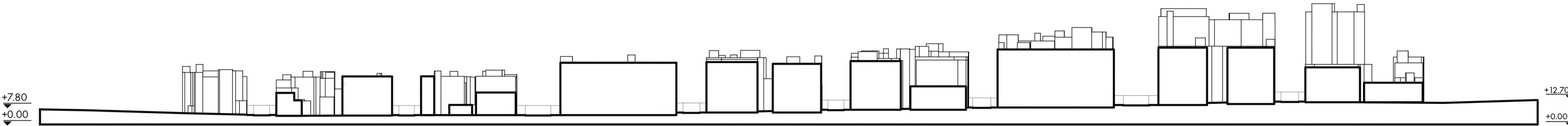


Does the road inclination allow the incorporation of green - blue infrastructure?

ANALYSIS - URBAN CONTEXT



Section along W Broadway Street

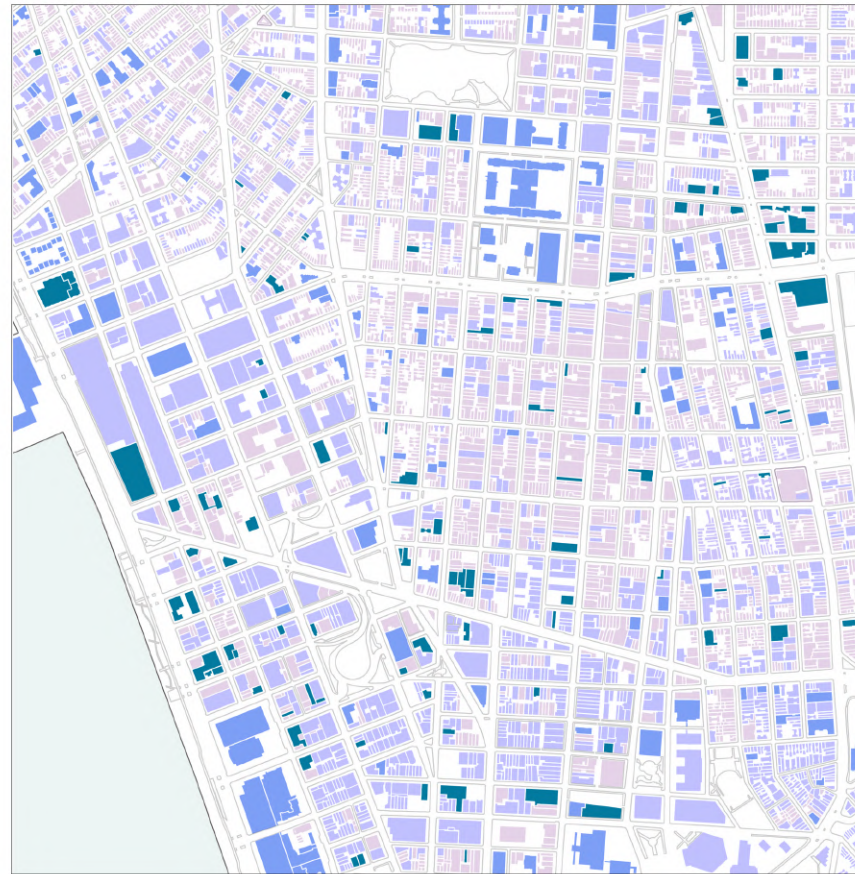


Section along Soho Streetscape

Source: AUTHOR



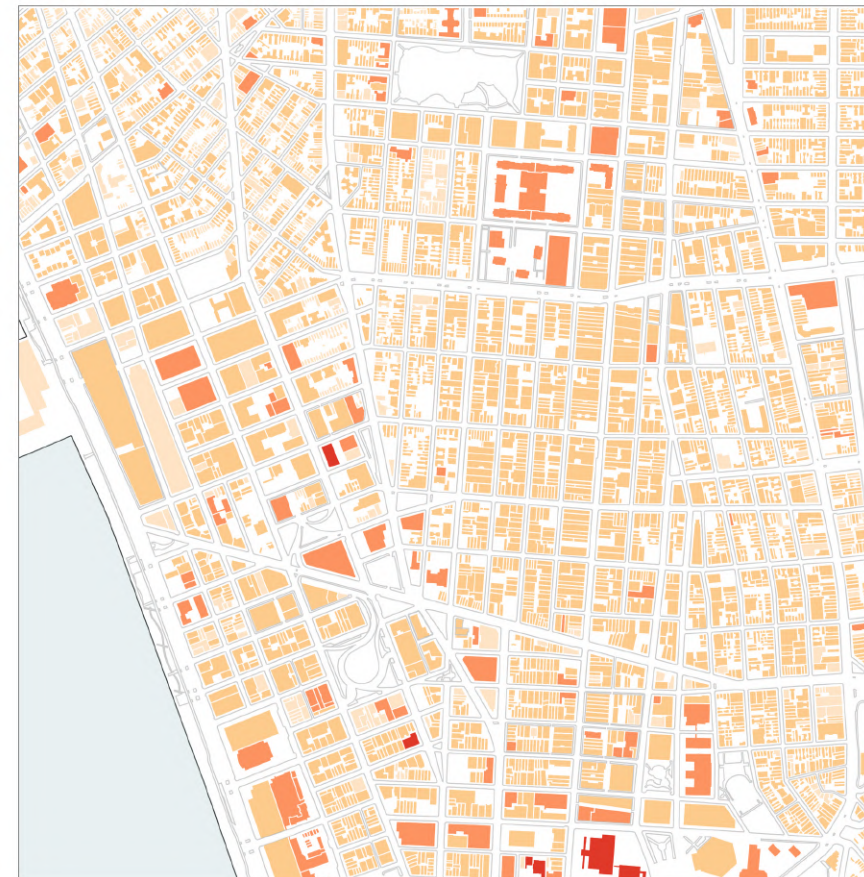
Building age poses limitations for potential demolition



- $\geq 2000$
- $\leq 1950$
- $\leq 1900$

**Building Age**

Buildings not that high - roof repurpose



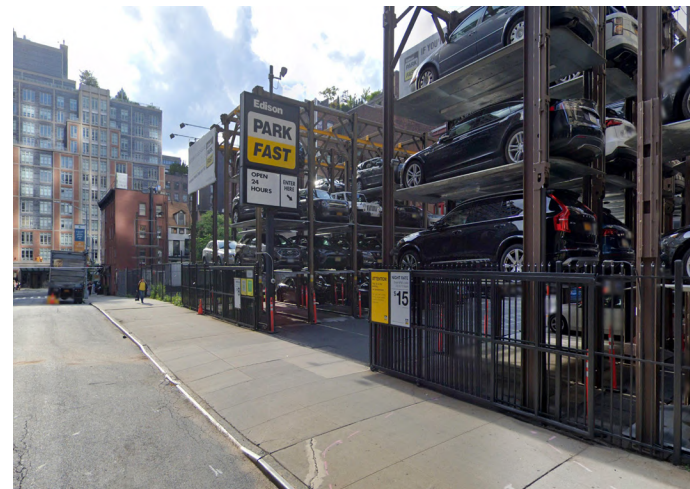
- $\geq 39$  floors
- $\leq 20$  floors
- $\leq 10$  floors

**Building Height**

Source: AUTHOR  
based on Zolaplanning.nyc.gov



Plazas



Parking Space

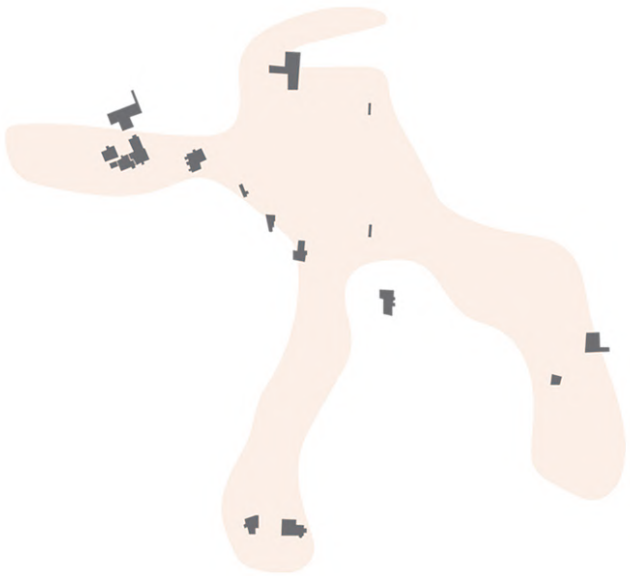


Inactive Rooftops

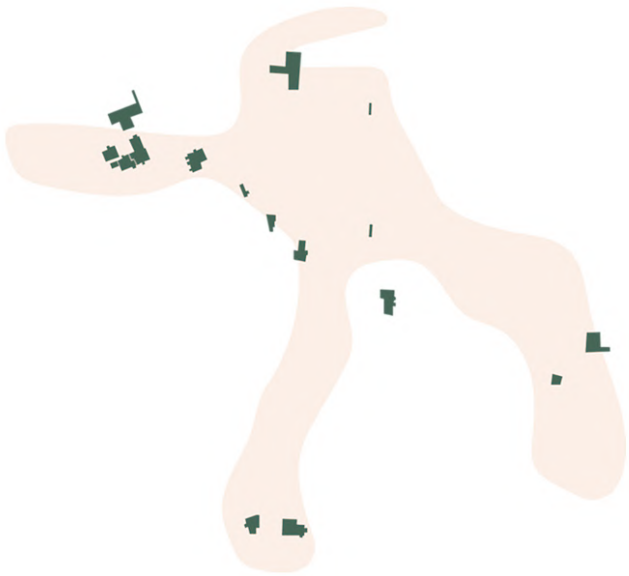
**Drosscapes and Mis used space**

Source: AUTHOR  
based on Google Earth





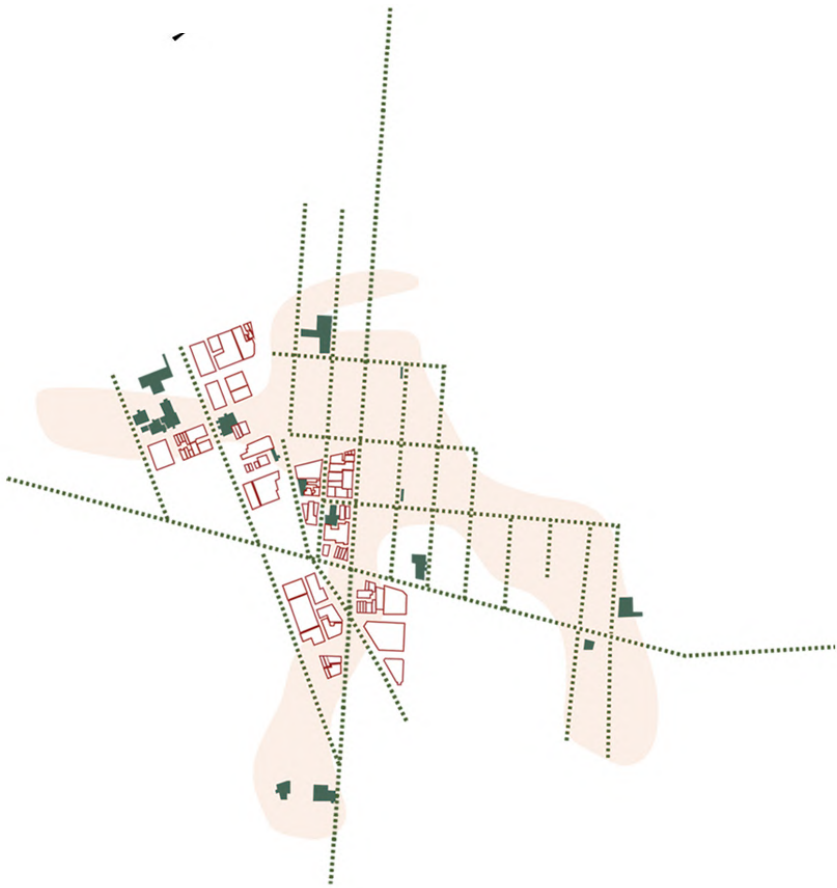
1. Parking Space



2. Parking Space repurpose as green space



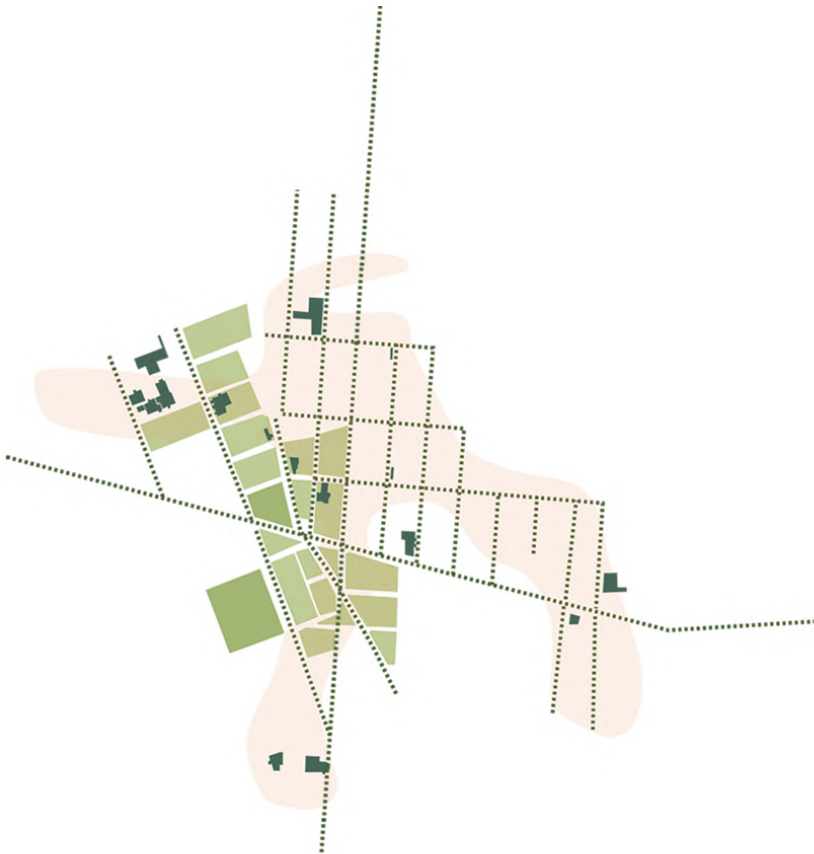
3. Potential Building repurpose



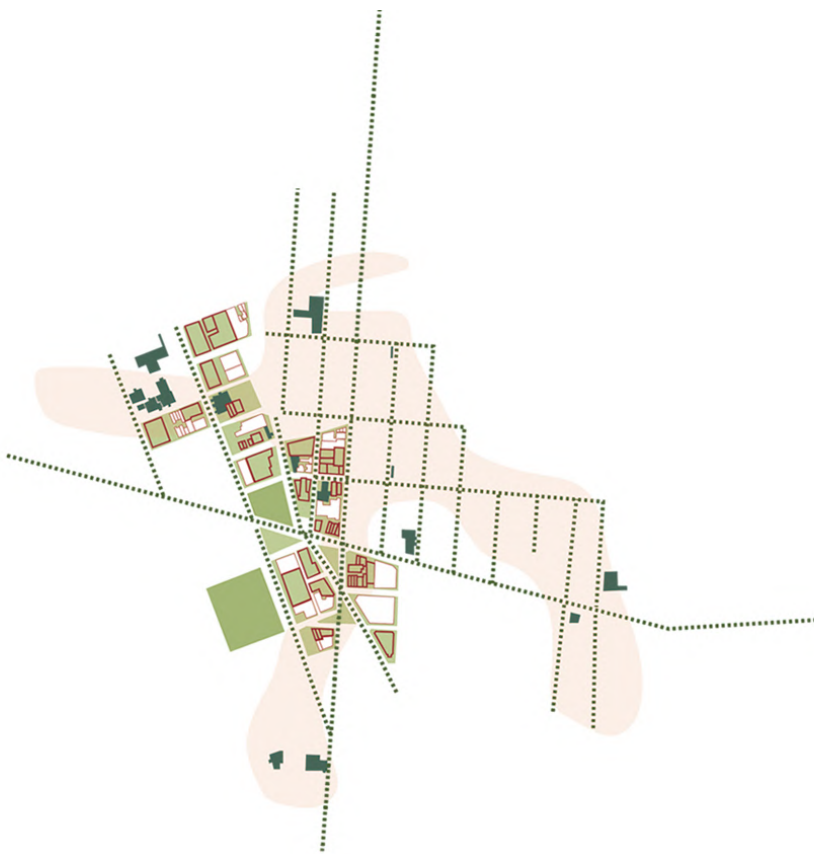
4. Green corridors

Source: AUTHOR





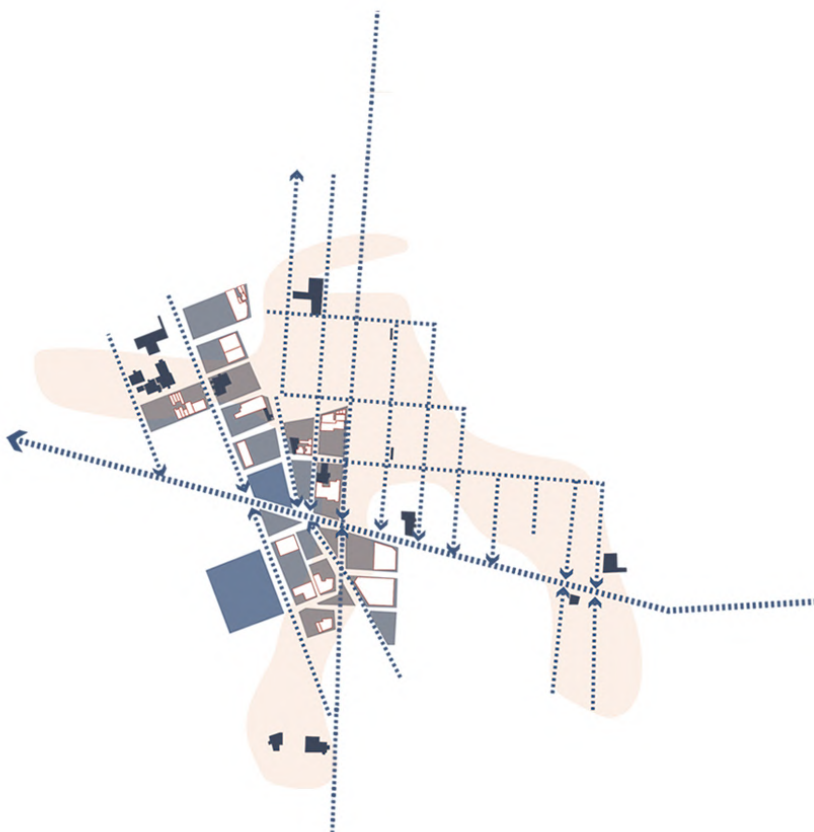
5. New green space



6. Potential Building Demolition



7. Green Network



8. Blue network during Flood

Source: AUTHOR





Potential Parking Spaces for repurpose

Source: AUTHOR

- |            |               |                        |                         |
|------------|---------------|------------------------|-------------------------|
| Parks      | Vacant Land   | Past Wetland           | Floodplain 2100         |
| Open Space | Parking Space | Historic Neighborhoods | Selected parking spaces |



Repurpose of Parking Spaces as Green Public Space

Source: AUTHOR

- |            |               |                        |                  |
|------------|---------------|------------------------|------------------|
| Parks      | Vacant Land   | Past Wetland           | Floodplain 2100  |
| Open Space | Parking Space | Historic Neighborhoods | New green spaces |

0 250 500 m







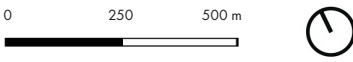
Past Streams

Source: AUTHOR



New Green Corridors

Source: AUTHOR







Blue Network during flood

Source: AUTHOR

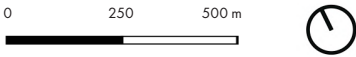
- |            |               |                        |                  |             |
|------------|---------------|------------------------|------------------|-------------|
| Parks      | Vacant Land   | Past Wetland           | Floodplain 2100  | Blue spines |
| Open Space | Parking Space | Historic Neighborhoods | New green spaces |             |



New Green nodes - Public Space

Source: AUTHOR

- |            |               |                        |                  |                 |
|------------|---------------|------------------------|------------------|-----------------|
| Parks      | Vacant Land   | Past Wetland           | Floodplain 2100  | Green Corridors |
| Open Space | Parking Space | Historic Neighborhoods | New green spaces | Green Nodes     |







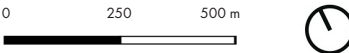
Potential Building Demolition

Source: AUTHOR



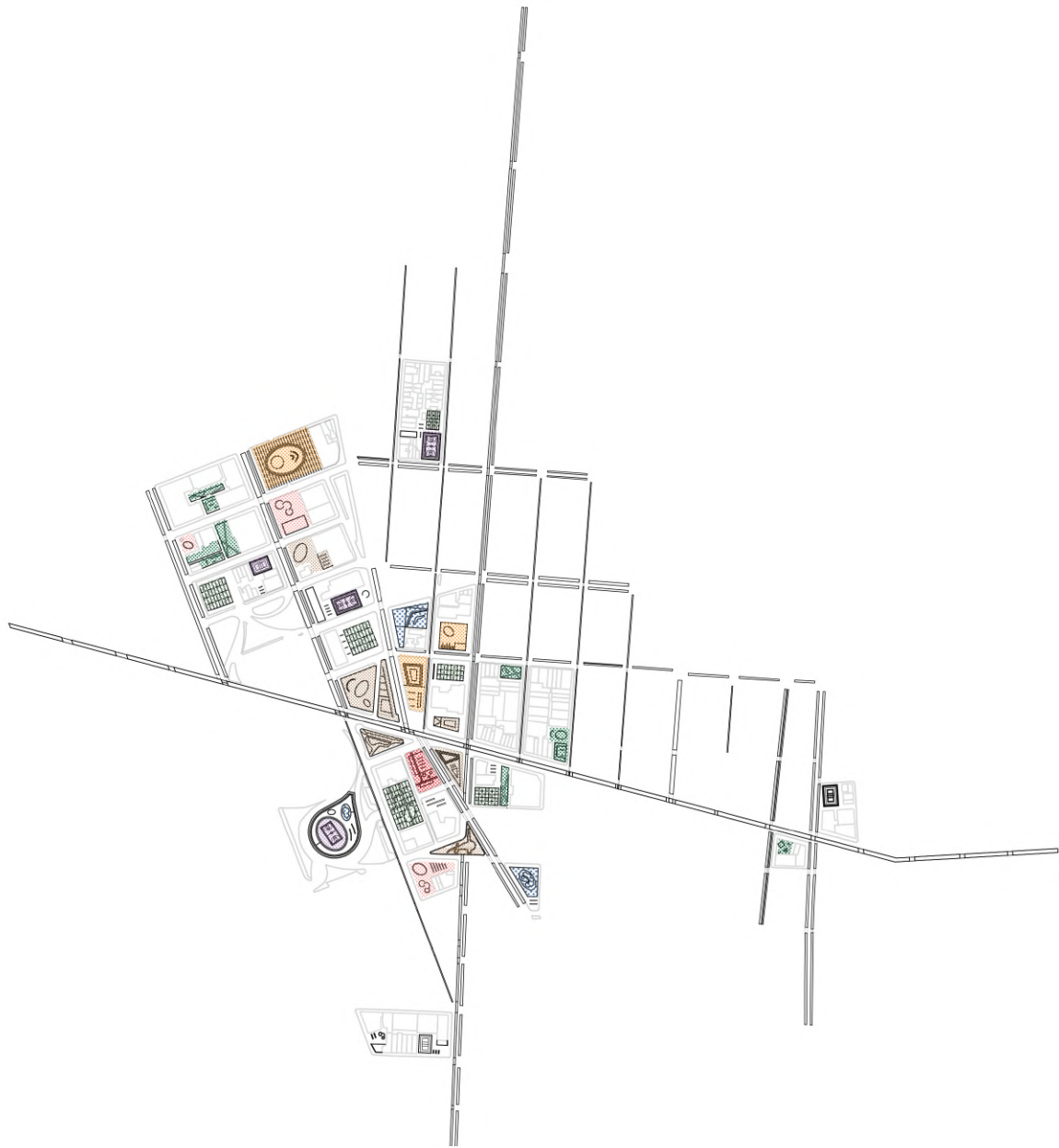
Final Plan

Source: AUTHOR





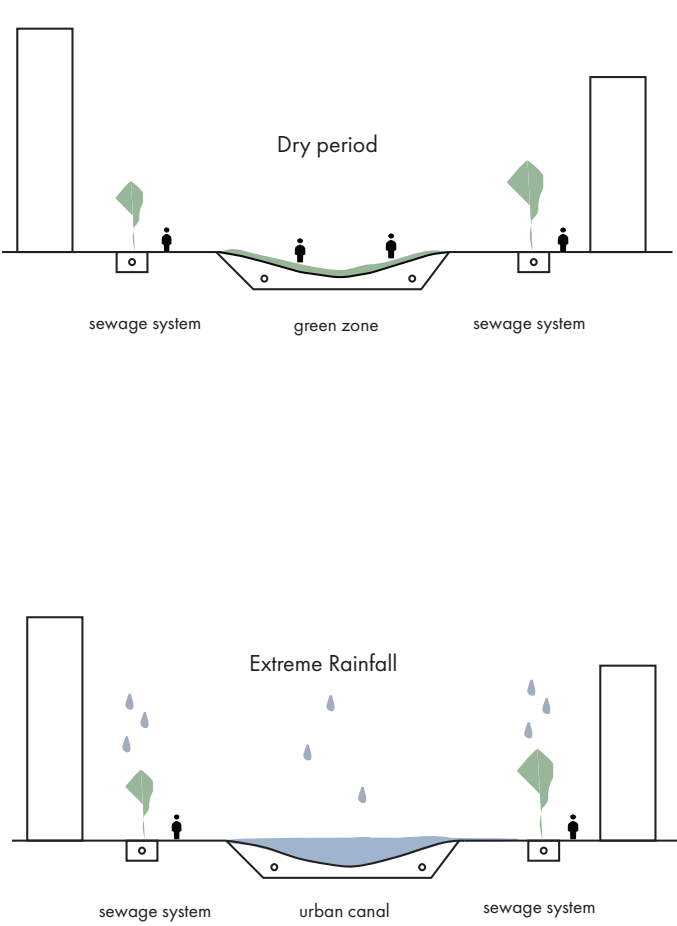
What are the main design principles for the flood adaptive system and what kind of public spaces does it include?



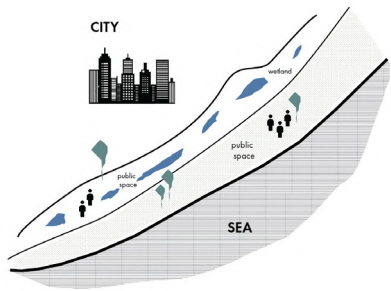
Sportfield Pocket Park Market Crops Plazas Skatepark Playgrounds Cultural Center

Network of Public Spaces

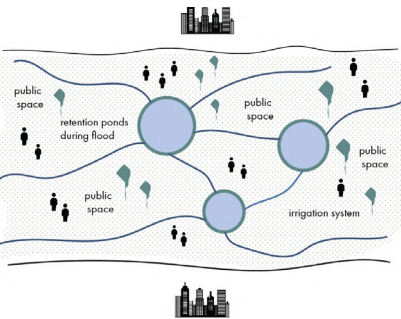
Source: AUTHOR



Cloudburst Formula, Copenhagen



Weiiu Park, China



Hans Tavsens Park Copenhagen

Source: AUTHOR





Masterplan Proposal

Source: AUTHOR

- |            |               |                 |                  |                        |
|------------|---------------|-----------------|------------------|------------------------|
| Parks      | Vacant Land   | Floodplain 2100 | Past Streams     | New Green corridors    |
| Open Space | Parking Space | Retention ponds | Subway Entrances | New Green public space |



Masterplan Proposal in combination with Historic Neighborhoods and Flood prone Areas

Source: AUTHOR

- |            |               |                        |                  |                        |
|------------|---------------|------------------------|------------------|------------------------|
| Parks      | Vacant Land   | Floodplain 2100        | Past Streams     | New Green corridors    |
| Open Space | Parking Space | Historic Neighborhoods | Subway Entrances | New Green public space |







Masterplan Proposal in combination with Past wetland

- |            |               |                 |                  |                        |
|------------|---------------|-----------------|------------------|------------------------|
| Parks      | Vacant Land   | Floodplain 2100 | Past Streams     | New Green corridors    |
| Open Space | Parking Space | Past Wetland    | Subway Entrances | New Green public space |



Masterplan Proposal during Extreme Flood

- |            |               |                 |                      |                             |
|------------|---------------|-----------------|----------------------|-----------------------------|
| Parks      | Vacant Land   | Floodplain 2100 | Flooded Public Space | Blue corridors during flood |
| Open Space | Parking Space | Retention ponds | Subway Entrances     | New Green public space      |





What is the water capacity of the project?

Dry Period



Proposal during dry period

Source: AUTHOR

Extreme Flood Period



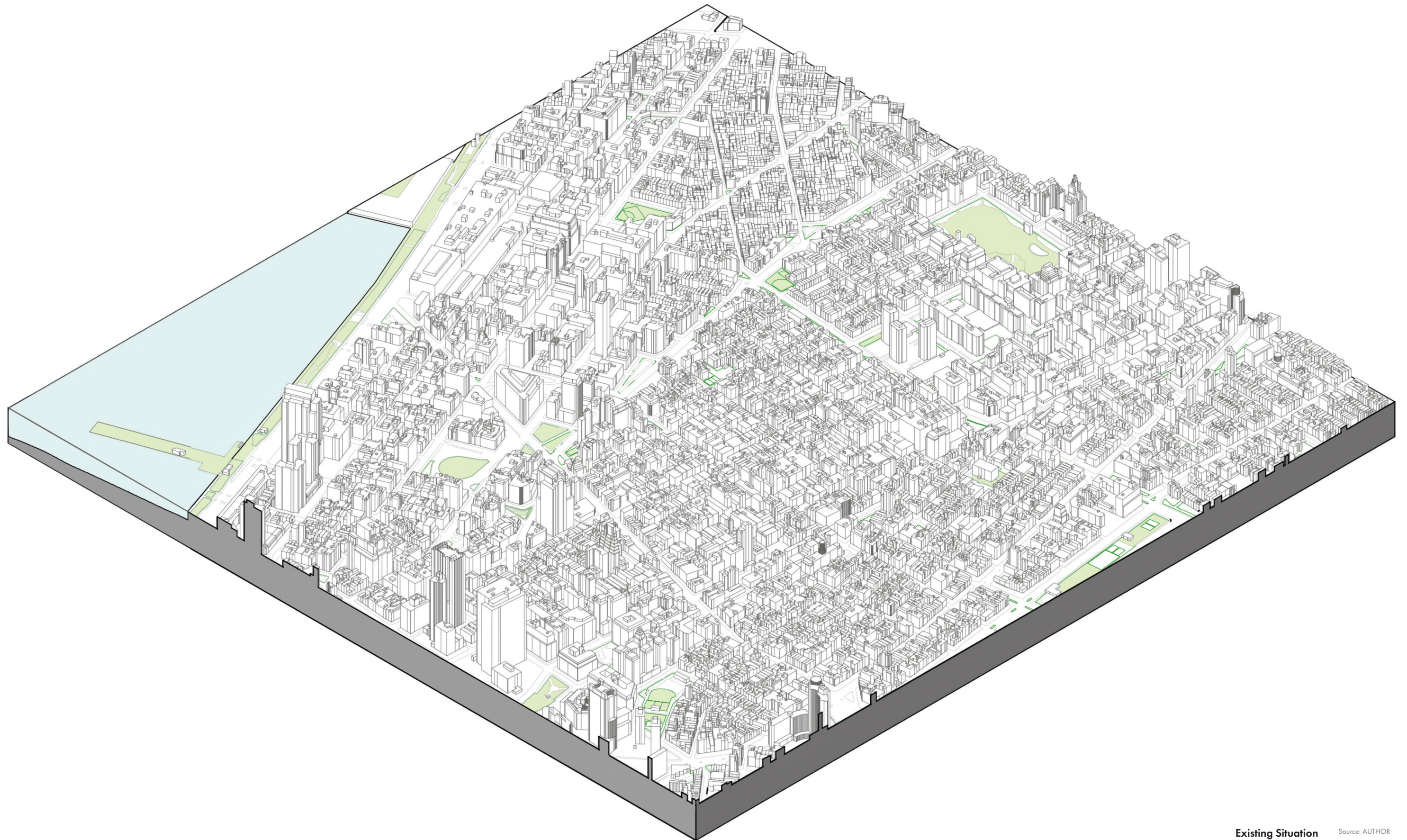
Proposal during extreme flooding period

Source: AUTHOR

The water capacity of the intervention is quite significant since according to calculations it can both collect and store stormwater of about 24.000.000 litres during an extreme flood period.

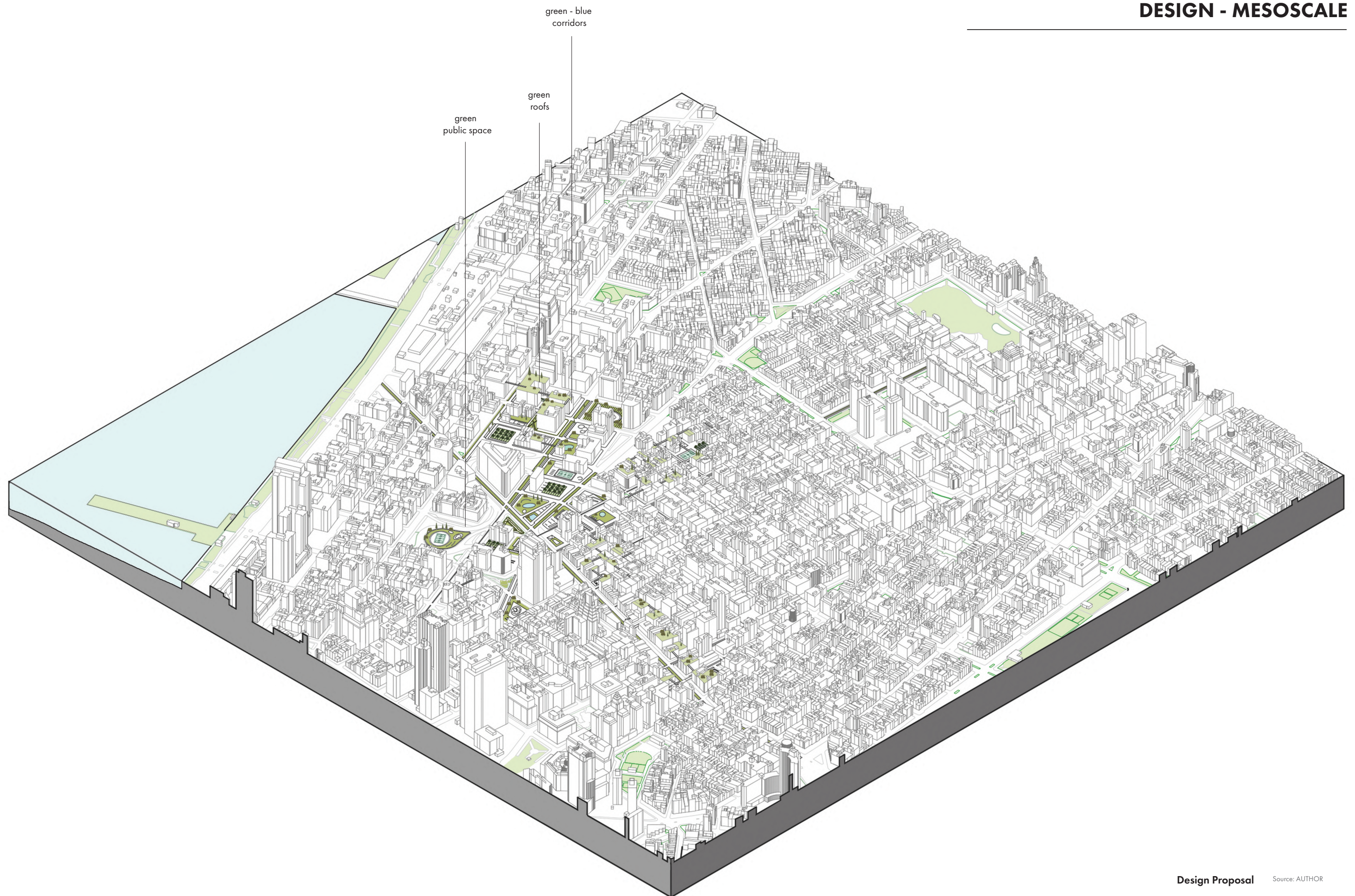




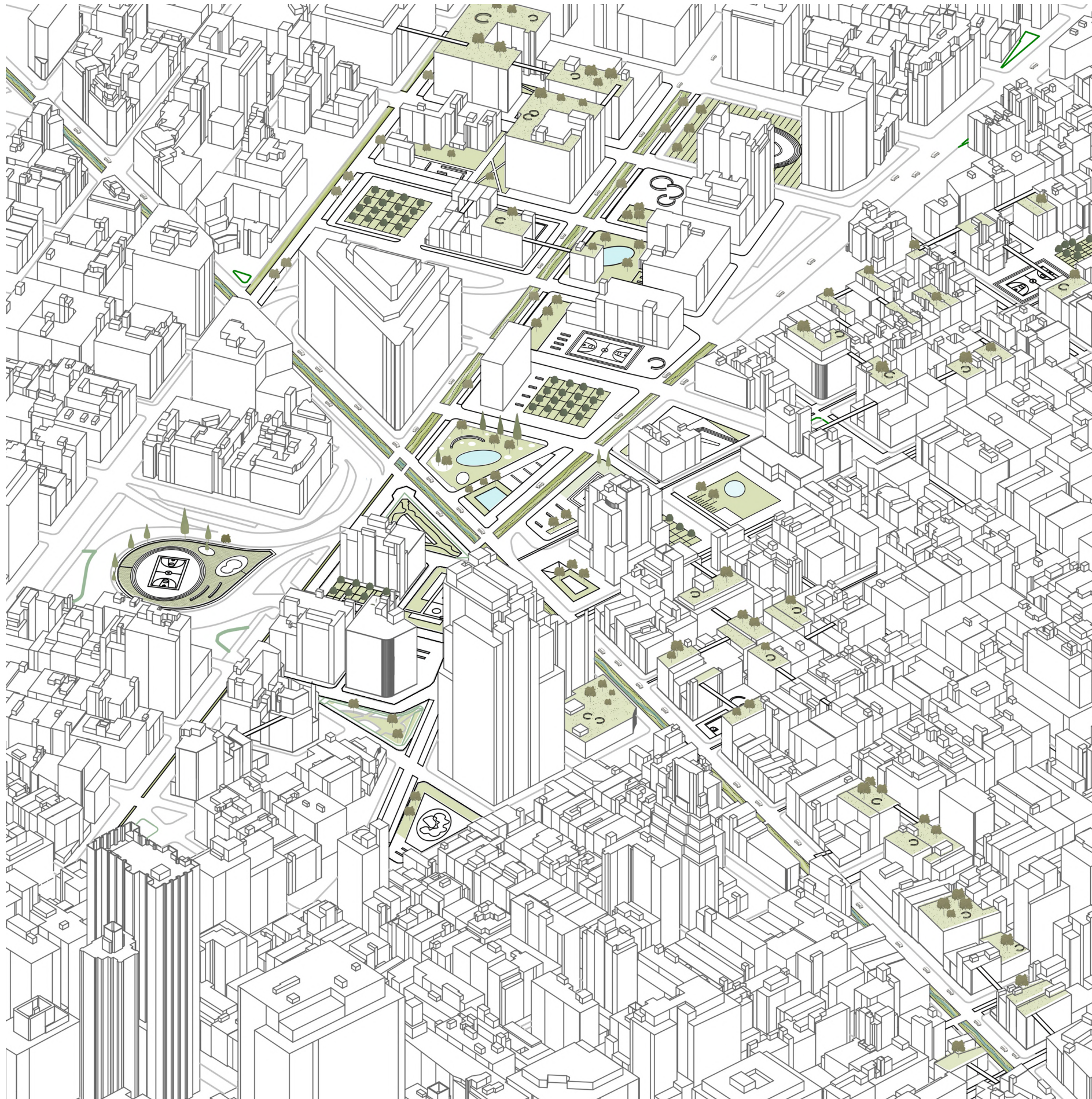


Existing Situation Source: AUTHOR









### KEY COMPONENTS

- Green & Blue system as a Grid redefinition
- Activation of roofscape through green roofs & public space
- The Grid as a social incubator in an aim to achieve the Porous City, Social Inclusion and Flood Resilience.

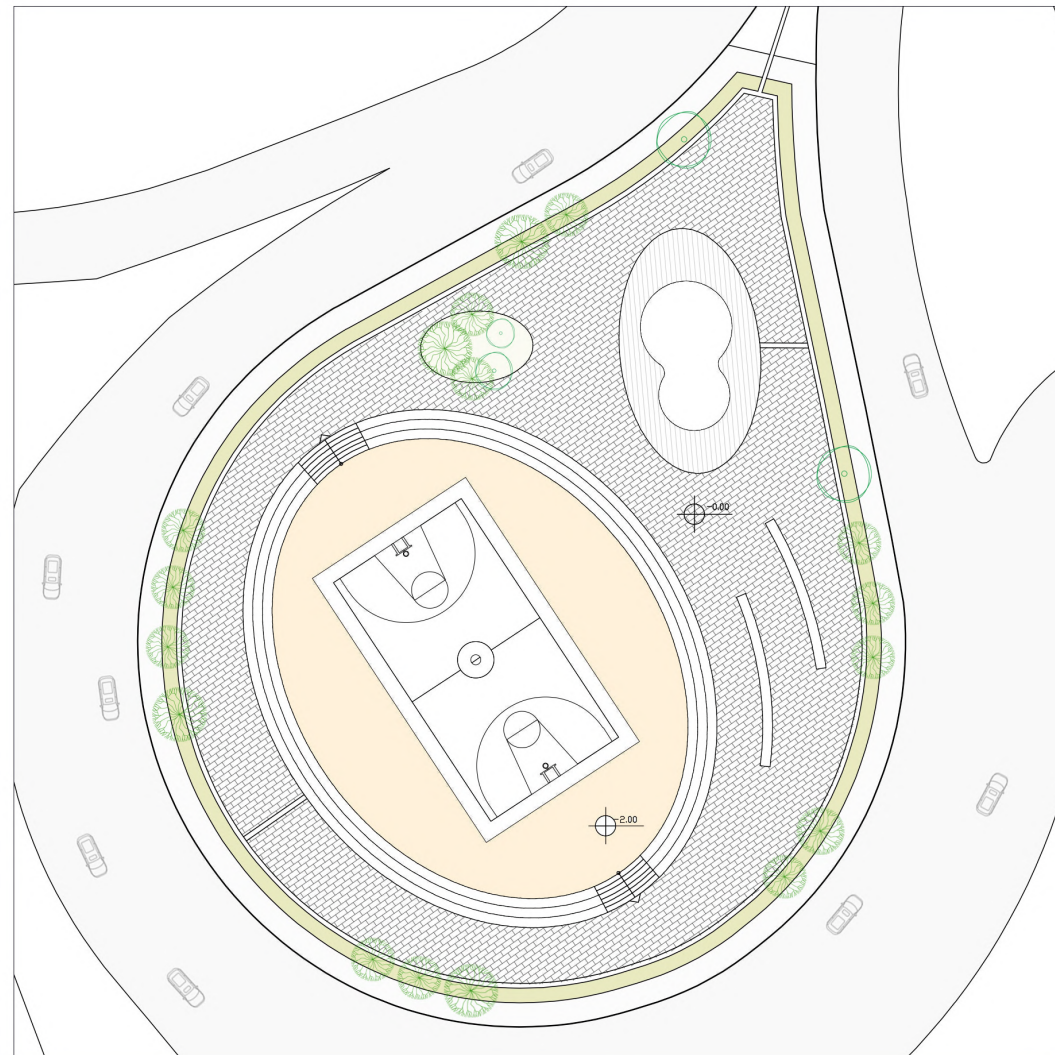


## Plaza - Basketball Watersquare

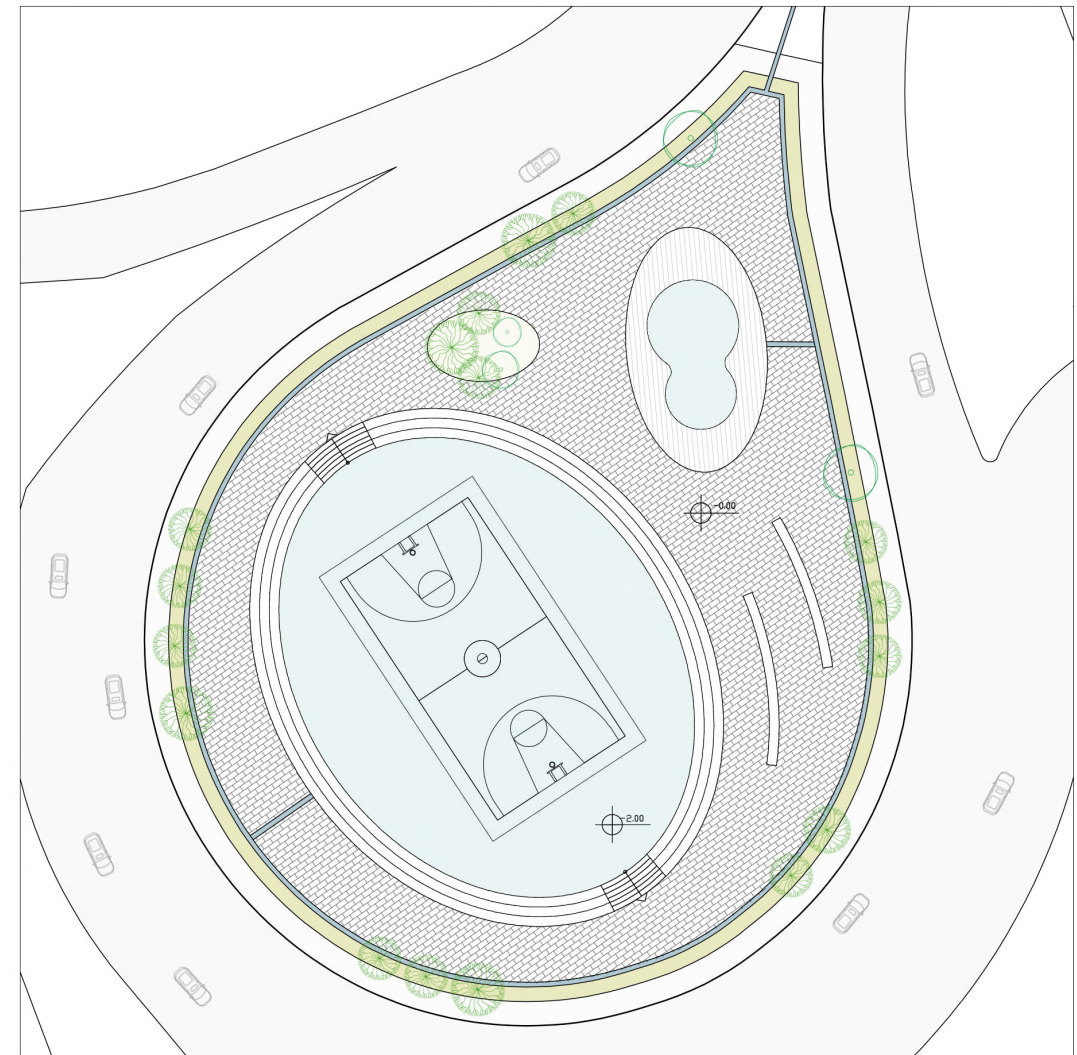
## DESIGN - URBAN SCALE

What kind of public spaces can foster the social interaction?

Dry Period



Extreme Flood Period



Source: AUTHOR

0 15 30



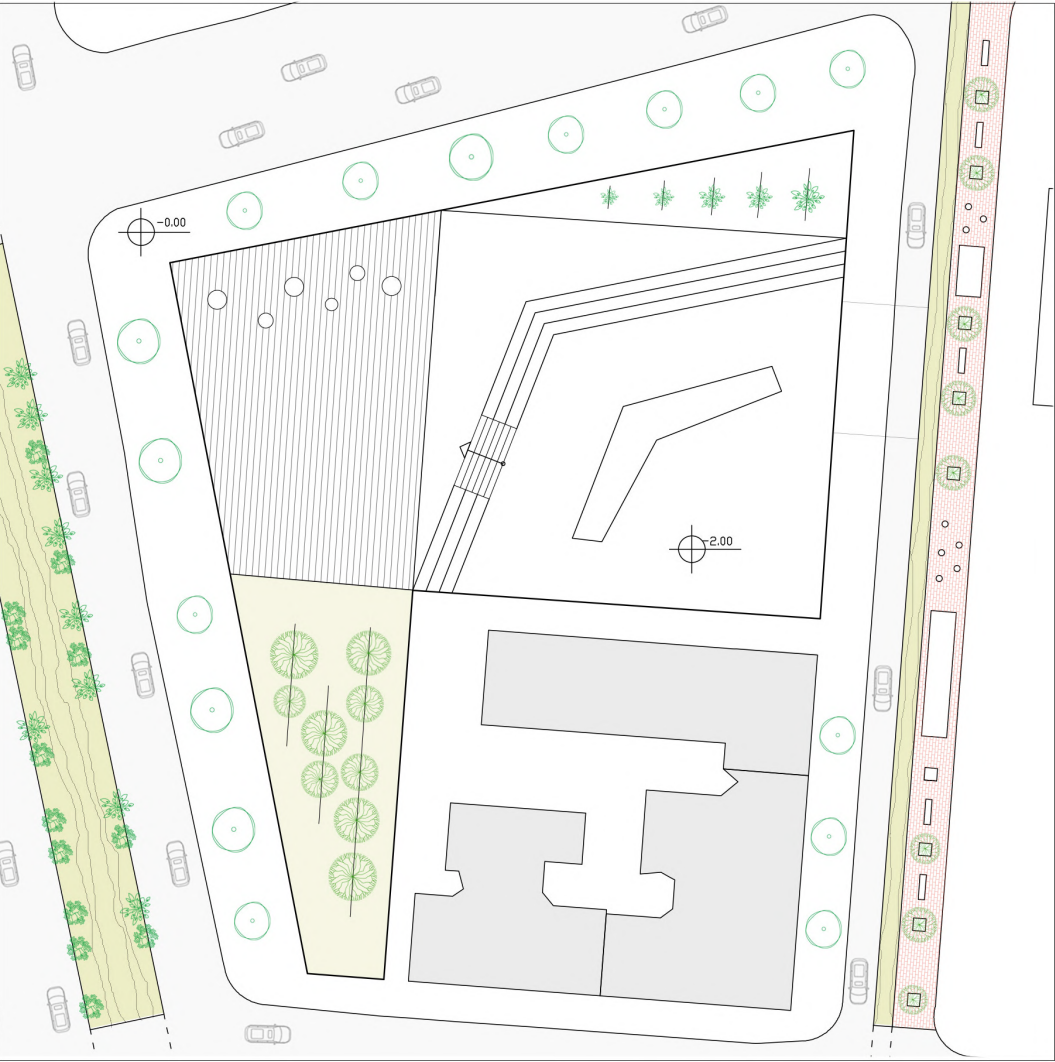


Plaza - Skateboard Watersquare

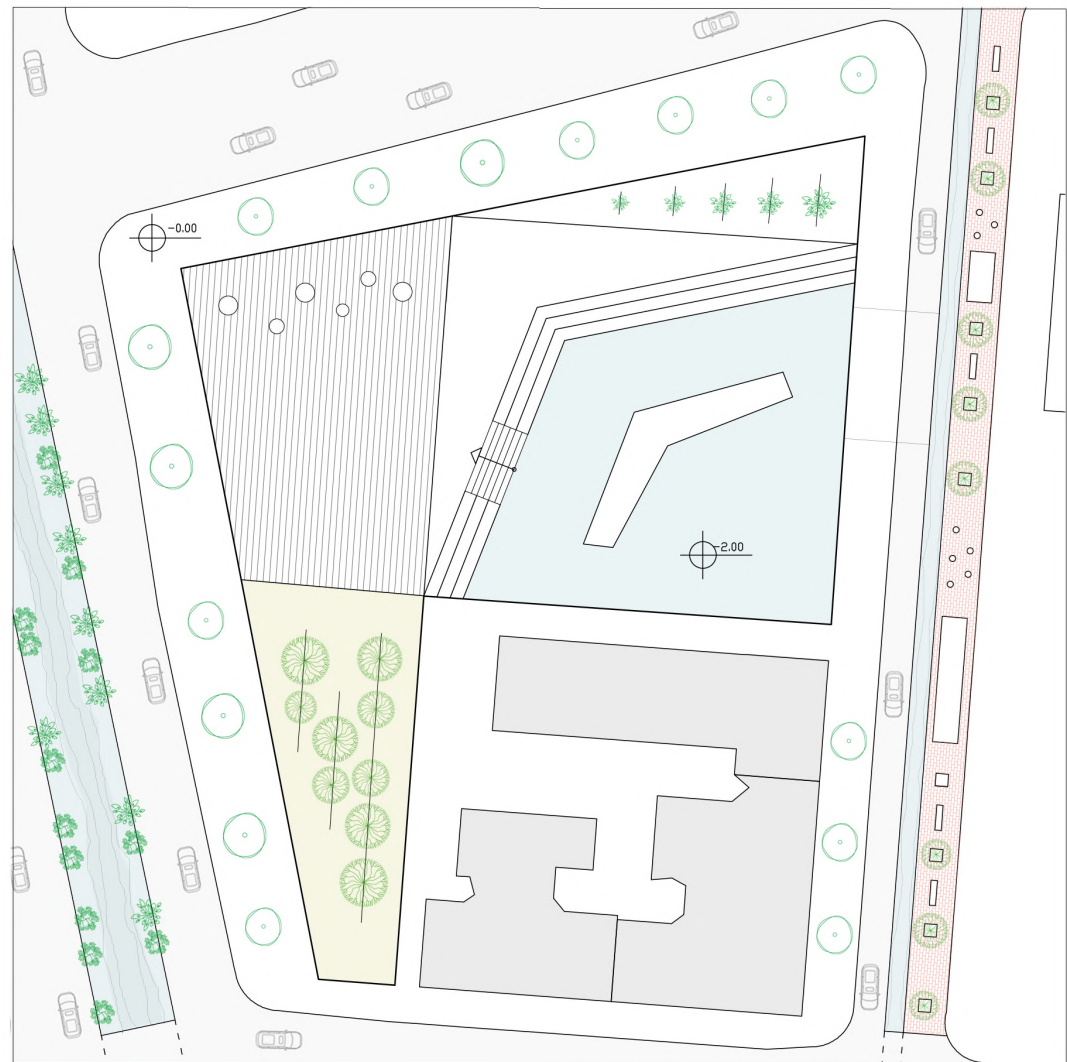
DESIGN - URBAN SCALE

What kind of public spaces can foster the social interaction?

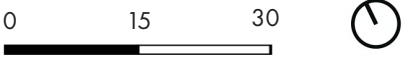
Dry Period



Extreme Flood Period



Source: AUTHOR



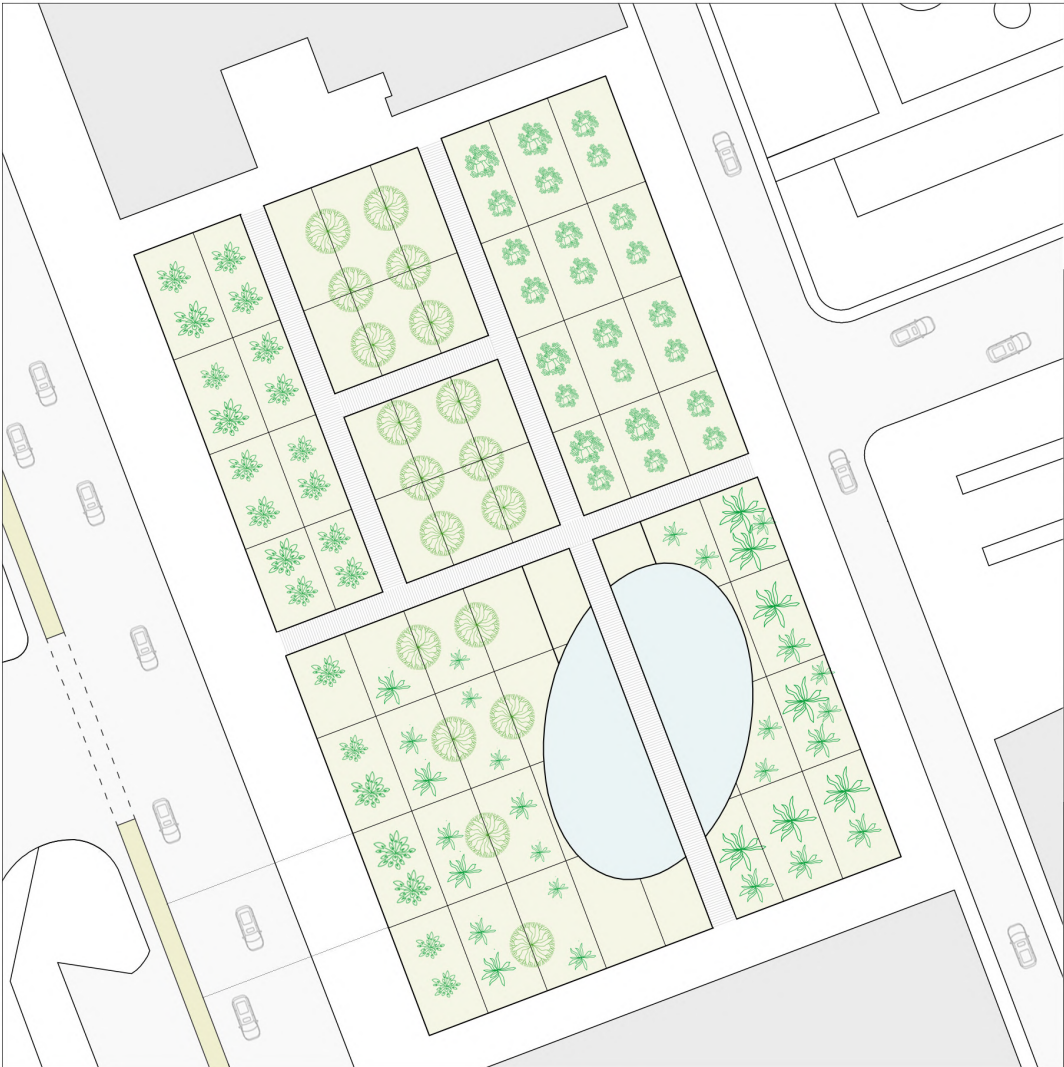


Agricultural Field - Pocket Park

DESIGN - URBAN SCALE

What kind of public spaces can foster the social interaction?

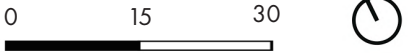
Agricultural Field



Pocket Park

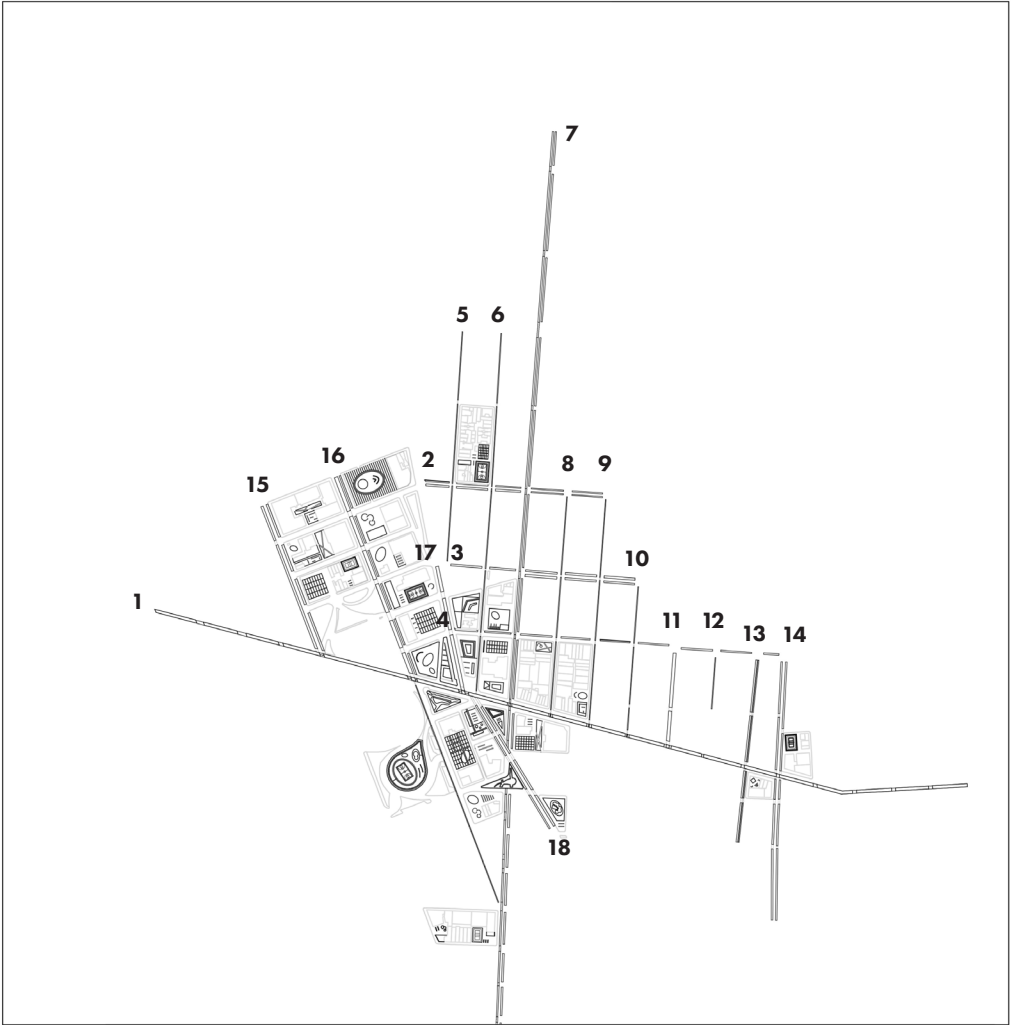


Source: AUTHOR



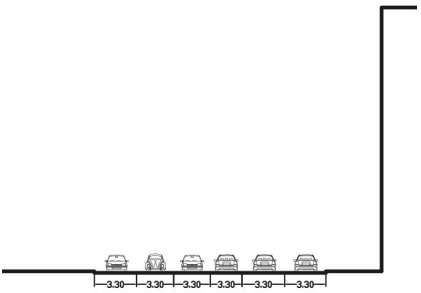


Street sections

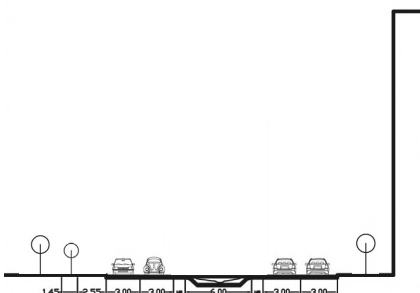


Green - blue network road indication

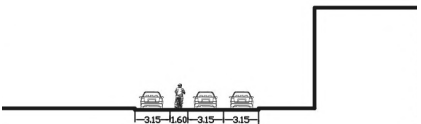
Source: AUTHOR



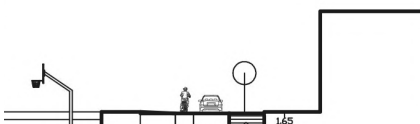
1 Existing Profile



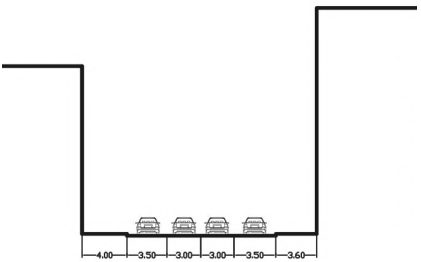
1 Proposed Profile



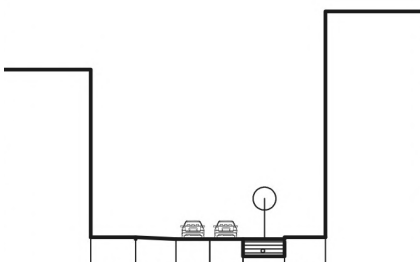
2 Existing Profile



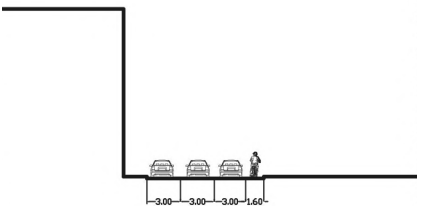
2 Proposed Profile



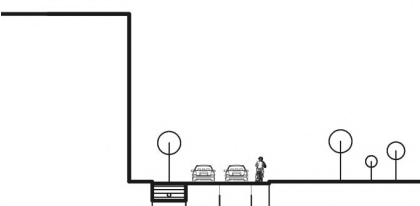
3 Existing Profile



3 Proposed Profile



4 Existing Profile



4 Proposed Profile

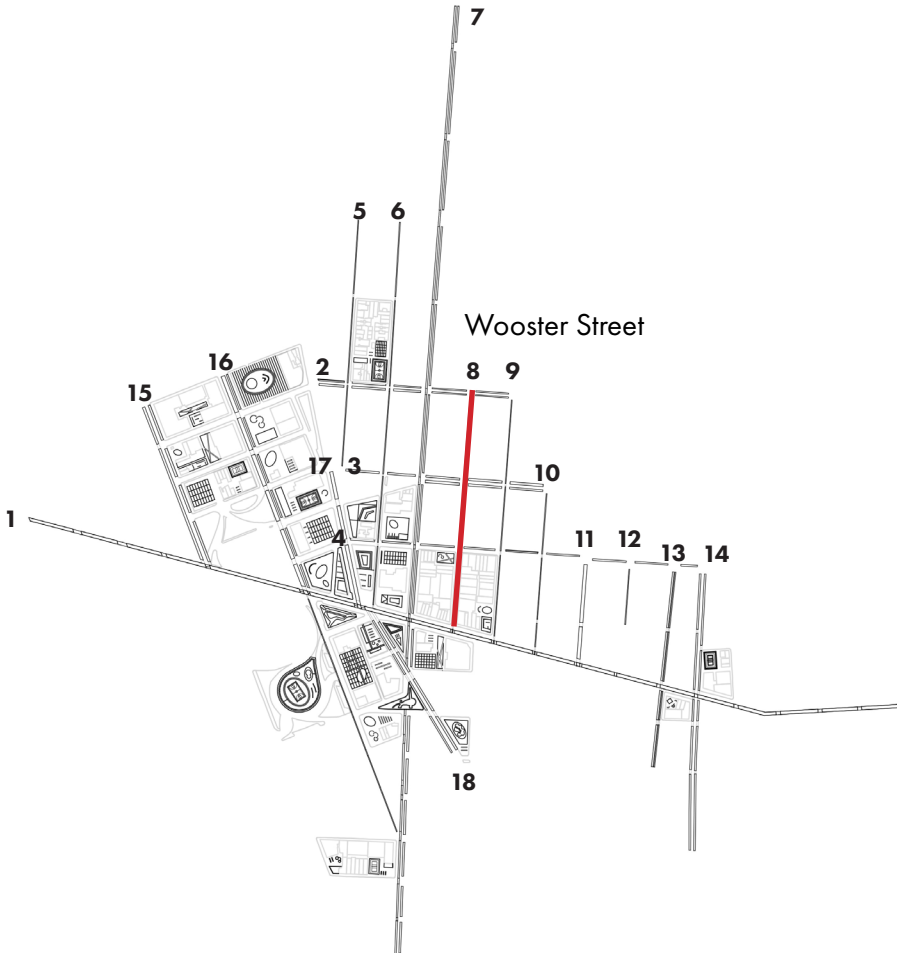
Source: AUTHOR





Wooster Street proposal (dry period)

Source: AUTHOR







Wooster Street proposal (rainy period)

Source: AUTHOR



Wooster Street proposal (extreme flood)

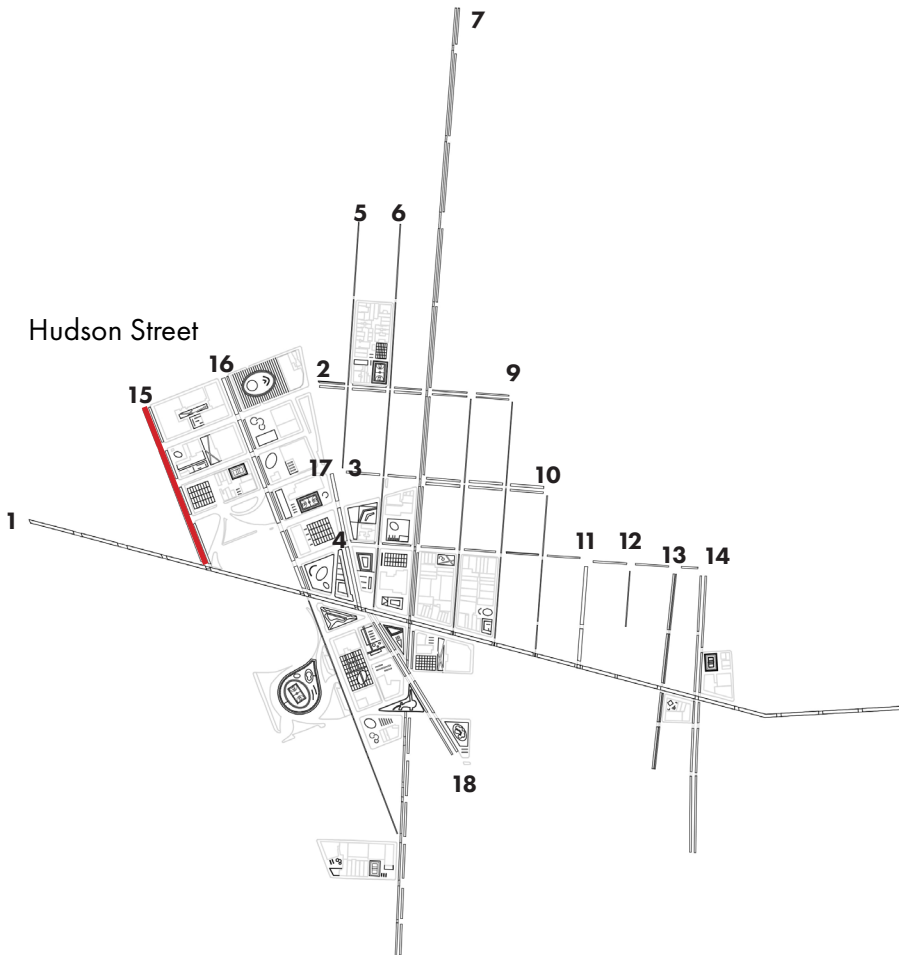
Source: AUTHOR





Hudson Street (existing Situation)

Source: AUTHOR based on Google Earth



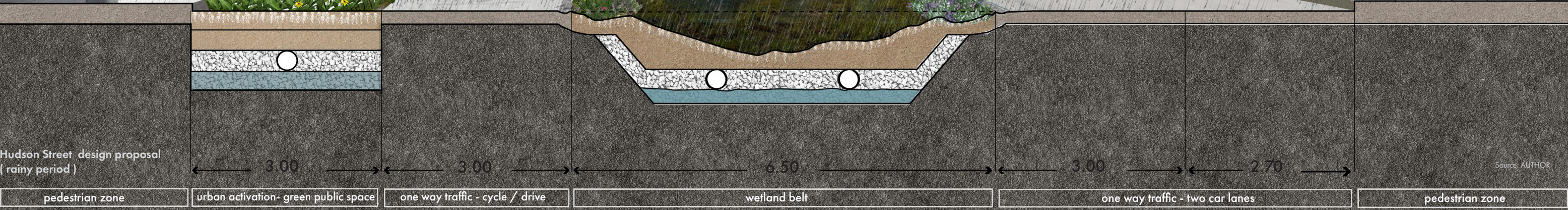








Hudson Street design proposal  
(rainy period)

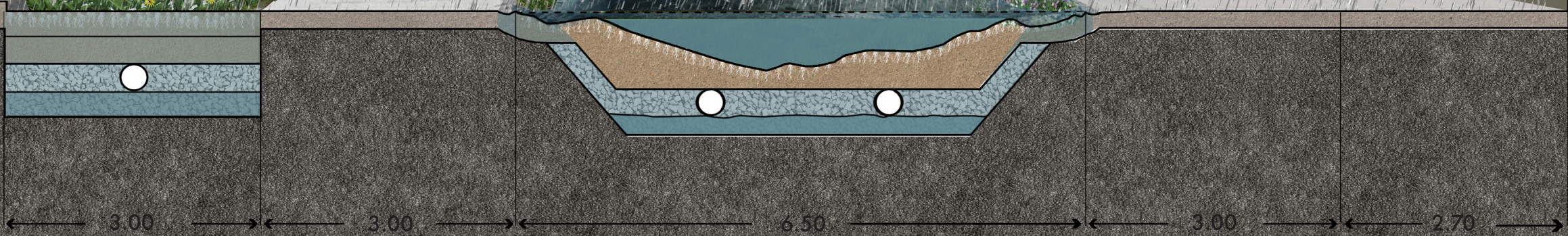


Source: AUTHOR





Hudson Street design proposal  
( extreme flood period )

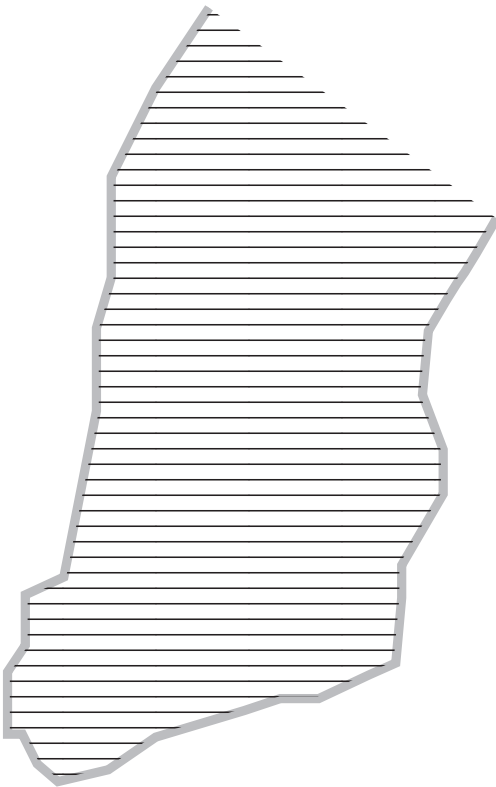


pedestrian zone	urban activation- green public space	one way traffic - cycle / drive	urban canal	one way traffic - two car lanes	pedestrian zone
-----------------	--------------------------------------	---------------------------------	-------------	---------------------------------	-----------------

Source: AUTHOR

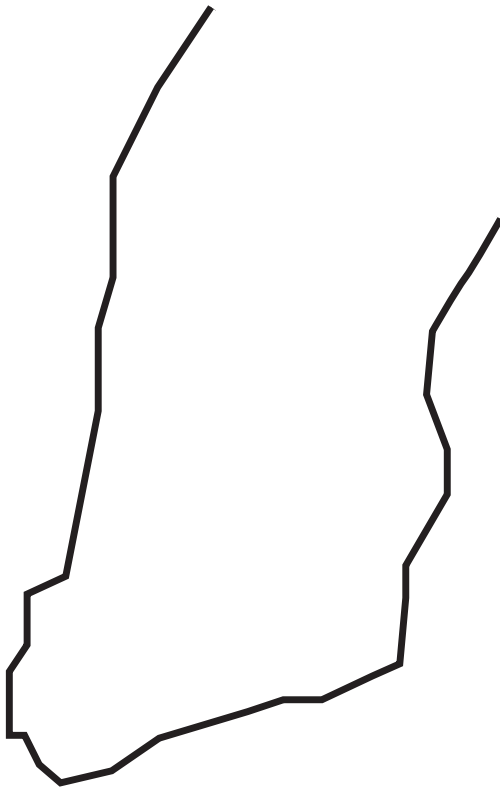


INNER



+

EDGE





PROPOSAL - INNER



Source: AUTHOR

BIG U PROJECT - EDGE

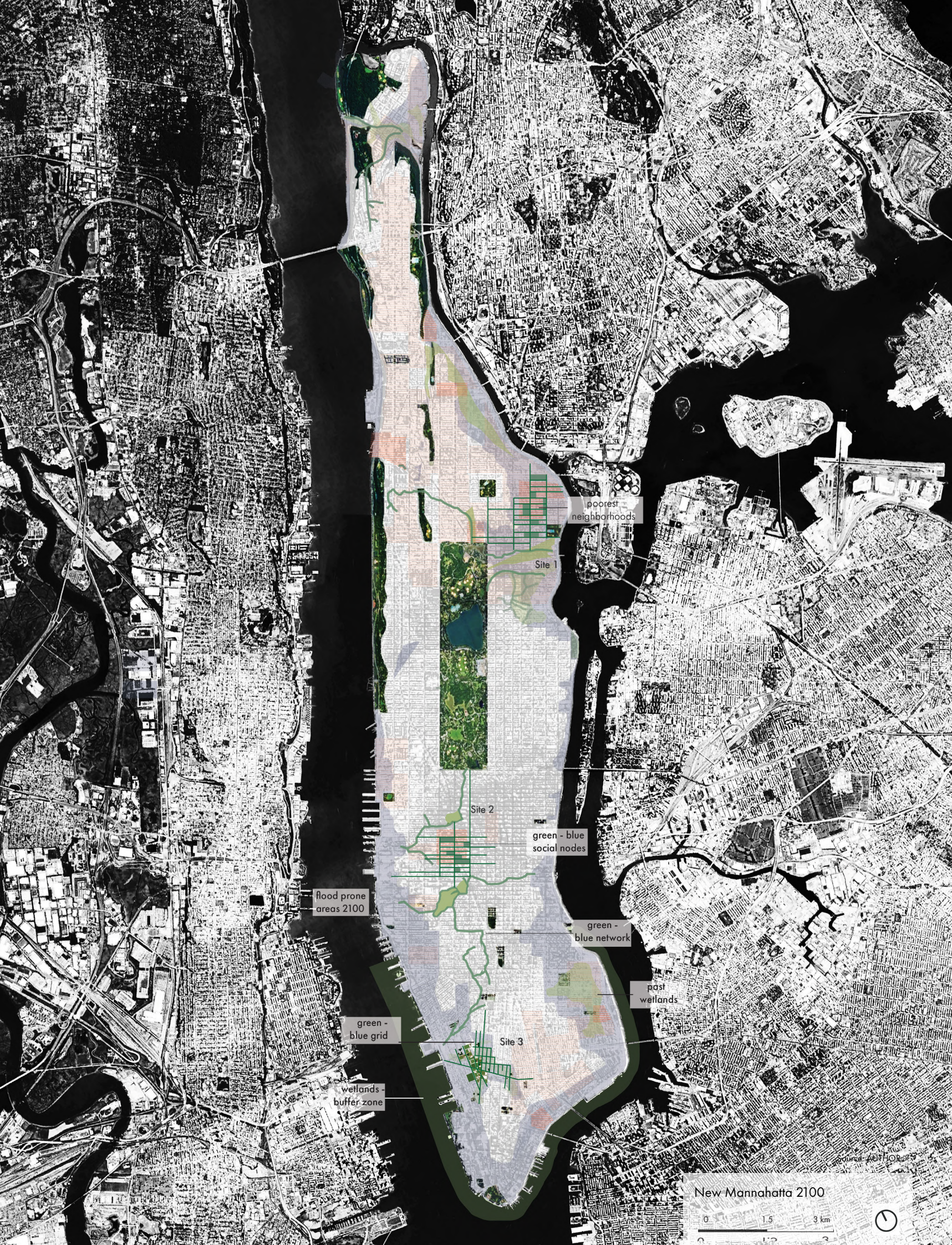


Source: rebuildbydesign.org



**NEW MANNAHATTA 2100**





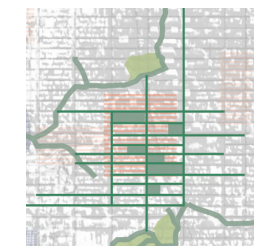
- The selected site for detailed design in Lower Manhattan serves as a pilot for the strategic design of the other two sites that constitute the metropolitan vision.

- The Grid is re-interpreted through the incorporation of a green – blue system with the palimpsest landscape as the connective element starting from the upper to the lower part.

- The internal metropolitan core deals with the grid re-definition which in combination with the already proposed projects for the incorporation of a wetland buffer zone in the edge of the island, will act complementary towards the mitigation of Flood Vulnerability.



Site 1

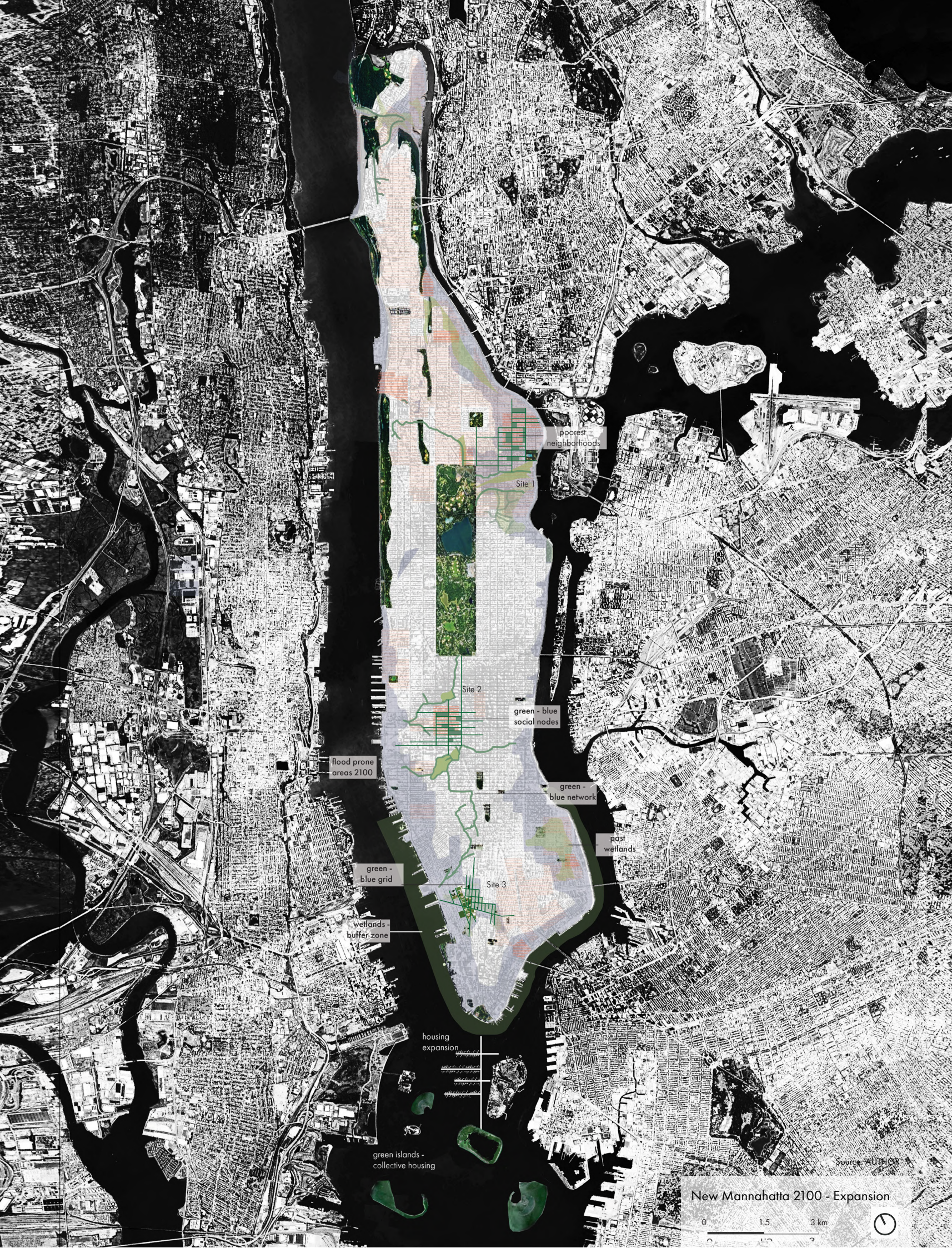


Site 2



Site 3





## AFTER THE EDGE

- The compactness of the building environment in combination with the space for nature arises several questions for future housing densification strategies.
- The internal part of the island will be redefined through the natural systems, while new housing densities will appear after the edge of the island.
- The New Mannahatta will incorporate housing structures as an urban expansion in the sea.
- A combination of floating houses with green islands meant for collective housing will assist towards the impending housing shortage.



# CONCLUSIONS & REFLECTIONS











## Conclusions - Reflections

### THE GRID IS BENEFICIAL

Despite the criticism that the grid plan received, the project proves that the grid application as a tool of organization in the urban context when it is properly designed, can be more than beneficial towards the Flood Resilience, Porosity and Social Inclusion.

### TRANSFERABILITY

The grid redefinition in Manhattan by the incorporation of green blue spines like in the case of Cloudburst formula in Copenhagen indicates the transferability of the project in urban environments with flood vulnerability.

### IMPLEMENTATION AND IMPACT ON LOCAL COMMUNITIES

The implementation of “New Mannahatta” requires specific legal, financial, political and societal conditions, while the benefits to the local communities are very important. The design of a holistic system with green and blue public spaces aims to foster the inclusivity and the meaningful interaction between all economic classes and ethnicities, while bolstering the local economy.

### IMPACT ON HOUSING STRATEGIES

The incorporation of the green blue system in the already dense building environment of Manhattan, poses limitations on new housing densities inside the urban core. The internal part of the island will partially become a green – blue matrix while new housing densities will appear in the sea in the form of floating houses and in green islands as an urban expansion.

### A NEW LENS OF THE GRID SYSTEM

The original grid constitutes a concrete road network with limited and disconnected green public space with no water presence leading to a compact building environment. The new lens of the grid aims to integrate green and blue structures in combination with inclusive public spaces in a holistic design system.

### A GREEN BLUE MEGASTRUCTURE


All in all, Manhattan island will gradually become a Green & Blue megastructure, laying the foundations for the connection with the forgotten Dutch past aiming to Flood Resiliency, Porosity and Social Inclusion.



Madelon Vriesendorp, *Freud Unlimited*, 1976

Source: Architectural Review

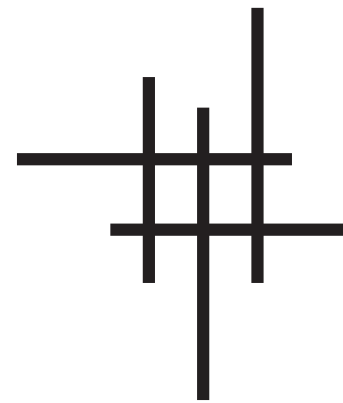


A black and white aerial photograph of New York City. The left side of the image shows Central Park, a large green space with winding paths and a small body of water. The right side shows the dense urban landscape of Lower Manhattan, with numerous skyscrapers and buildings. The Hudson River is visible on the right, with several ships and a bridge in the distance. The image is split vertically, with the left half showing the park and the right half showing the city.

"The designation ***terra firma*** (firm, not changing; fixed and definite) gives way in favor of the shifting processes coursing through and across the urban field: ***terra fluxus***."

- James Corner, 2006





THANK YOU!



# APPENDIX



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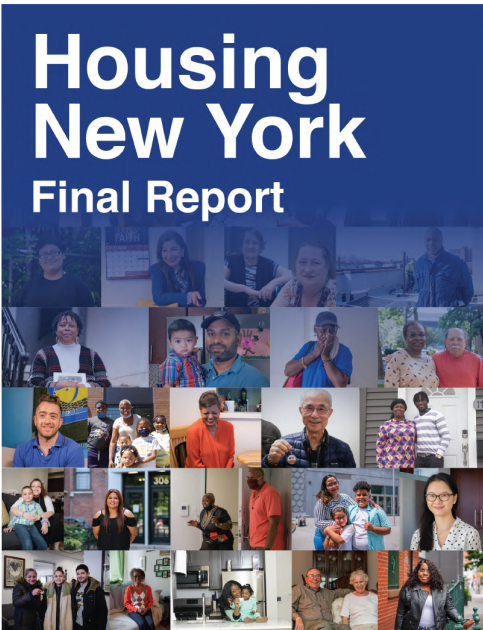
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HOUSING PLAN



Source: NYC.gov

Housing Initiatives:

- Housing +:** Many affordable developments constructed a century ago were built as islands in a sea of unused parking lots.
- Neighborhood construction program(NCP):** Use of smaller vacant and underused parcels of land for affordable housing.The Initiative started in 2015 and it was approved in 2020 for Central Harlem.
- Modular Construction:** In 2017, HPD piloted modular construction through the Build It Back program, financing the construction of nearly 100 single-family modular homes, and achieving cost savings of roughly 25% per singlefamily home as compared to conventional construction.

- Big Ideas for Small Lots NYC:** The initiative of utilizing vacant lots of land for affordaable housing resulted in some remainingoddly shaped small plots. In search of innovative housing solutions for these lots, HPD launched a design competition with American Institute of Architects (AIA NY) in 2019.

- Affordable Neighborhood cooperative program:** The Affordable Neighborhood Cooperative Program (ANCP) was created in 2012 to select qualified developers to rehabilitate the remaining City-owned TIL properties in order to create affordable cooperatives for low and moderate-income households.

- Share NYC:** Shared housing as a solution for one to two people households looking for affordable housing options in New York City. The initiative startedin 2018



Source: NYC.gov

Policies for Equitable neighborhood growth

- Zoning for quality and affordability (ZQA)** ZQA updated the zoning code to allow higher-quality buildings, better ground floor retail, community facility spaces and affrdable housing.
- Mandatory Inclusionary Housing (MIH)** Mandatory Inclusionary Housing (MIH) program in the nation to ensure that permanently affordable apartments are included in new development in areas zoned for growth.
- Voluntary Inclusionary Housing Program (VIH):** A market-based incentive program designed to encourage developers in neighborhoods already zoned for high density to create permanently affordable homes.

Spearheaded Neighborhood Plans and Rezonings

The City initiated community planning processes in neighborhoods where land use changes and improvements to infrastructure and services could result in new housing and amenities. The City has completed 11 comprehensive neighborhood plans, eight of which resulted in rezonings that create the capacity for approximately 34,000 homes, of which roughly 9,800 would be permanently affordable through MIH.

- Among them is
- The East Harlem Neighbirhood Plan
  - Soho /Noho Neighborhood Plan



Remediating Browfields and Affordable Housing Devoplement in Hamilton Hills.

Source: NYC.gov



Dawson Plaza, Affordable complex with 136 units in Harlem in a former underused area.

Source: NYC.gov



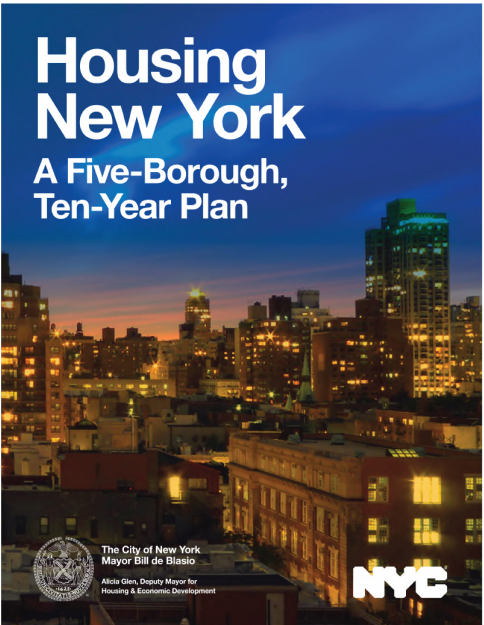
Hotel Reuse and Housing Development in Brooklyn

Source: NYC.gov



Redevelopment and Mixed Use Housing Complex in Bronx

Source: NYC.gov



Source: NYC.gov

- Aim:
- Fostering diverse, livable neighborhoods
  - Preserving the affordability and quality of the existing housing stock
  - Building new affordable housing for all New Yorkers
  - Promoting homeless, senior, supportive and accessible housing
  - Refining City financing tools and expanding funding sources for affordable housing

A new expansion

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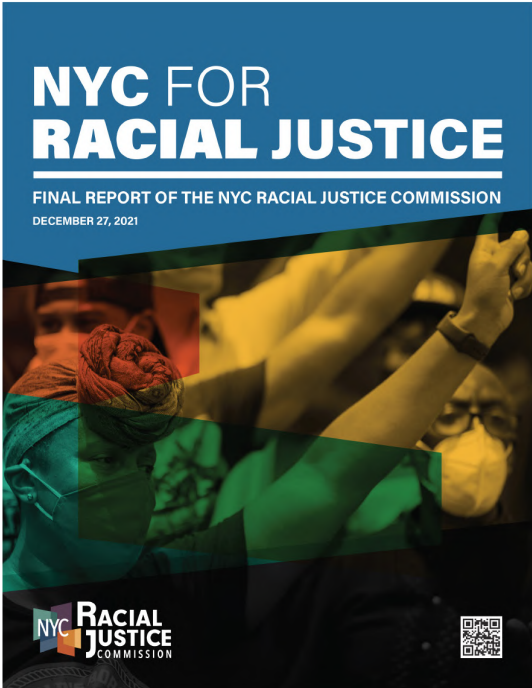


Manhattan Island extension could provide homes for 250,000 people

Source: dezeen.com



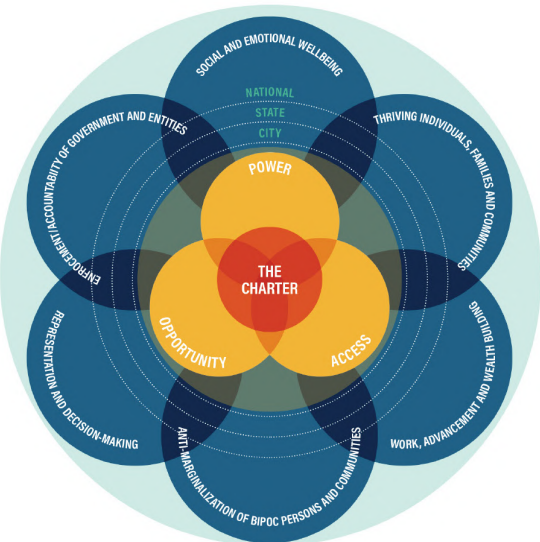
SOCIAL INCLUSION PLAN



Source: racialjustice.cityofnewyork.us

In March 2021, Mayor de Blasio announced the formation of the Racial Justice Commission and appointed 11 Commissioners, to focus on racial justice and reconciliation.

Aim



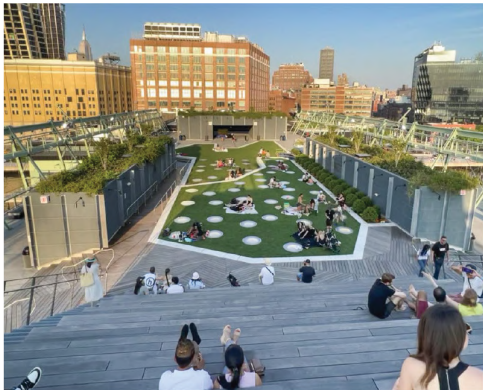
Source: racialjustice.cityofnewyork.us

Public Space as a form of social Interaction



High Line Park

Source: thehighline.org



Pier 27, Rooftop Park, Chelsea, Manhattan

Source: triptips.com



Little Island, Manhattan

Source: gonomad.com

Superblocking for Social cohesion



Aerial View of Housing Superblocks on the Lower East Side, April 30, 1952

Source: thegreatestgrid.mcnyc.org and edited by AUTHOR



Efforts to improve tenement building standards failed to improve what was already built, and in the 20th century, reformers turned to a new strategy: building demolition, site clearance, block aggregation, and new housing solutions on superblocks. The superblock carried a 20th-century social reform agenda.

The area along the East River was dramatically altered by superblocking from 42nd Street to the Williamsburg Bridge. This aerial view from 1952 shows, from north to south, the United Nations building under construction; two middle-class housing projects, Peter Cooper Village and Stuyvesant Town; and three public housing projects: Jacob Riis, Lillian Wald, and the Baruch Houses, for which clearance had just begun on the area directly north of the

Source: Extracted from Google Earth & edited by Author

FLOOD RESILIENCE PLAN

Lower Manhattan Coastal Resiliency (LMCR), “Rebuild by Design”

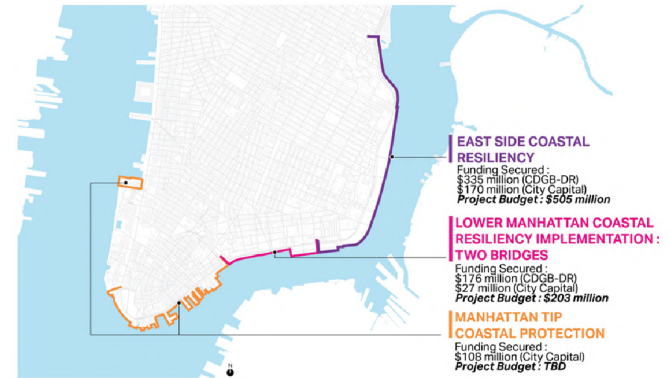
The Big U is a project to protect a 16-kilometer coastline stretching from West 57th Street to The Battery at the southern tip of Manhattan, and from there up to East 42nd. The public initiative aims to mitigate the structural and environmental vulnerabilities that Hurricane Sandy exposed and develop flood resilient solutions.



Source: rebuildbydesign.org



Source: rebuildbydesign.org



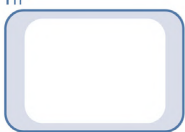
Source: rebuildbydesign.org



# PATTERNS

## PATTERNS TOWARDS THE MITIGATION OF FLOOD RISK

F<sub>n</sub>



Hypothesis

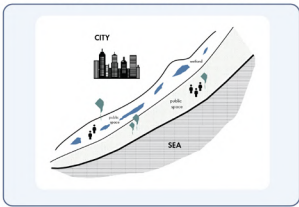
Theoretical back up

Practical Implication

Reference Image

Relationship with other patterns

### F1 WETLAND AS A SOCIAL INFRASTRUCTURE



**Hypothesis**  
Constructed wetlands form a social infrastructure which mitigates the flood risk in Manhattan region.

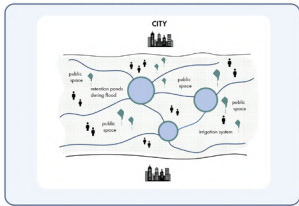
**Theoretical back up**  
Constructed wetland parks have a spread of environmental and social benefits. (M. Barnetjey, M. Elomari, T. Alkhatib, A. Harun, S. Maat, 2021). The formation of wetlands can support various public activities in order to create an urbanized landscape friendly for people and at the same time preventing the flood prone areas from threatening sea level rise.

**Practical Implication**  
Manhattan in NYC suffers from flood risk. It is estimated that in 2100 the sea level will rise almost 1 meter. Wetland formation on the the edges of Manhattan island could act as a buffer zone able to accommodate public facilities, thus reinforcing human interaction and flood adaptation.

**Reference Image**  
Wetland Park, Wanyang, China

**Relationship with other patterns:** F2, F3, F4, H1, H5, S4  
Reference paper: M. Barnetjey, M. Elomari, T. Alkhatib, A. Harun, S. Maat (2021). Constructed wetland Park as Happy Public Space to Achieve quality of life Case study of 10 Baseline City.

### F2 THE WATER AS A MEETING POINT



**Hypothesis**  
Water storage in the form of retention ponds trigger public space development in the flood prone areas of Manhattan.

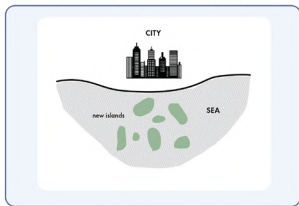
**Theoretical back up**  
Being in mind that Manhattan will experience significant storm and flood events in the future, there is a need for adaptation with water sensitive design. The retention area can be utilized as water catchment area as well as a place for supporting the residents' social activity. (F. Anwar, F. Amala, 2017). The retention ponds in combination with irrigation systems can offer a great opportunity for a public space network across Manhattan region.

**Practical Implication**  
Manhattan lacks interaction between people and the water element. Given the flood risk of the future, a system of retention ponds combined with public space could be the answer towards the integration of water into public space and the formation of a new system of social centralities. The example of Copenhagen is an important reference towards the integration of water in social activities.

**Reference Image**  
Hans Tavsens Park, Copenhagen, Denmark

**Relationship with other patterns:** F1, H1, S1, S4, S5  
Reference paper: F. Anwar, F. Amala, 2017. Making Retention Pond as an Attractive Element for Site Planning at Lowland Housing Area.

### F3 AN ARTIFICIAL GREEN ISLAND NETWORK



**Hypothesis**  
A network of artificial green islands assists in the mitigation of rising sea levels in Manhattan.

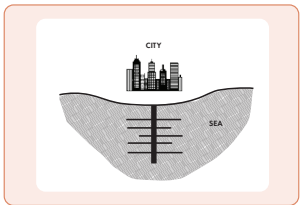
**Theoretical back up**  
Given the threatening rising sea levels of Manhattan and the need for urban expansion, the solution of artificial green islands could be integrated. The artificial raising of whole islands (island raising) to appropriate heights can cope with future sea-level rise (S. Brown, M. Wood-ey, R. Nichols, A. Shariel, Z. Khalid, J. Hikal, D. Jucker, M. McCabe, 2019). The creation of a network of new green islands can assist towards the mitigation of flood risk in the area of Manhattan through the integration of wetlands.

**Practical Implication**  
In order to create a new network of green islands in the area of Manhattan in an aim to mitigate flood risk, we need to test the proximity with natural salt marshes. In areas where there is an existing salt marsh there is a possibility of the integration of new islands that are connected to existing salt marsh. In this way, the flood risk is mitigated as well as a new alternative urban expansion is proposed.

**Reference Image**  
Tidal Basin, Washington DC, United States

**Relationship with other patterns:** F1, H1, S3  
Reference paper: S. Brown, M. Wood-ey, R. Nichols, A. Shariel, Z. Khalid, J. Hikal, D. Jucker, M. McCabe, 2019. Land raising as a solution to sea-level rise: An analysis of coastal flooding on an artificial island in the Maldives.

### H1 AMPHIBIOUS LIVING



**Hypothesis**  
Floating housing units constitute a form of urban expansion the dense environment of Manhattan region.

**Theoretical back up**  
In the volume "Architecture", the authors, define amphibious houses as "houseboats designed to rise on fixed foundations [...] and that rise on guide-posts, floating on the water", while floating houses "rise on a floating base, designed to rise and fall with the water level". (C. Ciccare, M. Ferraro, S. Marzocchi, F. Russo, 2020). Being in mind that Manhattan experiences a housing crisis which will increase the coming years, living in the water through amphibious or floating structures could assist towards the mitigation of the problem in the dense built environment while adapting to changing climate conditions.

**Practical Implication**  
According to statistics the number of housing units will rise up to almost 900,000 (40,000 housing units more than 2020) by 2040 in Manhattan. In an already dense environment, practical solutions are needed in order to overcome the housing crisis. Urban expansion in the sea through floating structures could respond to the demands of the future.

**Reference Image**  
Kenzo Tange Plans for Tokyo, Tokyo, Japan

**Relationship with other patterns:** F1, F2, F3, H5, S3  
Reference paper: C. Ciccare, M. Ferraro, S. Marzocchi, F. Russo, 2020. Adapting towards resilience: Analysis of the Construction Features and Dynamic Energy Performance of Amphibious and Floating Houses.

### H2 PARASITING THE ROOFSCAPE



**Hypothesis**  
Parasite structures as housing additions to the roofscape of Manhattan formulate a densification solution.

**Theoretical back up**  
Parasitism is to describe the relationship between two organisms living together. The parasite gets benefit from the host and the host is victimized from providing nutritional substance and living space. (A. Cattaneo, 2021). This dependent relationship between organisms could be inspirational to architectural design and the formation of patterns in the urban context, thus resulting to what is called parasite urbanism. Housing parasites in Manhattan context could create an interesting relationship between the existing buildings and the new additions.

**Practical Implication**  
The parasite structures can be a practical solution towards the housing crisis in a dense environment like the one of Manhattan. As a form of addition in an existing structure, it presents various benefits in terms of a cheaper solution than the creation of a brand new building. Furthermore, these structures can activate the dead space of many unused rooftops. Los Palmas parasite in Rotterdam is an innovative solution towards the housing problem in the Netherlands.

**Reference Image**  
Los Palmas Parasite, Rotterdam, the Netherlands

**Relationship with other patterns:** S2, S3, H3  
Reference paper: A. Cattaneo, 2021. What is a parasite?

### H3 RE-USE: FROM OFFICE TO HOUSING



**Hypothesis**  
Housing complexes as a result of transformation from office buildings offers a re-use solution in the dense environment of Manhattan.

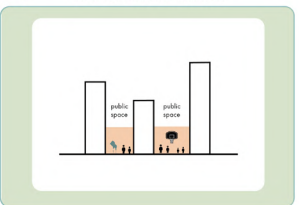
**Theoretical back up**  
The reuse of a building and the transformation from one use to another is a cost effective solution. Adapting instead of demolishing when possible is an essential ingredient to change the building industry towards more sustainable future and conserve valuable resources for the new ahead. (B. Gurney, N. Usher, 2020). More specifically, the reuse of office building complex into a housing complex can be an efficient solution towards the mitigation of housing crisis in Manhattan.

**Practical Implication**  
Thinking about the dense built environment of Manhattan in combination with the impending housing crisis, there is a question arising about the potential of building re-use. Office complexes could be transformed into housing units like in the case of Alexandria, Egypt, where an abandoned office complex was turned into a residential complex. The re-use of buildings can be both resilient and sustainable solution for the city of the future.

**Reference Image**  
Transformation from Office into Housing Complex, Alexandria, Egypt

**Relationship with other patterns:** H2, S2, S3  
Reference paper: B. Gurney, N. Usher, 2020. Housing performance for adaptive re-use of office and industrial buildings: Demolish or reuse.

### S1 ACTIVATING THE IN - BETWEEN



**Hypothesis**  
The activation of the space between the buildings leads to an alternative form of public space in the dense environment of Manhattan.

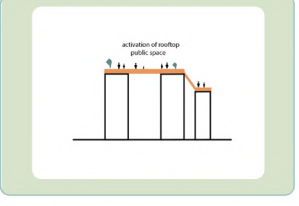
**Theoretical back up**  
Urban green areas are significant for people who live in cities to experience nature. The compactness of Manhattan offers limited number of large scale interventions. Since vacant lands inherently receive limited budgets, design practices must develop innovative ways to implement the projects. (A. Elkhouk, M. Faris, M. Noghzi, 2021). The space between the buildings could offer a great opportunity for multifunctional pocket parks.

**Practical Implication**  
The dense built environment of Manhattan makes vital the redefinition of public space integration. Small scale interventions such as pocket parks in the inactive in-between spaces of buildings could create a new form of meeting place, thus mitigating the social segregation. Pocket parks including plazas, playgrounds, sport facilities could redefine the public space meaning in Manhattan region.

**Reference Image**  
Pigalle Dupont, Paris, France

**Relationship with other patterns:** F2, H4, S3  
Reference paper: A. Elkhouk, M. Faris, M. Noghzi, 2021. Design possibilities of urban spaces in a pocket park in relation to planning enclosure.

### S2 ROOFTOP MUTATIONS



**Hypothesis**  
The inactive roofs present strong potential for transformation into a network of public spaces in Manhattan.

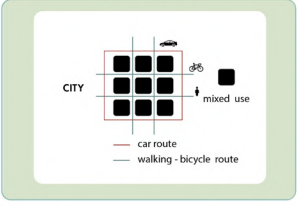
**Theoretical back up**  
In increasingly denser urban environments, there is a new-found interest in underused spaces as opportunities for further development. (A. Cattaneo, 2021). From sustainable infrastructure and urban farming to social spaces and cultural venues there is a strong potential of creating a multi-layered city through the activation of urban rooftops. In Manhattan, this strategy could form a significant mutation of rooftops into an interconnected network of public spaces.

**Practical Implication**  
The activation of the roofscape in Manhattan through a network of alternative public spaces could be a practical solution towards the mitigation of social segregation in a dense built environment. The rooftop walk in Rotterdam is a representative example of roof connections through promenades connecting the centralities of public spaces.

**Reference Image**  
Rooftop Walk, Rotterdam, the Netherlands

**Relationship with other patterns:** H2, H3  
Reference paper: A. Cattaneo, 2021. A New Layer of Public Space: The Case for Activating Urban Rooftops.

### S3 SUPERBLOCKING



**Hypothesis**  
The integration of Superblocks with mixed uses combats the social segregation in Manhattan.

**Theoretical back up**  
The superblocks are urban cells of about 400 x 400 m that can serve as the basis for the mobility and public space model of a new city. (S. Palencia, 2021). Superblocks significantly improve quality and public health through the integration of pedestrian - bicycle networks in combination with multifunctional public spaces. The redefinition of the urban grid in Manhattan through superblocking could offer a potential for social segregation mitigation.


**Practical Implication**  
The car dependency and dense built environment in Manhattan affects the social gathering. Superblocks combining a existing blocks leaving the car route in the perimeter is a sustainable and viable solution for the city. The formation of public spaces can be generated by the process of superblocking, thus bringing people together.

**Reference Image**  
Superblocks, Barcelona, Spain

**Relationship with other patterns:** F3, F4, F5, H1, H3, H4, S1, S5  
Reference paper: S. Palencia, 2021. Superblocks: From a New Model of Mobility and Public Space: Barcelona as an Example.

## PATTERNS TOWARDS THE MITIGATION OF HOUSING CRISIS

H<sub>n</sub>



Hypothesis

Theoretical back up


Practical Implication

Reference Image

Relationship with other patterns

## PATTERNS TOWARDS THE MITIGATION OF SOCIAL SEGREGATION

S<sub>n</sub>



Hypothesis

Theoretical back up

Practical Implication

Reference Image

Relationship with other patterns





What if ?

Source: AUTHOR