JAXSponge



A Multi-Faceted Innovations in Flood Management and Advancements in Blue and Green Infrastructure for Jacksonville's Future

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"A Multi-Faceted Innovations in Flood Management and Advancements in Blue and Green Infrastructure for Jacksonville's Future"

Master Thesis Report
MSc Architecture, Urbanism and the Built Environment
Landscape Architecture Track

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P5 P5 Presentation
June 25 2024

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Jacksonville Beach, Florida, United States - Published on June 5, 2022 - Captured by author on May 4th, 2021

PART Ⅰ
Born of Water, Entrapped Within Water

PART Ⅰ
BORN OF WATER, ENTRAPPED WITHIN WATER

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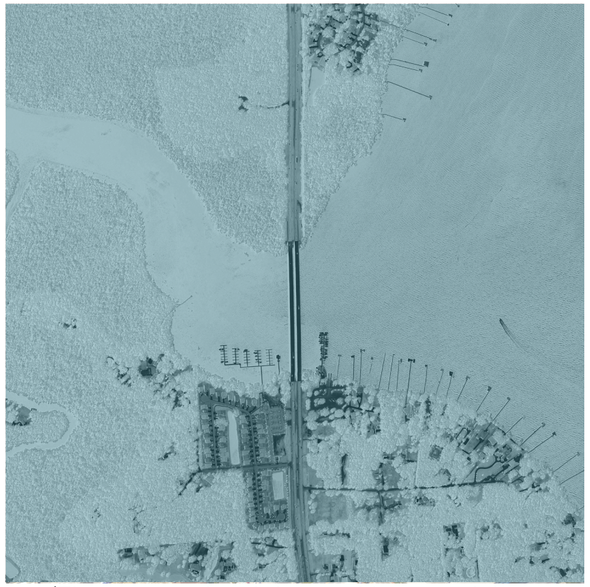
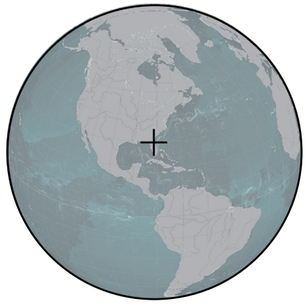
01
INTRODUCTION



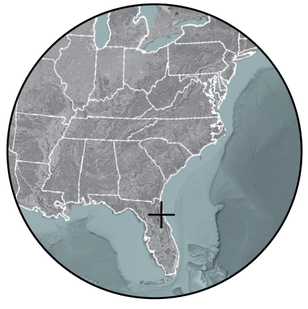
(The topography of river residence and dam,
Satellite image from Google earth, Edited by author
on May, 2024,)

1.1 LOCATION

From the St. Johns River to the Atlantic: the City Rising



North America

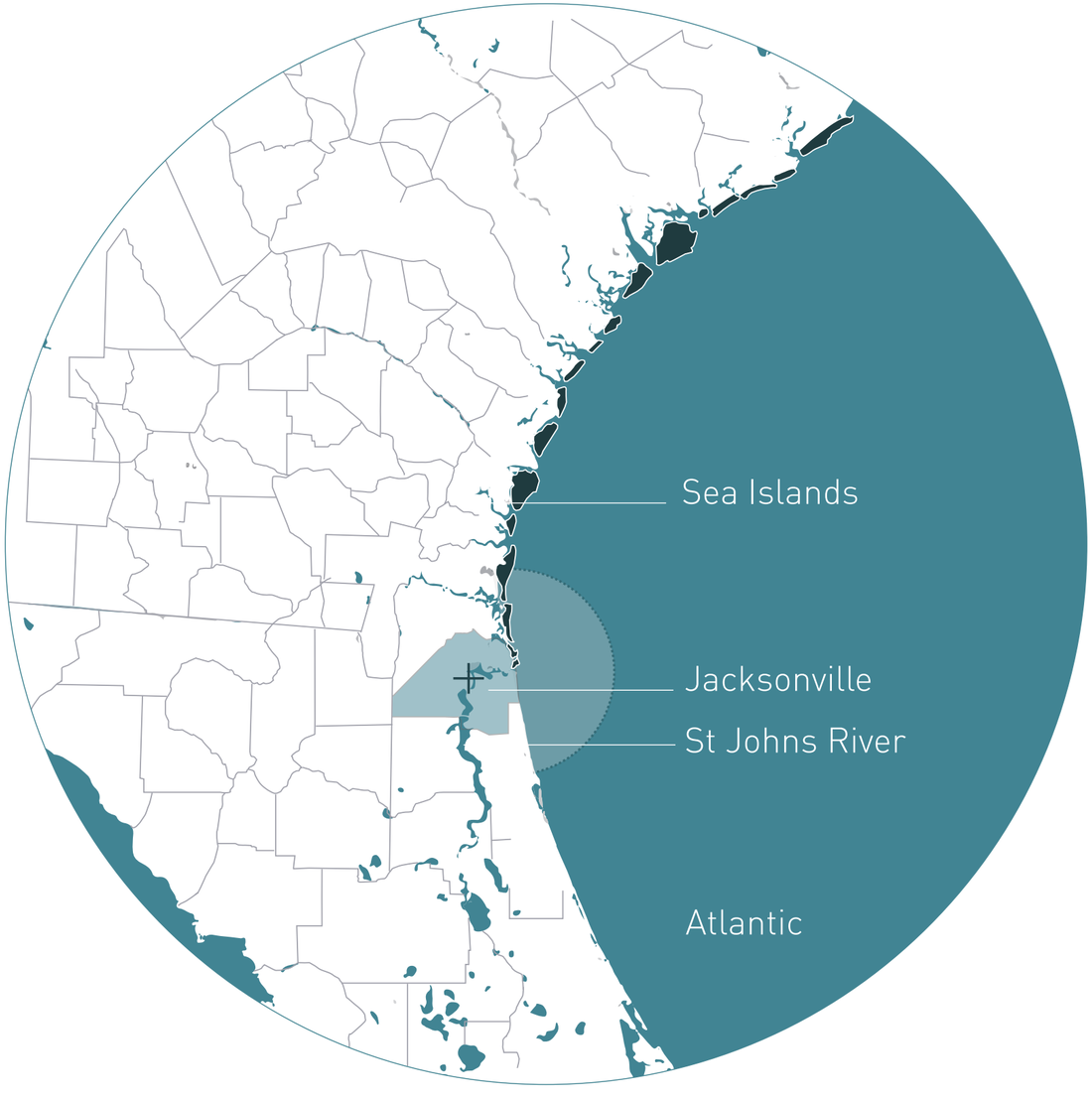


Florida



St John`s river Downstream
Jacksonville

The Atlantic's Western Gemstones: Sea Islands



Laziest yet Picturesque: the St. Johns River

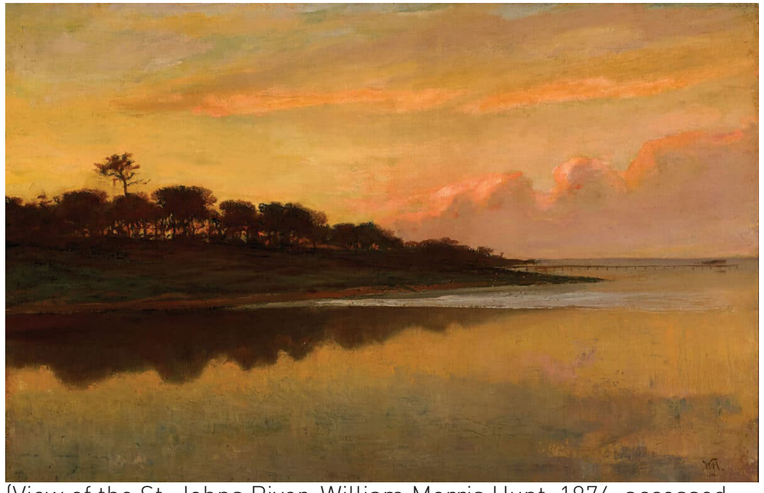


(Stephen Wood, Sunset on the St Johns River in Brevard County Florida, accessed by author on May 6th, 2024,)

Facing the Boundless Waters: The Beaches



(Lance Asper, Jacksonville BEACH Florida, Jacksonville, USA, Published on June 30, 2019, accessed by author on May 6th, 2024.)



(View of the St. Johns River ,William Morris Hunt, 1874, accessed on May 2024)



(A Florida Lagoon, St. Johns, George Henry Smillie, 1874, accessed on May 2024)

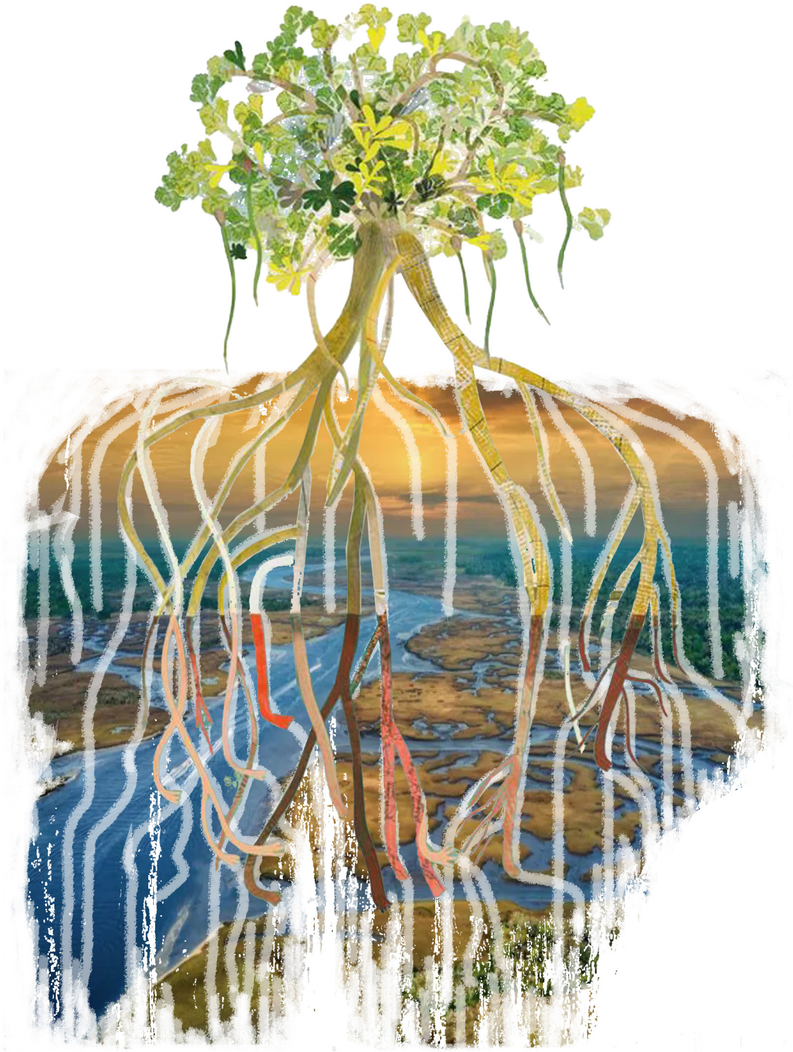


(St. Johns Cove,Laura Woodward, 1890, accessed on May 2024)

Transition and Ecological Richness: Estuarial Landscape



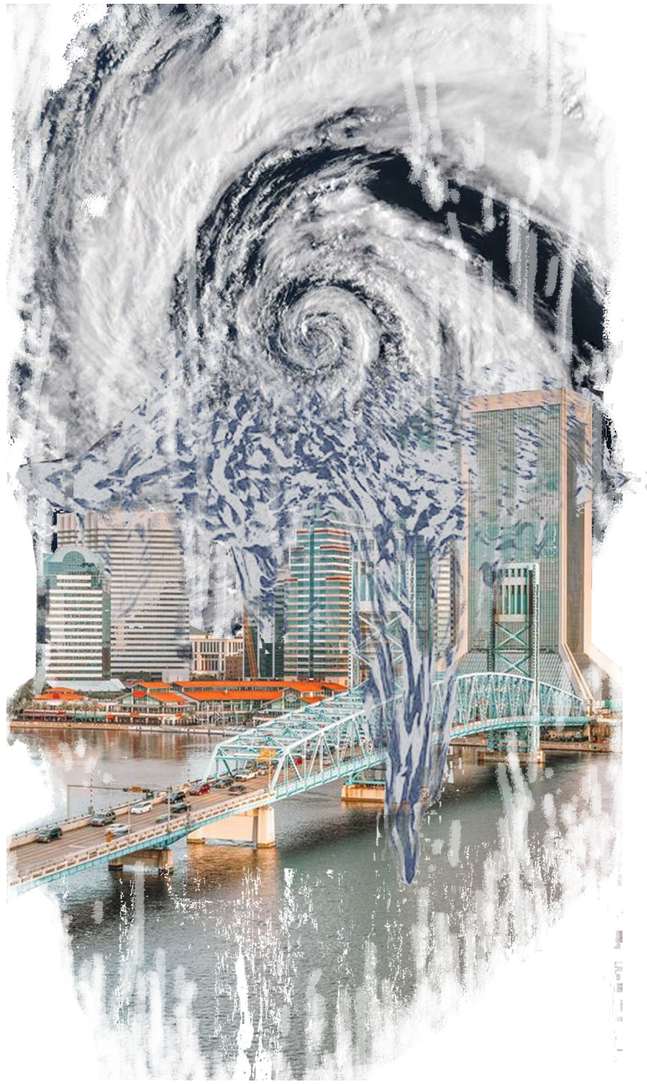
Bird's Eye View, "Jacksonville, Florida, 1893",Augustus Koch, 1893, Accessed on May 2024.]



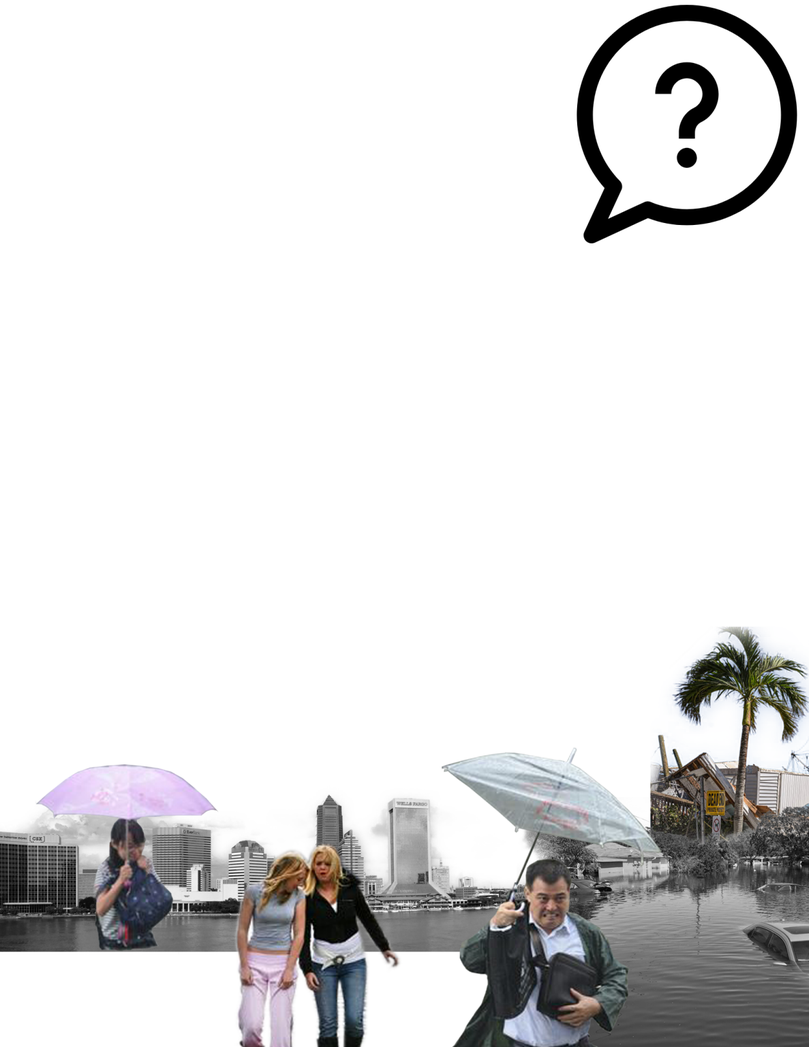


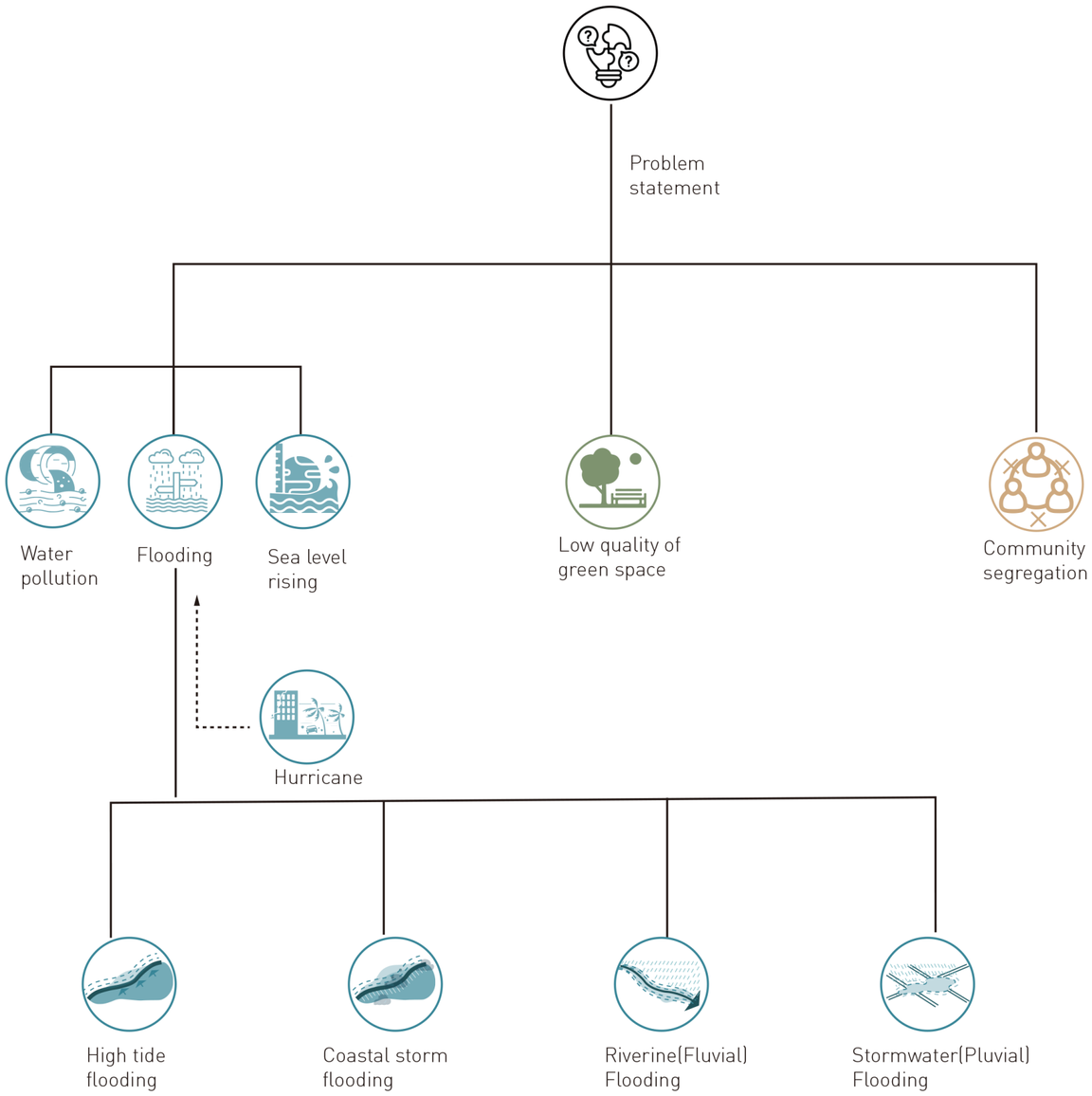
(SEAN RAYFORD 1964, Flooding in downtown Jacksonville after Hurricane Irma topped a record set in 1964 during Hurricane Dora, Getty Images, accessed 4 March 2024)

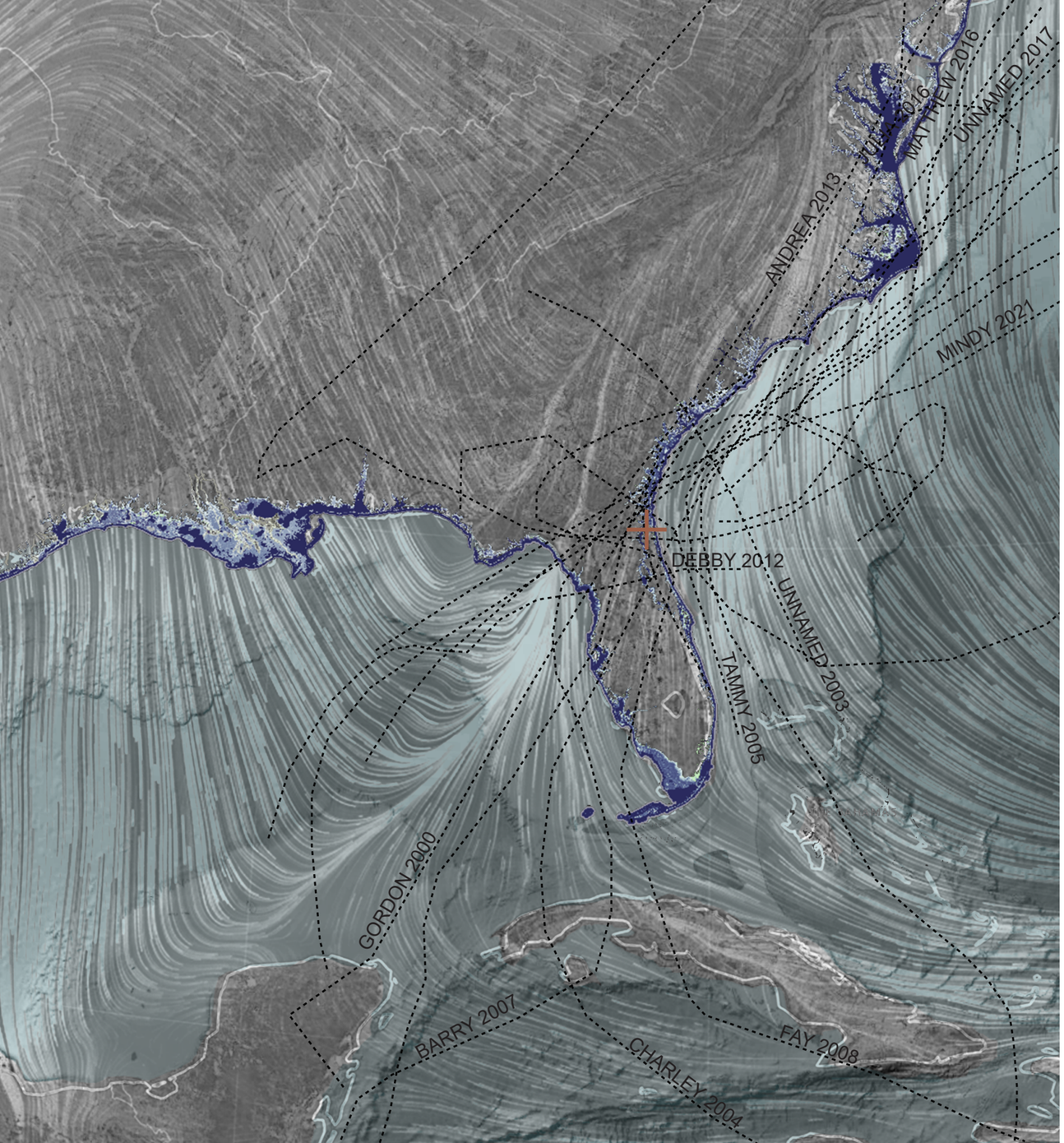
Assault and Super-Destructiveness: Hurricane Irma



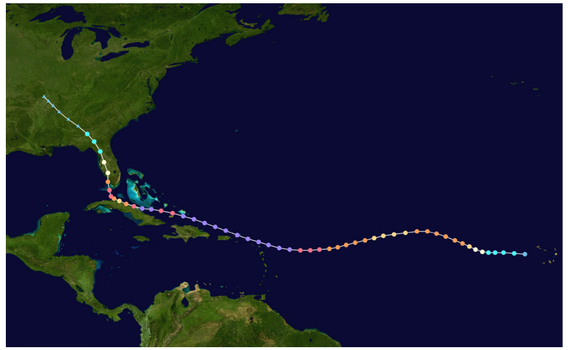
1.4 PROBLEM STATEMENT





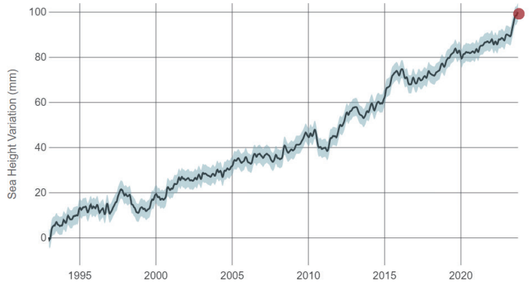


Hurricane-Stricken City



(Map plotting the storm's track and intensity, according to the Saffir–Simpson scale, from NASA. Tracking data is from the National Hurricane Center, accessed on May, 2024)

Sea Level Rising-Threaten City



(Observed sea level since the start of the satellite altimeter record in 1993 (black line), NOAA Climate.gov graphic, adapted on May, 2024)

FLOODING



Jacksonville's iconic sculpture amid floods





People trapped in floods





:(



Flooding

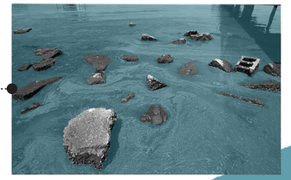




The stream near the residence seems to have become a smelly ditch







Pollution always collects in the tributaries of rivers and streams



Factories can impact local water quality



Images of polluted water appear in downtown

Plastic waste washed up on the beach





Water Pollution

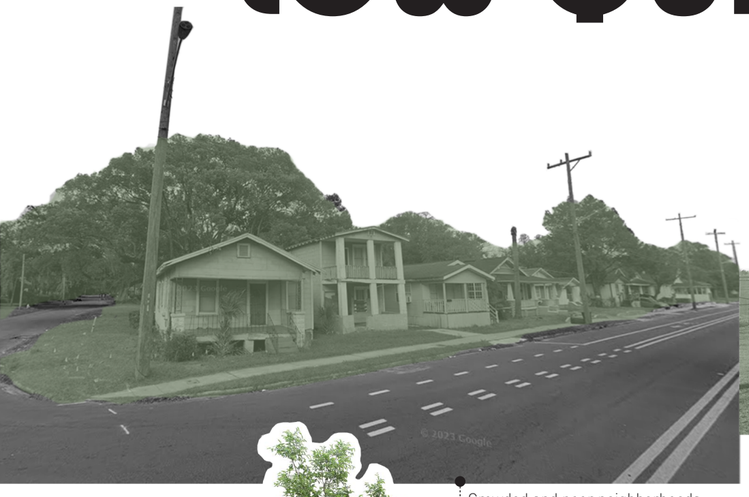
!!!

Born of Water,

Entrapped Within Water

POLLUTION

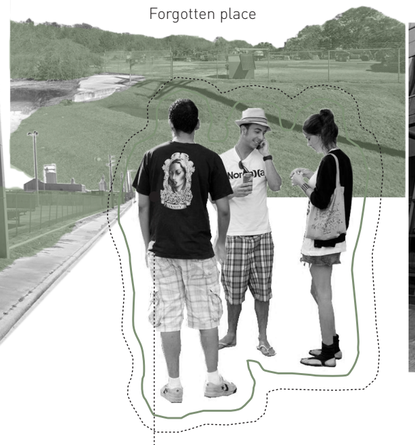
LOW QUALITY GREEN SPACE



Crowded and poor neighborhoods



Port



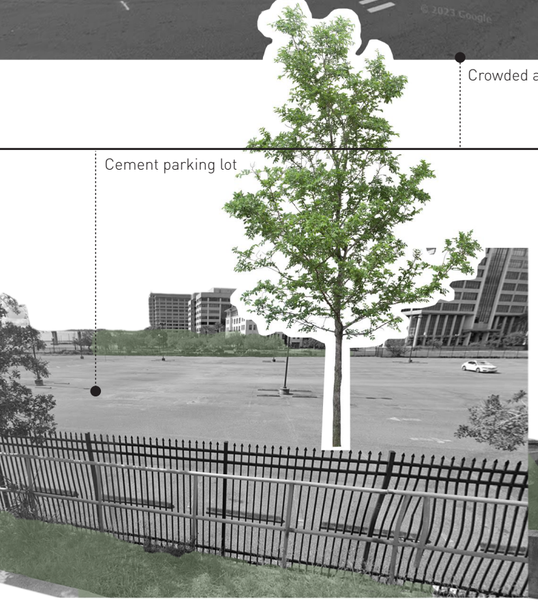
Forgotten place



Downtown

Low Quality Green Space

Cement parking lot



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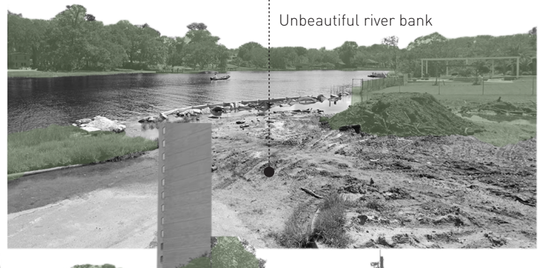
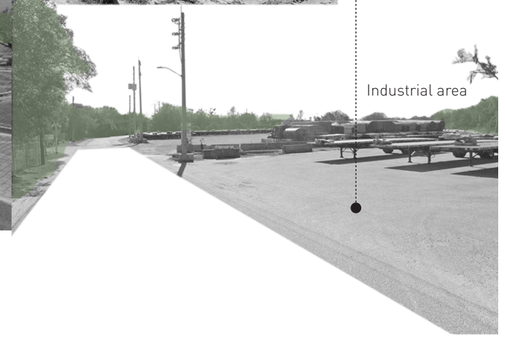
Railway



Unbuilt urban land



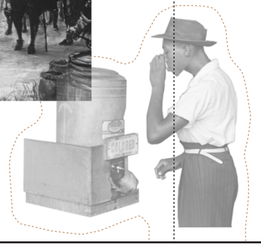
Unbeautiful river bank



Industrial area

His Tory of Segregation





In the 17th century
History of racial segregation in America:
The Sinful Legacy of Slavery

In the late 19th and early 20th centuries
Jim Crow Laws
Enforced Racial Segregation





SEGREGATION



Segregation in schools



?

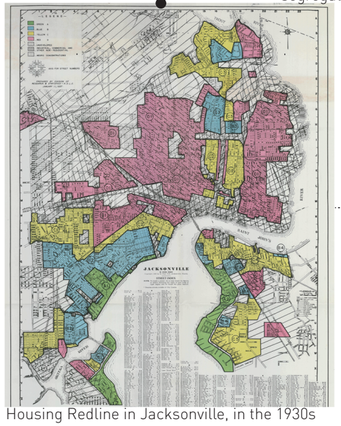


Block Busting maliciously evicted white residents and exacerbated community segregation

What`s the segregation city future?

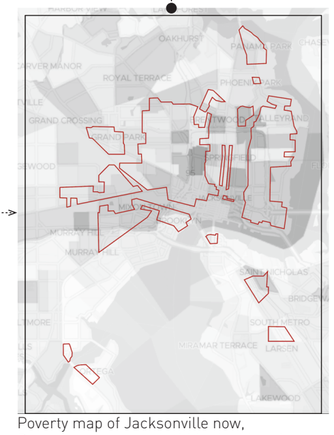


Redlining and Housing Discrimination
In the 20th century,



Housing Redline in Jacksonville, in the 1930s

Redlines are still
in play mentally



Poverty map of Jacksonville now,
Poverty concentrated within the historical red line

where is the future?

Community Segregation:
A Persistent scar on America's Past

History of racial segregation in America: The Sinful Legacy of Slavery

↓

History of housing segregation in America: Redlining and Housing Discrimination

↓

Modern-day community segregation: ZIP codes determine one's future

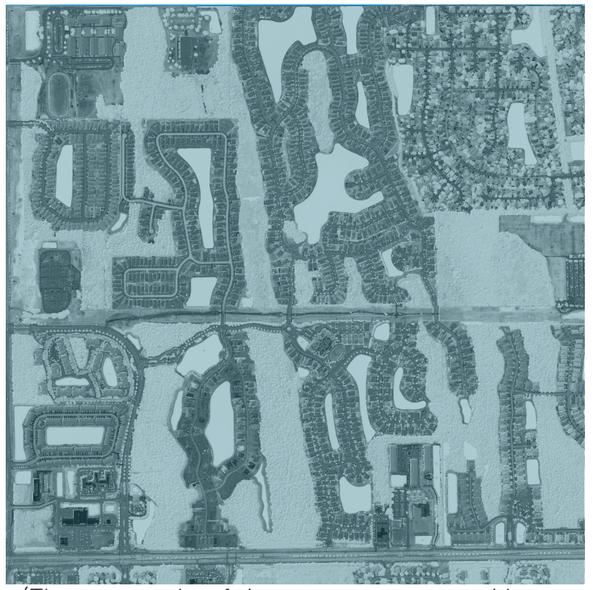
↓

New forms of wealth segregation: A desperate future



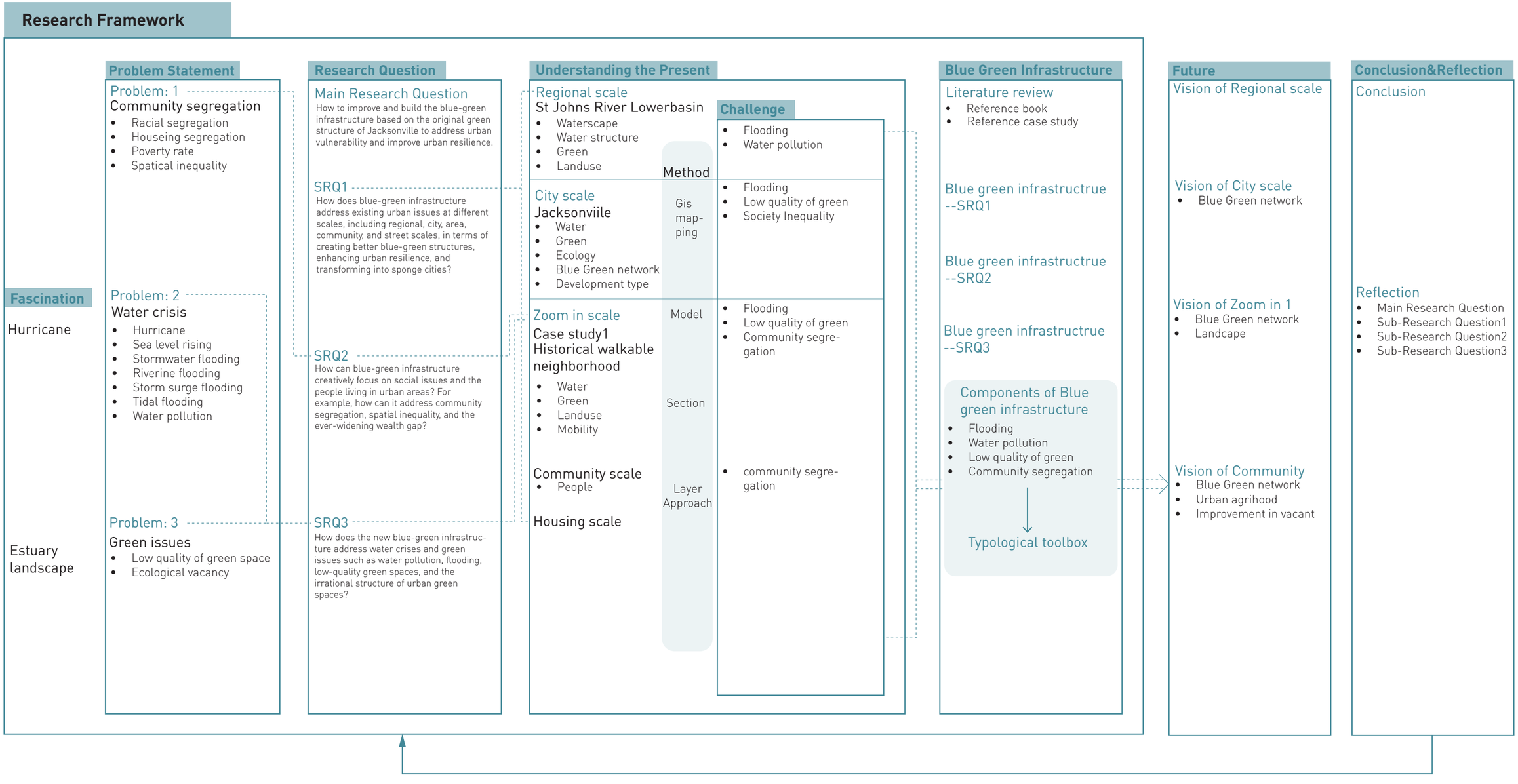
"Why does a ZIP Code determine life expectancy?"

02
RESEARCH
APPROACH



(The topography of river contemporary residence, Satellite image from Google earth, Edited by author on May, 2024,)

2.1 RESEARCH FRAMEWORK



2.2 RESEARCH QUESTION



Main Research Question

How to improve and build the blue-green infrastructure based on the original green structure of Jacksonville to address urban vulnerability and improve urban resilience.



Sub-Research Question1

How blue-green infrastructure addresses existing urban issues at different scales, such as regional scale, city scale, area scale, community scale, and street scale, creating better blue-green structures, enhancing urban resilience, and transforming into sponge cities.



Sub-Research Question 2

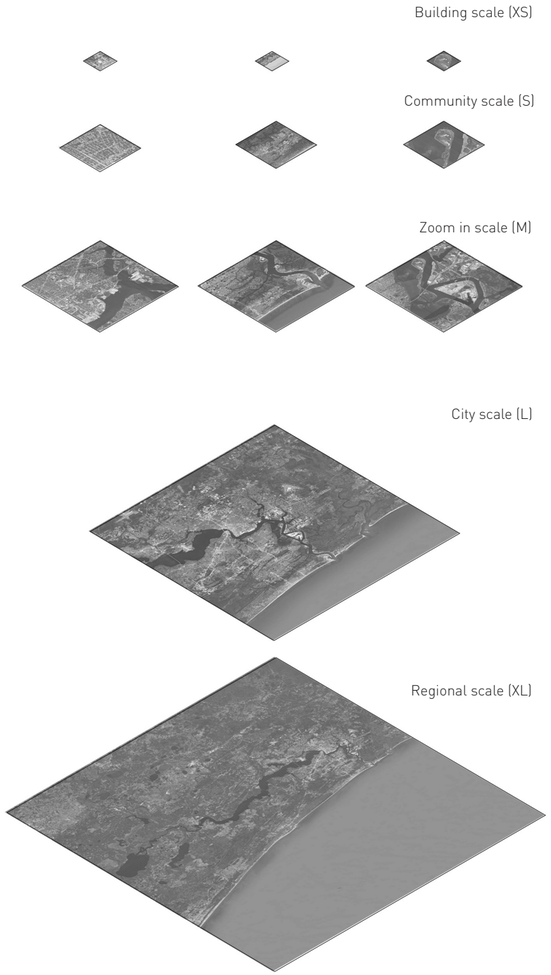
Generally, blue-green infrastructure has paid relatively less attention to social issues. How can we creatively focus on social issues and the people living here? For example, community segregation, spatial inequality, and the ever-widening wealth gap.



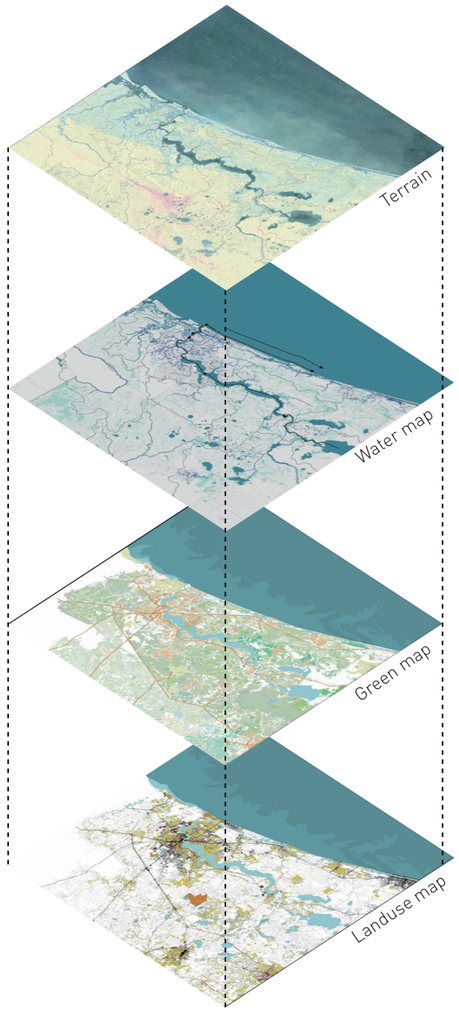
Sub-Research Question 3

How the new blue-green infrastructure addresses water crises and green issues such as water pollution, flooding, low-quality green spaces, and the irrational structure of urban green spaces.

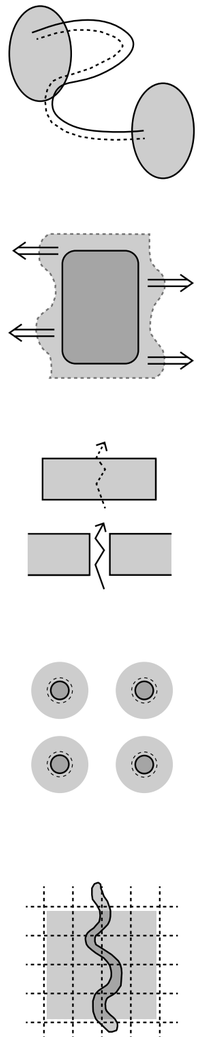
LANDSCAPE APPROACH: Multi-scales



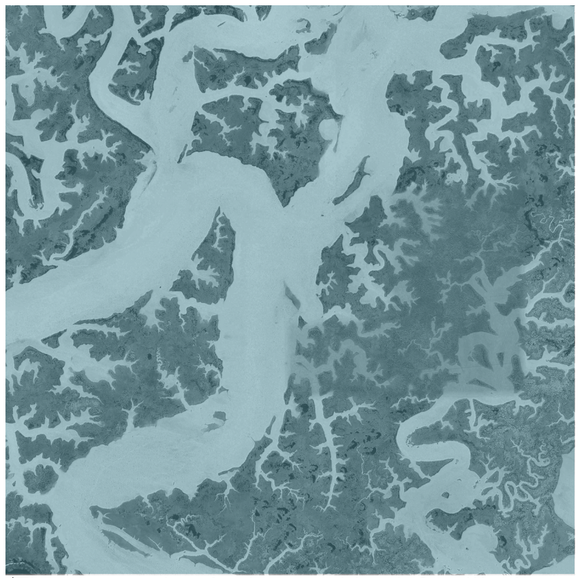
Layers Approach



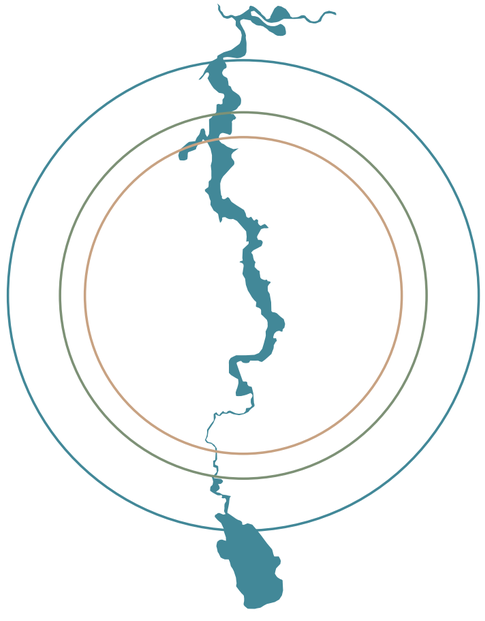
Design Graphic Methods



03
EXPLORE THE RIVER:
ST JOHNS RIVER



(The topography of salty marshland, Satellite image from Google earth, Edited by author on May, 2024,)



Regional scale

St Johns river Lowerbasin

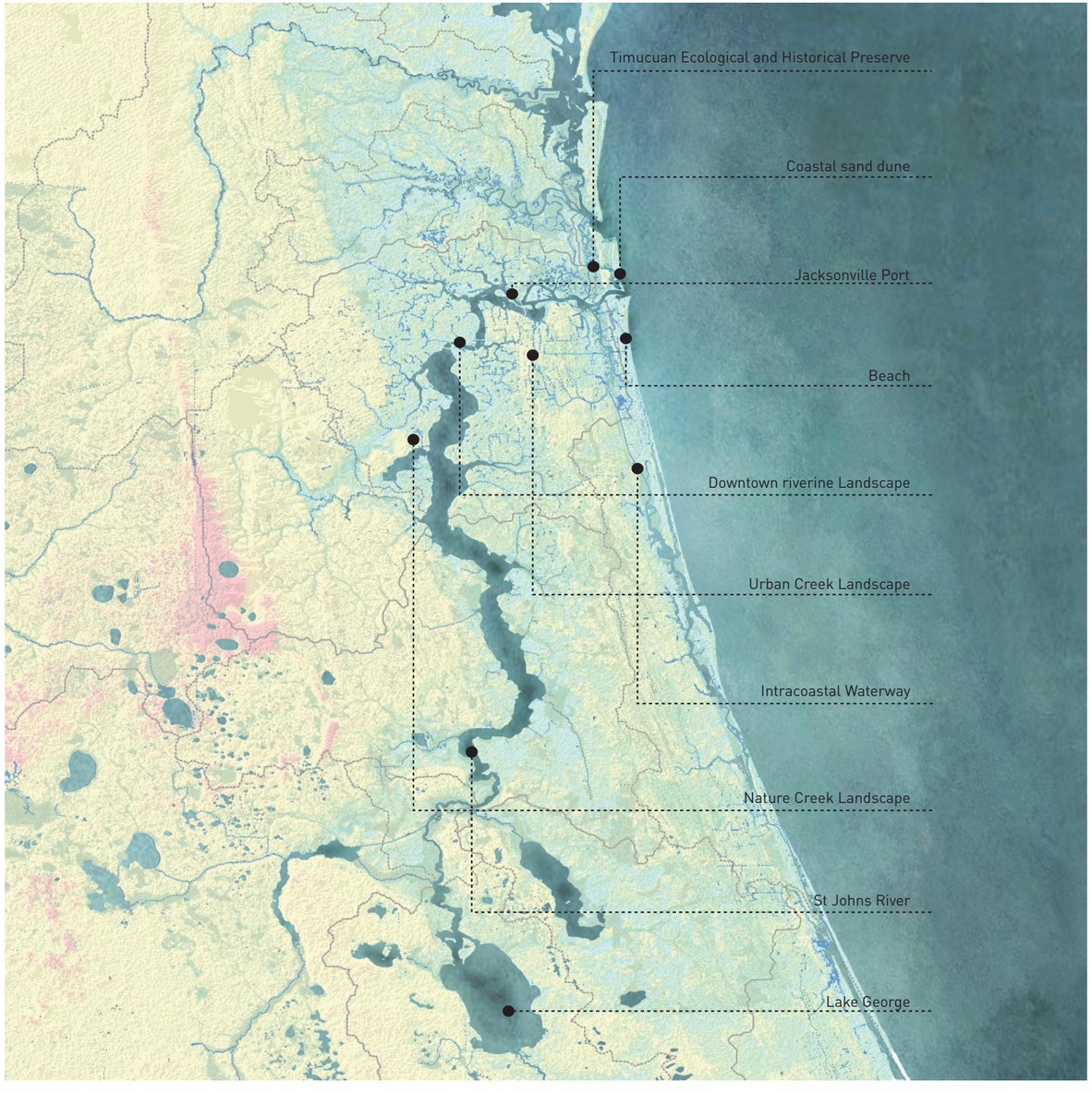
Local scale

Jacksonville,FL

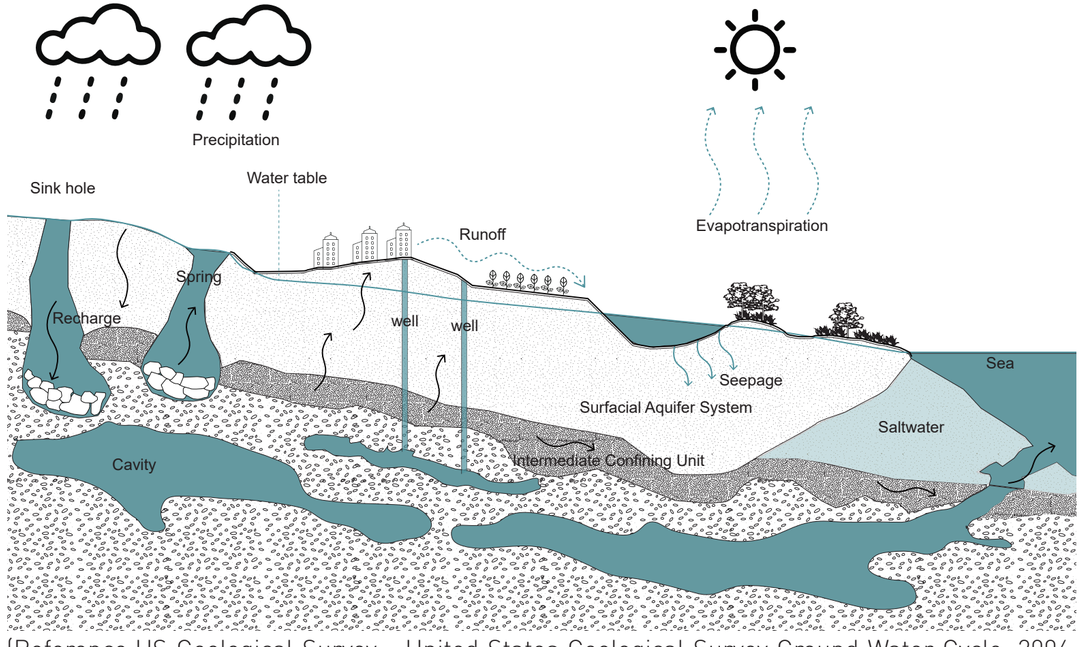


Zoom in

Historical Walkable Neighborhoods

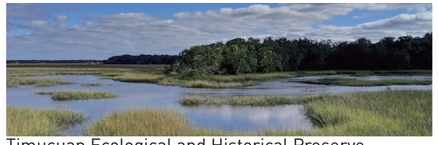


The Hydrological Foundation

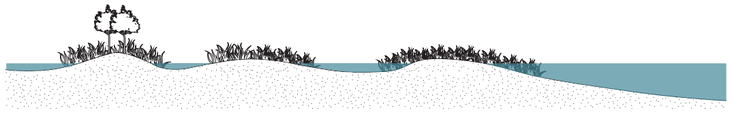


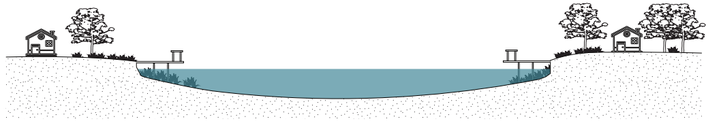
(Reference:US Geological Survey - United States Geological Survey Ground Water Cycle, 2006, edited by author on April, 2024)

Water Scape



Timucuan Ecological and Historical Preserve



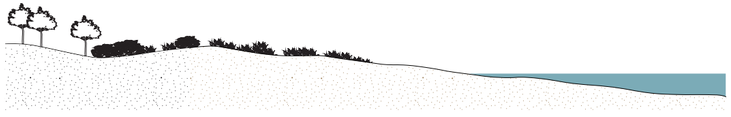


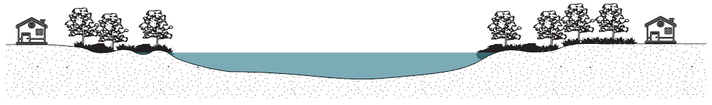


Urban Creek Landscape



Coastal sand dune



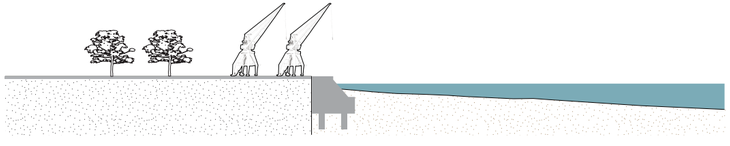




Intracoastal Waterway



Jacksonville Port



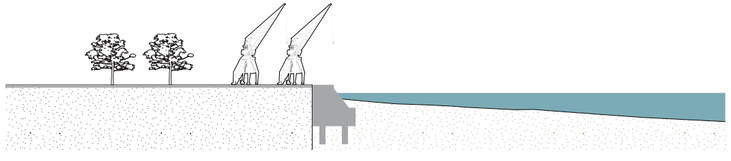


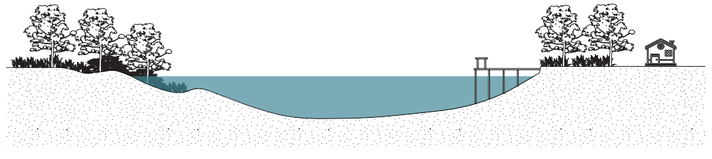


Nature Creek Landscape



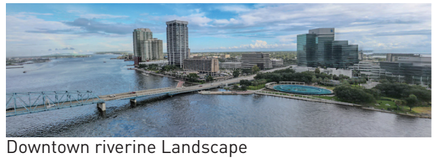
Beach



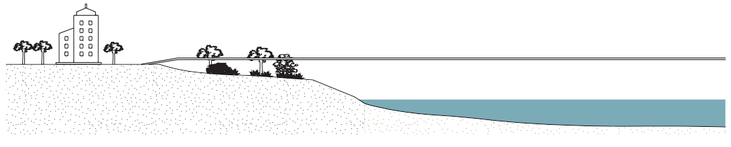


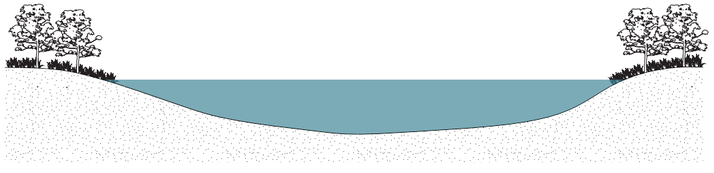


St Johns River



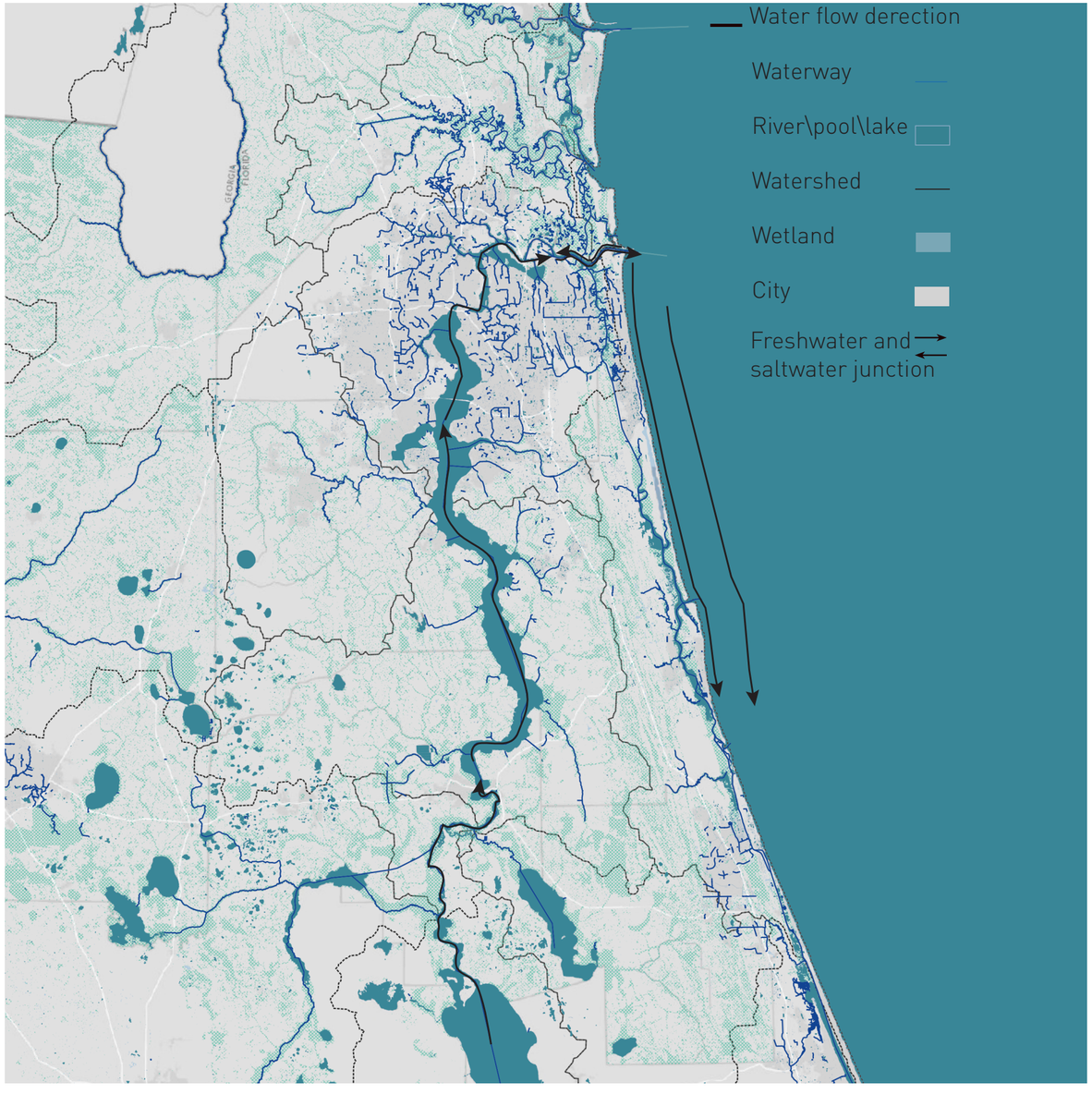
Downtown riverine Landscape





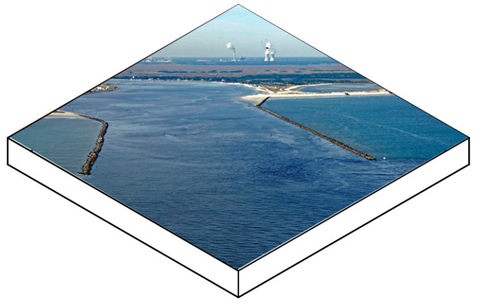


Lake George



Water structure map

A Brackish River and Interwoven Water Networks



St johns river estuary:
St Johns Point



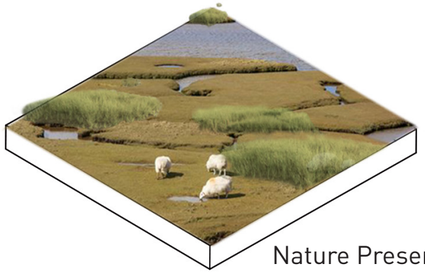
The intersection of salt water and freshwater:
Blount Island

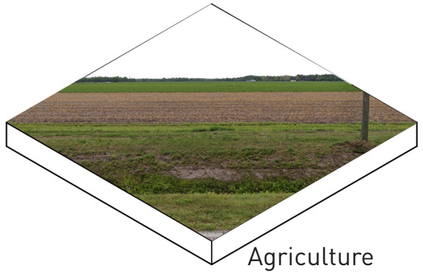


Green map

Cities Enveloped by Forests


Forest

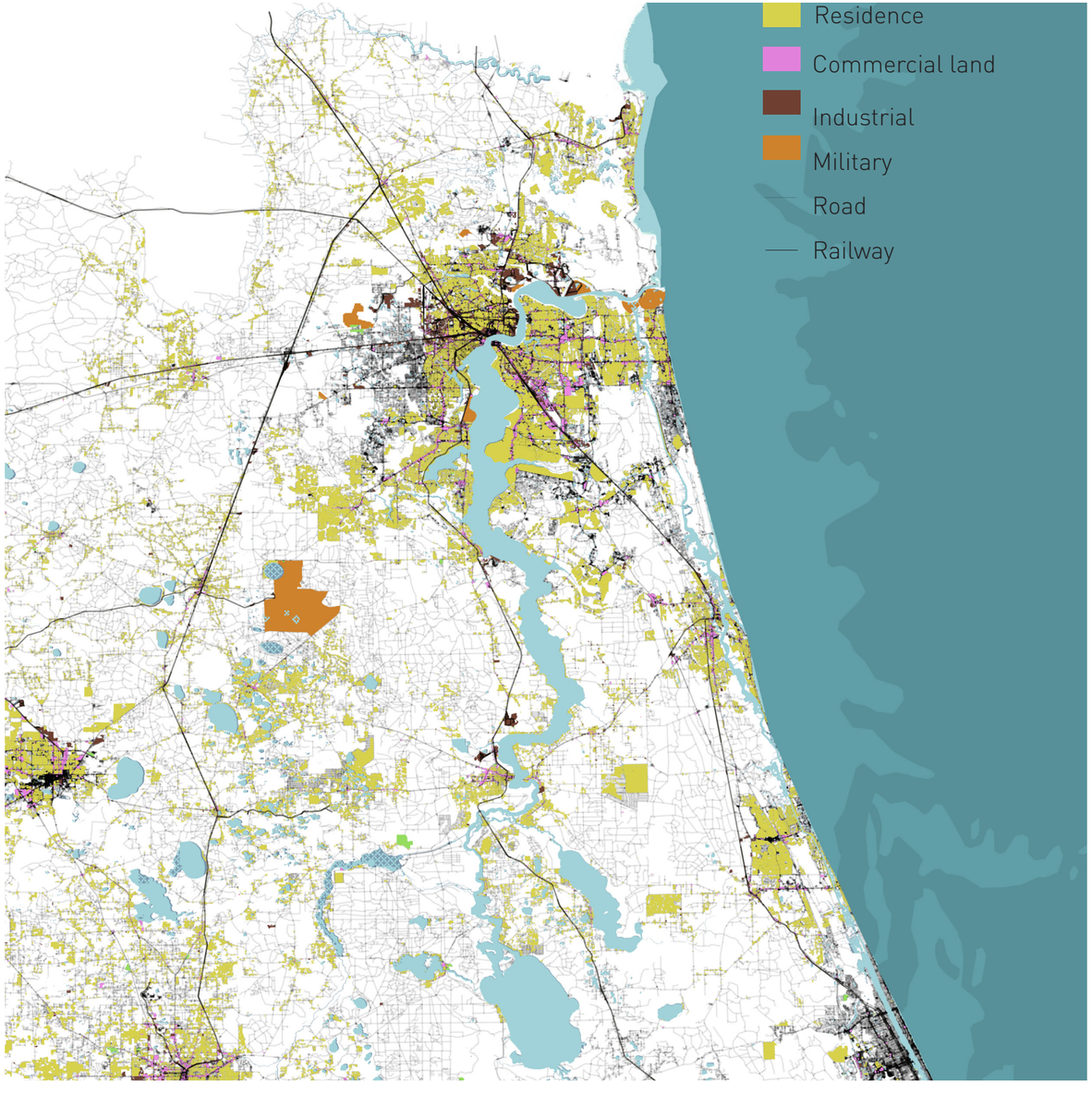

Nature Preserve


Agriculture


Scrub and meadow


Park


Urban area



Landuse map

Cities connected by Canals and Railways



Residence



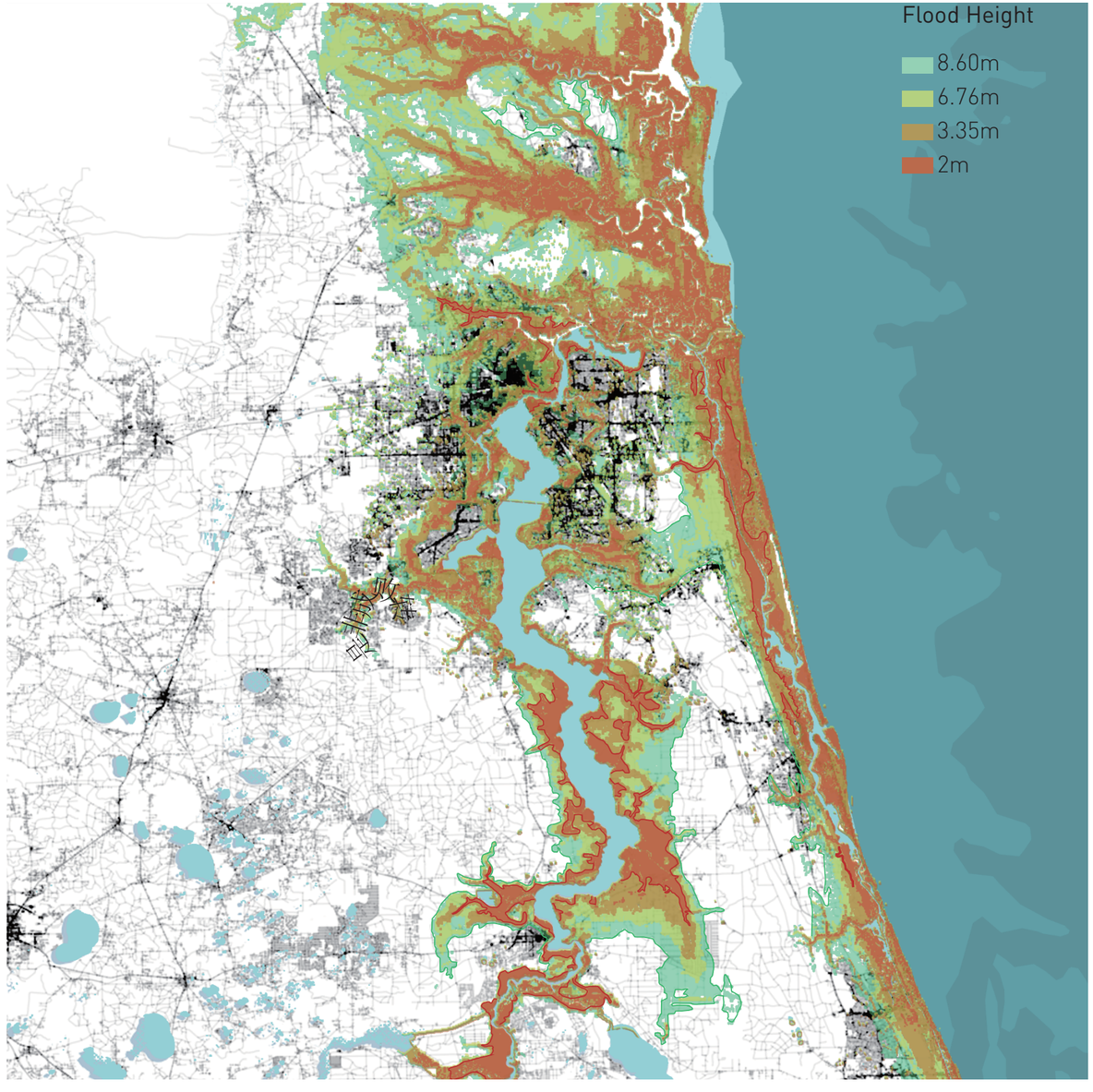
Commercial land



Industrial land

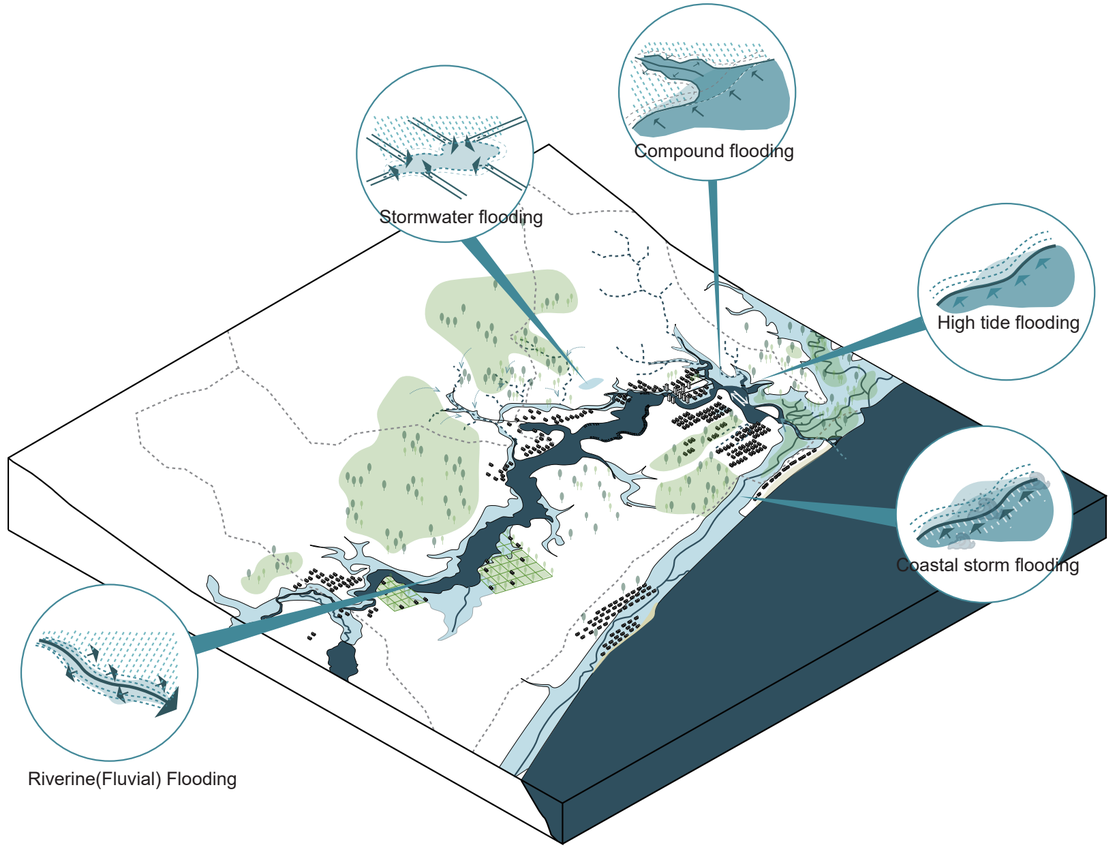


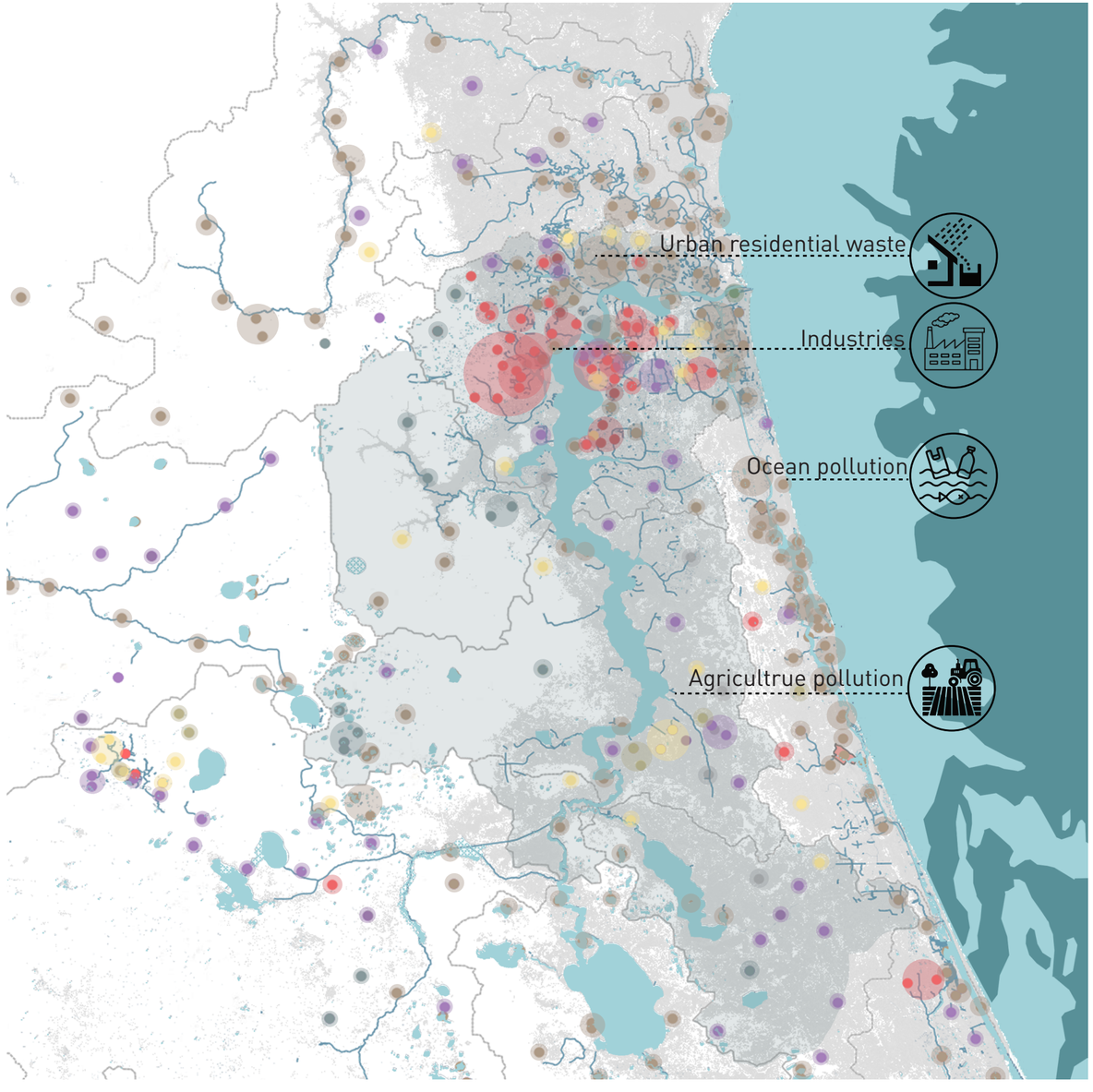
Military land



Flooding map

The River Ravaged by Flooding





Pollution map

The Pollution of St Johns River Lower Basin



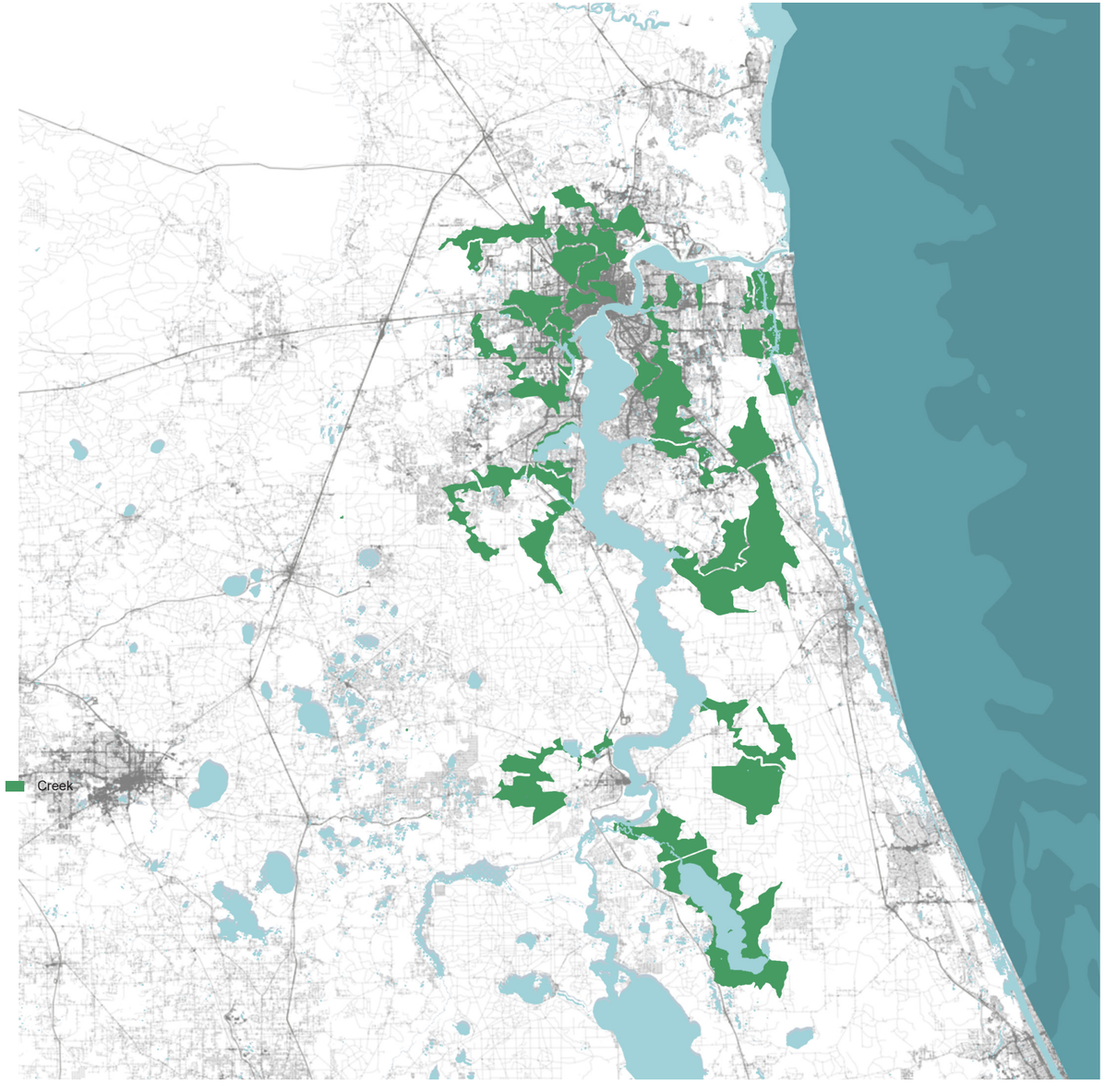
The Pollution in Ocean

(Pollution on the beach of tropical sea, JACKSONVILLE Magazine, accessed on April, 2024)



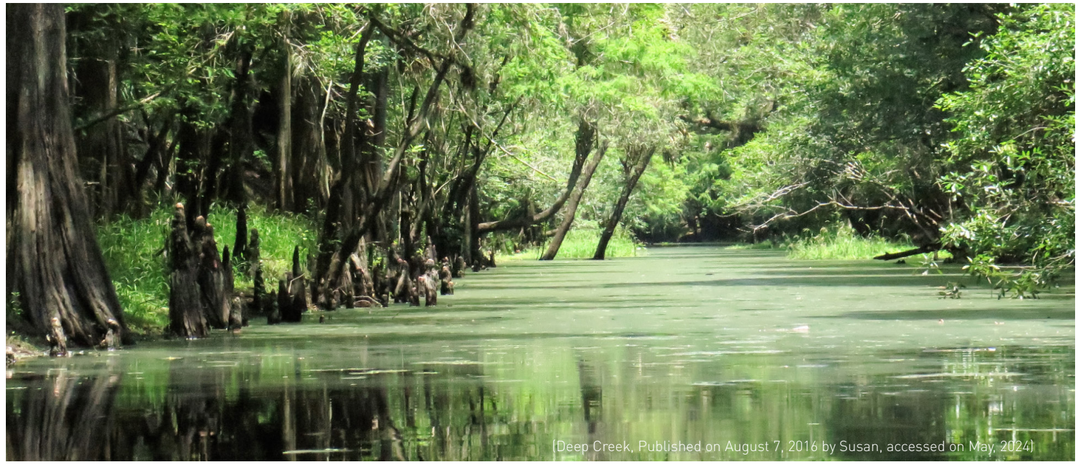
The Pollution in Creeks

(A large algal bloom chokes off the oxygen to Goodby's Creek along the St. Johns River, one of the most polluted waterways in Florida. SARASOTA HERALD-TRIBUNE, accessed on May, 2024)

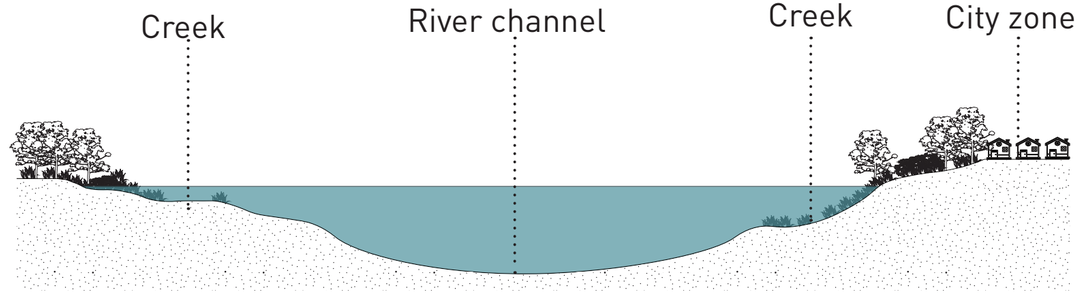


3.3 POTENTIAL

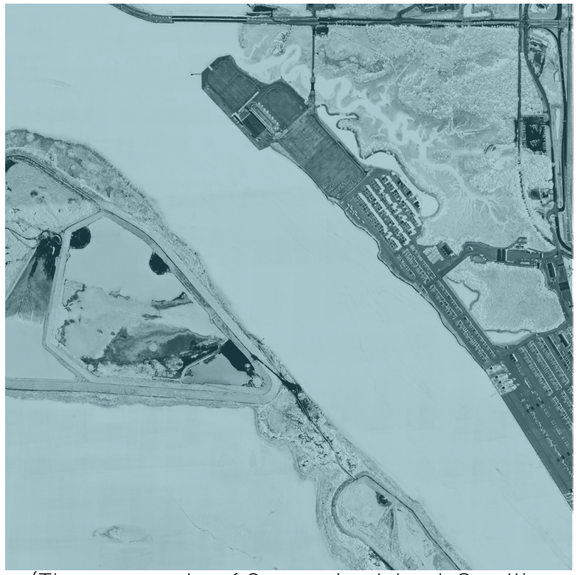
Creek is Natural Buffer



[Deep Creek, Published on August 7, 2016 by Susan, accessed on May, 2024]



04
EXPLORE THE RIVER CIRY: JACKSONVILLE



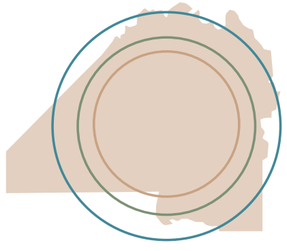
(The topography of Quarantine Island, Satellite image from Google earth, Edited by author on May, 2024,)



(Jacksonville, Florida, Lance Asper, Published on 2021, accessed on Ma, 202

Regional scale

St Johns river
Lowerbasin



Local scale

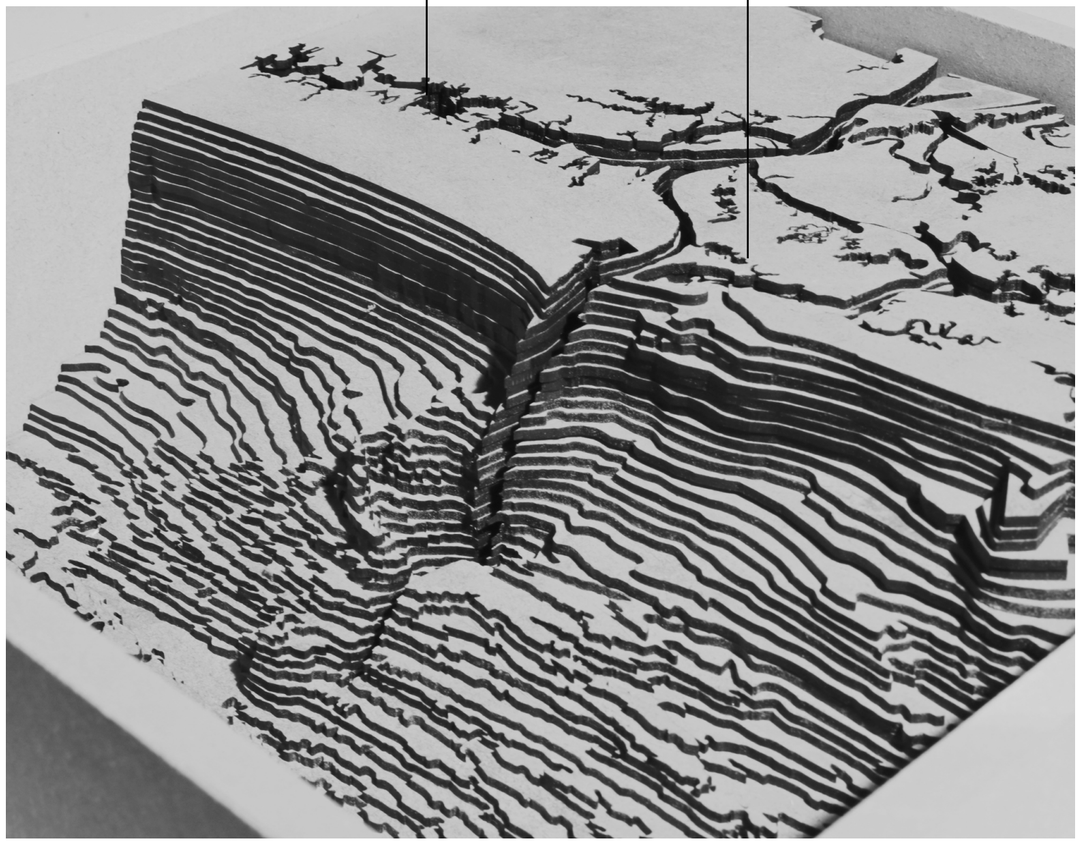
Jacksonville,FL

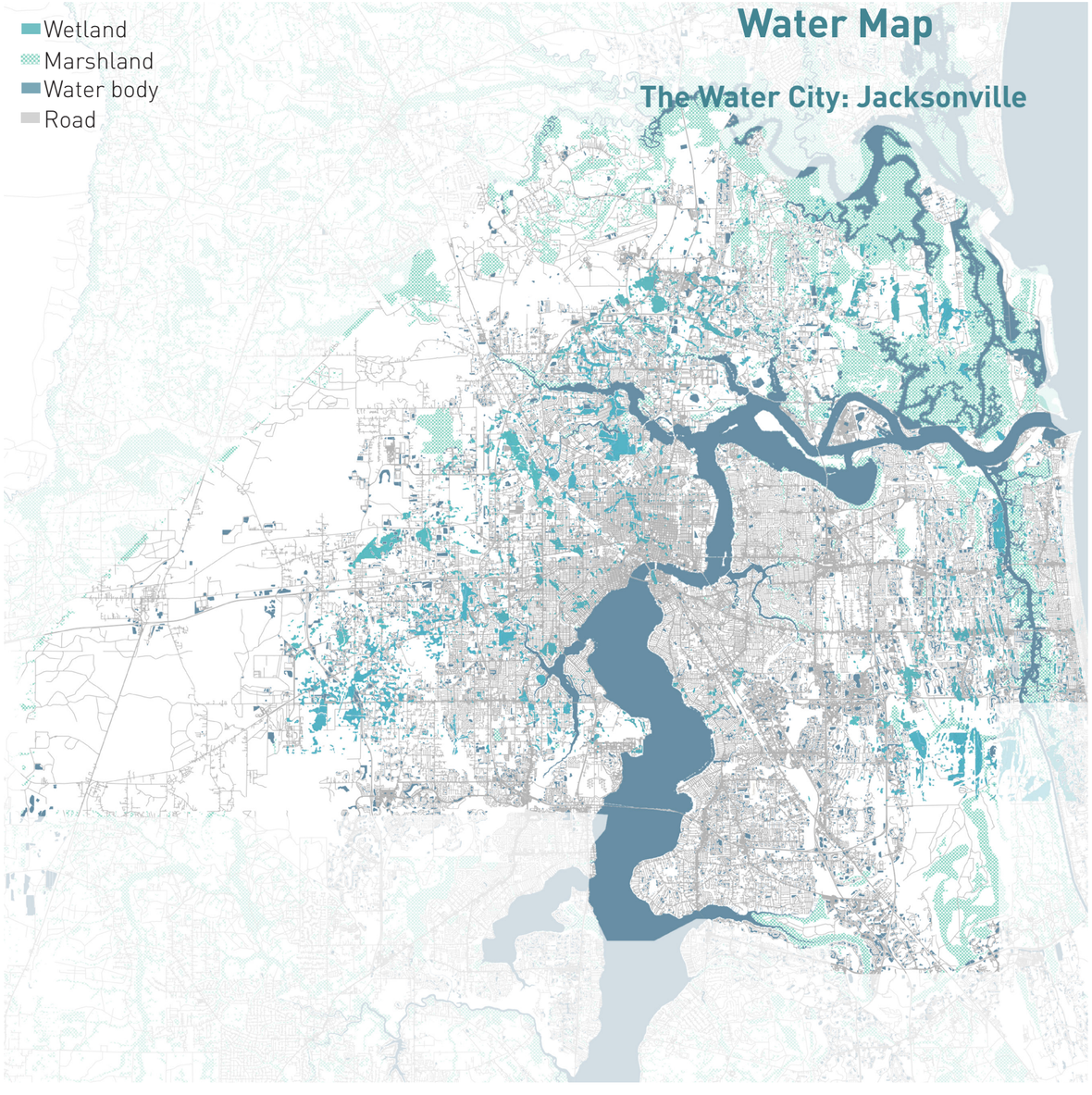


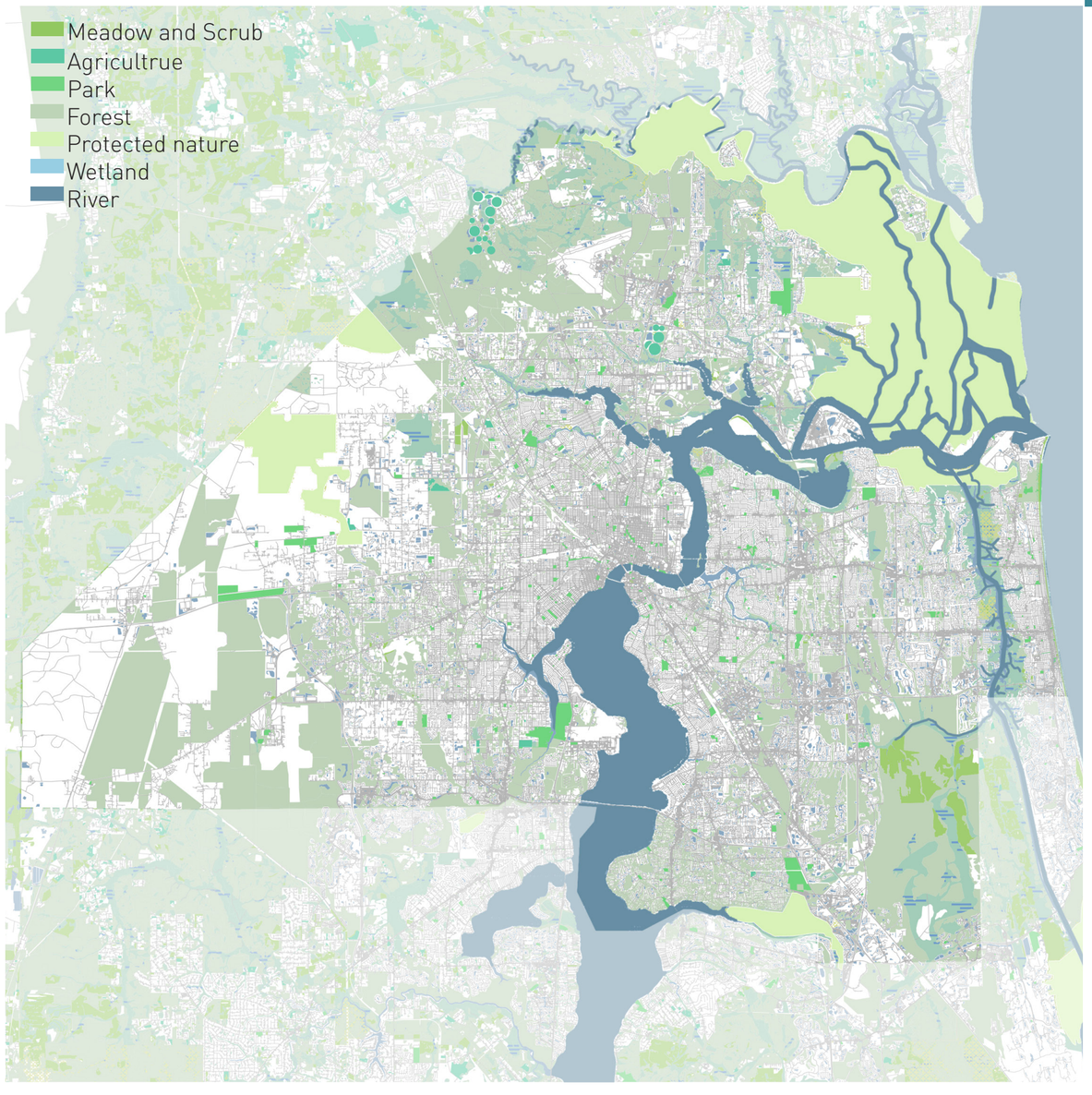
Zoom in

Historical Walkable Neighborhoods

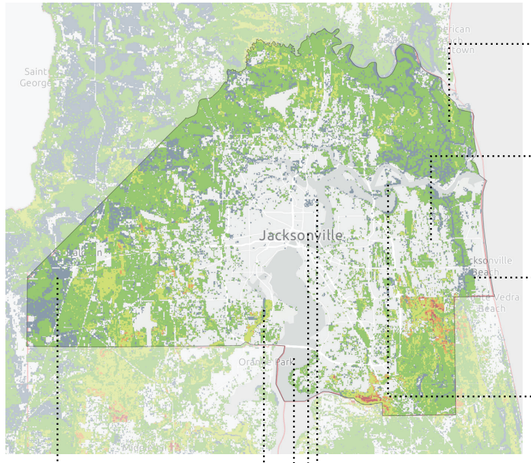

St johns river
Ocean


Intercoastal waterway
Marshland


Water Map
The Water City: Jacksonville
Wetland
Marshland
Water body
Road


Meadow and Scrub
Agricultrue
Park
Forest
Protected nature
Wetland
River

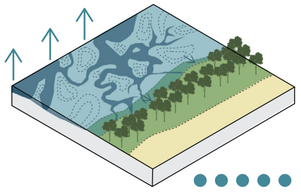
Ecology Analysis



Potential Habitat Richness Map

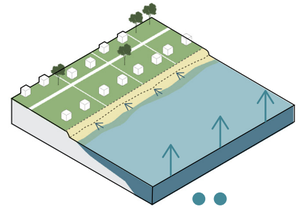
- 1 Species
- 2-4 Species
- 5-6 Species
- 7 Species
- 8-13 Species

(FGDL, UF GEOPLAN CENTER, Accessed on April, 2024)



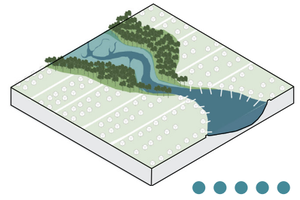






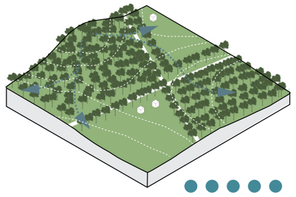






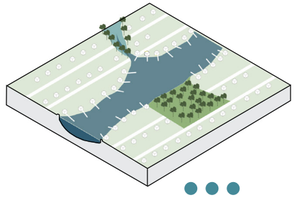


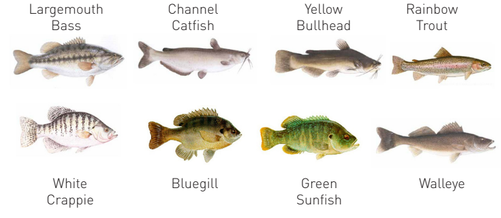


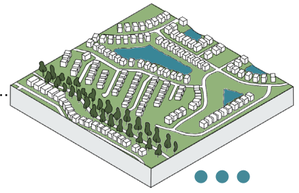


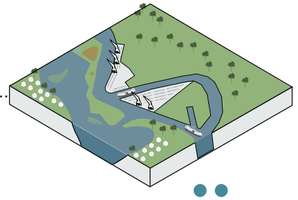


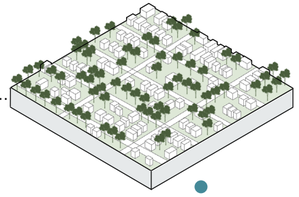


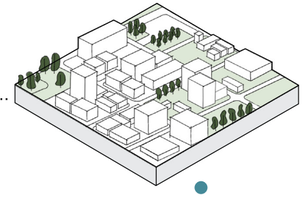


















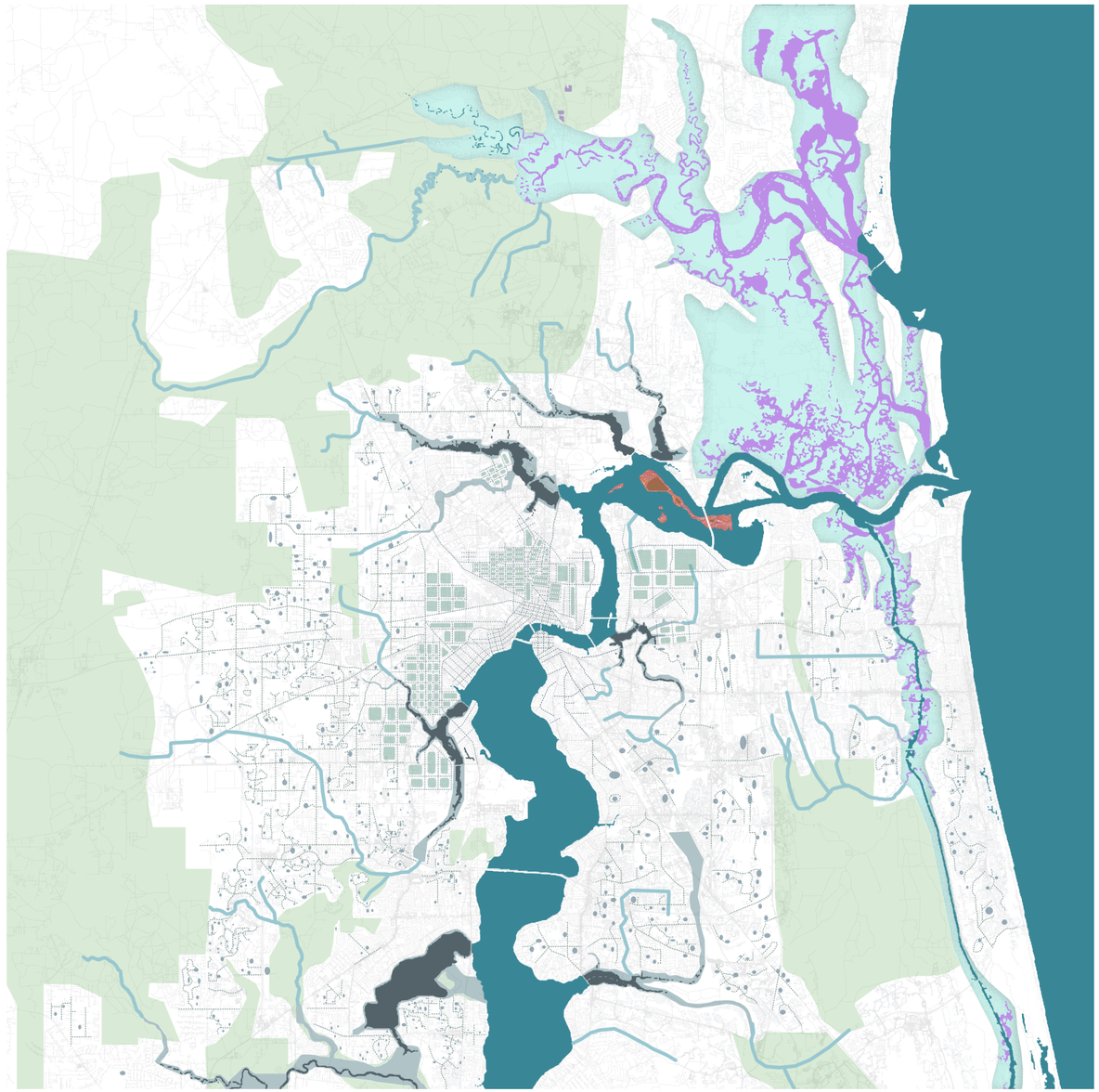










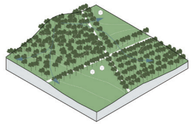


Blue Green Network

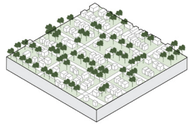
Original Blue-Green Structure



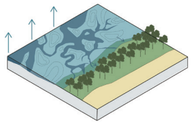

Contemporary Suburb



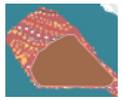
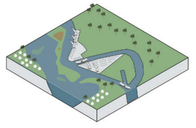
Eco-patch

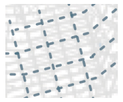
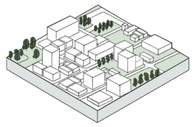
Historical walkable neighborhood and post-war suburb

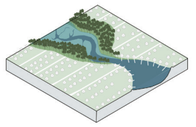
Estuary marshland

Quarantine Island

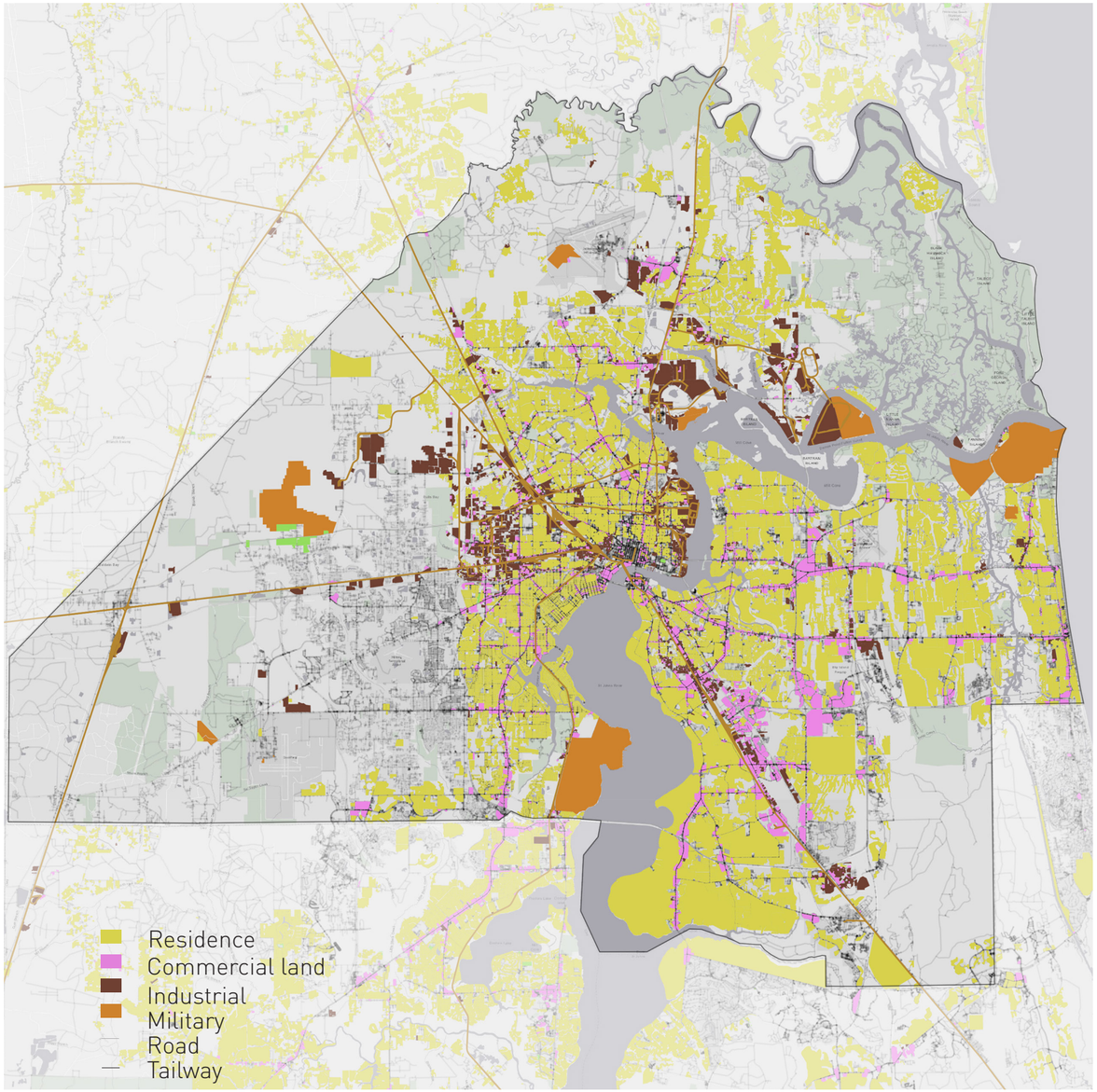
Downtown

Creek and Stream

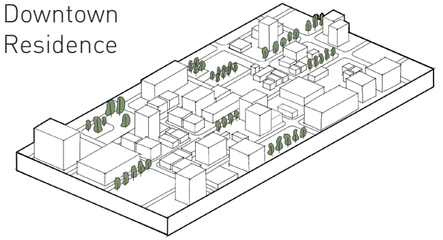
Urbanscape Map

A prosperous city centered on the river

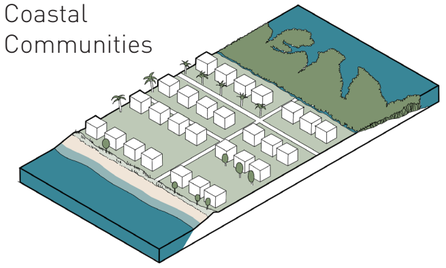


Residence Types

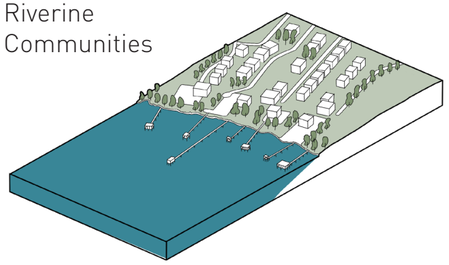
Downtown Residence



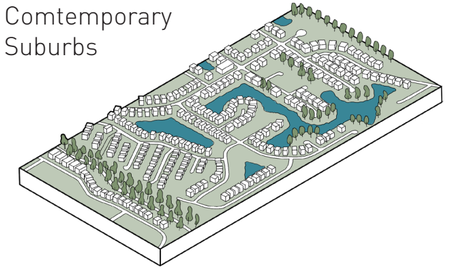
Coastal Communities



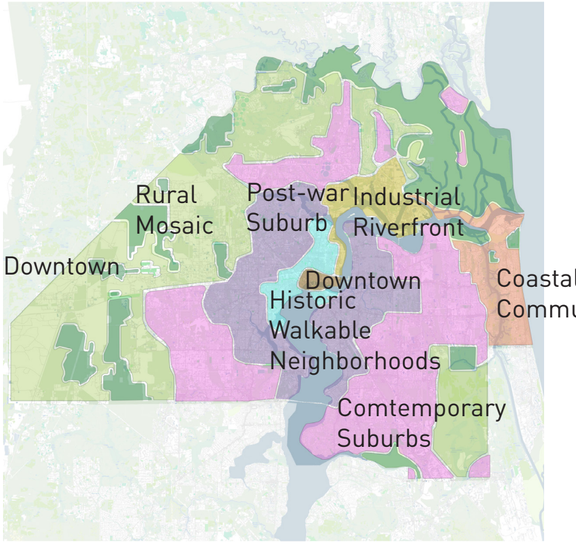
Riverine Communities



Comtemporary Suburbs



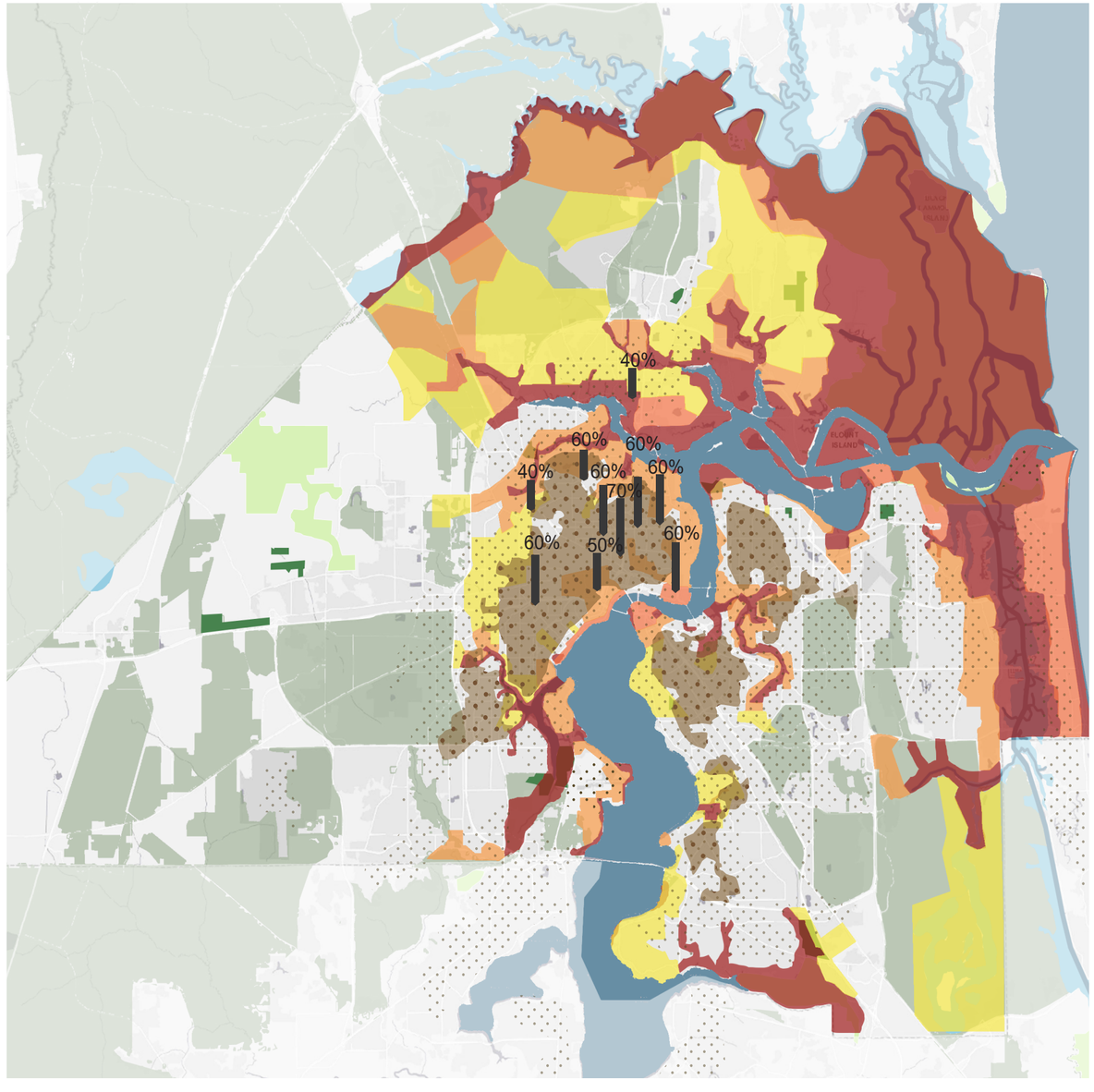
Development Types
Mapping the Types Across the City



(Adapt from RESILIENT JACKSONVILLE CITY OF JACKSONVILLE, Published on October 2023, edited by author on April, 2024)

4.2 CHALLENGE

The Complex Problem is Concentrated in the City.



Potential storm tide
- 2m
- 3.35m
- 6.07m
- 6.76m
- 8.60m

Poverty rates

Lowest landscape intergrity

Low landscape intergrity

PART Ⅲ
The City as the Solution: Embracing Blue-Green Infrastructure for Resilience

Part Ⅲ
[The City as the Solution
: Embracing Blue-
Green Infrastructure for
Resilience]

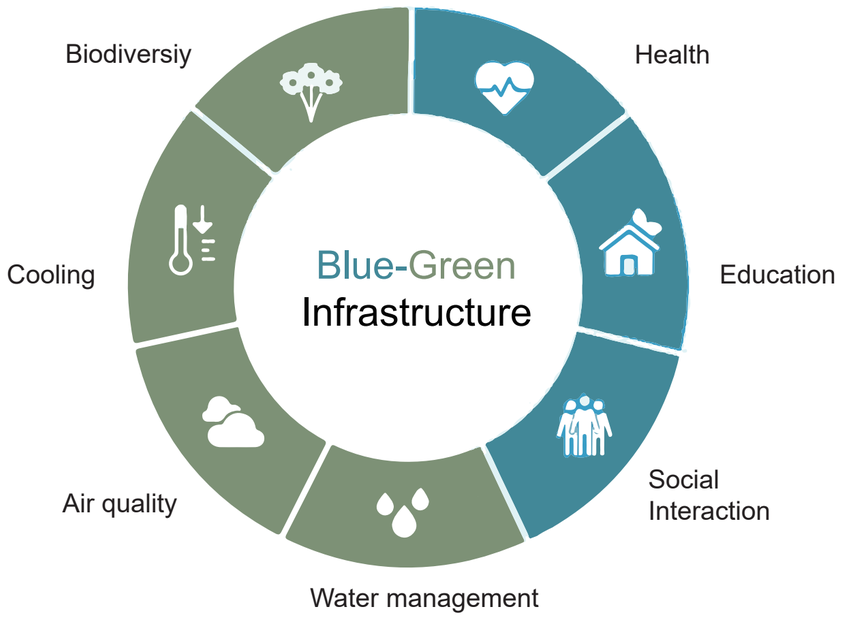
05 OPPORTUNITIES
5.1WHY BLUE
GREENINFRASTRUCTURE
5.2 LITERATURE
REFERENCES
5.3 OVERVIEW OF BLUE
GREEN COMPONENTS
5.4 COMBINATION AND
LOCALIZED APPLICATION
OF BLUE GREEN
COMPONENTS
5.5 WATER FLOW
INDICATION

05
OPPORTUNITIES



(The topography of Agricultrue near the Picolata Produce Farm , Satellite image from Google earth, Edited by author on May, 2024,)

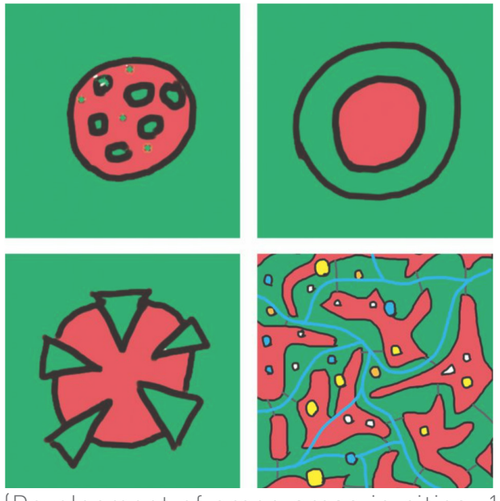
5.1 WHY BLUE GREEN INFRASTRUCTURE



Structural Strength:
Integrating Blue-Green Infrastructure as Foundation

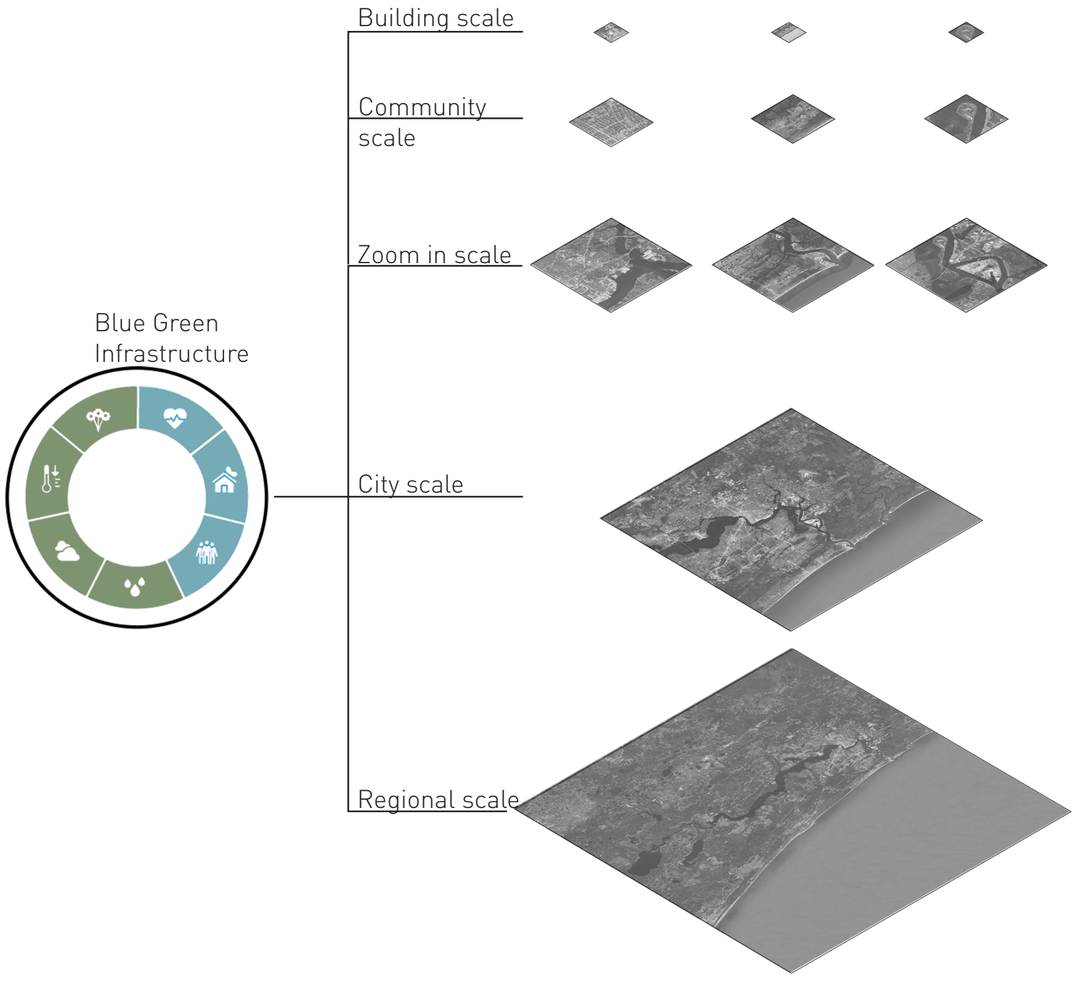
"Blue-green infrastructure refers to a network that provides the “ingredients” for solving urban and climatic challenges by building with nature."

--(Hiltrud Pötz & Pierre Bleuze)

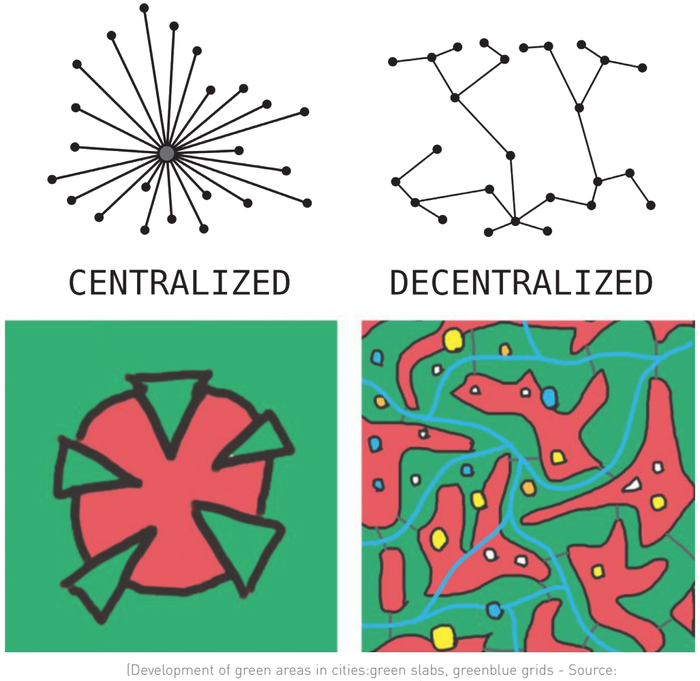


(Development of green areas in cities: 1. gardens in a walled city, 2. green ring, 3. green slabs, 4. greenblue grids - Source: atelier GROENBLAUW, accessed on May, 2024)

Integrating Blue-Green Infrastructure as Multi Scales Solution



Addressing Community Segregation with Blue-Green Infrastructure through Decentralized Approaches

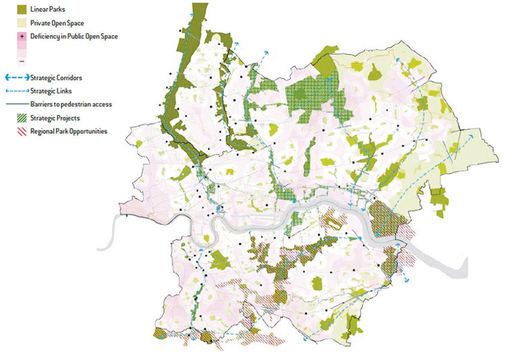


(Development of green areas in cities:green slabs, greenblue grids - Source: atelier GROENBLAUW, accessed on May, 2024)

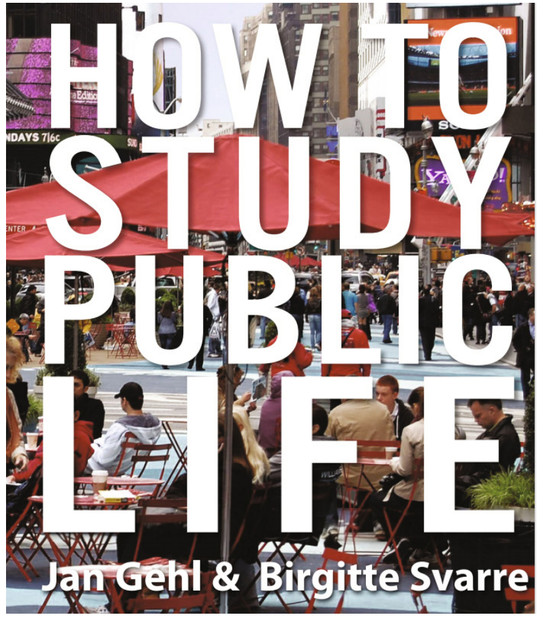
5.2 LITERATURE REFERENCES

Groenblauwe Netwerken voor duurzame en Dynamische steden by Hiltrud Pötz and Pierre Bleuzé





How To Study Public Life by Jan Gehl & Svarre



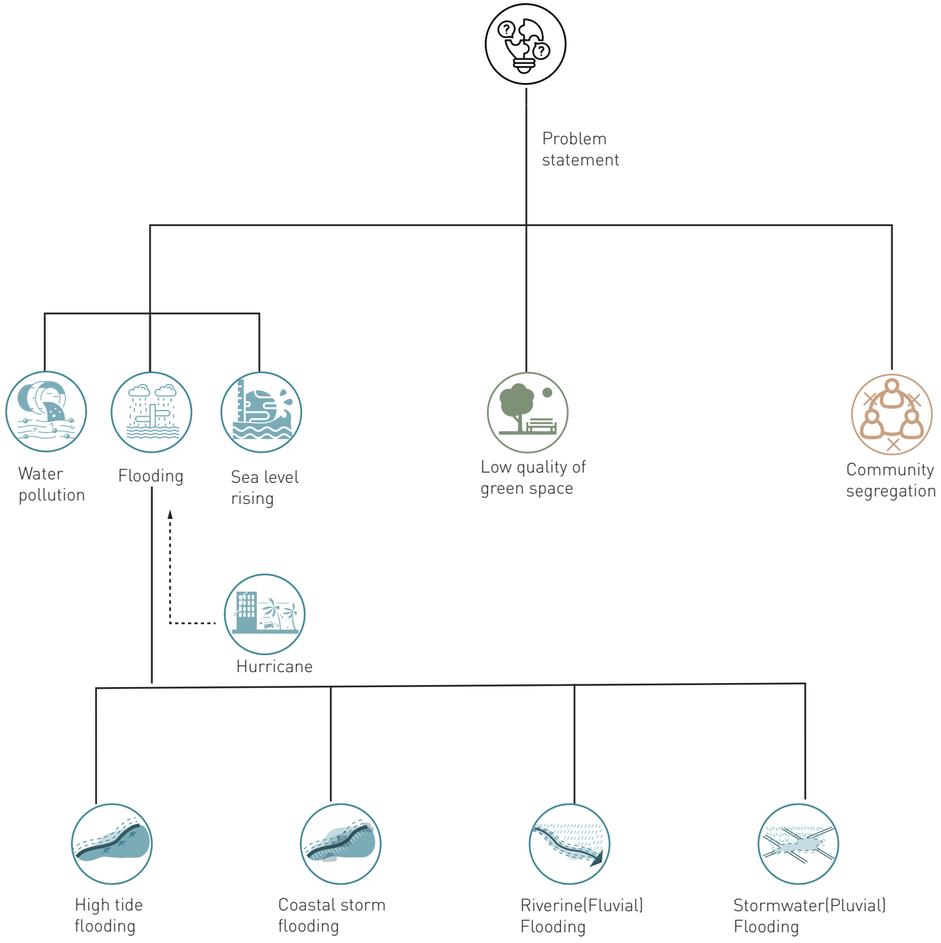
Jan Gehl's twelve quality criteria

1.Protection against Traffic Accidents
2. Protection against Crime and Violence:
3. Protection against Unpleasant Sensory Experiences
4. Opportunities to Walk
5. Opportunities to Stand and Stay
6. Opportunities to Sit
7. Opportunities to See
8. Opportunities to Talk and Listen
9. Opportunities for Play and Exercise

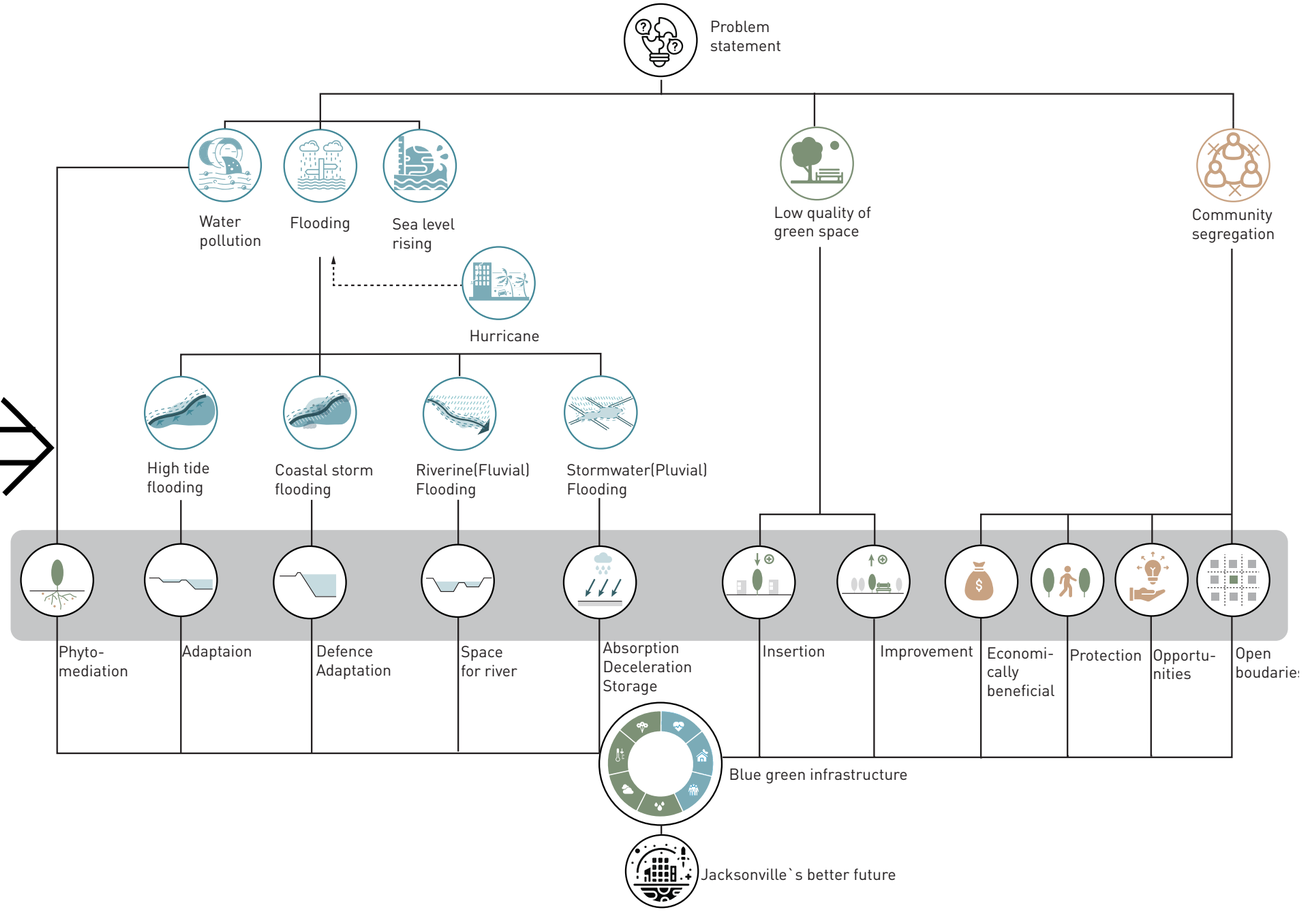
Protection	Against **traffic and accidents**	Against **harm** by others	Against **unpleasant sensory experiences**
Comfort	Options for **mobility**	Options to **stand and linger**	Options for **sitting**
	Options for **seeing**	Options for **talking and listening**	Options for **play**, exercise and activities
Enjoyment	Human **scale**	Positive aspects of **climate**	**Aesthetic qualities** and positive sensory experiences

5.3 OVERVIEW OF BLUE GREEN COMPONENTS

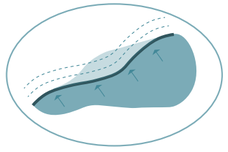
Problem statement



Blue Green Infrastructure as Sollution



Overview of Blue-Green Components

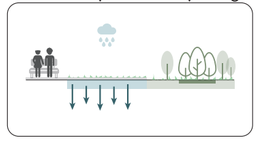


Stormwater(Pluvial)
Flooding

Absorption of rain water



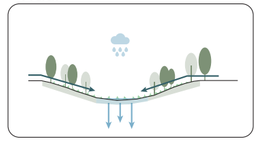
Reduce impermeable paving



Green Roof



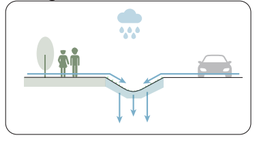
Wadi



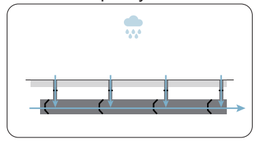
Deceleration of Runoff



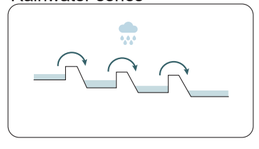
Biological ditch



Pipeline water storage to
increase capacity



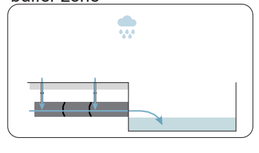
Rainwater series



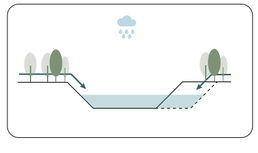
Storage of storm water



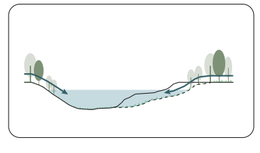
Underground stormwater
buffer zone



Add surface water storage



Widen river



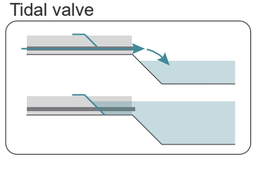


High tide flooding

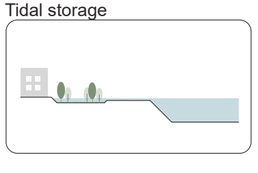
Adaptaion



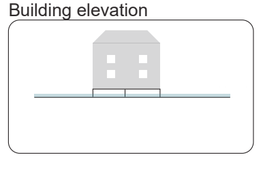
Tidal valve

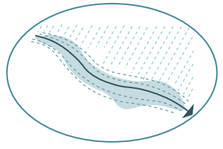


Tidal storage



Building elevation



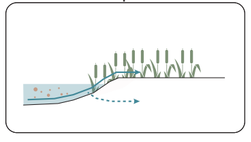


Riverine(Fluvial)
Flooding

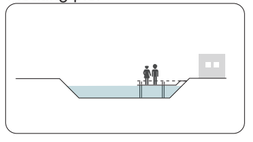
Adaptive sollution



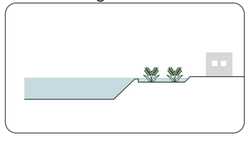
Plants absorb pollutants



Floating pier



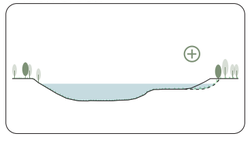
Floodable agriculture



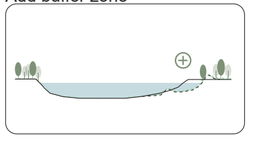
More space for river



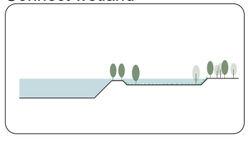
Widen creek

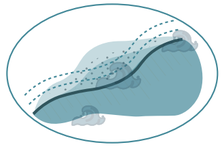


Add buffer zone



Connect wetland



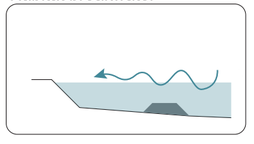


Coastal storm flooding

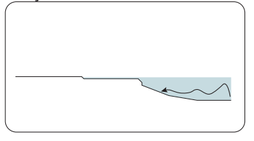
Defence



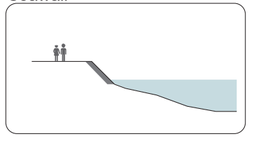
Habitat breakwater



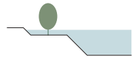
Groyne



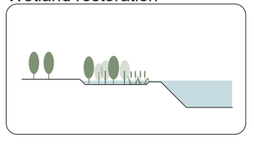
Seawall



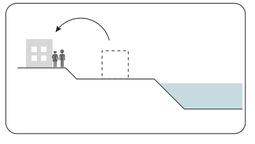
Adaptation



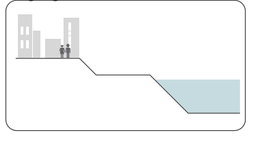
Wetland restoration



Relocation



High ground develoment

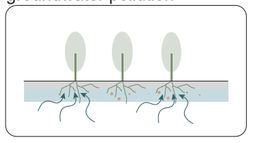




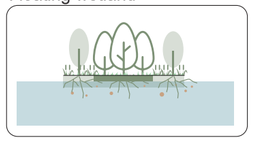
Water pollution

Phytomediation

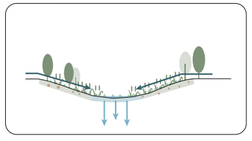
Deep-rooted trees absorb groundwater pollution



Floating wetland



Wadi



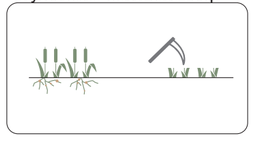
Absorption



Phytostabilization



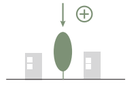
Phytostabilization and reap



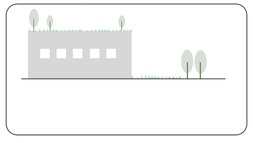


Green infrastructure

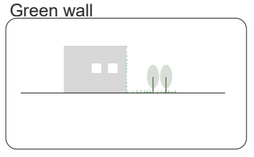
Insertation



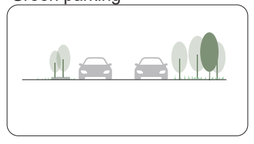
Green roof



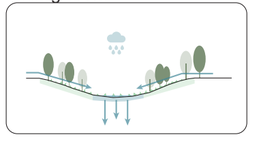
Green wall



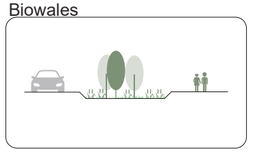
Green parking



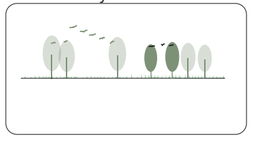
Rain garden



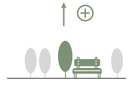
Biowales



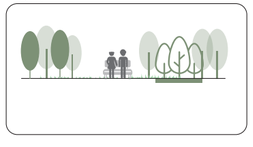
Bird sanctury



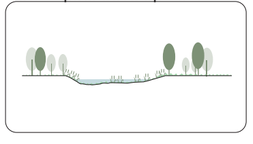
Improvement



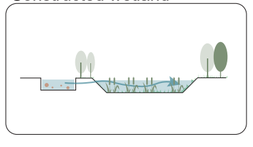
Park



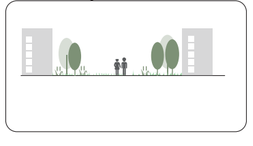
Low impact development



Constructed wetland



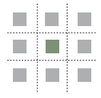
Green alleys





Community segregation

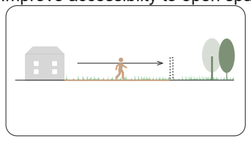
Open boundaries



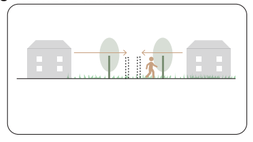
Increase public green space



Improve accessiblity to open space



Remove fences



Economically beneficial



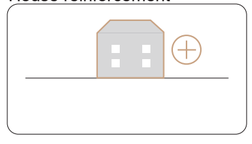
Community market



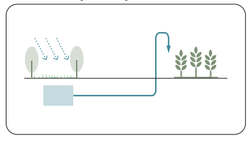
Community urban agrihood



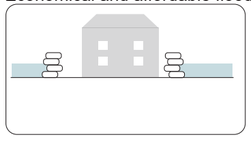
House reinforcement



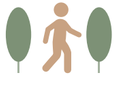
Water recycle system



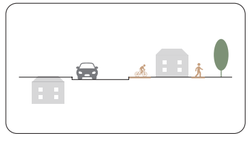
Economical and affordable flood control



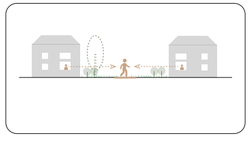
Protection



Protection against
Traffic Accidents



Protection against
Crime violence



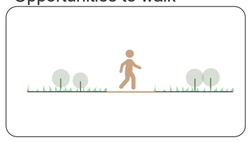
Protection against
Unpleasent sensory experience



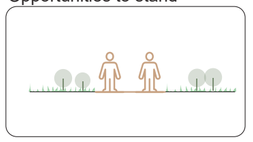
Opportunities



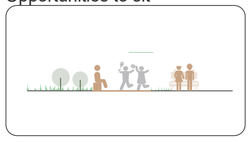
Opportunities to walk



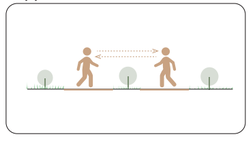
Opportunities to stand



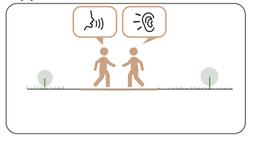
Opportunities to sit



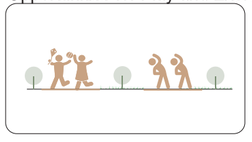
Opportunities to see



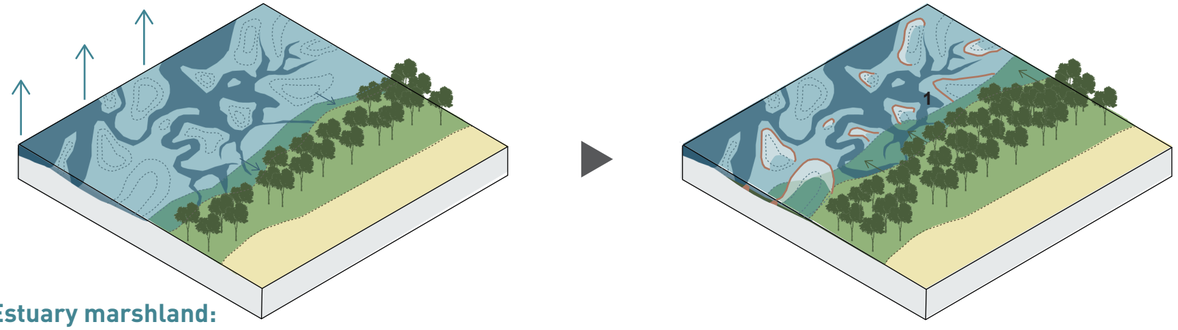
Opportunities to talk and listen



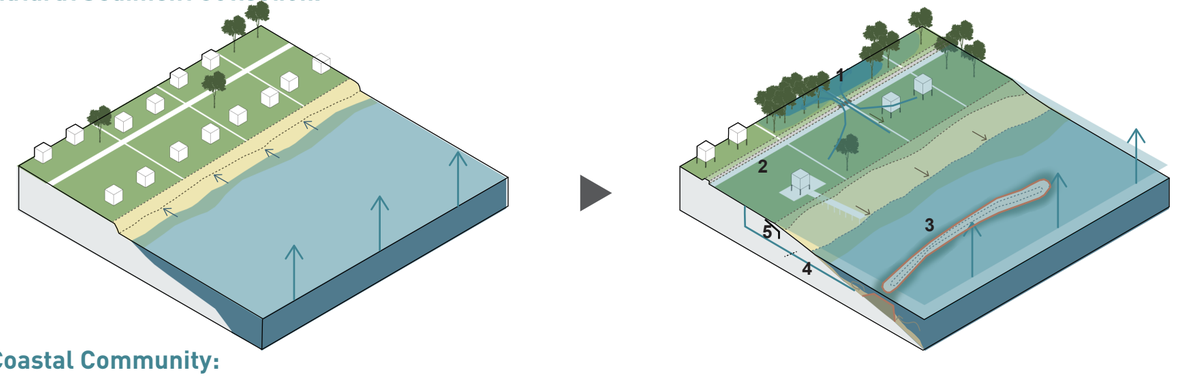
Opportunities for Play and Exercise



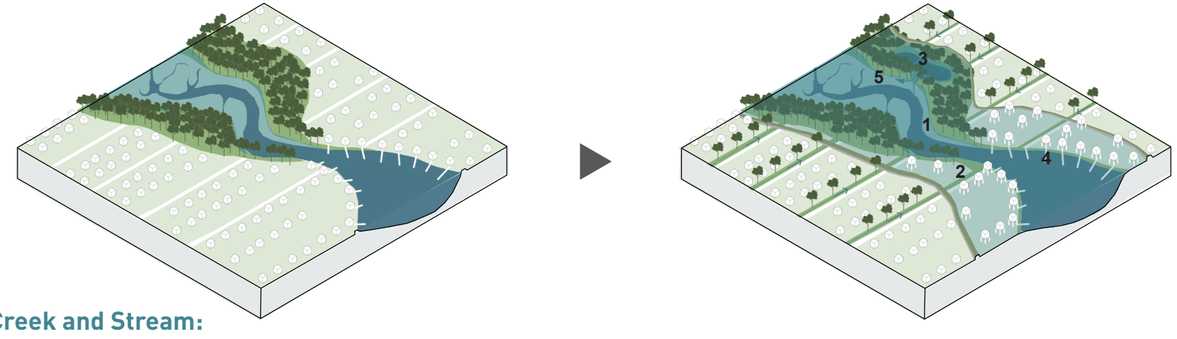
5.4 COMBINATION AND LOCALIZED APPLICATION OF BLUE GREEN COMPONENTS



Estuary marshland:
Marshland Protection and Natural Sediment Collection.

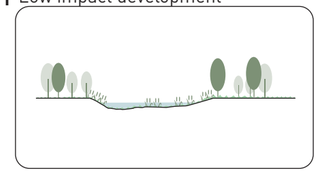


Coastal Community:
Protect the Coastline and Communities.

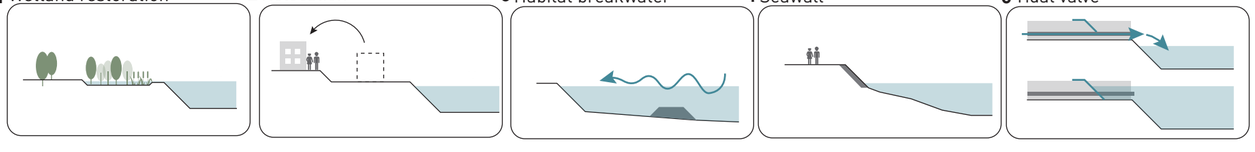


Creek and Stream:
Being Creek Floodplain.

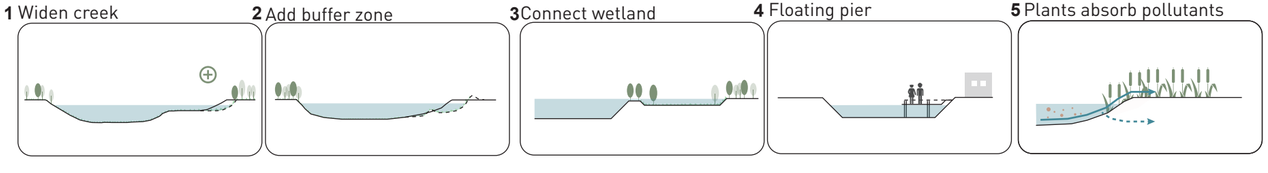
1 Low impact development

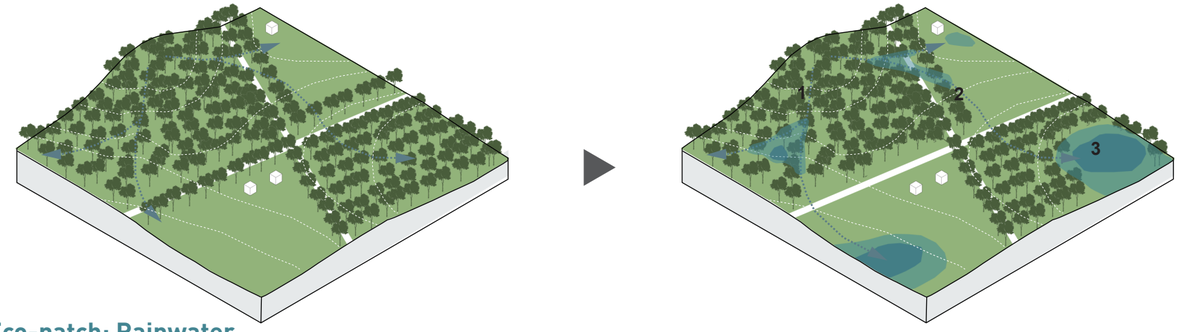


1 Wetland restoration **2** Relocation **3** Habitat breakwater **4** Seawall **5** Tidal valve

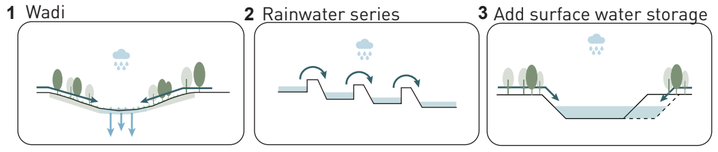


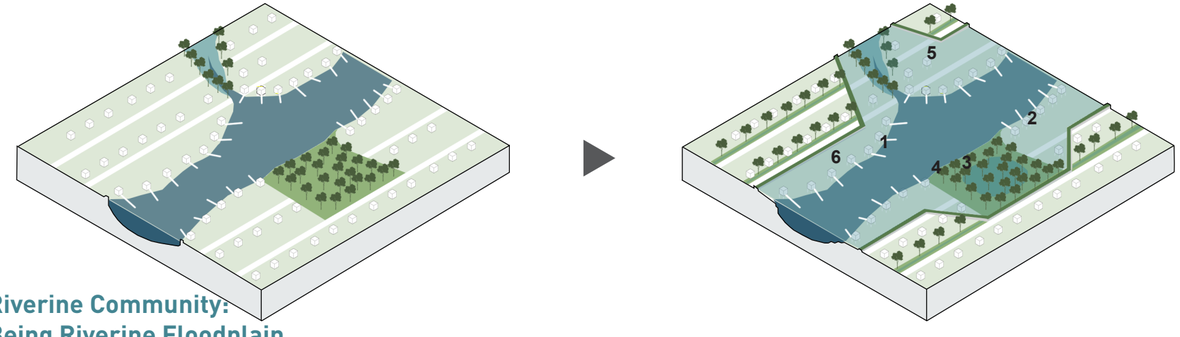
1 Widen creek **2** Add buffer zone **3** Connect wetland **4** Floating pier **5** Plants absorb pollutants



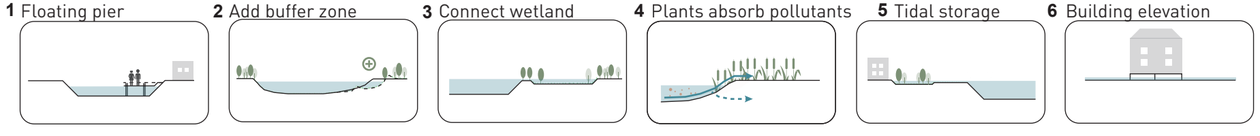


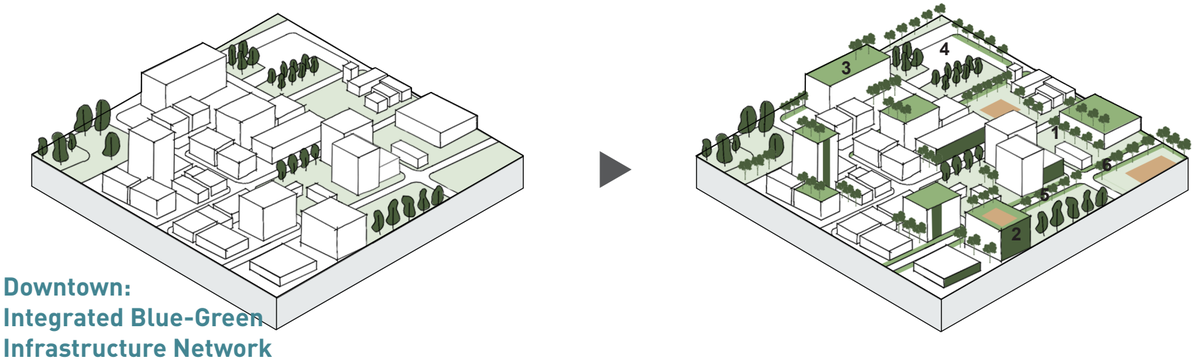
Eco-patch: Rainwater Mitigation and Collection in Forest Areas



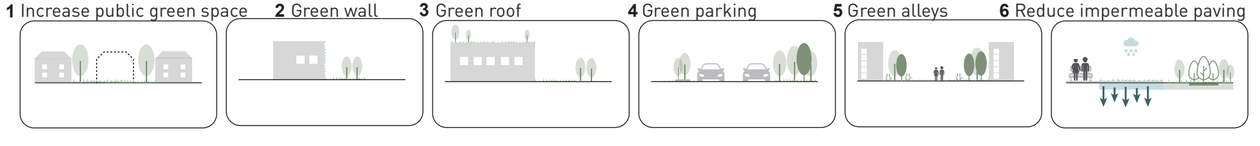


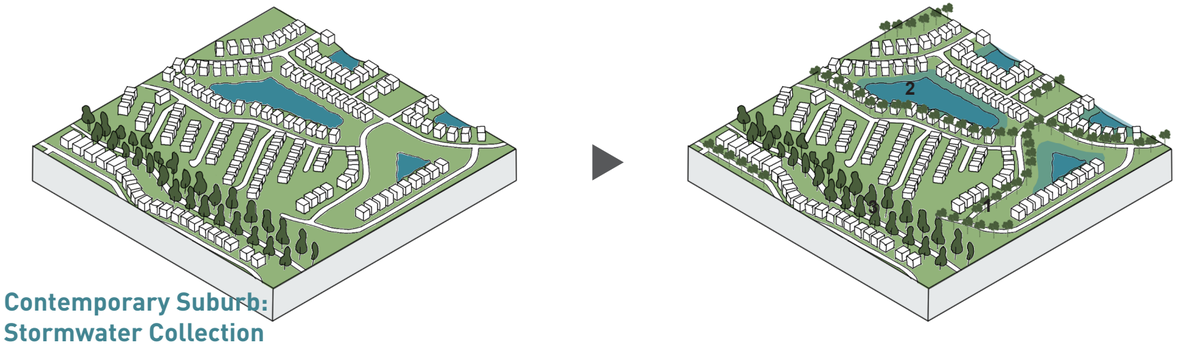
Riverine Community: Being Riverine Floodplain





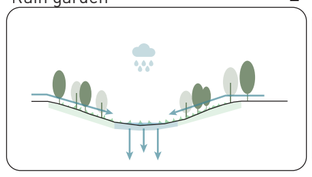
Downtown: Integrated Blue-Green Infrastructure Network



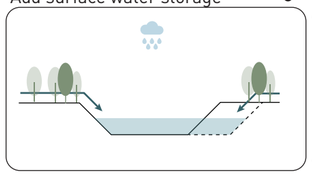


Contemporary Suburb:
Stormwater Collection

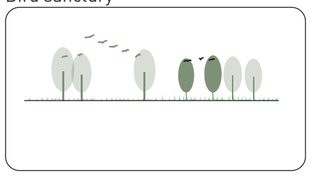
1 Rain garden

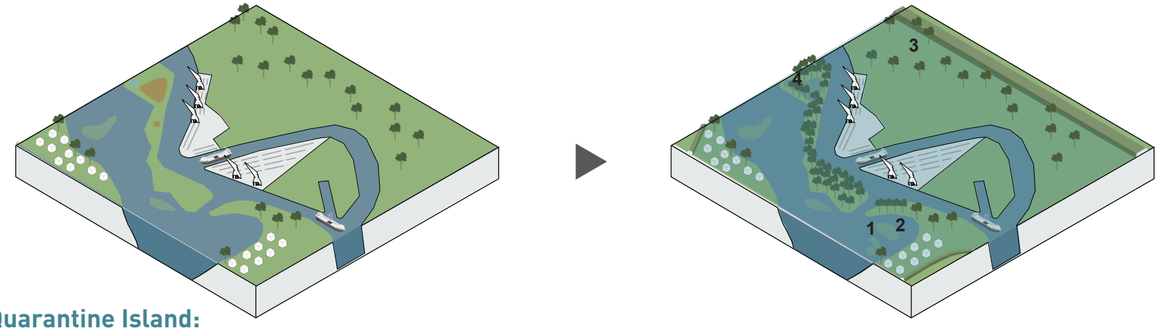


2 Add surface water storage



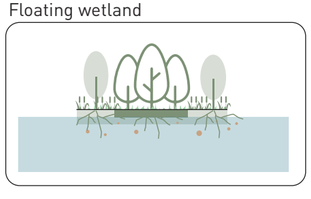
3 Bird sanctury



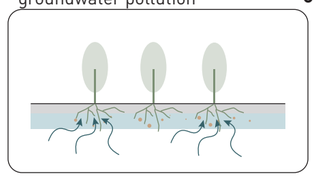


Quarantine Island:
Restoration of Port and
Dredging Areas to Nature

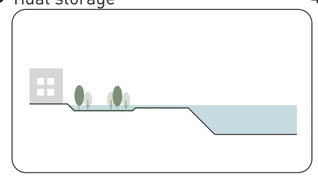
1 Floating wetland



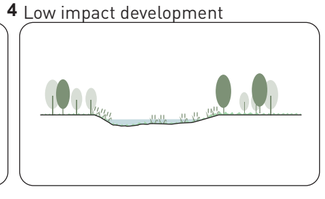
2 Deep-rooted trees absorb groundwater pollution

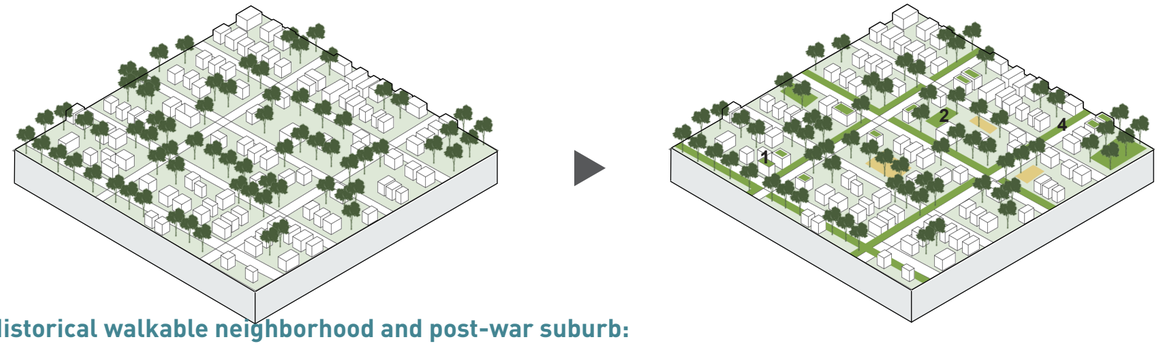


3 Tidal storage



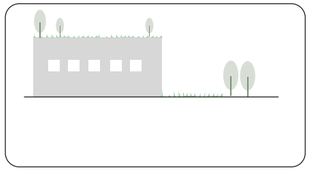
4 Low impact development



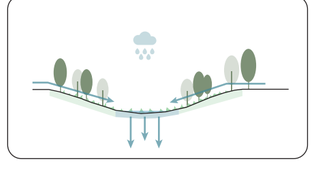


Historical walkable neighborhood and post-war suburb:
Centralized and Integrated Green and Pocket park

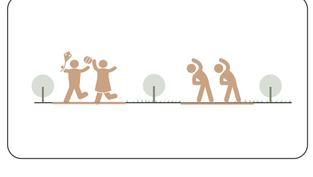
1 Green roof



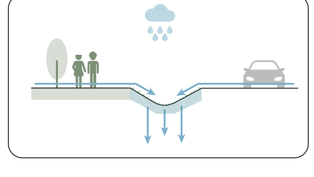
2 Rain garden



3 Opportunities for Play and Exercise



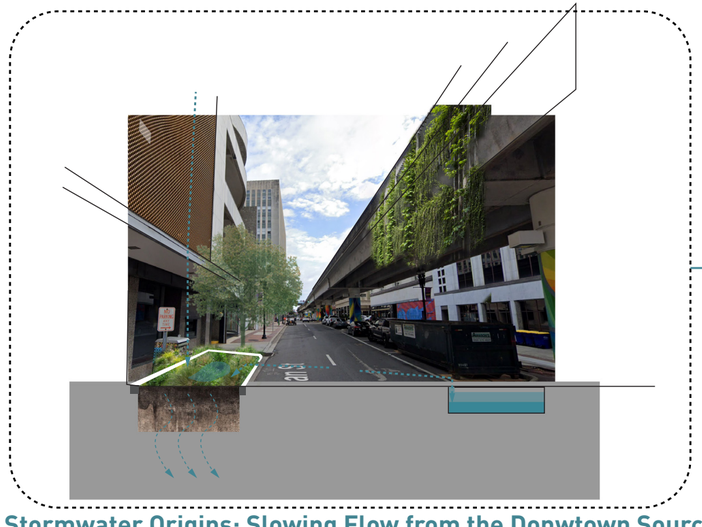
4 Biological ditch



5.5 WATER FLOW INDICATION Stormwater Flow: Inland to Outland

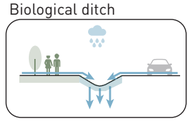


Stormwater Origins: Slowing Flow from the Community Source

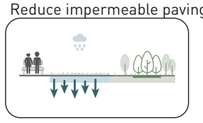


Stormwater Origins: Slowing Flow from the Donwtown Source

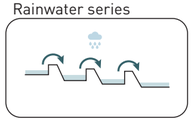
Biological ditch

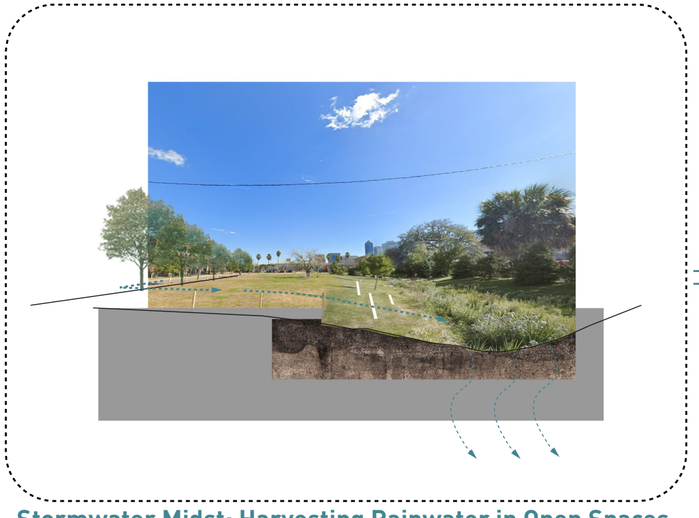


Reduce impermeable paving



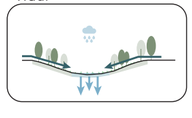
Rainwater series



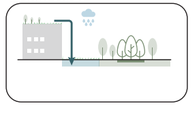


Stormwater Midst: Harvesting Rainwater in Open Spaces

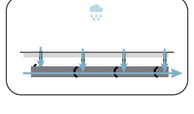
Wadi



Green Roof



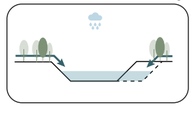
Pipeline water storage to increase capacity





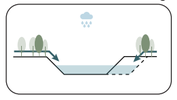
Final Stage of Stormwater: Decelerating in the Creek

Add surface water storage

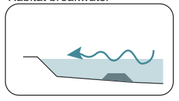


5.5 WATER FLOW INDICATION Tidal Seawater or Riverwater Flow: Outland to Inland

Add surface water storage

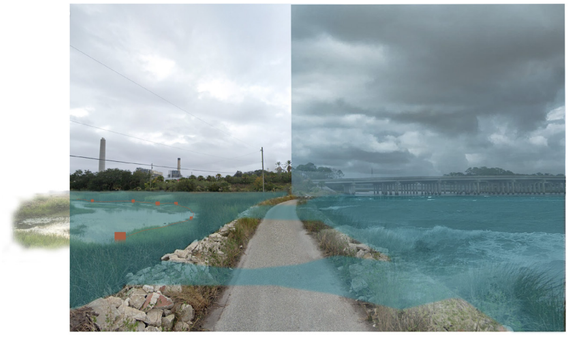


Habitat breakwater

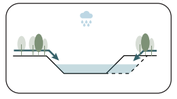


Tidal water coming from sea

Floodplain along the creek

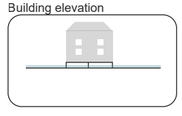


Add surface water storage



Final Dike protection land and water storage house

Building elevation





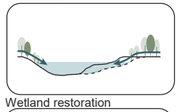


Storm surge coming

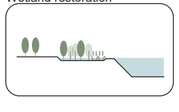


Floodplain along the river

Widen river



Wetland restoration



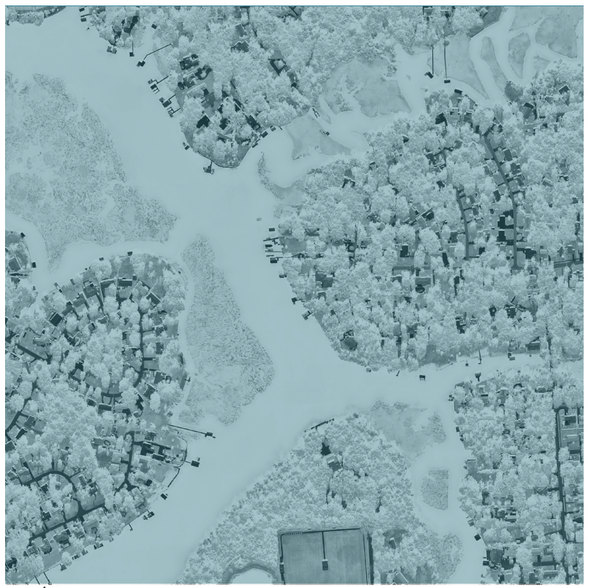
PART Ⅳ

A Promising Future: Vision Through Blue-Green Infrastructure

Part Ⅳ
[A Promising Future:
Vision Through Blue-
Green Infrastructure]

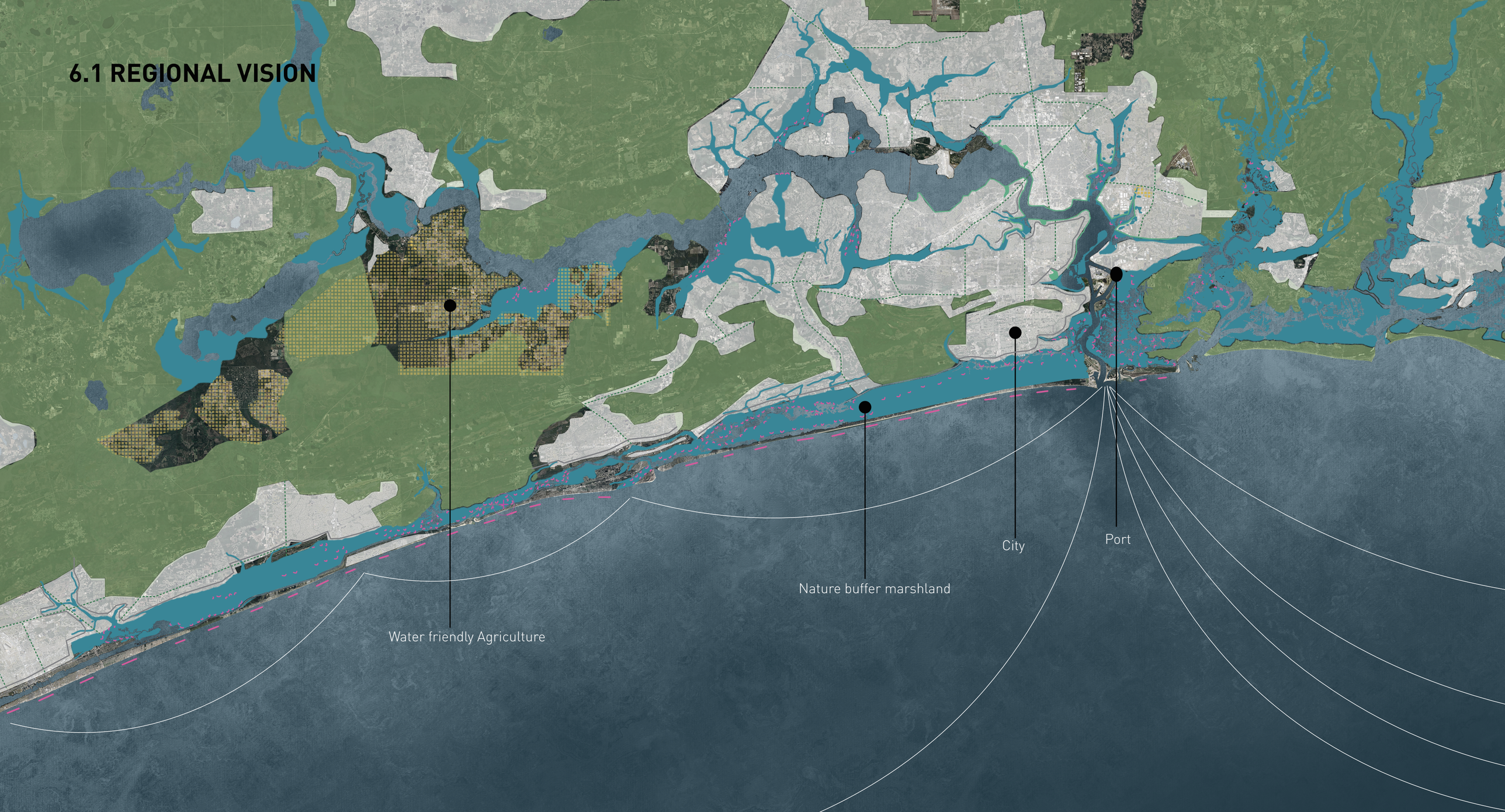
06 TOMORROW
6.1Regional vision
6.2 City vision

06 TOMMORROW

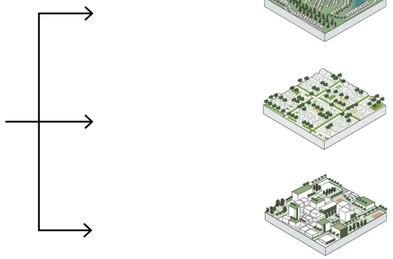


(The topography of residence near the creek ,
Satellite image from Google earth,
Edited by author on May, 2024,)

6.1 REGIONAL VISION









Contemporary Suburb:
Stormwater Collection

Historical walkable neighborhood and post-war suburb: Centralized and Integrated Green

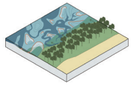
Downtown:
Integrated Blue-Green Infrastructure Network and Pocket park





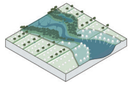
Eco-patch: Rainwater Mitigation and Collection in Forest Areas





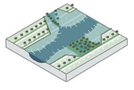
Estuary marshland:
Marshland Protection and Natural Sediment Collection.





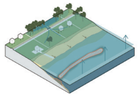
Creek and Stream:
Being Creek Floodplain.





Riverine Community:
Being Riverine Floodplain





Coastal Community: Protect the Coastline and Communities.

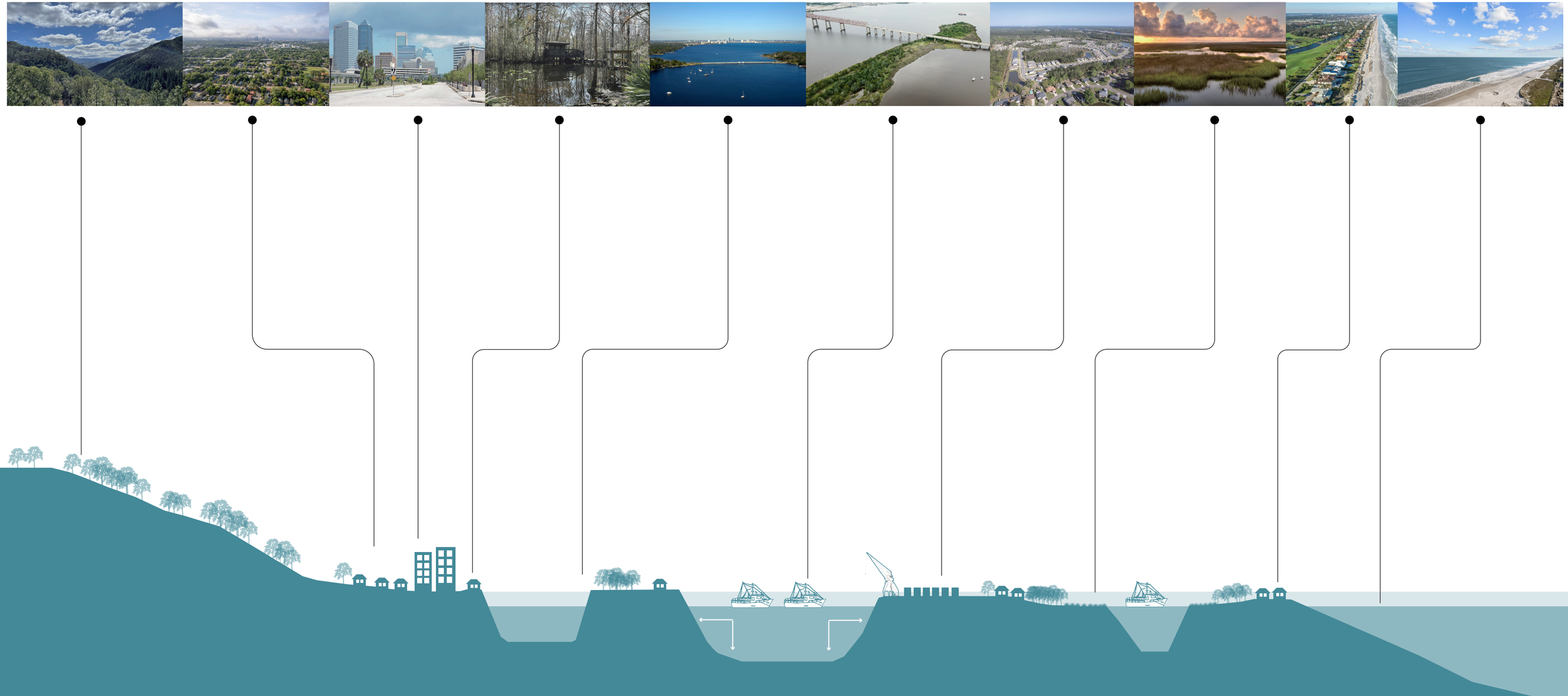


Water friendly agriculture

Natural Dike

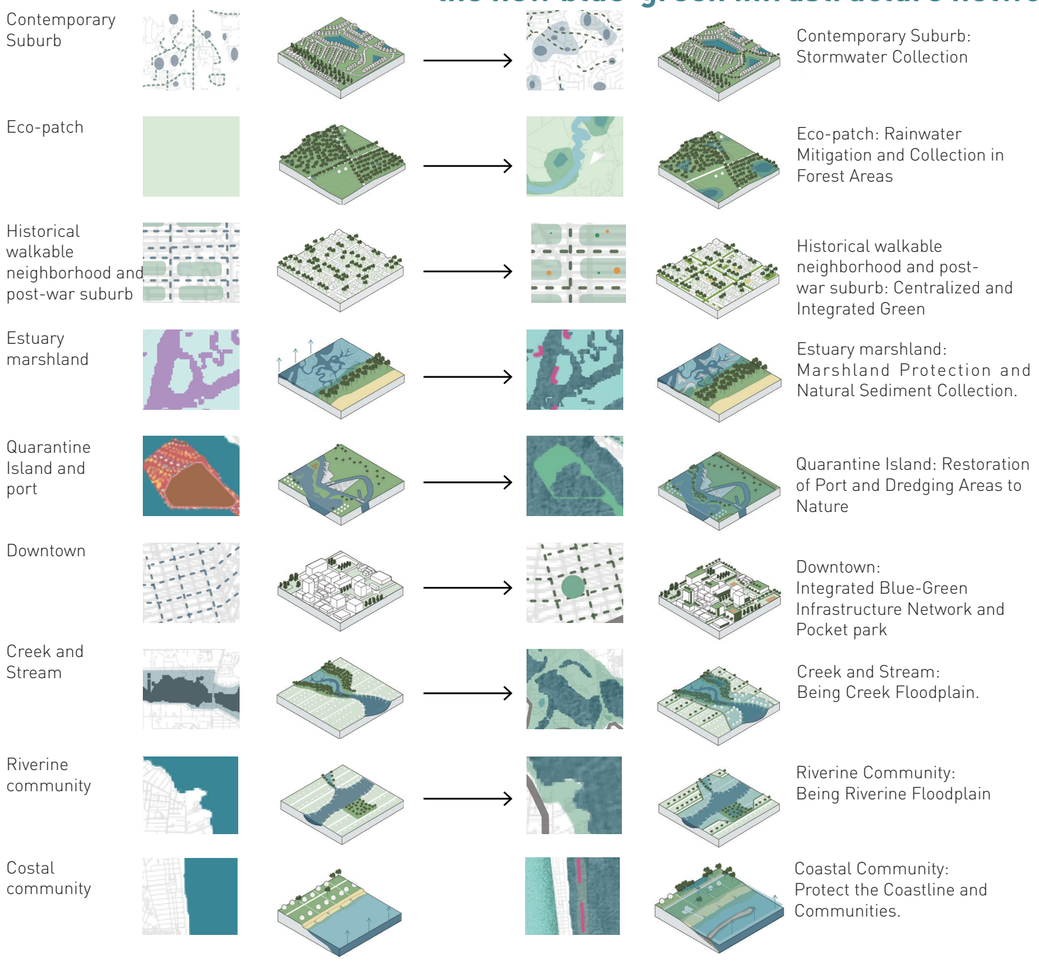
Green corridor

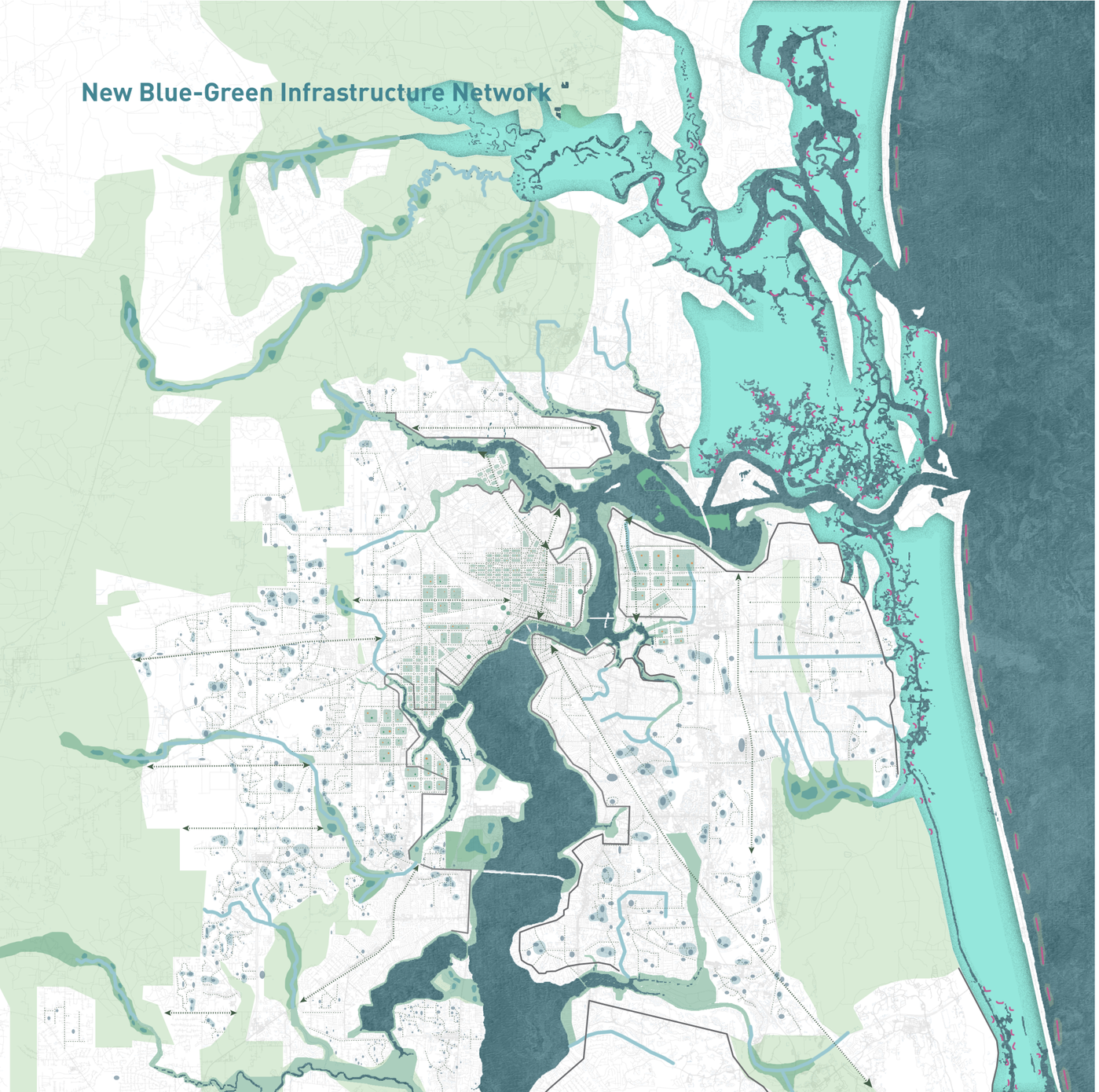
City scale: The Diverse Terrain of Jacksonville



Original Blue Green Structure of Jacksonville

Transformation from the original blue-green structure to the new blue-green infrastructure network

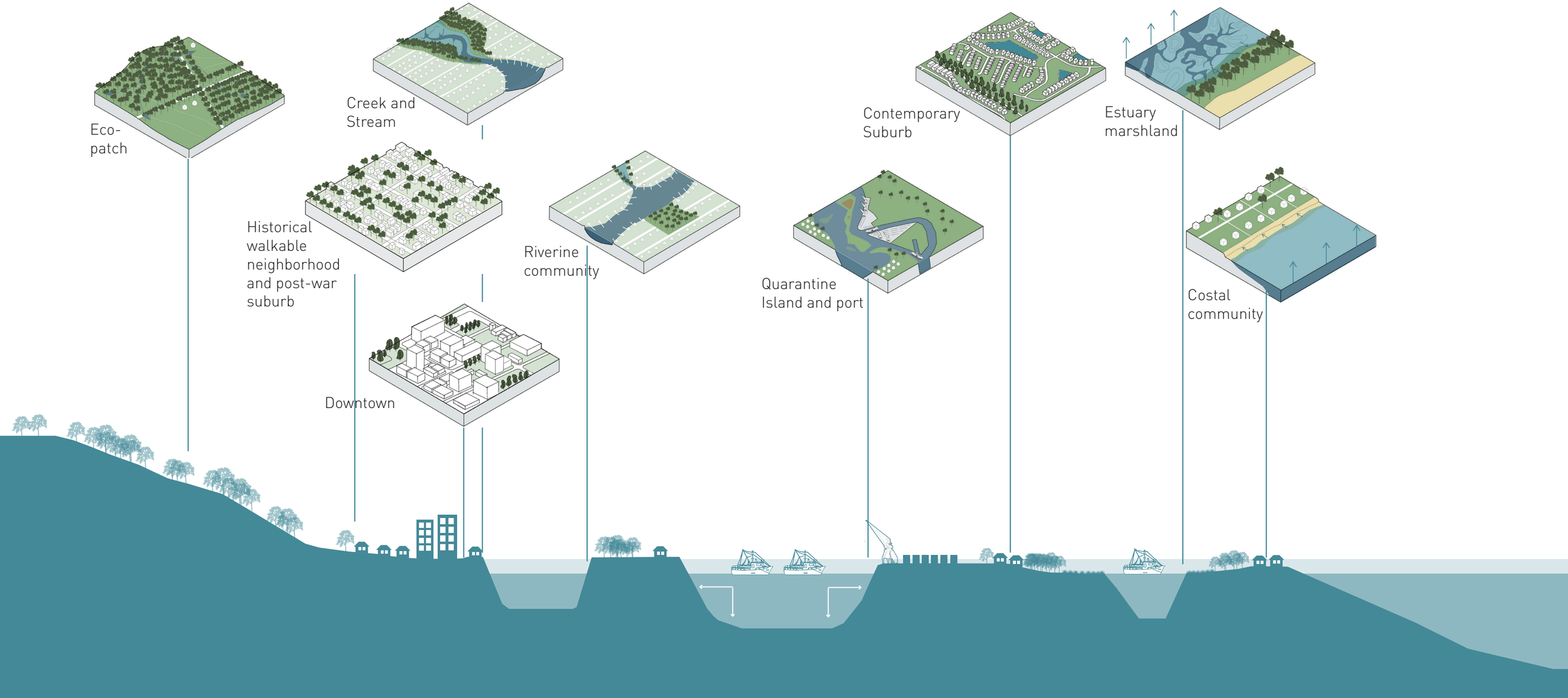




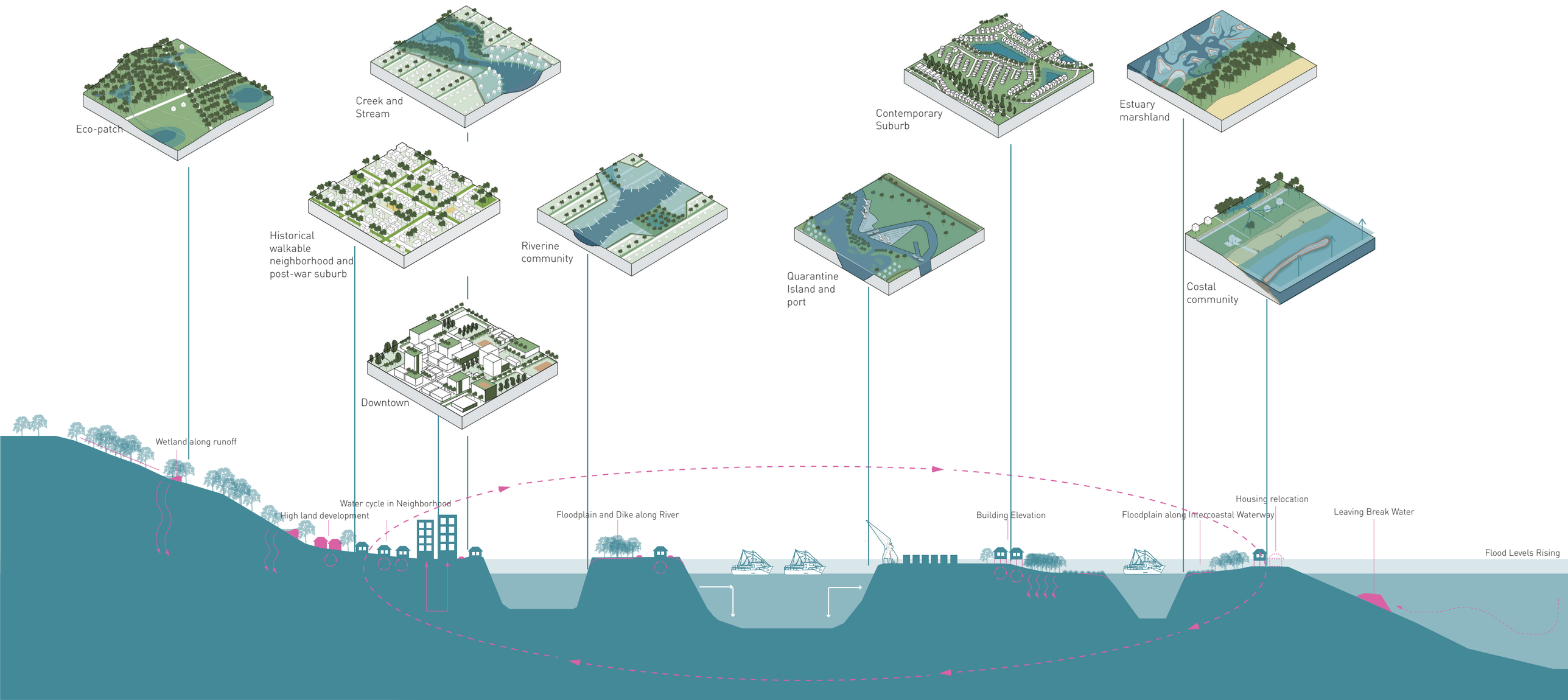
6.3 CITY VISION

6.4 Local application of Blue Green Infrastructure

Before Intervention



After Intervention



PART Ⅴ

Area-Specific Adaptive Design based on Blue-Green Infrastructure

Part Ⅴ
Area-Specific Adaptive Design based on Blue-Green Infrastructure

07 ADAPTIVE DESIGN 1
Typical Areas of Jacksonville: Addressing Community Segregation with Blue-Green Infrastructure
7.1Existing condition
7.2 Challenge
7.3 New plan of Zoom in 1
7.4 New plan of community
7.5 Detailed desgin

07 ADAPTIVE DESIGN

Typical Areas of Jacksonville:
Addressing Community Segregation with Blue-Green Infrastructure



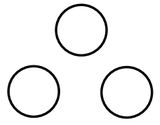
(The topography of Irrigation Agriculture, Satellite image from Google earth,
Edited by author on May, 2024,)

Regional scale

St Johns river
Lowerbasin

Local scale

Jacksonville,FL



Zoom in

Historical Walkable Neighborhoods

Sub-Research Question 2

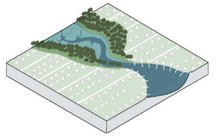
Generally, blue-green infrastructure has paid relatively less attention to social issues. How can we creatively focus on social issues and the people living here? For example, community segregation, spatial inequality, and the ever-widening wealth gap.



Sub-Research Question 3

How does the new blue-green infrastructure address water crises and green issues such as water pollution, flooding, low-quality green spaces, and the irrational structure of urban green spaces?

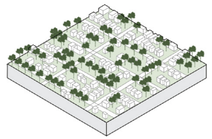
7.1 EXISTING CONDITION



Creek and Stream



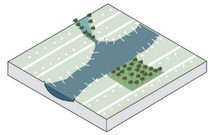
(Moncrief Creek, accessed on May 2024)



Historical walkable neighborhood and post-war suburb



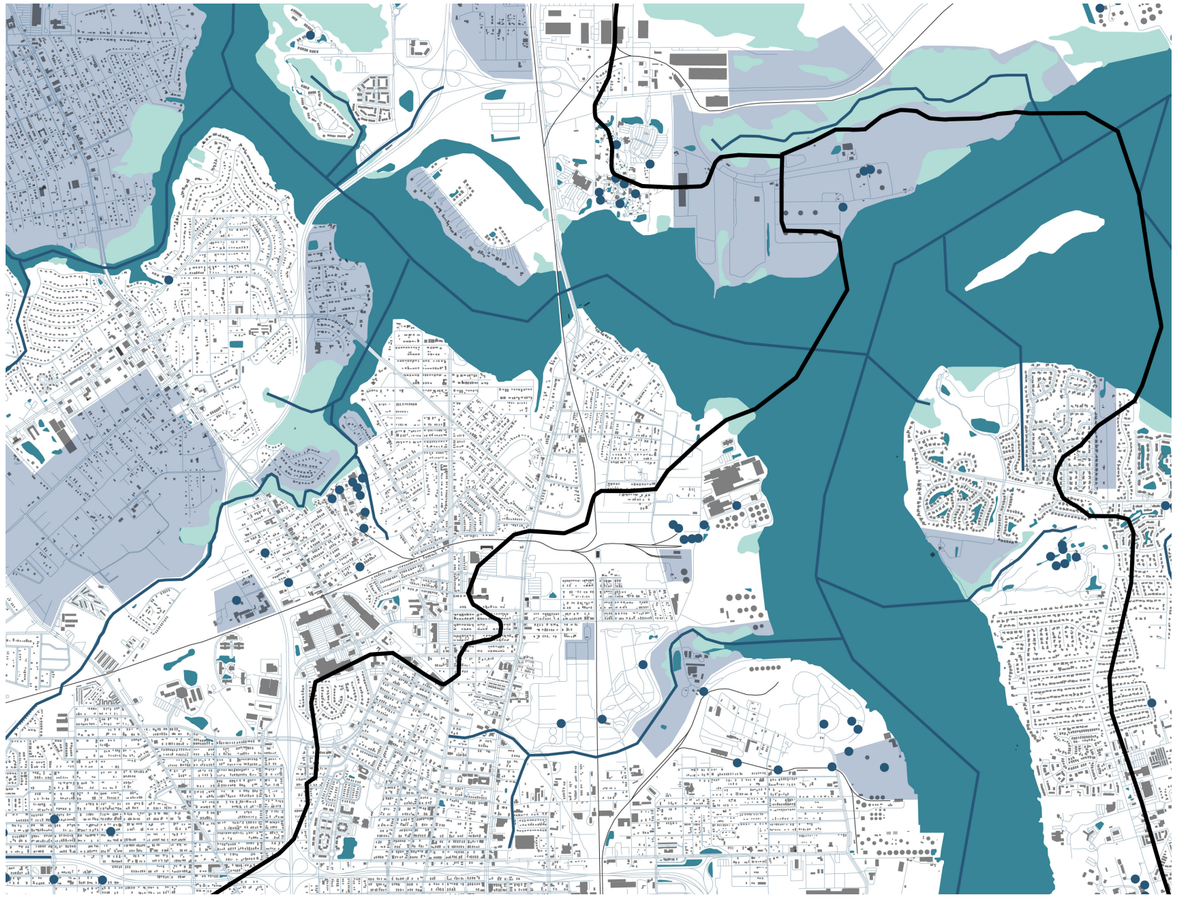
(Brentwood, accessed on May 2024)



Riverine community



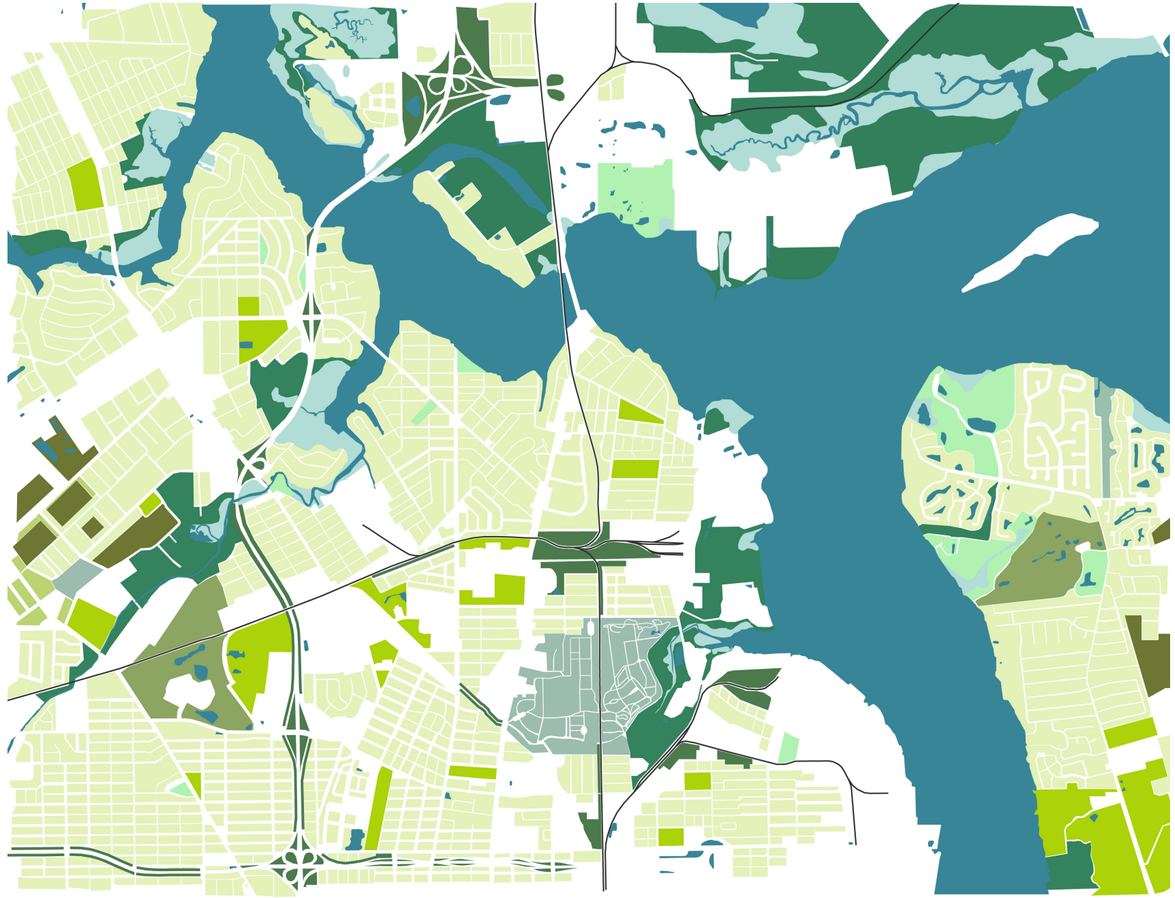
(Panama Park, accessed on May 2024)



Watershed
Waterway
Water pipeline
Marshland
Septic parcel
Well

Water map

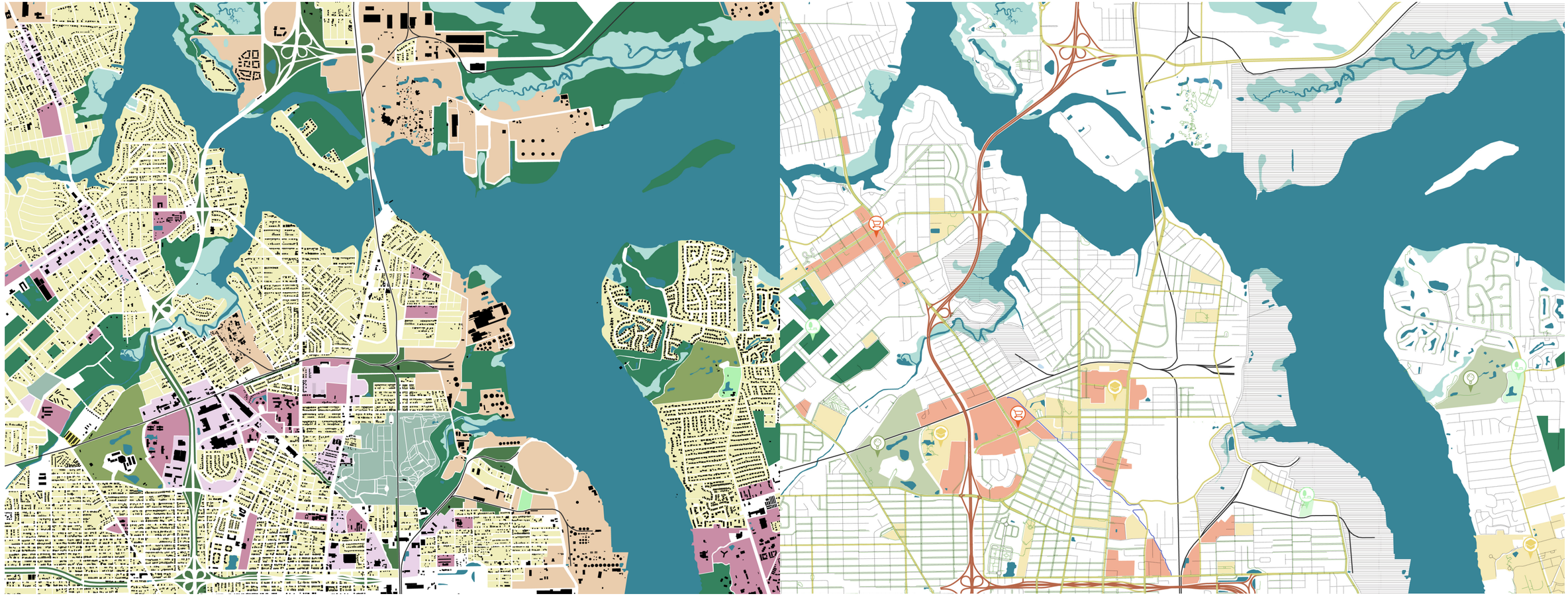
The confluence of rivers and streams



Private green
Public green
Cemetery
Golf course
Forest in residence
Park
Marshland
Unwalkable forest
Roadside green

Green map

Private green occupies the majority.



Building
Residential
Industrial
Commercial
Institutions
Forest
Golf field
Park
Roadside green
Railway

Landuse map

Riverbanks occupied by industry and private residences.

Railway
Primary road
Secondary road
Residential road
Footway
Cycleway

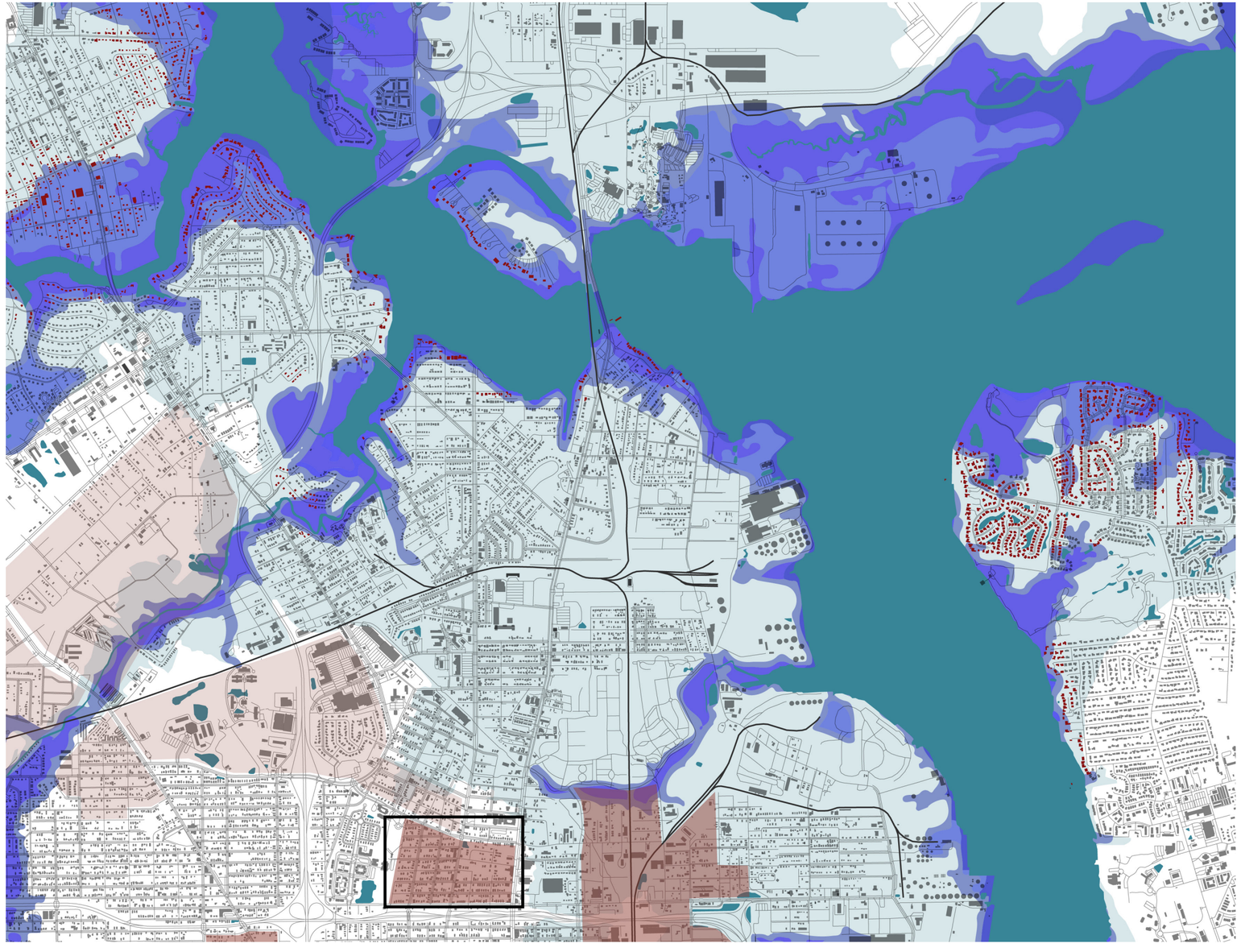
Mobility map

New Obstacles Reduced Accessibility

Park
Golf field
School
Shop
Inaccessible land

7.2 CHALLENGE

The interweaving of floods and poverty



Poverty rates

56%

38%

Flooding risk

100 years flood

1-3 feet

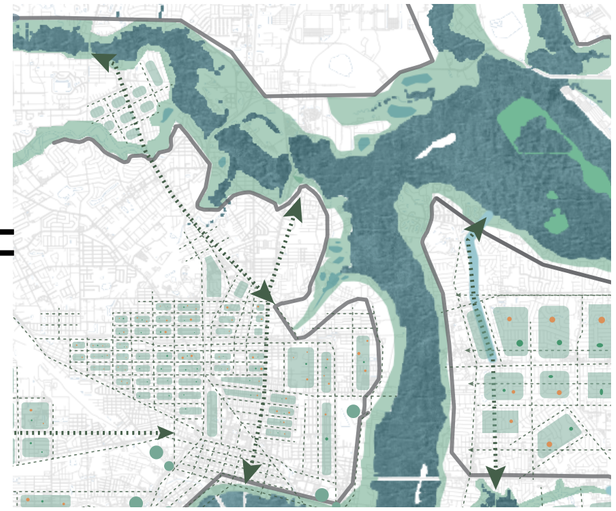
1feet

Potential storm

Flooded houses

NEW PLAN OF ZOOM IN

7.3 NEW PLAN OF ZOOM IN 1



1 Residence as pototential flood plain

2 Natural dike

3 Creek as new park

4 Creek as new park

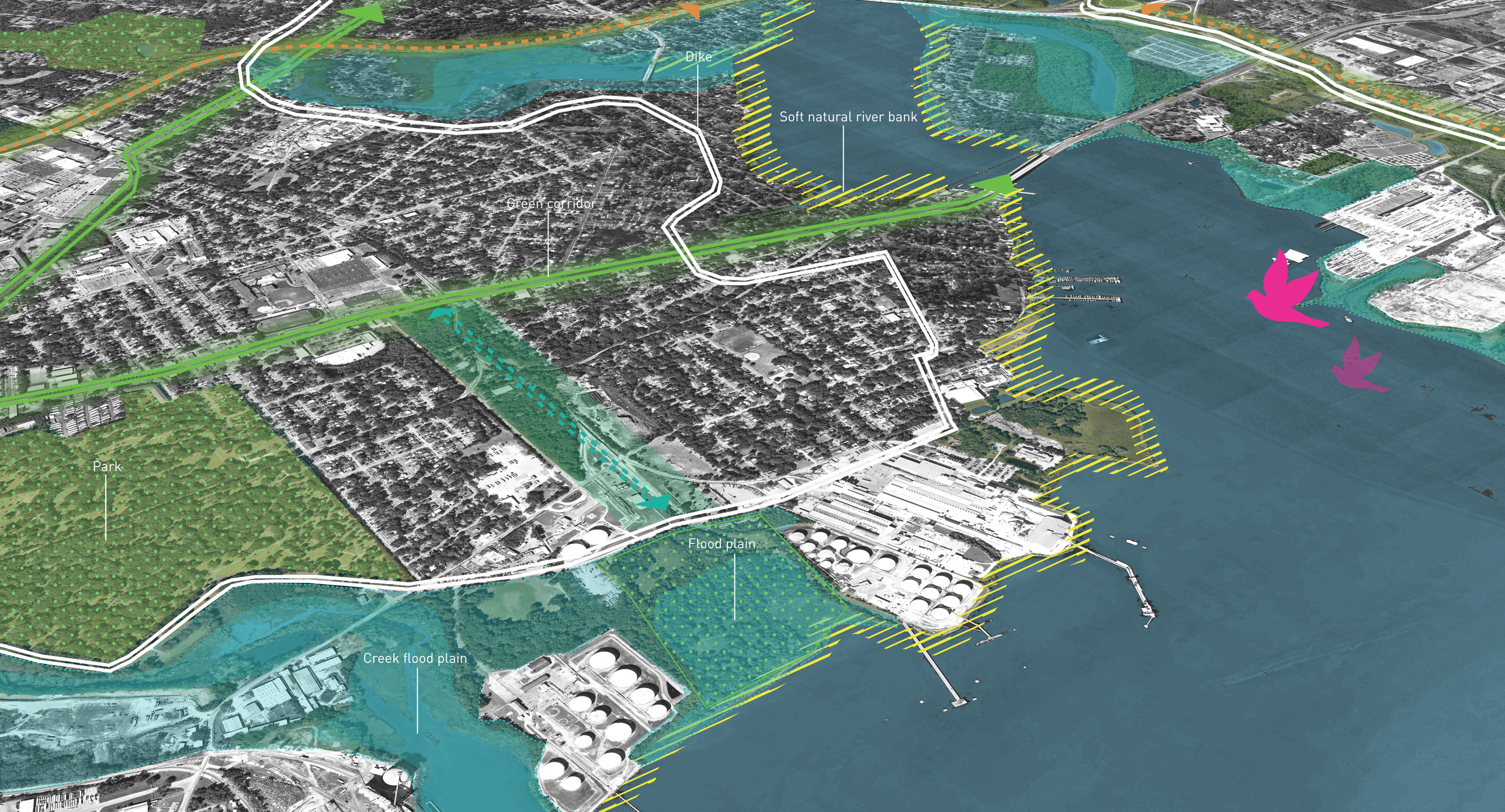
5 Semi-closure forest

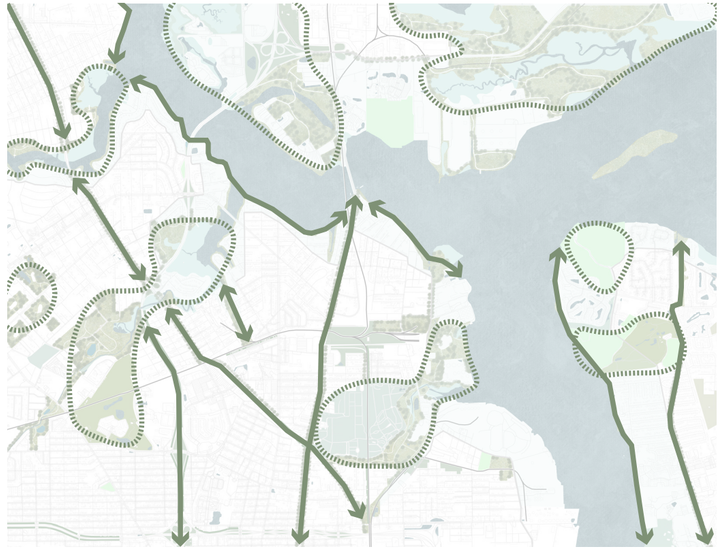
6 Creek as new park

7 Green corridor

8 Green corridor

9 Soft river bank


Dike
Soft natural river bank
Green corridor
Park
Flood plain
Creek flood plain



Ecology

The ecological corridors and soft riverbanks connect large public green spaces and ecological patches, forming a green network that spans the entire area. Coupled with the private green within the community, the new design constitutes a reasonable green structure,

Eco-patch

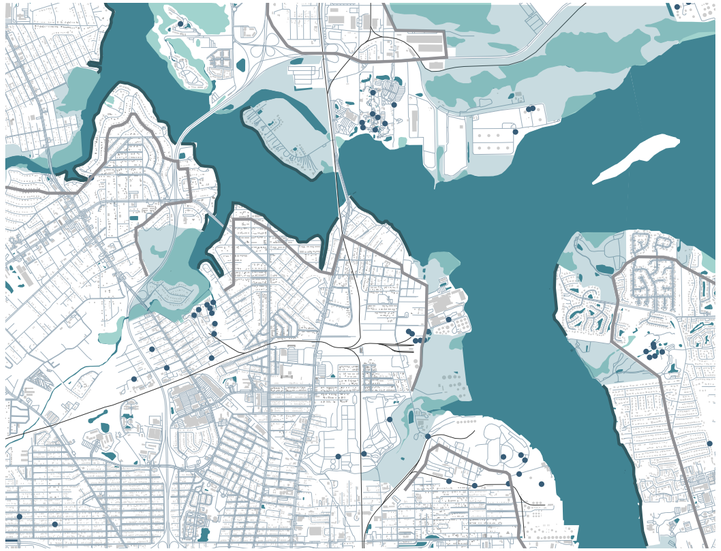
Eco corridor



Habitat

Along rivers and streams, fish enter the green floodplain, which becomes their natural habitat for spawning. The new design turns the green space along the stream into an ecological habitat with high green value.

Fish habitat



Water adaptive

Transform the many previously hard embankments into natural embankments to serve as buffer zones. Additionally, utilize the existing marshlands and riverbank green spaces to create a new floodplain, which can increase water capacity during floods and the rainy season. The dike protects residential areas on the land.

Dike

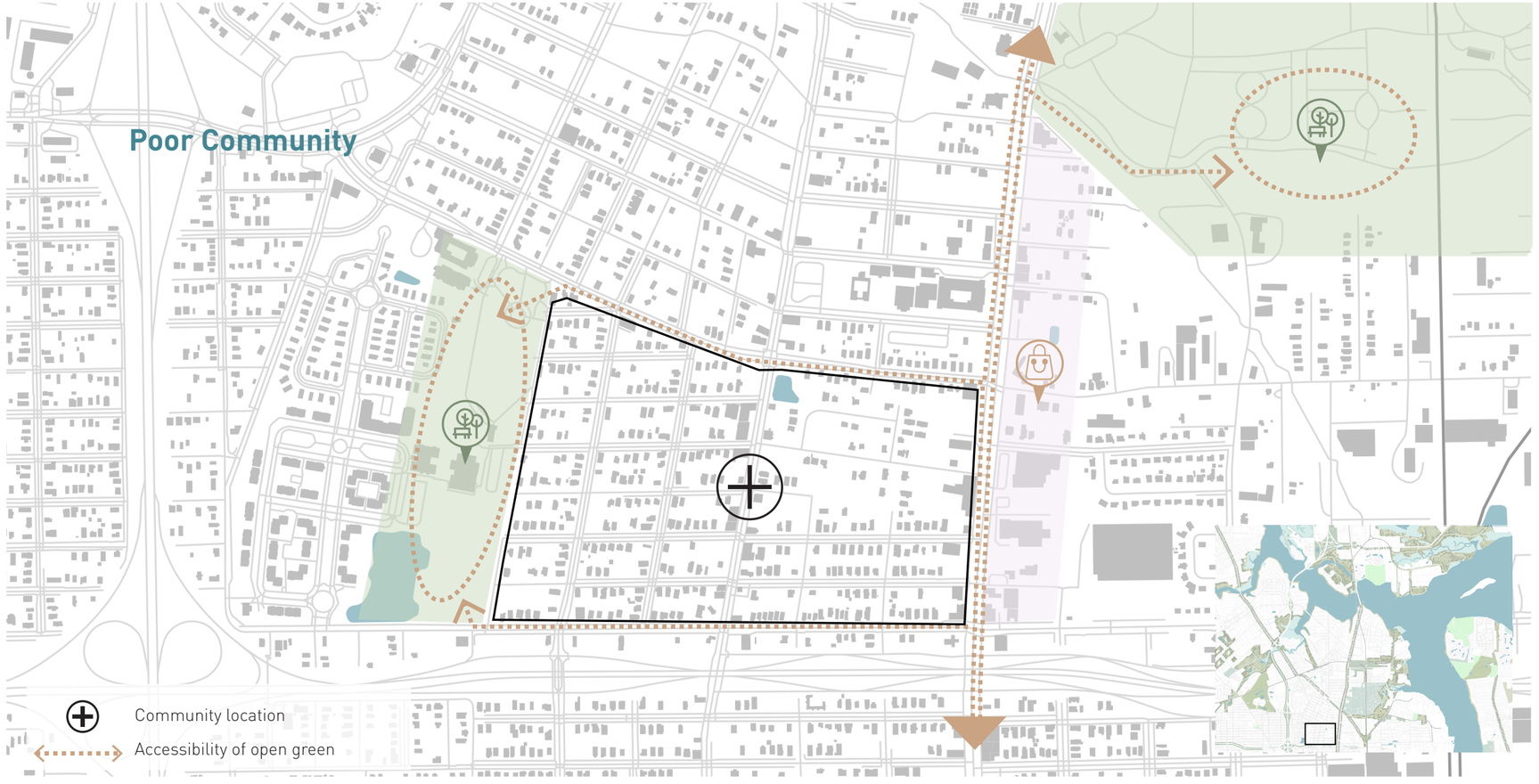
Soft river bank

Water pipeline

Wetland

Floodplain

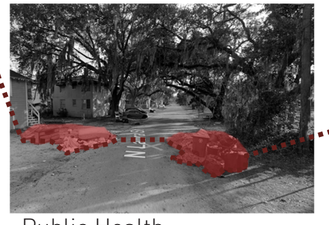
Well

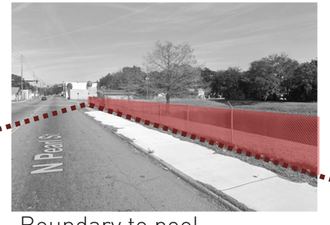


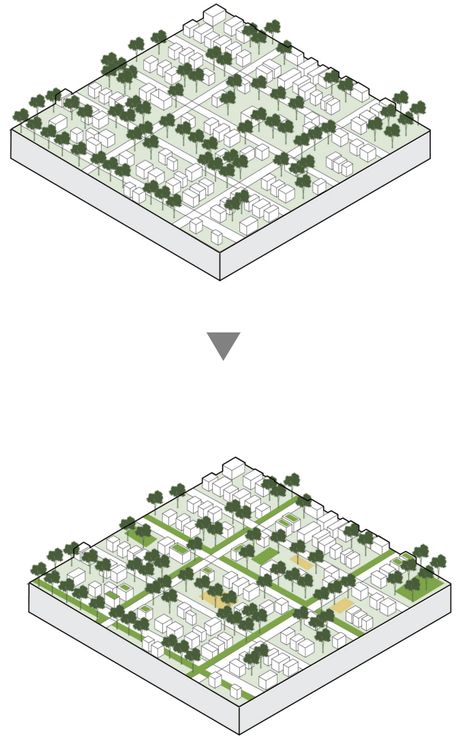

Boundary to open green


Boudary between private green


Green that needs maintenance

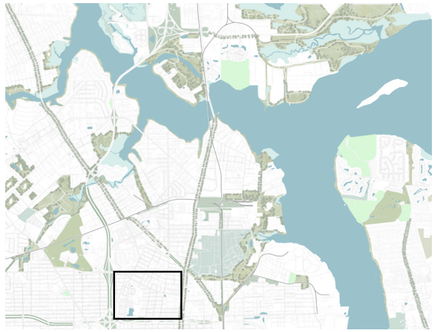

Public Health


Boundary to pool



New plan of Poor Community

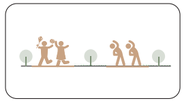
7.4 NEW PLAN OF COMMUNITY

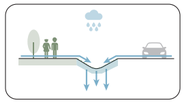


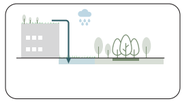
1  Community market

2  Community urban agrihood

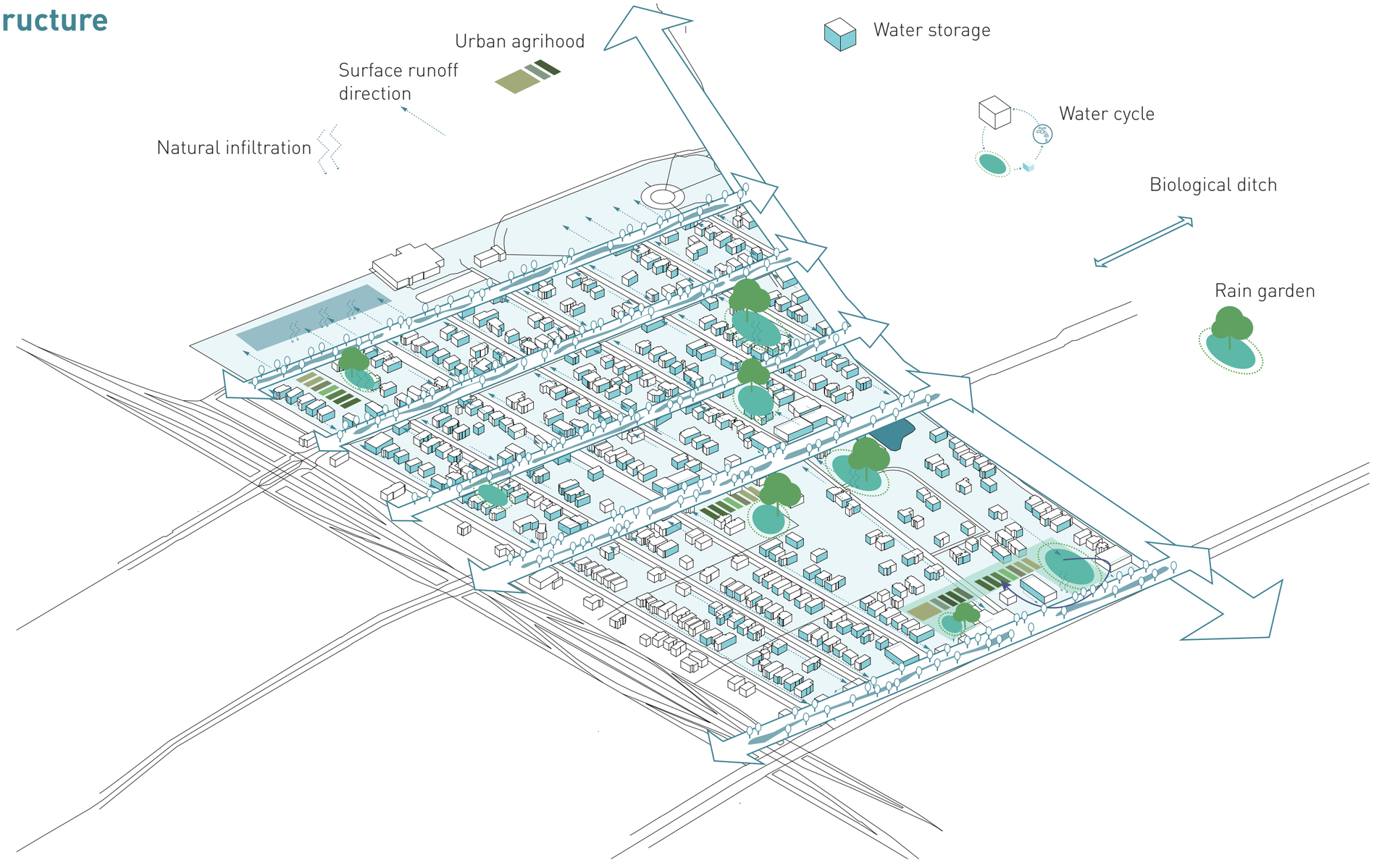
3  Biological ditch

4  Children playground

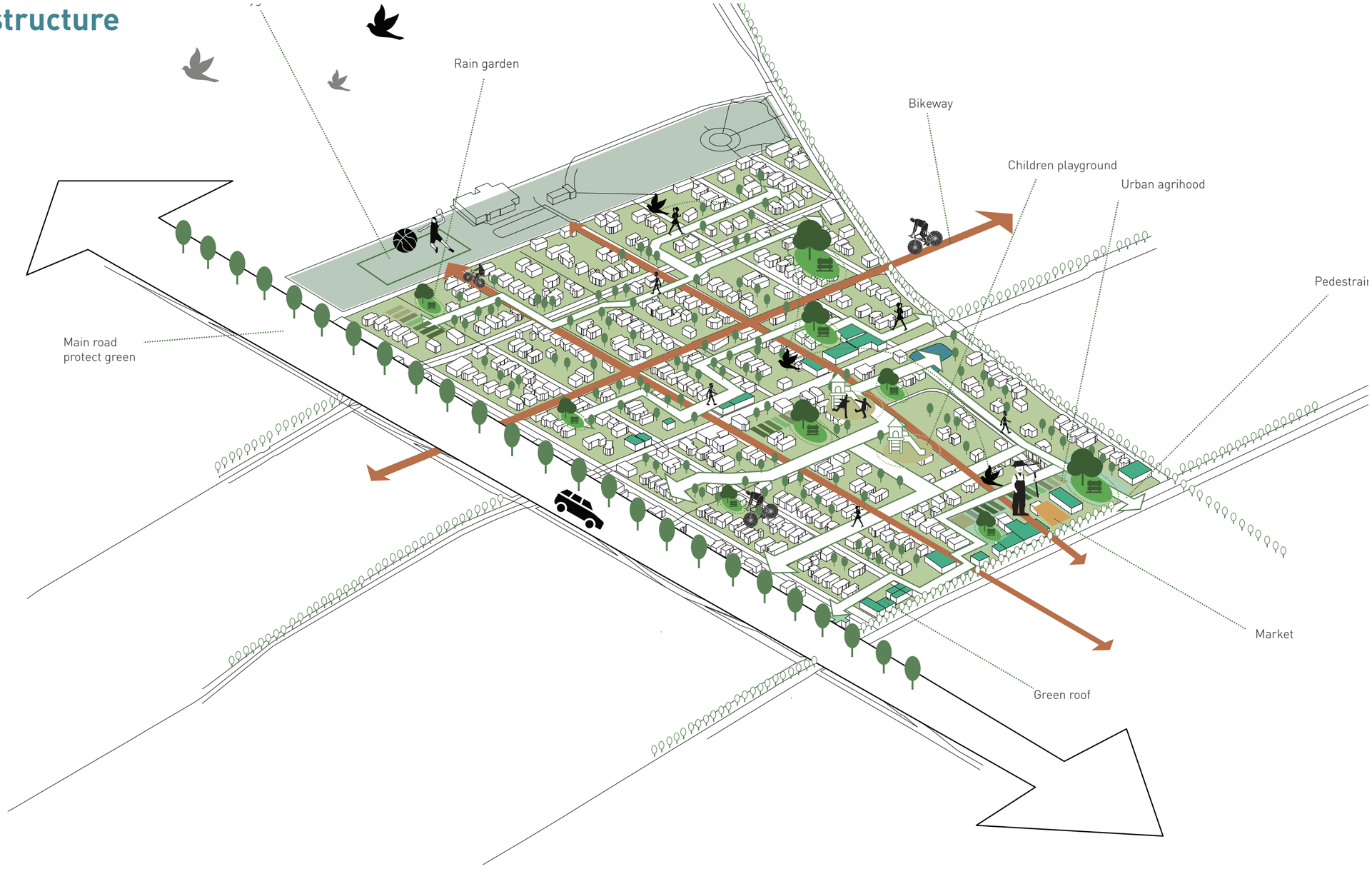
5  Biological ditch

6  Green roof

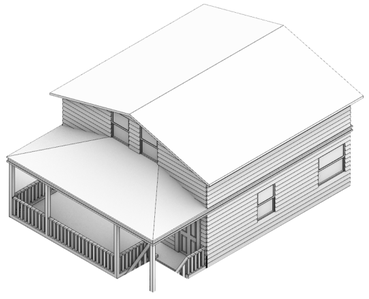
Water Infrastructure

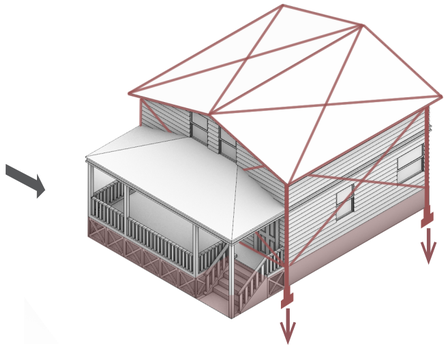


Green Infrastructure



Vacant land improvement

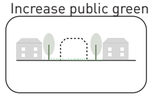


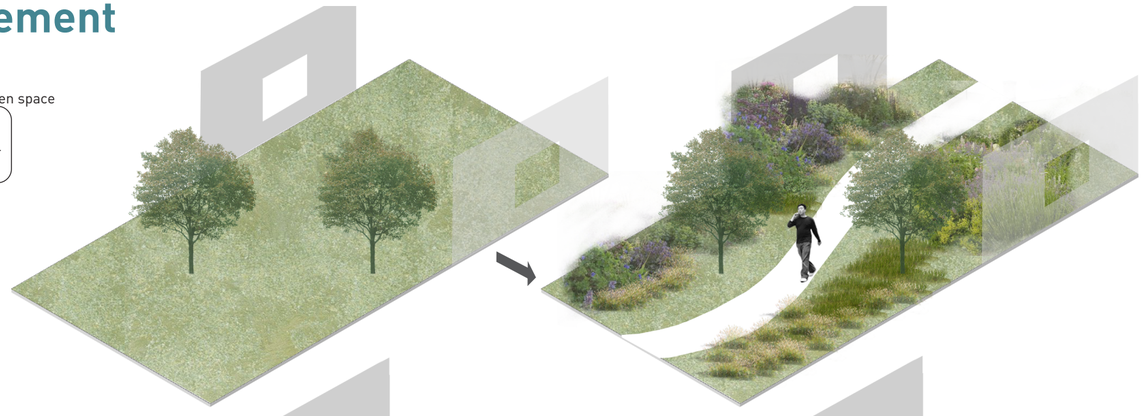


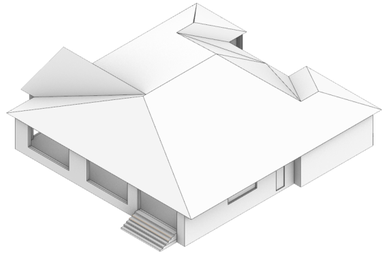
House Reinforcement

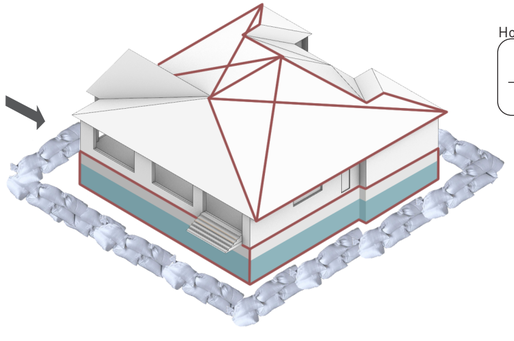


Increase public green space







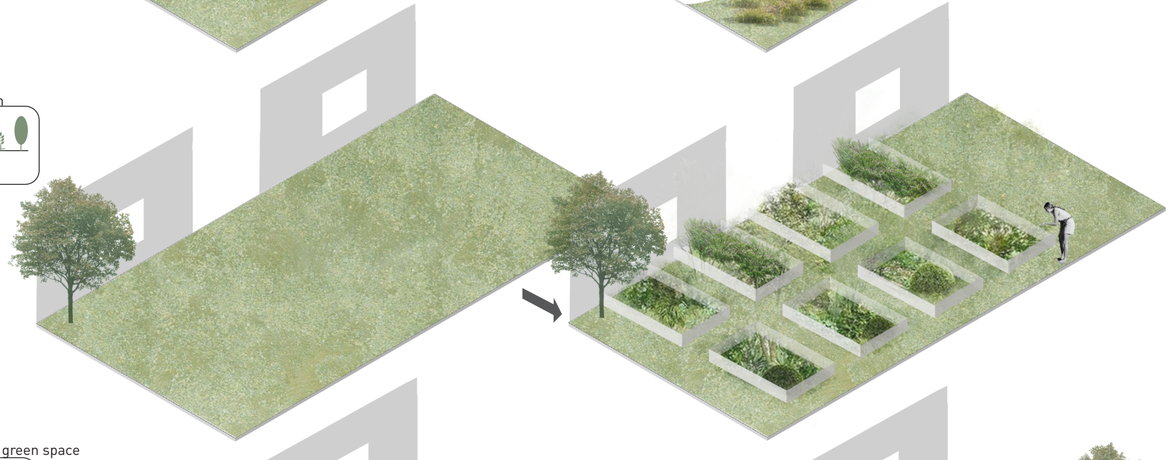


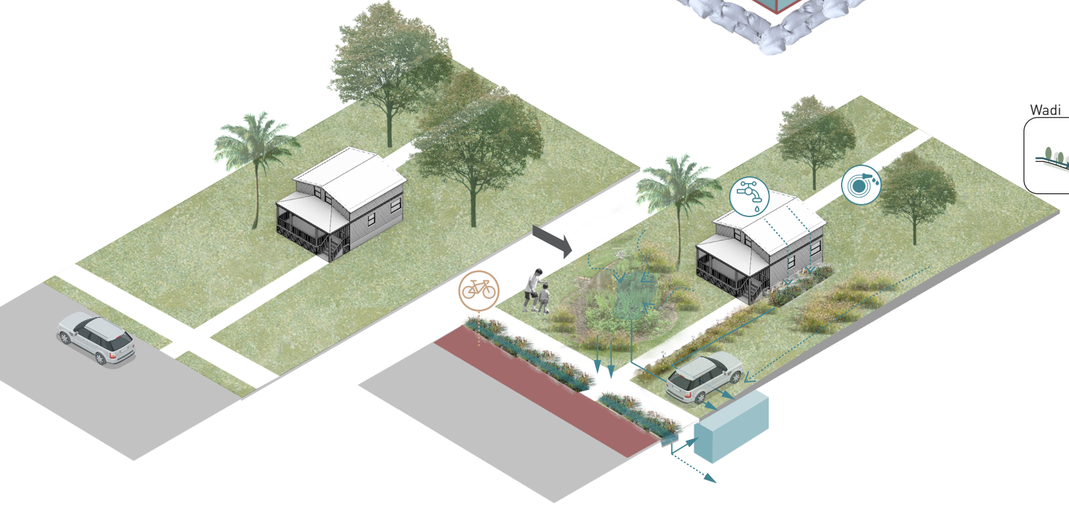
House Reinforcement



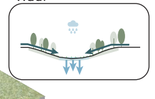
Community farm







Wadi



Increase public green space





7.5 Detailed Design



1 Community market

2 Community urban agrihood

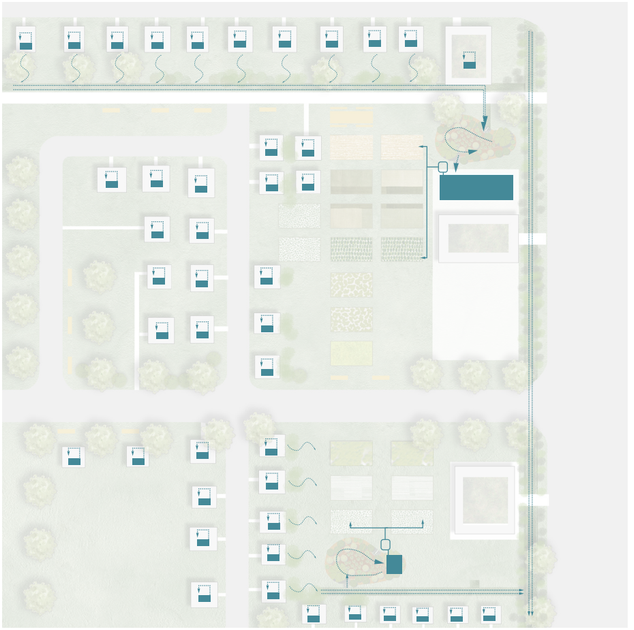
3 Rain garden

4 Green roof

5 Biological ditch

6 Community kitchen

7 Water storage under the parking lot and purification



Water cycle in urban agrihood

Housing water cycle

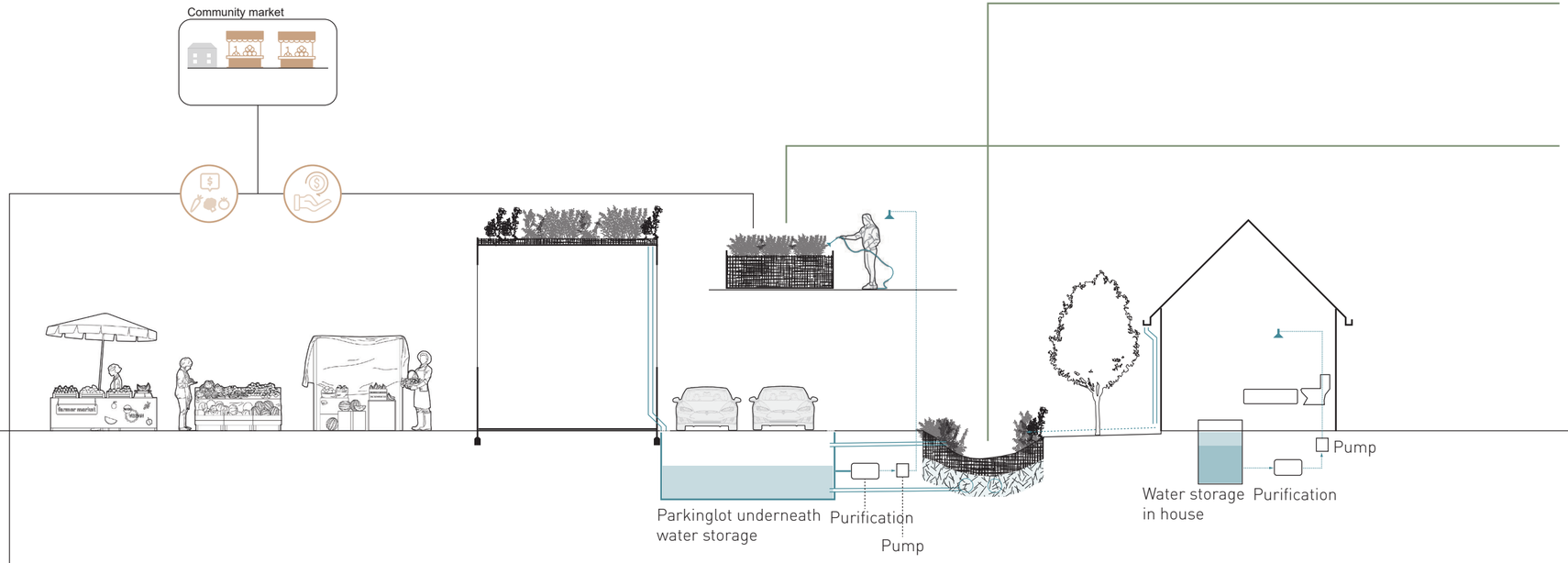
Water storage

Water purification

Runoff

Runoff in biological ditch

Technical Section and water



Blue Green Infrastructure

- Improve accessibility
  - Bikeway
  - Pedestrain
- Food
  - Selling food
  - Buying food
  - Enjoying food
  - Sharing food
- Space
  - Gathering
  - Talking
  - Walking
  - Communicating
  - Standing
- Water cycle
  - Lower price

- Feel convenient
- Feel safe → Break the Segregation
- Feel being supported

Plants and vegetables





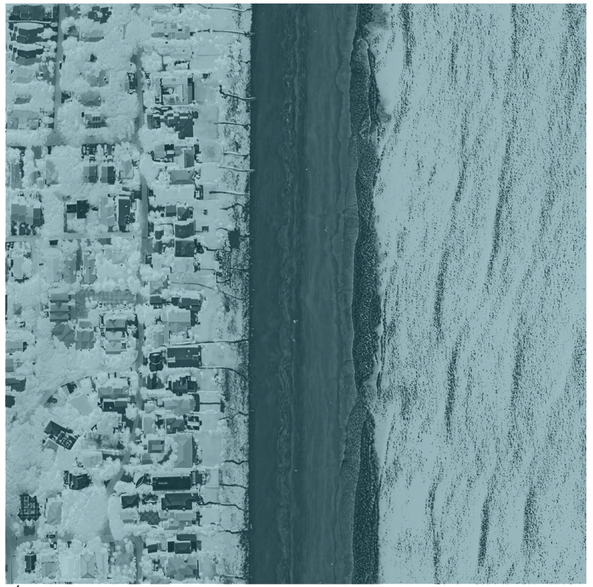
PART VI

Conclusion and Reflection

PART VI
Conclusion and Reflection

8 Conclusion and Reflection
8.1Conclusion
8.2Reflection
8.3Bibliography

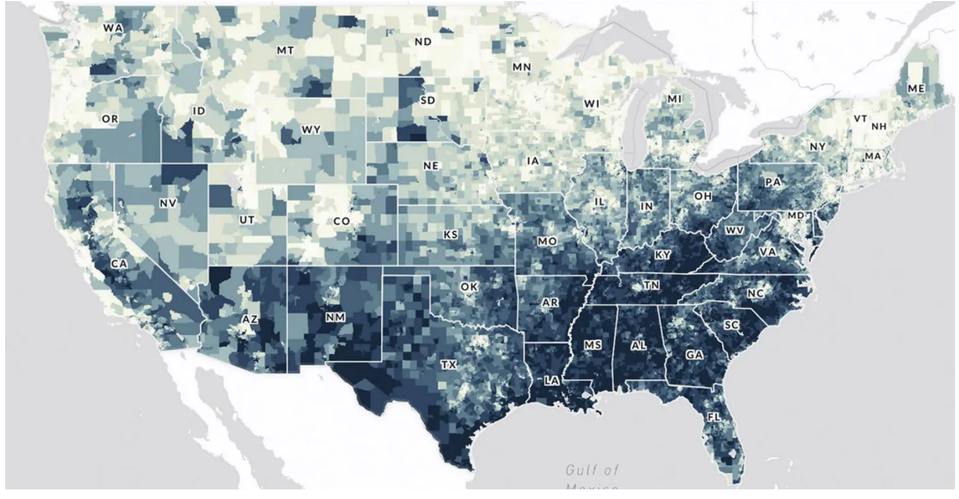
08
CONCLUSION



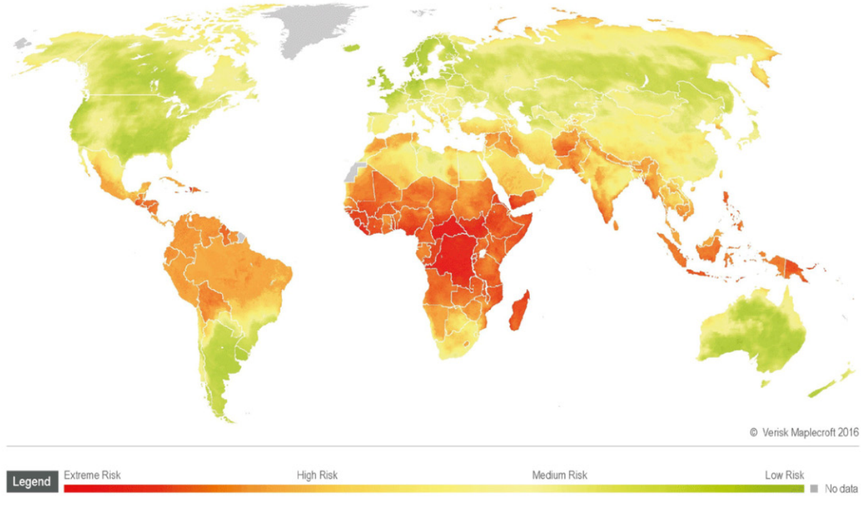
(The topography of Coastal community and beach,
Satellite image from Google earth,
Edited by author on May, 2024,)

SCOPE RELEVANCE

Think Global, Act Local.



(The U.S. Climate Vulnerability Index; Mapbox / OpenStreetMap, accessed 4 March 2024)



(The Global Climate Vulnerability Index; Mapbox / OpenStreetMap, accessed 4 March 2024)

9.1 CONCLUSION

Main question ： How to improve and build the blue-green infrastructure based on the original green structure of Jacksonville to address urban vulnerability and improve urban resilience.

In this project, I explore how blue-green infrastructure (BGI) can create a resilient urban network to address urban vulnerabilities and improve overall resilience. BGI combines water management and vegetation, offering multifunctional benefits.

Flood Mitigation
Implementation: Utilize wetlands, parks, and permeable surfaces to absorb excess water and reduce flood risks.
Application: Jacksonville can enhance its existing green spaces by integrating more permeable materials in urban planning and expanding wetland areas to act as natural flood barriers.

Stormwater Management
Implementation: Develop rain gardens, bioswales, and green roofs to capture and filter stormwater, easing the pressure on drainage systems.
Application: Discussing four types of flooding, the project applies blue-green principles using a typo logical toolbox for effective implementation. Incorporate these solutions in Jacksonville's urban planning to manage stormwater more efficiently.

Erosion Control
Implementation: Utilize coastal vegetation and dunes to stabilize soil and reduce erosion from waves and storms.
Application: In Jacksonville's coastal community areas where sand dune collapse is significant, implement breakwaters and protect marshlands to serve as ecological flooding buffer zones.

Water Quality Improvement
Implementation: Use natural filtration by wetlands and green spaces to remove pollutants from runoff.
Application: Focus particularly on creek and river areas in Jacksonville. Although industrial zone designs were not extensively developed due to time constraints, integrating BGI in these areas can address pollution problems effectively.

Biodiversity
Implementation: Create habitats for wildlife to enhance urban biodiversity and ecological resilience.
Application: Embed multiple blue-green nodes and lines within the city to form blue-green grids, boosting ecological benefits across Jacksonville.

Climate Adaptation
Implementation: Use vegetation and water bodies to regulate temperatures and sequester carbon, helping mitigate climate change.
Application: Strengthen Jacksonville's natural buffer zones and protect marshlands to defend against future sea-level rise.

Social and Economic Benefits
Implementation: Develop recreational spaces, boost property values, and strengthen community resilience.
Application: Detailed in the project's first zoom-in design, BGI enhances community resilience by applying Jan Gehl's twelve criteria to improve safety, cohesion, and reduce poverty and segregation in Jacksonville.

Disaster Risk Reduction
Implementation: Utilize green spaces as emergency buffers and integrate them into disaster planning.
Application: During extreme weather events, Jacksonville's green spaces provide safe areas and essential infrastructure for emergency situations.

In general, this project outlines how BGI can be developed based on Jacksonville's existing green structure to address urban vulnerabilities and enhance resilience. By incorporating these strategies, Jacksonville can improve flood management, stormwater control, erosion prevention, water quality, biodiversity, climate adaptation, social cohesion, and disaster risk reduction.

Research Question 1: How does blue-green infrastructure address existing urban issues at different scales—such as regional scale, city scale, area scale, community scale, and building scale—creating better blue-green structures, enhancing urban resilience, and transforming cities into sponge cities?

In this project, I discuss how blue-green infrastructure forms networks at different scales to address corresponding blue-green and social issues. The project is divided into five scales:

Regional Scale: XL Scale
Focuses on the lower basin of the St. Johns River. By applying typological tools to various terrains, it aims to maximize flood control and create a robust blue-green network, thereby enhancing regional resilience.

City Scale: L Scale
Examines the city scale to understand how to construct an effective blue-green infrastructure network that improves urban resilience and addresses city-level issues.

Zoom-In Scale: M Scale
Selects the representative Brentwood area, which faces multiple integrated issues such as flooding, poverty, and low-quality green spaces. This scale serves as an extension of the city-scale new blue-green infrastructure network.
The second zoom-in area is a coastal community, focusing on water crises like sea-level rise, storm surges, tidal flooding, and extreme hurricanes.

Community Scale: S Scale
At the community scale, a typical impoverished community in Brentwood is chosen to discuss how blue-green infrastructure can enhance community safety, strengthen positive communication among residents, and provide economic benefits to some extent.

Building Scale: XS Scale
Provides detailed discussion on utilizing vacant community spaces, transforming them into public spaces such as rain gardens and rainwater collection and reuse systems.

Research question 2: Generally, blue-green infrastructure has paid relatively less attention to social issues. How can we creatively focus on social issues and the people living here? For example, community segregation, spatial inequality, and the ever-widening wealth gap.

Due to its history of racial segregation, the United States has long faced serious issues of separation. From racial segregation to residential segregation, the mindset of human separation has always been a painful wound on this land. (Refer to the history of community segregation; illustrations show that poverty remains concentrated within the redlined areas delineated a hundred years ago.) This mindset is deeply ingrained in American society. As landscape architects, how can we break this closed loop of thinkingmind?

Although we must admit that our capabilities are limited, and our profession has seemingly always served the higher echelons, lacking a revolutionary spirit, when we focus on the lower strata, how can we change their daily living environment and reignite their hope from the smallest details, breaking the cycle of their difficult and impoverished lives? When they no longer distinguish between "us" and "them" with walls, but step out of their homes to talk with their neighbors (social interaction is a basic human need), they gain psychological support from their neighbors. If the design of boundaries makes them feel safe, this sense of security enables them to fully engage in their work and even to nurture the next generation. This is what I hope to see.

When people start growing nessaritis, such as food, in community farms, it seems that all perceptions return to the most basic human needs. Eating food they have grown themselves, or buying more convenient and cheaper food at the market, or even selling their own produce, undoubtedly has a positive impact on their lives. At the same time, a blue-green network structure for water circulation makes water usage cheaper and reduces water waste. Removing walls and increasing the accessibility of communities to public spaces makes it easier for them to access green space, thereby making the use of space more equitable.

Research question 3: How the new blue-green infrastructure addresses water crises and green issues such as water pollution, flooding, low-quality green spaces, and the irrational structure of urban green spaces.

Blue green infrastructure provides answers at both the regional and city scales by forming networks that better prevent water-related issues, such as flooding, and by creating more natural spaces, like green corridors, to enhance ecological benefits.

In the first zoom-in area, a new blue-green infrastructure framework has been established through a typological toolbox. Given the primary concern of riverine flooding here, strategies include using dikes to protect the land and residential areas. Additionally, increasing water storage along the riverbanks to create floodplains provides a place for excess water during flooding events. Micro-scale rainwater control structures within the community further enhance rainwater management.

Following the typological toolbox approach, formerly segregated green spaces are interconnected to form a green network. Through micro-scale interventions within the community, the quality of green spaces is improved, and accessibility for residents to these spaces is enhanced. These efforts collectively aim to enhance ecological benefits in the community.

9.2 REFLECTION

The Limitations of Designers' Abilities

Addressing the issue of community segregation, I designed the space using Jan Gehl's twelve criteria and attempted to create safer and more open community spaces where residents can play, converse, walk, exercise, and grow food, while also improving accessibility. However, I cannot avoid the question: can designers truly solve these problems fundamentally? This reminds me of a famous Chinese TV show, Dream Home Makeover, where a renowned interior designer redesigned the layout of a small hutong house for a family of six, creating a new indoor environment. Surprisingly, a month later, the newly designed house reverted to chaos, with clothes and garbage strewn about. What caused this result? It might be the deeply ingrained behavioral and thought patterns of the people. In this design, I often wonder if everything will truly achieve the expected effect as I anticipate. I am unsure. But the good thing is, at least we are doing something to help, to improve, and to try to break the impasse.

Systematic Thinking in Design and Application of Theory

In this project, systematic thinking and the application of design theory have been very helpful. From the initial problem statement, to finding theoretical support, to practical implementation, I used the typological toolbox as a theoretical foundation and a conduit for converting theory into practical design. This allowed me to apply blue-green infrastructure to the actual site effectively, handling details on a smaller scale to achieve design objectives and ultimately answer the research question posed at the beginning. Throughout the process, I developed a methodology for refining my designs, genuinely solving problems, and making them persuasive and feasible.

Feasibility of Results

This has been a long-standing question since my undergraduate studies in landscape architecture: how to truly implement design intentions, achieve design objectives, and realize the expected design effects. (I have seen beautiful water-themed parks designed by renowned studios that, when visited, offered no enjoyment; all the water features had turned into stagnant, foul-smelling water, which was very disappointing.) As I reach this important milestone in my sixth year of studying landscape architecture, this question resurfaces in my mind. I hope my designs are thoroughly researched and practically feasible. I also foresee numerous considerations during implementation, such as collaboration with the government, financial support, cooperation with residents, and negotiations with property owners. Although these are not issues I need to consider as a student, it is good to think comprehensively.

Scope Relevance

In the context of global warming and increasingly extreme weather affecting people worldwide, with sea levels still rising, all cities, especially those with large populations, face growing urban issues such as the urban heat island effect, energy shortages, excessive rainfall, and ecological problems. Where is the answer? The answer lies within the cities themselves. I hope that constructing more efficient and rational blue-green infrastructure networks will become the solution to these problems, achievable through clever design. I hope it becomes an effective method not only for this city but also applicable to other cities, enhancing urban resilience and creating sponge cities.

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Thanks for Listening