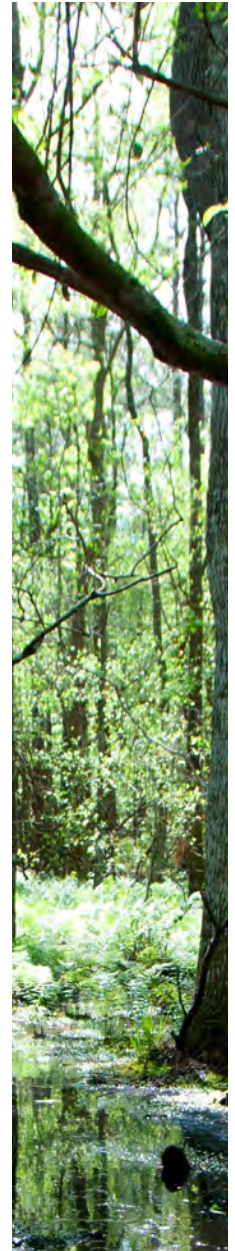


LOST & FOUND
a model for retreated landscapes



Madison L. Murray

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**LOST & FOUND:
A Model for Retreated
Landscapes**

Madison Murray
MLA Landscape Architecture, RISD

A thesis submitted in partial fulfillment of the requirements for the Master of Landscape Architecture Degree in the Department of Landscape Architecture of the Rhode Island School of Design, Providence, Rhode Island.

By: Madison Murray
Date: May 21st, 2019

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Nick DePace, Thesis committee

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I would like to take a brief moment to thank my mom, dad, and sister for all of the love and support they have given me throughout my time here at the Rhode Island School of Design. Without it, I would not be where I am, or who I am, today. I love you all, this one is for you!

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 - II. Final Reflection & Moving Forward



PREFACE

I feel as though it is crucial to structure this book in a way that takes you on the same journey I have taken through thesis, and life.

Growing up along the California coast has left me with an intense passion for environmental awareness and sustainability. I excelled in these courses throughout high school and eventually found myself taking more Environmental Science courses in college, during which I took a trip to India. There, I studied the environmental and economic effects of globalization. I remember stopping in Mumbai to witness the effects that clothing dyeing operations had on the downstream slums that used this water for everyday life. I specifically remember a little slum boy whose skin had been dyed blue by taking his morning bath in the neon waters. This experience kick started my journey into Landscape Architecture where I have continued to invest myself in issues of water quality around the globe.

Fast forward to the summer of 2018, when I began thinking about thesis topics. I was interested in looking at waste water treatment systems in Kolkata, India. However, finding accurate and current data became a tough hurdle to jump and after much deliberation, I moved my site from India to New Orleans, so I could look at similar issues through a

more localized lens. After spending a month researching water quality issues in New Orleans, I became interested in understanding post-storm resiliency strategies. However, after careful negotiations between my advisors and I, we decided that it was better to once again place my site and issues elsewhere, due to the tremendous amount of work and research being done there.

After another month of tedious research, I came across an article about post-hurricane nutrient pollution in North Carolina's Neuse River and Neuse River Estuary. The Neuse River is known as the 7th most endangered river in the United States due to industrial and agricultural operations located in the river's floodplain whose use of nitrogen and phosphorous hinders water quality. In many towns along the river, homes located in the floodplain have been evacuated and abandoned due to the constant threat of flooding. As floodwaters wash over the floodplains, it collects and carry's pollutants back into the river. Eventually, these nutrients accumulate in the estuary where their booming overproduction causes anoxic water conditions that result in mass fish and shellfish kills. With the inevitable threat of climate change worsening, future flooding will only become more frequent and worse, which could

permanently kill the entire estuary completely, along with its \$1.7 billion dollar fishing industry.

Thus, my thesis became about how to reclaim floodplains as areas to filter river water and runoff, post-hurricane, in order to mitigate the mass fish kills that happen in the Neuse River Estuary for weeks and months post storm.

This book aims to convey the story, and transition, that took place after I had settled on the final topic of post hurricane nutrient pollution in the Neuse River. What I thought was my topic became the beginning of another incredible journey.

**POST-HURRICANE NUTRIENT
POLLUTION**

NORTH CAROLINA



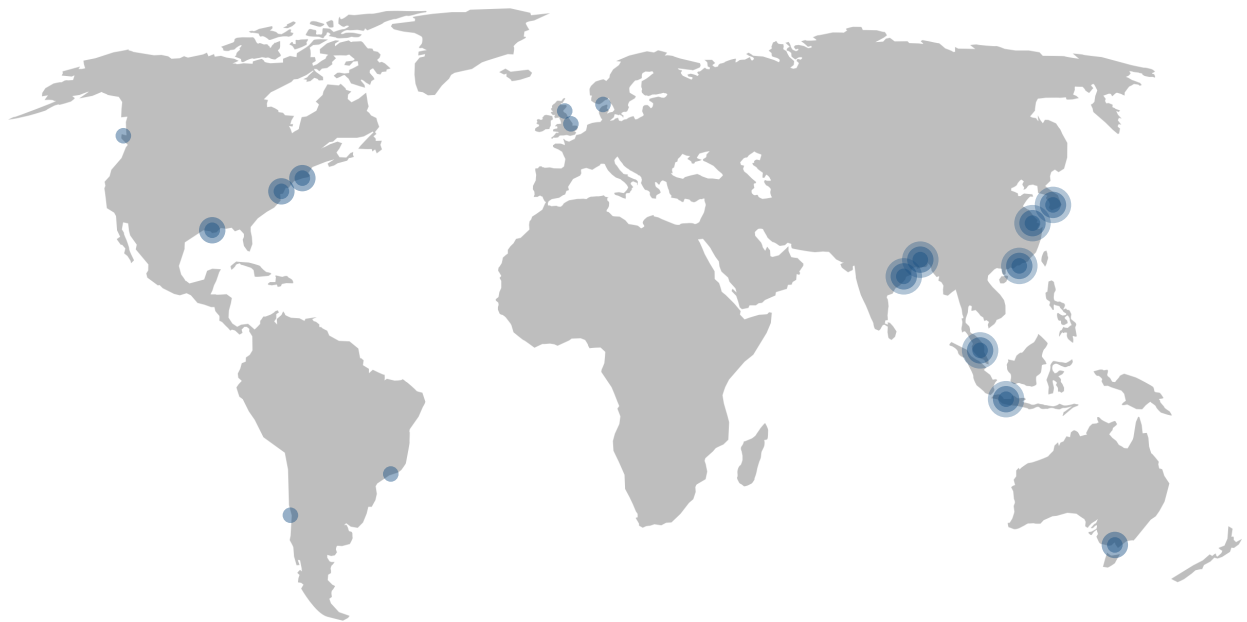
RETREATED LANDSCAPES

KINSTON, NORTH CAROLINA



PHASE 1

**POST-HURRICANE NUTRIENT
POLLUTION IN THE NEUSE RIVER**



I: GLOBAL INTRODUCTION

All over globe, nutrient pollution and increasing water temperatures threaten the health of water bodies and ecosystems. According to a study done by the EPA, “Sea surface temperature increased during the 20th century,” and “[has] continued to rise. From 1901 through 2015, temperature rose at an average rate of 0.13°F per decade,”¹ and show no signs of stopping. Moreover, because there are “increasingly more people living in coastal areas, there are more nutrients,” specifically nitrogen and phosphorus, “entering coastal waters from wastewater treatment facilities, runoff from land in urban areas during rains, and from farming,” located in and along floodplains.² The deadly combination of increasing water temperatures and nutrient pollution has wreaked havoc on the some of the worlds most important ecosystems: estuaries.

Estuaries, and their surrounding wetlands, are bodies of water that are usually found where rivers meet the sea. They are home to unique plant and animal communities that have adapted to brackish water—a mixture of fresh water draining from the land and salty seawater. They are among the most productive ecosystems in the world and many animals rely on estuaries for food, places to breed, and migration stopovers.³ However, and not surprisingly, “of the 32 largest cities in the world, 22

are located on estuaries. Human activities and our use of pollutants, “has led to a decline in the health of estuaries, making them one of the most threatened ecosystems on Earth.”⁴

So where do we go from here? If we acknowledge that Nitrogen and Phosphorous from agricultural operations, fertilizers, and pet waste start in cities and make their way down river to estuaries, where is the middle ground upon which we can tackle this issue? One answer is floodplains.

Floodplains, which are generally flat areas of land next to a river or stream, stretch from the banks of the river to the outer edges of the valley. During flooding events, rivers swell and overflow into these areas, stopping at the edges of the valley they occupy, and runoff from cities and developed areas also flows downhill to these zones. For decades, humans have built on, and used floodplains for our benefit because floods are usually seasonal, “and can be predicted months ahead of time. This predictability can make flood plains ideal locations to develop urban areas. The relatively level land can be developed either as agricultural fields or sites for habitation or business.”⁵ However, when these areas become inundated, any pollutants present are swept into the river and developments in these areas are often destroyed.



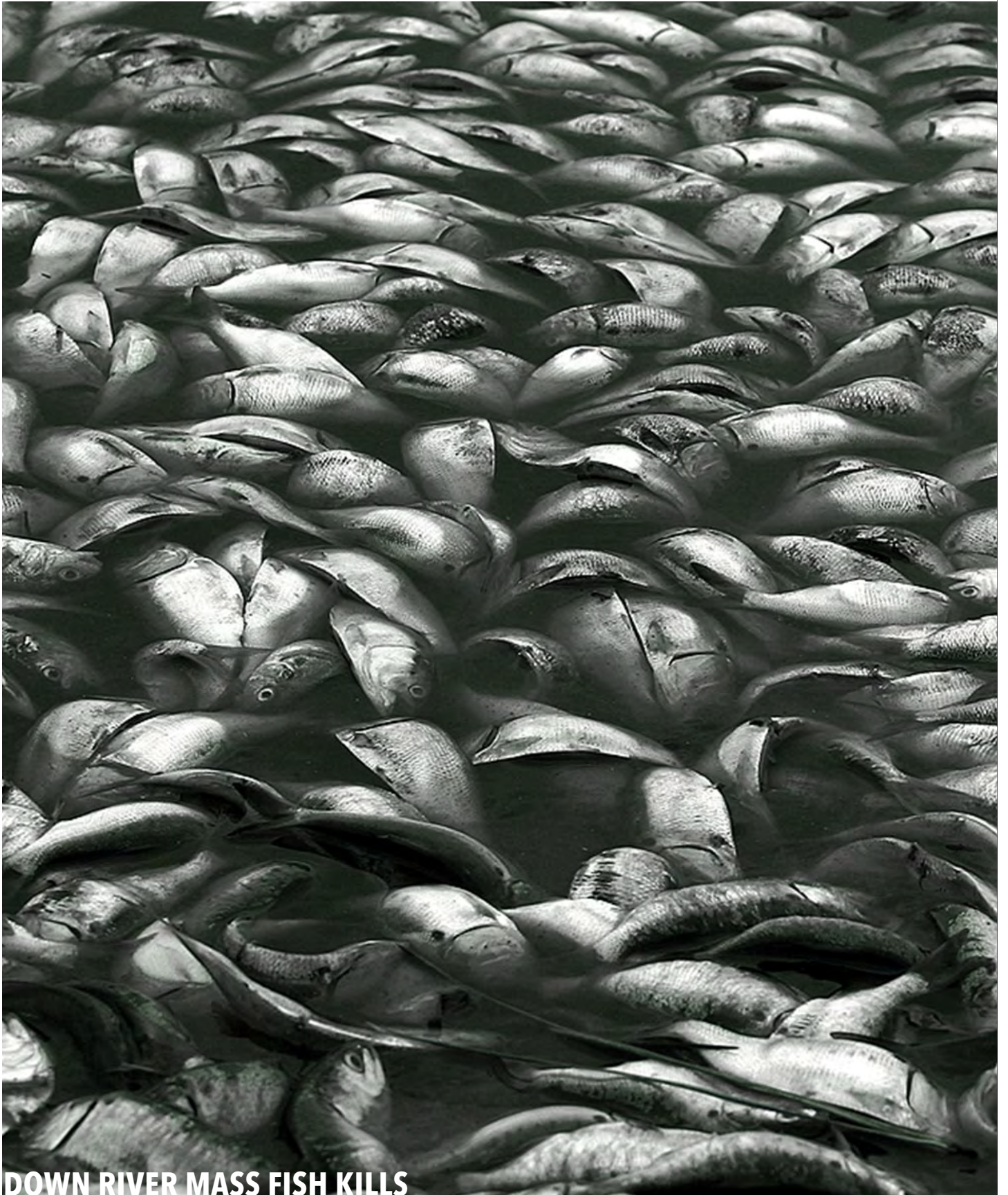
CITIES & RUNOFF



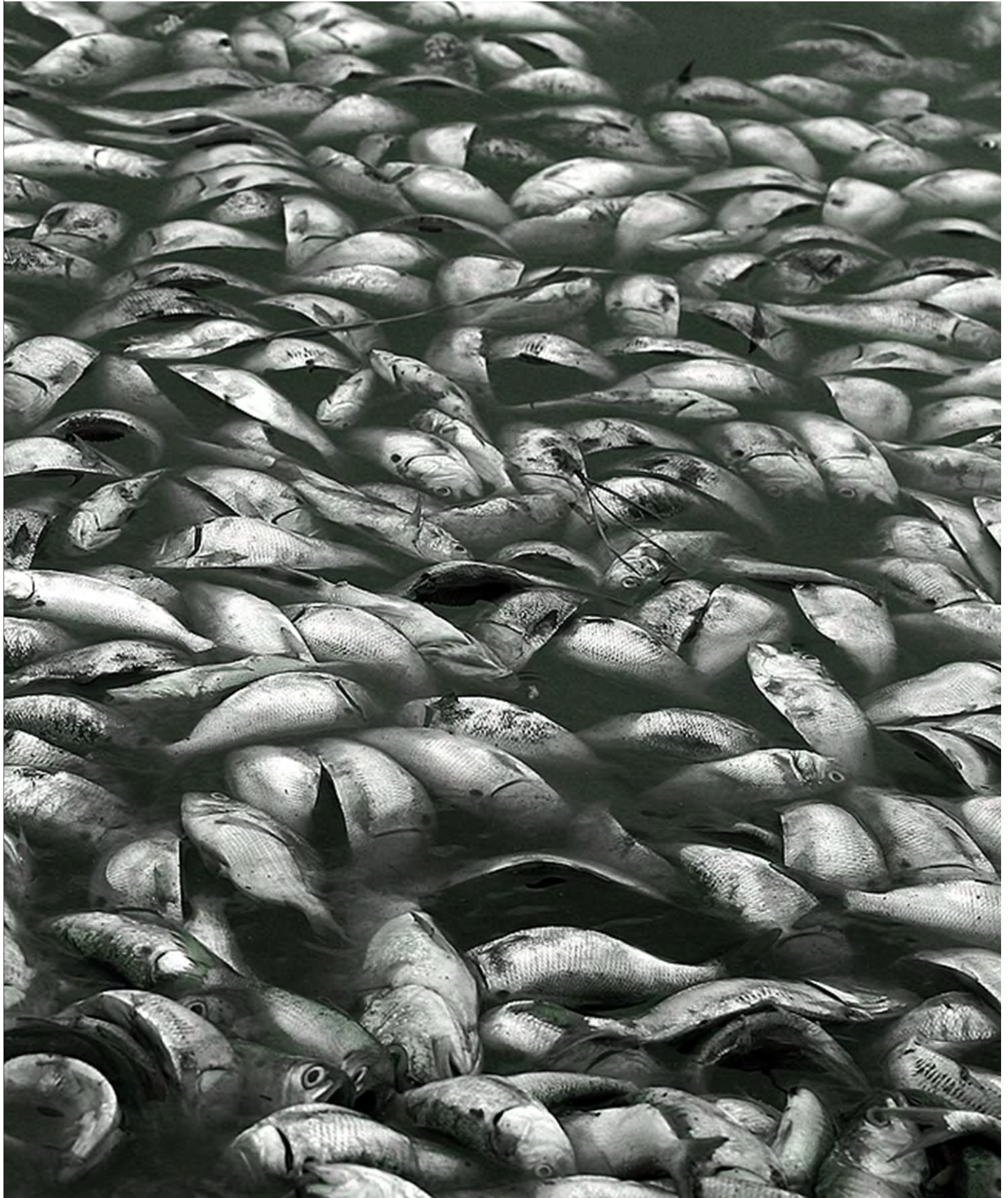


FLOODPLAINS & AGRICULTURE





DOWN RIVER MASS FISH KILLS



How can upriver floodplains become a new ecotone, between rivers and urban areas, that help mitigate the effects of post-rainfall nutrient pollution that threaten the world's most crucial estuaries?

How can Kinston's 'retreated landscape' become a new ecotone, between the river and city, that mitigates flooding and filters pollutants from floodwaters and runoff before it enters the Neuse and travels down river?

How can Kinston's 'retreated landscape' become a new form of reclaimed floodplain that gives back cultural significance and use to the communities who lost them? How can design honor what/ who was there, what/ who is there now, and what/who will be there in the future?

II: CHOOSING SITE

Although fish kills happen all over the world, in the past two decades North Carolina's Neuse River Estuary⁶ has seen an tremendous increase in algal blooms and fish kills. The Neuse River, which feeds into the NRE, flows south east for about 275 miles, and is contained within the state of North Carolina; its watershed measures roughly 6,235 square miles.⁷ More than four million people in North Carolina get their drinking water from the river and it plays a crucial role in North Carolinas \$1.7 billion dollar seafood industry, "which [accounts] for more than 90 percent of the commercial seafood species caught in North Carolina."⁸ Within the next 20 years, it is estimated that over 2 million people will move to the coast along the NRE and Pamlico Sound.

The Neuse River and its floodplains and littered with development, agriculture, and livestock operations. In fact, "North Carolina is the second leading producer of hogs and the third leading producer of poultry in the country. Prior to slaughter, these animals are predominantly raised in CAFOs to make production more economical. Much of the animal production in North Carolina occurs in the Coastal Plain, where shallow water tables and frequent precipitation, including extreme weather

events, increase the chances of waste getting into surface and groundwater supplies. The hundreds of millions of gallons of wet animal waste from these operations are held in open lagoons near the CAFOs and dry waste is piled in nearby fields. This waste contains bacteria, pathogens, concentrated levels of nutrients and residual antibiotics that if released into nearby rivers and streams would cause significant contamination.”⁸ The Neuse River has endured two 500-year floods from hurricanes in less than 20 years, during which dozens of animal waste lagoons within the 100-year floodplain were flooded or breached, discharging millions of gallons of raw animal waste directly into the rivers. In 2016, flooding caused by Hurricane Matthew overwhelmed 15 CAFO waste lagoons, spilling waste into public waterways. These lagoons were located in the floodplain and have yet to be moved out.⁸ American Rivers has since listed the Neuse River as “the seventh most endangered river in the United States.”⁹ The chronic threat of fish kills and anoxic conditions on the NRE could lead to its death.

To investigate my topic, I needed to find a specific location in which to site my project. After intense site explorations I came across Kinston, a town of 20,509, located in the coastal plains region

along the Neuse River approximately 62 miles from the NRE. The town played a vital role in the Civil War and was home to a number of industrial mills that grew along the river, which have since moved overseas and left the local economy in a dwindling, sluggish state. Over the past 30 years Kinston has also been heavily impacted by various flood events, such as Hurricane Floyd in 1999 which was deemed ‘The Flood of the Century.’ The perpetual threat of flooding and rebuilding has led the town to initiate a series of buyouts to relocate residents away from the floodplains to prevent future losses. Although this strategy has been proven, residents struggle with a lingering sense of loss for the old, removed neighborhoods, such as Lincoln City, and a disconnect from the river and its floodplains.

I have decided to call late towns, such as Lincoln City, ‘Retreated Landscapes’ and explore them further.





PALIMPSESTSOUS LANDSCAPES : KINSTON, N.C.

Pictured is an aerial view of Kinston, NC, and its expansive floodplains that are littered with traces of the past. Kinston has experienced a series of severe rainfall and storm events that have left the city in disrepair. After more than 75 percent of the county's homes were flooded or damaged, the city curated a comprehensive approach to improving future resilience by relocating homes located in and along the floodplain. This strategy has lessened the cost associated with post-storm clean up ever since, but has left Kinston with a longing for the old neighborhoods, such as Lincoln City, and the need for program opportunities in their place to fill the void.

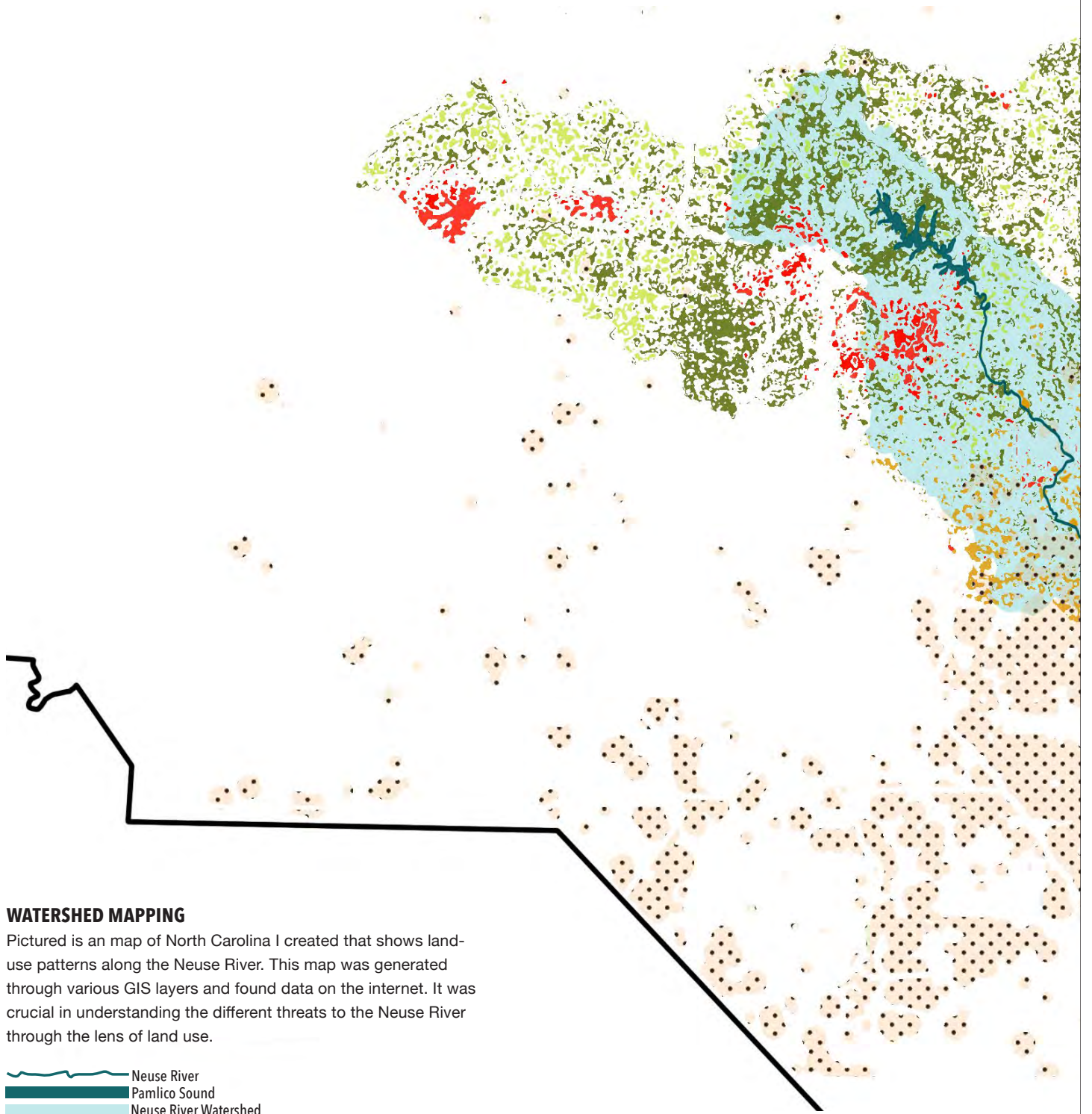
How can upriver floodplains become a new ecotone, between rivers and urban areas, that help mitigate the effects of post-rainfall nutrient pollution that threaten the world's most crucial estuaries?

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How can Kinston's retreated landscape become a new form of reclaimed floodplain that gives back cultural significance and use to the communities who lost them? How can design honor what/ who was there, what/ who is there now, and what/ who will be there in the future?











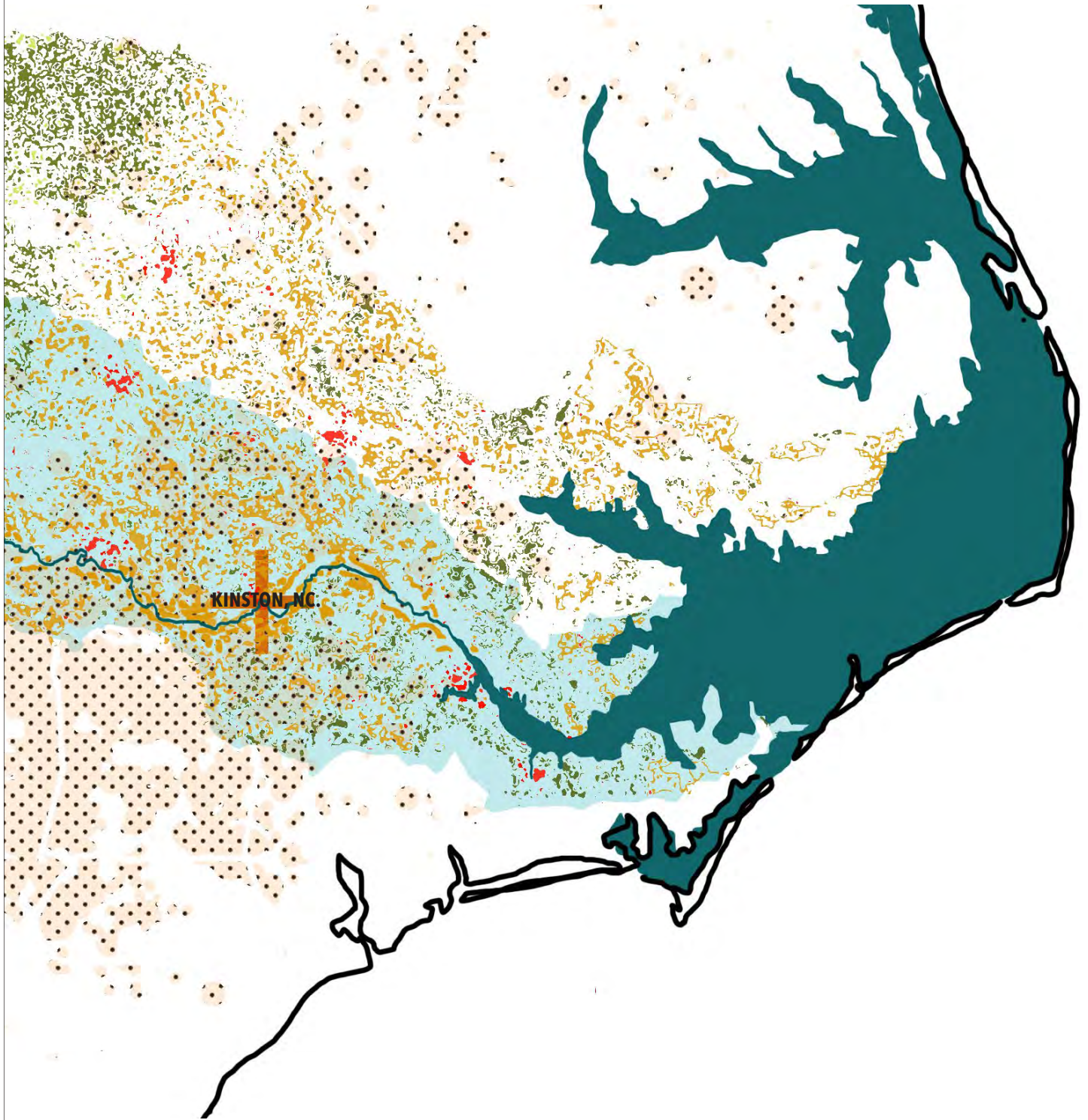
SITE ANALYSIS

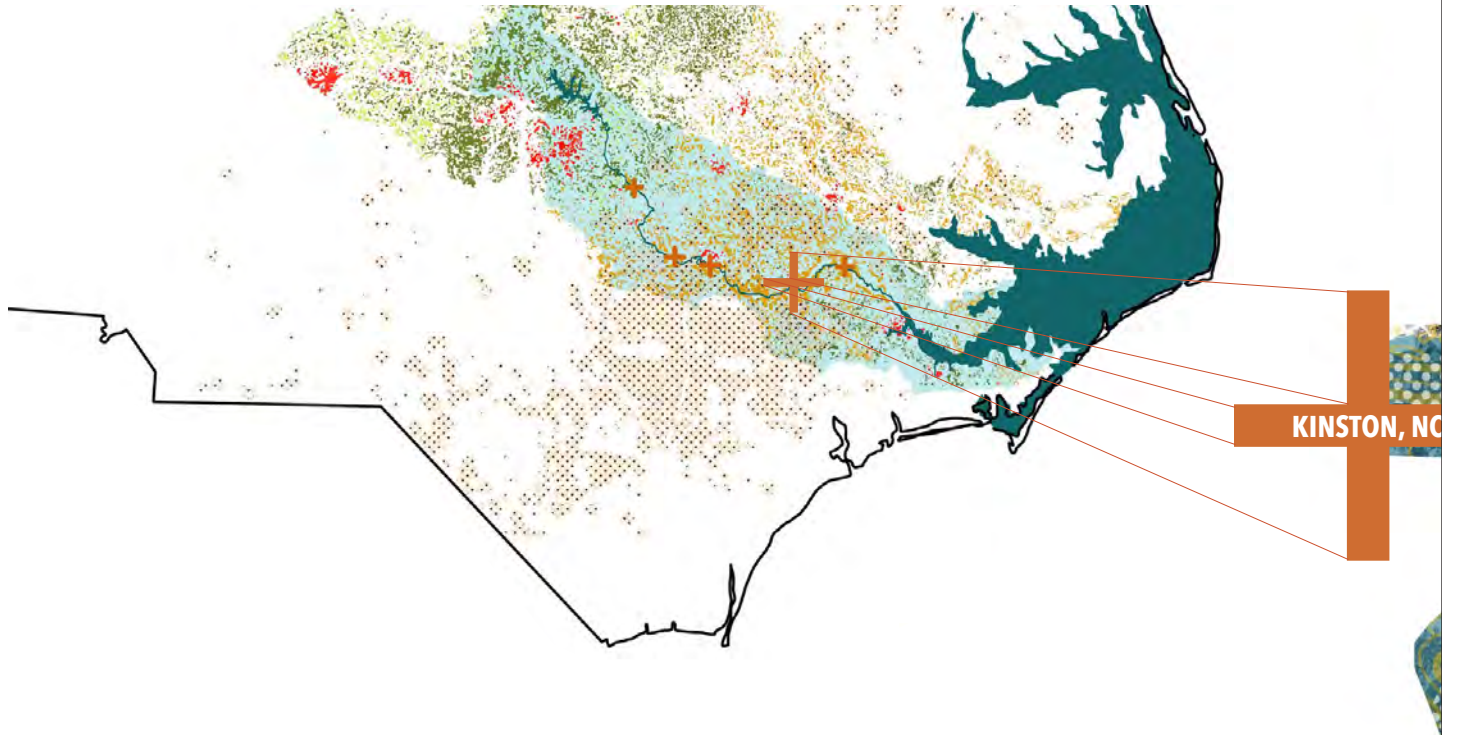


WATERSHED MAPPING

Pictured is an map of North Carolina I created that shows land-use patterns along the Neuse River. This map was generated through various GIS layers and found data on the internet. It was crucial in understanding the different threats to the Neuse River through the lens of land use.

-  Neuse River
-  Pamlico Sound
-  Neuse River Watershed
-  Livestock Farming
-  Agriculture
-  Development
-  Pasture
-  Forest





KINSTON SITE ANALYSIS

Pictured is Kinston in relation to the rest of North Carolina. Various layers of site analysis overlay key components that help to understand the relationship between the city and the river. These layers include:

- Topography
- Buyouts
- Floodplain Boundaries
- Wetland Locations
- Watershed Boundary



TOPOGRAPHY



BUY-OUTS



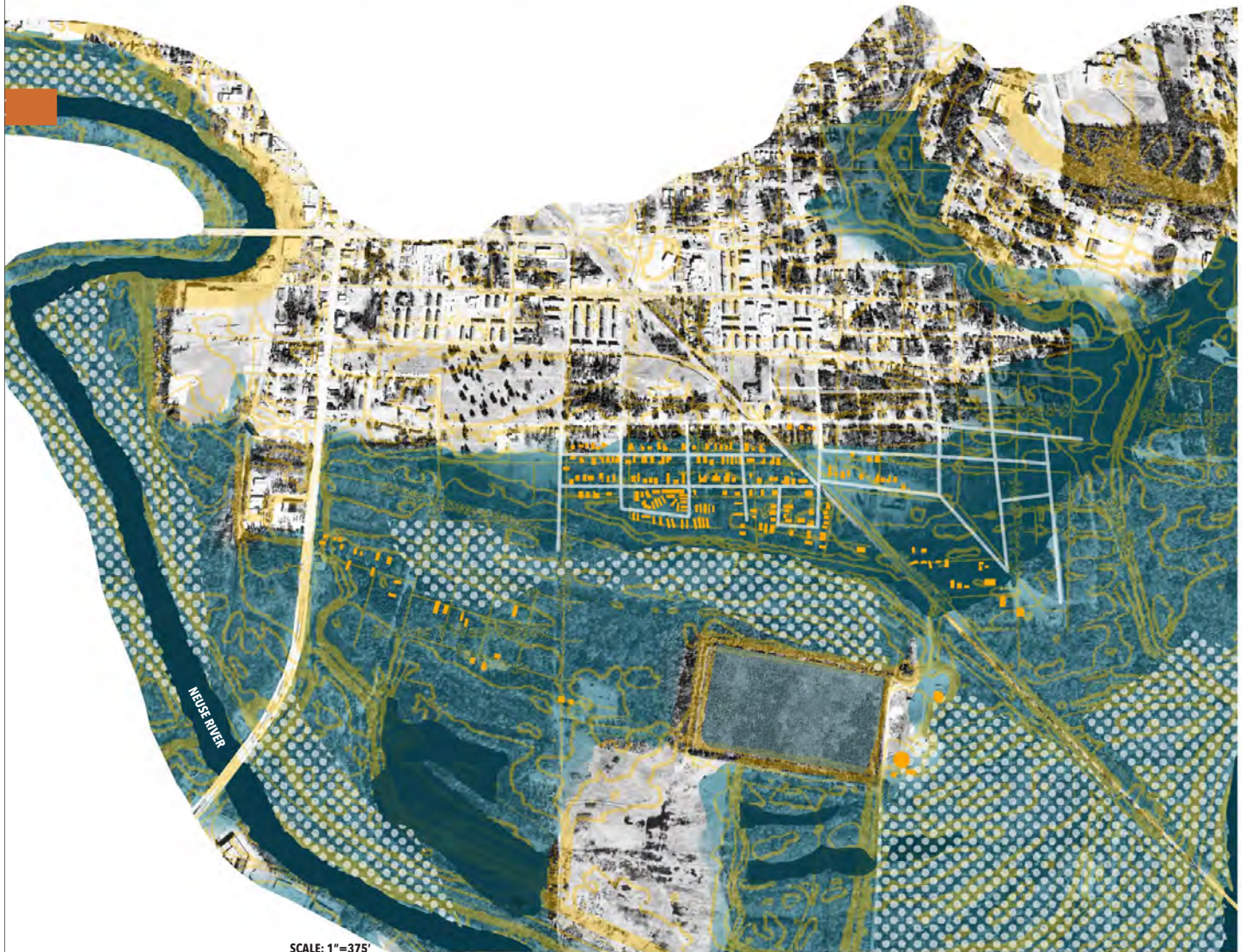
FLOODPLAIN



WETLANDS



WATERSHED



SCALE: 1"=375'



TOPOGRAPHY



BUYOUTS



WATER



WETLANDS

HURRICANES x HEAVY RAIN x BUYOUTS





RACE

- African American (64.7%)
- White (29.0%)
- Spanish (2.9%)
- Other (2.0%)
- Asian (1.4%)



EDUCATION

- High School (80.5%)
- College (16.4%)
- Attending College (5.3%)



INCOME x POVERTY

AVG: \$29,927
30% Poverty Rate



POPULATION

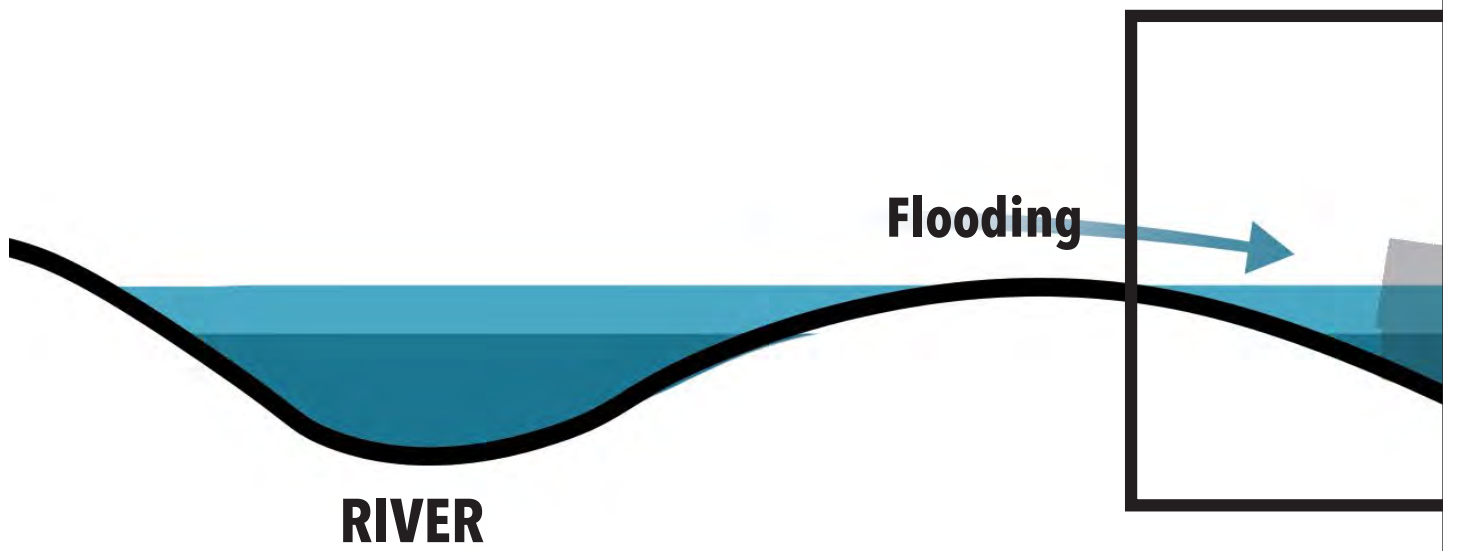
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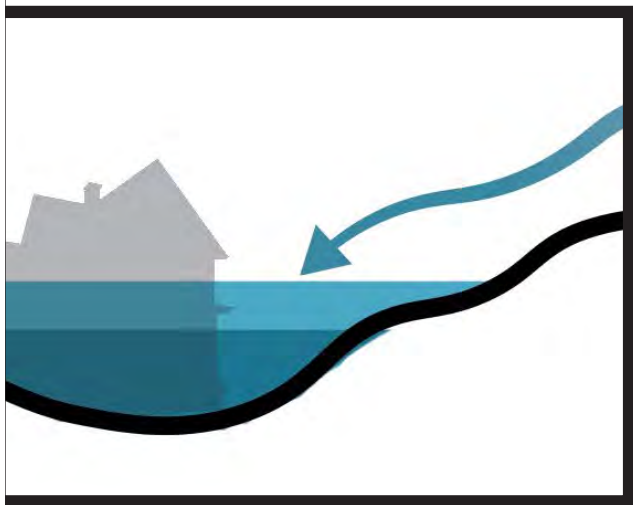


SITE DESIGN
+
REFLECTION

INITIAL DESIGN IDEAS

During this phase I was interested in combating down-river water quality issues by providing a double jointed approach. I aimed to use the floodplain and the retreated landscape of Lincoln City to filter floodwaters, as well as runoff coming from the city. In the following pages you will see my attempt to accomplish both of these measures through a proposed design for the site.





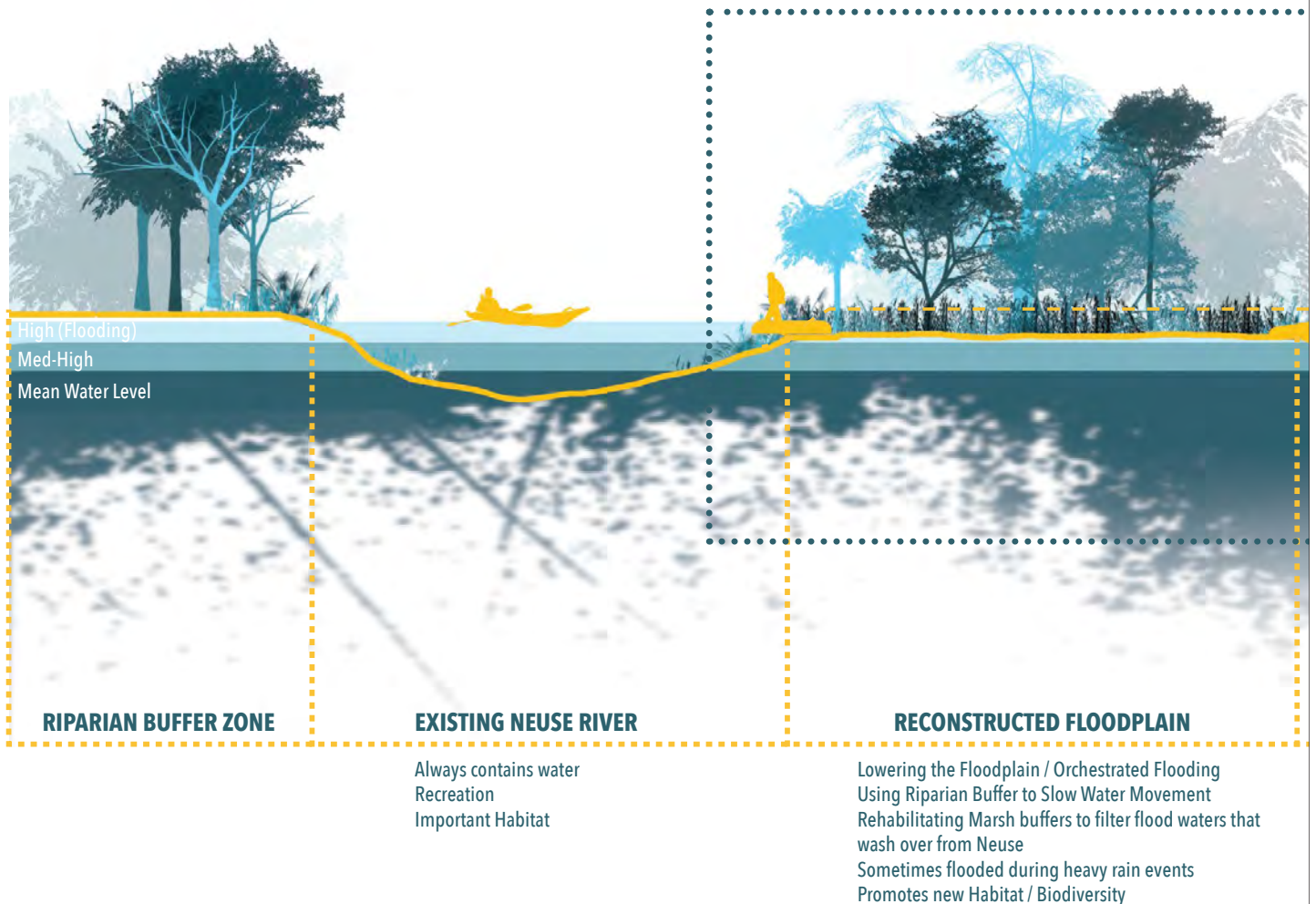
Runoff



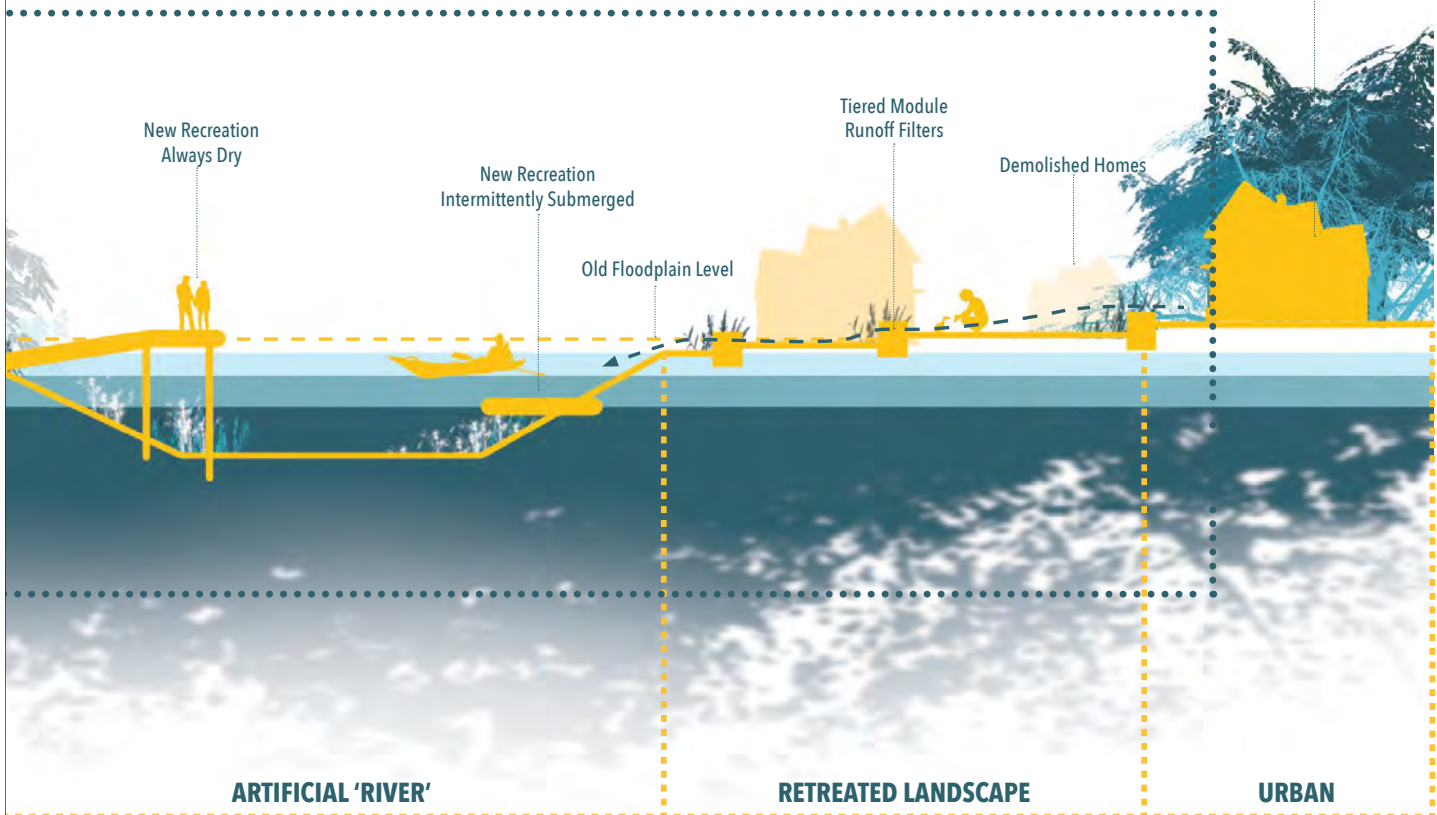
URBAN

Using 'retreated landscapes' as a place to create a new ecotone between rivers and communities...

- 1: Giving the river room to flood** while also buffering, absorbing, and filtering flood waters (Nitrogen / Phosphorous)
 - River Widening
 - Channelizing
 - Lowering the Floodplain
- 2: Filtering Agricultural and Urban runoff from Kinston** before it enters the river system (Nitrogen / Phosphorous)
 - Using phyto-remediation techniques
- 3: Providing new forms of social / recreational access** by curating a new relationship with water and flooded landscapes
- 4: Providing a new framework for retreated landscapes** as they become increasingly common with more frequent flooding



RETREATED LANDSCAPE



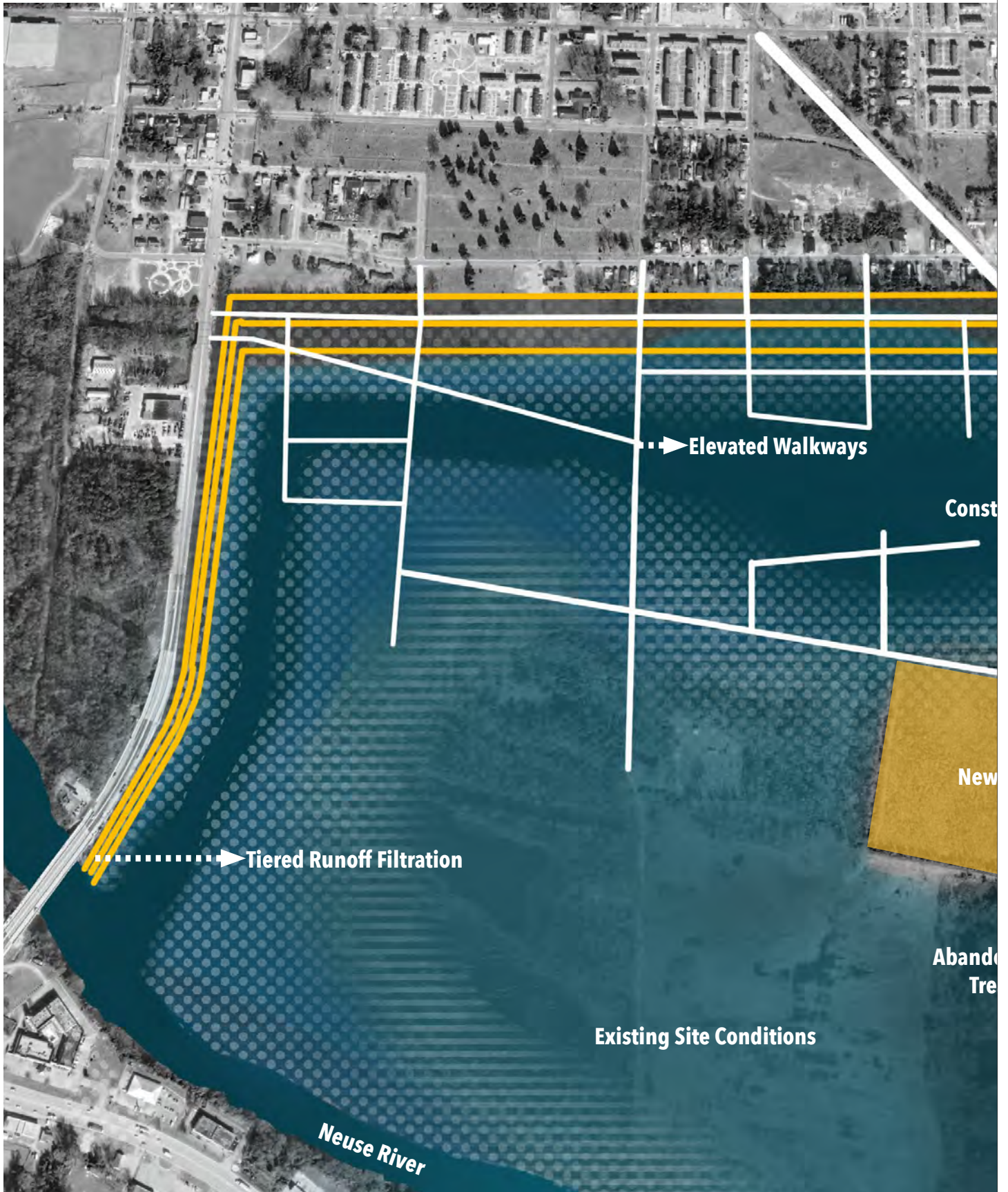
ARTIFICIAL 'RIVER'

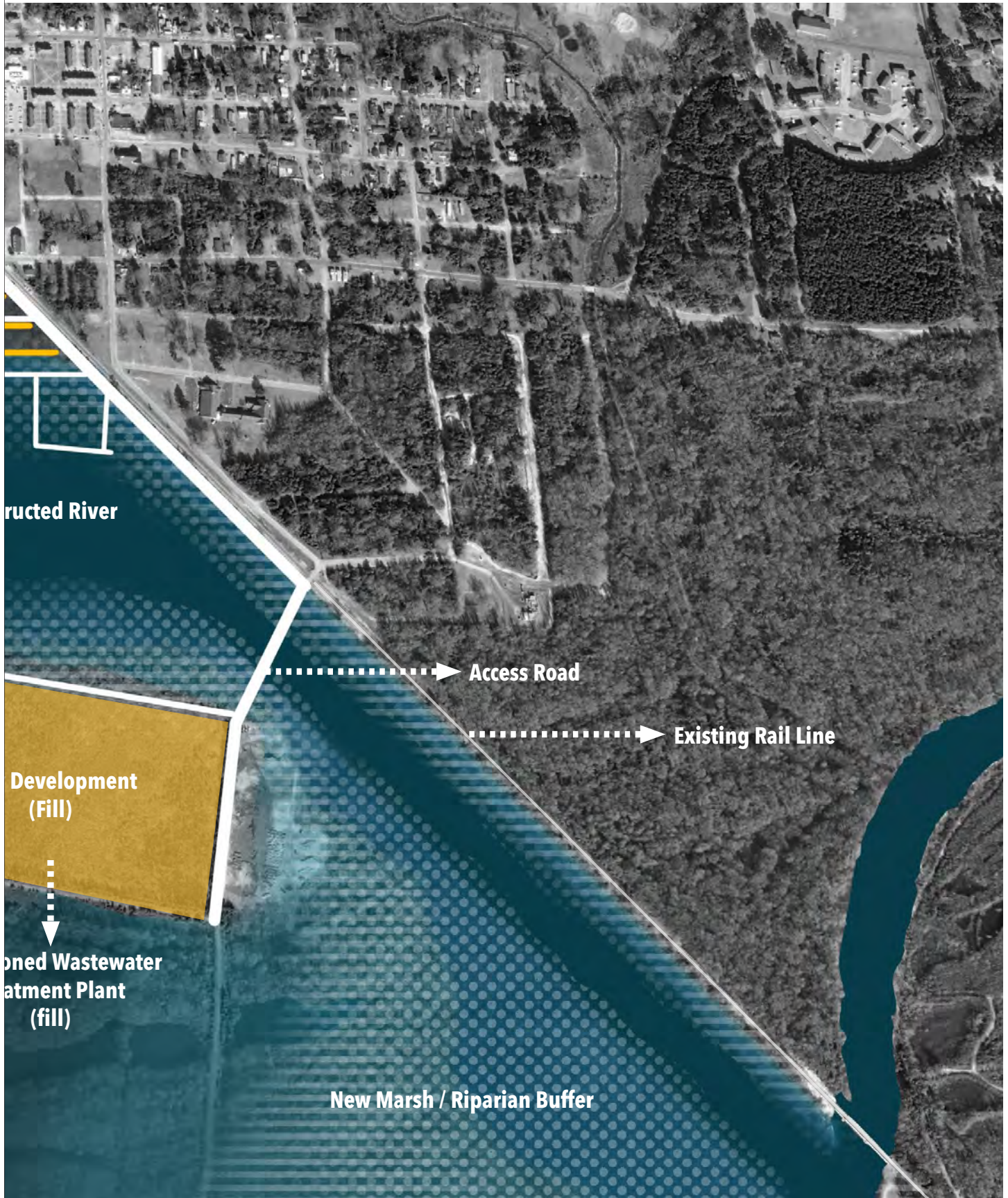
Capturing Overflow from Heavy Rain events
 Marsh Habitat filters water before it returns to River
 Promotes new forms of Social and Recreational Use and Access
 Water Levels Change offering different types of recreation
 Promotes new Habitat / Biodiversity

RETREATED LANDSCAPE

'Step-down' Tiers filter stormwater runoff from Kinston before entering new Artificial River
 Provides new forms of social and recreational access
 Promotes new Habitat / Biodiversity

URBAN



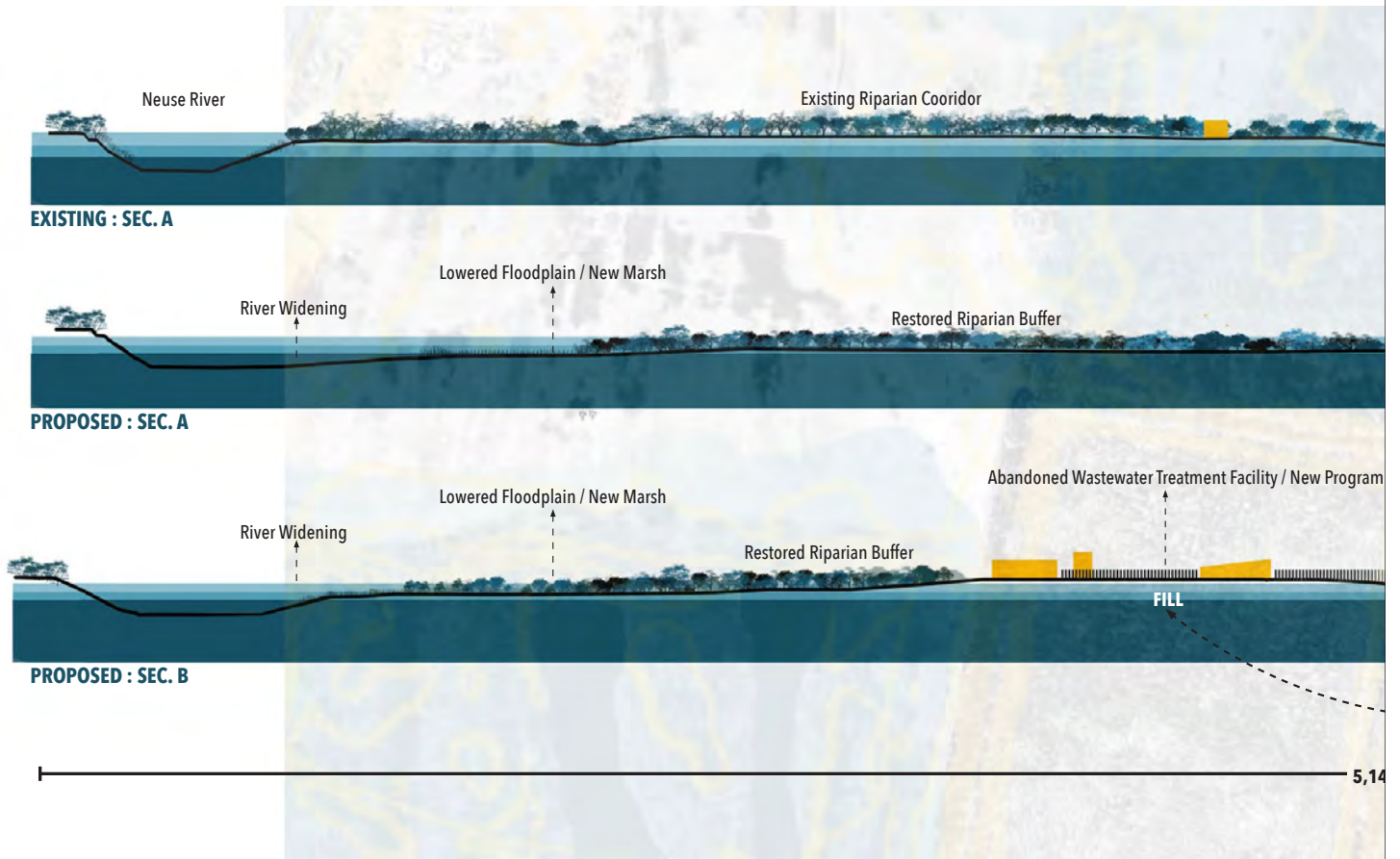


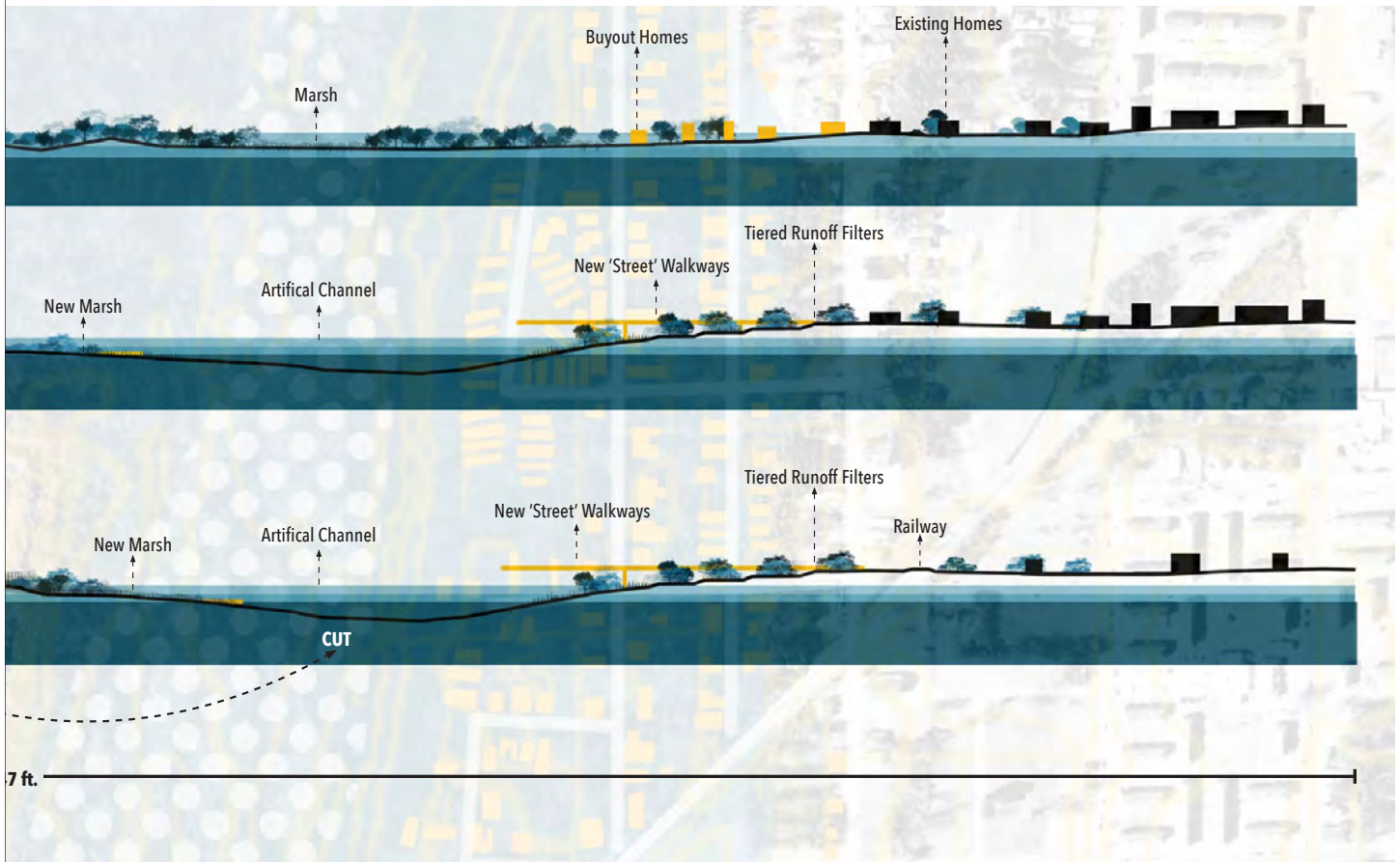




FLOODED BLOCKS

Above was one of the first conceptual renderings I did. I explored how the street grid could become channels for floodwaters, and how the blocks could transform into different productive landscapes with new programmatic uses for the community.





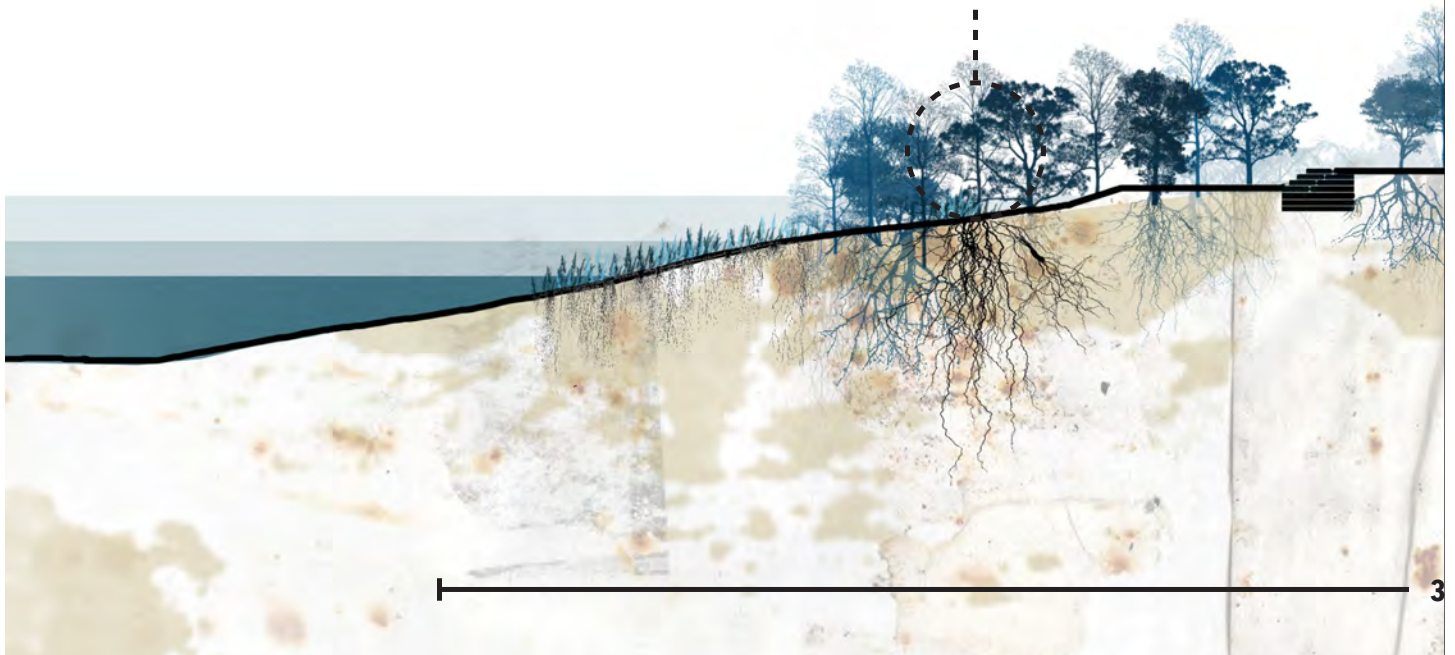
SECTIONS

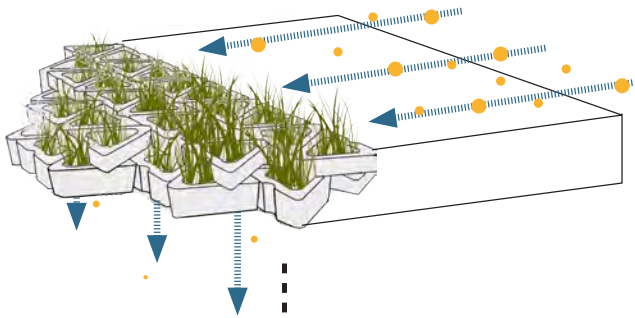
These sections were an attempt at understanding the existing site and its relationship to the river. I began exploring how different elements of my design would alter flood patterns.

RUNOFF FILTRATION STRATEGY

POPLAR, WILLOW, CYPRESS PLANTINGS

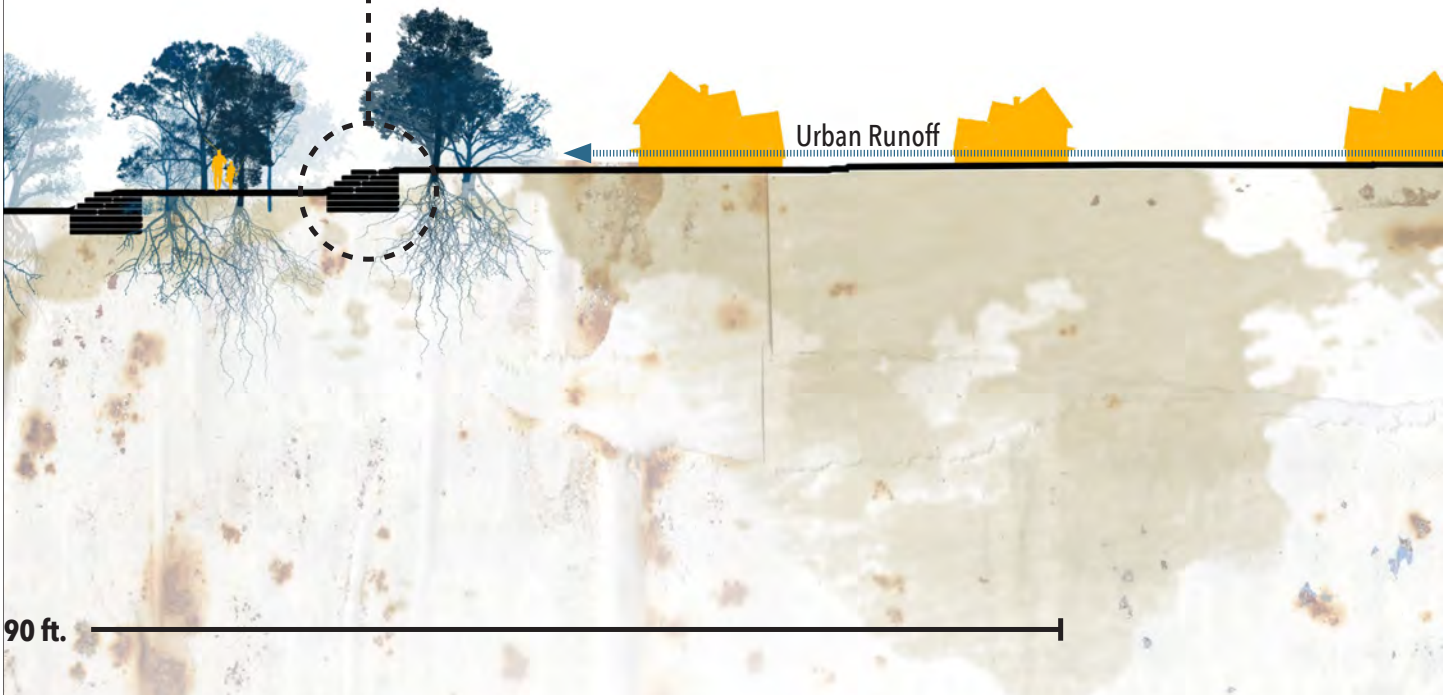
- Filter Nitrogen and Phosphorous from water / soils
- Stabilize soils / handle flooding
- Fast growing
- Economically Valuable





TIERED / MODULAR EDGE

- Stabilizes edge / plant growth
- Plants used here filter Nitrogen and Phosphorous from runoff
- Allows for runoff to slow down / be absorbed before reaching water

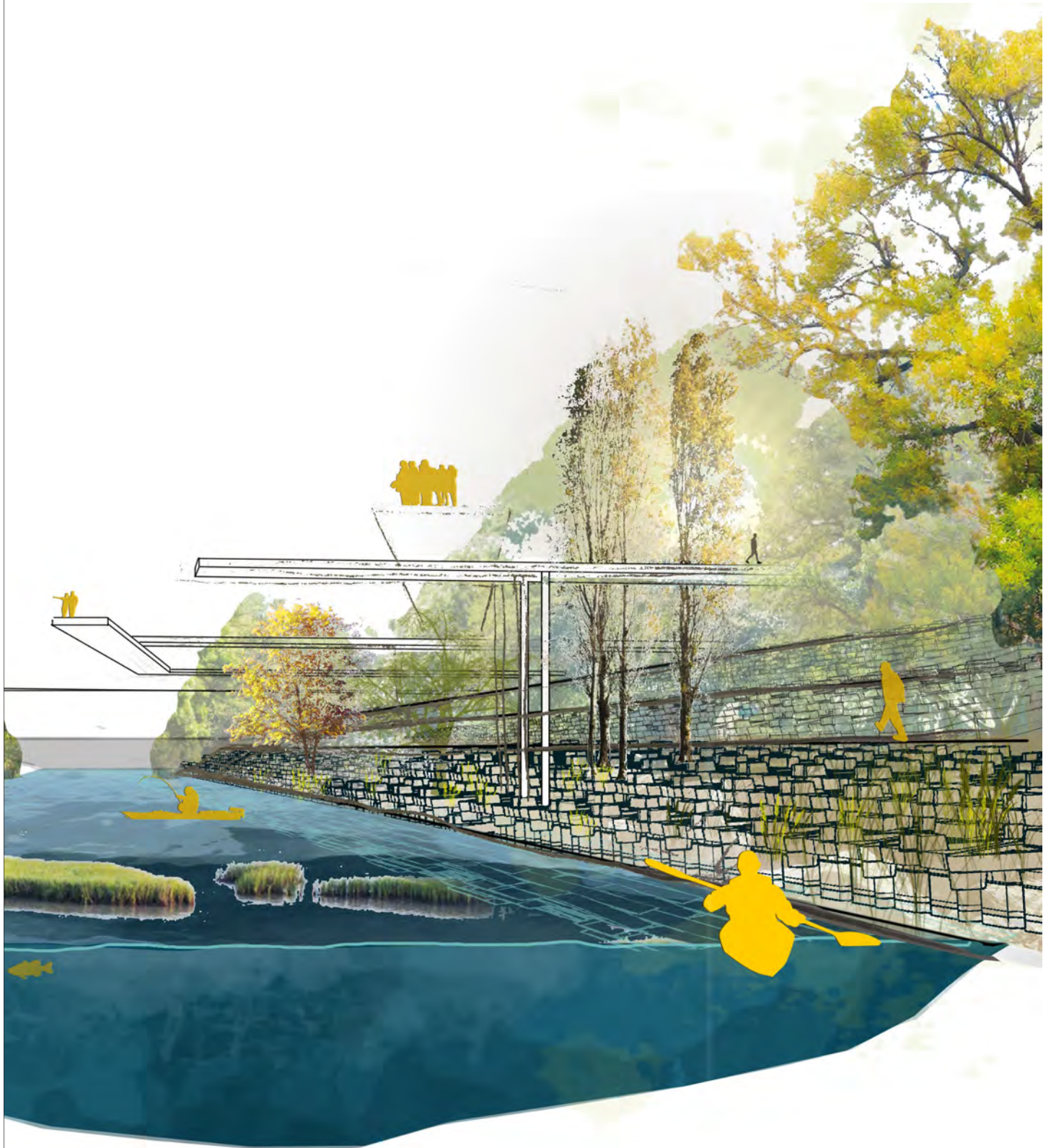


90 ft.



NON-FLOODED

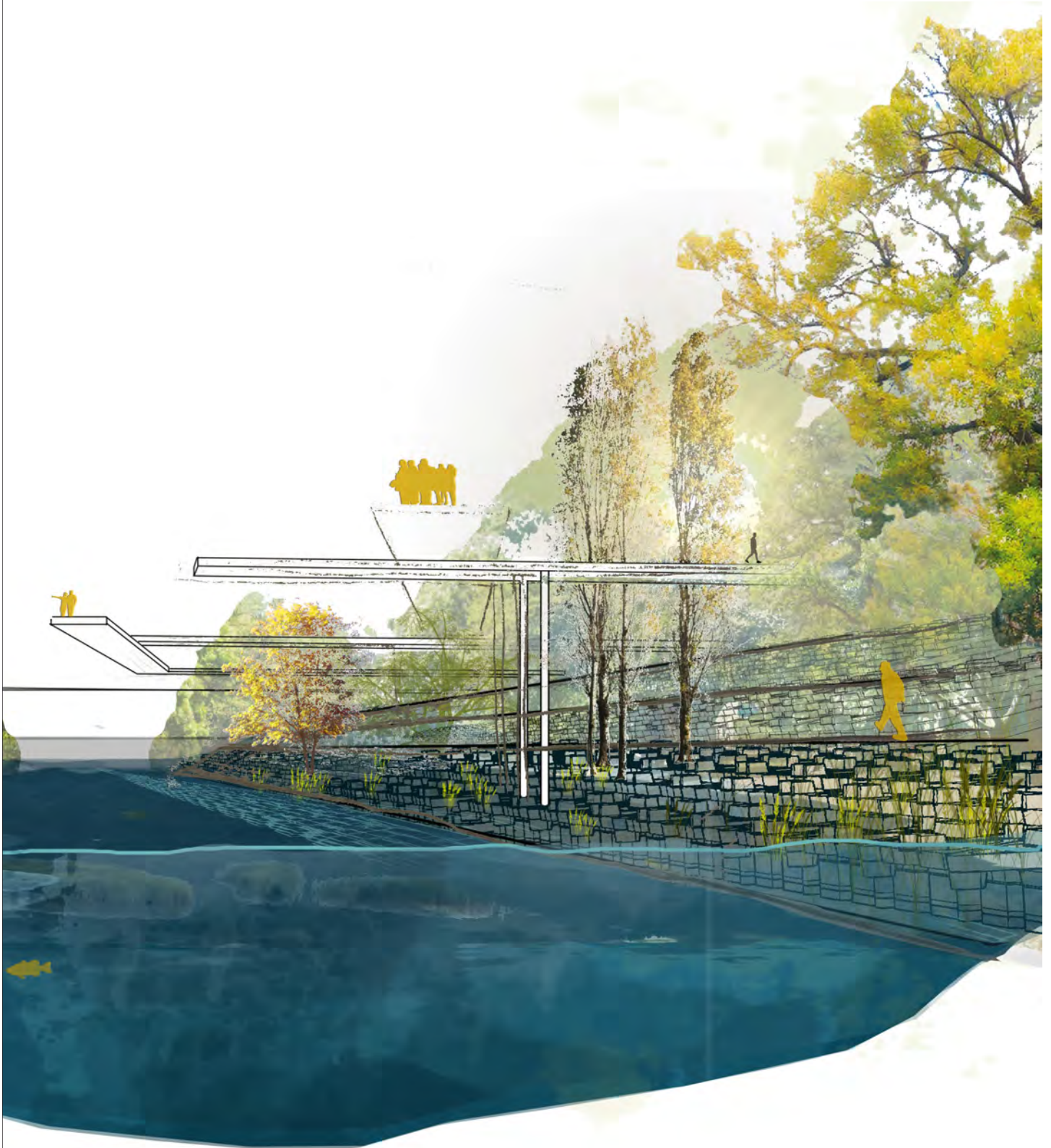
Above is a view of what the tiered modules meeting the artificial river would look like. Elevated walkways floating above the landscape allude to the street grid that was once there. During non-flooding events, this area promotes new forms of recreation for the residents of Kinston such as pathway networks, fishing, and kayaking.





FLOODED

Above is a view of what the tiered modules meeting the artificial river would look like. Elevated walkways floating above the landscape allude to the street grid that was once there. During flooding events, this area promotes holds and filters excess flood water as well as runoff coming from the city. The elevated walkways remain usable during this time.



PHASE ONE REFLECTION

During the phase one review critics provided me with a wealth of knowledge and feedback.

First and foremost, my design was described as being 'too muscular.' It did not reflect the community that was there, or the one that is there now, most of whom are predominately low-income, African-Americans. One critic further noted that a move 'this big' would turn the entire site into an eco-park, surely gentrifying the surrounding, vulnerable community. Furthermore, it lacked any and all cultural significance that the site and community had to offer. Therefore, I was tasked with intertwining ecologic and cultural frameworks together into a design that would benefit both.

The also critics left me with a few questions:

- 1: How could I begin to think about systems and how they were working with one another?
- 2: How could I include the sense of loss for the landscape into the design?
- 3: How large should my intervention be?
- 4: How can I reuse the existing grid infrastructure?

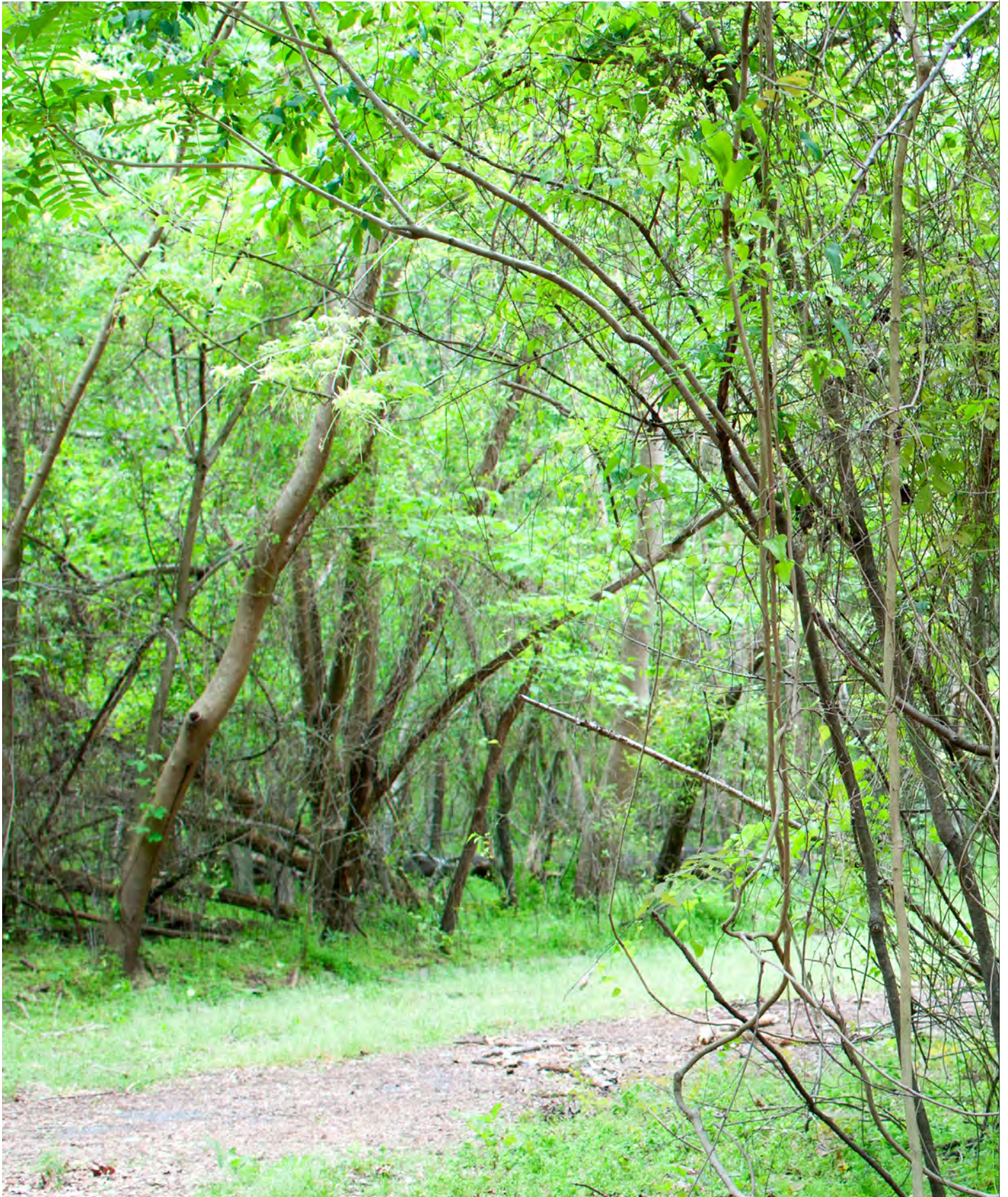
These ideas and questions are what pushed me into the next, and final, phase of my thesis.



PHASE 2 SITE VISIT

SITE VISIT

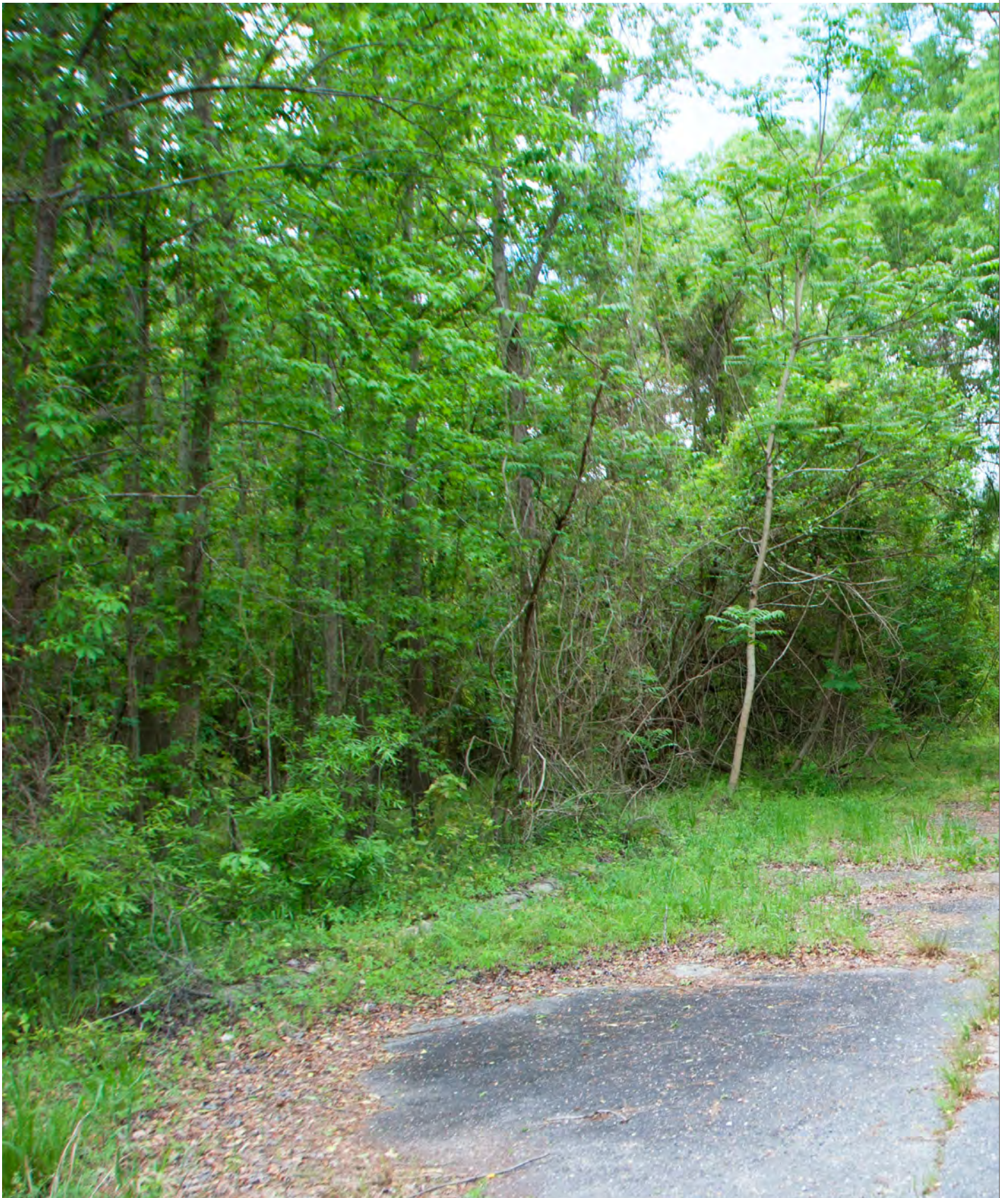
My site visit to Kinston was a crucial turning point in my thesis. I was able to experience the site for myself and talk with the local community members who were nice enough to lend me their time. I took careful notes of their stories, and paid close attention to the existing site and all of the meaning and memory it showcases. This next section is dedicated to portraying the powerful nature of the site. It was pristine and as sunshine rained down between dense layers of overgrowth, the sound of songbirds and insects filled the air. Stoops and stop signs were hidden under vines while storm drains and curbs camouflaged with wildflowers and mosses. The pavement has begun to break apart as plants reclaim what was once nature and untouched. In 50 years time, I can only imagine that all of the pavement will have eroded away and the site will look as it once had before altered by human hands.

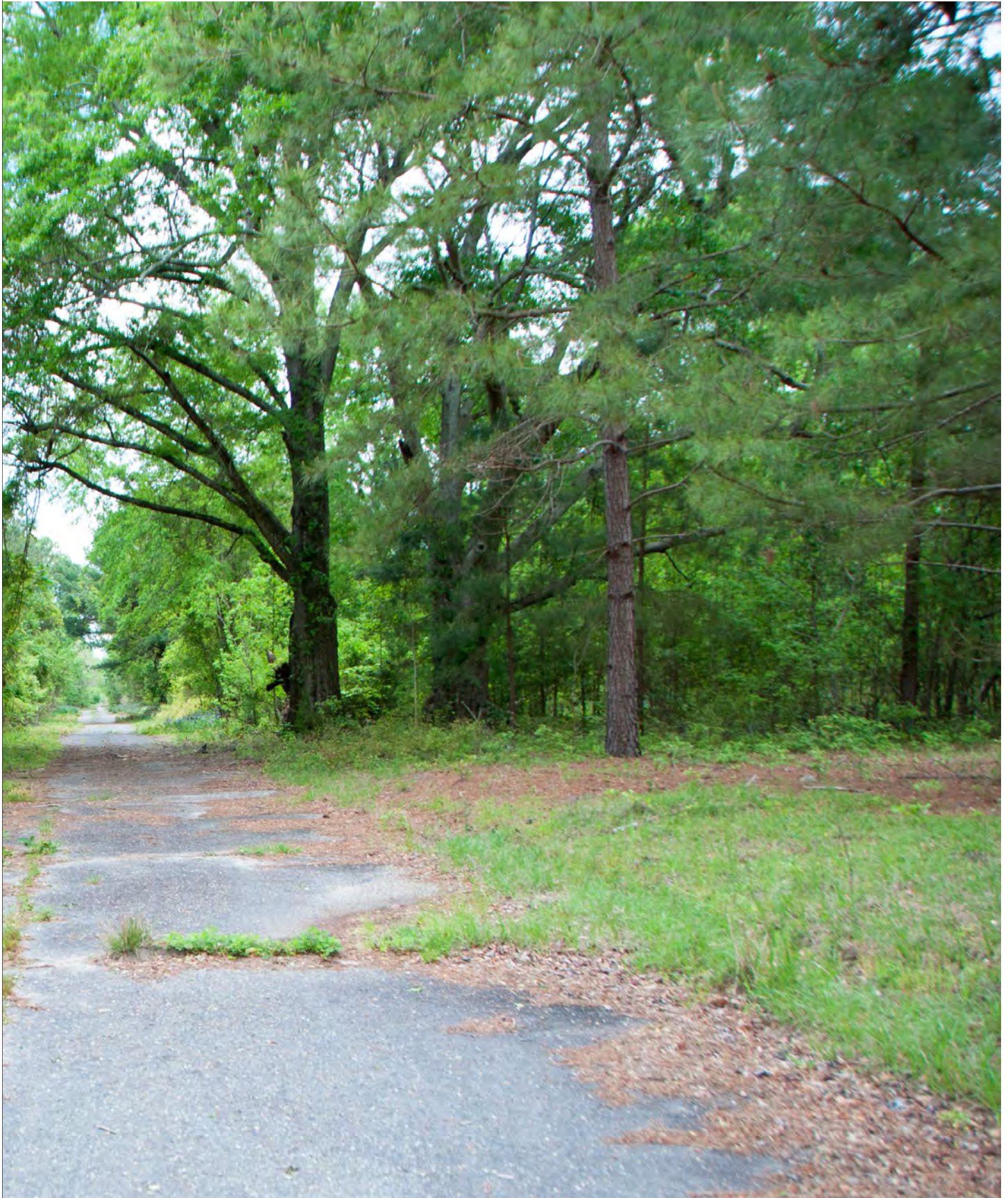


























FINAL SITE DESIGN

+

REFLECTION

I: PHASE 2 INTRODUCTION & DESIGN

After my site visit, my thesis became much more focused on meaning and memory. I aimed to design a place that would transform the site from one of decay and loss, to rebirth and regrowth, honoring what the site has become after the community retreated back in 2005.

After talking with the local community and hearing their needs and desires for the site, I realized that they were not needing water treatment, but water as a form of treatment to combat their sense of loss and nostalgia for the old neighborhood. One resident noted that they come together once a year for a large reunion. The act of retreating from this landscape has made the community stronger.

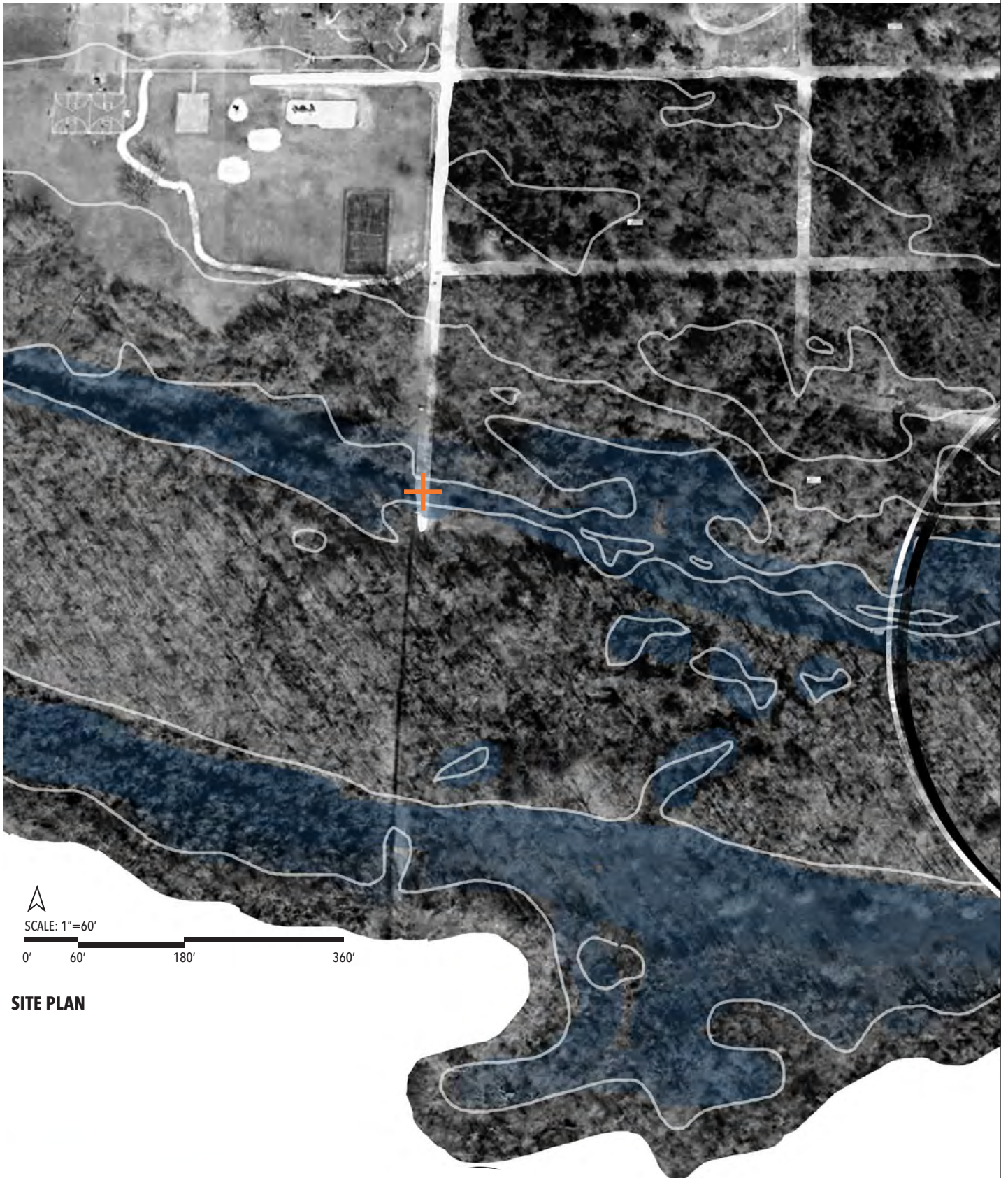
Thus, this final phase of design was driven by trying to **honor who was there, who is there now, and who will be there, as well as what was there, what is there now, and what will be there in the future. I used design to pull the community back out into the landscape rather than retreating from it as they had once done so they could curate new relationships and rituals with the retreated land.**

I used 5 main design strategies to accomplish this goal: Stream Revival, Looking In, Water Pavilion, Garden of Maintenance, and Stoops and Stones.

How can upriver floodplains become a new ecotone, between rivers and urban areas, that help mitigate the effects of post-rainfall nutrient pollution that threaten the world's most crucial estuaries?

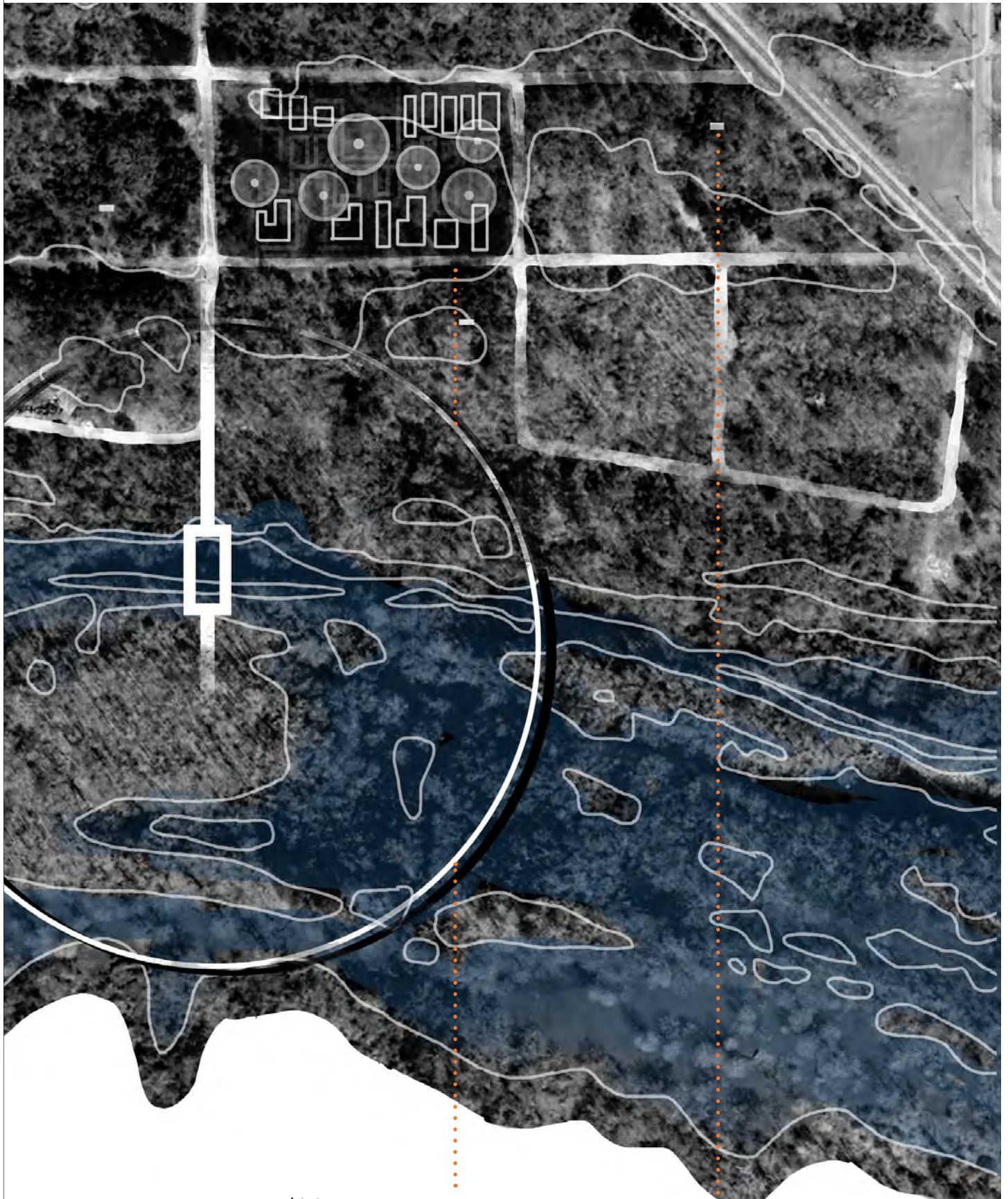
How can Kinston's 'retreated landscape' become a new ecotone, between the river and city, that mitigates flooding and filters pollutants from floodwaters and runoff before it enters the Neuse and travels down river?

How can Kinston's retreated landscape become a new model for reclaimed floodplains that give back cultural significance and use to the communities who lost them? How can design honor what/ who was there, what/ who is there now, and what/ who will be there in the future? How can it go from representing loss and decay, to rebirth and affirmation?

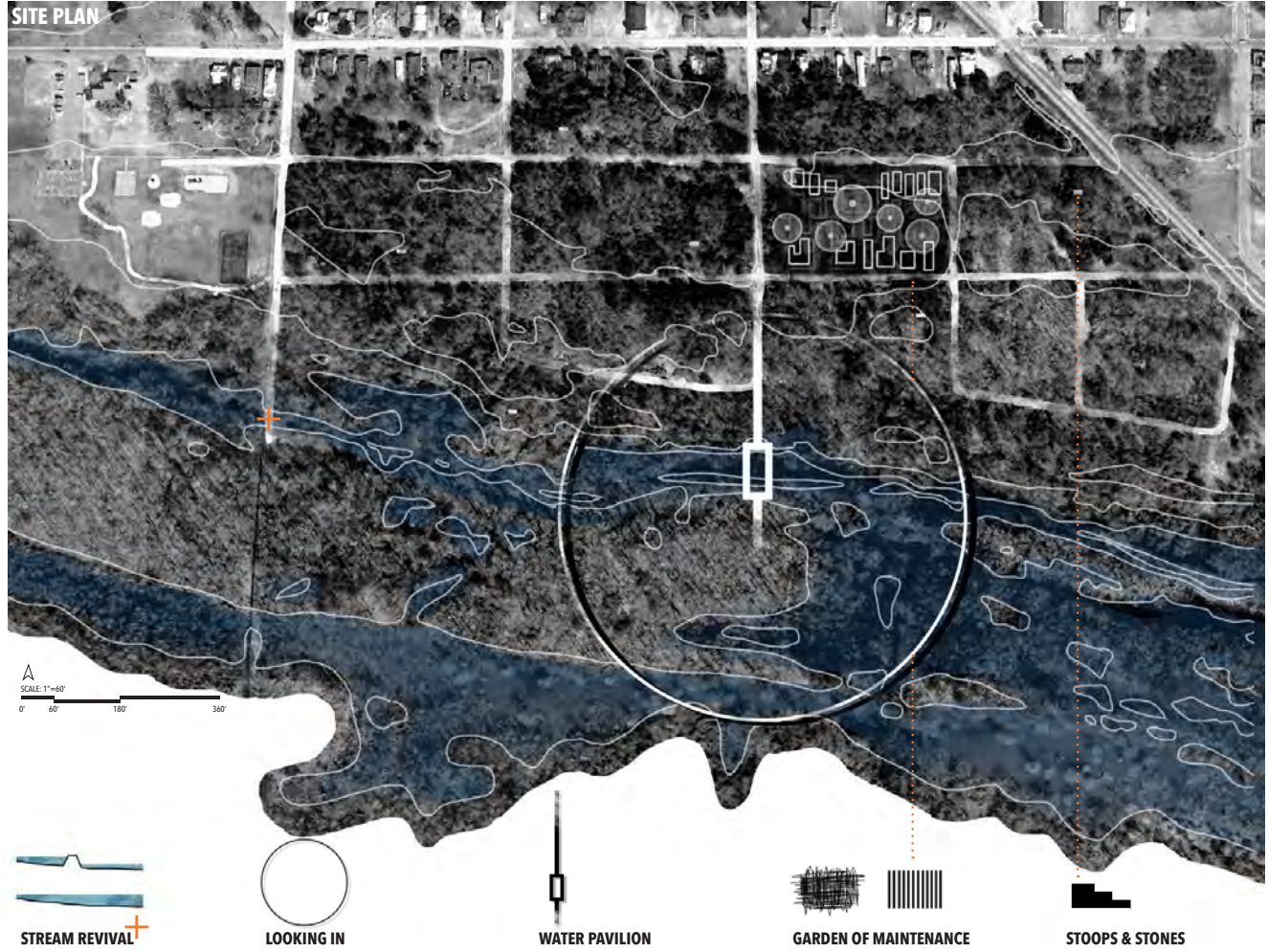


SCALE: 1"=60'
0' 60' 180' 360'

SITE PLAN



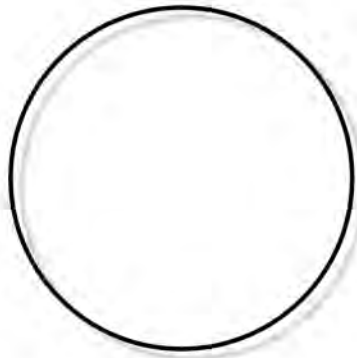
SITE PLAN & MAIN MOVES





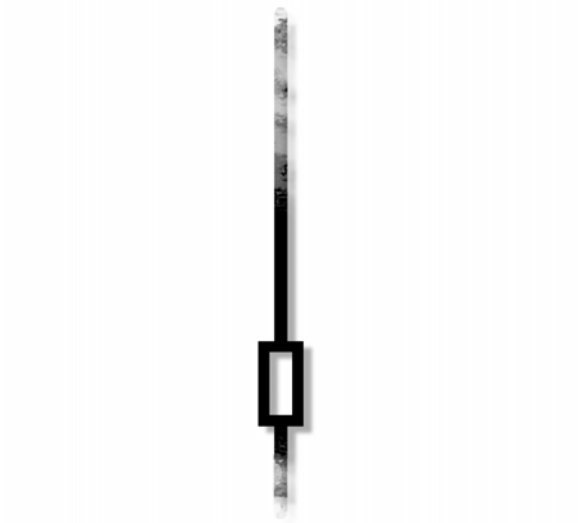
STREAM REVIVAL

The act of regrading, and replanting, old dikes built for streets that have since been abandoned, will help restore water flow to the stream, mitigating the chance of stagnant, still water. It will also promote biodiversity and cleaner water through the use of native plantings such as cypress, willow, and marsh grasses that absorb pollutants in the soil and water column.



LOOKING IN

This new elevated pathway connects both the abandoned neighborhood and the natural environment. By choosing a circle, the community and users all become part of the same conversation and whole. Unlike the existing street grid, the circle will never erode away over time. The highest elevation provides a vantage point to look back over the pavilion and towards the palimpsestous blocks, while it winds between tree stands and open air, allowing the user to experience the difference between the block plantings and 'natural' plant communities.



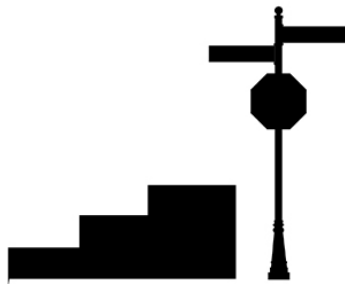
WATER PAVILION

The open pavilion is a new gathering space that intertwines rain and flooding to create an immersive, and demonstrative, encounter. The extension of the street into the pavilion brings the community out to experience the flooding, rather than retreating from it as they once had, thus curating a new relationship between the community and water. By bringing them to the water, the community is able to create their own rituals or reflect on their past. The view to the pavilion will fade over time, but it doesn't mean that is isn't there.



GARDEN OF MAINTENANCE

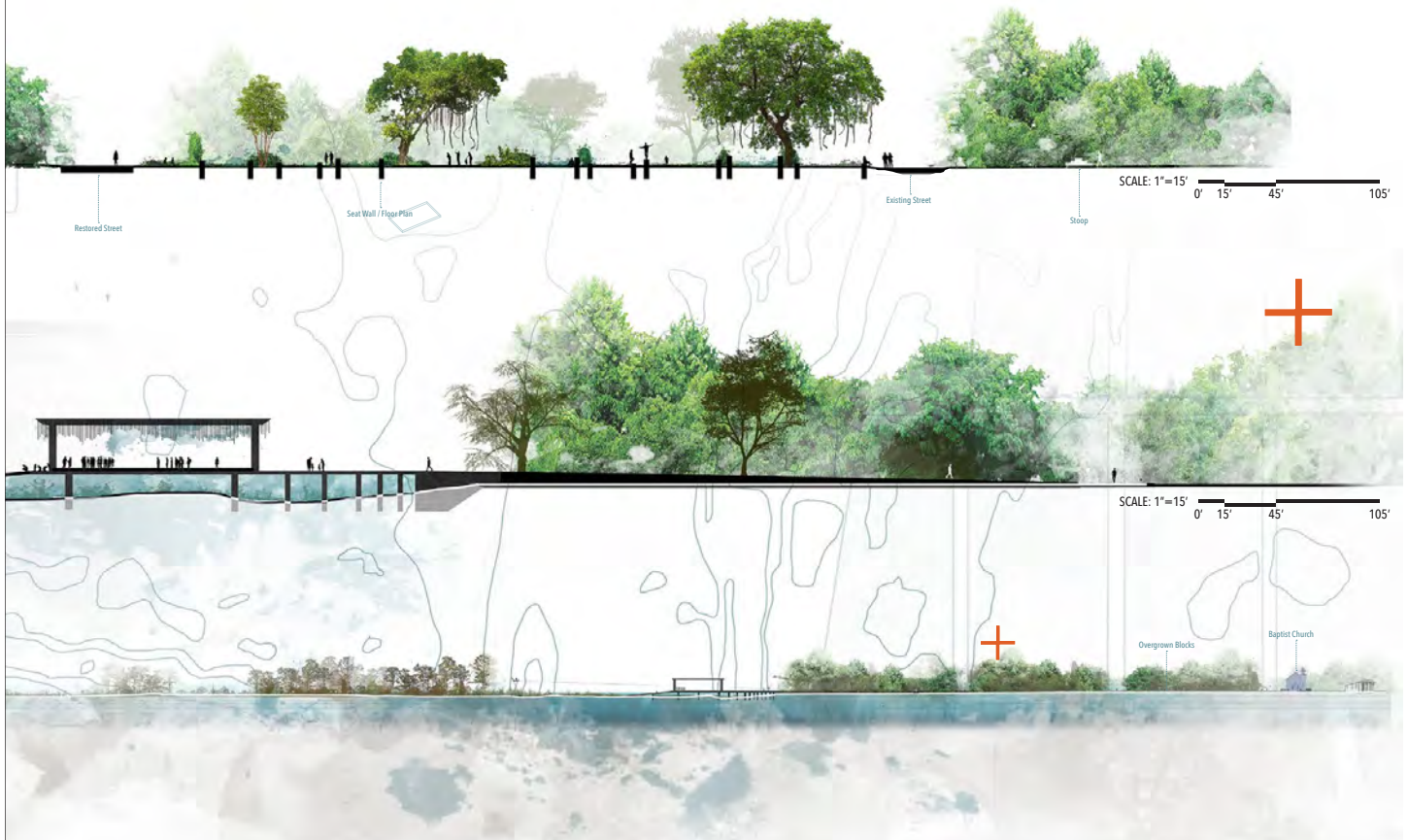
The Garden of Maintenance is a formal garden that uses the lost floor plans as seat walls at different heights. The existing plants are maintained and trimmed to look as they once did before residents were forced to leave. During future flooding events, with higher water levels than we have seen before, different 'homes' will flood and slowly release the water, becoming reflection ponds of sorts. Rain will also fill these boundaries in the mean time. The act of maintenance becomes a form of community building and garners stewardship over the site.



STOOPS & STONES

Scattered placement of stoops and stones promotes exploration of the wild, overgrown, blocks to find relics of the past. Once found, these sites will become places of personal reflection or gathering. The act of discovering these moments over time will lead to cow paths, allowing the community to forge their own way through the site.





SITE SECTIONS

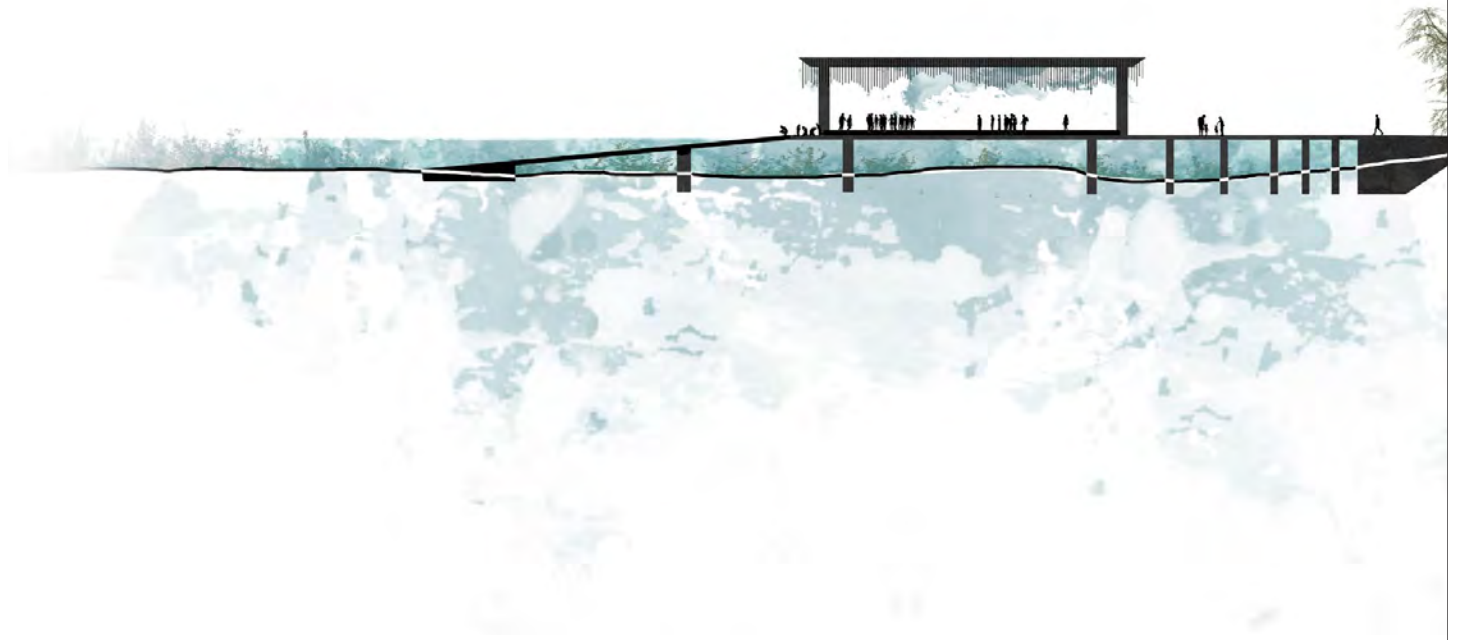
Above are sections from the river to the community. They detail the main Water Pavilion, as well as the Garden of Maintenance.





GARDEN OF MAINTENANCE

Above is a large scale section of the Garden. Here you can see the different seat walls that litter the block. The juxtaposition between the Garden and the overgrown blocks make a clear statement to the viewer.





WATER PAVILION

Above is a large scale section of the Water Pavilion. You can see the topography of the site as well as how the site is connecting with the existing blocks and interacting with the flood waters.

GARDEN OF MAINTENANCE x FLOODWATERS



LOW
CURRENT

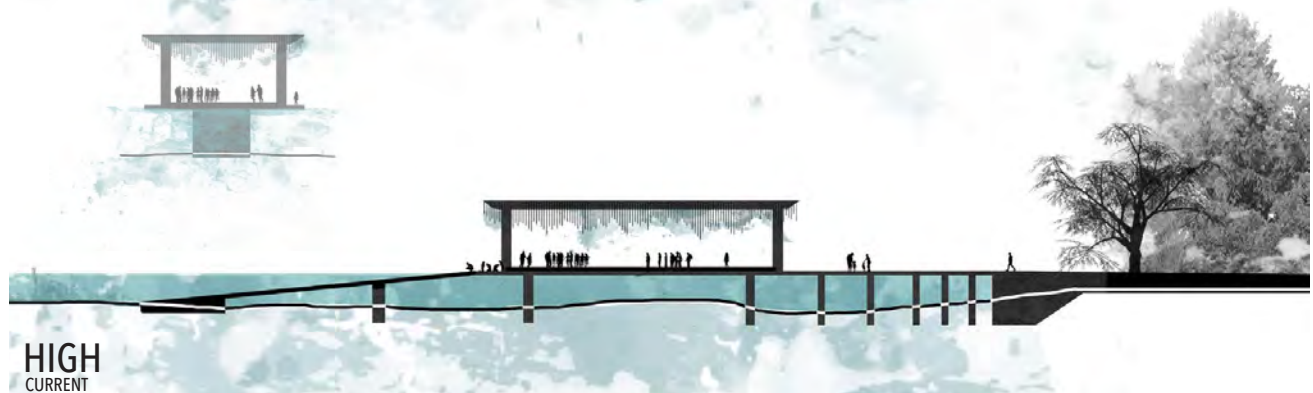
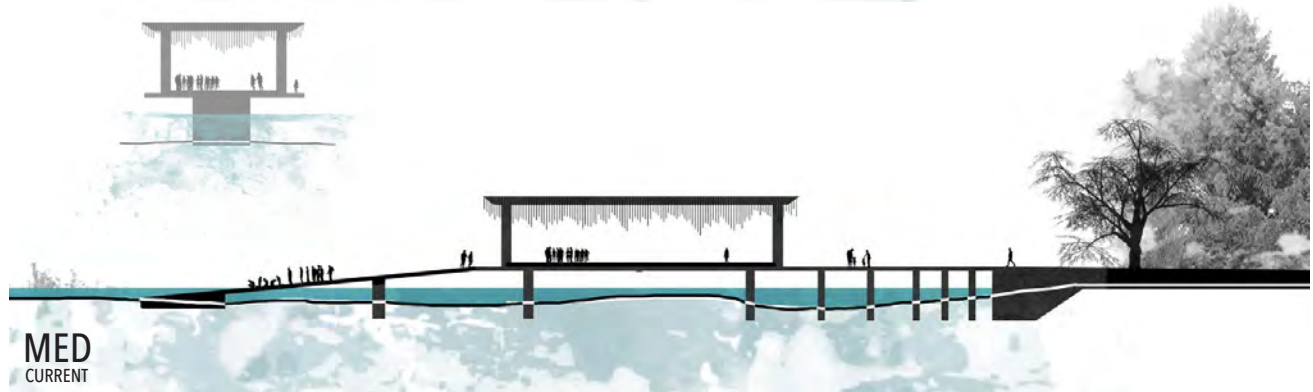
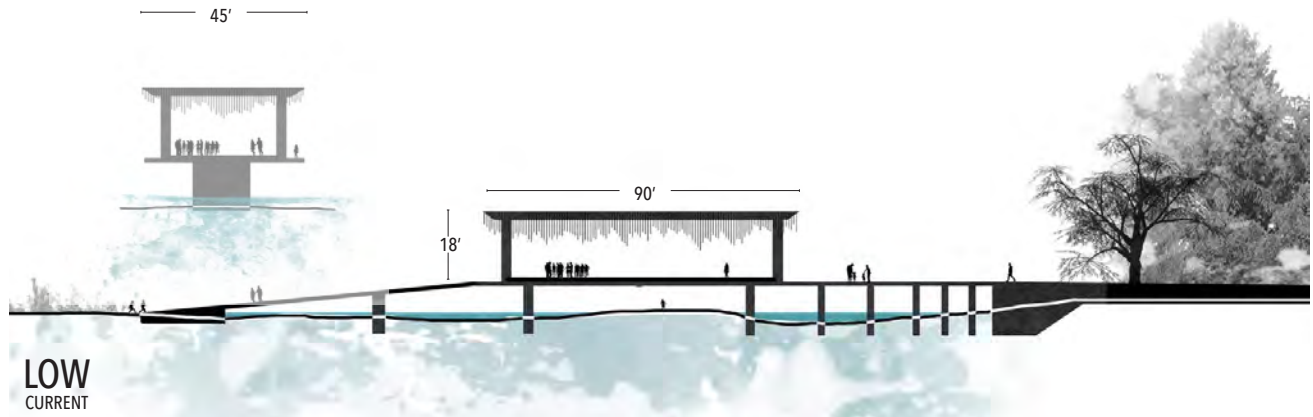


MED
FUTURE



HIGH
FUTURE

WATER PAVILION x FLOODWATERS



NOW



FUTURE



Water Pavilion (Concrete)
Bringing together flooding and rain

Looking In (Wood) x Pavilion
(Safe from Flooding)



Garden of Maintenance
(Full from recent, high
flooding)

Stoops and Stones (Discovered x Cow path)



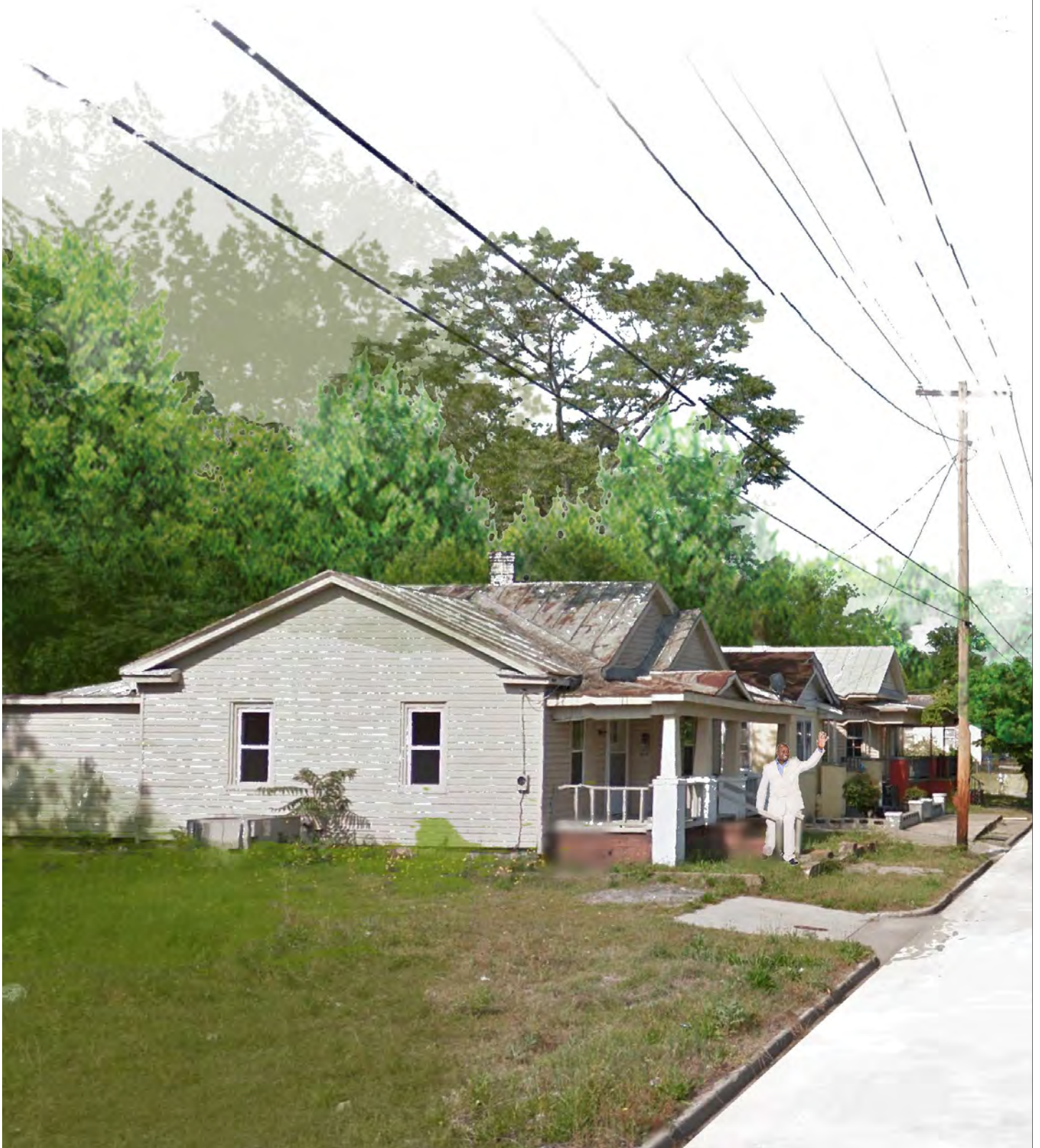
Reinforced Concrete Bisecting old Pavement
(Safe from Flooding)

THEN

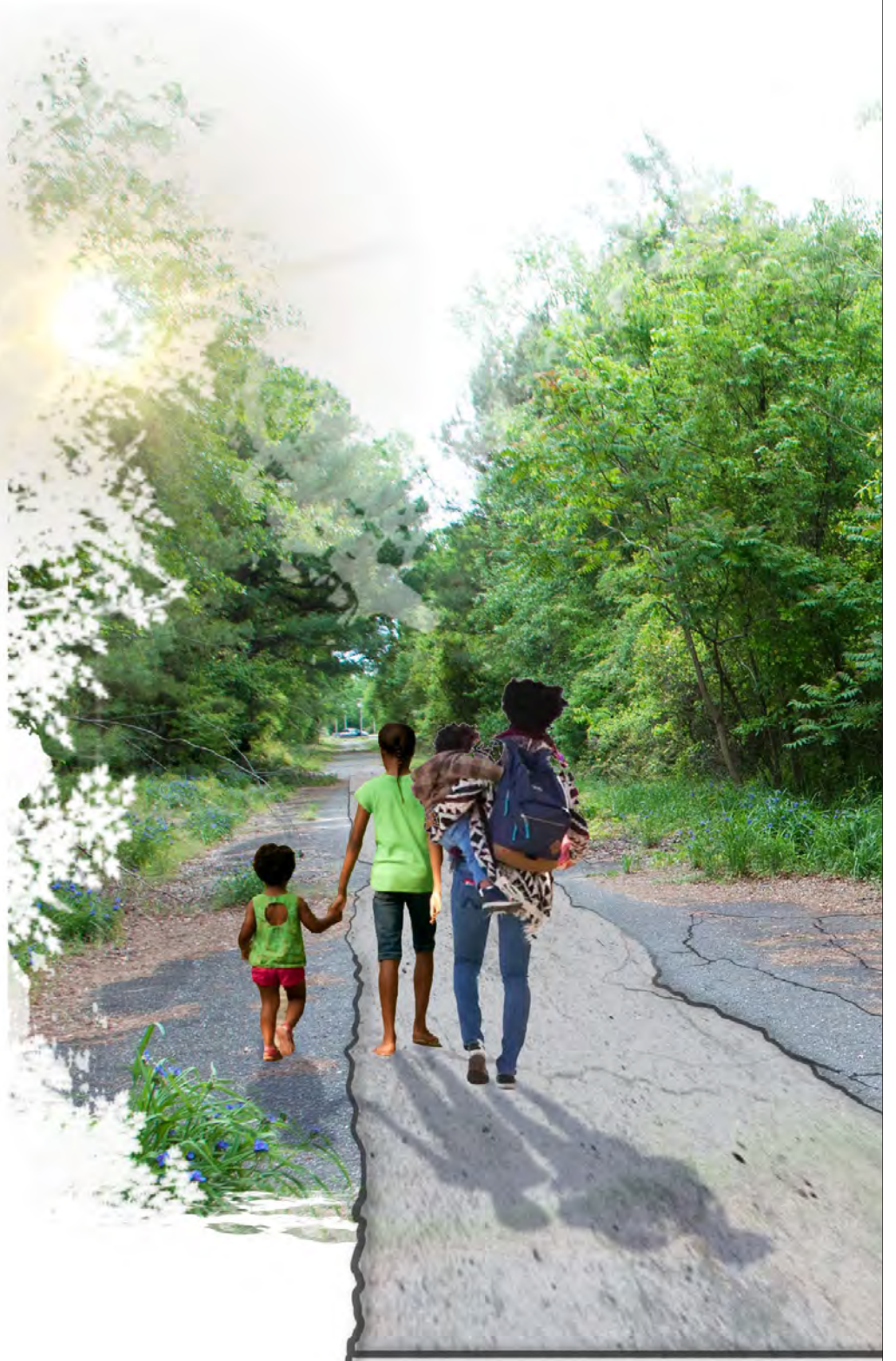
Existing Neighborhood, Homes, and Site Entrance (Safe from Flooding)

SURROUNDING COMMUNITY

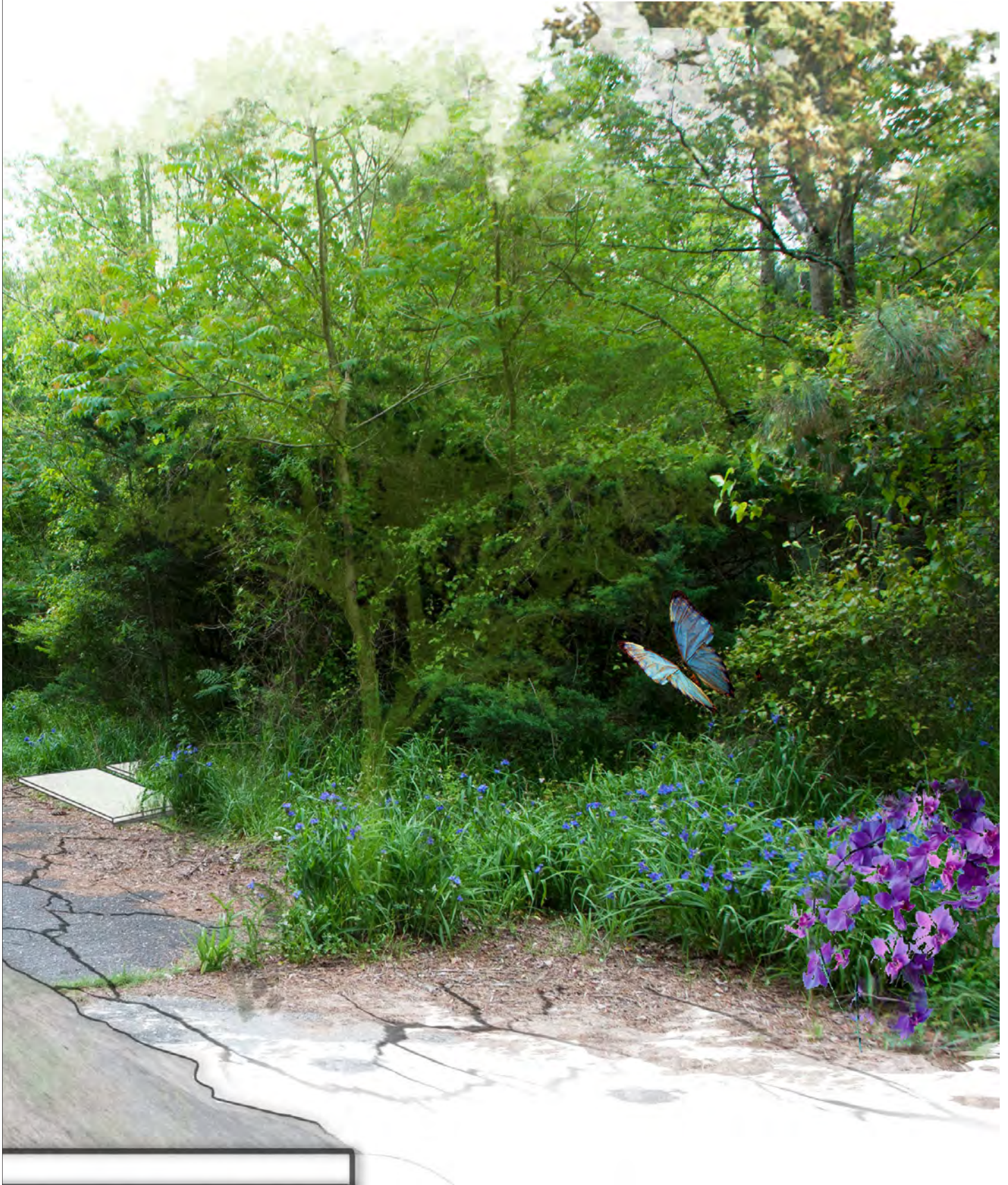
NOW & FUTURE





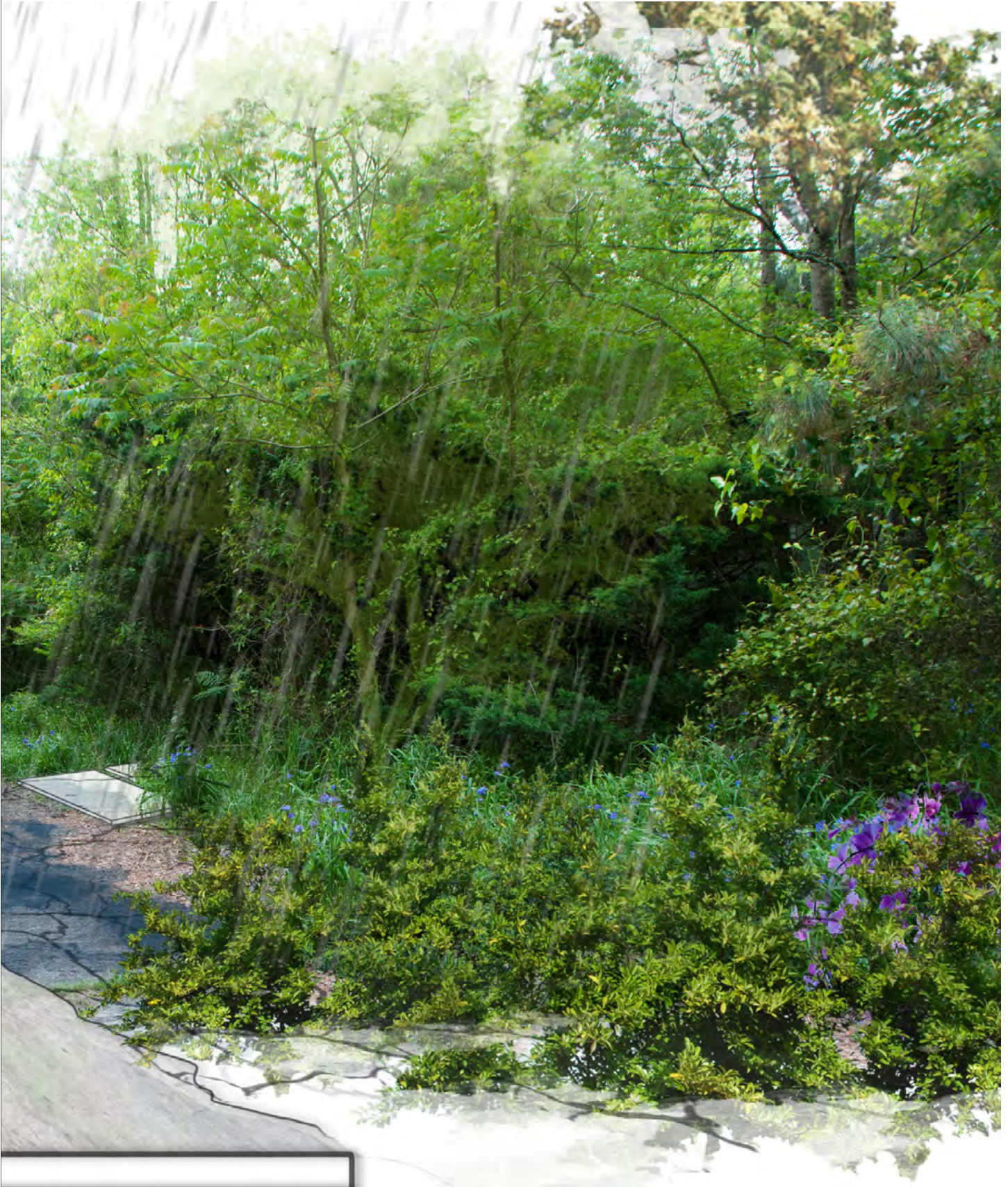


MAIN WALKWAY
NOW





MAIN WALKWAY
FUTURE & FLOODING





GARDEN OF MAINTENANCE
NOW





GARDEN OF MAINTENANCE
FUTURE & RECENT FLOODING





STOOPS & STONES
NOW





ALBERTA ST
CARVER ST

STOOPS & STONES
FUTURE & FOUND



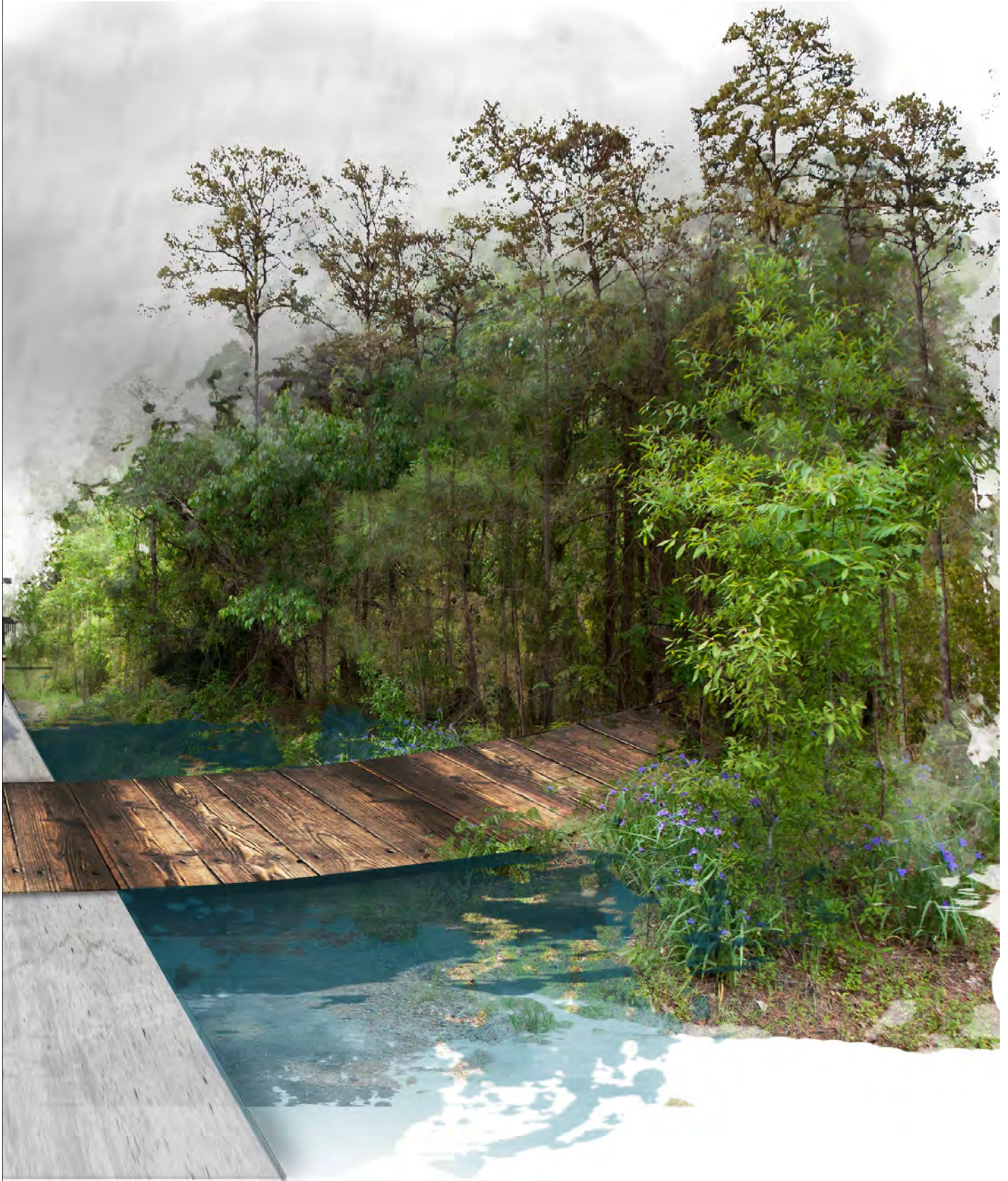


**LOOKING IN
NOW**





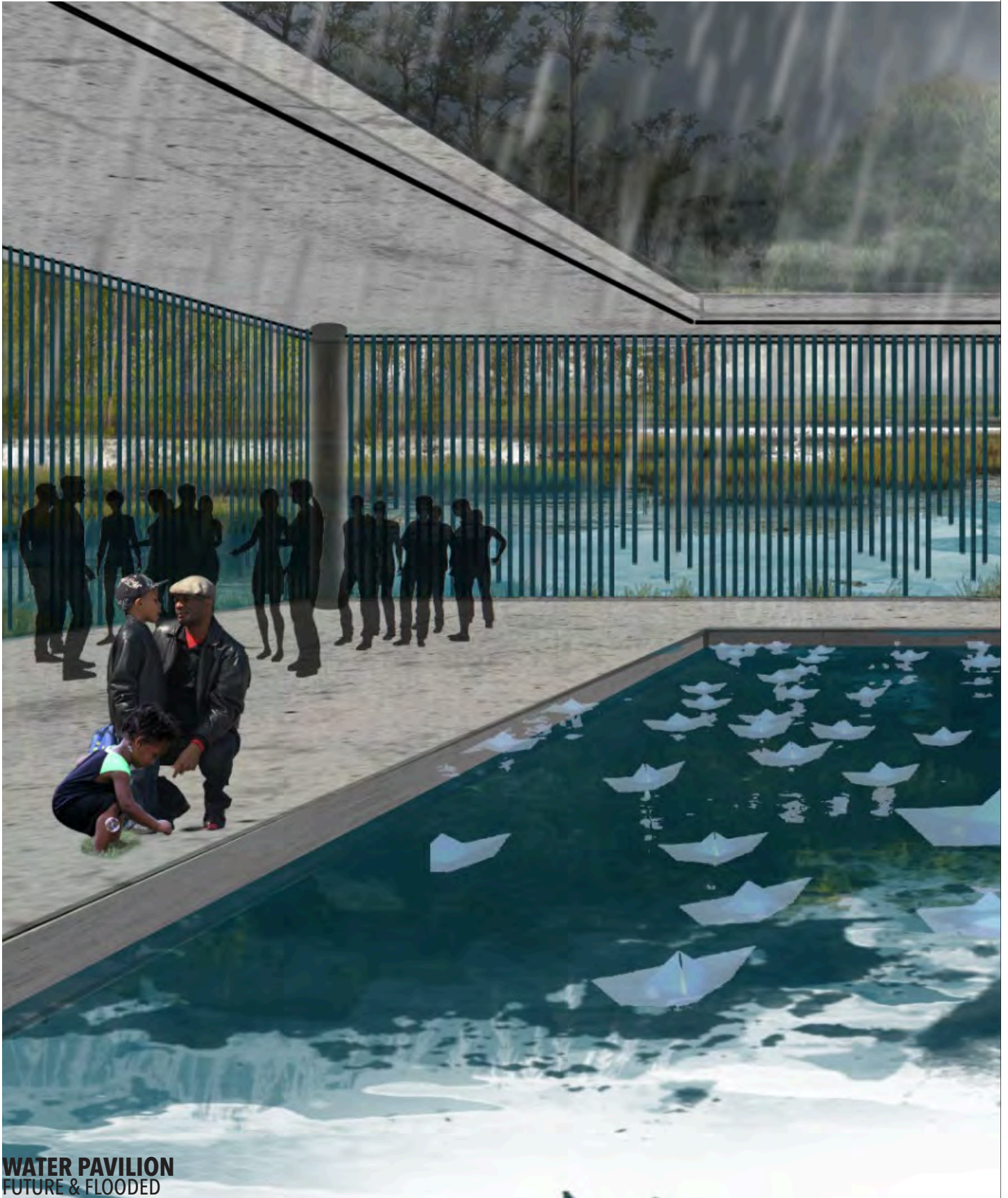
LOOKING IN
FUTURE & FLOODED





WATER PAVILION
NOW





WATER PAVILION
FUTURE & FLOODED



II: FINAL REFLECTION & MOVING FORWARD

After my final review I received a lot of helpful feedback. Overall, the critics were pleased with my decision to transition towards a project that revolved around meaning and memory. It became a project about affirmation, rather than one about loss and decay. It became a project about rejuvenation and treatment. It incorporated the cultural thinking that was lacking in my previous review and design.

Some constructive criticism included thinking about water as not a line, but rather understanding its directionality and the ‘muddiness it incurs’, whether it be sectional or elevational, and that it is ever changing. In this design, it was one or the other, the design moves were either wet or dry, there was no in between. Furthermore, the critics questioned how plantings and restoration plantings could connect with cultural systems at certain times or certain points.

Most importantly, I was challenged to go back and look at how to reintroduce filtration and water quality back into the project. How can these ecologic systems intertwine with cultural systems?

I am excited to move forward with this project and continue thinking about these ideas. I am proud of the journey I took to get to this point, and I am eager to see where it leads me in my personal and professional life.

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