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**COASTAL DYNAMICS DESIGN LAB
NORTH CAROLINA STATE UNIVERSITY**

DEPARTMENT OF LANDSCAPE ARCHITECTURE + DEPARTMENT OF ART & DESIGN +
DESIGN CONCEPTS CLA, INC. + GREENPLAY, LLC

FLOODPRINT: LUMBERTON, NORTH CAROLINA



LUMBERTON, NORTH CAROLINA

FLOODPRINT

STRATEGIES FOR RESILIENT
& USABLE OPEN SPACE

NC STATE
Design

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COASTAL DYNAMICS DESIGN LAB (CDDL)

The mission of the CDDL is to organize and lead transdisciplinary research and design teams to address critical ecological and community development challenges in vulnerable coastal regions, with a concentrated focus on the mid-Atlantic seaboard. The CDDL is operated within the NC State College of Design and works collaboratively with scientists, local governments and stakeholders, and professional design and planning communities to create innovative, sustainable, adaptive, and resilient design solutions that address the environmental and human needs of communities.

GRANTORS

The development of this document was made possible by grant funding from the North Carolina Community Foundation, U.S. Department of Homeland Security Science and Technology Directorate Flood Apex Program (through the Coastal Resilience Center, a DHS Center of Excellence), and the North Carolina Policy Collaboratory.

EXECUTIVE SUMMARY

LUMBERTON COMMUNITY FLOODPRINT

The Lumber River is the lifeblood of the communities that occupy its edges, including the City of Lumberton. The city owes its location and existence to the abundant resources provided by the river, tributaries, and floodplains. These natural features have made lasting physical and cultural impressions that continue to shape and influence both city and region. Recognizing that river and city are inseparable, this report introduces the concept of a “floodprint” – a landscape planning approach guided by land-water relationships, including the powerful forces associated with flooding.

The Lumberton Community Floodprint is the result of interdisciplinary work by NC State University College of Design faculty and students, managed through the Coastal Dynamics Design Lab. It reflects the combined expertise of landscape architects and graphic designers who have applied best practices in design and planning to the development of landscape analysis, planning, and design strategies that respect and reflect local character and history. The goal of this document is to help increase social and physical resilience in the City of Lumberton, specifically through recommending land-use strategies that reduce risk and improve public safety and long-term environmental function within historically flood-prone areas.

While the report does not offer solutions to keep floodwaters out of Lumberton, it recognizes that the Lumber River and its extensive floodplain lands is significant and must be an integral part of the future landscape of Lumberton. It offers ideas for ecologically sound trails and parks, and it identifies opportunities for Lumberton to transform its vacant parcels into places for recreation and water storage. It proposes ways Lumberton can forge ahead through the difficult task of rebuilding to

recognize the power of the Lumber River to promote adaptive design strategies that support long-term efforts of community function, health, resilience, culture, and vitality.

This effort contributes to the ongoing hurricane recovery work in Lumberton through an analysis of private and public lands that: 1) were directly impacted by Hurricanes Matthew (2016) and Florence (2018) floodwaters, 2) are within floodways and 100-year and 500-year floodplains, and 3) adjoin or are near existing parklands. The research team considered hazard-related issues facing the larger southeastern region of North Carolina, including the known and potential impacts of recurring floods, development patterns, and population trends within the Lumber River watershed. Additionally, the project was guided by landscape planning approaches to development, conservation, and management practices and uses. Emphasis was placed on assessing short-, mid-, and long-range planning options.

The resulting recommendations are tied to existing community assets and, where appropriate, county and regional recovery planning efforts and existing recreational programs. Recommendations also address a variety of spatial and temporal scales of open space planning and management within the context of disaster recovery and hazard mitigation. Lastly, the report suggests community engagement activities to support equitable design and implementation of the proposed options.

SCOPE AND BACKGROUND

In North Carolina alone, Hurricane Matthew caused \$4.8 billion in damage and displaced thousands of families due to flood waters. Hurricane Florence, less than two years later, is estimated to have caused an additional \$17 billion in monetary damages to the state. Tragically, Florence hit Lumberton before implementation of Hurricane Matthew community recovery planning efforts were completed, with flood waters from Florence hitting many of the same areas as Matthew (governor.nc.gov, 2018).

MICRO TO MACRO

In the months that followed Hurricane Matthew, there were many federal, state, and foundation supported initiatives that took place to help Lumberton in its recovery efforts. In July of 2017, through the support of the Hurricane Matthew Disaster Recovery and Resilience Initiative (HMDRRI) the NC State University Coastal Dynamics Design Lab (CDDL) completed a six-part series of documents titled Homeplace: Conversation Guides for Six Communities, Rebuilding after Hurricane Matthew that provided Individual Scale solutions for re-building houses, lots, and streetscapes in a more resilient manner.

Community Floodprint, seeks to build upon the lessons learned developing individual scale solutions as part of the Homeplace document. The goal is to expand resiliency planning and risk reduction strategies to respond to the demands of broader scale needs at the neighborhood and city scales - needs that have been further exacerbated by Hurricane Florence and its aftermath.

As part of the CDDL's continued commitment to shaping more resilient communities, this report, titled Lumberton

SCALES OF STUDY

CITY SCALE

Recommendations that a large group of property owners can help implement. These typically require efforts of on-going coordination between individual property owners, associated council members, and city or state officials/entities. City-scale recommendations are meant to connect physical improvements to a wide-range of constituents across the city for a shared public benefit. Projects of this scope can vary drastically in time to implement based on availability of resources and ability to manage post-construction. These projects have the broadest applicability to align with outside funds such as grants or private investments.

NEIGHBORHOOD SCALE

Recommendations that a small group of property owners can help implement. These typically require the efforts for at least modest coordination between individual property owners and associated council members, and can influence improvements to be made that connect multiple properties and/or streets to an agreed upon vision. These projects are also in alignment with multiple forms of funding, with a popular mechanism being the utilization of HUD-sponsored CDBG: Community Development Block Grants, which do not necessarily have a finite timeline for application.

INDIVIDUAL SCALE

Recommendations that a single property owner can self-implement. These include the acquisition, elevation, or reconstruction of a house (typically through participation in FEMA-sponsored programs such as HMGP: Hazard Mitigation Grant Program) and/or stormwater-based improvements made to the landscape areas of a property.



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PART 01. Learning from the Past

The impacts of Hurricane Matthew triggered multiple, wide-ranging research and recovery efforts throughout eastern North Carolina. This section of the report aims to provide a baseline understanding as to why Lumberton floods, identify who is most impacted by flood events, and then provide an overview of recently completed or ongoing policies and initiatives that seek to help those most impacted by floods.

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PART 02. Responding to the Present

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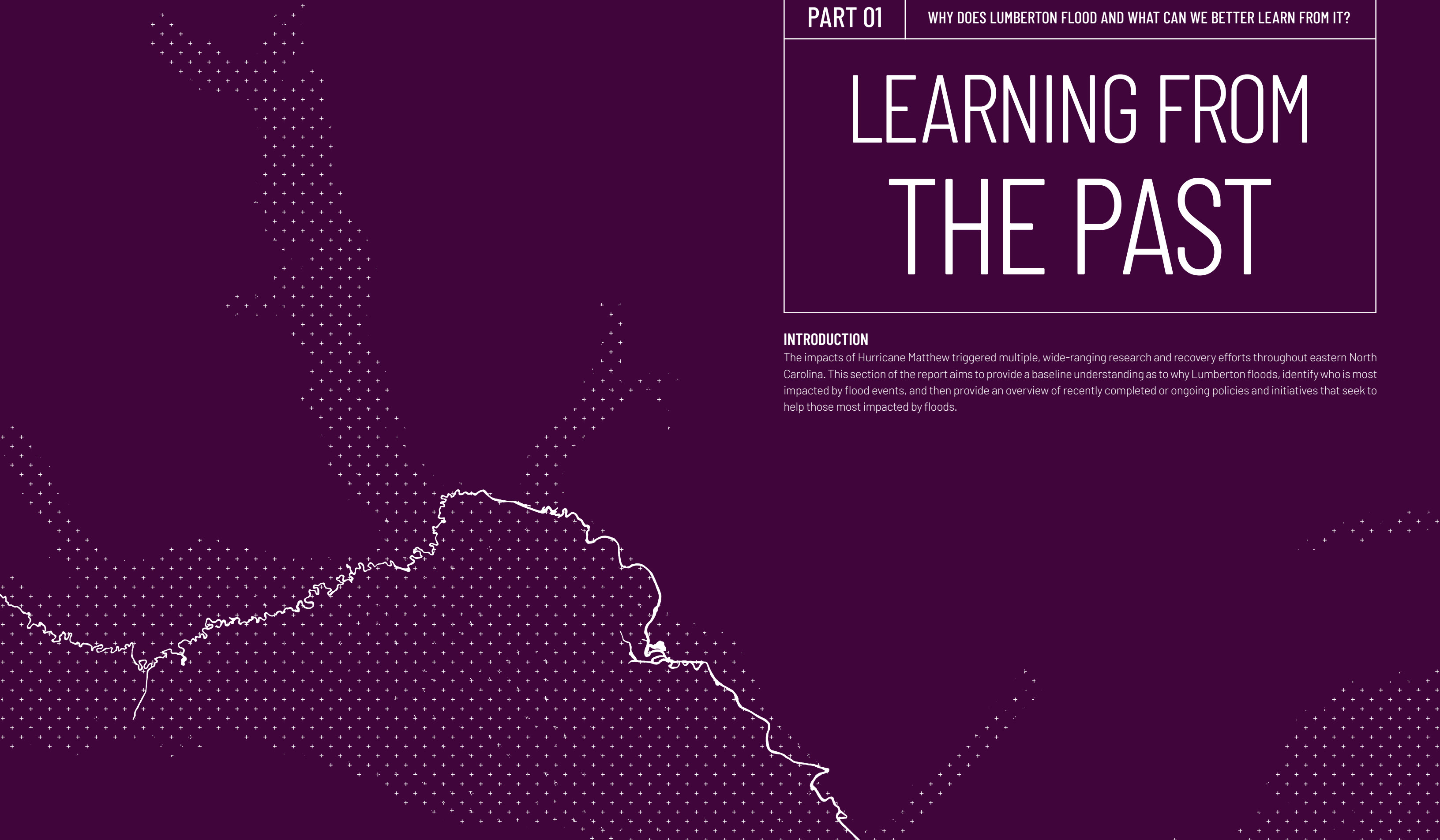
In addition to looking at how communities can respond to current resiliency needs and goals, it is also imperative for future vulnerabilities to be identified at a range of scales. This analysis can then be used as a basis of proactive discussion for local constituents and decision-makers within communities. The vulnerability assessment performed as part of this study utilized similar data as what was seen in the Land Suitability Analysis (LSA) for Lumberton, but adds additional layers of data to be inclusive of environmental, social, and economic conditions.

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PART 01

WHY DOES LUMBERTON FLOOD AND WHAT CAN WE BETTER LEARN FROM IT?

LEARNING FROM THE PAST

INTRODUCTION

The impacts of Hurricane Matthew triggered multiple, wide-ranging research and recovery efforts throughout eastern North Carolina. This section of the report aims to provide a baseline understanding as to why Lumberton floods, identify who is most impacted by flood events, and then provide an overview of recently completed or ongoing policies and initiatives that seek to help those most impacted by floods.

UNDERLYING CONTEXT FLOODING IN LUMBERTON

In 1968 the U.S. Congress passed the National Flood Insurance Act to create the National Flood Insurance Program (NFIP) so that property owners in flood-prone areas could purchase affordable insurance against flood losses that private insurers were becoming less and less likely to cover. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in newly mapped Special Flood Hazard Areas (SFHA's), the federal government makes flood insurance available.

WHY IT'S HAPPENING

The City of Lumberton was quick to adopt and by 1974 had a Flood Hazard Boundary Map finished, a new management plan for the Jacob Swamp watershed (south of downtown), and an earthen dike was under construction to protect the area from future flooding. Like many parts of the US, these activities encouraged building, and rebuilding, in vulnerable areas that would eventually expose an even larger group of people and their property to catastrophic flooding. Recently, the extensive flooding caused by Hurricane Matthew (2016) and Hurricane Florence (2018) have repeatedly proven these practices to be unsuitable and unsustainable.

The impacts of increased land development in these low-lying areas have cumulatively correlated with a growing

number of people living in environmentally vulnerable areas. This is a problem because increased land development typically means that vegetated areas are replaced by impervious surfaces, such as pavement and buildings. In their natural state, vegetated areas capture and absorb rainfall, preventing it from entering nearby waterways. But when these absorptive, pervious landscapes are replaced with impervious surfaces, rainfall can no longer infiltrate into the ground. Instead it quickly accumulates and runs off more rapidly, entering waterways that feed other, larger waterways. The cascading effect of that unabsorbed water has been shown to lead to rising river levels which inversely impact those that have been enabled to live in floodplains via incentives from the National Flood Insurance Program.



UNDERLYING CONTEXT WHO HAS BEEN IMPACTED?

Compounding the physical factors that influence disaster recovery is an uneven capacity across community cohorts to prepare for and respond to disaster. Flood risk is not distributed equally across communities and correlates with a wide array of social vulnerability indicators. Communities with large numbers of low income households, people of color, seniors, young children, and other factors often find themselves in areas most affected by environmental stressors. These cumulative barriers increase in times of crisis, including hurricanes and floods.

INDIVIDUAL ASSISTANCE CLAIMS
ROBESON COUNTY RESILIENT REDEVELOPMENT PLAN

Individual Assistance Flood Damage Claims in Robeson County:

18,842

Individual Assistance Flood Damage Claims in Lumberton

9,047

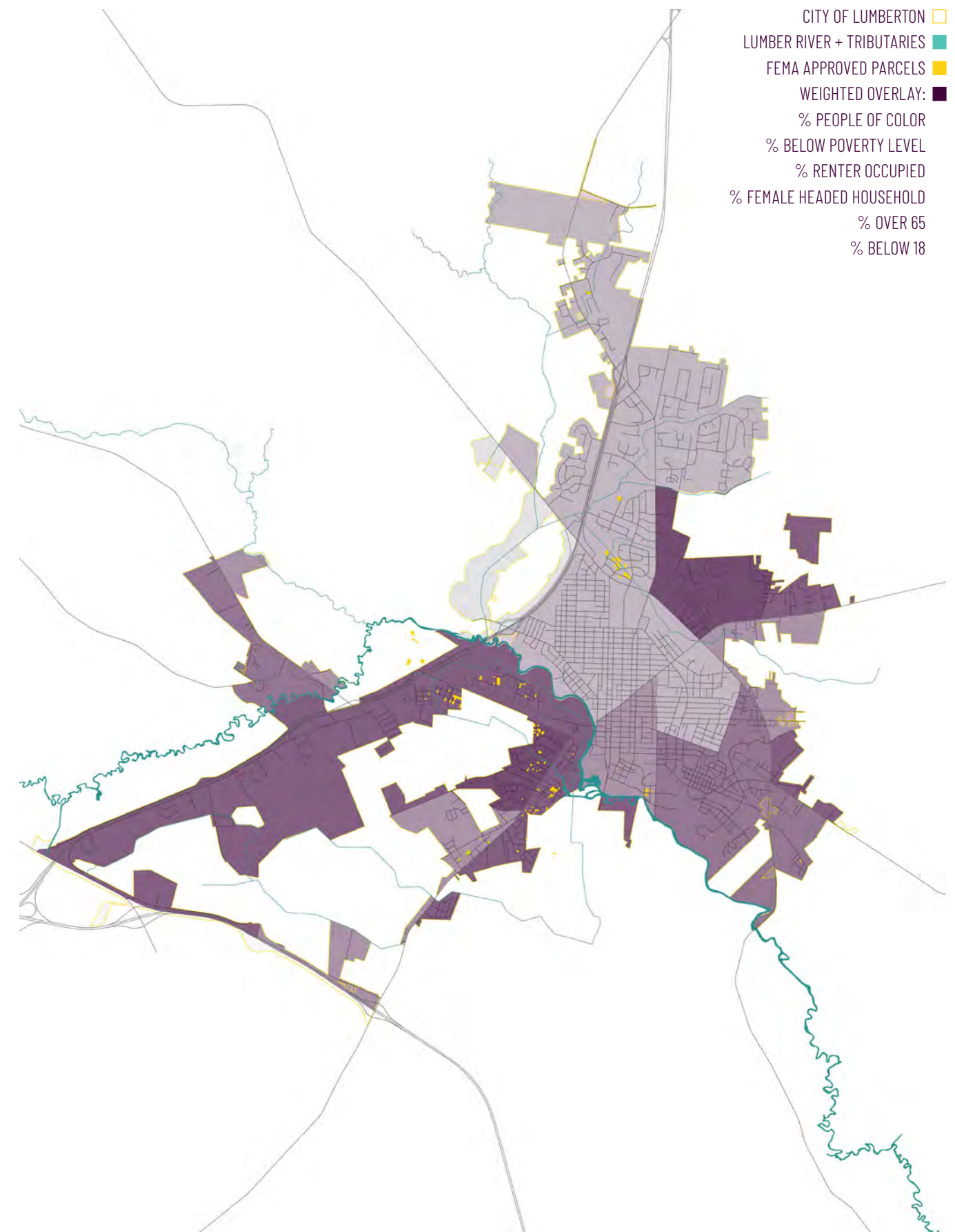
Total Population of Lumberton (2017):

21,040

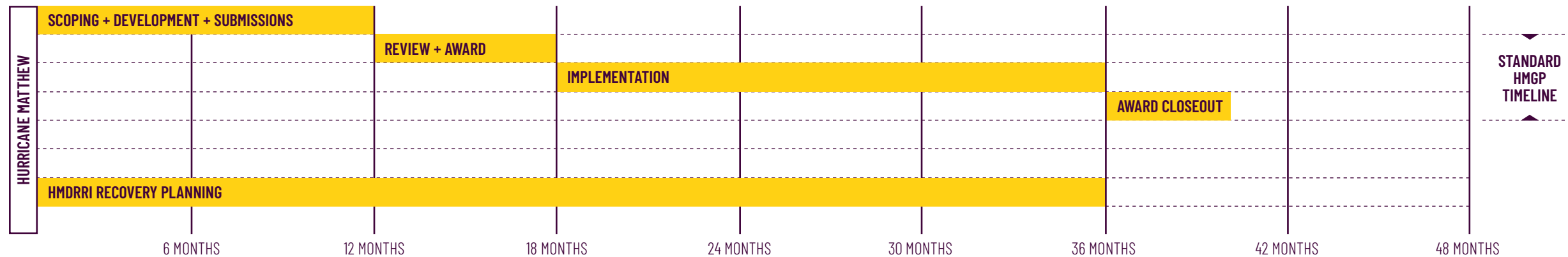
FLOODPLAINS AND TRIBUTARIES

In Lumberton, these areas exist most notably to the south of the Lumber River within its corresponding floodplains. These areas have long been artificially protected by a levee and lack other flood control measures to counteract the environmental hazards that correlate with major flooding events. Consequently, these areas also represent some of the city's most socially vulnerable populations.

Additionally, Hurricanes Matthew and Florence caused extensive flooding along the river's smaller tributaries located north of downtown. Although residing in the same city, these areas have vastly different demographic characteristics than the historically flood-prone areas south of the river.



UNDERLYING CONTEXT EXISTING POLICIES AND INITIATIVES



HMGP: HURRICANE MATTHEW HAZARD MITIGATION GRANT PROGRAM

The purpose of HMGP is to help communities implement hazard mitigation measures following a Presidentially declared disasters in areas requested by the local Governor or Tribal Executive. The key purpose of this grant program is to enact mitigation measures that reduce the risk of loss of life and property from future disasters (FEMA, 2018). HMGP funding is limited and is largely based on rigid sets of cost/risk assessments. As a result, recipients and local government officials must make difficult decisions as to the most effective use of grant funds, therefore not all projects may be selected. For projects that are selected, FEMA provides 75% of funds for mitigation, while the remaining 25% must come from the property owner(s) or other funding sources (FEMA, 2018).

Ultimately, **HMGP awarded 39 projects in Robeson County in June/July 2018** including: 6 Elevations, 18 Acquisitions, and 15 Reconstructions (NCEM, 2018). While over 400 properties in Lumberton applied for this financial support (and many more could have), the cost of elevation, acquisition, and reconstruction is expensive - totaling over \$5.3 million for these 39 projects alone.

CDBG-DR: COMMUNITY DEVELOPMENT BLOCK GRANT DISASTER RECOVERY

The US Department of Housing and Urban Development (HUD) provides flexible grants to help cities, counties, and states recover from presidentially declared disasters, especially in low-income areas. The availability of these funds are subject to supplemental congressional appropriations; Congress may appropriate additional funding for the Community Development Block Grant (CDBG) Program as disaster recovery grants to rebuild affected areas and provide crucial seed money to kick-start the recovery process. Since CDBG Disaster Recovery (CDBG-DR) assistance may fund a broad range of recovery activities, HUD can help communities and neighborhoods that otherwise might not recover due to limited resources. Applications and proposals for CDGB grants are on-going.

As of September 2018, North Carolina has been approved to use \$236 million in CDBG-DR funds. The guidelines published in the federal register direct the state to spend 80% of this funding in Cumberland, Edgecombe, Robeson, and Wayne counties. The state is awaiting federal guidelines that outline the use of an additional \$168 million (NC Dept of Public Safety, 2018).

HMDRRI: HURRICANE MATTHEW DISASTER RECOVERY AND RESILIENCE INITIATIVE

Led by the U.S. Department of Homeland Security Coastal Resilience Center of Excellence (CRC) and funded by the North Carolina Policy Collaboratory, researchers and students from several North Carolina universities have been leading three primary efforts in response to Hurricane Matthew. These include:

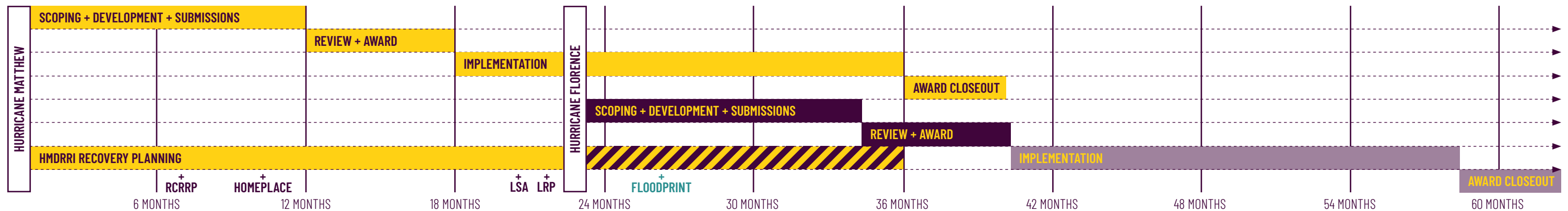
- (1) studying the impacts of Hurricane Matthew on eastern North Carolina communities
- (2) advising North Carolina Gov. Roy Cooper and the North Carolina Division of Emergency Management (NCEM) officials on state and federal recovery policies and programs, and
- (3) assisting communities develop disaster recovery plans

HMDRRI is focused on providing six hard-hit communities (Fair Bluff, Kinston, Lumberton, Princeville, Seven Springs, and Windsor) with the technical assistance needed to address issues typically revealed by post-disaster programs. Priorities identified by participating communities include: developing disaster recovery plans;

developing and implementing a housing relocation strategy; creating flood retrofit protocols for historic downtowns; and recommending uses and ongoing management strategies for community open spaces within floodplains. Other issues continue to be identified during the planning processes and through on-going dialogue with residents, community officials, and others.

UNDERLYING CONTEXT

WHAT EFFORTS HAVE BEEN COMPLETED?



RCRRP: ROBESON COUNTY RESILIENT REDEVELOPMENT PLAN

In response to the damage caused by Hurricane Matthew, the Robeson County Resilient Redevelopment Plan was released in **May 2017**. The objectives of the RCRRP were to (1) develop strategic, resilient redevelopment plans and actions, and (2) to define any unmet funding needed to implement such actions. The RCRRP identified many strategies to help foster a more resilient redevelopment of the county, including Lumberton, in response to the ill-effects of flooding. This report was thorough in categorizing low, medium, and high priority projects for housing, economic development, infrastructure, and environmental strategies, however, the scope of the RCRRP did not include specific methods for achieving many of its recommendations. This is especially true for Lumberton because the plan was characterized, in broad terms, for Robeson County.

Once completed, the intent of the RCRRP was to provide the foundation for supplemental funding received through Congress, N.C. General Assembly, and other funding sources. The RCRRP was also the basis for the state's Recovery Action Plan, which is required by the U.S. Department of Housing and Urban Development (HUD) before the state can expend funds received from the CDBG-DR program.

HOMEPLACE: A CONVERSATION GUIDE FOR LUMBERTON REBUILDING AFTER MATTHEW

The Homeplace Conversation Guide for Lumberton was completed in **July 2017** and was developed to assist residents decode and understand the complex information associated with recovery and resiliency building efforts. The purpose was to provide easy-to-understand technical assistance addressing typical post-disaster issues.

Working with and informed by the RCRRP, Homeplace delivered a framework to organize and communicate rebuilding policies, programs, and practices to enable informed dialogue with residents, community officials, and others. The report supported these efforts by providing residents with a menu of high-quality, community-specific designs and strategies focused mainly at the individual scale (household and streetscape) of application. Suggestions of neighborhood- and city-scale improvements were mentioned in Homeplace, but were not the primary focus of the document.

LSA: LAND SUITABILITY ANALYSIS FOR POST-DISASTER HOUSING RELOCATION IN LUMBERTON

The Land Suitability Analysis for Housing Relocation was completed in **September 2018**. It focused on identifying parcels that could be utilized for housing relocation within Lumberton's municipal boundary. The study created ratings on a parcel-by-parcel basis for potential housing relocation. The suitability rubric was informed by mapping jurisdictional boundaries, proximity to infrastructure, parcel size, building/land vacancy, vulnerability to flooding, and areas of future development. The report concludes that there are at least 100 individual parcels within Lumberton's city limits that can be considered to have the 'highest' composite suitability, may be vacant and/or acquirable, and could support multiple types of housing.

Additionally, through the creation of the LSA, parcels were also identified that had the highest levels of vulnerability (as mapped with the above criteria). These mapping techniques were thorough in identifying qualities of the physical environment that could be described as either suitable and vulnerable. However, similar mapping techniques were not utilized to further understand the overlay of socio-cultural suitability and vulnerability with the physical environment.

LRP: HURRICANE MATTHEW LUMBERTON RECOVERY PLAN

The Lumberton Recovery Plan was completed in **October 2018**, two years after the initial crisis and, ironically, during the same timeframe as Hurricane Florence. The objectives of the report, which was informed by the RCRRP and other HMDRRI efforts, were: (1) identify and address local disaster recovery needs, (2) increase disaster resilience, (3) facilitate collaboration, (4) improve local institutional capacity, (5) facilitate implementation of actions, and (6) draw from related program information and studies.

The LRP was thorough in that it described recovery action projects, needed policies, required resources, potential funding sources, responsible administrations and agencies, and anticipated timelines for recovery efforts in Lumberton. But much like the RCRRP, the LRP did not necessarily point to specific land-planning techniques or environmental design strategies capable of leading to on-the-ground change. Efforts were made to show some visualizations as to what a flood gate could look like, as well as elevated residences, however these illustrations alone do not provide a direct visual relationship to or potential outcomes associated with many of the report's outlined recovery action items.



PART 02

EVALUATING HOW TO TURN CURRENT VACANCIES INTO RESILIENT OPEN SPACES

RESPONDING TO THE PRESENT

INTRODUCTION

Previously completed reports have thoroughly documented flood damage, identified goals and objectives for a more resilient future, and recommended policy considerations moving forward. However, none of these efforts provided specific land-planning strategies capable of directing actionable, on-the-ground change. In order for local policymakers, councilmembers, and constituents to make informed land use decisions, this section of the report incorporates planning recommendations into visualizations that illustrate possible outcomes resulting from the implementation of phased, transformational land-planning decisions. The following scenarios consider various physical scales that constitute Lumberton — individual site, neighborhood, and city.

CURRENT CONDITIONS OPPORTUNITY FROM HAZARDS

Much of Lumberton lies within the 100-year floodplain. In other words, based on historical data about local rainfall and river levels, hydrologists predict that the areas of Lumberton located in the 100-year floodplain have a 1% annual chance of flooding. It is important to note that this percentage is only based on statistical probability, so it is possible for multiple 100-year flood events to occur within a single year. Hurricanes Matthew and Florence (approx. two years apart) mirrored much of the 100- and 500-year floodplains in Lumberton. These large flood events have consequently led to large areas of vacant land occupying a similar footprint. Given the total number of affected parcels and discontinuous nature (i.e., ownership, location, condition, land use, etc.) of these land holdings, a primary goal of this study is to propose methods for connecting vacated, underutilized, and/or repetitive flood loss parcels with already established public open spaces (i.e., parks or greenways) to create new public amenities that are more manageable and provide public benefit.

for reference

STATISTICS: HAZARD MITIGATION GRANT PROGRAM IN LUMBERTON (HMGP FUNDED BY FEMA)

Applicants in Lumberton from Hurricane Matthew:

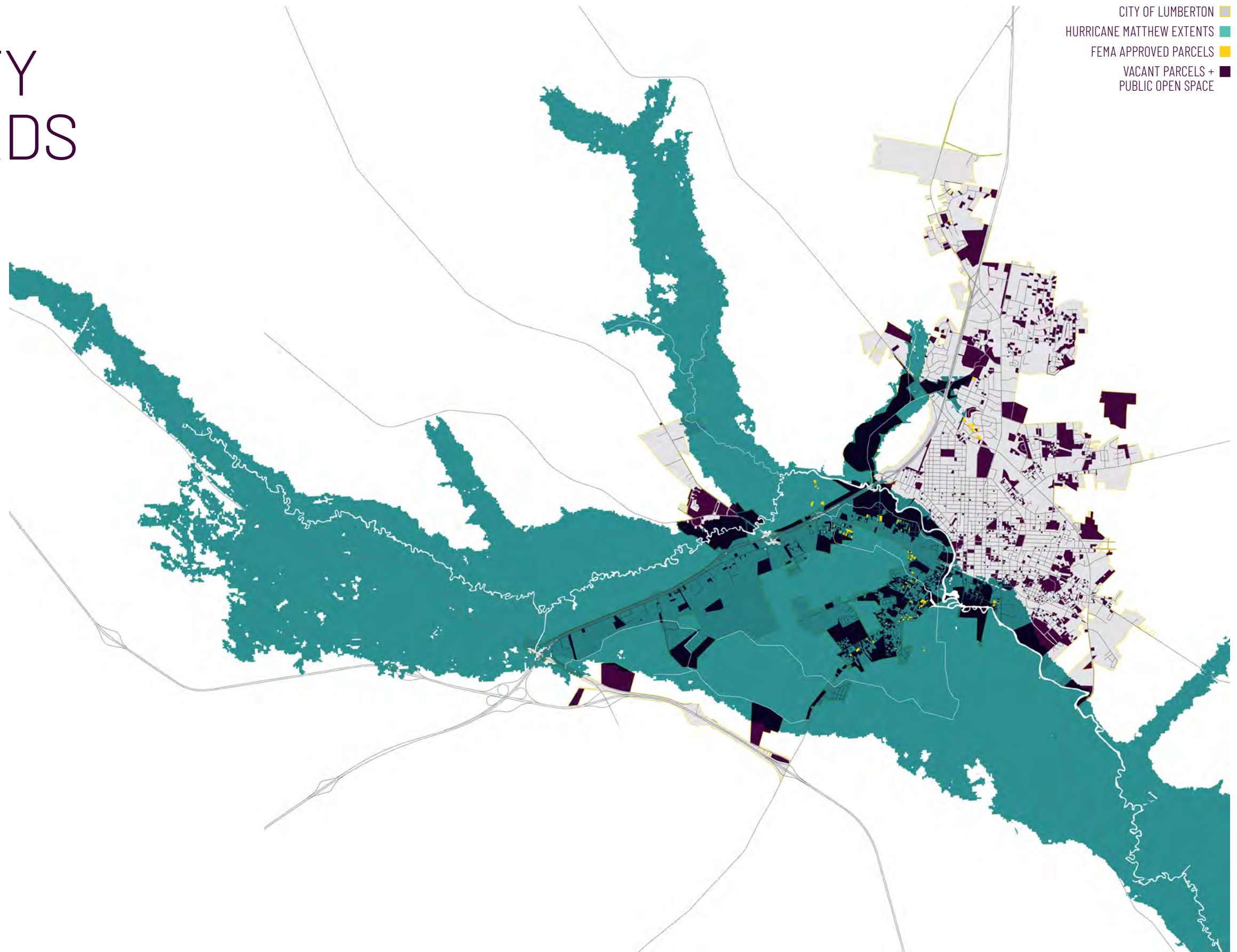
400+

Approved Properties (Buyouts + Reconstructions + Elevations):

107

Approved Properties that are Buyouts:

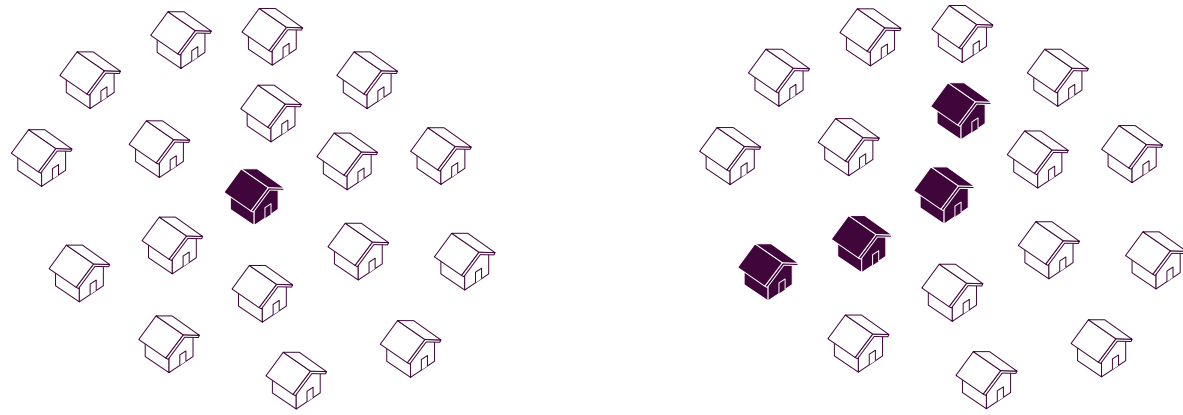
47



- CITY OF LUMBERTON
- HURRICANE MATTHEW EXTENTS
- FEMA APPROVED PARCELS
- VACANT PARCELS + PUBLIC OPEN SPACE

CURRENT CONDITIONS

PATTERNS OF DISCONTINUITY



INDIVIDUAL

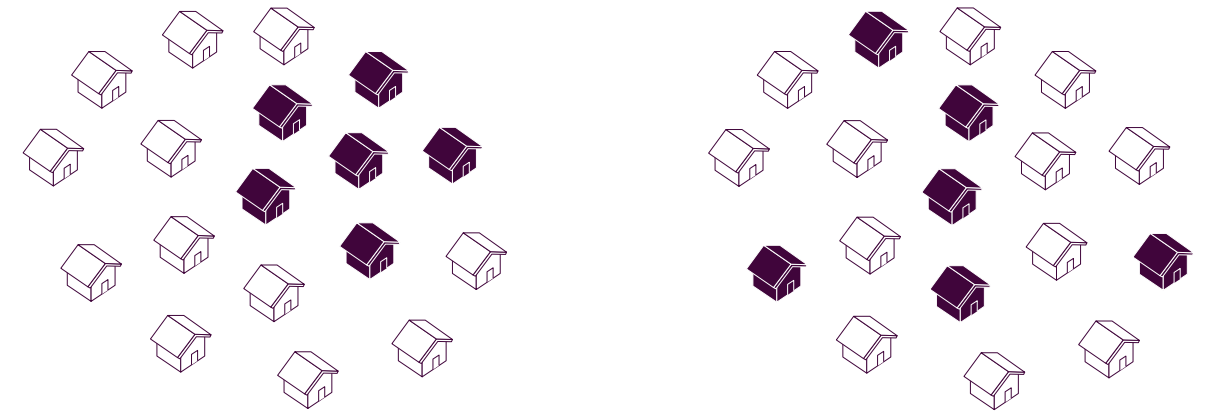
Cause. Individual patterns can occur for a wide variety of reasons. It may be that an impactful event took place in a very small area, it may be that a physical aspect of the property is compromised or inadequately maintained to the same level as surrounding properties, or it may be that an area is actively becoming more prone to flood hazards with many residents taking on repairs, maintenance, and security precautions without vacating a property.

Effect. The patterns of vacancy that cause individual properties to become isolated need to be evaluated for environmental context on a case-by-case basis. The contextual determinants resulting in isolation will signal if a single property is situationally unique, or potentially the start of a larger pattern of neighborhood vulnerability, risk, and deterioration. If determined to be an outlier among surrounding parcels, the city should consider tactical approaches to programming and beautifying individual lots (i.e., leasing the lot to adjacent neighbors or converting the lot into a community garden space). Conversely, if part of a larger trend of vacancy due to flooding in an area, individual lots can play a key role as linkages that connect greenway systems or provide communal park space (depending on location and presence of existing on-site infrastructure).

EDGE

Cause. Edge conditions typically occur in linear patterns, and often represent narrow bands of flood-prone areas where development has too closely encroached into floodways and floodplains. In Lumberton, these patterns are most notable along tributaries that eventually feed into the Lumber River. Oftentimes these tributaries have been altered by ditch-building activities. These constructed, functionally altered canals attempt to narrow floodable areas in lieu of houses, streets, and other neighborhood infrastructure components.

Effect. Neighborhoods that have edge-type patterns of discontinuity can experience an ununified, disrupted streetscape appearance. In some cases the resulting effect equates to undesirable views from neighboring yards to houses that are left unoccupied, or to continuous strings of vacant properties that may unevenly impact one side of the street. However, the composition of these edges, if contiguous, can be transformed into a recreational amenity as a corridor to connect neighborhood residents to larger greenway and park networks along tributaries.



CLUSTERS

Cause. Cluster patterns in Lumberton most often occur in areas where development is present within wider floodplains, such as the Lumber River. These compositions are in many cases a direct result of development that was incentivized after the initiation of the National Flood Insurance Program (NFIP) in 1968. This position is reinforced by the fact that there were not any homes built south of the Lumber River or along the major tributaries in north Lumberton prior to 1970.

Effect. Cluster patterns of vacancy need to be evaluated for their environmental context on a case-by-case basis. In some instances, the remaining neighbors of the vacated cluster of houses may be just as vulnerable as the cluster itself. In other instances, the environmental hazard may be isolated to just the affected cluster. Despite the cluster of vacancy usually being the result of a devastating event, the opportunities that exist to create public amenities is significant. Clusters, depending on size, can be the basis of an entirely new recreational amenity on its own, or it could easily adjoin a neighboring recreational amenity, should it exist, without extra property acquisitions.

CHECKERBOARD

Cause. Similar to cluster patterns, checkerboard patterns are usually found in areas that have development present within wide floodplains - in Lumberton, this means south of the Lumber River. While the NFIP may have enabled development across this large area, current political and financial mechanisms for relocation activities operate on a property-by-property basis, with many residents electing to stay in place due to issues such as place attachment, insufficient and/or unequal distribution of affordable housing options, and affinity for existing neighbors.

Effect. Because checkerboard patterns often occur within larger floodplain areas, residents that continue to occupy their homes remain equally as susceptible to future flood damage. Checkerboard patterns present a wide array of challenges for municipalities by requiring them to continue services to areas with shrinking and disconnected populations. Furthermore, the irregular patterns of occupied/vacant lots can impact public safety, social cohesion, and economic development. Creating public amenities within a checkerboard pattern likely needs.

CURRENT CONDITIONS METHODOLOGY FOR ACTIVATION

At the core of the Floodprint model is the use of land-planning techniques to promote public amenities for recreation and water storage in areas most acutely affected by floodwaters.

GUIDED BY LAND-PLANNING TECHNIQUES

Several Lumberton neighborhoods were impacted by the catastrophic floods caused by Hurricanes Matthew and Florence. The aftermath of which has left a scatter plot of vacant and/or underutilized properties throughout the city, further exacerbating existing vulnerabilities of these affected areas.

In some cases, the City of Lumberton becomes the owner of such properties, and ultimately bears the responsibilities of upkeep and management. In small communities like Lumberton, post-disaster decreases in taxbase coupled with spatial discontinuity between vacant properties can quickly make the task of land management an overwhelming burden. Additionally, in this condition, vacant and/or flood-prone properties are not typically utilized in ways that serve an ongoing public benefit. Instead, vacant and/or flood-prone properties remain undesigned, become troublesome to maintain, and are often viewed as a nuisance.

This need not be the situation.

If planned accordingly, neighborhoods, towns, and cities have the opportunity to transform Individual, Edge, Cluster, and Checkerboard discontinuities into community assets. While decisions surrounding a property owner's ability and choice to rebuild or relocate are highly individualized, this report uses methods intended to clearly and concisely illustrate land-use plans and strategies to inform individual, neighborhood, and citywide decisions in pursuit of broader community benefits. The following questions guided this study:

What if, unlike existing programs that consider only single parcel acquisition, future planning decisions were guided by a process that assesses individual parcels within the framework of the larger community context, including graphically depicting the outcomes of various planning and policy scenarios? What role might future greenways, stream restorations, and/or park spaces play in the long-term management of flood-prone properties? What are the potential benefits of connecting, partitioning, and/or conserving vacant and/or flood-prone properties to serve multiple environmental and social functions?

The objective of the Floodprint model is to find opportunities to move disaster recovery and resiliency planning activities in this optimistic and opportunistic direction. The following pages provide four examples of these possibilities in and for the City of Lumberton.

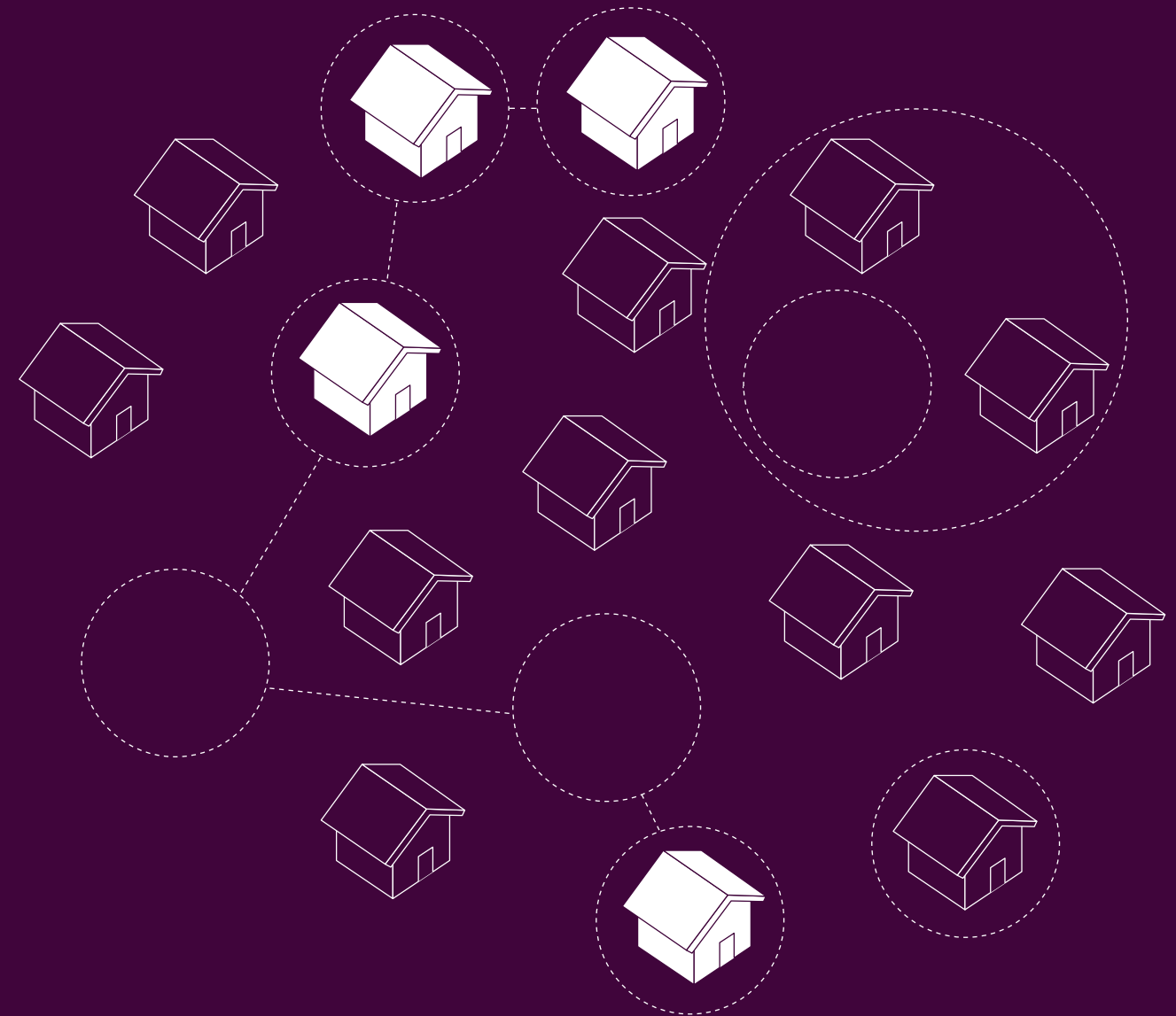


DIAGRAM: Methodology for activation in Floodprint model.

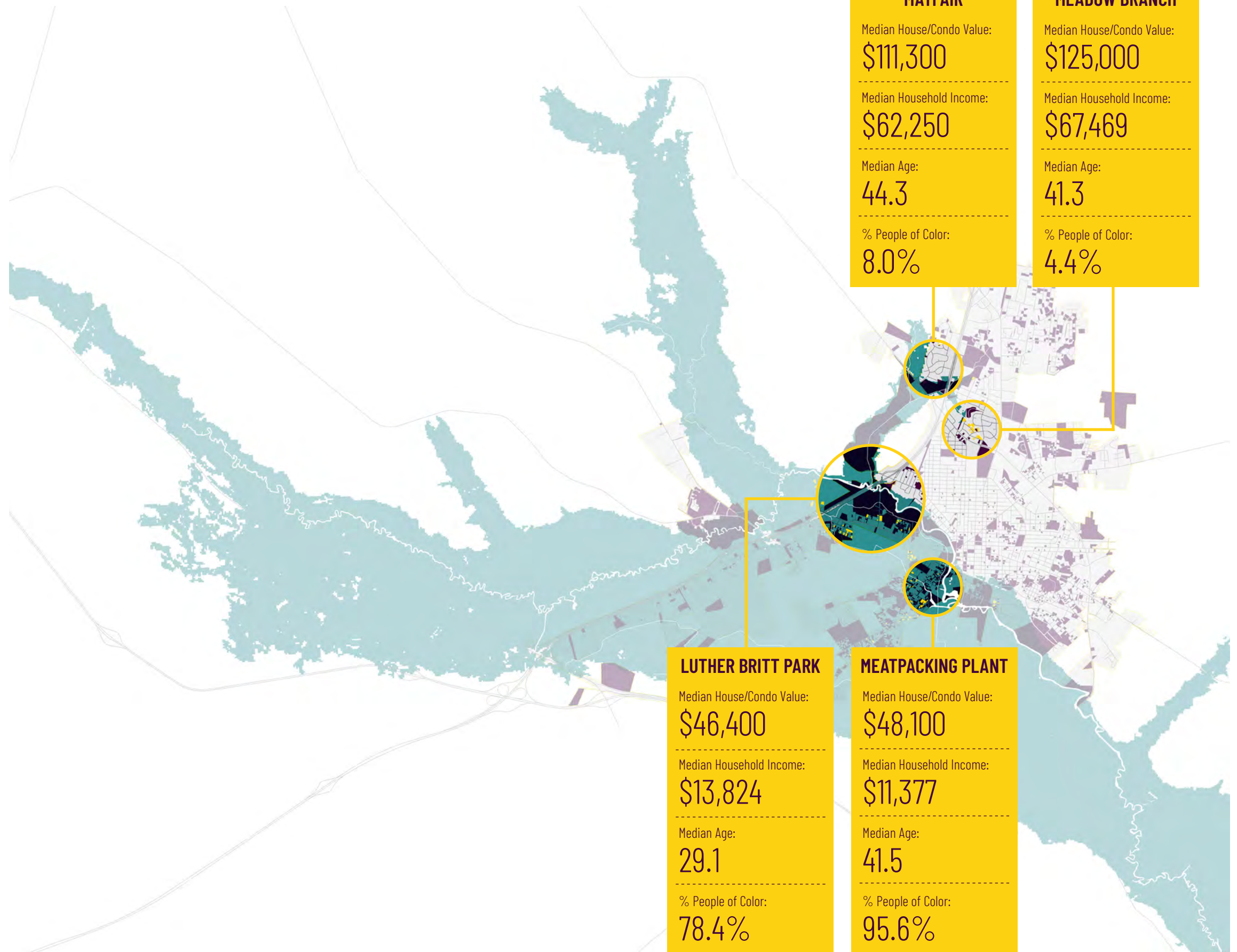
CURRENT CONDITIONS FOCUS AREAS

IDENTIFYING OPPORTUNITIES FOR IMPACT

Current research has shown that if managed properly, vacant land can serve as a catalyst for reconnecting natural systems, nurturing strong social bonds, and providing essential ecosystem services to areas undergoing transformation (Newman et al., 2017). In order to realize these benefits, vacant lands must be evaluated in the context of the entire community's landscape so larger planning and design strategies can be identified. This enables a system-wide understanding of important issues such as: vulnerability to flooding (including causes), ecological significance, and asset connectivity (existing and potential). Once these criteria are mapped, issues and opportunities related to management of vacancies within the system become clearer. The figure to the right shows areas where vacant parcels and existing lands owned by city, state, or conservation groups contain beneficial traits to be applied in the Floodprint model.

for reference

LUMBERTON	NORTH CAROLINA
Median House/Condo Value: \$102,939	Median House/Condo Value: \$165,400
Median Household Income: \$34,066	Median Household Income: \$50,584
Median Age: 34.4	Median Age: 38.7
% Non-White: 63.6%	% Non-White: 28.8%



FOCUS AREAS

A CONNECTED VISION: LUMBERTON LOOP

This report's focus areas represent a portion of the most flood-prone areas of Lumberton. These areas are commonly, and solely, viewed as environmental hazards. However, these same areas hold the potential to also serve as public amenities through the provision of active recreation, especially when connected to existing land holdings held by the city, county, and conservation groups. Coined the "Lumberton Loop", **this organizing concept would connect 806+ acres, over 99% of which are in the 100-year floodplain, through a citywide trail network.**

LUMBERTON LOOP QUICK FACTS AND FIGURES

Total Length of Proposed Trail Network:

8.52 miles

Individual Land Holdings Connected:

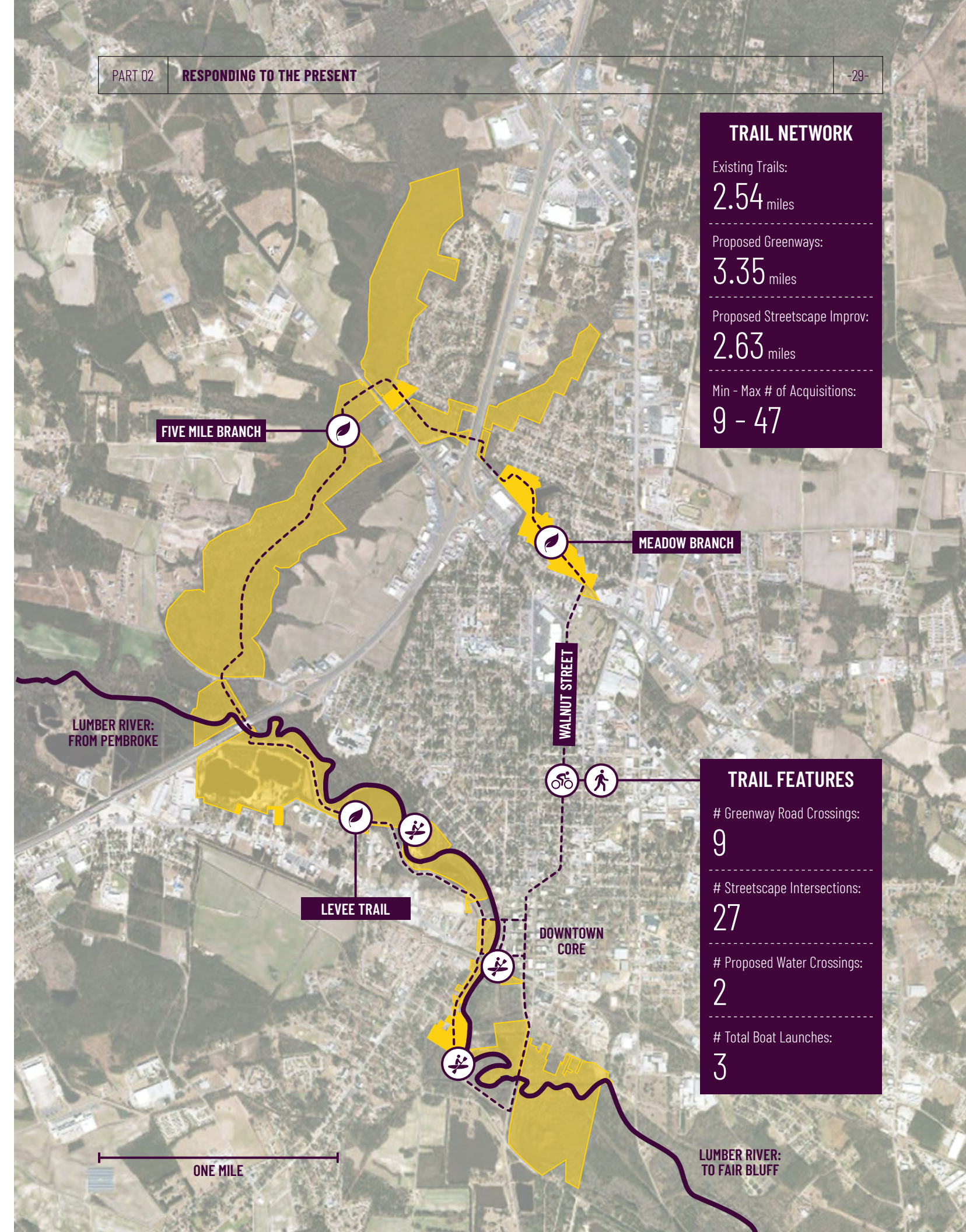
108 properties

Total Acres Connected:

806 acres

MITIGATION MEETS RECREATION

The lands identified in the Lumberton Loop proposal are within the 100-year floodplain. The highest and best of land within a floodplain is to serve its natural function – attenuation of flooding through the absorption and slow release of rising waters. While buyouts, conservation easements, and city/county parks often acquire these environmentally sensitive land holdings for conservation and hazard mitigation purposes, these lands can collectively provide a landmark recreational and flood infrastructure asset for the City of Lumberton. The Lumberton Loop concept (originally conceived in the Homeplace document) serves as a large-scale, unifying element connecting each of the report's focus areas into a high-functioning, greenway system.



TRAIL NETWORK

Existing Trails:

2.54 miles

Proposed Greenways:

3.35 miles

Proposed Streetscape Improv:

2.63 miles

Min - Max # of Acquisitions:

9 - 47

TRAIL FEATURES

Greenway Road Crossings:

9

Streetscape Intersections:

27

Proposed Water Crossings:

2

Total Boat Launches:

3

FOCUS AREAS

MEADOW BRANCH: FLOODWAY RESTORATION

PRECINCTS

1, 2, 8

COMPOSITION

Edge

RCRRP STRATEGY

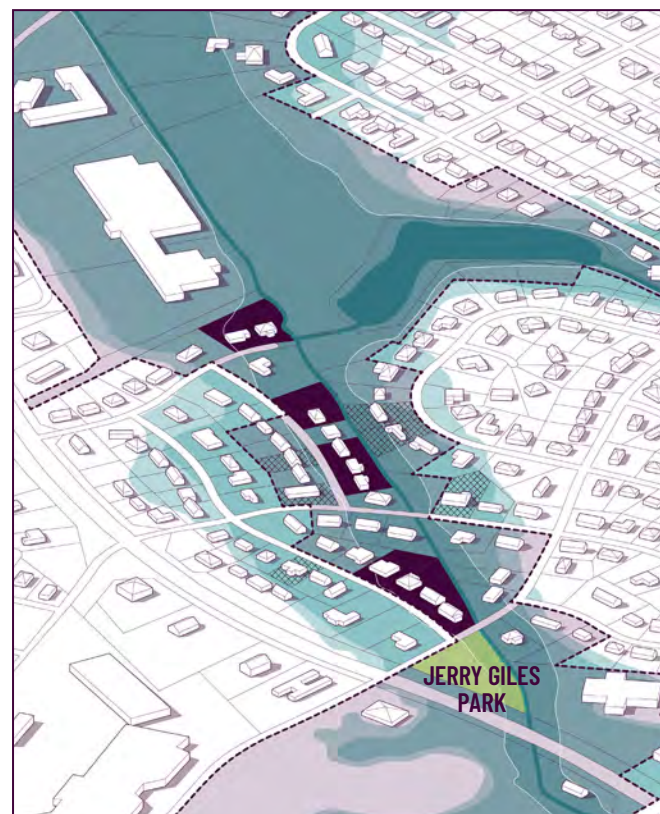
Environmental Action 34

LRP RECOVERY ACTIONS

Projects: 7, 19, 25, 26, 28

PROJECT SUMMARY

From the 2018 Robeson County Hurricane Matthew Resilient Redevelopment Plan: "Most of the homes along Best Drive in Lumberton were flooded during Hurricane Matthew and most of the homes that were flooded are in the floodway of Meadow Branch. Being in the floodway these properties are exposed to high velocity flows of water and debris. They are also routinely flooded and sustain damage form smaller rainfall events. This project would include the purchase and removal of homes in the Meadow Branch Floodway and then development of a linear park along the banks of Meadow Branch. The result of this project would be the elimination of flood risk to people living in these homes, elimination of flood damage, improved conveyance along Meadow Branch and reduced flood risk for remaining residences. Additionally, improved quality of life for residents who are able to access the park."



BUYOUT + FLOODWAY INTERSECTING PARCELS



PRIMARY ACQUISITIONS (+4)

In accordance with the Redevelopment Plan outline, this recommendation identifies parcels that: 1) intersect the floodway, and then 2) connects adjacent properties within the floodplain to create a single conglomerate of acquisitions for a new linear park. The propositions shown in the figures below illustrate a phased approach that could be taken to connect currently approved FEMA acquisition properties (dark purple) with the existing Jerry Giles Park to create a new amenity. Successful implementation of this proposal is reliant on the primary acquisition of four (4) additional properties on the southern side of Meadow Branch that can collectively create the preliminary footprint for a linear park along Meadow Branch. However, only acquiring these four properties, and even all properties in the floodway, still leaves many homes in harm's way and would contain resemblances of vacancy due to missing gaps in street presence. This circumstance is addressed through a series of secondary acquisitions (31 properties) that seeks to further remove at-risk houses from the floodway and floodplain, while considering the physical nature necessary to create a spatially functional streetscape.



SECONDARY ACQUISITIONS (+31)



MEADOW BRANCH PARK + LUMBERTON LOOP

FOCUS AREAS

MEADOW BRANCH: FLOODWAY RESTORATION

This proposal would extend the footprint of Jerry Giles Park to create an enhanced **linear park and trail system** within the floodway and floodplain of Meadow Branch.

BENEFITS AND TRADE-OFFS

There are many ecological, recreational, and economical advantages in pursuing the larger conglomerate of properties for a linear park as shown in this report. As delineated, the new Meadow Branch Park would connect many nearby residencies to an amenity while also helping convey and store stormwater during high-volume events.

Conversely, these properties are peoples' homes, and the sentimental attachment to a house or a neighborhood is a real concern that must be addressed for this project. Given the amount of individual land holdings that would need to be acquired to realize the more holistic vision of Meadow Branch Park, it is more than likely that not all individual property owners will agree to relocate even when presented with this plan. Should not all property owners agree to relocate, this project can still be achieved with the acquisition of the identified properties to connect already approved buyouts.

However, larger scale acquisition of land holdings would enable a more genuine park system that has the ability to: apply for more grants, be eligible for more financial support to implement, open up additional opportunities for co-management of the park with conservation-focused groups, and significantly reduce the flood hazard risk for this community.

The Town of Lyons, Colorado has enacted a program that can be used as a case study for how to provide an additional level of stewardship in between phases of property acquisition by the City. In Lyons, the town incentivized a program that allowed adjacent property owners to lease vacated lots for allowed landscaping and gardening uses. In an effort to reduce the spatial disconformity that may persist during a multi-year process of property acquisition, this method provides a way to minimize the appearance of vacancy. More information on this example from Lyons can be found in the Appendix section.

Potential funding sources and partners listed in the LRP (2018) include but are not limited to: Golden Leaf Foundation, NC Department of Environmental Quality (NCDEQ) 319 Program, HMGP, CDBG-DR, Clean Water Management Trust Fund (CWMTF), Division of Parks and Recreation (State Trails Program), NC Disaster Recovery Act funding, and the Economic Development Administration (EDA).



EXISTING



PROPOSED

RE-VEGETATED
FLOODPLAINWIDENED
BUFFERLUMBERTON
LOOP TRAIL

FOCUS AREAS

MAYFAIR: RECREATION EXPANSION

PRECINCTS

1, 3

COMPOSITION

Individual

RCRRP STRATEGY

Expand Recreational Lands

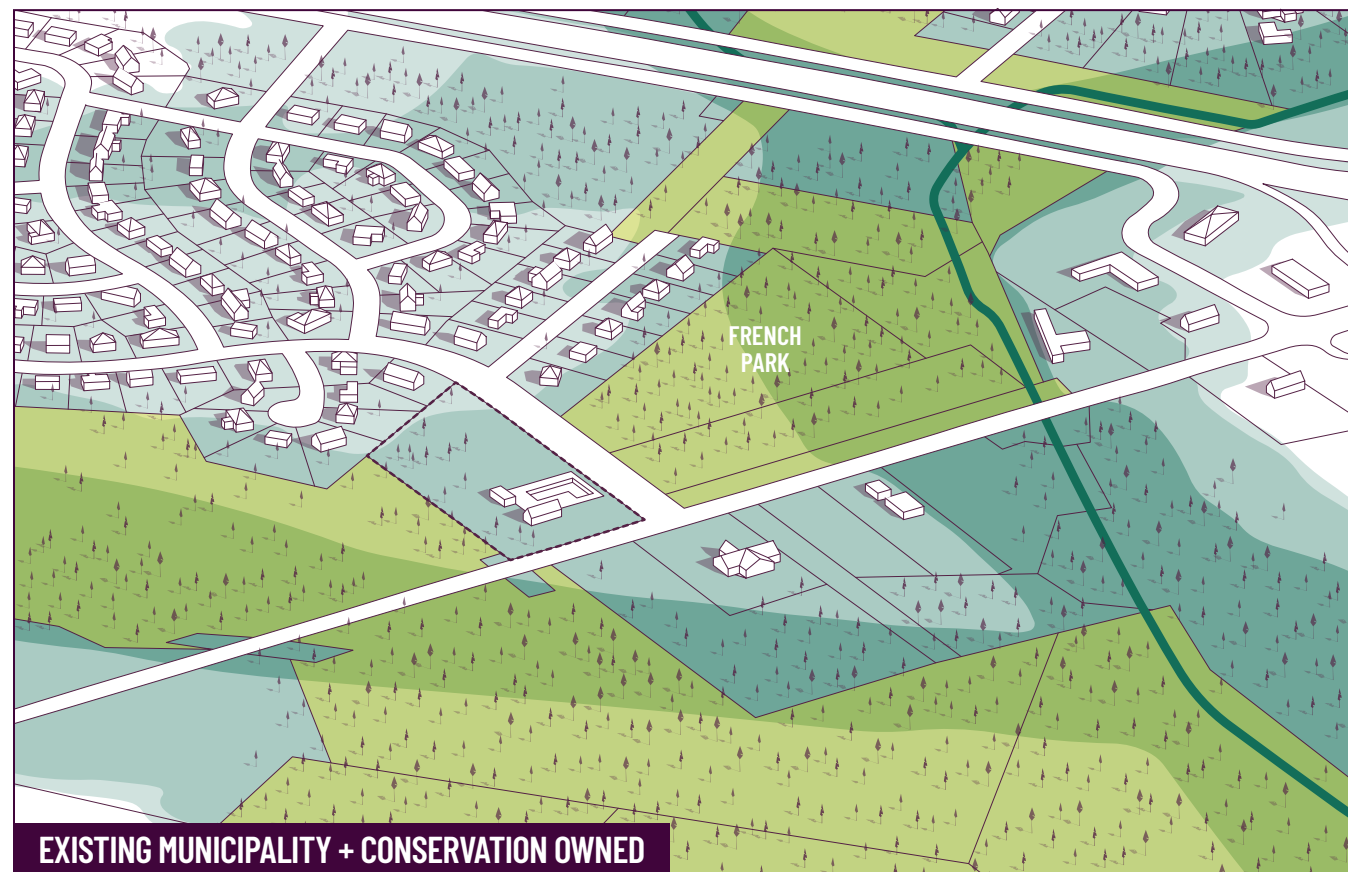
LRP RECOVERY ACTIONS

Projects: 7, 15, 25, 26, 28

PROJECT SUMMARY

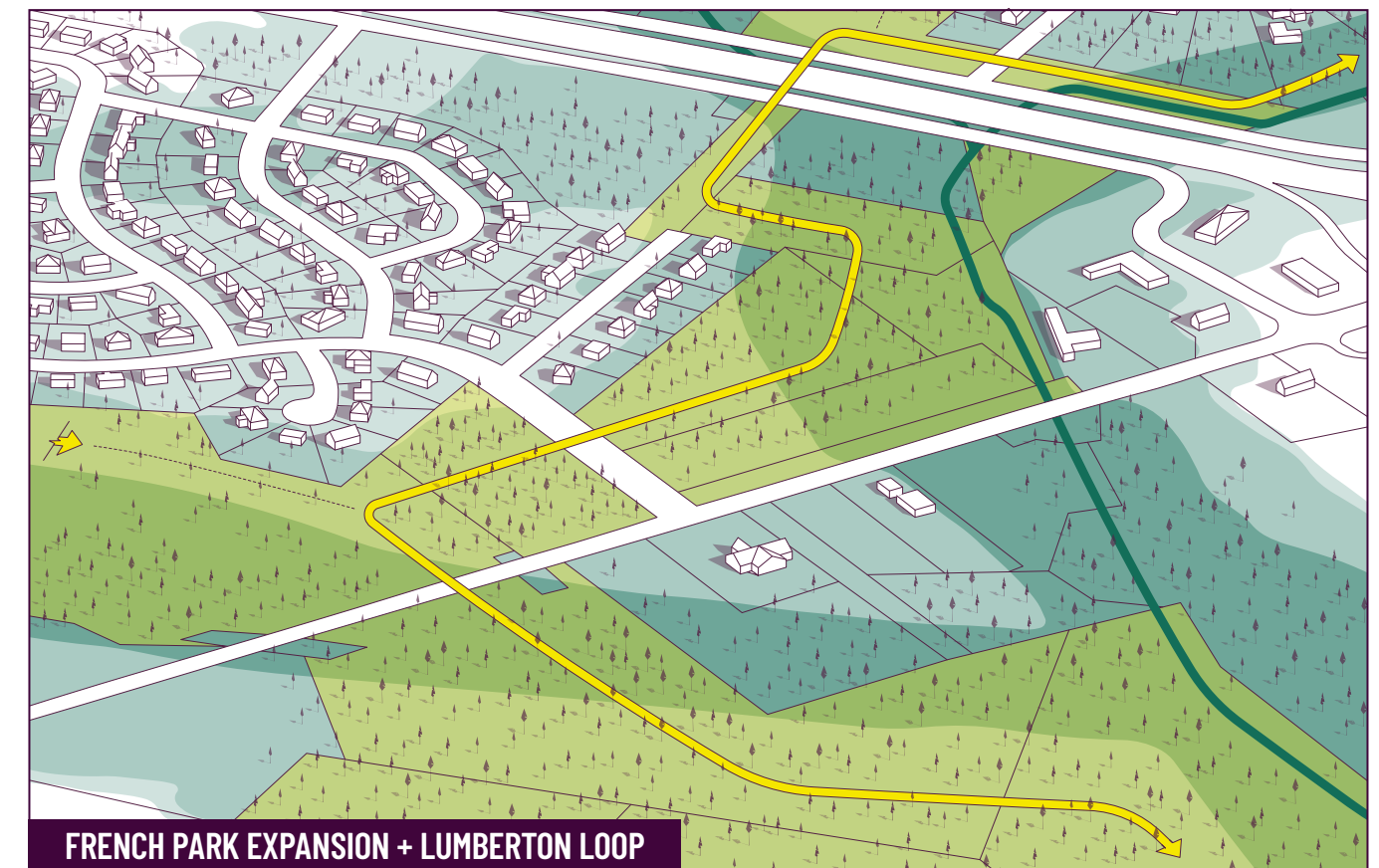
From the 2018 Robeson County Hurricane Matthew Resilient Redevelopment Plan: "Increase the amount of land in the floodplain that is used for recreational purposes. Provide trail access to community along easements obtained for ditch and stream restoration. Mark trails and maintain trails. This would help to maintain floodway along ditches and streams."

Northwest Lumberton contains several tributaries to the Lumber River that have experienced severe flooding during Hurricanes Matthew and Florence. Much like the aforementioned Meadow Branch, Five Mile Branch is one of these described tributaries. The Mayfair neighborhood, which exists just to the west of a portion of Five Mile Branch,



is almost entirely in either the 100- or 500-year floodplain. Despite the environmental hazard that these homes face by being situated in a floodplain, there were not any accepted HMGP applications from Hurricane Matthew in this neighborhood (and no application data from Hurricane Florence was available at the time of this report). The condition of the neighborhood suggests that residents will continue to live in this neighborhood for the foreseeable future as opposed to retreating. Should future HMGP and/or CDBG applications be accepted for Mayfair, the applicable homes can follow similar recommendations as provided for Meadow Branch in this report. However, for the time being, there is an immediate need to consider future uses for the vacated communal swimming pool at the entrance of the neighborhood.

As illustrated below, this particular lot is the last remaining piece of the puzzle that could connect city, state, and conservation lands via the proposed Lumberton Loop trail.



FOCUS AREAS

MAYFAIR: RECREATION EXPANSION

This proposal would demo the existing abandoned swimming pool and **establish a new stand of pine trees and trail** in its place - connecting larger networks of lands for public recreation.

BENEFITS AND TRADE-OFFS

Proactively afforesting this parcel would provide multi-pronged benefits to the residents of the Mayfair neighborhood. As a result of the repetitive damage caused by Hurricanes Matthew and Florence, the communal swimming pool has endured significant damage and is believed to be unusable without major repairs.

This proposal would eliminate the risk of future damage and costly repair by demolishing the pool and planting a new stand of pine trees in its place. Doing so would not only alleviate the appearance of vacancy upon entry into the neighborhood, but it would also provide the missing link necessary to connect large patches of city, state, or conservation group-owned land that surrounds the Mayfair neighborhood on all sides.

This reforested plot would at that point allow for a continuous greenway to be implemented from Meadow Branch, to Mayfair, then down Five Mile Branch until reaching the Lumber River (moving north to south).

There would be some potential costs associated with the acquisition of the property, the demolition of the swimming pool, the planting of trees, and the establishment of a trail through this section of the proposed Lumberton Loop. However, the cost of all of these elements is one that has

the potential to be great subsidized through HMGP and/or CDBG-DR funds due to the clear public benefit that this recommendation would be providing (to both the residents of Mayfair and a wide-range of greenway-using constituents throughout the city of Lumberton).

Projects like this are ones that the city of Charlotte regularly takes on as part of their "Rainy Day Fund" further explained in the Appendix section of this report - and would also be in alignment with Project #3 in the Lumberton Recovery Plan (LRP) if additional steps were to be taken by Lumberton City Council to set up a funding mechanism of this nature.



FOCUS AREAS

LUTHER BRITT PARK: STORMWATER AMENITY

PRECINCTS

4, 8

COMPOSITION

Cluster

RCRRP STRATEGY

Expand Recreational Lands

LRP RECOVERY ACTIONS

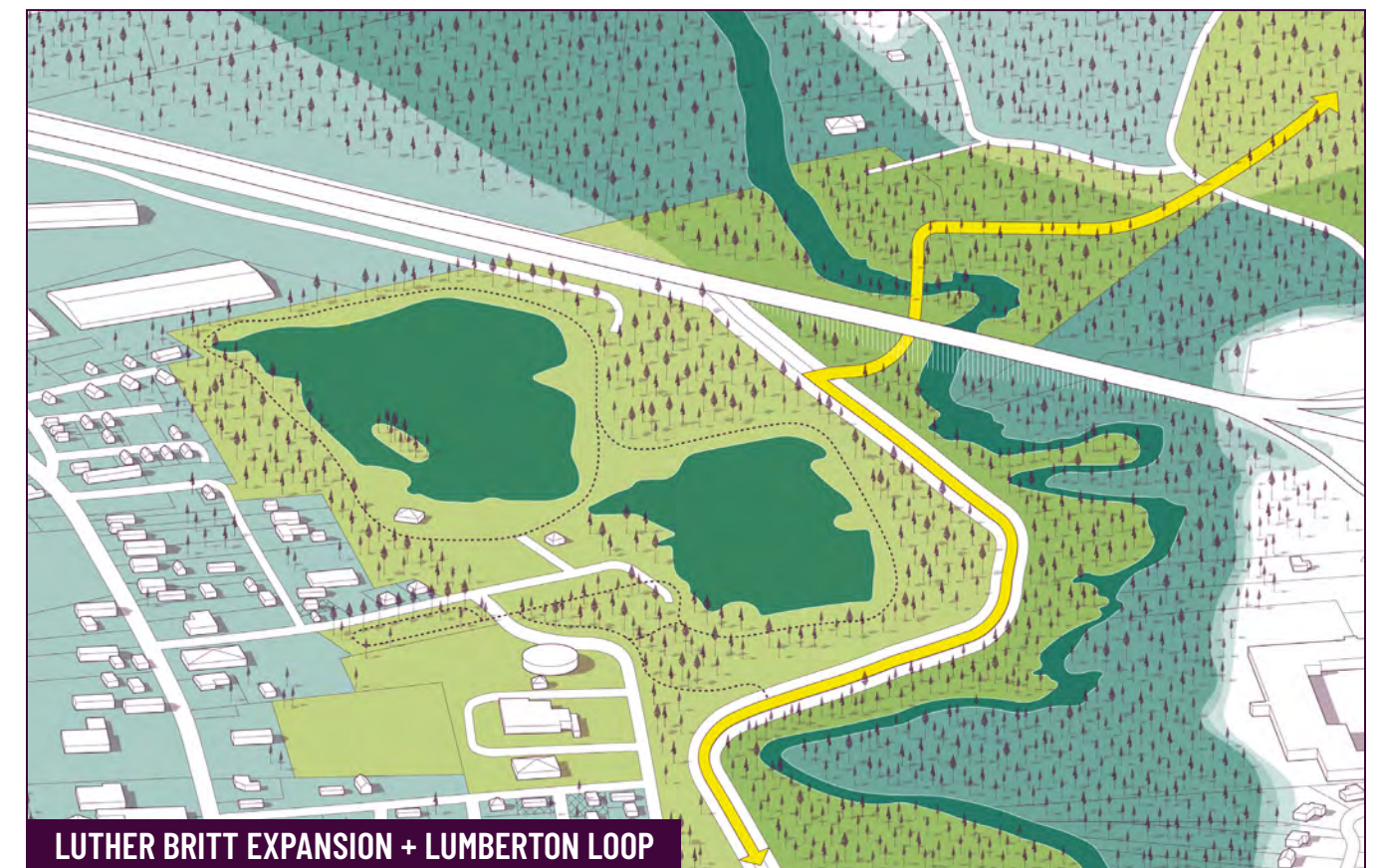
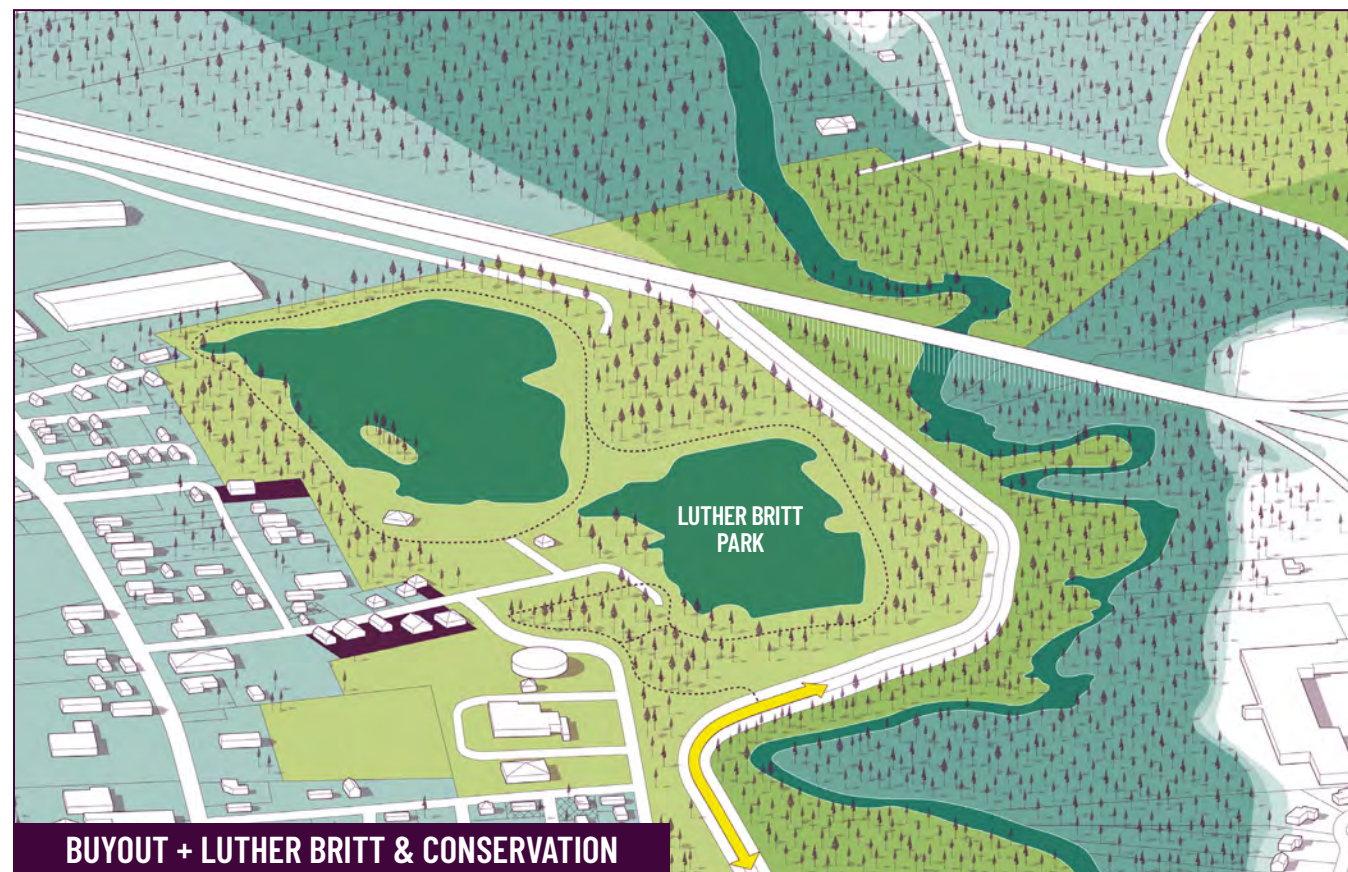
Projects: 6, 19, 25, 26, 28

PROJECT SUMMARY

From the 2018 Robeson County Hurricane Matthew Resilient Redevelopment Plan: "A large portion of damage experienced during Hurricane Matthew resulted from stormwater system failures. System owners do not have a current assessment of stormwater systems throughout the county and inspections are needed to determine if infrastructure is functioning properly/ as designed and how the systems should be repaired to function properly. Target areas of frequent shallow flooding in the county..."

Much of south Lumberton is within the 100- and 500-year floodplains, and in effect, represent some of the most likely properties to experience frequent shallow flooding as well as repeat flood loss. As stated in the Redevelopment Plan, properties in these floodplains that can be

used for recreational purposes need to be considered for that need in lieu of a permanent residence, and in this case, for additional stormwater capacity. The collection of six (6) FEMA-approved acquisition properties adjoining Luther Britt Park could serve as a compatible location for an educational stormwater amenity - simultaneously creating an enhanced entry sequence to the existing park. Illustrated in the figures below are the properties already approved for acquisition via FEMA acquisition (dark purple) and properties owned by city, state, or conservation group institutions (light yellow).



FOCUS AREAS

LUTHER BRITT PARK:
STORMWATER AMENITY

This proposal would extend the footprint of Luther Britt Park to create a recreation-focused, interactive **wetland and water storage area** along the entry drive into the park.

BENEFITS AND TRADE-OFFS

As evident through site photographs taken at various dates, and re-affirmed by soil maps from the U.S. Department of Agriculture (USDA), this area contains very hydric conditions in its natural state. Even after marginal precipitation events, the ground has little capacity to remain dry. In considering the parcels that could be acquired as part of a Luther Britt Park expansion, the appropriate programming of such space is vital in determining its ecological and recreational utility. This section of the report recommends that the land be topographically molded and natively re-vegetated to support a functional wetland.

Given the surrounding building uses (water treatment plant, church, businesses), the desire for additional stormwater storage is likely one that would be supported by adjacent constituents. And should the properties being considered for expansion of the park be connected to existing pathways via a walking loop, it can provide an additional low-cost feature to Luther Britt and the Lumberton Loop Trail. Proceeding with a plan similar to the described would align with funding sources such as: Environmental Protection Agency (EPA) Stormwater Management and Green Infrastructure Grants, and the National Recreation and Park Association (NRPA) Great Urban Parks Campaign.

Lastly, many of the base materials necessary for sidewalks and wetland impoundments are already on site, and can be recycled during the demolition process of the existing houses at these locations. The "Field Guide to Working with Lots" as published by Detroit Future City (2015) provides several examples of planting schemes and recycling methods for achieving this result. A summary of select information from the Field Guide is provided in the Appendix section.



FOCUS AREAS

MEATPACKING PLANT: ECONOMIC DEVELOPMENT

PRECINCT(S)

2, 5, 7, 8

COMPOSITION

Individual

RCRRP STRATEGY

Downtown Revitalization

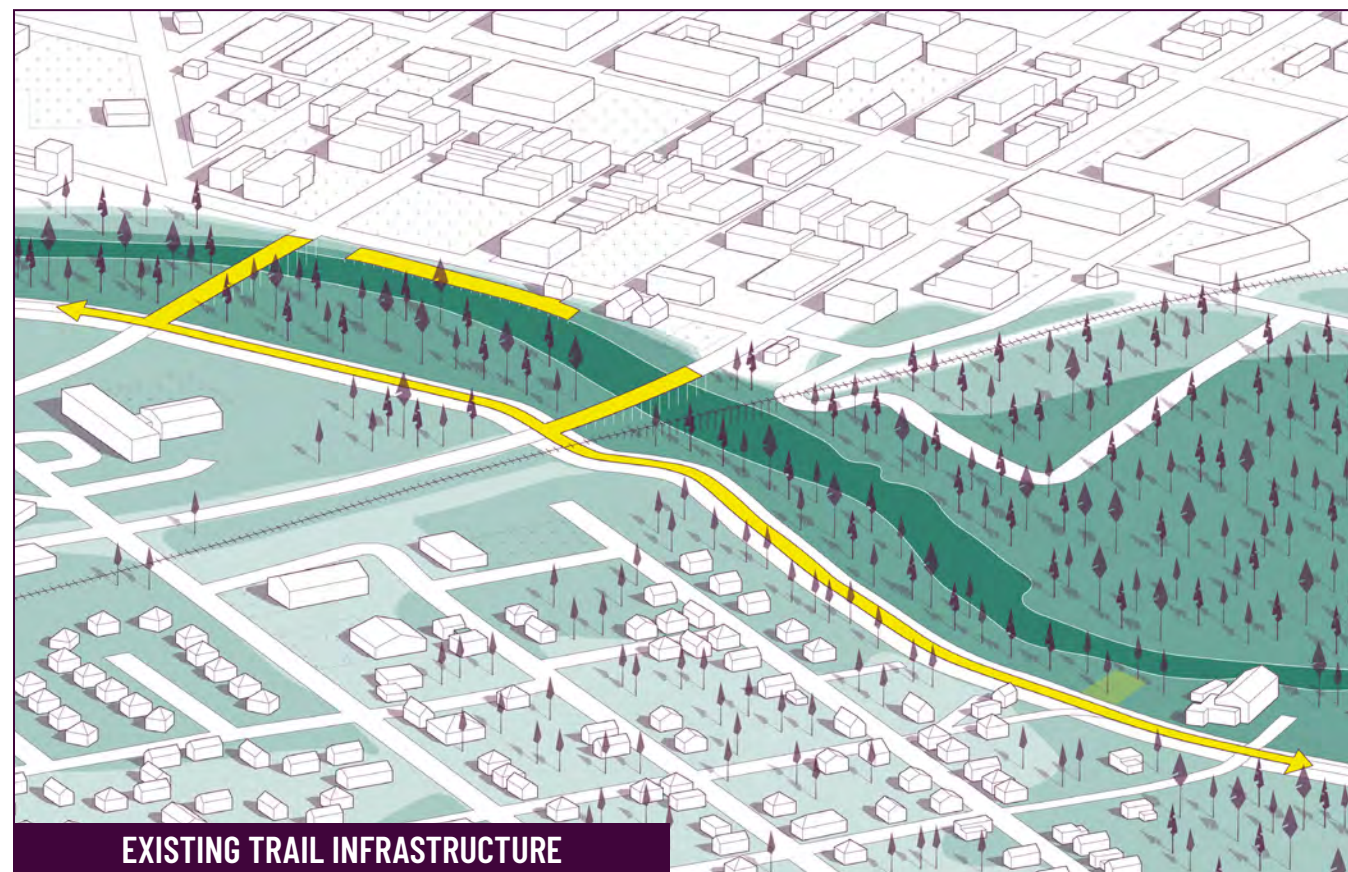
LRP RECOVERY ACTIONS

Projects: 15, 16, 19, 24, 25

PROJECT SUMMARY

The Robeson County Resilient Redevelopment Plan makes note of several economic development initiatives that involve "downtown revitalization or rehabilitation" - however, most of these recommendations and action items do not apply to Lumberton. While much of downtown Lumberton does not necessarily sit within mapped floodplains, the buildings and property owners still experience the ill-effects of flood loss in the community. One possible economic development package should involve the revitalization of programs and areas in downtown Lumberton that can take advantage of the assets afforded by the Lumber River.

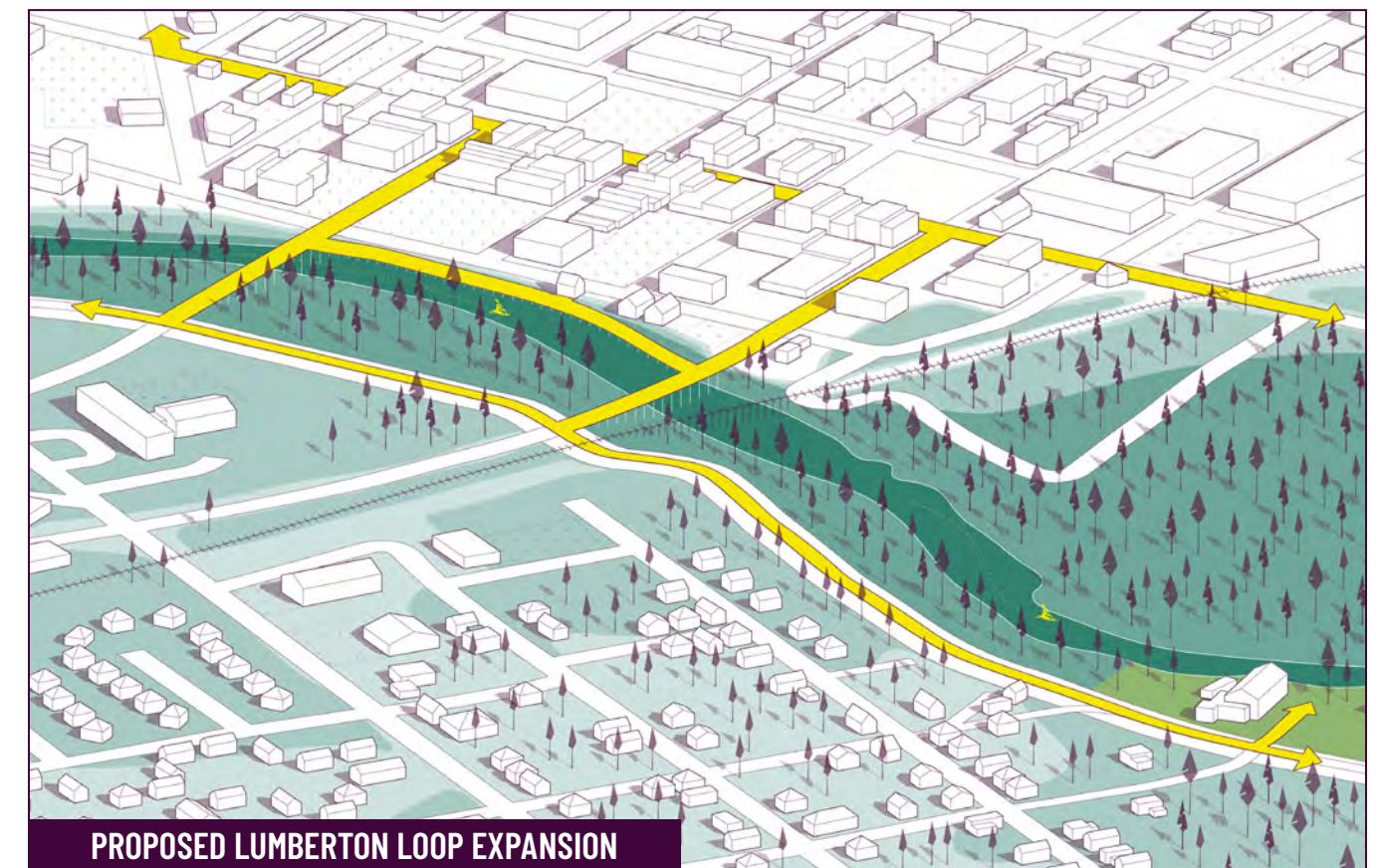
This recommendation looks specifically at the site of the former Scottish Meatpacking



EXISTING TRAIL INFRASTRUCTURE

Plant as a location to capitalize on the economic development potential of the Lumber River. This does so by proposing a retrofit of the existing building an lot to serve as communal gathering space centered around the flood-proofing of the existing building shell that still exists.

This project would provide a much-needed, floodable, destination on the south side of the Lumber River and would further promote walking, biking, and rafting activities that downtown Lumberton could be taking advantage of if more robust programs were in place.



PROPOSED LUMBERTON LOOP EXPANSION

FOCUS AREAS

MEATPACKING PLANT: ECONOMIC DEVELOPMENT

This proposal would create a **destination for recreational tourism and community gathering** south of the Lumber River that is connected to downtown via greenway and blueway.

BENEFITS AND TRADE-OFFS

Many of the neighborhoods south of the Lumber River have long been prone to the damage that high floodwaters can cause. This has left the area lacking the needed resources and available lands needed for communal gathering spaces.

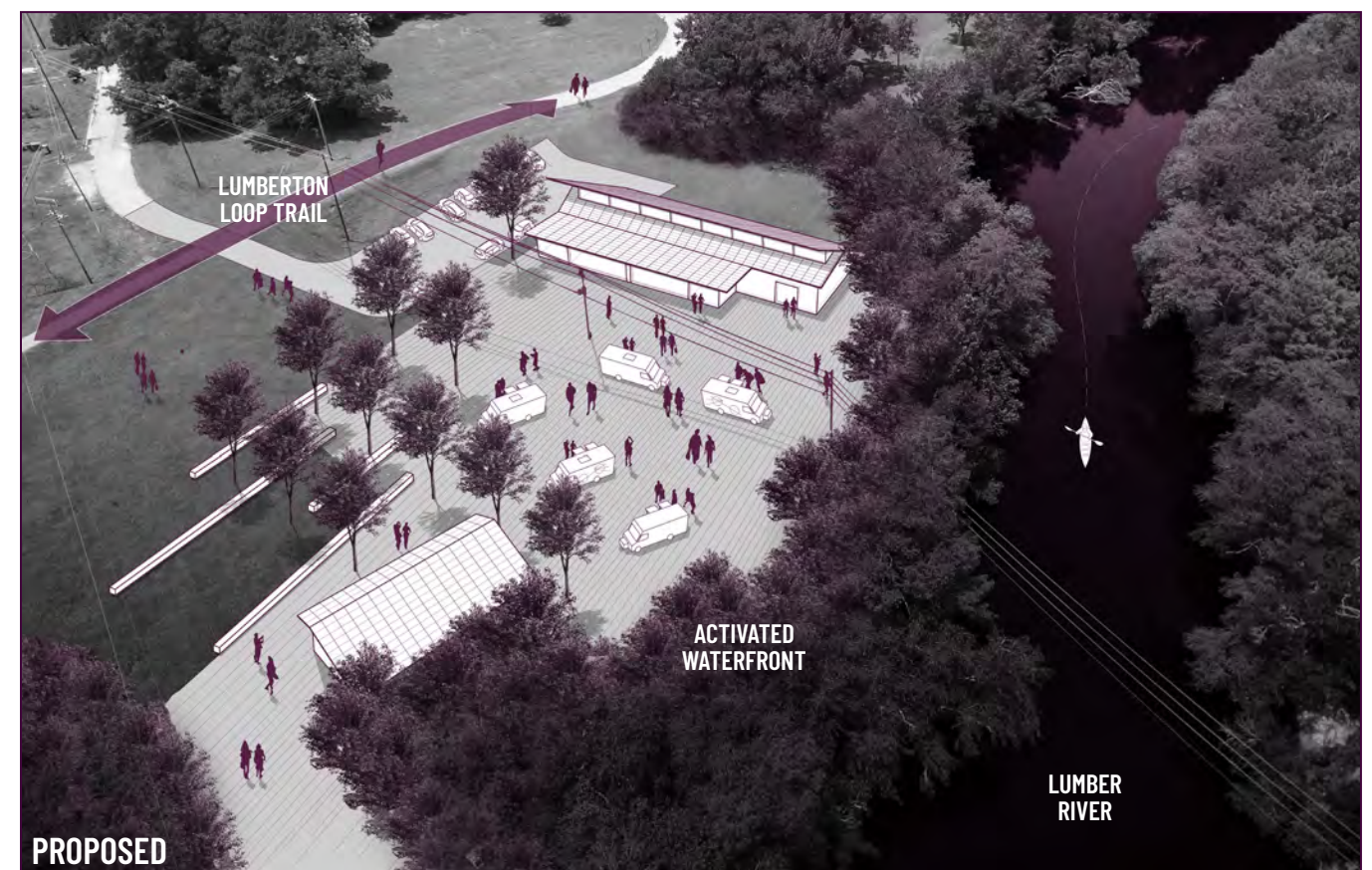
While the slow process of acquisition, elevation, and relocation is currently happening at many residences south of the river, the retrofitting of this building and site could, in the short-term, provide a space of gathering for those that still live in the adjacent neighborhoods. In doing so, this would also provide a long-term asset for recreational tourism that is connected to downtown Lumberton.

Should the site and building be designed and reconstructed to allow for the expected penetration of floodwaters, this site could perform as a resilient landscape that operates as a hub of activity during dry times, and would not fall consequent to severe damages during the rise of floodwaters.

Furthermore, should the full implementation of the Lumberton Loop trail be realized, this site would provide a much stop for refuge, shade, and potentially food/water along the greenway (and potentially a put-in location

for watercraft for both recreational and emergency services).

The biggest obstacle to implementation of this recommendation would be the funding of such a project. The building is technically located in the Lumber River's floodway (and on the water-side of the levee) and would therefore disqualify it from many outside grant sources. The design, planning, and construction of this project would likely need to come from a combination of private and city-based public resources should this recommendation be built.



FOCUS AREAS

CONNECTING PROGRAMS AND PLACES

An advantage of the Lumberton Loop is that it connects areas beyond the downtown to the river as well, while connecting downtown to surrounding parks and neighborhoods.

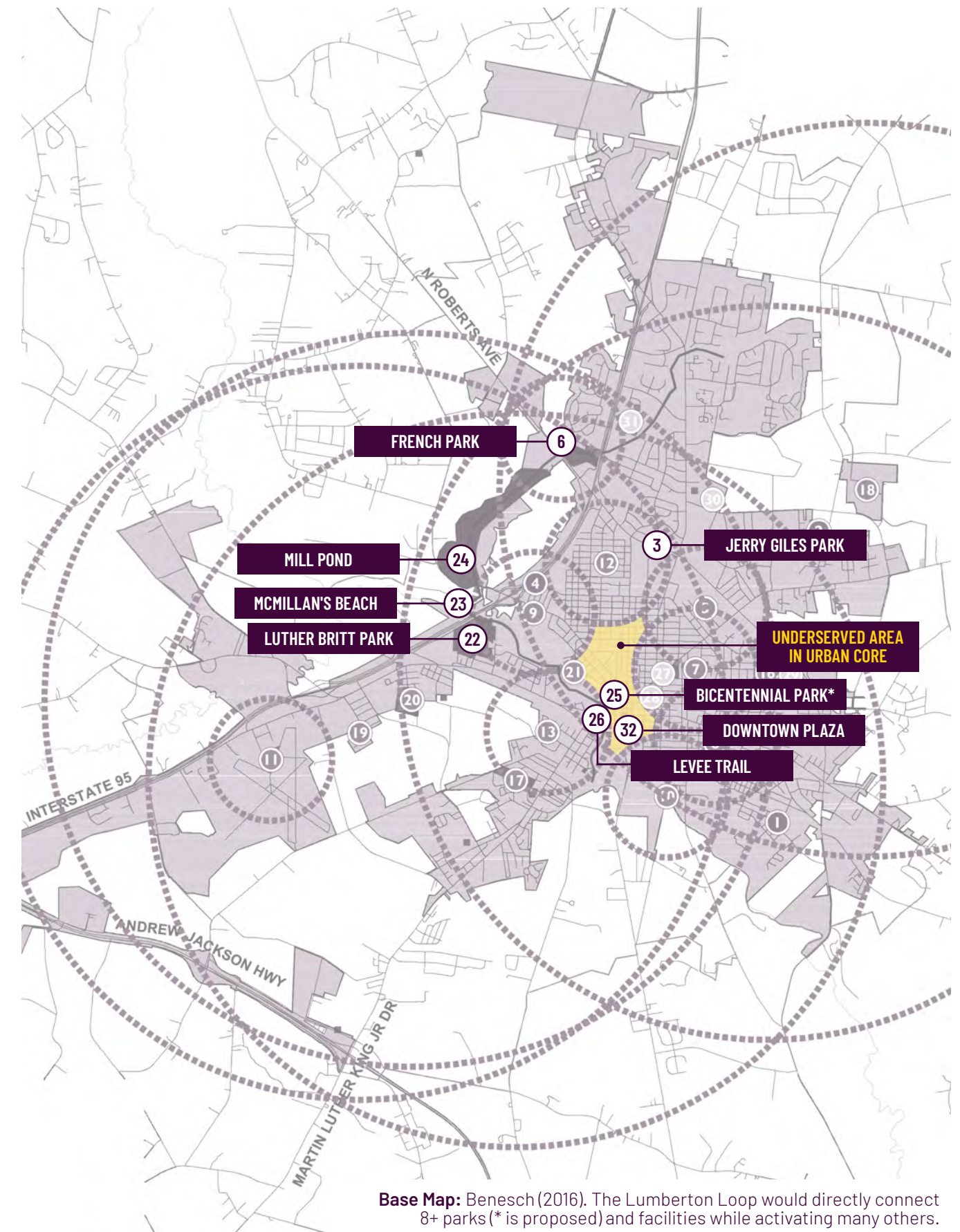
REVIEW OF PREVIOUS LEVEL OF SERVICE GOALS

The team reviewed previous planning efforts, along with the Master Plan Update for parks and recreation that was completed prior to recent floods, to align current post-flood recommendations with previous plans where applicable, and to provide some suggestions for management implications. Looking at the Existing Facilities Map from p. 2-10, it appears as though distribution of parks through the central part of Lumberton, where the Lumberton Loop would go under the current study, is adequate to the east and west, but there is a gap where part of the alignment might go. If the proposed alignment goes through this gap, it could improve connectivity and access to the parks that surround it, and thereby improve access for an underserved part of Lumberton.

The previous Master Plan update prioritized creating an open space/greenway system, with increased utilization of the Lumber River as a recurring theme. The plan also emphasized connecting Downtown with the river (pg. 3-3) and the development of a linear park along the River with enhanced pedestrian activity. The proposed Lumberton Loop connection aligns with and accomplishes these goals from the 2016 plan. The 2016 plan stated that the development of the Riverwalk should be a priority, and that greenways should be planned in conjunction with the overall City open space network. A well-planned trail system was recommended to provide ADA access to all park facilities

and to provide safe, designated walking trails for City residents (p. 4-6). The 2016 plan also called for enhanced opportunities to expand river access, and noted that this should be an important function of the Riverwalk in the downtown area, stating that this should be a priority (p. 4-7). It is also noted that the Riverwalk could greatly expand the visibility and use of the River as it flows through the City (p. 4-9). A key way in which the current study can align with the previous master plan goals is by enhancing connectivity and ADA accessibility to existing parks and by enhancing access to the River, especially in the downtown area.

The 2016 plan noted that park land acquisition was not a priority (p. 3-5). This plan adds land due to buyouts in light of flooding that has occurred. Adding additional lands now is likely warranted and can enhance the service of the parks system while addressing important storm water management issues. The 2016 plan indicated that Lumberton's needs for new parks of various classifications and capacity of existing components were currently met. When new lands are acquired through buyouts and/or flood protection, consideration of adding specific components to address capacities is not a priority. With the exception of walking paths and trails, appropriate uses for the new lands can be determined based on other means, such as ecosystem services, urban shaping, economic development, and greenway/blueway corridors.



Base Map: Benesch (2016). The Lumberton Loop would directly connect 8+ parks (* is proposed) and facilities while activating many others.



PART 03

INTEGRATING RESILIENCY AND VULNERABILITY INTO A HOLISTIC STRATEGY

PREPARING FOR THE FUTURE

INTRODUCTION

In addition to looking at how communities can respond to current resiliency needs and goals, it is also imperative for future vulnerabilities to be identified at a range of scales. This analysis can then be used as a basis of proactive discussion for local constituents and decision-makers within communities. The vulnerability assessment performed as part of this study utilized similar data as what was seen in the Land Suitability Analysis (LSA) for Lumberton, but adds additional layers of data to be inclusive of environmental, social, and economic conditions.

EVALUATION FRAMEWORK VULNERABILITY ASSESSMENT





CONTENT, CONTEXT & CONNECTIVITY

While many of the most vulnerable areas shown in this assessment are locations in the city that have long-seen the ripple effect that flooding can have on social and economic conditions, there are other areas identified (north of the river) that have not always held these correlations.

Using the factors listed to the right, it can be determined whether or not individual properties are valuable as part of collective flood mitigation and redevelopment strategies. With this information it is hoped that community-members can become more aware of risks to make proactive decisions regarding vulnerable lands. The following parcel based evaluations utilize a weighted overlay system to show where land is: 1) most valuable for flood-loss reduction / mitigation, and 2) most valuable for strategic re-development goals in and around Lumberton. Each overlay layer represents a specific criteria associated with these identified parameters of study. The darker the parcel appears on the overlay map, the more layers of criteria it meets.







CONTENT What's in it?

-  Vacant
-  Land contains no built structures
-  50% or greater canopy coverage
-  Contains structure valuable for redevelopment goals






CONTEXT What's it within?

-  Intersecting the Floodway
-  Within Lumberton's 10 Most Vulnerable Census Block Groups
-  Intersecting the 500-Year Floodplain
-  Adjacent to or Within a Critical Ecological Area (Within 250 feet of or inside contiguous patches of Forest or Wetland).

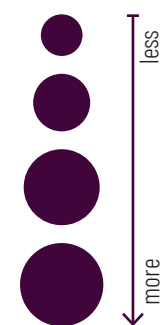


CONNECTIVITY What can it be a part of?

-  Adjacent to Publicly Owned and Conservation Land
-  1/3 of a Mile or Less From a Public Park
-  Adjacent to the Lumber River
-  Adjacent to Lumberton Levee Trail

for reference

WEIGHTED OVERLAY GIVEN TO CRITERIA



EVALUATION FRAMEWORK VULNERABILITY & OPPORTUNITY

Beyond a community's physical exposure to flood risk is their ability to respond to and recover from the impacts of flooding. Socially vulnerable populations typically coincide disproportionate exposures to environmental risk and a decreased ability to avoid or absorb potential harm. Identifying and understanding socially vulnerable populations informs risk assessment and focuses preparedness efforts to reduce the incidence of injuries and death during emergency situations (Martin 2015).

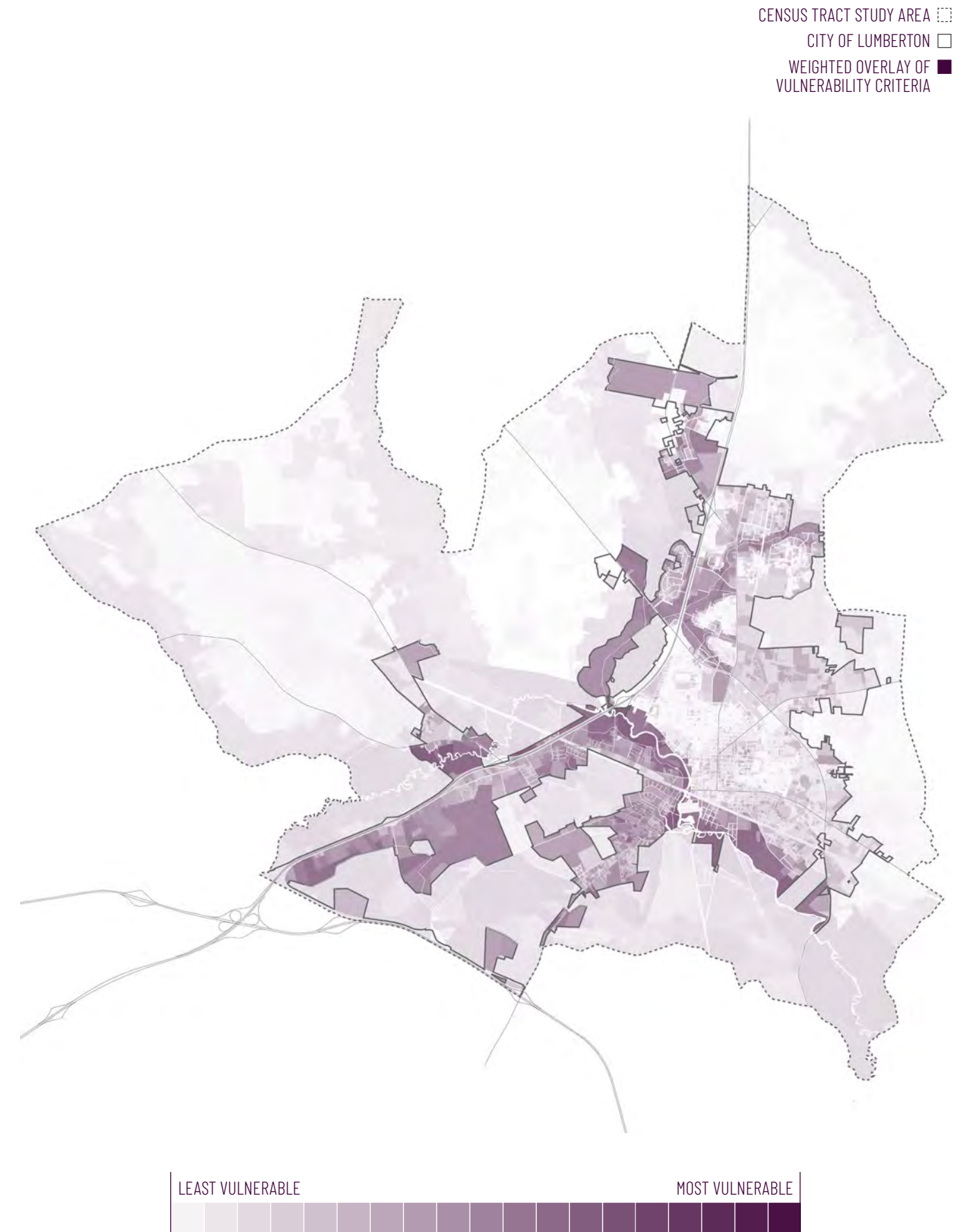
A HOLISTIC VIEW

Unfortunately, people have taken for granted the environmental services provided by floodplains and riverine wetlands. It is only now through suffering the consequences of development within these vulnerable lands, causing severe disturbances to natural processes and human order alike, that communities are beginning to understand and appreciate the significance of floodplains and wetlands. By removing these floodplain and wetland forests to build cities and grow crops, communities have removed the natural barriers of flood protection that once existed.

Where the Lumber River's floodplains begin to widen (East of Maxton) people have been replacing floodplain forests with crops for hundreds of years. The fertile sandy soil and abundant water have made this land highly productive for farmers. However, this fertile land is also the natural flood control area for everything downstream where water historically would

spill its banks, spread out, and be slowly absorbed. Without the trees of the original forest the soil stays wetter between storms with less capacity to absorb water and cannot pump the water out quickly after it arrives. The result is faster and deeper flood waters that take much longer to recede.

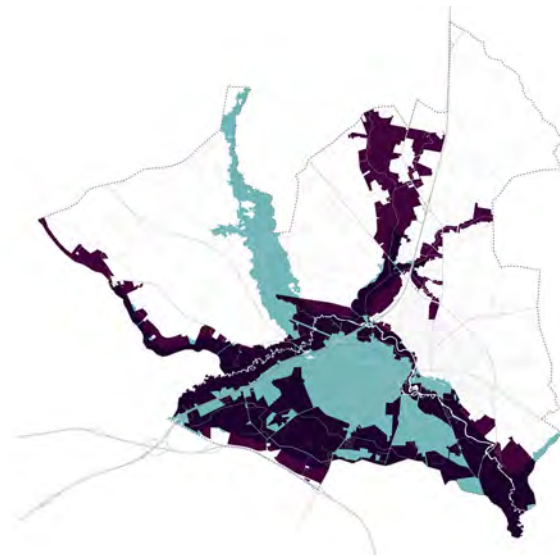
In order to understand what areas of Lumberton are more vulnerable to the impacts of flooding this report analyzes the following demographic data from the US Census Bureau (ACS-2015 estimates) that has been shown by researchers (Lindell et al. 2006, Martin 2015) to be indicators of social vulnerability.



FLOODWAY INTERSECT

Parcels highlighted in purple signify land holdings that have any portion of the property that intersects with a mapped floodway per the North Carolina Digital Flood Insurance Rate Map (NC DFIRM) from 2017.

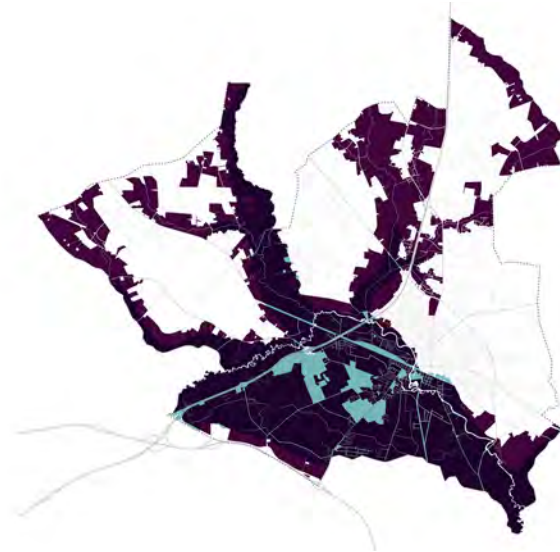
These parcels exist along both sides, north and south, of the Lumber River and also along some of the larger tributaries to the river - namely, throughout the Five Mile Branch corridor and the southernmost portions of the Jacob Swamp watershed.



100-YEAR FLOODPLAIN INTERSECT

Parcels highlighted in purple signify land holdings that have any portion of the property that intersects with a mapped 100-year floodplain per the North Carolina Digital Flood Insurance Rate Map (NC DFIRM) from 2017.

These parcels predominantly exist to the south of the Lumber River and also along all major tributaries to the river. Tributaries highlighted in this diagram include all those listed in the "Floodway Intersect" map plus corridors along Cotton Mill Branch and Raft Swamp.



500-YEAR FLOODPLAIN INTERSECT

Parcels highlighted in purple signify land holdings that have any portion of the property that intersects with a mapped 500-year floodplain per the North Carolina Digital Flood Insurance Rate Map (NC DFIRM) from 2017.

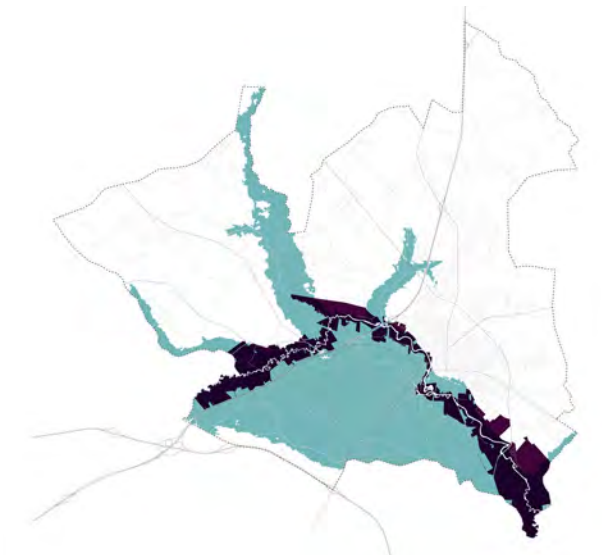
These parcels predominantly exist to the south of the Lumber River and also along all major tributaries to the river. Tributaries highlighted in this diagram include all those listed in the "100-Year Floodplain Intersect" map plus corridors along the Gum Branch canal. Properties shown as purple in this map most accurately reflect the flooding extents from Hurricane Matthew in South and West Lumberton.



RIVER ADJACENT

Parcels highlighted in purple signify land holdings that are directly adjacent to the Lumber River.

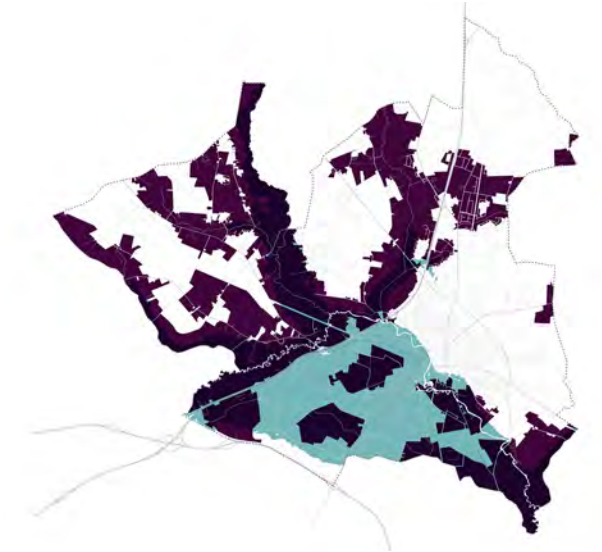
These parcels share a physical connection with the River and are largely representative of properties that also intersect the floodway of the river. While these properties are most prone to regular inundation from flood events, they also hold the opportunity to serve as the connecting fabric for recreational activities that may occur along the edges of the Lumber River.



CRITICAL ECOLOGICAL AREA

Parcels highlighted in purple signify land holdings that are inside or within 250 feet of 50 contiguous acres of either Forest or Wetland land cover typologies per the National Oceanic and Atmospheric Administration Coastal Change Analysis Program (NOAA C-CAP) from 2010.

These parcels predominantly exist to the west of Interstate 95, which seems to act largely as a barrier for these land cover typologies. While many of these areas are also within the floodway and/or floodplains, they currently serve integral ecological services and could potentially be utilized for select recreational purposes.



MINIMUM 50% CANOPY

Parcels highlighted in purple signify land holdings that have at least half of the property covered by a vegetative Canopy per the National Oceanic and Atmospheric Administration Coastal Change Analysis Program (NOAA C-CAP) from 2010.

These parcels are present throughout the study area. However, with only minor exceptions, the Lumber River and its major tributaries contain long corridors of connected parcels of 50% canopy cover. The presence of forested canopy cover in these locations would promote the feasibility of greenways and other recreational services to be in place.



LEVEE TRAIL ADJACENT

Parcels highlighted in purple signify land holdings that are directly adjacent to the existing Lumberton Levee Trail.

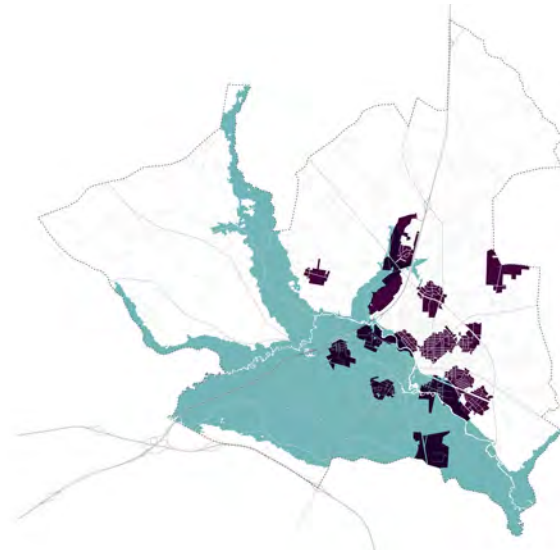
These parcels are all to the south of the Lumber River, many of which also intersect the river's floodway. Though the levee itself is at a slightly higher elevation than its surroundings (due to a mounded berm), the areas next to the levee, on both sides, are some of the most flood-prone areas in the study area. These locations could provide extra corridor width to an already established trail if managed accordingly.



WITHIN 1/3 MILE TO PARK

Parcels highlighted in purple signify land holdings that are within 1/3 of a mile to an existing Public Park as determined by a street-based network analysis in ArcGIS.

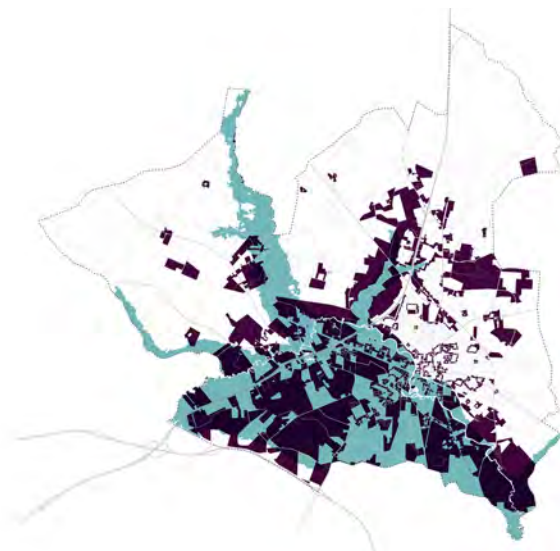
These parcels are concentrated most heavily within the Lumberton city limits of the study area. Additionally, many of the demarcated properties are within the flooded extents of Hurricane Matthew and are along aquatic corridors - specifically, Five Mile Branch, Meadow Branch, the Lumber River at downtown Lumberton, and the Lumber River east of downtown Lumberton. Highly vulnerable and/or recreationally opportune land holdings could potentially adjoin already established public parks in the future.



PUBLIC OPEN SPACE + CONSERVATION ADJACENT

Parcels highlighted in purple signify land holdings that are adjacent to properties currently owned by: the City of Lumberton, Robeson County, the State of North Carolina, and various conservation land trusts.

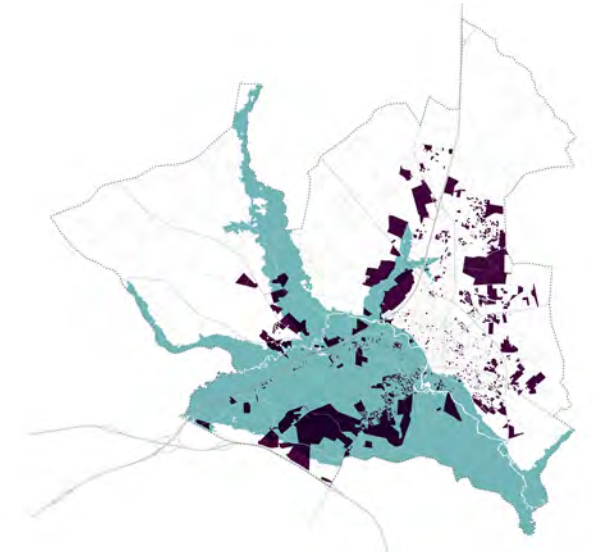
These parcels are scattered throughout much of the study area and have many different uses, purposes, and existing conditions. Common amongst many of the properties is that they are within the Hurricane Matthew flood extents. Much like properties adjacent to the Levee Trail or near a Public Park, these environmentally vulnerable areas could adjoin already established public open space to create a larger public amenity where appropriate.



VACANT PARCELS

Parcels highlighted in purple signify land holdings that are currently vacant and within or intersecting the Lumberton city boundary per North Carolina Emergency Management (NCEM) and the Hurricane Matthew Disaster Recovery and Resilience Initiative (HMDRRI) from 2016.

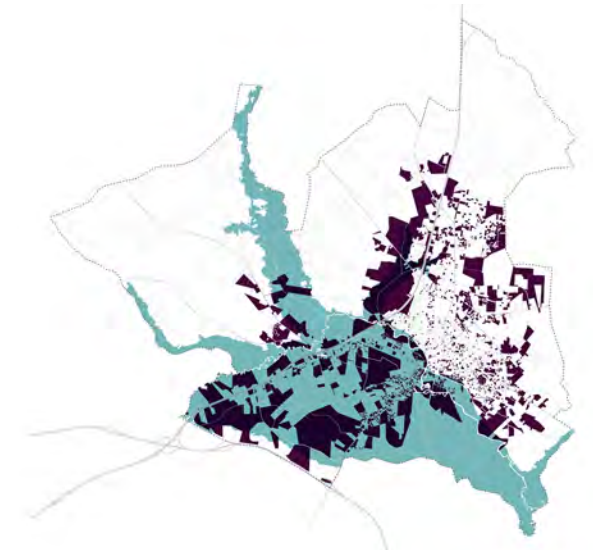
These parcels are scattered throughout the study area with increasing frequency in residential areas just south of the Lumber River. Vacant lots often represent neglected properties that in many cases had houses on the premise at some point in the past but fell into disrepair. These properties can be either a vulnerability or an opportunity depending on programming.



NO BUILDINGS

Parcels highlighted in purple signify land holdings within or intersecting the Lumberton city boundary that are absent of any built structures per the North Carolina Digital Flood Insurance Rate Map (NC DFIRM) from 2017.

These parcels can be found throughout the Lumberton portion of the study area and most closely correlate with vegetative canopy cover and vacancy. Should any of these properties be considered for recreational purposes, there would be a lower cost in modifying the property to fit new programming when compared to properties with unusable or unnecessary buildings.



VALUABLE INFRASTRUCTURE

Parcels highlighted in purple signify land holdings that have been identified either by project partners in Lumberton or by the Research Team as having existing infrastructure in place that could be re-used to help meet redevelopment goals. Examples of features these properties have in place include: paved access, boat launch, and buildings.

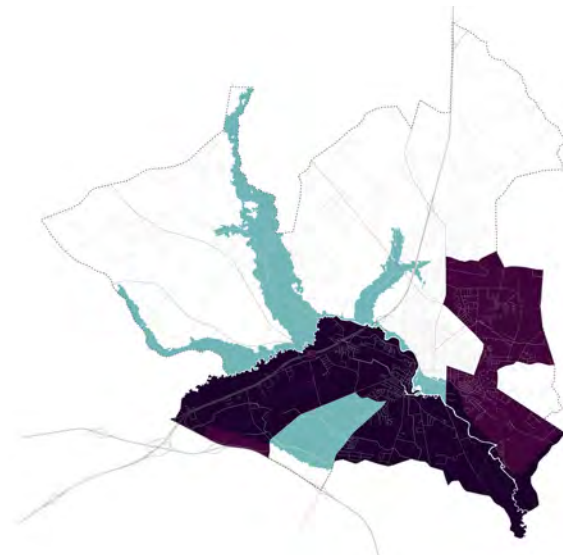
Counter to the "No Buildings" diagram, the existing infrastructure of these properties would help save extra costs of building these features from scratch should redevelopment occur on these parcels.



BELOW THE POVERTY LEVEL

Parcels highlighted in purple signify the ten (10) census blocks in the study area that contain the highest percentages of people living below the poverty level according to the most recent American Community Survey (ACS) from 2016.

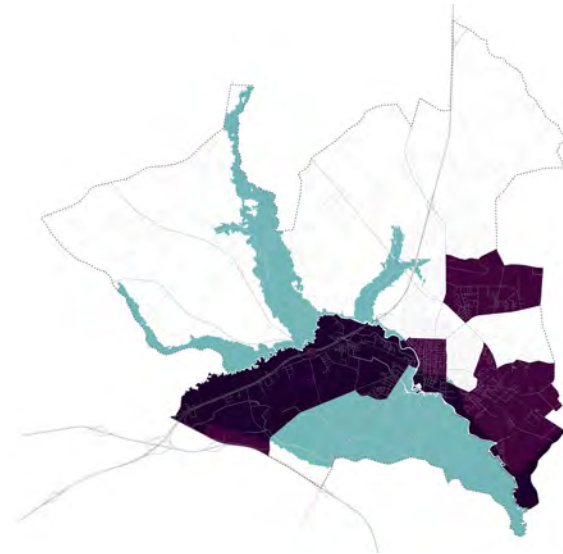
Geographically these census blocks are located in south and east Lumberton. Of these areas, six (6) of the ten (10) highlighted census blocks include areas that were inundated by the Hurricane Matthew flood extents.



RENTER OCCUPIED HOUSING

Parcels highlighted in purple signify the ten (10) census blocks in the study area that contain the highest percentages of people living in rental housing according to the most recent American Community Survey (ACS) from 2016.

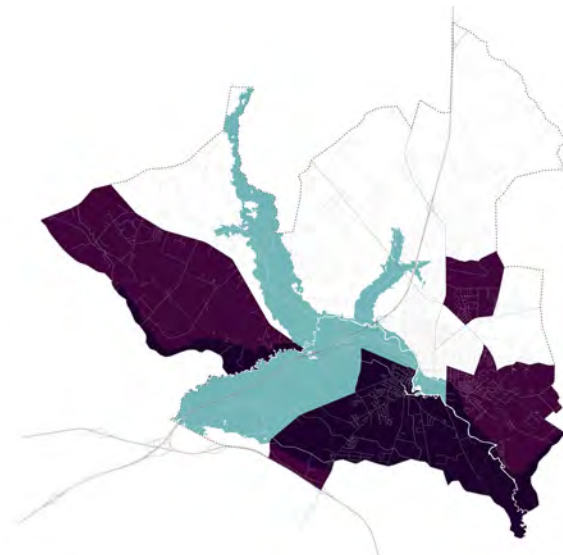
Geographically these census blocks are located in south and east Lumberton. Of these areas, six (6) of the ten (10) highlighted census blocks include areas that were inundated by the Hurricane Matthew flood extents.



FEMALE-HEADED HOUSEHOLDS

Parcels highlighted in purple signify the ten (10) census blocks in the study area that contain the highest percentages of female-headed households according to the most recent American Community Survey (ACS) from 2016.

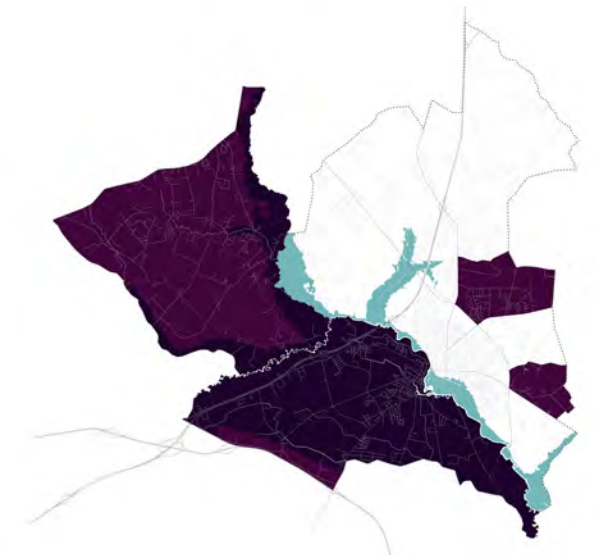
Geographically these census blocks are located in south and east Lumberton. Of these areas, seven (7) of the ten (10) highlighted census blocks include areas that were inundated by the Hurricane Matthew flood extents.



PEOPLE OF COLOR

Parcels highlighted in purple signify the ten (10) census blocks in the study area that contain the highest percentages of non-white residents according to the most recent American Community Survey (ACS) from 2016.

Geographically these census blocks are located in south, west, and east Lumberton. Of these areas, seven (7) of the ten (10) highlighted census blocks include areas that were inundated by the Hurricane Matthew flood extents.



OLDER THAN 65

Parcels highlighted in purple signify the ten (10) census blocks in the study area that contain the highest percentages of residents older than 65 years old according to the most recent American Community Survey (ACS) from 2016.

Geographically these census blocks are located in west and north Lumberton. Of these areas, five (5) of the ten (10) highlighted census blocks include areas that were inundated by the Hurricane Matthew flood extents.



YOUNGER THAN 18

Parcels highlighted in purple signify the ten (10) census blocks in the study area that contain the highest percentages of residents younger than 18 years old according to the most recent American Community Survey (ACS) from 2016.

Geographically these census blocks are located in south, west, and east Lumberton. Of these areas, six (6) of the ten (10) highlighted census blocks include areas that were inundated by the Hurricane Matthew flood extents.



ADDITIONAL CONSIDERATIONS FUNDING & MANAGEMENT

Although investments in capital improvements and ongoing maintenance of public facilities differ based on the type and intensity of use(s), addressing funding and management needs is critical to the long-term function and success of all open spaces, parklands, and recreational amenities. Therefore, the city will have to review existing and anticipated budgets (including incoming recovery funding) to assess the feasibility, and where appropriate, prioritization of floodplain acquisition activities.

PARK METRICS COMPARISONS

The 2016 Comprehensive Plan update acknowledged that the previous NRPA capacity standards used for level of service were outdated. We suggest that when the next plan is updated, a component-based method for inventory and level of service analysis should be used. This will incorporate the current GIS-based land mapping updates, and can add analysis of all park and recreation system components for location, functionality, and quality. Current Parks and Recreation administrative metrics were also reviewed relative to the National Recreation and Park Association Park Metrics ratios. Most of the metrics available indicate sufficient parklands are available for residents, however, operating expenditures to manage those lands are lower than both those for the state and national averages.

This Lumberton Floodprint plan supports the view that the lands acquired and specifically those around the river areas are ideal for management as parks,

recreation, and trails properties. They can be designed in ways that support periodic flooding and storm water management, yet allow for location of active and passive recreation, physical activity, community events, and river-based economic drivers. However, care should be taken that any lands that are added to the system also include assignment of additional resources for maintenance staff, lifecycle costing, and programming staff for best return on investment. The Parks and Recreation Department is a key element of future management of these lands and assets. They can partner with County, State, Federal, non-profit, and private entities to leverage necessary capital funding along with necessary staffing. In addition, trails and blueways on the River can be considered contributors to the transportation system as alternative transport corridors. If managed well, all of these new lands and components can substantially contribute to the safety and economic vitality of the region, along with enhanced quality of life for local residents.

AGENCY SUMMARY EFFECTIVENESS RATIOS	POPULATION: 21,040	NC POPULATION: 15-25K		US POPULATION 15-25K	
		#	MEDIAN	#	MEDIAN
KEY ADMINISTRATIVE METRICS	LUMBERTON				
OPERATING EXPENDITURES PER CAPITA	\$73	2	\$95	41	\$92
REVENUE PER CAPITA	\$7.5	2	\$19	43	\$22
TOTAL REVENUE TO TOTAL OPERATING EXPENDITURES	20.2%	2	17.7%	41	23.3%
PARK OPERATING EXPENDITURES PER ACRE OF PARKLAND	\$3,057	2	\$2,469	32	\$3,788
OPERATING EXPENDITURES PER ACRE OF PARKLAND	\$5,216	2	\$5,414	34	\$8,622
OPERATING EXPENDITURES PER ACRES OF PARKS AND NON-PARK SITES	\$5,985	2	\$4,738	29	\$6,921
OPERATING EXPENDITURES PER FTE	\$77,916	2	\$81,625	33	\$85,960
FTE'S PER 10,000 POPULATION	19.5	2	14.2	35	11.4
ACRES OF PARKS PER 1,000 RESIDENTS	17.6	2	18.2	36	11.1
NUMBER OF RESIDENTS PER PARK	770.7	2	1,478.2	36	1,319.5
NUMBER OF ACRES PER PARK	22.4	2	25.9	36	14.2
NUMBER OF PARTICIPANTS PER PROGRAM	269	2	250.2	29	50
RATIO OF FEE PROGRAMS TO ALL PROGRAMS	38%	2	59.7%	30	88.8%
RATIO OF BUILDING ATTENDANCE TO PARK ATTENDANCE	74.8%	1	69.3%	20	60.8%

Table: NRPA Agency Summary Effectiveness Ratios (2018).

ADDITIONAL CONSIDERATIONS COMMUNITY ENGAGEMENT

Communities with high levels of social cohesion and strong neighborhood networks recover more quickly than those without. Community engagement can play a critical role in strengthening social cohesion by creating opportunities for people to gain awareness, participate in resiliency efforts, and increase their social networks through shared activities. Unfortunately, the urgency and speed of the typical disaster recovery process, as well as the emotional state of people in crisis, can make engagement with everyday people challenging despite it being invaluable.

ACCESS TO INFORMATION

Communities need access to information explaining why their areas flood and what can be done to mitigate flooding. They need to know why and how flood damage contributes to the accumulation of vacant land and what can be done about it. Establishing a baseline of information about these issues can enable residents to understand their risk factors, recovery options, and vacant land reuse approaches.

Considerations. It's important to consider the context within which information will be distributed. Who lives in the community and are there factors that impact their access to information? What are the local cultural norms found in the community? Where are places and what are the events that already occur where community groups come together already? How can information be tailored to meet the needs of existing people with a range of interests, needs, and concerns?

Actions.

- + Review and summarize existing information associated with vacant land as a product of flood damage post-Hurricanes Matthew and Florence. Make the summary available to communities and organizations.
- + Create a community demographic profile for each neighborhood affected by Hurricanes Matthew and Florence. Use this profile to determine community outreach strategies and priorities focusing on reaching the most vulnerable populations in affected areas.
- + Make connections with local organizations, groups, and other associations reflecting the community demographic profile. Plan an event to share the summary (hosting a meeting, joining an existing meeting, or both).



Participation: Princeville Workshop, community asset mapping to determine priorities. (Photo credit: Kofi Boone, 2017)

+ Listen. In addition to sharing information, be prepared to receive and document information provided by the community.

+ Gauge community interest in engaging in more long-term events with a focus on the issues of disaster recovery and vacant land. Collaboratively create an engagement and participation plan to guide future interactions.

PARTICIPATION

Communities need opportunities to meaningfully participate in disaster recovery and vacant land reuse processes. Current processes do a good job of informing individual homeowners of their options and encourage them to apply for programs affecting individual properties. However, the only community-scale approaches occur in the immediately aftermath of disasters, and produce county-wide resiliency plans. Providing on-going

participation structures that enable communities to impact community-scale decision making can produce more sustainable long-term resilience strategies with broader community buy-in and support.

Considerations. It is important to understand the current processes by which communities can impact policy and resource allocation in the context of disaster recovery, flooding, and strategies for vacant land. What relevant groups engage the public? What are their goals and desired outcomes? Is there any assessment of their performance? Who is not being heard in current processes? How can existing processes be adapted to be more inclusive and responsive to the most vulnerable to flood risk?

(continued on next page)

ADDITIONAL CONSIDERATIONS COMMUNITY ENGAGEMENT

There are opportunities to frame community engagement as an on-going, long-term process that enables everyday people to add their capacity, participate, and sustain it. Regularly scheduled events, communication of important information in different media, and other intentional activities can contribute to long term resilience by building trust and good will. Investing in meaningful engagement over the long-term enables communities to bounce back after disasters, and make more impactful decisions on chronic issues like the use of vacant land from flood damage.

PARTICIPATION (CONT'D)

Actions.

+ Create "Power Maps" or other tools to analyze the systems affecting decision-making with regards to disaster recovery, flooding, and vacant land. Use these "Maps" to find areas of convergence (where multiple groups align) and divergence (where multiple groups do not) in their community participation approaches and target groups.

+ Create a community demographic profile for each neighborhood affected by Hurricanes Matthew and Florence. Use this profile to determine community outreach strategies and priorities focusing on reaching the most vulnerable populations in affected areas.

+ Evaluate outcomes from previous community participation efforts. What worked? What did not? Work with community partners to address the

gaps in previous participation approaches through the development of an engagement and participation plan.

+ Work collaboratively with community partners to set desired outcomes from community participation. Strive to go beyond "informing" and pursue avenues for more community input and impact on outcomes.

SHARED ACTIVITIES

Communities need shared activities to enact information gathered, and decisions resulting from participatory planning processes. Tangible and incremental community engaged outcomes in the near-term post-flood can build community cohesion as well as positive momentum towards more substantial long term resilient design and planning.



Shared Activities: Fighters 4 Freedom Hill lead a community walking tour (Photo credit: Kofi Boone, 2018)

Considerations. It is important to consider the existing capacity of communities to create and participate in activities that enable built environmental change. What activities does the community already create and participate in? Can they be inclusive of activities to support resilient design and planning, or should new activities be developed? Are there resources available to support these activities? What are the desired outcomes? How can outcomes lead to future steps towards community-wide resiliency?

Actions

+ Work with community partners to scope what shared activities are appropriate to meet community needs. Use their input to pursue resources (governmental, grants, other sources).

+ Where possible, compensate community partners for their work in developing and executing community shared activities. Track all work, in-kind efforts, and donations for future funding and resource opportunities.

+ Develop a media (and multi-platform social media) plan for announcing activities and outcomes.

+ Before conducting shared activities, work with community partners to develop an evaluation tool to assess the effectiveness of the activity. Administer the tool at the end of each activity.

+ Where possible, try to host activities in or nearby areas of community concern (in situ), and when possible, provide short-term outcomes from each activity. These outcomes can build community capacity and spirit.

ADDITIONAL CONSIDERATIONS

REGIONAL NETWORKS

In 1989, 81 miles of the Lumber River stretching from the South Carolina Border to the Sandhills Game Land in Scotland County was added to the North Carolina Natural and Scenic River System, forming Lumber River State Park. Additionally, **the Lumber River was designated a National Wild and Scenic River in 1998 and is one of only two in the state of North Carolina.** These designations carry with them special protections and access to funding which supports the management of the Lumber River State Park and on-going land acquisitions.

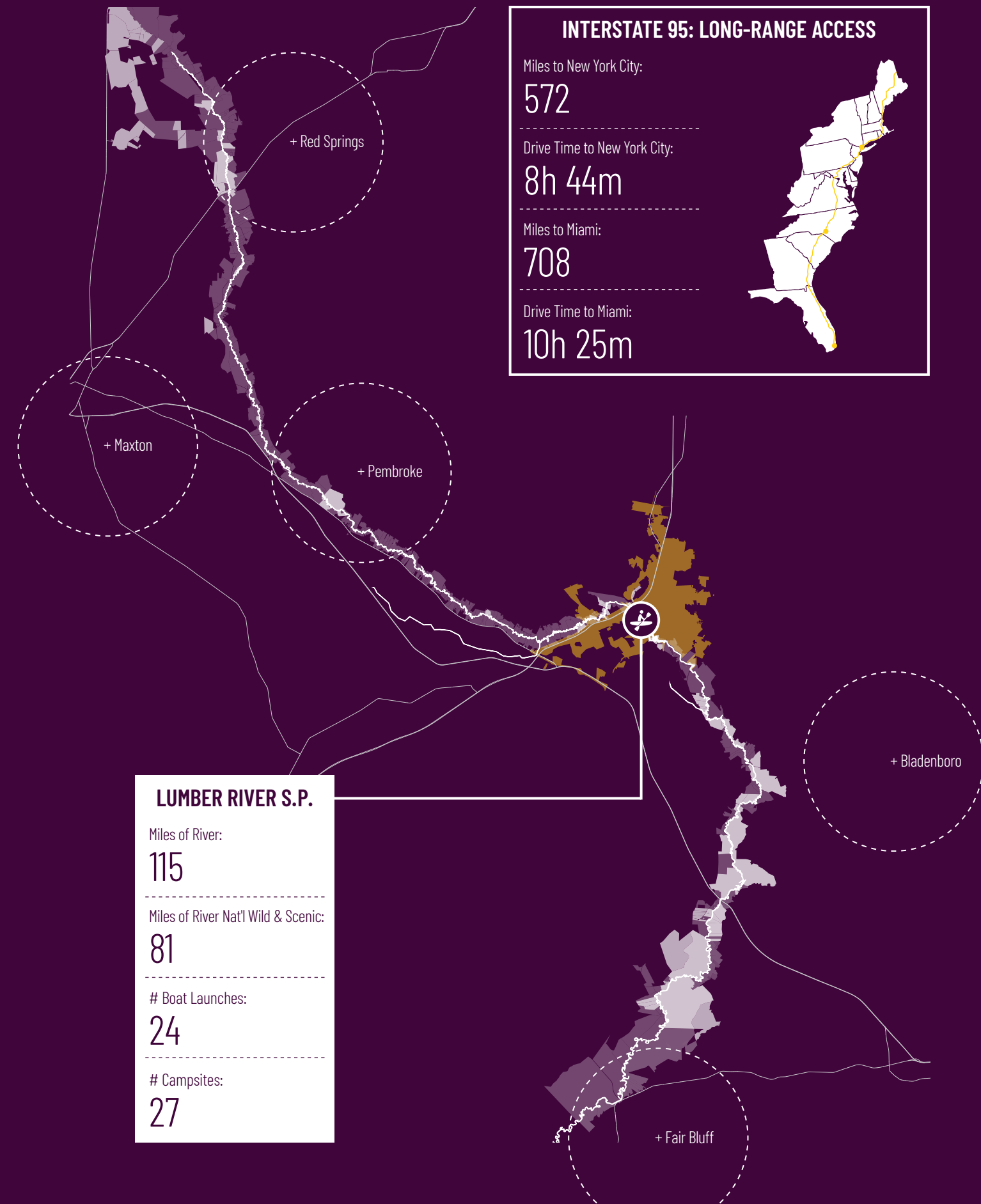
POTENTIAL FOR ECONOMIC DEVELOPMENT

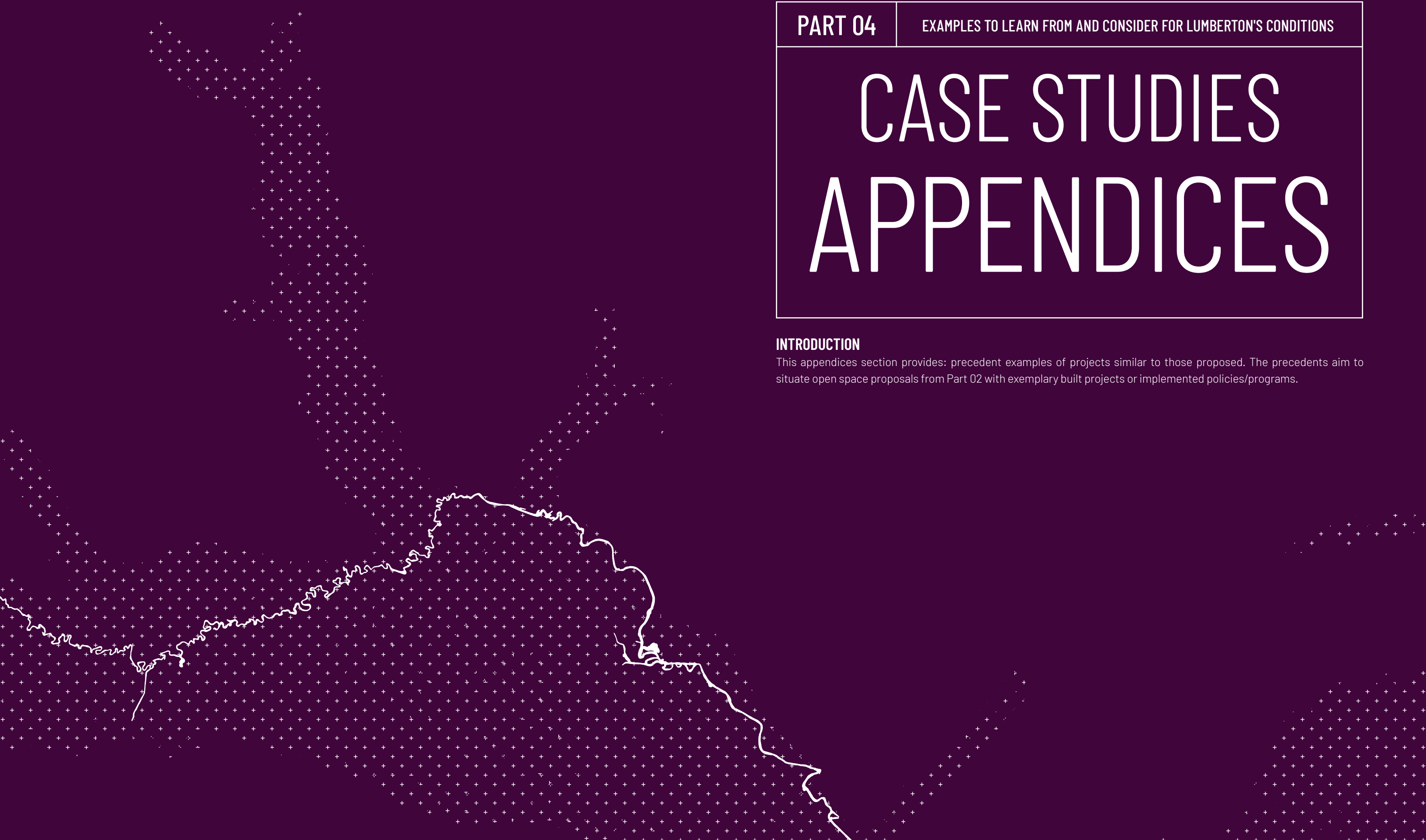
A vegetative buffer of at least 250 feet from each shoreline is needed to preserve the scenic quality of the state park and allows it to meet the scenic criterion for natural and scenic river designation. Expansion efforts so far have focused on areas of significant natural and cultural heritage as well as critical ecological areas along the Lumber River.

From a regional perspective, the Lumber River State Park can provide a stimulus of recreation tourism and complementary economic development programs if this asset is better utilized.

This starts with celebrating the river as an amenity that

better compliments downtown Lumberton, and becomes a regional draw when adjacent lands to the river are preserved or conserved. This can be done by connecting the last missing gaps in the land holdings for Lumber River State Park to run through Lumberton as a contiguous land AND water entity - effectively setting the stage for a regional-scale destination to attract both short- and long-term guests of the City.





PART 04

EXAMPLES TO LEARN FROM AND CONSIDER FOR LUMBERTON'S CONDITIONS

CASE STUDIES APPENDICES

INTRODUCTION

This appendices section provides: precedent examples of projects similar to those proposed. The precedents aim to situate open space proposals from Part 02 with exemplary built projects or implemented policies/programs.

CASE STUDIES

CEDAR RAPIDS, IA

DESCRIPTION

In June 2008, Cedar Rapids, Iowa experienced a catastrophic flood event when the Cedar River crested at 31.1 feet and remained at or above flood-stage for several weeks. The flooding far surpassed the mapped 500-year floodplain and inundated over 10 square miles of the city. The flood displaced more than 18,000 residents (approximately 14% of the population) and generated economic losses in excess of \$3 billion.

After the flood, the city worked with residents, planners, designers, hazard experts, and several government agencies to create the River Corridor Redevelopment Plan and a revised flood management strategy. The plan centered on the acquisition of 1,356 flood-affected properties and the implementation of levees, removable floodwalls, greenspace, and neighborhood revitalization in affected areas.

FUNDING

HMGP-funded voluntary acquisition of damaged or destroyed properties and CBDG. Properties qualify for HMGP if they are within the 100-year floodplain, meet FEMA's benefit-cost analysis requirements, or are declared 'substantially damaged' by the community.

STRATEGIES

Three main strategies for flood recovery and prevention were outlined through the River Corridor Redevelopment Plan, which fell into three geographic areas in relation to the river:

Construction Area. These properties are within the 100-year floodplain, and were acquired with CBDG funds for the construction of levees and floodwalls. This area will also serve as public recreational space as it is adjacent to

greenway areas or the river.

Greenway Area. These properties were acquired with HMGP funds and are located in the 100-year floodplain in the unprotected area between the Cedar River and the Construction Area. The demolition of buildings in this area will help prevent future damage and loss, and create public recreational opportunities near the river. This area is planned for a multi-use trail that will connect three future riverfront parks.

Neighborhood Revitalization Area. These properties were acquired with CBDG funds with a focus on developing affordable housing and improving walkability and access to recreation in these neighborhoods. The majority of properties in the Neighborhood Revitalization Area will be protected by the flood management system, and are unlikely to experience future flooding.



IMAGES

Clockwise from top: Agency Landscape + Planning, 2018; Sasaki Associates, Inc., 2018; Sasaki Associates, Inc., 2018; HooplaNow, 2016

CASE STUDIES

DETROIT, MI

DESCRIPTION

The past 50 years of disinvestment have resulted in about 120,000 vacant lots (roughly 24 square miles) throughout Detroit, with about 72% of these vacancies located in areas of concentrated poverty. Vacant lots fragment neighborhoods and can become unsightly and dangerous dumping areas. But Detroit's vacant land also offers unique opportunities for reutilization as public open space. Detroit Future City is one organization that is working to transform the patchwork of vacant lots into a long-term open space network with social, environmental, and economic benefits for the city.

"The DFC Strategic Framework is a shared vision for Detroit's future that resulted from a massive, citywide public engagement effort. It recommends a series of ideas, strategies and approaches on how to best use the city's abundance of land, foster job growth and economic prosperity, ensure vibrant neighborhoods, build an infrastructure that serves citizens at a reasonable cost, and maintain the high level of community engagement integral to the long-term revitalization of Detroit."
(From <https://detroitfuturecity.com/our-priorities/>)

VACANT LOTS

DFC's main goal is to transform the City's abundant vacant lots into an innovative open space network that can manage stormwater and improve water quality, increase biodiversity, create a beautiful place to live, improve the health of Detroit residents, and generate jobs through the green economy. One of DFC's programs, Field Guide to Working With Lots, provides a catalog of lot designs, as well as strategies for community engagement. Lot designs range from those that are inexpensive, and easy for a couple of people to install in a few days, to more complicated projects that will require permitting,

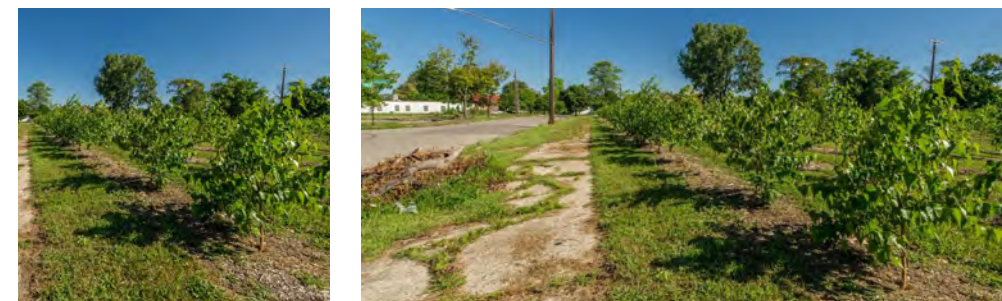
a contractor, and higher initial investment. The designs are organized by ecological and social functions, but also provide accurate estimates of the cost, time to complete the project, number of workers required, and ongoing maintenance inputs, so individuals or groups can prioritize goals and pick the most appropriate lot design based on the intended function as well as available resources. Each lot design also comes with a downloadable PDF with standard planting and construction details that can be given to a hired contractor. A couple examples of these lot designs are provided below:

'The Infiltrator' is an example of a lot design for a rain garden installed in a crushed-in-place basement. With an estimated cost of \$5,500, it is one of the more expensive lot designs, but is designed to manage stormwater from the two adjacent buildings, and can be programmed as a social/community space as well. (Luther Britt rendering)

'The Clay Soil Meadow' is a very low cost design that is ideal for Detroit's heavy soils. The native flower species will grow more easily than other more traditional flower gardens, and the deep roots allow for better infiltration and absorption of stormwater. This design can be executed without the use of a car and with only volunteer labor. Since the meadow requires so little initial input, this lot design may be temporary, providing ecological and social benefits until the lot is developed, either for future homes and businesses, or as a more permanent component of Detroit's open space plan.

FUNDING AND MANAGEMENT

Since this program aims to create a comprehensive and connected open space network from such a large patchwork of vacant properties, responsibility for funding, ownership,



IMAGES: A tree farm now occupies what used to be 1,800 vacant lots in Detroit. In addition to economic opportunities, these trees filter the air, manage stormwater runoff, and beautify the street (Detroit Future City, 2017).

and management cannot all fall on a single entity. Instead, a collaborative approach that includes several land ownership models should be implemented. A report by The Center for Community Progress outlines several public and private ownership models as well as policies that can ensure cohesion in the open space network.

- **Public Ownership:** City, Land Bank, Metropolitan Area
- **Private Ownership:** Land Trust / Land Conservancy, Land Cooperative, Private Individuals / Companies
- **Legal Tools** (to ensure that land remains a permanent part of the open space network): Deed Restrictions, Conservation Easements, Leases, Development Rights Agreements

The DFC also outlines a spectrum of funding tools and sources and their applicability to various open space types. The funding recommendations include debt tools

(bonds and loans), value capture mechanisms (developer fees, tax increment funding), credit assistance, direct fees (property taxes, user fees), private sources, and grants. Detroit's open space network is still in the planning stages, so the ownership, funding, and management strategies outlined here are all suggestions, but the biggest takeaway is that the success of this plan relies on diversity of open space types, funding sources, ownership models, and management strategies.

CASE STUDIES

CHARLOTTE, NC

DESCRIPTION

Since 1999, Charlotte-Mecklenburg Storm Water Services has purchased over 400 properties located within the floodplain, which has secured 185 acres of public open space. It is estimated that so far, \$25 million in flood-related losses have been avoided through the buyout program, with up to \$300 million in future avoided losses. While land acquisition programs frequently follow shortly after a highly damaging flood, in Charlotte, local government developed this comprehensive, strategic approach to reduce flood losses after several small-to-medium sized floods.

There are over 5,000 individual properties located within Charlotte-Mecklenburg's regulated floodplains. Each property has been evaluated according to Storm Water Service's Risk Assessment, Risk Reduction Plan, and is assigned a flood risk score, a priority score, and given risk reduction recommendations. Property specific data is updated annually to identify and prioritize specific properties for possible buyouts or other flood mitigation efforts.

PROACTIVE FUNDING & ACQUISITIONS

The first 12 years of the program were funded exclusively through Federal grants with local matching funding. Currently, the annual investment in buyouts is \$4M and most buyouts are funded completely with local money. The program also coordinates acquisitions with other public entities to achieve multi-objective goals. Since 1999, the buyout program has invested \$67 million in removing buildings from the floodplain (43% federal, 2% state, 48% local, 7% other).

Charlotte-Mecklenburg uses three main funding initiatives to acquire flood-prone properties:

Hazard Mitigation Grant Program (HMGP): 1999-Present

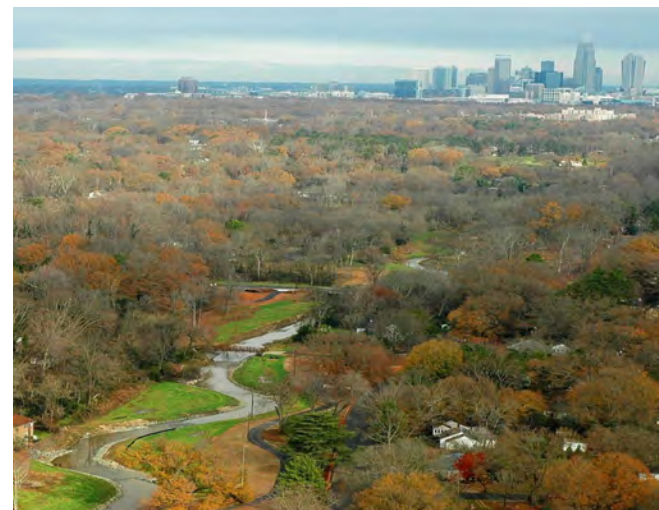
Voluntary acquisition of damaged or destroyed properties. Properties qualify for this program if they are within the 100-year floodplain, meet FEMA's benefit-cost analysis requirements, or are declared 'substantially damaged' by the community.

Quick Buys (2003-Present)

This is a 'rainy day fund' established by Storm Water Services. After a damaging flood, the Mecklenburg Board of County Commissioners can allocate some of these funds to purchase qualifying buildings with substantial flood damage.

Local Risk-Based Buyouts (2012-Present)

Storm Water Services prioritizes properties based on risk and need and funds all costs associated with these acquisitions with local stormwater fees.



MANAGEMENT

The goal of this program, in addition to avoiding flood-related losses, is for acquired properties to become community assets. Programming for these properties includes:

- Greenway trails and paths
- Community gardens
- Reforested natural areas
- Stream and floodplain restoration sites
- Stormwater wetlands and retention sites
- Informal recreational areas

In many cases, before development of a park or trail can begin, other nearby acquisitions must be completed. In these situations, buildings and other impervious surfaces are removed from the newly acquired property to restore the floodplain to a more natural state. Charlotte-Mecklenburg Police, and the Charlotte Fire Department

sometimes use the buildings for training exercises before they are deconstructed. Before buyouts are completed in an area, acquired properties are managed and maintained in an interim state. After all of the planned acquisitions in an area are completed, streets and utilities can be abandoned, and any construction or restoration can begin.

IMAGES:

Stewart Inc., 2018 (L); The Charlotte Weekly, 2017 (R)

CASE STUDIES LYONS, CO

DESCRIPTION

In September 2013, more than 200 homes were damaged or destroyed when the St. Vrain river flooded in Lyons, Colorado. With funding from FEMA's Hazard Mitigation Grant Program (HMGP) and the Community Development Block Grant (CDBG) for disaster recovery (through the department of Housing and Urban Development), the Town of Lyons acquired 27 former residential properties. Since these funding programs limit future development, many of the 27 properties will be incorporated into a plan that includes a mix of active and passive recreation, improves connectivity, allows for safe access to the river, restores riparian habitat and mitigates future flood hazards.

For some of the buyout properties, the Town of Lyons has developed a program in which residents may lease (for free) and use all or part of a lot adjacent to their own lot. In order to be eligible to lease (license) a lot, the resident must live adjacent to it. If neither nextdoor neighbor is interested, the neighbor directly across the right-of-way may apply. Certain activities are restricted, and structures are not permitted to be built, but as long as the licensee abides by the town's restrictions, they have exclusive, private use of the area. Acceptable uses include gardening, landscaping, maintaining as a natural area, or other use as approved by the Town of Lyons. While it is not required, the town encourages licensees to use the lots to benefit the public (i.e. start a community garden, or plant a flower garden with a long bloom season). The license agreement is for a one-year term, and licensees can reapply annually.

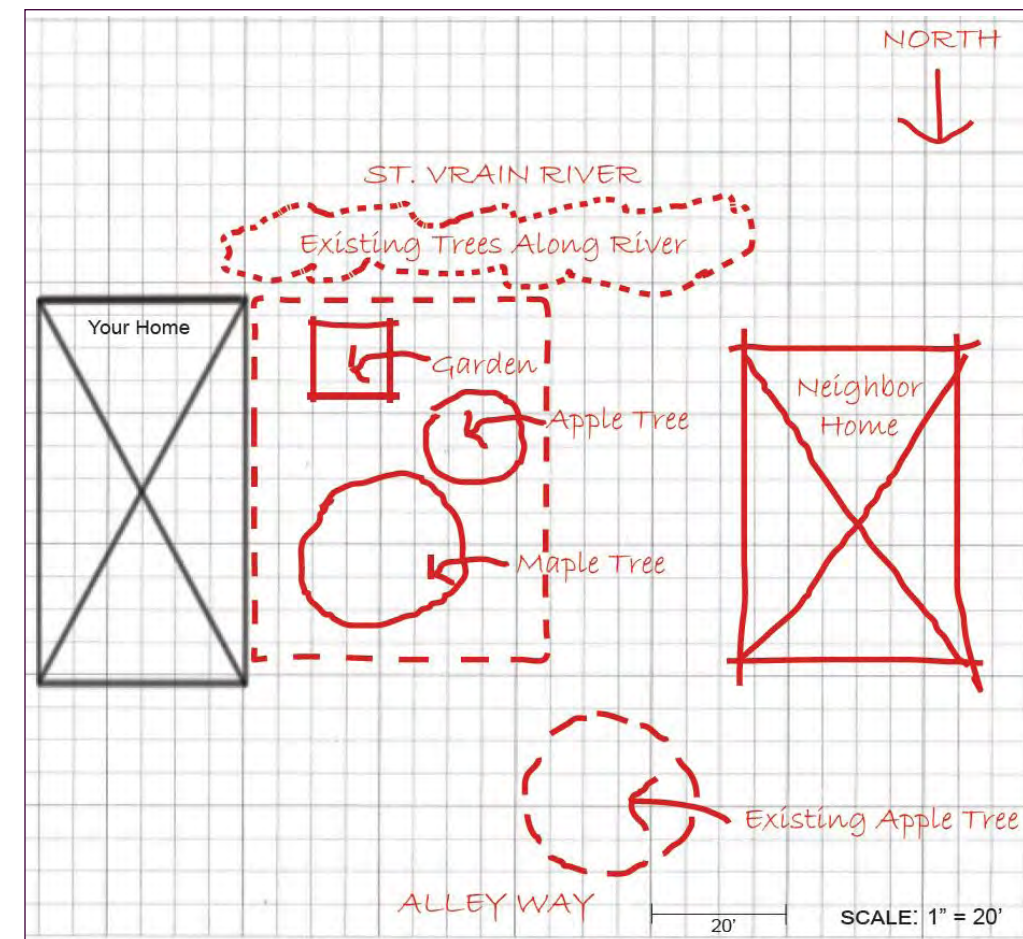
Development Block Grant (CDBG) for disaster recovery, and any lots that are not licensed will be maintained as open space by the Town of Lyons. Any resident that has a lot license is solely responsible for maintenance on their lot, which will reduce the Town's maintenance expenses for those lots, while also ensuring that this vacant land is useful to the community

FUNDING SOURCES AND MANAGEMENT:

The lots were acquired with funding from FEMA's **Hazard Mitigation Grant Program (HMGP)** and the **Community**

IMAGES

Town of Lyons, 2017
Lyons Neighborhood Licensure Handbook, 2017;



CASE STUDIES LONGMONT, CO

DESCRIPTION

The City of Longmont, Colorado's Open Space Master Plan outlines a unique, three-tiered weighted overlay analysis method used by the city to identify potential parcels for acquisition and integration into the City's Open Space Program.

The first tier analyzes GIS data for seven categories:

- + ecology and wildlife
- + agricultural lands
- + visual access
- + linkage / physical access
- + urban shaping / buffer
- + surface water
- + low-impact / passive recreation

Higher values were applied to more desirable or suitable open space attributes for each of these categories which were then overlaid on a single map, where the areas with the highest cumulative values appeared as darker. This initial analysis is not parcel specific, but instead identifies general areas, in which to look for parcels, that most fully meet the priorities of Longmont's Open Space Program.

The second tier of this evaluation method looks at individual parcels more closely with additional data from GIS, further research, and site visits. Factors to consider at this point include:

- + willingness of the seller
- + potential for restoration
- + adjacent land use
- + cost/benefit analysis
- cultural / historic value

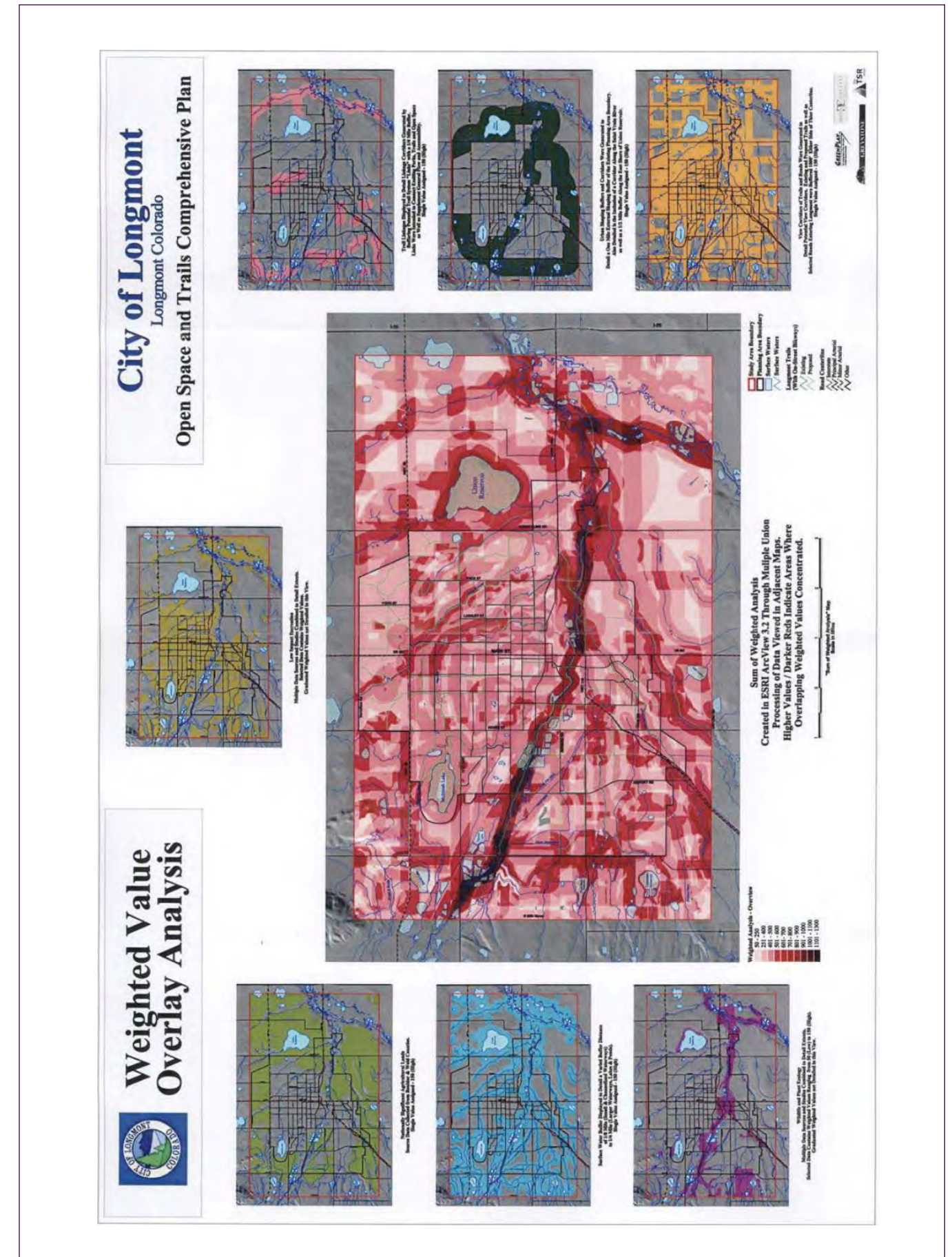
- + ecosystem services
- + equitable access

This analysis is helpful in narrowing down and directly comparing parcels, as well as beginning to think about future programming and maintenance.

The third and final tier of evaluation considers logistics of acquisition including who should acquire the property (and how), any potential for partnering opportunities, and whether the acquisition meets the goals of other planning efforts.

IMAGE

City of Longmont Open Space and Trails Comprehensive Plan, 2018



REFERENCES

- City of Charlotte.** (2018). Floodplain Buyout (Acquisition) Program. <https://charlottenc.gov/StormWater/Flooding/Pages/FloodplainBuyoutProgram.aspx>
- City of Lumberton.** (2016). Comprehensive Master Plan Update. Benesch Engineers.
- City of Lumberton.** (2015). Lumberton Tomorrow - Land Use Plan. Benchmark Planning. https://www.benchmarkplanning.com/images/project-files/Lumberton/Lumberton_LUP_Adopted_09142015_web_version.pdf
- Detroit Future City.** (2012). DFC Strategic Framework. <https://detroitfuturecity.com/strategic-framework/>
- Federal Emergency Management Agency.** (2014) The National Flood Insurance Act of 1968, as amended, and The Flood Disaster Protection Act of 1973, as amended, 42 U.S.C. 4001 et. seq. <https://www.fema.gov/media-library/assets/documents/21010>
- Federal Emergency Management Agency.** (2018). Hazard Mitigation Grant Program. <https://www.fema.gov/hazard-mitigation-grant-program>
- Hurricane Matthew Disaster Recovery and Resilience Initiative.** (2017). Homeplace: A Conversation Guide for the Lumberton Community, Rebuilding After Hurricane Matthew. <https://www.dropbox.com/s/f4exwjazsqc40/HomePlace-Lumberton.pdf?dl=0>
- Hurricane Matthew Disaster Recovery and Resilience Initiative.** (2018). Land Suitability Analysis for Post-Disaster Housing Relocation. <https://coastalresiliencecenter.unc.edu/files/2018/12/LSA-Technical-Memo-2.pdf>
- Hurricane Matthew Disaster Recovery and Resilience Initiative.** (2018). Lumberton Recovery Plan. <https://coastalresiliencecenter.unc.edu/files/2018/12/Lumberton-Recovery-Plan.pdf>
- Lindell, M., Prater, C. and Perry, R.** (2006). Fundamentals of Emergency Management. https://www.researchgate.net/publication/265494805_Fundamentals_of_Emergency_Management
- Martin, A.** (2015). A Framework to Understand the Relationship Between Social Factors that Reduce Resilience in Cities: Application to the City of Boston. International Journal of Disaster Risk Reduction. <https://www.sciencedirect.com/science/article/pii/S2212420914001198>

- National Oceanic and Atmospheric Administration.** (2010). Coastal Change Analysis Program. <https://coast.noaa.gov/digitalcoast/tools/lca>
- National Recreation and Park Association.** (2018). NRPA Park Metrics. <https://www.nrpa.org/publications-research/ParkMetrics/>
- Newman, G., Smith, A., and Brody, S.** (2017). Repurposing Vacant Land through Landscape Connectivity. Landscape Journal. http://lj.uwpress.org/content/36/1/37.short?casa_token=nsGCL9ESZcQAAAAA:0iD_PNCanUij0IG5XwYKnPqcXnIvGYaKCN8JH0BQVQ2_EEP4aPBcBWki6GyNLurdr77_LG_mVw
- North Carolina Department of Public Safety.** (2018). ReBuild North Carolina Announces CDBG-DR Awards Offered to 22 Families. <https://www.ncdps.gov/news/press-releases/2018/09/04/rebuild-north-carolina-announces-cdbg-dr-awards-offered-22-families>
- North Carolina Digital Flood Insurance Rate Map Database.** (2017). FEMA Data Catalog. <https://catalog.data.gov/dataset/digital-flood-insurance-rate-map-database-franklin-county-north-carolina054ef>
- North Carolina Office of the Governor.** (2018). Updated Estimates Show Florence Caused \$17 Billion in Damage <https://governor.nc.gov/news/updated-estimates-show-florence-caused-17-billion-damage>
- ReBuild NC.** (2017). Hurricane Matthew Resilient Redevelopment Plan: Robeson County. https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_roberson_plan_combined.pdf
- Sasaki.** (2018). Cedar Rapids River Corridor Redevelopment Plan. <http://www.sasaki.com/project/131/cedar-rapids-river-corridor-redevelopment-plan/>
- Town of Lyons.** (2017). Neighborhood Licensure Handbook. <http://www.townoflyons.com/AgendaCenter/ViewFile/Item/1877?fileID=3917>
- U.S. Census Bureau.** (2016). American Community Surveys. <https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2016/>
- U.S. Department of Housing and Urban Development.** (2016). Community Development Block Grant Disaster Recovery Program. <https://www.hudexchange.info/programs/cdbg-dr/>