Building Resilience: Connecting Water, Landscape and Community in the Mississippi River Delta

by

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Contents

Abstract

Humans have altered the natural flow of the Mississippi River Delta through settlement structures and a layered set of scalar infrastructural systems creating a complex hybrid landscape. These changes to the natural landscape at the largest scale, compounded by non-porous surfaces and unconnected green spaces and water systems at the city scale, are exacerbated by climate change, especially in low lying neighbourhoods. Historically, racialized and social inequalities segregated people of colour to low lying areas which make the issues of climate change challenging to recover from.

The design proposal for the Lower Ninth Ward in New Orleans uses architecture as a mediator connecting land-water infrastructures and people with social programming to engage and bring awareness to issues of climate change, while empowering the community through resilience. The theoretical framework of ecological urbanism brings together natural and infrastructural systems using intersectionality to connect ecology and hydrology to the neighbourhood.

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Chapter 1: Introduction

> The study of water exemplifies how interdisciplinarity has itself become a contested terrain in relation to the production of knowledge. Water does not constitute one object of analysis but rather an intersecting set of processes, practices, and meanings that cuts across existing disciplinary boundaries (Gandy 2014, 2).

Across cultures, water has been celebrated and ritualized in everyday life and practices. In *Water and Urbanization*, Terje Tvedt and Terje Oestigaard argue that a careful understanding of the relationship between water and society is important to further the practices employed in urban development, highlighting the integral role that water plays in our lives (Tvedt and Oestigaard 2014, 2). The way water is used and valued constitutes a part of society's cultural identity as it encompasses lifestyles, value systems, traditions and beliefs. Matthew Gandy similarly argues that "water lies at the intersection of landscape and infrastructure, crossing between visible and invisible domains of urban space" and forms a part of the culture of water, enabling technological networks to inform the city's infrastructure

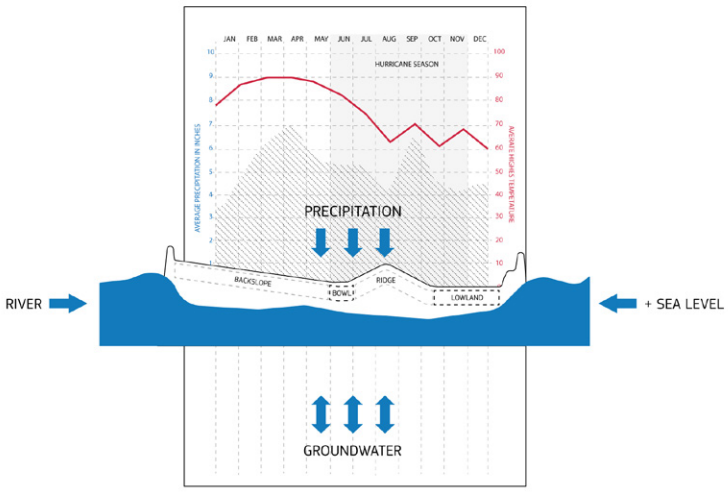


Diagram of the impacts of climate change on landscape. (data from Waggonner and Ball 2013)

growth (Gandy 2014, 1). These arguments suggest that the impacts of human intervention to the disruption of the natural landscape can be severe, especially within Delta cities. Today, many urbanized deltas around the world such as the Mississippi River Delta are confronted by the threat of climate change. As a result, water has increasingly become central to the design and scientific discussion surrounding these climate issues of sea-level rise, heavy rainfall and extreme temperatures only continue to heighten.

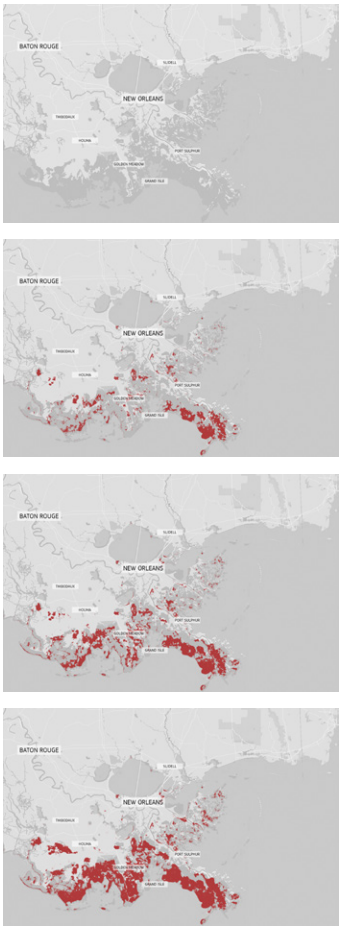


Diagram of disappearing coastline showed in red. (base map by Mapbox 2020; data from Battle 2019)

The interconnectedness of the natural systems and human systems is at the centre of how to mediate the dynamics of the Mississippi River Delta, a place of tidal fluctuation and shifting soils, flows of water. The urban centre of New Orleans and its industrial (trade and extraction) corridor, became a critical location at the mouth of the Mississippi for global commerce and access to the entire Mississippi River Valley. This regional wetland and port is important to the region's culture and economy, at the same time, doubles as a natural defense system that together with man-made levees and flood walls protect against impacts of hurricane winds and storm surges. Over the last three decades, the remaking of the coastal landscape for the purpose of resource extraction, commercial shipping and urbanization has drastically altered and even worked against the deltaic processes. New Orleans' urban and industrial development over time has resulted in accelerated land loss, subsistence and destruction of wetlands, changing the delta-cities' relationship with water and putting into question the future of cities along the river (Mossop and Carney 2010). For these communities along the water's edge, there is an urgency to find new solutions as scientific insights and predictions

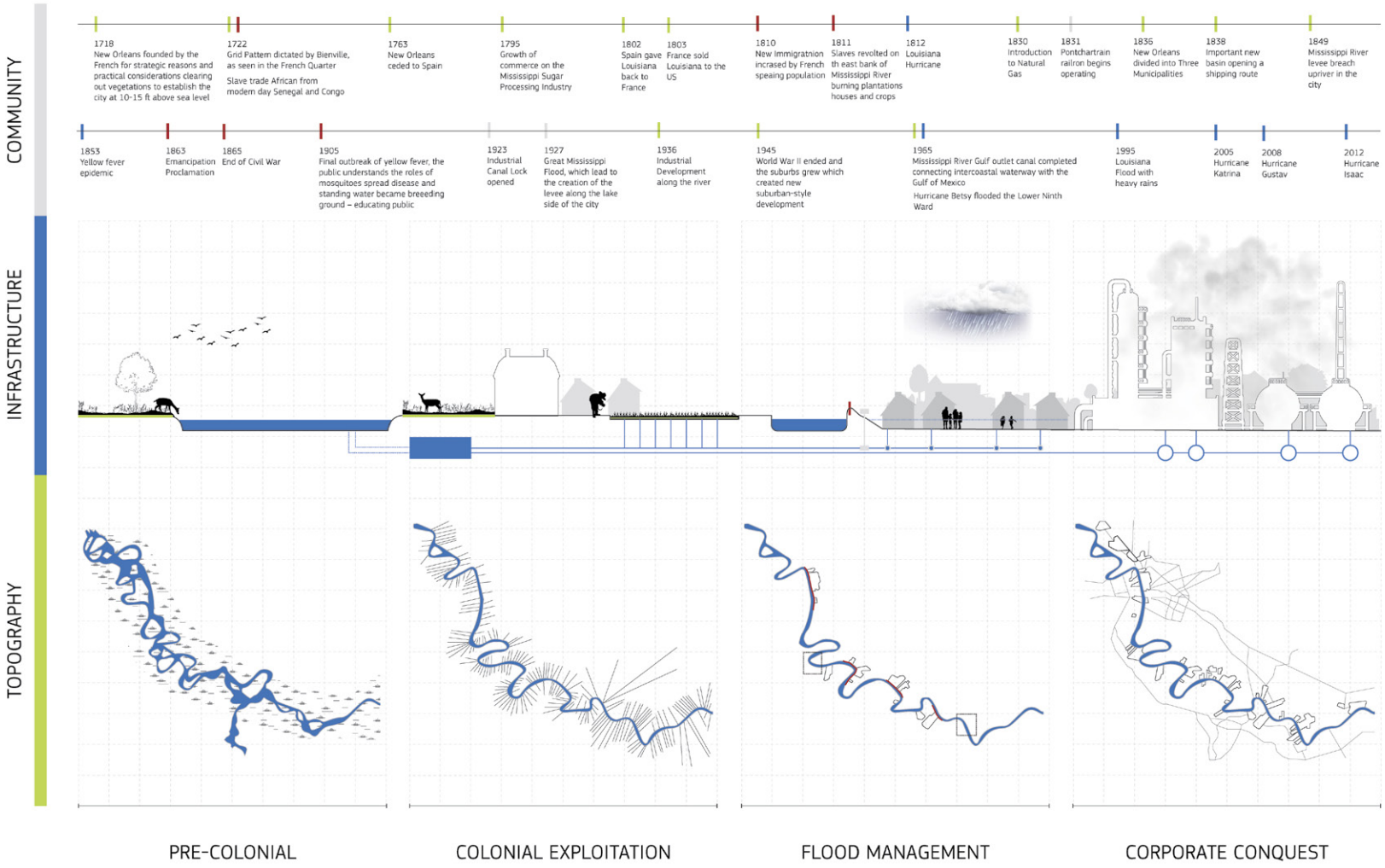


Illustration representing temporalities and impermanence translated into non-hierarchical strategies of networks, zones, and patterns to see commonalities across systems through space and time.

point to disastrous environmental change and a precarious future.

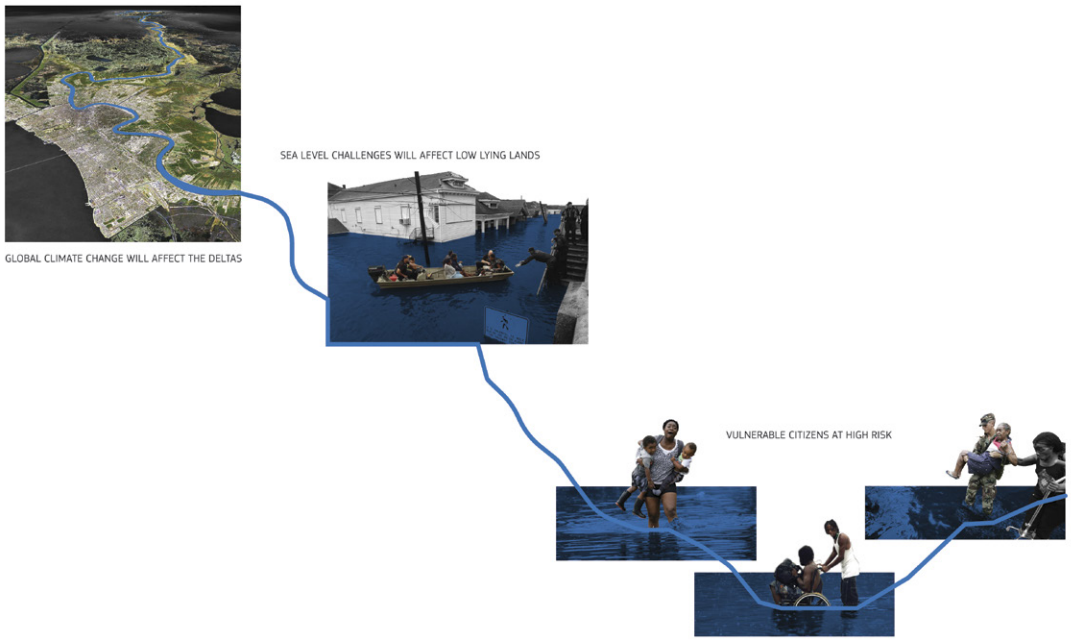
Using the larger theoretical framework of ecological urbanism, that brings together the natural and infrastructural systems with the social, political, and economic. Similar to the earlier work of Ian McHarg, in *Design with Nature*, where he argues that cities must consider the larger regional context and that the natural environment has a social value to be cultivated in urban design (McHarg 1969, 8). He considers that natural and human worlds are integrated entities interacting at various scales (McHarg 1969, 8). Ian McHarg's work shifted the way architects and designers approach regional landscape and urbanism through an understanding of systems and ecological thinking. In this sense, landscape acts as infrastructure, which is inherently a human intervention, connects to the cultural phenomenon of contemporary civilization that must be managed and maintained (Bélanger 2010, 348).

This concept promotes the fundamental idea that cities can and need to make infrastructure that serve multiple purposes, acting as positive social spaces and supports of biodiversity (Hill 2009, 146). Susannah Hagan states that ecological urbanism is environmentally led urban design that view "the city as literal and metaphorical ecosystems" (Hagan 2015, 4). In other words, it expanded the notions of site to include relationships between the dynamic environmental processes and social, political and economic conditions of urbanity.

To summarize, using McHarg's ecological approach, Bélanger's system approach, and Hill's social approach asserts a fundamental methodology to design both in

the temporal and spatial dynamics in all scales. Another prominent theorist, Hagen, combines these temporal and spatial dynamics in all scales with the concepts of new infrastructural and architectural interventions, which speaks to urban spaces as preventative measures in the face of climate change to address environmental issues first in order for social and economic prosperity to follow.

This thesis also considers neglected histories of inequality for many societies built adjacent to water. The inhabitants are central characters that define how urban space relates to their interactions with land and water. Therefore, it is essential to acknowledge that for decades inequalities have existed as the population increases. The inequality we see today is the consequence of centuries of unequal progression of society based on environmental, political, social, and economic conditions. Economic gaps have continued to grow with unprecedented levels of wealth



Collage of New Orleans' connection to water, land and people. Hurricane Katrina's devastating floods altered the lives of many people in New Orleans, especially those in low lying areas.

amongst the rich. The United States has more significant national wealth and income shares going to the top 1% (Institute of Policy Studies n.d.). The rise in economic inequality in the US is causing concern among the public, researchers, policy makers, and politicians. According to the Census Bureau's estimate, income inequality in the US increased by about 20% from 1980 to 2016 (Horowitz, Kochhar, and Igielnik 2020). The Lower Ninth Ward in New Orleans emerges as an important site that encompasses many of the hardships of environmental injustices. Race is a significant factor for land ownership that dates back to the 18th century, where it served as a colony for escaped slaves situated in low lying cypress swamp. Devastating floods exacerbated racial and social inequalities in low lying and low-income neighbourhoods. The origins of racism and inequality therefore are the direct result of colonialism, in which slave capture and ownership were created for cheap labour in the New World for the old world (Yusoff 2018, 11). Colonialism and modernism continued to this region's unequal social structure in the Lower Ninth Ward.

This thesis investigates the region's history, natural processes and infrastructure at three different scales: the Mississippi River Delta, the city of New Orleans, and the Lower Ninth Ward community. The methodology utilizes mapping, film and data on the displacement, recovery, and resilience of the Lower Ninth Ward to inform design brought by social, economic and environmental processes. Existing design proposals and analyses, worked on by stakeholders, researchers, architects, and residents, are essential information within the context of my design intervention. The regional scale will look at Coastal Sustainability Studio's ecological approach that will affect the natural

process of the Mississippi River Delta, to the investigation of Waggonner and Ball Architects' analysis of the natural landscape in Greater New Orleans that will situate existing racial inequality established by policies, and the catalyst of change that needs to be addressed to improve resilience within the Lower Ninth Ward. This thesis proposes a pilot program that uses the former Lower Ninth Village community centre as a site that supports public awareness to living with water and local ecology with component attached to sharing knowledge, learning, and play.

The thesis question that emerged asks: how can architecture reclaim and create resilience in vulnerable communities through connecting waterscapes, productive landscapes, and infrastructures to social spaces? It argues that effective design is adaptive, serving to reactivate the intrinsically linked relationship between the natural, built, and socio-cultural environment. This thesis aims to contribute to an architectural discourse that discusses the current framework of ecological urbanism in the Lower Ninth Ward, where organizations like the Center for Sustainable Engagement and Development focus on coastal rehabilitation, greening the built environment and increasing food security by reinforcing community driven goals through nature, economics, and culture. The goal is to design an adaptive system of change within a temporal landscape, reimagines how we live with water as a collective society that promotes community engagement towards resilience.

Chapter 2: Theory on Water, Land, and People

Natural Landscape to Ecological Urbanism

The influential work of Ian McHarg, a landscape architect and academic, laid the foundation for his seminal work, *Design with Nature*. McHarg believes that cities must view their regional context and that the natural environment has a social value to be cultivated in urban design (McHarg 1969, 8). He considers the natural and human worlds are integrated entities interacting at various scales (McHarg 1969, 8). The integration of natural and cultural systems then encourage a new way of thinking in how we occupy and modify the earth. Design then must operate at different scales and engage ecology, hydrology, and community to gain a stronger sense of place and identity. Building on McHarg's ideas of ecology, James Corner reinforces how all life on the planet, both human and non-human are engaged in dynamic relationships (Corner 2006, 24). A hybridized and dynamic urban ecology emerges as

> the union of landscape with urbanism promises new relational and systematic workings across territories of vast scales and scape, situating the parts in relation to the whole but at the same time the separateness of landscape and urbanism acknowledges a level of material physicality, of intimacy and difference, that is always nested deep within the larger matrix or field. (Corner 2006, 33)

The scalar, spatial, and temporal aspects of ecology must be considered with design as we deal with the natural processes that are always active and evolving, like those that make up the Mississippi River Delta. Thus, using ecological urbanism as a framework to understand the complex relationship between natural landscape, infrastructure, and society, will result in a better, symbiotic, relationship.

Scales and Systems

This section will introduce systems theory provides a framework to understand relational scalar dynamics. Systems theory offers a framework for relating scales and interconnected processes. Alan Berger and Dirk Sijmons' approach to system design "merges the existing stresses on a landscape with multi-layer, time-based strategies that work to reclaim value and increase sustainability in the built environment" (Berger and Sijmons 2009, 14). This strategy implies that changes within the larger systems, whether natural or human made, are not singular or local but occur as a result of scalar dynamics with other systems.

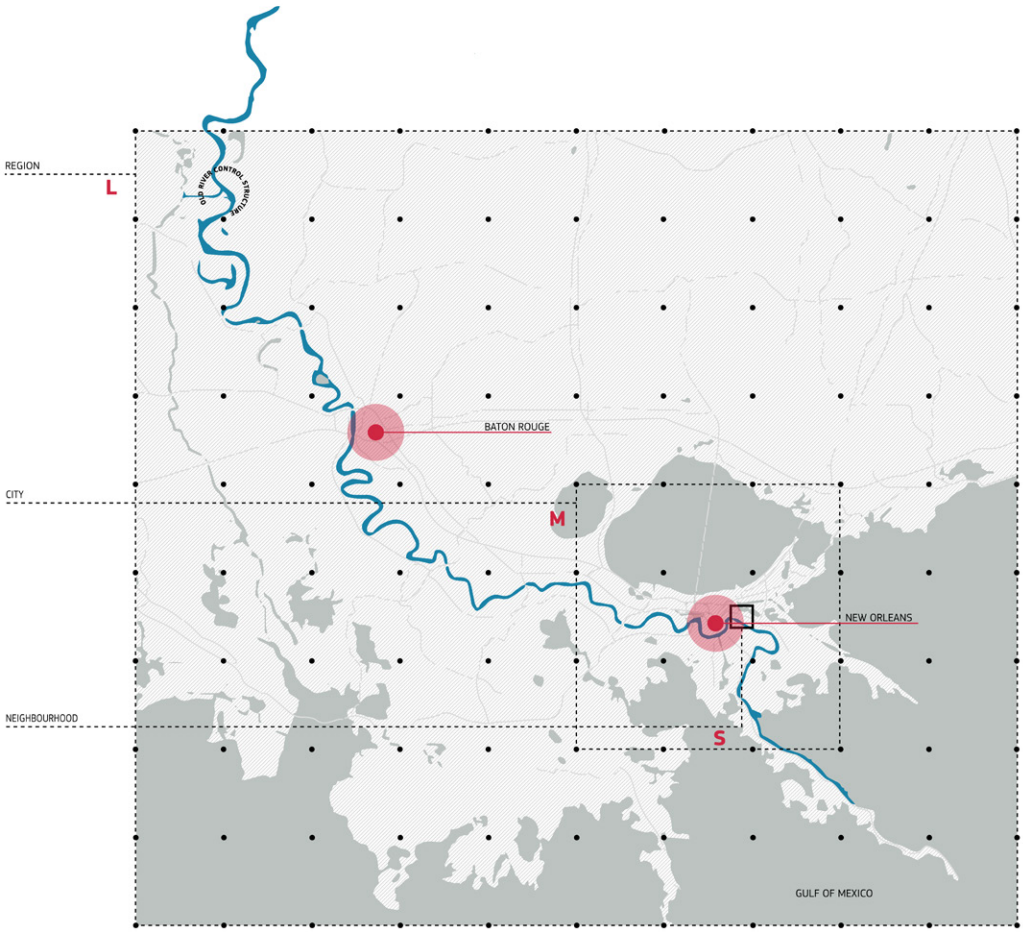


Diagram of integrated scalar systems of the Mississippi Region, city of New Orleans, and neighbourhood of the Lower Ninth Ward. (base map from Mapbox 2020)

Design is used to shift systems theory to ecology and urban approaches.

This shift from systems theory to ecological and urban approach redefines infrastructure as an infrastructural system aligned with ecology and biophysical systems. (Bélanger 2010, 345) He argues that landscape is defined by human intervention formed through the interactions between humans and their environments and for this reason the interconnectivity, Bélanger suggests, is necessary to understand the landscape, the process, and the systems which inhabits. This means recognizing how “the economy is now inseparable from the environment” (Bélanger 2010, 345). As a result, this proposal integrates contemporary infrastructure with ecology and economy to society as it utilizes landscape as an operative ground.

As both Berger and Bélanger suggest, any changes to the current operation and control of the Mississippi River will be a complex procedure that must engage actor groups like

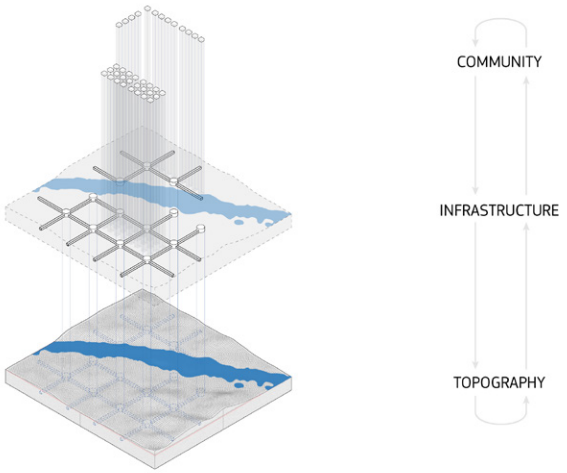


Diagram of city scale systems acting between topography, infrastructure, and community.

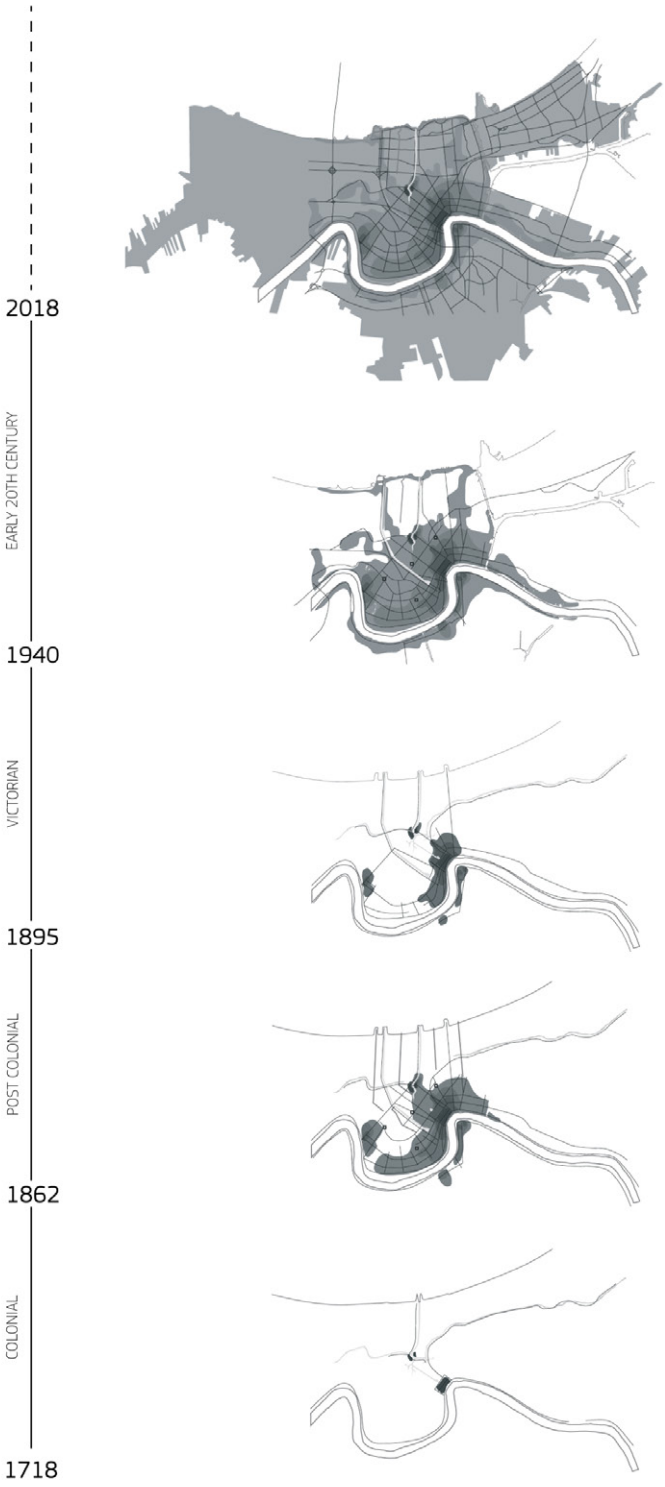
coastal scientists, engineers, designers, and community. As a result, any changes proposed to the design process at the different scales of the Mississippi River will present challenges and opportunities to the city scale of New Orleans, and eventually to the neighbourhood of the Lower Ninth Ward.

Social, Political, and Economic Conditions

The interconnected systems and temporalities of the water, land, and people emerge as a complex web. Nina-Marie Lister states that “if the collective analyses of sites and context shift beyond the ground place and embrace the social-cultural and political-economics of landscapes new typologies of infrastructure necessarily emerge” (Lister 2016, 526). The urban landscape is engaged in designing relationship between the natural processes and its urban form, while taking into consideration the history of human interventions, social, political, and economic conditions specific to the site. As Susannah Hagan observed urbanization along low lying lands, “if development on the flood plains is increased, then the ‘cost’ elements of the risk equation increased” thus “engineers and architects delivering the development know how to ‘design with nature’, in this case, how to produce built fabric that allows flood plain to function as they need to” (Hagan 2015, 63).

The city of New Orleans, situated within the Mississippi Delta, is an environmentally active and susceptible site, with underlying question concerning social-economic inequalities relating directly to environmental issues that should be addressed. As a result, changes in the environmental and urban processes will have to consider the social, political,

and economic conditions specific to the site as new typologies emerge out of necessity for its inhabitants.



The timeline of urbanization in New Orleans since colonialization. This diagram shows the expansion of human settlement from high elevation to low lying lands. (base map and data from Waggonner and Ball 2013)

Chapter 3: Dynamic Scales of Time and Space

This chapter will discuss the three different scales and the relationship between water, land, and people of the region. Using layering as a method of mapping, drawing, and documentation, helps to understand the fluid and interconnected networks of the sites at the scales of the Mississippi River Delta, the city of New Orleans, and the community of the Lower Ninth Ward.

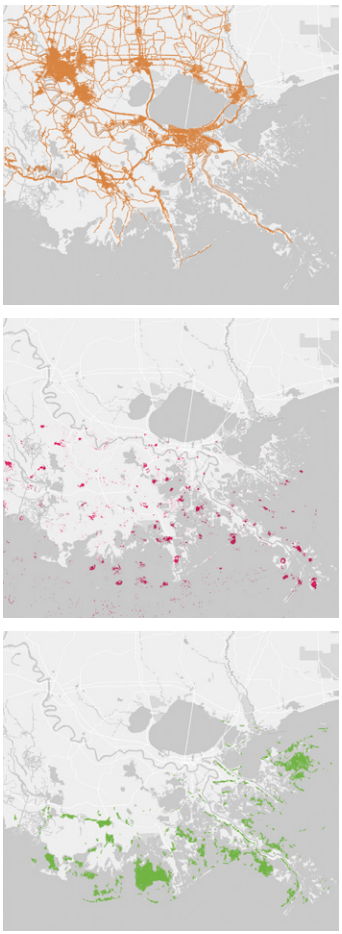


Diagram of human inhabitation, resource extraction, and wetlands in the Gulf of Mexico (base map from Mapbox 2020; data from Mossop and Carney 2010).

Mississippi: An Anthropocene River

The Mississippi River Delta in Louisiana is the confluence of the river's freshwater with the saltwater of the Gulf of Mexico. The Mississippi River is both a highly active ecosystem and a shipping route for raw materials, goods, and pollutants. It is revealed in this thesis that the natural processes, systems brought into place, and evolution of human settlements, have changed the Mississippi River Delta.

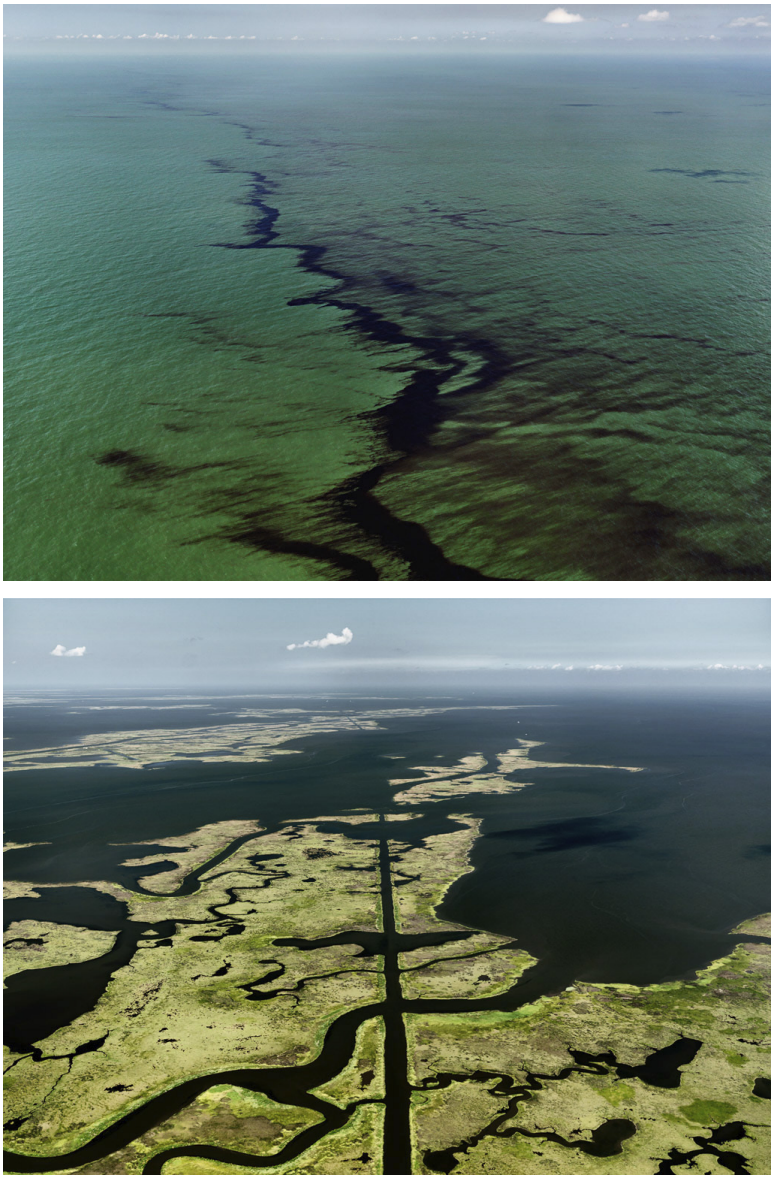
The Mississippi River Delta is a river-dominated delta system only partially influenced by tides and waves. Through fluvial processes, sediments make their way through the river's mouth and are then distributed outward. The landscape, and soil composition of the area is created by the deposition of silts carried along by the natural process of flooding and collection of sedimentation on the land, which now consists of soft clay (Snowden, Studlick, and Ward 1980). Distribution of sedimentation is vital to rebuilding wetlands, consisting of mainly sand that contributed to increasing elevation, while silts and clay sustain the land being built.

As urbanization grew along the edge of the Mississippi River, human interventions such as canalization, resource extraction, the shift to the commercial shipping industry and flood protection, have altered deltaic processes. The desire to control the river became necessary to protect the threat susceptible to settlements from natural waterways. The Old River Control Structure, a floodgate system, at a branch of the Mississippi regulates the flow of water into the Atchafalaya River. During significant floods, floodgate systems like Morganza Spillway, located 48 km from the Old River Control Structure, opens into the Atchafalaya basin. Just 19 km west of New Orleans, the Bonnet Carré Spillway opens into Lake Pontchartrain. These floodgates are in place in order to protect the city in the lower river from flooding.

Inhabitation along the river became a significant part of the development of settlement pattern, agriculture and economy. In *Petrochemical America*, Richard Misrach and Kate Orff state “how oil and petrochemicals have transformed the physical form and social dynamics of the

Photograph of the petrochemical industry in southern Louisiana. (Turner n.d.)

American landscape" as industrialization of agriculture and major infrastructural works enabled settlements to spread to further parts of the territory (Misrach and Orff 2014, 115). In the 18th century, French settlers transformed the landscape into geometric strands of the arpent pattern, perpendicular to the river, designed to maximize distribution of water to agriculture and allow easier access to the river (Misrach



Photographs of the Gulf of Mexico in 2010 that show the evidence of human intervention reshaping the landscape. Top image shows the oil spill; bottom image shows the submerged pipelines. (Burtynsky 2010)

and Orff 2014, 115). The associated importation of slaves to work plantation fields change the social paradigms and the landscape (Misrach and Orff 2014, 115). After the American Civil War, in 1865, many former slaves were granted access to land along the edges of plantations as a “system of identity and self-sufficiency through property ownership” (Misrach and Orff 2014, 157). The shift in the social paradigm and pattern of settlements sets up a framework for development that has led to inequity we still see today. As a result, by looking at the changes in the regional scale in the natural process of the Mississippi River Delta, the advancement of infrastructure and systems, resource extraction, and the social paradigm in this complex web need to be addressed as we continue to fight against the disappearance of the coastal region.

Greater New Orleans: The Urban Landscape

In 2013, Waggonner and Ball Architects, in collaboration with Greater New Orleans, Inc. created the urban water plan vision that adapted the Dutch’s highly effective water management techniques. This proposal intended to work in tandem with the region’s current levee system and Louisiana’s 2012 Coastal Master Plan. I will be using this document as a primary resource of data for their extensive research of Greater New Orleans to have a better understanding of the city’s ecology and infrastructure.

The city of New Orleans is located at the mouth of the Mississippi River and is a critical line of commerce that provides access to the River Valley. To the north of the urban city lies the estuary of Lake Pontchartrain and serves as additional access to the Gulf of Mexico. Regional wetlands have an abundance of ecosystems and act as a

natural buffer that protects the human-made levees and flood walls from hurricanes and storm surges. Its seasonal flows have attributed to the land formation processes that created the Mississippi River Delta's characteristic profile. From Waggonner and Ball's analysis before the European settlements, the natural process of the Mississippi River and its distributaries overflowed their banks where the heaviest soils settled out close to the riverbanks (Waggonner and Ball 2013). Waterbodies and waterways often define the edges of urbanized settlements and riverbanks. The edges between waterbodies and urban settlements in New Orleans are seen today as hard infrastructure. With the Flood Control Act of 1928, these infrastructures began to control the Mississippi River as it became entirely channelized, held between levees and flood water, preventing it from changing its natural course (Waggonner and Ball 2013). Levees along the lakefront became necessary to block storm surges and high tides from entering the city's low ground. While natural levees play a large role in creating landscape, another important component that ordered human settlements and the flow of commerce is the extensive use of local ridges for transportation. Today, the rest of Greater New Orleans have an average elevation of 5.9 feet below sea level (Waggonner and Ball 2013). Hurricane Protection and drainage technologies are necessary to battle against natural forces and an important aspect of maintaining life and livelihoods for local inhabitants.

In Waggonner and Ball Architects' 2013 analysis there are three distinct hydrological basins that encompass various interactions between the natural flow of water and sediments, forced drainage, and levee construction. Along with the basins, there are defining landscape types that

correlate to how each neighbourhood is situated. Some neighbourhoods are located on the backslope of the river levee, on a ridge, in a bowl, or in lowland areas.

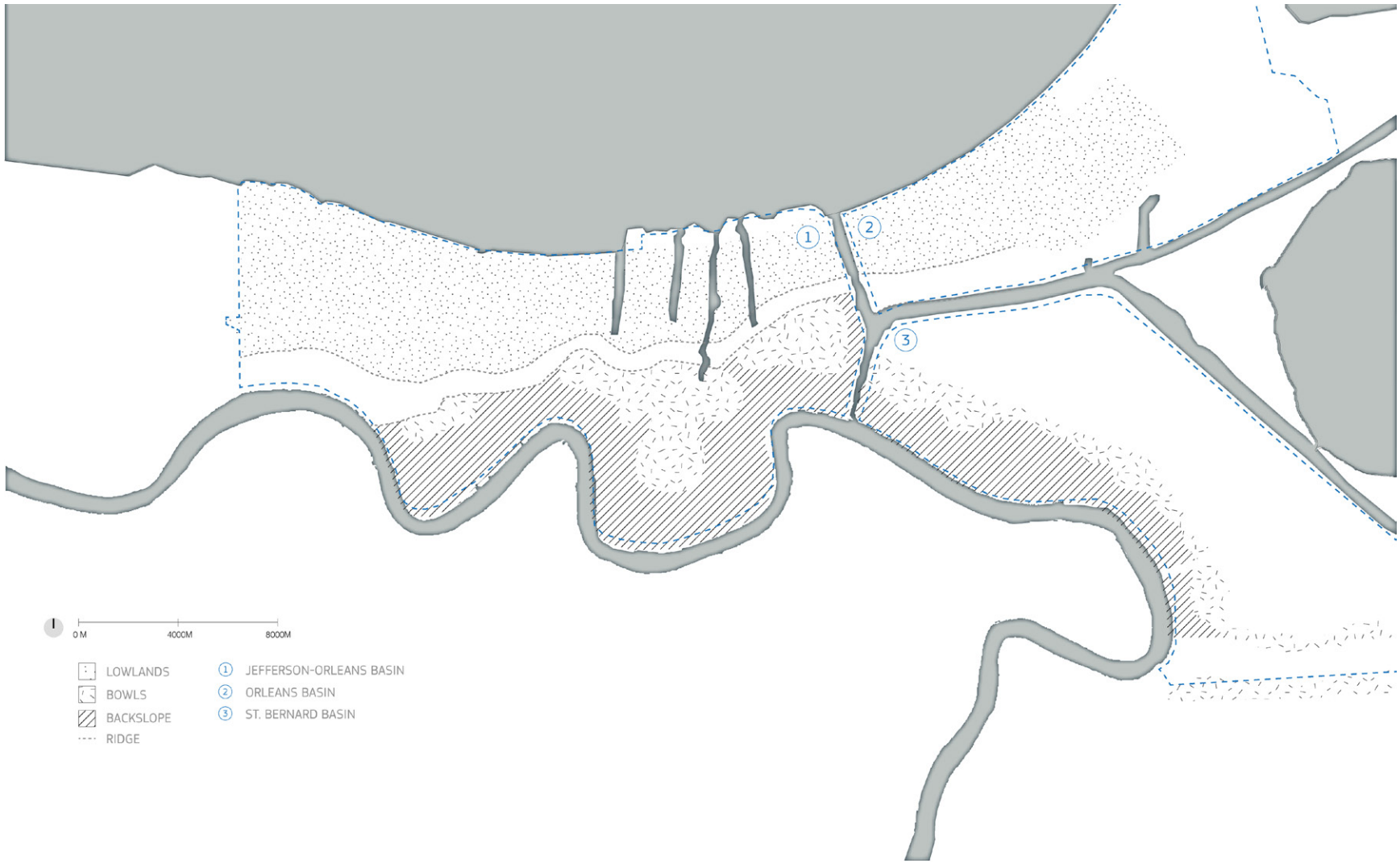
1. Backslopes are the more stable land along the Mississippi River. This landscape type is composed in areas above sea level where early settlements such as the French Quarter, Rivertown, Carrollton, and Old Arabi were built upon. These land area follows the curves of the Mississippi River as it moves towards the Gulf of Mexico.

2. Ridges are areas that remain on high ground as it functions as a natural levee formed when waterways overflowed their banks, depositing fresh sediment and silt to create high ground. Similarly to backslopes, ridges also served as sites for early settlements.

3. Bowls are areas below sea level that sit between backslopes of the river and ridges. Historically, when the river overflowed its bank, bowls would be the first to fill up and the last to dry out. These areas are heavily dependent on pumps which made it a challenge when pumping stations stopped working after the flood wall breached during Hurricane Katrina.

4. Lowlands have some of the lowest elevation and are more prone to floods. Lowlands are located between the ridge and the lakefront of Lake Pontchartrain is formerly swampland. These low lying areas have highly organic soils that are prone to subsidence, with a loss of over 10 feet in elevations.

Seen at the city scale, the neighbourhoods located on bowls are areas of major concern. A part of the Lower Ninth Ward neighbourhood lies in a bowl landscape type

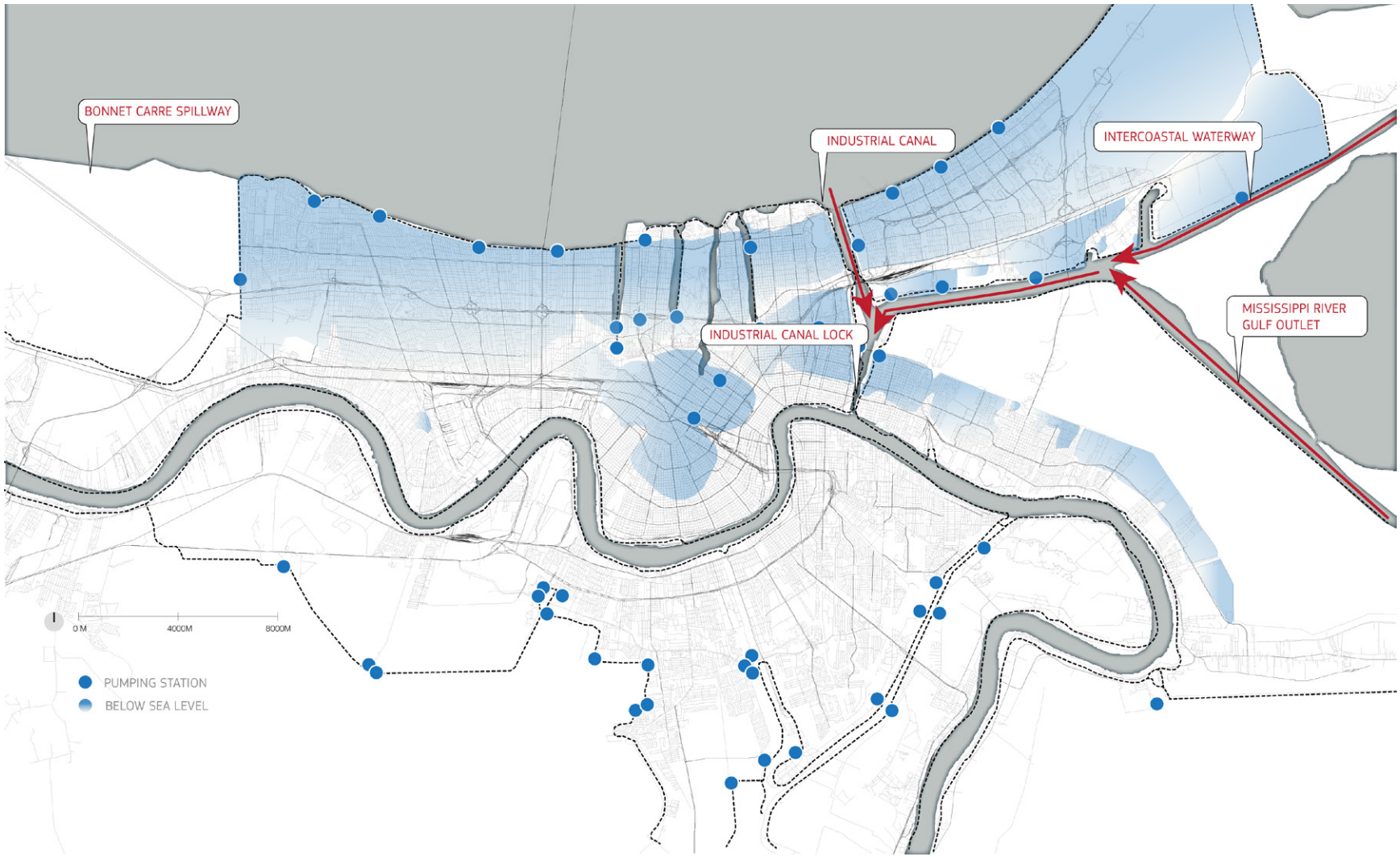


The natural landscape of New Orleans. (base map from Google Maps 2020; data from Waggonner and Ball 2013)

between a backslope and wetlands, making it an area that is susceptible to flooding as it naturally flows into the wetlands. The combination of the Industrial Canal, the intercoastal waterway, and the Mississippi River Gulf Outlet resulted in the channeling of storm surges caused during Hurricanes that contributed to multiple engineering failures and, in turn, to the displacement of people, damages to their homes, and loss of a sense of community. The city's location near the mouth of the Mississippi River is significant to the social, political, and economic relationship between the natural landscape, commercial canalization, and its neighbourhoods in New Orleans. This highly complex relationship needs to be understood as a way that these relationships and functions can be maintained and adapted by the community through social programming (food security, market, library/ resources, and disaster contingency plan) enabling the community to learn to live with water and create resiliency.

A History of Environmental Injustice

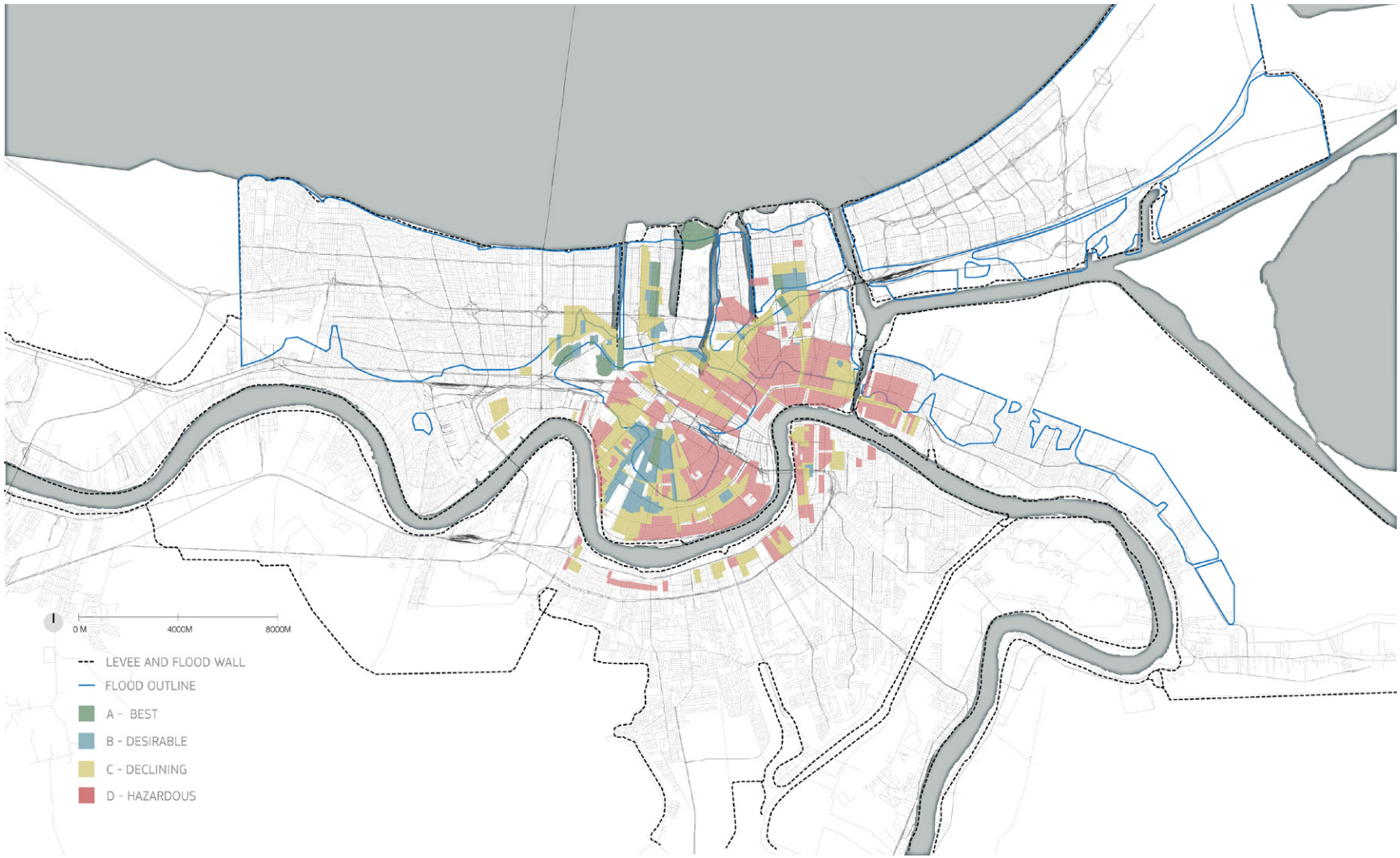
The city of New Orleans has a history of environmental injustices where resources for recovery and resilience are allocated to affluent white neighbourhoods. In the post-Katrina landscape, environmental injustices can be highlighted by comparing two environmentally risky neighbourhoods (Lower Ninth Ward and Lakeview). An open source interactive map collected by Mapping Inequality project, launched in 2016, created a foundational resource for unprecedented research and policy on redlining. In Mapping Inequality of the 1940s redlining documents reveal how federal housing programs codified and perpetuated displacement and expanded racial and class segregation practices. Neighbourhoods in the city were assigned grades to reflect a certain level of "mortgage security" that was then



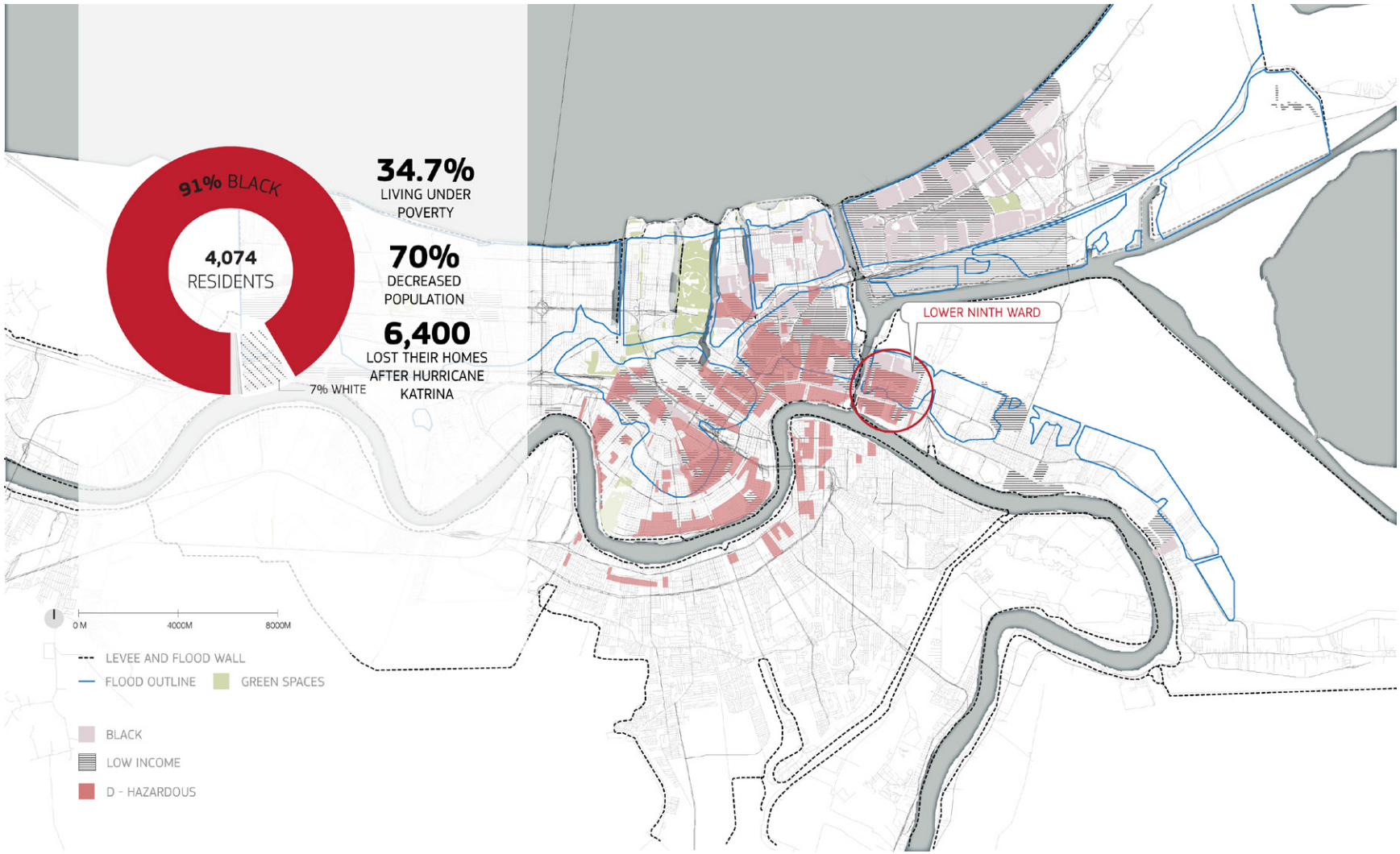
Flood protection system, canals, and infrastructure of New Orleans in relation to flooded areas of the bowl landscape type. (base map from Google Maps 2020; data from Waggonner and Ball 2013)

translated into a colour-coded map where the highest grade of “A”, coloured in green, indicated areas deemed minimal risks for banks and mortgage lenders when determining who received loans. The lowest grade of “D”, coloured in red, were areas considered hazardous, at high risk, for lenders (Mapping Inequality n.d.). The correlation between high and low grade areas were often determined by the high or low minority population inhabiting these areas.

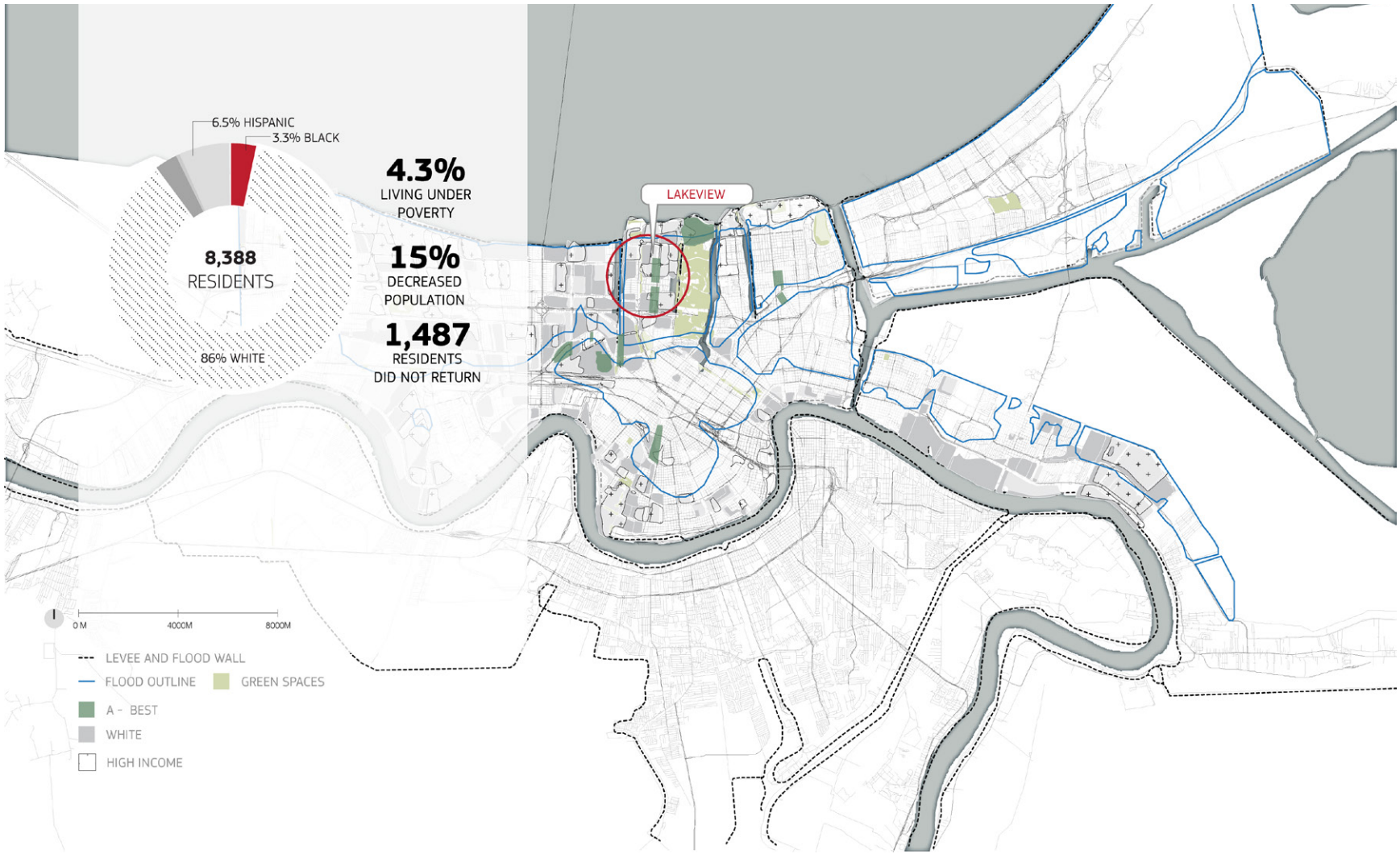
These inequalities were further compounded through urban and economic development, as an example, after World War II in the 1950s “local suburban explosion (aided by the draining of former backswamp, and the construction of the interstate highway system) which reflected the urban residential patterns nationwide” as supported for a slow migration of white populations from racially exclusive suburban developments taking basic services with them (Landphair 2007, 841). For example, when white populations fled the Lower Ninth Ward, they took clinics and grocery stores with them to their new neighbourhoods, leaving the Lower Ninth Ward with less access to basic services. Therefore, these white populations moved into whiter, more affluent neighbourhoods such as Lakeview. In 1927, the Louisiana Supreme Court struck down a state act that would prohibit Black individuals and families from renting and buying residential property in white communities but it failed to prevent neighbourhood developers from imposing the same restrictions (Elliot, Haney, and Sams-Abiodun 2010, 633). As a result, private developers stipulated that no-low cost homes could be built and rented to people of colour, making Lakeview exclusively white (Elliot, Haney, and Sams-Abiodun 2010, 633).



Home Owners' Loan Corporation's map for New Orleans. (base map from Google Maps 2020; data from Mapping Inequalities n.d.)



Comparative map between the neighbourhood of the Lower Ninth Ward and Lakeview. (base map from Google Maps 2020; data from Mapping Inequalities n.d.; Waggonner and Ball 2013; Data Center 2021b)



Comparative map between the neighbourhood of the Lower Ninth Ward and Lakeview. (base map from Google Maps 2020; data from Mapping Inequalities n.d.; Waggonner and Ball 2013; Data Center 2021a)

The white flight from the neighbourhood was exacerbated in September 1965 by Hurricane Betsy. Images from Hurricane Betsy are virtually identical to the ones from Hurricane Katrina in 2005, about forty years later. In the decades between Hurricanes Betsy and Katrina, New Orleans evolved into an African American city and as the Black population grew, it got poorer (Landphair 2007, 842). The race and class dynamics reshaping New Orleans were particularly salient in the Lower Ninth Ward. Today, the Lower Ninth Ward has a demographic of 91% Black Americans, a decrease of 70% in population since Hurricane Katrina in 2005, when approximately 6,400 residents lost their homes. While in comparison, Lakeview, facing similar flood threats, is 86% white with only a 15% decrease in population since Hurricane Katrina, as approximately 1,587 residents did not return home. When investigating the two environmentally susceptible neighbourhoods, sociological research emphasizes personal networks that offer social resources in times of need as an advantage to “seeing [informal] social systems as active resources, not passive victims, shifting the focus away from human vulnerability toward an emphasis on human capability” (Elliot, Haney, and Sams-Abiodun 2010, 624). Government initiatives needs to inform policy in planning for and responding to large-scale disasters to render support for all, particularly those in less-advantageous positions (Elliot, Haney, and Sams-Abiodun 2010, 645). Therefore, using the natural process of sedimentation in wetlands at the regional scale, restoration of cypress swamps in the city scale, and informing policies through the land trust at the neighbourhood scale connects ecology, water, and people through infrastructure.

Before human settlements, the majority of the Lower Ninth Ward was a cypress swamp. However, in the 18th century, many escaped and freed slaves settled in low lying areas; this migration resulted in many of the houses in the Lower Ninth Ward being passed down from one generation to the next, ultimately creating the highest homeownership rate. It is important to note the shift in geological settlement pre and post-technological advancements. Prior to large-scale engineering in the late 1920s, settlements were confined to areas above sea level. Then, in the early 20th century when technological advances made it feasible to support the post-war housing boom, creating levees and flood protection in low lying lands. Today, the Lower Ninth Ward neighbourhood is situated in a flood zone area. Therefore, as settlements moved further north, away from the Mississippi River where cypress forests were located, caused destruction of cypress

Diagram of where the former wetland areas were historically located in the Lower Ninth Ward. (base map from Google Maps 2020; data from Mossop and Carney 2010)

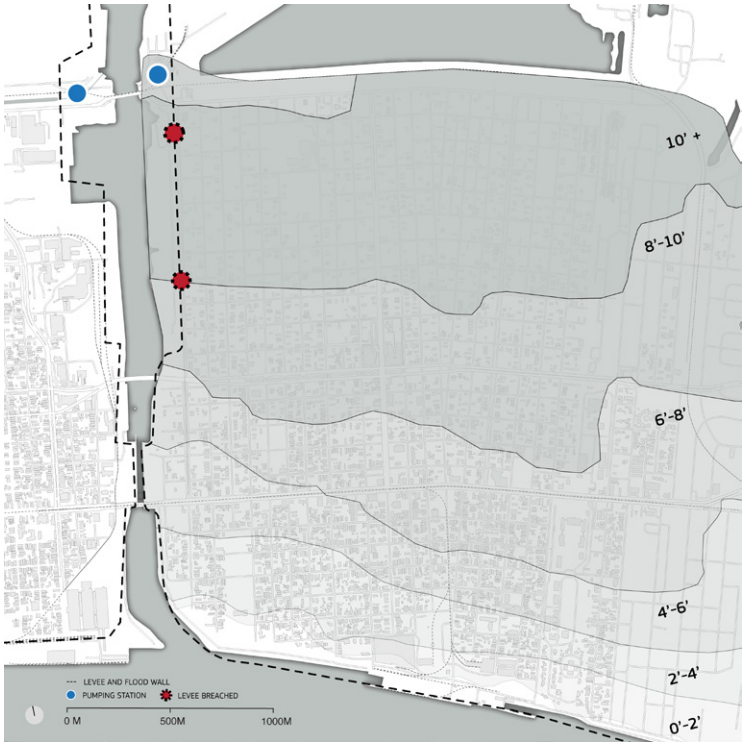


Diagram of the flooding after Hurricane Katrina in Lower Ninth Ward. (base map from Google Maps 2020; data from Swenson 2013; Waggonner and Ball 2013)

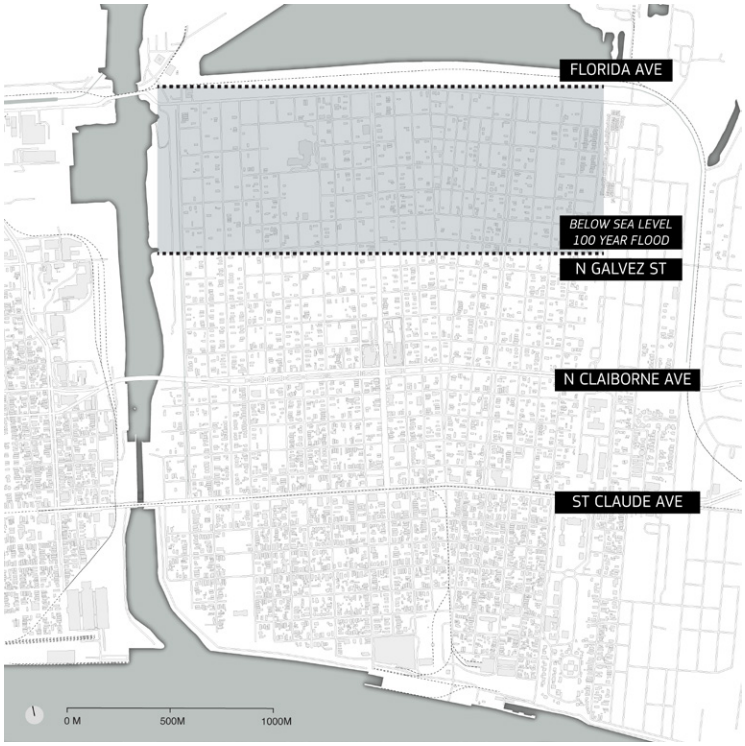


Diagram of the 100 year flood line. (base map from Google Maps 2020; data from New Orleans Regional and Urban Design Assistance Team Report 2018)

forest and coastal wetlands that once were the natural flood protection barrier.

This environmental risk was made visible as Hurricane Katrina's surges created a confluence in the Industrial Canal and breached two areas along the flood wall system. In addition to levee failure, pumping stations could not keep up with the amount of flood waters entering the neighbourhood, resulting in the devastation and catastrophic destruction of the neighbourhood.

Once the discussion of rebuilding efforts was underway, government agencies and stakeholders neglected the Lower Ninth Ward while prioritizing Lakeview in recovery efforts needed despite its similar environmental risk. As a result, new strategies and proposals needed to address past redlining discrimination practices in order to create positive change, especially in the Lower Ninth Ward, where generations of residents have owned their homes. Due to geophysical marginalization burdened by the community from rebuilding, new design proposals should not only address current challenges but also prevent future disasters. Understanding that the natural and infrastructural systems (involved in the regional, city, and neighbourhood scale) are intertwined lead to transparency and collaboration at the forefront of future urban design. This thesis is working towards urban development strategies that encourage working with various generations of the Lower Ninth Ward to promote the health, wealth, and stability – which correlate to the natural, social, and economical conditions – of the residents.

Lower Ninth Ward: Cultural Framework

Residents from the Lower Ninth Ward have a deep familial connection to the neighbourhood and their homes through a shared collective trauma that remains a socially symbolic place of identity. The Lower Ninth Ward "remains a place of purpose whose founding and migration narratives, significance within the national civil rights movement, have strong communal traditions, collective work ethic, investment in education with emphasis on excellence, robust arts culture, and integral ties to surrounding environments" (Regional and Urban Design Assistance Team Report 2018). The local efforts to preserve the diasporic community's sense of place, post-Katrina, should form then the basis of the Lower Ninth Ward redevelopment approach.

After Hurricane Katrina, it is imperative to work and collaborate with existing social infrastructure and non for profit organizations to create a strategic model for locally-focused reinvestment towards community equity. One of

Photograph of Ruby Bridges in 1960, walked through the doors of William Frantz Elementary School in New Orleans. She became the one of the first African-American student to attend an all-white elementary school. As part of a civil rights movement of desegregating schools in the southern United States. (AP Photo/File 2020)

Images outlining the Original Big Nine Social Aid and Pleasure Club parade in 2015 shows the importance of social infrastructure. In post-Katrina New Orleans, the city's many second line parades play a significant role in the cultural rebuilding and physical reconnection of people to their neighbourhoods. (Turner 2015)

the biggest social infrastructures refers to the New Orleans tradition of the Social Aid and Pleasure Club. In 1909, a large portion of Black African Americans formed this benevolent aid society. Under oppressive weight of racial segregation, Black communities formed their own organization known as the Social Aid and Pleasure Clubs. These clubs were the first form of insurance in Black communities where members received financial help when sick or financial aid when burying deceased members. During this era, New Orleans was divided into wards, and each ward had its own group. The Social Aid and Pleasure Club hosts parades where music is provided by a hired brass band leading the parade with the Social Aid and Pleasure Club members followed by everyone else. The people following after the band constitute the second line parade. Historically, segregation

laws contributed to how parade routes were determined during this period to areas in Black neighbourhoods (Zulu Social and Pleasure Club n.d.). Today there are about forty-five Social Aid and Pleasure Clubs in the city.

Second Line Parade

After Hurricane Katrina, the Big Nine Social Aid and Pleasure Club crossed the St. Claude bridge into the Lower Ninth Ward to show the strength and resilience in the face of the disaster. The second line parade has been a central community event of working-class African Americans in New Orleans, much like the subculture of Mardi Gras that has become a significant draw for tourism in the past generations (Dinerstein 2009, 615).

The origin of the second line parade brought people together to give family members proper burials. Drawing from West African traditions, an accompanying band would play during the procession to and from the cemetery. The second line parade were named after the crowds that formed behind the first line of grieving families. Today, it is known as a cultural institution, celebrated differently, and is considered a mobile block party that even takes over the public sphere as a weekly celebration of neighbourhood clans. Each is organized and sponsored by a Social Aid and Pleasure Club.

Social Aid and Pleasure Clubs evolved from the first fundraiser and have expanded beyond only funerals. Social Aid and Pleasure Clubs in New Orleans became a part of a distinctive culture that serves as a strong symbol of “home memory” (“Social Aids and Pleasure Clubs” n.d.). The nature of these celebrations is both somber and joyous, taking place every year from September through June.

Many neighbourhoods have their own clubs and each club organizes and hosts public parades in specific areas of the city where the club was founded or headquartered.

Second line parades routes are malleable from year to year with the addition of new stop for refreshments, and news of their schedules are often spread via word of mouth. This form of celebration was created out of the struggles of oppression, liberation, and in protest for social rights of free Black slaves. Celebration pours out into the streets and has become one the most unique local expressions. The second line parade has created a social event and symbol that is reimagined and reinvented generation after generation.

Similarly, the Center for Sustainable Engagement and Development (CSED), which has a long tradition of advocating for environmental injustice, is tied to the strong sense of community within the Lower Ninth Ward through community development and homeownership. The organization's mission is to focus on the natural environment, such as coastal rehabilitation; greening the built environment, to combat heat island effects; and increasing food security, which are due to geophysical isolation that has for decades supported historic preservation and fighting against environmentally risky plans that perpetuate environmental inequalities (CSED n.d.). There are existing community workshops and service-learning opportunities that work with the library to focus on sustainable solutions to regional climate challenges. By partnering with CSED to continue to uplift community driven goals, the introduction of the library becomes a space of integration to initiate, support, and stimulate equitable, sustainable and resilient community through sharing knowledge and advocacy to living with water.

Chapter 4: Design Proposals

> If resilience is to meaningfully inform policy and public debate, it needs to be discussed in close relation to environmental justice, or else it can be perceived as a tool to maintain unjust, or even oppressive social structures. (Lewis 2015)

There is no shortage of documentation and research on issues of climate change and environmental racism occurring in New Orleans. Many researchers, anthropologists, sociologists, journalists, and artists have thoroughly documented the events of Hurricane Katrina. For the purpose of this thesis, I will be looking at existing design proposals at the regional scale of the Mississippi River Delta that work on ecological and hydrological conditions, informing policies in the city of New Orleans to empower all residents despite race and class, and collaborating with organizations, advocate groups and the Lower Ninth Ward residents to create resilience in the community.

A Scalar Ecological Approach

Inspired by the work of Louisiana State University's Coastal Sustainability Studio (CSS), Elizabeth Mossop and Jeff Carney emphasize how a regional approach starts with looking at the Mississippi River Delta as a natural force to return to its role as the "delta builder" (Mossop and Carney 2010). The CSS's strategy returns the role of the delta to balance the necessity of man-made structure with the coastal processes needed to sustain natural systems. A series of five diversion spillways operating at the five basins of the delta, where gates are used, provide a steady flow of water and sedimentation. This natural process would accumulate sediments to build land and natural buffers (wetlands) over the course of the century (Mossop and Carney 2010). Wax Lake Outlet and Bonnet Carré spillway are examples of this

process. Wax Lake Outlet is located west of the Mississippi River near the mouth of the Atchafalaya River, becomes an important precedent showing the steady process of diverting sediments and building up a delta. Bonnet Carré spillway redirects the Mississippi flood waters into Lake Pontchartrain to protect the city of New Orleans. This proposal applies McHarg's ecological approach to the regional scale (of the Mississippi River Delta) combined with Berger's system theory on flood gates that sustained flooding in a controlled way. The goal is to make the river flexible through strategic planning base on the site's context that results in the land-river dynamics working with existing delta communities (Mossop and Carney 2010).

Simultaneously, giving the river room through sedimentation and wetland restoration at the regional scale connecting to Green Networks in the city scale as a part of the Crescent City Community Land Trust (CCCLT) initiative at the neighbourhood scale presents new challenges and opportunities for an integrated design. Communities must develop tools and infrastructures to work in harmony and co-exist with changing conditions. This means that creating spaces that work with wetlands, and river processes that are resilient to sudden fluctuations in water level apply a similar approach as Bélanger where landscape is use as infrastructure. Both Coastal Sustainability Studio and Waggonner and Ball Architects' proposals include a Central Wetlands Unit, a restoration of the cypress forest that once existed to provide new habitat and act as a natural buffer to storm surge. Waggonner and Ball Architects also propose to use the city as a sponge absorbing runoff into the ground, by integrating living water systems using permeable paving,

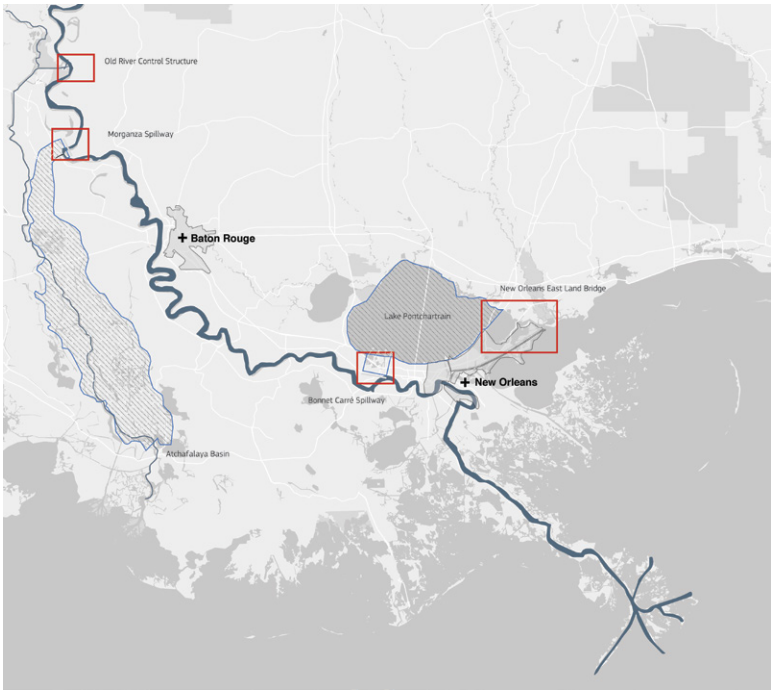


Diagram analysis of existing conditions within the boundary of the site region. (base map from MapBox 2020)

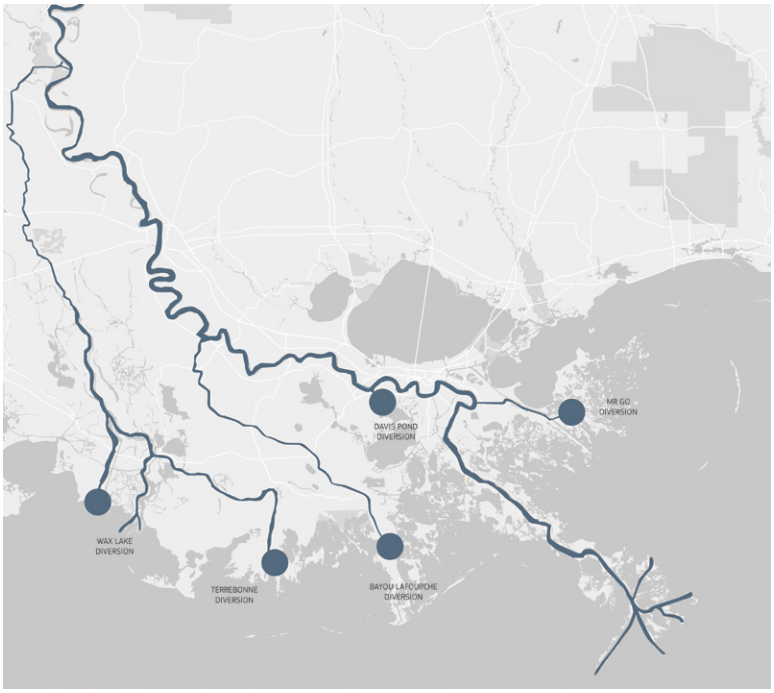
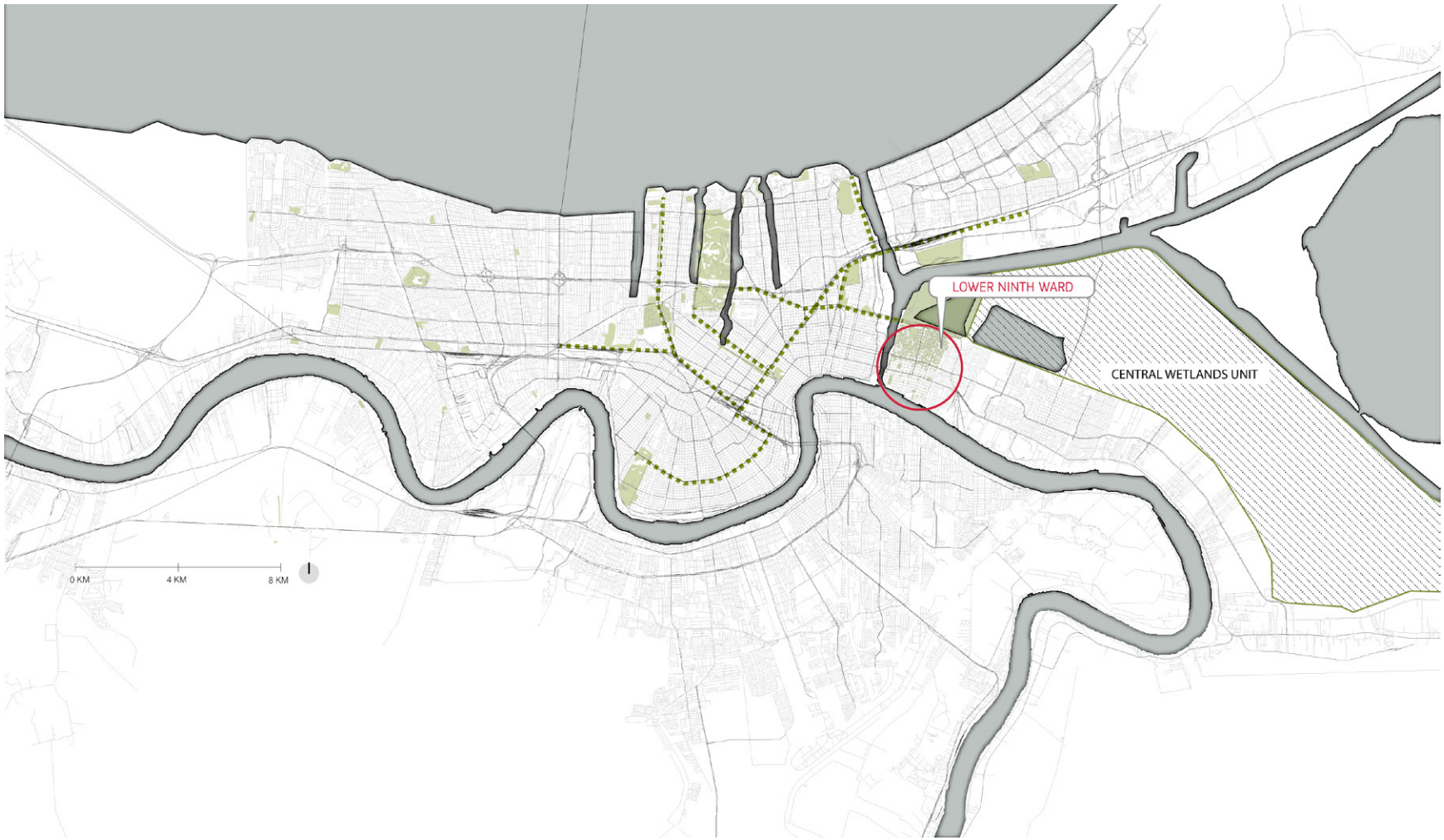


Diagram proposal of five diversion spillways to allow the Mississippi River Delta to return to its role as the delta builder. (base map from MapBox 2020; data from Mossop and Carney 2010)



Map of Lower Ninth Ward site in relation to the proposed Central Wetlands Unit showing its integration to the regional scale approached. Map also shows how the Green Networks are connected to each other, and by doing so, demonstrating the importance to rainwater management. (base map from Google Maps 2020; data from Mossop and Carney 2010)

trees, plants, and other soft infrastructure to flow, filter, and absorb runoff.

To build on the idea of giving room to the river, I am proposing the concept of Green Networks which will take vacant areas across Greater New Orleans and transform them into public green spaces integrated with wetlands in the regional scale and infrastructural system that works with existing communities. Each green space throughout the city is then connected through blue-green corridor (bioswales, rain gardens, canals, and open or closed pipes) creating a network of resilient parks. Green Networks are spaces that slow, store, and drain rainwater to the wetlands as part of the infrastructural system. This concept prevents the need to use forced drainage that only increases the differences in groundwater levels between wet and dry periods with negative consequences such as land subsidence. Green Networks start at the city scale, where as green spaces are tailored to neighbourhood needs determined by public organizations and residents. This strategy is done through informing policies of land use. In this case, working with government agencies, stakeholders and the CCCLT as the organization begins to inform policies on cooperative ownership. The CCCLT is made up of government agencies, stakeholders, and community residents with equal shares.

The CCCLT uses the community land trust model to create homes, apartments, and commercial spaces that are affordable, while expanding the traditional Community Land Trust (CLT) model to include homes, as well as residential and commercial rentals (CCCLT n.d.). The work set out by the CCCLT could also begin to inform policies that could enhance and support civic development. This thesis is proposing to establish a CLT model that extends to hold

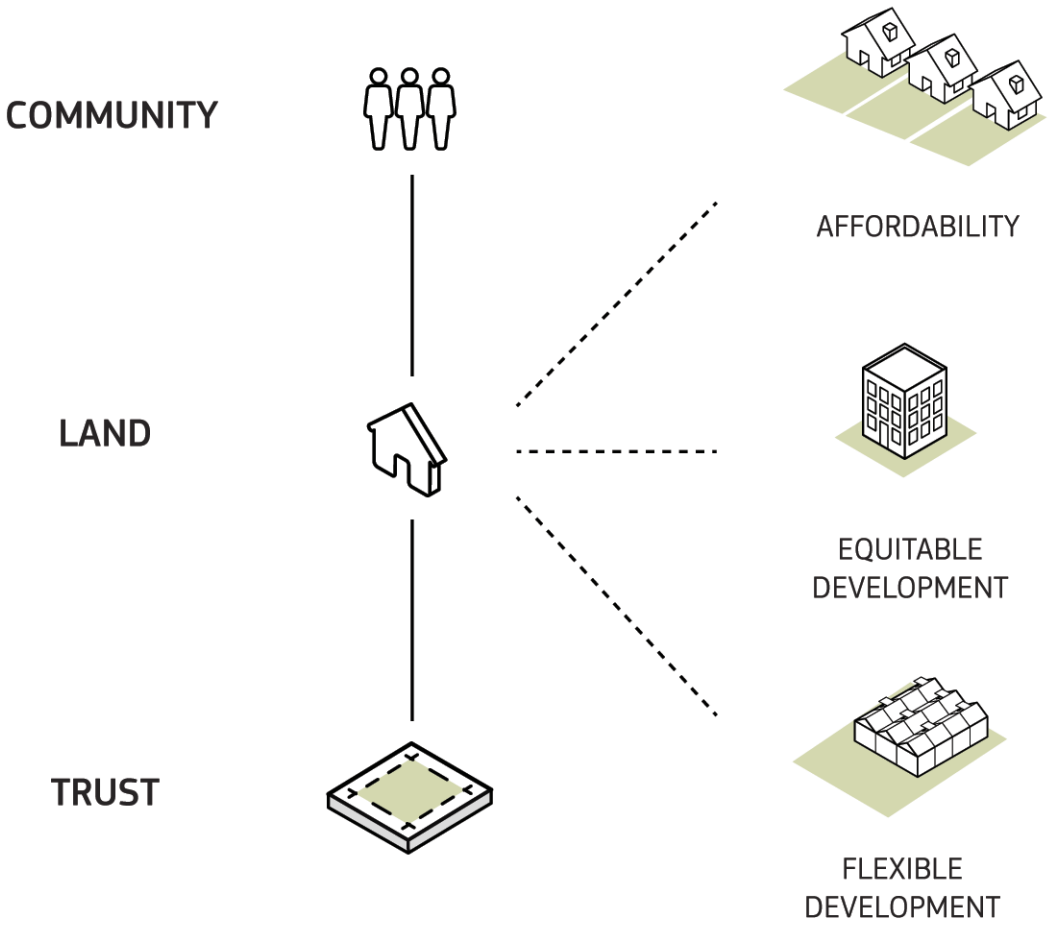


Diagram of the Community Land Trust model to identify actor groups involved, the policy and system in place, and the benefits it provides for the community.

vacant parcels of land for housing, but also for public spaces and civic development. This can be based off a local governmental framework that could fund and engage neighbourhood-scaled adaptation and design efforts.

As a result of this proposal, Green Networks have porous surfaces meant to recharge groundwater, store and use, and only drain rainwater when needed. The benefits of avoiding unnecessary drainage would resolve sinking land. Green Networks benefit the health of the community by activating public spaces positively around water, incorporating nature's temporal processes, and engaging through programming

into an integrated social and water system in the Lower Ninth Ward.

A Catalyst of Change

The Lower Ninth Ward neighbourhood serves as a case study to connect the regional scale systems to the community scale as a way to create resilience to flooding and climate change. To reiterate, much of the Lower Ninth Ward, historically, was made of cypress swamps that functioned as the natural buffer/middle zone that protected the neighbourhood. The destruction of the 76 mile long Mississippi River Gulf Outlet brought saltwater into the marsh, destroying the cypress swamp (Mossop and Carney 2010). My proposal uses Coastal Sustainability Studio strategies and Bélanger's integration of systems to nature. Coastal Sustainability Studio proposes the Lower Ninth Ward to be re-imagined and restored as the Central Wetlands Unit of 30,000 acres of cypress forest that once protected the Lower Ninth Ward from hurricanes (Mossop and Carney 2010). Bélanger's integration of contemporary infrastructures and the natural processes to optimize and develop a proposal that uses landscape as the operative ground for the proposed block. This neighbourhood scale proposal will include a cypress swamp restoration, located at the edge of the Central Wetlands Units; a berm defined as a protective landscape; blue-green corridor that connects all green spaces and mitigates water; and architecture with flexible spaces that accommodate different social programs. Each strategy forms the Green Networks throughout the city. Ideally, each neighbourhood would be integrated into the larger system at the city scale.

As part of my design proposal, the neighbourhood scale strategies include restoring the cypress swamp, a berm along the Industrial Canal, blue-green corridors, and vacant spaces as part of the community land trust model.

Restoration of the Cypress Swamp Wetland Edge

Located to the north of the Lower Ninth Ward neighbourhood, the cypress swamp becomes the edge separating the Central Wetlands Unit from the neighbourhood. The Central Wetlands Unit is part of the larger natural system. The edge condition provides an area for revitalizing cypress trees that acts as the middle zone to protect the neighbourhood from hurricanes. This visible intermediate zone brings nature and people together. Protected cypress swamps are a key way to increase biodiversity for birds. This edge condition is located at the lowest elevation of the neighbourhood.

Collage showing the restoration of the cypress swamp. Cypress swamp are able to withstand storm surges and redirect water so it doesn't move farther inland.

Collage showing people using the protective berm. This proposal increases waterfront access, creates new areas for future programs, and passive recreations.

Berm

The berm, located on the west side of the Lower Ninth Ward, along the Industrial Canal, creates an additional protective system along with the flood walls. The berm is a hard infrastructure defined as an artificial ridge or raised strip of land separating the canal and the neighbourhood. Underneath the berm are aqueducts (part of the blue-green corridor) where water drains into the canal during heavy precipitation. Burying the aqueduct increases waterfront access and creates new areas for program and passive recreation (bike paths, walkways, museums, and lookout points). The underside may also have different functions such as storage, amenities, and even stormwater tanks for use in building and irrigation.

Collage showing how the blue-green corridor contributes to flood protection. The Corridor includes bio-swales, rain gardens, and street plantings that will absorb and clean stormwater, cool the city, and improve mental health.

Blue-Green Corridor

The blue-green corridor consists of blue infrastructures and green infrastructures that contribute to flood protection and water mitigation. As climate change worsens, predictions include more frequent heavy precipitation events leading to street flooding and sewer overflows due to the impervious nature of the city and longer heat waves exacerbated by the urban heat island effect. The blue-green corridor includes bio-swales, rain gardens, and street plantings to absorb and clean stormwater and cool the city, as part of the Green Networks that connect urban green spaces. The water thus will become a more visible feature in the cityscape, creating a series of new public spaces. Implementing a blue-green corridor creates social benefits to improve air quality and shade as a place to gather and interact. The site selected is located at St. Claude Avenue and Alabo Street. The site

Proposed neighbourhood strategies that will work with regional scale changes. The Central Wetlands Unit gives the river room leading to changes in the built environment. The restoration of the cypress swamp along the Central Wetlands Unit creates a natural buffer. While the blue-green corridor mitigates excess rainwater. My site, highlighted in red, will attach its infrastructural system to the neighbourhood system. (base map from Google Maps 2020)

will strategically connect to the blue-green corridor on Alabo St. to show how vacant spaces are designed as part of the Green Networks.

Vacant Parcels

There are a series of vacant parcels of land throughout the neighbourhood that could create program opportunities

for a series of living systems that focus on reclaiming public spaces, working in conjunction with fluctuating amounts of water, productive landscape, and local users. In developing the vacant parcels using a community land trust model. It develops a new common ground, that pairs scalar landscape-infrastructural system functions together with economic opportunities – making affordable housing services, businesses, and Hurricane Katrina's diaspora to return to the Lower Ninth Ward.

For this thesis, programs and activities were informed through a series of documentaries, articles and academic journals, so that an understanding of the communities needs after Hurricane Katrina could be gathered and extrapolated to create possible scenarios for community engagement, activities, and processes. The architectural design proposal will look at a human-centric approach that utilizes an infrastructural system to connect the community's social, political, and economic conditions.

Informed Speculation on Program

The Lower Ninth Ward neighbourhood possesses "a unique bundle of characteristics that constitute a sense of place that cannot be found or replicated elsewhere" (Breckenridge-Jackson 2015). The homeownership, length of residence in the neighbourhood, perceptions of neighbourhood cohesion, and community activities positively correlate with place identity (Chamlee-Wright and Storr 2009, 618). Therefore, it is essential to understand the community's place attachment to the neighbourhood. This understanding was done by collecting and analyzing documentaries, articles, and journals. A set of Actor Groups and characters were developed for this thesis in order to speculate how they

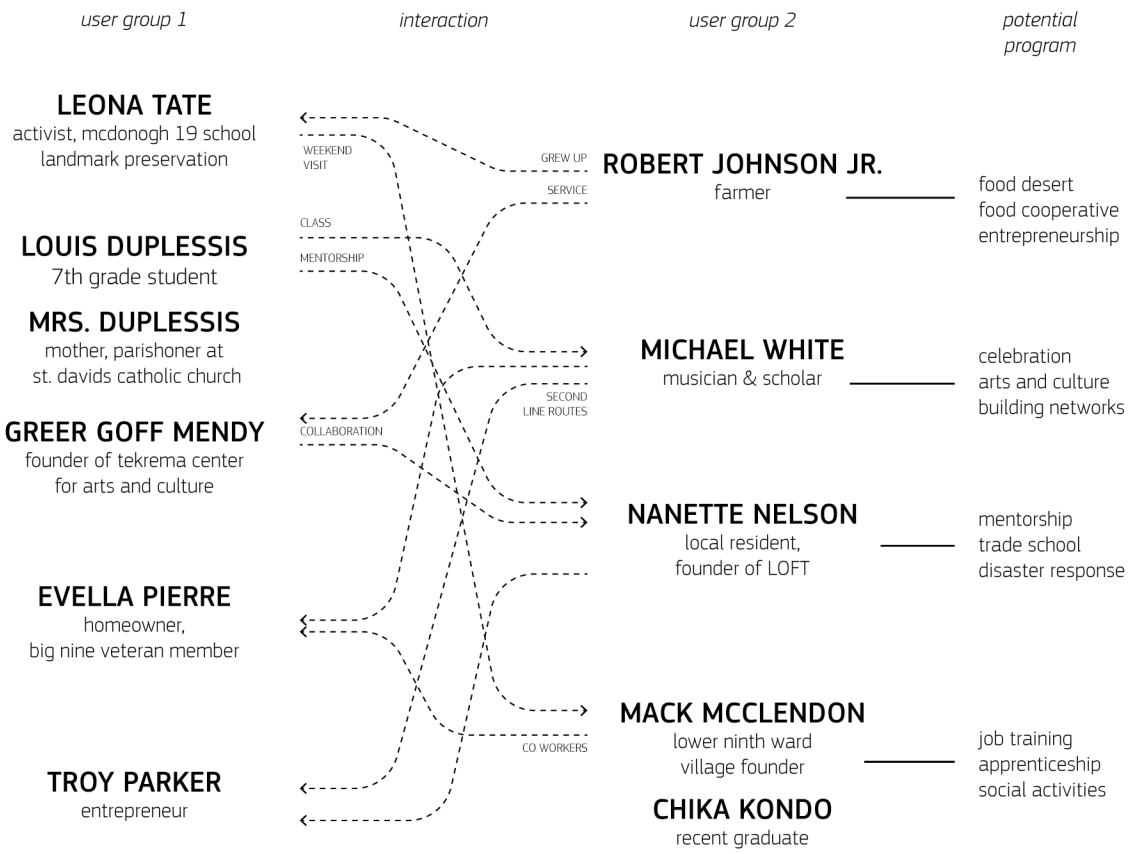


Diagram of the collected references and information transcribed into a visual map of character interaction in the Lower Ninth Ward neighbourhood to develop and inform the architecture.

would use the library. This documentation would provide a base for understanding everyday life in the neighbourhood. The information collected plays an essential role in creating narratives and informing the architecture. These stories will be discussed through different scenarios and program components, providing a base understanding of everyday life in the neighbourhood. The information referenced plays an essential role in creating narratives and informing the architecture, including “The Andrew ‘Pete’ Sanchez Multi-Service Center” written by Reckdahl (2017), “Putting the Ninth Ward on the Map” written by Breunlin and Regis (2006), *Reborn: New Orleans Schools* directed by Cooper (2008), *Maroon/Zarico/Liberty Street Blues* directed by Gladu (2006), “What’s Happening with the Lower Ninth Ward

Village" interviewed by Hockley-Smith (2014), and *When the Levees Broke* directed by Spike Lee (2006). Narratives derived from these sources are combined with existing community groups or organization to create scenarios that would then be implemented into the architecture.

Each narrative will discuss different program components of the library. Linking the large scale infrastructure design strategies works to bring together existing social groups and organizations. The second line parade, a community event that centres on working-class Black communities, would introduce the library and its facilities to the Lower Ninth Ward community by adding its location as a stop along the parade route. The library becomes a place for public space, gathering, and celebrating the city's culture and traditions. The Center for Sustainable Engagement and Development focuses on educating the neighbourhood on the importance of the natural environment through greening the built environment and sharing knowledge about urban agriculture that was lost after Hurricane Katrina. Character narratives are based on understanding everyday life through social programs such as market, after school mentorship, job training, library, and resources. The architectural intervention amplifies the synergy between different types of systems that address the existing climate while at the same time creating new social possibilities for culture and nature.

Chapter 5: Architecture as a Spatial-Temporal Framework

After Hurricane Katrina, the second line parade became a symbol of New Orleans' resilience. As discussed in Chapter 3, the second line parade shows the strength and resilience in the face of disaster, whether it is through oppression during slavery, ongoing racism, or in the face of disasters. Traditionally, it commemorates and celebrates burials. While the second line parade holds this tradition, it has become an act of democratic celebration against the oppression of racism for decades. However, this chapter focuses on the second line parade to stake a claim over public space to demonstrate the residents' desire to return to their homes. Music and celebration are at the centre of the second line parade, an event that affirms individual and community identity regardless of a person's socioeconomic status. Dr. Michael White, bandleader, musical educator, and scholar of New Orleans-based music states that these events are more than a celebration of "ancestral traditions but give scope for pride and free expression; they promote visibility, unity, respect and strength" (Dinerstein 2009, 624). There is an understanding that the city's culture shows a strong social network within these Black communities. Therefore, it is crucial to work and collaborate with existing community organizations and programs in the city to design and introduce this project.

Site and Conditions

The site is located at the intersection of St. Claude Avenue and the proposed blue-green corridor located on Alabo Street. The site was the former Lower Ninth Ward Village, a community centre that opened after Hurricane Katrina by

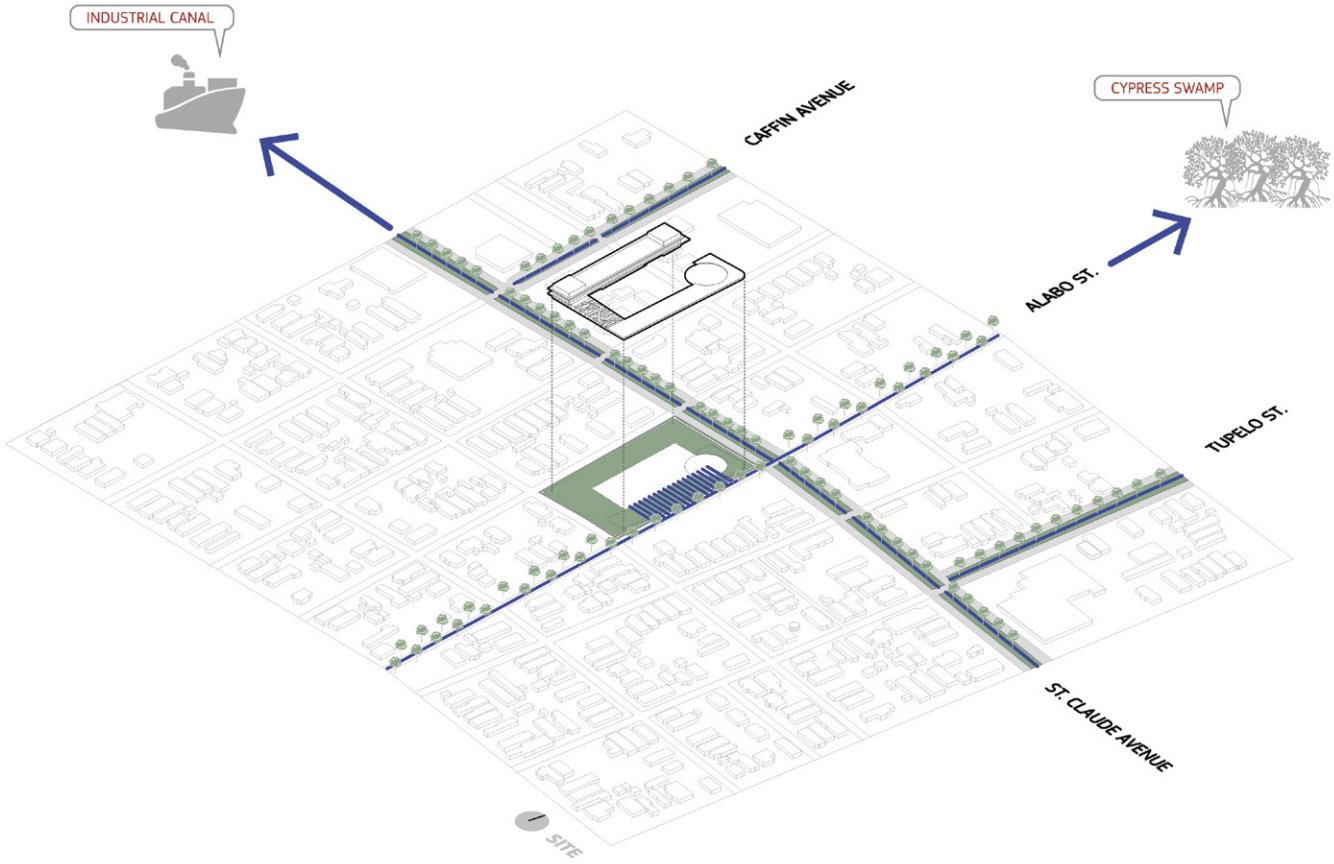


Diagram of the proposed site located on the intersection of St. Claude Avenue and Alabo St. connected to the blue-green corridor aids in mitigating water from the site to the cypress swamp at the edge of the Central Wetlands Unit. (base map from Google Maps 2020)

Mack McClendon (one of the Lower Ninth Ward residents). Before the Andrews Sanchez Multi Service Center, the Lower Ninth Ward Village became a beacon for displaced residents and played a crucial role in the neighbourhood's slow return. In 2012, the community centre closed to the public due to the lack of financial resources. The site has been abandoned but is in a good location in the Lower Ninth Ward. St. Claude Avenue, one of the main streets that connects the Lower Ninth Ward to the rest of New Orleans, is a primarily a mixed-used district, has one of the existing Regional Transit Authority (RTA) routes and is part of the Big Nine second line parade route. Alabo Street, located on the blue-green corridor, uses a south to north rainwater system to the Central Wetlands Unit, which is a part of the regional scale approach. My site will act as a catchment site, an area that collects precipitation and drains it into the wetlands, that can collect about 4.6 million liters of rainwater, which is then purified through the rain garden. The blue-green corridor uses the "The Soul of Nørrebro" project by SLA as a precedent for their rainwater management system. The excess rainwater will be led via Alabo St. to the Central Wetlands Unit. On the way, it will be purified through nature biotopes. Thus, the water will be a visible feature in the cityscape while contributing to irrigation and cooling the city through the blue-green public spaces (SLA 2016).

Components of the Site

This proposed block strategy utilizes the value of rainwater in all three scales and temporal dimensions that link small to large scale systems as an important resource to be collected, cleaned, and reused. The site is owned by the Crescent City Community Land Trust and the components

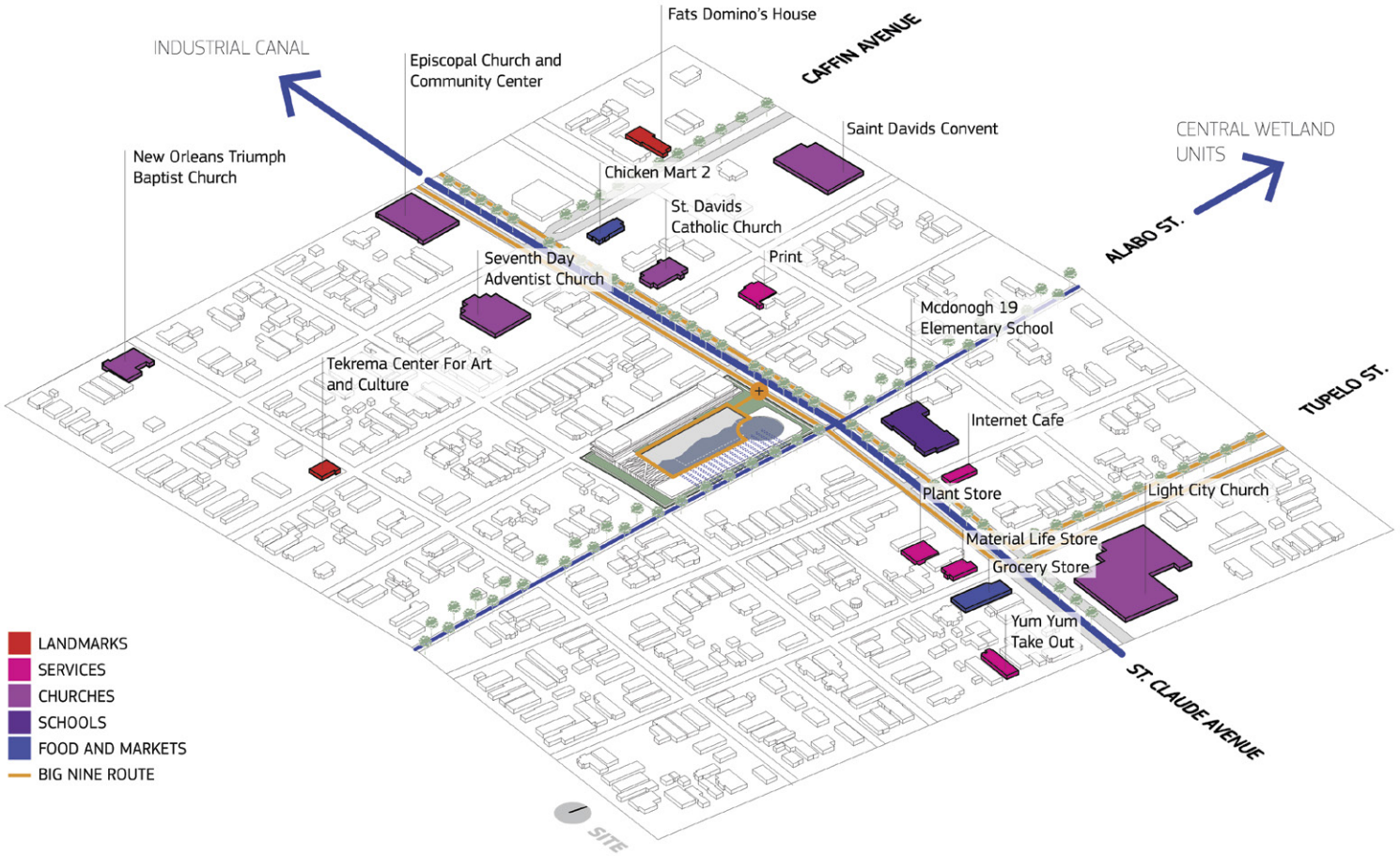


Diagram showing how the plaza proposal can activate existing community programs in the surrounding area. The site's location, on the main street of St. Claude Avenue, allows access to locals and visitors. This diagram highlights the Big Nine route in yellow that will include the plaza as a new stop and introduce participants to the library, whose mission is to raise awareness to the water systems, and urban agriculture. (base map from Google Maps 2020; data from Mossop and Carney 2010)

of the site includes the plaza, terrace agriculture, and the library.

Plaza as Public Space

The plaza serves as the main public square, an open space for social gatherings, inspired by Congo Square, which throughout the 19th century, was a prominent place for meetings, open markets, and the African dance and drumming celebrations that contributed to the development of jazz and the fight against oppression. The plaza becomes a new stop for the second line parade as an event space for celebration. The plaza also provides a space for activating existing programs in the surrounding area such as churches, schools, and the arts and culture centre.

During the wet season, the library can host and transform the plaza into a recreational space as pipes can be plugged to collect water and be used for social activities, showcasing numerous ways to celebrate water, its potential, and resourcefulness. The pipes that drains the plaza can then be unplugged and drained when necessary, purified through the rain garden before it is stored. This technical function connects the plaza to the temporal flow of water and exemplifies its contribution to public life. This reimagined form of water management becomes a reflection of the combined benefits of sustainably applied technological, architecture, and a much needed return to nature.

Terrace System for Agriculture

Incorporating a terrace system is essential for productive agriculture, as well as the efficient collection, and absorption of rainwater for times of need. With each cascading level, the terrace is not only able to absorb water but it also slows

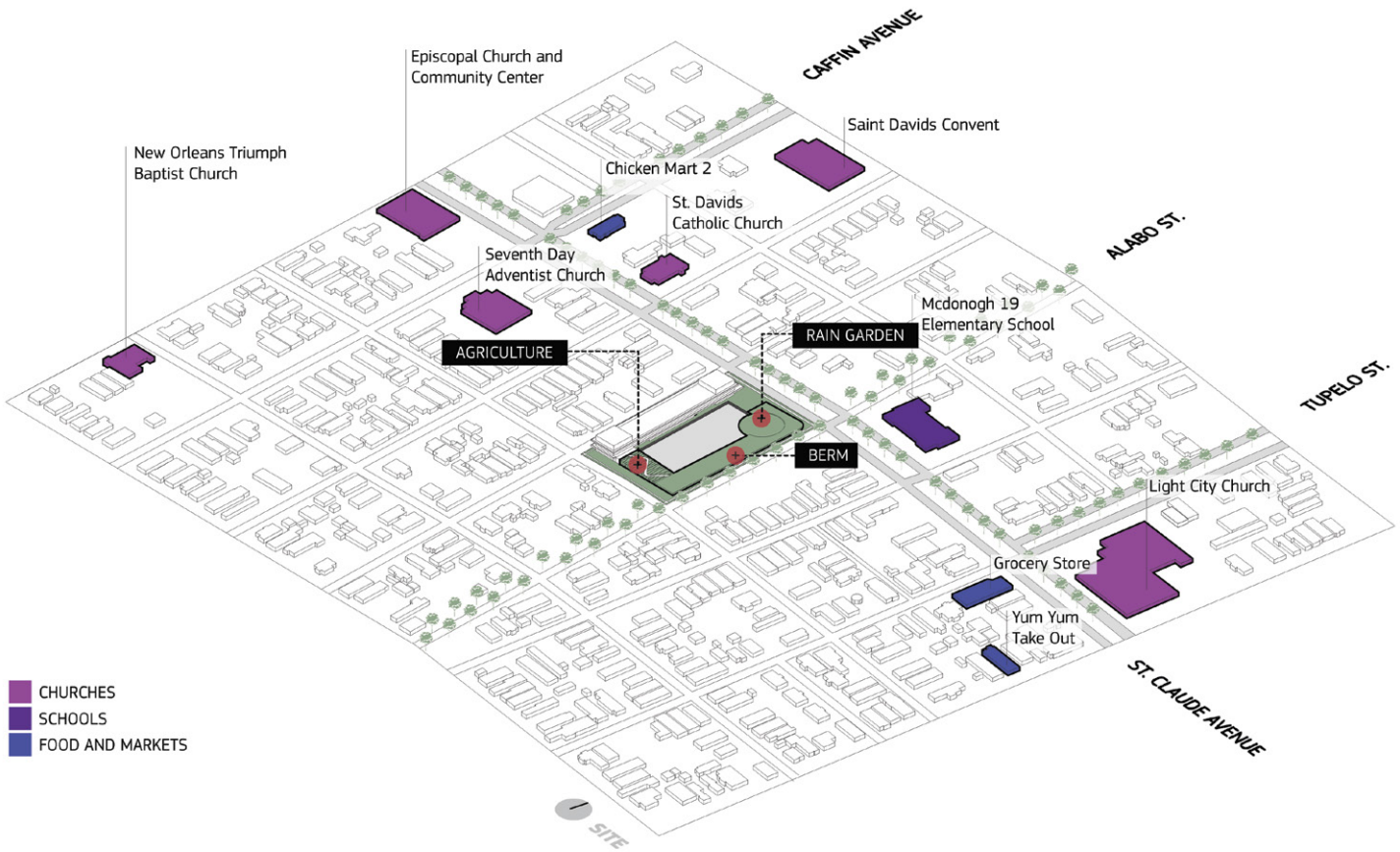


Diagram shows the proposal of the ecological intervention on site to deal with rainwater management and agriculture. These ecological programs will activate churches, schools, and existing food programs that would share first-hand knowledge and education on agriculture, and rainwater management. (base map from Google Maps 2020)

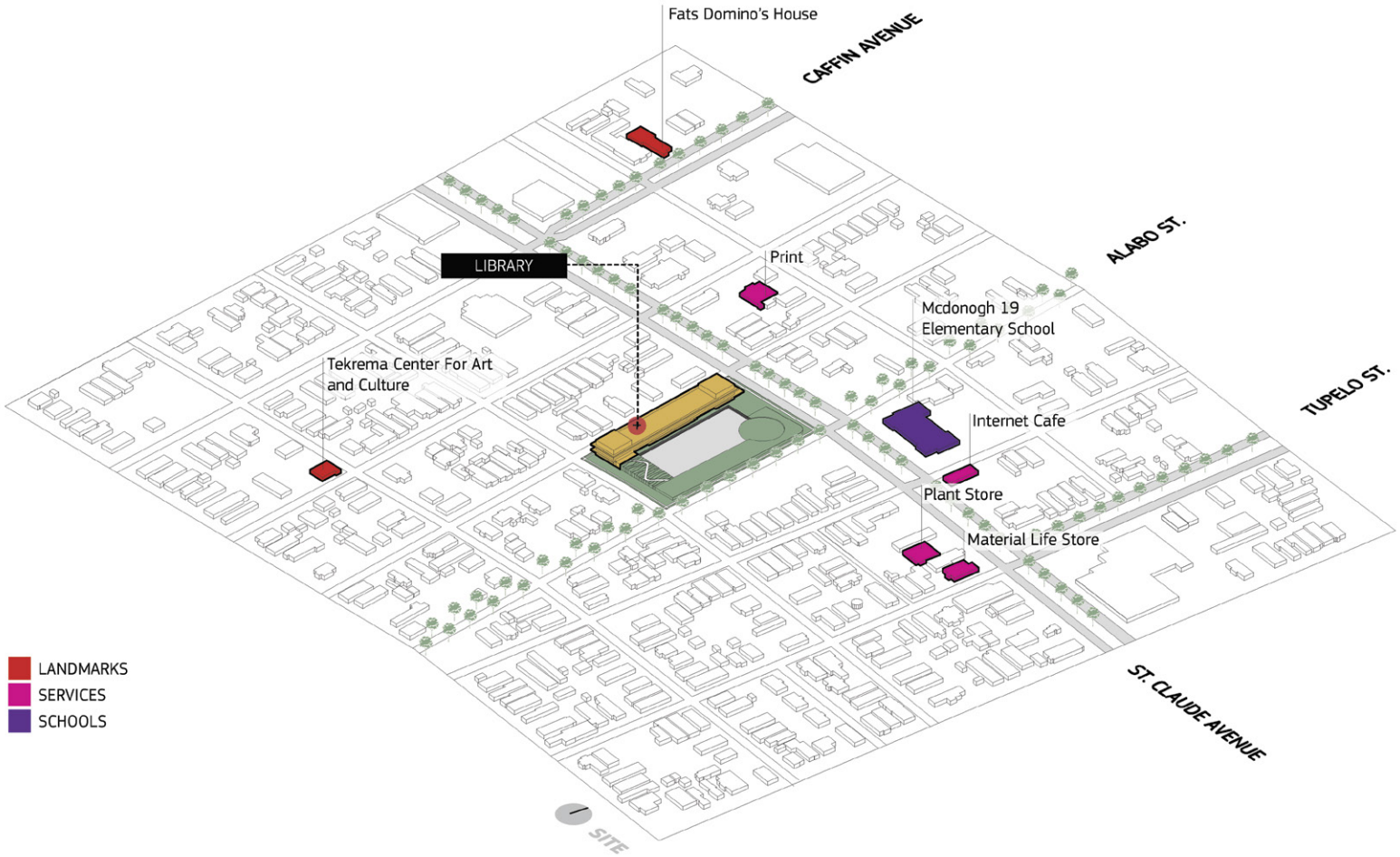


Diagram of the architectural anchor that would serve as a host for any and all of the community's social activities. Information and archives are stored in the library. (base map from Google Maps 2020)

water down. These platforms are used for planting and gardening, farming, and small-scale agriculture. The utility and social component that draws in people to work together will create a place and tradition that can be passed down to young people in the community to embrace the unique food culture of New Orleans. From a water management standpoint, cascading farm levels retain and utilize runoff while using it as a site to grow food for local consumption.

Library as the Architectural Anchor

The library will be used as a place to host workshops that range from art and culture, mentorship, entrepreneurship, job training, and service learning skills for sustainable urban farming. For example, the agricultural site has the potential to grow with the market and food processing components to create jobs and provide structure for small-scale economic activity. A green canteen works with the idea of farm to table completing its intended purpose of creating a holistic and sustainable model for one's own knowledge. Organic food source and destination become close proximity reducing emission, water produced during production, processing, packaging, and transportation. It also alleviates food scarcity the Lower Ninth Ward community is experiencing. This self-sustaining farming model puts well-being and ecological health at the centre.

Components of the Library

The functions and programs of the library respond to the needs of the community and the temporary changes of the landscape. Architectural strategies along the library's first floor and vertical core use a stereotomic concrete structure that holds water and retains earth. The second floor of the library transitions into wood elements and provides a tectonic

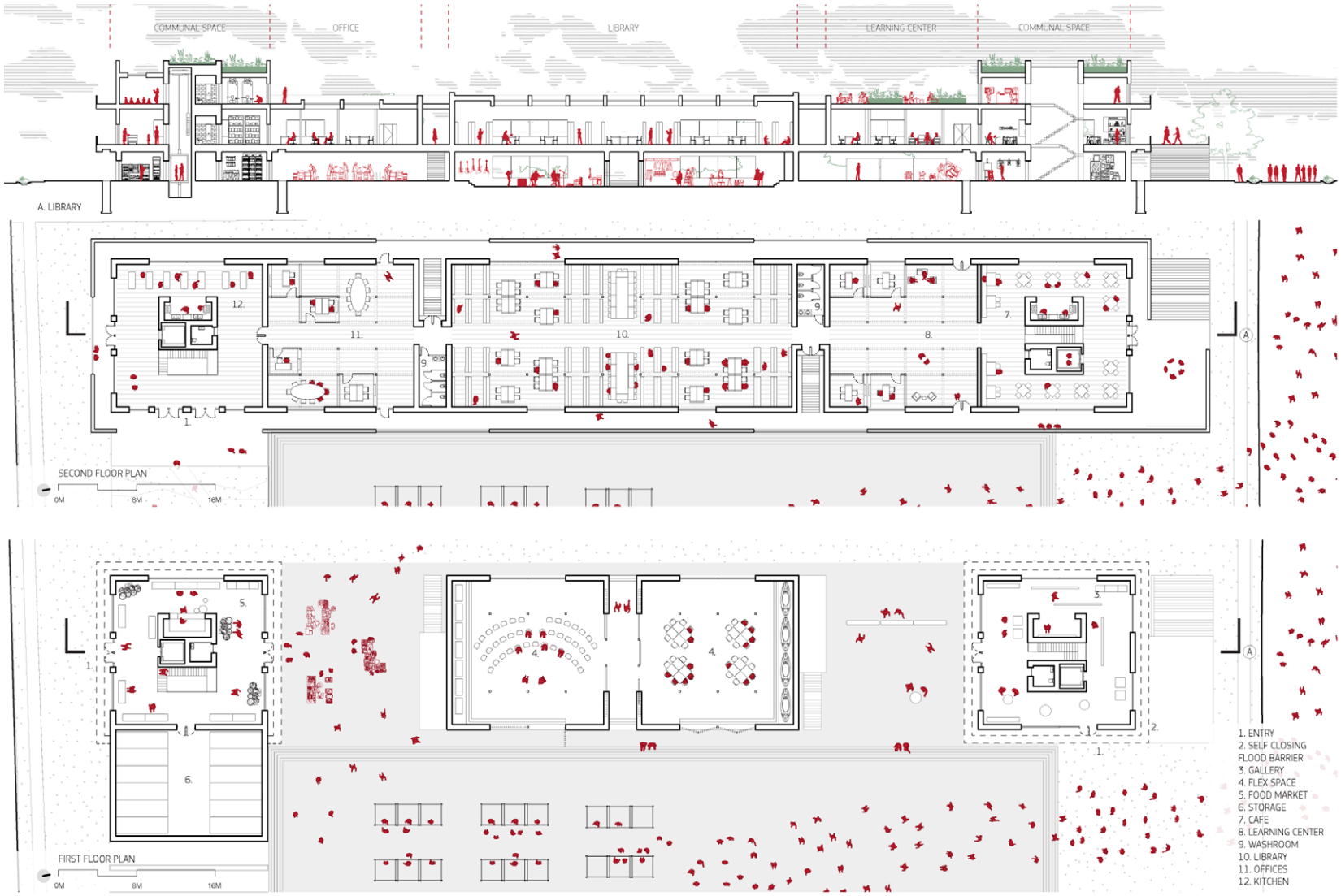
structure that sits on the concrete base. The building uses wood slats as cladding material that filter natural light into the space. Vertical cores are primarily used for circulation, wet zones, and communal areas that service the kitchens and bathrooms.

The Overall Function and Operation of the Library

Now that the structure has been established, characters are developed to illustrate different scenarios that interact with the space. The characters introduced in this section have specific social backgrounds tied to the Lower Ninth Ward community. Evella Pierre is a member of the Big Nine Social Aid and Pleasure Club and has raised her family in the Lower Ninth Ward.

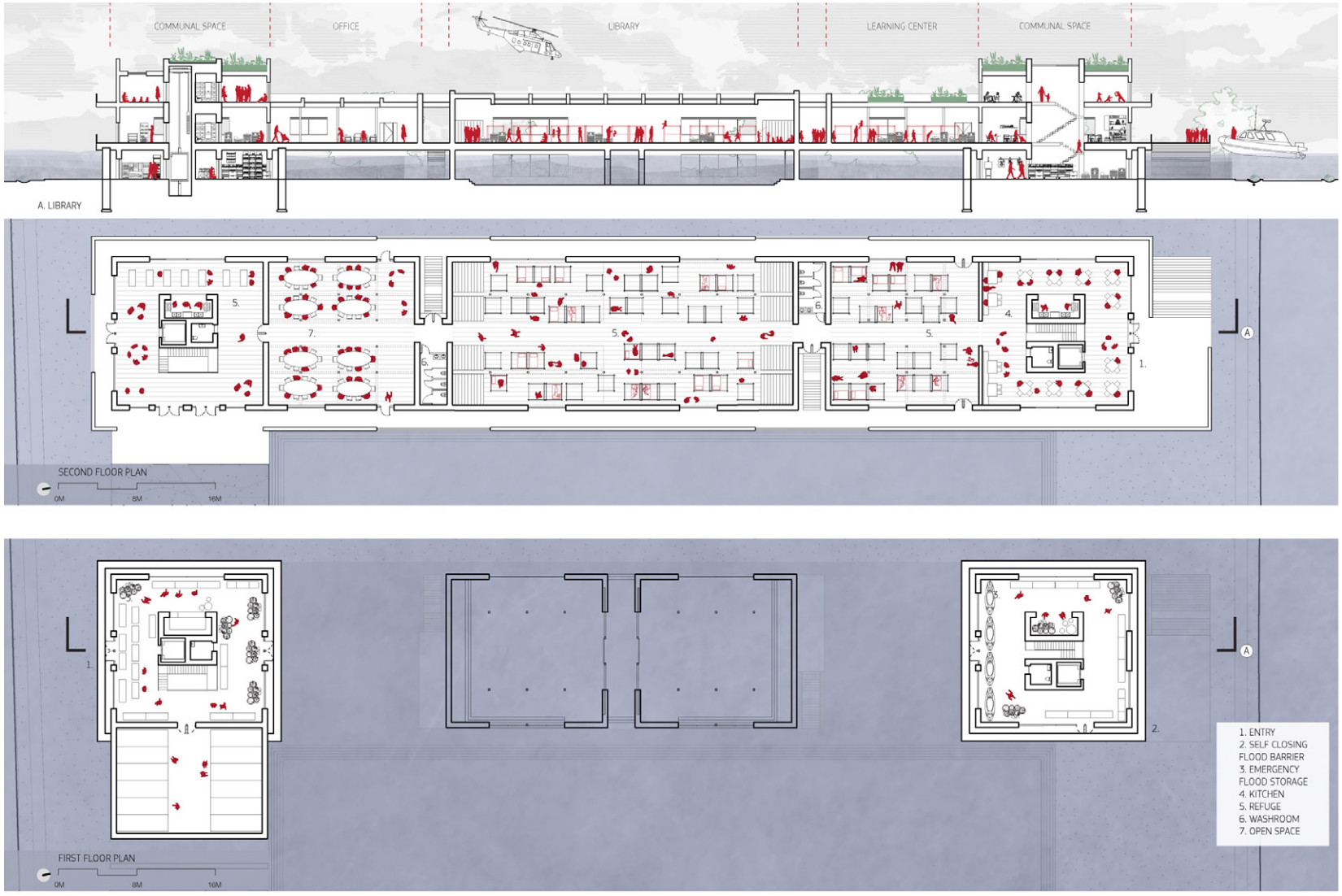
Louis Pierre, her son, was one of the members of the Big Nine, and after he passed away, the club honoured his memory with a stop at her home along the parade route.

A render of the second line parade including the library into their route. As the second line walks into the plaza, where vendors are waiting with food and refreshments, participants are introduced to the building and ongoing local social events in the community.

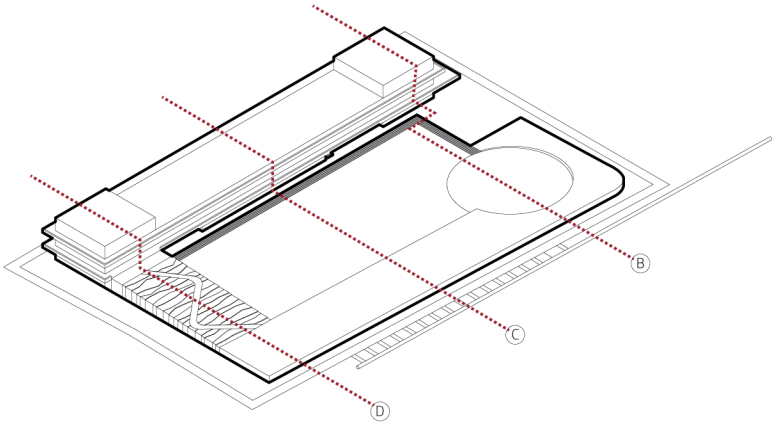


Section and plans show how spaces are used during the dry season. Programs spill into adjacent outdoor spaces and plaza.

Section and plans show how spaces are used during the rainy season, where the plaza collects water for recreational use.



Section and plans show the library transforming into a place of refuge during a flood emergency.



Cross section diagrams of spaces: B. Gallery-Plaza C. Flex Spaces D. Agriculture. Shows section cuts associated with each character.

When the library opened, Mrs. Pierre worked as the program coordinator, where she organizes workshops, works with non-profit organizations, schedules events, and uses the facility. As a local homeowner with close ties to the second line parade, Mrs. Pierre encourages the Big Nine to include the library as a new stop along the parade route to use the plaza to gather, celebrate, and introduce the library's mission to share knowledge on rainwater management.

Chika Kondo grew up in the Lower Ninth Ward. She left home when she attended UC Berkeley and has volunteered at the Lower Ninth Village Community Center whenever she came home. She worked alongside Mack McClendon, who founded the Lower Ninth Village Community Center after Hurricane Katrina. Due to the lack of funding and the passing of McClendon, the community centre had to close its doors. After Kondo graduated, she returned home to find ways to continue McClendon's work. Kondo found herself working at the library, assisting Mrs. Pierre in organizing town hall meetings, GED workshops, working in the community garden, library, hosting cooking classes, fitness classes, music classes, and participating in other various community events.

Pierre and Kondo would meet on St. Claude Avenue and walk up the stairs to the second floor café to discuss library operations where they prepare a schedule for events hosted by the library for the month. After their meeting, Pierre walks through the second floor where the library, learning centre, and kitchen are located. At the same time, Kondo looks after the first-floor functions for the gallery space, multi-functional flex spaces, and food co-op.

During the Dry Season

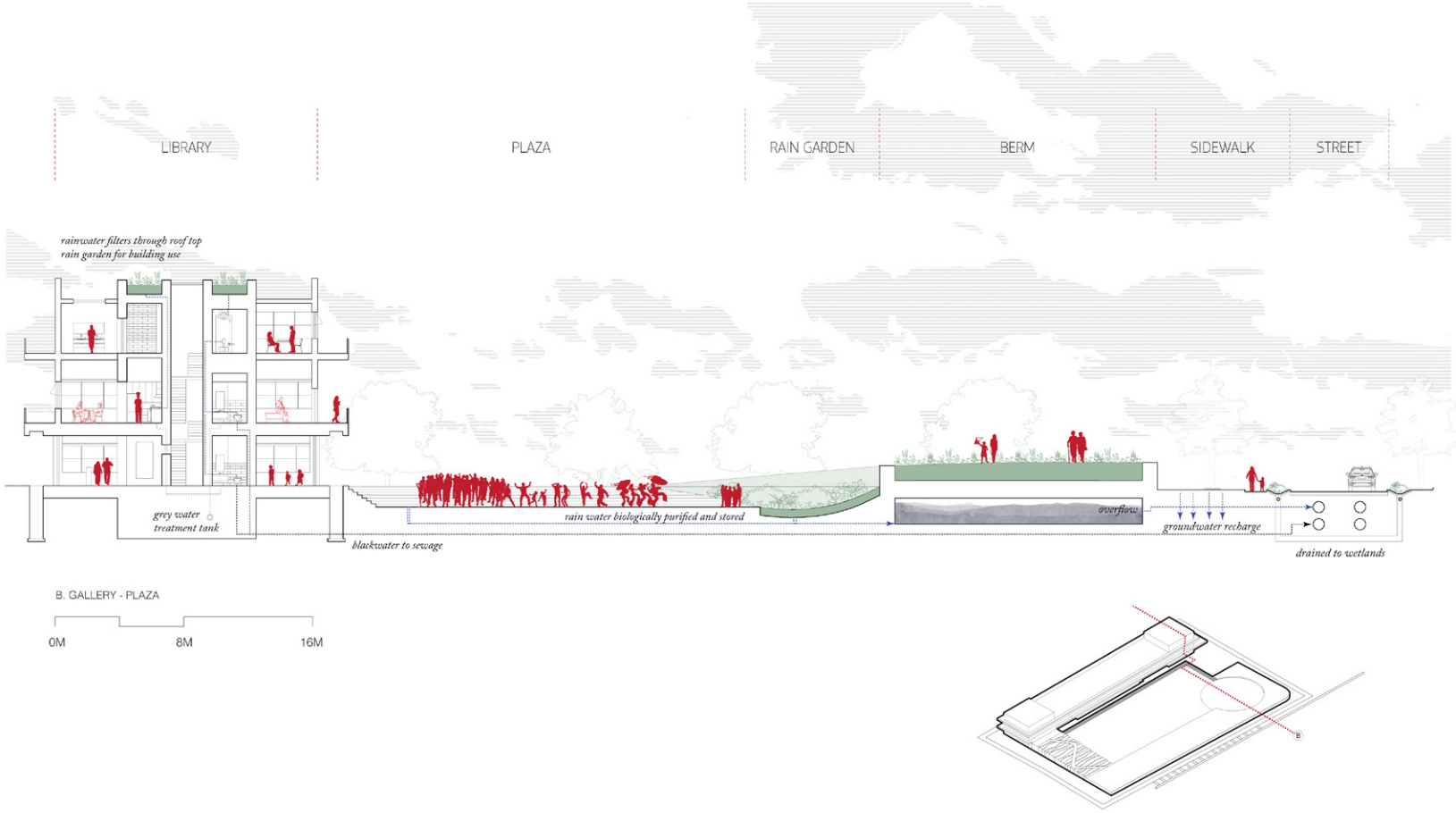
The plaza becomes an extension of the library. Programs and events hosted within the library would open and overflow into the plaza during the dry season.

Café

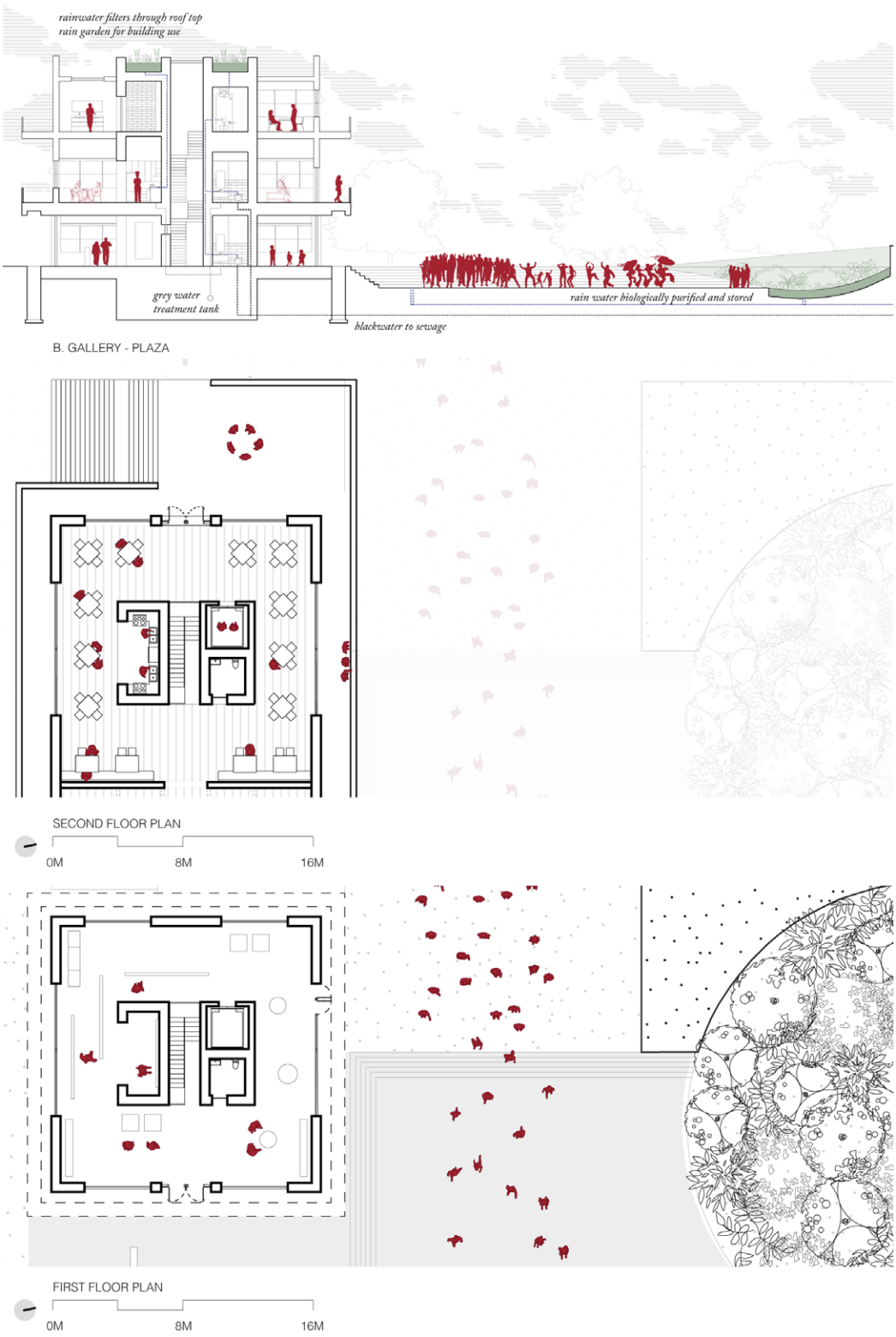
Troy Parker is an entrepreneur who wants to open a restaurant in the Lower Ninth Ward. To help introduce his new locally owned business to the community he worked with Evella Pierre and participated as a vendor at the second line parade. Parker rented out the café in the library in order to prepare the food and refreshments required for the event. After his preparation, Parker and his mother would take the food and beverages down to the plaza, where his brother is setting up their stall for the parade. During the celebration, the plaza becomes a space where local businesses and new entrepreneurs sell local cuisine and drinks – stalls and carts are set up to the delight of thirsty and hungry second liners.

Gallery and Plaza

Greer Goff Mendy is a 62-year old New Orleans dance legend. Mendy is dedicated to seeing African and African diaspora to develop and persevere in the neighbourhood.



Section showing the plaza as a site for any type of social activity such as the new stop for the Big Nine second line parade celebration, as well as any events hosted in the gallery space has the flexibility to spill out into the plaza. This section also shows the building water management and how its integrated into the neighbourhood's infrastructure.



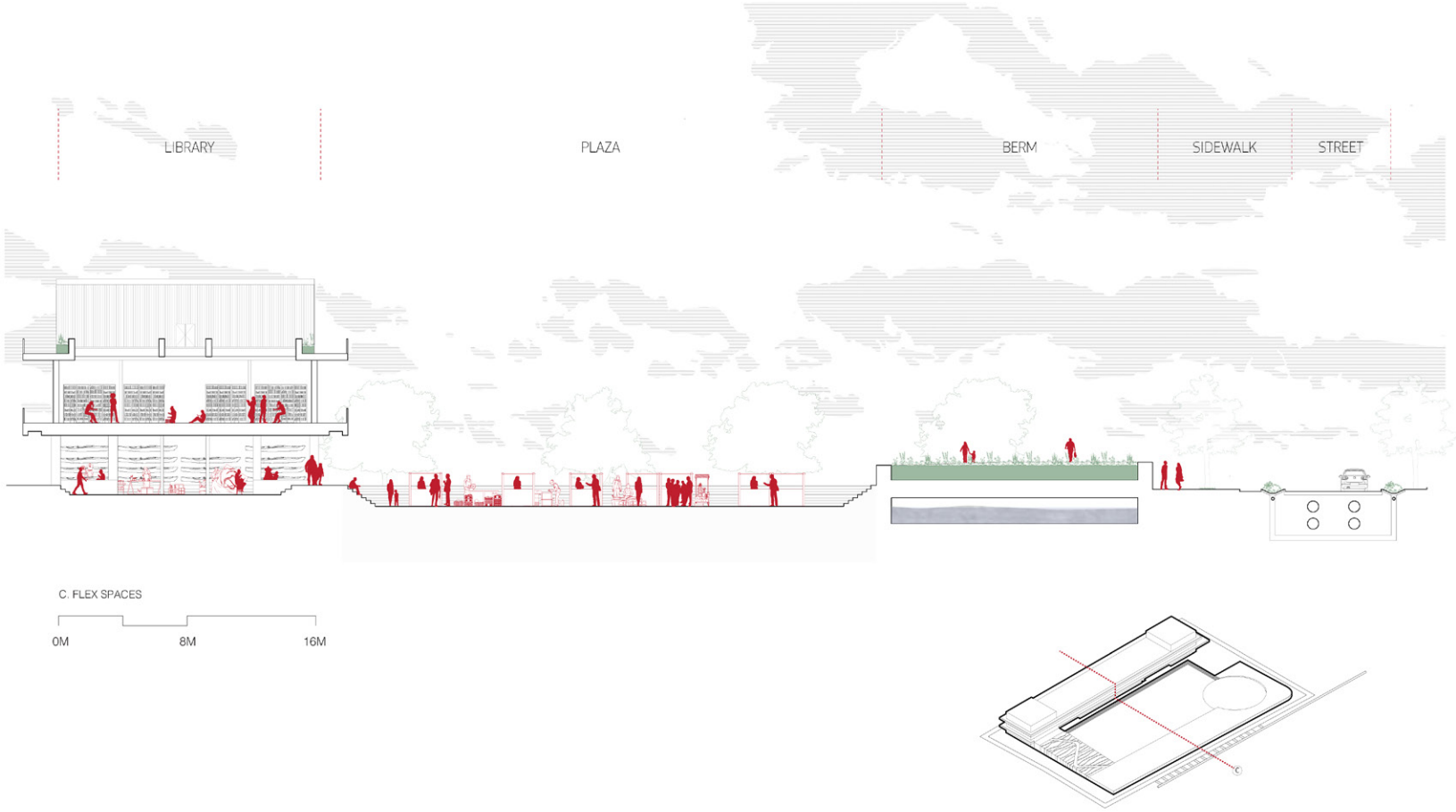
Section and plans through gallery and plaza showing the connection of spaces and function. Events on the first floor of the gallery can spill into the plaza, while providing a space of leisure for locals and visitors on the second floor café.

Mendy founded Tekrema Center to assist with sustaining Black cultural art, education, history, and pride among its community's youth, adults, and seniors – men, women, and non-binary or non-identified or gender-specific individuals. She booked the gallery space for an upcoming live performance art piece that includes essays, and historical references that tell stories of violence and healing within the Black community. The open space of the gallery allows for a flexible setup curated by the organization. At the same time, large windows enable the area to spill outside into the plaza, where a stage can be set up for the live dance and music performances.

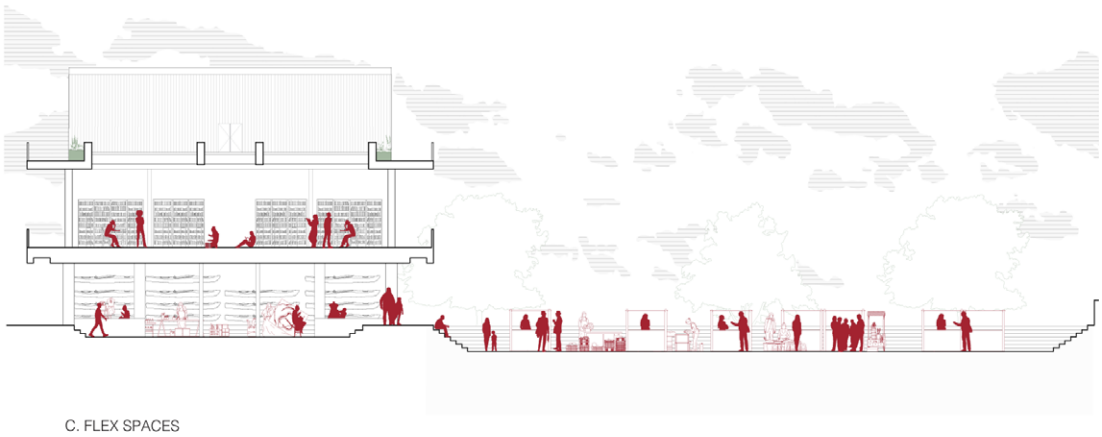
Flex Spaces – Classroom

Nanette Nelson runs the LOFT after school program in New Orleans, which is an existing program that teaches students more about their community and offers programs such as art, music, and swimming. Nelson uses the existing Andrew Sanchez Multi-Service Center to strengthen the relationship

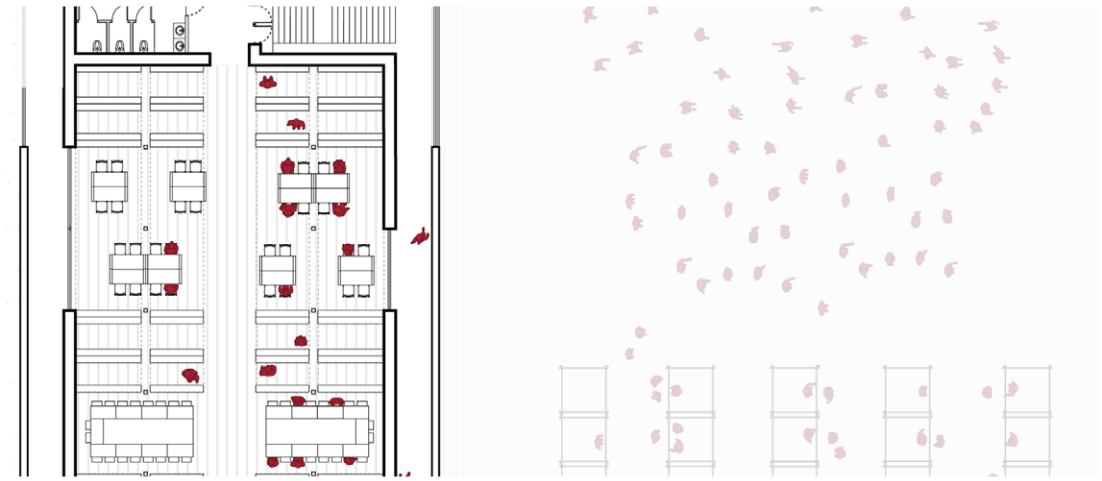
This scenario shows one of the flex spaces is used as a classroom and program spills into the plaza where there is a farmers' market setting up.



Section showing flex spaces as co-working spaces. Flex spaces have the capacity to spill into the plaza. This diagram shows how the plaza is transformed into a farmers' market.



C. FLEX SPACES



SECOND FLOOR PLAN

0M 8M 16M

FIRST FLOOR PLAN

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Section and plans through flex spaces showing the connection to the plaza. Doors in flex spaces are opened to the plaza merging two different programs together.

between children and seniors by having elders talk with their students about Lower Ninth roots, culture, and history. With the new library, Nelson would have a chance to incorporate urban farming into her academic calendar to educate children, ages 5-12, on the importances of urban agriculture traditions and independent living rooted in the Lower Ninth Ward. A program, called Meet Me at the Market, would allow her to work with the Crescent City Farmers' Market and Center for Sustainable Engagement and Development on the ongoing outreach and education of urban agriculture and local entrepreneurship. Flex spaces would transform into a classroom during any farmers' market event to educate visitors on local cuisine and locally sourced food. Doors towards the plaza can swing open to allow air and light into the space. During the farmers' market event, children have the opportunity to engage with local farmers, vendors, while residents and other visitors can sit along the plaza's steps as observers.

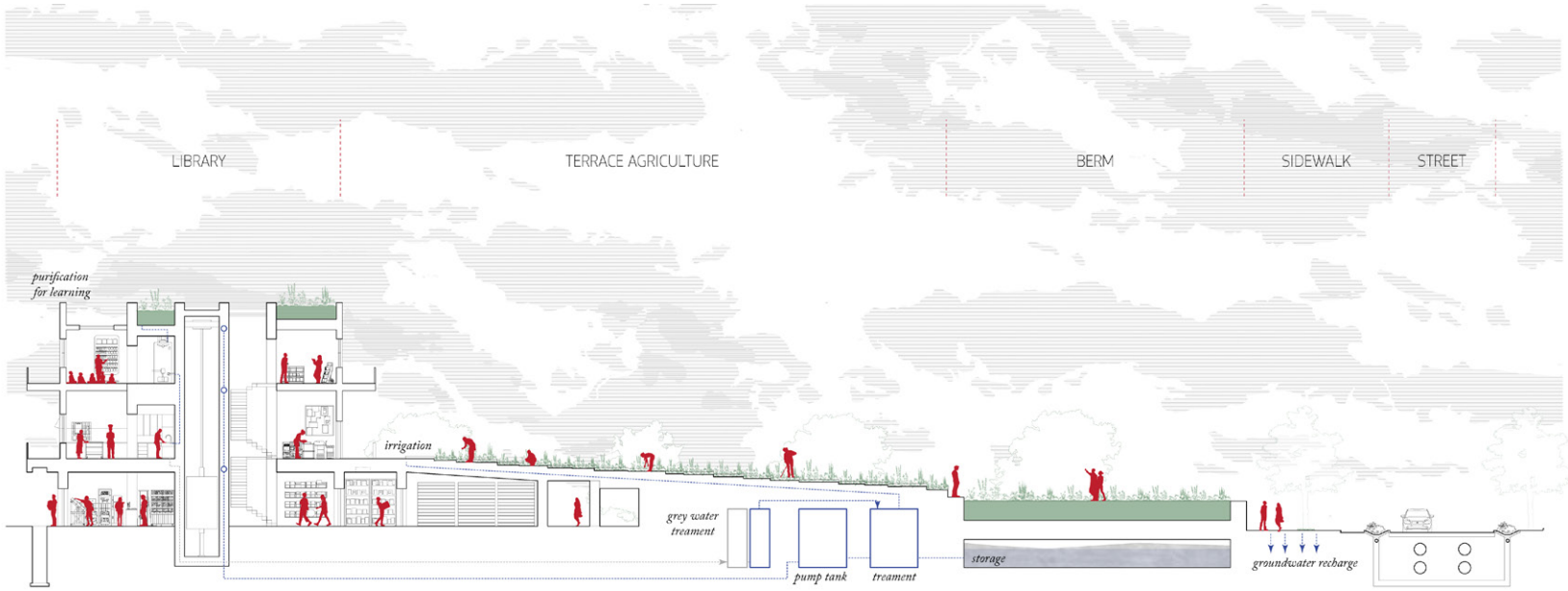
Flex Spaces – Music Room

Dr. Michael White is a musician and professor that plays primarily in social club parades. Dr. White does extensive work hosting workshops and teaching New Orleans music throughout the city. He uses the flex space of the library as a classroom, which can open up to the plaza so their music can be enjoyed by everyone. Students and musicians could also use this room as a practice room when the space is vacant. The flex spaces can be used as a single room or expanded to a larger room. To create the larger room, the doors would slide into the wall and the hall and the adjacent room would combine into one.

Terrace Agriculture

The Crescent City Farmers' Market operates weekly year-round throughout New Orleans. This event hosts local farmers, fishers, and food producers. Robert Johnson Jr. started participating in the Lower Ninth Ward farmers' market and arrives at the library early on Saturday mornings to engage and interact with the residents of the Lower Ninth Ward. After the farmers' market, he sells the rest of his produce to the food co-op located on the first floor on Rampart Avenue. Johnson Jr. has strong ties with the agriculture community in the Lower Ninth Ward. He is one of the local farmers who grow his produce on the terraces. He started working for the Meet Me at the Market program that happens throughout the city, where children ages 5-12 meet farmers and learn to identify, select, and prepare produce to understand that food is not just something that comes from a shelf. Johnson Jr. shows the children the crops he grows on the terraces, the water management system he uses (that works within the library), and how he cleans and processes his produce for his business in the shared communal kitchen. Robert Johnson Jr. discovered his passion for food from his

A render of the social activities, and learning opportunities existing between the berm, the terrace, and the building.



D. AGRICULTURE

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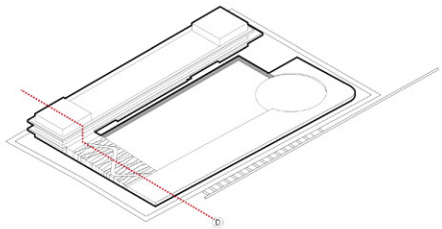
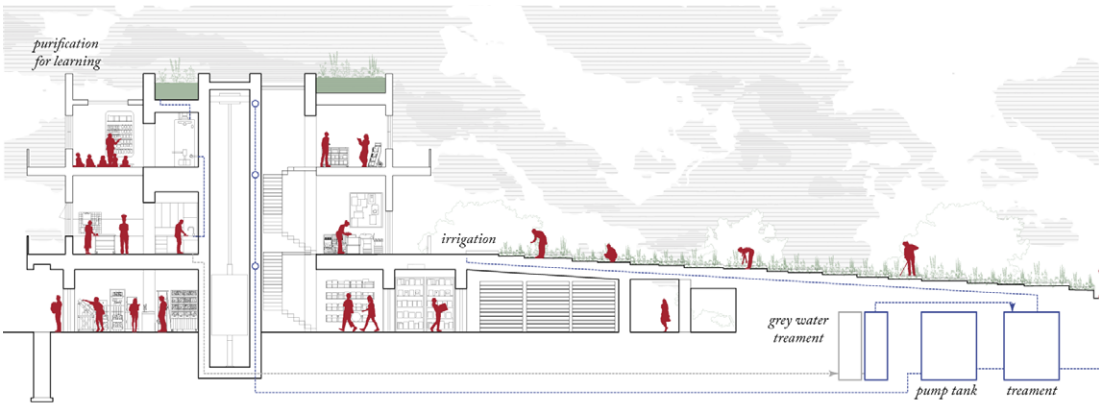
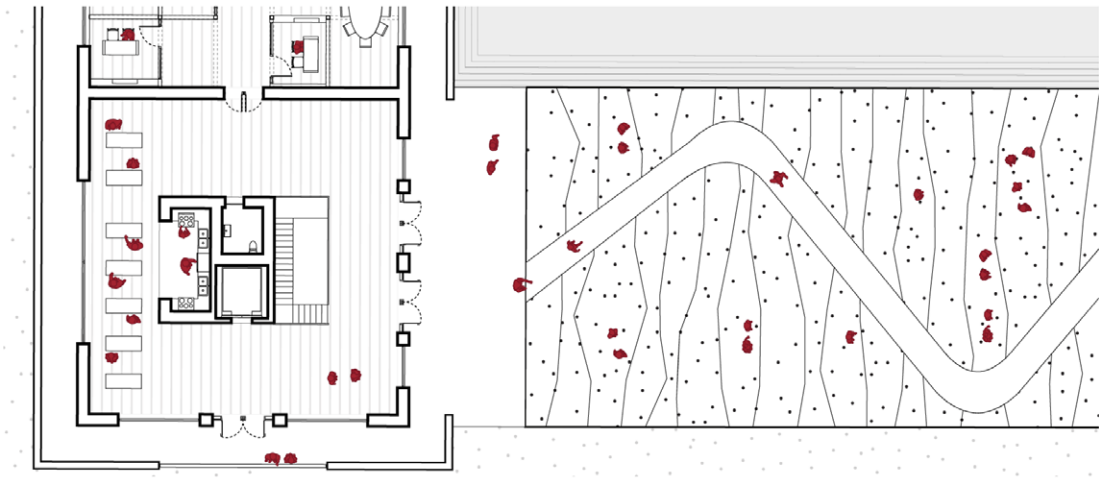


Section through the terrace agriculture site showing the platform's close proximity to the communal kitchen. The section also shows the infrastructure and water management systems underneath the terrace and berm. Rain gardens on the rooftop collect and filter rainwater to the cistern underneath. The collected water is then pumped into a treatment tank. The treated water is then circulated to supply building's needs.



D. AGRICULTURE



SECOND FLOOR PLAN

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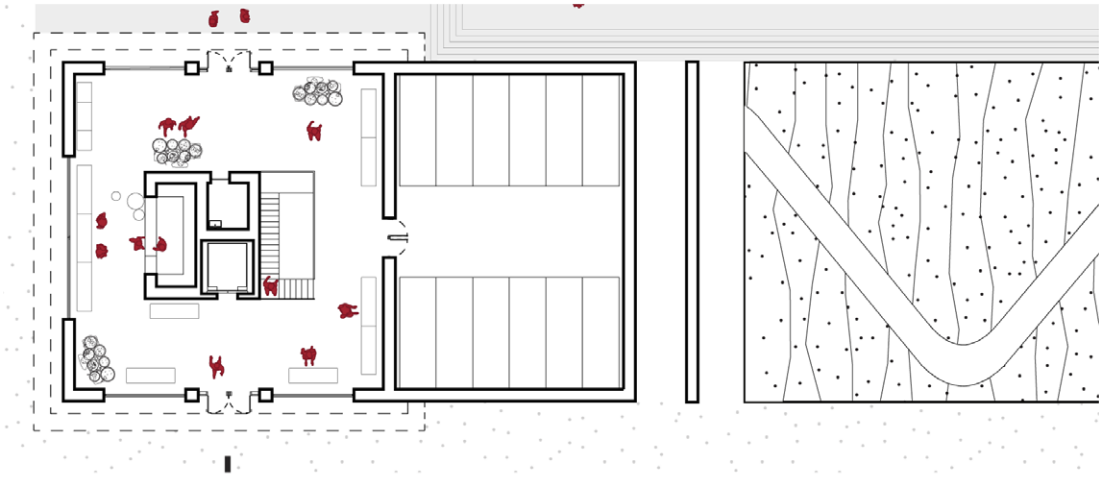

FIRST FLOOR PLAN

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Section and plans of the agriculture site and program. First floor shows the food co-op where produce from terrace agriculture is sold at affordable prices.

father and his days spent at the Old French Market in the French Quarter. He moved to the Lower Ninth Ward when he married his wife and he wanted to start his own business right in the heart of his neighbourhood with his growing family. The library's workshop, programs and collaboration with other institutions and organizations have helped him achieve his goal.

Water Management System

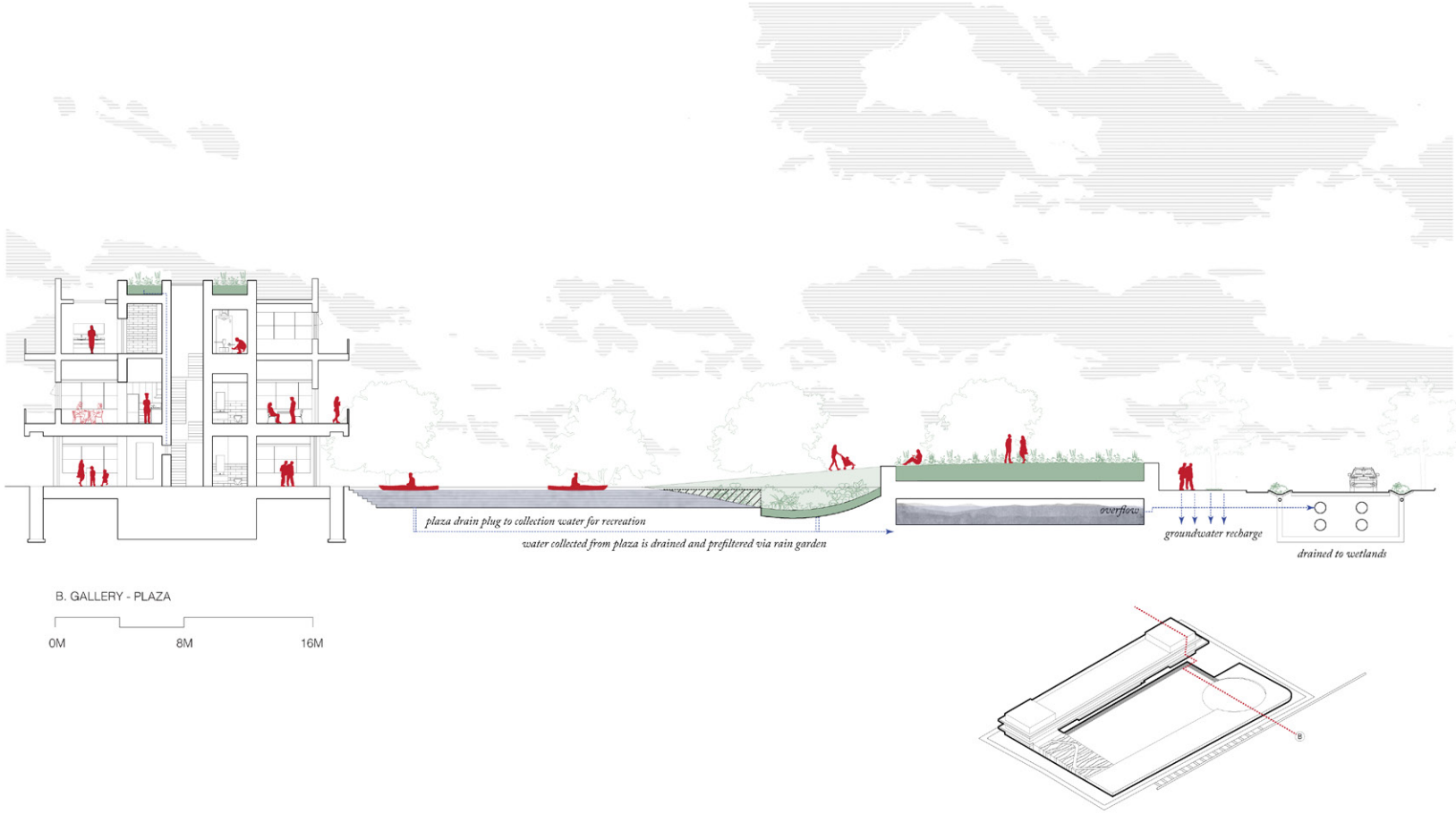
A cistern is stored underneath the berm for water collection, whereas treatment tanks are stored underneath the terraces for building use. Rainwater collected from the rooftop is treated and stored before use. A portion of the water collected from the rooftop gardens is stored in the third floor tank, where demonstrations for purification and treatments are visible to the public. Robert Johnson Jr. uses this area to teach children about the interconnectedness of the water system, agriculture, and the built environment. He advocates using water as an important resource within buildings and for agricultural purposes.

During the Wet Season

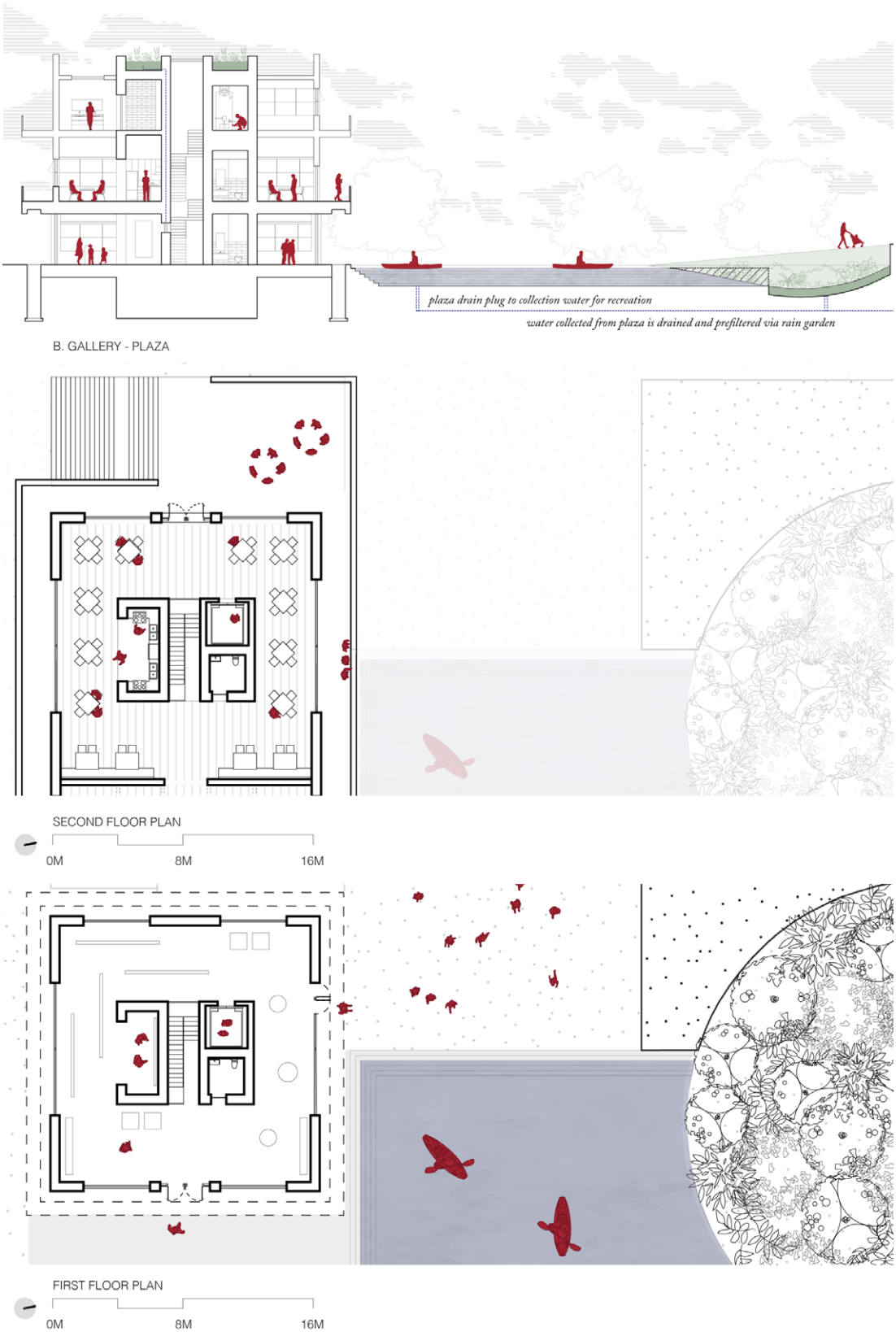
The plaza becomes a space of its own through different spatial and temporal changes. During the rainy season, drains are plugged and shut to collect rainwater for building use and water activities.

Gallery Space

Leona Tate was one out of three 6-year old girls, escorted by U.S. Marshals, who attended McDonogh 19 Elementary to desegregate formerly all white elementary public schools in the 1960s. Since Katrina, the McDonogh 19 Elementary School has been abandoned and was listed on the National



Section through gallery and plaza during rainy season where temporal changes the built environment. The plaza drains are plugged and water is collected in the plaza for recreation. This concept shows the importance of water as a resource for both practical and celebratory use in everyday life.



Section and plans of the gallery showing the transformation of the plaza during the rainy season.

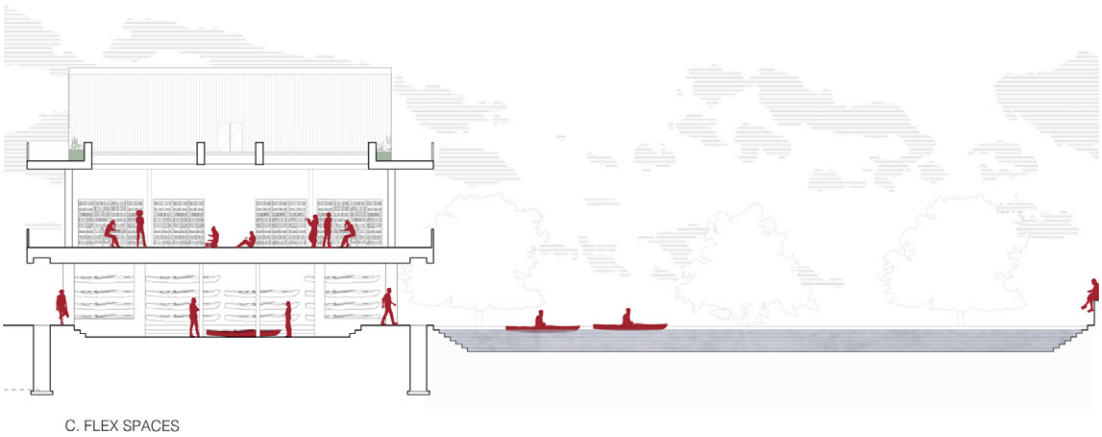
Register of Historic Places in 2016. The building was purchased by Leona Tate and her foundation to transform the abandoned building into a museum. The museum will be called the Tate, Etienne, and Prevost Center and is a mixed-use facility that will feature education and exhibition space dedicated to the history of New Orleans public school desegregation, civil rights, and restorative justice.

To promote this initiative, Leone Tate wanted to publicly speak about the importance of civil rights movements and landmark preservation. She has guest lectured throughout New Orleans and had wanted to share the process and work she is doing with the Lower Ninth Ward community. Tate collaborates with the library to showcase her work in the gallery space on the first floor, and uses the second floor café for lectures. Leona Tate is a guest speaker at the library, discussing the importance of Black history and culture in New Orleans, retelling stories of civil rights movements which often the education institution ignore. The gallery space houses a small exhibition and archival materials while McDonogh 19 undergoes reconstruction. At the same time, the café turns into a workshop for discussion and interaction between guest lecturers, residents, and visitors.

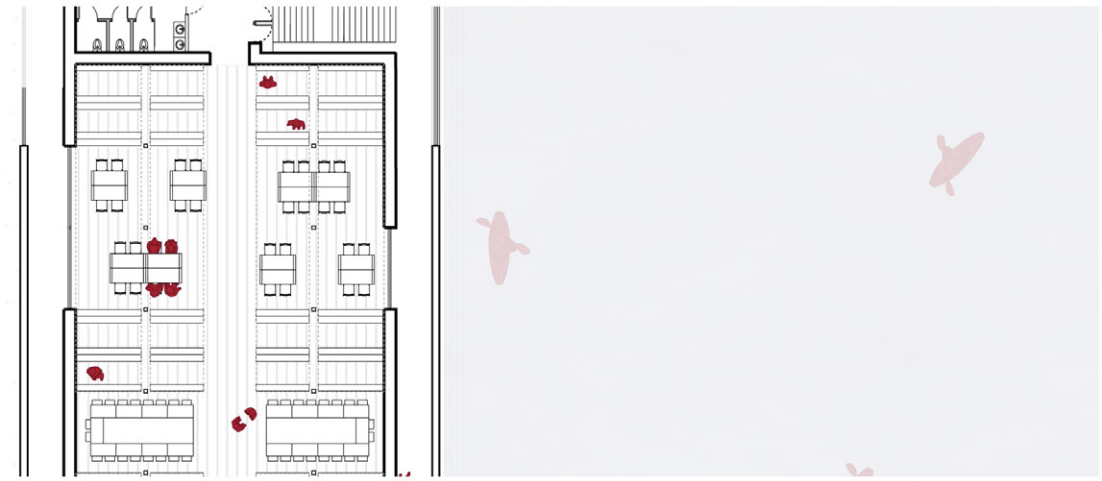
Flex Spaces – Water Activities

During the wet season, the flex spaces are used for multi-purpose functions to meet current needs of the community, while also serving as storage for recreational activities. It is one of Kondo's responsibilities to take care of the equipment used for social activities in the plaza. On hot summer days, Kondo takes care of recreational activities happening in the library. One of the activities in the plaza caters to youth and adults where it offers the opportunity to kayak in the plaza.

Section through flex spaces are used for kayak storage. Beginners can learn water safety and learn how to kayak. Access on the berm increases to create new area for program, and passive recreation, allowing those on the berm overlooks the plaza into the pool.



C. FLEX SPACES



SECOND FLOOR PLAN

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FIRST FLOOR PLAN

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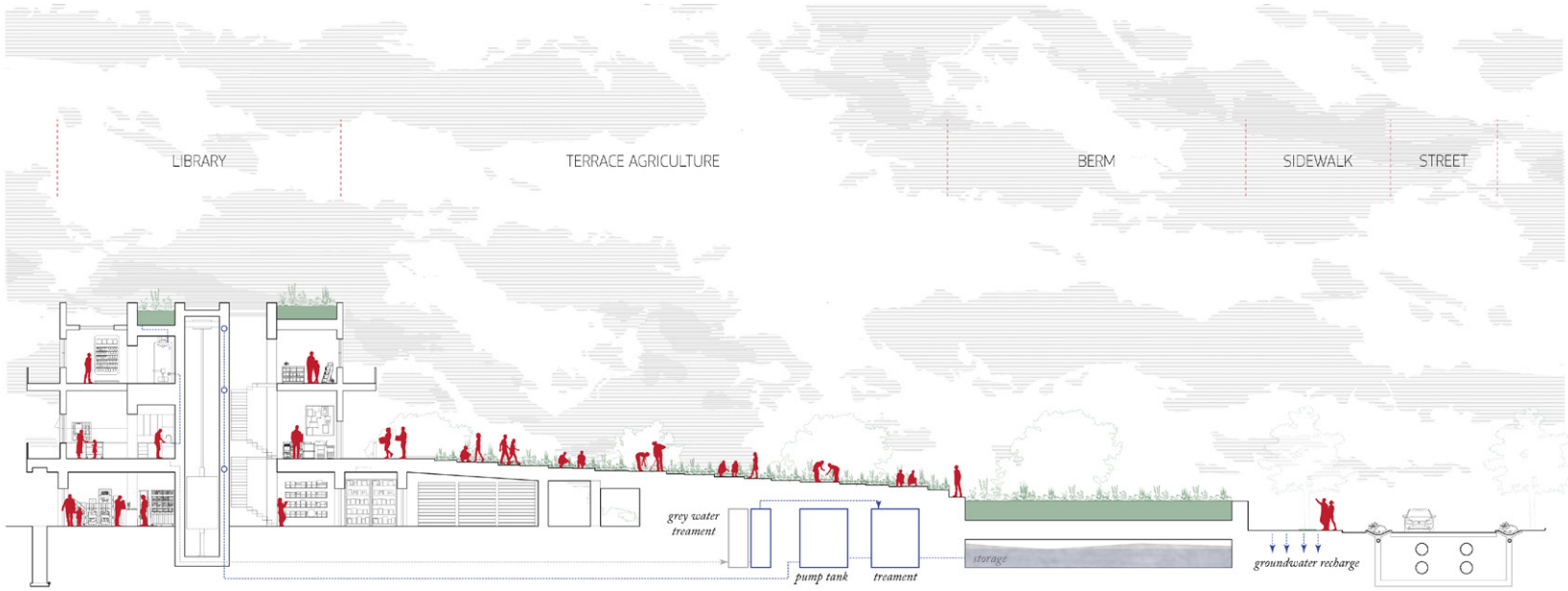
Section and plans through recreational flex spaces. Flex spaces become a classroom for anyone who wants to participate in kayaking to share knowledge and safety for water activities.

Scenario of locals and visitors enjoying the recreational water activities during rainy season as landscape reacts to temporal changes.

Inspired by Kayak tours in the French Quarter, this new program creates the opportunity for individuals to explore the bayous and wetlands on tandem kayaks. The Kayak for All pilot project founded by Kondo uses the space to share the knowledge and safety for water activities. The program is great for beginners and offers paddling lessons. The plaza is also schedule to be drained for other programs. When filled with water, the collected water in the plaza helps to cool the neighbourhood from the heat.

Communal Kitchen

Louis Duplessis is a student and is preparing for his first day of seventh grade as he walks with his mom from their home to the neighbourhood centre located at the corner of Caffin Avenue and N Claiborne Avenue in the Lower Ninth Ward. They make their first stop at the Dr. Martin Luther King Charter School to check last-minute details. Since the opening of the new library, the Andrew Sanchez Multi-Service Center has extended some of their programs to the library to help accommodate for more people. Since no



D. AGRICULTURE

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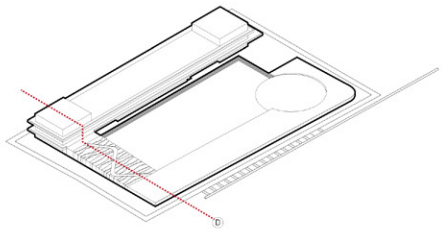
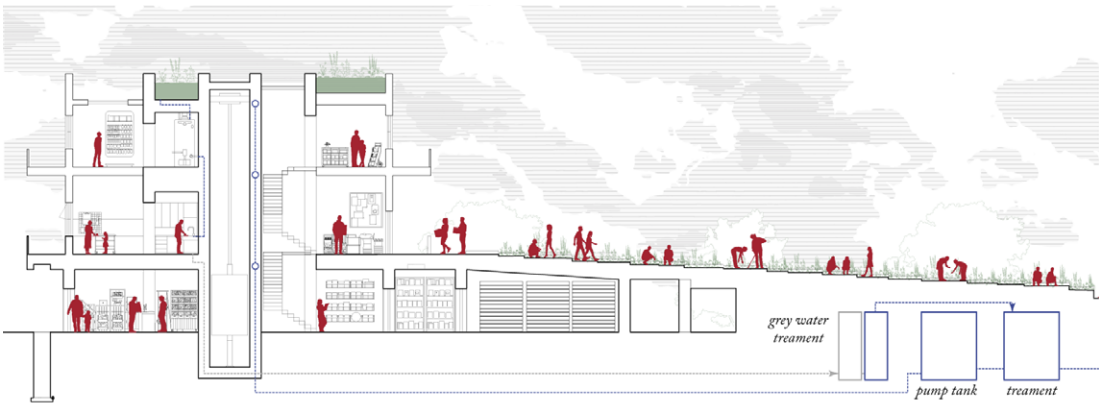
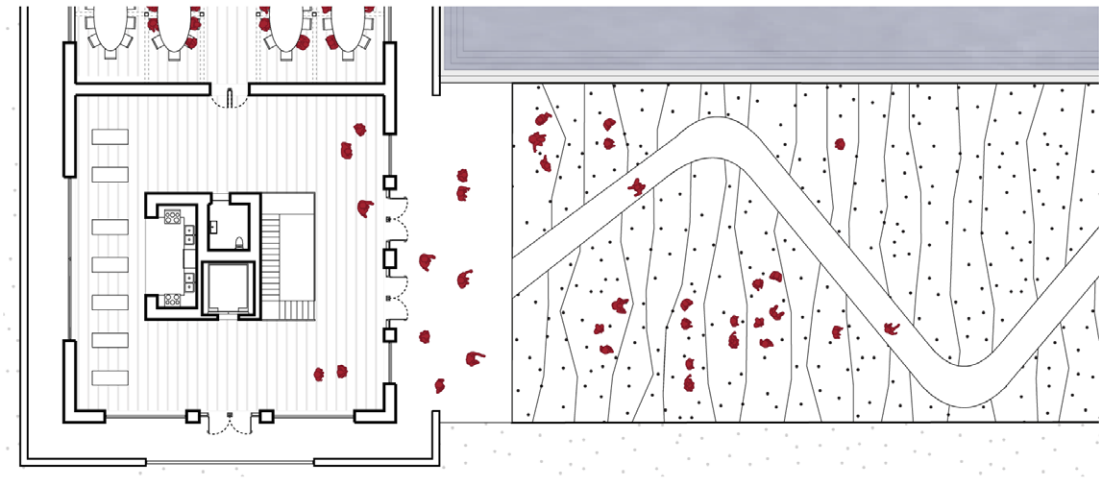


Section through terrace agriculture highlighting engagement between the terrace platforms, and communal kitchen on the second floor. The first floor food co-op has access to the second floor programs on the vertical circulation, but its primary access point is on street level for locals.



D. AGRICULTURE



SECOND FLOOR PLAN

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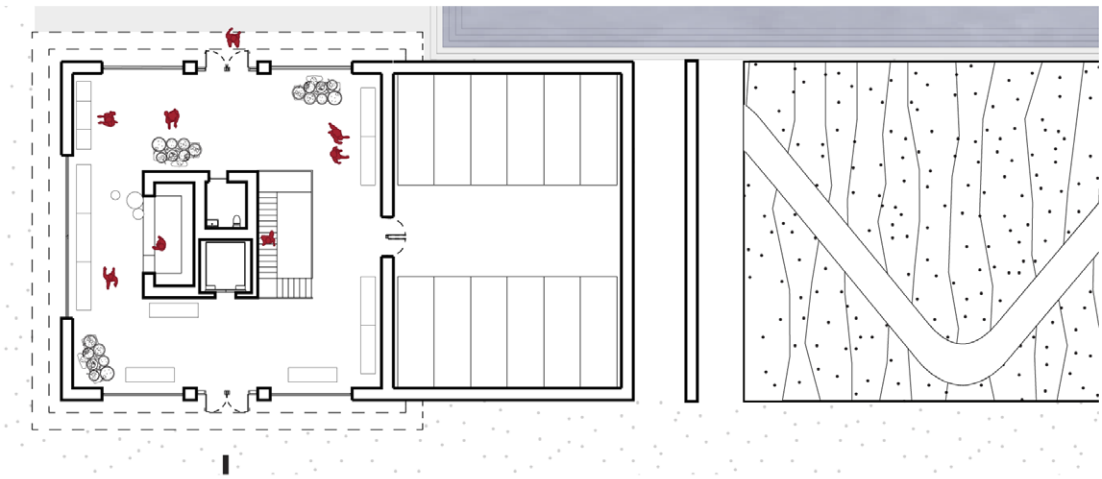

FIRST FLOOR PLAN

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Section and plans through the terrace agriculture showing activities on the terraces and market. Off to the side of the market, underneath the berm, is the storage room for temporary shelters.

grocery store has returned to the Lower Ninth Ward since the white migration to Lakeview, the library has become a food hub, working in partnership with the Center for Sustainable Engagement and Development in efforts to improve food security, to support community gardens, local farmers' markets, and the slow return of backyard gardens. Mrs. Duplessis attends an evening food program with Louis that supplies fresh vegetables grown from the site and meat and seafood from other local producers to create and share meals. Every week the food program would provide ingredients for a specific dish at a discounted rate, which could be purchased and cooked in their communal kitchen. This program allows community members to share the meal they prepare together. The food program revitalizes the community's lost food system, putting consumers in touch with local producers while simultaneously educating and sharing meals. Louis enjoys helping his mom cook and learning traditional recipes rooted in New Orleans culture. Mrs. Duplessis and Louis would often walk through the terraces before joining the rest of the group in the communal kitchen at their working station.

Disasters Response

Learning from the events of Hurricane Katrina, both Evella Pierre and Chika Kondo are working together with a committee to develop a flood emergency evacuation plan. As the program coordinators for the library, they are in charge of gathering volunteers to transform the library into a place for refuge during a flood emergency. In preparation, the lessons learned from Hurricane Katrina, as seen from the documentary *When the Levees Broke*, provided a contingency plan to transform the library into an open space that would house temporary shelters for families,

and individuals. As a disaster response site, the library is transformed in preparation for the storm. Once heavy rain begins, the pressure of water on the first floor activates the self-closing flood barriers that cover windows and doors surrounding the vertical cores. The remainder of the first floor outside of the flood barriers becomes sacrificial space that is porous to the movement of water during a flood. Kayaks and other equipment are transferred into the gallery space for temporary storage and can be used for an emergency rescue situation.

On the second floor of the library, the bookshelves which are on a track system, are pushed against the walls to open up space to the central common area for temporary shelters to be deployed. These shelters are designed as modular systems that are made from recycled materials and fabric to create space for privacy. Temporary partitions would be used and brought to the second floor through the elevators and stacked in preparation for the arrival of people. During a storm event, the library's dry areas can safely house up to 400 people.

Once set up for a storm, the library becomes a self-sufficient and sustainable building (food harvested and stored from the site in addition to water storage) that can house individuals until rescue efforts head their way. The building's cistern and sewage drains are closed and locked in efforts to not contaminate the building's filtered water collection, and any blackwater accumulated during the storm is held in a holding tank.

Temporary Shelters

The temporary shelters and partition pieces are flat-packed and stored on-site to ensure that relief is available for any

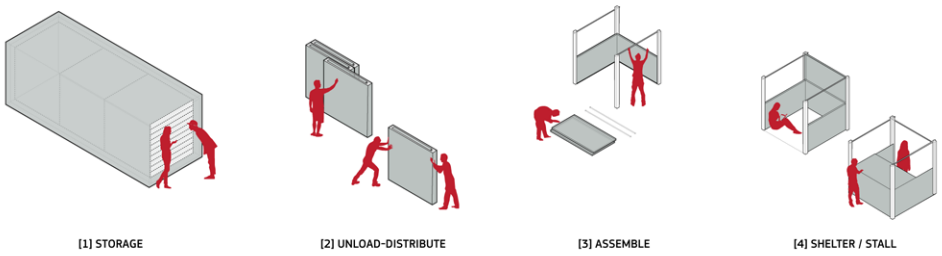
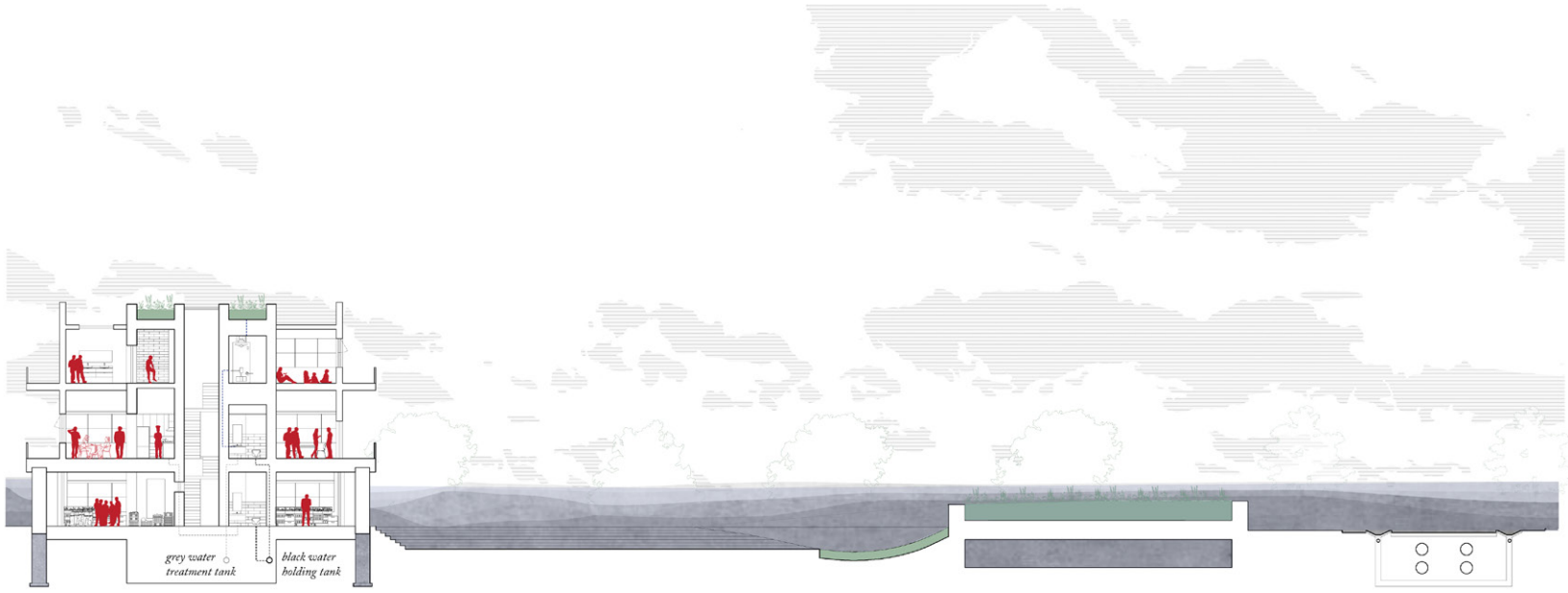


Diagram of temporary shelter and partitions storage, distribution, assemble, and usage for different events hosted by the library.

disaster scenario or, in the dry season, they can be quickly assembled for use as a temporary shelter from the sun for outdoor events. The shelter is easy to assemble and is constructed with lightweight and waterproof panels for easy maintenance to ensure ease of assembly. The materials utilized are cost-effective and recyclable. The temporary shelter kits are easy to store, unload, distribute, and assemble as well as take down.

In summary, vacant lots are owned by the Crescent City Community Land Trust, where the three components of the site include the plaza as a public space, the terraced agriculture system, and the library that becomes the architectural anchor that acts both on the spatial and temporal dynamics. As the architecture adapts to seasonal changes, the functions and programs of the library respond to the needs of the community demonstrated in everyday narratives using the café, gallery, flex spaces (music room, classroom, water activities, co-working spaces), library, resources, communal kitchen, offices, and food co-op. In addition, the architecture provides shelter for flood emergencies where the library transforms into a place of refuge during a disaster response.



B. GALLERY - PLAZA

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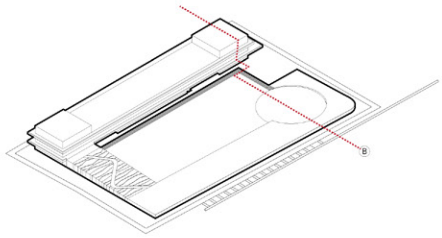
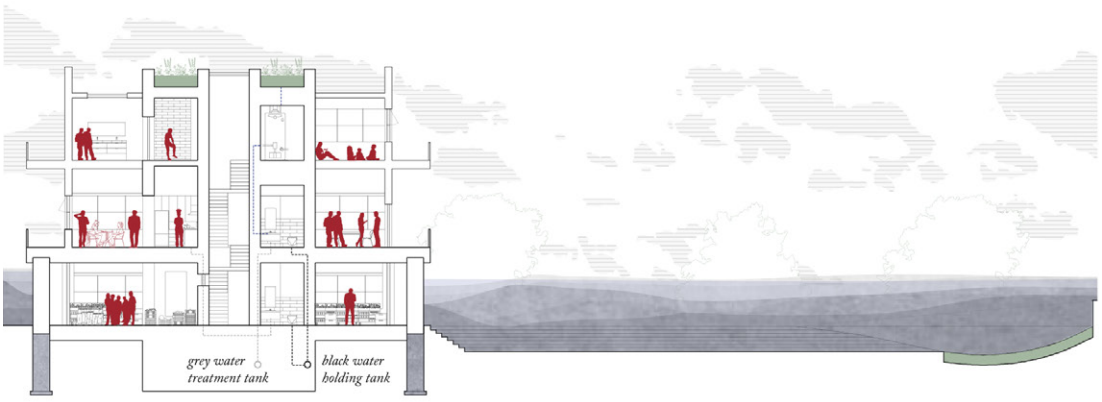
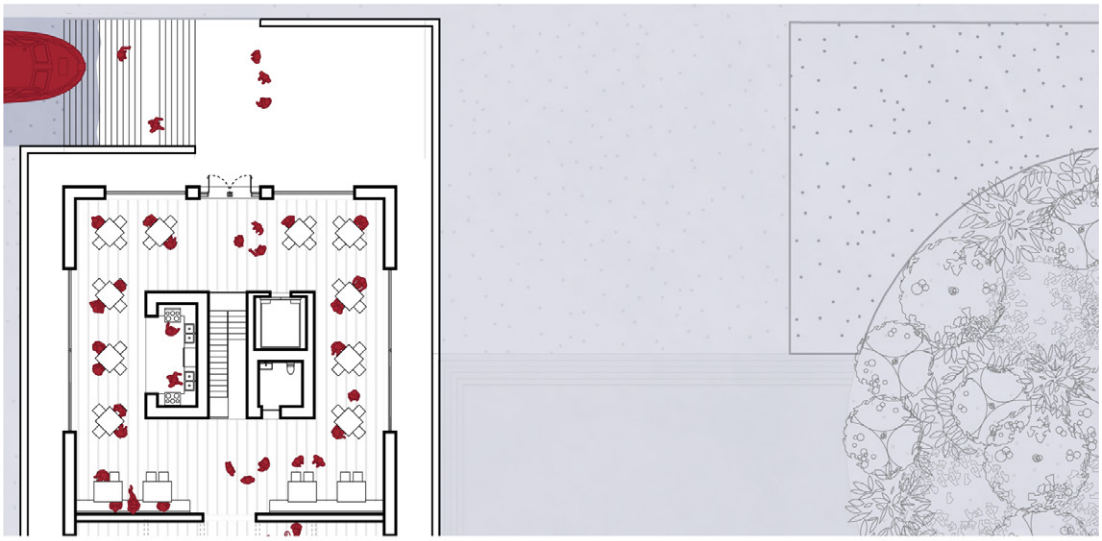


Section through gallery and plaza showing the different programs in the vertical core. It also shows the self-closing flood barrier around the vertical core on the first floor, where it during a flood emergency acts as a storage for kayak and food. This section also shows the second and third floor are primary spaces for refuge.

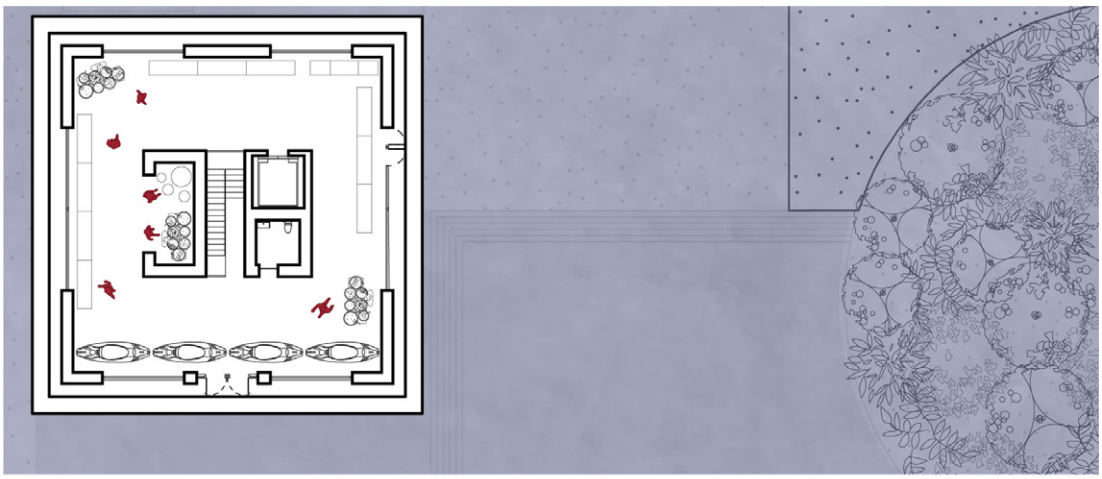


B. GALLERY - PLAZA



SECOND FLOOR PLAN

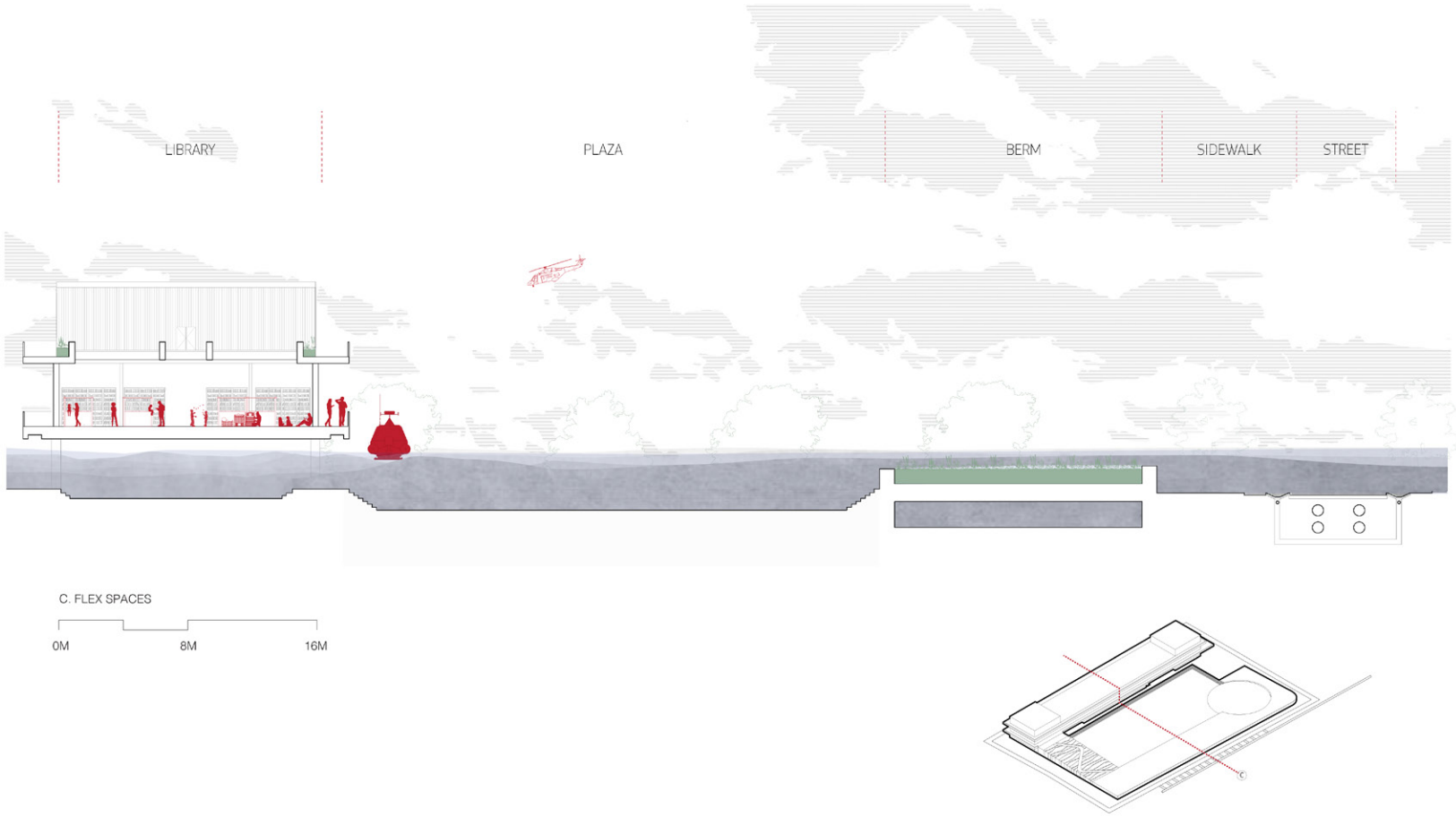
0M 8M 16M



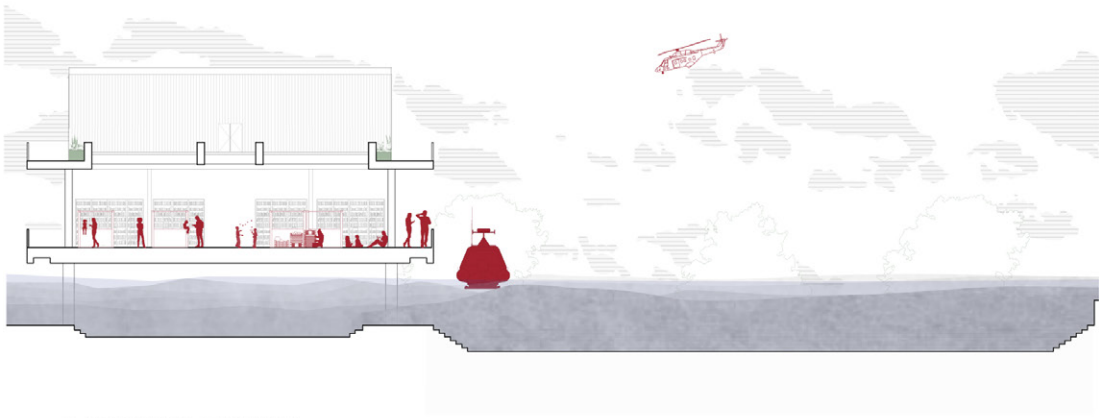
FIRST FLOOR PLAN

0M 8M 16M

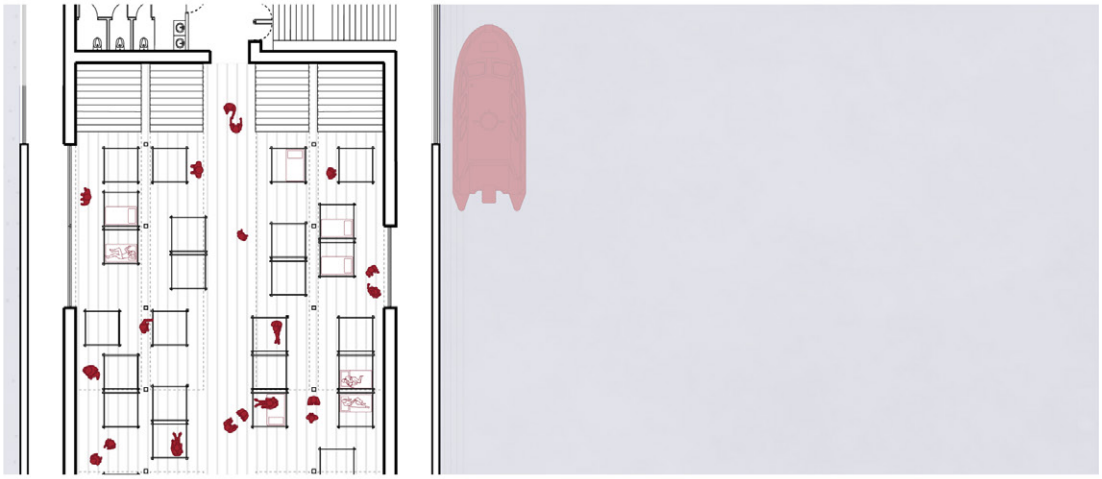
Section through gallery and plaza, the first floor becomes storage for kayaks and food. The main entrance becomes a place where rescue boats can dock.



Section through flex spaces and plaza showing how the flex spaces become sacrificial spaces. This section shows where the primary shelter is located in the library space on the second floor.

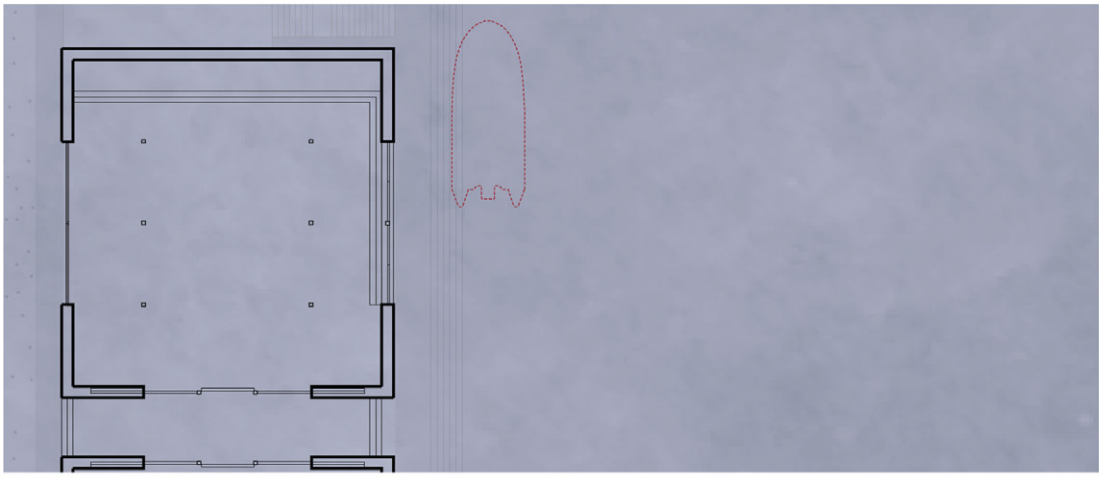


C. RECREATIONAL FLEX SPACES



SECOND FLOOR PLAN

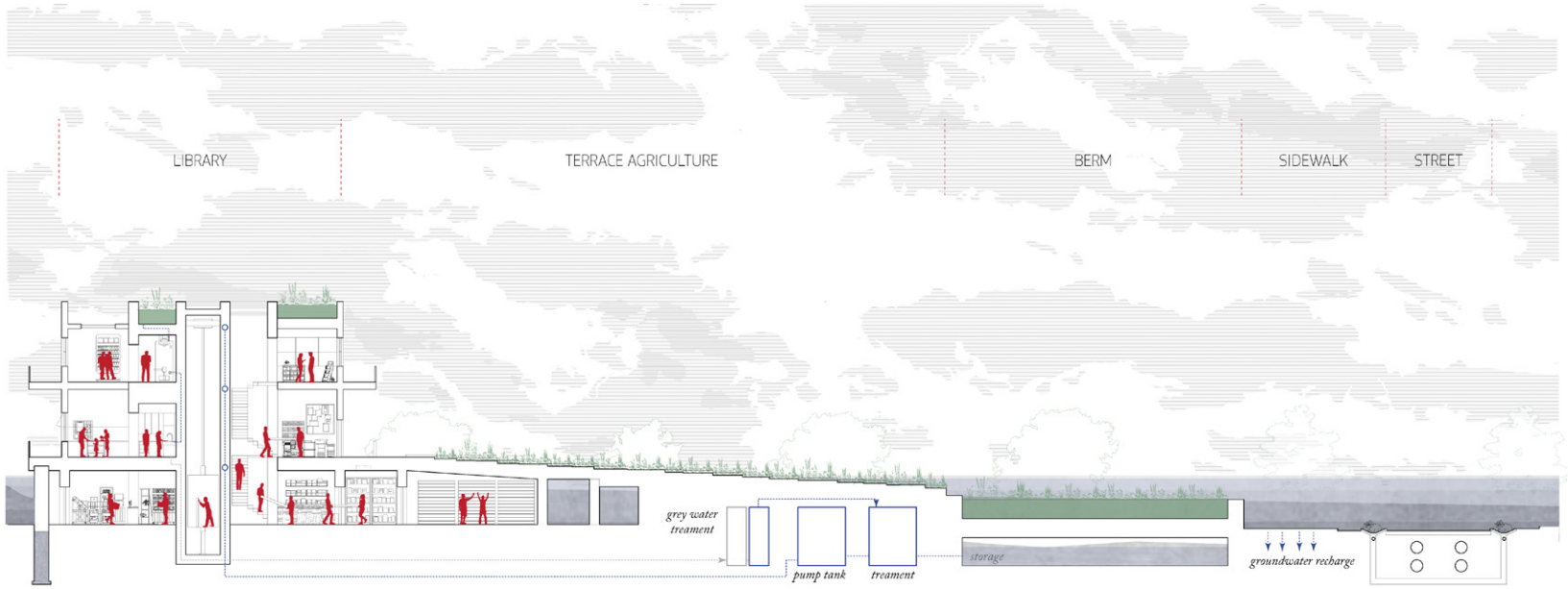
0M 8M 16M



FIRST FLOOR PLAN

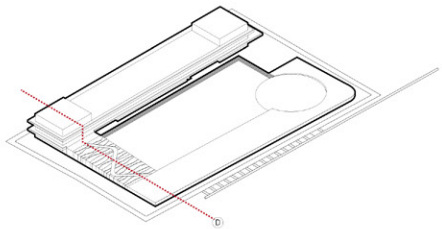
0M 8M 16M

Section through flex spaces highlights the transformation of the library into a shelter. Bookshelves are on tracks that can be pushed to one side of the wall to allow space for temporary shelter.

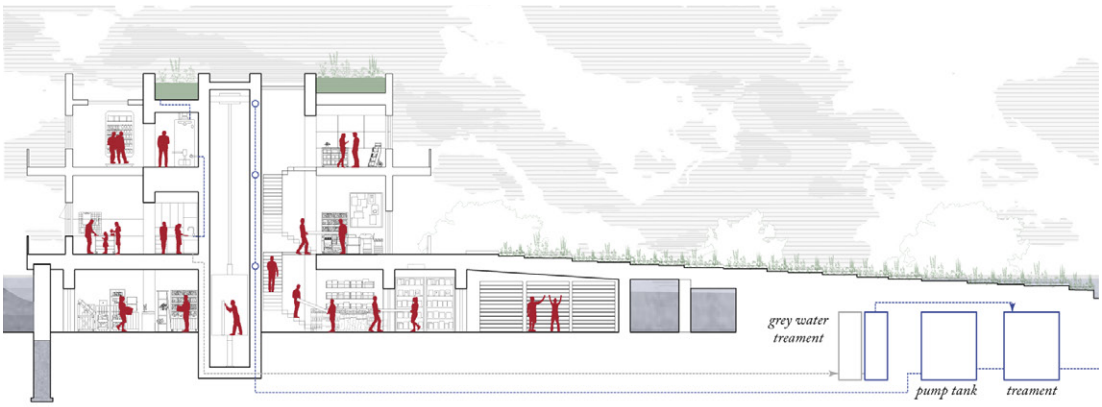


D. AGRICULTURE

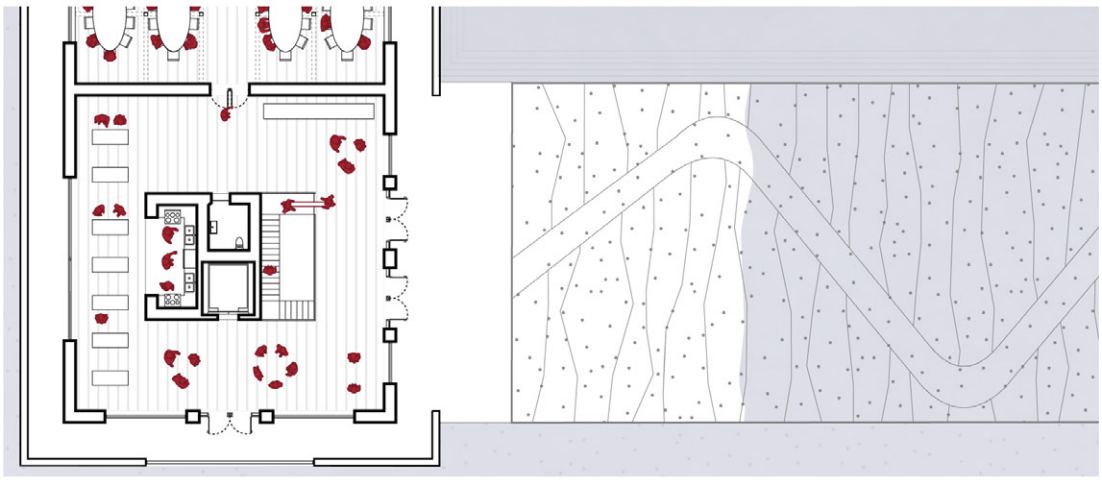
0M 8M 16M



Section through terrace agriculture showing residents moving temporary shelters from the storage to the second floor. This section also shows the market as a storage for food, and the communal kitchen are used for food preparation for everyone housed in the library.



D. AGRICULTURE



SECOND FLOOR PLAN

0M 8M 16M

FIRST FLOOR PLAN

0M 8M 16M

Section through terrace agriculture during the flood emergency highlighting the vertical core. Temporary shelters are stored on the first floor and are moved to the library.

Chapter 6: Conclusion

This thesis began as a multi-scalar approach to climate change mitigation, in which various infrastructures and programs function together with architecture to enable adaption at all scales and connect people to water and landscape. The goal was to understand how architecture situated within these scalar dimensions work, but also how they can adapt and co-exist within these environmental, social, and economic uncertainties. Reflecting on the relationship between water, landscapes, and human settlements reveals that the challenges we face today are by-products of human alteration to the natural landscape disrupted and eradicated the natural systems.

Using ecological urbanism as a theoretical framework allows a reimagined relationship that encompasses the natural temporal dimensions while finding the potential for utilizing landscape as infrastructure. This approach speaks to the complexity of social, political, and economic challenges that communities can face. It is from this juncture that an opportunity emerges to develop an architectural project that can reclaim and link multi-layered scalar resilient infrastructure to community with social spaces, productive landscapes, and infrastructure. Doing so creates a social program made sustainable to create security and self-sufficient living in these communities that are often denied proper access to amenities and basic human rights. The neighbourhood of the Lower Ninth Ward is a community with a long and deeply embedded history of social and environmental injustices that became an important part of the exploration for this thesis. The strength and community spirit of the people played a vital role in identifying programs

Neighbourhood map showing other potential sites that can be built along the blue-green corridor. This map also shows the site proposal for the pilot project and the boundary of the area of analysis. (base map from Google Maps 2020)

to develop an integrated system that reflects the synergies between ecology, hydrology, and the cultural landscape on the three scales – the neighbourhood, the city, and the region. This thesis serves as a pilot project setting and forging relationships between social programming, infrastructure, and nature. The outcomes and components of which can then be utilized on other vacant lots in the community. Thus opening up the potential for greener, more porous, and

adaptable neighbourhoods to emerge and naturally change over time (school yards, public buildings, and housing).

This pilot project is a catalyst in creating connected Green Networks by growing knowledge of infrastructure, systems and alternative ways of living with water as a resource, rather than as a burden. Each vacant lot or architecture will have its unique context that could develop different programs. This context would inform what is necessary and needed at the time of collaboration with residents. As a result, the architecture of the library gives the neighbourhood, locals, and visitors a way to understand the natural processes and man-made infrastructure while actively reclaiming public spaces for the future of New Orleans.

After reflecting on the research, there are numerous examples of design proposals that address the devastation caused by Hurricane Katrina. Some have been successfully implemented, while others have not been. It is imperative to reiterate that designing for resilience must include informing policy and public debate in close relation to social and environmental justice. Without these goals, ethical and inclusive ideals, and the funding to do justice existing in design proposals will remain unbuilt and more importantly the community will remain broken.

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