

**SOPHIE CHAEYUN LEE**  
Master of Science Architecture and Urban Design

Selected Works  
2020

**SOPHIE CHAEYUN LEE**  
| MSAUD Graduation Portfolio

01

**AKAKI REGIONAL TRUST**  
| MSAUD Spring 2020 Water Urbanism Studio

02

**BUILDING CRADLE TO CRADLE**  
| MSAUD Fall 2019 Hudson Valley Studio

03

**URBAN CAMPUS**  
| MSAUD Summer 2019 The Five Borough Studio



01

**AKAKI REGIONAL TRUST**  
| MSAUD Spring 2020 Water Urbanism Studio

Collaborative Project:  
Hala Abukhodair  
Eleni Kalapoda  
Minjung Lee  
Sophie Lee

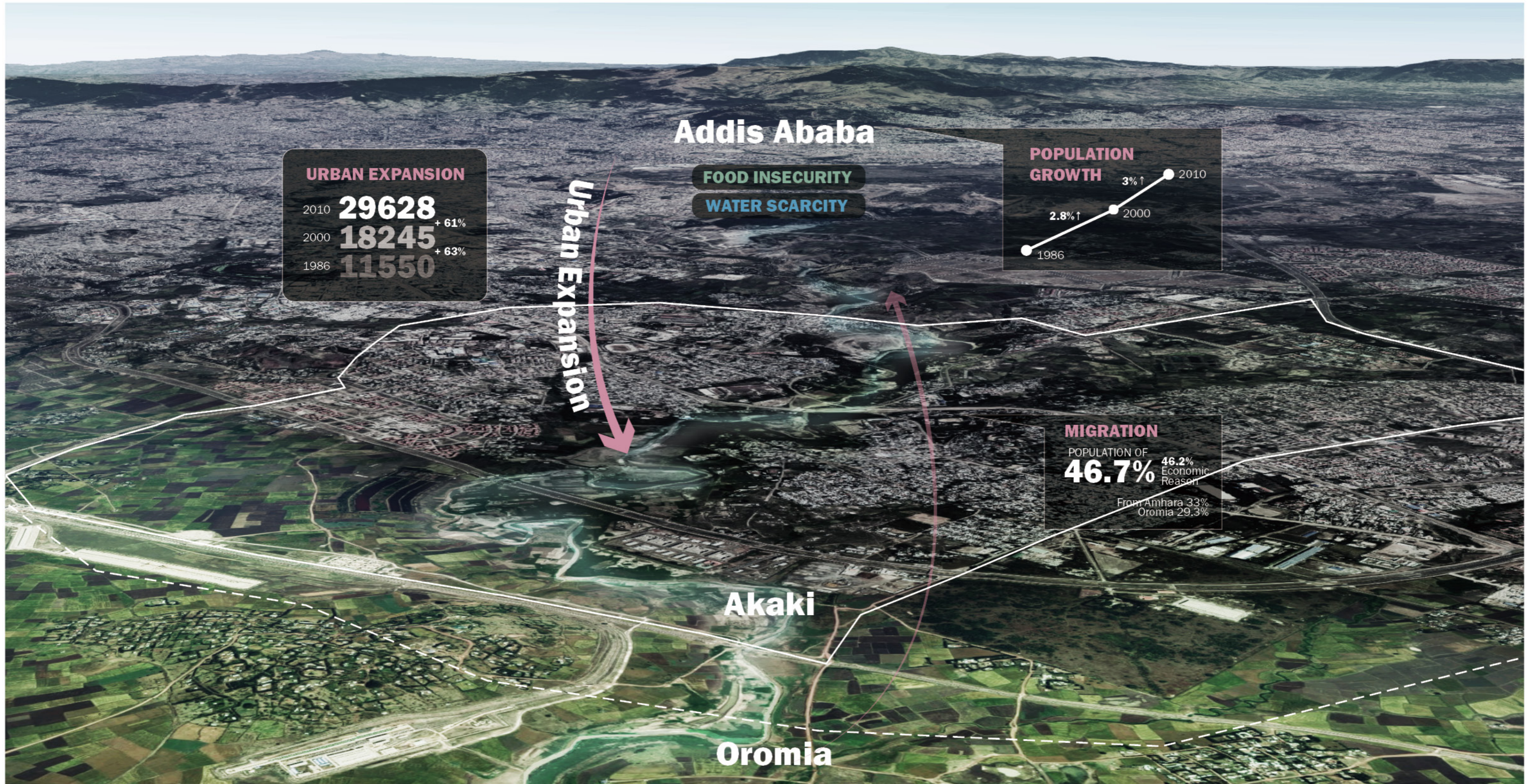
This project proposed that the City of Addis reconceive the Akaki basin lowlands as a regional water filtration park and working landscape, critical to maintain for the city's future water security.

Our project challenges the existing master plan which is based only on land use, neglecting ecology and hydrological systems.

Our counter proposal to the masterplan is to consider Akaki as an area of high, middle and low grounds, and propose appropriate uses for these topographical conditions that can lead to sustainable development and flood management.

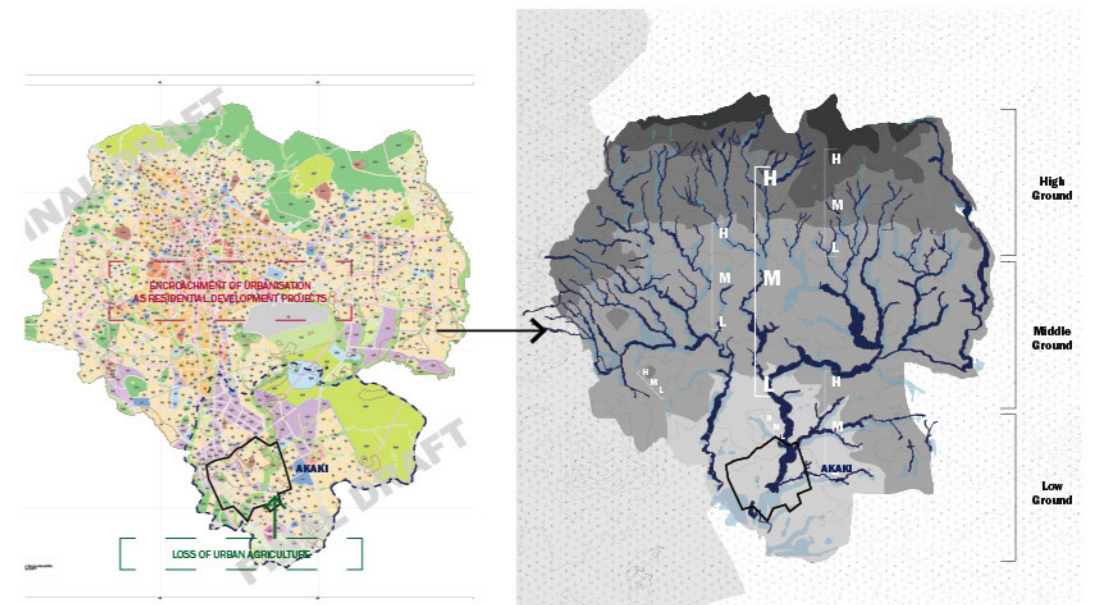
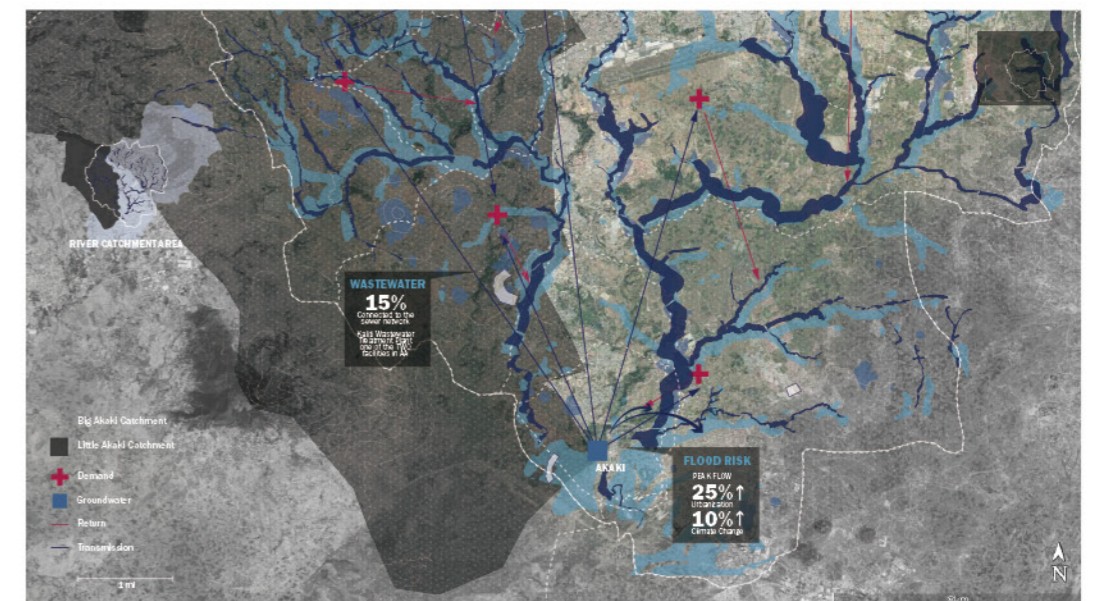
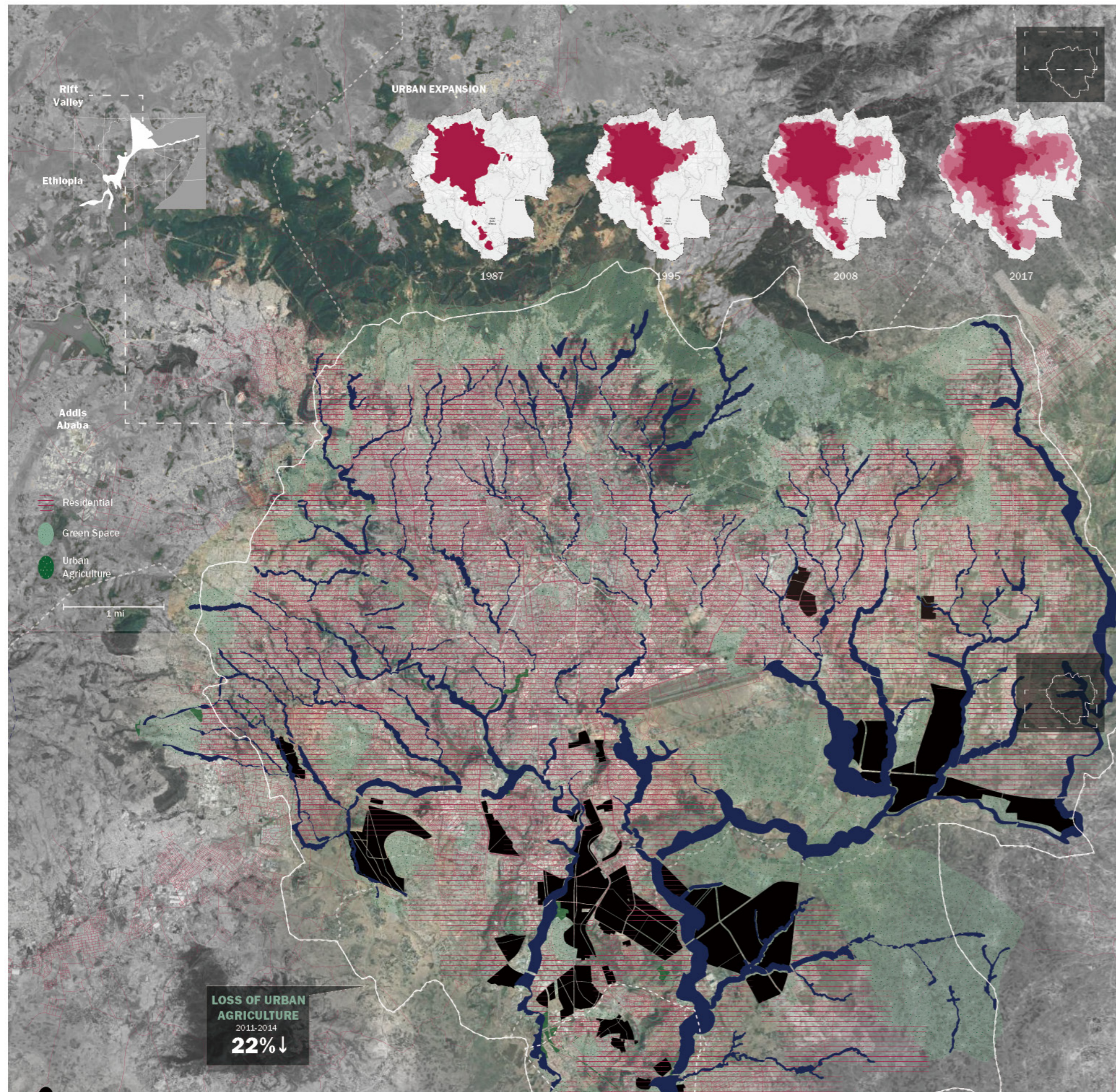
We introduce a system that enables beneficial co-existence of housing and productive landscapes including agriculture and water.

The proposed network of high middle and low ground will result in nature-based solutions for resilient river programs and urban transformation on multiple scales and multiple levels.



Encroachment: Akaki Lowlands of Addis Ababa

Addis Ababa is located on a mountain plateau and Akaki is located at the base. Akaki is on the boundary of Addis Ababa and Oromia region and is a vital supply gateway of agriculture and water.



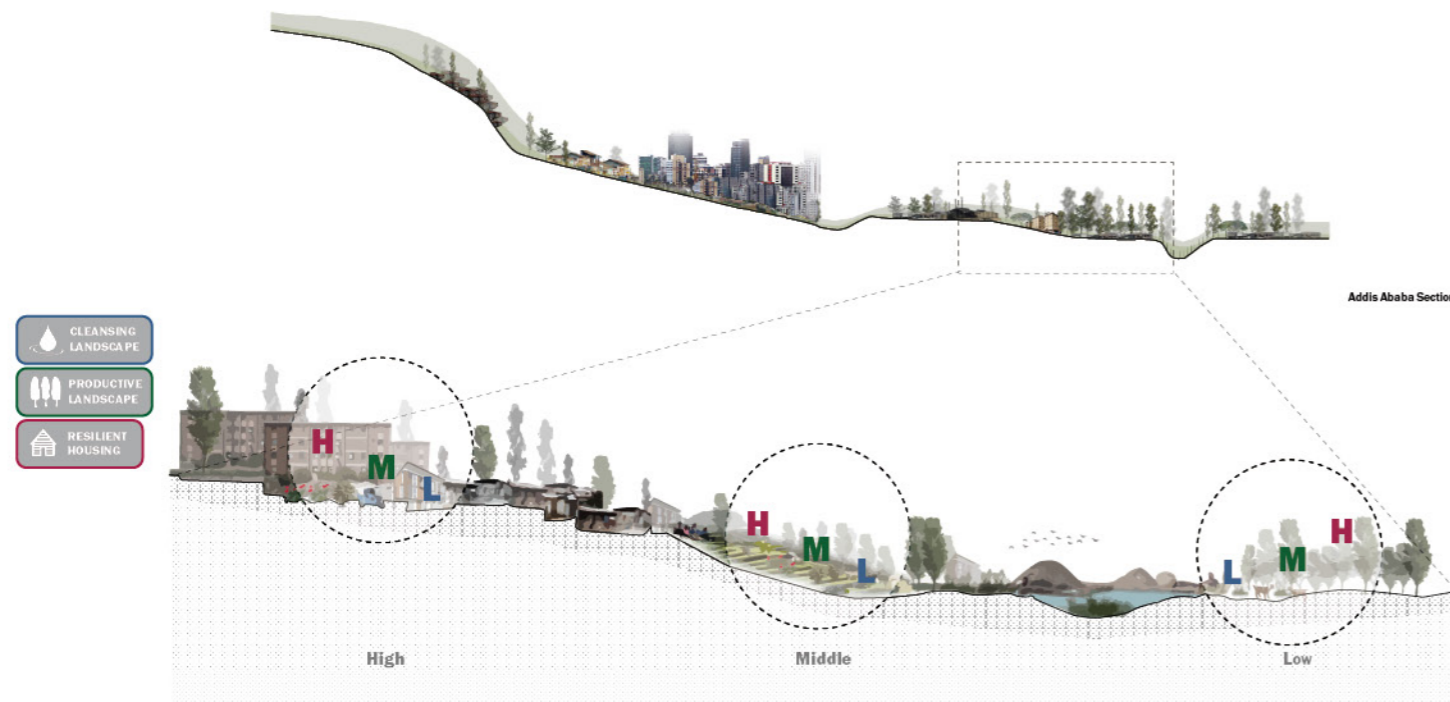
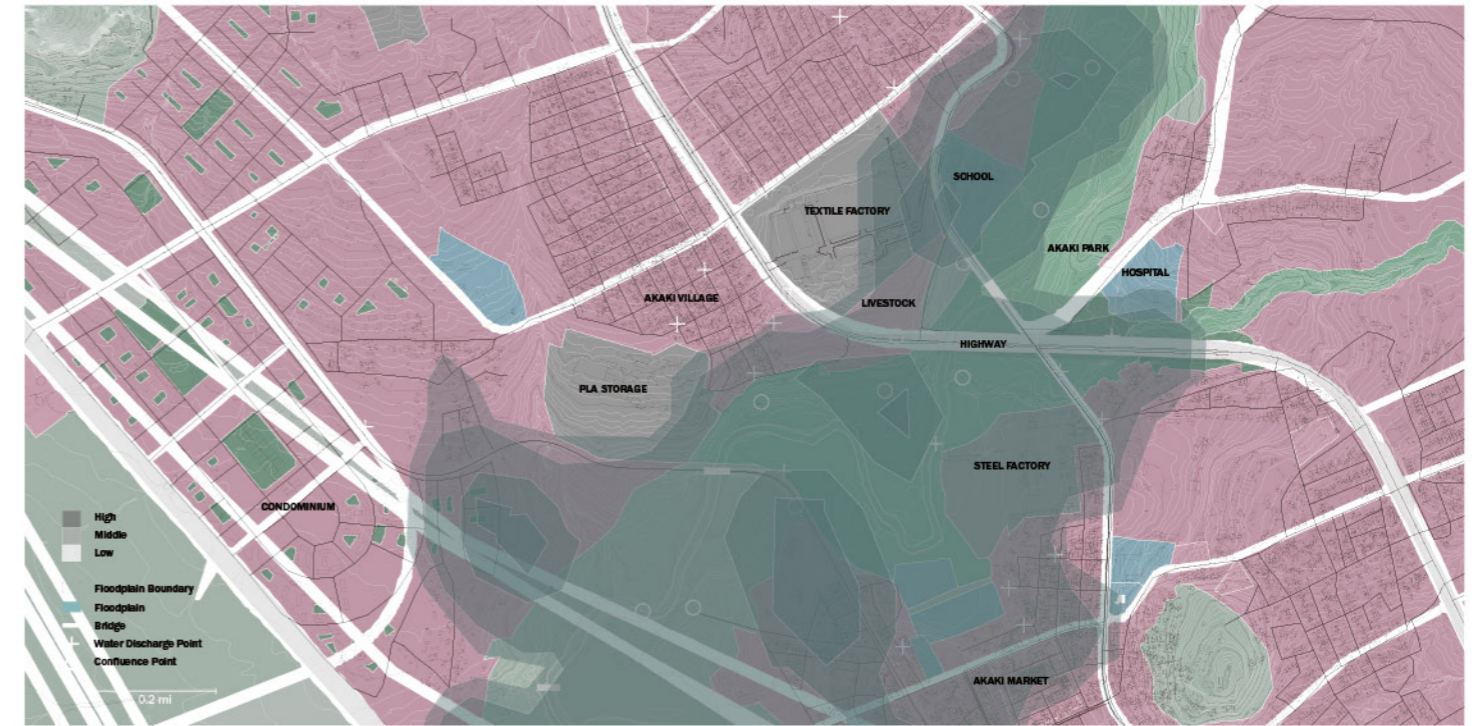
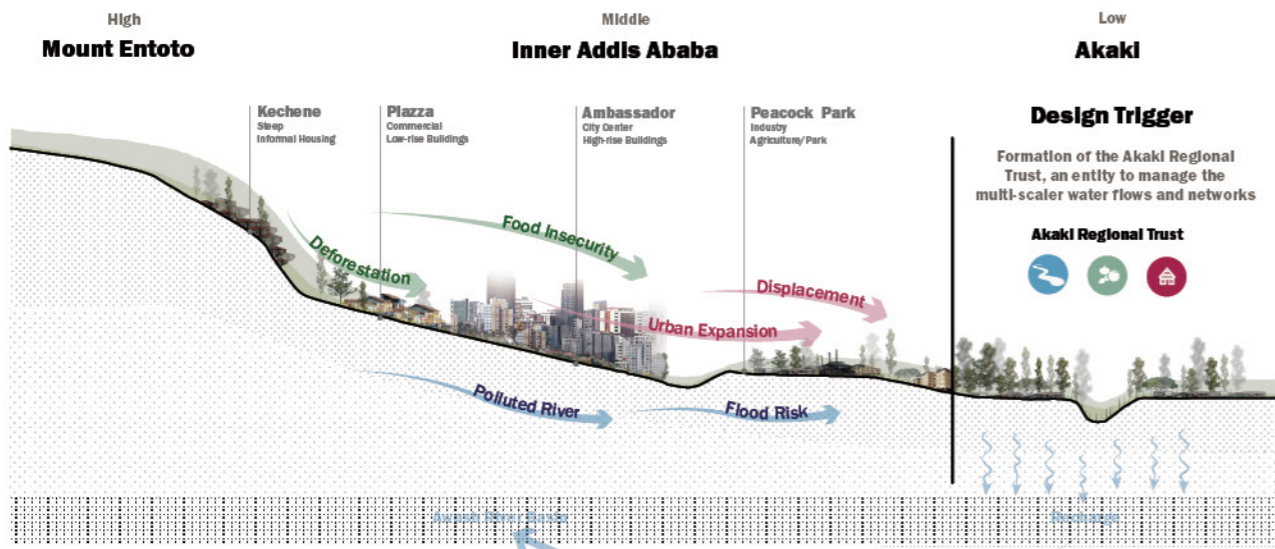
### Challenges

Rapid urban growth has expanded onto the existing productive land of Akaki, and manipulated the terrain of the river and its tributaries in unnatural ways. Akaki's river system has been currently reduced to an open sewer, increasing flood damage and adversely affecting the Oromia region further down.

There are significant agricultural activities in Akaki, supplying goods to Addis Ababa. The pollution of the river with urban growth, has resulted in the production and distribution of contaminated food across the city, putting Addis Ababa's food security at risk.

The river's tributaries that traditionally sustained ecological and productive functions allowing water to soak and flow are now facing degradation with the increase of impermeable surfaces. Concretisation also diminished Akaki's natural water catchment area and increased surface runoff placing the region at higher risk of dangerous flooding.

Our project challenges the existing master plan which is based only on land use, neglecting ecology and hydrological systems.



Design Trigger



Existing Conditions in Akaki

Our counter proposal to the masterplan is to consider Akaki as an area of high, middle and low grounds, and propose appropriate uses for these topographical conditions that can lead to sustainable development.

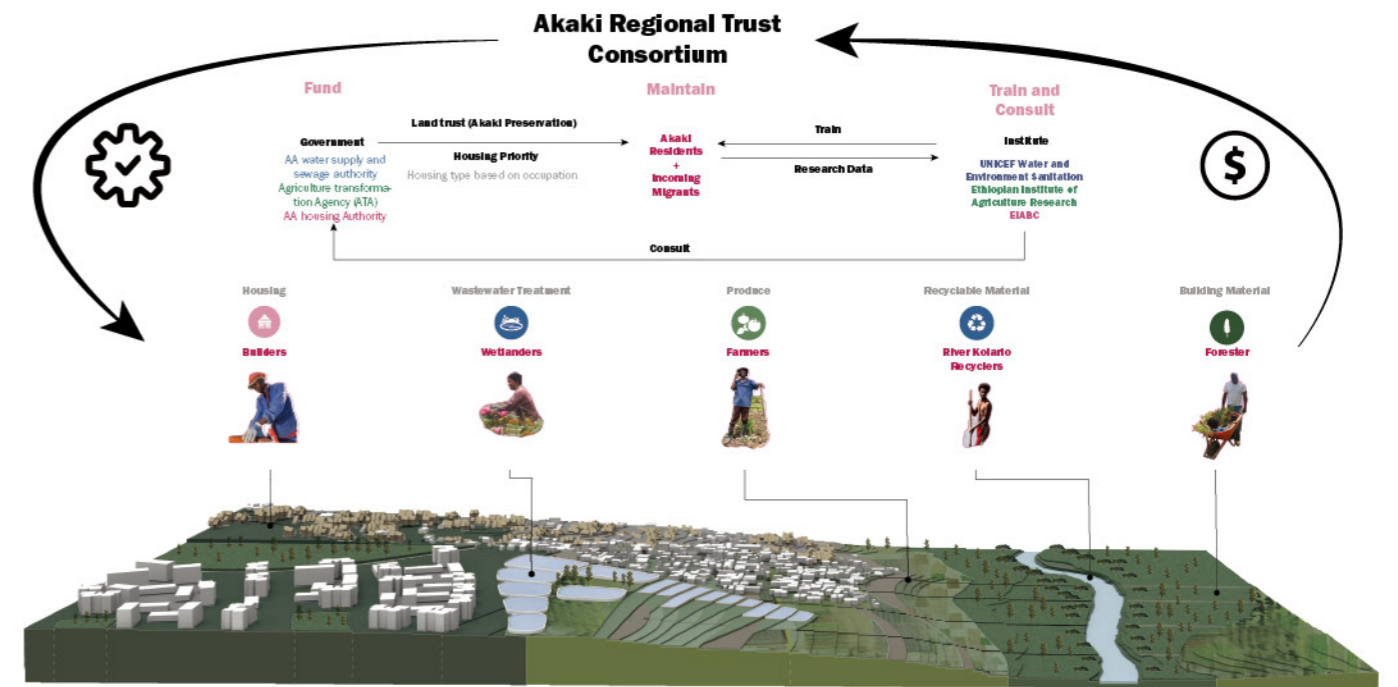
To tackle the flood risk challenges, food and water insecurity and internal development induced displacement pushing people out of Addis' city center, our project will create an entity that manages Akaki's resources which are critical infrastructure for regional water infiltration and recharge with agriculture and housing overlays.

Most wastewater discharge points from the existing sewer system flow into the river, being the number one source of stream pollution in the Akaki region. Additionally, the effects of the highway construction in the river buffer zone, increased risk of flooding compromising agriculture land, and housing settlements.



**Interwoven Networks**

Improving upon the masterplan induced problematic conditions at present, we propose an integrated system which consists of: cleansing and purifying wetland network for wastewater and stream pollution, flexible productive network for agriculture and recreational purposes and resilient and inclusive urban network for both existing and new housing typologies.



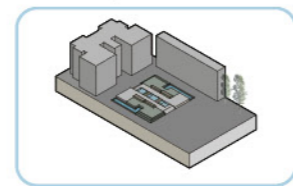
**Akaki Regional Trust**

The Akaki Regional Trust is a consortium of networks that includes the community, an educational institute and the city government to operate, maintain and manage proposed interventions in the interest of all stakeholders.

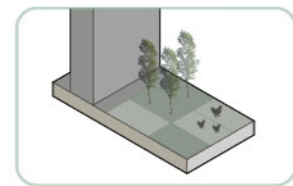
**HIGH**

**MIDDLE**

**LOW**



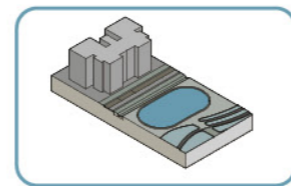
Community Wetland



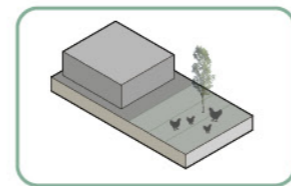
Community Garden



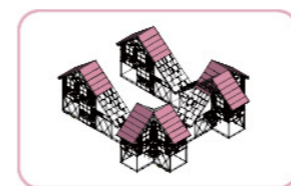
Civic



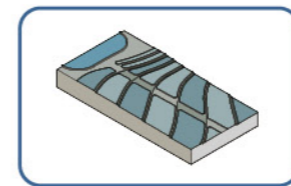
Constructed Wetland



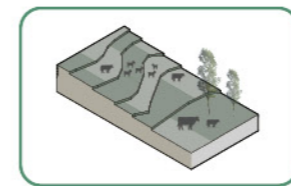
House Garden



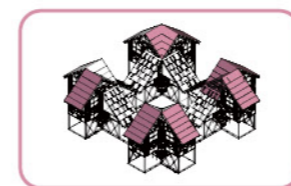
Production



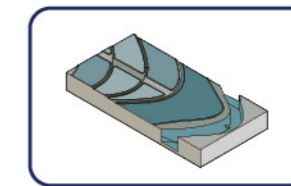
Teffaced Bio-Purification



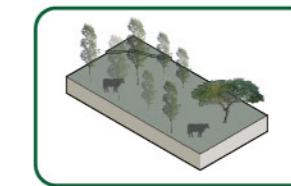
Terracing Agriculture



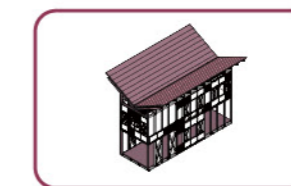
Production



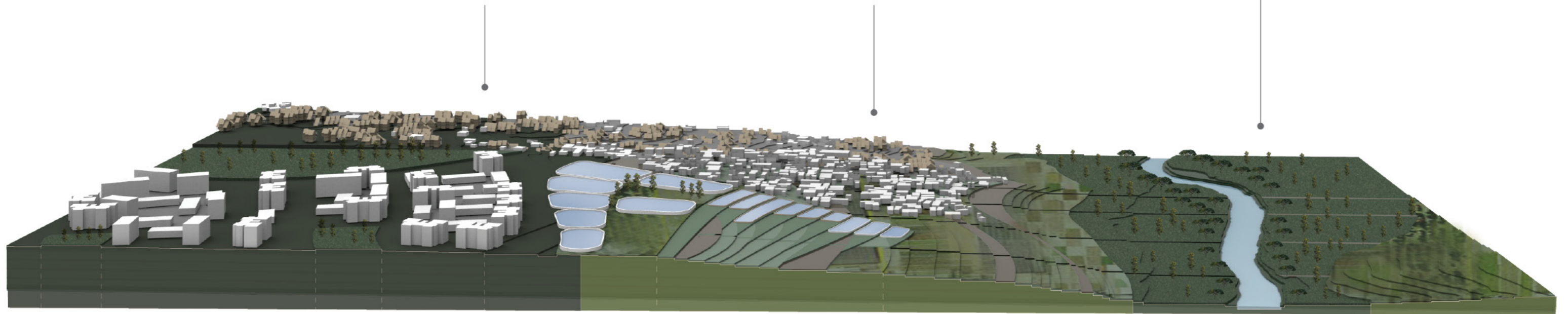
Terraced Aerated Lagoon



Regional Forest



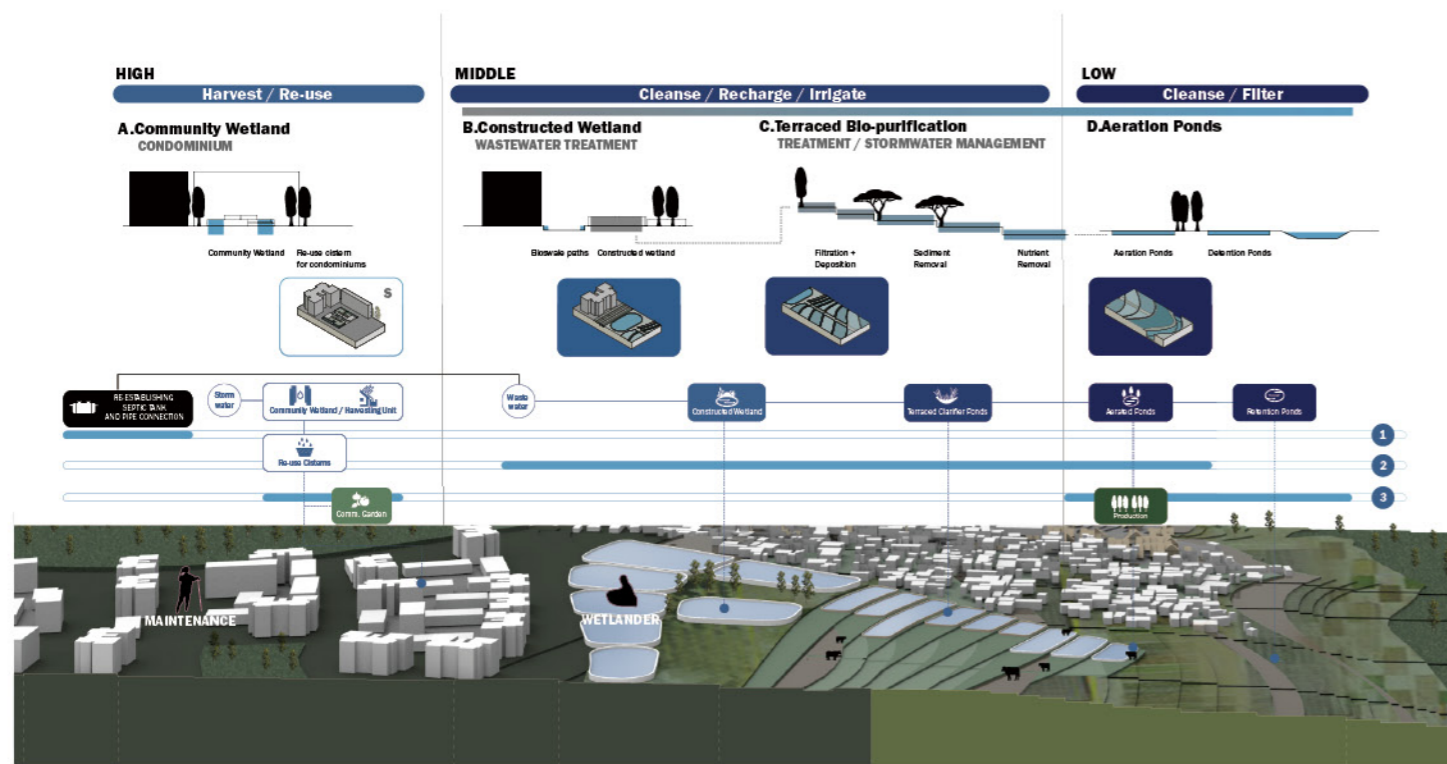
Ecology



Tollkit Implementation

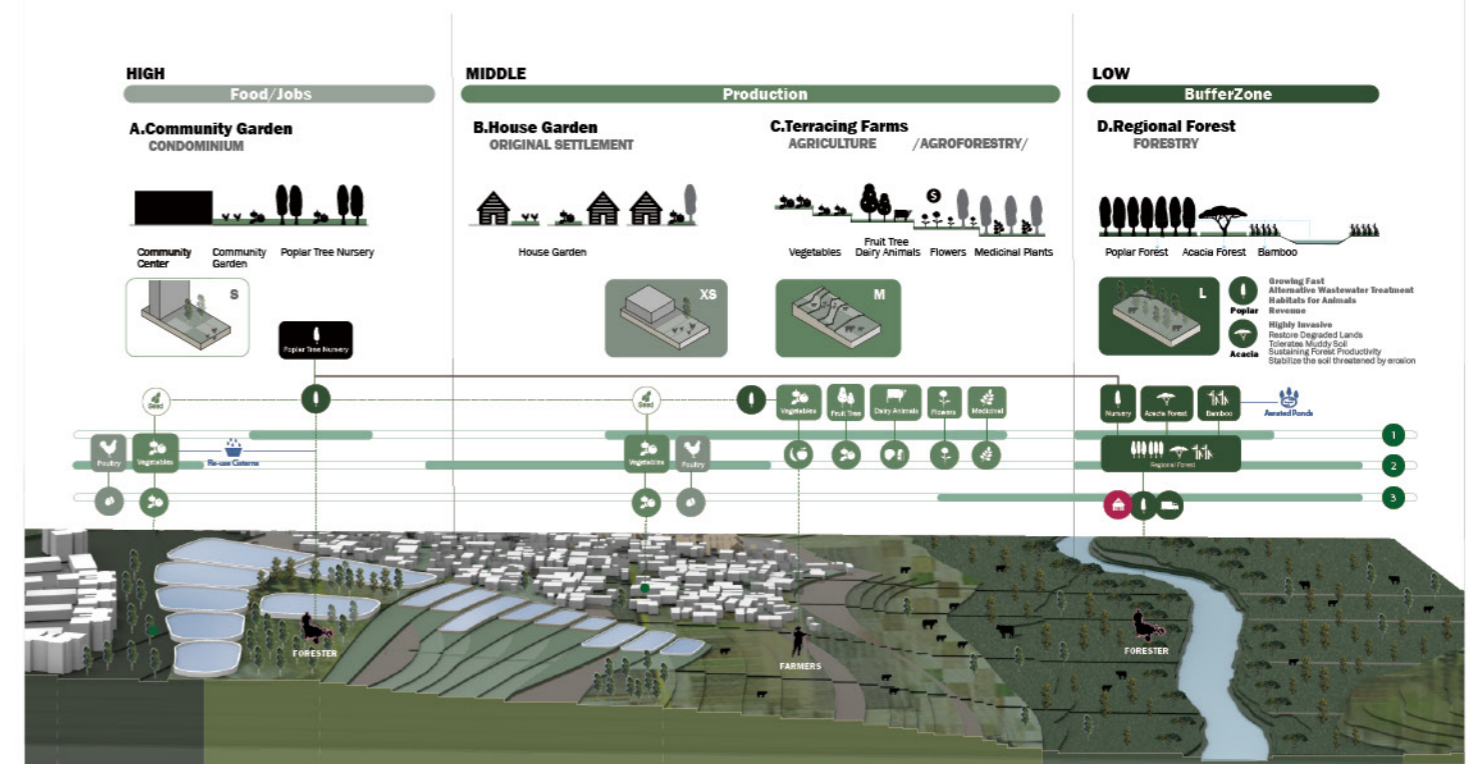
We have proposed tools for cleansing and productive landscape networks accommodating different urban levels ranging from community to regional scale. Resilient housing typologies have been proposed for relative high grounds, while strategies have been developed for the middle ground and low grounds.





Cleansing Landscape

By locating dense built up mixed use and mixed income areas on the high ground, we have proposed a productive and cleansing flexible landscape of filtering stream, natural wastewater treatment processes, storm-water management and agriculture.



Productive Landscape

We propose the productive landscape to include diverse typologies of agriculture, expansive treatment forests and storm-water retention with phytoremediation farms of various scales according to topography.



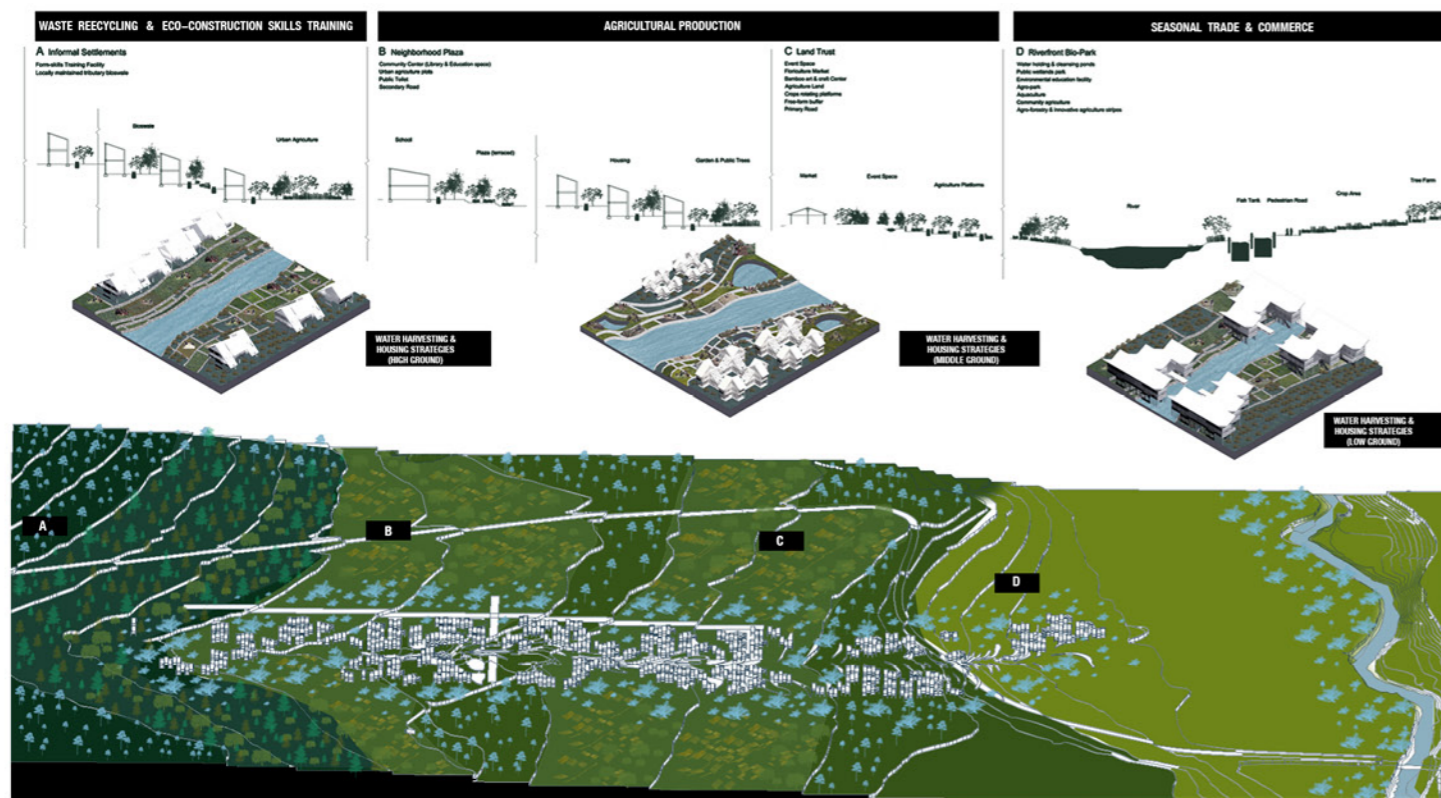
### Cleansing Landscape

The cleansing landscape we have proposed is a nature-based network with constructed wetlands and terraced bio-purification system. Whilst serving the purpose of cleansing, this network will additionally provide year-round irrigation system for the agriculture and incentivises local people to help clean and recycle solid and/or plastic waste in exchange for social capital credits.



**Productive Landscape**

Our productive landscape creates hubs for productive industries around multiple cycles of agricultural activities. The cycle of this network begins with reforestation and providing tree nursery and forestry jobs. Reduced flood risk through forestry allows farmers to diversify and expand production in the dry season as well as the wet season.



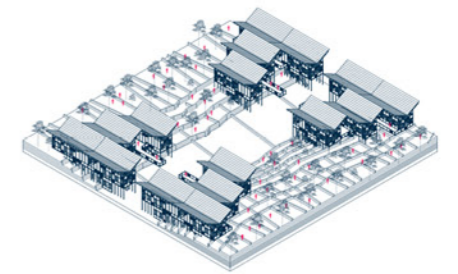
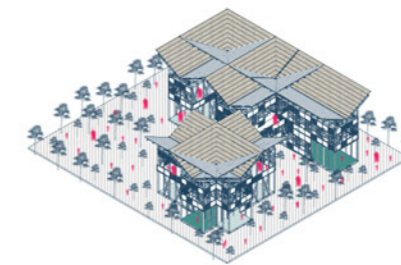
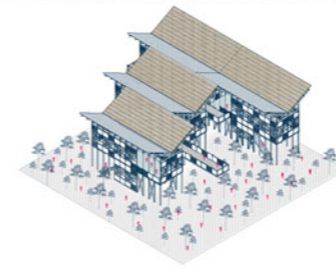
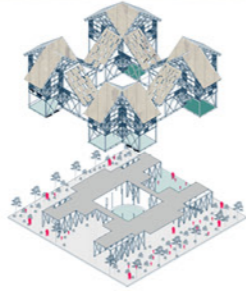
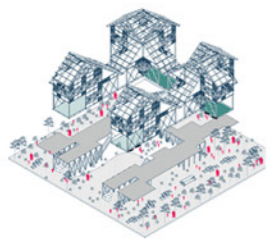
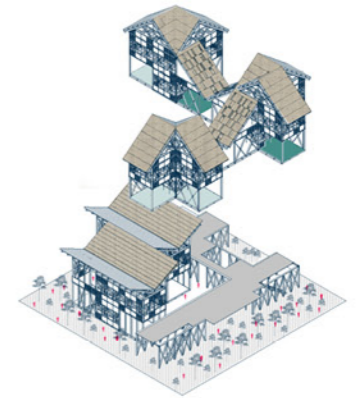
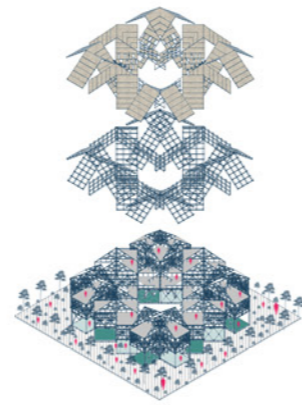
Resilient Housing

A system of local high and low grounds has been identified on creek scale where new housing typologies and multiple hydraulic and landform-altering strategies are to be implemented along with spaces for civic, ecological, economic and cultural amenities to create new livelihood opportunities inside the expanding informal settlements aggregations.



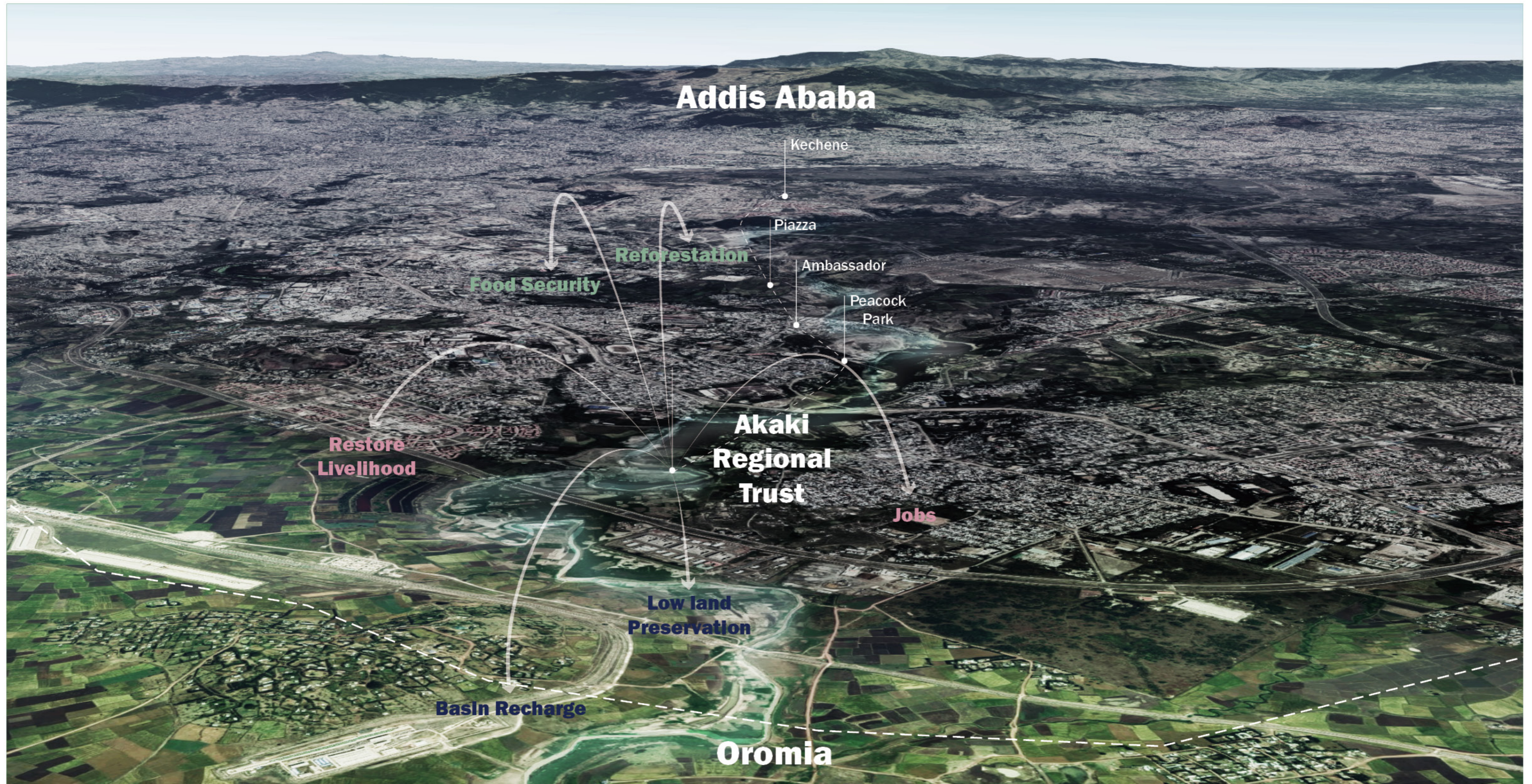
Housing Typologies

Flexible residential typologies with modular units will help preserve the cultural identity, while their evolution in time (connections through sky bridges for circulation) will ensure a variety of experiences that are already found in the community, and will be resilient to flooding. Additional programs focusing on urban agriculture, water harvesting, and Eco-construction skill training will promote new livelihood opportunities.



### Housing Typologies

Flexible residential typologies with modular units will help preserve the cultural identity, while their evolution in time (connections through sky bridges for circulation) will ensure a variety of experiences that are already found in the community, and will be resilient to flooding. Additional programs focusing on urban agriculture, water harvesting, and Eco-construction skill training will promote new livelihood opportunities.



# Addis Ababa

Kechene

Piazza

Ambassador

Peacock Park

## Akaki Regional Trust

Jobs

Low land Preservation

Basin Recharge

Oromia

Food Security

Reforestation

Restore Livelihood

### Regional Resilience Trust

Akaki Regional Trust networks aspires to activate and preserve Akaki lowlands and re-imagine it as a vital part of Addis Ababa's vision towards a resilient city.



Former Manufacturing Building

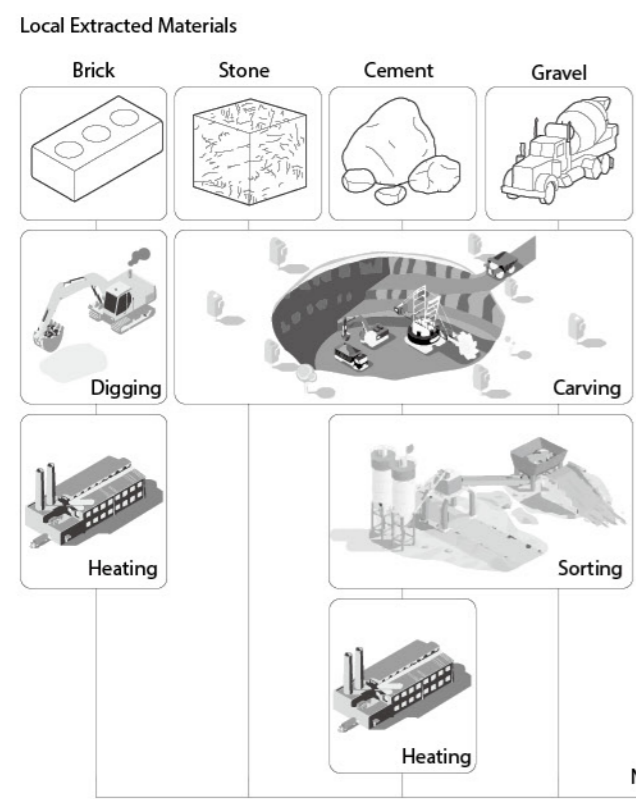
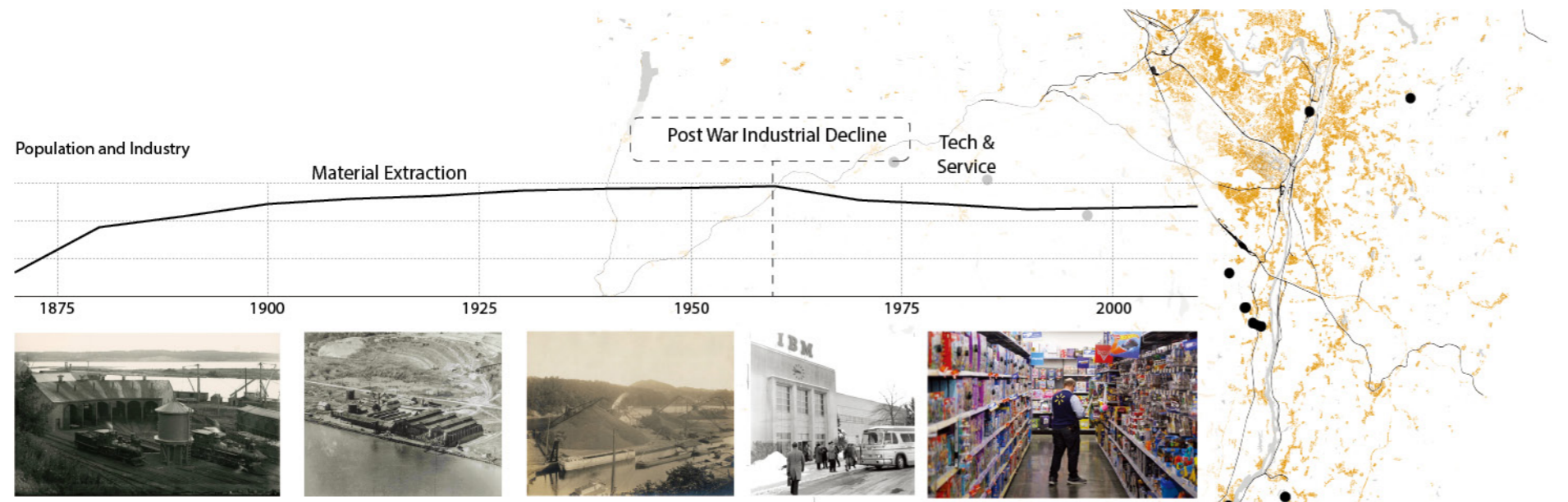
Former Computer Manufacturing Area

**BUILDING CRADLE TO CRADLE**  
| MSAUD Fall 2019 Hudson Valley Studio

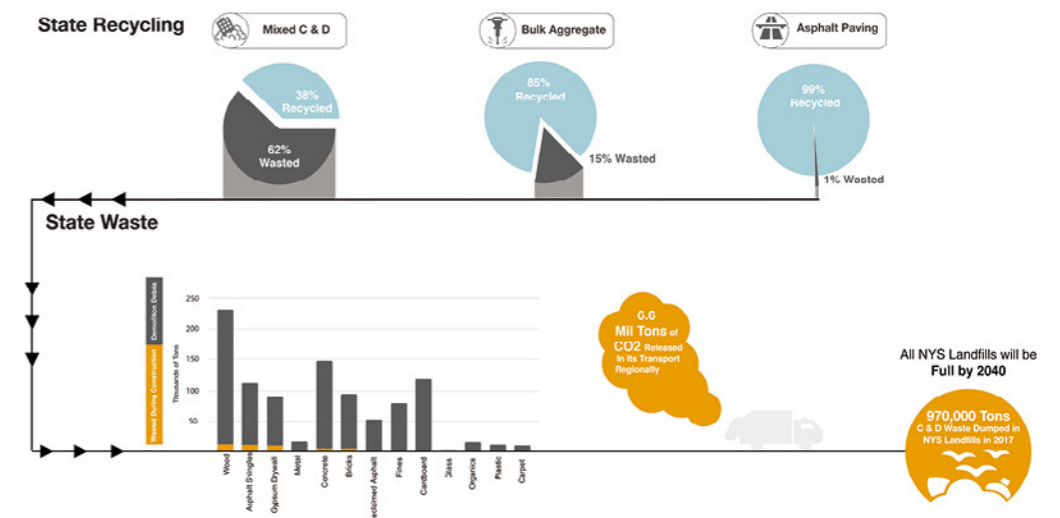
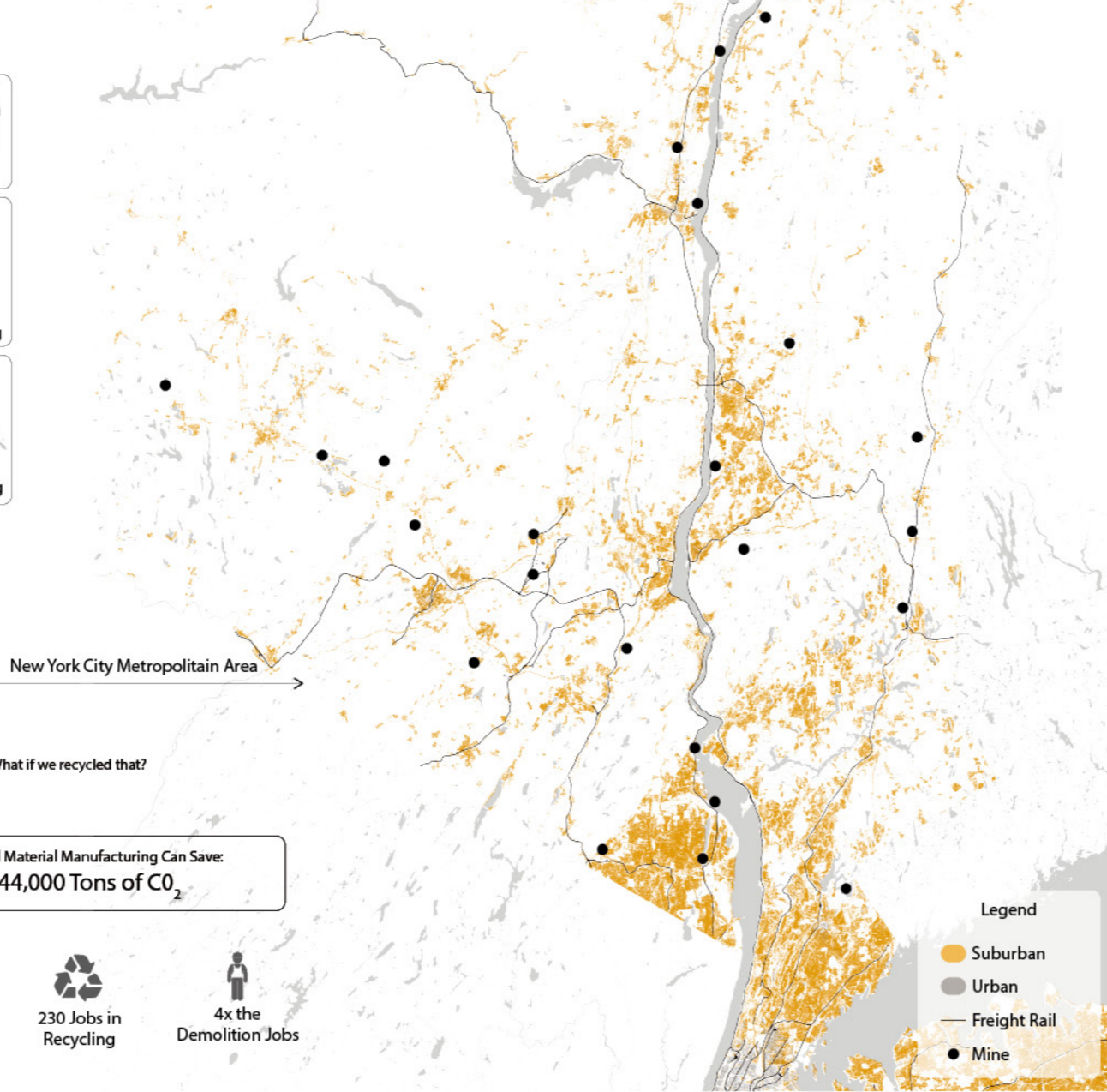
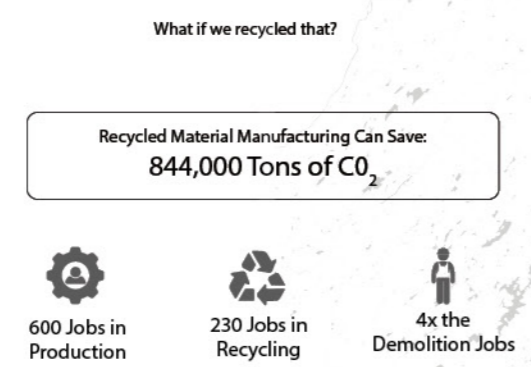
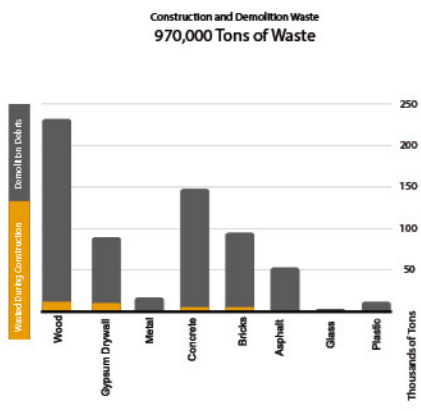
Collaborative Project:  
Ritchie Ju  
Laszlo Kovacs  
Sophie Lee  
Victoria Vuono

The Building industry accounts for 30% of Global Carbon Emissions with 40% coming from production and 60% coming from building efficiency. The Green New Deal calls for our building stock to be upgraded to reduce our emissions, but how can we build better and use less energy in manufacturing? The Hudson River Valley has a long history of building material production. Many of these industries have been moved abroad leaving us with a carbon intensive building process and post-industrial disinvestment.

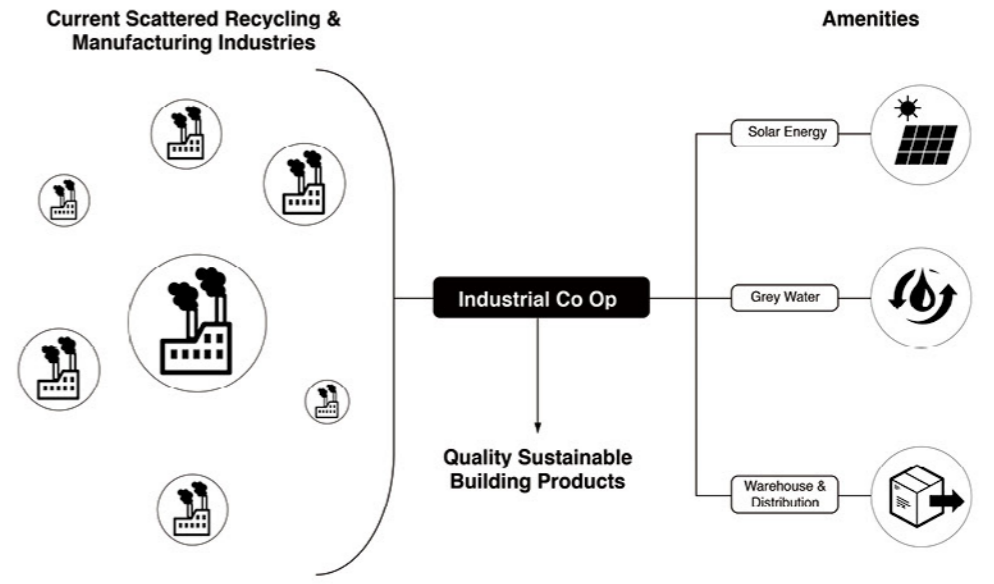
By creating recycling and localized building material production infrastructure, we can foster a new co-operative of sustainable industrial facilities. This infrastructure can facilitate symbiotic production relationships towards holistic quality building materials.



State Waste and Recycled Material Manufacturing Potential



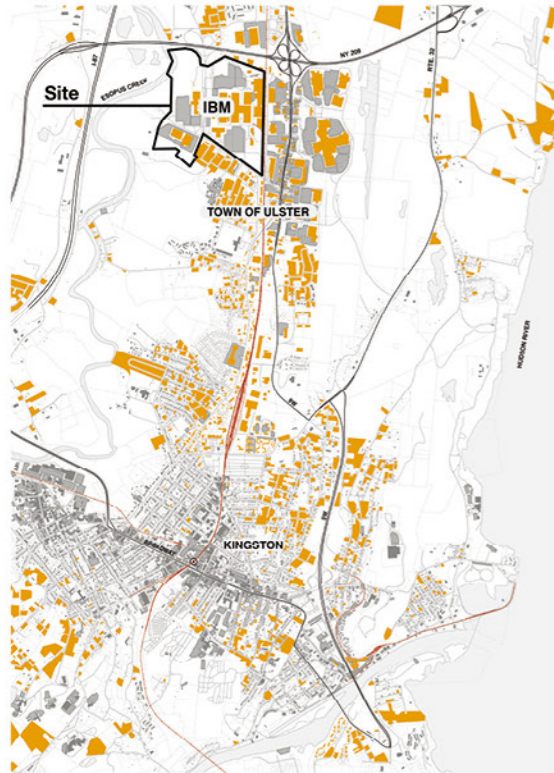
**Carbon That Could Have Been Saved:**  
**844,000 Tons of CO<sub>2</sub>**



**Regional Analysis and Material Lifecycle**

If we rethink the relationship between industrial processes we can create a symbiotic relationship using less energy and less waste. But how can we transition our already struggling industries towards more sustainable practices. We can create cooperatives that can provide a suite of sustainable amenities and foster new industrial relationships.

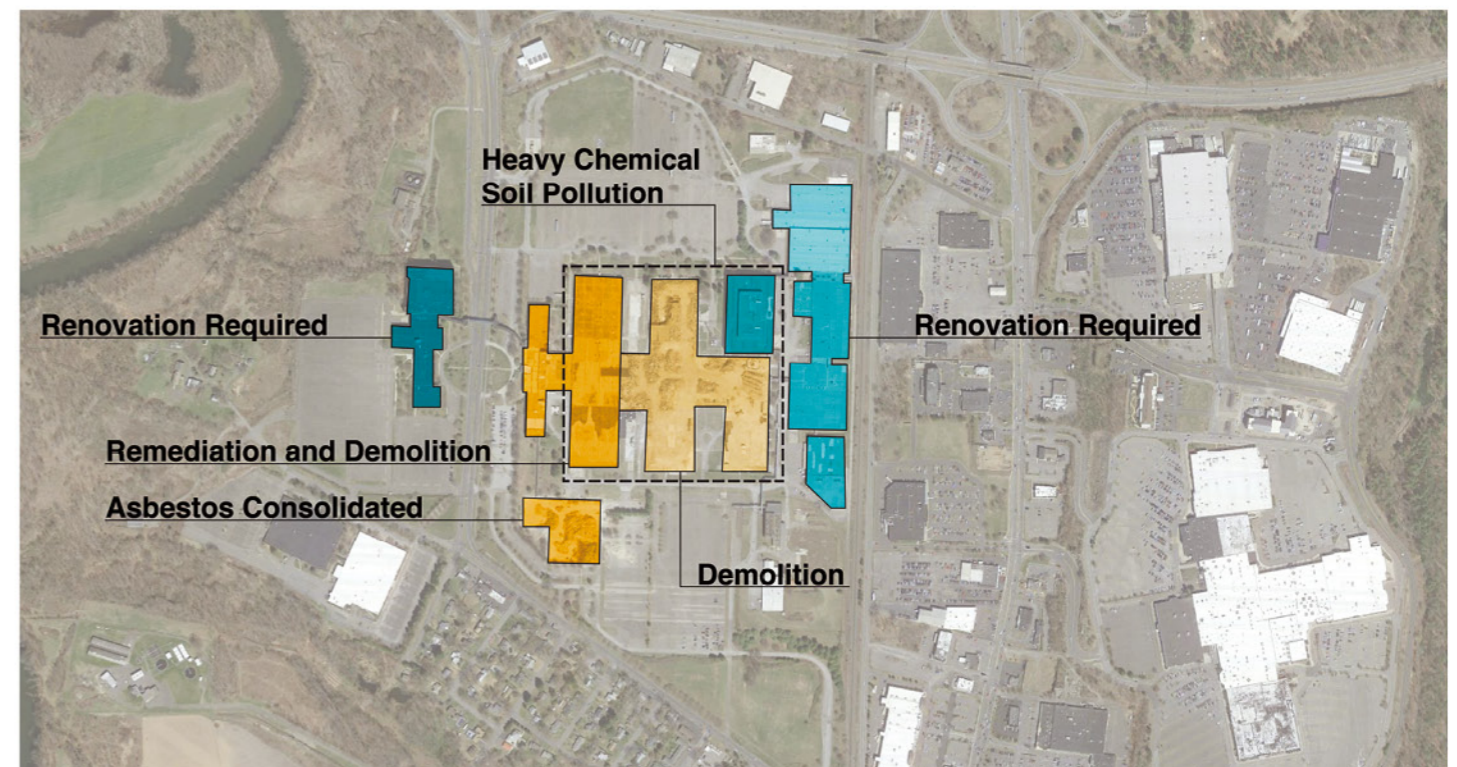
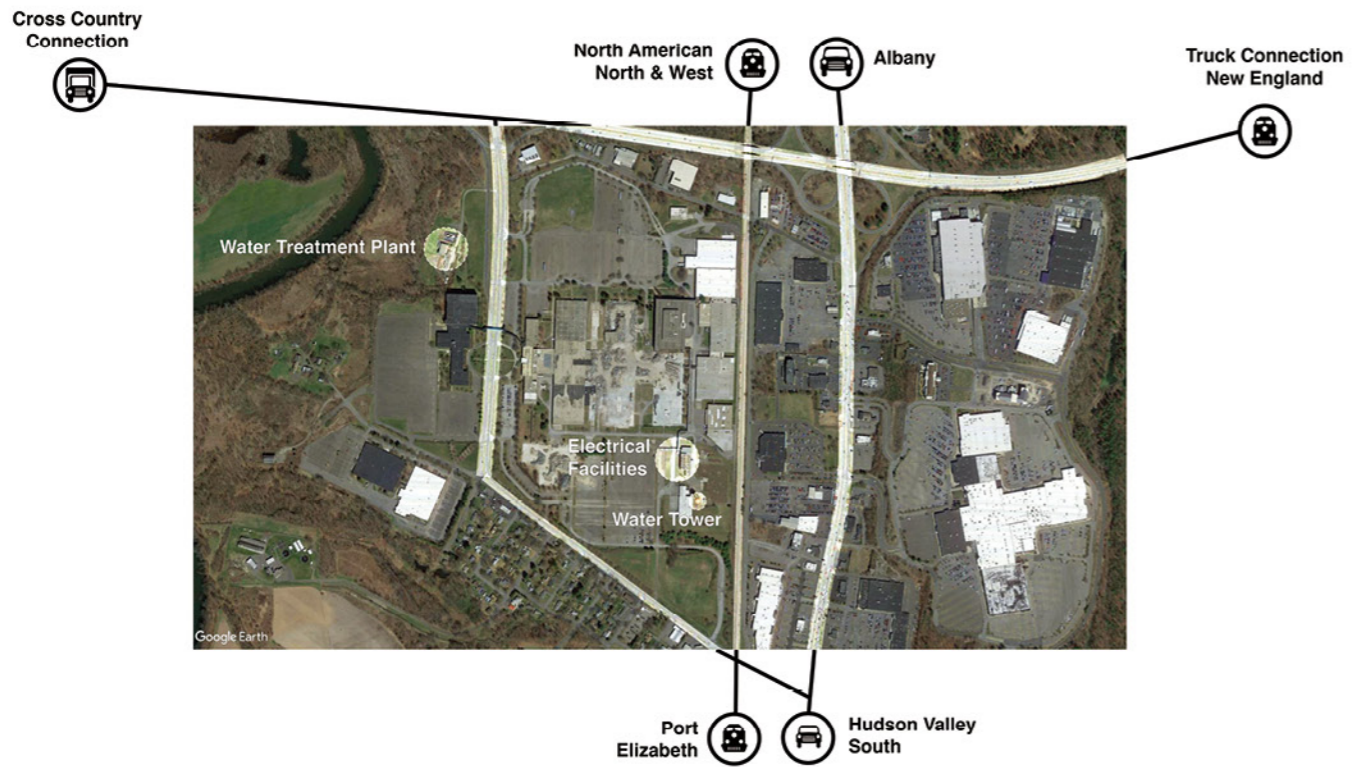




**80% of Housing In The Town of Ulster Built By IBM**

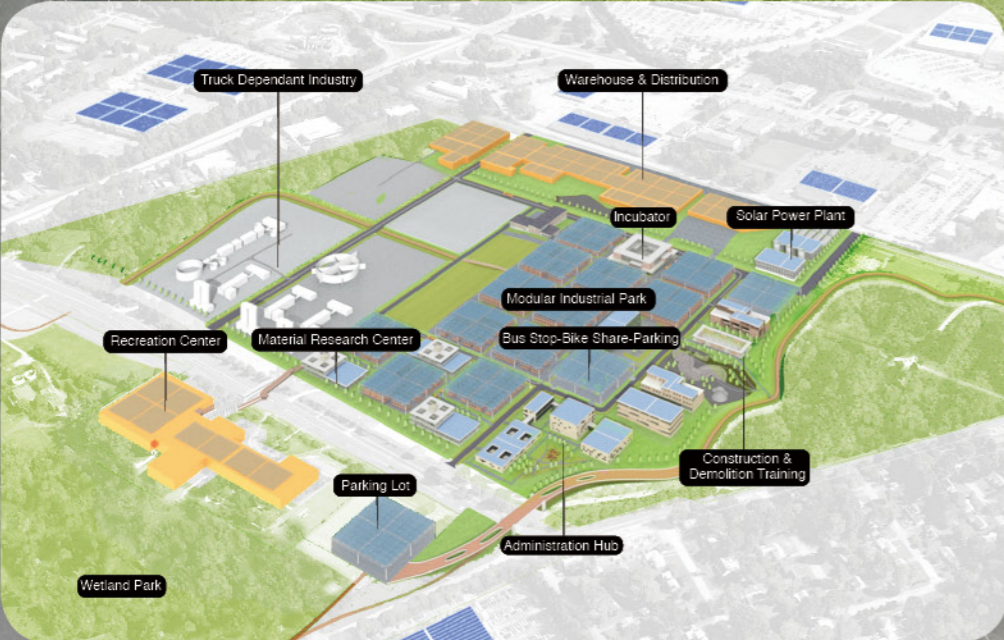
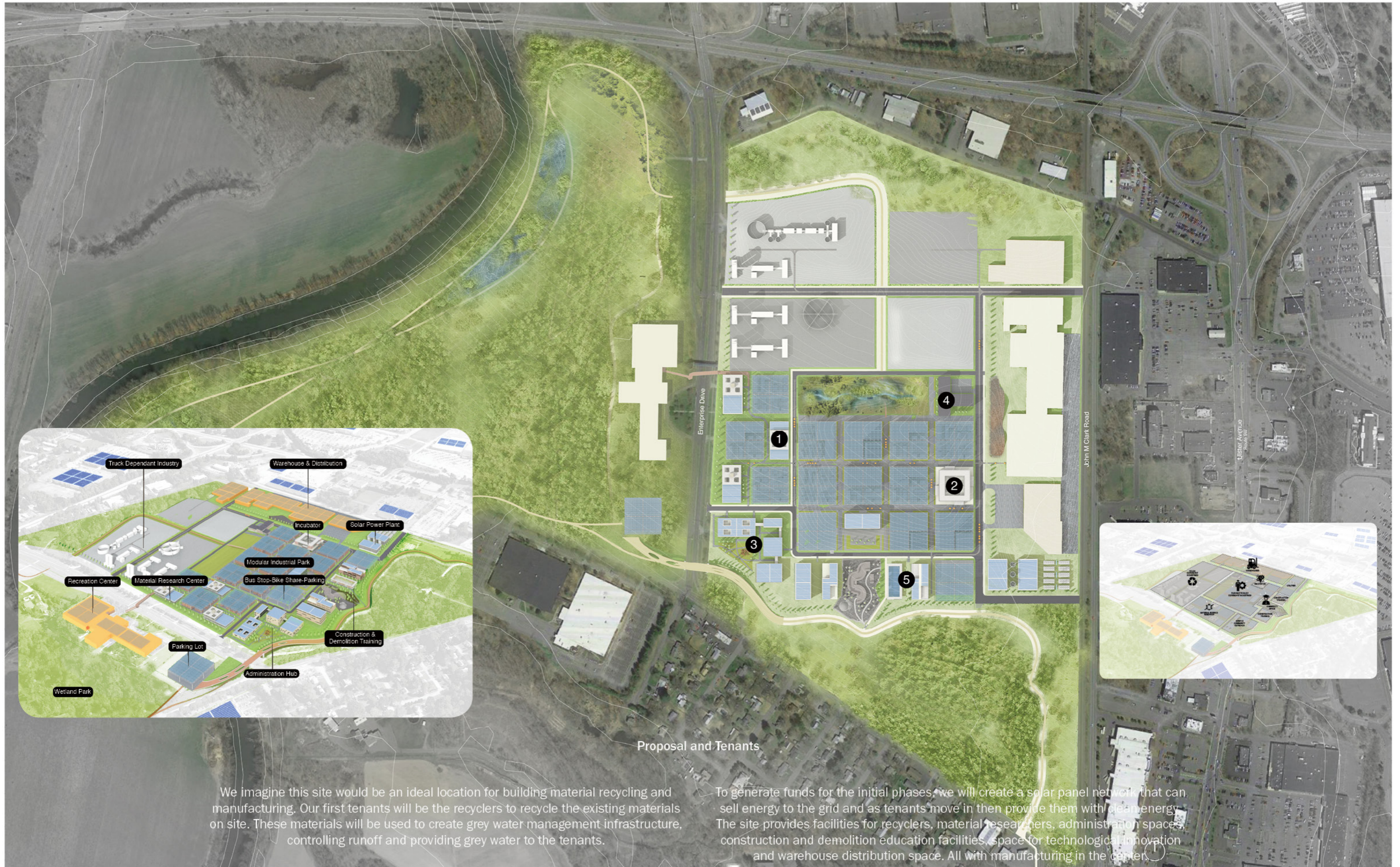
**7,000 Direct Jobs  
20,000 Indirect Jobs**

**4.5 Million SF of Strip Malls**



**Site Occupants and Issues**

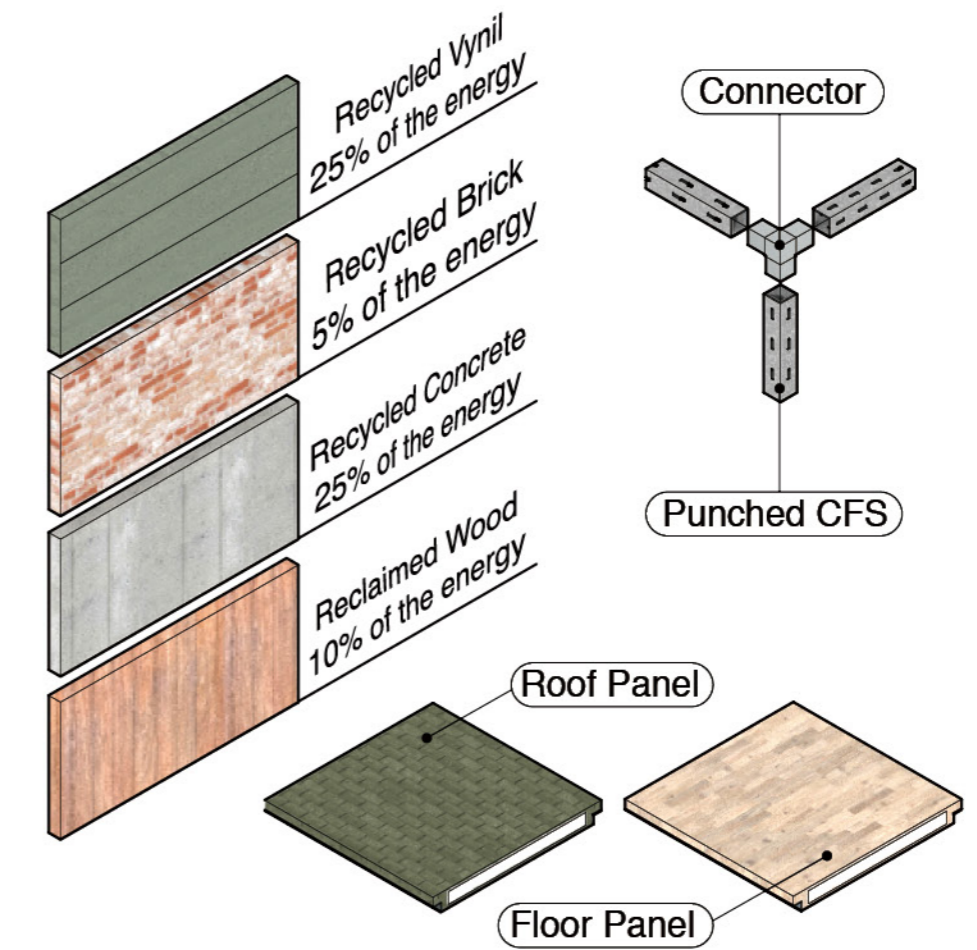
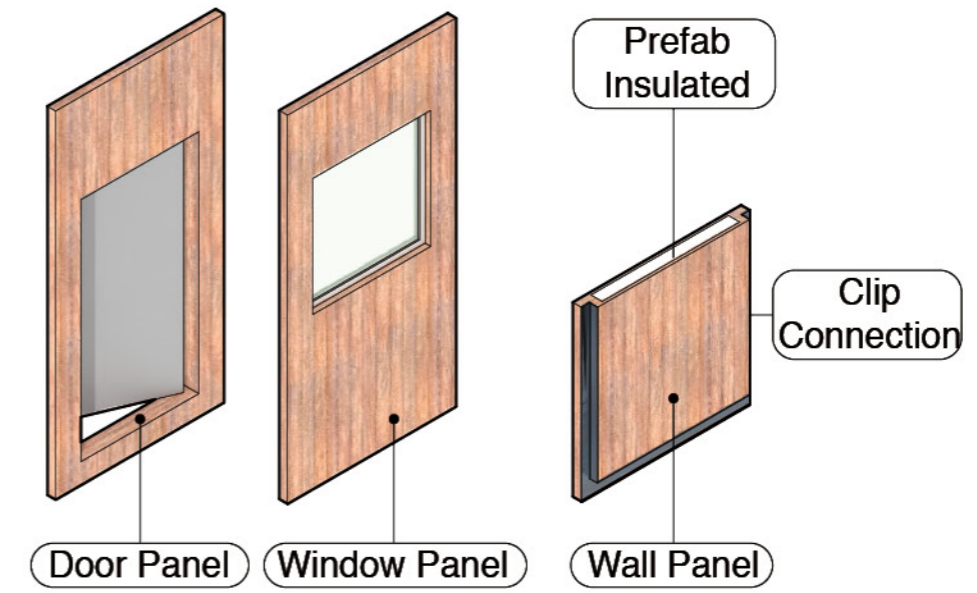
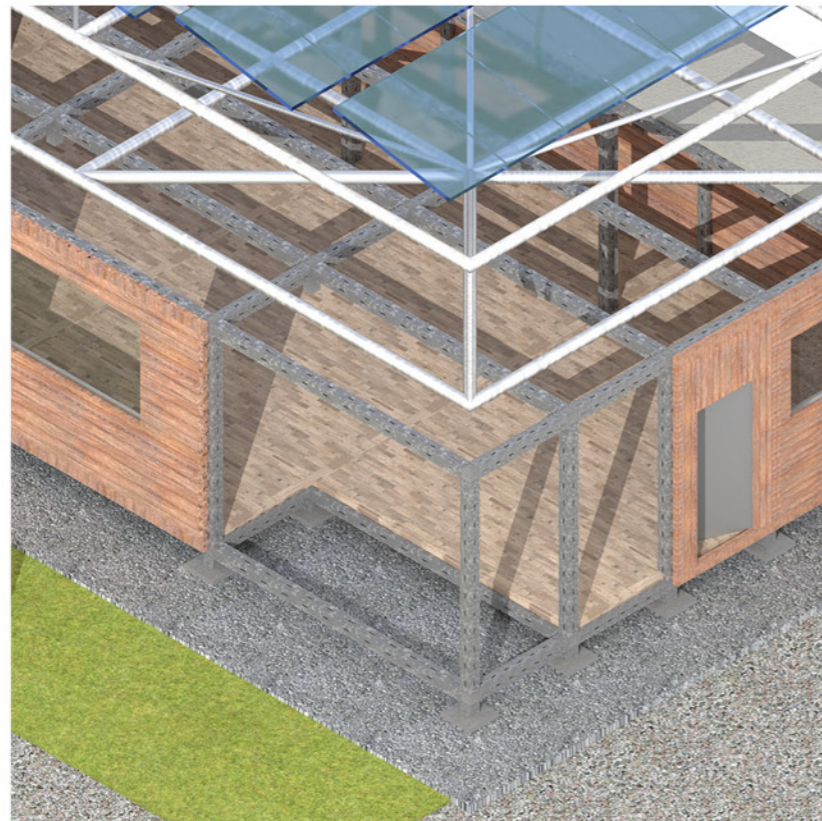
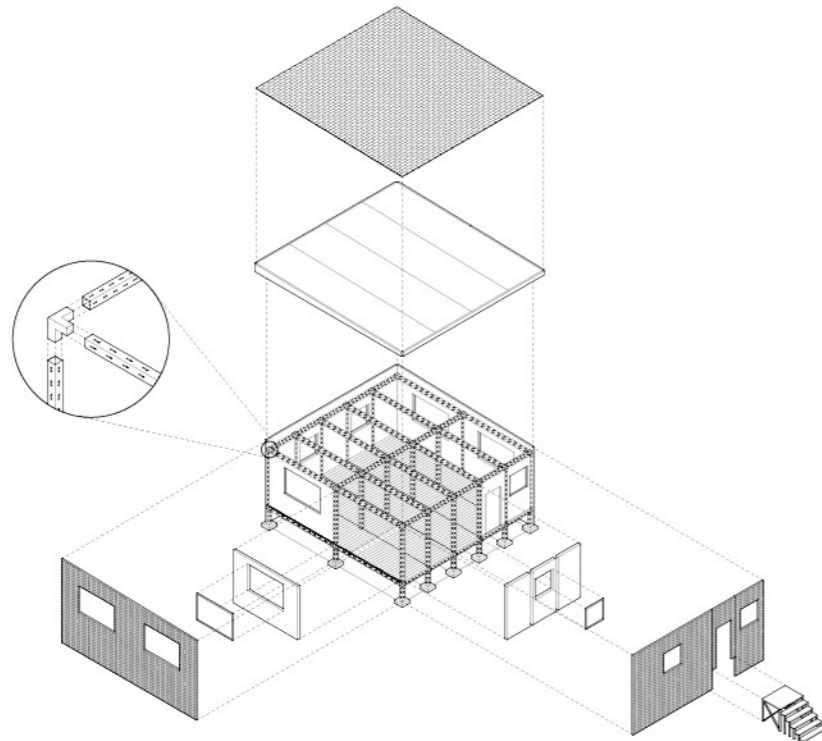
The former IBM site, known as tech city is currently home to a few remaining tenants. The owner has 12 million dollars in back owed taxes and the land is going through foreclosure with the county. The main building on the site is half demolished and the soil is heavily polluted. There are other building that have the potential to be renovated.



**Proposal and Tenants**

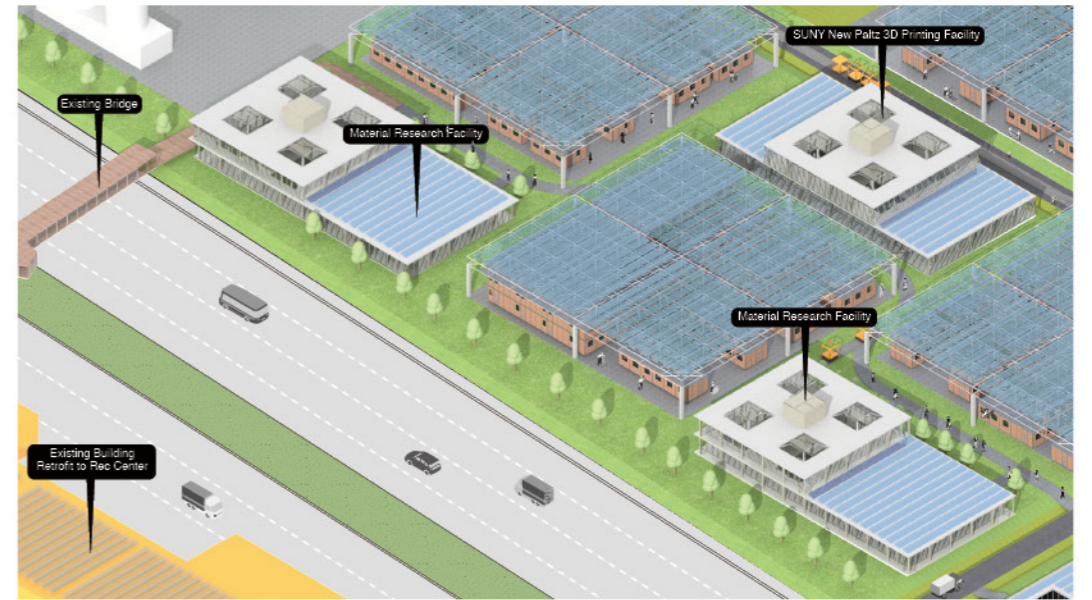
We imagine this site would be an ideal location for building material recycling and manufacturing. Our first tenants will be the recyclers to recycle the existing materials on site. These materials will be used to create grey water management infrastructure, controlling runoff and providing grey water to the tenants.

To generate funds for the initial phases, we will create a solar panel network that can sell energy to the grid and as tenants move in then provide them with clean energy. The site provides facilities for recyclers, material researchers, administration spaces, construction and demolition education facilities, space for technological innovation and warehouse distribution space. All with manufacturing in the center.



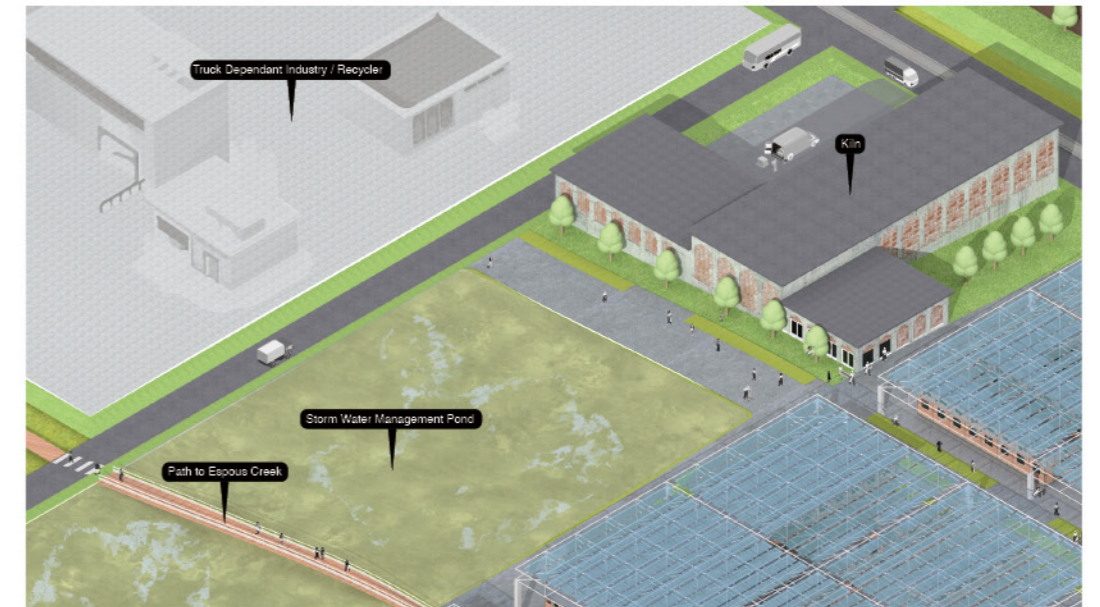
**Modular Panelised Construction**

The manufacturing tenants under the solar canopies will be built with modular building materials giving it flexibility in its configurations. The modular panel system can be dismantled and reassembled without deteriorating the material. Providing new opportunities for recycled materials that can be reused without further energy investment.



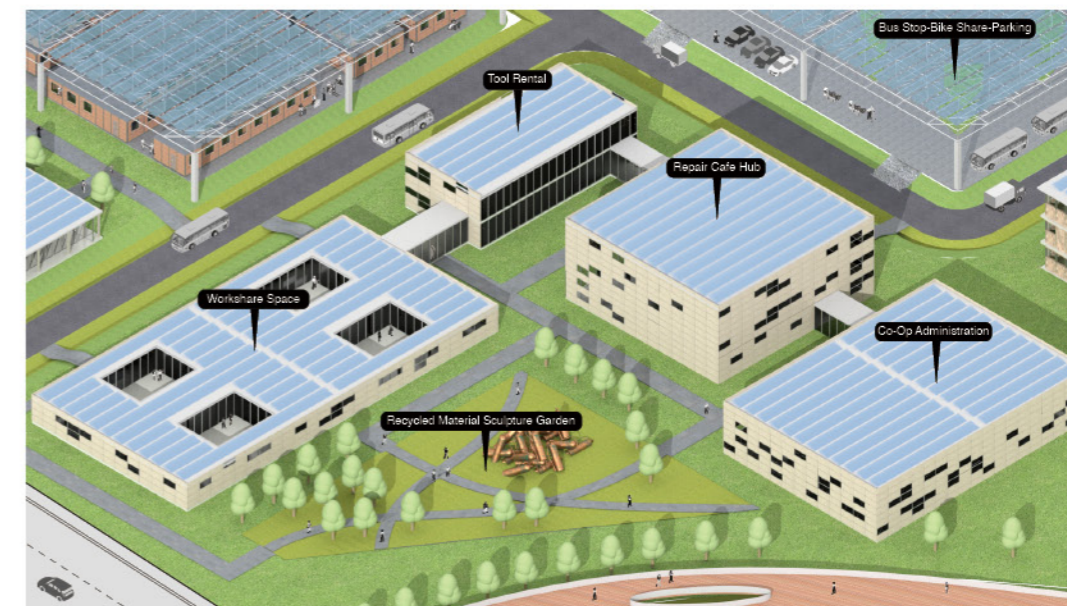
**Tech Incubator and Material Research**

Moving north we have an incubator facilitating technological innovation adjacent to the main truck loop servicing the warehouses and distribution center. To support the manufacturers we have provided a series of permanent facilities on site. Along enterprise drive we have a material research center affiliated with SUNY New Paltz existing 3D printing facilities supporting manufacturing innovation.



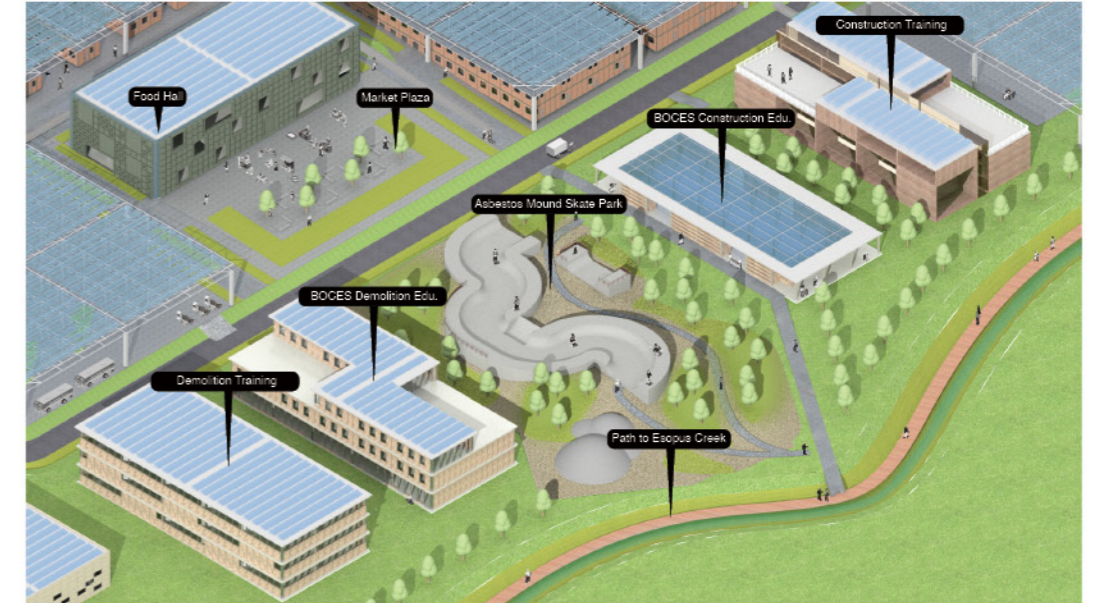
### Kiln and Water Management

Continuing north we have a shared kiln that provides spaces for wood seasoning, pottery and glass blowing. Adjacent to the kiln we have a detention marsh pond for stormwater management.



### Administration and Service

At the south west corner of the site we have our administration and co op service building providing space for tool rental and a machine repair hub affiliated with existing repair cafe.



### Education and Training

Towards the south side of the site we have provide demolition and construction training for both continuing education and BOCES. This is an image of the community using the space by the Educational and training facilities.



03

### **URBAN CAMPUS**

|MSAUD Summer 2019 The Five Borough Studio

Collaborative Project:

Sophie Lee

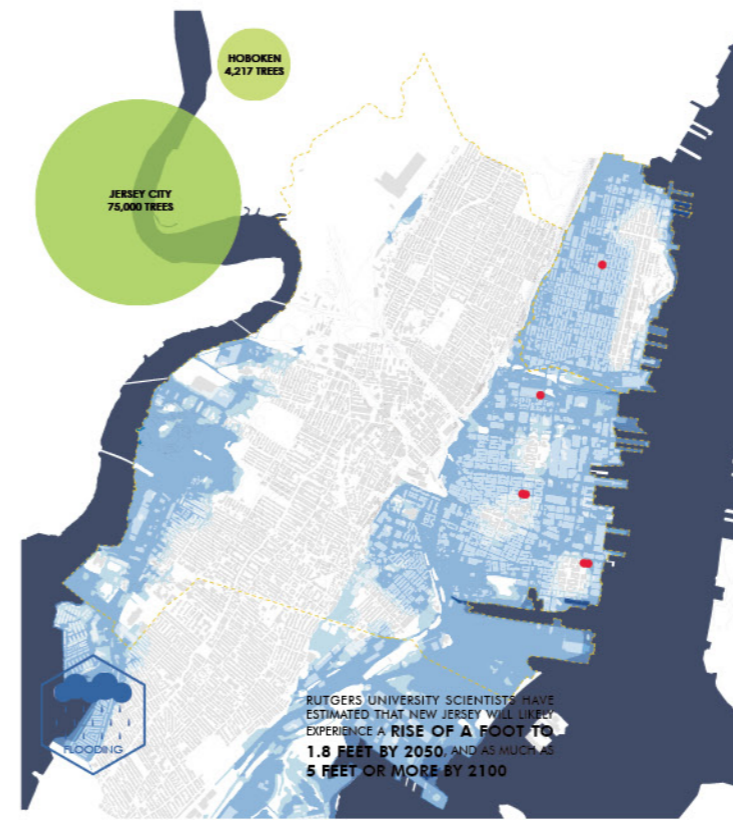
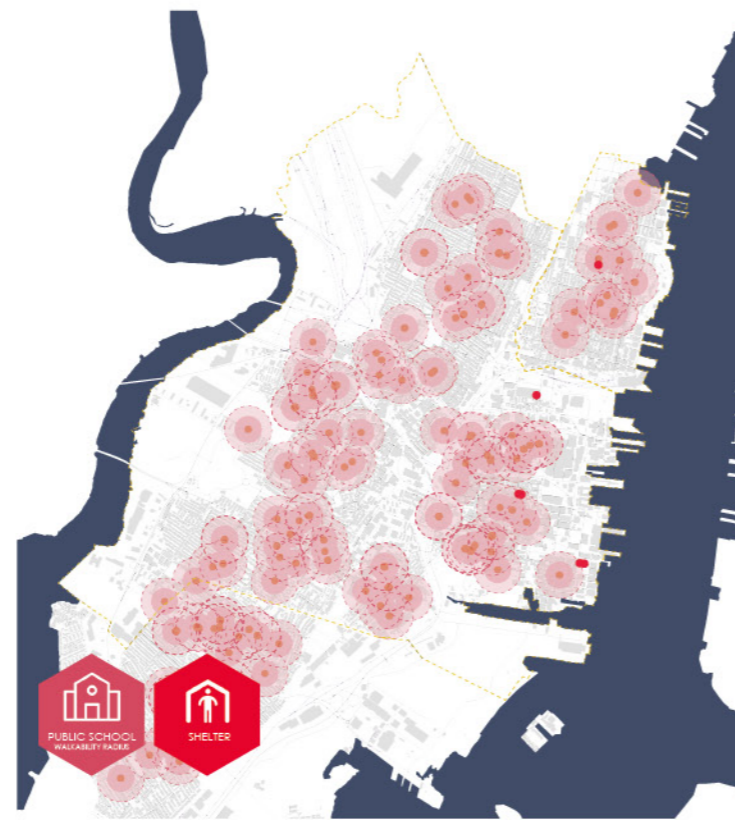
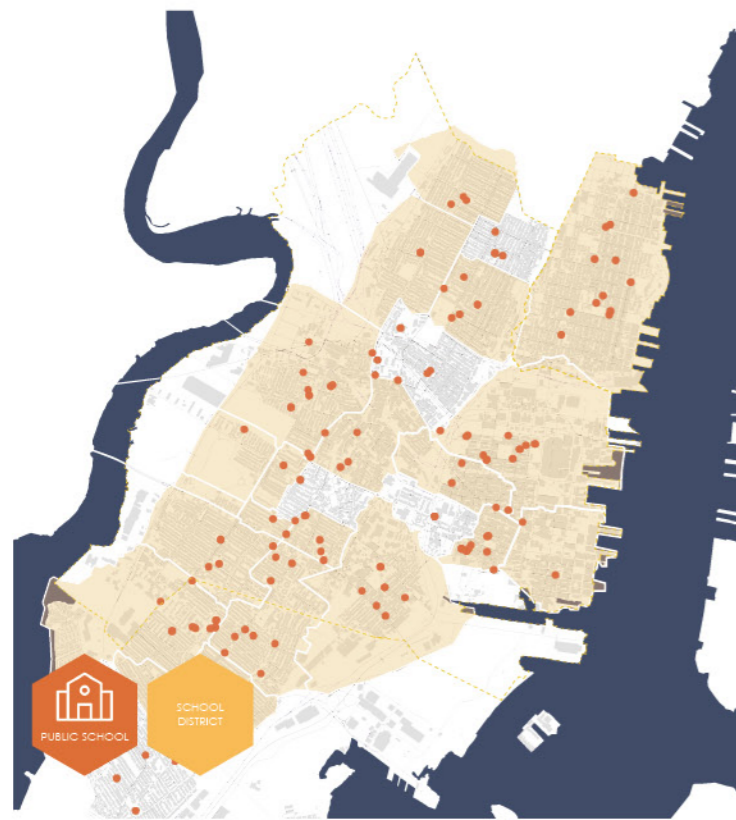
Nikita

Menghan Zheng

Hoboken and Jersey City are suffering from lack of social and building resilience due to coastal and precipitation flooding and unsustainable public education system and facilities with growing demand. Our initiative is to tackle this challenge and design a sustainable network of community fabric through the use of existing schools, design of new school/community buildings which will be used as resilience hubs and safe routes around the neighborhood.

Our proposal looks at building flood resilience through community resilience. During our analysis, we understood that schools acted as emergency shelters but schools were starved of funding and infrastructure. Therefore, we saw the potential of bringing in flood resilience and improving the educational situation with the schools acting as the hubs connected to various activities.





### Hoboken and Jersey City

Hoboken and Jersey City are suffering from lack of social and building resilience due to coastal flooding and unsustainable public education facilities with growing demand. Our initiative is to tackle this challenge and design a sustainable network of community fabric through the use of existing schools, design of new school/community buildings which will be used as resilience hubs and safe routes.



St. Paul and Peters Orthodox Church

Jersey City Hall

St. Lutheran Church



76 Bloomfield

Hoboken City Hall

220 Adams St

Church Square Park



Elks Lodge

Wallace Elementary School

Fox hills garden



### Low-lying areas

Jersey City and Hoboken are both located in low-lying areas. Hurricane Irene and Sandy have caused serious devastation in the past and there have been proposals to reduce the damage in the event of another flood. But are they enough?

**COMMUNITY ACTIVITIES IN SCHOOLS**



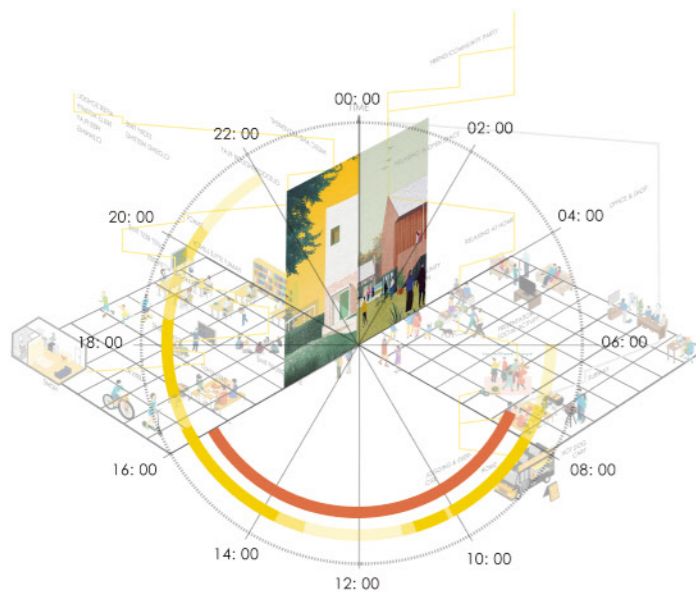
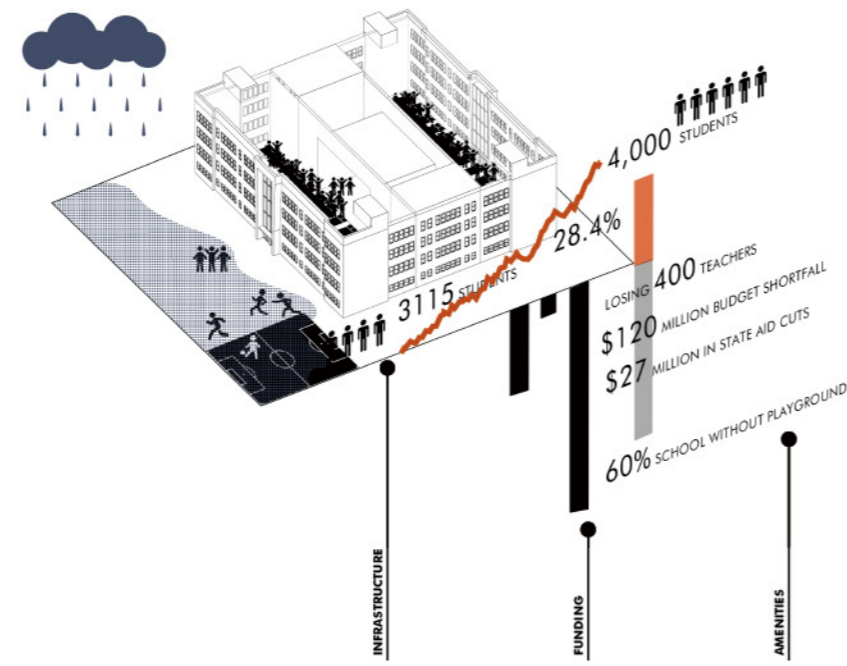
Frank R. Conwell Middle School - one of the city's busiest polling places in 2018 with 1,241 voters



Before the storm hit, the Wallace School was opened as a shelters

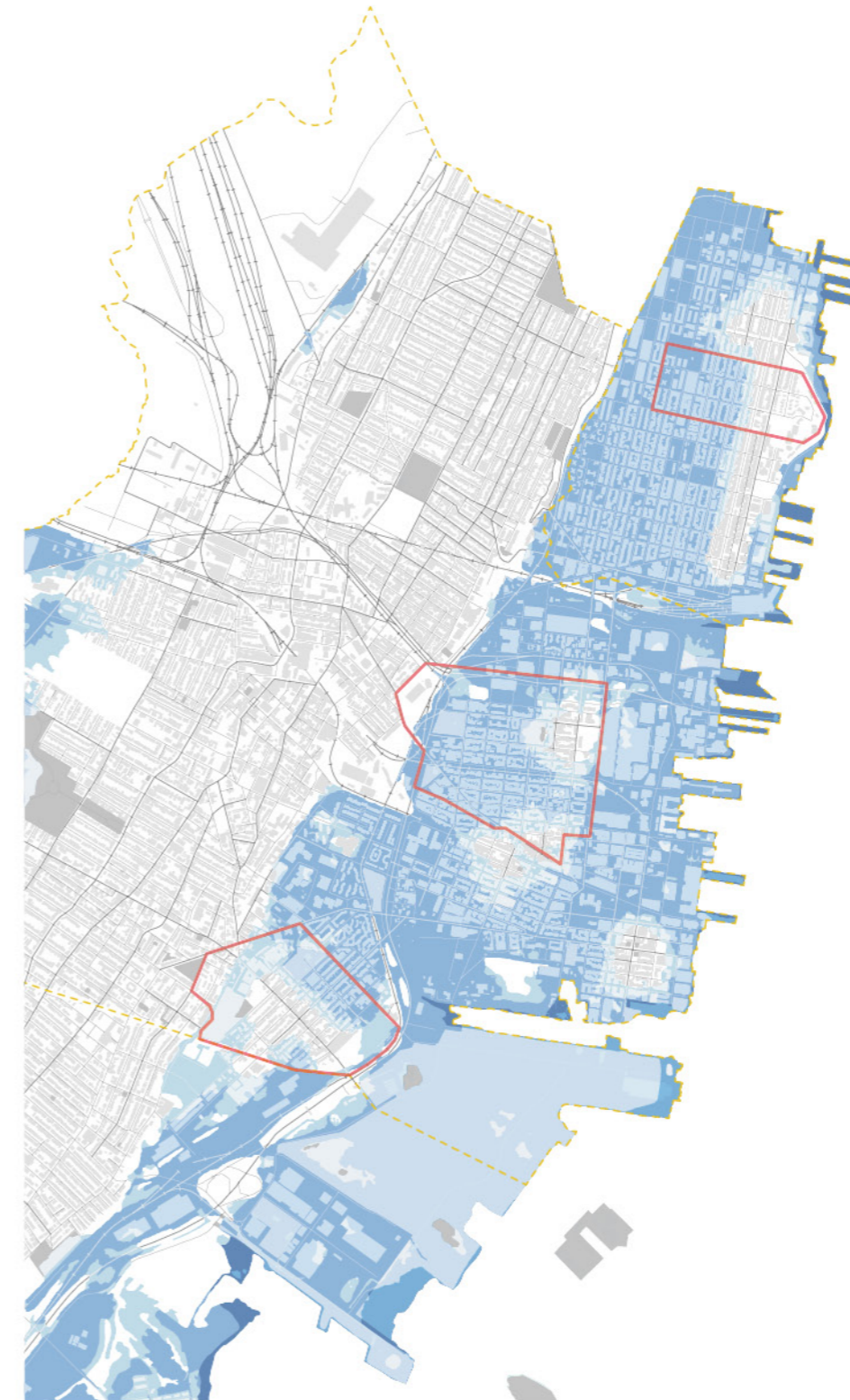


**CHALLENGES FACED BY THE SCHOOLS**



**Current Challenges and Timeline**

We identified the various users and their daily activity schedules. We overlaid these layers to find the points at which these time zones intersect, converge and diverge. NEXT This helped us understand how spaces are used differently at different times of the day based on the type of users using the space and types of mode.



**Three-zones Strategy**

We picked three zones as the first phase of our intervention. One zone lies in Hoboken while the other two lie in Jersey City, along the embankments and by liberty state park respectively.



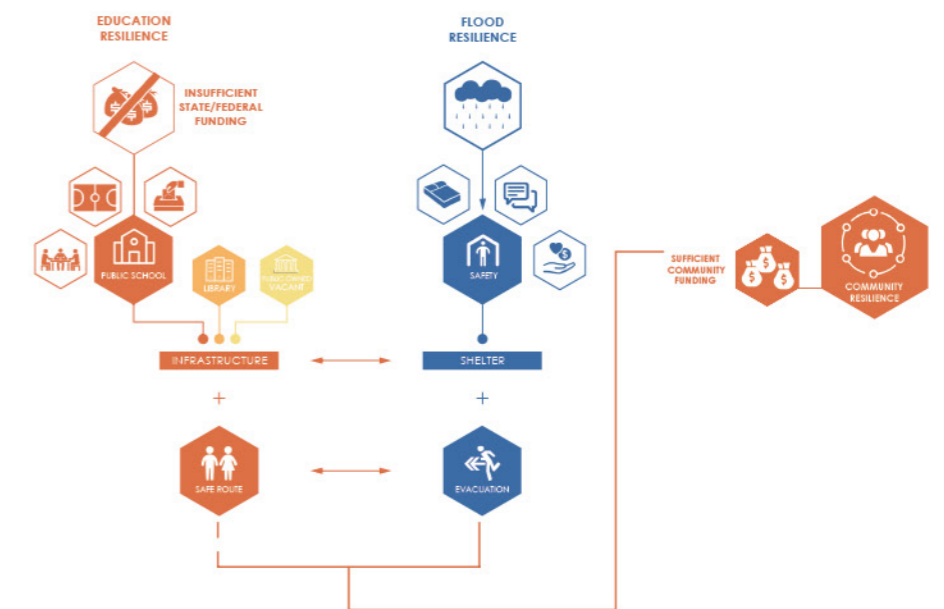
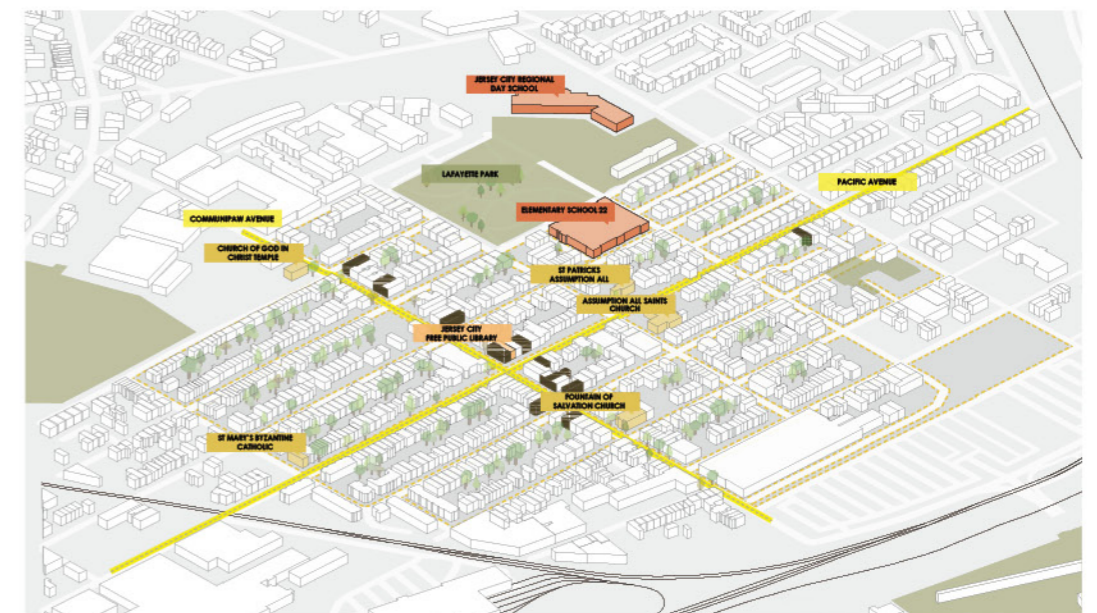
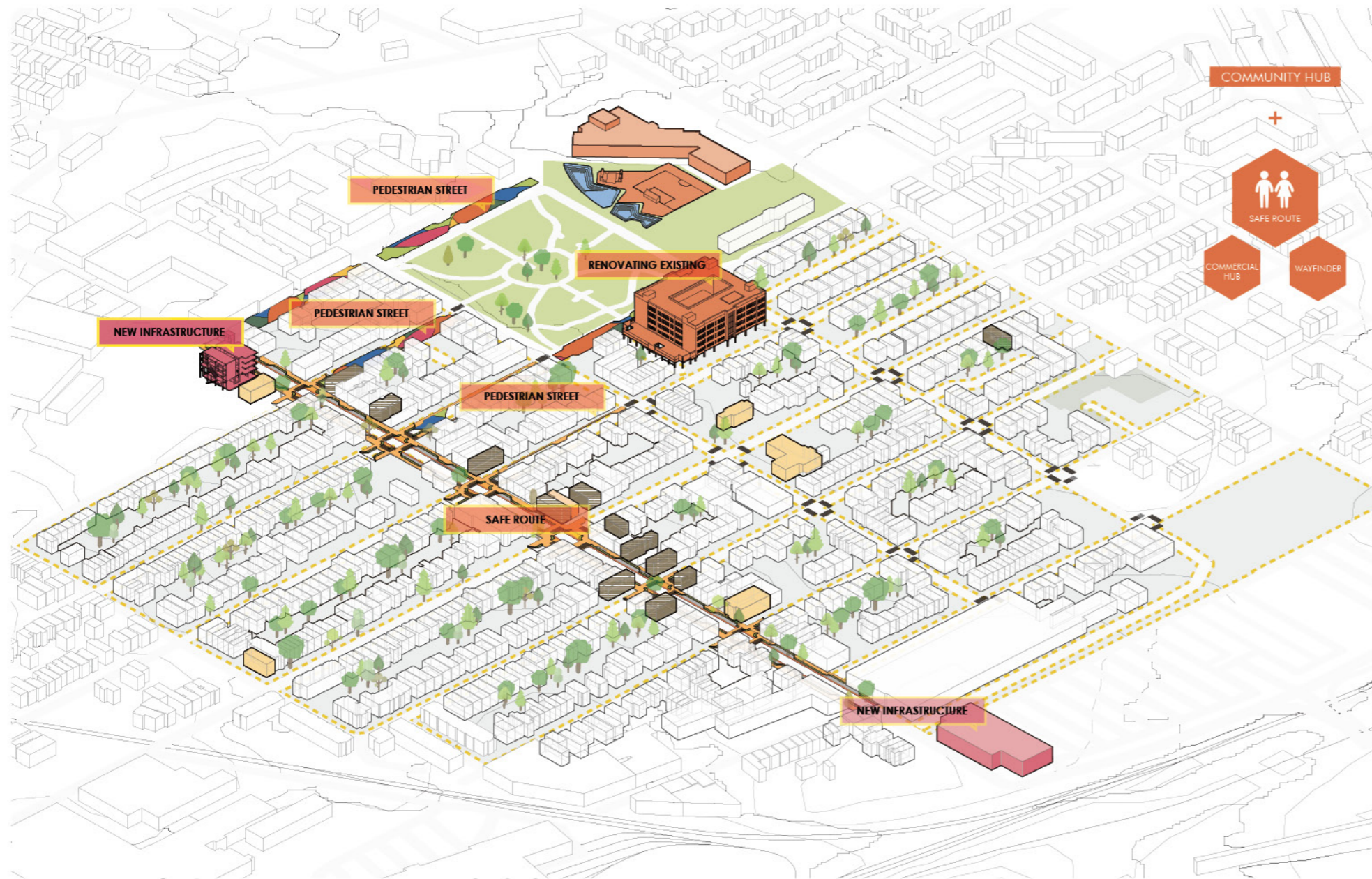
**ZONE 1: HOBOKEN**



**ZONE 2: HAMILTON PARK, THE VILLAGE**



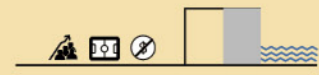
**ZONE 3: Bergen/Lafayette, COMMUNIPAW**



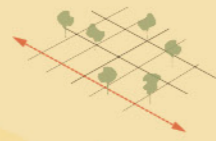
### Design Strategy

On these maps , we located the proposed zones with new network routes in consideration and decided to bring educational activities from the inside to the outside through extensions in the existing school infrastructure. In order to bring in learning through interaction in outdoor spaces, we included reading, eating and art and craft spaces. These are the existing conditions of our selected zone, which is zone 3 bergen and lafayette and communipaw avenue. There are two schools and no current SIDs.

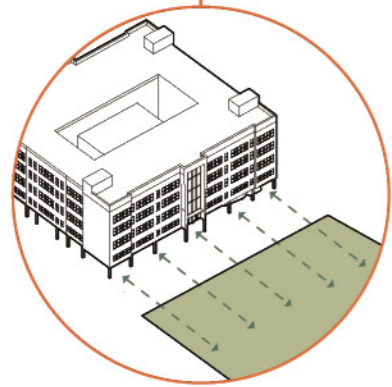
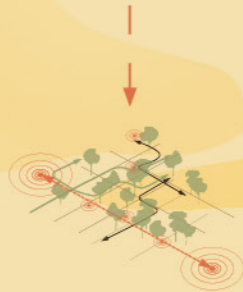
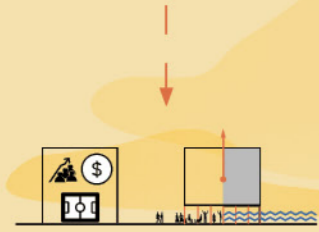
STRATEGY 1  
INFRASTRUCTURE



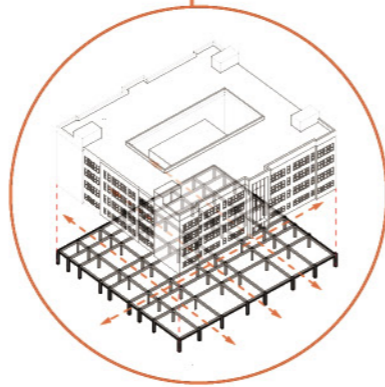
STRATEGY 2  
SAFETY ROUTES



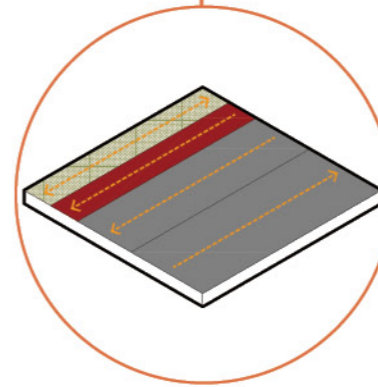
STRATEGY 3  
GREEN SYSTEM AND  
PERMEABILITY



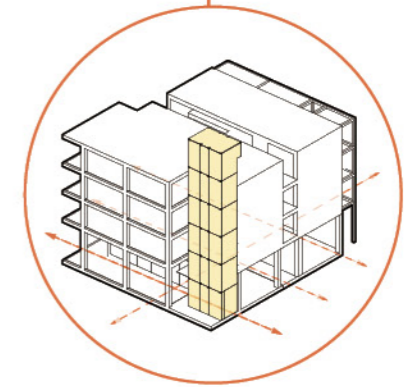
**GREEN SYSTEM AND  
PERMEABILITY**



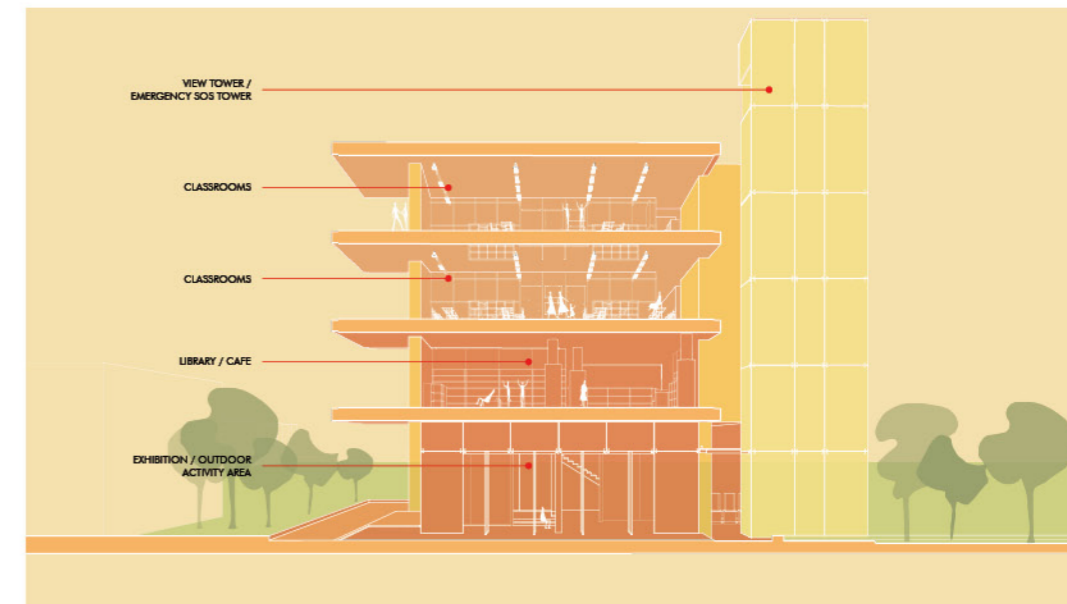
**EXISTING SCHOOL  
EXPANSION**



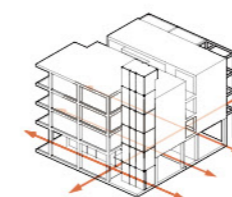
**SAFE ROUTES**



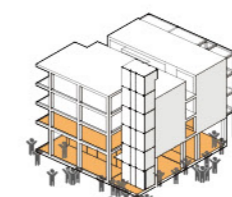
**NEW  
INFRASTRUCTURE**



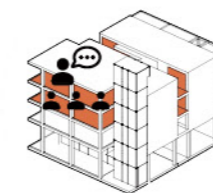
**Infrastructure**



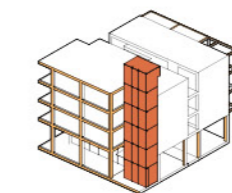
OPEN GROUND FLOOR



COMMUNITY SPACE & LIBRARY

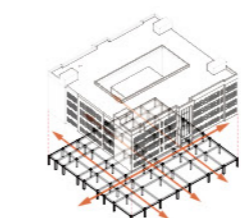


CLASSROOMS

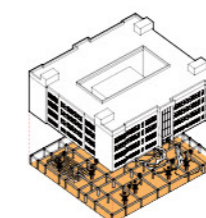


EMERGENCY TOWER

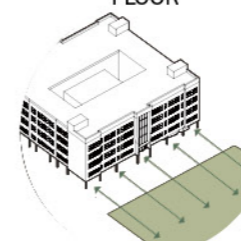
This built structure is primarily a community hub which leases out spaces for school events and functions. The structure is raised on stilts which house flexible functions like exhibit places, pop up classes and community activities, cafes etc. In the event of a flood this region provides for free movement of water. Furthermore, the upper floors provide for a library and classroom/seminar spaces of different sizes.



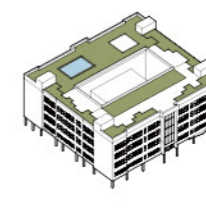
OPEN GROUND FLOOR



OUTDOOR PLAY AREA



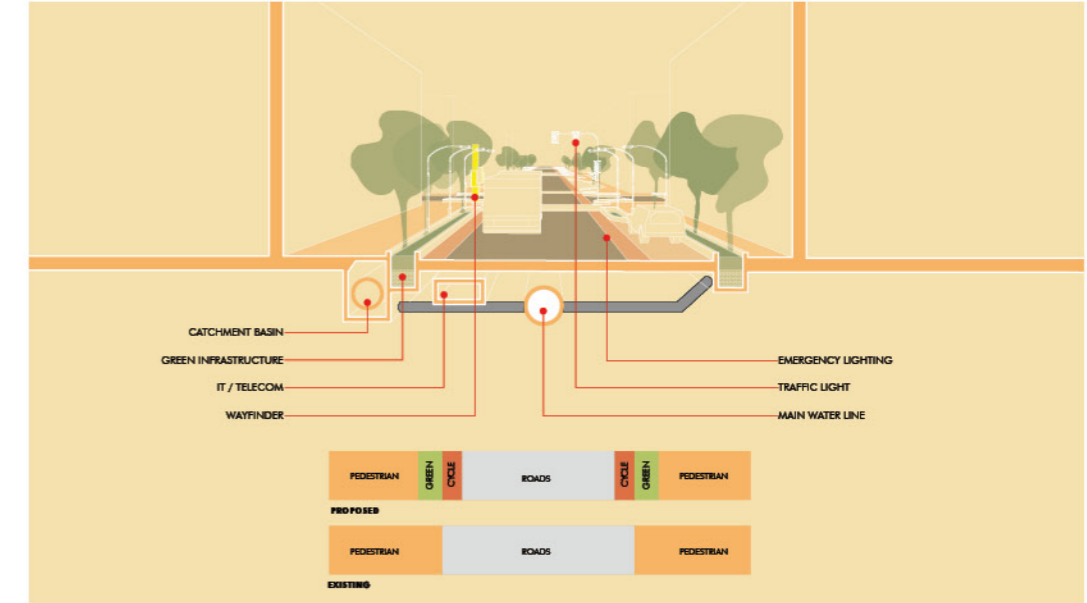
CONNECTION TO GREEN



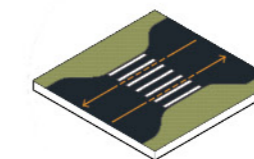
GREEN ROOF

### Infrastructure

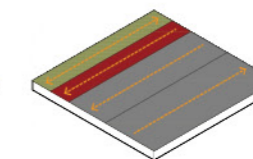
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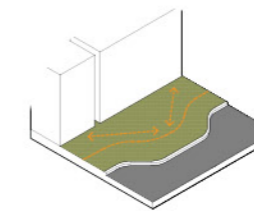
### Routes and Corridors



SAFE CROSSING



MULTIMODAL STREET

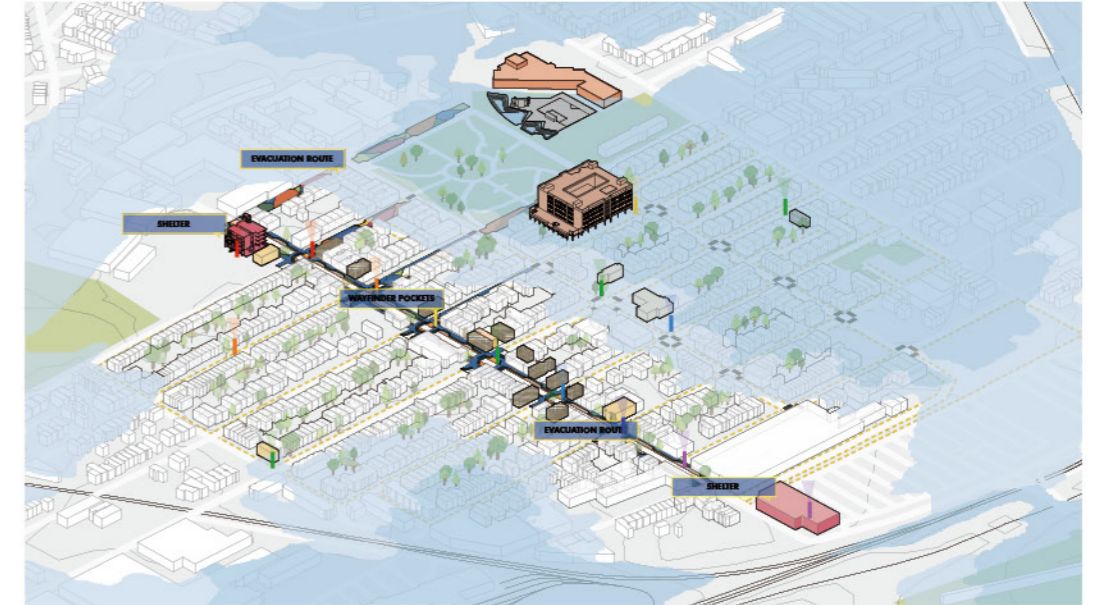


VALUE STREETS

At this point we moved away from the built structures to understand the routes children would take in order to move between campuses and places. Our aim was to render these routes safe and educational while providing a platform for community to come together.

Based on the location of parks, retail stores, libraries and other civic buildings we formulated this street as the street with educational and commercial activities for interactive learning while the other street with a high density of residential areas acting as a street for community convergence.





### Vision

What if we improve school situation and create them as the focal centres of community activities in order to build community resilience which will also bring about the intangible missing aspect of flood resilience?



