

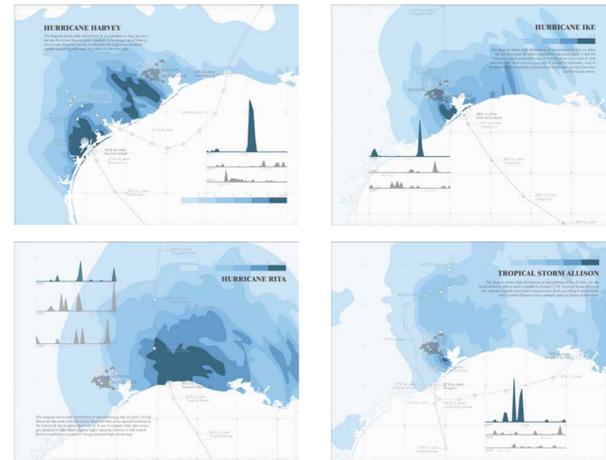
PROJECT AREA

The project site is Manchester Neighborhood, Houston, US. Manchester is located along Buffalo Bayou in southeastern Houston, in close proximity to the Houston Ship Channel.



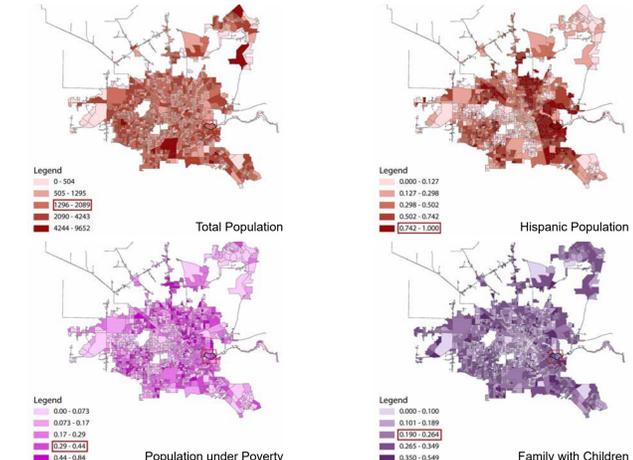
FLOOD ADAPTATION

With extreme weather conditions, frequent flood or drought, human society and living environment are facing irresistible change. It affects not only the coastal but also in inland areas.



SOCIAL & HEALTH CATALYST

Design for healthy communities is another major goal of the project. With toxic materials on site, the design has to consider the social conditions and promote health equity.



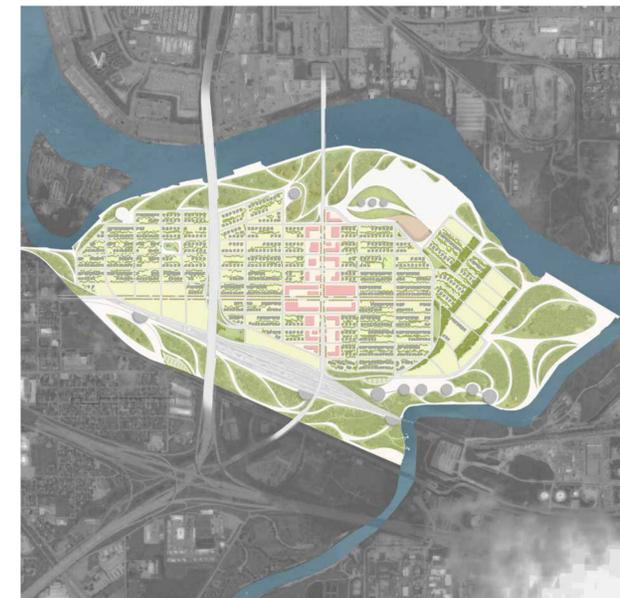
Major Requirements by 2050:

- Flood proof the neighborhood based on sea-level change projections
- Accomodate continued population growth of Houston
- Multi-functional space for live, work, recreate
- Enhanced health and well-being

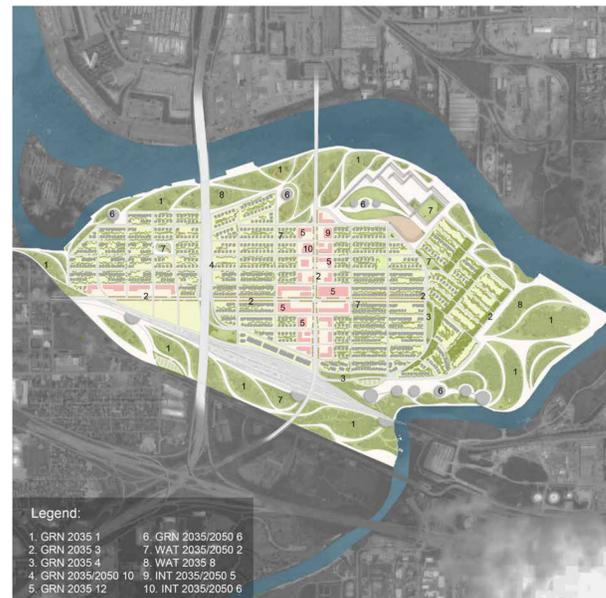
Assumptions/Innovations
The site faces severe flooding challenges. The intensity and frequency of flood is projected to increase. Innovations include water retention and bioretention systems.

Green infrastructure (GRN):
Green infrastructure is developed throughout the site to increase resilience and enhance performance of the site. Innovations include resilience landscape infrastructure, green stormwater infrastructure, linear parks, green streets, green building, engineered trees, daylighting lost streams and rivers, and green roofs.

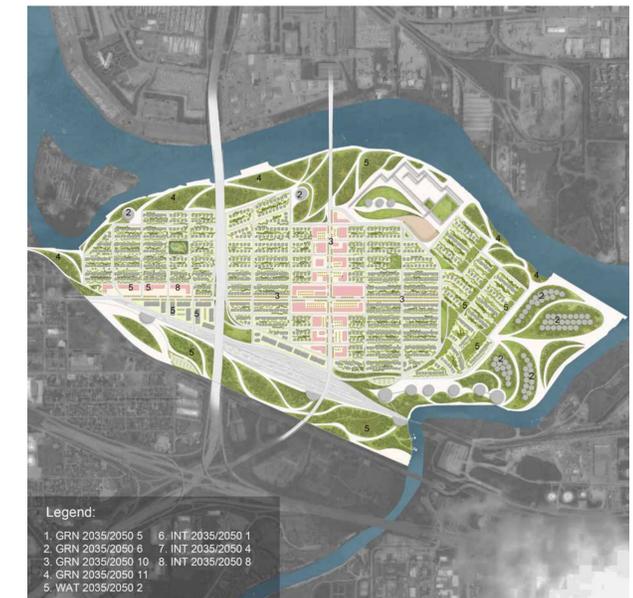
Institution (INS):
Institutional structures will promote public education and health. Innovations include the future of government services, health care, E-learning and educational choices for the future.



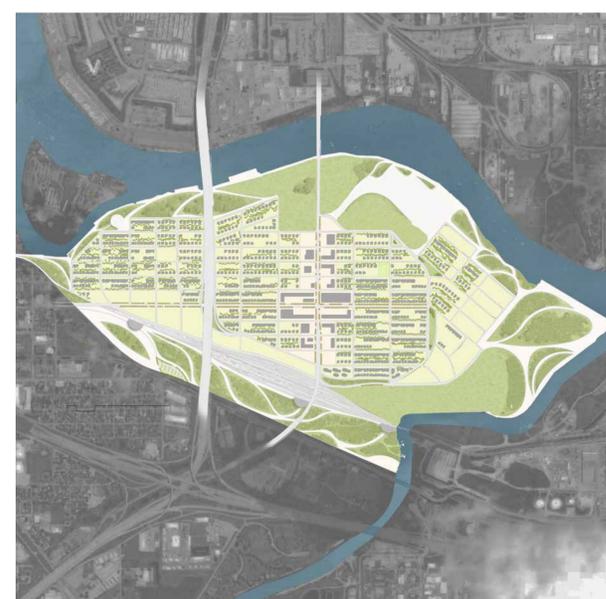
Existing situation: 2020



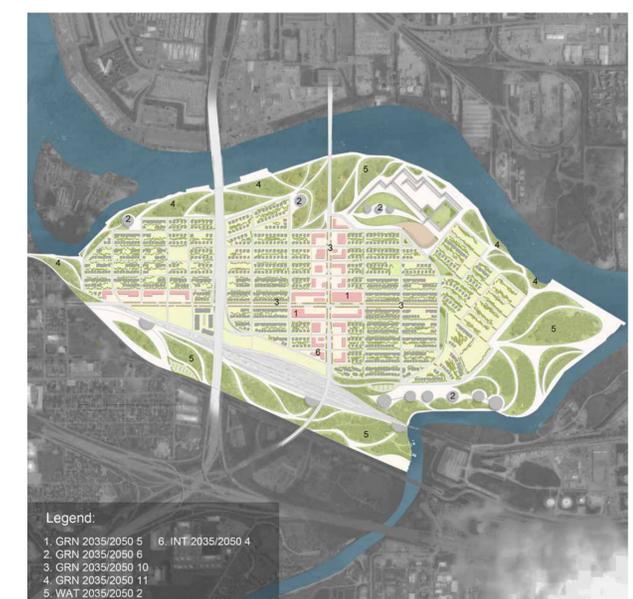
Early adopter: 2035



Early adopter: 2050



Late adopter: 2035



Late adopter: 2050

Early adopter scenario

An early adopter scenario focuses on creation of a green infrastructure skeleton in 2035 to mitigate flooding issues. Streetscape improvements and new stormwater mitigation facilities to counteract effects of proposed development will be implemented. Simultaneously, the amount of green space will increase while the percentage of pervious surface will almost double by 2050. This change will strengthen the capability of water infiltration.

Institutional and other functions are also proposed for greater health outcomes. The market and community center are two anchors put in place in 2035 to spur development for future phases and increase communication in the neighborhood and strengthen residents' belonging to the community.

- Water infrastructure
 - Green infrastructure
 - Transportation infrastructure
 - Commercial
 - Residential
- A locally specified color scheme is used in this project, as the plans entail not only land use, but also locally appropriate design details

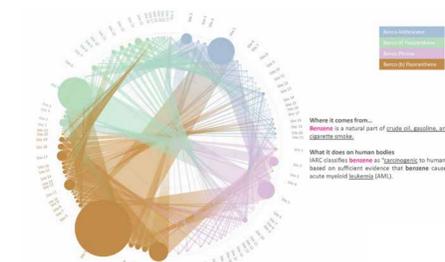
Late adopter scenario

A late adopter scenario assumes actions are not taken until 2035, when a lot of the hydrological and health issues will have manifested themselves. For example, flooding issues become increasingly severe, with more residential areas inundated during extreme events. Because of the consequences of the refinery explosion and Benzene release, the Valero refinery was ordered to relocate, while leaving behind urgent tasks of remediation and health interventions.

As the government and the public begin to realize the issues, fast responses and collection actions are initiated, focusing on the synergistic effects of environmental, social and health impacts. Green infrastructure and water infrastructure, especially those focusing on public/private partnerships, such as new developments with water storage capacities, street bioswales and pervious surface across the site were quickly implemented. Although the performance of the innovations do not evolve to be as strong as the early adopter scenario, the community is still able to relieve flood impact, restore water and soil quality, and increase well-being and happiness by 2050.

Refineries on site expose the communities to chemicals like benzene, which causes multifold health issues including:

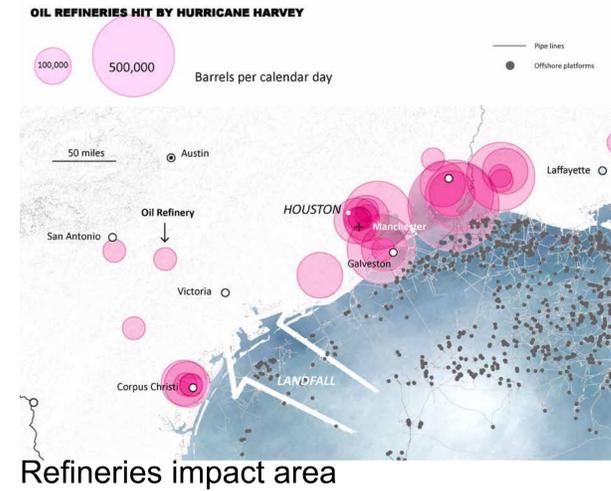
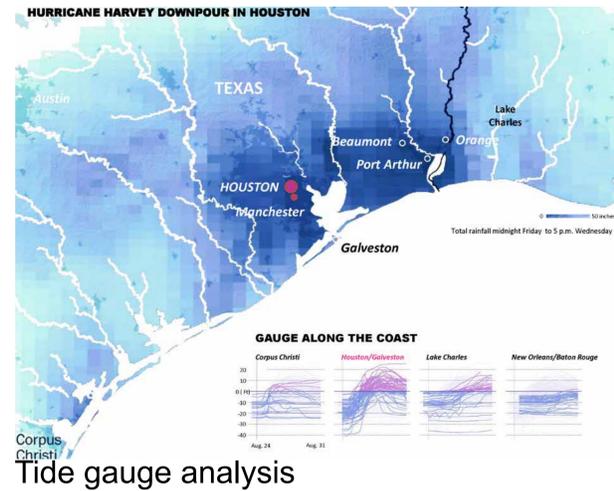
- short-term discomfort
- anemia
- Immune system issues
- fertility and birth defects



Health hazards

Data showed that during Hurricane Harvey, Downtown Houston and Port Arthur received the highest amount of rainfall. Compared to other areas along the coast, the Houston-Galveston area had the most intensive increase in tide gauge.

During Hurricane Harvey, multiple refineries were impacted, causing toxin release, explosion and other public health hazards. The site, Manchester, is located in the center of a number of refineries and was severely impacted.



Non adopter scenario

A non adopter scenario shows severe flood impacts, public health hazards, community decline, increase in vacant lots and blight, as well as a drop in sense of community.

Damage caused by severe and repeated flooding events will directly cause high vacancy rates and run-down infrastructure, which quickly leads to the decline of the area. Local businesses will have difficulties sustaining themselves, and public institutions will be forced to shut down.

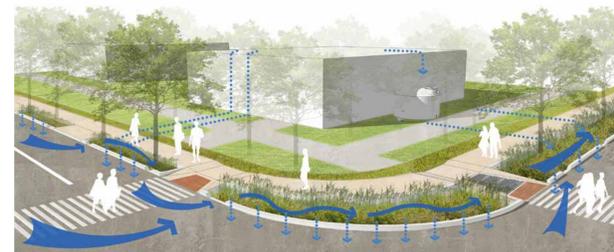
Although attempts to build levees and raise existing structures will ease the impacts of floods to some extent, the high costs associated with these passive approaches will prevent most residents from taking advantage. Population continues to decline, as residents choose to move to higher ground to avoid flood risks. The number of households decreases by almost half in 2050.



An analysis of the main categories of food import globally shows opportunities for shifting to local production and consumption. An analysis of the different links of the food framework demonstrates the high amount of attrition in energy during this process and excessive GHG emissions.

Local food logistics

Green and water infrastructure are used to regulate flood paths and increase retention/detention of stormwater.



Stormwater flow regulation

2020 Additions



2035 Additions



2050 Additions



Phasing of health/social interventions

The community center is designed as a park with permanent and temporary programs. It also serves as a nexus of the green corridor.



Multi-functional community space

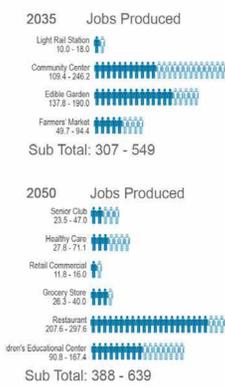


Phasing of health/social interventions

Multiple farmers markets provide opportunities for residents to access to health food at affordable prices.



Accessible local food



Public health interventions such as courts, pedestrian and bicycle lanes, and food trucks are designed to promote community health. Job opportunities will be provided in this process.

Design for public health

Aside from mitigating environmental health hazards, three strategies that promote healthy behavior are proposed in this project:

Mental health: exposure to nature has significant impacts on residents' stress and anxiety levels, happiness, and sense of community. By building community green space as places for interaction and personal recreation and meditation, we allow the public to restore cognitive capacities and regain happiness.

Active living: the environment influences levels of physical activity. New trails, pedestrian sidewalks and sports facilities are developed to promote an active living style.

Local food: the Manchester community is a food desert by the USDA standards. Access to healthy food is especially challenging for low-income minority residents. The design regenerates and renovates the existing communities with a healthier, local-oriented food environment. We also develop an app for community members to understand the local cycle of food production and consumption, and strengthen the influence of the healthy food built environment on individual's daily life.

Team credits and acknowledgements

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