



# A Green Future: Scranton PA

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# Project mission

This project aims to improve food security as well as walkable green space within downtown Scranton. Combining urban foraging principals with necessary pedestrian infrastructure enhancements will help to create a green city with health incentives for its inhabitants.

## Project goals:

Create safe walking spaces along roadways that encourage pedestrian transportation while incorporating food production.

Use road diets along defunct trolley roads to improve rain water collection, filter and re-use runoff to water plants, and create safe walking spaces along roadways.

Use vacant lots to create park space.

Reclaiming vacant lots to create open space and improve urban green space downtown to help connect streetscape and greenway designs.

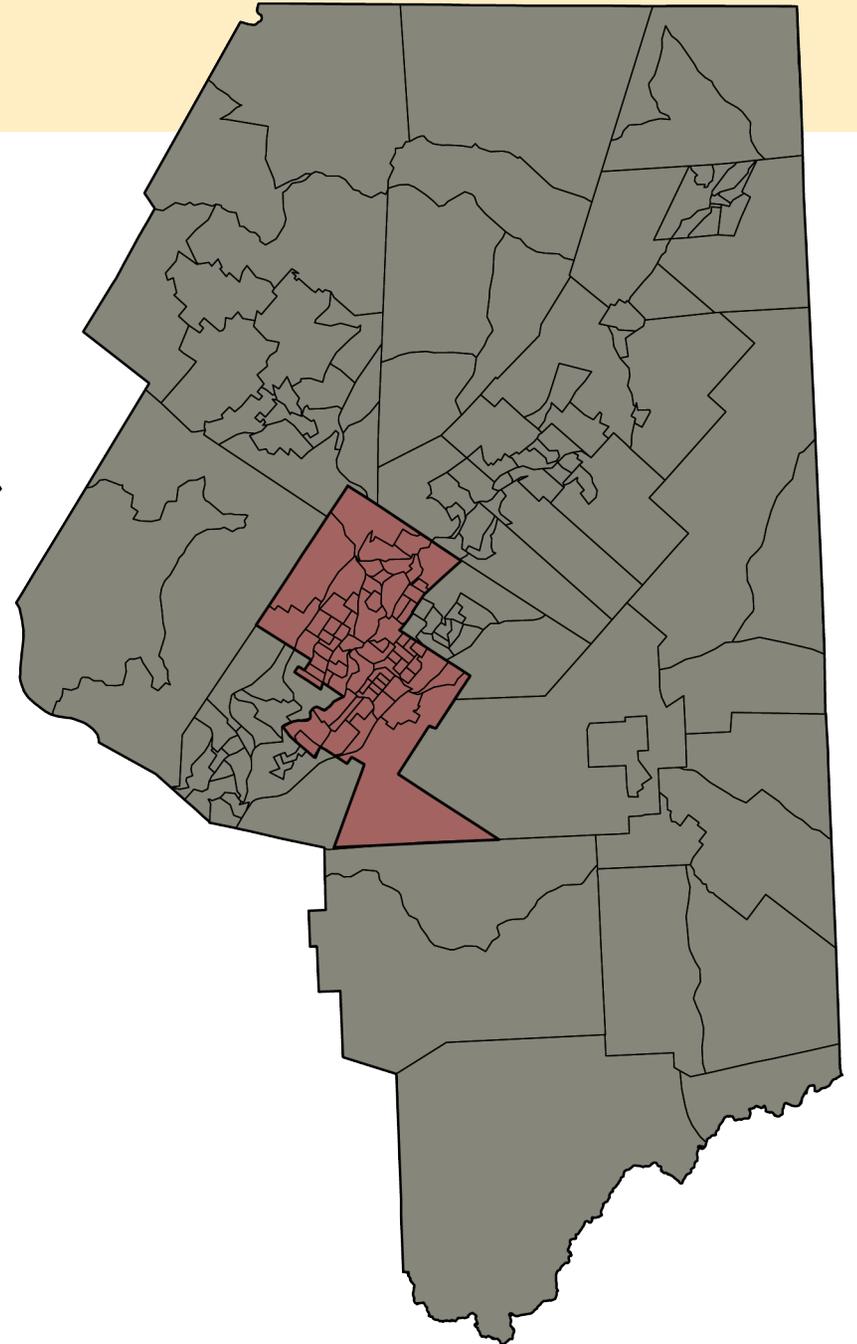
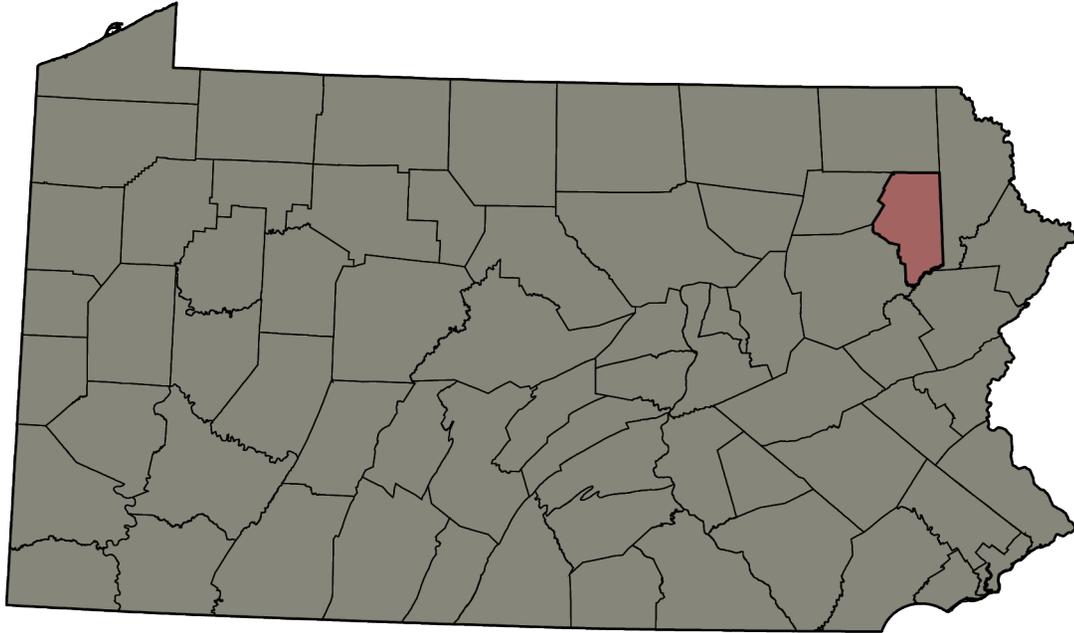
Reintroduce defunct train lines as a greenway that will help to create alternate and safe routes of travel for pedestrians.

Create a green way that emphasizes the history while increasing green space and walkability within the 25ft right of way of the defunct train line.

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# Scranton Pennsylvania



## About Scranton

Population: 75,874

Size: 25.54 sqmi

Founded: 1866

Elevation: 745'

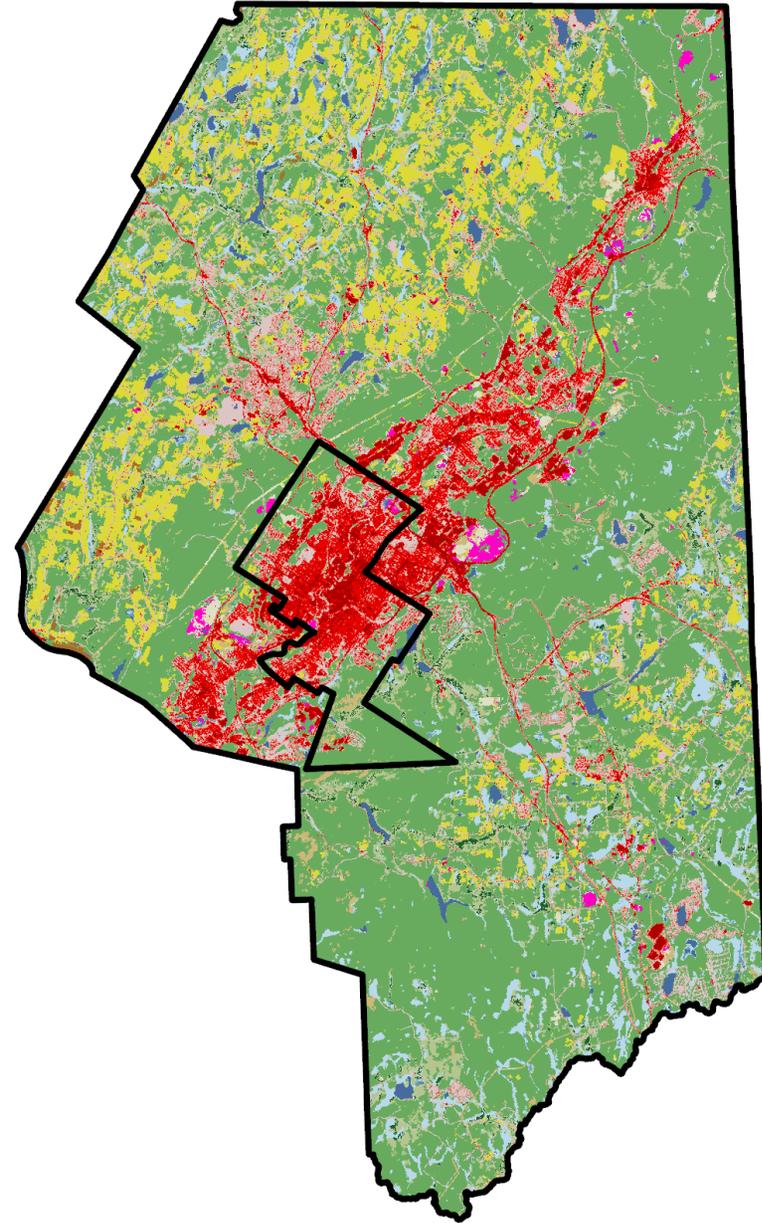
Climate: Humid continental climate

Sun exposure: 196 days

Snow: 28" per year

# Urban barriers within ecological systems

Located within a valley, Scranton, Pennsylvania creates a network of urban development, making it hard for community members to access to green space within the city. Urban environments are unforgiving and create different ecological conditions when compared to the natural areas that bound them. creating space for natural systems to work within urban systems provide opportunities, not only for the natural



# History of Scranton

Founded in 1840 by the Scranton brothers, the Lackawanna Iron and Steel company was founded, and relied on the Lackawanna river and the railway to transport goods. This plant would go on to produce steel and iron that would be used to create many railroads and bridges along the east coast.

When Scranton was founded back in 1856, many of the design efforts were focused on moving goods from point a to point b, mainly because of the Lackawanna Iron and Steel company. When the main mode of transportation shifted to automobiles, many of the pedestrian infrastructure disappeared, leaving the pedestrians with only sidewalks squeezed between buildings and roads.

Many of the streets within Scranton used to house and operate a trolley that was a very useful part of their public transportation. As cars have become more popular, the trolley system has become under used and since phased out. This has left the roadway system wider than necessary and can be used for design interventions.

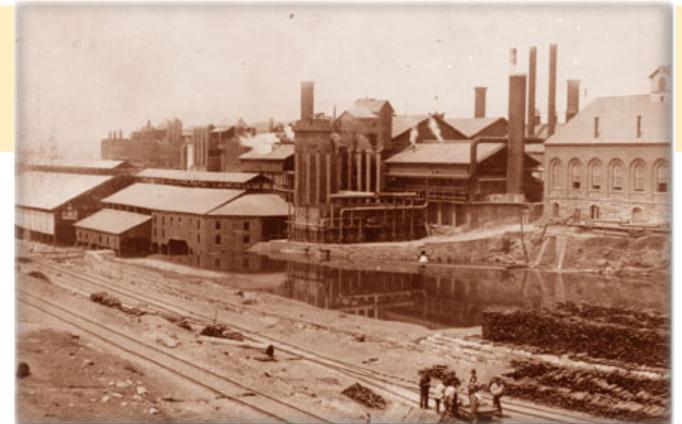


Fig. 2 Jake. Lackawanna Iron and Steel Company Blast Furnaces, Scranton, PA, 1892."



Fig. 3 Historic Map - Scranton, PA - 1890.



Fig. 4 Historic Map - Scranton, PA - 1890.

Research

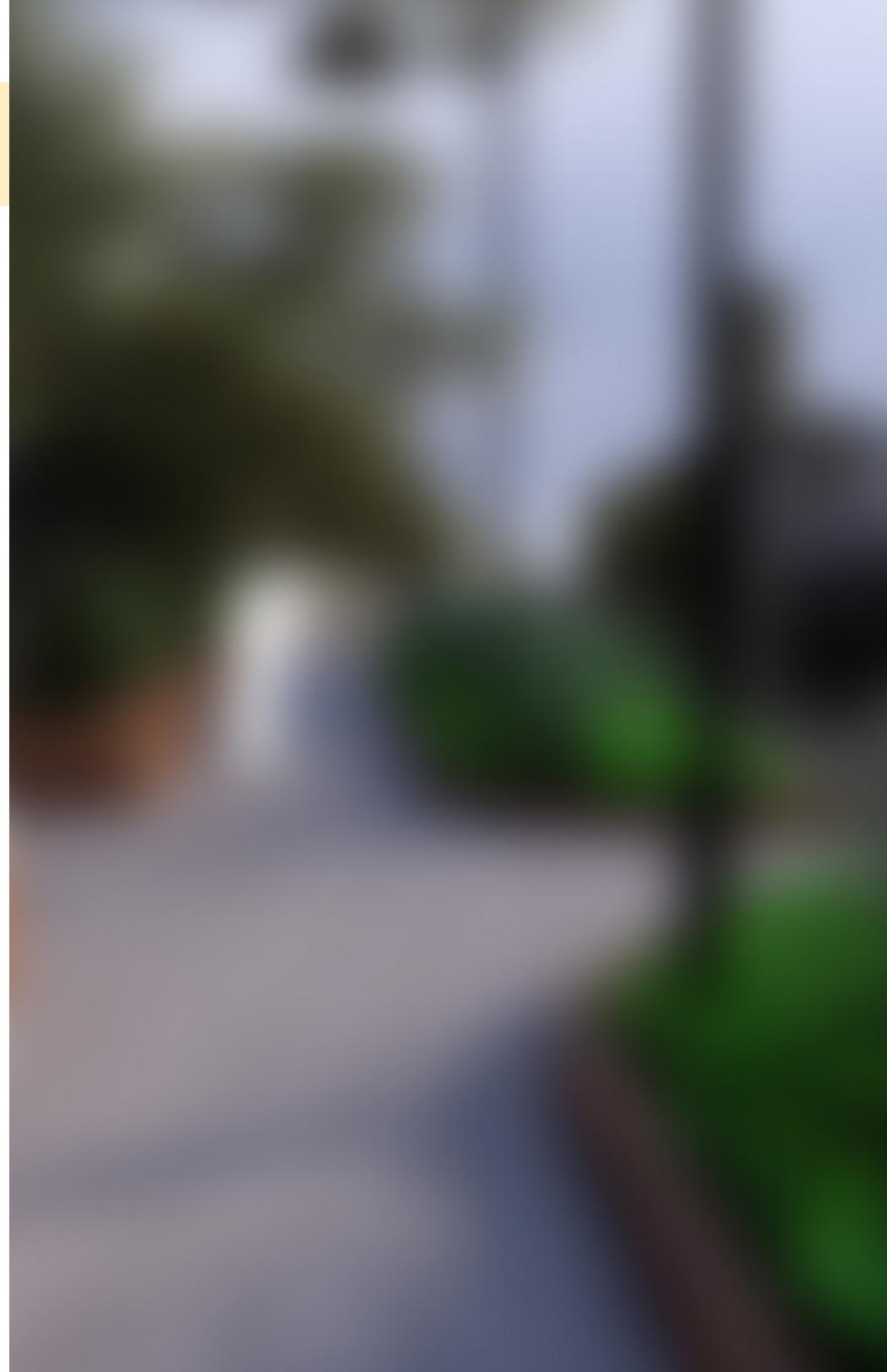




Fig. 5 ParkScore® for Denver, Co - TPL

# Denver, CO

## Case Study

### Urban greenery

Denver is a growing urban center blooming with business, green spaces, and urban trees. Backed by the urban forest initiative, Denver is able to provide economic, wellness and environmental benefits to community members and visitors of the mile high city. By using 10% of its lottery money, Denver is able to afford their green infrastructure endeavor.

### About Denver

Population: 711, 463

Size: 154.7 sqmi

Founded: 1858

Elevation: 5,279'

Climate: Semi-Arid, High-Desert

Sun exposure: 245 days

Snow: 56.5" per year

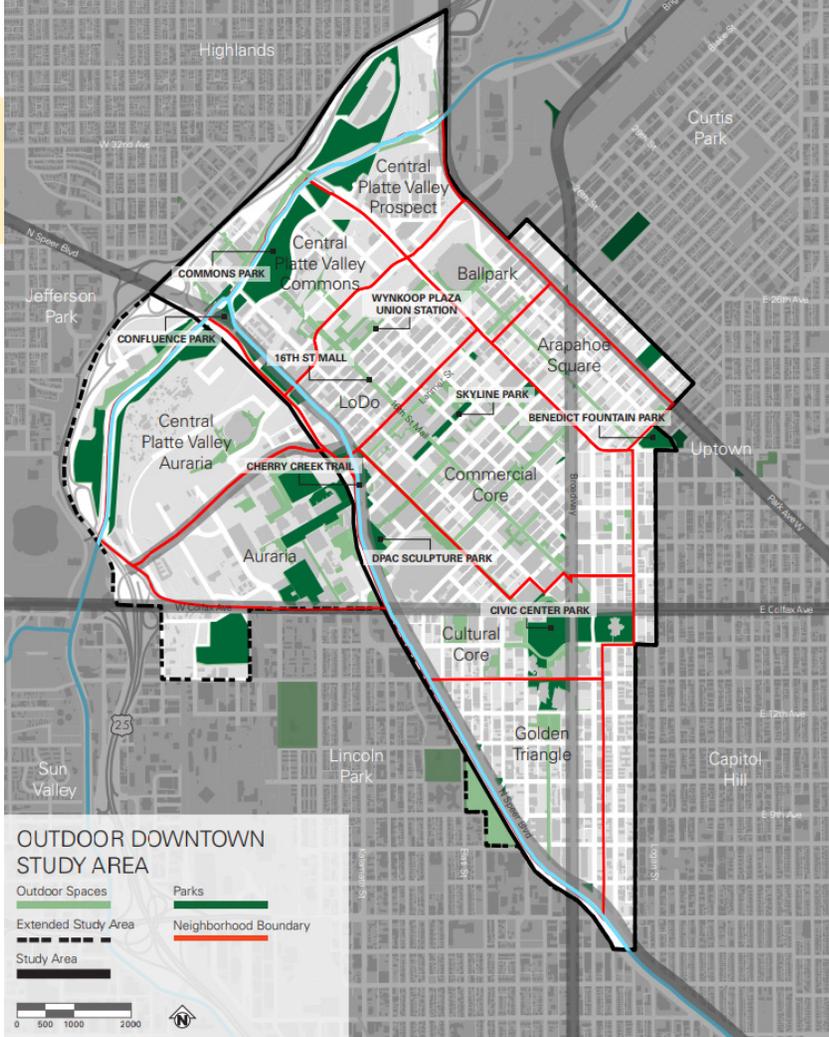


Fig. 6 Marion Street Green Infrastructure Project - Denver

## Existing conditions

Overall, Denver has an array of parks and green spaces, but these green spaces pose a challenge since they are not accessible to all residents. It can be more than a 15 minute walk for most residents. This presents a problem for community members interested in being active and using outdoor spaces, which the new plan combats.

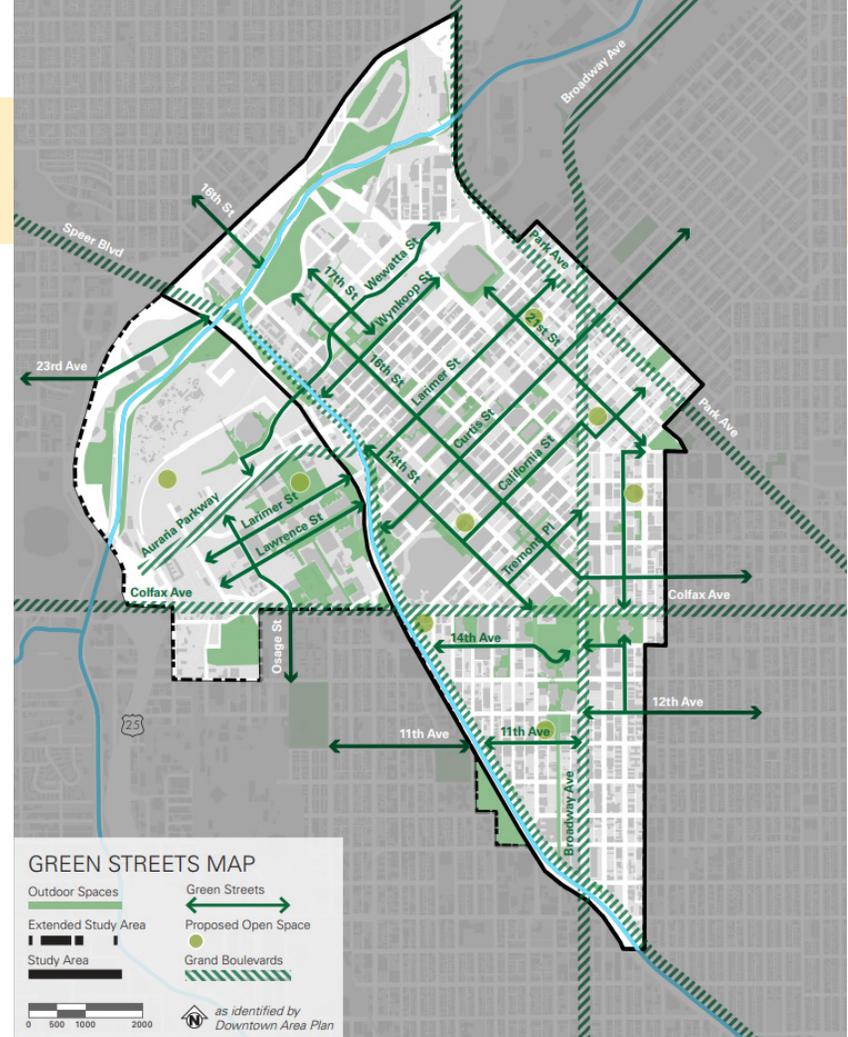


Fig. 7 Marion Street Green Infrastructure Project - Denver

## 20-Year Master Plan

The new plan promotes green streets, bringing green space to residents. With green streets, most residents and professionals in the LoDo area will be within a 3 minute walk of public green spaces. These green spaces will begin to reduce the carbon output of the city as well as improving everyday life of its residents.

# Social benefits of urban green spaces

## Social-ecological research in urban natural areas: an emergent process for integration

This study compares ecological significance of the feeling people get when entering an urban park in New York City. They found that there is a high interest rate of guests to urban parks that are more ecologically significant. This is important because it gives landscape architects a good reason to 'plant up' an area to create a space that feels more welcoming and usable to the guests it is hosting.

- Ecological integrity: the ability of an ecosystem to support and maintain a community of organisms with competition, diversity and function comparable to natural habitats within the same region.
- Forest health: focuses on a flourishing system rather than level of intactness.
- Urban parks provide recreational ecosystem services.
- Parks can also provide psycho-social-spiritual services to passive and active visitors.
- Typology 1, based on ecological condition and visitor density (visitor count normalized by zone size) and Typology 2, based on ecological condition and diversity of park use motivations.
- Social interactions can help inform policy and land use decisions.
- Case studies provide examples for ecological systems, urban agriculture and community engagement in parks



*Fig. 8 "Green Hubs as Social Inclusion and Community Engagement."*

## Urban ecology as an interdisciplinary field: differences in the use of “urban” between the social and natural sciences

Finding connections between human interaction and their natural environment is one of the key principles of urban ecology. Focusing on the urban environment can create issues of how that urban is defined. The focus of this article is to find similarities and links between understanding the urban ecological design and how people use their spaces.

- Since humans are a part of ecology, understanding how we can play a part in an ecological system not only by being passive and passersby, but also engaging with the natural environment.
- Working with other professions, specifically those who study people, we can begin to see how people can fit into an ecological system.
- Communication between researchers can lead to greater advancements in the involvement of people as a part of the ecology of urban spaces.
- Understanding how different fields use the term ‘Urban’ can lead to greater collaboration and a greater integration of people and places.



Fig. 9 Anderson, James A. "Much to Do about (Vacant) Lots."

# Philadelphia, PA

## Case Study

### Urban Reconstruction

Philadelphia is one of the largest cities on the East coast, and backed by the Pennsylvania horticulture society, is working to transform its vacant lots into usable public space. Many of these urban spaces are being converted to community gardens and community parks. Community parks provide glimpses of urban ecology and community recreation in spaces where it is difficult to access parks and green spaces.

### About Philadelphia

Population: 1,560,000  
Size: 147.7 sqmi  
Founded: 1682  
Elevation: 39'  
Climate: Humid continental  
Sun exposure: 205 days  
Snow: 21.7" per year



Fig. 10 Sasko, Claire. "Philly Study: Cleaning Vacant Lots Can Significantly Reduce Crime."

## Unused Space

Vacant lots are scattered amongst urban communities. These underused and overlooked spaces have potential to unite communities, improve storm water runoff, and improve urban ecology.

## Urban Agriculture

By creating urban agriculture spaces and creating spaces for communities to come together, urban gardens are a great way to promote strong community development as well as a place to improve food security.

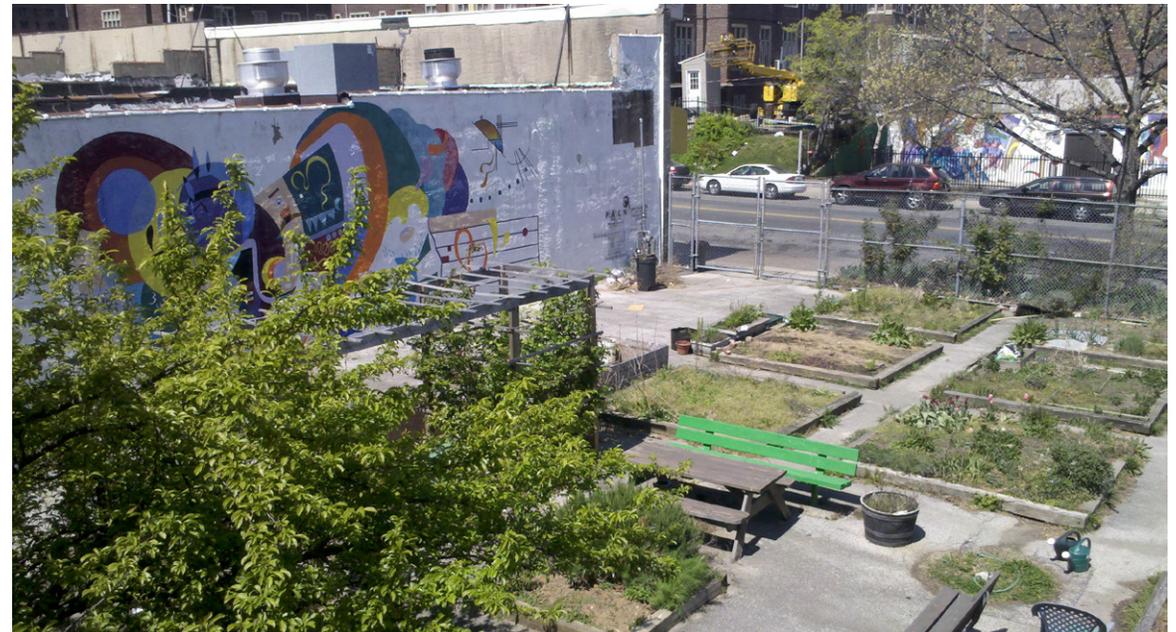


Fig. 11 Rodabaugh, Mary Anna. "How Grounded in Philly Is Making Vacant Lots Accessible to the Public."

# Vacant opportunity

## Urban vacancy and land use legacies: A frontier for urban ecological research, design, and planning

Abandoned properties are littered with history. These lots tell stories of years past, and can still be affecting the environment in the same way it was when it was occupied. The question is what we do with this vacant land, and how they can benefit us.

- Many vacant lots are along water and could potentially have high ecosystem services.
- Many areas around vacant land have lower quality of life and the people that live there likely have lower income.
- Vacancy affects people's perception of safety.
- Vacancy is patchy.
- Vacant land likely had a property on the site that negatively affected land.
- Maintaining properties so that people do not need to live in vacant areas, but also maintaining the market to avoid gentrification.
- Maintenance of urban lots create the perception of safety.
- Vacant lots can be subjected to illegal dumping.
- Finding that low social capital leads to more abandonment and more vacancy.
- Properly managing green space in cities can maintain optimal levels of occupied housing with moderate property values.



Fig. 12 Consumerist

## Vacant lots: An underexplored resource for ecological and social benefits in cities

Vacant lots provide a plethora of opportunity to create green spaces as well as areas for social interaction. Vacant lots provide opportunities for improving a city's ecological health, as well as the health of community members. Some of the issues of transitioning an urban lot is the ownership of the lot, the current zoning, and community engagement.

- Some of the benefits of vacant lots include storm water runoff, air quality and increasing biodiversity.
- Social benefits: can be used as community gardens, and public parks.
- Challenges: ownership, zoning, and community engagement.
- Engaging community members, securing funding and working with the government can help to ensure the best result and create the most useful plan for a vacant lot
- These groups also need to begin to understand the potential of vacant lots so that we can make policy that allows for the best possible use for the most amount of people.



Fig. 13 "What Is a Food Forest?"



Fig. 14 Rummel, Rachel. "Beacon Food Forest."

# Seattle, WA

## Case Study

### Beacon Food Forest

Located in the middle of Seattle, the Beacon Food Forest is a 7 acre public urban agriculture plot. This plot provides the opportunity for community members of the Beacon Hill community to pick their own fruit from the fruit bearing trees within the park. The idea for the park began in 2009 and was originally a concept for a permaculture class. This project received a \$22,000 grant and hired a certified designer to bring this park to life. Now this funding has been increased up to \$100,000.

### About Seattle

Population: 733,919  
Size: 83.78 sqmi  
Founded: 1851  
Elevation: 174'  
Climate: Temperate  
Sun exposure: 205 days  
Snow: 21.7" per year

# Beacon Food Forest Schematic Site Plan



Fig. 15 Husted, Kristofor. "Seattle's First Urban Food Forest Will Be Open to Foragers."

## Urban agroforestry

Beacon Food Forest provides an area for urban agroforestry in the heart of a highly urban environment. Located in a working class neighborhood, this urban forest provides food security for the surrounding community. This urban forest also provides ecosystem services such as improved urban ecology, reducing the heat island effect, and it also helps improve the connections within the community.

## Urban planting

By including plants such as apples, pears, plums, grapes, blueberries and raspberries this garden is able to meet the needs of the surrounding communities. Food security in a location such as Seattle, is important as homelessness and the cost of living increase.

# Urban agroforestry

## Ecosystem functions of fruit woody species in an urban environment.

This article explains some of the ecosystem services that are met by including edible woody plants in urban settings. By defining the needs that are met by certain plants and specifically studying how these plants affect the area around them, we can learn how to use plants for their greatest benefit. If the plant is good at taking in CO<sub>2</sub>, it can serve the environment by being close to a road, reducing the pollution from the roadway, improving the environment for community members.

- More than 60% of population will be living in cities by 2030.
- Meeting needs of public by including green spaces in urban areas is being discussed more and more.
- Urban green edible forests can become a place for community members to socialize, share ideas and collaborate for a public good.
- Inspect and investigate ecosystem services of 16 woody plants to create an efficient urban forest.
- Used “lifelivuttreedb” to simulate urban planting of woody fruit producing vegetation
- Also researched effects of tree crowns and the shade they produce finding that edible woody trees reduce the temperature when they are at least 1.5m off the ground
- Woody fruit trees also sequester carbon, helping to produce carbon positive cities.



Fig. 16 "Cultivating Community Gardens."

## Introducing urban food forestry: a multifunctional approach to increase food security and provide ecosystem services

Examining how woody plants can benefit urban cities. Urban food forestry is under practiced and under maintained. Looking at Burlington, Vermont, the most aggressive urban food forestry plan would meet the needs of 108% of the community.

- UFF is the combination of agroforestry, urban forestry, and urban agriculture.
- Most master plans for urban forestry include space for wildlife and only 4% focused on food security.
- Identified 70 species and 30 species are highly suitable
- Landscape ecology in urban areas is easy to study and difficult to implement.
- Bioswale provides ecosystem service in the way that UFF will provide a service.
- UFF can also provide food security to community members.
- Urban agriculture and urban forestry have largely stayed separate. They should work together.
- Analyzed master plans by comparing "fruit", "food", and "wildlife".
- Tested food planting in urban area with GIS data from Burlington and calculated public owned land. With that land planted optimally, they can exceed the minimum requirement

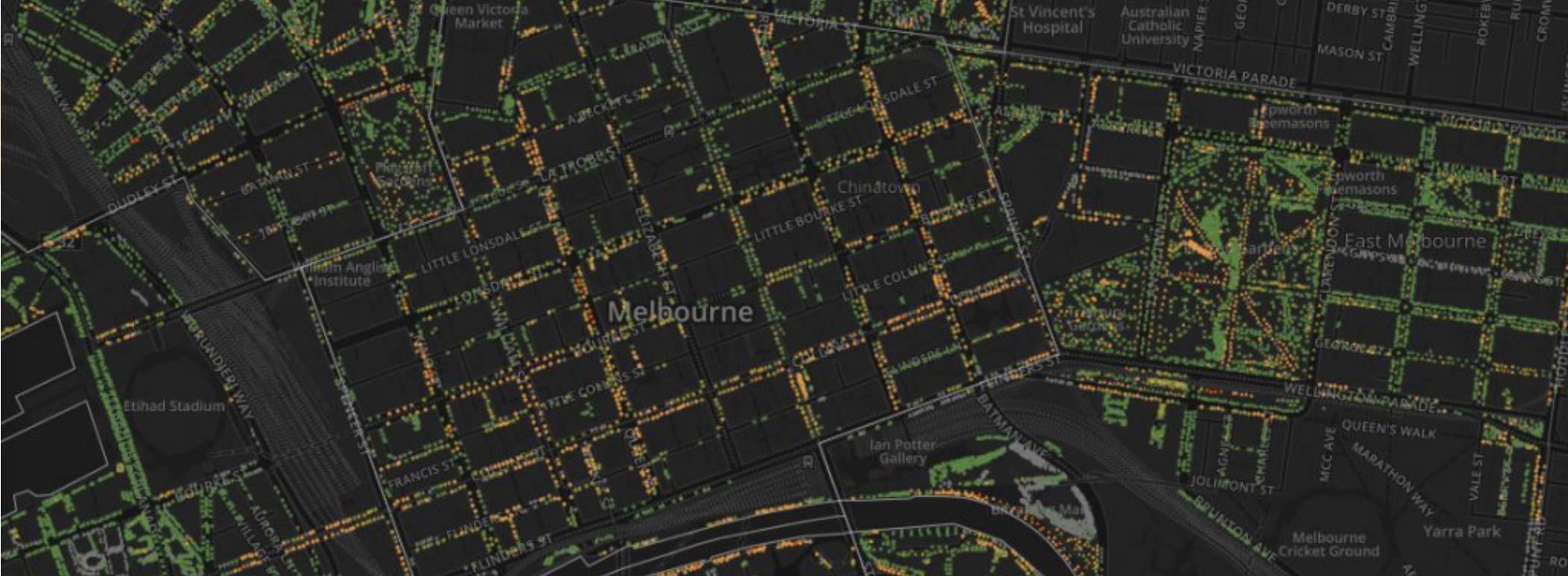


Fig. 17 "Melbourne Urban Forest."

## Urban ecology

Urban ecology principles: are urban ecology and natural area ecology really different?

Understanding how different microclimates can be created by urban spaces in order to improve the amount and depth of spaces. This article studies and identifies how different climates affect urban ecology.

- Urban ecological principals have been around for a while. In the 1920s, in Chicago, sociologists used principals of ecology to study social interactions between people.
- Urban ecology overlapped with sociology.
- Ecology began with a wide range of studies of the natural environment.
- Urban studies conducted in the same way as rural studies.
- Examples of urban ecology principals.



Fig. 18 "Go Tree Quotes Contractors: Melbourne's Urban Forest in Decline: Urban Forest, Melbourne, Forest."

## A comparison of the growth and cooling effectiveness of five commonly planted urban tree species.

Urban trees are a great way of reducing the heat island effect. Depending on the size, shape, color, and texture of the tree, you can achieve different results. These different species of trees determine that some are more effective in reducing the heat island effect in urban areas. Honey locust and silver maple are the most effective.

- Urban trees are one of the best ways to reduce the heat island effect along with green roofs and other mitigation techniques.
- The species of tree can affect the results of the mitigation of the heat island effect. Urban heat islands are one of the leading issues in highly urban areas.
- Understanding what all parties are expecting from a newly designed green space can help inform the parks usefulness.
- Green spaces planted with appropriate plants can achieve the desired goals of mitigating the heat island effect.
- Tree species should be carefully selected to meet the needs of the community while also providing ecosystem services to the community.

# Urban ecology disservices

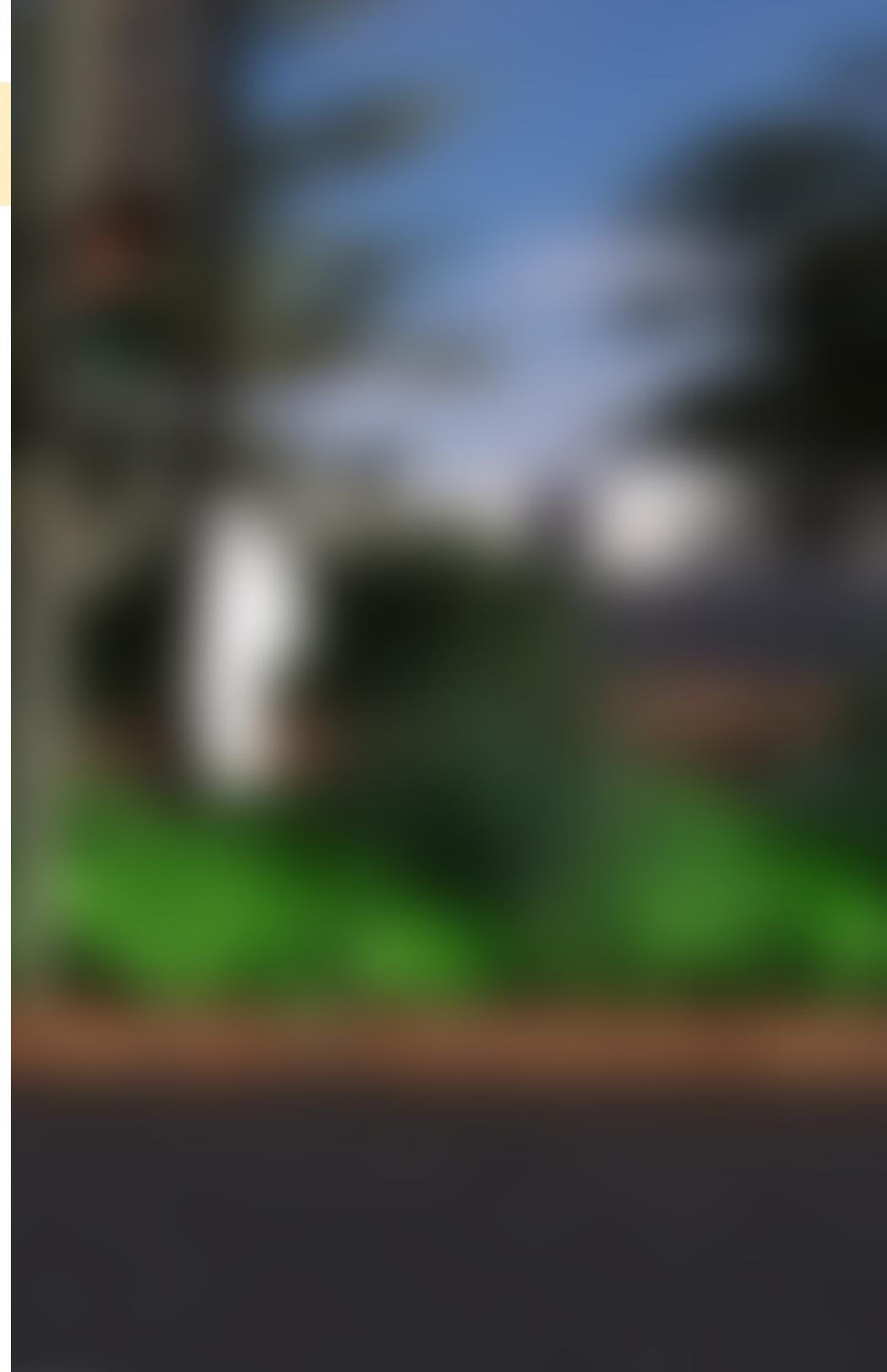
## Beyond “trees are good”: Disservices, management costs, and trade offs in urban forestry.

This article discusses some of the problems that happen when introducing certain species into an urban environment, including species that caused issues such as apple trees, or trees that got too big for the space. Trees frequently lose limbs causing injury and even death, and they can also release pollen causing worse air quality and can block visibility for drivers.

Overall, this article touches on many points showing problems with urban vegetation, but this article can also serve as a guide on constraints regarding urban vegetation.

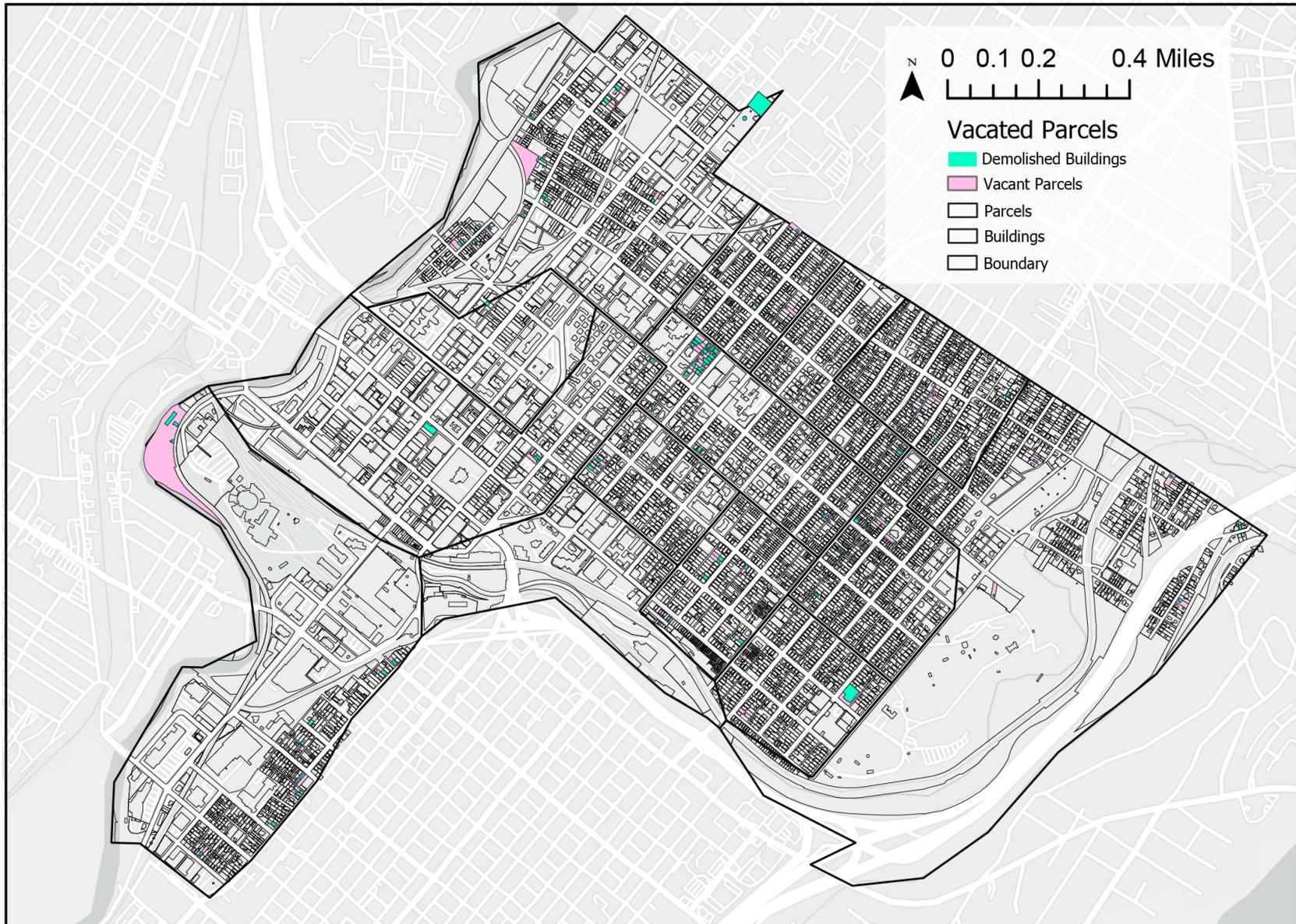
- Focused on Philadelphia and Malmo Sweden.
  - Perceptions of trees dominate urban forestry. Community members think that trees are good, but there can be side effects of including trees in urban spaces.
  - This can include problems such as tree care, tree dropping and potential damage to properties.
  - Ecosystem disservices.
  - Green infrastructure can interfere with existing infrastructure.
  - Injuries from falling limbs and pollen can affect everyday lives of community members.
  - Urban tree work is more difficult than rural tree work.
  - Gentrification can be an effect of urban forestry and urban agriculture.
  - The cost of maintaining a street with urban trees and urban green spaces is greater than an urban environment without trees.
- 22 Urban trees can also block views of drivers disrupting traffic patterns and impairing safety.

Spatial analysis



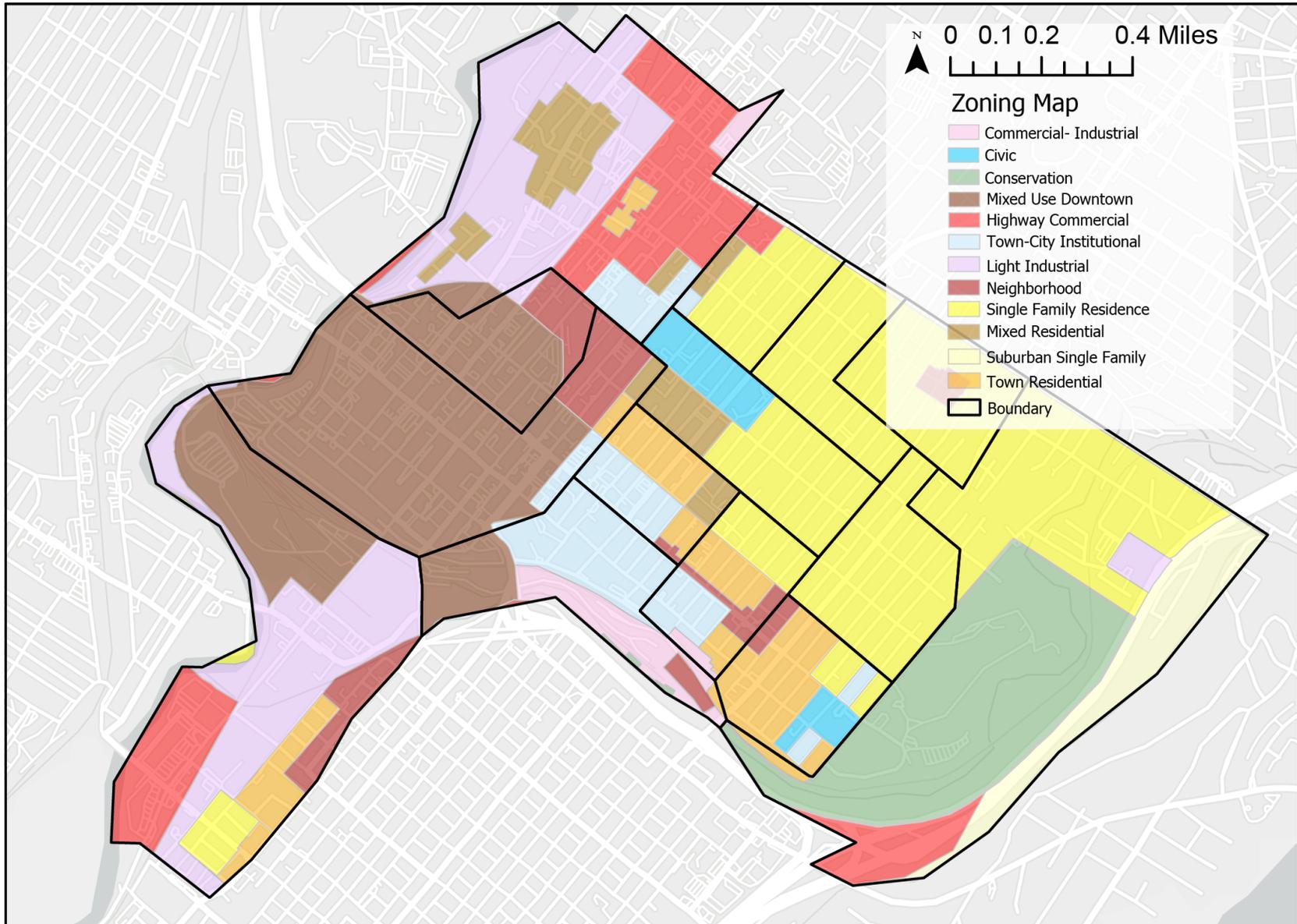
# Parcel data

Parcel and structure data help to begin to form where design interventions can begin to take shape. This area has many wide street right of ways as well as defunct train rails and vacant lots.



# Zoning

The Lackawanna river on the west side of the site is bordered by mainly impervious surfaces, including the downtown and industrial side of the site. This used to be used for easy river access for transportation, but is no longer necessary.



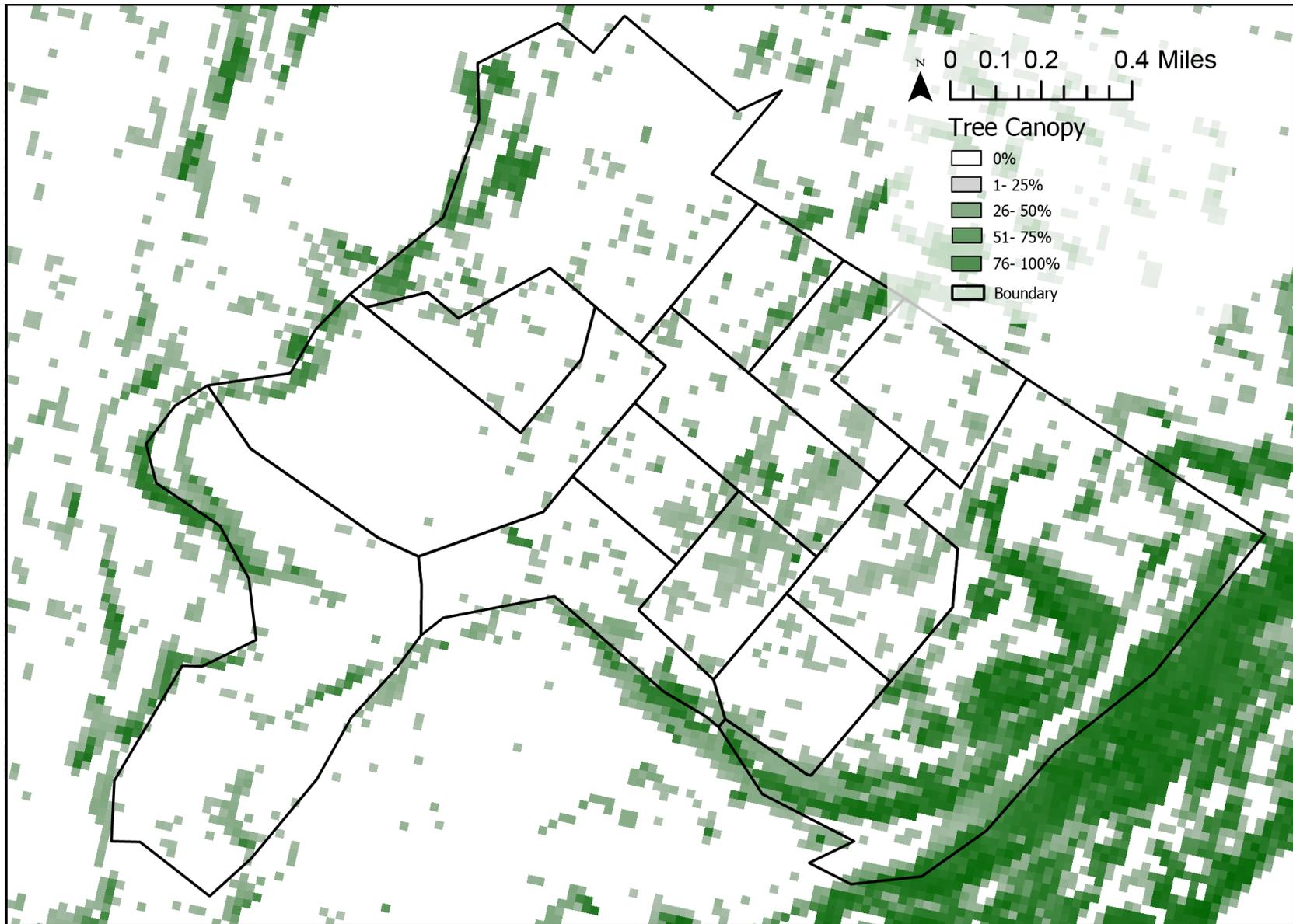
# Land use

The red and yellow color sections represent the impervious surfaces within urban Scranton. This data shows that there is a higher representation of impervious surfaces. Represented in green is the area that is covered by vegetation and pervious surfaces.



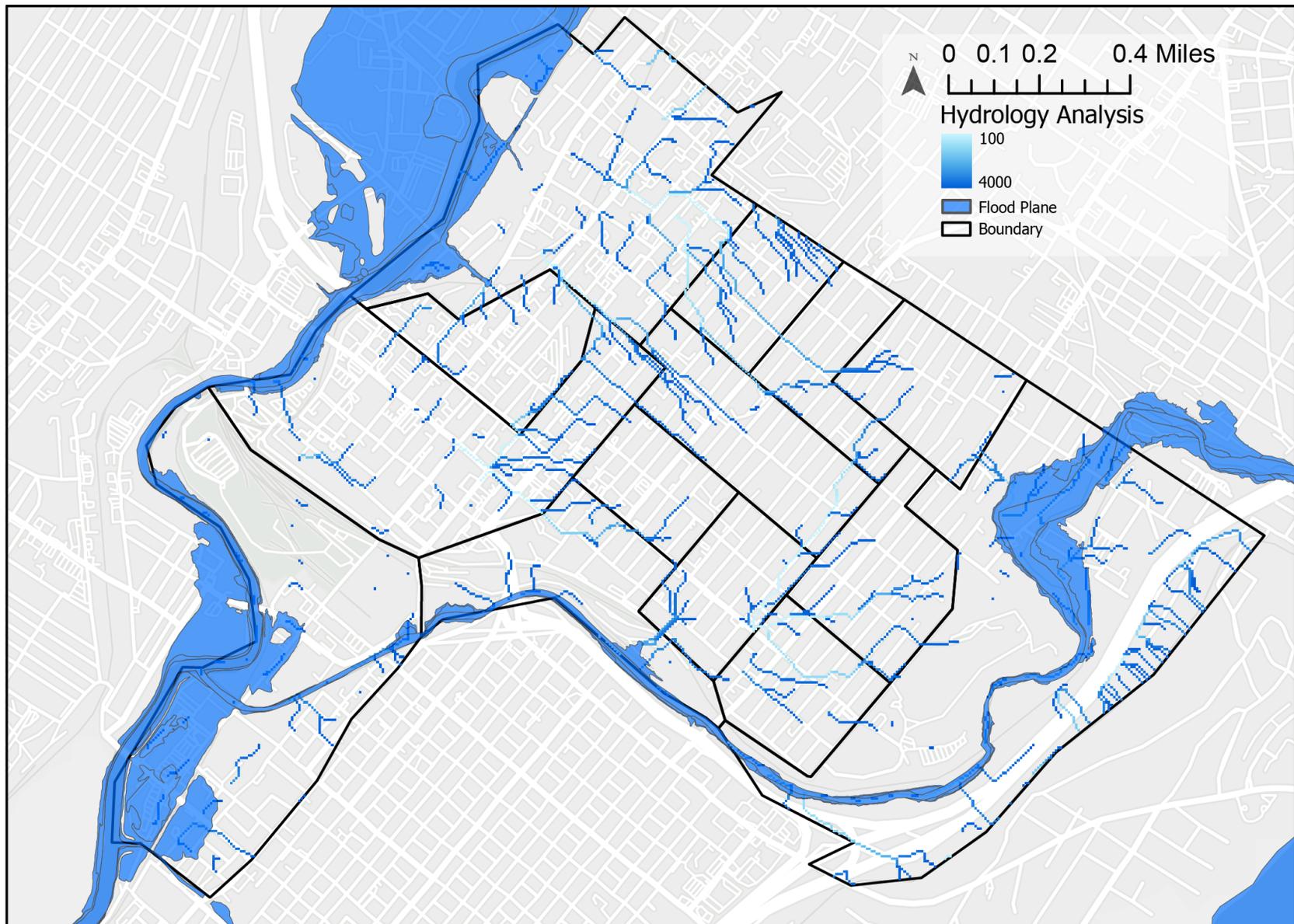
# Tree cover

Looking at tree cover provides broad swaths showing key spaces with green space. Most of the tree space currently exists in parks and vacant parcels. Some of these spaces closer to downtown provide small opportunities for green space renovation and reclamation.



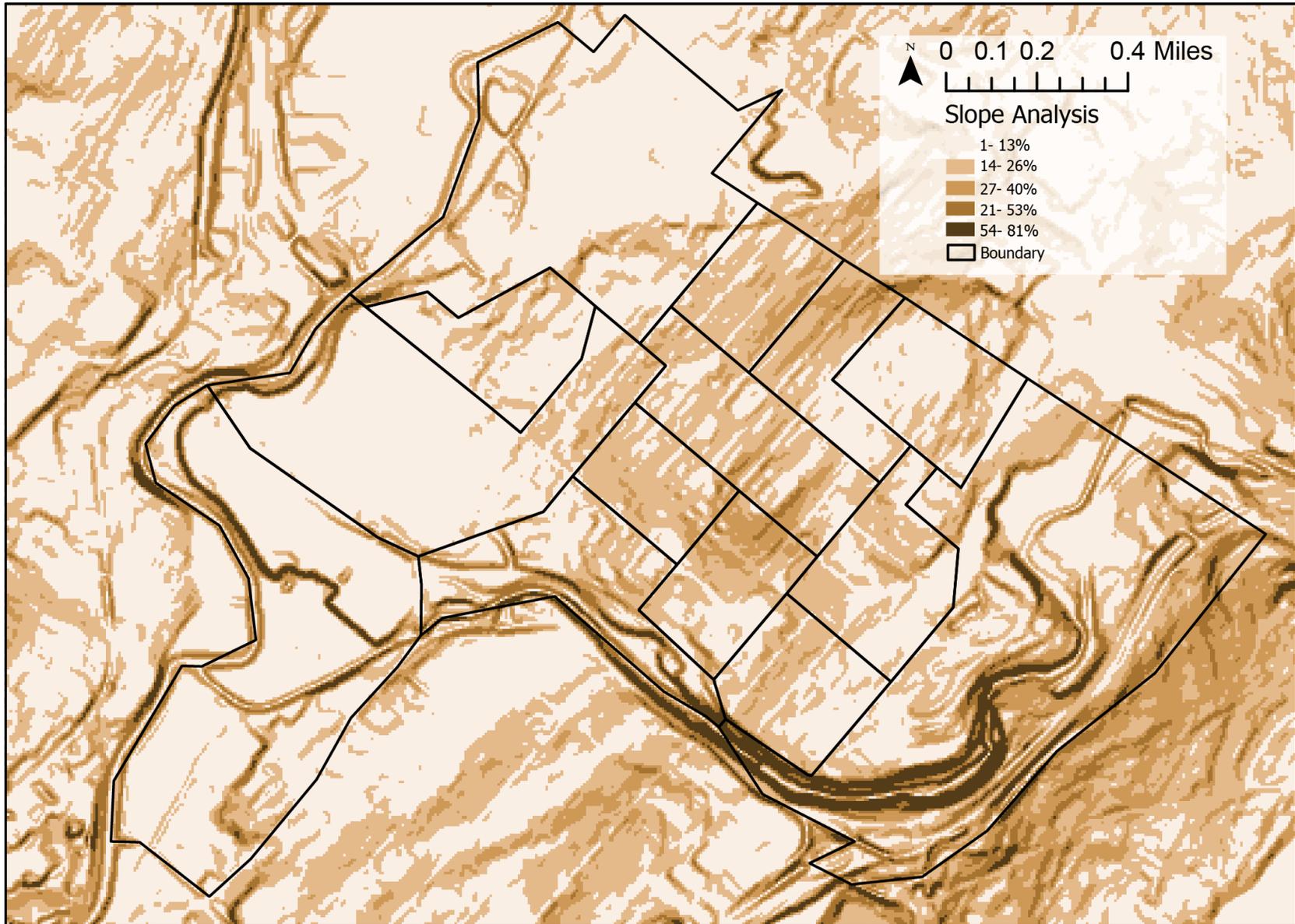
# Hydrology

Water on the site flows down to the Lackawanna river including Running Brook, bounding my site to the south. Some of the locations on the site are poorly drained, and that tends to be where the residential communities are.



# Slope

Scranton is located in a valley and has hillsides on either side of the Lackawanna River. This section of Scranton is located on the East bank of the river. This information shows that there is a main hill in the center of the site with steep slopes on either side.

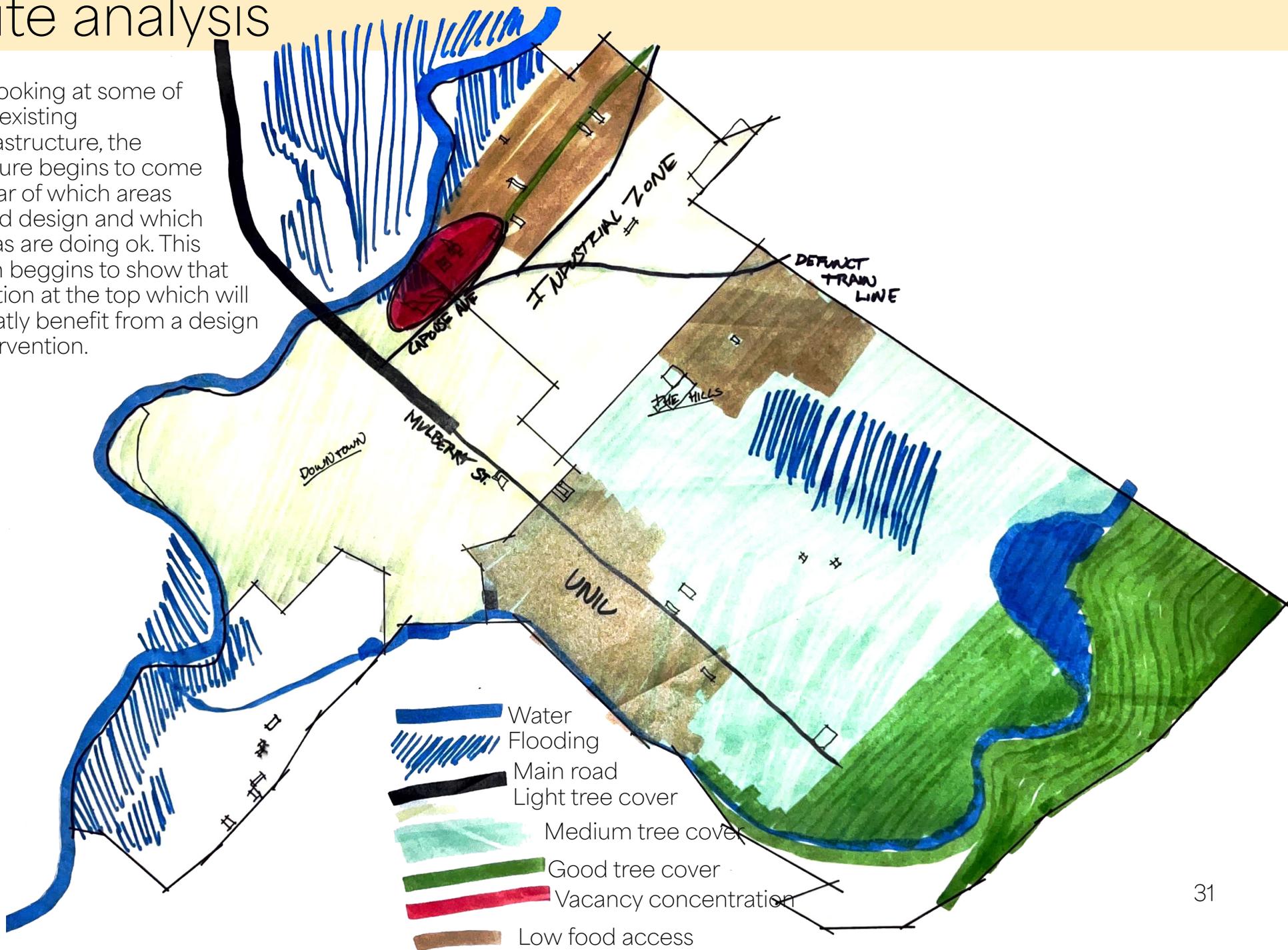




Master planing

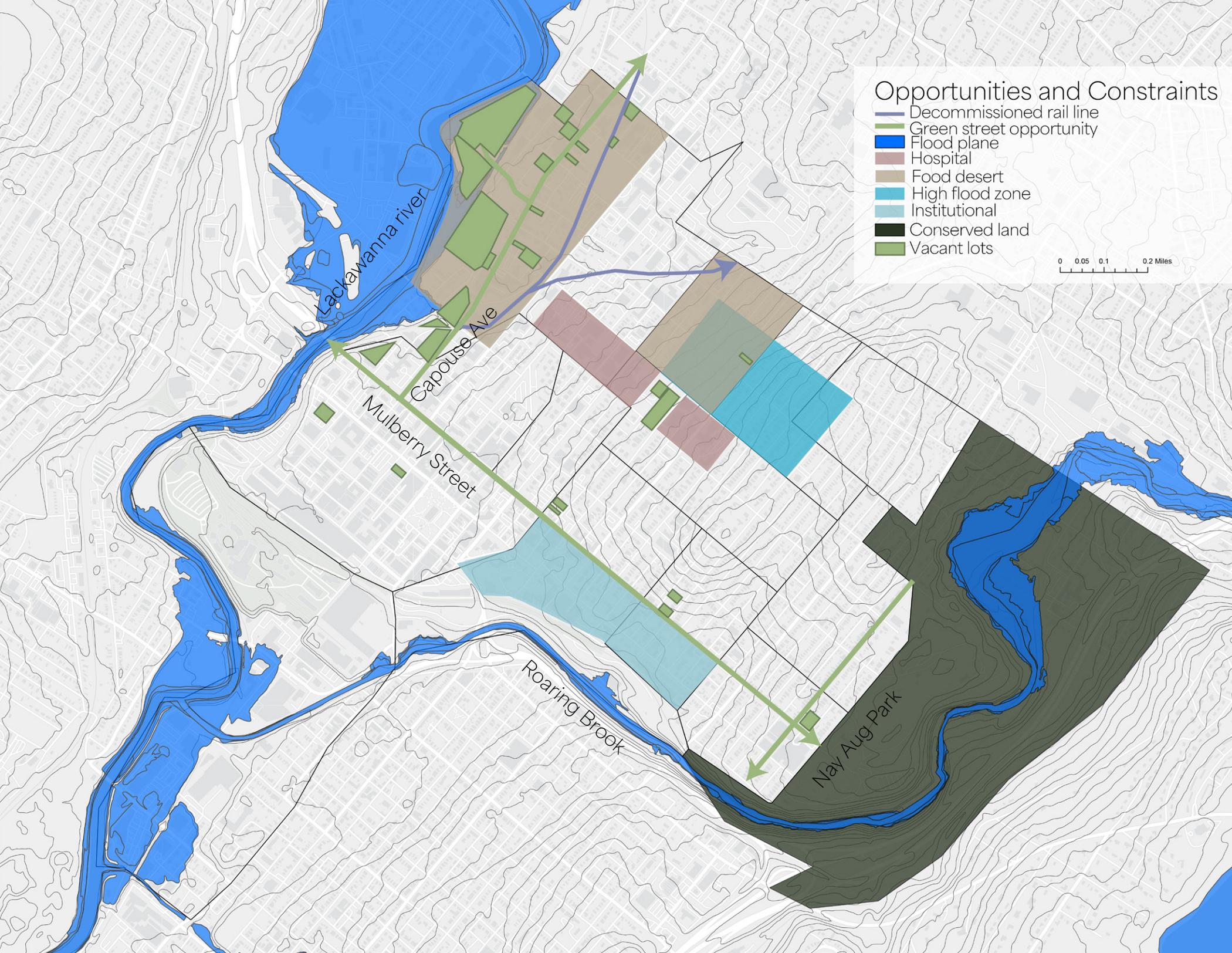
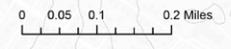
# Site analysis

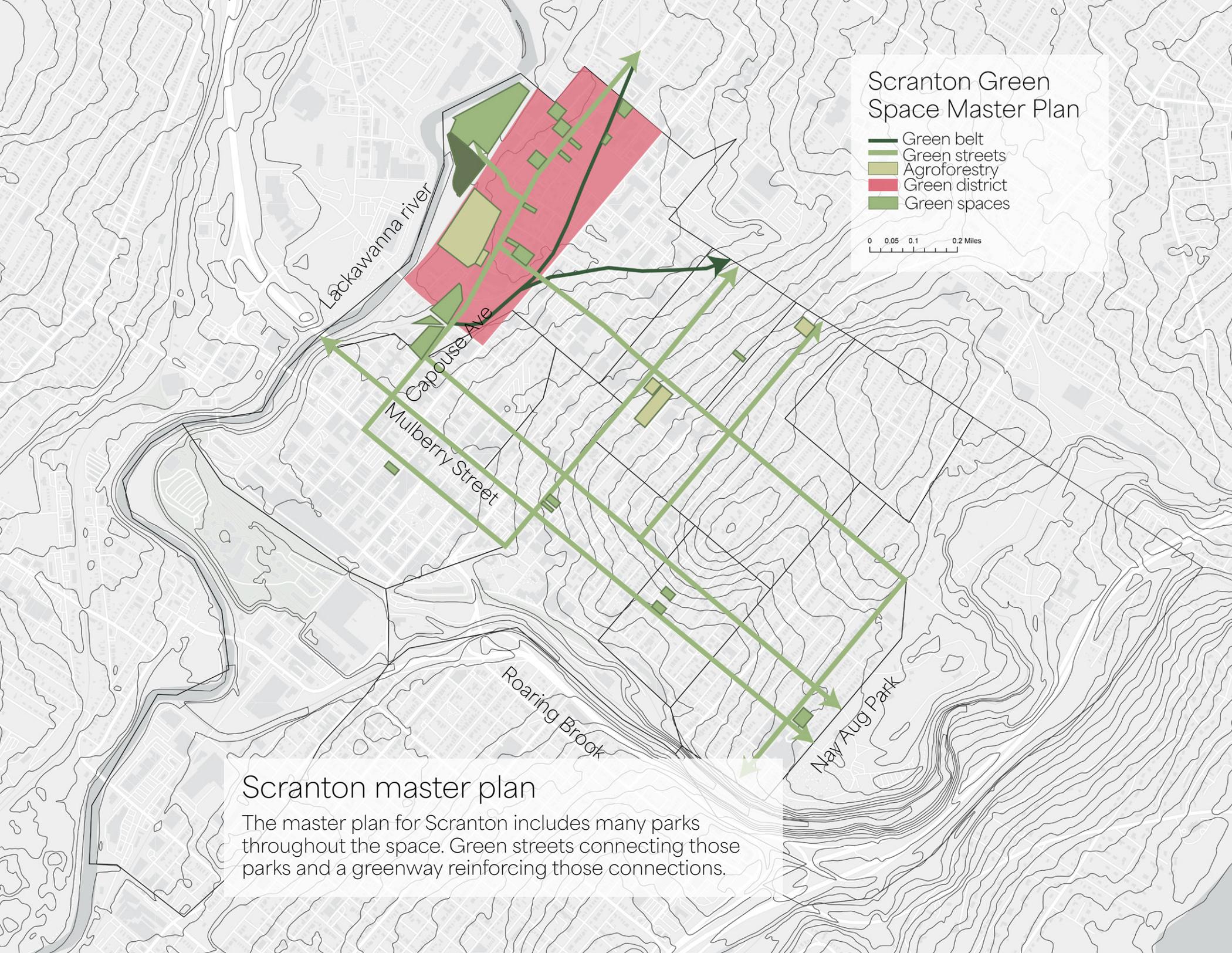
By looking at some of the existing infrastructure, the picture begins to come clear of which areas need design and which areas are doing ok. This plan begins to show that section at the top which will greatly benefit from a design intervention.



# Opportunities and Constraints

- Decommissioned rail line
- Green street opportunity
- Flood plane
- Hospital
- Food desert
- High flood zone
- Institutional
- Conserved land
- Vacant lots





### Scranton Green Space Master Plan

- Green belt
- Green streets
- Agroforestry
- Green district
- Green spaces

0 0.05 0.1 0.2 Miles

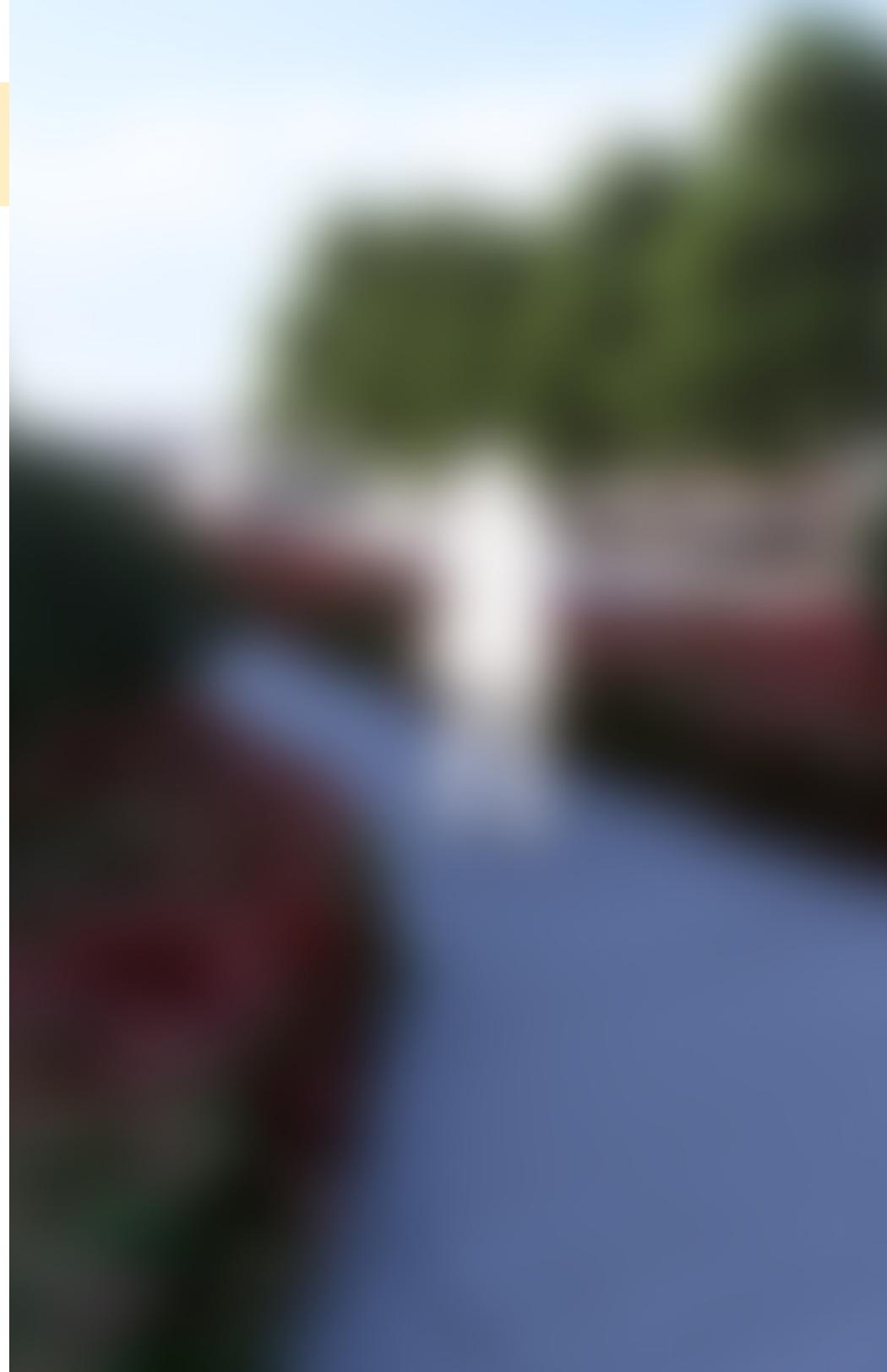
### Scranton master plan

The master plan for Scranton includes many parks throughout the space. Green streets connecting those parks and a greenway reinforcing those connections.

# Focus area

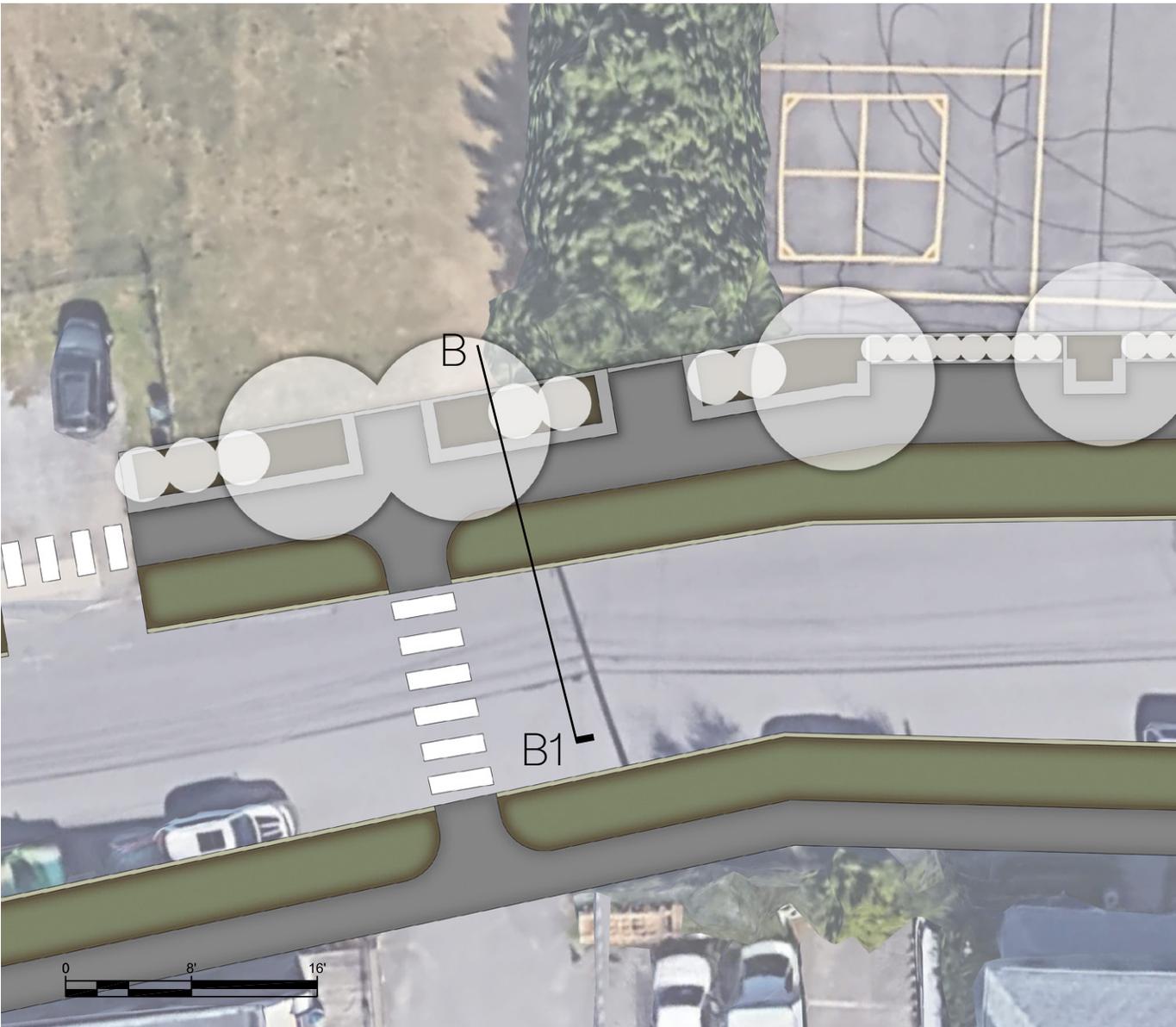


Design interventions



# Streetscape

Redesigned streetscapes to help promote uptake of rainwater from impervious surfaces



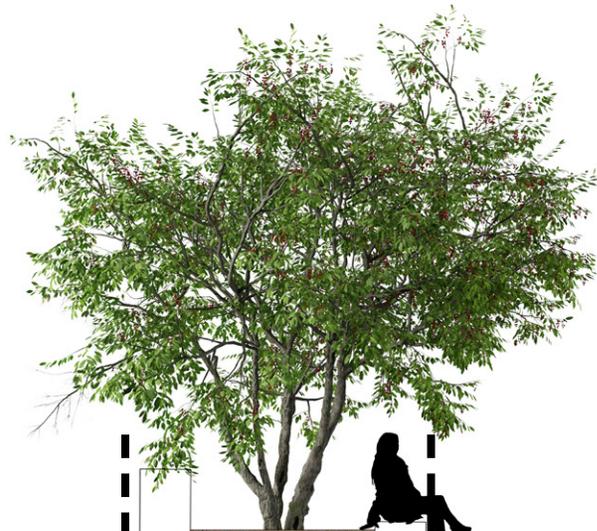
## Edible streetscapes

Taking advantage of small spaces located along roadways, edible streetscapes will help improve access to food in urban environments as well as performing ecosystem services such as storm water management. They feature plants such as blueberry bushes, apple trees and pear trees.

## Menu

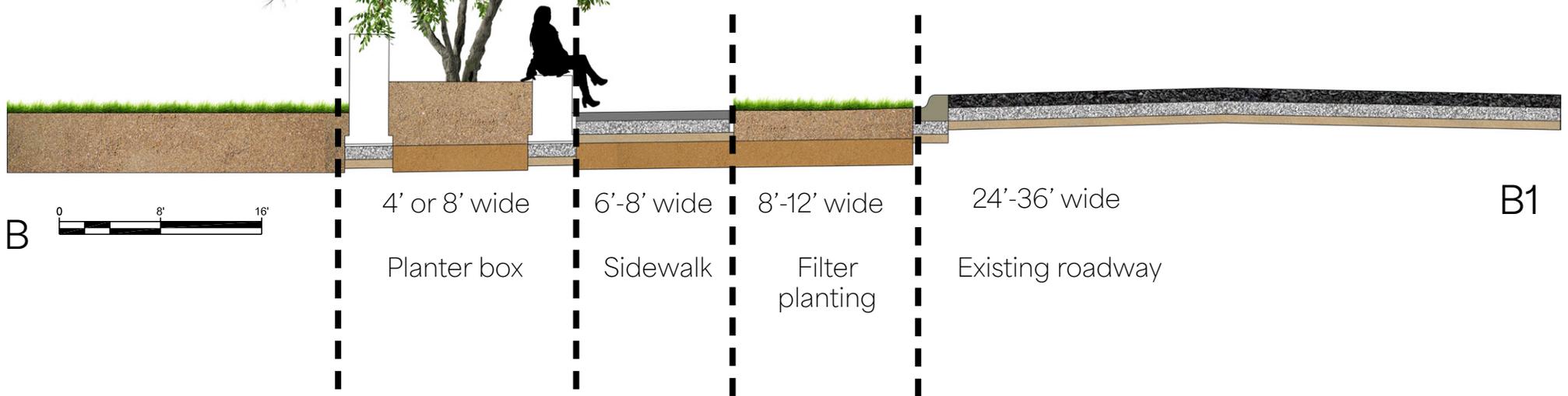
- Storm water collection along roadway 7' wide
- Seating areas
- Shaded walkways
- Street crossings
- Widened sidewalks 5' minimum
- Keep sight lines for drivers by limiting large trees near intersections
- Edible plants in locations where runoff is clean and can be recycled to irrigation

# Human experience

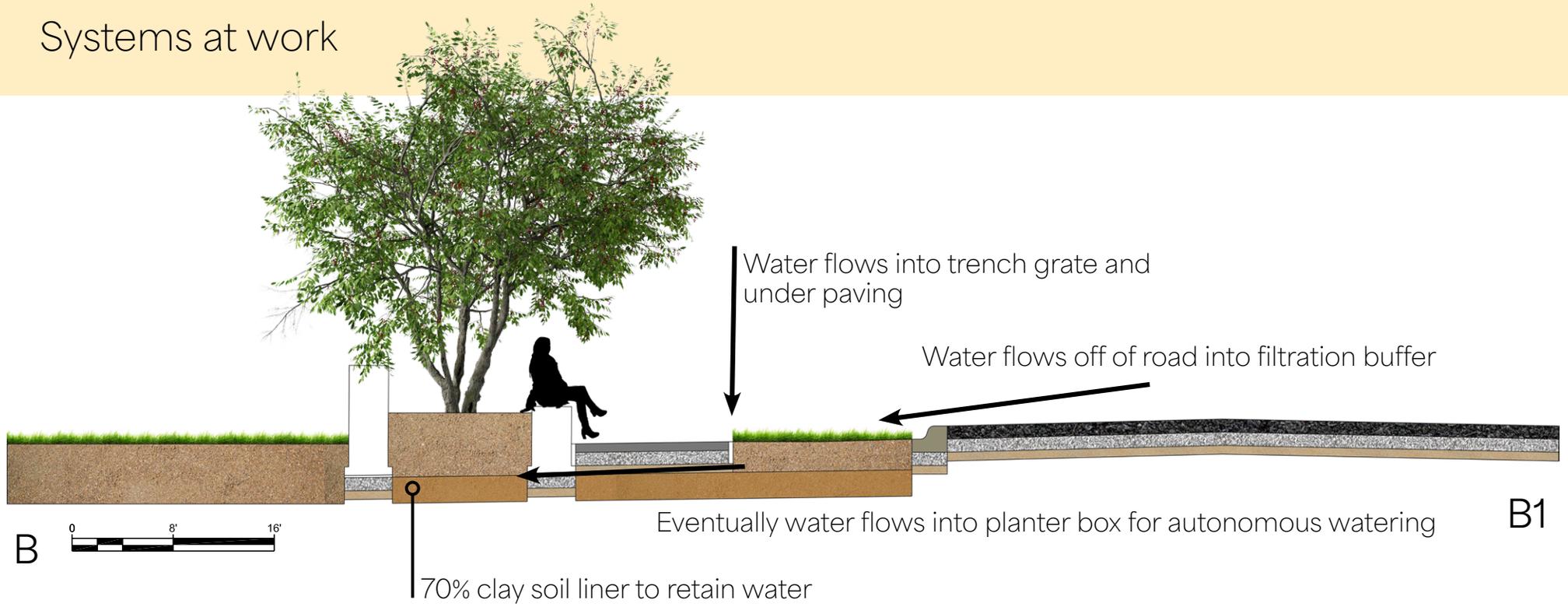


## Roadway buffer

Included in this roadway buffer are plantings that help to absorb and filter water. This buffer will also help to serve as a visual traffic calming device by narrowing the field of view of drivers.

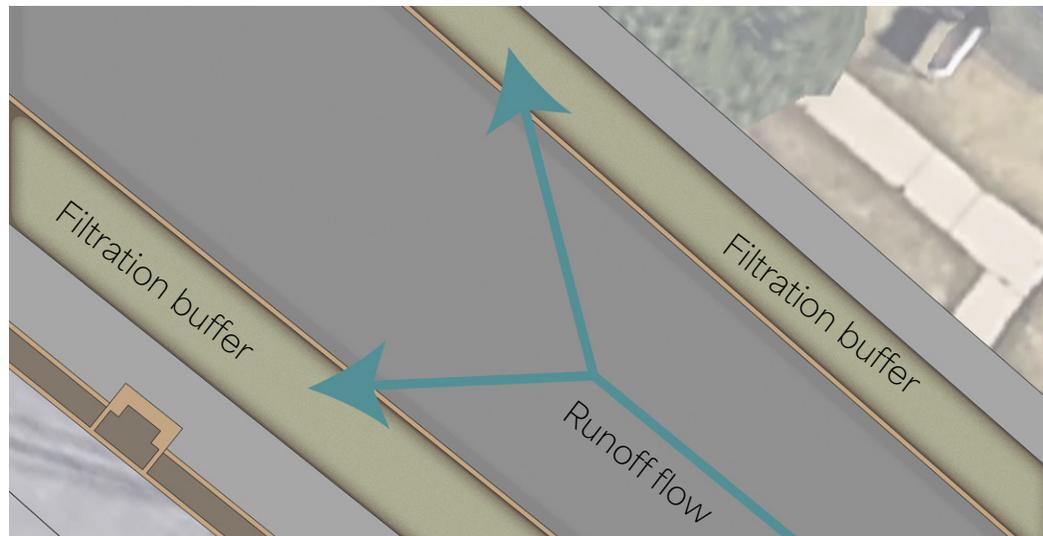


# Systems at work



## Linear street diagram

As the water flows down the hill, the natural grade of the streets will allow it to flow into the filtration buffers on either side.



- Lighting
- Crosswalk sign
- Blueberry bushes
- Filtration buffer



- Lighting
- Filter strip

- Cherry tree
- Filter strip
- Planter box



# Scranton greenway

Urban greenways provide special walking experiences for residents as well as bikers and nature lovers.



## The Green Line

Re-purposing a defunct train line into a greenway provides alternate pedestrian routes throughout downtown Scranton. The train line provides a unique space in the right of way of the defunct train to improve vegetative conditions.

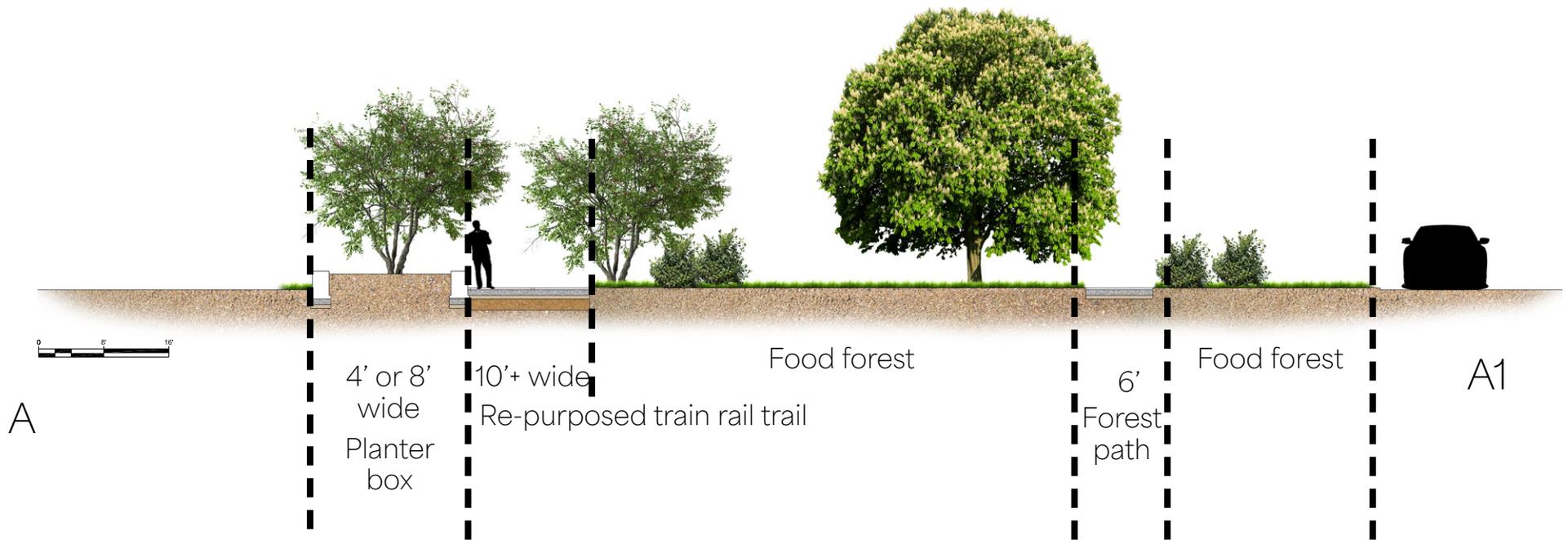
## Menu

- Use railroad ties to form pathway through barren land
- Use train right of way to improve green space as well as contain site amenities such as:
  - 16' wide walking path
  - 12' reforested buffer
  - Seating areas
  - Planter boxes for fruit producing

## Trees

- Storm water collection
- Storm water filtration
- Play structures
- Artwork and sculptures

# Human experience



## Rail line reclamation

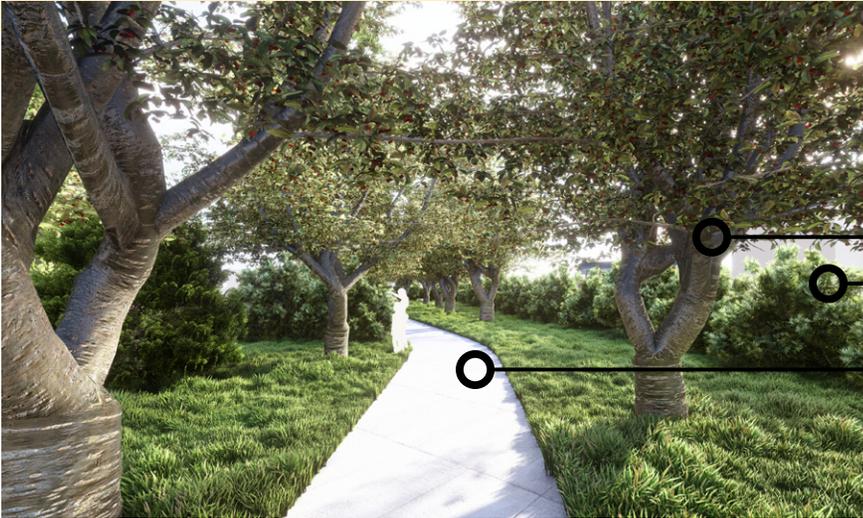
The train line will define the overall direction of the path. When the train line intersects a vacant parcel, there are opportunities to widen the footprint of the greenway and provide more amenities to communities.

# Systems at work



## Forraging forest

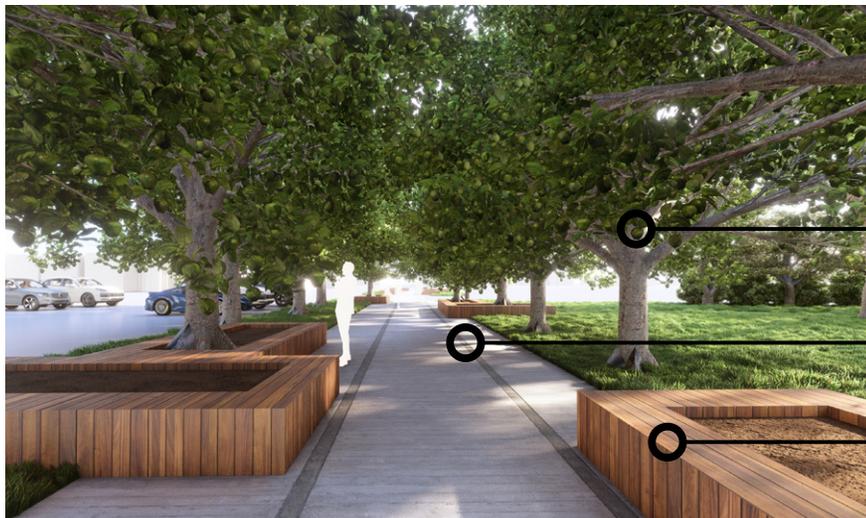
Along the greenway in the adjacent vacant lots, plants intended for foraging will flourish.



- Cherry tree
- Blueberry bush
- Path



Speed bump for traffic control



- Apple tree alle
- Preserved rail line
- Planter box

# Strawberry park

Urban agroforestry provides opportunity to improve food security in underprivileged areas while providing ecosystem services.



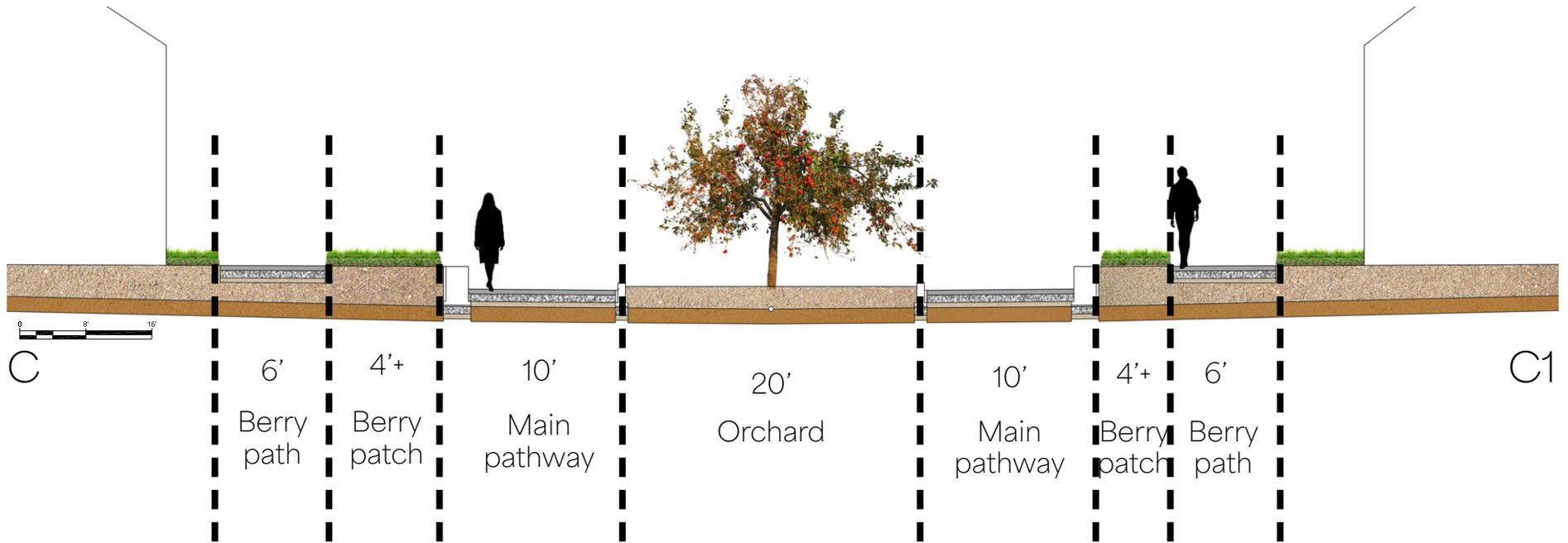
## Urban food production

Designed spaces for successful agriculture production; shared and maintained by the surrounding community to bring people together as well as provide fresh produce to the community.

## Menu

- Plant low maintenance fruit producing trees
  - Paw paw
  - Blue berries
  - Peaches
  - Pears
- Community garden area to increase foot traffic
- Include compost areas to reduce food waste
- Irrigation systems collect runoff and recycle to irrigate plants

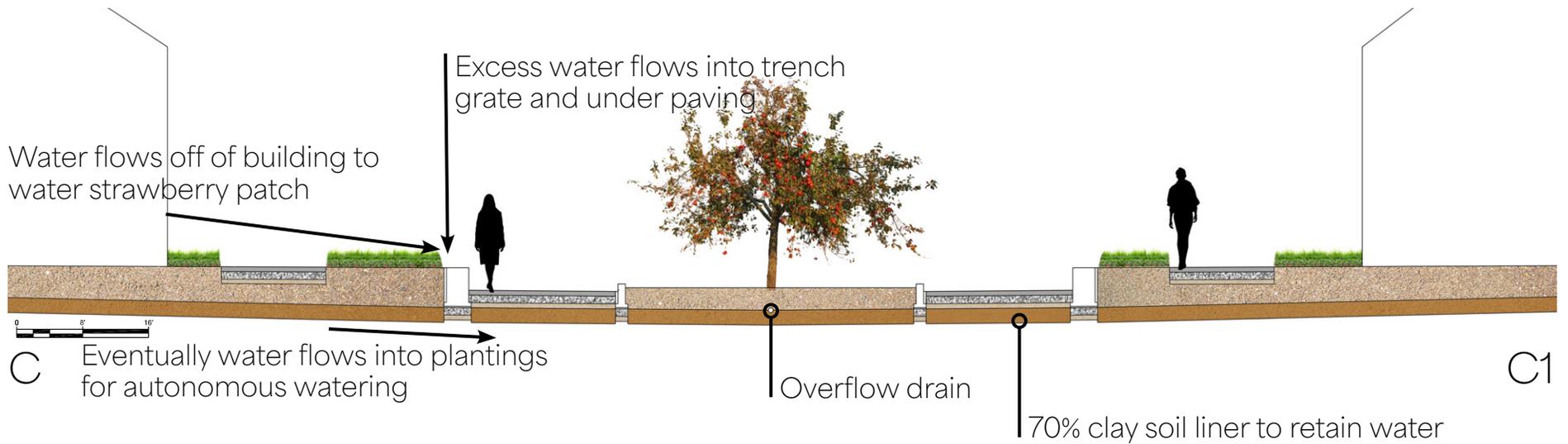
# Human experience



## Food forest

Vacant lots are prevalent and abundant, scattered through downtown Scranton. Re-purposing these lots into urban food forests would help to improve food security in much needed neighborhoods. These forests would be focused around certain plants, providing a unique experience in each park.

# Systems at work





Strawberry path



Orchard

Planter box

Main entry

Blueberries for seasonal interest

Strawberry patch



Seat wall

# Plant Palette



Persimmon trees  
*Diospyros kaki*



Blackberries  
*Rubus alleghaniensis*

Apple trees  
*Malus domestica*



Paw paw  
*Asimina triloba*



Chestnut trees  
*Castanea sativa*



Pear trees  
*Pyrus communis*

Blueberries  
*Vaccinium corymbosum*



Strawberries  
*Fragaria ananassa*

Cherry trees  
*Prunus serotina*



## Benefits of fruit producing vegetation

Not only are fruit producing trees beneficial for their fruit, but they also can provide visual appeal to spaces. Many of the plants selected produce attractive flowers and promote ecosystem services for insects such as bees and other pollinator insects.

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