

Integrating Urban Acupuncture and the Triple Bottom Line to Revitalize Portland's Downtown Core

Audrey Rycewicz | Masters of Landscape Architecture | June 2023

PATH TO LANDSCAPE ARCHITECTURE



BS Environmental Science and Management
Student Sustainability Center, Garden Coordinator



America's Wild & Scenic Landscapes



Outdoor Education, Outward Bound School and
Naturalists at Large

My journey into the field of landscape architecture has shaped the way I perceive the profession and understand my role within it. I graduated from Portland State University with a degree in Environmental Science and Management, focusing on old-growth forestry and urban agriculture. Following graduation, I pursued a career as an outdoor educator, guiding youth through transformative experiences in nature. Transitioning to landscape architecture was a natural step for me as I believe in the profound impact that the outdoors and "nature" can have on our lives and interactions. This master's project represents the convergence of my interests and the potential for sustainable urban landscape design to make a difference.

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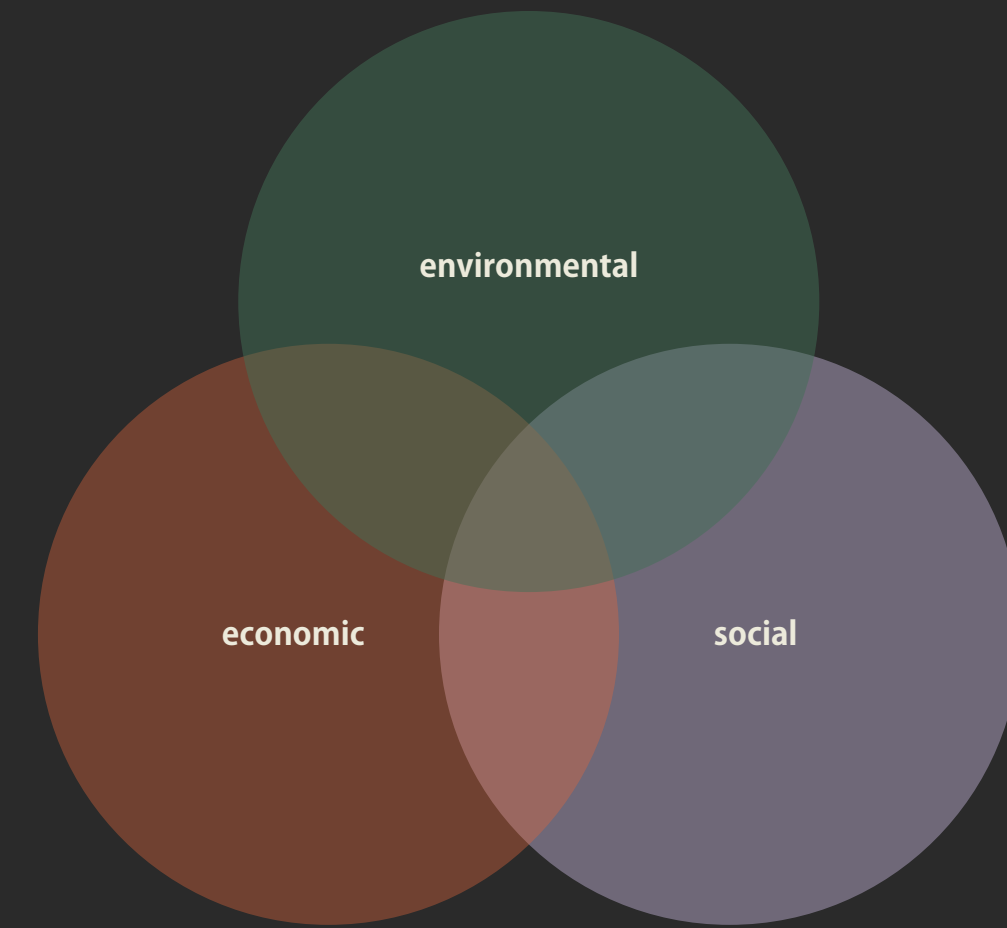
CHAPTER 1:

THE FRAMEWORK



TRIPLE BOTTOM LINE

JOHN ELKINGTON, 1994



“The triple bottom line wasn’t designed to be just an accounting tool. It was supposed to provoke deeper thinking about capitalism and its future.”

—John Elkington in his Harvard Business Review article

URBAN ACUPUNCTURE

MANUEL DE SOLA-MORALES



Urban acupuncture treats the city as if it were a body, healing it with discrete pinpricks at points of stress. It uses punctual, small-scale urban interventions that create a ripple effect of positive transformation.

The essence of my project lies in an experiment in urban planning and landscape design, drawing upon two distinct yet complementary theories. The first is the triple bottom line framework, introduced by John Elkington in 1994. This framework emphasizes the equal consideration of social, environmental, and economic impacts in decision-making processes, urging us to think beyond mere accounting tools and provoke deeper contemplation about capitalism and its future. The second theory is Urban Acupuncture, as proposed by Manuel De Sola-Morales, a Spanish architect, professor, and theorist. Urban Acupuncture draws parallels between the ancient Chinese practice of acupuncture and discrete interventions in the urban realm. By addressing specific points of stress, urban acupuncture generates positive ripple effects, akin to healing the city as a body. Given the complex challenges faced by cities, I believe that combining these two theories could offer a valuable approach to alleviate urban stresses. This project serves as a testing ground for this idea.



My research focuses on Portland, Oregon, the city where I was raised, educated, and started my career. Within Portland, I have selected a specific region to serve as the "body" for my experiment. Within this area, I will implement multiple discrete landscape changes, akin to acupuncture points.

URBAN STRESS, PORTLAND, OR

HOMELESSNESS & LACK OF AFFORDABLE HOUSING



Image adapted from the National Alliance to End Homelessness article by NAEH

SAFETY & CRIME



ECONOMIC IMPACT OF COVID-19



Image adapted from World Health Organization article

URBAN HEAT ISLAND EFFECT & CLIMATE CHANGE



Photograph: Nasir Khan/Getty Images/EyeEm

INFRASTRUCTURE FOR PERSONAL VEHICLES



Image adapted from Environmental Defence.ca article by Sarah Buchanan

The designs of these points aim to strike a balance between the environment, the economy, and the well-being of people. Unfortunately, Portland has experienced growing pains in recent years, and many of the issues it faces are similar to those encountered by other major metropolitan areas in the United States. Some of these pressing issues include:

Homelessness and the lack of affordable housing. On January 10th, 2023, Governor Tina Kotek declared a Homelessness State of Emergency, as approximately 18,000 Oregonians are experiencing homelessness, with around 11,000 individuals lacking shelter.¹ This complex issue is exacerbated by the lack of affordable housing. For instance, a minimum wage worker in Oregon would need to work 82 hours per week to afford a two-bedroom apartment, and there is a statewide shortage of 100,000 affordable housing units.²

Safety and crime. Gun incidents in the city of Portland increased by 300% by mid-2020, and even late into 2022, the number remained 260% higher than pre-pandemic levels.³ Residents of Portland have expressed a growing concern for their safety.

The economy and COVID-19. The COVID-19 pandemic has taken a toll on local businesses. In 2020, 2% of businesses permanently closed their doors, 27% had to lay off employees, and 28% experienced a revenue drop of 90% or more in April 2020.⁴ The effects of the pandemic persist today, with more vacant office spaces, reduced foot traffic, and fewer tenant improvement permits.⁵

Climate change. With the increasing effects of climate change, Portland is at a higher risk of heat emergencies, especially in historically redlined areas. Due to inequitable access to parks and trees, these redlined neighborhoods can be nearly 13 degrees hotter than non-redlined neighborhoods.⁶

Infrastructure for personal vehicles. Despite efforts to promote human-powered and public transportation, nearly 60% of commute trips in Portland are still made by individuals driving alone.⁷ This reliance on private vehicles leads to increased land consumption for driving and parking infrastructure contributing to the total area of impervious surfaces.

1 "State of Oregon Newsroom : NewsDetail : State of Oregon."
 2 "The Challenge – Housing Oregon."
 3 "Monthly Portland Neighborhood Offense Statistics | Tableau Public."
 4 "TO_COVID-19_impact-Survey_exe-Summary_FINAL-2.Pdf."
 5 "2023 State of Downtown & the Central City."
 6 Soll, "Climate Change in Greater Portland."
 7 "Transportation System Plan (TSP) | Portland.Gov."



I must emphasize that this project is an experiment and does not encompass all the aspects of a fully feasible design. Regrettably, the condensed timeframe of this project prevented me from conducting comprehensive community outreach. Additionally, the cost of materials and construction has not been carefully considered in my designs, as I opted for creative freedom and exploration. Furthermore, I cannot delve into the political viability of my proposals. It is important to acknowledge that addressing these complex and deeply rooted issues requires the coordination of people and organizations from various disciplines, backgrounds, and influences. The purpose of this project is to explore how design, through the lenses of urban acupuncture and the triple bottom line, can contribute to improving the state of affairs in Portland.

TRIPLE BOTTOM LINE



ENVIRONMENTAL

Climate Resilient Planting

Stormwater Management

Habitat Creation

Nature Integration to Urban Fabric

Low Embodied Carbon Materials

Reduce Urban Heat Island Effect



Photo Credit: Tojo Andrianarivo

ECONOMIC

Cues to Care

Prioritize Street Vendors

Local Business

Opportunities for Stability



SOCIAL

Reduce Crime

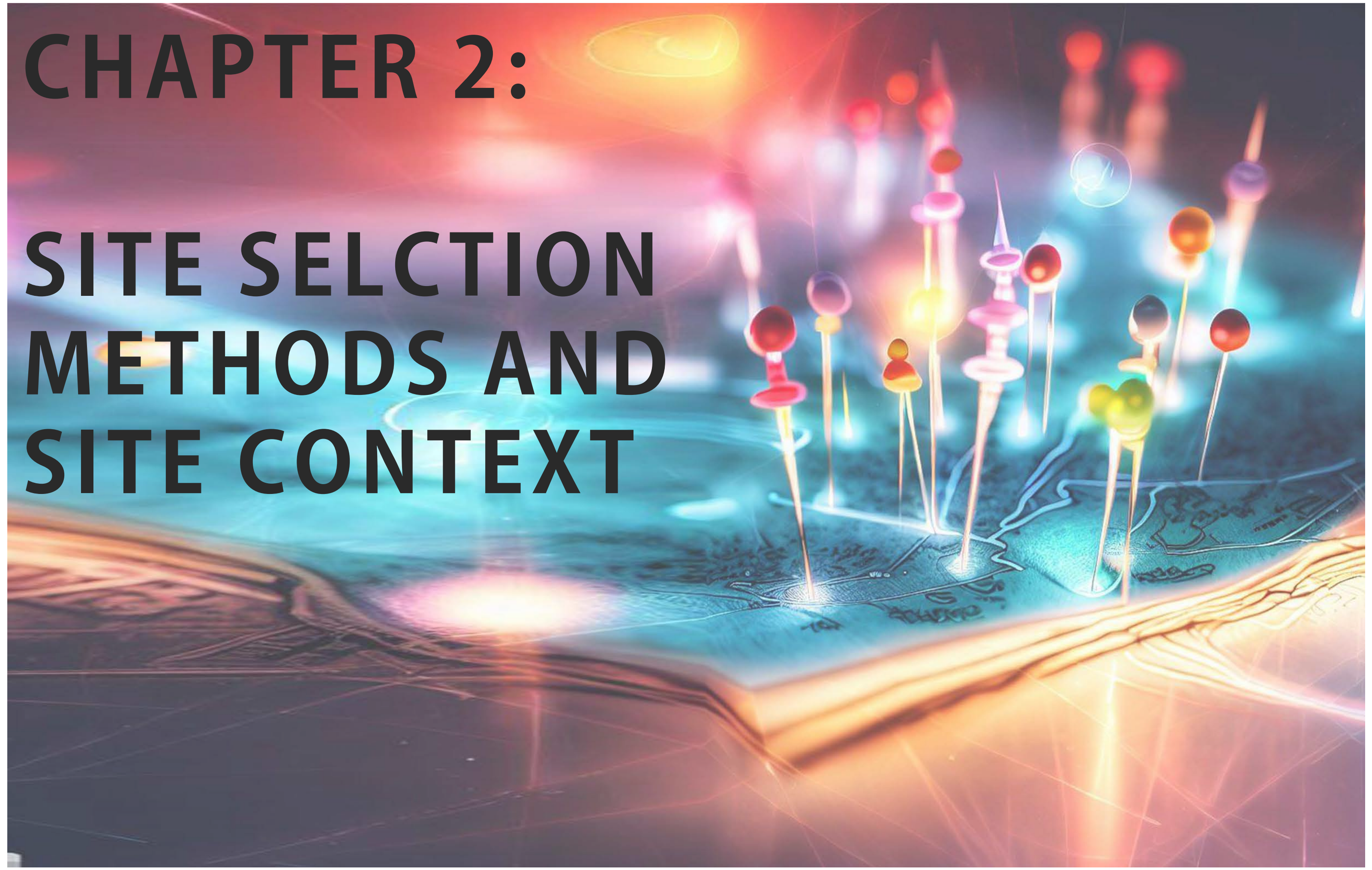
Highly Accessible

Positive Community Interaction

Generate Affordable Housing

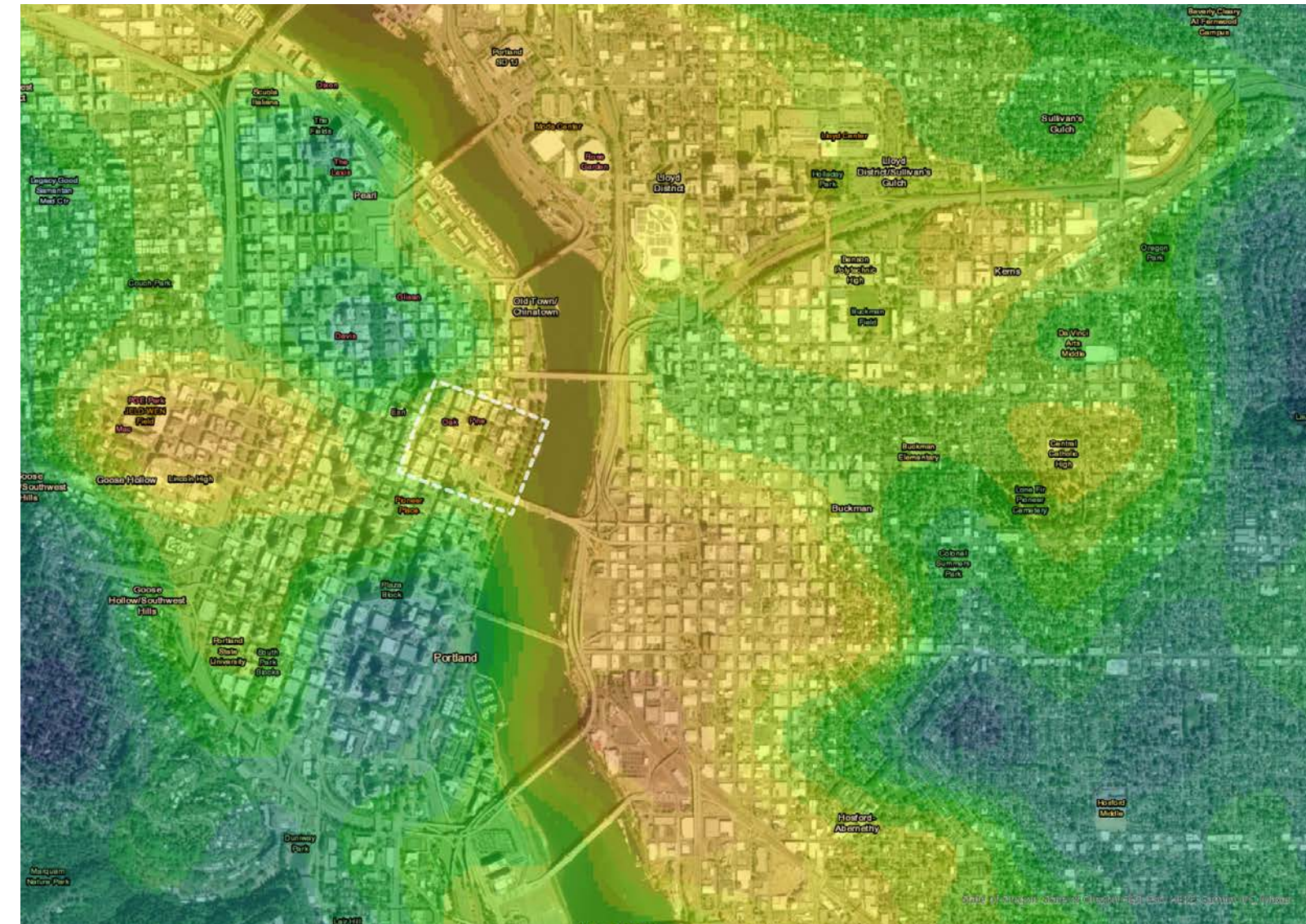
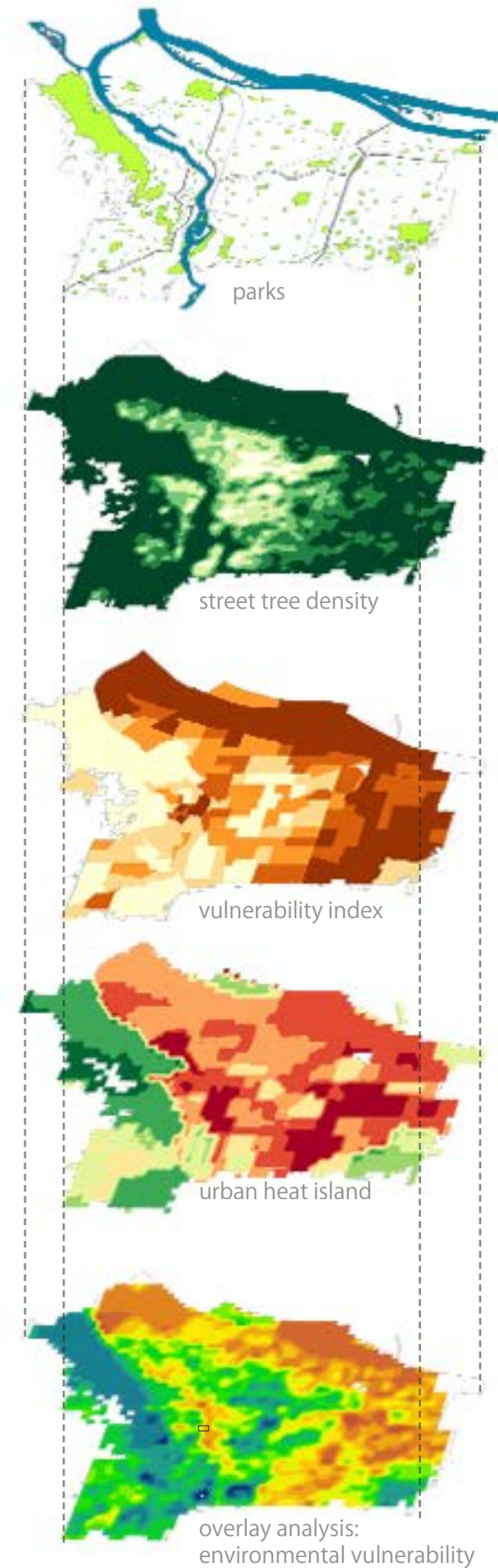
Holistic Care to Homeless

While Urban Acupuncture provides the methodological framework, the triple bottom line helps define my goals and objectives. Under the categories of Environmental, Economic, and Social, I have identified 15 goals related to the large-scale issues previously described in Portland. These goals have been instrumental in shaping my design process, serving as a foundation for my iterative approach. I continuously referred to them to ensure that my designs align with the intended outcomes. Moreover, these goals serve as a benchmark to evaluate the success of my final designs. The identified goals are shown on the screen and fall under the triple bottom line categories. I would like to highlight a couple of goals which may be a bit more difficult to understand. "Cues to Care" as used throughout this presentation are defined as "landscape elements that are immediately recognizable as designed, and that signal continuing human presence to care for a landscape." And, Habitat creation – a broad and very complex topic – is simplified for the purposes of this project by considering the environment in three layers: a large woody canopy, the volume of understory, herbaceous and floral diversity, and the presence of water with a preference towards native species.

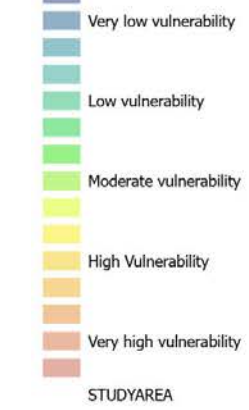


CHAPTER 2: SITE SELECTION METHODS AND SITE CONTEXT

SITE SELECTION METHODS

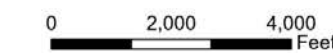


Environmental Vulnerability Index



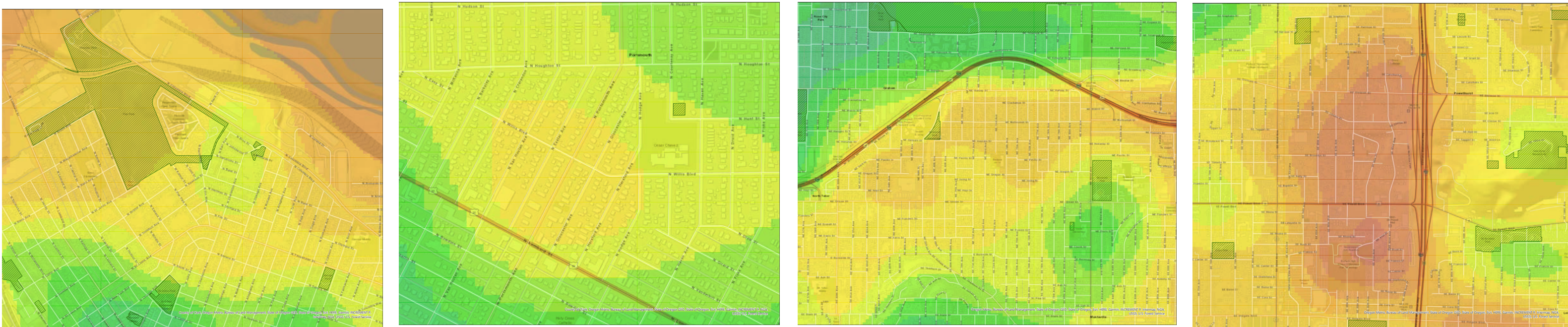
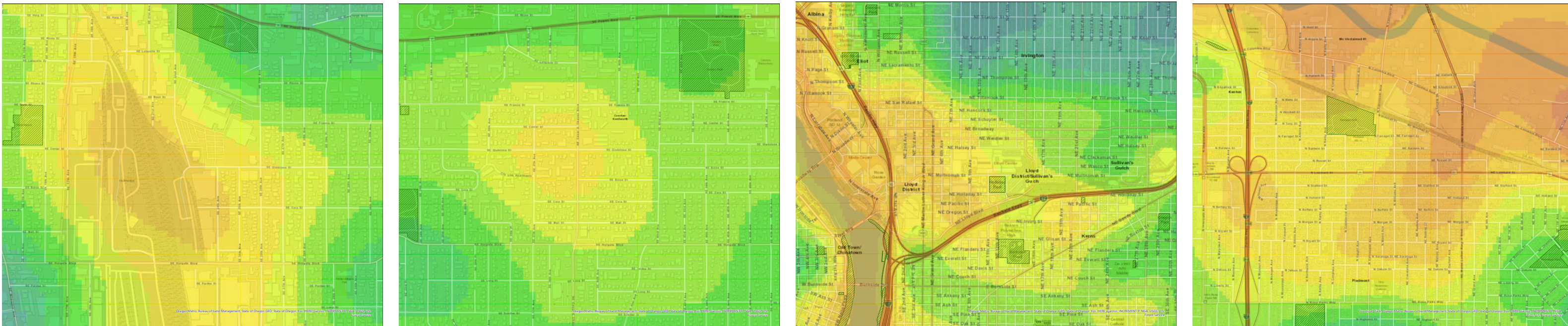
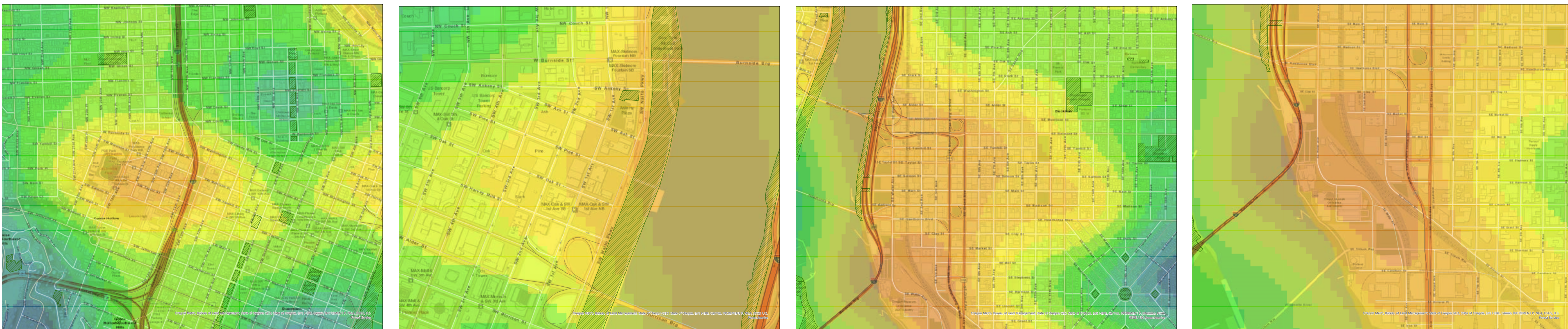
The Environmental Vulnerability Index takes into account the following factors:

- 1) Street tree density,
- 2) Proximity to public parks,
- 3) PDX Vulnerability Index,
- 4) Urban Heat Island Effect.

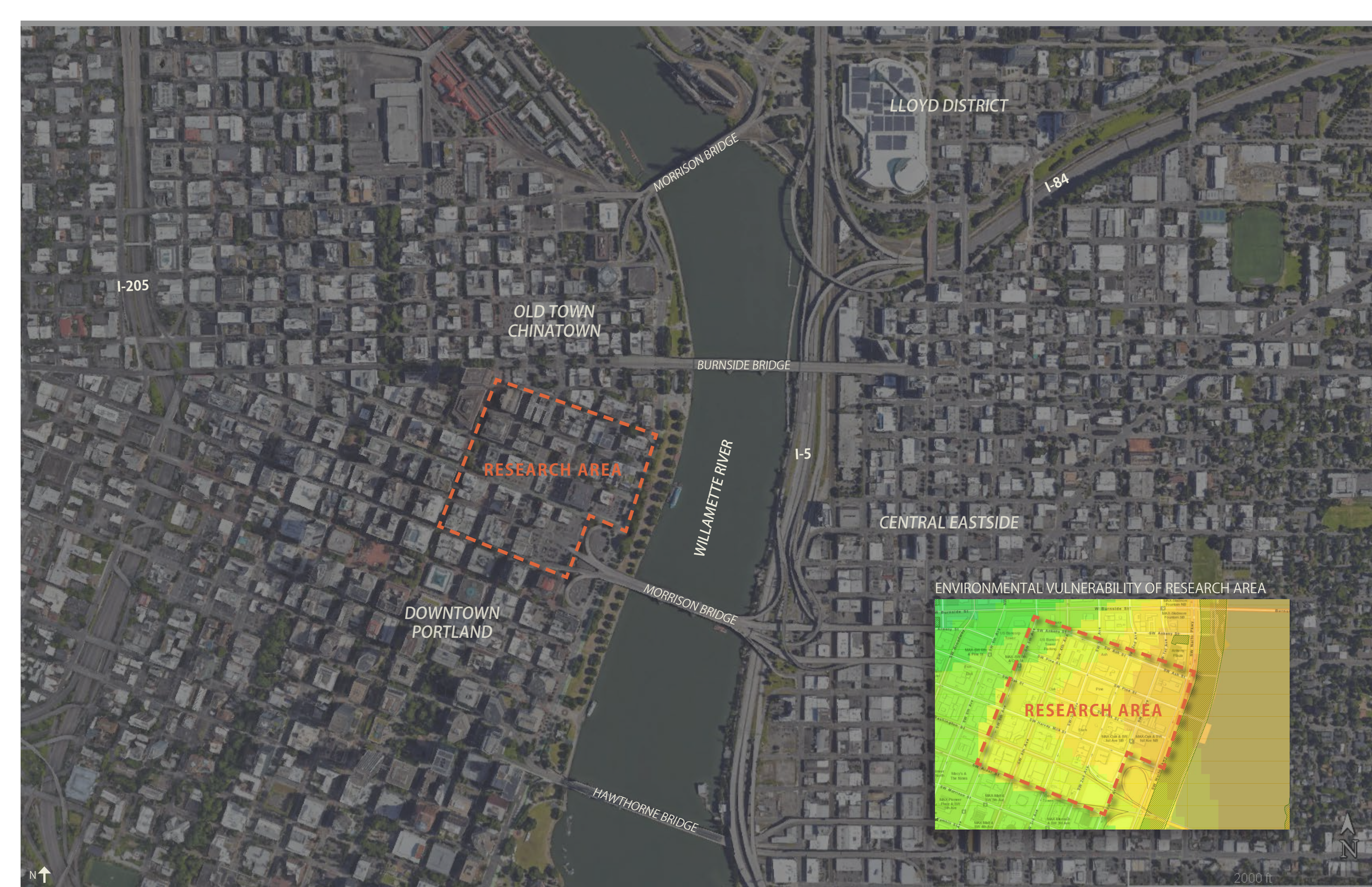


To determine the area in Portland most in need of design interventions, I conducted comprehensive analyses of the entire city. Employing a McHargian approach, I performed an overlay analysis using ArcGIS Pro to examine various factors. The layers utilized in the analysis included proximity to parks, density of street trees, the Portland Vulnerability Index, and the Urban Heat Island effect index. All the data used in the analysis was sourced from the Portland.gov's open data site. Proximity to parks and density of street tree layers were converted into rasters in ArcGIS Pro using the buffer and kernel density functions, respectively. I deliberately selected these layers as they are responsive to landscape interventions and allow for the identification of areas lacking equitable outdoor spaces and exhibiting higher risk factors associated with the urban environment. I would like to take a moment to explain the The Portland Vulnerability Index. It was developed by the city of Portland and integrates four defined risk factors: the percentage of renters, communities of color, population over 25 without a bachelor's degree, and households with income below 80% Median Family Income (MFI).⁸ This index aims to synthesize interconnected social, economic, and environmental factors to pinpoint at-risk areas.

To complete my analysis, each of the four layers was given equal weight and combined to create an "environmental vulnerability" heat map. Warmer-colored areas on the map indicate higher environmental vulnerability, while cooler-colored areas represent lower vulnerability.

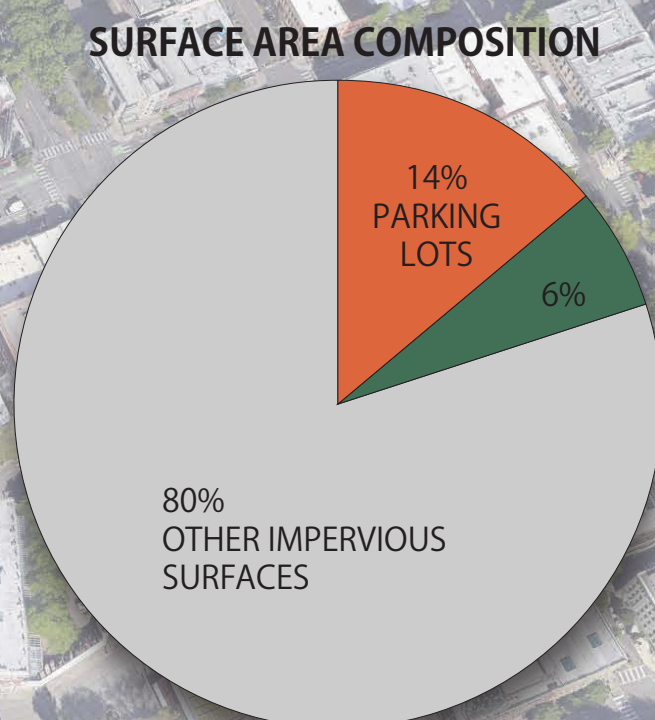


From the identified environmentally vulnerable areas in Portland, I selected and studied 12 locations, which are presented here. When choosing the final research area, I considered factors such as user numbers, mixed use, and cultural significance. An area with diverse uses and significant activity would not only present an interesting and challenging site but also have the potential to impact a larger number of people.



The research area I selected is situated in Downtown Portland, along the west shore of the Willamette River, including parts of both the Old Town Chinatown and Portland Downtown neighborhoods. It spans approximately 5 by 5 city blocks. Located between the Morrison and Burnside Bridges, this area is characterized by a dense urban environment with various building uses, including commercial, residential, parking, and institutional. It holds particular interest due to its history as a once-thriving metropolitan center that has experienced neglect, partially driven by the repercussions of the COVID-19 pandemic. I also happen to work in one of the office buildings on site and have had a continuous relationship with this area since my Portland State University days. I have seen this area change dramatically over the years -its been painful - and dream of a future where downtown can be a hub for positive change encounters, creativity, connection and community events once again.

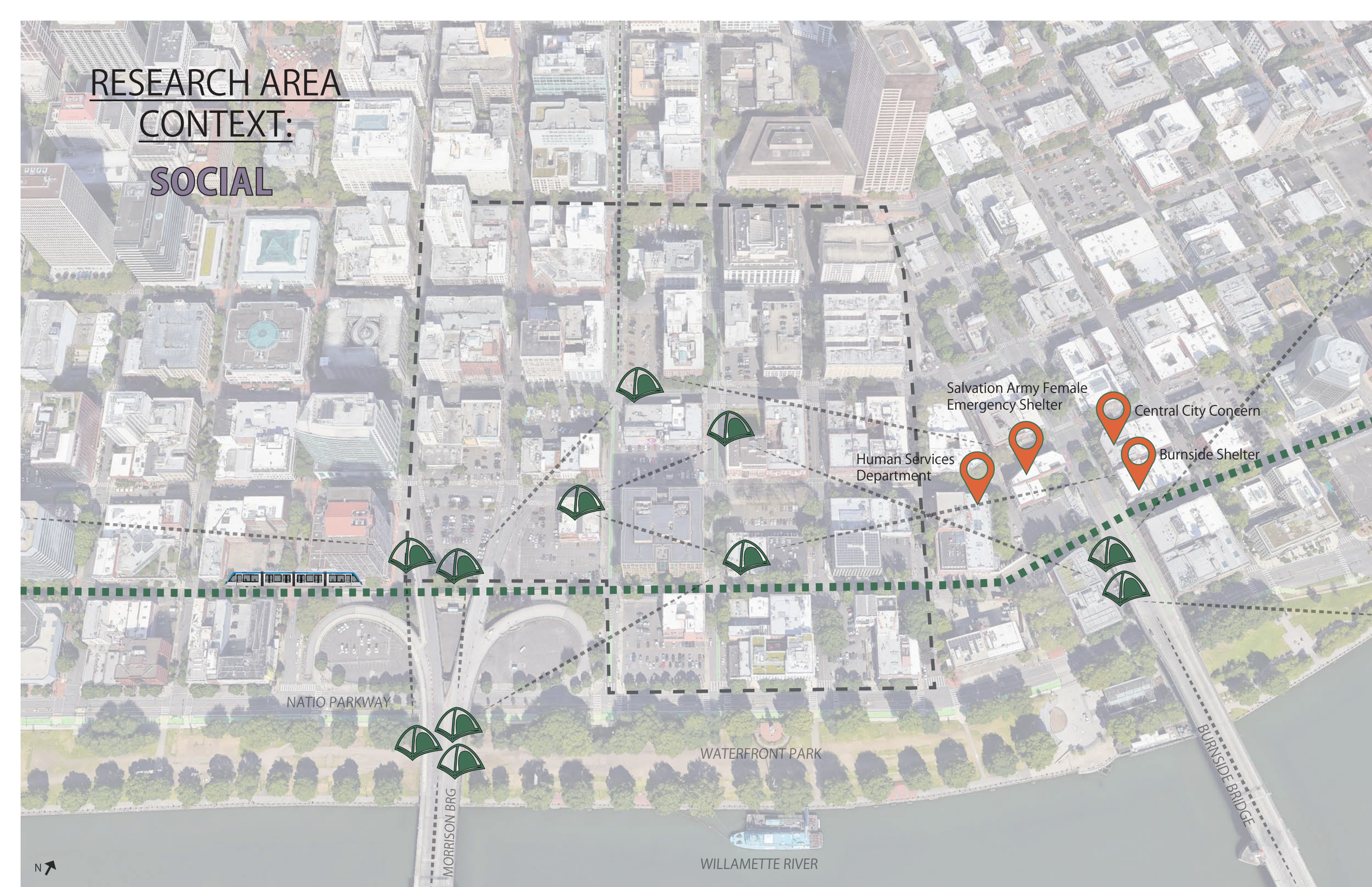
RESEARCH AREA
CONTEXT:
ENVIRONMENTAL



To gain a thorough understanding of the site, I examined its context through the lens of the triple bottom line, which encompasses the environmental, social, and economic aspects. One notable observation is the unusually large presence of parking lots within the research area. While other parts of downtown Portland have transitioned to high-density multi-level parking structures, the research area contains over 14% surface parking spread across 11 separate lots, accounting for approximately 660 parking stalls. The dark pavements of these parking lots absorb a significant amount of solar energy, rapidly releasing it into the air, thus contributing to the urban heat island effect. Although the urban heat island effect can be mitigated by a tree canopy, only 6% tree canopy cover exists in this area. Research has shown that urban tree canopy is inversely associated with higher crime rates for various potential reasons.⁹ It is worth noting that the Portland Downtown neighborhood currently exhibits the highest crime rate in the city.¹⁰

⁹ Troy, Morgan Grove, and O'Neil-Dunne, "The Relationship between Tree Canopy and Crime Rates across an Urban-Rural Gradient in the Greater Baltimore Region."
¹⁰ "Monthly Portland Neighborhood Offense Statistics | Tableau Public."

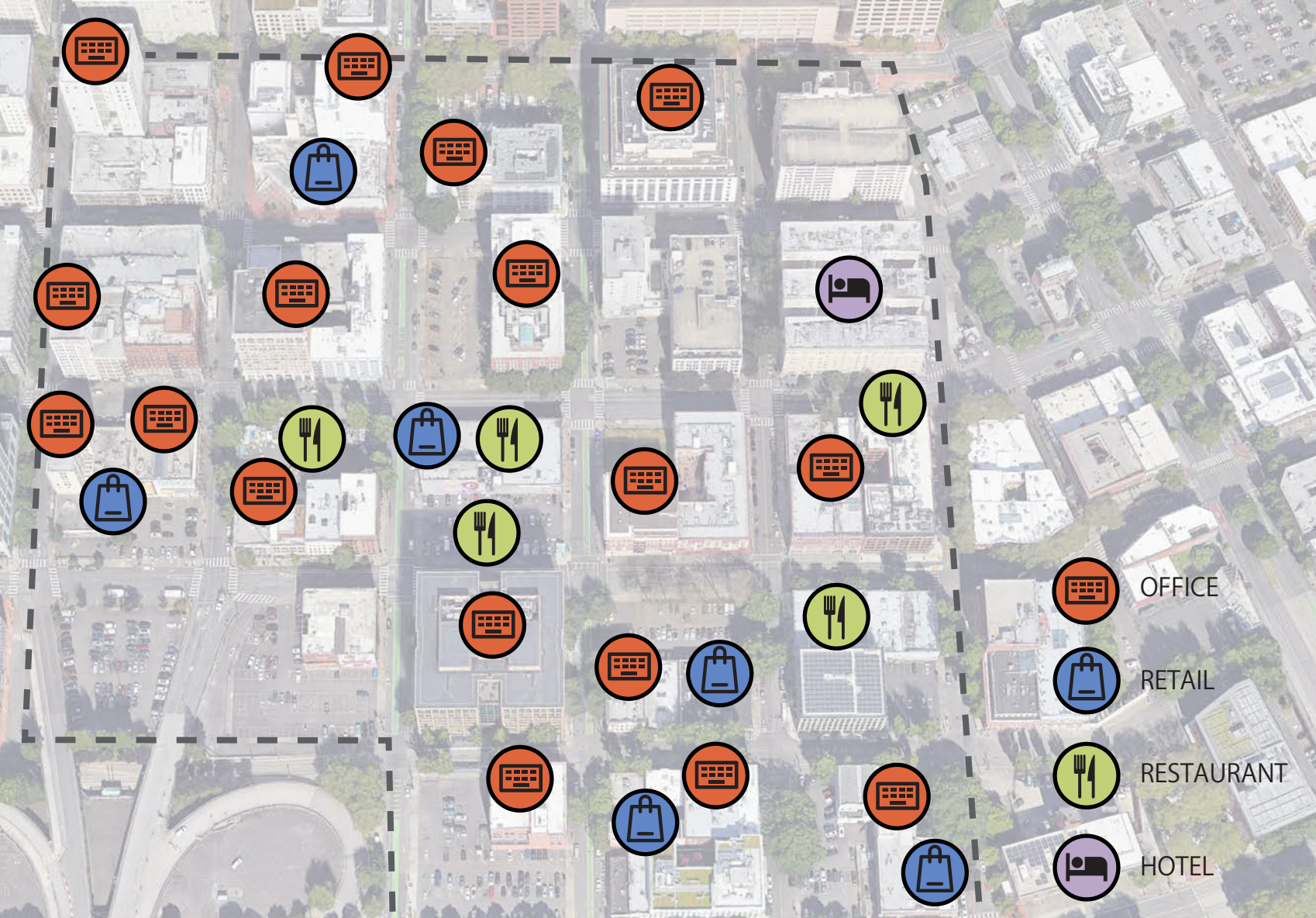
RESEARCH AREA
CONTEXT:
SOCIAL



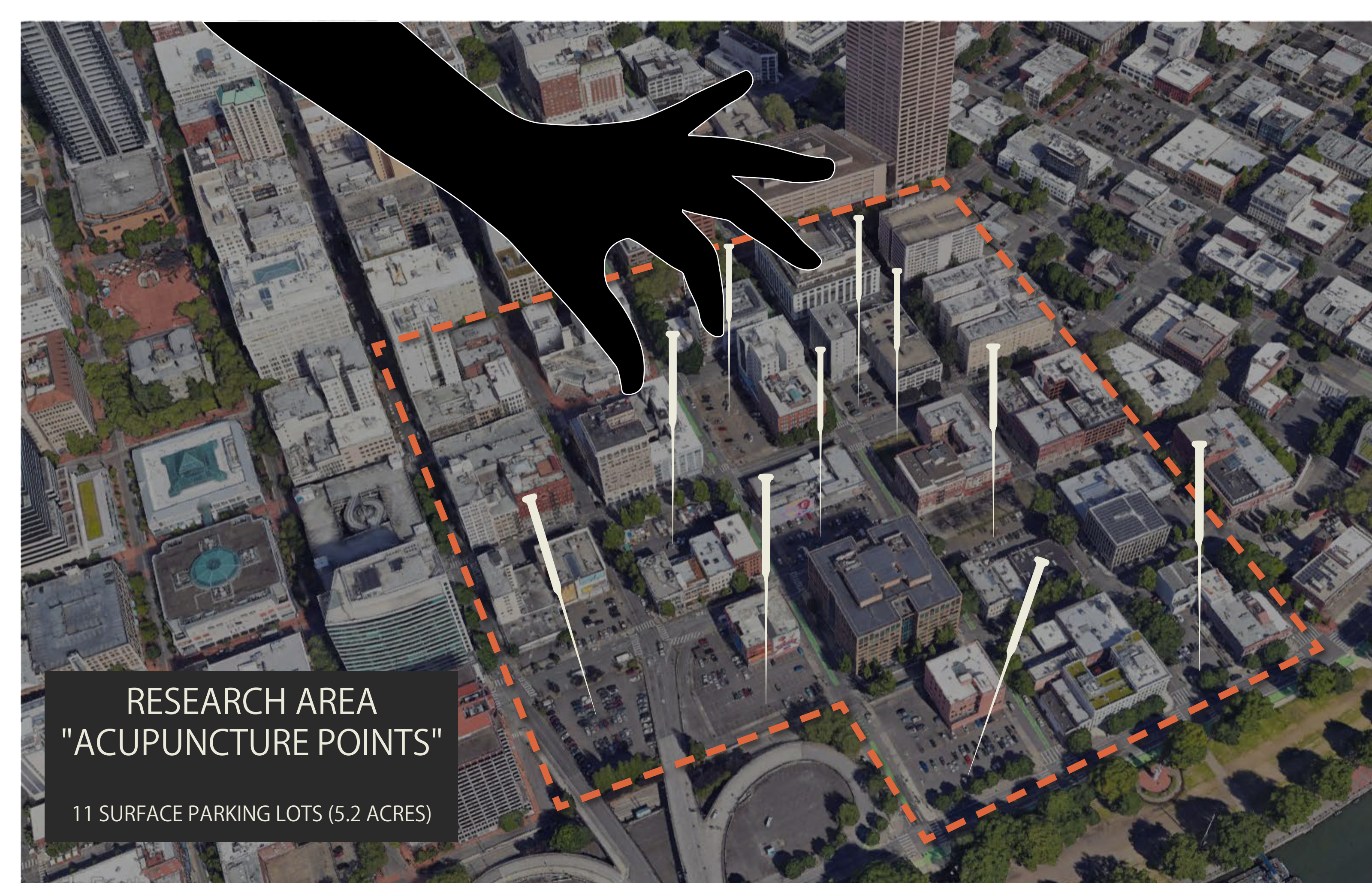
Portland is grappling with a severe housing shortage, which contributes to a significant number of individuals experiencing homelessness. The research area is adjacent to four major institutions that provide services to those without homes, contributing to numerous people camping in the area. This phenomenon is transient, with individuals setting up camps that may be swept or forcibly removed within a matter of hours, days, or weeks. The practice of clearing out camps may temporarily alleviate public perceptions of "nuisance" associated with homelessness by attempting to keep individuals out of sight and out of mind. However, it fails to address the underlying issues faced by individuals experiencing homelessness. The location of tents on this map is based on observation and is meant to illustrate a phenomenon – in other words the exact location of tents is not important. Research conducted by the National Alliance to End Homelessness indicates that the average cost to taxpayers for a chronically homeless person exceeds \$35,000 per year. Alternatively, when provided with supportive housing, these costs can be reduced by 49.5%.¹¹

11 "Cost-Savings-from-PSH.Pdf."

RESEARCH AREA
CONTEXT:
ECONOMIC

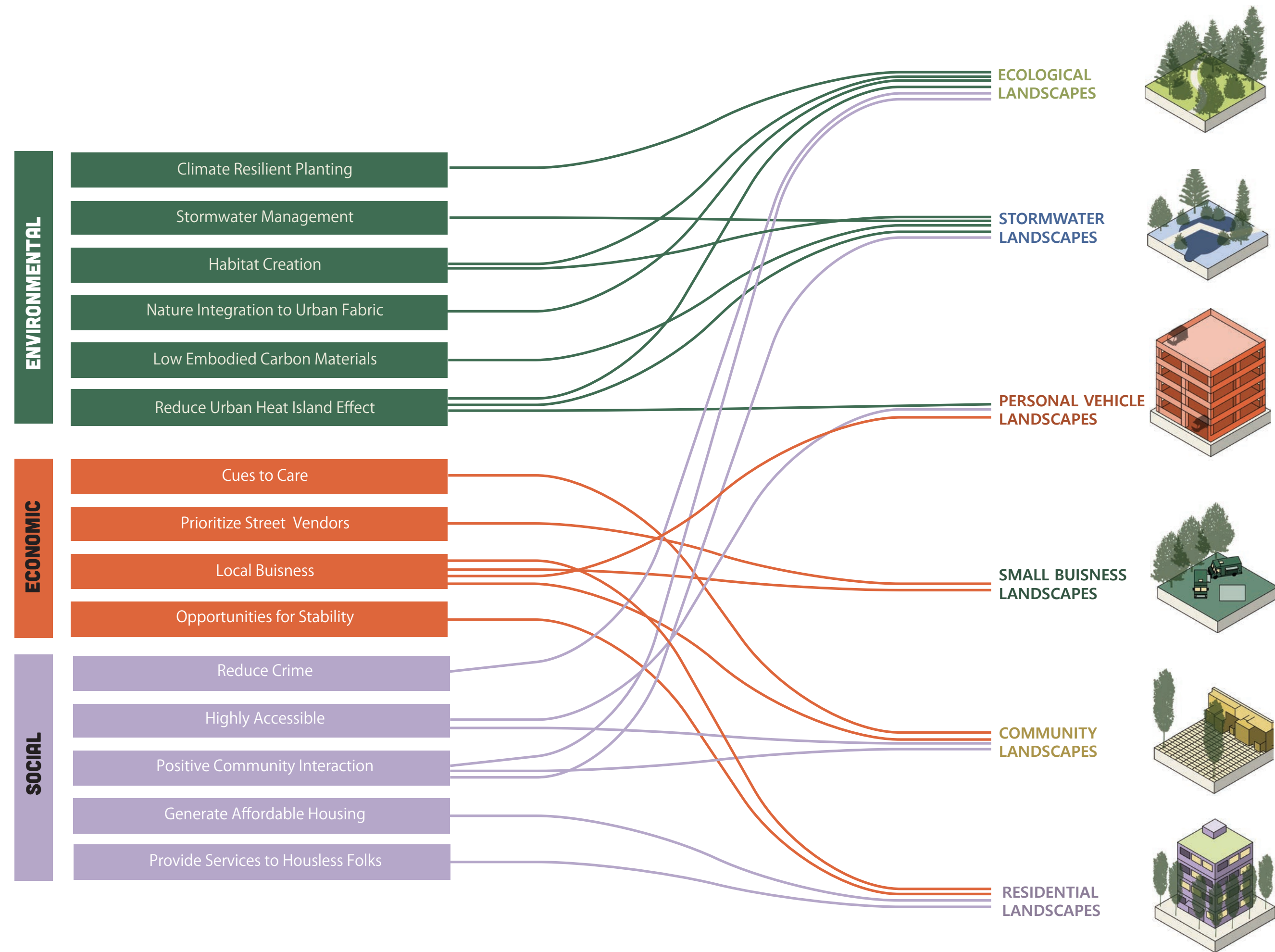


The businesses in the research area have been significantly affected by the COVID-19 pandemic. In 2020, many of Portland's small businesses either closed or had to lay off staff. By 2021, the overall economy had declined by 15%. Following the Black Lives Matter protests in the summer of 2020, pedestrian counts in the area experienced a substantial 57% decline compared to pre-protest levels. The Work-From-Home movement has transformed downtowns across the globe, with an increasing number of individuals foregoing their daily commutes. Consequently, businesses relying on office workers and foot traffic have been adversely impacted. Unfortunately, these factors create a feedback loop where decreased foot traffic leads to increased crime rates and diminished perceived safety, further deterring economic activity.



RESEARCH AREA
"ACUPUNCTURE POINTS"
11 SURFACE PARKING LOTS (5.2 ACRES)

The research area's 11 surface parking lots will serve as key points for intervention. My research focuses on the design interventions within these spaces rather than the surrounding streetscapes that integrate them.



It is important to note that not every intervention can address all 15 goals presented in the previous sections. In fact, I argue that they should not. By prioritizing specific goals in certain locations, design interventions can create a more significant overall impact. To optimize the utilization and design of these eleven sites, I sought out potential synergies that appeared evident. I created proposed use categories by grouping goals together to form distinct site types. Intuitively, I anticipated that these site types would be more suitable and feasible for different sets of design goals, while also generating valuable programs. Some goals, such as "Provide Services to Houseless Folks," can be translated into specific forms, such as Permanent Supportive Housing. Other goals can be combined to create use programs that lead to unexpected combinations of objectives, such as a stormwater-focused site designed to promote positive community interaction. Through my analysis, I identified six site types capable of addressing all 15 goals. These site types include:

Ecological Landscapes: Nature-inspired spaces with extensive vegetation coverage, potential habitat elements, and minimal hardscape.

Blue Infrastructure Landscapes: Sites designed to manage and infiltrate stormwater before it enters the river or wastewater treatment plant in north Portland.

Personal Vehicle Landscapes: Also known as parking garages, these sites, while not ideal in an ideal scenario, serve to increase accessibility for individuals with limited mobility, families, and those without access to public transportation.

Small Business Landscapes: Redesigned spaces centered around the long-standing street vendors in the area. These sites offer security and encourage patronage.

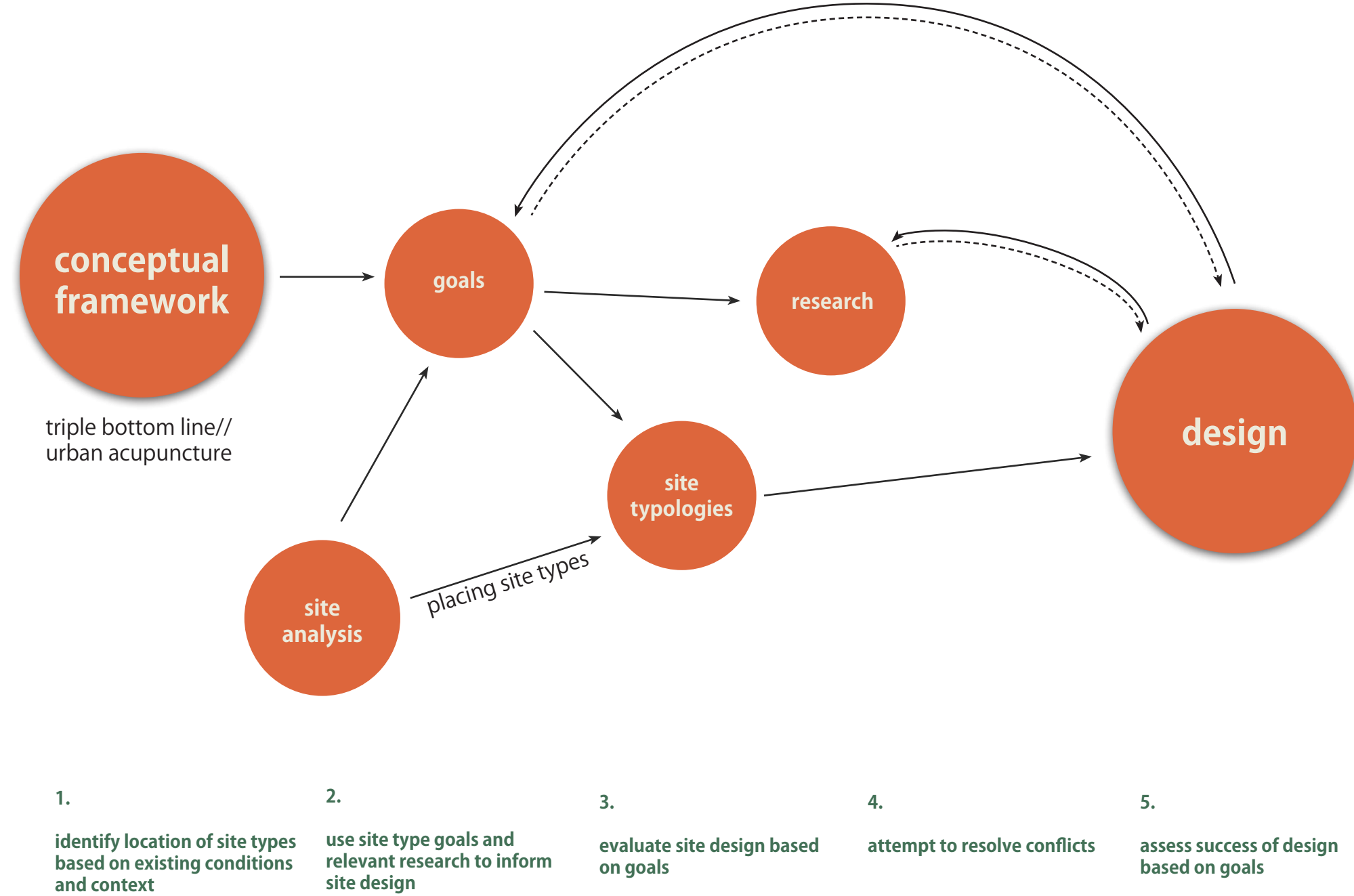
Community Landscapes: Plaza-like spaces designed for gatherings, events, protests, and enhanced social connection.

Residential Landscapes: Encompassing both affordable housing and permanent supportive housing

CHAPTER 3: THE DESIGNS



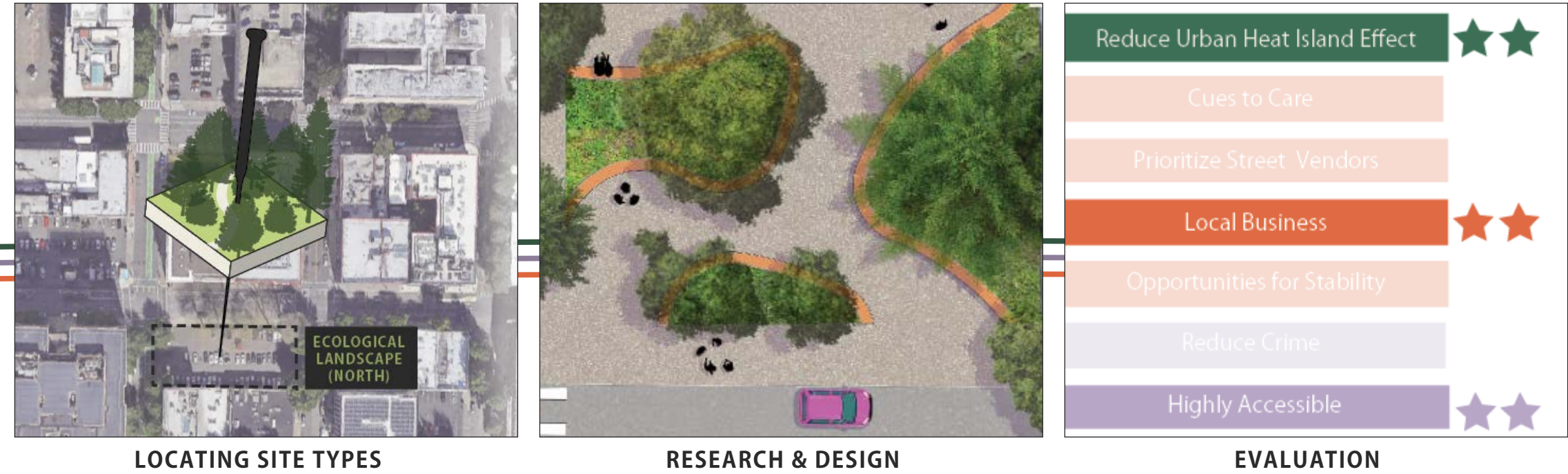
DESIGN PROCESS



1. identify location of site types based on existing conditions and context
2. use site type goals and relevant research to inform site design
3. evaluate site design based on goals
4. attempt to resolve conflicts
5. assess success of design based on goals

The design process for the individual sites within the research area was both goal-oriented and iterative. Initially, I located the site types within the research area based on existing conditions and potential opportunities in the area. The associated goals served as a foundation for shaping the design of each site. Once a conceptual design was developed, I evaluated its success in meeting the goals, identifying areas for improvement, and resolving any conflicts that arose. This iterative process continued until the design either optimally achieved all goals or until time constraints limited further refinement. Typically the latter. It is important to note that different interpretations of these goals were possible, and the following conceptual designs provided a means to test my framework at each site.

PRESENTATION PROGRESSION - DESIGNS



1. Locating site types based on site context and analysis.

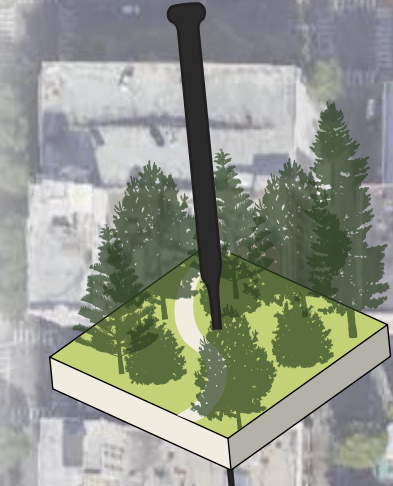
2. Plan render of design and research supporting decision making.

3. Evaluating how well each goal was achieved within the site on a 0-3 star scale.

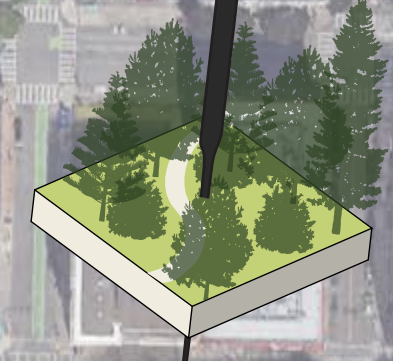
Now, let's delve into the details of each of the six site types, following a structured progression. We will begin by exploring the location of each site type within the research area and the reasons behind those choices. Subsequently, a brief description will be provided regarding how each design addressed (or failed to address) the set goals for that particular site type. Finally, we will evaluate the overall success or failure of the designs. As you review the plan renders, you will notice star ratings assigned to the goals they aimed to address. These ratings range from 0 to 3 stars, with 0 indicating no goal fulfillment and 3 representing optimal goal achievement.

LOCATING SITE
TYPES:

**ECOLOGICAL
LANDSCAPES**



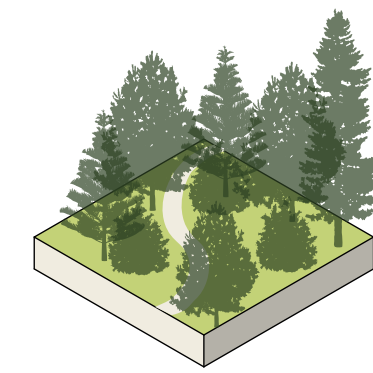
**ECOLOGICAL
LANDSCAPE
(SOUTH)**



**ECOLOGICAL
LANDSCAPE
(NORTH)**



While most site types were located within the research area by matching site program with existing site conditions, the “environmental landscapes” were located using a process of elimination. In other words, other uses and programs worked better elsewhere, so the ecological landscapes site types landed here.



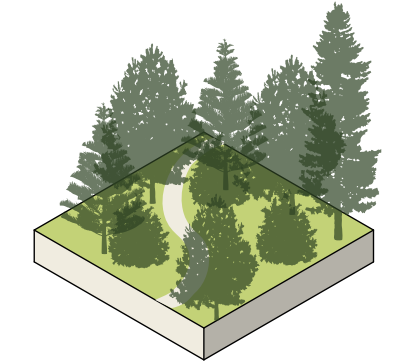
ECOLOGICAL LANDSCAPES (S)

- Climate Resilient Planting ★
- Stormwater Management
- Habitat Creation ★★ ★
- Nature Integration to Urban Fabric ★★ ★
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect ★★
- Cues to Care
- Prioritize Street Vendors
- Local Business
- Opportunities for Stability
- Reduce Crime ★
- Highly Accessible
- Positive Community Interaction ★
- Generate Affordable Housing
- Provide Services to Houseless Folks

The first ecological landscape design, ecological landscape south, was driven first and foremost by the goals previously laid out, as is the form and design of all sites. This site type's goals fall under the environmental and social category, more heavily leaning toward the environmental. As we know, the urban heat island effect in the summertime is due primarily to the "lack of greenery and the high level of solar radiation absorbed by the urban surface".¹² The research area has a 3.1% deviation towards higher temperatures from regional average surface temperatures.¹³ As regional summer temperatures rise due to climate change, mitigating the urban heat island effect is important to preserve life and health of urban inhabitants. Parks can create what are called cool islands and can reduce temperatures by up to 4 degrees Celsius (7.2 degrees Fahrenheit). Green spaces also reduce energy usage in surrounding buildings. The 22 trees added to this site through my design process will cool the surrounding area through evapotranspiration and shading. This design uses native trees and some understory vegetation near the buildings to create favorable habitat.

¹² Gago et al., "The City and Urban Heat Islands."

¹³ "Urban Heat Islands."



ECOLOGICAL LANDSCAPES (N)

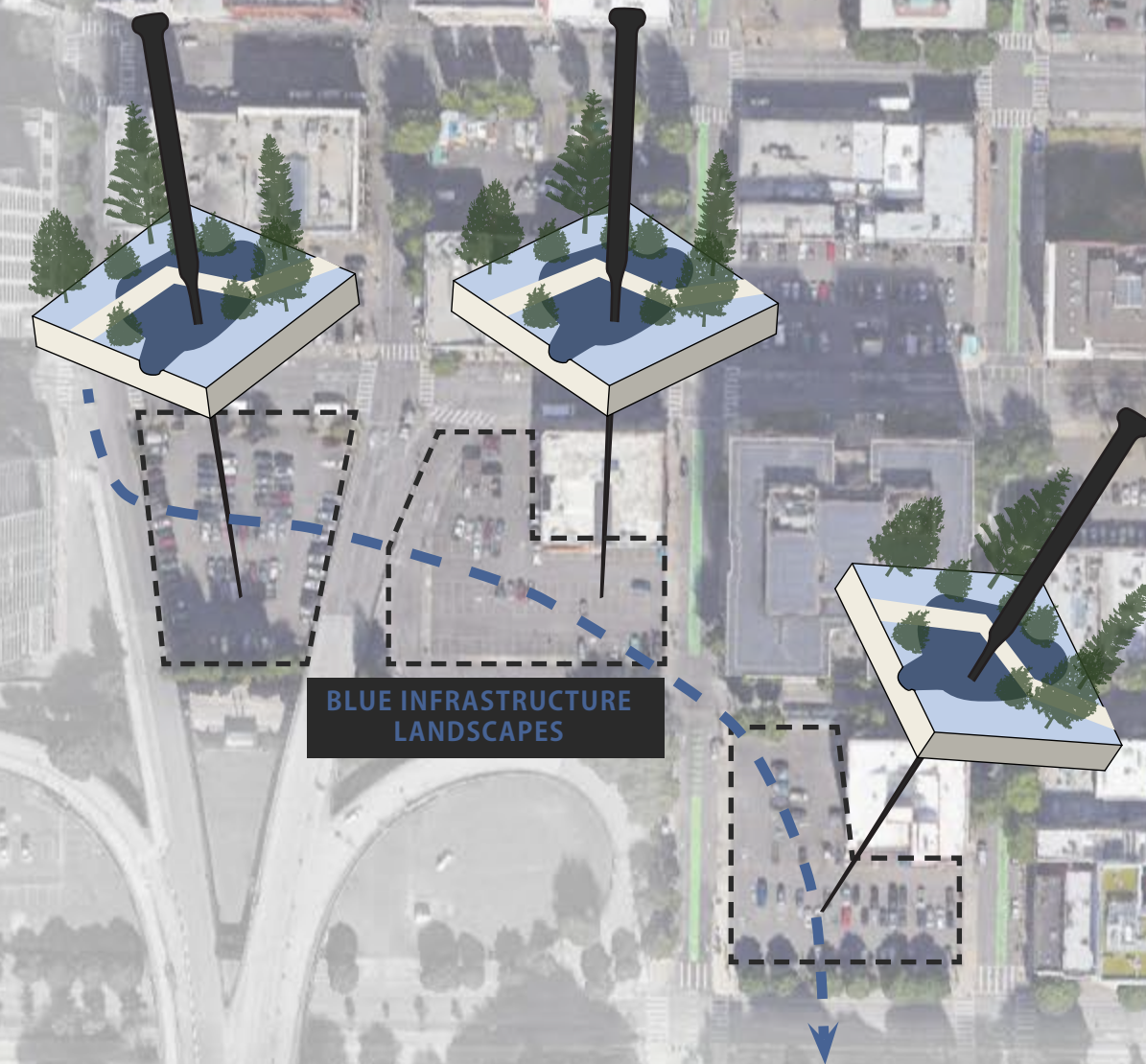
- Climate Resilient Planting ★★
- Stormwater Management
- Habitat Creation ★★
- Nature Integration to Urban Fabric ★★★
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect ★★★
- Cues to Care
- Prioritize Street Vendors
- Local Business
- Opportunities for Stability
- Reduce Crime ★★
- Highly Accessible
- Positive Community Interaction ★★★
- Generate Affordable Housing
- Provide Services to Houseless Folks

The inclusion of green spaces can contribute to a decrease in crime rates. Research conducted in the greater Baltimore region revealed that a 10% increase in canopy cover correlated with a 12% reduction in crime.¹⁴ Vegetation and trees attract people to the area, creating a sense of vigilance and care among the community. However, it is essential to maintain sight lines and avoid dense, low vegetation that could be used for concealment. Consequently, the understory of this ecological landscape prioritizes low vegetation to ensure clear visibility.

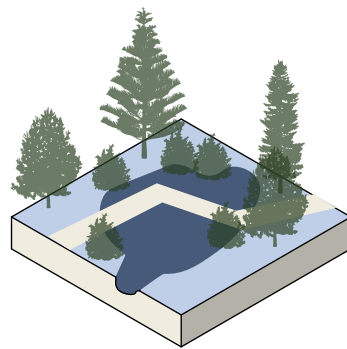
¹⁴ Troy, Morgan Grove, and O'Neil-Dunne, "The Relationship between Tree Canopy and Crime Rates across an Urban-Rural Gradient in the Greater Baltimore Region."

LOCATING SITE
TYPES:

**BLUE
INFRASTRUCTURE
LANDSCAPES**



The “blue infrastructure landscapes” are located here because the stormwater within the research area generally flows eastwards towards the Willamette River, and because of the many stormwater main lines adjacent to the sites. Additionally, the Morrison bridge creates excessive traffic noise, so the other uses would not be well suited here. The site also presents a unique opportunity to treat and infiltrate water coming from the Morrison Bridge. These three sites work together to provide stormwater treatment, wildlife habitat and positive community interaction. The water enters at the southern site and flows northeast towards the Willamette River.



BLUE INFRASTRUCTURE LANDSCAPES

- Climate Resilient Planting
- Stormwater Management ★★
- Habitat Creation ★★
- Nature Integration to Urban Fabric ★★
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect ★★★
- Cues to Care
- Prioritize Street Vendors
- Local Business
- Opportunities for Stability
- Reduce Crime
- Highly Accessible
- Positive Community Interaction ★★
- Generate Affordable Housing
- Provide Services to Houseless Folks

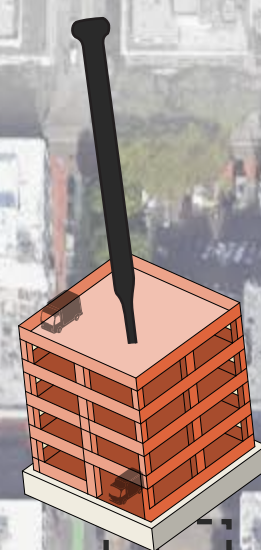
Constructed wetlands, if properly planned and maintained, can treat stormwater while simultaneously providing wildlife habitat and community benefits.¹⁵ By employing heterogeneous grading and planting techniques, nesting islands for waterfowl and other birds can be created, promoting biodiversity. The constructed wetlands, with an average depth of 18 inches, have the capacity to hold approximately 3 acre-feet of water, contributing to flood mitigation efforts. As water progresses through the system, it becomes cleaner, allowing increased human interaction and access to subsequent spaces. The first lot and pond are gated off, providing a promenade for people to walk past and observe the wetland. A viewing platform and interpretive signage further enhance the experience. The second site incorporates a boardwalk that cuts through the wetland, ensuring safety while providing opportunities to appreciate the surroundings. The third site, strategically located near a Max stop, caters to commuters and offers seating areas, interactive play equipment, and a pleasant environment to relax and wait for the train.

¹⁵ "How Do Treatment Wetlands Why Build Them? - US EPA



LOCATING SITE TYPES:

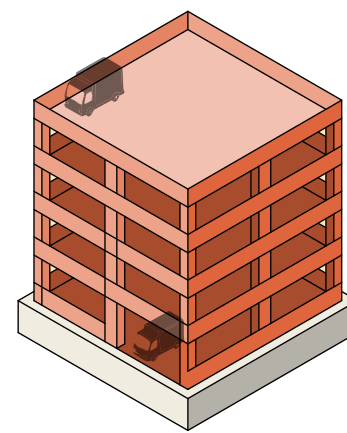
PERSONAL VEHICLE LANDSCAPE



PERSONAL VEHICLE LANDSCAPES



In order to locate the Personal Vehicle Landscape a solar analysis was conducted. Using Rhino, Grasshopper, and Ladybug, this site was identified as the shadiest within the research area. As a result, it was deemed unsuitable for site types that encourage significant human interaction. Furthermore, its central location offers convenient access to the surrounding offices and businesses.



PERSONAL VEHICLE LANDSCAPES

- Climate Resilient Planting
- Stormwater Management
- Habitat Creation
- Nature Integration to Urban Fabric
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect ★★
- Cues to Care
- Prioritize Street Vendors
- Local Business ★★
- Opportunities for Stability
- Reduce Crime
- Highly Accessible ★★
- Positive Community Interaction
- Generate Affordable Housing
- Provide Services to Houseless Folks

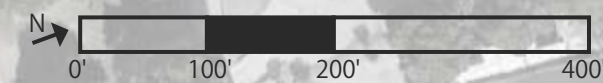
The process of converting surface lots into other uses in this project eliminated about 660 parking spaces in single level, surface parking lots. These are partially replaced in this four-level parking structure that provides about 253 parking spaces in a much more space-efficient manner. As Portland aims to densify and promote alternative forms of transportation, such as cycling and public transit, parking requirements are decreasing. However, it is crucial to include accessible parking at activity centers to ensure individuals with disabilities can access goods, services, employment, and entertainment. Although alternative transportation modes are encouraged, some individuals may reside outside the reach of public transportation or prefer personal vehicles. By incorporating parking in the redesign of the research area, those who rely on personal vehicles for transportation are accommodated. Additionally, on-street parking remains available since the project focused primarily on redesigning parking lots, not streetscapes. The swap of multilevel parking for surface parking resulted in a reduction of surface area used for parking from 5.2 acres to 0.5 acres. The redesigned parking lots proposed in this project incorporate shade trees, contributing positively to cooler microclimates.

LOCATING SITE TYPES:

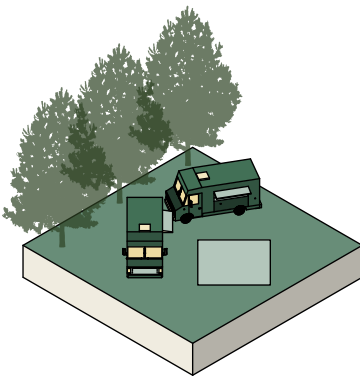
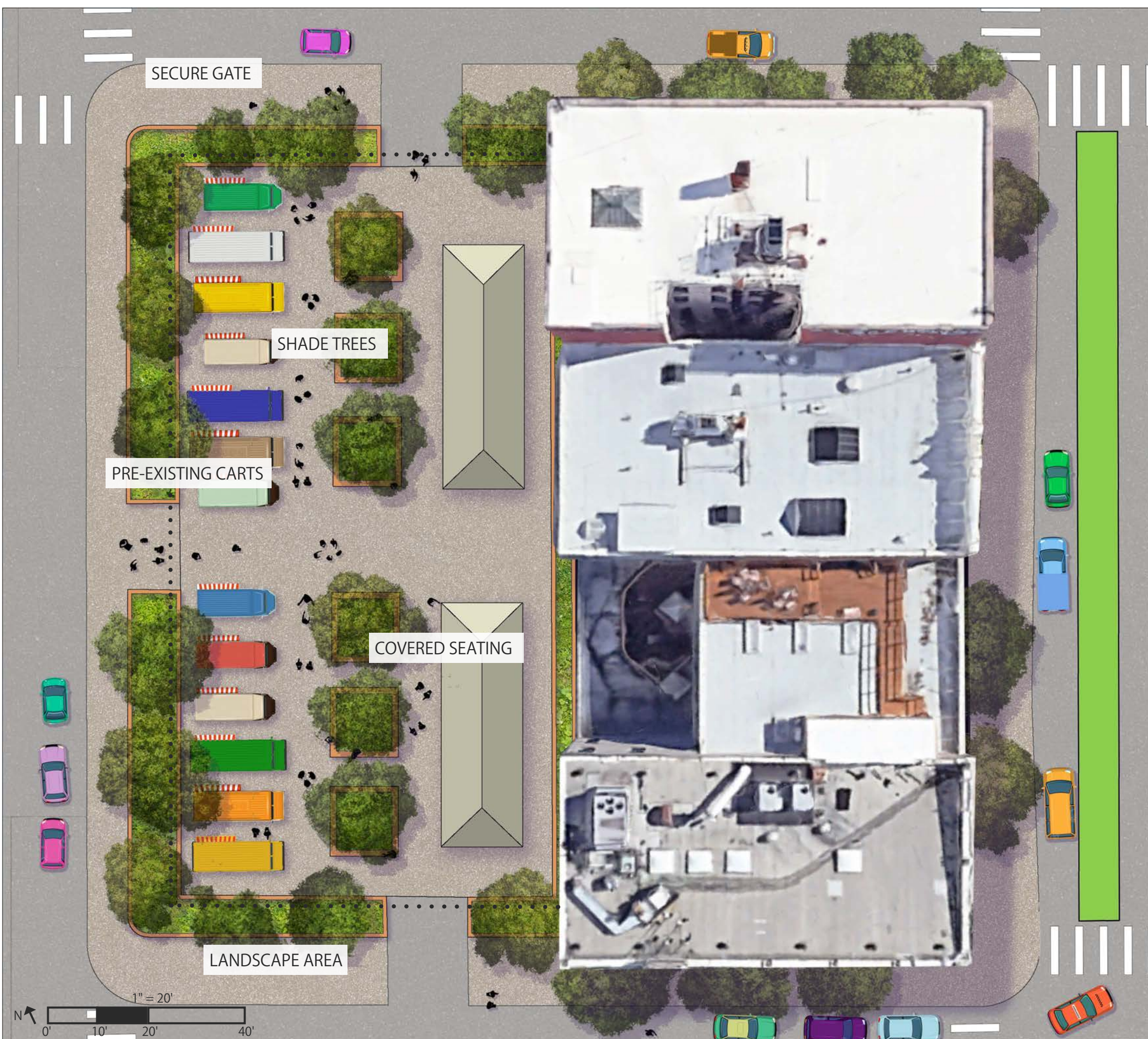
SMALL BUSINESS LANDSCAPES

SMALL BUSINESS LANDSCAPE (SOUTH)

SMALL BUSINESS LANDSCAPE (NORTH)



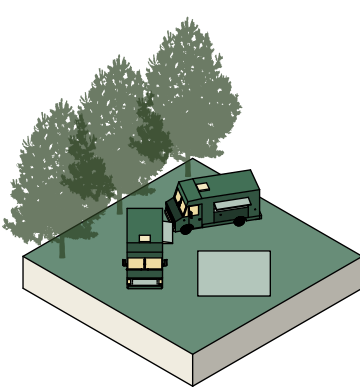
Two well-established food cart pods exist within the research area, activating the space and offering culturally diverse food options for many years. The success of these carts is attributed to the area's walkability, proximity to transit, and the pedestrian-oriented culture. While these businesses will not be relocated, their context will be redesigned.



SMALL BUSINESS LANDSCAPE (S)

- Climate Resilient Planting
- Stormwater Management
- Habitat Creation
- Nature Integration to Urban Fabric
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect
- Cues to Care
- Prioritize Street Vendors** ★★★★★
- Local Business** ★★★★★
- Opportunities for Stability
- Reduce Crime
- Highly Accessible
- Positive Community Interaction
- Generate Affordable Housing
- Provide Services to Houseless Folks

The redesign of these spaces focuses on enhancing the existing food cart pods by introducing additional amenities for both business owners and consumers. Improvements include seating areas, landscaped spaces, and shade structures.



SMALL BUSINESS LANDSCAPE (N)

- Climate Resilient Planting
- Stormwater Management
- Habitat Creation
- Nature Integration to Urban Fabric
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect
- Cues to Care
- Prioritize Street Vendors ★★★★★
- Local Business ★★★★★
- Opportunities for Stability
- Reduce Crime
- Highly Accessible
- Positive Community Interaction
- Generate Affordable Housing
- Provide Services to Houseless Folks

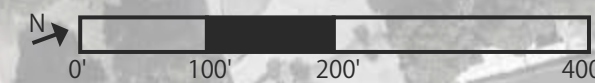
The improved designs incorporate perimeter fences to create a safer and more secure environment. During business hours, these fences can be opened, allowing cart owners to operate with increased confidence while defining the space more effectively.

LOCATING SITE
TYPES:

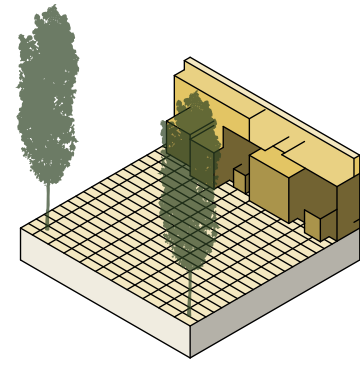
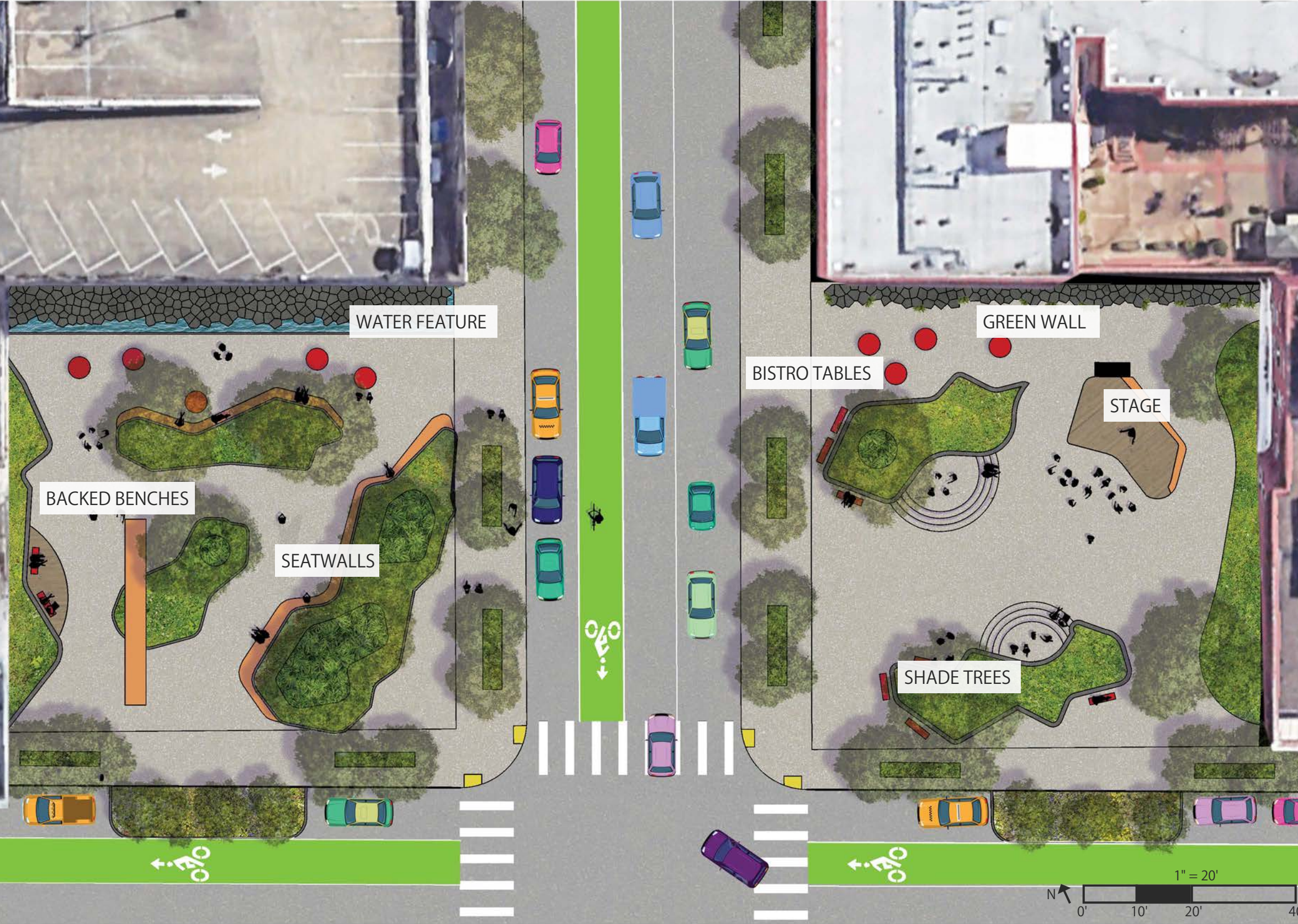
**COMMUNITY
LANDSCAPES**



**COMMUNITY
LANDSCAPES**



The two quarter-block sites in close proximity offer an intriguing opportunity for a "community landscape." Their spatial relationship allows for interaction, reflecting and contrasting the design and use of both spaces.



COMMUNITY LANDSCAPES

- Climate Resilient Planting
- Stormwater Management
- Habitat Creation
- Nature Integration to Urban Fabric
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect
- Cues to Care** ★★ ★
- Prioritize Street Vendors
- Local Business** ★ ★
- Opportunities for Stability
- Reduce Crime
- Highly Accessible** ★ ★ ★
- Positive Community Interaction** ★ ★ ★
- Generate Affordable Housing
- Provide Services to Houseless Folks

These designs foster community interaction, offering distinct spaces for various activities. The site on the left prioritizes intimate conversations, featuring a water feature to drown out city noise, tree planters for shade, and flexible seating options. These amenities enhance accessibility for different groups of people. The design on the right includes a central stage for performances, protests, and community events. Its open plaza-like composition allows for flexible usage, ranging from concerts to pop-up markets. Semi-circle shaped areas serve as secondary focal points, while seat steps and backed seating facilitate observation of multiple activities. Raised planters with deciduous shade trees contribute to cooling the area during increasingly hot summers. These parks, with their water features, shade trees, and benches, send a clear message to the community that they are cared for and well-maintained. Such "cues to care" are essential in reshaping public opinion about the area, potentially reducing crime rates and fostering positive perceptions among visitors, which, in turn, can benefit local businesses.

LOCATING SITE
TYPES:

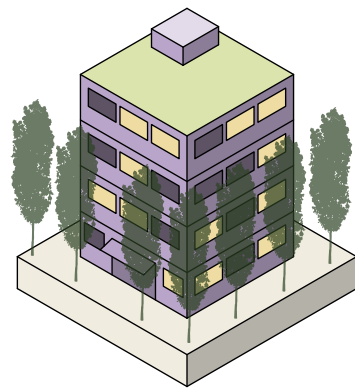
**RESIDENTIAL
LANDSCAPES**

RESIDENTIAL
LANDSCAPE
(AFFORDABLE HOUSING)

RESIDENTIAL
LANDSCAPE
(PSH)



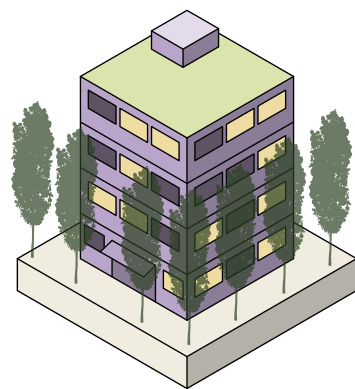
The Residential Landscapes site type encompasses an affordable apartment building and a permanent supportive housing facility. The affordable housing building is situated on the western side of the research area, aligned with the trend of increasing building height in that direction. A 10-story apartment building is well-suited to the urban context there. On the other hand, the northern site focuses on permanent supportive housing, providing not only housing but also medical, mental health, and addiction recovery services. Its proximity to existing services, shelters, and government assistance hubs establishes a tight support network.



RESIDENTIAL LANDSCAPES (AFFORDABLE HOUSING)

- Climate Resilient Planting
- Stormwater Management
- Habitat Creation
- Nature Integration to Urban Fabric
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect
- Cues to Care
- Prioritize Street Vendors
- Local Business ★★
- Opportunities for Stability ★★
- Reduce Crime
- Highly Accessible
- Positive Community Interaction
- Generate Affordable Housing ★★★
- Provide Services to Houseless Folks ★

The affordable housing site can accommodate approximately 210 units if all apartments are 800 square feet. The provision of affordable housing is a crucial step in addressing the city's housing needs, offering stability and creating opportunities for individuals to thrive. Investing in affordable housing yields economic benefits, as the cost of homelessness often exceeds the cost of providing housing. Furthermore, housing individuals experiencing homelessness in a supportive environment fosters a more favorable community atmosphere, potentially attracting investment and supporting local businesses.



RESIDENTIAL LANDSCAPES

PERMANENT SUPPORTIVE HOUSING

- Climate Resilient Planting
- Stormwater Management
- Habitat Creation
- Nature Integration to Urban Fabric
- Low Embodied Carbon Materials
- Reduce Urban Heat Island Effect
- Cues to Care
- Prioritize Street Vendors
- Local Business ★
- Opportunities for Stability ★★
- Reduce Crime
- Highly Accessible
- Positive Community Interaction
- Generate Affordable Housing ★★
- Provide Services to Houseless Folks ★★★

Recognizing the trauma associated with homelessness, the permanent supportive housing site incorporates a gated courtyard. Green spaces play a significant role in promoting mental health among individuals recovering from traumatic events. The rooftop garden offers opportunities for small to medium-sized gatherings and features elements of a therapeutic garden, designed to evoke feelings of safety and serenity. The gardens provide accessible tranquility, lush greenery, and privacy for the residents.

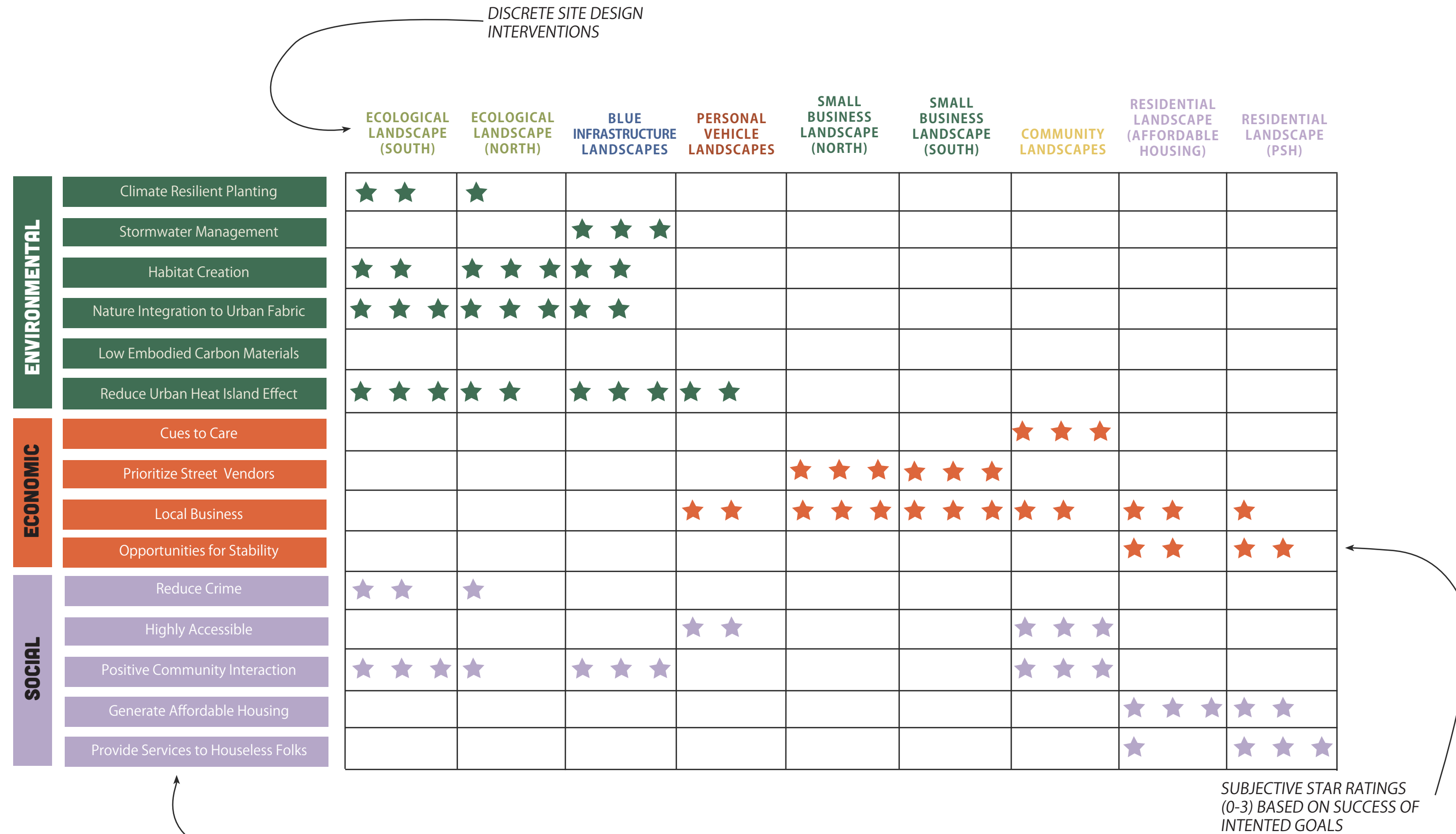


CHAPTER 4:

ANALYSIS OF DESIGN EFFICACY



INTENTIONAL STARS



The evaluation involved charting the performance of each discrete site design against the goals. These star ratings are based on my own intuitive judgement and not by measurements or defined criteria systems. The chart displays the 15 goals on the left side and the nine discrete landscape interventions across the top, with stars indicating the efficacy of each design in addressing its intended goals. These star ratings are the same as we saw previously next to the plan renders.

TOTAL STARS BY DESIGN

		ECOLOGICAL LANDSCAPE (SOUTH)	ECOLOGICAL LANDSCAPE (NORTH)	BLUE INFRASTRUCTURE LANDSCAPES	PERSONAL VEHICLE LANDSCAPES	SMALL BUSINESS LANDSCAPE (NORTH)	SMALL BUSINESS LANDSCAPE (SOUTH)	COMMUNITY LANDSCAPES	RESIDENTIAL LANDSCAPE (AFFORDABLE HOUSING)	RESIDENTIAL LANDSCAPE (PSH)
ENVIRONMENTAL	Climate Resilient Planting	★ ★	★							
	Stormwater Management			★ ★ ★						
	Habitat Creation	★ ★	★ ★ ★	★ ★						
	Nature Integration to Urban Fabric	★ ★ ★	★ ★ ★	★ ★						
	Low Embodied Carbon Materials									
	Reduce Urban Heat Island Effect	★ ★ ★	★ ★	★ ★ ★	★ ★					
ECONOMIC	Cues to Care							★ ★ ★		
	Prioritize Street Vendors					★ ★ ★	★ ★ ★			
	Local Business				★ ★	★ ★ ★	★ ★ ★	★ ★	★ ★	★
	Opportunities for Stability								★ ★	★ ★
SOCIAL	Reduce Crime	★ ★	★							
	Highly Accessible				★ ★			★ ★ ★		
	Positive Community Interaction	★ ★ ★	★	★ ★ ★				★ ★ ★		
	Generate Affordable Housing								★ ★ ★	★ ★
	Provide Services to Houseless Folks								★	★ ★ ★
TOTAL STARS BY SITE DESIGN		15	11	13	6	6	6	11	8	8

By analyzing the distribution of stars across the site types, it became evident that certain designs accumulated significantly more stars than others. The total stars achieved by each design intervention are listed at the bottom of the chart. For example, ecological landscapes South obtained the highest number of stars, indicating its success in addressing environmental and social categories. On the other hand, the "personal vehicle landscape" (parking garage) only scored six stars as it was assigned fewer goals and did not optimally achieve them. However, the presence of the parking garage allowed for the transformation of 10 other surface parking lots into improved landscapes, highlighting the need to consider the research area as a whole rather than solely relying on site-specific star ratings.

GOALS: INTENTIONAL STARS

TOTAL STARS EACH GOAL
INTENTIONALLY EARNED
ACROSS ALL SITE DESIGNS

		ECOLOGICAL LANDSCAPE (SOUTH)	ECOLOGICAL LANDSCAPE (NORTH)	BLUE INFRASTRUCTURE LANDSCAPES	PERSONAL VEHICLE LANDSCAPES	SMALL BUSINESS LANDSCAPE (NORTH)	SMALL BUSINESS LANDSCAPE (SOUTH)	COMMUNITY LANDSCAPES	RESIDENTIAL LANDSCAPE (AFFORDABLE HOUSING)	RESIDENTIAL LANDSCAPE (PSH)	
ENVIRONMENTAL	Climate Resilient Planting	★ ★	★								3
	Stormwater Management			★ ★ ★							3
	Habitat Creation	★ ★	★ ★ ★	★ ★							7
	Nature Integration to Urban Fabric	★ ★ ★	★ ★ ★	★ ★							8
	Low Embodied Carbon Materials										0
	Reduce Urban Heat Island Effect	★ ★ ★	★ ★	★ ★ ★	★ ★						10
ECONOMIC	Cues to Care							★ ★ ★			3
	Prioritize Street Vendors					★ ★ ★	★ ★ ★				6
	Local Business				★ ★	★ ★ ★	★ ★ ★	★ ★	★ ★	★	13
	Opportunities for Stability								★ ★	★ ★	4
SOCIAL	Reduce Crime	★ ★	★								3
	Highly Accessible				★ ★			★ ★ ★			5
	Positive Community Interaction	★ ★ ★	★	★ ★ ★				★ ★ ★			10
	Generate Affordable Housing								★ ★ ★	★ ★	5
	Provide Services to Houseless Folks								★	★ ★ ★	4

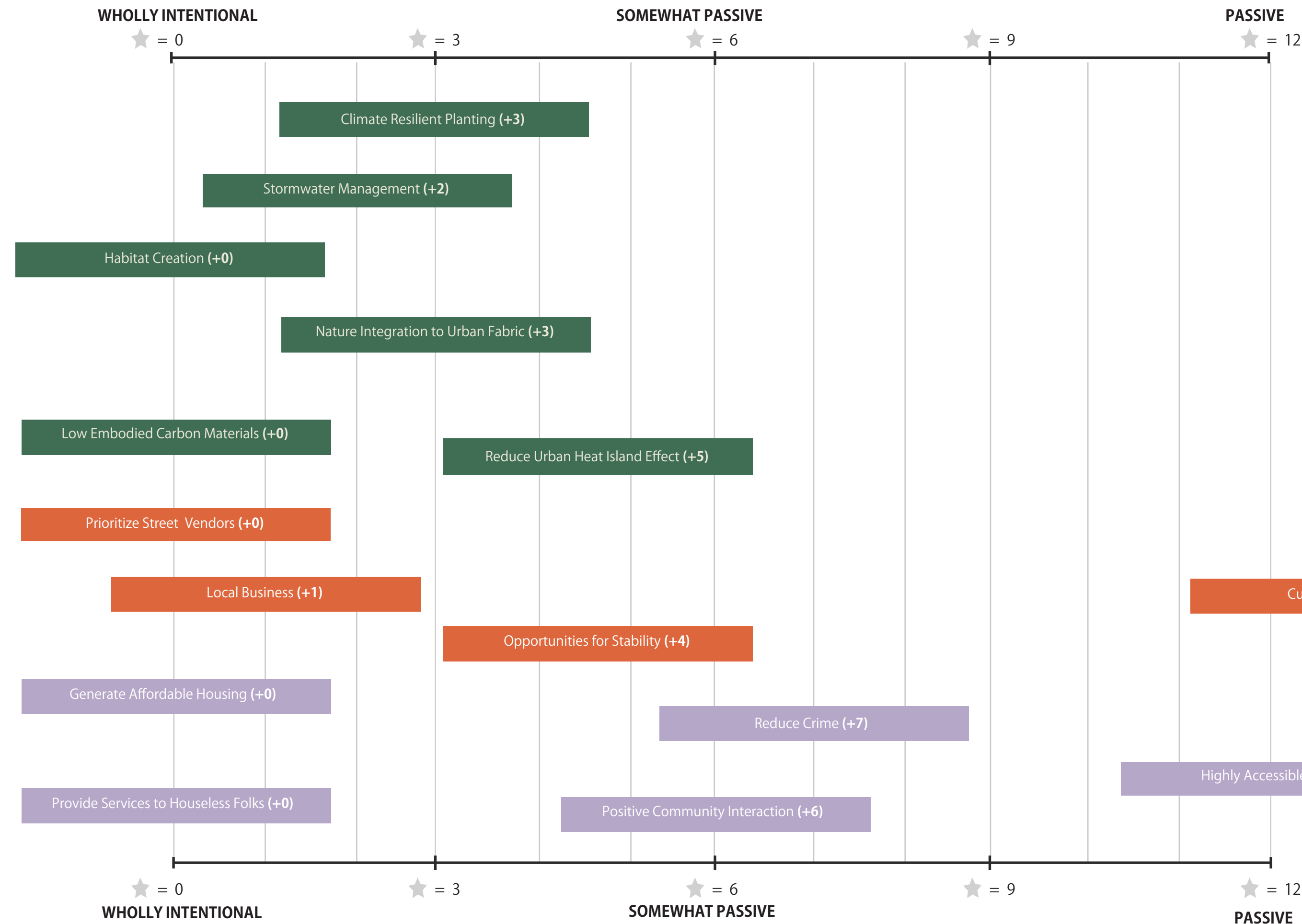
If we look at how many stars each goal achieved, along the right side of the chart, you can see that those goals ranged from achieving 0 stars to 13 stars. I wondered, for example, if cues to care only scored three stars total, does that mean that the redesign of the whole research area was ineffective at creating cues to care?

GOALS: INTENTIONAL AND PASSIVE STARS

		ECOLOGICAL LANDSCAPE (SOUTH)	ECOLOGICAL LANDSCAPE (NORTH)	BLUE INFRASTRUCTURE LANDSCAPES	PERSONAL VEHICLE LANDSCAPES	SMALL BUSINESS LANDSCAPE (NORTH)	SMALL BUSINESS LANDSCAPE (SOUTH)	COMMUNITY LANDSCAPES	RESIDENTIAL LANDSCAPE (AFFORDABLE HOUSING)	RESIDENTIAL LANDSCAPE (PSH)	TOTAL PASSIVE STARS	
ENVIRONMENTAL	Climate Resilient Planting	★ ★	★	★			★	★			6	+3
	Stormwater Management	★	★	★ ★ ★						★	6	+2
	Habitat Creation	★ ★	★ ★ ★	★ ★							7	
	Nature Integration to Urban Fabric	★ ★ ★	★ ★ ★	★ ★				★ ★ ★			11	+3
	Low Embodied Carbon Materials										0	
	Reduce Urban Heat Island Effect	★ ★ ★	★ ★	★ ★ ★	★ ★	★	★	★	★	★	15	+5
ECONOMIC	Cues to Care	★ ★ ★	★ ★ ★	★ ★ ★		★	★	★ ★ ★	★	★	16	+13
	Prioritize Street Vendors					★ ★ ★	★ ★ ★				6	
	Local Business			★	★ ★	★ ★ ★	★ ★ ★	★ ★	★ ★	★	14	+1
	Opportunities for Stability					★ ★	★ ★		★ ★	★ ★	9	+4
SOCIAL	Reduce Crime	★ ★	★			★ ★	★ ★		★ ★	★ ★	10	+7
	Highly Accessible	★ ★	★ ★	★ ★	★ ★	★ ★	★ ★	★ ★ ★	★	★	17	+12
	Positive Community Interaction	★ ★ ★	★	★ ★ ★		★ ★	★ ★	★ ★ ★	★	★	16	+6
	Generate Affordable Housing								★ ★ ★	★ ★	5	
	Provide Services to Houseless Folks								★	★ ★ ★	4	

TOTAL STARS EACH GOAL INTENTIONALLY & **PASSIVELY** EARNED

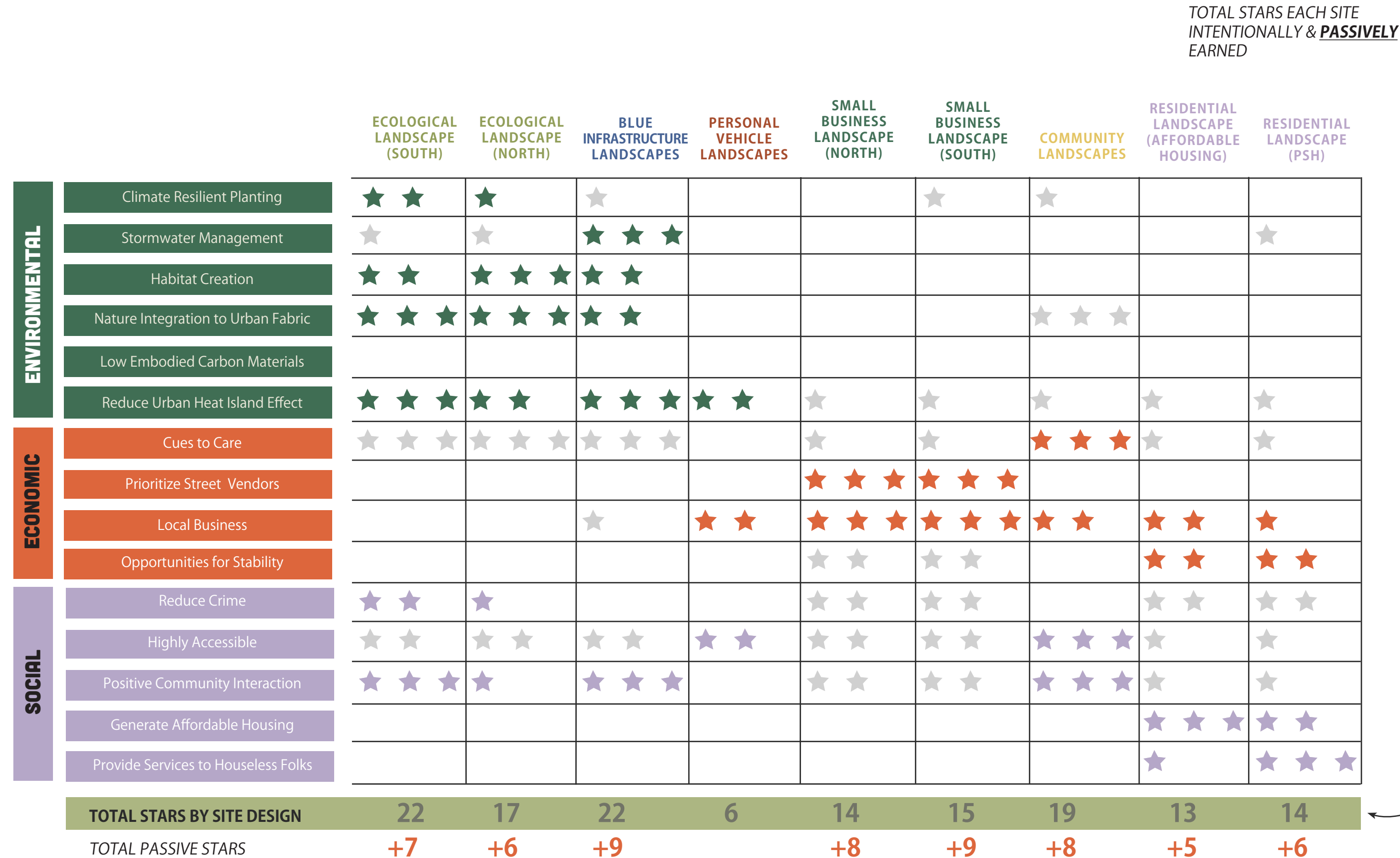
To gain a holistic understanding of the potential outcomes and impacts of my experimental methodology, I decided to score each site for every goal, and not just the goals assigned to the site type. The stars that each site achieved for goals that that site type was not intended to address are in grey – we will call these stars “passive”. This approach uncovered interesting patterns, with some goals being passively achieved across various site types, while others only saw improvement in spaces intentionally designed for their specific goals. Notably, cues to care were passively generated by transforming derelict sites into purposeful spaces, indicating that they were not necessarily produced by specific site programs. Conversely, goals related to affordable housing and services for the houseless population showed improvements only in sites explicitly designed to address them. You may have noticed that “low embodied carbon materials” scored no stars anywhere. This is due to the conceptual nature of my designs which lack material specificity.



We can assess the goals based on whether they are passively met or only intentionally met, by looking at how many additional stars each goal achieved outside of the sites that they were intended to be met upon. Goals that gained zero, or very few passive stars are deemed “wholly intentional” meaning that they were only achieved on sites that intended to address them. These goals are seen on the left side of the screen. Goals that gained many passive stars are deemed “passive” and are on the right side of the screen. Those goals that gained a moderate number of passive stars are “somewhat passive” and shown towards the middle of the screen.

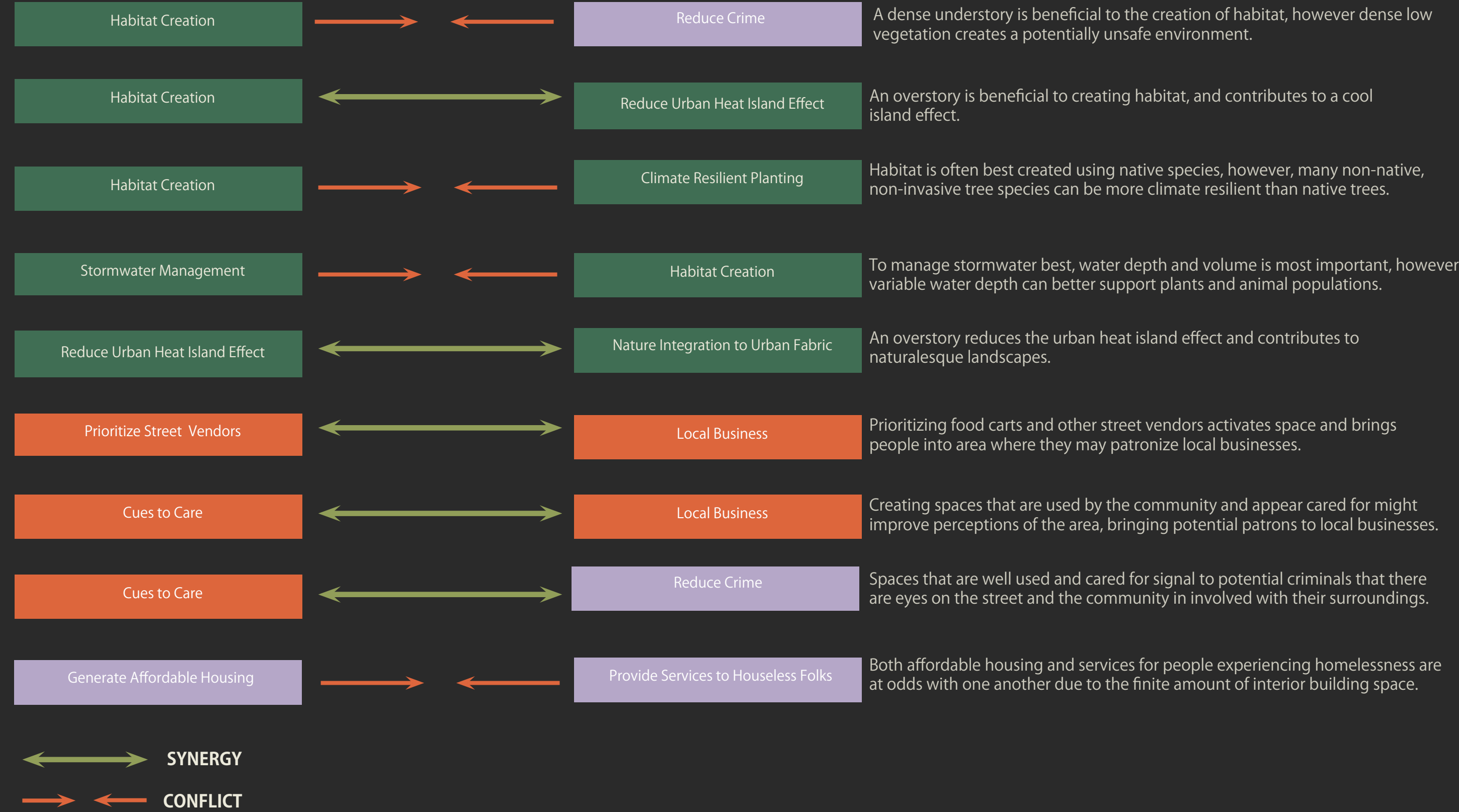
For example: Reducing crime, being highly accessible and cues to care were all quite passively achieved. I believe that accessibility was passively achieved because the research area is generally flat, and all surfaces and paths are accessible and hard. This is an important note because another research area being designed with the experimental methodology described here very well may not have the same outcome – depending on existing site conditions. The goals that were “wholly intentionally” achieved are more important to understand. Housing, of course, is not generated passively, nor is habitat or prioritizing street vendors. This indicated that to best achieve these goals in an urban design, one should set aside spaces that are very specific to each of these few goals.

DESIGNS: INTENTIONAL AND PASSIVE STARS



Taking a similar approach to assessing the impact of each designed space, we can rank each site's design based on how many additional stars it ranked beyond its intentional goals. The grey numbers in the green bar along the bottom of the chart indicate the total stars, passive and intentional, for each design, and the orange numbers indicate the net change due to serendipity. Interestingly, all sites gained between 5 and 9 stars, except the parking garage. No surprise there, traditionally designed parking garages rarely provide side services other than parking. This assessment indicates that nature-based designs – such as ecological landscapes and constructed wetlands - can produce more triple-bottom-line gains than their nominal goals suggest. These landscape types scored between 17-22 stars total and of those stars fall under the environmental and social goals. These goal types have potential to work well together because well, people tend to enjoy being in natural spaces.

SYNERGIES & CONFLICTS AMONGST GOALS



Throughout the assessment of the research area's acupuncture designs, conflicts and synergies emerged. For instance, habitat creation presented more conflicts than anticipated. The volume of understory is important for habitat creation, but a dense understory may create spaces and opportunities for criminal activity. Similarly, goals related to housing and services for the houseless population clashed with one another due to spatial availability. In future endeavors, it may be prudent to avoid pursuing conflicting goals on the same site, while prioritizing synergistic goals on shared spaces.



INTEGRATING URBAN ACUPUNCTURE AND THE TRIPLE BOTTOM LINE TO REVITALIZE PORTLAND'S DOWNTOWN CORE:

KEY TAKEAWAYS

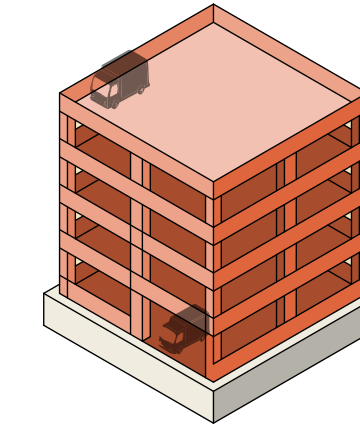
COMMUNITY ENGAGEMENT AND OUTREACH:

Community engagement and outreach are critical for predicting the outcomes of urban design effectively. Due to the short timeframe of this project - significant community engagement was not possible. Can this be done across many sites? Can stakeholders consider optimization beyond the place that they are most concerned about? How would my combination of frameworks work in public engagement processes? These are questions for another experiment.



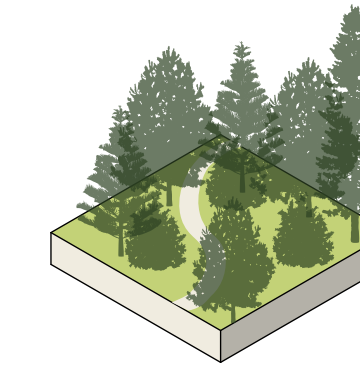
BROADER CONTEXT:

How can my process better consider context at the next scale out? How could it incorporate systemic and infrastructure design interventions between the acupuncture points? These are also questions for another experiment.



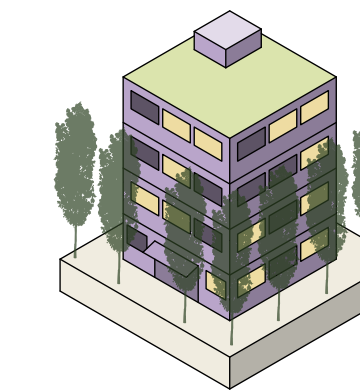
DO NOT UNDERESTIMATE THE POWER OF CONSOLIDATING PARKING:

While site types like parking garages may have limited impacts based on their design, they enable the consolidation of parking, freeing up land for uses that prioritize social, economic, and environmental factors. Therefore, landscape types that consolidate undesirable land can be beneficial to greater gains in triple-bottom-line urban health across cities.



NATURE BASED SITE TYPES CAN HAVE A BIG IMPACT:

Nature-based site types (such as blue infrastructure and ecological landscapes) demonstrated significant potential for impacting social and environmental goals but tended to provide fewer economic gains.

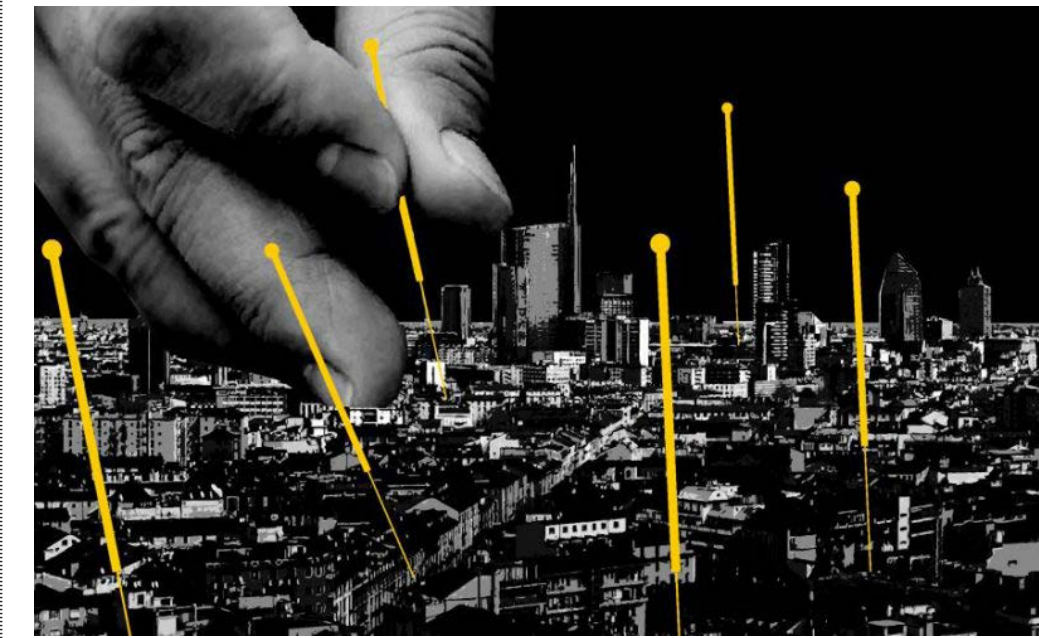


ADDRESSING HOUSING AND HOMELESSNESS IS KEY:

Lack of affordable housing and homelessness are complex issues that a single design is unlikely to solve. However, avoiding these issues and moving forward with landscape improvements is a potentially problematic approach, as the lack of affordable housing and those experiencing homeless contribute significantly to the urban stresses of a district. The triple bottom line framework, in my interpretation, prioritizes getting people off the streets and into stable housing.

HIGH IMPACT SITE TYPES

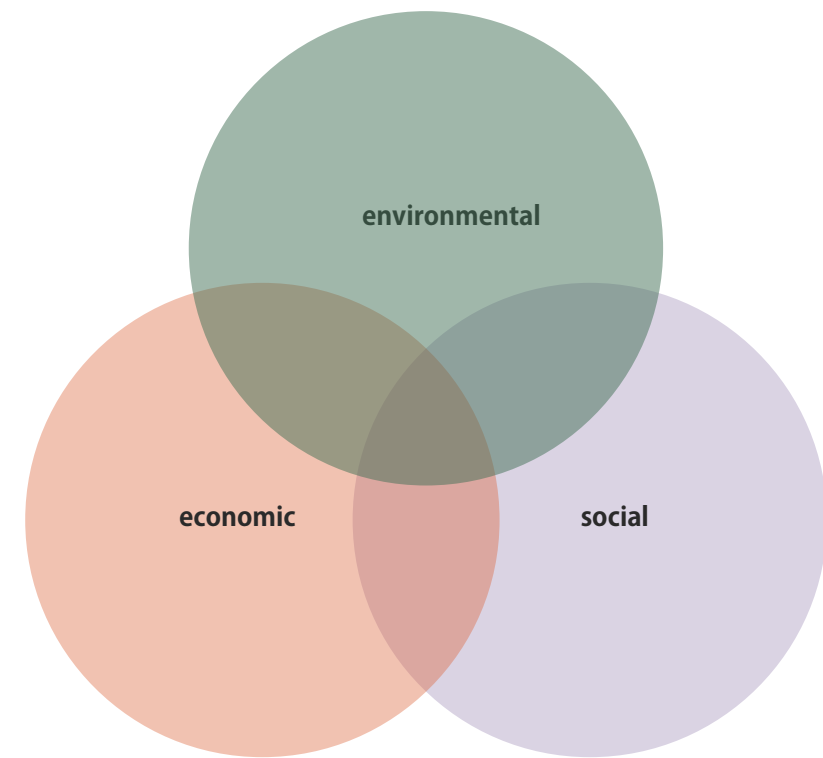
FUTURE AREAS OF RESEARCH



URBAN ACUPUNCTURE



TRIPLE BOTTOM LINE



THE METHODOLOGY

Designing the replacement of parking areas (or other underutilized land use types) within an entire district at once, using sustainable small scale landscape interventions may produce more benefits than a typical site-by-site approach. This experimental methodology provides opportunities to address multiple design goals at once, taking into account district wide opportunities and conditions. By starting with a broad range of goals and objectives, designers can identify site types that prioritize potential goal synergies and avoid conflicts. By incorporating these findings and considerations, future urban design planning and design endeavors can work towards creating more sustainable, socially inclusive, and economically vibrant urban environments.



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RESIDENTIAL
LANDSCAPE
(AFFORDABLE HOUSING)

PERSONAL VEHICLE
LANDSCAPES

COMMUNITY
LANDSCAPES

SMALL BUSINESS
LANDSCAPE
(NORTH)

SMALL BUSINESS
LANDSCAPE
(SOUTH)

ECOLOGICAL
LANDSCAPE
(SOUTH)

BLUE INFRASTRUCTURE
LANDSCAPES

ECOLOGICAL
LANDSCAPE
(NORTH)

RESIDENTIAL
LANDSCAPE
(PSH)

