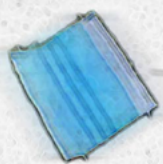




**ECO-WASTE:**  
Household Waste Material Flows  
in a Circular Economy



**ECO-WASTE**  
**Household Waste Material Flows in a Circular Economy**

Erqi Meng  
MLA Landscape Architecture, RISD

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Typeface: IBM Plex Sans by Mike Abbink,  
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A thesis submitted in partial fulfillment of the requirements for the Master of Landscape Architecture Degree in the Department of Landscape Architecture of the Rhode Island School of Design, Providence, Rhode Island.

By Erqi Meng  
May 28, 2020

Approved by Masters Examination Committee:

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Theodore Hoerr, Thesis committee

## **ABSTRACT**

The thesis aims to contextualize household waste on the more complete material flows it belongs to, including reciprocal relations between its landscapes of production and landscapes of landfill. Current one-way processes of waste treatment are repositioned within more circular economies which, it is argued, may also bring ecological benefits to our cities. The study focuses on a local community at Mount Hope district in Providence, RI. As part of a wider landscape framework that includes a study on consumer behaviour, a series of modular strategies are developed based on this community's main characteristics, with an eventual goal of integrating community participation and awareness in the decision making process.

Relying on public engagement as a form of raising collective awareness, the work suggests that well-integrated bottom-up strategies operating between the scales of the household, the street and the neighborhood, may affect people's consciousness and behavior, change the way people use materials and generate waste, and eventually try to change the structure of how we operate in society in relation to waste and lead us closer towards a waste-free future.

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Pixabay. (n.d.). Independent Tribune. [https://independenttribune.com/cit/as-local-landfill-gets-close-to-capacity-county-officials-encourage-proper-recycling/article\\_22a980d9-4d98-58b4-bef0-35da0db4ae5d.html](https://independenttribune.com/cit/as-local-landfill-gets-close-to-capacity-county-officials-encourage-proper-recycling/article_22a980d9-4d98-58b4-bef0-35da0db4ae5d.html).

## **How can we contend with consumerism by reimagining waste flows in a circular economy and their spatial relationships in the landscape?**

# INTRODUCTION

**The thesis explores ways to contextualize household waste on the more complete material flows it belongs to – including some of the reciprocities between its landscapes of production and landscapes of landfill. The work aims to reorient the current unhealthy one-way processes of dealing with waste into a more virtuous circular economy, with corresponding ecology benefits to our cities.**

At the landfill, food and yard waste decomposes and releases methane, and those inorganic materials are continuously polluting the soil. According to a recent EPA study, in the United States, the total generation of municipal solid waste (MSW) in 2018 was 300 million tons or 4.9 pounds per person per day. Of the 882 million tons of greenhouse gases released worldwide each year, the United States accounts for 16%.<sup>1</sup>

Such a large amount of waste is due to the abuse of resources caused by people's endless consumption and excessive packaging. When we bury those commodities, we also plant the seeds that threaten our cities and wider territories. Those materials continuously release greenhouse gases during the process of processing, transportation, and decomposing, which causes a series of adverse effects on the global environment.

---

<sup>1</sup> National overview: Facts and figures on materials, wastes and recycling. (2021, January 28). Retrieved March 21, 2021, from <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials>

Household waste is one of the things most closely related to our lives, and it can be a medium that connects us with our physical surroundings. This thesis aims to read the neglected relations with waste, to propose alternative relations with it, by trying to understand the stories, flows and dynamics involved in waste generation and treatment.. More specifically, the study then focuses on the Mount Hope neighborhood, in Providence, where I currently reside. The investigation starts from my own domestic waste, to explore further potential and better ways to live with waste, as well as some of the everyday materials we all generate before and once they become waste. The thesis considers both the ecological and economic flows in the process of material circulation, trying to raise public awareness of the waste, and finally proposes a new and more sustainable model to redirect waste flow and to lead the community moving toward a waste-free future.

the blowup. (2017). Overflowing garbage can. Unsplash. <https://unsplash.com/photos/t06aN6vewaQ>.



# 01 STORY OF WASTE

- + WHAT IS WASTE?
- + ISSUES WE ARE FACING NOW
- + TRACING MATERIAL FLOWS



# 01 WHAT IS WASTE?

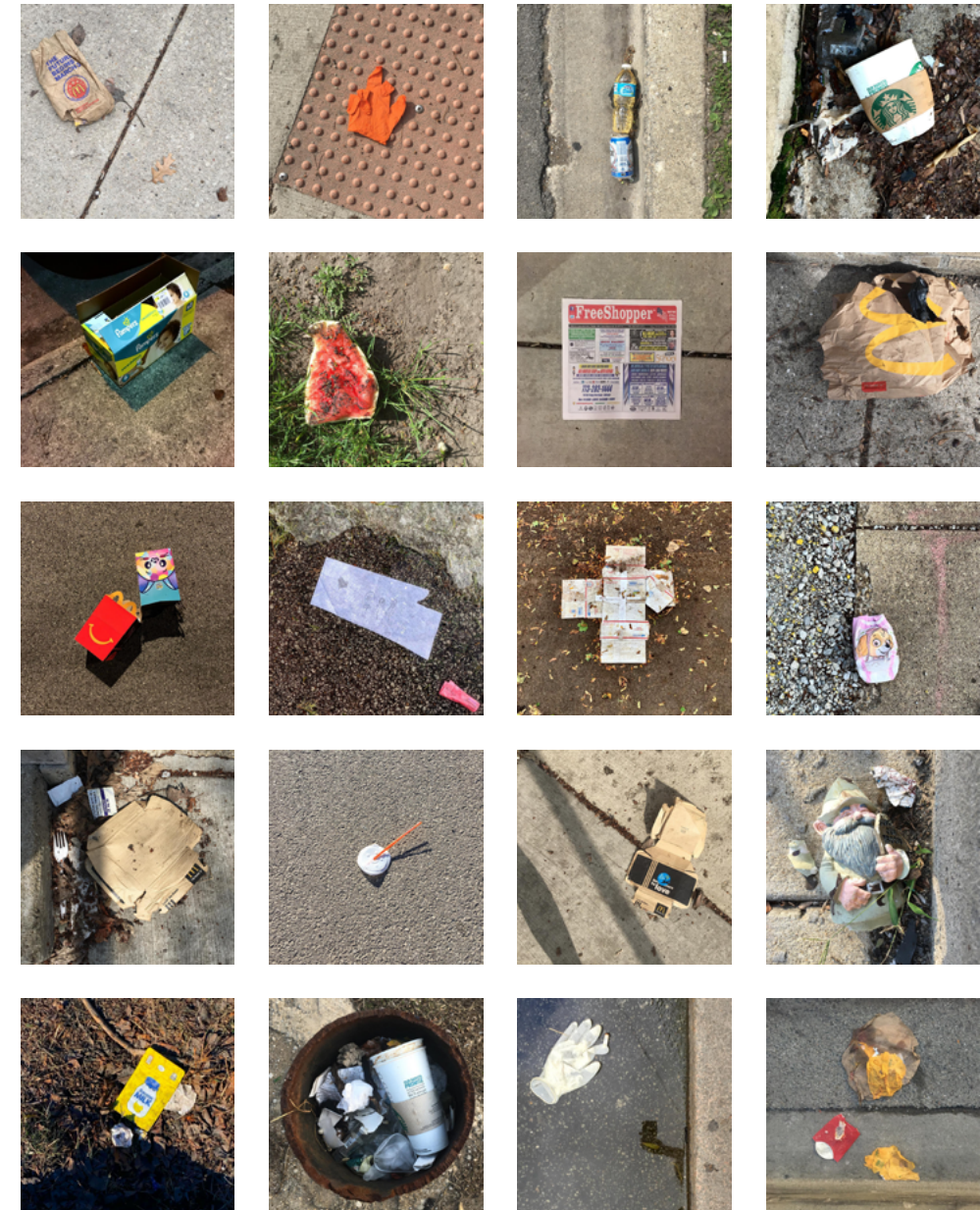
Garbage	Waste material, esp. unwanted food, or a container in which waste is kept
Trash	Waste material or things that are no longer wanted or needed, esp. dry waste like paper or packaging or discarded toys
Litter	Small pieces of trash that have been left lying on the ground in public places
Refuse	Unwanted waste material, especially material that is regularly thrown away from a house, factory.
Rubbish	Waste material or things that are no longer wanted or needed(BrE)
Waste	Unwanted matter or material of any type, especially what is left after useful substances or parts have been removed  - Cambridge Dictionary

There are plenty of similar words used to describe the materials and objects we throw in the trash can. Among them, “waste” has the broadest meaning, which can refer to all the things that we do not want. The Cambridge Dictionary defines “waste” as “unwanted matter or material of any type, especially what is left after useful substances or parts have been removed.” This definition reflects a widespread attitude that we will not regard waste as a reusable resource.<sup>1</sup> When we mention waste, we tend to think it is worthless, dirty, and maybe pathogenic. When we call something waste, it seems to be sentenced to death. And we don’t seem to care about where it is going. We can track the supply chain to know where the products we use come from, but it is difficult to know where the waste we throw away ends up.

Waste is the product of human activities. There is no waste in nature – in the natural ecosystem, all materials and energy are circulated, and living organisms interact with the environment on which they depend to form a self-regulating system.<sup>2</sup> Various human production activities result in a large amount of waste that cannot be degraded in nature, and it is this waste that causes serious harmful effects on the living environment of humans.

<sup>1</sup> What is waste? (n.d.). Retrieved March 22, 2021, from <http://www.zerowasteamerica.org/WhatIsWaste.htm>

<sup>2</sup> Ecosystem. (2021, March 05). Retrieved March 22, 2021, from <https://en.wikipedia.org/wiki/Ecosystem>



Houston, A [dontpickitup]. (n.d.). Retrieved from <https://www.instagram.com/dontpickitup/>

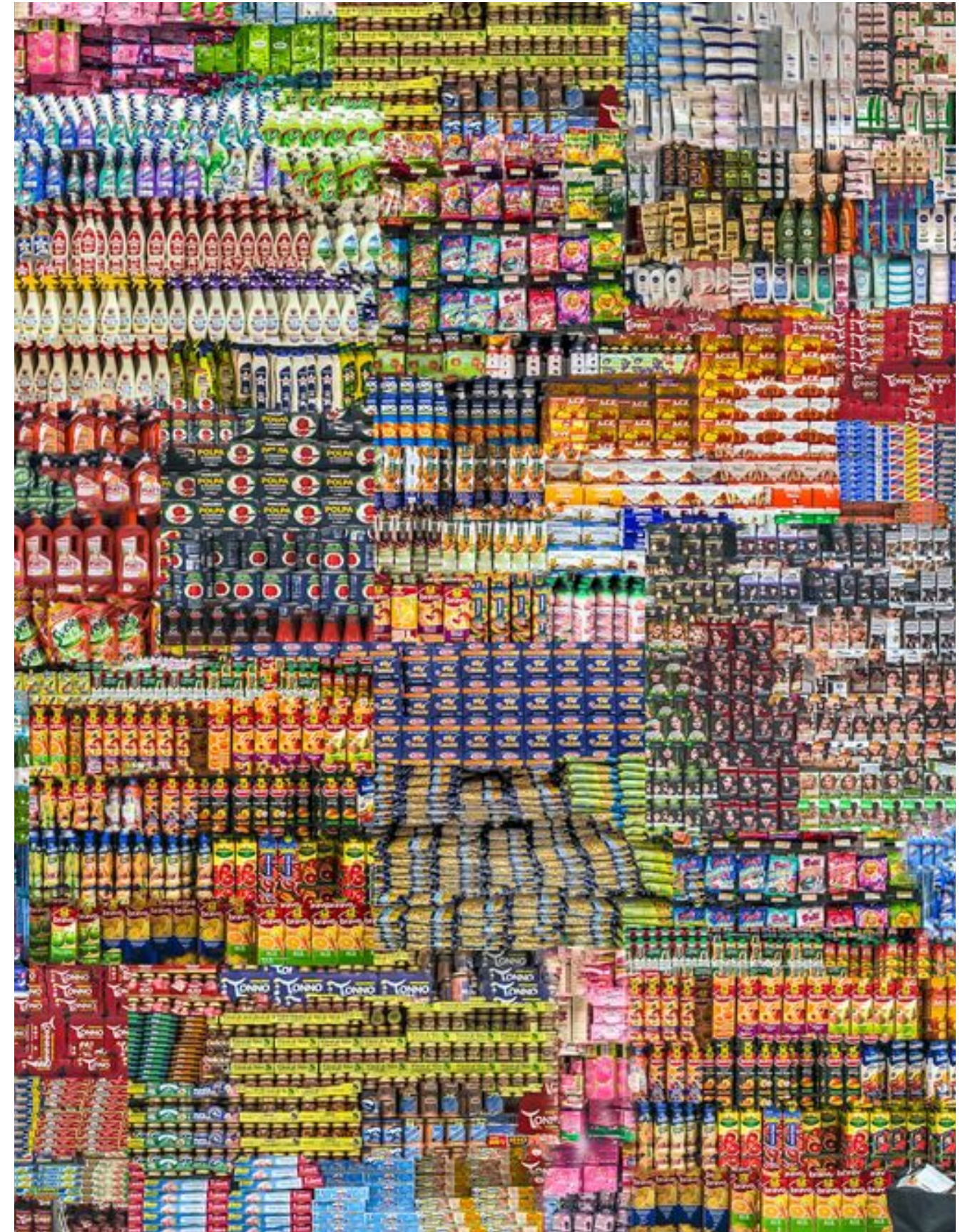


## 02 ISSUES WE ARE FACING NOW

### THE TRAP OF CONSUMERISM

We live in an impetuous society. Consumerism has become a symptom of the present era and it seems to affect everyone, even if differently. Developed modern cities are flooded with mass production and rapid disposal, followed by an astonishing waste of resources and a large amount of waste caused by excessive consumption. We are living in a human-centered world and regard everything around us as materials that we can use. These materials circulate on the earth in different forms, but almost all of them have the same destiny – being discarded and becoming waste.

This waste that is expelled by us from the city, on the other hand, is a portrait of the age in which we live. It is a recording of the memory of the landscape it comes from, the memory of the landscape in which it circulates, and the memory of a person's life in the city. However, this waste that is piled up in the dump cannot talk - it will only be buried in the landfill and then forgotten.



### THE PARADOX BETWEEN “ECOLOGY” AND “ECONOMY”

The thesis looks at the impact of waste management on both its economic and ecological aspects. The two words actually share the same root – eco, which derived from the oikos in Greek, means house and household. Ecology focuses more on the relationship between organisms and their physical surroundings, and describes how and where we live. But for economy, whose original meaning is “household management,” its current meaning now lies in the area of the production, distribution, and consumption of goods and services, and it seems to have abandoned its meaning in “household.”

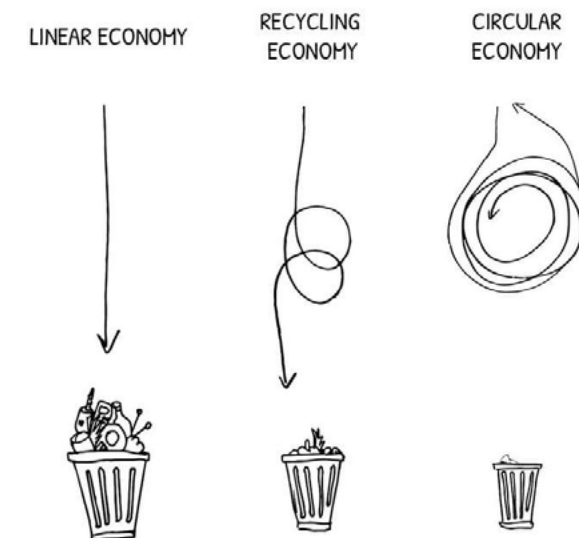
Therefore, in the very beginning, ecology seemed to provide context for the economy, with the latter functioning more as a “thrifty steward.” But ever since the economy became far less related to the household, it started to actually consume ecology, and the original relationship between the two was broken.

In 1988, the concept of Circular Economy appeared for the first time in “The Economics of Natural Resources”<sup>1</sup>, and was then further developed fol-

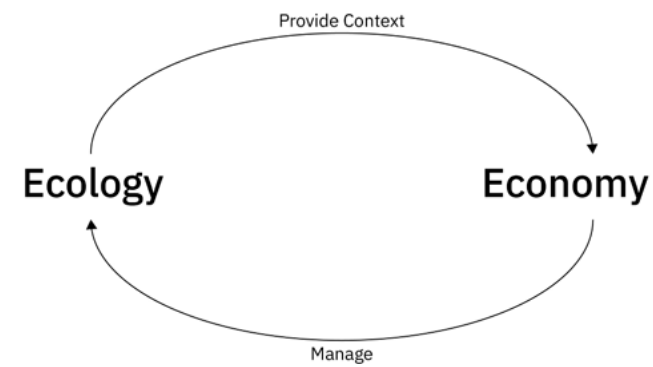
1Kneese, A. (1988). The Economics of Natural Resources. Population and Development Review, 14, 281-309. doi:10.2307/2808100

lowing three major events: the explosion of raw material prices between 2000 and 2010, the Chinese embargo on rare earth materials, and the arrival of the economic crisis<sup>2</sup>. The idea of Circular Economy is related to an economic system that aims at eliminating waste and the continuous use of resources. Circular Economy provides us with a new potential to rebuild the linkage between ecology and economy through better waste management methods. Circular Economy provides us with new potential to rebuild the linkage between ecology and economy through better waste management methods.

2Kneese, A. (1988). The Economics of Natural Resources. Population and Development Review, 14, 281-309. doi:10.2307/2808100



Biophilic & Sustainable interior DESIGN · circular economy: The ultimate form of SUSTAINABILITY · DFORDESIGN: Circular economy, economy Design, sustainable design. (n.d.). Retrieved March 21, 2021, from <https://www.pinterest.com/pin/282530576612048415/>



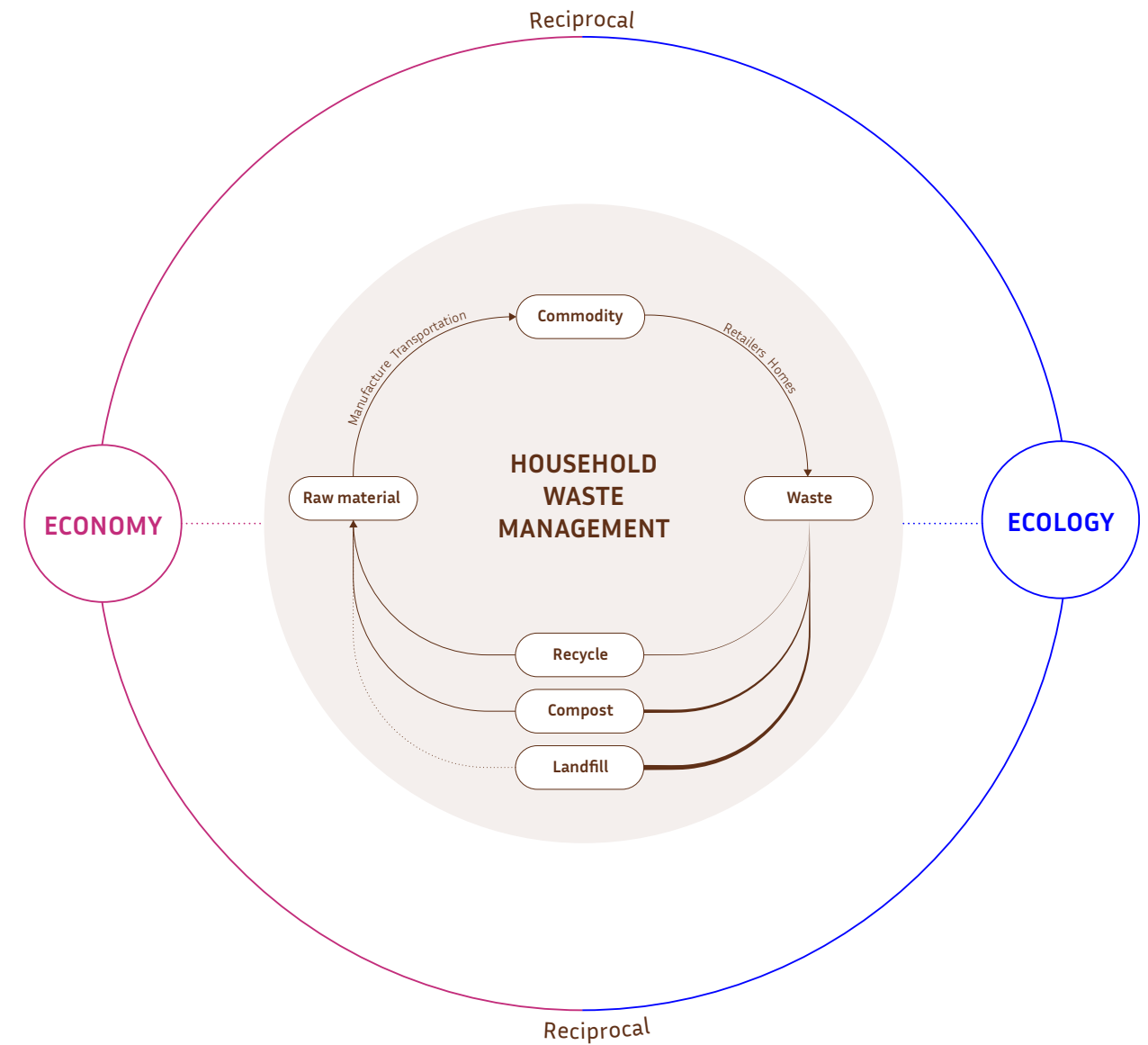
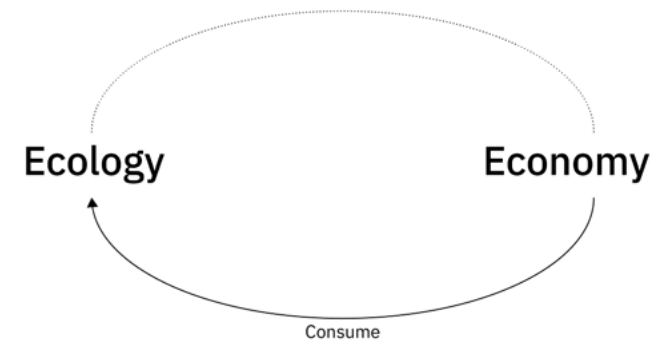
**Ecol-o-gy:** noun [from German ökologie, study of habitat] (1) a branch of science concerned with the interrelationship of organisms and their environment (2) the totality or pattern of relations between organisms and their environment.

**Econ-o-my:** noun [from Greek oikonomos, household manager] (1) archaic: the management of household affairs, especially expenses (2) thrifty and efficient use of resources; frugality in expenditures (3) the structure of economic life in an area or a period; an economic system.<sup>1</sup>

**Eco:** from Greek oikos, house, household<sup>2</sup>

<sup>1</sup> "Economy and Ecology." OpenLearn. The Open University, June 30, 2006. <https://www.open.edu/openlearn/society/politics-policy-people/geography/economy-and-ecology>.

<sup>2</sup> Ecology and economy. (n.d.). Retrieved March 21, 2021, from <http://thelateralline.com/tom-jay-ecology-and-economy>



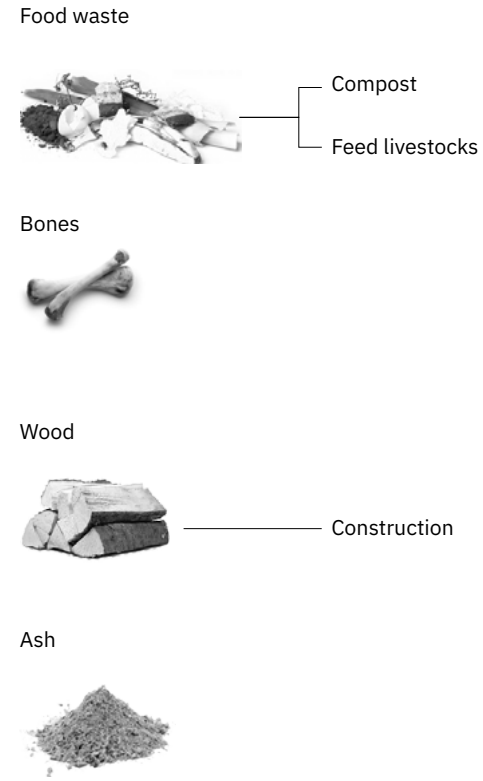
**WASTE MANAGEMENT AS A STRATEGY**

Rebuild the benign relationship between economy and ecology by rethinking the flow of waste.

***“Reciprocal Landscapes stems from a desire to think of construction materials not as fixed commodities or inert products, but as continuous with the landscapes they come from, and with the people that shape them.”***

- Reciprocal Landscapes, Jane Hutton

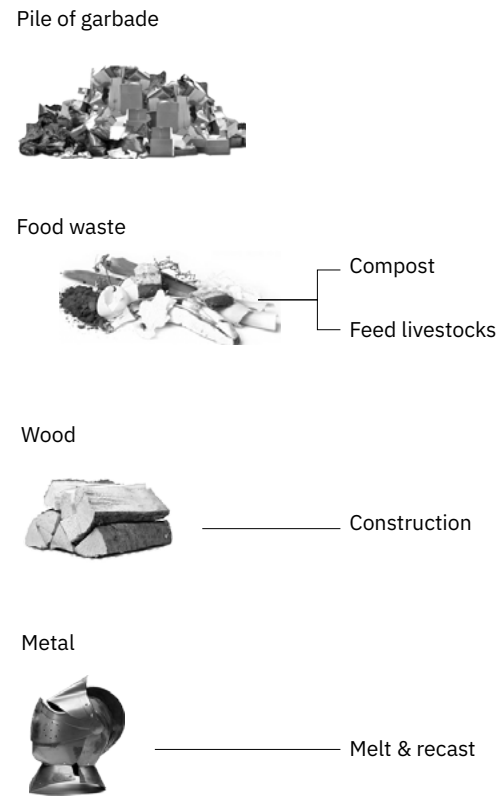
**TIMELINE OF WASTE MANEGEMENT**



**Ancient History**

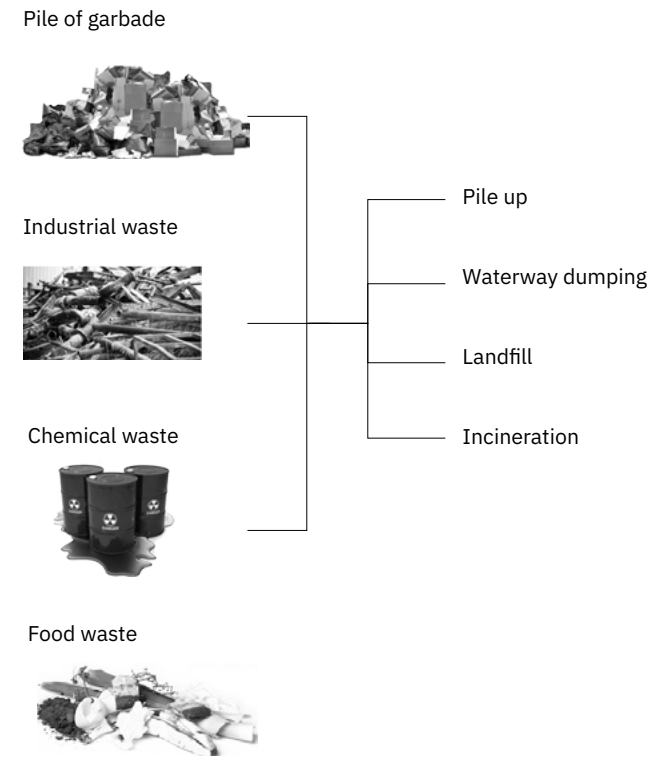
Crete, Athens and Rome are examples of ancient civilizations that began to establish rudimentary waste management systems.

For general household items, slightly damaged items will be repaired and continue to be used, while those that cannot be repaired will be used for other purposes.



**Middle Ages**

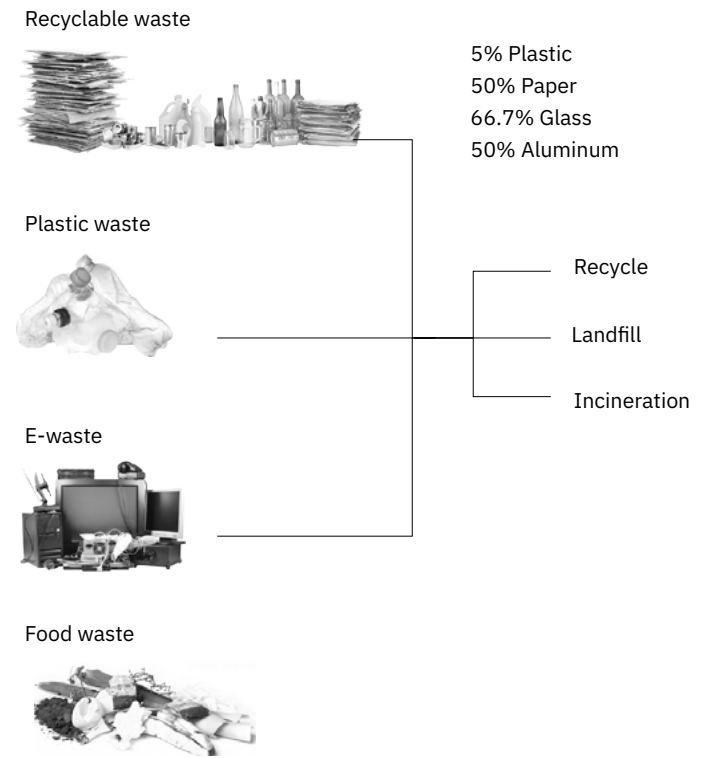
The plagues that affected Europe from the 14th to the 16th centuries were often spread by the vermin that thrived in unsanitary urban conditions prevalent at that time. Some of the greatest plagues to curse humanity resulted from these unsanitary living conditions. Early waste management techniques developed during this period as a way to prevent the spread of disease.



**Industrial Age**

During the Industrial Revolution in the 18th century, Europe and the United States were rapidly developing in areas of product innovation, machinery development, and trade. This time of growth also created significantly greater amounts of waste.

Scavengers performed a recycling function by selling what they could find in the rubbish.



**Modern Society**

The development of industry and manufacturing makes people produce more and more garbage. Many people feel guilty about their waste and feel helpless about how to avoid it.

Many products are only used once, without proper collecting and recycling system, they are sent directly to landfill or incineration station, which causes a lot of waste and serious pollution

**THE AMOUNT OF WASTE**

The total generation of municipal solid waste (MSW) in 2018 was 300 million tons (U.S. short tons, unless specified) or 4.9 pounds per person per day.

In Rhode Island, the number is about 300,000 tons, and it's growing year by year



**The United States**  
**300 million tons per year**



**Rhode Island**  
**300,000 tons per year**

## 03 TRACING MATERIAL FLOWS

### WASTE MANAGEMENT IN PROVIDENCE

At the beginning of my investigations, I walked around local communities in Providence to learn which corporation the household trash cans belong to, and then tried to search the location of their waste treatment center.

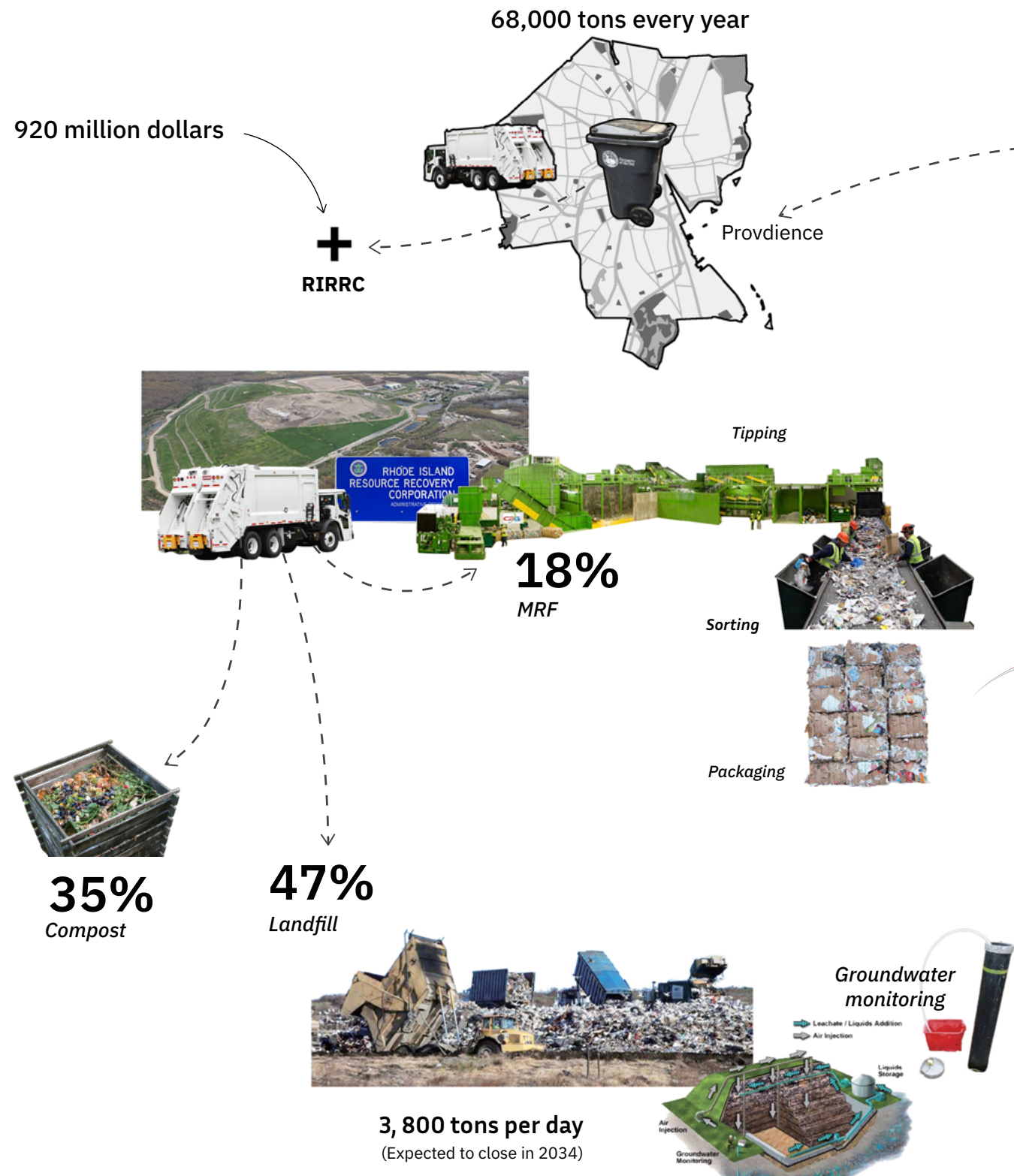
There is a surprising large number of waste centers with jurisdiction in Providence.. Unexpectedly, the most used trash cans come from the city government. Trash pick-up takes place in Providence Monday through Friday, and the trash is sent to the Rhode Island Resource Recovery Corporation (RIRRC), located in Johnston. There are several others: the Republic Services cooperates with RISD, and the Waste Management cooperates with Brown University.

Since the RIRRC deals with most of the waste produced in Rhode Island, the thesis uses it as a template to study the waste management system more deeply.



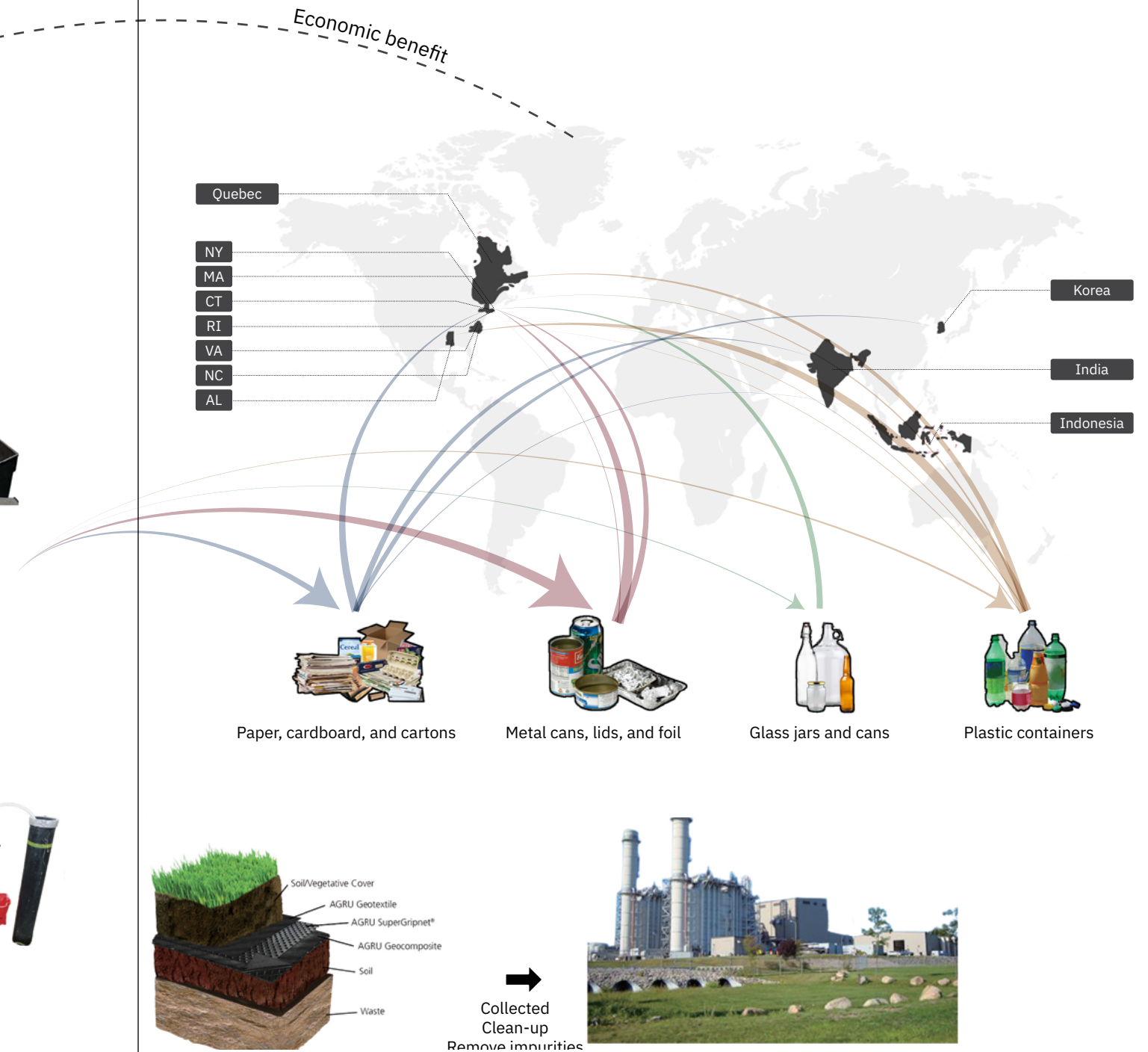
#### Corporations Working at Providence

A map shows the locations of waste management corporations that provide services at Providence.



**WASTE FLOW**

Through tracking the waste flow of our household waste which starts from the trash can, we can finally find that organic matter can be composted, while most of the inorganic matter is difficult to recycle or is not properly sorted which will finally be sent to the landfill, and only a small part is recycled through the MFR.





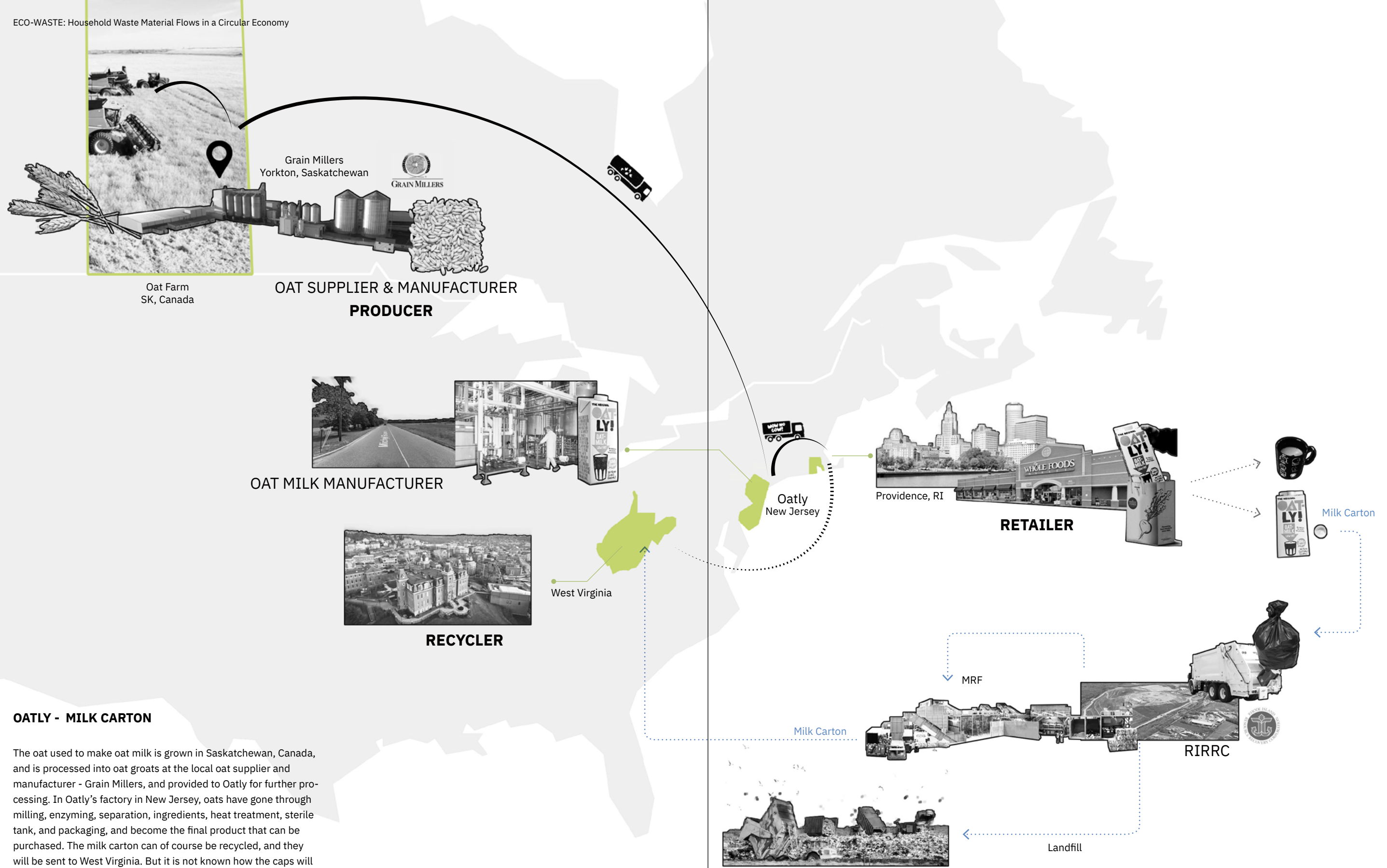
### WASTE DIARY

In order to better understand the composition of household waste and better tell their story, I recorded my own waste in an initial waste diary. I also asked my friends to help me to record their own waste. Subsequently, I tried to sort the waste based on the guidelines given by RIRRC. In the process, I also felt that the relationship between myself and waste changed; it gradually became closer. The waste documentation reflects my own life but from another angle.

I chose four common waste items to focus on and to trace where the raw materials come from, where they are manufactured, how they are transported to retailers, and also where they eventually end up. With these diagrams, I built a linkage between different landscapes through which these materials circulate.

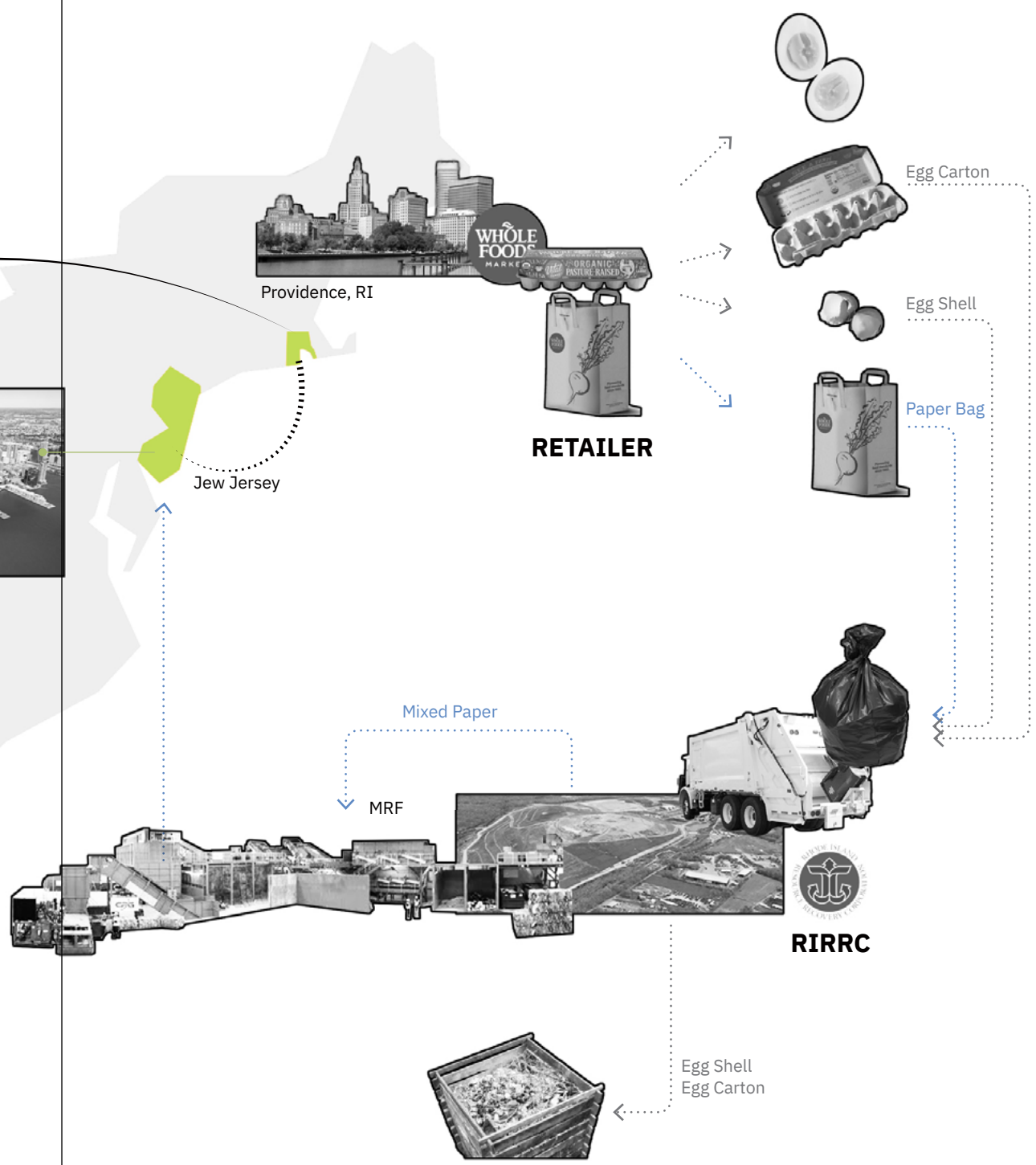
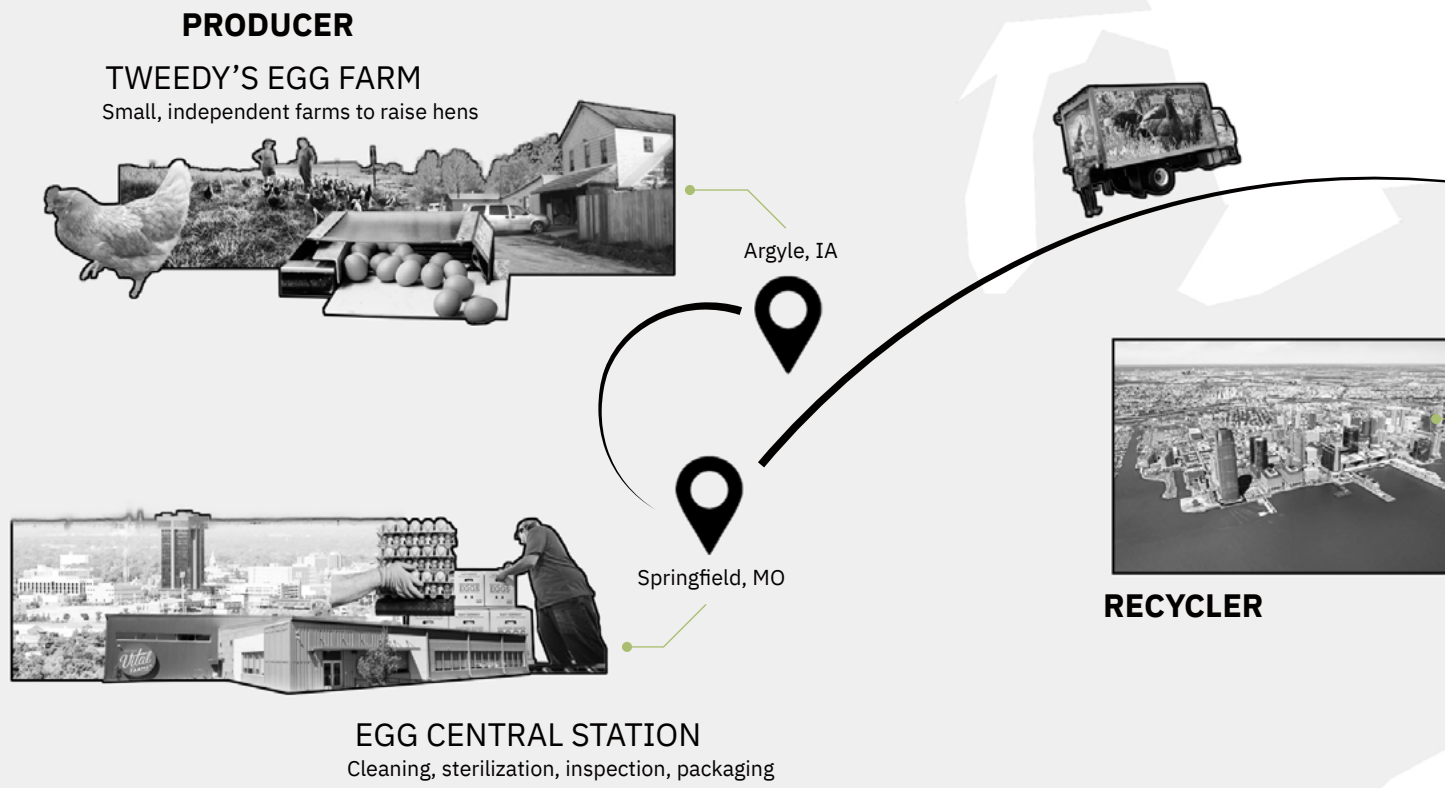
1. Paper, cardboard, and cartons
2. Plastic containers
3. Metal cans, lids, and foil
4. Food waste
5. Regular Trash

	DAY 1	DAY 2	DAY 3	DAY 4
1				
2				
3				
4				
5				
	DAY 5	DAY 6	DAY 7	DAY 8
1				
2				
3				
4				
5				



**OATLY - MILK CARTON**

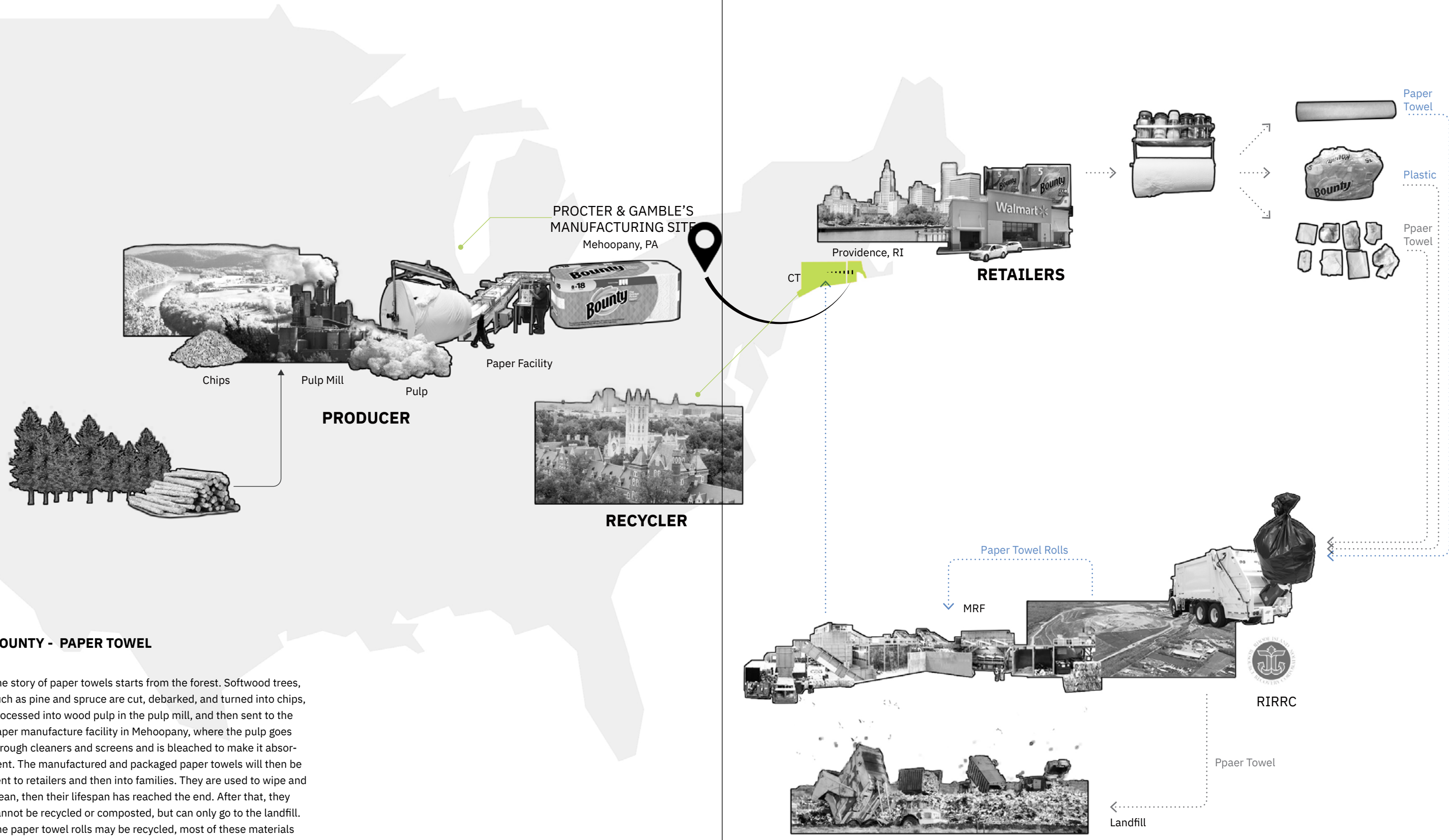
The oat used to make oat milk is grown in Saskatchewan, Canada, and is processed into oat groats at the local oat supplier and manufacturer - Grain Millers, and provided to Oatly for further processing. In Oatly's factory in New Jersey, oats have gone through milling, enzyming, separation, ingredients, heat treatment, sterile tank, and packaging, and become the final product that can be purchased. The milk carton can of course be recycled, and they will be sent to West Virginia. But it is not known how the caps will be disposed of.



**VITAL EGG FARMS - EGG & EGG CARTON**

The journey starts from the egg farm. The family ranch in the pasture belt collects the eggs laid by the free-range hens and sends them to the vital farm. The eggs will be transported to the egg central station in Springfield, where the eggs are transformed into edible ingredients. Truckloads of eggs arrive at the facility daily and remain in a cooler until they are ready to process. Eggs go through the process of cleaning, sterilization, inspection, and packaging here. It takes just four minutes for an egg to be processed and packaged. The pro-

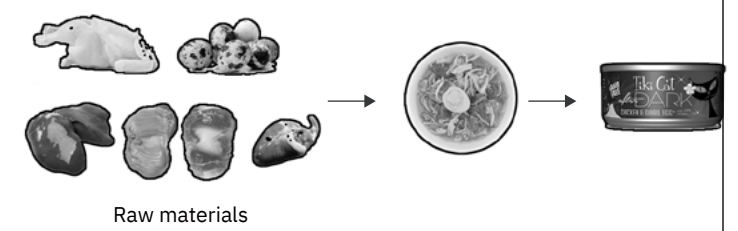
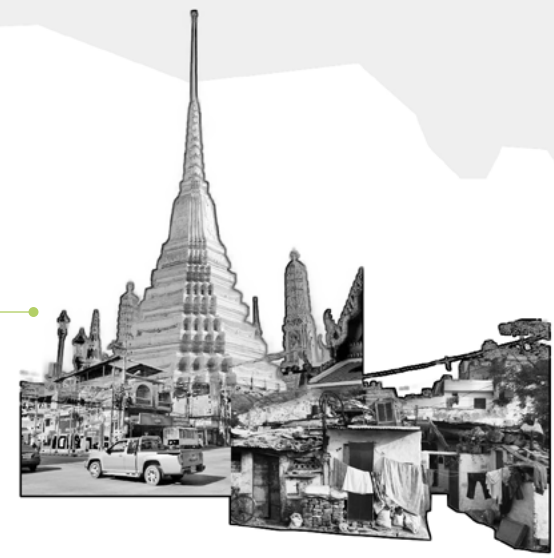
cessed eggs continued to set off and were sent to retailers, where they will be put on the shelves waiting to be purchased. After we eat their edible parts, its eggshell and its packaging will be thrown into the trash can. At the end of this journey, egg shells and egg carton will be composted in Resource Recovery and converted into a Class A Rhode Island compost that is safe and effective for all uses.



**BOUNTY - PAPER TOWEL**

The story of paper towels starts from the forest. Softwood trees, such as pine and spruce are cut, debarked, and turned into chips, processed into wood pulp in the pulp mill, and then sent to the paper manufacture facility in Mehoopany, where the pulp goes through cleaners and screens and is bleached to make it absorbent. The manufactured and packaged paper towels will then be sent to retailers and then into families. They are used to wipe and clean, then their lifespan has reached the end. After that, they cannot be recycled or composted, but can only go to the landfill. The paper towel rolls may be recycled, most of these materials will be sent to Connecticut to be recycled after sorting in RIRRC.

Thailand  
**PRODUCER**



**TIKI PET - CAT CAN**

The starting point of cat cans is far away in Thailand, where a variety of ingredients are made into finished cat cans, and then sent to Atlanta, GA. Since my cat cans are purchased online, the transportation process within the United States can be clearly traced. The cat eats a 6oz can everyday, so everyday there's a tin can that is thrown away. Fortunately, whether it is the can itself or the carton that comes with it, if they are properly sorted and discarded, can be recycled. In the RIRRC they pass through the MRF, and then will be sent to the surrounding areas of RI.



Atlanta, GA  
**RETAILERS**

**RECYCLER**

Tin Can

Cardboard

Providence, RI

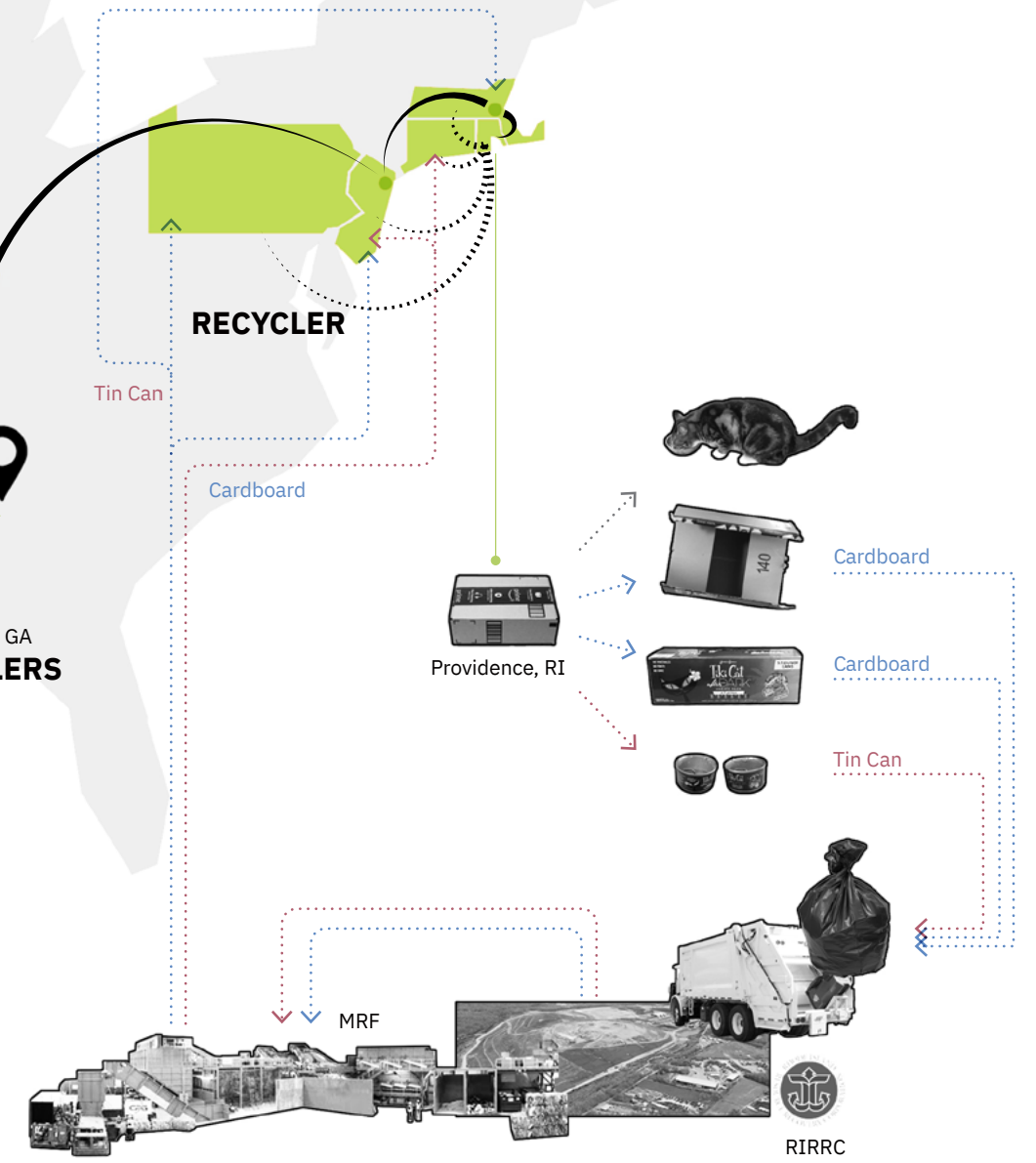
Cardboard

Cardboard

Tin Can

MRF

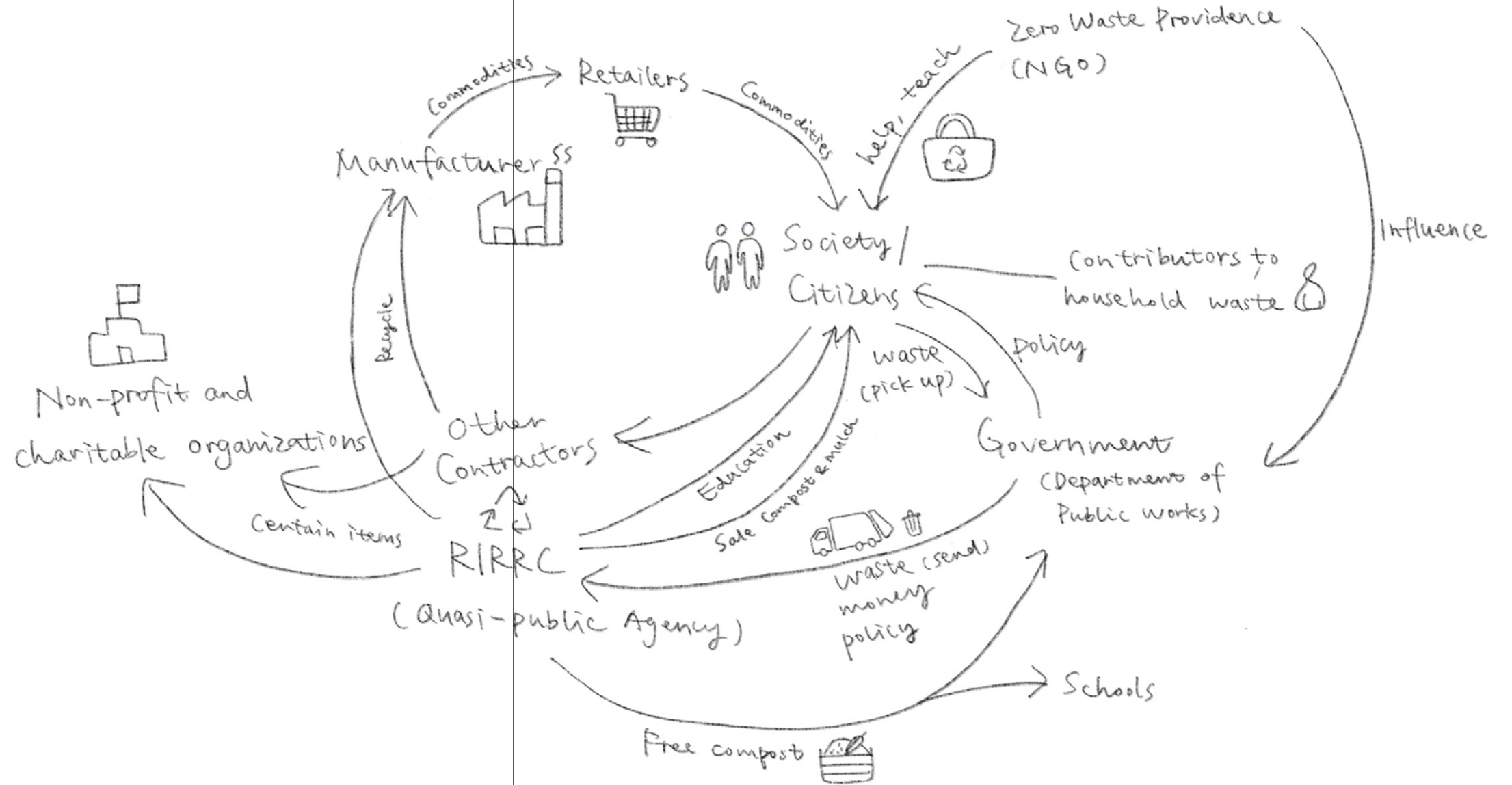
RIRRC



**RELATIONSHIPS INVOLVED IN FLOWS**

There are many exchanges of materials, energy, and money between different waste stakeholders. Both economy and ecology affect material and energy cycles. However, through human intervention, part of these cycles have been broken. For example, under the topic we discuss, it is because of our manufacturing and consumption activities that there is a large amount of waste that we cannot dispose of, which destroys the original ecological balance. In other words, we are continuously taking things from nature, but cannot return them accordingly.

The biggest issue of the current circulation system is that it is accompanied by a large amount of energy consumption and greenhouse gases emission, which are irreparable in this cycle. That is to say, in the current cycle, the economy is still constantly consuming ecology.



**STAKEHOLDERS**

Different stakeholders participate in the waste flow process. Including the manufacturer and retailers who produce and sell them, the citizens who are the main contributors to household waste, the contractors who do the waste treatment, and the government who makes policies. Beyond them, non-profit organizations can receive special materials from garbage collection centers, and NGOs also help people live a more sustainable life.



## 02 CONSUMER AS TRIGGER

- + WHY CONSUMERS IMPORTANT
- + CONSUMER BEHAVIOR
- + MATERIAL TEST
- + PUBLIC ATTITUDE



(2017). <https://kiipfit.com/grocery-cart-look-like/>.



## 00 WHY CONSUMERS IMPORTANT

**“Nobody wonders where, each day, they carry their load of refuse. Outside the city, surely; but each year the city expands, and the street cleaners have to fall farther back. The bulk of the outflow increases and the piles rise higher, become stratified, extend over a wider perimeter”**

**– Italo Calvino, Invisible Cities**



NPR. (n.d.). <https://www.kuow.org/stories/in-rome-uncollected-trash-festers-in-scorching-heat>.

### CONSUMER INITIATIVE

Consumers are the most active participants in the whole waste flow system. In a capitalist-driven society, consumers can have a transformational effect and they can bring a huge impact to both the market and the environment. On the one hand, by regulating or changing their own behavior, they can choose more environmentally friendly products and, at the same time, recycle more themselves. On the other hand, their consumption preferences will affect the services provided by the markets and urge them to introduce more environmentally friendly options.

At the same time, consumers are also an indispensable part of the entire economic cycle. They promote the economic cycle and the circulation of commodities. All of us will become consumers at some point. Therefore, the decision made from the consumer's point of view concerns each of us and each family. Every consumer behavior in daily life will bring about the butterfly effect and affect the entire material flow.

But most of us don't know that.

### NEGLECTED WASTE

We throw waste into the trash can and, from that moment, we no longer care about where these materials go – maybe we are related to where they are produced, but what we care about is only the content, such as whether they are natural and organic, or whether they are good for our bodies, but not necessarily how many resources are consumed in the manufacturing process.

We are indifferent to the increasingly serious waste issues, because we cannot see them. All the transportation and disposing of waste does not happen within our visible range. In our inherent concept

about waste, waste trucks collect it, and relevant staff properly dispose of it. Our governments spend a lot of money on waste disposal every year, but the problems caused by waste have not been solved.

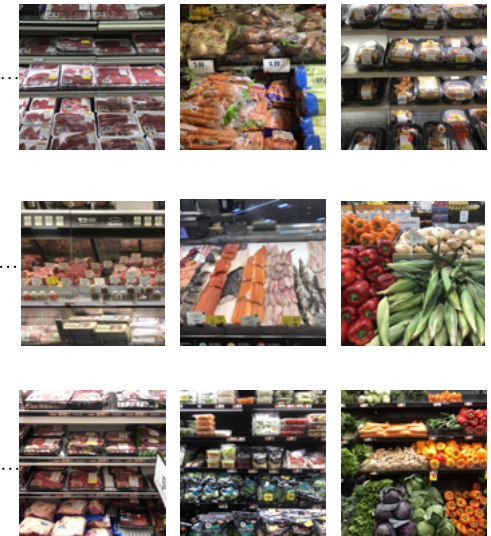
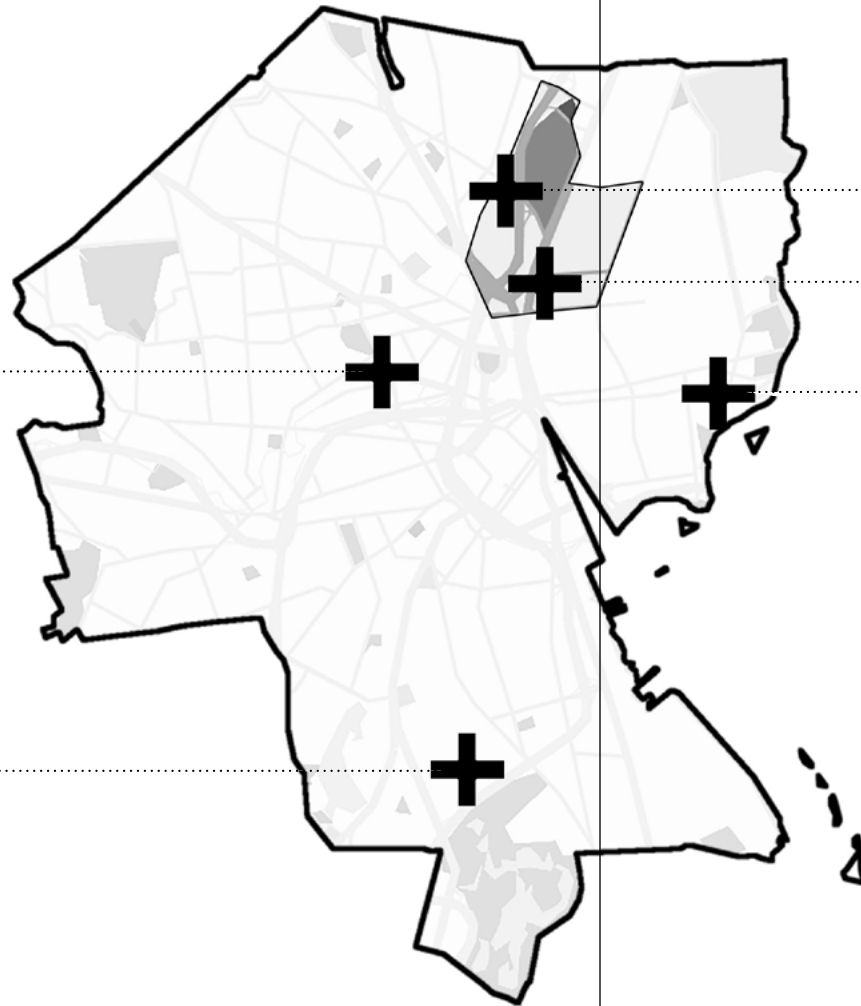
**The fact is, waste is all around us.**

We can not leave this issue totally to cleaners and waste disposal staff. Destigmatization of waste requires the participation of the public. Therefore, starting from the consumer's point of view, and helping them to make meaningful changes, is a crucial step in this process, because consumers are the most active participants, and will also be the highest beneficiaries of a waste-friendly community.

Farm Fresh



Good Fortune Supermarket



## 01 CONSUMER BEHAVIOR

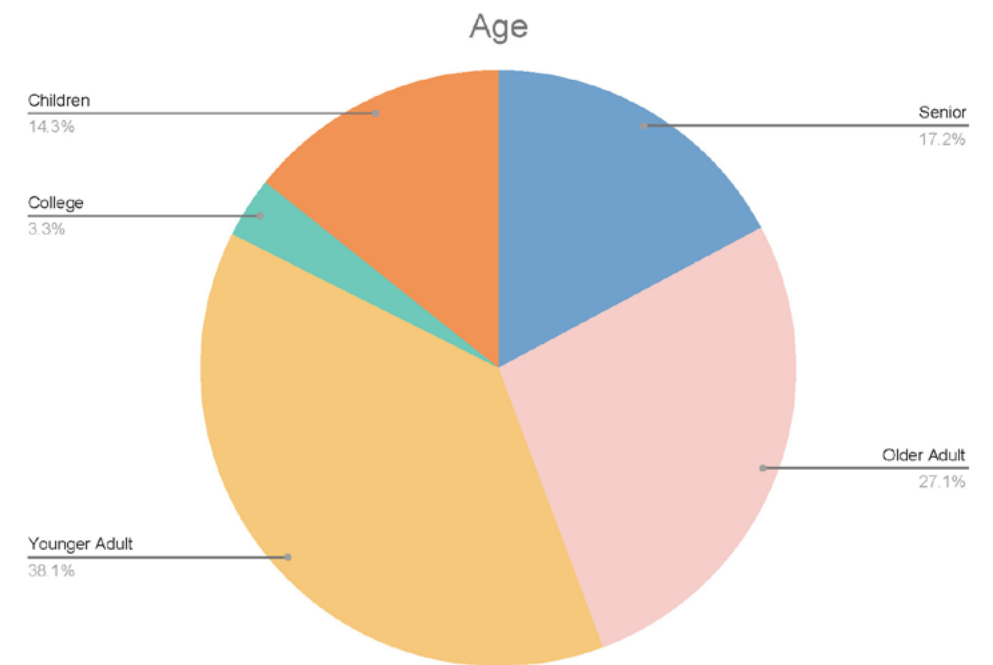
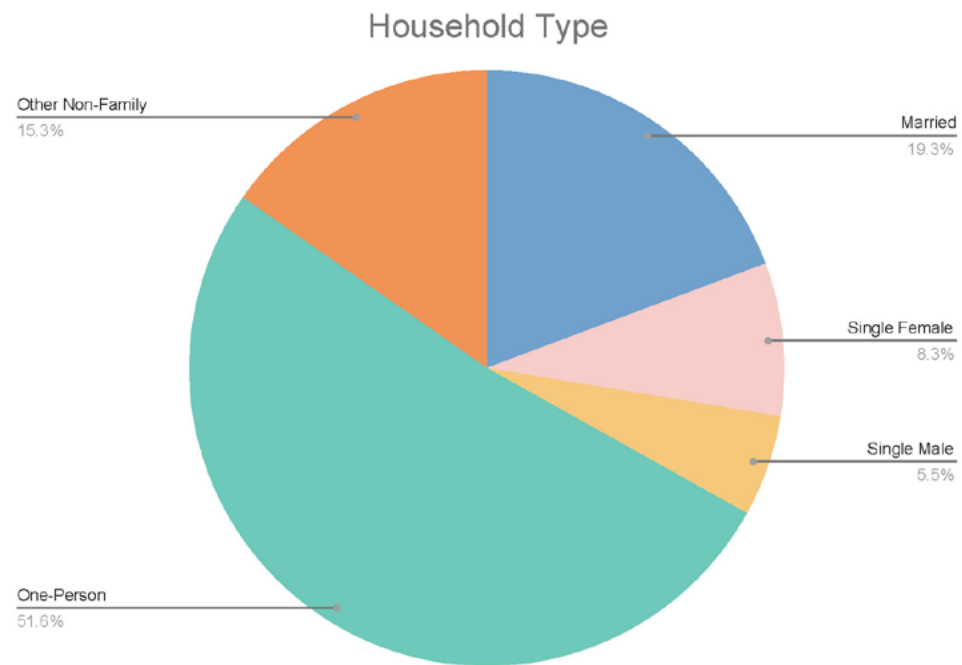
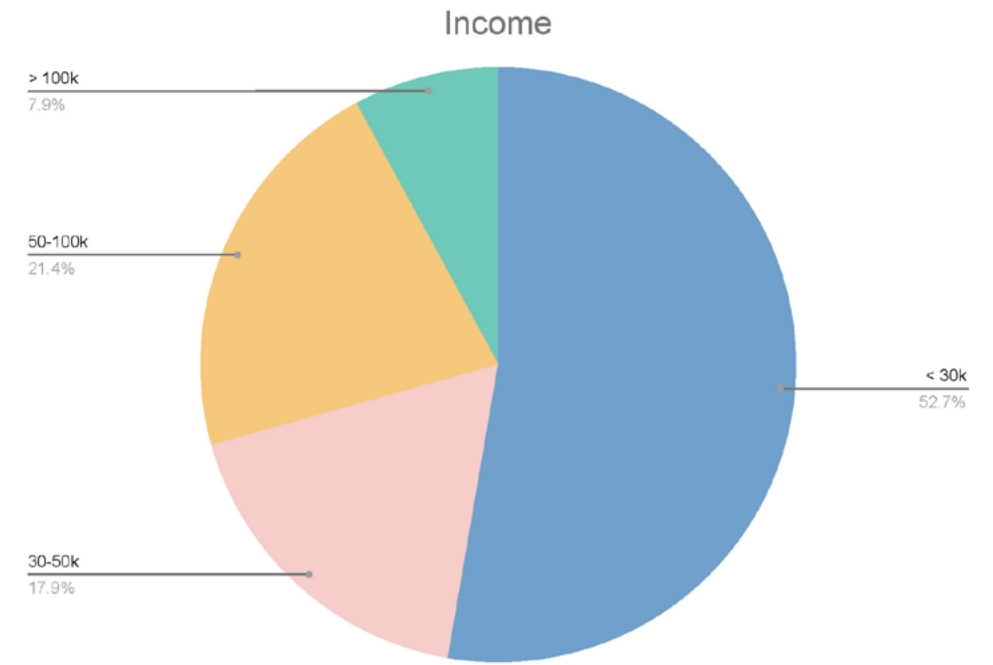
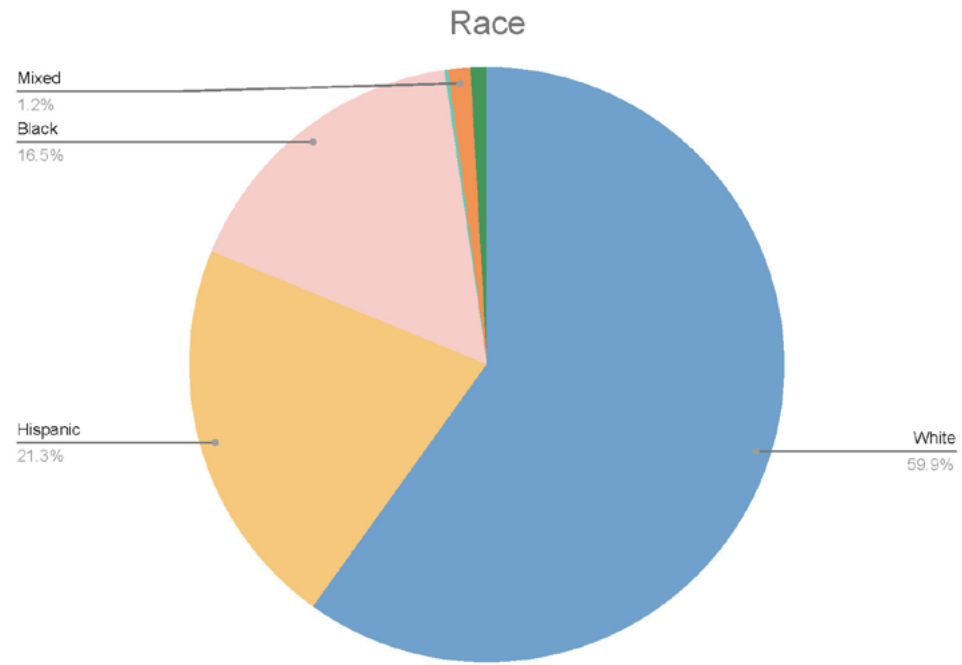
The focus of the thesis was narrowed down to food waste and its related packaging. There is a huge gap between landscapes of production and landscapes of landfill of food. When we buy food, we not only pay for food itself, but also pay for the packaging and the energy it consumes in the overall process of production and transportation. The excessive packaging,

especially food packaging, is in fact the source of a large amount of waste.

In most western countries, local fresh food is usually expensive, and cheap food is not only more processed, but also often accompanied by a lot of plastic packaging for protection and preservation.

The amount of packaging of ingredients depends on the consumption level of local residents. High-end supermarkets, like Whole Foods for example, want to provide their customers with more natural and environmentally friendly services, including more and more diverse fresh food, while low-end supermarkets, like Stop & Shop, are more concerned with

reducing costs, which means more packaging and more non-degradable waste. Residents make decisions on which type of supermarket to go according to their financial status and consumption level. On the other hand, the services provided by supermarkets can also influence the choice of consumers.



**STATISTIC OF MOUNT HOPE DISTRICT**

There are more single, low-income young people here, and there is a larger population of Hispanic and Black People in Mount Hope than in other districts.

**SPECULATED WASTE DIARY**

In order to better understand the relationship between consumer behavior and garbage, I developed four typical household consumer profiles based on available statistics. The profiles include a nuclear family, a single mother with her child, an early

career single man, and an elderly couple. I speculate on their waste diaries based on their characteristics, by imagining which supermarket they prefer to go to, what they would purchase, and what kind of waste would then be produced.

**A Nuclear Family**

Race: White  
Income: >100k  
Age: 2 Older Adults+2 Teenagers

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Paper, cardboard, and cartons					
Plastic containers					
Metal cans, lids, and foil					
Food waste					
Regular Trash					

**An Early Career Single Man**

Race: White  
Income: <30k  
Age: Younger Adult

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Paper, cardboard, and cartons					
Plastic containers					
Metal cans, lids, and foil					
Food waste					
Regular Trash					

**A Single Mother With Her Child**

Race: Hispanic  
Income: <30k  
Age: 1 Older Adults+1 Child

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Paper, cardboard, and cartons					
Plastic containers					
Metal cans, lids, and foil					
Food waste					
Regular Trash					

**An Elderly Couple**

Race: White  
Income: 30-50k  
Age: Senior

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Paper, cardboard, and cartons					
Plastic containers					
Metal cans, lids, and foil					
Food waste					
Regular Trash					

**RECIPE**

- #1 eggshell, flour, gelatin, glycerin, water, salt
- #2 orange peel, flour, gelatin, glycerin, water, vinegar, baking soda
- #3 orange peel, eggshell, flour, water, starch
- #4 orange peel, eggshell, gelatin, glycerin, water, vinegar, baking soda
- #5 Paper shell, expired milk, honey, starch, gelatin, glycerin
- #6 Paper shell, expired milk, honey, starch, flour

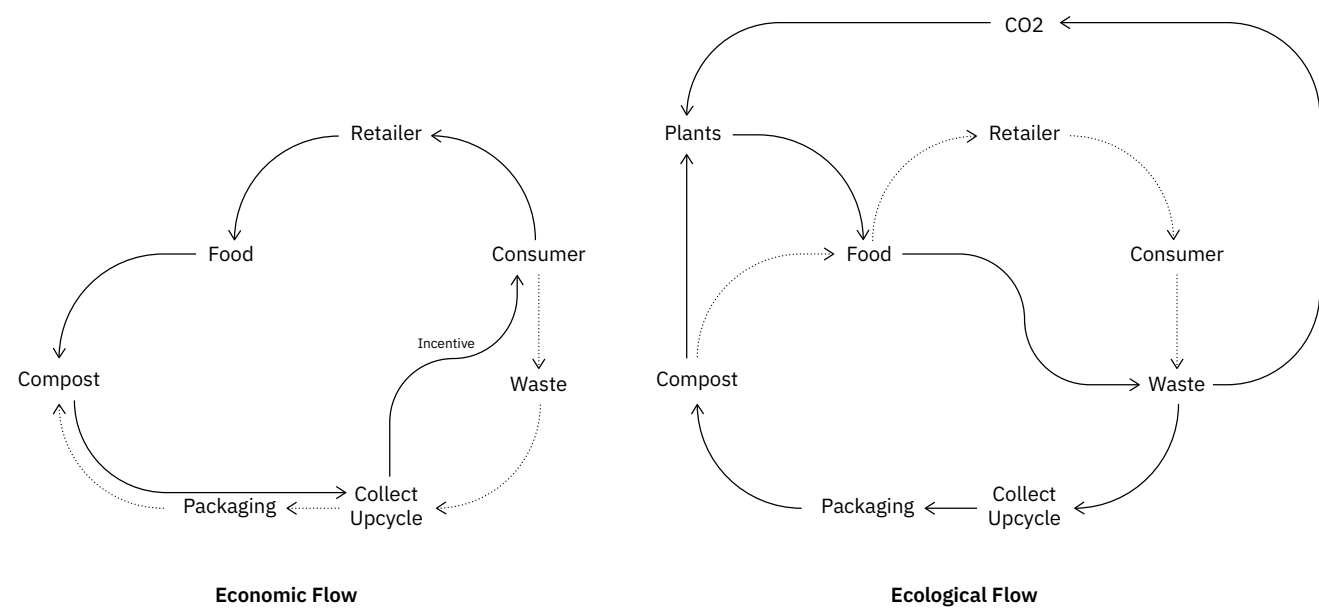
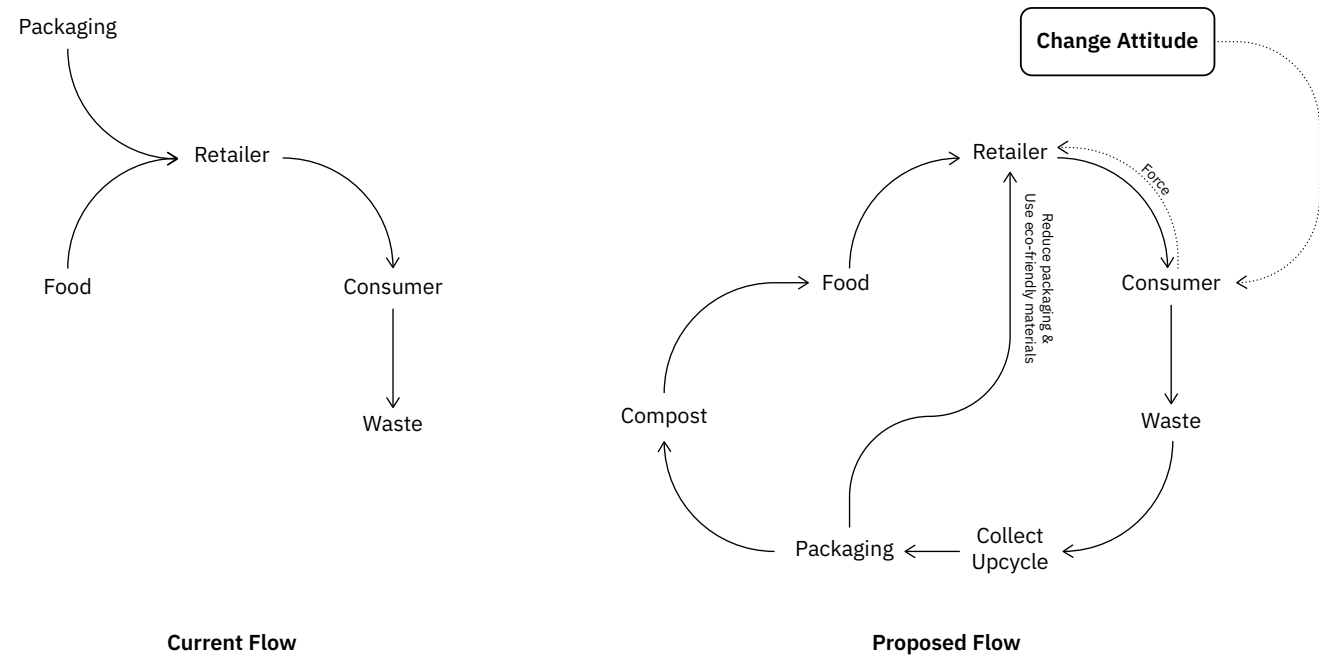


**02 MATERIAL TEST**

As part of the investigation, I did my own material tests with waste materials, namely eggshell powder. Other materials were also added, such as orange peel and paper shell. The process focused on transforming them into bioplastics in order to better understand their various properties such as texture, hardness, and flexibility.

The resulting biomaterials are fully degradable, and they can provide alternative choices for packaging materials. Even though this study was superficial, it suggests their potential to eventually be scaled up and replace, even if partially, some of the plastic alternatives currently in use.





### 03 PUBLIC ATTITUDE

In developed cities, waste is almost always invisible, and people have very little to no interest in it. Through my waste diary, my own thoughts and behavior have changed: I started to care more about waste in my daily life and tried to produce less. Changing public attitudes towards waste can have an amazing impact on the entire flow, both in ecology and economy. It can not only reduce the amount of waste generated through our own actions, individually and collectively, but also force the retailers and other market-driven systems to make changes in their attitudes and services.

In economic terms, most changes in consumer behaviour could happen through the monetary incentivization in their collection, recycling, and up-cycling actions which in turn could boost recycling. In ecological terms, when we use more biomaterials instead of plastic, we are able to compost more and use it to grow organic produce. If at an appropriate scale, the increase in plant production could, in turn, absorb more carbon dioxide emitted through the process of production and waste disposal.





### RASIE PUBLIC AWARENESS

1. Provide transparent information
2. Provide waste disposal guidelines
3. Public education
4. Create a platform for residents to communicate with each other



### REFORM CONSUMER EXPERIENCE

1. Collect consumer feedback
2. Provide unpackaged shopping experience
3. Provide environmentally friendly packaging
4. Reward consumers for their waste collection behavior



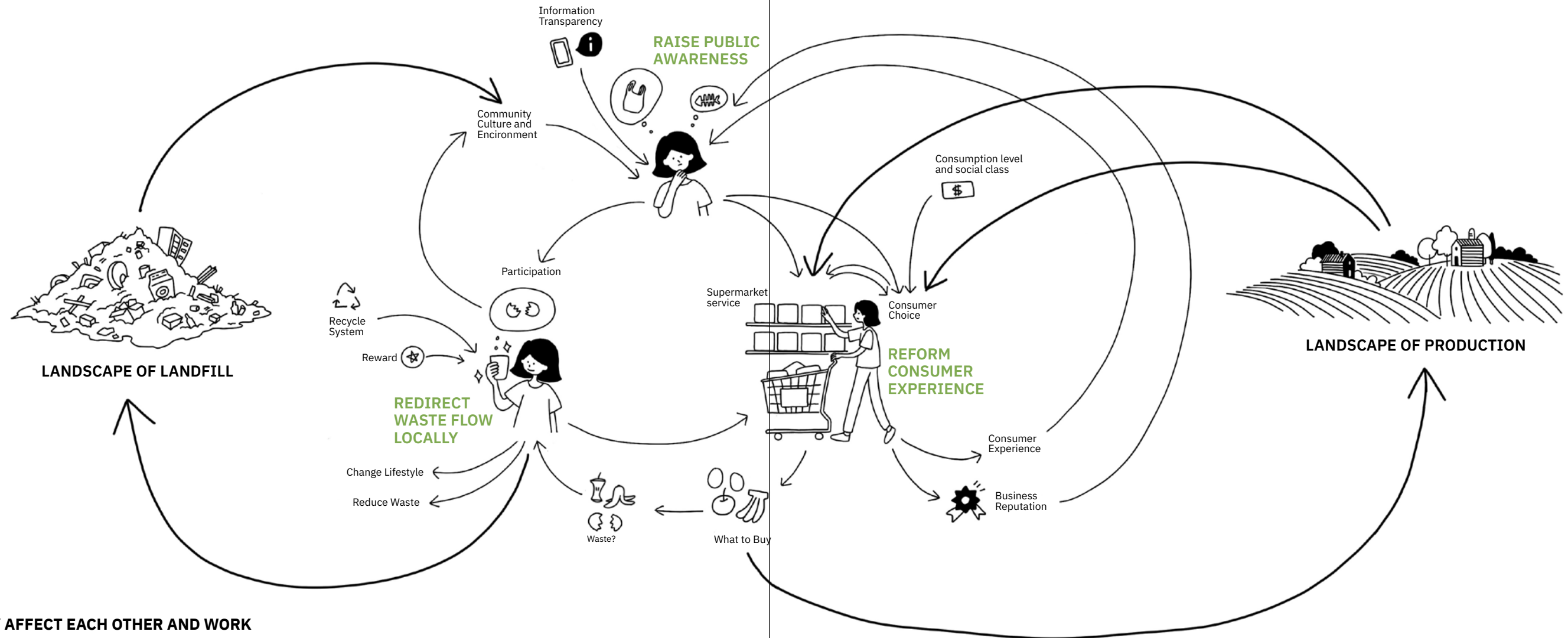
### REDIRECT WASTE FLOW LOCALLY THROUGH COMMUNITY COOPERATION

1. Build local waste collection center
2. Cooperate with local restaurants, retailers, and artists to upcycle waste materials

**The big goal of the thesis is to engage in an attitude that may lead to the reduction of the impacts of daily life, by proposing ways to change consumption behaviors through the design of a circular economic system, raising community awareness about the environment and hopefully suggest ways to move towards a waste free future.**

**From the perspective of landscape architecture, the design strategy in this study starts by providing more public spaces, both outdoor and indoor, to let residents get out more, communicate more with others, exchange their ideas in their community, and gain knowledge about waste.**



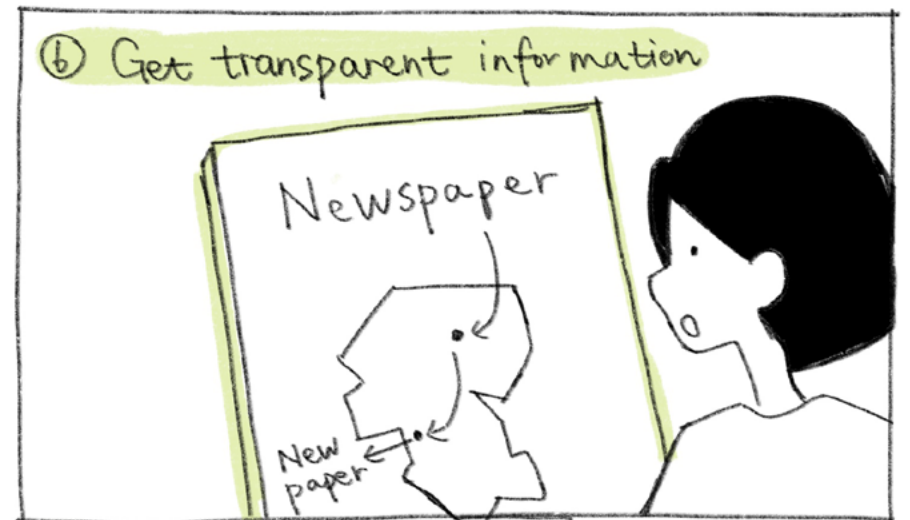
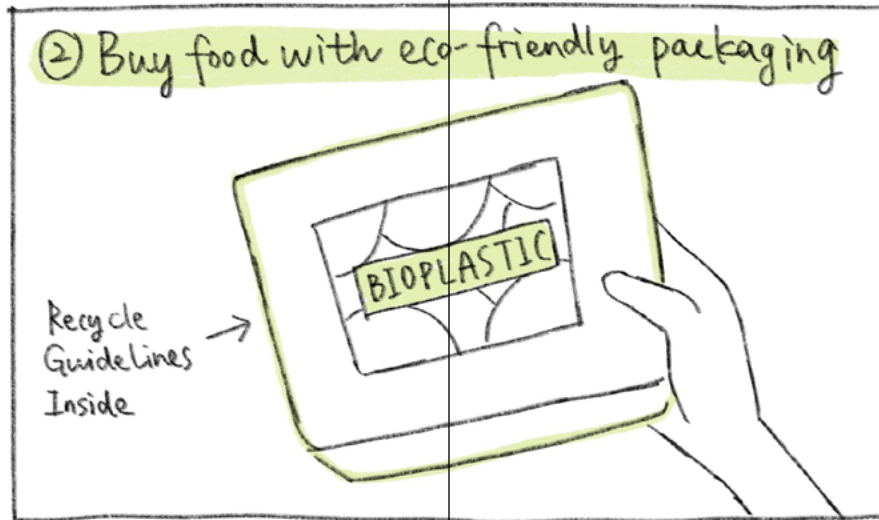


**HOW THEY AFFECT EACH OTHER AND WORK TOGETHER**

Raising public awareness begins with improving the transparency of information. Actions like these can both change the consumer experience and promote residents to participate more actively in waste recycling. On the one hand, as the consumer experience changes, the services provided by supermarkets and our attitudes towards them can also be changed. On the other hand, there will be less non-degradable waste produced, and more waste will be recycled and upcycled to go back into the material flows, and therefore, help create a better community environment, that is more friendly to waste.

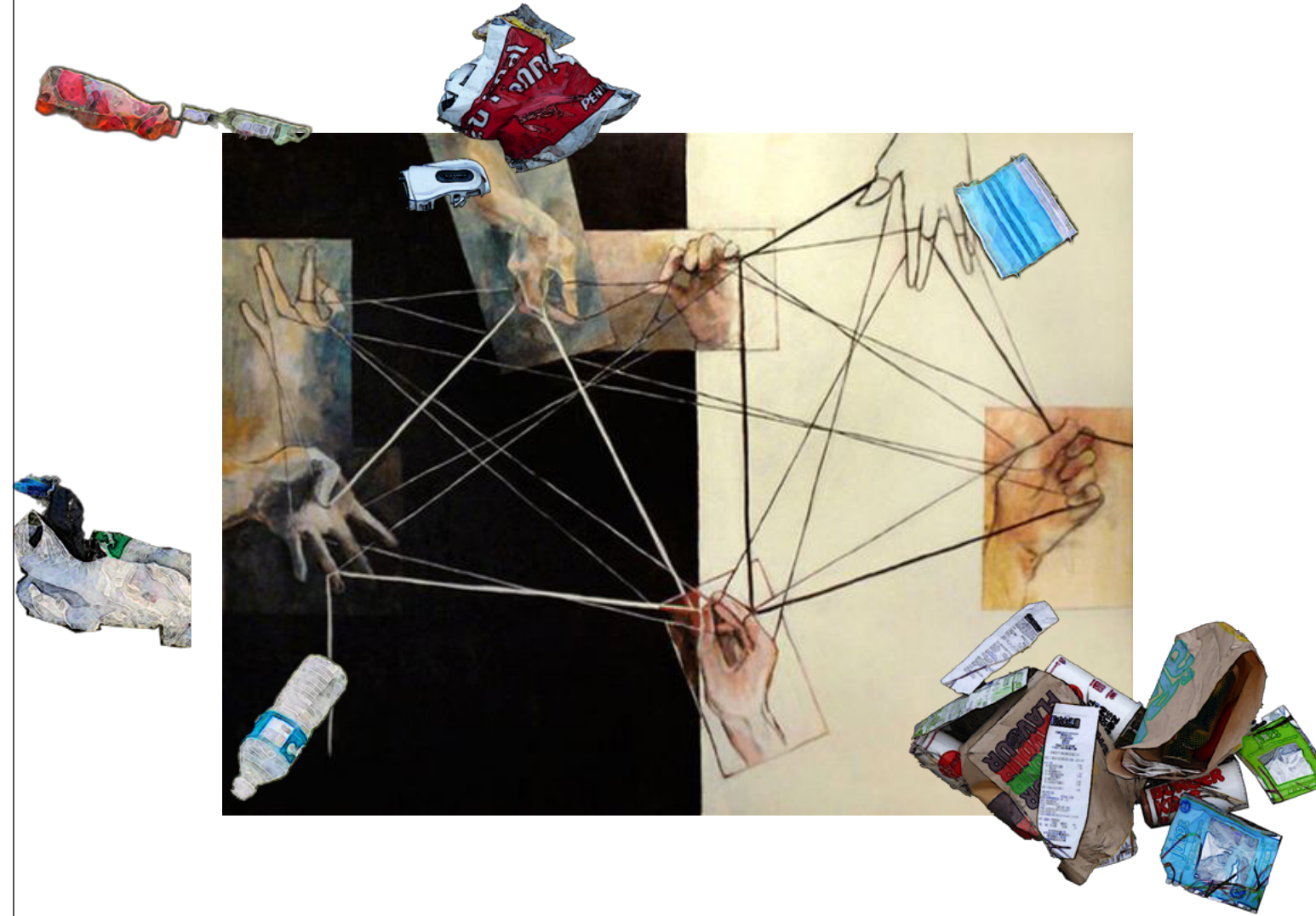
The three principles promote each other instead of building a linear structure. And they work together to bridge the gap between the landscapes of production and the landscapes of landfill involved in the flows. Our relation to these landscapes, which are often outside of our mind when it comes to our waste generation, can change as we change our attitude and behavior to waste, and reduce the amount of waste that is harmful to the environment.

**STORYBOARD: What a person's daily life in the community is like**

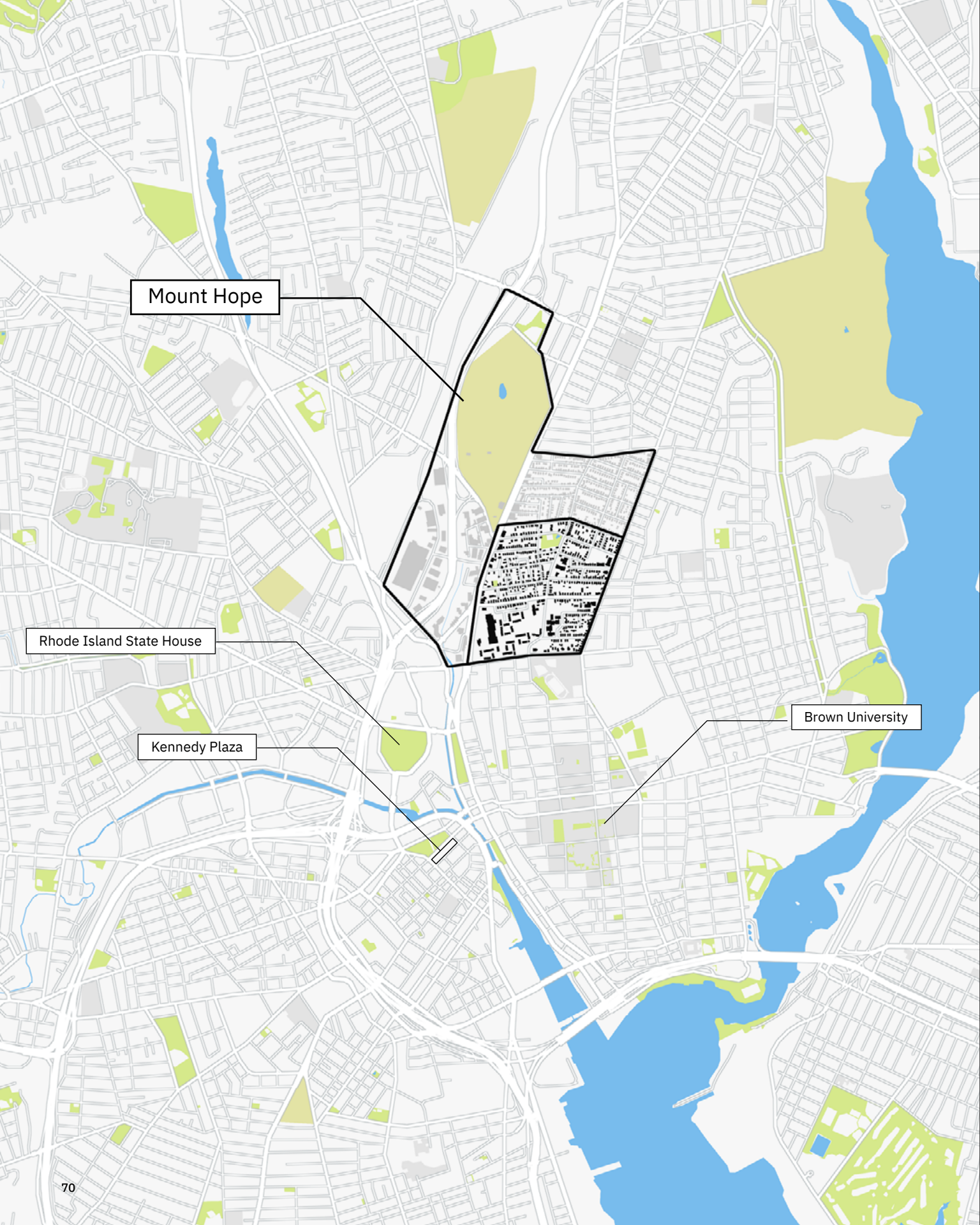




# 04 EXPLORE MOUNT HOPE



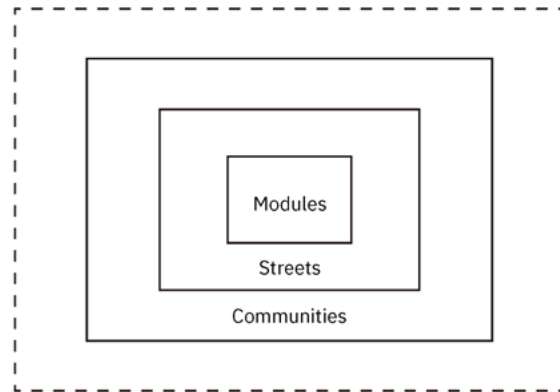
Goldenthal, B. (2008). Cat's Cradle/String Theory. [http://www.bailagoldenthal.com/painting/cats\\_cradle/cats\\_cradle.html](http://www.bailagoldenthal.com/painting/cats_cradle/cats_cradle.html).



**MOUNT HOPE DISTRICT**

The focus of this thesis' strategy is Mount Hope, a district located on the northeastern edge of Providence. The local community is diverse yet cohesive. Before the COVID pandemic in 2020-2021, residents of the community sometimes had meals together, and there were also initiatives such as the Sharing Garden and the Teaching Garden, which offered a strong support to the community in being able to grow fresh, healthy, and nutritious produce. Such a positive community environment has laid a good foundation for the implementation of various public participation-oriented strategies.

Currently, Mount Hope is experiencing strong processes of gentrification. With the skyrocketing housing prices, the once predominantly African-American neighborhood – and one of the oldest – in Providence, is gradually being forced to accept the wealthy to move in. Topography seems to play an important role in the distribution of white families from families of color: the former occupy a flat top between two main streets, while the latter live in the steeper slopes facing west. . How to unite them so as to work together to build a better community is also a problem that this thesis aims to address, even if only partially.



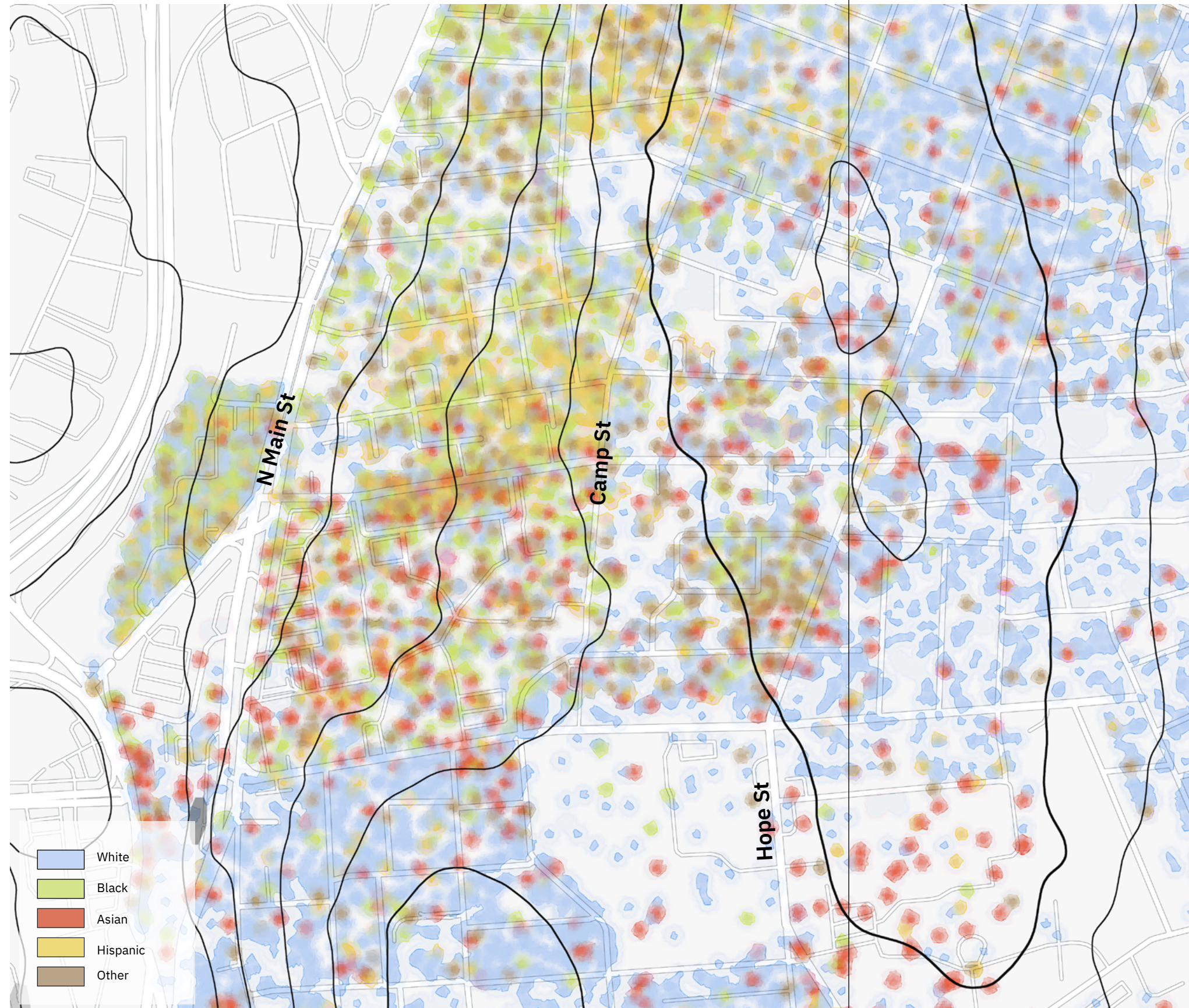
**START SMALL**

The design starts with a series of modules that can be applied to a variety of urban spaces, such as pocket gardens, vacant land, abandoned stores, and use them to reimagine a local street. The idea is, then, to expand the design approach to the wider scales of the neighborhood.



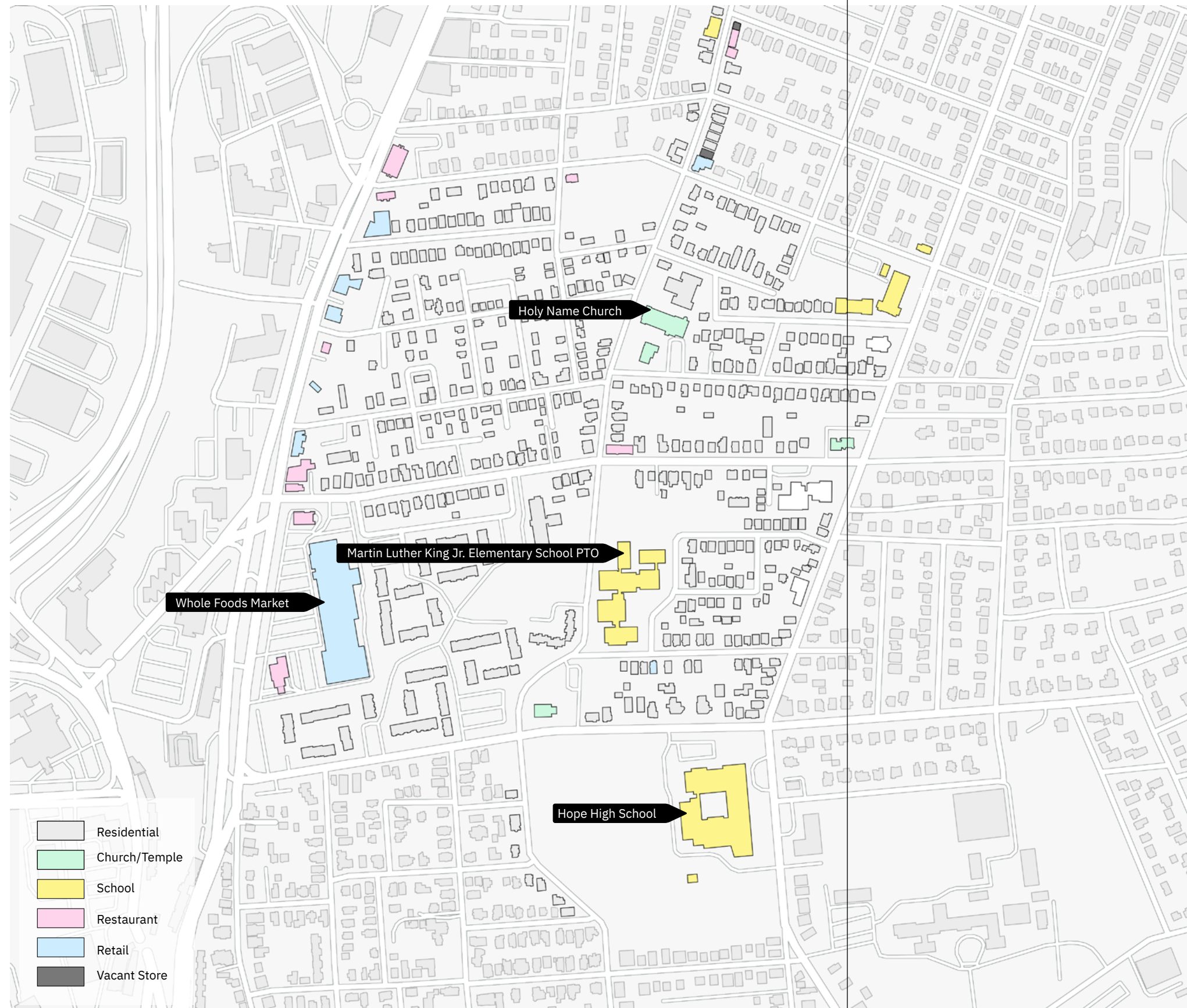
**SELECTED COMMUNITY**

This is the community at Mount Hope I'm looking at.



#### Topography + Race

Between the Camp St and N Main St there's a steep slope, and the area between Camp St and Hope St is relatively flat. In addition to the topography, there's a difference of race happening: More white people are living in the flat area, on the other hand, on the slope there're more black, asian, and hispanic people .



**Building**

There are many different types of buildings along the street, including an elementary school, a church, a bagel store, and a retail. The Whole Foods is also very close.



### Open Spaces

In addition to the buildings, there are a lot of open spaces that can be used. Including the school playground, the pocket park, the vacant land, and also parking lots. They are closely related to surrounding streets and buildings.





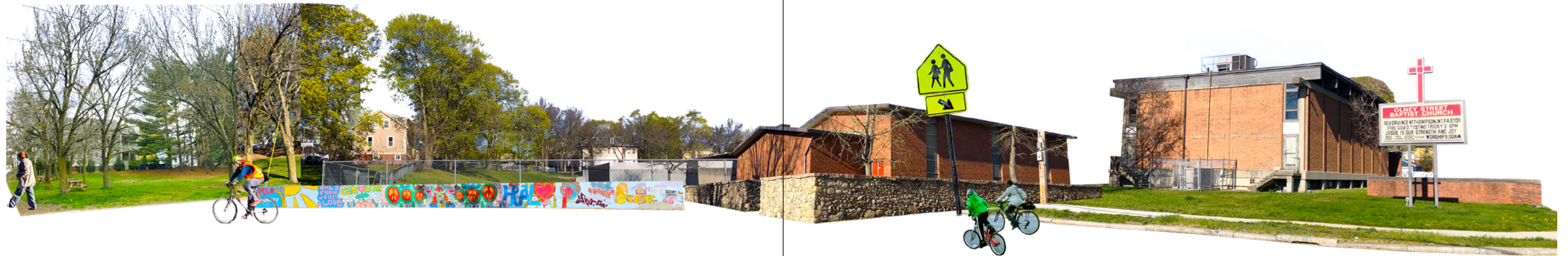
**Street Profile**

When walking on Camp St, it is easy to notice these characteristic landmark buildings and open spaces, which together make up the profile this street.



**Street Profile (from Olney St to Doyle St)**

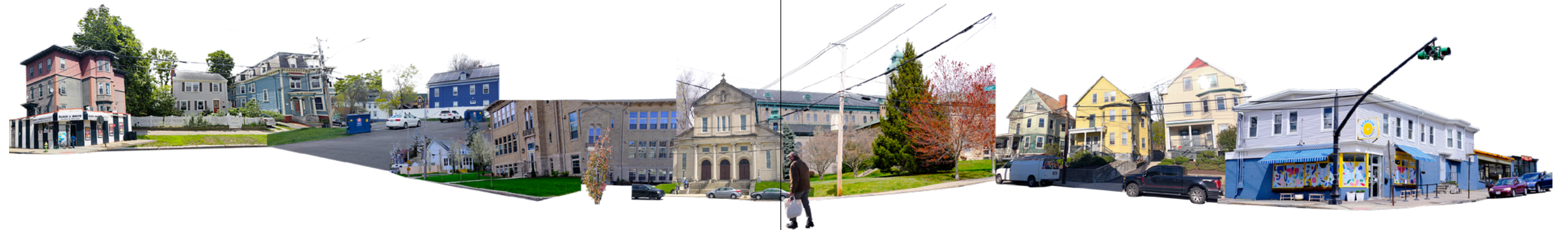
The environment on both sides of the street is very different from Olney St to Doyle St. On the north side of the road are the church, MLK elementary school, and pocket park. And on the south side, there are mainly residential areas and open spaces isolated by fences. There are a lot of unused public spaces on this section of the street, and the school can also become a good education base in the future.

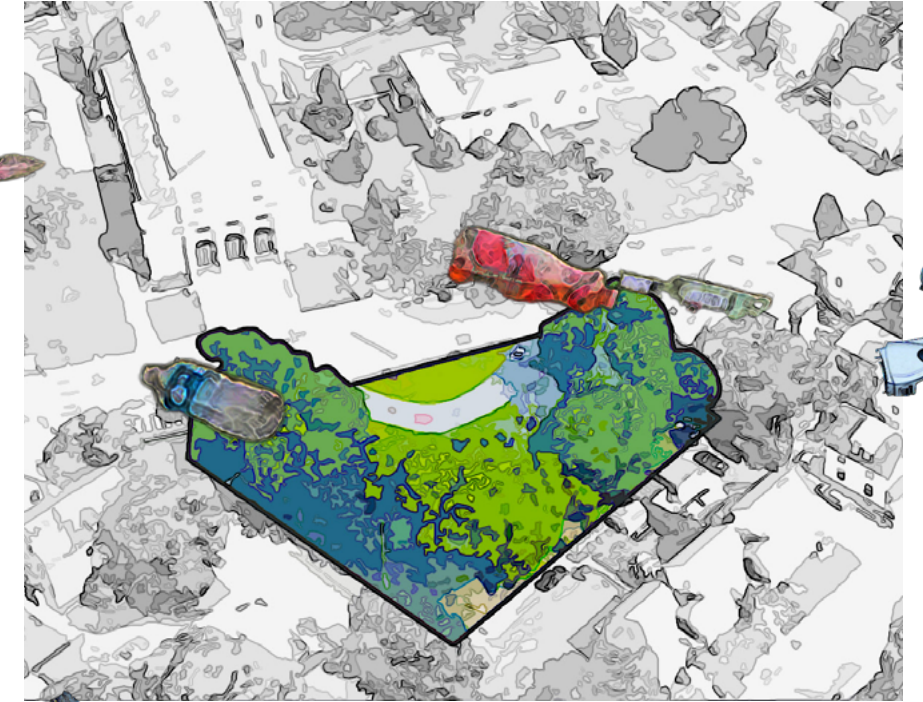
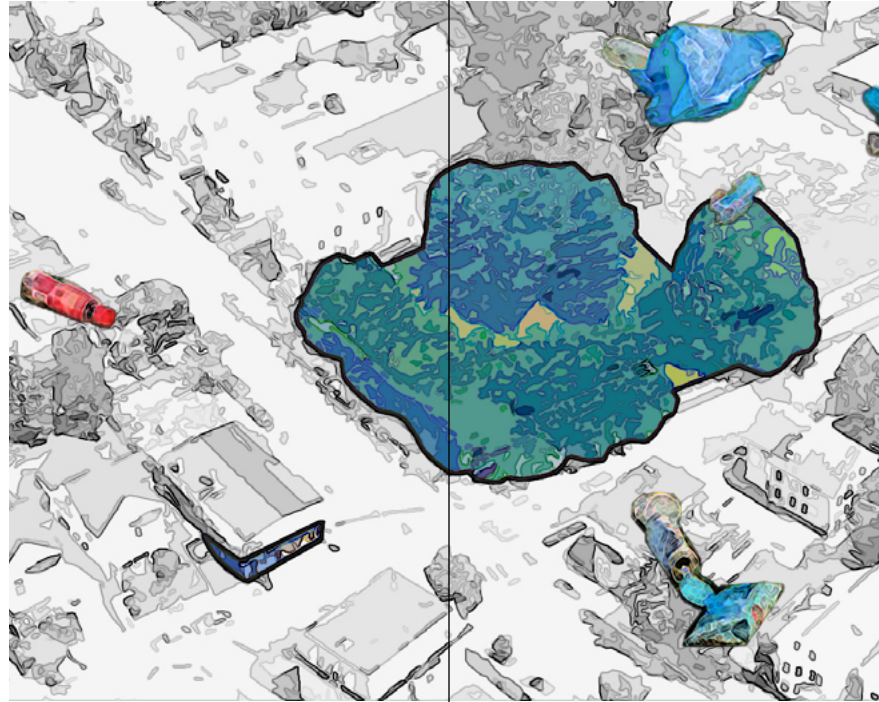
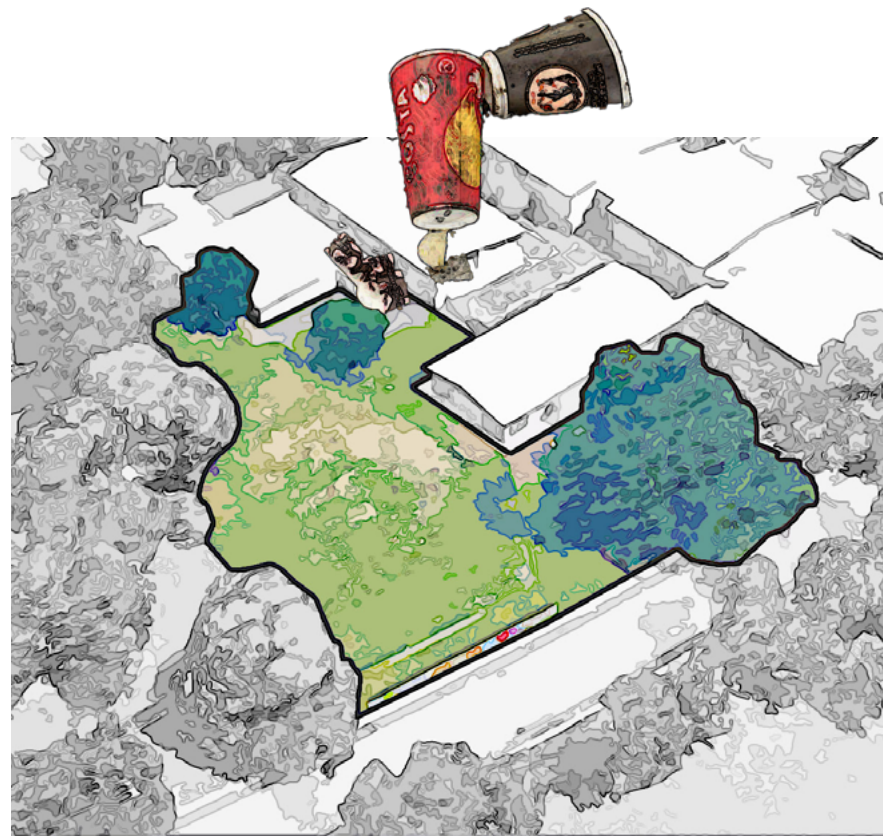




**Street Profile (from Doyle St to Cypress St)**

After passing Doyle St, there is a bagel shop on the corner of the street. There are more residential buildings along the road. Near the Cypress St, there the Holy Name Church, and opposite to it is Billy Taylor Playground.





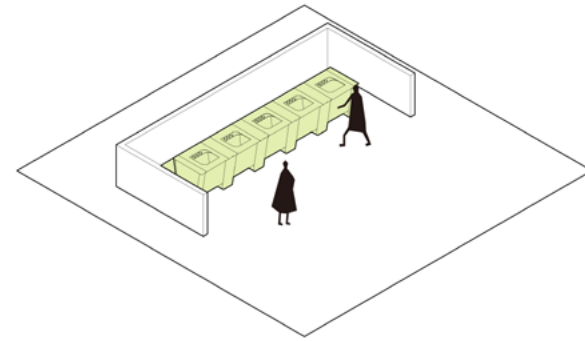
# 05 PROVIDE OPTIONS

- + MODULAR STRATEGIES
- + COMMUNITY OPTIONS
  - SCHOOL GROUND
  - POCKET PARK
  - PARKING LOT
- + PROJECT PHASES

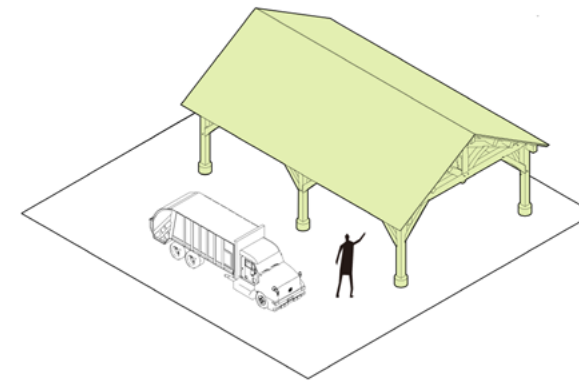


## 01 MODULAR STRATEGIES

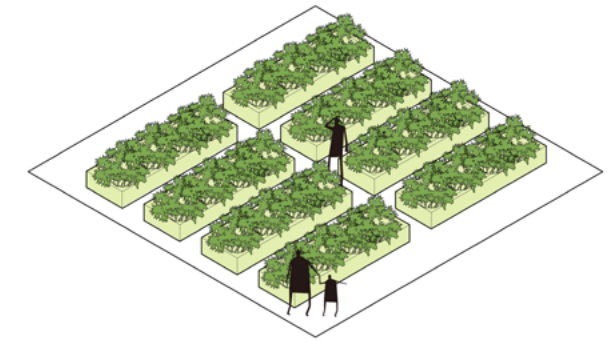
The design focuses on developing modular strategies and combining them in different ways and in distinct urban spaces. These strategies aim to reactivate these spaces and to encourage public participation in order to raise public awareness for the waste-related issues. Nine modular strategies are proposed, with a focus on three main aspects: garbage collection (green), public education (yellow), and market guidance (blue). They can work together to help build a cleaner community.



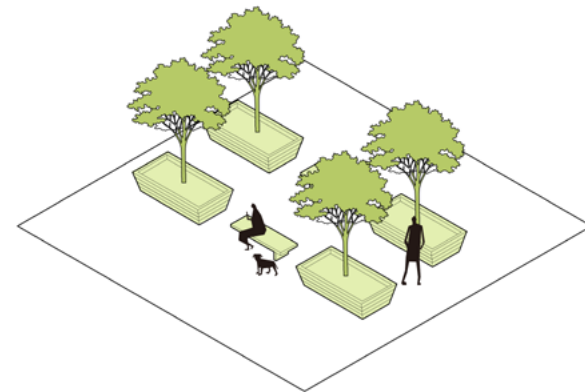
1 Waste collection station



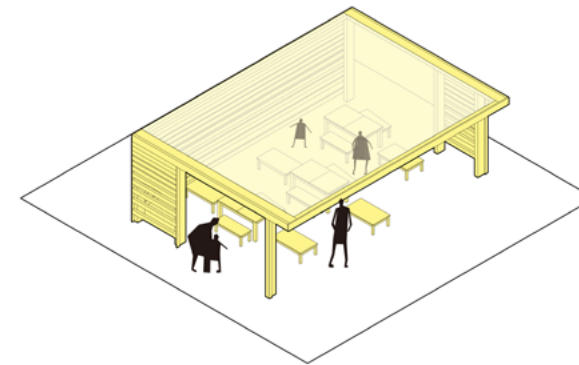
2 Waste recycling center



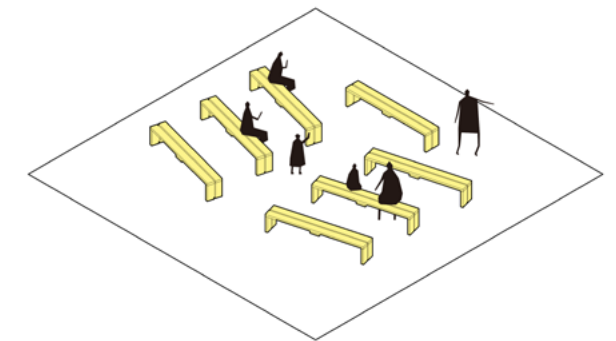
3 Community garden & compost center



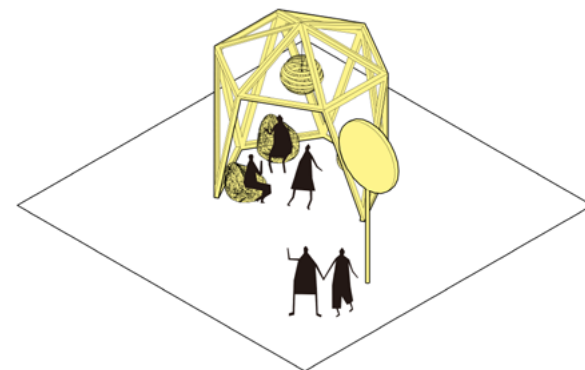
4 Eco friendly public facilities



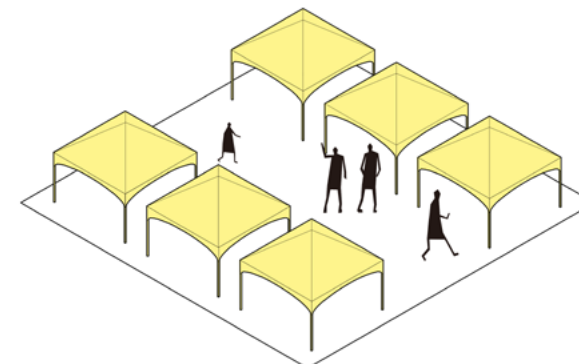
5 Workshop



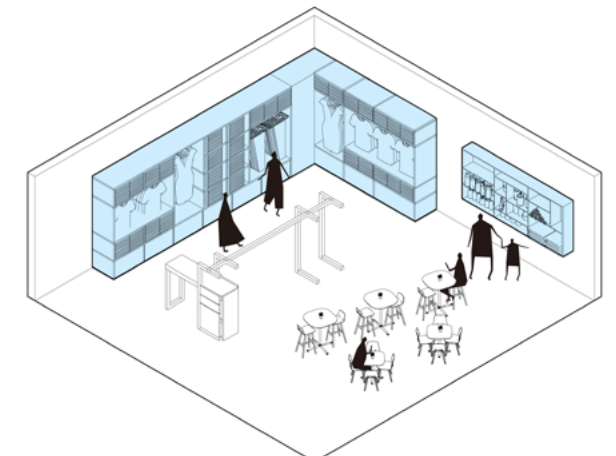
6 Outdoor Classroom



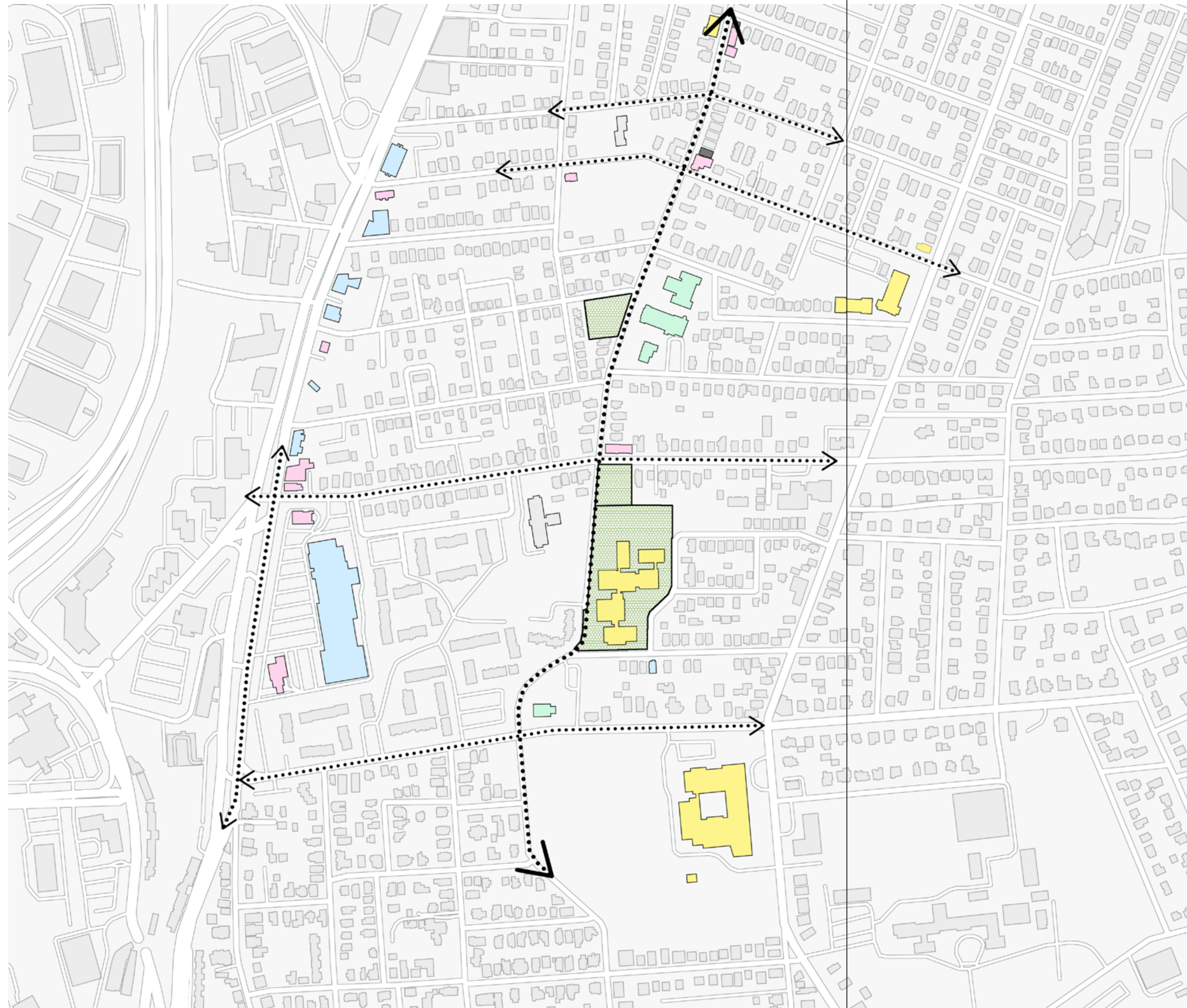
7 Installation



8 Flea Market



9 Cooperate with local stores



## 02 COMMUNITY OPTIONS

Three public spaces are chosen to test the modular strategies, which are the green space belonging to the school, a pocket park, and a parking lot serving a local church. They are very representative urban spaces along Camp Street. Options of how people can occupy these spaces that are now vacant, are explored, as templates that others can eventually refer to. However, here I just put forward some possible ways of using the site. Any final decision affecting the space should always be informed by the community residents.

## CONNECTION & EXTENSION

There are also some other spaces shown in light green, including the playground, Providence Center school, and the vacant land opposite to Martin Luther King, Jr. (MLK) elementary school. They have the potential to be a part of the whole network in the future but I will not include them in my thesis.



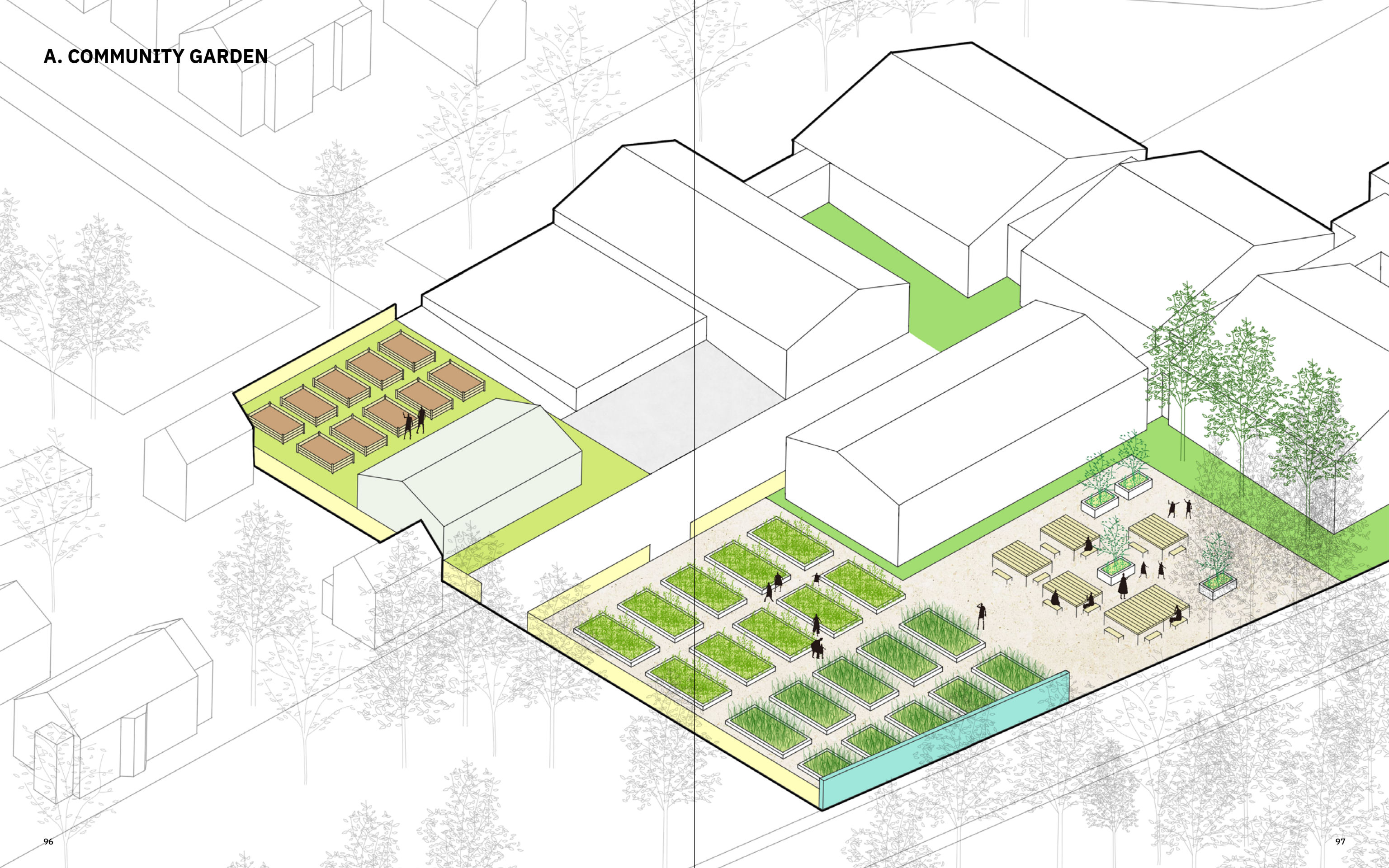


## SCHOOL GROUND

There's a large area of lawn in the school that is not currently used. The school has its own garden and amusement facilities, but their functions are not extended to this green space. This area can be used as an auxiliary space inside the school to carry out some outdoor activities.



# A. COMMUNITY GARDEN

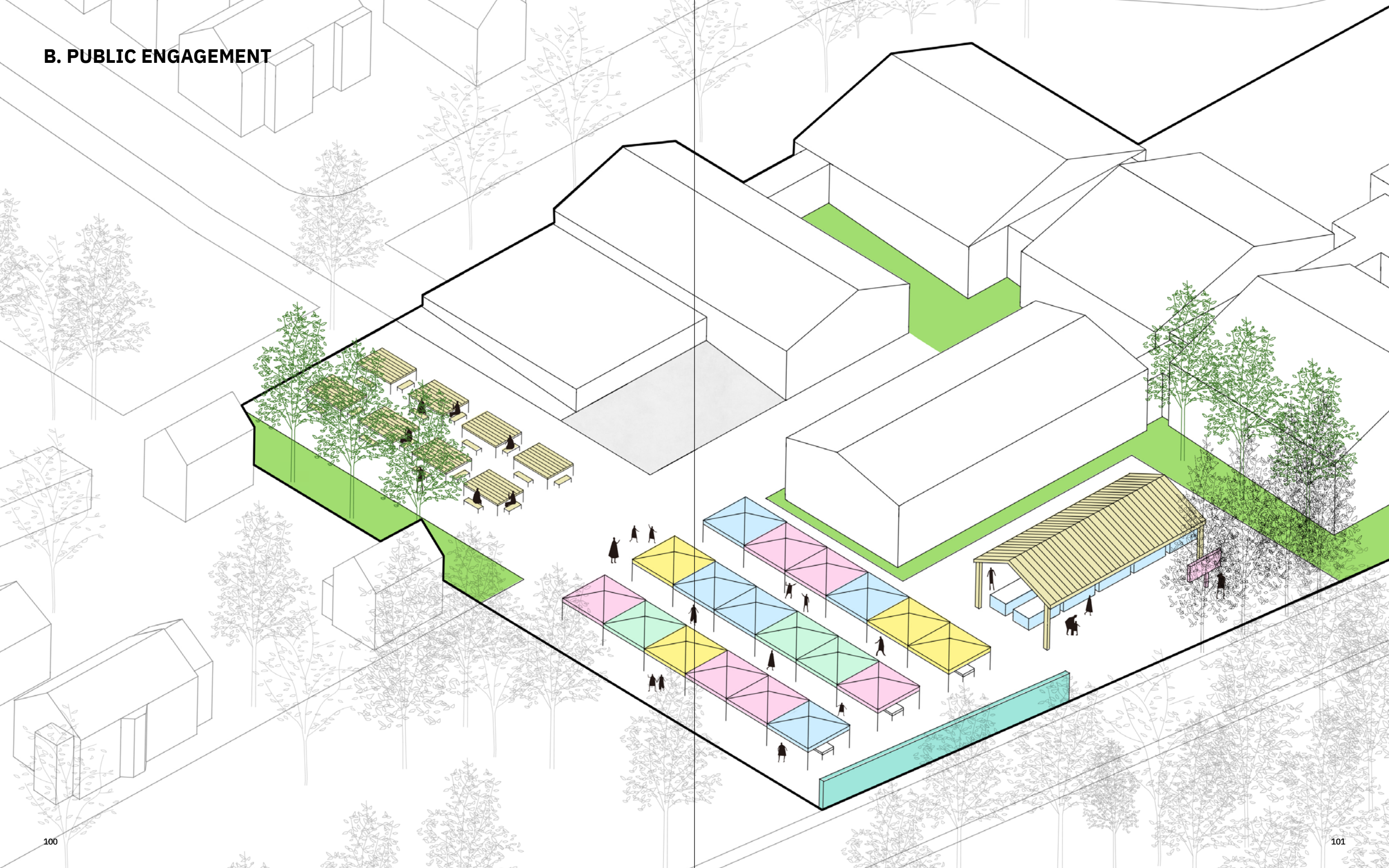




**Community Garden**

This option focuses on providing more planting area for students and also composting area. Therefore, a complete process from planting to processing to compost can be formed on campus, which students can participate in.

## B. PUBLIC ENGAGEMENT

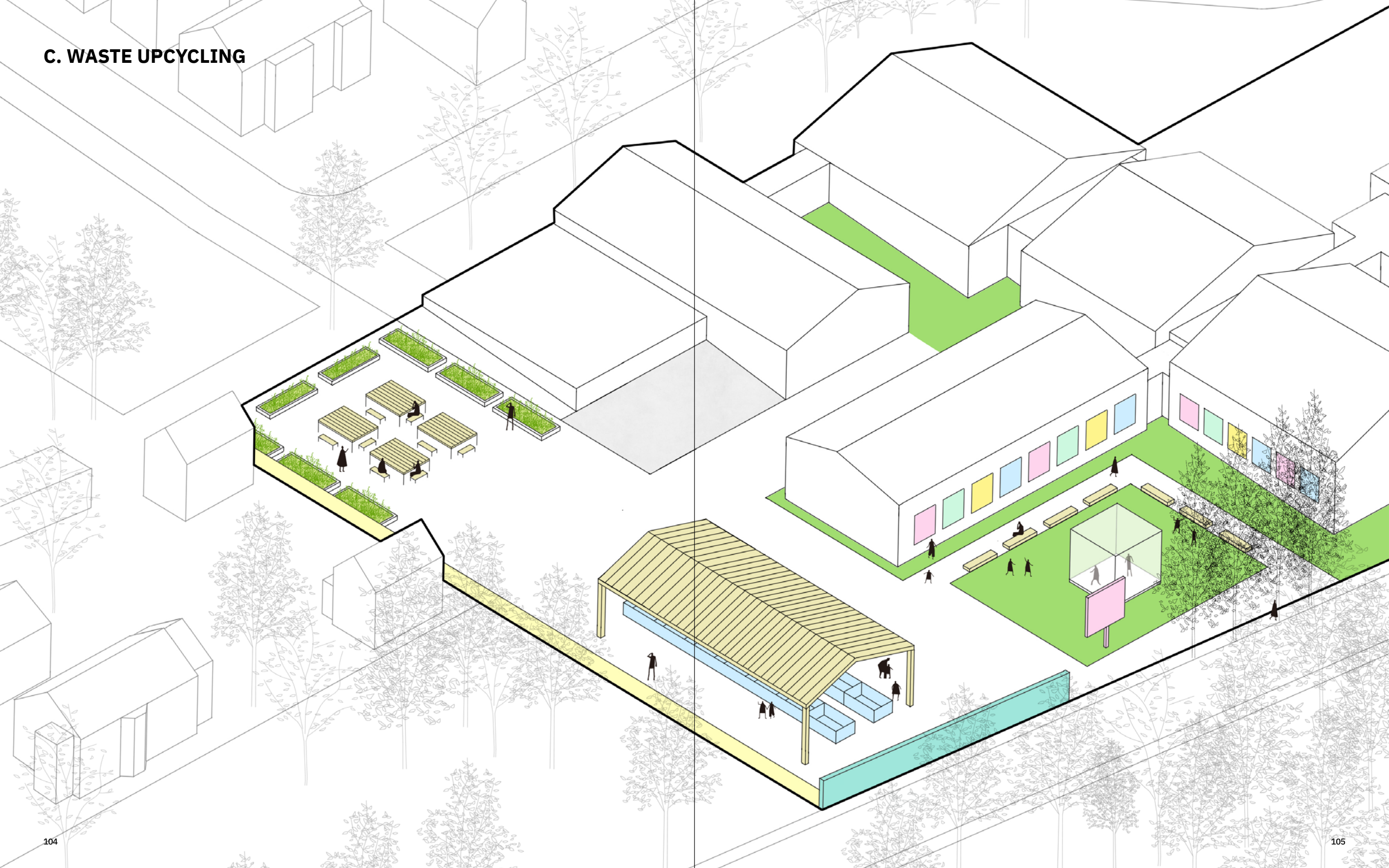




**Public Engagement**

This option is more about public engagement which includes the flea market. The space itself is opened to the street and the neighboring pocket park. Students can also make leaflets for distribution.

# C. WASTE UPCYCLING





**Waste Upcycling**

The third option is about waste upcycling. There are outdoor classrooms, and in addition, posters and art installations made by students can be exhibited here. The focus here is a waste recycling center on campus, where students can learn how to clean and sort waste in detail.



## POCKET PARK

The Doyle Avenue Historic District is a pocket park located at the intersection of Olney St and Camp St. Opposite to it is a bagel shop called Rebelle Artisan Bagels. From the school to the pocket park, and then to the bagel shop across the road, a complete public space that can be used is formed.

# A. COMMUNITY GARDEN



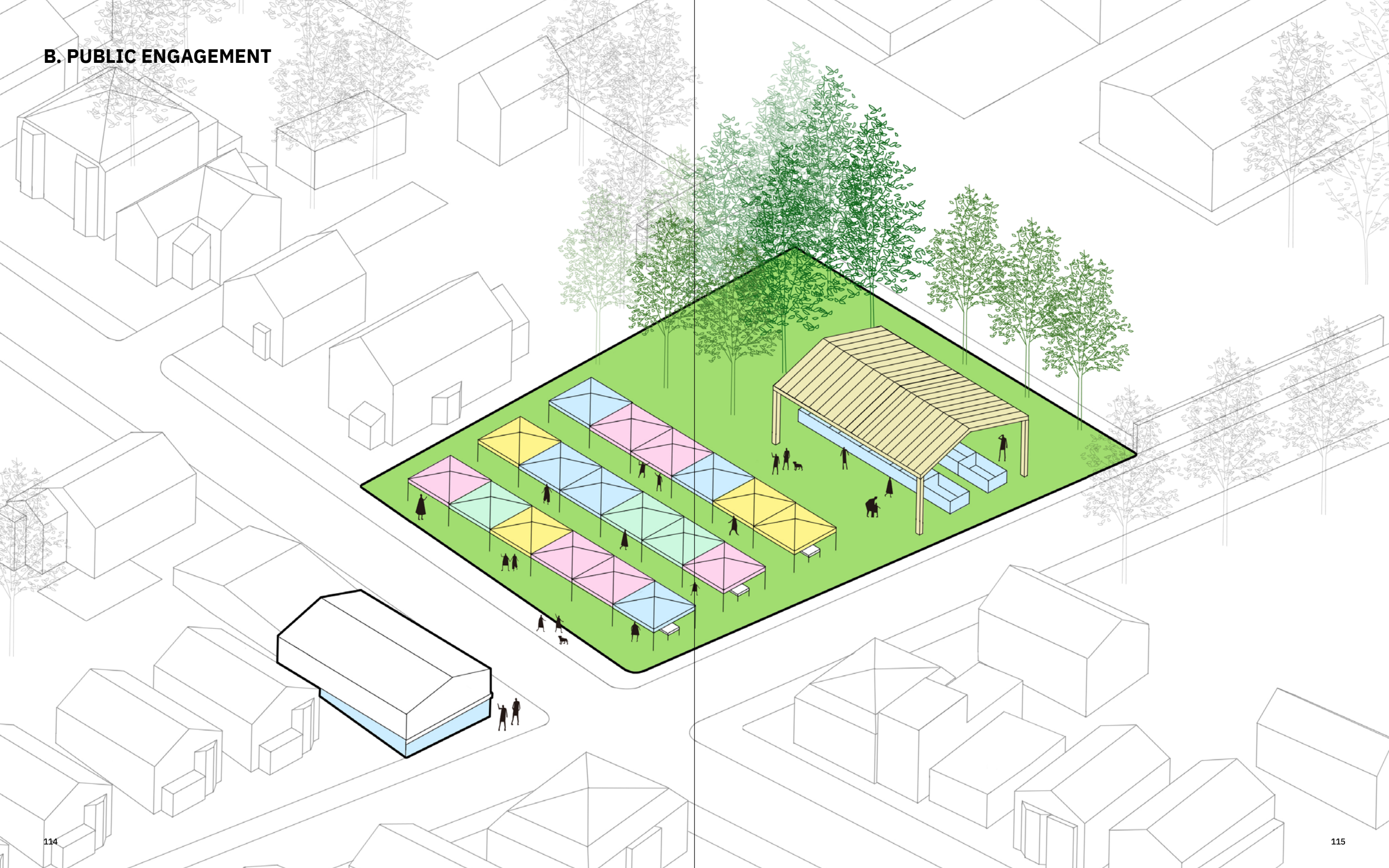




**Community Garden**

Unlike the planting area in the school, the community garden here allows more community residents to participate.

## B. PUBLIC ENGAGEMENT

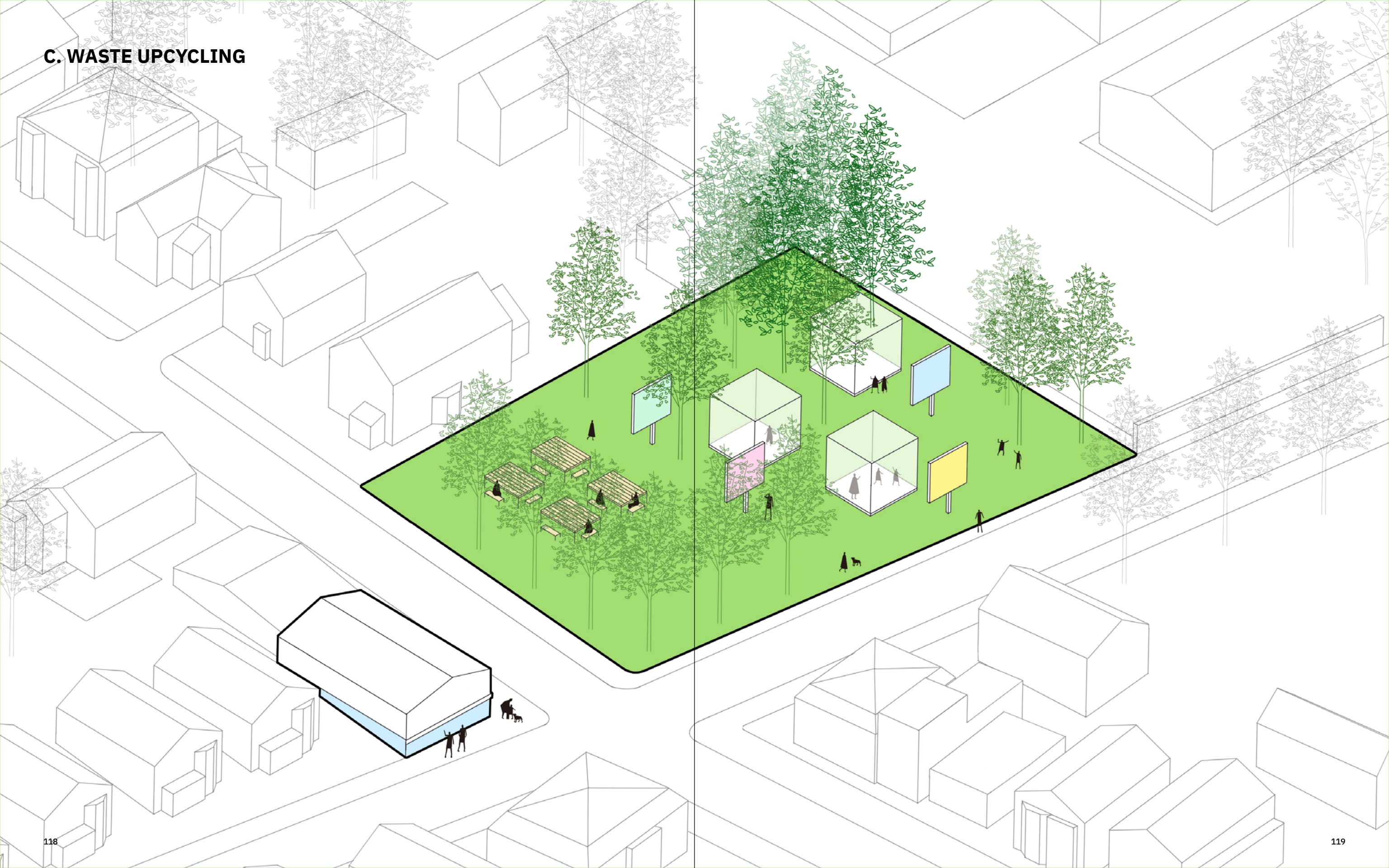




**Public Engagement**

Located at the intersection, the flea market that is facing the street can attract more people to come. It can also cooperate with local artists to sell their artworks that made out of waste material. The cooperation with the bagel store is also possible.

# C. WASTE UPCYCLING





**Waste Upcycling**

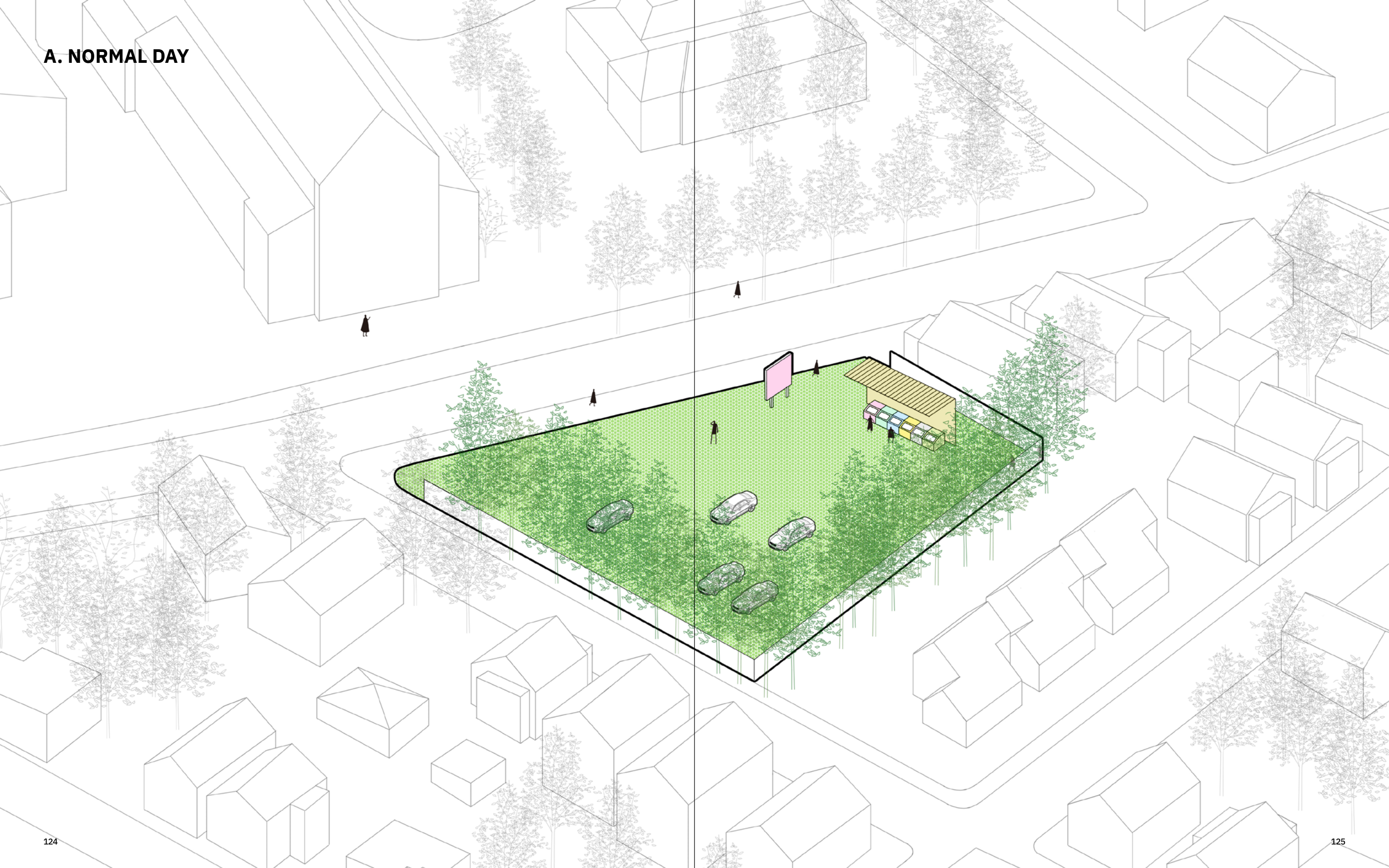
This option focuses more on outdoor workshops and interactive installations. Both of them can help raise public awareness of the waste issue.

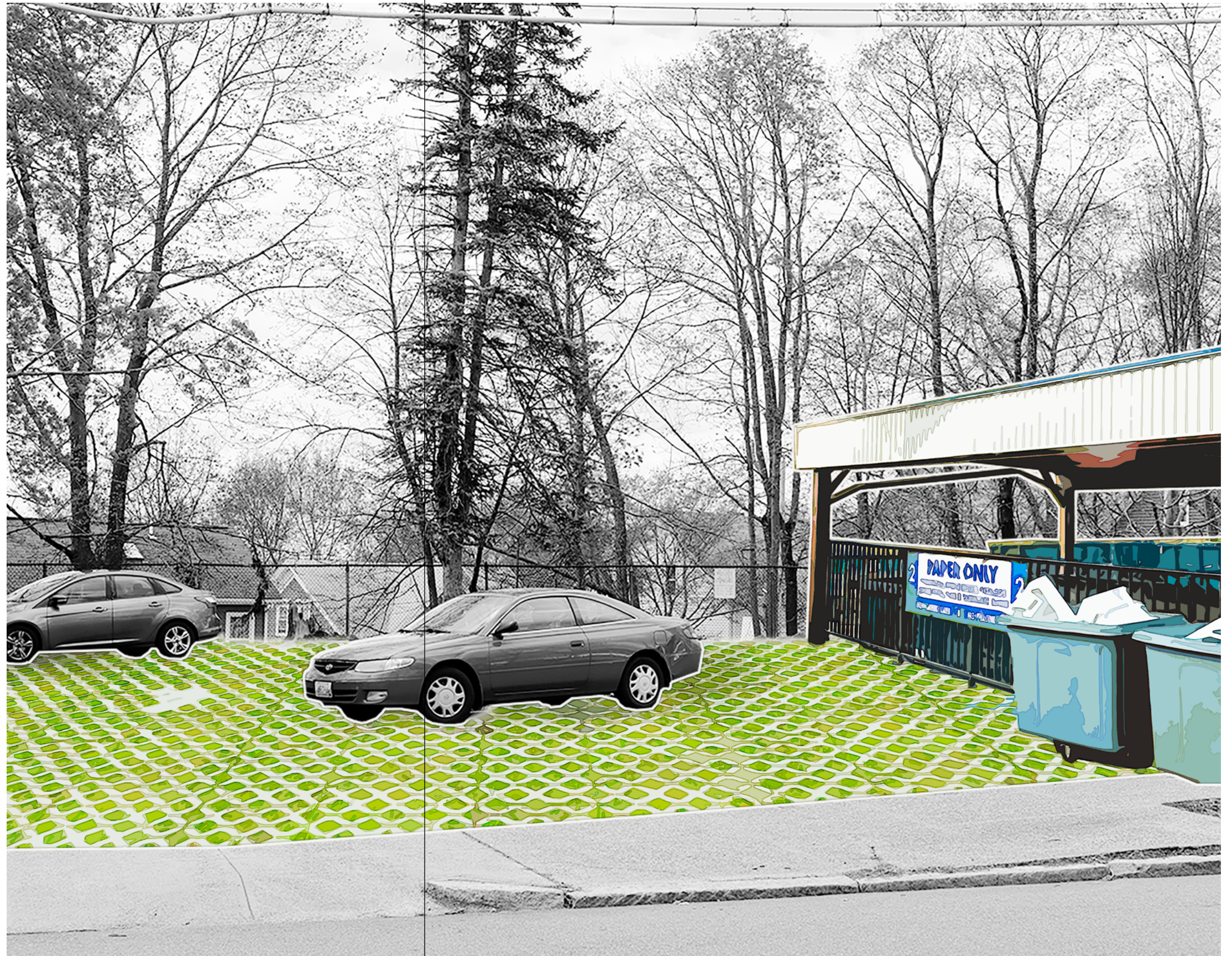


## **PARKING LOT**

The parking lot is opposite to the Holy Name Church. In my proposal, I change all paving to grass bricks, so that when the parking lot is free, all areas can be used. I provide two modes for it, one is normal, and the other is for the event.

**A. NORMAL DAY**



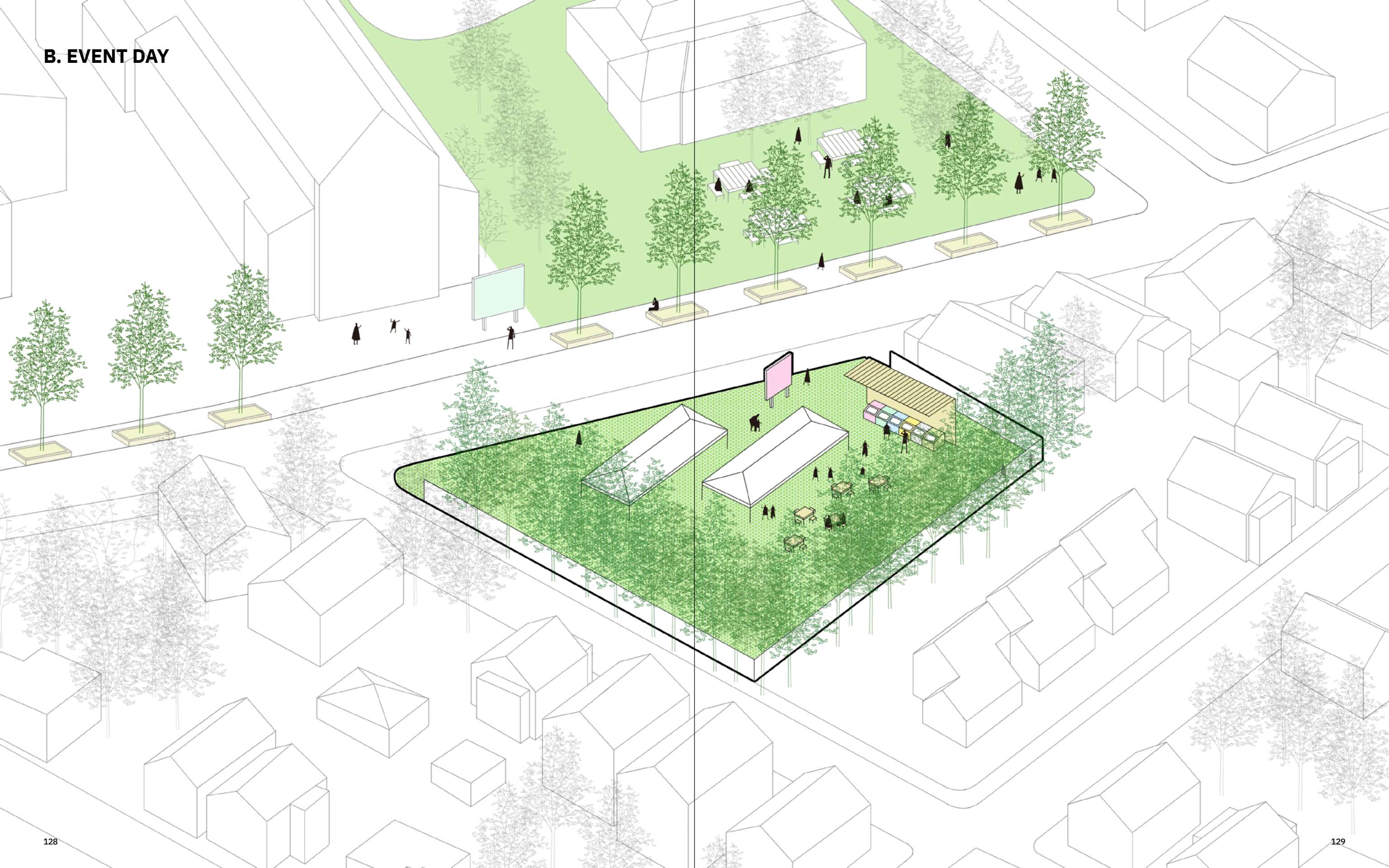


**Normal**

Normally it is a parking lot with a waste collection station for residents nearby carrying out waste sorting and recycling on a daily basis.



**B. EVENT DAY**





**Event**

Maybe one day in a week, this parking lot can be used for residents to hold events, this kind of event can also extend to the space outside the church.

## 03 PROJECT PHASING

In order to gradually raise residents' awareness and make these strategies more acceptable to them, the implementation of the entire project was divided into the following three stages.

**Phase 1:** work with schools to raise awareness to waste related issues in students and their families

**Phase 2:** activate the street connecting different physical spaces that compose this strategy

**Phase 3:** once the neighborhood has more waste related awareness, a series of events would be integrated into this strategy

### PHASE I: Schools

- 01 Promote students and their families to participate in garbage recycling activities by organizing activities in schools
- 02 Collect the shopping experience of students and parents and organize feedback to the supermarket, which has helped improve the industry chain
- 03 Develop workshops in the school to encourage students to recycle waste by themselves.
- 04 Build the student farm in the school to grow vegetables and compost to realize the self-sufficiency of part of the food supply in the school.
- 05 Cooperate with Zero Waste Providence to lead the students to learn more about waste-free lifestyle.



## PHASE II: Streets

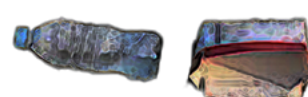
- 01 Build waste drop-off station and waste collection center
- 02 Cooperate with the city government and the neighborhood to set up a more complete waste recycling system and reward system
- 03 Bring more activities that can help raise environmental awareness to more public spaces, such as pocket park and parking lot, and also use the street space
- 04 Design and distribute waste collection and composting guidelines to residents



### PHASE III: Events

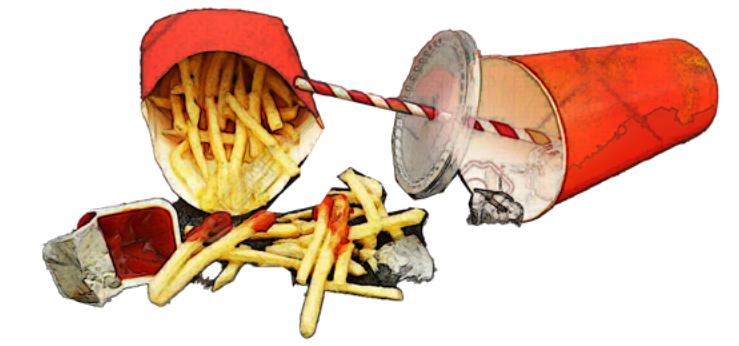
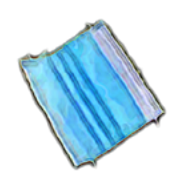
- 01 After the citizens' awareness of waste issue has generally increased, some local events will be carried out regularly to attract more people from surrounding areas to participate.
- 02 Invite related environmentalists, artists, and volunteers to hold lectures and seminars
- 03 Cooperate with local artists and scientists to develop more environmentally friendly products and put them into the market
- 04 Gradually improve the local impact of industrial supply chains of supermarkets to reduce waste of resources





# 06 ACTIVATE THE STREET

- + SHUT DOWN STREETS
- + COMMUNITY MEAL
- + GREEN FESTIVAL
- + PLASTIC FREE MONTH
- + CLEAN UP STREET





## 00 SHUT DOWN STREETS

The strategies can be expanded beyond the spaces explored in the previous chapter and integrated along the street. At this scale, the strategy relies more heavily on recurring events that aim to raise awareness whilst bringing the community together around the issues of waste. I provide the option for residents in this community to shut down part of the

street temporarily (shown in green in the figure) and gather residents along the street from both sides around collective activities related to waste. These activities can on the one hand, enhance community cohesion, and on the other hand, help reduce the total amount of generated waste by involving everyone.

## MAY 2021

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Eco-friendly lunch box

Huge table

Exchange waste diary

## 01 COMMUNITY MEAL

The first event suggests the placement of a huge table along the street to support a community meal. At the same time, participants in the event can exchange their thoughts and have discussions on how to make the community better.



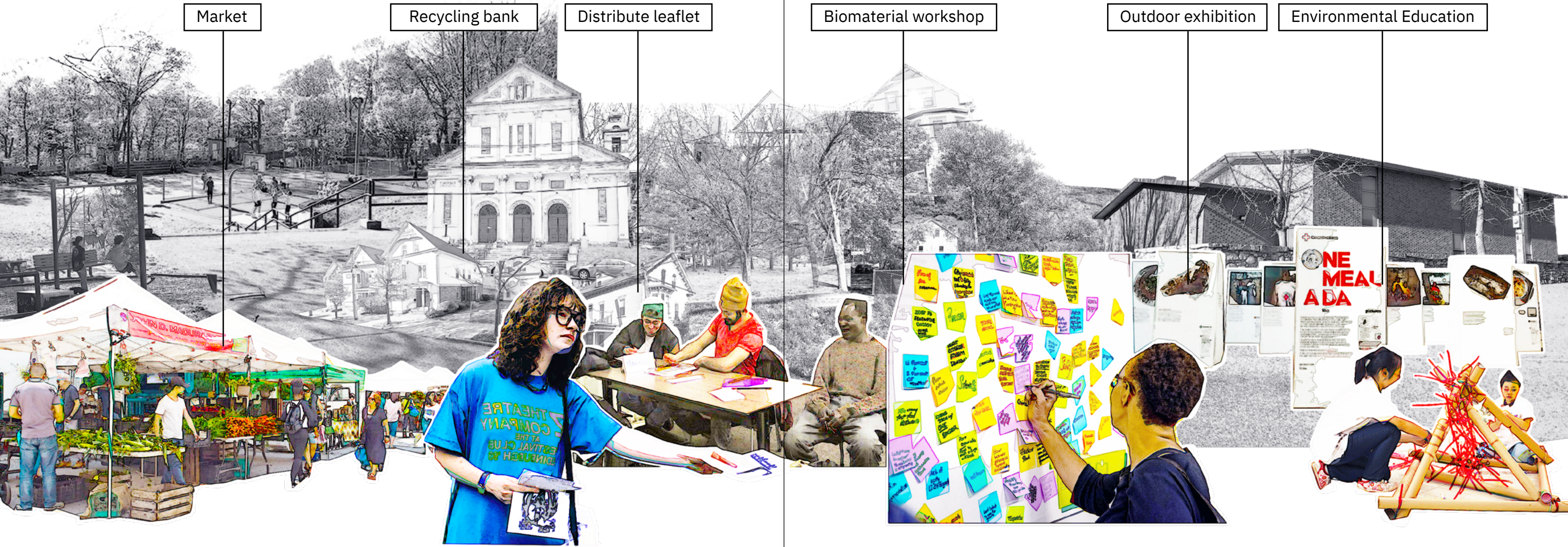


## MAY 2021

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

## 02 GREEN FESTIVAL

The second event proposes that the neighborhood hosts a waste festival that all the community members can participate in. And activities like flea market, biomaterial workshop, and exhibitions can be carried out during the festival.



## DETAILS OF THE FESTIVAL

### Preparation



Cooperate with ZWP (Zero Waste Providence) as the organizer of the event and do the promotion in community.



Contact government's department of public works to get financial support for holding the events.



Encourage students and their parents to make artworks and materials for distribution together.



Invite artists who work with waste materials to participate in the festival. They can bring their art works as a display, or they can sell them on the market.



Cooperate with the bagel shop on the street to provide food with ecofriendly packaging for people.

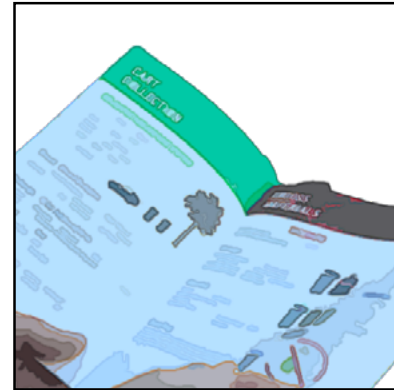


Work with whole foods to get some support on items and fresh food. The market can also get shopping feedback.

### Festival events



Waste upcycling workshop



Distribute waste sorting & recycling guide



Residents bring their household waste to the Waste Station to learn how to sort it properly



Feedback wall that collects community members' suggestions on consumption and recycling system



Lectures and seminars



Gain points by participating different activities and redeem them for prizes.

### Post-processing

All consumables used in the green festival are environmentally friendly. Some of them will be composted after the festival, and the parts that cannot be composted will be properly sorted and recycled.

### MAY 2021

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

## 03 PLASTIC FREE MONTH

The third event revolves around the definition of a plastic free month, during which period all the residents work together to reduce the generation of plastic waste, and use more eco-friendly materials. And during this month, schools should also strengthen their environmental education programs.



Parade

Artwork

Use eco bag

Environmental Education

Recycling bank

### MAY 2021

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

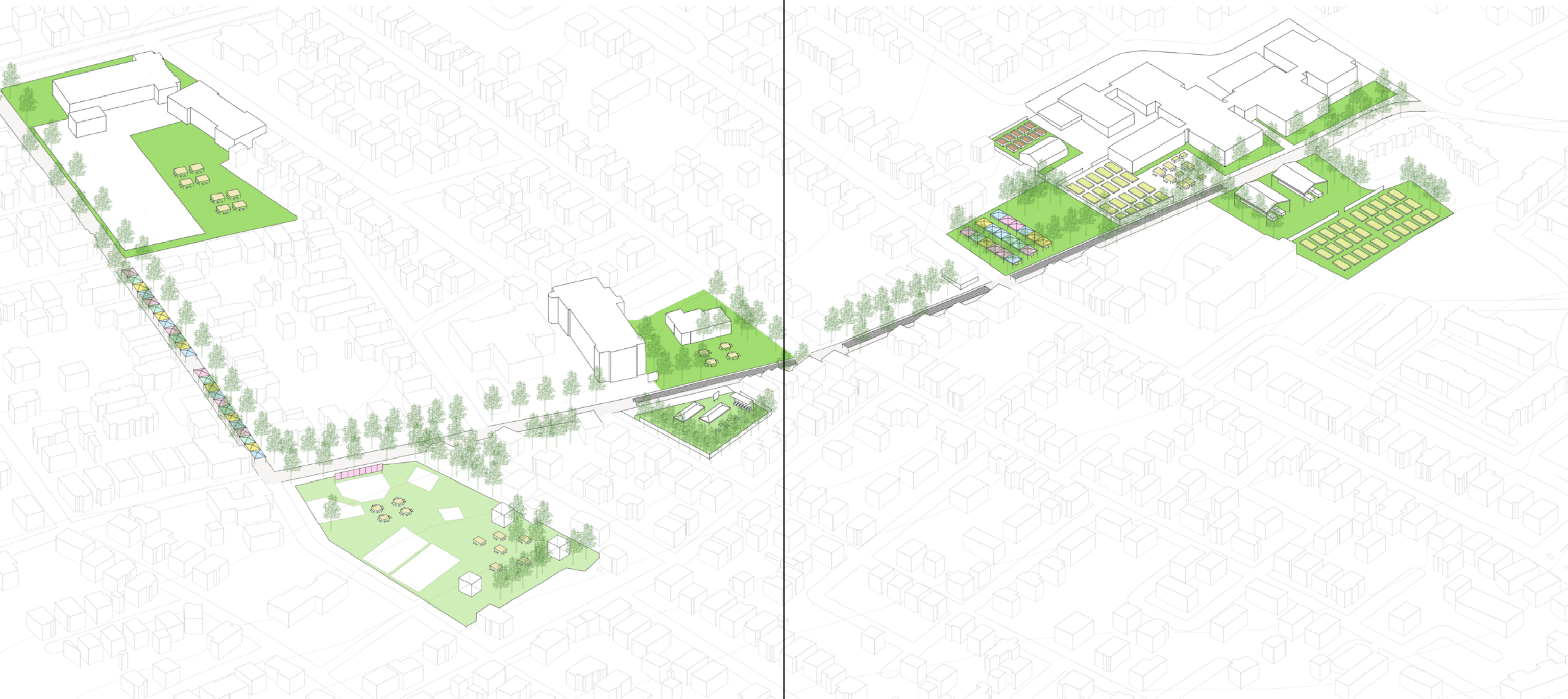
## 04 CLEAN UP STREET

The last proposed event is clean up street activity with waste sorting guidance and a recycling bank.

Pick up waste

Waste sorting guidance

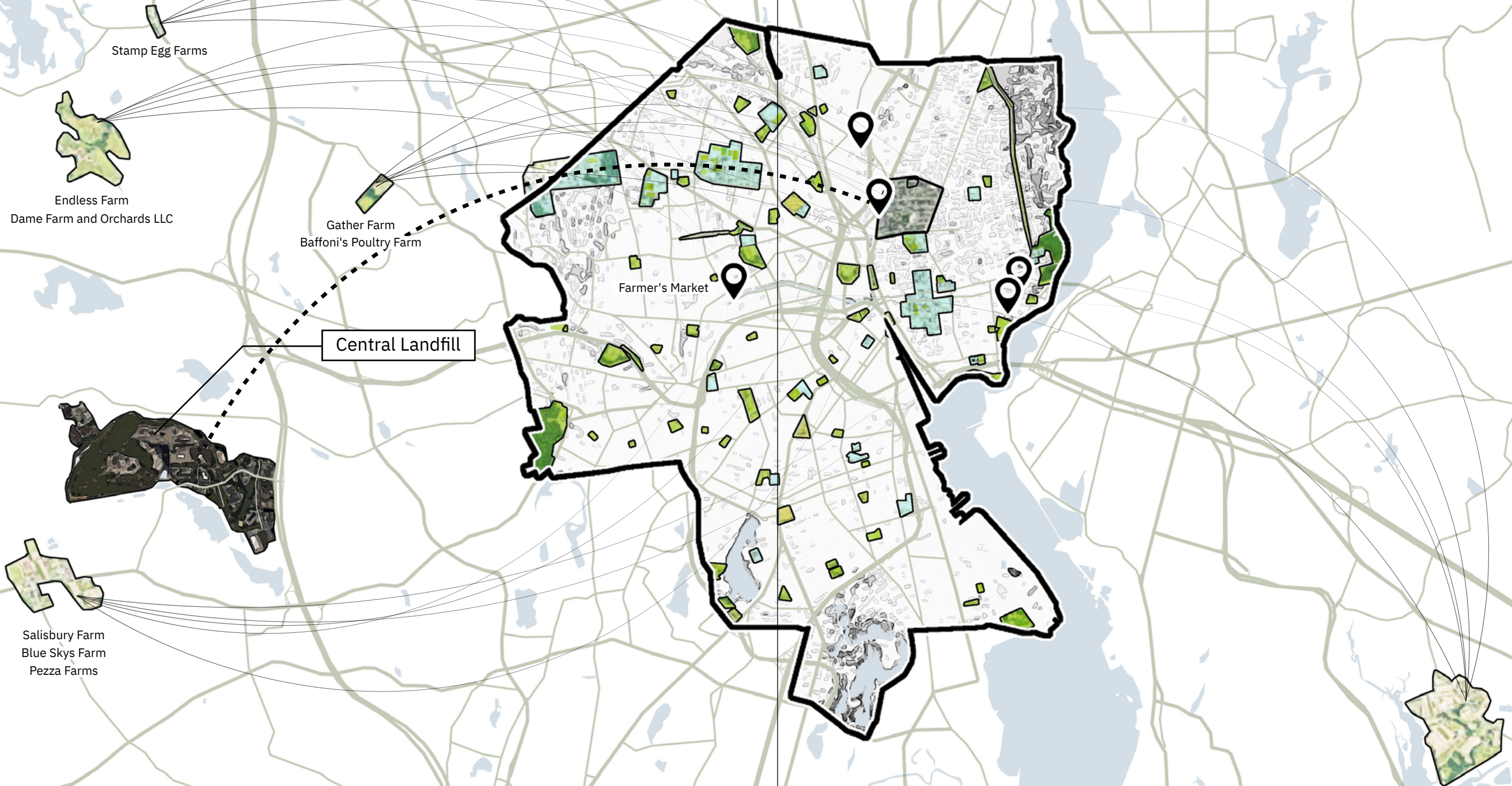




**New Street Profile**

This drawing shows how the street will look like where there's an event.

RECONNECT LANDSCAPE OF PRODUCTION AND LANDSCAPE OF LANDFILL



Stamp Egg Farms

Endless Farm  
Dame Farm and Orchards LLC

Gather Farm  
Baffoni's Poultry Farm

Central Landfill

Farmer's Market

Salisbury Farm  
Blue Skys Farm  
Pezza Farms

# REFLECTION

The thesis focuses on the destigmatization and elimination of waste by affecting people's consciousness and behavior, changing the way people use materials and generate waste, and even eventually trying to change the structure of how we operate in society in relation to waste. The goal is to reduce the impact of consumption behavior on the environment by building a more circular economic system, thus creating a community that cares about the environment, and moves towards a waste free future.

The design strategy continuously zoomed in. It started with the tracing of the material flow around the world, then zoomed in to Providence, and finally into the scale of Mount Hope and Camp Street, to focus on the community. This process allows me to narrow down my concerns to a more specific topic, and at the same time explore the feasibility of my proposal by studying a specific community. In addition, the theoretical studies in the early stage provided the basis for later community-based public participation

design approaches. Therefore, this thesis not only provides a framework, but it also develops some detailed solutions to face the issues .

The thesis began by asking the following question: **How can we contend with consumerism by reimagining waste flows in a circular economy and their spatial relationships in the landscape?** There are a lot of distinct approaches that can help answer this question, and I believe that working and the scales in which one can communicate with the community directly could be a good way forward. Through my study I attempted to change attitudes to recycling waste and affect consumer behaviors in ways that could impact the materials that end up going to landfill. The strategy developed tries to achieve a more circular economy at local scales, whilst also promoting benefits to the environment.

The thesis focused mainly on the materials that are actually used to make the products and how they

become waste. Left out of this focus are important considerations that tie directly into the study of the waste flows, such as water or electricity. The study could therefore progress in the future by looking at how these resources impact the economic and ecological aspects of waste.

The issues around waste and its flows are complex and multiscale. They are not something that can be solved easily or immediately. Rather, the strategies require subtle yet continuous measures and ideas that may result in the changing of the residents' attitudes and behaviors, and gradually make their community better. Standing in the middle between the landscapes of production and the landscapes of landfill, and being directly tied to how markets operate in capitalist societies, consumers can use their own initiatives and behaviours to affect change. This thesis is an invitation to use landscape to lead them to take the first step.

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## ACKNOWLEDGEMENTS

Upon the end of this thesis, I would like to thank the following people, who supported me a lot during my three years at RISD:

Firstly, special thanks to my thesis advisor, Tiago Torres-Campos, for helping me to complete the thesis throughout the semester. Thanks for your patience and all the constructive suggestions.

Thanks to my secondary advisor Theodore Hoerr, for providing instructive feedbacks for my thesis.

Thanks to Elizabeth Dean Hermann, for helping me determine the direction of my thesis during the winter.

Grest thanks to all the faculty members who have taught me, who provided valuable guidance throughout my studies during these three years. You have made me more professional and more confident.

Thanks to all my friends and classmates. It's my honor to meet you all.

Thanks to my cat, Hupijuan, for her company. Hope she will always be healthy and happy.

Last but not least, thanks to my family who gave me a lot of support and spiritual companionship. I will always love you.



