From Arrival City to Circular City:

The Circular Development Approach to Incorporating Migrant Workers into the Urban Village Regeneration

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Delft University of Technology
Faculty of Architecture and the Built Environment

MSc: Architecture, Urbanism and Building Sciences
Urbanism Track 2023/2024
AR3U013 Methods of Urbanism
AR3U023 Theories of Urbanism
AR3U040 Graduation Orientation

Planning Complex Cities

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P5 Report
June, 2024

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Sources for additional data are mentioned within the page

ABSTRACT

Urban villages in China, such as those in Chengdu's Green Belt, are typical informal settlements inhabited by a large number of migrant workers. These workers maintain short-distance food systems characterized by small-scale agriculture and local food sales, which are crucial for food security. However, under the "grain security" policy, the government has been acquiring fragmented farmland in the Green Belt area for unified management by food companies. Simultaneously, urban village renewal driven by real estate development is demolishing low-rent housing and shops, threatening the livelihoods and homes of migrant workers.

This project conducts a cross-scale study in Chengdu's Green Belt, Jinniu District, and Anjing urban village, integrating circular development and spatial justice theories into the urban regeneration discussion. The goal is to develop a vision, policy, and strategic framework for circular development in the region, exploring how transforming urban-scale food systems can drive the regeneration of urban villages by recognizing overlooked spaces and labor, thereby enhancing the well-being of marginalized groups.

The project begins with document analysis and mapping, summarizing the landscape characteristics of three types of urban villages and a concentrated farmland area. Subsequently, field surveys and interviews are conducted to collect data on the foodscapes managed by migrant workers. Supported by a literature review, a circular development assessment system is developed to evaluate these foodscapes. This assessment forms a planning vision for the development of a circular food system in the Green Belt, including the material flows of food, food waste, and construction debris. Based on this vision, a strategic framework called "Pattern Language" is proposed, focusing on socio-spatial adaptation, resource looping, ecological regeneration, and spatial justice.

The application logic of this framework is demonstrated through its implementation in the spatial planning of Jinniu District and the design of Anjing urban village. Additionally, a simulated stakeholder co-design workshop showcases its potential to negotiate and balance the needs of different stakeholders across various knowledge backgrounds.

Keyworks: circular development, spatial justice, urban regeneration, food system, co-design

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01 INTRODUCTION

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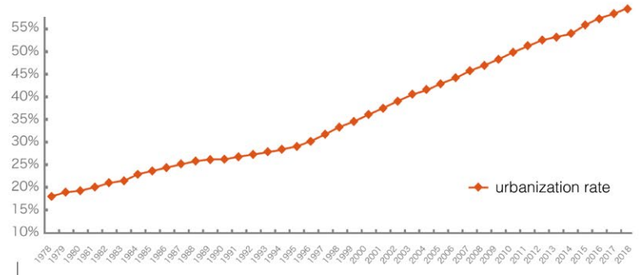
Figure 1: Vegetable store in an urban village
Source: © BERYL_SNW

INTRODUCTION

1.1 Informal Settlement in China



Source: China Statistics Office(2018)

1978 Deng Xiaoping's policies

Rapid urbanization

Over the past 50 years, China's urban land use has increased more than seven times,and more than 300 million people have moved from rural to urban areas.

1990s-2000s

Urban annexation of the countryside

When the frontiers of urbanization spread to villages formerly located on the outskirts of cities, the Government compulsorily purchased some of the villages' former arable land and converted it into urban land, while reserving residential land for the resettlement of villagers.

Source: Yangzi News(2018)

2000s-Present

Urban villages as informal settlements for migrant workers

These villagers lost their land to continue farming, but still owned their village land. As state-subsidized technology and manufacturing boomed around them and millions of citizens flocked to the core cities in search of employment opportunities, landowners began to maximize the use of their former village land as rental apartments.
The result is what we see today: dense islands of towers clustered in commercial landscapes, built rapidly with little planning regulation or consideration.
The largest urban village, Shipai, is located in the central Tianhe District of Guangzhou, with over 50,000 residents in one square kilometer.

Figure 2: Timeline of urban village development

Informal settlements are a widespread residential scenario under the rapid development of industrialization and urbanization, representing a global phenomenon (Pan & Du, 2021). It is estimated that 25% of the world's population, approximately one billion people, live in various types of informal settlements (UN-Habitat, 2020). In China, urban villages are a typical form of informal settlements within urban areas (Wang et al., 2009), primarily inhabited by migrant workers. Since the 1980s, with the rapid expansion of industry in China, rural villages on the periphery of cities have gradually been enveloped by urban built-up areas. As manufacturing industries burgeoned around these villages, rural landowners began to maximize the use of their land by converting it into low-cost rental apartments (Walsh, 2020). Consequently, high-density blocks were swiftly constructed with minimal control from planning regulations. Due to their advantageous location and affordable rent, these areas became prime destinations for migrant workers seeking employment opportunities from rural regions (Pan & Du, 2021). "Rural migrant workers" refers to the population from cities where household registration does not belong to the city where they live and work (Chan & Zhang, 1999), and by the end of 2020, there will be more than 285.6 million rural migrant workers in China (China's National Bureau of Statistics, 2021).

INTRODUCTION

1.2 Urban village renewal and disappearing informal food sectors

NOTICE

Dear Tenant:

This building is in a government-led redevelopment project. In accordance with the Civil Code of the People's Republic of China, we are legally canceling the rental contract and notifying you to move out by June 30, 2023, so please find your own housing.

landlord
May 18, 2023

Figure 3: Women making wonton

Disappearing Urban Villages Hiding Widely Recommended Cheap Vegetables and Delicious Tastes

Source: Wangyi News(2018)

"These delicacies we've enjoyed since childhood are disappearing."

Figure 4: Man working at a vegetable stall

Figure 5: A bustling night market in an urban village of Wuhan

The Chinese government recognized as early as the 1990s the need to transform these informal settlements into formal urban areas. One crucial approach has been urban renewal, defined as the redevelopment of existing built-up land, revitalizing declining enclaves and rejuvenating their socio-economic fabric (Lin et al., 2021).
Migrant workers, who constitute the majority in urban villages, find themselves at an extremely unstable crossroads due to the resettlements resulting from the demolition of these villages (Chen et al., 2023). Many are engaged in the informal food sector, running small-scale enterprises involved in food production, retail, and consumption, such as street stalls, temporary markets, and neighborhood canteens. Their presence creates a unique and lively commercial atmosphere in urban villages, offering affordable and accessible food to urban consumers while providing livelihood support to many who rely on these informal employment networks. However, urban village projects, often focused on demolition and reconstruction, typically involve the tearing down of existing buildings, including those housing informal food vendors and producers, to make way for modern residential and commercial complexes. This leads to the gradual disappearance of this unique culinary landscape from city.

02 PROBLEM FOCUS

2.1 Well-Being Problem Field 8
Personal Attributes
Objective Actions
Material Resources
External Interactions
2.2 Problem Statement 14

Figure 6: Bicycle fruit shop
Source: © Claudio Zaccherini

PROBLEM FOCUS
2.1 Well-Being Problem Field

Fulfillment of needs for well-being

Max-Neef, M. (1989). Human scale development conception application and further reflections. http://ci.nii.ac.jp/ncid/BA17184047

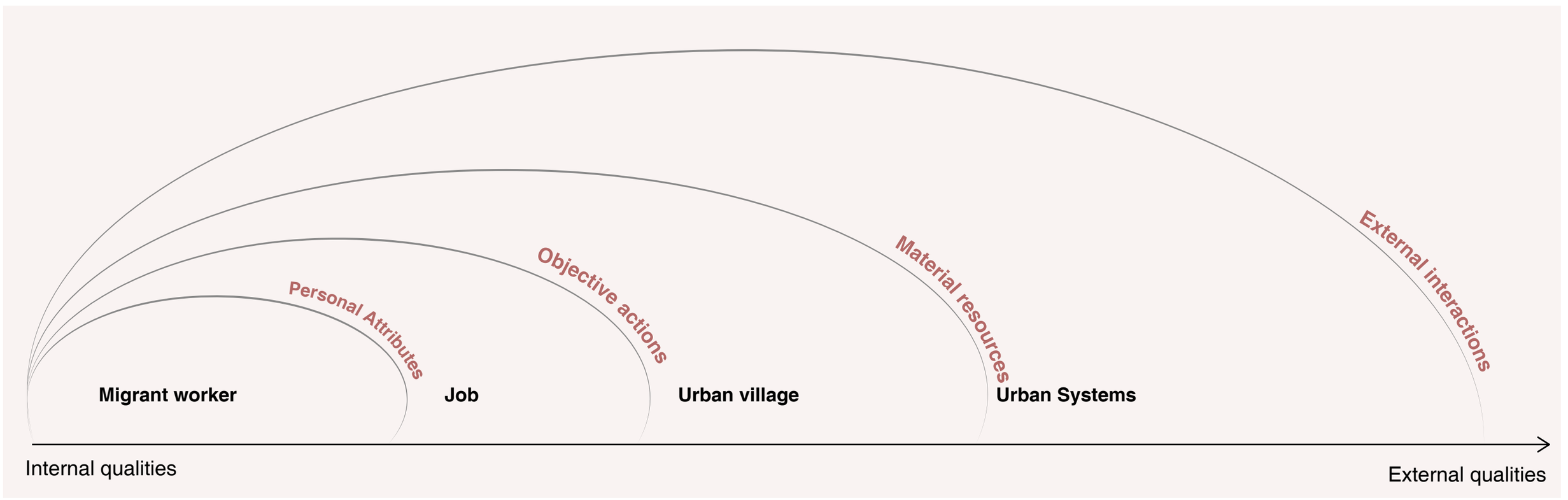


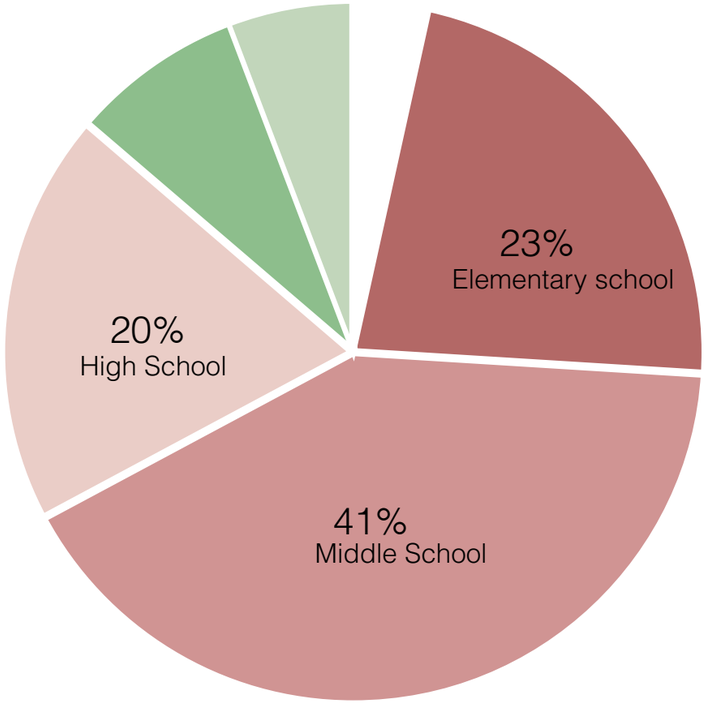
Figure 7: Well-being Framework
Adapted from Max-Neef (1989)

Urban village renewal, oriented towards real estate development, has been widely criticized for undermining the interests of marginalized groups. Scholars advocate for a more inclusive model of urban village renewal, decoupling it from the sole purpose of leveraging land for economic value and focusing more on its social implications.
What, then, is the true purpose of urban village renewal? With this question in mind, this project introduces the concept of well-being as the antithesis of GDP growth indicators in urban renewal (Dodds, 1997; Hickel et al., 2022; Van den bergh, 2009). Well-being is an interdisciplinary concept encompassing psychology, philosophy, and anthropology. As explained by Max-Neef (1989) in his book on human-scale development, human needs are met by satisfying four dimensions ranging from subjective to objective: “Personal Attributes,” “Objective Actions,” “Material Resources,” and “~~External Interactions~~.” For instance, a migrant worker aspiring to be rich might do a job, like running a small restaurant. He should then have space, like renting a premise in the urban village, to establish the restaurant, and must interact with the urban food system to procure ingredients like vegetables and meat.
In the field of urban planning, it advocates for designing cities based on human-scale needs. According to Cardoso et al. (2021), Max-Neef’s theoretical framework is relevant to the multi-scalar research approach in urban planning. Therefore, this project applies the four dimensions of well-being at individual, community, neighborhood, and city scales, discussing the well-being problems faced by migrant workers at these four levels - in their work(informal food sectors), their living environment (urban villages), and their interaction with urban systems (food and planning systems) due to the unfulfillment to needs.

PROBLEM FOCUS

2.1 Problem Field

2.1.1 Personal Attributes---Educational disadvantages



Never been to school | Elementary school | Middle School
High School | College | Undergraduate

Figure 8: Educational level of migrant workers
Source: Mobile Population Data Platform(2017)

2.1.2 Objective Actions---Economic disadvantages

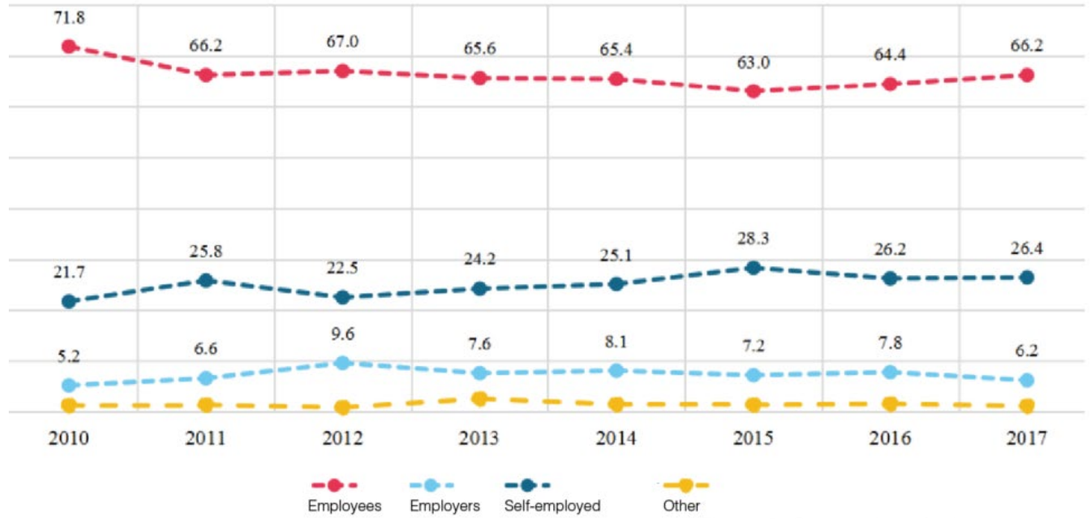


Figure 9: Occupation of migrant workers
Source: Chengdu Municipal Bureau of Statistics(2022)

Migrant workers are working as

The average salary of a migrant worker is

4,500 rmb **1/2** average salary in Chengdu

In the context of human development and well-being, personal attributes refer to the inner qualities, characteristics, and capabilities that define an individual. These attributes include a wide range of factors, including a person's skills, knowledge, and values. They significantly influence how individuals perceive their environment, interact with others, make choices, and pursue their goals. Personal attributes are shaped by a combination of cultural background, education, life experiences, and the socio-economic context in which an individual lives.

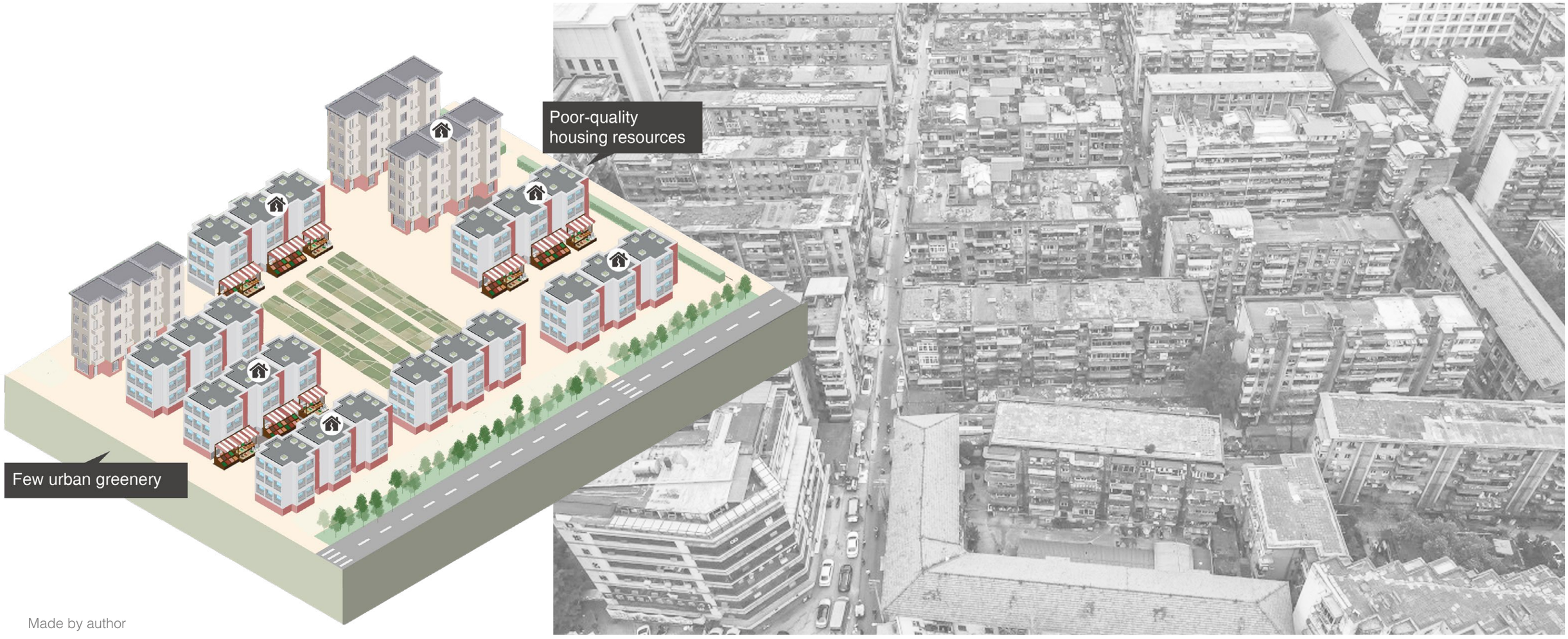
This project focuses on the disadvantaged position of migrant workers in terms of personal attributes related to their level of knowledge. The majority of them come from rural areas where they have traditionally worked in agriculture, and generally have a low level of formal education. Data from the China Migrants Dynamic Survey (2017) shows that over 60% of migrant workers have education levels at or below junior high school. Their background in agricultural skills directly influences their "Objective Actions," i.e., career choices, after moving to cities.

Objective action refers to the tangible, deliberate activities that individuals undertake to meet their needs, utilize their skills and available resources to overcome challenges and realize their aspirations. Objective action is often limited by personal attributes. For example, due to their limited educational background, migrant workers may only choose "low-cost, low-threshold" jobs, and this path dependency can lead them to continue working in food-related occupations, such as setting up stalls, running fruit stores or managing small restaurants. These jobs are usually not well paid. According to the Chengdu Municipal Bureau of Statistics (2022), the average monthly wage of a migrant worker is RMB 4,500 (about EUR 580), which is only half of the average wage in Chengdu.

PROBLEM FOCUS

2.1 Problem Field

2.1.3 Material Resources---Poor Environment Condition



Made by author

Figure 10: Environment Condition of Urban Village
Source: Baidu Map Street View (2024)

Material Resources refer to the physical and tangible assets necessary for individuals to meet their basic needs and engage in productive activities. These resources encompass a broad range of elements including land, housing, financial assets, tools, technology, and infrastructure. Material resources are not limited to possessions or property; they also include access to communal facilities, public services, and natural resources. The availability, quality, and accessibility of these material resources play a critical role in determining an individual's ability to achieve a sustainable livelihood, enhance well-being, and participate effectively in society. Migrant workers, due to their lower educational and economic status, have very limited choices in terms of living and operating spaces. Urban villages, with their informal development nature, often offer low rents and become the preferred choice for many migrant workers. However, the "Material Resources" available to migrant workers in urban villages are extremely limited.
Firstly, the building quality in urban villages is poor. These structures are often built outside the purview of urban regulatory and municipal management authorities, with exposed electrical wiring and narrow alleys being common sights. According to a survey by the China Fire Service (2021), over 60% of residential fires causing fatalities in China occur in self-built houses.
Secondly, urban villages lack public service facilities, such as public green spaces. Landowners often prioritize maximizing housing on their land to generate economic value, paying little attention to the living experience of residents, and rarely invest in constructing public spaces for recreation, like gardens and parks.
If migrant workers had access to superior external material resources, they might be able to escape their current predicaments, despite limitations in education and income. One can imagine scenarios where, if their business locations were ideally situated and the environment favorable, their rich culinary offerings could attract investment from enterprises such as tourism companies for redevelopment, potentially benefiting the migrant workers. This has been the case with some urban village renovations near tourist attractions in China. However, not all urban villages are so fortunate.

PROBLEM FOCUS

2.1 Problem Field

2.1.4 External interactions---Food System Exclusion

Figure 11: Land pressure from long-distance food system
Made by author

Source: Baidu Map Street View (2024)

External interactions encompass the social dimension of human development, emphasizing individuals' relationships and participation with society and the broader environment. These interactions are crucial for ensuring community support and fostering collective action, significantly affecting individuals' sense of belonging, identity, and their capacity to contribute meaningfully to larger external systems.

This project discusses the pressures brought upon migrant communities by food systems, ecosystems, policy and planning systems. These three systems do not operate in isolation to threaten the well-being of migrant groups; their impacts are interwoven, collectively posing threats to these communities.

Firstly, let's consider the food system. The contemporary food system, characterized by road-dependent, long-distance transportation, has significantly shaped urban landscapes, especially in terms of interactions between cities and surrounding farmlands. This system relies on extensive road and highway networks, facilitating long-distance food transportation. Consequently, cities increasingly exclude farmlands, concentrating agricultural land in rural areas.

This food trend overlooks the value of local, peri-urban agriculture. It not only impacts the supplement of local produce but also affects the livelihoods of those closely tied to the land. Peri-urban farmlands often serve as a vital resource for migrant workers, who depend on these areas not only to supplement their livelihoods with self-produced food but also to generate income by selling agricultural produce. With urban expansion and centralized food distribution models, the increasing distance between farmlands and city centers poses challenges to migrant workers who rely on proximity to farmlands for economic and food security.

PROBLEM FOCUS

2.1 Problem Field

2.1.4 External interactions---Ecology system degradation

1/3 Greenhouse gas emissions come from food system

2/3 Emissions come from transportation and processing

Migrant workers repairing leaking roofs

Red Star News, 2020

Longquanyi District, Chengdu, has been hit by continuous heavy rainfall, with people trapped. Today (August 16), the police station received a report that there were people trapped on the roof of a dormitory for migrant workers in Honghe Village.

Figure 13: Food and waste flow in long-distance food systems
Made by author

The long-distance food system also poses threats to urban ecosystems due to its substantial carbon emissions. As reported by UN News (2021), one-third of global greenhouse gas emissions are attributed to the food system, with two-thirds of these emissions stemming from long-distance transportation and food processing activities. The exclusion of farmlands from cities also means a severe lack of land that can absorb these carbon emissions.
The degradation of ecosystems leads to climate change, with extreme weather events like urban heat islands and heavy rain becoming more frequent. The impacts of these climatic changes are not equally distributed among urban groups; migrant workers, due to financial constraints and other reasons, find it difficult to recover from climate disasters. For example, areas like urban villages often lack well-equipped drainage systems, leaving them vulnerable to flooding during heavy rains.

PROBLEM FOCUS

2.1 Problem Field

2.1.4 External interactions---Policy and planning system nonrecognition

Figure 14: Migrant Workers in Urban Renewal Actions
Made by author

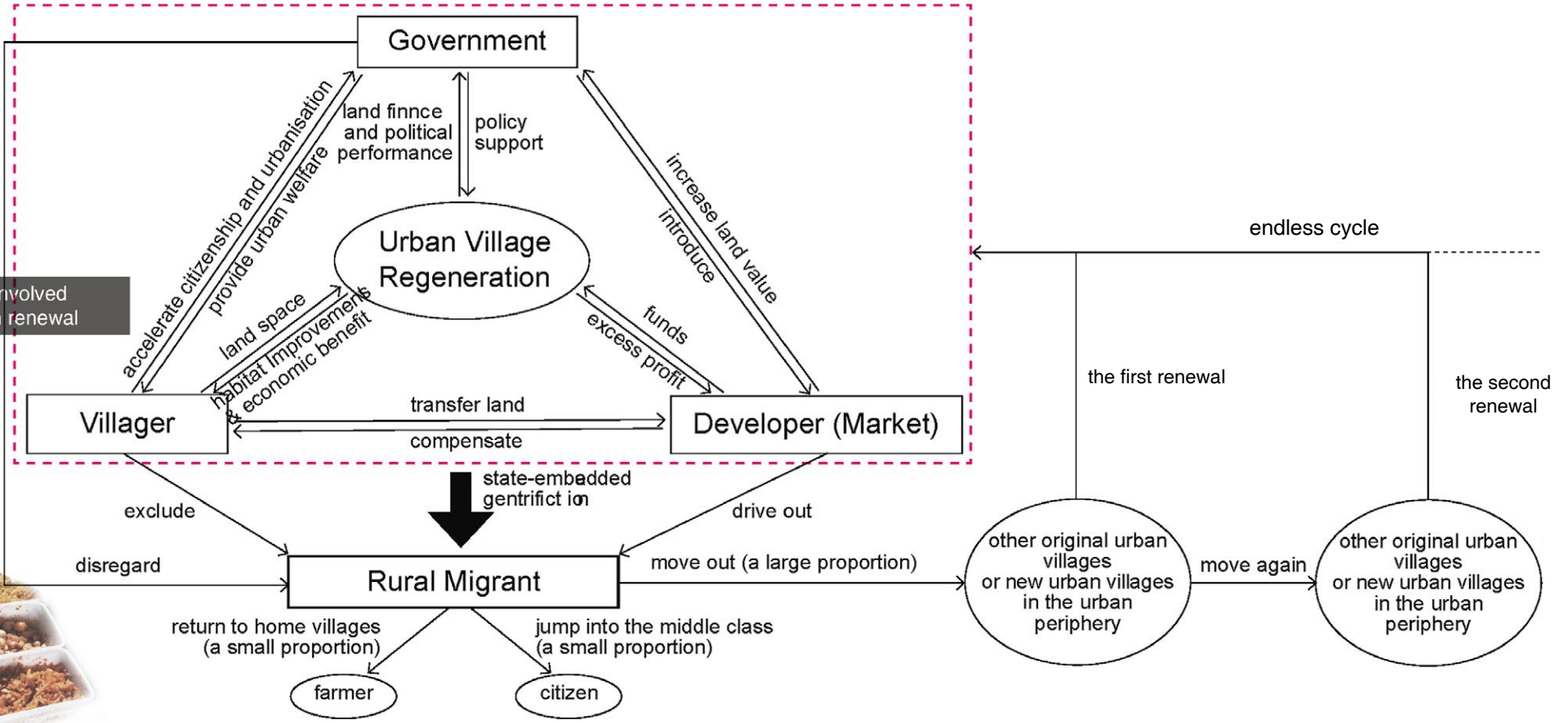


Figure 15: The interaction among stakeholders in China's urban village regeneration.(Chen et al., 2023)

Additionally, migrant workers are often unrecognized by urban planning systems due to their informal status. Take urban village renewal projects as an example. These projects are typically initiated by governments, attracting developers to buy land from landowners (usually the original villagers) for real estate and commercial development. Migrant workers, being the primary residents and operators, are excluded from the planning decisions made by this alliance. Urban village projects, often focused on demolition and reconstruction, typically involve tearing down existing buildings, including those housing informal food vendors and producers. This leads to the gradual disappearance of unique food landscapes from city. The government's neglect makes it difficult for the planning system to recognize them, as Chinese planning heavily relies on policy guidance. Even when inclusive planning proposals addressing the plight of migrant workers are put forward by some scholars in the planning field, without policy permission, these proposals struggle to be implemented.

PROBLEM FOCUS

2.2 Problem Statement

Non-fulfillment of needs for well-being

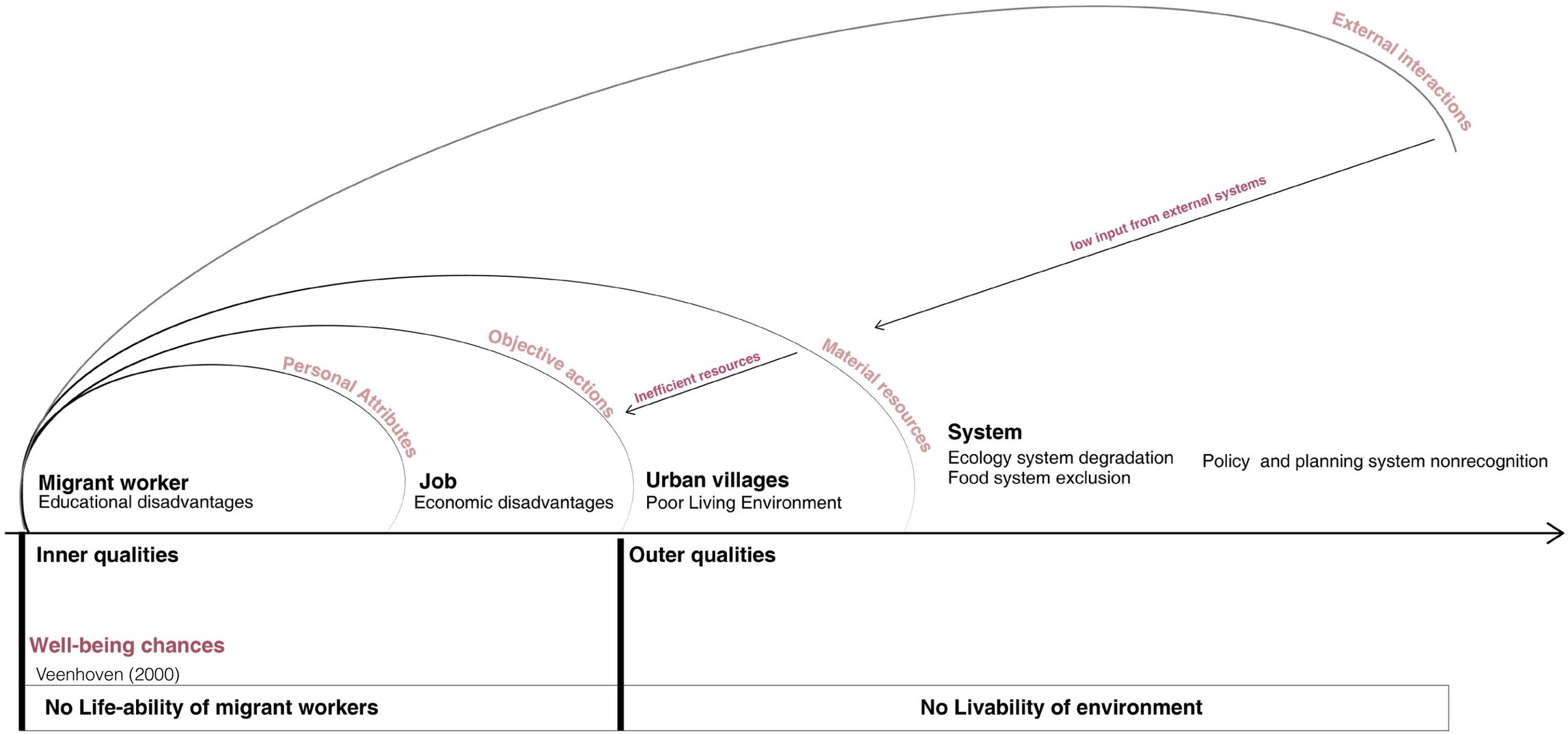


Figure 16: Problem Framework of Non-fulfillment of Needs for Well-being

Achieving human well-being requires addressing four key dimensions: personal attributes, objective actions, material resources, and external interactions.
In China's urban villages, migrant workers operating within the informal food system struggle to attain well-being across both personal capabilities and broader societal contexts.
Subjectively, they are often constrained by economic limitations and lack of educational opportunities, resulting in a lack of self-reliance. Objectively, they are marginalized by urban renewal policies that primarily focus on demolition and the city food system favoring long-distance transportation, leading to inadequate environmental livability.
This combination of subjective and objective barriers places migrant workers in a precarious position, trapping them in a vicious cycle of urban renewal, displacement, and unemployment.

03 THEORETICAL UNDERPINNING

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Figure 17: Man was tending vegetable gardens
Source: Cavan Images

THEORETICAL UNDERPINNING

3.1 Arrival City

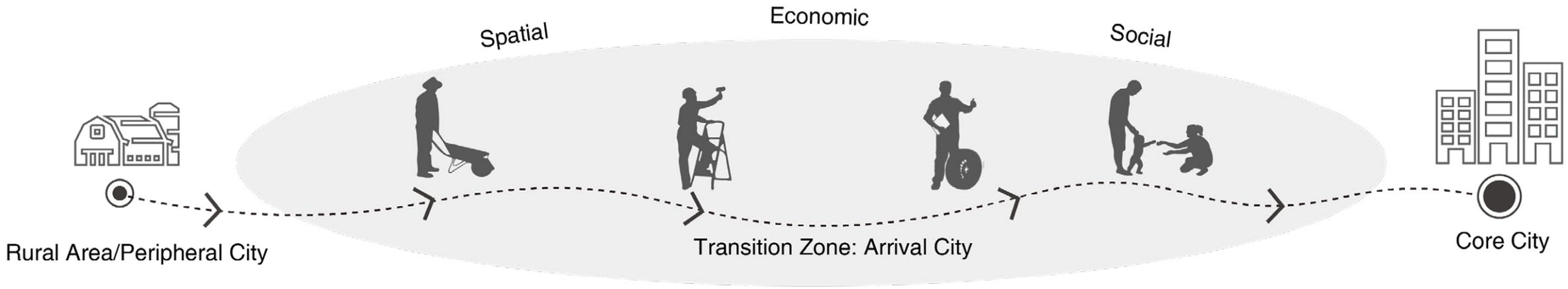

Figure 18: Theoretical Framework of Arrival City

Definition
The concept of “arrival city” was introduced by journalist Doug Saunders in his book “Arrival City: The Final Migration and Our Next World” (2010) and has since gained widespread attention in the fields of urban studies and sociology. He describes an arrival city as a transitional zone, a product of migration, serving as a gateway for new migrants from rural areas or small towns to enter urban life. More specifically, arrival cities are a kind of “entry mechanism” offering newcomers opportunities to integrate into the urban economy and society. Broadly, the term “arrival city” encompasses different types of places globally, including international immigrant communities in European countries, slums in African regions, and informal settlements in Asian cities.

Saunders also emphasizes that arrival cities are more than just physical spaces; they encompass economic processes and social structures critical to the migrant experience. Moreover, any arrival city is subject to constant change, influenced by national policies and economic fluctuations.

Economic Role of Arrival Cities
Doug Saunders discusses the economic significance of arrival cities, describing them as places where new migrants find their first job, save money, and potentially start their own businesses. Rumbaut (2015) explores how these areas often provide entry-level jobs, which, although low-paying, offer diverse employment opportunities due to the concentration of various industries, ranging from manual labor to service jobs. This is a crucial stepping stone for new migrants. Scholars like Neuwirth (2011) emphasize the role of arrival cities in fostering innovation and entrepreneurship. Street vendors, small manufacturers, and service providers contribute to local economic prosperity, laying the groundwork for future economic growth and urban development.

From an economic perspective, arrival cities are platforms for employment, skill development, entrepreneurship, and economic integration. Recognizing and fully utilizing the economic potential of arrival cities is vital for policymakers and urban planners.

Social Role of Arrival Cities
Arrival cities often serve as the first point of contact for new migrants with the urban environment. Saunders highlights how these areas facilitate the formation of close-knit communities, providing a sense of belonging for newcomers. These communities play a significant role in helping migrants navigate urban life challenges and find opportunities for advancement. Rumbaut (2014) notes that arrival city areas gather people from different cultural identities and backgrounds, serving as places for mutual exchange and interaction.

Urban Villages in China
In the context of China, urban villages are undoubtedly the expression of arrival cities. Economically, urban villages have nurtured a large number of manufacturing factories of various sizes. Their residential areas gather many workers who work in these factories. The daily life needs of these workers, such as restaurants and small grocery stores, form a vibrant economic atmosphere in urban villages.

Socially, these migrant communities have formed unique interpersonal networks. The loneliness of moving to a strange place alone makes them empathetic to others living in the same community, forming a social group with a unique culture. Some Chinese scholars, like Zhu (2015), have mentioned the social impact of this group. Zhu’s research illustrates how migrant workers use their social networks in urban villages to introduce each other and find job opportunities.

Challenges Faced by Arrival Cities
The status of any arrival city is far from stable and is constantly changing due to national policies, geopolitics, economic fluctuations, or local events that disrupt the status quo (Wilson, 2022). In China, urban villages as arrival cities are in an unstable position amidst economic transformation and urban renewal. Nearly 50 years have passed since China’s reform and opening up, with industries like manufacturing, once encouraged for development, gradually seen as inefficient economic models by the government. The emphasis is now on economic transformation towards big data and high technology. Especially in first-tier cities like Shenzhen, Guangzhou, and Chengdu, urban villages are seen as symbols of urban backwardness and occupy valuable urban land, making them primary targets for clearance.

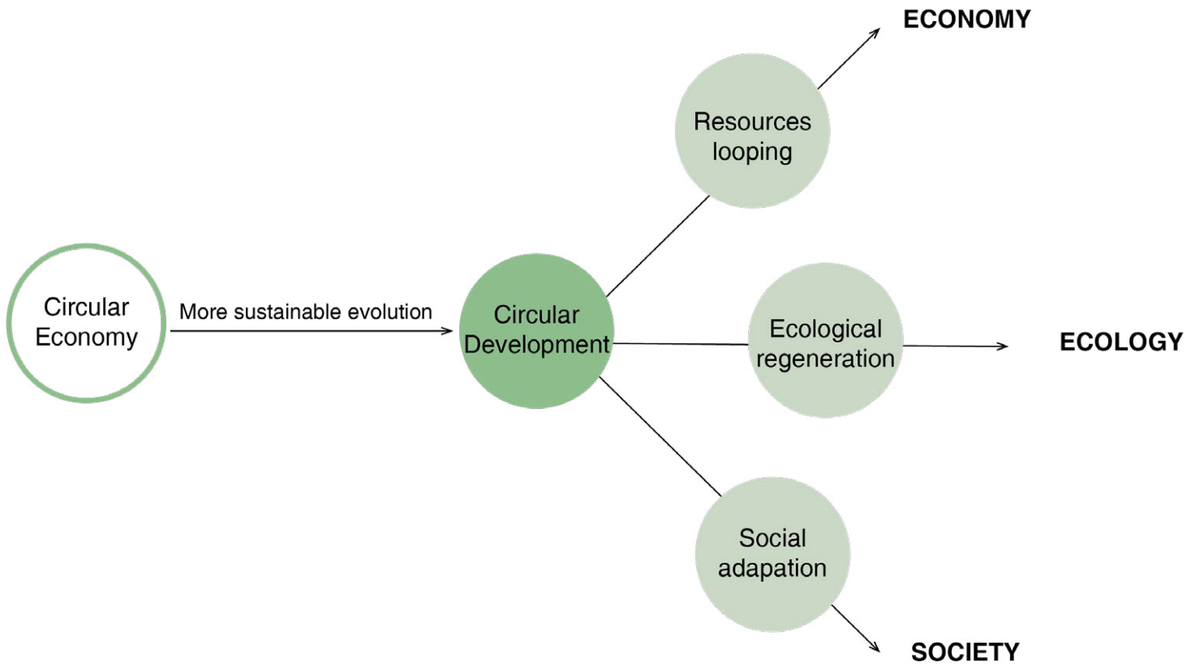

Figure 19: Theoretical Framework of Circular Development
Adapted from Williams (2019)

Definition of Circular Economy
The circular economy is a production and consumption model that aims to change the traditional linear economic model based on the acquire-make-consume-dispose pattern. It recycles existing materials and products through methods like recycling and reusing, thereby extending the lifecycle of products. It is based on three guiding principles: (1) designing out waste and pollution; (2) maintaining the use and value of products; and (3) regenerating natural systems in and around cities (Ellen MacArthur Foundation, 2019). The circular economy is a cross-disciplinary and rich concept, particularly in terms of changing the global ecological footprint of cities, but its implementation has not been without criticism. In previous urban strategies, the circular economy generally emphasized the role of businesses in driving the transition to a circular economy (Farnè Fratini et al., 2019), i.e., relying mainly on the production and flow of goods. Criticisms have dominated the technology-centric view, lacking reflection on social aspects and impacts (Pomponi & Moncaster, 2016; Prendeville et al., 2018).

Circular Development
Some scholars have extended the concept of the circular economy from the economic realm to social and environmental levels, proposing new concepts such as circular development and circular cities (Williams, 2019; Clube & Tennant, 2023). These concepts elaborate on circularity in three aspects:

- Resource Cycling (reuse, recycling, and recovery): This aspect evolved from the previous concept of the circular economy. It aims to close the linear consumption process of resources as much as possible, reduce waste, and promote the most effective use of resources.

- Social Adaptation: Building the capacity to adapt to changes within urban structures and communities. This capacity is established through flexible design, collaborative planning, joint provisioning, and learning systems. It advocates preserving the original logic and inertia of communities in the process of transitioning to circularity, encouraging communities to actively participate in and democratize the circular process, thereby building a bridge between top-down governmental decisions.

- Environmental Regeneration: Regenerating urban ecosystems and ecosystem service functions. Instead of continuously drawing resources from nature, it focuses on building natural capital. A clear starting point in this aspect is the food industry, where regenerative agricultural practices emphasize improving soil health and significantly reducing greenhouse gas emissions in food production by reducing the input of chemical fertilizers and creating healthy soils that absorb rather than release carbon. Additionally, by keeping materials in circulation after use, more and more land can return to nature as economic activities gradually decouple from material extraction.

Discussions on Vulnerable Groups in Circular Development
In these discussions, some scholars have particularly focused on the participation of marginalized communities in the circular transition. For example, Clube and Tennant (2023) also expanded the concept of the circular economy using Max-Neef's human-scale development theoretical framework, emphasizing strategies that consider maximizing the needs of different participants (e.g., workers, citizens, vulnerable groups) when managing resources with circular principles. Korsunova et al. (2022) focused on collecting the recycling practices of informal recyclers in Brazil and India, illustrating that many circular practices exist in the informal systems of cities, often out of necessity by local poor people to save on living expenses. More and more studies emphasize the need to identify and incorporate the value of the informal sector in the transition to circularity.

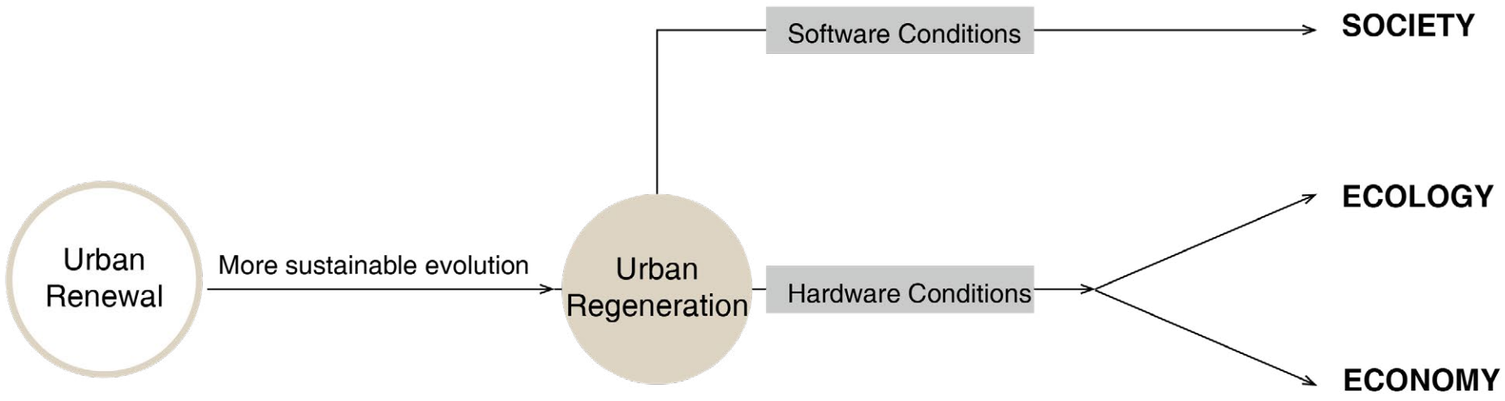

Figure 21: Theoretical Framework of Urban Regeneration

Urban Renewal

Urban renewal is the precursor to urban regeneration, a type of land redevelopment program often used to address urban decay in cities (Zheng et al., 2014). It involves clearing up dilapidated areas in inner cities to create opportunities for higher-grade housing, commercial, and other developments. Urban renewal is more of an economically driven concept, primarily aiming to revive the economic vitality of specific areas by attracting external private and public investments and encouraging business establishment and survival (Caves, 2013). Its operational mode usually involves municipal redevelopment agencies purchasing or expropriating private properties within designated renewal areas, leveling them, and then transferring them to selected developers for alternative uses. This has been the most common approach to urban village renewal in China. However, it has been controversial in academic circles due to the negative social impacts of its forceful demolition practices, such as displacement of original residents and gentrification.

Urban Regeneration

Urban regeneration is conceptually similar to urban renewal, but it is a comprehensive combination of vision and action, aimed at addressing multifaceted issues in impoverished urban areas. It acknowledges the economic growth objectives of redevelopment but does not view them as the sole goal, instead also focusing on improving the social and environmental aspects of decayed areas (Zheng et al., 2014). It is a concept that evolved from urban renewal actions towards a more sustainable direction. Regardless of the concept of sustainable development used, there seems to be a consensus that sustainable development has three main pillars: social, economic, and environmental. Therefore, this has become a popular method in most cases to achieve a more sustainable society, closely related to urban renewal. It is considered a good method to increase land value and improve environmental quality (Adams & Hastings, 2001); to address urban aging issues and achieve various socio-economic goals (Lee & Chan, 2008a); and to strengthen existing social networks, increase inclusivity for disadvantaged groups, and change adverse impacts on living environments (Chan & Yung, 2004). However, most urban renewal policies tend to focus on economic regeneration rather than environmental or social regeneration (Couch & Dennemann, 2000).

Two Dimensions of Urban Regeneration

Urban regeneration has two main dimensions: the urban planning aspect and the social relationship aspect. UR draws on reflections on the urban body composed of hardware and software (Landry, 2006): the first consists of infrastructure, buildings, and spaces; the second consists of interpersonal relationships, culture, social dynamics, and economic processes. To achieve sustainable urban regeneration, both systems must be considered holistically, i.e., planning systems must be used to rationally design and allocate various material elements involving land, housing, infrastructure, green spaces, water, and transport, while also involving all local stakeholders in the process to contribute to the planning and operation of urban regeneration.

Figure 23: Chengdu's most successful industrial renewal project, Dongjiao Memory, pictured with graffiti on the former factory dormitory building and a chimney in the distance

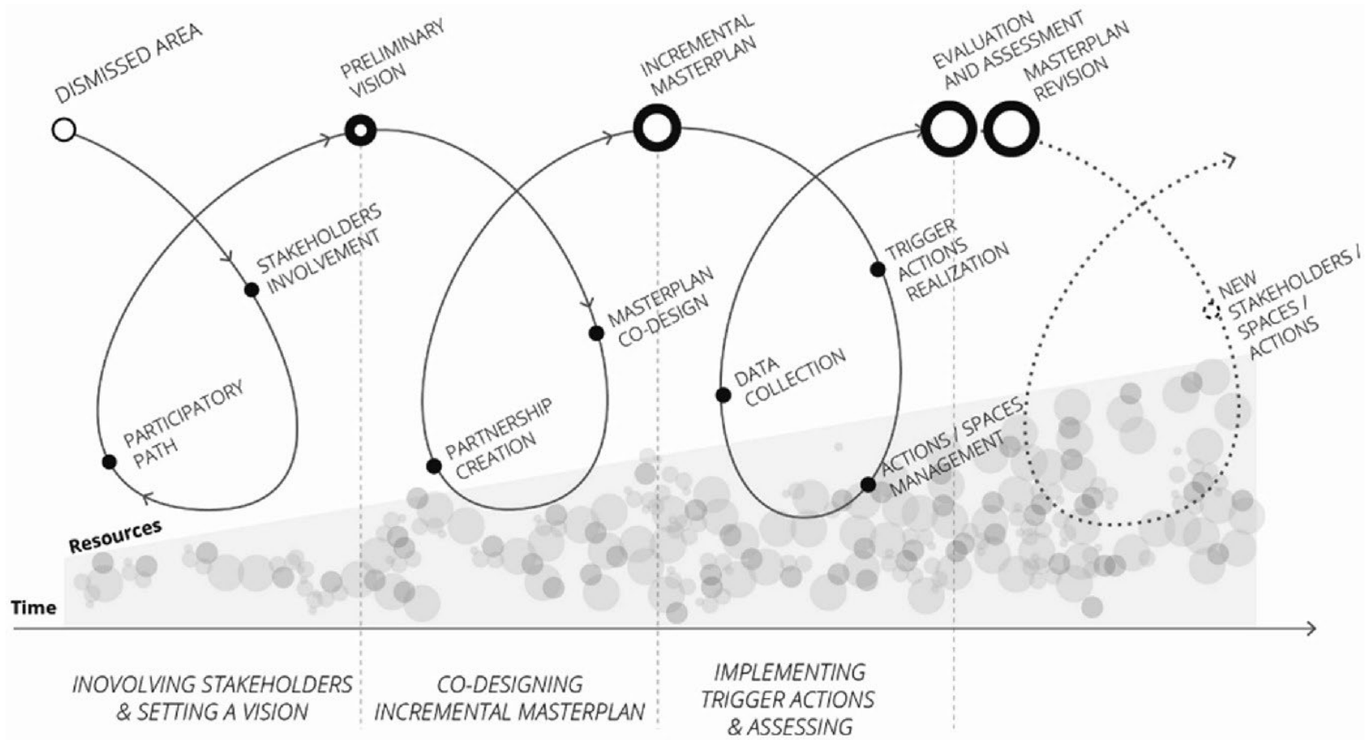

Figure 22: Incremental Circularity frame.(Cottino et al., 2022)
The continuous line indicates the "planned" process, while the dotted one the "unpredictable" process.
The gray circles at the bottom indicate the different types and intensity of resources (material and immaterial)

Hardware Conditions of Urban Regeneration

Internal Resource Reuse

One important goal of urban regeneration is reuse, which means identifying unused or underutilized material resources in urban decay spaces, such as land, labor, and building spaces, and generating new and unprecedented value through the combination of existing resources.

For example, the industrial area in the eastern suburbs of Chengdu, which was very prosperous in the last century as steel or home appliance manufacturing plants, is now full of abandoned train stations and vast empty factories. Developers and the government recognized the potential value of these tall chimneys, retro railway facilities, and spacious factory buildings, and have invested and transformed them into a new urban industrial heritage tourism destination. Chimneys have become graffiti walls, locomotives have become photo spots, and factories have become exhibition halls for artists.

Input of External Resources

In the case of the eastern suburbs of Chengdu, in addition to the re-identification and utilization of internal resources, it also involves the introduction of external resources, namely the investment of tourism industry developers. This case shows that the conditions for city regeneration and achieving well-being are similar, requiring the cooperation of both internal and external factors. One can imagine that once the location of urban renewal is not superior enough to be recognized by external investment, it is difficult to promote reuse with only internal resources. However, urban village areas are often difficult to recognize for their value.

The concept of "incremental cycling" in circular development is an interesting discussion for the external resources that can be obtained from urban renewal. That is, the circular economy can start from a larger scale of resource cycling, and leverage the re-identification and use of internal resources in urban villages. This view comes from Cottino et al. (2022), who, as a practitioner of urban regeneration, advocates not only considering the reuse of resources on the scale of the regeneration project itself but promoting an innovative way of regeneration, based on releasing and catalyzing local energy, strengths, and resources, and integrating them into a higher scale urban construction process. He created a "community-building" method framework, which incorporates the concept of "incremental cycling" in its subsequent stages, arguing that the resources of the renewal project will grow as the perspective shifts and flow into larger urban development actions.

This is the opposite of the operation mode of the case in the eastern suburbs of Chengdu. The latter attracts external investment through internal surplus resources, while the discussion here is about transforming and reorganizing external resources to recognize previously ignored resources. Take this project as an example, if the food system in urban villages is not enough to attract external investment directly, can the value of the informal food sector be recognized through the transformation of the larger-scale food system?

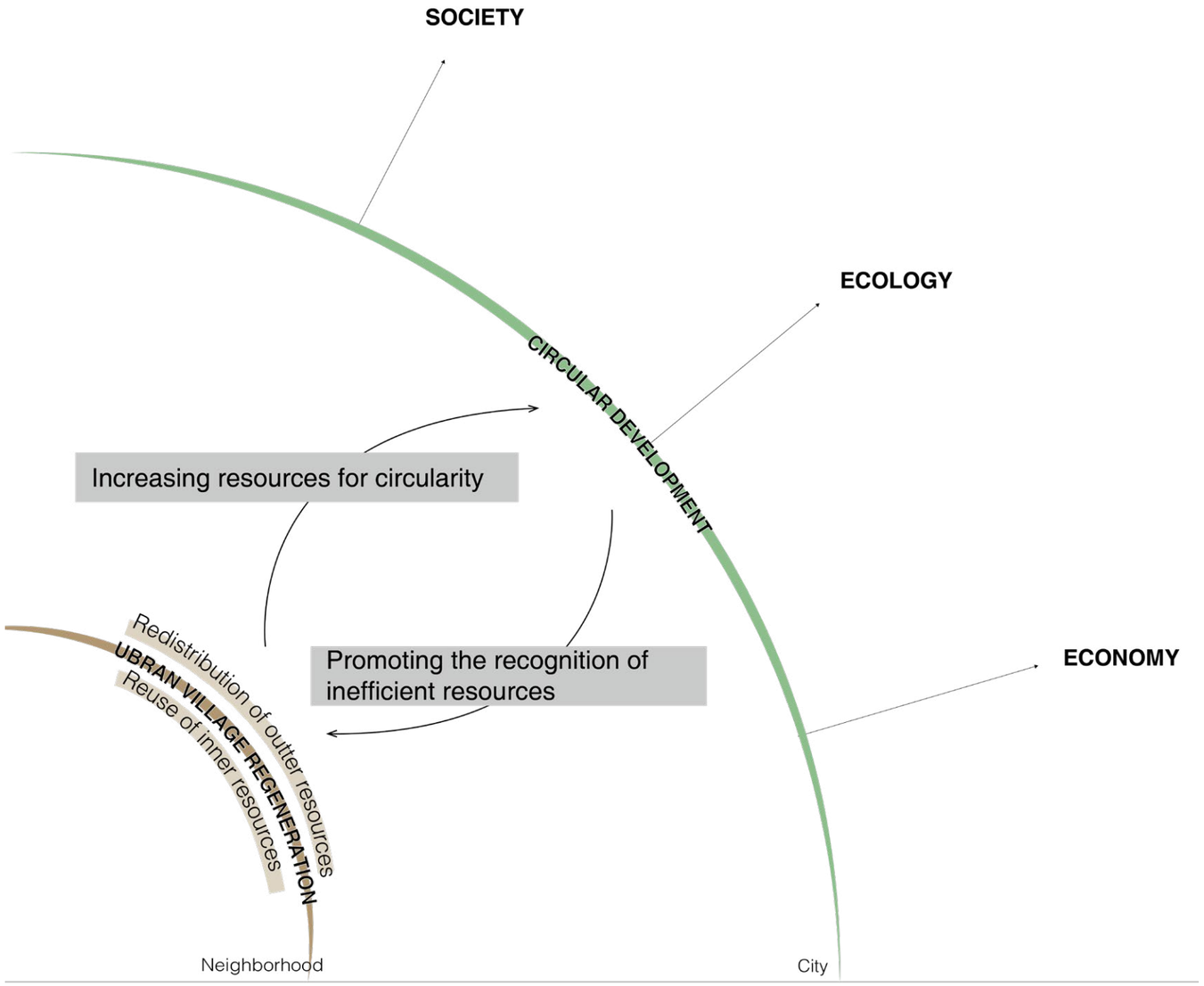

Figure 24: Theoretical Framework of Urban Regeneration with Incremental Circularity

Software Conditions of Urban Regeneration
Social inclusion has become an important goal. When discussing the realization of sustainable urban renewal, it is impossible to avoid the issue of “community participation” or “public participation”.

There has been a lot of discussion about public participation in urban village renewal, and scholars generally believe that this involves the most complex interest relationships and dual property systems. The public participation issue in urban village renewal is considered more prominent and thorny than other types of urban renewal. In most discussions, original villagers and migrant workers are bundled together (Chen et al. 2023). But even though both native residents and migrant workers belong to the residential group, their needs and the effects of renewal on them are very different. Original villagers, as landowners, have a lot of power in urban renewal and have objective economic compensation. Their situation is much better than that of migrant workers. More and more scholars emphasize that migrant workers should be singled out and considered as one of the core stakeholders to reconsider the public participation in urban renewal.

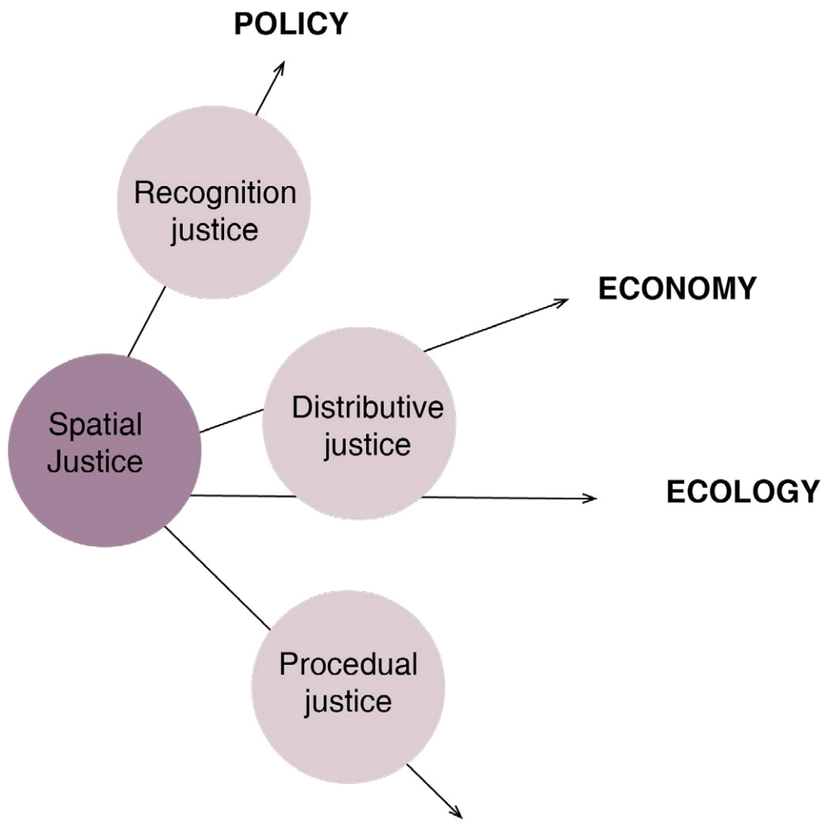

Figure 25: Theoretical Framework of Spatial justice
Adapted from Rocco (2023)

Spatial justice supports the social aspects of sustainable development and represents a critical spatial perspective on justice. It involves designing equitable and fair distribution of socially valuable support and opportunities to utilize resources within space. Spatial justice discusses how social justice occurs in urban spaces, often linked to the work of planners. It has three key dimensions: distributive justice (the spatial distribution of burdens and benefits of human interaction in cities and communities), procedural justice (justice in the processes and governance of the built environment), and recognition justice (acknowledging, validating, and respecting individual and collective identities, experiences, and cultural expressions, which historically and continuously determine marginalization, discrimination, and distortion of certain groups in society) (Rocco, 2023).

Distributive Justice: Focused on the equitable distribution of burdens and benefits in urban spaces, it ensures fair access to resources, amenities, and services for all, including marginalized communities such as migrant workers. In this research, it will be used to analyze whether migrant workers can fairly access urban services and economic opportunities amidst urban expansion and renewal.

Procedural Justice: Emphasizes the fairness of urban planning and policy-making processes. Advocating for transparent and participatory methods, it ensures that all stakeholders, especially marginalized groups, have a say in shaping the urban environment. My work will examine whether and how migrant workers currently participate in decision-making processes of urban renewal projects.

Recognition Justice: Addresses the need to recognize and value the identities, experiences, and contributions of all community members, especially those historically marginalized. This dimension aims to correct ongoing exclusion by recognizing the role and needs of migrant workers and their informal activities in urban spaces.

This project will utilize the three dimensions of spatial justice as a theoretical framework. Using recognition justice to identify the existence and value of the informal food sector in urban villages, procedural justice to re-examine the current planning, policies, and processes related to urban village renewal and urban expansion, revealing their unfairness to migrant workers. Finally, distributive justice provides the theoretical basis for proposing more inclusive strategies for urban regeneration and urban agriculture.

04 METHODOLOGY

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Figure 26: Nloodle making on a tricycle in the snake street
Source: Stockphoto Mania

METHODOLOGY
4.1 Research Aims

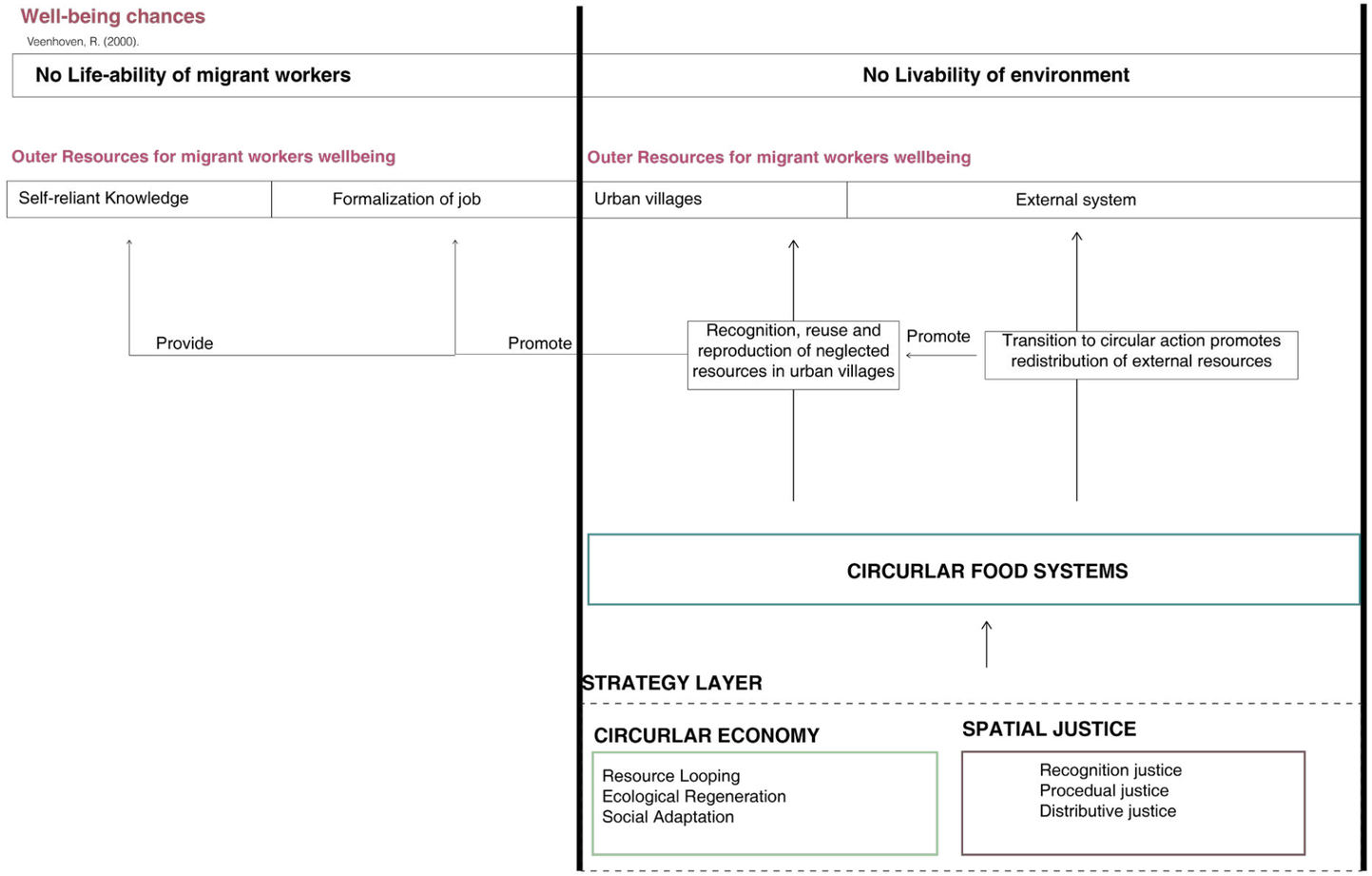

Figure 27: diagram on how urban planning can provide external resources for the well-being of migrant workers

Following the discussion of the plight of migrant workers in urban village renewal, it becomes evident that developing an alternative model to help them achieve deserved well-being is crucial. According to Veenhoven (2000), opportunities for individuals to obtain well-being not only come from their internal characteristics but also depend on the resources and opportunities provided by the external environment. Urban planning, as a discipline managing various material elements such as land, housing, and infrastructure in cities, can serve as an effective tool to mobilize urban resources and provide them to groups originally at the margins, offering them opportunities for well-being from an external resource perspective.

Based on theoretical underpinning discussed in previous chapter, the approaches of circular development in urban planning can promote the reflow of urban resources, redistributing them among social groups. Spatial justice, as a powerful guiding framework, demands that the process of redistributing resources considers all stakeholders, especially groups that have been marginalized in previous urban planning trends.

Therefore, this project views the transition of cities to circular development as an opportunity, taking the highly involved urban food system of migrant workers as an example. It aims to establish a planning system for spatial design and policy through circular development and spatial justice, thereby providing recognition from external policy systems, inclusion of the food system, and provision of ecosystem service functions for urban village regeneration. These external resources become the driving force behind the regeneration of urban villages, forcing them to start identifying inefficiently used spaces and labor related to the food system and to rebuild a good living environment for urban villages. The project also explores the impact of this process on the self-reliance of migrant workers, such as improving their income through the formalization of their work and acquiring knowledge for independence.

The research aim of this project are:

To explore a new urban village regeneration strategy framework with migrant workers as the main stakeholders.

Secondary aims include:

Examining the barriers set by urban renewal planning and policy systems for migrant workers' participation in decision-making processes.

Establishing insights into the current informal food sector in which migrant workers are engaged.

How to lead the urban village regeneration based on the policy and strategic framework of spatial justice and human-scale circular development, to achieve the well-being of migrant workers?

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4.3 Conceptual Framework

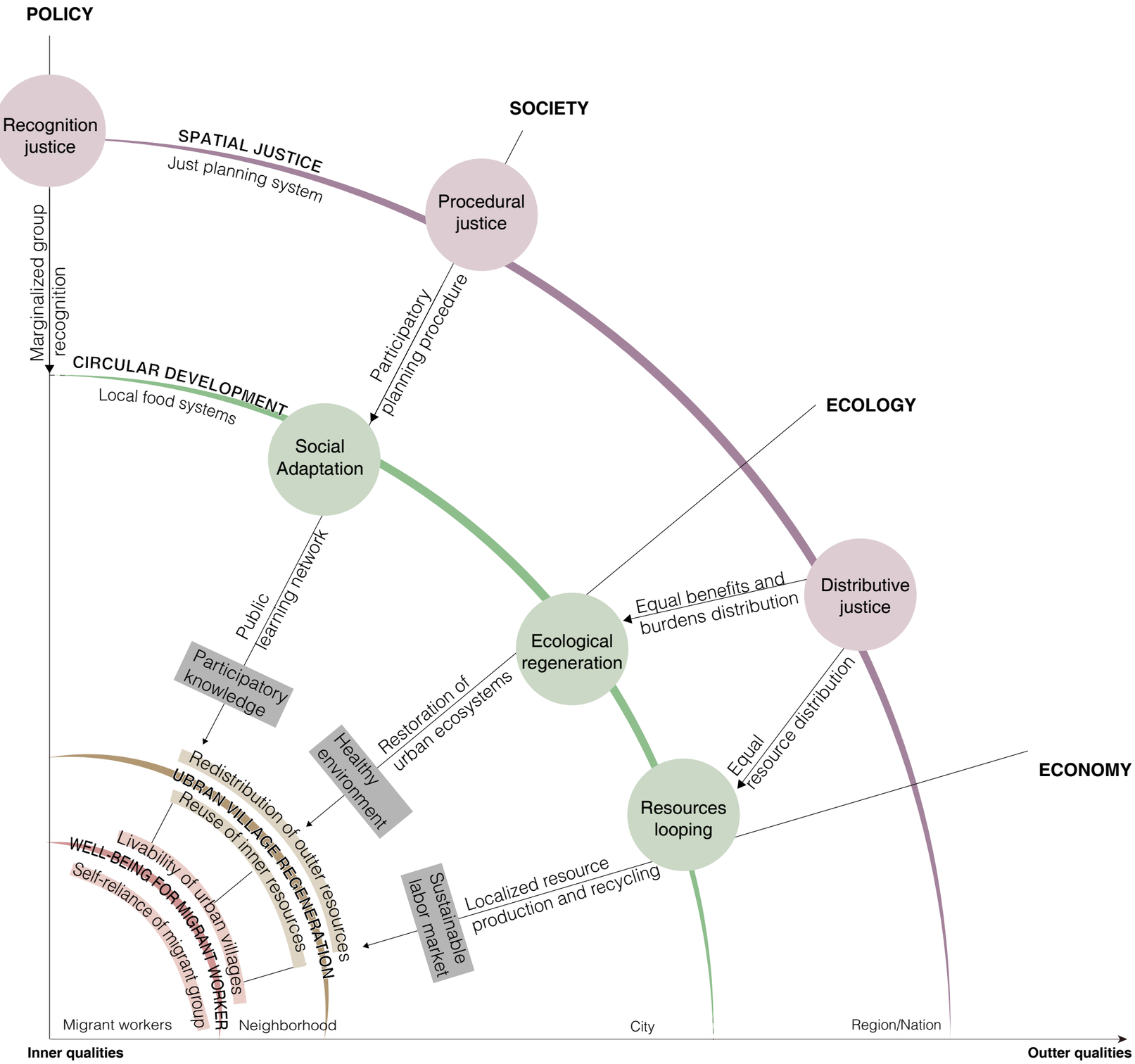

Figure 28: Conceptual framework

Based on the previously established theoretical framework, this project has developed a multi-scale conceptual framework as illustrated in the diagram below.

At the regional scale, the spatial justice framework will help establish a just planning system. Through three dimensions - recognition justice, procedural justice, and distributive justice - it will provide recognition of marginalized groups, public-involved procedure, and equal distribution of environmental benefits, burdens, and development resources for the city's transition to circularity.

At the urban scale, the circular development framework will use the food system as a case study to establish a local circular food system. Through three action principles - social adaptation, ecological regeneration, and resource looping - it aims to build a public circular knowledge learning network, restore urban ecosystem service functions, and promote the production and circulation of local resources.

At the neighborhood scale, urban villages will use the external resources, knowledge participation, healthy environment, and sustainable labor market gained from the city's transition to circularity as a starting point for urban regeneration. This will drive the recognition and reuse of local knowledge, space, and labor in neighborhoods.

All actions at the neighborhood, city, and societal levels will provide more livable external conditions for the well-being of the migrant community, thereby influencing the internal self-reliance of migrant workers.

METHODOLOGY

4.4 Methods and Outcomes

Research Questions	Scale	Methods	Outputs
What procedural and spatial barriers do urban planning systems create that affect the inequalities of migrant workers? Recognition justice · Procedual justice · Distributive justice	City	M-2 Policy analysis: Dual urban-rural household registration policy, Regulations on Resettlement for Land Collection in Chengdu, Urban Renewal Implementation Procedure M-2 Document analysis: Green Belt Plan	Pattern Filed:Pattern fields are used to clarify the systemic linkages between policies and plans and to expose the recognition, distributional, and procedural barriers faced by migrant workers.
What are the foodscapes of the short-distance food flows that migrant workers engage in? Reuse resources	Neighborhood	M-3 City-scale Mapping: Urban Village Distribution, Urban Village Development Timeline, Foodscape in the informal food sector. M-4 Systemic section: Local vegetable production-distribution flow. M-5 M-9 Fieldwork and interview: Observation trips to urban villages and interviews with migrant workers engaged in the retail sale of fruits and vegetables. M-8 Pattern language: Foodscapes in short-distance food system	Urban Village Typology Patterns and Pattern Field: Summarize the foodscapes in the informal food system and use pattern field to illustrate the inter-connectedness of these foodscapes
What intervention can transform the food system in Chengdu's green buffer zone into a circular model that addresses the degradation of urban ecosystems and effectively integrates marginalized communities? Distributive justice · Redistribution resources · Ecological regeneration · Resources looping	City Neighborhood	M-1 Literature review: Ecosystem degradation in Chengdu green belt zone and principles of building a circular food system M-2 Document analysis: Chengdu Green Belt Planning, Chengdu Agriculture Planning M-3 City-scale Mapping: Foodscapes of long-distance food flow M-6 Case study: Bangkok urban farm network, Copenhagen Finger Planning and Evaluation Literature M-8 Pattern language: Foodscapes in long-distance food system	Vision map: a circular food system at the green belt zone, including the size of the site, the land transition, and the resources flow.(Macro scale) Patterns that propose spatial strategies: Circular food strategies can be applied in the green belt. (Meso scale) Strategies Timeline
How can urban villages utilize resources from circular local food systems for internal resource reuse in order to regenerate at the social, ecological, and economic perspective? Livability of urban villages · Reuse resources	Neighborhood Community	M-1 Literature review: Understand the principles of building a circular food system M-6 Case study: Urban Village Inclusive Renewal Project (Nantou Ancient Village, Shenzhen), Circular Food Practices in Traditional Chinese villages and Urban Areas M-5 Fieldwork: Observe current recycling practices in urban villages, such as composting with rice water	Patterns that propose spatial strategies: Strategies that can be applied in the urban village to recognize and reuse the value of informal food sectors. (Meso scale) Design Test: Select 2-3 urban villages to test the design(Micro scale)
How can the gap between grassroots initiatives and policy-making systems be bridged to ensure the participation of migrant workers? Recognition justice · Procedual justice · Social adapation · Self-reliance of migrants	City Community	M-7 Stakeholder analysis: Analyze stakeholder relationships through perspectives gathered in interviews M-9 Interview: Stakeholders (Planners, Green belt developers, Real estate developers, migrant workers and neighborhood residents) attitudes towards the transition.	Patterns that propose policy strategies: Planning procedures for migrant worker participation, Policy recommendation

METHODOLOGY

4.5 Research Flow

M-1 Literature Review
M-2 Policy/document analysis
M-3 Multi-scale mapping
M-4 Systemic section
M-5 Fieldwork
M-6 Case study
M-7 Stakeholder analysis
M-8 Pattern language
M-9 Interview

Introduction

Problem Field

Problem Statement

In China's urban villages, migrant workers operating within the informal food system struggle to attain well-being across both personal capabilities and broader societal contexts.
Subjectively, they are often constrained by economic limitations and lack of educational opportunities, resulting in a lack of self-reliance. Objectively, they are marginalized by urban renewal policies that primarily focus on demolition and the city food system favoring long-distance transportation, leading to inadequate environmental livability.
This combination of subjective and objective barriers places migrant workers in a precarious position, trapping them in a vicious cycle of urban renewal, displacement, and unemployment.

Theoritical underpinning

Research Aim

Research Question

How to lead the urban village regeneration based on the policy and strategic framework of spatial justice and human-scale circular development, in order to achieve well-being of migrnat workers?

Conceptual framework

Analysis

Design

Evaluation

SQ1 What procedural and spatial barriers do urban planning systems create that affect the inequalities of migrant workers? M-2 M-3 M-4 M-8

SQ2 What are the foodscapes of the short-distance food flows that migrant workers engage in? M-3 M-4 M-5 M-8 M-9

SQ3 What intervention can transform the food system in Chengdu's green buffer zone into a circular model that addresses the degradation of urban ecosystems and effectively integrates marginalized communities? M-1 M-2 M-3 M-6

SQ4 How can urban villages utilize resources from circular local food systems for internal resource reuse in order to regenerate at the social, ecological, and economic perspective? M-1 M-5 M-6

SQ5 How can the gap between grassroots initiatives and policy-making systems be bridged to ensure the participation of migrant workers? M-7 M-8 M-9

Outcomes

Vision

Circular food system at green belt

Patterns

Illustrate policy barriers

Illustrate state quo of food systems

Propose spatial strategies

Propose policy strategies

Design Project

2-3 urban village regeneration projects

METHODOLOGY

4.6 Research Timetable

Content/Time	DEC				JAN				FEB				MAR				APR					MAY				JUN			
	2.4	2.5	2.6	Break	2.7	2.8	2.9	2.10	Break	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.10
	P2								P3								P4								P5				
Problem Focus																													
Problem Field																													
Problem Statement																													
Theoretical Underpinning																													
Methodology																													
Research Aims and Questions																													
Method																													
Analysis																													
Foodscapes																													
Urban Villages																													
Green Belt																													
P2 Presentation																													
Urban Renewal Policy																													
Field Trip																													
Urban Village Observation																													
Green Belt Observation																													
Preliminary Strategy Patterns																													
Interview with Stakeholders																													
Design																													
Case Study																													
Vision																													
Spatial Strategy Patterns																													
Strategy Timeline																													
P3 Presentation																													
Site Analysis																													
Policy Strategy Patterns																													
Design Projects																													
P4 Presentation																													
Evaluation																													
P5 Presentation																													

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Collaboration
Conflict

Figure 29: Construction debris illegally dumped inside farmland in the suburban area of Chengdu.
Photographs by the author

ANALYSIS

5.1 Introduction

Chengdu---The Ancient Agricultural Region and the Capital of Gastronomy

Figure 30: Traditional Rural Settlement and Production Units in Sichuan - Western Sichuan Forest Disk

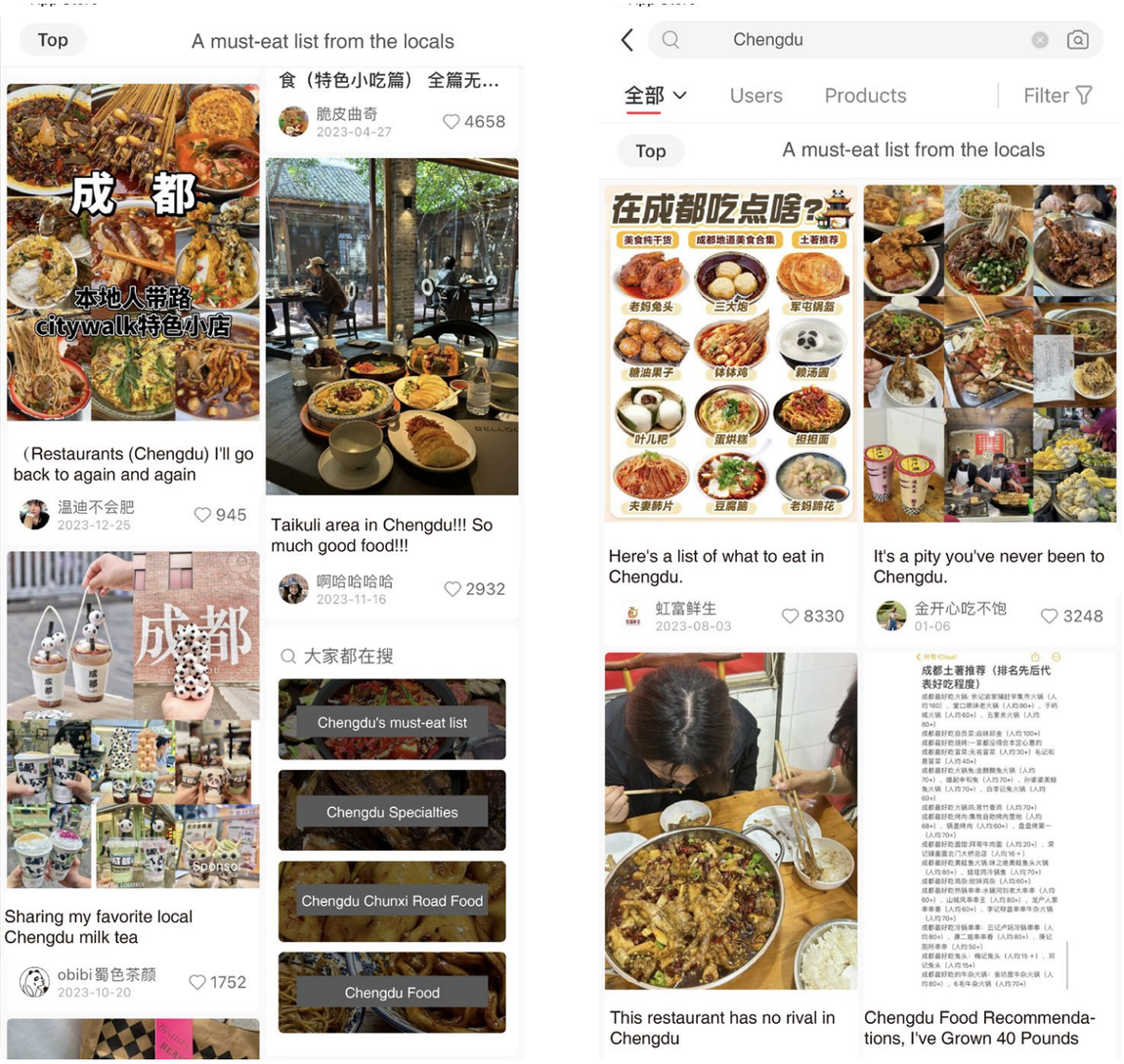


Figure 31: Screenshot of searching “Chengdu” in Xiaohongshu

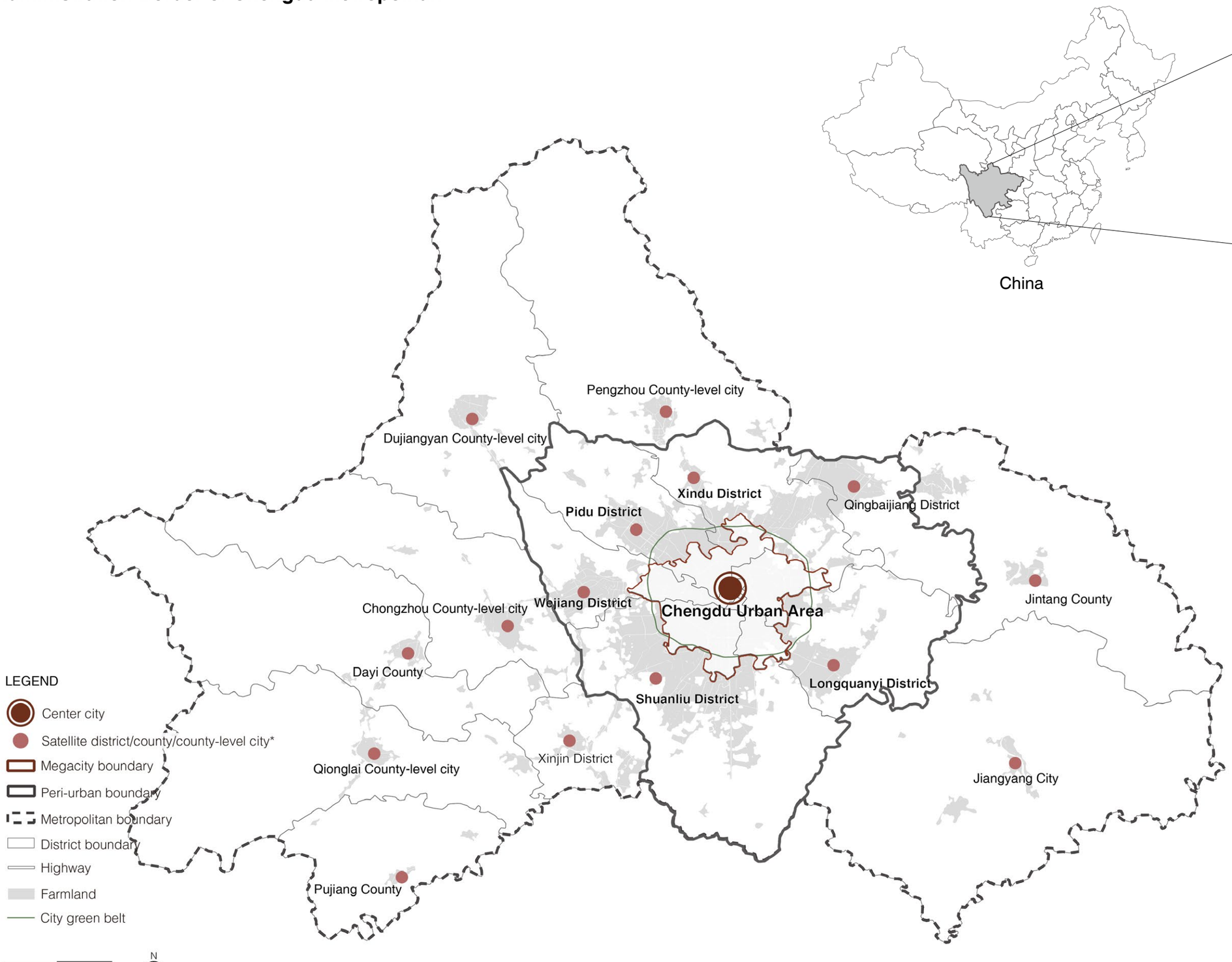
Chengdu, located in the Chengdu Plain of Southwest China, is a land of abundant wealth and rich water systems, long renowned as the “Land of Abundance”. Its fertile soil, deep earth layers, mild climate, and convenient irrigation conditions have nurtured an agricultural civilization here, forming a patchwork of rural landscapes across the vast plains. The “Western Sichuan Forest Disk” is a typical rural form in this area, where farmyards are surrounded by tall trees and bamboo groves, and the densely interconnected river network irrigates the farmlands that envelope the houses and forests, creating a unique rural landscape and a distinctive cultural heritage of Sichuan Province.

Modern Chengdu is renowned for its culinary culture, having been awarded the title of “City of Gastronomy” by UNESCO in 2016. The region’s traditional cuisine, Sichuanese cuisine, is one of the four great culinary traditions of China, with hotpot being one of its classic dishes that attracts over 200 million visitors annually. Searching for Chengdu on China’s largest social app reveals evaluations and recommendations from netizens across the country for restaurants in Chengdu.

ANALYSIS

5.1 Introduction

Administration Border of Chengdu Metropolitan



Chengdu is located in Sichuan Province, in the southwestern part of China, and is administratively classified as a metropolitan area. It covers an area of 14,335 km^2 and has a population of 20 million. Chengdu is composed of three layers. The first layer is the main urban area of Chengdu, where the majority of urban construction land is concentrated, spanning an area of 1,421.6 km^2 and housing over 80% of the population. The second layer is the suburban area, where farmlands, factories, and urban built-up areas form a mixed urban landscape. The third layer is the rural area, which boasts large-scale farmlands with a small proportion of urban built-up areas.

Figure 32: The three layers of administrative divisions in Chengdu

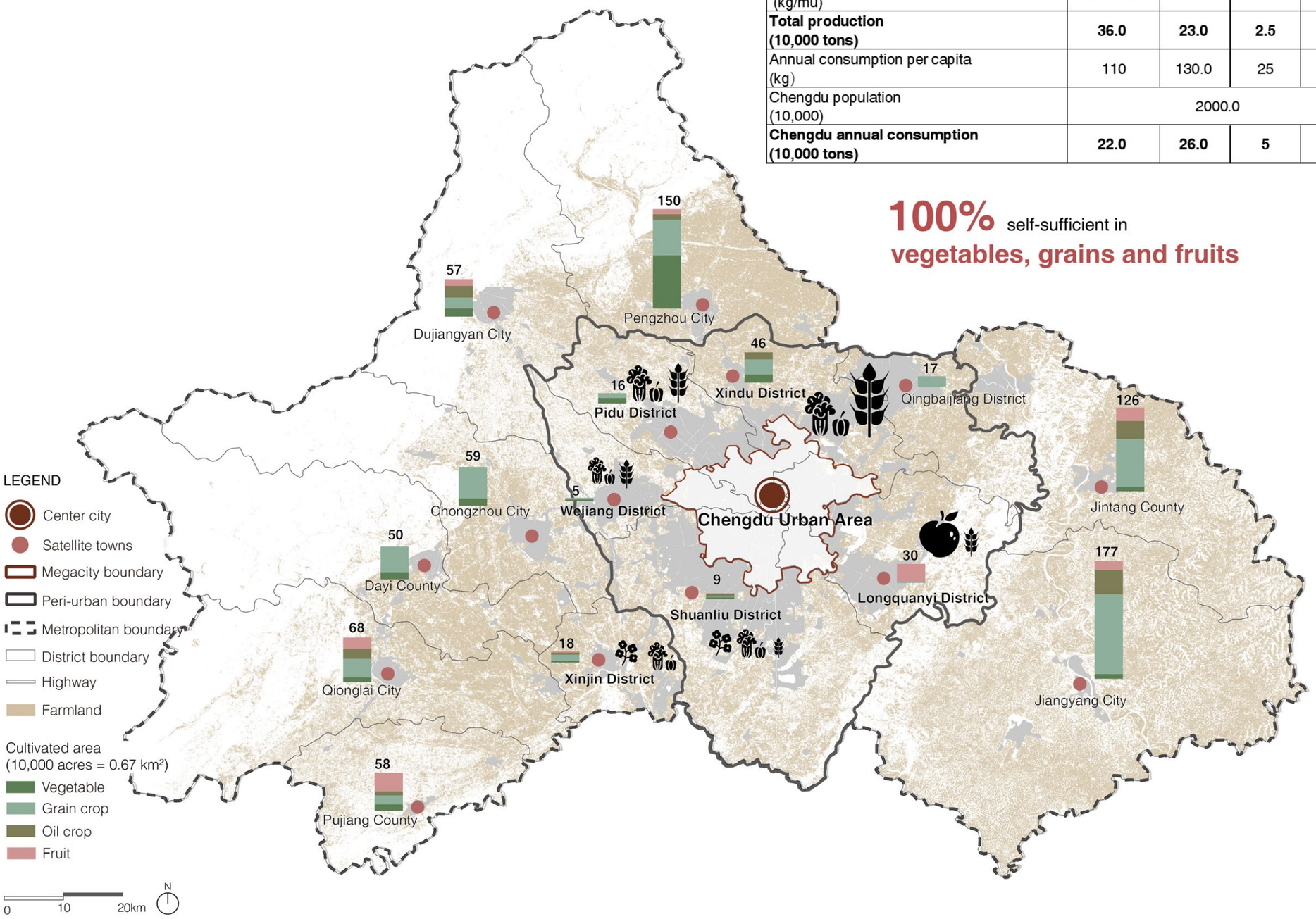
*County-level city is used to describe a particular administrative division in China, which is a city with the same administrative level as a county.

ANALYSIS

5.1 Introduction

100% Food Self-sufficient City

Annual food production and consumption in Chengdu				
	Vegetable	Grain	Oil	Fruit
Cultivated area (10000 mu)	181.9	451.1	127.8	124.0
Average annual yield (kg/mu)	2000.0	520.0	200	1000
Total production (10,000 tons)	**36.0**	**23.0**	**2.5**	**12**
Annual consumption per capita (kg)	110	130.0	25	61
Chengdu population (10,000)	2000.0			
Chengdu annual consumption (10,000 tons)	**22.0**	**26.0**	**5**	**12**



Chengdu, especially its third layer, possesses a vast area of farmland and a rich variety of agricultural products, including vegetables, fruits, oil crops, and grains. It is one of the primary food-producing regions. Apart from oil crops, the annual consumption and production of fruits, vegetables, and grains in the Chengdu metropolitan area are almost equal, making it one of the few self-sufficient food city in China.

However, self-sufficiency in food does not equate to food security. According to data from the third national land survey published in 2021, the area of arable land in the Chengdu Plain has decreased by nearly 40% since 2000.

Therefore, this project chooses Chengdu as a case study to explore how the local food system can transition to circular development under the conditions of self-sufficiency. It is hoped that Chengdu, with its advanced sustainable agricultural development, can serve as a research case to be extended to other regions of China in the longer term.

Figure 33: Distribution of farmland in Chengdu and major agricultural products by region
Land use based on ESA WorldCover (2020),
Statistical data based on Statistical Bulletin on National Economic and Social Development of Chengdu(2022)

ANALYSIS

5.2 Research location---the Green Belt

Urban Expansion Control Area

1954

The built-up land is located inside the second ring road.
Adopting zoning planning and following the principle of "production before life", the northeast zone is the main industrial zone with a large number of state-owned factories, while the southwest zone is the second phase of the industrial development zone.

1982

Built-up land expands to the east of the city's third ring road.
Large state-owned factories are relocated outward from the city center.
Prioritized industrial development and neglected of public services.

1994

The city's ring and radial road network began to take shape, with built-up land expanding along six main roads, toward the city ring road.
During implementation, growth along the six development corridors was unbalanced, with the western and southern parts benefiting the most from improved transportation and its long-standing upper-class image.

2011

The expansion of built-up land along six major roads continued into satellite towns. The City Ring Road was planned as urban growth boundary, with 1km wide green spaces established on both sides of the road, and the area between the six growth corridors set as urban green space.

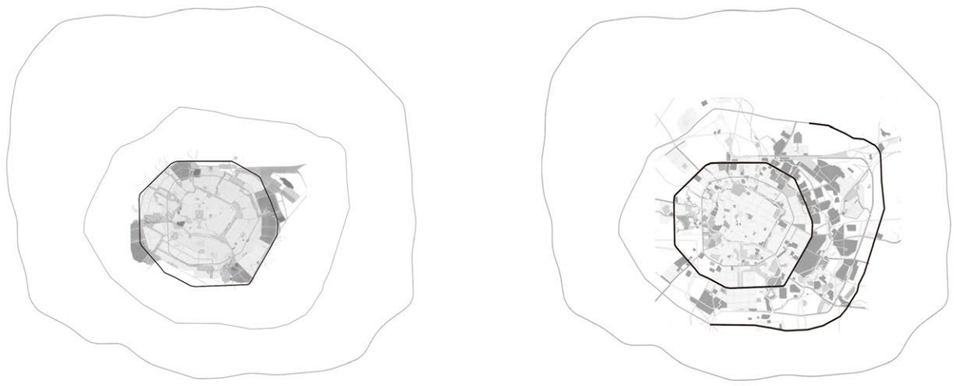


Figure 34: Expansion Trends of Main Built-up Areas in the four editions of Chengdu's urban master plan
Based on Chengdu Land Use Planning(1954;1989;1994;2011)

The green belt buffer zone in Chengdu is located at the junction of the first and second layers of Chengdu's metropolitan area, belonging to the urban expansion control area of Chengdu's mega city. Its range includes a 500m wide road buffer area on both sides of the Chengdu Ring Highway and seven wedge-shaped plots, with a total area of 187 square kilometers.(Chengdu Land Use Planning,2011)

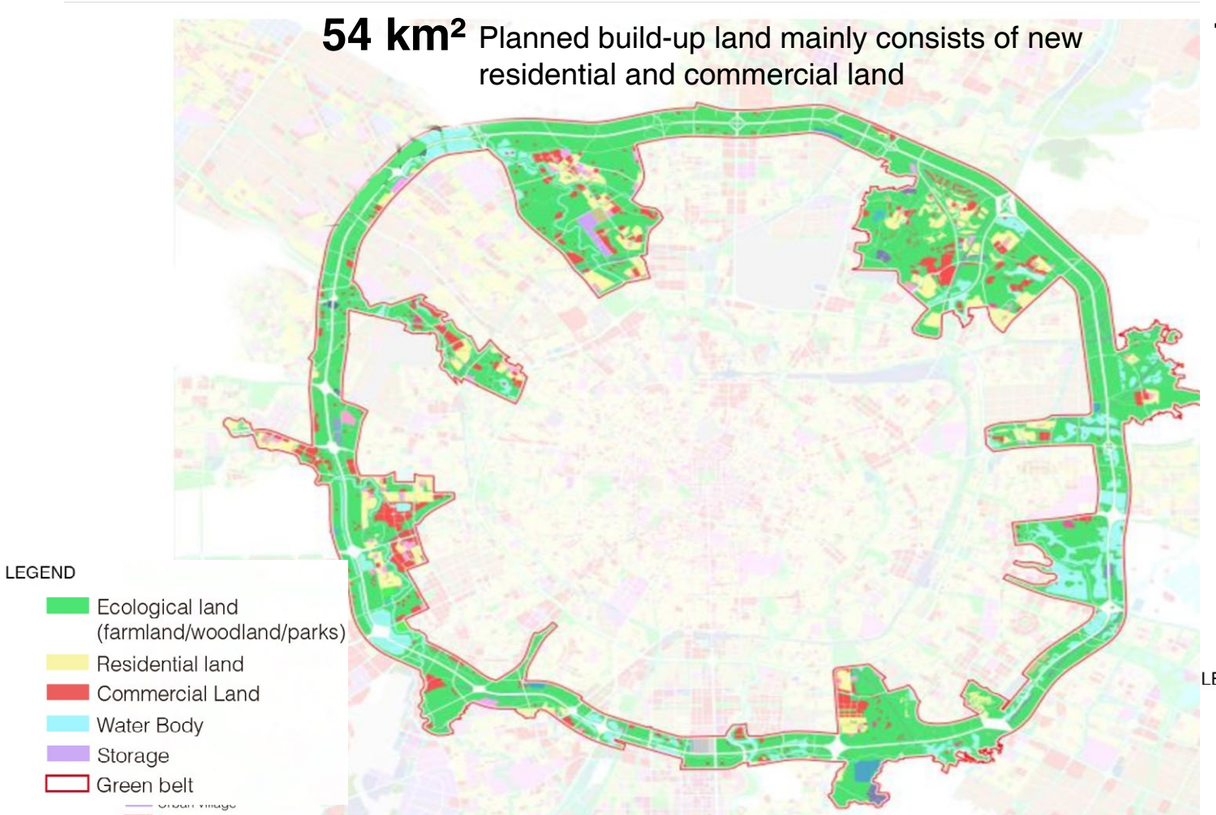
We can understand the mixed landscape within the green belt by analyzing the development timeline of Chengdu's land-use planning. Chengdu has had four editions of its master urban plan, the most important plan for Chinese cities, which dictates the types of land use and permitted development areas and has legal force. The evolution of these four master plans shows that since 1954, Chengdu has gradually expanded outwards from the ancient city within the First Ring Road. By 1994, when farmlands and villages within the Third Ring Road were mostly transformed into urban lands, Chengdu's expansion direction began to gradually extend along six development corridors, six main roads, towards the outer Ring Highway. The 2011 master plan started emphasizing urban livability, advocating controlling the urban expansion range, thus establishing a buffer zone along the Ring Highway and designating the wedge-shaped plots between the six development corridors as restricted areas for urban expansion.

Before the expansion of construction in the buffer zone in 2011, the rural areas here had already been occupied by many factories, and a significant portion of rural landowners began establishing urban villages as informal residential areas for profit. This led to a very complex landscape of urban-rural interweaving.

This project considers this area as a macro-scale of study and aims to establish a city-level circular food system here.

Reasons for Location - Threats and Opportunities

The green belt is an **urban expansion control area** consisting of **500 meters along each side of the urban ring road** and **7 wedge-shaped sites.**
The total area is **187 km²**.



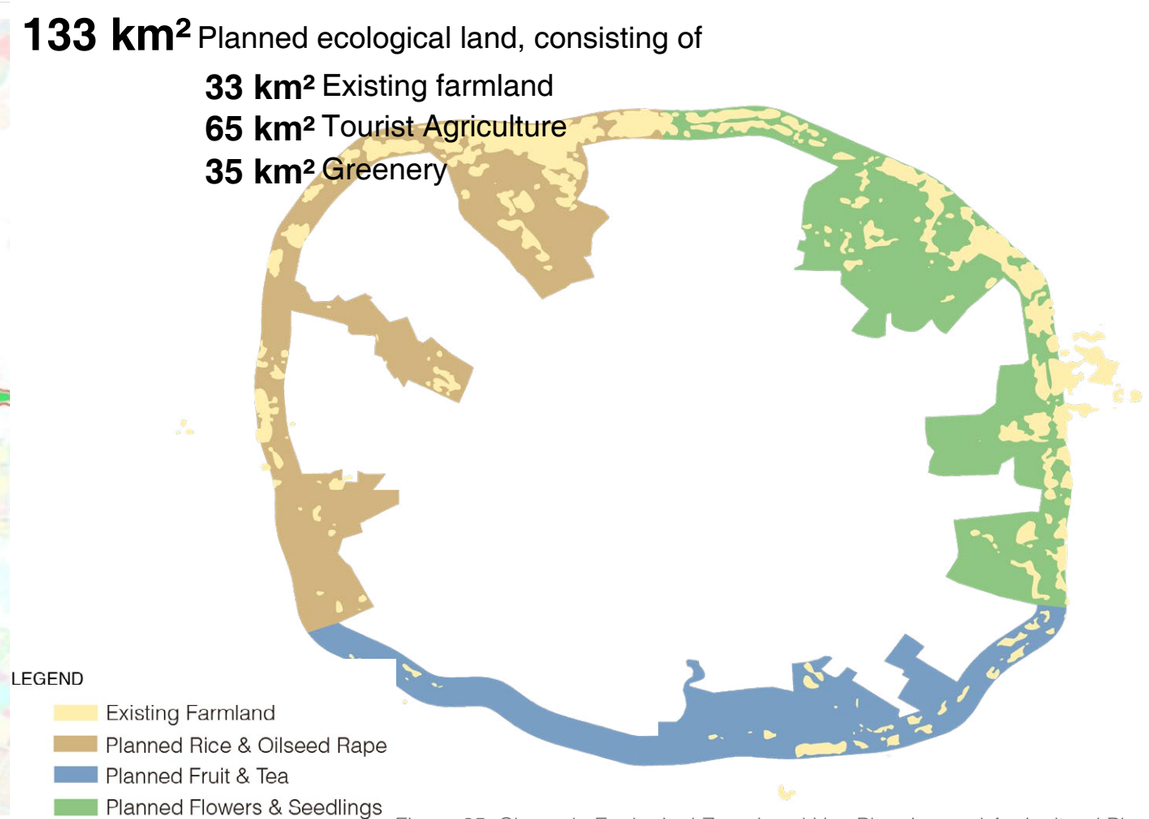


Figure 35: Chengdu Ecological Zone Land Use Planning and Agricultural Planning
Source: Master Plan for Chengdu's Ecological Zone(2020)

The reason for selecting this location is twofold. First, the regeneration of urban villages in the green belt area is urgent, as the current green belt planning approach in Chengdu is attempting to clear all urban villages. In 2020, Chengdu's Planning and Natural Resources Bureau released the Master Plan for Chengdu's Ecological Zone, specifying the land use within the green belt area. This document allocates 54 square kilometers for construction, which will be developed by builders into future high-rise residential complexes and shopping centers. This construction land primarily comes from the renewal of current urban villages and the conversion of land used to be rural homesteads.
The second reason for choosing the green belt area is that its agricultural planning has created opportunities for a more sustainable transition to circular agriculture and has already laid a certain foundation. The Master Plan for the Ecological Zone designates the remaining 133 square kilometers as ecological land, including the preservation of 33 square kilometers of existing farmland and the development of 65 square kilometers of new farmland for tourism-oriented agriculture, as well as 35 square kilometers of green space.

The preservation of a large area of farmland creates conditions for localized food supply, and the new farmland has already employed many cultivation methods related to the circular food system. For example, to restore soil fertility, rice straw is scattered back into the soil as organic fertilizer, and harvest festivals are organized to invite residents to personally harvest rice in the fields.

Therefore, this project considers the green belt area as a research zone for transitioning to a circular food system, exploring how this transformation can potentially benefit the preservation of the informal food sector in urban villages.

ANALYSIS

5.3 Landscape analysis

Mix Rural-urban Landscape

The green belt buffer zone in Chengdu is located at the junction of the first and second layers of Chengdu's metropolitan area, belonging to the urban expansion control area of Chengdu's mega city. Its range includes a 500m wide road buffer area on both sides of the Chengdu Ring Highway and seven wedge-shaped plots, with a total area of 187 square kilometers.

This project considers this area as a macro-scale of study and aims to establish a city-level circular food system here. This region, where urban and rural landscapes intertwine, is the most concentrated area of Chengdu's urban villages.

The map displayed here shows the main built-up areas of Chengdu and some land uses within the green belt area. It can be seen that the main built-up areas are located outside the green belt, while farmlands, rural construction lands, and urban villages within the green belt are interwoven.

Figure 36: Green Belt and Urban Village Distribution
Land use based on ESA WorldCover (2020)

ANALYSIS

5.3 Landscape analysis

Rural-urban landscape gradient lead by urban master plan

1954

Transition from agriculture to industry, defining the city as a "socialist industrial city focused on precision machinery, mechanical manufacturing, and light industry."(Tao & Wang, 2000)

1982

Emphasis on military and heavy manufacturing bases, state-owned military factories.

1994

Industry relocation from the city center, trends in housing commodification and land market formation, Chengdu defining itself as a hub for science, finance, business, communication, and transportation in the southwestern region.(Chengdu Municipal Planning Bureau, 1994)

2011

Development of substantial infrastructure and new residential areas along six major corridors, catering to high-end services and quality housing.

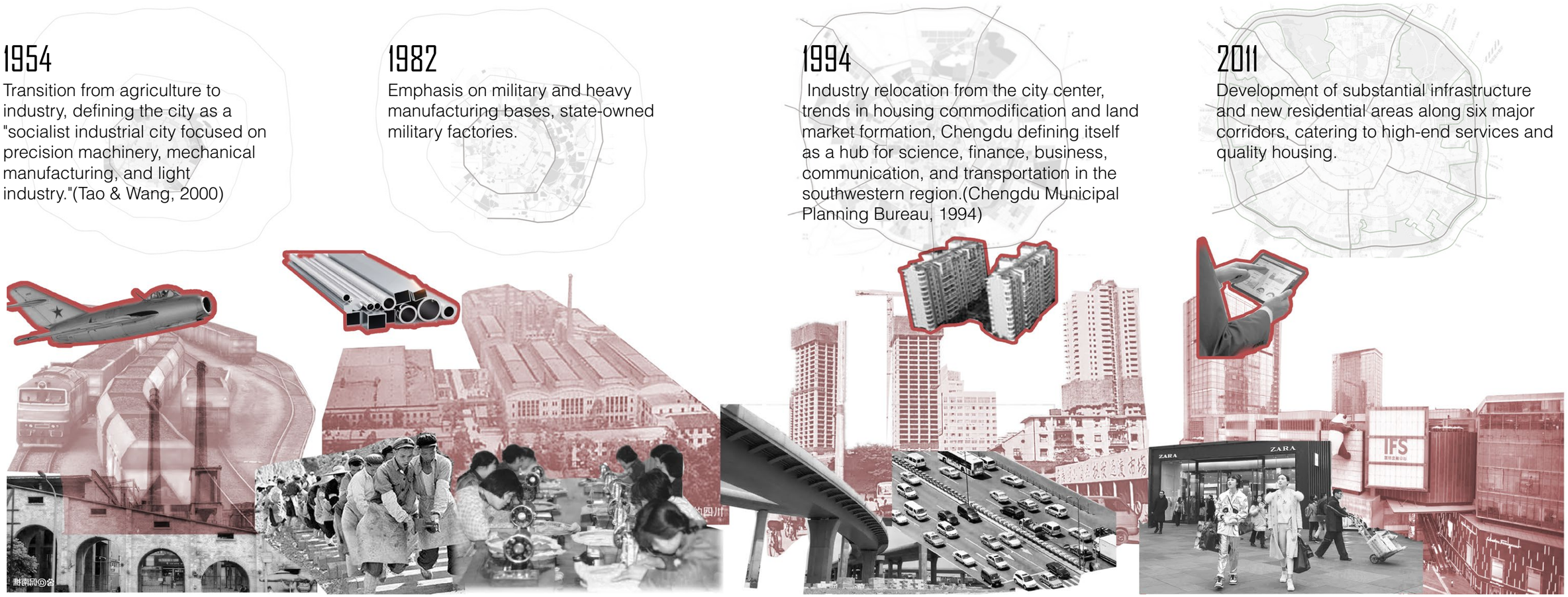


Figure 37: Primary industries described in the four editions of Chengdu's urban master plan
Made by the author

This section of the thesis analyzes the intertwined rural-urban landscape within Chengdu's Green Belt area, contrasted with the city's major built-up areas which lie outside the Green Belt along the urban expressways. The Green Belt intertwines farmlands, rural construction land, factories, and urban villages. The transformation in the eastern and southern parts of the Green Belt, closer to the developed urban areas, has led to the development of expansive urban parks, with previous agricultural and industrial landscapes nearly erased.

This landscape pattern is also reflected in the four versions of the city's urban master plans, which describe the city's evolving industrial focus.

Over nearly fifty years, Chengdu's primary industries have undergone multiple transformations from agriculture to industry, military manufacturing, and finally to real estate and services. These shifts have significantly influenced the city's landscape, especially in areas like the Green Belt, which are outside the main urban development focus and thus slower to respond to changes. As a result, the cityscape in these areas presents a diverse and intertwined mix of farmlands, manufacturing plants, military factories, and modern residential complexes.

ANALYSIS

5.3 Landscape analysis

Urban Village Typology - A Landscape Gradually Transformed from Rural to Urban

Figure 38: Landscape of Linpan
Made by the author

Source: Bing Satellite Map(2024)

Traditional Chengdu Village---Linpan Residential units+Farmland

This section examines the transformation of urban villages within the Chengdu metropolitan area, characterized by a diverse landscape that has shifted from rural to urban. These urban villages are classified based on their degree of urbanization. The analysis zooms into the neighborhood scale of urban villages to display the landscape characteristics of different village types.

A typical rural structure in Sichuan Province, the “Linpan” — largely absent in the Green Belt area today — originally formed the agricultural landscape from which the city’s urban villages evolved. Linpans are structured around major rural roads connecting family-based residential units, each centered around a courtyard farmhouse surrounded by a bamboo forest and extensive farmland, with irrigation channels running through.

ANALYSIS

5.3 Landscape analysis

Urban Village Typology - A Landscape Gradually Transformed from Rural to Urban

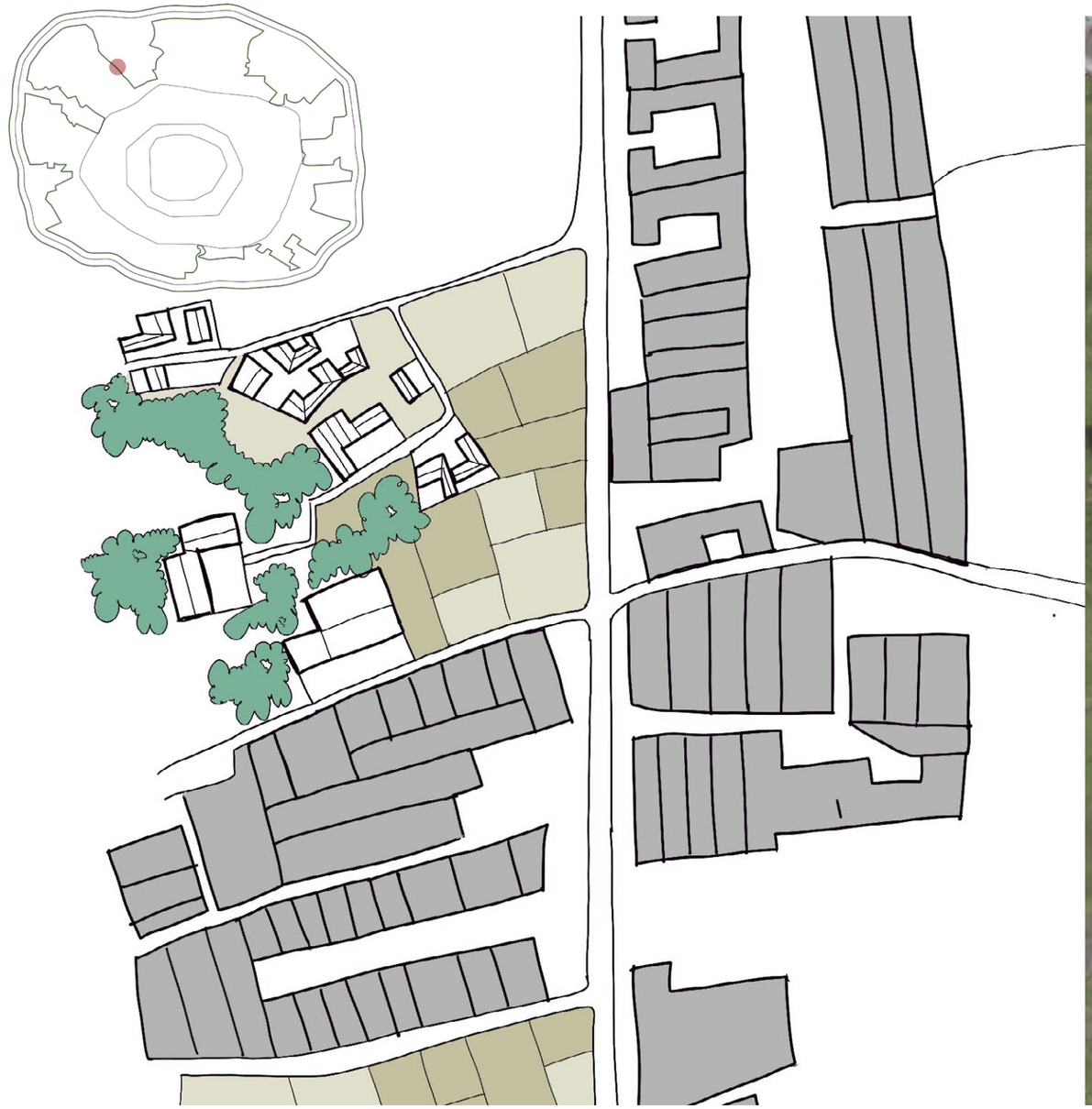


Figure 39: Landscape of Urban Village Typology 1
Made by the author

Source: Bing Satellite Map(2024)

Urban Village Typology 1---Village + small-scale factory + farmland

Urban Village Typology 1 marks the first step from Linpan towards urbanization, where large industrial facilities have taken over traditional farmlands. Nearby farmhouses have been illegally expanded to provide housing for factory workers, becoming denser and taller.

Urban Village Typology - A Landscape Gradually Transformed from Rural to Urban

Figure 40: Landscape of In Urban Village Typology 2
Made by the author

Source: Bing Satellite Map(2024)

Urban Village Typology 2---Urban village + large-scale factories + fragmented farmland

In Urban Village Typology 2, as industrial development intensifies, dense informal residential areas emerge and expand rapidly, mostly replacing the old farmhouses and occupying most of the farmlands, leaving only fragmented pieces.

Urban Village Typology - A Landscape Gradually Transformed from Rural to Urban

Figure 41: Landscape of Urban Village Typology 3
Made by the author

Source: Bing Satellite Map(2024)

Urban Village Typology 3---Urban village + land under construction + residential land

Urban Village Typology 3 sees a shift in the city's main industries, viewing industries as an outdated urban feature, prompting many factories to move out of the Green Belt. This leaves vast tracts of vacant land, which are then acquired by real estate developers to build high-rise residential complexes. Informal housing areas, due to complex stakeholder relations and high land acquisition costs, are slower to undergo demolition and redevelopment but experience frequent teardowns.

Urban Village Typology - A Landscape Gradually Transformed from Rural to Urban

Figure 42: Landscape of In Urban Village Typology 4
Made by the author

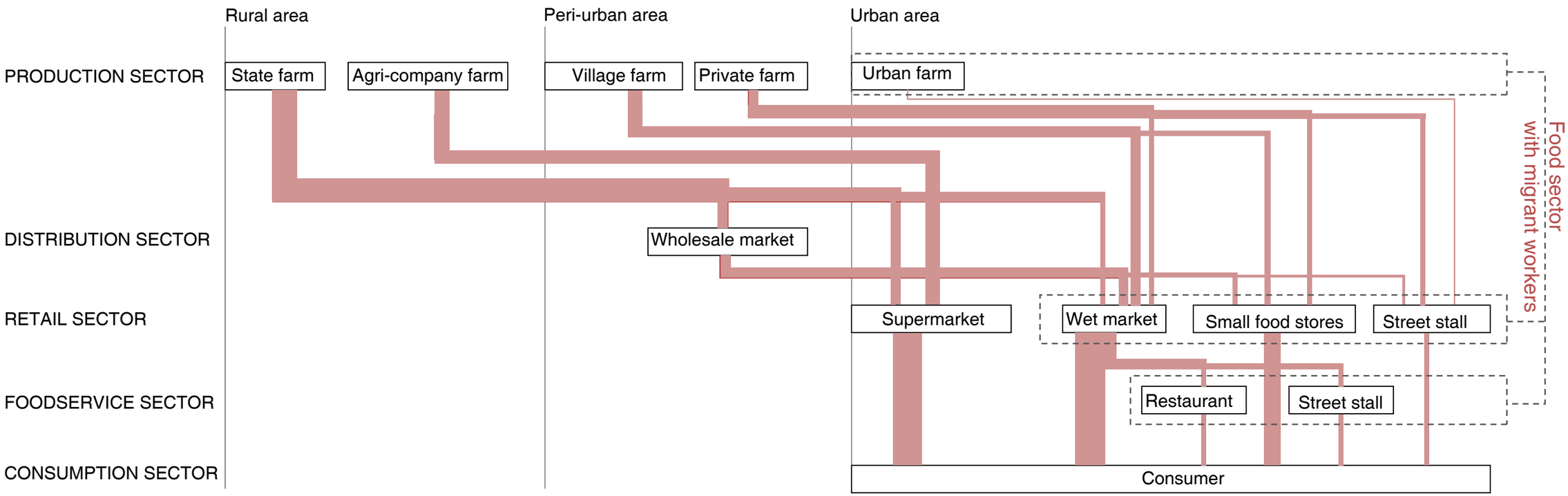
Source: Bing Satellite Map(2024)

Urban Village Typology 4---Urban village + residential land

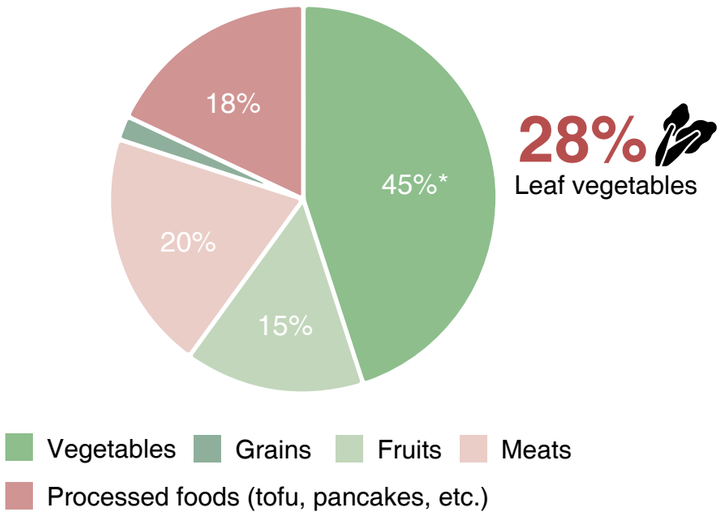
In Urban Village Typology 4, with the extensive relocation of factories and large-scale demolition of informal housing areas, the original landscape texture of the urban village is nearly erased, replaced by expansive roads, dense urban greening, and modern high-rise residential buildings. Only a few informal housing areas, difficult to demolish, remain.

ANALYSIS
5.3 Landscape analysis

Overview



Supply chain diagram based on Si et al. (2016)
Sales volume data source: Statistical Bulletin on National Economic and Social Development of Chengdu(2022)



Data source: Si et al. (2016)
*Percentage of vendors selling this type of food

This section analyzes the food system within Chengdu's Green Belt area, aiming to summarize the foodscape present within the Green Belt as well as the foodscapes actively engaged by migrant workers. Before delving into the foodscapes, an overview of Chengdu's food supply system is essential, focusing on commonly sold items by street vendors such as fresh fruits, vegetables, and lightly processed foods like tofu and noodles, alongside major crops grown in the Green Belt farmlands, such as grains and oil crops (rice, wheat, and canola).

By analyzing the food supply chain in Chengdu, it can be seen that, migrant workers are predominantly involved in the production, retail, and food service sectors within urban areas, playing a significant role in providing fresh produce to local communities.

ANALYSIS

5.4 Food system analysis

Two contrasting food systems

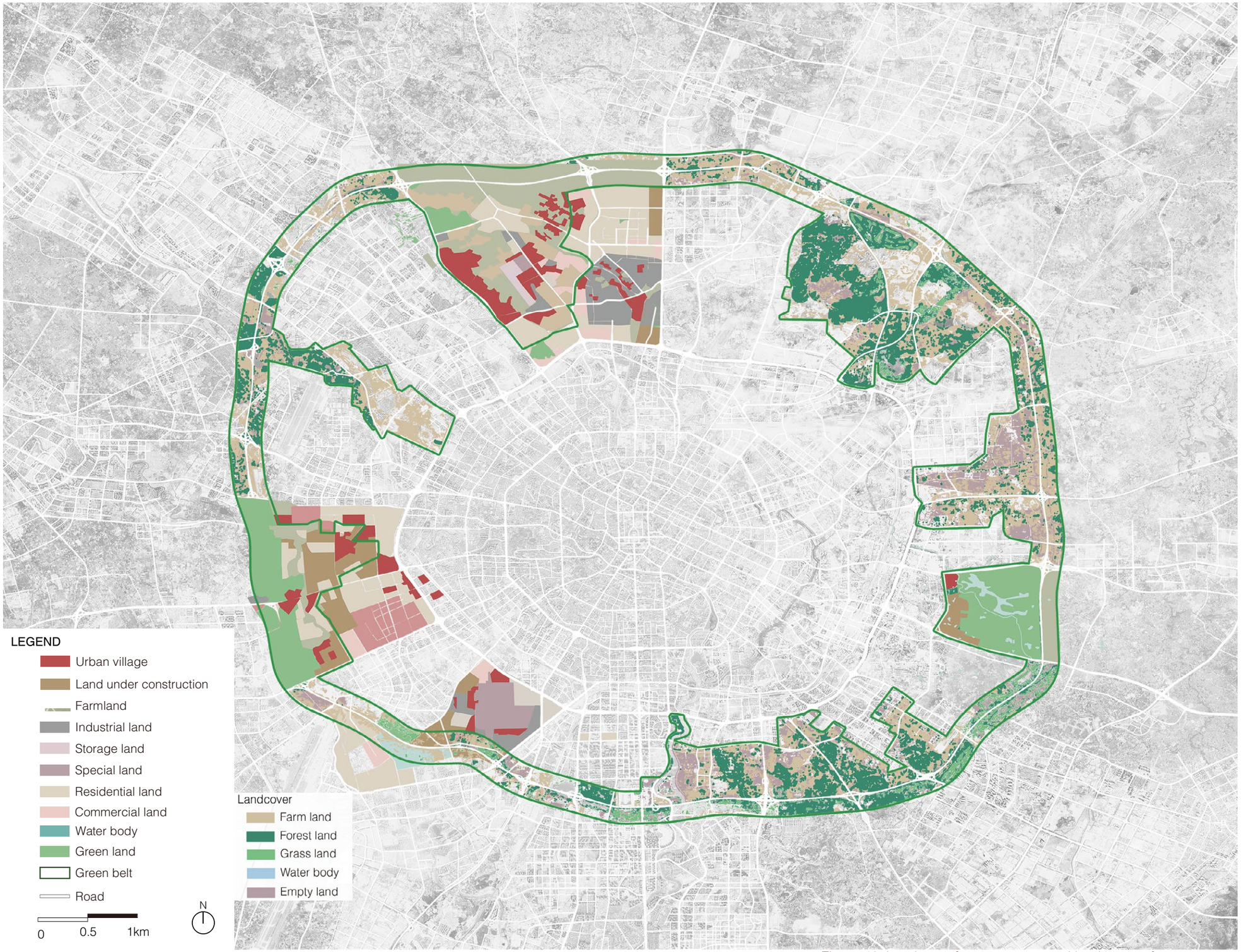


Figure 43: Land use of western zone and land cover of eastern zone
Based on: ESA WorldCover (2020), Bing statellite map(2024)

Before exploring the food systems directly, the project employs satellite mapping to analyze land use and coverage within the Green Belt area to gain a comprehensive and real-time understanding of land use.

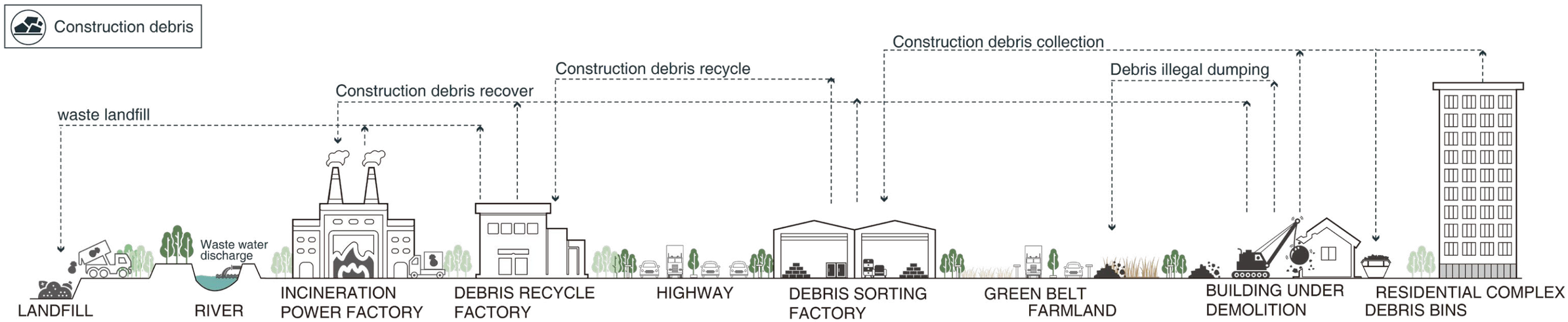
The mapping reveals significant differences in land cover between government-purchased, restored lands and farmland near urban villages. The eastern wedge and buffer zones along the city's ring roads were among the first areas planned under the urban ecological area scheme, with the western wedge areas developed later. In eastern regions, there is almost no trace of urban villages, which have been transformed into a large number of cultivated land for food under the unified management of food companies and a large number of ecological sites to be constructed, such as greenfield parks and wetland parks.

In contrast, the western regions host more construction lands but also significant farmland, which is slowly being consumed by urban renewal activities primarily focused on demolishing inefficient factories and urban villages. However, due to strict farmland protection policies, farmland remains interwoven with the landscape of the urban villages.

ANALYSIS

5.4 Food system analysis

Resources Flow---Green Belt Farmland System



Due to significant differences between the green belt system and urban village food systems, a separate analysis of the resource flows related to food in these two systems was conducted. The analysis was presented through systemic sections, detailing the departments involved and their flow behaviors. Notably, in analyzing the food systems' resources, construction debris emerged as an unexpected resource due to its impact on green belt farmland. During a field study, it was discovered that these farmlands had been heavily polluted by improperly disposed construction debris from demolition activities over the past decade. After the government acquired the farmlands, the first step to restore their productivity involved crushing and removing this debris. As a result, construction debris was included in the analysis, considering its potential and necessity for recycling transformation.

-Construction Debris Flow

Construction debris primarily arises from the large-scale demolition of informal residences and factories, then transported to debris sorting facilities, mostly located in suburban areas. Only a small fraction of the material is recycled, with the majority being either incinerated for power generation at waste-to-energy plants or landfilled. A significant portion of debris is improperly handled, either left at demolition sites or illegally dumped in nearby abandoned farmlands, causing severe land degradation.

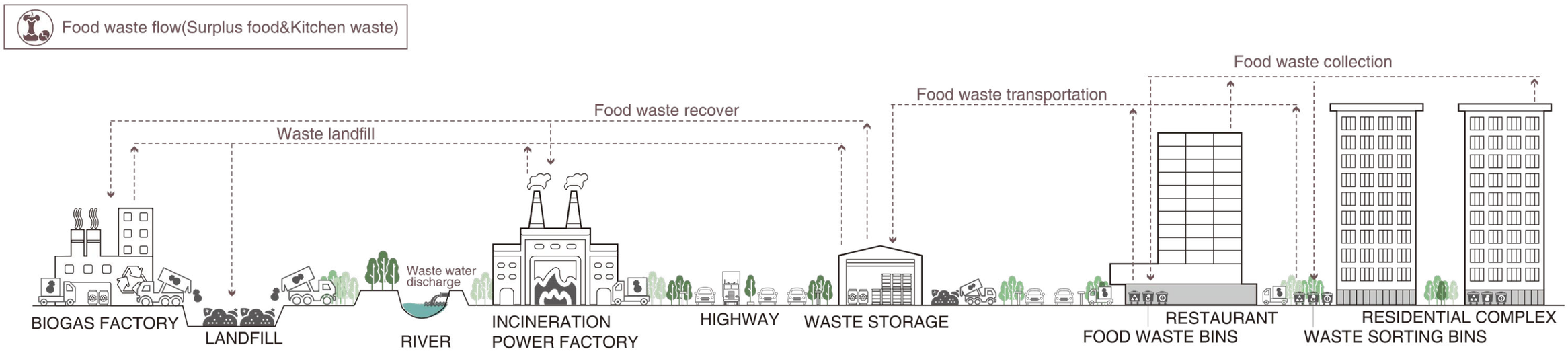
-Food Flow

The main crops in green belt farmlands are grain and oil crops, such as rice, wheat, and canola, with a smaller portion of vegetables. This is due to China's "food security" policy aimed at ensuring a steady supply of staple products (rice and flour) in the domestic market. However, the grains from the green belt are not processed and sold locally; for example, harvested rice is sold to suburban food processors like COFCO for husking, drying, and bagging, and then distributed to food distributors, typically wholesale markets, before reaching retailers nationwide, such as wet markets and supermarkets. So it's hard to know if these foods are consumed locally in Chengdu.

ANALYSIS

5.4 Food system analysis

Two Contrasting Food Systems---Green Belt Farmland System



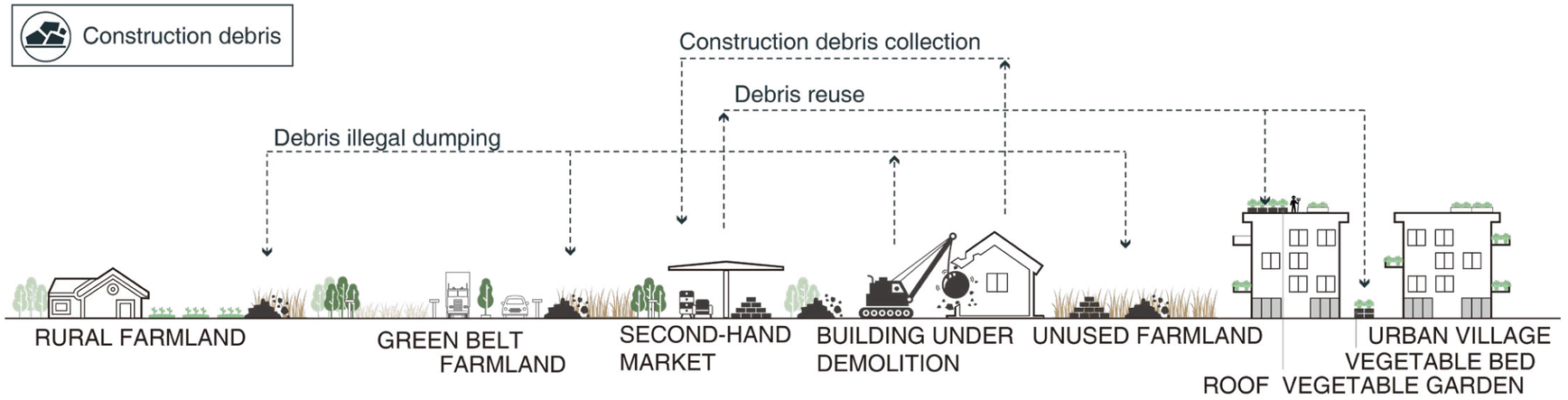
-Food Waste Flow

In Chengdu, most residential areas have started garbage sorting, excluding the hard-to-manage and monitor urban villages. The sorted waste is transported to waste transfer stations for initial compression and dehydration, similar to construction waste, and then sent to suburban incineration plants, with about 80% of household waste being incinerated, and a small fraction recycled.

ANALYSIS

5.4 Food system analysis

Resources Flow---Urban Village System



Management of these three material flows in urban villages is irregular and chaotic. However, local migrant workers, driven by thrift, inadvertently promote the recycling of materials.

-Construction Debris Flow

After demolition, urban villages with second-hand building materials and furniture dealers recycle valuable materials like wood, intact bricks, and windows. Field observations noted migrant workers collecting discarded bricks to construct vegetable planting beds.

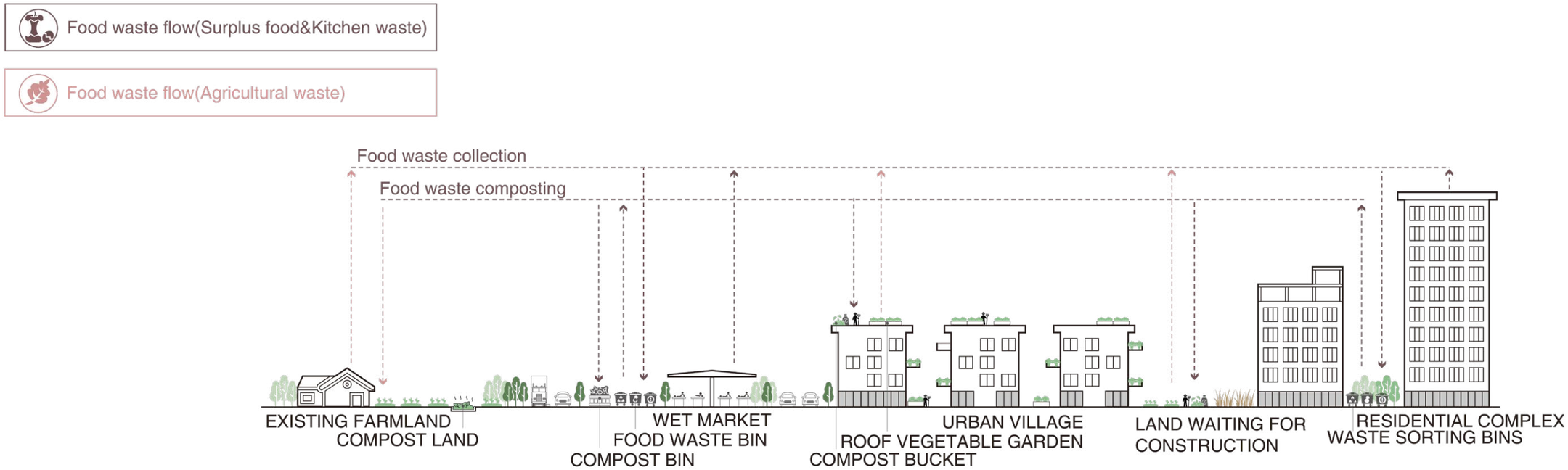
-Food Flow

Migrant workers, aiming to save household expenses or feeling it wasteful to leave land idle, spontaneously clear weeds and debris from unused farmlands to cultivate, selling surplus produce at nearby street or wet market stalls. Many of them, hailing from rural backgrounds with agricultural experience, find farming familiar, more a habit and leisure hobby.

ANALYSIS

5.4 Food system analysis

Two Contrasting Food Systems---Urban Village System



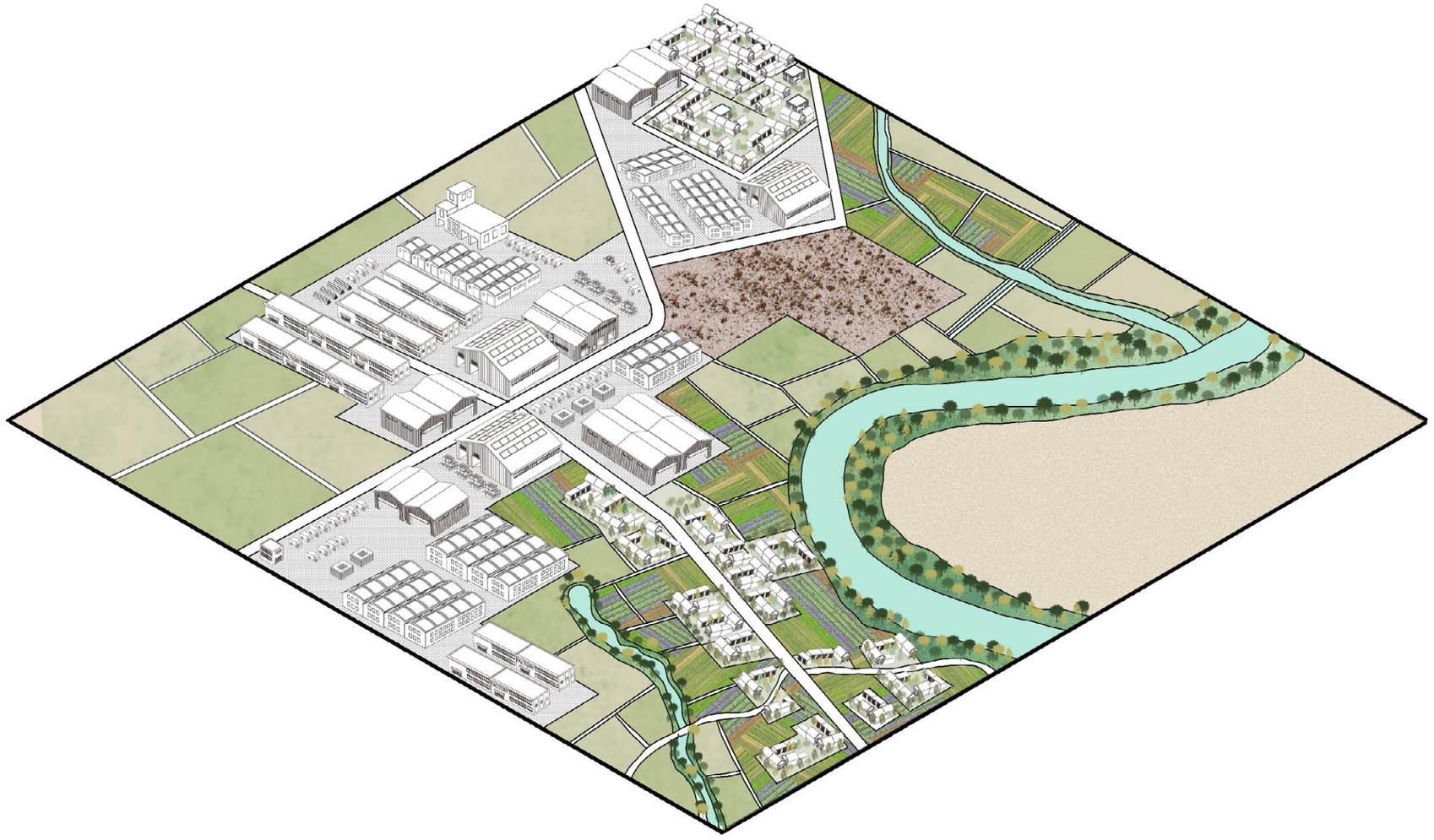
-Food Waste Flow in Urban Villages

Migrant workers place leftover household food, such as rotten vegetables, fruit peels, eggshells, and agricultural waste from farming activities, in composting spots or homemade composting boxes set up in some farmlands to produce organic fertilizer.

ANALYSIS

5.4 Food system analysis

Foodscapes of Urban Vilage Type 1



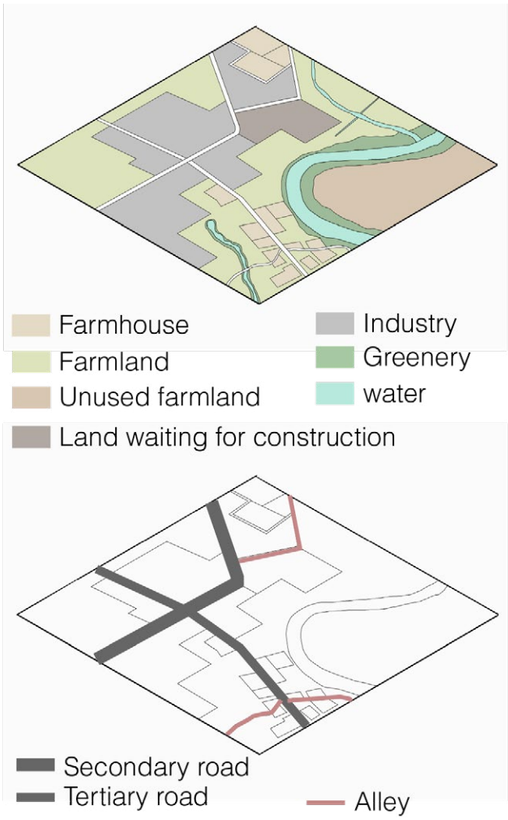


Figure 44: Landuse and Transportation Analysis
Made by author

Overview

After gaining a comprehensive understanding of resource flows within urban villages and green belt farmlands, a detailed examination of the foodscapes within these systems can now commence. Based on the summary of urban village typology in Section 5.4, axonometric diagrams are established as shown above. These diagrams display the land use characteristics, transportation systems, and spatial quality of buildings, and indicate their locations within the green belt.

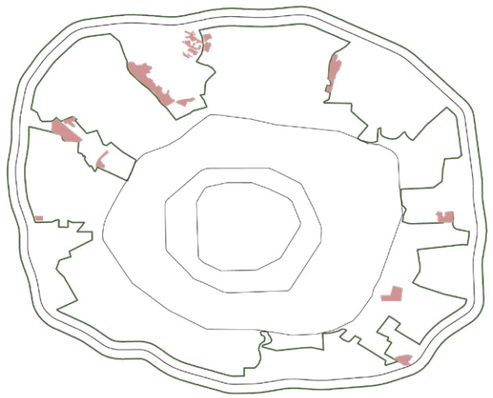


Figure 45: Location

ANALYSIS

5.4 Food system analysis

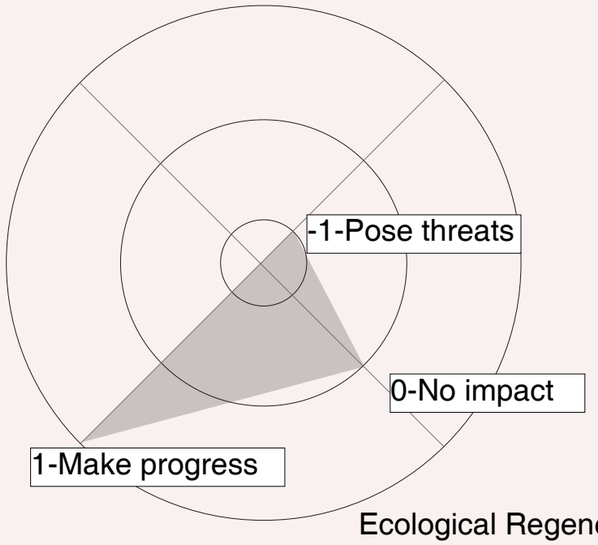
Foodscapes of Urban Vilage Type 1

Distributive Justice

Whether the space is accessible to all, ensuring individual has access to the resources and services in the space in order to have equal opportunities for development

Spatial Adaptability

As the physical form of social adaptation, it emphasizes the ability of physical space to adapt to multiple functions to ensure the flexibility of society in the face of transformational needs.



Resources Looping

Space's commitment to circularity by examining the extent to which material resources within the space are recyclable and reused

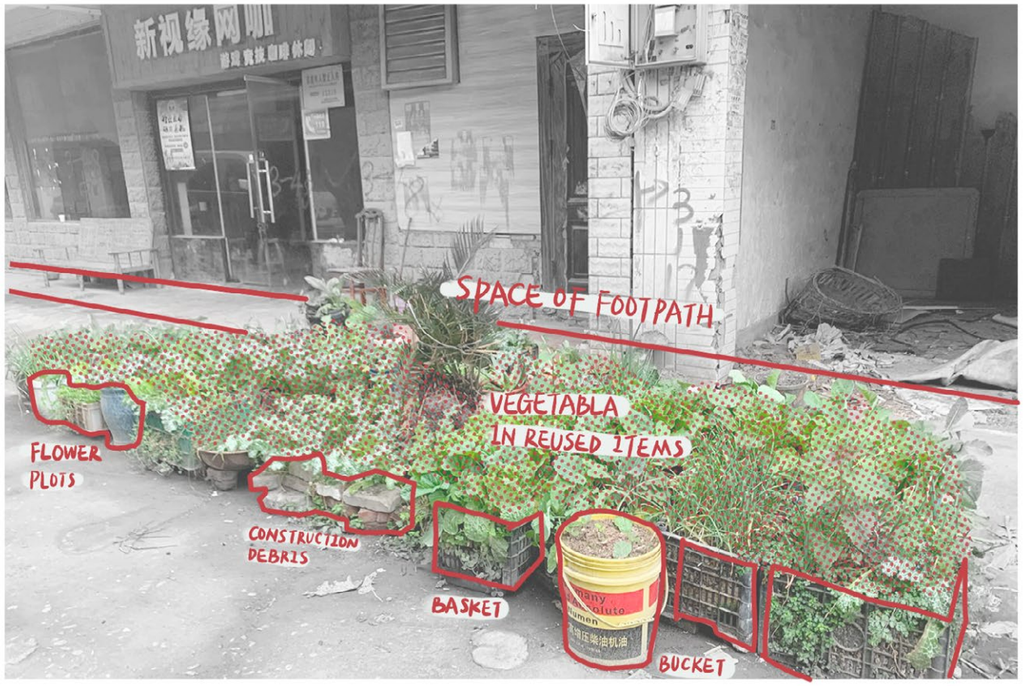
Ecological Regeneration

the environmental impact of the space, evaluating whether its design and use contribute to or detract from the health of the ecosystem

Circular development assessment of foodscapes

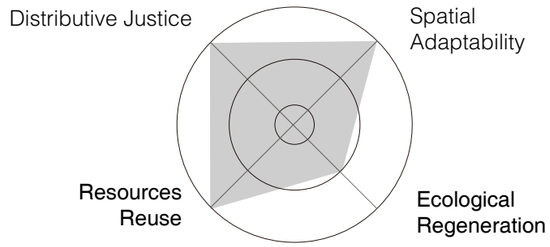
Subsequently, the evaluation system and cards shown in the diagram are used to display and assess the foodscape within this urban village typology. The purpose of this evaluation system is to assess the level of circular development of the foodscape, incorporating four evaluation indicators derived from the previously established conceptual framework. An additional indicator from spatial justice—distributive justice—is included, aimed at assessing whether migrant workers, as a marginalized group, can also equitably benefit from this foodscape.

Production Space: Vegetable Growing Boxes Made from Reused Waste



Location:

Assessment



Migrant workers spontaneously use construction debris to build vegetable planting beds in wide but unused alleys within informal communities, demonstrating the potential for local recycling of building materials and the possibility of engaging in urban agriculture using idle street spaces.

ANALYSIS

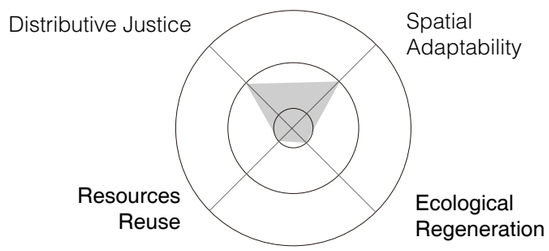
5.4 Food system analysis

Foodscapes of Urban Vilage Type 1

Production space: Unused Farmland

Location

Assessment

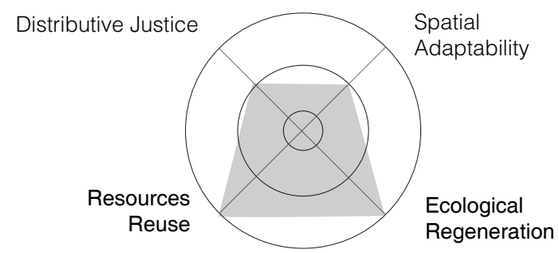


Unused farmlands are mostly located around parts of informal communities awaiting demolition. These farmlands typically accumulate construction debris from ongoing demolitions and are overgrown with weeds.

Production space: Existing farmland

Location:

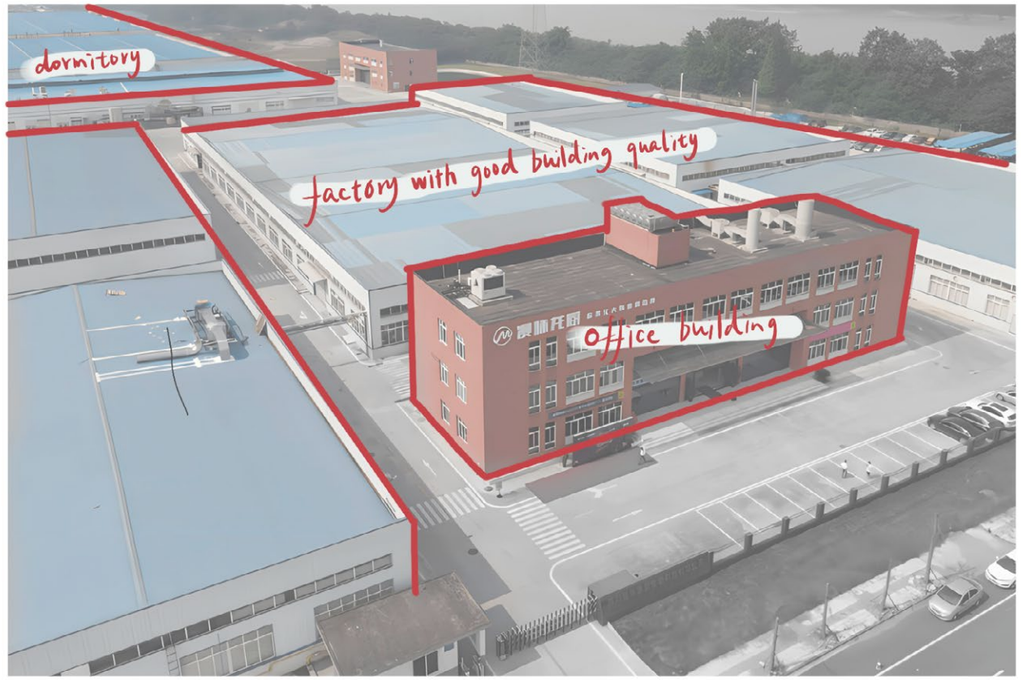
Assessment



In urban village type 1, there remain some undisturbed farmhouses and farmland landscapes, most of which are idle. However, some elderly who have not moved out of the village still live and farm here. Some migrant workers rent these lands for cultivation.

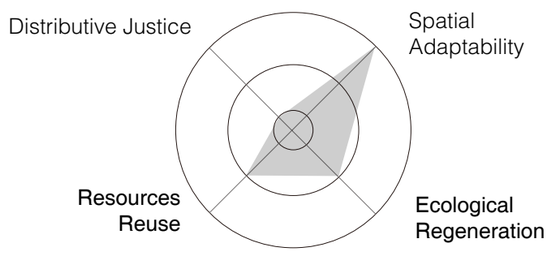
Foodscapes of Urban Vilage Type 1

Processing space: large-scale factory with good building quality



Location

Assessment

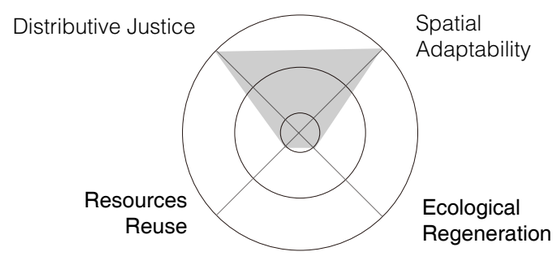


During the period when the central urban area's industry was still thriving, some financially robust companies built large and relatively well-constructed factories in these villages. Today, most of these factories are idle, with only a few still operational.

Processing space: middle-scale factory with poor building quality

Location:

Assessment



Urban village type 1 is also a favored location for private enterprises to build factories. These small and medium-sized factories are mostly located near farmhouses, with little to no rational planning, and generally of poor building quality.

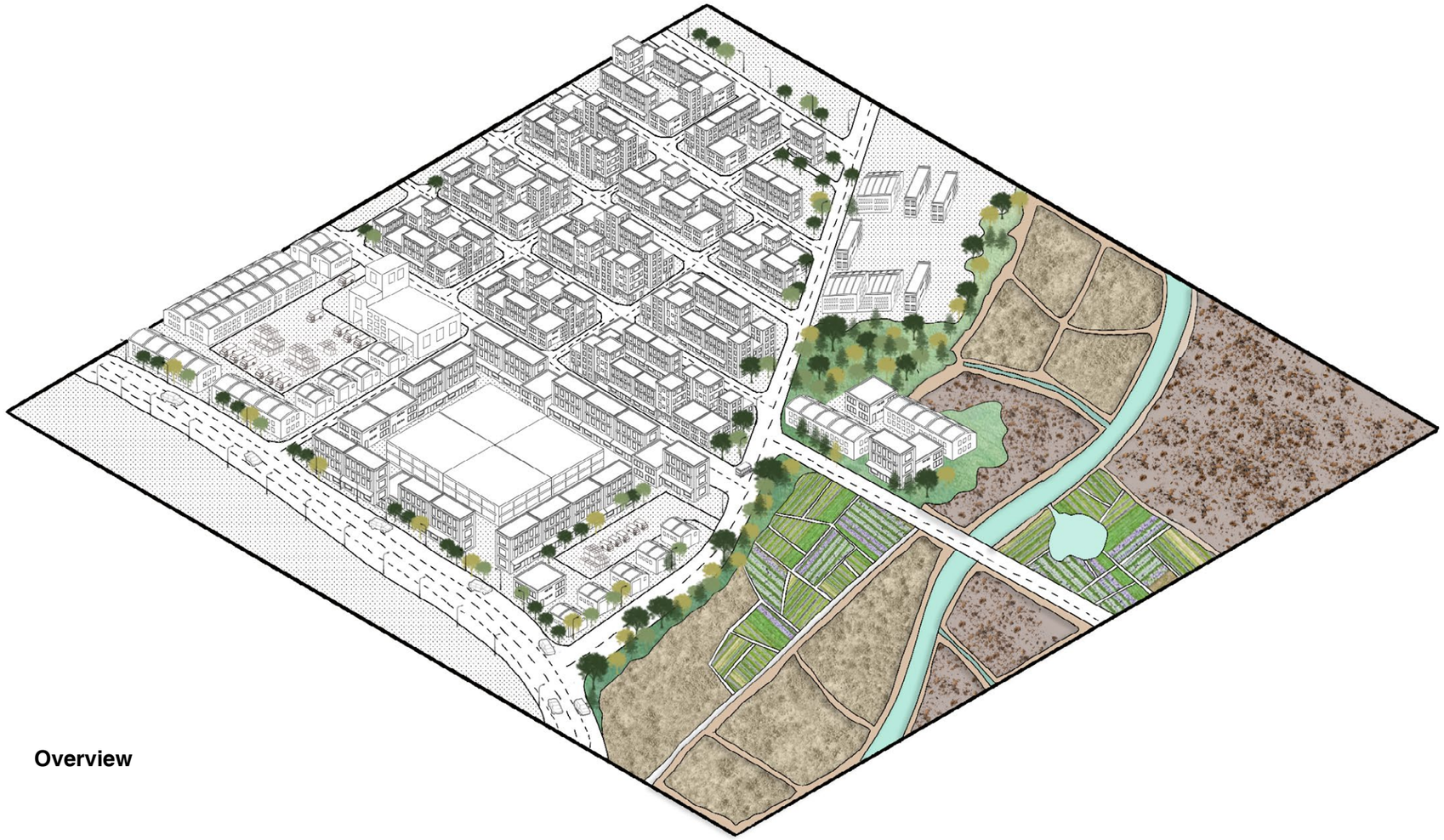
SWOT Analysis of Urban Vilage Type 1

STRENGTHS	OPPORTUNITIES
Spatial Adaptability: Numerous large and medium-sized industrial buildings of good quality are vacant.	**Spatial Adaptability:** The demand for construction debris and food waste processing, combined with government requirements for high-tech industrial zone and the availability of numerous buildable and idle industrial buildings, provides space for future circular industrial zone development. **Resource Reuse:** The construction of future circular industrial parks offers opportunities, knowledge, and methods for the recycling and reuse of construction debris.
Ecological Regeneration: A small portion of demolished industrial debris is piled up on nearby vacant farmland.	**Non-Exclusion:** New factories producing circular products may require workers with higher education levels, limiting job opportunities for migrant workers. **Ecological Regeneration:** Industrial areas within the city may pollute surrounding farmland and water systems.
WEAKNESSES	THREATS

ANALYSIS

5.4 Food system analysis

Foodscapes of Urban Vilage Type 2



Overview

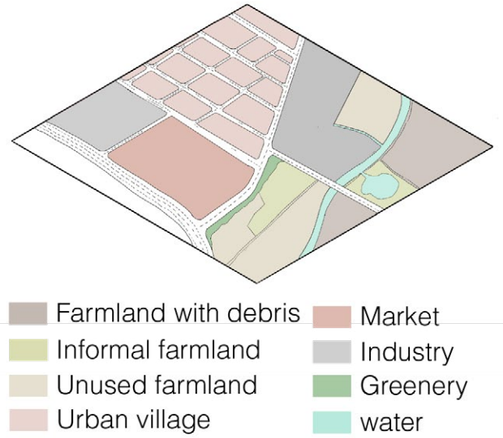


Figure 47: Landuse and Transportation Analysis
Made by author

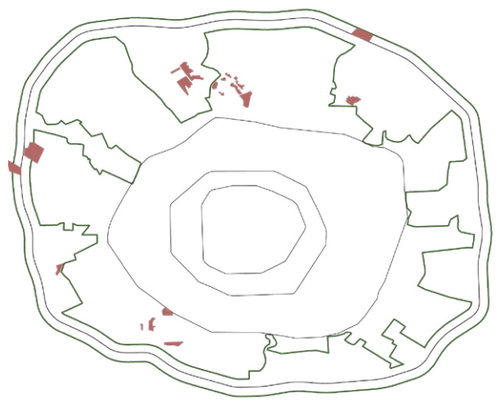
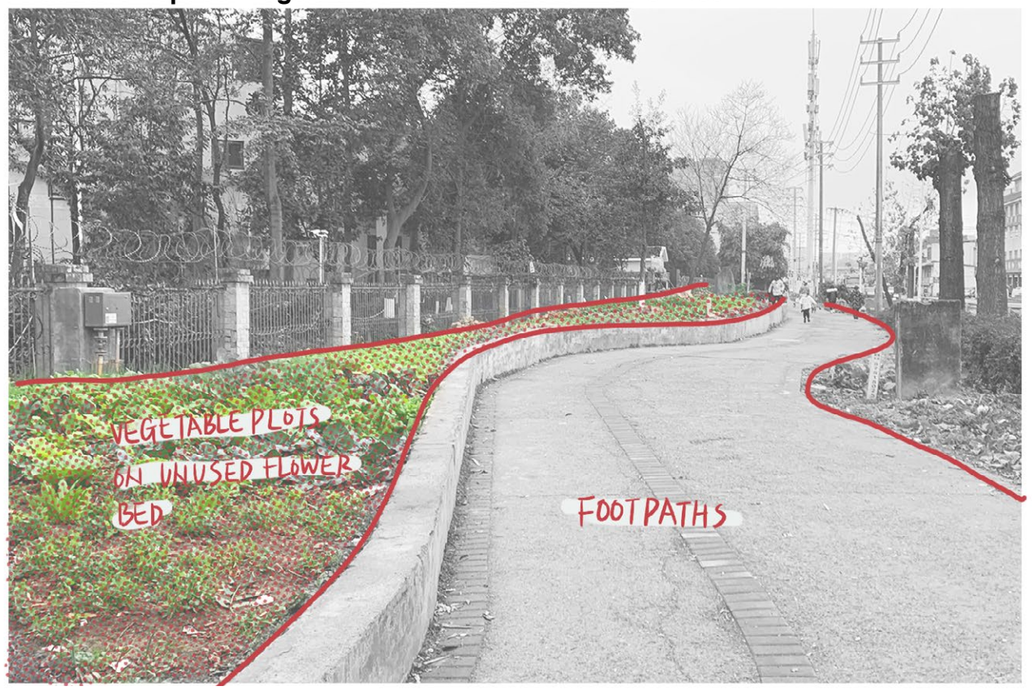


Figure 46: Location

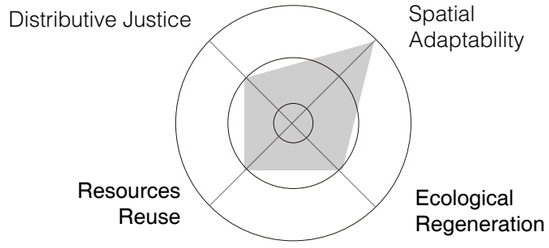
Foodscapes of Urban Vilage Type 2

Production space: Vegetable Plots on Unused Flower Bed



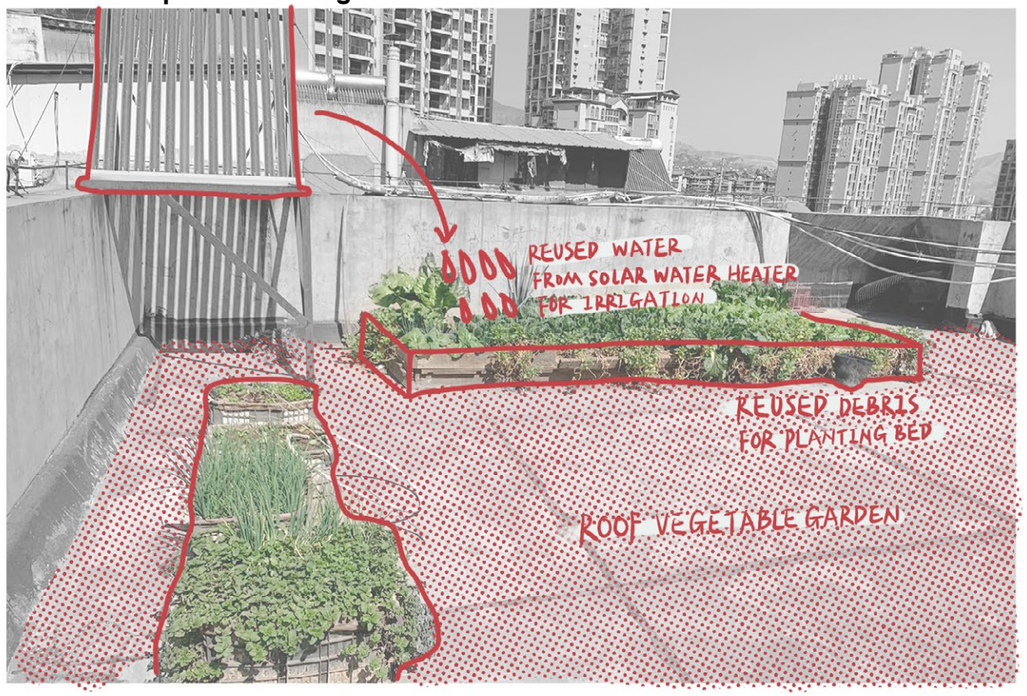
Location

Assessment



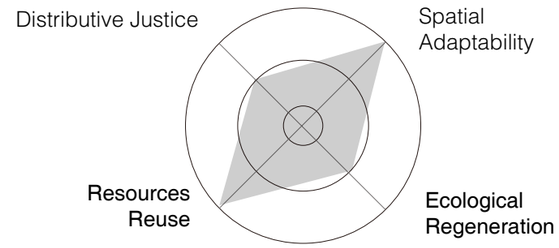
Migrant workers have identified and repurposed idle and unmonitored flower beds for vegetable production, often located near main roads with landscaped gardens.

Production space: Roof Vegetable Garden



Location:

Assessment

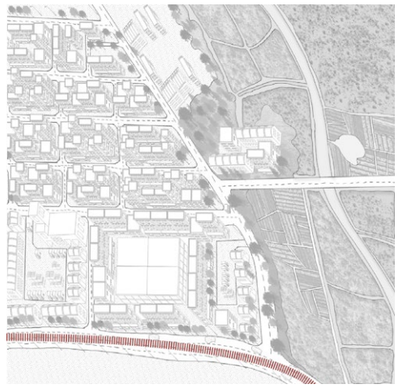


Rooftops in informal residential areas are also favored spaces for setting up vegetable planting beds. However, due to unauthorized extensions by landlords, some rooftops lack space for urban agriculture.

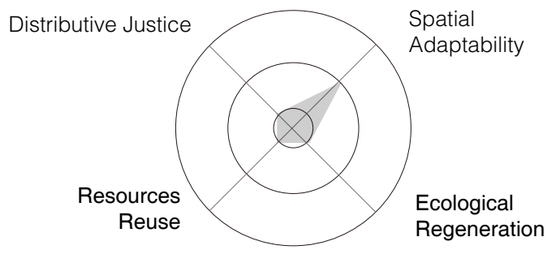
Foodscapes of Urban Vilage Type 2

Distribution space: Permanent stalls inside the market

Location



Assessment



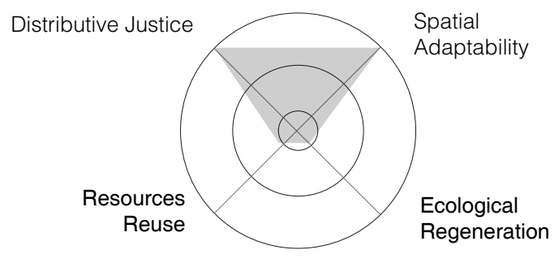
In densely populated informal residential areas, wet markets selling fresh food are commonly established.

These markets are rented by farmers from the suburbs, often involving long lease terms and high rents.

Distribution space: Temporary stalls outside the market

Location:

Assessment



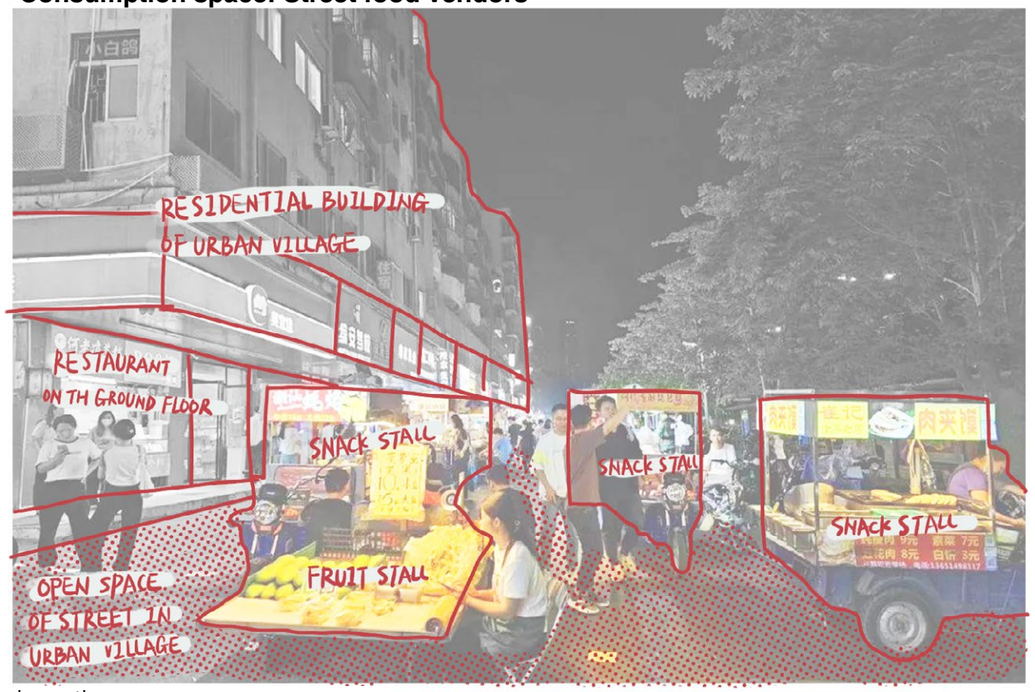
The streets outside these wet markets, managed by local neighborhood offices, are popular temporary stall locations for migrant workers. They only need to pay approximately 0.5 euros in cleaning fees to set up their stalls here.

ANALYSIS

5.4 Food system analysis

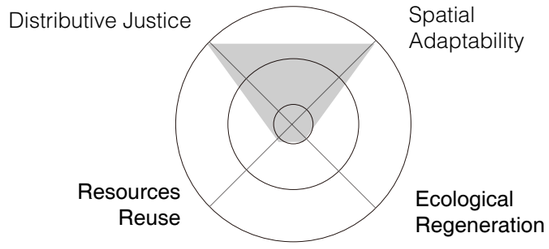
Foodscapes of Urban Vilage Type 2

Consumption space: Street food vendors



Location

Assessment

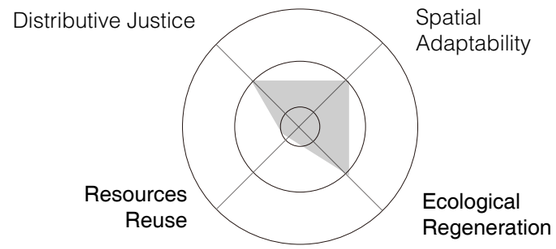


The main roads within the community are favored locations for food night markets, as these wide streets experience less vehicular traffic at night. Consequently, some street food vendors occupy sidewalks and even the edges of roadways, creating a vibrant night market atmosphere.

Consumption space: Vegetable store

Location:

Assessment



In urban villages, landlords of informal residential properties, aiming to collect higher rents, often convert entire buildings into shops, even if these shops are located in remote alleys. Here, only a small fraction of the shops are rented out, with the majority remaining idle.

ANALYSIS

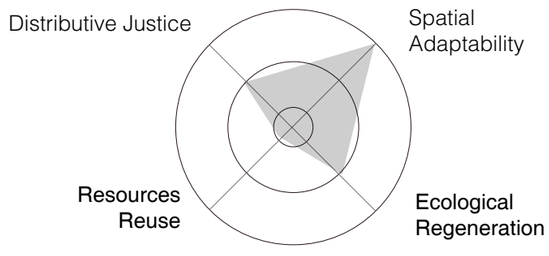
5.4 Food system analysis

Foodscapes of Urban Vilage Type 2

Consumption space: Fast Food Restaurants

Location

Assessment



Due to their advantageous geographical location and potential parking spaces, these main roads are also the most concentrated areas for restaurants.

SWOT Analysis of Urban Vilage Type 2

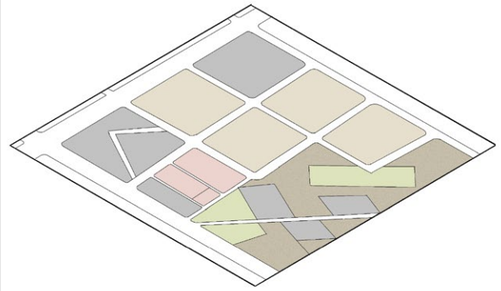
STRENGTHS	OPPORTUNITIES
Non-Exclusion: Urban village self-construction and lax urban governance grant equitable spatial access to all, fostering robust social networks and a local labor market among tenants. **Spatial Adaptability:** Expansive pedestrian pathways and secondary roads, commandeered by street vendors, establish a dynamic and mature culinary commerce environment. **Resource Recycling:** Economic imperatives encourage migrant workers to adopt resource reuse practices, evidenced by a rich culture of construction waste recycling, secondary market trading, and a preference for localized food supply chains over distant supermarket dependencies. **Ecological Regeneration:** Migrant workers' agricultural inclinations drive spontaneous cultivation on idle lands, counteracting land vacancy and supplementing domestic economies.	**Non-Exclusion:** Government policies favoring inclusive renewal underscore a commitment to preserving urban village socio-cultural integrity. **Spatial Adaptability:** Local governance exhibits tolerance towards street vending, suggesting potential for adaptive commercial use. **Ecological Regeneration:** Municipal directives advocate for stringent farmland conservation and ecological restoration efforts.
Non-Exclusion: The area's demographic, dominated by migrant workers, deters urban residents' engagement with the space and its culinary offerings. **Spatial Adaptability:** Inferior quality of informal housing stock challenges potential upgrades or renovations. **Resource Recycling:** The informal management framework facilitates the unlawful accumulation of kitchen refuse and construction debris. **Ecological Regeneration:** Informal agricultural practices, constrained by synthetic fertilizer use and irrigation scarcity, limit productivity and sustainability, compounded by substantial kitchen waste from unauthorized street commerce.	**Non-Exclusion:** Centralized land management by corporate entities impedes the continuation of informal urban agricultural activities. **Ecological Regeneration:** Predominantly demolition-focused urban renewal poses risks to the peripheral agricultural land through mismanaged construction waste.
WEAKNESSES	THREATS

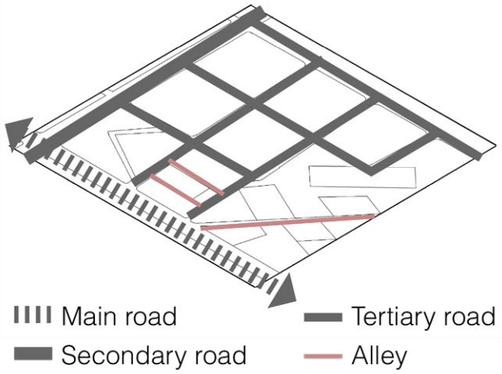
ANALYSIS

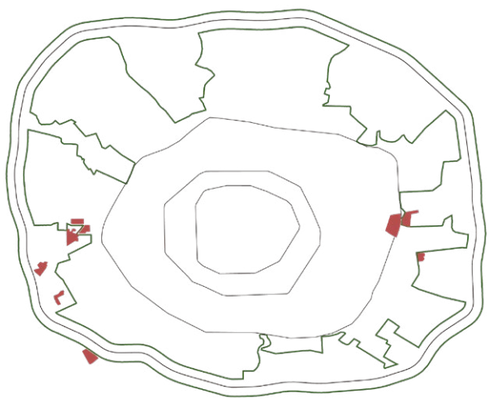
5.4 Food system analysis

Foodscapes of **Urban Vilage Type 3**

Overview







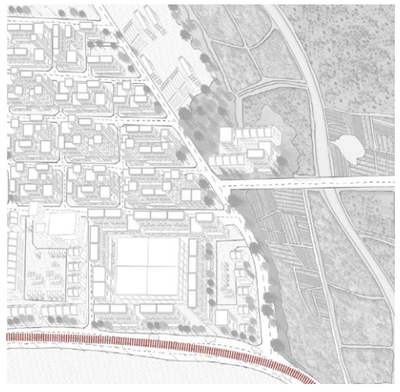
ANALYSIS

5.4 Food system analysis

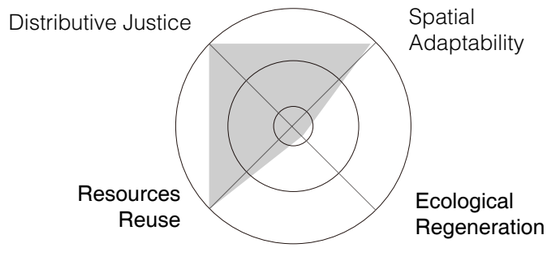
Foodscapes of Urban Vilage Type 3

Production space: Community-sponsored farmland on land waiting for construction

Location

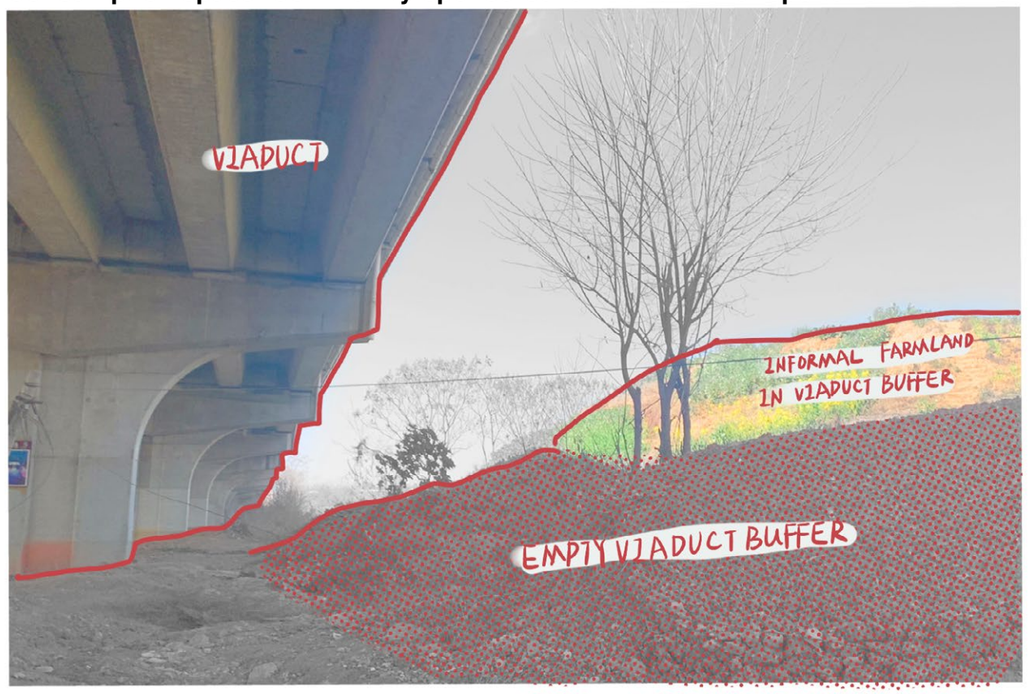


Assessment



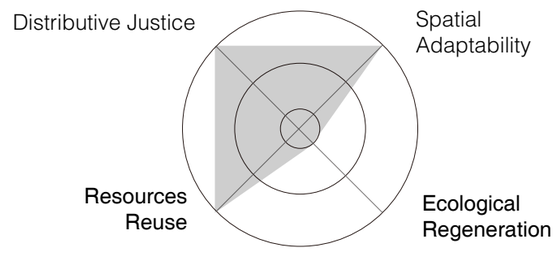
After the demolition of factories and informal residences, Urban Village Type 3 features numerous undeveloped plots where migrant workers spontaneously engage in farming. However, this agriculture is unstable, as the cultivated lands must be removed when real estate developers commence construction.

Consumption space: Community-sponsored farmland on transportation buffer zone



Location:

Assessment



Similarly, the green belt areas, which include numerous elevated bridges or railway buffer zones, also serve as popular farming spaces due to their long-term lack of supervision. Field research indicates that the fertilizers used in these two production space near urban areas are predominantly synthetic, posing potential risks to soil health. This issue is primarily attributed to the difficulty in finding suitable locations for composting and natural fertilizer storage near highly urbanized villages.

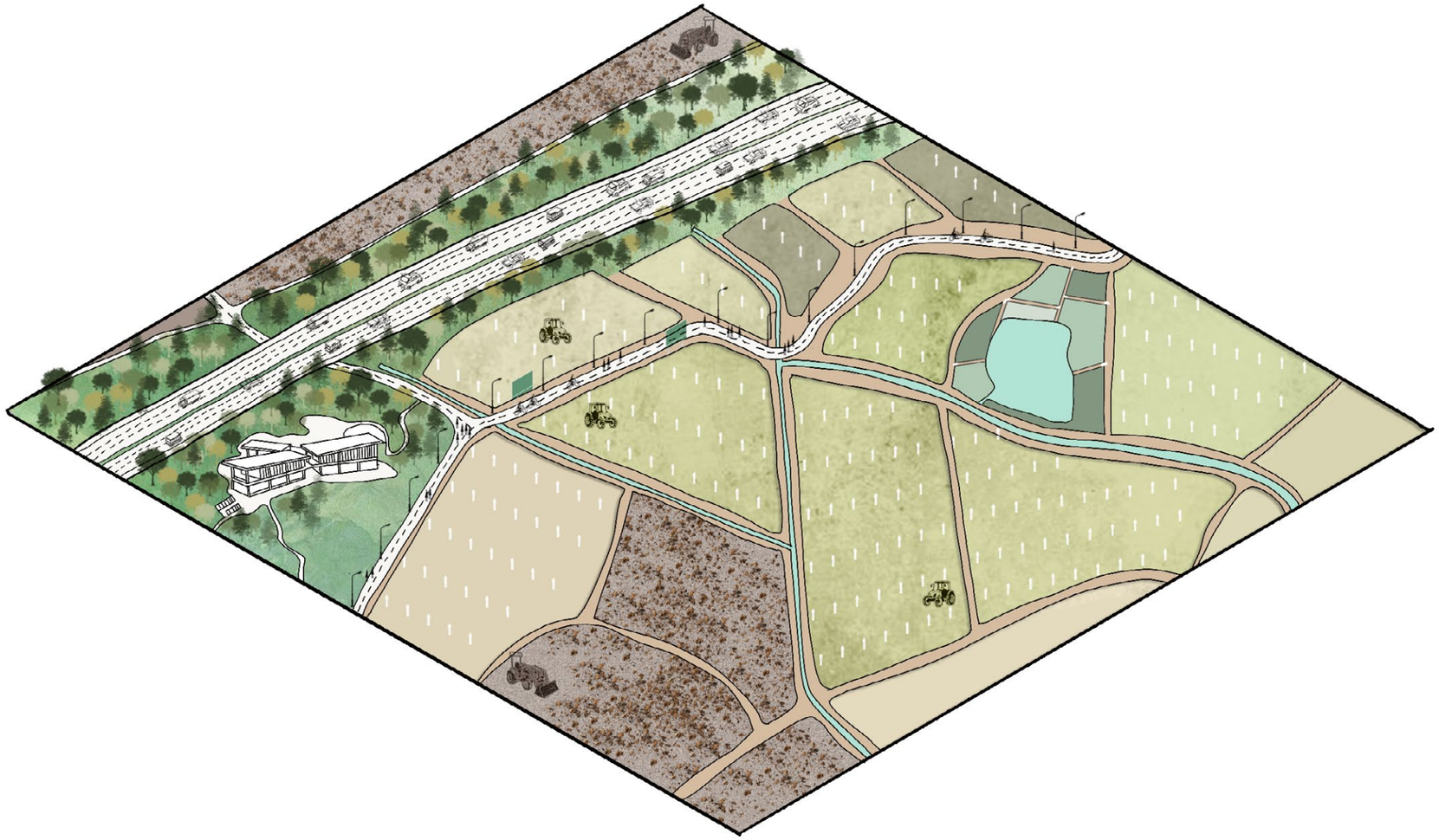
SWOT Analysis of Urban Vilage Type 3

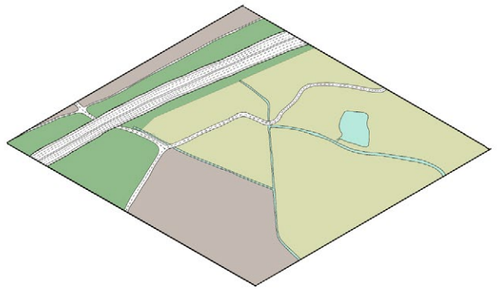
STRENGTHS	OPPORTUNITIES
Spatial Adaptability: A subset of industrial buildings of commendable quality and abundant vacant spaces surrounding undeveloped residential areas (under-bridge spaces, railway buffer zones, and undeveloped lots) present significant potential for adaptive use. **Ecological Regeneration:** Residents of nearby modern residential complexes engage in spontaneous urban agriculture activities with urban village inhabitants, driven by interests in leisure and recreation. Initiatives like community-organized kitchen waste composting and shared gardens offer models for sustainable practices.	**Resource Reuse:** The construction of new residential areas provides an opportunity for the increased use of recyclable materials and the reuse of construction debris, supported by governmental regulations and advocacy for kitchen waste recycling.
Non-Exclusion: The strict management protocols of surrounding modern residential complexes necessitate homeowner association approval for the reuse of communal spaces, such as rooftops. **Resource Reuse:** Chengdu's household kitchen waste segregation awareness and practice remain suboptimal.	**Spatial Adaptability:** Governmental plans to demolish industrial buildings close to residential areas lack consideration for their potential transformation.
WEAKNESSES	THREATS

ANALYSIS

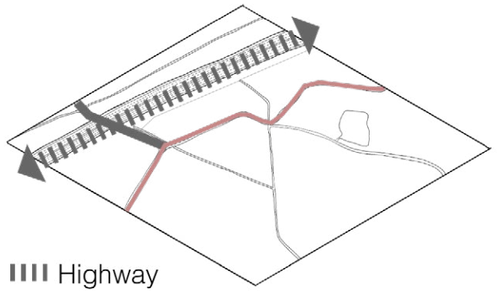
5.4 Food system analysis

Foodscapes of Green Belt Farmland





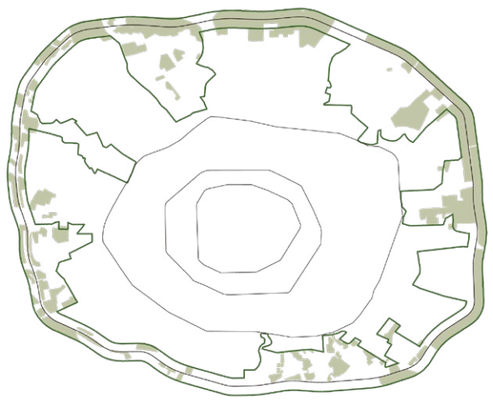
Field undergoing soil restoration
Grain field
Greenery
water



Highway
Tertiary road
Excursion path

Overview

Greenway farmlands, an integral part of the green belt's food system, have been included in the foodscape study. Despite their proximity to urban villages, migrant workers are seldom incorporated into the farming activities here. These lands are uniformly landscaped due to government



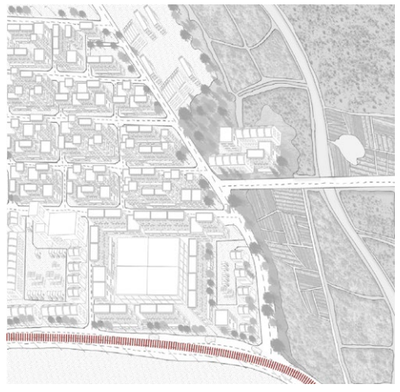
ANALYSIS

5.4 Food system analysis

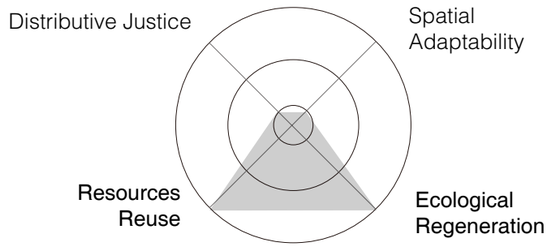
Foodscapes of Green Belt Farmland

Production space: Modernized farmland centrally managed by the company

Location

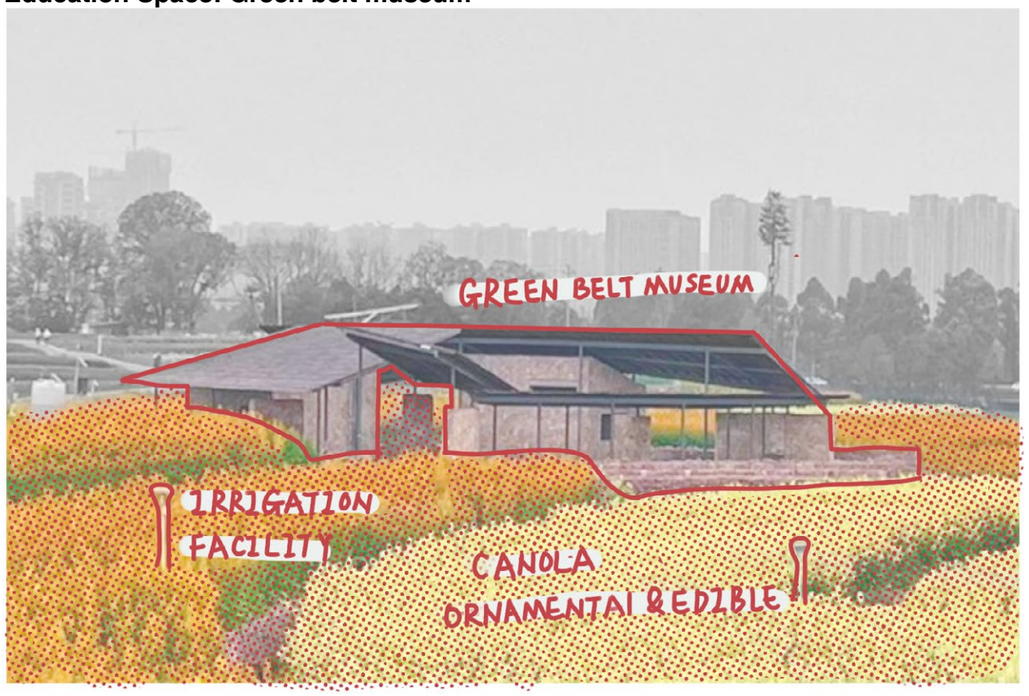


Assessment



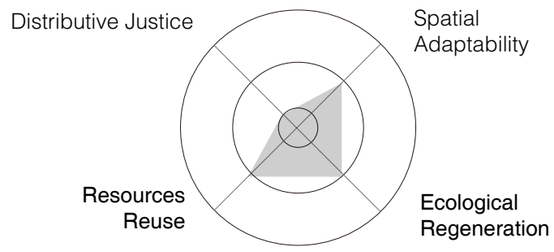
The most significant and extensive parts of the foodscape are the grain farmlands, primarily located within a 500-meter buffer zone along the city ring road. The government has also constructed a scenic cycling trail through these farmlands. This bicycle path, approximately 100 kilometers long, has been completed and is a popular recreational area for residents of Chengdu.

Education Space: Green belt museum



Location:

Assessment



There are museums scattered across the farmlands with a public education function. However, field surveys indicate that these museums attract few visitors and provide only rudimentary explanations of the agricultural restoration efforts within the greenway, failing to effectively educate the public or promote scientific understanding.

ANALYSIS

5.4 Food system analysis

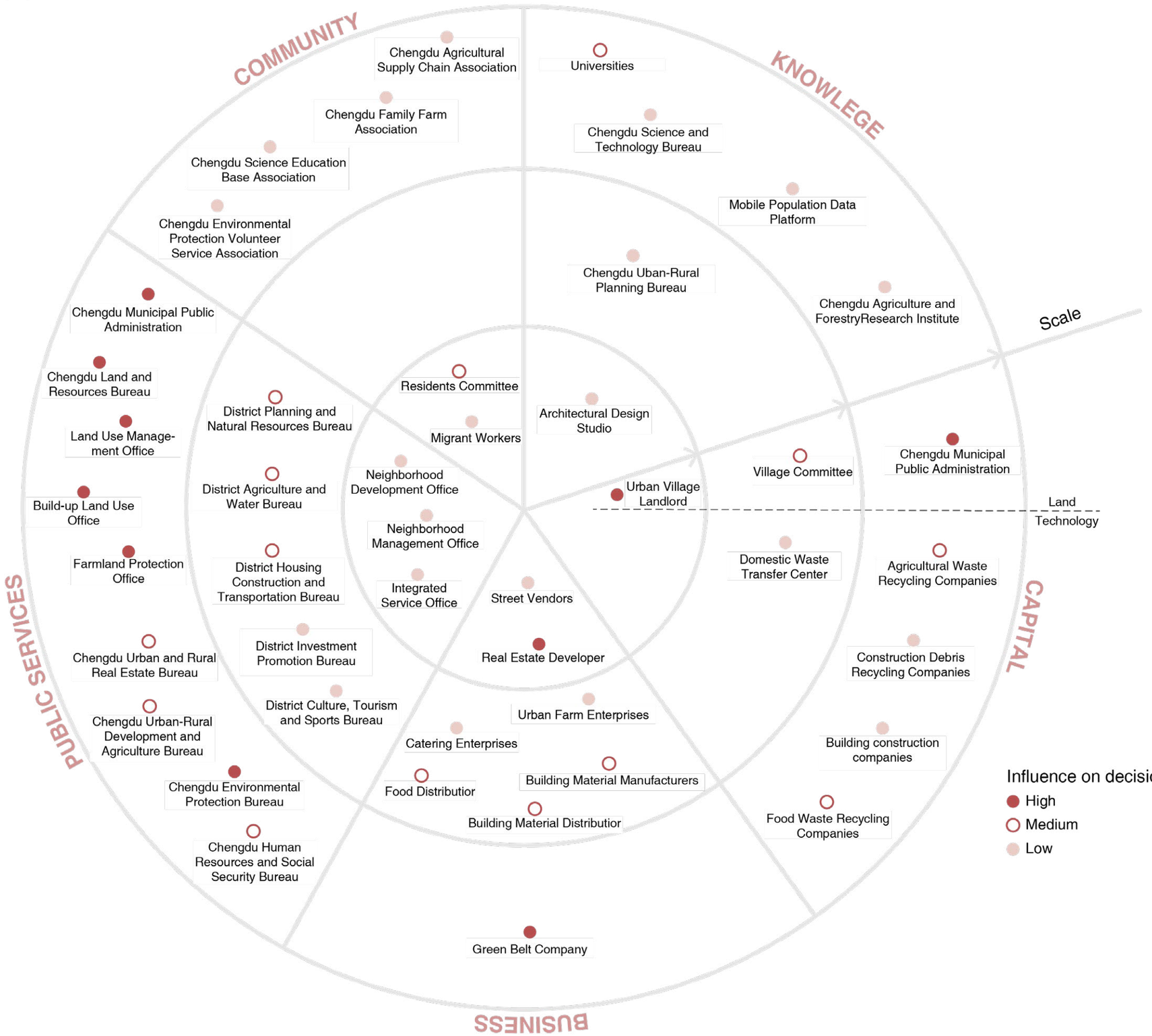
SWOT Analysis of Green Belt Farmland

STRENGTHS	OPPORTUNITIES
Resource Reuse: Practices on greenways utilize wheat and rice straw for soil fertility enhancement, demonstrating effective agricultural waste management. **Ecological Regeneration:** Previously barren or debris-filled lands have been rehabilitated to productive farmlands through subsoil inversion and debris removal.	**Ecological Regeneration:** Strong municipal policy for farmland conservation and ecological restoration offer a supportive backdrop for further regenerative initiatives.
Non-Exclusion: Large-scale modern agricultural projects have marginalized individual farmers' practices and reduced public engagement with agriculture, leading to a diminished understanding of food security and farmland conservation. **Ecological Regeneration:** Persisting low soil fertility despite two years of efforts, with many areas still in early stages of rehabilitation. Original irrigation systems are largely inoperative.	**Ecological Regeneration:** Imminent urban renewal focused on demolition could pose risks to surrounding farmland via construction debris.
WEAKNESSES	THREATS

ANALYSIS

5.5 Stakeholder Analyse

Actors



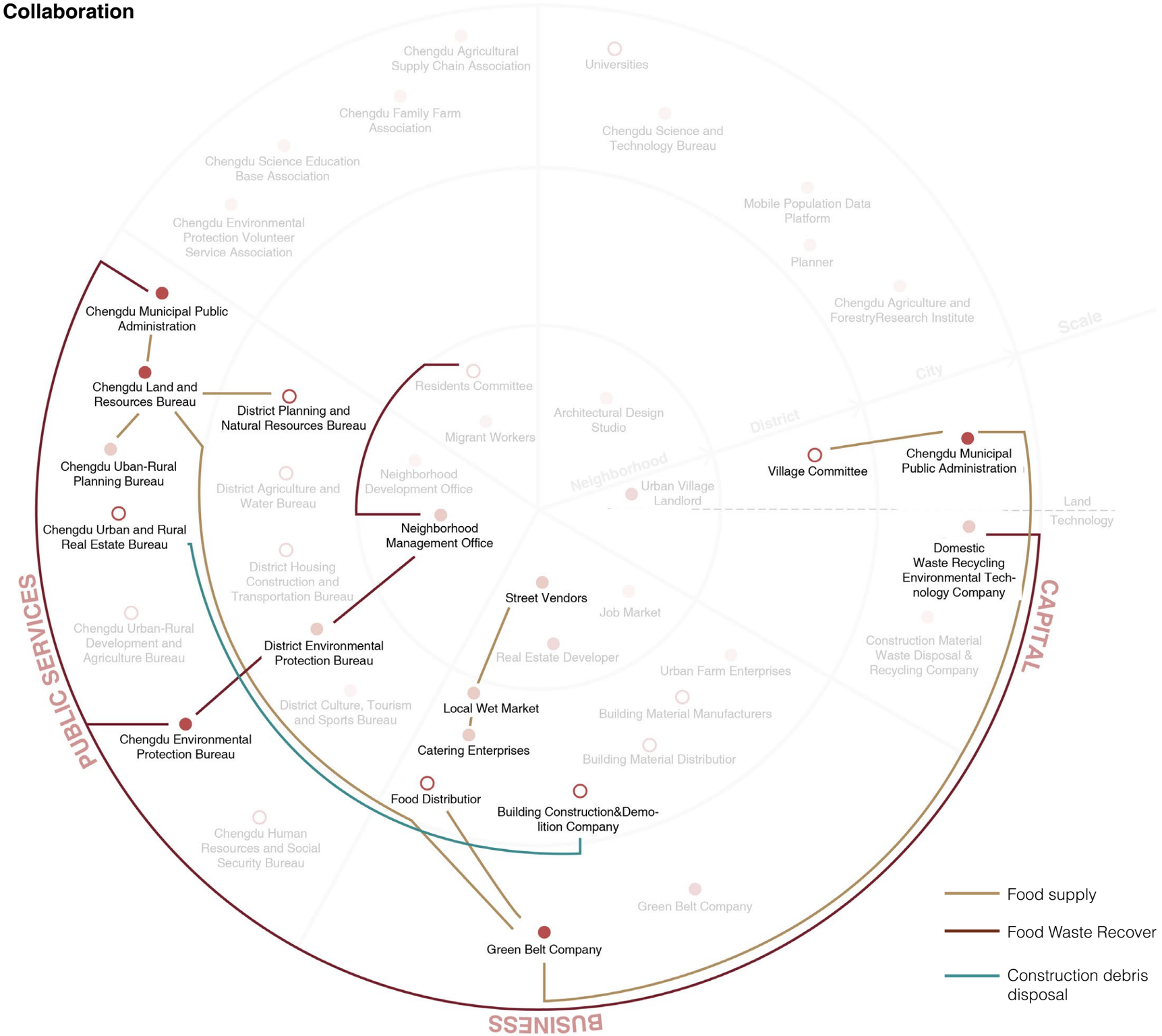
In the context of urban planning and policy formulation, one of the most challenging aspects is integrating the needs of diverse stakeholders (Hill et al., 2020). This project employs stakeholder mapping to identify which stakeholders will play a role in the process and how they might ally or conflict with one another. The transformation towards circularity in Chengdu's Green Belt involves numerous stakeholders. This project draws from Hill's 'Penta-helix stakeholder map' in "Foundries of the Future" to analyze five categories of stakeholders involved in the circular transformation of food and construction materials at various scales. These categories include:

-Public Services: Government departments under the Chengdu Municipal Government responsible for land interests, urban-rural construction, agriculture and food supply, environmental protection, and employment, focusing on policy issuance.
-Community: Local residents affected by planning actions, including migrant workers and native Chengdu citizens.
-Knowledge: Planners, architects, and research institutions that support through professional knowledge.
-Capital: Companies with expertise in food waste cycling and construction debris cycling, and private landowners in urban villages.
-Business: Providers of commercial services, including existing companies related to food and construction materials within the Green Belt.

These stakeholder groups are placed within the scales they most influence and marked according to their impact on decision-making.

ANALYSIS
5.5 Stakeholder Analyse

Collaboration



Stakeholder collaborations are categorized into three types based on the material flows necessary for circularity: food supply, food waste recovery, and construction debris disposal. Notably, collaborations between the government and businesses are particularly evident.

-Food Supply: The Chengdu government initially purchases farmland from village collectives, then establishes a state-owned enterprise, “Green Belt Company,” to manage but not directly operate the farmland within the Green Belt. For instance, after harvesting, Green Belt Company outsources to specialized agricultural companies responsible for the production and sale process, where food is processed and sold outside Chengdu, contrasting sharply with the local and shorter service collaborations of street vendors, local wet markets, and catering enterprises within urban villages.

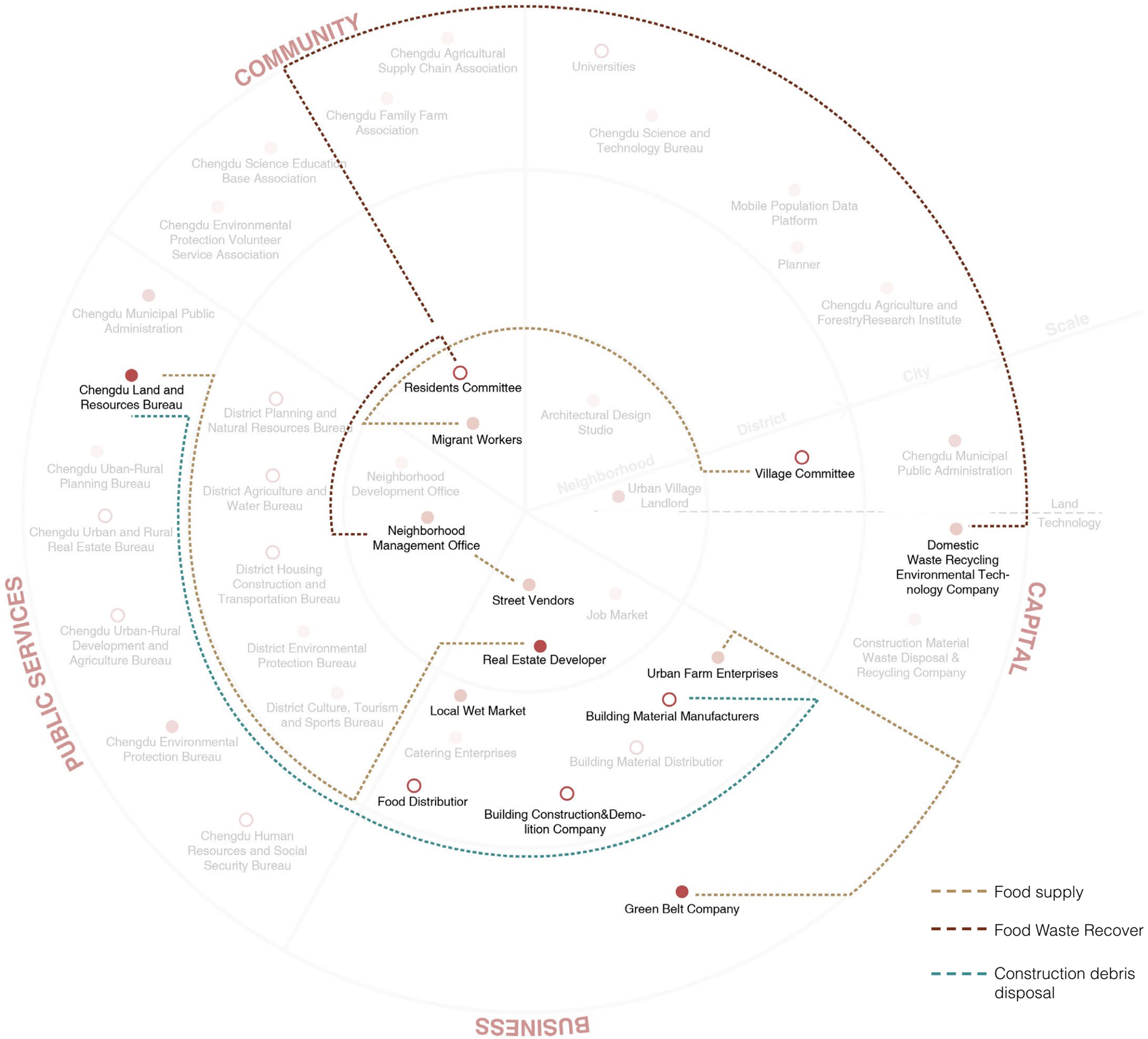
-Food Waste Recovery: Modern communities, under their neighborhood management offices, have begun sorting waste, but the subsequent handling remains unfamiliar. Typically, domestic waste is incinerated for energy production by the Domestic Waste Recycling Environmental Technology Company, operating far from residential areas.

-Construction Debris Disposal: Managed by government collaborations with demolition companies, the fate of the construction debris remains largely unknown, with some being dumped in remote areas or illegally in the countryside.

ANALYSIS

5.5 Stakeholder Analyse

Conflict



The close and somewhat non-transparent collaboration between the government and capital stakeholders potentially leads to conflicts with the community and local businesses.

-Food Supply: Real estate developers in the Green Belt area challenge the government's vision of high-quality farmland due to higher property values and promotional benefits of housing near parks compared to farmland. Additionally, the government and the Greenbelt Company's move to unify the purchase of farmlands means that migrant workers who farm these lands lose their cultivation spaces. Additionally, significant discord exists between the neighborhood management office and street vendors. This conflict arises because vendors sometimes obstruct traffic and leave considerable waste at their stalls after closing.

-Food Waste Recovery: there is potential conflict between migrant workers, who have not yet received training on food waste sorting, and the neighborhood management office responsible for local food waste segregation. Furthermore, constructing facilities for food waste recycling might face resistance from local urban residents concerned about odors and harmful emissions.

-Construction Debris Recycling: Pushing construction material manufacturers to use more recyclable materials, like straw bricks or timber, may cause conflicts due to increased costs and the need for facility upgrades.

06 VISION

6.1 From SWOT to Goal
6.2 From Goal to Vision
    Vision of Green Belt Farmland
    Vision of Urban Village Type 1
    Vision of Urban Village Type 2
    Vision of Urban Village Type 3
6.3 Vision map
6.4 Material Flows Between the Four Zones
    Food flow
    Food waste flow
    Construction debris flow
6.5 Future Stakeholder Vision for Collaborative Circular Actions

Figure 48: An urban farmer harvests winter squash from his rooftop vegetable garden
Source: Cavan Images

VISION
From SWOT to Goal

Socio-spatial Adaptation

S: Abundant industrial buildings of good quality and vacant land.
S: Active street food businesses occupying roads.
W: Inferior quality of informal residential buildings.
W: Strict management in modern residential complexes hinders communal space reuse.
O: Relaxed street vending policies.
T: Demolishment of industrial buildings without considering transformation potential.

Socio-spatial Adaptation

- Circular Knowledge Learning Network
- Creation of Adaptable Space

Resource Looping

S: Community-driven circular practices and initiatives.
W: Illegal dumping of kitchen waste and construction debris.
W: Suboptimal household waste segregation awareness and practices.
O: Government regulations and advocacy for kitchen waste recycling.
O: Potential for extensive use of recyclable materials in new constructions

Resource Looping

- No food waste & links residual flows to promote a closed balance
- Prioritizes to the shortest food loop

Ecological Regeneration

S: Community-driven urban agriculture practices.
W: Pollution risks to surrounding farmland and water systems from industrial areas.
O: Strong municipal mandates for ecological restoration and farmland conservation .
T: Debris from demolition-focused urban renewal.

Ecological Regeneration

- Rich surface water system
- Farmland regeneration
- Protection of forest diversity

Spatial Justice

S: Special social networks within local labor markets enhance communal support.
W: Marginalization of individual farmers' practices
W: Centralized land management leads to reduction in public agricultural engagement.
O: Governmental emphasis on inclusive urban village renewal policies.
T: Centralized land management hinders local informal urban agriculture.

Spatial Justice

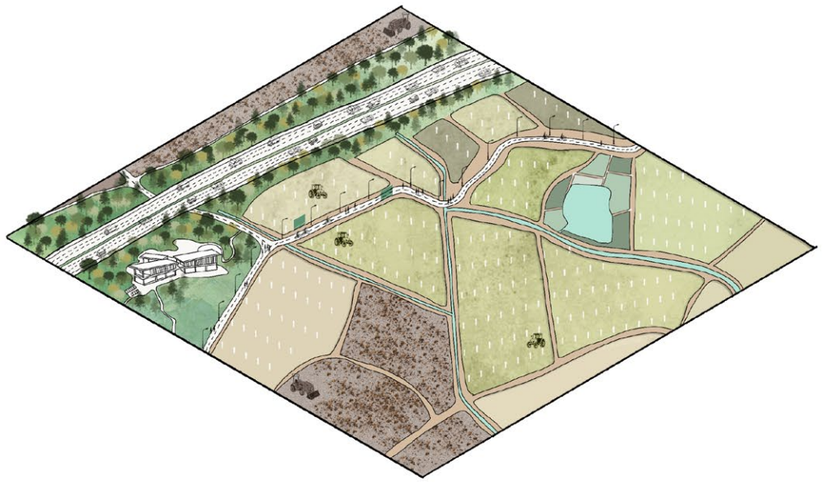
- Sustainable labor markets
- Community empowerment

VISION

From Goal to Vision

Vision of Green Belt Farmland

Existing landscape



Goal

Ecological regeneration

- Rich surface water system
- Farmland regeneration
- Protection of forest diversity

Social adaptation

- Circular Belt Learning Lab

Future Zone

Circular Agricultural Park

Focuses on large-scale organic food production and community-oriented farmland regeneration education. Soil productivity is regenerated with minimal external inputs to sustain soil health. Existing irrigation channels and forests are restored to ensure adequate irrigation and foster biodiversity. Along existing farm tour routes, structures such as farmhouses and small factories are repurposed into visitor service facilities like cafes and bike rental shops, as well as museums that demonstrate greenway practices in farmland regeneration.

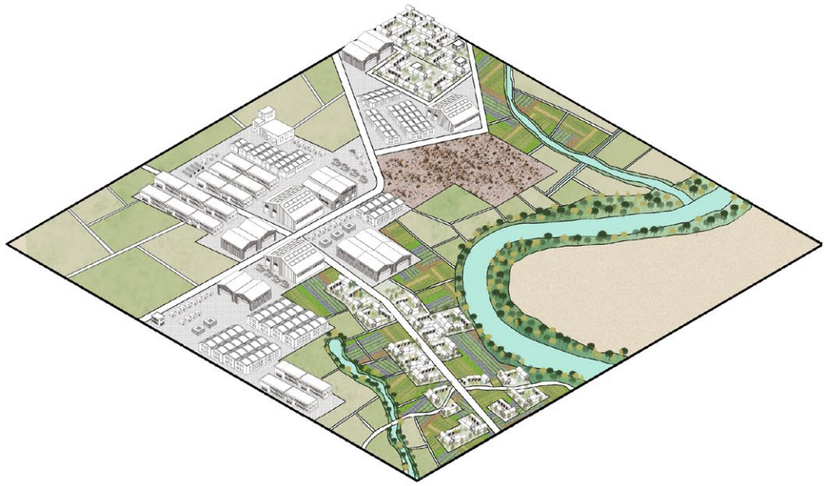
Design initiatives

VISION

From Goal to Vision

Vision of Urban Village Type 1

Existing landscape



Goal

Resource looping

No food waste & links residual flows to promote a closed balance

Social adaptation

Circular Belt Learning Lab

Creation of Adaptable Space

Equal opportunities for development

Sustainable labor markets

Future Zone

Circular Technology Park
Concentrates on processing foods from the Agricultural Park, recycling food waste, and facilitating commercial and scientific activities essential for circularity. Former large-scale factories are transformed into new facilities for food processing and waste management, office buildings, and research institutions. Remaining intact farmlands serve as nurseries or research farms.

Design initiatives

Circular Development Corporation officer enovated from a factory

Circular Education Center renovated from a factory

Waste-Building Material Factory

Building Materials Reuse Market

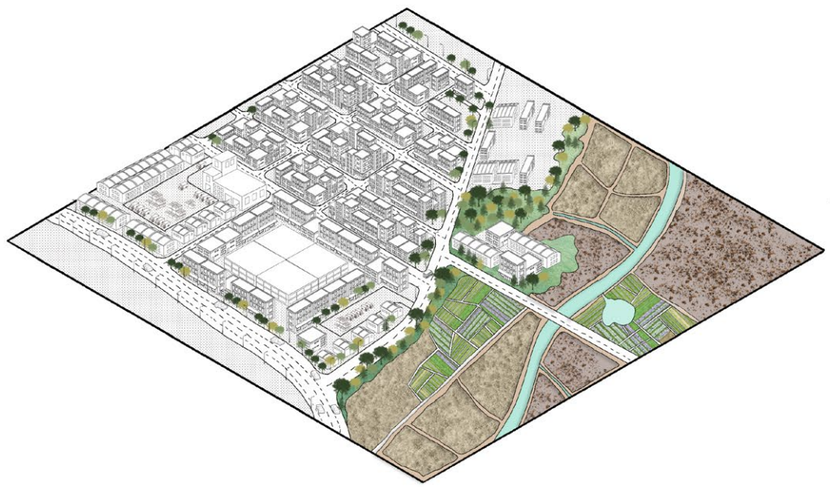
Seedling Base

VISION

From Goal to Vision

Vision of Urban Village Type 2

Existing landscape



Goal

Equal opportunities for development

Sustainable labor markets

Community empowerment

Social adaptation

Creation of Adaptable Space

Resource looping

No food waste & links residual flows to promote a closed balance

Future Zone

Circular Production and Consumption Town

Focuses on small-scale agricultural production and food consumption within the community. Fragmented farmlands near informal residences are used by local migrant workers for growing their own food and on-site composting. Some well-constructed farmhouses or small farms are converted into light food processing plants to handle and process food from nearby communities (e.g., rice husking, wheat milling). Main road street spaces are managed to accommodate street vendors under community regulation without obstructing traffic, creating a lively and attractive commercial atmosphere. Wide alleys are utilized for small-scale vegetable planting beds. Community surplus food is exchanged at the community circular logistics center.

Design initiatives

VISION

From Goal to Vision

Vision of Urban Village Type 3

Existing landscape

Goal

Social adaptation

Circular Belt Learning Lab

Creation of Adaptable Space

Resource looping

No food waste & links residual flows to promote a closed balance

Future Zone

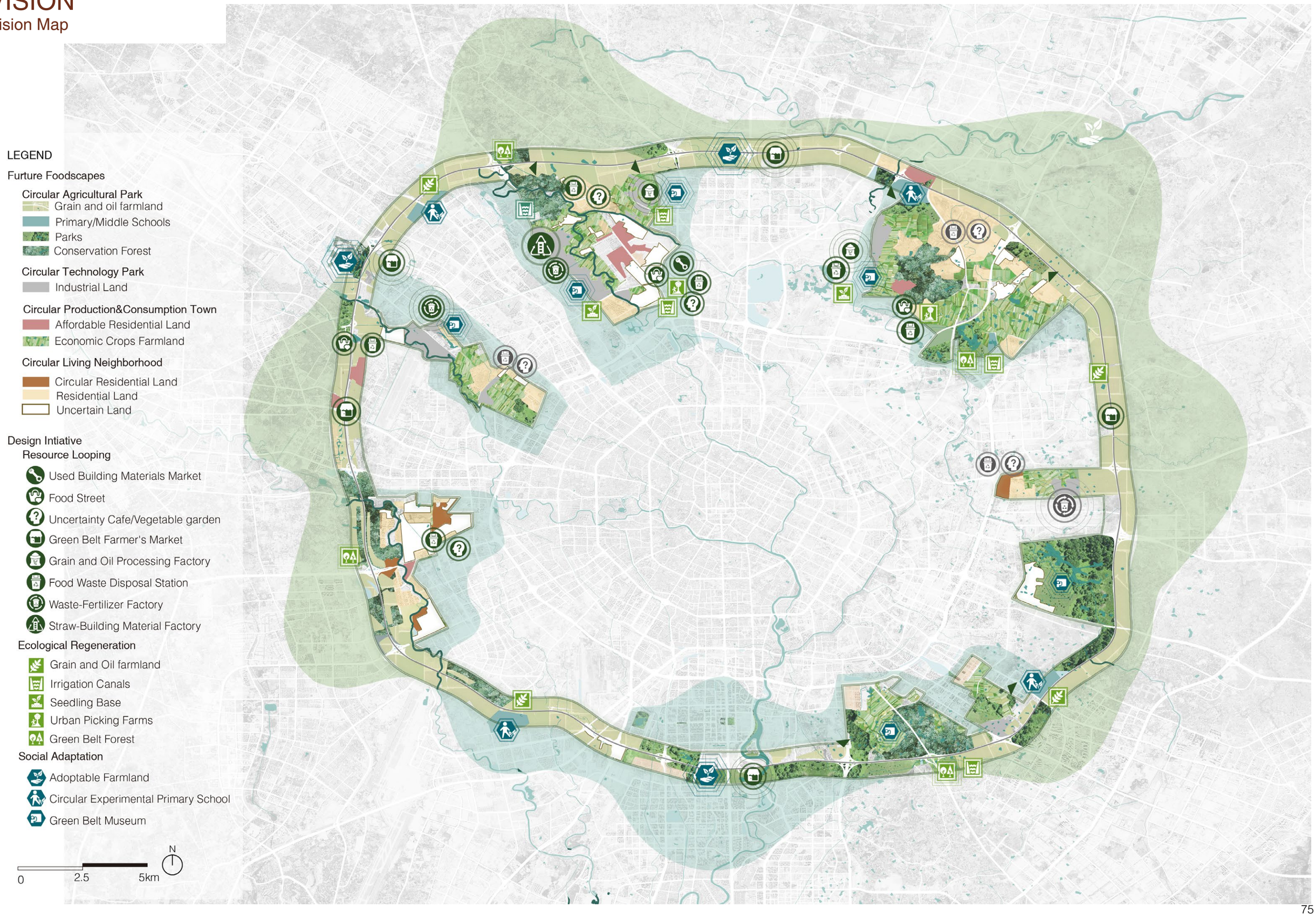
Circular Living Neighborhood

New residential areas awaiting construction extensively utilize recyclable materials, including internationally common but less used in China materials like Cross-Laminated Timber and innovative agricultural waste-based materials like prefabricated straw panels and straw bricks. These new developments reserve a significant portion of affordable housing for migrant workers displaced by demolition actions. A few abandoned factories are renovated into neighborhood circular logistics centers for several communities, where surplus food is exchanged. These centers also house repair workshops for furniture and other items. Vegetable gardens organized by migrant workers near these factories are preserved, with the vegetables sold at the logistics center, promoting dense neighborhood interaction.

Design initiatives

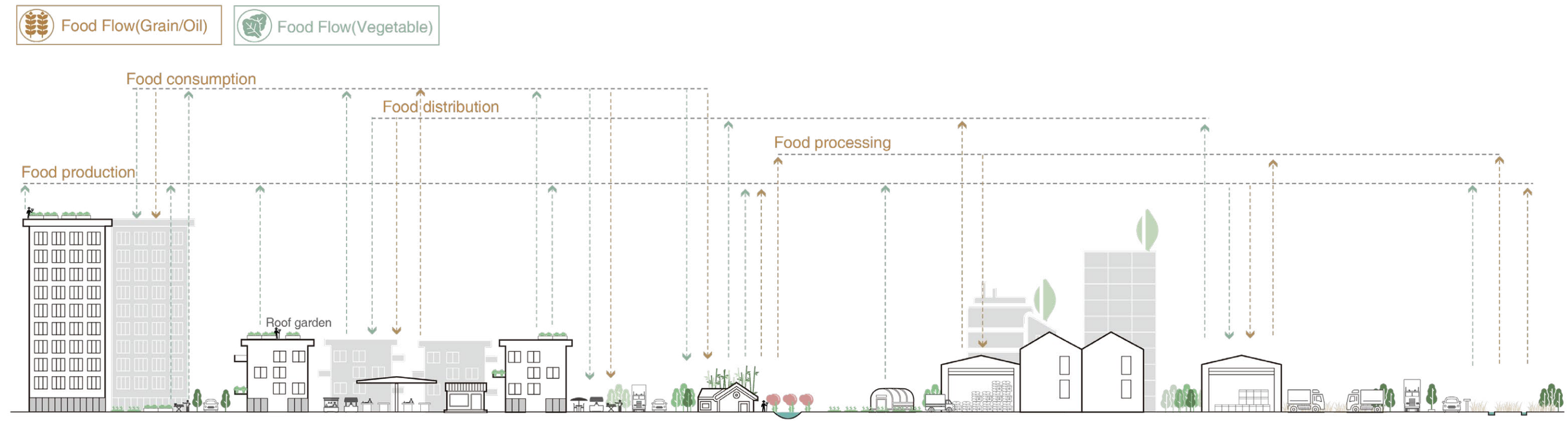
VISION

Vision Map



VISION

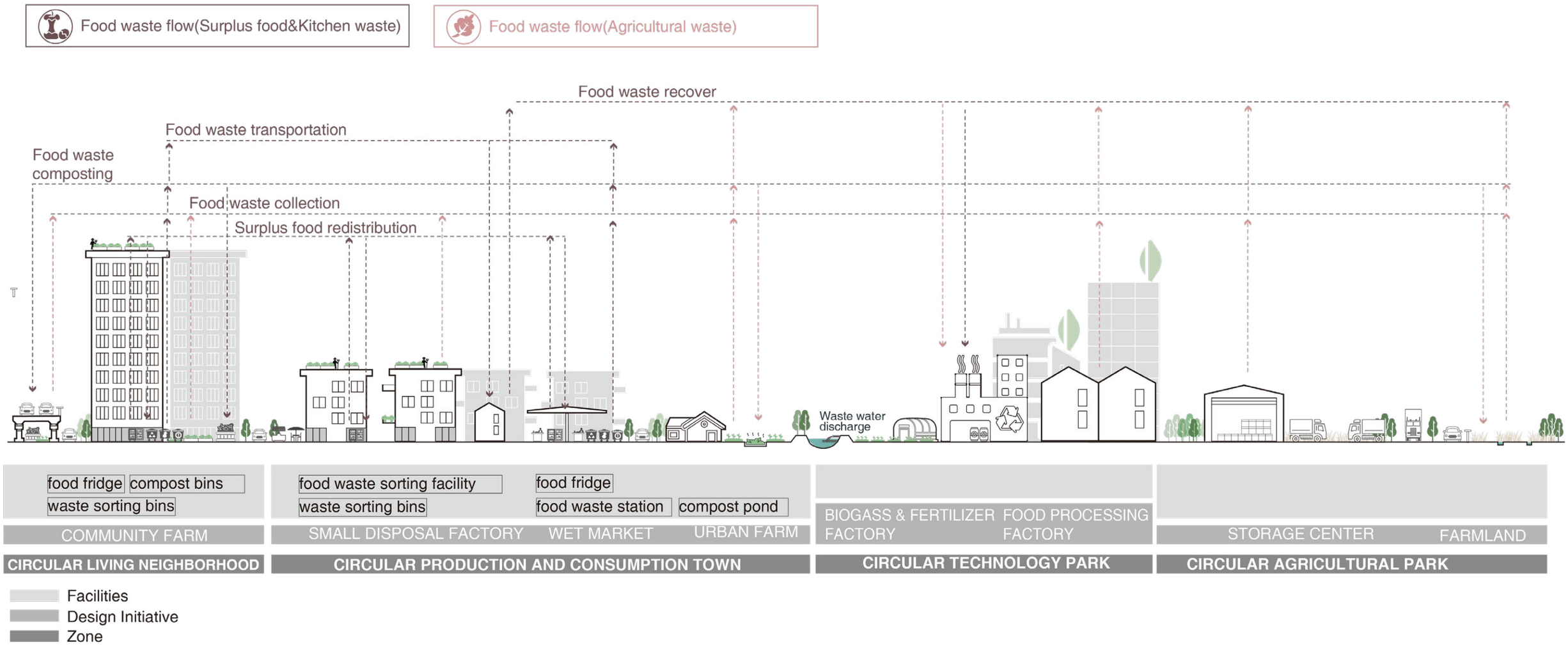
Material Flows Between the Four Zones



Food Flow: The large-scale farmlands within the Circular Agricultural Park are the primary sites for grain production and also produce a smaller amount of vegetables. These food products are processed in the food processing facilities of the Circular Technology Park and distributed through wholesale markets in the Circular Production and Consumption Town to various community wet markets, ensuring that the produce is consumed by residents of Chengdu. Both the Cir-cular Living Neighborhood and the Circular Production and Consumption Town engage in small-scale vegetable production, where the produce is directly con-sumed by the families and communities that grow them. Surplus produce is sold at flexible temporary stalls set up along the streets.

VISION

Material Flows Between the Four Zones



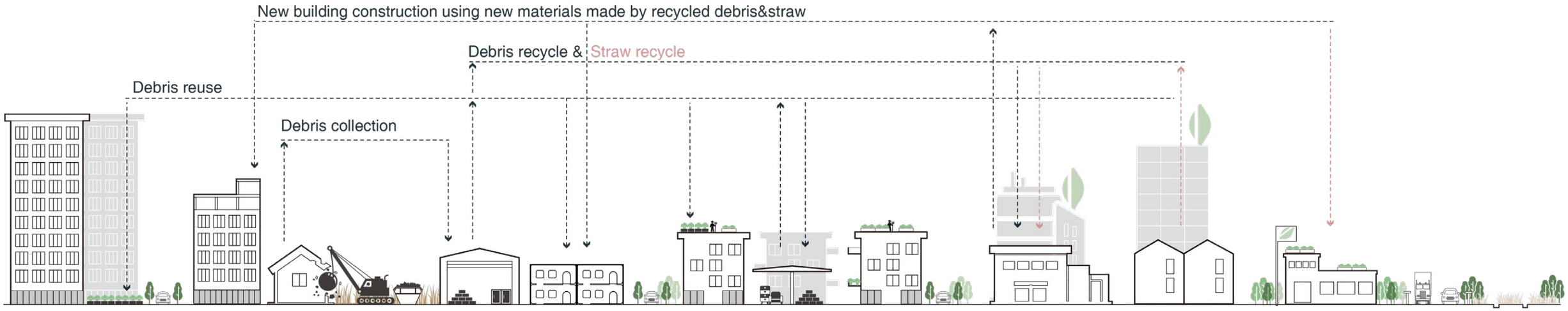
Food Waste Flow: Surplus food is the first type of waste to be addressed in the material flows, managed by placing food fridges in circular logistic centers across communities for redistribution and exchange of leftover food. Household food waste, such as eggshells and fruit peels, predominantly from the densely populated Circular Living Neighborhood and Circular Production and Consumption Town, is composted locally in communities with compost bins. Remaining waste is collected in segregated bins and transported to waste recycling facilities in the Circular Technology Park, where it is processed along with some agricultural waste from the Circular Agricultural Park into fertilizer and biogas through anaerobic digestion. These organic fertilizers are directly utilized in the grain production of the Circular Agricultural Park, and the biogas is transported to nearby breeding facilities for heating.

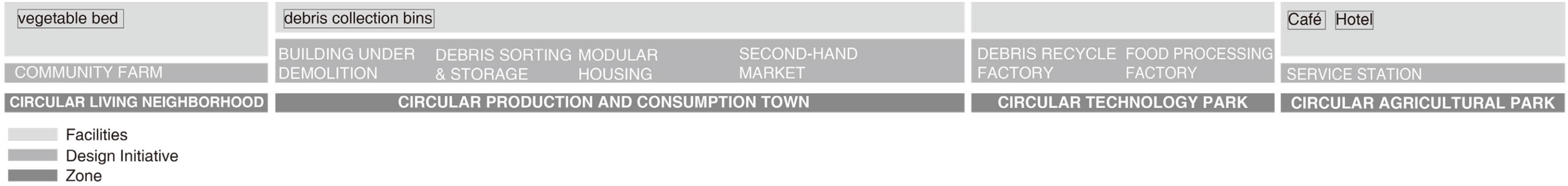
VISION

Material Flows Between the Four Zones

Construction debris

Agricultural waste flow(Straw)

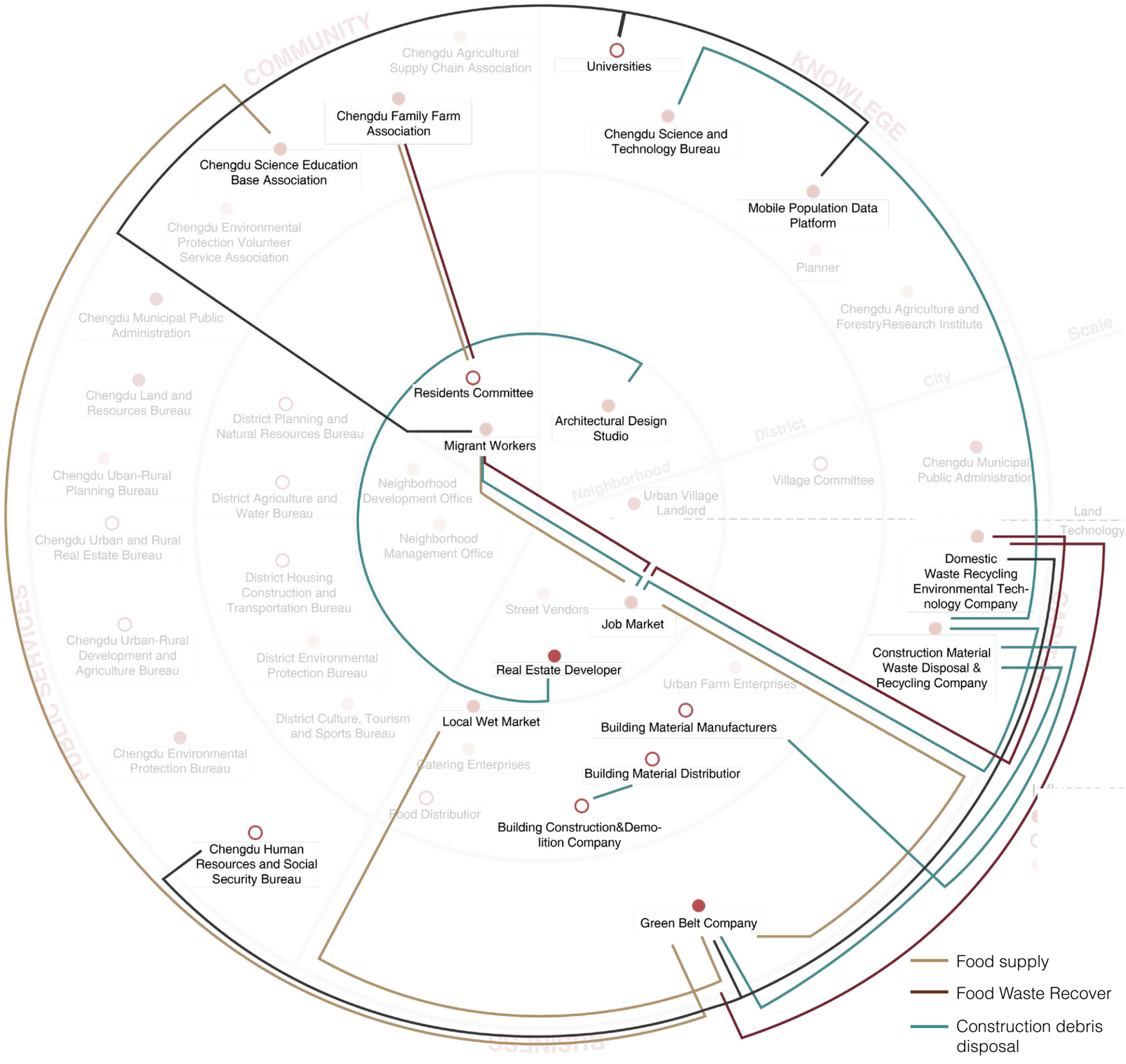




Construction Debris Flow: Massive demolition activities are prohibited, and the need for construction materials is mostly met by renovating existing factories and farmhouses. However, due to urban expansion, some new residential construction is still necessary in the Circular Living Neighborhood, and some poorly constructed illegal buildings in the Circular Production and Consumption Town must be demolished. During demolition, modular housing made from prefabricated straw panels serves as temporary accommodation for residents. New construction and housing renovation activities make extensive use of debris from the original sites and innovative recyclable building materials produced from straw from the Circular Agricultural Park.

VISION

Future Stakeholder Interests and Vision for Collaborative Circular Actions



The vision aims to resolve existing conflicts and establish new collaborations among diverse stakeholder groups to foster circular actions.

Food Flow: To create the shortest possible supply chain, the Green Belt Company, which manages extensive areas, is a crucial actor in need of establishing new collaborations. Firstly, partnerships with community wet markets are the most direct and efficient method for local product distribution. Secondly, collaborating with the Chengdu Science Education Base Association to host educational events such as picking festivals enhances the public's understanding of greenway farming practices and soil restoration processes. Furthermore, to ensure migrant worker participation, the Green Belt Company should open more job opportunities in urban villages, offering temporary positions like farmland maintenance and produce harvesting.

Food Waste Flow: In terms of agricultural waste management, the Green Belt Company should collaborate more with the Waste Recycling Environmental Technology Company to discuss specific applications for fertilizers produced from food waste. Communities interested in establishing shared farming initiatives should engage with the Chengdu Family Farm Association to learn from experienced communities. Waste management facilities managed by the Waste Recycling Environmental Technology Company should also offer more jobs to migrant workers in urban villages.

Construction Debris Flow: The Construction Debris Disposal & Recycling Company, which has expertise in debris processing and recycling technologies, needs to form agreements with the Green Belt Company and existing Building Material Manufacturers to co-discuss the feasibility and requirements for manufacturing straw-based building materials. Real estate developers should learn from architectural design studios familiar with innovative building materials to consider using recyclable materials in their constructions. Companies responsible for building demolitions should also collaborate more with local building material distributors to explore possibilities for recycling usable materials from demolitions and selling them locally. Additionally, companies involved in building material production and processing should open more job opportunities to migrant workers in urban villages.

Equitable Job Opportunities: The vision of opening more job positions for migrant workers in urban villages requires initiatives or mandates from the Chengdu Human Resources and Social Security Bureau to companies.

07 STRATEGY-PATTERN LANGUAGE

7.1 Pattern Development 81
7.2 Pattern Field 82
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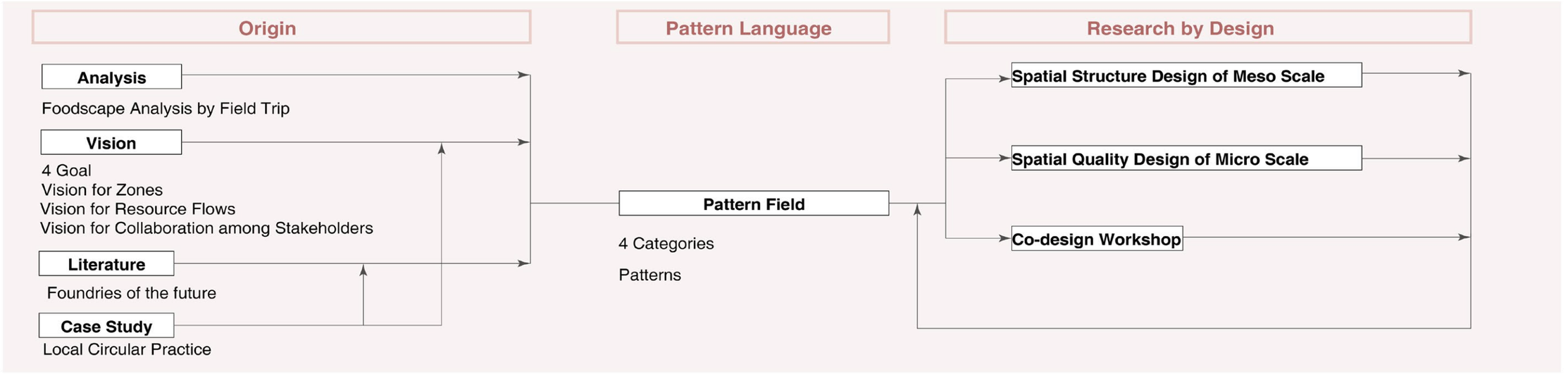
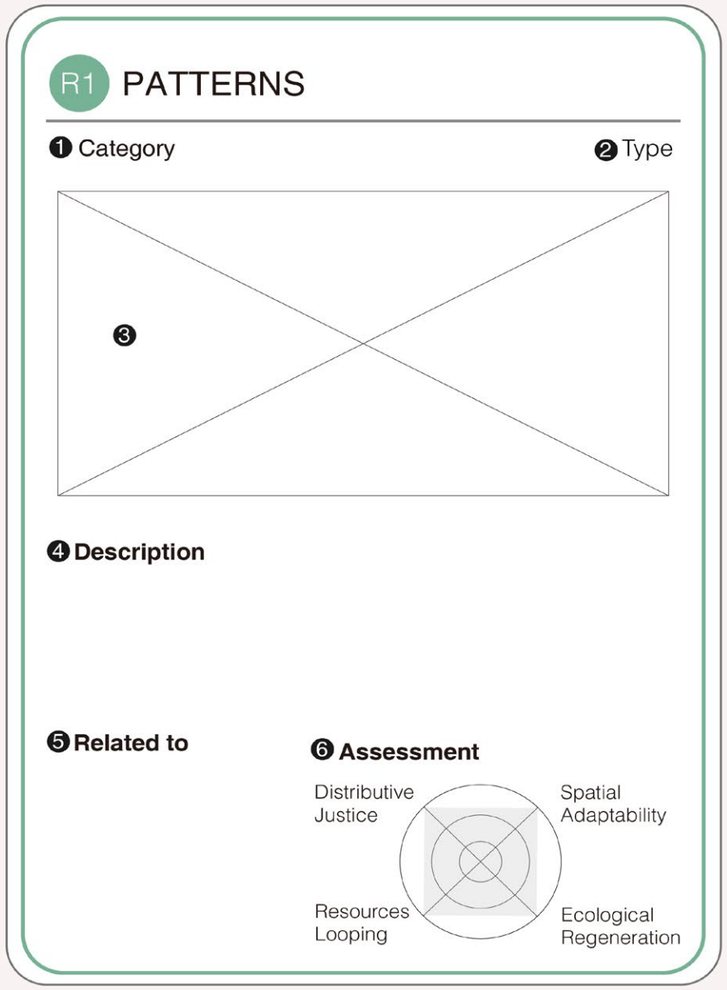
7.4 Timeline for strategy implementation 84

Figure 49: Traditional bamboo and timber building materials market in rural China
Source: Jiao and Tang (2019)

STRATEGY-PATTERN LANGUAGE

Pattern Development





❶ 4 Categories of patterns

(R=Resources Looping
S=Social Adapation
E=Ecological Regeneration
EO=Equal Opportunities for Development)

❷ 3 Types of patterns

(Urban/Spatial Design
Circular Practice
Policy and people network)

❸ Case photos of existing circular practices from Chengdu/China

❹ A concise description of what this pattern represents

❺ Relation to other patterns

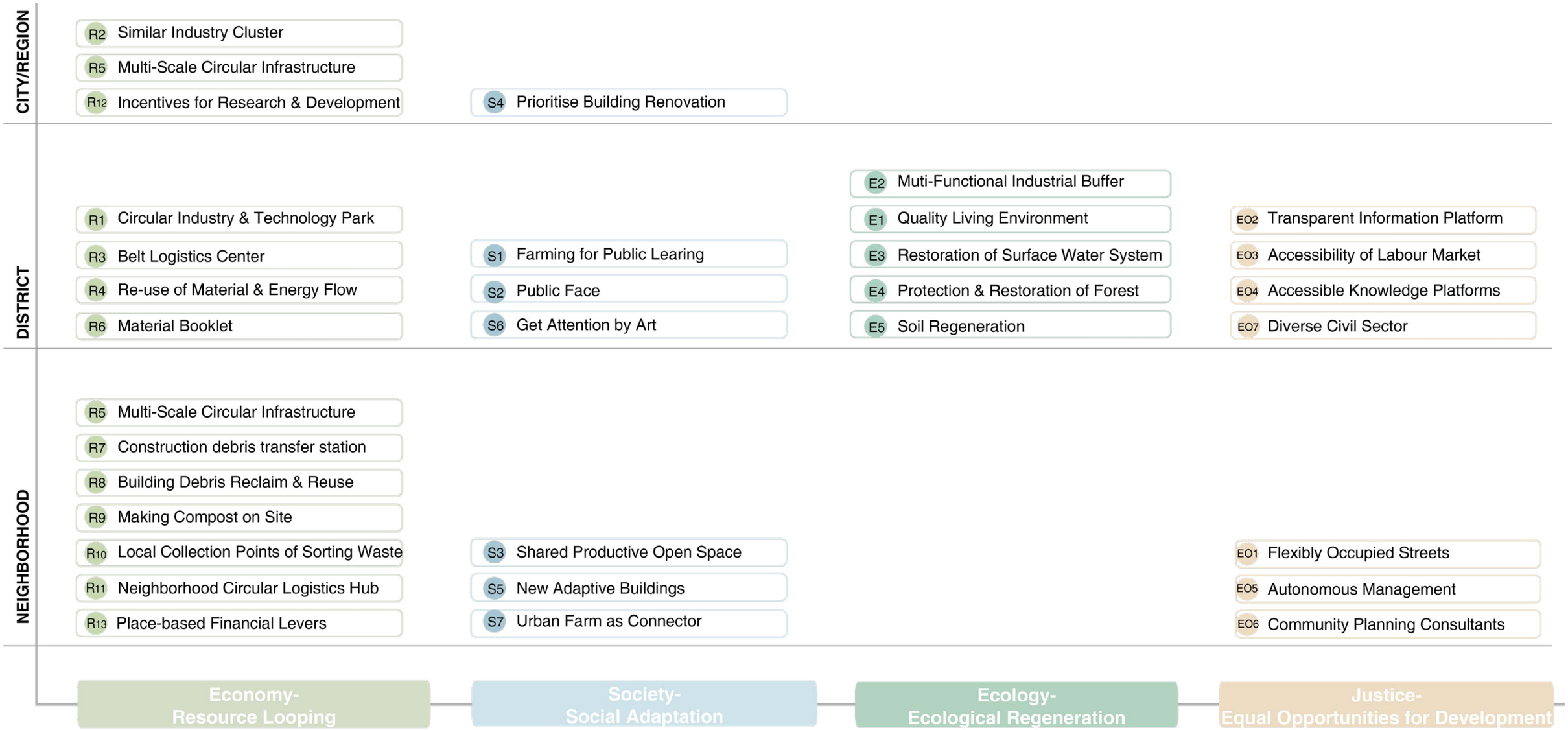
❻ Circular development assessment of this pattern

To involve marginalized groups, such as migrant workers with limited urban planning knowledge, in the design and decision-making processes, a tool that facilitates co-design and communication is essential. This project uses pattern language as a tool for collaborative creation and communication. This systematic approach breaks down complexity into understandable knowledge blocks and patterns (Croxford et al.).

As illustrated, I have described the process preceding the generation of pattern fields. Essentially, the most critical source of patterns is the Vision, from which patterns are derived by exploring the “What” and “How” of realization. Therefore, patterns are generated under the four goals described in the vision, each corresponding to a category of patterns. Field trips provide insights from the actual sites into the patterns. The meso-scale at which my patterns will be applied covers a large area (12km x 12km). Although I have considered various aspects of the circular transformation systematically, some patterns are inevitably abstract to ensure replicability. However, the purpose of using patterns is to facilitate clear and concise communication with stakeholders from various fields. I referred to the literature, “Foundries of the Future,” adopting some of its patterns and learning its style for naming and describing patterns. This approach aims to ensure that these abstract patterns are understood through direct descriptions and that the anticipated spatial and behavioral changes they will induce are perceptible. Case studies, mostly from Chengdu/China, focus on circular practices and introduce these patterns with intuitive photo examples, confirming their applicability in China. In subsequent design processes and co-design workshops at meso and micro scales, some patterns are added, removed, or modified.

STRATEGY-PATTERN LANGUAGE

Pattern Field



Every complex system possesses a hierarchical structure, meaning different processes occur at various scales or levels. There are connections within and between these levels (Wohl, 2018). This is also true for a pattern language. Figure 48 illustrates how the “language” builds a network of connections, where nodes at one level create higher-level nodes (Salingaros, 2000). This process is similarly reflected in my pattern field.

I have developed three higher-level patterns based on four main objectives. These serve as higher-level nodes that guide the sub-patterns while relying on these sub-patterns for practical application.

The sub-patterns are more focused on the district and neighborhood scale, with interconnected relationships among them. Some patterns require the implementation of a previous pattern to be activated; for example, “Shared Productive Open Space” can only be implemented after “Soil Regeneration” is completed.

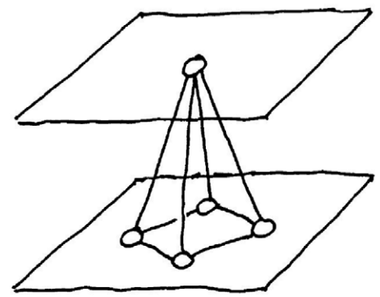


Figure 50: Patterns on one level combine to help define a new pattern on a higher level

STRATEGY-PATTERN LANGUAGE

Pattern Assessment

PATTERN \ CRITERIA		Scale				Location					Origin					Type				Goal									
		City/Region	District	Neighborhood		Circular Industry Zone (CI)	Circular Consumption Town (CC)	Circular-Life Neighborhood (CN)	Circular Agro Park (CA)		Vision (V)	Field Trip (I)	Case Study (C)	Literature (L)	Research by Design (R)		Urban/Spatial design	Circular Practice	Policy and people network		Shortest Resoure Loop	A Closed Balance	Circular Knowledge Learning	Adaptable Space	Farmland Regeneration	Clean & Rich Water system	Protection of forest	Sustainable Labor Markets	Community Empowerment
Circular Industry & Technology Park	R1		●			■					▲						⬟			Positive	●	●	●	●	●	●	●	●	○
Similar Industry Cluster	R2		●			■						▲		▲					⬟		●	●	●	○	○	○	○	○	○
Belt Logistics Center	R3		●			■					▲						⬟				●	●	●	○	●	●	●	●	○
Re-use of Material & Energy Flow	R4		●			■	■	■	■					▲				⬟			●	●	○	○	●	●	○	●	●
Multi-Scale Circular Infrastructure	R5		●			■	■	■	■		▲			▲			⬟			Neutral	●	●	●	●	○	●	○	●	○
Material Passports	R6		●			■		■						▲					⬟		●	●	●	○	○	○	○	○	○
Space for Storage	R7		●			■		■	■		▲			▲			⬟				●	●	●	○	○	○	○	○	○
Building Debris Reclaim & Reuse	R8		●			■	■	■	■		▲	▲	▲					⬟			●	●	●	○	○	○	○	○	○
Making Compost on Site	R9		●				■	■	■		▲	▲	▲					⬟			●	●	●	●	○	●	○	●	○
Local Collection Points of Sorting Waste	R10		●				■	■			▲						⬟			Negative	●	●	●	○	○	○	○	○	○
Neighborhood Circular Logistics Hub	R11		●				■	■			▲			▲			⬟				●	●	●	○	○	○	○	○	○
Incentives for Research & Development	R12		●				■		■		▲			▲					⬟		●	●	●	○	○	○	○	○	○
Place-based Financial Levers	R13		●				■							▲					⬟		●	●	●	○	●	●	●	●	○
Farming for Public Learing	S1		●				■		■		▲	▲							⬟		●	●	●	○	●	●	○	●	○
Public Face	S2		●			■	■							▲			⬟				○	○	●	○	○	○	○	●	○
Shared Productive Open Space	S3		●				■	■				▲	▲				⬟				●	●	●	●	●	○	○	○	○
Prioritise Building Renovation	S4		●			■	■						▲	▲			⬟		⬟		○	●	○	●	○	○	○	○	○
New Adaptive Buildings	S5		●			■	■	■	■		▲		▲	▲			⬟				○	●	○	●	●	●	○	○	○
Get Attention by Art	S6		●				■		■				▲						⬟		○	○	●	●	○	○	○	○	○
Urban Farm as Connector	S7		●				■	■				▲	▲						⬟		●	●	●	●	●	●	○	●	○
Quality Living Environment	E1		●				■	■			▲						⬟				●	●	○	○	●	●	●		
Muti-Functional Industrial Buffer	E2		●				■	■						▲			⬟				●	●	●	●	●	●	●	○	○
Restoration of Surface Water System	E3		●			■	■	■			▲	▲					⬟	⬟			●	●	○	○	●	●	●	○	○
Protection & Restoration of Forest	E4		●						■		▲	▲					⬟	⬟			●	●	○	○	●	●	●	○	○
Soil Regeneration	E5		●				■		■		▲	▲						⬟			●	●	○	○	●	●	●	●	○
Flexibly Occupied Streets	EO1		●				■	■				▲	▲				⬟		⬟		●	●	○	●	○	○	○	●	○
Transparent Information Platform	EO2		●			■	■		■					▲					⬟		●	●	○	○				●	○
Accessibility of Labour Market	EO3		●			■	■		■			▲	▲						⬟		●	●	○	○	○	○	○	●	○
Accessible Knowledge Platforms	EO4		●			■			■		▲								⬟		●	●	●	○	●	●	●	●	○
Autonomous Management	EO5		●				■					▲	▲						⬟		●	●	●	●	●	●	○	●	●
Community Planning Consultants	EO6		●				■	■						▲					⬟		●	●	●	●	○	○	○	○	●
Diverse Civil Sector	EO7		●				■	■						▲					⬟		●	●	●	○	○	○	○	●	●

STRATEGY-PATTERN LANGUAGE

Timeline for strategy implementation

DROP

Initiate pilot projects, establish policies for recycled materials, and raise public awareness through events.

RIPPLE

Implement multi-scale infrastructure, promote recycled materials, expand urban village regeneration and circular logistics centers, and ensure migrant worker inclusion in job markets and planning decisions.

WAVE

Integrate sustainable building materials and local food consumption into daily life, expand food waste and construction debris processing.

2025 | 2030 | 2035 | 2040 | 2045 | 2050

China's Fourteenth Five-Year Plan(2020-2025)
National recycling rate of crop straw: 86%
National recycling rate of construction waste:60%

China's Fifteenth Five-Year Plan(unpublished)
Setting the Next Circular Development Goal

Chengdu Master Plan (2024-2040)
Completion of urban village regeneration and greenway farmland restoration within the central city area

ECONOMY

TECHNOLOGY

- Set the Green Belt area as a pilot for circular urban regeneration
- Establish a multi-scale circular infrastructure system
- Promote the use of recycled materials in new construction
- Circular and straw building materials become common and are frequently used in residential and office buildings

INFRASTRUCTURE

- Identify existing debris and develop a material booklet
- Enact policies requiring recycled building materials utilization for new construction projects
- Set up Green Belt agro-logistics centers to facilitate the distribution of locally-produced food products within the city
- Establish an experimental center for straw building materials
- Experiment with and apply innovative straw building materials
- Expand the scale of food waste and building material processing in the Green Belt area, aiming to recycle as much of Chengdu's food waste and construction debris locally

SOCIETY

AWARENESS

- Hold harvest festivals and set up museums to raise public awareness about the necessity of farmland restoration
- Extend the experience of the biennale to other urban villages in the Green Belt area for comprehensive urban village regeneration
- Increase awareness of the necessity and benefits of building renovation among Chengdu citizens

ADAPTIVE SPACE

- Design Anjing urban village as a pilot, hosting a biennale on circular development to explore the potential for repurposing vacant buildings
- Continuously collect feasible plans for repurposing vacant buildings and reusing construction debris in urban village regeneration
- Allow urban village pilots to convert vacant land into community-managed farms and permit street vending on certain streets
- Establish community circular logistics centers in urban villages, organizing classes to share experiences in circular actions
- Cultivate a consumption habit among Chengdu citizens to prefer locally-produced food and consciously use vacant land to grow their own food

ECOLOGY

IRRIGATION SYSTEM

- Removing debris from farmland
- Implementing crop rotation to maintain soil fertility

SOIL

- Planting legumes to fertilize the soil
- Minimum external input & Use organic fertilizers recycled from food waste
- Restoring previous irrigation canals
- Setting canal buffer to maintain clean irrigation water
- Restoring existing forest

JUSTICE

PARTICIPATION

- Establish participatory urban regeneration planning processes
- Design Anjing community as a pilot, establishing a migrant worker resident committee and organizing meetings to hear their needs
- Organize participatory platforms, such as roundtable meetings, to widely include migrant workers in planning decisions
- Set up monitoring mechanisms to ensure the inclusion and employment rate of migrant workers

EQUAL OPPORTUNITY

- Establish policies for equal job opportunities, promoting the employment of migrant workers and providing necessary job training
- Connect migrant workers with external knowledge and job opportunities, bridging the informal job market of urban villages with enterprises

08 MESO-SCALE DESIGN IMPLEMENTATION

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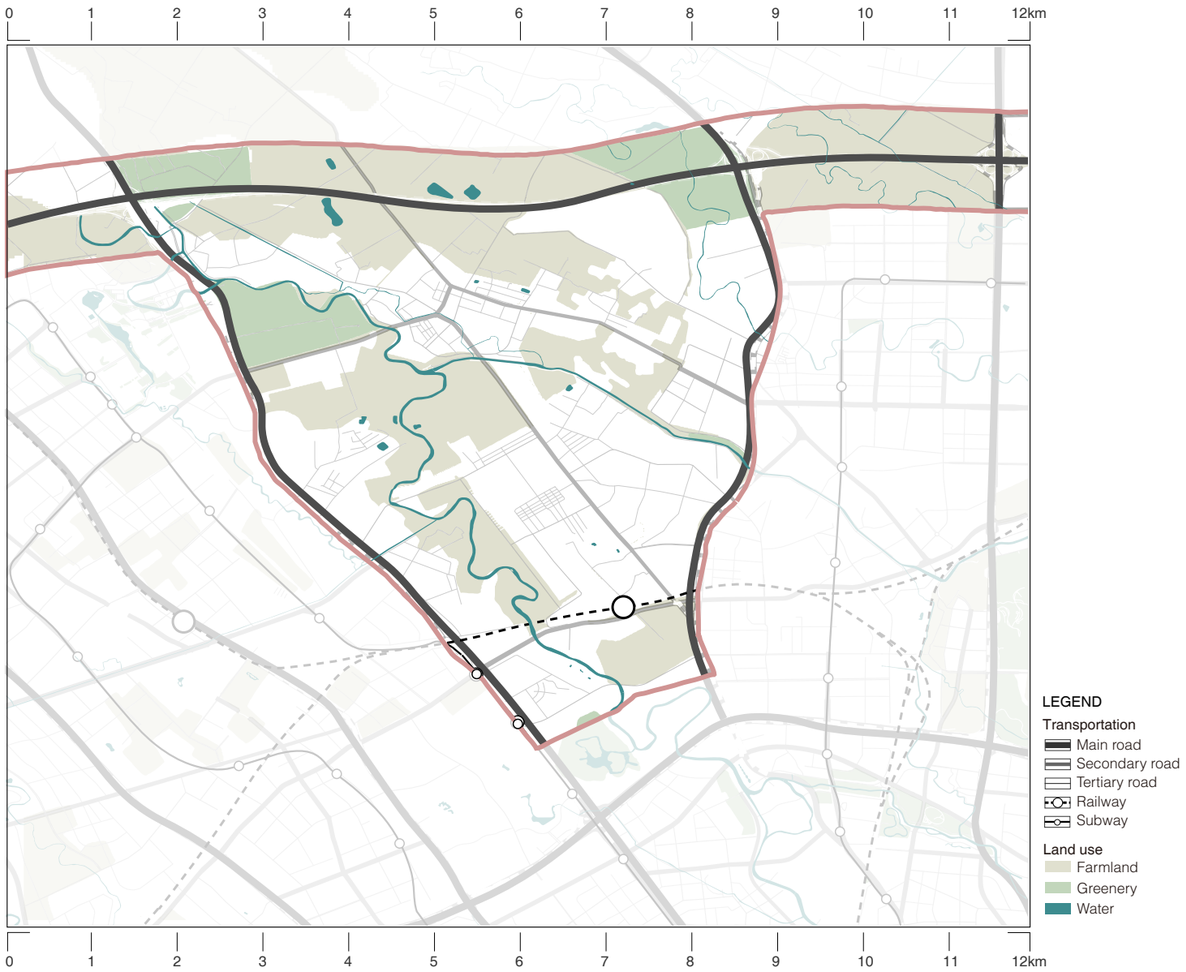
8.4 Circular Agricultural Park 89
8.5 Circular Production and Consumption Town 92
8.6 Circular Technology Park 95
8.7 Circular Living Neighborhood 99

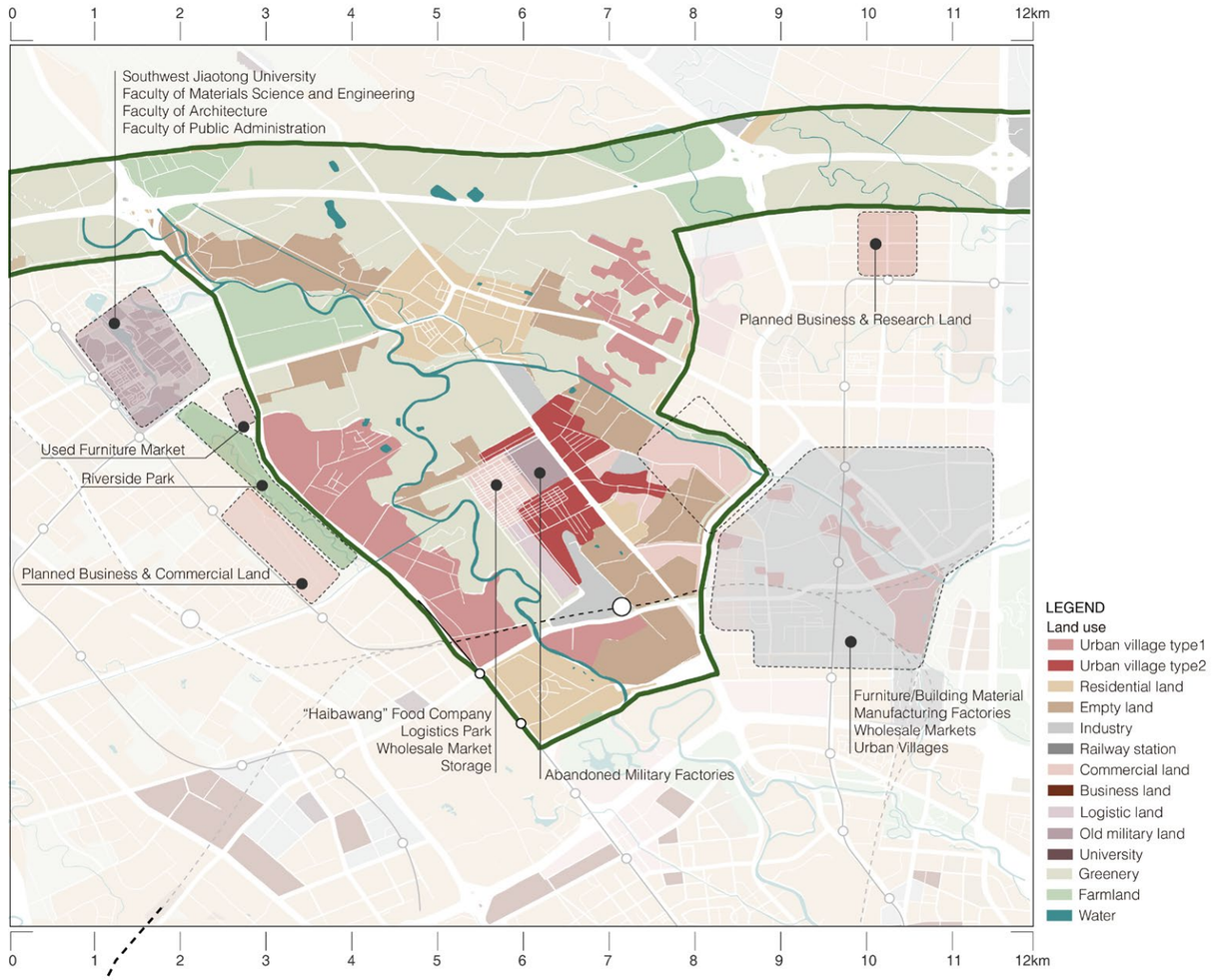
Figure 51: Walkers in the rapeseed flower fields on the Chengdu Greenway during the Spring Festival of 2024

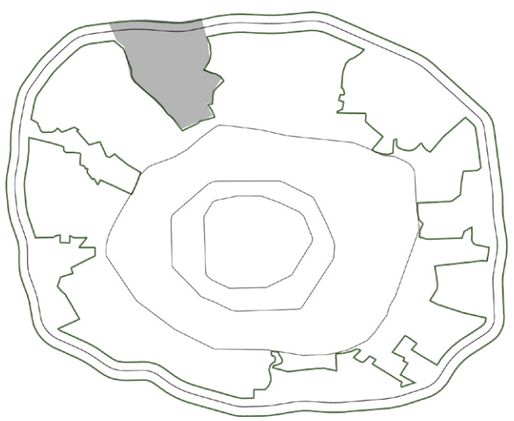
Source: Little Red Book, The Cat Slipped Shoulder, Authorized by the Author

MESO-SCALE DESIGN EXPLORATION

Site Analysis





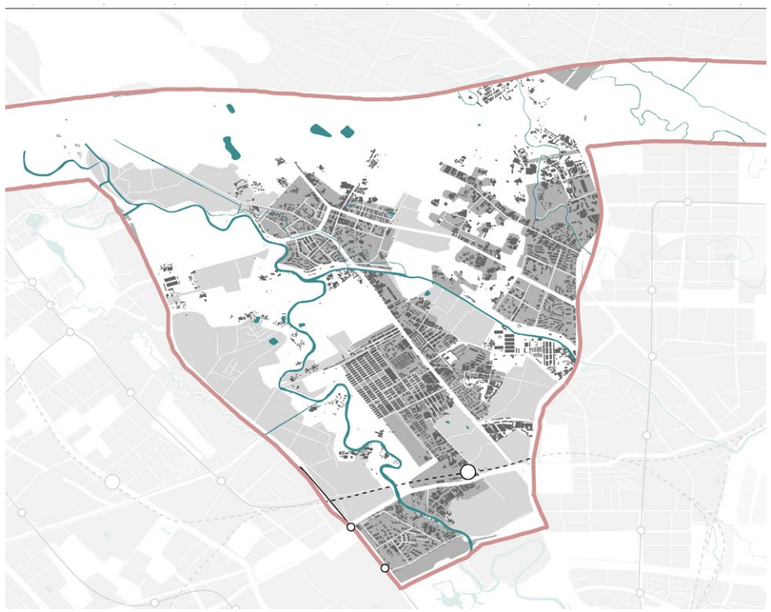


The meso-scale design zooms into the wedge-shaped area at the northern edge of the green belt, one of the least mentioned areas in government green belt planning documents. The planning for land use other than green spaces and farmland is still unclear in these documents. One significant reason is that this area contains one of the densest concentrations of urban villages in central Chengdu, along with large food enterprise logistics centers, wholesale markets, and numerous medium-sized but densely packed building material manufacturers and wholesale markets. The excessive density of urban villages may be one of the reasons why renovation is challenging here.

Additionally, traffic analysis has shown that the road network here is much sparser compared to other urban areas, with poor connectivity to the outside world.

MESO-SCALE DESIGN EXPLORATION

Action



Most buildings in this area are concentrated along a main road in the center or along two urban roads on the district's boundary. The action aims to protect the farmland and renovate the urban villages, with a lot of farmland close to the green belt being incorporated, and urban villages are generally upgraded and transformed considering the possibility of mixed-use with surrounding land types. For example, some factories in urban villages are transformed into office buildings for research institutions after renovation, and existing fragmented farmlands around the urban villages are converted into experimental farms. Based on the existing land use, the land type planning actions for this area are illustrated in three forms:

Expanding: One type of land use engulfs another.

Interacting: Two existing types of land use intertwine and influence each other, give and receive from one another, forming mixed-use land.

Upgrading: Retaining the existing land use types but upgrading and transforming them.

MESO-SCALE DESIGN EXPLORATION

Vision

The planned land use types are shown in the diagram. To create better connectivity for the area, the density of the road network is also increased.

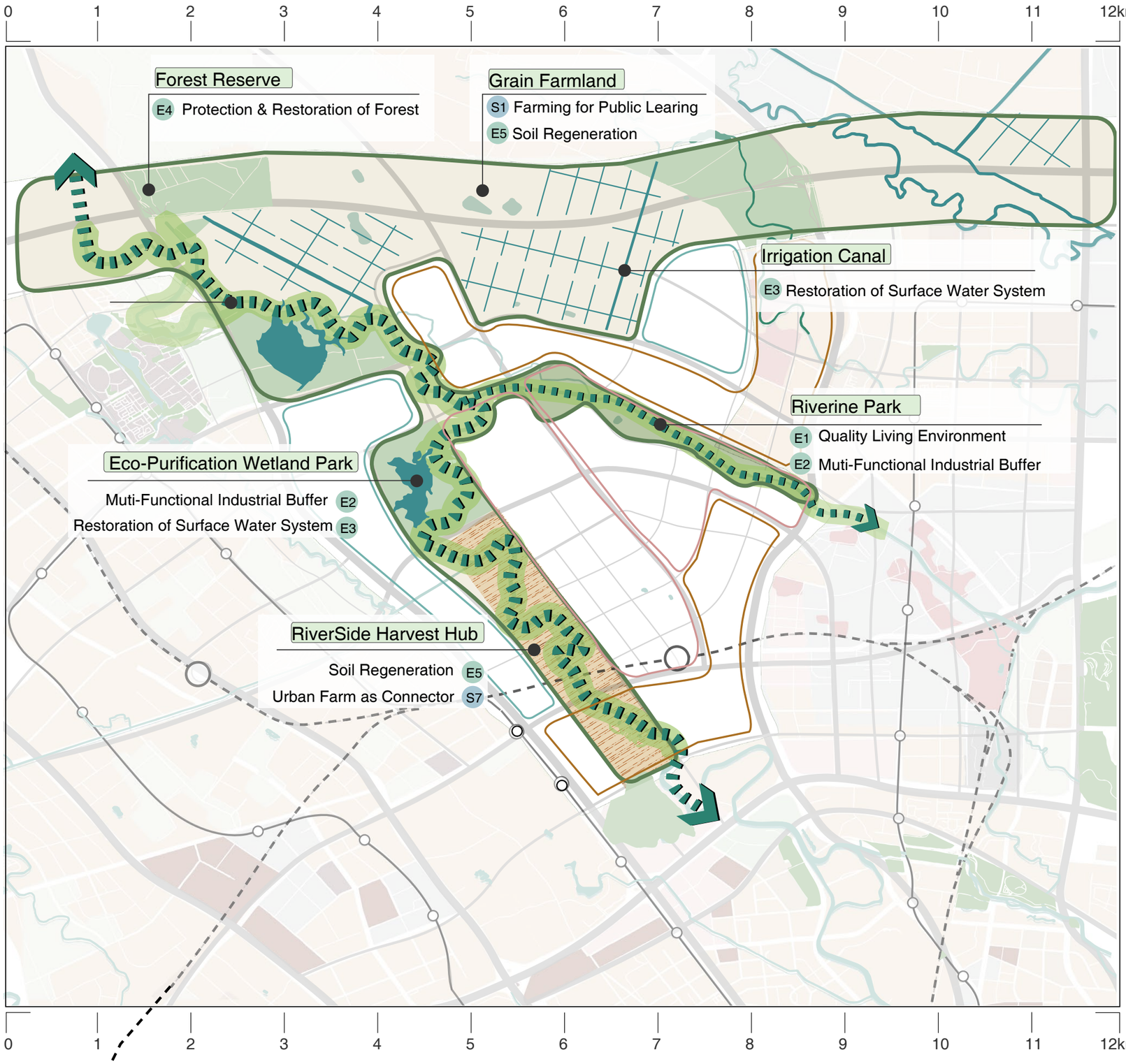
LEGEND

- Green belt farmland
- Urban Farm
- Greenery
- River buffer
- Water
- Seedling greenhouse
- Experimental farm
- Factory
- Office/Research
- Commercial Services
- Existing wholesale market
- Planned wholesale market
- Existing factory
- Planned factory
- Renovated residential land
- Uncertainty land
- Existing modern residential complex
- New residential complex
- Industrial to residential land
- Community service land
- Public service land
- Uncertainty land
- Water

MESO-SCALE DESIGN EXPLORATION

Circular Agricultural Park

Land use



The change in land use still centers around the four landscape types mentioned previously: green belt farmlands and three types of urban villages, which, according to the vision, develop into four functional zones. Compared to the relatively abstract descriptions of the future positioning of the four functional zones mentioned in the vision, the design focus of these four functional zones on the meso-scale is to showcase the spatial structure of this zone. The goal is to distinguish between natural, agricultural, and urban textures, and to describe where the main public activity spaces are located. The distribution of the four zones at the meso-scale is shown in the diagram, which primarily introduces the design interventions included in the Circular Agricultural Park zone and the patterns that will be used.

LEGEND

Functional zone

- Circular Agricultural Park
- Circular Production and Consumption Town
- Circular Technology Park
- Circular Living Neighborhood

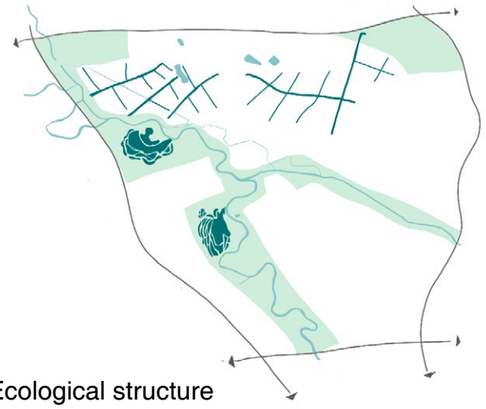
Land use

- Green belt farmland
- Urban Farm
- Greenery
- River buffer
- Water
- River system

MESO-SCALE DESIGN EXPLORATION

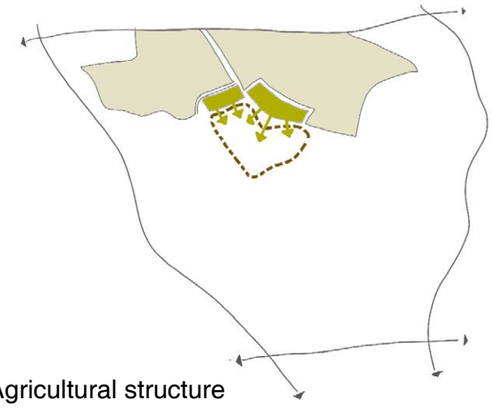
Circular Agricultural Park

Spatial Structure



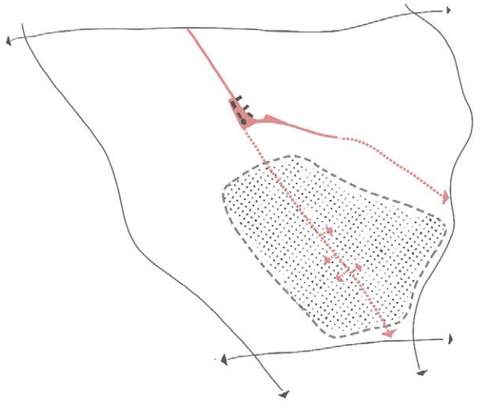
Ecological structure

Forest, Wetland & Irrigation Canal Restoration.



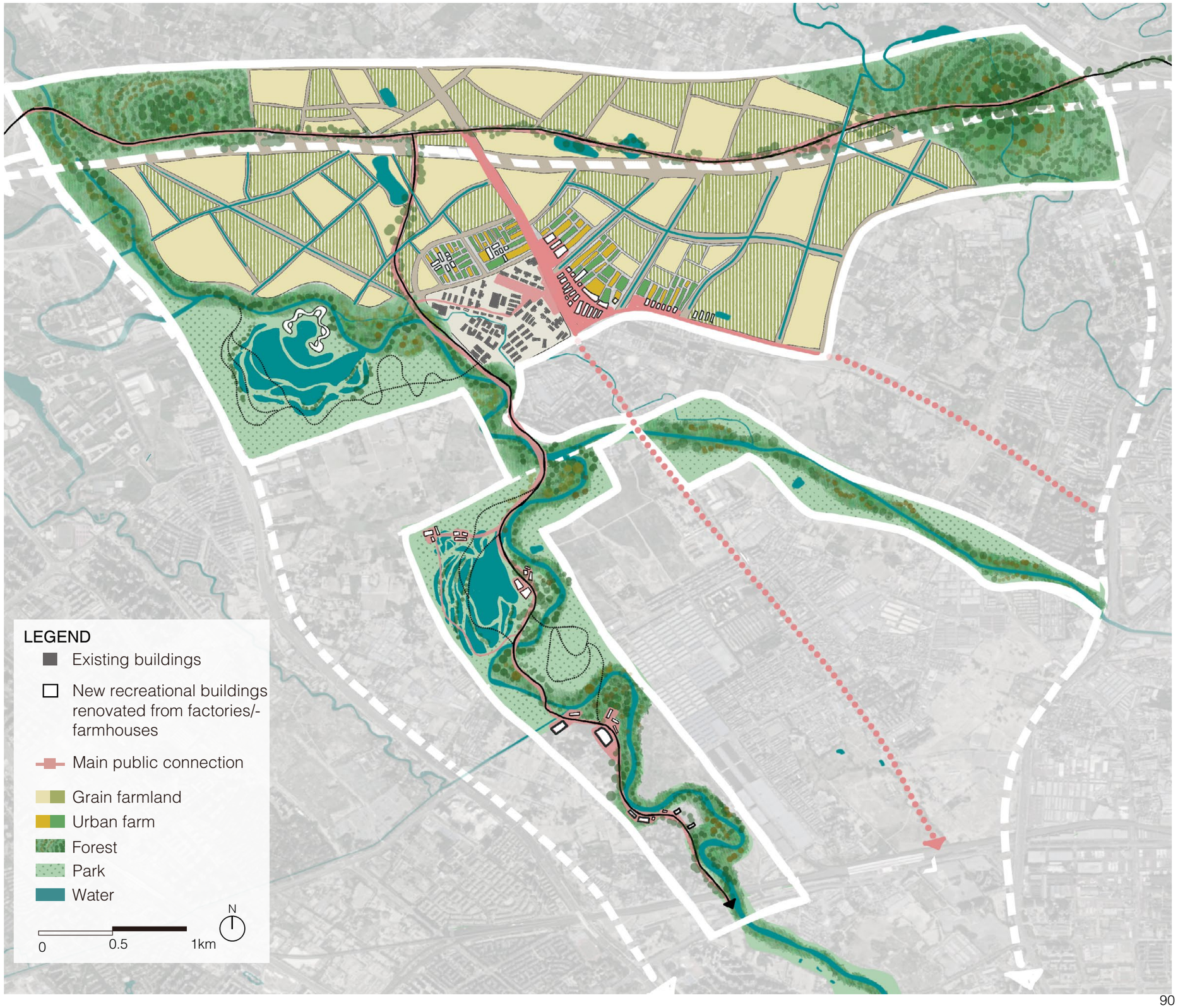
Agricultural structure

Farmland close to urban areas are family-run farms, providing access to fresh fruits and vegetables, as well as exposure to agriculture.



Public space structure

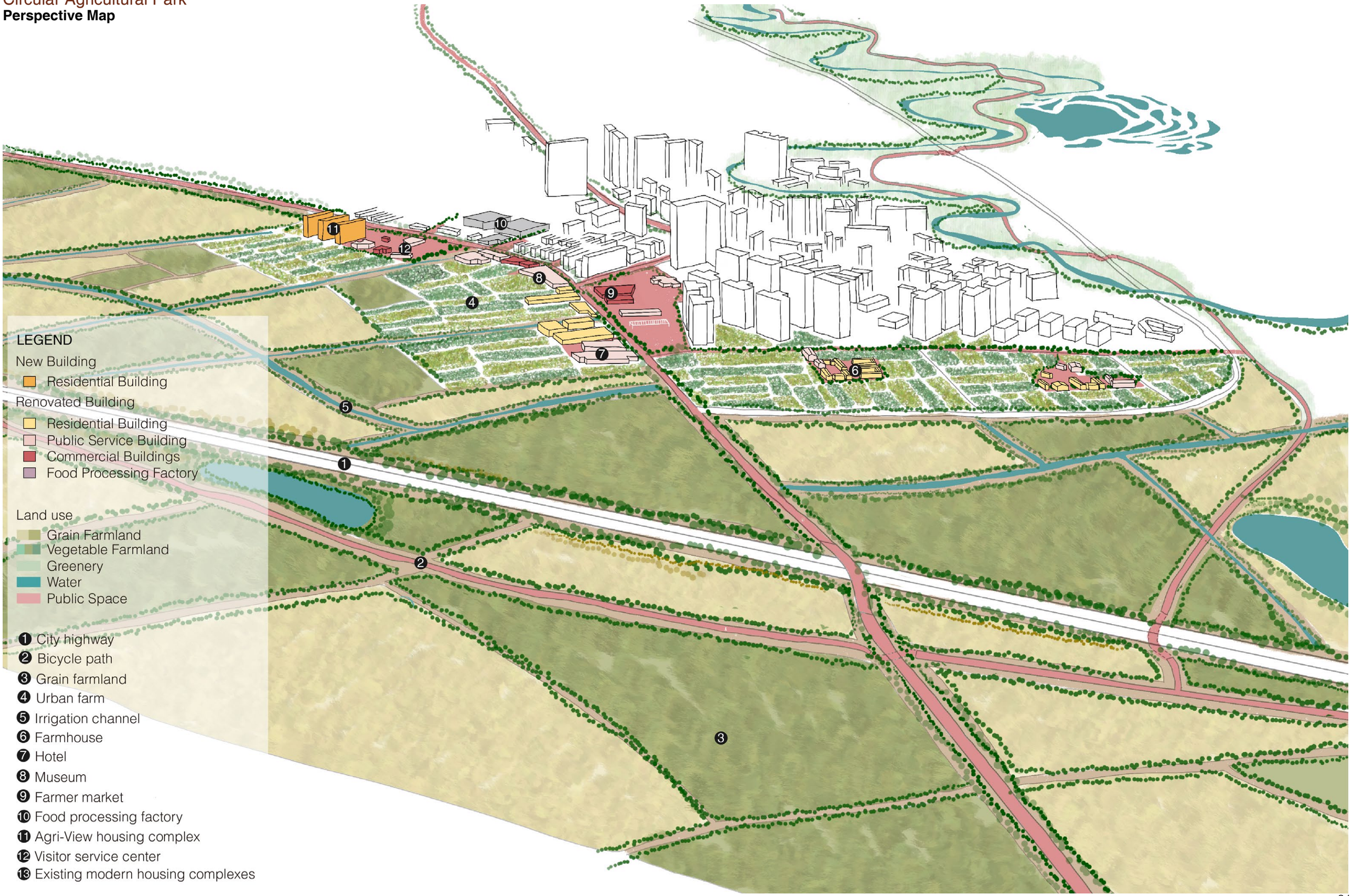
A recreational axis with a vibrant commercial atmosphere extends from the greenway farmland to the urban village in the south.



MESO-SCALE DESIGN EXPLORATION

Circular Agricultural Park

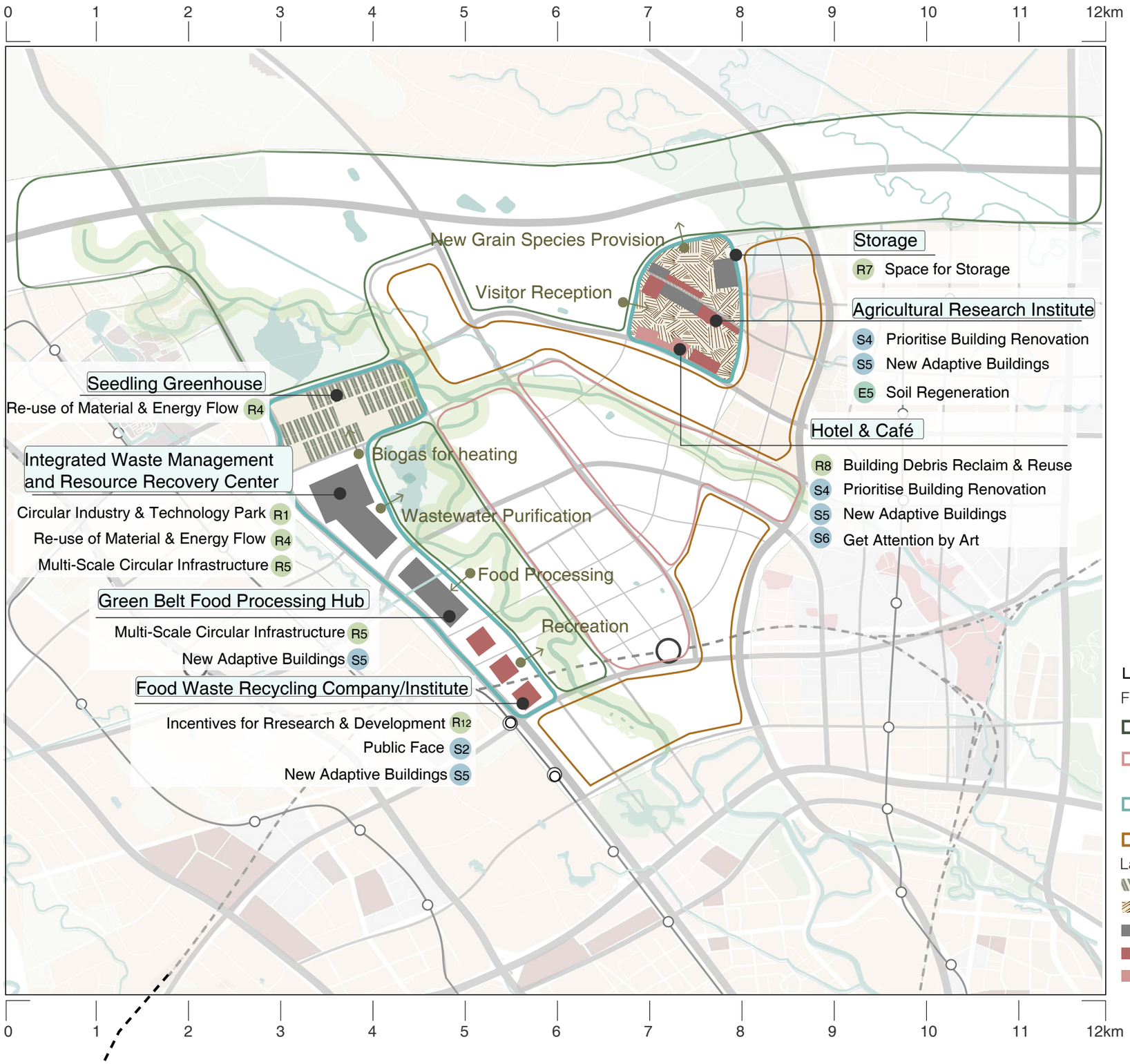
Perspective Map



MESO-SCALE DESIGN EXPLORATION

Circular Technology Park

Land use



LEGEND

Functional zone

- Circular Agricultural Park
- Circular Production and Consumption Town
- Circular Technology Park
- Circular Living Neighborhood

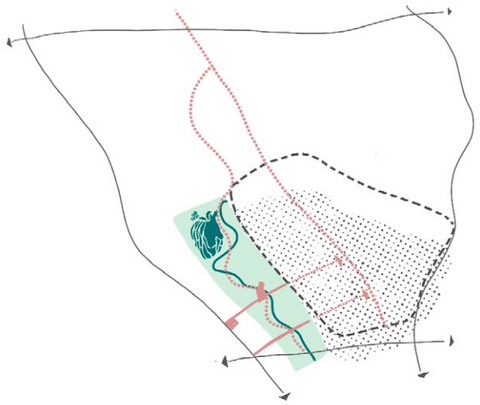
Land use

- Seedling greenhouse
- Experimental farm
- Factory
- Office/Research
- Commercial Services

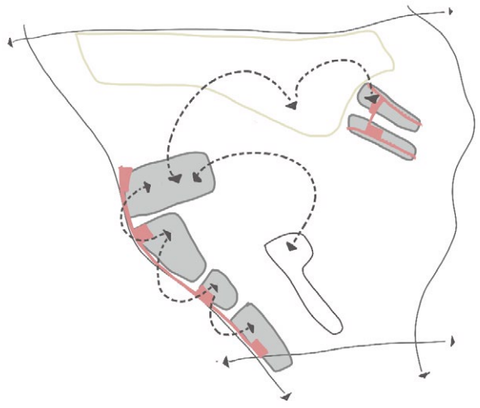
MESO-SCALE DESIGN EXPLORATION

Circular Technology Park

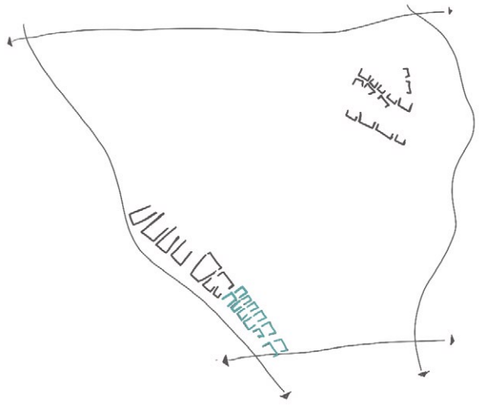
Spatial Structure



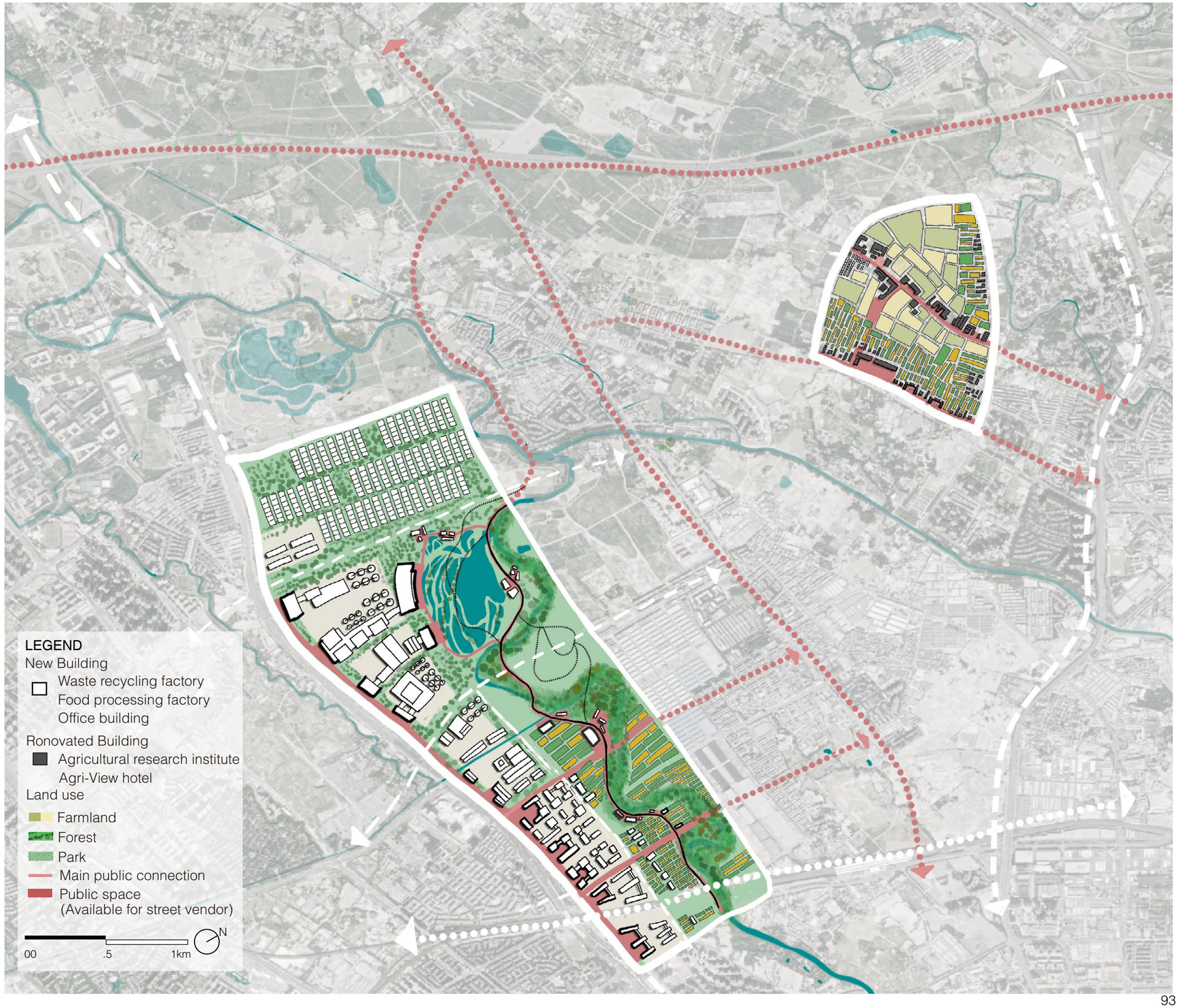
Establish protective forests near waste recycling sites, restore nearby wetlands, and create wetland systems for wastewater treatment.



Construct large-scale food processing plants, seedling greenhouses, and circular economy office areas to form similar industrial clusters.



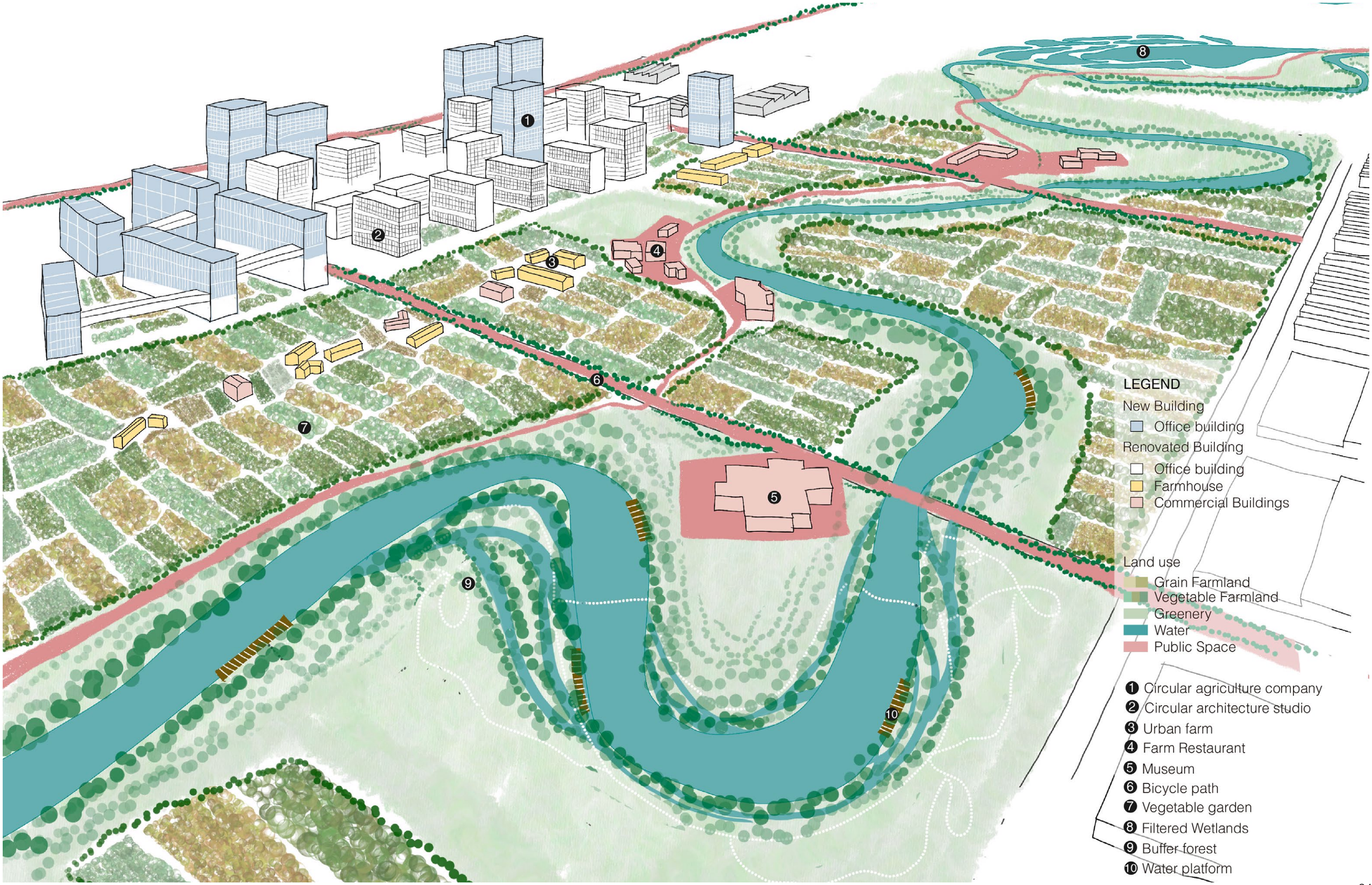
Create public connections between the office areas and the river wetlands.



MESO-SCALE DESIGN EXPLORATION

Circular Technology Park

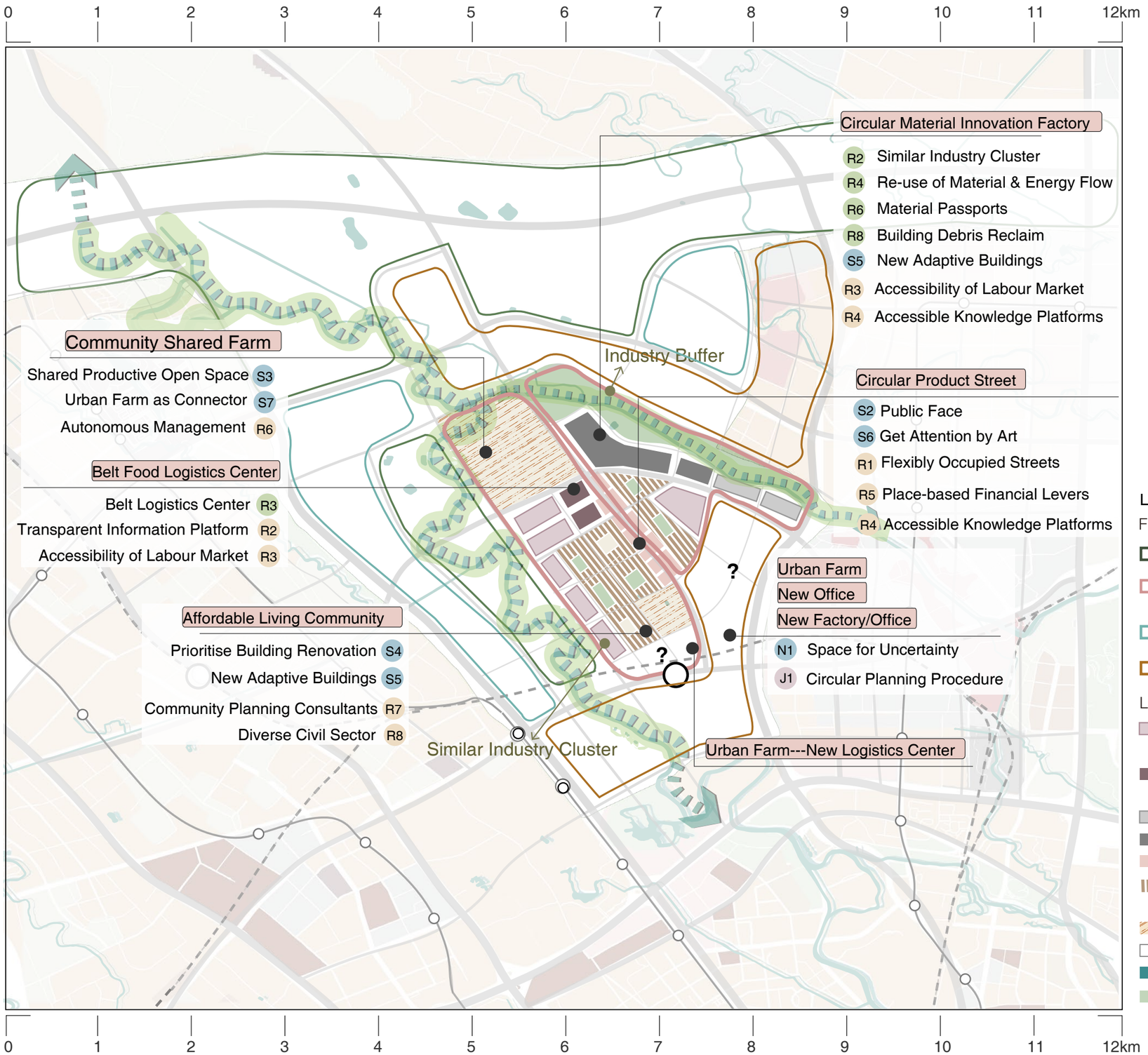
Perspective Map



MESO-SCALE DESIGN EXPLORATION

Circular Production and Consumption Town

Land use



LEGEND

Functional zone

- Circular Agricultural Park
- Circular Production and Consumption Town
- Circular Technology Park
- Circular Living Neighborhood

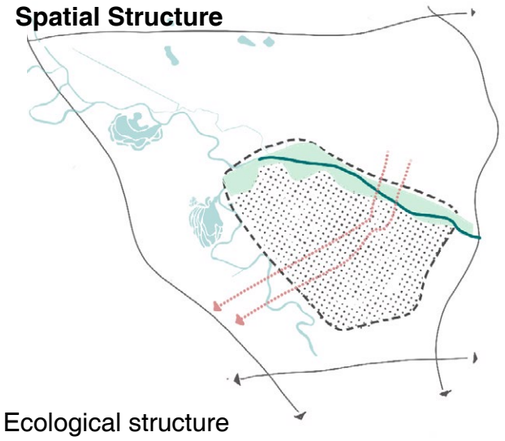
Land use

- Existing wholesale market
- Planned wholesale market
- Existing factory
- Planned factory
- Commercial service
- Renovated residential land
- Urban farm
- Uncertainty land
- River
- Greenery

MESO-SCALE DESIGN EXPLORATION

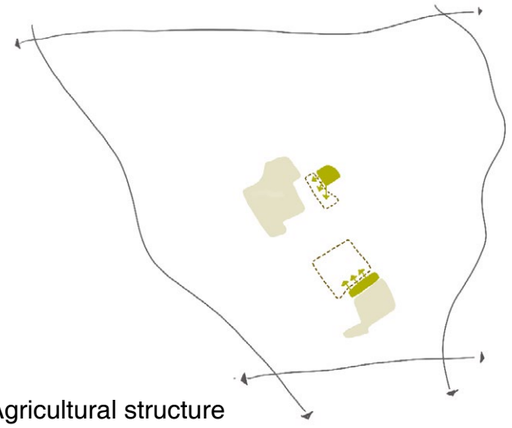
Circular Production and Consumption Town

Spatial Structure



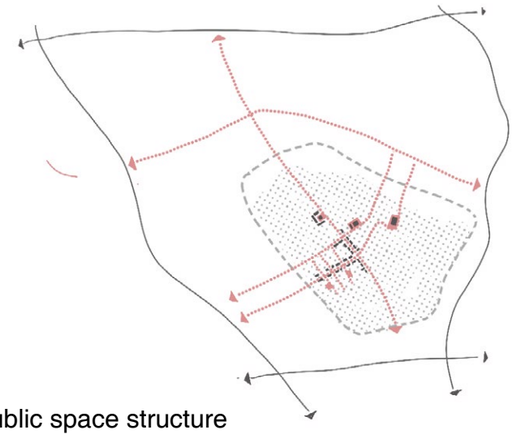
Ecological structure

Restore irrigation channels and create a river buffer, ensuring public access to these ecological areas.



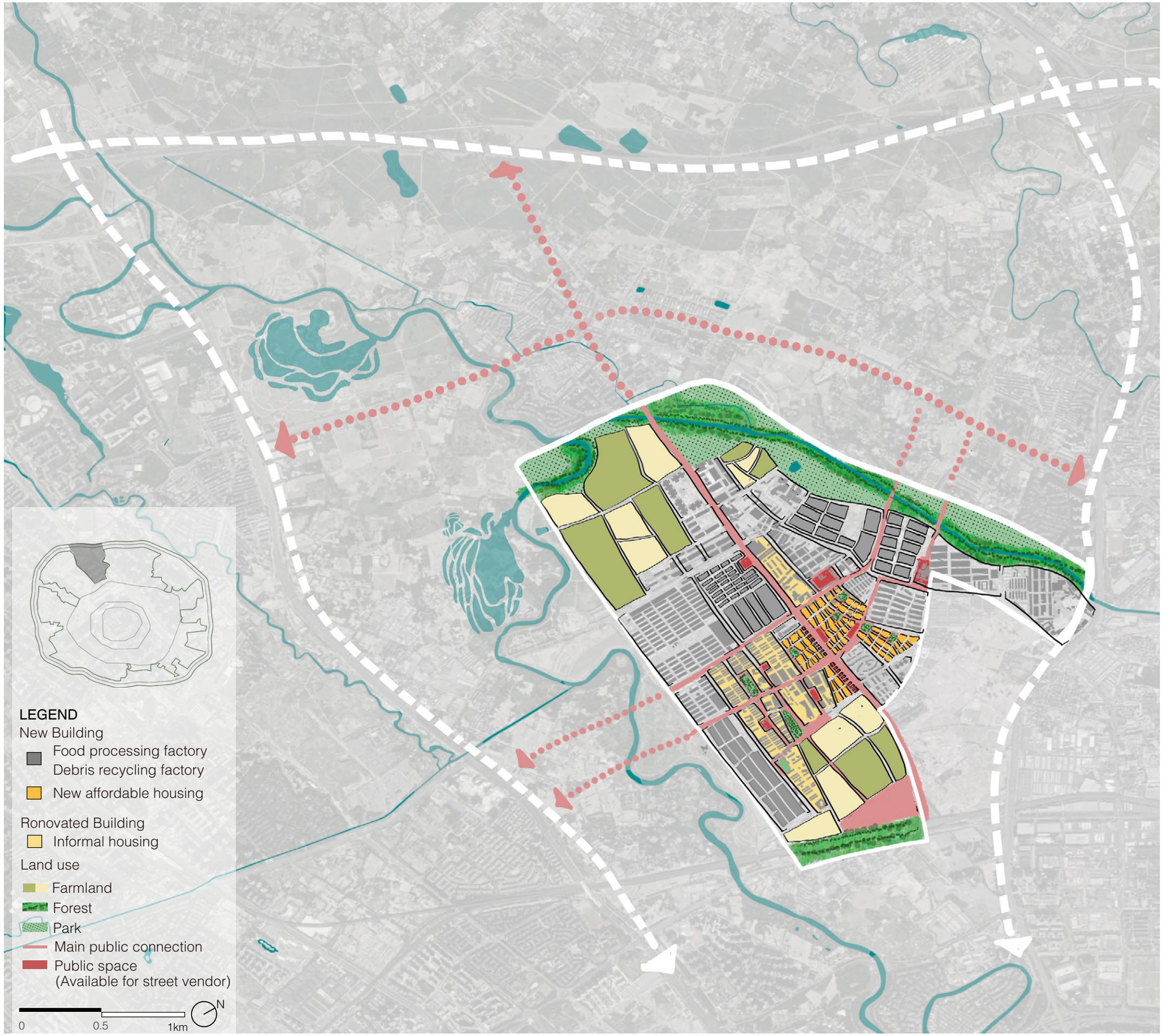
Agricultural structure

Revitalize agricultural soil and convert nearby urban village farmlands, currently used as vegetable gardens, into community-shared farms.



Public space structure

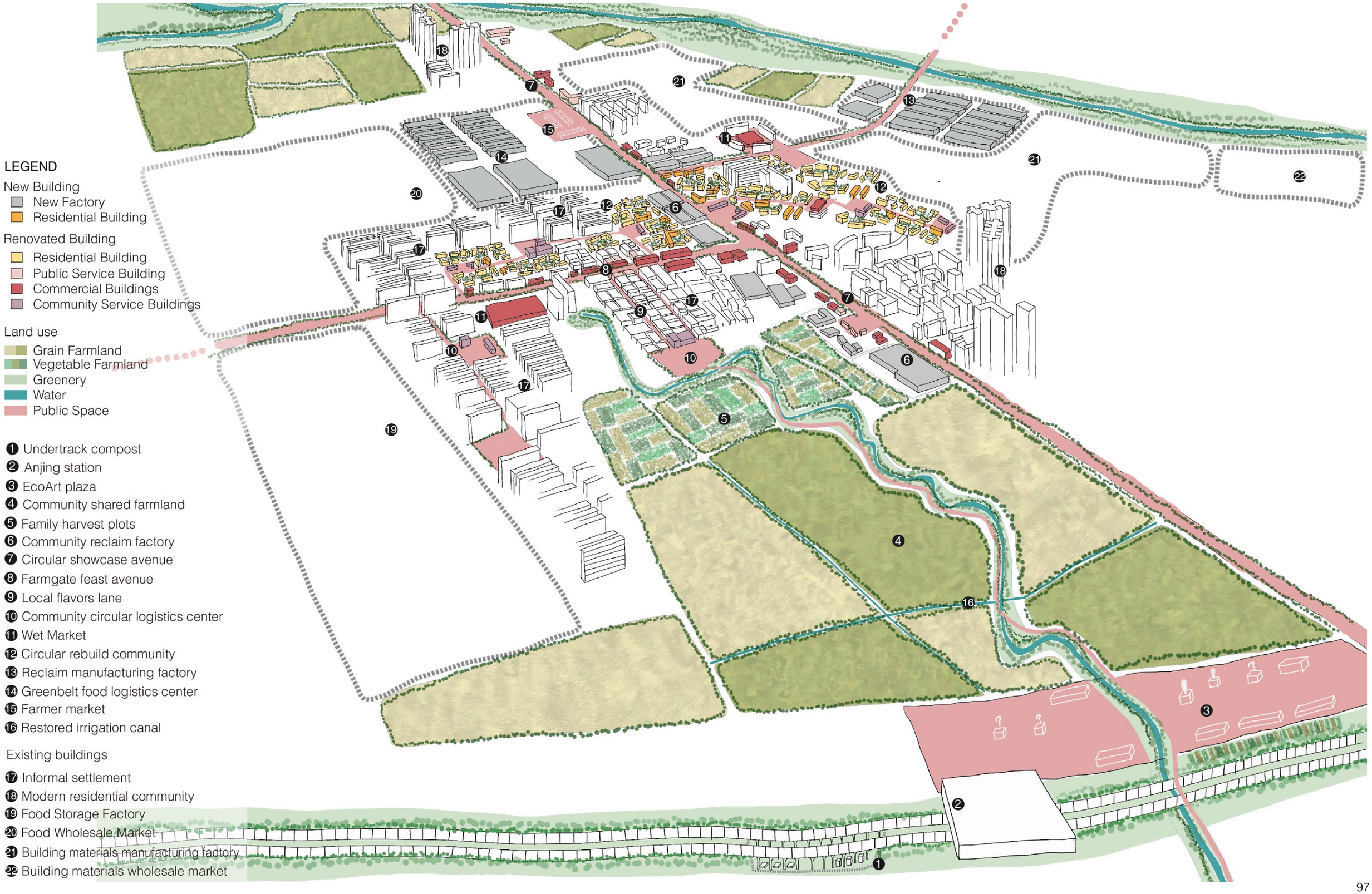
Develop a bustling public space axis that connects the main urban area in the south, through the urban village, to the greenbelt farmland in the north, drawing numerous visitors.



MESO-SCALE DESIGN EXPLORATION

Circular Production and Consumption Town

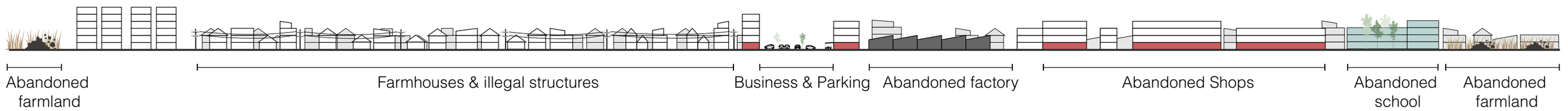
Perspective Map

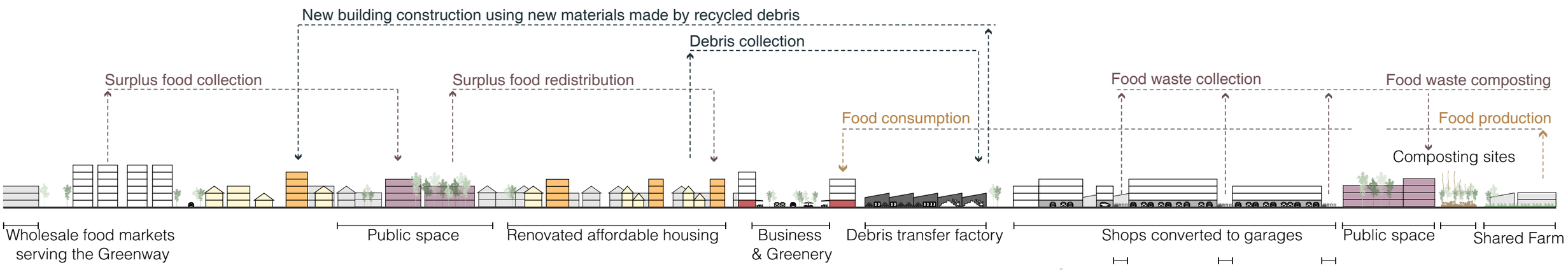


MESO-SCALE DESIGN EXPLORATION

Circular Production and Consumption Town

Resources Flow

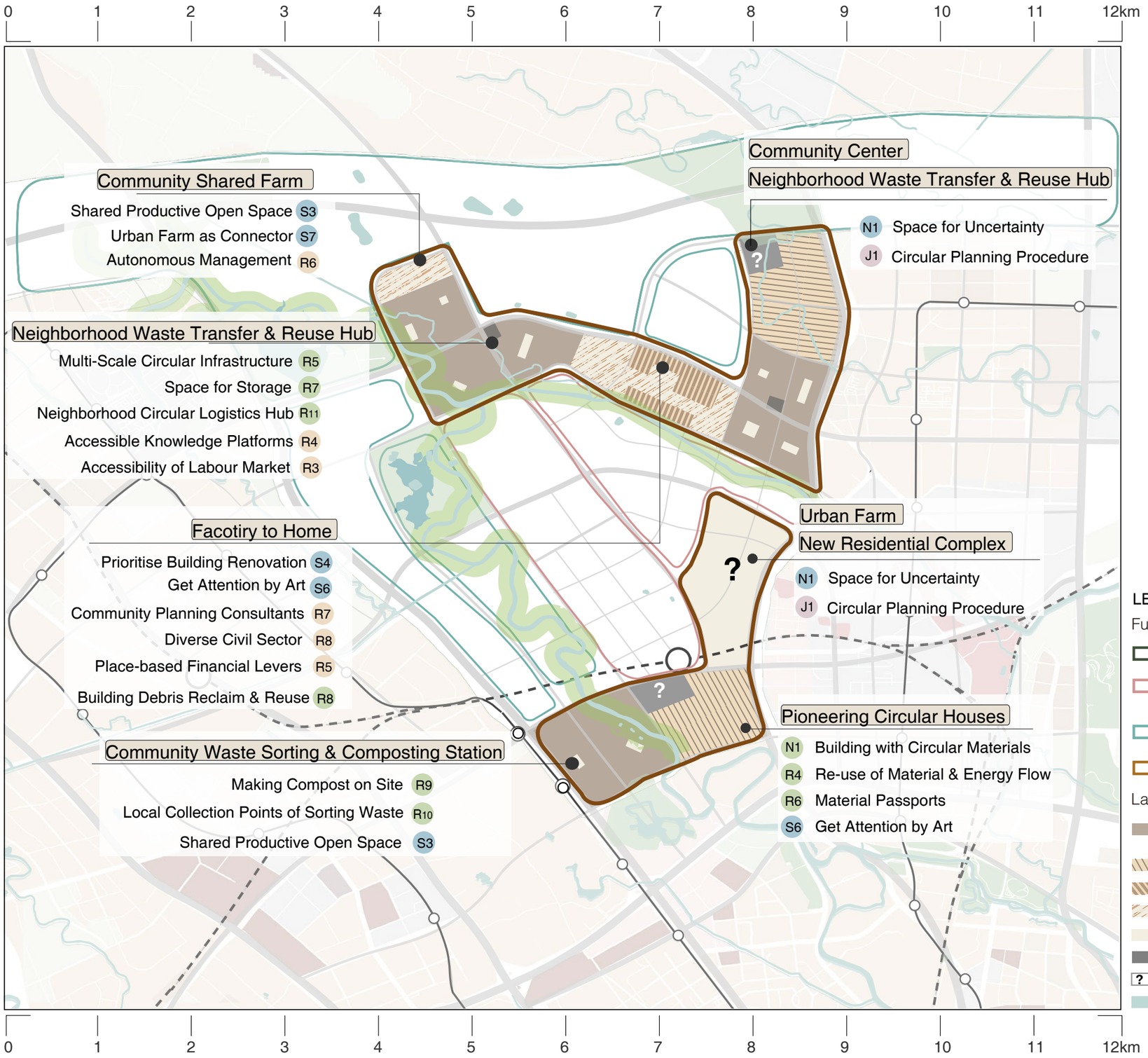




MESO-SCALE DESIGN EXPLORATION

Circular Living Neighborhood

Land use



LEGEND

Functional zone

- Circular Agricultural Park
- Circular Production and Consumption Town
- Circular Technology Park
- Circular Living Neighborhood

Land use

- Existing modern residential complex
- New residential complex
- Industrial to residential land
- Urban farm
- Community service land
- Public service land
- Uncertainty land
- Water

09 MICRO-SCALE DESIGN IMPLEMENTATION

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- Stakeholder power-interest analysis
- Patterns
- Timeline
- Design phasing
- Master plan
- Design initiatives and resource flow
- Spatial design

Figure 52: Prefab straw wall panels
Source: EcoCocon

MICRO-SCALE DESIGN EXPLORATION

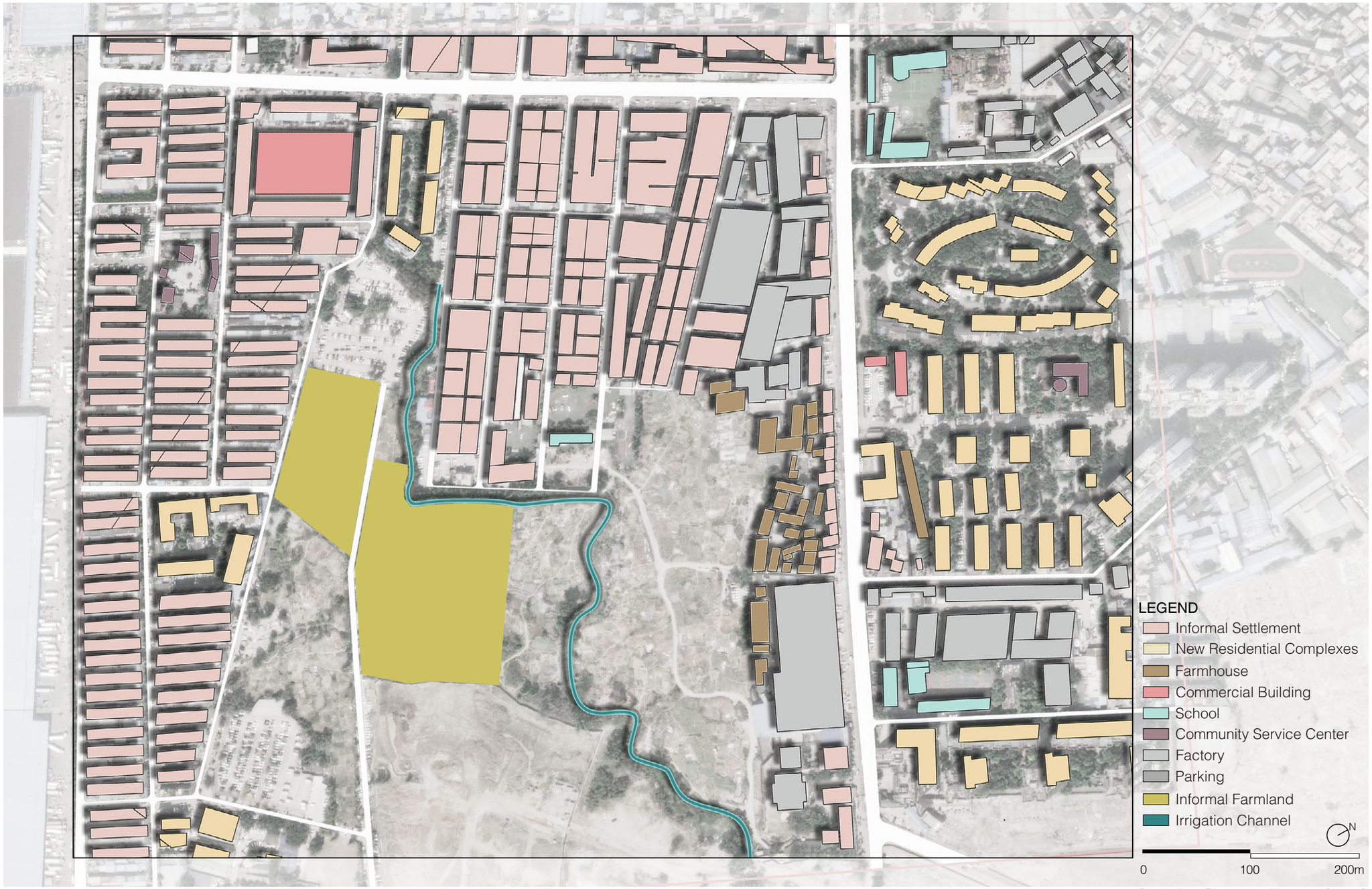
9.1 Location

The locations of micro-scale designs are shown in the diagram. They are respectively located in the southern part, within the Circular Production and Consumption Town's Anjing urban village.

MICRO-SCALE DESIGN EXPLORATION

9.2 Site Analysis

Building Analysis



Based on Bing statellite map(2024)

Made by author

The architectural analysis and functional layout of Anjing urban village are showed in the diagram. It represents a typical type 2 urban village, characterized by dense informal residences, a small portion of abandoned industrial buildings, and fragmented, abandoned farmland. To the east, along the main road, urban renewal activities primarily focused on demolition and reconstruction have already been initiated in the past, resulting in several newly constructed residential complexes. Satellite imagery and scientific observations have noted spontaneous farming activities by migrant workers in the idle farmland south near the densely populated informal residential areas. Additionally, an irrigation canal left from the agricultural village runs through these idle farmlands.

MICRO-SCALE DESIGN EXPLORATION

Site Analysis

Transportation Analysis

Based on Bing statellite map(2024)

Made by author

MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Co-design Workshop

Figure 53: Workshop Photo
Photograph by author

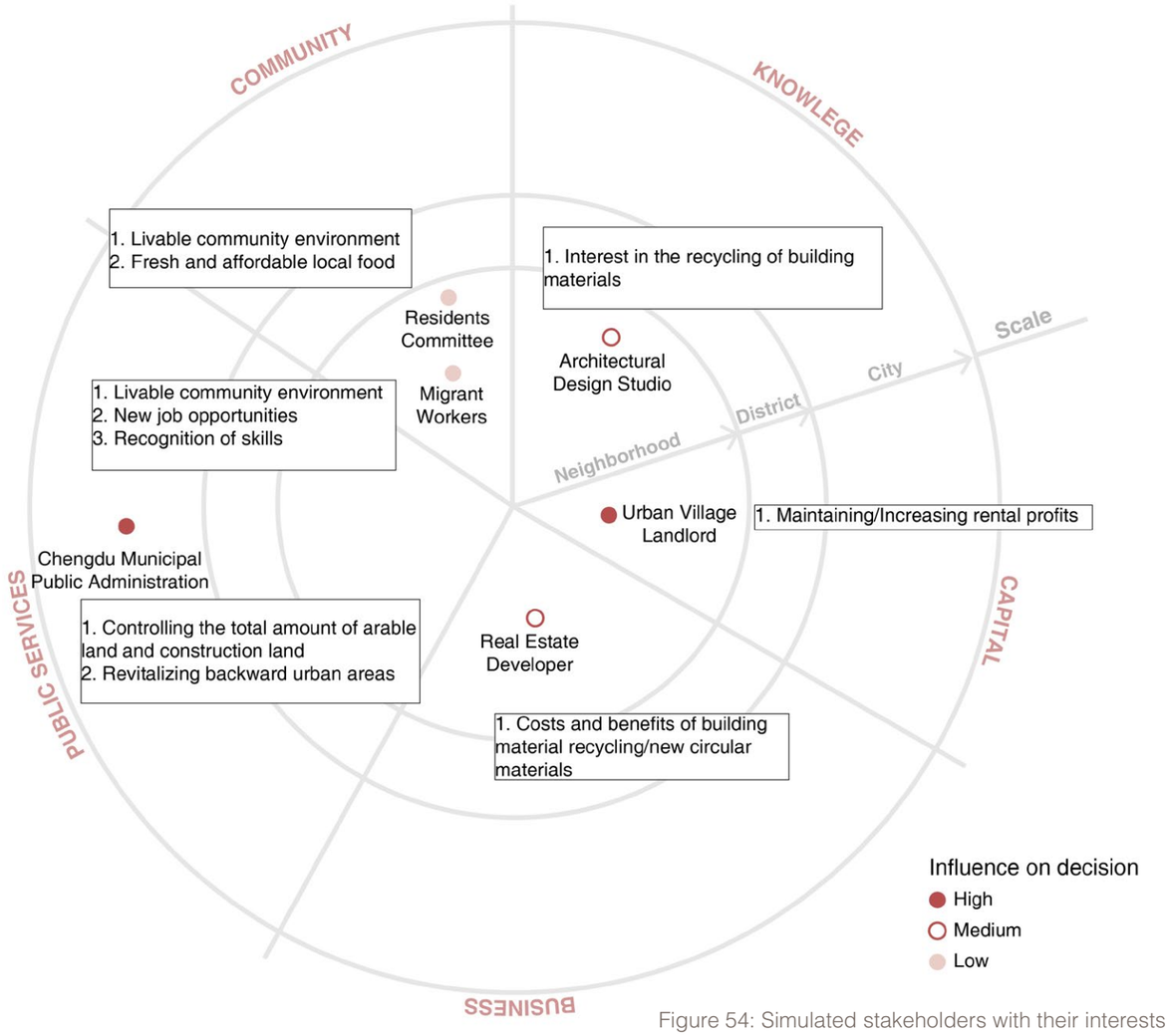


Figure 54: Simulated stakeholders with their interests
Made by author

Transitioning to a circular future is a complex and interdependent process that varies based on a series of values, stakeholders, and locations. Therefore, testing patterns with stakeholders to implement them effectively is crucial. In workshops, by selecting specific design sites and applying these patterns with stakeholders, the impacts of these patterns on spaces and people's lives become evident, and feedback for pattern improvement is gathered. In this project, the design workshop was simulated by six students participants from urbanism and architecture backgrounds, each role-playing different stakeholders to participate in the workshop.

The workshop was developed based on the "Foundries of Futures guidelines" (Hill, Adrian V (ed.), 2020, Chapter 5, Applications), and consisted of five stages: introduction, role selection, two open discussions, and one sketching session.

Introduction: This stage included a brief overview of the project and the theory of circular development, with a focus on the three types of materials that require circular design in this project. It also explained the purpose of the co-design workshop, the pattern language and its application, and the design sites that needed attention.

Role Selection: This part briefly introduced the six key stakeholders needed for simulation in the workshop, ensuring that at least one representative from each stakeholder category was present to reflect diverse group needs and voices. As illustrated, participants chose their roles based on their background knowledge and briefly described their potential interests in the circular process from their chosen roles' perspectives.

Figure 55: Three resources needed to establish circularity
Made by author

Open Discussion One: Prioritization of Establishing Circularity for Three Material Types

Participants deliberated whether there is a prioritization in establishing circularity for the three material types, aiming to first activate the potential of urban villages and attract external attention. Each participant initially expressed their views on the sequence of circularity from their perspective, followed by group discussions to reach a consensus.

Key points from the group discussions included:

1. **Short Food Supply System:**
Unanimously, all groups agreed that initiating a circular food supply system should be prioritized. For the community, local agricultural production brings additional income to migrant workers and fresh local food to nearby residents. For the government, reutilizing previously idle farmland aligns with national “food security” policies.

2. **Soil and Ecosystem Restoration:**
To establish a short food supply chain, restoration of local soil and ecosystems to enhance soil fertility should commence first. Moreover, removing construction debris from farmlands and prioritizing policies and practices for building remodeling and debris utilization were highlighted. The architectural community is particularly interested in local remodeling and the use of construction debris, as this represents opportunities for innovative, locally distinctive architectural designs. Developers responsible for building demolition (known as primary developers in China) show interest in recycling construction debris, as it allows them to profit from materials collected during demolition. However, developers responsible for new constructions (secondary developers) show less interest in debris reclaim and reuse, as it implies potential cost increases and the use of unfamiliar building materials.

3. **Food Waste:**
All stakeholders except the government considered food waste last. For migrant workers and local residents, the waste sorting process is cumbersome with minimal returns—agricultural fertilizer—while easily accessible artificial fertilizers offer a less burdensome alternative. Landlords are reluctant to use rentable spaces for community waste collection and sorting, although they have no objections if these activities occur on the streets.

In summary, while the transformation of the food supply chain can serve as a lever for local regeneration benefiting almost everyone, ecological regeneration activities, construction debris recycling, and building renovation should be prioritized to provide fertile and healthy soil for local food production. Once local production activities are underway, waste sorting and local composting should be encouraged through incentive and penalty mechanisms to provide organic fertilizer for the soil.

Figure 56: Participants used pattern cards for ordering and labeling.
Photograph by author

Open Discussion Two: Evaluation of Patterns

Participants reviewed pre-selected patterns that were classified into three categories corresponding to the types of material flows discussed:

Patterns of Food Flow:
- E3 Restoration of Surface Water System
- E5 Soil Regeneration
- S2 Public Face
- S3 Shared Productive Open Space
- EO1 Flexibly Occupied Streets
- EO6 Autonomous Management

Patterns of Food Waste Flow:
- R5 Multi-Scale Circular Infrastructure
- R9 Making Compost on Site
- R10 Local Collection Points for Sorting Waste
- R11 Neighborhood Circular Logistics Hub

Patterns of Debris:
- R6 Material Passports
- R7 Space for Storage
- R8 Building Debris Reclaim & Reuse
- S4 Prioritize Building Renovation
- S6 Get Attention by Art

Participants ranked these patterns based on the outcomes of the previous discussion and assessed whether the selected patterns were relevant. They examined if the titles and descriptions of the patterns were clear and discussed whether additional patterns were needed to facilitate circular transformation.

Three patterns were highlighted in this discussion for significant mentions:

1. **Modified R6 Material Passports:** Originally intended to allow architects and migrant workers to collaborate on a database to classify current construction debris and identify its reuse potential. However, terms like ‘passport’ and ‘database’ were unfamiliar to migrant workers, so it was replaced with ‘booklet’ to make the concept more accessible.

2. **Modified R7 Space for Storage:** This pattern aimed to find potential idle spaces near demolished communities for temporary storage and preliminary sorting of materials. The original name was vague and only mentioned storage, hence it was renamed to ‘Construction Debris Transfer Station’ for clarity.

3. **Added R13 Place-based Financial Levers:** Following the previous discussion, to encourage migrant workers to participate in waste sorting and attract secondary developers to use circular materials, some incentive mechanisms needed to be established. For instance, rewards such as rice and flour could be given to migrant worker families who comply with waste sorting and composting regulations monthly. Furthermore, new building regulations could be set for developers, such as the requirement to use at least 20% recyclable materials in new constructions.

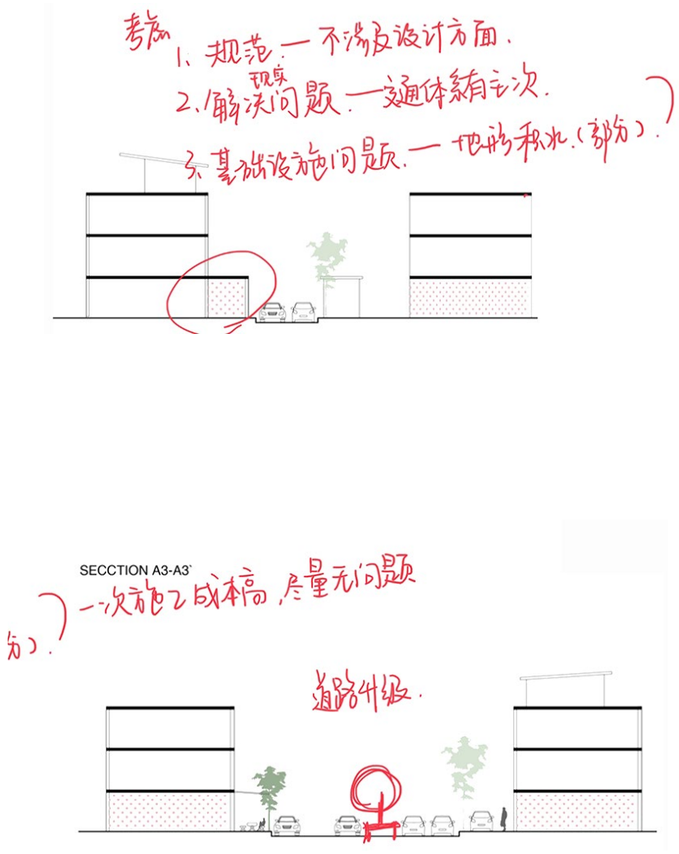


Figure 57: Drafts of plans and sections made by the participants
Photograph by author

Co-Design Session Three: Potential Applications and Spatial Forms for Patterns

Participants initially marked on the provided floor plans where circular practices could potentially take place. Using the modified patterns, they then described, through verbal descriptions or sketching, how these spaces would utilize specific patterns to facilitate material circulation.

Key residual spaces identified for discussion included:

Existing Farmlands, including dried irrigation channels:
Application of Patterns: Utilize E3 (Restoration of Surface Water System) and E5 (Soil Regeneration) for ecological restoration. Subsequently, use S3 (Shared Productive Open Space) to create community-operated shared farms.

Existing Farmhouses and Small Factories:
Application of Patterns: Transform these buildings into light food processing factories where raw materials from shared farms are processed simply (e.g., rice husking, canola oil pressing).

Wide Community Alleys and Idle Shops:
Application of Patterns: These alleys are currently used for parking; part of the idle shops could be transformed into parking facilities, thereby freeing up streets for placing outdoor waste sorting and composting bins.

Large Idle Factories:
Application of Patterns: Once remodeled, these could serve as excellent locations for construction debris transfer stations. Located away from main streets, these factories could be used for temporary storage and preliminary sorting of materials, with some materials that can be directly reused are collected and sold at a second-hand building materials market located near the street.

MICRO-SCALE DESIGN EXPLORATION

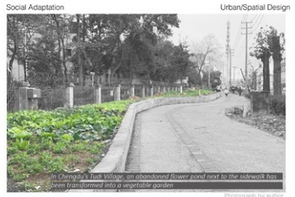
Anjing Urban Village Regeneration Co-design

Outcomes-Patterns

Shortest food supply chain

S3 SHARED PRODUCTIVE OPEN SPACE

Social Adaptation | Urban/Spatial Design



In Chengdu's Tuoli Village, an abandoned flower pond next to the sidewalk has been transformed into a vegetable garden

Photograph by author

Description
On vacant streets within the community, utilize construction debris to create food planting beds. This strategy enhances the utilization of over-looked spaces, formally integrates informal planting practices, and increases opportunities for local food access, thereby shortening the food supply chain.

Relation

Assessment

S2 PUBLIC FACE

Social Adaptation | Urban/Spatial Design

A store in a second-hand market in Leon, France, converted from a shipping container, which also serves as a display

Source: Douban (2018)

Description
To give recycling activities a public interface, such as entrances on main streets, increases community residents' understanding and interest in participation. Additionally, an attractive and vibrant public interface can also attract curiosity from outside residents and potential commercial investment.

Relation

Assessment

E3 RESTORATION OF SURFACE WATER SYSTEM

Ecological Regeneration | Urban/Spatial Design

Irrigation canals in a rural village in Meishan, Chengdu

Source: Xinhua News(2022)

Description
Restore the previously existing but now idle and dried irrigation channels from the original village within the urban village community. This restoration provides irrigation water for the community-shared farms and vegetable gardens. Around the water channels, a green belt of a certain width will be designed as a river buffer to protect the water source while simultaneously enhancing the living environment of the urban village.

Relation

Assessment

E5 SOIL REGENERATION

Ecological Regeneration | Urban/Spatial Design

Chengdu Green Belt, farmland undergoing soil restoration

Photograph by author

Description
Regenerate the soil in the idle agricultural fields surrounding informal residential areas. This includes removing weeds and clearing illegally dumped construction debris from the soil. Plant leguminous plants to enrich the soil, providing a healthy foundation for community farm development. Subsequent planting activities in the community farm should minimize external inputs, using organic fertilizers to continuously protect soil health.

Relation

Assessment

E01 FLEXIBLY OCCUPIED STREETS

Equal Opportunity for Development | Policy and people network

Street vendors outside a wet market in Chengdu during the Chinese New Year in 2024

Photograph by author

Description
In Chengdu, unlike other regions, urban village streets within informal residential areas are relatively wide, especially the main streets. Allowing street food vendors to set up stalls in these idle spaces facilitates the direct local sale of vegetables grown in community farms. This helps establish a local food supply chain, enhancing the accessibility of freshly grown produce within the community.

Relation

Assessment

E02 AUTONOMOUS MANAGEMENT

Equal Opportunity for Development | Policy and people network

The west courtyard community of Chengdu's Qingyanjian district organized residents to transform an unused garage roof into a shared vegetable garden, and some of the remaining products were given to poor households.

Source: Douban (2019)

Description
For certain idle lands and buildings, local residents are permitted to self-manage and engage in recycling activities, such as establishing community farms or temporarily storing usable construction debris like wood and windows. This approach helps facilitate the local circulation of resources, effectively shortening the resource recycling chain.

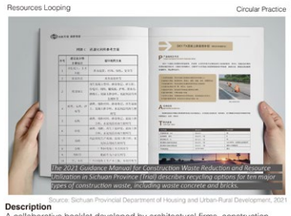
Relation

Assessment

No construction waste

R6 MATERIAL BOOKLET

Resources Looping | Circular Practice



The 2023 Guidance Manual for Construction Waste Reduction and Resource Utilization in Sichuan Province (Trial) describes recycling options for ten major types of construction waste, including waste concrete and bricks.

Source: Sichuan Provincial Department of Housing and Urban-Rural Development, 2021

Description
A collaborative booklet developed by architectural firms, construction companies, and migrant workers. It catalogs potential construction debris in urban villages to assess their recyclability and potential reuse options. Additionally, the booklet includes information on innovative recyclable materials made from agricultural waste, such as straw bricks. This helps to simplify the identification and effective use of reusable materials while enhancing understanding of innovative materials

Relation

Assessment

R7 CONSTRUCTION DEBRIS TRANSFER STATION

Resources Looping | Urban/Spatial Design | Circular Practice

A construction waste sorting facility built on a demolition site, Shanghai

Source: Green Environmental Waste Sorting Specialist, 2022

Description
Local community spaces are crucial for the onsite reuse of building debris, allowing for temporary storage and preliminary sorting of materials. Highly reusable items, such as glass and windows, are likely to be swiftly collected by local second-hand recyclers and experienced residents, facilitating efficient recycling practices.

Relation

Assessment

R8 BUILDING DEBRIS RECLAIM & REUSE

Resources Looping | Circular Practice

Hanoi's communist-period apartment buildings are being demolished to make way for new high-rise developments, leaving behind a mountain of rubble. Many residents are salvaging bricks from the debris to sell for reuse in construction projects.

Source: Circular Building Network, 2021

Description
maximizing the reuse of materials from demolished or structurally unsound buildings. Priority is given to directly reusing materials such as repurposing bricks for constructing planting beds. Where direct reuse is not feasible, materials like cement or bricks are crushed and repurposed for constructing roads, enhancing resource efficiency and reducing waste.

Relation

Assessment

S4 PRIORITISE BUILDING RENOVATION

Social Adaptation | Urban/Spatial Design

An exhibition hall and art plaza transformed from an abandoned factory building in Nantou urban village, Shenzhen

Source: URBANUS, 2018

Description
Renovating and repurposing existing buildings over constructing new ones to conserve resources. For instance, transforming abandoned factories into housing or office spaces supports sustainable development by utilizing existing structures and reducing environmental impact.

Relation

Assessment

S6 GET ATTENTION BY ART & BIENNIAL

Social Adaptation | Urban/Spatial Design

The 2017 Shenzhen Urbanism/Architecture Bi-City Biennale, themed "City Action", aims to explore how localized exhibitions from around the world embrace China's mode of urban creation in the context of globalization through works that integrate architecture, art, and design.

Source: URBANUS, 2018

Description
Engaging architectural firms in design exhibitions focused on urban village revitalization can explore innovative architectural transformations. These artistic and exploratory activities not only broaden the possibilities for urban village transformation but also attract external attention and potential investment, fostering community development and cultural enrichment.

Relation

Assessment

R13 PLACE-BASED FINANCIAL LEVERS

Resources Looping | Policy and people network

In Chengdu's Tongzi Yiyuan neighborhood, environmental protection companies work with the neighborhood to put in smart equipment that rewards points for cash withdrawals.

Source: Red Star News, 2019

Description
A mix of incentives and disincentives to influence behavior. Incentives, also known as 'carrots,' include tax breaks, low-threshold financing options, and stimulus funds. These are designed to attract real estate developers who may not initially prioritize using recyclable building materials. On the other hand, our disincentives or 'sticks,' aim to penalize developers who illegally dump building material waste. Additionally, this strategy encourages farmworkers to engage in waste separation

Relation

Assessment

No food waste

R5 MULTI-SCALE CIRCULAR INFRASTRUCTURE

Resources Looping | Circular Practice

Guangzhou Biomass Integrated Treatment Plant is the first comprehensive organic waste treatment project integrating food waste, animal solid waste, fecal waste treatment, biodiesel preparation and biogas power generation

Source: Ministry of Ecology and Environment of the People's Republic of China(2021)

Description
Integrated infrastructure systems at the neighborhood, regional, and city scales to help manage material flows (food, food waste, and construction debris) and promote more efficient reuse of resources.

Relation

Assessment

R9 MAKING COMPOST ON SITE

Resources Looping | Circular Practice

Neighborhood committee members in a community in Ningxia, China, are explaining how to use aerobic composting bins

Source: Tengxun News(2021)

Description
setting up designated areas within the community to compost organic waste. By composting food scraps and other biodegradable materials on site, the community can significantly reduce food waste. The resulting compost can be used to enrich the soil in local community gardens and farms, promoting sustainable agricultural practices and reducing the need for external fertilizers.

Relation

Assessment

R10 LOCAL COLLECTION POINTS OF SORTING WASTE

Resources Looping | Urban/Spatial Design

A waste segregation collection station equipped with a hand-washing sink and a resting room in Huizhong, Chengdu

Source: Tengxun News(2021)

Description
Implementing local collection points for sorting and recycling waste supports the direct local reuse of materials. These stations enable residents to sort their waste into categories such as plastics, metals, and food waste. This separation helps streamline recycling processes and ensures that food waste is specifically processed for composting, further reducing the community's environmental footprint and enhancing local waste management efficiency.

Relation

Assessment

R11 NEIGHBORHOOD CIRCULAR LOGISTICS HUB

Resources Looping | Circular Practice

Yogo, a community center for furniture reuse, second-hand furniture transfer, and surplus food distribution in a small community converted from unused rooms.

Source: Extreme Lassa(2019)

Description
Each community will establish a circular logistics hub to prevent food waste by housing a community refrigerator. This hub facilitates the redistribution of surplus food, reducing waste. Additionally, it will be equipped with various repair tools and workshops to assist local residents in handling and repurposing collected recyclable building materials.

Relation

Assessment

R13 PLACE-BASED FINANCIAL LEVERS

Resources Looping | Policy and people network

In Chengdu's Tongzi Yiyuan neighborhood, environmental protection companies work with the neighborhood to put in smart equipment that rewards points for cash withdrawals.

Source: Red Star News, 2019

Description
A mix of incentives and disincentives to influence behavior. Incentives, also known as 'carrots,' include tax breaks, low-threshold financing options, and stimulus funds. These are designed to attract real estate developers who may not initially prioritize using recyclable building materials. On the other hand, our disincentives or 'sticks,' aim to penalize developers who illegally dump building material waste. Additionally, this strategy encourages farmworkers to engage in waste separation

Relation

Assessment

Patterns added

More precise title/description

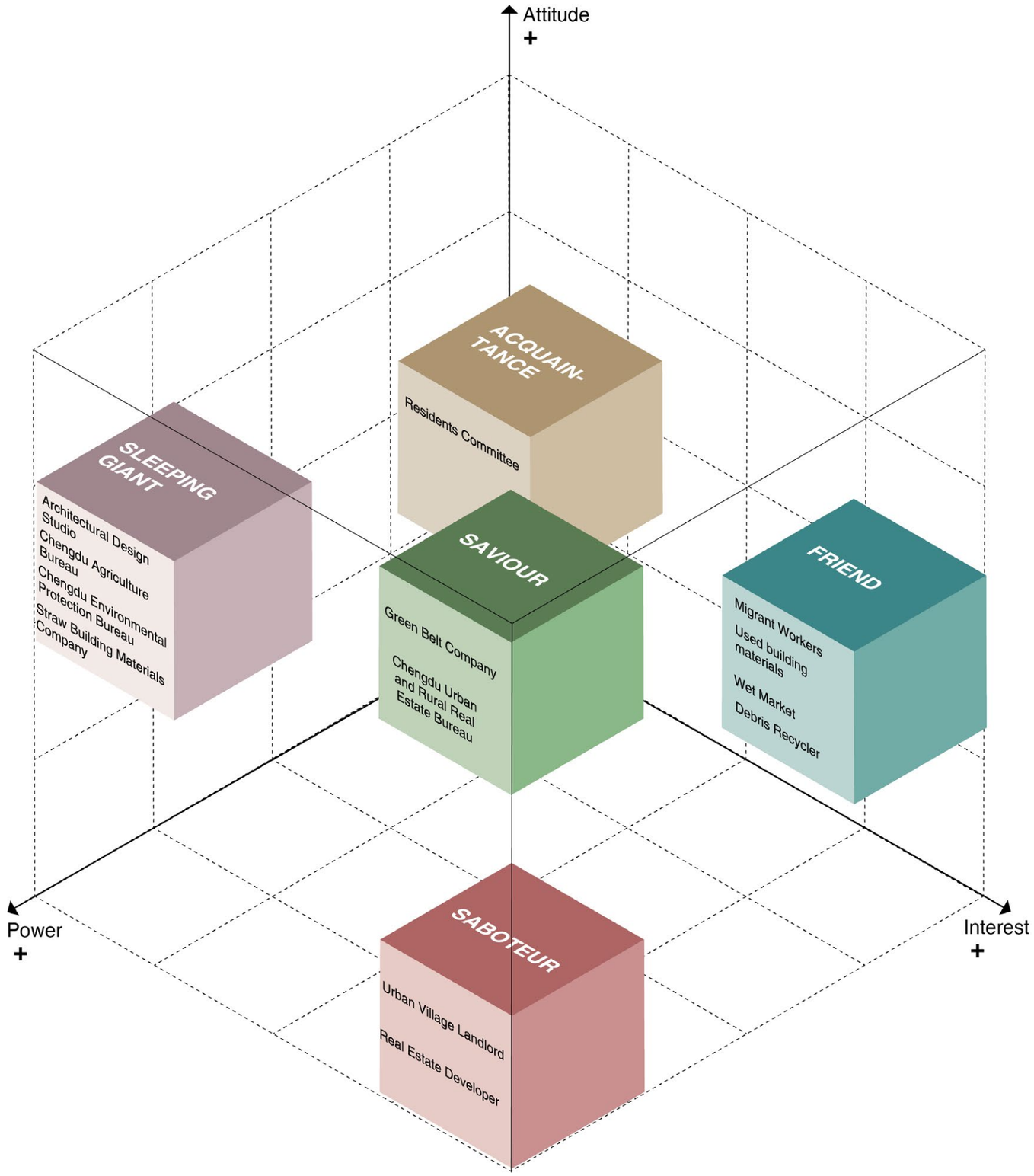
The patterns selected by stakeholders, which need to be applied first, are shown in the diagram. They are categorized according to three types of material flows. These patterns have been modified and expanded based on feedback received during the workshop

All patterns are available in extra file 'pattern book'

MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Outcomes-power-interest analysis



Saviour - powerful, high interest, positive attitude, the savior in this micro scale design is mainly the Green Belt Company which holds the right to manage the farmland and needs to promote the reclamation of the farmland and the Chengdu Urban and Rural Real Estate Bureau which is responsible for the regeneration of the housing area of the urban villages. Chengdu Urban and Rural Real Estate Bureau, which is responsible for the regeneration of housing areas in urban villages, needs to transform the backward areas of the city. Their needs need to be met so that they are on the same side of the cycle of transformation in the urban villages of Anjing.

Friend - low power, high interest, positive attitude for migrant workers, and wet market for local food distribution in the area, and Used building materials market and Debris Recycling for recycling and selling construction debris. market and Debris Recycler. they can benefit from the recycling transition and now have some experience of facilitating resource looping.

Saboteur - powertul, high interest, negative attitude for Urban Village Landlord, who hold the land use rights and Real Estate Developer, who hold the capital and experience in real estate development. They have benefited from the previous urban renewal of real estate development, and therefore the push for a recycled urban village transformation that focuses on housing renovation and requires the use of recycled building materials that are more expensive and complex to construct will be met with rejection from them.

Sleeping Giant - powerful, low interest, positive attitude is a leading provider of recycled building material design technology for Architectural Design Studio, innovative building material development for Straw Building Materials Company, and a supply chain management program for urban agricultural products for the Straw Building Materials Company. We can see that there are two kinds of sleeping giants, one is the enterprise that masters recycling technology, and the other is the government that has the power to issue policies. They need to be engaged in order to awaken them.

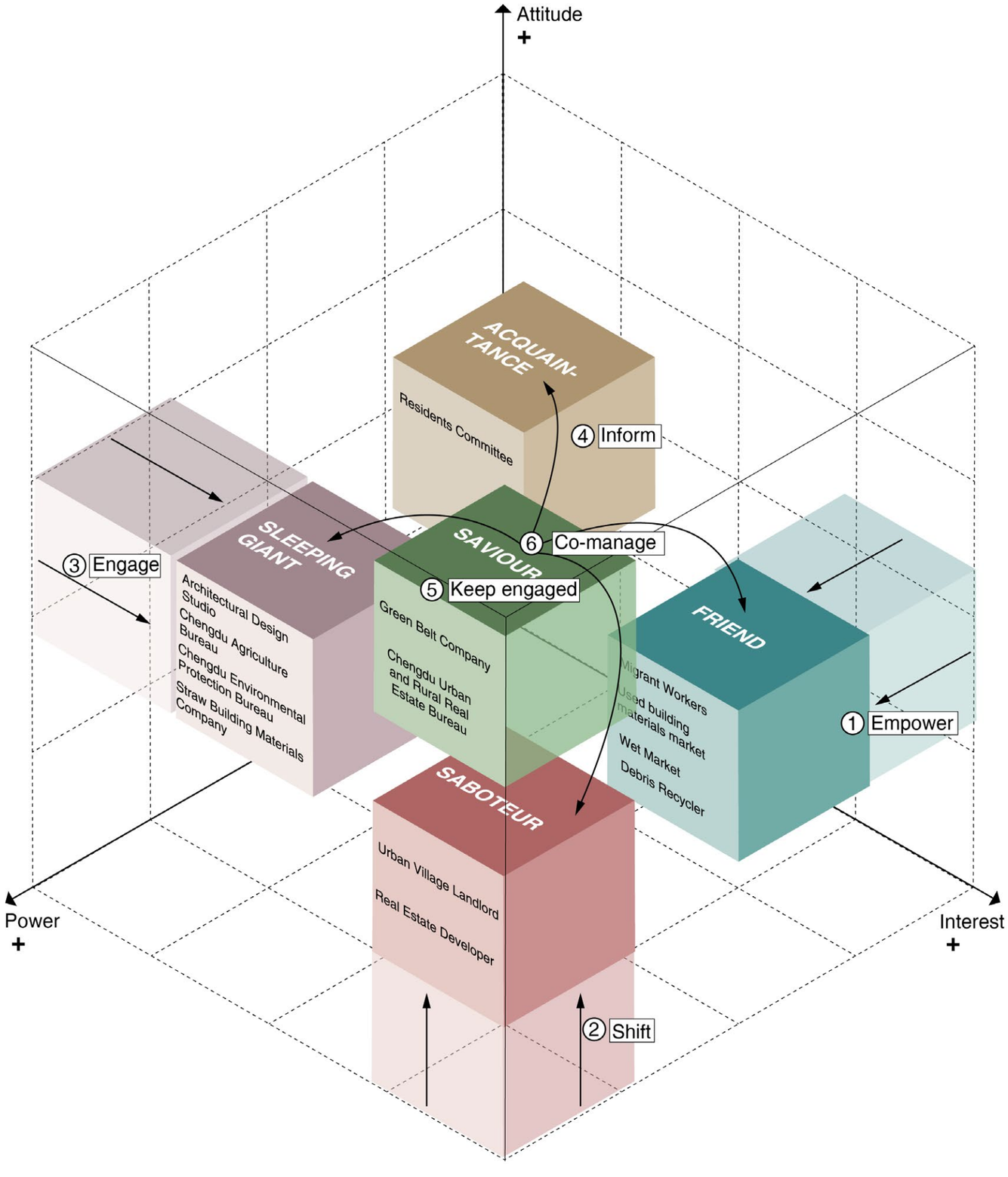
Acquaintance - low power, low interest, positive attitude, refers to the tenants of non-urban village neighborhoods in anjing. They are not very engaged in the transition but are potentially attracted to the transition because of the organic and accessible local food, they are also part of the anjing street and need to be informed and kept informed about the transition.

Figure 58: Curret power-interest grid
Made by author

MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Outcomes-power-interest analysis



① Empower

- EO1 Flexibly Occupied Streets
- EO2 Transparent Information Platform
- EO4 Accessible Knowledge Platforms
- EO6 Autonomous Management
- EO8 Diverse Civil Sector

② Shift

- EO5 Place-based Financial Levers
- S4 Prioritise Building Renovation

③ Engage

- S5 New Adaptive Buildings
- R2 Similar Industry Cluster
- R5 Multi-Scale Circular Infrastructure
- R12 Incentives for Research & Development

④ Inform

- S1 Farming for Public Learing
- S2 Public Face

⑤ Keep engaged

- R3 Belt Logistics Center

⑥ Co-manage

- EO2 Transparent Information Platform
- EO7 Community Planning Consultants

Figure 59: Future power-interest grid
Made by author

MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Outcomes-Timeline

DROP
Establishing pilots, policy implementation, and initiating scientific research.

RIPPLE
Expanding the infrastructure for resource recycle and broader adoption of circular practices throughout the green belt area, with an increased use of innovative circuar construction materials.

WAVE
complete integration of circular transformation within the green belt and its extension to the wider Chengdu area, enhancing the urban ecosystem, improving livability.

2025 2030 2035 2040 2045 2050

China's Fourteenth Five-Year Plan(2020-2025)
National recycling rate of crop straw: 86%
National recycling rate of construction waste:60%

Chengdu Master Plan (2024-2040)
Completion of urban village regeneration and greenway farmland restoration within the central city area

Multi-Scale waste management facilities R5
Development of food waste recycling and transfer stations at the city and district levels.

Material Passports R6
Identify existing debris and propose potential reuse options
Experimentation and application of straw building materials

Incentives for Research & Development R12
R&D of straw building materials

Prioritise Building Renovation S4
Policy banning non-essential demolition
Significant reduction in non-essential demolitions within Chengdu
Renovation of abandoned buildings for circular transition

Soil Regeneration E5
Removing debris from abandoned farmland
Minimum external input (artificial fertilizer)
Healthy soil
Plants grown for fertile soil (legumes)

Macro scale

Get Attention by Art & Biennial S6
Invitation to architects for urban village renovation and exhibition
Attracting the attention of residents, architects and artists nationwide to circular regeneration

Public Face S2
Train station plaza and circular showcase avenue created to attract tourists

Restoration of Surface Water System E3
Restoration of old irrigation canals
Establishment of buffer zones for canals
Rich irrigation canal system to provide water for agriculture and livability

Building Debris Reclaim & Reuse R8
Reuse of construction debris in renovation and new construction
Promote future new construction for reuse of debris

Community Planning Consultants EO7
Arranging for a planner in each village to provide planning advice and identify local cultural characteristics.

Diverse Civil Sector EO8
Establishment of migrant worker resident committees
Organize residents' meetings to listen to local views

Meso scale

Shared Productive Open Space S3
Conversion of some abandoned ground floor stores into garages
Set up community vegetable gardens in alleys

Construction debris transfer station R7
Sorting and temporary storage of necessary demolition operations and existing construction debris
Promote future demolition projects for collecting recyclable materials

Making Compost on Site R9
Set up composting bins and small composting sites in the community
Influence nearby communities to set up similar composting facilities
Encourage residents to segregate food waste

Local Collection Points of Sorting Waste R10
Set up composting bins and small composting sites in the community

Neighborhood Circular Logistics Hub R11
Set up committee offices in each urban village
Food sharing refrigerators
Material repair studio
Influence nearby communities to set up similar food sharing/repair facilities

Place-based Financial Levers R12
Incentives and punishment for waste separation
Incentives for the use of circular materials in new construction

Flexibly Occupied Streets EO1
Release suitable locations on streets to allow street vendors
Vibrant Food Alley Attracts Tourists

Autonomous Management EO6
Opening up some of the agricultural land around urban villages to allow private contracting
Pick-your-own farms, providing visitors with access to agriculture

Micro scale

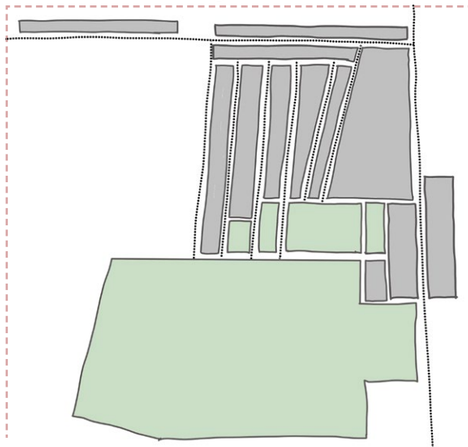
Figure 60: Timeline for Pattern Implementation
Made by author

MICRO-SCALE DESIGN EXPLORATION

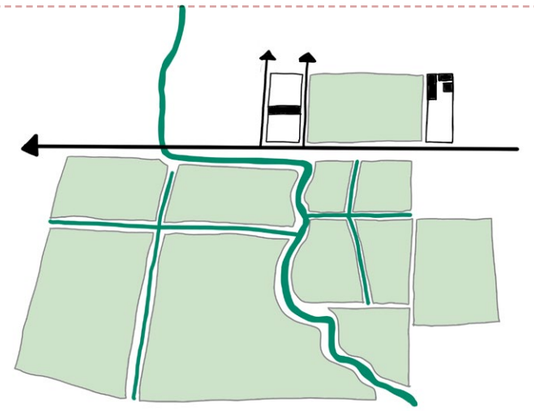
Anjing Urban Village Regeneration Co-design

Outcomes-Phasing

Phase 1



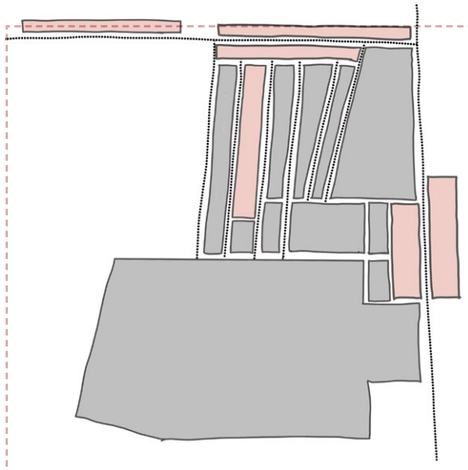
Farmland & Irrigation Canal Restoration.



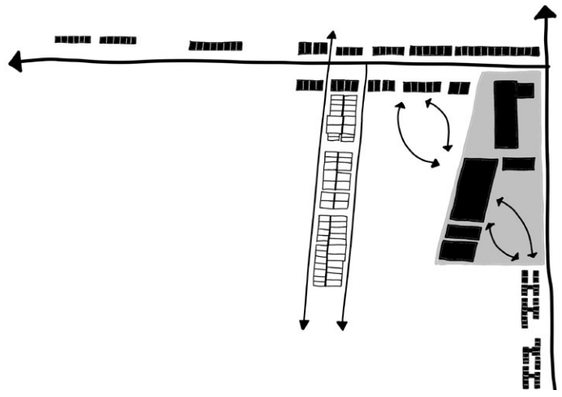
Establish small food processing plants to handle locally harvested produce.

Create educational farms on unused land around existing primary schools to encourage children to engage with agricultural production.

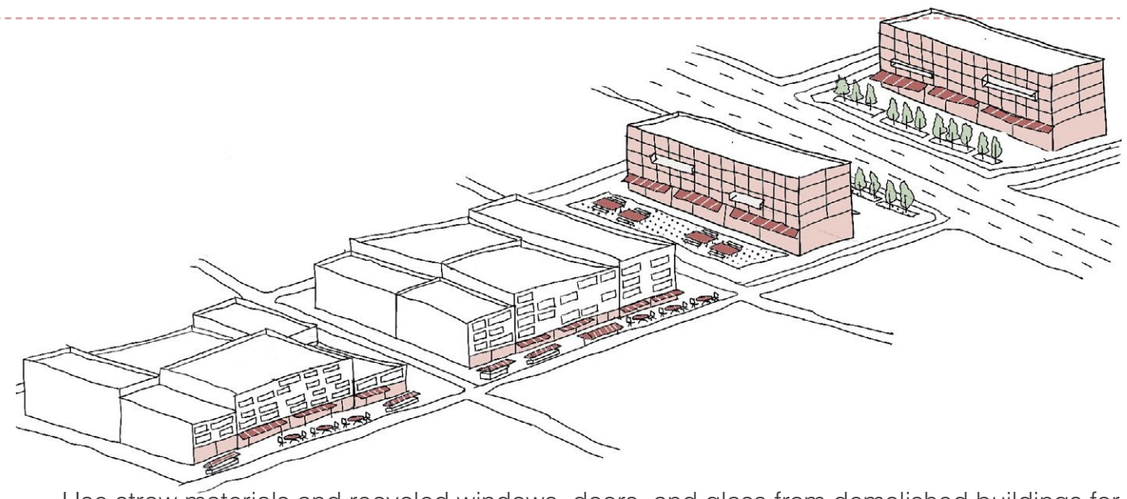
Phase 2



Develop a commercial atmosphere on main streets.

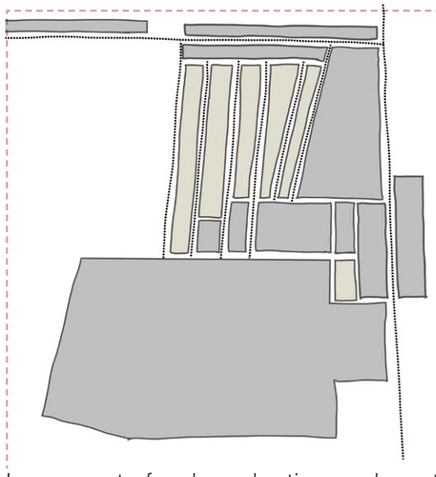


Demolish poorly constructed buildings and renovate aesthetically unpleasing structures along main streets. Process construction debris locally, reusing some materials directly in new constructions.

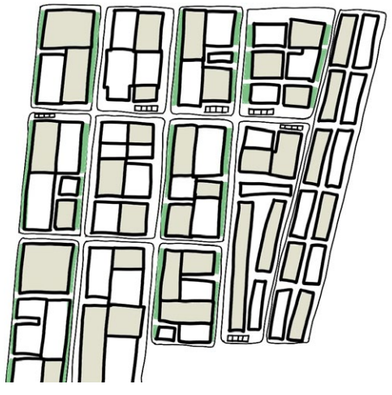


Use straw materials and recycled windows, doors, and glass from demolished buildings for the facades of ground-floor shops. Clearing illegal parking from streets creates opportunities for street vending.

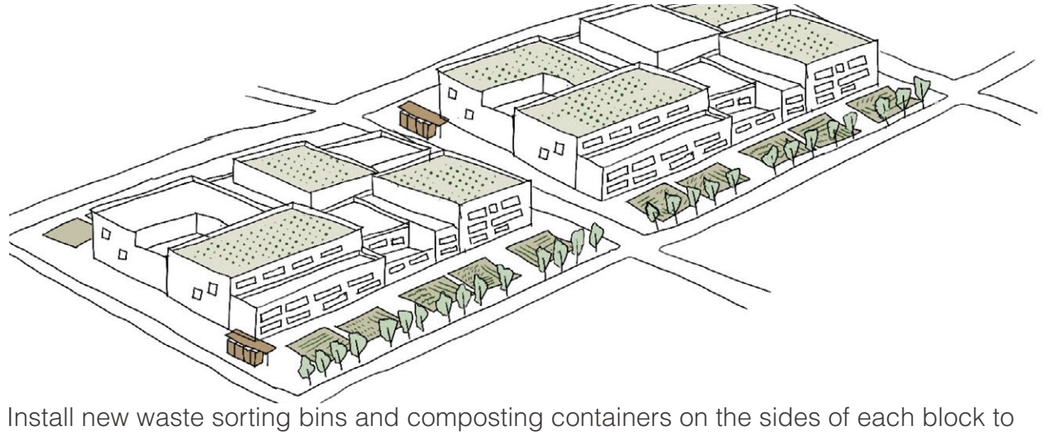
Phase 3



Incorporate food production and waste recycling within residential areas.



Relocate street parking to newly built parking lots, freeing up space for doorstep vegetable gardens. Remove illegal rooftop structures, converting suitable rooftops into vegetable gardens.

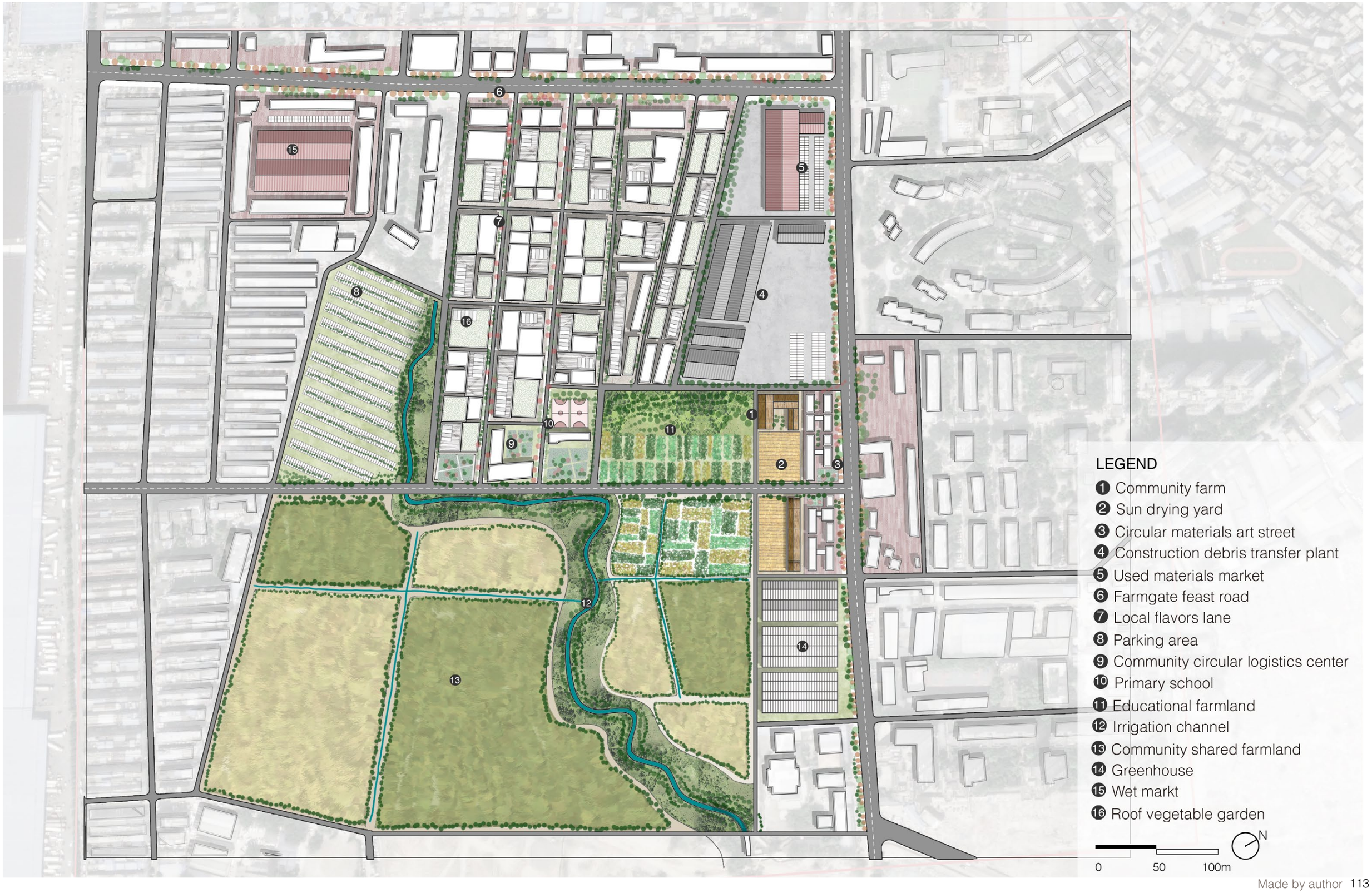


Install new waste sorting bins and composting containers on the sides of each block to facilitate waste management and recycling.

MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Master plan



MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Outcomes-spatial design

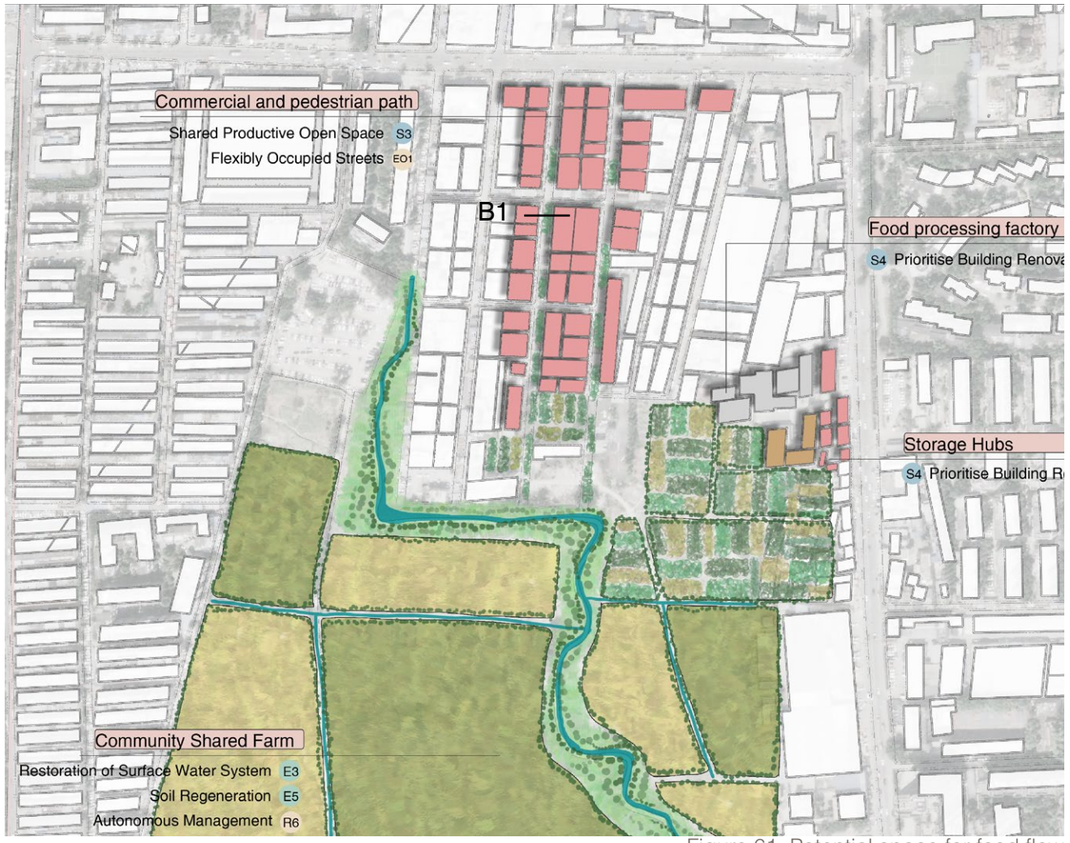
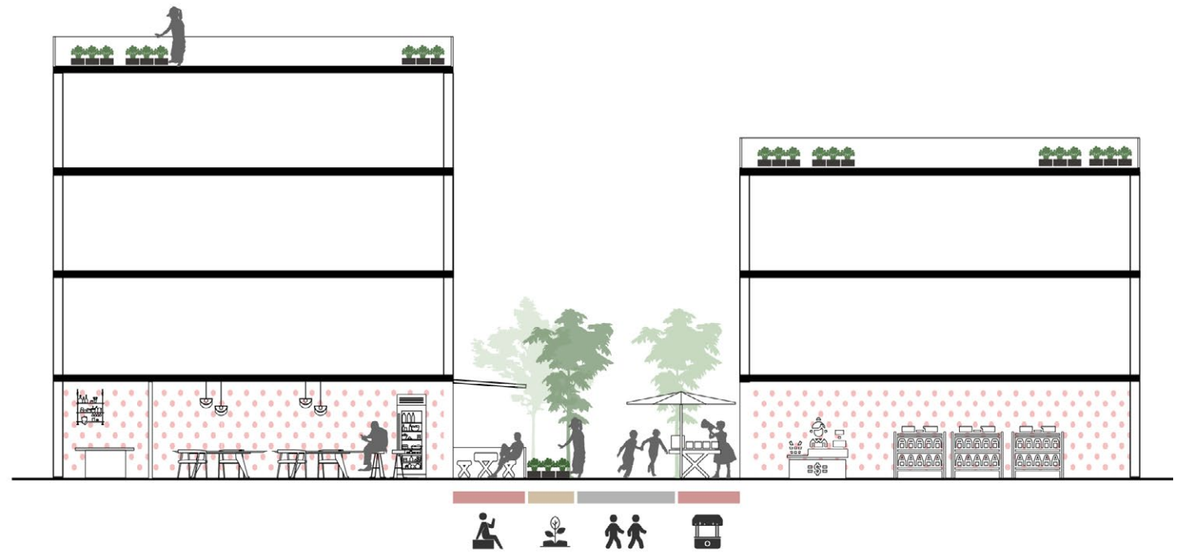


Figure 61: Potential space for food flow
Made by author

Based on the results of discussions in the workshop, potential sites for circular practice are illustrated in the diagram, categorized according to the three types of material flows.

Food Flow:

This includes vegetables, grains, oil crops, and lightly processed foods. Streets in informal communities are first categorized, with more centrally located streets and ground-floor shops along the street designated for commercial and pedestrian use. Vehicles previously parked on these streets are relocated, freeing up space for home harvest gardens. Previously idle farmlands, after soil restoration and canal rehabilitation, are converted into community-shared vegetable gardens and croplands. Some abandoned farmhouses are renovated to store farming tools and temporarily hold harvested crops. Small, abandoned factories are transformed into small-scale food processing workshops, while shops along main streets handle sales of surplus products from surrounding communities.

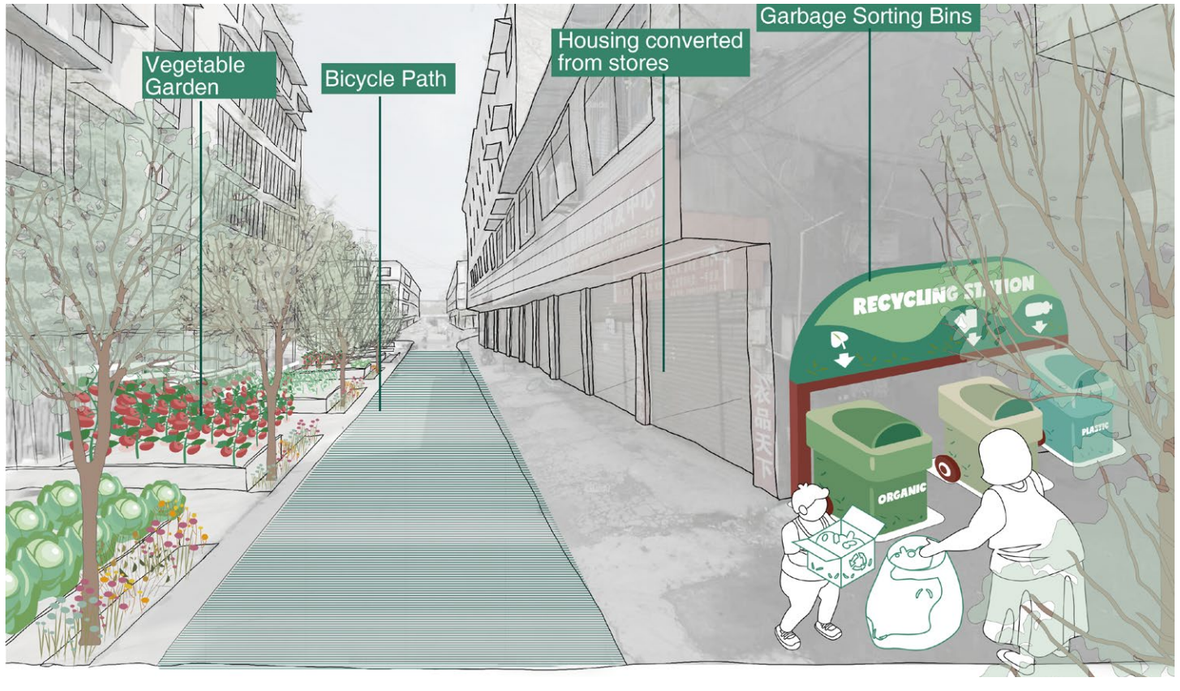


MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Outcomes-spatial design

Figure 62: Potential space for food waste flow
Made by author



Food Waste Flow:

The previous street parking on the street at the edge of the community was shifted to a newly constructed parking lot, thus freeing up some street space for waste sorting bins that serve the community. Considering the potential odor, green barriers are placed around the collection bins, with accessible entrances for vehicles and pedestrians. An abandoned private kindergarten is repurposed as the community's circular logistics center, which also houses the neighborhood committee office. This center hosts a community-shared fridge for exchanging leftover food.
A small open area northeast of the logistics center is set up as an open composting site for agricultural waste from the fields, with sufficient greenery for screening.

MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Outcomes-spatial design

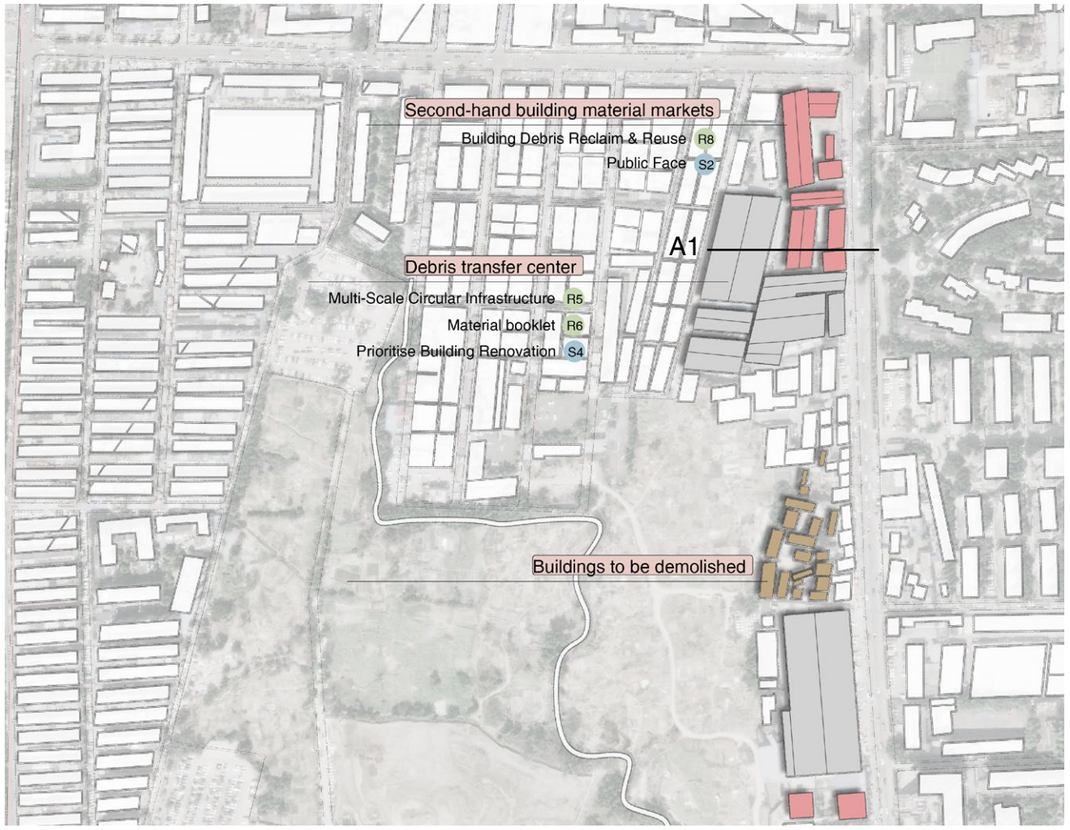
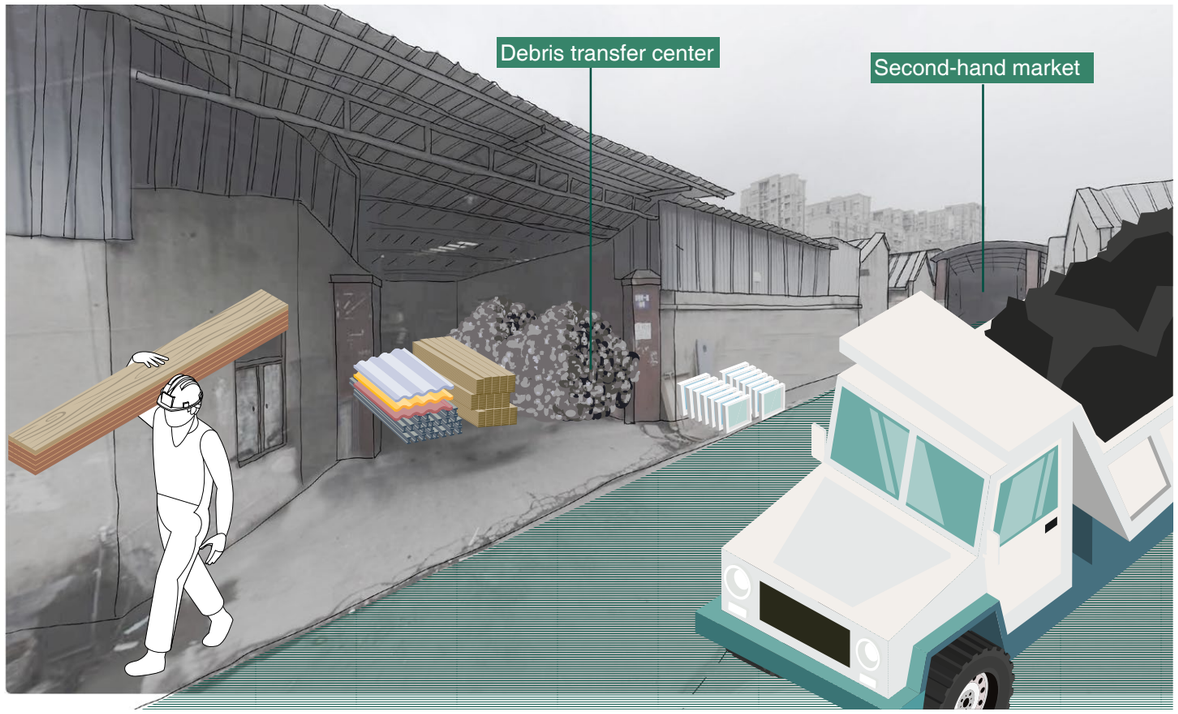


Figure 63: Potential space for construction debris flow
Made by author



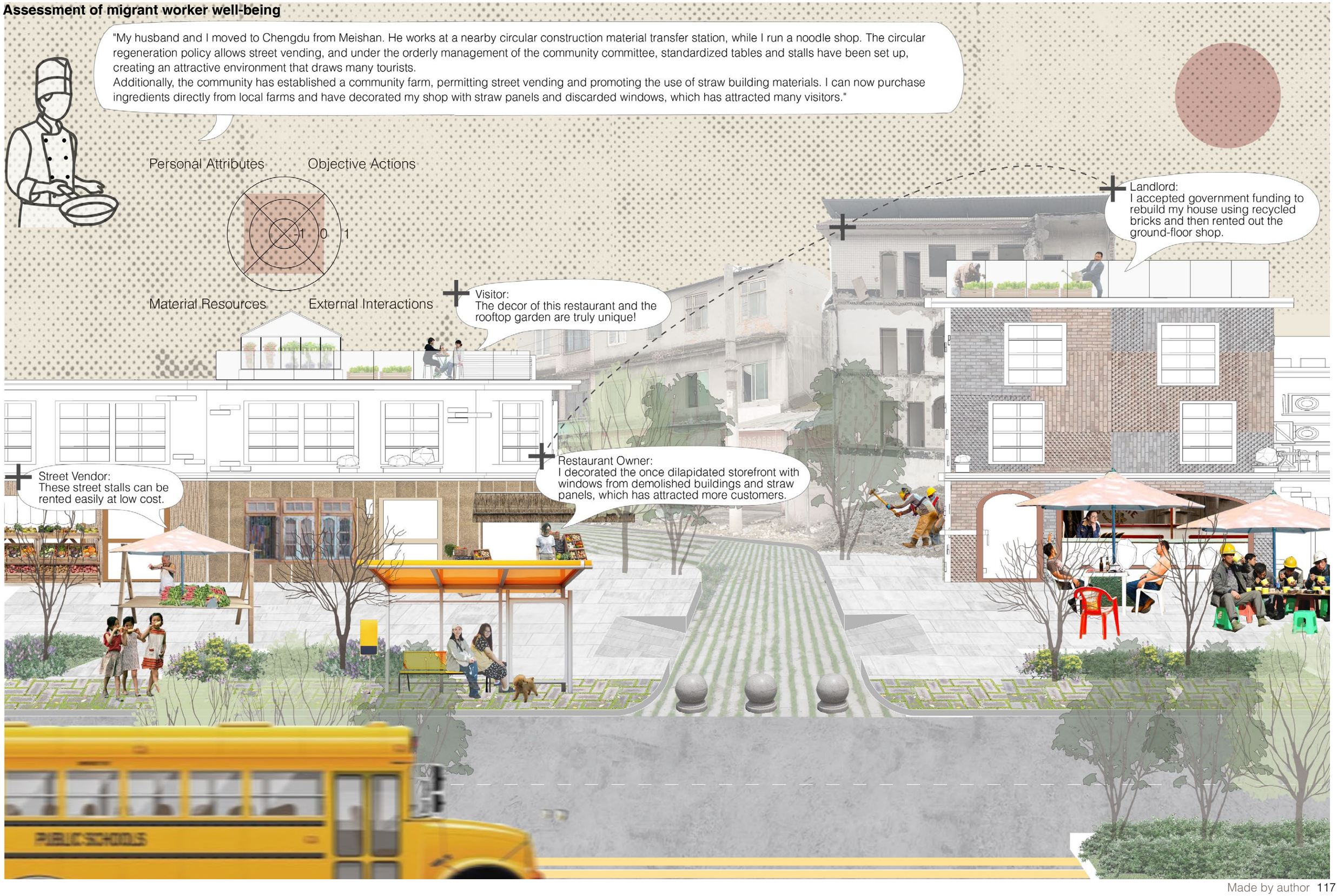
Construction Debris Flow:

This includes hard-to-reuse materials like cement and broken bricks, along with reusable materials like wooden window frames. Construction debris primarily arises from necessary demolitions of structurally unsound farmhouses in Anjing urban village and surrounding communities, including many informal constructions. These demolished materials are first sent to a nearby debris transfer center for preliminary sorting. Materials that can be directly reused are processed and repaired, then sold at nearby second-hand building material markets, while other materials are sent to a debris reclaim factory for further processing. Some shops along the main streets can be renovated using locally produced recycled materials.

MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

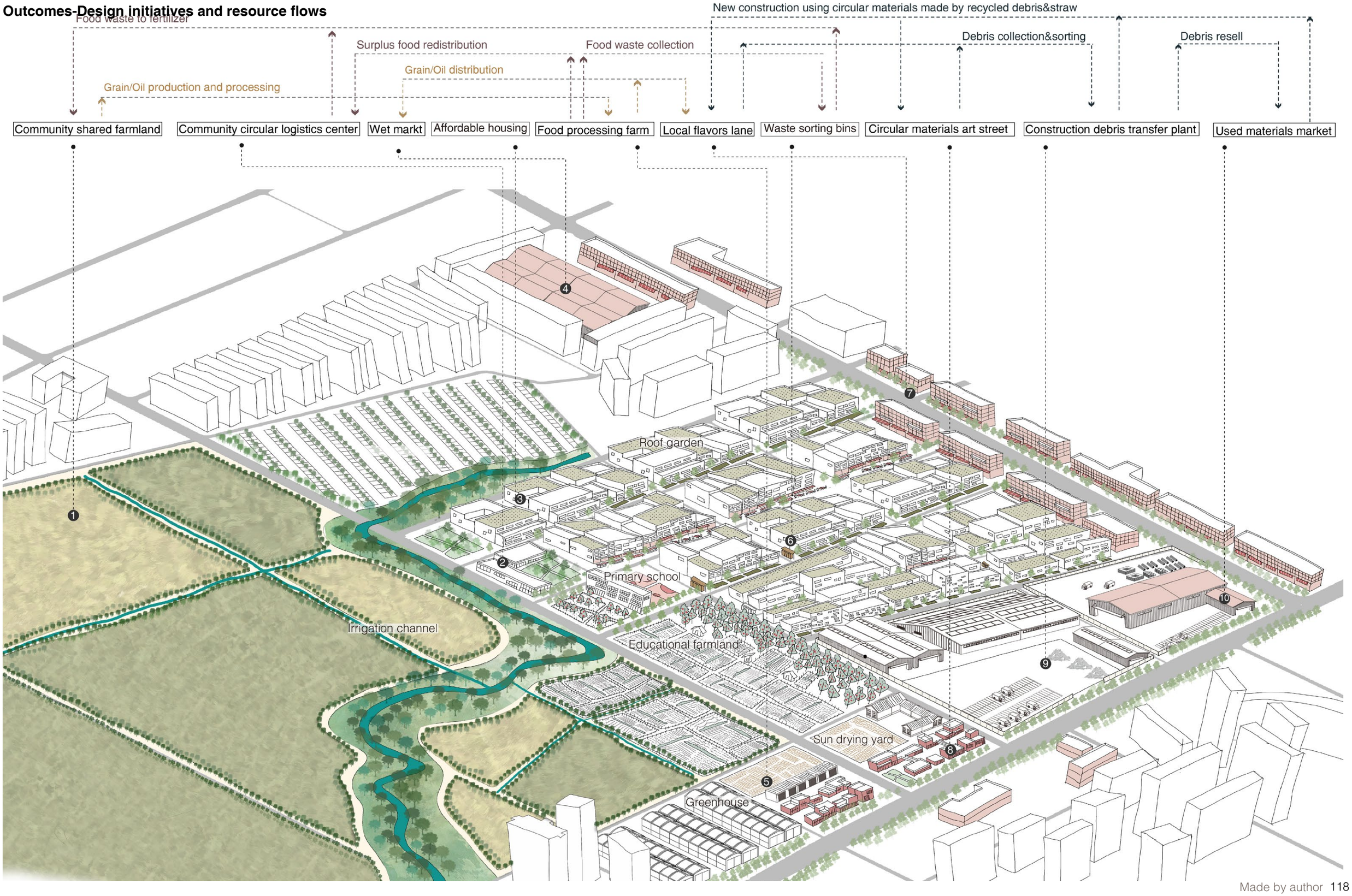
Assessment of migrant worker well-being



MICRO-SCALE DESIGN EXPLORATION

Anjing Urban Village Regeneration Co-design

Outcomes-Design initiatives and resource flows



10 REFLECTION

10.1 Conclusion 118
10.2 Reflection 121
Relation between project topic and Urbanism.
The interrelationship between research and design
The value of way of working
The academic and societal value
Ethical aspects
Transferability

Figure 64: Vegetable garden in front of abandoned shop in Chengdu's urban villages
Source: Photograph by the author

REFLECTION
10.1 Conclusion

SQ1:
What are the foodscapes of the short-distance food flows that migrant workers engage in?

The analysis of Chengdu's urban master plans shows that the urban planning system mirrors the city's shifting development goals and key industries, evolving from agriculture to industry, and now to real estate and services. Urban villages, with their extensive farmlands and factories, were tolerated during the industrial era but are now excluded from planning considerations as they no longer align with the city's development objectives. These areas, often located outside primary urban planning zones, are being relocated or demolished.

This project examines stakeholder relationships in the ongoing renewal of urban villages in China, revealing how migrant workers, labeled as "urban outsiders," are excluded from decision-making processes and planning considerations. This exclusion is driven by the collaboration between landlords, real estate developers, and public urban planning departments involved in new housing projects. The project highlights a critical issue: migrant workers, the main residents of urban villages, lack the necessary procedures and platforms to participate in regeneration planning, denying them the opportunity to express their opinions and needs.

SQ2:
What are the foodscapes of the short-distance food flows that migrant workers engage in?

In the demographic structure of migrant worker families, middle-aged couples often take on temporary jobs. During difficult employment periods, to save on household expenses, they utilize unmonitored idle farmland, land designated for housing development, and leftover street spaces near urban villages for farming, selling their produce in nearby bustling wet markets or street stalls. In Chengdu's green belt, migrant workers reside in three types of urban villages categorized by land use structure: Village Typology 1—Village + small-scale factory + farmland, Urban Village Typology 2—Urban village + large-scale factories + fragmented farmland, Urban Village Typology 3—Urban village + land under construction + residential land. Depending on the type of urban village, the food-related activities of migrant workers vary, creating distinct foodscapes.

In Typology 1, workers primarily use large areas of idle farmland for extensive farming. The diversity of industries, including food processing factories within some villages, provides employment opportunities within these factories. The foodscapes include: ①Production space: Unused Farmland ②Production space: Existing farmland ③Production Space: Vegetable Growing Boxes Made from Reused Waste ④Processing space: large-scale factory with good building quality ⑤Processing space: middle-scale factory with poor building quality

In Typology 2, densely populated informal communities, small food shops, and wet markets are prevalent, along with some small-scale idle farmland. Migrant workers mainly use these small residual spaces for cultivation, with food distribution and consumption activities being more vibrant. The foodscapes involve:①Production space: Vegetable Plots on Unused Flower Bed ②Production space: Roof Vegetable Garden ③Distribution space: Permanent stalls inside the market ④Distribution space: Temporary stalls outside the market ⑤Consumption space: Street food vendors ⑥Consumption space: Vegetable store

In Typology 3, as urban villages and factories are demolished and modern residential complexes emerge, migrant workers begin to cultivate on lands designated for housing construction and unmonitored green spaces around various infrastructures. The foodscapes involve: ①Production space: Community-sponsored farmland on land waiting for construction ②Consumption space: Community-sponsored farmland on transportation buffer zone

REFLECTION
10.1 Conclusion

SQ3:
What intervention can transform the food system in Chengdu's green buffer zone into a circular model that addresses the degradation of urban ecosystems and effectively integrates marginalized communities?

Before introducing specific interventions (How), the Vision is first established as an imagination of a circular transformation (What). The goal of transforming Chengdu's Greenway Food System into a circular one includes four dimensions: social adaptation, resource looping, ecological regeneration, and equal opportunities for development. Four types of landscapes, a Greenway farmland and three types of urban villages, are envisioned under these guiding objectives to transform into a Circular Agricultural Park, Circular Technology Park, Circular Production and Consumption Town, and Circular Living Neighborhood, focusing on large-scale food production and agricultural education, food processing and waste recycling, community-based small-scale food cultivation and consumption, and recyclable housing construction, respectively.

Pattern Field, as presented on page 83, serves as the form of this project's strategy, aiding the realization of the Vision. It is generated through envisioning the necessary conditions for the Vision, literature review, case studies, interviews, and research by design. It is categorized into four major groups according to the four dimensions of the goal, with 12 strategies under the resource looping category aimed at establishing the necessary infrastructure, policy environment, and reserves of recycling technologies. Eight strategies under social adaptation focus on identifying urban residual spaces for recycling activities and engaging public interest and participation in the transformation. Five strategies under ecological regeneration emphasize the restoration and sustainability of water systems, soil, and biodiversity, providing the necessary ecological conditions for food production and enhancing the livability of urban environments. Seven strategies under equal opportunity for development are designed for migrant workers, aimed at creating equitable learning and working environments from a distributive justice perspective, ensuring that marginalized groups share the benefits of the city's transformation towards circularity, and guaranteeing a just transition.

SQ4:
What intervention can transform the food system in Chengdu's green buffer zone into a circular model that addresses the degradation of urban ecosystems and effectively integrates marginalized communities?

The transition to a circular food system at the urban scale brings ecological, economic, and social impacts to urban villages.

Ecologically, rehabilitating farmlands and restoring irrigation channels with buffer woodlands significantly enhance the livability of urban villages and their surrounding areas. This ecological intervention addresses soil degradation by removing construction debris from idle farmlands, thus mitigating the need for large-scale demolitions and encouraging in-situ upgrades. Consequently, this approach ensures housing stability for migrant workers

Economically, the development of local food supply chains, food waste recycling, and construction debris sorting and reuse practices generate numerous job opportunities. Advocacy for fair employment practices, combined with the establishment of circular knowledge platforms at the urban scale, provides migrant workers with both job opportunities and the necessary knowledge to succeed in these roles. This fosters a more inclusive and equitable economic environment

Socially, emphasizing spatial adaptability by opening street spaces and idle lands to the public formalizes street vending and farming activities of migrant workers. This not only provides them with income opportunities and access to affordable local food but also integrates their contributions into the urban fabric. Additionally, public learning networks that highlight migrant workers' agricultural and recycling experiences enhance their social recognition and sense of achievement, fostering a more inclusive and cohesive community.

REFLECTION
10.1 Conclusion

SQ5:
How can urban villages utilize resources from circular local food systems for internal resource reuse in order to regenerate at the social, ecological, and economic perspective?

Based on the practical experience of this project, utilizing pattern cards to conduct co-design workshops with different groups of stakeholders is an effective approach. Bridging this gap requires efforts from the national public sector, local public sector, and the community.

National Public Sector:
The national public sector can eliminate biases against the informal status of migrant workers through the enactment and implementation of policies. These policies should mandate local governments to include migrant workers in urban renewal considerations and require impact assessments on migrant workers before policy implementation.

Local Public Sector:
Local public departments, especially urban planning departments, need to create collaborative platforms with migrant workers. This involves structuring frameworks that allow migrant worker participation in policy discussions. For instance, in this project, using patterns as communication tools in co-design workshops promotes interactive discussions between policymakers and migrant workers, ensuring their needs are heard.

Community Level:
At the community level, providing education and training for migrant workers is essential. This helps them understand the policy and planning processes and their rights and responsibilities, enabling them to play an active role in proposing local initiatives.

Relation between graduation project topic and Urbanism master track.

The relationship between my graduation design topic and the master's track in Urbanism at TU Delft focuses on "Urbanism as an interdisciplinary planning and design activity aimed at recreating sustainable urban landscapes that are adaptable to climate, circular in economy, socially equitable, and ecologically inclusive at all scales." This interdisciplinary and multi-scaled approach was a key reason for my choice to study here. Over two years, I've come to understand that Urbanism means developing a broad perspective that includes mastering urban planning and design and exploring all factors that impact spatial outcomes, such as public policy and technology. These elements affect planning differently at various urban scales, with public policy playing a significant role in macro-scale urban landscapes and technology impacting the lower scales.

My graduation project aligns well with my deep understanding of urbanism. In my project, I used the greenbelt area of Chengdu, China, as a case study to construct a policy and spatial strategy framework for transitioning to circularity. I also explored how this transition could promote the renewal of urban villages where migrant workers congregate. The research objectives closely align with the Urbanism master track's focus on circularity and social equity. In terms of research content and methodology, I employed an interdisciplinary approach, exploring public policy systems and sociological backgrounds relevant to the project. This included analyzing planning policies that integrate migrant workers into decision-making, conducting field surveys and interviews to understand the socio-geographical characteristics of migrant workers and urban villages, and organizing a collaborative design workshop with peers to obtain critical design feedback. The research outcomes were presented through a vision map at the urban scale, a spatial structure at the regional scale, and sectional drawings at the community scale, using various methods to convey the design intentions.

This graduation project demonstrates the characteristics of the urbanism discipline that I have learned and deeply appreciated at TU Delft: conducting interdisciplinary research across multiple scales to plan for a more sustainable urban future.

The interrelationship between research and design

My research and design processes are interdependent, and this intertwined relationship is most evident in the development of patterns as a strategy, which lies at the intersection of research and design.
The research framework, focusing on the well-being of migrant workers, introduces a social justice framework essential for considering urban regeneration and circular transition. It advocates for sustainable labor markets and public learning networks, integrating migrant workers into the planning process. This is reflected in patterns under the category "equal opportunities for development," proposing patterns such as "accessibility of labor market" and "accessible knowledge platform." In terms of spatial design, "accessibility of labor market" involves formalizing the informal labor markets currently present in urban villages, often characterized by factory recruiters operating stalls or posting job notices in community plazas. Formalization might include building dedicated labor market facilities or establishing agencies that specialize in posting job opportunities.
Furthermore, the evolution of spatial design also modifies patterns, with new patterns emerging in the design phase. For instance, in a co-design workshop, simulated migrant worker participants suggested a lack of interest in waste sorting due to minimal benefits, leading to the design of the "Place-based financial levers" pattern to encourage participation in waste sorting through incentives and penalties.

The value of my way of working (approach, used methods, used methodology)

Pattern language is a research method I'm glad to have focused on through an intensive course. It serves as a method that straddles both research and design, offering interdisciplinary value. Firstly, pattern language is a way to present design strategies, similar to a toolbox, offering replicable spatial design methods. However, it encompasses more systematic considerations, such as pre-design factors like policies and technological preparedness, which assist significantly in my project by allowing me to oscillate between abstract strategies like policy and circular practices, and tangible outcomes like spatial quality and people's behaviors.

For example, the "local collection points for sorting waste" pattern proposes the strategic placement of waste sorting bins in urban villages. Given that housing in these villages is privately owned and profit-driven, persuading landlords to dedicate shop space for public waste collection is challenging. However, these communities also have broad streets currently used for parking. Therefore, the proposal involves converting vacant shops into garages to meet landlords' rental expectations while situating waste bins in external street spaces.

The interdisciplinary value of pattern language also lies in its utility as a communication tool with various stakeholders. It demands the presentation of design intentions through intuitive titles, descriptions, and images. For instance, during a co-design workshop in this project, despite the complexity of the research framework and its multi-scalar nature, participants could easily grasp the conveyed design intents through pattern cards and efficiently suggest modifications.

Nevertheless, the pattern cards and the co-design workshop conducted have limitations. The workshop participants, all from architecture and urbanism backgrounds, simulated roles of different stakeholders, which may not accurately represent the true positions and opinions of such stakeholders. Moreover, although the pattern cards were revised based on feedback from the workshop and enhanced with photos for clearer visualization, the effectiveness of these patterns in conveying information in a real-world context, considering the educational backgrounds of migrant workers, remains uncertain.

The academic and societal value, scope and implication of my graduation project

Academic Value

1. Theoretical Framework Innovation

This project develops a cross-scale conceptual framework that creatively combines spatial justice, circular development, and urban regeneration to achieve the well-being of marginalized groups, elucidating their interrelationships.

a) Conceptual integration of Spatial Justice and Circular Development

This project utilizes Williams (2019) circular development framework, which encompasses the dimensions of looping, adapting, and regenerating. This framework extends beyond the traditional circular economy, which primarily focuses on economic performance, by providing a comprehensive approach that includes social, ecological, and economic dimensions essential for circular transformation. In this study, the framework was tested and validated, particularly within the context of the food system, which inherently involves complex interactions among ecological, economic, and social components. Specifically, the ecological regeneration of soils contaminated by construction debris was identified as a critical prerequisite for establishing a closed-loop system for food and waste resources within the city, emphasizing the necessity of ecological regeneration to support urban agricultural looping. Furthermore, the research highlighted the importance of raising public awareness, encouraging local food consumption habits, and integrating productive farmland back urban life. These social awareness components guided the design strategies aimed at creating socially sustainable food systems.

To address the well-being of migrant workers—a focal group in urban renewal initiatives—the project incorporated spatial justice theory within the circular development framework. This was based on Rocco (2023) interpretation of Fainstein (2010) and Soja (2010), which outlines three dimensions of spatial justice: distributive justice, procedural justice, and recognition justice. This integration highlighted the historically marginalized position of migrant workers in urban renewal actions and addressed the longstanding issue of underrepresentation of low-skilled, vulnerable groups in circular transformation discussions. The three dimensions of justice informed the development of an equitable planning process, ensuring fair distribution of both the burdens and benefits of circular transformation for these disadvantaged groups and provided them with the planning procedure and platform necessary to voice their needs.

Through this dual-framework approach, the research provided detailed guidance for strategy exploration. It demonstrated how integrating ecological, economic, and social considerations with principles of spatial justice can create more inclusive and sustainable urban regeneration strategy framework. This application not only validated the theoretical frameworks but also offered a structured approach for incorporating circular development and spatial justice into urban planning and design practices.

b) Interaction between Urban Regeneration and Circular Development

To illustrate the promotion of urban regeneration by circular development, the theoretical framework draws on the “incremental circularity” perspective by Cottino et al. (2022). It views city-scale circular transformation as a lever to promote community-scale urban regeneration, utilizing the opportunities for resource redistribution in circular transformation to introduce the necessary external resources (knowledge, financial support, technology, etc.) for the regeneration of marginalized communities. This innovative introduction of the circular development concept into the discussion of urban village regeneration addresses a research gap, seldom explored in previous projects.
residents’ lives.

2. Adding Social Sustainability Discussion to Circular Development

Circular economy has been a hot topic in academic discussions in recent years, but it has faced numerous criticisms. The most prominent critique is that it overemphasizes technological innovation and change as drivers of sustainability. Although designed as a win-win solution for the economy, environment, and society, its social impacts are often simplified to macroeconomic indicators based on wealth creation, such as job creation (Aguilar-Hernandez et al., 2021). It rarely addresses complex challenges essential to social sustainability, such as intergenerational and intragenerational equity, justice, and human rights (Murray et al., 2015).
This project adds a social dimension to circular development in two key ways:

a) First, following Clube and Tennant (2023) and Cardoso et al. (2021), the project introduces
Max-Neef’s (1989) human scale well-being framework, defining the well-being of marginalized groups as a key factor in the social sustainability of circular development. The project demonstrates how spatial planning and strategies can serve as tools for distributing urban resources to provide migrant workers with the external elements necessary for well-being: material resources and external interactions. For example, employment opportunities created through resources looping help vulnerable groups interact with a sustainable labor market, and public learning networks provided through social adaptation offer training to migrant workers, equipping them with knowledge as a resource for engaging in circular activities. Ecological regeneration actions, such as soil and water restoration, ensure healthy living and working environments. These external resources indirectly affect their internal resources, such as personal attributes and objective actions, enabling them to secure well-paying jobs.

b) Second, based on Mies and Gold (2021), the project defines the success of social sustainability in circular transformation as promoting communication and cooperation among five types of stakeholders: workers, organizations (or business), customers, local communities, and society (or the public sector). The project discusses this through stakeholder analysis. It lists the five types of stakeholders involved in the regional food system circular transformation and urban village circular regeneration, analyzing conflicts and collaborations to show how the highly cooperative and monopolistic circular actions of the government and enterprises cause conflicts between government departments and migrant workers, and between enterprises and communities. The project emphasizes the necessity of involving all stakeholders in the decision-making process. By analyzing the power-interest-attitude of stakeholders, the project explores their interests in circular transformation and builds a vision for cooperative stakeholder relationships, proposing practical strategies like empowerment, co-management, and inclusion.

The academic and societal value, scope and implication of my graduation project

3. Discussion of Circular Development in the Chinese Context

China's circular economy aims to enhance resource productivity and ecological efficiency to mitigate severe environmental pollution caused by rapid industrialization (Bleischwitz et al., 2022; Mathews & Tan, 2016; Su et al., 2013). Unlike European policies that emphasize consumption and product design, China's policy framework, while advocating for the principles of reduce, reuse, and recycle, places less emphasis on consumption patterns and more on industrial pollution and ecological sustainability, with less focus on broader social impacts (McDowall et al., 2017). This is partly because over half of China's manufacturing occurs in industrial parks and export zones, often away from everyday public life.

To address this gap and increase public engagement, this project adopts Williams' (2019) circular development framework, which emphasizes the creation of public learning networks to provide the knowledge needed for participation. By creating case studies based on food, food waste, and construction waste within Chengdu's greenbelt, this project explores the application of the circular development framework in the context of Chinese urban renewal initiatives, highlighting the issue of public participation—a topic previously unexamined in urban village renewal projects.

The circular transformation of China's construction and agriculture sectors lags behind that of the manufacturing and energy sectors (Bleischwitz et al., 2022). This lag is due to the complexity of stakeholders involved in housing and food issues, which require extensive understanding. Government and businesses alone cannot achieve this transformation. This project uses these sectors as case studies to provide innovative methods for identifying and incorporating more stakeholders in the transformation process, demonstrating the urgent need for broader stakeholder involvement in circular transformation. It calls on Chinese scholars to increase awareness of the circular development, especially in terms of social adaptation. However, it acknowledges that the circular development framework used is based on European experiences and needs adjustment and expansion to better suit China's conditions.

Notably, no one else has worked on these issues within the Chinese context before. While Chinese studies on the circular economy define circular economy in a manner focusing on resource efficiency and pollution control, my work differentiates itself by emphasizing the importance of public participation and stakeholder inclusion, aiming to foster a more inclusive and adaptive approach to sustainable development.

Societal Value

1. Policy Relevance with Emphasis on Spatial Dimensions

China's circular economy policies explicitly aim to integrate circular principles into land use planning (Circular Economy Promotion Law, Articles 29 and 37). This is particularly relevant in the context of China's ongoing urban-rural transformation, where the expansion of new cities and industrial zones presents challenges for land use planners, especially regarding farmland degradation and ecological land preservation.

The discussions in the Green Belt region, where industrial, agricultural, and residential land uses are highly mixed, align with this focus. Under the policies of protecting farmland for food security and promoting urban village renewal, this project proposes a circular development perspective for the northern Green Belt, which will undergo urban village renewal and farmland reclamation within five years. The project provides a vision-based land use plan that delineates residential, agricultural, and industrial activities, and through medium-scale spatial design, it illustrates the interrelationships and sensitivities between these land uses. This approach addresses the requirements of China's circular economy policies and offers strategic insights for sustainable land use planning.

2. Importance for Achieving Sustainable Development Goals (SDGs)

According to Schroeder et al. (2018), there is a direct relationship and synergy between circular development and the SDGs. Taking this project as an example:

a) Direct Relationships

The circular system constructed from the perspectives of ecological regeneration, resources looping, and social adaptation, based on food, food waste, and construction debris, is directly related to SDGs 2, 8, 12, and 16.

Target
2.4
By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

Through necessary ecological restoration measures required for constructing a circular food system, such as farmland reclamation, canal restoration, and forest regeneration, this project is directly related to SDG 2: Zero Hunger, particularly target 2.4.

Target
12.5
By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

Target
8.4
Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead

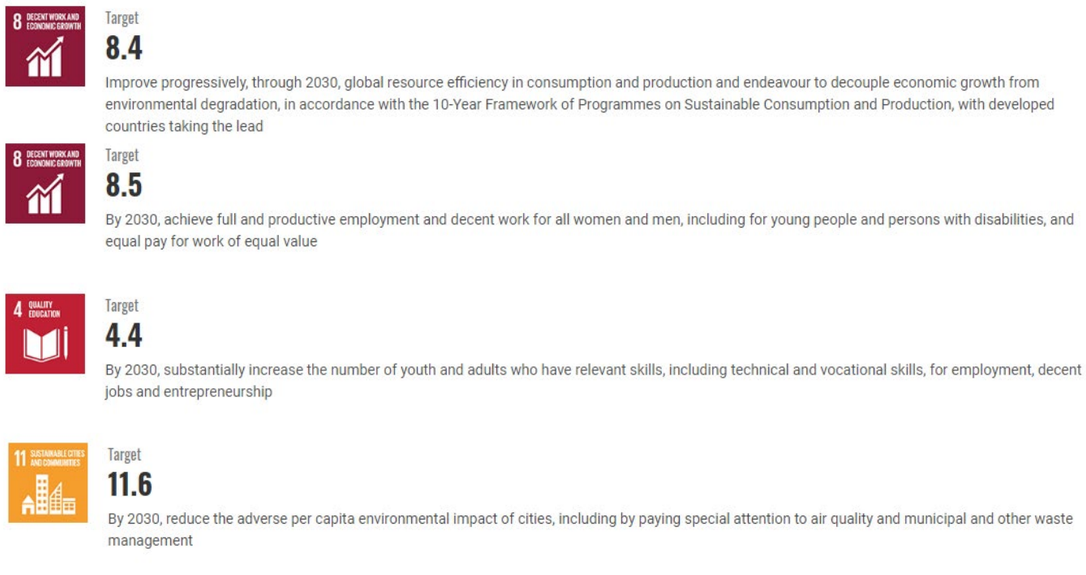
The recovery and reuse of construction debris and the composting of food waste to close resource loops as much as possible contribute to target 8.4 under SDG 8: Decent Work and Economic Growth and target 12.5 under SDG 12: Responsible Consumption and Production.

Target
16.7
Ensure responsive, inclusive, participatory and representative decision-making at all levels

By collecting migrant workers' contributions to the urban food system and creating platforms for participation in planning decisions, the project aligns with target 16.7 under SDG 16: Peace, Justice, and Strong Institutions.

b) Synergies Related to Construction Debris Recycling

The practice of circular development also generates additional synergies among SDGs. For instance, many targets under SDG 4: Quality Education are not directly linked to circular economy practices; however, progress in technical skills and vocational training will significantly enhance circular practices and achieve the goals of economic sustainability, particularly SDG 8: Decent Work and Economic Growth (Schroeder et al., 2018).



In this project, adopting circular methods to extend the lifecycle of building materials—including remanufacturing, refurbishment, repair, and reuse—restores value to materials that would otherwise be incinerated or landfilled, directly contributing to target 8.4 by decoupling economic growth from environmental degradation. In urban villages, the collection and resale of construction debris create tangible employment opportunities, indirectly achieving target 8.5. Responsible companies providing knowledge and skills training help migrant workers progress toward target 4.4 under SDG 4: Quality Education. Additionally, the refurbishment in the construction industry offers solutions for SDG 11: Sustainable Cities and Communities, especially with the reuse of construction debris and the use of recycled building materials like straw and wood, significantly contributing to target 11.6.

Reflection on ethical aspects

This project focuses on migrant workers, a marginalized group, necessitating careful ethical consideration.

1. Authenticity and Timeliness of Data

The exploration of migrant workers' challenges and living conditions in this project primarily relies on literature, most of which is from around 2018 and focused on the southeastern coastal areas of China, such as Guangzhou and Shenzhen, rather than Chengdu. Although I supplemented this with multiple site surveys, the project cannot fully capture the current realities of migrant workers' lives. Their conditions might have worsened, with a greater emphasis on food affordability, or improved, allowing them to afford better housing. Therefore, I urge more planning, public policy, and sociology scholars to conduct comprehensive studies on migrant workers, urban villages, and informal food sectors in Chengdu (referencing Professor Zhong's 2018 survey report on Nanjing's informal food sector). Additionally, I hope the Chinese Migrant Population Data Platform, which closed in 2023, reopens to facilitate further research, and that the National Health Commission resumes publishing the China Migrant Population Development Report, which has not been updated since 2018.

2. Beneficence of Patterns for Migrant Workers

Although the project aims to help marginalized communities by developing planning strategies, there was limited direct engagement with migrant workers. In the co-design workshops, migrant worker participants were simulated by students, which may not fully represent their perspectives. The effectiveness and actual benefit of these pattern strategies for marginalized communities remain uncertain. Future efforts should include genuine co-design workshops with migrant workers to truly capture their voices, rather than having planners simulate them.

3. Cultural Sensitivity

In future co-design workshops, preliminary interviews with migrant worker participants should be conducted to understand their cultural backgrounds and develop respectful communication methods. For example, during brief interactions with migrant workers engaged in urban agriculture during site surveys, I found that expressing appreciation for their work and showing a desire for their agricultural activities to continue facilitated better communication. It is also important to use sensitive language and avoid negative terms like "informal" in discussions.

Despite the project's intention to support marginalized communities, the lack of direct involvement of migrant workers presents an ethical challenge. Ideally, their direct participation would provide more accurate and representative insights. Moving forward, integrating migrant workers more authentically into the research and design process is crucial for the ethical and effective development of planning strategies.

Transferability

Scalable Value within Chengdu Metropolitan Area

The focus of this project is limited to the Greenway Area of Chengdu. However, satellite images reveal multiple urban villages within the six districts of the peri-urban area outside Chengdu's central city, which originally were independent cities and have been included in the administrative boundaries of the Chengdu Metropolitan Area in the past decade. These areas, close to the city center, have rapidly transitioned from rural landscapes to industrial zones and urban villages. The study found that these districts have more severe farmland abandonment, and urban renewal has yet to commence in the informal settlements.
If the transformation of the Greenway Area into a circular food system serves as a pilot, the experiences there could inform similar strategies in these districts. In the future, migrant workers living in the city center might move to urban villages in the peri-urban area to start circular agricultural businesses, such as family-operated farms or straw building material processing plants, driven by the knowledge gained from platforms, government incentives, better infrastructure, and lower living costs.

Promotion in Other Major Cities in Southwest China

Other major cities in Southwest China, such as Chongqing and Kunming, could adopt Chengdu's model by initiating urban agricultural practices within urban expansion control zones and revitalizing declining urban villages.

The reasons for referencing Chengdu's model for urban village regeneration include:
-Unlike highly urbanized metropolises like Beijing, Shanghai, and Shenzhen, the metropolitan areas in Southwest China, especially those outside central urban areas, still retain extensive farmland, presenting a gradient of decreasing urbanization and increasing agricultural and ecological lands as one moves outward.
-The areas at the interface between central urban districts and peri-urban areas have experienced a rapid transition from rural to factory to urban village landscapes, leaving large areas of undefined, unused farmland and dense informal residential areas.
-These areas have the agricultural base to support some level of food self-sufficiency, with cities like Chongqing and Kunming having a food self-sufficiency rate of two-thirds.

Recommended planning steps for these cities include:
Defining clear urban expansion boundaries and agricultural land control areas within them.
Planning for urban circular agriculture based on local agricultural products, geographic conditions, and leading industries.
Incorporating locally distinctive, community-organized farming practices and spaces within urban villages into urban circular agricultural planning.
Repurposing abandoned factories and rural buildings within urban villages to accommodate food production, feed processing, and fertilizer production activities related to circular food system practices.

REFLECTION

10.2 Reflection

Transferability

The urban expansion at the edges of the six suburban districts around Chengdu mirrors the issues of idle farmland and the need for urban village regeneration seen in the green belt areas.

Recognizing unused farmland and urban villages

Converting straw into building materials

The straw-based building material technology piloted in the urban villages is gradually being promoted throughout Chengdu. This material is now widely used in new urban constructions, making the suburban farmlands a crucial base for raw materials and production.

Mining the Gold in Waste

The experience of sorting and managing food waste from the city center is applied here, with waste from households and restaurants transformed into fertilizer for the fields.

Activating the food supply market

Foods made from douban (a paste derived from these peppers) have attracted many visitors from the city center, leading urban villages to take on roles in light food processing and tourist hospitality.

Developing specialty agriculture

Longquan's peppers are renowned for their uniqueness and are a key agricultural product of the region. Additionally, rice production, as a staple crop, is consistently maintained in Longquan.

Figure 65: The transferability for Chengdu Metropolitan
Made by author

REFLECTION
10.3 Acknowledgement

Urban village renewal has been a topic I have wanted to explore since applying for my master's at TU Delft. During my undergraduate studies, I conducted similar research and became vaguely aware of the complex stakeholders and the intricate issue of land owner conversion in China. At that time, all I could do was create seemingly beautiful images for the future of these marginalized communities, but I privately felt that my contribution to improving their living conditions was minimal.

In the motivation letter for my TU Delft application, there was a question asking applicants to propose a master's thesis topic. Urban village renewal was the research direction I had already decided on then.Now, two years later, I cannot say I have answered this question, but I can say that I increasingly understand the complexity involved and realize that my ability to make a difference is quite limited. What matters is continuous exploration and advocacy for these communities.

I would like to thank my mentor, Marcin, for his guidance on my project. Cross-cultural discussions are always relatively challenging, but his sustained enthusiasm and interest in my project and site, as well as his recognition of my outcomes throughout this process, have been one of the main supports in my exploration of this topic. His extensive and orderly logical thinking has supported me, as I am a student who also highly values logic,which allowed and urged me to meticulously refine the logical rigor and completeness of my project.

Thank you to Birgit, especially for introducing me to the pattern language research method. This was something I had never encountered in previous design projects but was exactly what I needed for this project – a co-design tool for engaging with local stakeholders. I also appreciate her help with my visualization.

I am deeply grateful to my family. Their support and understanding have been the most important pillars for me to continue my research and studies abroad. In the two years of studying away from home, I can say I have found myself, partly through my identity as a planning researcher and partly as a daughter who receives unconditional love and care from her parents.

I also want to thank my friends, Shen Ying, Chen Jingyi, Xiao Zhuojun, Liang Shiyin, Zhou Zhiqing, Hu Yifan, and their two lovely dogs. During times of project setbacks and uncertainties about the future, I sought their companionship and comfort. Through deep conversations with them during my two years at TU Delft, my worldview and values have become increasingly clear and firm.

Graduating is a special time, facing choices and farewells. Urban village regeneration is a topic I am interested in and hope to research further. Regardless of my career path, I hope to continue exploring answers to this question. What is important is continuous effort and self-acceptance.

自申请代尔夫特理工大学的硕士以来，城中村改造一直是我想要探索的课题。在本科学习期间，我曾在成都进行过类似的研究，并隐约意识到中国土地权属转换中的复杂问题以及错综的利益相关者关系。当时，我所能做的只是为这些边缘化社区的未来创造出看似美好的图景，但私下里却觉得自己对改善他们的生活条件所做的贡献微乎其微。

在我申请代尔夫特理工大学的动机信中，有一个问题要求申请者预设一个硕士论文题目。两年后的今天，在用所学尽力对这个话题探索了一年之后，我不能说我已经回答了这个问题，因为越来越明白其中的复杂性，也意识到个人的力量是有限的。重要的是不断探索和为这些社区发声。

我要感谢我的导师Marcin对我的项目给予的指导。跨文化讨论总是相对具有挑战性的，但他对我的项目和研究场地成都始终保持着热情和兴趣，并在整个过程中对我的成果给予肯定（特别是理论框架部分，我们都很喜欢这个跨学科和跨尺度的概念框架），这是我能坚持完成这个项目的主要支持之一。他广泛而有序的逻辑思维为我提供了太多的帮助，因为我也是一个非常重视逻辑的学生，这让我能够一丝不苟地完善项目的逻辑严谨性和结构完整性。

感谢 Birgit，尤其是她向我介绍了Pattern Languaged作为表达策略的方法。这是我在以前的设计项目中从未接触过的，但正是我在这个项目中所需要的---一种能有效与当地利益相关者进行沟通的共同设计工具。我也很感谢她在我的设计可视化方面提供的帮助。

我非常感谢我的家人。他们的支持和理解是我在国外继续研究和学习的最重要支柱。在离家求学的两年里，我渐渐开始对“自我”进行定义，我身份的一部分是一名城市规划研究人员，另一部分是一个得到父母无条件支持和爱的女儿。

我还要感谢我的朋友们，申颖、陈镜伊、姜予茜、吴欣怡、蒋佳欣、肖卓君、梁诗音、周芷晴、胡艺凡，还有他们的两条可爱小狗七夕和八妹。在项目卡壳和对未来非常忐忑未卜的时候的时候，我太多次太多次地向他们寻求陪伴和安慰。一次又一次跟他们的深入交谈中，我对世界的认识也变得越来越清晰。

毕业是一个特殊的时刻，面临着选择和告别。城中村改造是我感兴趣并希望进一步研究的课题。无论我的职业道路如何，我都希望能继续探索这个问题的答案。重要的是持续努力并对自己的工作与价值保持认同。

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Figure 66: A woman tending to her rooftop vegetable garden
Source: Cavan Images

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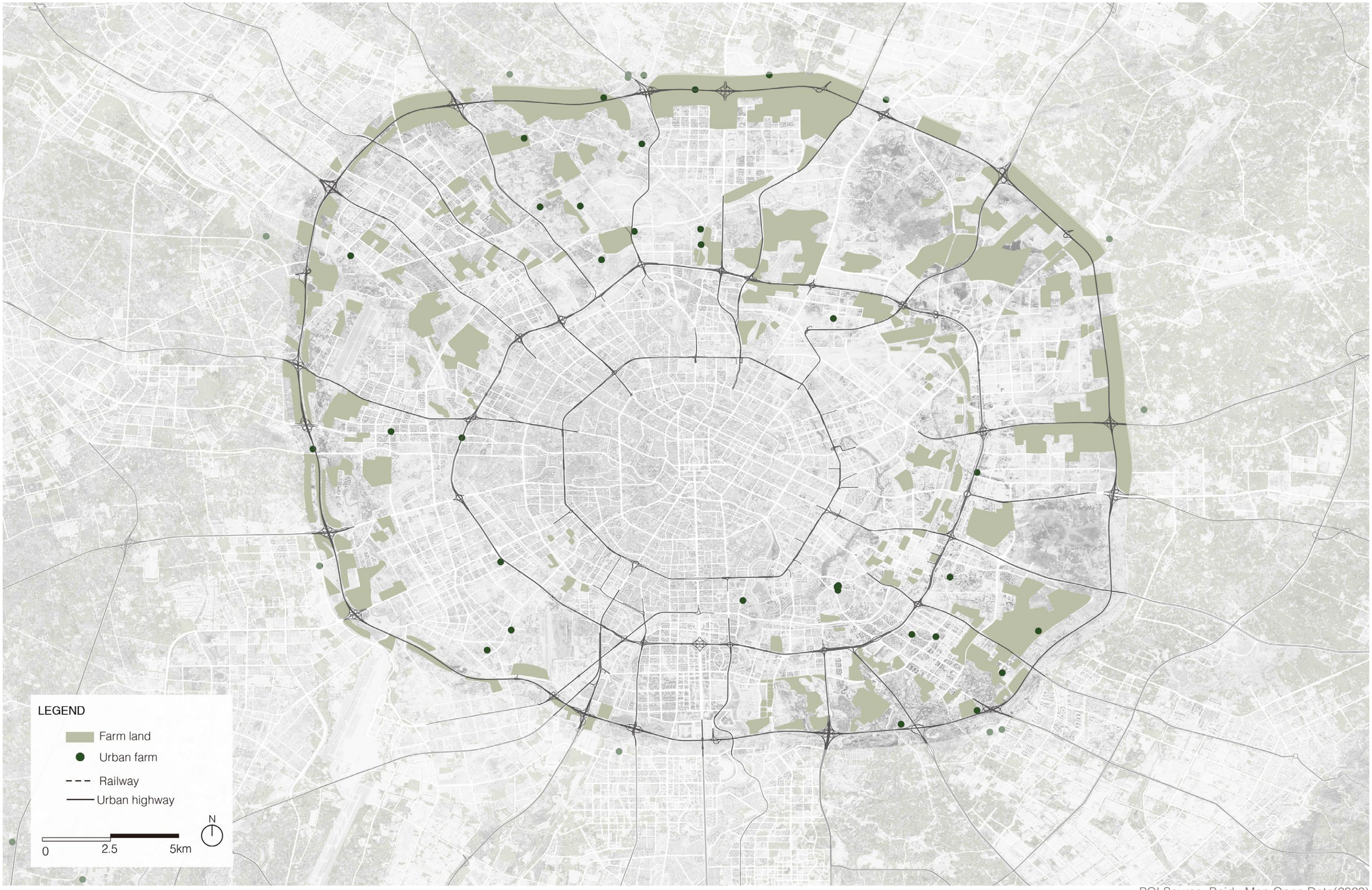
APPENDIXES

Agricultural land within the Green Belt



POI Source: Baidu Map Open Date(2023)

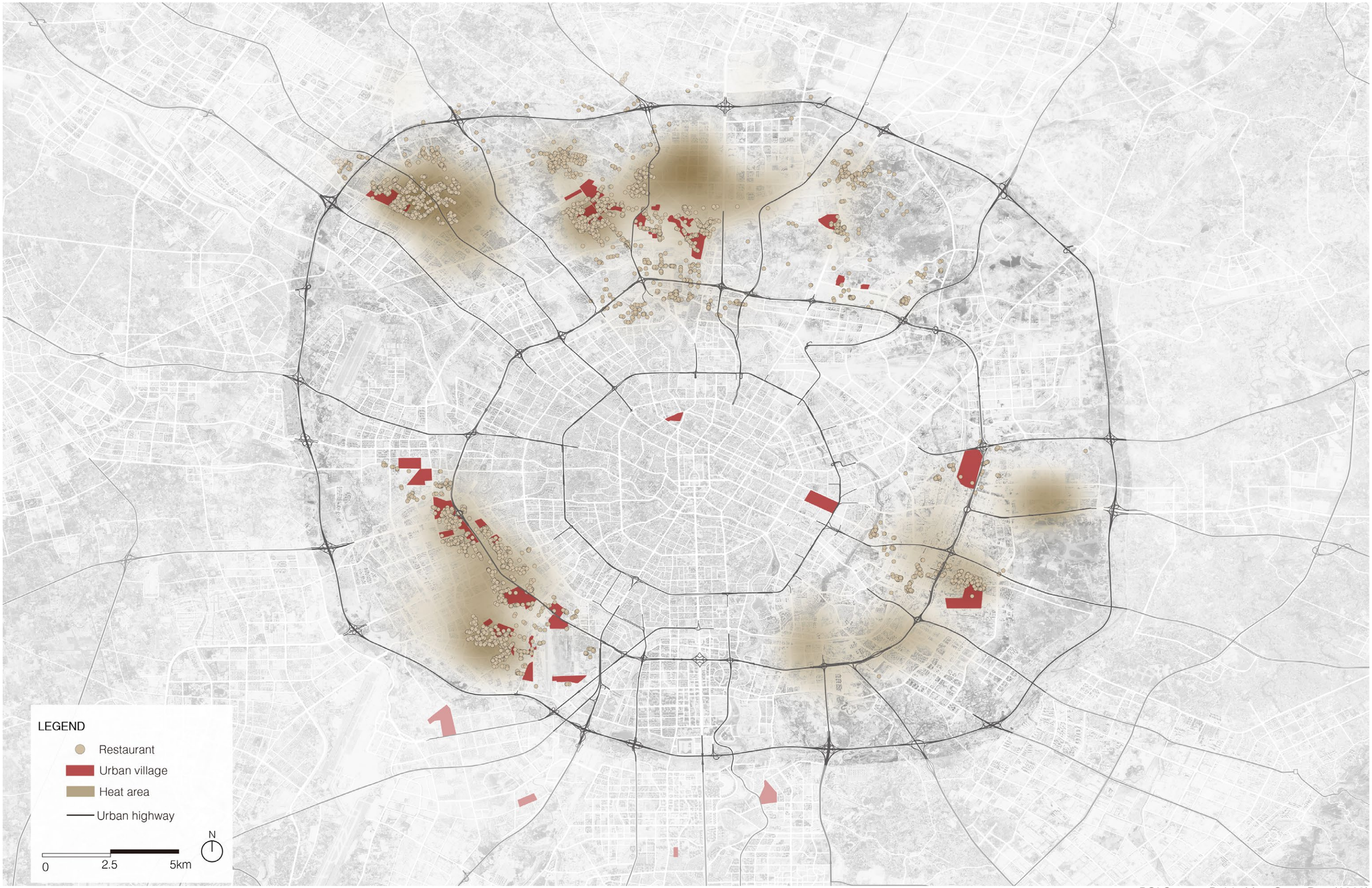
APPENDIXES

Wholesale markets and the food retail sector within the Green Belt

POI Source: Baidu Map Open Date(2023)

APPENDIXES

Restaurants within the Green Belt



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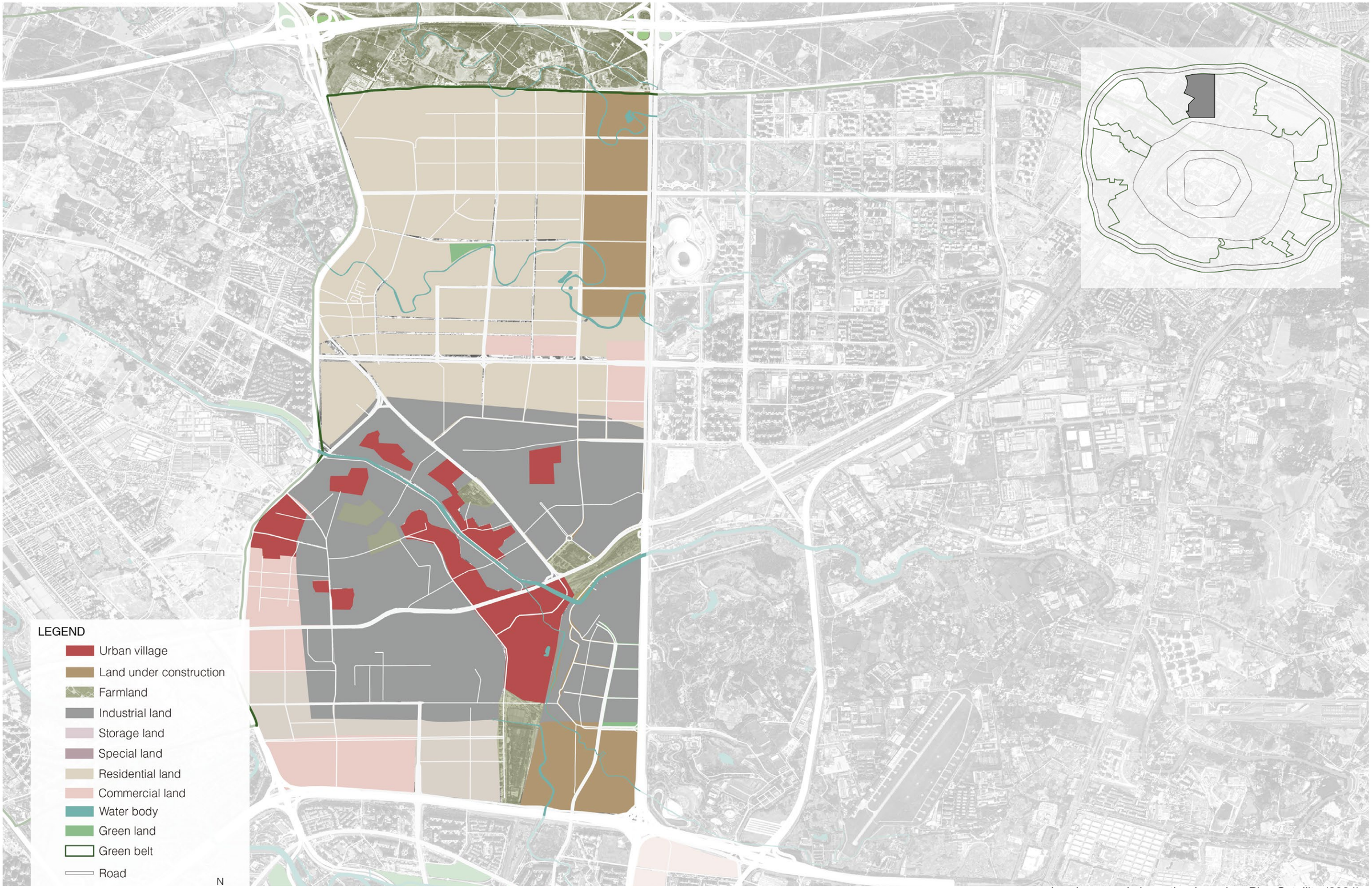
APPENDIXES

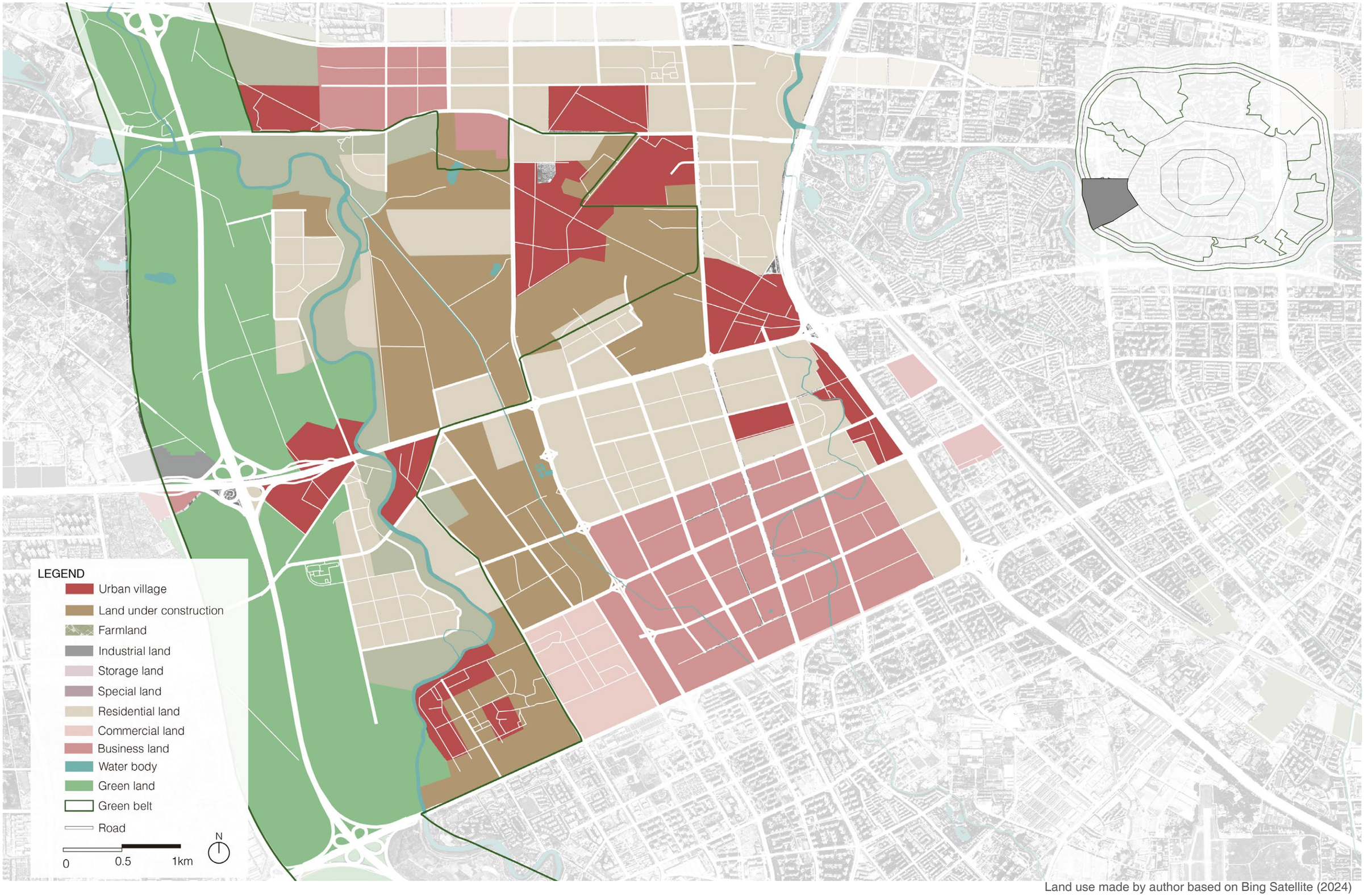
Land use of wedge-shaped plot 2



Land use made by author based on Bing Satellite (2024)

APPENDIXES

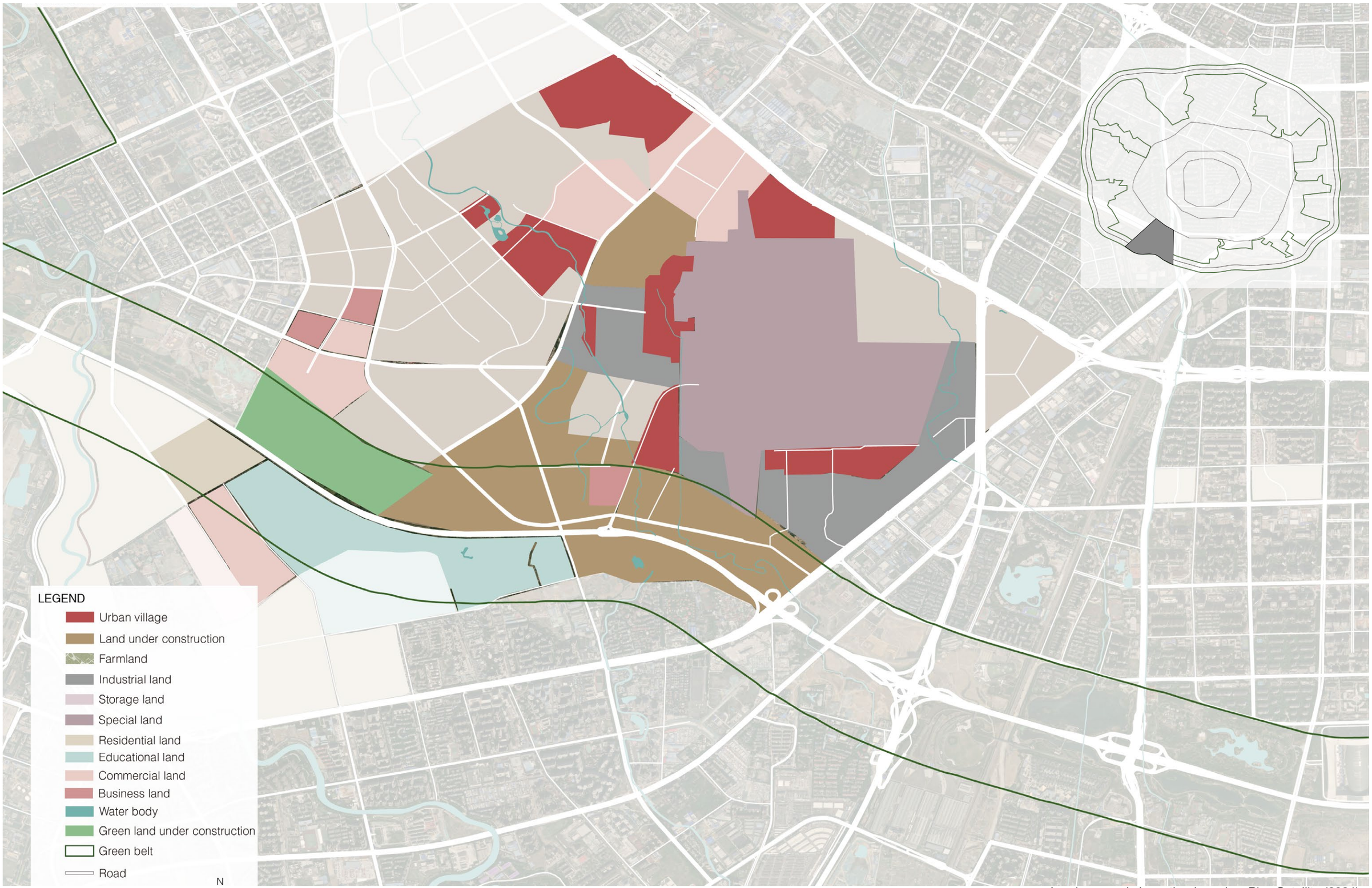
Land use of wedge-shaped plot 3



Land use made by author based on Bing Satellite (2024)

APPENDIXES

Land use of wedge-shaped plot 4



Land use made by author based on Bing Satellite (2024)