

Articulating agricultural landscape and new town  
development for the "Green City" Guangming in Shenzhen



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**Farming Gaunamging**  
*Articulating agricultural landscape and new town development  
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MSc Thesis

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# 概述

## INTRODUCTION

Motivation / Methodology / Project aims & research question / Theoretical framework

### Farming behind the high-speed railway station

This is the high-speed railway station that has stimulated the development of Guangming new town. In front of the station, there will be large-scale complexes for creative industry and high-end services. The picture shows the back side of the station, where the vacant land has been transformed into an informal farmland. It seems to be a figurative expression of the current situation of Guangming: heading for a modernized future, with an agriculture root that has not yet fade away.



# 1. Motivation

China is undergoing rapid urbanization. Urban population is 52.6% of the overall population in 2012, doubling that of 1990, and the number will definitely increase in the coming decades. Hundreds of new towns or urban expansion areas are being planned or realized to accommodate rural migrants and boost the economy (and generate revenue for the local municipalities) in a top-down, organized way.

On the other hand, China has a long and rich history rooted in agriculture. As for the importance of agriculture for the country, feeding the huge population is of course one of the biggest challenge today, but more importantly, the way our ancestors farmed shaped the structure of the society before industrialization (Fei, 1947), which still has great impacts on today's society. However, built on agricultural land mostly, the new towns tend to ignore the existing agricultural conditions, no matter what kind of design concept they adopt. In their visual impressions, little clue can be found about former landscape characteristics (figure 1).

The reasons behind the ignorance are complicated, probably associating with the urban-rural dual system or people's imagination of modern cities. In this study, the focuses are to investigate the responsibility of current spatial planning approaches in reinforcing the division, and at the same time to explore the possibilities of agricultural landscape in intervening in and contributing to the new town development.

In sum, the study is motivated by a very simple question: instead of being eaten up by new towns, can agricultural landscape perform more actively in the process of development? What I mean "more actively" is to shift the current urban-oriented development mode that excludes agriculture in urban area towards a development mode that utilizes agriculture to structure and characterize the city.

*Instead of being eaten up by new towns, can agricultural landscape perform more actively in the process of development?*

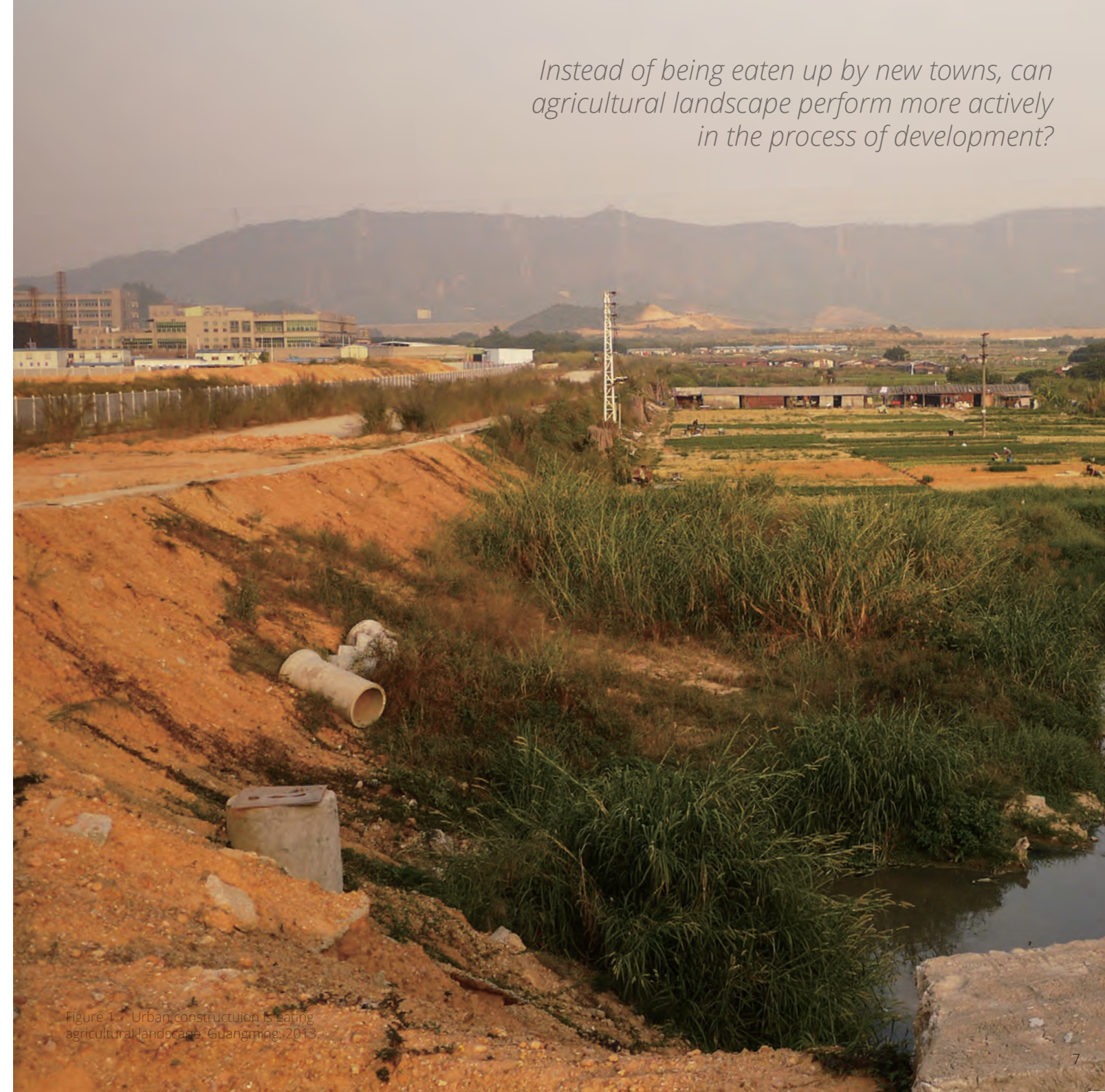


Figure 1- Urban construction is eating agricultural landscape. Guangming, 2013.

## 2. Methodology

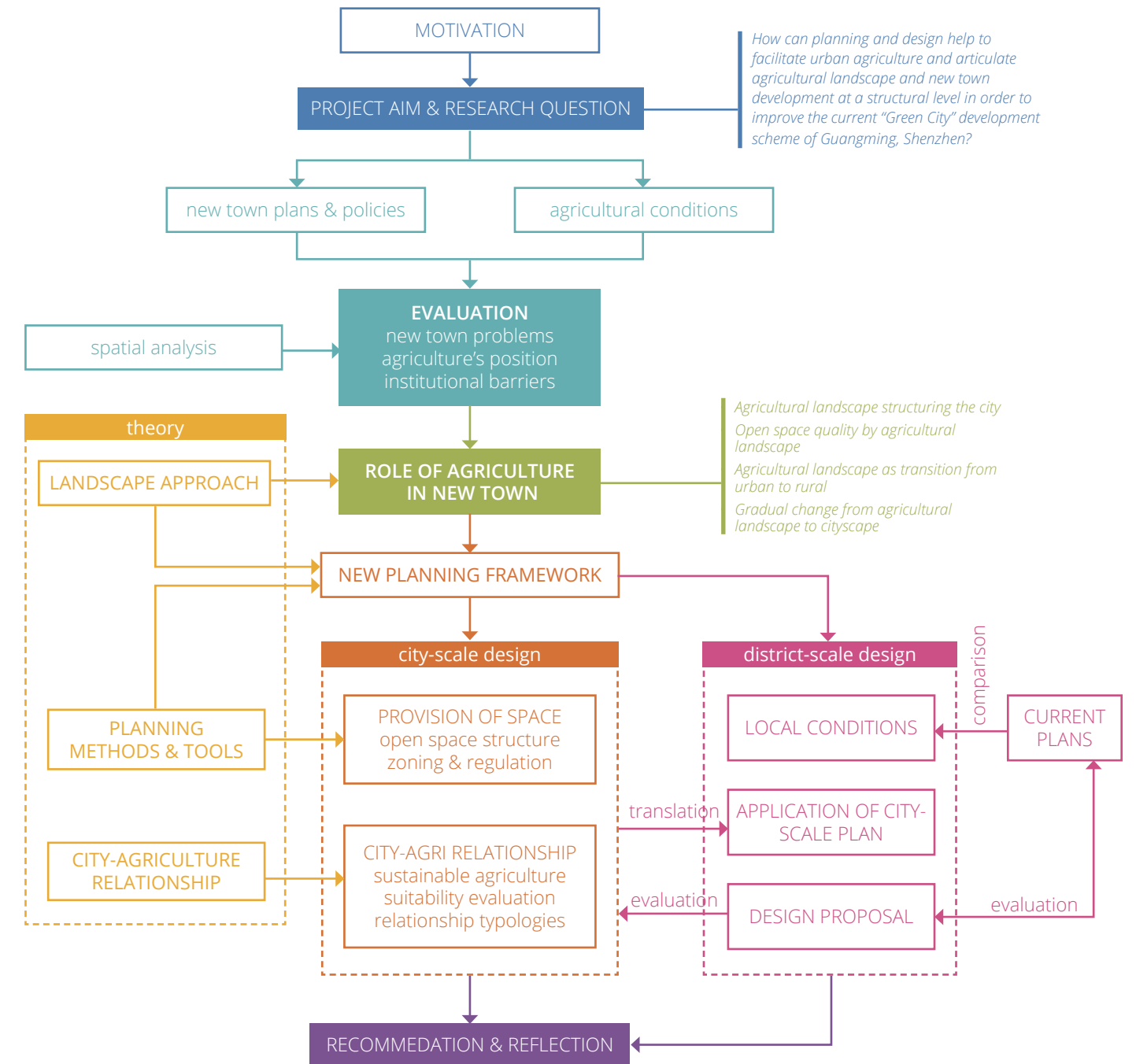
Before I dig into the planning and design methods to restructure the relationship between agriculture and new town development, two questions should be answered first: why it is necessary to include agriculture in new towns and what are the barriers for the inclusion in current planning system?

Pity on the loss of agricultural land or preserving agricultural land for food production are not arguments that are strong enough, as agricultural land can also be preserved on the outskirts of new towns, and still be excluded from the urban area. As majority of investment and attentions are oriented to cities rather than countryside, I must demonstrate why and in which way agricultural land can help to tackle existing problems in new town development.

As agriculture is most relevant for ecological environment and local farmers, I take these the aspects of ecosystem and local communities as my focuses to evaluate the performance of contemporary new towns in China, in order to find gaps which agriculture can fill. I pick Guangming, a new town being built in Shenzhen, as my testing ground. The development of Guangming is driven by regional economic interests, led by infrastructure, designed with the Green City concept. It is a perfect location for my study, as the area used to be an important agricultural base for Shenzhen, and the vision of Green City also include green community and green ecosystem. Finding the gaps is relevant not only to my concerns, but also to the new town vision.

The following is a summary of problems by evaluating the impacts of current plans and policies on ecosystem and local communities:

- Large-scale blueprint masterplan pays not enough attention to local communities and ecosystem;
- Institutional separation of urban area and countryside makes it difficult to integrate urban system and ecosystem, balance urban and rural development, or control urban growth;





- Rapid transformation challenges the adaptability of local farmers and society;
- Placeless and costly open spaces that is not affordable, accessible or usable for local residents.

The next question is in which way agriculture can engage in these issues. To explain this, I put agriculture in broader senses to understand how it functions. Spatially, agriculture is one type of landscape, and also the most important and widespread landscape type in Guangming. The city-agriculture relationship is basically a relationship between city and landscape. The landscape approach or landscape urbanism, which has been researched and advanced theories in city-landscape relationship in recent years, is adopted in this research to give a framework for city-agriculture relationship. Relating the landscape urbanism to problems in Guangming, I sketch the characteristics of the scenario of Guangming with more coherent city-landscape relationship:

- An open space structure that respects ecosystem;
- Meaningful open spaces that are relevant and beneficial to local population;
- More smooth transition from urban area to countryside using integrated management methods;
- Facilitating incremental urban growth which embraces flexibility and takes the adaptability of the society into account.

Within this framework, I am able to position agriculture in the “Green city” scheme in the new town, which includes dimensions below:

- Restructuring the open space system from the perspectives of agricultural conditions;
- Utilizing agricultural land to facilitate transect from urban area to rural area and better management of the transition;
- Identifying the process for incremental urban growth on agricultural land;
- Utilizing agriculture to improve the quality of open spaces and benefit local population.

This perspective also implies that agricultural land can be preserved within the urban tissue in a structured way if it is incorporated in landscape. But provision of land for

agriculture is not enough. To sustain agriculture in urban area, agricultural activities in urban area should be adapted to the urban context. The terms Urban Agriculture (UA) or Urban and Peri-urban Agriculture (UPA) are used to distinguish agriculture in and around urban area from rural agriculture. Theories and principles on city-UPA relationship is studied to understand specific benefits that agricultural landscape can bring to new town development, communities and ecosystems, and the types of agriculture that can be embraced by the urban systems.

The introduction of the landscape urbanism also indicates new planning instruments and design principles needed. The new planning framework should be able to accommodate more integrated management of urban area and countryside, facilitate gradual urban growth on agricultural land and include bottom-up forces in transforming open spaces.

To show how planning and design can help to articulate agriculture and new town specifically in Guangming, a multi-scalar design proposal is developed. The city-scale (the whole new town) plan consists of two parts: provision of space in structural level, and guidance for building city-agriculture relationship. To provide spaces for agriculture, the open spaces and infrastructure of the new town is restructured from the agricultural perspective, and management methods are also defined to ensure the quality and characteristics of landscape. To guide the city-agriculture relationship, types of agriculture, suitability assessment and typologies for relationship between agriculture and other spatial elements are elaborated.

The city-scale plans and instruments are tested in smaller scales using two examples, one with more rural characteristics, another one in more urban environment. The feasibility of city-scale plan are examined and so is whether the city-scale plan and the agricultural perspective can help to deal with the conflicts in the smaller scale.

In the end, the design proposal of both scales will be reviewed and evaluated to examine whether it answers the research questions and in which way they add to the existing knowledge of planning and design for more sustainable new town development and city-agriculture relationship.



### 3. Project Aim & Research Question

#### *Project Aim*

The aims of the project are to question the exclusion of agriculture in current spatial planning system, and to explore the possibility of planning and design in facilitating and utilizing agricultural landscape to moderate the impacts of new town development on ecosystem and local communities and improve the current “Green City” development scheme of Guangming.

#### *Research Question*

**Main research question:** How can planning and design help to facilitate urban agriculture and articulate agricultural landscape and new town development at a structural level in order to improve the current “Green City” development scheme of Guangming, Shenzhen?

Before answering the main question, several pre-questions should be answered first:

- To what extent do current “Green City” new town scheme in Guangming include existing ecological and social conditions?
- What is the condition and role of agriculture in current new town scheme? Why currently agriculture is not included in the urban area in Guangming?
- Why is it important to integrate agriculture into the new town development scheme of Guangming?
- In which dimensions can agriculture help to tackle the problems in Guangming?

Through theoretical and analytical study, I summarize four dimensions that agricultural landscape can be integrated in the new town development: restructuring the open space system from the perspectives of agricultural conditions; utilizing agricultural land to facilitate transect from urban area to rural area and better management of the transition; identifying the process for incremental urban growth on agricultural land; utilizing agriculture to improve the quality of open spaces and benefit local population. Thus, the sub-questions of the main research question are:

- How to design the open space structure in Guangming that respects agricultural and ecological conditions and how can urban structure be adjusted to the new structure?
- What kinds of planning instruments can be utilized to facilitate transect from urban area to rural area and better management of the transition and what is the role of agriculture in these planning instrument?
- What are the spatial structure and planning instruments that can facilitate incremental urban growth on agricultural land?
- What kind of benefits can urban agriculture have in improving the quality of open spaces in Guangming and what are the planning and design principles to facilitate these benefits?



# 問題

## QUESTIONING NEW TOWN

Context / Before new town development / Current  
Plans & Policies / Agricultural condition / Spatial  
analysis / Evaluation of Current Plan



# 1. Context

## 1.1 A brief history of agriculture in China

### *Crisis of agriculture since P. R. China*

The proportion of output of agriculture sectors in overall economy has decreased a lot since 1978 (figure. X). But it doesn't mean agriculture is getting less important. The fact is that with the growth of population and increasing living standards, demands for agriculture products are in a strong and long-term uptrend. However, agriculture itself is facing serious problems, making it a real challenge to provide sufficient agriculture products for cities.

First, farmland loss is inevitable. Although China adopts an extremely strict agriculture land protection policy (Ke, 2008), the urban development and 'building a new countryside' require land resources to fulfil their goals. Combined with land revenue system, it is a great challenge to restrain the trend of farmland loss.

Secondly, the income from farming is too low to motivate farmers. The urban-rural income gap makes working in cities and industries more preferable. The control on the food price and raising price of pesticide and fertilizer are worsening the situation.

For farmers, working on the soil means a lot of efforts and investment, but too little profits. Environmental problems also have negative effects on agriculture. Due to water pollution, decreasing fresh water supply and degrading ecosystem, agriculture land is getting less fertile and more vulnerable.

In this case, increasing productivity and controlling farmland loss are key strategies to deal with the agriculture crisis in China, which means more agricultural infrastructure, more applied technology, improvement of business model, more educated farmers (Ke, 2008) and more effective land use management.

1.2 New towns and agricultural land in Shenzhen, China

Land Shortage in Shenzhen

Being one of the first Special Economic Zones in China, Shenzhen is also the first city which faces the problem of land resource shortage for development. Of a territory of less than 2000km<sup>2</sup>, only 58 km<sup>2</sup> in Shenzhen is available for development by 2020 (Hu, 2012). Shenzhen is facing the challenge of upgrading its industry to more knowledge-based economy, which needs land, as well as supporting facilities and appealing environment to attract high-educated groups.

New towns in Shenzhen

Agriculture in Shenzhen

Shenzhen is the first city in China which claims to be 100% urbanization rate, which means all the population registered in Shenzhen is officially recognized as urban citizens. In 2011, in the economic statistic of Shenzhen, proportion of agriculture sectors in overall GDP is less than 0.05%. Majority of agro-products supply in Shenzhen have to be imported from other cities. In 2012, the municipal agriculture ministry was abolished, and related functions are merged into economy commission, which promotes better linkage between primary, secondary and tertiary economic sectors (Lei et al., 2012), but also implies that economic productivity is very likely to be the main concern on agriculture land.

In Shenzhen, there are 2000 ha basic farmland which needs to be maintained permanently according to regulations. Using the farmland, agricultural sectors are also being upgraded, together with the changes in administrative level and industrial upgrading in Shenzhen. Seed industries and agricultural researches are promoted by the municipality. A national agriculture scie-tech park is founded in Guangming in 2010, located near Guangming downtown. For food security, “shopping basket programme” is advanced, which include modernized green food production in peri-urban area of Shenzhen, most of which are run by agriculture enterprises. In other words, farming activities in Shenzhen is in the process of marketization, and agriculture land is considered merely spaces for economic production.

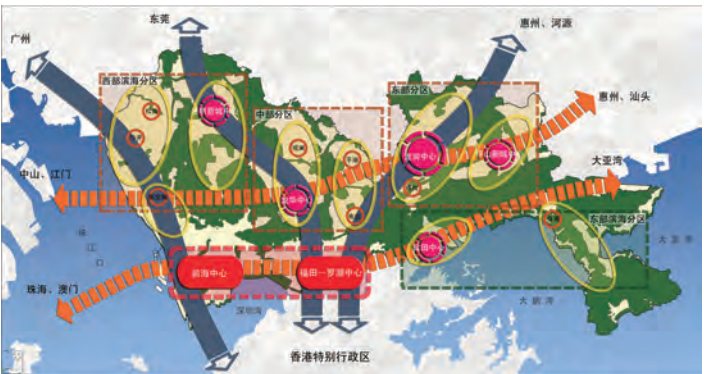
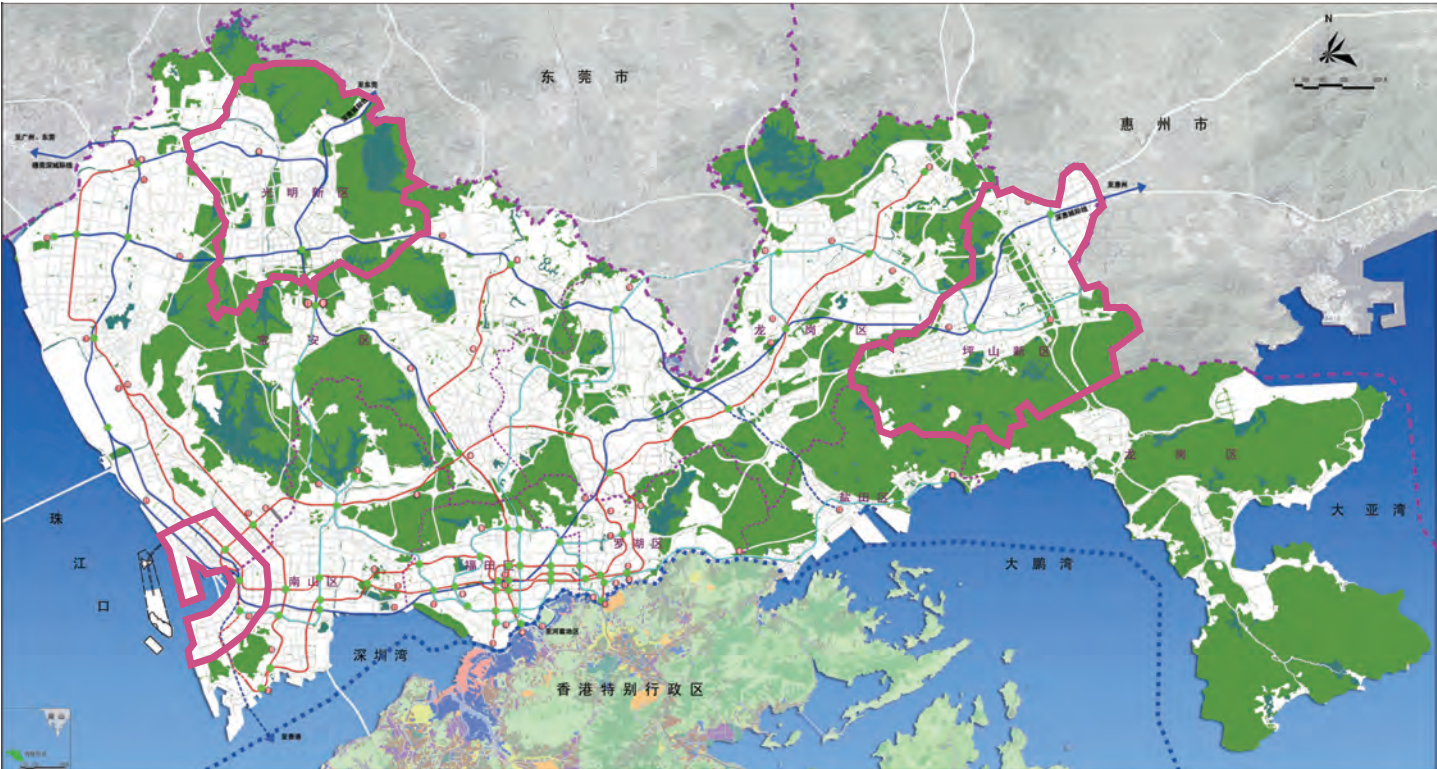


Figure 2. Restructuring Shenzhen: emerging new centers linked by infrastructure. The structure plan of Shenzhen (2010-2020).



Figure 3. Green space and urban expansion. Master plan of Shenzhen (2010-2020).



**Basic facts of Guangming**

*New town development start in 2007*

*Area: 156.1 km<sup>2</sup>*

*Population: around 1 million, of which registered population is 42,000*

*GDP in 2010: 30 billion RMB, 2.9% of the totla GDP of Shenzhen*

*Average annual GDP growth since new town: 25%*

**1.4 Introduction of Guangming**

Located in the north of Shenzhen, Guangming used to be an important agricultural base to supply food for Shenzhen and Hong Kong.

The high-speed railway which connects Guangzhou, Shenzhen and Hong Kong brings opportunity of development for Guangming. To seize the opportunity, Guangming New District was established in 2007, and the huge amount of remaining agricultural land made it possible to develop a new town on green field.

“Green City” is the key concept used to guide the development of Guangming. The concept includes the aspects of green ecosystem and green community. So focusing on local communities and ecosystem is not only my research concern, but also relevant for the achievement of the new town vision for the municipality.

The agricultural past and the shared concerns on ecosystem and community make Guangming a perfect location as a testing ground for my study.

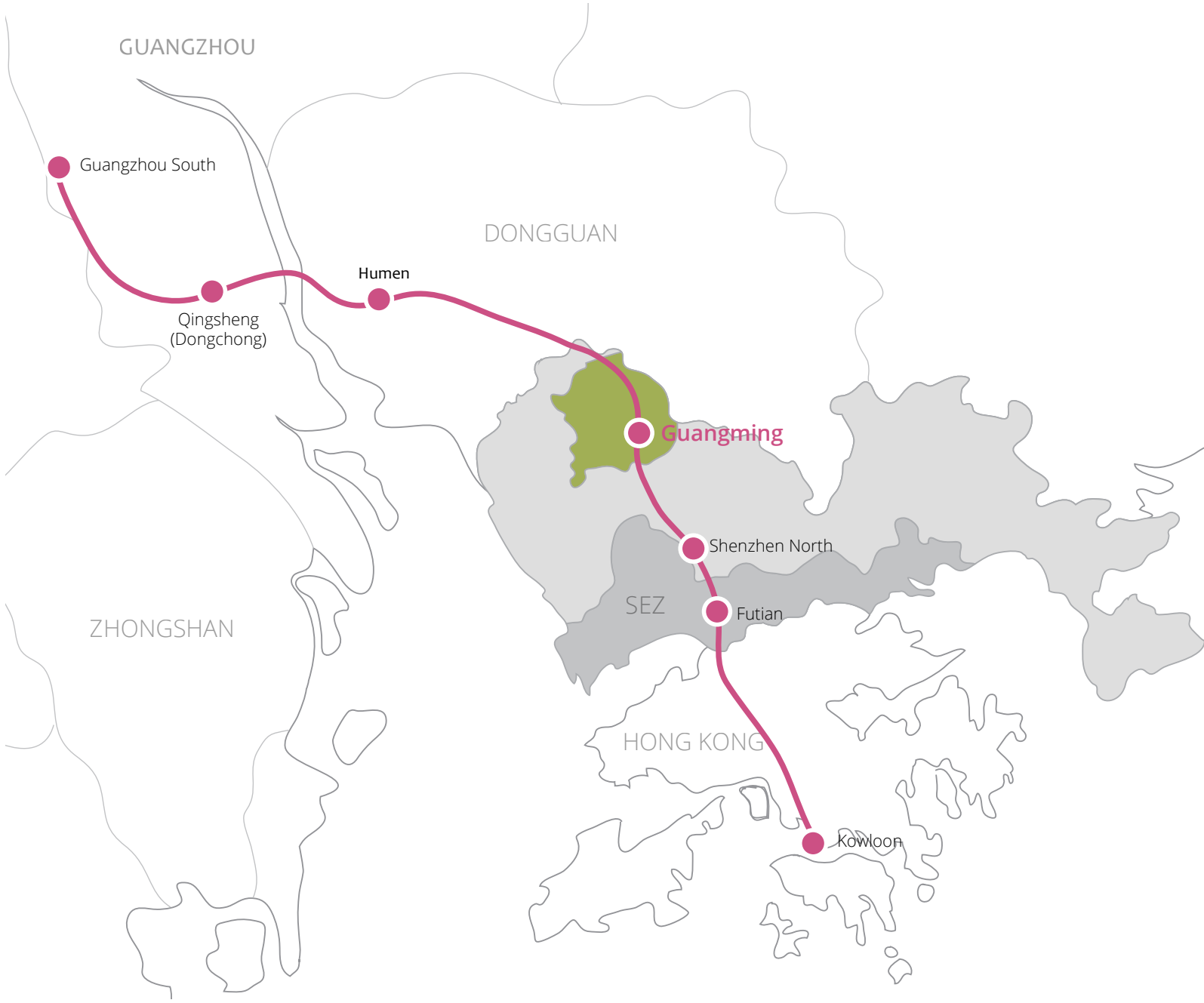


Figure 4. Regional high-speed railway that drives the development of Guangming new town. Elaborated by the author.

## 2. Before New Town Development

Guangming new town was founded in 2007, by combining former Gongming town and Guangming Farm, which both used to be agriculture-based society, like most places in the rest of China. Before industrialization, settlements were located near rivers as farming relied on water and fertile soil. In this way, settlement, soil and water were closely connected through agriculture activities.

In 1958 state-owned Guangming Farm was founded. Afterwards it, together with Gongming town, became an important agricultural production area, supplying Shenzhen and Hong Kong with agro-products including pigs, fruits, vegetable, chicken, milk, fish and flower.

In 1980s, stimulated by economic reform and opening up policy, Gongming began to industrialize, using funds from abroad and local rural collectives. Many manufactories thus have arisen since then, mostly located along main roads for better accessibility and around existing settlements. As settlements are situated on fertile arable land, the amount of agriculture land decreased dramatically due to urban expansion. Yet Gongming is still an important food production area for the region.

On the other hand, Guangming Farm mainly focus on agriculture and agriculture-based industries since its establishment. The great amount of remaining agriculture land in Guangming Farm become an advantage for Guangming to develop a new town with little restriction from the existing fabric.

Since the start of new town scheme in 2007, urban expansion has happen in a much more organized and rapid way. Infrastructure is built in advance as a method to divide land for sale and also to guide urban expansion, which is different from the former urban expansion mode. In this way, new development quickly fills in the gaps between existing built area, and at the same time wipes away the remaining agriculture land. In those newly exploited land, mainly high-tech industries, research centres and commercial housing are being built (see also [section 3.1](#)).

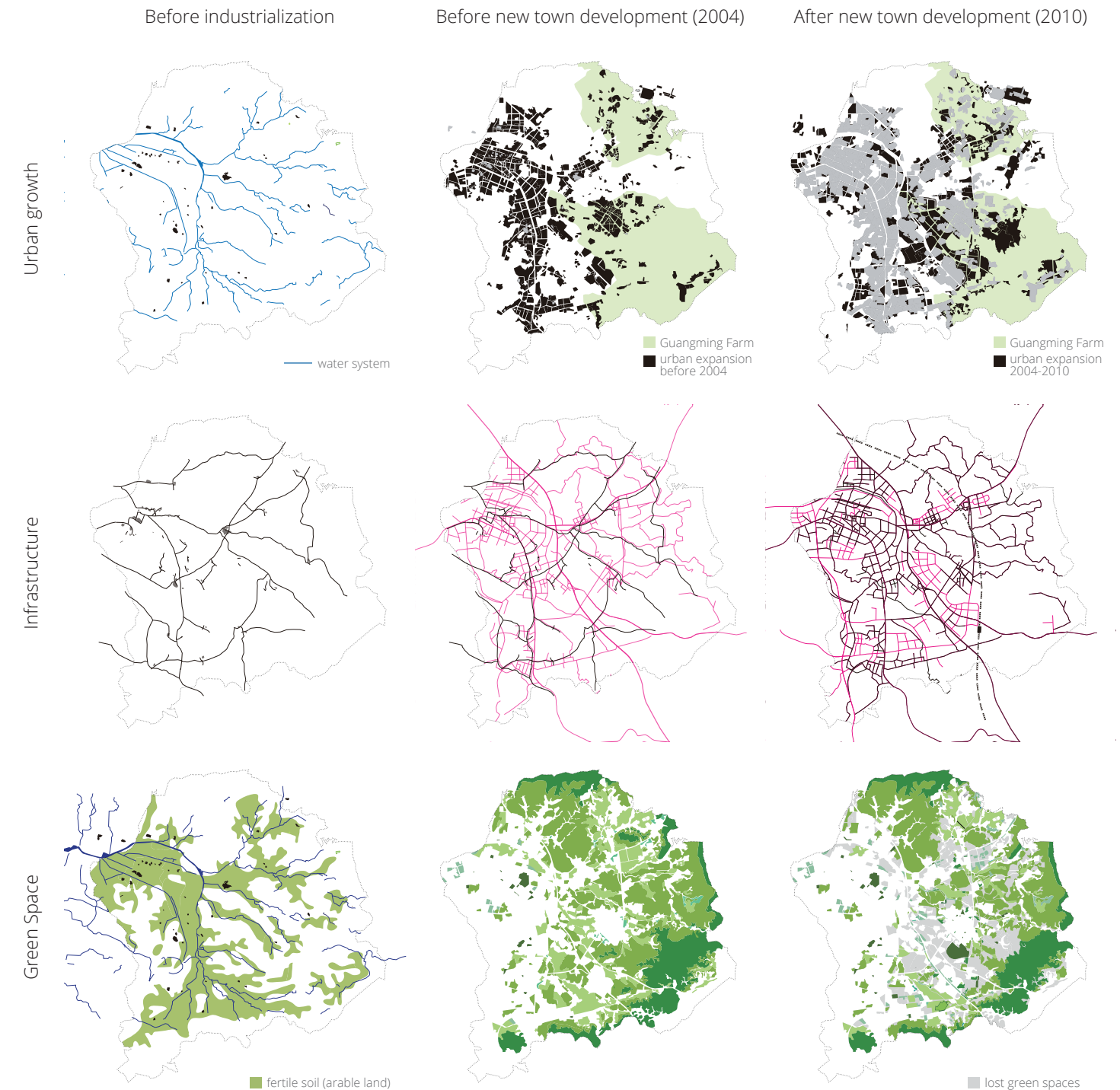


Figure 5. Historical analysis

### 3. Current Plans & Policies

#### 3.1 The Planning System in Shenzhen

##### *Urban planning's role in guiding urban development*

Since the establishment of Shenzhen Special Economic Zone (SEZ) in 1979, Shenzhen has known for the innovation and success of its planning system to guide the rapid urban development, which also makes urban planning an important tool for managing the city. According to Shenzhen's regulations on urban planning, land use and urban construction should utilize urban plans as the main basis to guide the development and coordinate conflicts in land use between different sectors. To ensure the legal authority of urban planning, permit for construction must follow regulatory plans, which means construction is restricted before regulatory plans are done.

In order to realize the guiding role of urban planning, urban planning system is coordinated with other administration sectors, like land planning of Land and Resource Ministry (which defines the quantity of built-up area and basic farmland, see chapter.X) and five-year and annual development plan of the municipality.

##### *Urban planning system*

Due to the role of urban planning in guiding urban development, the formulation of plans is oriented to implementation and administration. Comprehensive plans are used to provide the whole picture and structure for the area. To better manage the whole territory, the comprehensive planning system is divided into five scales: *regional master plan* (the whole Shenzhen city), *sub-regional master plan*, *district master plan*, *statutory plan* and *detailed blueprint*. The regional master plan is foundationally important as it gives a direction and a structure for the whole city, while statutory plans are the practical tools to directly regulate development projects. In-between are plans to translate the regional master plan into more narrowed focus on the area.

As comprehensive plans are generally to be realized in 10-20 years, annual and 5-year *short-term construction plans* are developed by local governments to better manage recent urban construction and relate their actions to the long-term visions.

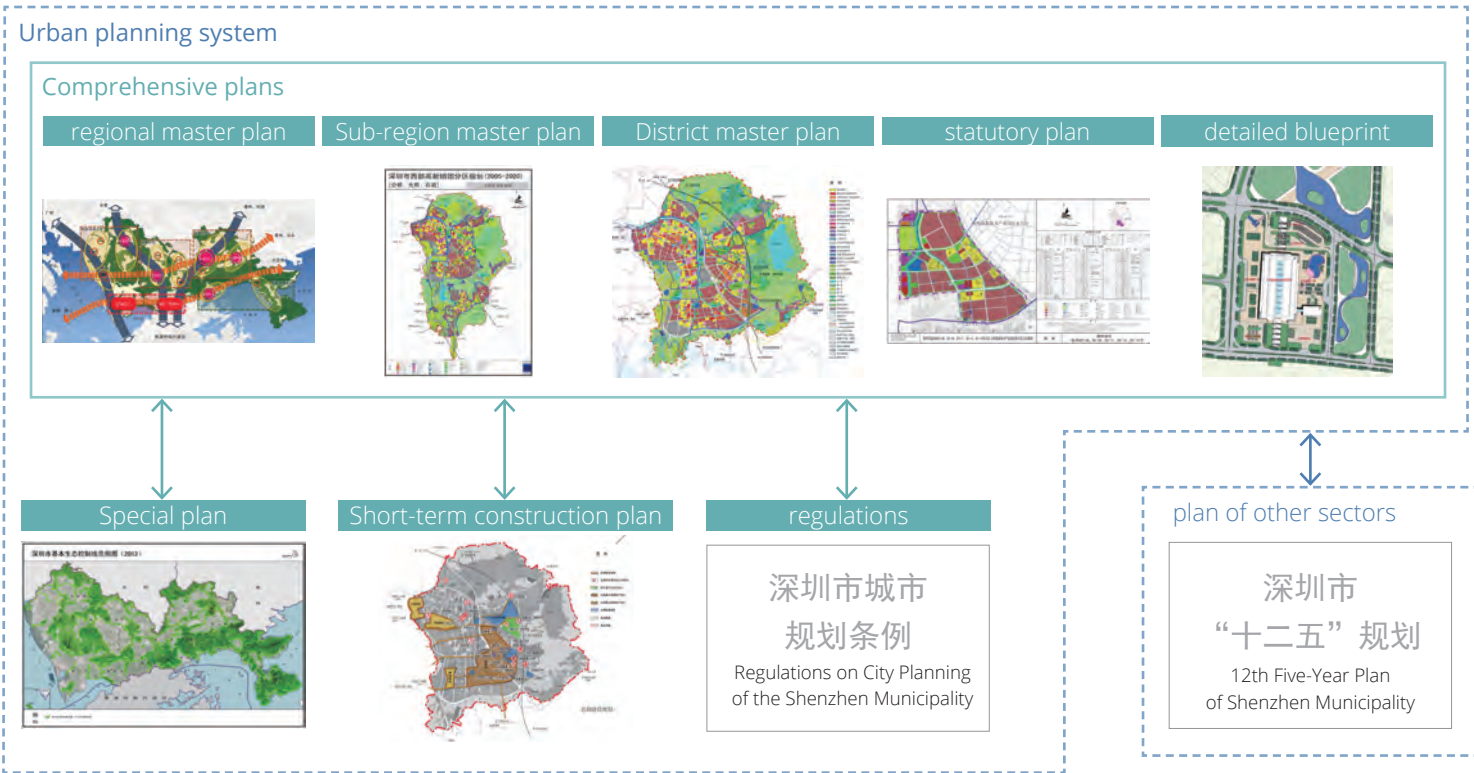


Figure 7. The planning system in Shenzhen.

Other *special plans* are also developed to guarantee the quality of spaces and deal with some specific issues like environmental protection, public transport and heritage protection, which are used as a complement to comprehensive plans.

To direct the city to the way the municipality wants to achieve, pilot projects, infrastructure and public facilities and new town are promoted or built by the municipality as strategic interventions, which are designed as *detailed blueprint*.

Regulations on implementation and administration of plans are also (being) developed to make sure that urban planning does play a part in guiding development, of which the special legislative power of being a SEZ enables more innovative operation.

Development Goal

The new town is aimed for low-carbon ecological city, a modern and green new city, based on technological innovation, guided by scientific urban planning, led by the development of infrastructure and utilities.

Size

Urban construction should be controlled within 72.33 km².

Land use in urban area

Residential	1062 ha	14.7%
Commerces and services	366ha	5.1%
Mixed-use	237ha	3.3%
Administrative	505ha	7.0%
Industrial use	1741ha	24.1%
Green areas	1008ha	13.9%

3.2 Guangming development plan

Context: The speed matters

Facing the challenge of land shortage, the municipality of Shenzhen values un-built land very much, and wants to make the most out of those areas. About one third of Guangming used to belong to a state-owned farm, making it easy to access the land by the government. Combined with the opportunity brought by the high-speed railway station (see figure 4), Guangming therefore is considered as a strategic location for industrial upgrading in Shenzhen.

However, as the new town development is pushed by governments of both city and district level to achieve economic goals, the speed is an important factor.Their ambition is to build the new town in 10 years. In this way, the limited and precious land for development is undergoing fast urban expansion, which seems to be a paradox.



Note: Time listed indicates initiation time



History of “green city” concept

2007: The concept of “green city” was proposed for the first time for Guangming district. It has become the development goal since.

2007.5: Bao'an district government meeting – high standard urban planning, high standard construction, to develop Guangming new town as “a pilot project for scientific urban development”by 21st century standard and post-modern concepts.

2008.3: Shenzhen and China Ministry of Construction signed a framework agreement to build Guangming New Town as a “pilot zone for green construction”.

2010.1: Shenzhen successfully applied for the construction of a “low-carbon eco-city, pilot project” , Guangming new town as an experiment and demonstration district

“Green City” Concept

Guangming is branded as a “green city” in the development plan, which is the key design concept behind the construction. The idea of “green city” includes seven dimensions, and is translated into many administrative documents and practices in Guangming (see table. XX). However, when we look closer to the practices, the real picture is not so happy and sustainable as it claims itself to be:

- The emphases of these strategies and measures concerning “green city” are placed on economy, building, (hard) infrastructure and city beautification, while practical realization of green ecosystem and green community is far from enough.
- The implementation of green city is not authentically green, as the development still adopts some popular (but usually unsustainable) methods for greenfield development in China.

The “Green City” concept and the relevant practices will be evaluated in details in the Section. X.



Figure 8. Pilot green building projects, mostly public facilities, with free-standing buildings surrounded by car-oriented roads and placeless green spaces. (source!)

dimensions	contents	description
green economy	High-tech industry	LED, information technology, flat panel display, solar PV industry, medical biotechnology, materials Science
	Manufactory	Ungraded by relocation Main industries: undergarment, horologe, matrix
	Service industry	Producer service, tourism, logistic, real estate, culture, education, health care
	Modern ecological agriculture	Seed industry, research, medical biotechnology
green building	Green Building Standard (6 published, 20 in process)	Methods: Green wall, sunshade, natural ventilation Total building floor area: 596 ha (by 2013), including under construction, mostly from public investment, like public buildings and social housing
	LED lighting in public area	
	Floor area award	for buildings with light pipe system, etc
	Subsidies	for buildings with recycled energies, greywater recycle and roof greenery
green space	Green ecological area	Ecological area: more than 1000 ha Green space ratio: 53% (Shenzhen (2009): 50%) 8 urban parks, 28 neighborhood parks, 3 special parks Green roads
	Flower Sea	floriculture, combined with tourism, health care, creative industry, training
green infrastructure	Utility tunnel	21 km in total
	Transport	5 scenic roads (main roads, 8-lane) 2 metro lines 1 BRT line + bus lines Greenway (i.e. bicycle lane, total length:161 km, density 1 km/km2)
	Low-impact development (LID)	Reclaimed water system; rainwater utilization system; increase infiltration rate; flood storage area (171 ha.)
	Flooding	3 pumping stations to protect urban area
	Infrastructure-led urban expansion	Infrastructure is built before urban projects
green community	Waste sorting	Food waste turned into fertilizer for neighborhood use
green ecosystem	Define Ecological Control Line	Covering 53.45% of the territory
	Maozhou River restoration	Length: 31.2 km Methods: Remove factories and livestock, clean river bed, and improve sewage system, water storage for flooding Investment: 5.58 billion RMB (0.66 billion euro)
green identity	Greening the city	About 650 million RMB invested in improving green spaces: mostly along main roads, nodes and parks in 2012-2014

Table 1. The practices of “green city” concept in Guangming. (Source: Guangming municipality, <http://www.szgm.gov.cn>, elaborated by the author)



### 3.3 Blueprint master plan

A master plan is developed to illustrate the scenario of the new town in 2020 and also provide a comprehensive solution for the rapid urban growth of Guangming. Important as it is, detailed statutory plans and other complementary plans follow the main structure that the master plan defines.

However, the primary structure defined in the master plan is the road structure, of which regional connectivity and continuity are the main focus. In the blueprint, details like land use, neighborhood streets are also designed. As comprehensive as it is, a fixed outcome is likely to be delivered, in which complex conditions in smaller scale are generally neglected.

With the introduction of the master plan, the development mode of the area since industrialization has been changed. Before the new town scheme, industries expanded along existing roads and around urban villages, usually in an unorganized way, while the master plan utilizes road network for land parcelling and structuring the new town. Wherever the grid goes, urban construction follows. In this way, the gaps between existing built-up area are being filled rapidly.

#### Blueprint

*Blueprint is a complete or total design aiming to show a comprehensive and detailed vision of the area. Deterministic as it is, the outcome and the process is usually fixed (Carmona, et.al, 2010). When the whole circumstances change, the out-dated plan need to be replaced by another comprehensive plan. It is also a direct design, which means limited actors are involved.*





### 3.4 The Ecology Control Line (ECL)

In order to preserve natural environment and open space from urban expansion, an Ecology Control Line (ECL) is introduced in Shenzhen in 2005, which covers almost half of the territory of Shenzhen. Shenzhen is the first city having an ECL in China, but an ECL will become obligatory for every city according to Communiqué of the Third Plenum of 18th CPC Central Committee. So it is meaningful to study its implication and impacts.

The basic concept is that within the ECL, no construction is permitted except for important infrastructure, utilities, tourist facilities and parks. Even for existing buildings, modification and reconstruction need permission from government. In other words, it can be recognized as an urban stop line.

An ECL only defines the area that should be protected from urban development, which includes important natural resources in Shenzhen. But as it is invalid in built-up area or to-be-urbanized area, so it cannot guarantee that ecosystem in the urban area is respected and preserved. In the urban area of Guangming, many rivers and streams are narrowed and are irrelevant to the new urban structure, which will cause problems on, for instance, flood prevention. So to facilitate sustainable urban expansion in city level, defining an ECL is far from enough.

Another problem is from the decision making process in defining the ECL. Without consultation with local communities in the decision making process, the ECL has strongly influenced the livelihood of local residents. Most communities in the ECL stagnate as no factories or enterprises are able to move in, and many residents are suffering from unemployment (Liu, 2010). Some infrastructure construction also stops due to the ECL line. In 2013, the ECL was modified according to the local demands (see figure X), but still a lot of communities remain in the ECL. A study on how to develop (or relocate) those communities is going on, led by the Urban Planning Land and Resource Commission of Shenzhen. It is also a crucial question to investigate for this study.

We should also be aware that strict regulations in the ECL do not mean that nothing happens or changes in the ECL now. From my observation, one big reservoir is under construction in Guangming, and many former farmlands are cleared and levelled to prepare for modern agriculture. Besides, a regional highline going through the ECL in Guangming destroys the natural skyline. There is also one 'greenway', i.e. cycling path, in the ECL, being part of the regional green way network. It has very good spatial quality, yet badly connected with other networks. Currently, there is no specific detailed spatial plan to guide development activities in ECL.

**Basic facts of ECL**  
*Established: 2005*  
*Modified: 2013*  
*Area in Guangming: 79 km<sup>2</sup>*

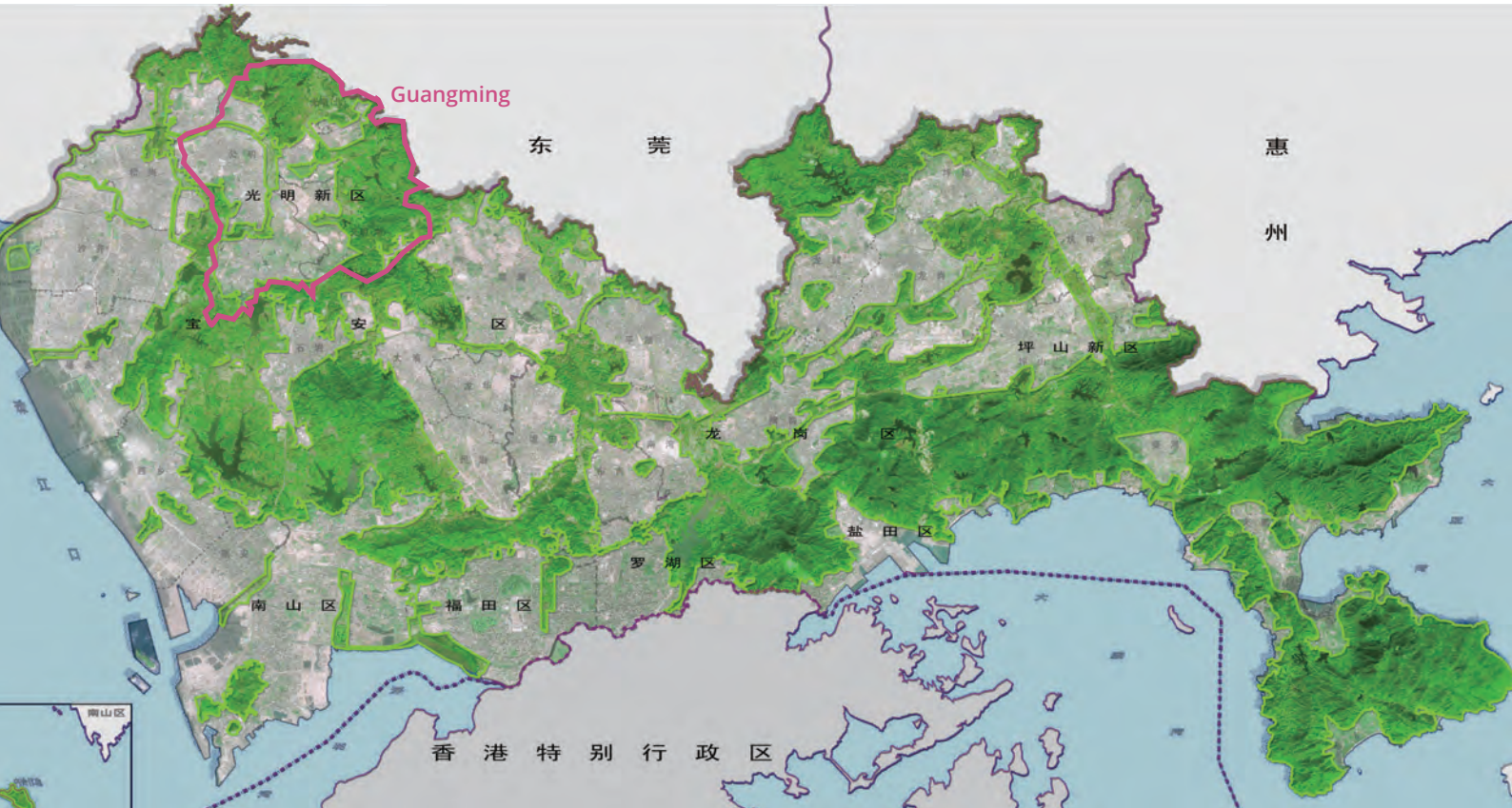


Figure 10. The ECL of Shenzhen (2013).

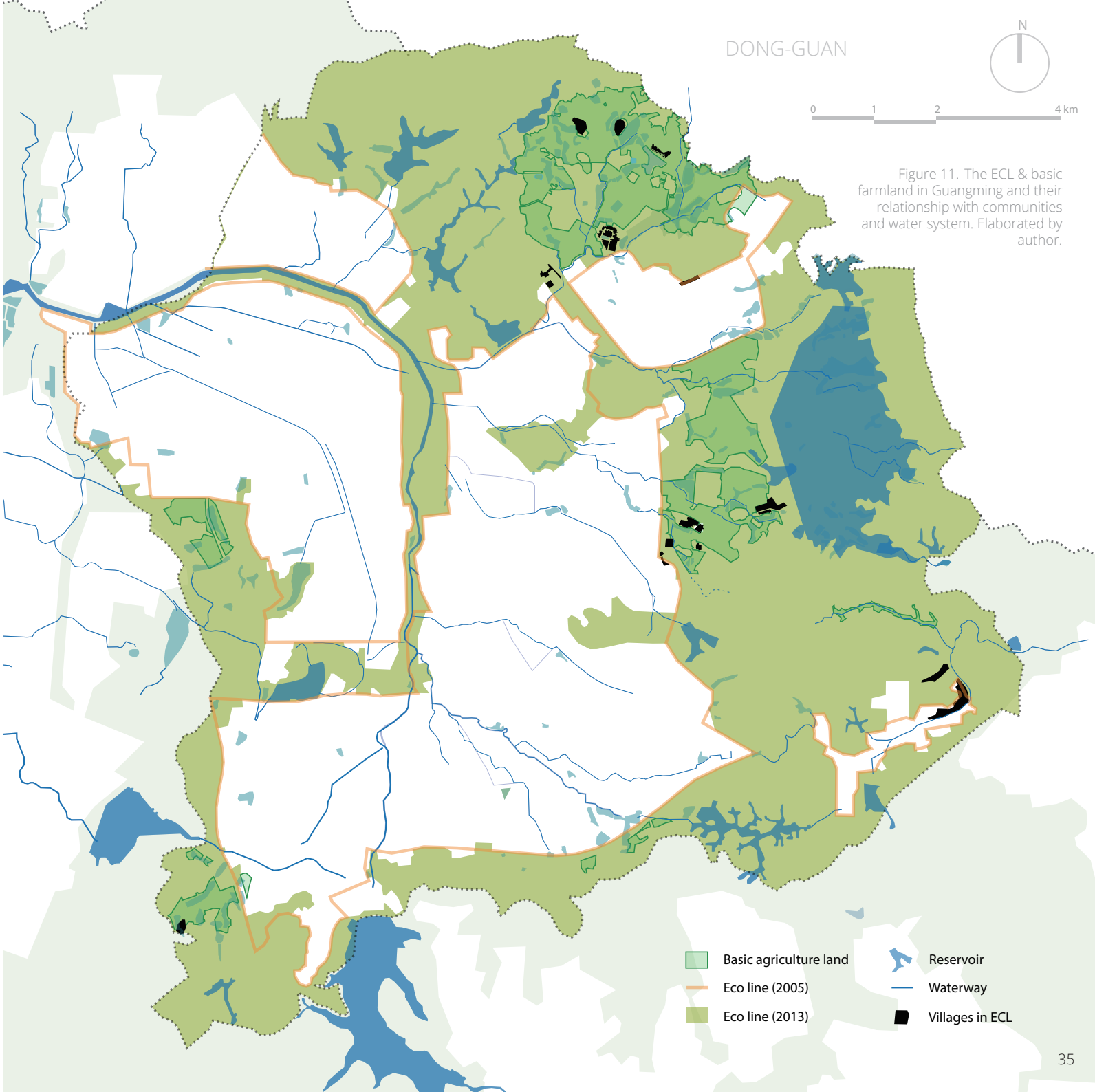
3.5 Basic Farmland Policy

Basic farmland policy is a tool used by the Land and Resources Bureau for achieving food security of whole China. Basic farmland means cultivated land where other kinds of agricultural activities, like fish ponds and orchards, are not permitted. Every municipality should keep a certain amount of basic farmland, even for Shenzhen, a fully urbanized city. In Shenzhen, most basic farmland is for growing vegetable.

There is 12.26 km2 of basic farmland in Guangming, accounting for 41% of basic farmland in Shenzhen, which implies maintaining basic farmland in Guangming is important for Shenzhen. In order to enhance the productivity of basic farmland and also better oversee it, from 2011 to 2013, small-scale farms with diverse agriculture activities are replaced by concentrated and standardized farmland, usually cultivated by enterprises (see figure X). Temporary buildings are removed, and people who live there beside their fields have to leave, generally without any compensation, because farming and those buildings are considered illegal. During my field study, some fields of a large area are vacant for more than one year, because no agricultural enterprise has moved in yet. According to a survey report by Shenzhen Center for Design (2012), at least one company working on the basic farmland is suffering from a deficit, so the profitability of these companies is still unclear.

Basic farmland in Guangming is mostly situated around communities in the ECL, as the farmland used to be looked after by the local communities. In recent years, farming activities are taken over by immigrants, and local residents mostly rely on rental income from factories and housings or working in factories. But without opportunities to develop or land to farm, the future of these communities seems to be quite gloomy.

"Without opportunities to develop or land to farm, the future of these communities seems to be quite gloomy."





# 4. Agricultural condition

## 4.1 Classification of agricultural use of land

Having a state-owned farm and making use of its geographical advantages, Guangming district had a remarkable performance in agriculture in 1980-1990s. It used to be one of the main food resources for Shenzhen and Hong Kong. To understand the legacy from its agricultural past for today's new town, a systematic analytical approach that fits in the research aim is essential.

Within a spatial discipline, the performance of agricultural use of land is the main concern for me, which requires a classification of land use. The classification approach I adopt is adjusted from the *land utilization type (LUT)* system by FAO. Instead of having one synthetic and simplified land-use type, I describe agricultural land use in three layers: agriculture produce, non-agriculture produce and management, as they are most relevant for planning and agricultural operation.

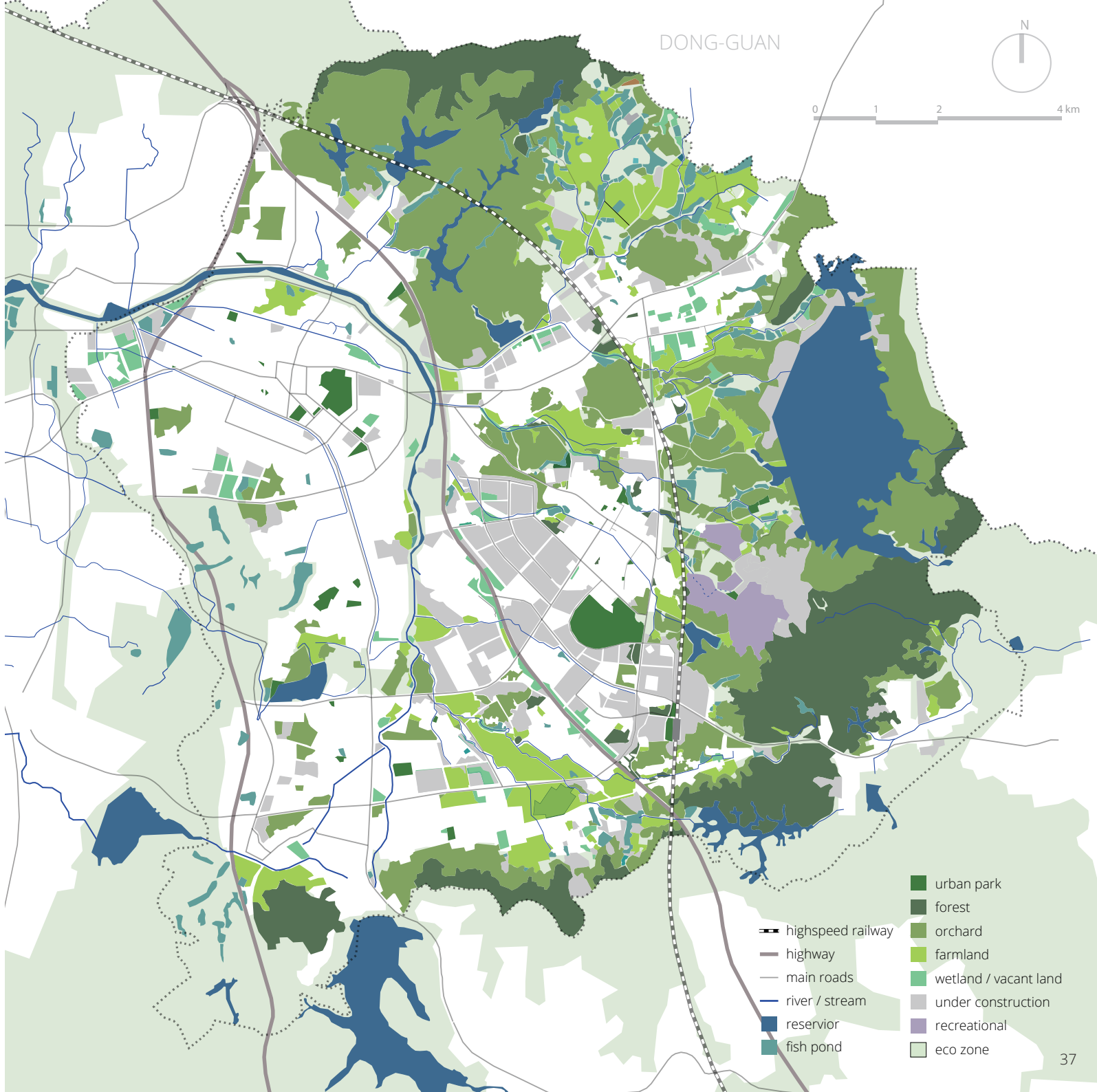
Table 2 shows the current land use types of each layer respectively. The spatial distribution of agriculture and non-agriculture produce in Guangming is shown in figure. X. More detailed description of the management methods of farms is elaborated below, to illustrate the conflicts and imbalanced power relationship in the realm of agriculture.

Layer	Current land use types	Remark
Agriculture produce	1. Temporary crops 2. Permanent crops 3. Livestock 4. Fishery 5. Non-food crops	Featured products: Lychee, longan, mango, corn, milk, pork, pigeon
Non-agricultural produce	1. Recreation / Education	An agriculture theme park
Management	1. Subsistence farming gardens 2. Informal small-scale family farms 3. Formal small-scale family farms 4. Large-scale agribusiness 5. Recreation agri-park	

Table 2. Three layers for defining land use types.

### Land utilization type (LUT)

The concept of land utilization type is a tool widely used to define typologies in agriculture. It define use of land by products, inputs and operation, and social-economic settings in which production is implemented (FAO, 1976). A LUT is 'a synthetic, simplified, representative land-use type' (FAO, 2007) aiming for detailed study on land suitability, as suitability analysis requires more information on management conditions (George, 2003).





### ***Subsistence farming garden***

A subsistence farming garden means agriculture land that is farmed by urban or rural residents living around to grow vegetable for their own use. It takes over small plots of possible arable land that is vacant in industrial area, after the construction of railway, in some urban neighbourhoods, near or in the urban villages, and turns the deserted land into a productive green area. A farmland is often divided into small plots with an area of 2-5m<sup>2</sup>, cultivated by different households. The food produced from the farmland is not enough for a household to be self-sufficient, but it saves the urban poor some expenditure on food. As a farmland is shared by different household, types of vegetable vary from plot to plot, creating a quite pleasing and human-scale landscape.

The spontaneity of farming gardens indicates that farmers own at least basic farming skills. It is very likely that they come from rural area or used to be full-time farmers. The fact is that most of the population in Shenzhen and Guangming have a certain degree of rural background. So the phenomenon implies a common desire for farming of residents with rural background, which can be utilized for improving public space in and around neighbourhoods if designed and implemented properly.

### ***Informal small-scale family farm***



Informal family farming is usually cultivated by one household (often one couple) with an area of 1300 m<sup>2</sup> to 2000 m<sup>2</sup> (2 mu to 3 mu). The products usually are fish or vegetable, sometimes horticulture, and mostly are sold by themselves in Guangming. The revenue from farming highly depends on the weather and market price, so it is not stable. Most of the farmers are migrants, who used to farm in their hometown and move to Shenzhen to be close to the market. Some have worked in the farmland in Guangming for more than 10 years. They usually live in their temporary houses or vacant buildings next to the field, with elementary water and electricity supply.

Recently, due to the urban development or consolidation of basic farmland, some farmers have lost their farmland (or fish ponds) and were forced to leave or relocate themselves. Usually no compensation is paid for those farmers because their farming activities are considered illegal in the eyes of the government, making those farmers very vulnerable. Besides, since their farming is not overseen by authorities, it is likely that their products are not safe and the chemical they use pollute water and soil.

### ***Formal small-scale family farm***

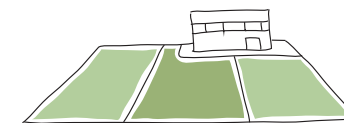
The farming activities in formal small-scale family farms are basically the same as informal small-scale family farms. The biggest difference is that in formal family farms, farmers lease the land from companies. Farmers have contracts with companies, which usually last for one year. Companies provide facilities to protect vegetable from storms. Farmers also live in temporary houses of low quality, but the houses are supported by companies. Companies may buy products from them, but farmers have freedom to sell their products to markets on their own.

Small-scale household farming is a traditional type of farming in China, and it provides a livelihood for at least 400 households in Guangming. But it is now losing its competitiveness in the face of modernized large-scale agribusiness. It seems that this kind of farming doom to disappear if no change is made. In fact, they generally lack long-term land security, and plots of farms are too small for upgrading. So it is not likely that those farms are able to adapt themselves to new conditions. However, despite its drawbacks and dim future, it currently accommodates low-skilled rural migrants in the city and provides affordable and localised food for the city, so it should not be wiped off from the territory of Guangming in a simple and direct way.

### ***Large-scale agribusiness***

Farming carried out by a agribusiness is often intensive, standardized and of large scale. The biggest agricultural enterprise in Guangming is a state-own farm, which now has grown as Guangming Group with business in the fields of food, biotechnology, real estate, recreation and manufacturing.























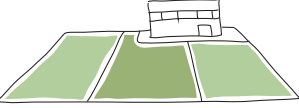















Besides Guangming Group, more and more modern farming enterprises move in after the consolidation of basic farmland since 2010. But the operation of those new enterprises is highly constrained by the basic farmland policy, as only grow grains or vegetables for food are allowed on the basic farmland. For most market-oriented enterprises, the best choice of crops on basic farmland is leafy vegetable, and some have a few recreational fish ponds to attract tourists. Some basic farmland is developed as fields for agricultural research and experiments. As most of basic farmland is currently vacant, waiting to be developed, economic profitability of those new farming enterprises is still not clear. However, from the environmental and aesthetics perspectives, if most of the basic farmland is developed as vegetable and experimental fields, the diversity of the countryside landscape and biodiversity in Guangming will surely decrease.



### ***Agribusiness: Guangming Group***

*With an area of 55km<sup>2</sup> and a history of more than 50 years, Guangming Group (former Guangming Farm) owns more than 7km<sup>2</sup> orchards, 20km<sup>2</sup> economic forests. It also has a grass skiing field of 6 hectares and an agricultural theme park of 66 hectares. The main products are milk, pigeons, pig, chicken, lychee and ham. It is an important source of food supply for Hong Kong. As a state-owned farm, Guangming used to build infrastructures, facilities and housings for production and its staff, including built reservoirs, water supply, sewage system, schools and hospitals, etc. In 2002, the functions of government were separated from those of the enterprise in Guangming Farm. But since the new town development in 2007, Guangming Group has been again under the administration of the Guangming government in order to facilitate new town development, like relocating some livestock factories.*



	MAIN PURPOSE	AGRICULTURE PRODUCE	NON-AGRICULTURAL PRODUCE	SIZE OF UNITS	FARM MANAGEMENT	LEVEL OF INCOME	MARKET	LAND LEGITIMACY	PROBLEMS & TRENDS
 subsistence farm	 subsistence agro-products	 vegetable / fruit /livestock	—	 2m <sup>2</sup> -30m <sup>2</sup>	 individual household / communities	—	—	 illegal temporary	<ul style="list-style-type: none"> <li>- should be legalized</li> <li>- to be used to improve public space in and around neighborhood and encourage social interaction</li> </ul>
 informal small-scale family farm	 agro-products for sale	 vegetable / fish / flowers	—	 2 Mu -3 Mu (1333m <sup>2</sup> - 2000m <sup>2</sup> )	 individual household	 Low	 informal	 illegal temporary	<ul style="list-style-type: none"> <li>- should be legalized to oversee its farming activities and prevent negative impacts</li> </ul>
 formal small-scale family farm	 agro-products for sale	 vegetable / fish / flowers	—	 2 Mu -3 Mu (1333m <sup>2</sup> - 2000m <sup>2</sup> )	 household + cooperative / companies	 Low	 informal / formal	 legal temporary	<ul style="list-style-type: none"> <li>-losing its competitiveness</li> <li>-need to be upgraded, otherwise will disappear</li> </ul>
 large-scale agribusiness	 agro-products for sale	 vegetable / fruit flowers	—	 >1000 Mu (>66 ha.)	 enterprise	 average	 formal	 legal long term / permanent	<ul style="list-style-type: none"> <li>- Homogeneous landscape</li> <li>- constrained by the basic farmland policy</li> </ul>
Recreational agri-park	 tourism (entrance fee, agro-products, services)	 vegetable / fruit / meat / milk / processed food	 education / recreation	 1000 Mu (66 ha.)	 enterprise	 average	 formal	 legal long term / permanent	<ul style="list-style-type: none"> <li>-getting popular</li> <li>-need to be more integrated to the environment around</li> </ul>

**Recreational agri-park**

There is one recreational agri-park in Guangming, founded by Guangming Group, with an area of 66 hectares. It is gated park, isolated from the surroundings, and the entrance fee is 50 RMB (around 6 euro). The park provides diverse agriculture activities that tourists can experience and participate, like feeding milk cow, growing silkworms, learning technique of processing, picking organic vegetables. It is a popular tourist site for families and students.

Near the entrance are a few restaurants providing local cuisines, and some informal markets selling local food. A golf club, an outward bound field and a grass skating field are located next to the park, together constituting an outdoor recreational location for Shenzhen citizens. The tourism cluster is not accessible enough for tourists due to poor road connection. Besides, those parks and sport fields do not have a good interaction with local chacteristics and conditions.

**4.2 Characteristics and problems of agriculture in Guangming**

***Spontaneity shows a strong incentive to grow food***

Many small-scale farming activities happen in a spontaneous and informal way. Citizens transform available land, no matter how small it is, into urban farms and gardens. It can be recognized as a way of greening the city (or claiming spaces) initiated by the people out of the daily demands of people's life.

***Farming systems is in rapid transformation***

Meso-scale household farming is decreasing in number to make room for urban expansion and modern standardized farms. Farming systems in Guangming is shifting from household-based to enterprise-led. At the same time, subsistence farming arises and become popular in and near urban villages, making use of small plots of land.

***Not involving the local***

In Guangming, farming activities used to be and still is part of people's life. However, the new agriculture scheme tends to exclude citizens and communities in farming. Instead, enterprises are introduced to take over the job of agricultural production for the city. The positive side of this includes improved productivity of agriculture land and better monitoring of production. But the negative effects may arise due to the homogeneity of farming system, leaving no space for citizens to get involved in working on the land as

they used to do. For citizens living in urban area, the strong motivation to farm cannot be utilized as a means to green the city, so potentials are neglected; for communities inside ECL, the problem is more severe as the communities do not have other way to make a living after their opportunity to develop industry was deprived.

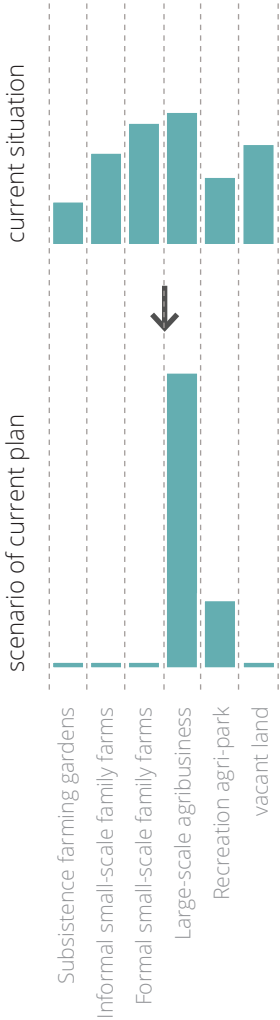
***Vulnerable household farms***

Housing farming is the most vulnerable type of farming facing urban expansion and invasion of agriculture enterprises. The household farms decrease in number and farming population who used to live on the field have to relocate themselves and find another livelihood. As most of the farms are considered illegal, no compensation is given to them. Their products can only be sold in the informal market, and due to the temporality of their access to land, they do not have sufficient facilities to prevent the damage from severe weather. This type of farming seems to lose its competitiveness and is likely to disappear from the territory from Guangming.

However, farming by one household is not the cause of the disadvantageous conditions of this type of farming. Experience from other countries (like the Netherlands and U.S.A) shows that one household is sufficient to run a profitable farming business, with the help of modern technology. The reasons for their vulnerability are the lack of land security and the small scale of the farms, which do not allow them to upgrade or have long-term investment on their farms.

***Reducing diversity in countryside***

Countryside before industrialization used to be self-sufficient in terms of daily necessities and relatively isolated from other regions, so culture and landscape is very diverse to meet the need of people's daily life. After the industrialization, the impact of urban system on countryside gets more and more remarkable, not only economically, but also socially, spatially and culturally. With the introduction of the standardized farming and large scale farming enterprises, countryside has been debased to an area for food production. Identity crisis arises among the countryside residents when they compare their conditions with prosperous urban area, and then they will regard urban way of living as a superior lifestyle. The reduced diversity in culture and society also means reduced diversity in landscape and biological species. Large-scale farms usually create a "placeless landscape" (Morgan, 2013). Researches show that small-scale farms are more likely to achieve sustainable farming practices (Denckla, 2013) as their farming practices are more localized and more territorial-integrative than large-scale farms.





## 5. Spatial Analysis

### 5.1 Substratum layer

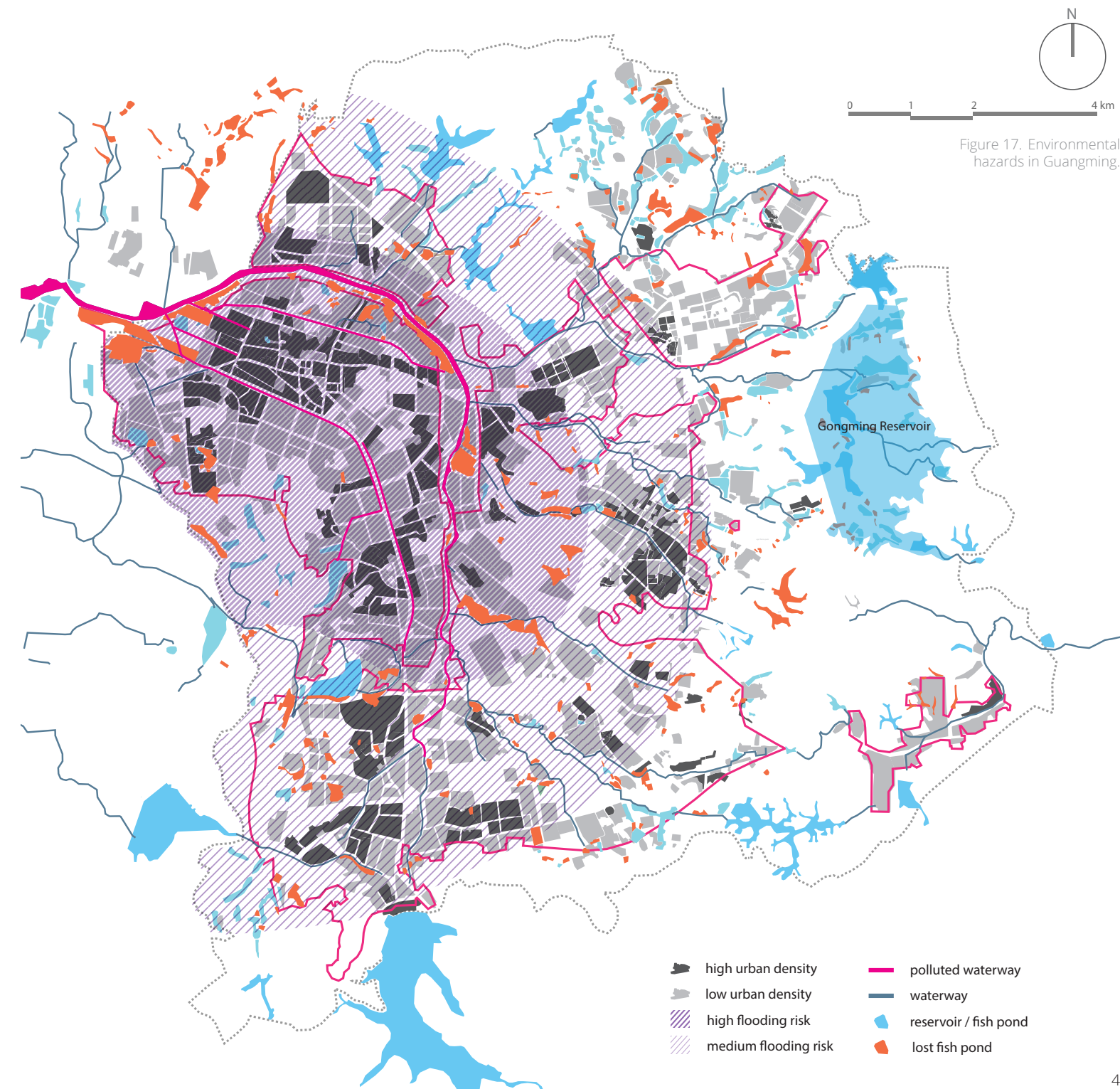
#### *Environmental Harzard*

Situated to the south of the Tropic of Cancer, Shenzhen has a warm, monsoon-influenced, humid subtropical climate, with long and hot summer and short and dry winter. It is generally a pleasing climate for living, but severe weather also happen frequently. In spring, autumn and winter, the city may experience drought, while in summer, which last as long as six months, storms and typhoons bring intense rainfall and strong winds, causing floods and damage to man-made structures or trees. Summer in Shenzhen is also humid with high temperature, making outdoor environment indisposing. Heat island effect in expanding urban area deteriorates the negative condition in summer. As for urban design and planning, the challenge is, therefore, to facilitate city's capacity to deal with the severe weather, say intense rainfalls, strong winds, urban heat and seasonal droughts.

Guangming is identified as the worse liveable area in terms of climate, according to Meteorological Bureau of Shenzhen (see figure 20). As it is located more inland and more to the north, Guangming is more likely to have high temperature and also low temperature than the rest of Shenzhen. Maozhou River, which goes through the whole territory of Guangming, is a river with severe flood hazards and also the most polluted river of Shenzhen due to the industries along it.

#### *Maozhou River and Lost Fish Ponds*

Arable land in Guangming is mostly located along the Maozhou River, but most of the arable land is or will be occupied or by urban expansion and industries (see figure. 20). As industries were developed along the Maozhou River before new town development, the river is severely polluted by those industries, with a lot of impurities and a strong smell sometimes. The polluted water may pollute the nearby soil, on which vegetables are still being cultivated by local citizens (see figure 20).





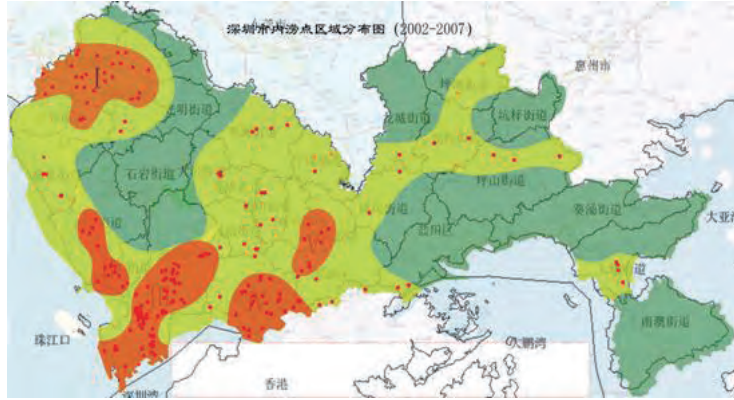


Figure 27. Flood hazard map of Shenzhen. Source: <http://www.szmb.gov.cn>



Figure 21. Natural river banks.



Figure 22. River banks in new town.



Figure 24. Pollution in Maozhou River. source: <http://umedia.oeeee.com>



Figure 25. Farmland next to Maozhou River. source: <http://umedia.oeeee.com>



Figure 23. A fish pond that is gone. (On the board: the pond is deep. Swimming is forbidden.)

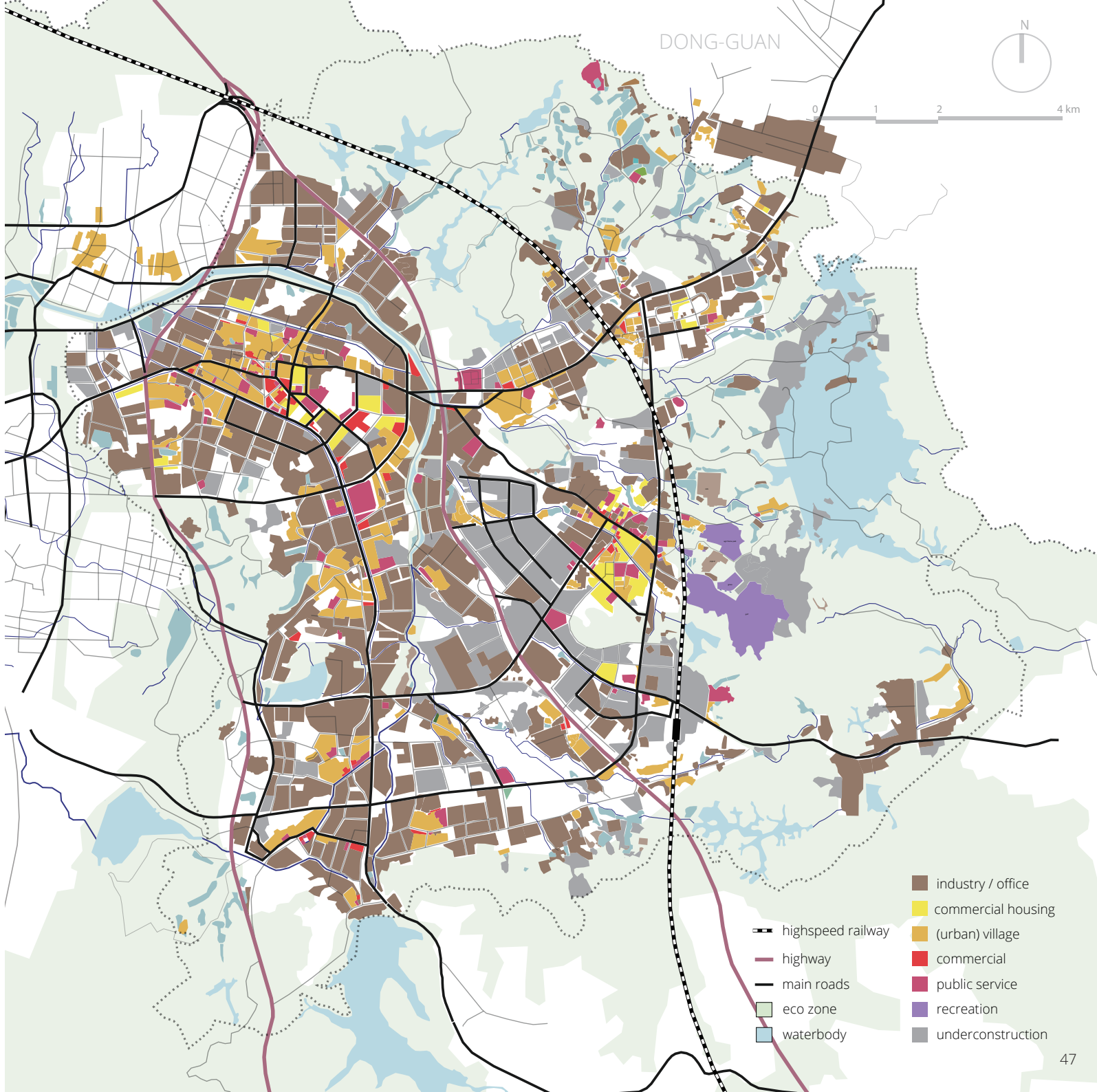


Figure 26. Solidified river banks of Maozhou River. source: <http://umedia.oeeee.com>

Along Maozhou River, especially in Gongming downtown, the level of flood risk is very high. The river banks and rivers are being reconstructed now aiming to solve the flood problem. But at the same time, rivers mostly are narrowed in the master plan. More than half of the fish ponds along the river have been covered for farmland or urban construction (see figure 28, 31). Being the lowest area of the surrounding, fish ponds have the capacities to buffer heavy rainfalls. Fish ponds can also contribute to the ecosystem in other ways like supplying underground water, mediating heat island effects and feeding birds, etc. In Hong Kong, fish ponds are considered as an important part of wetland systems (WWF, 2009). But now in Guangming, the amount of fish ponds is decreasing rapidly.

### Gongming Reservoir

Shenzhen, although located in a humid subtropical area, water supply is always a problem, especially in dry seasons. A big reservoir in Guangming is under construction to secure water supply, called Gongming Reservoir. Located inside the ECL, the reservoir will be the biggest one in Shenzhen with an area of 6 km<sup>2</sup> and a volume of 148 km<sup>3</sup>. Dikes of more than 4 km are being built, with a height of more than 20 m (see figure 21). With Gongming reservoir, water security in Shenzhen will be enhanced. Making use of the height difference and wetland, a new recreational park will be created around the reservoir.

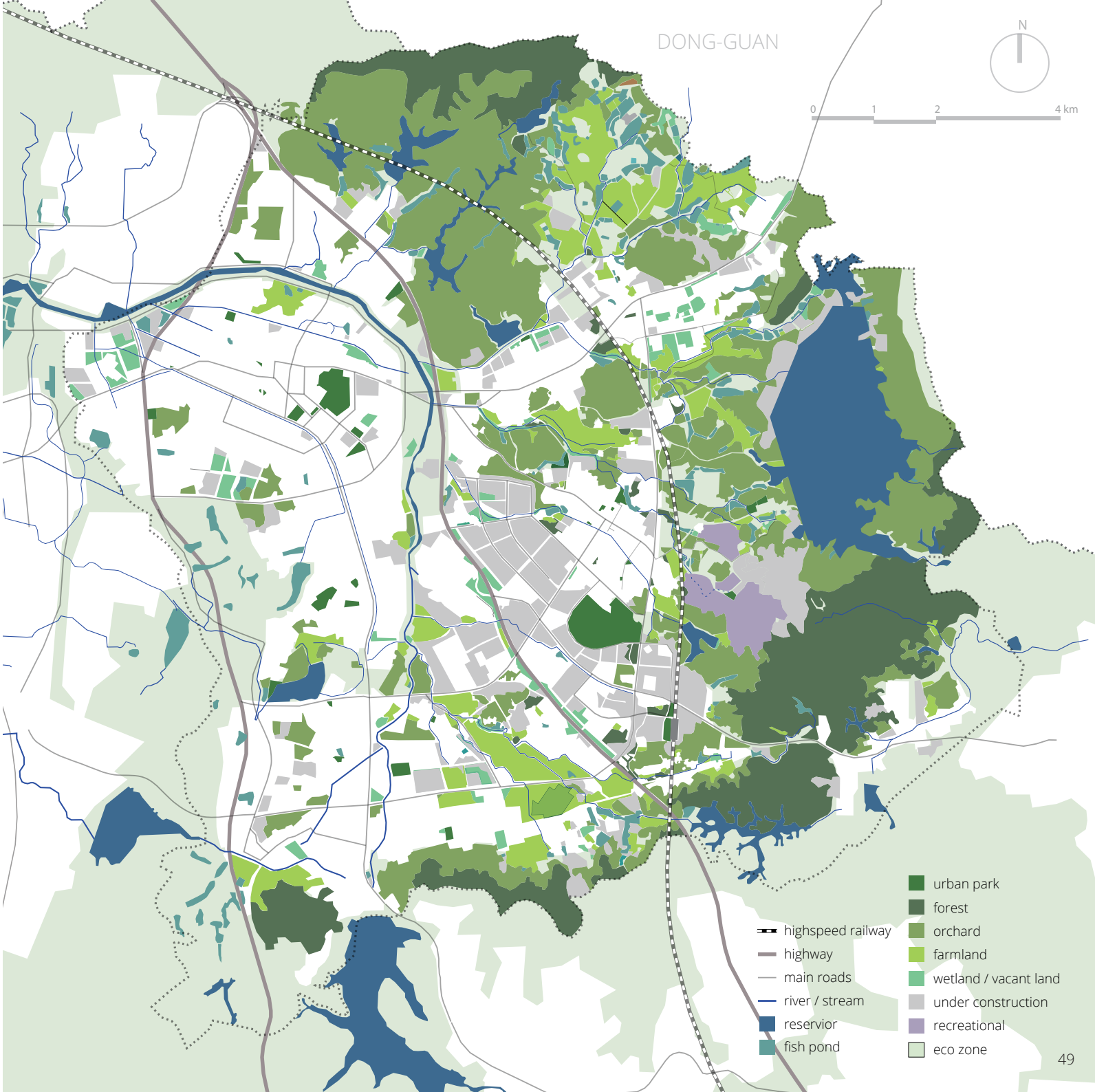




5.3 Open Space Structure

More than 2/3 of open space is productive landscape

Agriculture can be considered as a way for local farmers and citizens to utilize and maintain open spaces. From this perspective, farming is one of the most popular outdoor activities and most common way of using open spaces in Guangming. So urban agriculture is more than an urban design concept for Guangming; it is part of daily life. Without understanding how agriculture functions in the area we cannot get the whole picture of the performance of open space system in Guangming.



## 6. Evaluation of Current Plan

### 6.1 Evaluation Approach

There are two questions that the evaluation should answer: what is the performance of current new town plan and what is the statue of agriculture in the new town plan?

#### Problems of the new town plans

For the first question, the framework of “Green city” concept is adopted, as my aim is to improve the current “Green city” scheme. Special attentions are placed on *green community*, *green ecosystem* and *green space*, because these aspects are most relevant for agriculture and get less attention from the municipality. So in the evaluation, my focus is on:

- whether the new town plans help to build a coherent relationship between the city and the ecosystem it is in?
- whether the new town plans facilitates enhancement of livelihood and capacity for local communities?
- how is the quality of the open space and to what extend it improves the living environment and supports the outdoor activities of residents?

Based on the understanding of current planning system, the evaluation also links the new town problems with current planning instruments and regulations, and discusses in which way these institutional factors are responsible for the problems.

#### Agriculture in the new town vision

The second question is answered through the lens of agriculture, to evaluate the relationship between the new town vision and agricultural activities and land use. First, I discuss the contents in the new town scheme related to agriculture, to understand the role and position of agriculture from the perspective of the municipality and planners. Second, the impacts of new town plans on agriculture are studied, to figure out the barriers to better integration of agriculture in the new town development.

### 6.2 Problems of the new town plans

#### Large-scale blueprint master plan pays not enough attention to local communities and ecosystem

When overlaying the green structure and water system, an incoherent relationship between the two can be easily identified (figure. X). The east-west green connection which goes through the city linking hilly areas in the east and west seems to be an imaginary line proposed by designers without adequate arguments. The actual form of the green connection is just a series of green spaces which are separated by several main roads (figure. X), which means the connection do not act as an important element in shaping the urban structure.

The non-genuineness of the green connections draw forth another problem in the design of the plan: infrastructure overrides open spaces. Infrastructure and regional connections has much higher priority than the green and blue network. They structure the city dominantly, while leaving little spaces and opportunity for the open space to intervene at a structural level. The large-scale comprehensive blueprint makes it more likely to overlook the spatial continuity of open space networks, because the blueprint determines the structure of sub-districts in details so as to achieve regional mobility.

The urban grid may also damage existing settlements and communities, which mostly are urban villages, by putting roads on existing villages in the master plan roads (figure. X), which indicates the removal of these settlements and a huge amount of compensation for the current land users. Meanwhile, the urban villages surrounded by grids are not well-connected to the urban fabrics around, resulting in

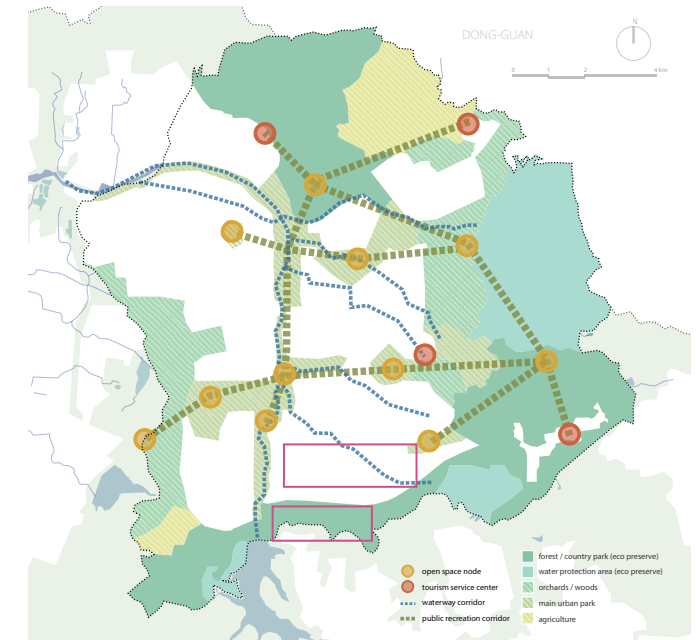


Figure 28. Overlaying green structure and water network according to the urban design of Guangming. (Source: Guangming New District Overall Urban Design, 2010. Elaborated by the author.)

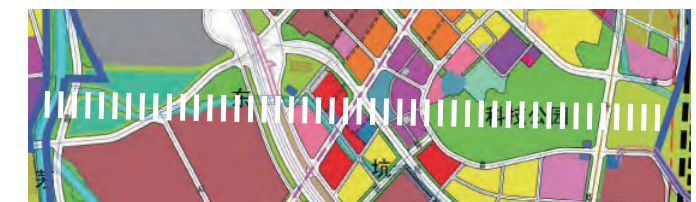


Figure 29. Infrastructure overrides green connection. (Source: Guangming Master land use plan 2007-2020)

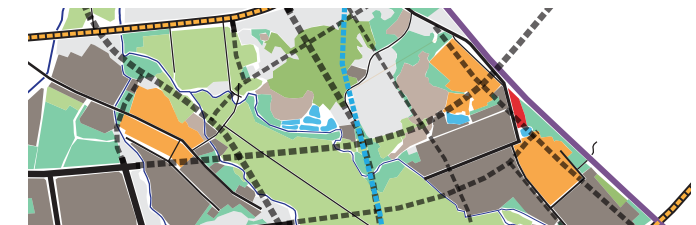


Figure 30. Planned roads (dashed line) damaging existing urban villages (orange). (Source: Guangming master plan 2007-2020, Google satellite map. Elaborated by the author.)

#### 7 dimensions of Green City

- green economy
- green building
- green space
- green infrastructure
- green community
- green ecosystem
- green identity



isolation of urban villages from other residential area and “a decrease of opportunity of slow economic upgrading for the migrant population” (Van Oostrum, 2013).

To conclude, the large-scale blueprint of Guangming is oriented to a fixed outcome. In this single-direction vision, the given ecological conditions and social networks are not integrated structurally, and due to its comprehensiveness and rigidity, little opportunities are provided for the local to adapt the plan to their demands and interests.

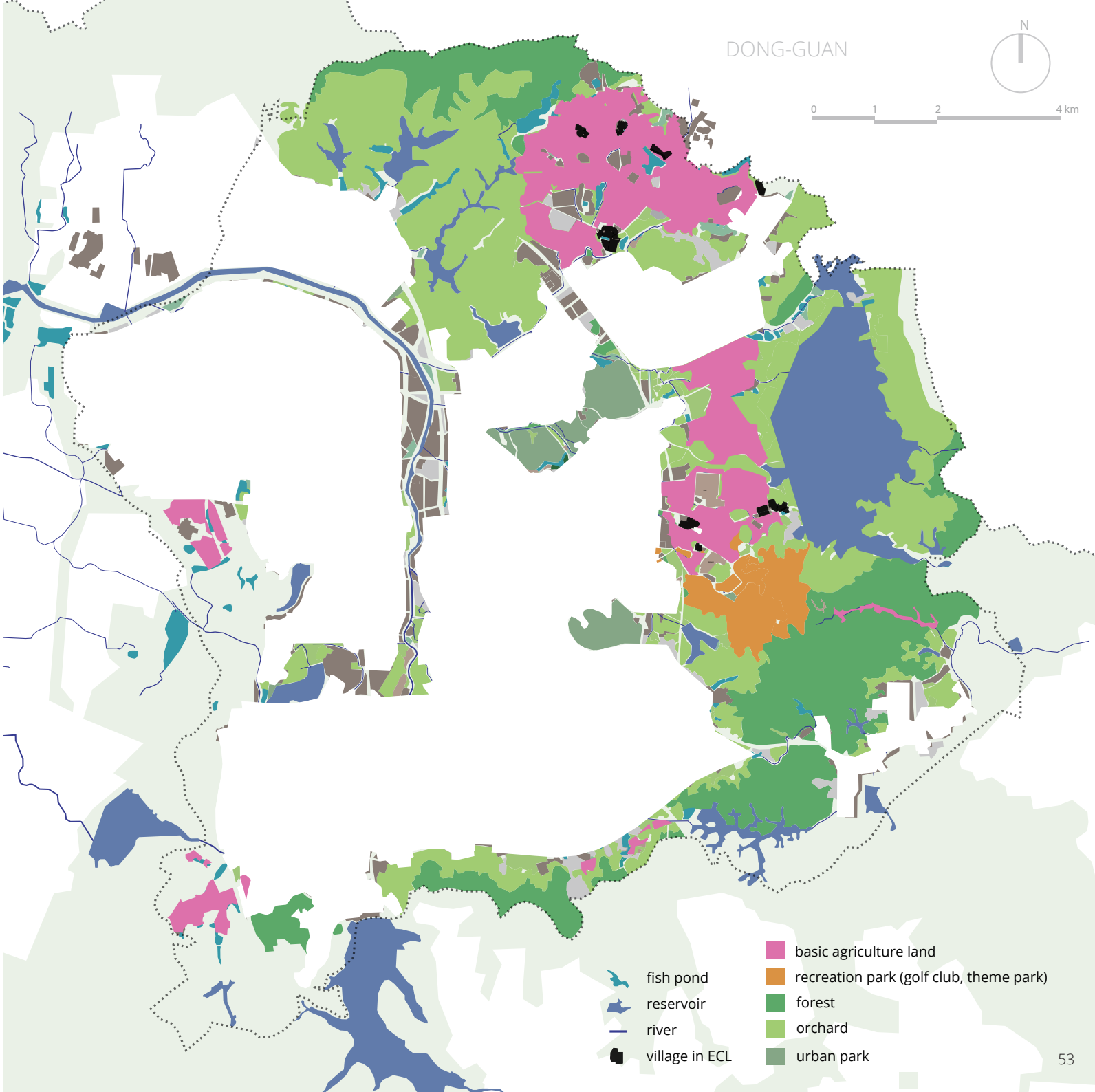
*Placeless and costly open spaces reduce biodiversity and are not affordable, accessible or usable for local residents*

As a green city, open space system is one of the main concerns for the municipality to build the identity of the new town, which requires a huge amount of public expenditure. The definition of ECL separates urban and rural area in Guangming, and also implies two different management modes of open spaces in the urban area and the countryside.

In the urban area, open spaces are used as a means for urban beautification and shaping identity of Guangming, yet resulting in placeless and costly green spaces along main roads and removal of original vegetation on hills. The large amount of investment in greenery has little to do with improving living standard of the local population, and reduces the biodiversity compared with the previous agricultural landscape. One additional thing to notice is that the idea of urban agriculture is included in the design of Central Park, which is targeted to be Manhattan Central Park. But the reality is that five years after the completion of the design, the construction has not started yet due to lack of funds, which demonstrates that taking agriculture merely as a design element is not sufficient to deal with the high expenditure of maintenance of open spaces.

On the other hand, in the ecological protection zone, basic farmland occupied most of the arable land, which is not well accessible or pleasing as landscape amenities for visitors. Other open spaces are developed as recreational parks. But parks built by local enterprise Guangming Group are gated with entrance fees that are not affordable for migrants. Natural parks are built by the municipality to offer open space amenities and restore the ecosystem (usually without agriculture) in the ECL. The construction and maintenance of those parks cost a huge amount of public finance.

In sum, the design and maintenance of the open spaces in Guangming are considered carefully to meet the needs of local population or respect the ecological conditions, although big investments from government go into them.



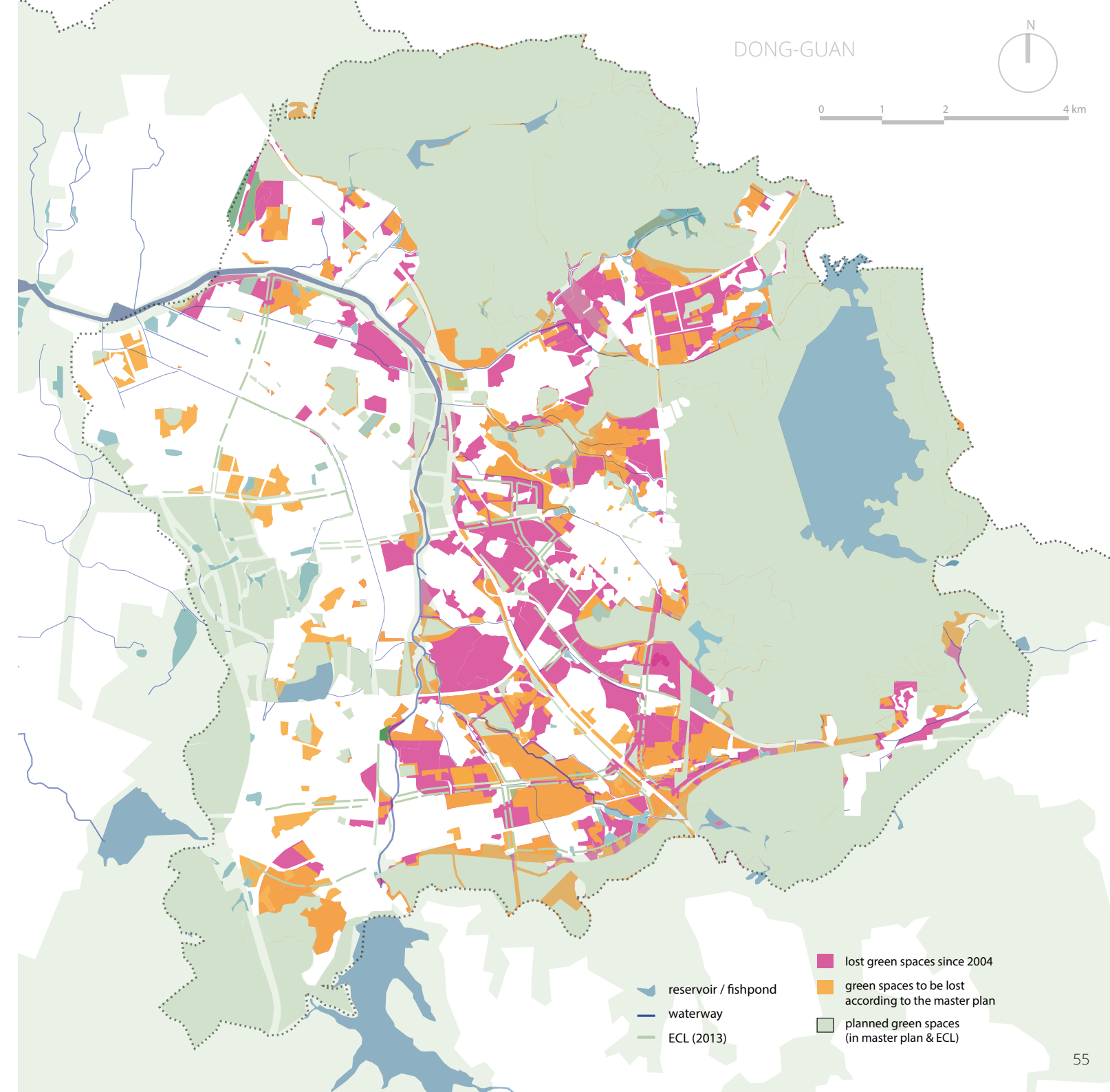
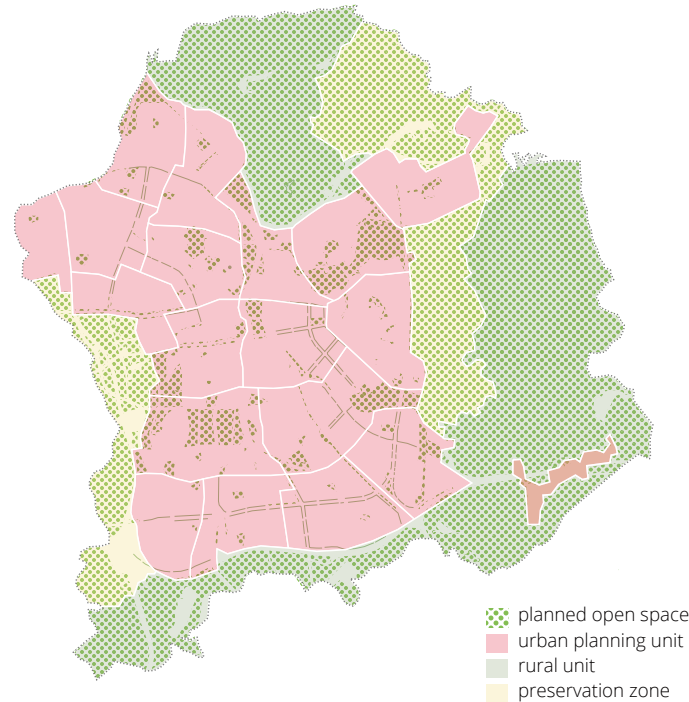
*Institutional separation of urban area and countryside makes it difficult to integrate urban systems and ecosystem and balance urban and rural development*

As mentioned above, agriculture and natural landscape feature the open spaces in the countryside, while greenery in the urban area is more artificial. The existence of the ECL reinforces the difference in the management methods of open spaces in urban and rural areas by giving a rigid boundary between the two areas. It makes the integration of ecosystem and agriculture into urban area more difficulties.

Another critique on the ECL is its strict rules on construction. It restricts the construction in the area, taking away opportunities to develop industries or housing for leasing in local communities. Meanwhile, the basic farmland consolidation replace the small-scale family farms with large-scale agribusiness, so local population cannot even grow food for their own use, let alone make a living from agricultural land. In this case, poverty becomes the most crucial problem for communities situated in the ECL.

The ECL is used not only to restrict urban construction in countryside, but also to differentiate management methods in urban area and countryside. In the current new town planning framework, planning units are defined for more detailed statutory plans, which directly can be translated into regulations and development requirements for projects. However, the division of planning units only happen in the urban area defined by the ECL, which make the difficult to deal with the interface and interaction between urban and rural area.

In sum, development in Guangming is oriented to urban area, which enlarges the gap between the countryside and the city. The introduction of the ECL and the strict regulation of it worsen the situation, making it difficult to achieve urban-rural integration spatially in the territory of Guangming.





*Rapid transformation challenges the adaptability of local farmers and society*

According to the scenario of Guangming new town, the future key economic sector of Guangming is high-tech industry, employing mostly well-educated population. The manufactory in Guangming should be upgraded, with more technique and knowledge involved. In order to achieve this goal in 10 years, high-tech industries are encouraged to move in, while the manufactories are relocated or removed from Guangming. In the process, the amount of low-skilled jobs is not enough for local residents who used to work on the fields. Meanwhile, the urban expansion, which replaces small-scale farms (figure. X), forces farmers to leave the soil and seek jobs in other sectors in Guangming, or find other arable land to farm in other cities. In sum, the transformation oriented to knowledge-based economy is faster than the adaption of the society, and the transformation process does not give enough attention to the livelihood of the less-educated population.

However, the good side of the agricultural background of Guangming is the strong initiatives of residents to farm. They turn the waste land into productive landscape, which offer an opportunity and a clue to improve the liveability of the new town.



Figure 32. Spontaneous farming by residents takes over abandoned land after construction of high-speed railway.



Figure 31. Spontaneous farming by residents living in urban villages.

6.3 Agriculture in the new town vision

*The role of agriculture in the new town vision*

Table X shows the agriculture-related projects and plans promoted by the municipality or built by enterprises. From the plan of the municipalities, we can conclude that the agriculture is mainly regarded as an economic sector to generate revenue and shape identity for the city, rather than a livelihood for farmers. Especially in the ECL area, where urban construction is restricted, high-tech agriculture is the most effective way to make profit and transform the traditional farming landscape to a modern landscape. Therefore, it is not surprising that agriculture described in the documents is mostly run by large-scale enterprises, while the original farming activities are mostly categorised as illegal.

Project / plan	Content	Area / location	Schedule	Investment
Agriculture in industry planning	Keywords: high-tech, intensive, industrialized, modern management, ecological, landscaping Program: food production for the city; high-tech park for agriculture Featured products: vegetable, floriculture, fruit, milk, meat		2008-2020	
Agriculture technology exhibition park	Education and exhibition on agriculture Entrance fee: 50 RMB	1000 Mu (67 ha) in the ECL	Built in 2000s	Built by Guangming Group
Basic farmland consolidation	Clean the field and improve farmland for high-tech agriculture like seed industry, bio-tech, research, agribusiness Combined with tourism Remove small-scale illegal farming	Total: 18395 Mu (1226 ha) Arable land: 13628 Mu (908 ha); In the ECL	2010-2013	Land prepared by the municipality; Farming by agribusiness
Flower Sea Project	Copy the Dutch experience in floriculture and the experience of Butchart Gardens in floral display Tourism, research, education included Making use of hilly area, ecological protection area, basic farmland	In the ECL	Start from 2014	Land prepared by the municipality; Farming by agribusiness
Guangming Central Park	Allotment gardens in the park Slow traffic, sport facilities Investment: 790 million RMB (92 million euro)	193 ha	Designed in 2009, not start yet due to lack of funds	Invested by the municipality

Table 3. The agriculture-related projects and plans in Guangming. Source: Guangming municipality website, [www.szgm.gov.cn](http://www.szgm.gov.cn)

In the urban area, the idea of urban agriculture is introduced as a design element in the Central Park. The agriculture proposed in the design is in the form of allotment gardens, where urban residents can farm (which is actually happening spontaneously all around the city). However, the construction of the park is not yet on the agenda in lack of funds. The investment is a great amount because all the existing agricultural landscape has to be removed and replaced by new vegetation to create a completely new landscape.

### Impact of the new town plan on agriculture

The most obvious impact is the loss of agricultural land. Figure X overlaps the soil types with the open spaces designed in the master plan. It shows the most arable land with fertile soil will be almost eaten up by built-up area by 2020. The process of losing agricultural land is almost irreversible.

Another major impact of new town plan is the loss of access to land of local farmers. Even though a certain amount of agricultural land is kept by basic farmland policy and ECL regulation, the arable land is not accessible for local small-scale farmers, which changes the farming system in Guangming completely, and makes local farmers vulnerable to the change.

### Barriers to include agriculture in planning

Two elements are needed to take agriculture as one of the dominant factors in shaping the city: institutional structure and knowledge. The institutional separation of urban area and countryside makes it difficult to create an integrated open space management means for both city and countryside. The idea of providing urban green spaces in a top-down way also hinders the bottom-up initiatives to provide green spaces by farming.

The imagination of modern agriculture is always about large-scale, intensive farming run by enterprises. The knowledge of benefits and sustainability of small- and medium-scale farms is missing. There is also a lack of knowledge of the potential performance that agriculture can have in improving living environment and urban form, which is also what this project would like to contribute.

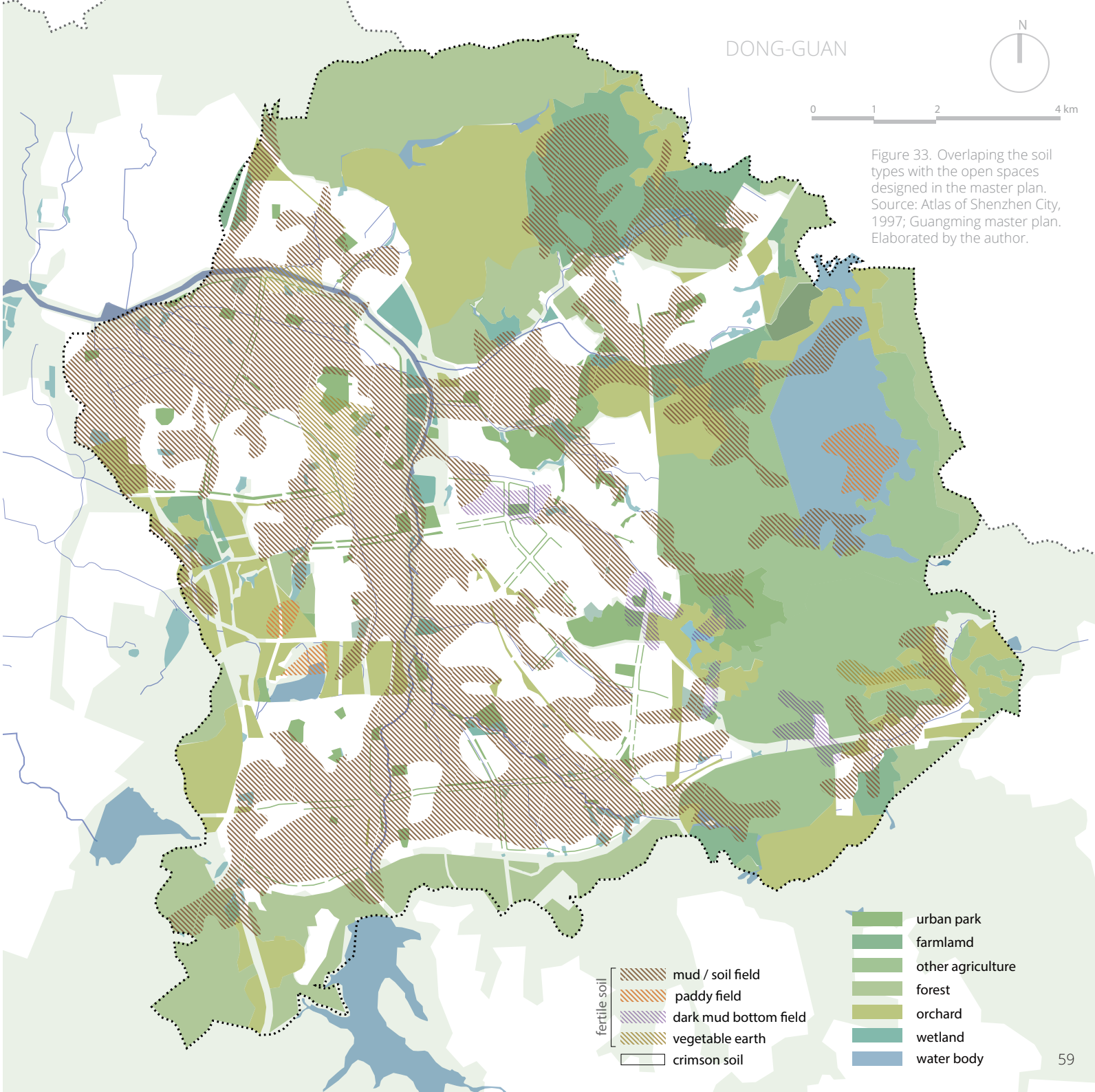


Figure 33. Overlapping the soil types with the open spaces designed in the master plan. Source: Atlas of Shenzhen City, 1997; Guangming master plan. Elaborated by the author.





***The Only fisherman Left***

Surrounded by weeds, far away from the settlements (in the ECL), with two dogs and several free-range chicken, the traditional-style house here looks like a “retreat away from the world” written in Chinese ancient literature. With this romantic feeling in my mind, I got closer and had a talk with the dweller.

He is a young fisherman. His livelihood relies on the two fish ponds in front of his house, but lately his business is not going very well. His house is of poor condition, with leaking roof and unstable electricity supply. He said the area covered by weeds now used to be agricultural land, for fishery or vegetable by several households. Two years ago, the municipality removed the farmers without any compensation. But the land remains vacant till now. “I don’t know what else I can do if I lose these fish ponds,” he said.

Astonished by the reality, I said: “I feel really sorry that I cannot help.” The fisherman said: “No worries. Finish your report, get a diploma, and then find a good job. The world is difficult to be changed.”

# 景觀

## AGRICULTURE AS LANDSCAPE

Landscape perspective / Agriculture as the main concern / Roles of agriculture in new town



# 1. Landscape perspective

To get a more understanding on the relationship between agriculture and city from theory, the landscape perspective is introduced, because agriculture is essentially one type of landscape. Within the bigger framework of city-landscape relationship, we can gain more profound insight theoretically.

## 1.1 Theory

*landscape urbanism; urban by nature; landscape approach*

Integrated Landscape Management, J. Corner, 2006

- The stage of surface
- The operational or working method
- Process over time
- The (collective) imaginary

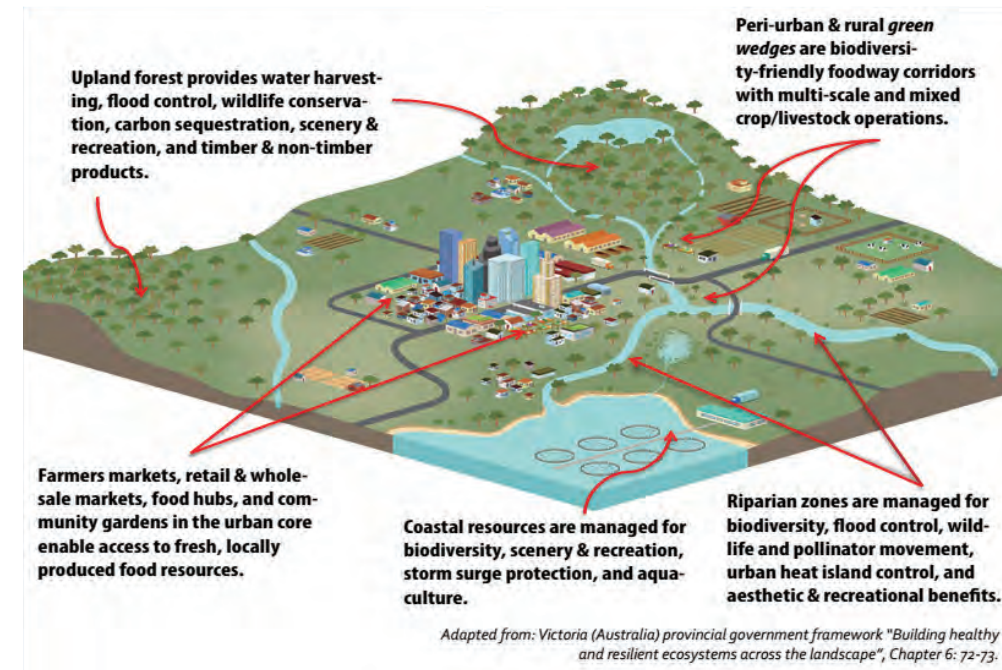


Figure 34. Ecosystem service flows along the urban rural continuum. (Forster and Escudero, 2014)



## 1.2 City-landscape relationship of Guangming

What does a coherent relationship between city and landscape mean specifically for Guangming? Using the framework by Corner and combining the problems in planning and policies, I summarize the characteristics of a sustainable city-landscape relationship of Guangming into four aspects:

### *Landscape structuring the city*

Landscape should be regarded as a dominate element in giving a shape to the city, rather than infrastructure as it is currently in Guangming. Open space system is designed based on high awareness of the performance of landscape. Relevant theories and design methods include Dutch layer approach and design with nature, etc., which discuss the planning approaches to identify the open space structure based on the mechanism of ecological systems.

### *Landscape improving open space quality*

Instead of having anonymous open spaces, the landscape perspective advocates uniqueness and collective memory of a place. It can be achieved by strengthening the identity of the environment and social conditions, which is mostly about agricultural landscape in the case of Guangming.

### *Landscape as a medium connecting city and countryside*

The idea of landscape should not be restricted in un-built area. Taking urban area as part of the landscape system, the characteristics of the local natural system can also be incorporated into the built environment. By respecting the landscape, a smooth transition from city to countryside can be created, because the natural landscape is usually continuous and integrative.

### *City growing over time*

In the realm of landscape, thinking the process over time is an important perspective. Urban growth in Guangming, instead of being pictured wholly in a blueprint, should happen step-by-step with more flexibility. In the process of transition to a new town, adaptability of the society and ecosystem should also be taken into account.

## 2. Agriculture as the main concern

There are four reasons why I choose agricultural landscape as my main concern to discuss the relationship between open spaces and urban built-up environment:

- Agricultural landscape is the most widespread landscape in Guangming, so it is the main way of utilizing open spaces;
- Agricultural landscape and the spatial structure based on agricultural production shows a coherent relationship between human and ecosystem;
- Agricultural landscape is one type of open spaces that is highly relevant for the livelihood of local farmers and also the living environment of urban residents;
- Bottom-up forces in maintaining open spaces can be included from the lens of agricultural landscape.

### *The most widespread landscape*

Figure X (page X) shows the types of open spaces in Guangming in 2010, of which agricultural use of land is the majority, including farmland (vegetable), orchards and fish ponds (including reservoirs that raise fish). So agriculture represents the main means of utilizing open spaces.

### *Coherent relation of human & nature*

- Spatial relationship

When we look back and investigate the spatial relationship between nature and human in the era of agriculture before industrialization, it is easy to recognize the strong connection between water system, soil types and human settlements (figure X). The soil along the river was fertile, while settlements were situated on the fertile soil, with a distance from the river to prevent flooding. The road network was organic, connecting dispensed settlements.

In the city-scale, the coherent relationship between human settlement and nature has lost due to urbanization. Yet the relationship still exists in smaller scales on remaining agricultural land. The case of Xinqiang (page X) demonstrates the diversity of agricultural

landscape and the landscape pattern that ensures the settlements free from flooding, enables local circulation of materials and supports local agricultural economy. The case of Jiazitang shows the structural relationship between water system and road network based on agricultural production.

In the agricultural society, the form of settlements always were built according to the demands of agricultural production and adapted to the natural environment to minimize the environment hazard for human. The structure and types of agriculture relied highly on the given ecological conditions, such as the typography, water system and soil types. So through agriculture, people gained knowledge of the ecosystem in the area they lived in, and adapted their behaviours and construction to the environment. It provides a perspective to reconsider the structure and relationship with natural environment of contemporary new towns.

- Urban Metabolism

Agriculture as a medium can also build functional and material connection between ecosystem and urban systems. I take the view of urban metabolism to understand the relationship.

In the era of agriculture, the flow of energy, food, water and material that happened between natural system, agriculture and human settlements was to a high extend closed locally (figure X). Agriculture was the key medium to enable this circulation. After the industrialization, the material and energy input and output increased dramatically, bringing in pollutions, while local circulation went weak (figure X). After the construction of the new town, closing some circulation locally is an objective for the Green City concept. The methods adopted rely mostly on hard infrastructure at city level, such as centralized water reclaiming system (figure X).

The re-introduction of agriculture into human settlements can help to close the circulation in a smaller scale while producing green spaces at the same time. It can produce food locally in the urban area, make use of food waste as fertilizer and enhance infiltration of surface, etc. (figure X)





Case study: the importance of agriculture in Asia

**Central Park, Nangan, Matsu Island, Taiwan**

Given the opportunity to create their own central square, the local government and citizens decided to turn the square into a food production garden.

Source: <http://www.foodurbanism.org/central-park-matsu/>

**Societal relevance**

Chapter X (page X) discusses the impact of new town plans on agriculture. The livelihood and well-being of the former local farmers has been destroyed by the top-down scheme with not enough consideration or compensation for them. So concern for agricultural landscape is not only on improving the quality of open spaces, but also relevant to people's life.

The importance of agriculture in urban area is also demonstrated by people's behaviours in open spaces. Many small plots of leftover land are transformed into farming gardens by residents nearby. The fever for farming is embedded in the culture. Fei (1947) gave an interesting explanation for this phenomenon:

I met an American friend who had returned from a trip to Inner Mongolia. He told me he could not understand why the people who moved to those frontier prairies still tried to farm as if they lived in China's heartland. Mongolian grasslands are best suited only for pastureland, but he said that every family had carved up the land into small plots for farming. It was as if they have dived, headfirst, into the soil, as if they were unable to see any other way of using the land. ... These accounts show that the Chinese are really inseparable from the soil. ... Now it appears that these very limitations imposed by agriculture will hold China back, will prevent the nation from moving forward.

Of course, the importance of agriculture has changed a lot since 1947. But, learnt from the small plots of green agricultural land cultivated by the local residents in Guangming, we can conclude that the culture that is rooted in the soil has not yet faded away.

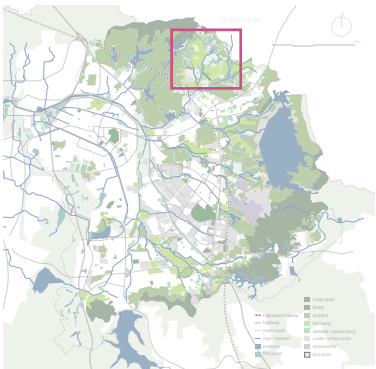
**Bottom-up forces included**

Learnt from the case of Central Park, high-quality of open spaces are too costly for a new town at a starting stage. However, many small plots of farmland cultivated by local residents show a promising alternative to achieve high quality open space at low cost. It is by involving people in the creation of open spaces. Through involvement, the sense of belonging as well as the identity of the new town can be also cultivated.

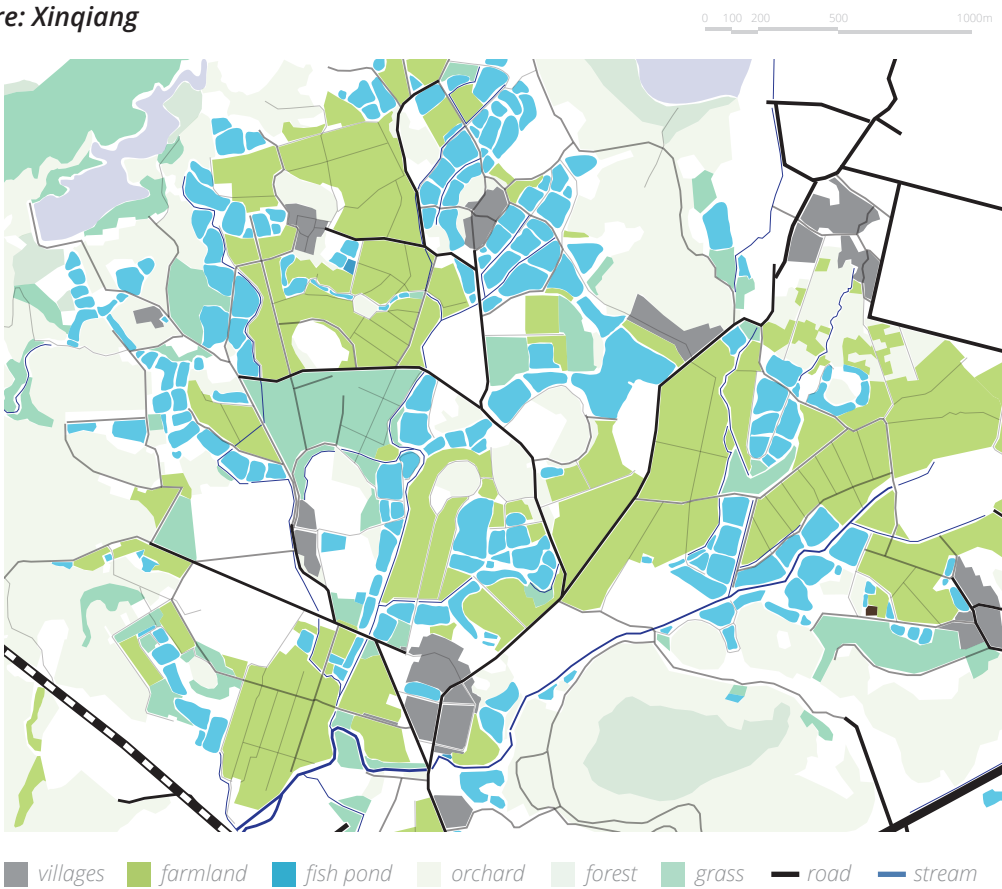


Figure 35. Relationship between water system, soil types and human settlements, before industrialization. Source: Atlas of Shenzhen City, 1997; Van Oostrum, 2013; Google satellite map, 2010

Coherent relation of human & nature: Xinqiang



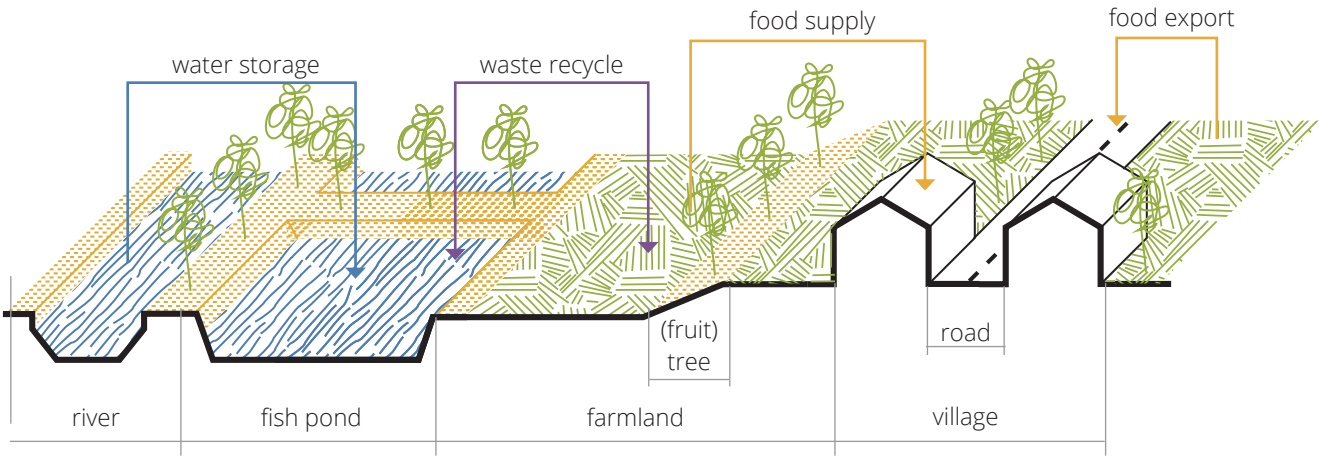
Located in the ECL, Xinqiang Neighborhood is not threatened by the urban expansion, so the original landscape of Guangming can be learnt from the area (it remained until the consolidation of basic farmland, 2013). Using the Google satellite map of 2010, a pattern of relationship between water, fish ponds, farmland, settlements and roads can be identified. The pattern ensures the settlements free from flooding, enables local circulation of materials, and supports local agricultural economy.



Coherent relation of human & nature: Jiazitang

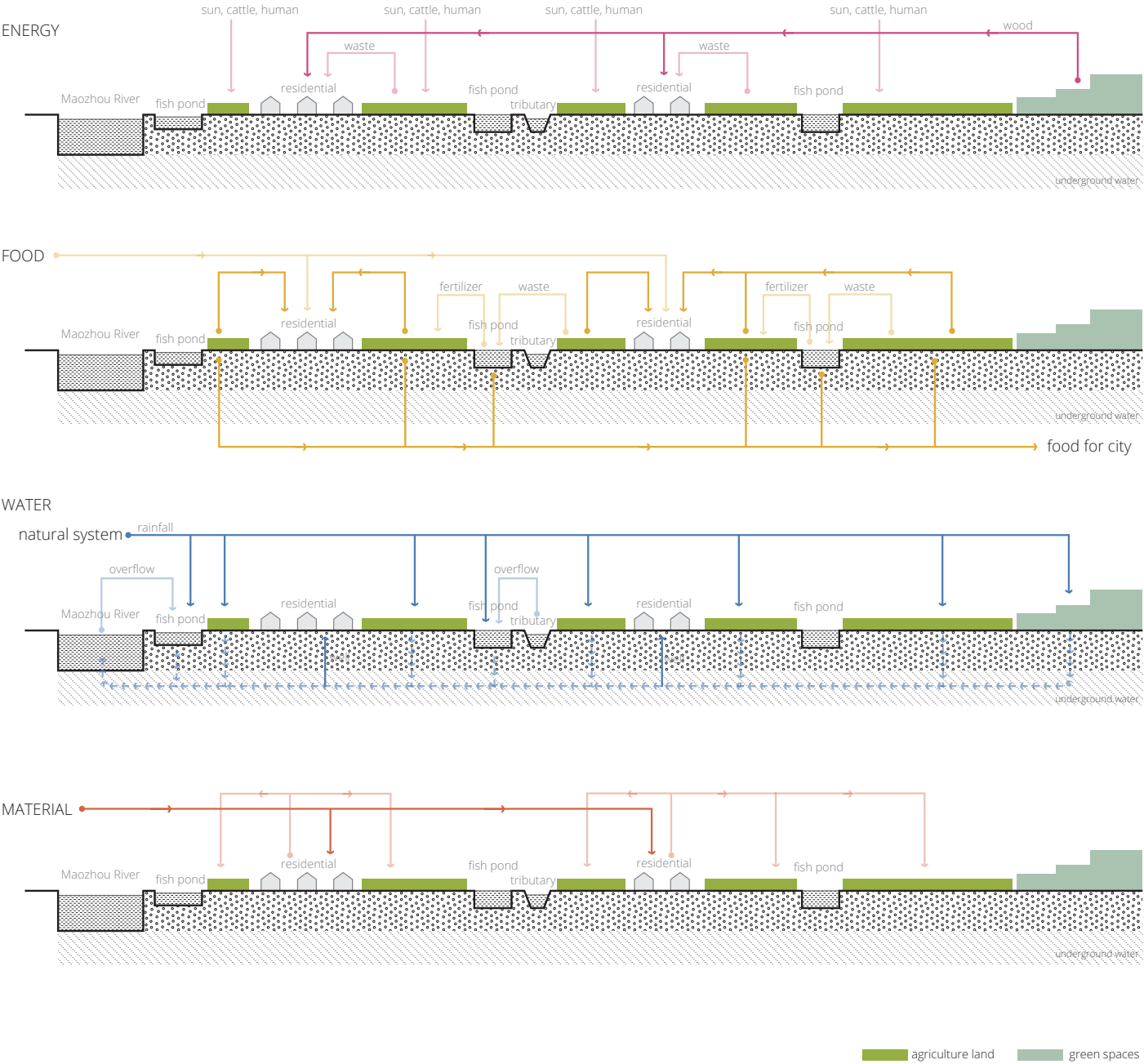


Surrounded by urban grid, Jiazitang area still retains a corridor of agricultural land. The map shows the relationship between water network and the road structure built before new town. The road structure which is based on agriculture and later extended for industries, follows the direction of the streams. As a comparison, the road built since the new town scheme is not coordinated with the water structure.





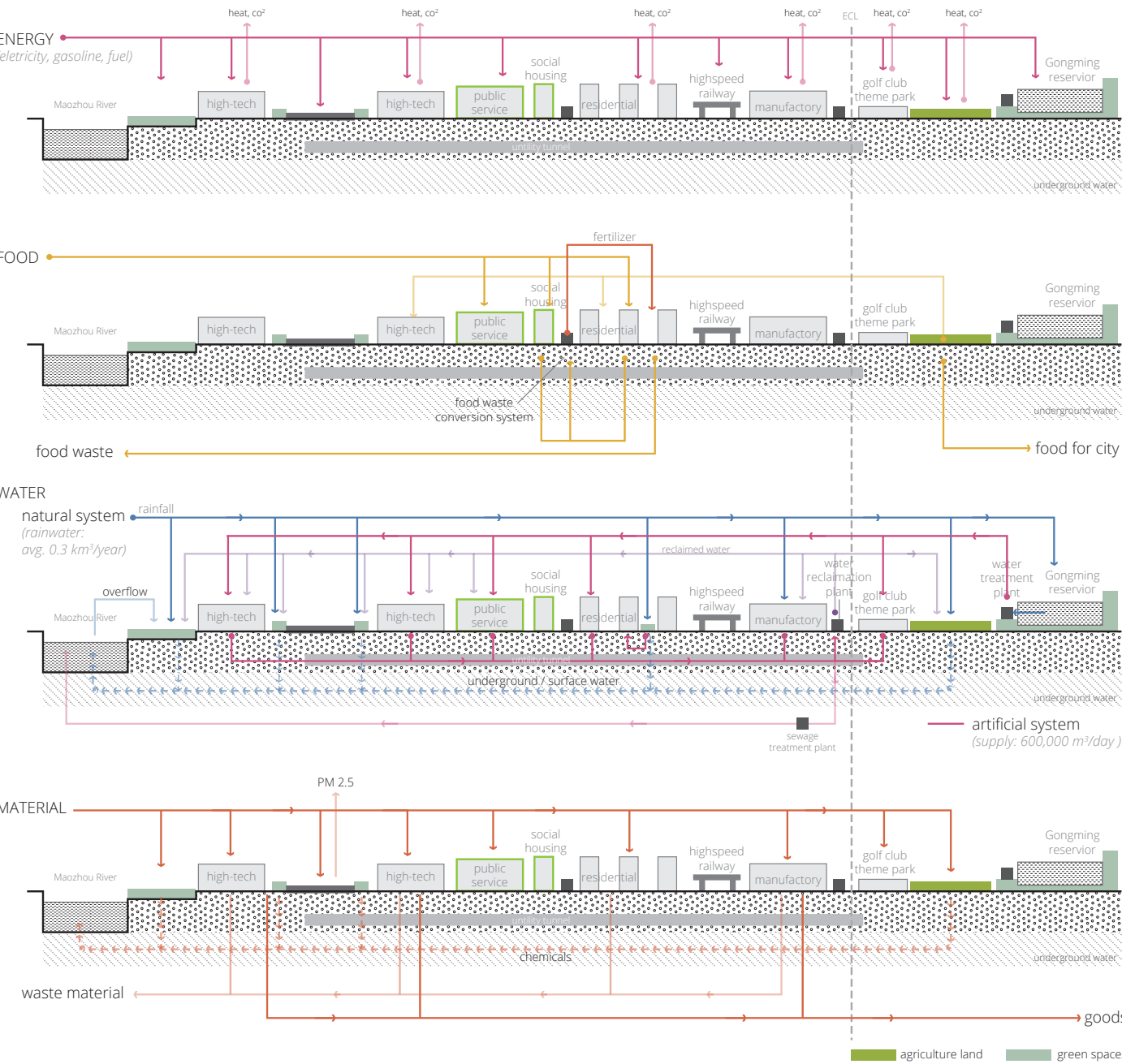
Before industrialization (before 1980)



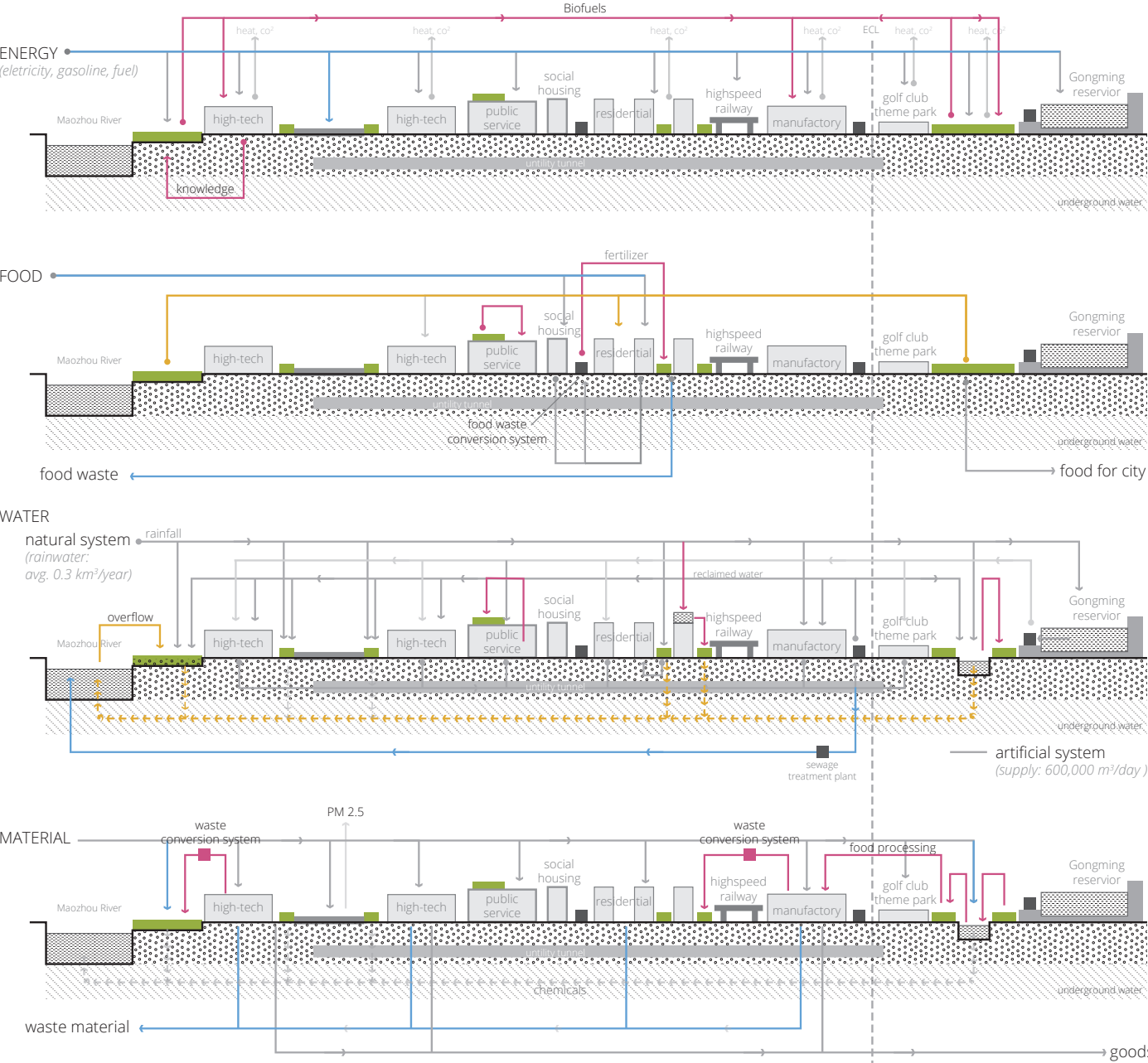
Before New Town (1980-2007)



New Town Scenario (2007-present)



Adding agriculture into current scheme: localisation / decentralisation





### 3. Roles of agriculture in new town

#### Characteristics of Guangming vision with a coherent relationship with landscape

- *Landscape structuring the city*
- *Landscape improving open space quality*
- *Landscape as a medium connecting city and countryside*
- *City growing over time*

As mentioned above, there are four dimensions to build a coherent relationship between city and landscape. Taking agriculture as the most important landscape, the relationship between city and landscape can also be translated into agriculture, which includes the dimensions below:

#### *Agricultural landscape structuring the city*

First, the open space system is re-structured from the perspectives of agricultural conditions. It indicates that the understanding on the operation of agricultural system and its relationship with human settlement and ecosystem can be incorporated into the design of the open space system.

Secondly, the redefined structure should be regarded as the dominate structure for the city. Infrastructure and regional connectivity should be adjusted to guarantee the continuity of the open space network.

#### *Open space quality by agricultural landscape*

Opportunities are offered for local communities or enterprises to farm in urban and rural open spaces. By involving people in the field, open space can generate more benefits for communities, such as enhancing their health, facilitating community building, reduce people's daily expense on food and creating pleasing public spaces with human scale. The cost on the maintenance of open space will also be lessened for the municipality.

#### *Agricultural landscape as transition from urban to rural*

Urban functions can be incorporated into agricultural landscape, making it possible to achieve spatial and functional transition from urban area to rural area using diversified agricultural landscape. With clear responsibility to maintain the land, agriculture can also help to achieve an effective management of the transition.

#### *Step-by-step change from agricultural landscape to cityscape*

Urban growth on agriculture land should be a gradual process to facilitate flexibility and give time for society, esp. farmers, to adapt themselves to changes. To facilitate such process in urban structure, the structure of agriculture landscape is respected and well connected with regional network.





# 理論

## THEORETICAL FRAMEWORK

Urban & peri-urban agriculture / UPA by  
Planning & Design / Planning methods and tools

### Small-scale family farm

The women, together with her husband, earns her living from the field with 2 Mu (1300 m<sup>2</sup>). The main product is vegetable, which is sold in local markets. The couple live in an abandoned factory right next to the field. She said there used to be about a dozen families living in the factory, all of whom farmed on the farmland nearby. But due to the urban constrution, the field they used to farm were expropriated by the municipality, and her field was relocated to the place she is now.



# 1. Urban & Peri-urban Agriculture

The term used to describe agriculture integrated into urban area or under the impact of urban systems is Urban and Peri-urban Agriculture (UPA). In some literatures, urban agriculture is also used to describe the agriculture in and around urban area.

The popularity of the concept of UPA has been increasing since the beginning of this century, and studies on the realm of UPA is also growing. For this project, UPA is an important lens to understand the possible interaction between agriculture and urban systems. Here is a summary of the relevant literatures.

## ***UPA-city relationship and sustainable UPA***

Rural agriculture and UPA is different in many aspects: farm types, livelihood, products, production factors, farmer organization, social context, environmental context, market, land security, etc. (van Veenhuizen and FAO, 2007). But to distinguish UPA and rural agriculture, the most important criteria is the relationship between cities and agriculture: UPA is an integral part of the urban economic, social and ecological systems (Bohn and Viljoen, 2005, Pearson et al., 2010).

Urban system is highly dynamic compared with rural system, which has a strong influence on the development of UPA (van Veenhuizen and FAO, 2007). Urban development provides economic opportunities for the agriculture producers in peri-urban area, while urban sprawl, increasing land price and relatively high income from urban sectors become challenges to sustain UPA in and around city (Tsubota, 2006). Mega (2010) listed synergies and conflicts between city and UPA in the dimensions of environment, society and economy, and suggested that the degree of synergy and conflict between UPA and city in the long term determines the sustainability of UPA. Supply-demand relationship between agriculture and city overviewed by Vermeulen (2013), points out the opportunities for synergy and integration. To better understand the UPA-city relationship, Pearson et al. (2010) proposed three elements: 'urban agriculture in isolation; its interface with the people and environment within which it is situated; and its contribution to the design and construction of built form of cities'. The distinction can give a framework for analysis and interventions and find out missing knowledge in enhancing UPA-city relationship.

Van Veenhuizen and FAO (2007) summarized that, to achieve sustainability, UPA should 'maintains its dynamism and flexibility, adapting to changing urban conditions and demands, intensifying productivity and diversifying its functions for the city while enhancing synergy and reducing conflict, and thereby gaining more social and political acceptability'.

## ***Potentials and Problems of UPA***

Table X shows potentials categorized into economic, social and environmental dimensions, based on Graaf (2013), Zasada (2011), Pearson et al. (2010), van Veenhuizen and FAO (2007), Mubvami et al. (2006).

It should be recognized that the actual roles that UPA can or should perform in a given area to a great extent depend on the context. For instance, UPA serves different purposes in developing and developed countries. In developing world, UPA address more food security and economic issues, while in the context of developed countries, environmental, recreational and health issues are more relevant (Hagan, 2005, Pearson et al., 2010).

However, UPA is not always welcomed in cities and planning. One of the reasons is the potential negative impacts of UPA on urban living environment. Due to its close proximity to densely populated area, UPA, if not practiced properly, has more severe impacts than rural agriculture. The problems associated with UPA are listed by the Urban Agriculture Network (2001?). Smit et al. (2001) grouped them into four categories: health and hygiene effects, environmental effects, inefficiency and aesthetic effects.

Because of the problems of UPA, many local authorities tend to prohibit UPA rather than trying to resolve them (Smit et al., 2001). But as a matter of fact, health hazards and environmental damages of UPA can be minimized or prevented by proper management and education. For instance, education to farmers can help to prevent agrochemical pollution and spread of diseases through crop and livestock production; area with pollutants can be identified and zoned from research, from which regulations and farming methods can be developed to ensure food safety and reduce environmental

risks; monitoring systems on urban farming can also be developed to oversee the impacts of farming activities; organizational structure at community level which empowers community-based groups, farmers’ associations and local professionals can help to create localized solution combined with scientific methods. Due to its close proximity to concentrated population, those potential problems should be treated with more care.

Urban farming is also frequently considered as an economically inefficient use of land. It generates less revenue compared with other types of land use like housing and offices, so it is usually not favoured by local governments and developers. But “urban agriculture is also opportunistic by nature”, adapting to “the possibilities and limitations of the city”(Graaf, 2013). It can turn idle land like roofs, courtyards or along roads, into resources, or add more productivity to existing green spaces. So it does not necessarily compete with other types of land use. Besides, cost and benefits of land use should be evaluated from the perspectives of not only economy, but also environment, social justice and culture, etc. UPA can play a role in various aspects like health, local income generation, food security and urban resilience, which should also be taken into account in planning. By using the concept of multifunctionality, agriculture practices can also embrace other urban functions like recreation and education. Thus, more value in addition to economic benefits can be generated from urban farming if it is implemented in an integrative way.

Urban farming is also perceived as inappropriate in modern cities and contrary to the urban beauty. But agriculture needs not to be ugly if it is managed in a proper way. In Guangming, most of the spontaneous small-scale agriculture is actually well maintained and provides a quite pleasing landscape in the city. If designed in a modern way, it can be well integrated in the urban modern environment and thus overcome the traditional bias.

In sum, the negative effects and inefficiency of UPA can be prevented by proper planning, guidance and monitoring. In the case of Guangming, despite the formalized agriculture, most urban farming happens in a spontaneous and unorganized way. There are strong initiatives to farm in Guangming, which is embedded in the society and culture. Therefore, banning or ignoring the existence of informal farming activities is not an effective way to deal with the negative impacts of UPA. Only by accepting, legalizing and regulating farming activities, especially small-scale farming, can the problems be prevented, of which the first step is to find out what types of farming are suitable in which parts of the city through research and analyses (Smit et al., 2001).

		Potential	Problems
Economic	Local economy	Employment in urban agriculture to reduce social inequity and poverty Supporting micro-enterprise providing services for agriculture	May cause women (often the primary farmers) to overwork, considering other family obligations Engages and can overwork children
	Economic opportunity	Promoting a viable business model Higher profits due to proximity to densely populated area	In some cases occupies a site that may command a higher rent for another use Uses expensive potable water without paying for it
Social	Food access, security	Affordable food for the urban poor Improving diet by provision of fresh and healthy food	
	Interpersonal relationship	Social integration of disadvantaged groups and enhancing gender equity (UPA are mainly undertaken by women in some developing countries) Community development, social interaction, capacity building Provision of aesthetically pleasing landscape in and around cities	
	Liveability & health	Involving city residents in growing and preparing food Open space for outdoor recreation and leisure Promoting awareness of food, health and the environment Encouraging physical activities by farming	Diseases carried by animals like mosquitos, cows, pigs, rats Unsafe food (Fish or vegetable with hepatitis and heavy metals, food with insecticides, contaminated food, planted on polluted soil or irrigated with polluted water) Raising livestock in the city leads to informal, unsupervised slaughtering
Environmental	Resilience	Increase cities' adaptation to climate change providing natural buffer against natural disasters Water infiltration for flood control and groundwater replenishment Urban micro-climate moderation (greening, air and heat) Urban biodiversity	Water pollution from waste and chemicals Insecticide air pollution Damage to grassland if overgrazed Soil pollution from waste and chemicals Sometimes replaces forest cover with field crops Drains wetlands and reduces biodiversity, as do all urban land uses Farming practices on riversides and steep slopes contribute to flooding and erosion
	Low-carbon	Urban waste recycling Production of local food to reduce food miles	
Management		More efficient management of open space Productive use of vacant land	Can be unattractive, depending on how it is implemented In some cases, the shoulders of highways used by farmers contribute to accidents Difficult to tax To be safe, urban agriculture requires more monitoring per unit of production than some other urban production processes

Table 4. 1 Summary of potential and problems of UPA. Based on Graaf (2013), Zasada (2011), Pearson et al. (2010), Veenhuizen and FAO (2007), Veenhuizen (2006), Tsubota (2006)



## 2. UPA by Planning & Design

### 2.1 The role of Planning and design

By reviewing research on urban agriculture, Pearson et al. (2010) summarized two elements that facilitate sustainable UPA and enhance city-UPA relationship, which are *knowledge and institutional structure*. In the field of spatial planning and design, the key issues are to justify the existence of urban agriculture by spatial plans and regulations and to investigate the social, economic and environment goods and services delivered by UPA to improve the urban environment. The review of planning and design that facilitate UPA here is also divided into two parts: provision of land and improvement of city-UPA relationship.

Pearson et al. (2010) also pointed out that the knowledge gap in the benefits of UPA is the biggest “where it relates to the opportunities for UA to impact on urban form (planning, design and construction)”. And the dynamic interaction between UPA and city over time is deficient. This graduation project provides a perspective and specific on-site knowledge to fill in these gaps.

### 2.2 Provision of space

Urban farming requires urban space. Provision of land is a key issue for spatial planning and policy to facilitate agriculture in urban and peri-urban area. To provide land for agriculture, availability, accessibility and usability are necessary conditions (Mubvami et al., 2006). It means land should be officially acknowledged for agriculture use, affordable for farmers, with secured tenure, and equipped with sufficient services.

Above all, security of land tenure is the most fundamental issue for preservation of UPA, as it more or less determines the investment level of urban farmers on their farms. But preservation of agriculture land is always challenged by other types of competitive land use, so access to land is also one of the most controversial issues. Therefore, to protect agricultural uses in urban area, the conflicts in land use should be taken into account.

Land tenure for UPA includes ‘the right to possess or occupy the land’ and also ‘the right to use the land for agricultural activities’ (Wooten and Ackerman, 2011). Securing

‘the right to possess or occupy the land’ require a series of supportive land policies, like taxing, ownership, a property lease, while ‘the right to use the land for agricultural activities’ should be justified in spatial planning.

RUAF and UMP (2003) summarized the strategies applied in various place around the world to enhance the access of urban farmers (especially from lower class) to land for agriculture:

- First is to enable access to public or semi-public land for temporary agriculture use. An inventory of available vacant land in cities and analysis of the suitability for farming is usually the first step for this approach. Temporary occupancy licenses are provided for legality and security of farming activities.
- A second strategy is using allotment gardens on privately owned land, which can be leased to urban farmers. In this strategy, involvement of municipalities and NGOs is important to coordinate the relationship between land owners and farmers.
- Third is taking UPA as a permanent type of land use and integrating it in land use planning. Legalizing UPA in zoning laws can enhance the security of agricultural land use, and also help to conserve and maintain open spaces in and around cities. In different contexts, legitimization of agricultural uses may happen in different manners.

In the developed society, UPA practices often happen in the intra-urban area in a bottom-up way at the community level. These bottom-up movements, in the Netherlands for example, often encounter planning restrictions. Vermeulen (2013) suggested a more supportive land use and building policies by the local government to encourage local farming initiatives. Hagan (2005) also argued that top-down approaches are needed to free up lands for agriculture.

In areas where cities grow rapidly, like many developing countries, long-range comprehensive planning based on blue-print approach is often used to guide the rapid urbanization (Mubvami et al., 2006). In a rigid plan, if urban agriculture ‘is not considered during the planning process, it would then be very difficult to properly include it in the implementation of the plan, and to achieve the maximum benefit’ (Mubvami et al.,

2006). Therefore, accepting agriculture as official urban land use is a key issue. Planning instruments like zoning, master plans, local plans, site plans should include UPA and recognize it as part of the development strategy.

Difficulties to include UPA in planning often come from the lack of awareness and knowledge on UPA, so urbanists should play a leading role in delivering the knowledge to local authorities and the public. In addition, the success of those inclusive plans to a great extent depends on the capacity and will of local authorities, and multi-stakeholder approaches are also important for effective guidance and minimizing negative effects of farming activities. To facilitate the multi-stakeholder planning process, an inventory of potential agricultural land and evaluation of suitability and availability of land for agricultural use is often the first step. Conditions, benefits, risks, and management guidelines of each type of UPA should be described and provided. Besides, urban farmers should be empowered to get themselves organized and educated for effective implementation of plans.

2.2 Improving city-UPA relationship

Combining green structure and agriculture: CPUL

The concept of continuous productive urban landscape (CPUL) is first mentioned by Viljoen et al. (2005), intending to reconnect cities to food system to prevent scarcity in European city development from a spatial design perspective. ‘Productive’ includes economic, social-cultural and environmental aspects, in the framework of which food production in the urban and peri-urban area is integrated in urban landscape network to benefit the urban realm.

The concept of CPUL suggests that urban agriculture is more than dispersed spots in the neighborhood, but also a landscape element that can be embedded in different types and scales of open urban spaces, like urban parks, urban forest and urban gardens (Bohn and Viljoen, 2005). For contemporary open urban spaces, bringing in urban agriculture can richen activities and experience, and enhance the influence of open spaces on shaping more sustainable local lifestyle.

On one hand, agriculture is embraced in the urban realm, while on the other hand, UPA can also benefit from being part of the networked landscape. In CPULs, non-vehicular circulation routes are introduced to link open urban spaces, increasing the accessibility of wider regional landscape, in which way peri-urban agriculture can be more meaningful for urban residents, making more leisure activities possible.

Building functional connction: Multifunctional agriculture (MFA)

Potentials of UPA mentioned above indicate the possibility that UPA can accommodate diverse functions. Multifunctionality of UPA can be achieved by diversifying products and activities of farms, tourism development schemes, development of open space network, integrated rural development projects (Purple), etc.

Viljoen et al. (2005) identified four scales that are interrelated and important to understand multifunctional agriculture: farm, rural community, regional and national levels. Due to different decision making process and actors involved, multifunctional agriculture has different emphasis in each scale. The direct expression of agricultural multifunctionality lies in the farm level. Having multiple functions in a farm can increase the economic income and deliver public good as well. Multifunctionality of rural-community level helps the area to attract external consumers and thus develop tourism economy, and the issue of landscape and environmental protection should also be addressed at this level. Social and economic issues like food supply chain, population flow, cultural and educational environment and economic opportunities are important at the regional level. Policies and ideas on national levels should be able to translate to local actions via community and regional levels.

One thing to add is that co-existence of multiple functions in one area also implies that synergies and integration of conflicting situations is the crucial problem for multifunctional agriculture (Brandt and Vejre, 2004).

Four scales of multifunctional agriculture

- Farm
- (Rural) community
- regional level
- national level



### 3. Planning Methods & Tools

#### A coherent relationship between city and agriculture

- *Agricultural landscape structuring the city*
- *Open space quality by agricultural landscape*
- *Agricultural landscape as transition from urban to rural*
- *Step-by-step change from agricultural landscape to cityscape*

According to the role of agriculture in improving the new town plan and achieve environmental and social coherence, the planning approaches and instruments adopted should meet the following criteria:

- Understand the ecological conditions, and by analysis define the spatial structure;
- Encourage the participation of local communities to create and maintain public spaces;
- Provision feasible regulation for guiding the transition from urban to rural
- Be able to manage urban growth over time and embrace flexibility in the plan

Here is a review of relevant theories and research that give inspiration for the planning and design methods in this study.

#### 1.1 Layer approach

#### 1.2 Transect from urban to rural (SmartCode)

#### 1.3 Framework plan rather than blueprint

#### 1.4 Multi-scalar approach

#### 1.5 Suitability evaluation for agriculture

#### Landscape Approach

*The World Bank*

*A “landscape approach” means taking both a geographical and socio-economic approach to managing the land, water and forest resources that form the foundation – the natural capital – for meeting our goals of food security and inclusive green growth.*

*Typically, a landscape approach will:*

- *Consider people as central elements of the landscape;*
- *Take an integrated, spatial approach to the management of land, water and vegetation within a particular geographical area, taking account of upstream and downstream impacts;*
- *Combine measures to support sustainable intensification on the most fertile land with landscape restoration and soil and water conservation on degraded land;*
- *Within these principles, adapt the focus of support measures to the particular geography;*
- *Aim to restore a balance of environmental, social, and economic benefits from the use of land, water, forests and trees within a broader pattern of land and water use; and*
- *Monitor impact and take into account lessons learned.*





# 構架

## CITY-SCALE DESIGN

Contents / Spatial structure & zoning /  
Sustainable agriculture operation / Suitability  
evaluation / Relationship typology



# 1. Contents of city-scale design

## A coherent relationship between city and agriculture

- Agricultural landscape structuring the city
- Open space quality by agricultural landscape
- Agricultural landscape as transition from urban to rural
- Step-by-step change from agricultural landscape to cityscape

The city-scale design aims to demonstrate the feasibility and possibility to articulate agriculture and urban form at a structural level, and explore what kind of planning instruments can be utilized to build a closer and beneficial relationship between city and agriculture.

As mentioned in the review of urban agriculture theories, there are two ways of planning and design to facilitate sustainable agriculture: providing spaces and improving city-UPA relationship. Therefore, the contents in city-scale design is also categorised into two parts: spatial structure and regulations focusing on providing spaces at city-scale level; and planning tools and guidance that help to maximize the benefits of urban agriculture while minimize the negative effects on urban environment in neighbourhood level.

In the city-scale structure, open space structure is determined according to ecological and current urban conditions. Based on this structure, future urban growth, transition zones from urban to rural and detailed planning units are defined. The regulations of the zones are elaborated to better guide the development. Infrastructure, which focuses on the regional mobility, is adjusted to the new open space system and also allows smaller scales to develop more territorial-integrative plans.

Planning tools and special plans on agriculture may not be regulatory, but provide guidance for improving city-agriculture relationship. A scenario of overall agricultural system is developed to picture the sustainable agricultural operation in Guangming. Land evaluation for agriculture use of land is conducted, which provides knowledge on locating different types of agriculture for zoning and more detailed designs. A toolbox of spatial combination of agricultural land and urban uses is created to show the possibilities and spatial quality that agriculture can achieve in neighbourhood and street scales. These tools and guidance offer knowledge and inspiration for agricultural operation and design for individuals, communities and local authorities, which enable them to create their own solutions based on their demands.

The diagram (figure X) shows an overview of the contents of the city-scale design and their relationships. The framework that these interrelated elements constitute enables the integration of agricultural landscape in the new town in different scales.

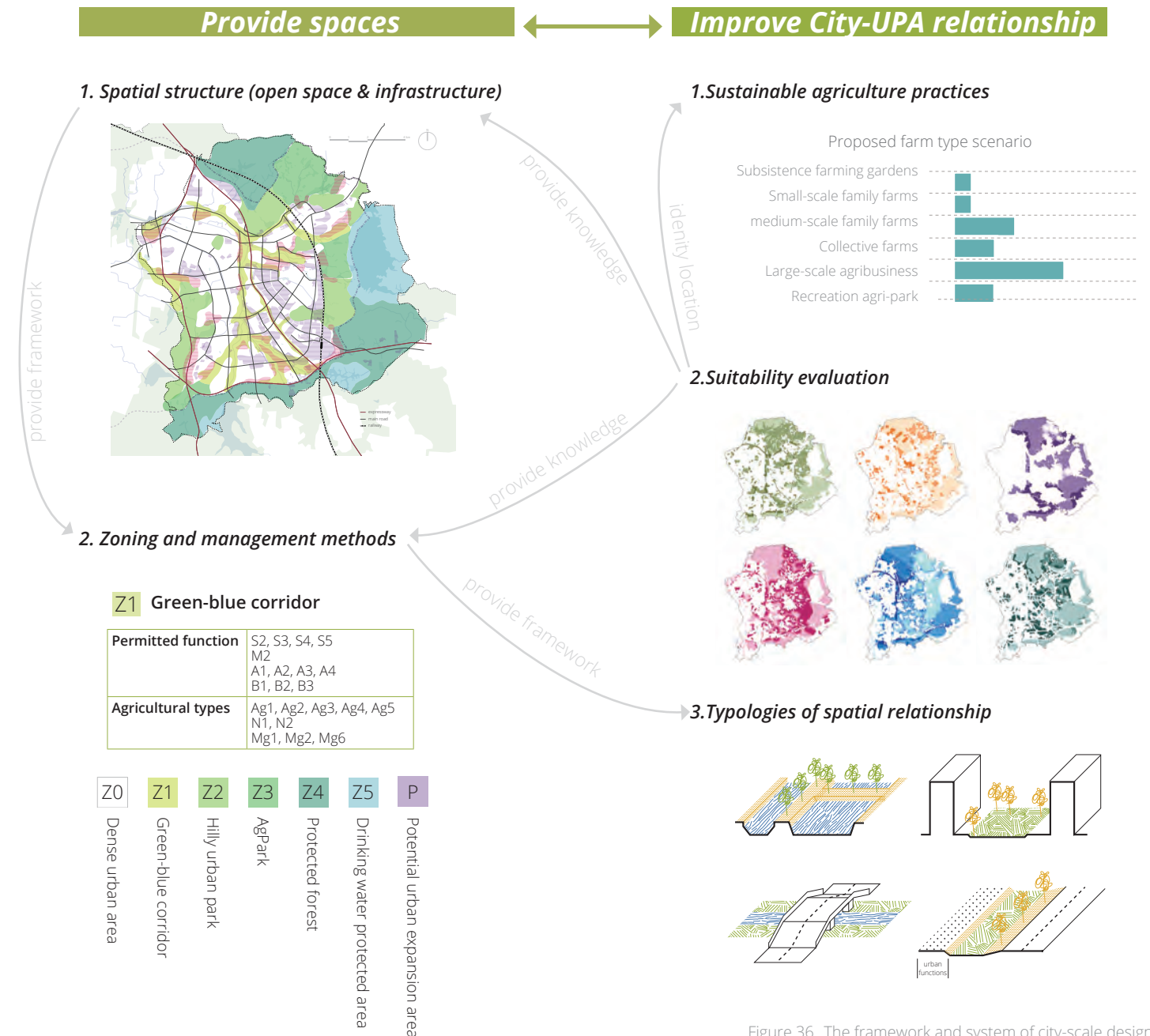
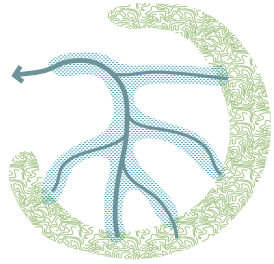


Figure 36. The framework and system of city-scale design.

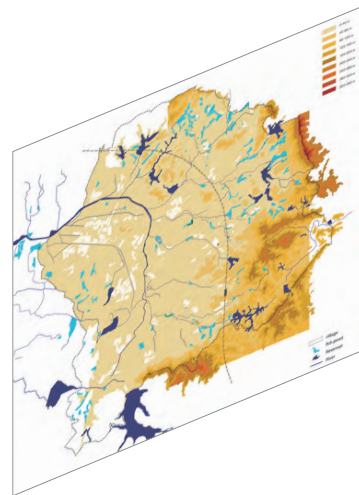
## 2. Spatial Structure & Zoning



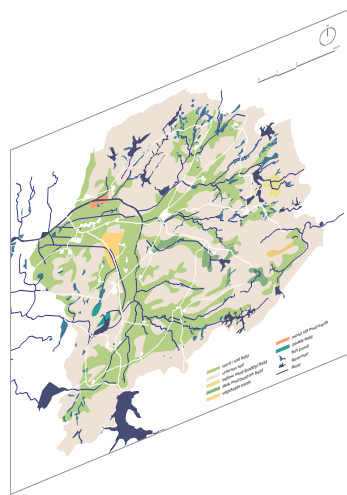
### 2.1 Defining Open space structure based on ecological and agricultural conditions

For agriculture, the most relevant natural conditions are soil, water and typography. Besides, current land use and environmental problems should be also taken into accounts. The following are the criteria I use to identify the open space structure for Guangming:

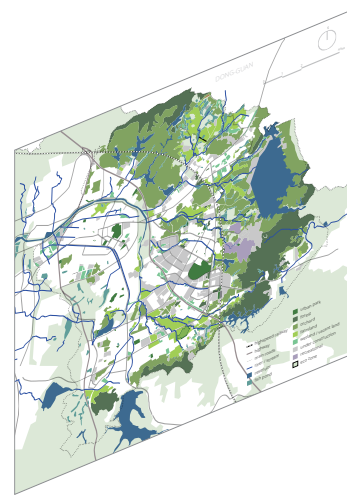
- The most valuable land for agriculture should be preserved or be treated carefully for urbanization (which is evaluated with soil, water and typography data);
- The current urban built-up area and structure is respected;
- The preserved agriculture land also includes riparian buffer zones to prevent flooding and green buffers along main infrastructures;
- The open space network should be continuous, leaving opportunity to incorporate functions such as slow traffic system, bio-corridors and ecosystem services into the system.



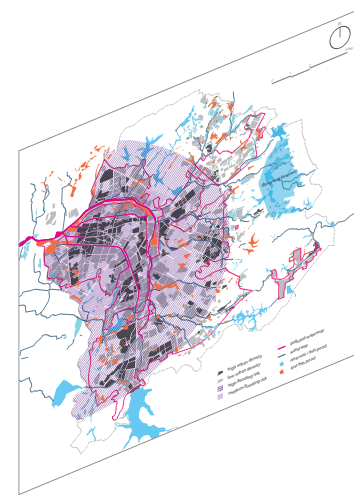
topography



soil types



existing open spaces



Environmental hazard

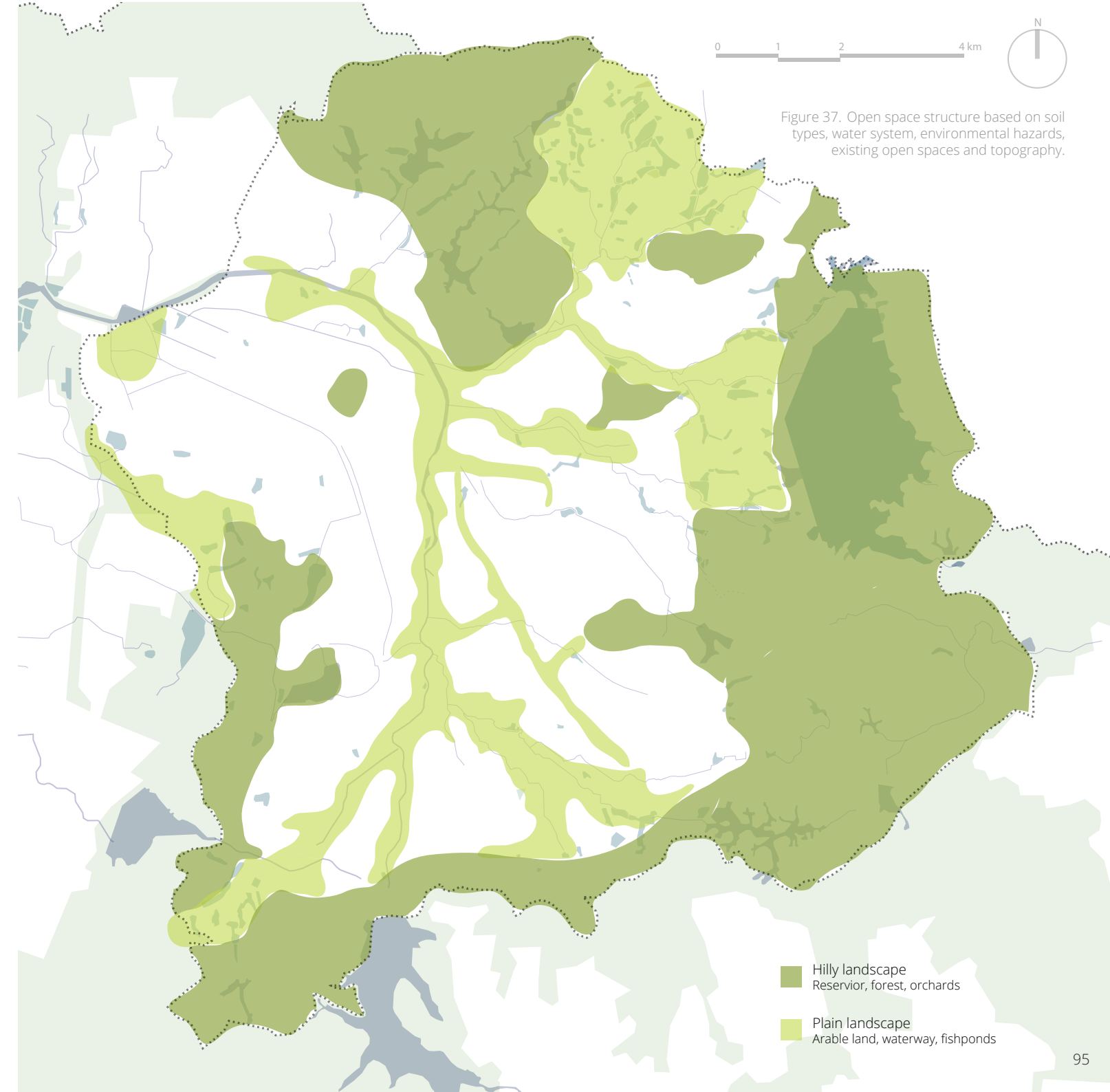
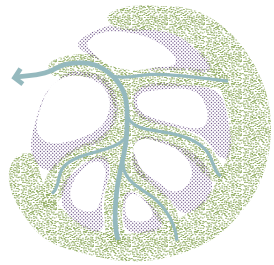


Figure 37. Open space structure based on soil types, water system, environmental hazards, existing open spaces and topography.

- Hilly landscape  
Reservoir, forest, orchards
- Plain landscape  
Arable land, waterway, fishponds



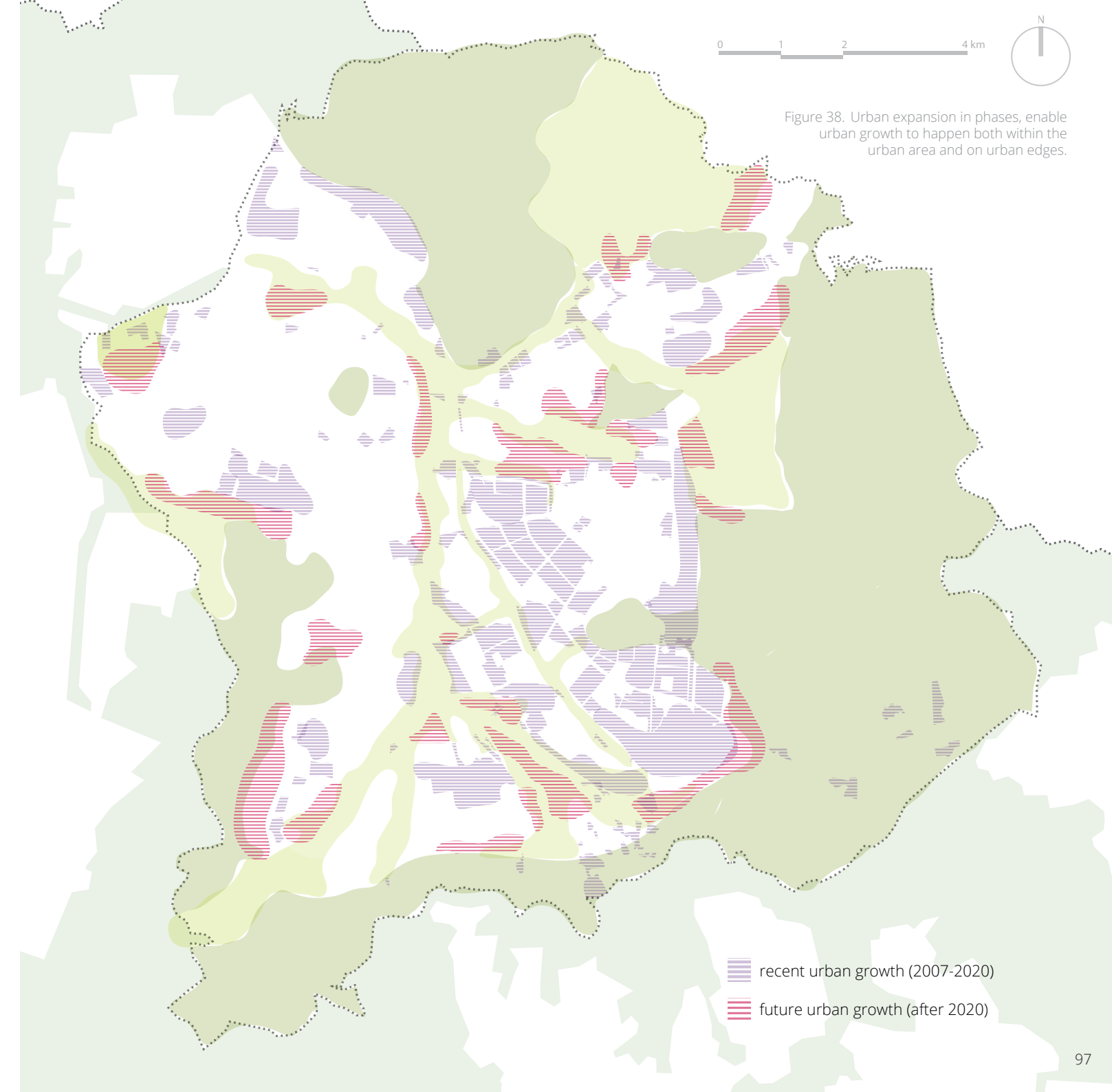


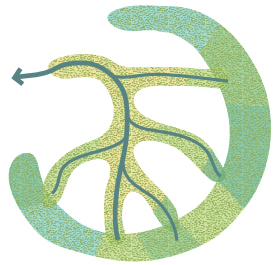
## 2.2 Open space structure guiding urban growth

The phase of current new town plan is from 2007 to 2020. The vision is fixed, without considering possibilities and spaces that should be left for further urban development after 2020. If the demand for urban growth still remain after filling in all the land by 2020, the boundary of ECL is likely to be altered.

Instead of having one fixed picture for the future urban growth, my proposal includes the future possibilities on urban growth based on the open space network. The framework actually defines two phases for new town development:

- Until 2020: The areas which are less sensitive to agriculture and ecosystem can be urbanized in the first place at a high speed, so as to enhance the economic performance of the region. The sensitive places are preserved for agricultural use or improvement of ecosystem services. The agricultural land are improved and supported for more sustainable practices during this period.
- After 2020: when the financial status of the municipality and people's livelihood make great progress and gets smoother, the more sensitive area for agriculture and ecosystem can be used for urbanization more meticulously. At that time, more environmental and social issues are more likely to enter government's agenda at that moment. And the time gap also helps local farmers to adapt themselves to new circumstances.



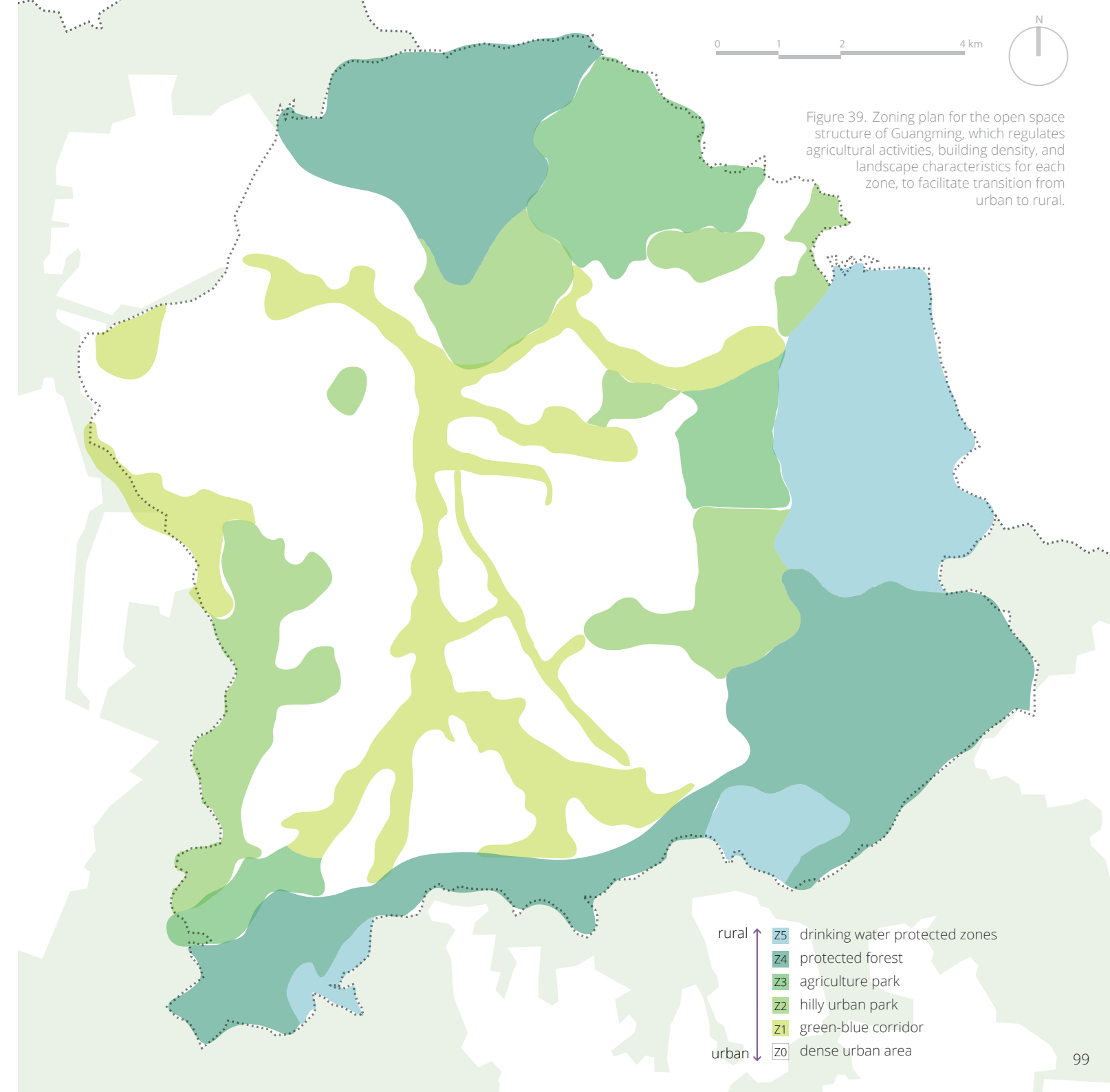
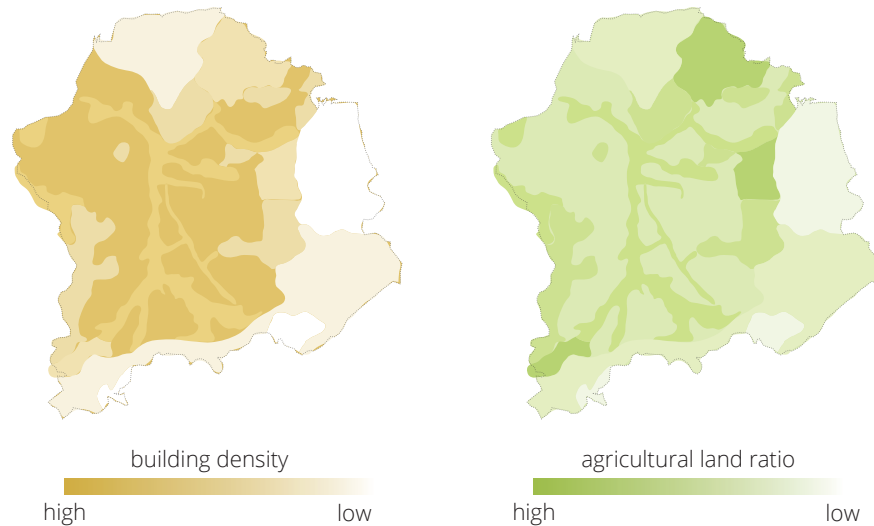
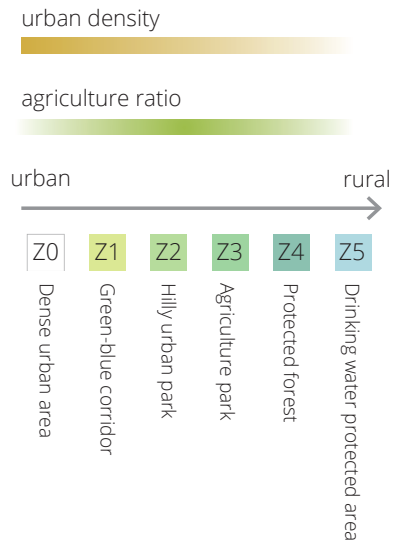


### 2.3 Transect zoning from urban to rural

Based on the landscape characteristics and the location of the open spaces, six zones are defined to describe and regulate activities and landscape in the city:

- Drinking water protection zone (Z5)
- Protected forest (Z4)
- Agriculture park (Z3)
- Hilly urban park (Z2)
- Green-blue corridor (Z1)
- Dense urban area (Z0)

With detailed profiles and regulations on building density, agricultural practices and landscape characteristics, the six zones constitute a spectrum from urban to rural. Compared with the current new plan, which rigidly divide city and countryside by ECL, the proposed spectrum from urban to rural creates a more integrative system that balances the city and the countryside by recognizing and utilizing the local conditions.





Z5: Drinking Water Protected Areas		
	<p>General Character</p> <p>Building Height</p> <p>Building Footprint</p> <p>Types of Agriculture</p> <p>Agricultural Land Area</p> <p>Farmers' organization</p> <p>Location for agriculture</p>	<p>Natural landscape with restricted agricultural use and construction not applicable</p> <p>not applicable</p> <p>pollution-free, organic agriculture; mainly orchards with some arable land</p> <p>&lt;20%</p> <p>local farmers / agribusiness</p> <p>A certain distance from drinking water with a buffer in-between</p>

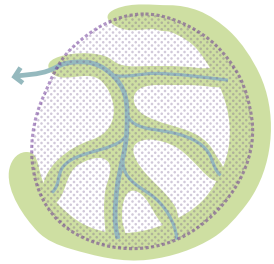
Z4: Protected Forest		
	<p>General Character</p> <p>Building Height</p> <p>Building Footprint</p> <p>Types of Agriculture</p> <p>Agricultural Land Area</p> <p>Farmers' organization</p> <p>Location for agriculture</p>	<p>Hilly area covered by natural woods and diversified orchards, with walking routes for hiking</p> <p>&lt;5m</p> <p>&lt;2%</p> <p>pollution-free, organic agriculture; diversified orchards with some arable land</p> <p>&lt;60%</p> <p>agribusiness</p> <p>hillsides with low slope</p>

Z3: Agriculture Park		
	<p>General Character</p> <p>Building Height</p> <p>Building Footprint</p> <p>Types of Agriculture</p> <p>Farmers' organization</p> <p>Location for agriculture</p>	<p>primarily agricultural landscape on plain area with scattered buildings; tourism economy developed based on agricultural produce and landscape; well connected to urban road network</p> <p>&lt;12m</p> <p>5-10%</p> <p>organic, diversified agriculture for local communities; standardized, experimental agriculture for agribusiness</p> <p>Rural communities; farming households; agribusiness</p> <p>main surface</p>

Z2: Hilly Urban Park		
	<p>General Character</p> <p>Building Height</p> <p>Building Footprint</p> <p>Types of Agriculture</p> <p>Agricultural Land Area</p> <p>Farmers' organization</p> <p>Location for agriculture</p>	<p>Open spaces on hilly area mainly for recreational use</p> <p>&lt;10m</p> <p>3-5%</p> <p>pollution-free orchards, some free-range livestock &amp; arable land</p> <p>30-90%</p> <p>local farmers, agribusiness</p> <p>Near residential area as allotments / community gardens; design elements in green spaces</p>

Z1: Green-blue Corridor		
	<p>General Character</p> <p>Building Height</p> <p>Building Footprint</p> <p>Types of Agriculture</p> <p>Agricultural Land Area</p> <p>Farmers' organization</p> <p>Location for agriculture</p>	<p>Continuous open spaces along rivers or streams, combined with public services, like theaters, libraries</p> <p>&lt;20m</p> <p>5-10%</p> <p>pollution-free &amp; diversified agriculture as riparian buffers for flooding and eco-corridor in dense urban area</p> <p>20-50%</p> <p>Communities or local farmers</p> <p>Near residential area as allotments / community gardens; design elements in green spaces</p>

Z0: Dense Urban Area		
	<p>General Character</p> <p>Building Height</p> <p>Building Footprint</p> <p>Types of Agriculture</p> <p>Agricultural Land Area</p> <p>Farmers' organization</p> <p>Location for agriculture</p>	<p>Medium to high-density urban area for administrative, industrial, residential, commercial and recreational use;</p> <p>20-230m, average 20-50m</p> <p>30-50 %</p> <p>Subsistence or small-scale farms as a landscape element for community development &amp; maintenance for open spaces</p> <p>2-5%</p> <p>Individuals, communities or local farmers</p> <p>Attached to buildings (roof, balcony), community gardens, neighborhood parks</p>



## 2.4 Integrative urban-rural management

As discussed above, the ECL differentiates management methods for urban area and countryside. Detailed planning units are confined in the ECL, making it difficult to provide integrative and balanced solutions for urban edge areas along the ECL (see also page X).

To facilitate the inclusion of agriculture and more integrative planning for the urban edge area, the line that defines the boundary of detailed planning units is enlarged. Basically, the line include agriculture park (Z3), hilly urban park (Z2) and green-blue corridor (Z1), where certain types of construction is permitted and more urban functions are embedded. In this way, areas with more rural characteristics also should be planned and regulated in detailed to avoid fragmentation, and the interface between urban and countryside can be better designed and managed (instead of merely using a road as a boundary as it is now).

*Detailed planning units are confined in the ECL, making it difficult to provide integrative and balanced solutions for urban edge areas along the ECL*

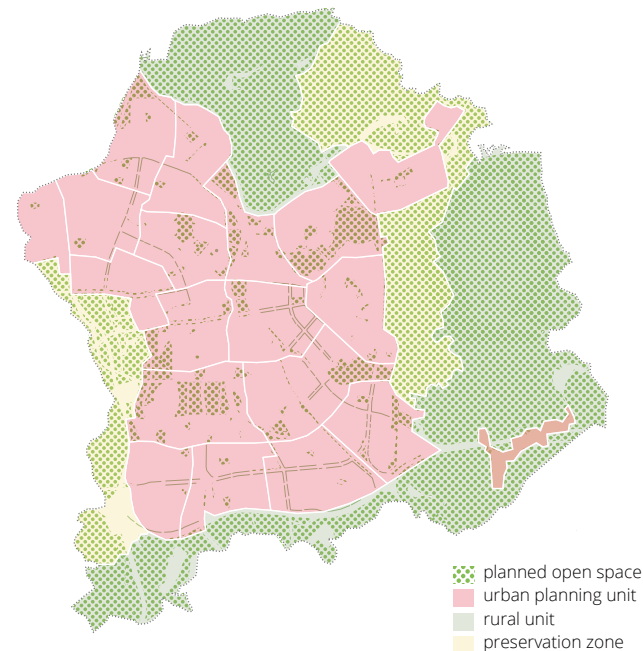


Figure 40. Urban planning units that use ECL as the boundary, indicating different management methods of urban area and countryside.

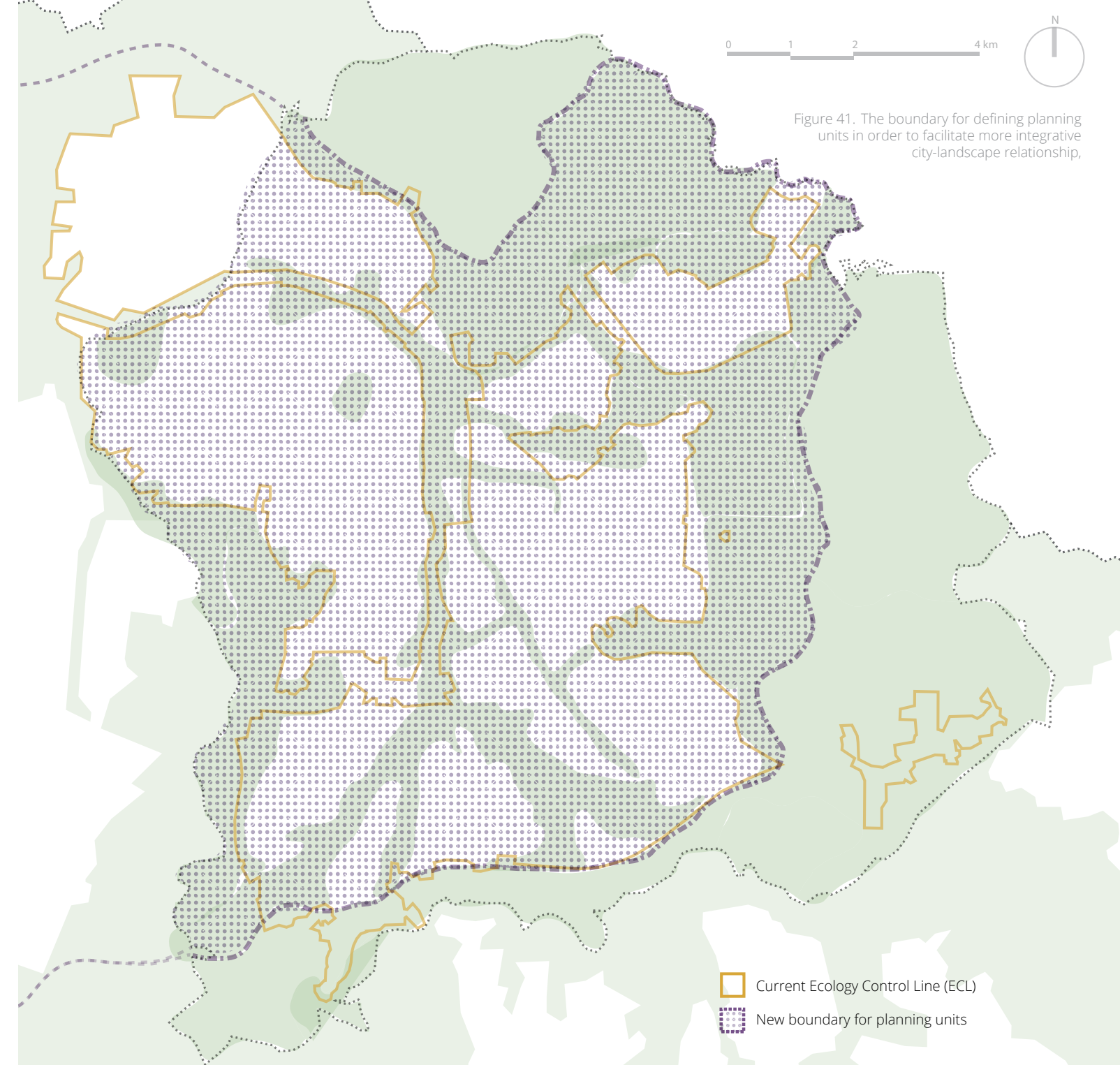
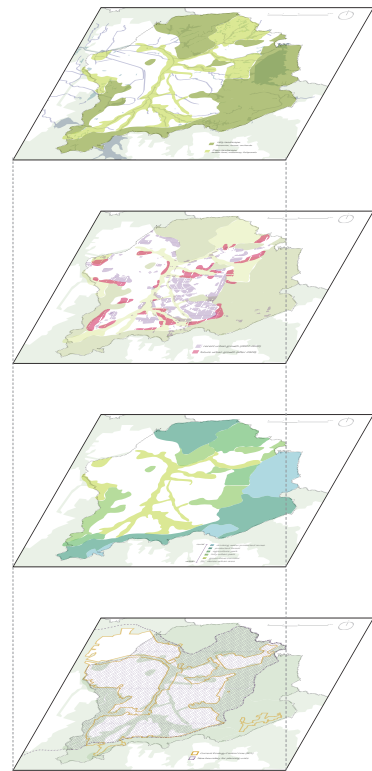


Figure 41. The boundary for defining planning units in order to facilitate more integrative city-landscape relationship,

Current Ecology Control Line (ECL)  
New boundary for planning units





## 2.5 The ECL and the open space framework

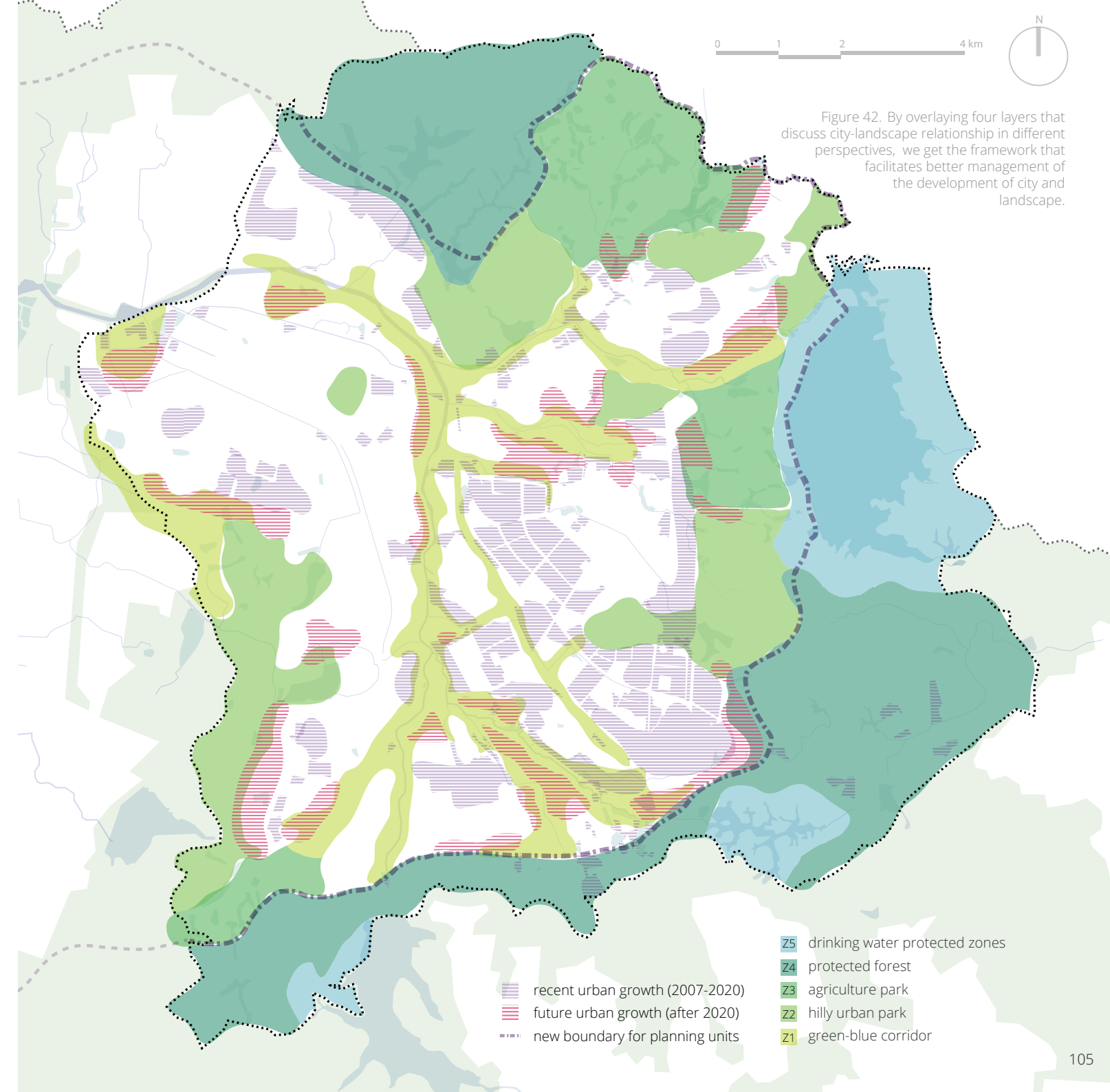
Currently, the Ecology Control Line (ECL) has four purposes: defining the main green structure for the city; defining locations for urban growth; protecting open spaces; defining the boundary of urban management. In today's cities, the urban-rural boundary has been blurred. Urban systems, administration system and ecosystem have different dynamics. So using one single line to guide the development of these systems at the same time actually oversimplifies the intense interaction between city and its surrounding landscape.

By separating the functions of the ECL, we can get an open space framework that can better serve these purposes. Each layer mentioned above serves as one function of ECL:

- Agriculture- and ecosystem-sensitive areas are defined, which form an open space structure for the city;
- Green-field urban expansion is identified into two phases to guide rapid urbanization on less eco-sensitive area, enable more flexibility for the future and guide adaptation of the agricultural-related society to the emerging economic system;
- Transition from urban to rural is achieved by defining a spectrum of zones, in which by regulating urban density, agricultural operation and landscape identity, characteristics of different open spaces can be preserved;
- Enlarged and inclusive planning zone is defined to facilitate better integration and transition from city to countryside at urban edges.

In total, the framework gives a picture of the interaction and dynamics between city and landscape in the coming future.

*Using one single line to guide the development of these systems at the same time actually oversimplifies the intense interaction between city and its surrounding landscape.*



## 2.6 Urban structure and open space structure

In current new town development, infrastructure plays a dominating role in shaping the city structure, which mostly focuses on regional mobility. The continuity and spatial quality of open space network is generally neglected in the city-scale master plan (see also page X).

Using a landscape approach, a different hierarchy between infrastructure and landscape is introduced. An open space structure is regarded as the primary design element while infrastructure should be adapted to it. Figure X shows the adjusted urban structure of Guangming, in which the directions of lines is modified according to the open space structure, yet the regional connectivity remains.

Another change from the original plan is the reduction of details. Secondary roads and neighbourhood streets are not shown in the master plan, so that more freedom is given for local scale to develop local network according to local conditions.

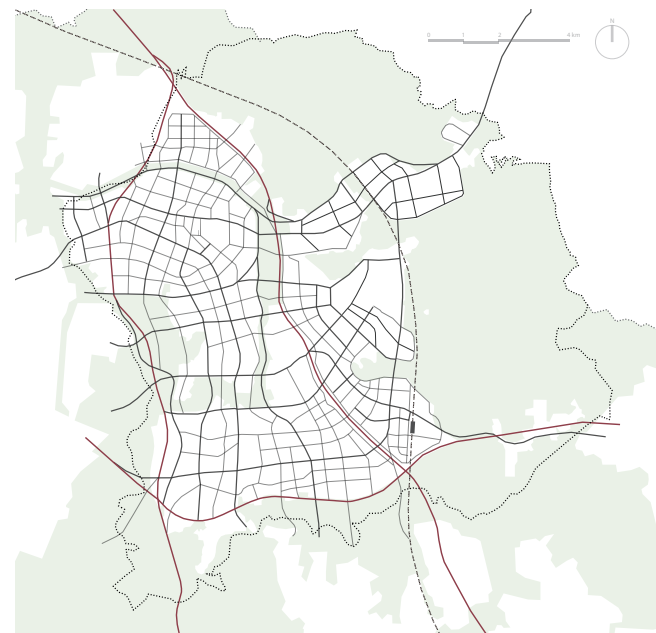


Figure 43. The road network of the Guangming master plan.

*"The ideal way of development would be that infrastructure follows planning or functional change of land use, growth or shrinkage. However, most of the time it is the other way round."*

A. van Timmeren, 2014 (Atlantis, interview)

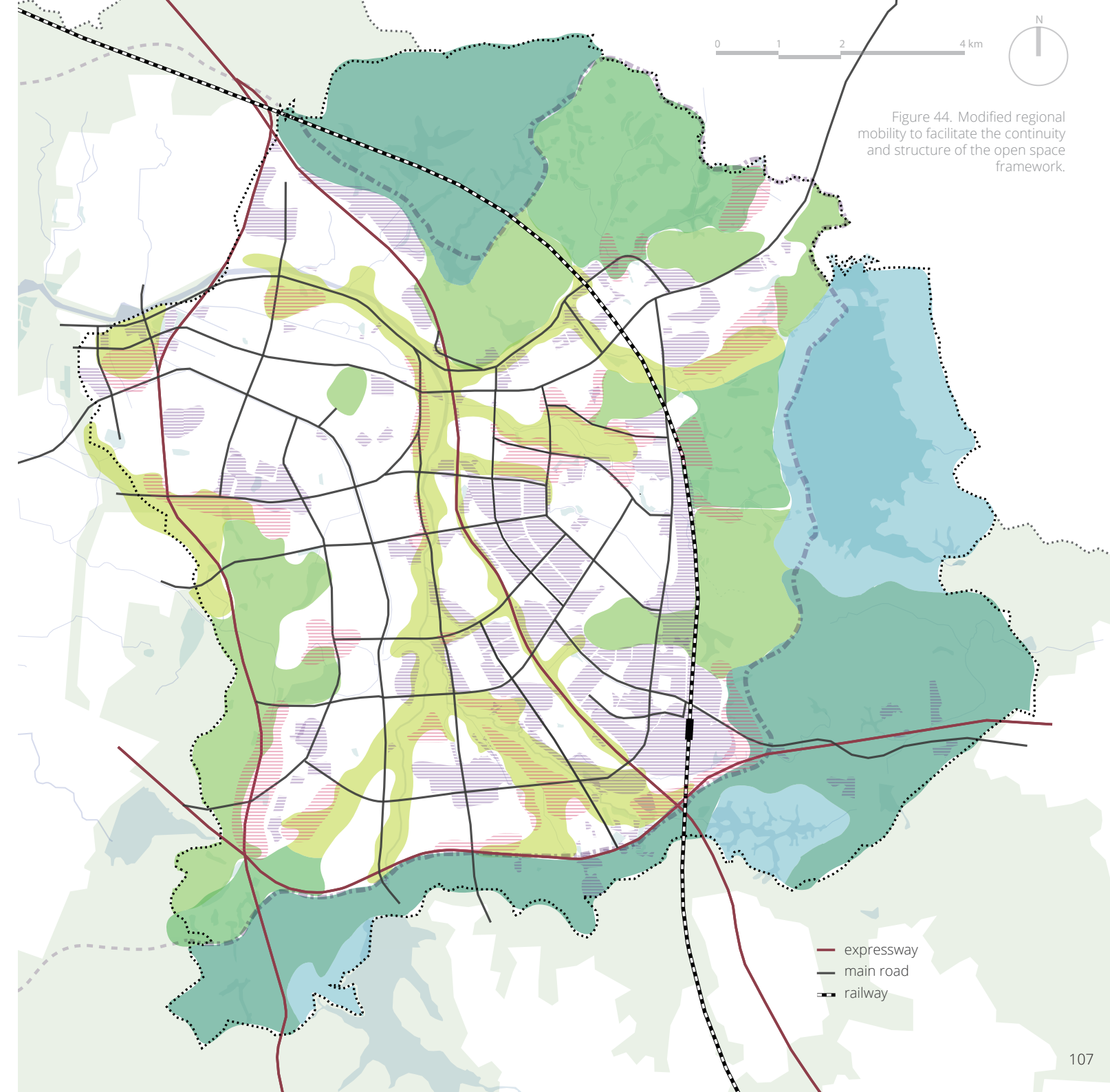


Figure 44. Modified regional mobility to facilitate the continuity and structure of the open space framework.



### 3. Sustainable agriculture operation

Small farms and urban farms are more likely than large, industrial farms to use sustainable agricultural practices.

D. A. Denckla, 2013

#### 3.1 Benefits of agriculture in Guangming

Adapted from the potentials of agriculture (table X), the main goods and services that urban agriculture can provide for the urban systems of Guangming specifically are:

- Employment in urban agriculture
- Social integration of disadvantaged groups
- Community development
- Provision of aesthetically pleasing landscape
- Meeting demands of subsistence food production
- Providing riparian buffer against flooding
- Water infiltration for flood control and groundwater replenishment
- Moderation of urban heat
- Urban biodiversity
- Urban waste recycling
- More efficient management of open space
- Productive use of vacant land

#### 3.2 Sustainable agricultural use of land

##### Land use types improvement

Sustainable agriculture should include social, environmental, economic and technological dimensions. According to the problems defined previously, the main focuses of achieving sustainable agriculture in Guangming are involving residents in farming, sustaining farmers and restoring diversity of vegetation and landscape, which should be facilitated by planning to provide land.

Table X shows the improvement of current land use types, which includes ecosystem service in non-agricultural produce layer, and medium-scale family farm and collective farm in management layer. Medium-scale family farms and collective farms enable higher degree of involvement of local farmers, which not only provides employment locally, but also makes it likely to achieve sustainable agricultural practices due to their local knowledge and more careful management of the land. For more detailed definition and benefits of new farm types, see page X.

Layer	Current land use types	Improved land use types
Agriculture produce (P)	1. Temporary crops 2. Permanent crops 3. Livestock 4. Fishery 5. Non-food crops	1. Temporary crops 2. Permanent crops 3. Livestock 4. Fishery 5. Non-food crops
Non-agricultural produce (N)	1. Recreation / Education	1. Recreation / Education 2. Ecosystem service
Management (F)	1. Subsistence farming gardens 2. Informal small-scale family farms 3. Formal small-scale family farms 4. Large-scale agribusiness 5. Recreation agri-park	1. Subsistence farming gardens 2. Small-scale family farms 3. Medium-scale family farms 4. Collective farms 5. Large-scale agribusiness 6. Recreation agri-park

Table 5. Three layers for defining land use types.( Orange: new land use types)

##### Problems of agricultural system in Guangming

- Spontaneity shows a strong incentive to grow food, which is not included in planning
- Farming systems is in rapid transformation, which making small-scale farms vulnerable
- Reducing diversity in countryside

##### Sustainable agriculture

The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such development...conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. (FAO. 1991)

Scenario of management types

Current agriculture plans and policies advanced by the municipality mainly focus on the economic productivity of agricultural land. Social and environmental dimensions of agriculture are mostly neglected. (Interestingly, the agriculture bureau of Shenzhen was cancelled in 2012, and the function of administrating agricultural activities is merged into the Economy, Trade and Information Commission.)

Besides the introduction of ecosystem services and more eco-friendly farming techniques in agricultural land, another important means to achieve sustainability in agricultural operation is the management methods of farms. According the current plan, farmland in Guangming will be managed by large-scale agricultural enterprises, which generally are motivated by economic revenue from the land, and less attention are paid to environmental issues in the field. Meanwhile, local farmers are excluded from the agriculture scheme and can only become an employee in those enterprises.

The introduction of medium-scale family farms and collective farms gives more possibilities to diversify farming system and enhance the capacity of local farmers. The scenario I purpose consists of diverse farming systems in which local initiatives are included (figure X). The spatial distribution and conditions of these farming types is guided by suitability evaluation and is also illustrated in the district-scale designs.

Any form of sustainable urbanism is dependent on the presence of a sustainable user.

T. De Jong

Family farm

Family farming is a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labour, including both women's and men's.

Family Farming is the predominant form of agriculture both in developed and developing countries. Family farmers carefully manage their lands to sustain remarkably high levels of productivity despite having less access to productive resources such as agricultural inputs and support (most research shows an inverse relationship between land size and productivity). Family farming preserves traditional food products, while contributing to a balanced diet and safeguarding the world's agro-biodiversity and the sustainable use of natural resources.

Source: <http://www.fao.org/family-farming-2014/en/>

Medium-scale family farm in CN

Currently, the most common mode of organizing farming activities in rural area in China is "individual farms + farmers cooperative", in which a group of small-scale household farms are organized to help mutually to offer services like marketing, processing, logistics, providing technologies and information, etc.

But due to the migration of younger generation from rural to urban area, and the appearance of large-scale enterprises, the competitiveness of household farms is decreasing. In the NO.1 central document of 2013, the concept of "family farm" is introduced to enhance the capacity of farms run by households. The difference of family farms from original household farms relying on cooperatives is larger scale and independence, which enable farmers to increase yield and diversify their products. The difference of family farms from large-scale farms is less reliance external labors, so that the land and resources can be managed with more care (Chen, 2013).

Research shows that the size of family farms in china generally range from 50 mu to 500 mu (3.3 ha to 33 ha).

Source: <http://www.tdzyw.com/subject/jiatingnongchang> (in Chinese); Law of the People's Republic of China on Specialized Farmers Cooperatives; Chen: [http://news.ifeng.com/mainland/detail\\_2013\\_03/10/22940990\\_0.shtml](http://news.ifeng.com/mainland/detail_2013_03/10/22940990_0.shtml)





## 4. Suitability Assessment

### Purpose of assessment

The evaluation of suitability is essential to find proper locations for land uses and to deal the complexity of the different dimensions of agriculture land. The result is an important source to understand the land resource from the perspective of agriculture so that planning can act accordingly. In this project particularly, it is used in the analysis of agriculture performance, definitions and regulations of urban-rural transect zones (page X) and city-scale references to guide agricultural activities in lower scales.

### Suitability evaluation approach

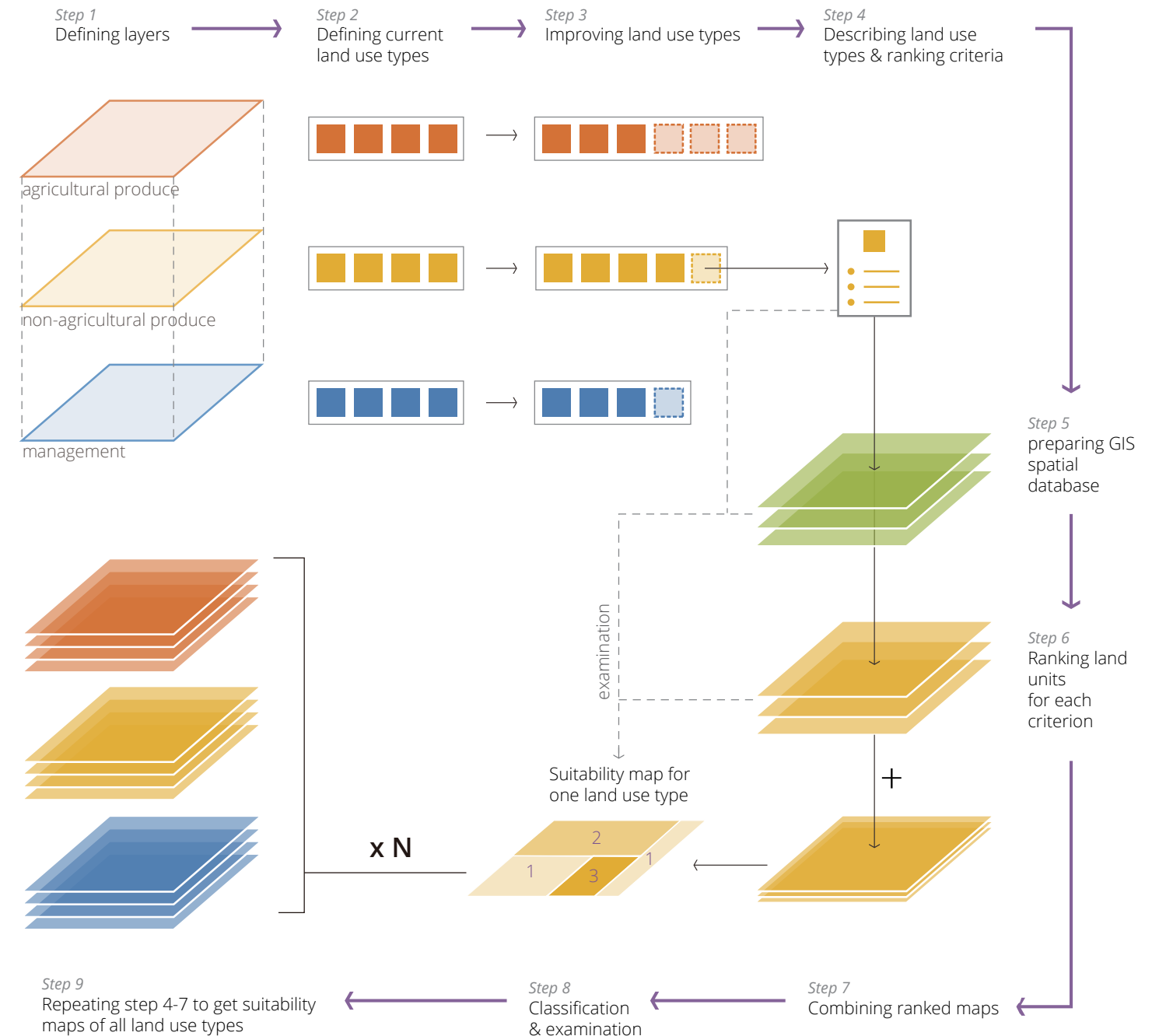
The approach of suitability evaluation is based on land evaluation method of FAO (1976, 2007) and spatial analysis model in ArcGIS manual. GIS is used to provide more explicit results for later decision making. The evaluation approach has been adopted to make the results more relevant and useful for leading design decisions throughout the project, which can be simplified into nine steps:

Step 1: Defining layers. In order to reflect environmental, social and economic conditions for agriculture in Guangming, three layers are identified: agriculture produce, non-agriculture produce and management methods. The agriculture and non-agriculture produce layers determine the degree of multifunctionality. Management methods reflect the ownership and responsibility of maintaining the land.

Step 2: Defining current land use types. A land use type is a representative characterization of activities that happen on the ground. Land use types are defined by the previous analysis and combining with local land use standards.

Step 3: Improving land use types. Land use types are improved or modified to tackle problems of the site and reflect objectives of the study. In practice, the voice of stakeholders should be included in this section.

Step 1-3 defines the framework of suitability evaluation, which has been introduced in the analysis of agriculture operation (page X) and scenario of sustainable agricultural operation (page X).



**An Example of defining evaluation criteria**

*Large-scale agribusiness*

*Definition: a large-scale, intensive, standardized farm (usually with an area more than 30 ha.) operated by an agriculture enterprise for production or research.*

*Criteria:*

- *Size of land (>30ha.)*
- *Near agriculture centers / industrial area*
- *Away from communities in the ECL to give communities access to land to develop their own economy*
- *Not on temporarily available land*

Step 4: Describing land use types and ranking criteria. The question of finding suitable location for a land use type can be broken down into smaller questions, which reflects different conditions and objectives of the type. The criteria are also translated into quantitative expression for GIS analysis.

Step 5: Preparing GIS spatial database. Spatial information is digitalized and imported into GIS database, including soil, hydrography, topography, current land use, infrastructure, urban density, etc.

Step 6: Ranking land units for each criterion. Using the quantitative criteria, suitability of each land unit for each criterion can be evaluated and shown on maps.

Step 7: Combining ranked maps. Calculation tools in GIS are used to combine suitability maps of each criterion.

Step 8: Classification and examination. Reclassify the final result and examine it with criteria and conclusion from previous analysis. Four classes are identified: high suitability, medium suitability, low suitability and unsuitable.

Step 9: Repeating step 4-7 to get suitability maps of all land use types.

Following the procedure, 13 suitability maps are produced for each land type (figure X). More details of the criteria and data sources for evaluation are documented in Appendix X.

**Analysis of suitability maps**

By overlaying and calculation of the suitability maps, we can have some preliminary conclusions. They identify the locations which:

- have capacity and potential to develop diverse agriculture products (figure X);
- are more suitable for ecological protection than developing recreational uses (figure X);
- have more possibilities to develop different means of production organization, which may results in conflicts in the right to use the land (figure X).

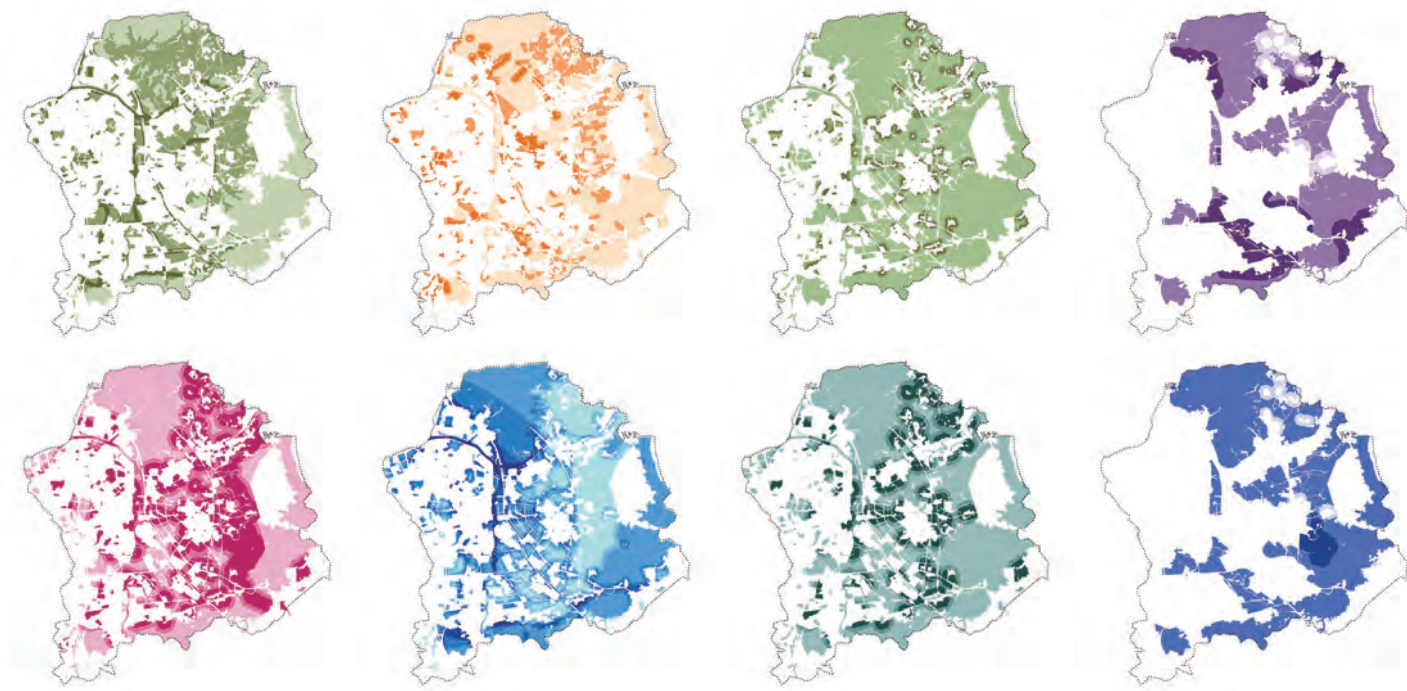


Figure 45. Examples of suitability maps for each land use types..

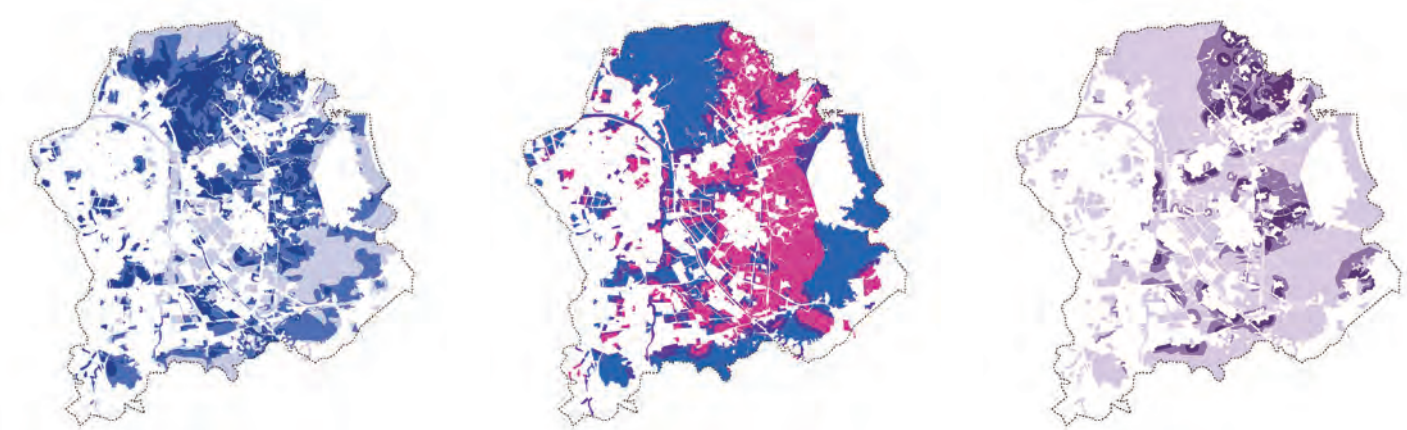


Figure 46. Diversity of agriculture produce by overlaying agricultural produce layer.

Figure 47. Main non-agricultural function by comparing non-agricultural produce layer. (recreation: pink; ecosystem service: blue)

Figure 48. Area with more conflicts in the right to use the land by combining management methods layer.



## 5. Relationship Typology

As agriculture is used as a medium to articulate urban system and the natural landscape, agriculture should be situated in the urban or natural context to discuss its performance and operation. Typologies are developed in the study, aiming to provide tools and guidance for implementing city-agriculture-ecosystem relationships at neighborhood and street levels. They also demonstrate various potentials and the flexibility of agriculture being a design element to be incorporated into built environment.

Infrastructure (S)		1. highspeed railway 2. expressway 3. main road 4. neighborhood street 5. greenway
Building	Residential (R)	1. commercial housing 2. social housing 3. Danwei housing 4. urban village 5. rural village
	Industry (M)	1. manufactory / high-tech industry 2. agribusiness 3. industrial park
	Public facility (A)	1. health care / community service 2. education 3. cultural 4. sport
	Commercial facility (B)	1. restaurant 2. market 3. recreational 4. office 5. shopping mall
Landscape element (E)		1. hills 2. river / stream 3. reservoir / ponds

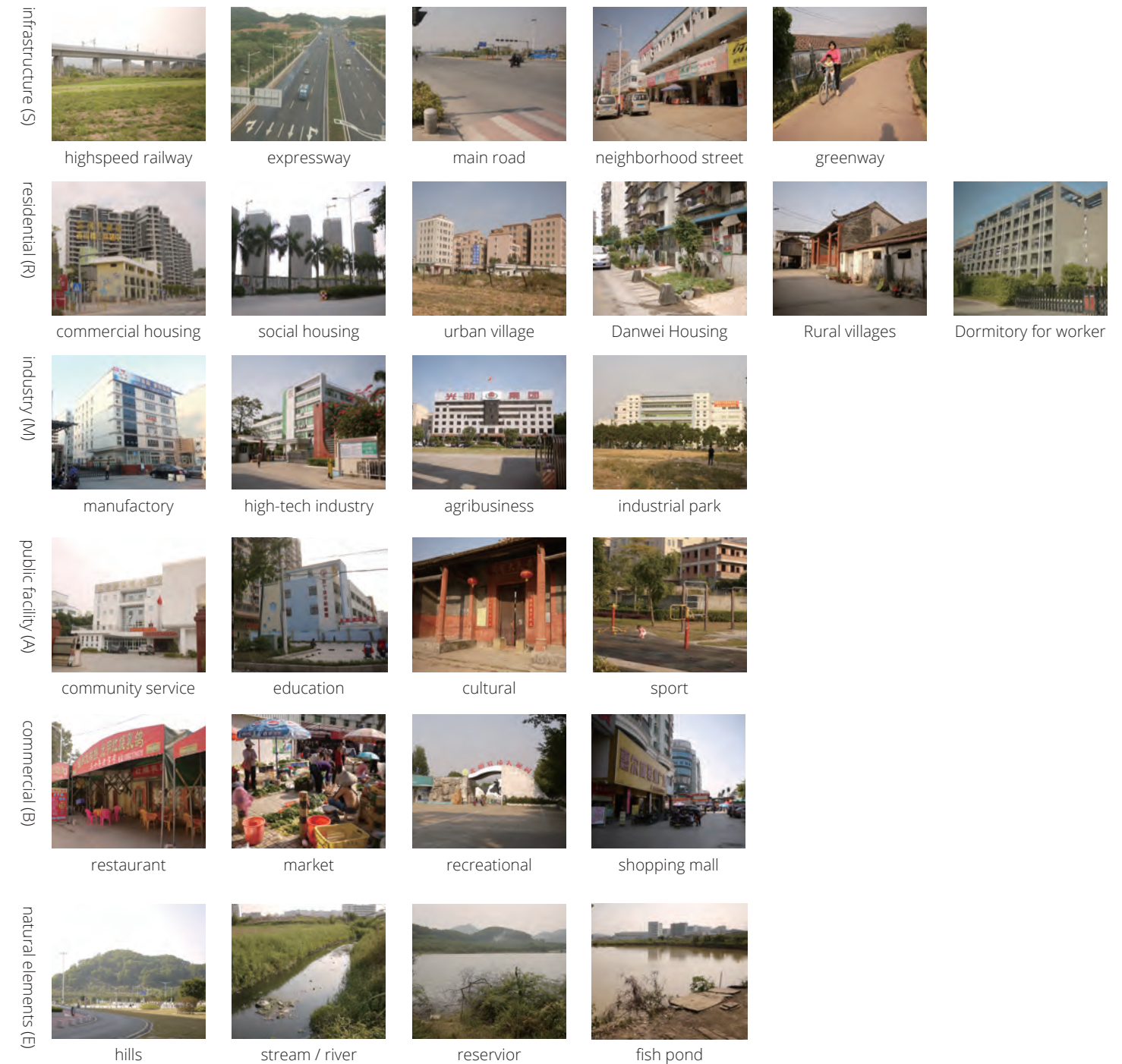
Table 6. The classification of urban and natural elements that can have interactions with agricultural use.

### 5.1 Urban & natural elements

To develop typologies of city-agriculture-ecosystem relationship, we need first to classify the urban and natural elements.

Table X shows the list of urban functions that modified from current land use system in Shenzhen, and landscape elements that represent the major types of natural elements in Guangming. The urban elements can be categorized into two main types: buildings and infrastructure.

Figure X selects typical form of these elements from Guangming. The spatial quality and characters are taken into account when I develop typologies for city-agriculture-ecosystem relationship.



5.2 Typologies

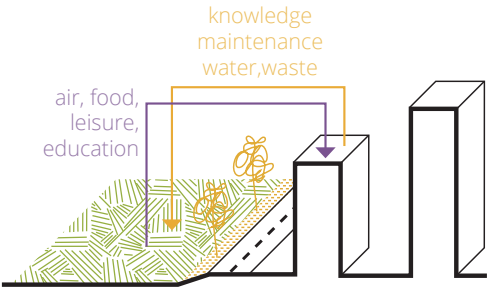
The main types of urban and natural elements are building, infrastructure and landscape elements, so typologies can also be categorized into three main types.

Figure X show the full list of typologies discribing city-agriculture-ecosystem relationship. The typologies is used not only to illustrate the possible spatial combination between agricultural land and urban land use, but also to discribe the possible interactions between agriculture and urban systems that can be facilitated by the spatial relationship. In other words, the typology system is a tool to link funtional relationship and spatial design solutions. The functional relationship between urban systems and agricultural landscape also illustrate how urban agriculture can improve urban metabolism by making use of resources locally.

Detailed profiles for each typology are developed to better guide the application of typologies. A profile includes urban element and landscape elemented that shown in the typology, and also the benefitis of urban agriculture can bring by using the typology,

suggested locations for the typology, and advices on permission and restriction of agriculture types. By using the typologies, different regulations and plans I proposed can be combined, and be give physical forms. In other words, the typologies link them together and illustrate how these layers can work together to create a more integrative environment that is meaningful for local population.

Figure in the left show an example of a profile for one typology, which includes an illustration to show spatial and functional relationship, a brief discription, a detailed profile and an example to show possible spatial quality.



Building-agriculture: B-1

Agricultural field located next to built-up area, separated by a neighborhood road, accessible and usable for urban users

Code	B-1
urban element	R1, R2, R3, R4; M2; A1, A2, A3, A4; B1, B2, B3
landscape element	E1, E3
possible purpose	Community development Social integration of farmers Aesthetically pleasing landscape Subsistence food production Water infiltration Moderation of urban heat Urban biodiversity Urban waste recycling
location	Z0, Z1, Z2, Z3
Permitted agri types	Ag: 1,2,4,5 Mg: 1, 2, 5
Restricted agri types	Ag: 3

Illustration:



Options		
Infrastructure (S)		
1. highspeed railway		
2. expressway		
3. main road		
4. neighborhood street		
5. greenway		
Residential (R)		
1. commercial housing		
2. social housing		
3. Danwei housing		
4. urban village		
5. rural village		
Industry (M)		
1. manufactory / high-tech industry		
2. agribusiness		
3. industrial park		
Public facility (A)		
1. health care / community service		
2. education		
3. cultural		
4. sport		
Commercial facility (B)		
1. restaurant		
2. market		
3. recreational		
4. office		
5. shopping mall		
urban element		
	1. hills	
	2. river, stream	
	3. reservior / ponds	
landscape element		
	Employment in agriculture	
	Social integration of farmers	
	Community development	
	Aesthetically pleasing landscape	
	Subsistence food production	
	riparian buffer against flooding	
	Water infiltration	
	Moderation of urban heat	
	Urban biodiversity	
	Urban waste recycling	
	Efficient management of open space	
	Productive use of vacant land	
benefits of urban agriculture		

	Drinking water protection zone (Z5)
	Protected forest (Z4)
	Agriculture park (Z3)
	Hilly urban park (Z2)
	Green-blue corridor (Z1)
	Dense urban area (Z0)
location	
	Agriculture produce (P):
	1. Temporary crops
	2. Permanent crops
	3. Livestock
	4. Fishery
	5. Non-food crops
	Management layer (Mg):
	1. Subsistence farming gardens
	2. Small-scale family farms
	3. Medium-scale family farms
	4. Collective farms
	5. Large-scale agribusiness
	6. Recreation agri-park
Permitted / restricted agri types	

Table 7. The classification of different dimensions that define conditions for application of typologies.



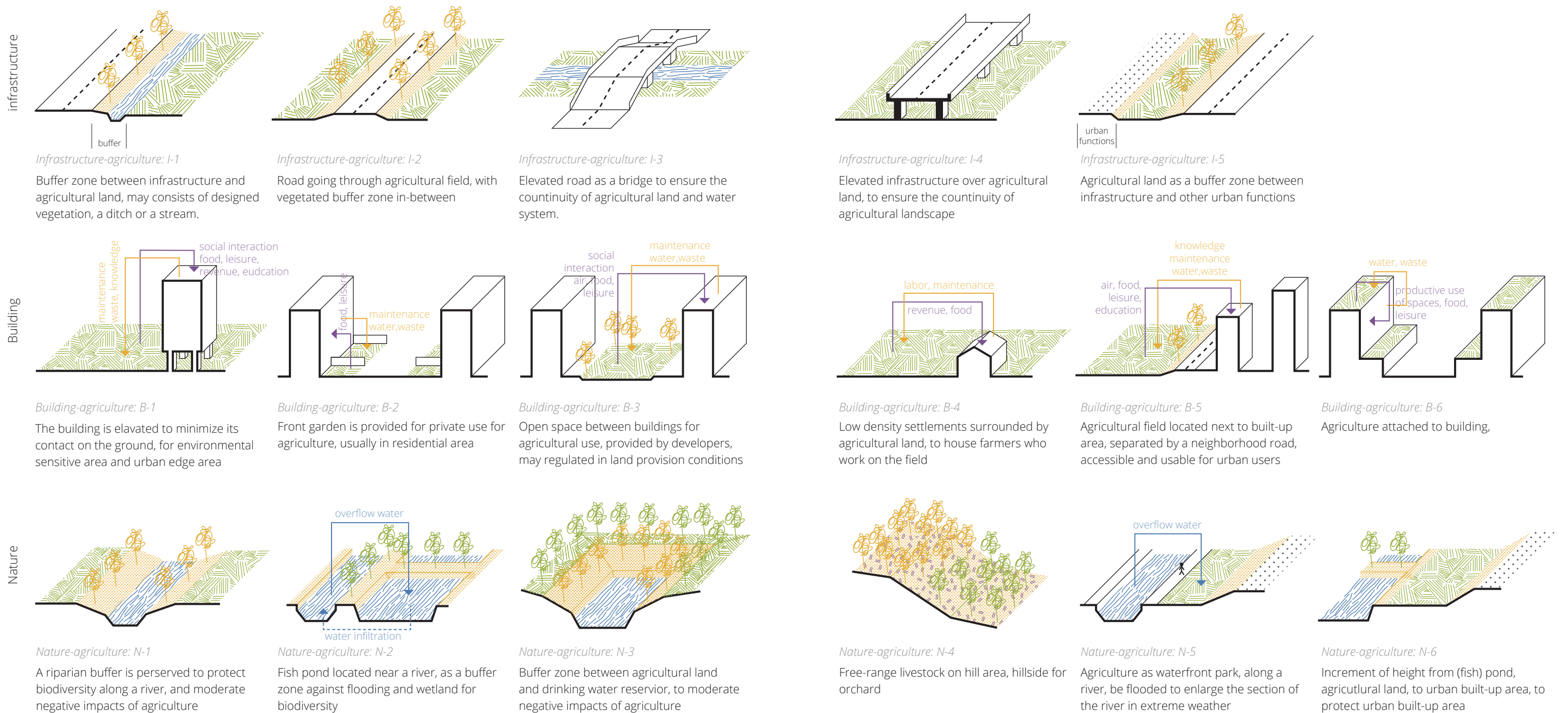


Figure 49. The typologies showing spatial and funtional relationship between agriculture, city and natural environment.



# 分區

DISTRICT-SCALE DESIGN

Content / Jiazitang / Xinqiang



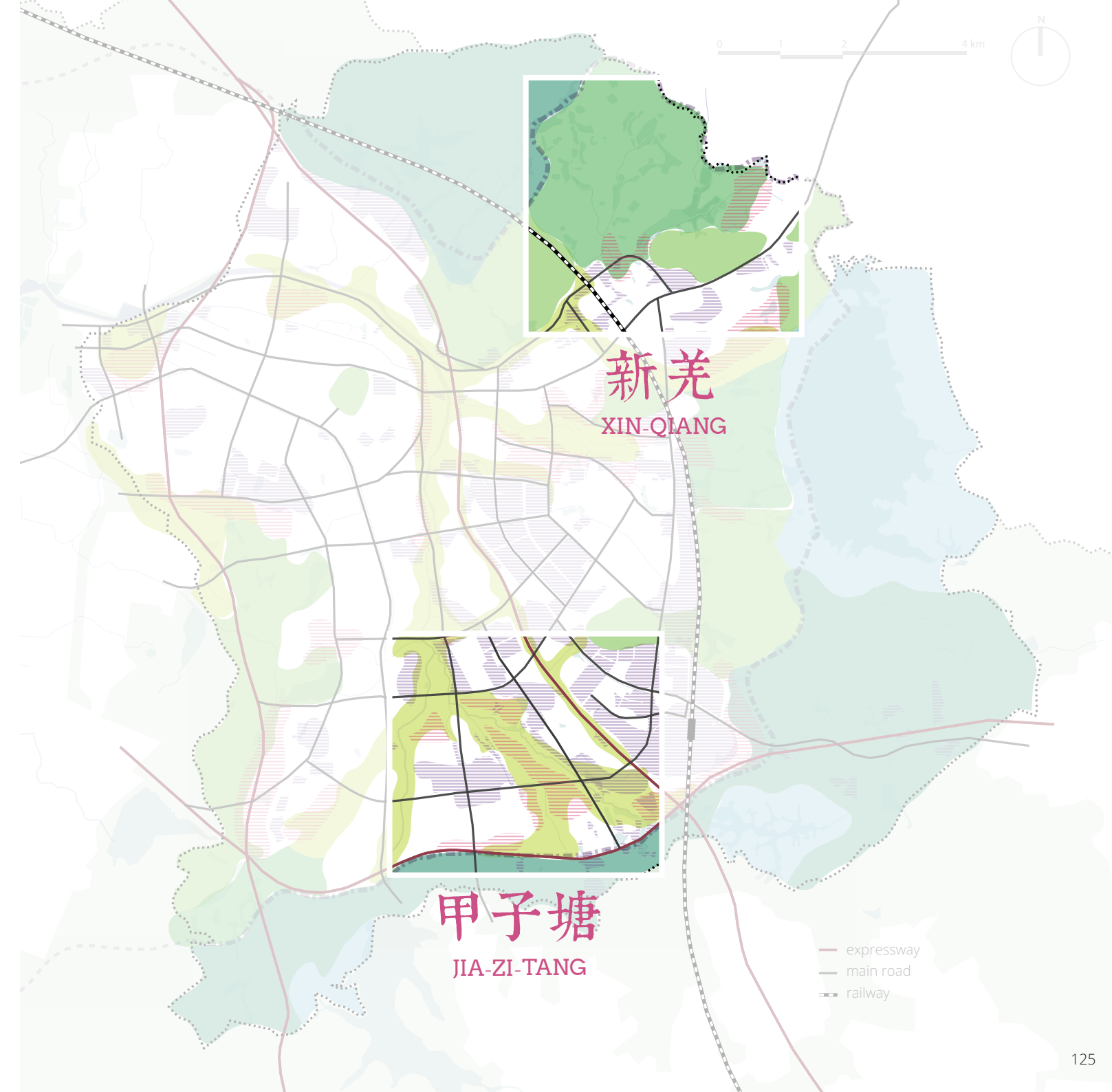
# 1. Content of district-scale design

The aim of having district-scale design is to examine the plans and regulations proposed in city level. It includes testing feasibility of the plan and showing opportunities and impacts the city-scale design may bring for neighbourhoods. These small-scale experiments should also demonstrate a process of translating the flexible city-scale framework into a more practical plan to guide constructions on sites.

Two locations are chosen for the elaboration in district level: Jiazitang and Xinqiang (figure X). Surrounded and threaten by ongoing urban construction, Jiazitang is chosen to show how step-by-step urban growth can happen with respect to current agricultural and social conditions, and how infrastructure is modified to facilitate it. Located on the urban edge, the case of Xinqiang intend to illustrate how the transition from urban to rural help to tackle local conflicts, and particularly, sustain local communities, and how this transition can be regulated in a detailed statutory plan.

Despite different contexts and problems, the two locations follow the same process of design development, to show the elaboration of city-scale design on district scale:

- Analyse local conditions and current plans, and evaluate the impacts of current plans on local communities and landscape;
- Summarize the implication of the proposed city-scale plan on the location;
- Develop design based on the information, using the condition offered by the city-scale plan to tackle local problems;
- Elaborate the design and illustrate possible spatial quality and development process.



## 2. Jiazitang: Agri-city structure

### 2.1 Local conditions and current plans

Jiazitang is the name of a urban village and also the northwest-southeast road going through a remaining agricultural land between two streams (figure X). The agricultural land is one of the few open lands out of the ECL in Guangming that are not yet eaten by urban construction.

Currently, on the farmland grows mostly vegetable, which is the main source of income for the farming households. Farmers live next to their fields, in temporary houses that built by the households (figure X). They lease the farmland, usually of 2-3 mu (1333-2000 m<sup>2</sup>) per household, from one company, which support them with selling to markets and some farming facilities (figure X). The leasing contract between the company and farmers is for one year, which means when the urbanization come, the farmers can be easily removed from the field by the end of the contract.

Around the remaining vegetable field are three urban villages with high density, housing thousands of migrant workers. Near these villages, many small plots of farm can be found along neighbourhood streets or on vacant land. They are farmed by local residents as a complement to their daily food consumption.



Figure 50. The stream that define the boundary of the remaining Jiazitang agricultura land.



Figure 51. Local conditions in Jiazitang. From left to right: small-scale farmland, leased from a company; temporary house where farmers live in the field; urban villages around farmland; a spontaneous farmland along the street towards urban village, cultivated by residents living in urban villages.

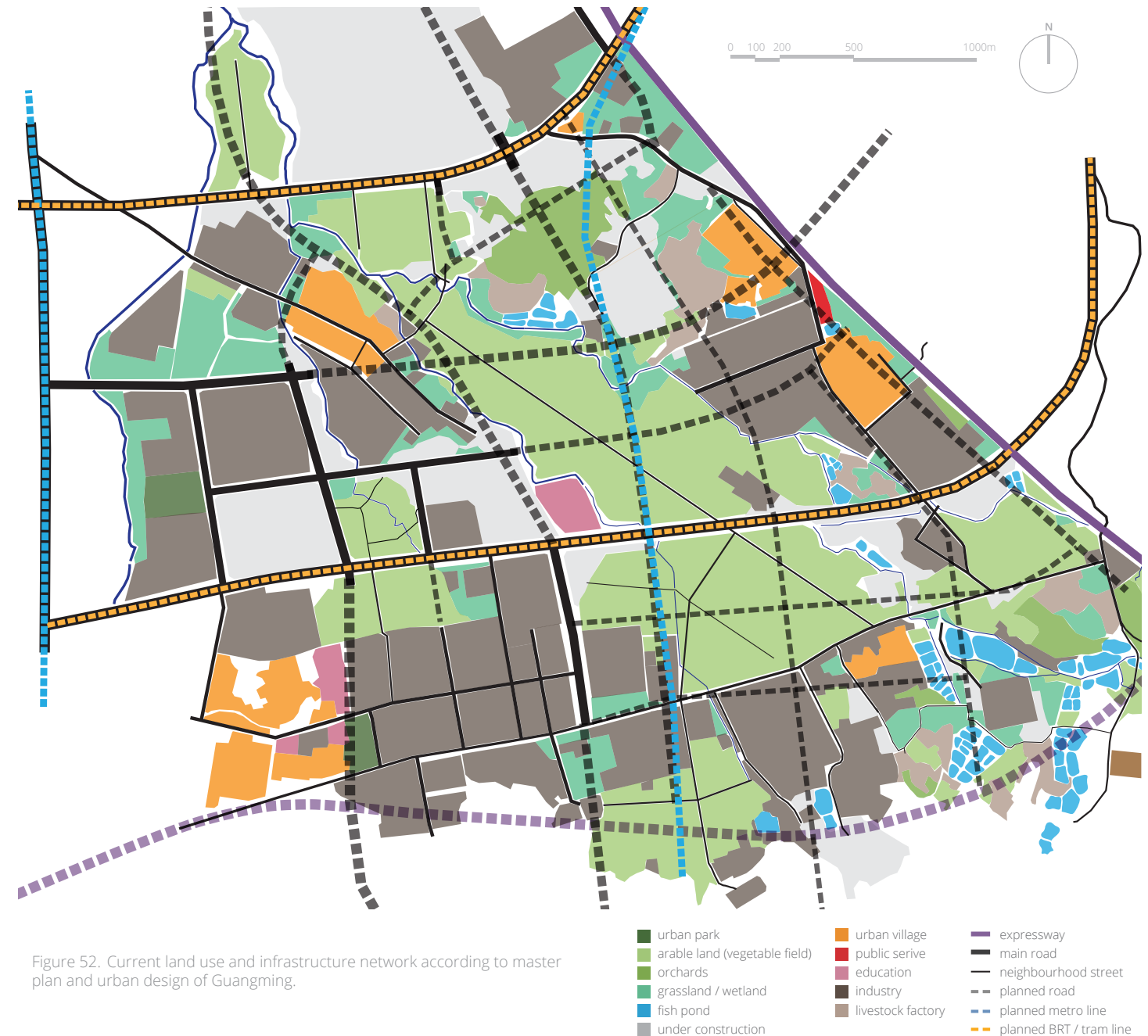


Figure 52. Current land use and infrastructure network according to master plan and urban design of Guangming.



Analysis of the local network built before the new town (page X) shows a strong relationship between road, water system, agricultural production and settlements (urban villages). However, the local network is likely to disappear if the new town plan is implemented, in which infrastructure and regional mobility are dominating and local network is hardly taken into account (figure X). The plan may also damage the existing urban villages, which requires a huge fund to compensate land owners.

The loss of local network has great impact on local farmers. Because the infrastructure-led plan can only be implemented by removing local landscape and networks simultaneously, giving little time for local farmers to adapt to such changes. After the construction of infrastructure, the plots divided by the roads sometime will stay vacant for several years before investments are attracted. However, the vacant land is no longer available for those farmers. This temporal gap of productive use of land is a result from the dominating role of infrastructure, which mostly focus on regional connectivity.

The road structure and profiles are car-oriented. Main roads generally have eight lanes, with vegetation buffers on both sides (which are placeless open spaces). The main public transport lines (BRT or tram), instead of connecting dense urban area on more human-scale roads, make use of the main road network. The combination of wide main road and main public transport make it difficult for pedestrian to access the public transport.

*The infrastructure-led plan can only be implemented by removing local landscape and networks simultaneously, giving little time for local farmers to adapt to such changes.*



Figure 53. Local network built before new town development, showing a coherent relationship between structure agricultural land, water network, roads, and human settlements.

## 2.2 Proposed city-scale plan on Jiazitang

According to the city-scale plan, Jiazitang area should have the following characteristics:

- Green-blue corridor from northwest to southeast that is connected to the hilly area in the south;
- The green-blue corridor will be urbanized in the second phase of urbanization, which means it should allow future urban growth;
- The blue network, or the water system, should be preserved permanently;
- Diverse agricultural production is possible;
- Functions of recreation and environmental protection should be well balanced;
- Possible farm types are subsistence farming gardens, Small-scale family farms, medium-scale family farms and recreation agri-park
- On the edge of the corridor, areas for subsistence farming or community gardening can be provided for local population.

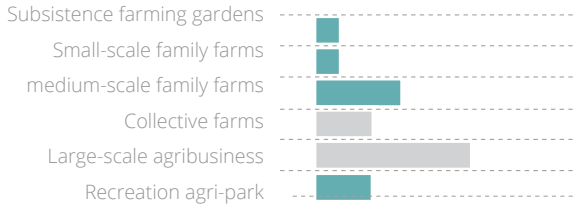
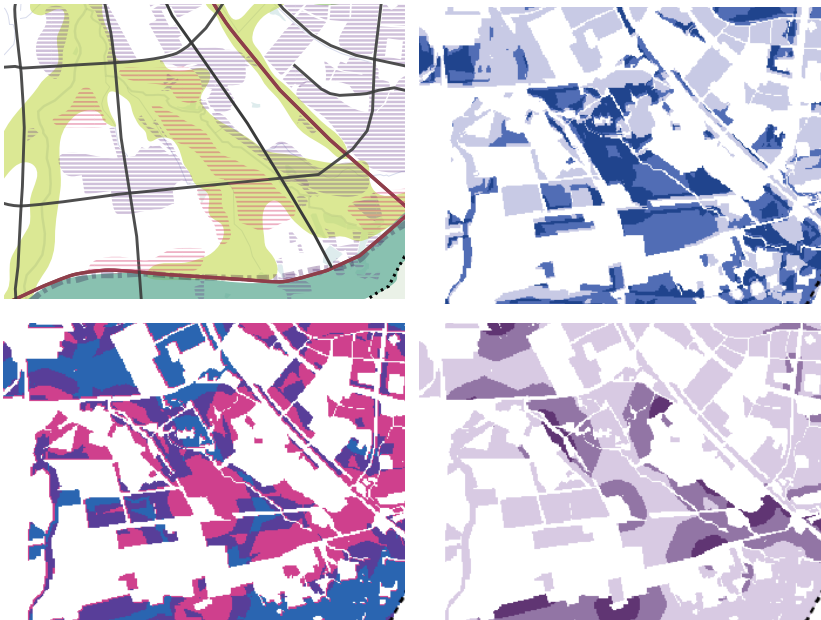
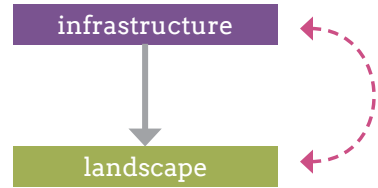


Figure 55. Proposed farm type scenario (possible farm types in Jiazitang: green)

Figure 54. Zoom-in of city-scale plan. From top-left to bottom-right: city structure, suitability maps (diversity of potential agricultural production, eco-service or recreation dominated landscape, conflicts in right to use farmland).



Changing hierarchy between infrastructure and landscape

*The spatial continuity and gradual change of current landscape is of higher priority than the regional connectivity.*

## 2.3 Design development

### Changing hierarchy

As mentioned, the dominating role of infrastructure results in the disappearance of landscape characteristics, the loss of livelihood of local farmers and lack of opportunities for urban residents to grow their own food. In the city-scale scenario, the green-blue corridor going through the area provide an opportunity to reserve the agricultural land for more modest and slow urban growth in the future.

The city-scale plan also indicates that the hierarchy between infrastructure and landscape should be changed in order to preserve the landscape structure and characteristics. In other words, the spatial continuity and gradual change of current landscape is of higher priority than the regional connectivity. As existing network for agricultural use is coherent with the landscape structure, it can be utilized and be integrated into the new urban structure.

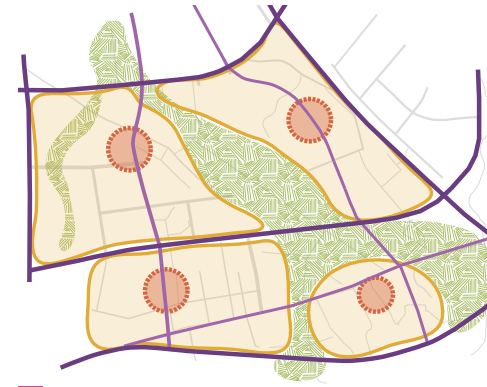
### Challenge: articulating two grids

The challenge of restructuring the area is the different grids of regional connections and the natural system. There is about 45 degree of angle between the urban grid defined by the main roads and the direction of the streams going through the area. Here is the design development process in order to deal with the challenge:

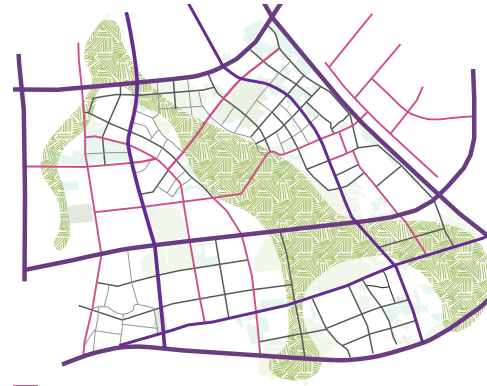
- The green-blue corridor is introduced into the area, and by the corridor urban clusters (including built-up area and urban cores) are defined;
- Main roads are defined for regional connection, some as the boundary of urban clusters, the others as the linkages between urban cores. The two types of roads should have different profiles;
- The grids in the urban area follow the grid of the main roads, but also are adjusted to original road structure, which follows the same structure of the water system;
- Cycling and public transport networks are designed between the urban clusters separated by the green-blue corridor, which makes the most of the current agricultural structure;
- Road networks on the green-blue corridor are considered to explore the possibility for future urban growth on the agricultural field.



1 define blue-green corridor & urban core



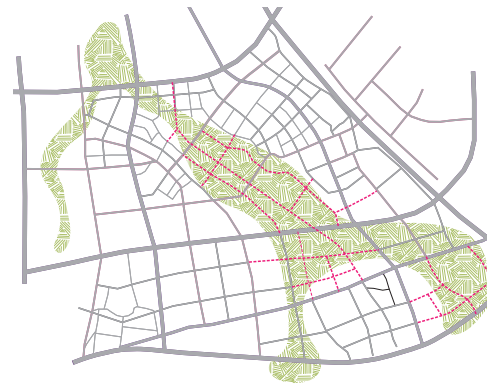
2 define regional connection



3 urban grid follow regional network



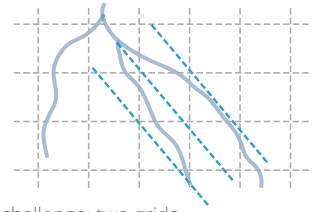
4 linking by landscape grid



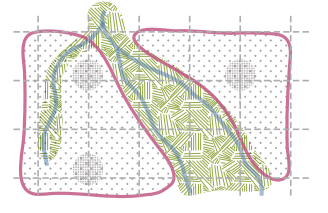
5 landscape grid for future growth



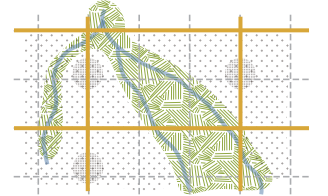
6 future scenario for flexible open space structure



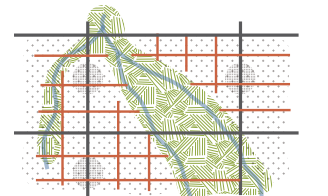
challenge: two grids



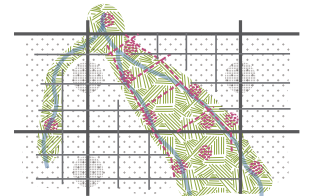
1. define corridor & urban core



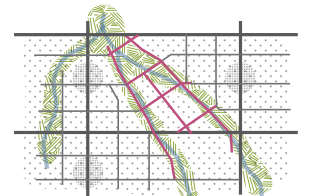
2. define regional connection



3. urban grid follow regional network



4. linking by landscape grid



5. landscape grid for future growth



As existing network for agricultural use is coherent with the landscape structure, it can be utilized and be integrated into the new urban structure.

### 2.4 Phases of urban growth

By changing the hierarchy between infrastructure and landscape in design process, the urban structure is capable of facilitating more gradual changes from agricultural landscape to urban environment in the new town development process.

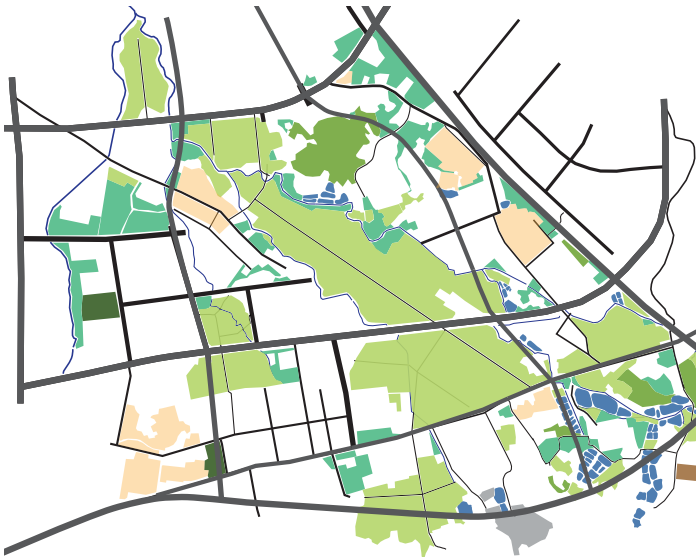
Figures in the right show how the two phases of new town development defined in the city-scale plan happen in Jiazitang and transform the urban and open space structure.

#### Phase 1: Rapid growth

In the first phase of new town development, urbanization can happen in a rapid rate, yet it should be confined in the area which is less environmental and agricultural sensitive. The road construction should respect and integrate local networks in addition to guaranteeing regional mobility.

The focus of development is on economic growth, yet spaces for community development and ecosystem services are preserved for future betterment. Preserved open spaces include farmland near urban villages, riparian area and some existing agricultural land for future urban growth.

In these open spaces, agricultural activities can continue to produce food for communities around. Small programs can happen to improve the quality of these open spaces. Possible programs include recreational facilities (cycling paths, sport facilities, allotment gardens, squares, local markets, local restaurants, etc.) and environmental services (waste recycling, sewage system, water purification, etc.). The construction of these facilities may be led by local authorities or initiated by communities, with funds from the municipality. City-agriculture-ecosystem relationship typologies in the city-scale plan can help the local to develop their strategies and solutions. in the These small interventions do not require huge investment, but can greatly improve the quality of open spaces and the living environment for local communities.



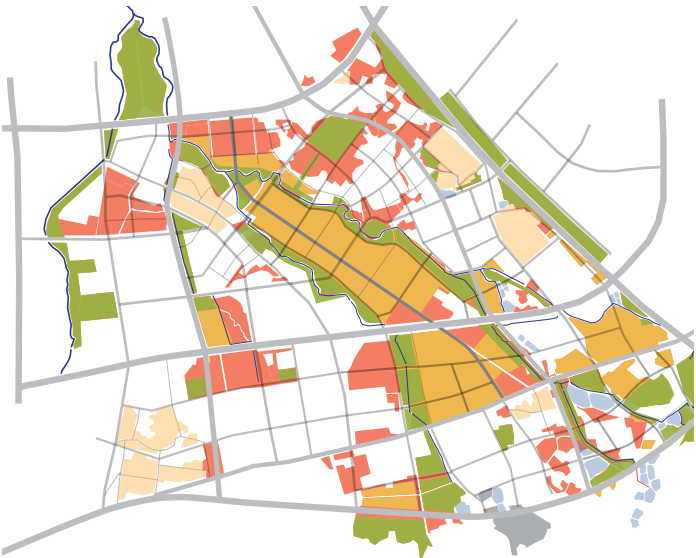
0 current situation of agricultural landscape and urban villages where migrant workers concentrate



1 Phase 1: rapid urban growth on the edge of the green-blue corridor  
Small interventions happens in agricultural land: cycling paths, sport facilities, allotment gardens, squares, etc



2 Phase 2: urban growth on agricultural land yet preserving green corridors along the water network  
Urban parks grow gradually by transforming agricultural land



Possible open space changes in the future

urban park   agricultural land   urban villages   urban growth   fish pond   small program   main road   neighborhood street   cycling path

The plan does not intend to provide a comprehensive solution for it, but to demonstrate how infrastructure network can be modified for more moderate urban development on agricultural land.

Phase 2: Moderate growth

With thriving economy after the first phase, the second phase of the new town development should be more modest and include more public issues like environment and social cohesion into municipality's agenda.

As second-phase urbanization is in the green-blue corridor, the development of the area should treat the land and resources with more care, with more consideration for residents and ecosystem. The riparian zone should be preserved and be transformed into a pleasing urban park for residents around gradually.

Other open spaces are also upgraded gradually in this phase. As for the small interventions in open spaces that developed in the first phases, they may remain if they work well for communities or be transformed into urban parks. The agricultural land is also transformed gradually to better meet the needs of new comers of the city. It does not mean the disappearance of agricultural land. Rather, if agricultural land is still welcomed by the residents, they can remain in the urban area in other forms.

2.5 Reflection

There are many technical issues and institutional barriers to achieve more gradual urban growth in China, like administration periods, land ownership, community empowerment, utility supplies. However, the plan does not intend to provide a comprehensive solution for it, but to demonstrate how infrastructure network can be modified for more moderate urban development on agricultural land. By illustrating the possibility, I hope more questions can be arisen on the current infrastructure-led development mode in China.

The phasing introduced above shows the feasibility of enhancing regional connectivity and remaining local network simultaneously in one plan. It gives spaces and time for local farmers to adapt themselves to changes, and also preserve the water network in urban structure. Besides, a side benefit of using agricultural structure in the plan is a more human-scale street network, because the original network is more organic and more relevant for the local life.



Figure 56. Future scenario of Jiazitang (open space system, urban villages, public transport)



### 3. Xinqiang: urban-rural transition

#### Basic facts of Xinqiang

- 5 main villages
- 11km<sup>2</sup>
- Inhabitants: 25000
- Registered inhabitants: 2500
- Problems:  
*poverty, food desert, poor infrastructure, decreased biodiversity, complicated land ownership, no overall development plan or strategy*

Figure 57. Left: traditional houses and community still remain in Xinqiang; right: villages within the farmland. Pictures by M. van Oostrum, 2013



#### 3.1 Local conditions and current plans

Xinqiang is a typical area that is heavily influenced by the ECL. Xinqiang is the name of the administrative district with five main villages and thirteen settlements. Around 90% of the area is located within the ECL, where construction is restricted.

There are around 25000 residents living in the area, of which 2500 is registered inhabitants. So 90% of the population in the area is migrant workers. Most of migrants live in two villages, Xinpotou and Qiangxia, which are located near the main road connecting Guangming to Dongguan. Although Xinpotou is located in the ECL, rents from houses and factories built before the establishment of the ECL can sustain the registered residents there.

So the most influenced area by the ECL is villages in the more remote area away from the city. The ECL deprived their opportunity to develop their real estates for rent or develop their own industries. The competitiveness of local residents for finding a job in factories is generally lower than the migrant worker. One third of registered population depends on governments' subsidies; in one village called Honghu, less than 10 persons are employed out of 330, the overall population.

However, the situation has worsened because of the land consolidation for basic farmland from 2011 to 2013 (figure X). Before it, unemployed local residents can still

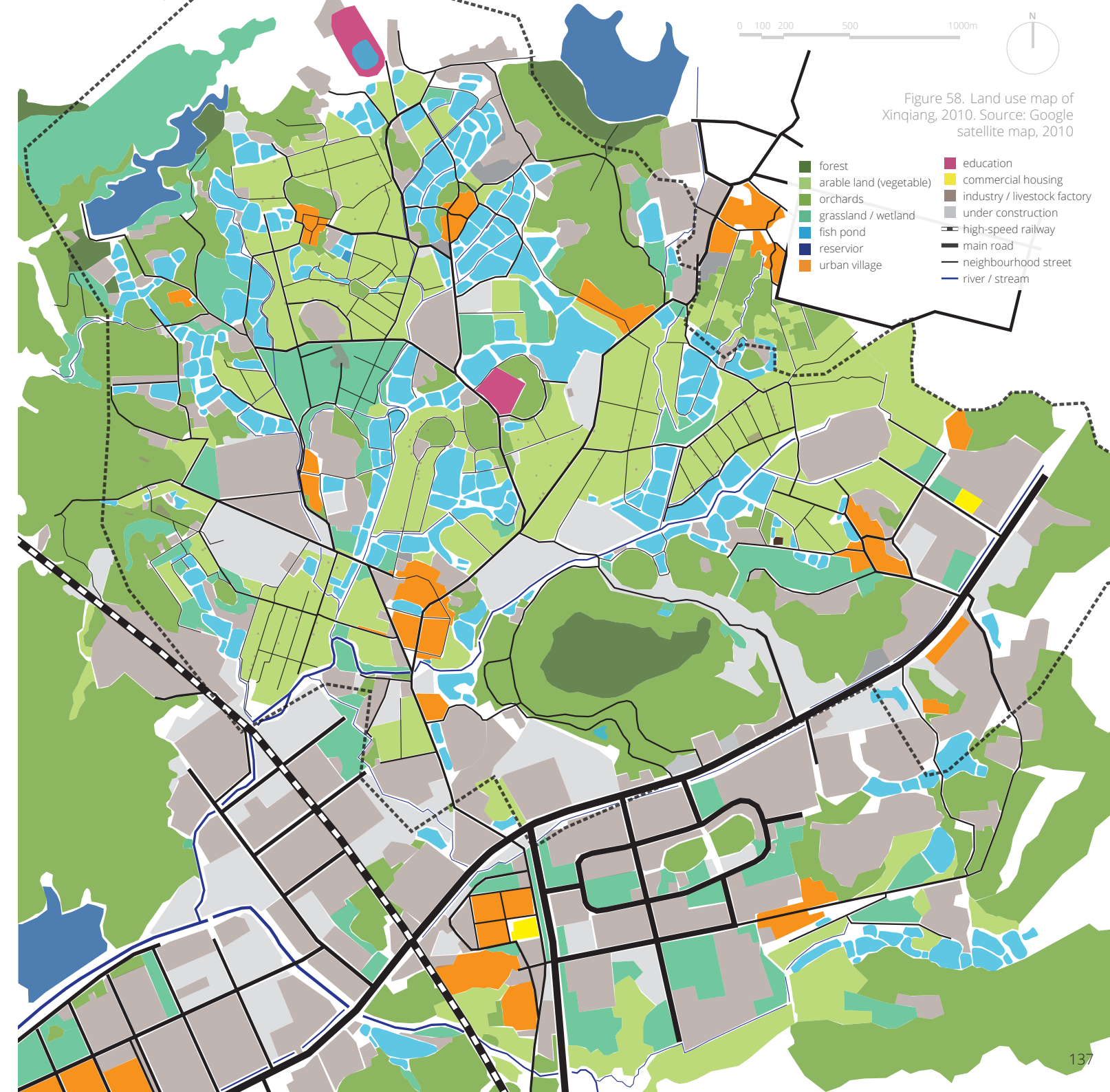


Figure 58. Land use map of Xinqiang, 2010. Source: Google satellite map, 2010

make a living from farming. After 2013, they even need to buy food from markets in the city, even though their settlements are surrounded by arable land.

The infrastructure in the area is also poor. As the only one connection to the city for the whole area, the four-lane road is always over-crowded during commuting hours.

The biodiversity of the area has also decreased because of the land consolidation. Figure X shows the landscape transition from rivers to settlements, where landscape is interrelated and form inner material circles. After the land consolidation, the diverse landscape will be replaced by standardized and homogeneous agricultural production.

No overall plan or strategy is formalized to guide and coordinate the economic, social, environmental and spatial development in the area. Most of the development is based on policies and negotiations between local communities and the municipality on specific issues.

A study on how to sustain the communities in the ECL is going on, led by the Urban Planning Land and Resource Commission of Shenzhen. Some policies are put forward recently, hoping to solve the problems by providing those communities with land in the urban area (far away from the communities) for collective industry and real estates.

(The information above is mostly based on the online reports by Shenzhen Centre for Design since 2012. <http://www.szdesigncenter.org/?cat=47> )

**Recent policies for ECL communities (2014)**

*To provide land to sustain communities in the ECL, collective companies are established for each communities. 52 ha of land is distributed among companies, where they can develop industries. These companies are funded by the municipality with 1.8 billion RMB.*

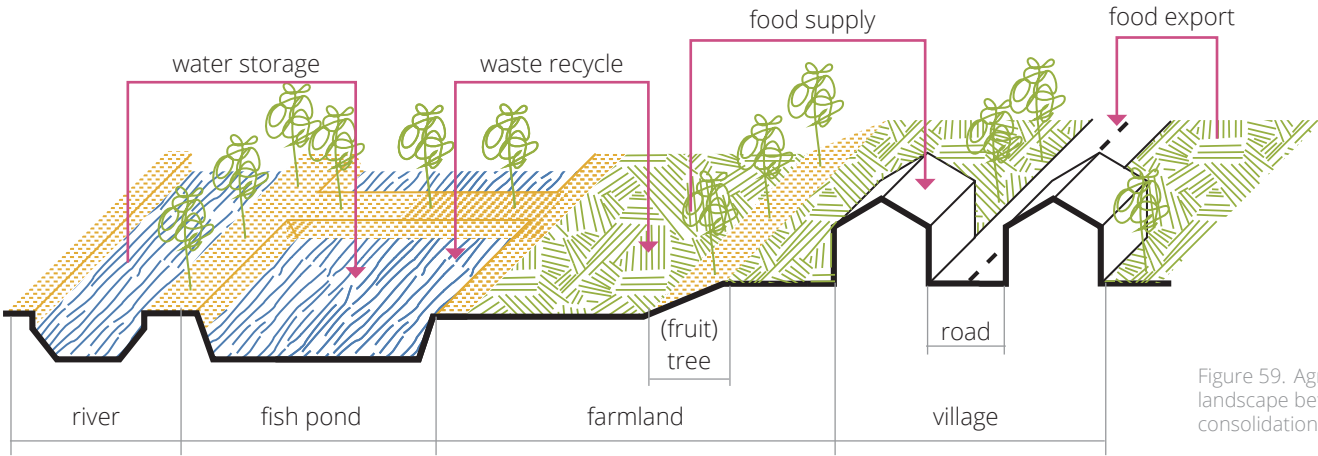


Figure 59. Agricultural landscape before land consolidation.



Figure 60. Population distribution.

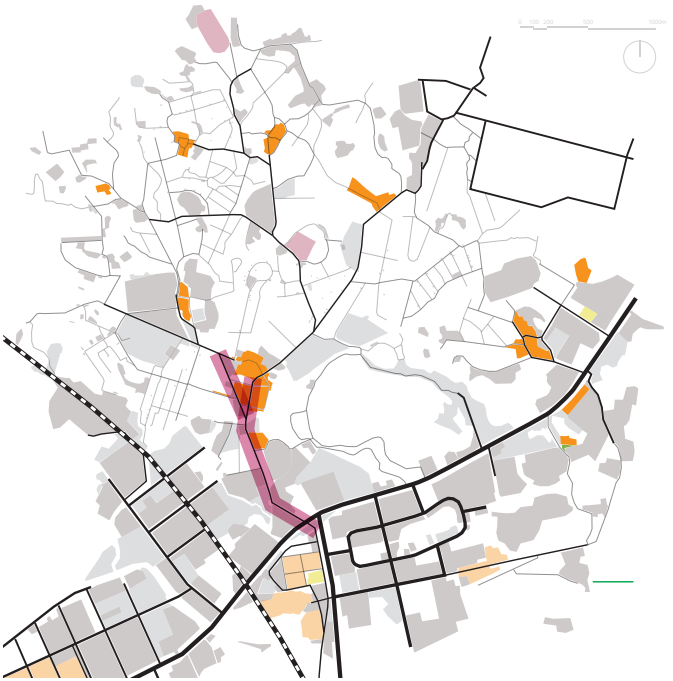


Figure 61. Road network and traffic jam location (pink) in commuting hours.

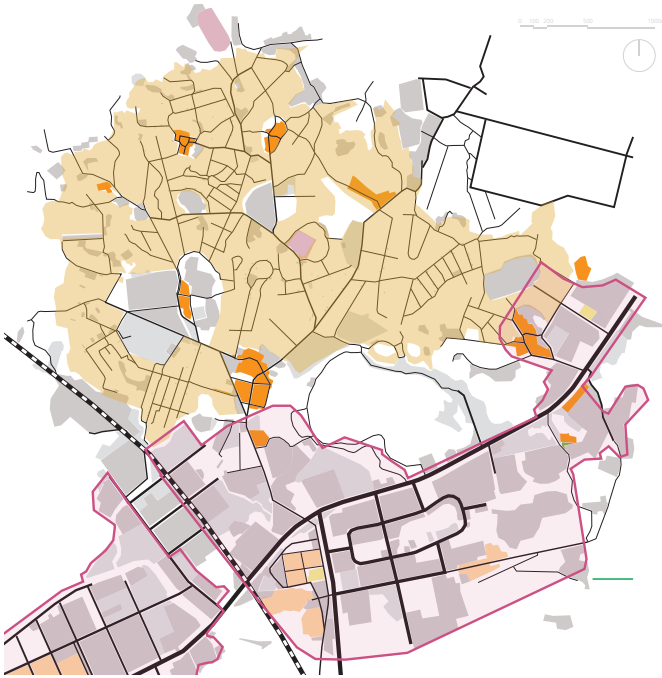


Figure 62. The ECL (pink) and land consolidation for basic farmland (green).

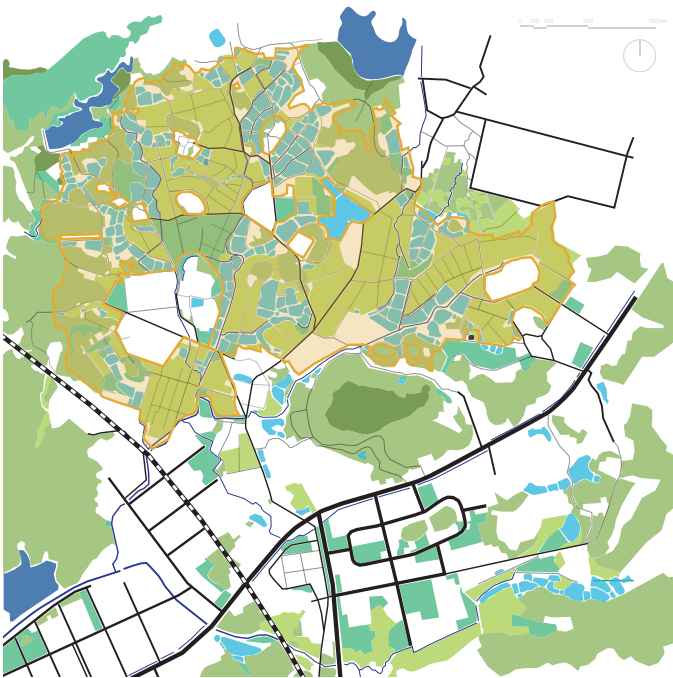


Figure 63. Disappearance of diverse landscape due to land consolidation.



3.2 Proposed city-scale design on Xinqiang

According to the city-scale plan, a plan for Xinqiang district should have the following characteristics:

- Transition from urban to rural: green-blue corridor/hilly urban park - Agricultural park - protected forest;
- Located within the planning unit area, detailed planning is necessary for the area;
- Future urban growth on the edge should be taken into account;
- The blue network, or the water system, should be preserved permanently;
- Diverse agricultural production is possible;
- Recreation service provided for the city is the main non-agricultural function;
- All farm types are possible, which also leads to conflicts in the right to use the farmland.

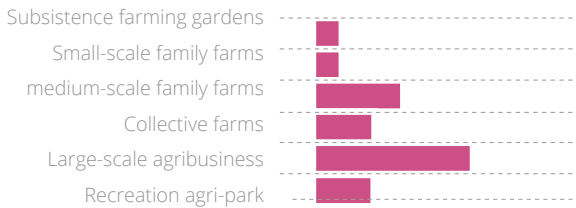
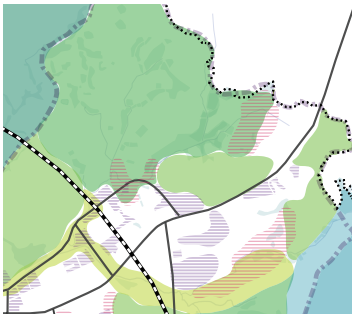


Figure 65. Agricultural farm types, All are possible for the area.

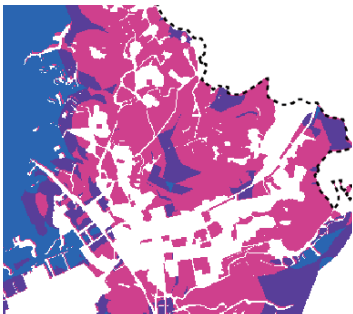


Figure 64. Zoom-in of city-scale plan. From top to bottom: city structure, suitability maps (diversity of potential agricultural production, eco-service or recreation dominated landscape, conflicts in right to use farmland).

3.3 Design development

The development of Xinqiang can be seen as an issue of sustainable development of rural communities. Below are some selected examples of sustainable rural community development projects and tools that aim to strengthen economic capacity, social cohesion and environmental resilience of communities in countryside. Despite different contexts, emphases and methods, one is common for these cases: putting people in the centre.

To understand people better, I analyse the power relationship and demands of different stakeholders in Xinqiang (Figure X). The most important question is whether these demands can be met by one plan. The case studies on rural community development give some experiences to integrate all these demands. It requires better collaboration

A selection of rural community development tools & projects

Rural Design (the US)

Rural design is an important tool for rural communities to build upon existing assets and improve the way a community looks, its quality of life, and its economic viability. By using rural design can help community leaders and residents to find creative strategies that address:

- How to build strong economies and grow jobs;
- Where to locate new growth or redevelop older areas;
- How to design efficient transportation systems;
- How to protect the community's historic and culturally significant resources.

<http://www.rural-design.org/>

AgPark (the US)

Agricultural park is a combination of working farms and a municipal park, which:

- acts as buffer zones between urban and agricultural uses.
- has multiple uses that accommodate small farms, public areas and natural habitat.
- allows small farm operations access to secure land and local markets.
- provides fresh food, and an educational, environmental and aesthetic amenity for nearby communities.

<http://www.sacog.org>

SEPLS & The Satoyama Initiative (Japan)

Satoyama landscape is a traditional Japanese multi-functional land use system. The term "socio-ecological production landscapes and seascape" is used to describe this kind of landscape which is "dynamic mosaics of habitats and land uses where the harmonious interaction between people and nature maintains biodiversity while providing humans with the goods and services needed for their livelihoods, survival and well-being in a sustainable manner."

The Satoyama Initiative aims to help evaluate such landscapes and promote the revival and amelioration of the mechanisms for their sustainable management.

<http://satoyama-initiative.org>

Community Empowerment (Taiwan)

The Taiwanese government has been working in collaboration with local communities since 1993. These community development projects have enabled communities to help each other grow and surpass themselves.

A key term in Taiwan's community development projects is the idea of a "new hometown". The New Hometown Community Building Project aimed to encourage the public to identify with the places where they lived and create quality lives for themselves. The idea is that if people are dedicated to improving their living environment, the whole country will eventually become a wonderful place to live.

<http://sixstar.moc.gov.tw>

of the municipality and local communities and provision of land for local communities to develop their agriculture-related economy. The scenario on agriculture for Guangming and transect zoning plan in the city-scale plan takes local initiatives in farming into the account, which facilitates localisation of farms.

There are many ways to distribute land among residents and organize local farmers. The agreement should be based on discussions and negotiations among stakeholders (figure X). Here, to illustrate feasibility to meet all demands of stakeholders, the concept of AgPark is used as an example.

**Example: AgPark**

The area of the AgPark is shown in figure X, where small- and medium-scale farms managed by local families are united to form a recreational park for urban visitors. Diverse agricultural products and recreational services are provided, either by individual farms or collective (figure X). The functions around the AgPark are also defined to ensure the continuity of the recreational open space network.

Circulation systems are improved to meet the different needs of local population, food production and transportation and urban visitors. Therefore, three systems are identified. All of these networks are well connected to the urban area.

**Circulation network**

- Tracks for agricultural equipments;
- Roads for cars and public transport for commuting;
- Cycling paths (greenways) with pleasing landscape along;

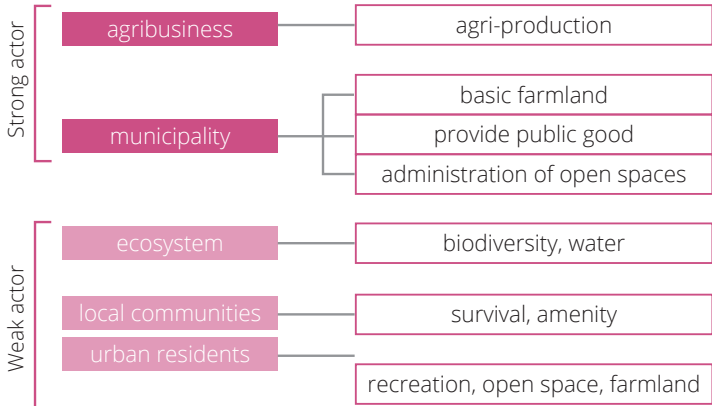
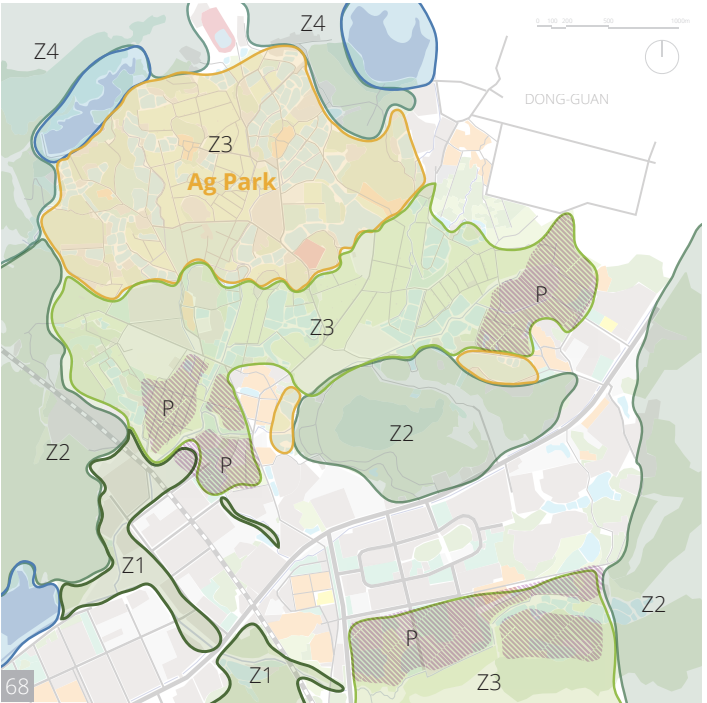


Figure 67. Cooperative / participatory planning process



Figure 66. Cooperative / participatory planning process



**Possible Functions in the AgPark**

*Agricultural produce: vegetable, honey, fruits, fish, livestock, processed food, meat, milk*

*Non-agricultural produce: cycling, outdoor concerts and parties; allotment gardens for urban residents, landscape sketching, cooking courses, hostels, restaurants, teahouse, sport events, etc.*

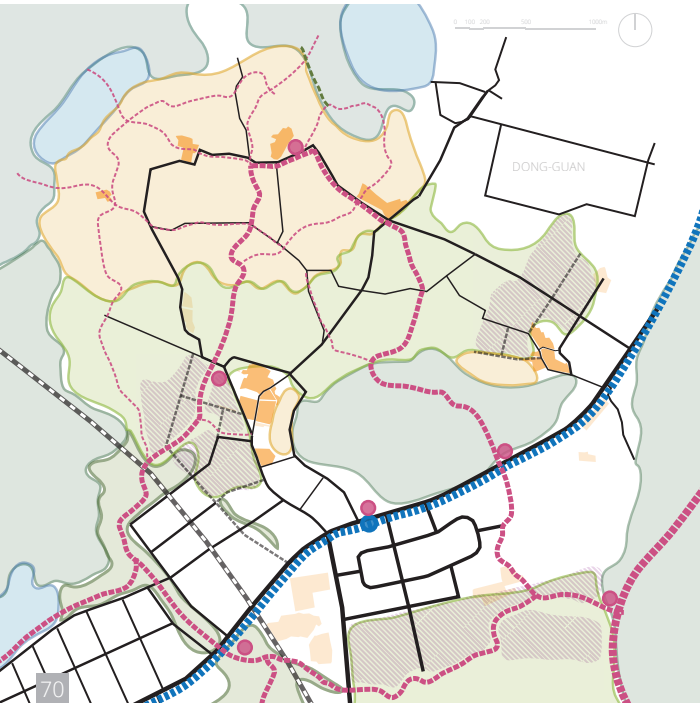
*Farming types:*

- small-scale / medium-scale family farms, supported by collectives and agri-enterprises with services like techniques, facilities, marketing, logistics
- Several collective farms around settlements as tourist and agricultural service centers for the area

Figure 68. Transect zoning in Xinqiang

Figure 69. Possible functions for different zones.

Figure 70. Continuous cycling and road networks for Xinqiang.





### 3.4 Reflection

#### *Rethinking current policy*

The problems happening now in the communities were not foreseen when the planners draw the citywide ECL line. It took almost 10 years to come up with a preliminary compensation plan for these communities. The plan is to provide industrial land for communities who form collective companies to manage the real estates. But if we think in the long term, what can keep the people staying in the land if they earn their living outside of the area? If people afford to leave the area and move to the city, is it fair for other urban residents who cannot be supported by the same public resources? (The municipality plan to invest 1.8 billion RMB in those collective companies.) The local communities get the compensation because of their location, and because of the compensation, they are very likely to leave the area.

The final outcome of these series of policies may only be revealed in the future. However, because the potential consequences are not considered in a bigger picture, the solution of one problem may lead to other problems, like the case of the ECL 10 years ago.

#### *Opportunities from the proposed city-scale plan*

The purpose of the design is not to give a comprehensive solution to the area (which is impossible without the participation of the local), but to provide one possible method and some inspirations for planning countryside in the ECL. Whatever the solutions are, the basis is to sustain and retain local communities, rather than encouraging outflow of population. The nature of agriculture is to root people on the ground. It is totally

different from urban sectors, which feature mobility. So to avoid loss of population in the countryside, developing local farms and enhancing the capabilities of the farms are the ways to go. The scenario of sustainable agriculture discussed in the city-scale plan facilitates the inclusion of local farms. The transect zoning, as a replacement of the ECL, enables controlled construction in the countryside, where local communities can develop agricultural-related industries and services to multiply the value of their products.

Another thing to highlight is the importance of an overall vision for the area. To sustain local communities, merely restriction of construction with a compensation plan is not enough. By including local initiatives and demands, a vision enables individuals and the municipality to work together based on consensus. The enlargement of the planning unit area in the city-scale enables urban planners and designers to intervene and help communities to formulate their overall plans.

Many ECLs are being regulated in Guangdong and other cities in China (Government of Guangdong province, 2013). It is important for urban planners to understand the consequences of the ECLs and rethink the rural planning and design from the perspectives of agriculture and farmers, so as to achieve a more sustainable countryside after the ECL.

*Whatever the solutions are, the basis is to sustain and retain local communities, rather than encouraging outflow of population.*



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# 反思

## REFLECTION

Conclusion / Reflection



# 1. Conclusion

*Main research question: How can planning and design help to facilitate urban agriculture and articulate agricultural landscape and new town development at a structural level in order to improve the current “Green City” development scheme of Guangming, Shenzhen?*

## ***The importance of integration of agriculture***

The analysis of Guangming shows how agriculture is tightly linked to the livelihood of farmers, lifestyle and behaviors of current residents, and the ecological conditions of the area. By introducing these perspectives into the new town development, the Green City vision of Guangming can be “greener” by making use of agriculture to achieve social cohesion and enhance environmental resilience of the city. As most of new towns and urban expansion in China take place on existing agricultural land, the social and environmental values of agriculture provide important angles for more sustainable urbanization.

## ***The role of planning and design in articulating agriculture and new town***

Considering agriculture as one type of landscape, recent academic discourses on city-landscape relationship provide insights for the possibility of agriculture to impact urban form. Combined with problems in Guangming, agricultural landscape can structure and benefit the city in the realms of open space structure, place making in open spaces, city-countryside integration and urban expansion mode. The new angle poses challenges on the current planning systems.

A new planning framework and planning tools are explored to facilitate the new city-agriculture relationship. The planning framework and tools help to provide spaces for agriculture and also guide the adaptation of agriculture to urban contexts. Tested by smaller-scale designs, the planning framework and tools enable opportunities in smaller scales to tackle local problems by understanding and utilizing agricultural landscape.

## 2. Reflection

### ***The relationship between research and design***

The research focuses of the project are to question the exclusion of agriculture in current spatial planning system, and to explore the possibility of planning and design in facilitating and utilizing agricultural landscape. The researches in problem definition and planning theories define the angles for planning and design, and also provide theoretical knowledge in implementing the design.

Elaboration in design in my project is not only a tool to test theories and research conclusions in reality, but also a source of knowledge that can be summarized into more general methodology and principles to be implemented somewhere else. It can also help to find gaps of theoretical framework and narrow down the research questions, which used to be very broad in beginning.

### ***The theme of the studio and the subject***

Complex cities studio is based on complexity theory, in which cities are considered to be formed by various interrelated networks. Recognition of these relationships and the interactions between cities and other layers is the basic philosophy of the studio. With this awareness, the project intends to understand the complex interactions between cities, landscape, agriculture and local communities, and to put the local situations in wider contexts to explore the mechanism behind the phenomenon. From these understandings, a new planning framework is proposed, rather than some specific interventions.

### ***Research approach***

The research is based on the hypothesis that the introduction of agriculture in the urban area can help to articulate new town development, local demands and ecosystem in a better way. The hypothesis is examined by theoretical studies, analysis of a specific site (Guangming) and planning and design proposals.

### ***Societal relevance***

The introduction of agriculture into the new town aims to improve the relationship between ecosystem, local communities and new town development. By improving the relationship, these aspects can all benefit from the each other.

The agricultural perspective also questions the current planning system, which mostly focuses on the urban area with insufficient knowledge on the dynamic of landscape, countryside and agriculture. However, the boundary of a city and its countryside has blurred, and sustainability of a city cannot be achieved without considering the environment the city is situated in. By rethinking the relationship between city and agriculture, I hope that the results can contribute to the knowledge of the integration of city and countryside.





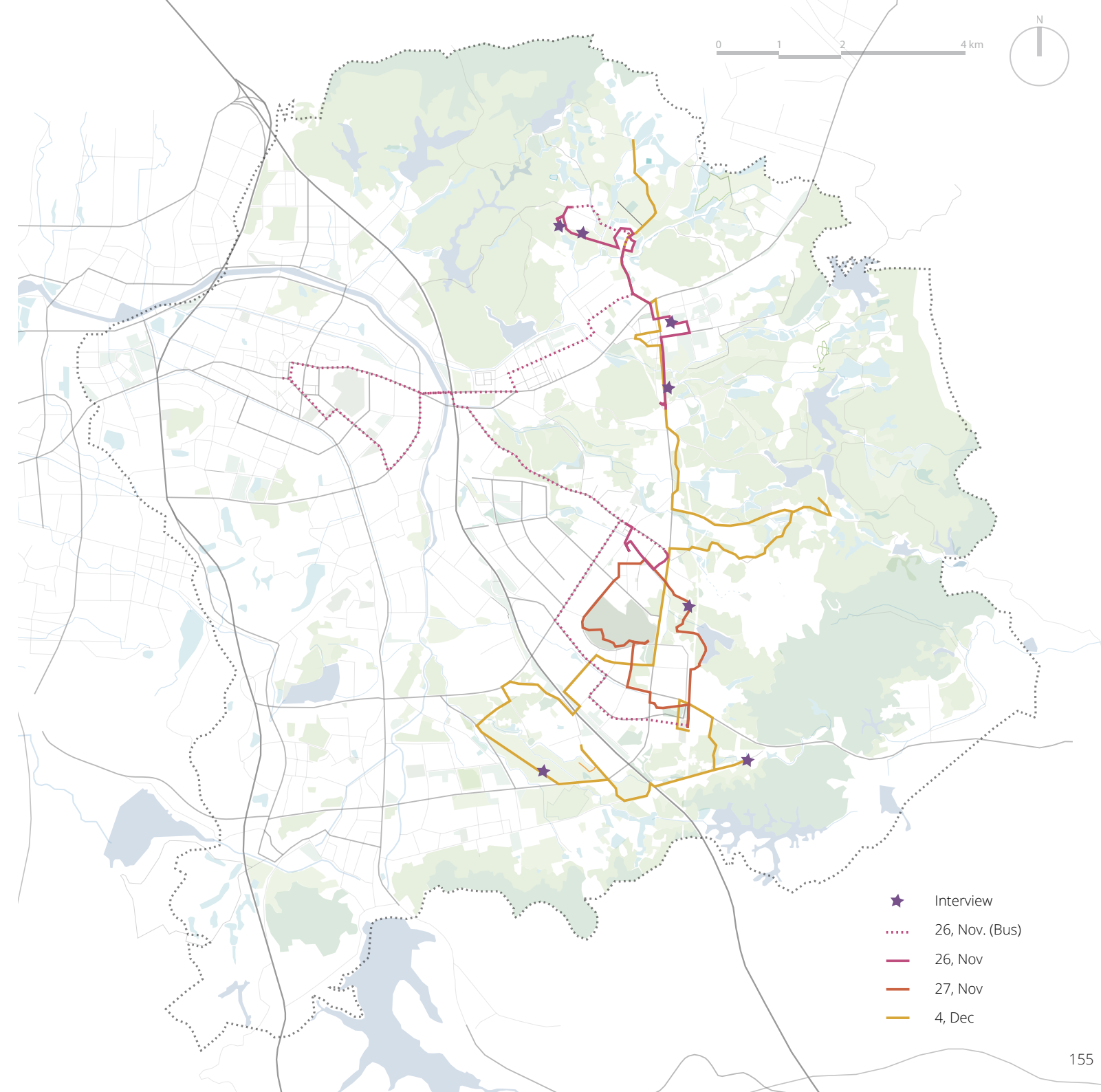
# 附錄

## APPENDIX

Site visit / Criteria of suitability  
evaluation / Bibliography



# 1. Site visit





## 2. Criteria of suitability evaluation

### Agricultural produce

#### Temporary Crops

Definition: crops that mature within one or more rain seasons and are destroyed after harvesting, such as grains, vegetable, etc.

Criteria:

- Fertile soil, flat surface, sufficient water supply
- Away from water pollution;
- Away from main roads;
- In flood hazard area to increase infiltration and used as water storage during extreme weather
- Not on the polluted soil (brownfield land)

#### Permanent Crops

Definition: crops which occupy the land for a long period of time and do not need to be replaced after each harvest, such as fruit trees, shrubs, nuts, etc.

Criteria:

- Hilly area;
- Away from water pollution;
- Not in temporarily available land;
- Along main road to reduce air pollution
- In urban dense area to moderate urban heat

#### Non-food Crops

Definition: crops for uses other than human or animal consumption, whose functions includes bioenergy, landscape plants, construction, fiber, chemicals, etc.

Criteria:

- Along main roads to reduce air pollution
- For landscape plants and floriculture: flat surface, sufficient water supply

### Livestock

Definition: domesticated animals raised in an agricultural field to produce commodities such as food, fiber and labor.

Criteria:

- Away from dense urban area to prevent diffusion of diseases;
- Away from polluted water.

### Fishery

Definition: raising fish through fish farming or aquaculture

Criteria:

- Near current or lost fish ponds (which is suppose to be the lowest area of the surroundings);
- Away from polluted water;
- In flood hazard area to increase infiltration and used as water storage during extreme weather

### Non-agricultural produce

#### Recreation / Education

Definition: leisure activities that involve people and are purposed for fun, health or education, such as gardening, sightseeing, hiking, eating, cycling, etc.

Criteria:

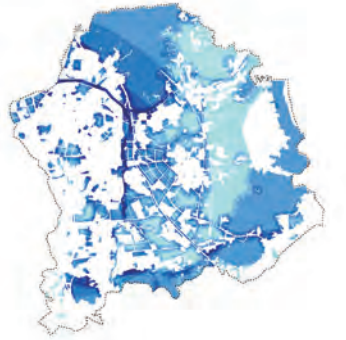
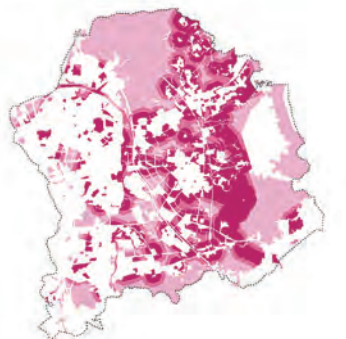
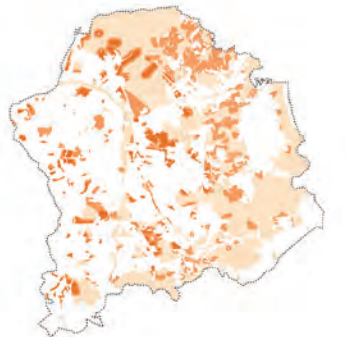
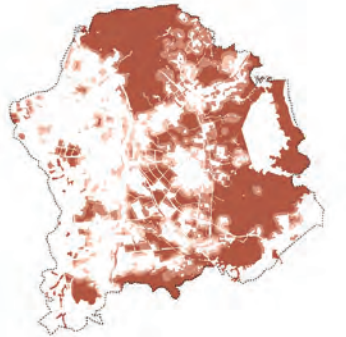
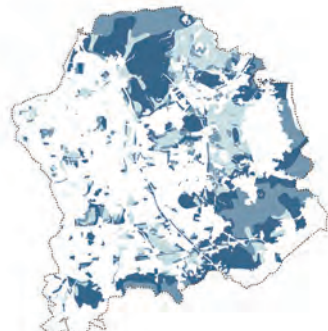
- Along greenways (cycling route);
- Near urban built environment, esp. public services, schools, residential area

#### Ecosystem service

Definition: to increase the capacity of the region to respond to a perturbation or disturbance by resisting damage and recovering quickly, esp. flooding, urban heat, windstorms and deforestation by human.

Criteria:

- Flood hazard area;
- High urban density area;
- Along main roads;
- Water & soil pollution area;
- Existing natural forest.





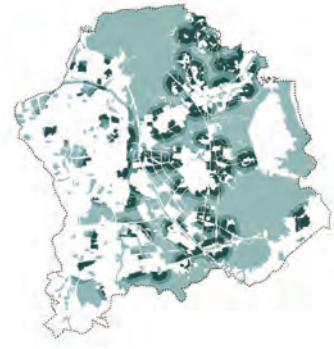
## Farm management

### ***Subsistence farming garden***

Definition: farms in which urban farmers focus on growing food to feed themselves and their families or shared by the communities

*Criteria:*

- Near public services like hospitals and schools as part of health care and educational environment
- Around urban / rural villages, where lower classes live
- On both temporarily and long-term available land



### ***Small-scale family farm***

Definition: small-scale farms (with an area less than 3000 m2) operated by one household to make a living

*Criteria:*

- Near public services like hospitals and schools as part of health care and educational environment
- Around urban / rural villages, where lower classes live
- On both temporarily and long-term available land

### ***Collective farm***

Definition: a farm operated by collective of communities in ECL.

*Criteria:*

- Size of land (>30ha.)
- Around existing settlements in the ECL
- Not on temporarily available land



### ***Large-scale agribusiness***

Definition: a large-scale, intensive, standardized farm (usually with an area more than 30 ha.) operated by an agriculture enterprise for production or research.

*Criteria:*

- Size of land (>30ha.)
- Near agriculture centers / industrial area
- Away from communities in the ECL to give communities access to land to develop their own economy
- Not on temporarily available land

### ***Recreational agri-park***

Definition: a farm operated by companies, collectives or the municipality aimed to provide recreation and tourism service for citizens

*Criteria:*

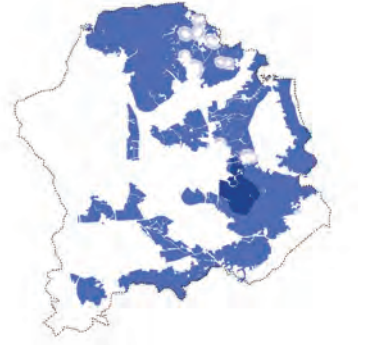
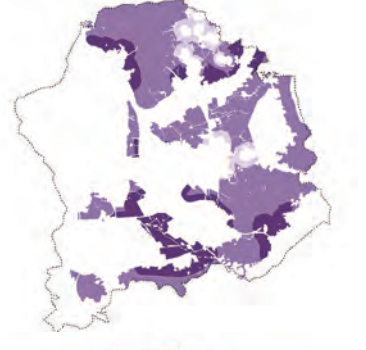
- Size of land (>30ha.)
- Near existing recreation facilities
- Away from communities in the ECL
- Not on temporarily available land

### ***Large-scale family farm***

Definition: a farm by one household with an area of more than 6ha.

*Criteria:*

- Size of land (>6ha.)
- Around existing settlements in the ECL
- Not on temporarily available land





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