

# SPATIAL DISTRIBUTION OF AFFORDABLE HOUSING PROJECTS IN NANJING, CHINA

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## Abstract

*Traditional location theory matches location choices and stakeholder (e.g. developer, user) decisions in a competitive efficient market framework. Developer profit and land value are directly linked to the location characteristics of the property development project. Recent progress in theory & empirical studies has indicated the imperfection of the market e.g. market competition is monopolistic in the urban property sector. Urban affordable housing is typically under direct government intervention e.g. planning, finance and taxation benefits and/or restrictions. We investigate the Nanjing (China) affordable housing sector. Data is collected from all existing affordable housing projects (2002-2010) in the city. Semi-structured interviews and site visits were conducted in 2009 and 2010. Through the study of the Nanjing affordable housing case, we found that (1) the site (location) selection of most projects has shown positive relationship with the general land value ingredient of Nanjing; (2) site selection is heavily influenced by nearby urban development projects, which cause strong resettlement demand; (3) due to the local government's dual role, they consider the economic factors, such as the surrounding conditions of the sites, and the previous use and compensation fees. We argue that demand and institutional factors place important role in determining the location of affordable housing projects in Nanjing.*

Keywords: Location distribution, government, allocation, affordable housing, Nanjing

## Introduction

Affordable housing in China is a central government initiative to housing reform, which is a crucial part of economic reform started in 1978. It was introduced in 1994 by the very first Affordable Housing Management Regulation published at central level. Its purpose is to provide living space for low and middle income urban residents, accelerate housing reform pace, as well as establish Chinese housing system together with commodity housing. Over the years, affordable housing construction was planned in each five year plan. At the national level, in the 11<sup>th</sup> Five Year Plan (from 2006-2010), around 350,000 units were completed each year, and around 50 million sqm affordable housing were newly commenced each year. Till now, there were 4.4 million affordable units completed in national wide from 2000 to 2009.

At a local level, affordable housing construction is taken by officials as a political obligation. It is important to reach the target of affordable housing construction and provision, which is an indication about following the leadership of the higher level government faithfully. The provision of affordable housing is as important as accomplishing high level of GDP growth, yet the implications of revenue income to the local confer is totally different. High GDP growth brings the locality more income, but more affordable housing means losing revenues by using land for free for these projects.

In an emerging property market in the Chinese cities, location of affordable housing has become a major concern to municipal and district governments, because of land cost and the revenue implications as well as the social aspects in affordable housing development. Where affordable housing projects are located and should be located is a matter subject to continuous debate.

Some argued that affordable housing should be located at remote areas, as it can distort the prices of the nearby commodity housing markets (Tighe 2010; Diamond 2009). Others argued that the location should be chosen near city centre with good access to public transportation and facilities because this can reduce household cost of low-income groups who are users of this housing stock. Alternative views on affordable housing supports such projects are located in an isolated location so that the often cited social problems such as high criminal rate will not spread. Affordable housing provision is an order from the central government to local governments. Thus for provincial/city/district governments in China, how to balance interests and conflicts generated in the land sales and delivery of affordable housing projects has become a crucial task. This paper explores factors influence the spatial location and distribution of affordable housing projects in Nanjing, China.

This paper examines the spatial distribution characteristics of affordable housing development in Nanjing, China. Main research questions include: what are the location characteristics of affordable housing projects in Nanjing? How does the location of affordable housing in Nanjing fit into the emerging property market? Is social implication a factor in the location decision-making process? Why?

The paper is organized into seven sections. Section two, followed the introduction section, focuses issues on land price theory and transitional economy in China. The research design sector presents the case study approach, data collection and data analysis. The key analysis part is sub-divided into three sectors, which starts from providing an overview of spatial distribution of affordable housing projects in Metropolitan Nanjing. It further steps down to the explanations from the economical and institutional sectors.

## Literature review

Land is a fundamental element of real estate, thus its value is closely related to the value of the property. In a competitive land market, each location is used at its most productive way, namely the highest and best use. Classical theory suggests productivity of different land uses of a location or a land use at different locations varies primarily due to transportation cost, which firstly came from von Thünen's "isolated state" model in early 19<sup>th</sup> century, which is mainly focused on the spatial distribution of different agriculture activities. The agriculture products with shorter time lasting were produced closer to the city; while, other long lasting products with less transportation cost were located further from the city. Alonso (1964) expanded the theory out of the agriculture sector, and found that commercial business located in or just next to the centre, followed by industry, residential activities and farming. Later studies used the bid-rent curve to describe the positive correlation between land rent, or land price, and the cost of transportation. One land use that is more sensitive to its transportation cost is located at an area that is close to the city centre, whilst less sensitive are located more remotely from the city centre (Geltner & Miller, 2001).

This simple monocentric model reflected a general pattern of land use location in an ideal market. However, Burgess's concentric ring model of urban land use structure and Hoyt's sector model of urban land use structure are considered more realistic. Both discuss housing distribution relative to household income. In Burgess's model (Park, Burgess & McKenzie, 1925), in addition to the distance-rent correlation, low-income groups live closer to the CBD than higher-income groups. This is related to the density and the distance to industrial lands (the work location). Hoyt (1970) also noted that, instead of being distributed within similar distance from city centre, similar land uses (e.g. residential) tend to locate at particular direction from city centre. Similar to Burgess, low-income households tend to live closer to industrial areas than higher-income groups.

The polycentric city model developed based on the monocentric model, as a real city normally had both major and minor central points. Thus, the bid-rent curve of each land use type was influenced by transportation cost to all of these central points. Thus, introducing the minor centres varied the land use distribution pattern within a city.

Policy wise social or affordable housing is residential buildings supplied for a specific group of urban residents who have problem to afford renting or owning a property, basing on their own capacity. Lots of discussions have addressed the location and spatial characteristics of subsidized housing, the demographical patterns of its occupiers, and its neighbourhood environments across cities and countries (Lui, & Suen, 2011; Morris, 2009; Oakley, 2008; Wyly & DeFilippis, 2010). In advanced nations, social housing developments are often located in neighbourhoods of low incomes and high rates of poverty (Newman and Schnare 1997). In the US, these developments were purposely built in disadvantages neighbourhoods (Hirsch 1983; Rohe and Freeman 2001). The concentration of social housing also leads to a concentration of poverty which tends to lead to problems such as high crime rate, poor education quality - all attract continuous attention of the government. Although the government has strong motivation to reduce the concentrative tendency of social housing by policies and

regulations, there is a continuous isolation of public housing occupiers and the surrounding community (Carter et al, 1998; Newman and Schnare 1997).

The general pattern of land prices in China seems to show a downward price-distance relationship (Wang, 2009). It seems that in a broad view, commodity housing markets in major Chinese cities follow location theory. However, Han (2004) showed more fluctuations in residential property value distribution in Beijing, the pattern of which was not like the monocentric or polycentric model. The economic factors, such as the higher return of urban redevelopment, had an influence over housing price. However, other factors mattered greatly as well. The transitional condition of the Chinese housing market, which is unique, contributed a strong demand from the work units, instead of individual buyers. Institutional factor, such as government's direct intervention, can not only brought huge projects, but pulled up the land price immediately in a special point.

Affordable housing in China is closely tied up with economic, political and social issues (Meng et al, 2004). The study of economical housing from 1998 to 2002 in Beijing showed the affordable housing development at the beginning stage in China. It showed that, due to price control, affordable housing projects in Beijing are mostly built in suburban areas, which were mainly out of 4<sup>th</sup> Ring Road (Meng et al, 2004).

In China, government usually have significant involvement in the real estate development and/or urban development processes, especially for housing provision (Huang 2004). The Chinese government has done much to foster and facility the development of the market, encouraging a continuous growth of the non-state sectors (Zhang 2006). In order to facilitate the marketization process, the government created new structures and organisations whose functions and behaviours are more government by the market forces. However, government's direct and indirect participation and intervention have been substantial. This is especially so at local government levels. Huang (2004) further focused government's involvements in housing reform at the local level. It found that the municipal government influenced housing choice more directly and also behaved distinguished in reforming old housing system and in implementing new housing policies, due to the impacts over local economic and politics.

Meng et al (2004) found that from 1998-2002, affordable housing was forcefully pushed forward by the government, though granting land and reducing administrative charges. The reasons behind were firstly, affordable housing was a pillar in the new housing provision system, and, secondly, affordable housing may help on improving the affordability level (Meng et al, 2004). Meng et al (2004) argued that the resource distribution of social housing should mainly follow the market mechanism. They also provided evidence that most affordable housing projects are at least 10 kilometres away from the Beijing CBD at cheaper land prices. It is noted that the locational characteristics of affordable housing projects measured against property/land prices and government participation/intervention are questions demand careful treatment.

## **Research Design**

This paper aims to examine the factors influence the spatial distribution of affordable housing projects in China. Due to significant geographic difference of housing and economic conditions, this study specifically examines one of the Chinese cities - Nanjing, a major second-tier city that offers sound access to affordable housing data. Nanjing is a city continuously undertaking large-scale affordable housing projects since 2002. This city is the capital city of Jiangsu Province, one of the Chinese provinces beared the largest number of affordable housing supply by area, especially between 2008 till now (Figure 1). Nanjing was ranked number six in affordable housing construction national-widely in 2009. As such, the Nanjing case can provide relevant evidence for the purpose of this paper. We restrict our enquiry within the metropolitan area of Nanjing, which is made up of 8 districts. Key reasons include: (1) all eight districts are under the same administration system, (2) most affordable housing projects are located within the metropolitan area. All the affordable housing projects from 2002 till now are included in this research, as there were few 'affordable housing projects' prior to 2002.

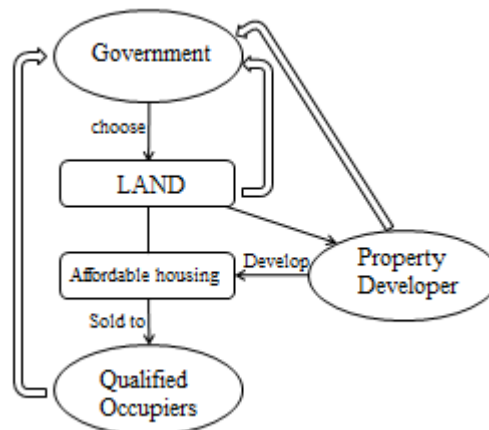
**Figure 1 Nanjing location in China**



(Source: <http://www.vacationstogo.com/images/ports/maps/864.gif>)

The key actors involved in affordable housing development in Nanjing are government at municipal and district levels, property developers, and qualified occupiers (Figure 2). Local government is responsible for choosing land, while the municipal government usually has a final say for decision-making. Developers are these ones who are responsible for the development process. For example, differ from commodity housing; occupiers of affordable housing are selected by the local government. Thus, in order to identify factors of spatial distribution of affordable housing projects, the conditions on land will be considered jointly with influences from other key stakeholders such as developer and occupiers.

**Figure 2 Key stakeholders and interrelationship in affordable housing supply (author)**



We need this section - Fieldwork was conducted between 2010 and 2011. Data is collected by means of map layers of the metropolitan area of Nanjing, government policies, project inspections during site visits and semi-structured interviews with key stakeholders. Details of the map layers include administrative boundaries, boundaries of *New Town*, *University Town* and *Economic Development District*<sup>1</sup>, *highway and railway network*, and *affordable housing projects* from 2002 till now. Government policy documents were gathered for projects

<sup>1</sup> 新城; 大学城; 经济开发区;

analysis. Due to a lack of systematic data on land sales prices in Nanjing, three official sources are used to benchmark land cost for residential development in the Nanjing metropolitan:

- Published in 2003, the *Location Classification of Nanjing Urban Housing Demolition-relocation*<sup>2</sup> is housing demolition and relocation compensation standard for state-owned land.
- *Tables of Basic Land Prices for Residential Land Use of Nanjing River South Districts*<sup>3</sup> is valued by the Bureau of Land Resource of Nanjing in 1<sup>st</sup> January 2008. This is used as benchmark prices of land.
- *Regulations of Compulsory Land Acquisition Compensation and Resettlement of Nanjing*<sup>4</sup> is applied to compensate and resettle those farmers when their collectively-owned land is transferred to state-owned.

There are no official records of locations of affordable housing projects. This is collected through inspection, media search such as public notices and project search. It is more difficult to confirm boundaries information of new projects. The data collected are used to explore reasons behind land allocation and location decisions of affordable housing projects. However the authors noted the challenge of data availability.

The spatial distribution patterns were draw by GIS mapping to show the location of affordable housing units distributed in different districts, as well as areas with various grades on compensation standards and land price level. Content analysis was used for analysing primary data from semi-structured interviews with key stakeholders.

## Spatial distribution of affordable housing in Nanjing

Figure 3 and Table 2 shows all affordable housing projects in each administrative district in Nanjing. It shows although each district has at least one affordable housing project, they were unevenly distributed (Table 1). Most affordable housing projects were allocated in Xiaguan District, Yuhuatai District and Qixia District, which is farther from the Nanjing CBD (Xinjiekou). In contract, there were much less project in Gulou, Jianye, and Qinhuai Districts. For Xuanwu District and Baixia District, although there were 5 projects in each district, those ten projects were all located in their district boundaries, which were far from the CBD.

**Table 1 Affordable housing distribution in administrative districts (Author)**

District	Total	2002	2005	2007	2008	2010
Gulou District	1	0	0	1	0	0
Xuanwu District	5	1	1	1	1	1
Baixia District	5	1	0	1	0	3
Qinhuai District	3	0	1	1	1	0
Xiaguan District	11	1	2	4	3	1
Jianye District	2	0	1	0	1	0
Yuhuatai District	16	2	6	1	6	1
Qixia District	18	7	3	3	0	5
<b>Total</b>	<b>61</b>	<b>12</b>	<b>14</b>	<b>12</b>	<b>12</b>	<b>11</b>

Though 11 affordable housing projects are located in Xiaguan District, they are small-size units compared to other districts (Table 2). The 11 projects provide 5,462 affordable housing units, with a gross building area of 475,100 sqm. In contract, projects in Baixia, Qixia or Yuhua Districts, within them the smallest one has a gross building area of 6,400 sqm, with only 58 housing units. Qixia and Yuhuatai District shared the greatest number of affordable housing projects. Although there was one project within Yuhuatai District in 2010, it is (AH051) the largest affordable housing project in Nanjing, which is expected to provide living place for 80,000 residents upon completion.

**Table 2 Affordable housing projects in Xiaguan District (Author)**

<sup>2</sup> 南京市城市房屋拆迁区区级别

<sup>3</sup> 南京市江南八区住宅用地级别基准地价表

<sup>4</sup> 南京市征地补偿安置办法

Affordable housing projects	Land area (1,000 sqm)	Gross residential construction area (1,000 sqm)	Gross construction area (1,000 sqm)	Housing units
AH003	142.70	136.90	148.80	2,078
AH014	16.70	21.30	28.80	348
AH015	7.60	9.40	11.30	138
AH028	4.30	4.60	6.40	58
AH029	45.80	40.90	63.10	646
AH033	26.90	25.00	38.10	268
AH036	153.70	30.30	37.90	410
AH043	18.30	58.60	70.90	790
AH044	21.30	50.00	69.70	726
<b>Subtotal</b>	<b>437.30</b>	<b>377.00</b>	<b>475.00</b>	<b>5,462</b>

If grouped all affordable housing projects based on their geographical distance from the CBD, it seems that projects were mostly gathered in areas not far from the CBD (Table 3). Half of them were only 5.01-1 km from the CBD, which means it only took 10 to 15 minutes travelling to the city central by driving. Nearly another quarter of projects, were located in the areas which were 10.01-15 km from the CBD, which controlled the travelling time to the CBD within 20 minutes by car. Another 10% of projects were constructed from 15.01-20 km from the CBD, which may spend 30 minutes on driving if they want to go to the city centre. However, only 3 projects were more than 20 km from the city centre. The farthest one is 38.35 km from the CBD construct in 2007, which was next to the Nanjing city boundary.

**Table 3 Distance from affordable housing projects to the CBD (Author)**

Distance to CBD	Total	2002	2005	2007	2008	2010
0-5 km	0	0	0	0	0	0
5.01-10 km	33	5	6	9	7	6
10.01-15 km	18	6	3	2	2	5
15.01-20 km	7	1	3	0	3	0
20.01-30 km	1	0	1	0	0	0
30.01-40 km	2	0	1	1	0	0
<b>Total</b>	<b>61</b>	<b>12</b>	<b>14</b>	<b>12</b>	<b>12</b>	<b>11</b>

If separate the projects by year, it seems that in Nanjing, affordable housing projects did not expand to remote area across time. Although the only one project may be regarded as a random case, more and more affordable housing projects were allocated in Baixia District and Xiaguang District. In 2002 and 2005, total numbers of projects in Yuhuatai District and Qixia District were 9 (over 12) and 9 (over 14). However, in 2007, 2008 and 2010, those numbers changed to 4 (over 12), 6 (over 12) and 6 (over 11). Although those two districts played significant role in affordable housing development since 2002, it still showed that their contribution ratio declined a lot since 2007. The development of affordable housing was kept on locating in the inner area of Nanjing over years. Only in 2005, there were 5 over 14 projects located in the areas 15 km from the CBD.

## Price schemes and the location of affordable housing

Figure 4 is affordable housing projects distribution in the Nanjing metropolitan area. Although the compensation benchmark is of the minimum amount which often does not reflect actual market, it is able to show the location differences. The further a house is from the city centre, the less compensation fee it can get. According to Table 4, there are only 6 projects allocated within the areas of Grades 1-3. Instead of locating all affordable housing to the most remote area (Grade 6), most affordable housing (83.61%) are allocated under Grade 4 (31 projects, 50.82%) and Grade 5 (21 projects, 34.43%). The only project under Grades 1 and 2, it is 141,400 sqm in gross

building area with around 1,600 units. Compared with other projects, it is not small projects. The three projects located in Grade 6 are all large-scale development, providing at least 4,800 units each project. For AH018, it is a two-phase development operated from 2004 to 2007, with 1,005.2 thousand sqm in total, which is made up of parking units, shops, community centres, kind gardens, green areas, as well as 10,284 residential units.

**Table 4 Affordable housing projects distribution by demolition standards in Nanjing (Author)**

Grade	Compensation Benchmark	Total	2002	2005	2007	2008	2010
Grade 1	RMB 3,900/sqm	0	0	0	0	0	0
Grade 2	RMB 3,600/sqm	1	0	0	1	0	0
Grade 3	RMB 3,100/sqm	5	0	1	1	2	1
Grade 4	RMB 2,700/sqm	31	7	4	8	5	7
Grade 5	RMB 2,200/sqm	21	5	7	1	5	3
Grade 6	RMB 2,000/sqm	3	0	2	1	0	0
<b>Total</b>		<b>61</b>	<b>12</b>	<b>14</b>	<b>12</b>	<b>12</b>	<b>11</b>

However, the grade distribution was uneven in each district (Table 5). For districts, much closer to the CBD, including Gulou District, Xuanwu District, Baixia District, Qinhuai District, Xiaguan District, Jianye District and Yuhuatai District, affordable housing projects were placed in areas with lower demolition standards. The only exception is in the Qixia District, half of the total projects were placed in Grade 4 with higher demolition level, and only 3 projects were in the area with the lowest demolition cost, which was the Grade 6. Except Xuanwu District, the other 5 districts all placed their affordable housing projects to the area with the lowest demolition standard within each district. Although in Xuanwu District, there were 3 (over 5) projects located in the Grade 3 area, but those 3 projects were all located closed to the boundary of Grade 3 and 4. However in the Xiaguan District, although all 11 projects were placed in the area with lowest demolition standards within the district, but 9 out of 11 projects were placed near the boundary of Grade 2 and 3.

**Table 5 Affordable housing projects distribution in each district with different demolition standards in Nanjing (Author)**

Grade	Gulou District	Xuanwu District	Baixia District	Qinhuai District	Xiaguan District	Jianye District	Yuhuatai District	Qixia District
Grade 1	0	0	0	0				
Grade 2	1	0	0	0	0	0		
Grade 3		3		0	0	2	0	0
Grade 4		2	5	3	11		1	9
Grade 5							15	6
Grade 6								3
<b>Total</b>	<b>1</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>11</b>	<b>2</b>	<b>16</b>	<b>18</b>

Figure 5 is affordable housing distribution on the residential land under different land price benchmarks. There is no project developed in the area of Grades 1, 2 and 3. Within the level of Grade 4, there is only one project (Table 6). Although there are 4 projects are allocated under Grade 5, 2 are located at the boundary of Grades 5 and 6. Similarly, 2 are located at the boundary of Grades 6 and 7, and 3 are located at the boundary of Grades 6 and the Remaining Area. It showed that most affordable housing projects are allocated in Grades 6, 7, and 8, locations of much lower benchmark prices. It should be noted that 15 projects are not located in areas included in the official valuation report. Overall a significant number of affordable housing projects are located in *remote* areas for residential development.

**Table 6 Affordable housing distribution on residential land with different land price benchmarks (State-owned land) (Author)**

Grade	Benchmark of Land Price	Total	2002	2005	2007	2008	2010
Grade 1	RMB 20,600/sqm	0	0	0	0	0	0
Grade 2	RMB 14,700/sqm	0	0	0	0	0	0
Grade 3	RMB 11,800/sqm	0	0	0	0	0	0

Grade 4	RMB 10,400/sqm	1	0	0	1	0	0
Grade 5	RMB 7,400/sqm	4	1	0	1	1	1
Grade 6	RMB 6,000/sqm	12	0	3	4	3	2
Grade 7	RMB 4,000/sqm	18	7	2	3	3	3
Grade 8	RMB 2,800/sqm	11	0	5	1	4	1
Remaining Area		15	4	4	2	1	4
<b>Total</b>		<b>61</b>	<b>12</b>	<b>14</b>	<b>12</b>	<b>12</b>	<b>11</b>

Although there is no official explanation on the calculation standards behind, the remaining area was expected to be areas, which are mainly not state-owned land or without necessary conditions for residential development. Within each district, there is no project located in the area with highest land price of that district (Table 7). Both Xuanwu District and Baixia District put majority of their affordable housing price in the remaining area. Qinhuai District, Jianye District and Yuhuaitai District located affordable housing in the area with lowest land price, instead of putting them in the remaining area. However, in Xiaguan District, 8 projects out of 11 were located in the second lowest land price area, with only 1 project located in the area with lowest land price standard. Similarly, in Qixia District, although majority area within it was classified as the “remaining area”, 10 projects was located in the Grade 7 area, and 7 projects were in the remaining area.

**Table 7 Affordable housing distribution in each district on residential land with different land price benchmarks in Nanjing (State-owned land) (Author)**

Grade	Gulou District	Xuanwu District	Baixia District	Qinhuai District	Xiaguan District	Jianye District	Yuhuaitai District	Qixia District
Grade 1	0	0	0			0		
Grade 2	0	0	0	0		0		
Grade 3	0	0	0	0		0		
Grade 4	1	0	0	0	0	0		
Grade 5	0	2	0	0	2	0		0
Grade 6		0	0	3	8	0	0	1
Grade 7		0			1	2	5	10
Grade 8							11	
Remaining Area	0	3	5	0		0		7
<b>Total</b>	<b>1</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>11</b>	<b>2</b>	<b>16</b>	<b>18</b>

Figure 6 shows affordable housing distribution on collective-owned land with different rate of land compensation. It does not cover all the land in metropolitan Nanjing, as land in the remaining area is state-owned, which is not suitable for measurement. 4 projects are located in the remaining area (Table 6). Except 1 in the Nanjing Economic Development District and 2 in the Hexi New Town, all remaining are allocated near boundaries of the remaining area and Grade 1. At the early stage of affordable housing development, most projects were allocated within the Grade 2. In 2002, 10 out of 12 projects are located in area of Grade 2. In 2005, there were 6 projects in Grade 2, 5 in Grade 3. It may further expand to other areas, such as Grade 1 and Remaining Area since 2007.

**Table 8 affordable housing distribution by area with different compensation rate (collective-owned land) (Author)**

Grade	Compensation Benchmark	Total	2002	2005	2007	2008	2010
Remaining Area		4	0	1	0	2	1
Grade 1	RMB 113,000/Mu <sup>5</sup>	19	2	2	8	2	5
Grade 2	RMB 82,000/Mu	29	10	6	3	5	5
Grade 3	RMB 58,000/Mu	9	0	5	1	3	0

<sup>5</sup> Mu (亩) is a Chinese unit of area. 1mu is 1 / 15 of a hectare, which is around 666.67 sqm.



<b>Total</b>		<b>61</b>	<b>12</b>	<b>14</b>	<b>12</b>	<b>12</b>	<b>10</b>
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Similar as the pattern showed on state-owned land, the projects distributions on collective-owned land varied across districts. For most districts, with greater proportion of state-owned land, which regarded as “remaining area” here, including Gulou District, Xuanwu District, Baixia District, Qinhuai District, Jianye District and Yuhuatai District, affordable housing projects were not placed in the “remaining area”, but in areas with lowest compensation rate. The only exception is in the Jianye District, both affordable housing projects were placed in the remaining area. Although in Xiaguan District, there is 1 project placed in the “remaining area”, that project was actually at the boundary of remaining area and Grade 1 area. However, in Yuhuatai District and Qixia District, where with limited land was regarded as state-owned one, affordable housing projects were not placed in the area with lowest compensation rate, but in the area with the second-lowest one.

**Table 9 affordable housing distribution in each district with different compensation rate (collective-owned land) in Nanjing (Author)**

<b>Grade</b>	<b>Gulou District</b>	<b>Xuanwu District</b>	<b>Baixia District</b>	<b>Qinhuai District</b>	<b>Xiaguan District</b>	<b>Jianye District</b>	<b>Yuhuatai District</b>	<b>Qixia District</b>
Remaining Area	0	0	0	0	1	2	0	1
Grade 1	1	2	1	0	10	0	0	5
Grade 2		3	4	3		0	10	9
Grade 3							6	3
<b>Total</b>	<b>1</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>11</b>	<b>2</b>	<b>16</b>	<b>18</b>

Overall speaking, in Nanjing, although affordable housing can hardly be found in the area with higher compensation standard and land price, it also does not mean that all the affordable housing projects were developed in the very remote area from the city centre, which with lowest compensation standard and cheapest land price, a great mass of affordable housing projects in Nanjing were located in the areas with middle standards of both land compensation level and land price. However, further extended to projects at the district level, for districts closer to the city centre, most affordable housing were placed in the areas with lowest compensation standard and cheapest land price within each district. However, for area further from the city centre, especially in Yuhuatai District and Qixia District, major projects were located in areas with highest and middle standards of both land compensation level and land price within that district.

## **Further explanations about the location of affordable housing**

The figures show that, few affordable housing projects are allocated closed to the city centre of high land value. However, neither do many affordable housing projects locate highly remotely to the city. The majority are allocated in the areas with a middle-level *land cost* and *compensation fees*. The reasons behind this kind spatial distribution of affordable housing projects are discussed as influential factors.

### **Urban development plan and purpose of users**

Affordable housing in Nanjing is mainly used for resettlement purposes. Qualified occupiers should either be low-income urban households or residents whose properties were demolished with insufficient compensation. Although there is a lack of time-series data, there is information from the government showing that majority of affordable housing units were used for the resettlement purposes of urban and rural residents. In 2002, within the 39,752 affordable housing units newly completed in that year, there are 33,736 units (84.87%) were used for resettlement purpose. In 2005, 33,059 units were used for resettling urban and rural residents, which composed 78.38% of the affordable housing units completed that year. Interviewees of both government officials and management staffs of development companies mentioned that according to their practical experience, affordable housing in Nanjing was mainly for *resettlements purposes*. If there is any remaining units, those units are used for providing living units to low-income residents, or used as low-rental housing and public rental housing. The principle of resettlement is to allocate residents in nearby locations of original property. Moreover, to reduce disputes among the districts, each district government is expected to deal with the resettlement task within its own district, unless large-scale developments which are led by the municipal government. Thus, affordable housing projects were located in areas where demolitions and new development projects are undertaken.

According to the purpose of resettlement, affordable housing could be divided into three types (Table 6). One is the affordable housing projects used for large-scale urban development projects, such as new town and economic development district development. The most common approach is choosing one site within the development, which is suitable for residential usage, to develop affordable housing units for relocating all residents within. The typical example is the AH030 (Figure 7). It is used for resettling the residents within the development boundary of Gulou District Science Park. The local government choose one piece small piece of land next to the southern boundary, and build up only 5 buildings with 1,602 affordable housing units. Moreover, within the over plan of this science park, there is no other site used for residential purpose. Thus, it can explain that why this project is the only one within the area with both Grade 4 of Residential Land Price Benchmark, and Grade 2 of the Urban Housing Demolition Price. Similar case can be found in other districts as well. The vice manager of the projects AH011, AH012, and AH018, said in the interview that: “It seems that the affordable housing projects currently developed by them were all have a development project first. The affordable housing projects followed up then for relocation. The development scales of affordable housing projects were determined by the number of people need to be resettled. Our company’s responsibility is only for resettling residents originally lived in the Xianlin University Town area by developing affordable housing units. Why we now have less affordable housing projects than before was not because we have less interest on that, but simply due to those residents were nearly all resettled.”

The second type is for resettlement of large projects, such as the High-speed Railway project, and industrial development, where original places are no longer suitable for residential purpose. Thus, a piece of land, which is not far away from the original place, is approved and chose by the local government for resettlement. AH025 and AH021 are examples in this group. Both of these two projects are at remote area, far away from the city centre. Reasons for allocation of these two projects are not simply due to the limited cost on land and compensation, but mainly because they are used for resettle residents influence by major industrial projects in surrounding areas. If there is urban redevelopment project undertook in old town with high living density, the Nanjing Municipal Government will choose one piece of land, which is not far away but not adjacent to the original place, as there is no suitable land with enough capacity in the surrounding area to settle down a large amount of residents.

**Figure 7 Location of AH030 in Gulou District Science Park (Author)**



(Captured from google’s demonstrative clip, [http://maps.google.com.au/maps?q=nanjing&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&hq=&hnear=0x35b58c9b668dcd83:0x8ffb60b79df1b06,Nanjing,+Jiangsu,+China&gl=au&ei=\\_2l4TtO-BuWaiQft8ZD7DA&sa=X&oi=geocode\\_result&ct=image&resnum=2&ved=0CEUQ8gEwAQ](http://maps.google.com.au/maps?q=nanjing&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&hq=&hnear=0x35b58c9b668dcd83:0x8ffb60b79df1b06,Nanjing,+Jiangsu,+China&gl=au&ei=_2l4TtO-BuWaiQft8ZD7DA&sa=X&oi=geocode_result&ct=image&resnum=2&ved=0CEUQ8gEwAQ), September 2011)

For the two groups mentioned above, projects’ sizes may vary significantly, as projects’ scales are determined by how many people are influenced by the development (Table 6). The last group of affordable housing projects is normally large in scale, as they are used for settling residents from various demolition projects. One typical example is AH002, which is one of the largest affordable housing projects with developments six-phases. The project, located at the south-east corner of Baixia District, is used for resettling all qualified residents within the Baixia district.

**Table 6 affordable housing projects and their usage of resettlement projects (Author)**

Affordable housing projects	Resettle residents for projects (Mainly)	Land area (1,000 sqm)	Gross construction area (1,000 sqm)	Housing units
Type 1	For large-scale urban development projects			

AH026	Hexi New Town	189.5	506.3	5,107
AH045	Hexi New Town	206.2	702.3	7,799
AH060	Nanjing Economic Development Zone	55	70.4	1,332
AH011	Nanjing Economic Development Zone and Nanjing Xianlin University Town	89.5	101.8	1,239
AH012	Nanjing Economic Development Zone and Nanjing Xianlin University Town	242.1	209.6	2,560
AH018	Nanjing Economic Development Zone and Nanjing Xianlin University Town	973	1005.2	10,284
AH024	Banqiao New Town in Yuhuatai District	295.5	430	3,946
AH058	Baixia District High-technology Development Zone	105.1	134.6	1,576
AH030	Gulou District Science Park	73.8	141.4	1,602
AH017	Yuhua Economic and Technology Development Zone	103.2	149	1,582
AH041	Yuhua Economic and Technology Development Zone	276.6	527	8,157
<b>Type 2</b>	<b>For large projects</b>			
AH053	Nanjing Yangtze River Water-front Development Project	448.6	1843	
AH025	Longtan Industrial Harbour and Longtan Logistic Park	502.6	451.5	4,922
AH042	Nanjing South Station for Beijing-Shanghai High-speed Railway	156.2	188.7	2,020
AH002 (Phase 5)	Beijing-Shanghai High-speed Railway	57.9	134.7	1,576
AH046	Beijing-Shanghai High-speed Railway			
AH061	Beijing-Shanghai High-speed Railway	141.5	376.5	4,244
AH044	Shanghai-Nanjing Intercity Railway	21.3	69.7	726
AH021	Redevelopment of Shanghai Baosteel Co., Ltd. Nanjing Factory	111.9	110.7	1,224
AH039	Redevelopment of Shanghai Baosteel Co., Ltd. Nanjing Factory	264.2	299.3	2,684

## Development cost

### Land cost

Land for affordable housing is government allocated for free, thus the main cost for land acquisition is cost of demolition. As local government is responsible for demolition and face political duty (i.e. pressure) to develop planned amount of affordable housing units, it also considers difficulty of obtaining land. Although there is lack of evidence to show that previous usages of those pieces of land used for affordable housing development, interview analysis and satellite map analysis provide additional information.

Interviews suggest most affordable housing projects were constructed on rural land. One key reason is the limited compensation cost on land. Figure 6 shows most affordable housing projects are built on the collective-owned land with compensation standard of RMB123/sqm. Interview analysis suggests that although they did not calculate the actual difference between the compensation fees on collective-owned land and state-owned land, it is obviously much cheaper for the compensation over collective-owned land. An interviewee suggested that it is common that, for commodity housing, 50% of the total cost paid for land; for affordable housing projects, currently, it is expected to be 30% of total cost. One interviewee from district government supports this view who suggested that although using agriculture land for construction purpose should get permission from the provisional government or even the State Council, local government still prefers to use collective-owned land due to the low compensation fees, as long as it is suitable for residential development.

For those affordable housing units that are developed within the urban area, urban redevelopment is the most popular approach. Xiaguan District, one of the districts in the old town area, built up 8 out of 11 of its affordable housing projects on previous industrial area (see Table 7). The government official of the Xiaguan District admitted that they have the intention to find land previously used by state-owned enterprises as factories and/or

warehouses for affordable housing projects within the Xiaguan District. The reason is said to be that negotiating with those enterprises is much easier and time-saving than with individual residents. SOEs either have new plan of relocation, or they are so poorly performed that they need to sell their land located in inner city. He said that the availability of industrial area leads to a variety of project locations and sizes. Compared to other districts, affordable housing projects in Xiaguan District are larger in number but smaller in size. All three projects in Qinhuai District are also allocated on lands that were previously used as factory warehouses. One of the largest affordable housing projects developed with gross building area of over 1.843 million sqm in 2010-2011, is located on a previous logistic park.

**Table 7 Affordable housing projects and their pervious land use (Author)**

<b>Project</b>	<b>Commenced time</b>	<b>Pervious land use</b>
<b>AH003</b>	2002 (Phase 1); 2005 (Phase 2)	Lack of information
<b>AH014</b>	2005	Rural land
<b>AH015</b>	2005	Lack of information
<b>AH028</b>	2007	Factory
<b>AH029</b>	2007	2 factory warehouses
<b>AH033</b>	2007	10 factories and enterprises
<b>AH036</b>	2007	Rural land
<b>AH043</b>	2008	Warehouse of a logistic company
<b>AH044</b>	2008	Factory
<b>AH047</b>	2008	Factory
<b>AH057</b>	2010	Several factories

### Construction cost

As, for affordable housing, land is allocated for free with regulated profit margin, the sales price is determined largely by construction cost. Construction cost not only makes up of cost of units, supporting facilities and amenities, to meet its intended social objective, the cost also became one of the factors influencing the location of affordable housing projects.

The level of residential land and benchmark price of each level is valued by the Nanjing Bureau of Land Resources according to location, together with average plot ratio within the area and the living amenities in the area, including electricity and water supply, public roads and accessibility, as well as availability of sewerage. The Remaining Area is normally regarded as area either lack of necessary amenities or not planned for residential development. Although there are some projects allocated in areas without necessary living amenities, majority affordable housing projects (46 projects, 75.41% of total) are allocated within the area with necessary living amenities. However, around half of the projects (29 projects, 47.54% of total) are in the areas of Grade 7 and 8, where condition of living amenities is not as good as in Grades 1 to 6. The general manager from one district government subsidiary real estate company, which developed three affordable housing projects in the area of Grade 7, pointed out that the costs of amenities determined the final price of affordable housing projects. If a lot is lack of necessary amenities, the developer beared higher risks of undertaking that affordable housing project. During the interview with him in Dec 2010, he supported this point of view by using a project recently finished at that time. He said that although the lot is within Grade 7, the local condition is much poorer than expected. Thus, they spent lots of time and money on the construction of necessary amenities by them own, including linking road to the existing road system, as well as pipelines of electricity, water and sewerage, which made the average overall cost per square meter a bit higher than other projects. Thus, as the government has the determination power of how much affordable housing unit should be sold at, the developer may have the risk of financial loss on the project. However, choice is limited because they are subsidiary company of the district government therefore follow vertical order from the government.

The remaining area involves affordable housing projects either of large-scale or are developed in cluster with several phases. Typical examples are AH002 and AH018. AH002 (Figure 8) is an early stage affordable housing project, extending its development from 2002 until the present. The general manager of the developer said that there are some facilities and amenities are necessary for the affordable housing projects and requested by the Planning Bureau. However, as they are divided in phases (e.g. community centre in the first phase and bus terminal in the third phase), they do not feel too strong pressure for providing facilities. AH018 is a project 23.56 km from the city centre. It is an isolated residential project on a lot of 973,000 sqm, with 1 million built area which provide 10,284 housing units. Its senior project manager said that although it costed a lot on facilities

and amenities, the size of project is large enough to allow each unit with insignificant share of the total cost over facilities and amenities.

**Figure 8 Geographical concentrations of AH002 and AH058 in Baixia District (Author)**



(Captured from google's demonstrative clip, [http://maps.google.com.au/maps?q=nanjing&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&hq=&hnear=0x35b58c9b668dcd83:0x8ffb60b79df1b06,Nanjing,+Jiangsu,+China&gl=au&ei=\\_214TtO-BuWaiQft8ZD7DA&sa=X&oi=geocode\\_result&ct=image&resnum=2&ved=0CEUQ8gEwAQ](http://maps.google.com.au/maps?q=nanjing&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&hq=&hnear=0x35b58c9b668dcd83:0x8ffb60b79df1b06,Nanjing,+Jiangsu,+China&gl=au&ei=_214TtO-BuWaiQft8ZD7DA&sa=X&oi=geocode_result&ct=image&resnum=2&ved=0CEUQ8gEwAQ), September 2011)

#### **Local condition of the land at micro-level**

Property price is determined by a group of factors, including location, transportation and local conditions of the site. The local government worked to find a place for affordable housing in the general housing market. Local land conditions are taken into consideration by the local government. In the case of the Hexi New Town, there are two projects (AH026 and AH045) at the southern part of the Hexi New Town, mainly rural area and was planned to be one of the first new town developments since 2005 (Figure 9). According to the planning of Hexi New Town, its southern part is planned as higher-end residential. Both AH026 and AH045 are within the scope of development of the Hexi New Town. They are located on both sides of the City Ring Road. AH026 project was started in 2005; the first phase is completed and the second phase under construction. The two-phase development is expected to provide 5,017 affordable housing units, with 506,300 sqm gross building area. AH045 project has obtained government permit in 2010. It is a three-stage development by two developers. It is a large-scale development with 7,799 housing units (702,300 sqm gross building area) in total. The first phase of 3,107 housing units (252,400 sqm GBA) is nearly completed. An interviewee previously with the planning authority of Hexi New Town, is a senior project manager of one of the developers of these projects explained the land selection process. He admitted that: "The local government does not choose a piece of land with high land price for affordable housing, as the land for affordable housing projects is freely allocated, and they relied a lot on the income of selling land. Thus, normally, the local government preferred to select a piece of land with an acceptable location, which means it is not too isolated from the existing facilities, and has or will have public transportation nearby." For AH026 and AH045, the two pieces of land are permitted by the planning bureau for residential, and there is a large subway station next to AH026.

However, compared local conditions, the piece of land for affordable housing is not same quality as those for commodity housing. For AH045, both its east and north boundaries are next to the City Ring Road. However, for AH026, its west and north boundaries are next to the City Ring Road, while its east boundary is next to the light rail. Air quality and noise are the main concern. It is suggested that the two affordable housing projects have performed as a *barrier* for the higher quality commodity housing located further within the New Town. The market price of existing residential properties located opposite to AH045 and further within the New Town is RMB 18,000/sqm. The AH045 project will be sold at around RMB 3,000/sqm.

**Figure 9 AH026 and AH045 in the southern part of Heixi New Town (Author)**





(Captured from google’s demonstrative clip, [http://maps.google.com.au/maps?q=nanjing&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&hq=&hnear=0x35b58c9b668dcd83:0x8ffbb60b79df1b06,Nanjing,+Jiangsu,+China&gl=au&ei=\\_2l4TtO-BuWaiQft8ZD7DA&sa=X&oi=geocode\\_result&ct=image&resnum=2&ved=0CEUQ8gEwAQ](http://maps.google.com.au/maps?q=nanjing&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&hq=&hnear=0x35b58c9b668dcd83:0x8ffbb60b79df1b06,Nanjing,+Jiangsu,+China&gl=au&ei=_2l4TtO-BuWaiQft8ZD7DA&sa=X&oi=geocode_result&ct=image&resnum=2&ved=0CEUQ8gEwAQ), September 2011)

Although it was not possible to interview stakeholders involved in land selection of each affordable housing project, the analysis of local conditions of each project provide some useful observation. Within the 61 projects, there are 28 projects next to highway and/or railway. Around one-third of the projects are next to the City Ring Road (Table 8). Guo (2011) had the similar observation that most projects are located along the City Ring Road, but explained that it is mainly because the Ring Road is boundary of the Main City according to the *Nanjing Master Plan (1991-2011)*. Interview analysis and site visits showed that affordable housing projects not only locate along the Ring Road, but also near highways, railways and newly built high-speed railway.

**Table 8 Affordable housing projects and their adjacent to highways, railways and grounded metro lines (Author)**

Project	Next to	Project	Next to
AH001	Railway	AH024	Highway
AH002	Highway	AH026	Highway and grounded metro line
AH003	Railway	AH033	Highway and Railway
AH004	Highway and factory	AH035	Highway, railway and old airport
AH005	Two Highways	AH037	Highway
AH006	Highway	AH038	Highway
AH007	Highway	AH039	Railway
AH008	Railway	AH040	Highway
AH012	Highway and railway	AH042	Two Highways
AH016	Railway	AH043	Railway
AH018	Highway	AH045	Highway
AH019	Highway	AH047	Highway and railway
AH020	Highway	AH049	Highway, railway and old airport
AH022	Highway, railway and old airport	AH051	Highway

## Conclusions

In the Nanjing metropolitan area, there are 61 affordable housing projects that were developed between 2002 and 2011. According to pattern on the compensation standards of rural land and urban land, as well as levels of land price benchmarks, the metropolitan Nanjing showed an overall land price pattern that the CBD held the highest land price and compensation fess, and both of these two standards reduced generally accompany with the distance from the CBD. In Nanjing, although most affordable housing projects are not located in the inner-city, they are not too remotely located either. Instead of located all affordable housing projects in areas, which are geographically farthest from the Nanjing CBD and with lowest compensation standard and land price benchmark, majority of those 61 projects were located in the middle ring in Nanjing, which were around 5-15 km away from the CBD, with intermediate range of compensation fees and land price standards. This meets government’s ‘interpretation’ of social housing as well as its urban development and resident relocation needs.

The 61 projects were unevenly distributed among the city's districts, with at least one project in each of the administrative districts, as each district has responsibility of providing living space for residents within it. Thus the spatial distribution pattern needed to be connected jointly with the administrative district boundary, as well as the land price benchmark and the compensation standards. For districts closed to the CBD, affordable housing projects were mainly located in areas with lowest land price benchmark and lowest compensation standards within that district. However, in contrast, districts far from the CBD, which are Yuhuatai District and Qixia District, majority of projects were located in areas with higher land price benchmark and compensation standards within the districts.

As mentioned above, the considerations of land-selection for affordable housing in Nanjing cannot be simply explained from the land price sector. Other factors need to be considered as well. A crucial factor is the occupiers, although it seems affordable housing should be less affected by demand as it is policy driven. As affordable housing in Nanjing is mainly used for resettlement purpose, both sizes and locations of them are determined by the numbers of residents to be resettled and their original locations of residency.

Investigation at the micro-level identifies other factors impact the local government's land selection. The local government is the one who promotes affordable housing development by free land allocation, and meanwhile, is also the one who receives incomes from land sales. Given the dual roles, the local government tries to balance the quality of affordable housing projects from the cost end. The local government prefers to choose the lands easy to acquire with low compensation fees, e.g. industrial land and rural land of low density. Both industrial and rural lands do not need to take in another group of residents to be resettled. However, as both compensation fees and construction cost are included in the total projects cost, which determine project selling price, in order to control affordable housing price, the government prefer to choose land with low compensation fees and with existing living amenities. As land for affordable housing projects are free allocated, the local government still prefer to choose those land with less potential of high selling price, thus minimize the loss on market allocated lands. Thus, lands with poor local conditions, such as those adjacent to highway or railway, or next to factories, are more likely to be chosen for affordable housing projects. Overall, the location of affordable housing is mainly determined by occupiers. The institutional factors are noted to play an important role in Nanjing's land selections for affordable housing project. Further research may obtain more in-depth understanding of spatial characteristics by collecting detailed data from the government and each specific project over time.

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Figure 3 affordable housing projects distribution in different administrative districts in Nanjing (Author)

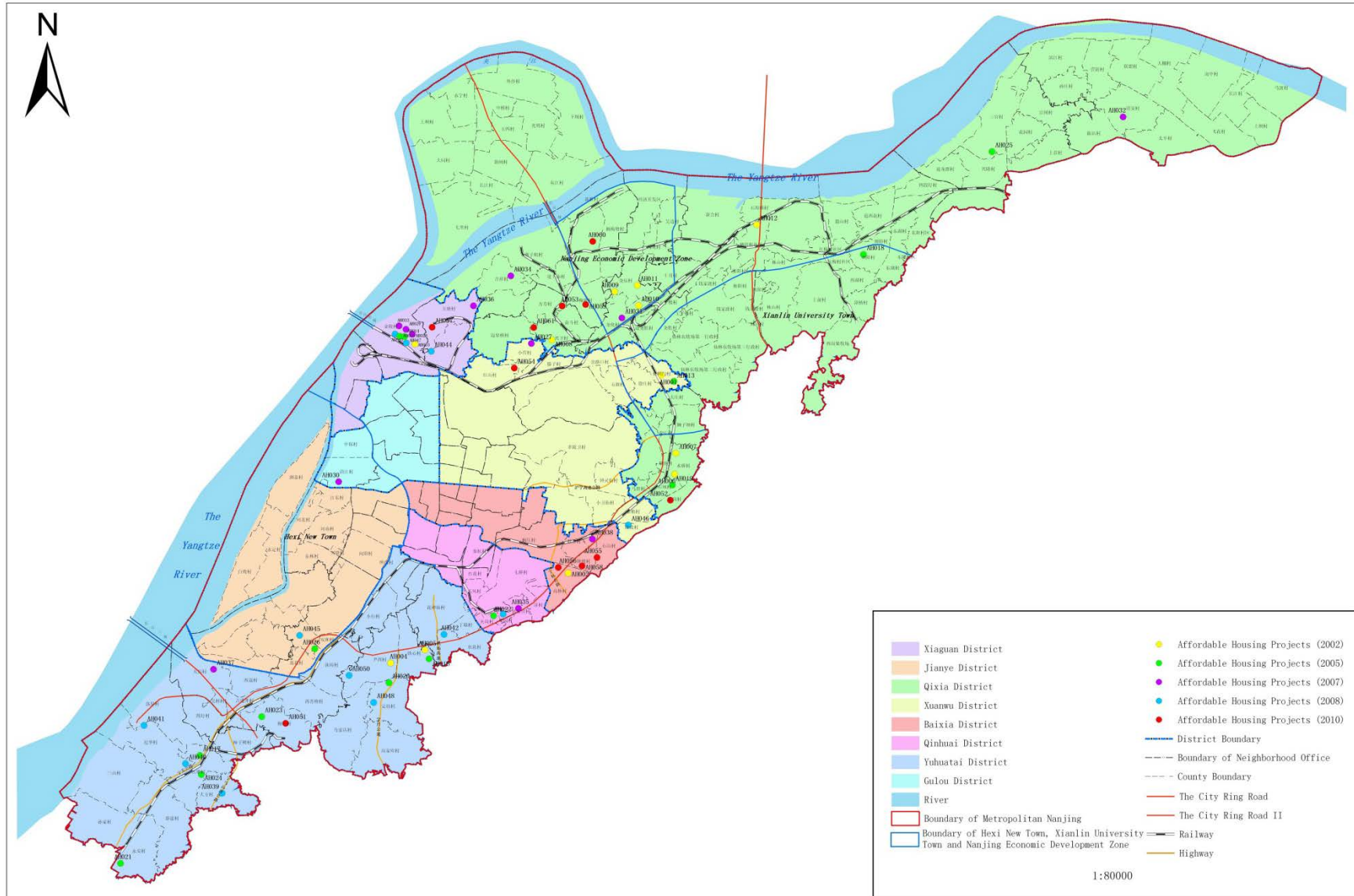


Figure 4 affordable housing projects distribution in each urban housing demolition level in Nanjing metropolitan area (author)

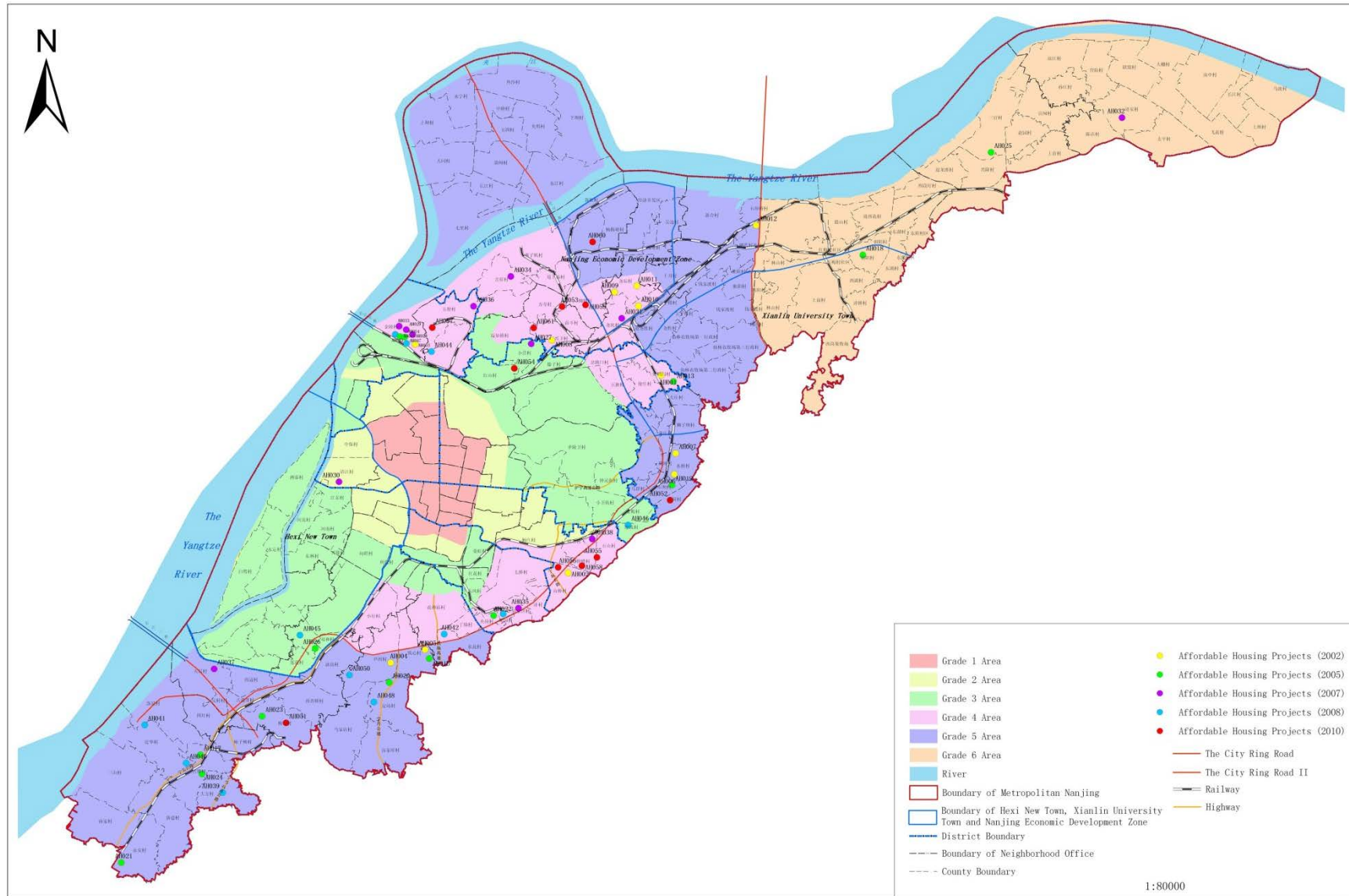


Figure 5 affordable housing distribution on the residential land with different land price benchmarks (state-owned) (Author)

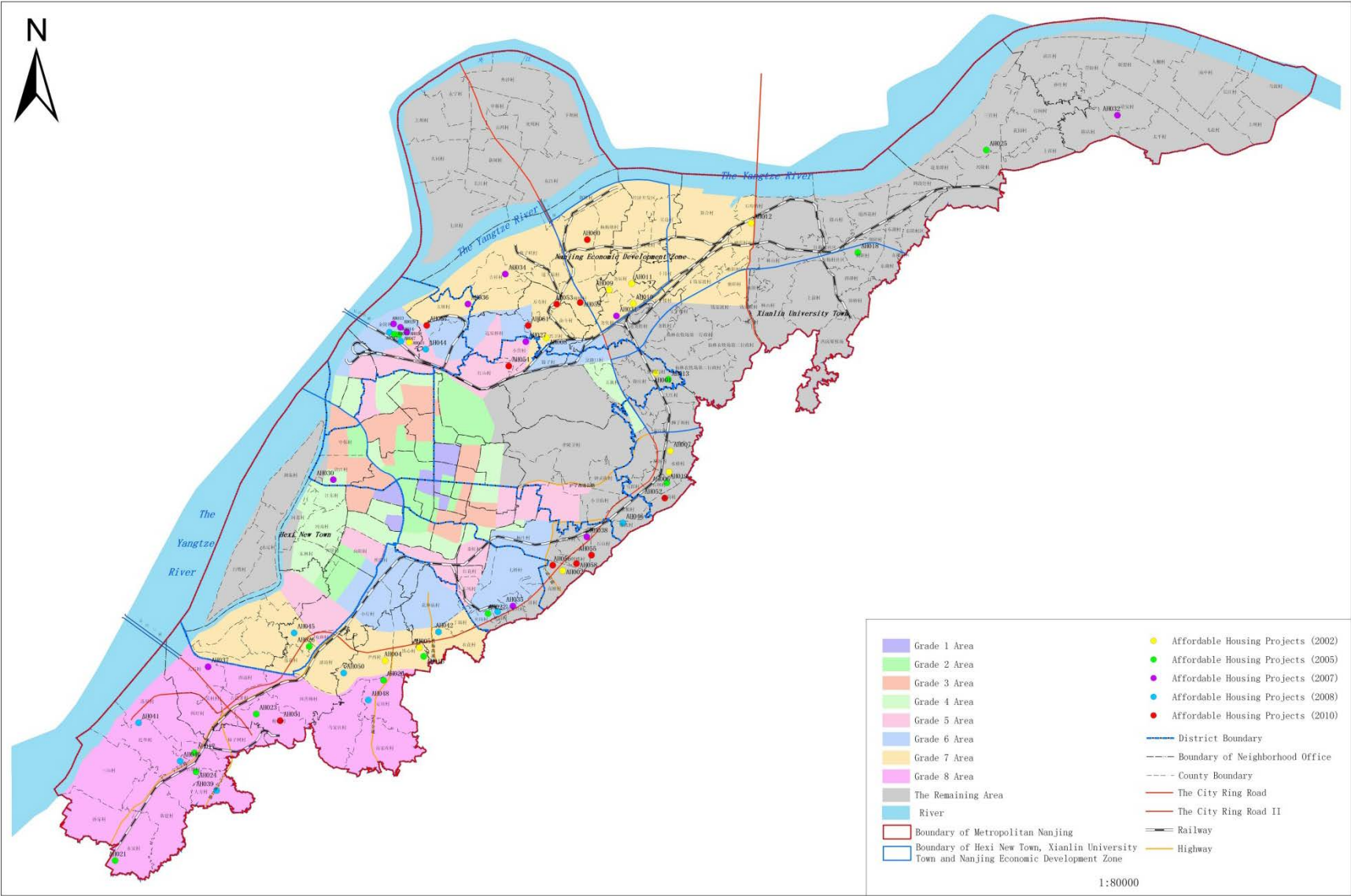




Figure 6 affordable housing distributions on the collective-owned land with different rate of compensation on land (Author)

