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THE UNIVERSITY OF HONG KONG

AN EMPIRICAL STUDY ON THE RATE OF PRIVATE REDEVELOPMENT IN HONG KONG

A DISSERTATION SUBMITTED TO
THE FACULTY OF ARCHITECTURE
IN CANDIDACY FOR THE DEGREE OF
BACHELOR OF SCIENCE IN SURVEYING

DEPARTMENT OF REAL ESTATE AND CONSTRUCTION

BY

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Declaration

I declare that this dissertation represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University to any other institution for a degree, diploma or other qualification.

Signed: _____

Name: **Lam Ka Ho**

Date: **14th April, 2009**

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At last, all faults in this dissertation are mine.

Abstract

Studies on private redevelopment progress in Hong Kong have been largely neglected in the past literatures. This study aims at addressing this key issue. In this study, private redevelopment progress in Kowloon and Hong Kong Island will be critically reviewed and analyzed, and some key factors which lead to different private redevelopment progress in different areas of Hong Kong will be identified.

To examine the private redevelopment progress in a place, a new approach called 'private redevelopment rate' is proposed. It can measure the private redevelopment progress in an area with reference to the scale of the implemented redevelopment projects and the amount of private building stocks in the area. 'Consent to commence work' is employed as to proxy to indicate private redevelopment. A total number of 612 private redevelopments within the study period (1997 – 2008) are identified and analyzed.

An empirical analysis is conducted to assess the factors affecting private redevelopment rate. The analysis is divided into two parts: district level and sub-district level. In the district level, private redevelopment rates of different districts are calculated and examined with simple bivariate analysis. In the sub-district level, private redevelopment rates of different sub-districts are calculated and studied by using regression analysis.

The empirical results indicate that both permitted plot ratio and private property price level of an area have a significant positive impact on the private redevelopment rate. The rate tends to be higher in area with higher permitted plot ratio or higher property price level. This is also supported by the argument that private developers always aim at capturing the unexploited development potential of an area in implementing redevelopment projects. Therefore the divergent in private property price and permitted plot ratio across different areas are two of the main causes leading to different private redevelopment rate in different areas of Hong Kong.

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Chapter 1 Introduction

1.1. Background

In the past few decades, Hong Kong has been developing very fast. Following the World War II, Hong Kong industrialized rapidly as a manufacturing centre driven by exports, and then underwent a rapid transition to a service-based economy in the 1980s. Since 1990, Hong Kong has further transited to become an international financial and trade centre (Wikipedia, 2009). Accompanying with the rapid economic growth, the property development industry keeps on bombing. Lots of office towers, shopping centre, residential blocks, service apartments, hotel and industrial office are erected everywhere, especially in the urban areas (Kowloon and Hong Kong Island). As a result, land has been extensively developed in the past twenty years.

From Table 1, it can be seen that the amount of vacant land for development in Hong Kong is very scarce and keeps on declining over time. By 2007, the percentage of vacant land for development in Hong Kong drops to around 1.7%.

Table 1 Composition of vacant land for development in Hong Kong

Year	Area of vacant land for development	Percentage of vacant land for development in Hong Kong
1996	43 Km^2	3.9%
1997	41 Km^2	3.7%
1998	39 Km^2	3.5%
1999	27 Km^2	2.4%
2000	27 Km^2	2.5%
2001	31 Km^2	2.8%
2002	33 Km^2	3.0%
2003	31 Km^2	2.8%
2004	29 Km^2	2.6%
2005	26 Km^2	2.3%
2006	20 Km^2	1.8%
2007	19 Km^2	1.7%

Source: Informational Services Department, 2007

Due to the scarcity of land, some private developers turn their eyes from vacant land to developed land[1] and implement different redevelopment projects on it. The term "redevelopment" refers to the complete reconstruction on a site after demolition of the existing buildings (Simon and Chan, 2008). This redevelopment decision is also facilitated by the local economic transitions and the high land price of Hong Kong (Simon and Chan, 2008). Due to economic transitions, some private buildings may become 'outdated' or unsuitable for use in the society. Developers could then redevelop these buildings into a more profitable use. Furthermore, the high land price in Hong Kong attracts developers to capture the unexploited development potential (Ng, 1998) in different areas through redevelopment. In later discussion, the term "private redevelopment" is used to mean redevelopment projects implemented on developed land by private developers.

As different areas in Hong Kong consist of different characteristics, they appear as different level of redevelopment opportunities to private developers. Some may appear more favourable, but are less favourable. This leads to different pattern of private redevelopment in different areas of Hong Kong. This can be readily observed in different districts in Hong Kong. In the past decade, lots of private redevelopment cases are reported in Central & Western District, Wan Chai or Yau Tsim Mong District (Ming Pao, 2008; Ming Pao, 2009; Sing Dao, 2008 and Sito, 2007). However in some other old districts like Southern District or Wong Tai Sin District, very few cases could be found. The reason behind for this phenomenon could be due to location factor (Dye and McMillen, 2007), property prices level of different areas (Kwakye, 1994) or even some underpinned planning issues (Peterson, 1974), which directly affects the redevelopment potential of a site.

[1] Developed land refers to land with private buildings erected on it.

1.2. Aim and Objectives of the study

As mentioned earlier, different areas in Hong Kong are observed to have different private redevelopment patterns. This phenomenon directly stimulates the interest of the Author as yet there is still not a comprehensive study in this aspect. So this study aims at '*examining some underlying factors which leads to different private redevelopment progress in different areas of Hong Kong"*.

To measure the private redevelopment progress in an area, this study proposed a new approach called 'private redevelopment rate'. The word 'rate' refers to the average speed of private redevelopment in an area within the chosen study period (i.e. 1997 – 2008). It is defined as the total gross floor area of all redeveloped private properties in an area within the study period (GFA_R) divided by the total gross floor area of all private properties in that area (GFA_P) and by the number of years in the study period (12). The rate can be represented by the following Equation (1).

$$\text{Private redevelopment rate (average)} = GFA_R / (GFA_P \times 12) \quad \text{.....(1)}$$

It should to be noted that GFA_R is restricted to redevelopment projects carried out by private developers only. Projects initiated by or connected with the Hong Kong Housing Society (HKHS), Urban Renewal Authority (URA), Land Development Corporation (LDC) and under the Private Sector Participation Scheme are all excluded as their business agenda are different from that of pure private developers. They have different considerations in implement redevelopment projects due to the difference in interests. For example, URA/HKHS/LDC may prefer location yielding a greater benefit to the society, but private developers prefer location yielding a higher profit to their own. Apart from that, the denominator (GFA_P) in equation (1) would only account the pool of land re-developable by private developers. Otherwise, the redevelopment rate will be underestimated if a district has a lot of public developments (e.g. public housing) or government buildings. These areas are not re-developable by private developers. More detail discussion of this new approach will be given in the following chapters.

To achieve the aim of this study (in italic form), three objectives are set up:

1. To examine the private redevelopment rate in different area
2. To identify some underlying factors which leads to different private redevelopment rate in different areas of Hong Kong
3. To explain why these factors can have an impact on the private redevelopment rate

The key factors which is going to be tested later includes a key zoning measure (permitted plot ratio), property price level of an area and the potential externality effect bought by the URA, LDC & HKHS projects.

1.3. Importance of the study

The factors leading to the difference in private redevelopment rates in different areas cannot be easily observed or deduced as redevelopment can be influenced by a number of factors at the same time, rather than just one single factor at a time. In the past literature studies (Adams and Hastings, 2005; Tang and Tang, 1999; and Wu, 1996) only evaluation on specific redevelopment schemes or the impacts brought by certain Hong Kong Government policies on urban redevelopment are done. Yet, there is no in depth study about the factors affecting private property redevelopment in Hong Kong. So this study serves to add more knowledge in this area.

Apart from the above, the result of this study is important for the consideration of local government. Hong Kong has been facing growing problem of urban decay and deterioration of buildings. In the 1999 Policy Address by the former Chief Executive of the Hong Kong SAR, "Out of the existing 8,500 urban buildings which are over 30 years old, some 2,200 require redevelopment or extensive repair. Another 3,900 or so also require repairs of varying scale. In ten years' time, the number of buildings over 30 years old will increase by 50 percent…" (Tung, 1999). To deal with this problem, one of the Government's approaches is to encourage more private sector involvement in redevelopment (Hui, Wong, and Wan, 2008). So this study can give the Government some ideas about how to encourage private redevelopment in different areas.

Furthermore, this study can introduce some investment opportunities to property owners and investors by giving them an idea about the private redevelopment potential of an area (i.e. whether the area is favourable for private redevelopment or not). For the property owners, if they know that their properties are located in a high potential area, they would keep on holding them and wait for redevelopment. This is because private developers usually offer a higher price to acquire properties for redevelopment purpose. The higher price is used to initiate the public to sell all their units. The owners then can make a profit out of this chance. Similar principle applies to property investors. They will buy more properties located in a high potential area

and wait for developer’s acquisition. Furthermore professional surveyors can make use of this study when formulating their redevelopment proposals to introduce to their clients.

1.4. Organization of study

This dissertation is categorized into 6 chapters. Chapter 1 introduces the research background, aim and objectives, and importance of the study, as well as the organization of this paper.

Chapter 2 summarizes the past literatures related to the topic of this study and point out the research gap. Local and overseas studies about the nature of property development industry, private redevelopment process, redevelopment progress and factors affecting redevelopment in an area will be reviewed.

Chapter 3 illustrates the three hypotheses for testing in this study. The supporting argument for each hypothesis is addressed in detail.

Chapter 4 explains the overall research design in this study. Two approaches are adopted to test the hypotheses. Treatment and selection of data are also addressed in detail.

Chapter 5 describes and discuss the empirical results of this study, including the private redevelopment rates in different areas of Hong Kong..

Chapter 6 summarizes the key findings in this study. The limitations of this research will be discussed and further study area are suggested.

Chapter 2 Literature review

This chapter reviews previous local and overseas studies related to private property redevelopment. It is divided into four sections. The first two sections aim at introducing the nature of private property redevelopment in order to establish a fundamental understanding on it. Then it goes further into examining previous studies in redevelopment progress in Hong Kong and overseas. The methodologies and finding in these will be discussed. Their deficiencies will be highlighted. Lastly, the influential factors which affect private property redevelopment in an area will be introduced and discussed.

2.1. Nature of property development industry

To understand the nature of private redevelopment, the nature property development industry has to be first understood as private redevelopment is a sub-set of the property development industry.

According to Byrne and Cadman (1996), property development is defined as “The process by which development agencies, together or on their own, seek to secure their social and economic objectives by the improvement of land and construction or refurbishment of buildings for occupation by themselves or others”. As property redevelopment usually involves the demolition of an older building on land followed by the erection of a new, modern and more innovative building, the improvement of land can be achieved basically. It can c within the definition of property development.

According to Ratcliffe and Stubbs (1996), property development is always a lengthy and time consuming process. It usually takes several years for a new development on a vacant land to be completed. The time involved is even longer for redevelopment as it involves additional steps in acquiring all the units of the building and demolishing it.

Apart from that, property development is an activity which consists of a high degree of uncertainty and speculation. Byrne and Cadman (1996) highlighted that uncertainty lies at the root of the process of property development, which is essentially concerned with the manufacture of a product in anticipation of unknown future demand. The developers usually cannot make sure the market conditions at the time of completion of their development and thus, making the development project speculative. Cadman and Catalano (1983) also have similar ideas. They point out that developers are investing on the basis of an anticipated demand only, but not knowing the exact return of the redevelopment and this, results in a cyclical pattern of the property market, with cycles of over and under supply of accommodation. This leads to the speculative nature of property development.

To lower the degree of uncertainty associated with property development, the decisions made by developers are not random in nature but through a comprehensive consideration of all the relevant factors. Byrne and Cadman (1996) mentioned that developers have to indentify those uncertainties which are to some extent within their control and recognize those uncontrollable uncertainties when they are making their development decision to minimize the risks undertaken.

Furthermore, according to Seow, Fook, Boaz and Tien (2003), property development industry in most countries usually operates under an oligopolistic environment. The industry is dominated by a few large developers and each developer is acutely sensitive to the actions of other developers. The development and pricing strategies cannot be made without regard to other developer's actions. By examining this phenomenon in the context of Hong Kong, similar market structure can be observed. Hong Kong property development industry is also dominated by a few large developers namely Sun Hung Kai Properties, Henderson Land Development, Hang Lung Properties, New World Development, Sino Group, Cheung Kong Holdings and China Resources Holding Limited.

Generalizing all these ideas, property development in Hong Kong is a lengthy process with a high degree of uncertainty. It is characterized with its speculative nature and under an oligopolistic market condition. Private property redevelopment should also exhibit similar features as it is identified as part of the property development industry.

2.2. Process of private redevelopment

According to Leung and Hui (2005), redevelopment process can be classified into four stages, which are the initial stage, collection of land and construction of the infrastructure, construction of the superstructure and release of the properties and facilities to occupants. These fours stages will be looked into in the context of private redevelopment in Hong Kong.

Initial stage is the planning stage. It involves the preparation of strategic plan for the whole redevelopment by the private developer. The plan generally includes identification of site(s) with redevelopment potential, investigation in trends of the demand and supply for properties in the market and thus what structure should be built on the site(s) (Leung and Hui, 2005). Apart from that, the plan also indicates how the site under the existing ownership of other party(s) could be acquired including the terms to offer.

The collection of land and construction of the infrastructure is the implementation stage followed by the initial stage (planning stage). A land assembly process has to be first undergone, which involves the acquisition of all the undivided shares of the existing building(s) erected on the site(s) (Tang and Tang, 1999). At 1999, the Hong Kong Government introduced the Land (compulsory sale for redevelopment) Ordinance Cap 545. Under the ordinance, developer who owns, otherwise than as a mortgagee, not less than 90% of the undivided shares in a lot can make an application to the Lands Tribunal for an order to sell all the undivided shares in the lot for the purpose of redevelopment of the lot. So this provides an alternative way for land assembly nowadays. After land assembly, the existing building(s) have to be torn down. Site formation and substructure work will then be followed (Chudley, and Greeno, 2008). In addition, infrastructure linkage between the site and the surroundings has to be constructed for transportation purposes (transportation of construction materials, labour and construction wastes in or out of the site).

After the collection of land and construction of the infrastructure, superstructure work

will to be commenced. It generally refers to all the building works involved in the erection of building structure above ground level (Meritt, 1965). Sometimes, construction of superstructure, substructure and infrastructure carried out in the same time.

The last stage of the redevelopment process is the release of properties and facilities to occupants upon completion of all the building works. Different units of the new building are sold or rented to the public or for the developer's own use. This is the whole process for private redevelopment.

2.3. Previous study on redevelopment progress

In this section, both local and overseas studies on redevelopment progress are reviewed in order to address what have been done in the past.

2.3.1. Local studies

A number of scholars have conducted researches to review the urban redevelopment progress of Hong Kong.

Tang and Tang (1999) evaluated the impact of a new planning incentive measure introduced at 1994 on private urban property redevelopment in Hong Kong. The measure is about granting bonus floor area ratio to developers if their redevelopment reaches a certain minimum lot size and if they agree to provide some servicing facilities. The findings show that most of the redevelopment sites have an area below the minimum lot size and there are no signification changes in the site area after the implementation of the new measure. The new measure failed to achieve the government's principal aim about increase private sector site amalgamation for urban redevelopment.

Adams and Hastings (2001) conducted a study to evaluate the Land Development Corporation (LDC) in promoting urban redevelopment in Hong Kong. The results show that the overall progress of the work done by LDC fell much below the original expectation. Originally, the LDC intended to run over 20 redevelopment projects in all the major urban area in around 9 years time. However it turned out to be totally far behind schedule. Only a few redevelopment projects were implemented successfully. Others were all delayed or failed. The main reason is that the LDC was accorded neither resumption powers itself nor ready access to Government resumption powers. It had to behave like a private developer during site acquisition. Furthermore all the redevelopment projects run by the LDC has to be totally self-funded with no financial assistance from the Government. Lack of fund is another issue.

Adams and Hastings (2005) conducted another study to examine the operation of the Land (compulsory sale for redevelopment) Ordinance in facilitating private sector participation in urban redevelopment process in Hong Kong. An analysis on the applications to the Lands Tribunal for a compulsory sale order of all the undivided shares of an existing building was conducted. The result provides little indication that private sector developers have taken advantages of the new ordinance. The ordinance has a very minimal impact on the local redevelopment rate upon its operation. Some year later, Hui *et al.* (2008) conducted a similar study on the impact of the Ordinance on private property redevelopment again. The same result was obtained. The usage of the Ordinance was particular low – a mere six successful land assembly cases in 8 years time.

Most of the redevelopment progress studies in the past focus on the government side – examination of government's land use policies, the new ordinance or the statutory body formed by the government. Research related to the private property redevelopment progress across different regions in Hong Kong is rather empty.

Hui *et al.* (2008) attempted to provide an analysis on the private redevelopment progress across different districts in Hong Kong. The issue of occupation permit by the Building Authority is used as the proxy to indicate private redevelopment. Data about the number of redeveloped buildings between 1996 and 2005 in different districts are collected and analyzed. The result shows that Central and Western District and Yau Tsim Mong District consist of the highest number of redeveloped buildings. The authors then proposed various supporting statement to explain why these two places have the highest private property redevelopment progress. Nevertheless the study consists of several underlying problems. First many redevelopment buildings under progress can be ignored by using occupation permit as the proxy, as it can only reflect the completed ones, without regard to those under progress (under construction). So the data sample was subject to a certain extent of underestimation. Second, the scale and dimension of redeveloped buildings isn't considered during the analysis, as the study just focus on the number of

redevelopment cases in each districts. In such analysis, a 3-storey redeveloped building is treated same as a 100-story redeveloped building, but they are significantly different in scale and dimension. Third the amount of property stocks in different districts is ignored. You can imagine that by holding all other factors constant (e.g. price, location, environment), a region with more private properties should have a higher chance for redevelopment than a region with less private properties in terms of probability. So the result could be biased to districts with larger amount of buildings stocks.

2.3.2. Overseas studies

In this part, overseas study in analyzing the redevelopment progress in different regions is the target for review. The aim is to examine the methodologies adopted in them to provide some sort of foundation knowledge on building up the methodology for this study.

However, overseas studies mainly focus on evaluation of economic factors on the private redevelopment progress. Munneke (1996) analyzed the effect of changes in land value on the probability of private redevelopment for both commercial and industrial land uses in Chicage. McGrath (2000) investigated the effect of contamination risk on the probability of private redevelopment for industrial land use. Their estimation made use a structural probit model proposed by Rosenthal and Helsley (1994). .

Only the paper by Dye and McMillen (2007) are found to be directly related to the study on redevelopment progress in different regions. They analyzed the private residential property redevelopment progress across seven metropolitan areas around Chicago in America. Demolition permit was employed as the proxy to indicate redevelopment. To measure the extent of redevelopment in an area, the authors adopted the “net replacement rate”, which is to express the number of demolish-and-replace units in percentage relative to the total number of housing stock in that area. This approach can take the total number of building stocks in an area into consideration when examining redevelopment progress. However, the scale problem mentioned in the previous part somehow still exists. The scale of redevelopment (large scale redevelopment or small scale one) still remains unnoticed. Furthermore, demolition permit itself is an imperfect proxy. Some permits that are issued are never used. Some permits may not be followed by new construction if the objective is simply to clear a dilapidated structure.

2.4. Factors affecting private property redevelopment in a region

An urban redevelopment model was first put forth by Brueckner (1980) and Wheaton (1982) in their independent development of spatial growth models of metropolitan areas. They derived an optimal redevelopment rule that identifies the economic conditions under which private redevelopment will occur. The rule states that the present value of revenue obtainable from a parcel converted to a new use, net of capital development costs, must equal or exceed the present value of the gross revenue from the existing capital stock on the parcel. This can be expressed as

$$\frac{r(t, S^*/L)L}{i} - c(t)S^* \geq \frac{r(t, S/L)L}{i}, \qquad \textbf{.....(2)}$$

where $r(t,S^*/L)$ is the revenue per acre obtainable from optimal capital redevelopment, which depends on time t, and the ratio of optimal, new capital S^* to the amount of land L; i is the discount rate; $c(t)$ is the unit cost of capital at time t; and S is the existing capital on the parcel. The left side of equation (2) is the present value of the parcel in its redeveloped state, denoted V^R. The right side of the equation is the present value of the parcel remaining in its current use, denoted V^C. Therefore a parcel will only be developed when the value differential, ($V^R - V^C$), is greater than or equal to zero.

Harvey (1992) also proposed similar idea for the optimal redevelopment rule. He stressed that the timing of private property redevelopment projects depends on three fundamental items. They are

(1) The present value of the existing use of the land resources
(2) The present value of the best alternative use
(3) The cost of rebuilding

Redevelopment will take place when the net value of (2) and (3) is greater than (1). This makes the project financially viable.

Apart from the above three elements which determine whether a redevelopment project will be feasible in a place, Hui *et al.* (2008) reminded that land assembly in Hong Kong is very time consuming and costly. This involves extra cost in assembling

the land. So the cost associated with land assembly is another element affecting private redevelopment to take place. Factors affecting these four elements will be gone through in the followings.

2.4.1. Existing building age and size

Dye and McMillen (2007) analyzed the characteristics of private housing units which had been torn down for redevelopment in Chicago and the nearby suburb. They found that older and smaller homes are likely to be torn down than others. For older homes, they are usually associated with poor conditions or being deteriorated which have led to relatively low sales prices and thus lower existing value. For smaller homes, they are usually less expensive to rebuild as tall buildings are costly to tear down.

Furthermore, developers often look for smaller house to replace with new house built to the limits of local building codes and zoning regulations. The small house usually consists of higher unexploited development potential and thus developers can have a higher return by capturing all the development potential through redevelopment.

Therefore, the composition and status of the existing private buildings in an area can affect the private redevelopment progress of it.

2.4.2. Zoning control

Zoning control is one of the major components in the urban land use policy. It is a public sector attempt to influence private investment by placing regulations on land development in order to achieve certain social objectives (Tang and Tang, 1999). These regulations range from permissible usage to restrictions on specific property characteristics.

Ihlanfeldt and Boehm (1987); and Maser, Riker and Rosett (1977) found that zoning measures on permissible usage can generate externality which can depress or raise the value of existing properties due to the change in neighborhood quality. Apart from the externality effect, restrictions on permissible usage can lead to conversion effects

(Grieson and White, 1989). They illustrated that residential properties situated on non-residential zone may have a higher probability of being converted to non-residential use in the future if the non-residential use is of higher value.

Peterson (1974) analyzed the effect of zoning regulations on specific property characteristics (maximum building density). He found that quite a number of single houses located in areas zoned for multi-story were converted to multi-story buildings. This is mainly due to the unexploited development potential on land associated with the single house. This value could be captured by redeveloping the existing building to the limit of zoning regulations. Tang and Tang (1999) also highlighted that zoning restriction can affect the incentive of private developers to redevelop a site as the development potential is bounded by the regulations.

Therefore zoning measures play an important role in redevelopment as it directly affects the value of the building under existing use and the value of its best alternative use.

2.4.3. Transportation network

Gospodini (2005) studied the effects of transport infrastructure projects on urban redevelopment of a sample of 12 European cities. The analysis showed that transport infrastructure projects, such as metro, rail, tram and trolley-bus, always have a positive impact on redevelopment in urban areas, but the degree varies from the place to place. The infrastructure projects can entail a big increase in the accessibility of the area and can stimulate the property demand nearby. Dye and McMillen (2007) also found that properties near public transportation have a higher tendency to be torn down due to their higher accessibility. This directly affects the value of the land through conversion to the new use.

2.4.4. Legislation[2]

Walker (2002) proposed that redevelopment decision can be influenced by legal factors. Legal factors mainly refer to the law enacted in a region. In the private redevelopment process, land assembly is a crucial element. Government can introduce or amend certain local ordinance to facilitate the land assembly process (Hui *et al*., 2008). Also, new legislation can be introduced to restrict the building density of new development. This could lower the value of V^R in the optimum redevelopment rule. Therefore local legislation plays an important role on private redevelopment in a region.

2.4.5. Property price level

Recalling back the urban redevelopment model proposed by Brueckner (1980) and Wheaton (1982), whether a private property redevelopment will occur depend on the revenue obtainable from a parcel converted to a new use and that under the existing use. Both components are derived from the price of the properties. Any change in the property price level in an area can result in a change of the value differential, (V^R – V^C), and thus affect the probability of redevelopment in an area.

The same idea is also implied in Kwakye (1994) paper. He pointed out that redevelopment is affected by changes in land value. The word 'value' is generally defined as the estimated present worth of future return (Albritton, 1982). So any change in land value implies a change in the future return of the piece of land for redevelopment purpose and this directly affects its feasibility for implementation in economic terms. According to Li (1997), land value is a residual figure, which is derived from the income available on land after deduction for the various production costs as well as the land user's profit margin. As the income available on land comes from selling or renting the properties units, it can be said that land value is roughly derived from the property price. Therefore, the property price level of an area can directly affect the return of the project and this affect feasibility of a private redevelopment project to be implemented in an area.

[2] Zoning control is not classified as legislation in this study, although it could be part of it.

2.4.6. Type of building ownership

The types of building ownership can directly affect the land assembly process involved in private redevelopment. Building ownerships generally can be classified into two forms: single and multiple. For single ownership, the whole building is solely owned by an owner. If a developer would like to acquire that building, he just needs to deal with a single owner. However, for buildings under multiple ownerships, owners of the units do not hold a direct title to any specific units in the building, but in fact hold a respective share of the whole structure and the land it stands upon (Tang and Tang, 1999). If a developer wants to acquire the building under multiple ownerships, they have to deal with different expectations from diverse groups of owners and face lengthy process of negotiating with them. As stated by Ng (1998), multiple ownership of existing building is often identified as a major obstacle in private sector land assembly for redevelopment.

2.5. Conclusion

This chapter explores the unique nature and characteristics of the private property redevelopment industry. These ideas can help us to have a better understanding throughout this study.

Although there are quite a number of past studies on redevelopment process in Hong Kong, most of them just focus on evaluation of government policies, new legislation or the work carried out by the statutory bodies. Private participation in redevelopment process has been largely neglected in the past literatures. Although, in the study of Hui *et al.* (2008), private redevelopment progress in the urban districts has been briefly examined, the methodology adopted consists of three main problems:

1) Underestimation of private redevelopment
2) Ignorance of redevelopment scale
3) Ignorance of the total building stocks in a region

Also, no empirical analysis on the factors affecting private redevelopment progress across different regions in Hong Kong was conducted.

Therefore this study intends to fill the literature gaps and address the above problems by introducing a new methodology to study the progress of private property redevelopment, examining the private redevelopment progress in different districts in Hong Kong and pointing out some underlying factors influencing it through empirical test. Moreover, the methodology adopted in this study can also provide some new insight to overseas studies on private redevelopment progress.

Chapter 3 Hypotheses

In this chapter, factors affecting private redevelopment rate in different areas of Hong Kong will be hypothesized based on previous discussion and the author's ideas.

Six factors are identified as 'factors affecting private property redevelopment in a region' in Chapter 2. However half of them will not be examined in this study across different areas of Hong Kong due to two reasons: (1) control factor and (2) data limitation.

In Hong Kong, local legislation affecting private redevelopment includes Land (compulsory sale for redevelopment) Ordinance and Buildings Ordinance. Under the Land (compulsory sale for redevelopment) Ordinance, private developers can make an application to the Lands Tribunal for compulsory sale of the whole lot for the purpose of redevelopment if a person holds not less than 90% of the undivided shares. However, the applicant has to prove that redevelopment is justified due to the age or state of repair of the existing building (Cheung, 1998). Building Ordinance specifies the permitted plot ratio, permitted site coverage and building design for all kinds of private redevelopment. Generally speaking, legislation (except zoning control) in Hong Kong are equally enforcement in all parts of Hong Kong under the same terms and their effect exert on different areas should be in the same extent. Therefore local legislation is classified as a control factor (Reason 1).

Age and size of existing private buildings in different local areas could be a factor affecting the private redevelopment rates in Hong Kong. However, no relevant data which indicates the age and size of existing building in each year between 1997 and 2008, is available for analysis (Reason 2). This makes us unable to examine this issue precisely.

The factor about type of building ownership in a region also will not go through in this study due to both reason (1) and (2). As identified by Ng (1998), most buildings in Hong Kong are in the form of multiple ownerships. So it can be regarded as a control factor across different areas of Hong Kong. However you may argue that some buildings in Hong Kong are in single ownership (like Central Plaza). Even so, data about the composition of single ownership and multiple ownership buildings in different areas couldn't be obtained[3]. So this factor will not be examined based on either reason.

Three hypotheses are proposed for investigation in this study. They are subject to testing by using both simple bivariate analysis and regression analysis, which will be outlined in the Chapter 4.

[3] This composition could be obtained if a comprehensive land search of all pieces of land in the study area is done. However the limited research time and fund is a major obstacle for the author.

3.1. Zoning control hypothesis

The first hypotheses concern about the effect of zoning control. In Hong Kong, zoning control is enforced in different areas through the Outline Zoning Plan or DPA plan, which specifies the permissible uses and specific characteristics for the building(s) to be erected on that area. The details of the plan vary from place to place, depending on that local environment and the planning intention. One of the important elements in the plans is the permitted plot ratio[4] clause. Private developers always 'bargain' on this clauses with Government bodies for their redevelopment project.

Permitted plot ratio limits the amount of gross floor area of a new development to be built on a site and thus limit its rentable or salable floor area. This directly affects the income produced from redeveloping the area and thus the probability of redeveloping it. Recalling back optimal redevelopment rule (equation (2)) in Chapter 2, for an area enjoying a higher permitted plot ratio (higher rentable or salable area), a more positive V^R could be obtained if the new use is built to the maximum development potential. Thus the value differential ($V^R - V^C$) will be more positive and private developers would have more incentive to introduce redevelopment projects in that area. This leads to the formation of the first hypothesis.

Hypothesis 1:

> *"In an area enjoying a higher permitted plot ratio as specified in the respective Outline Zoning Plan or DPA plan, its private redevelopment rate will be higher, by holding all other factors constant."*

This hypothesis aims at examining the importance of the permitted plot ratio clause on private redevelopment in an area.

[4] Plot ratio of is the gross floor area of a building divided by the area of the site on which the building is erected (Legislative Council, 2005).

3.2. Private property price hypothesis

The second hypothesis concerns about private property price level. In Hong Kong, property price level varies from places to place. As discussed in Chapter 2, property prices of an area can affect both V^R and V^C, and thus the resultant value differential ($V^R - V^C$). According to Ng (1998), developers are always attracted by the unexploited development potential associated with the existing buildings and try to capture a large potential value. This potential value consists of two components, extra gross floor area and the property price. So in an area with higher private property price level (holding the extra gross floor area constant), the potential value appears to be much larger and thus makes the value differential ($V^R - V^C$) much more positive than an area with lower property price level. So an area with higher property price would attract more private developers to redevelop that area. This leads to the formation of the third hypothesis

Hypothesis 2:

> *"The higher the private property price level of an area, the higher is the private redevelopment rate, by holding all other factors constant."*

Furthermore, it should be noted that the transportation factor mentioned before should have been factored into the property price, according to Alcaly (1976); Antwi (1994); and Chau and Ng (1998). Therefore the author will not examine this further.

3.3. Externality hypothesis

The third hypothesis concerns about the positive externality effect which could be brought about by the projects run by Land Development Corporation (LDC), Urban Renewal Authority (URA) and the Hong Kong Housing Society (HKHS).

Land Development Corporation was a statutory body established in 1988. It was responsible to undertake, encourage, promote and facilitate renewal within the older urban areas (Adams and Hastings, 2001). From 1988 to 2000, it had participated in various redevelopment projects in the urban area. At 2001, the LDC was replaced by the URA, which continued to serve similar function. Various redevelopment projects had been introduced by the URA from 2001 to 2008. For HKHS, it is a non-profit making housing organization established in 1948. Its principal aim is to provide public housing or subsidized housing for poor's need (Hong Kong Housing Society, 2009). In recent years, it has actively participated in the property redevelopment in old districts in Hong Kong (Simon and Chan, 2008).

Unlike private sector, LDC, URA and HKHS aim at improving and enhancing the urban areas through implementing redevelopment projects. Their projects are usually in larger scale and could give some sort of improvement to the surrounding areas (improvement of amenities). So this may enhance the value of properties in the surround regions or stimulate more demand in the area in the future. Therefore private developers may be interested in investing in the nearby areas. Furthermore, the redevelopment projects implemented in an area by LDC and URA may show the intention of the government to 'upgrade' that area. An area with potential of improvement may appear as a beneficial term to private developers. Therefore, the effect of LDC, URA and HKHS's projects could be kind of like positive externality on private redevelopment in the nearby area. This leads to the formation of the third hypothesis.

Hypothesis 3:

> *"The redevelopment projects implemented by LDC, URA and HKHS (excluding public housing project) can initiate private property redevelopment in the nearby areas. For areas with higher percentage of the LDC, URA and HKHS redevelopment projects, the private redevelopment rate will be higher, by holding all other factors constant. "*

Percentage of the LDC, URA, HKHS projects is defined as the total gross floor area of all redeveloped properties by LDC, URA and HKHS (GFA_{LUH}) in an area divided by the total gross floor area of all private properties in that area (GFA_P) over the study period and by the number of years in the study period (12 years) to give an average rate.

$$\text{Percentage of the LDC, URA, HKHS projects} = GFA_{LUH} / (GFA_P \times 12) \quad \textbf{……(3)}$$

Chapter 4 Methodology and Data

This chapter will give an overall account of the approach for assessing the private redevelopment rate in different areas and testing the hypotheses proposed in Chapter 3. The choice of data sample and the relevant adjustment to be made will be addressed in the later section of this chapter.

4.1. Research Design

In the course of carrying out this study, private redevelopment progress in different areas are investigated by measuring the respective private redevelopment rate. Recalling back Equation (1) highlighted in Chapter 1, the rate is defined as the total gross floor area of all redeveloped private properties in an area (GFA_R) divided by the total gross floor area of all private properties in that area (GFA_P) and by the number of years in the study period 1997 – 2008 (12-years). Recalling back equation (1)

$$\text{Private redevelopment rate (average)} = GFA_R / (GFA_P \times 12)$$

This 'rate' concept has two main advantages. First, it can take into account the scale of all the private redevelopments by measuring up the gross floor areas produced by them. Second, it can take into account the total private property stocks in each area. As different areas consist of different amount of stocks, the rate of an area should be expressed relative to the private property stocks in each area, for a fair measurement. This idea in measuring the private redevelopment progress is an innovative idea when comparing with the past literatures mentioned in Chapter 2. They failed to take the scale of a redevelopment project into consideration. the private property stocks in the local area.

A cross-sectional approach is then adopted in analyzing the private redevelopment rate and the underlying factors hypothesized in Chapter 3. This approach is recommended in the policy evaluation study on the impact of urban growth control

(Schwartz, Zorn and Hansen, 1986). By using this approach, the private redevelopment rate across different areas in Hong Kong can be compared under the same dimension of time. So factors which affect the redevelopment rate of the whole Hong Kong can be eliminated.

As private redevelopment is always a long process, which involves lengthy negotiation time to acquire all the undivided shares of the existing building(s) to be redeveloped (Adams and Hastings, 2005) and the extra time involved in demolishing the existing building(s), it cannot be examined by taking a snapshot in a particular year or within a short time period. This will make the results largely drive by random errors. Therefore a considerable longer period from 1997 to 2008 (12-years) is used for the cross-sectional study. The private redevelopment rate will be assessed in an 'average' magnitude within the study period (i.e. dividing GFA_R by the number of years (12) between 1997 and 2008). The random error for this study can be minimized by using this 'average' concept as it considered such a longer time period. It should be noted that time-series analysis will not be gone through here as an even longer study period is required.

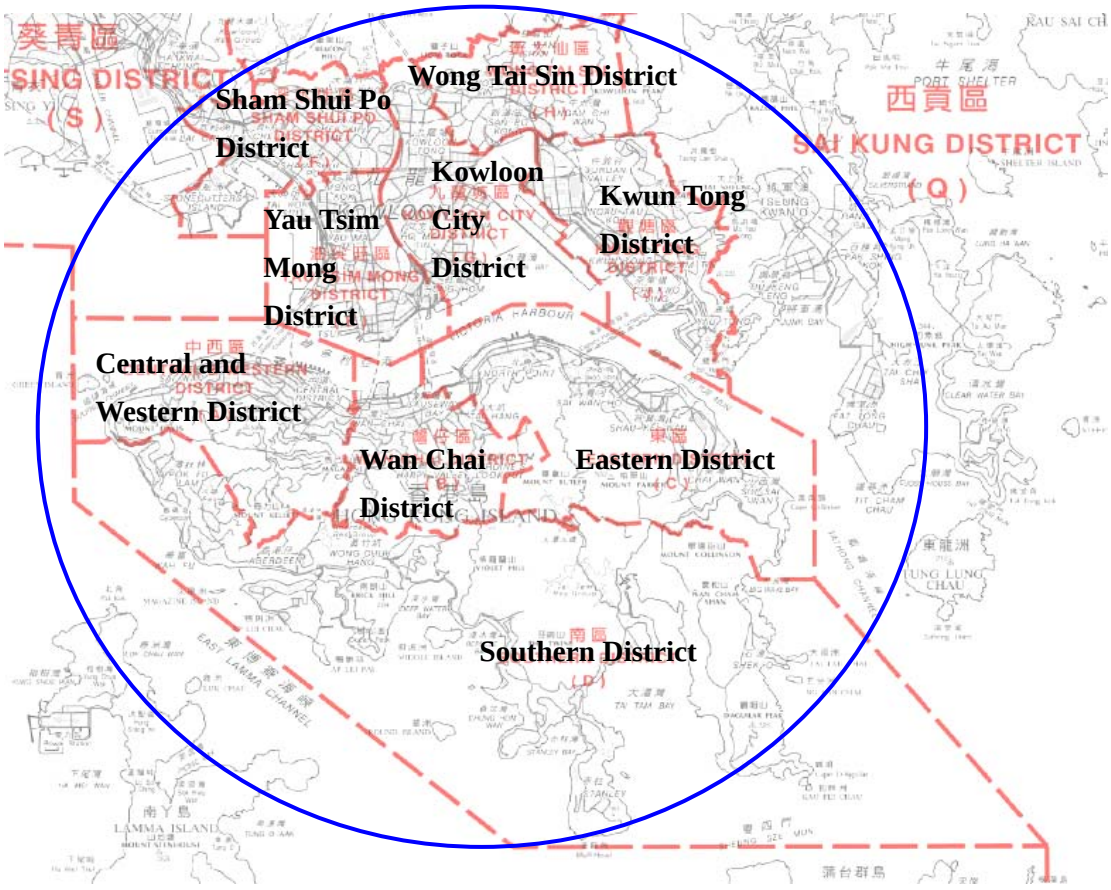
The cross-sectional study on private redevelopment rate consists of two parts. The first part involves the calculation of the private redevelopment rate across the nine districts in Kowloon and Hong Kong (the reason for excluding New Territories will be discussed in 4.2). Then bivariate analysis is used to examine the correlation between the rate and the hypothesized factors. In the second part, the nine districts are subdivided into 162 sub-districts. The respective private redevelopment rates in sub-district level will be calculated. Then regression model is employed to analyze the relationship between the hypothesized factors and the redevelopment rate of different sub-districts. A certain degree of approximation is adopted here. Full details of these two parts are outlined on the next few pages. All the districts and sub-districts divisions in this study are according to the District Council Electoral Boundary Map (2007).

4.1.1. Simple bivariate analysis

This is the first part of the cross-sectional study, which involves the examination of private redevelopment rate in district level by using simple bivariate analysis (i.e. correlation analysis).

The target sample for this part is the nine districts in Hong Kong Island and Kowloon: Central and Western District (C&W), Eastern District (E), Southern District (S), Wan Chai District (WC), Kowloon City District (KC), Kwun Tong District (KT), Sham Shui Po District (SSP), Wong Tai Sin District (WTS), Yau Tsim Mong District (YTM). Their location is shown in Figure 1.

Figure 1 Location of the nine districts in Hong Kong Island and Kowloon



Source: District Council Electoral Boundary Map, 2007

Before starting the analysis, the private redevelopment rate (R_r) of each district has to be calculated by using Equation (1). The values of each hypothesized factors (plot ratio (F_{PR}), private property price (F_{PP}), and percentage of the LDC, URA and HKHS projects (F_{LUH}) in each district are also calculated.

To examine the relationship between private redevelopment rate (R_r) and each hypothesized factor (F_{PR}, F_{PP}, F_{LUH}), they have to be formulated into three pairs of variables. They are listed below:

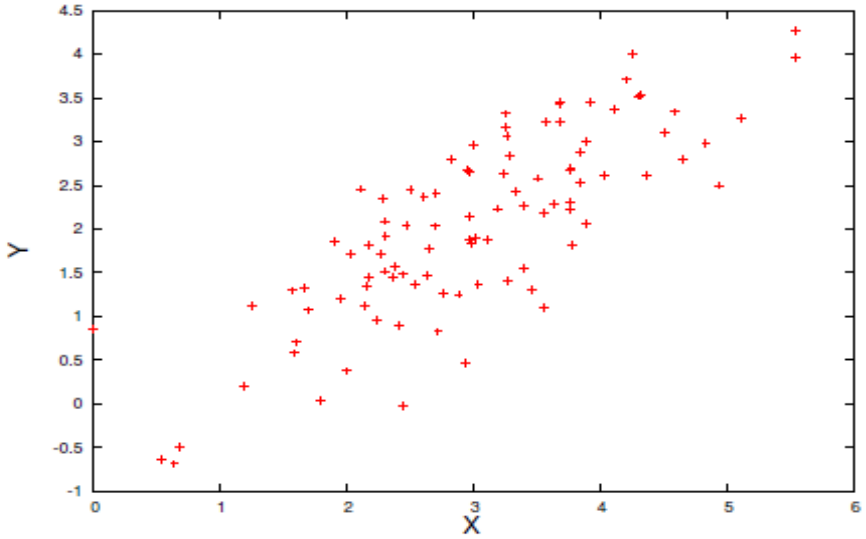
1) Private redevelopment rate and permitted plot ratio, represented by (R_r, F_{PR})
2) Private redevelopment rate and private property price level, represent by (R_r, F_{PP})
3) Private redevelopment rate and percentage of the LDC, URA and HKHS projects, represented by (R_r, F_{LUH}).

Each pair is examined separately by using simple bivariate analysis. Simple bivariate analysis is a quantitative approach for measuring the degree correlation that exists between a pair of variables (Bryman and Cramer, 1990). Generally, the analysis involves two basic steps:

1) Graphing the relationship between a pair of variables in a scatter diagram
2) Calculating the correlation coefficient of the pair of variables

For a pair of variables (e.g. X and Y), Y is plotted against X (or X against Y) on a graph. Each point on the graph represents the appropriate combination of scale values for the associated X and Y variables, as shown in Figure 2. This forms a scatter diagram.

Figure 2 Scatter diagram for X and Y



Scatter diagram allow three aspects of a relationship to be discerned: whether it is linear; the direction of the correlation (i.e. whether positive or negative); and the strength of the relationship. The amount of scatter is indicative of the strength of the relationship.

To assist in the interpretation of the diagram, the correlation coefficient for each pair of variables will be calculated. Correlation coefficient (CC) is a statistical measure of the association between two variables. It ranges from +1.0 to -1.0. If the value of r is positive (+ve), there is a positive relationship between the two variables. If the value of r is negative (-ve), a negative relationship is indicated. No correlation is indicated if r = 0. A correlation coefficient indicates both the magnitude of the linear relationship and the direction of the relationship. The formula for calculating the correlation coefficient for a pair of variables (*X*, *Y*) is

$$CC_{xy} = CC_{yx} = \frac{\sum (Xi - \overline{X})(Yi - \overline{Y})}{\sqrt{\sum (Xi - \overline{X})^2 \sum (Yi - \overline{Y})^2}}$$

where the symbols $\overline{X}$ and $\overline{Y}$ represents the sample means of X and Y respectively

With the help of scatter diagram and correlation coefficients, the correlation between private redevelopment rate of each district and the three hypothesized factors would be known. However it is importable to note that correlation doesn't mean causation.

Just because *X* and *Y* increase or decrease together doesn't mean that *X* cause *Y* to increase or vice versa. For example, there is a high correlation between teacher's salary and the consumption of liquor over a period of years, with correlation coefficient (CC) of 0.8. This high correlation doesn't indicate that teachers drink, nor does it indicate that the sale of liquor increases teachers' salaries. It is more likely that both teacher's salaries and liquor sales covary because they are both influenced by a third variable, like growth in national income. Therefore the relationship between each pair of variables is apparent but not real as they can be affected by other variables.

To confirm whether the hypothesized factors would really affect the private redevelopment rate, a second technique – regression analysis is employed for further investigation.

4.1.2. Regression analysis

This is the second part of the cross-sectional study, aiming at analyzing whether the hypothesized factors would affect the private redevelopment rate in Hong Kong. The target sample in this part is also the nine districts, but they are finely divided into 162 sub-districts to facilitate regression analysis. The details of the sub-division will be given in the later section of this chapter (4.2. Data).

Again by using Equation 1, the private redevelopment rate of each sub-district is first calculated. Then regression analysis, which is a statistical technique, is adopted to regress the private redevelopment rate on the three hypothesized factors to examine what kind of effect each factor would exert on the private redevelopment rate, and to test whether such an effect is significant or not.

Regression analysis attempts to explain movements in one variable, the dependent variable, as a function of movements in a set of other variables, called the independent variables, through the quantification of a single empirical equation (Studenmund and Cassidy, 1987). It is used to test whether a significant quantitative relationship exists between the dependent and independent variables. In this case, the private redevelopment rate is set as the dependent variable and the three hypothesized factors are set as the independent variables, which act as the explanatory variables to the private redevelopment rate in Hong Kong

Ordinary Least Squares (OLS) method is adopted in the regression analysis. By using it, the redevelopment rate will be modeled into an econometric function, which is estimated from the data pool in a way that will minimize the residual sum of the squared differences between the actual and estimated value of the dependent variables. The criterion of the OLS method is:

$$\sum_{i=1}^{n} e_i^2 \quad \text{is minimum}$$

where $e_i = Yi - \hat{Y}i$ (The "residual"), Yi = actual value of the dependent variable

$\hat{Y}i$ = estimated value of the dependent variable, n = number of observations

4.1.2.1. Choice of functional form

To structure an appropriate regression function, a correct choice of the functional form is very important. As demonstrated by Linneman (1980), 86% overestimation obtained from his hedonic property valuation is due to the functional form mis-specification.

The choice of functional form is generally affected by two conditions.

1) The relationship between the dependent variable and the independent variables can be logically deduced by prior knowledge.
2) There is a lack of prior information.

For the former condition, the choice of functional form is easy to arrive by assuming the established relationship from prior knowledge. However for the latter condition, the functional form has to be deduced by trial and error method based on empirical observation. Usually a linear functional form will be assumed as a starting point and modification is introduced to the function if the linear assumption fails. This idea is supported by Studenmund and Cassidy (1987), who stated that the liner functional form is in effect being used by default and should only be changed until strong evidence is shown for inappropriate use.

As this study on private redevelopment rate falls into the second condition, a linear functional form is adopted for the regression equation and the empirical results in Chapter 5 also support this choice.

4.1.2.2. Structure of the regression equation

To test the effect of the three hypothesized factors on private redevelopment rate, a simple linear regression equation is structured as follows:

$$R_r = a_0 + a_1 F_{PR} + a_2 F_{PP} + a_3 F_{LUH} + \varepsilon \text{ .....} \textbf{(4)}$$

where R_r is the private redevelopment rate of each sub-districts;

F_{PR} is the average permitted plot ratio of each sub-district

F_{PP} is the average private property price level of each sub-district

F_{LUH} is the average percentage of the LDC, URA and HKHS projects in each sub-district

a_0 is the constant term

a_1, a_2, a_3 are the coefficients to be estimated

ε is the stochastic error term

In the equation, the private redevelopment is the dependent variable, where the three hypothesized factors are the independent variables.

4.1.2.3. Model interpretation and test statistics

Generally, to interpret the result of the regression analysis (i.e. Equation 4), the regression coefficients as well as two test statistics, including the t-statistic and the coefficient of determination have to be considered.

(1) Regression coefficient

Regression coefficient measures the changes in the dependent variable with respect to changes in the independent varible, holding all other factors constant. This means that any changes in the independent variable will cause the dependent variable to vary in the extent specified by the associated coefficient. In Equation 4, the coefficient of F_{PR} is a_1. Then one unit change in the independent variable (F_{PR}) will cause the dependent variable (R_r) to change by a_1 units, by holding all other factors constant. Therefore the sign of the coefficients can show whether the each hypothesized factor (i.e. the

independent variable) is positively or negatively related to the private redevelopment rate (i.e. the dependent variable).

(2) T-statistics (t)

T-statistics is used to test the significance of the effect of each independent variable on the dependent variable R_r. The value of t depends on the regression coefficient of the independent variable (e.g. $F_{PR)}$ and the standard error of that coefficient ($SF_{PR)}$, where

$$t = \left| F_{PR} / SF_{PR} \right|$$

The larger the value of t, the more accurate is the estimate since the less likely for F_{PR} equal to zero. It should be noted that statistical significance refers to the likelihood that the statement (R_r) is affected by the specified independent variable" is true. The word 'significance' has nothing to do with the magnitude of the effect of the independent variable on R_r. In other words, in the regression equation, an independent variable can be very significant (high t-value) but the effect of it on R_r can be very small.

In order to reject null hypothesis, the calculated t-value for each independent variable has to be compared with a critical t-value. A critical t-value is the value that distinguishes the acceptance region from the rejection region. It depends on whether the test is one-sided or two-sided, on the level of Type 1 error specified, and on the degrees of freedom, which is defined as the number of observations minus the number of coefficients estimated (including the constant). If the calculated t-value is larger than the critical one, then the coefficient of the independent variables is significant. In this study, 95% confidence level[5] (i.e. 95% sure that the independent variable is non zero) is employed to examine the significance of the independent variable. It is reminded that significant at the 95% confidence level also means that 'significant at a 5% level'.

[5] In practice, the 95% confidence level is widely accepted as a benchmark level for regression analysis.

(3) Coefficient of determination – R^2

The coefficient of determination indicates the proportion of the whole sample variation in the dependent variable explained by the variation in the independent variable (Wooldridge, 2003). It measures the 'goodness of fit' of the regression equation (i.e. the explanatory power of the model specification). The higher the value of R^2 is, the closer the estimated regression equation fits the sample data. The value of R^2 ranges from zero to one, showing completely lack of fit to perfect fit. For example, if $R^2 = 0.60$, it means that 60% of the changes in the dependent variable (R_r) is due to the changes in the independent variable. The reason for the remaining 40% variation in R_r is unknown or unexplained by the variables in the model.

In interpreting the private redevelopment rate regression model in this study, the focus is on the regression coefficients and T-statistics. The coefficient of determination will not be the main focus here as this study intends to investigate some underlying factors which lead to different private redevelopment rate in different areas of Hong Kong, rather than all the factors affecting private redevelopment rate in an area. Some control factors (i.e. factors exerting the same effect in every areas of Hong Kong), which can affect the private redevelopment rate in an area, is not covered here.

4.1.3. Expected results

As the research design consists of two separate parts, their expected results will be highlighted here.

Recalling back the ideas proposed in Chapter 3, the three factors (permitted plot ratio; private property price level; and percentage of the LDC, URA and HKHS projects) are predicted to have a positive impact on the private redevelopment rate. This means that:

1) An increase in permitted plot ratio can trigger more private redevelopment in an area, by holding all other factors constant

2) A place with a higher private property price level will have a higher private redevelopment rate, by holding all other factors constant

3) A place having a higher percentage of the LDC, URA and HKHS projects will have a higher private redevelopment rate, by holding all other factors constant

4.1.3.1. Simple bivariate analysis

According to the above prediction, the three pair of variables [(R_r, F_{PR}); (R_r, F_{PP}); (R_r, F_{LUH})] in the simple bivariate analysis should all show a positive relationship. This should be indicated in both the scatter diagrams and the correlation coefficients.

In each scatter diagram, the points plotted on the graph should show a general upward-sloping trend. For the respective correlation coefficients, they all should exhibit a positive sign.

4.1.3.2. Regression analysis

Again according to the above prediction, all the three coefficients (a_1, a_2, a_3) attached to the independent variables in the regression equation (2) should show a positive sign. This indicates that the independent variable (F_{PR}/F_{PP}/F_{LUH}) is positively related to the dependent variable (R_r). Furthermore, they are expected to acquire the 95% confidence level in order to confirm the hypothesis.

4.2. Data

This section describes the details of all the data used in this study, including their sources. It is divided in three main parts. First the target sample for this study, the choice of study period, and the choice of proxy to indicate private redevelopment will be discussed. Second the data sample for the four variables in simple bivariate analysis will be stated. At last the data sample for the independent and dependent variable in regression analysis will be highlighted.

4.2.1. Target sample

The target sample for this study is restricted to the high density urban areas in Hong Kong, which are those in Kowloon and Hong Kong Island. Non-urban area (i.e. New Territories) is excluded as it is relatively low density with much larger amount of vacant land. Private redevelopments in non-urban area are very few in numbers (Eddie *et al.*, 2008) and therefore excluded. Also, any land came from reclamation in the past two decades in Kowloon and Hong Kong Island is excluded in the target sample as redevelopment is unlikely to take place on newly reclaimed land.

In the first analysis (simple bivariate analysis), the study area is the nine districts in Kowloon and Hong Kong Island. The location and boundary of each district are according to the District Council Electoral Boundary Maps (2007), which is already shown in Section 4.1.

In the second analysis (regression analysis), the study area involves 162 sub-districts in Kowloon and Hong Kong Island. Their division generally follows the constituency boundary in the District Council Electoral Boundary Maps (2007). The sub-districts in each district, which are represented by codes, are listed in Table 2. Each code represents an area in the sub-district map in Appendix A to I.

Table 2 List of sub-district samples in Kowloon and Hong Kong Island

Districts	C&W	WC	E		S	WTS
Sub-districts	A01	B01	C01	C18	D01	H01
	A02	B02	C02	C19	D02	H02
	A03	B03	C03	C20	D03	H03
	A04	B04	C04&C05	C21	D04	H04
	A05	B05&B07	C06	C22	D05	H05
	A06&A07	B06	C07	C23&C24	D06&D07	H06
	A08&A09	B08	C08	C25	D08	H07
	A10	B09	C09&C11	C26, C27&C28	D09	H08&H09
	A11	B10	C10	C29	D10	H10
	A12	B11	C12&C13	C30&C31	D11	H11
	A13	/	C14	C32	D12	H12
	A14	/	C15	C33&C34	D13	H13
	A15	/	C16	C35	D14	H14
	/	/	C17	C36&C37	D15	H15
	/	//	/	/	D16	H16
	/	/	/	/	D17	H17
Districts:	**KC**	**SSP**	**KT**		**YTM**	H18
Sub-districts	G01	F01	J01	J16	E01	H19
	G02	F02	J02	J17	E02	H20
	G03	F03	J03	J18	E03	H21&H24
	G04&G14	F04, F18&F20	J04	J19	E04	H22
	G05	F05	J05, J06&J32	J20	E05&B06	H23
	G06&G21	F06&F09	J07	J21	E07	H25
	G07	F07	J08	J22	E08	/
	G08	F08	J09	J23	E09&E10	/
	G09	F10&F11	J10	J24	E11	/
	G10	F12&F13	J11	J25	E12	/
	G11	F14	J12	J26	E13	/
	G12&G13	F15	J13	J27&J28	E14	/
	G15	F16&F17	J14	J29&J34	E15	/
	G16&G17	F19	J15	J30&J31	E16	/
	G18&G19	F21	/	J33	/	/
	G20	/	/	/	/	/
	G22	/	/	/	/	/

After looking at the table, you may notice that some sub-districts (for example, A06&A07) consist of more than one code. This is because the area for either A06 or A07 is too small to be investigated alone. Either of them consists of too few private property stocks. Such observation can lead to a high random error. So they join up together and form into a sub-district for analysis.

4.2.2. Period for investigation

This study covers a 12-years duration between 1997 and 2008. Within this period, Hong Kong property market has undergone both peak and trough conditions. Thus it is quite a representative period for investigation of private property redevelopment in Hong Kong. This can prevent any bias of the samples towards peak or trough conditions. Thus the overall pattern can be assessed in an appropriate way.

4.2.3. Proxy to indicate private redevelopment

In this study, one of the key issues is the proper indication of private redevelopment. From the past literatures, scholars usually made use of the issue of demolition consent to an existing building (Dye and McMillen, 2007) or the issue of occupation permit to a redeveloped building (Hui *et al.*, 2008) from the government department as the proxy to indicate redevelopments. However both proxies are imperfect. Some demolition permits that are issued are never used, or they are just used to clear some deteriorated structure, rather than redevelopment. If occupation permit is used as the proxy, some private redevelopment under progress is ignored. It can only indicate the completed ones. Therefore neither of them will be used here.

In the private redevelopment process, there are two other kinds of approval which are required to be obtained from the Building Authority under Building Ordinance. They are the ‘approval of building plans’ and the ‘consent to commence work’.

An approved building plan is a pre-requisite before any redevelopment work can be commenced on site. It only reflects an interest for redevelopment. Many projects are not actually proceeded after obtaining the approval of building plan as developers

always try to get in on hand in the first instance before going into detail planning of a redevelopment scheme.

For ‘consent to commence building work’, it also has to be obtained before any actual work is commence on site. Unlike the ‘approval of building plans’, ‘consent to commence work’ can represent an actual commitment of developers to proceed with the redevelopment process. To obtain the ‘consent to commence work’ in a redevelopment project, the existing buildings on site has to be first demolished, and all site preparatory works such as erection of hoarding and other safety measures have to be done. The site supervision plan also has to be submitted to the Building Authority prior to or at the time of application for ‘consent to commence work’. Therefore, the issue of ‘consent to commence work’ can show the actual determination of the developer to proceed with a private redevelopment project. It can also take into account any private redevelopment under progress as it indicates the initial stage of it. So ‘consent to commence work’ for private redevelopment project is employed as a proxy to indicate private redevelopment in this study.

All the ‘consent to commence work’ for private redevelopment issued between 1997 and 2008 are collected. The data are all available in the Monthly Digest (1997 - 2008) published by the Hong Kong Buildings Department. However the Monthly Digest shows all the ‘consent to commence work’ issued to all new buildings, without indication about which are private redevelopments. Therefore a further step is required to sort them out. According to the definition of private redevelopment (defined in Chapter 1), it must be run purely by private developers and the site must be developed beforehand. So any ‘consent to comment work’ issued to non-private applicants (i.e. government bodies, statutory bodies or public bodies) are excluded. As stated in Chapter 1, all projects initiated or connected with the LDC, URA, HKHS are also excluded. Besides, consent issued to sites directly came from government land sales are excluded as they are highly unlikely to be redevelopment. This is done by mapping the Government Land Sales record published by Lands Department on its homepage with the address of the site obtained ‘consent to commence work’.

Furthermore, it is reminded that this study focuses on ‘consent to commence work’ issued to private redevelopment for the following buildings types:

1) Hotel
2) Apartment
3) Commercial
4) Residential

These fours types are the main businesses run by private developers, which would follow the optimal redevelopment rule discussed in Chapter 2. For other building types, like church, training center or community center, their business agenda and consideration is totally different and therefore excluded.

By using the ‘consent to commence work’ and careful screening of the sample, 612 private redevelopments are identified in the 12-years time between 1997 and 2008. All of them are listed in Appendix J.

4.2.4. Variables in simple bivariate analysis

There are four variables involved in the simple bivariate analysis. They are private redevelopment rate (R_r), permitted plot ratio (F_{PR}), private property price level (F_{PP}) and percentage of the LDC, URA and HKHS projects (F_{LUH}). The data about these four variables are collected in a district level. It should be noted that as the private redevelopment rate is an average value, the other three variables will be assessed in an average value too.

4.2.4.1. Private redevelopment rate

For the calculation of private redevelopment rate of each district, Equation 1 is used, By applying it in a district level:

$$\text{Private redevelopment rate (district)} = GFA_R / (GFA_P \times 12)$$

where GFA_R = total gross floor area of all redeveloped private properties in a district

GFA_P = the total gross floor area of all private properties in the same district

All the private redevelopments in each district are identified through manual scrutinizing the 'consent to commence work' record in the Monthly Digest (1997 - 2008) and government land sales record, and checking the District Council Electoral Boundary Map. As the 'consent to commence work' record includes the gross floor area of a new development, GFA_R for each district can be calculated.

For the denominator (GFA_P), as highlighted in Chapter 1, it only accounts for the land re-developable by private developers. Taking into account any land which is unable to be redeveloped by private developers will lead to an unfair assessment on the private redevelopment rate. To assess the value of GFA_P, an approximation method is adopted because it is impossible to measure the gross floor area of all the private properties in a district directly. Therefore GFA_P (the total gross floor area of all private properties in a district) is assumed to be equal to the average number of story of private buildings in a district times the area of land re-developable by private

developers in the same district. The simple formula is shown below:

GFA_P = Average no. of story of private buildings in a district x
re-developable land area by private developers in the district

The average number of story of private buildings in a district can be calculated by assessing the Database of Private Building in Hong Kong (2008) in the Home Affairs Department webpage. The database consists of the development parameters and the building management structure of all private buildings in Hong Kong. It is believed to be a very reliable source as it is prepared by several government departments (Home Affairs Department, Buildings Department and Rating and Valuation Department).

Re-developable land (by private developers) refers to a piece of developed land which could be acquired by private developers through private negotiation. It simply means that a piece of land with private developments erected on it. To measure the area of re-developable land, the author will make use of the Hong Kong Guide (2008), which is a map published by the Lands Department. The area is then calculated by measuring up the map in each district. Only land with private developments on it is measured. Vacant land, open spaces, park, hospital, police station, fire station, post office, sports centre and government buildings are all excluded in measuring the re-developable area. Also the land occupied by public housing is excluded. The data about the location of public housing can be obtained on the homepage of Hong Kong Housing Authority and Hong Kong Housing Society.

4.2.4.2. Plot ratio

All the districts in Hong Kong Island and Kowloon are covered by the Outline Zoning Plans (OZP). In the OZP, each district is divided into different zones. Each zone will generally specify the permitted type of the new developments to be erected on land and the permitted plot ratio of it. These zoning restrictions vary from place to place in a district. So in order to determine the permitted plot ratio of a district, a weighted average technique will be adopted. Furthermore, as OZP is subject to changes within

the study period, the permitted plot ratio of different districts has to be reviewed annually within the study period (1997 – 2008). This means that there are 12 sets of observations per district representing the permitted plot ratio for that district in each year. They are then summed up and divided by 12 to give an average value. This average value can take into account of all the changes in plot ratio restriction within the study period. Again it is reminded that only zones which allow private redevelopment are concerned here. Therefore two zones - Government, Institution or Community zone and Open space Zone are excluded.

To facilitate calculation, each district is divided into different sub-districts according to the District Council Electoral Boundary Maps (2007), like that in Table 2. Then the areas of different zones (e.g. Residential, CDA, Industrial, Commercial or Other specified uses (Business)) in each sub-district are measured by referring to the respective Outline Zoning Plan. The permitted plot ratio of each zone stated in the OZP will be recorded down. However for some zones, the OZP doesn't specific the permitted plot ratio. Then this has to be referred to the Building (Planning) Regulations, which specify the permitted plot ratio for a new development according to its height and the classification of site. If the zone consists of no plot ratio restriction on the OZP, the permitted plot ratio is determined to be the highest plot ratio limit for a Class B site[6] under the Building (Planning) Regulations (i.e. 9 for domestic use, 15 for non-domestic use). The reason why assuming all zones are Class B sites is that overestimation of plot ratio will easily occur if all the zones are treated as a Class C site[7] and underestimation of plot ratio will easily occur if all zones are treated as a Class A site[8]. However, by adopting Class B site, the overestimation effect can somehow balance the underestimation effect to yield a more accurate result.

[6] Under Building (Planning) Regulations, class B site means a corner site that abuts on 2 specified streets neither of which is less than 4.5m wide.
[7] Under Building (Planning) Regulations, class C site means a corner site that abuts on 3 specified streets none of which is less than 4.5m wide.
[8] Under Building (Planning) Regulations, class A site means a site, not being a class B site or class C site, that abuts on one specified street not less than 4.5 m wide or on more than one such street

The steps below outline the procedures for the calculation of the average permitted plot ratio of a district.

(1) The permitted plot ratio of each sub-district is calculated by the following equation.

$$\textit{Permitted plot ratio of a sub-district} = \frac{\sum_{i=0}^{n} \textit{Area of a zone}_i \; x \; \textit{Plot ratio of the zone}_i}{\textit{Sum of area of all the zones in the subdistrict}}$$

(2) After calculating the permitted plot ratio of all the sub-districts, the permitted plot ratio of a district can be calculated by using the follow equation.

$$\textit{Permitted plot ratio of a district} = \frac{\sum_{i=0}^{n} \textit{redevelopable land area of a subdistrict}\ t_i \; x \; \textit{permitted plot ratio of the subdistrict}\ t_i}{\textit{Total redevelopable land area in a district}}$$

By using (1) and (2), permitted plot ratio of each district in each year can be calculated. An average permitted plot ratio for each district is then calculated by the following equation:

$$\textit{Average permitted plot ratio of a district} = \frac{\sum_{T=1997}^{2008} \textit{Permitted plot ratio of a district at time } T}{12}$$

4.2.4.3. *Private property price level*

Private property price level of each district is indicated by the average unit transaction price of private properties in the district within the study period. The data for the transaction record of private properties for different districts can be obtained by assessing the Economic Property Research Center (EPRC). It gathers most of the transaction records of private properties registered in the Land Registry.

With the help of EPRC, average unit transaction price of private properties for the

nine districts at each year between 1997 and 2008 are first calculated (assessed in annual basis). They are then summed up and divided by 12 to give an average value. The equation is as follows.

$$\textit{Property price level of a district} = \frac{\sum_{T=1997}^{2008} \textit{Average unit transaction price of private properties in a district at time } T}{12}$$

By using this 'average concept', all the fluctuation in private property price level at different time frame within the study period can be taken into account. It is also measured in the same dimension as the private redevelopment rate.

4.2.4.4. Percentage of LDC, URA and HKHS projects

As highlighted in Chapter 3, the percentage of LDC, URA, HKHS projects implemented in a district is defined as the total gross floor area of all redeveloped properties by LDC, URA and HKHS (GFA_{LUH1}) in a district divided by the total gross floor area of all private properties in that district (GFA_P) over the study period and by the number of years in the study period (12 years) to give an average rate.

$$\text{Percentage of the LDC, URA, HKHS projects in a district} = GFA_{LUH1} / (GFA_P \times 12)$$

Again gross floor area is measured as this can take into account the scale of the projects. The indication of redevelopment projects run by LDC, URA and HKHS can be referred to the issue of 'consent to commence work' and checking with the land sales record. The data are all available in the Monthly Digest (1997 - 2008) published by the Hong Kong Buildings Department. The projects by URA and HKHS can be double-checked by assessing their homepage[9]. For the calculation (GFA_P), it has been described before.

[9] Homepage address for URA: http://www.ura.org.hk/html/c100000e1e.html
Homepage address for HKHS: http://www.hkhs.com/

The table below illustrates the redevelopment projects initiated/run by LDC, URA and HKHS within the study period 1997 - 2008. Each projects are indicated by the issue of their 'consent to commence work'.

Table 3 List of redevelopment projects run by LDC, URA and HKHS (1997-2008)

Year	Address	District	GFA (sq. m.)
2007	2-56 First Street, 39-41 Centre Street	C&W	32,756
2006	J/O Po On Road, Shun Ning Road & & Hing Wah Street	SSP	10,513
2005	9- 22 Hanoi Road, 5-29 Mody Road, 2-4 Bristol Avenu	YTM	45,596
2004	Johnston Road (J residence)	WC	20,567
2004	Reclamation Street project	YTM	4,921
2003	Wanchai Road / Tai Yuen Street, H9	WC	62,310
2002	J/O Kennedy Town New Praya, Cadogan Street, Catehick Street, & Davis Street	C&W	61,456
2002	8 Waterloo Road	YTM	32,011
2000	Argyle Street/Shanghai Street Project (Langham Place)	YTM	167,295
1998	29 Ka Wai Man Road	C&W	29,389
1998	127-133 Hollywood Road	C&W	12,000
1997	11-15 Wing Lok Street	C&W	1,698
1997	Queen's Road Central, Jubilee Street, Des Voeux Road Central & Gilman's Buzzar	C&W	41,143
1997	69-79 Bulkeley Street	KC	3,012

Source: Monthly Digest (1997-2008), Buildings Department.

4.2.5. Variables in regression analysis

In the regression analysis, the same variables are employed, but they are set in a sub-district level. The following passages will briefly describe how the data for the four variables are collected in a sub-district level. The technique is very similar to that used in simple bivariate analysis.

4.2.5.1. Private redevelopment rate

Private redevelopment rate of different sub-districts is set as the dependent variable. The rate is again calculated by using equation (1), but it is set in a sub-district level.

$$\text{Private redevelopment rate (sub-district)} = GFA_S / (GFA_T \times 12)$$

where GFA_S = total gross floor area of all redeveloped private properties in a sub-district, GFA_T = the total gross floor area of all private properties in the same sub-district

All the private redevelopments in each sub-district are identified through manual scrutinizing the 'consent to commence work' record in the Monthly Digest (1997 – 2008) and the land sales record, and checking the District Council Electoral Boundary Map. The gross floor areas from all the private redevelopments in each sub-district are then summed up to derive GFA_S. For the calculation of GFA_T, again an approximation approach is adopted due to the data limitation. It is assumed that all tall and shorts private buildings are evenly distributed in every district. So GFA_T equals to the total re-developable land area by private developers in the sub-district times the average number of story of private buildings in the respective district.

4.2.5.2. Plot ratio

Plot ratio is an independent variable in the regression analysis. The way to tackle this variable is roughly the same as that stated in Part 4.2.4.1 (Variables in simple bivariate analysis), but in a sub-district level. The areas of different zones in a sub-district are again measured by using the respective Outline Zoning Plan. The plot ratio of each zone has to be marked. Then:

$$\textit{Permitted plot ratio of a sub-district} = \frac{\sum_{i=0}^{n} \textit{Area of a zone}_i \textit{ x Plot ratio of the zone}_i}{\textit{Sum of area of all the zones in the subdistrict}}$$

The permitted plot ratio of a sub-district is assessed in an annual basis. So the permitted plot ratio of a sub-district in each year within the study period has to be calculated. Then they are summed up and divided by 12 to give an average value which represents the overall average plot ratio of the sub-district in the 12 years time.

$$\textit{Average permitted plot ratio of a subdistrict} = \frac{\sum_{T=1997}^{2008} \textit{Permitted plot ratio of a subdistrict at time T}}{12}$$

4.2.5.3. Private property price

Private property price level of a sub-district is an independent variable. The way to tackle this variable is exactly the same as that stated in Part 4.2.4.3 (under Variables in simple bivariate analysis), but in a sub-district level. With the help of EPRC (the trend analysis function), the average unit transaction prices of private properties in different sub-districts at each between 1997 and 2008 are collected. They are then summed up and divided by 12 to give the average property price level of the sub-districts. The equation is shown below/

$$\textit{Property price level of a sub-district} = \frac{\sum_{T=1997}^{2008} \textit{Average unit transaction price of private properties in a district at time T}}{12}$$

4.2.5.4. Percentage of LDC, URA and HKHS projects

Percentage of LDC, URA and HKHS projects in a sub-district is also an independent variable in this study. Its calculation and source of data is exactly the same as that described in Part 4.2.4.4 (under Variables in simple bivariate analysis), but in a sub-district level. The formula is modified as follows.

Percentage of LDC, URA, HKHS projects in a sub-district = GFA_{LUH2} / (GFA_T x 12),

where GFA_{LUH2} is 錯誤! 尚未定義書籤。total gross floor area of all redeveloped projects by LDC, URA and HKHS in a sub-district, GFA_T represents total re-developable area in the sub-district.

4.3. Conclusion

The reason why this research is designed into two parts is mainly due to the problem of data limitation, which prevents the author from examining the issues precisely with one single method. Therefore, two research methods which analyze aggregates in two different levels are adopted in this study.

In part one, the data set is the nine districts. Due to the small number of data set (9 set of data for each hypothesized factor), regression analysis or other complicated analytical technique is not favourable. So a simple correlation test is used at the first instance to examine the relationship between each proposed factor and the private redevelopment rate. However any proved relationship cannot indicate causation. That's why a part two analysis is employed in order to prove any 'causation' between them.

Part two aims at proving any 'causation' between the private redevelopment rate and the hypothesized factors. Regression analysis is employed for such purpose. To facilitate regression analysis, each district in part one is sub-divided into several sub-districts so that 162 set of observations can be obtained over the 162 sub-district. Then the private redevelopment rate in sub-district level is regressed on the hypothesized factors. However a higher degree of approximation is adopted in deriving the private redevelopment rate of different sub-districts.

Strictly speaking, part two analysis is used to support part one analysis. Furthermore if any hypothesis can be confirmed in both analyses which are set at two different levels, the result is more representative.

Chapter 5 Empirical results and analysis

This chapter will address the private redevelopment rate in different districts and sub-districts in Hong Kong Island and Kowloon. Then the empirical results of the simple bivariate analysis and regression analysis will be highlighted and discussed.

5.1. Private redevelopment rate in Hong Kong Island and Kowloon

The assessment of private redevelopment rate in Hong Kong Island and Kowloon consists of two levels. The first level is about the average rate of the nine districts within the study period 1997 to 2008. The second level is about the average rates of different sub-districts in the nine-districts. Both levels will be looked into one by one.

5.1.1. The nine districts

Private redevelopment in the nine districts is summarized as follows:

Table 4 Private redevelopment in Kowloon and Hong Kong Island 1997 - 2008

District	No. of private rede. projects	Total GFA of all private properties (sq.m.)	Total GFA for private rede. projects (sq.m.)	Private redevelopment rate
Central and Western	146	24,200,000	925,911	0.318%
Wan Chai	95	16,400,000	520,504	0.264%
Eastern	46	38,400,000	504,843	0.109%
Southern	67	28,900,000	243,633	0.070%
Kowloon City	106	22,100,000	381,928	0.143%
Kwun Tong	23	23,200,000	617,246	0.221%
Sham Shui Po	42	16,200,000	371,798	0.191%
Wong Tai Sin	3	9,600,000	32,800	0.028%
Yau Tsim Mong	83	26,500,000	681,000	0.214%

Source: Author's analysis

From Table 4, it can be observed that Central and Western District, Wan Chai District and Kowloon City District have the highest number of private redevelopment projects within the study period, while Wong Tai Sin District has an exceptionally low number

of private redevelopment cases.

In terms of total gross floor area from private redevelopments in different districts, again Central and Western District ranks top of the list. This is expected as it has lots of private redevelopment projects. It is interesting to keep your eye on Kwun Tong District and Eastern District. Although they have lower number of private redevelopment projects within the period (less than 50 cases), they give a high value of total GFA. This is mainly because redeveloped buildings in these two districts tend to be taller and in a large scale.

For the private redevelopment rate, Central and Western Disrict came up on the top of the list with 0.318% with no doubt. Following the Central and Western District is the Wan Chai District (0.264%) and Kwun Tong District (0.221%). They have a second and third high in private redevelopment rate respectively among the nine districts. In contrast, Wong Tai Sin District (0.028%) and Southern District (0.070%) are ranked in the bottom of the list. Privet redevelopments in Southern District are usually smaller in scale. Some of them are just several stories high. The low rate of Wong Tai Sin District is mainly due to the low number of redevelopment projects. It doesn't appear attractive to private developers.

5.1.2. The 162 sub-districts

In this part, the private redevelopment rate of different sub-districts in each district is reviewed one by one.

(1) Central and Western District (location of the sub-districts can be referred to Appendix A)

Table 5 Private redevelopment in Central and Western District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
A01	332,329	7,245,000	0.38%
A02	98,654	1,605,000	0.51%
A03	58,435	1,235,000	0.39%
A04	17,454	3,500,000	0.28%
A05	19,339	864,000	0.19%
A06+A07	67,351	1,156,000	0.49%
A08+A09	27,711	1,537,000	0.15%
A10	8,717	868,000	0.08%
A11	33,639	1,124,000	0.25%
A12	68,801	1,795,000	0.32%
A13	59,589	995,000	0.50%
A14	29,423	1,194,000	0.21%
A15	7,069	1,111,000	0.05%

Source: Author's analysis

Among all the sub-districts in Central and Western District, A01, A02, A03, A06+A07 and A13 attain the highest rate. They are all located at/near the core Central or mid-level areas, except A06+A07. A06+A07 are located at the far western side of Hong Kong Island – Kennedy Town. The rate is the lowest in Sai Wan (A08+A09, A15) and Shek Tong Tsui (A10)

(2) Wan Chai District (location of the sub-districts can be referred to Appendix B)

Table 6 Private redevelopment in Wan Chai District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
B01	21,247	1,050,000	0.17%
B02	53,708	1,410,000	0.32%
B03	38,926	1,660,000	0.20%
B04	34,062	2,580,000	0.11%
B05+B07	68,854	1,590,000	0.36%
B06	19,903	1,680,000	0.10%
B08	15,434	1,530,000	0.08%
B09	71,985	2,280,000	0.26%
B10	57,615	1,240,000	0.39%
B11	113,555	1,410,000	0.67%

Source: Author's analysis

In Wan Chai District, private redevelopments are more concentrated in sub-districts which are close to the core Central (i.e. B10, B11) and around the Leighton Hill and Tai Hang (i.e. B05+B07). These three sub-districts attain the highest private redevelopment rate. The rate keeps on dropping when the sub-districts are further and further away from the center of Wan Chai (i.e. rate of B02>rate of B03>rate of B04).

(3) Eastern District (location of the sub-districts can be referred to Appendix C)

Table 7 Private redevelopment in Eastern District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
C01	48,604	2,472,000	0.16%
C02	-	1,730,000	0.00%
C03	-	2,142,000	0.00%
04+C05	2,857	2,769,000	0.01%
C06	4,796	824,000	0.05%
C07	-	1,813,000	0.00%

C08	-	1,114,000	0.00%
C09+C11	-	1,598,000	0.00%
C10	-	-	-
C12+C13	-	824,000	0.00%
C14	-	659,000	0.00%
C15	-	1,285,000	0.00%
C16	28,334	1,186,000	0.20%
C17	26,662	1,343,000	0.17%
C18	34,593	1,813,000	0.16%
C19	20,783	1,054,000	0.16%
C20	24,917	1,392,000	0.15%
C21	32,570	1,236,000	0.22%
C22	-	1,145,000	0.00%
C23+C24	116,258	2,134,000	0.45%
C25	69,838	1,407,000	0.41%
C26+C27+C28	75,751	1,978,000	0.32%
C29	-	494,000	0.00%
C30+C31	17,248	2,414,000	0.06%
C32	-	-	-
C33+C34	-	1,021,000	0.00%
C35	-	1,565,000	0.00%
C36+C37	-	1,054,000	0.00%

Source: Author's analysis

Private redevelopments in Eastern District mainly focus in North Point (C17, C19, C20 and C21), Quarry Bay (C23+C24, C25) and Kornhill (C26+C27+C28). Their private redevelopment rates are relatively higher than other areas in the Eastern District.

In the far eastern part of Eastern District, the redevelopment rate is minimal, tending to zero in most of the areas.

(4) Southern District (location of the sub-districts can be referred to Appendix D)

Table 8 Private redevelopment in Southern District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
D01	9,165	1,357,000	0.06%
D02	-	-	-
D03	-	814,000	0.00%
D04	-	775,000	0.00%
D05	-	-	-
D06+D07	-	2,094,000	0.00%
D08	-	-	-
D09	-	-	-
D10	-	-	-
D11	22,268	3,200,000	0.06%
D12	-	1,454,000	0.00%
D13	31,166	774,000	0.34%
D14	-	-	-
D15	68,487	1,668,000	0.34%
D16	81,437	9,970,000	0.07%
D17	31,110	6,837,000	0.04%

Source: Author's analysis

In Southern District, the private redevelopment rates in different sub-districts are very low. Most of then are below 0.1%. However in the two sub-districts in Aberdeen (D13 and D15), a high redevelopment rate is found. Private developers seem to be interested in redeveloping Aberdeen in the past 12 years.

(5) Kowloon City District (location of the sub-districts can be referred to Appendix E)

Table 9 Private redevelopment in Kowloon City District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
G01	68,487	732,400	0.26%
G02	81,437	762,000	0.10%
G03	31,110	858,000	0.08%
G04+G14	22,547	1,010,000	0.31%
G05	9,000	-	-
G06+G21	7,791	1,494,000	0.17%
G07	37,484	2,021,000	0.13%
G08	-	2,331,000	0.14%
G09	30,806	4,564,000	0.12%
G10	31,274	1,494,000	0.18%
G11	39,371	963,000	0.25%
G12+G13	65,245	1,206,000	0.04%
G15	31,774	1,127,000	0.28%
G16+G17	28,390	1,253,000	0.00%
G18+G19	5,944	1,494,000	0.14%
G20	37,821	878,000	0.10%
G22	-	-	-

Source: Author's analysis

Private redevelopments in Kowloon City Districts are quite evenly distributed, apart from a few sub-districts (G05, G12+G13 and G22). Private redevelopment rates tend to be higher in areas around Hung Hom (G04+14 and G15) and Kai Tak (G01 and G11).

(6) Kwun Tong District (location of the sub-districts can be referred to Appendix F)

Table 10 Private redevelopment in Kwun Tong District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
J01	475,477	9,906,618	0.40%
J02	127,008	5,215,718	0.20%
J03	-	-	-
J04	-	-	-
J05+J06+J32	-	1,168,670	0.00%
J07	-	-	-
J08	-	-	-
J09	-	-	-
J10	-	-	-
J11	-	-	-
J12	-	-	-
J13	-	-	-
J14	-	-	-
J15	-	-	-
J16	-	-	-
J17	-	-	-
J18	-	-	-
J19	-	-	-
J20	-	-	-
J21	14,761	2,099,272	0.06%
J22	-	1,298,519	0.00%
J23	-	-	-
J24	-	-	-
J25	-	-	-
J26	-	-	-
J27+J28	0	1,504,120	0.00%
J29+J34	0	1,368,864	0.00%
J30+J31	0	668,737	0.00%
J33	-	-	-

Source: Author's analysis

In Kwun Tong District, there are lots of public housing estates in different sub-districts. That's why many sub-districts in Table 10 contain no GFA for private properties. Nevertheless, Kwun Tong District still has a high private redevelopment rate. There is a high concentration of private redevelopment projects in Kwun Tong Central (J01) and Kowloon Bay (J02).

(7) Sham Shui Po District (location of the sub-districts can be referred to Appendix G)

Table 11 Private redevelopment in Sham Shui Po District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
F01	22,766	1,258,000	0.15%
F02	19,751	1,256,000	0.13%
F03	2,611	1,295,000	0.02%
F04+F18+F20	6,714	844,000	0.07%
F05	12,788	1,323,000	0.08%
F06+F09	8,161	1,267,000	0.05%
F07	18,411	422,000	0.36%
F08	-	-	-
F10+F11	30,307	1,142,000	0.22%
F12+F13	102,687	1,295,000	0.66%
F14	-	556,000	0.00%
F15	126,136	2,054,000	0.51%
F16+F17	9,954	562,000	0.15%
F19	1,941	2,027,000	0.01%
F21	9,571	901,000	0.09%

Source: Author's analysis

Private redevelopments in Sham Shui Po District are concentrated in Lai Chi Kok (F15) and Mei Foo (F12+F13). They attain the highest private redevelopment rate among the sub-districts. The lowest rate is fond in some of the oldest areas – Shek Kip Mei (F04+F18+F20) and Sham Shui Po (F05, F06+F09)

(8) Wong Tai Sin District (location of the sub-districts can be referred to Appendix H)

Table 12 Private redevelopment in Wong Tai Sin District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
H01	-	-	-
H02	-	-	-
H03	-	-	-
H04	32,897	1,615,000	0.17%
H05	-	-	-
H06	0	602,000	0.00%
H07	0	5,105,000	0.00%
H08+H09	0	370,000	0.00%
H10	-	-	-
H11	-	-	-
H12	-	-	-
H13	-	-	-
H14	-	-	-
H15	-	-	-
H16	-	-	-
H17	-	-	-
H18	-	-	-
H19	0	549,000	0.00%
H20	-	-	-
H21+H24	0	1,430,000	0.00%
H22	-	-	-
H23	-	-	-
H25	-	-	-

Source: Author's analysis

Wong Tai Sin Districts consists of many public housing estates around Tsz Wan Shan, Wong Tai Sin and Diamond Hill. So many sub-districts don't contain any private properties. Over the past 12 years (1997 – 2008).only three private redevelopment projects took place in Wong Tai Sing. They are all located in H04.

(9) Yau Tsim Mong District (location of the sub-districts can be referred to Appendix I)

Table 13 Private redevelopment in Yau Tsim Mong District 1997 - 2008

Sub-district	Total GFA for private rede. projects (sq.m.)	Total GFA of all private properties (sq.m.)	Private redevelopment rate
E01	69,739	2,315,000	0.25%
E02	5,455	1,223,000	0.04%
E03	84,746	2,328,000	0.30%
E04	6,109	1,666,000	0.03%
E05+B06	15,177	2,672,000	0.05%
E07	-	-	-
E08	0	1,158,000	0.00%
E09+E10	205,560	1,816,000	0.94%
E11	25,188	2,569,000	0.08%
E12	18,280	1,977,000	0.08%
E13	21,197	1,412,000	0.13%
E14	33,351	1,759,000	0.16%
E15	30,708	1,614,000	0.16%
E16	165,740	4,028,000	0.34%

Source: Author's analysis

Private redevelopments in Yau Tsim Mong District are concentrated in Tsim Sha Tsui (E01+E06), Jordan (E03) and Tai Kok Tsui North (E09+E10). They attain the highest private redevelopment rates. Unlike the old days back in 80s, Tai Kok Tsui North has actually undergone rapid development in the past decade. Many new luxury redevelopment developments (e.g. Harbour Green) are erected in Tai Kok Tsui North.

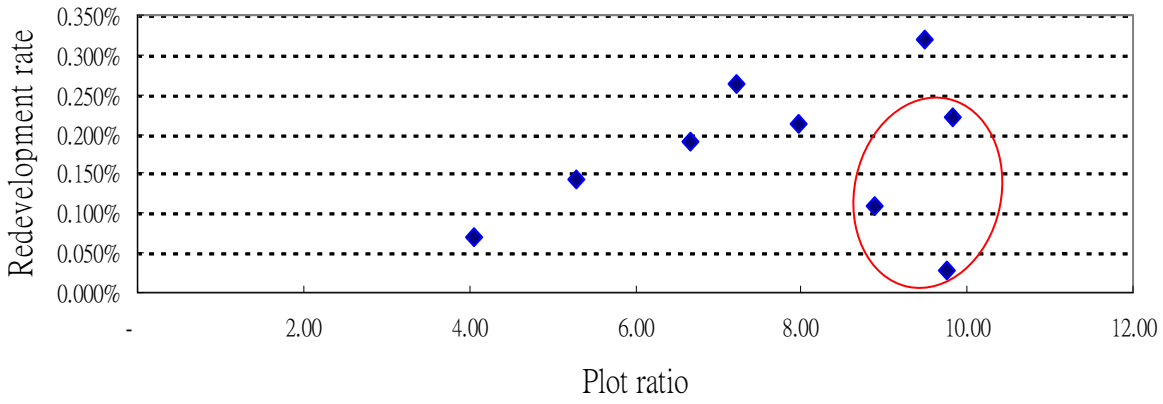
5.2. Empirical results for simple bivariate analysis

Three pairs of variables are examined by using simple bivariate analysis. The statistics for different variables in the nine districts are summarized in the table below

District:	C&W	E	WC	S	KC	KT	SSP	WTS	YTM
Private redevelopment rate:	0.318%	0.109%	0.264%	0.070%	0.143%	0.221%	0.191%	0.028%	0.214%
Plot ratio	9.50	8.90	7.21	4.06	5.29	9.83	6.65	9.76	7.98
Property price ($/sq. ft)	5,920	3,348	4,892	6,325	4,288	2,853	3,157	3,013	3,345
Percentage of URA,LDC & HKHS proj.	0.061%	0.000%	0.042%	0.000%	0.001%	0.000%	0.005%	0.000%	0.078%

For the first pair of variables – private redevelopment rate (R_r) and plot ratio factor (F_{PR}), a low positive correlation is found between them. The figure below shows the scatter diagram for (R_r, F_{PR}).

Figure 3 Scatter diagram for private redevelopment rate and plot ratio factor



In the scatter diagram, private redevelopment rate tends to increases with plot ratio, apart from the three observations circled in red. The correlation coefficient between private redevelopment rate and plot ratio factor is +0.25. Both scatter diagram and the correlation coefficient shows that private redevelopment rate of a district is little correlated with the average plot ratio of the district.

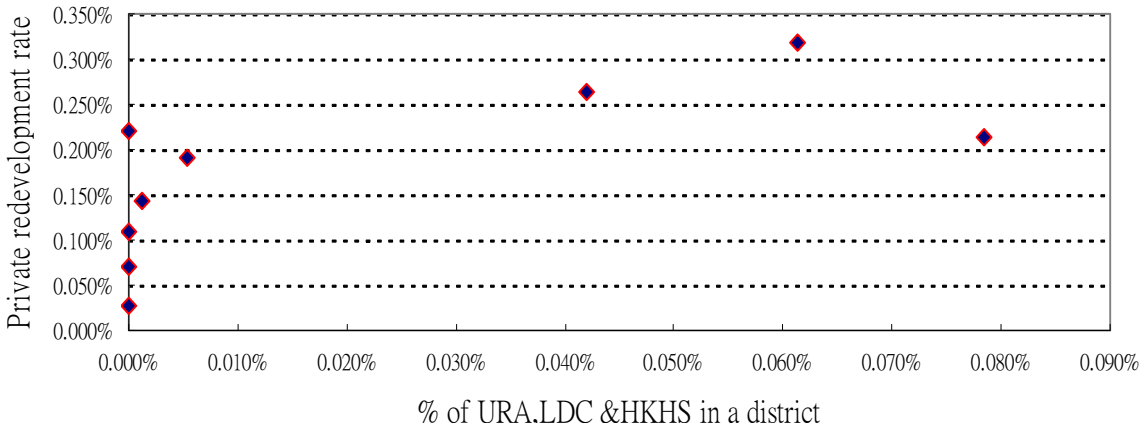
For the second pair of variables – private redevelopment rate (R_r) and private property price factor (F_{PP}), a low positive correlation is found between them. Figure 4 shows the scatter diagram for (R_r, F_{PP}).

Figure 4 Scatter diagram for private redevelopment rate and property price factor

In the scatter diagram, private redevelopment rate is generally higher in districts with higher property price. However there are four observations that deviate from this trend (circled in purple). The correlation coefficient for the scatter diagram is +0.20. These again indicate a slight positive correlation between private redevelopment rate of a district and the respective property price level.

For the third pair of variables – Private redevelopment rate of a district (R_r) and percentage of the LDC, URA and HKHS projects factor (F_{LUH}) in the district, a stronger positive correlation is found between them. Figure 5 shows the scatter diagram for (R_r, F_{LUH}).

Figure 5 Scatter diagram for private redevelopment rate and property price factor



The correlation coefficient for (R_r, F_{LUH}) is +0.68. Both the scatter diagram and

correlation coefficients shows that private redevelopment rate of a district tends to be higher in districts with higher percentage of URA, LDC & HKHS projects.

The results of bivariate analysis for the three sets of variables are all positive. They are same as the expected results.

5.3. Empirical results for regression analysis

In part 4.1.2.2 in Chapter 4, the regression model for private redevelopment rate of a sub-district is set as follows:

$$R_r = a_0 + a_1 F_{PR} + a_2 F_{PP} + a_3 F_{LUH} + \varepsilon$$

The three independent variables (F_{PR}, F_{PP}, F_{LUH}) are examined by using a computer program called E-Views. The results are shown in the table below.

Table X Results of the regression model for private redevelopment rate

Independent variables	Coefficients	Standard Error	T-statistic	Prob.
Plot ratio (F_{PR})	0.021187	0.005964	3.552774	0.0006*
Property price(F_{PP})	4.88E-05	1.13E-05	4.312614	0.0000*
Proj. by LDC,URA,HKHS (F_{LUH})	0.293693	0.163045	1.801293	0.0744

* Significant at 1% level

** Significant at 5% level

The results show that the coefficients of all the three independent variables are positive. This complies with the expected results. However not all of them can reach the required significant level (5%). Plot ratio (F_{PR}) and property price (F_{PP}) are shown to be very significant as they are significant within 1% level (less than 1% of chance for the independent variable to be zero). The independent variable (F_{LUH}) is shown to be insignificant. This means that the effect of F_{LUH} on R_r is insignificant

Therefore in the sub-district analysis by regression model, only plot ratio and property price level of a sub-district are found to have a significant positive effect on private redevelopment rate of it. The effect exerted by the redevelopment projects by LDC, URA and HKHS on private redevelopment rate is showed to be insignificant.

5.4. Conclusion

As highlighted in Chapter 4, the three hypotheses are confirmed if they can pass in both simple bivariate analysis and regression analysis.

For Hypothesis 1 – permit plot ratio of an area, positive results are shown in both analyses. In the simple bivariate analysis, permitted plot ratio of a district is found to be positively correlated with the private redevelopment rate of the respective district. In the regression analysis, again permitted plot ratio of the sub-district is found to have a significant positive impact on private redevelopment rate. This means that an increase in permitted plot ratio can increase the private redevelopment rate of the sub-district by holding all other factors constant. Therefore this hypothesis is confirmed to be correct. Permitted plot ratio of an area can exert a 'causation' effect on the private redevelopment rate.

For Hypothesis 2 – private property price level of an area, again positive results are shown in both analyses. In the simple bivariate analysis, private property price level of a district is positively correlated with the private redevelopment of the respective district. That's what predicted under Hypothesis 2. In the regression analysis, private property price level shows a significant positive on private redevelopment rate. Therefore this hypothesis is confirmed to be correct.

For Hypothesis 3 – redevelopment projects carried out by URA, LDC and HKHS, it only passed the simple bivariate analysis. In the simple bivariate analysis, it shows a strong positive correlation with the private redevelopment rate. However this result is exposed to a high degree of error as there are only 14 projects carried out by URA, LDC and HKHS within the study period. The data sample used to in a district level analysis is rather small. Therefore, the interpretation of result should be more relied on the regression analysis which tests the hypothesis in a sub-district level. The result of the regression analysis shows that the effect of redevelopment projects carried out by URA, LDC and HKHS is insignificant to the private redevelopment rate. Therefore Hypothesis 3 is rejected. The positive externality effect exerted by the URA, LDC and

HKHS’s projects on the surrounding environment doesn’t not actually exist.

Chapter 6 Conclusion

This study focuses on private redevelopment progress between 1997 and 2008 in Hong Kong, a 12 year study period. A total number of 612 private redevelopments are identified and analyzed by quantitative approaches. In the following sections, a summary of this study will be presented. The limitation of this study is discussed and suggestions are given for further research.

6.1. Summary of the study

This study attempts to answer an interesting question about what factors can lead to different private redevelopment progress in different areas of Hong Kong. Rather than tackling this question by logical deduction or in a qualitative manner, the author adopted quantitative techniques for investigation. Quantitative analysis is always regarded as more scientific.

A ‘private redevelopment rate’ concept is employed in this study to investigate the private redevelopment progress across different areas. It is found that private redevelopment rate is the highest in Central and Western District; and Wan Chai District. Wong Tai Sin District and Southern District attains the lowest rate among all the districts.

Detail analysis by using simple bivariate technique (i.e. correlation test) and regression model are carried out on three proposed factors, which includes 1) permitted plot ratio of an area, 2) private property price level of an area and 3) externality effect by redevelopment projects undertaken by Land Development Corporation, Urban Renewal Authority and Hong Kong Housing Society. The empirical results show that both permitted plot ratio and the private property price level are significant components affecting private redevelopment in different areas, while externality effects exert by LDC, URA and HKHS projects are found to be insignificant. The results further support that a positive relationship exist between

private redevelopment rate and permitted plot ratio; and between private redevelopment rate and private property price level of an area. This can be easily explained in terms of exploited development potential. As stated by (Ng, 1998), private developers always try to capture the unexploited development potential in different areas through redevelopment. The value of this unexploited development potential of an area depends on two elements: extra gross floor area and private property price. Areas with higher permitted plot ratio could somehow enjoy more extra gross floor area (provided that the existing buildings are of similar scale). A higher private property price level can also enhance the value of the unexploited development potential. A higher property price level or permitted plot ratio can give a higher value of V^R under the optimum redevelopment rule, and the concerned areas appear to be more attractive to private developers for redevelopment.

As private property price levels and permit plot ratio vary from place to place, they exert different impact on the private redevelopment rate in different areas. However it is noted that private redevelopment is affected by a number of factors at the same time. Therefore such effect can only examined by using empirical tests rather than direct observations.

6.2. Limitation of the study

The major limitation of this study mainly comes from the use of proxy and the approximation method. As private redevelopment is not readily observable, a proxy is used to indicate private redevelopments. ‘Consent to commence work’ is selected as the proxy. However the issue of ‘consent to commence work’ doesn’t necessarily to be followed by redevelopment. The buildings which have received the consents can still remain un-demolished, although it is unlikely.

This study intends to assess the private redevelopment rate in an area in terms of gross floor area (GFA). To calculate the total GFA of private properties in a district or sub-district, an approximation approach is adopted. It is assumed that the total GFA of private properties is equal to the area of re-developable land by private developers

times the average height of private buildings in the district. As the re-developable land area is done by hand measurement, there is a certain degree of human error and systematic error. Furthermore, this approximation approach ignored the scale of different buildings in calculating the average number of story of private buildings. For example, if there are two regular buildings, one is 10 story high with footprint $100m^2$ and another is 2 story high with footprint $10m^2$. By using the approximation approach, total GFA of the two buildings = (10+2)/2 x (100 + 10) = $660m^2$. However the actual value = 10x100 +2x10 = $1020m^2$.

6.3. Further research areas

This study has proposed a method to assess the private redevelopment progress in different areas and a mechanism to examine the factors affecting private redevelopment in an area. Further research can be done by focusing on some other factors untouched in this study, like building height restriction of a place and making use of the method and mechanism in this study. Furthermore, a time-series study can be conducted to examine factors affecting private redevelopment in a time-series manner.

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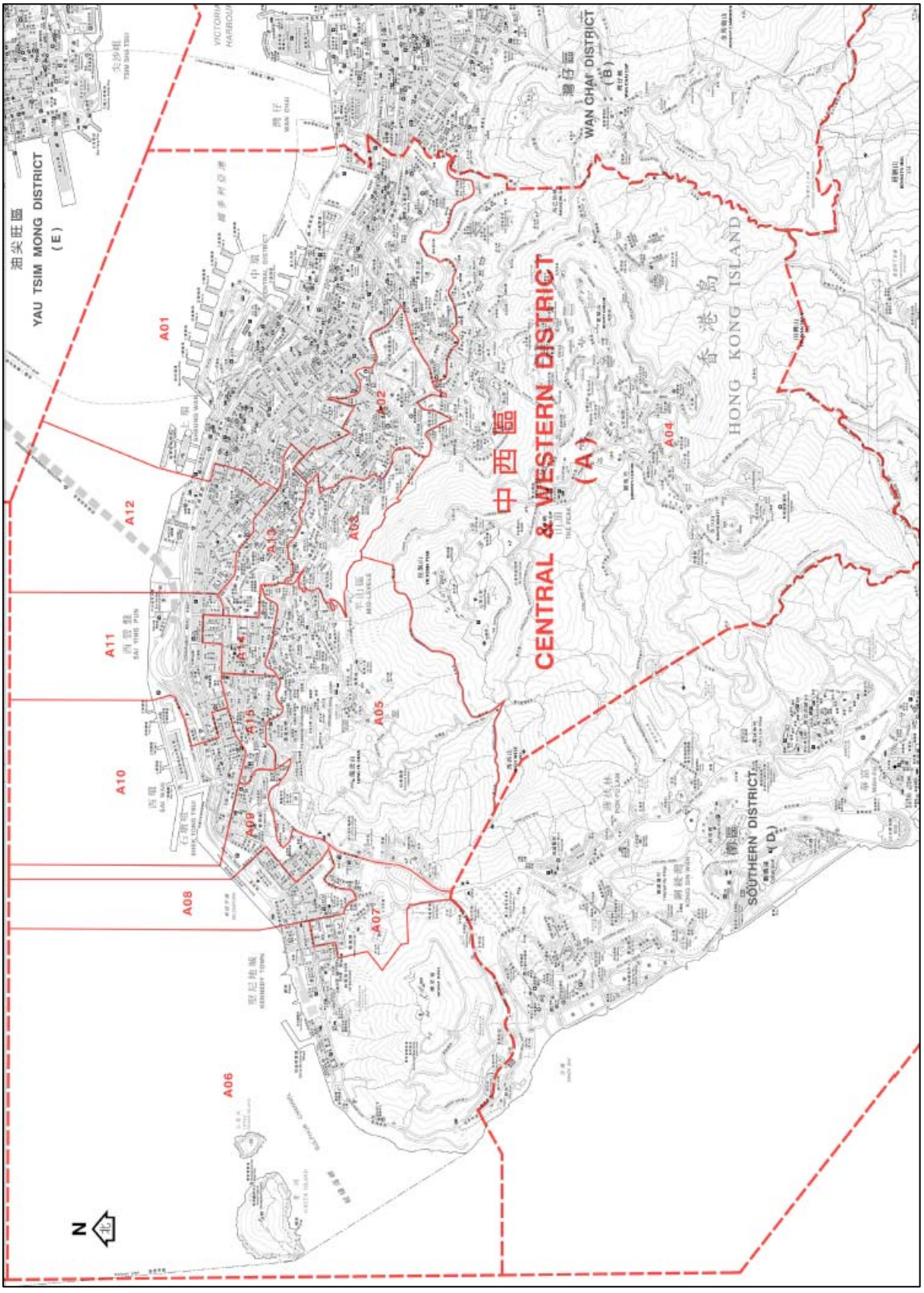
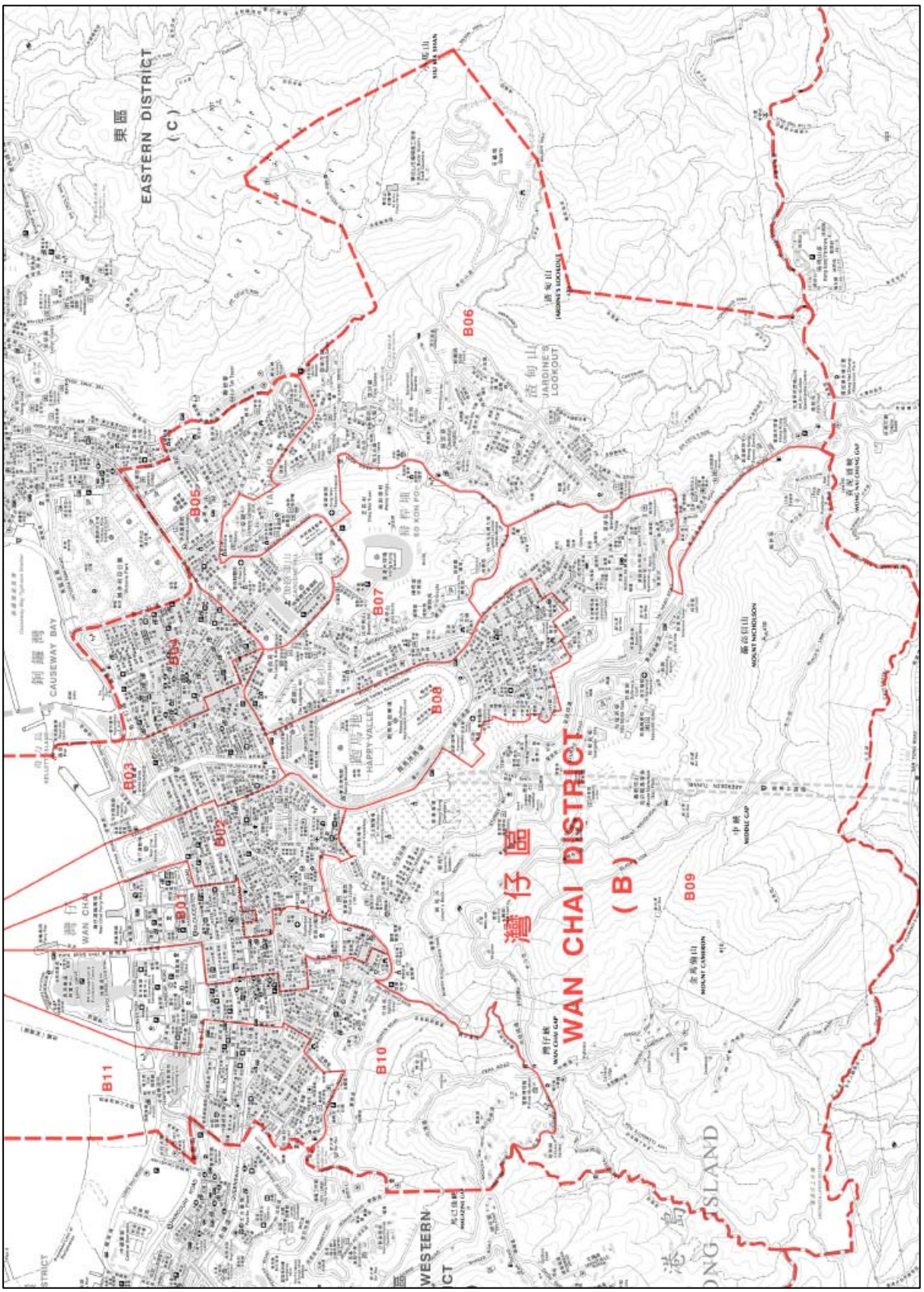
Appendix A Sub-division in Central and Western District (C&W)



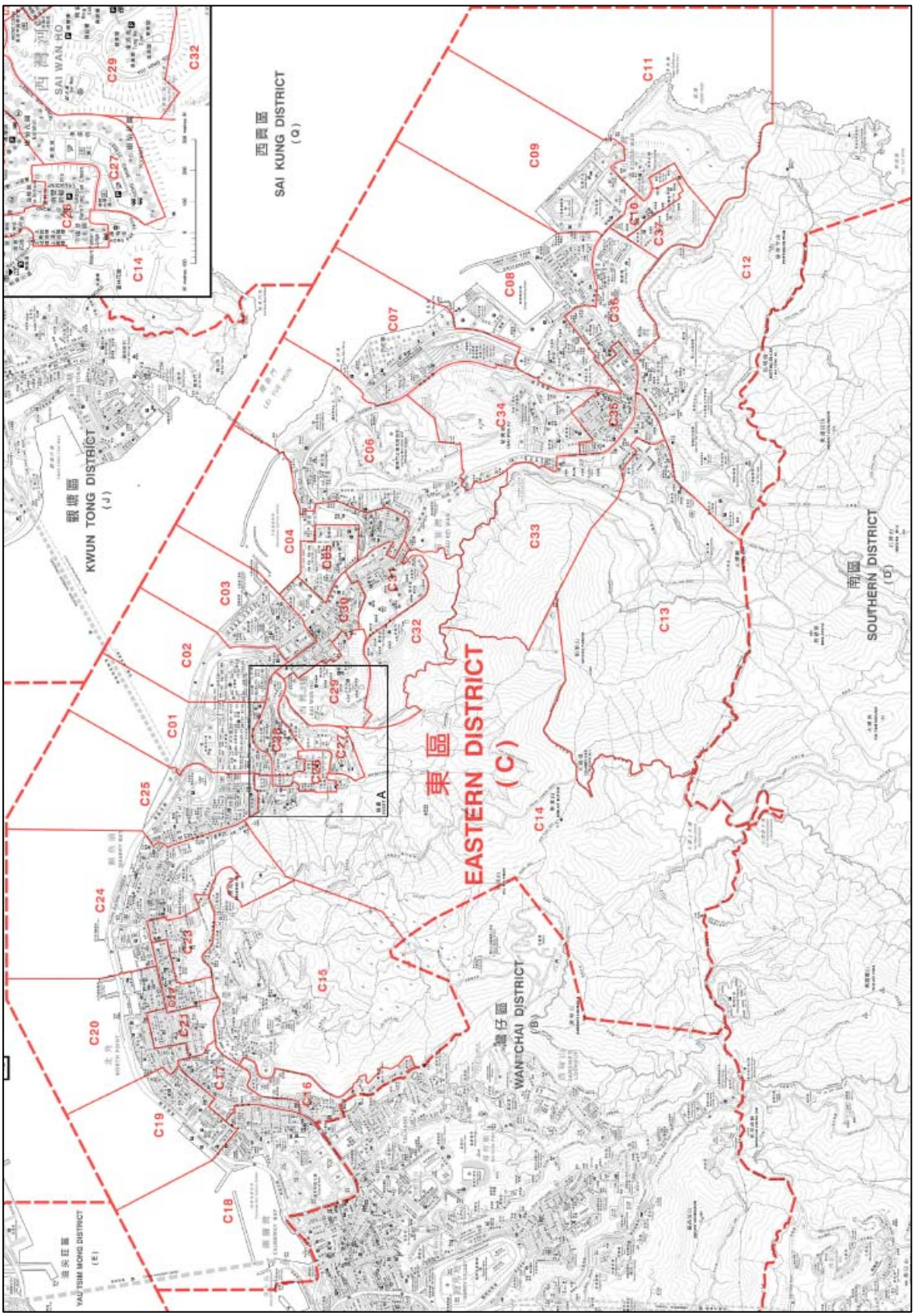
Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix B Sub-division in Wan Chai District (WC)



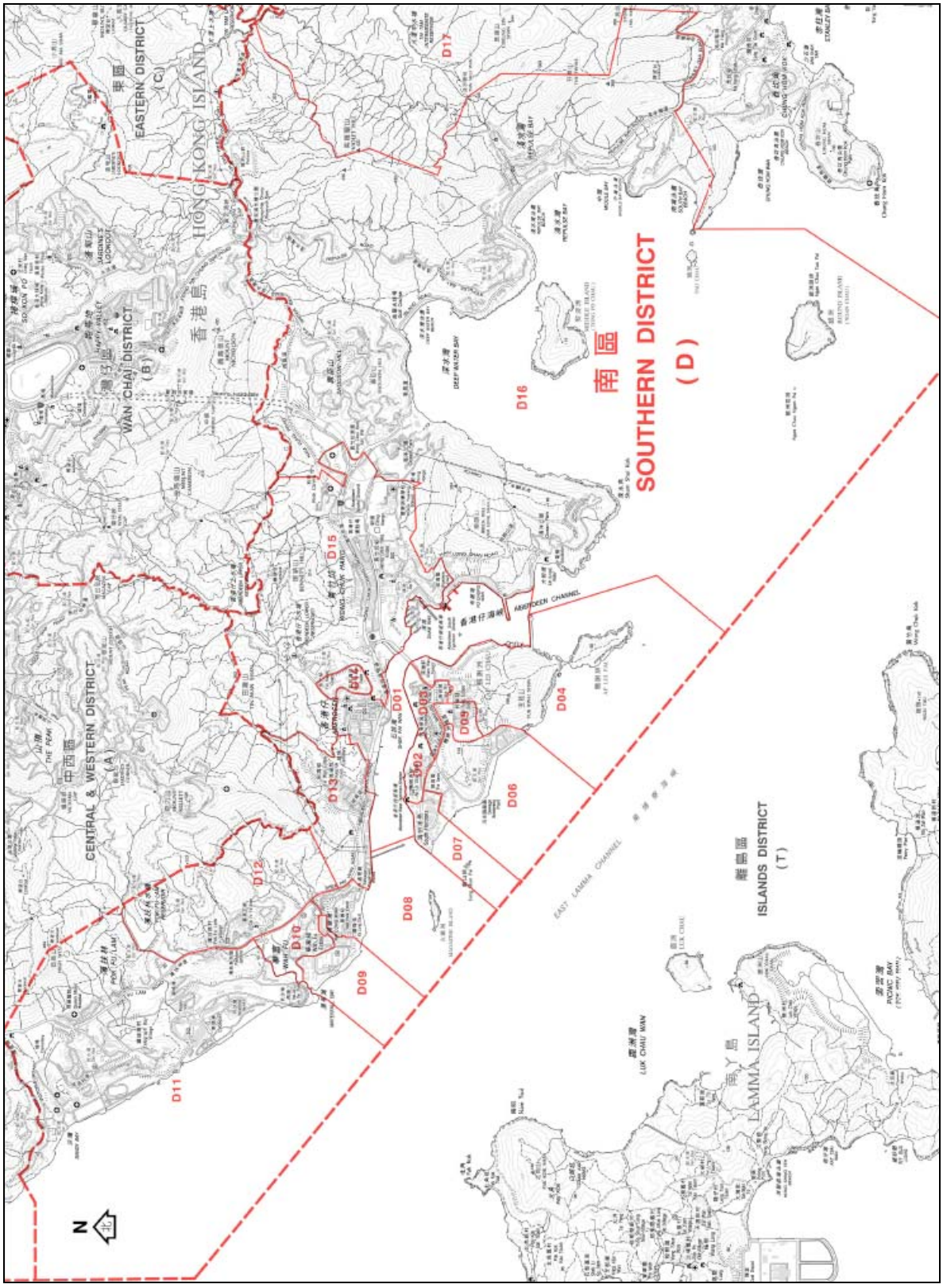
Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix C Sub-division in Eastern District (E)



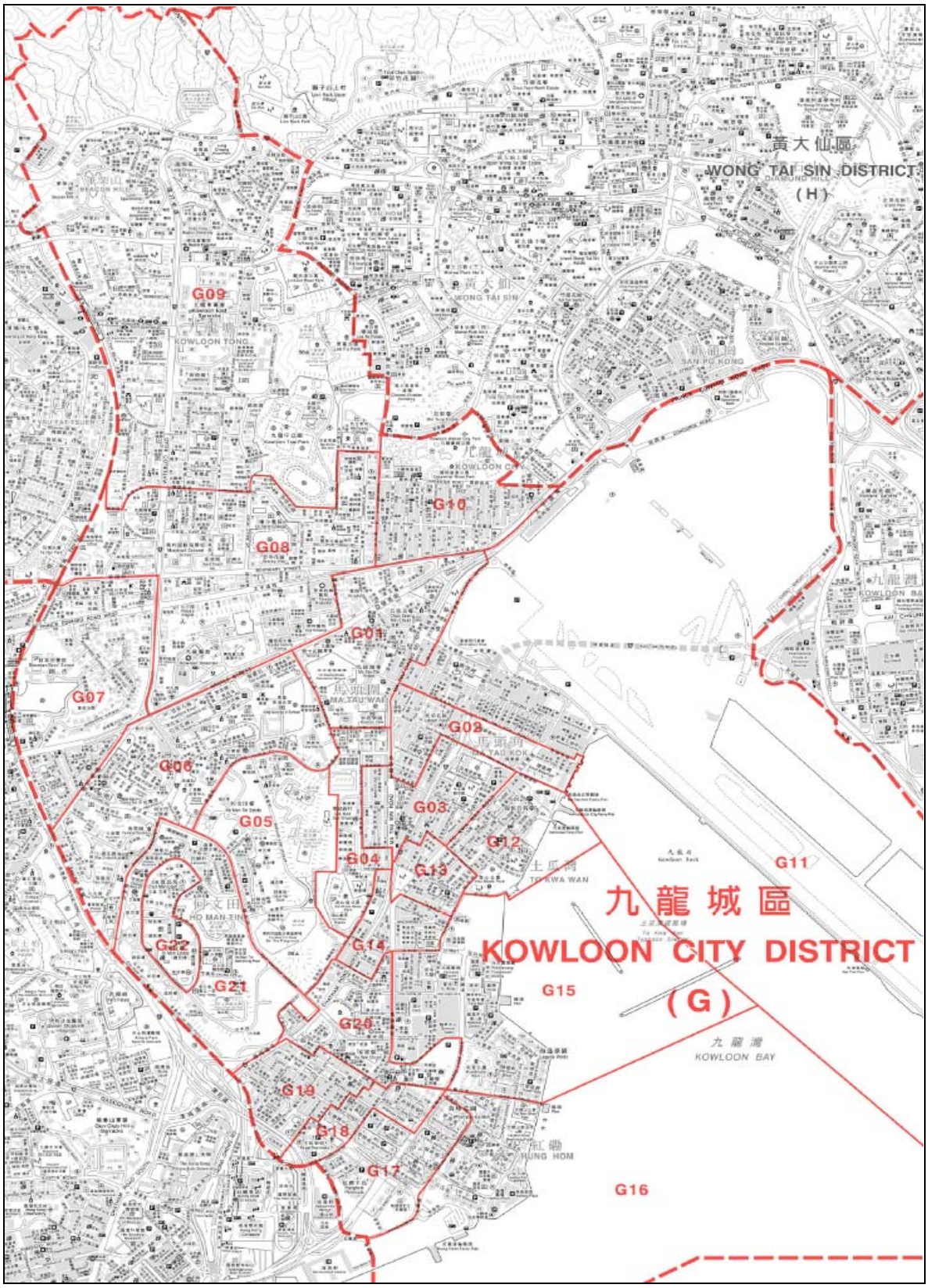
Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix D Sub-division in Southern District (S)



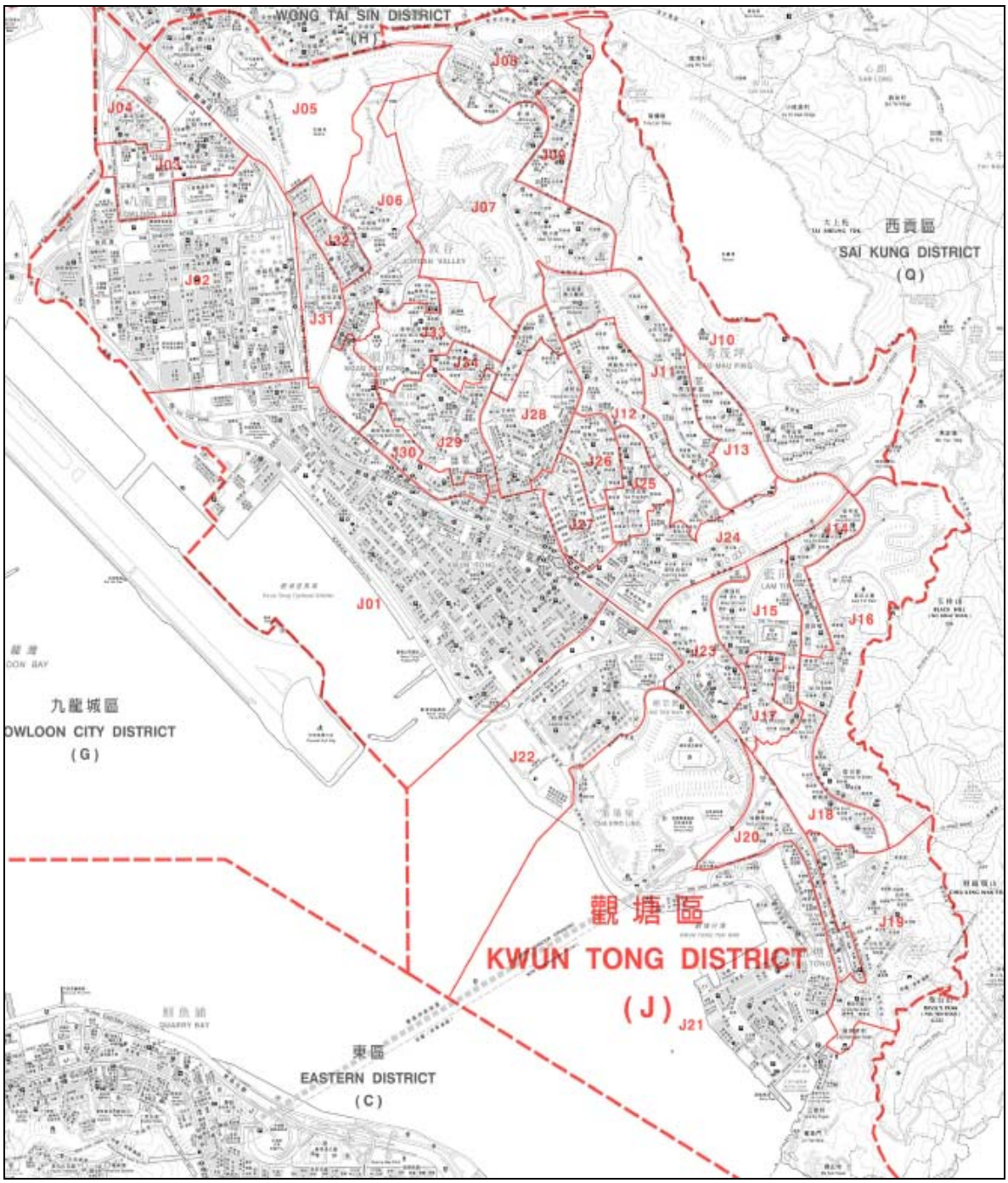
Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix E Sub-division in Kowloon City District (KC)



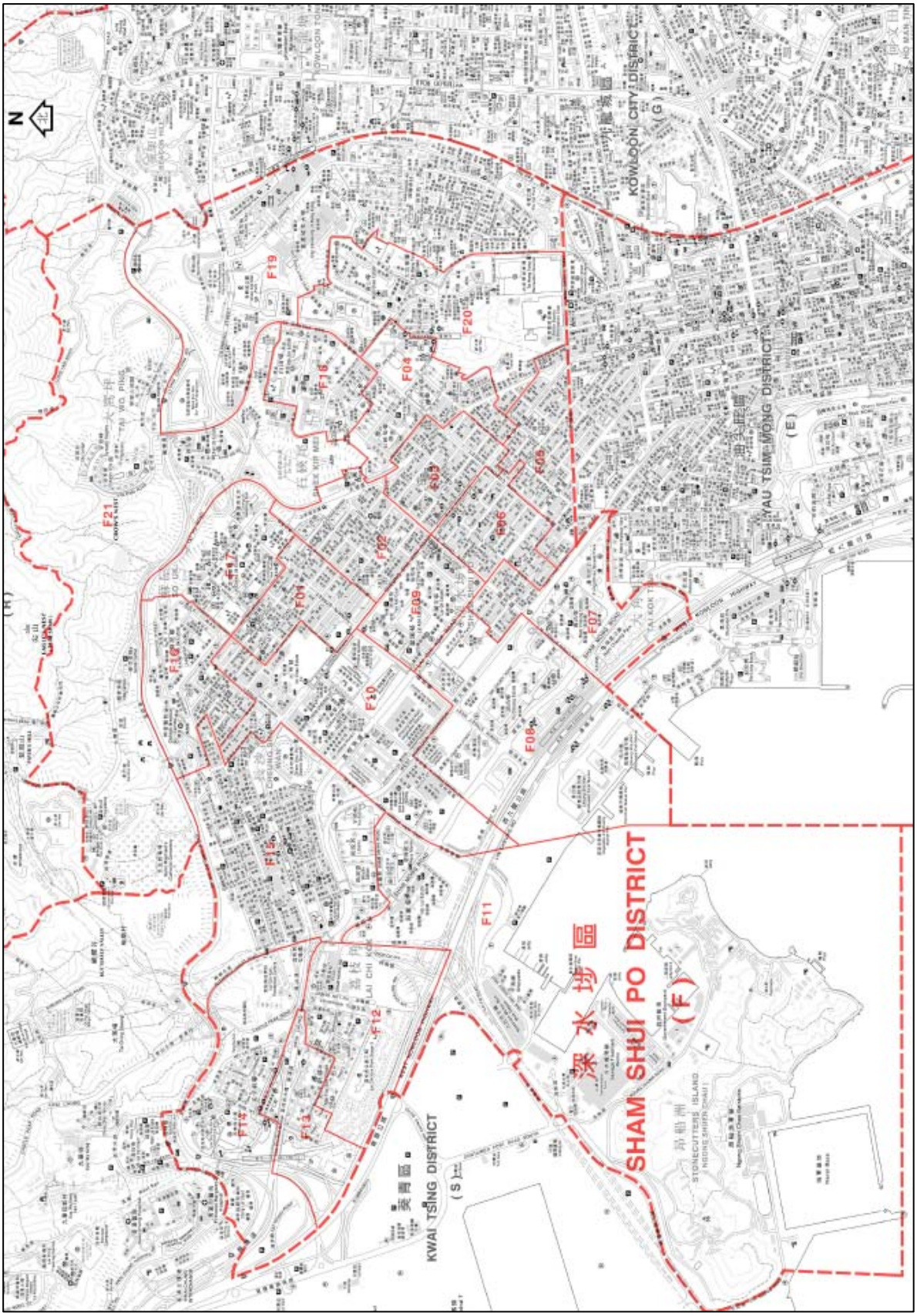
Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix F Sub-division in Kwun Tong District (KT)



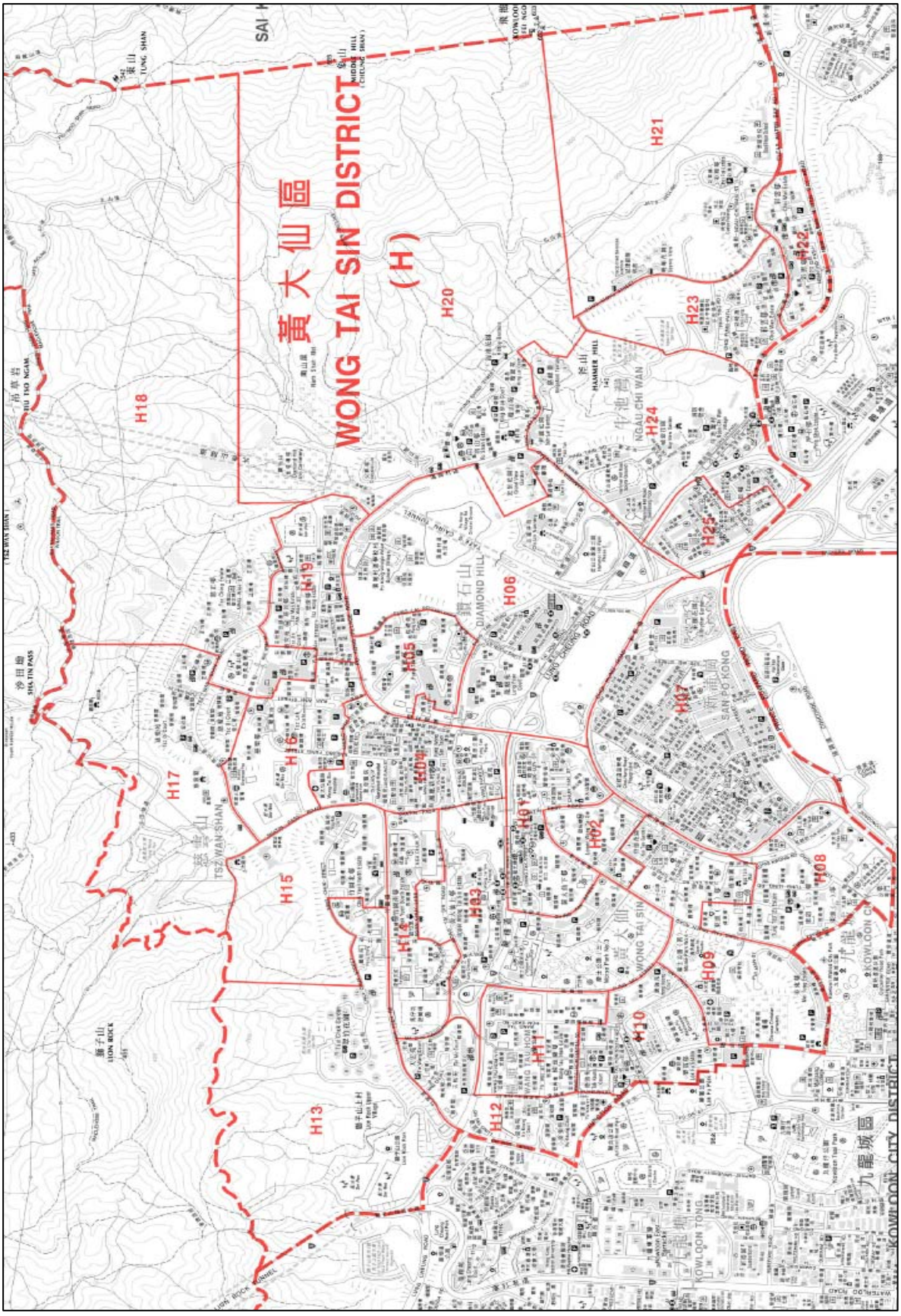
Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix G Sub-division in Sham Shui Po District (SSP)



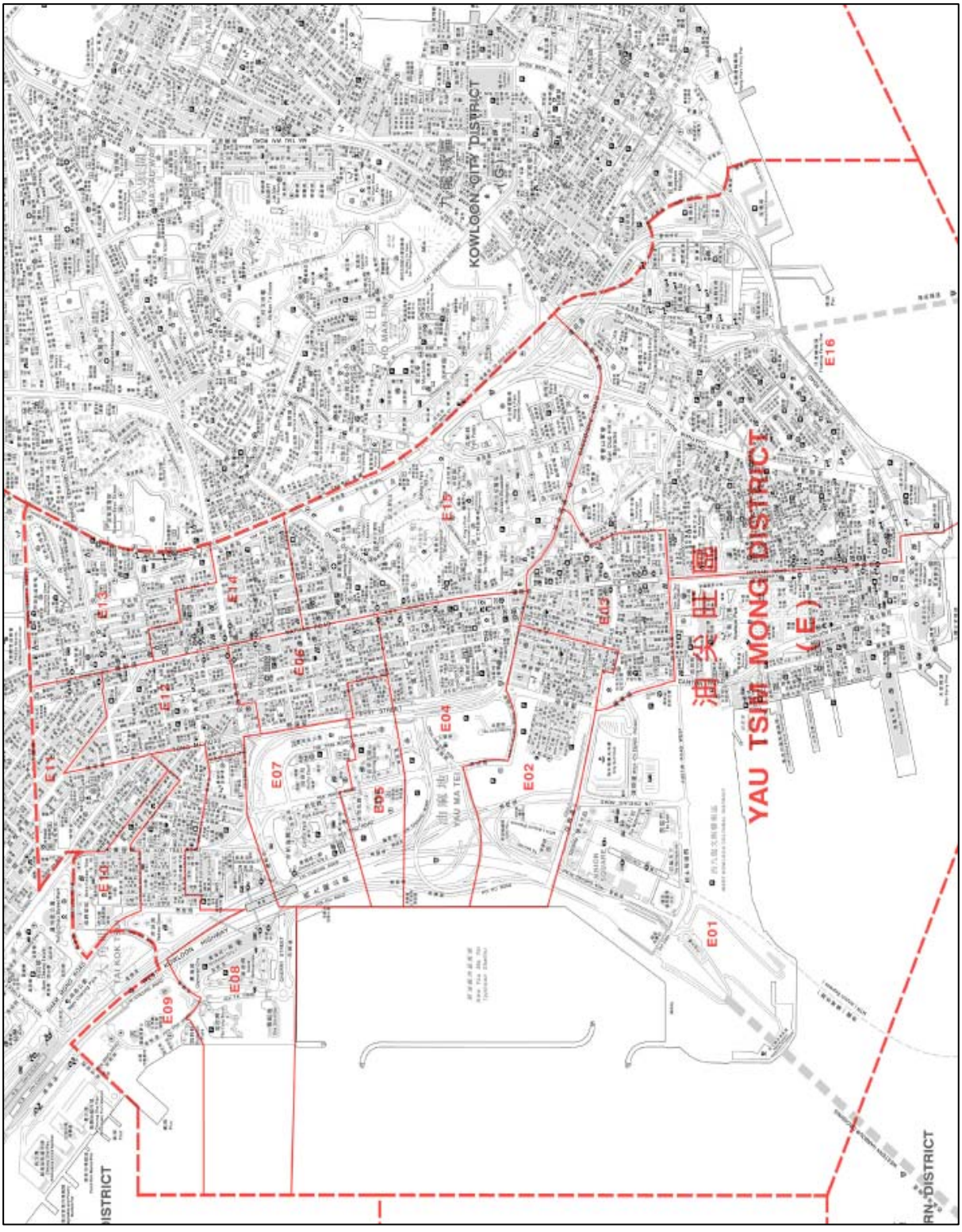
Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix H Sub-division in Wong Tai Sin District (WTS)



Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix I Sub-division in Yau Tsim Mong District (YTM)



Source: District Council Electoral Boundary Map of the Hong Kong SAR, 2007

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008

Year	Address
2008	50-54 Wing Lok Street
2008	26 Mount Kellett Road
2008	6D-6E Babington Path & 11-12 St Stephen's Lane
2008	12-22 Davis Street
2008	50, 55, 57-59 Connaught Road
2008	77-85 Jervois Street & 16-22 Burd Street
2008	20-26 Staunton Street
2008	99-103 Bonham Strand & 127 Wing Lok Street
2008	28 Barker Road
2008	38-44 Caine Road
2008	119-120 Connaught Road Central & 237-239 Des Voeux Road Central
2008	16-18 Conduit Road
2008	38 Conduit Road
2008	37 Severn Road
2008	8 Rednaxela Terrace
2008	87 & 89 Jervois Street
2008	426 Queen's Road West
2008	20, 22, 24 & 26 Cape Road
2008	2 Heung Yip Road
2008	32-34 Stanley Village Road
2008	5-11 & 13-19 South Bay Close
2008	32 Chung Hom Kok Road
2008	3 Henderson Road
2008	16-34 Wood Road
2008	135-139 Thomson Road
2008	32-40 Yiu Wa Street
2008	12 Broadwood Road
2008	235-245 Queen's Road East
2008	6 Shiu Fai Terrace
2008	62 Kennedy Road
2008	9-12 Chun Fai Terrace
2008	1 Oxford Road & 3 Lancashire Road
2008	8 College Road
2008	2 Beacon Hill Road
2008	13 Hok Yuen Street
2008	1 Ma Hang Chung Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2008	157 Argyle Street
2008	48-50 La Salle Road
2008	7 Shing Yip Street
2008	79 Hoi Yuen Road
2008	414 Kwun Tong Road
2008	11 Verbena Road
2008	16 Osmanthus Road
2008	181-183 Pei Ho Street
2008	22, 26 & 28 Tai Po Road
2008	1-19 Granville Road & 100 Nathan Road
2008	60-68 Shanghai Street
2008	7-9 Cheong Lok Street
2008	32-34 Argyle Street
2008	74-76 Shantung Street
2008	590-600 Canton Road
2007	137-138 Connaught Road West
2007	98 Belcher's Street & 41 Smithfield Road
2007	5-11 Stanley Street
2007	1 Wo Fung Street
2007	42-44 Belcher's street
2007	18 Carmel Road
2007	37 Island Road
2007	14 Headland Road
2007	11-12 Headland Road
2007	55 Beach Road
2007	3 Middle Gap Road
2007	5 Moorsom Drive
2007	4-20 Leighton Road
2007	3 Black's Link
2007	20-26 Johnston Road
2007	13-15 Tai Hang Road
2007	28 Yat Sin Street
2007	214-224 Queen's Road East, 9-19 Sam Pan Street
2007	20 Tung Shan Terrace
2007	487-489 Lockhart Road
2007	1 & 1E La Salle Road
2007	38 Sung Wong Toi Road
2007	1 Lincoln road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2007	52 Hung To Road
2007	1 Wang Kwong Road
2007	2 Tai Yip Street
2007	332-338 Tung Chau Street
2007	358-364 Un Chau Street
2007	37-39 Wing Hong Street & 70-72 King Lam Street
2007	27-31 Tai Nan Street
2007	164A & 164B Prince Edward Road West
2007	21-21D Bedford Road & 26-40 Larch Street
2007	33 Cameron Road
2007	35-43 Ivy Street
2007	10 Prat Avenue
2007	63 Nathan Road
2006	108 Hollywood Road& 1-17 Bridges Street
2006	167 Connaught Road West
2006	10, 12, 16 & 18 Pollock's Path
2006	202, 204 & 206 Queen's Road Central
2006	46 Plantation Road
2006	39 Conduit Road
2006	35-37 Hollywood Road
2006	119-120 Connaught Road West
2006	3-5 Plunkett's Road
2006	29 Mosque Street & 35-41 Mosque Junction
2006	880 King's Road
2006	9-23 Kam Hong Street, 72-186 Java Road, & 61-75 Marble Road
2006	26-30 Beach Road
2006	22A, 22B, 22C, 22D Shouson Hill Road
2006	20 Carmel Road
2006	22 Big Wave Bay Road
2006	58 Stanley Village Road
2006	118-122 Tung Lo Wan Road
2006	25-27 Jardine's Bazaar
2006	256 Hennessy Road
2006	217-218 Gloucester Road
2006	223-227 Wanchai Road & 2 Morrison Hill Road
2006	196-206 Queen's Road East
2006	214-224 Queen's Road East & 9-19 Sam Pan Street
2006	25-27 Tung Lo Wan Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2006	440-450 Prince Edward Road West
2006	43-45 Beacon Hill Road
2006	23 Kent Road
2006	2 Lincoln Road
2006	307 To Kwa Wan Road
2006	6 & 6A Wiltshire Road
2006	27 Cumberland Road
2006	4 Somerset Road
2006	14-20 Baker Street
2006	31 Cumberland Road
2006	181-185 Fuk Wing Street & 188-200A Fuk Wa Street
2006	305 Castle Peak Road & 7 Fat Tseung Street
2006	561-563 Fuk Wa Street
2006	155-161 Yee Kuk Street
2006	97 Po Kong Village Road
2006	33 Lai Chi Kok Road
2006	589-601 Reclamation Street
2006	18-30 Bedford Road
2005	419K Queen's Road West
2005	2, 2A, 4-6 Aberdeen Street & 2-4 Tung Wa Lane
2005	202-206 Queen's Road
2005	24 Des Voeux Road Central
2005	30 & 30B Bonham Strand
2005	61-63 Wyndham Street
2005	78 Mount Kellett Road
2005	38-40 Ko Shing Street
2005	31-35A Wellington Street
2005	6, 6A, 8, 8A, 10, 12 12A Sai Wan Ho Street
2005	13-15 Tung Tau Wan Road
2005	120 Stanley Main Street
2005	120 Aberdeen Main Road
2005	19 Shek O Road
2005	216 Victoria Road
2005	77 Deep Water Bay Road
2005	188 Wong Nai Chung Road
2005	4 Monmouth Terrace
2005	52 La Salle Road
2005	51-53 Sa Po Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2005	78, 78A, 78B & 78C Waterloo Road
2005	2 Norfolk Road
2005	31 Grampian Road
2005	51-53 Station Lane
2005	8 Devon Road
2005	83 Hung To Road
2005	392 Kwun Tong Road
2005	111 King Lam Street
2004	60 Victoria Road
2004	1 High Street & 5 Hospital Road
2004	52 Hollywood Road & Graham Street
2004	52-54 Wellington Street
2004	29 Severn Road
2004	73 Mount Kellett Road
2004	92-94 Queen's Road Central
2004	139-141 Bonham Strand
2004	23-25 Centre Street
2004	33 Wellington Street
2004	33 Ka Wai Man Road
2004	66-72 Mount Davis Road
2004	51 Mount Davis Road
2004	15 Yun Ping Road & 25-27 Lan Fong Road
2004	18 Perkins Road
2004	12-16 Fuk Lo Tsun Road
2004	15 Ho Man Tin Hill Road
2004	302-302A Prince Edward Road West & 170A & 170B Boundary Street
2004	8 Wiltshire Road
2004	51-53 Station Lane
2004	8 Essex Crescent
2004	170-178 Pau Chung Street
2004	44 Oxford Road
2004	165-167 Wai Yip Street
2004	18 Tak Hing Street
2004	533-541 Canton Road
2004	388-390 Portland Street
2003	31E,31F& 33-39 Wyndham Street
2003	2-7 Kui In Fong
2003	23 Severn Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2003	136-144 Java Road
2003	1 Connaught Road
2003	42A Macdonnell Road
2003	1 Barker Road
2003	26 Belcher's Street
2003	64-64 A Mount Davis Road
2003	25, 27 & 29 Stanley Village Road
2003	15 Shouson Hill Road West
2003	80-84 Stanley Main Street
2003	53 Mount Davis Road
2003	193-197 Lockhart Road
2003	7B & 7C Tung Shan Terrace
2003	4 Perkins Road
2003	523-527 Hennessy Road
2003	20 Tung Shan Terrace
2003	50A, 50B, 50C Tai Hang Road
2003	24-28 La Salle Road
2003	7 Essex Crescent
2003	19 Sze Shan Street
2003	13A Chong Yip Street
2003	8 Cheung Yee Street
2003	1 Po Lun Street
2003	6B-6E Hart Avenue
2003	10 Nelson Street & 76A-76E Fa Yuen Street
2003	3 Jordan Road
2003	65-67 Tai Nan Street
2003	46-48 Anchor Street
2003	186-188 Sai Yeung Choi Street
2002	56 Peak Road
2002	31 Barker Road
2002	2 Park Road
2002	4-6 St Stephen's Lane
2002	22-24 Gough Hill Road
2002	1-4, 7-10 West End Terrace & 11-11A Bonham Road
2002	144-148 Wellington Street
2002	68-82 Ko Shing Street, 15 Li Sing Street & 14A Sutherland Street
2002	28 Borrett Road
2002	3-7 Mosque Junction & 28 Robinson Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2002	60 Peak Road
2002	40-42 Peak Road
2002	3-5 Gough Hill Path
2002	2A & 12 North Street
2002	14-16 Shipyard Lane
2002	244-254 Shau Kei Wan Road
2002	18 King's Road, 7-9 Lau Sin Street & 15 Tin Hau Temple Road
2002	72 Deep Water Bay Road
2002	20 Tin Wan Street
2002	33-35 Island Road
2002	42A-E Island Road
2002	192 Victoria Road
2002	89-91 Repulse Bay Road
2002	26 Middle Gap Road
2002	23-45 Sharp Street East & 11-13 YiuWa Street
2002	3 Coombe Road
2002	517 Jaffe Road
2002	1 Queen's Road East
2002	1 Moorsom Drive
2002	79 Sing Woo Road
2002	13-15 Tai Yuen Street
2002	12-14 PakSha Road
2002	28 Peak Road
2002	353-355 Hennessy Road
2002	10-14 South Wall Road
2002	6 York Road
2002	1 Derby Road
2002	145-151A Kau Pui Lung Road
2002	377 Prince Edward Road West
2002	15-17 Fuk Lo Tsun Road
2002	24 Oxford Road
2002	2C & 2D San Lau Street
2002	18 Farm Road
2002	20 & 22 Fuk Lo Tsun Road
2002	12 Kai Shing Street
2002	416-424 Kwun Tong Road
2002	58A-58D Yen Chow Street
2002	322 Shanghai Street

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2002	759-761 Nathan Road
2002	157 Prince Edward Road West
2002	23-29 Jordan Road
2002	55-61 Carnarvon Road, 24-26 Kimberiey Road & 38-40 Kimbertey Street
2002	9-11 Cheung Wong Road
2002	102-104 Austin Road
2002	15-21 Fa Yuen Street
2001	27-37 Centre Street
2001	80-90 Des Voeux Road West
2001	1-11 Ngan Mok Street
2001	1 & 3 Greig Road
2001	31 Tin Hau Temple Road
2001	50-52 Wharf Road & 33-39A North Point Road
2001	43-45 Tin Hau Temple Road
2001	979 King's Road
2001	122-128 Chun Yeung Street
2001	10-18 Wharf Road
2001	87 Repulse Bay Road
2001	110 Repulse Bay Road
2001	34 Island Road
2001	82 Chung Hom Kok Road
2001	57 Shouson Hill Road
2001	35 Deep Water Bay Road
2001	6 & 10 Black's Link
2001	21 Tung Shan Terrace
2001	12B Bowen Road
2001	15 Mount Cameron Road
2001	3 Village Terrace, Village road
2001	11-19 Ship Street, Wanchai
2001	11 Durham road
2001	8 Lincoln Road
2001	16,18,20 & 22 Hampshire Road
2001	1-7 Lion Rock Road
2001	356 Ma Tau Wai Road
2001	1S Fuk Lo Tsun Road
2001	412-418 Ma Tau Wai Road
2001	156 Waterloo Road
2001	26 Oxford Road
2001	83 Waterloo Road
2001	19 Kent Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2001	9 College Road
2001	60-66 Baker Street & 2-6 Baker Court
2001	370 KwunTong Road
2001	192-200 Yee Kuk Street
2001	477-499 Shun Ning Road
2001	143-151 Reclamation Street
2001	8-14 Mau Lam Street
2001	100-l00A Fa Yuen Street
2001	IC-IF Kwong Wa Street, 22-30 Yin Chong Street & 1-11,2-4 Kwong Yung Street
2000	166-170 Queen's Road Central & 117-121 Wellington Street
2000	9-12 Hing Hon Road
2000	21A-21B Lyndhurst Terrace & 40 Cochrane Street
2000	20-34 Hau Wo Street
2000	16 Ice House Street
2000	57 Plantation Road
2000	15 Mosque Street
2000	2 Queen's Road Central
2000	11 Chater Road
2000	11-15 Macdonnell Road
2000	22-24 Plunkett's Road
2000	71 Mount Kellett Road
2000	3 Tai Ning Street
2000	28 Java Road
2000	2G, 2H & 2F Marble Road
2000	180 Tung Lo Wan Road
2000	22-28 Mercury Street
2000	913-919,929-935 King's Road
2000	116 Pok Fu Lam Road
2000	2 Cape Drive
2000	16E Shouson Hill Road
2000	34-38 Chung Hom Kok Road
2000	3 South Bay Close
2000	26 Peak Road
2000	7 Sing Woo Crescent
2000	486-488 Jaffe Road
2000	99 Hennessy Road
2000	6-16 Russell Street

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
2000	31 San Shan Road & Kowloon City Road
2000	141-149 Thomson Road
2000	49 Village Road
2000	6 Cheung Yue Street
2000	363 Tai Po Road
2000	128 Tai Po Road
2000	123 Bulkeley Street
2000	9 Durham Road
2000	1 Ho Man Tin Hill Road
2000	51A, 5 1B & 53 Nga Tsin Wai Road
2000	47-49 La Salle Road
2000	165-167 Wai Yip Street
2000	33 Po Kong Village Road
2000	2-20A Minden Avenue & 4-8 Blenheim Avenue
2000	18-24 Fa Yuen Street
2000	138-144 Sai Yeung Choi Street
2000	2W & 2X Sai Yeung Choi Street
2000	7-9 Minden Avenue
2000	3 Ashley Road
2000	239-243 Fa Yuen Street
2000	199-205 Portland Street
2000	611-615 Nathan Road
2000	11-21 Cheong Lok Street
2000	201 Tai Kok Tsui Road & Fuk Lee Street
1999	284-288 Queen's Road West
1999	7-11 Li Yuen Street East
1999	62B Robinson Road
1999	155-163 Belcher's Street
1999	21 D'Aguilar Street & 19 Wing Wah Lane
1999	18-24 Pokfield Road
1999	115-117 Caine Road, 1-6 Po Wa Street & Shing Wong Street
1999	82 Peak Road
1999	8 Queen's Road Central
1999	2A Arbuthnot Road & 54-56 Wyndham Street
1999	43 Barker Road
1999	663 King's Road
1999	72-76 Shaukeiwan road
1999	7-8 Fuk Kwan Avenue
1999	979 King's Road
1999	88 Hing Fat Street & 13-15 Gordon Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
1999	56 Chung Hom Kok Road
1999	148A, 148B & 148-160 Tung Lo Wan Road
1999	49-55 Java Road
1999	50 Repulse Bay Road
1999	12 Big Wave Bay Road
1999	12,14,16 Tai Tam Road
1999	12 Big Wave Bay Road
1999	29-31 South Bay Close
1999	11-15 Tin Wan Street
1999	2-3 Goldsmith Road
1999	6 Wang Fung Terrace
1999	152 Tai Hang Road
1999	40-42 Yun Ping Road & 17-19 Jardme's Crescent
1999	1 Star Street
1999	41D Stubbs Road
1999	5-7 Blue Pool Road
1999	9 Middle Gap Road
1999	110-114 Johnston Road
1999	8B-10 Tai Hang Road
1999	69A-69B Sing Woo Road, 6-16 Lun HJng Street
1999	2-10, 10A-10E Kennedy Street
1999	125 Wan Chai Road
1999	2-12 Shelter Street
1999	4 & 4A Hampshire Road
1999	9 Wiltshire road
1999	337-339A Prince Edward Road West
1999	7 Oxford Road
1999	11B Cambridge Road
1999	41-47 Baker Street
1999	6-8 Stafford Road
1999	121-127 Wuhu Street
1999	401-407 Chatham Road North
1999	106-118 Wuhu Street
1999	167-169 Boundary Street
1999	73D Waterloo Road
1999	81 Waterloo Road
1999	155 Argyle Street
1999	18A La Salle Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
1999	13 & 15 Lancashire Road
1999	33 Yin Chong Street
1999	59-61 Temple Street
1999	222, 222A, 222B & 222C Fa Yuen Street
1999	26A Jordan Road
1999	579 & 579A Nathan Road
1999	41-47 Waterloo Road
1999	2-6 Bowring Street
1999	2- 10A Yen Chow Street
1999	61 Berwick Street
1999	256-258 Tung Chau Street
1999	283-297 Shun Ning Road
1998	60-68 Des Voeux Road
1998	1 & 3 Bonham Strand West, 165-167 Wing Lok Street & 135 Bonharn Strand
1998	10-12 Ying Wa Terrace
1998	15 Aberdeen Street
1998	8 U Lam Terrace
1998	2-4 &4B Ying Fai Terrace
1998	83 Catcbick Street & 28 NewPraya Kennedy Town
1998	76-84 Staunton Street, 1-7 Wa In Fong East & 12-14 Wa In Fong West
1998	36-38 Tai Ping Shan Street
1998	2 BowenRoad
1998	1, 5, 7, 7A, B, C & D Seymour Road
1998	78-80 Robinson Road & 10 BonhamRoad
1998	83-95 First Street
1998	68 Robinson Road
1998	419E Queen's Road West
1998	11 Plantation Road
1998	56 Plantation Road
1998	63 Mount Kellett Road
1998	44 Kennedy Road
1998	35-37 Gage Street & 2-10 Kin Sau Lane
1998	633-635 King's Road
1998	J/O 1060 King's Road & Greig Road
1998	18,2Q,20A&24 Tin Hau Temple Road
1998	1063 King's Road
1998	14-16 Shipyard Lane

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
1998	67-71 Bisney Road
1998	40 Fort Street
1998	136-142 Java Road
1998	1-5 Chung On Terrace
1998	16-22 Ming Yuen Western Street
1998	J/O 9-15 Tong Shui Road & Java Road
1998	J/O 30 Factory Street & Tai Tak Street
1998	90 Stanley Main Street
1998	124 Pokfulam Road
1998	25-27 South Bay Close
1998	71 Deep Water Bay Road
1998	1-9 Shouson Hill Road East
1998	75 Deep Water Bay Road
1998	12 Big Wave Bay Road
1998	33 Tung Tau Wan Road
1998	244 Aberdeen Main Road
1998	30-48 Russell Street & 25-29 Tang Lung Street
1998	25-27 Yuk Sau Street
1998	22 Perkins Road
1998	9-33,20-22 Star Street & 21-23 Momnouth Path
1998	73 Sing Woo Road
1998	82 Stone Nullah Lane
1998	22 Middle Gap Road
1998	10- 12 Peak Road
1998	42 & 44 Blue Pool Road
1998	65-67 Cooke Street
1998	18 Cumberland Road
1998	68-68A Wuhu Street
1998	28 Tin Kwong Road Phase II
1998	71-73 PakTai Street
1998	6 & 8 Oxford Road
1998	3-3A Oxford Road
1998	38A Ko Shan Road
1998	46 Hoi Yuen Road & 68 Hung To Road
1998	634-638 Cheung Sha Wan Road
1998	25-27 Tai Po Rd
1998	33-39 Pei Ho Street
1998	298 Un Chau Street

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
1998	5-9 Observatory Court
1998	38 Hing Wah Street
1998	789 Cheung Sha Wan Road
1998	195 A & I95B Castle Peak Road
1998	32-34 Po On Road
1998	777 Lai Chi Kok Road
1998	112-134 Wan Fung Street
1998	666 Nathan Road
1998	196-198 Nathan Road
1998	230-238 Nathan Road
1998	20-22 Pitt Street
1998	620-628 Nathan Road
1998	2X & 2W Sai Yeung Choi Street
1998	171 Prince Edward Road West
1998	11 Changsha Street
1998	50-52 Cameron Road
1997	38C Bonham Road
1997	54-56 Bonham Strand West
1997	74 Mt Kellett Road
1997	36 Queen's Road Central
1997	244-258A Des Voeux Road West
1997	16-19 Tai Pak Terrace
1997	9 May Road
1997	23 Hollywood Road
1997	1-3 Staunton Street
1997	1,2,3 Leung Fai Terrace
1997	11 Sands Street
1997	42-50 Wellington Street
1997	39-41 Hill Road
1997	43-45 Lyndhurst Terrace
1997	69-73 Hollywood Road
1997	235-237 Wing Lok Street
1997	88-91 Connaught Road West
1997	2 Gough Hill Road
1997	97A Wellington Street
1997	10-22 Chung Wo Lane
1997	68 Robinson Road
1997	49-51 Centre Street

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
1997	1063 King's Road
1997	17 Wo On Lane
1997	348-356 Queen's Road
1997	23 Centre Street
1997	5-7 Lau Li Street
1997	50-52 Wharf Road
1997	51 Shau Kei Wan Main Street East
1997	243-255 King's Road
1997	76-92 Chun Yeung Street
1997	101 King's Road
1997	1-11 Ngan Mok Street
1997	39A Island Road
1997	Turtle Cove
1997	127 Repulse Bay Road
1997	12-12A Stanley Beach Road
1997	1, 3, 5 Yue Wok Street & 8, 10, 12 Yue Lai Street
1997	8 Tai Tam Road
1997	29-31 Tung Tau Wan Road
1997	9-33 & 20-22 Star Street (G/F to podium floor)
1997	513-517 Hennessy Road
1997	9 Ship Street
1997	11-13 Morrison Hill Road
1997	490-498 Jaffe Road
1997	137-141 Queen's Road
1997	197-199 Wan Chai Road
1997	14-16 Lin Fa Kung Street West
1997	47-55 Wun Sha Street
1997	46-52 Jardine's Bazaar
1997	92-98 Thomson Road
1997	10 Perkins Road
1997	6 Peace Avenue
1997	3 Norfolk Road
1997	1-1A Oxford Road
1997	17 Lancushire Road (蘭開夏道)
1997	22 Sung Wong Toi Road
1997	34-40 Tin Kwong Road
1997	40 Oxford road
1997	9, 9A-C Victory Avenue
1997	12 York Road
1997	11-13 Wiltshire Road

Appendix J List of private redevelopments in Hong Kong Island and Kowloon from 1997 to 2008 (Cont')

Year	Address
1997	315, 315C & 315D Prince Edward Road West
1997	64 Nga Tsin Wai Road
1997	23 La Salle Road
1997	70-82 Ma Tau Wai Road
1997	28-33 Oxford Road
1997	26 Hung To Road
1997	25 Chong Yip Street
1997	61 Hoi Yuen Road
1997	181 Hoi Bun Road
1997	74 Hung To Road
1997	51 Tsun Yip Street
1997	161 Wai Yip Street
1997	777 Lai Chi Kok Road
1997	134-136 Fuk Wing Street
1997	682-684 Castle Peak Road
1997	182-186 Fuk Wa Street
1997	95-97 Yu Chau Street
1997	38-48 Shun Ning Road
1997	7 Wing Hong Street
1997	609-611 Tai Nan West Street
1997	70-76 Nam Cheong Street
1997	28 Austin Avenue
1997	62-64 Oak Street & 10 Anchor Street
1997	92-98 Parkes Street
1997	343-361 Nathan Road
1997	474 Nathan Road
1997	29-29A Granville Road
1997	206 Portland Street
1997	49-55 Shanghai Road
1997	132-134 Nathan Road
1997	10-12 Canton Road
1997	25-27 Lock Road
1997	5 Kimberley Street
1997	1B & 1C Kimberley Street
1997	50 Shantung Street
1997	143 Reclamation Street
1997	9 Ashley Road