Implications for sustainable land use in high-density cities: Evidence from Hong Kong

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ABSTRACT

Sustainable land use policies are concerned with the kind of world we want to live in now, and in future, and therefore inevitably involve some form of community involvement or consultation process. Hong Kong's sustainable land use planning system is well developed, involving considerable community participation and therefore serves as a good model for similarly situated cities. However, although there are several recent studies involving aspects of its land use planning system, none has yet examined the system as a whole from the perspective of sustainability.

To correct this, this paper describes the land use conditions of Hong Kong from both demand and supply perspectives, reviewing its statutory and administrative procedures of land development and allocation together with the sustainable urban renewal practices involved. Problems in current sustainable land use planning and management, such as difficulties in urban renewal, the inherent shortage of land and the lengthy time involved due to need for coordination and responsiveness to multiple stakeholders, and outdated and overcomplicated administrative processes were also analyzed.

Keywords: Sustainable land use planning, Hong Kong, urban renewal, problems in practice.

INTRODUCTION

The debate over the concentration or planning of sustainable land use development has had a long history, and has been attracting prioritized academic attention since the widespread acceptance of the ideas of sustainability. Physically, land use varies between different cities due to different terrain conditions, populations, legal restrictions, cultures, etc. For example, in a city with a high population density, the pattern of land use is always compact, mixed and efficient. In contrast, if a city has a low population density or hilly terrain, a reasonable land-use layout (urban form) that can provide convenient living services to its citizens is often more important than exploring the potential for efficient land use. Land use policies, therefore, need to be developed according to local characteristics and development.

Sustainable land use policies are concerned with the kind of city/region that we want to live in now, and in future, and therefore inevitably involve some forms of community involvement or consultation process (Watson, 2015). Although such policies may differ in specific standards and regulations, however, they have a common objective, which is to adapt to practical land-use conditions and serve for building a sound legal system of land development and management in which community involvement is recognized and supported. Previous studies on sustainable land use have been widely conducted in the US, the UK, and European countries (e.g., Collins et al., 2001; Pauleit et al., 2005; Young et al., 2005; Reginster & Rounsevell, 2006; Adam & Fritzsche, 2012; Musakwa &

Niekerk, 2013), aiming to provide theoretical and practical reference for sustainable land-use policy making in the cities. Land is relatively scarce in metropolises such as the Hong Kong Special Administrative Region of the People's Republic of China due to the continual attraction of immigrant employment placing increasing demands on urban development. Hong Kong's sustainable land use planning system includes considerable community participation (e.g., Ng et al., 2014) and therefore serves as a good model for similarly situated cities. In other words, Hong Kong is a very typical high-density city with the combination of rapid population growth and limited land resources made a high-rise and high-density development approach become necessary. The fact can be illustrated by a few figures. In 1958, the built area was 57 km^2 accounting for 5% of a total land area of 979 km^2. However, around 80% of the undeveloped land area was hilly, with slopes mostly ranging from 30 to 45 degrees (Gregory, 1964). In this context, there is an extreme scarcity of land for urban growth and urgent need for seeking sustainable land use for Hong Kong. Therefore, Hong Kong was chosen as the target city in this study to illustrate how tailored land use policy was made to achieve sustainable land use development. However, although there are several recent studies involving aspects of its land use planning system (e.g., Tang & Ho, 2015; Wang et al., 2014; Cheung & Tang, 2013; Cheung, 2015; Lai et al., 2001), none has yet examined the system as a whole from the perspective of sustainability.

This paper seeks to correct this situation by describing the land use conditions of Hong Kong from both demand and supply perspectives, reviewing its statutory and administrative procedures of land development and allocation together with the sustainable urban renewal practices involved. The analysis of land demand and supply

explores the driving forces of land use changes, while a summary of the statutory procedures for land management helps identify the main issues that are affecting the sustainable land-use allocation in practice. Problems in current sustainable land use planning and management, such as difficulties in urban renewal, the inherent shortage of land and the lengthy time involved due to the need for coordination and responsiveness to multiple stakeholders and outdated and overcomplicated administrative processes are also analyzed.

Sustainable land use in high-density cities: literature review

The United Nations World Commission on Environment and Development defines sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their own needs (Yaakup et al., 2005). As a result of the political agenda of sustainable development, the significance and approaches to sustainable urban development in high-density cities have been extensively discussed in international literature (Breheny, 1992; Campbell, 1996; Bruff and Wood, 2000; Thinh et al., 2002; Chan and Lee, 2008; Fischer and Amekudzi, 2011; Long et al., 2014). In terms of sustainable land use, Li and Liu (2008) claimed that sustainable land use should coordinate the land-use demand from multiple aspects and different interest groups, and a useful tool can be provided to alleviate land-use conflicts. The sustainability of land use implies not only the sustainability of land use model and biological production on the temporal scale, but also includes the optimization of land use patterns on the spatial scale (Peng et al., 2007; Zhang et al., 2011). Particularly, in high-density cities, the sustainability of land use can be reflected in the sustained capacity of supporting the urban future development with limited land resources.

Some researchers have focused on urban form/land use pattern in compact cities to explore what sustainable land use is. For example, Breheny (1992) presented a review paper on the contradiction inherent in compact cities, and deeply analyzed the close relationship between urban form and sustainable development. Welbank (1996) made a further search for a sustainable urban form, and thought that the compact city can be a sustainable form. Kombe (2005) paid attention to land use dynamics and its implications on the urban growth and form. Land use and land cover change (LUCC) helps interpret the interactive mechanism of land use/cover changes between human driving forces and environmental responses, which has been studied in some high density cities (Weng, 2002; Herold et al., 2005; Turan et al., 2010). Land use planning directly regulates urban future land-use development, and some researchers have discussed sustainable land use in high-density cities from the perspective of land use planning, including land suitability analysis (Bruff and Wood, 2000; Joerin et al., 2001; Pourebrahim et al., 2011). Due to the complexity of urban systems, urban land aims to support more socio-economic activities such as large-scale constructions, public facilities and infrastructure than suburban land, and the complexity becomes higher in high-density cities. In order to improve the sustainability of urban land use, some researchers have looked into urban land carrying capacity from different perspectives (Rees and Wackernagel, 1996; Oh et al., 2005; Du et al., 2006).

Although there are some recent studies relating to sustainable land use in compact/high density cities, none has yet examined local land use policies as a whole system with the consideration of sustainability. There is a necessity to systematically analyze sustainable land use policies and introduce the whole system as a good model in this paper to provide

more insights and implications for sustainable land use in the context of high-density cities.

LAND DEMAND AND SUPPLY IN HONG KONG

Land Demand

As a world city in Asia, Hong Kong is an international financial and service center, serving as a hub for logistics and information services, and a premier world tourist destination (Shen et al., 2009). The region has over 7 million people, with an average population density of 6,500 persons/km^2 (over 20,000 persons/km^2 in metropolitan areas). Hong Kong also has very limited land resources (approximately 1,100 km^2), consisting of Hong Kong Island, the Kowloon Peninsula and New Territories with many small islands - all dominated by hilly terrain, 84% of which is unfavorable for urban and agricultural development (Ye, 1998). Meanwhile, the population is projected to steadily increase over the next 30 years at an average of 0.7% pa, with the working population and employment on a similar trajectory. How to accommodate the increasing demand for space is a long-standing question faced by the Hong Kong government.

To meet the needs of this growing population, one basic land demand is from housing. This has been a major problem in Hong Kong for many years. The average living space in Hong Kong is less than 14 m^2 per capita (Wong, 2011), in contrast with mainland China's 25, Japan's 37, UK's 35 and U.S.'s 79 m^2 (Personal Finance, 2015).Not only is the quality of housing in need of improvement, but also more residences need to be built for the increasing population. A total housing demand of around 924,000 units (averaging about 34,000 per year) is anticipated over the period leading up to 2030. In addition, as a

world financial hub, Hong Kong needs an enduring land provision for economic activities serving both the local and global market. Land is also needed for transportation and infrastructure development in addition to that for housing and economic activities.

Land Supply

Unlike most world cities, the built-up (developed) area in Hong Kong comprises only 25% (less than 300 km^2) of the whole territory. Approximately 66% of land is woodland/shrubland/grassland/wetland, including 46% in country parks and special areas under statutory control. Public sector land is provided by the government through land sales to general developers, and private treaty grants to approved bodies for specified uses. Developers can also procure land from private landowners in the open market. In addition, private landowners can redevelop their own land according to the town plan and land lease conditions. The majority of government land from 2005 to 2010 was provided by private treaty grants (Table 1) for specified uses, usually for public utilities or non-profit-making purposes.

Private developers can complement the source of land supply by the government by land exchanges and lease modifications (Table 2). These are driven by market forces and, to some extent, reflect the frequency of activities of land redevelopment and reutilization, and indicate the vibrancy and stability of the land (real estate) market.

<Insert Table 1 here>

Currently, there are six land supply options selectively adopted by the government to meet increasing land demands every year: rezoning, redevelopment, resumption,

reclamation, rock cavern development and reuse of ex-quarry sites. The definitions and key limitation/challenges are summarized in Table 3. For example, rezoning and redevelopment are market-driven but unpredictable, and resumption may disturb the local residents. Reclamation may cause some environmental and landscape deterioration and is a major issue in Hong Kong. In the past, reclamation was one of the main solutions to the land shortage problem and was used extensively to produce new flat land along the coast. In recent years, the pace of reclamation has dropped dramatically, mainly due to strong public sentiment in protecting and preserving Victoria Harbour as a natural heritage and special public asset.

<Insert Table 3 here>

Ensuring a sufficient land supply for Hong Kong's development involves the collaboration of several government departments, with each having specific responsibilities (Table 4). In 2011, for example, the Civil Engineering and Development Department (CEDD) commissioned a study entitled 'Enhancing Land Supply Strategy: Reclamation outside Victoria Harbour and Rock Cavern Development' by consultants Arup Group Limited, the first stage of which - Public Engagement - was arranged by multiple hosts: the Development Bureau, Planning Department and CEDD. The government also plans to allocate a large sum (around HKD 300 million) for a public engagement exercise to examine the prospects for reclamation outside the harbor and rock cavern development, which suggests their potentially important role in meeting Hong Kong's land needs in future.

<Insert Table 4 here>

In the long run, more land is required to accommodate population growth and economic development and to cope with an increasing public need for quality living and heritage conservation. Meanwhile, with the decline in reclamation, a more flexible and resilient land supply strategy is needed to respond to the changing demands stemming from the complex uncertainties in society and the challenges faced by the various land supply options. In doing this, land reserve is a potentially effective approach. At present, land reserve can be established in three forms: 1) land is held ready for use when the need arises; 2) potential sites are identified with necessary studies and design work; and 3) potential sites meeting the site selection criteria are reserved. In line with the land reserve system, land can therefore be provided flexibly with three established forms:

- Land in the land bank can be allocated for temporary use before its permanent use is determined;
- Construction works can commence immediately when the need is confirmed;
- Further studies to guarantee the feasibility of the potential sites and design work can be conducted directly after the need is established

THE LAND-USE ALLOCATION MECHANISM

As stated in *The Basic Law of the Hong Kong Special Administrative Region of the People's Republic of China* (CAB, 2006),

> The land and natural resources within the Hong Kong Special Administrative Region (the SAR) shall be State property. The government of the SAR shall be responsible for their

> management, use and development and for their lease or grant to individuals, legal persons or organizations for use or development. The revenues derived therefrom shall be exclusively at the disposal of the government of the Region (Article 7).

In practice, the duties stipulated in this Article 7 (including managing, developing and leasing land in Hong Kong) are discharged by the Chief Executive and authorized officials on behalf of the Hong Kong Government.

Over the years, the Hong Kong Government has attempted to optimize land use and promoted economic development with a vision to enhancing the living environment for Hong Kong residents. Given the scarcity of land in Hong Kong, the government uses the private treaty land grant system. In order to fully utilize such precious natural resources, this involves land use planning to be determined in line with the development needs of whole society. The government then develops the planned uses according to resource availability and development priorities, or leases the land to individuals, legal entities or organizations for their use or development.

In addition to maximizing the provision of land, the Hong Kong Government regularly reviews its policy of using land resources and increases the land available by improving the efficiency of land-use management. For example, the government has been urged to subsidize commercially operated infrastructure projects through financing arrangements, and supply land through the market mechanism and fair competition. In addition to reserving sufficient land for public housing development, land is also reserved for other developments that are compatible with the public interest.

Application List System for Land Sales[1] （Land Management Perspective)

The government's land allocation policy is based on the principle of fairness and transparency. In Hong Kong, the core of the land system is that land users pay for the right of land use within certain periods on the principle of the separation of land use rights and land ownership. The land can be granted mainly through open bidding (such as land auction and tender) for commercial, residential and other private developments. The land grants system has experienced a series of changes over time. Before 1997, land was mainly granted through scheduled land auctions and tenders following a one-year land sale program (LSP). In 1999, an application list system (ALS) was introduced as a supplement to the LSP to enable the market to flexibly determine the amount, timing and type of additional land required (Legislative Council, 2004a). Since then, there have been two temporary suspensions of land sales; one was from June 1998 to March 1999 and the other from November 2002 to the end of 2003. Land sales have since been regularly conducted without interruption.

The application procedure under the LSP-ALS is illustrated in Figure 1. The Lands Department publishes a list of sites available for sale upon application (Application List). The Application List includes information about the lot number, location, use, site area and the estimated earliest available date for each of the sites. A developer with an interest in a land site on the application list can apply to buy the land use rights from the government by first offering its minimum (upset) price. If the government thinks that the minimum price offered is reasonable and acceptable, the site will be put up for sale by

[1] the term “land sale” here denotes the sale of land use rights and not that of ownership.

tender or auction as appropriate so the price at which the land is sold will reflect the prevailing market value of the land. Government policy is that land cannot be sold below its reserve price, which means that, if the land cannot be sold at the upset price or above in the public auction, the government will withdraw the land sale. If it is acceptable, the site is then sold to the highest bidder, who can hold the land use right for a certain lease term (up to 2047 for a lease signed after 1997).

<Insert Figure 1 here>

In addition to open bidding, the government under certain circumstances also grants land by means of private treaty to non-government or private organizations. This way of granting land has been in use for a long time for the purpose of meeting social needs. It is mainly adopted for land assigned to community use or for public utility purposes. Examples include non-profit making community uses such as schools, welfare and charitable organizations, as well as land for essential public utility services such as power stations, and land for policy promotions such as Science Parks. The level of land premium charged on the land grants depends on the use of the land (Legislative Council, 2005). For instance, a nominal or concessionary premium is normally charged for non-profit-making community/public uses, and a full market premium is usually charged for commercial land uses such as power stations.

Control System for Land Development (Land Planning Perspective)

The objective of town planning in Hong Kong is to provide a comfortable and safe living environment, meet the needs of social development and provide sustainable development and benefits for the next generation (Legislative Council, 2005). In Hong Kong, the

Town Planning Ordinance (TPO) stipulates that the Town Planning Board (TPB) develops the statutory plans including Outline Zoning Plans (OZPs) and Development Permission Area (DPA) Plans. Specific studies are made if necessary to finalize the plans. Similar to planning applications, requests for changing land use zoning submitted by the public are also processed by the TPB. This administrative practice is formalized and enhanced in the Amendment Ordinance (Planning Department, 2004). A new plan or amendment is made by strictly following an elaborate and lengthy process (Figure 2), with a strict procedure also being provided for the application process involved (Figure 3).

<Insert Figure 2 here>

<Insert Figure 3 here>

Land in Hong Kong is classified into 18 broad categories according its use, comprising residential use, commercial use, industrial use, etc. Details of these are listed in Table 5. These categories enable greater flexibility in the use of land, and facilitate the interchange of land uses under the same broad use granted by planning permission. Land use planning and control is carried out at either the territorial/strategic or district/local (site) levels and different types of plans are implemented within each of these (Figure 4). The main task in territorial planning is to predict the demand and supply for all kinds of land uses and correspondingly plan the land use allocation, while site selection for specific land use is the major task at the site level.

<Insert Figure 4 here>

When a piece of land is selected for development, it must comply with the OZPs in which the site is located. Figure 5 shows the application process involved. As depicted, sites with different land uses have different development processes. The TPB sets the development requirements and controls the development processes. The variety of procedures involved enables a more flexible environment for developers. If the plans made by developers are classified as permitted use, they can proceed to obtain other approvals such as land lease modifications and building plan submissions instead of waiting for the approval of the TPB. This makes the development process more efficient by reducing the cost and time involved.

<Insert Figure 5 here>

Continuous Public Engagement

Public participation and support is the key to the success of Hong Kong's planning system (Legislative Council, 2005), where it is necessary for major strategic and development plans drafted by the government to be reviewed by the public from time to time to collect its views and incorporate its needs into the revised plans. This is an effective way of coping with the changing environment and the desire of the public for development in different regions or areas. The Kai Tak Planning Review is a good example. Hong Kong's old Kai Tak airport was closed in 1998, leaving a large piece of land to be redeveloped in the metropolitan area and creating a big issue for the government and affected residents. Since planning started over ten years ago, many rounds of public consultation have been conducted to gather views from the public. Public consultations in the form of forums and community workshops aimed to ensure

that the development proposal would not only take into account the local characteristics of the area/zone to be developed but satisfy public aspirations too.

As with the Kai Tak redevelopment project, planning reviews for other projects are similar and have been successful in collaborating with different stakeholders for the better future of the community.

URBAN RENEWAL PRACTICE IN HONG KONG

Urban renewal is a major issue in today's Hong Kong. Like other cities which have a long history of construction work, many old buildings and sites need to be redeveloped or revitalized to meet changing demands. Urban renewal is an inevitable issue during the process of urban development and one of the good strategies for achieving sustainable land use. As the city center or old districts become dilapidated and the land use patterns no longer adapt to the changing demand of urban development, urban renewal therefore serves as a good solution to optimizing/altering land use patterns in certain districts of cities to make the land use suitable and sustainable. Therefore, urban renewal is highly related to the sustainability of land use in high-density cities.

Transition of Governing Agency of Renewal Projects

Large-scale urban renewal has taken place in Hong Kong for over 40 years (Drakakis-Smith, 1976). During these years, the building stock has aged rapidly, with around 4,000 buildings now at least 50 years old - a number set to increase by 500 pa over the next decade (Development Bureau, 2011). Renewal/redevelopment projects urgently need to

be carried out to deal with the serious problems of urban decay and poor living conditions. In order to officially undertake, encourage, promote and facilitate renewal projects in the older urban areas, the Land Development Corporation (LDC) was established in 1988 (Adams and Hastings, 2001). The LDC operates as a self-financing commercial organization, with its main objective of promoting urban renewal through cooperating with private developers. Although LDC is more flexible than government departments in utilizing private resources, its major weakness is in the timely coordination of both the government and private developers (Adams and Hastings, 2001). As a result, the condition of old buildings in Hong Kong in the period leading up to the sovereignty handover to China in 1997 was still unsatisfactory and posing threats to public safety (Development Bureau, 2011).

To address this problem and speed up the pace of urban renewal, the Urban Renewal Authority Ordinance (Chapter 563) (URAO) was enacted in 2000. Under this guideline, the Urban Renewal Authority (URA) was established as the new governing agency replacing the LDC for improving the implementation of urban renewal projects in 2001. “Redevelopment” and “Rehabilitation” are two core businesses of URA, including Redevelopment, Rehabilitation, heritage preservation and Revitalization (i.e. the 4Rs). The functions and difficulties with the 4Rs are summarized in Table 6. The URA plays a more flexible role in redevelopment projects since it can redevelop on its own or through joint-venture partnerships as ‘implementer, or as ‘facilitator’ is in disposing of project sites upon land resumption in the open market for private development .

<Insert Table 6 here>

Urban Renewal Strategy

The urban renewal strategy (URS) in Hong Kong is a government strategy, initially published in 2001, that aims at expediting the urban renewal process. Under this strategy, a comprehensive and holistic approach is adopted to rejuvenate older urban areas by means of redevelopment, rehabilitation, revitalization and heritage preservation (Development Bureau, 2011). As highlighted in the latest strategy revised on the basis of comments received from public consultation review, implementation of URS is undertaken by the URA, as well as all the other stakeholders/participants in order to achieve a better balance and coordination among the 4Rs. The main objectives of urban renewal are stated in the URS as (Development Bureau, 2011):

- To restructure and re-plan the urban areas concerned;
- To design more effective and environmentally-friendly local transport and road networks within the urban areas concerned;
- To rationalize land use within the urban areas concerned;
- To redevelop dilapidated buildings into modern standard and environmentally-friendly new buildings;
- To promote sustainable development in the urban areas and the timely maintenance and rehabilitation of buildings in need of repair;
- To preserve buildings, sites and structures of historical, cultural or architectural value;
- To preserve as far as practicable the local characteristics and the social networks of the local community;

- To provide purpose-built housing for groups with special needs and more open space and community/welfare facilities;
- To enhance the townscape with attractive landscape and urban design.

New advisory platforms, government appointed District Urban Renewal Forums (DURF), are proposed in the new URS to strengthen urban renewal planning at the district level. This calls for the adoption of a "People First, District-based, Public Participatory" approach at the stage of urban renewal planning. The chairman of each DURF is a professional familiar with urban renewal issues and its members are drawn from a wide cross-section in the local community. In addition, the Planning Department provides secretariat and professional support to the DURFs (Development Bureau, 2011). The DURFs advise the government on district-based urban renewal initiatives in an integrated way (including the 4Rs), and conduct broad-based public engagement activities and planning related studies.

The URA implements renewal by development projects or development schemes under the guidance of the URAO. During the planning process, the URA prepares a draft corporate plan and draft business plan, and submits both to the Financial Secretary for approval (Development Bureau, 2011). Specifically, the URA

- conducts a freezing survey to determine the eligibility for *ex gratia* allowances and rehousing on the commencement day of a project;
- initiates social impact assessments to be conducted by the DURF before any specific redevelopment project is implemented; and

- Establishes and endows an urban renewal trust fund to provide financial aid for the various activities to be conducted by the DURF and social service teams.

OZPs and statutory development scheme plans (DSPs) are prepared for the URA to control its redevelopment projects. The OZPs are a form of statutory plans developed by the Planning Department, in which the proposed land uses and major road systems are made for individual planning areas. Such plans cover almost all planning scheme areas in the territory, with areas zoned for specific uses such as residential, commercial, government, institutional and community and open space. In order to align the development plans with changing demand, the OZPs need to be continuously amended over time and approved by the TPB. Consequently, redevelopment projects can be carried out subject to the control of the DSPs which are derived from the dynamic OZPs.

PROBLEMS WITH THE CURRENT LAND USE SYSTEM

To ensure economic growth in the long term, a flexible land provision mechanism needs to be developed and adopted by the government. Although six land supply options have been identified, and land reserve is being established for adequate and flexible land provision, problems still exist in the current land use system in terms of the inherent shortage of land, difficulties in urban renewal, procedures and regulations.

Inherent Shortage of Land

As Hong Kong is a small territory with an increasingly large population, it is necessary for the government to utilize the land available as efficiently as possible to accommodate

the demand from population growth and economic development. In doing this, the government needs to not only create new space through reclamation or rock cavern development, but also explore land potential and improve the efficiency of land use by rezoning and redeveloping the under-utilized sites and old areas. Simply increasing the quantity/amount of land is insufficient to meet the pace of land demand, and an efficient land use/reuse mechanism to manage land resource quality is required. Land reuse in urban renewal is an effective way to maximize land use efficiency and improve the built environment (Wang et al., 2013).

The government's objective of ensuring the timely provision of adequate land and infrastructure for the development of housing and community facilities is currently not being adequately pursued and the supply of affordable housing is still lagging behind public needs. The waiting list for public housing has become longer during the past ten years (increasing from 108,000 live applicants in 2000/01 to 152,000 in 2010/11), with an awaiting period of around 2 years in 2010/11 (Housing Authority, 2011), while the average living space per person for public housing continues to be much smaller than most cities around the world – increasing by only 2.1 m^2 from 2001 (10.7 m^2) to 2011 (12.8 m^2).

Difficulties in Urban Renewal

Redevelopment work is not easy to carry out due to such urban renewal difficulties as resumption of land, coordination between governmental departments, public protests and problems of social equity. For example, urban redevelopment in Hong Kong mainly involves multiple ownership of the land and buildings within potential redevelopment

sites, and the area of most of the sites on which sporadic high-rise old buildings (commonly called “pencil development”) stand are small (Adams and Hastings, 2001). This leads to lengthy negotiations in assembling a number of small lots into a larger site for redevelopment. The planning process of urban renewal projects also involves many diverse stakeholders, such as governments, developers and local residents. They have their own aspirations for the renewal projects, making a consensus outcome very difficult to achieve (Wang et al., 2013). Urban renewal projects therefore often take a long time to complete, and the timing is invariably unpredictable. In addition, an unavoidable issue is the impact on surrounding residents, as people who live in the renewal area are inevitably affected to some extent. The government needs to find better ways to shorten the time of redevelopment and improve communication between the different stakeholders to reduce the impact on local residents.

Procedure and Regulation Amendments

In many cases, large projects take a long time (usually over 10 years) to be completed, partially due to the outdated regulations in an increasingly complicated land administration system. Feasibility analysis, in particular, is often a lengthy process for urban renewal projects. Simplifying and shortening procedures would help to improve the efficiency of management and further benefit Hong Kong’s investment environment.

CONCLUSIONS

High-density cities encounter greater difficulties in the land use policies since they do not have sufficient land resources to meet the increasing demand of urban land development. Therefore, how to maintain sustainable land use in high-density cities is an imminent issue all over the world. This paper provides a comprehensive review of sustainable land use practice in Hong Kong, where a major challenge for the Hong Kong government continues to be to ensure an adequate supply of land together with the necessary supporting infrastructure to meet market demands in a timely manner, while still maintaining public participation in decision making. An account of the region's land utilization is given from both land demand and supply perspectives in terms of different land use and the land supply measures, and the current land-use allocation mechanism is analyzed in terms of land management and land use planning. Hong Kong's sustainable urban renewal practice is discussed, with major problems identified as the inherent shortage of land and the lengthy time involved due to need for coordination and responsiveness to multiple stakeholders, as well as outdated and overcomplicated administrative processes.

Hong Kong's land use system has several successful strategies including various land supply options, rigorous land-use allocation mechanism and comprehensive urban renewal strategy. These strategies help Hong Kong deal with the land use problems and make its land use system perform well under the limited resources conditions. Generally, the most important enlightenment for other high-density cities could be Hong Kong's land use allocation mechanism and urban renewal strategy, which ensure that the limited land resources are used efficiently and explore the potential of land use in a sustainable

way. As Hong Kong was chosen as a good model for other high-density cities in this paper, Hong Kong's sustainable land use policies provide a useful reference for other similar cities, and the findings/implications could serve as a guideline for such cities in land use planning and management. In particular, the successful experience of land use policies in Hong Kong can be learned and adopted by other cities, while the existing problems in the land use system can be identified and further improved in the future studies.

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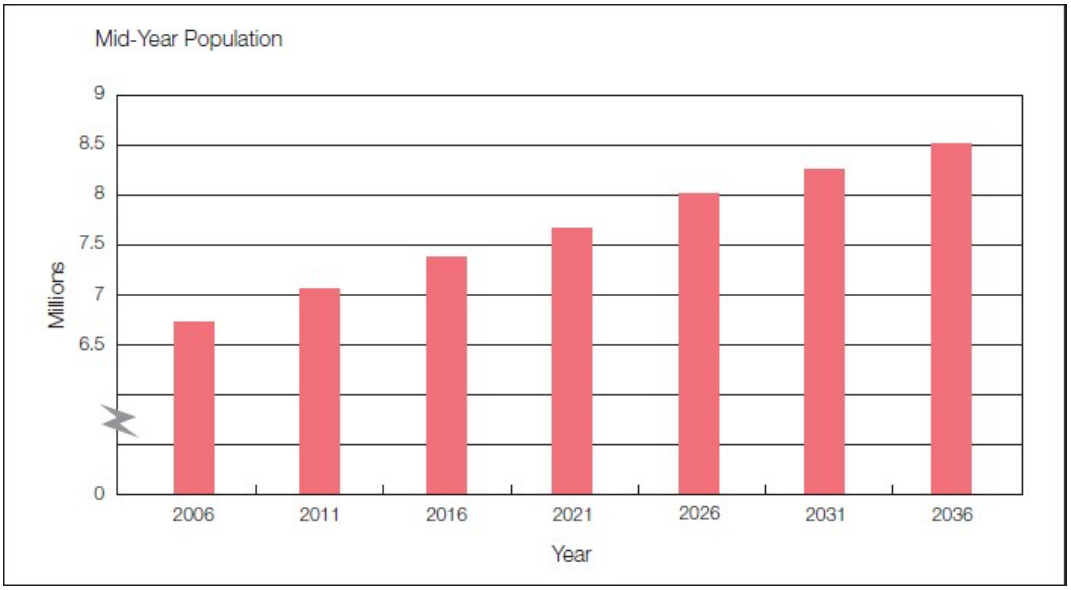
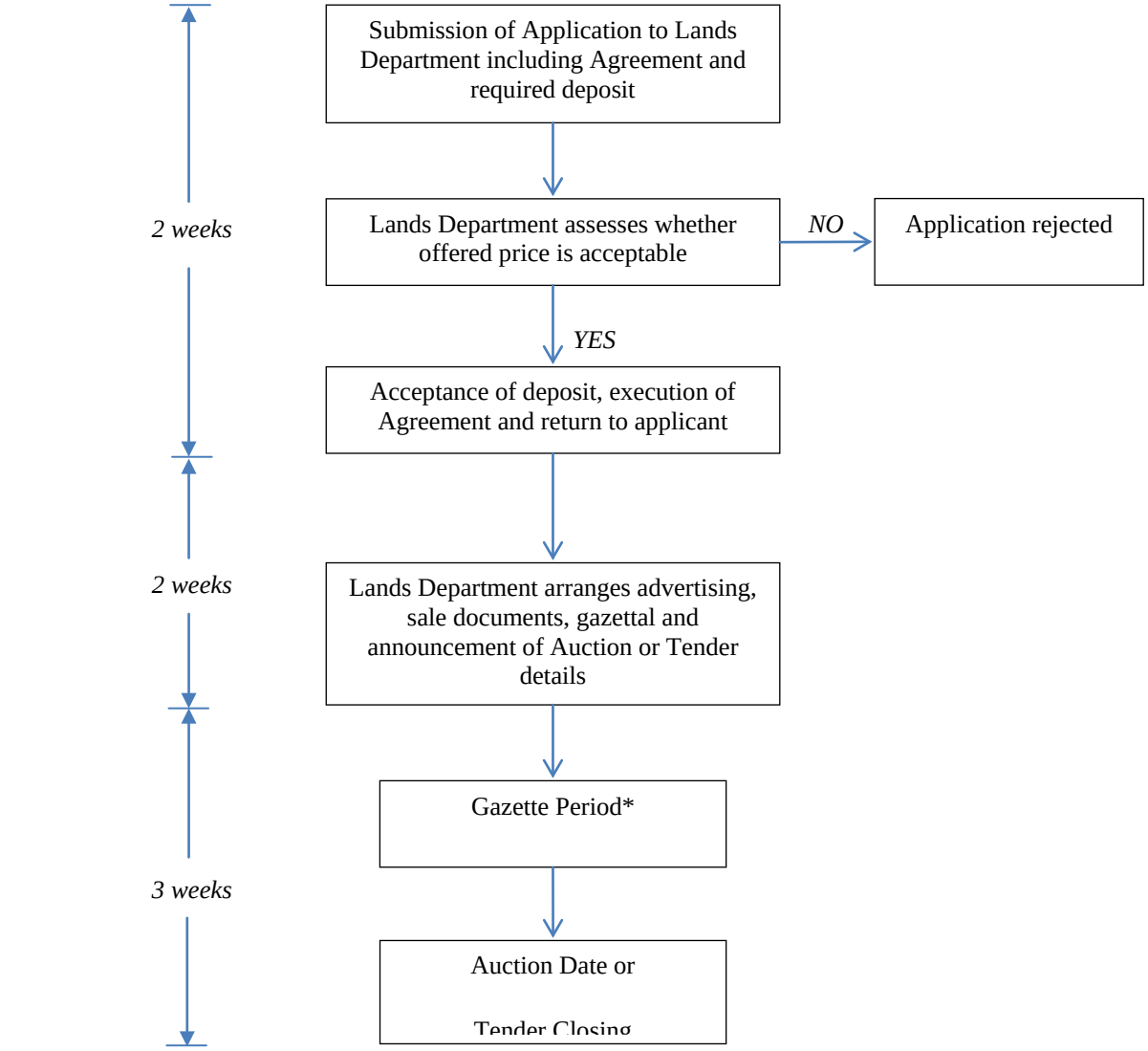
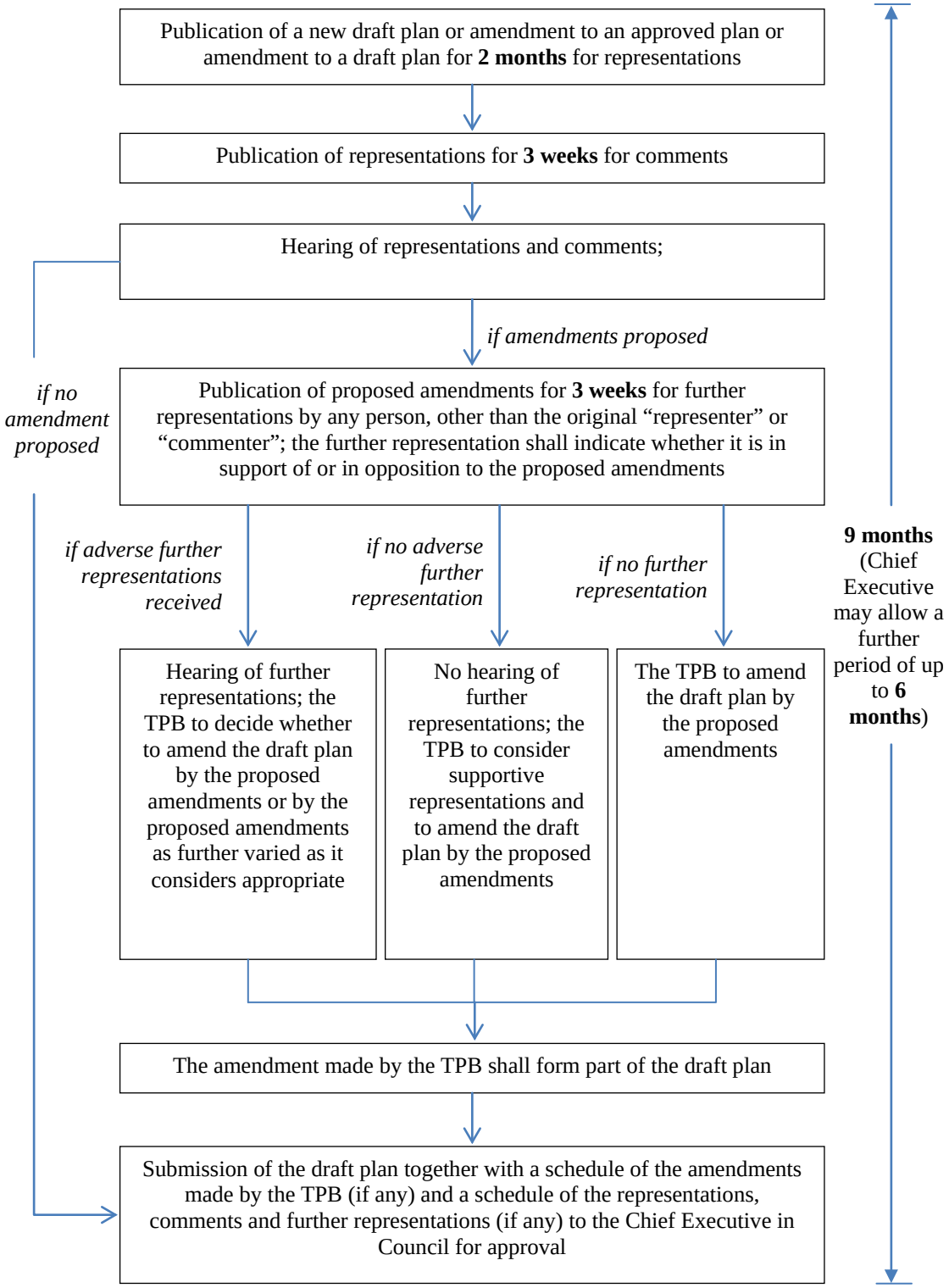


Figure 1 Projected population growth (2006-based)
(Source: Planning Department, 2007)



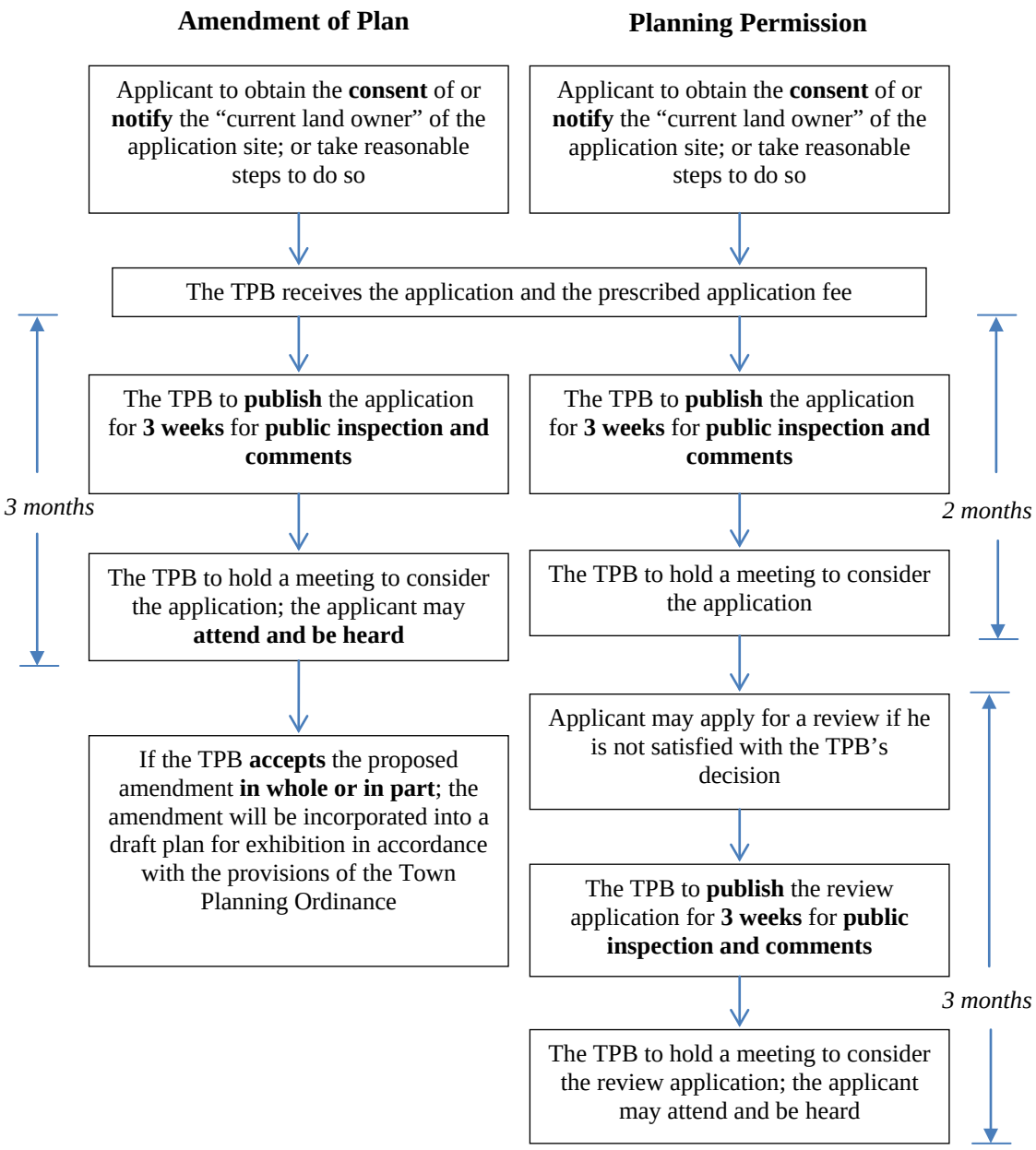
* (two consecutive weeks)

Figure 2 Application procedure for land sale
(Source: Lands Department, 2005)



Note: details refer to 'Town Planning (Amendment) Ordinance 2004'.

Figure 3 The process of making a new plan or amendment
(Source: Planning Department, 2004)



Note: details refer to 'Town Planning (Amendment) Ordinance 2004'.

Figure 4 Application procedure for plan amendment and planning permission
(Source: Planning Department, 2004)

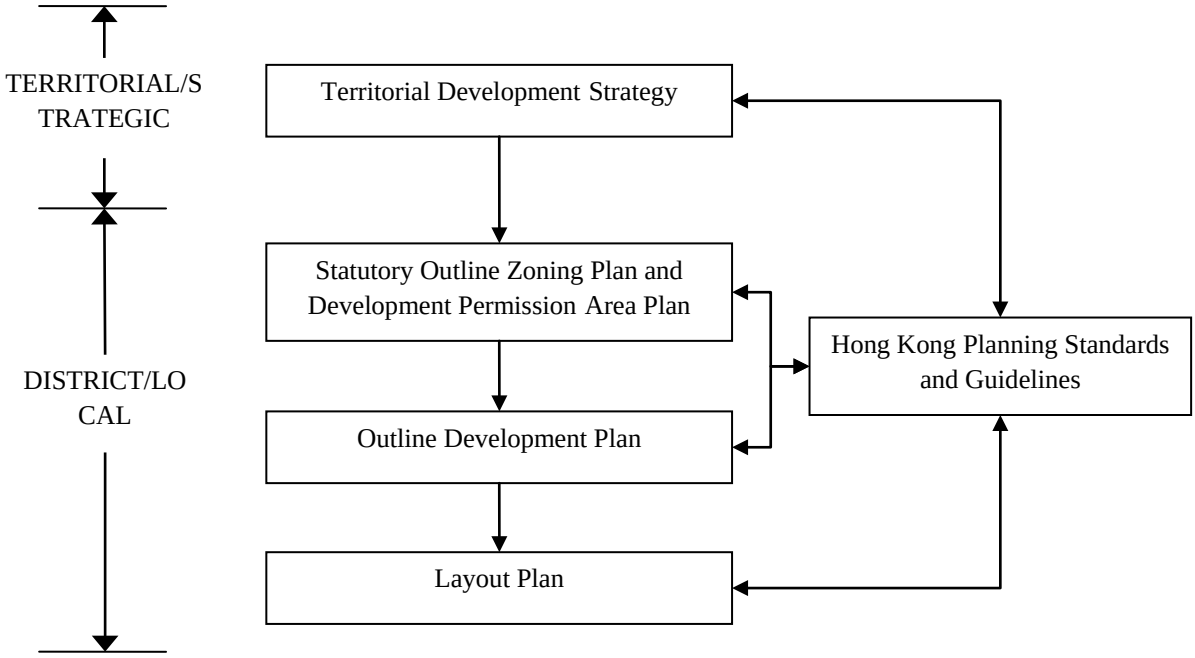


Figure 5 Plans involved in the two-level planning process

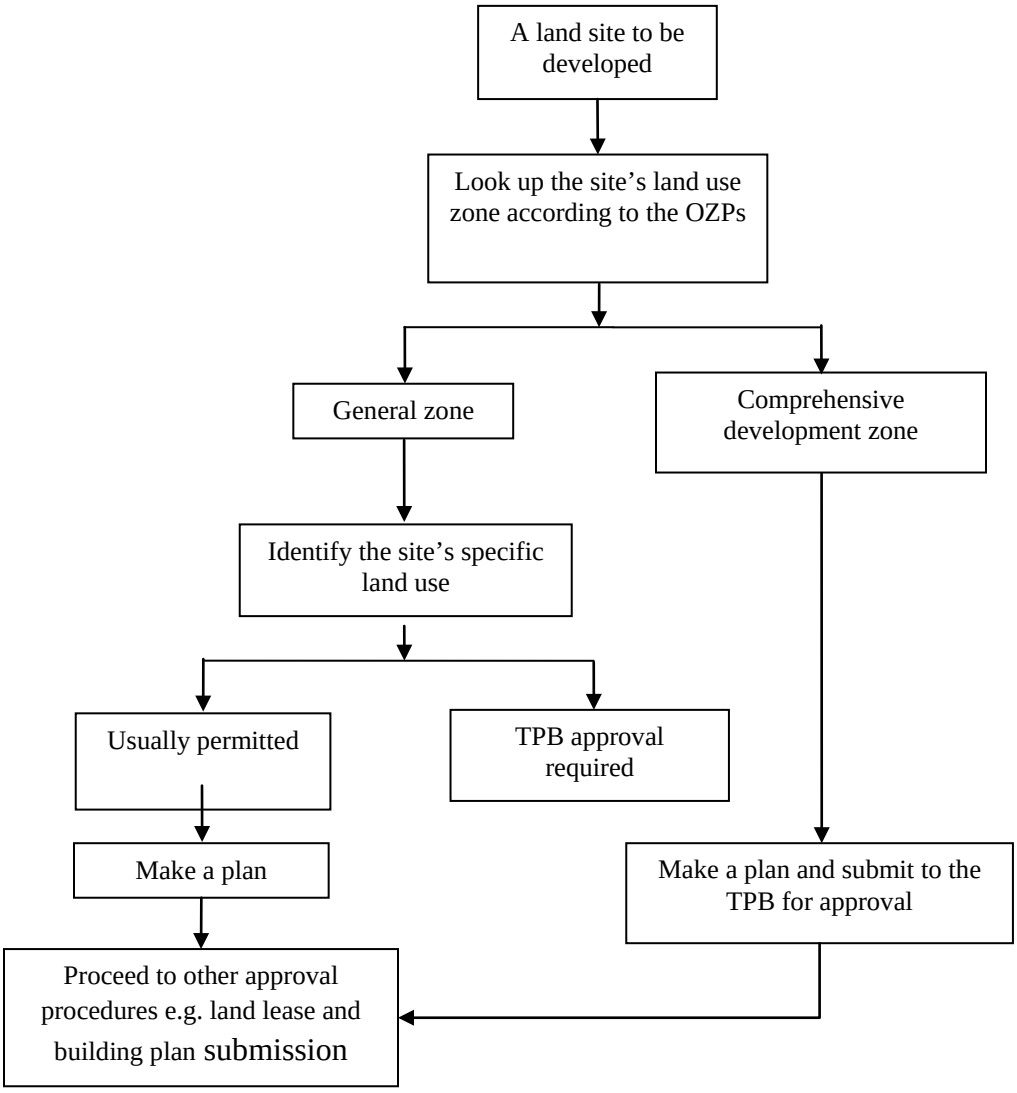


Figure 6 Application process of land development for specific uses

Table 1 Population and employment projection
(Adapted from Planning Department, 2007)

	Base Year (2003)	2010	2020	2030
Resident Population	6.8	7.2	7.8	8.4
Working Population	3.2	3.6	3.8	3.9
Employment	3.0	3.5	3.7	4.0

(Unit: million)

Table 2 Housing demand assumption
(Adapted from Planning Department, 2007)

	Base Year (2003)	2010	2020	2030
Housing stock	2,394	2,642	2,948	3,319
Accumulative Requirement	-	248	553	924

(Unit: thousand)

Table 3 Assumed floor space demand and requirements
(Adapted from Planning Department, 2007)

	Base Year (2003)	2010	2020	2030	Demand 2003-2030	Requirement 2003-2030
CBD Grade A Offices	4.1 (10%)	5.1 (11%)	5.8 (12%)	6.7 (13%)	2.6	2.7
General Business	33.0 (80%)	35.5 (77%)	36.2 (76%)	38.2 (74%)	5.2	5.4
Special Industries	4.0 (10%)	5.5 (12%)	6.0 (13%)	6.7 (13%)	2.7	2.9
Total	**41.1 (100%)**	**46.2 (100%)**	**47.9 (100%)**	**51.6 (100%)**	**10.5**	**11.0**

(Million m^2 gross floor area)

Table 4 Broad land use distribution in Hong Kong

(Tabulated from Planning Department, 2011)

Class	Sub-class	Approximate Area (km^2)				
		2006	**2007**	**2008**	**2009**	**2010**
Developed Lands						
Residential		75	75	75	76	76
	Private Residential	25	25	25	25	25
	Public Residential	16	16	16	16	16
	Rural Settlement	34	34	34	35	35
Commercial		3	3	4	4	4
	Commercial/Business and Office	3	3	4	4	4
Industrial		24	24	25	25	26
	Industrial Land	7	7	7	7	7
	Industrial Estates	3	3	3	3	3
	Warehouse and Storage	14	14	15	15	16
Institution/Open Space		46	47	48	48	49
	Government, Institution and Community Facilities	24	24	24	24	25
	Open Space	22	23	24	24	24
Transportation		55	57	57	58	56
	Roads	39	41	41	42	40
	Railways	3	3	3	3	3
	Airport	13	13	13	13	13
Other Urban or Built-up Land		55	53	52	52	52
	Cemeteries and crematoriums	7	7	7	8	8
	Utilities	7	7	7	7	7
	Vacant Development Land/Construction in Progress	20	19	17	16	16
	Others	21	20	21	21	21
Sub-total		258	259	261	263	263
Non-built-up Lands						
Agriculture		68	67	68	68	68
	Agricultural Land	51	51	52	51	51
	Fish Ponds/Gei Wais	17	16	16	17	17
Woodland/Shrubland/Grassland/Wetland		744	744	742	740	740
	Woodland	245	247	241	234	254
	Shrubland	228	237	238	241	303
	Grassland	266	255	258	260	178
	Mangrove and Swamp	5	5	5	5	5
Barren Land		9	9	8	8	7
	Badland	5	5	5	5	2
	Quarries	2	2	1	1	1
	Rocky Shore	2	2	2	2	4
Water Bodies		29	29	29	29	30
	Reservoirs	24	24	24	24	25
	Streams and Nullahs	5	5	5	5	5
Sub-total		850	849	847	845	845
Total		**1108**	**1108**	**1108**	**1108**	**1108**

Note: above figures updated on 2011

Table 5 Government land supply (2005-2011)

Year	Auction/Tender		Private Treaty Grant		Total Land Area (ha.)
	Land area (ha.)	Percentage	Land area (ha.)	Percentage	
2005/2006	3.30	2	138.30	98	141.60
2006/2007	7.79	8	94.67	92	102.46
2007/2008	11.46	6	167.20	94	178.66
2008/2009	2.45	2	151.46	98	153.91
2009/2010	5.97	3	180.13	97	186.10
2010/2011	15.04	9	147.14	91	162.18
2011/2012	35.71	89	4.50	11	40.21

Note: raw statistics from Lands Department

Table 6 Number of approved applications of land exchange/lease modification (2005-2011)

Year	Land Exchange	Lease Modification	Total No.
2005/2006	25	72	97
2006/2007	15	104	119
2007/2008	13	128	141
2008/2009	15	224	239
2009/2010	12	127	139
2010/2011	20	108	128
2011/2012	12	77	89

Note: raw statistics from Lands Department

Table 7 Six existing land supply options
(Tabulated from CEDD, 2011)

Option	Definition	Key Limitation/Challenge
Rezoning	Rezone under-utilized sites and lands that no longer perform their original functions for housing or other uses	• A longer process may be required due to the involvement of private owners and developers or different Government departments • Timing of development is less predictable because the actual development hinges on market response
Redevelopment	Redevelop the older urban areas or individual buildings through re-planning and re-building to improve the local environment and better utilize the land	• Less predictable because private owners and developers take the leading role comparing with other options implemented by the government
Resumption	Exercise statutory power to compulsorily take over private lands for public purposes	• Local resentment may be caused if residents wish to maintain their rural lifestyle or are not satisfied with the compensation or re-housing arrangement • Low flexibility in land use due to only designated purposes for the land acquisition
Reclamation	Create usable land over the foreshore or sea-bed	• Much more emphasis is placed on reducing and mitigating the impact on marine ecology
Rock cavern development	Place new facilities inside caverns and relocate suitable existing government facilities into rock cavern to release the sites for housing or other uses	• May be applicable to many uses only if the public can accept daily activities inside cavern
Reuse of ex-quarry sites	Rehabilitate the platforms formed in ex-quarry sites as a source of new land	• Limited sources and only be available upon quarry closure

Table 8 Government departments/bureaux involved and their roles in land supply

Government Department/Bureau	Major roles/responsibilities
Development Bureau	• Facilitate effective land use planning as well as a steady and sufficient supply of land • Achieve the optimum use of land resources and maintain an effective land administration system • Manage an efficient system for registration of land
Environment Bureau	• Develop policies covering environmental protection • Facilitate the integration of sustainable development into new government initiatives and programs (e.g. sustainability assessment)
Transport and Housing Bureau	• Make policies on matters relating to Hong Kong's internal and external transportation • Maintain a fair and stable environment to enable sustained and healthy development of the property market by ensuring adequate land supply and the provision of an efficient supporting infrastructure
The Land Registry	• Ensure secure, customer friendly land registration and information services • Advocate reform of Hong Kong's land registration system
Planning Department	• Coordinate planning matters • Prepare Outline Zone plans and Outline Development Plans • Carry out necessary land rezoning
Lands Department	• Process land resumption • Coordinate clearance matters • Issue possession license
Civil Engineering and Development Department	• Prepare and handle site formation and infrastructural work contracts including gazettal actions • Coordinate fill management • Comment on slope stability and geotechnical matters • Advise on blasting matters
Buildings Department	• Provide services to owners and occupants in both existing and new buildings in the private sector • Make the built environment of existing buildings safe and healthy • Approve building plans, audit construction works and site safety, and issue occupation permits upon completion of new buildings
Transport Department	• Coordinate major traffic planning matters • Comment on Traffic Impact Assessment (TIA) • Advise on road layout and capacity
Environmental Protection Department	• Comment on Environmental Impact Assessment (EIA) • Advise on environmental nuisance control requirements • Control marine dumping
Highways Department	• Advise on road construction materials and maintenance responsibilities • Comment on road drainage design • Prepare gazettal actions under the Roads Ordinance
Water Supplies Department	• Advise and make provision for water supply
Drainage Services Department	• Advise and make provision of drainage connections • Advise on drainage design and maintenance responsibility • Comment on Drainage Impact Assessment (DIA)

Table 9 Broad land use categories in Hong Kong
(Tabulated from TPB, 2008)

No.	Land Category	Specific Uses
1	Residential Use	Flat, House, Residential Institution
2	Commercial Use	Broadcasting, Television and Film Studio, Commercial Bathhouse/Massage Establishment, Eating place, Exhibition or Convention Hall, Hotel, Market, Off-course Betting Center, Office, Shop and Services, Wholesale Trade
3	Industrial Use	Cargo Handling and Forwarding Facilities, Cement Manufacturing, Concrete Batching Plant, Container Vehicle Park/Container Vehicle Repair Yard, Container Storage/Repair Yard, Dangerous Goods Godown, Industrial Use, Information Technology and Telecommunication Industries, Offensive Trades, Open Storage, Research Design and Development Center, Rural Workshop, Service Industries, Ship-building, Ship-breaking and Ship-repairing Yard, Vehicle Repair Workshop, Vehicle Stripping/Breaking Yard, Warehouse
4	Other Special Uses and Installations	Abattoir, Bus Depot, Chemical and Biochemical Plant, Electric Power Station, Gas Works, Resource Recovery Park, Mine and Quarry, Oil Depot, Oil Refinery and Petro-chemical Plant, Refuse Disposal Installation, Sewage Treatment/Screening Plant
5	Recreation and Leisure	Field Study/Education/Visitor Center, Golf Course, Holiday Camp, Private Club, Place of Entertainment, Place of Recreation, Sports or Culture, Theme Park, Zoo
6	Education	Educational Institution, School, Training Center
7	Medical Facility	Ambulance Depot, Hospital, Public Clinic
8	Government Use	Animal Quarantine Center, Correctional Institution, Firing Range, Government Refuse Collection Point, Government Use, Library, Public Convenience, Service Reservoir
9	Social/Community/Institution Use	Social Welfare Facility, Institutional Use
10	Religious Use	Religious Institution
11	Funeral Related Facility	Burial Ground, Columbarium, Crematorium, Funeral Facility, Grave
12	Agricultural Use	Agricultural Use, On-farm Domestic Structure
13	Open Space	Amenity Planting, Open Space
14	Conservation	Country Park, Nature Reserve, Nature Trail, Wetland Habitat, Wild Animals Protection Area
15	Public Transport Facility	Cable Car Route and Terminal Building, Mass Transit Railway Vent Shaft and Other Structure above Ground Level, People Mover, Pier, Public Vehicle Park, Public Transport Terminus or Station
16	Airport Related Use	Air Cargo Handling System and Facility, Air Catering Facility and Service, Aircraft Maintenance and Repair Plant, Airfield, Air Mail Center, Air Passenger and Freight Handling and Processing System/Facility, Air Passenger Terminal and Concourse, Airport Apron, Airport Runway, Airport Supporting and Servicing Facility, Airport Taxiway, Air Traffic Control Tower and Center, Apron Control Center, Aviation Fuel Pipeline Reserve, Aviation Fuel Storage Facility, Radar, Navigational Aid and Communication Devices, Sea Rescue Station, Vehicle Staging
17	Utility Installation	Public utility Installation, Radar, Telecommunications Electronic Microwave Repeater, Television and Radio Transmitter Installation, Utility Installation for private Projects
18	Miscellaneous	Animal Boarding Establishment, Driving School, Helicopter Fuelling Station, Helicopter Landing Pad, Marina and its Fuelling Station, Petrol Filling Station, Recyclable Collection Center

Table 10 Functions and difficulties in the 4Rs

4Rs	Functions	Difficulties
Redevelopment	• Targets old, dilapidated buildings with poor living conditions; • Replan and rebuild these sites and buildings to achieve environmental and social benefits, such as open space and community facilities	• Land resumption under multiple land ownership; • Land assembly for comprehensive planning
Rehabilitation	• Prevents the decay of the built environment by promoting and facilitating the proper repair and maintenance of buildings; • Extends the useful life of buildings to alleviate the urgency of redevelopment	• Mortgage lending on older properties; • Owner attitudes on maintenance; • Public perceptions on older buildings
Revitalization	• Deploys appropriate means to revive and strengthen the economic and environmental fabric of different districts	• Absence of empowered local district authority; • Coordination of stakeholders' contributions and project programs; • Few experienced business associations
Preservation	• Preserves buildings, sites and structures of historical, cultural or architectural interest; • Retains the local color of the community and the historical characteristics of different districts	• Identification of few buildings worthy of preservation; • Limited public support; • Absence of dedicated funding support