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Housing Development and Redevelopment in Hong Kong

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Abstract: Redevelopment, in essence, is good as it can renew specific urban areas and bring new energy into the city. But what people tend to forget in the aftermath of the redevelopment of residential estates often tends to be quite grim, considering the residents that will likely be relocated and their neighbourhood gentrified, directly and indirectly. Therefore, redevelopment can be seen as a double-edged sword. It will better the city landscape and generally increase the housing stock while dissatisfying some affected individuals.

Keywords: Housing development, Redevelopment, Hong Kong, Housing situation, Solution.

1. Introduction

Hong Kong is and will still have the most unaffordable housing in the world, leading to vast amounts of subdivided flats and many other inadequate housing (ie. coffin houses and cage homes). There's also a long waiting list for public housing that amounted to some six years before one could be assigned to a Public Rental Housing (PRH). On top of that, a significant fraction of Hong Kong's residential housing was built in the 1960s and 1970s, leading to growing concern regarding their age. All this is to say that there are lots of problems concerning the housing situation in Hong Kong, public or private.

One of the solutions to ease the strain on the housing market is to redevelop and expand the residential estates, as it could modernise the building structure and ensure better living conditions for the masses. However, the current pace of redevelopment and development of residential estates are far from the public needs, coupled with the rapid ageing of existing buildings, the housing situation in Hong Kong would likely worsen if not for an complete overhaul of its current policy. Modern construction techniques such as Prefabrication and Modular Construction should be expanded to increase output, and collaboration with the private developers to ensure the supply of housing for the public.

The housing situation in Hong Kong is dire, with the shortage, ageing buildings, vast number of inadequate housing, gentrification, and many other issues that has perpetuated simply due to the lack of effort of the responsible authorities. While there are certainly some efforts made by HKHA and THB to increase the housing stock in Hong Kong in the past decade, the fundamental root of this issue has not been solved. Housing in Hong Kong is still overpriced, and unaffordable for most, and there seems to be no stop to this issue in the foreseeable future if not for a complete overhaul or national focus on the issue of housing. If not, with the projected population increase, the housing situation would worsen, and the lives of thousands would be place in jeopardy .

The government measure to counteract the current crisis is insufficient and on many aspect, idealistic. Considering it past record of under delivering projected PH, its ambition to construct and deliver some 330000+ PH by the end of 2031-32 will no doubt be a challenge, and a land reclamation project in Lantau. The number of the first is quite high considering it aims to average a production of 30000+ units of PH annually, while in the past, it records around 11k-26k+ units, achievable but ambitious *(HA). The latter might be too far fetched as it envision a reclamation of some 1000+ hectare of land, controversial at best as it face opposition as it cost up to 624 Billion HKD. The underutilisation of brownfield also posed a significant question to the public, as there are available land in Hong Kong with some level of existing infrastructure that were left without use. In addition, the PR of the government is going into a new low due to a multitude of public distrust and protests. It's under reporting of brownfield in Hong Kong and reported "lack of available land for development" was also a misconception, justifying its high price. With the installation of the new administration headed by John Lee, if the government aims to regain the public support, taking decisive action towards increasing the supply of public and affordable housing will be a crucial step.

The Hong Kong government can certain learn from the Singapore model of Public Housing as it is one of the most successful in the world. Or potentially from the Soviet Union model with the addition of more quality inspection. As with its current policy of Public Housing, it has not worked ever since its implementation, no helping but worsening the crisis (especially in 2013 onward). Other than the policy side, there are many new technology that could potential change the situation and improve the condition of many in a relatively short period of time. Modular Construction and Prefabrication has been on the rise in the recent years due to its flexibility, costs, and construction time. If such technology were implemented in Hong Kong public housing, it could enable the government to mass produce housing in a short time. The Hong Kong government has already been experimenting with Modular Construction, an encouraging note at last.

The fight to supply affordable housing in Hong Kong will be a long one, it will not be solve in the next decade and possibility decades after with its existing policy and spending. The Hong Kong government should look abroad and learn from successful cases of Public Housing and adopted new technology of of mass production of housing in order to ease the crisis. It is through this research that would hope to identify the current issue with existing policy, evaluate possible model to follow, and a realistic solution in the short and long term that aims to ease, or at best, solve the current

crisis. It will not be an easy one to tackle, some sacrifice will have to be made in the process to achieve the broader goal. But considering that there are 245000+ applications for PRH, 129000+ household in inadequate housing, and many more unsatisfied with their current condition, some sacrifice will be justified if it contribute to helping the public.

2. Overview of Hong Kong's Housing Situation:

The situation has been dire for decades, to find available housing in Hong Kong in good condition along with an adequate amount of living space might be the most difficult thing to do. Due to many constraints on lands available for development and excavation, especially its terrain, only 6.9% of the total land area is allocated for housing (private, public, and rural), with only 24.1% of the total developed land area *(CEDD.Gov). In addition, some 63% of the land falls under the government's protection, further limiting the availability of land *(CEDD.Gov). 45.3% of the population lives in Public Housing (permanent and rental), while the majority, 53.9%, still reside in private housing *(HKgov). In the 2020-21 fiscal year, some 11,300 units of Public Housing are delivered by Hong Kong Housing Authority, while there are still some 147500 general applications for PRH and 97700 for non-elderly one-person applications (low priority) *(HKHA.gov) in March of 2022.

During the 2020-21 fiscal years, there is a total count of 804k units of PRH housing 2112k people *(HKHA2021). There are a total of 344 units of housing demolished by URA for redevelopment, affecting 672 people *(HKHA2021). For the next five years, HKHA projects to further deliver 95600 units of public housing (107000 if include developments by HKHS). Despite all the recent developments, housing in Hong Kong still ranks as the least affordable out of 92 major property markets around the world, scoring a 23.2 (above 5.1 being severely unaffordable), some 7.9 points above the second-highest Sydney housing market *(DHI), rendering the average price for a home to be more than 10 million HKD *(Love Property).

All the above-mentioned statistics provide an image of a nightmarish housing market, making rent the a very significant part of household expenditure (35.8%) *(C&SD), and actual ownership of a home impossible for the average wage earner in Hong Kong.

2.1. Issues Concerning Building Age (need fix):

The majority of buildings in Hong Kong were constructed during the booming 1960s-70s, and most of them are still in liveable condition. However, going into the future, the prospect of the age of building will become a significant problem for the entire city to tackle.

According to the available government database *(rvd.gov), there are a total of 473 buildings built before the 1960s, most being institutions, hospitals, or independent houses. But moving up into the 1960s, the data shows a more troubling trend as there are around 7350+ (increasing by a pace of +500 count a year) residential/composite buildings built between 1960-1972 (still standing as of 2022), most being residential apartments *(rvd.gov.hk)(rvd.gov.new)(LegCo)(HKIS). All of those seven thousand buildings built in the 1960s are at least 50 years of age. These aged buildings would rely on the increased amount of maintenance to curb degradation, but a prolonged period of continued maintenance will be costly and not economical in the long run. According to LegCo Subcommittee on Land, "the design working life of an ordinary building is 50 years" *(LegCo). According to the Hong Kong Institute of Surveyors (HKIS), upon reaching the age of 30 years, signs of degradation will show. If said buildings did not under regular maintenance, after reaching the age of 50 years, it will require either large-scale renovation or reconstruction *(HKIS, p7). In another study by HKIS, as the building age increases, maintenance cost for building aged 30+ years is significantly more than in other categories (refer to table 1) *(HKIS, maintenance). As the year progresses, this issue will further exacerbate as according to HKIS's estimate, by 2046, there will be 28,000 buildings in Hong Kong whose age will surpass 50yrs *(HKIS, p7).

Another pressing issue concerning building age, there still exists a large number of public estates whose age has reached beyond 50+ in recent years. According to the HKHA public estates lists, there are some 20 estates whose age has surpassed 50, the oldest of which is the Model Housing Estate (68 yrs) *(HKHA, model estate). However, public estates will have more difficulties undergoing redevelopment or reconstruction, as the residents have to be relocated for the time being to other public estates or transitional housing (at present, only 531) *(thestandards). And given the very limited available housing stock for relocation in Hong Kong, large-scale reconstruction of many estates will be difficult given the housing stock limitation. HKHA has clarified that redevelopment of aged public housing estates should only be commenced on an Estates-by-Estates basis *(HKHA, discussion) in order to avoid over-capacitating the available housing resources. The only large-scale redevelopment/reconstruction program in Hong Kong was during the 1980s when a corruption scandal concerning the quality of building material was called into question. The 26 blocks scandal led to the discovery of inferior concrete used in the construction of some 577 PH buildings, 26 of which are in danger of collapse, thereby requiring urgent reconstruction *(icac.org). Following the scandal, further redevelopment was initiated by the Selective En Bloc Redevelopment Scheme that lasted from 1987 to 2012, with 566 public housing buildings being reconstructed *(aud.gov). This would be the most recent redevelopment program signed off by the government, it did temporally solve the immediate danger of potential collapse of building and upgraded many estates to higher standards. However, the same redevelopment scheme does not apply to private residential or composite buildings, as the redevelopment of those does not fall under the jurisdiction of the HKHA *(HKHA mission).

It can be fairly concluded that the rapidly increasing number of ageing buildings will be of great concern to the HKHA and the public, as logically, not all buildings will undergo regular and quality maintenance, especially older private residential buildings *(HKIS, maintenance). However, on the bright side, even though the regular designation for a building age is 50 years of time, under adequate maintenance, the concrete should be able to last up to 100 years (note, under most optimal conditions) *(RazorBack). But this should not reduce any urgency of the rapid ageing of most buildings, it is only a matter of time for Hong Kong to undergo mandatory large-scale redevelopment as the year progresses to ensure the safety of its population.

Table 1. Building maintenance cost range (at 1st Quarter 2012 Price Level)

BUILDING MAINTENANCE COST RANGE (at 1st Quarter 2012 Price Level)

No. of Storey / Building Age	< 7 storeys	≥ 7 storeys
< 30 years	HK$38,000 – $65,000 per Unit	HK$38,000 – $45,000 per Unit
≥ 30 years	HK$51,000 – $68,000 per Unit	HK$44,000 – $54,000 per Unit

Table 2. List of public residential estates whose building age exceeds designed working life (50 yrs) that has not been reconstructed

Only taken into account estates listed, constitute only a small fraction		
Name of Estate/Building	Age of construction	Building Age
Chai Wan Estates	1952	70 yrs
Model Housing Estate	1954	68 yrs
Kwuan Lung Lau	1968	54 yrs
Ming Wah Dai Hu	1963, 1965	59, 57 yrs
Healthy Village	1965	57 yrs
Wah Fu (1) Estate	1967	55 yrs
Yue Kwong Chuen	1965	57 yrs

Table 3. List of Public Estate aged 50+ years that has been reconstructed

Name of Estates	Date constructed	Date of Completion of Reconstruction/Renewal	Time took for Reconstruction/ Renewal
Hing Wah (1) Estate	1971	1999	4 yrs *(LINK)
Reason for Reconstruction: Issue concerning the strength of concrete in the 1980s, therefore a need to be reconstructed to renewal structural integrity. *(LINK)			
Chai Wan Estate	1957	2010	47 yrs *(LINK)
Reason for Reconstruction: Renewal, in addition, to meet the goal of Green Form Subsidised Home Ownership Scheme *(LINK)			
So Uk Estate	1960	2016, 2018, 2019	4 - 6 yrs *(LINK)
Reason for Reconstruction: High maintenance cost despite still in good condition, offered temporary relocation to Un Chau Estate *(LINK)			
Un Chau Estate	1969	1998, 2008, 2012	4 - 12 yrs *(LINK)

Reason for Reconstruction: To expand the structure and to improve surrounding infrastructure and transportation *(LINK)			
Shek Kip Mei Estate	1953	1973, 2007, 2012, 2018	5 - 9 yrs
Reason for Reconstruction: modernization, and to increase living space and improve the sanitation, in addition with some other facilities. *(LINK)			
Tung Tau Estate	1959, 1961-67	1980s-1990s	~9 - 10 yrs,
Reason for Reconstruction: make room for new housing blocks, and redevelopment of a separate housing estate, in addition to issues concerning structural integrity. *(LINK)			
Lower Wong Tai Sin (i) Estate	1957	1989	12 yrs
Reason for Reconstruction: Issue concerning structural integrity, and according to the policy of Selective En Bloc Redevelopment Scheme, with mass refitting of the public estate. *(LINK)			
Upper Wong Tai Sin Estate	1963	2000, 2009	4 - 8 yrs
Reason for Reconstruction: To improve the sanitary condition, and fall under the Selective En Bloc Redevelopment Scheme reconstruction plan. *(LINK)			
Lok Fu Estate	1957	1980s	~ 4 - 12 yrs
Reason for Reconstruction: The estate falls under the Selective En Bloc Redevelopment Scheme reconstruction plan *(LINK)			
Shatin Pass Estate	1967	2002	5 - 8 yrs
Reason for Reconstruction: The estate falls under the Selective En Bloc Redevelopment Scheme reconstruction plan *(LINK)			
Lower Ngau Tau Kok Estate	1967, 1969	2012, 2015	~ 4 - 7 yrs
Reason for Reconstruction: The estate falls under the Selective En Bloc Redevelopment Scheme reconstruction plan *(LINK)			
Lam Tin Estate	1966	2009	4 yrs
Reason for Reconstruction: Due to quality of construction material used, falls under the Selective En Bloc Redevelopment Scheme reconstruction plan *(LINK)			
Yau Tong Estate	1964	2000, 2002	~ 7 yrs
Reason for Reconstruction: To make space for MTR station and rail in construction *(LINK)			
Kwai Chung Estate	1964	1997-2008	5 - 8 yrs
Reason for Reconstruction: To improve sanitation, and due to building age *(Wikipedia?)			
Kwai Fong Estate	1971	1987	~ 3 - 5 yrs
Reason for Reconstruction: Due to quality of construction material used, falls under the Selective En Bloc Redevelopment Scheme reconstruction plan *(LINK)			
Shek Yam Estate	1968	2005	10 yrs
Reason for Reconstruction: Issue concerning construction material and internal corruption, especially the concrete hardness were off mark *(LINK)			

2.2. Issue concerning Housing Shortage and Needed Redevelopment:

As stated in the previous section, there is a massive shortage of public housing available to the public, as there are still 147500 general applications followed by 97700 non-elder single applications waiting to be fulfilled *(HKHA.gov). However, this number only accounts for some of the population in need, while there are still a substantial number of individuals that are not eligible for application for PRH

units. The final number for those who need PH available to them is much large then the current number of applications.

Another issue concerning the shortage of public housing is the pace of PRH construction. For the next five years, the projection shows that HKHA will be delivering 95600 units of PRH + Subsidised housing *(HKHA, 2020-21). Despite the rather superficial pledge by the new chief executive of Hong Kong to increase the housing supply and shorten the waiting period, this pledge lacks any detailed policy to tackle this shortage *(the standards). In addition, one must consider the previous point made about ageing buildings. While the projection shows that HKHA will be able to complete 95600 units of public housing, not all of these units will be offered to those on the PRH waiting list. The first reason is that those affected by URA redevelopment will be granted the choice to relocate to PRH units *(URA, PRH). The second reason is that reconstruction of existing public housing will lead to tenant relocation, effectively taking another portion out of the 95600 units *(HKHA, discussion). Coupled with the uncertainty regarding the Covid-19 Policies that slowed the construction process during the 2020-21 fiscal year, realistically, the final unit delivered to those on the waiting list will not be 95600, but a figure lower.

The Long Term Housing Strategy organised by the Transport and Housing Bureau (THB) envisioned the construction of some 330000+ PH in a ten-year period between 2022-23 to 2031-32 *(LTHS 2021)[2], in addition to another 129000+ units of private housing during the same period. This goal is ambitious. However, there are definitely issues concerning whether if this goal is achievable. Between the ten-year period of 2016-17 to 2025-26, the original goal was to deliver 255000+ units of PH and Subsidies Sales Flats (SSFs). However, during the first five years, only 83600 units were delivered by the HKHA and HKHS combined *(LTHS, 2020). The projection of the second five years currently aims for a production goal of 107000 units, even if the projection were delivered, there is still a significant shortfall of 64500 units not delivered between 2016-17 to 2025/26, only achieving 74.7% of the initial goal. This shortfall calls into question whether the goal/projection for the future of the THB is realistic.

The question of when will Hong Kong solve its housing shortage will be a lasting one, despite the rather optimistic projection, there are still many uncertainties. Hopefully, the current projection of the next ten years of housing production will be materialised, delivering an adequate number of housing. However, the rapid ageing of private and public housing stock alike will not help ease this issue either, as a growing number of buildings would need redevelopment in the near future, potentially leading to some level of displacement.

2.3. Responsible Parties for Redevelopment in Hong Kong:

There are a number of parties that are responsible for redevelopment in Hong Kong. Public organisations such as the Hong Kong Housing Authority (HKHA), Hong Kong Housing Society (HKHS), and Transport and Housing Bureau (THB). A quasi-governmental organisations like the Urban Renewal Authority (URA), and many private developers in Hong Kong. To solve the housing crisis in Hong Kong, it should be a collective effort to tackle this issue together.

3. Urban Renewal Authority (URA):

URA is founded in 1999, serving as a replacement for the Land Development Corporation. It is a quasi-governmental organisation, profit-making and tax-exempt, responsible for accelerating urban development, redevelopment, and rehabilitation in Hong Kong *(URA). Its redevelopment and compensation policy is run according to the guidelines of the Urban Renewal Strategy designated by the government, aiming to place the interest of the people first *(URA).

The organisation is not without controversies, as at times their redevelopment projects have led to some level of gentrification, and the demolition of cultural heritage, and collective memory *(SCMP 2008). The most high-profile example is the demolition of Lee Tung Street when 930 households were affected by redevelopment into four residential towers and four shopping malls *(CUHK).

3.1. URA Compensation Policy

By first glance, the compensation policy of URA is fair considering the amount the affected tenant will be paid if their residence is affected by redevelopment. Overall, the compensation policy provided by URA does take into consideration the potential cost inflicted on affected tenants, thereby offering a variety of options. .

Total compensation includes the following values: market value of property + Home Purchase Allowance (HPA, for occupied residence) / Supplementary Allowance (SA, 25-75% of HPA, for unoccupied properties). The market value of the property will be determined by independent consultants provided by URA. The final valuation will be based on the median value determined, minus the highest and the lowest valuation *(URA comp). Home Purchase Allowance will be determined by how much a similar level of housing will cost (in similar size and locality). If the affected property's total valuation is 2 million, and the purchase price of another property similar in size and locality (at least 7 years old) costs a total of 3.5 million, then HPA will be 3.5 mil - 2 mils = 1.5 million offered *(URA comp). In addition, the cost of relocation and incidental costs will be covered by URA.

In terms of other option for relocation, affected tenants by URA redevelopment (owners of the occupied property) does fit the eligibility criteria for relocation to PRH units offered by HKHA *(URA PRH)(HKHA URA). However, the PRH units assigned to affected tenants will be the smallest units to meet the minimum standard on per-person floor area, 4-5 person households will obtain 35sq meters of space *(HKHA URA). If one were to refuse URA provided re-housing program, they could access an ex-gratia allowance that will be based on 3.5 times the property’s Rateable Value *(URA EGA). If the affected tenants or owners of affected property found the valuation of their property to be underestimated, they could appeal to the Land Tribunal to seek potential adjustments to the compensation received *(LT).

3.2. URA-led redevelopment projects

As mentioned in the previous section, URA is a profit-making organisation, thereby its incentive would look for the current level of demand. If low-cost housing is rising in demand and the URA can make a profit out of them, URA will certainly participate in the development. However, the more popular housing demand is for high to median end or luxury properties, and as a logical thinking private organisation would do, URA plays its cards according to the current trends

*(SCMP). On URA's redevelopment webpage, a few completed redevelopment projects are listed as the following:

K7, Kwun Tong Town Centre Project, or Park Metropolitan, a joint venture project. Total affected tenants amount to some 3139 individuals, and 1653 property interests. Finished 1-3 phrases, with phrases 4-5 projected to the finished by 2026. The Rent ranges from 16-20k a month *(K7).

Though the rent range might seem to be quite a low relative to other properties alike located in Hong Kong Island, it should be noted that the average HH income in the Kwun Tong area is only 19000 HKD *(2016 By-census). So it can be fairly inferred that the majority of the local population might not be able to afford the rent in the K7 Town Centre Project, rendering it unaffordable for most in the district.

More interestingly, and also disturbing, is the fact that the buildings around K7's proximity are mostly residential composite buildings built in the 1960s (Kai King Building 1965, Far View Mansion 1966, Kin Tai House 1969, etc). And that a new development project was completed not long ago, the Grand Central developed by the Sino Group (private). The Grand Central was complete in 2020, rent ranges between 20-45k, while sales ranges between 8.5-28mil *(Midland). All the while the building in the 1960s only has a sales value of around 1-12 million, with living spaces ranging between 300-1000 sqft (according to midland realty). The surrounding area will eventually be redevelopment as the building age has already reached 50 yrs, and if so, according to Urban Renewal Strategy, the compensation offered will be that of the total valuation of property + HPA for another property similar in size and locality *(URA comp). This might be applicable to property owners, but not necessarily to people who rent the properties as they are only offered ex-gratia of 3 times Government EGA + 24 months 'profit rent. [requires more clarification] *(URA.org). Even though the redevelopment might not affect tenants directly, the surrounding property price will be somewhat influenced by the newly developed property. Nearby tenants could be next in line to be redeveloped if the building structure is too old, or if rent in the residents will increase due to higher demand for housing in the area close to the newly developed area.

In addition to the K7 Park Metropolitan, there are many other ongoing redevelopment projects in Kowloon. 2 in Kwun Tong, 15 in Kowloon City, 7 in Sham Shui Po, 7 in Mongkok, and Yau Ma Tei, and 1 in Wong Tai Sin *(ura. redevelopment). This number will only increase in the near future as suggested by the LTHS by the THB to expand the housing stock *(LTHS2021). And close to non of the redevelopment projects will be targeted for the Lower-Income Group

Table 4. List of URA complete redevelopment projects (note, not all URA projects are included, sourced fro Centaline Realty)

Name	Location (district)	Year of Completion	Rent Range	Sales Range	SFA in sqft
Kwun Tong Town Centre / Park Metropolitan	Kwun Tong	2014	16k to 20k	8.2 to 16 million	Mostly 400 - 1200
Sheung Heung Road Project / Artisan Garden	To Kwa Wan	2020	~15k	6.5 - 900+ million	283 to 386
Baker Residence	Hung Hom	2011	~10k	~4 - 4.5 million	~ 260
93 Pau Chung Street Project	To Kwa Wan	2018	~14k to 15.8k	6 - 6.5 million	333 to 334
San Shan Road Project / Downtown 38	To Kwa Wan	2019	15k to 33k	6 to 7 million	~300 to 561
Mok Cheong Street Project / My Place	Ma Tau Kok	2016	12k to 19k	5 - 9.5 million	255 - 340
eResidence / Ma Tau Wai	Hung Hom	2019	n/a	3.7 - 6.5 million	300 - 483
City Hub / Chi Kiang Street	To Kwa Wan	2017	12k to 42k	5.3 - 18.6 million	261 - 832
Madison Park / Kowloon Road	Sham Shui Po	2020	18k - 21k	6.8 - 11.5 million	301 - 438
Hyde Park / Hai Tan Street	Sham Shui Po	2020	~15k	5.6 - 11.7 million	262 - 474
The Amused / Fuk Wing	Sham Shui	2018	13.5k - 25.5k	~4.5 - 10.2	254 - 410

Street	Po				
Trinity Towers / Lai Chi Kok	Sham Shui Po	2015	15k - 24,5k	6 - 12 million	362 - 745
The Ascent	Sham Shui Po	2018	14.5k - 18.5k	5 - 10 million	276 - 458

4. Hong Kong Housing Authority and Society

The Hong Kong Housing Authority (HKHA/HA) is the main authority responsible for public housing in Hong Kong, especially focusing on Public Rental Housing Estates and other commercial facilities, also supporting the construction and management of interim housing, market stalls, car parks, and land resumption *(HKHA).

The Hong Kong Housing Society on the other hand is an independent, non-government, non-for-profit organisation (unlike URA) established in 1948. Its main responsibility was to meet the demand of the niche housing market, but playing a relatively minor role in terms of public housing *(HKHS).

Public Rental Housing Eligibility Bracket:

The average living space per person in Hong Kong's PRH units is only 13.5 square meters with the average home being just over 350 square feet *(stats), the lowest in the world, making housing in Hong Kong the most unaffordable and generally cramped. In addition, there are still some 127100 households living in inadequate housing (mostly subdivided units) in Hong Kong *(LTHS 2021)[2]. While some of those who felt their current living condition is uncomfortable or even inhumane, can opt for applying to Public Rental Housing developed and manage by HKHS and HKHS. However, there are certain demographic that do not enjoy priority treatments.

The very basic eligibility bracket for the applicants is the income and net asset limit that the applicants would fulfil before advancing into other sections, if not, one can't apply for PRH units if income or net assets exceeded limits. In addition, applicants should not be an owner or joint owner of a property along with ex-owner/ex-joint owner of SSFs unit are eligible to apply for PRH if not for financial hardship. Those who opted for cash compensation after their housing was demolished cannot submit an application to HKHA within two years from the date of termination of their tenancy.

In terms of priority, elders aged above 60 years old do enjoy priority on the PRH waiting list, single or multiple. Harmonious families also enjoy certain priorities over ordinary general applications. The most disadvantaged demographics are single-person applicants and for good reason, as their application is with dead last priority, and individuals are scored on a point base on determining priority (+9 pts every year, higher points, higher priority over other non-elder single applicants) *(HA). However, at least all applicants that fit the income eligibility can apply and will eventually receive a PRH unit on their own, the real trouble rests with the "sandwich class" in Hong Kong.

While there are some specially designated housing units for the "sandwich class" in Hong Kong, it is few in number. At present, there are only 9000 units of Sandwich Class housing (subsidised) after some estate was converted to private properties, and sold at full market value *(HKHS). Due to the limited number of units provided, many issues would ensue.

Table 5. Income Eligibility for Application for PRH *(HKHA source)

Note that all applicants aged 58+ Note that Income and Assets will be reviewed annually		
Family Size	Income Limit per month Limit	Net Asset Limit
1 person	12.9k	273k
2 people	19.5k	369k
3 people	24.4k	481k
4 people	30.9k	562k

Table 6. Income Eligibility for Application for PRH *(HKHA source)

Note that all applicants that do not aged 58+, must not be one person household		
Family Size	Income Limit per month Limit	Net Asset Limit
2 people	23.4k	738k
3 people	29.2k	962k
4 people	37.1k	1.124 mil
5 people	44.6k	1.248 mil

4.1. The Hong Kong Property Market

The property market in Hong Kong, is in a league of its own. In the past 13 years, property price has increased some 165% (adjusted for inflation), with some +28.5% increase in 2009, unrivalled globally *(Globe Property). And it will likely remain the most expensive property market in the world as housing is so scarce. After Covid's impact and following strict curfew, many would leave Hong Kong, leaving the market in a slump. But there is a projected revival of the market as Covid restriction eases, and demand would rise again *(Business Insider).

4.2. The Wants and Needs of the Public

In the current market, the wants and the needs of the public are very different. As the wealth disparity still remain wide, the lower-income group and the sandwich class need affordable private housing or opt for PRH, conflicting with the interest of the higher-income group who wants high-end housing. While the demand for affordable housing will certainly remain high for years to come, there is also a rising demand for high-end housing in Hong Kong *(SCMP).

But from the developer's point of view, there are certainly no or little profits to be made with the construction of low-cost private housing for the public, considering the land still costs a lot. Even though the private market is more versatile and can develop plots of land where public estates are too big to fit, its sole motivation is to seek profit *(alake). However, due to the revision of the LTHS in 2020, the ratio of proposed public housing to private housing ratio was adjusted from 60:40 to 70:30 as the administration wanted to speed up PH development *(LTHS 2020). It seems that the government finally realised the immediate importance of the population's needs after the disastrous administration of Leung Chun-ying, which drove housing prices way up. The need is no doubt more important than the want of the population. The housing crisis in Hong Kong can be solved with a city-wide focus (like in Singapore) on this issue and solve it once in for all.

The private sector can still play a role in the housing market by supplying a limited number of high-end, less land-efficient estates (i.e., independent houses). But the main focus should align with the HKHA and HKHS to provide mass affordable housing for the short term. There can certainly be some form of collaboration or joint venture between the private and public sectors for the short term. In return, the government can provide the private sector with tax concessions and retain the incentive of said collaboration. URA is designed to bridge the public and private sectors, but for the most part, it redeveloped property with joint venture partners and sold housing at market value. It should, at least in the short term, align its interests with that of THBs and HKHAs to provide enough housing for the population so that it would ease the crisis at last.

4.3. The Conundrum Facing the "Sandwich Class"

https://theinitium.com/article/20170316-hongkong-public-housing/

The "Sandwich Class" in Hong Kong is no doubt in a peculiar situation, as their personal income is too high to apply for PRH, and but too low to afford private housing in Hong Kong. There is too few estates designated as Sandwich Class Housing Scheme. They are basically trapped in an immobile position as property prices continue to rise.

An interesting article from the Initium documented the lives of the Sandwich class and those on the PRH waiting list. There seems to be little hope in their lives no matter how hard they try *(Initium).

The Median Household Income in Hong Kong in 2022 is 28000 HKD *(C&SD), and the average household size is 2.7. Then according to PRH's eligibility brackets, there are some that can apply for PRH, while that Household with income over 29.2k can't *(HA eligibility). This is cruel for those who might just income slightly above, as they are similar in economic condition but cannot access the same resources as others can. While the exact number of population that suffers from this same issue is unknown, a substantial number of people do.

The sandwich class can certainly afford to live in a private rental flat, but the desire toward achieving home ownership is and will remain an aspiration for all as most see it as an investment *(Juwai). But to afford to buy a home in decent condition has become harder than ever, as rents continue and are expected to make a full rebound by 2022 *(HKbusiness). In the years that follow, the Sandwich class will likely be trapped in the same predicament. However, if the goal of the LTHS was achieved and delivered 220000 units of PRH by 2032 in addition to some 90000 units of SSFs, the housing situation in Hong Kong will most likely improve *(LTHS2021). But it is only a forecast. The reality could be very different as historically, HKHA has underdelivered. It could take longer until the "3-year wait period" can be achieved.

4.4. Ongoing Population Movement and Gentrification

So from table 5, it can be reasonably inferred that Both Sham Shui Po and Kowloon City District are two areas

experiencing a significant amount of population movement, which can be interpreted as gentrification. Some 19.4% of the population entered Kowloon Tong, and 14.5% entered Sham Shui Po between 2011-2016. The reason? There are newer and better housing options, leading to an influx of population and new residents.

Table 7. Household statistics in different districts: sourced from (By-census 2016)

District:	Median HH income	Median HH area (in sq meters)	Low 25th percentile HH area (in sq meters)	Remain in same exact HH	Remain in the same district	Come from other districts
Sham Shei Po	**20,000$**	**35**	**23**	68.1%	**12.6%**	14.5%
Kowloon City district	25,000$	40	30	**63.7%**	11.1%	**19.4%**
Kwun Tong District	20,160$	**35**	28	80.7%	6.9%	10.9%
Northern District	21,500$	40	34	76.4%	10.1%	8.3%
Kwai Tsing	28,800$	**35**	30	73.9%	10.7%	11.0%

According to the data from the 2016 By-Census, there is certainly a large shift in the population, and most like, the change of local demographic in the Sham Shui Po and Kowloon. Regarding Table 2, in a list of URA redevelopment projects, there are 14 finished redevelopment projects alone in the Sham Shui Po and Cheung Sha Wan area (not all are listed), with another 8 in construction *(URA). There are also seven finished redevelopment projects in Kowloon City, with an additional 15 in construction *(URA). And for table 6, including all private development projects, there are 15 residential projects construction between 2011-2016 and 14 in Kowloon City. It is pretty clear the reason that leads to the population movement. Redevelopment of old estates into new modern tower blocks at a relatively low price compared to property prices in Hong Kong Island is attractive to the middle-class (HH income of at least 55000) who wants large apartments *(China Daily)(RVD). Thereby leading to a significant influx of population from other districts.

This influx of mostly middle-class households could potentially lead to gentrification. From October 2010 to October 2020, the Midland property price index of Kowloon increased to 159.4 pts (+93.6%) while Hong Kong's index jumped to 181.8 pts (+81.8%) *(Midland). The property price gap between Hong Kong and Kowloon has been slowly closing. According to the data in May 2022, Kowloon recorded 172.4 pts, only 6.7 below that in Hong Kong *(Midland). If the income in Kowloon were on part with that of Hong Kong, there would not be any major change in the demographics. However, this is untrue. According to the 2016 By-census, the median household income (shortened for MHI) in Central and Western Districts stands at 36,000 HKD. On the other hand, the MHI of the Sham Shui Po district stands at only 20,000 HKD *(By-census).

As the pricing gap between Hong Kong and Kowloon slowly disappears, the once cheap Kowloon property price has nearly reached that of those in Hong Kong island *(Midland). The local population would slowly be driven out to the neighbourhood. As if the 15 ongoing redevelopment projects in Kowloon aren't obviously clear of projected population influx into the older and poorer region *(By-census)(re-URA), it will lead to gentrification in those areas affected by gentrification.

4.5. Gentrification in Action

Though the directly affected tenants (owner and occupier) by redevelopment will be compensated with cash, ex-gratia allowance, and PRH relocation priority, the same cannot be said for surrounding tenants that do not live in the redeveloping building *(URA PRH). As most private redevelopment projects in Hong Kong are designed for the middle class, the influx of middle-class citizens into a traditional poor region such as Sham Shui Po with lead to gentrification, directly, and indirectly *(By-census). As recorded in December of 2008 the average price per GFA is 2402 HKD *(28hse). After a series of redevelopments around Sham Shui Po, the most recent records show the average price per GFA rising to 11293 HKD *(28hse). This is an increase of some 370.1% in housing prices, a lot above the average increase in Hong Kong between the same period of 165% increase in property prices across HK Island *(Globe Property). In 2008, Sham Shui Po recorded the lowest MHI of only 13800 HKD, and new data in 2016 shows an increase of 45% to 20000 HKD *(PICO.Gov, By-census). The most recent data in 2020 shows a further increase in MDI of all households (not be to confused with economically active households) from 15% to 23000 HKD *(censtatd.gov). While there are certainly some increases in wages in the Sham Shui Po district, it is far from the tremendous increase in property price (66% increase in MHI relative to 370% in property price), this calls into the question of whether staying in the district is bearable for over residents that do not experience direct redevelopment in their respective housing building.

This phenomenon is more obvious in buildings which's age is not too old (not surpassing 50+ years) due to the fact that it is not as expensive as the newly redeveloped near its proximity but also hold up in terms of quality.

In a redeveloping neighbourhood like SSP, the aged buildings (50+ yrs) will eventually be redeveloped into residential or composite buildings with rent higher than the local district rate; the not too old building's rent will also increase following the redevelopment, and the original tenants having to bare. Therefore, directly displaced tenants (owners/renters) by redevelopment will not be harmed as they can either purchase another property in the local district with a similar size and locality or be offered relocation to nearby PRH. However, those indirectly affected tenants (who live close to redeveloping area) will have to bare the blunt of the knife, as they are most likely negatively influenced by rent hikes due to the influx of a wealthier population from other districts, which is the classic definition of gentrification *(reventure).

Thereby, due to the relatively imbalance increase between wage and property price, it explains the internal migration data recorded in the 2016 By-census in SSP (refer to table 5) (note, no exact figure for internal migration in SSP recorded in 2021 by-census). Due to a dramatic increase in property price relative to that of local MHI, followed by an influx of population from other districts (demographic on population influx to SSP not detailed), the renters of not directly affected buildings surrounding redevelopment projects located in SSP are being displaced as gentrification continues.

4.6. Ongoing Redevelopment

Table 8. List of Residential Buildings/Apartments built between 2011-2016, data sourced from HKHS

	Kowloon City (14)	Ho Man Tin (9)	Sham Shui Po/Cheung Sha (14)
	To Kwa Wan (4)	Kowloon Tong (10)	Mongkok (3)
	Shau Kei Wan (5)	Prince Edwards (3)	Others (15)
Number of Buildings	2011	2012	2013
1	3 built in HK island, 8 built in Kowloon and New	13 built in HK island, 10 built in Kowloon and New	4 built in HK island, 10 built in Kowloon and New
2	Baker Residence, Hung Hom (URA)	Bayview, To Kwa Wan	Dunbar place, Ho Man Tin
3	Lime Stardom, Prince Edwards	景怡峯, Sham Shui Po	The Met. Focus, Kowloon City
4	Meridian hill, Kowloon Tong	J17, Kowloon Tsai	Heya Green, Sham Shui po
5	One Mayfair, Kowloon Tong	Le Château, Kowloon Tong	I Uniq Residence, Shau Kei Wan
6	One Victory, Ho Man Tin	Lions Rise, Wong Tai Sin	I Uniq Grand, Shau Kei Wan
7	The Signature, Tai Hung	Macpherson Place, Mongkok	Kadoorie hill, Ho Man Tin
8	Urbana Lofts, Kowloon Tong	The Coronation, Yau Ma Tei	La villa de la salle, Kowloon tong
9	Wuhu Residence, Kowloon City	The Prince Place, Kowloon city	Ocean One, Yau Tong
10		The Ultimate, Kowloon city	One West Kowloon, Sham Shui Po

11		18 Upper East, Shau Kei Wan	The Opulence, Kowloon City
	2014	2015	2016
Number of Buildings	11 built in HK island, 20 built in Kowloon and New	13 built in HK Island 12 built in Kowloon and New	17 built in HK Island 19 built in Kowloon and New
1	Billionaire Avant, Kowloon city	Heya delight, Sham Shui Po	Billionaire Luxe, Kowloon city
2	Chatham Gate, kowloon city	Heya star, Cheung Sha Wan	Cristallo, Prince Edward
3	Eden Gate, Kowloon Tong	High One Grand, Cheung Sha Wan	Eivissa Crest, Sai Wan
4	Grand Austin, Jordan	High Park, Sham Shui Po	Heya Aqua, Cheung Sha Wan
5	Harmony place, Shau Kei Wan	L.Harbour 18, To Kwa Wan	Heya Crystal, Cheung Sha Wan
6	High place Kowloon City	Metro 6, Kowloon City	High One, Sham Shui Po
7	High Point, Sham Shui Po	My Place, To Kwa Wan	Kadooria, Prince Edward
8	Kadoorie lookout, Ho Man Tin	Parkes Residence, Yau Ma Tei	Kum On Hin, Kowloon city
9	Le Riviera, Shau Kei Wan	The Argyle, Ho Man Tin	La Lumiere, Ho Man Tin
10	Luxe Metro, Kowloon city	The Met Delight, Sham Shui Po	La Maison de la salle, Kowloon Tong
11	Park ivy, Tak Kok Tsui	Ultima, Ho Man Tin	Parc Inverness, Kowloon Tong
12	Park Metropolitan, Kwun Tong	3 muk chui st, Tai Tak	Peninsula East, Kowloon Tong
13	Paxtonn, Kowloon city		Skypark, Mongkok
14	Sevilla crest, Sham Shui Po		The Grampian, Kowloon Tong
15	Star Ruby, Hung Hom		The Paseo, Jordan
16	The Austine place, Jordan		The Zumurud, Ho Man Tin

17	The Avery, Kowloon city		Upper West, Tai kok Tsui
18	Triazza, Cheung Sha Wan		VIVA, To Kwa Wan
19	Trinity towers, Sham Shui Po		Zion Apartments, Mongkok
20	8 Lasalle, Ho Man Tin		

Conclusion of the above finding: It can be fairly concluded that out of 140 residential buildings/towers constructed between 2011-2016, 61 out of 140 are constructed within the boundaries of HK island, whereas 79 were constructed in Kowloon and New Territories, with a heavy emphasis on the Kowloon City and Sham Shui Po/Cheung Sha Wan district. This finding does support the 2016 Government by-census that relative to other districts, there are more people in the said district (refer to HH stats table) while a percentage small than HK average of citizens remained in exact HH between 2011-2016. Thereby, it can be said with existing evidence so far that gentrification could be a cause of the population movement in Sham Shui Po and Kowloon Tong. According to the OKAY property agency, there has been a very significant increase in property prices in Kowloon in 2016 (OKAY). And according to 28Hse.com (property agency), property prie in Sham Shui Po have risen significantly, with +52% between 2011-2016, and 50.2% between 2016-2021 (total increase per GFA in a decade from 4709 to 10755 HKD) *(28Hse). The same goes with Kowloon city, but with relatively less fluctuation, +0.7% change between 2011-2016, and +40.6% between 2016 to 2021 (total increase per GFA in a decade from 8018 - 11369 HKD) *(28Hse)

For the above-listed buildings, all of which are not built to accommodate the lower and lower-middle income group, but rather the middle to the upper-middle-income group. Just to take a few buildings:

Lime Stardom, Prince Edwards, SFA(sqft): 20222 HKD (2021), Rent: 13000-22000 HKD

Lions Rise, Wong Tai Sin, SFA(sqft): 17917 HKD average, Rent: 20000-33000 HKD

One West Kowloon, Sham Shui Po, SFA(sqft):15655 HKD average, Rent: 24000-38000 HKD

The Avery, Kowloon City, SFA(sqft): 20982 HKD average, Rent: 16000-16500 HKD

Heya Delight, Sham Shui Po, SFA(sqft): 16350 HKD average, Rent: 17500-22500 HKD

La Lumiere, Kowloon City, SFA(sqft): 18968 HKD average, Rent: 19000 HKD

Whether this rent is affordable for the lower middle class and some middle class with average HH income of between 20000 HKD is debatable. Certainly, some would sacrifice spending on other commodities for better housing, but is this rent affordable for the general population of HK? The answer would most likely be NO.

The Rent for the listed residence is not social rent, but rather the rent in the free market. Previously in the paper, one housing agent has said that his experience in the real estate industry has told him that the free market will abide to supply and demand. However, the case in Hong Kong is that the demand for affordable housing is high, but the supply of it is low. Of the 140 residential buildings constructed by the majority of private developers between 2011-2016, all but one was housing designated only towards elders age 60+ (but still with high rent, see lease incentives).

So what happens when the free market only develops residence for the relatively higher-income group as their demand is more attractive. This scenario would leave the HKHS and HKHA as the only public developers that could help to develop affordable housing.

5. A Model to be Praised - Singapore

5.1. History of Urban Development in Singapore

Singapore is a city much like Hong Kong in its geographical constraints, both being rather small but with concentrated populations, while Singapore is even more so. With a total landmass of only 733km^2.Hong Kong has a total landmass of 1114km^2, with 24.1% of total developed land *(cedd.gov)[1]. Not all lands can be developed due to the mountainous terrain that covers the majority of HK island, leaving some 70% of the total landmass as undeveloped Woodland/ Shrub-land/ Grassland and such *(cedd.gov)[1]. 63% of total landmass is classified as protected land, thereby highly restricted from development. But there are still some 5.28 million sq meters that can be developed or under construction *(HK land), primarily in the Tia Tak area and other development zones in the New Territories which could later be transformed into residential housing.

Despite the fact that Singapore does have a smaller total landmass, the geography of Singapore is far more favourable for urban development as the geography is mostly plains with less elevation compared to Hong Kong, which might be a few differences. However, traveling to Singapore and witnessing the urban planning in-person tells a completely different story than that of Hong Kong despite many similarities. The city skyline is beautiful and organised, and the city is just generally clean, not only on the street but also on its building, not at the level of disrepair that many HK residential buildings are in. And amazingly, despite having to house 5.68 million people, the homelessness rate is also very low (around 1000 only, relative to HK's 1530) *(SCMP)(U21).Globally, Singapore ranks 5th for its quality of public housing *(Iproperty). And despite still being ranked as severely unaffordable by the Urban Reform Institute (5.8, 5.1 over being severely unaffordable), it is still 17.4 pts less than HK's level of affordability *(URI). As of 2020, 78.7% of Singapore

residents live in public housing, relative to HK's 45.3% *(SG)(HIF).

What makes Singapore so successful with its urban development? Is there gentrification in Singapore? These questions will be crucial to finding a solution for Hong Kong's Housing and gentrification issues.

5.2. Gentrification in Singapore

Gentrification in Singapore is rather limited, at least not to the extent that HK now suffers from. A particular area experiencing extensive redevelopment and gentrification is the Tiong Bahru planning area, where the original older population is being displaced or relocated to other districts following growing property prices (+46-76%) in that neighbourhood *(Positive gentrification). The typical pattern of gentrification would ensue, as hippy restaurants and art venues were rushed into Tiong Bahru. However, the Singapore Government seems to be quite supportive of such development as it hopes to turn Singapore into a "creative cluster and increase global competitiveness" *(Positive gentrification). The media also seems to be quite fond of the redevelopment and the beautification of the Tiong Bahru planning area, as a single first-page google search will be all positive with no mention of ongoing gentrification. Thereby, it can be said that gentrification in Singapore is much less serious compared with Hong Kong due to its high homeownership.

5.3. Hong Kong can take from Singapore Urban Renewal and Public Housing

As mentioned above, Singapore does have a top public housing system and one of the highest rates of homeownership globally. There are several reasons why:

Table 9. Government Expenditure and Revenue concerning Land Use and Housing Programs

Note all in HKD, sourced from (Sgov),(Gov)		
	Hong Kong (FY2020) / HKHA	Singapore (FY2020) / HDB
Total expenditure on Public Housing Development	22,862,000,000 (Non-recurrent) + 22,082,000,000 (recurrent) = 44,944,000,000	42,412,800,000 grant to HDB
Land Sales / Land Premium	118 billion *(Gov)	81.97 billion (Sgov)
Maintenance and Improvements	4,354,000,000 + 487,000,000 for improvement works	60,547,000 for upgrading

As listed on the above table, the spending on public housing for both public housing department are rather similar. The HKHA does spend more relative to HDB, they do receive the larger grants and larger total expenditure for development, and the HK government does also receive more revenue from land premium, same goes with funds for property maintenance. The HKHA outspends the HDB on every level, but the product that they deliver is far more limited.

In FY 2020, the HKHA only delivered 11300 units, while the HDB delivered 9400 units *(Strait Time). On paper, it may seem that HKHA is doing a better job with a relatively high number of PRH units delivered. However, when taking this into context, there are still 245200+ total applications for the PRH unit in 2021. Even if all the 11300 units are delivered to the 245200+ applicants, there are still 245200+ applicants left in wait, not accounting for new applicants. On the other hand, for HDB, there are only some 22000+ applicants in line, far shorter than the waiting line for HK PRH. Thereby, the number of units that HKHA delivered is not a sufficient amount of PRH to satisfy the public housing need and is far less flexible.

If the HK government wants to ease the housing crisis, much more spending does have to be redirected to HKHA redevelopment, as the current pace of delivery will not be enough. For the next five years, HKHA hopes to deliver a total of 95600 on its (HKHA annual 2020) units of PRH and subsidised housing, with an average of 18720 units per year *(HKHA). The government and the responsible parties would have to spend significantly more to achieve the 220000K units that it plans to deliver from 2025-26 to 2031-32, as for now, they are already spending some 44 billion, and the figure may be doubled in the near future if they truly see this issue as immediate.

The reason why Singapore was able to avoid suffering the same fate regarding housing its population is the dedication of the Singaporean government toward such a cause, and the length of time it spend perfecting the existing system of public housing.What the HK gov can learn is that the only approach to this crisis is simply to spend more, accompanied by more attention. If the government refuses to devote more resources to the development of PH, the root cause of the housing crisis will not truly be solved, at least not in the short term.

6. Proposed Solution

There has already been quite some solution offered by others, hoping to solve the supply issue, but most failed to tackle all the programs posed by Hong Kong's housing crisis, listed as follow:

To create affordable housing in Hong Kong

To provide public rental housing to all of the population in need

To avoid a heavy level of gentrification during the redevelopment period

To upgrade and redevelopment public and private estates beyond the age of 50yrs +

To draft a solution/solutions that consider the profit and benefits of all parties involved

Even though fitting all of the categories could be a challenge, THB has already attempted to address some through their most recent publication of LTHS in 2021 *(LTHS). In the 2021 LTHS, the proposed ten years plan included the construction of a total of 433000 units of housing, and 330000 units of PH (including PRH and SSFs), while hoping the private sector would deliver 129000 units of private housing *(LTHS 2021)[2]. In addition, the LTHS hopes to expand the Design and Build program (D&B) that aims to get the private sector to be more involved in the construction and design of PH units, currently, at an early stage. The most recent collaboration was with that of MIC, a Modular Integrated Construction company that would hope to increase the pace of construction. However, the technology is still in its infancy relative to the more successful prefabrication construction method already proven in the past decades *(99).

Earlier, the result of the PH construction speed has been called into question as it failed to deliver the 255000 units envisioned in 2016-17, resulting in approximately a potential shortfall of 64500 units by the end of the ten years period between 2016-17 to 2025-26. It is the goal of this section to evaluate the current LTHS and any potential alternatives that can be made to better the current plan. However, the solution will not be pretty, as this section hopes to maximise the quantity of PH delivered with less consideration of auxiliary aspect of housing development. The results could be cityscape straight out of a dystopian literature, despite its ugliness and blandness, it will still be efficient.

6.1. Production Side

Hong Kong is no doubt in need of a vast number of PH present and in the near future, and according to the recent LTHS report, there exist still some 127100 HH living in inadequate housing (mostly in subdivided units) *(LTHS 2021)[2]. Therefore, there is definitely a need for a significant amount of PH provided to house the huge portion of Hong Kong's demographic. The only way to do so in the short term is the employment of either Prefabrication or Modular Integrated Construction method has already proven to be successful in dealing with mass housing.

6.2. Mass production of Public Housing

As mentioned in previous sections concerning urban development and public housing development in Singapore during the 1960s. After the Bukit Ho Swee fire in Singapore in May of 1961, some 2800 houses were destroyed, displacing some 16000 *(Bukit). Coupled with concern with the quality and living conditions that most Singapore residents live in, the Singaporean government decided to take matters into their own hands and being large-scale PH construction in 1965, mass-producing housing that would house the vast majority of the population in the following decades. Another country that has experimented and had success with public housing is the former USSR. Like Singapore pre-1965, during the communist reign in the former USSR, there was a period of extensive housing shortage in the 1950s after devastating destruction during the Second World War. The Soviet economy shrunk by some 20%, over a million of housing was destroyed, and some 25 million Soviet citizens became homeless *(SOV). After the death of Stalin in 1953, Nikita Khrushchev would commence a mass housing project to eliminate the housing shortages for the people with the seven years plan *(7 years plan) which would lead to the construction of many so-called Khrushchevka. Even more impressive was the Brehnevka built in the soviet union after the outing of Khrushchev, which would include more variation and a general improvement in building quality. However, there are still issues concerning heat insulation and sanitation. The buildings were taller (9-16 floors), and the dimension was larger in comparison with Khrushchevka *(Brehnevka). But the most impressive feat accomplished by the Brehnevka is how from the mid to late 1960s, until the end of the Soviet regime, there are some 1.6 billion sq meters of free public housing constructed, able to house 162 million residents according to some sources (may be soviet propaganda). These apartment buildings are constructed with prefabricated material produced in factories and can be put together on-site in a rather short period of time. It costs far less than the standard structure of an apartment building, and is standardised, making the production of the material much cheaper, faster, and easier.

Although there are many upsides to both Prefabrication and Modular Integrated Construction, there are some slight downsides to both but they can be overcome with closer quality inspection. During the soviet-era, the Khrushchevka and the Brehnevka are faced with issues concerning heat insulation and noise cancellation. In addition, some see both building types as dull, dreadful, and plainly ugly *(rbth). However, this can certainly be overcome with better quality inspection. The first batch of Khrushchevka delivered by the late 1950s are constructed in haste. The number of flats delivered is all that matters. Thereby, not much work was put into quality control *(JSTOR). But one must consider this factor. Both Khrushchev and Brezhnev are not aiming for the quality aspect of housing, but simply on the quantity to house those in communal apartments and those living in urban slam *(JSTOR), and another factor is that these apartments are free. A quote from Nikita Khrushchev is listed as such: "Do you build a thousand adequate apartments or seven hundred good ones? And would a citizen rather settle for an adequate apartment or wait ten to fifteen years for a very good one? The leadership must proceed from the principle of using available material resources to satisfy the needs of the people as soon as possible" *(USSR)(USSR2) .

The current situation in Hong Kong cannot be solved with the current pace of conventional PH construction. The 10 years plan envisioned by THB could be a bit too ambitious considering the pace that it had during the recorded history. To Complete some 220000k units of PH in a span of 5 years will no doubt be a challenge. And despite a recent trend of more focus on the new tech of MIC and expansion on Prefabrication construction in Hong Kong, this tech should be further implemented (especially prefab) as it has been proven historically to work to house the masses. The HK government has been pushing the MIC tech and has already signed off on some projects, one recent being the Nam Cheong Street Modular Social Housing Project which provided 89 units with 10 to 25 sqm *(MIC)(MIC.HK). More projects are underway, some being SSFs building, others being transitional housing projects (1800 units), and even projects for private developers (Chinachem) *(skhwc)(MIC)(ChinaChem). This is the right direction to go, the HK government just has to further experiment with this form of housing in Hong Kong and increase investment for Prefab and MIC forms of PH in the

future.

The focus should follow the Soviet's or Singapore's development model, more on quantity delivered, and worry about the quality later. Even though the MIC or Prefab PRH might look dull and dreadful, a home is better than no home. A huge advantage for construction methods such as Modular Construction is that it can be rearranged and reassembled if needed, granting lots of flexibility for the short term and the long term. If the future policy were to change regarding public housing in Hong Kong, redevelopment of Modular Construction building will be much easier than that of traditional.

6.3. Future of Construction: Modular Construction

Before this section, there needs to be one point of clarification, that all modular units are prefabricated, but not all prefabricated units are modular. As there only has to be part of the building constructed in the factory for the building to be called Prefabricated, while Modular units are of most components assembled in factory.

Think of Modular Construction as Legos, as a number of blocks can be assembled and disassembled for different purpose. The process of Modular Construction and be simply as the following: construction in factory, transport to construction site, and assembly *(TWI). This method of construction has been gaining popularity recently. While both prefabrication and modular are all constructed in the factory before assembly, MIC uses standardised frames or structure which can be put together easily, much like the Prefabrication building but more flexible *(MIC). Modular construction can also be employed on smaller plots of land. It is also more energy-efficient, generates less construction waste, less noise and disturbance during on-site assembly, is faster to construct, can be imported from elsewhere, and the list continues *(B1M)(SCMP). Though the history of MIC is not as long or as proven as Prefabrication construction, it certainly does have potential. Not only that, it suits the narrative of Hong Kong's housing crisis, as it can be put together in a short period of time while being quite flexible, and most importantly, cost less than conventional building methods *(B1M).

However, it is not without its own issues, as completed modular units can take up a significant amount of space during transportation (varying dimension), which would be an issue in Hong Kong due to narrow roads. And in terms, the transportation space will limit the size of modular unit, making most of the modular unit quite small in size relative to conventional units *(TWI). But considering that modular units in Hong Kong will mostly likely serve the role of transitional housing and public housing, its dimension will not be too large. And if complete modular units were to be standardise into shipping container size, it should be able to navigate the roads and terrain in Hong Kong. And while there are still question concerning at what height can modular units go, this has already overcome by the construction of 461 Dean St modular residential block located in NYC (32-story, 3 yrs construction time) *(461)(NY), and the 44-storey La Trobe Tower in Melbourne (tallest modular constructed building in Australia, 19 month construction time) *(the-possible).Wide ranging application, repurposing, i.e. schools and other communal facilities, police station and even prison, post disaster reconstruction；Electric and water supply system can also be prefabricated （Note: all modular homes are prefabricated, but not all prefabs are modular） Prefab a category of construction, any unit that is primarily construct in factory and then assembled on site is modular constructed building in Australia *(the-possible)Modular are made up of pre-assembled pieces, almost entirely constructed in factory, more limitation in terms of size. https://www.royalhomes.com/tip/prefabricated-vs-modular-homes-whats-the-difference/ .

6.4. Availability of New Development Area and other Alternatives:

The question of where to locate the many mass housing projects in Hong Kong would be the toughest question to answer. As of now, there some 31 total developing projects, 1 in Hong Kong Island, 16 in Kowloon, 11 in new territory, and 3 in Lantau Island *(HKHA). With the absence of new town development in the past three decades, there is a lacks of newly available development area for PH (last being Tseung Kwan O, Tin Shui Wai, and Tung Chung new towns developed in the 1980s - 1990s) *(gov). There are a few new development areas (NDA) in Kwu Tung North and Fanling North in the New Territories. Both NDA are projected to begin population intake by 2023 and provide 60000 units of housing in total (50% being subsidised) *(gov). CEDD has also identified Kam Tin South as a plausible NDA in the future and projected infrastructure completion by 2021. Lok Ma Chau Loop was also a plausible NDA *(gov).

In addition to new developments area, many districts are now included in Urban Development Areas, such as the following: Central and Wan Chai (Reclamation), Kai Tak (320 ha), West Kowloon Cultural District (40ha), Anderson Road (20ha), and Anderson Road Quarry Site (40ha)*(gov).

Kai Tak Development *(KTD)(Pland.gov):

Aims to provide housing for 90,000 residents (mostly private housing), and a working environment for 80,000 professionals.

Projected to complete development in two to three decades, with a heavy emphasis on sustainability of the development.

More than 100 hectares of land be allocated for public space development, constituting one-third of all NDA

Within the Comprehensive Development Area (CDA), will include low-rise retail blocks (1.38 ha), and the majority of residential located around Kai Tak City Centre

Completed 2 PRH Estates (Kai Ching Estate and Tak Long Estate), 1 estate of HOS scheme estates (Kai Yiu, Kai Yat, and Kai Yeung House). Providing 14083 units of PH (13400 of PRH) *(KTD.gov)(Kai Ching)(Tak Long). Majority private housing.

Other Major NDAs

Northern Metropolis

https://hongkongfp.com/2022/02/23/hong-kong-budget-northern-metropolis-development-plan-to-cost-at-least-hk100bn/

Lantau Tomorrow Vision

Of the NDA projects in construction, the most important of which is the Kai Tak Development Area as it constitutes some 340 hectares of development area *(KTD), plenty of land for housing development. However, from what the plan entails, it does not include many PRH units, hardly meeting the quota for the LTHS plan. Another issue that could be a source of inefficient use of land, especially in Hong Kong, is the vastness of the open space reserved for Tai Tak NDA *(KTD). There is no doubt a need for open space for the public as it

can help with the environment and recreational activities. However, an allocation of around 100 hectares of open space just might be a bit too much considering what can be in place in that area rather than parks and recreational facilities. What the Tai Tak development area was envisioned to be were to "create a dynamic skyline, Green web for sustainable development and to connect the neighbourhood…" *(planning review). In addition, another issue concerning inefficient use can be further illustrated by the LTHS 2021 report, where the Government has identified the ~350 Hectares of land were 330000 units of PH will be constructed *(LTHS 2021)[2]. There definitely could be more land allocated to residential development rather than commercial or open space development. A more controversial set of events in the march of 2022 showed the market resistance towards commercial land conversion to residential (projected 6000 units) with claims that said residential development would "jeopardise Kai Tak's role as Hong Kong's second core business district." *(28hse). In addition, groups opposing said rezoning from commercial to residential development argue that said residential rezoning could lead to "negative impact on the connectivity between Kai Tak and East Kowloon *(28hse). Thereby, from the narrative of the opposing interest group, though there are certain merits to their argument, they do not seem to be too collaborative with the LTHS. The total land mass in the Tai Tak NDA could be a game changer to the housing crisis in Hong Kong if said land area becomes a primarily residential/composite area. However, With the prospect of the second's core business district in Hong Kong, it would become something else and potentially harm nearby districts and communities.

7. Potential Development Areas (PDAs)

7.1. Policy Side of Public Housing

7.1.1. Funding the Mass Housing Projects

If the construction of mass housing didn't cost so much, there would not have been a housing crisis in Hong Kong in the first place. As noted in this research, the conventional interpretation of the lack of affordable housing and available lands for development but rather lack of new town construction *(HKF). If the government actually decided to develop a new town and that there is land available at its disposal, it still needs one more reason to commence development - money. The question of will the government be willing to fund these projects and development in the future is a question. Although stated in the LTHS in 2021 that the plan for the construction of 330000+ PH units in the next tens years is unchanged *(LTHS 2021), how to fund this project will definitely be a challenge as historically, the HK gov has never taken on a project at this magnitude.

With the development in 2021, the THB and the HA hope to deliver a total of 20000 units of PH with funding of 19.237 billion HKD as Construction Expenditure *(budget), not accounting for other expenditures. Though the budget plan for the next decade is not available yet, in order to step up the PH development speed, there will be a huge step up in its spending. With the envisioned increase in construction of PH to 220000 in half a decade between 2026-27 to 2031-32. Judging from the current annual budget, the budget for PH development from 2026-27 to 2031-32, the total annual budget could easily double as HA is trying to deliver on average 44000+ units of PH a year *(budget).

With the city forecasting deficit of 18 billion in 2021-22, the economy of Hong Kong will slow due to a multitude of constraints but still holding onto 910 billion HKD in reserve *(EY). The government can certainly fund these projects with no issue when considering an annual revenue of 118 billion from land premium *(Gov). With its public image getting steadily worse by the years, the HK government would try its best to remain the falling public confidence and trust *(hkfp). In addition, with the new National Security Law and the new chief executive John Lee, the happiness index in Hong Kong also decreased by 1.55% between 2019 and 2021 *(knoema). The government can definitely boost popular support through the development of Public Housing and actually deliver it to those desperately in need. The People Action Party in Singapore was able to boost the public confidence following the nation's independence in 1965 by delivering cheap PH that vastly improved the living standards of citizens of the city *(JSTOR), leading to the continued domination of the PAP in Singapore politics up to this day. Providing low-cost PH can certainly benefit the image of the HK Gov after an unpopular administration change and years of turmoil, the only cost the Gov has to pay is to spend more.

7.1.2. The Need to Prioritise

There has recently been a number of voiced concerns regarding the potential harm redevelopment might do to an old neighbourhood, especially those with historical buildings. The demolition of the Edinburgh Place Ferry Pier in 2007, and Queen's pier in 2008 has sparked controversies and protest against the government in name of preserving the history *(timeout). Another issue regarding preservation is that of the demolition of Tong Lau (唐樓), many concerns were raised about cultural preservation and the hopes to keep the existing Tong Lau especially demonstrated in the protest against URA redevelopment of the Lee Tung Street *(on.cc)(mingpao). After attending a discussion group (九龍城重建的危機與城市想像) hosted by Liber-Research in 3rd of July concerning such issues, the following are a few points the conservationist made.

The first point of the discussion surrounds the need to preserve the so-called Character Defining Elements in most historical structures, and how there are several issue with the redevelopment of Kowloon City. The first argument being that historical structures such as Tong Lau should be kept as it is once and still is the defining character of Hong Kong and its past, and that people felt connect to their roots and such. It is beyond simply a structure that is old, but rather a collective identity of the people. On the other hand, redevelopment is necessary for the growth of a city, but historical structures certainly can be conserve if referring to the case of Covent Garden in London and its confrontation against forceful redevelopment in the 1970s *(Covent Garden). The conservation of Covent Garden would be a success as it would become a major tourist attraction in the years to come primarily due to its historical nature *(planetware). Thereby the same can be experimented with Hong Kong as some of its historical structures in Kowloon are susceptible or already has been demolish, as this Tong Lau and other structures can be today's normality but tomorrow's treasure. This argument does certain have some merit, as the conservation of history and collective identity is important to the local population, and that potentially in the future, we might turn back and see its importance to the community. However, from a utility point of view, there are certainly issue with this argument.

The second point of the discussion is the planning part of the Kowloon redevelopment scheme (KC-017) and its practicality *(URA). The recently published URA redevelopment plan argued that height restriction on buildings in its redevelopment area and other single block buildings is "making it hard to improve the overall layout of the built environment". And there lacks parking space, leading to traffic congestion and with a by a lack of green-space. The plan aims to "enhancing the community facilities, creating a walkable environment, as well as strengthening the local characteristics, the URA will adopt an integrated approach by introducing building rehabilitation and revitalisation to those aged buildings in the neighbourhood but outside the project site.", along with a 5.2 times increase in residential units to 4350 units *(URA press). However about 1640 person will be affected by this redevelopment *(KC-017), and the question about where to relocate will be an issue due to the lack of transitional housing and many other obstacles. Considering the entire scheme will take up to 15 years of development period, the promised 4000+ units of housing stock will only be here in the distance future *(KC-017). Meanwhile, the affected tenants will likely be displaced due to the lack of housing to provide local relocation.

Historical structures such as Tong Lau certainly does have its unique value and importance to the local inhabitant, and that is should most definitely be preserved under normal circumstances. However, the issue is that we are currently now within a "normal circumstance" due the existing housing crisis. Sure, there is some degree of housing shortage in London in the 1970s, but not nearly the same magnitude as it is in Hong Kong *(history). In addition, the redevelopment plan for Covent Garden will require the rehousing of some 100,000 people, relative to the 1640 affect by URA's Lung Shing redevelopment plan *(theguardian). The people of London and residents of Covent Garden showed up for mass protest against the planning council, however, the affected residents in Hong Kong are in no position to protests the plan and even if someone were to take action, it will be insufficient to garner enough attention. The conservation of the Covent Garden is through collective effort of the masses with the help of some government official (chairman of planning committee Lady Dartmouth joined the protesters) *(theguardian). The Lung Shing redevelopment plan would most likely commence with minimal opposition, and to convince the URA to not make money out of the existing project will be next to impossible. However, conservation of small section of district where Tong Lau and other historical structure exists should be considered as they most likely constitute a small fraction of land. There will be some goods that could be generated from this plan, that is the expanded housing stock to 4350 units and a general renewal of the district though no promises were made to retain the local characteristics and elements (as state in detailed plan, URA will preserve said characteristic "as far as practicable"). However, there are still many issue with the current plan.

The main issue concerning is the current plan is that of the time expect for the completion of the housing units, that being 15 years. Hong Kong is in desperate need for low-cost, affordable, and mass housing, and by need it means 245000 in application for PRH, and 127100 household in inadequate housing *(LTHS). To build only 4350 in a spam of 15 years might not fit the agenda of the current goal of expanding housing supply as fast as "applicable". The Government has under-delivered PH in the past, and with the expected 180000 units of public and private housing completed by 2025, there still exist a shortfall of 120000 units to make up for the supply gap *(HKfound, pg3)[3]. The housing development that URA envisioned are simply not in the same timeline as THB's and HKHA's if they really were to make this project a 15 years long one. Sure on the office document, the Lung Shing plan aims to create "a gateway square between the Lung Tong area and Kai Tak Development Area" which was also projected to be completed by 2030 *(KC-017). However, this simply will not serve to ease the immediate shortage.

Second issue is about the futurism involved in urban planning and redevelopment, as its practicality is in doubt. Sure, flashy glass cover sky rise might look glamorous in picture, whether if the plan will actually solve the issue at heart is questionable at best. But the most efficient type of mass housing shown in history aren't what was envisioned. Prefabs such as Khrushchevka and Brehnevka were ugly and dull, most with some issue with its construction quality, however, those are areas in which it can overcome with quality inspection. In addition, previously mentioned MiC and Prefab construction are cheaper, faster, more efficient, and reusable. It fits the timeline of LTHS of producing housing for the masses in a short time, and it is certainly application in redevelopment area such as Lung Shing. When the buildings were demolished, land were free, not all construction will commence at once, so why not construction some form of transitional or temporary housing to house the displace inhabitant using MiC or prefab, as once the land is near its stage of construction, the MiC and prefab can simply be dismantled and moved to elsewhere. And if there were to be an overwhelming incentive for the affected inhabitant to remain in the district, the MiC can then be expanded or adjusted to serve other purpose, as it is Modular in nature.

There is certainly challenge in attempting to conserve an area as big as the Lung Shing development area without popular support.

7.1.3. Need some fix

That of prioritising issues, is providing housing (private or public) to the citizens of Hong Kong more important or of preserving cultural heritage. According to the existing statistic of some 127100+ inadequately housed households in addition to 245000 total applications of PRH waiting in line, there is definitely an immediate need for mass housing projects to provide adequate housing for the masses *(HKHA).

If a person with adequate housing with some degree of security without first-hand experience of SDUs were asked about the importance of preservation of historical buildings, they will likely oppose demolition in the name of preserving heritage. However, if the demographic that were surveyed were those in desperate need of PH or at least adequate housing, their answer could be very different if referring to the vast demand for PH. According to a survey conducted shown in Chan Siu Ming's paper, it highlighted that the those in inadequate housing noted that "housing was the core element in defining poverty", and culturally, most would define their condition according to the level of housing on may access *(cuhk). However, others might ask if the redevelopment could be elsewhere rather than focusing on the demolition of old structures like Tong Lau as it still has some historical significance *(mingpao). Even though some Tong Lau are provided level protection level 2-3 status, they are susceptible to demolition for land resumption if it was deemed as unsafe or for "public purpose" *(mingpao)(land

ordinance)[4]. Coming from a utilitarian point of view, if a PRH/SSFs building can be constructed at a side site that requires the demolition of Tong Lau with low level protection status, for the greater good, the project should commence.

This idea of destroying the past for the sake of immediate good will no doubt be controversial in Hong Kong. To make decision making more democratic, the decision to preserve or demolish the side Tong Lau or other historical structures should be put to a vote to determine its value in the eye of the public. The community around the proximity of the affected site and a random group of PRH applicants (ideal ratio of 50:50) should hold a vote to determine its fate.

However, if we were to determine that the lack of affordable and available adequate housing in Hong Kong is a public crisis, and there comes a need to provide said housing to the public as soon as possible, increasing the power of responsible authorities financially and legally should be considered (public and private). If not for historical buildings with significant importance, its presence should be regarded less if there were to be a PRH unit or other form of SSF's construction should commence regardless for reason of efficiency. (some parts need revision) .

8. Finalised Proposal/Plausible Solution

The final proposal for future housing development would be in two parts, short-term and long-term. Short term proposal will focus on the next decade regarding potential solution that could possibly ease the housing problem, primarily on the possibility of expanding MIC method to temporary and short term public housing project according to that of Singapore's urban development in the 1960s. The long term proposal will focus on sustainable development and redevelopment of housing to ensure steady supply of housing, and the potential role that MIC could play in reshaping the city.

8.1. Proposal from other Media:

8.1.1. Proposal from SCMP:

SCMP has address the housing crisis in Hong Kong as it is conventionally understood, with insufficient land supply and an increasing population, and that the Government aren't really addressing the issue with full focus. Which rendered the deadline to solve the housing crisis by 2049 questionable *(SCMP).

There are certainly attempts on part of the government to address this issue, the most large scale and controversial of which being the Lantau Tomorrow Vision that is known to be vastly overpriced and destructive to the local environment though there are certainly an more viable solution *(SCMP). Other than the development or redevelopment of existing brown-fields, the Gov decided to send some 624 billion for the entire plan, hoping to deliver a total of 150k to 260k units of housing, 70% of which being PH units *(gov). The current Hong Kong administration would likely to carry out the plan and would commence in 2026, estimated to being population intake by 2034 *(thestandards)(thestandards).

Though this massive reclamation project would certainly generate jobs (~200k) *(gov) and create a vast strip of land (1700 Hectares). However, the public perception of the projects aren't great considering that 40% of Hong Kong citizen oppose this plan *(economist). But due to the lack of opposition in the LegCo after wave of resignation and popular protest, the projects are set to commence without opposition *(yahoo).

The issue with this projects with such a high cost is that, there simply are land available in Hong Kong for developments. Currently, according to the government, there are 1579 hectares of brown-fields, while other research team identified 1958 hectares *(greenpeace.org)[5]. Those land can certainly be development or repurposed, however, the government decided to opt for a more expensive, and frankly, not pragmatic solution.

SCMP has certainly has its doubt regarding the current Lantau Tomorrow Vision, but, there are not an exact solution propose, but rather an indication that massive overhaul is needed to change Hong Kong for good *(SCMP).

8.2. Proposal from Real Engineering

On an engineering perspective, there are certainly a myth regarding the cost effectiveness of skyscrapers, and how it cheaper relative to low rise buildings. However, the most cost effective height of a building in Hong Kong is simply 12 stories buildings. If disregarding the public misconception of lack of land available for development, there are certainly rooms for the construction of brehnevka style public housing in the form of prefabrication or modular construction.

In addition, Real Engineering has promoted the prospect of Modular Construction as it is flexible and suitable for mass and quite construction. And if the government are serious with the housing crisis in Hong Kong, it can certainly be applied here.

8.3. Proposal from Our Hong Kong Foundation:

Our Hong Kong Foundation is a Hong Kong think tank that conduct research in areas as as land use, and housing development. It has actively inserted itself into the policy making of the Hong Kong government and to advice the government on potential change of policy and such. However, according to their most recent report published in May 31st of 2022, it suggested that the Government is not taking action to solve the supply problem in the short term, and also projected LTHS housing development to be back loaded *(HKfound). Their conclusion of the government effort regarding solving the crisis is "Government largely unresponsive, and its reform efforts are far from sufficient … the suggestions put forward by various parties are rather fragmented …" *(HKfound).

Our Hong Kong Foundation emphasis the need for "streamline procedures to accelerate housing supply", citing the reason of repeated consultations, duplicated regulations, inconsistent and unclear approval standards, fragmented opinion, lack of civil servant efficiency, lack of moral and more *(HKfound, pg 4). It is not as simple as the lack of land to develop but rather issue surrounding the entire procedure. In tackling these issues, the proposal in brief is as followed: "Need to significantly streamline the current development procedures, clarify supply trades, enhance high-level steering, and make every effort to shorten housing development cycle. No better time than now to push for reform."

However, this development should not fully fall on the shoulders of the government and respective public authorities, it should also be distributed to the private following the LTHS with the 70:30 ratio *(LTHS 2021)[2]. The paper drew up 23 areas in which the government has to work to change, sum down to speed up, efficiency up, and mass up *(HKfound, pg 6-7). Some of the areas being the need to "accelerate land assembly to unleash the development potential of private

lands", "accelerate urban redevelopment", "draw reference from the practice of the past PSPS to improve construction efficiency", "Based on the Government's inter-departmental top-tier land and housing supply goals, each relevant departments should set their own corresponding quantifiable performance indicators", and "enhance the overall construction capacity" (detailed list please refer to page 6-7).

However, some of its policy suggestion in the past is controversial. Our Hong Kong Foundation is one of the main proponent of the East Lantau Reclamation project (now the Lantau Tomorrow Vision with 40% public disapproval) and general push for reclamation in the urban *(HKfoundLand). Greenpeace, an organisation campaigning against deforestation, overfishing and other environment related issue, has suggested that not only will the Lantau Tomorrow Vision project be an disaster to the environment, but also to the Hong Kong fiscal reserve *(greenpeace). The past reclamation in Victoria Harbour has incur similar question about marine condition deterioration and such *(geog.com.cn)

With the current policy of the government, reaching the original target for PH delivery will be difficult without a comprehensive overhaul of the system. If these changes were made, at least there will be a possibility of lowering the property prices and increase the overall supply of housing in Hong Kong.

8.4. Short-Term

The vast demand of public housing could be solved with the LTHS if all things goes according to plan between 2022-23 to 2031-32. However, the final quantity of PH delivered by the end of the ten years plan is sceptical considering its past records with said PH delivery between 2016-17 to 2025-26 *(LTHS 2015-2020). And considering the rapid ageing of the vast majority of older buildings including PH in the near future, some 28000 buildings will surpass the age of 50+ by 2046. As of today, there are already 7350+ units of residential/composite buildings that surpass the age of 50+ *(urban print). Thereby, the 330000 units of PH proposed to be delivered by the end of 2031-32 might simply not be enough for the population due to the need to either redevelop old buildings or afford the growing maintenance cost *(HKIS maintenance).

LTHS will provide affordable public housing in the long term as most would employ the traditional method of construction, thereby could last for at least 50+ years. However, the good news is that the HKHA has already incorporated the Precast concrete construction (similar to Prefab construction) in its PH construction *(HKHA), and currently experimenting with the MIC construction method, its first project completion around 2024 providing 240 units *(MIC). If the first medium height Modular Construction public housing are met with success, more development should commence in the identified brownfield with close proximity to the town centre to provide housing and proximity to local communal facilities. However, there are two paths that the government can go with Modular Construction, one being using Modular Constructed PH as transitional housing to fulfil the temporary need of the people, or to future develop the technology and respective local communal facilities to create an new town in its surrounding.

8.4.1. Paths one: Modular or Prefabrication Constructed PH for temporary use

As it is currently understood, there is a tremendous amount of housing storage for the public, either for those waiting for PRH delivery or those in SDUs. The construction of Modular or Prefabrication temporary PH housing could ease this crisis and offer basic accommodation for the masses without having to endue inadequate housing units such as the SDUs. In addition, there are only a few available transitional housing in Hong Kong. HKHS only provides some 200 domestic flats as transitional housing currently *(HKHS). The Hong Kong government has acknowledged this issue as LegCo has created a task force focusing on transitional housing, aiming to provide 15000 units between 2020-21 and 2022-23 *(LegCo). The previously mentioned experimentation of Modular Constructed PH in Nam Cheong Street located in Sham Shui Po is one example *(LegCo). The four-story Modular Housing proved that it is applicable in Hong Kong and could be too in other districts or even in brownfields.

Considering that the Hong Kong government has been following the trend of Modular Integrated Construction as the positive that it will bring, it has passed policies that would support and encourage the development of such buildings *(MiC). The government should consider extending these projects to identified brownfields with adequate supporting infrastructure and proximity to the town centre. This will not only be fast in terms of delivery, but it will at least be able to provide housing for those in need in a relatively short time, other than waiting for a call from HA with conventional PH delivered.

While we do not have much access to the expertise of the level or amount of infrastructure required for a residential area/block, a few areas must be fulfilled for transitional PH to be developed.

Development of Residential Area must include *(UKCON):

Transportation, i.e., route to the town centre, and access to public transport

Energy infrastructure, i.e., access to electricity, water, and adequate online infrastructure

Social Infrastructure/communal facilities, i.e., access to schools and hospitals, etc

If the above criteria are fulfilled, low-rise temporary housing development like Nam Cheong Street should be viable. However, the criteria above might not be enough to sustain a long residency period as there is most likely a significant distance between brownfield residences and the town centre where most of the social infrastructures are located. The issue that this solution might lead to is the lack of accessibility to necessary communal facilities if it's (brownfield's) location to the town centre. However, it would be a much cheaper, faster, and more viable short-term solution to ease the housing crisis before the conventional construction of PH temporarily could catch up in the following decade. Using such a methodology of employing the speedy Modular Construction and utilising the brownfield in Hong Kong, the responsible authority for transitional housing development will certainly fulfil or surpass the given quota.

8.4.2. Design of Transitional Housing for Modular Integrated Construction

For Transitional Housing to be mass produced, components of the building and individual flats will have to be standardised. In addition, to ensure speedy construction and minimising cost, many components in the flat will have to be minimised. However, please do note that certain units will only serve as transitional housing in temporary use, while others can potential serve as long-term residence.

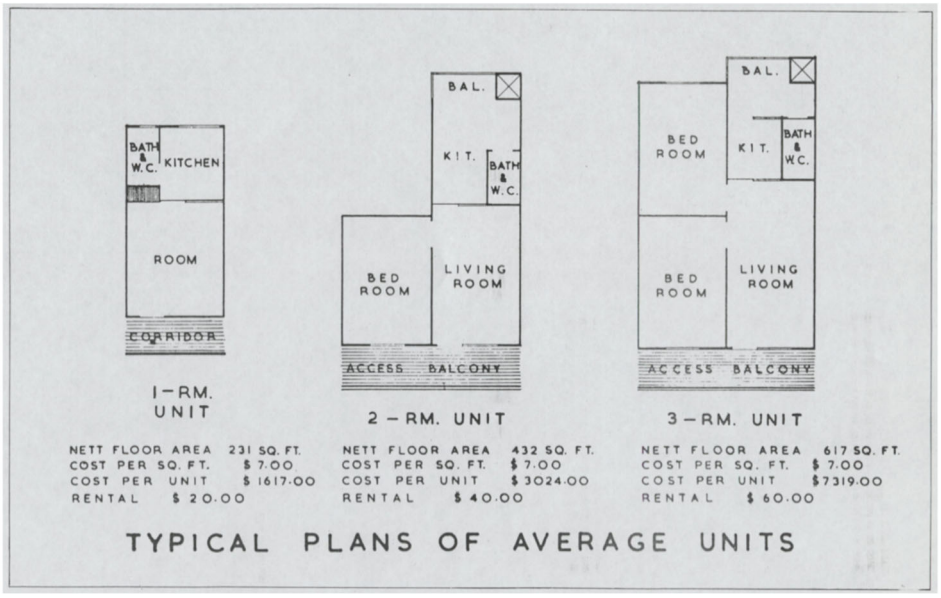
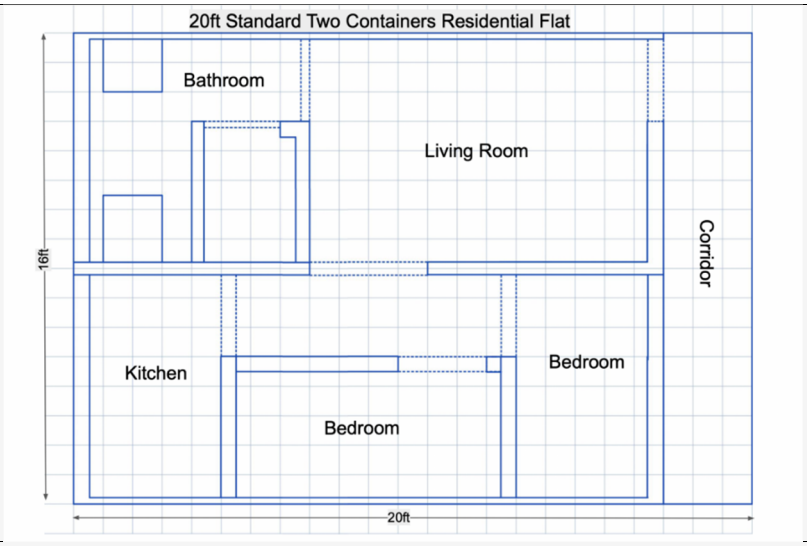
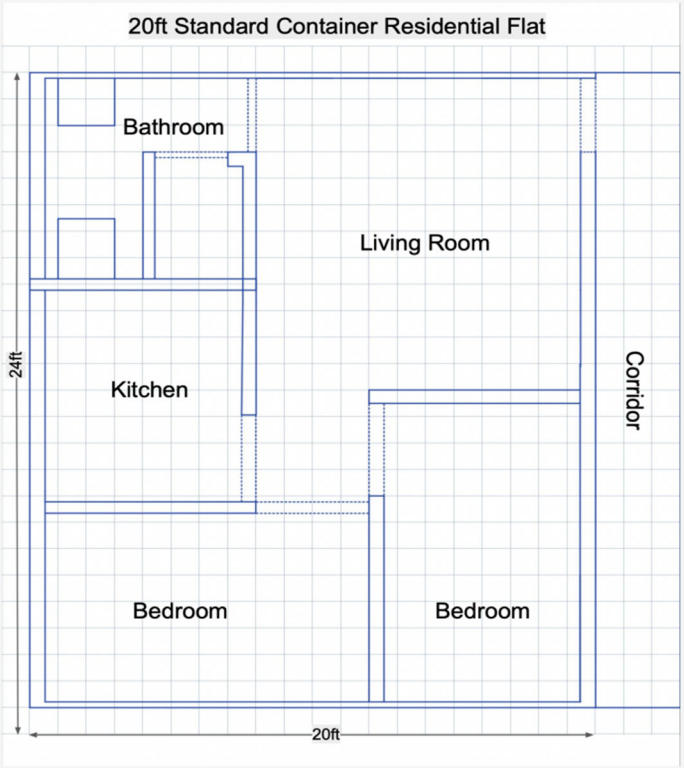


Figure 1. Typical Plans Of Average Units

Once again, referring to the Singaporean model of mass construction of public housing in the 1960s, PH unit construction should be simple, yet efficient *(JSTOR). The below image shows the typical construction plans

for average units. It is made entirely out of rectangular shapes, compacted, and shares a common corridor *(JSTOR). The one room unit is especially efficient and suitable for MiC development, as such unit can be fitted into an standardised shipping container, with all applicants installed with essential water and electricity components. One company that has commercialised this type of housing is iMOD, a California based modular construction company. All of its housing are assembled with 20ft x 7.8ft x 7.9ft containers or the larger 40ft x 7.9ft x 7.9 standard shipping containers. It is also possible to combine two 20ft container together to form a large dimension, granting this container home more flexibility *(iMOD). And following the Singaporean model for basic housing, only essentials should be included in the building, i.e. Bathroom and Kitchen for every units, other aspect of additional furniture should be minimised. For example, the following are the brief design of what modular constructed home using container might look like:

	The design shows a single container apartment unit, fitted with minimal amount of furnitures, only providing the essential for the residency of one to two tenants. The very basic design, following the example of Singapore's 1 unit apartment. Net Floor Area: ~160 square feet
	The design shows an expanded version of the first 1 units design, as it combines two standard 20ft sized container into one. Can offer residency for between 2-4 people with the addition of an kitchen, a bedroom, and an independent living room. An upgrade relative to the previous

	basic unit. Net Floor Area: ~320 square feet
	Combination of 3 standard 20ft containers, expanding on the Net Floor Area and living comfort. No additional change to the number of rooms but with an general increase in its size. Accompanied with independent bathroom and kitchen, coupled with 2 Bedrooms and a large living room. Can offer residency for family or household up to 3-5 person. Net Floor Area: ~480 square feet

The designs above are just simple ideas, and much more engineering and details has to go into such project before implementation. However, there's another aspect of implementing modular construction, that is how these containers might be assembled and disassembled. Given the fact that the proposal aims to construct modular units for the main purpose of temporary housing, individual containers (standardised) can be repurposed or recycled if wanted. Unlike conventional building and homes, the only way to redevelop the area is through demolition, which in the process, generates significant amount of noice and building waste. For modular container building, construction team can just disassemble it for repurpose, minimising waste in and reduce the amount of time for new construction.

As mentioned earlier, modular units can be repurpose, replaced, recycled, and reassembled. If the size of the unit were to be universally standardised in Hong Kong, every parts of modular units can be interchanged *(ennomotive). Using the Lego analogy once again, placing an addition 2 by 4 block onto an existing structure, adding onto the height and capacity. If the need for transitional housing decreases as either the

housing supply grew in Hong Kong, the transitional modular units can then possibly be repurposed to regular PH, potentially combining two standard 20ft x 8ft container into either an two to three container modular unit, adjusted according to the demand, just like Lego blocks.

8.4.3. Paths Two: Spending The Way Out, Developments and Redevelopments

There are certainly doubt concerning mass constructing modular units as no city or nations has did so on a large scale, thereby quite unproven. Then the alternative might be just spending the way out. As the government has already passed an 624 billion HKD budget for the Lantau Tomorrow Vision project, it can certainly spare another 100 billion or so for the construction of conventional PH in Hong Kong, or even entire NDA if not willing to develop the underutilise brownfield in Hong Kong.

The budget plan or the exact finance for the next decade of housing construction has not yet been published, but projection of construction expenditure is expect to increase by a significant margin. According to Our Hong Kong Foundation, construction expenditure projection for private and public project combined will be 220-270 Billion in 2021/22, 245-300 Billion in 2025/26, and 240-325 Billion in 2030/31 respectively *(ourhkfoundation). Considering the 624 billion HKD put into the Lantau Tomorrow Vision project, the Hong Kong government can certainly afford another 100 billion for other non reclamation related development elsewhere, or simply put money towards the development of other NDA/PDA to increase the housing stock.

As mentioned in the earlier section regarding New Development Areas/Potential Development Areas (need fix and backing),.

8.5. Long-Term

Once the immediate crisis is solved and most if not all of the Hong Kong population adequately housed, the job of the Hong Kong governments far from done. Once again considering the fact that building age plays a major role in redevelopment, sustainable redevelopment should be formulate to continuously upgrade, improve, and refurbish. If the government were to take path one to use modular units as the backbone of future housing supply PSPS, private sector participation scheme.

Increase number of construction workers, foreign workers? Rapid ageing of construction workers not a good sign.

Author's notes:

9. List of Abbreviations:

PH: Public Housing (general)
PRH: Public Rental Housing
SSFs: Subsidised Sales Flats
HA; Hong Kong Housing Authority
HKHS: Hong Kong Housing Society
URA: Urban Renewal Authority (HK)
URAs: Urban Redevelopment Authority (SG)
THB: the Transport and Housing Bureau (HK)
MHI: Median Household Income
HH: Household
MC: Modular Construction
PFC: Prefabrication Construction
NDA: New Development Area

10. Conclusion

The root cause of the Hong Kong housing shortage should not be blamed on the lack of available land in Hong Kong. But for the past decade, while the government does understand the current shortage of housing supply, it did not increase the land supply. There are many undeveloped brownfields in Hong Kong that has been under-utilized, and there might be a need for a reclamation project as large as the Lantau Project. Conventional NDAs and New Town should be able to provide sufficient land supply in the long term, that a project costing 624 billion HKD might do more harm than good.

As of now, there are still a substantial number of Hong Kong citizens suffering due to the housing shortage, and homes are simply old, unaffordable, small, and unattainable. While there are attempts to improve the condition, it has worsened since 2013, leading to some 165% an overall increase in property prices. There require some form of reform in order to get the current condition under control and satisfy the need of the public. The responsible authorities of housing development can step up their performance. The Housing Authority and Housing Society should focus on delivering PRH and SSF to the public and prioritize those living under inadequate housing such as SDU, and expand the eligible demographic to help the sandwich class. The URA should take note of some level of cultural preservation, rehabilitation of the community, and the price tag on its joint venture, and avoid gentrification and large-scale displacement in their redevelopment projects. The Hong Kong government, in general, should step up its effort to improve the condition of its citizens to deliver humane housing conditions.

However, in the process of attempting to solve or at least ease this crisis, the focus of housing development and redevelopment might be in the wrong place. Considering the current 245000+ applications for PRH and many more hoping to attain better housing, the development of housing in general should be affordable, not extravagant. Thereby emphasis should be placed on projects that are cheap, fast, and capable of mass housing, like that of Modular Prefab. Though the technology has not been proven at a large scale, it certainly does possess much quality which Hong Kong's development is in desperate need of. Hong Kong can follow the Soviet model of mass prefab housing development like the Khrushchevka and Brezhnevka in the short term, with the construction of cheap, fast, and temporary housing. In the long term, the Hong Kong government can look towards more conventional housing development or advance the modular prefab technology, which does have the potential to reshape and revolutionize construction.

The fight to solve the housing crisis will be a long one considering its magnitude; it will likely take generations to finally deliver affordable, quality housing to the entire population in Hong Kong. However, it is no doubt possible if one is willing to walk the path of trials and tribulations. If the government were to sincerely focus on the housing crisis, it could unquestionably solve or at least ease the issue. In addition to effort on the part of the government, the public should also unite and strive towards the same goal.

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