

## THE REDEVELOPMENT OF KWAI CHUNG ESTATE, HONG KONG.

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### Summary

Kwai Chung Estate in the Western New Territories of Hong Kong, was built in the 1960s at a time when the population was increasing rapidly and when there was a severe shortage of safe and secure housing. The original estate was home to 22,000 people in 42 seven storey “walk-up” Mark II and III blocks, with shared toilet and washroom facilities. They were built at a time of great urgency to cope with the needs of shelter for the masses when Hong Kong was emerging as a post-war industrial city. When they were built, they were a great improvement for those who were re-housed but by the late 1980s the estate was in poor condition, with an aging population and the basic living shared toilet and washroom facilities no longer met accepted standards. The estate was identified for redevelopment under the Housing Authority’s Comprehensive Redevelopment Programme.

### 1. Introduction

After the upheavals of the Second World War and the civil war in China, the Hong Kong Government was faced with a huge influx of migrants to the territory. The population of Hong Kong rose from 600,000 at the end of the war to over 2,000,000 in the early 1950’s and the growing number of people had no choice but to live in crude squatter settlements on hillsides, on boats in Typhoon shelters or in overcrowded tenements. Consequently they were very vulnerable to fire and other natural disasters.

These conditions were the catalyst for the Public Housing programme in the 1950’s, which began as an emergency programme struggling to cope with a growing demand and to address the chronic shortage of safe and secure housing for people on low incomes. The standards of accommodation in the first estates were very rudimentary by comparison with the modern comprehensive estates that are built today, but for homeless people, the shelter and security provided was a huge improvement on their previous conditions. Kwai Chung Estate, in Tsuen Wan New Town in the Western New Territories, was one of the earliest ‘Resettlement’ Estates built in the early 1960’s.

Though the population and the consequent demand for housing continued to increase, stability and prosperity in Hong Kong improved dramatically. Gradually, public expectations went beyond the desire for simple shelter. The type of accommodation provided in the early estates was becoming unacceptable and by the late 1980s Kwai Chung Estate was in poor condition, with an aging population.

### 2. The Old Kwai Chung Estate

Kwai Chung Estate provided homes for 22,000 people in 42 Mark II and Mark III blocks of reinforced concrete construction. These buildings were some of the earliest forms of public housing in Hong Kong and were eight storey walk-up blocks with single room flats and shared toilet and washroom facilities. Each flat was designed as a single room with no partitions and no water supply. Flat sizes were 14 to 21 sq. meters to accommodate 4-6 persons (2.3m<sup>2</sup> per person).

The old estate had no proper public transport facilities and the estate was split into small irregular sites by the road network which made access difficult. Car parking was insufficient and not segregated from pedestrians. Estate shops were scattered under the residential blocks and local open spaces were isolated and uncoordinated with minimum soft landscape work and recreational facilities.



Figure 1: (From left to right) Kwai Chung Estate before redevelopment in 1960s. Master Layout Plan (top left), overview of the Estate, market bazaar, Mark III building

Public housing had been provided through several separate government agencies and in 1973 the new Hong Kong Housing Authority (HA) was formed to manage the programme more effectively. Clearer policies were developed and the experiences of the preceding 20 years led to a programme of more comprehensive and self-contained estates, each with its own public transport interchange, purpose built schools, shopping and market facilities and a wide range of social welfare services provided by both the Housing Authority and NGOs to cater for the diverse needs of a more complex community.

However, when compared to the standards of housing in the new estates built by the new Housing Authority, Kwai Chung Estate fell far short of expectations. In 1988, the HA introduced its Comprehensive Redevelopment Programme (CRP) and Kwai Chung Estate was then included in this programme.

### 3. The Need for Redevelopment

Since the public housing programme had begun in the 1950s, housing standards had risen significantly. By the late 1980s, space standards had increased from 2.3m<sup>2</sup> per person to 5.5m<sup>2</sup>. There had been a growing demand for housing and for changing eligibility criteria which exacerbated demand still further. Increased demand meant making better use of the land available and as a consequence development densities were rising and by the 1980s, developments of 2,500 persons per ha were the norm.

Larger flats and more flats in each new site meant that buildings were increasing in height from the seven storey walk up designs of the 1950s to buildings of over twenty storeys in the 1960s and 1970s and to 35 storeys in the early 1980s. By the time that the CRP had been announced, the Housing Authority was planning even higher blocks of 39 storeys with even larger flats. The improved standards of facilities, and more comprehensive estates naturally led to far greater site planning constraints.

The condition of the buildings in Kwai Chung Estate had deteriorated badly, maintenance demands were growing, and the blocks had no lifts which were causing greater problems for the aging population. Non self-contained flats with shared toilet and washroom facilities had been phased out in new estates from the late 1960s and conversion of this type of building into self-contained units was not practical when considered alongside the demands of rising standards, increasing production and greater development densities.

The old estate also had no planned public transport facilities, and the existing streets split the estate into small irregular sites and made access between them difficult. Car parking spaces were insufficient and not well planned nor segregated from pedestrians. Local open spaces were also isolated and uncoordinated with minimum soft landscape work and recreational facilities. Shops and other support services were scattered under the blocks and were a world apart from the new comprehensive shopping centres that were being built in new estates.

### 4. The Objectives

Planning for redevelopment commenced in early 1990. The objectives were to improve the standard of accommodation for the population, rejuvenate the community, optimise redevelopment potential, improve the road network, pedestrian access and public transport facilities, and provide modern and comprehensive shopping, social, recreational and community facilities for residents. Regeneration of ageing districts serving the people living in the area and retaining and rejuvenating community identity, is the main goal of redevelopment.

### 5. The Planning and Design Concept

The redevelopment was planned in phases. The CRP concept was to enable the Housing Authority to redevelop its older estates more speedily and more efficiently. It allowed a larger scale of redevelopment compared to the slower and relatively inefficient “pump primer” approach that had been tried in the late 1970s and early 1980s, when individual blocks were built in older estates. One of the main principles of the CRP was to recognise that communities had been established in older estates and hence redeveloping around those communities was seen to be an essential component of the success of the programme.

The redevelopment of Kwai Chung was therefore based on the need to re-house as many of the existing residents as possible in the same estate and if that was not possible, then in the same district. The CRP therefore relied on the construction of large reception estates to enable the first groups of residents to be moved out and allow the redevelopment to proceed.

What are now widely regarded as the parameters essential to achieve sustainable development goals, were the key parameters at the time of the planning of the redevelopment of Kwai Chung Estate and the following approach on social, environmental and economical considerations was used: -

## 5.1 Social considerations

### 5.1.1 Minimising Social Disruption to Residents

Under the CRP, an overriding principle has been to maintain many of the characteristics and essential components of the of the existing community by in-situ rehousing, re-provisioning and retention of facilities. Essential facilities, such as temporary car-parking and a market, were to be built in advance, adjacent to phase 1 and maintained throughout the redevelopment period.

Efforts were also made to retain and integrate an existing religious shrine, schools, youth centre and the premises of the local *Kai Fong Association* [Neighbourhood Community Association] in the master layout plan of the new Estate.



Figure 3: (From left to right) Existing school and factory building, the Kai Fong Association [Neighbourhood Community Association], Youth Centre, religious shrine, retained in the neighbourhood of Kwai Chung Estate.

Kwai Chung estate was over 25 years old and consequently with established communities and important social networks in place. The elderly residents in particular, wished to stay in the estate because of these long standing networks and because of their association with the various complementary social welfare services which provided care where required and regular opportunities for them to conveniently meet friends.

### 5.1.2 Establishing a Civic Hub

The design was based on a ‘civic hub’ concept which was strategically located to provide essential facilities and create a focal point in the estate. This ‘civic hub’, together with the podium garden, acts as a natural meeting point, with a wide range of easily accessible estate facilities where residents meet and socialise.

The central ‘civic hub’ comprises of a 3-storey central air-conditioned shopping centre with a total floor area of 5,800 sq. metres, an air-conditioned market with stall area of 800 sq. metres, 744 car-parking spaces, 112 light goods vehicle parking spaces and 75 motorcycle parking spaces. A covered public transport interchange is now centrally located along with the educational and social welfare accommodation; kindergartens, a day nursery, clinics and Residential Care Home for the Elderly, as the essential supporting facilities for the residents

## 5.2 Environmental Considerations - A Green and Healthy Living Environment

In the planning of the original Kwai Chung Estate, which was part of a programme for fast track emergency housing, there was no clear theme for the planning of play and recreation, with no provisions for sheltered seating nor formal planning of passive and active recreation. Though there had been estate improvements over the years, the estate lacked green spaces and external areas were fragmented and predominantly concrete paved with play and recreation facilities which fell far short of the standards of new estates in the 1980’s.

A large housing estate such as Kwai Chung, has a significant impact on the district as a whole and hence play and recreation spaces for the district were planned in consultation with the Leisure and Cultural Services Department (LCSD) of the Hong Kong Government and with the local District Council. Two sites have been specifically designed in consultation with the LCSD as local open spaces for the use of the residents of the district and will be under their management upon completion. Landscaping, play and recreation within the estate follows the HA’s comprehensive guidelines and they have been built at-grade (in phase 5) and at podium level (in phase 3 and 4) and are all linked to other estate facilities and domestic buildings.

The overall area of open space has been increased in the redevelopment from about 4.8 ha to 6.5 ha. An area has been excised in consultation with the Government and a playground has been re-provisioned, as a District Open Space. About 30% of the estate area has been landscaped with over 100 old trees retained and about 150,000 new trees and plants provided in the new Estate. Environmental and landscape features include a bamboo garden, planting on the podium and a well landscaped noise barrier.



Figure 4: The footbridges connecting Phase 4 and Phase 5; and the Bamboo Garden in Kwai Chung Estate Phase 5 with Phases 3 and 4 beyond

The open spaces in the estate have been strategically located and integrated with the main pedestrian circulation networks. Active and passive recreation areas, including badminton courts, basketball courts, volleyball courts, table tennis tables, children's play areas, and a Tai Chi court, have been provided as part of the overall landscaping design of the estate. These open spaces, together with the main podium plaza, provide greatly improved opportunities for the residents day to day recreational needs and for formal planned community activities.

### 5.3 Economic Considerations

#### 5.3.1 Optimising Site Potential

The HA has routinely formulated its design briefs in close consultation with Government but over time the supply of land has become more difficult. In the late 1990's there was a critical shortage and demand for flats for rent and flats for sale had been increasing dramatically. The Government set annual production targets for both the public and private sectors, with 50,000 flats per annum required of the public sector.

Steps were taken to maximise the development potential of new HA developments and there was a gradual alignment with private sector practices. Phases 3 and 4 of the redevelopment were designed with a podium to accommodate the new transport interchange, a new modern shopping centre and car-parking for estate residents and for shoppers. Residential blocks were built above the podium with recreation space and landscaping on the podium decks. This approach allowed an increase in number and size of flats, improved the extent and standard of the estate facilities and at the same time provided greater opportunities for landscaping.

The redevelopment has optimised the site potential with a plot ratio of 5.5 providing 430,000 sq. metres domestic gross floor area. The number of new flats in the redevelopment has increased from 8,850 to 14,543 and the population from 22,000 to 40,000, yet still allowed for an impressive upgrading of the whole estate and hence a much improved living environment. The flats are also generally larger and to a much higher quality than those in the old estate. The mix of flat types and flats sizes has been more finely tuned to fit the profile of the estate residents, with flat sizes ranging from 17 sq. metres to 47 sq. metres, suitable for 1 person, and families up to a household size of 6 persons to cater for changing demographic needs.

#### 5.3.2 Improving Pedestrian Accessibility, Road Network and Transport Provision

The old housing sites were fragmented, with level differences and consequent accessibility difficulties. The sites were small and split by the local road network and so did not allow sufficient development opportunities. The space required for some of the improved and more comprehensive estate facilities required larger sites and this, along with the need for clear and simple communication links through the estate, provided the opportunity to simplify and realign the road layouts, thereby improving the traffic flow, and at the same time allowing the optimisation of the overall development potential.

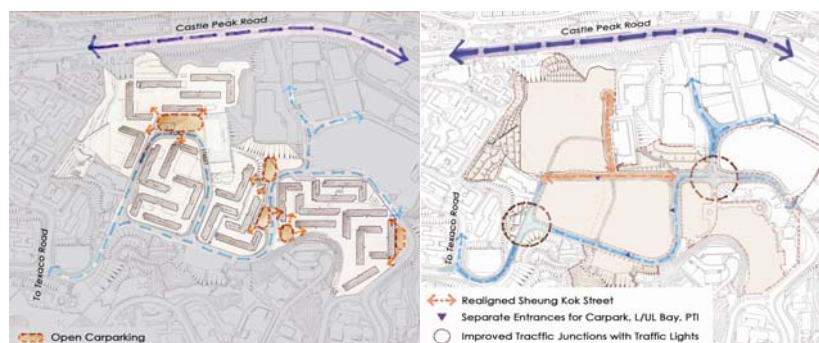


Figure 5: The road network before development (at left) and after redevelopment (at right)

The redevelopment has created a predominately vehicular free environment, with a well planned pedestrian network with footbridges and lifts which provide above grade connections throughout the estate between domestic blocks, schools and the "civic hub". A link has also been provided to the Tai Wo Hau MTR station so that there is now a quick, efficient and convenient link to Kowloon and Hong Kong Island and the KCRC and West Rail connections to the New Territories.

## 6. Social Aspects

### 6.1. Local Rehousing

Under the CRP, the redevelopment was to allow for in-situ rehousing, reprovisioning of open space and retention of existing facilities and features as far as possible, so was to be implemented in stages. As a first step, residents on the site of Phase 1 were to be moved to a new reception estate in Kwai Shing Estate so that the construction of new blocks on the site could begin. The new blocks in phase 1 would eventually re-house people from other parts of the estate and trigger the overall redevelopment in a planned and sequential manner. Phase 1 of the redevelopment was completed in early 1998.



Figure 6: Phase 1 completed in 1998 (left). Small Household Block completed in 1999 providing housing for elderly residents (right)

### 6.2 Retention of Existing Heritage and Community Buildings

The existing religious shrines, youth centre, schools and *Kai Fong Association* [Neighbourhood Community Association] were essential local heritage and community facilities which had to be retained, so the new estate was designed to accommodate them. Temporary arrangements for vehicular and pedestrian access to these locations was provided to maintain proper functioning of activities during the redevelopment.

### 6.3 Updating of Development Parameters, Social and Policy Changes

During the last 10 years of the redevelopment programme, there were substantial changes in the development parameters in response to adjustments in public housing policy, such as intensification of development potential, introduction of quality initiatives, cessation of flats for sale through the Home Ownership Scheme (HOS), and enhanced design features to emphasise the identity of the Estate.

In February 1998 the government began to look at the opportunities for increasing land supply for housing by redeveloping old HA factory sites. There were four 7-storey factory buildings completed in the mid 1960's next to Kwai Chung Estate. These factory buildings were under-utilised and in 1999 were selected for redevelopment to become part of the new Kwai Chung Estate. Relocation of affected factory tenants was to be resolved before redevelopment, so special ex-gratia allowances were made to assist them to re-establish their businesses in other accommodation.

### 6.4 Housing for the Elderly

From the start of the housing programme, family sizes have reduced and estate populations have naturally aged. The HA had been extending its support services for the elderly since the early 1970's, but because of the high housing demand, accommodation for elderly was only provided on a shared basis. By the late 1980's the demand was acute and the HA built more self-contained small flats for 1 to 2 persons in its main residential blocks of the time, the Harmony blocks. New blocks of small flats were designed to be linked to the main residential blocks and make use of their lift and utility services. These Annex blocks, as they became known, became the most common way of providing small flats.

In the mid 1990s the HA embarked on a programme of special developments for the elderly with self-contained small flats for single persons and couples, with recognised accessibility standards and appropriate support services provided by the Non-government organisations. These buildings were known as "Small Household Developments" and a programme of 25 such projects was launched in 1995 with flats of 17m<sup>2</sup> to 22m<sup>2</sup> for single persons and couples, built up to 20 storeys in height. One such block with 240 self-contained flats was built in Kwai Chung by arranging a site swap for a small but under-utilised playground next to Kwai Chung Estate. Later housing for the elderly in the final phases of the redevelopment was provided in 17m<sup>2</sup> flats in the 40 storey residential blocks as part of the standard flat mix along with family flats, and in Annex Blocks in phases 3 and 5 of the estate.

This redevelopment project has therefore had to respond to new policies and priorities that have arisen in the community during the design and construction programme, spanning almost two decades.

## 7. Environmental Aspects

### 7.1 Layout Design

The design of the estate and the disposition of the buildings, has made use of environmental studies to model the local wind environment and traffic noise in the area to help to plan the estate facilities more

effectively. The domestic blocks are located away from the noise sources as far as possible; some blocks located adjacent to the public roads are on the podium, which serves as a noise barrier to reduce the impact of traffic noise. Noise barrier walls at appropriate locations along estate boundaries have also been provided.

## 7.2 New Construction Technology

When Kwai Chung Estate was included in the Comprehensive Redevelopment Programme, the HA embarked on a major programme to improve construction quality and efficiency. Though standards had improved between the 1960's to the 1980's there had been very little change in the way that buildings were built, despite the considerable increase in height of buildings, from 7 to 35 storeys.

Construction was very labour intensive in-situ concrete construction with a reliance, to a large extent, upon semi-skilled or unskilled labour. Quality was a major concern. Housing production targets were increasing and hence the increased stock of housing, led to growing management and maintenance responsibilities. The construction industry was a major employer and site safety and working conditions were a cause of concern. The HA was a major government developer and began to look at new practices to improve working conditions and site safety, quality, efficiency, and waste management.

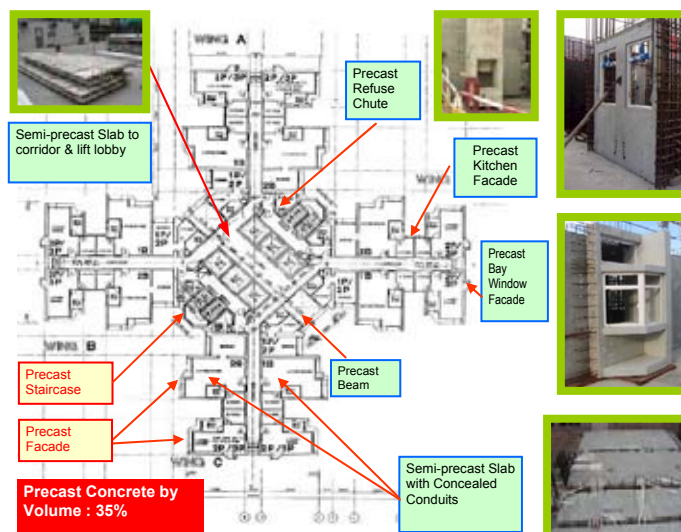


Figure 7: Precast Elements for the New Harmony Blocks constructed in Kwai Chung Estate

Prefabricated construction techniques had been tried over the years and by the late 1980's the HA embarked on a new approach in the design and construction of its buildings using modular design concepts and mandatory prefabrication. This started with pre-cast concrete components and was later extended into the fitting out of flats, with dry construction lightweight concrete partitions, door assemblies and kitchen fitments. The intention was to reduce wet trades, reduce the reliance on unskilled or semi-skilled site labour and introduce factory production as far as possible. Precast elements amounted to approximately 30% of concrete works by volume and included facades, staircases, refuse chutes, and later, features to emphasise the identity of each estate.

The last project, at the Kwai Chung Flatted Factory site, has used prefabrication more extensively, including structural elements, and components amount to over 60% of construction volume. These techniques have had a major effect on the Hong Kong construction industry and led to the development pre-cast concrete components industry in Hong Kong and latterly in southern China, which benefits the industry as a whole.

An Automated Refuse Collection System (ARCS) was also implemented for collection and handling of domestic refuse in a totally concealed environment where the refuse is automatically extracted by vacuum to centralised containers, thereby minimising nuisance caused by spills and smell. The system is one of the largest ARCS in Hong Kong and can handle a capacity of about 34 tonnes of refuse per day with 2 to 3 nos. of 10-tonne capacity containers for daily storage.

## 8. Economic Aspects - Continuous Provision of Basic Facilities

In order to maintain basic facilities such as shops, car parking and transport for the residents and the public in the vicinity, a temporary market and carparking was provided on the future district open site adjacent to phase 1. New roads were constructed in stages and remained in-use throughout the redevelopment period.

## 9. Continuous Community Engagement

A continuous dialogue with local residents is an important part of the redevelopment process. After public consultation at planning stage, efforts were made to seek local comments during and after completion. Resident's Surveys were carried out after occupation to obtain feedback and the findings showed that over 80% of the residents were satisfied with the estate as a whole, in particular, with the planning and design of

blocks and estate facilities.

Continuous improvement is also on going after in-take. A working group formed by Members of the Kwai Tsing District Council, a representative from the Incorporate Owners of the nearby HOS court, and representatives from Housing Department conducted regular meetings over about 2 years to work out common objectives for improvements. A lift tower and footbridge were eventually planned, and are now under construction, to serve Kwai Chung Estate, Tai Wo Hau Estate, and the schools.

In order to promote public participation in “greening”, a Community Participation Scheme was launched in mid 2007 in the new estate. The Scheme is to provide young plants to the participants approximately 6 months before completion of the Estate. The plants are to be grown at home or school and to be transplanted in the estate. The idea is to engage the community in the longer term to enhance commitment to the well-being and up keep of the estate and will be part of a series of activities to be arranged to generate more interaction and dialogue with the local community.



Figure 8: Community Participation Scheme – Action Seedling held in Kwai Chung Estate

## 10. Implementation and Project Cost

The first stage comprised of three 39 Storey Harmony Blocks with 2,400 flats which were completed in 1998. These blocks are adjacent to the District open space which had been built on the site used as a temporary car park and market until the car parking facilities in phases 3 and 4 were completed in 2005.

The second stage was the construction of the Small Household Development for the elderly and two New Cruciform Blocks (NCB) originally intended for sale. The NCB were fully fitted apartments, larger than flats for rent, with 10 flats per floor, rather than 20 flats per floor for typical rental housing. Prior to completion, the HA cancelled its flats for sale scheme and the buildings were eventually transferred the Government for use as disciplined services staff quarters.



Figure 9: Master Layout Plan of the completed Kwai Chung Estate, with the civic hub at the centre.

The third stage shows the re-alignment of road network, intensification of production that was necessary towards the late 1990's when phases 3 and 4 were developed with a podium design to accommodate the “Civic Hub”. The shopping centre, public transport interchange and car-parking were built beneath the podium and residential blocks built above, with social welfare facilities, and landscaped passive and active recreation facilities to cater for all ages. Social welfare support services were located at the above grade pedestrian access levels in phase 4. Residential buildings were five 40 storey modified New Harmony One blocks, and two 30 storey Annex Blocks, with small flats for single persons and couples. This stage also shows the new direction for the HA, where efforts has been made to give the buildings a clear identity of their own. Though standard building types are an efficient and cost effective way of building mass housing, there were concerns that public housing estates were becoming monotonous and not contributing positively to the urban landscape. Consequently, design teams modified the detailing of the buildings and developed unique colour treatment for each site within an overall colour theme.

The fourth and final stage was for the construction of five 40 storey New Harmony One blocks and two 30

storey Annex Blocks with small flats for single persons and couples, catering predominantly for the elderly or small families. This stage also shows the drive towards greater identity, with more modelling on the facades than those in phase 3 and 4 and a slightly different, though sympathetic, colour scheme.

Functional and cost-effective materials, such as acrylic paints for external walls and internal corridor walls, homogeneous floor tiles to common domestic floor areas, were used to ensure rational use of public resources. The final project cost for the redevelopment is estimated at HK\$3,958M and is within the project budget of HK\$4,974M. Average unit cost for the domestic flat is about HK\$5,000/m<sup>2</sup> construction floor area.

## 11. The Completed Estate

Residents are now living in modern self-contained flats with a much improved estate environment, a high standard of landscaping, and ample sitting out areas for the elderly and play facilities for children. The redevelopment has allowed for more effective land use and enhanced traffic flow in the area. Key facilities were maintained during the redevelopment and out of the original 22,000 tenants, 7,000 were eventually rehoused in the new estate.



Figure 10: New Harmony type blocks above the podium in Kwai Chung Estate Phases 3 and 4

Pedestrian access has been improved by footbridges, escalators, lifts and a comprehensive covered walkway system. There is a connection to the nearby Tai Wo Hau MTR station, for convenient and quick access to Hong Kong and Kowloon. A public transport interchange is now at the core of the estate, with a wide range of shopping, social and community facilities, which have created a new focal point at the civic hub. There are greatly enhanced recreation facilities and new district open spaces to serve the wider area.

The redevelopment has regenerated the area with the preservation of mature trees, religious shrines, and schools and revitalised landscaping and recreation and play facilities to serve the estate and the district. The environment of the completed estate and improvements for the district as a whole together with the community engagement programme, have fostered a renewed community identity, encouraged greater social interaction and provides for the needs of a vibrant and diverse community, with a greener, safer, healthier and more comfortable living environment.

After 12 years of work and close attention to local interests, Kwai Chung Estate has been one of the largest CRP projects with homes for 40,000 people.

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ARCA Ltd: Phase 3

MLA Architects (HK) Ltd: Phase 4

P & T Architects and Engineers Ltd: Phases 5 and 7

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