優質房屋 · 舒適生活

Better Housing for Better Living

元朗洪福邨是房委會新近建成的公屋項目。
Hung Fuk Estate in Yuen Long becomes one of the estates in the HA portfolio.

Over the years, the Hong Kong Housing Authority (HA) has made continuous improvements to its housing stock in order to meet the changing needs and aspirations of society. The simple shelters of the first public housing blocks of the 1950s have been transformed; and today's public rental housing (PRH) estates incorporate modern technology and green planning, and provide tenants with a comprehensive range of support facilities. This commitment to enhance our housing stock, driven by care for the people who make their homes there, has continued in 2015/16 in the latest batch of quality housing produced for Hong Kong.

During the year we completed construction of around 14 300 new PRH flats, in a total of 12 projects. These were made up of Long Ching Estate (Yat Long House and Ching Long House), Shui Chuen O Estate Phase 2 (Ming Chuen House, Yuet Chuen House and Ying Chuen House) and Phase 4 (Ling Chuen House), So Uk Estate Phase 1 (Orchid House, Marigold House, Peony House, Cedar House, Willow House and Cherry House), Lower Ngau Tau Kok Estate Phase 2 (Kwai Wah House), On Tat Estate (Oi Tat House, Shing Tat House, Chun Tat House, Yin Tat House, Hau Tat House and Him Tat House), Hung Fuk Estate Phases 1 to 3 (Hung Foon House, Hung Lok House and Hung Long House), Po Heung Estate (Po Hing House and Po Shun House), and Lei Yue Mun Estate Phase 3 (Lei Wong House). We also completed around 25 100 square metres (gross floor area) of retail facilities, and around 530 private car and lorry parking spaces.

Showing care through listening

A starting point for all our planning and construction work is the end-users – the community and our future tenants. Every project begins with community engagement initiatives that are designed to gauge community attitudes and take on board local preferences and expectations. These initiatives include, for example, community engagement workshops during the early stages of planning and design of our projects, and surveys of residents in newly completed estates; each of which is analysed and considered in our Post Completion Review Workshops. This feedback is taken into account when we design new estates, alongside other important criteria such as safety and comfort, sustainability and environmental friendliness, and efficiency and cost-effectiveness. We also use tenants' feedback to regularly refine our Model Client Brief and Modular Flat Design.

A green focus for development

We are committed to green design, coupled with the introduction of a range of environmentally-friendly systems in our buildings. The energy-saving initiatives

PRH development projects at Anderson Road, Kwun Tong

we have introduced over the past few years have been implemented in our new public housing estates with very positive results.

We have developed and applied Carbon Emission Estimation (CEE) as a tool for estimating the total carbon emissions from a new development project over its entire expected life. By setting benchmarks of carbon emissions (based on emissions from the New Harmony 1 Option 6 block and Kai Ching Estate), we are able to gauge how effectively the design of a new development project is able to minimise carbon emissions throughout its entire lifecycle. CEE is applied at many different levels, including materials used in major construction work, building structures, communal building services installations and demolition activities, as well as the use of renewable energy and the planting of trees. In 2015/16, we endorsed CEE for 12 new projects. Since implementation of CEE, we have achieved an average of about 13% reduction in estimated carbon emission for our domestic buildings as compared with the baseline figure of benchmark block in terms of construction floor areas.

In addition, we have implemented the ISO 50001 Energy Management System in the design of our new domestic blocks. This enables us to gauge the communal energy consumption associated with the building once it is in operation. In 2015/16, we endorsed energy estimations for 12 new projects and achieved a reduction of about 20% of estimated communal energy consumption for the domestic blocks, compared with the baseline figures.

During the planning and design stage, we have been adopting standard green procedures such as the use of micro-climate studies. These help optimise the estate layout and the disposition of buildings, which in turn enable new estates to achieve a better environmental performance. We also adopt the principle of "passive design", by which we are able to harness the unique characteristics of individual sites to make the most of natural ventilation and daylight in our estates.

"Go green" is a principle we are also applying to our selection of construction materials. Since 2013, for instance, we have incorporated the use of the

Two of the estates completed during the year – (left) Lei Yue Mun Estate Phase 3 (Lei Wong House) in Kwun Tong and Po Heung Estate in Tai Po

environmentally-friendly Ground Granular Blast Furnace Slag (GGBS) into our specifications for new building contracts, and now require that GGBS should replace 35% of the cement in concrete used in the construction of pre-cast concrete facades and precast staircases. We are also studying the possibility of using GGBS in other precast concrete elements, such as semi-precast slabs.

Greening is another area in which the HA is showing its care for its PRH communities. To mitigate the Heat Island Effect, we require overall greening coverage of at least 20% of the total site area of our estates, and at least 30% for sites of over two hectares; and we plant at least one tree for every 15 flats built. More recently, we have introduced integrated water sensitive urban design features into our estate designs; these are helping slow down run-off and enhancing water retention capacity at our Shui Chuen O and Au Tau projects. The HA has also been pioneering the use of the Zero Irrigation System (ZIS) in Lung Yat Estate (see Feature Stories), and we are now using a vacant site in Homantin to monitor a trial of a revised ZIS design for tree planting. Meanwhile, in our Choi Yuen Road project, we are developing a prefabricated modular system that will make tree planting on the podium more efficient and reduce construction time.

Green building achievements

All new HA projects are designed to achieve a Gold rating under the Hong Kong Green Building Council's green building assessment scheme (the Building Environmental Assessment Method Plus (BEAM Plus)), while a selection of our projects are able to achieve the highest Platinum rating. The table below summarises our certification results under BEAM Plus Version 1.2 for New Buildings for 2015/16.

Project	Rating
PRH Development at Ex-Kwai Chung Police Married Quarters	Platinum Rating, Provisional Assessment
PRH Development at Cheung Sha Wan Wholesale Food Market (Site 3)	Gold Rating, Provisional Assessment
Home Ownership Scheme Development at Cheung Sha Wan Wholesale Food Market (Site 5)	Gold Rating, Provisional Assessment
Home Ownership Scheme Development at Kiu Cheong Road East	Gold Rating, Provisional Assessment
PRH Development at Lin Shing Road	Gold Rating, Provisional Assessment
PRH Development at Lai Chi Kok Road – Tonkin Street Phases 1 & 2	Gold Rating, Provisional Assessment

The Zero Irrigation System in Lung Yat Estate

Better protection for workers

The HA's Site Safety Strategy 2015 is a set of safety requirements implemented at all our new works and maintenance works sites, and is also applicable to the work of our property service agents, cleansing services contractors and security contractors. In 2015, we achieved our safety goal of no more than 12 accidents per 1 000 workers, recording accident rates of 9.2 per 1 000 workers for new works contracts and 1.5 per 1 000 workers for maintenance works contracts. These figures remain well below Hong Kong's average industry accident rate of 39.1 per 1 000 workers. In March 2016, we were delighted to receive again the Gold Award in the Client-Developer category of the Derek Smyth Safety Leadership Awards, organised by the Lighthouse Club with the support of the Construction Industry Council. The award recognises our exemplary efforts in safety leadership at every stage of our projects, which include engaging with stakeholders to improve the safety management system, addressing safety in the design process, and implementing safe working practices during construction.

During the year, we continued our process of enhancing our specification requirements for contractors, and introduced them in a wide range of areas. In each case, the new specification requirements introduce mandatory actions designed to protect workers on the job more effectively. We have also continued to foster safety awareness among our industry stakeholders by organising safety promotional events in the form of forums, seminars and workshops. One highlight was a Pointing and Calling Competition held to promote this good practice among HA contractors. Posters illustrating pointing and calling commands were prepared and distributed to contractors.

Our work in existing estates is also totally safety-oriented. This year we continued to arrange surprise safety inspections of building maintenance and improvement works, lift maintenance and lift modernisation works, all with the aim of enhancing site safety. We also conducted a review of our surprise safety inspections for building maintenance and improvement works, in which we explored possibilities for refining the inspections to make them more effective still.

The Housing Authority Occupational Injury and Disease Surveillance System has been developed to manage information relating to site safety more effectively. This web-based information management system makes it easier for contractors to record accidents and incidents, and can be used to generate accident statistics for analysis.

Workers are required to wear safety helmet and reflective vest on site

Suitable personal protective equipment is necessary when carrying out welding works

Quality management systems

We have achieved a number of quality management certifications as part of our efforts to ensure our services are delivered to the community effectively, and we have adopted the European Foundation for Quality Management (EFQM) Excellence Model to help us make continuous improvements across our operations.

Our contractors must be ISO 9001, ISO 14001 and OHSAS 18001 certified, and since January 2014 we have also required our building (new works) contractors and piling contractors to operate a certified ISO 50001 energy management system. The standards to which we are certified and the management systems we adopt in our operations are shown in the following tables:

Certified Standards

Certified Standard	Scope	Certified since
Development & Construction Division (DCD)		
ISO 9001 : Quality Management	Planning, design, project management and contract administration for the construction of public housing	1993
ISO 14001 : Environmental Management	Planning, design, project management, contract administration and materials testing for the construction of public housing	2009
ISO 50001 : Energy Management	Planning, design, project management and contract administration for the construction of the communal areas of PRH domestic blocks	2012
OHSAS 18001 : Occupational Health and Safety Management System	Materials testing for the construction of public housing	2013
Estate Management Division (EMD)		
ISO 9001 : Quality Management	Planning, design, project management and contract administration for the maintenance and improvement of public housing	1993
ISO 14001 : Environmental Management	Planning, design, project management and contract administration for the maintenance and improvement of public housing estates. Provision of property management services (including cleansing, security, landscaping and office administration) in public housing estates.	2011
ISO 50001 : Energy Management	Planning, design, operation, project management and contract administration for facility management and improvement works of the communal areas of PRH domestic blocks	2013
OHSAS 18001 : Occupational Health and Safety Management System	Planning, design, project management and contract administration for the maintenance and improvement of public housing	2014
Independent Checking Unit (ICU)		
ISO 9001 : Quality Management	Building Control for Public Housing	2014
ISO 14001 : Environmental Management	Building Control for Public Housing	2014

Other Quality Schemes and Standards

Scheme / Standard	Scope	Adopted since	Remarks
DCD			
ISO 26000 : Social Responsibility	Planning, design, project management and contract administration for the construction of public housing	2010	Integrated with other management systems of DCD. A non-certifiable standard, but measured through the HKQAA CSR Advocate Index. For the fourth consecutive year since 2012, DCD achieved the full score of 5.0.
ISO 31000 : Risk Management	Planning, design, project management and contract administration for the construction of public housing	2010	Integrated with other management systems of DCD.
European Foundation for Quality Management (EFQM) Excellence Model	Planning, design, project management and contract administration for the construction of public housing	2010	Integrated with other management systems in DCD.
EMD			
ISO 19011 : Auditing Management System	Internal audit for planning, design, project management and contract administration for the maintenance and improvement of public housing	2012	Integrated with other management systems of EMD. A non-certifiable standard, but verified through HKQAA with Verification Statement obtained in 2013.
ISO 26000 : Social Responsibility	Planning, design, project management and contract administration for the maintenance and improvement of public housing	2012	Integrated with other management systems of EMD. A non-certifiable standard, but measured through the HKQAA CSR Advocate Index. For the second consecutive year since 2015, EMD achieved the full score of 5.0.
ISO 31000 : Risk Management	Planning, design, project management and contract administration for the planned maintenance and improvement of public housing.	2012	Integrated with other management systems of EMD. A non-certifiable standard, but verified through HKQAA with Verification Statement obtained in 2013.
HKQAA Sustainable Building Index (SBI) Scheme	Sustainability performance (environmental, social and economic) of domestic blocks in 10 estates containing all major block types	2012	A non-certifiable standard, but verified through the HKQAA SBI Scheme. In 2012, the HA became the first organisation to obtain the HKQAA SBI Verified Mark.

For the fourth consecutive year, the HA's Development & Construction Division achieved the full score of 5.0 in the HKQAA CSR Advocate Index annual performance assessment. The Estate Management Division also enrolled for verification under this index, achieving a full score of 5.0 for the second consecutive year.

Quality control

To ensure upstream quality control, the HA currently applies product certification to 11 building products – fire resistant timber doors, panel wall partitions, packed cement for architectural use, tile adhesives, ceramic tiles, repair mortars, aluminium windows, uPVC drainage pipes and fittings, close-coupled water closet suites, mesh reinforcement, and LED bulkheads. Multi-layer acrylic paint is the next building material targeted for product certification.

Independent checking

The Independent Checking Unit (ICU), operating under the Office of the Permanent Secretary for Transport and Housing (Housing), provides third-party checking of all structural and building plans submitted by the HA for its new development projects. It also processes submissions for alterations and additions to the HA's existing buildings. In addition, the ICU is responsible for exercising statutory building controls, under the powers delegated by the Building Authority, over buildings in Home Ownership Scheme courts, Tenant Purchase Scheme estates, and estates with commercial and car parking facilities divested to The Link REIT. Meanwhile, the Lift Inspection Focus Team (LIFT) operates an audit inspection system that helps enhance safety and reduce the risk of accidents in lifts and escalators managed by the HA.

The ICU's Housing Electronic Building Records Online System (HeBROS) introduced new services allowing for on-line inspection and purchase of HA building records in 2014. This was followed in December 2015 with the rolling out of the ICU's Housing Electronic Plan Submission System (HePlan) for pilot projects, with full implementation in the first quarter of 2016. HePlan enables the e-submission and e-processing of documentation regarding the HA's new development projects, as well as alterations and additions to existing buildings.

IT as a quality building tool

Information Technology (IT) resources are widely used by the HA in its design and construction activities. Some of the most important ones are Building Information Modelling (BIM), the Geographic Information System (GIS), the Housing Construction Management Enterprise System (HOMES), and Radio Frequency Identification (RFID).

We have now implemented Phase 1 of the Development and Construction Site Mobile System (DCSMS), which enables mobile devices and applications to be used to carry out site inspections of building works and building services works during construction, and to raise alerts about accidents or site safety incidents. The DCSMS SafetyAlert apps allow site staff to send instant alerts regarding accidents or incidents to the project team and management, through their mobile devices. This innovation streamlines the management of safety, quality and productivity at our building sites. The Building Works and Building Services site inspection apps facilitate site staff to take photographs to illustrate the results of inspections, and notify contractors if rectification is needed. We are now proceeding with the development of Phase 2 of DCSMS, in which we will develop wider applications of mobile apps to cover inspection work across other areas, streamline the inspection processes with contractors, and better integrate the Occupational Injury and Disease Surveillance System into DCSMS.

The HA is responsible for the management and maintenance of approximately 102 000 trees growing in some 200 public housing estates and venues. To keep the public safe, we conduct an annual Tree Risk Assessment (TRA) of all these trees before the onset of the rainy season. In the past, the data relating to this risk assessment was stored in paper form, making retrieval very time-consuming. It also made it difficult to monitor the progress of the tree management work geographically. We have therefore developed and implemented a new application system, the Enterprise Tree Management System (ETrMS), which integrates WEB (world-wide web) and GIS (Geographical Information System) technologies with other new technologies such as RFID (radio frequency identification) and GPS (global positioning system). ETrMS gives us an effective platform for retrieving and updating tree data, and allows us to upload the tree data to the GIS database. This enables both HA staff and our business partners to easily access the GIS tree database and retrieve tree records. ETrMS also facilitates the updating and completion of tree assessment reports on site, making the process of auditing of the huge number of assessment reports and checking the accuracy of the tree data before the end of the annual TRA cycle more efficient. Moreover, the system offers an efficient way of recording new tree data, and shortens the preparation time needed for compiling new tree information. We expect ETrMS to enhance the monitoring of the progress of TRA and Tree Remedial Works (TRW), and the performance of the contractors involved, through its ability to generate electronic workflows and management reports.

Innovation through collaboration

We collaborate closely with industry stakeholders and draw on a wide range of internal and external expertise to encourage innovative solutions. One example is our use of the Integrated Procurement Approach (IPA), based on a three-envelope tendering system comprising price, technical and innovation submissions. IPA encourages stakeholders to collaborate to deliver innovative design and construction concepts, and is particularly suitable for complex and large-scale housing projects. It turns the tendering process into a learning process, in which tenderers can collaboratively explore new ideas and new options.

Mobile devices and apps are being used to streamline the management of safety, quality and productivity at our building sites

ETrMS makes it much easier for HA staff and business partners to carry out tree assessments on site

Hung Fuk Estate – Integrating a New Community with the Countryside

Infrastructural provisions including retail, community and transport facilities are important to quality of modern living. For new public housing development in sites without these provisions in their vicinity, the HA is faced with the challenge to provide its residents with all the conveniences of modern community living on the spot.

One example of this is our development of Hung Fuk Estate in Yuen Long, completed in 2015. Currently surrounded by low-rise rural villages and green spaces, the estate sits in an area that has been earmarked for a possible New Town sometime in the future. In the meantime, its 4 905 flats in nine domestic blocks have brought a substantial new population to this once sleepy area. Our challenge was to ensure that residents did not feel isolated and cut off in their new rural environment, but had access to a comprehensive range of facilities and retail opportunities. In addition, we wanted the estate facilities to represent a big first step in the development of a future town centre for the district.

We planned the estate in careful harmony with the surrounding environment, developing two unobstructed east-west view corridors, of 30m and 15m respectively, that allow free permeation of sunlight and breezes for the enjoyment of residents.

Hung Fuk Estate is comprised of nine blocks

One important facility for new residents was a well-equipped public transport interchange (PTI) giving access to nearby towns and transport links. But vehicles in PTI generate noise, and one of our priorities was therefore to create an effective partial noise-reducing cover for the PTI. We piloted a zig-zag cover design that meant residents above it had no lines of sight to the bus lanes, and which divided up the roof cover into small sections to improve natural ventilation and save the need for installing sprinklers and ventilation system. Besides reducing noise, the cover acts as an efficient sunshade and keeps off some rain in wet weather. This design will benefit private housing residents too, when new blocks are built nearby.

Within the estate, we tried to create a "Main Street" effect for retail activities by delivering a verandah style shopping experience at the estate entrance. A covered walkway and canopy provide pleasant shading along the shop fronts, and there are plenty of well-defined spaces for walking and engaging in leisure activities too. Picking up the traditional rural culture of the area, the pedestrian walkways highlight Chinese decorative motifs along them.

Wide corridors offering spatial pleasure for residents

The smart-designed public transport interchange

The shopping centre

A highlight of the shopping centre at Hung Fuk Estate is a brand new wet market with 42 stalls, situated alongside the estate supermarket. It has been designed to welcome in customers and provide a concordant and user-friendly feel. Inside are well-lit open and semi-open stalls with low partitions. Essential hanging racks were provided to assimilate the market stalls design and to create a welcome and open environment for shoppers. The end result is a wet market with a very modern feel: light, bright, clean and efficient.

In addition, all the latest in environmental advances and sustainability initiatives have been incorporated into Hung Fuk Estate, including a sensitive colour scheme appropriate to the surroundings, a high level of greening within the estate (including extensive roof greening), and renewable energy and water management.
The new estate currently stands tall above the older village housing, but as the area transforms into a new population centre for Hong Kong, Hung Fuk Estate and its modern facilities will find itself at the centre of the life of a new urban community.

The greenery of the estate

Lung Yat Estate – Smart Design for a Sustainable Community

Given the shortage of land for building new PRH estates in Hong Kong, it is not uncommon for the HA to be required to work with constrained or challenging spaces when designing a new estate. In such cases, we go the extra mile to ensure the end result is a sustainable community, one that functions well both on its own terms and also in relation to the existing urban environment round about.

The PRH development of Lung Yat Estate in Tuen Mun demonstrates how we tackled the challenges. This small estate of two 33-storey blocks, with a total of 990 flats, was developed on a vacant flat site, and completed in 2013. Accompanying the domestic blocks is a two-storey standalone Community Hall and other facilities. The challenge here was that the site was immediately adjacent to a busy traffic flyover and other major roads. Without thought for sensitive and sustainable design, residents may have ended up feeling isolated in a traffic "island", battling traffic noise and pollution daily.

The orientation of blocks enables residents to enjoy panoramic views of Tuen Mun River and Castle Peak.

The HA's design proposal aimed at creating a sustainable, cost-effective and healthy environment. Key to achieving this was to ensure that the residential development would be shielded from traffic noises and emissions. This was one of the major reasons for choosing a "single aspect" building design for the estate – that is, all the flats effectively face in one direction, to minimise the noise impact of major traffic arteries. The two domestic blocks were aligned so as to form a natural noise shield, with their service cores and staircases orientated towards the major noise source. In addition, the blocks' orientation is arranged so that residents are able to enjoy panoramic views of the Tuen Mun River and distant Castle Peak.

To further create a sense of connection with the surrounding community, the domestic blocks were given a distinctive colour scheme that blended in with the colours in adjacent residential buildings and a nearby school. Other features used to create a sense of harmony and to form links with the local landscape included the use of a strong series of vertical structural lines in the buildings and their components (such as external vertical fins and protective screens in the corridors), and the design of the Community Hall and the external landscape. Carefully planned climbing greenery on every three floors also softened the hard materials and added extra sustainability values.

Parallel to the sustainable design features of the buildings, our planning also aimed at achieving social sustainability. Following local community consultation, the government decided to incorporate a Community Hall in the overall estate design. Including a multi-purpose hall that can seat 450 people and a conference room, the Community Hall not only offers a multi-purpose space for local community events and activities, but also provides an attractive local landmark on the banks of the Tuen Mun River Channel.

Since its opening, the Lung Yat Community Hall managed by the Home Affairs Department has witnessed many vibrant community initiatives that have helped place Lung Yat Estate at the heart of local and neighbourhood connectivity. The value of the Hall to the community is perhaps best symbolised by the impressive wall mural next to its entrance – a fitting emblem of the colourful community spirit that is now a feature of the new estate. To get a closer look at the mural and see how it captures the diversity of the Tuen Mun area, use the QR code below to download an image of "Seeing Sound".

"Single aspect" building design minimises the noise impact of major traffic arteries

The Community Hall entrance and the wall mural "Seeing Sound"

ZIS – Vegetation without Potable Water

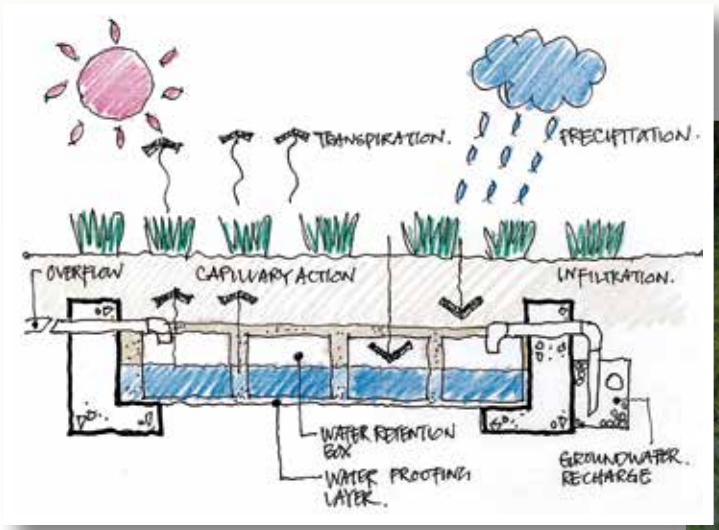
Fresh clean water is a limited and precious resource. To enhance the sustainability of its developments, in recent years the HA has launched initiatives for cutting down its water usage and reusing or recycling water where possible. One area focused on has been the use of water in landscape irrigation. Trees, shrubs and vegetation need water to flourish. We have been working on a pioneering method of irrigation known as the Zero Irrigation System (ZIS) for use in our new public housing projects, designed to avoid the need to use any potable water for irrigation.

ZIS is a sub-irrigation method, meaning that water is delivered to the plant root zone from below the soil surface and absorbed upwards. This passive design system removes the need for any external irrigation sources apart from the most natural and sustainable one – rain.

Rain falls, and is then absorbed into the soil. Any excess is collected in special retention boxes under the ground. When the soil above dries, capillary action draws up water from the retention boxes to irrigate the plants, in a self-sustaining cycle. ZIS harvests rainwater at lower capital and management costs than conventional systems, and is also able to collect and re-use storm water – thus reducing the amount of storm water entering the drainage system.

We constructed a ZIS trial planter at Lung Yat Estate in 2013, and monitored its consumption of irrigation water over a 24-month period. No manual watering using potable water was needed throughout the entire two-year trial period. Across the period, both trees and shrubs remained in good condition, with HA specialists observing no signs of suffering due to lack of water. Furthermore, there was no waterlogging, and no odour was generated. Compared with the conventional irrigation system, the ZIS trial resulted in a saving of about 55m^3/year in water consumption for that planter. Plant species that proved able to manage well under ZIS included *Cordyline teminalis Tricolor, Duranta erecta Variegata, Drejerella guttata, Nephrolepis exaltata Bostoniensis* and *Schefflera arboricola Variegata*.

We have been very encouraged by the result of the ZIS trial, which has proved effective both in saving water and reducing the manpower resources needed for maintenance. ZIS looks to have great potential for wider use in new estates, and we are now conducting further research with the aim of refining the design and reducing construction time and costs through modularisation.



The illustration shows how ZIS works

ZIS in Lung Yat Estate