

Greater Bay Area, Macao will further demonstrate its advantages as a world tourism and leisure centre and a commercial and trade services platform between China and Portuguese-speaking countries, fostering the growth of nascent industries and expediting adequate economic diversification. Given the varied industrial orientation and positioning of Greater Bay Area cities, it is necessary for Macao to fully utilise its unique advantages, follow the strategy of positioned cooperation and complimentary development, and make the best use of policy benefits and the momentum of innovation to make Greater Bay Area cities the bases for its adequate economic diversification, thereby opening up vast development potential for Macao.

## Enhancing crisis management capacity to build a safer city



Building a city favourable for living, commuting and tourism is one of the major tasks in the MSAR Government's Five-Year Development Plan. While commencing various construction projects and enhancing living and commuting conditions, the Government attaches great importance to building a safer city, to protect the lives and property of Macao people.

Since Typhoon Hato hit Macao on 23 August 2017, the Government has continued to review and improve its mechanism for responding to major disasters and their aftermath, as well as promoting and implementing policies on weather disaster prevention and mitigation. The security related departments followed recommendations

from the National Commission for Disaster Reduction to draw up short-, medium-, and long-term plans for response to typhoon and safety issues, and launched relevant follow-up work and refinements for civil protection, disaster relief work coordination and reforming systems.

## **Promptly releasing accurate information to effectively coordinate disaster relief**

Ensuring accurate information flows is important for tackling disasters and preventing secondary disasters. The civil protection management team is strengthening the coordination mechanism while further expanding information distribution and communication channels. As the core of disaster prevention and mitigation, the Civil Protection Operations Centre set up a public broadcasting system to facilitate information exchanges between the centre's staff members.

Regarding external communications, the Civil Protection Operations Centre set up 12 assistance and enquiry hotlines after the civil protection management team commenced full operations. Hotlines have also been established for the Customs Service, the Public Security Police and the Fire Service. Upon commencement of operations of the civil protection management team, the number of public hotlines available will increase from 25 to 55. Police transceivers have also been distributed to neighbourhood associations in various districts, for communicating and enhancing cooperation with the Civil Protection Centre, medical institutions, water supplies and power companies for situation reporting and requesting assistance during disasters.

To ensure the public can receive accurate information on a timely basis, the civil protection management team set up audible sirens in low-lying areas, and installed high frequency alarms on the radio transmitters at Guia Lighthouse, Taipa Grande and Alto de Coloane, to broadcast weather warning, flood warning and typhoon warning signals. Civil protection information broadcasts and display systems have also been installed at major border checkpoints, to disseminate the latest news to any stranded passengers and the public.

After Typhoon Hato, the public security forces established a working group for dissemination of civil protection information. Apart from consolidating and coordinating releases of information under the fully operational civil protection management team, the working group also cooperates with other departments to deepen publicity and education on disaster relief, and raise public awareness of preventing and responding to disasters.

Coordinated by the Office of the Secretary for Security, various units and departments have been working with the Government Information Bureau to discuss and refine work related to dissemination of civil protection information, and will continue establishing

a mechanism for closer communication with and improved information dissemination to the media.

## **Effective measures proven and recognised for tackling another strong typhoon**

After a year of optimisation and preparation, the disaster prevention and mitigation mechanism was proven effective when Typhoon Mangkhut hit Macao on 16 September 2018. Led by the Chief Executive, the public security forces joined hands with other administrative units, departments under the civil protection management team and Macao residents, to cope with the typhoon. Casualties were prevented, injuries and losses were minimised, and society quickly returned to normal. The adopted measures received wide recognition and appreciation from all.

On 13 September, Typhoon Mangkhut was on a track towards Macao. The Chief Executive held a meeting and paid site visits to low-lying areas. He listened to reports from members of the civil protection management team on how to tackle Typhoon Mangkhut, and the implementation of the evacuation plan for storm surge in low-lying areas during the typhoon. As Macao was forecast to be hit by Typhoon Mangkhut, the Chief Executive visited the Civil Protection Operations Centre five times, to hold meetings to be briefed about the situation and give instructions on disaster response efforts.

On the morning of 15 September, the Secretary for Security called for a general meeting with the public security forces, urging all departments to maintain close communications, and be well prepared for the typhoon impact. That afternoon, the Secretary for Security and representatives of the civil protection management team jointly organised a press conference to introduce their preparations for tackling the typhoon.

Through coordination by the Government, 627 parking spaces of various government department car parks and many temporary parking spaces were opened for public parking. Six casino operators also provided 2,770 free private vehicle parking spaces to the public from 15 to 18 September, with the aim of minimising damage to vehicles arising from flooding.

Based on a risk assessment by the Civil Protection Operations Centre, the Chief Executive also requested the six casino operators to suspend operation from 11 p.m. on 15 September to 8 a.m. on 17 September, to ensure the safety of related personnel, and prevent public safety risks for casino workers and tourists, thus easing stress for casino employees.

After timely communication and coordination with the Zhuhai Municipal Government,

three checkpoints – at the Border Gate, the Zhuhai-Macao Cross-border Industrial Zone and Cotai – were closed at 1 a.m. on 16 September, to ensure the safety of local residents and visitors.

On 15 September, Macao issued the Red Storm Surge alert at 9 p.m. The civil protection management team commenced full operations, and implemented the evacuation plan for storm surge in low-lying areas during a typhoon. Twenty-nine representatives of bodies under the civil protection management team were stationed at the Civil Protection Operations Centre, to meet and coordinate all related operations.

From 2 a.m. to 11 p.m. on 16 September, Typhoon Signals No. 8, 9 and 10 were hoisted in succession. At 2 p.m., the Black Storm Surge alert was issued. Areas in S. Lourenco Market, Inner Harbour, Fai Chi Kei and Ilha Verde were heavily flooded, with the highest water depth of 1.9 metres recorded at the Inner Harbour. The Customs Service and Fire Service Bureau deployed a new model inflatable crafts and jet skis to evacuate residents.

As the evacuation plan for storm surge in low-lying areas during a typhoon was activated, all units of the Public Security Forces operated in their districts to evacuate residents and tourists from low-lying areas to safe places. Totals of 16 emergency shelters and four assembly points for people with limited mobility, and four places to stay during emergency evacuations were opened to the public. In all, 5,650 households were evacuated, with 1,343 people transferred to emergency shelters during the peak period.

When there were changes to typhoon signals and storm surge alerts, the civil protection management team broadcast the updated warnings in Cantonese, Putonghua, Portuguese and English via the alarm devices installed at three higher spots on Macao peninsula, Taipa and Coloane, and 90 closed circuit television camera posts in low-lying areas, to alert the public regarding the severity of the typhoon and urge evacuations.

During the typhoon, the Government disseminated accurate, detailed information on a timely basis through the media, to reassure people, allowing the Government to focus on its response measures so it could tackle the typhoon.

After Typhoon Signal No.3 was issued at 4 a.m. on 17 September, over 2,000 officials from the Unitary Police Service, the Customs Service, the Judiciary Police, the Public Security Police Force, the Fire Service and the Academy of Public Security Forces immediately joined hands with the Civic and Municipal Affairs Bureau to commence clean-up work. Major roads and streets were reopened to traffic before noon that day.

All clean-up work throughout Macao was completed on 18 September. The Correctional Service Bureau, Customs Service, Education and Youth Affairs Bureau and

over 2,700 volunteers from more than a dozen of community organisations formed clean-up teams. Three construction industry associations also offered their pumps and heavy-duty machinery, to assist in disaster relief work. Public order in Macao was restored within a short time.

The Government also decided to suspend classes for all students on 17 September, and exempted civil servants from going back to the office, to ensure smooth progress with clean-up work, to expedite the recovery of public order and people's normal lives.

### Implementing short-, medium- and long-term plans to optimise disaster prevention and mitigation



Regarding facilities and hardware, the Government acquired a variety of rescue and reconstruction equipment and tools, to strengthen the public security forces' disaster prevention and mitigation capability. These included an unmanned undersea reconnaissance vehicle, a cable-operated underwater robot, underwater communication devices with snorkelling gear, a fibreglass offshore patrol boat with night vision and surveillance functions, several models of inflatable craft, generators, large diameter water pumps, motor saws, chain saws, large electric cutting machines, electric saws, and tree shears.

Medium-term plans include construction of the Civil Protection and Emergency Operations Centre Building. The construction plan was handed over to the public works department in 2018. Apart from building the essential facilities in the office building, storage for material supplies will be included for effective management and coordination of disaster relief work. Before the completion of the office building, the

Unitary Police Service has already commenced expansion work on the third floor of the Immigration Department Building in Taipa, which is serving as a temporary office before the authority responsible for civil protection affairs is established.

While optimising measures and operations, the Government also followed the short-, medium-, and long-term plans for responding to typhoon and safety issues, to review the existing legal system related to civil protection, organisational structure, work and operational mechanism, and began drafting the Civil Protection Fundamental Law and its supplementary regulations.

Coordinated by the Office of the Secretary for Security, the Unitary Police Service conducted a 45-day public consultation from 28 June to 11 August, to collect opinions and suggestions from different sectors of society.

Also, the Secretary for Security, the Unitary Police Service and the Public Security Forces Affairs Bureau cooperated with high schools and scientific research companies in mainland China to develop an emergency command application platform. Parts of the sub-system were completed in April 2018. The platform framework was tested during the “Crystal Fish” drill on 28 April.

The system was further enhanced through referring to the feedback on the test, with the aim of establishing a preliminary application platform: the “Single Puzzle”, with five sub-systems - resource management, incident reporting, emergency response, alert announcement, and a kernel module.

## **Safeguarding infrastructure to reduce impact of disasters on people’s livelihoods**

The Government also strived to further safeguard infrastructure against disasters, to support people’s livelihoods. In 2018, Macao finished installing infrastructure for power supply facilities, altered the power grid circuits, enhanced waterproofing of facilities related to public utilities, and began implementing related measures, to ensure the safety of power and water supplies.

There were also improvements in over 80 transformer rooms in low-lying areas. The Government reviewed Macao’s electricity supplies and expedited construction of the sets of new natural gas power generators, to upgrade local power generation capacity. It also worked with mainland China to review and formulate contingency plans, in order to safeguard emergency power supplies.

Three high-voltage substations have been built to optimise local power supply grids. Two of these – the substations at the Conde S. Januario Hospital and the Macao border crossing area of the Hong Kong-Zhuhai-Macao Bridge – commenced operations on



schedule in 2018, while construction of the Islands District Medical Complex substation was completed by the end of the year.

In another measure to safeguard electricity supplies, cable laying for the third Guangdong-Macao high-voltage electric power transmission channel commenced in 2018.

Regarding optimisation of water supplies, construction of Seac Pai Van Water Treatment Plant commenced in 2018. After completion, it will satisfy the increased demand for water supplies in the Islands District. To ensure stability of emergency water supplies, the Government finished reviewing the Contingency Plan for Ensuring Safety of Water Supplies in Macao, and conducted research on building more high storage reservoirs in elevated locations in Macao; these are expected to extend the buffer time of water supplies from 4 hours to 12 hours. The Government also facilitated formulation of a regional disaster contingency response collaboration mechanism by a Guangdong-Macao water supply taskforce.

Targeting the problems with flooding in low-lying areas, in 2018 work commenced on implementing a series of flood prevention and drainage plans, to improve flood prevention capability and drainage infrastructure. This included expedited construction of sluices at the Inner Harbour, flood barriers in low-lying coastal areas, drains to intercept rainwater, and stormwater pumping stations in the Inner Harbour, to reduce the risk of flooding in low-lying areas.

Regarding the medium-to-long-term perspective, the Government completed its report on the Research on the Master Plan for Flood Prevention, Drainage Infrastructure and Drainage of Floods in Macao Inner Harbour Seafront Area, in accordance with comments from related ministries of the Central People's Government, and submitted the revised version to the ministries for approval. Meanwhile, the Feasibility Study on



Constructing Sluices in Macao Inner Harbour — Engineering Research and Research Study was approaching completion. The Government will continue communicating with related departments in mainland China, and implement the projects through regional cooperation.

Based on the improvement work that has been completed in the Inner Harbour, the Government commenced the Study on the Optimisation and Emergency Plan for Flood Prevention and Drainage of Floodwaters in the Inner Harbour of Macao. It is planned that flood control barriers will be constructed in the Inner Harbour area, to reduce the risk of seawater spilling over the bund and flooding the low-lying areas of the Inner Harbour. The design has been completed, and the tender exercise for the construction project will commence.

The Government is committed to improving weather monitoring and alert capability, to cope with extreme weather and climate disasters that may happen in future. To expand the climate monitoring range, the Meteorological and Geophysical Bureau (SMG) set up more weather stations including precipitation monitoring stations in 2018, to strengthen weather monitoring in densely populated districts. The Government also optimised the equipment of water-level monitoring stations, to enhance flood monitoring.

Moreover, the tropical cyclone signals and the storm surge warning system were revised, to optimise the warning systems. The SGM also adjusted the assessment of tropical cyclone strengths and wind speeds for typhoon signals, and expanded the bandwidth dedicated to sharing meteorological data with Guangdong province, to enhance the capability for providing alerts regarding approaching severe weather and potential climate disasters.

## **Implementing the Five-year Development Plan for more comfortable living and commuting**

Apart from being committed to boosting the ability to mitigate and prevent disasters, the Government continued implementing its Five-year Development Plan, with the aim of constructing a city for comfortable living and commuting.

There was further progress with reclamation for new urban areas. Work has commenced on designing infrastructure in Zone A, and the design of piping and sewage infrastructure within the district was completed in phases. For the New Urban Zone B (the government administration and judicial zone), a tender exercise has commenced on infrastructure and road design, while a study on selecting the site of the district's electricity substation was underway. The Government also expedited the



planning and analysis of facility construction in the district. Upon completion of the analysis, work will commence on preparing budgets and tenders.

The tender exercise for reclamation in New Urban Zone C was completed on schedule, and the project has already begun. The design of New Urban Zone D was also completed on schedule, and the tender exercise will soon be conducted.

To ensure that LRT Taipa line could satisfy the requirements for commencing operations in 2019, the Government established an LRT operating company in 2018. Drafting of the Light Rapid Transit Law was completed, and the draft law was submitted to the Legislative Assembly for deliberation.

As most work on the LRT Taipa line and construction of the LRT depot superstructure was completed, in 2018 the Government proceeded with installing the installation for LRT trains. A total of 110 carriages were delivered to Macao on schedule, and follow-up tests were conducted. Preliminary construction work of A-Ma station, which connects Taipa and Macao Peninsula, was completed in 2018, and construction of the major section of the station immediately commenced. Meanwhile, construction of A-Ma transport interchange proceeded as planned.

Regarding the LRT Seac Pai Van line, work on the connection between LRT Seac Pai Van line and Taipa line commenced on schedule in 2018, and the design of the route for LRT Seac Pai Van line was completed. During the year, work began on rerouting underground utilities along the route. The Government also conducted a study on the route for the LRT East line. According to the plan, this line will connect the Taipa Ferry Terminal, and pass through the New Urban Zone A to the Border Gate. The study on the route also assesses a plan to connect New Urban Zone A with the Macao border crossing area of Hong Kong-Zhuhai-Macao Bridge and the Outer Harbour Ferry Terminal.

To satisfy Macao people's demand for housing, construction of public housing continued during 2018. Projects completed during the year included Cheng Tou Building, Fai Ieng Building and Bairro da Ilha Verde Building. Moreover, construction of the second phase of Mong Ha Public Housing project, Toi San Public Housing Estate and Venceslau de Morais public housing project also commenced.

The public housing projects in the development plan include the tender exercise for the phase-one design of public housing in New Urban Zone A; and the tender exercise for the phase-one design of Wai Long public housing project; a feasibility study for the latter was completed on schedule in 2018.

Regarding public housing allocation and management, the Government continued upholding the policy of "Public housing as the core, supplemented by the Home Ownership Scheme" to accelerate the process for approving public housing

applications. The Government followed up the assessments of applications for multi-room housing units, and arranged for qualified applicants to select and purchase Home-Ownership Scheme housing units; it also followed up regarding assessments of public housing applications submitted since 2017.

## **Expediting construction of convenient border-crossing facilities for participation in development of the Greater Bay Area**

To support the operation of Hong Kong-Zhuhai-Macao Bridge, construction of the Macao border crossing area was completed, and it was handed over to the Government on 15 March 2018. Construction of two bridges in New Urban Zone A – which connect with the Macao border crossing area of Hong Kong-Zhuhai-Macao Bridge and Pérola Oriental of the Macao Peninsula, respectively – was also completed.

Construction of a new Guangdong-Macao border crossing is among the Guangdong-Macao cooperation projects. It mainly includes construction of the new border checkpoint (Qingmau Checkpoint), the border crossing channel, and the Canal dos Patos improvement works.

To support the first phase of the construction, the old wholesale market was demolished in 2018, immediately after the completion of construction of the new wholesale market. Construction of the two checkpoint buildings of the Qingmu Checkpoint (one on the Macao side, the other on the Zhuhai side) and the connected crossing commenced on schedule. Guangdong province and Macao also reached a consensus regarding the final plan for the Canal dos Patos improvement project, after which work commenced on the design.

The third phase of construction of Taipa Ferry Terminal commenced on schedule during 2018. Meanwhile, the facilities of Taipa Ferry Terminal and Outer Harbour Ferry Terminal were also optimised.

## **Promoting environmental protection to build an ecologically advanced city**

Environmental protection is an important element of sustainable development. In 2018, the Government made further progress in recycling, waste reduction, energy conservation, waste and sewage treatment, and air quality enhancement, to promote environmental protection.

According to Macao's Five-year Development Plan and the Framework Agreement on Cooperation Between Guangdong and Macao in Environmental Protection, the MSAR Government expedited coordination with related regulatory authorities in

mainland China regarding inter-regional transfers of scrapped vehicles. During the second half of the year, a pilot scheme was initiated to transfer two batches of pre-processing scrapped motor vehicles, totalling 300 vehicles, to mainland China. This was followed by the construction of a pre-processing facility for scrapped vehicles.

Regarding inert construction and demolition materials, the tender process for improving construction waste landfill material commenced in 2018. The Environmental Protection Bureau assisted the recycling industry by launching an equipment and vehicle subsidy scheme.

Regarding energy conservation and pollutant reduction, the number of light-vehicle charging spaces was increased to 170 by the end of 2018. Moreover, more than 30 percent of the transitional streetlights were replaced by LED lights, helping to save more energy.

The Macao Sewage Treatment Facilities Master Plan and the Assessment of Macao's Overall Solid Waste Management System were completed in 2018. Regarding the facilities, construction of the Cross-border Industrial Zone Sewage Treatment Plant in Macao – a facility for pre-processing sludge discharges from Qingzhou tap water supply company, was completed in 2018, further enhancing the water quality in Canal dos Patos. Tenders have been invited for design and expansion of Macao Incineration Centre, and optimisation and operational maintenance of Macao Peninsula Sewage Treatment Plant. Work has begun on the preliminary design for upgrading Coloane Sewage Treatment Plant.

The Government finished reviewing the new exhaust emission standards for imported vehicles and motor vehicles, and the exhaust emission standards for in-use vehicles. To tackle Macao's roadside air quality problem, the SMG assessed the roadside air quality monitoring stations in all districts, and acquired lightweight, mobile air quality monitoring equipment, which suits Macao's narrow streets.

The draft-by-law regulating the air pollutant emission standards and for monitoring companies operating facilities such as oil storage tanks, power plants and sewage treatment plants, and the chemical pharmaceuticals industry, has entered legislative procedures.