

**For discussion
on 7 May 2019**

Legislative Council Panel on Security

Review of the Government's Handling of Super Typhoon

Purpose

Arising from the experience with Super Typhoon MANGKHUT, the Government has reviewed the handling of super typhoons. This paper briefs Members on the outcome of this review, as well as the Government's preparedness, emergency response and recovery work for future super typhoons.

Background

Super Typhoon MANGKHUT

2. MANGKHUT battered Hong Kong on 16 September 2018. While the preparedness and response work have achieved the desired effects with no human life lost, the damage MANGKHUT inflicted was substantial and extensive. Collapse of trees caused extensive road blockage, leading to serious impediment to traffic and public transport services. Travelling to work became very difficult for many in some parts of the territory. Strong wind and storm surges also brought different degrees of damage to a wide range of public facilities. Significantly longer time than usual was used to clear the huge amount of fallen trees and debris.

3. The Government briefed the House Committee of the Legislative Council ("LegCo") in October 2018 about our preparedness, emergency

response and recovery efforts arising from MANGKHUT. With global warming, sea level rise and the expected increase in extreme weather conditions, Hong Kong may be hit by typhoons of strengths and impact similar to or even stronger than MANGKHUT in future. To prepare for the challenges, the Government has conducted a review on the Government's mechanism of handling future super typhoons.

Review Mechanism

4. Taking into account feedbacks from relevant Bureaux / Departments (B/Ds), media reports and the views expressed at LegCo and District Councils (DCs), the review placed special focus on six key issues – institutional enhancement; clearance and disposal of debris; work arrangement; infrastructure improvement; tree management; and information dissemination. In respect of each issue, we reviewed the Government's operational experience during MANGKHUT, identified matters requiring improvements, and worked out measures to address them. The key outcome is reported in detail below.

Key Outcome

(1) Institutional Enhancement

5. In the preparedness and response stages of MANGKHUT, coordination among Government departments and agencies as well as precautionary work were enhanced when compared to the handling of tropical cyclones (TC) previously : two pre-TC inter-departmental meetings chaired by the Secretary for Security (S for S) were held (on 12 and 14 September 2018) to review the preparedness of Government departments and agencies; prompt precautionary measures were taken by Government departments and agencies and early public alert and warning were given; activation of the Emergency Monitoring and Support Centre

(EMSC) under the Security Bureau (SB)¹ was advanced when TC Warning Signal No. 3 was issued (on 15 September 2018) which worked closely with emergency control centres (ECC) operated by other departments². During the actual emergency response stage, the manpower and resources of emergency departments were mobilized to their maximum capacities, while the EMSC continued to effectively serve as the Government's main monitoring and support centre, collecting and collating inputs from other departments (including their ECCs) and producing regular situation reports. Such enhanced preparedness and response work has achieved the desired effects with no human life lost.

6. It is considered that the advanced and enhanced coordination adopted in the preparedness and response stages of MANGKHUT would be highly useful if applied to the handling of future super typhoons, including the recovery stage, and should be institutionalized with the leading role to be pitched at an even higher level – i.e. the Chief Secretary for Administration (CS). In gist, in the case of super typhoons (or other natural disasters of a substantial scale), a Steering Committee³ will be set up under the chair of the CS with relevant Principal Officials as members, which will be responsible for overseeing the preparedness, response and

1 EMSC will be activated if a Tropical Cyclone (TC) Warning Signal No. 8 or higher is issued. As a coordinating, monitoring and support centre for the Government during a major emergency, it discharges its role by collecting and collating updates from other Government departments, whilst other departments maintain their own emergency centres or contact points and discharge their own functions. See also footnote 16.

2 Departments which operate ECCs during TCs include the Agriculture, Fisheries and Conservation Department (AFCD), Architectural Services Department (ArchSD), Buildings Department (BD), Drainage Services Department (DSD), Electrical and Mechanical Services Department (EMSD), Geotechnical Engineering Office (GEO) and the Port Works Division of the Civil Engineering and Development Department (CEDD), Home Affairs Department (HAD), Housing Department (HD), Highways Department (HyD), Lands Department (LandsD), Social Welfare Department (SWD) and Water Supplies Department (WSD). Moreover, the Transport Department (TD) also steps up the operation of its Emergency Transport Coordination Centre (ETCC), which monitors and handles traffic and transport incidents round the clock each day, during TCs.

3 Whether the “Steering Committee” arrangement is to be invoked will be considered on a case-by-case basis, depending on the anticipated force of the TC, the predictability of the TC and the duration that Hong Kong will likely be affected.

recovery stages, as assisted by the relevant B/Ds. In the preparedness and response phases, SB, in accordance with the established mechanism, will continue to exercise the role of coordination with the emergency rescue units through the operation of the EMSC. For the recovery phase, the Steering Committee should decide shortly before the cancelling of TC Signal No.8 (T8) whether enhanced arrangements would need to be made to ensure that recovery work is coordinated and implemented effectively⁴. The Steering Committee will also be vested with the responsibilities of making recovery-related assessments (such as allowing more time for employees to return to work (see paragraphs 14 to 15 below)), according priorities in coordinating government-wide resources for clearance efforts (see paragraphs 10 to 11 below), and making high-level policy decisions. The exact B/Ds to provide support to the Steering Committee at the recovery stage would depend on the nature and degree of gravity of the issues to be addressed at the recovery stage. Moreover, depending on operational needs, problems encountered and circumstances involved, the Steering Committee will also be supported by the EMSC and other relevant ECCs⁵.

7. The establishment of Steering Committee mechanism as a standing institutional set up for handling super typhoons will offer the following advantages:

- (a) ensuring that all stages – from preparedness to response work and recovery planning and operations thereafter – are coordinated and supervised by one single high-level body;
- (b) enabling the work to be handled in a more practical, coordinated and efficient manner, with strengthened contributions from the concerned B/Ds; and

4 The need for enhanced arrangements, and hence continued operation of the Steering Committee, at the recovery stage should not be a routine protocol but to be decided on a case-by-case basis nearing the end of the “response” stage (and in good time prior to the commencement of the “recovery” stage) of the handling of a super typhoon (or other natural disasters of a substantial scale). Factors to be taken into account should include the scale and intensity of the typhoon as well as the damage and disruption it causes to Hong Kong, in addition to the anticipated time needed for recovery work.

5 Departments which operate ECCs are set out in footnote 2 above.

- (c) co-ordinated priority-setting can be achieved after taking into account the information across B/Ds represented in the Steering Committee, thus ensuring that resources available (in particular that for the necessary recovery work) can be effectively utilized to enable the normal daily lives of community to resume as quickly as practicable.

(2) Enhancing Efficiency in Clearing Fallen Trees and Debris

8. Timely clearance of fallen trees and debris from carriageways is crucial to the resumption of traffic and public transport, and would be beneficial to the other recovery efforts. Under the extreme situation like in MANGKHUT, Development Bureau (DEVB)'s standing mechanism applicable to works departments named "Emergency Command System" (ECS)⁶ was triggered to assist Highways Department (HyD) in expediting the clearance of fallen trees and debris that blocked the major thoroughfares taking into account the priorities set out by different departments. Tree cutting and clearance resources from all works departments were pooled together under the central deployment by HyD. With the concerted efforts, most of the roads were cleared and over 95% of the franchised bus services resumed service within two days after the passage of MANGKHUT. The Government considered ECS to be operationally effective in allowing the community to quickly resume normal in the initial recovery stage. In this connection, ECS will continue to be activated in the immediate aftermath of super typhoons for emergency work, if considered necessary.

9. As for the subsequent non-critical tree and debris clearance in the territory which was taken forward based on normal handling procedures⁷,

⁶ In the event that the scale of an emergency incident is beyond the capability of an individual works department (e.g. HyD) to handle, DEVB would consider mobilizing ECS in order to enhance the coordination of emergency work for early completion.

⁷ Before clearance could be arranged on a non-critical spot by a particular government department, a responsibility-identification process was required through site inspection and ownership identification. In some cases, difficulties such as complication in accessing the spots, legal limitation (Noise Control Ordinance, Cap. 400) on tree cutting at night hours in the vicinity of residential areas, etc. might further lengthen the clearance process.

the work has taken significantly longer time than usual. The reasons as identified (other than the sheer number of fallen trees which strained the clearance resources of the responsible departments) are : (a) time required for site inspection and delineation of responsibility before the clearance work could be carried out; (b) the substantial volume of removal work beyond the normal capacity of certain departments; and (c) technical difficulties for removal work at some spots⁸.

10. With the benefit of the experience in the post-MANGKHUT clearance, we will adopt the following measures to better facilitate post-super typhoon clearance work in future :

- (a) The ECS will continue to be deployed for the initial phase of the post-super typhoon clearance work to facilitate the clearance of major thoroughfares, which may also be suitably extended to cover the clearance of secondary roads on a need basis if so decided by the Steering Committee. The time for the ECS to stand down for transition into the next phase of the recovery work will also be decided by the Steering Committee;
- (b) After the critical phase of the recovery work, relevant departments would continue to handle the work under their respective responsibility according to the established mechanism which will be speeded up through more flexible and effective use of spare contractor resources from works departments, Leisure and Cultural Services Department (LCSD) and Food and Environmental Hygiene Department. District Offices will monitor district reaction and comments of DCs on outstanding clearance work within their respective district, refer cases reported to them to relevant departments in the first instance, and the relevant departments will keep track of the clearance work required for reporting to the DCs and the Steering Committee; and

⁸ Common technical difficulties encountered during the course of the clearance work included the requirements of implementing temporary traffic measures particularly on expressways; lack of vehicular access to the tree falling spots; and the restrained use of mechanical plant due to site limitations.

- (c) to better cope with the possibility of handling a substantial number of fallen trees and allow for more speedy clearance in future, relevant clearance departments have also provided enhanced training to their staff and procured additional equipment (e.g. chainsaw) to better prepare for future super typhoons. For instance, LCSD will enhance tree management training, equipment and skill upgrading, particularly in tree inspection and the use of chainsaws; works departments will also establish understanding with their contractors to mobilise more manpower and equipment to assist in clearance and recovery works in emergency situations; and DEVB has since April 2019 increased the provision of training on the safe use of chainsaw for some 200 relevant staff members.

11. Tree and debris clearance work aside, at district level, inevitably there will be varying degree and quantities of public facilities damaged by future super typhoons that affect different walks of life (e.g. public escalators / lifts leading to public facilities). To facilitate the community to resume the normal daily lives as soon as practicable, prioritisation, coordination, implementation and progress monitoring of the relevant repair works will be of paramount importance. In this regard, the Steering Committee, with information to be provided by district teams of relevant departments as well as observations tendered by District Offices about the situation in the districts, will also be an effective platform to ensure that the recovery demands on damaged public facilities at district level can be addressed in a timely manner.

(3) Returning to Work after Super Typhoon

12. The difficulties of employees in returning to work following a super typhoon is a key issue covered in the review. The Government is aware of the concerns of the working community in this regard. To assist employers and employees to better prepare for the different scenarios at the workplace relating to post-super typhoon or inclement weather, the Labour Department (LD) is revising the existing “Code of

Practice in times of Typhoons and Rainstorms” (COP)⁹. Employers are asked to exercise greater flexibility for resumption of work after typhoon. They are reminded to reach prior agreement with employees on work arrangements in times of typhoons and rainstorms. They are also advised to show understanding and flexibility towards employees’ pleas especially in after-super typhoon situations when public transport may not be able to resume normal operation very quickly.

13. Two additional measures are also formulated to address the serious problem experienced by the public in resuming work after the cancelling of T8 in the case of MANGKHUT.

(a) Work Arrangements under Extreme Conditions

14. Under certain “extreme conditions” such as large-scale power outage, extensive flooding, major landslides and unavailability of public transport services, employees should be advised to stay in their places for another 2 hours, instead of heading for work (or going out) immediately, after cancellation of T8¹⁰. The Steering Committee will assess the latest information available, review the situation (including the public transportation and other aspects) and announce to the public before Hong Kong Observatory (HKO) replaces T8 with T3 whether the “extreme conditions” apply and warrant extended hours for resumption of work. Factors that the Steering Committee will consider include the strength

9 The COP aims to provide practical guidelines and samples for reference of employers and employees in times of typhoons and rainstorms to prevent unnecessary disputes and confusion in labour-management relations and to ensure safety of employees. The COP is not legally binding and employers are advised to make reference and adopt a flexible approach in preparing and implementing suitable work arrangements.

10 Currently, LD’s COP provides, at appendices, sample work arrangements proposed for employers/employees. The sample work arrangements are provided as an example under specific conditions for employers and employees to consider following, e.g. when T8 or above is issued before the commencement of working hours and is cancelled 3 hours or more before the end of working hours, an employer may consider requiring all his employees to return to work within 2 hours after cancellation of the warning. In tandem with this, employees are also advised to inform their supervisors as soon as practicable if they have difficulties in reporting to duty. The above is provided as an example and is up to the two parties to agree on the exact arrangement.

and impact of the super typhoon, multi-hazard situations arising from the super typhoon (e.g. storm surge, heavy rain), and other scenarios that, depending on the degree of disruption and the scale of it, should seriously, and for a prolonged period, affect the working public to resume work effectively.¹¹ Moreover, during the first two-hour period after T8 is cancelled, the Government will review the situation, and advise the public again, by the end of this two-hour period, whether any further extension of time for resumption of work would be required.

15. In this connection, LD is revising the COP to reflect the above mechanism. It continues to serve as a useful reference for employers and employees to agree among themselves the suitable work arrangements.

(b) *Review on the Arrangement for Resumption of Work for Government Employees after Super Typhoons*

16. The Civil Service Bureau (CSB) will embark on the procedures for amending the prevailing general guidelines for government employees on resumption of work arrangements after tropical cyclones to include the arrangement of returning to work after super typhoons mentioned in paragraph 14. CSB will also amend the guidelines to specify that not requiring staff to take leave for absence from work due to road flooding, landslides, heavy rain, non-availability of public transport services, etc. after a TC or after the “extreme conditions” advice is one of the discretions that supervisors may flexibly exercise after taking into consideration the genuine circumstances of the individual staff. B/Ds will also be reminded to provide the guidelines, their standing departmental instructions and work plans to all their staff, and recirculate the same to them on a regular basis.

11 Examples of scenarios that may seriously affect the working public to resume work effectively or bring safety concern for a prolonged period include: large-scale power outage, extensive fallen windows from high-rises leading to dangerous streetscape, major landslides, extensive flooding, widespread unavailability of public transport services etc.

(4) Infrastructure Improvement

17. Identification of areas for improvement in infrastructure preparedness for future super typhoons has been conducted. In this regard, various measures and reviews leading to infrastructure improvements have been implemented or taken forward. In essence, the Government has formulated short, medium and long term solutions to tackle the infrastructural challenges posed by future super typhoons. In gist :

- (a) Immediately after MANGKHUT, relevant B/Ds have implemented various mitigating measures at coastal areas seriously affected by overtopping wave and storm surge to alleviate the adverse impact on nearby residents. For instance:
- ArchSD has implemented various mitigating measures at locations prone to overtopping wave, including Tseung Kwan O (TKO) Waterfront Park and Siu Sai Wan Promenade.
 - Civil Engineering and Development Department (CEDD) has been assisting Drainage Services Department (DSD) in enhancing seawalls at Sai Kung Sewage Treatment Works and Ap Lei Chau Preliminary Treatment Works. CEDD has substantially completed the repair works of the Aberdeen Breakwater and Chai Wan Breakwater, and is deploying precast concrete units at the above repaired breakwaters to strengthen their structures. Apart from emergency repair, CEDD will construct a wave wall along the TKO Waterfront Park and commission a consultancy study to identify low-lying and exposed coastal areas subject to severe storm attacks during extreme weather due to climate change with enhancement plans devised. CEDD targets to commence the study in Q2 2019 for completion in Q4 2020.
 - LCSD has initiated the construction of sturdy planter/boundary walls in Heng Fa Chuen Playground and Siu Sai Wan Sports Ground, in accordance with the expert advice from CEDD and DSD.

- (b) For the medium to long term, CEDD is leading the Climate Change Working Group on Infrastructure (CCWGI) set up under the Steering Committee on Climate Change chaired by the CS to oversee the revision of design standards¹², and examine the scope of enhancement works needed for strengthening the resilience of existing public critical infrastructures (CIs)¹³. Under CCWGI, further studies would be conducted to assess the effect of climate change.

(5) Enhancement to Tree Management

18. Uprooting and breakage of trees under extreme weather conditions is inevitable. This notwithstanding, selection of suitable tree species can help ameliorate the situation. In this connection, the Greening, Landscape and Tree Management Section (GLTMS) of the DEVB released the “Street Tree Selection Guide”¹⁴ in December 2018 to provide guidelines for tree management departments and other interested parties in selecting suitable trees for Hong Kong’s urban street environment. The Guide features 80 less commonly used tree species suitable for street planting in Hong Kong, being tolerant to heat, drought, wind and waterlogging, as well as resistant to pests and diseases. GLTMS will continue to promote proper tree selection and improve the growing environment, e.g. by increasing the space and soil volume as far as practicable. In addition, GLTMS will also strengthen the tree management regime by introducing enhanced Tree Risk Assessment and Management requirements for tree inspections. Moreover, GLTMS is working closely with the MTR Corporation Limited and the China Light and Power Company Limited on tree pruning and maintenance

12 Under CCWGI, CEDD and DSD have updated the Port Works Design Manual and Stormwater Drainage Manual in January 2018 and February 2018 respectively, taking into consideration the rise in sea level, increase in rainfall and wind speed in connection with climate change. Other relevant works departments are also reviewing their design manuals and/or guidelines to account for the effect of climate change.

13 Identified CIs include coastal structures, drainage and sewerage, water supplies, transport, government buildings, waste facilities and fill management facilities.

14 Based on the “Right Tree, Right Place” principle, GLTMS has identified 14 street typologies in the urban areas, each with its own tree selection criteria, e.g. tolerance to heat, drought, wind and waterlogging, etc.

arrangements to prevent disruptions to train service and power supply caused by tree collapse during extreme weather as far as practicable.

(6) Improvements to Information Dissemination

19. The following measures will be introduced to enhance internal and external information dissemination, so that timely, accurate and consistent super typhoon information can be provided to enable both the Government and the public to better prepare for, respond to and recover from disasters.

(a) Internal Information Dissemination

20. Internal information dissemination within government departments is the most instrumental to making assessment and reaching informed decisions in the response and recovery stages. In this regard, improvements in the following areas will be introduced before the coming typhoon season.

(i) Common Operational Picture

21. The Common Operational Picture is an electronic, map-based platform for real-time sharing of emergency information among relevant B/Ds¹⁵ under adverse weather conditions. The centralised emergency information on the Common Operational Picture will facilitate the EMSC and the Steering Committee to appreciate the situation in handling super typhoons.

15 Including DSD (on flooding); HyD (on major road incidents); CEDD, LandsD and Housing Department (on landslides); BD (on building/structural incidents); plus HKO, TD, HAD and Census and Statistics Department (covering supporting information). Starting from the 2019 typhoon season, Hong Kong Police Force and Fire Services Department (on dangerous scaffolding and fallen tree, and other super typhoon-related data) will also be covered.

(ii) *Information accessible in the EMSC*¹⁶

22. To strengthen the overall situational awareness, Transport Department (TD)'s CCTV signals and HyD's patrol information on blockages on major / critical road links during typhoon will be accessible to the EMSC for the overall monitoring on behalf of the Government Secretariat.

23. Moreover, the Government has developed a new and secure mobile application enabling call / video conferencing regardless of location. With the EMSC as a communication hub, the application can provide support for multiple-parties call / video conferencing, and greatly facilitate the communication among senior officials.

(iii) *Information accessible to the Emergency Transport Co-ordination Centre (ETCC)*¹⁷

24. To expedite traffic assessment, TD is planning to install more CCTVs at strategic locations such as access routes near bus depots to facilitate early and better assessment of serviceability of roads and traffic conditions which may affect public transport operators.

25. Moreover, the MANGKHUT experience indicated that the use of technology is important for situation appreciation after the passage of a super typhoon. In this regard, the Government will put on trial a scheme to deploy drones for instant aerial monitoring to appreciate the aftermath of future super typhoons. With live-feed function to the ETCC, videos taken by the drones can facilitate TD to better assess the road situation after super typhoons, especially when roads are still not accessible or safe for use, and

16 EMSC is the Government Secretariat's main monitoring and support centre during a widespread or major emergency that may seriously affect public order or public safety. EMSC itself is not an operational co-ordination or command centre. See also footnote 1.

17 The function of ETCC is to liaise with other departments and public transport operators on traffic and transport arrangements and disseminating traffic and transport information during both unplanned events such as serious traffic and transport disruptions, rainstorms, tropical cyclones and planned events such as public processions, commissioning of new transport infrastructures, major sports/festive events.

make suitable decisions and/or release information to the public as necessary. Similarly, EMSC can also have access to the live-feed from the drones mentioned above for a better appreciation of the overall situation in the territory. The use of drones for such purpose is so far untested. We envisage that its efficacy will depend on a range of factors such as actual weather conditions and the relevant topography.

(b) External Information Dissemination

Use of Mobile Apps

26. Dissemination of information to the public is crucial during and after natural disasters. In this regard, the Government will use the mobile application “MyObservatory” (我的天文台) from HKO, with more than 7 million downloads and by far the most popular government applications, to generate automatic push notifications to share emergency notice from the Government for wider circulation. TD’s mobile application “HKeMobility”, with about 2 million downloads since its launch in July 2018, has also served to disseminate traffic news to commuters.

27. The Government will also ride on the existing successful use of social media platforms of various departments such as HKO, Hong Kong Police Force (HKPF) and Fire Services Department (FSD), and actively utilize their Facebook and Instagram pages in disseminating the advisory videos / messages from the Government.

Other Related Matters

(a) Contingency Plan For Natural Disasters (CPND) Review

28. The CPND will be revised with the following new measures highlighted:

- (a) setting out the set-up, function, and mode of operation of the new Steering Committee (as set out in paragraphs 6 to 7 above);
- (b) the formal establishment of a system of departmental liaison

officers for enhancing departmental knowledge on CPND, strengthening departmental training and conducting multi-departmental exercises before the next typhoon season, and enhancing communication should the EMSC and / or Steering Committee be activated;

- (c) amending the existing three phases of disaster response, namely 'Rescue', 'Recovery' and 'Restoration', into 'Preparedness', 'Response' and 'Recovery'; and
- (d) requiring B/Ds to review annually their contingency plans on emergency coordination.

29. The abovementioned review aside, similar to last year, a Government-wide table-top exercise will be held prior to the next typhoon season.

(b) HKPF's Capacity Review on 999 Emergency Call Centre

30. After MANGKHUT, HKPF has conducted a capacity review on the 999 Emergency Call Centre and will take the following measures to enhance its effectiveness:

- (a) deployment of additional trained regular officers and auxiliary officers to the 999 call centre during super typhoons; and
- (b) raising public awareness on the proper use of "999" Service.

(c) Territory-Wide Publicity Programme

31. The MANGKHUT experience proved that community education and engagement are invaluable to minimize casualty and damages in the face of a super typhoon. To this end, the Community Emergency Preparedness Division of FSD will include natural disaster preparedness and response in the public education programme for enhancing public awareness.

32. As a part of the publicity programme, the Geotechnical Engineering Office of CEDD will launch a large scale public education campaign titled "Safer Living 2.0" (晴天行動 2.0) in June 2019. It is a

year-long campaign with support from some 20 B/Ds and non-governmental organisations (NGOs). The aim of the Campaign is to arouse public awareness on natural disasters, such as typhoons, storm surge, flooding and landslides, thereby enhancing community resilience against these hazards.

33. As regards efforts in the community, suitable modules on emergency awareness and self-help knowledge will be provided by FSD and other NGOs to community organizations which stand ready to volunteer assistance in post-typhoon clearance.

Conclusion

34. The Government will strive to strengthen, on a continuous basis, our preparedness for and response to natural disasters, as well as our capability for recovering and restoring work after such disasters.

Civil Service Bureau
Development Bureau
Education Bureau
Environment Bureau
Food and Health Bureau
Home Affairs Bureau
Hong Kong Observatory
Labour and Welfare Bureau
Security Bureau
Transport and Housing Bureau

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