

**Discussion Paper for LegCo**

**Panel on Planning, Lands and Works**

**Special Meeting on 20 May 2003**

**Flood Control and Prevention**

**INTRODUCTION**

This paper provides Members with a general update on flood control and prevention measures, a brief account of the flooding incidents on 5 May 2003 in the New Territories and our findings on the causes of the flooding. Measures taken or under planning to tackle the problem are also described.

**UPDATE OF FLOOD CONTROL AND PREVENTION STRATEGY AND MEASURES**

2. To tackle the flooding problem in Hong Kong, the Administration is actively implementing a series of major flood control projects. Usually, these major flood control projects are implemented in stages from downstream to upstream so as to gain early benefits from each phase of the completed works. The following is a brief description of the achievement so far and the present status of major projects under Public Works Programme (PWP) being planned or constructed.

a) North Western New Territories (NWNT)

Over 14 km of drainage channels and 13 village flood pumping schemes have been constructed in Tin Shui Wai, Yuen Long and Kam Tin areas at a cost of about \$1.8 billion. The drainage channels completed include the most important drainage outlets for the region such as the Shan Pui River Channel and the Kam

Tin River Channel. Major flood control projects currently under construction comprise 18.3 km of drainage channels including San Tin Eastern Main Drainage Channel, Yuen Long By-pass Floodway and drainage channels in Ngau Tam Mei and Kam Tin, 4 village flood pumping schemes for Ma Tin Tsuen, Shui Pin Wai, Wang Chau, Mai Po Lo Wai/Mai Po San Tsuen, upgrading of the existing floodwater pumping station at Sheung Cheung Wai, as well as 7.5 km of stormwater drains for Yuen Long town, Ping Shan and Hung Shui Kiu. The total cost of the projects under construction is about \$2.4 billion. Planning and design for another 13.7 km of river channels is underway including the upper reaches of Kam Tin River, San Tin Western drainage channel and some smaller channels, at a total cost of about \$1 billion.

Since the completion of the river training works at Shan Pui River and the lower reach of Kam Tin River, the flooding situation in NWNT which was a regional flooding blackspot has been substantially alleviated. The flooding problems in the lower to mid stream of the Shan Pui River, such as Nam San Wai, has been resolved and the flood water in the upstream areas in Yuen Long and Kam Tin can now subside quickly after rainstorms have ceased. This is in contrast with the long flood duration experienced before the completion of the channels.

Furthermore, since the completion of the 13 village flood pumping schemes in Tin Shui Wai, Yuen Long, Kam Tin and San Tin, no major flooding incidents have been reported for the low-lying villages protected by these schemes. For example, the flooding situation at Pok Wai has been remarkably improved due to the completion and operation of the floodwater pumping station at Pok Wai in 2002. Flooding situation near Wo Shang Wai, Chuk Yuen Tsuen, Yau Mei San Tsuen, Yau Tam Mei San Tsuen and Wai Tsai has also been improved due to the recent completion of large portion of channel works carried out at Ngau Tam Mei Channel.

b) Northern New Territories (NNT)

Stages I and II works of the Shenzhen River Regulation Project, the most critical flood mitigation projects in the Northern New Territories, were completed in April 1997 and June 2000 respectively at a cost of about \$500 million. The flow capacity of 10.4 km-long Shenzhen River from Lo Wu to the estuary at Deep Bay has been significantly increased and the flood risk along this section of Shenzhen River has basically been eliminated. The works are also effective in lowering the water level at Lo Wu by more than 1 m which alleviates the flooding problem in Sheung Shui. Stage III of the project involves the training of 4 km of the river channel from Lo Wu to the confluence of Ping Yuen River at a cost of about \$500 million. The first contract for training the river channel at Lo Wu commenced in December 2001. The second contract for training the river channel from Lo Wu to Man Kam To commenced in July 2002. We are working closely with the Shenzhen Municipal Government with an aim of completing the whole project in early 2006.

The training of 18 km of the primary river network comprising River Indus in Fu Tei Au, Tin Ping Shan and Shek Wu San Tsuen as well as River Beas in Ho Sheung Heung and Yin Kong has also been substantially completed. Two village flood pumping schemes in Sheung Shui Tsuen and Tsung Pak Long/Tai Tau Leng villages have been completed. The total construction cost of the projects is about \$1.7 billion. The flooding situation in these previously flood prone areas has been greatly improved. To tackle the flooding problem in Ta Kwu Ling area, a drainage rehabilitation scheme for 1.7 km of Ping Yuen River is underway, costing about \$180 million for completion in end 2005.

To further improve the stormwater drainage infrastructure of the region, planning and design for another 23 km of river channels is underway including a number of existing streams in San Tin and the upper reaches of River Beas, River Indus and Ping Yuen River as well as 8.8 km of stormwater drains for Sheung Shui

town and Fanling town, at a total cost of about \$1 billion.

c) West Kowloon

The drainage improvement works at Nathan Road between Boundary Street and Nullah Road have been completed to provide initial relief to the flooding problem in Mong Kok. Works under Stage 1 of the West Kowloon Drainage Improvement Scheme have been progressing well since commencement in April 1998 for completion in mid 2003. They include laying of about 10 km of stormwater drains in Yau Ma Tei, Mong Kok, Kowloon Tong, Sham Shui Po and Lai Chi Kok. Works under Stage 2 of the improvement scheme commenced in December 1999 and are progressing well. They include improvements of 23 km of stormwater drains in Tsim Sha Tsui, Yau Ma Tei, Mong Kok, Sham Shui Po, Cheung Sha Wan and Lai Chi Kok, and construction of the Tai Hang Tung Storage Scheme and the Kai Tak Transfer Scheme. Most of these critical works are scheduled for completion in 2004. Works under Stage 3 Phase 1 of the drainage improvement commenced in March 2001 for completion in 2007. They include laying of about 11 km of stormwater drains in Yau Ma Tei and Sham Shui Po.

d) Other Areas

We have completed seven Drainage Master Plan (DMP) studies to look into the long term development needs and recommended a programme of works to upgrade the secondary drainage network in the rural New Territories and the urban area drainage to the current flood protection standards where possible. Implementation of the works will be prioritized for optimum utilization of available resources

3. Before the completion of the major flood control projects, the Administration would provide interim mitigation measures for the locations that were affected by flooding. Interim improvement and maintenance measures are in place to help alleviate the flooding problem before the completion of the long-term improvement measures. Local

drainage improvements have been implemented to provide initial relief to some of the flooding problems. They include various drainage works under the Rural Planning and Improvement Strategy (RPIS) programme in the New Territories.

4. For the day-to-day flood prevention management, we will inspect, desilt and repair the stormwater drainage system regularly before and during the rainy season to ensure that any blockages and defects will be cleared and rectified. At locations where flooding may cause high risks to the local residents, flood warning systems (flood sirens) have been installed to monitor the flooding situations and to alert them about the arrival of floodwater. For instance, in Ta Kwu Ling area, in addition to the village of Fung Wong Wu, which was installed with flood sirens, the villages of Kan Tau Wai and Chow Tin Tsuen will also be installed with flood sirens, and the work is near completion. The flood warning systems are actively monitored by DSD.

5. There is also a list of flooding blackspots compiled to facilitate the deployment of resources to carry out immediate relief measures when adverse weather comes. Drainage Services Department (DSD) will closely liaise with other relevant Government departments and personnel in charge of construction sites to avoid flooding due to blockage of roadside gullies, drains or watercourses by rubbish or construction waste. A television announcement is broadcast from time to time soliciting for the support of the public to keep the drainage system from blockage.

6. During emergency, DSD will activate their Emergency and Storm Damage Organization (ESDO) and Emergency Control Centres (ECCs). To achieve higher responsiveness in the 2003 rainy season, DSD would have dedicated emergency night gangs for the whole Hong Kong, working from 10:00 p.m. till 8:00 a.m. everyday. The gangs would be equipped with water jetting units for clearing emergency drainage blockage and would be supervised by DSD staff.

### **FLOODING INCIDENT ON 5 MAY 2003**

7. Rain bands associated with a trough of low pressure caused

exceptionally heavy rainfall to the north and northwestern part of the New Territories in the early morning of 5 May 2003. A number of flooding incidents were reported in North, Tai Po and Yuen Long Districts. As a result of the heavy rainfall, a total of 84 flooding complaints were recorded by DSD from 03:00 to 12:00 on that day.

### **Rainfall Records**

8. The rainstorm was heaviest from 03:00 to 06:00 in the morning where the rain bands concentrated heavily over Kam Tin, Sheung Shui and Ta Kwu Ling areas. The heaviest 2-hr clock rainfalls in the northern and northwest parts of the New Territories were recorded as 160.5 mm at Fanling at 04:55 and 164.5 mm at Lam Kam Road at 05:55. The recorded 4-hr clock rainfalls were also very heavy. Total rainfall depths of 278.5 mm at Fanling and 286 mm at Lam Kam Road were recorded in 4 hours, which are equivalent to having “black rainstorm” weather continuously for 4 hours.

### **Significant Flooding Locations**

9. There were 7 significant flooding locations in the North, Tai Po and Yuen Long Districts. The locations are shown on the plan in **Appendix A**. The major cause of the flooding was due to the inadequate capacity of the existing drainage systems at these locations. Under the heavy rainfall on 5 May 2003, flooding is not unexpected in the historically flood-prone areas such as Yuen Long, Kam Tin and Ta Kwu Ling areas where major flood control projects are still under construction. The following is a brief description of the flooding locations and the corresponding mitigation measures:

#### a) Lin Ma Hang Road in Ta Kwu Ling

Lin Ma Hang Road and the adjacent areas in Ta Kwu Ling were flooded to a depth of about 1.5 m. The location is very close to Shenzhen River. Two police officers were trapped by the floodwater. One of the police officers was rescued on the spot. The other police officer, a senior inspector, was unfortunately washed away by the floodwater and killed. The location is a

known flooding blackspot. It is low-lying and the existing Ping Yuen River and the section of Shenzhen River upstream of Lo Wu do not have adequate drainage capacity to cope with the large amount of flood water in the morning of 5 May 2003. The flooding situation will be improved in the long-term after the Drainage Rehabilitation Works at Ping Yuen River under 4131CD/A and the on-going Regulation of Shenzhen River Stage III under 4090CD/A are completed in 2005 and 2006 respectively. As an interim, the Administration would also endeavor to complete the critical sections of the river training works in Ping Yuen River as early as possible, in particular at the drainage outlet to Shenzhen River, so as to bring early flood relief to the low-lying areas in Ta Kwu Ling.

b) Ping Che

In the early morning of 5 May 2003, access to village areas beyond the police check point was blocked due to flooding over Ping Che Road. Several villages were flooded to about 600 mm deep in Fung Wong Wu and Chow Tin. The location is a regional flooding blackspot. It is low-lying. The existing Ping Yuen River and the section of Shenzhen River upstream of Lo Wu do not have adequate drainage capacity to cope with the large amount of flood water in the morning of 5 May 2003. Drainage improvement works will be implemented under 4090CD/A - Regulation of Shenzhen River Stage III, 4131CD/A - Drainage Rehabilitation Works at Ping Yuen River, 4119CD/B – Drainage Improvement in Northern New Territories Package C and drainage works under the proposed Ping Che/Ta Kwu Ling New Development Area Project to improve the local drainage system.

c) Ma Liu Shui San Tsuen in Lung Yeuk Tau, Fanling

An area of about 1000 sq. m in the village was flooded up to a depth of 200 mm. Pedestrian and road traffic was disturbed. The flood water due to the existing local streams of inadequate capacity while some local U-channels were also blocked by debris washed down flooding. The location is in the vicinity of

a flooding hotspot. Drainage improvement works are under planning and design to improve the local drainage system under 4125CD/B – Drainage improvement from Tung Kok Wai to San Wai, and 4119CD/B – Drainage improvement in Northern New Territories Package C.

d) Yuen Leng in Kau Lung Hang, Tai Po

Two sections of the local stream in the vicinity of a village area overflowed during the rainfall event. It was estimated that the area was flooded to a depth of about 300 mm and road traffic was affected. The location is a flooding hotspot. Flooding was due to the existing local streams of inadequate capacity and flow constriction as the stream pass underneath the railway bridge. Local drainage improvement works have already been implemented by the Home Affairs Department after the flooding incident in June 2001. Nevertheless, long-term improvement will be in place after the completion of the drainage improvement works under 4112CD/B – Drainage improvement in Northern New Territories – package A – River Channel Works, in 2007.

e) Hung Mo Tam in Wang Toi Shan, Kam Tin

The flooded area is located in the vicinity of the works site of the on-going river training works under 7095CD/A – Main drainage channels for Yuen Long and Kam Tin stage 2 – Kam Tin San Tsuen to Wang Toi Shan section. The existing drainage systems in the area do not have adequate capacity and the village area was flooded to a depth of about 500 mm in the morning of 5 May 2003. The flooding situation will be improved upon the completion of aforesaid river training works in 2004.

f) Tai Kei Leng, Yuen Long

Many village houses were flooded to a depth of about 300 to 500 mm. The village is a low-lying area and a known flooding hotspot. Drainage improvement works are underway under 4070CD/A – Yuen Long Bypass Floodway which would lower



the water level of the main drainage channels in Yuen Long town area and drain away the runoff in this blackspot area. The works will be completed in 2006.

g) Ma Tin Pok, Yuen Long

Overflow occurred at Yuen Long East Nullah near Ma Tin Pok and the roads adjacent to the nullah were flooded. The flooding was mainly caused by the inadequate capacity of the nullah under heavy rainfall. Drainage improvement works are underway under 4070CD/A – Yuen Long Bypass Floodway to divert flood water away from this drainage channel near Yuen Long town area. The works will be completed in 2006. As an interim measure in Ma Tin Pok, temporary flood walls will be installed along both banks of the existing nullah and the vehicular bridge at Tai Shue Ha Road East, which restricts the flow in the nullah, will be raised to clear of the nullah.

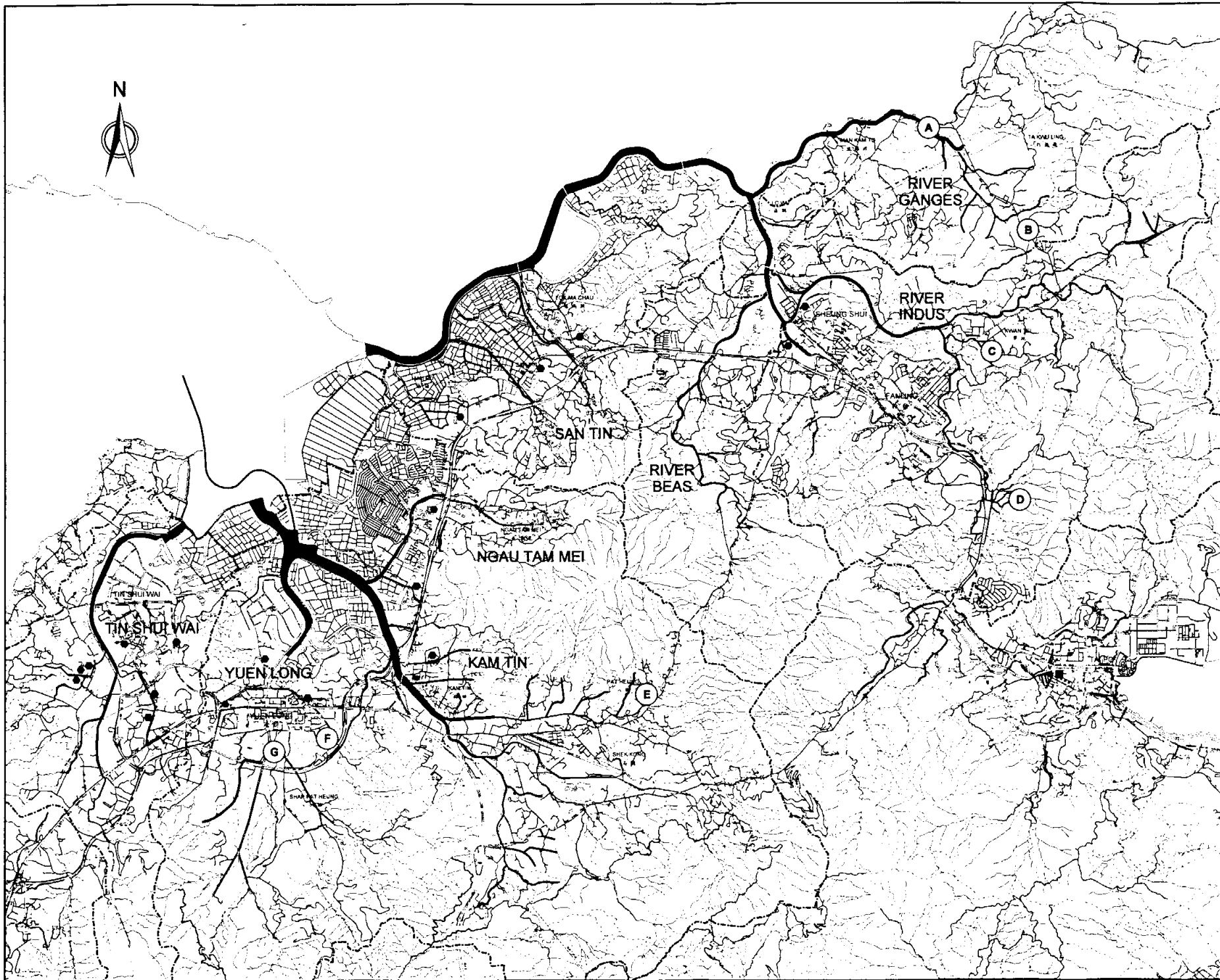
## **CONCLUSION**

10. The flooding in the NNT and NWNT areas on 5 May 2003 is due to the exceptionally heavy rainfall occurring during the morning, in particular at locations where the major flood control projects are not yet in place. Nevertheless, we have witnessed the effectiveness of the major flood protection works including river training, village flood protection and other flood relief works completed over the years. Significant improvement has already been achieved after the completion of the major parts of the primary drainage channels in Yuen Long, Kam Tin, San Tin, Lo Wu and Sheung Shui. No regional flooding was observed in these historical flood-prone areas, despite the very heavy rainfall.

11. Drainage improvement works are immense tasks involving large area coverage and take years to complete. With the continual implementation of the comprehensive flood control and prevention measures, the Administration is on its way to providing good flood protection for the benefits of the community.

12. Localised flooding however could be caused by inadequate local drainage system, blockage of local drains and the low-lying nature of the land and may not be adequately resolved by the major drainage projects. The Administration will look into flood preventive or relief measures, where practicable, to address the problem at individual localized flooding locations.

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- Legend:**
- Projects completed
  - Projects under construction
  - Projects under planning and design
  - - - - Catchment Boundary
  - Significant flooding incident on 5.5.2003
  - A. Lin Ma Hang Road, Ta Kwu Ling
  - B. Ping Che
  - C. Ma Liu Shui San Tsuen, Lung Yeuk Tau
  - D. Yuen Long, Kau Lung Hang
  - E. Hung Mo Tam, Wang Toi Shan
  - F. Tai Kei Leng
  - G. Ma Tin Pok

Drawing title 圖則標題  
**Flooding Locations and Major Flood Prevention Projects in Northern and North-western New Territories**

Drawing no. 圖則編號  
**DLD 1384A**

Scale 比例  
 N.T.B.

**LAND DRAINAGE DIVISION**  
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