For information **PWSCI(2001-02)53**

NOTE FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

Supplementary information on 120CD – Drainage improvement in Sai Kung

INTRODUCTION

In considering PWSC(2001-02)104 on **120CD** "Drainage improvement in Sai Kung" at the Public Works Subcommittee meeting held on 27 February 2002, Members requested and the Administration undertook to provide supplementary information on flood protection standards in drainage projects.

THE ADMINISTRATION'S RESPONSE

2. An overview of the flood control and prevention strategy, including the flood protection standards adopted by the Government, has been outlined in Paper CB(1) 1172/00-01 circulated to Members of the Panel on Planning, Lands and Works in May 2001 for information. For ease of reference, an extract of the paper concerning the flood protection standards and the drainage improvement measures in the territory is at Enclosure 1.

3. A table illustrating the relationship between the duration of rainstorm and intensity of rainfall for different return periods has been included in Information Paper PWSCI(2000-01)32 circulated to PWSC Members in November 2000. The table is extracted at Enclosure 2 for Members' reference.

Works Bureau
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(inf120cdv1.doc)

Enclosure 1 to PWSCI(2001-02)53

Extract of Information Paper CB(1) 1172/00-01
for Legislative Council Panel on Planning, Lands and Works

Supplementary Notes on
92CD - Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai drainage improvements, stage 1
109CD - Drainage improvement in Sha Tin and Tai Po
112CD - Drainage improvement in Northern New Territories – Package A

INTRODUCTION

At the meeting on 23 April 2001, Panel Members requested the Administration to provide an overview of the flood control and prevention strategy for tackling the flooding problem in the territory and to provide further details about the proposed drainage improvement works under **92CD**, **109CD** and **112CD**.

AN OVERVIEW OF THE FLOOD CONTROL AND PREVENTION STRATEGY

Development of the Strategy

2. In 1990, the Government completed the phase I of the Territorial Land Drainage and Flood Control Strategy Study. Based on the recommendation of the Study, the Government endorsed a set of flood protection standards such that all new stormwater facilities have to be designed to withstand a severe flood event as described below:

	Return Period[1]
• Urban drainage trunk systems	200
• Urban drainage branch systems	50
• Main river and rural drainage channels	50
• Village flood protection scheme	50

[1] "Return Period" means the average number of years within which a certain severity of a flood event will occur once statistically. It indicates the probability of occurrence of a certain flood severity. A longer return period represents a more severe event and a rarer occurrence, but there is always the chance that it will occur in any one year.

3. The definition of a flood event is based on the combination of rainfall intensity and tide levels. For a drainage basin, the downstream of the catchment is under influence of the sea. The capacity of the drainage network will be reduced if the tide level is high, as the high tide prevents the free discharge of flood water to the sea. This is a natural phenomenon and occurs to every drainage network within the tidal zone. We have always taken this into account and a high tide level is used in all our designs.

4. For urban areas, a 200 years protection standard is specified for the trunk drain such that adequate protection is provided against extensive regional flooding in the urban area. For the branch networks, a protection level of 1 in 50 years is provided for cost-effectiveness consideration, bearing in mind that the catchment area served by a branch drain is relatively small.

5. Regarding the design of main river and rural drainage channels as well as village flood protection schemes, a protection level of 50 years return period is provided to achieve cost-effectiveness based on considerations such as land requirement, social and economic impacts of flooding.

6. The above strategy serves to provide general guidelines for desired flood protection standards for new stormwater drainage infrastructure. They are subject to appropriate adjustment with regard to site constraints and characteristics of individual catchments.

7. The Government also completed in 1993 the phase II of the Territorial Land Drainage and Flood Control Strategy Study. The Study provided Government with concrete plans and tools needed to make the strategy more effective in the five most flood prone basins, namely the Yuen Long, Tin Shui Wai, San Tin, Ganges and Indus Basins in the New Territories. The principal output from the Study provided a rational framework for managing the drainage systems in each basin, implementing structural and non-structural flood mitigation measures and responding to requests for development.

8. In 1994, the Government completed the West Kowloon Drainage Master Plan (DMP) study to investigate and resolve the drainage problems in the area. Since then, the Government has carried out seven more DMP studies to cover the following areas -

(a) Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai
(b) Northern Hong Kong Island
(c) Tsuen Wan, Kwai Chung and Tsing Yi
(d) Tuen Mun and Sham Tseng
(e) Northern New Territories
(f) Sha Tin and Tai Po
(g) Sai Kung, East Kowloon and Southern Lantau

9. The above studies comprehensively examined the adequacy of the drainage systems and developed drainage improvement measures to meet the required flood protection standards and future development needs. They have taken into consideration a number of constraints and factors including social and economic pressures, financial and legal constraints, geographical and environmental conditions, institutional and management constraints as well as known development plans when formulating the required drainage improvement measures.

Drainage Improvement Measures in the New Territories

10. In the New Territories, the capacities of some existing rivers are inadequate and need to be improved to cope with the rapid development and changes in land use. River channels are the primary choice for drainage networks in the New Territories where the catchment areas to be drained are large and the river channel can more easily blend with the natural environment. Providing a box culvert in place of an open river channel will require a much larger land intake because of the need to compensate the corresponding reduction in the flow area for conveying the floodwater and to construct the supporting walls and deckings. Box culverts will be used when the drainage basin is small. Box culvert will also be used in urban areas when the decked area is required for other land use purpose.

11. Being constrained by the natural topography and existing development, existing villages in some low-lying areas are still susceptible to flooding even after the construction of river channels. Village flood protection schemes are therefore required. The scheme is to protect the low-lying village by constructing a perimeter bund to prevent the ingress of floodwater from outside and installing a floodwater pumping station to discharge the stormwater collected within the bunded area to the nearby river channel.

12. Based on the above strategy, we have completed improvement to about 10 km downstream sections of the major river channels in the Yuen Long and Kam Tin areas in the North-western New Territories. Construction works for about 9 km midstream sections of the river channels in Yuen Long, Kam Tin and Ngau Tam Mei areas have also been in progress since 1999. In the Northern New Territories, Stages I and II works of the Shenzhen River Regulation Project have been completed. Corresponding improvement works for the River Beas and River Indus have also been in progress. In addition to the river training works, 19 village flood protection schemes have also been constructed and are now in operation.

13. Planning and design for further improvements to midstream and upstream sections of the river channels and tributaries and further village flood protection schemes in the New Territories are actively underway. Some are now ready for construction, subject to approval of funding, works could commence in end 2001/early 2002.

Drainage Improvement Measures in Urban Areas

14. In urban areas like the West Kowloon, Northern Hong Kong Island, Tsuen Wan and Kwai Chung, the stormwater drainage systems were built many years ago. There is a need to upgrade the flood protection level to the current flood protection standard. However, conventional drainage improvement works involving road opening works for the installation of new drains of larger size are always subject to constraints due to the presence of congested underground utilities, traffic diversion problems and public concern over the nuisances and inconveniences resulting from the construction activities. In this regard, a combination of the following alternatives will be explored in order to minimise these impacts -

(a) the application of no-dig technology to minimise road opening works;

(b) the provision of underground storage tanks for floodwater to reduce peak flows and hence reduce the extent of conventional drainage improvement works in the urban areas; and

(c) the construction of tunnel systems to collect rain water from upland areas for discharge directly into the sea. By employing this method, less rain water would enter the old drainage systems within the urbanised districts and therefore, the flood protection level of the systems could be improved with much less requirement for the construction of conventional drainage works in busy streets, thus minimizing the disruption to the public.

15. In accordance with above strategy, we have already commenced Stage I and Stage II drainage improvement works in West Kowloon including constructing a flood storage tank of a capacity of 100,000 m^3 underneath the Tai Hang Tung Recreation Ground and a 1.5 km stormwater transfer tunnel from Kowloon Tong to the Kai Tak Nullah.

16. To improve the existing drainage systems in other urban areas including Northern Hong Kong Island, Lai Chi Kok, Sham Shui Po, Tsuen Wan and Kwai Chung areas, construction of drainage tunnels of about 20 km in length to intercept and transfer stormwater from the upper catchments directly to the sea have been recommended. These tunnels aim to upgrade the flood protection standards of the lower urban areas while minimizing public disruption and avoiding practical difficulties/constraints associated with conventional drainage improvement works in heavily built-up areas. Preliminary feasibility studies for these drainage tunnels have been completed. Besides these tunnels which are under planning, we do not envisage the necessity for further drainage tunnels to meet the present planned development scenarios in Hong Kong.

May 2001

Enclosure 2 to PWSCI(2001-02)53

Relationship between the duration of rainstorm and intensity of rainfall for return periods of 10, 50, 100 and 200 years

Duration of rainstorm	Intensity (mm/hr) of rainfall for various return periods			
	10-year return period	50-year return period	100-year return period	200-year return period
30 minutes	132	167	181	196
1 hour	103	132	144	156
2 hours	73	96	105	114
4 hours	48	65	72	79
6 hours	39	53	59	64
8 hours	32	44	49	54
12 hours	24	33	36	40

The above figures, which are Hong Kong specific, are derived from historical records as well as extrapolation of rainfall patterns based on internationally-accepted probability theory.

November 2000