Discussion Paper for Legislative Council LegCo Panel on Planning, Lands and Works Meeting on 5 March 2001

103CD - Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel

104CD - Drainage Improvement in Northern Hong Kong Island - Lower Catchment Improvement

108CD - West Kowloon Drainage Improvement - Lai Chi Kok Transfer Scheme

110CD - Drainage Improvement in Tsuen Wan, Kwai Chung and Tsing Yi - Urban Drainage Improvement Works

111CD - Drainage Improvement in Tsuen Wan, Kwai Chung and Tsing Yi - Tsuen Wan Drainage Tunnel

INTRODUCTION

This paper informs Members of a strategy for tackling the flooding problems in Northern Hong Kong Island, Lai Chi Kok, Sham Shui Po, Tsuen Wan and Kwai Chung areas. We plan to submit three PWSC papers in April 2001 to seek approval for upgrading parts of the above items to Category A to engage consultants to carry out site investigations and surveys, impact assessments, physical modelling tests and detailed design of the projects.

BACKGROUND

2. The existing drainage systems in Northern Hong Kong Island, Lai Chi Kok, Sham Shui Po, Tsuen Wan and Kwai Chung areas were built many years ago to meet the flow requirements at that time.

3. Owing to changes in land use over the years, some natural ground and slopes have been paved over and become impermeable. Rainwater which would previously dissipate naturally underground can no longer do so. This has led to significant increase in surface runoff and overloading of the existing drainage systems. As such, many areas in Northern Hong Kong Island, Lai Chi

Kok, Sham Shui Po, Tsuen Wan and Kwai Chung are prone to flooding during heavy rainstorms.

4. To address the flooding problem, we commissioned a series of studies to examine the adequacy of the existing drainage systems, formulate an effective flood protection strategy and develop drainage improvement measures to meet current flood protection standard and future development needs.

Northern Hong Kong Island

5. We commissioned a drainage master plan study in Northern Hong Kong Island in May 1996 and completed the study in February 1999. The study recommended a programme of drainage improvement works to tackle the flooding problems. In September 2000, we upgraded the proposed improvement works to Category B as **103CD** "Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel" and **104CD** "Drainage Improvement in Northern Hong Kong Island - Lower Catchment Improvement".

6. We plan to start the site investigation and design for **103CD** and **104CD** in December 2001 for completion in March 2007 and start the construction in mid 2005 for completion in 2013.

Lai Chi Kok and Sham Shui Po areas

7. We commissioned a drainage master plan study in West Kowloon in June 1994 and completed the study in December 1995. The study recommended a programme of drainage improvement works to upgrade the capacity of about 103 kilometres of drains in West Kowloon in three stages. We started the construction works of stage 1 improvement works for about 9 kilometres of drains which are critically inadequate in capacity in April 1998.

8. In view of the extensive road opening and construction works that may be resulted, we reviewed and revised the drainage improvement strategy in 1998 with the view to minimizing the disruptive impact to the public during construction. The new strategy consists of a combination of innovative stormwater storage/transfer schemes, i.e. the Tai Hang Tung Storage Scheme, Kai Tak Transfer Scheme and Lai Chi Kok Transfer Scheme, and conventional drainage upgrading works. The Tai Hang Tung Storage Scheme, Kai Tak Transfer Scheme and drainage upgrading works are now under various stages of design and construction with a view to substantial completion in 2007.

9. We commenced the feasibility study of the Lai Chi Kok Transfer Scheme in October 1998 and completed the study in May 2000. We upgraded

the project to Category B as **108CD** "West Kowloon Drainage Improvement – Lai Chi Kok Transfer Scheme" in September 2000.

10. We plan to start the site investigation and design for **108CD** in December 2001 for completion in June 2006 and start the construction in mid 2006 for completion in 2010.

Tsuen Wan and Kwai Chung areas

11. We commissioned a drainage master plan study in Tsuen Wan, Kwai Chung and Tsing Yi in September 1996 and completed the study in July 1999. The study recommended a programme of drainage improvement works to tackle the flooding problems. In September 2000, we upgraded the proposed improvement works to Category B as **110CD** "Drainage Improvement in Tsuen Wan, Kwai Chung and Tsing Yi - Urban Drainage Improvement works" and **111CD** "Drainage Improvement in Tsuen Wan, Kwai Chung and Tsing Yi - Tsuen Wan Drainage Tunnel".

12. We plan to start the site investigation and design for **110CD** and **111CD** in November 2001 for completion in May 2006 and start the construction in October 2004 for completion in 2011.

PROJECT SCOPE

Northern Hong Kong Island

13. **103CD** comprises construction of about 3.8 kilometres long tunnel of 5.5 metres in diameter from Tai Hang Road to Aberdeen Tunnel and about 6.5 kilometres long tunnel of 8 metres in diameter from Aberdeen Tunnel to an outfall at Sandy Bay. The estimated project cost under **103CD** is about $1724 million at September 2000 prices.

14. **104CD** comprises construction of about 4.4 kilometres of drains in Northern Hong Kong Island and the decking of Queen's College nullah. The estimated project cost under **104CD** is about $180 million at September 2000 prices.

15. Site plan showing the location of the proposed works is at **Enclosure 1**.

Lai Chi Kok and Sham Shui Po areas

16. **108CD** comprises construction of about 1.2 kilometres long main tunnel of 5.6 metres in diameter from Wai Man Tsuen to an outfall to Victoria Harbour near Stonecutters Island, about 2.2 kilometres long branch tunnel of 4 metres in diameter from north of Chak On Estate to Wai Man Tsuen and 0.8 kilometres long collector tunnels of 1.5 to 2.5 metres in diameter at various locations along the foothills of Lion Rock Mountain. The estimated project cost under **108CD** is about $780 million at September 2000 prices. Site plan showing the location of the proposed works is at **Enclosure 2**.

Tsuen Wan and Kwai Chung areas

17. **110CD** comprises the replacement and rehabilitation of about 0.95 kilometres of existing drains in Kwai Chung. The estimated project cost under **110CD** is about $74 million at September 2000 prices.

18. **111CD** comprises construction of about 5.4 kilometres long tunnel of 6.5 metres in diameter from the junction of Shing Mun Road and Wo Yi Hop Road in Kwai Chung to an outfall at Yau Kom Tau. The estimated project cost under **111CD** is about $1114 million at September 2000 prices.

19. Site plan showing the location of the proposed works is at **Enclosure 3**.

20. The scope of works that we propose to part-upgrade to Category A are -

(a) site investigation and surveys
(b) impact assessments
(c) physical modelling tests
(d) detailed design, preparation of tender documents and assessment of tenders

JUSTIFICATION

21. In Northern Hong Kong Island, West Kowloon and Tsuen Wan, the coastal areas are fully urbanized with large pieces of hilly hinterlands. Due to such topography, large quantity of stormwater can flow from the upland catchments to the lower urban areas at a fairly short time during heavy rainstorms and overload the drainage systems there. In Lai Chi Kok area, potential overflows from the Kowloon group of reservoirs during heavy rainstorms can further aggravate the flooding problem in the lower catchment. Apart from causing flooding, traffic disruption and damage to properties, the fast and large flows from the hills may also impose potential risk to life.

22. To improve the drainage systems in the urban areas by conventional upgrading would involve very extensive road opening and construction works, which would be very disruptive. As in these highly developed areas, the roads are heavily trafficked and densely packed with utility services such as watermains, gas pipes, sewers, drainage culverts and cables beneath. To find suitable space to install the large-sized drains would be extremely difficult and require a lot of utilities diversions. The construction works would therefore be very time-consuming and cause serious disruption and nuisance to road-users and the public.

23. In view of the problems associated with road opening and construction in these busy urban areas and the characteristics of the drainage catchments, we propose to use a stormwater transfer approach to intercept and convey the large quantity of surface runoff from the upper catchments through large diameter tunnels for disposal directly to the sea. This would reduce the risks of flooding in the urban areas. Details of the transfer proposals in Northern Hong Kong Island, Lai Chi Kok and Sham Shui Po areas, and Tsuen Wan and Kwai Chung areas are shown respectively in **Enclosures 4 to 6**. By diverting these flows, the extent of drainage upgrading works required in the congested urban areas would be substantially reduced and the traffic disruption and disturbance to the public otherwise would be minimized.

24. However, some of the existing branch drains in the lower catchments are still inadequate in capacity. We need to replace them with larger drainpipes to prevent flooding in these areas.

25. Upon completion of the above tunnel projects and the lower catchment improvement works, the flood protection level in the concerned areas will be improved and the risk of flooding during heavy rainstorms will be substantially reduced.

26. Owing to the lack of in-house staff resources and expertise, the Director of Drainage Services proposes to employ consultants to carry out site investigation and surveys, impact assessments, physical modelling tests and detailed design to facilitate the implementation of the proposed drainage works.

COST

27. We estimate the cost of the proposed consultancies for the drainage improvement works in Northern Hong Kong Island, Lai Chi Kok and Sham Shui Po areas, and Tsuen Wan and Kwai Chung areas to be $80.9 million,

$37.8 million and $68.8 million (in MOD prices) respectively, made up as follows –

			$ million			
			103CD & 104CD	**108CD**	**110CD & 111CD**	
(a)	Consultants' fees for		32.8	13.5	27.9	
	(i)	supervision of site investigation, surveys and physically modelling tests	3.9	2.1	1.6	
	(ii)	environmental impact assessment	2.5	0.6	2.0	
	(iii)	traffic impact assessment	2.6	0.4	1.4	
	(iv)	detailed design, preparation of tender documents and assessment of tenders	23.8	10.4	22.9	
(b)	Site investigation, surveys and physical modelling tests		33.5	17.6	29.6	
(c)	Contingencies		6.6	3.1	5.2	
		Sub-total	72.9	34.2	62.7	(at September 2000 prices)
(d)	Provision for price adjustment		8.0	3.6	6.1	
		Total	80.9	37.8	68.8	(in MOD prices)

28. A breakdown by man-months of the estimate for the consultants' fee is at **Enclosure 7**.

PUBLIC CONSULTATION

Northern Hong Kong Island

29. We presented the findings and recommendations of the study under **75CD** "Stormwater Drainage Master Plan Study on Northern Hong Kong Island" to the Works and Project Committee of the Wan Chai District Council on 30 January 2001, the Works and Development Committee of the Eastern District Council on 12 February 2001, the Food, Environment, Hygiene and

Works Committee of the Central and Western District Council on 22 February 2001 and the South District Council on 26 February 2001. All supported the implementation of the project.

Lai Chi Kok and Sham Shui Po areas

30. We presented the findings and recommendations of the feasibility study for the Lai Chi Kok Transfer Scheme to Sham Shui Po District Council on 7 December 2000. The Council supported the implementation of the project.

31. We briefed the revised strategy for drainage improvement in West Kowloon including the feasibility study for the Lai Chi Kok Transfer Scheme to LegCo Panel on Planning, Lands and Works on 13 May 1999. The Panel Members supported the proposed West Kowloon drainage improvement works.

Tsuen Wan and Kwai Chung areas

32. We presented the findings and recommendations of the study under **76CD** "Stormwater Drainage Master Plan Study in Tsuen Wan, Kwai Chung and Tsing Yi" to Tsuen Wan District Council on 2 February 2001 and Kwai Tsing District Council on 9 February 2001. Both Councils supported the implementation of the projects.

ENVIRONMENTAL IMPLICATIONS

33. The proposed consultancies will not generate any construction and demolition material (C&DM) while the site investigation will only generate a very small amount of C&DM. We will require the consultants to fully consider measures to minimise the generation of C&DM and to reuse/recycle C&DM as much as possible in the implementation of the construction project.

34. Both the Hong Kong Island West drainage tunnel project and the Tsuen Wan drainage tunnel project are designated projects under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance. Environmental permits are required for these two tunnel projects. We will carry out an EIA study to assess the environmental impact of the projects and prepare EIA reports to meet the requirements under the EIA Ordinance. We will incorporate all the measures recommended in the EIA report into the detailed design and relevant works contracts.

35. The lower catchment drainage improvement works in Northern Hong Kong Island and in Tsuen Wan and Kwai Chung areas are not designated

projects under EIA Ordinance. The Preliminary Environmental Reviews (PER) were completed in March 1999 and March 2000 respectively. The reviews concluded that all the proposed lower catchment drainage improvement works would have no long-term environmental impact. To minimise short-term environmental impact during construction, we will require the contractors to implement general pollution control measures.

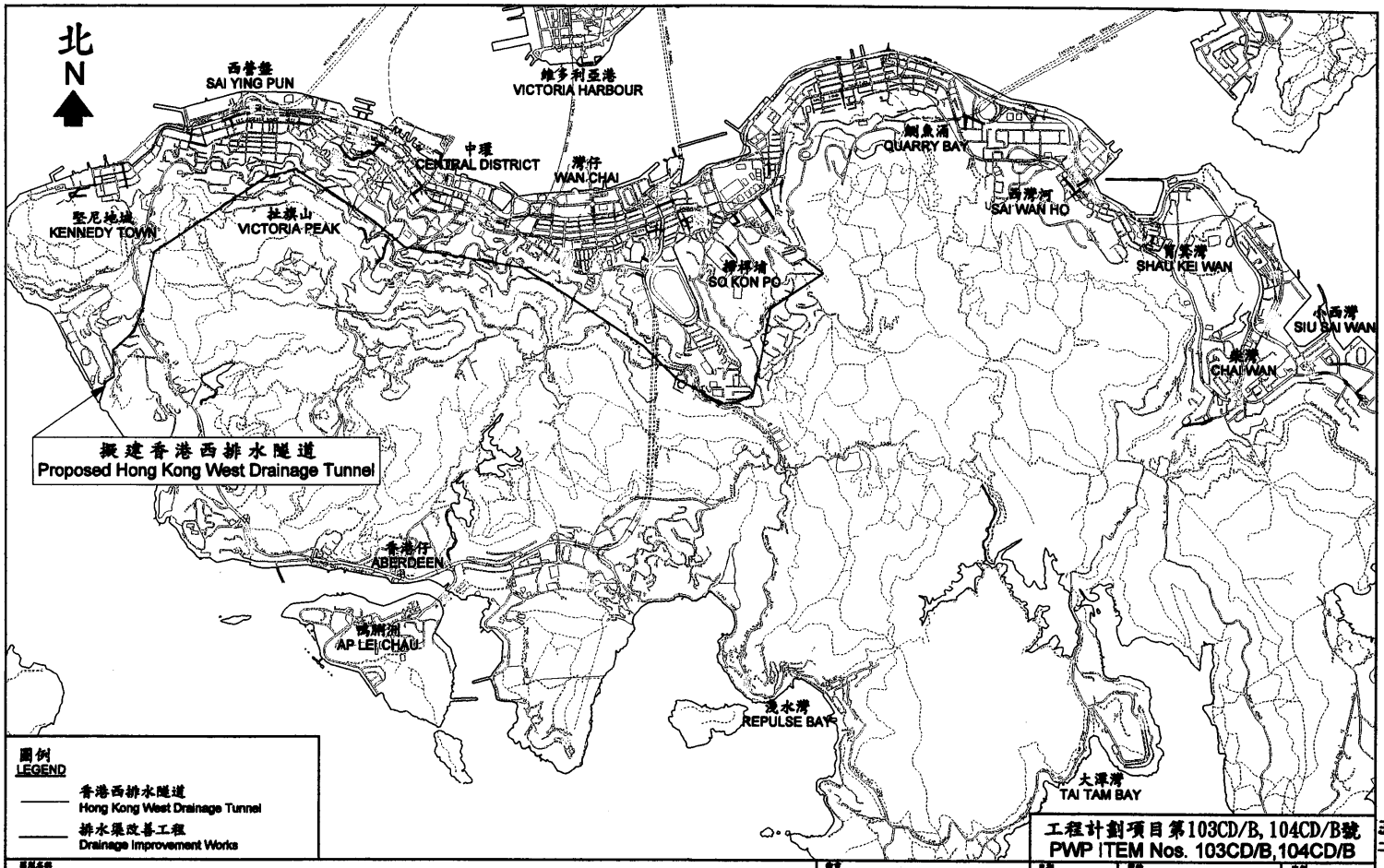
36. The Lai Chi Kok Transfer Scheme is also not a designated project under the EIA Ordinance. The PER was completed in February 2000, which concluded that the project would not cause long-term environmental impact. To minimise short-term environmental impact during construction, we will require the contractors to implement general pollution control measures.

LEGISLATIVE REQUIREMENTS

37. The proposed drainage tunnels will pass under some private lands. The Government will draft and enact relevant legislation in order to provide easements and other rights over land for the purpose of the construction, maintenance and operation of drainage tunnels. We plan to complete the necessary legislation by April 2003.

38. Before commencement of construction, each drainage tunnel project will be gazetted and authorised under the relevant ordinance which will provide channels for objections and appeals from the public.

Works Bureau
February 2001



工程計劃項目第103CD/B, 104CD/B號
PWP ITEM Nos. 103CD/B,104CD/B

圖則名稱 drawing title

港島北兩水排放系統改善工程-香港西排水隧道和下游集水區改善工程
DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND
- HONG KONG WEST DRAINAGE TUNNEL AND LOWER CATCHMENT IMPROVEMENT

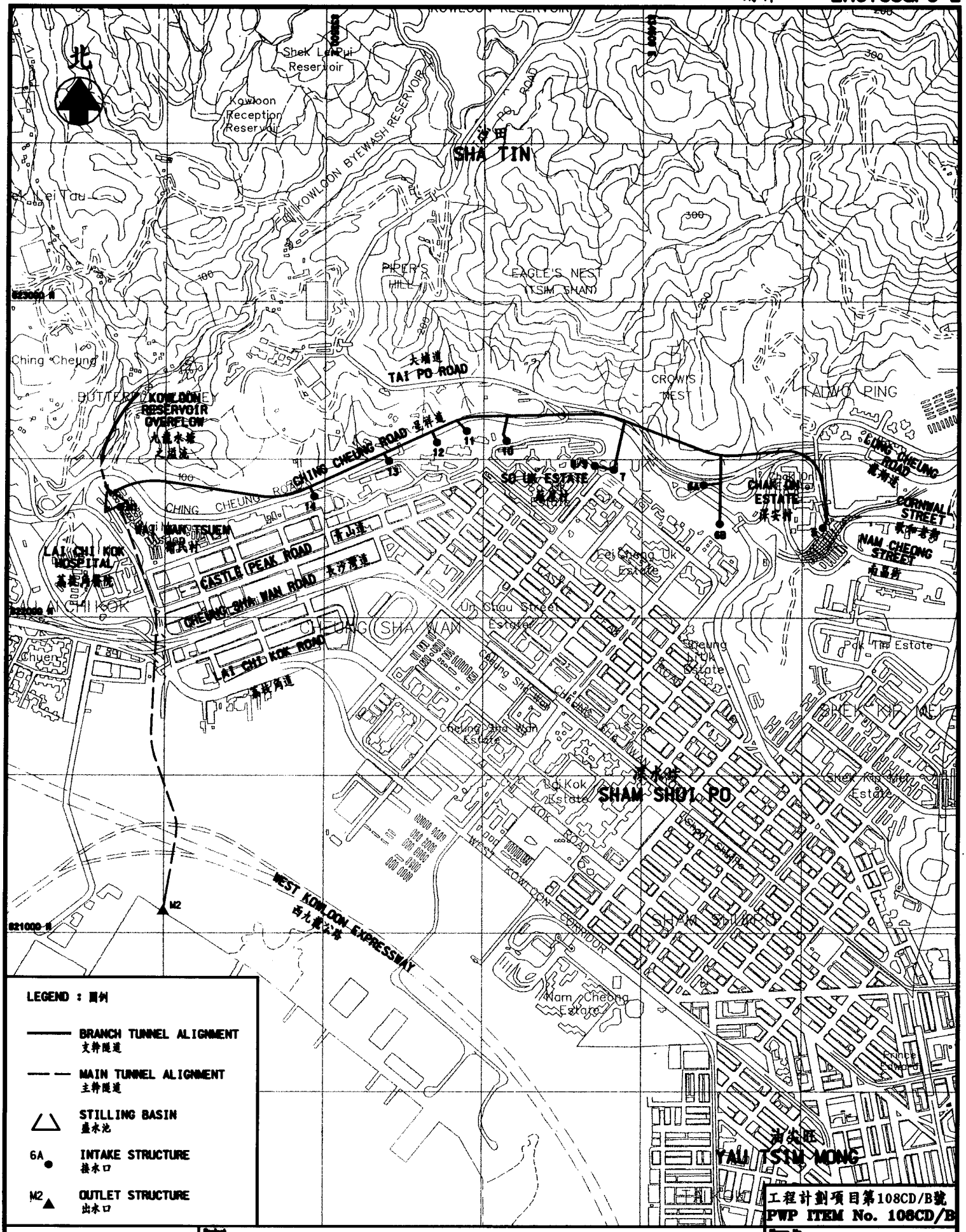
繪圖 drawn by	C.W. CHAN	日期 date	15 - 02 - 2001
核准 approved	Y.F. KAN	日期 date	15 - 02 - 2001
辦事處 office	工程管理部 PROJECT MANAGEMENT DIVISION		

圖則編號 drawing no. DPM 0003

比例 scale 1 : 50 000

渠務署 DRAINAGE SERVICES DEPARTMENT
香港特別行政區政府 GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

附件一 Enclosure 1



LEGEND : 圖例

- BRANCH TUNNEL ALIGNMENT 支幹隧道
- MAIN TUNNEL ALIGNMENT 主幹隧道
- STILLING BASIN 盪水池
- 6A INTAKE STRUCTURE 接水口
- M2 OUTLET STRUCTURE 出水口

工程計劃項目第108CD/B號
PWP ITEM No. 108CD/B

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATION REGION

工程管理部
PROJECT MANAGEMENT DIVISION

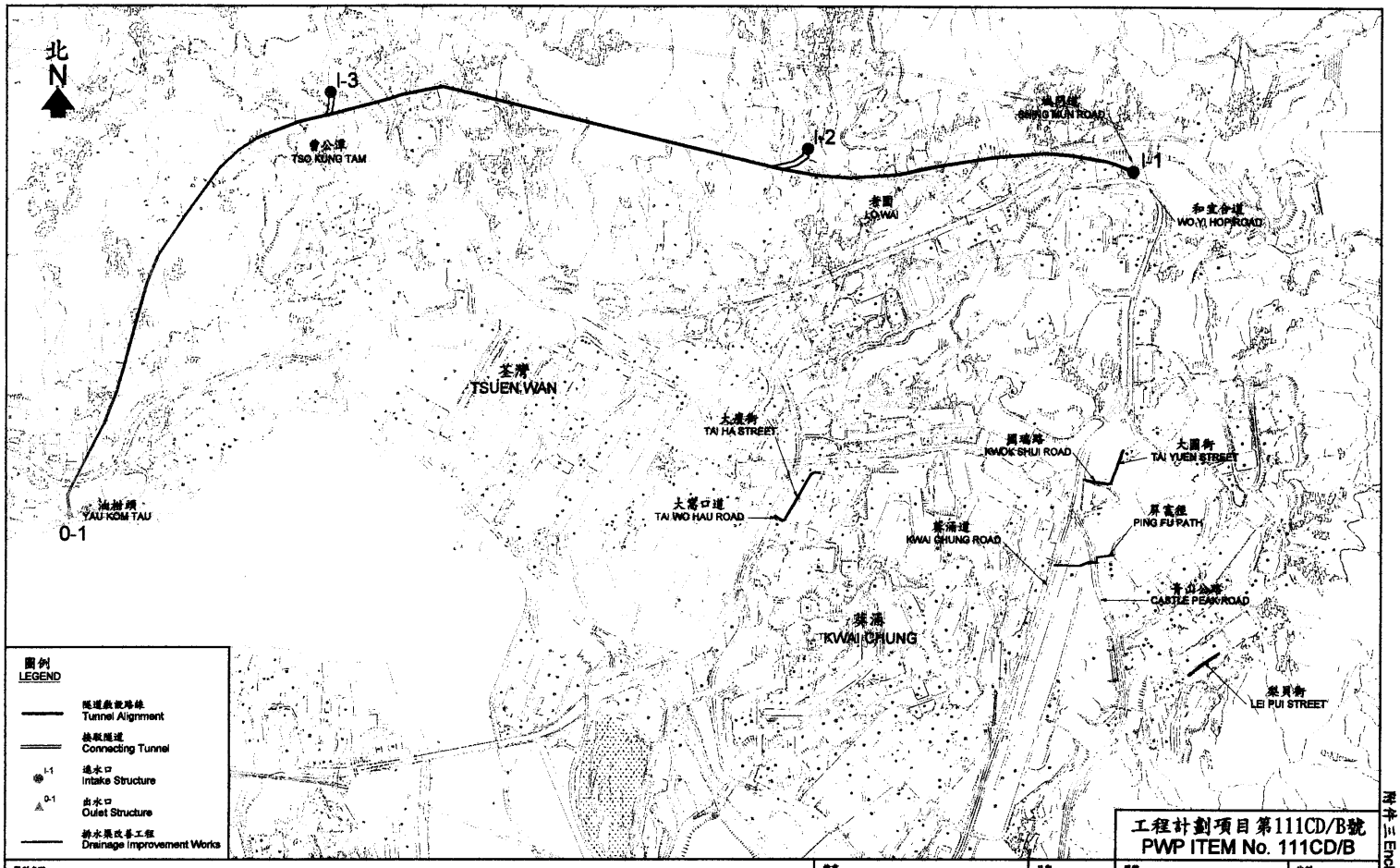
Project: WEST KOWLOON DRAINAGE IMPROVEMENT – LAI CHI KOK TRANSFER SCHEME
西九龍雨水排放系統改善工程 - 荔枝角雨水轉運計劃

Figure No. 1

Title: PLAN OF THE PROPOSED LAI CHI KOK TRANSFER SCHEME
擬建之荔枝角雨水轉運計劃路線圖

Drawn: Y.L.LAU | Checked: Y.F.KAN | Date: 11/00 | Scale: 1:15000

Plot Date = 22 FEB 2001



工程計劃項目第111CD/B號
PWP ITEM No. 111CD/B

圖則名稱 drawing title

荃灣、葵涌及青衣雨水排放系統改善計劃
荃灣雨水排放隧道及市區雨水排渠改善工程

DRAINAGE IMPROVEMENT IN TSUEN WAN, KWAI CHUNG AND TSING YI
TSUEN WAN DRAINAGE TUNNEL AND URBAN DRAINAGE IMPROVEMENT WORKS

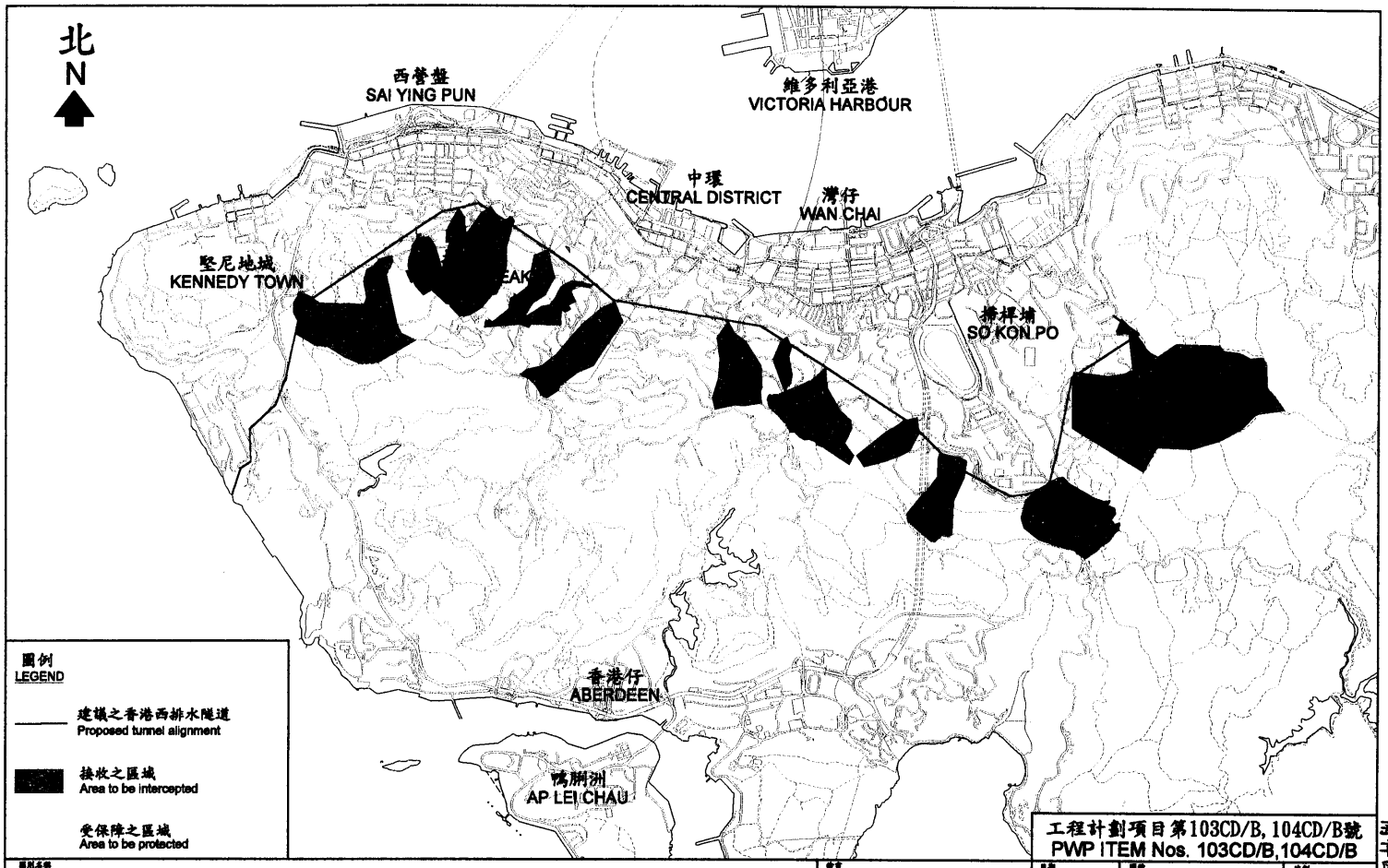
繪圖 drawn by	C.W. CHAN	日期 date	22 - 02 - 2001
核准 approved	Y.T.D. CHEUNG	日期 date	22 - 02 - 2001
辦事處 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION		

圖號 drawing no. DCM/2001/020

比例 scale 1 : 20 000

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

附件三 Enclosure 3



工程計劃項目第103CD/B, 104CD/B號
PWP ITEM Nos. 103CD/B,104CD/B

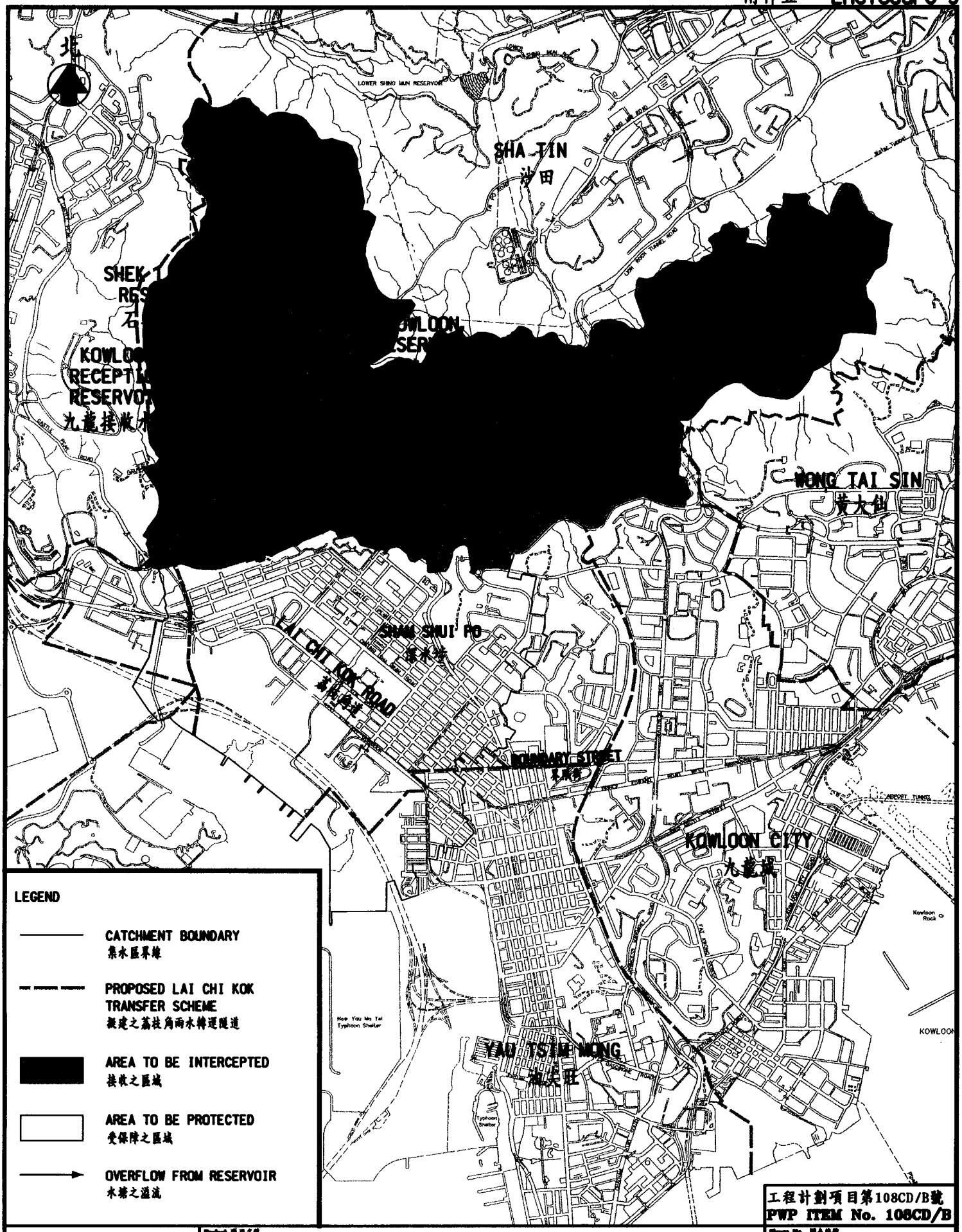
港島北雨水排放系統改善工程-香港西排水隧道和下游集水區改善工程
--雨水隧道所接收及受保障之區域

DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND -
HONG KONG WEST DRAINAGE TUNNEL AND LOWER CATCHMENT IMPROVEMENT
-- AREAS TO BE INTERCEPTED AND PROTECTED BY DRAINAGE TUNNEL

drawn by	C.W. CHAN	date	22 - 02 - 2001
approved	Y.F. KAN	date	22 - 02 - 2001
office	工程管理部 PROJECT MANAGEMENT DIVISION	drawing no.	DPM 0004
		scale	1 : 40 000

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

附件四 Enclosure 4



工程計劃項目第108CD/B號
PWP ITEM No. 108CD/B

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATION REGION

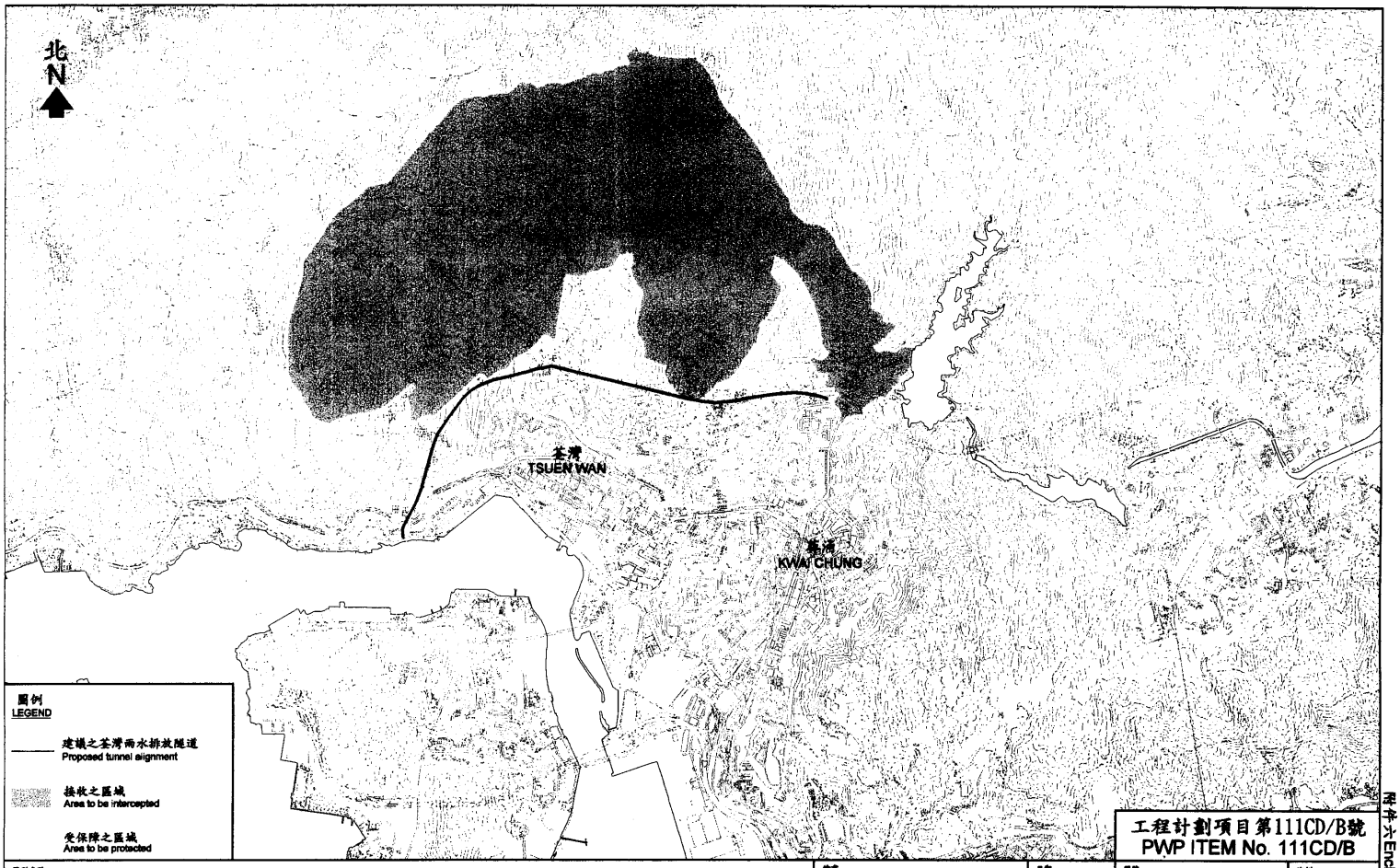
Project 項目名稱
WEST KOWLOON DRAINAGE IMPROVEMENT – LAI CHI KOK TRANSFER SCHEME
西九龍雨水排放系統改善工程 – 荔枝角雨水轉運計劃

Figure No. 圖表編號
2

工程管理部
PROJECT MANAGEMENT DIVISION

Title 圖表名稱
CATCHMENT AREA OF THE PROPOSED LAI CHI KOK TRANSFER SCHEME
荔枝角雨水轉運計劃之集水區

Drawn 繪圖 Y.L.LAU
Approved 核准 Y.F.KAN
Date 日期 11/00
Scale 比例 N.T.S.



圖則名稱 drawing title

荃灣、葵涌及青衣雨水排放系統改善計劃
荃灣雨水排放隧道

DRAINAGE IMPROVEMENT IN TSUEN WAN, KWAI CHUNG AND TSING YI
TSUEN WAN DRAINAGE TUNNEL

繪圖 drawn by	C.W. CHAN	日期 date	23 - 02 - 2001
核准 approved by	Y.T.D. CHEUNG	日期 date	23 - 02 - 2001
辦事處 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION		

工程計劃項目第111CD/B號
PWP ITEM No. 111CD/B

圖號 drawing no. DCM/2001/029

比例 scale N.T.S.

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION

附件六 Enclosure 6

103CD - Drainage improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel
104CD - Drainage improvement in Northern Hong Kong Island - Lower Catchment Improvement
108CD - West Kowloon Drainage Improvement - Lai Chi Kok Transfer Scheme
110CD - Drainage Improvement in Tsuen Wan, Kwai Chung and Tsing Yi - Urban Drainage Improvement Works
111CD - Drainage Improvement in Tsuen Wan, Kwai Chung and Tsing Yi - Tsuen Wan Drainage Tunnel

Breakdown of estimates for consultants' fees -

Consultants' staff costs		Estimated man months			Average MPS salary point	Multiplier factor	Estimated fee ($ million)		
		103CD & 104CD	108CD	110CD & 111CD			103CD & 104CD	108CD	110CD & 111CD
(a) Supervision of site investigation, surveys and physical modelling tests	Professional	27	12	9.5	38	1.7	2.6	1.2	0.9
	Technical	41	28	21.3	14	1.7	1.3	0.9	0.7
(b) Environmental impact assessment	Professional	15	4	11.1	38	2.4	2.1	0.5	1.5
	Technical	9	1	11.2	14	2.4	0.4	0.1	0.5
(c) Traffic impact assessments	Professional	15	2	6.6	38	2.4	2.1	0.3	0.9
	Technical	10	2	10.6	14	2.4	0.5	0.1	0.5
(d) Detailed design, preparation of tender documents and assessment	Professional	115	48	104.9	38	2.4	15.9	6.6	14.5
	Technical	174	83	182.3	14	2.4	7.9	3.8	8.4
Total consultants' staff costs							32.8	13.5	27.9

Out-of-pocket expenses

(a)	Site investigation and surveys	31.2	16.1	26.5
(b)	Physical modelling tests	2.3	1.5	3.1
	Total out-of-pocket expenses	33.5	17.6	29.6

Notes:

1. A multiplier factor of 2.4 is applied to the average MPS points to arrive at the full staff costs including the consultants' overheads and profit, as the staff will be employed in the consultants' offices (At 1.4.2000, MPS pt. 38 = $57,525 per month and MPS pt. 14 = $19,055 per month). A multiplier factor of 1.7 is applied in case of site staff supplied by the consultants.

2. Out-of-pocket expenses are the actual cost incurred. The consultants are not entitled to any additional payment for overheads or profit in respect of these items.

3. The figures given above are based on estimates prepared by the Director of Drainage Services. We will only know the actual man months and actual fee when we have selected the consultants through the usual competitive lump sum fee bid system.