EXECUTIVE SUMMARY
行 政 摘 要

深圳市治理深圳河办公室

香港渠务署

Regulation of Shenzhen River Stage 4 EIA Study:
Executive Summary Report (Hong Kong Side)

治理深圳河第四期工程環境影響評估研究
行政摘要(香港側)

October 2010
二零一零年 十月

长江水资源保护科学研究所
CHANGJIANG WATER RESOURCES PROTECTION INSTITUTE

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REPORT

Shenzhen River Regulation Office
Drainage Services Department

Regulation of Shenzhen River Stage 4 EIA Study: *Executive Summary (Hong Kong Side)*

October 2010

Reference 0101759

For and on behalf of ERM-Hong Kong, Limited	
Approved by:	Frank Wan
Signed:	
Position:	Partner
Date:	25 October 2010

CONTENTS

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Shenzhen River is the boundary river between the Hong Kong Special Administration Region (HKSAR) and the Shenzhen Special Economic Zone. In order to prevent serious flooding in the vicinity and improve the livelihood of residents on both sides, the government of the HKSAR and the Shenzhen Municipal Government have jointly completed the Shenzhen River Regulation Program Stages 1, 2 & 3 between 1997 and 2006. About 13.67 km in length of Shenzhen River, starting from the confluence with Ping Yuen River to the river mouth, has been regulated under the first three stages of regulation program.

The purpose of the Stage 4 regulation program is to upgrade the flood protection standard of the Shenzhen River. In addition, the regulation program will also tie in with the development of the proposed Liantang / Heung Yuen Wai (LT/HYW) Boundary Control Point (BCP). The proposed Stage 4 of the regulation program will continue the works of Stage 3 regulation program starting from the Ping Yuen River to about 1.4 km upstream of the proposed LT/HYW BCP (a total of about 4.5 km of Shenzhen River will be regulated) (hereafter "the Project"). In addition, associated with the river training works, the existing boundary patrol road and boundary fence of about 4.5 km in length running alongside the concerned river section are required to be realigned. The location and alignment of the Project site is shown on *Figure 1.1*.

Changjiang Water Resources Protection Institute (CWRPI 長江水資源保護科學研究所) in association with ERM-Hong Kong Ltd was jointly commissioned by the Shenzhen River Regulation Office of the Shenzhen Municipal Government (深圳市治理深圳河辦公室) and the Drainage Services Department of the HKSAR to undertake the Regulation of Shenzhen River Stage 4 EIA Study (the Assignment). This Executive Summary summarizes the key findings of the EIA related to the requirements of the Hong Kong side.

1.2 NEED OF THE PROJECT

The catchment of the Shenzhen River comprises a "fan-shaped" system, characterised by short and steep upstream rivers. Large flow from these rivers can converge into Shenzhen River within a short time. During heavy rain storm, the flood peak can reach the downstream section of Shenzhen River within a few hours. The flooding risk of the Shenzhen River is particularly prominent at times of heavy rain associated with typhoon, where the high sea level suppressed the water discharge from Shenzhen River. Prior to the regulation of Shenzhen River, frequent flooding occurred along the river. Since the completion of the Stage 3 regulation works, the flood

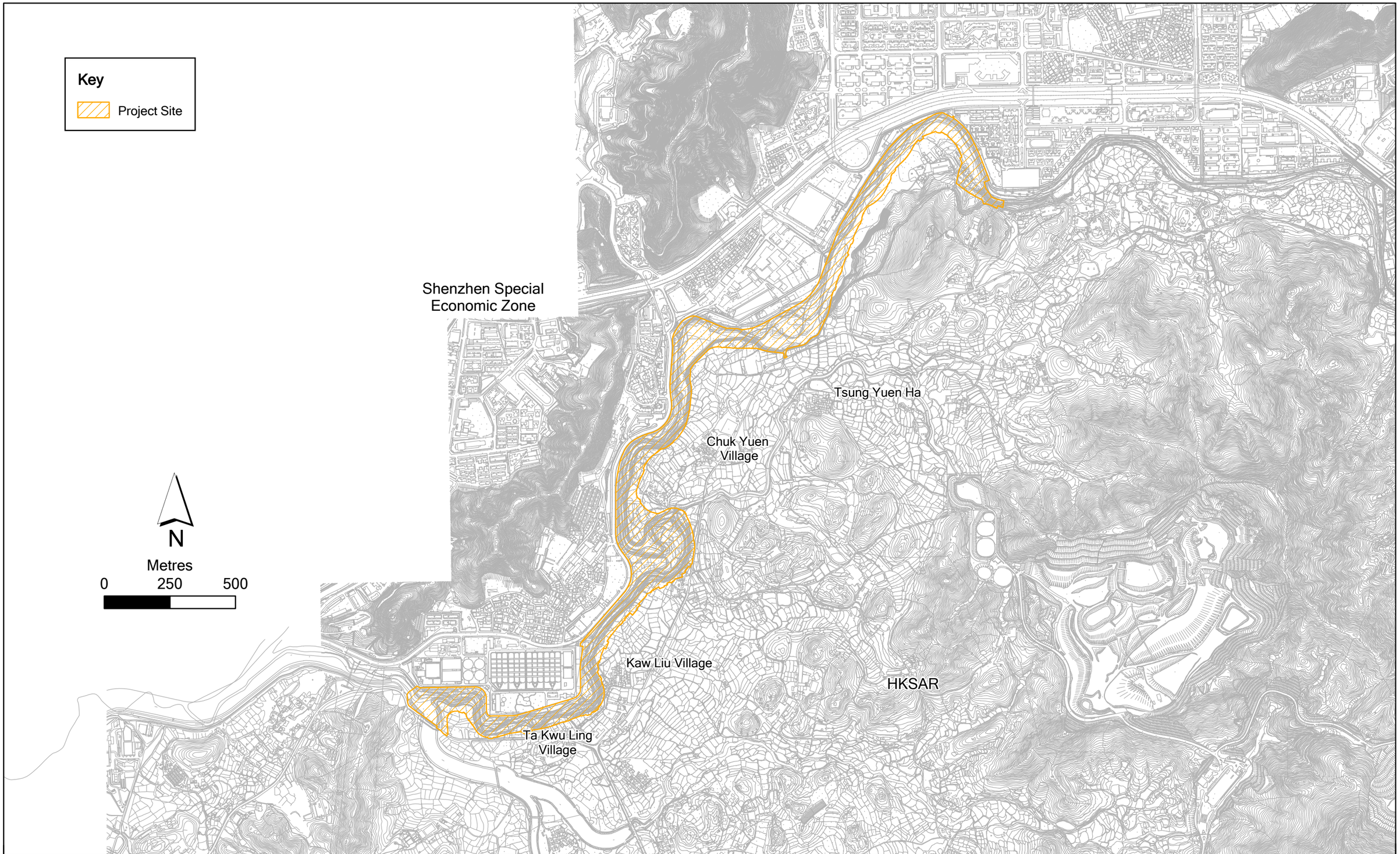

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Figure 1.1

File: Final\0101759_ location of project site.mxd
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Location of Project Site

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Legend 图例

漫滩界線

Perforamcne 防洪标准

- 200
- 50
- 20
- 5
- 2
- <2

Flood Depth 洪水深度 (m)

<VALUE>

- <0
- 0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2
- 2.0 - 2.5
- >2.5

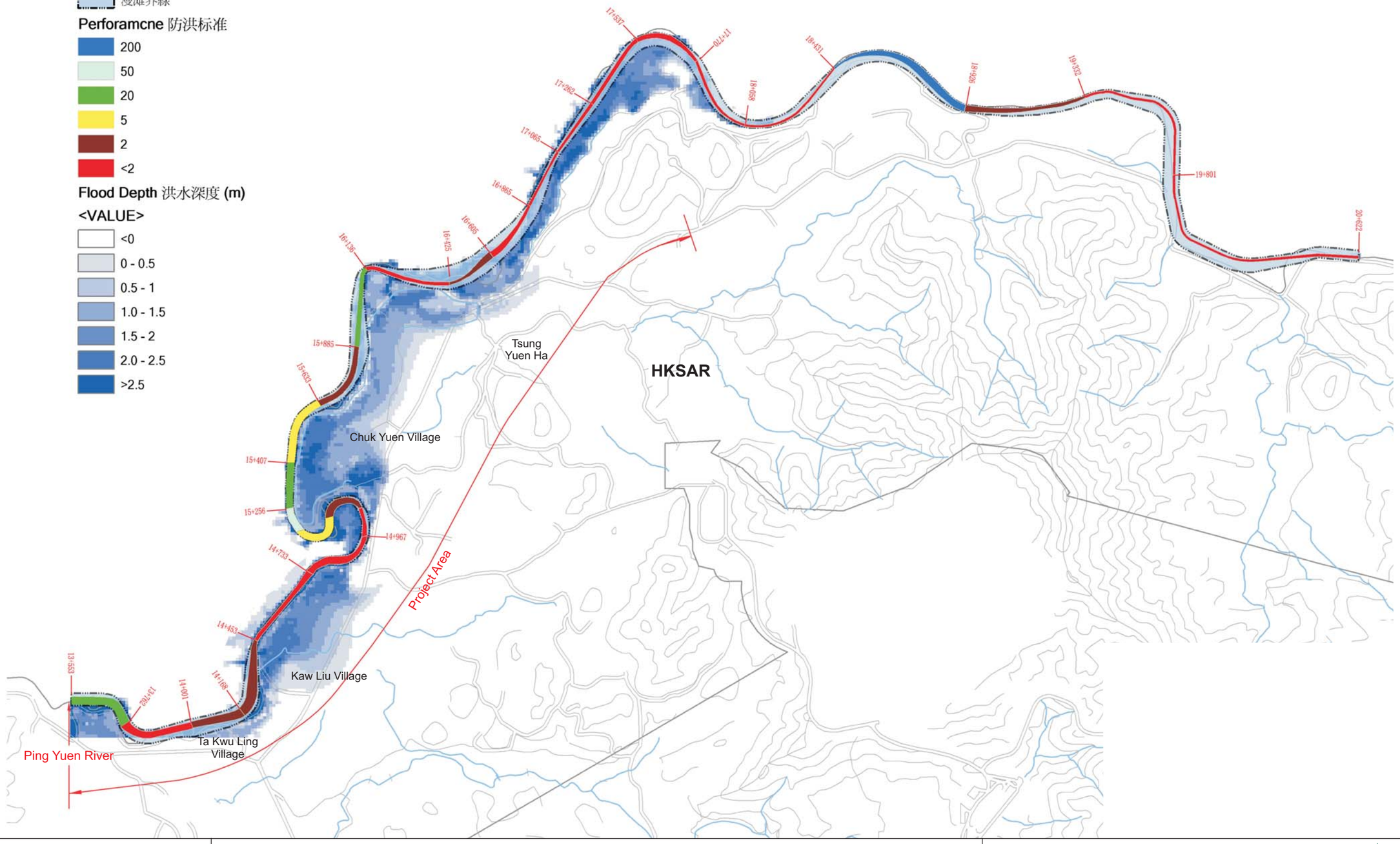

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Figure 1.2

Predicted Extent of 1 in 50 Year Flood

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DATE: 29/06/2010

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prevention ability of Shenzhen River is enhanced and the flooding frequency is reduced.

The section of the Shenzhen River to be regulated under this Project is relatively flat, narrow and winding. The width of the river is uneven and erosion can be found along the river bed and river banks. Some sections of the river embankment have collapsed. The current flood prevention performance are in the range of 1 in 2 to 1 in 20 years, which cannot meet the standard in the PRC National Standard (1 in 20 to 50 years) or the Hong Kong Standard (1 in 50 years).

Figure 1.2 shows the predicted flood extent of a 1 in 50 years flood event. As shown in *Figure 1.2*, the extent of the flood will encroach into the villages along Shenzhen River, including Ta Kwu Ling Village, Kaw Liu Village, Chuk Yuen Village, Tsung Yuen Ha Village, as well as the boundary patrol road and part of the Lin Ma Hang Road. Hence, there is a need to carry out the Project to rectify the flood prevention performance of this section of the Shenzhen River and to safeguard the livelihood of settlements and boundary security along the river. In addition, the Project will be required to meet the required flood protection standard for the proposed LT/HYW BCP development.

1.3 OBJECTIVES OF THE EIA STUDY

The Project is classified as a Designated Project under Item I.1, Part 1, Schedule 2 of the EIA Ordinance and therefore the construction and operation of the Project will require an Environmental Permit.

The overall objectives of the EIA Study are to provide information on the nature and extent of environmental impacts arising from the Project; to recommend appropriate mitigation measures to control the potential environmental impacts so that it complies with the requirements of the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM); and to confirm the environmental acceptability of the Project. Key environmental issues identified in the EIA Study Brief include air quality, noise, water quality, ecology, fisheries, waste management, land contamination, cultural heritage and landscape and visual impacts.

The EIA was conducted in accordance with the guideline on assessment methodologies provided in the EIAO-TM. The general approach for the assessment includes description of baseline environmental conditions for the impact assessment, identification and evaluation of potential impacts and recommendation of mitigation measures and an environmental monitoring programme. The assessments in this EIA Study are conducted using well-proven and internationally accepted methods based on reasonable worst-case conditions.

2 PROJECT DESCRIPTION

2.1 EXISTING ENVIRONMENT

Shenzhen River is the drainage outlets of various watercourses in Shenzhen and Hong Kong. The main tributaries on Shenzhen side include Wu Tong Shan Stream (梧桐山溝), Jing Du Stream (徑肚溝), Chang Ling Stream (長嶺溝) and He Jiao Long Stream (禾叫壟溝) and on Hong Kong side include Ping Yuen River (River Ganges) and Kong Yiu Drainage Channel.

On Hong Kong side, the Project Site is located at rural area entirely within the Frontier Closed Area in the New Territories. The surrounding environment consists of mainly abandoned agricultural fields and scattered rural village houses.

2.2 CONSIDERATION OF ALTERNATIVES

2.2.1 *Design Return Period*

The relevant legislation and guidelines in both Mainland China and HKSAR will be followed in setting design criteria for the Project. In accordance with the PRC National Standard *Flood Prevent Standard* (GB 50501-94) and *Urban Flood Prevent Engineering Design Standard* (CJJ50-92), the design return period for Shenzhen River should be between 20 to 50 years. Whist in Hong Kong, the *Stormwater Drainage Manual* published by the DSD recommended that the design return period based on flood levels should be 50 years for main rural catchment drainage channels. With reference to the above relevant legislation and guidelines and the design criteria adopted in the Stage 1, 2 & 3 regulation works, the governments of the two cities have agreed that the flood prevention measures to be implemented for the Stage 4 regulation works shall be designed to attain the drainage capacity of a 50-year return period.

2.2.2 *Flood Prevention Measures Analysis*

The flood prevention measures considered during the feasibility study include flood storage, flood diversion and river modification. These measures were compared against their effect on flood prevention and land and environmental limitations. Based on the preliminary assessment of different flood prevention measures, a combination of river modification works and flood storage was taken forward to study the preferred option for the Stage 4 regulation works.

2.2.3 *Design Options*

The design principle of the works is to protect the livelihood of residents on both sides of the river with an ecological sensible design, which should maintain the naturalness of the river and riparian habitats and hence protect the biodiversity. The design and layout planning of the works should be

compatible with the future LT/HYW BCP. Two design options were then developed for further study:

Option A: The existing alignment of the concerned section of the Shenzhen River will be maintained as far as practical and massive excavation, dredging or filling will be avoided. Different designs such as trapezoidal, vertical or compound channel will be used with reference to the existing conditions. The centerline of the concerned section of the Shenzhen River will be about 4.5 km in length and a flood retardation pond will be constructed with a storage capacity of 80,000 m^3. The river side slope will be at the ratio of 1:2 to 1:5 and the standard bottom width of the riverbed will be in a range of 14 to 32m.

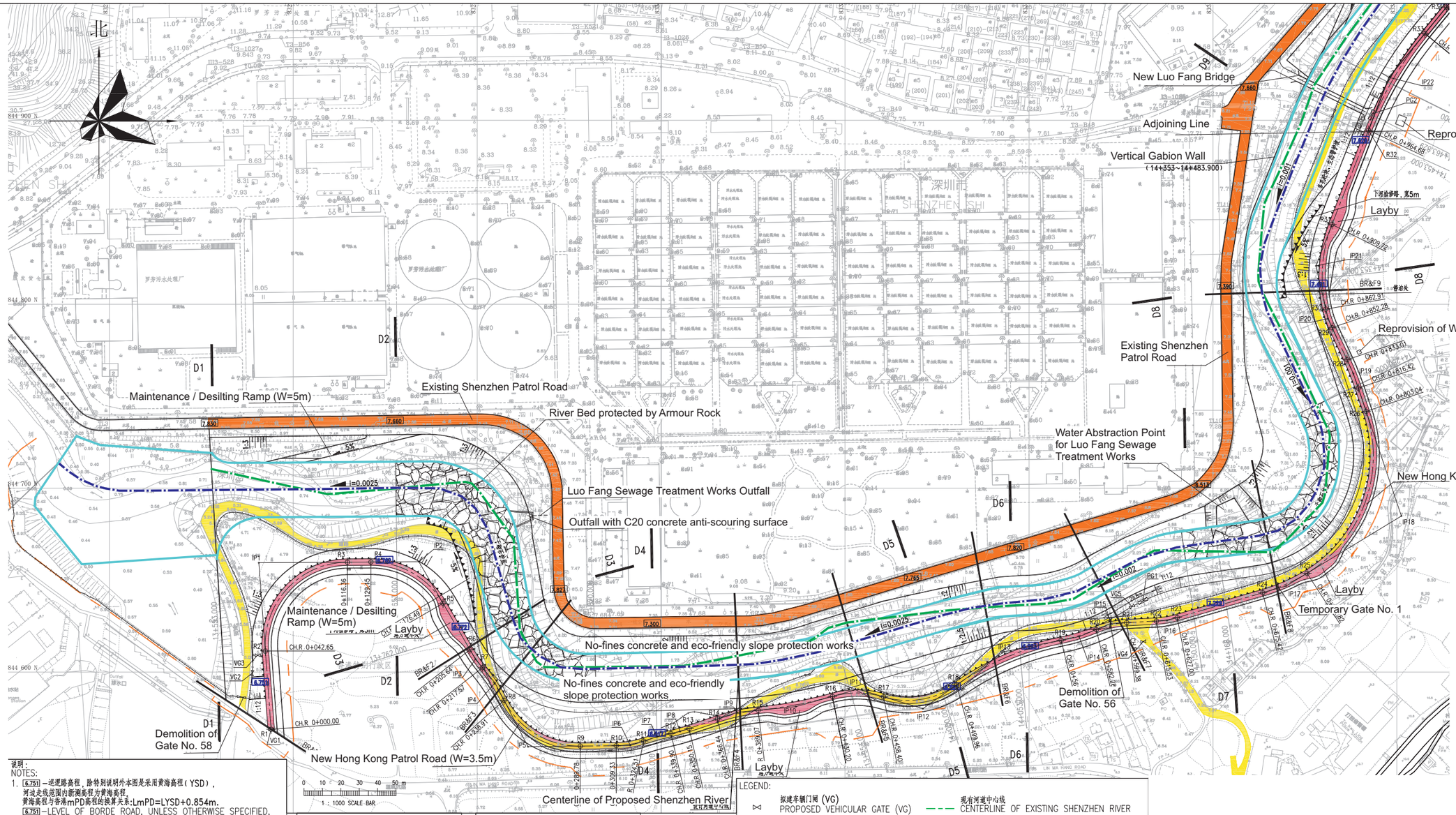
Option B: The concerned sections of the Shenzhen River will be straightened and widened. The centerline of the concerned section of the Shenzhen River will be about 4.5 km in length and a flood retardation pond will be constructed with a storage capacity of 80,000 m^3. The regulation works will mainly in the form of trapezoid open channel with side slope at the ratio of 1: 3. The standard bottom width of riverbed will be in a range of 14 to 16m.

The two options were evaluated against the aspects of land requirement, environmental consideration, management and maintenance during operation and cost. Both Option A and Option B are designed to attain the drainage capacity of a 50-year return period. The management and maintenance of both options will be simple and in low costs and the design and layout planning of both options will be compatible with the proposed LT/HYW BCP. Option A will preserve the existing river alignment and will provide diversified river and riparian habitats after the modification. It requires less additional land than Option B especially the use of land in Hong Kong. The capital cost of Option A is less that that of Option B. As a result, Option A is preferred in terms of land requirement, environmental consideration and cost implication and will be adopted as the design scheme for detailed design and EIA Study.

2.2.4 Construction Sequence and Methodology

The reprovision of boundary patrol road on Hong Kong side will commence before the river modification works for security reason. The road sections near the LT/HYW BCP development will be constructed first in order to tie in with the BCP development.

The river modification works will be carried out in four phases, commencing from the downstream section of the river. Two phases will be carried out in parallel. This approach will strike a balance between the need to control the magnitude of environmental impact at the same time while not hindering the overall programme of the Project. Heavy rains during wet and typhoon seasons will increase the quantity of site runoff during construction. In order to minimize the potential water quality impacts, river excavation works will be arranged to be conducted in dry seasons (November to March of the following year).



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0 10 20 30 40 50 m
1 : 1000 SCALE BAR

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES		HORIZONTAL ALIGNMENT
	EASTING	NORTHING	
R1	832787.960	844568.956	STRAIGHT
R2	832784.821	844611.489	R=45m
R3	832829.411	844659.800	STRAIGHT
R4	832842.195	844659.882	R=45m
R5	832881.419	844637.444	STRAIGHT
R6	832896.036	844612.217	R=72m
R7	832902.843	844602.436	R=100m
R8	832914.588	844584.672	R=46m
R9	832956.020	844559.816	STRAIGHT
R10	832975.567	844560.061	R=50m
R11	832990.491	844562.537	R=161.5m
R12	833005.322	844566.620	R=100m
R13	833015.189	844569.375	STRAIGHT
R14	833030.633	844574.553	R=100m
R15	833052.720	844579.268	R=234
R16	833093.091	844586.825	R=50m
R17	833120.923	844586.571	

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES		HORIZONTAL ALIGNMENT
	EASTING	NORTHING	
R17	833120.923	844586.571	
R18	833160.567	844592.991	R=46m
R19	833217.453	844617.347	R=150m
R20	833236.540	844623.162	R=101m
R21	833253.132	844626.936	R=50m
R22	833269.267	844627.787	STRAIGHT
R23	833280.547	844629.692	R=50m
R24	833327.057	844643.165	STRAIGHT
R25	833351.159	844653.754	R=100m
R26	833383.296	844741.778	R=75m
R27	833379.027	844754.458	STRAIGHT
R28	833372.877	844769.857	R=150m
R29	833364.748	844787.334	STRAIGHT
R30	833361.321	844797.373	R=50m
R31	833364.708	844843.376	R=79m
R32	833384.571	844894.623	STRAIGHT

SETTING OUT

POINTS	CO-ORDINATES	
	EASTING	NORTHING
IP1	832781.279	844659.492
IP2	832868.320	844660.049
IP3	832899.034	844607.044
IP4	832909.667	844594.183
IP5	832927.634	844559.459
IP6	832983.219	844560.157
IP7	832997.809	844564.932
IP8	833010.326	844567.745
IP9	833041.409	844578.166
IP10	833073.238	844581.268
IP11	833107.044	844590.730

SETTING OUT

POINTS	CO-ORDINATES	
	EASTING	NORTHING
IP12	833142.303	844580.163
IP13	833186.443	844611.165
IP14	833227.285	844619.307
IP15	833244.510	844626.482
IP16	833275.016	844628.090
IP17	833339.811	844646.859
IP18	833402.439	844684.911
IP19	833376.378	844762.328
IP20	833362.499	844792.171
IP21	833355.993	844820.892

LEGEND:
- 拟建车辆门闸 (VG) PROPOSED VEHICULAR GATE (VG)
- 拟建行人门闸 (PG) PROPOSED PEDESTRIAN GATE (PG)
- 工地边界线 SITE BOUNDARY
- 现有河道中心线 CENTERLINE OF EXISTING SHENZHEN RIVER
- 拟建河道中心线 CENTERLINE OF PROPOSED SHENZHEN RIVER
- 拟建河床边界线 EDGE OF PROPOSED RIVER BED
- 现有/拟建深方巡逻路 EXISTING/PROPOSED SHENZHEN BORDER ROAD
- 现有港方巡逻路 EXISTING HONG KONG BORDER ROAD
- 现有港方边界围网 EXISTING HONG KONG BOUNDARY FENCE
- 拟建边防路&围网子第一阶段重建 PROPOSED BORDER ROAD & FENCES TO BE RECONSTRUCTED UNDER PHASE I
- 拟建临时港方巡逻路 PROPOSED TEMPORARY HONG KONG BORDER ROAD

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Figure 2.1

River Modification and Reprovision of Boundary Patrol Road & Boundary Fence (1/5)

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DATE:30/07/2010

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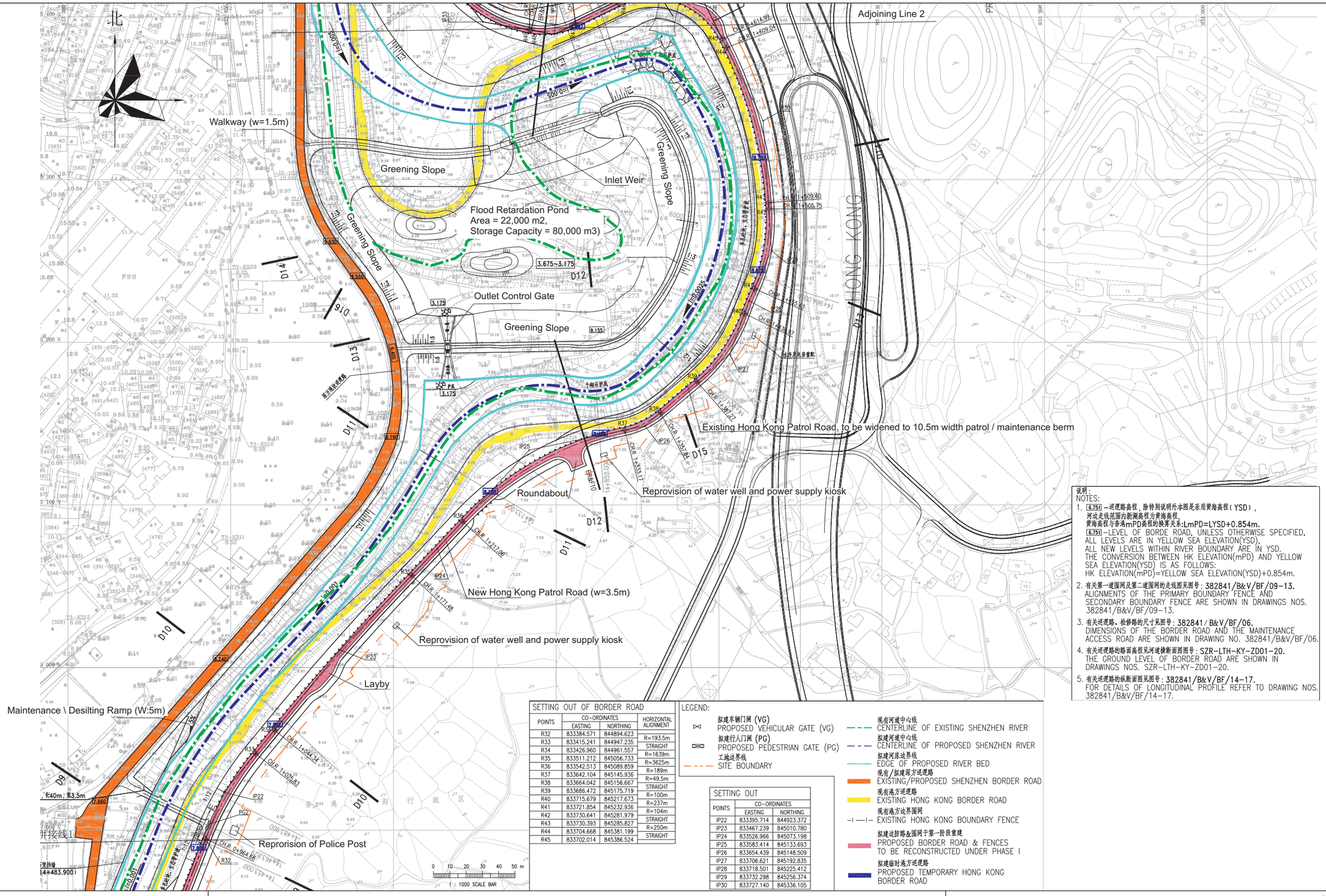

说明:
NOTES:

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SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES		HORIZONTAL ALIGNMENT
	EASTING	NORTHING	
R32	833384.571	844894.623	R=193.5m
R33	833415.241	844947.235	STRAIGHT
R34	833426.960	844961.557	R=1639m
R35	833511.212	845056.733	R=3625m
R36	833542.513	845089.859	R=189m
R37	833642.104	845145.936	R=49.5m
R38	833664.042	845156.667	STRAIGHT
R39	833686.472	845175.719	R=100m
R40	833715.679	845217.673	R=237m
R41	833721.854	845232.936	R=104m
R42	833730.641	845281.979	STRAIGHT
R43	833730.393	845285.827	R=250m
R44	833704.668	845381.199	STRAIGHT
R45	833702.014	845386.524	

LEGEND:

- 拟建车辆门闸 (VG) / PROPOSED VEHICULAR GATE (VG)
- 拟建行人门闸 (PG) / PROPOSED PEDESTRIAN GATE (PG)
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SETTING OUT

POINTS	CO-ORDINATES	
	EASTING	NORTHING
IP22	833395.714	844923.372
IP23	833467.239	845010.780
IP24	833526.966	845073.198
IP25	833583.414	845133.693
IP26	833654.439	845148.509
IP27	833706.621	845192.835
IP28	833718.501	845225.412
IP29	833732.298	845256.374
IP30	833727.140	845336.105

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Figure 2.2

River Modification and Reprovision of Boundary Patrol Road & Boundary Fence (2/5)

FILE: 0101759u2a
DATE: 30/07/2010

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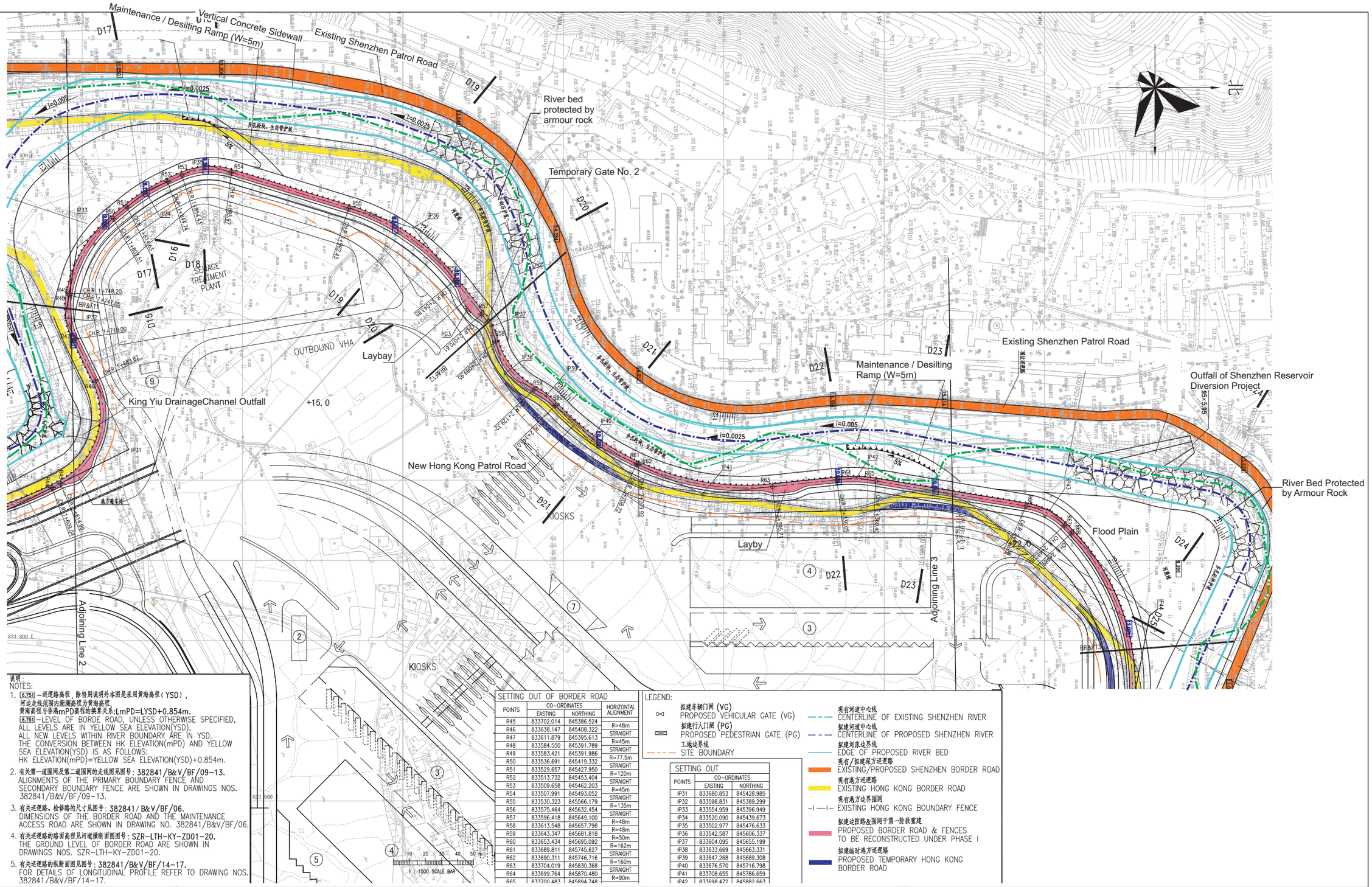

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SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R45	833702.014	845386.524	R=48m
R46	833638.147	845408.322	STRAIGHT
R47	833611.879	845395.613	R=45m
R48	833584.550	845391.789	STRAIGHT
R49	833583.421	845391.986	R=77.5m
R50	833536.691	845419.332	STRAIGHT
R51	833529.657	845427.950	R=120m
R52	833513.732	845453.404	STRAIGHT
R53	833509.658	845462.203	R=45m
R54	833507.991	845493.052	STRAIGHT
R55	833530.323	845566.179	R=135m
R56	833575.464	845632.454	STRAIGHT
R57	833596.418	845649.100	R=48m
R58	833613.548	845657.798	R=48m
R59	833643.347	845681.818	R=50m
R60	833653.434	845695.092	R=162m
R61	833689.811	845745.627	STRAIGHT
R62	833690.311	845746.716	R=160m
R63	833704.019	845830.368	STRAIGHT
R64	833699.764	845870.480	R=90m
R65	833700.483	845884.748	

LEGEND:

- 拟建车辆门岗 (VG) PROPOSED VEHICULAR GATE (VG)
- 拟建行人门岗 (PG) PROPOSED PEDESTRIAN GATE (PG)
- 工地边界线 SITE BOUNDARY
- 现有河道中心线 CENTERLINE OF EXISTING SHENZHEN RIVER
- 拟建河道中心线 CENTERLINE OF PROPOSED SHENZHEN RIVER
- 拟建河床边界线 EDGE OF PROPOSED RIVER BED
- 现有/拟建深方道渡路 EXISTING/PROPOSED SHENZHEN BORDER ROAD
- 现有港方道渡路 EXISTING HONG KONG BORDER ROAD
- 现有港方边界围网 EXISTING HONG KONG BOUNDARY FENCE
- 拟建边防路&围网干第一阶段重建 PROPOSED BORDER ROAD & FENCES TO BE RECONSTRUCTED UNDER PHASE I
- 拟建临时港方道渡路 PROPOSED TEMPORARY HONG KONG BORDER ROAD

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP31	833680.853	845428.985
IP32	833598.831	845389.299
IP33	833554.959	845396.949
IP34	833520.090	845439.673
IP35	833502.977	845476.633
IP36	833542.587	845606.337
IP37	833604.095	845655.199
IP38	833633.669	845663.331
IP39	833647.268	845689.308
IP40	833676.570	845716.798
IP41	833708.655	845786.659
IP42	833698.472	845887.663

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Drainage Services Department
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Figure 2.3

River Modification and Reprovision of Boundary Patrol Road & Boundary Fence (3/5)

FILE: 0101759u2b
DATE:02/08/2010

长江水资源保护科学研究所
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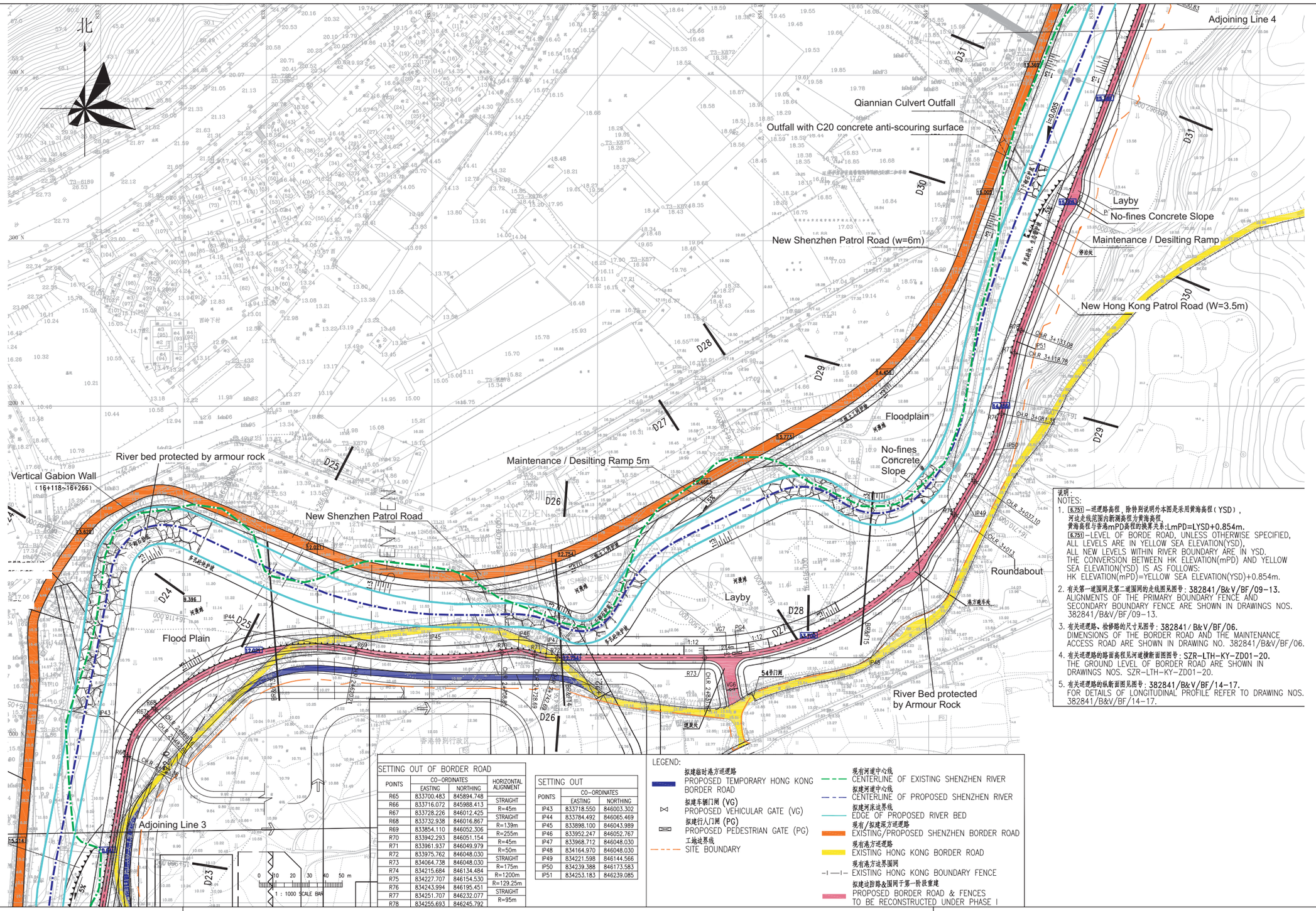

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R65	833700.483	845894.748	STRAIGHT
R66	833716.072	845988.413	R=45m
R67	833728.226	846012.425	STRAIGHT
R68	833732.938	846016.867	R=139m
R69	833854.110	846052.306	R=255m
R70	833942.293	846051.154	R=45m
R71	833961.937	846049.979	R=50m
R72	833975.762	846048.030	STRAIGHT
R73	834064.738	846048.030	R=175m
R74	834215.684	846134.484	R=1200m
R75	834227.707	846154.530	R=129.25m
R76	834243.994	846195.451	STRAIGHT
R77	834251.707	846232.077	R=95m
R78	834255.693	846245.792	

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP43	833718.550	846003.302
IP44	833784.492	846065.469
IP45	833898.100	846043.989
IP46	833952.247	846052.767
IP47	833968.712	846048.030
IP48	834164.970	846048.030
IP49	834221.598	846144.566
IP50	834239.388	846173.583
IP51	834253.183	846239.085

LEGEND:

- 拟建临时港方巡逻路 PROPOSED TEMPORARY HONG KONG BORDER ROAD
- 拟建车辆门闸 (VG) PROPOSED VEHICULAR GATE (VG)
- 拟建行人门闸 (PG) PROPOSED PEDESTRIAN GATE (PG)
- 工地边界线 SITE BOUNDARY
- 现有河道中心线 CENTERLINE OF EXISTING SHENZHEN RIVER
- 拟建河道中心线 CENTERLINE OF PROPOSED SHENZHEN RIVER
- 拟建河床边界线 EDGE OF PROPOSED RIVER BED
- 现有/拟建深方巡逻路 EXISTING/PROPOSED SHENZHEN BORDER ROAD
- 现有港方巡界围网 EXISTING HONG KONG BORDER ROAD
- 现有港方边界围网 EXISTING HONG KONG BOUNDARY FENCE
- 拟建边防路&围网于第一阶段重建 PROPOSED BORDER ROAD & FENCES TO BE RECONSTRUCTED UNDER PHASE I

说明:
NOTES:

1. 6.751 —巡逻路高程，除特别说明外本图是采用黄海高程(YSD)，河边走线范围内新测高程为黄海高程。
   黄海高程与香港mPD高程的换算关系:LmPD=LYSD+0.854m.
   6.751—LEVEL OF BORDE ROAD, UNLESS OTHERWISE SPECIFIED, ALL LEVELS ARE IN YELLOW SEA ELEVATION(YSD), ALL NEW LEVELS WITHIN RIVER BOUNDARY ARE IN YSD. THE CONVERSION BETWEEN HK ELEVATION(mPD) AND YELLOW SEA ELEVATION(YSD) IS AS FOLLOWS: HK ELEVATION(mPD)=YELLOW SEA ELEVATION(YSD)+0.854m.
2. 有关第一道围网及第二道围网的走线图见图号：382841/B&V/BF/09-13. ALIGNMENTS OF THE PRIMARY BOUNDARY FENCE AND SECONDARY BOUNDARY FENCE ARE SHOWN IN DRAWINGS NOS. 382841/B&V/BF/09-13.
3. 有关巡逻路、检修路的尺寸见图号：382841/B&V/BF/06. DIMENSIONS OF THE BORDER ROAD AND THE MAINTENANCE ACCESS ROAD ARE SHOWN IN DRAWING NO. 382841/B&V/BF/06.
4. 有关巡逻路的路面高程见河道横断面图图号：SZR-LTH-KY-ZD01-20. THE GROUND LEVEL OF BORDER ROAD ARE SHOWN IN DRAWINGS NOS. SZR-LTH-KY-ZD01-20.
5. 有关巡逻路的纵断面图见图号：382841/B&V/BF/14-17. FOR DETAILS OF LONGITUDINAL PROFILE REFER TO DRAWING NOS. 382841/B&V/BF/14-17.

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Drainage Services Department
香港渠务署

Figure 2.4

River Modification and Reprovision of Boundary Patrol Road & Boundary Fence (4/5)

FILE: 0101759u2c
DATE: 02/08/2010

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1. [6.751] – 巡逻路高程，除特别说明外本图是采用黄海高程（YSD），
河边走线范围内新测高程为黄海高程。
黄海高程与香港mPD高程的换算关系：LmPD=LYSD+0.854m.
[6.751] –LEVEL OF BORDE ROAD, UNLESS OTHERWISE SPECIFIED,
ALL LEVELS ARE IN YELLOW SEA ELEVATION(YSD).
ALL NEW LEVELS WITHIN RIVER BOUNDARY ARE IN YSD.
THE CONVERSION BETWEEN HK ELEVATION(mPD) AND YELLOW SEA ELEVATION(YSD) IS AS FOLLOWS:
HK ELEVATION(mPD)=YELLOW SEA ELEVATION(YSD)+0.854m.
2. 有关第一道围网及第二道围网的走线图见图号：382841/B&V/BF/09-13.
ALIGNMENTS OF THE PRIMARY BOUNDARY FENCE AND SECONDARY BOUNDARY FENCE ARE SHOWN IN DRAWINGS NOS. 382841/B&V/BF/09-13.
3. 有关巡逻路、检修路的尺寸见图号：382841/B&V/BF/06.
DIMENSIONS OF THE BORDER ROAD AND THE MAINTENANCE ACCESS ROAD ARE SHOWN IN DRAWING NO. 382841/B&V/BF/06.
4. 有关巡逻路的路面高程见河道横断面图图号：SZR-LTH-KY-ZD01-20.
THE GROUND LEVEL OF BORDER ROAD ARE SHOWN IN DRAWINGS NOS. SZR-LTH-KY-ZD01-20.
5. 有关巡逻路的纵断面图见图号：382841/B&V/BF/14-17.
FOR DETAILS OF LONGITUDINAL PROFILE REFER TO DRAWING NOS. 382841/B&V/BF/14-17.

北

Xian Hu Road Floodway

River bed protected by armour rock

Maintenance /Desilting Ramp (W=5m)

Existing Shenzhen Patrol Road

Maintenance /Desilting Ramp (W=5m)

Roundabout

New Hong Kong Patrol Road (W:3.5)

Roundabout

Ju Bao Road Floodway
2.51×2.58

Outfall with C20 Concrete Anti-Scouring Surface

Proposed Project End Point

New Hong Kong Patrol Road (W=3.5m)

Grassed Cellular Concrete eco-friendly slope protection works

Grassed Cellular Concrete eco-friendly slope protection works

Landscape Area

Layby

Grassed Cellular Concrete eco-friendly slope protection works

Grassed Cellular Concrete eco-friendly slope protection works

Existing Vertical Sidewall

Layby

Adjoining Line 4 ⊄

0 10 20 30 40 50 m
1 : 1000 SCALE BAR

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R78	834255.693	846245.792	STRAIGHT
R79	834332.002	846449.731	R=386m
R80	834347.207	846484.932	R=397m
R81	834369.578	846540.660	R=50m
R82	834374.128	846550.897	STRAIGHT
R83	834383.129	846566.241	R=45m
R84	834402.022	846583.820	R=125m
R85	834463.617	846651.724	STRAIGHT
R86	834478.516	846691.160	R=110m
R87	834511.873	846737.509	R=184m
R88	834561.101	846799.775	R=105m
R89	834618.793	846852.300	STRAIGHT
R90	834646.647	846862.718	R=55m
R91	834696.765	846856.736	STRAIGHT
R92	834699.988	846854.552	R=175.25m
R93	834765.259	846772.368	STRAIGHT
R94	834777.873	846739.565	R=46m
R95	834778.808	846709.221	STRAIGHT
R96	834774.105	846694.308	R=55m
R97	834806.977	846626.371	R=46m
R98	834825.107	846613.802	STRAIGHT
R99	834842.313	846594.281	R=46m
R100	834857.720	846582.851	STRAIGHT
R101	834881.494	846571.999	R=160m
R102	834898.002	846565.544	STRAIGHT
R103	834902.272	846564.141	

LEGEND:

拟建行人门闸 (PG)
PROPOSED PEDESTRIAN GATE (PG)
工地边界线
SITE BOUNDARY

现有河道中心线
CENTERLINE OF EXISTING SHENZHEN RIVER
拟建河道中心线
CENTERLINE OF PROPOSED SHENZHEN RIVER
拟建河床边界线
EDGE OF PROPOSED RIVER BED
现有/拟建深方巡逻路
EXISTING/PROPOSED SHENZHEN BORDER ROAD
现有港方巡逻路
EXISTING HONG KONG BORDER ROAD
现有港方边界围网
EXISTING HONG KONG BOUNDARY FENCE
拟建边防路&围网于第一阶段重建
PROPOSED BORDER ROAD & FENCES TO BE RECONSTRUCTED UNDER PHASE I
拟建临时港方巡逻路
PROPOSED TEMPORARY HONG KONG BORDER ROAD
拟建车辆门闸 (VG)
PROPOSED VEHICULAR GATE (VG)

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP52	834338.730	846467.710
IP53	834360.506	846511.948
IP54	834371.276	846546.035
IP55	834389.945	846577.858
IP56	834446.202	846605.633
IP57	834488.966	846718.817
IP58	834543.364	846763.205
IP59	834579.437	846837.581
IP60	834673.251	846872.668
IP61	834745.519	846823.702
IP62	834783.644	846724.557
IP63	834758.506	846644.839
IP64	834817.594	846622.326
IP65	834848.798	846586.924
IP66	834889.569	846568.314

深圳市治理深圳河办公室

Drainage Services Department
香港渠务署

Figure 2.5

River Modification and Reprovision of Boundary Patrol Road & Boundary Fence (5/5)

FILE: 0101759u2d
DATE: 14/10/2010

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River sediment will need to be dredged during the river modification work. Due to the site constraints and the shallow water depth, the use of dredging barge in this Project is not feasible. Land based dredger will be used.

With regard to river bed excavation, instead of directly excavating the river bed, which will generate sediment plume release to the river water throughout the excavation period, the excavation of river bed for this Project will be carried out within a cofferdam made of hessian bags. By implementing this method, the cofferdam will block the sediment released into the river during the excavation work, thus minimising the water quality impact. River diversion work will be carried out before the commencement of excavation and construction works. When the excavation and placement of embankment foundation are carried out on one side, the river course on the other side will be used as a diversion channel. This method will ensure the seamless flow of water along the river and minimise the disruption of hydrology of the river.

2.3 PROJECT DESIGN

The location and alignment of the Project components are shown in *Figure 2.1 to 2.5*. The scope of the Project comprises:

- Improvement of an approximately 4.5km long section of Shenzhen River;
- Re-provision of a boundary patrol road and about 4.5km of boundary fence;
- Dry weather flow interception along Shenzhen side of the river; and
- Associated landscaping works.

2.3.1 River Modification Works

Under the proposed Stage 4 regulation, about 4.5km section of the Shenzhen River will be regulated. The work starts from the confluence with Ping Yuen River (ie the endpoint of Stage 3 regulation works) and will pass through the Luo Fang Sewage Treatment Works, Luo Fang Bridge, Luo Fang Village, Sai Ling Village in Shenzhen and Kaw Liu Village and Chuk Yuen Village in Hong Kong, and ending near Pak Fu Shan in Hong Kong.

The design principle of the works is to protect the livelihood of residents on both sides of the river with an ecological sensible design, which should maintain the naturalness of the river and riparian habitats and hence protect the biodiversity. As shown in *Figures 2.1* to *2.5*, the design alignment will follow the existing watercourse as far as possible to minimise alternation to the existing river profile and meandering nature, minimise landtake and avoid massive excavation and filling. Moreover, the river bed will remain as natural bottom without concreting. At several meandering locations with sharp bend, a floodplain will be created with the planting of existing species

to resemble the naturalness of the river while achieving the required flood design standard.

A combination of trapezoid channel, compound channel and vertical sidewall will be used along the river alignment. The proposed flood retardation pond will be located near Chuk Yuen Village, covering an area of 22,000 m^2 with a storage capacity of 80,000 m^3. Overflow weirs will be used in the inlet and outlet of the retardation pond

2.3.2 Reprovisioning of Boundary Patrol Road and Boundary Fence

The reprovisioning of boundary patrol road and boundary fences along the concerned section of Shenzhen River under the Stage 4 regulation has already been incorporated into the design and construction programme of this Project.

The design of boundary patrol road on Hong Kong side will be based on the *Transport Planning and Design Manual* and *Guidance Note* published by Transport Department of HKSAR. The total length of the boundary patrol road to be reprovided under this Project is about 4.5km and the width will be 3.5m. The boundary patrol road will be paved with asphaltic concrete. Passing bays (12m long and 6m wide) will be provided at 200 to 300m intervals. Boundary fences will be constructed on both sides of the boundary patrol road. The height of secondary and primary fences will be 3.5m and 4.6m respectively and the primary fence will be equipped with security sensing system and barbed wire.

The reprovisioning of the section of boundary patrol road and boundary fence along the section of Shenzhen River under this Study will be managed by DSD as an "Advanced Works" of this Project. Currently, the Architectural Services Department (ArchSD) is managing the construction of a secondary boundary fence and reprovision of boundary patrol road from Pak Hok Chau to Sha Tau Kok.

2.3.3 Dry Weather Flow Interception on Shenzhen Side

Currently, the separation of sewage from stormwater in Shenzhen is not very effective and stormwater discharge points at Shenzhen side into the Shenzhen River is polluted. As part of this Project, the dry weather flow from these outflows will be collected and diverted to the Luo Fang Sewage Treatment Works in Shenzhen in order to improve the water quality of Shenzhen River.

24 overflow manholes will be constructed to collect the dry weather flow and gravity sewer will be built to convey the dry weather flow to the Luo Fang Sewage Treatment Works.

2.3.4 Landscaping Works

The landscaping works along the riverbank will be designed to re-establish the natural riparian ecosystem with the aims to enhance the local biodiversity, protect the water resources and avoid erosion. The landscape characters

along the river course will be designed with considerations of local characteristics and the landuse planning in the adjacent area.

2.4 CONSTRUCTION PROGRAMME

The construction phase of the main works will last for 44 months. An Advanced Works contract on the construction of boundary fence and boundary patrol road on Hong Kong side will be included as part of this Project and will last for about 36 months between the period of February 2012 and January 2015. The proposed construction programme is presented in *Table 2.1*.

Table 2.1 Construction Programme

	Phase	Date	Duration	Works Description
1	Advanced Works	February 2012 to January 2015	36 months	Construction of boundary fence and boundary patrol road on HK side
2	Preparation Phase	March to July 2013	5 months	Tendering; land resumption
3	Pre-construction	August to September 2013	2 months	Construction of site access roads and site office, site clearance, site preparation works etc.
4	Construction	October 2013 to December 2016	39 months	Main construction works of the Project such as dredging of river sediment and soil excavation, construction of flood retardation pond, boundary fence and boundary patrol road on Shenzhen side, river modification works, dry weather flow interception works etc.
5	Post-construction	January 2017 to March 2017	3 months	Demolition of temporary structures, landscaping works etc.

2.5 MAINTENANCE DREDGING

It is revealed in the sediment modelling result that the amount of sedimentation in the section of Shenzhen River within the Project Site is minimal, due to the fact that the gradient of the concerned river section is relatively steep and the river is not affected by tidal movement. Hence, only small scale maintenance dredging activity along the river channel is anticipated at regular intervals (the frequency will be determined through sediment monitoring in the operation stage), and the scale of maintenance dredging will be very small as compared with the dredging works during the capital works construction.

Maintenance dredging of sediment may be required at the flood retardation pond on Shenzhen side and will be carried out by the Shenzhen side. The flood retardation pond will only be used for water storage during severe

rainstorm event in the wet season, and therefore the rate of sediment accumulation in the pond is expected to be small. As such, and given that the size of the pond is only about 2.2 ha on plan, the scale and volume of the maintenance dredging, if required, is anticipated to be significantly smaller than that during the capital works construction.

3 SUMMARY OF ENVIRONMENTAL IMPACTS

3.1 INTRODUCTION

This *Section* summarises the environmental impacts associated with the construction and operation of the Project.

3.2 AIR QUALITY

3.2.1 Construction Phase

Construction dust generating from the soil excavation, embankment construction, dry weather flow interception works, landscaping works, patrol road and boundary fence re-provisioning and odour from dredging and handling of river sediment are the key air quality concerns during construction phase.

With the implementation of the recommended dust control measures and good construction site practices, the construction of the Project will not cause adverse dust and air quality impacts at the identified air sensitive receivers (ASRs). Dust monitoring during the construction stage is recommended to ensure compliance with the Air Quality Objectives.

The measured acid volatile sulphide (AVS) concentrations in the sediment samples of the Project Site were well below that for the remediated sediments, which are considered to have minimum odour impact to the surrounding environment. The dredged sediment will be stored in enclosed tanks and will be delivered off-site for disposal at regular intervals. Therefore, potential odour impact due to dredging and handling of river sediment will be minimal.

3.2.2 Operation Phase

The frequency and scale of maintenance dredging required along the river channel and the flood retardation pond is anticipated to be very small compared with the dredging works during the capital works. Besides, the dry weather flow interception works to be carried out under this Project will convey the untreated sewage from Shenzhen side (which are currently discharging to the Shenzhen River) to the sewage treatment work at Shenzhen. It is therefore expected that the water and sediment quality of the Study Area will be improved after the completion of the Project. The potential odour emissions due to the dredging and handling of sediment associated with maintenance activity will be minimal. With the infrequent dredging activities required, limited quantity of sediments dredged and limited number of truck trips at Shenzhen side or marine vessels required, no adverse cumulative air quality impact is anticipated.

3.3 CONSTRUCTION NOISE

Potential impacts to the noise sensitive receivers (NSRs) during the construction phase of the Project will mainly arise from the use of power mechnical equipment. Owing to the close proximity of some of the NSRs to the works areas of the Project, mitigation measures are required to be implemented to mitigate the construction noise impacts. Practicable mitigation measures, including good construction site practices, use of quiet PME, movable noise barriers and scheduling of PME/construction activities, are recommended. With the implementation of mitigation measures, the mitigated construction noise levels at the representative NSRs will comply with the construction noise criterion of 75 dB(A) throughout the construction period. Noise monitoring during the construction stage is recommended to ensure compliance with the noise criterion.

3.4 WATER QUALITY

The potential sources of water quality impacts associated with the construction and operation of the Project have been identified and the potential impacts were evaluated using proven mathematical models. The modelling has assessed a number of scenarios (including a number of worse case scenarios) for pollutants (including SS, heavy metal, nutrients and micro-organic pollutants) releases from the construction activities, and maintenance dredging and the change of the hydrodynamic conditions of the river during the operation of the Project.

3.4.1 *Construction Phase*

Potential impacts arising from the proposed construction works are predicted to be largely confined to the specific works areas. With proper implementation of the recommended good site practices, sediment dispersion is not expected to cause adverse water quality impacts at the identified water sensitive receivers.

3.4.2 *Operation Phase*

During the operation phase, changes to hydrodynamic regime within the Project Site are predicted to be beneficial and no adverse impacts are anticipated. Adverse water quality impacts are not expected at any identified water sensitive receivers due to the operation of the Project. Within the Project Site, the scale and volume of the maintenance dredging activity will be significantly smaller than that of the capital construction work. Adverse water quality impact is not expected.

Cumulative water quality impacts associated with operation of the LT/HYW BCP have been considered, no adverse impact is anticipated.

3.5 *TERRESTRIAL ECOLOGY*

The ecological resources recorded within the Study Area included twelve habitats (woodland [including fung shui woodland], plantation, shrubby grassland, low-lying grassland, marshy low-lying grassland, abandoned agricultural land, cultivated land (dry), wet active agricultural land, stream / river, channel, pond and developed area) of which only two were not found in the Project Site (shrubby grassland and pond). Low-lying grassland, cultivated land (dry), wet active agricultural land, channel, pond and developed area (including road / path) were considered as having low ecological value, secondary woodland and the stream / river other than the Shenzhen River as having moderate ecological value, fung shui woodland as having high ecological value and the remainder (plantation, shrubby grassland, abandoned agricultural land, marshy low-lying grassland and Shenzhen River) as having low to moderate ecological value. One small section of the Ping Yuen River, located within the Study Area but outside the Project Site, was considered of low to moderate ecological value, due to it acting as a possible breeding site for Greater Painted Snipe. Overall 286 plant species were recorded in the Study Area, only one of which was a species of conservation interest (Incense Tree), which was recorded in the secondary woodland habitat to the south of the Tsung Yuen Ha within the Study Area. No plant species of conservation interest was recorded within the Project Site.

A total of 38 wildlife species of conservation interest were recorded within the Study Area during the surveys, including six mammal species, twenty six bird species, two herpetofauna species, three butterfly species and one dragonfly species. Only thirteen of these species were recorded in the Project Site during the surveys, twelve of them being highly mobile birds (Greater Coucal, Common Buzzard, Peregrine Falcon, Black Kite, Chinese Pond Heron, Black-crowned Night Heron, Grey Heron, Great Egret, Intermediate Egret, Little Egret, Common Teal and White-breasted Waterhen) and the other being the Courtesan butterfly which despite not being as mobile, has an abundance of similar habitat in the immediate vicinity. Hence, it is anticipated that the impact to these species is low.

The Project will cause some permanent habitat loss. The Shenzhen River will be disturbed during construction but additional stream/river habitat (> 2ha), woodland habitat (~0.5ha) and riverbank landscaping areas (>4 ha) will be formed after river modification works. Given the relatively low value of the habitat and the low faunal abundance / diversity in the area, the impact of the Project is anticipated to be low. With the implementation of the proposed mitigation measures and good construction practice no unacceptable ecological impact is anticipated.

3.6 *FISHERIES*

A total of one active fishpond and three abandoned fishponds were identified within the 500 m Study Area of the Project Site. No direct or indirect

negative impacts on the pond fish culture resources are anticipated during the construction or operation of the Project.

3.7 WASTE MANAGEMENT

3.7.1 Construction Phase

During the construction phase, the main activities, which will result in the generation of waste, include dredging of river sediment, soil excavation, embankment construction, sewage diversion works, landscaping works, and patrol road and boundary fence re-provisioning. The waste types associated with these activities include dredged river sediment, C&D materials, chemical waste, sewage and general refuse.

It is estimated that the gross total C&D materials generated from the Advanced Works will be about 18,750 m^3. About 15,000 m^3 will be inert but are not suitable fore reuse on site. These materials will be disposed of in a public fill reception facility in HKSAR. A small quantity of about 3,750 m^3 of construction waste (non-inert C&D material) will be disposed of at the NENT Landfill.

It is estimated that a gross total excavated materials generated from the river modification and associated works will be about 690,200m^3, comprising 95,000 m^3 of river sediment, 595,200 m^3 of C&D material . For the 95,000 m^3 river sediment, about 27,000 m^3 with all contaminants levels not exceeding the LCEL (Category L) will be disposed of at Huangmao Dao in Zhuhai, and the remaining sediments (with Categories M and H) of 68,000 m^3 will be disposed of at the Type 1 (dedicated) and Type 2 marine disposal facilities as appropriate within the HKSAR, to be determined by the MFC of the CEDD. Of the 595,200 m^3 C&D materials, about 586,000 m^3 are inert in nature. About 114,800 m^3 of these inert C&D materials will be reused on site for backfilling or embankment construction and the surplus inert C&D materials of about 471,200 m^3 will be disposed of at Huangmao Dao (黃茅島) in Zhuhai. About 9,200 m^3 of construction waste will be generated and disposed of at landfills in Shenzhen.

During the peak construction period (during the river modification and the associated works), approximately 878.5 kg per day of general refuse will be generated (195 kg from Advanced Works and 682.5 kg from River Modification and Associated Works). General refuse will be disposed of at landfills in Shenzhen or at NENT Landfill in the HKSAR (for the Advanced Works). Provided that the general refuse are properly collected and disposed of at regular intervals, no adverse environmental impacts are envisaged.

Chemical waste will be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*. For the Advanced Works, the chemical waste will be collected by a licensed chemical waste collector to the Chemical Waste Treatment Facility for disposal. For the river

modification and the associated works, the chemical waste will be collected and disposed of at licensed hazardous waste treatment facilities in Shenzhen.

With the implementation of general good construction site practices, it is not anticipated that the construction of the Project will cause adverse environmental impacts due to handling, transportation and disposal of the wastes.

3.7.2 Operation Phase

Maintenance dredging will be carried out along the river channel and the flood retardation pond. The scale of the dredging work is anticipated to be small and hence the volume of sediment is expected to be less than that of the dredging works during the construction phase. The disposal and handling of the dredged materials will follow the requirement in the *ETWB TC(W) No. 34/2002.*

With the implementation of general good construction site practices, it is not anticipated that the operation of the Project will cause adverse environmental impacts due to handling, transportation and disposal of the wastes

3.8 LAND CONTAMINATION

In the vicinity of the Project area, a few potential commercial and industrial developments were identified during the site surveys. These included abandoned poultry/livestock farms, a plant nursery, a non-operating industrial facility (a bean curd stick production plant) with an air emission stack, a police station with a dangerous goods store, and a pumping station for the Ping Yuen River. The potential land contamination risks of these facilities to the Project area were assessed and identified only one site required intrusive site investigation to confirm if the soil is contaminated. Based on the soil analytical results, it is concluded that there is no significant contamination at the identified potential site of land contamination. All results were below the respective Risk Based Remediation Goals (RBRGs) – Rural Residential for the parameters tested. As no groundwater was present at the sampling depth of 3 m (bgs), groundwater samples were not retrieved. There is no risk to humans from the handling of the excavated soil and therefore no further assessment or remediation of soil is required.

As the result of the above, no potential impact from the contaminated soil is anticipated.

3.9 CULTURAL HERITAGE IMPACT

Literature review and field surveys identified no Declared Monument and government historic sites within the CHIA Study Area of this Project. Five graded historic buildings, one nil grade historic building, sixteen built structures, seven graves and four cultural/historical landscape features are identified within the CHIA Study Area and a small quantity of fragmented

secondary archaeological deposits were identified from archaeological survey at Chuk Yuen and Pak Fu Shan sections of the Project. Other sections have been identified with no archaeological potential where no impact is anticipated. In case the works boundary of the Project changes during the detailed design stage to cover additional area not being assessed, the need for further archaeological survey and subsequent impact assessment should be reviewed and AMO should be consulted.

None of the identified built heritage features will be directly or indirectly impacted by the proposed development as they are located far from the Project Site. No mitigation measure or monitoring will be required during the construction and operation phases of the Project.

The archaeological survey identified only the secondary archaeological deposits at Chuk Yuen and Pak Fu Shan sections of the Project. The chance of finding *in situ* archaeological deposits is very low. Therefore, no impact on significant archaeological resources is anticipated and thus no archaeological monitoring is required. Pursuant to the *Antiquities and Monuments Ordinance,* the project proponent should inform the AMO immediately in case of discovery of antiquities or supposed antiquities in the course of soil excavation works in construction stage.

3.10 LANDSCAPE AND VISUAL IMPACT

With regard to LIA, a total of 18 LRs and four LCAs have been identified in the Study Area. There will be moderate or slight residual landscape impacts on eight LCAs/LRs as detailed below.

The significance of residual, adverse landscape impacts on LCA 4 (Natural River and Floodplain Landscape), LR2 (Natural Watercourse) and LR8 (Shrubby Grassland on Lowland) is **moderate**.

The significance of residual, adverse landscape impacts on LCA 1 (Settled Agricultural Lowland Landscape), LR4 (Woodland on Hillside), LR5 (Woodland on Lowland), LR9 (Active Farmland) and LR10 (Inactive Farmland) is **slight**.

Upon mitigation, at day 1 of operation, the significance of residual, adverse impact on one LCA and two LRs is **moderate** (LCA4 (Natural River and Floodplain Landscape), LR2 (Natural Watercourse) and LR8 (Shrubby Grassland on Lowland)). The significance of residual, adverse impact on five LCA/LRs is **slight** (LCA 1 (Settled Agricultural Lowland Landscape), LR4 (Woodland on Hillside), LR5 (Woodland on Lowland), LR9 (Active Farmland), LR10 (Inactive Farmland)). The significance of residual impacts on the thirteen other LCAs/LRs is **insignificant** (LCA 2 (Natural Vegetated Hillside Landscape), LCA 3 (Channelised Watercourse Landscape), LR1 (Channelised Watercourse), LR3 (Pond), LR6 (Fung Shui Forest), LR7 (Shrubby Grassland on Hillside), LR11 (Commercial Farm), LR12 (Village Area), LR13 (Traditional Village Area), LR14 (Abandoned Village Area), LR15 (Temple), LR16 (Rural Built/Open Storage Area) and LR17 (Ongoing

Development)) with the exception of the residual landscape impact on LR 18 (Roads) which is **insignificant if not slightly beneficial**. At year 10 of operation, when planted and natural vegetation has had time to mature all residual impacts for these LRs are either **slight** or **insignificant**, and the residual impact on LR 18 (Roads) remains **insignificant if not slightly beneficial.**

The Project has insignificant residual landscape impacts on all other LCAs/LRs.

With regard to VIA, five VSRs representing two categories (residents and travellers) were identified in the visual envelope to represent key visually sensitive receivers in the area. Photomontages were constructed at three VPs in three of these VSRs to help illustrate the visual impact of the Project. A further two planned VSRs have been identified: the future residents of the re-sited Chuk Yuen Village and the future travellers through the LT/HYW BCP.

At construction phase, the residual visual impacts after the implementation of mitigation measures **moderate** for three VSRs (residents of Ta Kwu Ling Village, Residents of Kaw Liu Village and Residents of the current Chuk Yuen Village) and **slight** for three VSRs (Travellers along Lin Ma Hang Road, Residents of Tsung Yuen Ha and future Residents of the re-sited Chuk Yuen Village). Construction phase impacts are **not applicable** for one VSR (Travellers through the LT/HYW BCP), since it will not exist during this phase.

At operation phase, following the implementation of the proposed visual mitigation measures, at day 1 of operation, the mitigated impacts are **slight** for four VSRs (Residents of Ta Kwu Ling Village, Residents of Kaw Liu Village, Travellers along Lin Ma Hang Road and Residents of the current Chuk Yuen Village if the village is still in existence); and **insignificant** for two VSRs (Residents of Tsung Yuen Ha and future Residents of the re-sited Chuk Yuen Village). The LT/HYW BCP will not be operational at this point, so the visual impact on Travellers through the LT/HYW BCP is not applicable. At year 10 of operation, when planted and natural vegetation has had time to mature all residual impacts are **insignificant**, including for Travellers through the LT/HYW BCP which will be operational by this time.

According to *Annex 10* of the *EIAO-TM*, the landscape and visual impact are considered **acceptable with mitigation**.

3.11 EM&A REQUIREMENT

Monitoring of dust, noise, and water quality has been recommended at designated sensitive receivers during the River Modification and Associated Works. Environmental site audit shall be conducted throughout the construction phase for both River Modification Works and Associated Works and Advanced Works to ensure that the proposed mitigation measures are implemented, and completed landscape works will be monitored during a one-year establishment period.

A bird monitoring programme will be undertaken to monitor the effectiveness of the reprovisioned/reinstated habitats during the operation of the Project. Monitoring of bird abundance and occurrence will be undertaken for one year after the establishment of the landscape plantings of the Project.

3.12 OVERALL CONCLUSION

The environmental impact assessment has concluded that no unacceptable environmental impacts are envisaged as a result of the construction and operation of the Project, provided that the recommended mitigation measures are implemented.

目錄

1 引言

1.1 項目背景

深圳河是香港特別行政區和深圳經濟特區之間的分界河。爲了預防附近地區出現嚴重水浸情形，並改善兩岸居民生活，香港特區政府和深圳市政府攜手合作，於 1997 年至 2006 年間，完成了第一、二和三期的深圳河治理工程。這三期工程治理了從平原河匯合點至深圳河口之間長約 13.67 公里的深圳河。

第四期治理工程是為提高深圳河的防洪標準，同時亦會配合擬議發展的蓮塘／香園圍新口岸計劃。第四期工程會在第三期工程的終點開始，爲平原河匯合點至蓮塘／香園圍口岸上游約 1.4 公里之間的一段深圳河（長約 4.5 公里）進行治理工程（以下簡稱“本工程項目”）。此外，爲配合這項治理工程，現時長約 4.5 公里，沿著河道伸延的邊界巡邏道路和圍網，都需要改道重建。本工程項目的位置和走線均展示於*圖 1.1*。

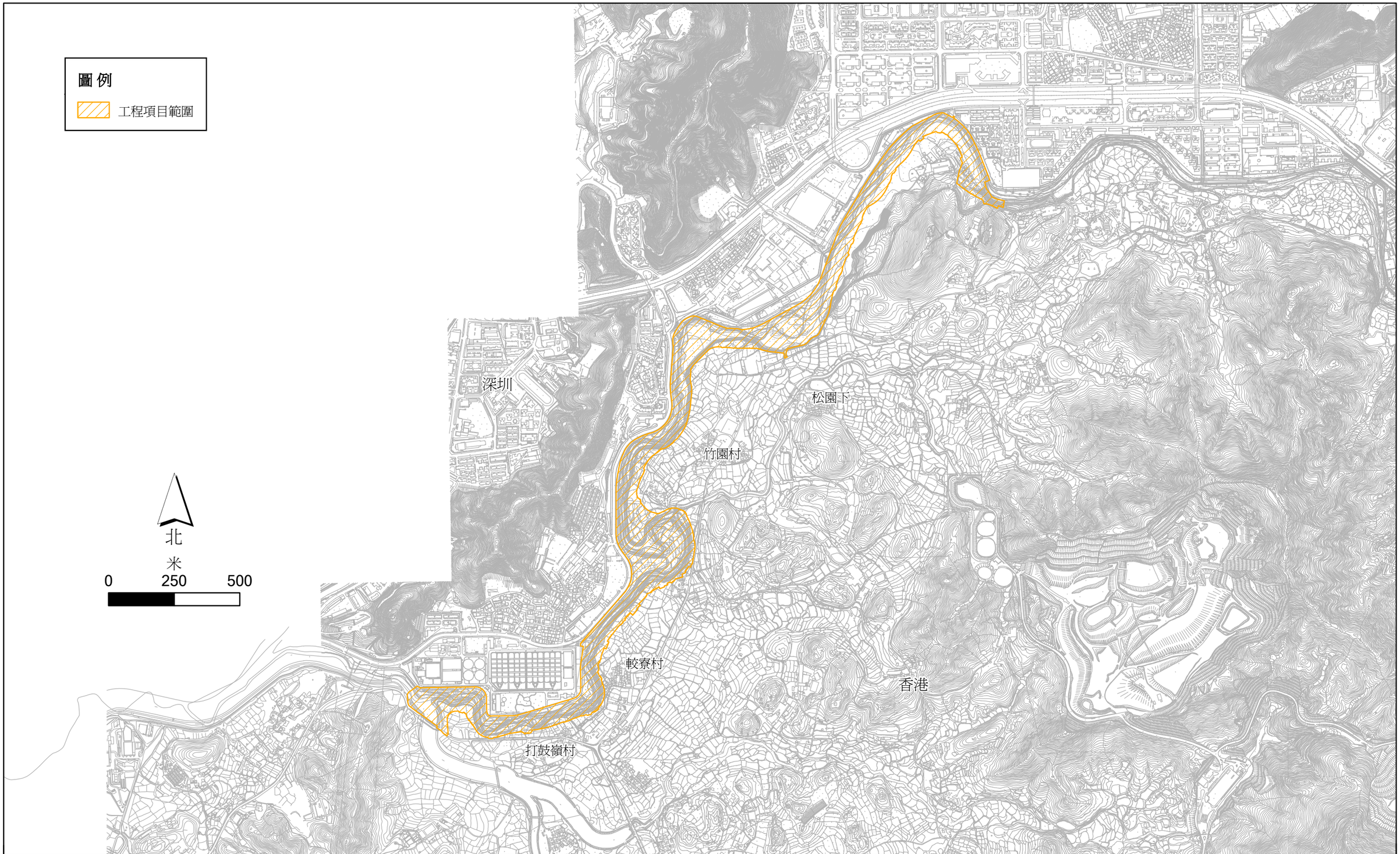
長江水資源保護科學研究所及香港環境資源管理有限公司受深圳市治理深圳河辦公室和香港政府渠務署共同委託，進行第四期深圳河治理工程環境影響評估研究（是次研究）。本行政摘要概述了香港方面所需要的環評研究主要結果。

1.2 本工程項目的必要性

深圳河的集水區是一個扇形系統，上游的河流都短且急。因此，可能會在短時間內有大量水流從這些河流匯集至深圳河。在大雨期間，洪峰可以在數小時內到達深圳河下游河段。若在颱風期間下大雨，深圳河的水浸風險會特別顯著，因爲颱風引起的海水漲潮會阻礙雨水經深圳河排入海中。在進行治理工程前，深圳河沿岸經常發生水浸事件。在完成第三期治理工程後，深圳河的防洪能力已獲得改善，而發生水浸的頻率亦已降低。

本工程項目所要治理的一段深圳河比較平坦、狹窄和彎曲；河道闊窄不一，而且河床和河岸均已受侵蝕；部份河堤亦已傾塌。現時的防洪能力介乎兩年一遇至二十年一遇之間，未能符合中國國家標準（二十年至五十年一遇）或香港標準（五十年一遇）。

圖 1.2 所示，是預測在五十年一遇的洪水中會出現的水浸情況。從圖中所見，洪水會淹浸深圳河沿岸村落，包括打鼓嶺村、較寮村、竹園村、松園下村，以及邊界巡邏路和部份蓮麻坑路。因此，有必要進行本工程項目，以加強這段深圳河的防洪能力，並保障沿岸居民的安全和邊境保



深圳市治理深圳河办公室

香港渠务署

圖 1.1

本工程項目位置

File: Final\0101759_
location of project site_chi.mxd
Date: 20/09/2010

长江水资源保护科学研究所
CHANGJIANG WATER RESOURCES PROTECTION INSTITUTE

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圖例

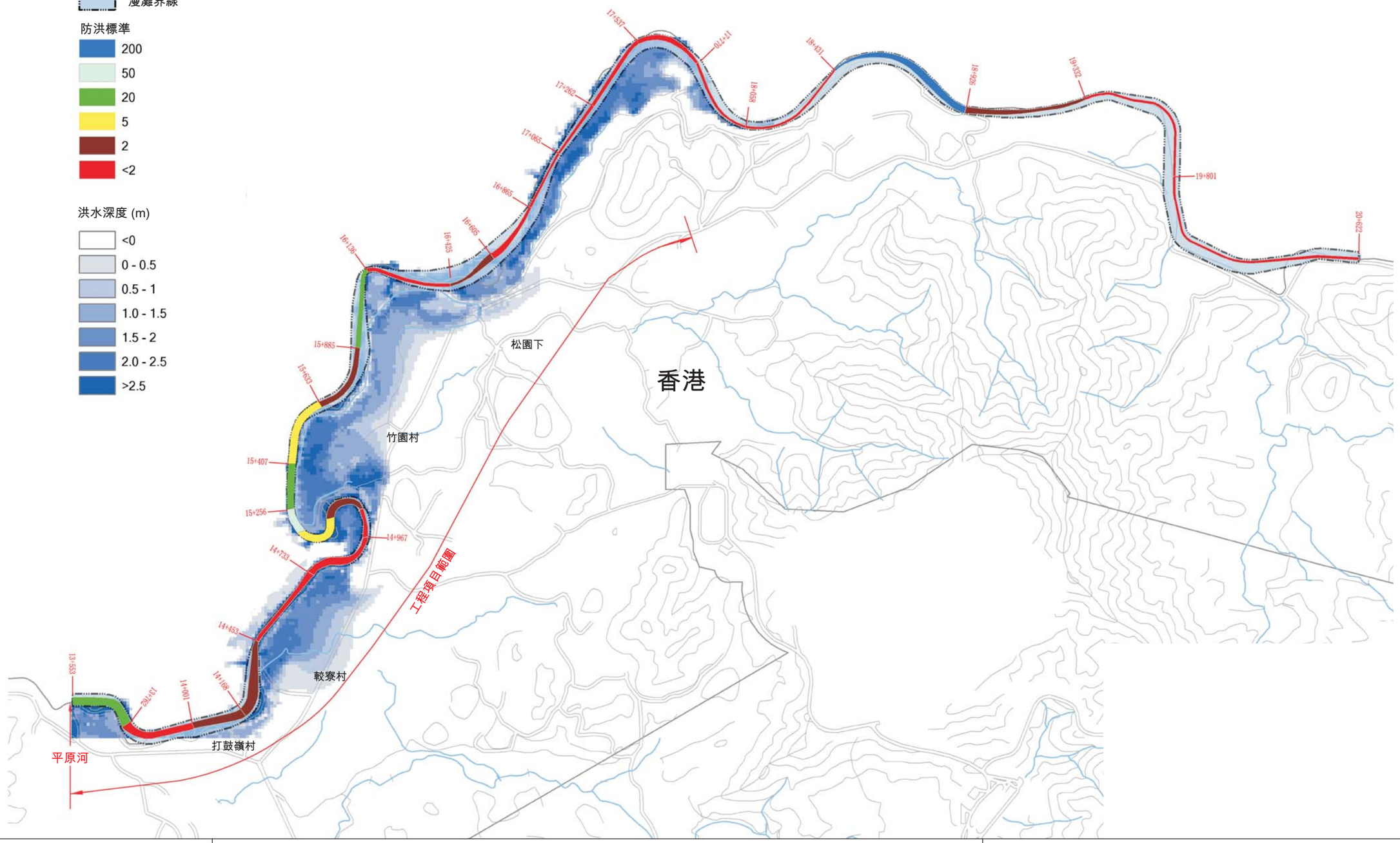
漫灘界線

防洪標準

- 200
- 50
- 20
- 5
- 2
- <2

洪水深度 (m)

- <0
- 0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2
- 2.0 - 2.5
- >2.5



深圳市治理深圳河办公室

Drainage Services Department
香港渠务署

圖 1.2

50年一遇洪水淹沒範圍

FILE: 0101759z8_6
DATE: 20/09/2010

长江水资源保护科学研究所
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安。此外，爲了符合擬建的蓮塘／香園圍口岸所要求的防洪標準，亦有必要進行本工程項目。

1.3 環評研究目的

本項目屬於《環境影響評估條例指南》附表 2 第 1 部 I.1 項所述的指定工程項目，因此，在施工和運作前必須先取得環境許可證。

是次環評研究的整體目的，是要就本工程項目對環境可能造成的影響，提供有關其性質和範圍的資料；並建議適當的緩解措施，以便控制各項潛在環境影響，務求能夠符合《環境影響評估程序的技術備忘錄》(以下簡稱《環評技術備忘錄》)的要求；以及確定本工程項目在環保要求方面的可接受程度。在環評研究大綱中所羅列的已知主要環境事宜包括：空氣質素、噪音、水質、生態、漁業、廢物管理、土地污染、文化遺產和景觀及視覺等方面的影響。

是次環評是按照《環評技術備忘錄》所闡述的評估準則和指引而進行。一般評估程序大致上包括：基線環境情況說明，鑒別和評估可能產生的環境影響，以及建議相應的緩解措施和環境監察計劃。是次環評研究是採用行之有效和已獲國際接受的方法，並根據合理的最壞情況而進行評估。

2 *工程項目說明*

2.1 現有環境

深圳河是深圳和香港境內多條河流的排水河道。在深圳境內的主要支流包括梧桐山溝、徑肚溝、長嶺溝、和禾叫壟溝；而在香港境內則有平原河和缸窰排水道。

香港方面的工程地點位於新界邊境禁區內的郊區。四周環境主要是荒廢的農地和零散的鄉郊村屋。

2.2 其他方案的考慮

2.2.1 設計重現期

本工程項目在訂定各項設計準則時，已遵循內地和香港的相關法例和指引。根據中華人民共和國國家標準《防洪標準》（GB 50501-94）和《城市防洪工程設計規範》（CJJ50-92），深圳河的設計重現期應該介於 20 至 50 年。在香港方面，渠務署出版的「雨水排放手冊」建議主要鄉郊集水區排水道的水浸程度預訂重現期爲 50 年。在參考上述各種相關法例和指引，以及第一、二和三期治理工程所採用的設計準則後，深港兩地政府均同意，第四期治理工程的防洪措施必須達到 50 年重現期的設計排放量。

2.2.2 防洪措施分析

在可行性研究時考慮過的防洪措施包括蓄洪、分洪和河道修改。防洪措施比較了這些措施的防洪效果以及在土地和環境方面的限制。可行性研究根據這些初步評估結果，提出了一個結合河道修改工程和蓄洪措施的方案，作爲第四期治理工程的最可取方案。

2.2.3 設計方案

是項工程的設計原則，是以合理的生態設計來保護河流兩岸居民的生活，並保持河道和兩岸生境的天然性質，藉此保護生物多樣化。此外，設計和佈局上的規劃，亦應該配合日後的蓮塘／香園圍口岸。可行性研究共擬訂了兩個設計方案供深入探討：

方案 A：盡量保留深圳河有關河段的現有走線，亦會盡量避免進行大規模的挖掘、疏濬或填河工程。同時，會按照河道現有情況而採用不同的河道設計，例如梯形、垂直形或複合型河道。深圳河有關河段的中線長約 4.5 公里，並會建造一個容量達 80,000 立方米的滯洪池。河畔坡度會介乎 1:2 至 1:5 之間，而河床的標準闊度則會介乎 14 至 32 米。

方案 B：深圳河有關河段將會被拉直和擴闊，中線會長約 4.5 公里，並會建造一個容量達 80,000 立方米的滯洪池。治理工程會以梯形的露天河道爲主，其河畔坡度是 1:3。河床的標準闊度則會介乎 14 至 16 米。

這兩個方案在不同範疇的表現都經過評估，其中包括土地要求、環境影響、運作期間的管理和維修，以及建造成本。方案 A 和方案 B 的設計排水容量都能夠應付五十年一遇的洪水。兩個方案的管理和維修都很簡單，成本亦低，而且設計和布局規劃都能夠配合擬建的蓮塘／香園圍口岸。方案 A 將會保留現有河道的走線，並會在改建後形成多樣化的河道和河岸生境。它比方案 B 需要較少額外土地，特別是在香港境內的土地。方案 A 的建造成本亦比方案 B 少。無論在土地要求、環境影響和建造成本方面，方案 A 都是最可取的選擇，因此會被採納爲本工程項目的設計方案，以便進行詳細設計和環評研究。

2.2.4 施工次序和方法

基於保安理由，香港境內的邊界巡邏路重置工程會在河道修改工程前展開；而且會首先建造蓮塘／香園圍口岸附近的路段，以便配合口岸的發展計劃。

河道修改工程會從下游河段開始，分四期完成。在同一時間會同時進行兩期工程，這樣可以在控制環境影響的幅度和照顧整體工程進度之間取得平衡。在雨季和風季時的大雨，會令施工中的工地徑流增加。爲了減低對水質的影響，河道挖掘工程會安排在旱季（11 月至翌年 3 月）進行。

在進行河道修改工程時，需要疏濬河中的沉積物。由於工地的限制和河水較淺，本工程項目難以使用挖泥船，因此會採用岸上的挖泥機。

在疏濬河床時，若直接在河床挖泥，會在整個疏濬期間在河水中產生沉積物卷流。因此，本工程項目會以麻包袋築成圍堰，然後在圍堰範圍內疏濬河床。這樣，挖泥時所揚起的沉積便會被圍堰擋住，因而減低對水質的影響。河道改道工程會在挖掘和建造工程動工前展開。當在河道一側進行挖掘工程和設置河堤地基時，河水會被引導至另一側的河道流走。這樣便可以確保河水可以無間斷地沿河而下，從而減少干擾河流的水文情況。

2.3 工程項目設計

本工程項目各個部份的位置和走線均展示於*圖 2.1* 至 *2.5*。整個工程項目的範圍包括：

- 改善一段長約 4.5 公里的深圳河；
- 重置一條邊界巡邏路，以及約 4.5 公里的邊界圍網；

- 在深圳一側的旱季污水截流；及
- 相關的環境美化工程。

2.3.1 河道修改工程

擬議進行的第四期治理工程會治理一段長約 4.5 公里的深圳河。工程會從平原河交匯處（即第三期治理工程的終點）開始，經過深圳的羅芳污水處理廠、羅芳橋、羅芳村，以及位於香港的較寮村和竹園村，並會以香港的白虎山爲終點。此外，河流底部將保留爲自然河床。在幾個蜿蜒的急彎地點，將建成漫灘並種植現有品種的植物，在仿照自然河道的同時亦能達到要求的設計防洪標準。

這些工程的設計原則，是以合理的生態設計來保護河流兩岸居民的生活，並保持河道和兩岸生境的天然性質，藉此保護生物多樣化。從*圖 2.1* 至 *2.5* 可見，設計的走線會盡量依循現有河道，藉此減少改變現有河道的縱剖面和蜿蜒性質，並減少所需土地和避免進行大量挖掘和填土工程。

河道沿線會採用梯型河道、複合河道和垂直岸牆等多種形狀的河道。擬建的滯洪池會位於竹園村附近，面積達 22,000 平方米，容量爲 80,000 立方米。滯洪池的入口和出口都會採用溢流堰。

2.3.2 重置邊界巡邏路和圍網

本工程項目的設計和施工計劃，都把深圳河相關河段的邊界巡邏路和圍網重置工程納入第四期治理工程中。

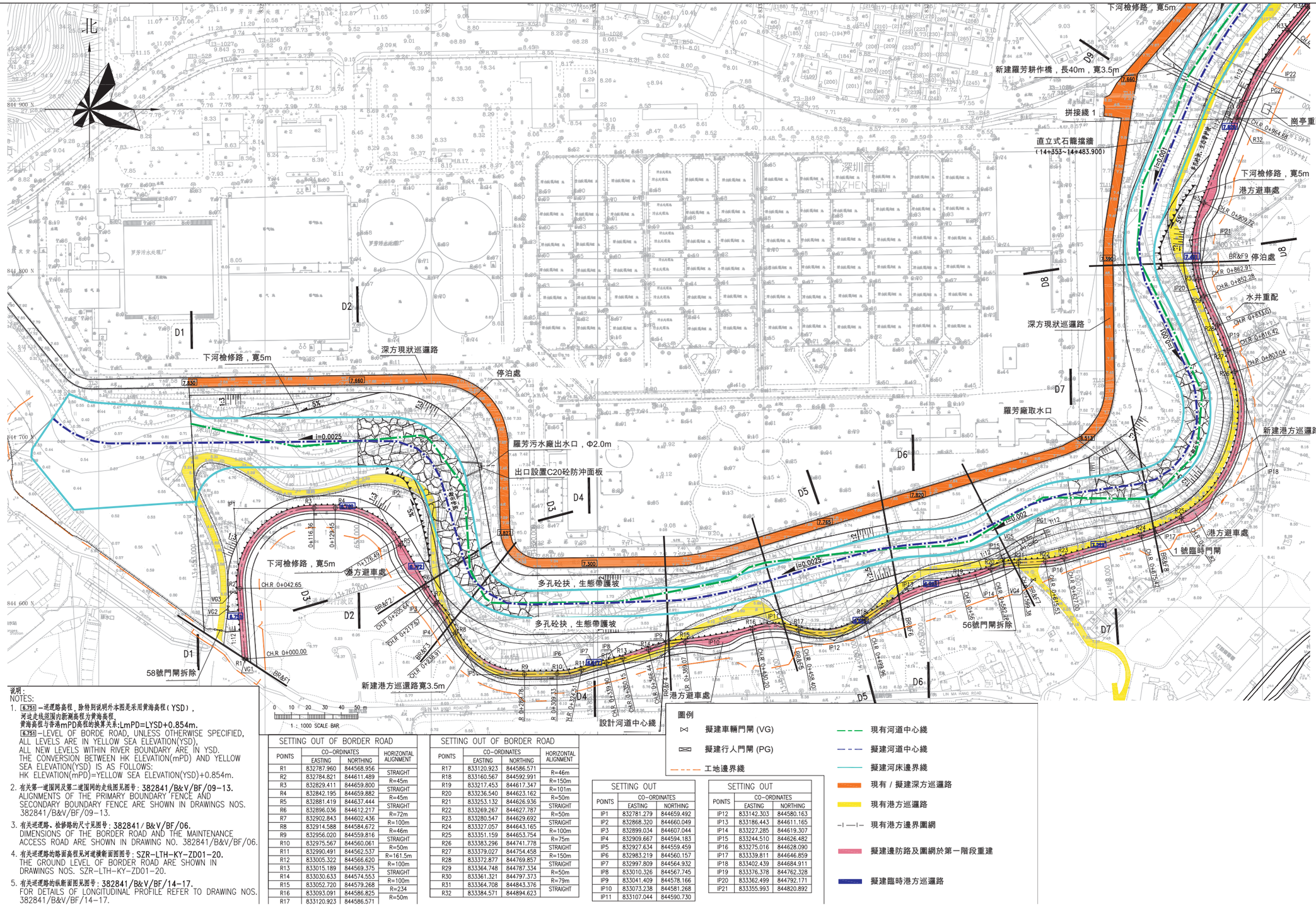
在香港境內的邊界巡邏路的設計，會按照香港政府運輸署所出版的《運輸策劃及設計手冊》和指引設計。由本工程項目重置的邊界巡邏路全長約 4.5 公里，闊約 3.5 米。路面會以瀝青混凝土鋪築。每隔 200 至 300 米會設置避車處（長 12 米、濶 6 米）。邊界巡邏路兩側均會建造邊界圍網。第一線和第二線圍網的高度分別是 4.6 米和 3.5 米。第一線圍網會裝設保安感應系統和帶刺鐵線。

是次研究所涵蓋的深圳河段邊界巡邏路和圍網重置工程，會由渠務署管理，作爲本工程項目的「前期工程」。現時，建築署正在管理白鶴洲至沙頭角的一段第二線圍網建築工程和邊界巡邏路重置工程。

2.3.3 深圳境內的旱季污水截流

現時深圳的污水和雨水分隔並非十分有效，因此深圳境內排放至深圳河的雨水排放點均受污染。本工程項目會把這些旱季污水引至深圳的羅芳污水處理廠，藉此改善深圳河的水質。

項目會建造 24 個溢流沙井來收集旱季污水；並會建造無壓污水管道，以便把旱季污水運送至羅芳污水處理廠。



說明：
NOTES:

1. 6.751 –巡邏路高程，除特別说明外本图是采用黃海高程（YSD），
河边走线范围内新测高程为黃海高程，
黃海高程与香港mPD高程的换算关系:LmPD=LYSD+0.854m.
6.751 –LEVEL OF BORDE ROAD, UNLESS OTHERWISE SPECIFIED, ALL LEVELS ARE IN YELLOW SEA ELEVATION(YSD), ALL NEW LEVELS WITHIN RIVER BOUNDARY ARE IN YSD. THE CONVERSION BETWEEN HK ELEVATION(mPD) AND YELLOW SEA ELEVATION(YSD) IS AS FOLLOWS: HK ELEVATION(mPD)=YELLOW SEA ELEVATION(YSD)+0.854m.
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5. 有关巡逻路的纵断面图见图号：382841/B&V/BF/14-17. FOR DETAILS OF LONGITUDINAL PROFILE REFER TO DRAWING NOS. 382841/B&V/BF/14-17.

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R1	832787.960	844568.956	STRAIGHT
R2	832784.821	844611.489	R=45m
R3	832829.411	844659.800	STRAIGHT
R4	832842.195	844659.882	R=45m
R5	832881.419	844637.444	STRAIGHT
R6	832896.036	844612.217	R=72m
R7	832902.843	844602.436	R=100m
R8	832914.588	844584.672	R=46m
R9	832956.020	844559.816	STRAIGHT
R10	832975.567	844560.061	R=50m
R11	832990.491	844562.537	R=161.5m
R12	833005.322	844566.620	R=100m
R13	833015.189	844569.375	STRAIGHT
R14	833030.633	844574.553	R=100m
R15	833052.720	844579.268	R=234
R16	833093.091	844586.825	R=50m
R17	833120.923	844586.571	

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R17	833120.923	844586.571	
R18	833160.567	844592.991	R=46m
R19	833217.453	844617.347	R=150m
R20	833236.540	844623.162	R=101m
R21	833253.132	844626.936	R=50m
R22	833269.267	844627.787	STRAIGHT
R23	833280.547	844629.692	R=50m
R24	833327.057	844643.165	STRAIGHT
R25	833351.159	844653.754	R=100m
R26	833383.296	844741.778	R=75m
R27	833379.027	844754.458	STRAIGHT
R28	833372.877	844769.857	R=150m
R29	833364.748	844787.334	STRAIGHT
R30	833361.321	844797.373	R=50m
R31	833364.708	844843.376	R=79m
R32	833384.571	844894.623	STRAIGHT

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP1	832781.279	844659.492
IP2	832868.320	844660.049
IP3	832899.034	844607.044
IP4	832909.667	844594.183
IP5	832927.634	844559.459
IP6	832983.219	844560.157
IP7	832997.809	844564.932
IP8	833010.326	844567.745
IP9	833041.409	844578.166
IP10	833073.238	844581.268
IP11	833107.044	844590.730

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP12	833142.303	844580.163
IP13	833186.443	844611.165
IP14	833227.285	844619.307
IP15	833244.510	844626.482
IP16	833275.016	844628.090
IP17	833339.811	844646.859
IP18	833402.439	844684.911
IP19	833376.378	844762.328
IP20	833362.499	844792.171
IP21	833355.993	844820.892

圖例
- 擬建車輛門閘 (VG)
- 擬建行人門閘 (PG)
- 工地邊界綫
- 現有河道中心綫
- 擬建河道中心綫
- 擬建河床邊界綫
- 現有 / 擬建深方巡邏路
- 現有港方巡邏路
- 現有港方邊界圍網
- 擬建邊防路及圍網於第一階段重建
- 擬建臨時港方巡邏路

深圳市治理深圳河办公室

Drainage Services Department
香港渠務署

圖 2.1

香港側巡邏路及圍網平面佈置圖 (1/5)

FILE: 0101759Z8_1
DATE:31/09/2010

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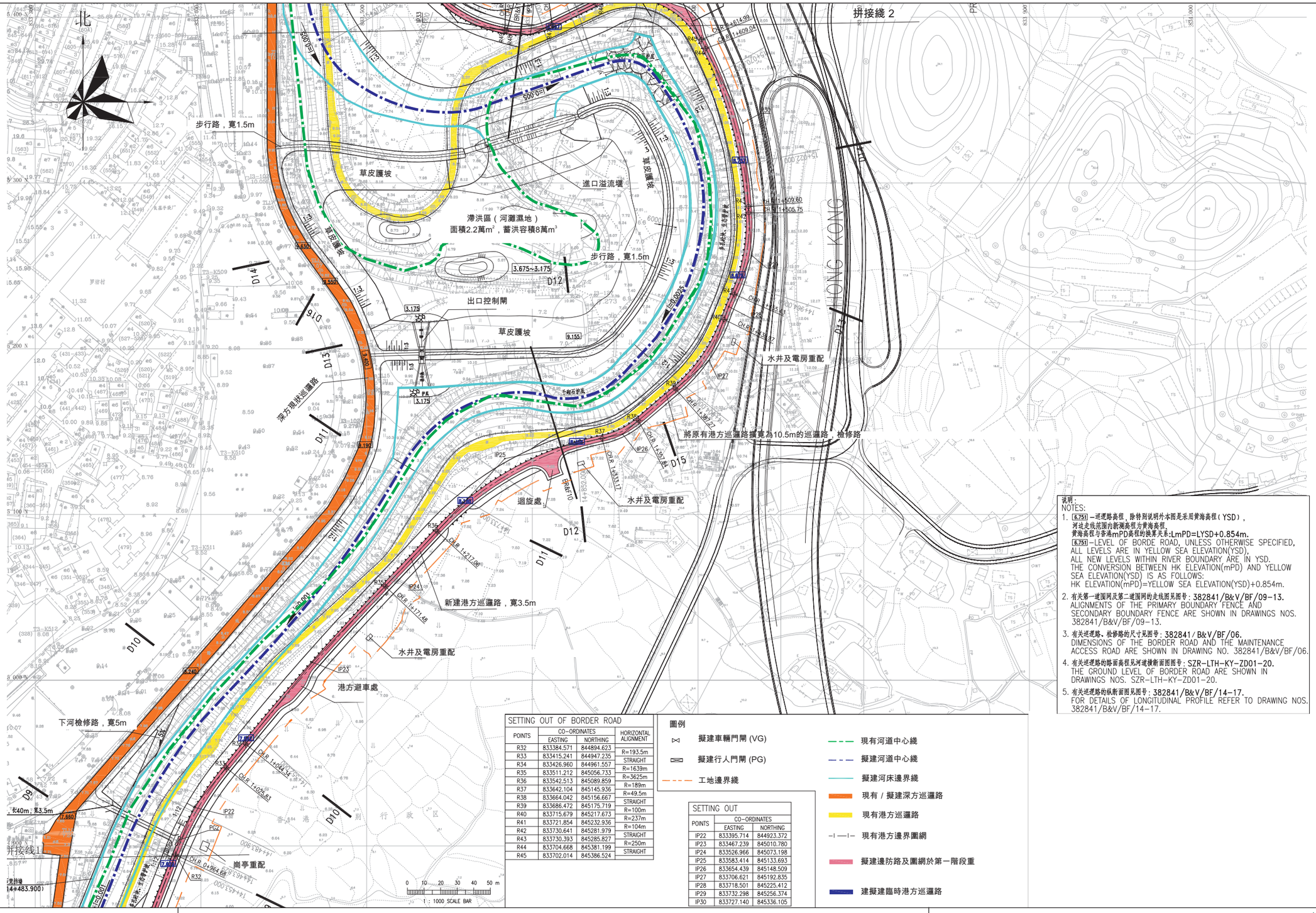

說明：
NOTES:
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6.751–LEVEL OF BORDE ROAD, UNLESS OTHERWISE SPECIFIED, ALL LEVELS ARE IN YELLOW SEA ELEVATION(YSD), ALL NEW LEVELS WITHIN RIVER BOUNDARY ARE IN YSD. THE CONVERSION BETWEEN HK ELEVATION(mPD) AND YELLOW SEA ELEVATION(YSD) IS AS FOLLOWS: HK ELEVATION(mPD)=YELLOW SEA ELEVATION(YSD)+0.854m.
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4. 有关巡逻路的路面高程见河道横断面图图号：SZR-LTH-KY-ZD01-20.
THE GROUND LEVEL OF BORDER ROAD ARE SHOWN IN DRAWINGS NOS. SZR-LTH-KY-ZD01-20.
5. 有关巡逻路的纵断面图见图号：382841/B&V/BF/14-17.
FOR DETAILS OF LONGITUDINAL PROFILE REFER TO DRAWING NOS. 382841/B&V/BF/14-17.

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R32	833384.571	844894.623	
			R=193.5m
R33	833415.241	844947.235	
			STRAIGHT
R34	833426.960	844961.557	
			R=1639m
R35	833511.212	845056.733	
			R=3625m
R36	833542.513	845089.859	
			R=189m
R37	833642.104	845145.936	
			R=49.5m
R38	833664.042	845156.667	
			STRAIGHT
R39	833686.472	845175.719	
			R=100m
R40	833715.679	845217.673	
			R=237m
R41	833721.854	845232.936	
			R=104m
R42	833730.641	845281.979	
			STRAIGHT
R43	833730.393	845285.827	
			R=250m
R44	833704.668	845381.199	
			STRAIGHT
R45	833702.014	845386.524	

圖例
- 擬建車輛門閘 (VG)
- 擬建行人門閘 (PG)
- 工地邊界綫
- 現有河道中心綫
- 擬建河道中心綫
- 擬建河床邊界綫
- 現有 / 擬建深方巡邏路
- 現有港方巡邏路
- 現有港方邊界圍網
- 擬建邊防路及圍網於第一階段重
- 建擬建臨時港方巡邏路

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP22	833395.714	844923.372
IP23	833467.239	845010.780
IP24	833526.966	845073.198
IP25	833583.414	845133.693
IP26	833654.439	845148.509
IP27	833706.621	845192.835
IP28	833718.501	845225.412
IP29	833732.298	845256.374
IP30	833727.140	845336.105

深圳市治理深圳河办公室
Drainage Services Department
香港渠务署

圖 2.2

香港側巡邏路及圍網平面佈置圖 (2/5)

FILE: 0101759z8_2
DATE: 15/09/2010

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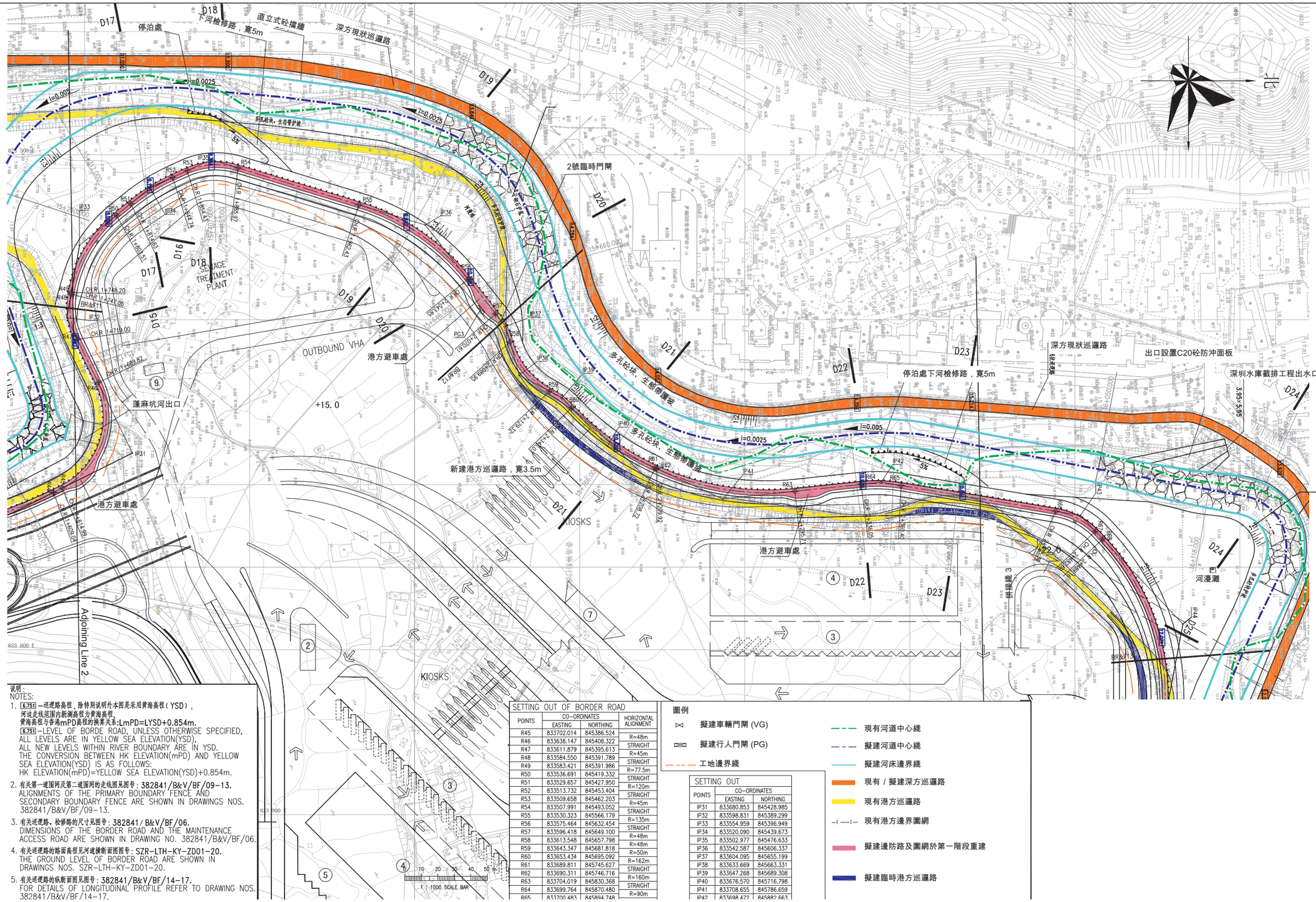

說明：
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4. 有关巡逻路的路面高程见河道横断面图图号：SZR-LTH-KY-ZD01-20. THE GROUND LEVEL OF BORDER ROAD ARE SHOWN IN DRAWINGS NOS. SZR-LTH-KY-ZD01-20.
5. 有关巡逻路的纵断面图见图号：382841/B&V/BF/14-17. FOR DETAILS OF LONGITUDINAL PROFILE REFER TO DRAWING NOS. 382841/B&V/BF/14-17.

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R45	833702.014	845386.524	R=48m
R46	833638.147	845408.322	STRAIGHT
R47	833611.879	845395.613	R=45m
R48	833584.550	845391.789	STRAIGHT
R49	833583.421	845391.986	R=77.5m
R50	833536.691	845419.332	STRAIGHT
R51	833529.657	845427.950	R=120m
R52	833513.732	845453.404	STRAIGHT
R53	833509.658	845462.203	R=45m
R54	833507.991	845493.052	STRAIGHT
R55	833530.323	845566.179	R=135m
R56	833575.464	845632.454	STRAIGHT
R57	833596.418	845649.100	R=48m
R58	833613.548	845657.798	R=48m
R59	833643.347	845681.818	R=50m
R60	833653.434	845695.092	R=162m
R61	833689.811	845745.627	STRAIGHT
R62	833690.311	845746.716	R=160m
R63	833704.019	845830.368	STRAIGHT
R64	833699.764	845870.480	R=90m
R65	833700.483	845894.748	

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP31	833680.853	845428.985
IP32	833598.831	845389.299
IP33	833554.959	845396.949
IP34	833520.090	845439.673
IP35	833502.977	845476.633
IP36	833542.587	845606.337
IP37	833604.095	845655.199
IP38	833633.669	845663.331
IP39	833647.268	845689.308
IP40	833676.570	845716.798
IP41	833708.655	845786.659
IP42	833698.472	845887.663

圖例
- 擬建車輛門閘 (VG)
- 擬建行人門閘 (PG)
- 工地邊界綫
- 現有河道中心綫
- 擬建河道中心綫
- 擬建河床邊界綫
- 現有 / 擬建深方巡邏路
- 現有港方巡邏路
- 現有港方邊界圍網
- 擬建邊防路及圍網於第一階段重建
- 擬建臨時港方巡邏路

深圳市治理深圳河办公室
Drainage Services Department
香港渠务署

圖 2.3

香港側巡邏路及圍網平面佈置圖 (3/5)

FILE: 0101759z8_3
DATE:17/09/2010

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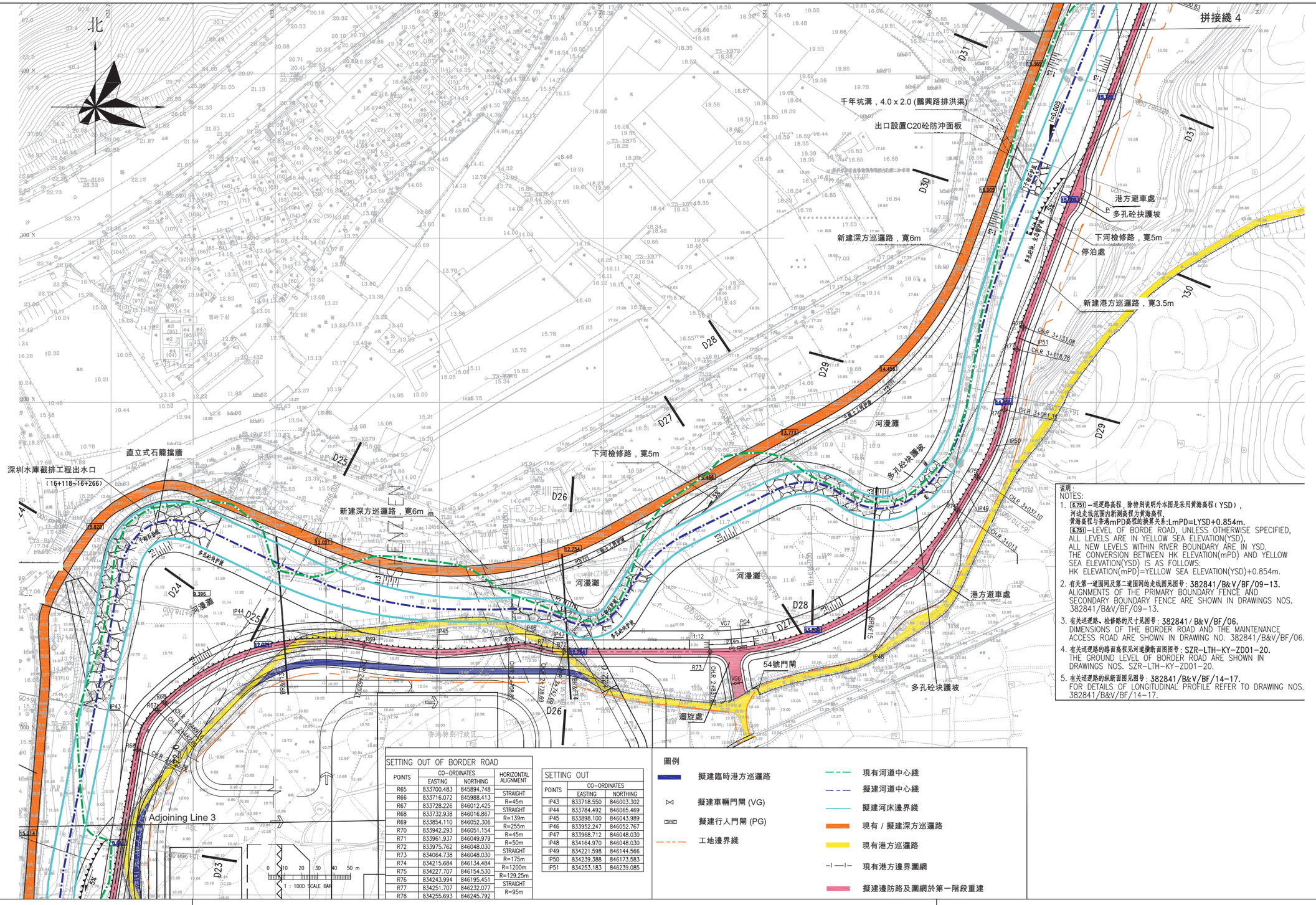
ERM



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3. 有关巡逻路、检修路的尺寸见图号：382841/B&V/BF/06. DIMENSIONS OF THE BORDER ROAD AND THE MAINTENANCE ACCESS ROAD ARE SHOWN IN DRAWING NO. 382841/B&V/BF/06.
4. 有关巡逻路的路面高程见河道横断面图图号：SZR-LTH-KY-ZD01-20. THE GROUND LEVEL OF BORDER ROAD ARE SHOWN IN DRAWINGS NOS. SZR-LTH-KY-ZD01-20.
5. 有关巡逻路的纵断面图见图号：382841/B&V/BF/14-17. FOR DETAILS OF LONGITUDINAL PROFILE REFER TO DRAWING NOS. 382841/B&V/BF/14-17.

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R65	833700.483	845894.748	STRAIGHT
R66	833716.072	845988.413	R=45m
R67	833728.226	846012.425	STRAIGHT
R68	833732.938	846016.867	R=139m
R69	833854.110	846052.306	R=255m
R70	833942.293	846051.154	R=45m
R71	833961.937	846049.979	R=50m
R72	833975.762	846048.030	STRAIGHT
R73	834064.738	846048.030	R=175m
R74	834215.684	846134.484	R=1200m
R75	834227.707	846154.530	R=129.25m
R76	834243.994	846195.451	STRAIGHT
R77	834251.707	846232.077	R=95m
R78	834255.693	846245.792	

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP43	833718.550	846003.302
IP44	833784.492	846065.469
IP45	833898.100	846043.989
IP46	833952.247	846052.767
IP47	833968.712	846048.030
IP48	834164.970	846048.030
IP49	834221.598	846144.566
IP50	834239.388	846173.583
IP51	834253.183	846239.085

圖例
- 擬建臨時港方巡邏路
- 擬建車輛門閘 (VG)
- 擬建行人門閘 (PG)
- 工地邊界綫
- 現有河道中心綫
- 擬建河道中心綫
- 擬建河床邊界綫
- 現有 / 擬建深方巡邏路
- 現有港方巡邏路
- 現有港方邊界圍網
- 擬建邊防路及圍網於第一階段重建

深圳市治理深圳河办公室
Drainage Services Department
香港渠務署

圖 2.4

香港側巡邏路及圍網平面佈置圖 (4/5)

FILE: 0101759z8_4
DATE: 17/09/2010

长江水资源保护科学研究所
CHANGJIANG WATER RESOURCES PROTECTION INSTITUTE

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1. [6.751] –道邊路高程，除特別說明外本圖是采用黃海高程(YSD)，
河道走線范圍內新測高程为黃海高程。
黃海高程与香港mPD高程的換算关系:LmPD=LYSD+0.854m.
[6.751] –LEVEL OF BORDE ROAD, UNLESS OTHERWISE SPECIFIED,
ALL LEVELS ARE IN YELLOW SEA ELEVATION(YSD).
ALL NEW LEVELS WITHIN RIVER BOUNDARY ARE IN YSD.
THE CONVERSION BETWEEN HK ELEVATION(mPD) AND YELLOW SEA ELEVATION(YSD) IS AS FOLLOWS:
HK ELEVATION(mPD)=YELLOW SEA ELEVATION(YSD)+0.854m.
2. 有关第一道圍网及第二道圍网的走线图见图号：382841/B&V/BF/09–13.
ALIGNMENTS OF THE PRIMARY BOUNDARY FENCE AND SECONDARY BOUNDARY FENCE ARE SHOWN IN DRAWINGS NOS. 382841/B&V/BF/09–13.
3. 有关道道路、检修路的尺寸见图号：382841/B&V/BF/06.
DIMENSIONS OF THE BORDER ROAD AND THE MAINTENANCE ACCESS ROAD ARE SHOWN IN DRAWING NO. 382841/B&V/BF/06.
4. 有关道道路的路面高程见河道横断面图图号：SZR–LTH–KY–ZD01–20.
THE GROUND LEVEL OF BORDER ROAD ARE SHOWN IN DRAWINGS NOS. SZR–LTH–KY–ZD01–20.
5. 有关道道路的纵断面图见图号：382841/B&V/BF/14–17.
FOR DETAILS OF LONGITUDINAL PROFILE REFER TO DRAWING NOS. 382841/B&V/BF/14–17.

北

仙湖路排洪渠

River bed protected by armour rock

下河檢修路，寬5m

深方現狀巡邏路

停泊處

下河檢修路，寬5m

迴旋處

新建港方巡邏路，寬3.5m

迴旋處

聚寶路排洪渠
2.51×2.58

出口設置C20砼防沖面板

擬治理工程終點

多孔砼块，生態帶護坡

Cellular Reinforced Concrete eco-friendly slope protection works

新建港方巡邏路，寬3.5m

港方避車處

多孔砼块，生態帶護坡

多孔砼块，生態帶護坡

現狀直立式擋牆

港方避車處

拼接綫 4

0 10 20 30 40 50 m
1 : 1000 SCALE BAR

SETTING OUT OF BORDER ROAD

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	HORIZONTAL ALIGNMENT
R78	834255.693	846245.792	STRAIGHT
R79	834332.002	846449.731	R=386m
R80	834347.207	846484.932	R=397m
R81	834369.578	846540.660	R=50m
R82	834374.128	846550.897	STRAIGHT
R83	834383.129	846566.241	R=45m
R84	834402.022	846583.820	R=125m
R85	834463.617	846651.724	STRAIGHT
R86	834478.516	846691.160	R=110m
R87	834511.873	846737.509	R=184m
R88	834561.101	846799.775	R=105m
R89	834618.793	846852.300	STRAIGHT
R90	834646.647	846862.718	R=55m
R91	834696.765	846856.736	STRAIGHT
R92	834699.988	846854.552	R=175.25m
R93	834765.259	846772.368	STRAIGHT
R94	834777.873	846739.565	R=46m
R95	834778.808	846709.221	STRAIGHT
R96	834774.105	846694.308	R=55m
R97	834806.977	846626.371	R=46m
R98	834825.107	846613.802	STRAIGHT
R99	834842.313	846594.281	R=46m
R100	834857.720	846582.851	STRAIGHT
R101	834881.494	846571.999	R=160m
R102	834898.002	846565.544	STRAIGHT
R103	834902.272	846564.141	

SETTING OUT

POINTS	CO-ORDINATES EASTING	CO-ORDINATES NORTHING
IP52	834338.730	846467.710
IP53	834360.506	846511.948
IP54	834371.276	846546.035
IP55	834389.945	846577.858
IP56	834446.202	846605.633
IP57	834488.966	846718.817
IP58	834543.364	846763.205
IP59	834579.437	846837.581
IP60	834673.251	846872.668
IP61	834745.519	846823.702
IP62	834783.644	846724.557
IP63	834758.506	846644.839
IP64	834817.594	846622.326
IP65	834848.798	846586.924
IP66	834889.569	846568.314

圖例

- 擬建行人門閘 (PG)
- 工地邊界綫
- 現有河道中心綫
- 擬建河道中心綫
- 擬建河床邊界綫
- 現有 / 擬建深方巡邏路
- 現有港方巡邏路
- 現有港方邊界圍網
- 擬建邊防路及圍網於第一階段重建
- 擬建臨時港方巡邏路
- 擬建車輛門閘 (VG)

深圳市治理深圳河办公室

Drainage Services Department
香港渠務署

圖 2.5

香港側巡邏路及圍網平面佈置圖 (5/5)

FILE: 0101759z8_5
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2.3.4 環境美化工程

河道兩岸的環境美化工程會重建天然的河岸生態系統，務求能夠促進當地的生物多樣化程度、保護水資源和避免侵蝕。在設計河道沿線的景觀時，會考慮當地的特點和鄰近地區的土地用途規劃。

2.4 施工計劃

主要工程的施工階段需時 44 個月。本工程項目會包括一份建造香港境內邊界圍網和巡邏路的前期工程合約，施工期從 2012 年 2 月起至 2015 年 1 月止，維時約 36 個月。本工程項目的建議施工計劃展示於*表 2.1*。

表 2.1 施工計劃

	階段	日期	需時	工程說明
1	前期工程	2012 年 2 月至 2015 年 1 月	36 個月	建造香港境內的邊界圍網和邊界巡邏路
2	準備階段	2013 年 3 月至 7 月	5 個月	招標；收回土地
3	準備工程	2013 年 8 月至 9 月	2 個月	建造前往工地的通道和工地辦公室、清理工地、工地準備工程等。
4	施工	2013 年 10 月至 2016 年 12 月	39 個月	本工程項目的主要建築工程，例如疏濬河中沉積物和挖掘泥土、建造深圳境內的滯洪池、邊界圍網和巡邏路、河道改善工程、旱季污水截流工程。
5	善後工程	2017 年 1 月至 2017 年 3 月	3 個月	拆卸各項臨時結構、進行環境美化工程等。

2.5 維修疏濬

根據沉積模擬結果顯示，工程地點內深圳河段的沉積物極少，因爲該河段的縱向坡度較陡峭，而且河段不受潮水影響。因此，預計該段河道只需定期進行小規模的維修疏濬工程（具體頻率會透過運作階段的沉積物監察措施決定），而且，與施工時的建設疏濬工程相比，維修疏濬工程的規模非常小。

在深圳境內的滯洪池內可能需要進行沉積物維修疏濬，並會由深圳方面負責。由於滯洪池只會在雨季發生豪雨時作蓄洪之用，因此，預計沉積物累積的速度會較低。鑑於計劃中的滯洪池只有 2.2 公頃，若需要進行維修疏濬，其規模和挖泥體積都會顯著地少於建造工程的疏濬工程。

3 環境影響摘要

3.1 引言

本節摘述本工程項目在施工和運作時可能造成的環境影響。

3.2 空氣質素

3.2.1 施工階段

在施工階段主要對空氣質素可能產生影響的工程包括：挖掘泥土、建造基堤、旱季污水截流、環境美化工程、重置邊界巡邏路和圍網等工程所產生的建築塵埃，以及疏濬工程和處理河流沉積物時可能發出的氣味。

在實施各項建議的塵埃控制措施和良好工地管理方法後，本工程項目在施工期間將不會對已知的空氣質素敏感受體造成不良的塵埃和空氣質素影響。顧問建議在施工期間進行塵埃監察，以確保本工程項目能夠符合香港空氣質素指標的要求。

一般認爲，已作除污的沉積物對四周環境造成的氣味影響極少。與已除污的沉積物的酸性揮發硫化物濃度相比，在本工程項目地點所收集的沉積物樣本的酸性揮發硫化物濃度比它低得多。被挖出的沉積物會存放在封閉的箱內，並定期運離工地處置。因此，由挖泥和處置河中沉積物而造成的潛在氣味影響將會極少。

3.2.2 運作階段

預計河道和滯洪池只需進行頻率很低的維修疏濬工程，而且規模比建設工程中的疏濬工程小得多。此外，本工程項目所進行的旱季污水截流，會把來自深圳未處理的污水輸送至深圳的污水處理廠（污水現時排入深圳河）。因此預計，在本工程項目竣工後，研究區內的水質和沉積物質量都會有改善。維修時進行疏濬工程和處理沉積物，只會造成極輕微的潛在氣味影響。考慮到疏濬工程的需要不頻密、沉積物的數量和在深圳測運送沉積物的卡車或船隻的數量有限，預計不會造成不良的累積空氣質素影響。

擬於蓮塘／香園圍口岸建造的污水處理廠會完全封閉，而且廠內的氣體亦會經過除臭後才會排出大氣中，因此，預計對已知的空氣質素敏感受體不會受到累積氣味影響。

3.3 施工噪音

本工程項目在施工階段對噪音敏感受體可能造成的噪音影響主要來自施工時使用的機動設備。由於部份噪音敏感受體非常接近本項目的工地，因此需要實施緩解措施來紓緩建築噪音影響。建議採用的緩解措施包括：良好的工地管理方法、採用低噪音機動設備和流動隔音屏障，以及妥善編排機動設備／建築工作的時間。在實施各項緩解措施後，具代表性的噪音敏感受體在整個施工期間所受到的建築噪音，低於 75 分貝(A)的建築噪音準則。顧問建議在施工期間進行噪音監察，以確保本工程項目能夠符合相關的噪音準則。

3.4 水質

是次研究已找出本工程項目在施工和運作期間可能對水質有影響的潛在來源，並運用行之有效的數學模擬方法來評估有關的潛在影響。這項模擬研究評估了多個有關本工程項目在施工時和維修疏濬時釋放污染物（包括懸浮固體、重金屬、營養和微量有機污染物）的假設情況（包括多個最壞情況）；亦評估了在運作期間水流力學情況的變化。

3.4.1 施工階段

根據預測，建議進行的建築工程可能造成的影響大都會局限於特定工地地區。在妥當地實施各項建議的良好施工方法後，預計沉積物的擴散不會對已知的水質敏感受體造成不良的水質影響。

3.4.2 運作階段

顧問預計本工程項目在運作階段對本工程項目地區將會造成良性的水流力學變化，而不會造成任何不良影響。預計各個已知的水質敏感受體都不會因爲本工程項目的運作而受到不良的水質影響。在本工程項目地點內的維修疏濬工程，無論是規模或挖泥體積，都會顯著地少於建設工程中的疏濬工程。因此，本工程項目整體上不會產生不良水質影響。

是次研究亦已考慮蓮塘／香園圍口岸在運作時可能造成的累積水質影響，預計不會產生不良影響。

3.5 陸地生態

顧問在研究區內錄得的生態資源包括十二種生境（林地〔包括風水林〕、種植區、多灌木草地、低窪草地、低窪沼澤草地、荒棄農地、乾旱耕地、水濕耕地、小溪／河流、水道、池塘和已發展地區），其中只有兩種不在本工程項目地點內（多灌木草地和池塘）。這些生境中，低窪草地、乾旱耕地、水濕耕地、水道、池塘和已發展地區（包括道路／小徑）都只具低生態價值；而次生林地和深圳河以外的小溪／河流則具有中等生態價值；風水林具有高等生態價值；其餘生境（種植區、多灌木

草地、荒棄農地、低窪沼澤草地和深圳河）的生態價值則屬低至中等。位於研究區內但在本工程項目地點外的一小段平原河可能是彩鷸的繁殖地，因此具有低至中等生態價值。研究區內共錄得 286 種植物，其中只有一種具有保育價值（牙香樹），是在研究區內的松園下南面次生林地內錄得的。在本工程項目地點內沒有錄得任何具保育價值的植物。

在調查期間，研究區內共錄得 38 種具保育價值的野生動物，包括六種哺乳類動物、二十六種鳥、兩種爬蟲類動物、三種蝴蝶和一種蜻蜓。在這些物種中，只有十三種是在調查期間於本工程項目地點內錄得，其中十二種是流動性非常高的鳥類（褐翅鴉鵑、普通鴛、游隼、黑鳶、池鷺,、夜鷺、蒼鷺、大白鷺、中白鷺、小白鷺、綠翅鴨和白胸苦惡鳥）。另外一種是芒蛺蝶，雖然流動性沒有上述鳥類高，但在附近有很多類似生境可供生存。因此預計，這些物種只會受到較低的影響。

本工程項目會令部份生境永久消失。在施工期間，深圳河會受滋擾，但在河道改善工程完工後，將會形成更多小溪／河流生境（超過 2 公頃）、林地（約 2 公頃）和河岸綠化區（超過 4 公頃）。由於區內的生境只具有較低的生態價值，而且動物種類／多樣性亦偏低，本工程項目的影響會較低。評估結果顯示，在實施各項建議的緩解措施和良好施工方法後，預計不會造成不可接受的生態影響。

3.6 漁業

顧問在本工程項目地點的 500 米研究區內，共找到一個使用中的魚塘和三個已棄用的魚塘。預計本工程項目在施工或運作期間，不會對魚塘的魚類養殖資源造成直接或間接的負面影響。

3.7 廢物管理

3.7.1 施工階段

在施工階段會產生廢物的主要活動包括：挖掘河中沉積物、挖掘泥土、建造河堤、旱季污水截流工程、環境美化工程，以及重置巡邏路和邊界圍網。這些活動可能產生的廢物包括：被挖出的河流沉積物、拆建物料、化學廢物、污水和一般垃圾。

在香港境內的前期工程預計會產生 18,750 立方米的拆建物料。其中約有 15,000 立方米會是惰性物料，但不適合在工地上重用。因此，會棄置於香港的公眾填料接收設施。約有 3,750 立方物的小量建築廢物（非惰性拆建物料）會被棄置於新界東北堆填區。

河道修改和相關工程預計會產生共約 690,200 立方米掘出物料，其中包括 95,000 立方米的河流沉積物和 595,200 立方米的拆建物料。在 95,000 立方米河流沉積物中，約有 27,000 立方米低於化學物質低量值的沉積物

（L類）會被運往珠海的黃茅島處置；而其餘約 68,000 立方米受污染的沉積物（M 類和 H 類）運往香港境內的第 1 類（專用）或和第 2 類海洋棄置設施處置，具體地點則由土木工程拓展署的海洋填料委員會決定。在 595,200 立方米的拆建物料中，約 114,800 立方米的惰性拆建物料會在現場的回填工程或河堤建築工程中重用，而剩餘的拆建物料（約 471,200 立方米）則會運往珠海的黃茅島處置。河道修改和相關工程產生的約 9,200 立方米的建築廢物（非惰性物料）會棄置於深圳的堆填區。

在施工高峰期間（在進行河道修改和相關工程時），每日約會產生 878.5 公斤的一般垃圾（195 公斤來自前期工程，682.5 公斤來自河道修改及相關工程）。這些垃圾會被棄置於深圳的堆填區或香港的新界東北堆填區（前期工程的垃圾）。若能妥當地收集這些一般垃圾，並定期加以處置，本工程項目將不會對環境造成任何不良影響。

對於化學廢物，會按照《包裝、處理及存放化學廢物的工作守則》予以處理。前期工程所產生的化學廢物，會由持牌化學廢物收集商收集，並運往化學廢物處理設施處置。河道修改和相關工程所產生的化學廢物會被收集，並運往深圳的持牌危險廢物處理設施處置。

在實施一般良好工地管理方法後，本工程項目在施工期間處理、運送和處置廢物時，將不會對環境造成不良影響。

3.7.2 運作階段

本工程項目在運作期間，會爲河道和滯洪池進行維修疏濬工程。由於疏濬工程的工程規模較小，預計沉積物的數量會少於施工階段的疏濬工程產生的沉積物體積。在棄置和處理被挖出的物料時，會遵照《環境運輸及工務局 34/2002 號技術通告》的要求。

在實施一般良好工地管理方法後，本工程項目在運作期間處理、運送和棄置廢物時，將不會對環境造成不良影響。

3.8 土地污染

在進行工地調查時，顧問發現工程地區附近有數個潛在的商業及工業發展地點，其中包括：已棄用的禽畜農場、苗圃、非營運中的工業設施（腐竹廠）及其煙囪、警署及其危險品儲存室，以及爲平原河而設的抽水站。是次研究評估了這些設施對項目地區造成土地污染的風險，並發現只有一個地點需要進行工地勘察，以確定泥土是否已受污染。根據土壤分析結果顯示，可能受到土地污染的地點沒有顯著的污染情況。所有參數的測試結果都低於相應的《按風險釐定的污染整治標準－鄉郊住宅》指標。由於在 3 米（地面以下）的取樣深度處沒有任何地下水，因此沒有收集任何地下水樣本。在處理被掘出的泥土時不會對人類構成任何風險，因此無需對泥土進行深入評估或除污。

基於上述結果，預計預計本工程項目不會產生來自污染泥土的潛在影響。

3.9 文化遺產影響

文獻檢閱和實地調查都沒有在本工程項目的文化遺產影響評估研究區內發現任何法定古蹟和政府文物地點。在文化遺產影響評估研究區內共發現五座已評級的歷史建築、一座無級別歷史建築、十六座歷史結構、七個墳墓和四個文化／歷史景觀特色；並在本工程項目的竹園和白虎山地區的考古調查中，發現次生考古堆積。至於本工程項目的其他地區並沒有考古潛質，預計不受工程影響。如本工程項目在詳細設計期間修改施工範圍而該範圍又未有進行過評估的話，項目倡議人須要重新探討是否需要再進行考古調查及其影響評估，以及諮詢古物古蹟辦事處之意見。

然而，已知的建築文物特色地點都遠離本工程項目地點，因此不會直接或間接地受到本工程項目的影響。本工程項目在施工和運作階段都無需實施任何緩解或監察措施。

考古調查在本工程項目的竹園和白虎山地區只發現次生考古堆積，找到原生考古堆積的機會很低。因此本工程項目預計不會對重要的考古資源構成潛在影響，亦不需要進行考古監察。根據「古物及古蹟條例」的要求，倘若在進行挖掘工程時發現古物或假定古物，項目倡議人應該馬上通知古物古蹟辦事處。

3.10 景觀及視覺影響

景觀影響方面，是次研究在研究區內共發現十八個景觀資源和四個景觀特色區。其中有八個景觀資源/景觀特色區可能會受到輕微或中等程度的影響。

景觀特色區 LCA4（自然河流和洪泛平原景觀 ）、景觀資源 LR2（天然河溪）和 LR8(低地灌木草原)可能會受到中等程度的剩餘負面景觀影響。

景觀特色區 LCA1（定居農業低地景觀）、景觀資源 LR4（山坡林地）、LR5（低地林地）、LR9（耕地）和 LR10（荒棄農地）可能會受到輕微的剩餘負面景觀影響。

在運行期的第一天，實施緩解措施後，有一個景觀特色區及兩個景觀資源(包括景觀特色區 LCA4（自然河流和洪泛平原景觀 ）、景觀資源 LR2（天然河溪）和 LR8(低地灌木草原))可能會受到中等程度的剩餘負面影響；有五個景觀特色區／景觀資源(包括景觀特色區 LCA1（定居農業低地景觀）、景觀資源 LR4（山坡林地）、LR5（低地林地）、LR9（耕地）和 LR10（荒棄農地）)可能會受到輕微的剩餘負面景觀影響；其餘十三個景觀特色區／景觀資源(包括景觀特色區 LCA2（自然植被山坡景觀）、

LCA 3（經修直河道景觀）、景觀資源 LR1（經修直水道）、LR3（池塘）、LR6（風水林）、LR7（山坡上的灌木草地）、LR11（商業農場）、LR12（村區）、LR13（傳統村落區）、LR14（荒廢村區）、LR15（寺廟）、LR16（郊區建築 /露天貨倉區）和 LR17 （發展中區），但不包括而景觀資源 LR8（道路））可能會受到微不足道的剩餘負面影響；而景觀資源 LR8（道路）如果不是有少許正面的影響則是微不足道的負面影響。在運行期的第十年，當所有自然和人工種植的植物有足夠時間成長後，所有景觀特色區／景觀資源均會受到輕微或微不足道的剩餘影響，而對景觀資源 LR8（道路）的影響如果不是維持少許正面的影響則是微不足道。

其它景觀特色區/景觀資源只會受到微不足道的剩餘影響。

視覺影響方面，是次視野範圍內共找到 5 個視覺敏感受體，來自兩個類別（居民和道路使用者），並被確定爲具代表性的視覺敏感受體。本研究已在三個覺敏感受體位置製作了集成照片，展示本工程項目對這些視覺敏感受體構成的視覺影響。另外，有兩個計劃中的視覺敏感受體也被納入是次研究，分別是重置後的竹園村和將來經新口岸過境的旅客。

在施工期實施緩解措施後，三個視覺敏感受體(包括打鼓嶺村居民、較寮村居民和現時的竹園村居民)可能會受到中等程度的剩餘影響。另外，三個視覺敏感受體(包括蓮麻坑路的道路使用者、松園下居民和重置後的竹園村居民)則可能會受到輕微的剩餘影響。施工期的影響評估不適用於一個視覺敏感受體(經新口岸過境的旅客)，因爲該視覺敏感受體在施工期尚未出現。

在運行期的第一天，實施所建議的視覺緩解措施後將有四個視覺敏感受體（包括打鼓嶺村居民、較寮村居民、蓮麻坑路使用者和如果未被重置的竹園村居民）受到輕微的剩餘影響；兩個視覺敏感受體（包括松園下居民和重置後的竹園村居民）受到微不足道的剩餘影響。此時新口岸則尚未運行，因此對於經新口岸過境的旅客的視覺影響將不適用。在運行期的第十年，當所有自然和人工種植的植物有足夠時間成長後，所有視覺敏感受體(包括於已運行的新口岸的過境旅客)均會受到微不足道的剩餘影響。

根據《環評技術備忘錄》附件 10 的要求，這些景觀及視覺影響評估結果在實施緩解措施後屬可以接受。

3.11 環境監察與審核要求

是次研究建議在進行河道修改及相關工程時，在指定的敏感受體處監察塵埃、噪音和水質。此外，在河道修改及相關工程和前期工程的整個施工期間，必須進行實地環境審核，以確保各項建議緩解措施均得到執行和完成的綠化種植在一年的保養期內得到監測。

本工程項目將會在項目運作期間進行鳥類監測計劃，以監察被重置或恢復的生境。在完成綠化種植後，項目會對於鳥類的出沒及數目進行一年的監測。

3.12 總結

是次環境影響評估認爲，若能實施各項建議的緩解措施，本工程項目的施工和運作都不會對環境造成不可接受的影響。