Appendix III

Drainage Proposal



Proposed Temporary Warehouse (excl. D.G.G.) with Ancillary Facilities and Associate Filling of Land for a Period of 3 Years in "Agriculture" Zone, Lots 1161 (Pt.) and 1163 (Pt.) in D.D. 109, Kam Tin, Yuen Long, New Territories

Drainage Proposal

Oct 2025 r2



Proposed Temporary Warehouse (excl. D.G.G.) with Ancillary Facilities and Associate Filling of Land for a Period of 3 Years in "Agriculture" Zone, Lots 1161 (Pt.) and 1163 (Pt.) in D.D. 109, Kam Tin, Yuen Long, New Territories

Drainage Proposal

2

2

Table of Contents

1	Intro	duction	1
		Background	
		Application Site	
2		lopment Proposal	
		The Proposed Development	
3		ssment Criteria	
		osed Drainage System	
		Proposed Channels	
		lusion	
Li	ist of	Table	

List of Figure

Figure 1 – Site Location Plan

Figure 2 – Existing Drainage Plan

Figure 3- Proposed Drainage System

Table 1 - Key Development Parameters

Table 2- Design Return Periods under SDM

Figure 4 – Catchment Plan

Figure 5 – Sections

List of Appendix

Appendix A – Design Calculation

Appendix B - Development Layout Plan

Appendix C - Reference Drawings

Appendix D – Site Photo

Proposed Temporary Warehouse (excl. D.G.G.) with Ancillary Facilities and Associate Filling of Land for a Period of 3 Years in "Agriculture" Zone, Lots 1161 (Pt.) and 1163 (Pt.) in D.D. 109, Kam Tin, Yuen Long, **New Territories**

Drainage Proposal

1 Introduction

1.1 Background

- 1.1.1 The applicant seeks planning permission from the Town Planning Board (the Board) to use Lots 1161 and 1163 (Part) in D.D. 109, Kam Tin, Yuen Long, New Territories (the Site) for 'Proposed Temporary Warehouse (excluding Dangerous Goods Godown (D.G.G.)) with Ancillary Facilities and Associated Filling of Land for a Period of 3 Years'.
- 1.1.2 This report aims to support the development in drainage aspect.

1.2 Application Site

- 1.2.1 The application site is located at the north of Chi Ho Road. It has an area of approx. 2,285 m². The site location is shown in Figure 1.
- 1.2.2 Existing levels are approximately +4.6 mPD. The site would be concreted for not more than 0.2m for formation of structure and maneuvering of vehicle. No major site formation of the Application Site is anticipated.
- 1.2.3 There is an existing approx.. 2m width watercourse at the north and west of the site which will eventually discharge to Kam Tin River. Figure 2 indicates the existing drainage system of the area.

1

Proposed Temporary Warehouse (excl. D.G.G.) with Ancillary Facilities and Associate Filling of Land for a Period of 3 Years in "Agriculture" Zone, Lots 1161 (Pt.) and 1163 (Pt.) in D.D. 109, Kam Tin, Yuen Long, **New Territories**

Drainage Proposal

2 Development Proposal

2.1 The Proposed Development

2.1.1 The total site area is approximately 3,507 m². The catchment plan is shown in Figure 4.

Proposed Development Area (Approx.)							
Total Site Area (m²)	2,285						
Paved Area after Development (m²)	2,264						
Unpaved Area after Development (m²)	21						
Assume the Paved Area after development is 2 assessment purpose	2,285 m ² for						

Table 1 - Site Development Area

3 Assessment Criteria

3.1.1 The Recommended Design Return Period based on Flood Level from SDM (Table 10) is adopted for this report. The recommendation is summarized in Table 2 below.

Description	Design Return Periods
Intensively Used Agricultural Land	2 – 5 Years
Village Drainage Including Internal Drainage System under a polder Scheme	10 Years
Main Rural Catchment Drainage Channels	50 Years
Urban Drainage Trunk System	200 Years
Urban Drainage Branch System	50 Years

Table 2- Design Return Periods under SDM

The proposed drainage system intended to collect runoff from internal site and external catchment. 3.1.2 1 in 10 years return period is adopted.

2

Proposed Temporary Warehouse (excl. D.G.G.) with Ancillary Facilities and Associate Filling of Land for a Period of 3 Years in "Agriculture" Zone, Lots 1161 (Pt.) and 1163 (Pt.) in D.D. 109, Kam Tin, Yuen Long, New Territories

Drainage Proposal

- 3.1.3 Stormwater drainage design will be carried out in accordance with the criteria set out in the Stormwater Drainage Manual published by DSD. The proposed design criteria to be adopted for design of this stormwater drainage system and factors which have been considered are summarised below.
 - 1. Intensity-Duration-Frequency Relationship The Recommended Intensity-Duration-Frequency relationship is used to estimate the intensity of rainfall. It can be expressed by the following algebraic equation.

$$i = \frac{a}{(t_d + b)^c}$$

The site is located within the HKO Zone. Therefore, for 10 years return period, the following values are adopted.

a =
$$485$$

b = 3.11
c = 0.397

(Corrigendum No.1/2024)

The development is proposed for temporary use for a period of 3 years. 11.1% rainfall increase due to climate change is considered.

2. The peak runoff is calculated by the Rational Method i.e. $Q_p = 0.278CiA$

where Q_p = peak runoff in m³/s C = runoff coefficient (dimensionless) i = rainfall intensity in mm/hr A = catchment area in km²

- 3. The run-off coefficient (C) of surface runoff are taken as follows:
 - Paved Area: C = 0.95
 Unpaved Area: C = 0.35

Drainage Proposal

4. Manning's Equation is used for calculation of velocity of flow inside the channels:

Manning's Equation:
$$v = \frac{R^{\frac{1}{6}}}{n} R^{\frac{1}{2}} S_f^{\frac{1}{2}}$$

Where,

V = velocity of the pipe flow (m/s)

S_f = hydraulic gradient

n = manning's coefficient

R = hydraulic radius (m)

5. Colebrook-White Equation is used for calculation of velocity of flow inside the pipes:

Colebrook-White Equation:
$$\underline{v} = -\sqrt{32gRS} \log \log \left(\frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS_f}}\right)$$

where,

V = velocity of the pipe flow (m/s)

S_f = hydraulic gradient k_f = roughness value (m)

v = kinematics viscosity of fluid

D = pipe diameter (m) R = hydraulic radius (m)

Oct-25 4

Proposed Temporary Warehouse (excl. D.G.G.) with Ancillary Facilities and Associate Filling of Land for a Period of 3 Years in "Agriculture" Zone, Lots 1161 (Pt.) and 1163 (Pt.) in D.D. 109, Kam Tin, Yuen Long, **New Territories**

Drainage Proposal

4 Proposed Drainage System

4.1. Proposed Channels

- 4.1.1 Proposed channels are designed for collection of runoff for application site. It is proposed to discharge to existing approx. 2m width watercourse which eventually discharge to existing Kam Tin River. According to the checking of existing drains in Appendix A, it have enough capacity to carry the flow from proposed development.
- 4.1.2 The design calculations of proposed drains are shown in Appendix A. Checking of utilization of existing approx. 2m width watercourse is also indicated in Appendix A. It is shown that the utilization is only about 5%.
- 4.1.3 The alignment, size, gradient and details of the proposed drains are shown in Figure 3. The catchment plan is shown in Figure 4.
- 4.1.5 Reference Drawings are shown in **Appendix C** for reference.

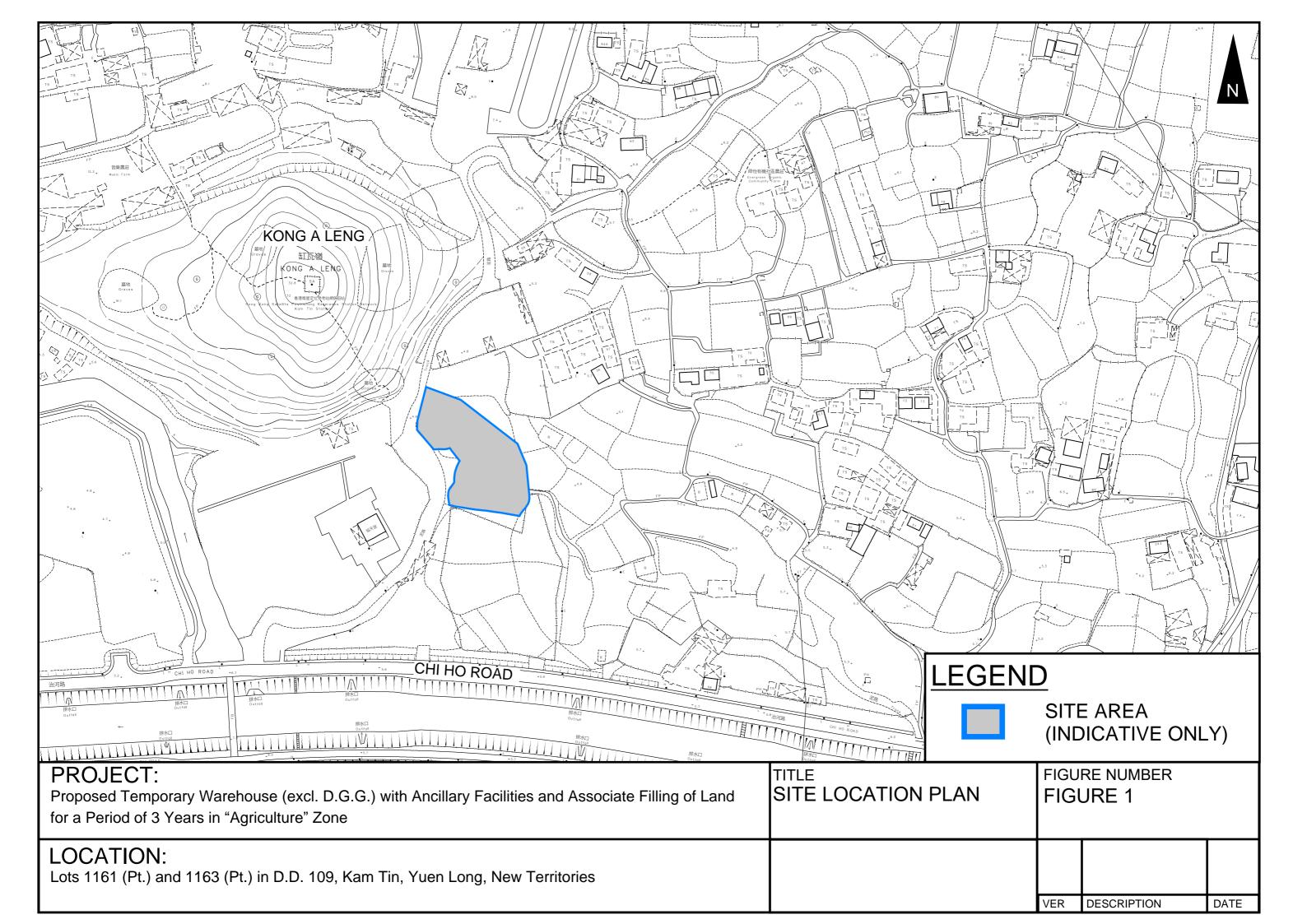
5 Conclusion

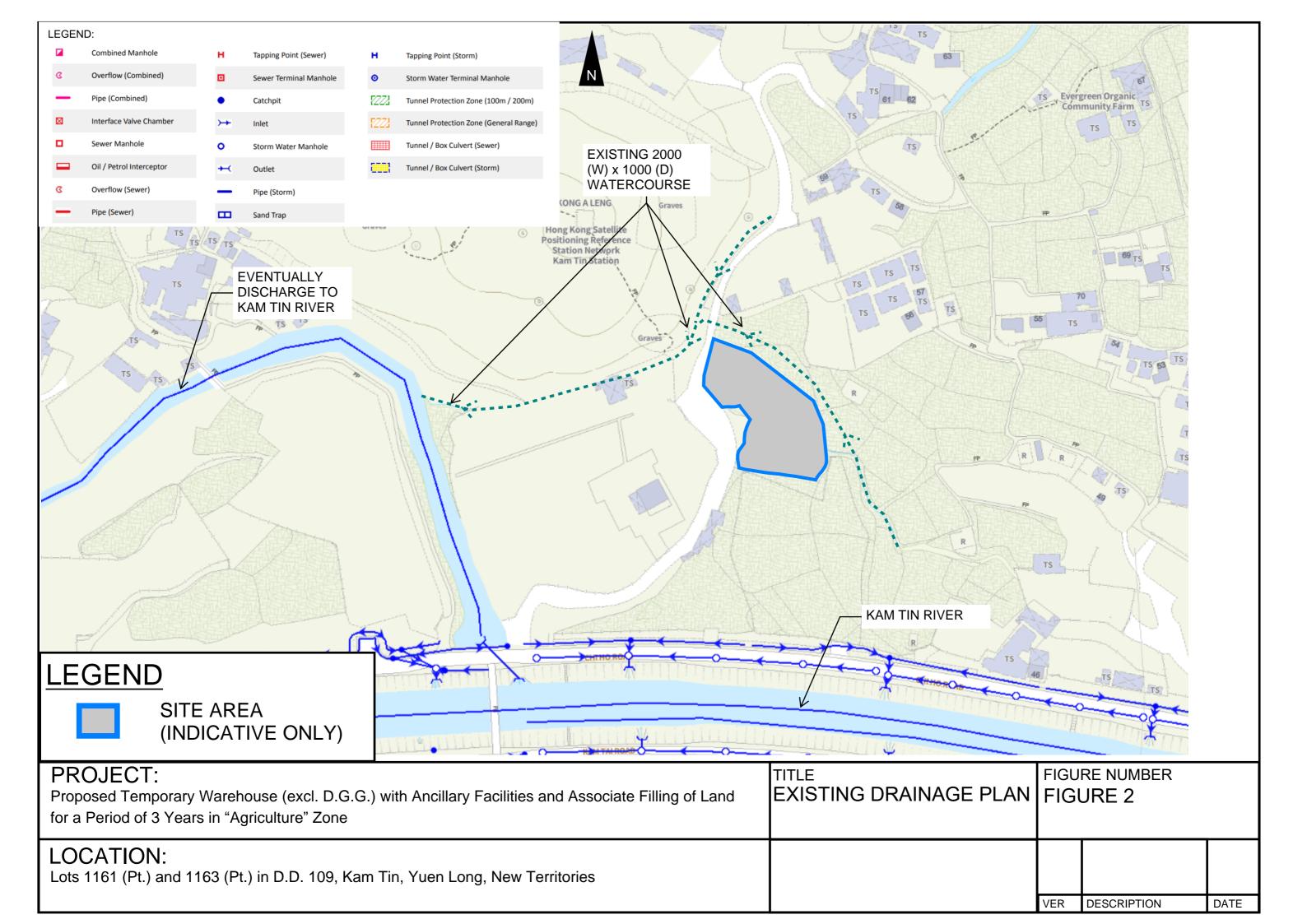
- Drainage review has been conducted for the Proposed Development. The surface runoff will be collected by the proposed drains and discharged to existing watercourse.
- With implementation of the above drainage system, no unacceptable drainage impact is anticipated. 5.1.2

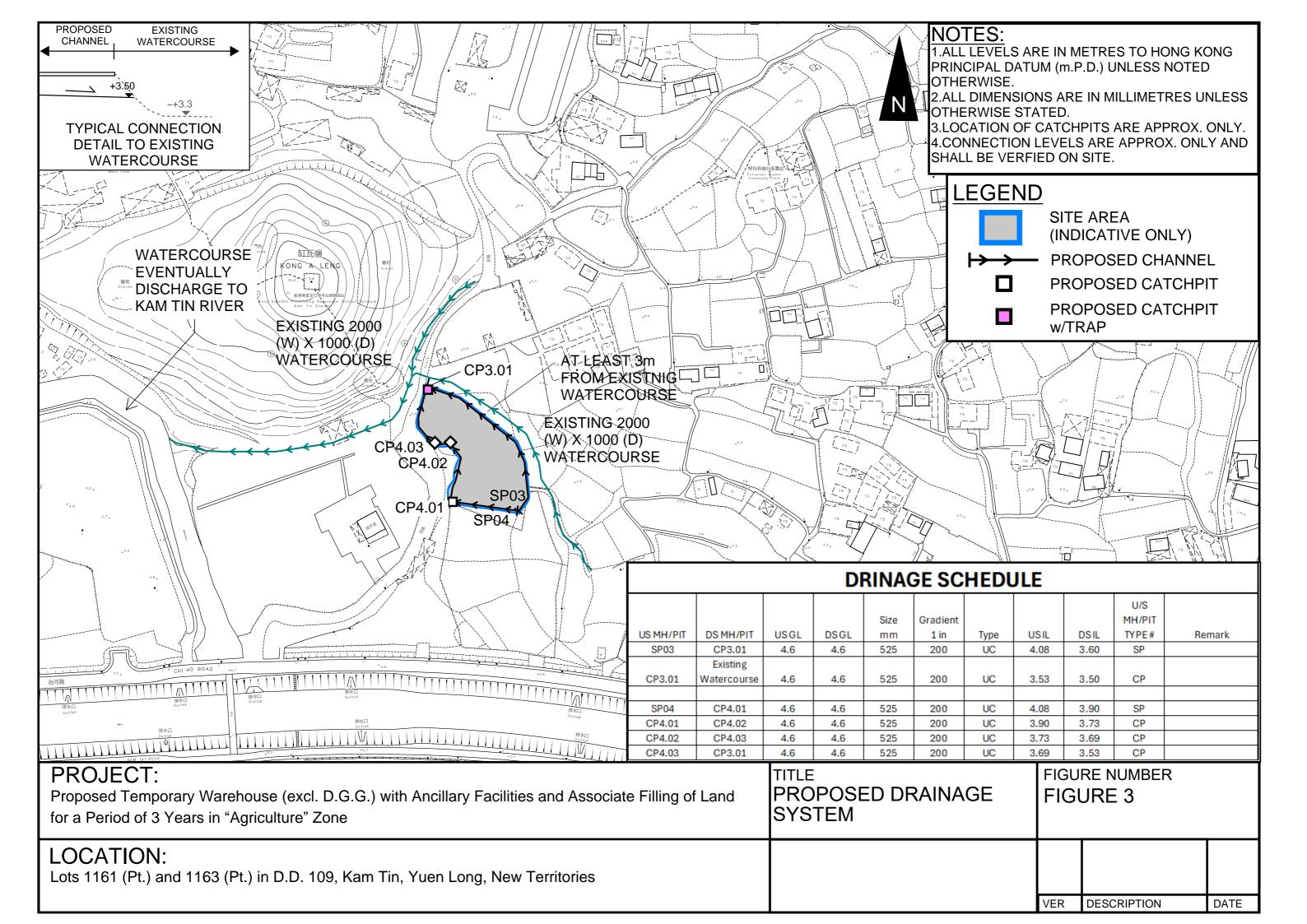
End of Text -

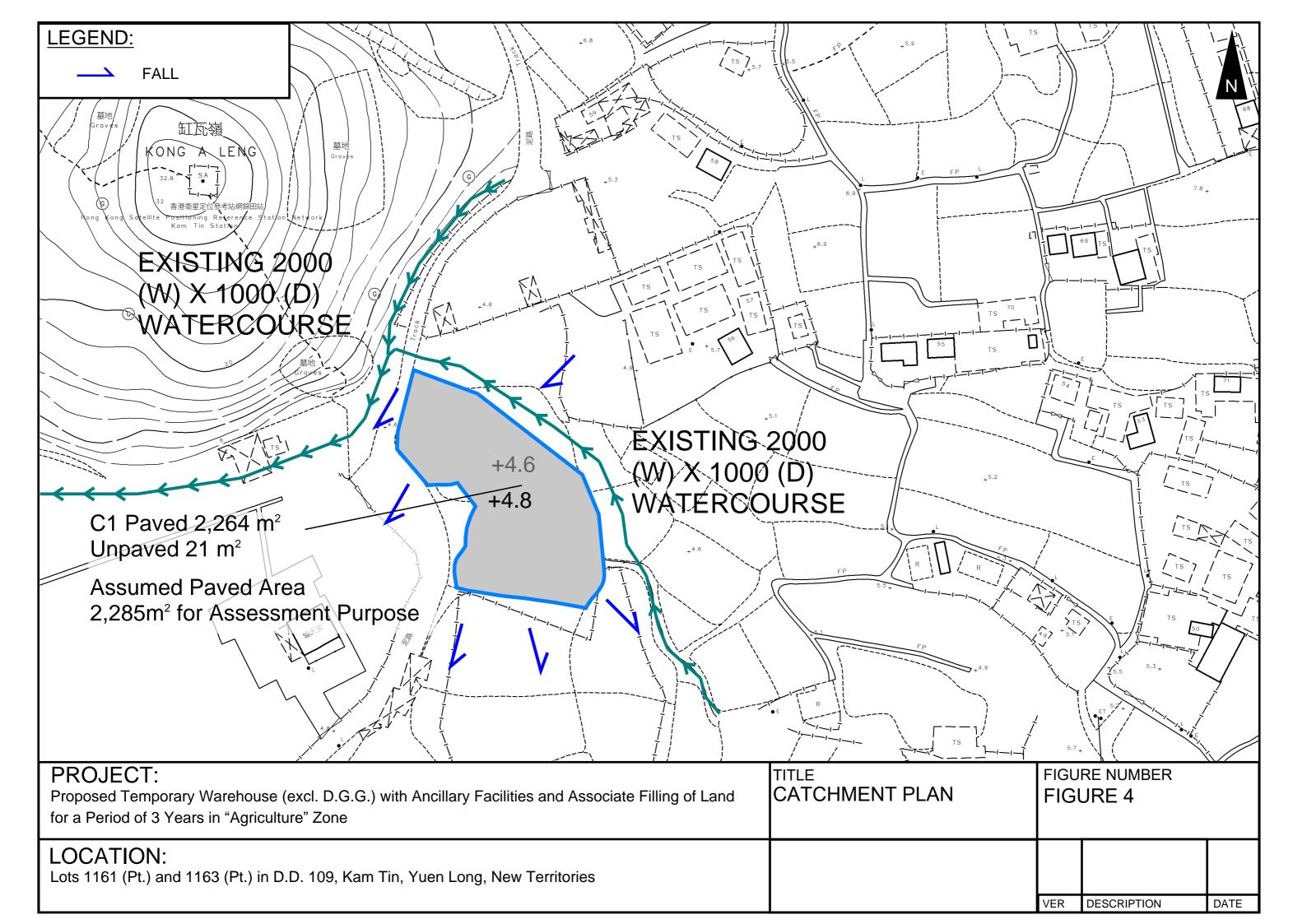
5

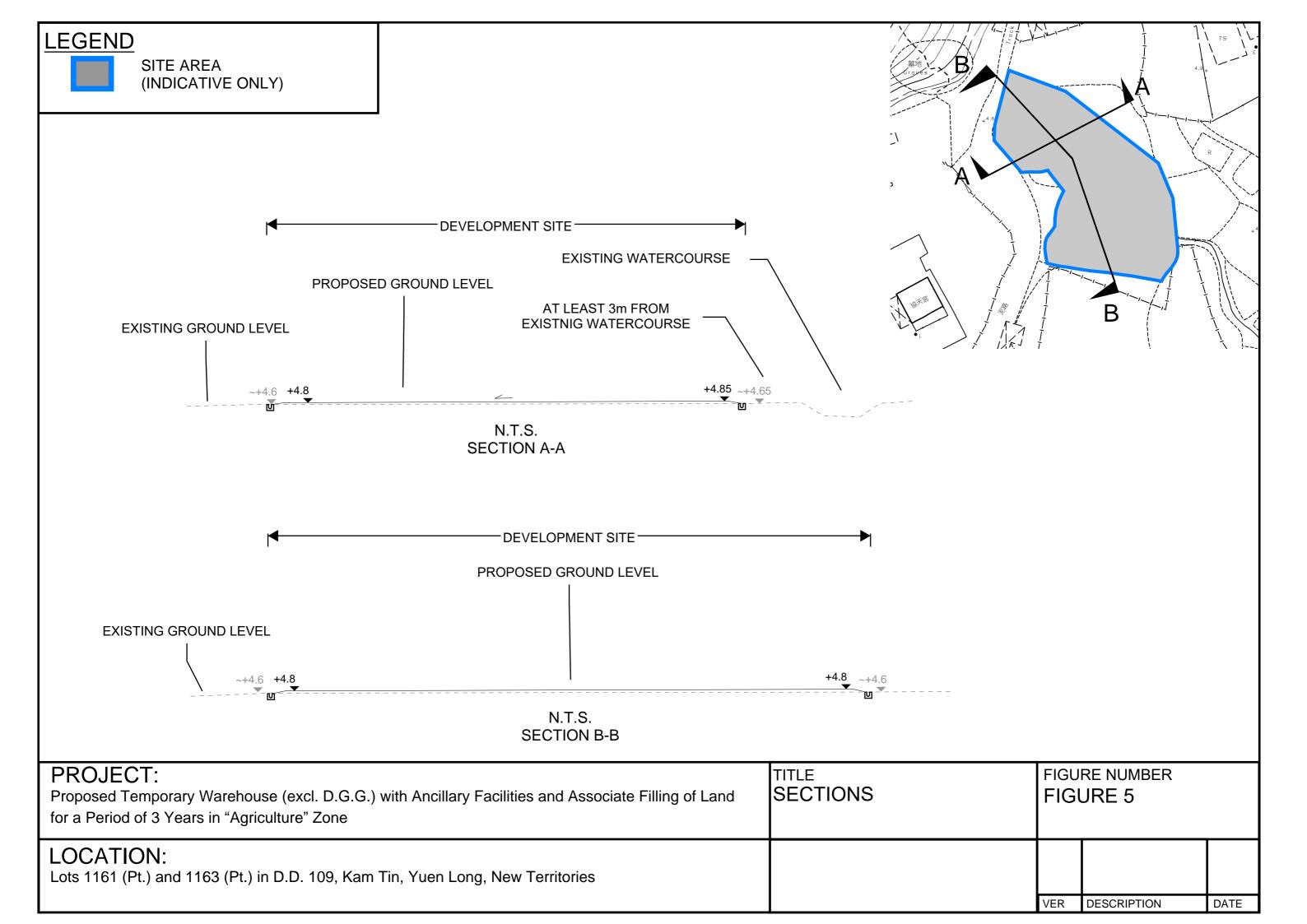
FIGURES











APPENDIX

Appendix A: Design Calculation

Zone

НКО

Return Period	1 in	10	years

n	0.014
Ks	0.15
Viscosity	0.000001

	НКО а	485
Storm Constant	НКО Ь	3.11
	НКО с	0.397

Catchment Area Table (Area in m²)

Catchment	C1									
Total Area	2285									
Hard Paved Area	2285									
Unpaved Area	0									
Equival. Area	2170.75									

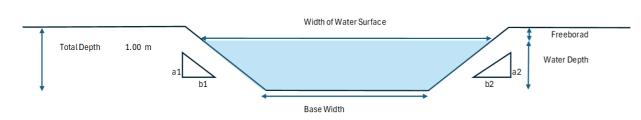
Pavement Type	Hard Paved	Unpaved				
Runoff Coefficient	0.95	0.35				

Calculation Table of Drainage System

Calculation Table (accutation rable of Drainage System																		
US MH/PIT	DS MH/PIT	US GL	DS GL	Size	Gradient	Туре	US IL	DS IL	U/S MH/PIT	Length	V	Capacity	Catchments	Total Equivalent Area	ToC	Intensity	Total	Utilitizatio	Remark
				mm	1 in				TYPE#	m	m/s##	m³/s		m ²	min	mm/hr ##	Discharge	n	
																	m³/s		
SP03	CP3.01	4.60	4.60	525	200	UC	4.08	3.60	SP	94.5	1.62	0.40	C1	2170.75	1.50	294	0.18	44.4%	
CP3.01	Existing Watercourse	4.60	4.60	525	200	UC	3.53	3.50	CP	4.9	1.62	0.40	C1	2170.75	2.63	269	0.16	40.7%	
SP04	CP4.01	4.60	4.60	525	200	UC	4.08	3.90	SP	35.5	1.62	0.40	C1	2170.75	1.50	294	0.18	44.4%	
CP4.01	CP4.02	4.60	4.60	525	200	UC	3.90	3.73	CP	33.2	1.62	0.40	C1	2170.75	1.86	285	0.17	43.0%	
CP4.02	CP4.03	4.60	4.60	525	200	UC	3.73	3.69	CP	8.5	1.62	0.40	C1	2170.75	2.21	278	0.17	41.9%	
CP4.03	CP3.01	4.60	4.60	525	200	UC	3.69	3.53	CP	32.8	1.62	0.40	C1	2170.75	2.29	276	0.17	41.7%	

#SP: Start Point

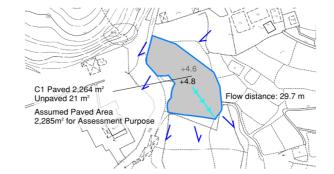
Capacity Checking existing watercourse for flow from Proposed Development Area



a1	1	
b1	1.0	
a2	1	
b2	1.0	
Total Depth	1.00	m
Base Width	1.00	m
Assumed Water Depth	0.70	m
Freeboard	0.30	m

Time of Concentration Checking

Catchment	Flow Distance	Highest Level	Lowest Level	Gradient (per 100m) = (H1-H2)/L x 100	to (min) = 0.14465L/ (H ^{0.2} A ^{0.1})	tc = to + tf
Α	L	H1	H2			
(m2)	(m)	(mPD)	(mPD)		(min)	(min)
2285	29.7	4.8	4.6	4.600	1.5	1.5

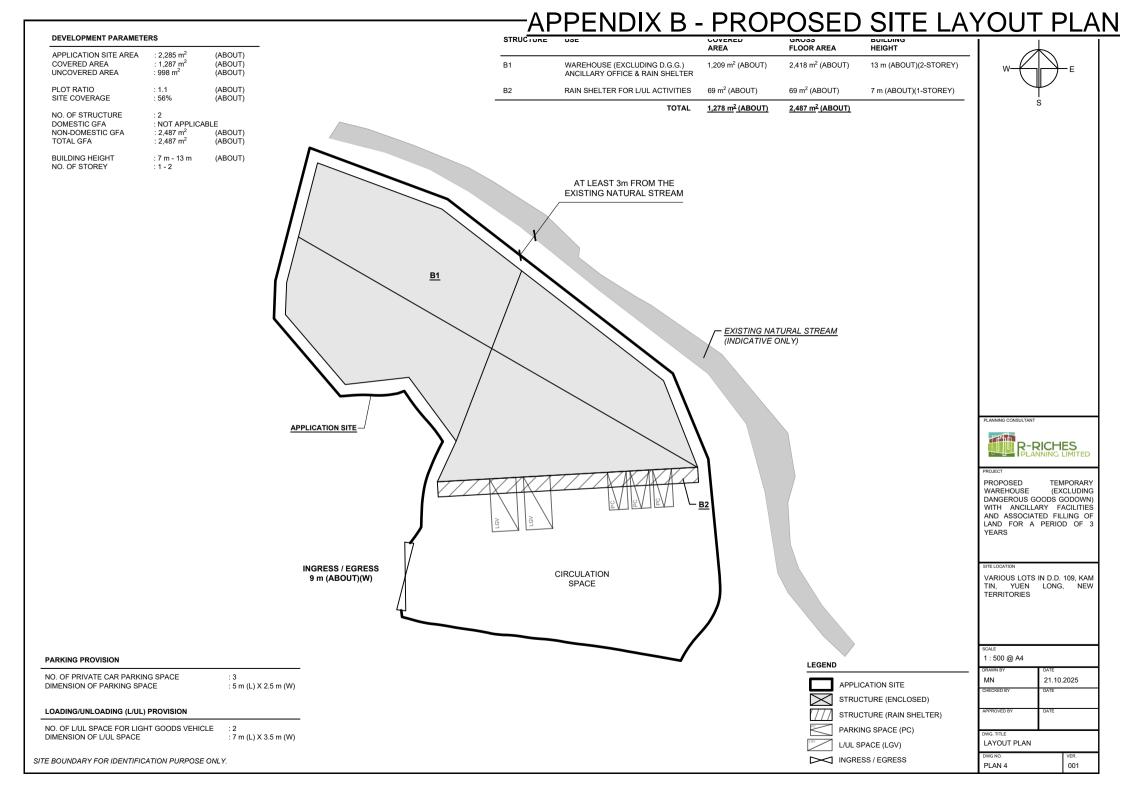


Assumed Water Depth	Freeboard	Base Width	Width of Water Surface	Flow Area	Wetted Perimeter	Hydralic Radius	Manning's Roughness	Gradient	Velocity	Capacity
m	m	m	m	m ²	m	m		1 in	m/s	m ³ /s
0.70	0.30	1.00	2.40	1.19	2.98	0.40	0.014	200	2.74	3.26

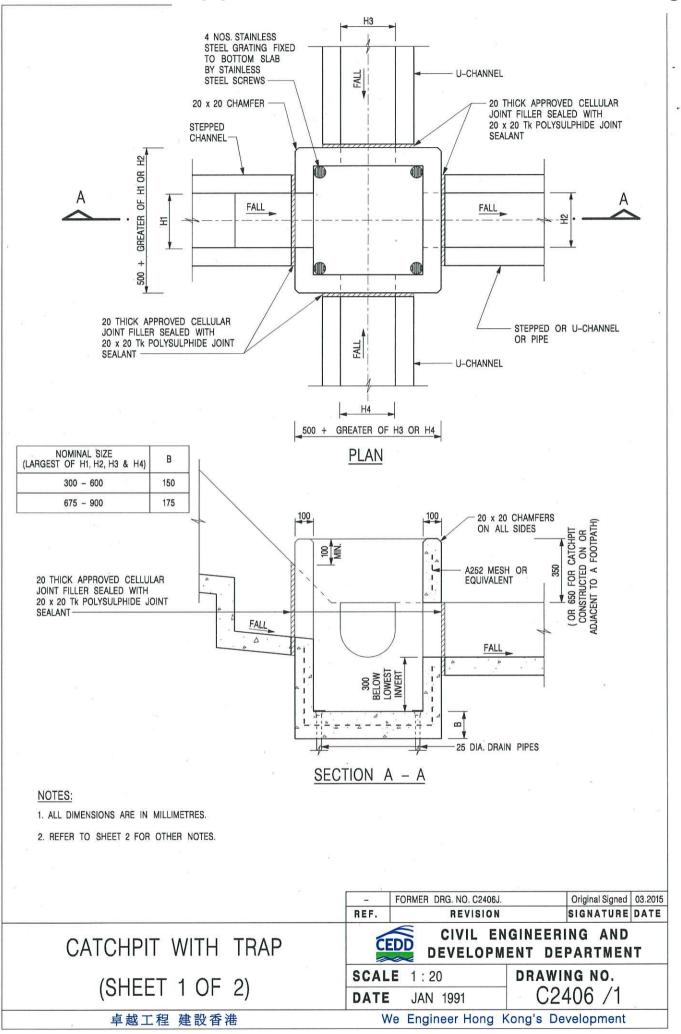
Total Flow due to the application = $0.16 \text{ m}^3/\text{s}$ Utilization Rate = 4.99%

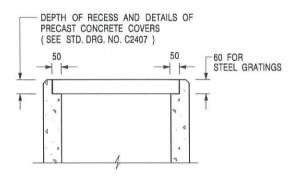
Total flow due to the Application Site only occupy 4.99% of the existing Channel/ Watercourse.

^{## :} With 11.1% rainfall increase as per Table 28 of SDM Corrigendum No. 1/2022.



Appendix C - Reference Drawings





ALTERNATIVE TOP SECTION FOR PRECAST CONCRETE COVERS / GRATINGS

NOTES:

- 1. ALL DIMENSIONS ARE IN MILLIMETRES.
- 2. ALL CONCRETE SHALL BE GRADE 20 /20.
- 3. CONCRETE SURFACE FINISH SHALL BE CLASS U2 OR F2 AS APPROPRIATE.
- 4. FOR DETAILS OF JOINT, REFER TO STD. DRG. NO. C2413.
- 5. CONCRETE TO BE COLOURED AS SPECIFIED.
- UNLESS REQUESTED BY THE MAINTENANCE PARTY AND AS DIRECTED BY THE ENGINEER, CATCHPIT WITH TRAP IS NORMALLY NOT PREFERRED DUE TO PONDING PROBLEM.
- 7. UPON THE REQUEST FROM MAINTENANCE PARTY, DRAIN PIPES AT CATCHPIT BASE CAN BE USED BUT THIS IS FOR CATCHPITS LOCATED AT SLOPE TOE ONLY AND AS DIRECTED BY THE ENGINEER.
- FOR CATCHPITS CONSTRUCTED ON OR ADJACENT TO A FOOTPATH, STEEL GRATINGS (SEE DETAIL 'A' ON STD. DRG. NO. C2405 /2) OR CONCRETE COVERS (SEE STD. DRG. NO. C2407) SHALL BE PROVIDED AS DIRECTED BY THE ENGINEER.
- 9. IF INSTRUCTED BY THE ENGINEER, HANDRAILING (SEE DETAIL 'J' ON STD. DRG. NO. C2405 /5; EXCEPT ON THE UPSLOPE SIDE) IN LIEU OF STEEL GRATINGS OR CONCRETE COVERS CAN BE ACCEPTED AS AN ALTERNATIVE SAFETY MEASURE FOR CATCHPITS NOT ON A FOOTPATH NOR ADJACENT TO IT. TOP OF THE HANDRAILING SHALL BE 1 000 mm MIN. MEASURED FROM THE ADJACENT GROUND LEVEL.
- 10. MINIMUM INTERNAL CATCHPIT WIDTH SHALL BE 1 000 mm FOR CATCHPITS WITH A HEIGHT EXCEEDING 1 000 mm MEASURED FROM THE INVERT LEVEL TO THE ADJACENT GROUND LEVEL. AND, STEP IRONS (SEE DSD STD. DRG. NO. DS1043) AT 300 c/c STAGGERED SHALL BE PROVIDED. THICKNESS OF CATCHPIT WALL FOR INSTALLATION OF STEP IRONS SHALL BE INCREASED TO 150 mm.
- FOR RETROFITTING AN EXISTING CATCHPIT WITH STEEL GRATING, SEE DETAIL 'G' ON STD. DRG. NO. C2405 /4.
- SUBJECT TO THE APPROVAL OF THE ENGINEER, OTHER MATERIALS CAN ALSO BE USED AS COVERS / GRATINGS.

	REF.	REVISION	SIGNATURE	DATE
	-	FORMER DRG. NO. C2406J.	Original Signed	03.2015
	Α	MINOR AMENDMENT.	Original Signed	04.2016

CATCHPIT WITH TRAP (SHEET 2 OF 2)

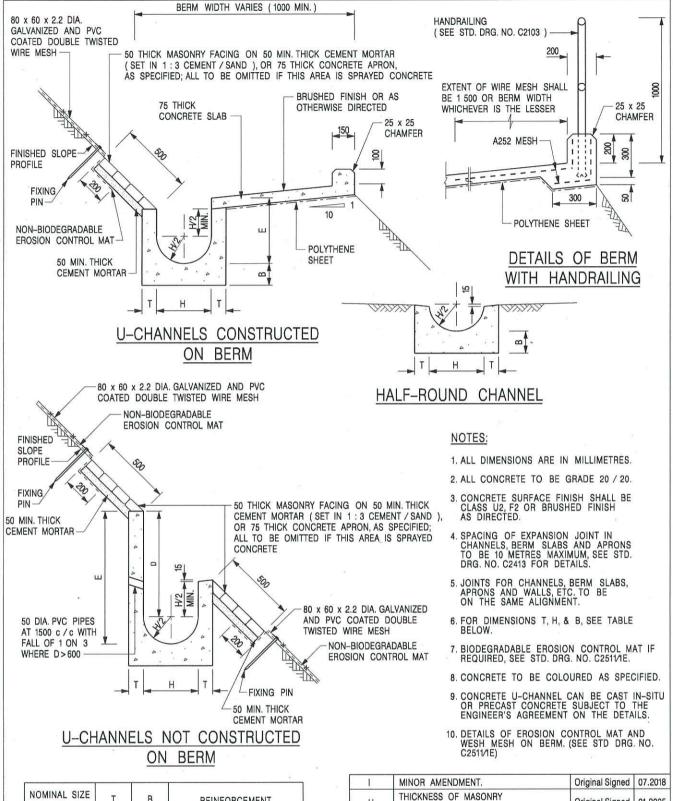


CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1:20 **DATE** JAN 1991

drawing no. C2406 /2A

卓越工程 建設香港



NOMINAL SIZE H	T	В	REINFORCEMENT
300	80	100	A252 MESH PLACED CENTRALLY AND T=100
375 - 600	100	150	WHEN E>650
675 - 900	125	175	A252 MESH PLACED CENTRALLY

REF.	REVISION	SIGNATURE	DATE
В	MINOR AMENDMENTS.	Original Signed	3.94
С	150 x 100 UPSTAND ADDED AT BERM.	Original Signed	6.99
D	MINOR AMENDMENT.	Original Signed	08.2001
E	DRAWING TITLE AMENDED.	Original Signed	11.2001
F	GENERAL REVISION.	Original Signed	12.2002
G	MINOR AMENDMENT.	Original Signed	01.2004
Н	THICKNESS OF MASONRY FACING AMENDED.	Original Signed	01.2005
1	MINOR AMENDMENT.	Original Signed	07.2018

DETAILS OF HALF-ROUND AND U-CHANNELS (TYPE A -WITH MASONRY APRON)

卓越工程 建設香港

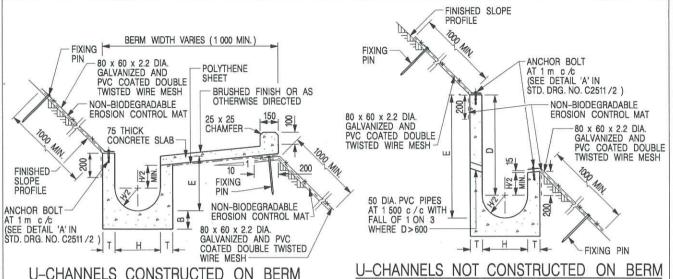
CEDD

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1:25

DATE JAN 1991

C2409l



U-CHANNELS CONSTRUCTED ON BERM WITH NON-BIODEGRADABLE EROSION CONTROL MAT U-CHANNELS NOT CONSTRUCTED ON BERM WITH NON-BIODEGRADABLE EROSION CONTROL MAT

BIODEGRADABLE

EROSION CONTROL MAT

07.2018

12.2017

01.2005

12.2002

08 2001

6.99

3.94

10.92

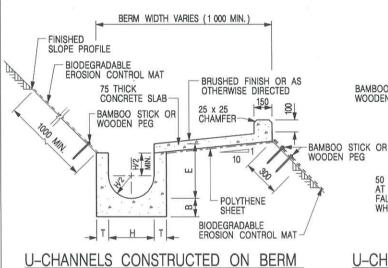
DATE

Original Signed

SIGNATURE

FINISHED SLOPE PROFILE

ш



WITH BIODEGRADABLE

EROSION CONTROL MAT

BAMBOO STICK OR WOODEN PEG

U-CHANNELS NOT CONSTRUCTED ON BERM

WITH BIODEGRADABLE

EROSION CONTROL MAT

NOTES:

- 1. ALL DIMENSIONS ARE IN MILLIMETRES.
- 2. ALL CONCRETE TO BE GRADE 20 /20.
- 3. CONCRETE SURFACE FINISH SHALL BE CLASS U2, F2 OR BRUSHED FINISH AS DIRECTED.
- SPACING OF EXPANSION JOINT IN CHANNELS, BERM SLABS AND APRONS TO BE 10 METRES MAXIMUM, SEE STD. DRG. NO. C2413 FOR DETAILS.
- 5. JOINTS FOR CHANNELS, BERM SLABS, APRONS AND WALLS, ETC. TO BE ON THE SAME ALIGNMENT.
- 6. FOR DIMENSIONS T, H, & B, SEE TABLE BELOW.
- 7. FOR TYPICAL FIXING PIN DETAILS, SEE STD. DRG. NO. C2511/2.
- 8. MINIMUM SIZE OF 25 x 50 x 300mm SHALL BE PROVIDED FOR WOODEN PEG.
- MINIMUM SIZE OF 10mm DIAMETER WITH 200mm LONG SHALL BE PROVIDED FOR BAMBOO STICK.
- 10. THE FIXING DETAILS OF NON-BIODEGRADABLE AND BIODEGRADABLE EROSION CONTROL MATS ON EXISTING BERM SHALL REFER TO STD. DRG. NO. C2511/1.

NOMINAL SIZE H	Ţ	В	REINFORCEMENT
300	80	100	A252 MESH PLACED
375 - 600	100	150	CENTRALLY AND T=100 WHEN E>650
675 - 900	125	175	A252 MESH PLACED CENTRALLY

	DETAILS	OF	HALF-I	ROUN	D AND	
	U-CHAN	NELS	S (TYP	ЕВ-	- WITH	
I	FROSION	COL	NTROI	MAT	APRON	1)

6
CEDD
CEDD
nac

Н

G

F

E

D

C

В

A

REF.

BAMBOO STICK OR WOODEN PEG

50 DIA. PVC PIPES AT 1 500 c/c WITH FALL OF 1 ON 3

WHERE D>600

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE DIAGRAMMATIC
DATE JAN 1991

MINOR AMENDMENT.

MINOR AMENDMENT

GENERAL REVISION.

MINOR AMENDMENT.

MINOR AMENDMENT.

MINOR AMENDMENT

FIXING DETAILS OF BIODEGRADABLE

150 x 100 UPSTAND ADDED AT BERM

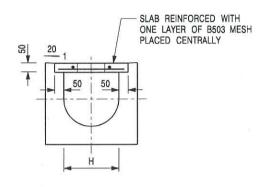
REVISION

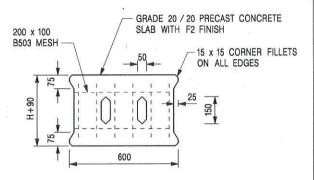
EROSION CONTROL MAT ADDED.

DIMENSION TABLE AMENDED

C2410

卓越工程 建設香港



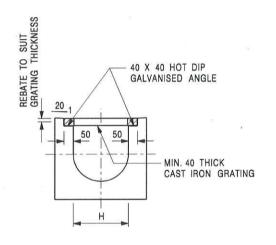


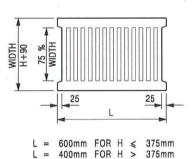
<u>PLAN OF SLAB</u>

TYPICAL SECTION

U-CHANNELS WITH PRECAST CONCRETE SLABS

(UP TO H OF 525)





TYPICAL SECTION

CAST IRON GRATING

(DIMENSIONS ARE FOR GUIDANCE ONLY, CONTRACTOR MAY SUBMIT EQUIVALENT TYPE)

U-CHANNEL WITH CAST IRON GRATING

(UP TO H OF 525)

NOTES:

- 1. ALL DIMENSIONS ARE IN MILLIMETRES.
- 2. H=NOMINAL CHANNEL SIZE.
- ALL CAST IRON FOR GRATINGS SHALL BE GRADE EN-GJL-150 COMPLYING WITH BS EN 1561.
- 4. FOR COVERED CHANNELS TO BE HANDED OVER TO HIGHWAYS DEPARTMENT FOR MAINTENANCE, THE GRATING DETAILS SHALL FOLLOW THOSE AS SHOWN ON HyD STD. DRG. NO. H3156.

REF.	REVISION	SIGNATURE	DATE
Α	CAST IRON GRATING AMENDED.	Original Signed	
В	NAME OF DEPARTMENT AMENDED.	Original Signed	01.2005
С	MINOR AMENDMENT. NOTE 3 ADDED.	Original Signed	12.2005
D	NOTE 4 ADDED.	Original Signed	06.2008
E	NOTES 3 & 4 AMENDED.	Original Signed	

COVER SLAB AND CAST IRON GRATING FOR CHANNELS

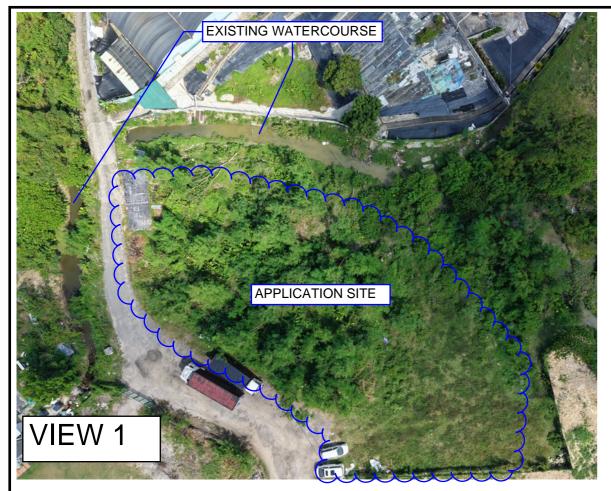


CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

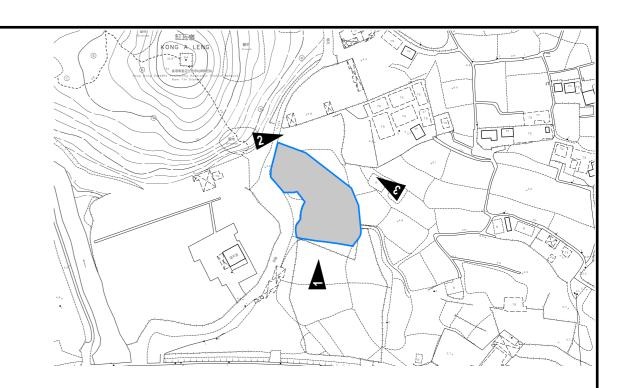
 SCALE
 1:20
 DRAWING NO.

 DATE
 JAN 1991
 C2412E

卓越工程 建設香港









PROJECT:

Proposed Temporary Warehouse (excl. D.G.G.) with Ancillary Facilities and Associate Filling of Land for a Period of 3 Years in "Agriculture" Zone

LOCATION:

Lots 1161 (Pt.) and 1163 (Pt.) in D.D. 109, Kam Tin, Yuen Long, New Territories

SITE PHOTO	APPENDIX D		
	VER	DESCRIPTION	DATE