Proposed Temporary Animal Boarding Establishment and Associated Land Filling for a Period of 3 Years at Lot 1070 RP (Part) in D.D. 109, Kam Tin North, Yuen Long

元朗錦田北丈量約份第 109 約地段第 1070 號餘段（部分）

擬議臨時動物寄養所連相關填土工程（為期 3 年）

P08_Drainage Proposal

Date: 2025-06-12

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APPENDIX

REFERENCES

1. Stormwater Drainage Manual, Planning Design and Management by DSD
2. Geotechnical Manual for Slopes by GEO
3. Standard Drawings by DSD

1. Introduction

This proposal is prepared for the proposed stormwater drainage works for the proposed temporary animal boarding establishment and associated land filling for a period of 3 years at lot 1070 RP (Part) in D.D.109, Kam Tin North, Yuen Long.

2. Existing Drainage Condition

A plan showing the existing catchments is enclosed in **Appendix B**. Currently, the surface runoff collected from the site is discharging to the existing Kam Tin River located at the west of the site as shown in **Appendix A**. As per the existing site condition, an additional peripheral U-channels area is considered necessary for the proposed development. A drainage proposal is required to be carried out for the proposed development.

3. Design Parameters & Assumptions

The design criteria to be used for the modeling assessment are based on the standards set out in the Stormwater Drainage Manual, Third Edition (SDM). According to Section 6.6.1 of the SDM, the existing village drainage system in the vicinity of the development is classified as main rural catchment drainage system. Table 10 of the SDM recommends to be adopted a 50 year design return period storm event for the urban drainage branch system.

<u>Stormwater Runoff (Q)</u>

The rate of stormwater runoff used in this assessment report is estimated by the "Rational method" in which the peak runoff is calculated from the formula:

$$Q = K \times i \times A / 3600$$

where
- Q = maximum runoff (L/s)
- i = design mean intensity of rainfall (mm/hr)
- A = area of catchment (m^2)
- K = runoff coefficient

4. Proposed Stormwater Drainage

The proposed stormwater drainage works include surface U-channels at the peripheral of the site collecting the runoff from catchments within the site. The U-channels will connect and discharge the surface runoff to the existing Kam Tin River located at the west of the site. Catchpits with 300mm sump are proposed at the discharged points of the proposed U-Channel to desilt the surface water before discharging to the drainage outside. The proposed stormwater drainage layout plan is shown in **Appendix A**.

5. Effect on Drainage Characteristics and Potential Drainage Impact

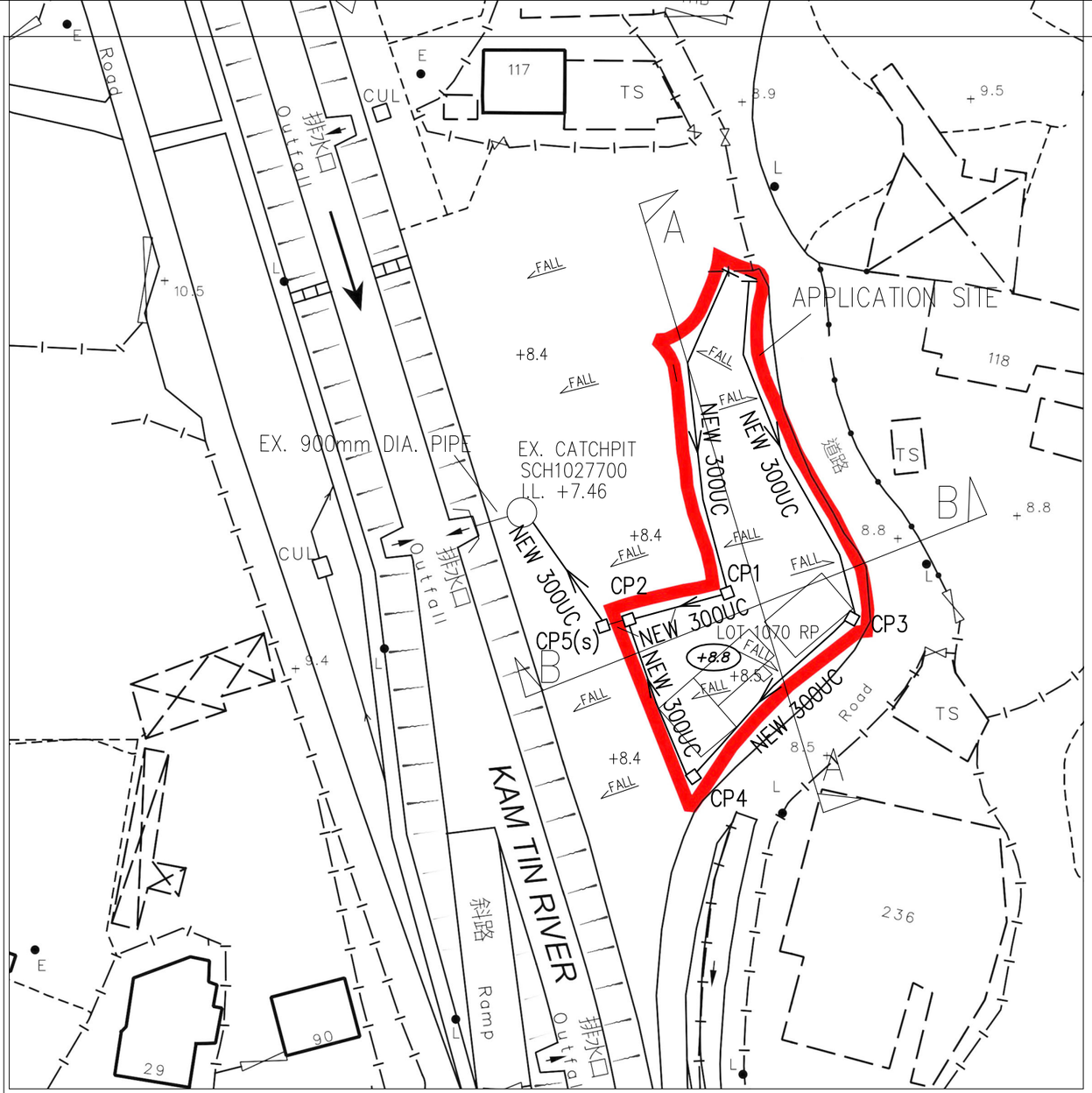
The drainage design of the proposed U-channel is presented in **Appendix B**. Since no wall or hoarding would be erected in this development, it is considered that the existing overland flow passing through the site would not be affected.

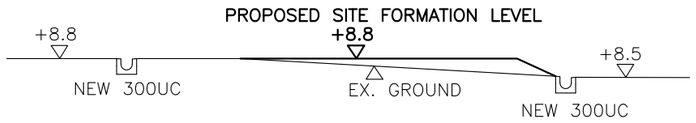
6. Conclusion

Peripheral channels are to be provided along the site boundary where necessary to intercept runoff from crossing the site. The drainage conditions of adjacent areas will not be adversely affected.

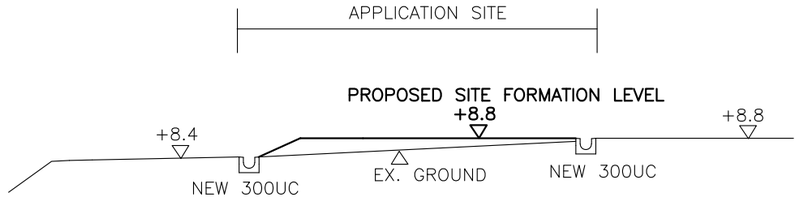
Appendix A

Stormwater Drainage Proposal Plan





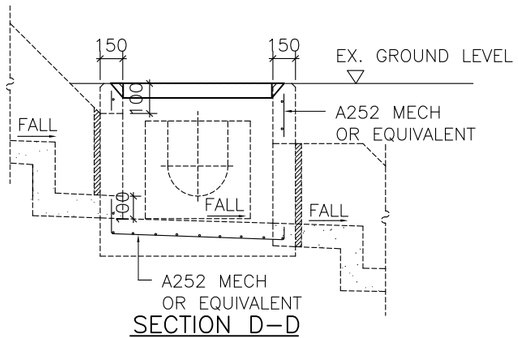
SECTION A–A



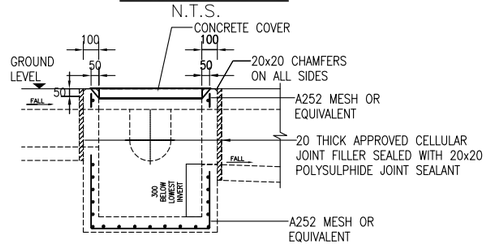
SECTION B–B

LEGEND:

+8.8	EXISTING GROUND LEVEL AT +8.8mPD
NEW 300UC →	PROPOSED 300mm U–CHANNEL WITH GRATING AT FALL 1: 100 (MIN)
CP5(s) □	PROPOSED COVERED DESILTED CATCHPIT NO. CP5
CP1 □	PROPOSED COVERED CATCHPIT NO. CP1
(+8.8)	PROPOSED SITE FORMATION LEVEL
□	PROPOSED BUILDING

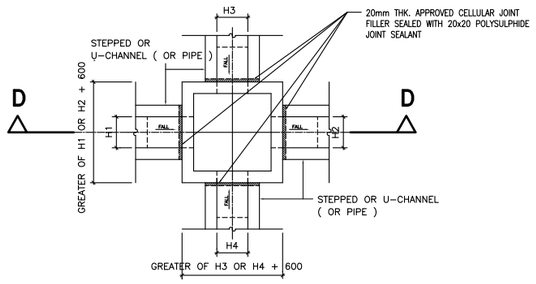


SECTION D–D
N.T.S.



SECTION D – D WITH DESILTED TRAP

COMPLY WITH CEDD'S DRAWING NO. DS C2405 AND C2406I



PLAN

GENERAL NOTE

1. THE PROPOSED DRAINAGE WORK, WHETHER WITHIN OR OUTSIDE THE LOT BOUNDARY, SHOULD BE CONSTRUCTED AND MAINTAINED BY THE LOT OWNER AT HIS OWN EXPENSE. FOR WORKS TO BE UNDERTAKEN OUTSIDE THE LOT BOUNDARY, PRIOR CONSENT AND AGREEMENT FROM DLO AND/OR RELEVANT PRIVATE LOT OWNER SHOULD BE SOUGHT.

CONCRETE STRENGTH AND STEEL REINFORCEMENT SPECIFICATION FOR DRAINAGE DETAILS

1. CONCRETE GRADE FOR CATCHPITS AND U–CHANNEL SHALL BE 30D DESIGN IN COMPLIANCE WITH CS1 : 2010
   FOR BLINDING LAYER SHALL BE 15D, DESIGN COMPLY WITH CS1–2010.
2. ALL MAIN BARS TO BE HOT ROLLED HIGH YIELD STEEL DEFORMED BAR COMPLM WITH CS2 : 2012
   Y – HIGH YIELD BAR 500 MPa
   M – MILD STEEL BAR 250 MPa
3. CONCRETE COVER TO MAIN REINFORCEMENT TO BE 50mm.
4. LAP LENGTH FOR ALL BARS TO BE 46x DIAMETER OF LARGER BAR TO BE LAPPED.
5. REACTIVE ALKALI CONTENT EXPRESSED IN SODIUM OXIDE PER CUBIC METER OF CONCRETE SHOULD NOT EXCEED 3KG AS PER PNAP APP–74.

HALF ROUND, U, AND STEPPED – CHANNELS

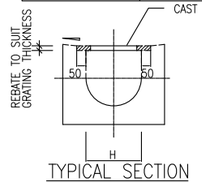
1 ALL DIMENSIONS ARE IN MILLIMETERS
2 CONCRETE SURFACE FINISHING SHALL BE CLASS U2 OR F2 AS APPROPRIATE
3 FOR HALF ROUND AND U – CHANNEL, SPACING OF EXPANSION JOINT IN CHANNELS, BERMS AND APRON TO BE 10m MAXIMUN. FOR STEPPED CHANNELS, EXPANSION JOINTS TO BE PROVIDED AT A MAXIMUN SPACING OF 10m.
4 DIMENSIONS FOR HALF ROUND AND U–CHANNELS SEE TABLE 1.
5 THE COVER FOR U–CHANNELS AND CATCHPIT SHALL COMPLY WITH CEDD'S STANDARD DRAWINGS NO. C2405 TO C2407 AND C2412.
6 ALL PROPOSED U–CHANNELS SHALL BE COVERED WITH GRATING

TABLE 1 : DIMENSION OF U–CHANNEL AND HALF–ROUND CHANNEL

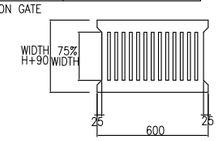
NORMAL SIZE H	T	B	REINFORCING
<300	100	100	NIL
375 – 675	150	150	NIL
750 – 900	175	175	A252 MESH PLACED CENTRALLY

PROPOSED CATCHPIT SCHEDULE

CATCHPIT NO.	C.L. (mPD)	I.L. (mPD)
CP1	8.80	8.11
CP2	8.80	7.62
CP3	8.80	8.06
CP4	8.80	7.81
CP5(s)	8.80	7.60



TYPICAL SECTION



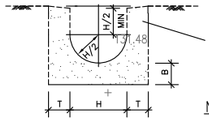
CAST IRON GRATING

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

U–CHANNEL WITH CAST IRON GRATING

CATCHPITS

1 ALL DIMENSIONS ARE IN MILLIMETRES
2 CONCERTE SURFACE FINISH SHALL BE CLASS U2 OR F3 AS APPROPRIATE



FOR REINFORCEMENT REFER TO TABLE 1 FOR DETAIL

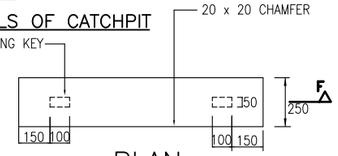
U–CHANNEL

COMPLY WITH FIG 8.11
OF GEOTECHNICAL MANUAL FOR SLOPES

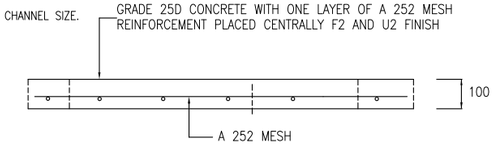
NOTES:

1. H = NOMINAL CHANNEL SIZE.

TYPICAL DETAILS OF CATCHPIT



PLAN
N.T.S.



PRECAST CONCRETE COVERS FOR CATCHPIT

N.T.S.

REV	DESCRIPTION	CHECKED	APPROVED	DWN	DATE
	PLANNING SUBMISSION	RC	AY	RY	JUNE 25

PROJECT TITLE:
STORMWATER DRAINAGE PROPOSAL
LOT 1070 RP IN D.D. 109

DRAWING TITLE:
DRAINAGE PROPOSAL PLAN
AND TYPICAL DETAILS

SCALE :	N.T.S.		CAD FILE: CAD_REF
DRAWN	RY		DRAWING NO.
S.D	RY		SDP001
DESIGNED	RC		
CHECKED	AY		B.D. REF. NO.:

Appendix B

Surface Drainage Design

Time of Concentration (tc)

The time of concentration is defined as the time required for stormwater runoff to flow from the most remote part of the catchment area to the point in the drainage system under consideration. Based on the assumptions adopted in the Rational Method, this is the time taken for the peak runoff to become established at the considered section.

The time of concentration comprises the time for water flowing within natural catchments and along the man-made drainage pipes/channels. For natural catchments, the time of concentration is estimated by the modified form of the Brandsby William's equation.

$$t_o = \frac{0.14465L}{H^{0.2} A^{0.1}}$$

Where t_o = time of concentration of a natural catchment (min.)

A = catchment area (m^2)

H = average slope (m per 100m), measured along the line of natural flow, from the summit of the catchment to the point under consideration

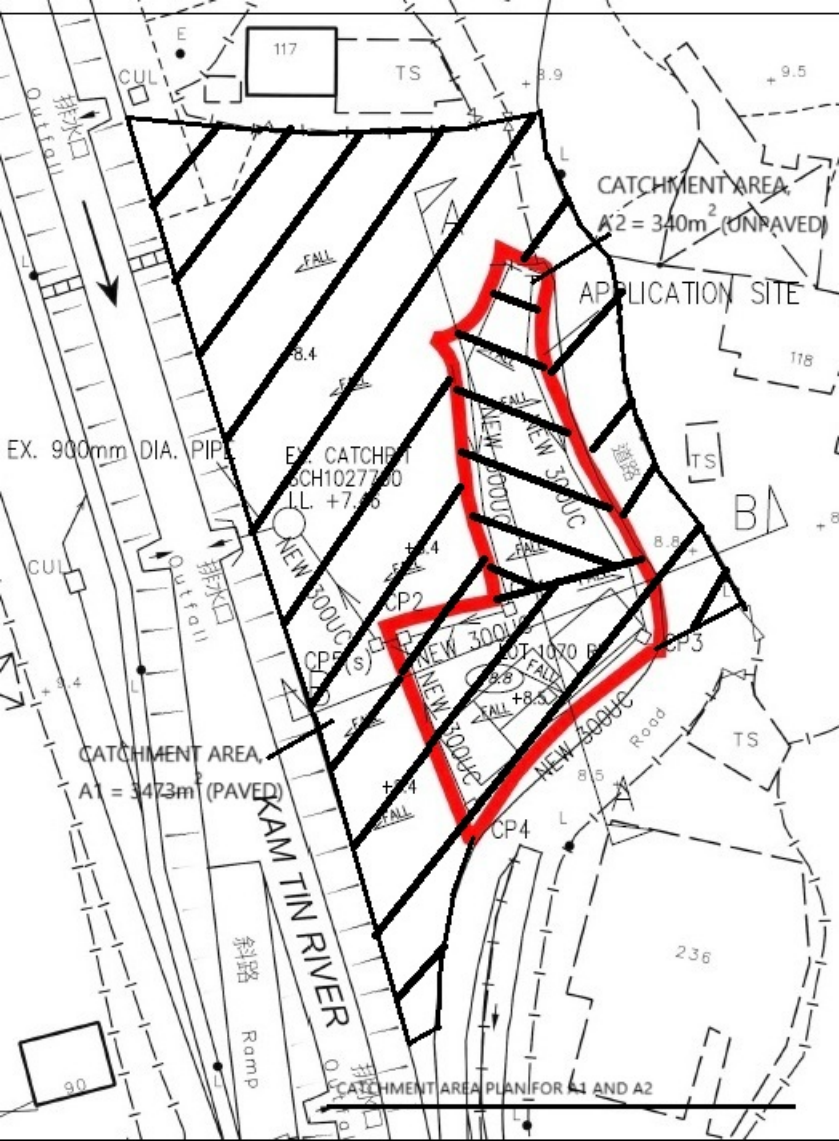
L = distance (on plan) measured on the line of natural flow between the summit and the point under consideration (m)

Mean Rainfall Intensity (i)

Mean rainfall intensity-duration curves attached in this report are based on the Statistical analysis of long term rainfall records from the Hong Kong Observatory. A return period of 50 years is adopted.

Runoff Coefficient (K)

The value of K is taken as 1 for developed area. For vegetated ground, the value of K is taken as 0.3.


CATCHMENT AREA
A2 = 340m² (UNPAVED)
APPLICATION SITE
EX. 900mm DIA. PIPE
EX. CATCHPIT
SCH1027700
NEW 300UC
CP2
CP3
CP4
CATCHMENT AREA
A1 = 3473m² (PAVED)
KAM TIN RIVER
Outfall
Ramp
Road
CATCHMENT AREA PLAN FOR A1 AND A2

Drainage Design at lot 1070 RP in
Project No.: D.D.109 Kam Tin Village Date: 31-May-25
Prepared by: Ray Cheng

Check for the drainage capactiy of existing 900mm dia. pipe

Catchment area,	A1	=	3473	m^2	Assume k = 1.0 for paved surface
	A2	=	340	m^2	Assume k = 0.3 for unpaved surface
	Total Area, A	=	3473 + 0.3x340		
		=	3575	m^2	

Use Rational Method from Geo-Manual

$Q = kiA/3600$ where,

Q = Maximum runoff (lit/sec)
k = Runoff coefficient
i = Design mean intensity of rainfall (mm/hr)
A = Total catchment area (m^2)

Longest distance from summit point to outlet, PtZ (Ld) = 114.00 m
Shortest distance from summit point to outlet, PtZ (Ls) = 46.00 m

Elevation of remote point (Pt A)	=	8.80	mPD
Elevation of outlet point, PtZ	=	7.46	mPD
Average fall, H	=	$(z_1-z_2)/L_s$ x 100	
	=	2.91	m per 100m

From TGN30

T_c = $0.14465 \times L_d / (H^{0.2} \times A^{0.1})$
= 5.84 min

Assume a 1 in 50 year design rainfall return period for rural area
From SDM Corrigendum No. 1/2024

i	=	215	mm/hr
Q	=	kiA/60	x 1.16
		14860	lit/min

From TGN 43A1
For existing 900mm dia. pipe with 1 in 100 gradient

Maximum capacity = 1.992 x 1000 x 60 = 119520 lit/min > 14860 o.k.

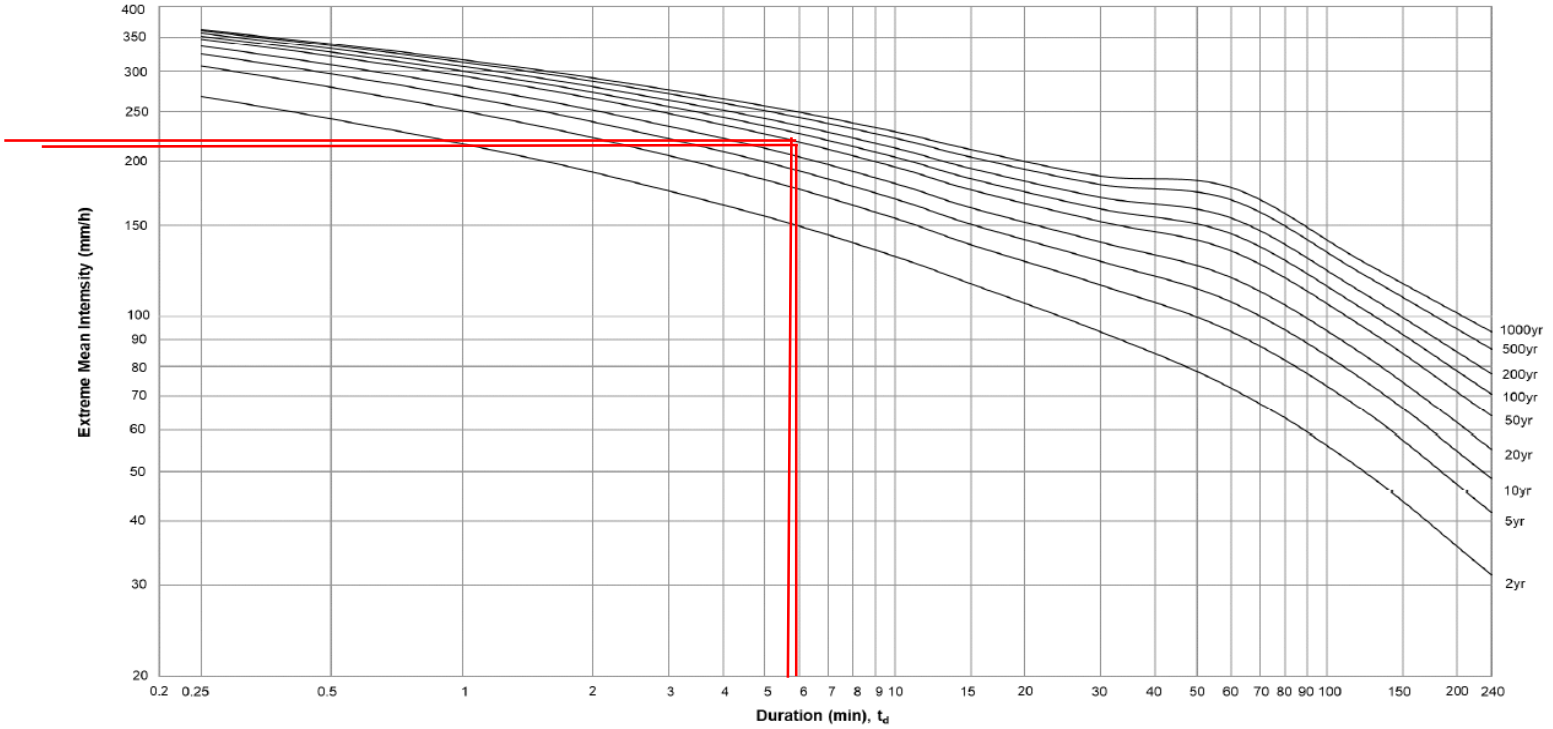


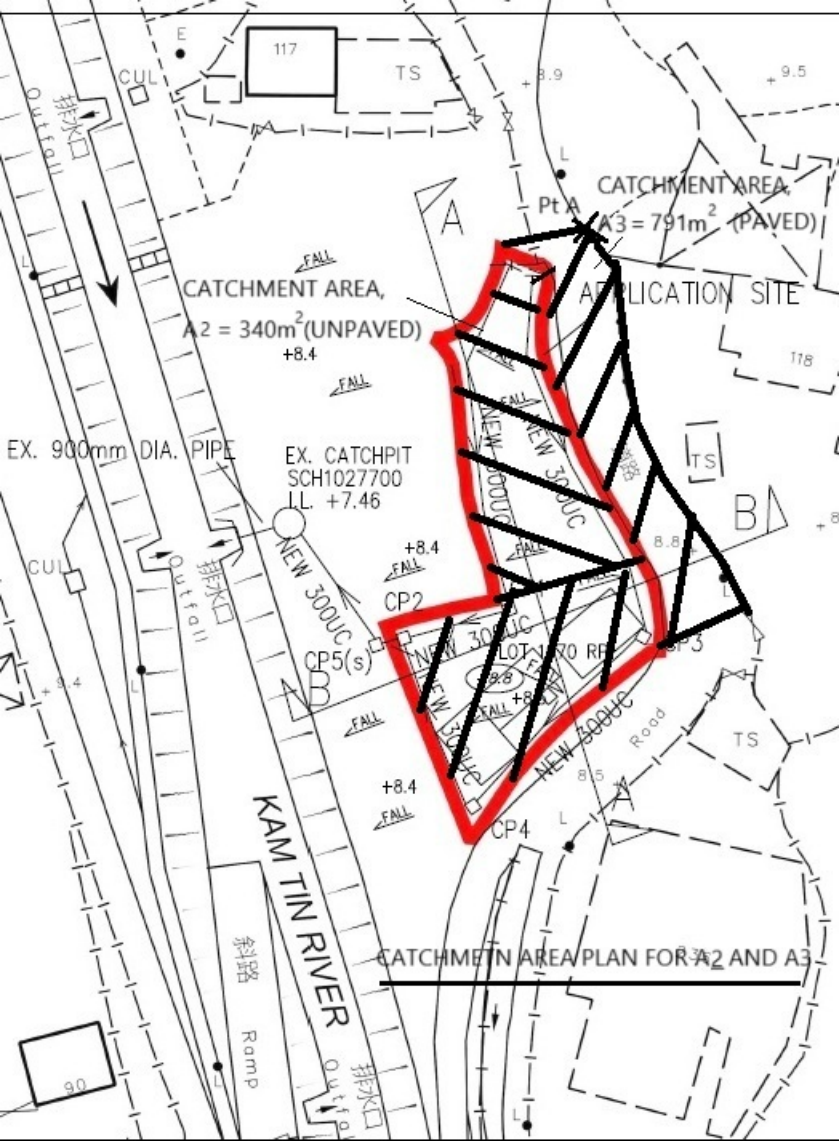
Figure 4a – Intensity-Duration-Frequency Curves of HKO Headquarters
(for durations not exceeding 4 hours)

continued

ie hydraulic gradient = 1 in 333 to 1 in 13 ·

velocities in m/s
discharges in m^3/s

Gradient	Pipe diameters in mm 900	975	1000	1050	1100	1200	1350	1500	1650	1800	1950	2100
0.00300 1/ 333	1.709	1.796	1.824	1.880	1.935	2.042	2.195	2.342	2.483	2.619	2.750	2.877
	1.087	1.341	1.433	1.628	1.839	2.309	3.142	4.139	5.309	6.663	8.212	9.963
0.00320 1/ 313	1.765	1.855	1.885	1.942	1.999	2.109	2.268	2.419	2.565	2.705	2.840	2.971
	1.123	1.385	1.480	1.682	1.900	2.385	3.246	4.275	5.484	6.883	8.482	10.292
0.00340 1/ 294	1.820	1.913	1.943	2.003	2.061	2.175	2.338	2.494	2.644	2.789	2.928	3.063
	1.158	1.428	1.526	1.734	1.959	2.459	3.347	4.408	5.654	7.096	8.745	10.610
0.00360 1/ 278	1.873	1.969	2.000	2.061	2.121	2.238	2.406	2.567	2.721	2.870	3.013	3.153
	1.192	1.470	1.571	1.785	2.016	2.531	3.444	4.536	5.819	7.303	9.000	10.919
0.00380 1/ 263	1.925	2.023	2.055	2.118	2.180	2.300	2.473	2.638	2.796	2.949	3.096	3.239
	1.225	1.510	1.614	1.834	2.071	2.601	3.539	4.661	5.979	7.504	9.247	11.220
0.00400 1/ 250	1.975	2.076	2.109	2.173	2.237	2.360	2.537	2.707	2.869	3.026	3.177	3.324
	1.257	1.550	1.656	1.882	2.126	2.669	3.632	4.783	6.135	7.700	9.489	11.513
0.00420 1/ 238	2.025	2.127	2.161	2.227	2.292	2.419	2.600	2.774	2.940	3.101	3.256	3.406
	1.288	1.588	1.697	1.929	2.178	2.735	3.722	4.902	6.287	7.891	9.724	11.798
0.00440 1/ 227	2.072	2.178	2.212	2.280	2.346	2.476	2.662	2.839	3.010	3.174	3.333	3.487
	1.318	1.626	1.738	1.974	2.230	2.800	3.810	5.018	6.436	8.078	9.954	12.077
0.00460 1/ 217	2.119	2.227	2.262	2.332	2.400	2.532	2.722	2.904	3.078	3.246	3.408	3.566
	1.348	1.663	1.777	2.019	2.280	2.863	3.896	5.131	6.582	8.260	10.179	12.350
0.00480 1/ 208	2.165	2.275	2.311	2.382	2.451	2.587	2.781	2.966	3.145	3.316	3.482	3.643
	1.378	1.699	1.815	2.063	2.330	2.925	3.980	5.242	6.724	8.438	10.399	12.616
0.00500 1/ 200	2.210	2.323	2.359	2.431	2.502	2.640	2.838	3.028	3.210	3.385	3.554	3.718
	1.406	1.734	1.853	2.105	2.378	2.986	4.063	5.351	6.863	8.613	10.614	12.877
0.00550 1/ 182	2.319	2.437	2.475	2.551	2.625	2.770	2.978	3.176	3.367	3.551	3.728	3.900
	1.475	1.819	1.944	2.209	2.495	3.132	4.262	5.613	7.200	9.035	11.134	13.509
0.00600 1/ 167	2.423	2.546	2.586	2.665	2.743	2.894	3.111	3.318	3.517	3.709	3.895	4.074
	1.541	1.901	2.031	2.308	2.606	3.273	4.453	5.864	7.521	9.439	11.631	14.111
0.00650 1/ 154	2.522	2.650	2.692	2.774	2.855	3.012	3.238	3.454	3.662	3.861	4.054	4.241
	1.604	1.979	2.114	2.402	2.713	3.407	4.635	6.104	7.829	9.826	12.108	14.690
0.00700 1/ 143	2.618	2.751	2.794	2.880	2.963	3.127	3.361	3.585	3.800	4.008	4.208	4.402
	1.665	2.054	2.195	2.493	2.816	3.536	4.811	6.336	8.126	10.198	12.567	15.246
0.00750 1/ 133	2.710	2.848	2.893	2.981	3.068	3.237	3.480	3.712	3.934	4.149	4.356	4.557
	1.724	2.126	2.272	2.581	2.916	3.661	4.981	6.559	8.413	10.557	13.009	15.783
0.00800 1/ 125	2.800	2.942	2.988	3.079	3.169	3.343	3.594	3.834	4.064	4.285	4.499	4.707
	1.781	2.196	2.347	2.667	3.012	3.781	5.145	6.775	8.689	10.905	13.437	16.302
0.00850 1/ 118	2.886	3.033	3.081	3.175	3.267	3.447	3.705	3.952	4.189	4.418	4.638	4.852
	1.836	2.264	2.419	2.749	3.105	3.898	5.304	6.984	8.958	11.242	13.852	16.806
0.00900 1/ 111	2.970	3.121	3.170	3.267	3.362	3.547	3.813	4.067	4.311	4.546	4.773	4.993
	1.890	2.330	2.490	2.829	3.195	4.012	5.458	7.188	9.219	11.569	14.255	17.295
0.00950 1/ 105	3.052	3.207	3.258	3.357	3.455	3.645	3.918	4.179	4.430	4.671	4.904	5.130
	1.942	2.394	2.558	2.907	3.283	4.122	5.608	7.385	9.472	11.887	14.647	17.770
0.01000 1/ 100	3.132	3.291	3.343	3.445	3.545	3.740	4.020	4.288	4.545	4.793	5.032	5.264
	1.992	2.457	2.625	2.983	3.369	4.230	5.754	7.578	9.719	12.197	15.029	18.233
0.01100 1/ 91	3.285	3.452	3.506	3.614	3.719	3.923	4.217	4.498	4.768	5.028	5.279	5.522
	3.090	3.577	3.754	4.129	4.534	5.437	6.036	7.949	10.195	12.794	15.764	19.125


CATCHMENT AREA,
A2 = 340m² (UNPAVED)
CATCHMENT AREA,
A3 = 791m² (PAVED)
Pt A
APPLICATION SITE
EX. 900mm DIA. PIPE
EX. CATCHPIT
SCH1027700
I.L. +7.46
NEW 300UC
CP2
CP3
CP4
CP5(s)
LOT 1170 RP
KAM TIN RIVER
Outfall
Ramp
Road
CATCHMENT AREA PLAN FOR A2 AND A3

Drainage Design at lot 1070 RP in
Project No.: D.D.109 Kam Tin Village Date: 31-May-25
Prepared by: Ray Cheng

Check for the drainage capactiy of proposed 300UC

Catchment area,	A3	=	791	m^2	Assume k = 1.0 for paved surface
	A2	=	340	m^2	Assume k = 0.3 for unpaved surface
	Total Area, A	=	791 + 0.3x340		
		=	893	m^2	

Use Rational Method from Geo-Manual

$Q = kiA/3600$ where,

Q = Maximum runoff (lit/sec)
k = Runoff coefficient
i = Design mean intensity of rainfall (mm/hr)
A = Total catchment area (m^2)

Longest distance from summit point to outlet, CP5(s) (Ld) = 98.00 m
Shortest distance from summit point to outlet, CP5(s) (Ls) = 45.00 m

Elevation of remote point (Pt A)	=	8.80	mPD
Elevation of outlet point, CP5(s)	=	7.60	mPD
Average fall, H	=	$(z_1-z_2)/L_s$ x 100	
	=	2.67	m per 100m

From TGN30

$T_c = 0.14465 \times L_d / (H^{0.2} \times A^{0.1})$
$= 5.77$ min

Assume a 1 in 50 year design rainfall return period for rural area
From SDM Corrigendum No. 1/2024

i	=	220	mm/hr
Q	=	kiA/60	x 1.16
		3798	lit/min

From TGN 43A1
For proposed 300 UC with 1 in 100 gradient

Maximum capacity	=	8000	lit/min	>	3798	o.k.
The corresponding velocity	=	1.75	m/s	<	4	o.k.

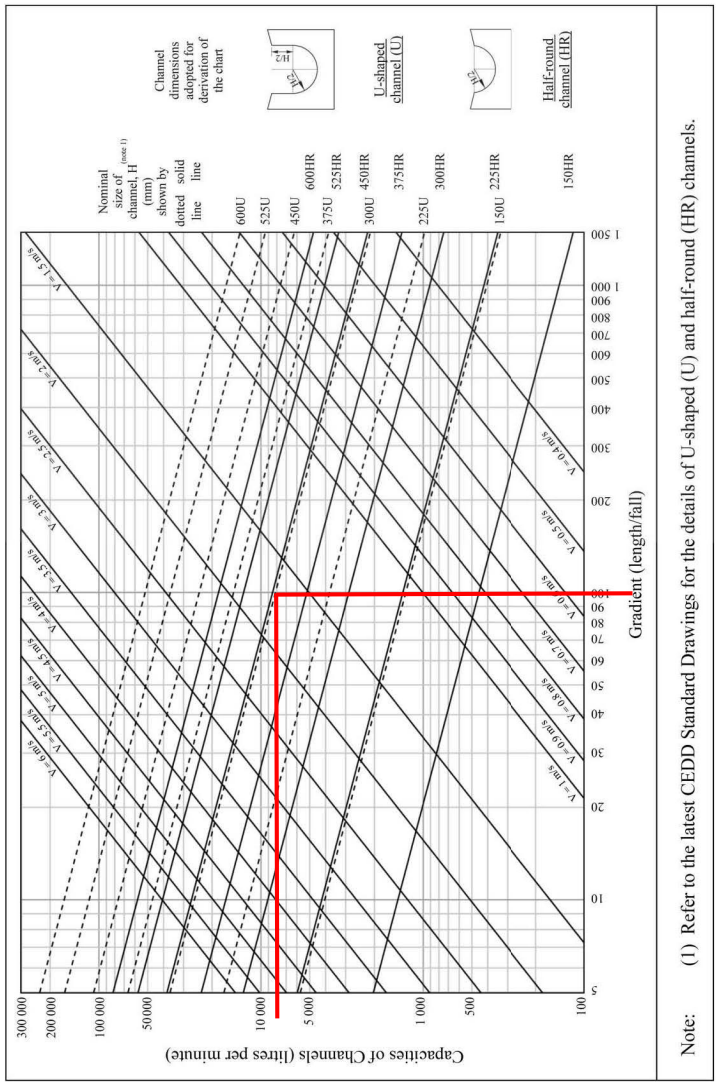


Figure 1 - Chart for the rapid design of U-shaped and half-round channels up to 600 mm

Note: (1) Refer to the latest CEDD Standard Drawings for the details of U-shaped (U) and half-round (HR) channels.