Appendix | 2

Drainage Design Report

Proposed Drainage Facilities
Lot No. 110 in D.D.219,
Sai Kung,
New Territories,

TABLE OF CONTENTS

1. INTRODUCTION

The application for the proposed house redevelopment at Lots 110 in D.D. 219, Kei Pik Shan, Tai Chung Hau, Sai Kung, New Territories (Application Number: A/SK-PK/295) has been submitted for approval.

The latest enhancements for the application are provided in Appendix A.

This report is prepared to support the drainage proposal by:

(a) Identifying the catchments;

(b) Demonstrating with hydraulic calculations that the proposed drainage facilities are adequate to collect, convey, and discharge the surface runoff.

2. IDENTIFY CATMENT AREA AND RUNOFF

The key plan for the proposed catchment, which is perpendicular to the contour lines, is shown in Figure 1 below.

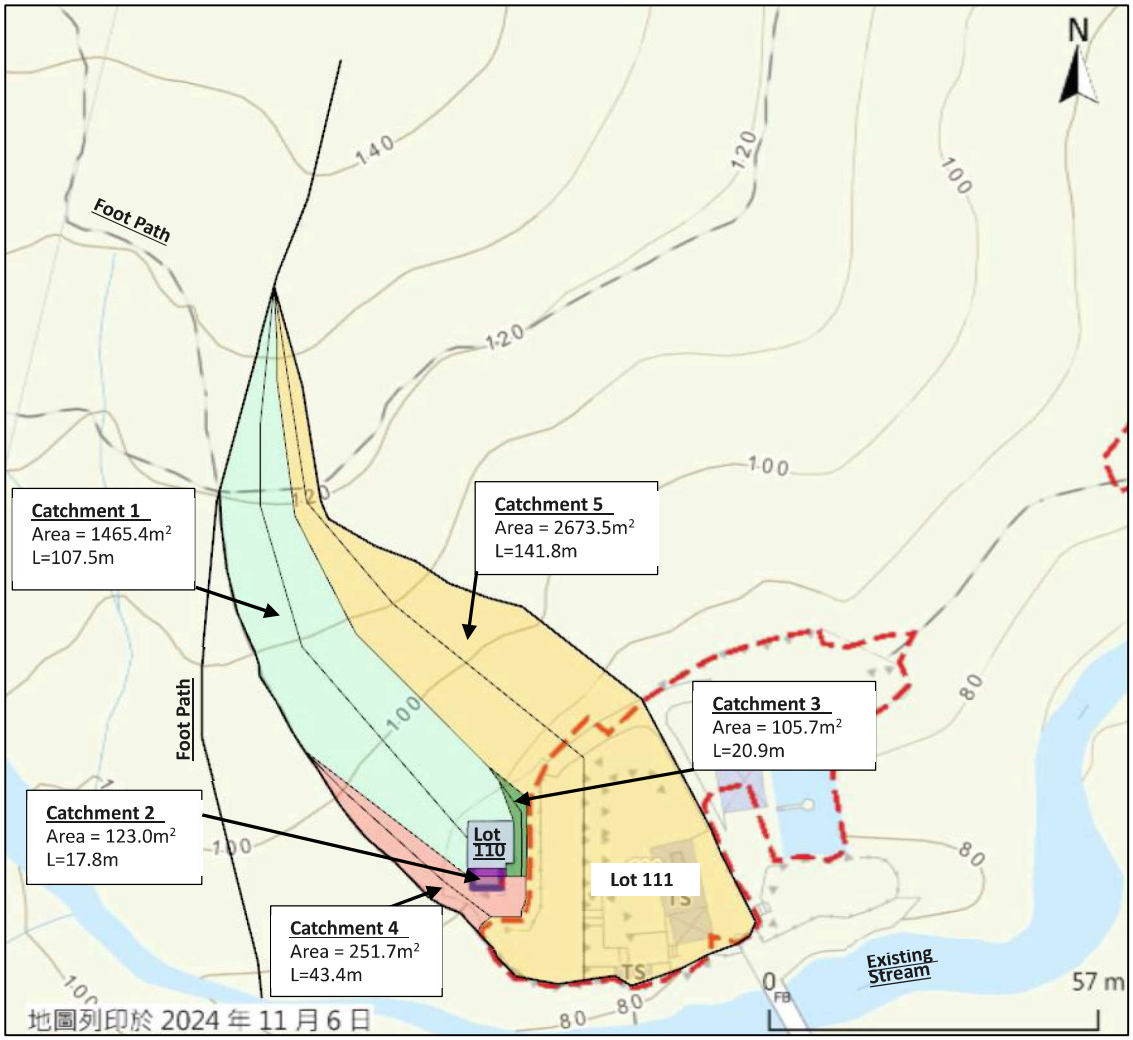


Figure 1. Catchments Identification

It is found that the application site, Lot 110 in D.D. 219, is likely to collect uphill surface runoff from Catchment 1 and will also collect stormwater runoff from its building rooftop and side walls, referred to as Catchment 2. However, the proposed drainage facilities will continue to collect surface runoff from uphill areas outside the boundary of Lot 110, namely Catchments 3, 4, and 5. The facilities are designed to collect this runoff all the way to the discharge point.

3. DESIGN OF DRAINAGE FACILITIES

The proposed facilities are designed according to the following codes and guidelines:

1. Geotechnical Manual for Slopes (GCO, 1984);
2. Stormwater Drainage Manual 2018 (SDM 2018);
3. GEO Technical Guidance Note No. 30 (TGN 30);
4. GEO Technical Guidance Note No. 39 (TGN 39);
5. GEO Technical Guidance Note No. 43 (TGN 43);

The surface runoff for a 1 in 200-year return period rainstorm is calculated using the rational method in accordance with TGN 30 and SDM 2018; the calculations are attached in Appendix B.

The increment for climate change (inclement weather) is included in the calculations (+28.1%, TGN 30).

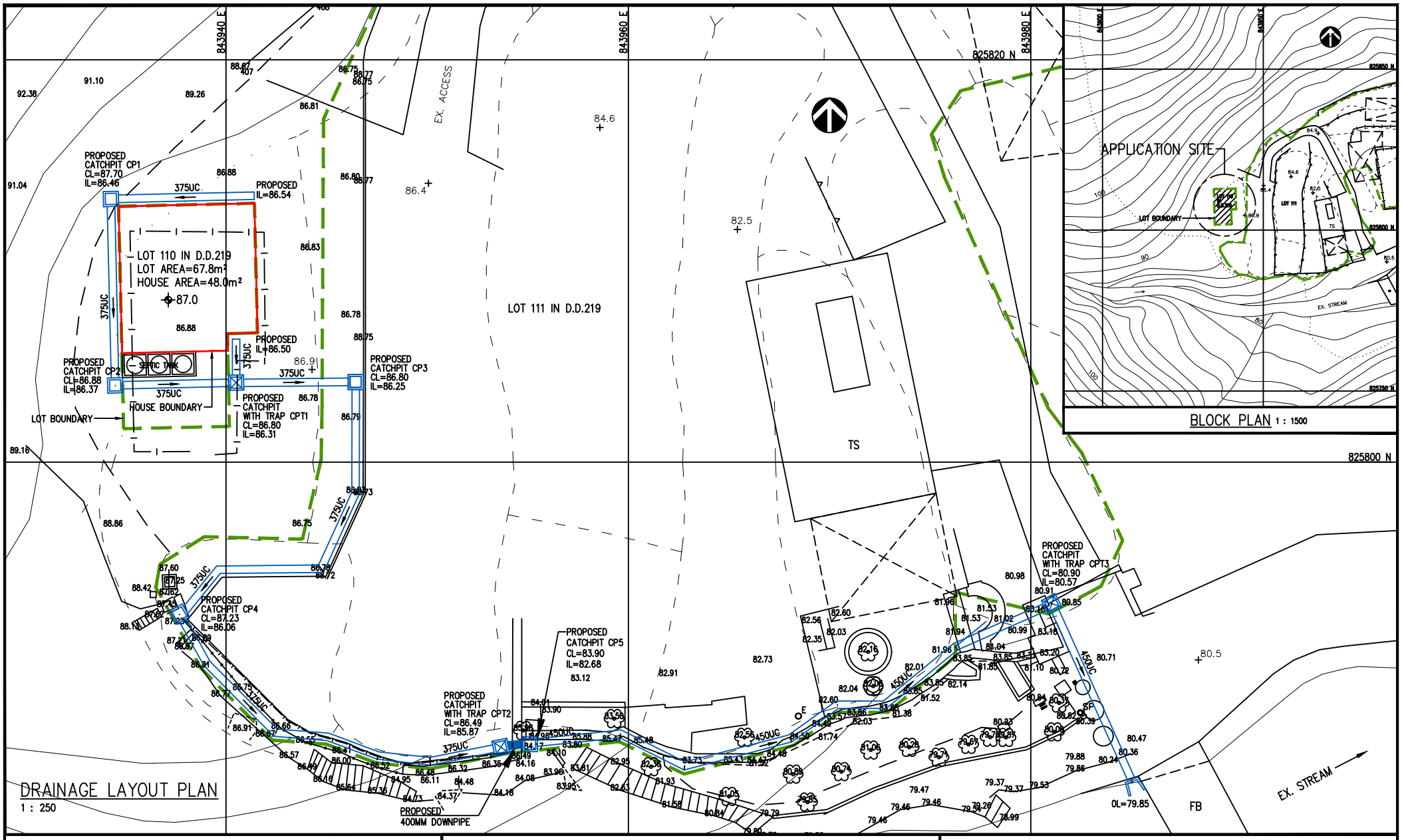
It is concluded that a 375UC (1 in 100 fall) is provided in the upper section from Lot 110 to Catchpit With Trap 2 (CPT2), which is connected by a 400mm downpipe, leading to a 450UC (1 in 13.5 fall) in the lower section of the facilities. Please refer to Appendix A for the layout plan and details.

The proposed facilities discharge into the existing stream at +79.85mPD, which is well above the extreme sea level. The existing river receiving the discharge was already collecting the same mountain runoff before the provision of the facility, meaning no additional surface runoff is added.

The design is considered adequate.

APPENDIX A

Proposed Drainage Details for the Application Site



DRAINAGE LAYOUT PLAN
1 : 250

LEGENDS

- LOT BOUNDARY LINE
- HOUSE BOUNDARY LINE
- +86.9 – EX. SPOT LEVEL (mPD)
- 87.0 – PROPOSED SITE FORMATION LEVEL (mPD)
- 375UC – PROPOSED 375 U-CHANNEL WITH COVER
- PROPOSED 400MM DOWNPIPE
- PROPOSED CATCHPIT
- PROPOSED CATCHPIT WITH TRAP
- CL=86.90 – PROPOSED COVERED LEVEL (mPD)
- IL=86.65 – PROPOSED INVERT LEVEL (mPD)
- OL=80.00 – PROPOSED OUTLET LEVEL (mPD)

PROJECT :	PROPOSED 1-STOREY HOUSE AT LOT 110 IN D.D.219 SAI KUNG, N.T.
DWG. TITLE :	DRAINAGE LAYOUT PLAN AND BLOCK PLAN
DATE : 14/11/2024	SCALE : 1 : 250 — SK/D-01(e)

GEOTECHNICAL CONSULTANT :

PHILIP SO & ASSOCIATES LTD.
CONSULTING CIVIL AND GEOTECHNICAL ENGINEERS

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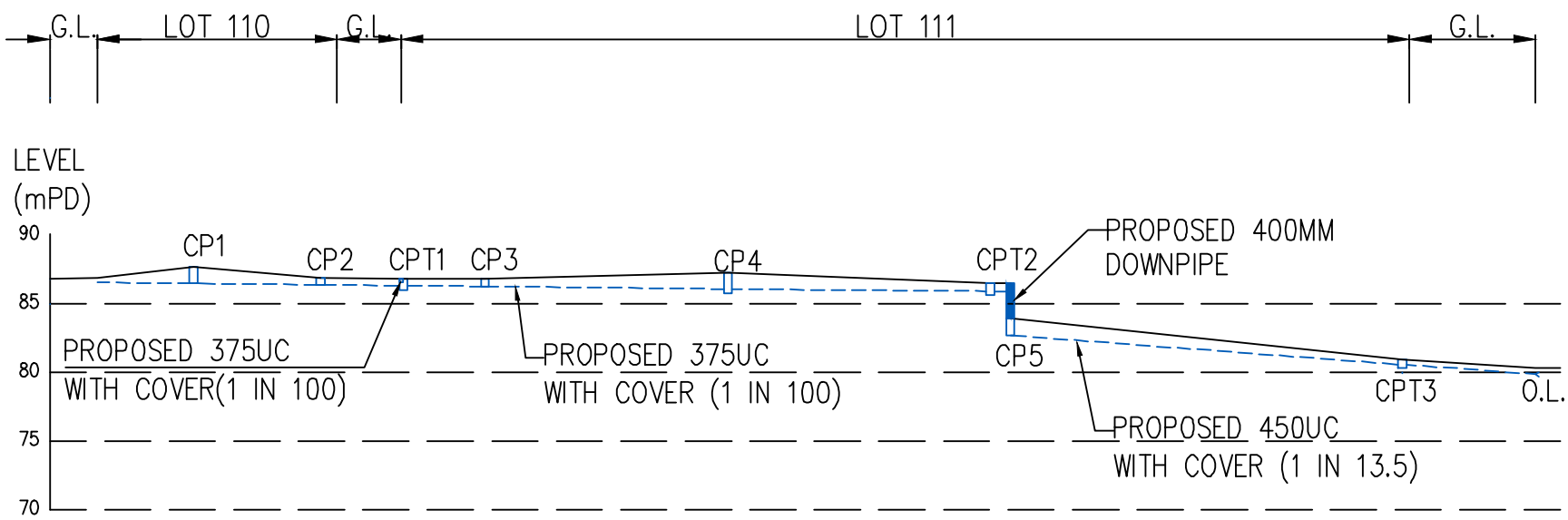

LONGITUDINAL SECTION ALONG THE PROPOSED DRAINAGE

PROJECT : PROPOSED 1-STOREY HOUSE AT LOT 110 IN D.D.219 SAI KUNG, N.T.		GEOTECHNICAL CONSULTANT : PHILIP SO & ASSOCIATES LTD. CONSULTING CIVIL AND GEOTECHNICAL ENGINEERS
DWG. TITLE : LONGITUDINAL SECTION ALONG THE PROPOSED DRAINAGE		
DATE : 14/11/2024	SCALE : 1:500	DRG. NO. : SK/D-02(a)

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NOTES FOR CATCHPIT

1. ALL CONCRETE SHALL BE GRADE 30D/20 AND COMPLY WITH CS1:2010 EXCEPT ITEM 7.1.
2. MINIMUM CONCRETE COVER SHALL BE 40mm.
3. ALL REINFORCEMENT (GRADE 500B) TO BE HIGH TENSILE DEFORMED BAR. ALL REINFORCEMENT SHALL COMPLY WITH CS2:2012. ALL WIRE MESH TO BS 4483:2005.
4. RUN OFF FROM THIS SITE SHALL BE PROPERLY TREATED AND CONVEYED TO THE PUBLIC DRAIN VIA CATCHPIT DURING THE SITE FORMATION WORKS.

NOTES FOR U-CHANNEL

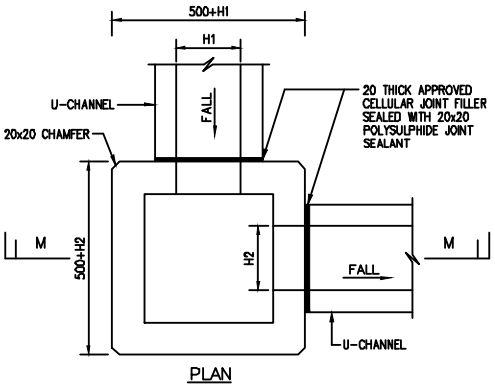
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. FOR DIMENSIONS OF CHANNEL SEE TABLE.

NOMINAL SIZE H	T	B	REINFORCEMENT
150 ~ 375	80	100	A252 MESH PLACED CENTRALLY

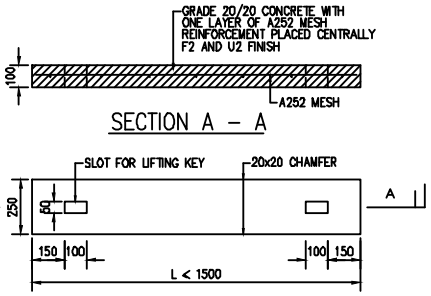
3. CONCRETE SURFACE FINISH SHALL BE CLASS U2 OR F2 AS APPROPRIATE.
4. EXPANSION JOINTS SHALL BE PROVIDED AT A MAXIMUM SPACING OF 10 METRES.
5. 750-900 CHANNELS ARE REINFORCED.
6. X=20 UNLESS OTHERWISE SPECIFIED.
7. ALL CONCRETE SHALL BE GRADE 30D/20.

NOTES FOR HEAD WALL

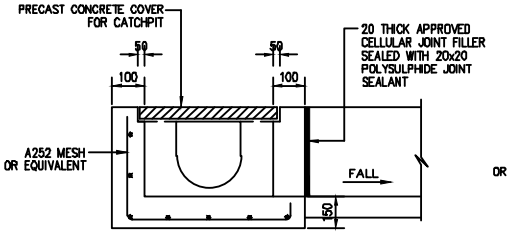
1. CONCRETE GRADE TO BE 20/20.
2. MINIMUM LAP LENGTH OF REINFORCEMENT SHOULD BE 40 x DIA. OF BAR.
3. ALL CONCRETE CHAMFERS TO BE 25x25mm.



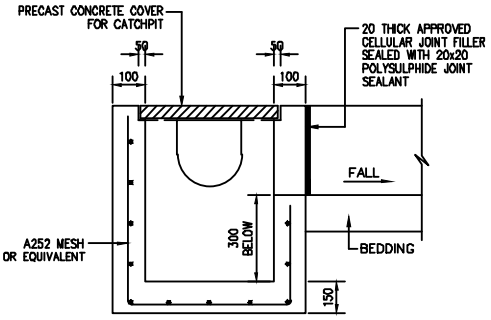
PLAN



TYPE 1 - FOR SPAN UP TO 1.5m (N.T.S.)

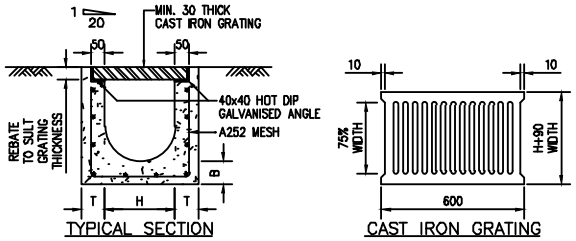


SECTION M-M (WITHOUT TRAP)



SECTION M-M (WITH TRAP)

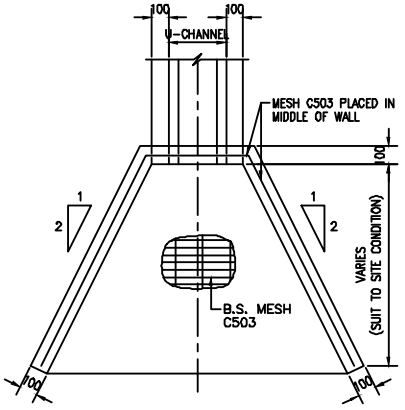
TYPICAL DETAILS OF CATCHPIT JOINING U-CHANNEL (N.T.S.)



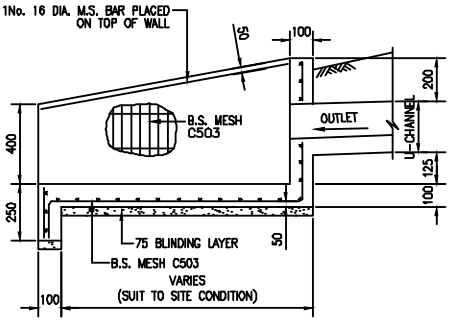
TYPICAL SECTION

CAST IRON GRATING

U-CHANNEL WITH CAST IRON GRATING (N.T.S.)



PLAN ON HEAD WALL N.T.S.



OUTLET DETAIL N.T.S.

PROJECT :	PROPOSED 1-STOREY HOUSE AT LOT 110 IN D.D.219 SAI KUNG, N.T.		
DWG. TITLE :	NOTES AND TYPICAL DETAILS 1		
DATE : 14/11/2024	SCALE : N.T.S.	DRG. NO. : SK/D-03(c)	

GEOTECHNICAL CONSULTANT :

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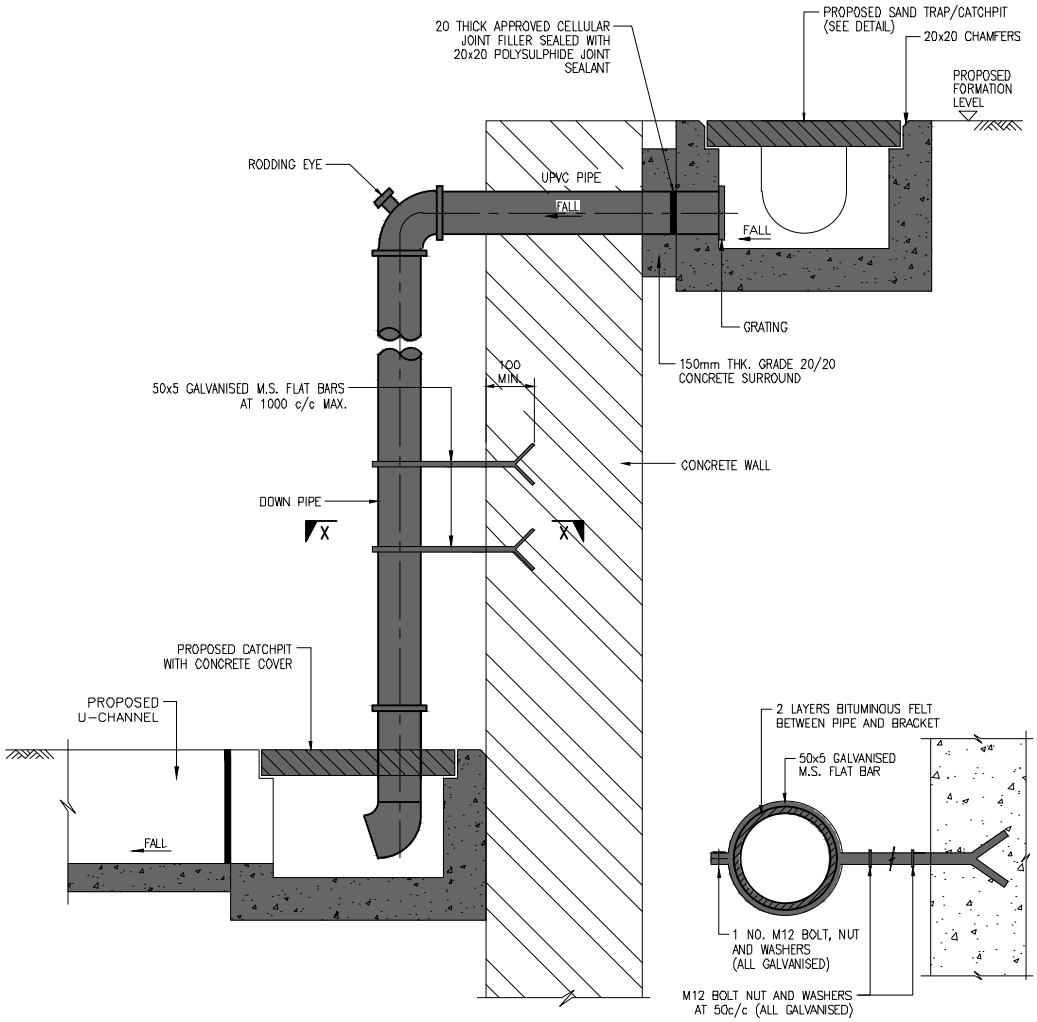

TYPICAL EXPOSED DOWNPIPE CONNECTION DETAILS (SCALE N.T.S.)

SECTION X – X SCALE N.T.S.)

PROJECT :	PROPOSED 1–STOREY HOUSE AT LOT 110 IN D.D.219 SAI KUNG, N.T.		
DWG. TITLE :	NOTES AND TYPICAL DETAILS 2		
DATE : 14/11/2024	SCALE : N.T.S.	DRG. NO. : SK/D–04(a)	

GEOTECHNICAL CONSULTANT :

PSA PHILIP SO & ASSOCIATES LTD.
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APPENDIX B

Design Calculation

		PROJECT No. **DD219-110**
OFFICE **PS**	PROJECT TITLE **DRAINAGE DESIGN REPORT - Lot. 110 in D.D. 219**	CATCHMENT No. **110-111**

NOTES

1. Refer: Geotechnical Manual for Slopes (GCO, 1984)".
2. Refer: Stormwater Drainage Manual 2018 (SDM 2018)
3. Refer: GEO Technical Guidance Note No. 30 (TGN 30)"
4. Refer: GEO Technical Guidance Note No. 39 (TGN 39)
5. Refer: GEO Technical Guidance Note No. 43 (TGN 43)

Design Parameters and Assumption

1 The design of surface drainage system is based on the guidelines given in the "Geotechnical Manual for Slopes (GCO, 1984)".

2 Rainfall intensity is taken from "Updated Intensity-Duration-Frequency Curves with Provision for Climate Change for Slope Drainage Design, GEO Technical Guidance Note No. 30 (TGN 30)"

3 Adopted Runoff Co-efficient from the "Guidelines for Estimation of Surface Runoff from Natural Terrain Catchments for Drainage Design Purposes, GEO Technical Guidance Note No. 39 (TGN 39)"

4 All designed drainages are using Concrete U-Channel, in accordance to "Guidelines on Hydraulic Design of U-shaped and Half-round Channels on Slopes, GEO Technical Guidance Note No. 43 (TGN 43)"

5 The required design intensity is based on a 50-years return period storm according to the SDM 2018, but adopted 200-years return period. (Section 4.3.2-4.3.4, 6.6.1 SDM 2018)

6 The flow in the catchment area is calculated using the "Rational Method",

The formula is $Q = k \times I \times A/3600$ (Ref. Eq. 8.1, Ch. 8.2.1, GCO, 1984)

where
Q = Maximum Runoff (litres/sec)
I = Design mean intensity of rainfall (mm/hr)
A= Area if catchment (m^2)
k = Runoff coefficient (Adopting from TGN30)

7 The Time of Concentration is calculated using the modified form of original Bransby--Williams equation,

$t = 0.14465 \times L/ (H^{0.2} \times A^{0.1})$ (Ref. Eq. 8.2, Ch. 8.2.3, GCO 1984)

where

t = Time of Concentration (min)
H = Average fall (m/100m) from the summit of catchment to the pt. of design.
A= Area of catchment (m^2)
L = Distance in (m) measured on the line of natural flow between the design section and that pt, of the catchment from which water would take the longest time to reach the design section.

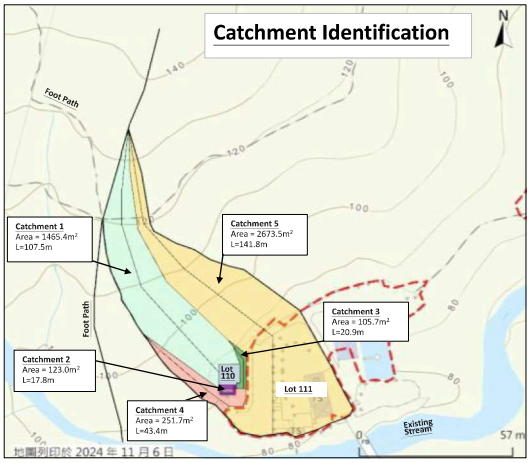
8 The stormwater collected by the surface drainage system is connected to the existing stream.

9 Area is divided into sub-catchment areas for the calculation of surface runoff if necessary. Runoff is collected by U-channels,

		PROJECT No.
		DD219-110
OFFICE	PROJECT TITLE	CATCHMENT No.
PS	DRAINAGE DESIGN REPORT - Lot. 110 in D.D. 219	110-111

NOTES

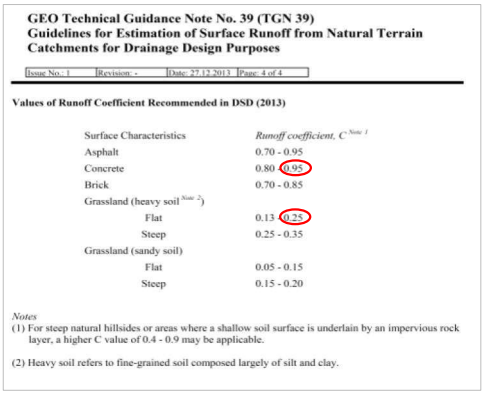
1. Refer: Geotechnical Manual for Slopes (GCO, 1984)".
2. Refer: Stormwater Drainage Manual 2018 (SDM 2018)
3. Refer: GEO Technical Guidance Note No. 30 (TGN 30)"
4. Refer: GEO Technical Guidance Note No. 39 (TGN 39)
5. Refer: GEO Technical Guidance Note No. 43 (TGN 43)



Design Information

Catchment	1	2	3	4	5
Area (m^2)	1465.4	123.0	105.7	251.7	2673.5
L (m)	107.5	17.8	20.9	43.4	141.8
$L_{f\text{-upper}}$ (m)	50.2	44.2	38.3	0.0	0.0
$L_{f\text{-lower}}$ (m)	28.6	28.6	28.6	49.1	28.6
k	0.25	0.95	0.25	0.25	0.25

k refers to



GEO Technical Guidance Note No. 39 (TGN 39)
Guidelines for Estimation of Surface Runoff from Natural Terrain Catchments for Drainage Design Purposes

Issue No.: 1 | Revision: - | Date: 27.12.2013 | Page: 4 of 4

Values of Runoff Coefficient Recommended in DSD (2013)

Surface Characteristics	*Runoff coefficient, C* [Note 1]
Asphalt	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Grassland (heavy soil [Note 2])	
Flat	0.13 - 0.25
Steep	0.25 - 0.35
Grassland (sandy soil)	
Flat	0.05 - 0.15
Steep	0.15 - 0.20

Notes
(1) For steep natural hillsides or areas where a shallow soil surface is underlain by an impervious rock layer, a higher C value of 0.4 - 0.9 may be applicable.

(2) Heavy soil refers to fine-grained soil composed largely of silt and clay.

10 Calculated Time of Concentration for Catchment

Since $t_c = t_0 + t_f$ **(Section 7.5.2, Stormwater Drainage Manual 2018)**

	Catchment	1	2	3	4	5	
Eq. 8.2,	H	40.0	100.0	29.6	38.7	34.6	(m / 100m)
	A	1465.4	123.0	105.7	251.7	2673.5	m^2
	L	107.5	17.8	20.9	43.4	141.8	m
Gives	t_0	3.59	0.63	0.96	1.74	4.59	min
Assume to use		**U375**	**U375**	**U375**	**U375**	**U450**	
	Gradient 1 in	**100**	**100**	**100**	**100**	**13.5**	
	Velocity	**1.96**	**1.96**	**1.96**	**1.96**	**3.99**	m/s
Length of U-Channel to CPT2	L_f-upper	50.2	44.2	38.3	0.0	0.0	m
	t_f-upper	0.43	0.38	0.33	0.00	0.00	min
Length of U-Channel to CPT3	L_f-lower	28.6	28.6	28.6	49.1	0.0	
	t_f-lower	0.12	0.12	0.12	0.21	0.00	
Thus,	tc	**4.13**	**1.13**	**1.41**	**1.94**	**4.59**	**min**

11 Extreme Mean Rainfall Intensity (Figure 1, TGN30), and Increased by 28.1% for Climate Change

	I_0 =	395	470	462	455	385	**mm/hr.**
I_0 x 128.1% =	I_{28}=	**506.0**	**602.1**	**591.8**	**582.9**	**493.2**	

Calculated Time of Concentration, for each Catchement at its Extreme Mean Rainfall.

	Catchment	1	2	3	4	5	
Eq. 8.1, (GEO, 1984)	k	0.25	0.95	0.25	0.25	0.25	
	I	506.0	602.1	591.8	582.9	493.2	mm/hr
	A	1465.4	123.0	105.7	251.7	2673.5	m^2
Gives, Maximum Runoff,	**Q**	51.49	19.54	4.34	10.19	91.56	litres/sec
		3089.5	**1172.4**	**260.6**	**611.3**	**5493.9**	
					5133.8	**5493.9**	**litres/min**

		PROJECT No. DD219-110
OFFICE PS	PROJECT TITLE DRAINAGE DESIGN REPORT - Lot. 110 in D.D. 219	CATCHMENT No. 110-111

NOTES

1. Refer: Geotechnical Manual for Slopes (GCO, 1984)".
2. Refer: Stormwater Drainage Manual 2018 (SDM 2018)
3. Refer: GEO Technical Guidance Note No. 30 (TGN 30)"
4. Refer: GEO Technical Guidance Note No. 39 (TGN 39)
5. Refer: GEO Technical Guidance Note No. 43 (TGN 43)

12 **U-Channel Design for each individual Catchment**

Figure 1, TGN43,

Collect Area	1	1+2	1+2+3	1+2+3+4	5		
Peak Run-off	3089.5	4261.9	4522.5	5133.8	5493.9	**litres/min**	
Required Channel	U375	U375	U375	U375	U450		
Design Gradient 1 in	100	100	100	100	13.5		
Design Velocity	1.46	1.46	1.5	1.57	3.99	**m/s**	< =4.0 m/s, OK
Premissible Velocity	1.98	1.98	1.98	1.98	4	**m/s**	(Cl. 8.3.4, GCO, 1984)
Channel Capacity	14,784	14,784	14,784	14,784	11,200	**litres/min**	
Status	ok	ok	ok	ok	ok		

13 Calculated Time of Concentration at 4.59 minutes, I_{28} = **493.2** mm/hr for all catchements.

Catchment	1	2	3	4	5	Total	
Eq. 8.1, (GEO, 1984) k	0.25	0.95	0.25	0.25	0.3		
I	493.2	493.2	493.2	493.2	493.2		mm/hr
A	1465.4	123.0	105.7	251.7	2673.5	4619.3	m^2
Gives, Maximum Runoff, Q	50.19	16.01	3.62	8.62	91.56	170.0	litres/sec
	3011.3	**960.4**	**217.1**	**517.2**	**5493.9**	**10,200**	**litres/min**
						<11,200 L/min, OK	

Conclusion

a. The Maximum Runoff for each individual Catchment at its Extreme Mean Rainfall Intensity, does not exceed the design capacity of individual channel.

b. The combined Maximum Runoff for ALL Catchments is 10200 litres/min, which is within the design capacity of the proposed U450 channel at gradient 1: 13.5 , 11200 litres/min.

c. The proposed outfall IL is at +79.85mPD, which is well about the Extreme Sea Level. The existing river receiving the discharge was already collecting the same mountain runoff before the provision facility, i.e. no additional surface runnoff is added.

d. The design is adquated.

NOTES

1. Refer: Geotechnical Manual for Slopes (GCO, 1984)".
2. Refer: Stormwater Drainage Manual 2018 (SDM 2018)
3. Refer: GEO Technical Guidance Note No. 30 (TGN 30)"
4. Refer: GEO Technical Guidance Note No. 39 (TGN 39)
5. Refer: GEO Technical Guidance Note No. 43 (TGN 43)

Geotechnical Engineering Office, Civil Engineering and Development Department
The Government of the Hong Kong Special Administrative Region

GEO Technical Guidance Note No. 30 (TGN 30)
Updated Intensity-Duration-Frequency Curves with Provision for Climate Change for Slope Drainage Design

Issue No.: 3	Revision: -	Date: 30.5.2023	Page: 3 of 4

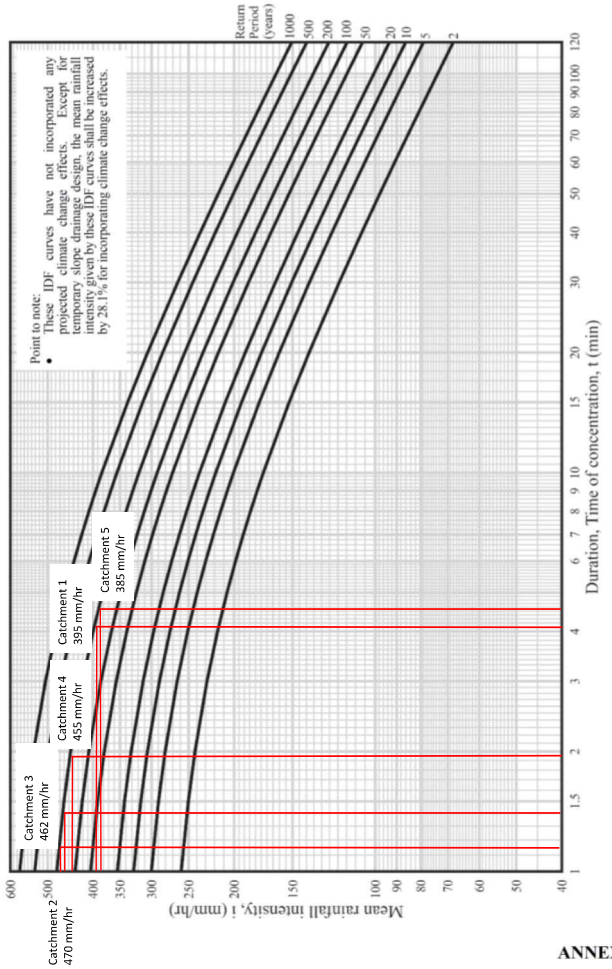


Figure 1 – Updated Intensity-Duration-Frequency Curves

Notes: 1. These IDF curves are to supersede those given in Figure 8.2 of the Geotechnical Manual for Slopes (GCO, 1984).
2. The mathematical formulae of these IDF curves are shown in Table 1 of Annex TGN 30 A1.

ANNEX TGN 30 A1 (1/2)

Calcuation of U-Channal Capacity by using Manning's Formula

Refer to Section 8.3.4 of Geotechnical Manual for Slopes (GCO, 1984) &
5.1 of GEO Technical Guidance Note No. 43 (TGN 44)

For U-Channel

R=Dh=A/P

b= 0.375 m
h= 0.375 m
r=b/2= 0.1875 m half full A= 0.055223

For h <=r, Half-Circle:

$\theta=2*Cos^{-1}((r-h)/r)=$ 3.141593

P=rθ= 0.589049 m

$A=r^2(\theta-\sin\theta)/2=$ 0.055223 m2, (limit at half circle) Hydraculic Radius, R=A/P= 0.09375

For h>r, Upper Rectangle:

h'=h-r= 0.1875 m

Additional P'=2h= 0.375 m

Additional, A'=bh'= 0.070313 m2 Hydraculic Radius, R=A/P= 0.1875

Combined:

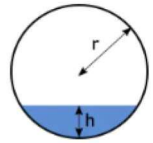
P= 0.964049 m

A= 0.125536 m2 Hydraculic Radius, R=A/P= 0.130217 m

Manning's formula,

$V=R^{0.67}*S^{0.5}/n$ 8.3.4 of GCO 1984 & 5.1 of TGN43

2. Pipe (less than full)



The problem gets a bit more complicated when the pipe is only partially filled. We already calculated this wetted perimeter in the wetted perimeter of a pipe section:

`P = r × θ`, where the central angle `θ = 2 × arccos [(r − h) / r]`

What about the area, then? You can use the segment area calculator or directly the formula for the circle segment area:

`A = r² × (θ − sin(θ)) / 2`

Combining the two, we find the hydraulic radius equation:

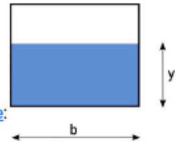
`R = A / P = [r² × (θ − sin(θ)) / 2] / (r × θ)`

This is quite a formula! Luckily, you can use this handy hydraulic radius calculator instead of meticulously performing all the calculations by hand ;)

Hydraulic radius equation for rectangular, trapezoidal, and triangular channel

This hydraulic radius calculator can be used for channels of various shapes, including rectangles, trapezoids, and triangles. Let's analyze them in more detail to find out which hydraulic radius equations can be used in each case.

1. Rectangular channel



In the case of a rectangular channel, the formulas are very straightforward. The hydraulic radius is simply equal to the rectangle's area divided by the wetted perimeter, as explained in the first example:

`R = A / P = (b × y) / (b + y + y) = (b × y) / (b + 2y)`

That's it — you can use this formula to find the hydraulic radius of a rectangular open channel.

									Lower half-Circle		Upper Rectangle							
	b	h	r=b/2	θ	1 in	S=	n=	A	P	A'	P'	A+A'	P+P'	R=Dh=A/P	V m/s		Q, m3/s	Q, L/min
Cap/Chart	**0.375**	**0.3750**	0.1875	3.141593	**100.00**	0.010	0.013	0.055223	0.589049	0.070313	0.375	0.125536	0.964049	0.130217	**1.96**		**0.246407**	14,784

Calcuation of U-Channal Capacity by using Manning's Formula

Refer to Section 8.3.4 of Geotechnical Manual for Slopes (GCO, 1984) &
5.1 of GEO Technical Guidance Note No. 43 (TGN 44)

For U-Channel

R=Dh=A/P

b= 0.45 m
h= 0.45 m
r=b/2= 0.225 m half full A= 0.079522

For h <=r, Half-Circle:

$\theta=2*Cos^{-1}((r-h)/r)=$ 3.141593

P=rθ= 0.706858 m

$A=r^2(\theta-\sin\theta)/2=$ 0.079522 m2, (limit at half circle) Hydraculic Radius, R=A/P= 0.1125

For h>r, Upper Rectangle:

h'=h-r= 0.225 m

Additional P'=2h= 0.45 m

Additional, A'=bh'= 0.10125 m2 Hydraculic Radius, R=A/P= 0.225

Combined:

P= 1.156858 m

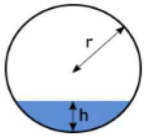
A= 0.180772 m2 Hydraculic Radius, R=A/P= 0.156261 m

Manning's formula,

$V=R^{0.67}*S^{0.5}/n$ 8.3.4 of GCO 1984 & 5.1 of TGN43

2. Pipe (less than full)

The problem gets a bit more complicated when the pipe is only partially filled. We already calculated this wetted perimeter in the wetted perimeter of a pipe section:



`P = r × θ`, where the central angle `θ = 2 × arccos [(r − h) / r]`

What about the area, then? You can use the segment area calculator or directly the formula for the circle segment area:

`A = r² × (θ − sin(θ)) / 2`

Combining the two, we find the hydraulic radius equation:

`R = A / P = [r² × (θ − sin(θ)) / 2] / (r × θ)`

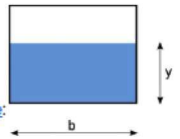
This is quite a formula! Luckily, you can use this handy hydraulic radius calculator instead of meticulously performing all the calculations by hand ;)

Hydraulic radius equation for rectangular, trapezoidal, and triangular channel

This hydraulic radius calculator can be used for channels of various shapes, including rectangles, trapezoids, and triangles. Let's analyze them in more detail to find out which hydraulic radius equations can be used in each case.

1. Rectangular channel

In the case of a rectangular channel, the formulas are very straightforward. The hydraulic radius is simply equal to the rectangle's area divided by the wetted perimeter, as explained in the first example:



`R = A / P = (b × y) / (b + y + y) = (b × y) / (b + 2y)`

That's it — you can use this formula to find the hydraulic radius of a rectangular open channel.

								Lower half-Circle		Upper Rectangle								
	b	h	r=b/2	θ	1 in	S=	n=	A	P	A'	P'	A+A'	P+P'	R=Dh=A/P	V m/s		Q, m3/s	Q, L/min
Running	0.45	**0.1509**	0.225	2.470646	13.50	0.074	0.013	0.046801	0.555895	0	0	0.046801	0.555895	0.08419	**3.99**		0.186667	11,200
Cap/Chart	0.45	**0.4500**	0.225	3.141593	13.50	0.074	0.013	0.079522	0.706858	0.10125	0.45	0.180772	1.156858	0.156261	**6.04**		1.091187	65,471

APPENDIX C

Response to DSD's Comments

DSD's Comments (as at 4.7.2024), The Chief Engineer/Mainland South, Drainage Services Department (CE/MS, DSD) (Contact Officer: Mr. Henry YEUNG, Tel: 2300 1343)	Our Response to DSD's Comments
4(a) peripheral drainage channels should be provided to intercept the surface runoff from the uphill catchment so as to avoid the application site form overland flow influence;	A 375UC is provided at the lot boundary facing the uphill catchment to intercept surface runoff. Please refer to the Drainage Layout Plan in Appendix A.
4(b) the applicant should demonstrate with the support of hydraulic calculation, that the proposed drainage system has adequate capacity to accommodate the surface runoff collected from its catchment, the application site and its upstream catchments;	The catchment area and the drainage proposal are detailed in the Drainage Design Report (DDR).
4(c) the applicant should critically review the proposed drainage system and propose drainage mitigation measures to prevent the potential flooding risk arising from surface runoff running from the hillside areas to the proposed site during the	Noted. The design was carried out in accordance with the GEO Technical Guidance Note No. 30 (TGN 30) dated 30.5.2023, adapting the updated

inclement weather;	Intensity-Duration-Frequency Curves with Provision for Climate Change for SLOPE Drainage Design(IDF+28.1%), please refer to the content of DDR.
4(d) a sand trap/catchpit should be provided and regularly desilted by the applicant or the successive owners of the proposed dévelopment to prevent sand and silt from being washed into the existing drainage system/channel at is downstream;	Noted. Multiple sand traps/catchpits are provided along the proposed drainage facilities. Please refer to the Drainage Layout Plan in Appendix A.
4(e) there is no existing DSD foul sewer in the vicinity of the subject site;	Noted.
4(f) the applicant shall be responsible for the maintenance of his completed drainage works and, if required in future by DLO/SK, relocation of such works;	Noted and agreed.
4(g) the applicant shall allow all time free access for the Government and its agent to conduct audit on his completed drainage works;	Noted and agreed.
4(h) the applicant shall allow connections by others to his external drainage works when required by the Government; and	Noted and agreed.

4(i) the applicant is reminded that the limited desk-top checking by Government on the drainage proposal covers only the fundamental aspects of the drainage design. The applicant shall ensure that his proposed drainage works will not cause any adverse drainage of environmental impact in the vicinity. The applicant shall check and ensure that the proposed drainage works and the downstream drainage systems have adequate capacity and are in good condition to accommodate all discharge water collected from his lot and all upstream catchments. The applicant shall be responsible to effect any subsequent upgrading of these proposed works and the downstream drainage systems in respect of design, construction and maintenance, as may be required by DLO/SK.	Noted. The proposed facilities discharge into the existing stream at +79.85mPD, which is well above the Extreme Sea Level. The existing river receiving the discharge was already collecting the same mountain runoff before the provision of the facility, meaning that no additional surface runoff is added.