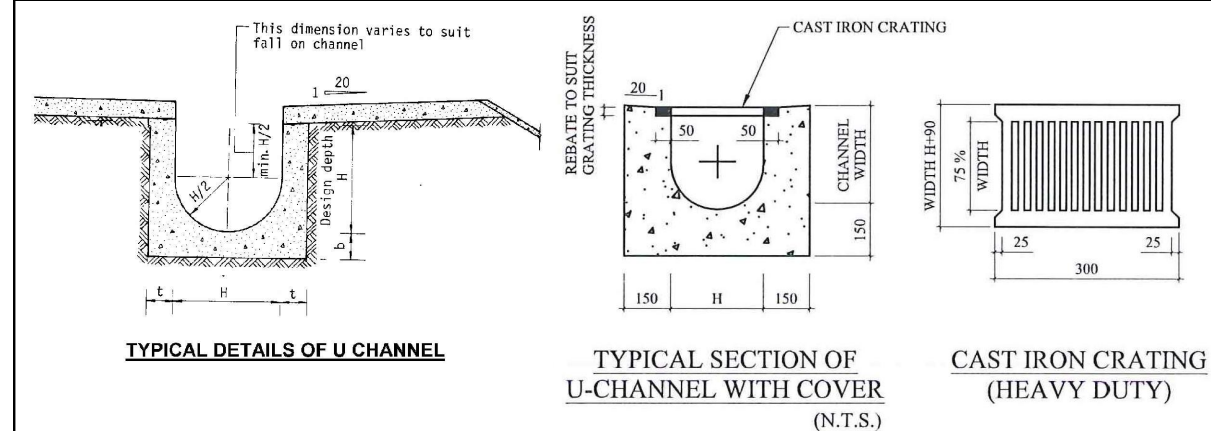
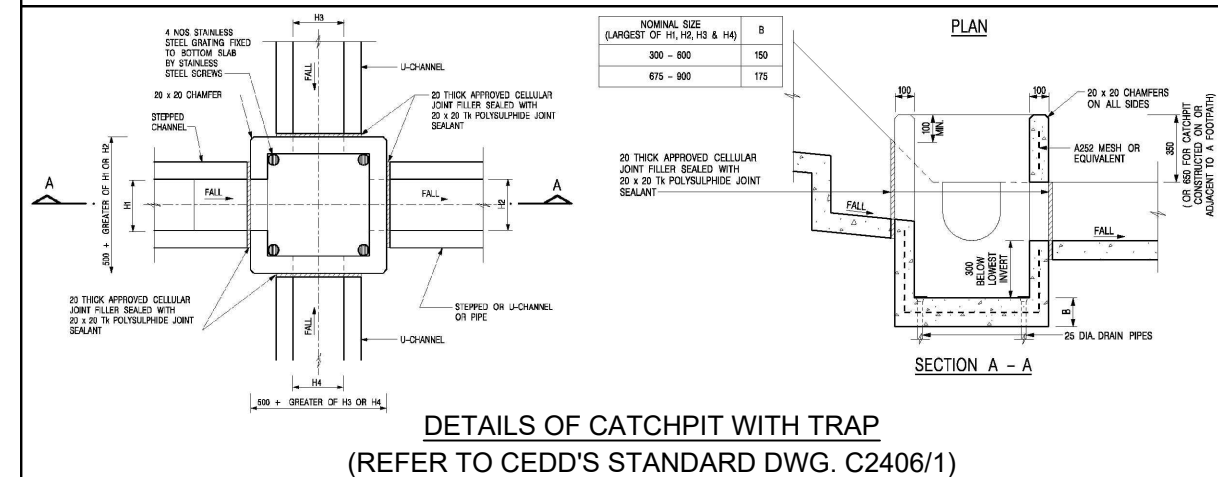
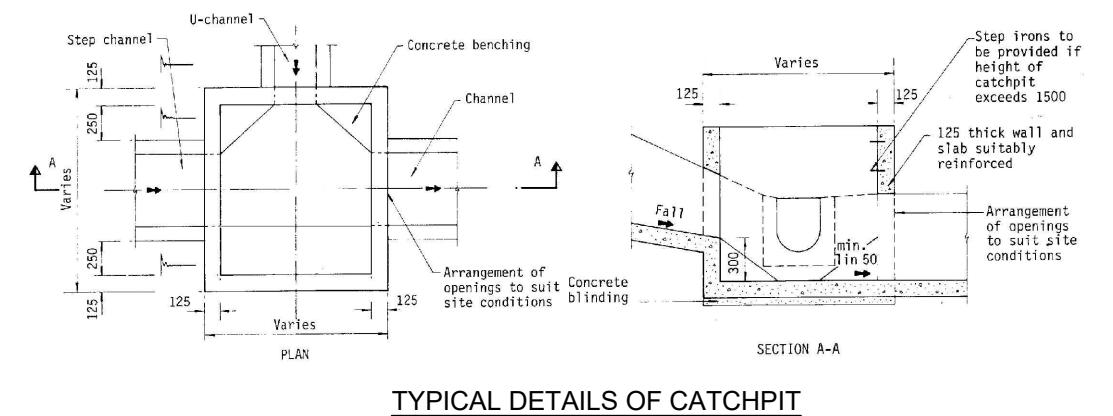
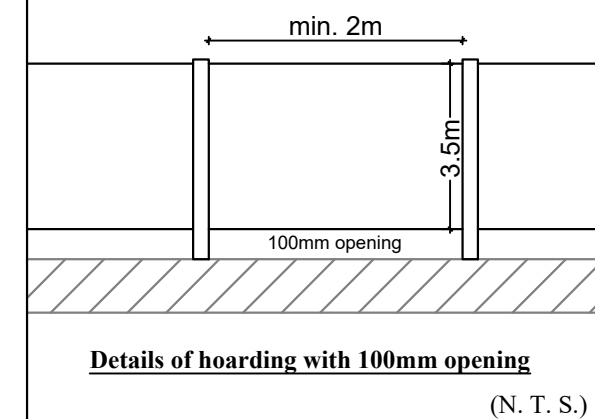
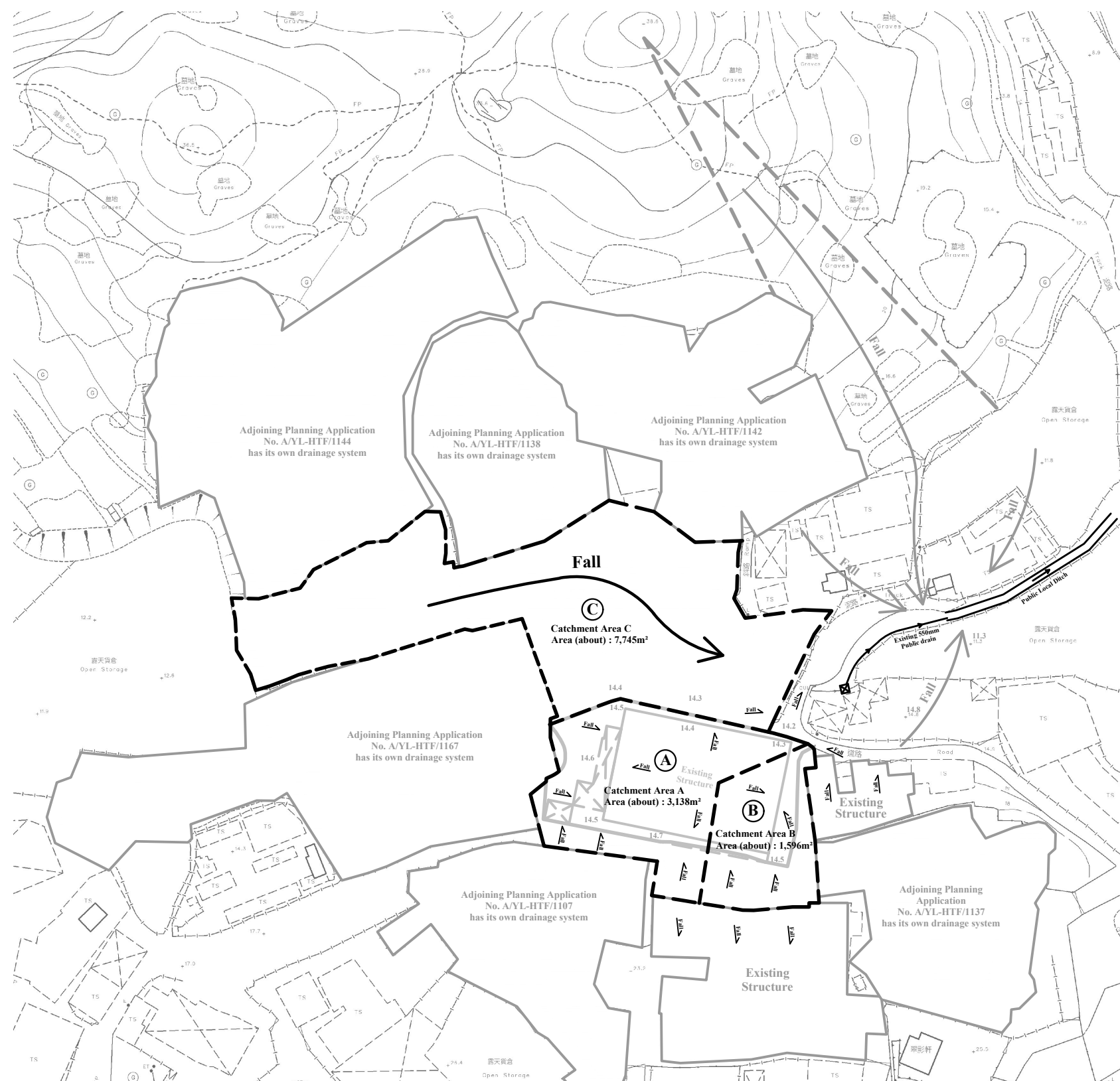




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February 2025

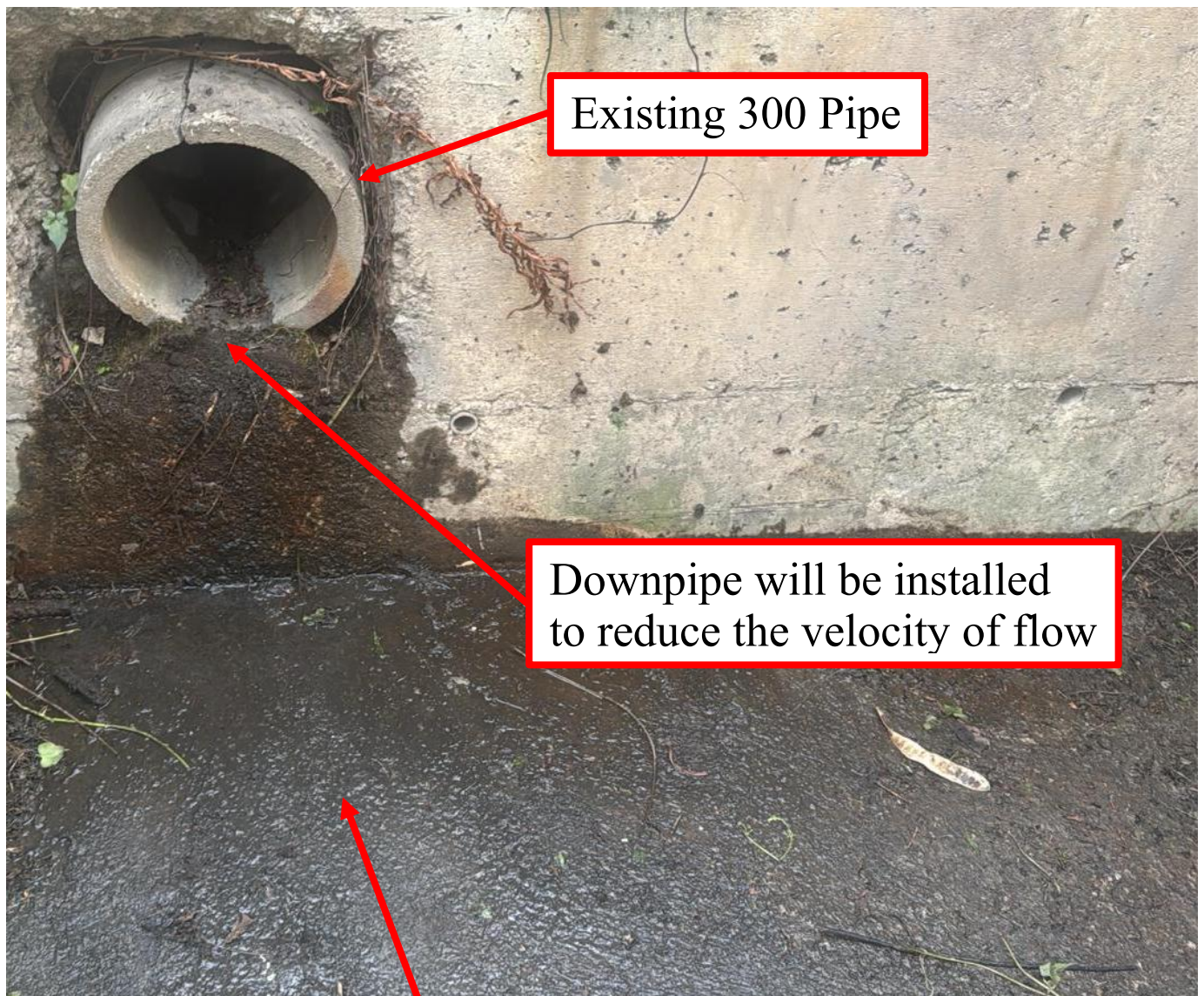
Drainage Proposal

**Lots 154 (Part), 159 S.A (Part) in D.D. 128
and Adjoining Government Land,
Yuen Long, New Territories**

**Goldrich Planners &
Surveyors Ltd.**

Plan 1.2
(P 24034)

Viewpoint 1



Existing 300 Pipe

Downpipe will be installed
to reduce the velocity of flow

Existing 500mm u-channel

1 For Catchment Area A			Ref.
Area, A	=	3138 m ²	SDM 7.5.2 (d)
Average slope, H	=	0.1 m per 100m	
Distance on the line of natural flow, L	=	22.5 m	
Time of concentration, t _o	=	0.14465L / (H ^{0.2} A ^{0.1}) = 0.14465 (22.5) / (0.1 ^{0.2} *3138 ^{0.1}) = 2.3 min	
2 For U-Channel of Catchment Area A			
	From	To	
Ground level (mPD)	14.70	14.50	
Invert level (mPD)	14.40	13.35	
Width of u-channel, w	=	300 mm	SDM 8.2.1
Length of u-channel, L _c	=	105.2 m	
Depth of vertical part of u-channel, d	=	1000 mm	
Gradient of u-channel, S _f	=	(14.4-13.35)/105.2 = 0.0100	
Cross-Section Area, a	=	0.5 π r ² + w d = 0.5 x 3.14 x 150 ² + 300 x 1000 = 0.335 m ²	
Wetted Perimeter, p	=	π r + 2 d = 3.14 x 150 + 2 x 1000 = 2.471 m	
Hydraulic radius, R	=	a / p = 0.136 m	
	=		
3 Use Manning Equation for estimating velocity of stormwater			
Take n	=	0.016 for concrete lined channels:-	SDM Table 13
Allowable velocity, v	=	R ^{1/6} x (RS _f) ^{1/2} / n = (0.136) ^{1/6} x (0.136 x 0.01) ^{1/2} / 0.016 = 1.65 m/s	SDM Table 12
Time of flow, t _f	=	1.1 min	
4 Use "Rational Method" for calculation of design flow			
Design intensity, i	=	a / (t _o + t _f + b) ^c = 505.5 / (2.3+1.1+3.29) ^{0.35} for return period T = 50 years = 258	SDM 4.3.2 Corrigendum 1/2024 SDM Table 3a
Type of surface	Runoff Coefficient C	Catchment Area A (m ²)	SDM 7.5.2 (b)
Flat Glassland(heavy soil)	0.25	0.0	
Concrete Paving	0.95	3145.0	
		SUM = 2987.8	
Upstream flow, Q _u	=	0 m ³ /s	SDM 7.5.2 (a)
Design flow, Q _d	=	0.278i Σ C _j A _j x 1.16 + Q _u where A _j is in km ² = 0.278 x 258 x 2987.75 / 1000000 + 0 = 0.214 m ³ /s	
Allowable flow, Q _a	=	a x v = 0.335 x 1.65 = 0.553 m ³ /s	
	=	> Q _d (O.K.)	
Reference was made to Stormwater Drainage Manual (SDM) by DSD			
Scale: NA	Hydraulic Calculation		Goldrich Planners & Surveyors Ltd.
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1 For Catchment Area B			Ref.															
Area, A = 1589 m ² Average slope, H = 0.1 m per 100m Distance on the line of natural flow, L = 20.5 m Time of concentration, t _o = 0.14465L / (H ^{0.2} A ^{0.1}) = 0.14465 (20.5) / (0.1 ^{0.2} *1589 ^{0.1}) = 2.2 min																		
2 For U-Channel of Catchment Area B																		
<table><tr><td></td><td>From</td><td>To</td></tr><tr><td>Ground level (mPD)</td><td>14.70</td><td>14.50</td></tr><tr><td>Invert level (mPD)</td><td>14.23</td><td>13.35</td></tr></table> Width of u-channel, w = 300 mm Length of u-channel, L _c = 88.2 m Depth of vertical part of u-channel, d = 1000 mm Gradient of u-channel, S _f = (14.23-13.35)/88.2 = 0.0100 Cross-Section Area, a = 0.5 π r ² + w d = 0.5 x 3.14 x 150 ² + 300 x 1000 = 0.335 m ² Wetted Perimeter, p = π r + 2 d = 3.14 x 150 + 2 x 1000 = 2.471 m Hydraulic radius, R = a / p = 0.136 m					From	To	Ground level (mPD)	14.70	14.50	Invert level (mPD)	14.23	13.35						
	From	To																
Ground level (mPD)	14.70	14.50																
Invert level (mPD)	14.23	13.35																
3 Use Manning Equation for estimating velocity of stormwater																		
Take n = 0.016 for concrete lined channels:- Allowable velocity, v = R ^{1/6} x (RS _f) ^{1/2} /n = (0.136) ^{1/6} x (0.136 x 0.01) ^{1/2} / 0.016 = 1.65 m/s Time of flow, t _f = 0.9 min																		
4 Use "Rational Method" for calculation of design flow																		
Design intensity, i = a / (t _o + t _f +b) ^c = 505.5 / (2.2+0.9+3.29) ^{0.35} for return period T = 50 years = 261																		
<table><tr><td>Type of surface</td><td>Runoff Coefficient C</td><td>Catchment Area A (m²)</td><td>C x A</td></tr><tr><td>Flat Glassland (heavy soil)</td><td>0.25</td><td>0.0</td><td>0.0</td></tr><tr><td>Concrete Paving</td><td>0.95</td><td>1589.0</td><td>1509.6</td></tr><tr><td colspan="3">SUM =</td><td>1509.6</td></tr></table> Upstream flow, Q _u = 0 m ³ /s Design flow, Q _d = 0.278i Σ C _j A _j x 1.16 + Q _u where A _j is in km ² = 0.278 x 261 x 1509.55 / 1000000 + 0 = 0.110 m ³ /s Allowable flow, Q _a = a x v = 0.335 x 1.65 = 0.553 m ³ /s > Q _d (O.K.)			Type of surface	Runoff Coefficient C	Catchment Area A (m ²)	C x A	Flat Glassland (heavy soil)	0.25	0.0	0.0	Concrete Paving	0.95	1589.0	1509.6	SUM =			1509.6
Type of surface	Runoff Coefficient C	Catchment Area A (m ²)	C x A															
Flat Glassland (heavy soil)	0.25	0.0	0.0															
Concrete Paving	0.95	1589.0	1509.6															
SUM =			1509.6															
Reference was made to Stormwater Drainage Manual (SDM) by DSD																		

Scale: NA	Hydraulic Calculation Lots 154 (Part), 159 S.A (Part) in D.D. 128 and Adjoining Government Land, Yuen Long, New Territories	Goldrich Planners & Surveyors Ltd.
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1 For Catchment Area of Underground Pipe			Ref.
Area, A	=	0 m ²	SDM 7.5.2 (d)
Average slope, H	=	0.1 m per 100m	
Distance on the line of natural flow, L	=	0 m	
Time of concentration, t _o = 0.14465L / (H ^{0.2} A ^{0.1}) = 0.14465 (0) / (0.1 ^{0.2} 0 ^{0.1})			
= 0.0 min			
2 For Underground Pipe after Existing CP5			
Size(Diameter) w	=	300 mm	
Length of Pipe	=	6 m	
Design the pipe to 9/10 full bore capacity, then			
Area of ventilated portion	=	0.1 of pipe area	
½ r ² θ - ½ r ² sin(θ)	=	0.1 π r ²	
θ - sin(θ)	=	0.2 π	
θ	=	1.63 rad = 93.4 ^o (By trial and error)	
Area A = 0.9 π r ²			SDM 8.2.1
= 0.9 x 3.14 x 300 ²			
= 0.254 m ²			
Wetted Perimeter P	=	2 π r – r θ = 1396 mm	
Hydraulic radius R	=	A/P	
		182.2 mm	
3 Use Manning Equation for estimating velocity of stormwater			
Fall S	=	1: 3	
Take n	=	0.016 for concrete lined channels:-	
Allowable velocity, v	=	2.00 m/s (downpipe applied)	
Time of flow, t _f	=	0.05 min	
4 Use "Rational Method" for calculation of design flow			SDM 4.3.2 Corrigendum 1/2024 SDM Table 3a
Design intensity, i	=	a / (t _o + t _f +b) ^c	
	=	505.5 / (0.0+0.05+3.29) ^{0.355} for return period T = 50 years	
	=	329	
Type of surface	Runoff Coefficient C	Catchment Area A (m ²) C x A	
Flat Glassland(heavy soil)	0.25	0.0 0.0	
Concrete Paving	0.95	0.0 0.0	
Macadam Roadways	0.425	0.0 0.0	
Wooded Areas	0.105	0.0 0.0	
		SUM = 0.0	
Upstream flow, Q _u = 0.324 m ³ /s			SDM 7.5.2 (b)
Design flow, Q _d = 0.278i Σ C _i A _i + Q _u where A _i is in km ²			
= 0.278 x 329 x 0 / 1000000 + 0.324			
= 0.324 m ³ /s			
Allowable flow, Q _a = a x v			
= 0.3974 x 1.35			
= 0.509 m ³ /s			
> Q _d (O.K.)			
Reference was made to Stormwater Drainage Manual (SDM) by DSD			

Scale: NA	Hydraulic Calculation Lots 154 (Part), 159 S.A (Part) in D.D. 128 and Adjoining Government Land, Yuen Long, New Territories	Goldrich Planners & Surveyors Ltd.
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1 For Catchment Area C			Ref.	
Area, A	=	7745 m ²		
Average slope, H	=	0.1 m per 100m		
Distance on the line of natural flow, L	=	190.5 m		
Time of concentration, t _o	=	0.14465L / (H ^{0.2} A ^{0.1}) = 0.14465 (190.5) / (0.1 ^{0.2} *7745 ^{0.1}) = 17.8 min		
2 For Existing 550mm Public Drain			SDM 7.5.2 (d)	
	From	To		
Ground level (mPD)	11.30	11.30		
Invert level (mPD)	10.53	10.06		
Width of u-channel, w	=	550 mm		
Length of u-channel, L _c	=	46.8 m		
Depth of vertical part of u-channel, d	=	965 mm		
Gradient of u-channel, S _f	=	(10.53-10.06)/46.8 = 0.010		
Cross-Section Area, a	=	0.5 π r ² + w d = 0.5 x 3.14 x 275 ² + 550 x 965 = 0.650 m ²		
Wetted Perimeter, p	=	π r + 2 d = 3.14 x 275 + 2 x 965 = 2.794 m		
Hydraulic radius, R	=	a / p = 0.232 m		
3 Use Manning Equation for estimating velocity of stormwater			SDM 8.2.1	
Take n	=	0.016 for concrete lined channels:-		
Allowable velocity, v	=	R ^{1/6} x (RS _f) ^{1/2} / n = (0.232) ^{1/6} x (0.232 x 0.01) ^{1/2} / 0.016 = 2.37 m/s		
Time of flow, t _f	=	0.3 min		
4 Use "Rational Method" for calculation of design flow			SDM Table 13 SDM Table 12	
Design intensity, i	=	a / (t _o + t _f + b) ^c = 505.5 / (17.8+0.3+3.29) ^{0.35} for return period T = 50 years = 170		
Type of surface	Runoff Coefficient C	Catchment Area A (m ²)	C x A	SDM 4.3.2 Corrigendum 1/2024 SDM Table 3a
Flat Glassland (heavy soil)	0.25	0.0	0.0	
Concrete Paving	0.95	7745.0	7357.8	SDM 7.5.2 (b)
SUM =			7357.8	
Upstream flow, Q _u	=	0.324 m ³ /s		SDM 7.5.2 (a)
Design flow, Q _d	=	0.278i Σ C _j A _j x 1.16 + Q _u where A _j is in km ² = 0.278 x 170 x 7357.75 / 1000000 + 0.324 = 0.672 m ³ /s		
Allowable flow, Q _a	=	a x v = 0.65 x 2.37 = 1.384 m ³ /s		
> Q _d (O.K.)				
Reference was made to Stormwater Drainage Manual (SDM) by DSD				

Scale: NA	Hydraulic Calculation	Goldrich Planners & Surveyors Ltd.
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