Appendix 1

Drainage Proposal

Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land, Kong Nga Po, Sheung Shui, New Territories

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Drainage Proposal

Prepared by: Matthew Poon
Date: 16-July 2026

[redacted]

CONTENTS

APPENDICE

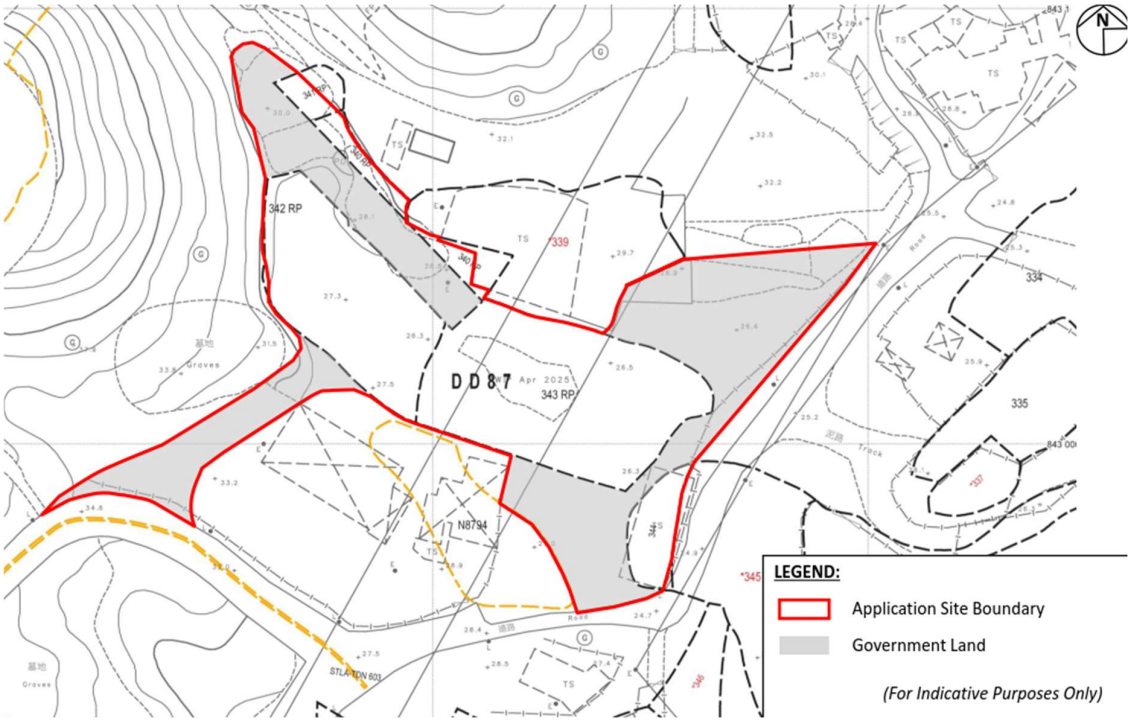
1. INTRODUCTION

1.1 The drainage proposal is under the application of Section 16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land, Kong Nga Po, Sheung Shui, New Territories. The proposed uses of the subject lots are temporary open storage of containers with ancillary facilities and associated filling of land and pond for a period of 3 years. Levelling the land with filling up ponding areas is proposed.

Wings & Associates Consulting Engineers Limited is appointed to be the consultant to prepare for the Drainage Proposal in supporting the construction works for the proposed application.

2. SITE DESCRIPTION

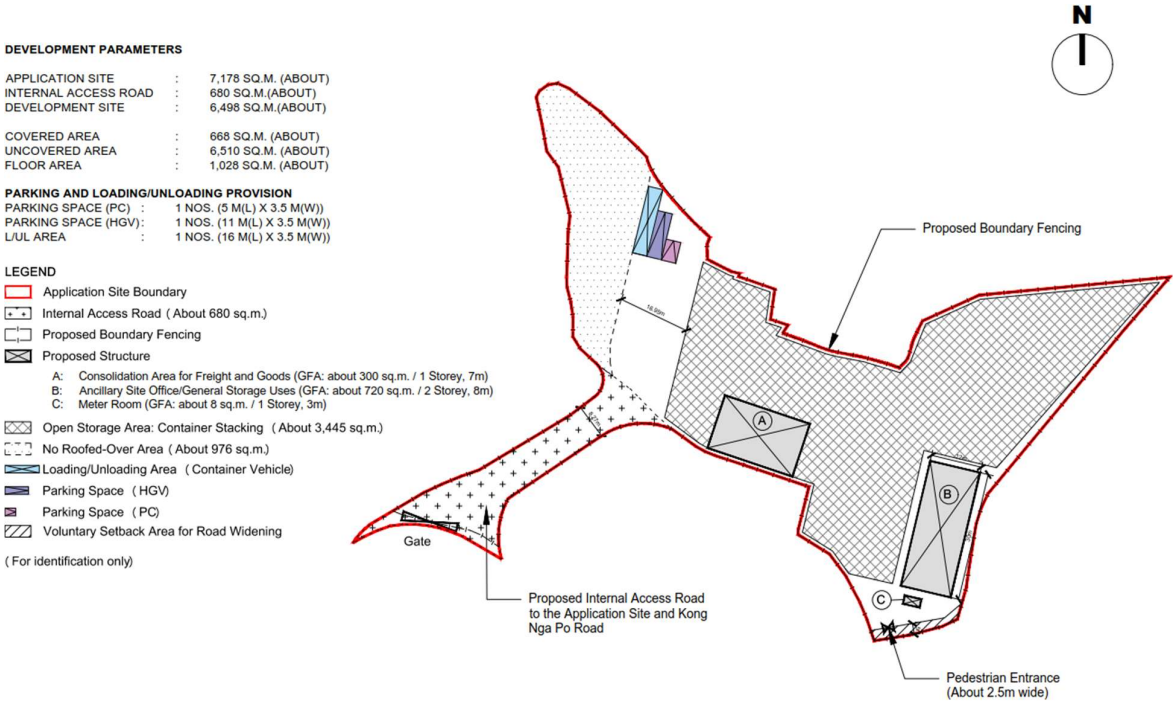
2.1 The general views of the application area can be referred to the figures below. The combined parts of the lot cover an area of about 7178m^2. This area will be surrounded by fencing in the subject lots. The fencing will provide clearance above ground surface to allow the flow of storm water surface runoff.



Lot information of the Subject Site

Plan view of Lot 343RP

2.2 The figure below shows the layout of proposed development. No permanent structures and buildings will be placed within the subject lots.



Layout plan of the subject site

2.3 The existing ground level of the application lots range between +25mPD to +33mPD. With reference to the Stormwater Drainage Manual, the existing ground level of the site is significantly higher than sea level, as a result, the site will not be affected by tidal effects.

The information from the Observatory and the tables from the Stormwater Drainage Manual are shown below for reference.

Table 8 – Design Extreme Sea Levels (in mPD)

Return Period (Years)	North Point/ Quarry Bay (1954-2017)	Tai Po Kau (1962-2017)	Tsim Bei Tsui (1974-2017)	Tai O (1985-2017)
2	2.73	2.91	3.07	2.87
5	2.94	3.20	3.31	3.16
10	3.09	3.45	3.51	3.36
20	3.24	3.73	3.74	3.57
50	3.45	4.19	4.09	3.84
100	3.63	4.60	4.40	4.06
200	3.81	5.10	4.77	4.28

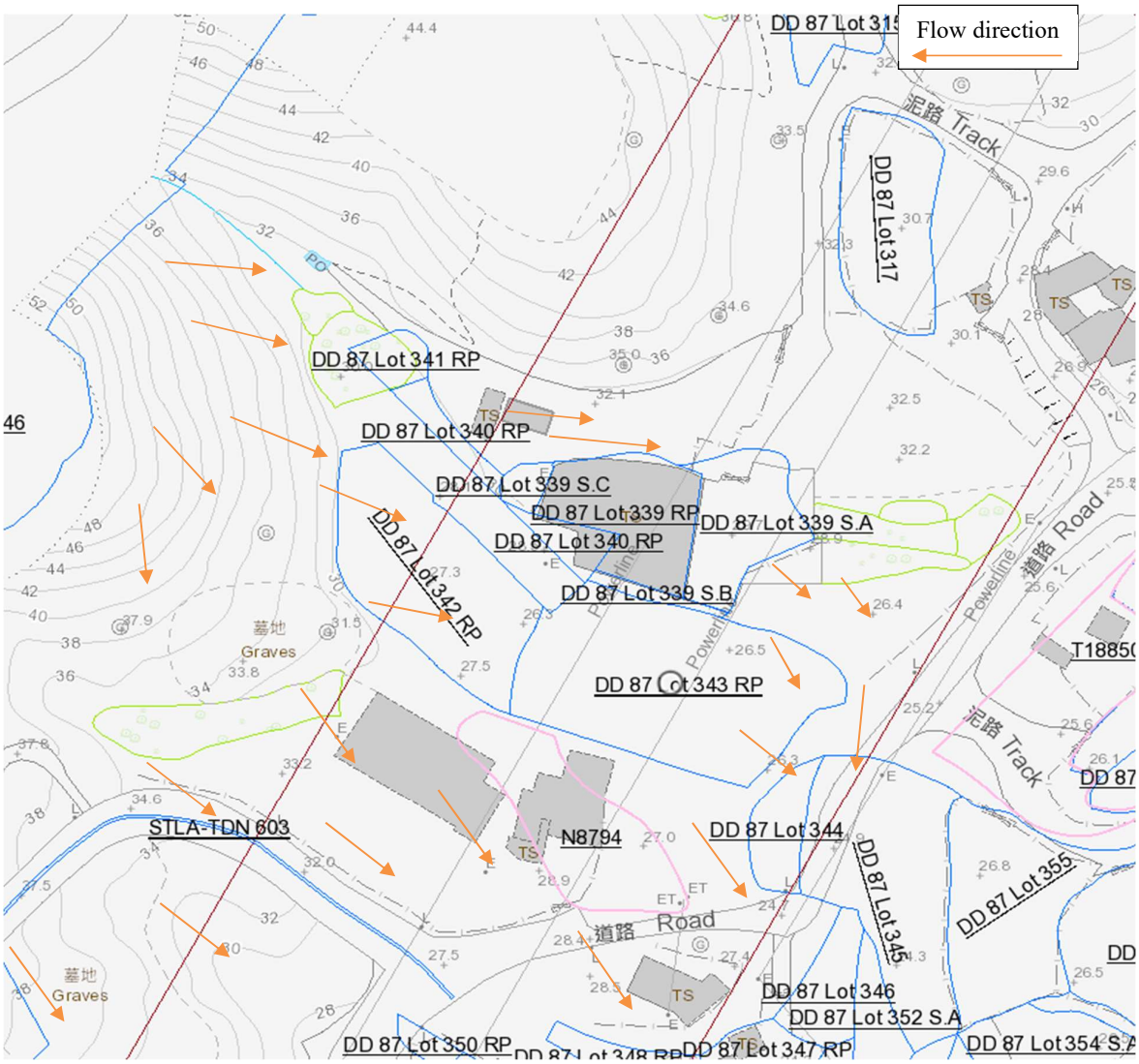
Table 9 – Mean Higher High Water (MHHW) Levels (in mPD)

North Point/ Quarry Bay (1962-2017)	Tai Po Kau (1981-2017)	Tsim Bei Tsui (1983-2017)	Tai O (1985-2017)
2.01	2.02	2.32	2.13

3. ORIGINAL DRAINAGE SYSTEM FOR STORMWATER DISCHARGE

3.1 Identification of the Effective Catchment Area

Referring to the location plan and the existing topography, the catchment area of surface runoff affecting the subject lots is considered.



Flow Direction of the Catchment Area on this site

3.2 Studying on the Existing Run-off

Based on the existing ground profile, surface runoff flows from west to southeast and ultimately discharges into the existing stream.

4. PROPOSED DRAINAGE SYSTEM OF THE SITE FOR STORMWATER DISCHARGE

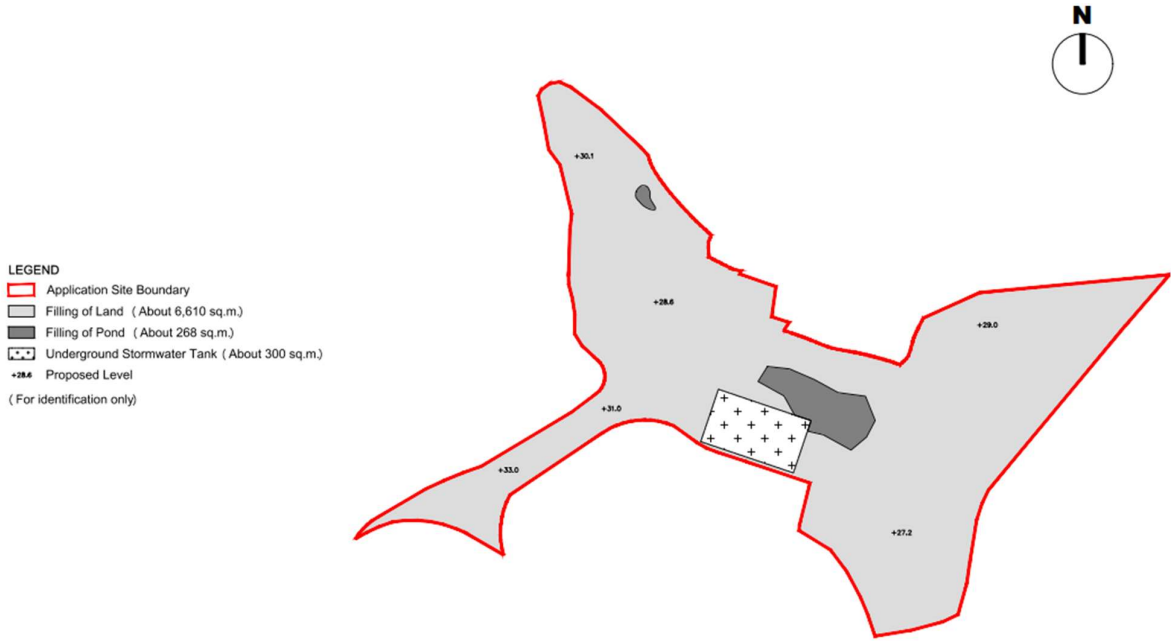
4.1 General Planning

The planning of the new drainage system for stormwater within and adjacent to the subject lots will cover the following items:

- Construction of new stormwater storage tank
- Construction of new surface channels and catchpits to divert the stormwater to the new storage tank or discharge to existing stream

4.2 Filling the subject site to rearrange cover level

The area inside the lot will be filled up to form a flat surface for the proposed development. The proposed ground surface will be formed with fall gradient towards the proposed drainage system.



Filling plan of the subject site

4.3 Design Assumption

The design adheres to the guidelines outlined in the Stormwater Drainage Manual.

Material Properties:

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

Stormwater Drainage Manual 7.5.2

Rainfall Intensity
- Runoff Coefficient for grass = 0.20
- Runoff Coefficient for paved = 0.80

The adopted design rainfall parameters are consistent with the SDM Corrigendum No. 1/2024 table 3d. The adopted parameters are summarised in table 4-1

Return Period T(years)	**50**
a	474.6
b	2.90
c	0.371

Table 4.1 Storm Constants for Different Return Periods of North District Area

4.4 Climate Change

Table 4-2 presents a summary of the design rainfall used for the end-21st century storm events. (reference from Corrigendum 1-2022 of SDM)

	Rainfall Increase
End of 21st Century	16.0%

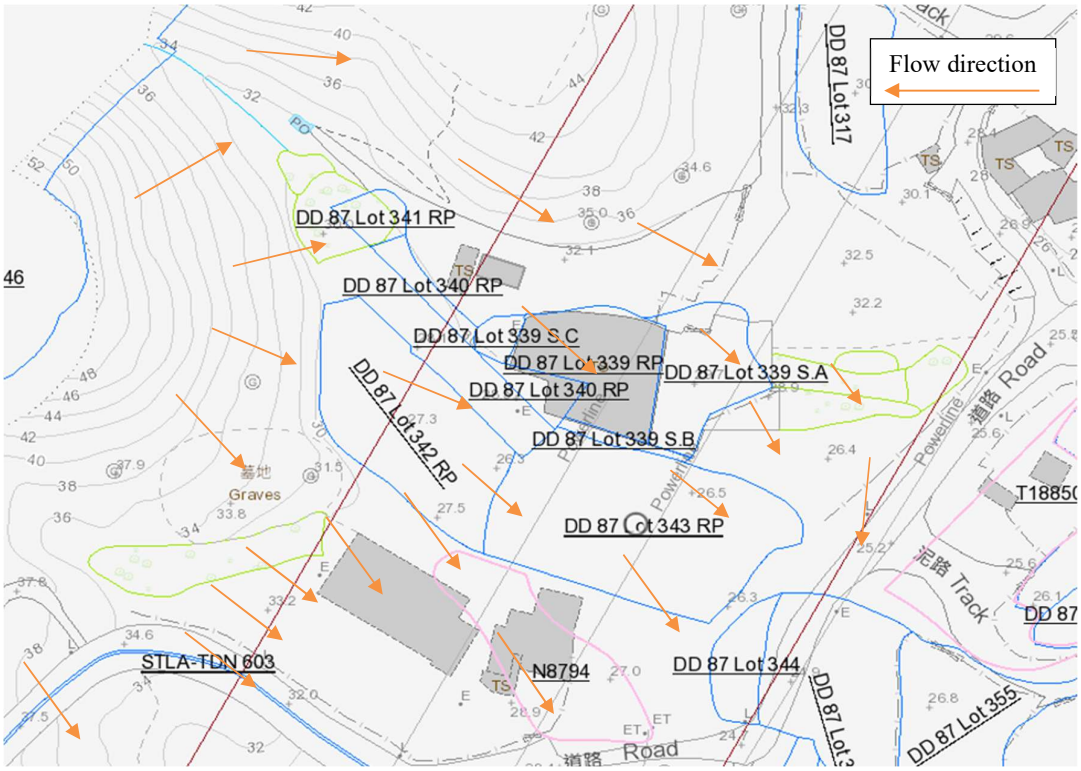
Table 4-3 Rainfall Increase due to Climate Change

4.5 Design of Channels and Catchpits

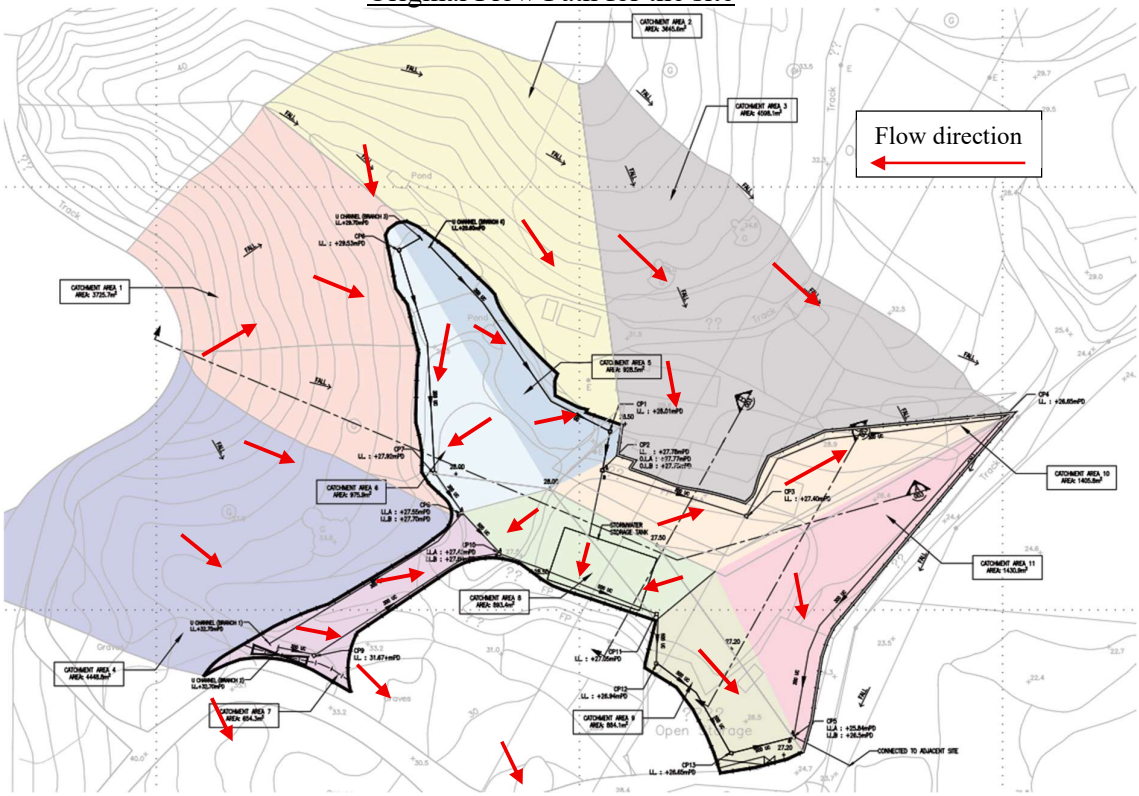
The proposed drainage system will collect the surface runoff from effective catchment area inside and outside the lot. Then, the surface runoff will be diverted to the adjacent site.

The proposed drainage system to collect and divert the surface runoff from the designed catchment to the adjacent site has been checked. All surface channels are capable to divert the surface runoff from 10-year return period rainstorm. The detailed calculation and design drawings can be found in Appendix C & D.

4.5 Flow Path Comparison



Original Flow Path for the site



Flow Path after Development

5. CONCLUSION

5.1 A new drainage system within the subject lots is proposed after the site formation works to raise the ground level to be uniform.

5.2 Having considered each branch of the proposed surface channel to handle the surface runoff from both catchment areas from uphill and the subject lots concurrently in the design checking (design calculation refers to Appendix C), the proposed surface channels and catchpits are capable of receiving potential surface runoff in calculating the rainfall intensity storm effect in approximate 50 years of return period. The collected stormwater will be discharged to an adjacent lot, which then drains to the nearby river.

5.4 As an additional mitigation measure for the lot, a 450m³ stormwater storage tank(13m x 23.1m x 1.5m) is proposed. In extreme rainfall events, the inlet pipe connected to the existing surface channel diverts stormwater into the tank. The tank will temporarily store incoming peak stormwater flows, effectively reducing the peak discharge to downstream areas. To maintain its capacity for subsequent events, the tank will be emptied after each rainfall.

5.5 Regular maintenance such as routine desilting will be carried out by the development owner for the drainage system (i.e. surface channel and catchpit) surrounding the site to avoid blockage and deterioration.

5.6 Openings on the bottom of fencing and walls will be provided surrounding the subject lots to avoid blockage and changing the flow path of the surface runoff.

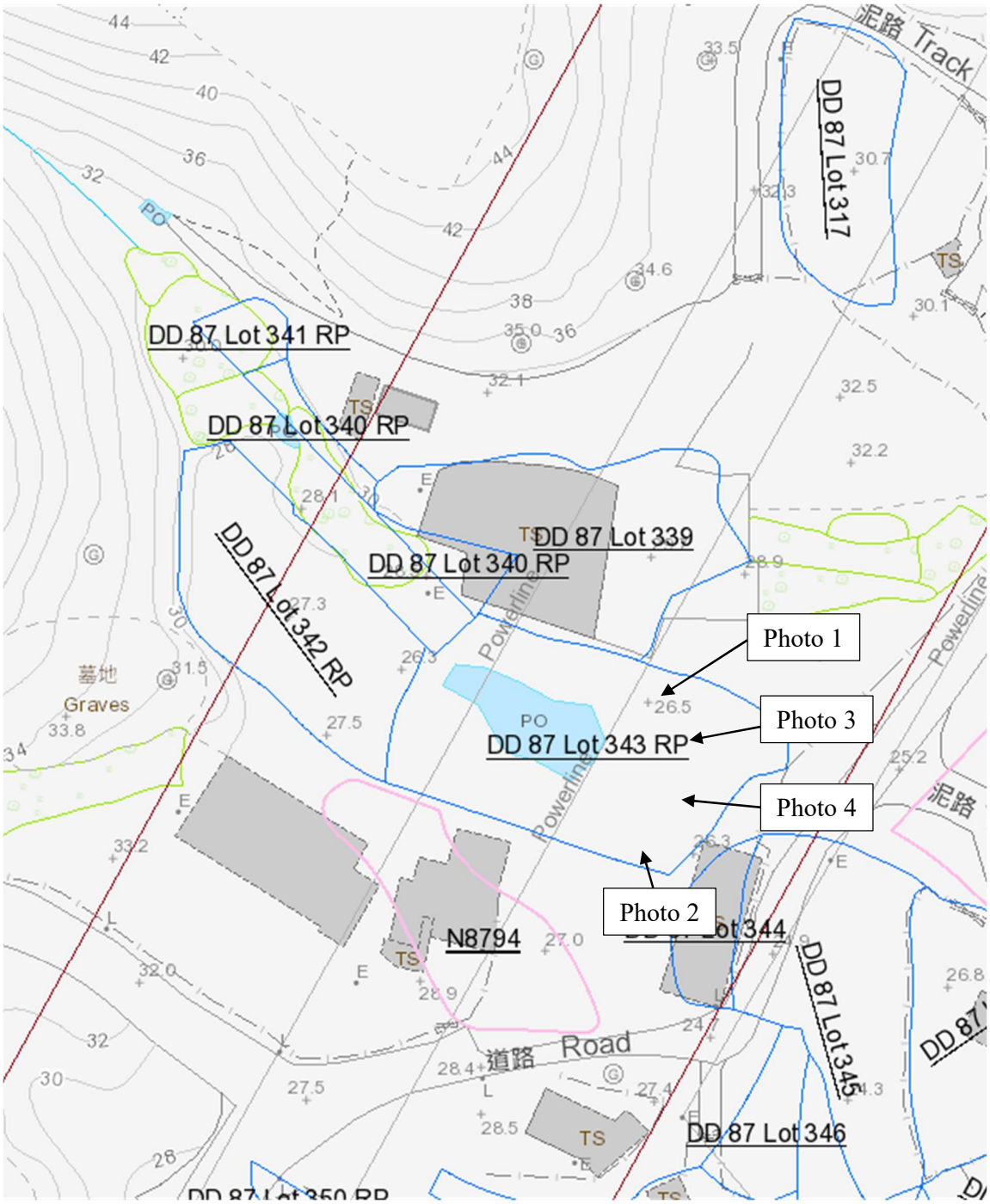
5.7 For the surface channels pass through vehicle access, steel gratings referring to the typical details from standard drawings will be provided.

5.8 The development will not have any adverse impact on the drainage in the surrounding area. The construction and development within the subject lot will not alter the flow direction of surface runoff. There will be no increased risk of flooding, and the capacity of existing drainage utilities will not be exceeded.

END OF TEXT

APPENDIX A

Photo Record



Location Plan

Photo No. 1

Photo No. 2

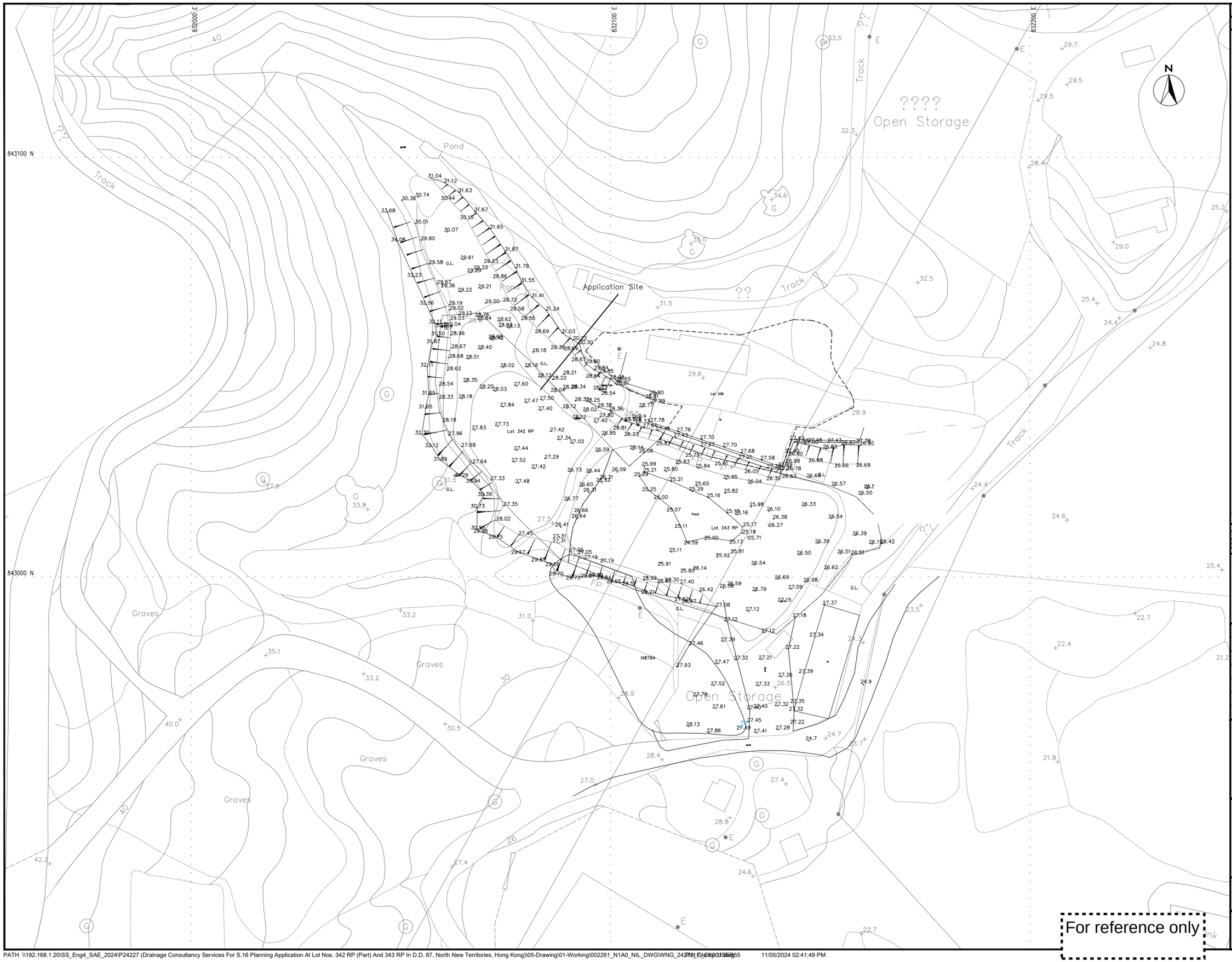
Photo No. 3

Photo No. 4

APPENDIX B

Topography Survey Record

ISO A1 594mm x 841mm



B.D. REF.	
F.S.D. REF.	

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

SIGNATURE FOR SUBMISSION/ CONSTRUCTION

PROJECT NO:	24277		
DRAWN BY:	WYM		10/24
DESIGNED BY:	SC		10/24
CHECKED BY:	RM		10/24
APPROVED BY:	VT		10/24
SCALE:	1:400 (A1)		
CAD FILE:	WNG_24277_C_SK001		

PROJECT:
DRAINAGE CONSULTANCY SERVICES FOR S16 PLANNING APPLICATION AT LOT NOS. 342 RP (PART) AND 343 RP IN D.D. 87, NORTH NEW TERRITORIES, HONG KONG

DRAWING TITLE:
LAYOUT PLAN

DRAWING NO:	REV:
WNG/24277/C/SK001	

WINGS & ASSOCIATES CONSULTING ENGINEERS LTD.
和昇顧問工程師有限公司

For reference only

APPENDIX C

Drainage Design Calculation

Design Calculation of U-Channel

Project : **S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land**

Reference code: Stormwater Drainage Manual 2018 & Geotechnical Manual for Slope

Assumption:

Runoff Coefficient for grass	0.2	(Steep and sandy grassland)				
Runoff Coefficient for concrete	0.9					
Catchment 1	3725.7	m^2	(Effective catchment inside subject lots)	Rainfall Intensity =	269.5	mm/hr
Catchment 2	3645.6	m^2	(Effective catchment inside subject lots)	Rainfall Intensity =	267.9	mm/hr
Catchment 3	4598.1	m^2	(Effective catchment inside subject lots)	Rainfall Intensity =	266.7	mm/hr
Catchment 4	4448.8	m^2	(Effective catchment outside subject lots)	Rainfall Intensity =	262.5	mm/hr
Catchment 5	928.5	m^2	(Effective catchment outside subject lots)	Rainfall Intensity =	265.1	mm/hr
Catchment 6	975.9	m^2	(Effective catchment outside subject lots)	Rainfall Intensity =	264.8	mm/hr
Catchment 7	654.3	m^2	(Effective catchment outside subject lots)	Rainfall Intensity =	269.4	mm/hr
Catchment 8	893.4	m^2	(Effective catchment outside subject lots)	Rainfall Intensity =	259.5	mm/hr
Catchment 9	884.1	m^2	(Effective catchment outside subject lots)	Rainfall Intensity =	271.3	mm/hr
Catchment 10	1405.8	m^2	(Effective catchment outside subject lots)	Rainfall Intensity =	224.7	mm/hr
Catchment 11	1430.9	m^2	(Effective catchment outside subject lots)	Rainfall Intensity =	225.0	mm/hr
Allowance	10.0	% reduction in flow area due to permissible degradation between desilting cycles				

Abbreviation and Terms:

USCP	Upstream Catchpit	RAINFALL INTENSITY	Rainfall Intensity, mm/hr
DSCP	Downstream Catchpit	RUNOFF COEF	Runoff Coefficient
USGL	Upstream Ground Level, mPD	CATCHMENT	Catchment Area, m^2
USIL	Upstream Invert Level, mPD	EFF. AREA	Effective Area, m^2
DSIL	Downstream Invert Level, mPD	CUM. AREA	Cumulative Effective Area, m^2
INVERT DIFF.	INVERT DIFFERENCE, m	DESIGN FLOW	Design Flow m^3/s
LENGTH	Channel Length, m	SIZE	Channel Size, mm
SLOPE	Channel Gradient, 1 in	UC TYPE	Channel Type
		VEL.	Velocity of Channel by Manning's Equation where n = 0.013
		FLOW CAP.	Fullbore Capacity m^3/s
		SPARE CAP.	Spare Capacity m^3/s

Catchment	Flow Direction	USGL mPD	DSGL mPD	USIL mPD	DSIL mPD	AVG. DEPTH m	INVERT DIFF. m	LENGTH m	GRADIENT 1 in	RAINFALL INTENSITY mm/hr	RUNOFF COEF.	CATCHMENT m^2	Affected Area (catchment	EFF. AREA m^2	DESIGN FLOW m^3/s	CUM. DESIGN FLOW m^3/s	SIZE mm	TYPE	VEL m/s	ALLOWANCE (REDUCTION %)	FLOW CAP. m^3/s	SPARE CAP. m^3/s	UTILISATION %	RESULT	A (m^2)	P (m)	R (m)
4	Branch 1 to CP8	33.00	28.00	32.70	27.60	0.40	5.10	55.0	11	262.5	0.2	4449	4	889.76	0.06492	0.06492	300	UC	4.2	10	0.413	0.348	16	OK	0.099	0.971	0.102
Resultant & Discharge															0.06492	0.06492	300	UC	4.2	10	0.413	0.348	16	OK	0.099	0.971	0.102
7	Branch 2 to CP10	33.00	28.00	32.70	27.60	0.40	5.10	58.3	11	269.4	0.9	654	7	556.16	0.04166	0.04166	300	UC	4.0	10	0.401	0.360	10	OK	0.099	0.971	0.102
Resultant & Discharge															0.04166	0.04166	300	UC	4.0	10	0.401	0.360	10	OK	0.099	0.971	0.102
1	Branch 3 to CP8	30.00	28.00	29.70	27.55	0.45	2.15	69.1	32	269.5	0.2	3726	1	745.14	0.05582	0.05582	300	UC	2.5	10	0.277	0.221	20	OK	0.113	1.071	0.105
6		30.00	28.00	29.70	27.55	0.45	2.15	69.1	32	264.8	0.9	976	6	829.52	0.06107	0.06107	300	UC	2.5	10	0.277	0.216	22	OK	0.113	1.071	0.105
Resultant & Discharge															0.11689	0.11689	300	UC	2.5	10	0.277	0.160	42	OK	0.113	1.071	0.105
8	CP8 to CP11	28.00	27.50	27.54	27.05	0.45	0.49	51.7	105	259.5	0.9	893	8	759.39	0.05477	0.05477	500	UC	1.7	10	0.307	0.252	18	OK	0.178	1.185	0.150
Flow from branch 1															0.06492	0.06492	500	UC									
Flow from branch 2															0.04166	0.04166	500	UC									
Flow from branch 3															0.11689	0.11689	500	UC									
Resultant & Discharge															0.27825	0.27825	500	UC	1.7	10	0.307	0.029	91	OK	0.178	1.185	0.150
9	CP11 to CP5	27.50	27.20	27.04	26.50	0.70	0.54	52.3	97	271.3	0.9	884	8	751.49	0.05668	0.05668	500	UC	2.0	10	0.573	0.516	10	OK	0.291	1.685	0.173
Flow from CP8															0.27825	0.27825	500	UC									
Resultant & Discharge															0.33493	0.33493	500	UC	2.0	10	0.573	0.238	58	OK	0.291	1.685	0.173

2	Branch 4 to CP2	30.00	28.00	29.60	27.78	0.22	1.82	70.5	39	267.9	0.2	3646	2	729.12	0.05431	0.05431	300	UC	1.9	10	0.097	0.043	56	OK	0.051	0.611	0.083
5		30.00	28.00	29.60	27.78	0.22	1.82	70.5	39	267.9	0.2	929	5	262.5	0.01955	0.01955	300	UC	1.9	10	0.097	0.077	20	OK	0.051	0.611	0.083
Resultant & Discharge															0.07386	0.07386	300	UC	1.9	10	0.097	0.023	76	OK	0.051	0.611	0.083

3	CP2 to CP4	28.00	27.50	27.77	26.65	0.85	1.12	103.9	93	266.7	0.2	4598	3	919.62	0.06818	0.06818	300	UC	1.6	10	0.345	0.276	20	OK	0.221	1.871	0.118
10		28.00	27.50	27.77	26.65	0.85	1.12	103.9	93	224.7	0.9	1406	10	259.5	0.01621	0.01621	300	UC	1.6	10	0.345	0.328	5	OK	0.221	1.871	0.118
Flow from CP1															0.07386	0.07386	300	UC									
Resultant & Discharge															0.15824	0.15824	300	UC	1.6	10	0.345	0.186	46	OK	0.221	1.871	0.118

11	CP4 to CP5	27.50	27.20	26.64	25.84	1.36	0.80	79.9	100	225.0	0.9	1431	3	1287.8	0.08055	0.08055	300	UC	1.6	10	0.557	0.476	14	OK	0.358	2.889	0.124
Flow from CP4															0.15824	0.15824	300	UC									
Resultant & Discharge															0.23879	0.23879	300	UC	1.6	10	0.557	0.318	43	OK	0.358	2.889	0.124

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 1

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	3725.7	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	10.1	m
L =	length which water takes the longest time to reach the design section	=	99.0	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 3.96 min say 3.96 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

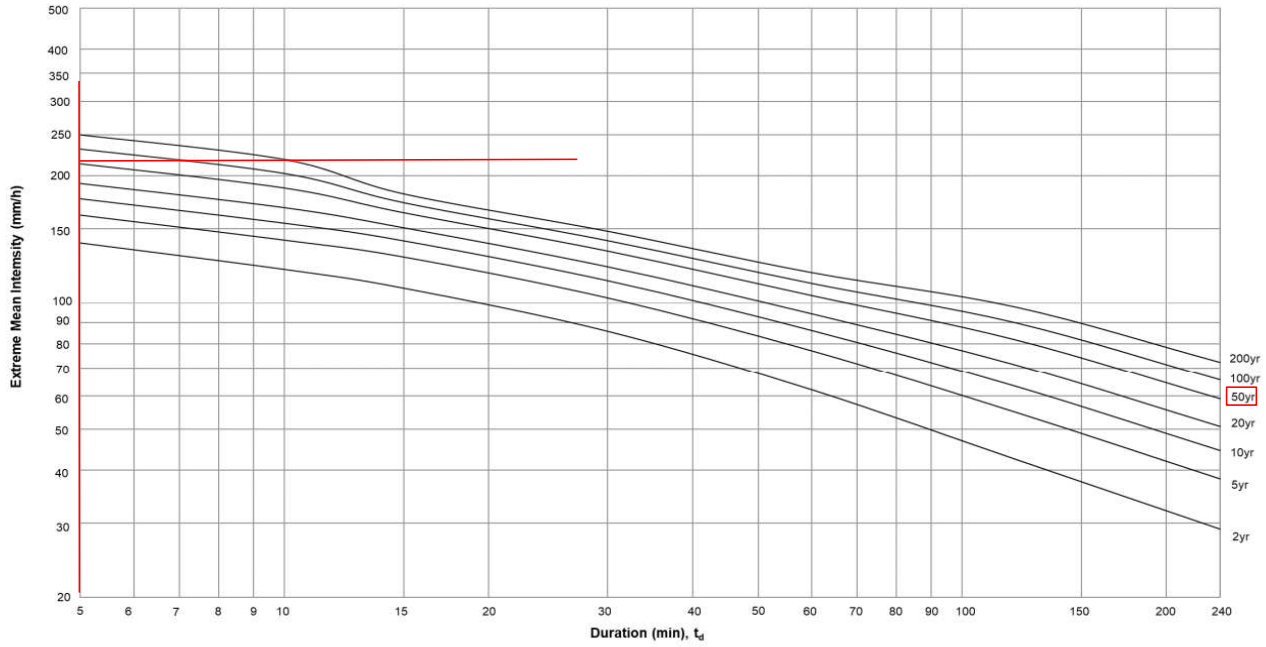


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	232.3	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	269.5	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 2

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	3645.6	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	11.1	m
L =	length which water takes the longest time to reach the design section	=	103.4	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 4.07 min say 4.07 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

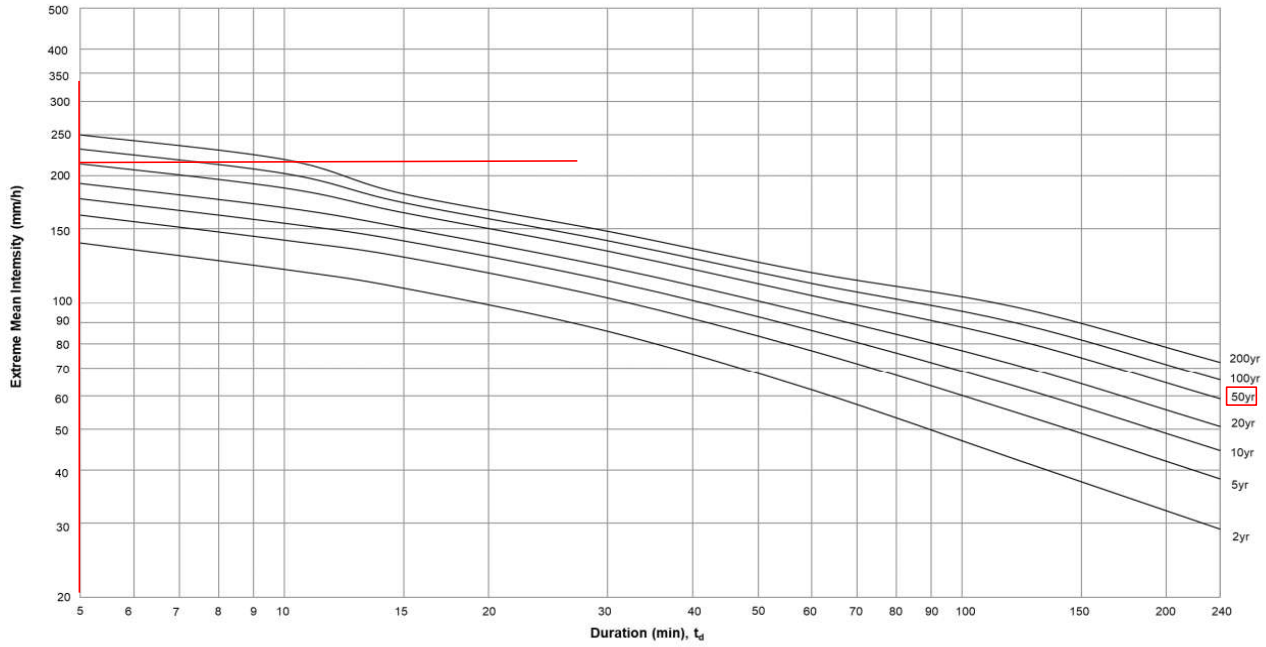


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	231.0	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	267.9	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 3

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	4598.1	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	11.5	m
L =	length which water takes the longest time to reach the design section	=	108.8	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 4.15 min say 4.15 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

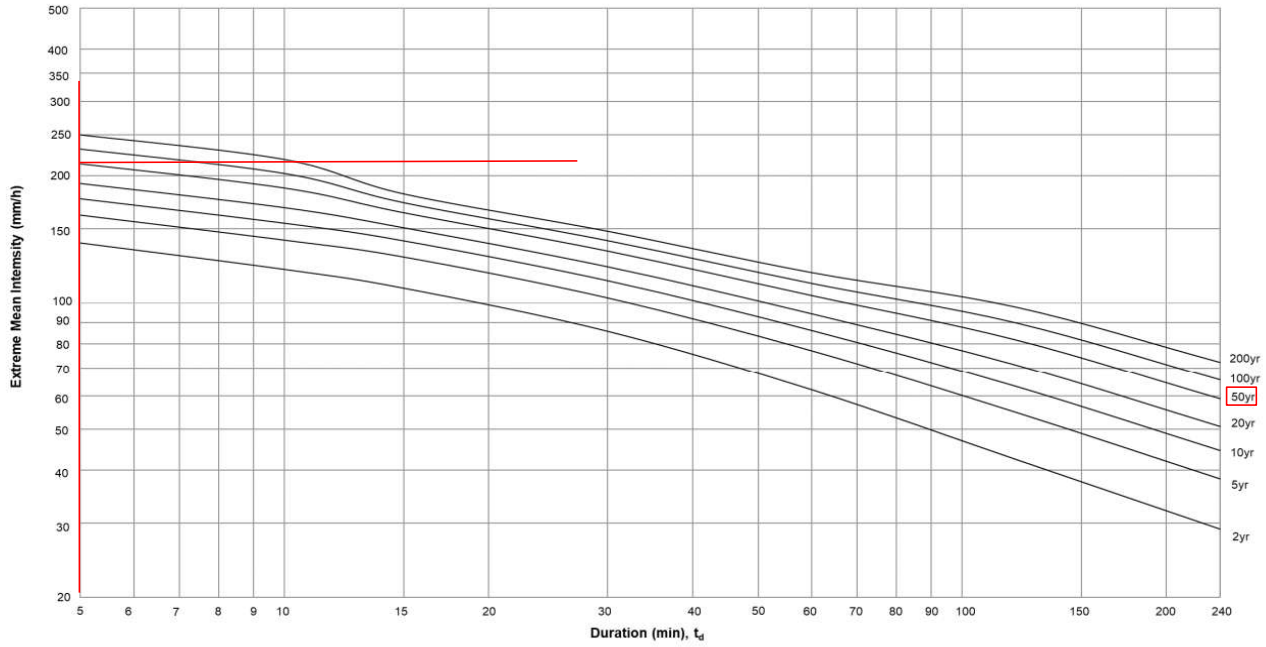


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	229.9	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	266.7	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 4

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	4448.8	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	10.5	m
L =	length which water takes the longest time to reach the design section	=	114.5	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 4.46 min say 4.46 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

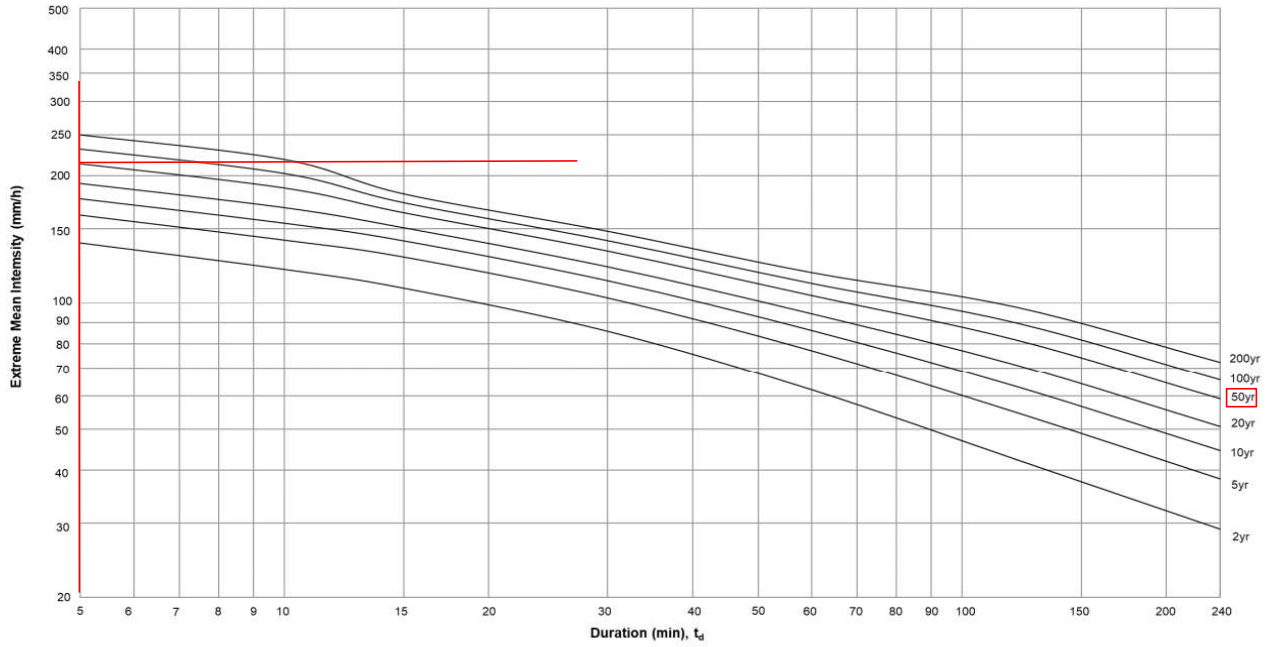


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	226.3	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	262.5	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 5

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	928.5	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	2.8	m
L =	length which water takes the longest time to reach the design section	=	71.7	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 4.27 min say 4.27 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

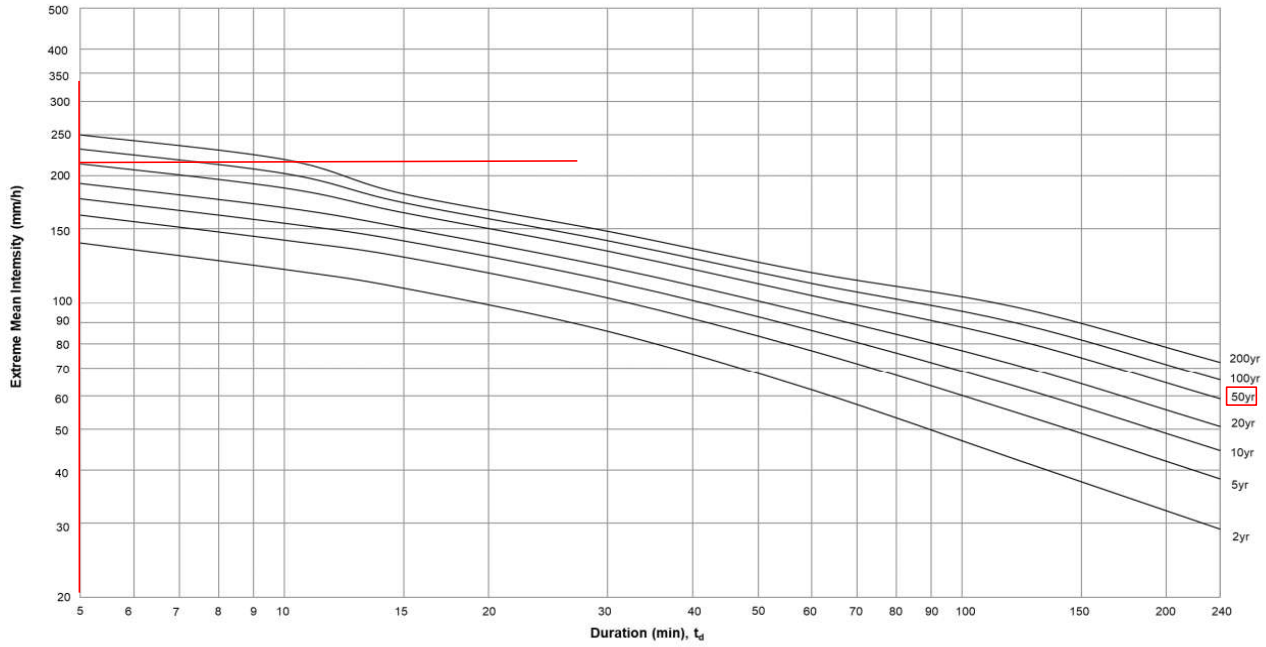


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	228.6	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	265.1	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 6

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	975.9	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	2.8	m
L =	length which water takes the longest time to reach the design section	=	72.4	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 4.29 min say 4.29 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

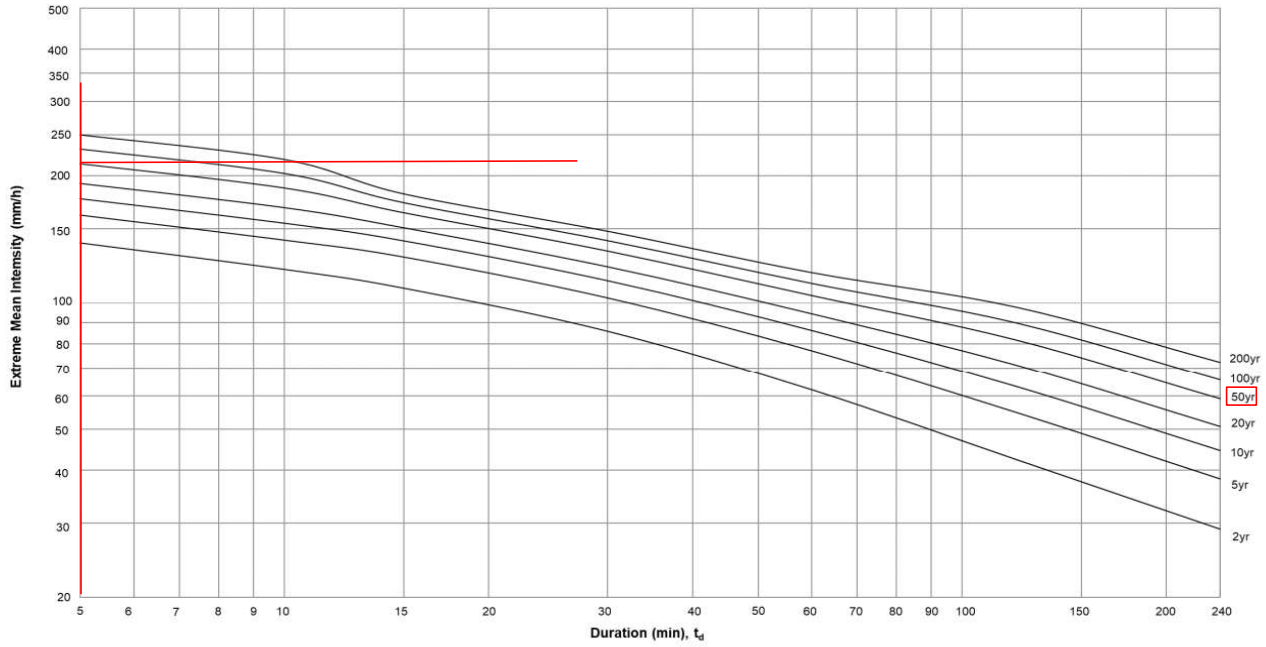


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	228.3	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	264.8	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 7

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	654.3	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	6.6	m
L =	length which water takes the longest time to reach the design section	=	76.3	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 3.96 min say 3.96 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

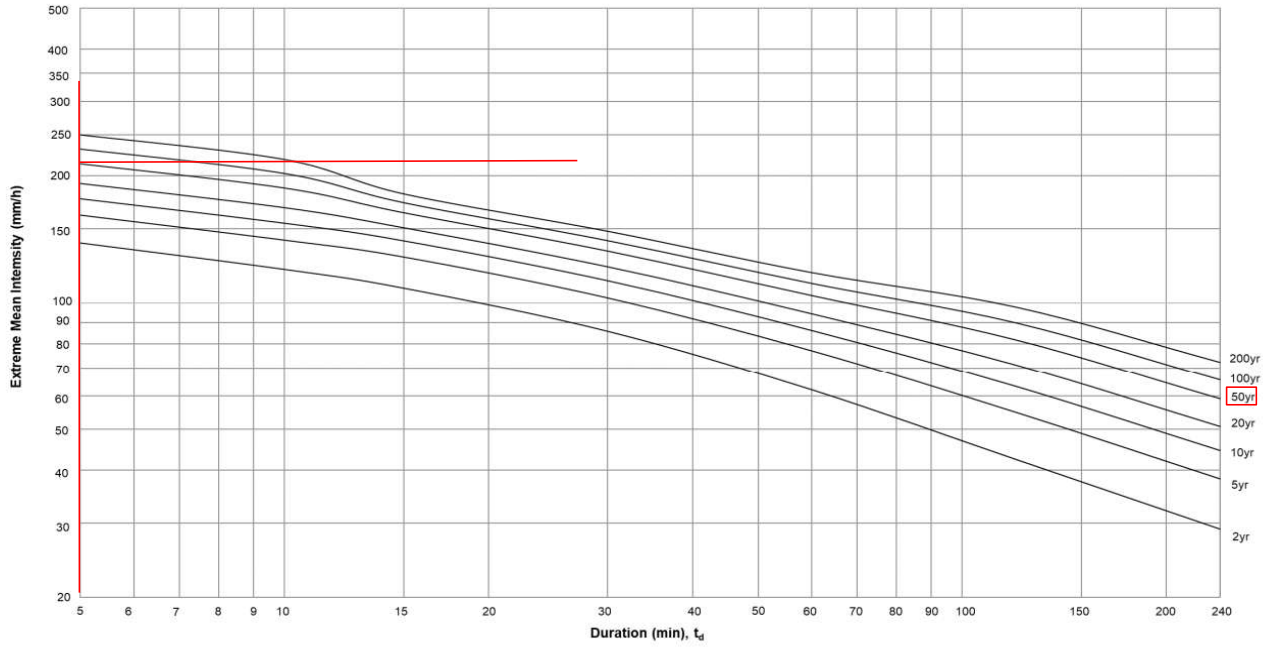


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	232.3	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	269.4	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 8

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A = area of catchment (m^2)	=	893.4	m^2
H = average fall (per 100m) from the summit of catchment to the point of design	=	0.8	m
L = length which water takes the longest time to reach the design section	=	61.5	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 4.70 min say 4.70 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

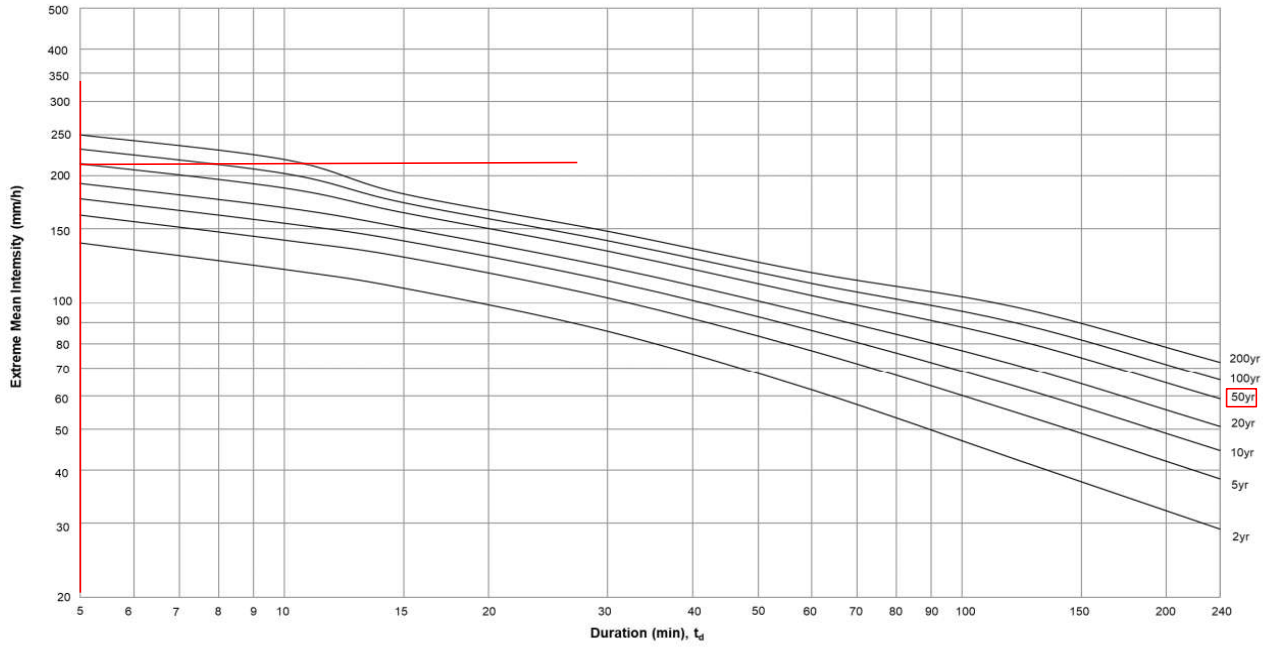


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i = designed mean intensity of rainfall (mm/hr)	=	223.7	mm/hr
Rainfall increased due to Climate Change (16%)	i x 1.16 =	259.5	mm/hr
(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 9

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	884.1	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	0.6	m
L =	length which water takes the longest time to reach the design section	=	47.7	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 3.83 min say 3.83 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

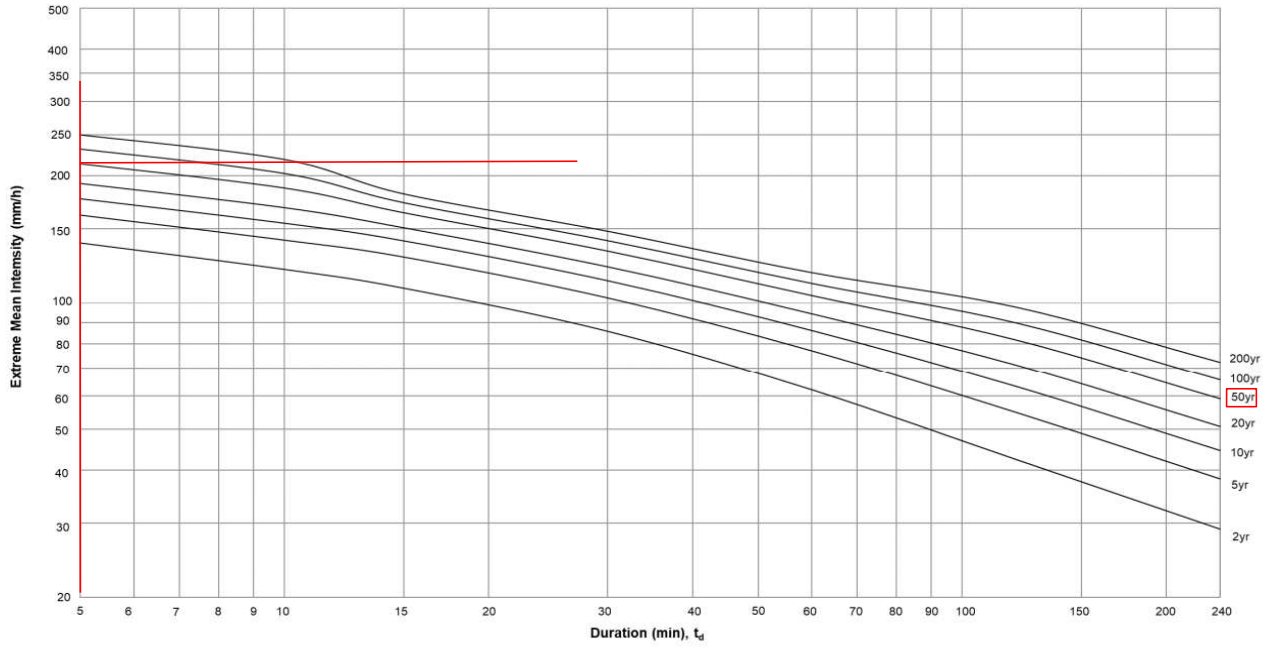


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	233.9	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	271.3	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 10

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	1405.8	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	0.7	m
L =	length which water takes the longest time to reach the design section	=	111.0	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 8.30 min say 8.30 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

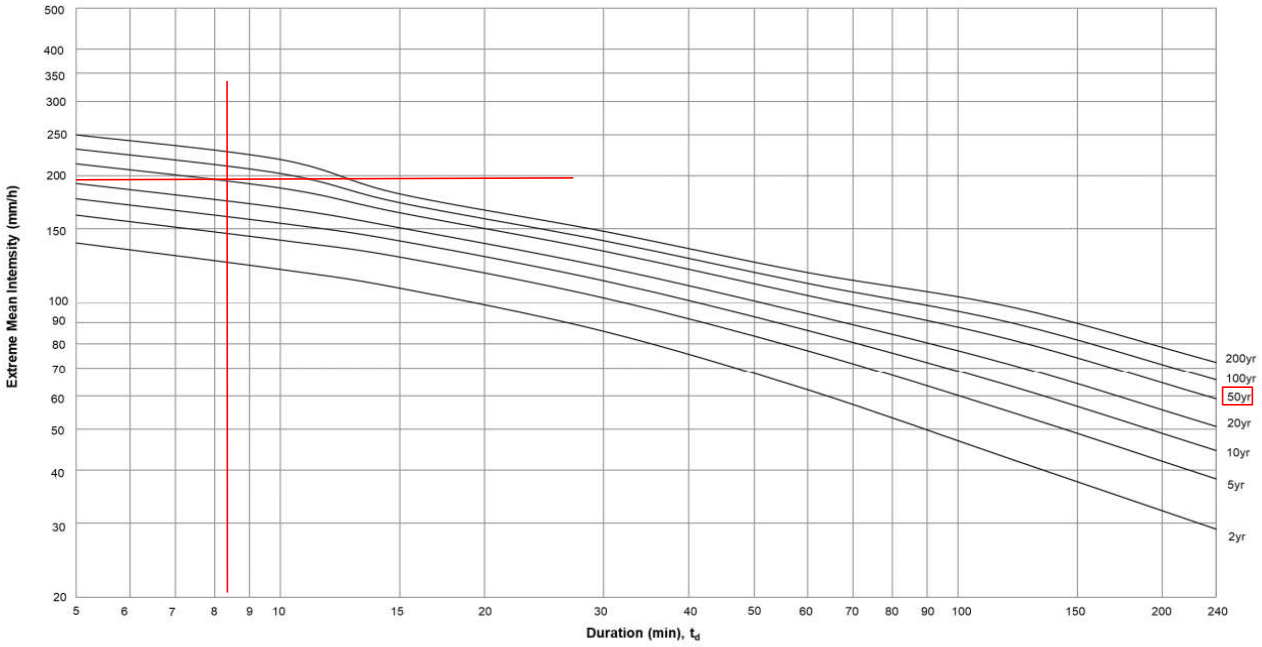


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	193.7	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	224.7	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Catchment Area : 7

Determination of Time of Concentration and Designed Mean Rainfall Intensity

A =	area of catchment (m^2)	=	1430.9	m^2
H =	average fall (per 100m) from the summit of catchment to the point of design	=	0.3	m
L =	length which water takes the longest time to reach the design section	=	94.0	m

Time of concentration, $t = 0.14456 \times (L / (H^{0.2} \times A^{0.1}))$ = 8.26 min say 8.26 min

From Figure 4d of Corrigendum No.1 2024 Stormwater Drainage Manual, assuming storm return period is 1 in 50 years,

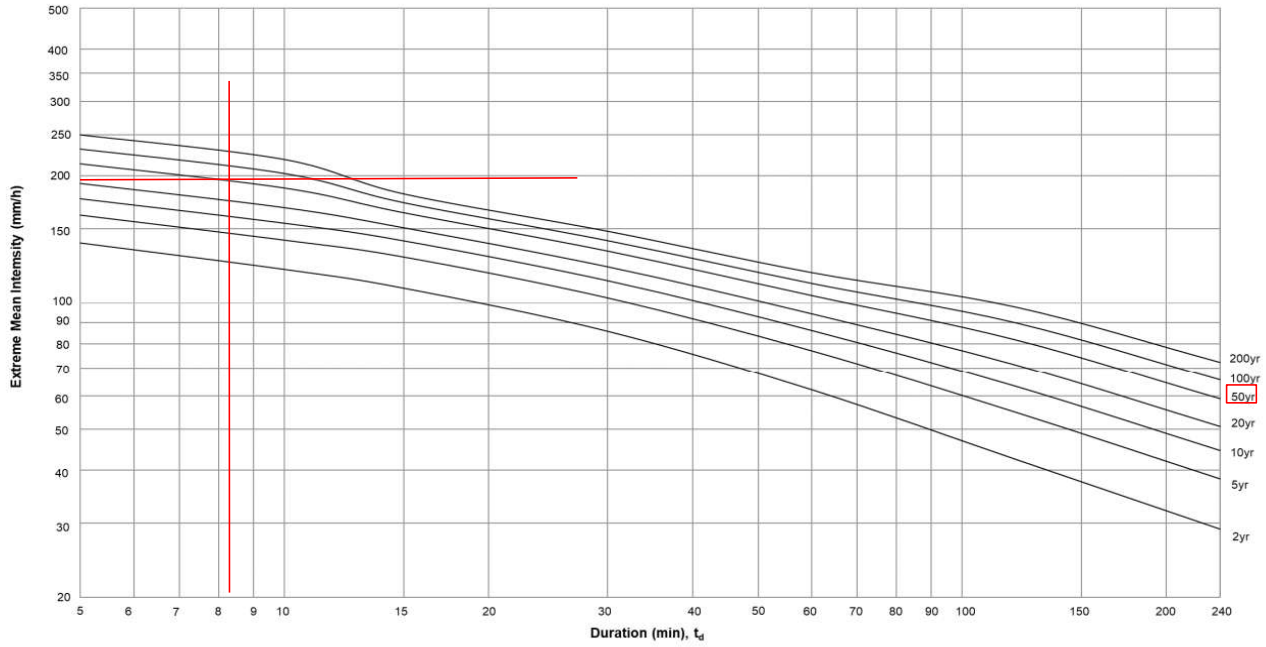


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i =	designed mean intensity of rainfall (mm/hr)	=	193.9	mm/hr
	Rainfall increased due to Climate Change (16%)	i x 1.16 =	225.0	mm/hr
	(With reference to Corrigendum-No.-1_2022-of-Stormwater-Drainage-Manual)			

Project : S.16 Planning Application at Lots 340 RP (Part), 341 RP (Part), 342 RP (Part), 343 RP, 344 (Part) in D.D. 87 and adjoining Government Land

Calculation of the Stormwater Storage Tank

Size of pipe	=	300	mm	
Flow capacity	=	0.0707	m^3	
Peak flow from Branch 4 to CP2	=	0.0739	m^3/s	(from design calculation of U-channel)
Water depth within the 300UC	=	0.2784	m	
Level of 300UC	=	27.77	mPD	
Water level	=	28.05	mPD	
Invert level of 300 Dia. inlet pipe	=	27.9	mPD	
Flow to be received by the tank	=	0.04	m^3/s	
Capacity of tank	=	450	m^3	
Retention time of the tank	=	168.491	mins	
Percentage of water flowing into the tank	=	60.270	%	

APPENDIX D

Construction Drawing

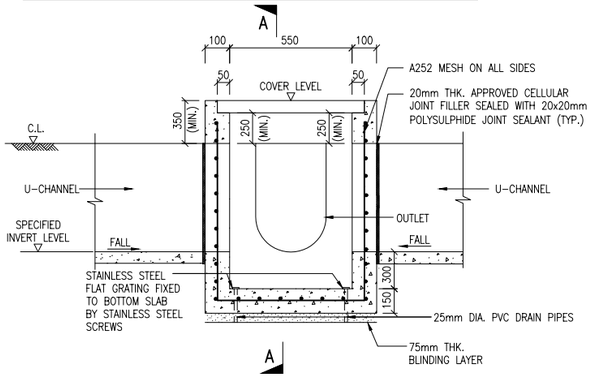
ISO A1 594mm x 841mm

GENERAL NOTES

1. GRADE 40D CONCRETE SHALL BE USED UNLESS OTHERWISE STATED.
2. THE PROPOSED DRAINAGE WORKS, WHETHER WITHIN OR OUTSIDE THE LOT BOUNDARY, SHALL BE CONSTRUCTED AND MAINTAINED BY THE OWNER AT HIS OWN EXPENSE. FOR WORKS TO BE UNDERTAKEN OUTSIDE THE LOT BOUNDARY, PRIOR CONSENT FROM DLO AND/OR RELEVANT PRIVATE LOT OWNERS SHALL BE SOUGHT.
3. ALL U-CHANNEL SHALL BE GRADIENT 1:100 UNLESS OTHERWISE STATED.
4. GRATE COVERS SHALL BE PROVIDED FOR THE SECTION THAT VEHICLE MAY CROSS THE CHANNELS.

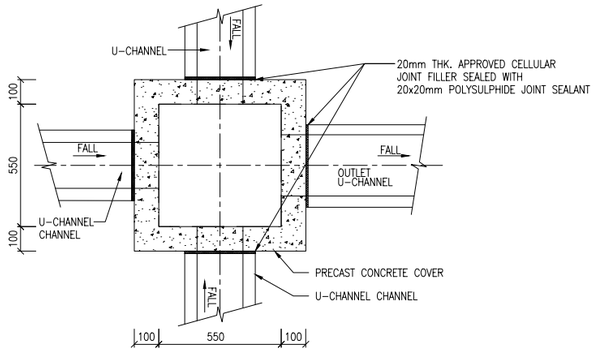
SCHEDULE OF CATCHPIT WITH SAND TRAP

CATCHPIT NO.	CATCHPIT TYPE	COVER LEVEL (mPD)	BTM. LEVEL (mPD)	INLET LEVEL (mPD)	OUTLET LEVEL (mPD)
CP1	1	+28.35	+27.85	+28.01	+28.00
CP2	1	+28.35	+27.62	+27.78	+27.77
CP3	1	+27.85	+27.24	+27.40	+27.39
CP4	1	+27.85	+26.49	+26.65	+26.64
CP5	1	+27.55	+25.68	A: +25.84 B: +26.50	+25.83
CP6	1	+30.35	+29.37	+29.53	+29.52
CP7	1	+28.35	+27.76	+27.92	+27.91
CP8	1	+28.35	+27.39	A: +27.55 B: +27.7	+27.54
CP9	1	+32.85	+31.51	+31.67	+31.66
CP10	1	+28.85	+27.26	A: +27.42 B: +27.60	+27.41
CP11	1	+27.85	+26.89	+27.05	+27.04
CP12	1	+27.75	+26.78	+26.94	+26.93
CP11	1	+27.55	+26.49	+26.65	+26.64



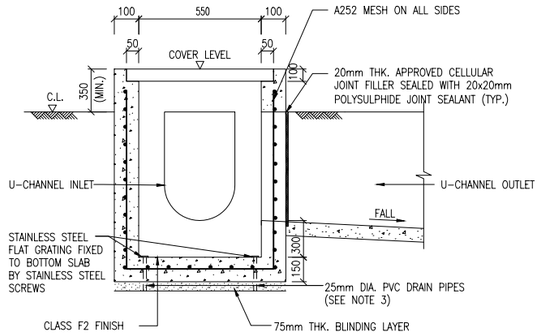
SECTION OF TYPE 2 CATCHPIT

SCALE 1:100



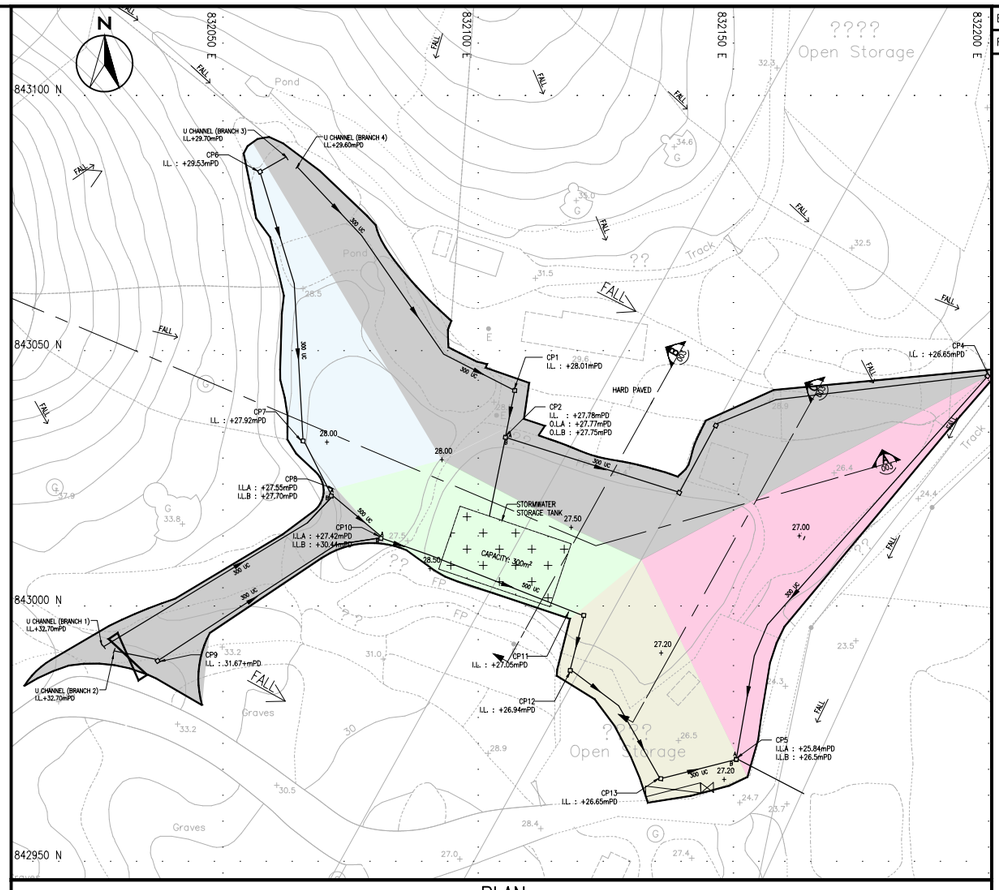
PLAN OF CATCHPIT (TYPE 1&2)

(REFERENCE: CEDD STANDARD DRAWING NO. IC2406_1&2)
N.T.S.



SECTION A–A

SCALE 1:100



PLAN

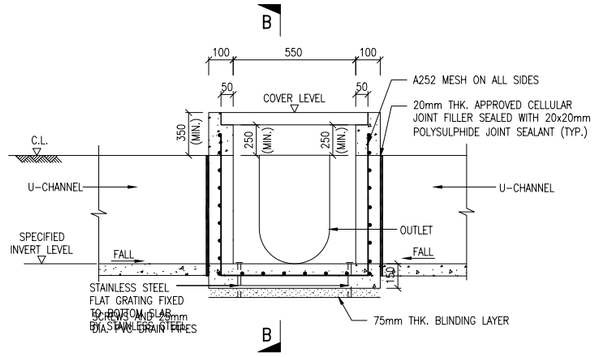
SCALE 1:1200

B.D. REF.

F.S.D. REF.

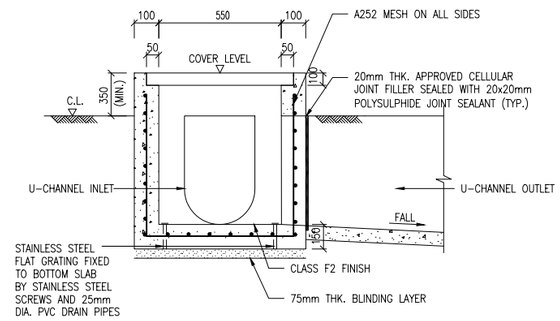
LEGEND:

- BOUNDARY OF LOTS FOR THIS APPILCATION
- FLOW DIRECTION
- CP — CATCH PIT



SECTION OF TYPE 1 CATCHPIT

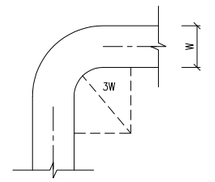
SCALE 1:100



SECTION B–B

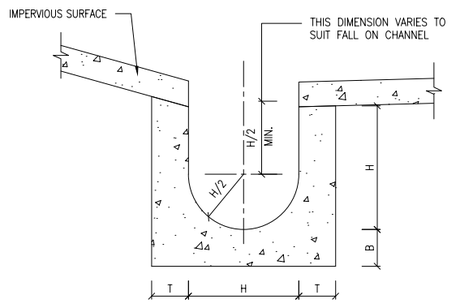
SCALE 1:100

NOMINAL SIZE H	THICKNESS T	THICKNESS B
225–600	175	225
675–1200	175	225



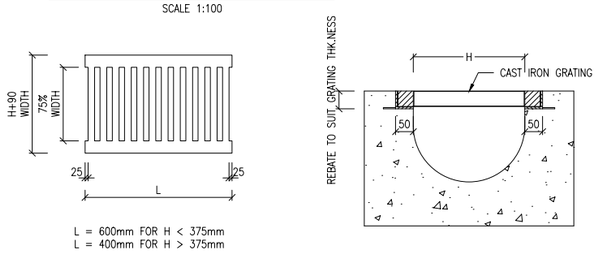
CHANNEL CHANGING DIRECTION THROUGH BENDS

(REFERENCE : PAGE 100 GEOTECHNICAL MANUAL FOR SLOPES)
N.T.S.



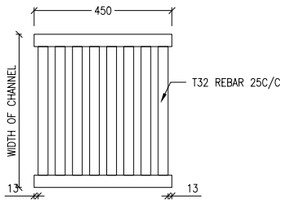
DETAILS OF U-CHANNEL

(REFERENCE : FIG. 8.11 OF GEOTECHNICAL MANUAL FOR SLOPES)
N.T.S.



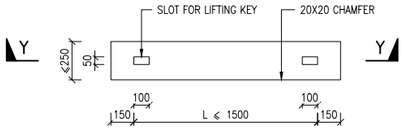
CAST IRON GRATING FOR U-CHANNELS

(REFERENCE : CEDD DWG. NO. C2412D)
N.T.S.



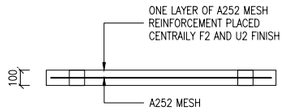
U-CHANNEL COVER GRATING (FOR HEAVY DUTY)

N.T.S.



PLAN OF PRECAST CONCRETE COVERS

(REFERENCE : CEDD DWG. NO. C2407B)
N.T.S.



SECTION Y–Y PRECAST CONCRETE COVERS FOR SAND TRAP AND CATCHPIT

(REFERENCE : CEDD DWG. NO. C2407B)
N.T.S.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

SIGNATURE FOR SUBMISSION/ CONSTRUCTION

PROJECT NO:	24277		
DRAWN BY:	JC		10/24
DESIGNED BY:	SL		10/24
CHECKED BY:	RM		10/24
APPROVED BY:	VT		10/24
SCALE:	AS SHOWN (A3)		
CAD FILE:	WNG_24227_C_DRA_001a		

PROJECT:
DRAINAGE CONSULTANCY SERVICES FOR S16 PLANNING APPLICATION AT LOT NOS. 342 RP (PART) AND 343 RP IN D.D. 87, NORTH NEW TERRITORIES, HONG KONG

DRAWING TITLE:
GENERAL NOTES AND LAYOUT PLAN

DRAWING NO:	REV:
WNG/24227/C/DRA/001	A

朝翔顧問工程師有限公司
WINGS & ASSOCIATES CONSULTING ENGINEERS LTD.

ISO A1 594mm x 841mm

832000 E | 832100 E | 832200 E

843100 N | 843000 N

N

CATCHMENT AREA 1
AREA: 3725.7m²

CATCHMENT AREA 2
AREA: 3645.6m²

CATCHMENT AREA 3
AREA: 4598.1m²

CATCHMENT AREA 4
AREA: 4448.8m²

CATCHMENT AREA 5
AREA: 928.5m²

CATCHMENT AREA 6
AREA: 975.9m²

CATCHMENT AREA 7
AREA: 654.3m²

CATCHMENT AREA 8
AREA: 893.4m²

CATCHMENT AREA 9
AREA: 884.1m²

CATCHMENT AREA 10
AREA: 1405.8m²

CATCHMENT AREA 11
AREA: 1430.9m²

U CHANNEL (BRANCH 1)
I.L.+32.70mPD

U CHANNEL (BRANCH 2)
I.L.+32.70mPD

U CHANNEL (BRANCH 3)
I.L.+29.70mPD

U CHANNEL (BRANCH 4)
I.L.+29.60mPD

CP1
I.L. : +28.01mPD

CP2
I.L. : +27.78mPD
O.L.A : +27.77mPD
O.L.B : +27.75mPD

CP3
I.L. : +27.40mPD

CP4
I.L. : +26.65mPD

CP5
I.L.A : +25.84mPD
I.L.B : +26.5mPD

CP6
I.L. : +29.53mPD

CP7
I.L. : +27.92mPD

CP8
I.L.A : +27.55mPD
I.L.B : +27.70mPD

CP9
I.L. : 31.67+mPD

CP10
I.L.A : +27.42mPD
I.L.B : +27.60mPD

CP11
I.L. : +27.05mPD

CP12
I.L. : +26.94mPD

CP13
I.L. : +26.65mPD

STORMWATER STORAGE TANK

CONNECTED TO ADJACENT SITE

Pond | Track | Open Storage | Graves | FALL | 300 UC | 500 UC

PLAN
SCALE 1:400

B.D. REF.
F.S.D. REF.

LEGEND:

BOUNDARY OF LOTS FOR THIS APPILCATION

PROPOSED VEHICULAR ACCESS

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

SIGNATURE FOR SUBMISSION/ CONSTRUCTION

PROJECT NO:	24277		
DRAWN BY:	JC		10/24
DESIGNED BY:	SC		10/24
CHECKED BY:	RM		10/24
APPROVED BY:	VT		10/24
SCALE:	1:400 (A1)		
CAD FILE:	WNG_24277_C_DRA_002a		

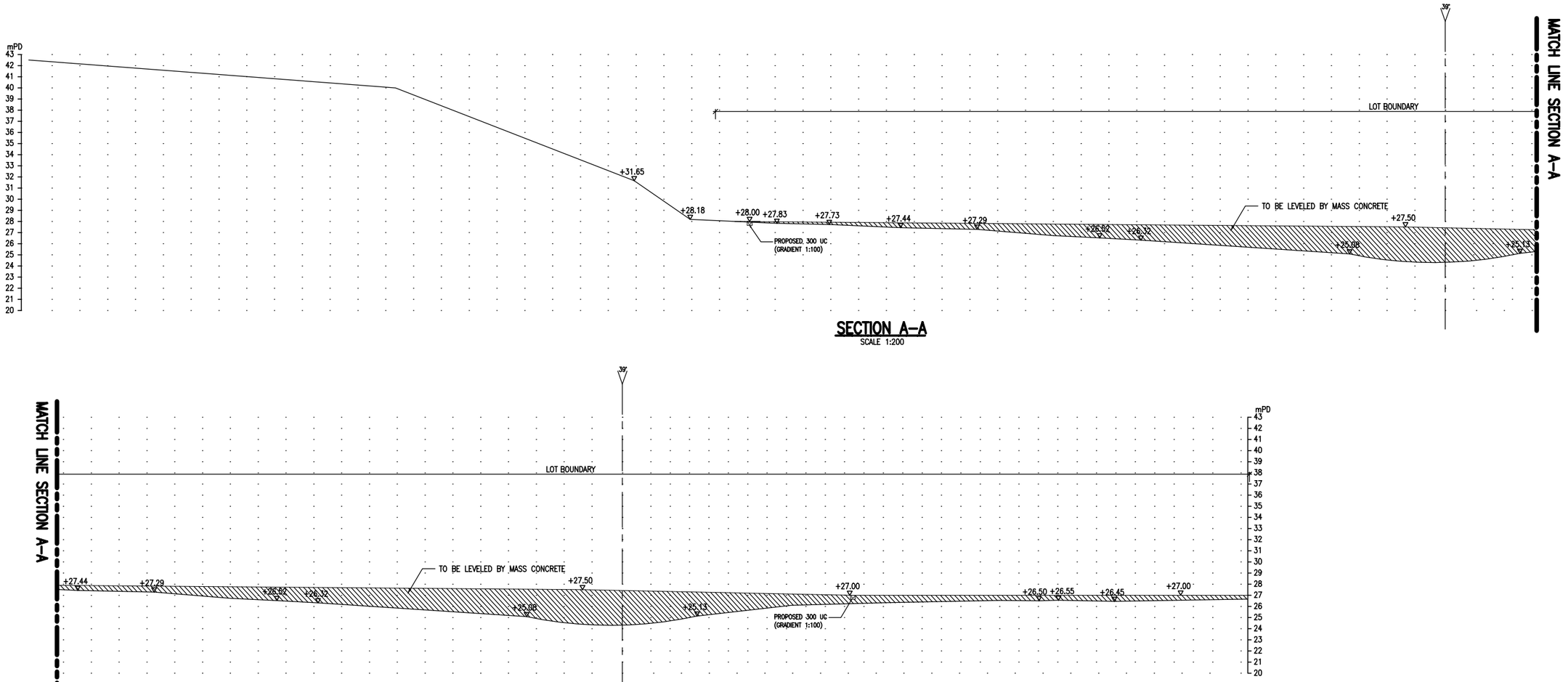
PROJECT:
DRAINAGE CONSULTANCY SERVICES FOR S16 PLANNING APPLICATION AT LOT NOS. 342 RP (PART) AND 343 RP IN D.D. 87, NORTH NEW TERRITORIES, HONG KONG

DRAWING TITLE:
PROPOSED EFFECTIVE CATCHMENT AREA FOR SURFACE RUNOFF AFFECTING SUBJECT LOTS

DRAWING NO: WNG/24277/C/DRA/002
REV: A

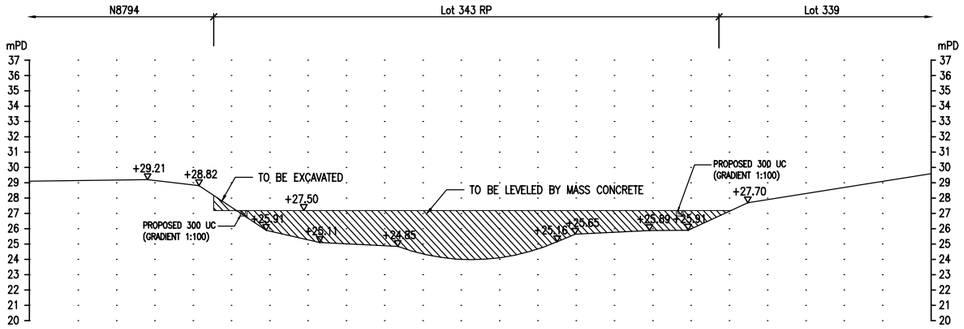
WINGS & ASSOCIATES CONSULTING ENGINEERS LTD.
輝淵顧問工程師有限公司

ISO A1 594mm x 841mm



SECTION A–A
SCALE 1:200

SECTION A–A
SCALE 1:200



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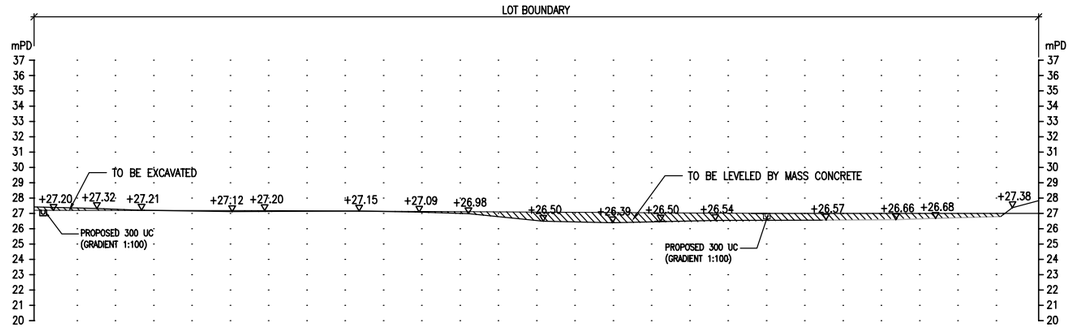
SCALE 1:200



SECTION C–C
SCALE 1:200

B.D. REF.	
F.S.D. REF.	

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

SIGNATURE FOR SUBMISSION/ CONSTRUCTION

PROJECT NO:	24277		
DRAWN BY:	JC		10/24
DESIGNED BY:	SL		10/24
CHECKED BY:	RM		10/24
APPROVED BY:	VT		10/24
SCALE:	1 : 200 (A1)		
CAD FILE:	WNG_24227_C_DRA_003		

PROJECT:
DRAINAGE CONSULTANCY SERVICES FOR S16 PLANNING APPLICATION AT LOT NOS. 342 RP (PART) AND 343 RP IN D.D. 87, NORTH NEW TERRITORIES, HONG KONG

DRAWING TITLE:
DRAINAGE SECTIONS

DRAWING NO:	REV:
WNG/24227/C/DRA/003	–

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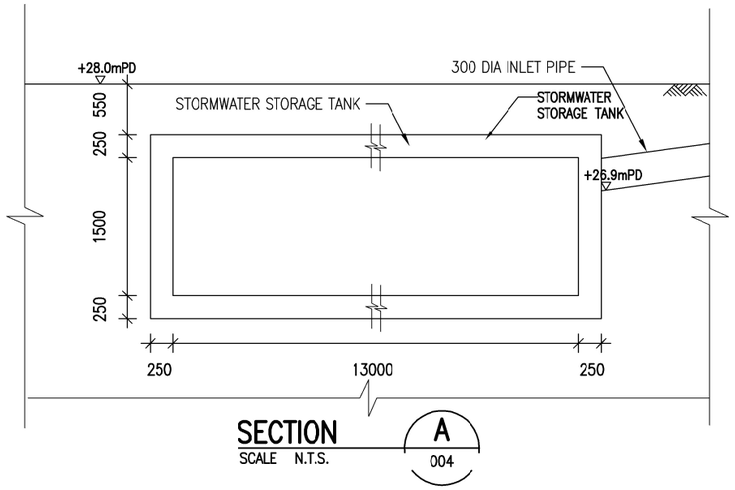
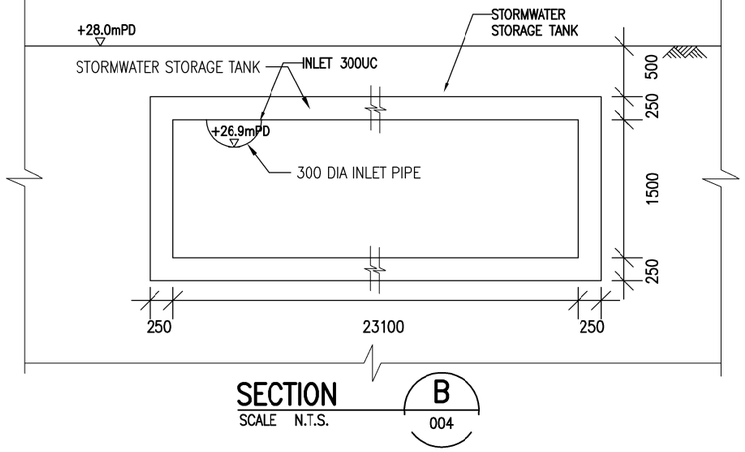
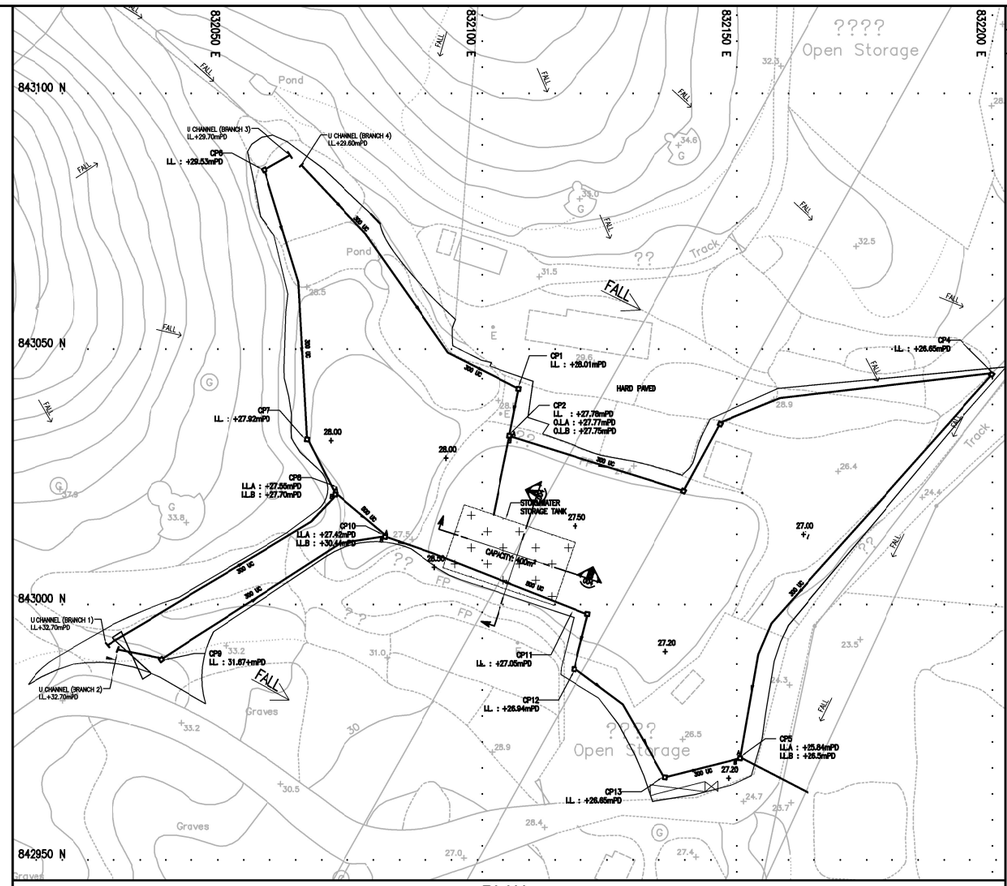
WINGS & ASSOCIATES
CONSULTING ENGINEERS LTD.



SECTION A
SCALE N.T.S.
004



SECTION B
SCALE N.T.S.
004



PLAN
SCALE 1:1200

LEGEND:

→ FLOW DIRECTION

B.D. REF.	
F.S.D. REF.	

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED

SIGNATURE FOR SUBMISSION/ CONSTRUCTION

PROJECT NO:	24277		
DRAWN BY:	QYD		04/24
DESIGNED BY:	HT		04/24
CHECKED BY:	MC		04/24
APPROVED BY:	VT		04/24
SCALE:	AS SHOWN (A3)		
CAD FILE:	WNG_24227_C_DRA_001a		

PROJECT:
DRAINAGE CONSULTANCY SERVICES FOR S16 PLANNING APPLICATION AT LOT NOS. 342 RP (PART) AND 343 RP IN D.D. 87, NORTH NEW TERRITORIES, HONG KONG

DRAWING TITLE:
SECTIONS OF STORMWATER DRAINAGE TANK

DRAWING NO:	REV:
WNG/24227/C/DRA/004	–

WINGS