

Appendix 7

Drainage Impact Assessment

Prepared for
Alex Development Limited

Prepared by
Ramboll Hong Kong Limited

PROPOSED RESIDENTIAL DEVELOPMENT AT VARIOUS
LOTS **IN D.D. 107** AND ADJOINING GOVERNMENT LAND,
FUNG KAT HEUNG, YUEN LONG

DRAINAGE IMPACT ASSESSMENT

Date October 2025

Prepared by Miko Wan
Environmental Consultant

Signed



Approved by Calvin CHIU
Technical Director



Signed

Project Reference CKHYLFKHEI00

Document No. R9348_v1.3

No part of this document may be reproduced or transmitted, in any form or by any means electronic, mechanical, photographic, recording or otherwise, or stored in a retrieval system of any nature without the written permission of Ramboll Hong Kong Ltd, application for which shall be made to Ramboll Hong Kong Ltd, 21/F, BEA Harbour View Centre, 56 Gloucester Road, Wan Chai, Hong Kong.

Disclaimer: This report is made on behalf of Ramboll Hong Kong Ltd. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any third party relying on it accepts that no individual is personally liable in contract, tort or breach of statutory duty (including negligence).

Ramboll Hong Kong Limited

21/F, BEA Harbour View Centre
56 Gloucester Road, Wan Chai, Hong Kong

Tel: (852) 3465 2888
Fax: (852) 3465 2899
Email: hkinfo@ramboll.com

Q:\Projects\CKHYLFKHEI00\04 Deliverables\04 DIA\R9348_v1.3 (clean version).docx

CHAPTERS

	Page
1. INTRODUCTION	1-1
1.1 Background	1-1
1.2 The Application Site and Its Environs	1-1
1.3 The Proposed Development.....	1-1
2. DRAINAGE IMPACT ASSESSMENT	2-1
2.1 Scope of Work.....	2-1
2.2 Assessment Criteria and Methodology	2-1
2.3 Existing Drainage Condition	2-1
2.4 Proposed Drainage System	2-1
2.5 Discussion	2-2
3. OVERALL SUMMARY	3-1
3.1 Conclusion	3-1

TABLES

Table 2.1	Summary of Surface Runoff	2-2
Table 2.2	Upgraded Design to be Implemented by SPPHD	2-3

FIGURES

Figure 1	Location of the Application Site and Its Environs
Figure 2	Proposed Connection from the Application Site and Existing Drainage Layout
Figure 3	Location of Catchment Area
Figure 4	Cross Section of the Application Site and Ground Level

APPENDICES

Appendix 1	Master Layout Plan (MLP)
Appendix 2	Detailed Drainage Impact Assessment Calculations
Appendix 3	Proposed Drainage Layout Plan extracted from Engineering Feasibility Study Report for Proposed Public Housing Development at Sha Po

1. INTRODUCTION

1.1 Background

- 1.1.1 The Application Site is located within an area in Fung Kat Heung primarily zoned “Industrial (Group D)” (“I(D)”) with a minor portion of it falling within R(A) and “Agriculture” (“AGR”) zone on the Approved Kam Tin North Outline Zoning Plan No. S/YL-KTN/11 (OZP) near the Proposed Sha Po Public Housing Development (SPPHD).
- 1.1.2 A S12A application for rezoning of the site to enable a private residential development at the site is submitted to the Town Planning Board for consideration.
- 1.1.3 Ramboll Hong Kong Limited is commissioned to provide Drainage Impact Assessment (DIA) consultancy services for the proposed development.

1.2 The Application Site and Its Environs

- 1.2.1 The site area is about 7,290 sq.m. It is located in Fung Kat Heung, currently bounded by access roads on north and east sides. It is surrounded by Lam Tsuen Country Park to the north, and existing warehouse and industrial uses to the east and south.
- 1.2.2 A Public Housing Development at Sha Po (SPPHD) is proposed by CEDD to the immediate west of the Application Site. An engineering feasibility study (EFS) of the SPPHD was submitted as one of the supporting documents for the OZP amendment (RNTPC Paper No. 9/22). Its findings have been referenced to where appropriate (hereafter referred as “EFS”).
- 1.2.3 Figure 1 shows the location of the Application Site and its environment.

1.3 The Proposed Development

- 1.3.1 The Proposed Development comprises 2 residential towers (Tower 1 and Tower 2) of 48 storeys (including 1 refuge floor) and 50 storeys (including 1 refuge floor), respectively, which gives a total of 1439 units. A clubhouse (GFA of about 1,253m²) and an outdoor swimming pool is planned.
- 1.3.2 Proposed Development is tentatively to be completed in 2035, after the completion of SPPHD.
- 1.3.3 Greenery area will be provided which covers a minimum of about 20% of the site area as required in PNAP APP-152.
- 1.3.4 The Proposed Development Scheme is shown in Appendix 1.

2. DRAINAGE IMPACT ASSESSMENT

2.1 Scope of Work

- 2.1.1 The aim of this DIA is to assess whether the capacity of the existing drainage network serving the Application Site is sufficient to cope with the stormwater runoff from the proposed development. Drainage Record Plans were referred to the GeoInfo Map for the purpose of this DIA.

2.2 Assessment Criteria and Methodology

- 2.2.1 The assessment standard complies with DSD Stormwater Drainage Manual (SDM) (2018 Edition), Corrigendum No. 1/2022 and Corrigendum No. 1/2024 where applicable. The Application Site is situated in an area served by urban drainage branch system, therefore, a 1 in 50 year return storm has been adopted for the DIA.
- 2.2.2 For the purpose of this assessment, a runoff coefficient of 0.95 has been adopted for the paved / impermeable areas, while a runoff coefficient of 0.20 has been adopted for unpaved / permeable areas.
- 2.2.3 The catchment runoff has been calculated using the "Rational Method", as outlined in the DSD SDM:

$$Q = 0.278 C i A$$

Where	Q	=	peak runoff in m ³ /s
	C	=	runoff coefficient (dimensionless)
	i	=	rainfall intensity in mm/hr
	A	=	catchment area in km

- 2.2.4 According to Stormwater Drainage Manual Corrigendum No. 1/2022, the projection of rainfall increases as well as corresponding design allowance should be added to the respective design rainfall intensities given in the corresponding Table 28 of SDM Corrigendum No. 1/2022. Rainfall increase of 11.1% for mid 21st century and 16% for end of 21st century have been adopted in the calculations.
- 2.2.5 The rainfall intensity parameter "i" is dependent on the return period, rainfall duration and the time of concentration of the catchment under consideration. Runoff calculations are included in Appendix 2.

2.3 Existing Drainage Condition

- 2.3.1 According to the Drainage Record Plans obtained from DSD, there is no existing drainage system serving the Application Site. According to the EFS of SPPHD, there is a 850mm U-channel running along the western boundary of the Application Site flowing in the southwest direction. In the proposed plans of SPPHD, Ø1500mm drainage pipes will be constructed at the northern corner of the Application Site (see Figure 2).

2.4 Proposed Drainage System

- 2.4.1 Runoff from the Application Site will be conveyed using Ø600mm underground pipes with 1:100 gradient then discharged into Manholes T1 and T2, which are then connected to the drains planned and constructed by SPPHD project (i.e. Manhole D1 , Ø1500mm and Ø1800mm drainage pipes).
- 2.4.2 The size, alignment and details of the proposed drains will be subject to confirmation at the Detailed Design Stage. The applicant will ensure the proposed terminal manhole would have sufficient freeboard to the ground floor and should be of cover level higher than that of the downstream public manhole.

2.5 Discussion

- 2.5.1 The potential drainage impact due to the Proposed Development has been quantitatively addressed. The estimated surface runoff under existing condition and future conditions of the Application Site is shown in Appendix 2.
- 2.5.2 Based on the requirement of BD PNAP APP-152, minimum 20% greenery area will be provided for the Proposed Development. The peak 1 in 50-year runoff from the site is expected to decrease from 0.459m³/s to 0.387m³/s.
- 2.5.3 Rainfall increase due to Climate Change has also been considered in this assessment. The surface runoff under different scenarios for the Application Site are summarized below in Table 2.1.

Table 2.1 Summary of Surface Runoff

Catchment	Area (m ²)	Runoff (m ³ /s)	Runoff with Rainfall increase for mid 21 st Century (m ³ /s)	Runoff with Rainfall increase for end 21 st Century (m ³ /s)
S1 (Application Site)	7,290	0.387	0.430	0.449

- 2.5.4 Runoff from the Application Site will be discharged to Terminal Manhole T1 then Manhole T2, which is then connected to Manhole D1 (constructed by SPPHD) via Ø600mm drainage pipes.
- 2.5.5 According to the EFS of the SPPHD, a 850mm U-channel is proposed for stream diversion. However, as stated in the EFS, the final location and alignment of the proposed drainage are subject to review at detailed design stage. Part of proposed 850mm U-channel in the EFS is located at the interface of the SPPHD and this Application Site and may also slightly encroach into the Application Site. This planned section of U-channel (see Figure 2) is considered no longer necessary, given that the surface off at the Application Site area would be collected by future internal drainage system and discharged to the planned manhole D1 (constructed by SPPHD) via future terminal manhole. The applicant will further liaise with CEDD or project proponent of SPPHD to revise their proposed alignment of the U-channel that SPPHD is responsible for in detailed design stage.
- 2.5.6 A peripheral surface channels will be provided along the site boundary to collect the surface runoff accrued on the Application Site and to intercept the overland flow from the adjacent lands (Figure 2) and then discharged to the Ø850mm u-channel proposed and constructed by SPPHD and downstream of the proposed development. According to the Technical Note No.1 on Drainage Submission from DSD, 2 of Ø450mm U-channel or other equivalent size of u-channel with a gradient of 1 in 200 would be suitable for the site area larger than 6,000m² and less than 10,000m². Ø675mm U-channel would be proposed for peripheral surface channel to collect runoff from within the proposed development at the Application Site and upstream catchment area. The size and alignment of the proposed peripheral channel would be preliminary and will be subject to detailed design stage.
- 2.5.7 According to Table 4b of Appendix 2, regarding to the surface runoff from SPPHD and proposed development, it is found that one of the SPPHD proposed pipe segment (D2-D3) is over capacity.

- 2.5.8 Diameter of SPPHD proposed drainage pipe (D2-D3) is recommended to be increased from Ø1500mm to Ø1800mm and to be constructed by SPPHD. Table 2.2 below summarizes the required upgraded design. The applicant intends to approach CEDD in the next stage after the application approved to make sure that the proposed development will be accounted in their detailed design of SPPHD.

Table 2.2 Upgraded Design to be Implemented by SPPHD

Segment	Original Diameter (mm)	Upgraded Diameter (mm)
D2-D3	1500	1800

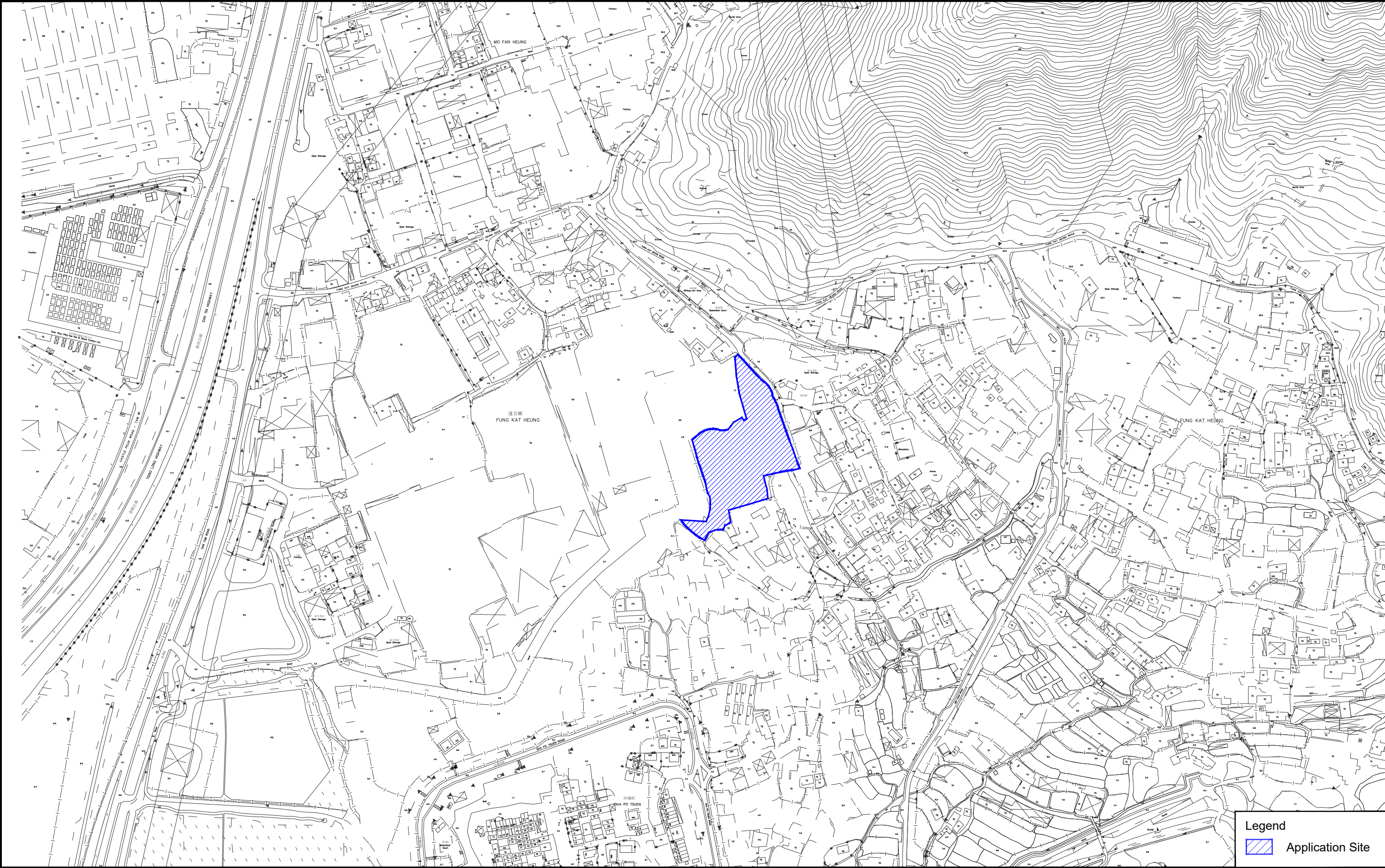
- 2.5.9 With the proposed upgraded design, all drains will have sufficient capacity to cater for the runoff from the Application Site and nearby catchment areas, even with rainfall increase for end of 21st Century. Therefore, the Proposed Development does not have any adverse impact in terms of drainage point of view.
- 2.5.10 In the Sewerage Impact Assessment (SIA) submitted for this planning application, the Preferred Option is recommended to convey wastewater by connecting the new sewer from the Application Site to future nearby manhole to be implemented under SPPHD project. However, in case of slippage of programme of SPPHD or unresolved problems with respect to relevant upgrading work proposed under Preferred Option, the Fallback Option to provide onsite treatment facilities (onsite Sewage Treatment Plant (STP)) within the Application Site to treat wastewater and with the treated effluent discharged to public drainage system will be adopted.
- 2.5.11 The peak flow with respect to STP of 55.1L/s (i.e. 0.055m³/s) under the Fallback Option of the SIA has been considered in this DIA. The total discharge volume of the Application Site (i.e. future surface runoff includes rainfall increase due to Climate Change 16% in the end of 21st Century + effluent from STP) is considered to be 0.50m³/s.
- 2.5.12 The surface runoff and treated effluent will be discharged to existing drainage system and the drainage alignment unchanged. The existing Application Site is currently a carpark with 100% paved area. The Proposed Development is planned to include not less than 20% of greenery area. As the vegetated area increases, the surface runoff will decrease. Referring to the Table 2b of Appendix 2, the surface runoff and treated effluent will be less than the existing surface runoff. It is anticipated that the Proposed Development does not have any adverse impact in terms of the drainage system.

3. OVERALL SUMMARY

3.1 Conclusion

- 3.1.1 A residential development is proposed at various lots in D.D.107 and adjoining government land, Fung Kat Heung, Yuen Long. The potential drainage impact is quantitatively addressed.
- 3.1.2 There is no existing drainage system near the Application Site but there will be new Ø1500mm drains constructed by the adjacent planned Sha Po Public Housing Development. Since the new drains will run along the northern boundary of the Application Site, the runoff from the Application Site will be conveyed to Ø600mm underground drains, then connected to the Ø1500mm drains constructed by SPPHD. Alignment of the proposed drainage pipelines will be subjected to detailed design stage.
- 3.1.3 The Proposed Development would result in reduced surface runoff due to increased greenery area. Based on the hydraulic analysis, one of the proposed drains for SPPHD project would not have adequate capacity to cater for the runoff from the Application Site and from nearby catchment areas (including SPPHD).
- 3.1.4 The design of Ø1500mm drain segment is proposed to be upgraded to Ø1800mm and assumed to be constructed under SPPHD project (the applicant will liaise with the proponent of SPPHD promptly on this matter). Two drainage pipelines (T1 to D1) will be proposed from the Application Site to SPPHD proposed drainage manhole (D1).
- 3.1.5 As SPPHD project assumes a surface U-channel running partially within the Application Site, a segment of proposed U-channel alignment is interfacing with the Application Site and considered not necessary because internal drainage system and intercepting channel will be proposed and implemented by the applicant to convey surface runoff within the Application Site to D1 and those upstream to the Ø850mm u-channel proposed and constructed by SPPHD. The applicant will liaise with CEDD or the proponent of SPPHD who should be responsible for finalizing in detailed stage with the Application Site accounted. The applicant intends to approach CEDD in the next stage after the application approved to make sure that the proposed development will be accounted in their detailed design of SPPHD.
- 3.1.6 The applicant will be responsible for the implementation of the proposed new connection pipes and the section of the new pipes (all within government land) downstream of the proposed terminal manhole and assumed to be handed over to DSD for future maintenance (Figure 2). For the proposed drains from the SPPHD, the maintenance parties will be subject to the proponent of SPPHD.
- 3.1.7 On the other hand, under the SIA submitted for this planning application, onsite Sewage Treatment Plant (STP) will be proposed if there is slippage of programme of SPPHD or unresolved problems with respect to relevant upgrading work proposed under Preferred Option in the SIA. Treated effluent will be discharged to the drainage system. The STP will be subject to later detailed design and proposal will be submitted to relevant departments for approval. The project proponent will be responsible to apply the discharge license and the implementation and maintenance of the STP.
- 3.1.8 According to the findings in DIA (Table 2b of Appendix 2), the surface runoff including treated effluent from STP will be less than the existing surface runoff.
- 3.1.9 The DIA confirms the feasibility of the Proposed Development in terms of impact on the public drainage system.

Figure



Legend
 Application Site

Figure: 1

Title: Location of the Application Site and its Environs

Project: Proposed Residential Development at Various Lots in D.D. 107 and Adjoining Government Land, Fung Kat Heung, Yuen Long

RAMBOLL

Drawn by: MW

Checked by: CC

Rev.: 1.0

Date: Mar 2024

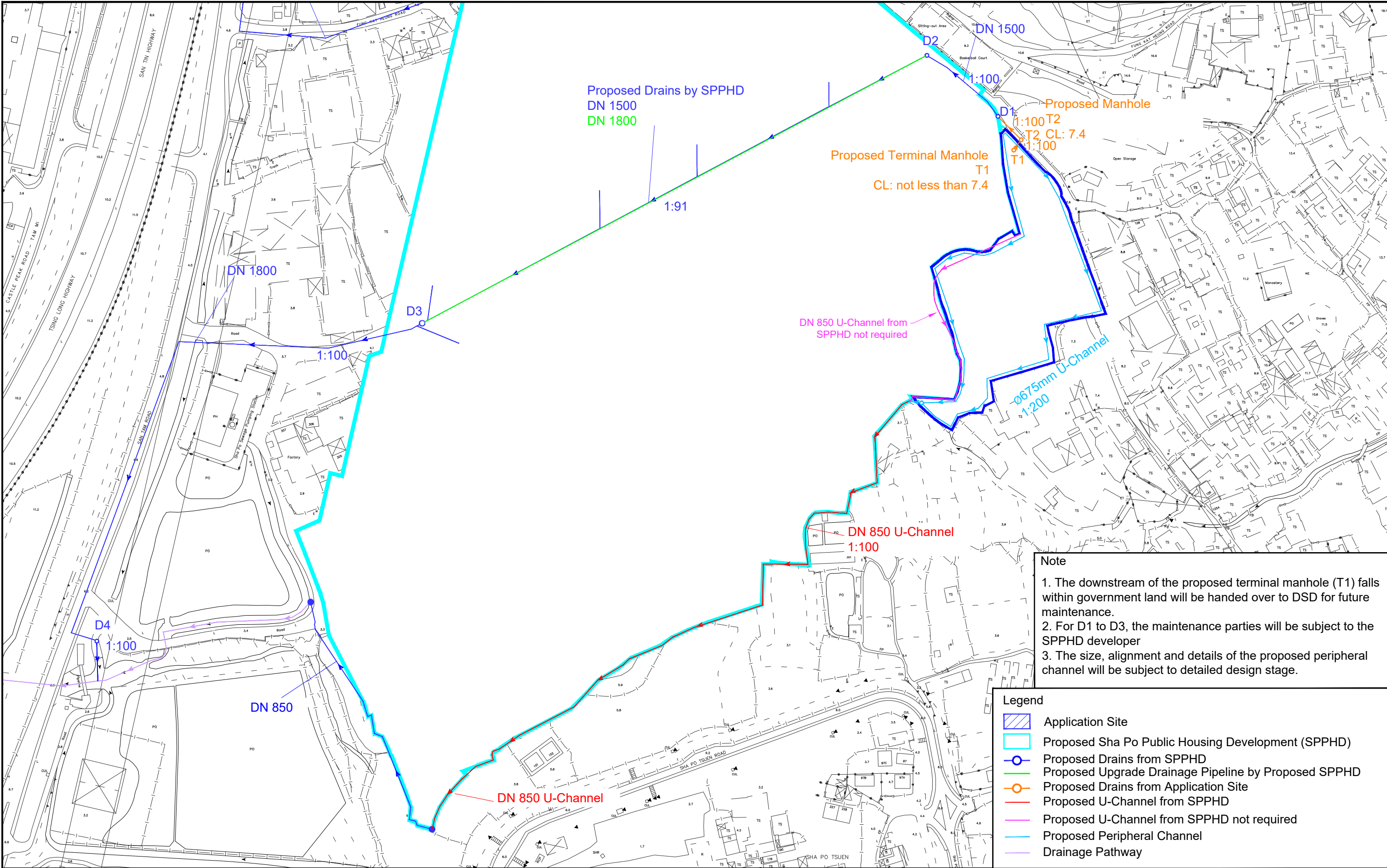


Figure: 2		RAMBOLL	
Title: Proposed Connection from the Application Site and Existing Drainage Layout		Drawn by: MW	
Project: Proposed Residential Development at Various Lots in D.D. 107 and Adjoining Government Land, Fung Kat Heung, Yuen Long		Checked by: CC	
		Rev.: 1.3	
		Date: Jun 2025	

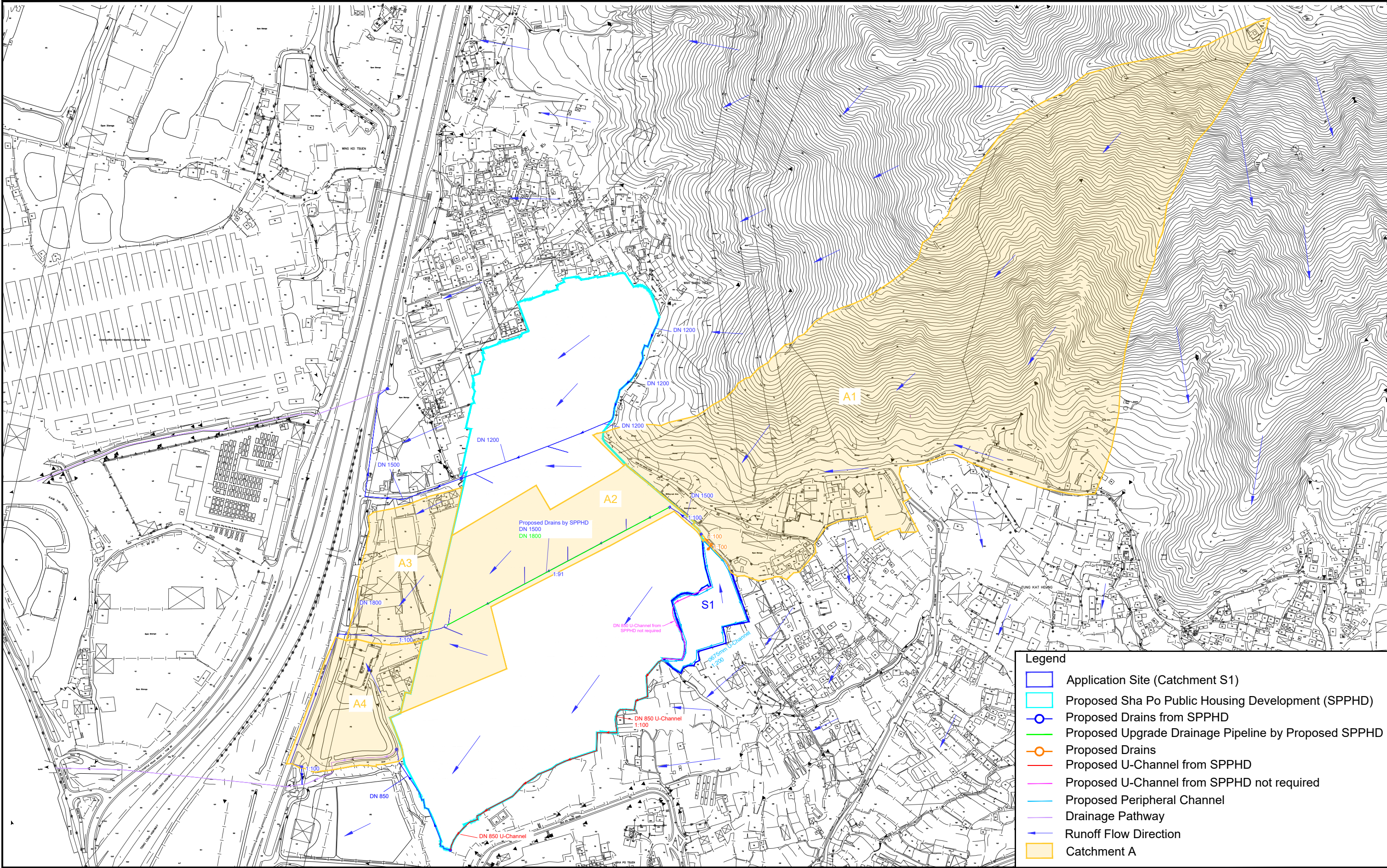
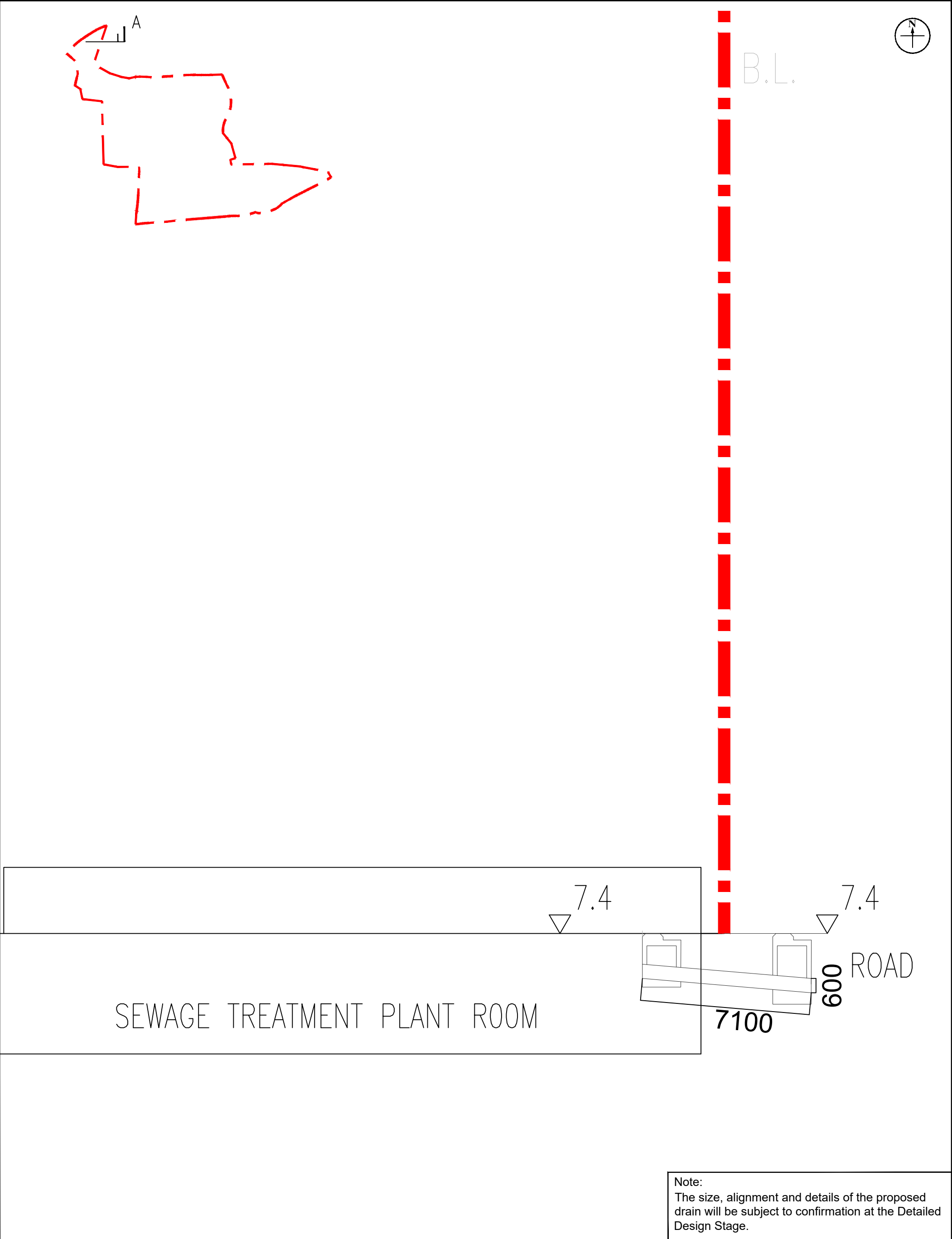


Figure: 3
Title: Location of Catchment Area

Project: Proposed Residential Development at Various Lots in D.D. 107 and Adjoining Government Land, Fung Kat Heung, Yuen Long

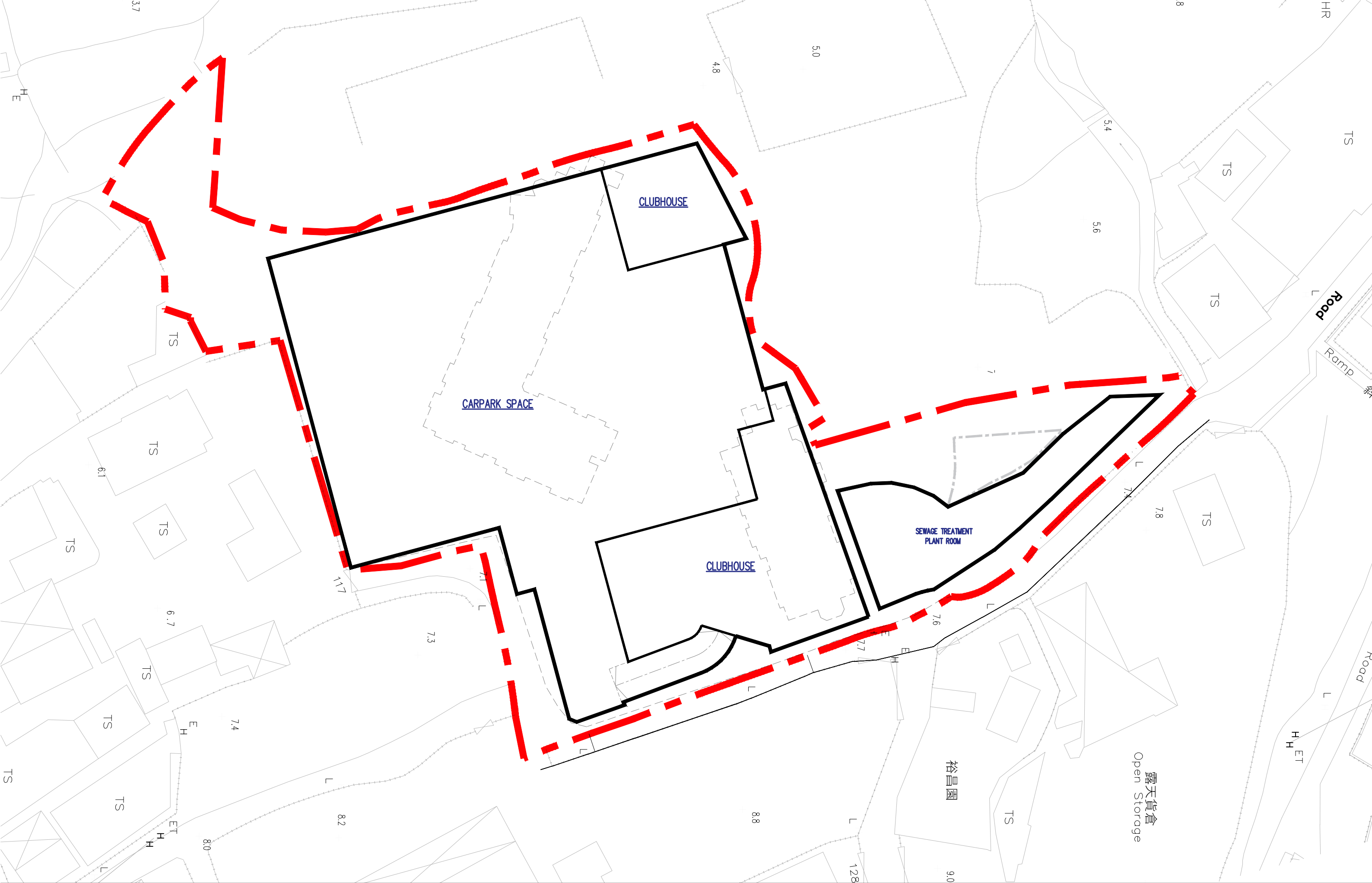
RAMBOLL	
Drawn by:	MW
Checked by:	CC
Rev.:	1.3
Date:	Jun 2025



Note:
The size, alignment and details of the proposed
drain will be subject to confirmation at the Detailed
Design Stage.

Figure: 4		RAMBOLL	
Title: Cross Section of the Application Site and Ground Level		Drawn by: MW	
		Checked by: CC	
Project: Proposed Residential Development at Various Lots in D.D. 107 and Adjoining Government Land, Fung Kat Heung, Yuen Long		Rev.: 1.3	
		Date: Jun 2025	

Appendix 1 Master Layout Plan (MLP)



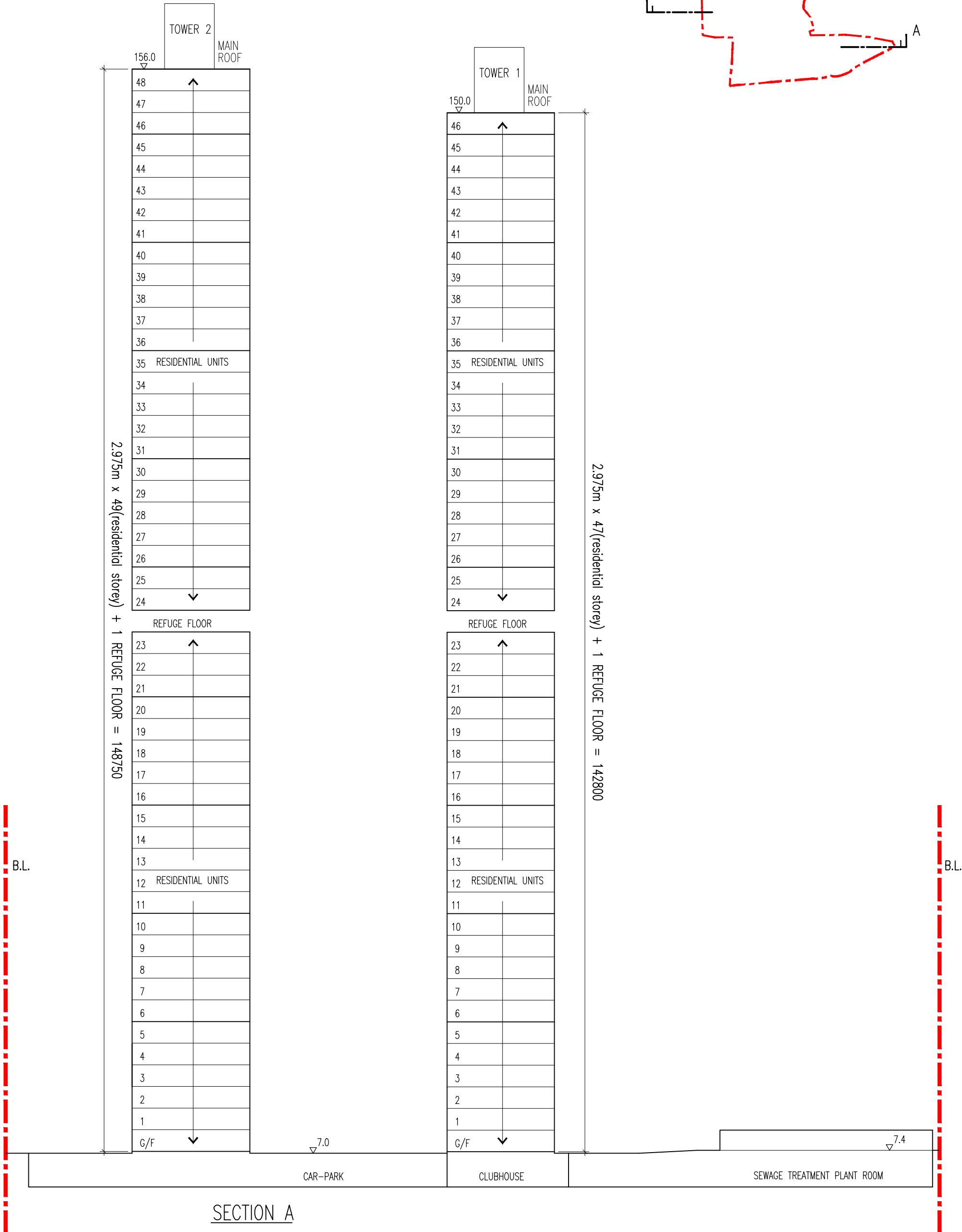
**Proposed Residential Development at Various Lots in D.D. 107
and Adjoining Government Land , Fung Kat Heung, Yuen Long.**

BASEMENT PLAN (1:500)

Proposed Residential Development at Various Lots in D.D. 107
and Adjoining Government Land , Fung Kat Heung, Yuen Long.

SCHEMATIC SECTION

(1:500)



Appendix 2 Detailed Drainage Impact Assessment Calculations

Proposed Rezoning Site for Residential Development at Various Lots and Adjoining Government Land in D.D. 107, Fung Kat Heung, Yuen Long
Table 1 - Proposed Catchment Areas and Run-off (1 in 50 year)

Notes:

Site Area 7,290 m²

Catchments are small, so Rational Method is appropriate

1 in 50 year (according to Table 3 of DSD Manual)

a= 505.5
b= 3.29
c= 0.355

$$Q_p = 0.278 \ C \ i \ A$$

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

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

	Catchment	Discharge Manhole	Paved	Unpaved	Run-off at	Area	Levels (mPD)		Fall	Overland, L	Fall, H	Overland t _c	t ₀	Total t _f	Total t _c	Intensity	Weighted Runoff Coefficient ¹	Run-off	Run-off ²	Run-off ³		
						(m ²)	Upstream	Downstream	(m)	(m)	(m/100m)	(min)	(min)	(min)	(min)	(mm/h)		(m ³ /s)	(m ³ /s)	(m ³ /s)		
Existing	Application Site																					
	S1	T1	100%	0%	T1	7,290								5.00	5.00	239	0.95	0.46	0.51	0.53		
Future	Application Site																					
	S1	T1	80%	20%	T1	7,290								5.00	5.00	239	0.80	0.39	0.43	0.45		
					T2	7,290								5.00	5.00	239	0.80	0.39	0.43	0.45		
					D1																	
					D2																	
					D3																	
					D4								5.00	239	0.80	0.39	0.43	0.45				
	Overall					7,290														0.39	0.43	0.45
	Surrounding Catchments																					
	A1	D1	15%	85%	D1	219,450	306.2	9.0	297.2	1152.1	25.8	25.4	25.4	5.00	30.43	145	0.31	2.76	3.07	3.21		
					D2	36,591								5.00	30.43	145	0.31	2.76	3.07	3.21		
					D3																	
					D4																	
					D4																	
	A2	D2	80%	20%	D2	36,591								5.00	5.00	239	0.80	1.94	2.16	2.25		
					D3	18,394								5.00	5.00	239	0.88	1.07	1.19	1.24		
					D4																	
					D4																	
					D4																	
	A3	D3	90%	10%	D3	18,394								5.00	5.00	239	0.88	1.07	1.19	1.24		
					D4	19,099								5.00	5.00	239	0.88	1.07	1.19	1.24		
					D4																	
					D4																	
D4																						
A4	D4	30%	70%	D4	19,099								5.00	5.00	239	0.43	0.54	0.60	0.62			
						55,625	21.8	6.1	15.7	419.3	3.7	15.6	15.6	5.00	20.62	164	0.79	2.00	2.22	2.32		
					CP1																	
					CP2																	
					Overall																293,534	

Remarks:

1. Runoff coefficient of 0.95 for Paved area and 0.20 for Unpaved area
2. Runoff includes rainfall increase due to Climate Change 11.1% in the mid 21st Century
3. Runoff includes rainfall increase due to Climate Change 16% in the end of 21st Century

Proposed Rezoning Site for Residential Development at Various Lots and Adjoining Government Land in D.D. 107, Fung Kat Heung, Yuen Long
Hydraulic Calculations of Existing and Proposed Drainage System

Table 2a - 1 in 50 year Runoff of Future Catchments (m³/s)

Runoff at Manhole/ Channel	Catchments					Total Runoff (m ³ /s)	Total Runoff [1] (m ³ /s)	Total Runoff [2] (m ³ /s)
	A1	A2	A3	A4	S1			
D1	2.76				0.39	3.15	3.50	3.66
D2	2.76	1.94			0.39	5.09	5.66	5.91
D3	2.76	1.94	1.07		0.39	6.16	6.84	7.15
D4	2.76	1.94	1.07	0.54	0.39	6.70	7.44	7.77
T1					0.39	0.39	0.43	0.45
T2					0.39	0.39	0.43	0.45

Remarks:

[1] Runoff includes rainfall increase due to Climate Change 11.1% in the mid 21st Century

[2] Runoff includes rainfall increase due to Climate Change 16% in the end of 21st Century

Table 2b - Comparison on 1 in 50 year Runoff of Existing and Future Catchments (m³/s)

	Runoff		Total Runoff (m ³ /s)	Runoff includes rainfall increase due to Climate Change 12% in the mid of 21st Century		Total Runoff (m ³ /s)	Runoff includes rainfall increase due to Climate Change 16% in the end of 21st Century		Total Runoff (m ³ /s)
	S1	SPS		S1	SPS		S1	SPS	
Existing	0.46		0.46	0.51		0.51	0.533		0.53
Future + SPS	0.39	0.055	0.44	0.43	0.055	0.48	0.449	0.055	0.50

Proposed Rezoning Site for Residential Development at Various Lots and Adjoining Government Land in D.D. 107, Fung Kat Heung, Yuen Long
Hydraulic Calculations of Existing and Proposed Drainage System

Table 3a - Hydraulic Capacities for Drainage System constructed by Application Site

Segment	Manhole Reference	Manhole Reference	Type of Channel	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k _s	s	Gradient	v	V	Area	Q	Q _{silt} ¹
				mm	m	mPD	mPD	m/s ²	m		1 in	m ² /s	m/s	m ²	m ³ /s	m ³ /s
T1 - T2	T1	T2	Circular	600	7.1	-	-	9.81	0.0003	0.010	100	0.000001	2.63	0.28	0.74	0.67
T2 - D1	T2	D1	Circular	600	18.4	-	-	9.81	0.0003	0.010	100	0.000001	2.63	0.28	0.74	0.67

Table 3b - Hydraulic Capacities for Drainage constructed by Sha Po Public Housing Development (SPPHD)

Segment	Manhole Reference	Manhole Reference	Type of Channel	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k _s	s	Gradient	v	V	Area	Q	Q _{silt} ¹
				mm	m	mPD	mPD	m/s ²	m		1 in	m ² /s	m/s	m ²	m ³ /s	m ³ /s
D1 - D2	D1	D2	Circular	1500	-	-	-	9.81	0.0030	0.010	100	0.000001	3.54	1.77	6.26	5.63
D2 - D3	D2	D3	Circular	1500	-	-	-	9.81	0.0030	0.011	91	0.000001	3.71	1.77	6.56	5.91
D3 - D4	D3	D4	Circular	1800	-	-	-	9.81	0.0030	0.010	100	0.000001	3.97	2.54	10.11	9.10

Table 3c - Hydraulic Capacities for Drainage constructed by Sha Po Public Housing Development (SPPHD) (need to be further upgraded)

Segment	Manhole Reference	Manhole Reference	Type of Channel	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k _s	s	Gradient	v	V	Area	Q	Q _{silt} ¹
				mm	m	mPD	mPD	m/s ²	m		1 in	m ² /s	m/s	m ²	m ³ /s	m ³ /s
D1 - D2	D1	D2	Circular	1500	-	-	-	9.81	0.0030	0.010	100	0.000001	3.54	1.77	6.26	5.63
D2 - D3	D2	D3	Circular	1800	-	-	-	9.81	0.0030	0.011	91	0.000001	4.17	2.54	10.60	9.54
D3 - D4	D3	D4	Circular	1800	-	-	-	9.81	0.0030	0.010	100	0.000001	3.97	2.54	10.11	9.10

Table 4a - Comparison of Runoff from Application Site and Hydraulic Capacities of Proposed Drains

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Q _{silt} ¹	Catchment Involved	Runoff	Occupancy	Sufficient Capacity?	Runoff [1]	Occupancy	Sufficient Capacity?	Runoff [2]	Occupancy	Sufficient Capacity?
			mm	m ³ /s		m ³ /s			m ³ /s			m ³ /s		
T1 - T2	T1	T2	600	0.67	S1	0.39	57.8%	YES	0.43	64.2%	YES	0.45	67.1%	YES
T2 - D1	T2	D1	600	0.67	S1	0.39	57.8%	YES	0.43	64.2%	YES	0.45	67.1%	YES

Table 4b - Comparison of Runoff from Application Site and Catchment Areas, and Hydraulic Capacities of Drainage constructed by SPPHD

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Q _{silt} ¹	Catchment Involved	Runoff	Occupancy	Sufficient Capacity?	Runoff [1]	Occupancy	Sufficient Capacity?	Runoff [2]	Occupancy	Sufficient Capacity?
			mm	m ³ /s		m ³ /s			m ³ /s			m ³ /s		
D1 - D2	D1	D2	1500	5.63	S1 + A1	3.15	55.9%	YES	3.50	62.1%	YES	3.66	64.9%	YES
D2 - D3	D2	D3	1500	5.91	S1 + A1 to A2	5.09	86.2%	YES	5.66	95.8%	YES	5.91	100.0%	NO
D3 - D4	D3	D4	1800	9.10	S1 + A1 to A3	6.16	67.7%	YES	6.84	75.2%	YES	7.15	78.5%	YES

Table 4c - Comparison of Runoff from Application Site and Catchment Areas, and Hydraulic Capacities of Drainage constructed by SPPHD (after further upgrade)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Q _{silt} ¹	Catchment Involved	Runoff	Occupancy	Sufficient Capacity?	Runoff [1]	Occupancy	Sufficient Capacity?	Runoff [2]	Occupancy	Sufficient Capacity?
			mm	m ³ /s		m ³ /s			m ³ /s			m ³ /s		
D1 - D2	D1	D2	1500	5.63	S1 + A1	3.15	55.9%	YES	3.50	62.1%	YES	3.66	64.9%	YES
D2 - D3	D2	D3	1800	9.54	S1 + A1 to A2	5.09	53.4%	YES	5.66	59.3%	YES	5.91	61.9%	YES
D3 - D4	D3	D4	1800	9.10	S1 + A1 to A3	6.16	67.7%	YES	6.84	75.2%	YES	7.15	78.5%	YES

Note:

Q_{silt}: 5% reduction in flow area if the gradient is greater than 1 in 25; 10% reduction in flow area in other cases.

Cross Section Area of Circular Pipe: $D^2 \times \pi / 4$

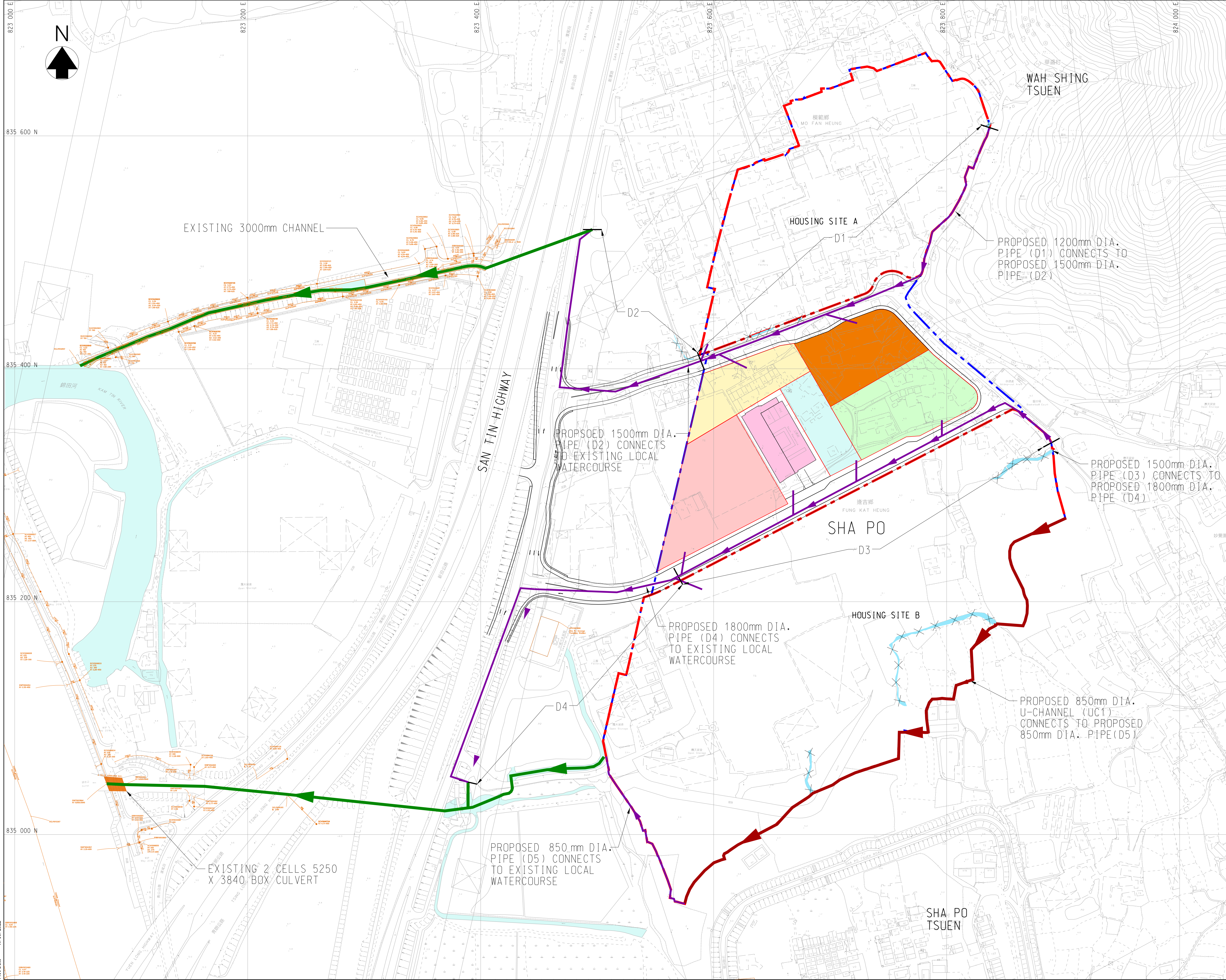
Perimeter of Circular Pipe: $(D \times 2 \times \pi) / 2$

Remarks:

[1] Runoff includes rainfall increase due to Climate Change 11.1% in the mid 21st Century

[2] Runoff includes rainfall increase due to Climate Change 16% in the end of 21st Century

**Appendix 3 Proposed Drainage Layout Plan extracted from Engineering
Feasibility Study Report for Proposed Public Housing
Development at Sha Po**



© Copyright by Binnies Hong Kong Limited

LEGEND:

- INDICATIVE HOUSING DEVELOPMENT SITE BOUNDARY SUBJECT TO EFS STUDIES AND RELEVANT B/D'S DECISION
- EFS STUDY SITE BOUNDARY
- HISTORICAL BUILDING
- PRIMARY SCHOOL
- POLICE STATION
- FIRE STATION
- SPORTS/LEISURE CENTRE
- MIN-LEISURE CENTRE
- PROPOSED DRAINAGE PIPE
- PROPOSED U-CHANNEL
- DRAINAGE PATHWAY
- EXISTING DRAINAGE
- STREAMS TO BE DIVERTED/ABANDONED

Revision	Date	Description	Initial	
	Designed	Checked	Drawn	Checked
Initial	-	-	SZ	-
Date	01/21	01/21	01/21	01/21
Approved				

Agreement no.

CE10/2020 (CE)

Project title

SITE FORMATION AND INFRASTRUCTURE WORKS FOR PROPOSED PUBLIC HOUSING DEVELOPMENTS AT SHA PO, SHAP PAT HEUNG AND TAI KEI LENG, YUEN LONG - FEASIBILITY STUDY

Drawing title

PROPOSED DRAINAGE LAYOUT

Drawing no.	Revision
406041/SP/FR/0703	-

Scale

A1 1 : 1500
A3 1 : 3000

土木工程拓展署
CEDD Civil Engineering and Development Department

binnies
BINNIES HONG KONG LIMITED
賓尼士工程顧問有限公司