Annex A

Revised Drainage Impact Assessment

Prepared for

Allex Development Limited

Prepared by

Ramboll Hong Kong Limited

PROPOSED REZONING OF THE SITE FROM "INDUSTRIAL (GROUP D)", "RESIDENTIAL (GROUP A)" AND "AGRICULTURE" TO "RESIDENTIAL (GROUP A)1" FOR RESIDENTIAL DEVELOPMENT AT VARIOUS LOTS AND ADJOINING GOVERNMENT LAND IN D.D. 107, FUNG KAT HEUNG, YUEN LONG

DRAINAGE IMPACT ASSESSMENT

Date	**February 2026**
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Project Reference	**CKHYLFKHEI00**
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CHAPTERS

TABLES

FIGURES

APPENDICES

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 1,253m^2) 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 all adverse drainage impacts on the drainage system and adjacent areas resulting from the development, along with recommendations for mitigation measures, improvement works and other measures and works. 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 m^2

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, 16% for end of 21st century and storm surge increase due to climate change (Table 30a & Table 30B) and design allowance in end of 21st century (Table 31) 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.

2.3.2 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**).

2.3.3 Based on the site survey and desktop study (see **Appendix 4**), it was observed that a 1.15m x 1.13m catchpit is located near the Application Site, which caters to the surface runoff from the southeast and northwest developments. Additionally, an 800mm channel was observed along Fung Kai Heung Road, approximately 300m west of the Application Site, which discharges into the existing local watercourse. A nature stream was found near San Tam Road, which approximately 500m west of the Application Site.

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 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.

2.4.3 Runoff from the Application Site will be conveyed using Ø750mm underground pipes around 500m into the existing nature stream.

2.4.4 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 0.459m^3/s to 0.387m^3/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 21st Century (m^3/s)	Runoff with Rainfall increase for end 21st Century (m^3/s)
S1 (Application Site)	7,290	0.387	0.430	0.449

Prefer Option

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 6,000m^2 and less than 10,000m^2. 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.

Fallback Option

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. 0.055m^3/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 0.50m^3/s.

2.5.12 A 750mm drainage pipes will be proposed to connect the existing nature stream. The size and alignment of the proposed pipeline would be preliminary and will be subject to detailed design stage. In addition, stream survey will be conducted in the detailed design stage. 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 and adjoining government land in D.D.107, 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 6b of **Appendix 2**), the surface runoff including treated effluent from STP will be less than the existing surface runoff. A 750mm drainage pipes will be proposed to connect the existing nature stream.

3.1.9 The DIA confirms the feasibility of the Proposed Development in terms of impact on the public drainage system.

Figure

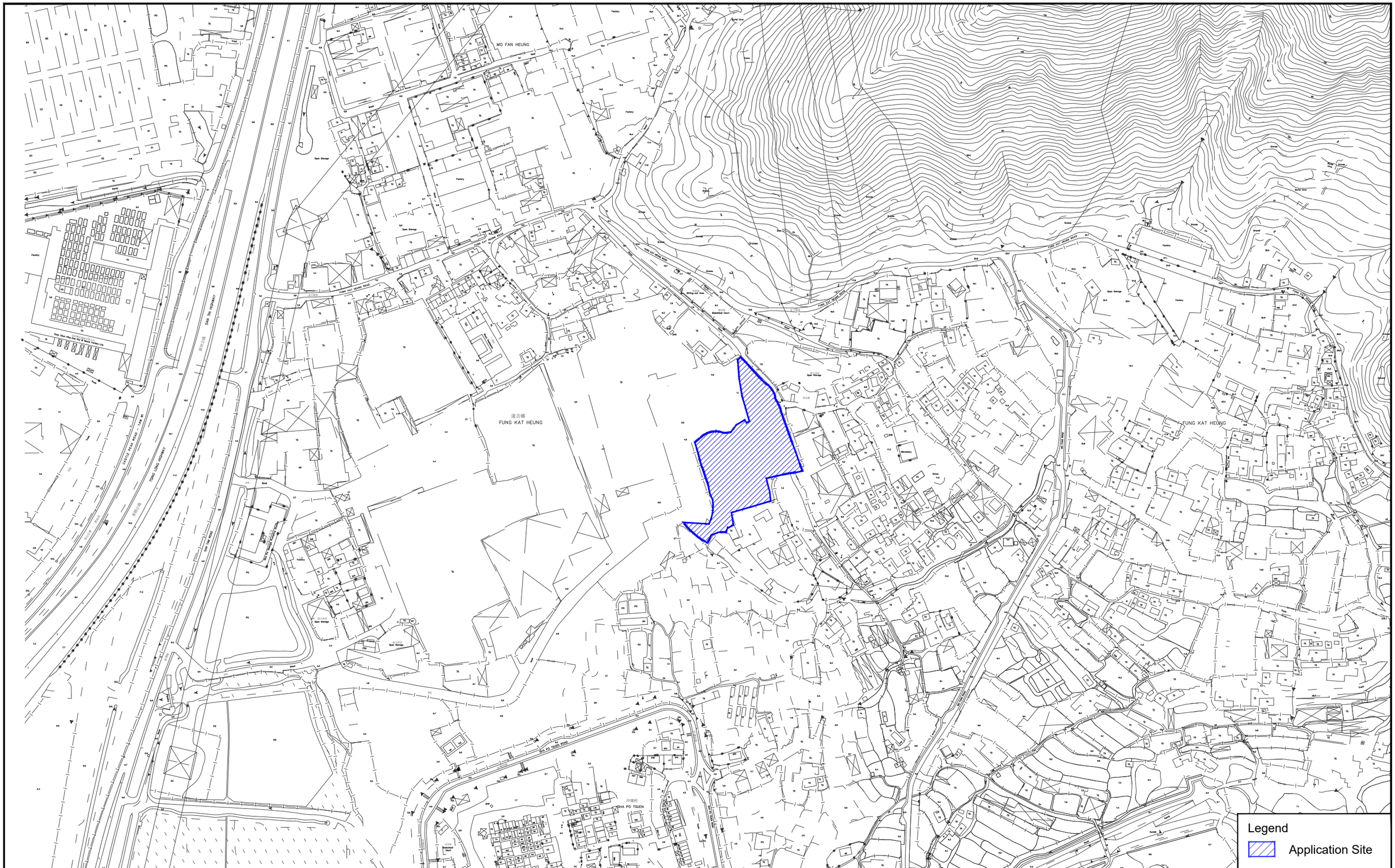

Figure: 1

Title: Location of the Application Site and its Environs

Project: Proposed Rezoning of the Site from "Industrial (Group D)" , "Residential (Group A)" and "Agriculture" to "Residential (Group A)1" for Residential Development at Various Lots and Adjoining Government Land in D.D. 107, Fung Kat Heung, Yuen Long

RAMBOLL

Drawn by:	MW
Checked by:	CC
Rev.:	1.0
Date:	Mar 2024

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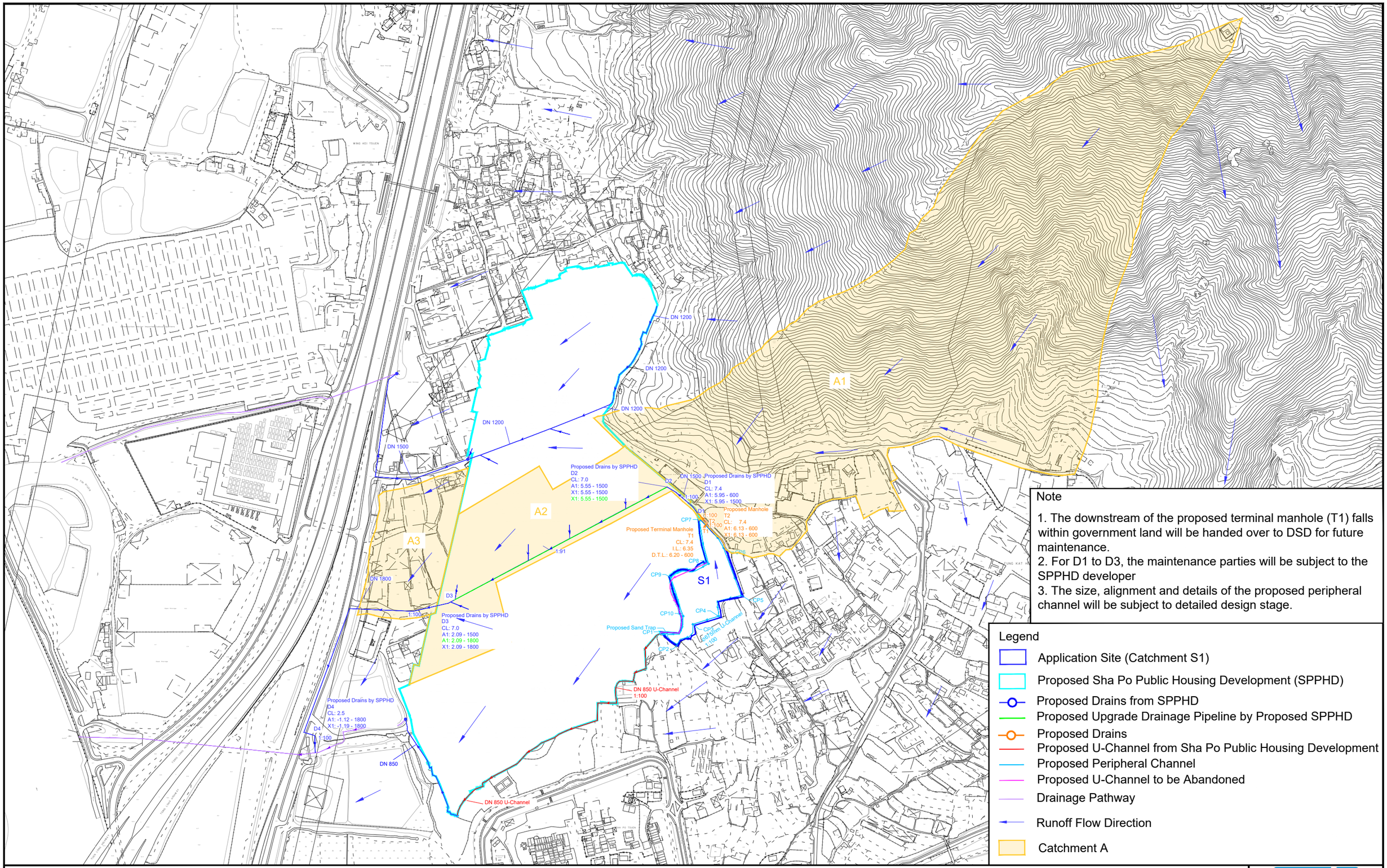

Figure: 2

Title: Location of Connection from the Application Site, Existing Drainage System and Catchment Area- Prefer Option

Project: Proposed Rezoning of the Site from "Industrial (Group D)" , "Residential (Group A)" and "Agriculture" to "Residential (Group A)1" for Residential Development at Various Lots and Adjoining Government Land in D.D. 107, Fung Kat Heung, Yuen Long

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Drawn by:	MW
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Date:	Jan 2026

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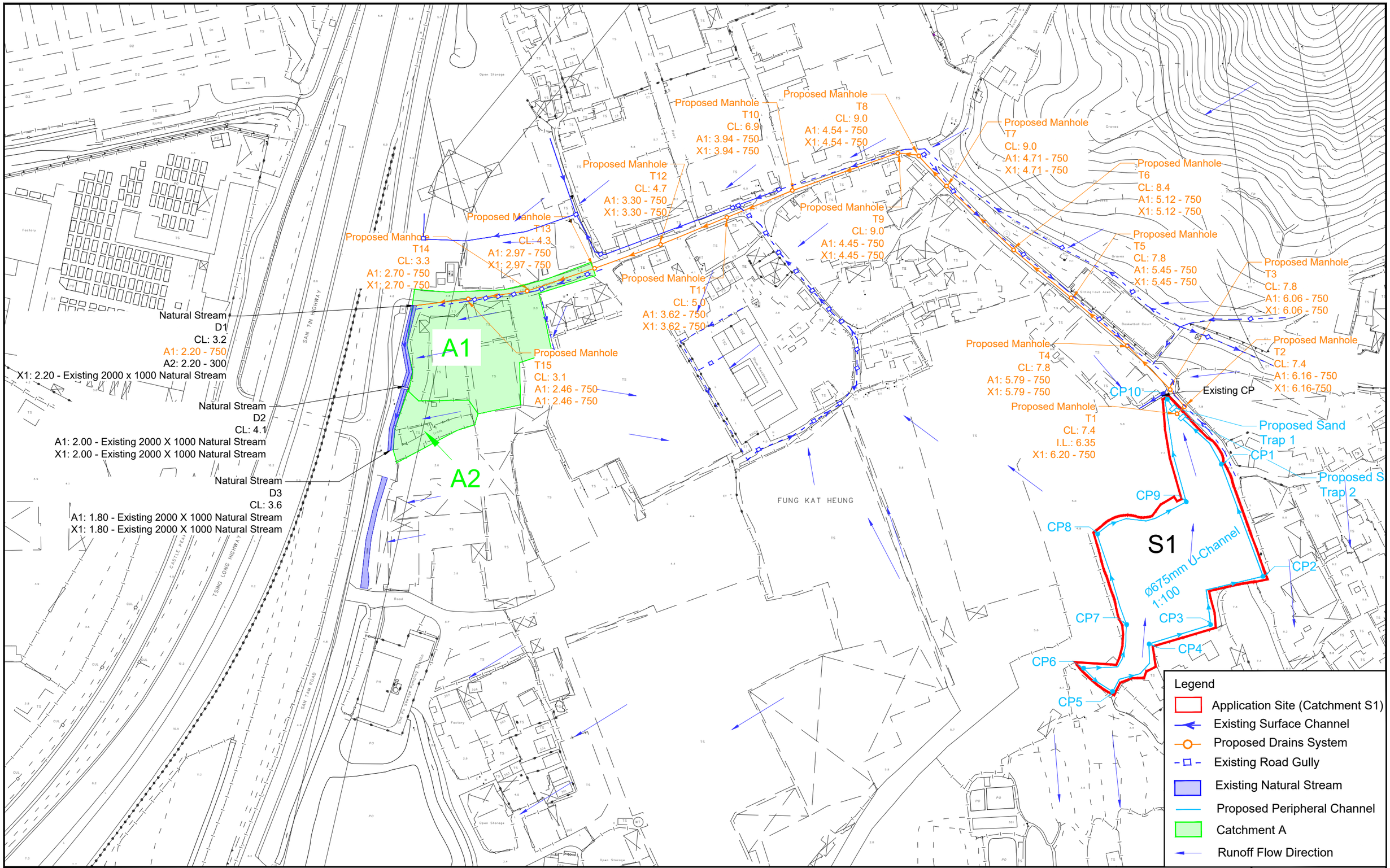

Figure: 3

Title: Location of Proposed Connection from the Application Site, Existing Drainage System and Catchment Area - Fallback Area

Project: Proposed Rezoning of the Site from "Industrial (Group D)" , "Residential (Group A)" and "Agriculture" to "Residential (Group A)1" for Residential Development at Various Lots and Adjoining Government Land in D.D. 107, Fung Kat Heung, Yuen Long

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Date:	Feb 2026

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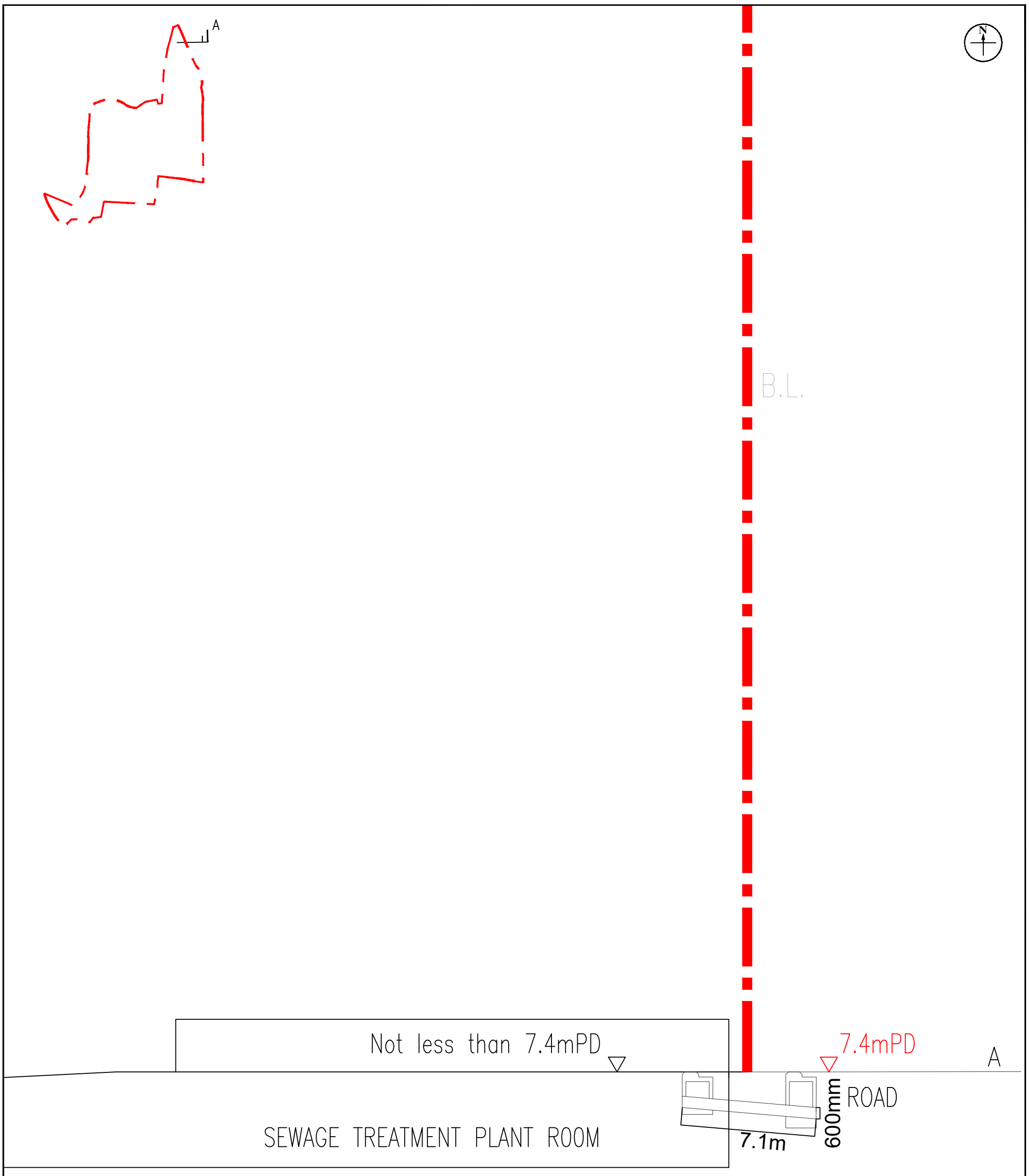


Legend:

- ▽ Existing Ground Floor Level
- ▽ Proposed Ground Floor Level within the Application Sitel

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: S12A Amendment for Plan Application for Proposed Rezoning from "Industrial (Group D)" , "Residential (Group A)" and "Agriculture" to "Residential (Group A)1" zone for the Proposed Residential Development at Various Lots in DD 107, Fung Kat Heung, Yuen Long, New Territories	Rev.: 1.4 Date: Jan 2026

Appendix 1 Master Layout Plan (MLP)

LEGENDS:

Site Boundary

Third Party Lot to be Acquired

Driveway / EVA

N

CLUBHOUSE
10.5mPD

TOWER 2
156.0mPD

TOWER 1
150.0mPD

DRIVEWAY/EVA

SEWAGE TREATMENT PLANT ROOM

15000

5000

7.0

Road

Ramp

裕昌園

露天貨倉
Open Storage

Proposed Residential Development at Various Lot in D.D. 107, Fung Kat Heung, Yuen Long.

MASTER LAYOUT PLAN (1:500)

LEGENDS:

Site Boundary

Third Party Lot to be Acquired

Driveway / EVA

N

CLUBHOUSE

TOWER 2

ENTRANCE LOBBY

TOWER 1

ENTRANCE LOBBY

DRIVEWAY/EVA

SEWAGE TREATMENT PLANT ROOM

Road

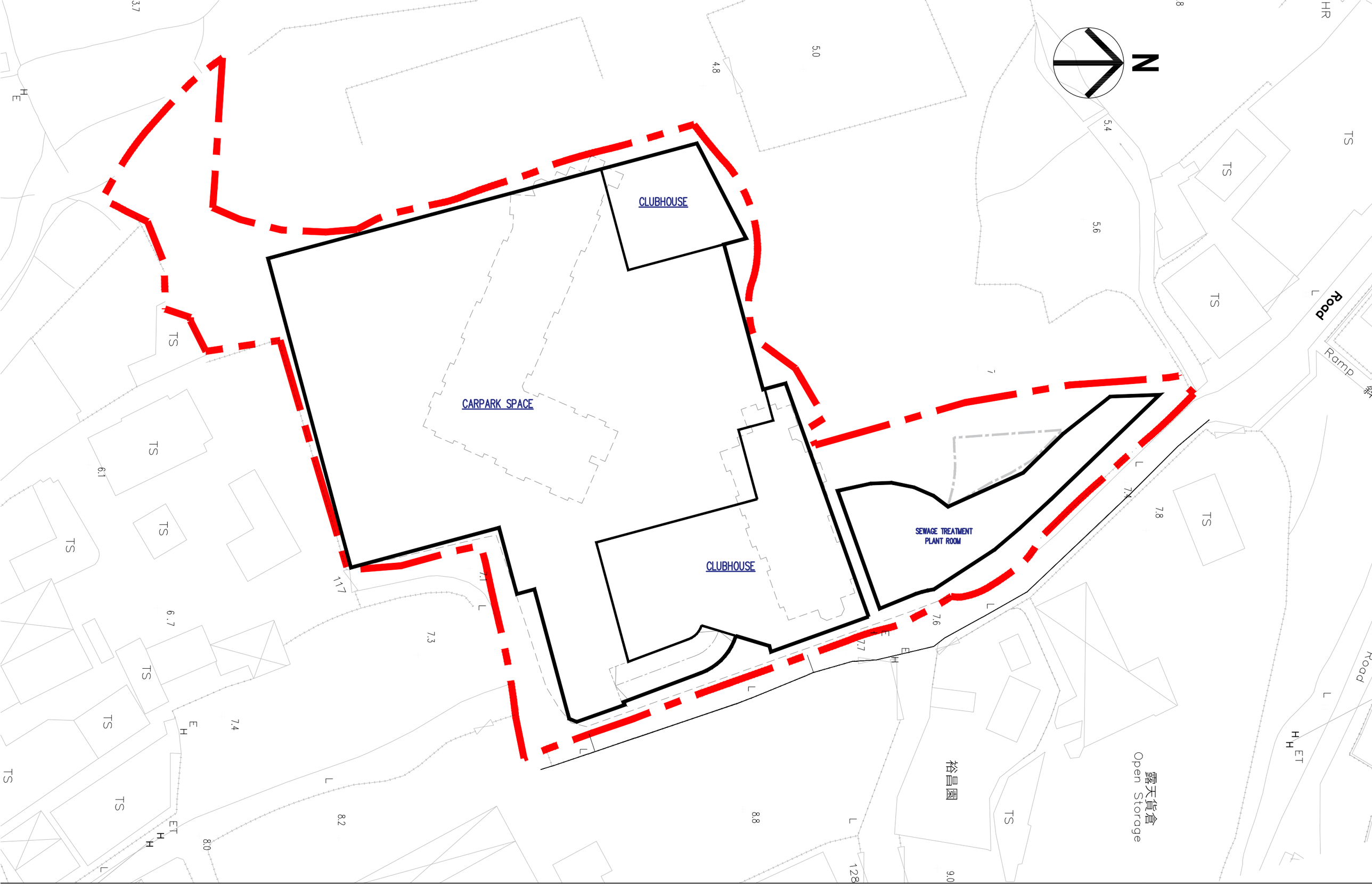
Ramp

裕昌園

露天貨倉
Open Storage

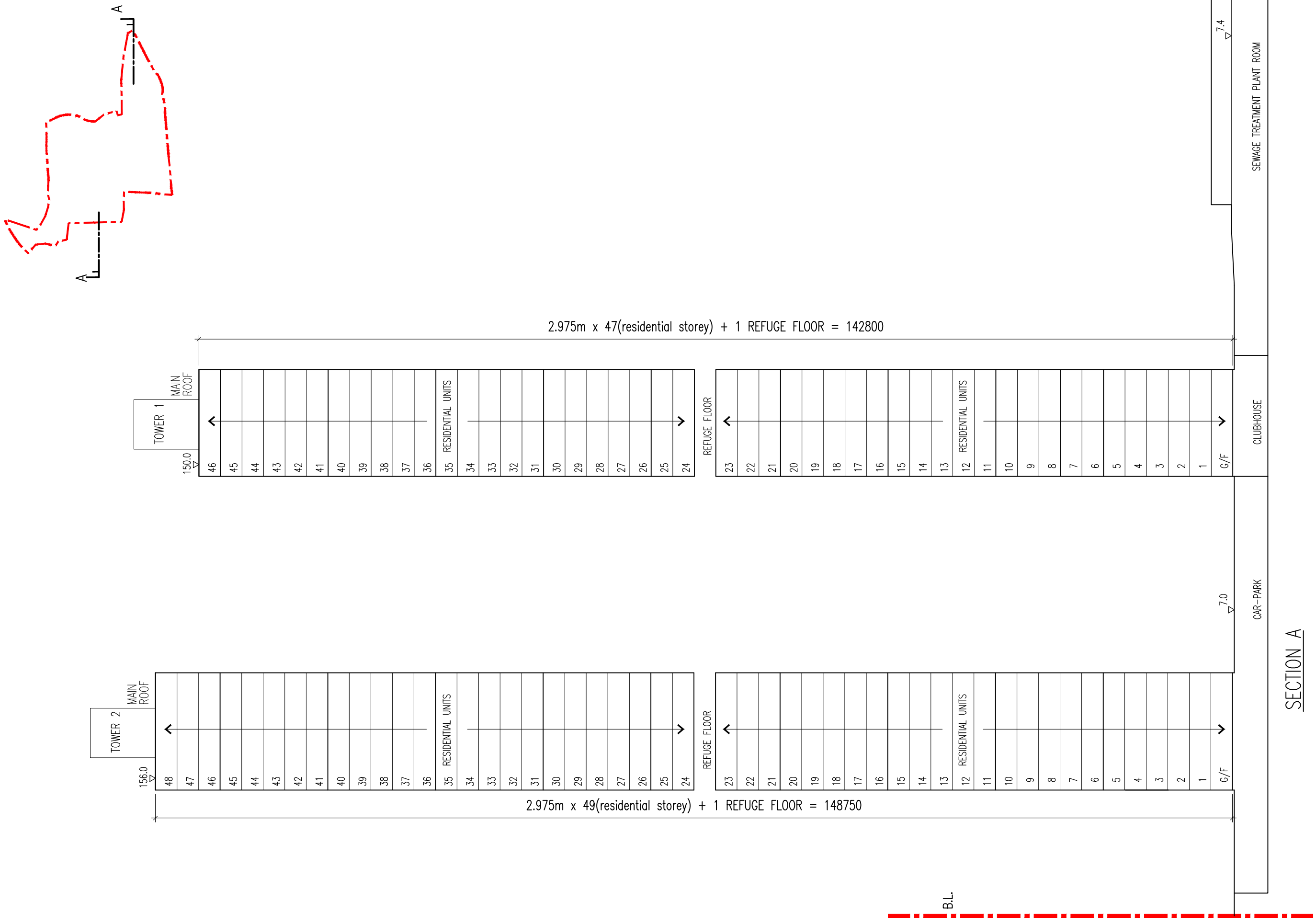
Proposed Residential Development at Various Lot in D.D. 107, Fung Kat Heung, Yuen Long.

G/F PLAN (1:500)



Proposed Residential Development at Various Lot in D.D. 107, Fung Kat Heung, Yuen Long.

BASEMENT PLAN (1:500)



Proposed Residential Development at Various Lot in D.D. 107, 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 - Prefer Option
Table 1 - Proposed Catchment Areas and Run-off (1 in 50 year)

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

where Q_p = peak runoff in m^3/s
C = runoff coefficient (dimensionless)
i = rainfall intensity in mm/hr
A = catchment area in km^2

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

Notes:
Site Area 7,290 m^2

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

	Catchment	Discharge Manhole	Paved	Unpaved	Run-off at	Area (m^2)	Levels (mPD) Upstream	Levels (mPD) Downstream	Fall (m)	Overland, L (m)	Fall, H (m/100m)	Overland t_c (min)	t_0 (min)	Total t_f[4] (min)	Total t_c (min)	Intensity (mm/h)	Weighted Runoff Coefficient[1]	Run-off (m^3/s)	Run-off[2] (m^3/s)	Run-off[3] (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										5.00	239	0.80	0.39	0.43	0.45
					D1										5.00	239	0.80	0.39	0.43	0.45
					D2										5.00	239	0.80	0.39	0.43	0.45
					D3										5.00	239	0.80	0.39	0.43	0.45
					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										30.43	145	0.31	2.76	3.07	3.21
					D3										30.43	145	0.31	2.76	3.07	3.21
					D4										30.43	145	0.31	2.76	3.07	3.21
	A2	D2	80%	20%	D2	36,591								5.00	5.00	239	0.80	1.94	2.16	2.25
					D3										5.00	239	0.80	1.94	2.16	2.25
					D4										5.00	239	0.80	1.94	2.16	2.25
	A3	D3	90%	10%	D3	18,394								5.00	5.00	239	0.88	1.07	1.19	1.24
					D4										5.00	239	0.88	1.07	1.19	1.24
					Overall	**293,534**												6.31	7.01	7.32

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
4. Reference of Planning Application YL-KTN/761-2, the assumption as 5 mins of time of concentration was adopted.

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

Table 2a - 1 in 50 year Runoff of Future Catchments (m^3/s)

Runoff at Manhole/ Channel	Catchments				
	A1	A2	A3	S1	Total Runoff (m^3/s)
D1	2.76			0.39	**3.15**
D2	2.76	1.94		0.39	**5.09**
D3	2.76	1.94	1.07	0.39	**6.16**
D4	2.76	1.94	1.07	0.39	**6.16**
T1				0.39	**0.39**
T2				0.39	**0.39**

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

Table 3a - Hydraulic Capacities for 850mm U-channel (to be diverted)

Segment	Inlet	Outlet	Type of Channel	Pipe Dia. (D)	Depth (H)	Slope	Gradient	Manning's roughness coefficient	Cross Section Area	Wetted Perimeter	Hydraulic Radius (R)	V	Q
				m	m		1 in		m^2	m	m	m/s	m^3/s
Proposed Perpheral Channel	-	-	U-channel	0.675	0.675	0.010	100	0.016	0.407	1.735	0.234	2.38	0.97

Table 3b - 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	6.20	6.13	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	6.13	5.95	9.81	0.0003	0.010	100	0.000001	2.63	0.28	0.74	0.67

Table 3c - 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	39.1	5.95	5.55	9.81	0.0030	0.010	100	0.000001	3.54	1.77	6.26	5.63
D2 - D3	D2	D3	Circular	1500	315.2	5.55	2.09	9.81	0.0030	0.011	91	0.000001	3.71	1.77	6.56	5.91
D3 - D4	D3	D4	Circular	1800	321.1	2.09	-1.12	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	39.1	5.95	5.55	9.81	0.0030	0.010	100	0.000001	3.54	1.77	6.26	5.63
D2 - D3	D2	D3	Circular	1800	315.2	5.55	2.09	9.81	0.0030	0.011	91	0.000001	4.17	2.54	10.60	9.54
D3 - D4	D3	D4	Circular	1800	321.1	2.09	-1.12	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 Capcities 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?	Runoff [3]	Occupancy	Sufficient Capacity?
			mm	m^3/s		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	0.55	82.3%	YES
T2 - D1	T2	D1	600	0.67	S1	0.39	57.8%	YES	0.43	64.2%	YES	0.45	67.1%	YES	0.55	82.3%	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?	Runoff [3]	Occupancy	Sufficient Capacity?
			mm	m^3/s		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	4.48	79.6%	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	7.25	122.7%	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	8.77	96.3%	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?	Runoff [3]	Occupancy	Sufficient Capacity?
			mm	m^3/s		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	4.48	79.6%	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	7.25	75.9%	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	8.77	96.3%	YES

Table 4d - Comparison of Runoff from Proposed Catchments and Hydraulic Capcities of Proposed Drainage System

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Q_{silt} [1]	Catchment Involved	Runoff	Occupancy	Sufficient Capacity?	Runoff [2]	Occupancy	Sufficient Capacity?	Runoff [3]	Occupancy	Sufficient Capacity?	Runoff [4]	Occupancy	Sufficient Capacity?
			mm	m^3/s		m^3/s			m^3/s			m^3/s			m^3/s		
Proposed Perpheral Channel	-	-	0.675	0.97	S1	0.39	40.0%	YES	0.43	44.4%	YES	0.45	46.4%	YES	0.50	52.0%	YES

Note:
1. Qsilt: 5% reduction in flow area if the gradient is greater than 1 in 25; 10% reduction in flow area in other cases.
2. Cross Section Area of Circular Pipe: D^2 × PI / 4
3. Perimeter of Circular Pipe: (D × 2 × PI) / 2
4. The value of k_s= 0.3mm is used for the calculation of slimed precast uPVC for the proposed drains, poor condition (based on Table 14: Recommended roughness value in SDM)
5.The value of k_s= 3mm is used for the calculation of slimed precast concrete for the proposed drains, poor condition (based on Table 14: Recommended roughness value in SDM)
6. The value of k_s is interpolated for pipe velocities between 0.75m/s and 1.2 m/s.
7. The assumed invert levels of the proposed manholes and drains are used for calculation purpose only. The exact invert levels will be confirmed during detailed design stage.

Remarks:
(1) Runoff [2] includes rainfall increase due to Climate Change 11.1% in the mid 21st Century
(2) Runoff [3] includes rainfall increase due to Climate Change 16% in the end of 21st Century
(3) Runoff [4]includes rainfall increase due to Climate Change 16% + Design Allowance 12.1% in the end of 21 st Century

Proposed Rezoning Site for Residential Development at Various Lots and Adjoining Government Land in D.D. 107, Fung Kat Heung, Yuen Long - Fallback Option
Table 5 - Proposed Catchment Areas and Run-off (1 in 50 year)

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

where Q_p = peak runoff in m^3/s
C = runoff coefficient (dimensionless)
i = rainfall intensity in mm/hr
A = catchment area in km^2

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

Notes:
Site Area 7,290 m^2

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

	Catchment	Discharge Manhole	Paved	Unpaved	Run-off at	Area	Levels (mPD)		Fall	Overland, L	Fall, H	Overland t_c	t_0	Total t_f[4]	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										5.00	239	0.80	0.39	0.43	0.45
					T3										5.00	239	0.80	0.39	0.43	0.45
					T4										5.00	239	0.80	0.39	0.43	0.45
					T5										5.00	239	0.80	0.39	0.43	0.45
					T6										5.00	239	0.80	0.39	0.43	0.45
					T7										5.00	239	0.80	0.39	0.43	0.45
					T8										5.00	239	0.80	0.39	0.43	0.45
					T9										5.00	239	0.80	0.39	0.43	0.45
					T10										5.00	239	0.80	0.39	0.43	0.45
					T11										5.00	239	0.80	0.39	0.43	0.45
					T12										5.00	239	0.80	0.39	0.43	0.45
					T13										5.00	239	0.80	0.39	0.43	0.45
					T14										5.00	239	0.80	0.39	0.43	0.45
					T15										5.00	239	0.80	0.39	0.43	0.45
					D1										5.00	239	0.80	0.39	0.43	0.45
					D2										5.00	239	0.80	0.39	0.43	0.45
					D3										5.00	239	0.80	0.39	0.43	0.45
					Overall	7,290												0.39	0.43	0.45
	Surrounding Catchments																			
	A1	D1	100%	0%	D1	4,666								5.00	5.00	239	0.95	0.29	0.33	0.34
					D2										5.00	239	0.95	0.29	0.33	0.34
					D3										5.00	239	0.95	0.29	0.33	0.34
	A2	D2	100%	0%	D2	1,040								5.00	5.00	239	0.95	0.07	0.07	0.08
					D3										5.00	239	0.95	0.07	0.07	0.08
					Overall	**5,706**												0.36	0.40	0.42

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
4. Reference of Planning Application YL-KTN/761-2, the assumption as 5 mins of time of concentration was adopted.

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

Table 6a - 1 in 50 year Runoff of Future Catchments (m^3/s)

Runoff at Manhole/ Channel	Catchments				Total Runoff (m^3/s)
	A1	A2	S1	SPS	
D1	0.29		0.39	0.06	**0.74**
D2	0.29	0.07	0.39	0.06	**0.80**
D3	0.29	0.07	0.39	0.06	**0.80**
T1			0.39	0.06	**0.44**
T2			0.39	0.06	**0.44**
T3			0.39	0.06	**0.44**
T4			0.39	0.06	**0.44**
T5			0.39	0.06	**0.44**
T6			0.39	0.06	**0.44**
T7			0.39	0.06	**0.44**
T8			0.39	0.06	**0.44**
T9			0.39	0.06	**0.44**
T10			0.39	0.06	**0.44**
T11			0.39	0.06	**0.44**
T12			0.39	0.06	**0.44**
T13			0.39	0.06	**0.44**
T14			0.39	0.06	**0.44**
T15			0.39	0.06	**0.44**
Proposed Peripheral Channel			0.39		**0.39**

Table 6b - Comparsion on 1 in 50 year Runoff of Existing and Future Catchments (m^3/s)

	Runoff		Total Runoff (m^3/s)
	S1	SPS	
Existing	0.39		**0.39**
Future + SPS	0.39	0.055	**0.44**

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

Table 8a - Hydraulic Capacities for Proposed Peripheral Channel

Segment	Inlet	Outlet	Type of Channel	Pipe Dia. (D)	Depth (H)	Slope	Gradient	Manning's roughness coefficient	Cross Section Area	Wetted Perimeter	Hydraulic Radius (R)	V	Q
				m	m		1 in		m^2	m	m	m/s	m^3/s
Proposed Peripheral Channel	-	-	U-channel	0.675	0.675	0.010	100	0.016	0.407	1.735	0.234	2.38	0.97

Table 8b - 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	750	5.7	6.20	6.16	9.81	0.0030	0.008	130	0.000001	2.00	0.44	0.88	0.79
T2-T3	T2	T3	Circular	750	12.4	6.16	6.06	9.81	0.0030	0.008	129	0.000001	2.00	0.44	0.88	0.80
T3-T4	T3	T4	Circular	750	34.2	6.06	5.79	9.81	0.0030	0.008	127	0.000001	2.02	0.44	0.89	0.80
T4-T5	T4	T5	Circular	750	41.1	5.79	5.45	9.81	0.0030	0.008	121	0.000001	2.07	0.44	0.91	0.82
T5-T6	T5	T6	Circular	750	41.7	5.45	5.12	9.81	0.0030	0.008	126	0.000001	2.02	0.44	0.89	0.80
T6-T7	T6	T7	Circular	750	51.7	5.12	4.71	9.81	0.0030	0.008	126	0.000001	2.02	0.44	0.89	0.80
T7-T8	T7	T8	Circular	750	21.8	4.71	4.54	9.81	0.0030	0.008	128	0.000001	2.01	0.44	0.89	0.80
T8-T9	T8	T9	Circular	750	10.8	4.54	4.45	9.81	0.0030	0.008	120	0.000001	2.07	0.44	0.92	0.82
T9-T10	T9	T10	Circular	750	62.5	4.45	3.94	9.81	0.0030	0.008	123	0.000001	2.05	0.44	0.91	0.82
T10-T11	T10	T11	Circular	750	39.7	3.94	3.62	9.81	0.0030	0.008	124	0.000001	2.04	0.44	0.90	0.81
T11-T12	T11	T12	Circular	750	39.1	3.62	3.30	9.81	0.0030	0.008	122	0.000001	2.06	0.44	0.91	0.82
T12-T13	T12	T13	Circular	750	39.7	3.30	2.97	9.81	0.0030	0.008	120	0.000001	2.07	0.44	0.92	0.82
T13-T14	T13	T14	Circular	750	33.1	2.97	2.70	9.81	0.0030	0.008	123	0.000001	2.05	0.44	0.91	0.82
T14-T15	T14	T15	Circular	750	30.5	2.70	2.46	9.81	0.0030	0.008	127	0.000001	2.02	0.44	0.89	0.80
T15-D1	T15	D1	Circular	750	31.9	2.46	2.20	9.81	0.0030	0.008	123	0.000001	2.05	0.44	0.91	0.82

Table 8c - Hydraulic Capacities for Existing Natural-stream

Segment	Inlet	Outlet	Type of Channel	Pipe Dia. (D)	Depth (H)	Slope	Stream Length	Invert Level 1	Invert Level 2	S	Gradient	Manning's roughness coefficient	Cross Section Area	Wetted Perimeter	Hydraulic Radius (R)	V	Q
				m	m		m	mPD	mPD		1 in		m^2	m	m	m/s	m^3/s
D1-D2	D1	D2	Natural-stream Channel	2.000	1.000	0.004	46.40	2.20	2.000	0.004	232	0.040	2.571	4.142	0.621	1.19	3.07
D2-D3	D2	D3	Natural-stream Channel	2.000	1.000	0.006	35.00	2.000	1.800	0.006	175	0.040	2.571	4.142	0.621	1.38	3.54

Table 9a - Comparison of Runoff from Application Site and Hydraulic Capcities of Proposed Drains

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Q_{silt} [1]	Catchment Involved	Runoff	Occupancy	Sufficient Capacity?	Runoff [2]	Occupancy	Sufficient Capacity?	Runoff [3]	Occupancy	Sufficient Capacity?	Runoff [4]	Occupancy	Sufficient Capacity?
			mm	m^3/s		m^3/s			m^3/s			m^3/s			m^3/s		
T1-T2	T1	T2	750	0.79	S1 + SPS	0.44	55.7%	YES	0.49	61.8%	YES	0.51	64.6%	YES	0.63	79.2%	YES
T2-T3	T2	T3	750	0.80	S1 + SPS	0.44	55.6%	YES	0.49	61.7%	YES	0.51	64.5%	YES	0.63	79.1%	YES
T3-T4	T3	T4	750	0.80	S1 + SPS	0.44	55.0%	YES	0.49	61.1%	YES	0.51	63.8%	YES	0.63	78.3%	YES
T4-T5	T4	T5	750	0.82	S1 + SPS	0.44	53.8%	YES	0.49	59.7%	YES	0.51	62.4%	YES	0.63	76.5%	YES
T5-T6	T5	T6	750	0.80	S1 + SPS	0.44	55.0%	YES	0.49	61.1%	YES	0.51	63.8%	YES	0.63	78.2%	YES
T6-T7	T6	T7	750	0.80	S1 + SPS	0.44	54.9%	YES	0.49	61.0%	YES	0.51	63.7%	YES	0.63	78.2%	YES
T7-T8	T7	T8	750	0.80	S1 + SPS	0.44	55.4%	YES	0.49	61.5%	YES	0.51	64.2%	YES	0.63	78.8%	YES
T8-T9	T8	T9	750	0.82	S1 + SPS	0.44	53.6%	YES	0.49	59.5%	YES	0.51	62.1%	YES	0.63	76.2%	YES
T9-T10	T9	T10	750	0.82	S1 + SPS	0.44	54.1%	YES	0.49	60.1%	YES	0.51	62.8%	YES	0.63	77.0%	YES
T10-T11	T10	T11	750	0.81	S1 + SPS	0.44	54.5%	YES	0.49	60.5%	YES	0.51	63.2%	YES	0.63	77.5%	YES
T11-T12	T11	T12	750	0.82	S1 + SPS	0.44	54.1%	YES	0.49	60.1%	YES	0.51	62.7%	YES	0.63	76.9%	YES
T12-T13	T12	T13	750	0.82	S1 + SPS	0.44	53.6%	YES	0.49	59.6%	YES	0.51	62.2%	YES	0.63	76.3%	YES
T13-T14	T13	T14	750	0.82	S1 + SPS	0.44	54.1%	YES	0.49	60.2%	YES	0.51	62.8%	YES	0.63	77.1%	YES
T14-T15	T14	T15	750	0.80	S1 + SPS	0.44	55.1%	YES	0.49	61.2%	YES	0.51	63.9%	YES	0.63	78.5%	YES
T15-D1	T15	D1	750	0.82	S1 + SPS	0.44	54.2%	YES	0.49	60.2%	YES	0.51	62.8%	YES	0.63	77.1%	YES

Table 9b - Comparison of Runoff from Application Site and Catchment Areas, and Hydraulic Capacities of Existing Natural Stream

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Q_{silt} [1]	Catchment Involved	Runoff	Occupancy	Sufficient Capacity?	Runoff [2]	Occupancy	Sufficient Capacity?	Runoff [3]	Occupancy	Sufficient Capacity?	Runoff [4]	Occupancy	Sufficient Capacity?
			mm	m^3/s		m^3/s			m^3/s			m^3/s			m^3/s		
D1 - D2	-	-	2000	3.07	S1 +A1	0.74	24.0%	YES	0.82	26.6%	YES	0.85	27.8%	YES	1.05	34.1%	YES
D2 - D3	-	-	2000	3.54	S1+ A1 to A2	0.80	22.7%	YES	0.89	25.2%	YES	0.93	26.3%	YES	1.14	32.3%	YES

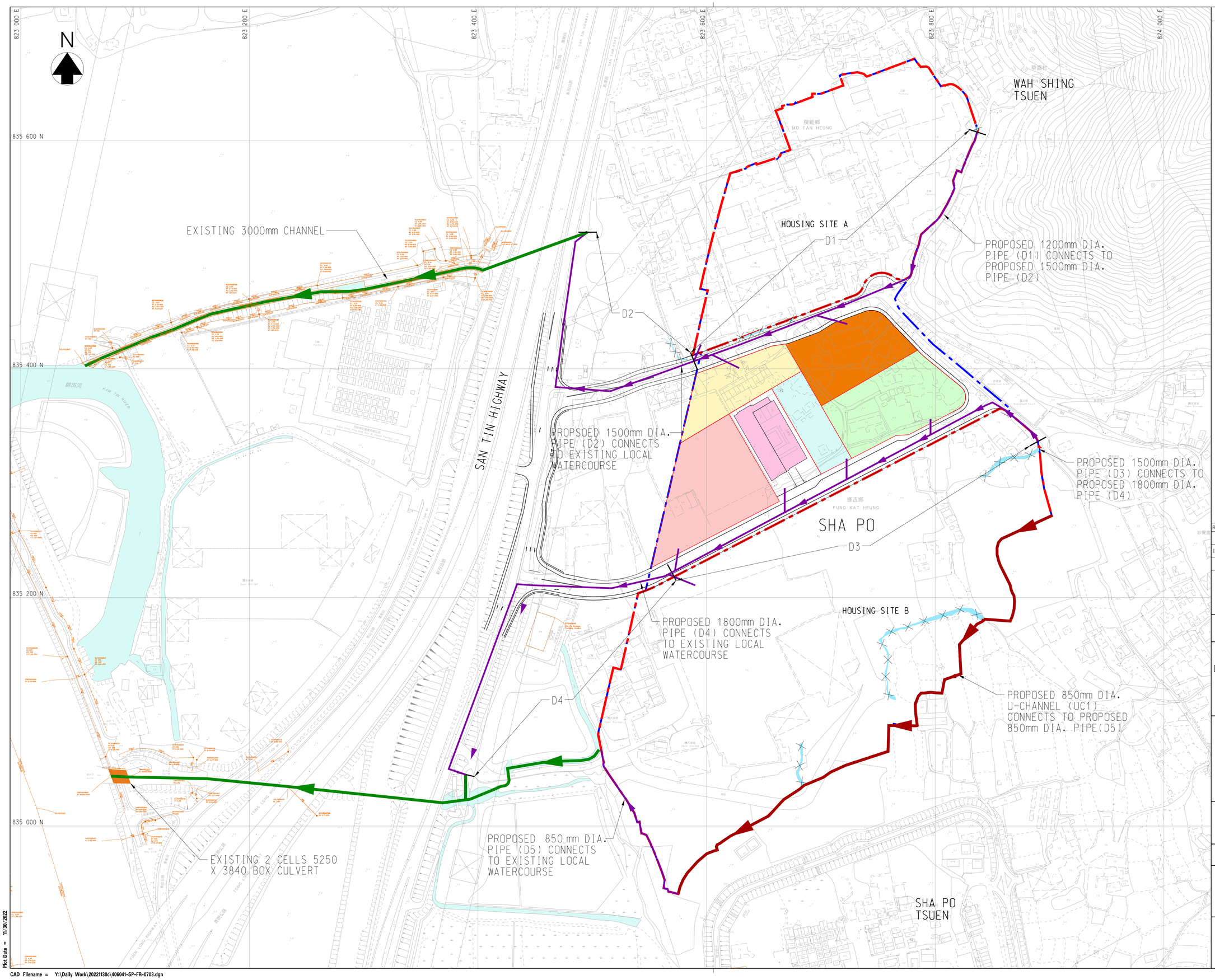
Table 9c - Comparison of Runoff from Proposed Catchments and Hydraulic Capcities of Proposed Drainage System

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Q_{silt} [1]	Catchment Involved	Runoff	Occupancy	Sufficient Capacity?	Runoff [2]	Occupancy	Sufficient Capacity?	Runoff [3]	Occupancy	Sufficient Capacity?	Runoff [4]	Occupancy	Sufficient Capacity?
			mm	m^3/s		m^3/s			m^3/s			m^3/s			m^3/s		
Proposed Peripheral Channel	-	-	0.675	0.97	S1	0.39	40.0%	YES	0.43	44.5%	YES	0.45	46.4%	YES	0.55	57.0%	YES

Note:
1. Qsilt: 5% reduction in flow area if the gradient is greater than 1 in 25; 10% reduction in flow area in other cases.
2. Cross Section Area of Circular Pipe: D^2 × PI / 4
3. Perimeter of Circular Pipe: (D × 2 × PI) / 2
4. The assumed invert levels of the proposed manholes and existing natural stream are used for calculation purpose only. The exact invert levels will be confirmed during detailed design stage.
5. The value of manning's roughness coefficient = 0.016 is used for the calculation of concrete pipe for the proposed drains, bad condition (based on Table 13: Value of n to be used with the Manning equation in SDM)
6.The value of manning's roughness coefficient = 0.040 is used for the calculation of natural-stream (2) for the existing natural-stream, bad condition (based on Table 13: Value of n to be used with the Manning equation in SDM)
7. The value of k_s is interpolated for pipe velocities between 0.75m/s and 1.2 m/s.
8. The diameter and depth for the existing natural stream are estimated during the site visit; the exact dimensions will be confirmed by a stream survey during the detailed design stage.

Remarks:
(1) Runoff [2] includes rainfall increase due to Climate Change 11.1% in the mid 21st Century
(2) Runoff [3] includes rainfall increase due to Climate Change 16% in the end of 21st Century
[3] Runoff [4] includes rainfall increase due to Climate Change 16% + Design Allowance 12.1% in the end of 21 st Century

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



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.
406041/SP/FR/0703

Revision
-

Scale
A1 1 : 1500
A3 1 : 3000

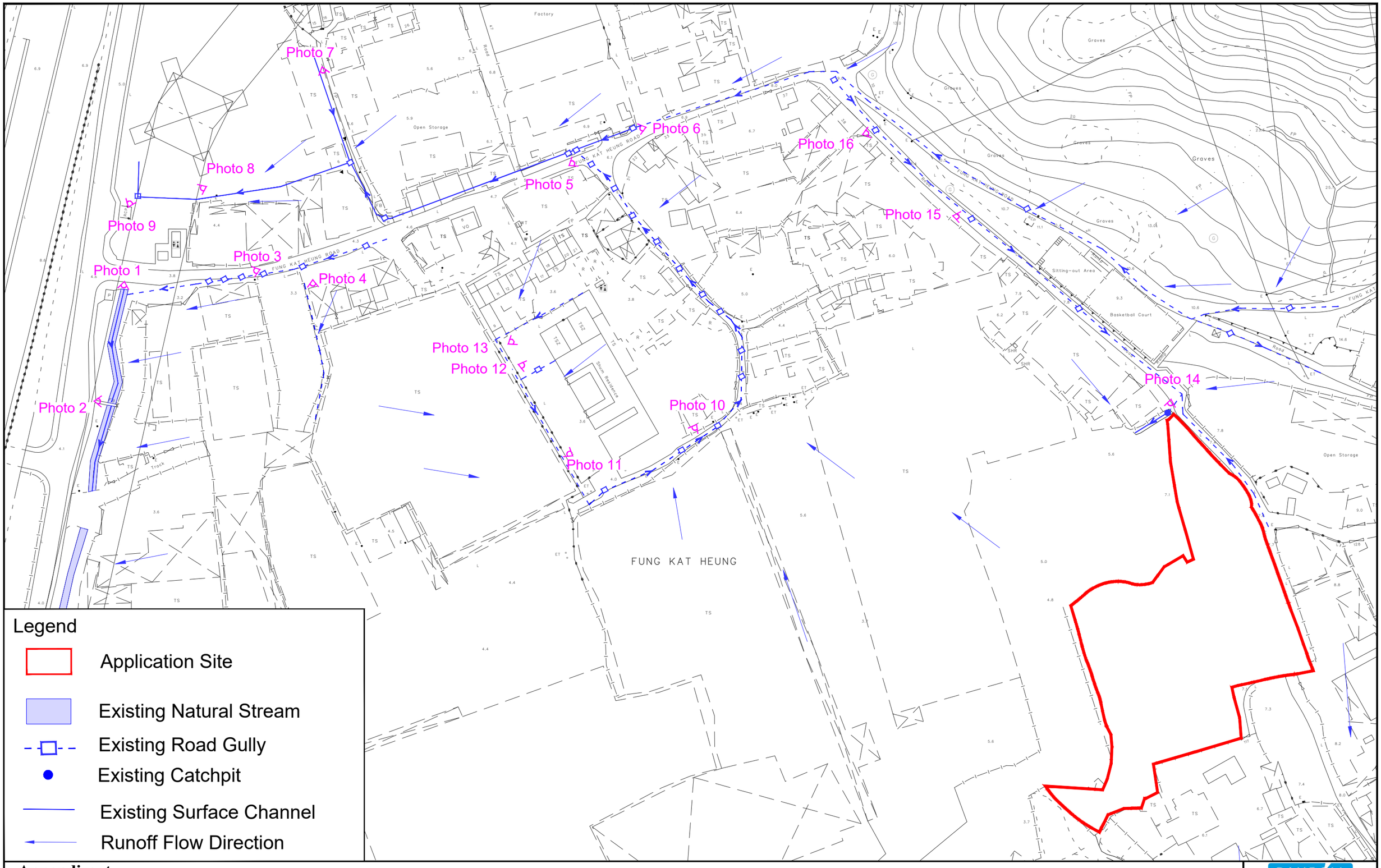
土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot Date = 11/30/2022

CAD Filename = Y:\Daily Work\20221130c\406041-SP-FR-0703.dgn

Appendix 4 Site Survey Photo Record



Appendix: 4

Title: Site Survey Photo Record

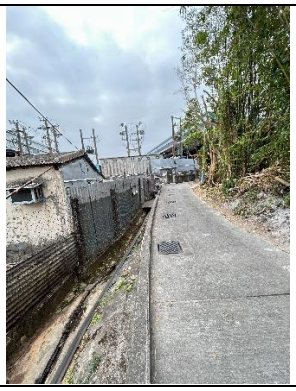
Project: Proposed Rezoning of the Site from "Industrial (Group D)" , "Residential (Group A)" and "Agriculture" to "Residential (Group A)1" for Residential Development at Various Lots and Adjoining Government Land in D.D. 107, Fung Kat Heung, Yuen Long

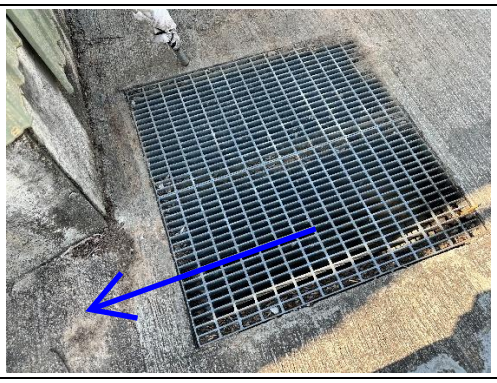
RAMBOLL

Drawn by:	MW
Checked by:	CC
Rev.:	1.4
Date:	Feb 2026

Q:\Projects\CKHYLFKHEI00\05 Assessments\06 Drainage\20260113_v1.4\DIA_20260129_site survey.dwg

	
Photo 1 A natural stream is located along the eastern side of San Tam Road.	Photo 2 A natural stream flows to the north of San Tam Road.
	
Photo 3 A road gully is located along the southern side of Fung Kat Heung Road and is connected to the natural stream on the eastern side of San Tam Road.	Photo 4 A gully is connected to the warehouses located on the north side of Fung Kat Heung Road.
	
Photo 5 A road gully crosses Fung Kat Heung Road and is connected to the drainage channel along the north side of Fung Kat Heung Road.	Photo 6 Drainage channel is located along the north side of Fung Kat Heung Road.

	
Photo 7 Surface channel is connected to the channel along north side of Fung Kat Heung Road.	Photo 8 The natural stream located on the north side of Fung Kat Heung Road and connects to the surface channel along the same road section.
	
Photo 9 The outlet of the natural stream.	Photo 10 A gully surrounds the warehouse and the logistics company.
	
Photo 11 A gully surrounds the warehouse and the logistics company.	Photo 12 A gully for Shum Residence is connected to gully for warehouse and logistic company.

	
Photo 13 A gully surrounds the warehouse and the logistics company.	Photo 14 A catchpit is located near the Application Site.
	
Photo 15 A road gully is located along the road to the north of the Application Site.	Photo 16 A road gully is located along the road to the north of the Application Site.