Appendix 8

Drainage Impact Assessment

S.12A Planning Application
on the Draft Mai Po & Fairview Park OZP No. S/YL-MP/7
Rezoning from “Residential (Group D)” to “Residential (Group C) 1” Zone
for a Proposed Residential Development
at Various Lots in D.D. 104 and the Adjoining Government Land
in Yuen Long, N.T.

Drainage Impact Assessment Report

December 2024

AECOM

Table of Contents

List of Tables

List of Drawings

List of Appendices

1. INTRODUCTION

1.1 Background

1.1.1 AECOM Asia Company Limited (AECOM) has been commissioned by the Applicant to conduct a Drainage Impact Assessment (DIA) in support of the S12A planning application to enable a medium-rise residential development on the Application Site.

1.1.2 The Application Site is bounded by Kam Pok Road to its immediate north and west, a village area and Ha Chuk Yuen Tsuen Road to its immediate east, and the existing Drainage Services Department (DSD) Chuk Yuen Floodwater Pumping Station (CYFPS) with its water retention pond to its immediate south. **Figure 1** presents the location of the Application Site.

1.1.3 The Application Site has been previously approved for a 2-storey house development (TPB Ref.: A/YL-MP/205 & 205-1). The current application aims to better utilize the land resource/development potential of the Site to increase flat supply without generating any insurmountable adverse impacts.

1.2 Objective of this Submission

1.2.1 The main objectives of this assessment include the following:-

(i) Review the existing drainage condition of the Application Site based on available information.

(ii) Outline the methodology adopted in this assessment;

(iii) Outline changes to the drainage characteristics and potential drainage impacts which may arise from the Proposed Development, especially in the respect of the following:

- effect on the existing drainage conditions;
- susceptibility to flooding of neighbouring areas upstream or downstream of the Proposed Development; and
- assessing the drainage impact upon completion of the Proposed Development.

(iv) Propose drainage mitigation measures where appropriate to mitigate the potential drainage impact from the proposed development.

1.3 Project Description

1.3.1 The overall development parameters of the proposed development at the Application Site are shown in **Table 1-1**. The Master Layout Plan (MLP) of the Proposed Development is illustrated in **Figure 2**.

Table 1-1: Site Condition

	Development Parameters
Site Area	About 65,690m^2 in total
Site condition (Pre-development)	Mostly unpaved
Site Condition (Post-development)	Mostly paved development area with a landscape pond, and landscape open space
Development Type	Residential Development, i.e. 10 residential blocks with a height of 14 to 16 storeys and commercial (retail and kindergarten), social welfare and transport facilities

2. METHODOLOGY OF DRAINAGE IMPACT ASSESSMENT

2.1.1 This DIA assesses the drainage impact of the proposed residential scheme (i.e. a medium-rise residential development) to the downstream section of Ngau Tam Mei Drainage Channel (NTMDC). The assessment is carried out in accordance with the requirements stated in "Advice Note No.1 – Application of the Drainage Impact Assessment Process to Private Sector Projects" issued by Drainage Services Department (DSD). The design parameters adopted from Stormwater Drainage Manual (SDM) are summarized in **Table 2-1.**

Table 2-1: Adopted Parameters in Drainage Impact Assessment

Design Standard	1 in 200 year for trunk drainage 1 in 50 year for branch drainage	
Runoff Coefficient	0.95 for paved area and landscape pond 0.3 for unpaved area 1.0 for swimming pool	
Sediment Depth	5% for pipe gradient greater than 1 in 25 10% for other pipes	
Pipe Roughness (K_s)	k_s = 0.6mm for precast concrete pipe with 'O' ring joints in poor condition k_s = 0.15mm for precast concrete pipe with 'O' ring joints in normal condition n=0.012 for concrete channel	
Storm Constants	1 in 50 year: a= 505.5, b=3.29, c=0.355 1 in 200 year: a=508.8, b=3.46, c=0.322 Extreme Intensity (mm/hr) at 240 minutes duration for various Return Periods: 1 in 2 year: i = 31.5 mm/hr 1 in 50 year: i = 63.9 mm/hr 1 in 200 year: i = 77.3 mm/hr	]]]]]]] Table 3a of SDM Corrigendum No. 1/2024 Table 2a of SDM Corrigendum No. 1/2024
Rainfall Increase due to Climate Change	16.0% for End of 21st Century	]] Table 28 of SDM Corrigendum No. 1/2022
Design Allowance	12.1% for End of 21st Century	]] Table 31 of SDM Corrigendum No. 1/2022

2.1.2 Rational Method is used for estimation of surface runoff for the current residential scheme.

2.1.3 Colebrook-White Equation and Manning's Equation would be used for hydraulic checking of existing and proposed drainage system.

2.1.4 The drainage system for the proposed medium-rise residential development would be designed for 1 in 50-year rainfall event as urban drainage branch system following SDM.

3. CLIMATE CHANGE AND DESIGN ALLOWANCE

3.1.1 Climate change and design allowance for end of 21st century have been considered with the projection of rainfall increase and sea level rise in accordance with Section 6.8 of SDM, reference is made to Table 28 and Table 31 [SDM Corrigendum No. 1/2022].

4. EXISTING DRAINAGE CHARACTERISTICS

4.1 Existing Drainage Structures

4.1.1 **Figure 3** presents the existing drainage infrastructure on site and its sub-catchment flow direction. There are existing 450mm dia. outlet pipes located to the immediate north of the site, which discharge the site runoff to NTMDC.

4.1.2 An existing flooding relief pond is located to the immediate south of the site. The runoff from the site will discharge to the flooding relief pond during storm events. The stormwater collected by the flooding relief pond is then pumped into NTMDC via CYFPS.

4.1.3 The NTMDC is an engineered channel which is divided into upstream section (Section B – upstream of San Tin Highway) and downstream section (Section A – between San Tin Highway and Kam Tin River). The river training works for Section B and Section A were completed in 2003 and early 2005 respectively under the project "Construction of Main Drainage Channels for Ngau Tam Mei" by DSD. After the completion of the river training project, the flood risk at the low-lying areas within the Ngau Tam Mei Drainage Catchment has been substantially reduced.

4.2 Existing Drainage Conditions

4.2.1 Currently, the subject site is located in an area with ground levels ranging from about +2.2mPD to about +4mPD in general. It is low-lying in terrain with two local higher-level areas, one at the south of the site (about +4.5mPD to about +6.5mPD) and the other at the middle (about +4.1mPD to about +4.2mPD) of the site. The existing topographic ground levels and flow directions are indicated in **Figure 3**.

4.2.2 The Application Site presently is mainly unpaved. The surface runoff within the site is currently collected by surface channels and discharge to NTMDC and the flooding relief pond via a series of existing discharge pipes located along perimeter of the Application Site. The existing drainage facilities are shown in **Figure 3**.

4.2.3 The southern tip of the site separated from the main site by Ha Chuk Yuen Road is an unpaved area at present with a size of about 1,077m². This vacant land is proposed to be used for a landscaped open space under the current development proposal with the existing site level unaltered. Currently, the surface runoff from this vacant land drains to the existing drainage channel SCP1013738. No impact on the existing drainage from this vacant land (or the future landscaped area) is anticipated and hence, no additional drainage system is required for this small land parcel.

5. PROPOSED DRAINAGE SYSTEM

5.1 Change in Site Level

5.1.1 According to the topography survey, parts of the external catchment area at the east of the Application Site, bounded by Ha Chuk Yuen Road, generally falls towards Kam Pok Road. Surface runoff is currently intercepted by existing drains along the edge of Kam Pok Road within the Application Site. The proposed medium-rise residential scheme will have a mean site formation level of about +5.4mPD, suggesting that the future ground level will be higher than existing one at about +3.0mPD, and thus the existing drains would require modification.

5.1.2 It is proposed to convey the runoff from these external areas through U-channel. Following the existing topography, the external areas can generally be divided into Area 1 and Area 2. A 450mm U-channel is proposed along the eastern boundary of the subject site to collect surface runoff from the adjacent areas (i.e. Area 1 and 2). The eastern part of the peripheral drainage system (i.e. Area 1) is proposed to be connected to the existing 450mm dia. outlet pipe while the rest (i.e. Area 2) is proposed to be connected to the existing engineered channel / nullah along Ha Chuk Yuen Road via a new 600mm dia. outlet pipe.

5.1.3 The proposed peripheral drainage system and its corresponding catchment areas are shown in **Figure 4.** The details of the peripheral drainage system have been summarized below in **Table 5-1** and the detailed calculation for peripheral drainage system for collecting runoff from Area 1 and 2 is presented in **Appendix 1**.

Table 5-1: Summary of the Peripheral Drainage System

Location Mark	U-channel			Outlet Pipe		
	Size (mm)	Design Velocity (m^2/s)	Utilization Rate	Size (mm)	Design Velocity (m^2/s)	Utilization of Outlet Pipes
Area 1	450	2.70	71%	450	2.93	80%
Area 2	450	2.70	79%	600	2.81	52%

5.1.4 In addition, 375mm to 450mm peripheral drains are proposed along the southern and north-western boundaries of the development where appropriate to ensure that no surface runoff overflows onto adjacent lots. The detailed design of the peripheral drains is part of the internal drainage system and will be addressed in the detailed design stage.

5.2 Change in Paving Conditions

5.2.1 Comparing the existing and proposed catchment areas, the paving conditions have generally changed from unpaved to paved, which will increase the total runoff from the proposed site. To manage this, it is proposed to store the additional runoff in a detention tank, which will be further detailed in Section 6. Additionally, a designated portion of the catchment area after the proposed development, will be designed to allow direct discharge to the flooding relief pond and the North Tuen Mun Drainage Channel (NTMDC), ensuring no increase in overall peak runoff.

5.2.2 A designated portion of the proposed development area is designed to allow direct discharge to the flooding relief pond and NTMDC. The details of this designated development area and its direct discharge to the flooding relief pond and NTMDC are summarized below in **Table 5-2**.

Table 5-2: Proposed Designated Development Area Discharges to Flooding Relief Pond and NTMDC

Discharge Point	Pre-development			
	Area (m^2) (A)	Paving Condition	Runoff coefficient (B)	Runoff Area (m^2) (A) x (B)
Flooding Relief Pond	24,940	Unpaved	0.30	7,482
NTMDC	39,673	Unpaved	0.30	11,902
	Post-development			
	Designated Area (m^2) (A)	Paving Condition	Runoff coefficient (B)	Runoff Area (m^2) (A) x (B)
Flooding Relief Pond	7,876	Paved/Pond	0.95	7,482
NTMDC	12,528	Paved	0.95	11,902

5.2.3 It is proposed to convey the runoff from the designated portions through internal drainage system and discharge it to the flooding relief pond and NTMDC via existing discharge outlets along the southwest and northwest boundaries, respectively.

5.2.4 The designated areas and the proposed drainage systems are shown in **Figure 4**. The details of the proposed drainage systems have been summarized below in **Table 5-3** and the detailed calculation is presented in **Appendix 2**.

Table 5-3: Proposed Stormwater Discharges to Flooding Relief Pond and NTMDC

Location Mark	U-channel			Outlet Pipe (Existing)		
	Size (mm)	Design Velocity (m^2/s)	Utilization Rate	Size (mm)	Design Velocity (m^2/s)	Utilization of Outlet Pipes
Area A	450	2.89	77%	750	2.28	45%
Area B	450	2.42	74%	450	2.88	78%

5.2.5 The proposed internal drainage system within the Application Site will be equipped with sand traps and oil interceptor to remove potential pollutants from the runoff collected before discharging into the flooding relief pond and NTMDC. The remaining catchments of the Application Site will be diverted to the proposed stormwater storage tank for detention and off-peak discharge after each storm event.

6. MITIGATION MEASURES

6.1 Proposed Storm Water Detention Tank

6.1.1 Rational method is adopted in the assessment to estimate the pre- and post-development site runoff based on the design 4-hour rainfall accumulation. As mentioned in Section 5.2, a designated portion of the proposed development area is designed to allow direct discharge to the flooding relief pond and the NTMDC. The additional runoff will be conveyed and stored in a detention tank. This detention tank is intended to store the additional runoff, i.e., the net difference in volume between the pre-development and post-development 4-hour accumulated rainfall.

6.1.2 It is proposed that detention tank with capacity of min. 9,821m^3 would be provided, in addition to the detention tank volume a minimum 500mm freeboard would be required to cater for the 1 in 50 years rainfall event. The location of the proposed detention tank is presented in **Figure 5** and the estimation of required detention volume is presented in **Appendix 3**.

6.1.3 Under a typical storm event, the surface runoff would be diverted to the proposed detention tank via the internal drainage system. Details of the internal stormwater drainage system would be further developed in detailed design stage.

6.1.4 Stormwater temporary stored in the detention tank would be discharged to NTMDC by pump with flowrate not more than 0.32m^3/s after each storm event, which is the peak flow discharge to NTMDC as shown in **Appendix 2**. For the designed 1 in 50-year storm, the discharge cycle to empty the proposed detention tank requires approximately 9 hours.

6.1.5 The additional runoff induced by the proposed development will be stored in the detention tank and discharged to NTMDC after the storm event. No adverse impact on the existing NTMDC under the design rainfall events is anticipated.

7. MAINTENANCE RESPONSIBILITY

7.1.1 The general operation and maintenance requirements will be referenced to Practice Note No. 1/2024 for "Design Checklists on Operation & Maintenance Requirements".

7.1.2 The Applicant will be responsible for the construction of all necessary stormwater network within site and carry out connection works to the public drainage system.

7.1.3 The Applicant will maintain the terminal manholes and all upstream stormwater network within the site.

7.1.4 The Applicant will maintain the slope toe half-round channels and U-channels within the site boundary. The drainage pipes, channels and catchpits outside the site boundary will be maintained by relevant Government departments.

7.1.5 As requested by DSD, Cross Sections Drawings and Maintenance Plan are shown in **Appendix 4** for vetting.

8. CONCLUSION

8.1.1 The current S.12A planning application aims to better utilise the land resource/development potential of the site to increase flat supply by proposing a medium-rise residential development.

8.1.2 Based on the assessment, surface runoff at a rate not larger than that of pre-development scenario would be discharged into the flooding relief pond and NTMDC in the 1 in 50 year storm event via the proposed drainage pipes.

8.1.3 The additional runoff due to the increase in paved area induced by the proposed development would be stored in the detention tank. It would be discharged to NTMDC after each rainfall event within 9 hours with a rate of 0.32m^3/s by pumping.

8.1.4 Proper internal and peripheral drainage system will be provided within the site to ensure no adverse drainage impact arising from the proposed residential development. Hence, it could be concluded that no adverse drainage impact on the existing drainage system due to the project is envisaged.

End of Report

Drawings

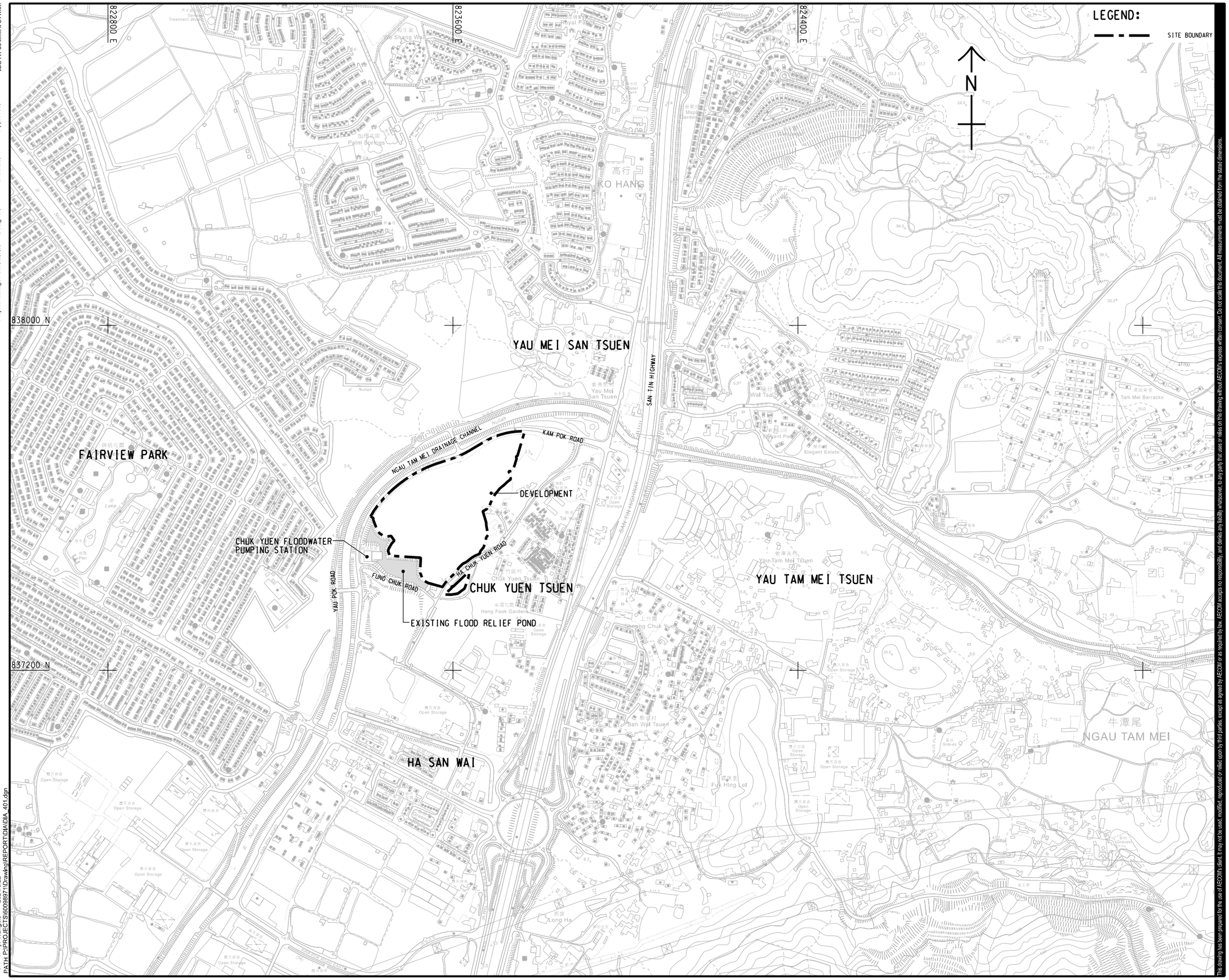
ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:



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PROJECT
項目

S.12A PLANNING APPLICATION ON THE DRAFT MAI PO & FAIRVIEW PARK OZP NO. S/YL-MP/7 REZONING FROM "RESIDENTIAL (GROUP D)" TO "RESIDENTIAL (GROUP C) 1" ZONE FOR A PROPOSED RESIDENTIAL DEVELOPMENT AT VARIOUS LOTS IN D.D. 104 AND THE ADJOINING GOVERNMENT LAND IN YUEN LONG, N.T.

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I/R 修訂	DATE 日期	DESCRIPTION 修改說明	CHK. 核對

STATUS
階段

SCALE 比例
A3 1 : 8000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
LOCATION PLAN

SHEET NUMBER
圖紙編號
60098971/DIA/FIGURE 1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

823400 E

823600 E

823800 E

837800 N

837600 N

837400 N

LEGEND:

SITE BOUNDARY

+5.4 GROUND LEVELS

REINFORCED CONCRETE DETENTION TANK

N

DEVELOPMENT

LANDSCAPE POND

DETENTION TANK

CHUK YUEN TSUEN

KAM PO ROAD

YAU POR ROAD

HA CHUK YUEN ROAD

CASTLE PEAK ROAD TAM MI

SAN TIN HIGHWAY

SAN TAM ROAD

FUNG CHUK ROAD

NGAU TAM MEI CHANNEL

Chuk Yuen Floodwater Pumping Station

COMMERCIAL & GIC FACILITIES

COMMERCIAL & TRANSPORT LAYBY

COMMERCIAL

CLUBHOUSE

OUTDOOR SWIMMING POOL

LANDSCAPE AREA

PRIVATE OPEN SPACE (OPEN FOR PUBLIC USE)

T1 15s

T2 15s

T3 14s

T5 14s

T6 16s

T7 16s

T8 16s

T9 16s

T10 16s

T11 16s

PRIVATE GARDEN

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SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
MASTER LAYOUT PLAN

SHEET NUMBER
圖紙編號
60098971/DIA/FIGURE 2

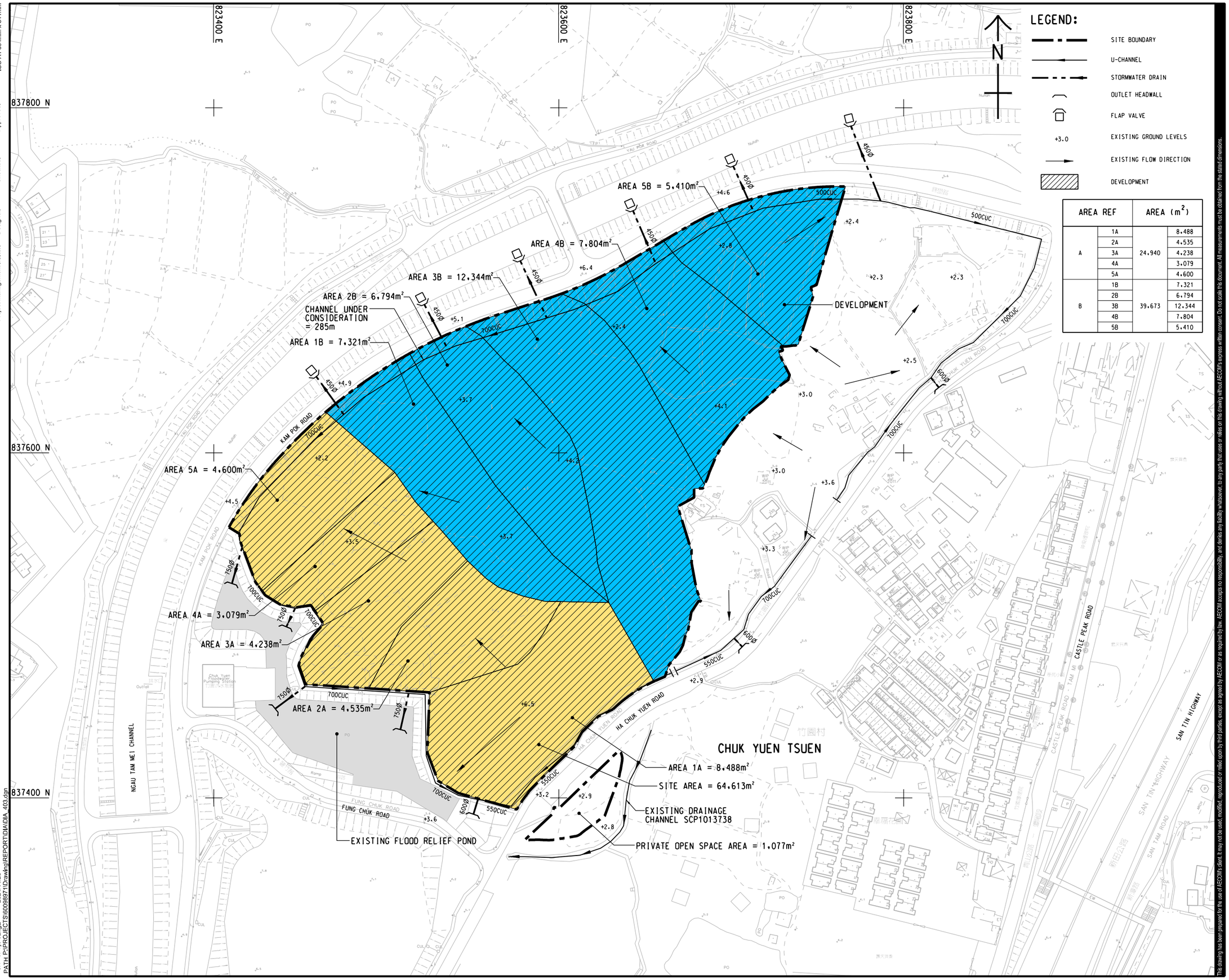
ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:



AREA REF		AREA (m^2)	
A	1A	24,940	8,488
	2A		4,535
	3A		4,238
	4A		3,079
	5A		4,600
B	1B	39,673	7,321
	2B		6,794
	3B		12,344
	4B		7,804
	5B		5,410

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項目

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STATUS
現狀

SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
CATCHMENT PLAN UNDER EXISTING CONDITION

SHEET NUMBER
圖紙編號
60098971/DIA/FIGURE 3

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

823400 E

823600 E

823800 E

837800 N

837600 N

837400 N

N

DISCHARGE OUTLET FOR EXTERNAL CATCHMENT AREA 1

AREA 1B = 945m²

AREA 2B = 3704m²

AREA 3B = 3055m²

AREA 4B = 2336m²

AREA 5B = 2488m²

AREA 1 = 8585m²

DEVELOPMENT

AREA 2 = 8064m²

AREA 1A = 4854m²

AREA 2A = 3022m²

CONNECT TO INTERNAL DRAINAGE SYSTEM

DISCHARGE TO DETENTION TANK

DISCHARGE OUTLET FOR EXTERNAL CATCHMENT AREA 2 (EQUIPPED WITH FLAP VALVE)

I.L. = +1.600mPD

DETENTION TANK

CHUK YUEN TSUEN

KAM POK ROAD

YAU POK ROAD

HA CHUK YUEN ROAD

CASTLE PEAK ROAD

SAN TIN HIGHWAY

FUNG CHUK ROAD

NGAU TAM MEI CHANNEL

COMMERCIAL & GIC FACILITIES

COMMERCIAL & TRANSPORT LAYBY

COMMERCIAL

CLUBHOUSE

LANDSCAPE POND

OUTDOOR SWIMMING POOL

PRIVATE OPEN SPACE (OPEN FOR PUBLIC USE)

T1 15s

T2 15s

T3 14s

T5 14s

T6 16s

T7 16s

T8 16s

T9 16s

T10 16s

T11 16s

LEGEND:

	SITE BOUNDARY
450U	U-CHANNEL
450Ø	STORM DRAIN
	FLOW DIRECTION
	REINFORCED CONCRETE DETENTION TANK
	CATCHPIT
	DISCHARGE OUTLET
	FLAP VALVE
	MANHOLE
450Ø	EXISTING STORM DRAIN AND DISCHARGE OUTLET
450Ø	EXISTING STORM DRAIN AND DISCHARGE TO BE ABANDONED
	EXISTING CATCHPIT

AREA REF		AREA (m^2)	
A	1A	7876	4854
	2A		3022
B	1B	12528	945
	2B		3704
	3B		3055
	4B		2336
	5B		2488

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STATUS
階段

SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
PERIPHERAL DRAINAGE SYSTEM AND ITS CORRESPONDING CATCHMENT

SHEET NUMBER
圖紙編號
60098971/DIA/FIGURE 4

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

823400 E

823600 E

823800 E

837800 N

837600 N

837400 N

N

LEGEND:

- SITE BOUNDARY
- REINFORCED CONCRETE DETENTION TANK
- DETENTION TANK INTERCONNECTION (INDICATIVE ONLY)
- 450Ø MODIFIED STORM DRAIN AND DISCHARGE OUTLET
- FLAP VALVE
- MANHOLE

DISCHARGE OUTLET TO NTMDC

EXISTING OUTLET DISCHARGE TO BE MODIFIED

TERMINAL MANHOLE

LANDSCAPE POND

450Ø

DEVELOPMENT

9,821m³ = REQUIRED DETENTION TANK VOLUME
FOR THIS PROPOSED FOOTPRINT=3,719m².
THE TANK DEPTH OF 2.7m WOULD BE REQUIRED.
PROVIDE MINIMUM 500mm FREEBOARD.
THE TOTAL TANK DEPTH SHOULD BE AT LEAST 3.2m.

CHUK YUEN TSUEN

KAM POK ROAD

YAU POK ROAD

HA CHUK YUEN ROAD

CASTLE PEAK ROAD

SAN TIN HIGHWAY

FUNG CHUK ROAD

NGAU TAM MEI CHANNEL

LANDSCAPE AREA

PRIVATE OPEN SPACE (OPEN FOR PUBLIC USE)

COMMERCIAL & GIC FACILITIES

COMMERCIAL & TRANSPORT LAYBY

COMMERCIAL

CLUBHOUSE

OUTDOOR SWIMMING POOL

T1 15s

T2 15s

T3 14s

T4 15s

T5 14s

T6 16s

T7 16s

T8 16s

T9 16s

T10 16s

T11 16s

Chuk Yuen Flood Pumping Station

HANG FOOK GARDENS

Happy House

Open Storage

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ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS
階段

SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
DETENTION SYSTEM PLAN

SHEET NUMBER
圖紙編號
60098971/DIA/FIGURE 5

Appendix 1

Calculation of Peripheral Drainage and Outlet Pipe for External Catchments

Catchment Area 1

Checking of Peripheral Drainage and Catchment Runoff
Catchment Area 1 - Uchannel

A) SURFACE RUNOFF ESTIMATION

The surface runoff in the development would be collected by internal road drainage system which would be designed to the road drainage standard as stipulated in HyD's "Guidance Notes on Road Pavement Drainage Design".

Therefore t_d = 5.0 min

B) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following algebraic equation:

$$i = \frac{a}{(t_d + b)^c} \quad \textit{(SDM 4.3.2)}$$

where i = extreme mean intensity in mm/hr
t_d = duration in minutes (t_o less than or equal to 240), and
a, b, c = storm constants given in SDM - Corrigendum No. 1/2024 Table 3a

For 50-year return period, according to SDM - Corrigendum No. 1/2024 Table 3a

a = 505.5
b = 3.29
c = 0.355

==> i = 239 mm/hr

Considering:
1 Rainfall increase in Climate Change = 16% *(Table 28, SDM Corrigendum No. 1/2022)*
2 Design Allowance in End of 21st Century = 12.1% *(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *239x(1+16%+12.1%)*
= *306* mm/hr

C) PEAK RUNOFF ESTIMATION

The peak runoff by Rational Method is given by the following expression:

$Q_p = 0.278\ C\ i\ A$ *(SMD7.5.2)*

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

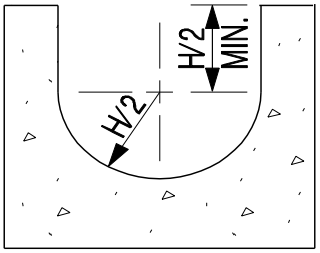
Catchment area of Catchment Area 1 = 8,585 m^2

Assuming:
1. 35% Paved Area and 65% Unpaved Area
2. Considering the existing U-channel on the east and northern sides, it is conservatively assumed that 90% of the runoff will flow into the proposed U-channel.

Paved Area	=	3,005 m^2	(C = 0.95)
Unpaved Area	=	5,580 m^2	(C = 0.3)
Weighted C Value	=	0.528	

==> Q_p = *0.347* m^3/s

D) DRAINAGE CHANNEL CHECKING



Channel Type: Concrete-lined U-Channel
Channel Size (H): 450 mm = 0.45 m

The full-bore capacity is calculated by Manning's Equation:

$$V = \frac{R^{2/3}\sqrt{S}}{n}$$

Where V = velocity of the flow (m/s)
R = hydraulic radius (m)
S = hydraulic graident = 0.01250 (1 in 80)
n = Manning's Roughness n = 0.012 *(SDM Table 13)*

Area of Channel (A)	=	0.181 m^2
Wetted Perimeter (P)	=	1.157 m
Hydraulic Radius (R)	=	0.156 m
Flow Velocity (V)	=	2.703 m/s
Flow Rate (Q)	=	V x A
	=	0.48862 m^3/s
Utilization of the U-channel	=	71%

Checking of Peripheral Drainage and Catchment Runoff
Catchment Area 1 - Outlet Pipe

A) Time of Concentration

t_d = 5.0 min (U-channel)

Length of the drainage path L= 150 m
Flow velocity in u-channel v= 2.70 m/s

tc = L/v
tc = 0.9 min

t_d = 5.9 min (Pipe)

B) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following algebraic equation:

$$i = \frac{a}{(t_d + b)^c} \quad \textit{(SDM4.3.2)}$$

where i = extreme mean intensity in mm/hr
t_d = duration in minutes (t_o less than or equal to 240), and
a, b, c = storm constants given in SDM - Corrigendum No. 1/2024 Table 3a

For 50-year return period, according to SDM - Corrigendum No. 1/2024 Table 3a

a = 505.5
b = 3.29
c = 0.355

==> i = 230 mm/hr

Considering:
1 Rainfall increase in Climate Change = 16% *(Table 28, SDM Corrigendum No. 1/2022)*
2 Design Allowance in End of 21st Century = 12.1% *(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *230x(1+16%+12.1%)*
= *295* mm/hr

C) PEAK RUNOFF ESTIMATION

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SMD7.5.2)*

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

Catchment area of Catchment Area 1 = 8,585 m^2

Assuming:
1. 35% Paved Area and 65% Unpaved Area
2. Considering the existing U-channel on the east and northern sides, it is conservatively assumed that 90% of the runoff will flow into the proposed U-channel.

Paved Area = 3,005 m^2 (C = 0.95)
Unpaved Area = 5,580 m^2 (C = 0.3)

Weighted C Value = 0.528

==> Q_p = *0.334* m^3/s

D) OUTLET PIPE CAPACITY CHECKING

The full-bore capacity of the pipe is calculated by Colebrook-White equation:

$$V = -2\sqrt{2gDS}\log\left[\frac{k_s}{3.7D} + \frac{2.51\nu}{D\sqrt{2gDS}}\right]$$

where V = velocity of the pipe flow (m/s)
S_f = hydraulic gradient = 0.0154 (or 1 in 65)
k_s = roughness value (m) (Precast concrete pipes with 'O' ring joints in normal condition)
= 0.15 x 10^{-3} m
v = kinematic viscosity of fluid = 1E-06
D = pipe diameter (m) = 0.450 m

==> V = 2.93 m/s

Q = V x A = Flow capacity of the pipe
where A = pipe sectional area = 0.1590 m^2

==> Q = 0.466 m^3/s

Assume 10% reduction of pipe capacity due to siltation

==> Q_a = Adjusted flow capacity of the pipe
= *0.420* m^3/s
> Q_p *(OK)*
> *0.334* m^3/s

Utilization of the Pipe = 80%

Catchment Area 2

Checking of Peripheral Drainage and Catchment Runoff
Catchment Area 2 - Uchannel

A) SURFACE RUNOFF ESTIMATION

The surface runoff in the development would be collected by internal road drainage system which would be designed to the road drainage standard as stipulated in HyD's "Guidance Notes on Road Pavement Drainage Design".

Therefore t_d = 5.0 min

B) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following algebraic equation:

$$i = \frac{a}{(t_d + b)^c} \quad \textit{(SDM 4.3.2)}$$

where i = extreme mean intensity in mm/hr
t_d = duration in minutes (t_o less than or equal to 240), and
a, b, c = storm constants given in SDM - Corrigendum No. 1/2024 Table 3a

For 50-year return period, according to SDM - Corrigendum No. 1/2024 Table 3a

a = 505.5
b = 3.29
c = 0.355

==> i = 239 mm/hr

Considering:
1 Rainfall increase in Climate Change = 16% *(Table 28, SDM Corrigendum No. 1/2022)*
2 Design Allowance in End of 21st Century = 12.1% *(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *239x(1+16%+12.1%)*
= *306* mm/hr

C) PEAK RUNOFF ESTIMATION

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SMD7.5.2)*

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

Catchment area of Catchment Area 2 = 8,064 m^2

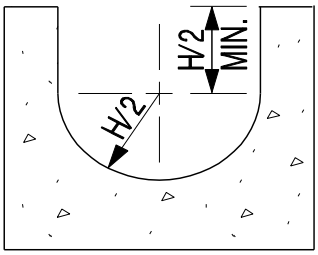
Assuming:
1. 50% Paved Area and 50% Unpaved Area
2. Considering the existing U-channel on the east and northern sides, it is conservatively assumed that 90% of the runoff will flow into the proposed U-channel.

Paved Area = 4,032 m^2 (C = 0.95)
Unpaved Area = 4,032 m^2 (C = 0.3)

Weighted C Value = 0.625

==> Q_p = *0.386* m^3/s

D) DRAINAGE CHANNEL CHECKING



Channel Type: Concrete-lined U-Channel
Channel Size (H): 450 mm = 0.45 m

The full-bore capacity is calculated by Manning's Equation:

$$V = \frac{R^{2/3}\sqrt{S}}{n}$$

Where V = velocity of the flow (m/s)
R = hydraulic radius (m)
S = hydraulic graident = 0.01250 (1 in 80)
n = Manning's Roughness n = 0.012 *(SDM Table 13)*

Area of Channel (A) = 0.181 m^2
Wetted Perimeter (P) = 1.157 m
Hydraulic Radius (R) = 0.156 m

Flow Velocity (V) = 2.703 m/s

Flow Rate (Q) = V x A
= 0.48862 m^3/s

Utilization of the U-channel = 79%

Checking of Peripheral Drainage and Catchment Runoff
Catchment Area 2 - Outlet Pipe

A) Time of Concentration

t_d = 5.0 min (U-channel)

Length of the drainage path L= 170 m
Flow velocity in u-channel v= 2.70 m/s

tc = L/v
tc = 1.0 min

t_d = 6.0 min (Pipe)

B) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following algebraic equation:

$$i = \frac{a}{(t_d + b)^c} \quad \textit{(SDM4.3.2)}$$

where i = extreme mean intensity in mm/hr
t_d = duration in minutes (t_o less than or equal to 240), and
a, b, c = storm constants given in SDM - Corrigendum No. 1/2024 Table 3a

For 50-year return period, according to SDM - Corrigendum No. 1/2024 Table 3a

a = 505.5
b = 3.29
c = 0.355

==> i = 229 mm/hr

Considering:
1 Rainfall increase in Climate Change = 16% *(Table 28, SDM Corrigendum No. 1/2022)*
2 Design Allowance in End of 21st Century = 12.1% *(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *229x(1+16%+12.1%)*
= *293* mm/hr

C) PEAK RUNOFF ESTIMATION

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SMD7.5.2)*

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

Catchment area of Catchment Area 2 = 8,064 m^2

Assuming:
1. 50% Paved Area and 50% Unpaved Area
2. Considering the existing U-channel on the east and northern sides, it is conservatively assumed that 90% of the runoff will flow into the proposed U-channel.

Paved Area = 4,032 m^2 (C = 0.95)
Unpaved Area = 4,032 m^2 (C = 0.3)

Weighted C Value = 0.625

==> Q_p = *0.370* m^3/s

D) OUTLET PIPE CAPACITY CHECKING

The full-bore capacity of the pipe is calculated by Colebrook-White equation:

$$V = -2\sqrt{2gDS}\log\left[\frac{k_s}{3.7D} + \frac{2.51\nu}{D\sqrt{2gDS}}\right]$$

where V = velocity of the pipe flow (m/s)
S_f = hydraulic gradient = 0.0100 (or 1 in 100)
k_s = roughness value (m) (Precast concrete pipes with 'O' ring joints in normal condition)
= 0.15 x 10^{-3} m
v = kinematic viscosity of fluid = 1E-06
D = pipe diameter (m) = 0.600 m

==> V = 2.81 m/s

Q = V x A = Flow capacity of the pipe
where A = pipe sectional area = 0.2827 m^2

==> Q = 0.80 m^3/s

Assume 10% reduction of pipe capacity due to siltation

==> Q_a = Adjusted flow capacity of the pipe
= *0.716* m^3/s
> Q_p *(OK)*
> *0.370* m^3/s

Utilization of the Pipe = 52%

Appendix 2

Calculation of Peripheral Drainage and Outlet Pipe for Internal Catchments

Catchment Area A

Checking of Peripheral Drainage and Catchment Runoff
Catchment Area A - Uchannel

A) Proposed Designated Development Area Discharges to Flooding Relief Pond

Considering pre-developed area as unpaved area. The runoff coefficient is derived as follows:

Unpaved Area	=	24,940	m^2	(C1	=	0.30)
Paved Area	=	-	m^2	(C2	=	0.95)
Water Pond	=	-	m^2	(C3	=	1.00)

Which is equivalent to the following post-developed area.

Unpaved Area	=	-	m^2	(C1	=	0.30)
Paved Area	=	2,621	m^2	(C2	=	0.95)
Water Pond	=	5,255	m^2	(C3	=	0.95)

(i.e., 24,940 * 0.30 = 2,621 * 0.95 + 5,255 * 0.95)

B) SURFACE RUNOFF ESTIMATION

The surface runoff in the development would be collected by internal road drainage system which would be designed to the road drainage standard as stipulated in HyD's "Guidance Notes on Road Pavement Drainage Design".

Therefore t_0 = 5.0 min

C) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following algebraic equation:

$$i = \frac{a}{(t_d + b)^c} \quad \textit{(SDM 4.3.2)}$$

where i = extreme mean intensity in mm/hr
t_d = duration in minutes (t_o less than or equal to 240), and
a, b, c = storm constants given in SDM - Corrigendum No. 1/2024 Table 3a

For 50-year return period, according to SDM - Corrigendum No. 1/2024 Table 3a

a = 505.5
b = 3.29
c = 0.355

==> i = 239 mm/hr

Considering:
1 Rainfall increase in Climate Change = 16% *(Table 28, SDM Corrigendum No. 1/2022)*
2 Design Allowance in End of 21st Century = 12.1% *(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *239x(1+16%+12.1%)*
= *306* mm/hr

D) PEAK RUNOFF ESTIMATION

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SMD7.5.2)*

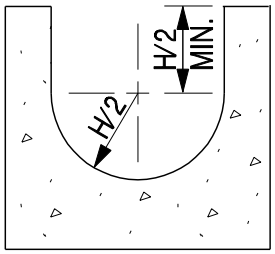
where Q_p = peak runoff in m^3/s
C = runoff coefficient (dimensionless)
i = rainfall intensity in mm/hr
A = catchment area in km^2

Paved/Pond Area	=	5,000 m^2	(C =	0.95)
Unpaved Area	=	- m^2	(C =	0.95)

Weighted C Value = 0.950

==> Q_p = *0.404* m^3/s

E) DRAINAGE CHANNEL CHECKING



Channel Type: Concrete-lined U-Channel
Channel Size (H): 450 mm = 0.45 m

The full-bore capacity is calculated by Manning's Equation:

$$V = \frac{R^{2/3}\sqrt{S}}{n}$$

Where V = velocity of the flow (m/s)
R = hydraulic radius (m)
S = hydraulic graident = 0.01429 (1 in 70)
n = Manning's Roughness n = 0.012 *(SDM Table 13)*

Area of Channel (A)	=	0.181 m^2
Wetted Perimeter (P)	=	1.157 m
Hydraulic Radius (R)	=	0.156 m
Flow Velocity (V)	=	2.890 m/s
Flow Rate (Q)	=	V x A
	=	0.52236 m^3/s
Utilization of the U-channel	=	77%

Checking of Peripheral Drainage and Catchment Runoff
Catchment Area A - Outlet Pipe

A) Time of Concentration

t_d = 5.0 min (U-channel)

B) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following algebraic equation:

$$i = \frac{a}{(t_d + b)^c} \quad \textit{(SDM4.3.2)}$$

where
- i = extreme mean intensity in mm/hr
- t_d = duration in minutes (t_o less than or equal to 240), and
- a, b, c = storm constants given in SDM - Corrigendum No. 1/2024 Table 3a

For 50-year return period, according to SDM - Corrigendum No. 1/2024 Table 3a

a = 505.5
b = 3.29
c = 0.355

==> i = 239 mm/hr

Considering:

1	Rainfall increase in Climate Change	=	16%	*(Table 28, SDM Corrigendum No. 1/2022)*
2	Design Allowance in End of 21st Centu	=	12.1%	*(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *239x(1+16%+12.1%)*
= *306* mm/hr

C) PEAK RUNOFF ESTIMATION

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SMD7.5.2)*

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

Paved/Pond Area	=	5,000 m^2	(C =	0.95)
Unpaved Area	=	- m^2	(C =	0.95)

Weighted C Value = 0.950

==> Q_p = *0.404* m^3/s

D) OUTLET PIPE CAPACITY CHECKING

The full-bore capacity of the pipe is calculated by Colebrook-White equation:

$$V = -2\sqrt{2gDS}\log\left[\frac{k_s}{3.7D} + \frac{2.51\nu}{D\sqrt{2gDS}}\right]$$

where V = velocity of the pipe flow (m/s)
S_f = hydraulic gradient = 0.0067 (or 1 in 150)
k_s = roughness value (m) (Precast concrete pipe with 'O' ring
= 0.60 x 10^{-3} m joints in poor condition)
v = kinematic viscosity of fluid = 1E-06
D = pipe diameter (m) = 0.750 m

==> V = 2.28 m/s

Q = V x A = Flow capacity of the pipe
where A = pipe sectional area = 0.4418 m^2

==> Q = 1.01 m^3/s

Assume 10% reduction of pipe capacity due to siltation

==> Q_a = Adjusted flow capacity of the pipe
= *0.908* m^3/s
> Q_p *(OK)*
> *0.404* m^3/s

Utilization of the Pipe = 45%

Catchment Area B

Checking of Peripheral Drainage and Catchment Runoff
Catchment Area B - Uchannel

A) Proposed Designated Development Area Discharges to NTMDC

Considering pre-developed area as unpaved area. The runoff coefficient is derived as follows:

Unpaved Area	=	39,673	m^2	(C1	=	0.30)
Paved Area	=	-	m^2	(C2	=	0.95)
Water Pond	=	-	m^2	(C3	=	1.00)

Which is equivalent to the following post-developed area.

Unpaved Area	=	-	m^2	(C1	=	0.30)
Paved Area	=	4,000	m^2	(C2	=	0.95)
Water Pond	=	-	m^2	(C3	=	0.95)

(i.e., 39,673 * 0.30 = 4,000 * 0.95)

B) SURFACE RUNOFF ESTIMATION

The surface runoff in the development would be collected by internal road drainage system which would be designed to the road drainage standard as stipulated in HyD's "Guidance Notes on Road Pavement Drainage Design".

Therefore t_0 = 5.0 min

C) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following algebraic equation:

$$i = \frac{a}{(t_d + b)^c} \qquad \textit{(SDM 4.3.2)}$$

where
- i = extreme mean intensity in mm/hr
- t_d = duration in minutes (t_o less than or equal to 240), and
- a, b, c = storm constants given in SDM - Corrigendum No. 1/2024 Table 3a

For 50-year return period, according to SDM - Corrigendum No. 1/2024 Table 3a

a	=	505.5
b	=	3.29
c	=	0.355

==> i = 239 mm/hr

Considering:

1	Rainfall increase in Climate Change	= 16%	*(Table 28, SDM Corrigendum No. 1/2022)*
2	Design Allowance in End of 21st Century	= 12.1%	*(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *239x(1+16%+12.1%)*
= *306* mm/hr

D) PEAK RUNOFF ESTIMATION

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SMD7.5.2)*

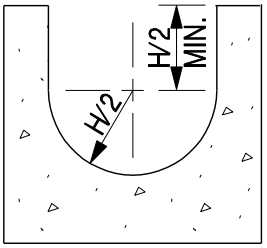
where Q_p = peak runoff in m^3/s
C = runoff coefficient (dimensionless)
i = rainfall intensity in mm/hr
A = catchment area in km^2

Paved Area	=	4,000 m^2	(C =	0.95)
Unpaved Area	=	- m^2	(C =	0.95)

Weighted C Value = 0.950

==> Q_p = *0.323* m^3/s

E) DRAINAGE CHANNEL CHECKING



Channel Type: Concrete-lined U-Channel
Channel Size (H): 450 mm = 0.45 m

The full-bore capacity is calculated by Manning's Equation:

$$V = \frac{R^{2/3}\sqrt{S}}{n}$$

Where V = velocity of the flow (m/s)
R = hydraulic radius (m)
S = hydraulic graident = 0.01000 (1 in 100)
n = Manning's Roughness n = 0.012 *(SDM Table 13)*

Area of Channel (A)	=	0.181 m^2
Wetted Perimeter (P)	=	1.157 m
Hydraulic Radius (R)	=	0.156 m
Flow Velocity (V)	=	2.418 m/s
Flow Rate (Q)	=	V x A
	=	0.437 m^3/s
Utilization of the U-channel	=	74%

Checking of Peripheral Drainage and Catchment Runoff
Catchment Area B - Outlet Pipe

A) Time of Concentration

t_d = 5.0 min (U-channel)

B) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following algebraic equation:

$$i = \frac{a}{(t_d + b)^c} \quad \textit{(SDM4.3.2)}$$

where i = extreme mean intensity in mm/hr
t_d = duration in minutes (t_o less than or equal to 240), and
a, b, c = storm constants given in SDM - Corrigendum No. 1/2024 Table 3a

For 50-year return period, according to SDM - Corrigendum No. 1/2024 Table 3a

a = 505.5
b = 3.29
c = 0.355

==> i = 239 mm/hr

Considering:
1 Rainfall increase in Climate Change = 16% *(Table 28, SDM Corrigendum No. 1/2022)*
2 Design Allowance in End of 21st Centur = 12.1% *(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *239x(1+16%+12.1%)*
= *306* mm/hr

C) PEAK RUNOFF ESTIMATION

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SMD7.5.2)*

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

Paved Area = 4,000 m^2 (C = 0.95)
Unpaved Area = m^2 (C = 0.3)

Weighted C Value = 0.950

==> Q_p = *0.323* m^3/s

D) OUTLET PIPE CAPACITY CHECKING

The full-bore capacity of the pipe is calculated by Colebrook-White equation:

$$V = -2\sqrt{2gDS}\log\left[\frac{k_s}{3.7D} + \frac{2.51\nu}{D\sqrt{2gDS}}\right]$$

where V = velocity of the pipe flow (m/s)
S_f = hydraulic gradient = 0.0200 (or 1 in 50)
k_s = roughness value (m) (Precast concrete pipes with 'O' ring joints in poor condition)
= 0.60 x 10^{-3} m
v = kinematic viscosity of fluid = 1E-06
D = pipe diameter (m) = 0.450 m

==> V = 2.88 m/s

Q = V x A = Flow capacity of the pipe
where A = pipe sectional area = 0.1590 m^2

==> Q = 0.46 m^3/s

Assume 10% reduction of pipe capacity due to siltation

==> Q_a = Adjusted flow capacity of the pipe
= *0.412* m^3/s
> Q_p *(OK)*
> *0.323* m^3/s

Utilization of the Pipe = 78%

Appendix 3

Calculation of Volume of the Proposed Detention Tank

Surface Runoff Estimation - Rational Method
Pre-Development Scenario 1 in 50 year

(A) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following Table
(Extracted from SDM Table 2a, Intensity-Duration-Frequency (IDF) Relationship of HKO Headquarters, SDM Corrigendum No. 1/2024):

Extreme Intensity (mm/h) for various Return Periods									
Duration	T (year)								
(min)	2	5	10	20	50	100	200	500	1000
240**	31.5	41.6	48.5	55.1	63.9	70.6	77.3	86.3	93.2

For **50-year** return period,
==> i = 63.9 mm/hr

Considering:
1 Rainfall increase in Climate Change = 16% *(Table 28, SDM Corrigendum No. 1/2022)*
2 Design Allowance in End of 21st Century = 12.1% *(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *63.9x(1+16%+12.1%)*
= *82* mm/hr

(B) PEAK RUNOFF ESTIMATION

Site Area = 64,613 m^2

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SDM 7.5.2)*

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

Considering the catchment of the site mainly natural terrain. The runoff coefficient is derived as follows:

Unpaved Area	=	64,613 m^2	(C1	=	0.30)
Paved Area	=	- m^2	(C2	=	0.95)
Water Pond	=	- m^2	(C3	=	1.00)

C = 0.30

==> Q_p = ***0.44*** m^3/s

Surface Runoff Estimation - Rational Method
Post-Development Scenario 1 in 50 year

(A) RAINFALL INTENSITY

The Intensity-Duration-Frequency data can be expressed by the following Table
(Extracted from SDM Table 2a, Intensity-Duration-Frequency (IDF) Relationship of HKO Headquarters, SDM Corrigendum No. 1/2024):

Extreme Intensity (mm/h) for various Return Periods									
Duration	T (year)								
(min)	2	5	10	20	50	100	200	500	1000
240**	31.5	41.6	48.5	55.1	63.9	70.6	77.3	86.3	93.2

For **50-year** return period,
==> i = 63.9 mm/hr

Considering:
1 Rainfall increase in Climate Change = 16% *(Table 28, SDM Corrigendum No. 1/2022)*
2 Design Allowance in End of 21st Century = 12.1% *(Table 31, SDM Corrigendum No. 1/2022)*

==> i = *63.9x(1+16%+12.1%)*
= *81.9* mm/hr

(B) PEAK RUNOFF ESTIMATION

Site Area = 64,613 m^2

The peak runoff by Rational Method is given by the following expression:

Q_p = *0.278 C i A* *(SDM 7.5.2)*

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

Considering the catchment of the site mainly natural terrain. The runoff coefficient is derived as follows:

Unpaved Area	=	18,630 m^2	(C1	=	0.30)
Paved Area	=	38,923 m^2	(C2	=	0.95)
Swimming Pool	=	1,805 m^2	(C3	=	1.00)
Water Pond	=	5,255 m^2	(C4	=	0.95)

C = 0.76

==> Q_p = ***1.12*** m^3/s

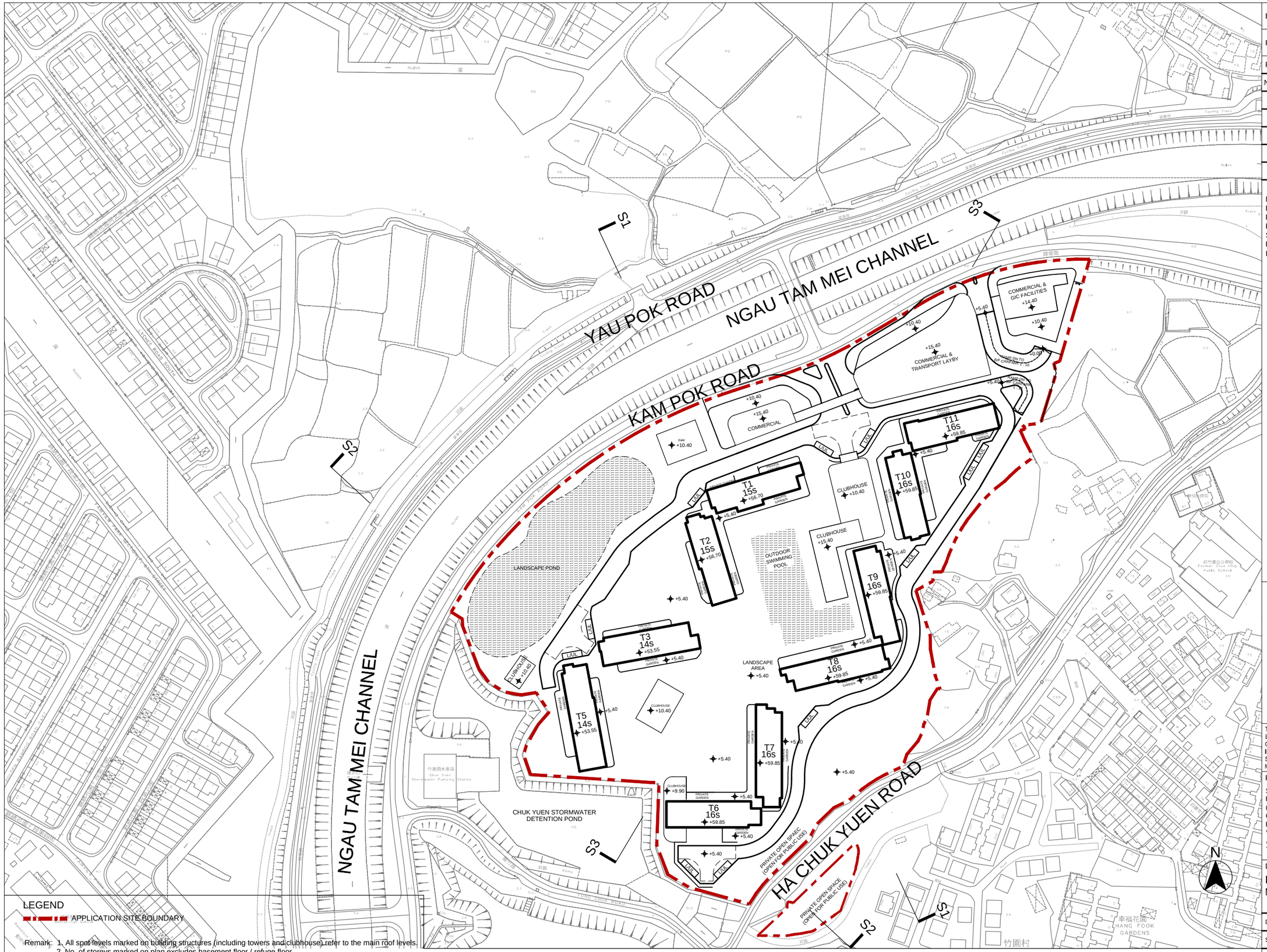
Permissible discharging volume = Qp (Pre-develop) x Duration
= 0.442*60*60*4
= 6,365 m^3

Post development discharging volume = Qp (Post-develop) x Duration
= 1.124*60*60*4
= 16,186 m^3

Size of detention tank = Post development discharging volume - Permissible discharging volume
= 16186 - 6365
= 9,821 m^3
(Provide approximately 10,000 m^3)

Appendix 4

Cross Sections Drawings and Maintenance Plan



LEGEND

APPLICATION SITE BOUNDARY

Remark: 1. All spot levels marked on building structures (including towers and clubhouse) refer to the main roof levels.
2. No. of storeys marked on plan excludes basement floor / refuge floor.

B.D. REF. :

F.S.D. REF. :

REVISIONS :

NO.	DESCRIPTION	DATE

NOTE:
DETAIL DESIGN INCLUDING BARRIER FREE ACCESS, F.S. REQUIREMENT, STRUCTURAL REQUIREMENT, ETC. TO BE DETERMINED IN GBP STAGE.

ARCHI+
ARCHIPLUS INTERNATIONAL (HK) LIMITED

PROJECT :

SECTION 12A PLANNING APPLICATION FOR REZONING FROM "RESIDENTIAL (GROUP D)" TO "RESIDENTIAL (GROUP C) 1" ZONE FOR A PROPOSED RESIDNEITLA DEVELOPMENT AT VARIOUS LOTS IN D.D. 104 AND THE ADJOINING GOVERNMENT LAND IN YUEN LONG, THE NEW TERRITORIES

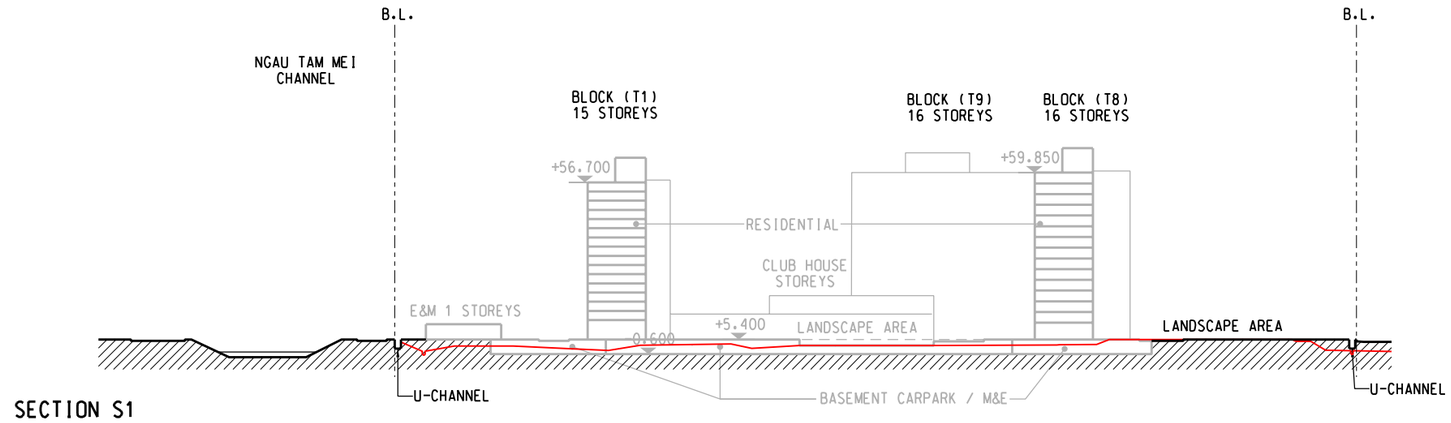
DRAWING TITLE :

INDICATIVE
MASTER LAYOUT PLAN

DATE :	FEB 2025	PAPER SIZE :	A3
SCALE :	1:2000	DRAWN :	AIL
PROJECT NO. :	767		
DWG. NO. :	(767)S16-A-02		

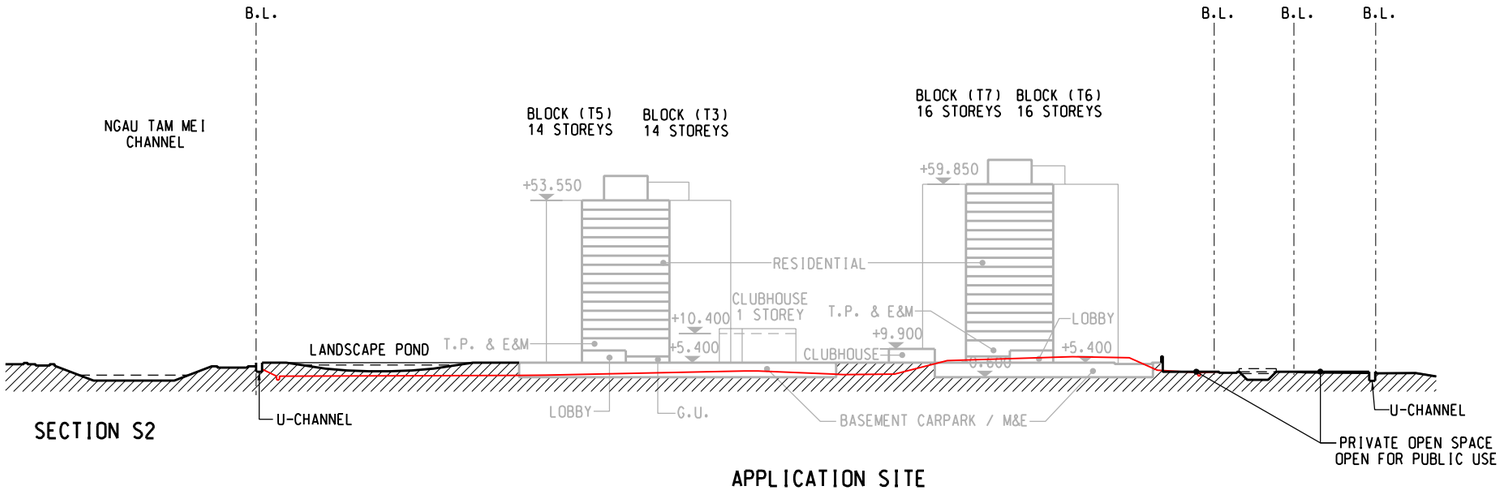
LEGEND:

EXISTING SITE LEVEL



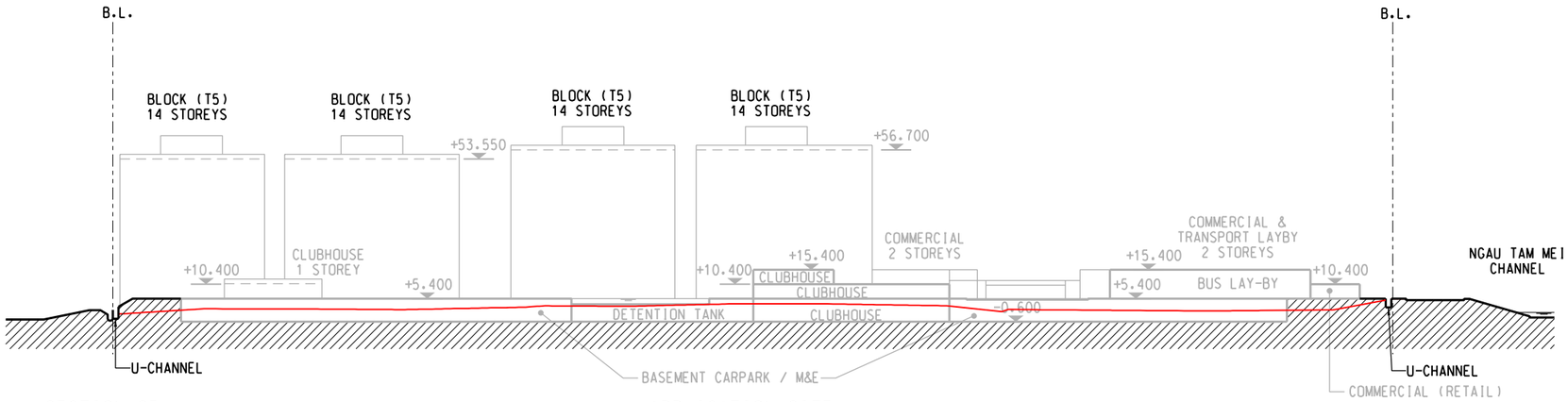
SECTION S1

APPLICATION SITE



SECTION S2

APPLICATION SITE



SECTION S3

APPLICATION SITE

AECOM

PROJECT

S.12A PLANNING APPLICATION ON THE APPROVED MAI PO & FAIRVIEW PARK OZP NO. S/YL-MP/6 REZONING FROM "RESIDENTIAL (GROUP D)" TO "RESIDENTIAL (GROUP C) 1" ZONE FOR A PROPOSED RESIDENTIAL DEVELOPMENT AT VARIOUS LOTS IN D.D. 104 AND THE ADJOINING GOVERNMENT LAND IN YUEN LONG, N.T.

CLIENT

CONSULTANT

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE N.T.S.

DIMENSION UNIT METRES

KEY PLAN

PROJECT NO. 60098971

AGREEMENT NO.

SHEET TITLE

INDICATIVE SECTIONS

SHEET NUMBER

60098971/SK4002

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

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ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

823400 E

823600 E

823800 E

837800 N

837600 N

837400 N

LEGEND:

- SITE BOUNDARY
- 450U — U-CHANNEL
- 450Ø — STORM DRAIN
- REINFORCED CONCRETE DETENTION TANK
- CATCHPIT
- DISCHARGE OUTLET
- FLAP VALVE
- MANHOLE
- 450Ø — EXISTING STORM DRAIN AND DISCHARGE OUTLET MAINTAINED BY DSD
- 450Ø — EXISTING STORM DRAIN AND DISCHARGE TO BE ABANDONED
- EXISTING CATCHPIT

N

TERMINAL MANHOLE TMH8

TERMINAL MANHOLE TMH7

TERMINAL MANHOLE TMH6

TERMINAL MANHOLE TMH5

TERMINAL MANHOLE TMH4

TERMINAL MANHOLE TMH3

TERMINAL MANHOLE TMH2

TERMINAL MANHOLE TMH1

NGAU TAM MEI CHANNEL

KAM POK ROAD

YAU POK ROAD

FUNG CHUK ROAD

HA CHUK YUEN ROAD

CASTLE PEAK ROAD

SAN TIN HIGHWAY

CHUK YUEN TSUEN

HANG FOOK GARDENS

DISCHARGE SYSTEM TO BE CONSTRUCTED BY THE APPLICANT AND MAINTAINED BY DSD

DEVELOPMENT

DISCHARGE SYSTEM TO BE CONSTRUCTED BY THE APPLICANT AND MAINTAINED BY DSD

DETENTION TANK

CONNECT TO INTERNAL DRAINAGE

DISCHARGE TO DETENTION TANK

COMMERCIAL & GIC FACILITIES

COMMERCIAL & TRANSPORT LAYBY

COMMERCIAL

CLUBHOUSE

OUTDOOR SWIMMING POOL

T1 15s

T2 15s

T3 14s

T4 15s

T5 14s

T6 16s

T7 16s

T8 16s

T9 16s

T10 16s

T11 16s

PRIVATE OPEN SPACE (OPEN FOR PUBLIC USE)

LANDSCAPED AREA

Open Storage

AECOM

PROJECT

S.12A PLANNING APPLICATION ON THE DRAFT MAI PO & FAIRVIEW PARK OZP NO. S/YL-MP/7 REZONING FROM "RESIDENTIAL (GROUP D)" TO "RESIDENTIAL (GROUP C) 1" ZONE FOR A PROPOSED RESIDENTIAL DEVELOPMENT AT VARIOUS LOTS IN D.D. 104 AND THE ADJOINING GOVERNMENT LAND IN YUEN LONG, N.T.

CLIENT

CONSULTANT

AECOM Asia Company Ltd.
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SUB-CONSULTANTS

ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE / **DIMENSION UNIT**

A3 1 : 2000 — METRES

KEY PLAN

PROJECT NO. / **AGREEMENT NO.**

60098971

SHEET TITLE

MAINTENANCE PLAN

SHEET NUMBER

60098971/DIA/FIGURE 6

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