Annex 8

Drainage Impact Assessment

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Issue Date	:	March 2026
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DRAINAGE IMPACT ASSESSMENT

FOR

PROPOSED REDEVELOPMENT OF ST. THOMAS' CHURCH AT 43 BERWICK STREET, SHAM SHUI PO, KOWLOON FOR HKSKH

Prepared by:

Allied Environmental Consultants Limited

COMMERCIAL-IN-CONFIDENCE

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Document Verification

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1. Introduction

1.1.1. This Drainage Impact Assessment ("DIA") Report is prepared in support of the S12A Planning Application for the Proposed Redevelopment of Hong Kong Sheng Kung Hui St. Thomas' Church (hereafter refer to as the "Proposed Redevelopment") at Berwick Street, Sham Shui Po (hereafter refer to as the "Subject Site").

2. Objectives

2.1.1. This Drainage Impact Assessment (DIA) is to review the existing drainage facilities in the vicinity of the Proposed Redevelopment at the Subject Site, evaluate potential impacts based on the catchment, recommend appropriate options for stormwater discharge, if necessary.

3. Site Description

3.1.1. The Subject Site is currently zoned "Government, Institution or Community" ("GIC") on the Approved Cheung Sha Wan Outline Zoning Plan ("OZP") No. S/K5/41. The surrounding areas are mainly zoned as "GIC", "Residential (Group A) 7" ("R(A)7"), "Open Space" ("O") and "Residential (Group A)" ("R(A)").

3.1.2. The Subject Site area is approximately 685.7 m^2. It is located at southwestern side of Berwick Street. ***Figure 3-1*** shows the location of the Subject Site.

3.1.3. The Subject Site is intended to be redeveloped into complex building with a total GFA of approx. 6,031.4 m^2. The Proposed Redevelopment has adopted a building height of twelve (12) storeys building (G/F – 11/F) comprising facilities including child care centre (CCC), special child care centre (SCCC), day care centre for the elderly (DE), neighbourhood elderly centre (NEC), integrated elderly rehabilitation service centre (IERSC), office, church hall, activity centre and flat.

3.1.4. The Proposed Redevelopment is anticipated to complete and handover to client in Q4 2032.

4. Relevant Government Standards

4.1.1. Water quality in Hong Kong is legislated by the provisions of the *Water Pollution Control Ordinance (Cap 358), 1980 (WPCO)*. Territorial Water has been subdivided into ten Water Control Zones (WCZ) and four supplementary water control zones. A Technical Memorandum on Standards for Effluents discharged into Drainage and Sewerage Systems, Inland and Coastal Water (TMES) has been issued, which requires licensing of all discharges into all public sewers and drains. The water quality standards will have to be met during the operation stage.

4.1.2. Besides as stipulated in the Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations 41(1), 40(2), 41(1), 90 and recap in ProPECC PN 1/23, domestic sewage should be discharged to a foul water sewer and surface water should be discharged via rainwater pipes to stormwater drains during operation phase.

5. Assessment Methodology

5.1.1. The surface runoff discharged from the identified drainage catchment areas was determined to estimate the potential drainage impact to the existing stormwater drainage system.

5.1.2. With reference to the Storm Water Drainage Manual, Planning, Design and Management published by Drainage Services Department (DSD), Rational Method shall be applied to estimate the peak surface runoff values. The idea behind the Rational Method is that for a spatially and temporally uniform intensity *i*, which continues indefinitely, the runoff at the outlet of a catchment will increase until the time concentration t_c, when the whole catchment is contributing flow to the outlet. The peak runoff is calculated as follows:

$$Q_P = 0.278\ C\ i\ A \quad \ldots\ldots (1)$$

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

5.1.3. Runoff coefficient C depends on the permeability, slope and pond character of the surface; rainfall intensity *i*, is the average rainfall intensity selected on the basis of the design rainfall duration and return period.

5.2. Existing Drainage Systems

5.2.1. It has been proposed that the surface runoff generated by the Subject Site would be discharged through manhole SMH4018768 in service lane located at the southwestern side of Subject Site into the existing public drainage system, as shown in ***Figure 5-1***.

5.3. Catchment Area

5.3.1. The Subject Site contains an approximate area of 685.7 m^2 and is currently comprises of the St. Thomas' Church and Hong Kong Sheng Kung Hui Religious Education Resource Centre. As advised by Project Team, the Proposed Redevelopment will contain a minimum horizontal greenery area of 6.9%. The details of the Subject Site and surrounding catchment area that contributes to the generation of stormwater generation is summarized in **Table *5-1***.

Table* 5-1 *Estimated Peak Flow for the Subject Site

Description	Catchment Area (m^2)
Subject Site	685.7

5.4. Peak Flow Estimation

5.4.1. The peak flow from the identified drainage catchment area is calculated from *equation (1)* as mentioned in **5.1.2**. The peak runoffs from the Subject Site before and after the completion of Proposed Development are as presented in ***Table 5-2***, detailed calculation is appended in ***Appendix 5-1***.

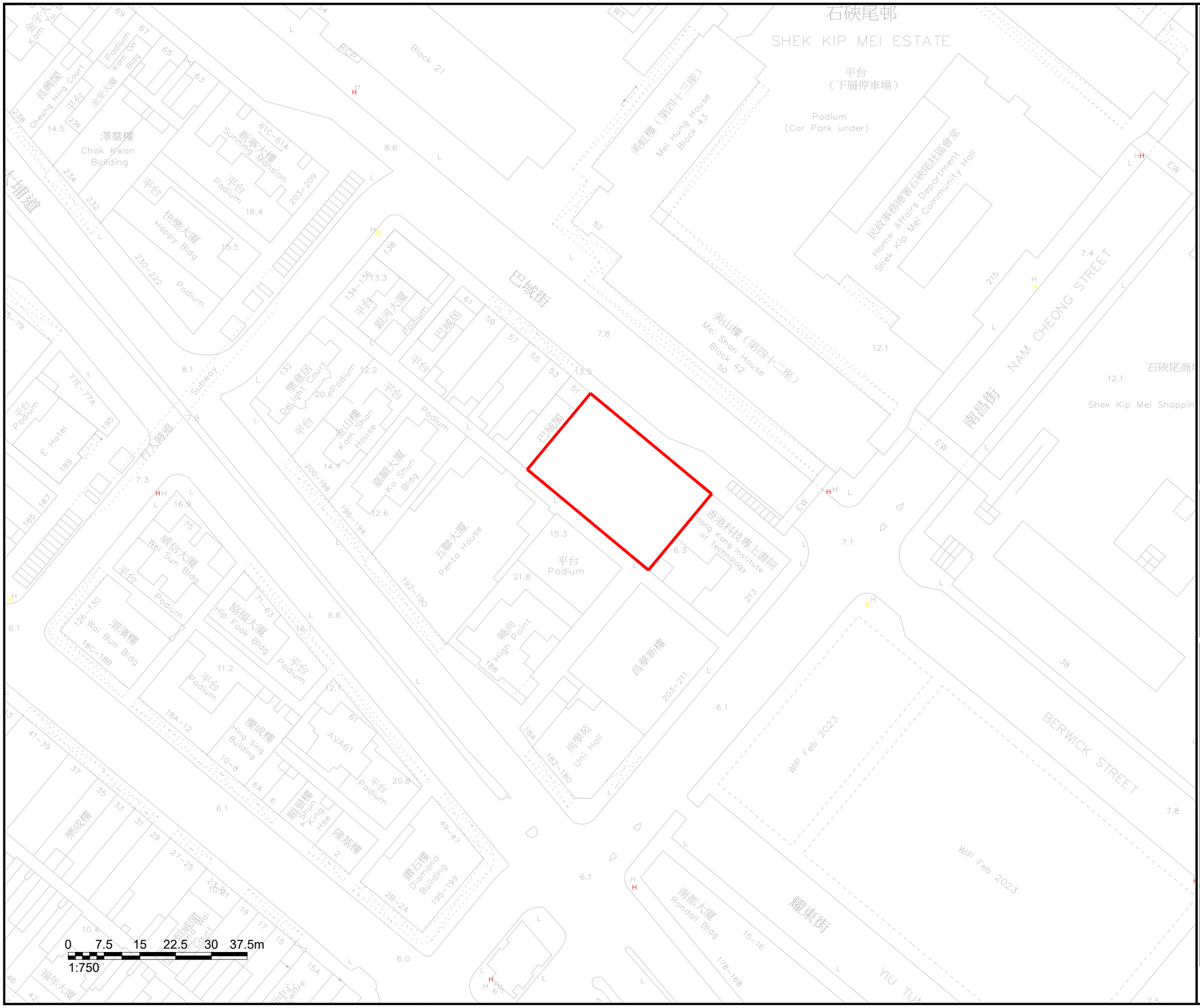
Table* 5-2 *Estimated Peak Flow Before and After Redevelopment

Catchment ID	Peak Flow (m^3/s)	
	Before Redevelopment	After Redevelopment
Subject Site	0.065	0.062

5.4.2. Results showed that the peak flow has decreased by 4.62% after completion of Proposed Redevelopment.

6. Conclusion

6.1.1. The stormwater generation associated with the Proposed Redevelopment after the completion of construction will be 4.62% lower than the existing condition. Therefore, no potential drainage impact is anticipated.



NOTES :

SUBJECT SITE

CONSULTANT

Allied Environmental Consultants Limited

PROJECT NO. :	2076EA
DRAWN BY :	MS

PROJECT :

PROPOSED REDEVELOPMENT OF
HONG KONG SHEUNG KUNG HUI
ST. THOMAS CHURCH

DRAWING TITLE :

LOCATION OF SUBJECT SITE

DRAWING NO : FIGURE 3-1	REVISION : 0
SCALE : AS SHOWN	DATE : MAY 2024

A3 420 x 297

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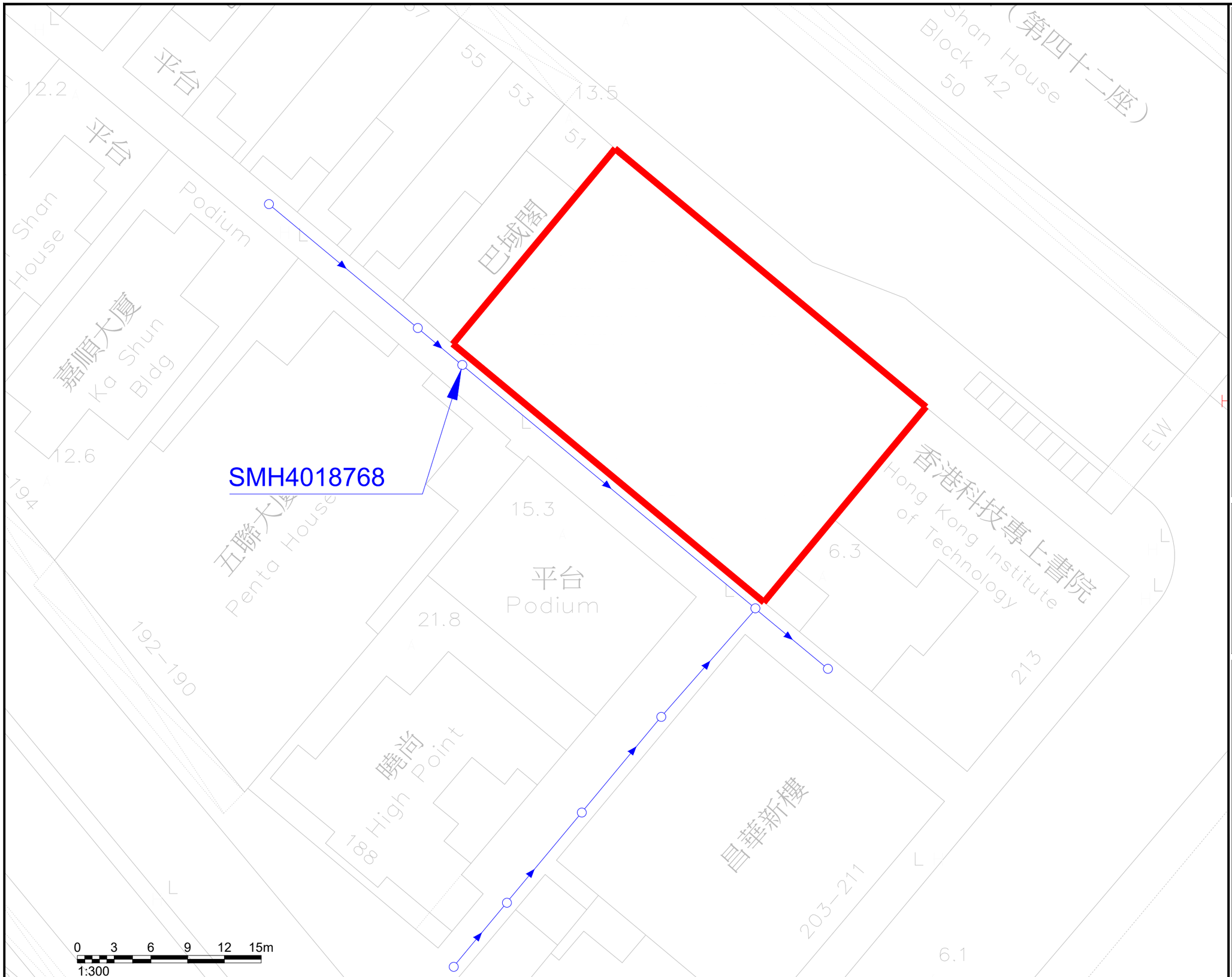

NOTES :

SUBJECT SITE

EXISTING DRAINAGE

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PROJECT NO. :	2076EA
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PROPOSED REDEVELOPMENT OF
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LOCATION OF EXISTING DRAINAGE

DRAWING NO : FIGURE 5-1	REVISION : 0
SCALE : AS SHOWN	DATE : MAY 2024

A3 420 x 297

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Appendix 5-1

Peak Flow Estimation

Table 1. Peak Runoff Estimation of Subject Site After Redevelopment

Catchment	Total Area of the Catchment (m^2)	Land Use		Topography		Average Slope, H (m per 100m)	Flow Distance, L (m)	Inlet Time, t_o (min) [1]	Flow Time, t_f (min) [2]	Duration, t_c (min) [3]	50 - year return period				Runoff Coefficient, C [6]	Rainfall Increase due to Climate Change, % [7]	Rainfall Increase for Design Allowance, % [8]	50 - year return period	
		Surface Characteristics	Area (m^2)	Inlet invert level (mPD)	Outlet invert level (mPD)						Storm Constant, a [4]	Storm Constant, b [4]	Storm Constant, c [4]	Extreme Mean Intensity, i (mm/hr) [5]				Peak Runoff, Qp (m3/s) [9]	Total Peak Runoff, Qp (m3/s) [9]
Subject Site	685.7	Concrete	638	7.7	7.1	1.97	30.45	2.00	0	2.00	505.5	3.29	0.355	279.80	0.95	16.0	12.1	0.060	0.062
		Greenery	47												0.35			0.002	

Table 2. Peak Runoff Estimation of Subject Site Before Redevelopment

Catchment	Total Area of the Catchment (m^2)	Land Use		Topography		Average Slope, H (m per 100m)	Flow Distance, L (m)	Inlet Time, t_o (min) [1]	Flow Time, t_f (min) [2]	Duration, t_c (min) [3]	50 - year return period				Runoff Coefficient, C [6]	Rainfall Increase due to Climate Change, % [7]	Rainfall Increase for Design Allowance, % [8]	50 - year return period	
		Surface Characteristics	Area (m^2)	Inlet invert level (mPD)	Outlet invert level (mPD)						Storm Constant, a [4]	Storm Constant, b [4]	Storm Constant, c [4]	Extreme Mean Intensity, i (mm/hr) [5]				Peak Runoff, Qp (m3/s) [9]	Total Peak Runoff, Qp (m3/s) [9]
Subject Site	685.7	Concrete	686	7.7	7.1	1.97	30.45	2.00	0	2.00	505.5	3.29	0.355	279.80	0.95	16.0	12.1	0.065	0.065
		Greenery	0												0.35			0.000	

Note:

[1] Brandsby William's equation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

$$t_o = \frac{0.14465L}{H^{0.2}A^{0.1}}$$

where t_o = time of concentration of a natural catchment (min.)

A = catchment area (m^2)

H = average slope (m per 100 m), measured along the line of natural flow, from the summit of the catchment to the point under consideration

L = distance (on plan) measured on the line of natural flow between the summit and the point under consideration (m)

[2] t_f is assumed to be 0 for conservative estimation.

[3] $t_c = t_o + t_f$

[4] Storm constants are referenced to Table 3a in DSD Stormwater Drainage Manual Corrigendum No. 1/2024 based on corresponding return periods.

[5] Intensity-Duration-Frequency calculation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

$$i = \frac{a}{(t_d + b)^c}$$

where i = extreme mean intensity in mm/hr,
t_d = duration in minutes ($t_d \leq 240$), and
a, b, c = storm constants given in Tables 3a, 3b, 3c and 3d.

[6] Runoff coefficient is referenced from Section 7.5.2 in DSD Stormwater Drainage Manual (Fifth Edition). For conservative estimation, coefficient of 0.35 is assumed for unpaved area while that of 0.95 for paved area.

[7] Rainfall increase precentage due to climate change (i.e. 16.0%) is referenced from Table 28 in DSD Stormwater Drainage Manual - Corrigendum No. 1/2022.

[8] Rainfall increase precentage for design allowance calculation (i.e. 12.1%) is referenced from Table 28 in DSD Stormwater Drainage Manual - Corrigendum No. 1/2022.

[9] Rational method for peak runoff estimation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

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

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