Appendix 6

Drainage Impact Assessment

Proposed Minor Relaxation of Building Height Restriction for a Permitted Residential Development in "Residential (Group) B" and "Residential (Group C) 4" Zones at 1 & 1A Kotewall Road and 64 Conduit Road, Mid-levels

Drainage Impact Assessment

(V1.0)

June 2026

Approved By 

(Project Manager: K.S. Lee)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties.

CINOTECH CONSULTANTS LIMITED

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1 INTRODUCTION

1.1 Background

1.1.1 The Project Proponents, Gainlong Limited and Honour Future Limited, has proposed a minor relaxation of the building height restriction for a permitted residential development in the "Residential (Group) B" and "Residential (Group C) 4" zones at 1 & 1A Kotewall Road and 64 Conduit Road, Mid-Levels.

1.1.2 Cinotech Consultants Limited has been commissioned by the Project Proponents to conduct a Drainage Impact Assessment (DIA) to evaluate the drainage impacts associated with the implementation of the Project and to recommend any necessary upgrades.

1.1.3 This DIA has been prepared to support the application for planning permission to the Town Planning Board (TPB) under Section 16 of the Town Planning Ordinance (Cap. 131) for the proposed residential development involving relaxation of height restrictions.

2 DESCRIPTION OF THE ENVIRONMENT

2.1 The Application Site

2.1.1 The Application Site (the Site) is located in the Mid-Levels on Hong Kong Island. It has a total site area of approximately 1,674.6 m². The location of the Proposed Development is shown in **Figure 2-1**. The Site is surrounded by sloping terrain, with residential, G/IC, and open space zones in the vicinity, which tally with the Outline Zoning Plan (OZP) as shown in **Figure 2-2**. The Site and its vicinity are not a flooding blackspot.

2.2 The Proposed Development

2.2.1 The proposed residential development comprises two residential towers. The taller block ("Tower 1") with 31 storeys and the lower block ("Tower 2") with only 3 storeys. The major development parameters are summarised in **Table 2-1**.

2.2.2 The expected population intake year of the Proposed Development is 2029.

Table 2-1 Development Parameters of the Proposed Development

Major Development Parameters	
Total Site Area	About 1,674.6m^2
Domestic Plot Ratio	5
Domestic GFA	8,373m^2
No. of Unit	46
Average Flat Size	About 182m^2
Maximum Building Height	Tower 1: Not more than +225.5mPD
	Tower 2: Not more than +144.56mPD
No. of Storeys	Tower 1: 31
	Tower 2: 3
Site Coverage	Not more than 33.3%
No. of Block	2
Private Open Space	Not less than 1m^2 per person

3 DRAINAGE IMPACT ASSESSMENT

3.1 Methodology

3.1.1 The assessment will take into account of the Proposed Development under the notional design for a complete picture and its accumulated impacts to the existing drainage system.

3.1.2 Stormwater Drainage Manual – Planning, Design and Management", fifth edition, January 2018, (hereafter called "the SDM") prepared by Drainage Services Department (DSD) provides guidelines for the design of the drainage system. "Corrigendum No. 1/2022 of the Stormwater Drainage Manual" (hereafter called "SDM Corrigendum 1/2022"), has been made by the DSD in 2022 for updating the design requirement of rainfall increase and extreme sea level rise in 21st century. "Corrigendum No. 1/2024 of the Stormwater Drainage Manual" (hereafter called "SDM Corrigendum 1/2024"), has been made by the DSD in 2024 for updating the maximum rainfall intensity.

3.1.3 This report adopts the rational method for the assessment, where the peak runoff is estimated by runoff coefficient, rainfall intensity and catchment area as stated in Section 7.5.2 of the DSD Manual.

3.1.4 The adopted runoff coefficients are referred to Section 7.5.2(b) of the DSD Manual and summarized in **Table 3-1**.

Table 3-1 Runoff Coefficients

Type of Area	Run-off Coefficient [1]
Grass	0.19
Paved/Concrete	0.90

Note:
[1] The runoff coefficients are extracted from Section 7.5.2(b) of "Stormwater Drainage Manual – Planning, Design and Management", fifth edition, January 2018.

3.1.5 According to Table 10 of the SDM, the recommended design return period based on flood levels is 50 years ("Urban Drainage Branch Systems[1]") for conservative purpose. The rainfall intensities are calculated by Intensity-Duration-Frequency (IDF) Relationship (Section 4.3.3 of SDM Corrigendum 1/2024) with storm constants of HKO Headquarters' rainfall zone (Figure 4a & Table 3a of the SDM Corrigendum 1/2024).

3.1.6 As stated in Section 6.8 of the SDM Corrigendum 1/2022, drainage provision in new development areas should consider the climate change effects up to end of 21st century. Therefore, the increase of 16.0% in rainfall and 12.1% design allowance for end of 21st century (Tables 28 & 31 of SDM Corrigendum 1/2022) is incorporated into the calculation.

3.1.7 The capacities of the public stormwater pipes are calculated by Colebrook-White Equation. All existing public stormwater pipes in the assessment are assumed to be slimed concrete pipes under poor condition for conservative assessment.

[1] This Proposed Development Scheme do not intend altern or upgrade any trunk drains, which are equal to or larger than 1.8 m in diameter according to Section 6.6.2 of the SDM. Therefore, return period of "Urban Drainage Branch Systems" has been adopted.

3.2 Stormwater Discharge from the Site and Surrounding Catchments

3.2.1 The existing stormwater system and the stormwater catchments in the vicinity are illustrated in **Figures 3-1 & 3-2**.

3.2.2 Under the existing condition, stormwater from the Site and the nearby catchments is discharged to the 1,500 mm open channel to the north of the Site via the local public stormwater pipes.

3.2.3 The peak stormwater discharge from the Site and the nearby catchments, calculated as per **Section 3.1**, is summarised in **Table 3-2**. The detailed calculations are provided in **Appendix 3-1**.

Table 3-2 Peak Stormwater Discharge from the Site and Surrounding Catchments

Catchments	Description	Total Drainage Discharge (L/s)
Site	Project Site	147.3
B1	Existing Development	282.1
B2	Existing Development	446.7
R1	Paved Road	124.5

Note:
[1] Detailed calculations are shown in **Appendix 3-1**.
[2] Assume a fully paved scenario

3.3 Capacity of Existing Downstream Stormwater Pipes

3.3.1 The capacities of the affected downstream stormwater pipe sections (PS01 & PS02) have been calculated using Colebrook-White Equation. The calculated capacities are listed in **Table 3-3** and the detailed calculation can be found in **Table A of Appendix 3-2**.

Table 3-3 Capacity of Existing Stormwater Pipes

Pipe Section	Upstream Manhole	Downstream Manhole	Full Capacity (L/s)
PS01	SMH7034822	SMH7034821	1464.3
PS02	SMH7034821	SNF7004402 (To Open Channel)	1464.3

Note:
[1] The calculation is detailed in **Appendix 3-2**.

3.3.2 A summary of the utilization of the existing downstream stormwater pipes is shown in **Table 3-4**. Detailed calculations can be found in **Table A of Appendix 3-2**. The results indicate that the existing stormwater pipes are able to cater for the expected stormwater flow. Therefore, no adverse drainage impact is anticipated.

Table 3-4 Proportion of Peak Flow to Full Capacity (Existing Pipes)

Pipe Section	Full Capacity (L/s)	Peak Flow (L/s)	Utilization (%)
PS01	1464.3	429.4	29%
PS02	1464.3	1000.6	68%

Note:
[1] The calculation is detailed in **Appendix 3-2**.

3.4 Terminal Manhole and Discharge Pipe of the Site

3.4.1 Stormwater discharge from the Site is proposed to be collected by terminal manhole T-SWMH-01 and discharged via the proposed pipe PP01, which has a diameter of 350 mm. This pipe will be connected to the existing public stormwater manhole SMH7034822, as shown in **Figure 3-3**.

3.4.2 Details of the proposed new pipe are presented in **Table 3-5** below. The exact location of the new manhole and the invert levels will be determined during detailed design. The proposed new pipe will be able to cater for the expected peak stormwater flow from the Site. Therefore, no adverse drainage impact arising from the Proposed Development is anticipated.

Table 3-5 Proportion of Peak Flow to Full Capacity (Proposed New Pipes)

Pipe Section	Upstream Manhole	Downstream Manhole	Diameter (m)	Full Capacity (L/s)	Peak Flow (L/s)	Utilization (%)
PP01	T-SWMH-01	SMH7034822	0.350	370.1	147.3	40%

Note:
[1] The calculation is detailed in **Appendix 3-2**.
[2] The proposed pipes will be either PE pipes or precast concrete pipes with PVC or equivalent lining.

4 CONCLUSION

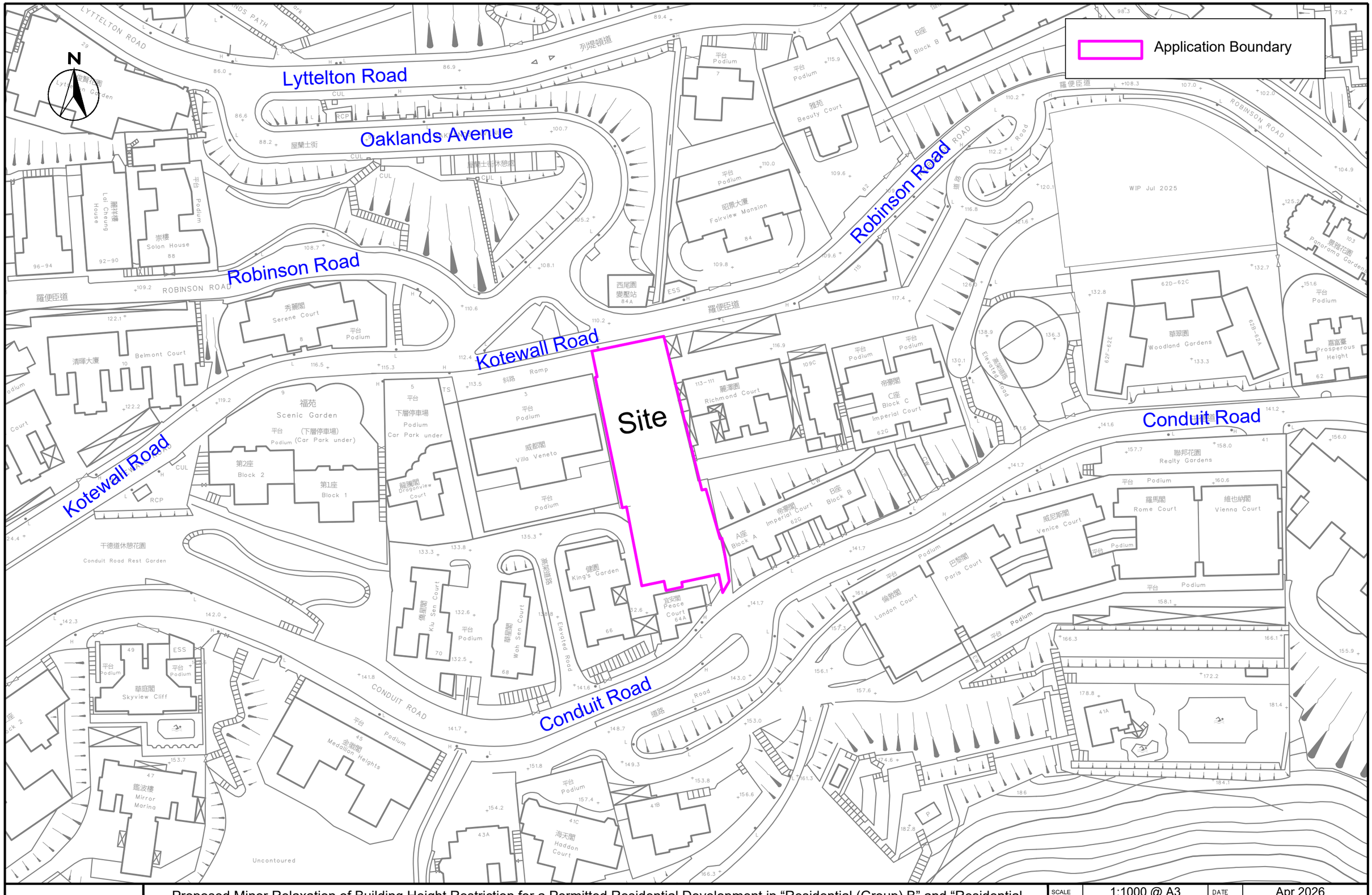
4.1.1 This Drainage Impact Assessment has been undertaken to assess the potential drainage impact of the Proposed Development and to serve as a supporting document for the S.16 Application to the Town Planning Board (TPB) for consideration.

4.1.2 The results indicate that the existing stormwater pipes are able to cater for the expected stormwater flow.

4.1.3 Stormwater discharge from the Site is proposed to be collected by terminal manhole T-SWMH-01 and discharged via the proposed pipe PP01, which has a diameter of 350 mm. This pipe will be connected to the existing public stormwater manhole SMH7034822.

4.1.4 Both the existing and proposed pipes will be able to cater for the expected peak stormwater flow. Therefore, no adverse drainage impact arising from the Proposed Development is anticipated.

FIGURES



Proposed Minor Relaxation of Building Height Restriction for a Permitted Residential Development in “Residential (Group) B” and “Residential (Group C) 4” Zones at 1 & 1A Kotewall Road and 64 Conduit Road, Mid-levels

Site Location Plan

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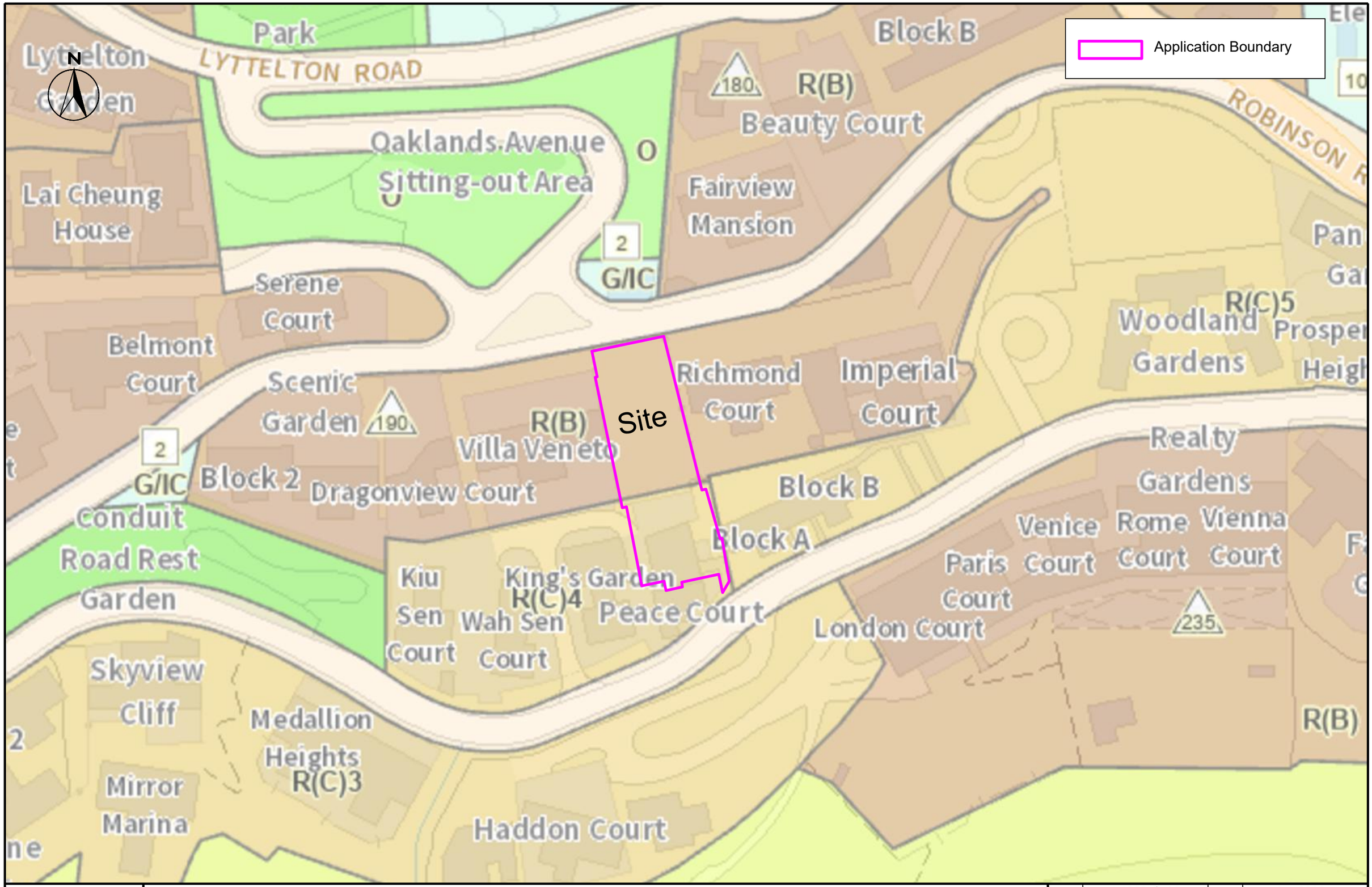

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Proposed Minor Relaxation of Building Height Restriction for a Permitted Residential Development in "Residential (Group) B" and "Residential (Group C) 4" Zones at 1 & 1A Kotewall Road and 64 Conduit Road, Mid-levels

Outline Zoning Plan

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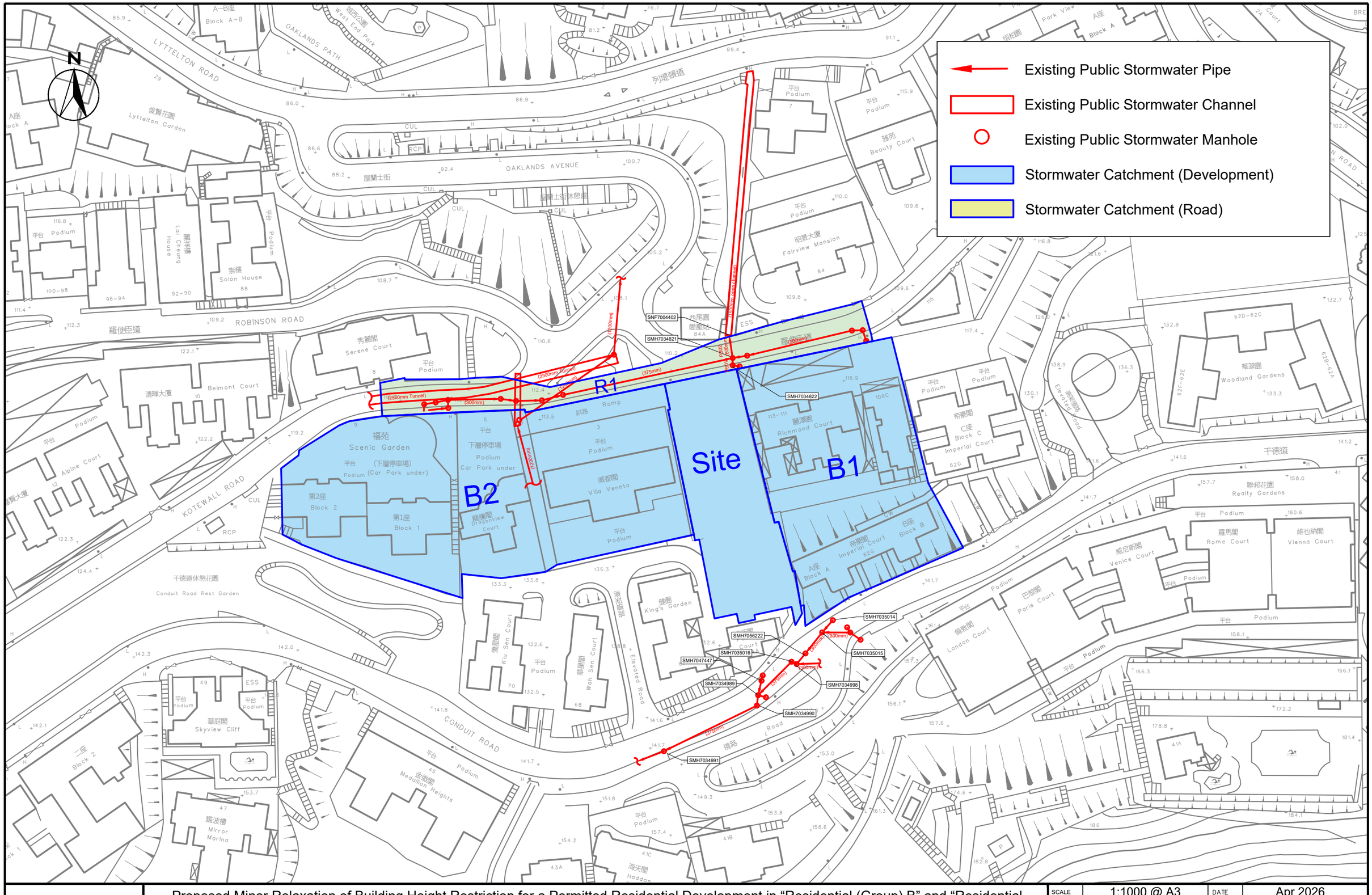

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Proposed Minor Relaxation of Building Height Restriction for a Permitted Residential Development in “Residential (Group B)” and “Residential (Group C) 4” Zones at 1 & 1A Kotewall Road and 64 Conduit Road, Mid-levels

Stormwater Catchments and Existing Public Stormwater Pipes in the Vicinity (Overview)

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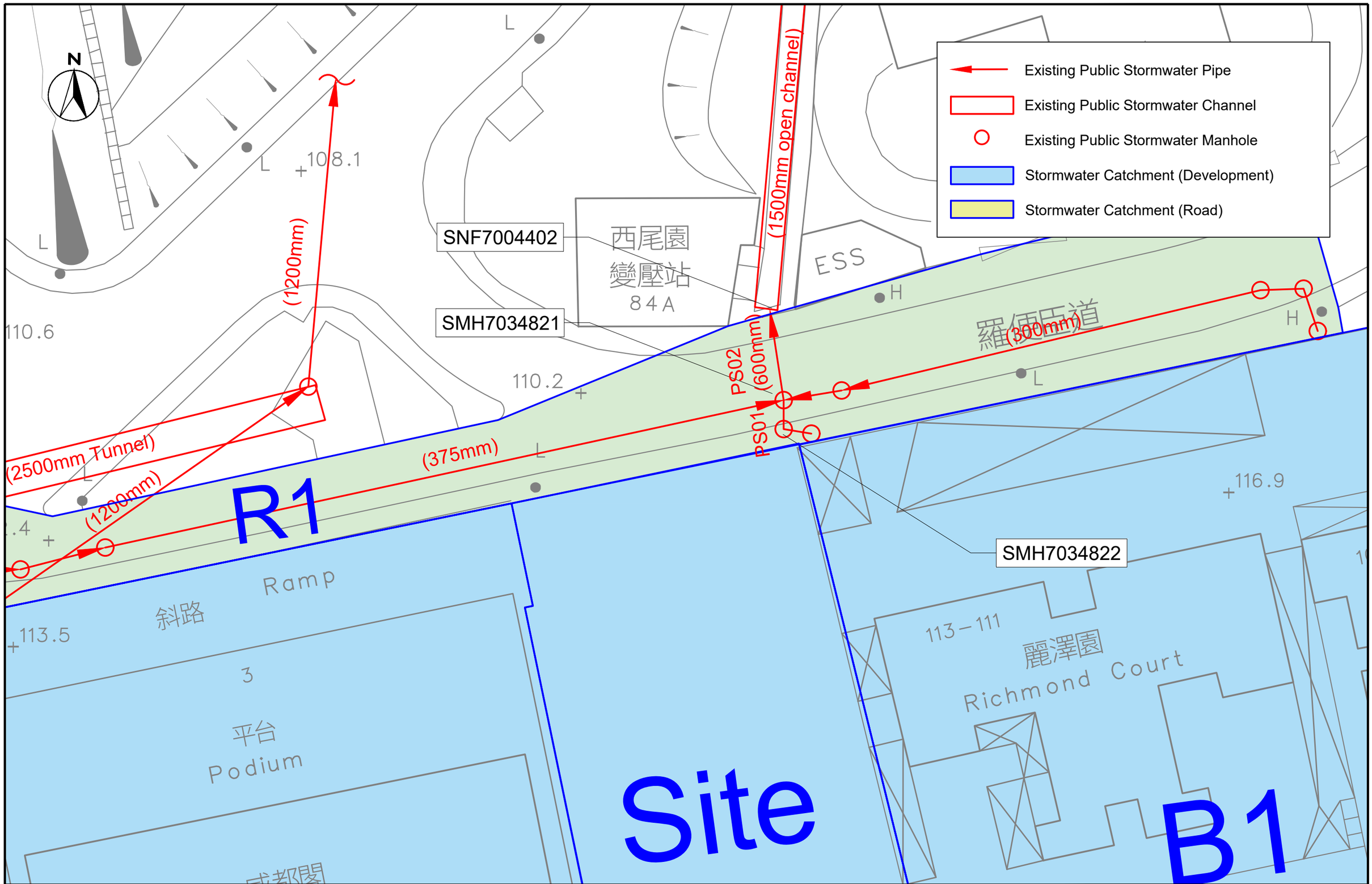

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Proposed Minor Relaxation of Building Height Restriction for a Permitted Residential Development in “Residential (Group) B” and “Residential (Group C) 4” Zones at 1 & 1A Kotewall Road and 64 Conduit Road, Mid-levels

Stormwater Catchments and Existing Public Stormwater Pipes in the Vicinity (Downstream)

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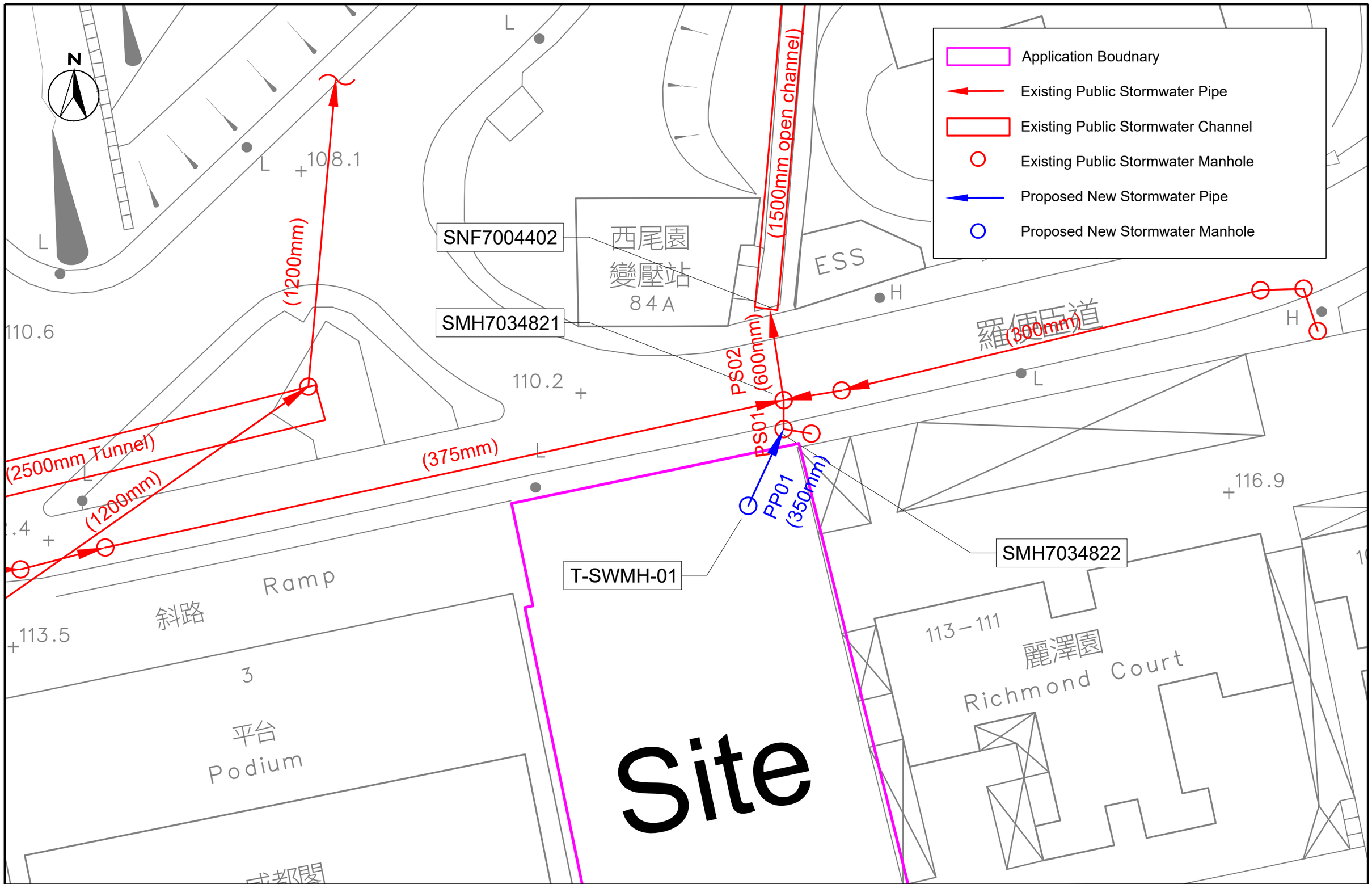

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Proposed Minor Relaxation of Building Height Restriction for a Permitted Residential Development in “Residential (Group) B” and “Residential (Group C) 4” Zones at 1 & 1A Kotewall Road and 64 Conduit Road, Mid-levels

Proposed Stormwater Pipe and Manhole

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APPENDIX 3-1
STORMWATER DISCHARGE FROM CATCHMENT ZONE

Appendix 3-1 - Stormwater Discharge from Catchment Zone

Catchment Zone	Site	B1	B2	R1
Description	Project Site	Existing Development	Existing Development	Paved Road
Catchment Area (m^2)	1675	3187	5014	1245
Slope (m per 100m)[1]	40.54	40.54	2.50	9.53
L (m)	70.0	70.0	40.0	14.0
TOC (min) [3]	2.3	2.2	2.1	0.6
Runoff intensity (mm/hr)[2]	274.4	276.2	278.0	312.1
Paved area (m^2)	1675	3187	5014	1245
Runoff coefficient (paved)	0.9	0.9	0.9	0.9
Drainage discharge (L/s)	115.0	220.2	348.7	97.2
Unpaved area (m^2)[3]	0	0	0	0
Runoff coefficient (unpaved)	0.19	0.19	0.19	0.19
Stormwater discharge (L/s)	0.0	0.0	0.0	0.0
Total Stormwater discharge (L/s)	115.0	220.2	348.7	97.2
Rainfall increased and design allowance for end of 21st century	28.1%	28.1%	28.1%	28.1%
Total Stormwater discharge with Rainfall increased (L/s)	147.3	282.1	446.7	124.5

Note:

[1] A slope of 1:40 is assumed for flat catchment area.

[2] The run-off intensity is calculated by the equation in Section 4.3.3 of the CORRIGENDUM No. 1/2024:

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

where Table 3a - Storm Constants for 50years return period of HKO Headquarters are adopted.

a = 505.5

b = 3.29

c = 0.355

[3] The time of Concentration (TOC) has been capped to 5 minutes.

APPENDIX 3-2
DETAILED CALCULATION OF PIPE UTILIZATION

Appendix 3-2 - Detailed Calculation of Pipe Utilization

Table A -Existing Pipes

Pipe No.	Upstream Manhole No.	Downstream Manhole No.	Upstream invert level (mP.D.) [3]	Downstream invert level (mP.D.) [3]	Length (m)	Diameter (m)	Area (m^2)[2]	Hydraulic Radius (m)	Slope	Kinematic Viscosity (m^2/s)	Hydraulic Pipeline Roughness (m) [1]	Velocity (m/s)	Full Capacity (L/s)	Catchment	Peak Flow (L/s)	% of full capacity
Existing Pipes																
PS01	SMH7034822	SMH7034821	107.77	107.59	2.1	0.600	0.254	0.150	0.086	1.14E-06	0.003	5.75	1464.3	Site, B1	429.4	29%
PS02	SMH7034821	SNF7004402 (To Open Channel)	107.59	107.03	6.6	0.600	0.254	0.150	0.086	1.14E-06	0.003	5.75	1464.3	Site, B1, B2, R1	1000.6	68%

Note:
[1] The roughness coefficient for slime concrete sewer under poor condition is adopted; the ks values are 3mm for velocities greater than 1.2m/s, otherwise 6mm.
[2] According to Section 9.3 of Stormwater Drainage Manual (Fifth Edition), the effect of sedimentation should be estimated by 10% reduction in flow area.
[3] Highlighted invert levels are estimated values based on results of topo survey.

Table B - Proposed New Pipe

Pipe No.	Upstream Manhole No.	Downstream Manhole No.	Upstream invert level (mP.D.)	Downstream invert level (mP.D.)	Length (m)	Diameter (m)	Area (m^2)[2]	Hydraulic Radius (m)	Slope	Kinematic Viscosity (m^2/s)	Hydraulic Pipeline Roughness (m) [1]	Velocity (m/s)	Full Capacity (L/s)	Catchment	Peak Flow (L/s)	% of full capacity
Proposed New Pipe																
PP01	T-SWMH-01	SMH7034822	108.08	107.77	6.1	0.350	0.087	0.088	0.051	1.14E-06	0.0003	4.27	370.1	Site	147.3	40%

Note:
[1] The roughness coefficient for slime uPVC sewer under poor condition is adopted; the ks values are 0.3mm for velocities greater than 1.2m/s, otherwise 1.5mm.
[2] According to Section 9.3 of Stormwater Drainage Manual (Fifth Edition), the effect of sedimentation should be estimated by 10% reduction in flow area.
[3] The details of the Proposed Pipe subject to change.