URBAN GREEN

Section 16 Application for Filling of Pond for Permitted Agricultural Use in Sub-section 1 and the Remaining Portion (Portion) of Section E of Lot No. 1212 in D.D. 115 and the Discrepant Areas (Portion) adjacent to Section E of Lot No. 1212 in D.D. 115, Nam Sang Wai, Yuen Long, New Territories

Drainage Impact Assessment Report

Reference: P159-DIA-I1
Date: 16 September 2025
Confidential

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Issue	Status	Prepared By	Date	Checked by	Date	Approved By	Date
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Contents

List of Figures

List of Tables

List of Appendices

1 Introduction

1.1 Background

The planning application is for filling a pond for permitted agricultural use in Sub-section 1 and the Remaining Portion (Portion) of Section E of Lot No. 1212 in D.D. 115 and the Discrepant Areas (Portion) adjacent to Section E of Lot No. 1212 in D.D. 115 in Nam Sang Wai, Yuen Long, New Territories (hereafter as "the Site").

The Site mainly falls within an area designated as "Other Specified Uses" annotated as "Comprehensive Development to include Wetland Restoration Area" ("OU(CDWRA)") zone with a small portion in an area designed as "Village Type Development" ("V") zone on the Approved Nam Sang Wai Outline Zoning Plan No. S/YL-NSW/11 ("NSW OZP"). According to the Notes of the NSW OZP for "OU(CDWRA)" and "V" zones, 'Agricultural Use' falls into Column 1 that is always permitted by the Board.

The Site falls within the Wetland Buffer Area ("WBA") as designated under the TPB PG-No. 12C for "Application for Developments within Deep Bay Area under Section 16 of the Town Planning Ordinance". Complying with its "No-Net-Loss in Wetland" principle, this proposed use aligns with the guideline's intention to protect the ecological integrity of the fishponds and wetlands within the sensitive Wetland Conservation Area ("WCA") through the rehabilitation of agricultural area and fishponds.

The proposed area for cultivation was previously ponds and had been formed for more than two decades. It is currently covered with vegetation. In order to reflect the current situation of the Site and to regularize the pond filling, a planning application for filling of pond is proposed.

This proposal demonstrates that the proposed agricultural use is always permitted under the NSW OZP and the filling of pond is to reflect the current condition of the Site.

Due to concerns about possible drainage impact arising from the proposed development, Urban Green Consultants Ltd. (UGC) has been commissioned to

conduct a Drainage Impact Assessment (DIA) to demonstrate the acceptability of drainage impact upon the surrounding environment.

1.2 Study Objectives

The objectives of this DIA are to assess the possible drainage impacts that may be caused by the proposed development and to recommend mitigation measures to alleviate such impacts if necessary.

1.3 Report Structure

The remaining chapters of this report are shown below:

Chapter 2 – Site Context

Chapter 3 – Drainage Analysis

Chapter 4 – Conclusion

2 Site Context

2.1 Current Site Conditions and its Environs

The Site covers a total area of about 21,828.5 m^2, including portion of Lot 1212 s.E R.P. of about 13,070 m^2., Lot 1212 s.E ss.1 of about 9.5 m^2., and a portion of Discrepant Areas (Portion) adjacent to Lot 1212 s.E of about 8,749 m^2. The Site is currently fenced off, largely paved with vegetations covering a major portion of the site and a pond situated in the northwest.

The Site is located at the far fringe of Nam Sang Wai. The surrounding environment of the Site is in rural village context intermixed with temporary uses. The Site is surrounded by Shan Pui Tsuen and Shan Pui Chung Hau Tsuen, with other low-rise residential developments. The immediate northwest of the Site is the Hong Kong School of Motoring, while to the southwest is the transitional housing project of United Court providing about 1800 units. Figure 2.1 shows the Site location and its environs.

2.2 Existing Drainage Condition

A site survey was conducted on 7 May 2025. The Site is not served by any drainage system to direct surface runoff. Part of the runoff overflows directly into the Kam Tin River.

3 Drainage Analysis

3.1 Assessment Methodology and Assumptions

This DIA has adopted the Rational Method for runoff estimation:

$$Q_p = 0.278\ i \sum C_j\ A_j$$

where
Q_p is peak runoff (m^3/s);
i is rainfall intensity (mm/hr);
A_j is the j^{th} catchment (km^2);
C_j is the runoff coefficient of the j^{th} catchment (dimensionless).

The details of the Rational Method can be referred to the *Stormwater Drainage Manual* (SDM) (DSD, 2018).

Based on a 1:50 year flood protection standard in the SDM and the estimated time of concentration, the appropriate rainfall intensities (i) were calculated based on linear interpolation of the intermediate table values.

The assumptions of this DIA are summarised below:

- Rainstorm return period – 1 in 50 years
- Runoff coefficient for flatted grassland (heavy soil) – 0.25
- Manning's roughness coefficient for the proposed U-channels – 0.016

3.2 Design Parameters

Based on the geographical characteristics of the Site and its surroundings, 3 catchments (Catchment A, B and C) were identified as shown in Figure 3.1.

Surface runoff from catchments A, B and C will be collected by a series of the proposed U-channels and discharged to the Kam Tin River via proposed U-channels M1 – M14. The drainage proposal is shown in Figure 3.2.

The surface runoff from the Site has been estimated and presented in Appendix B.

3.3 Assessment Results

Detailed calculations of the estimated on-site catchment runoffs to the proposed drainage system are provided in Appendix B. The assessment results are summarized in Table 3.1.

Table 3.1 Estimated Runoffs to Proposed Drainage System

Channel Segment	Diameter / Width, m	Depth, m	Gradient	Catchment Runoff, m3/s	Capacity, m3/s	% of capacity flow	Sufficient Capacity?
M1-M2	0.600	0.600	0.005	0.041	0.499	8%	Y
M2-M3	0.600	0.600	0.005	0.076	0.499	15%	Y
M3-M4	0.600	0.600	0.005	0.076	0.499	15%	Y
M4-M5	0.600	0.600	0.005	0.076	0.499	15%	Y
M5-M6	0.600	0.600	0.005	0.076	0.499	15%	Y
M6-M7	0.600	0.600	0.005	0.235	0.499	47%	Y
M7-M8	0.600	0.600	0.005	0.235	0.499	47%	Y
M8-M9	0.600	0.600	0.005	0.235	0.499	47%	Y
M9-M10	0.600	0.600	0.005	0.235	0.499	47%	Y
M10-M11	0.600	0.600	0.005	0.235	0.499	47%	Y

Channel Segment	Diameter / Width, m	Depth, m	Gradient	Catchment Runoff, m3/s	Capacity, m3/s	% of capacity flow	Sufficient Capacity?
M11-M12	0.600	0.600	0.005	0.235	0.499	47%	Y
M12-M13	0.600	0.600	0.005	0.235	0.499	47%	Y
M14-M13	0.600	0.600	0.005	0.159	0.499	32%	Y
M13 to Kam Tin River	0.600	0.600	0.005	0.235	0.499	47%	Y

Based on the results in Appendix B, the proposed drainage system has adequate capacity to cater the surface runoff from the proposed development.

3.4 Climate Change

Climate change projections for Hong Kong estimate the increases in rainfall intensity of 11.1% and 16.0% for the Mid-21st Century (2041-2060) and End of 21st Century (2081-2100) respectively. To assess the impact to the surface water drainage system, both uplift percentages were applied to the rainfall intensity to estimate the increased runoff and quantify any projected capacity requirement. The assessment has been included in Appendix C.

The analysis indicated that the proposed drainage system would have sufficient capacity for the additional runoff from the proposed development with a 11.1% and 16% increase in rainfall intensity due to Climate Change. Hence, the proposed development would not cause adverse drainage impacts nor increase the flooding susceptibility of the surrounding areas.

4 Conclusion

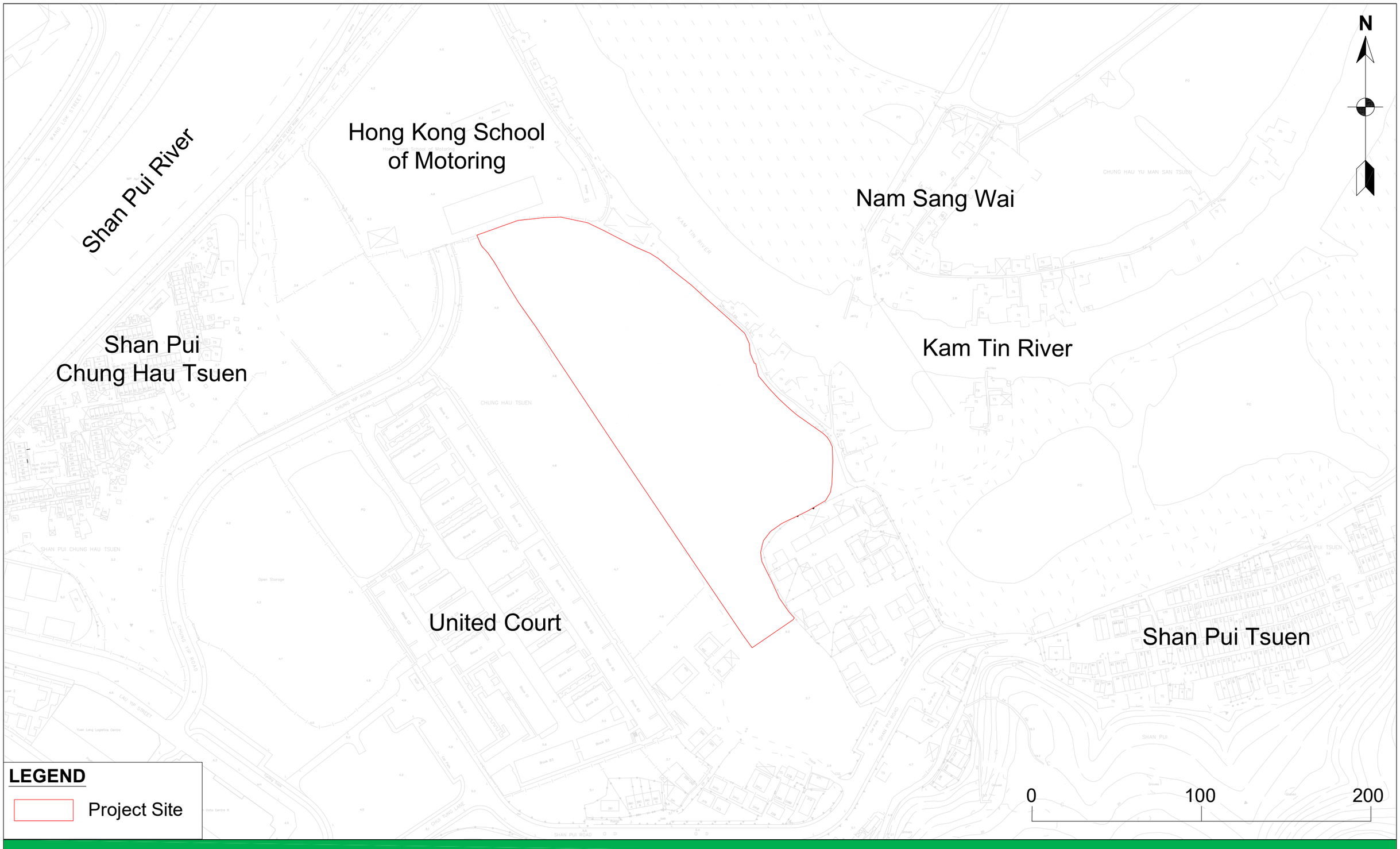
A Drainage Impact Assessment (DIA) has been conducted for the proposed development in Yuen Long, New Territories.

The peak surface runoff was calculated based on a 50-year return period, as well as projected increases in rainfall intensity attributed to both the Mid-21st Century and End of 21st Century due to climate change.

Surface runoff from the Site will be collected by a series of U-channels and discharged to the Kam Tin River. The drainage analysis has demonstrated that the proposed drainage systems have adequate capacity to cater the surface runoff from the Site.

Based on the above, it is concluded that the proposed development will not result in any adverse drainage impacts.

Figures



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Site Location and Its Environs

Figure 2.1

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Section 16 Application for Filling of Pond for Permitted Agricultural Use in Sub-section 1 and the Remaining Portion (Portion) of Section E of Lot No. 1212 in D.D. 115 and the Discrepant Areas (Portion) adjacent to Section E of Lot No. 1212 in D.D. 115, Nam Sang Wai, Yuen Long, New Territories

Identified Catchment Areas

Figure 3.1

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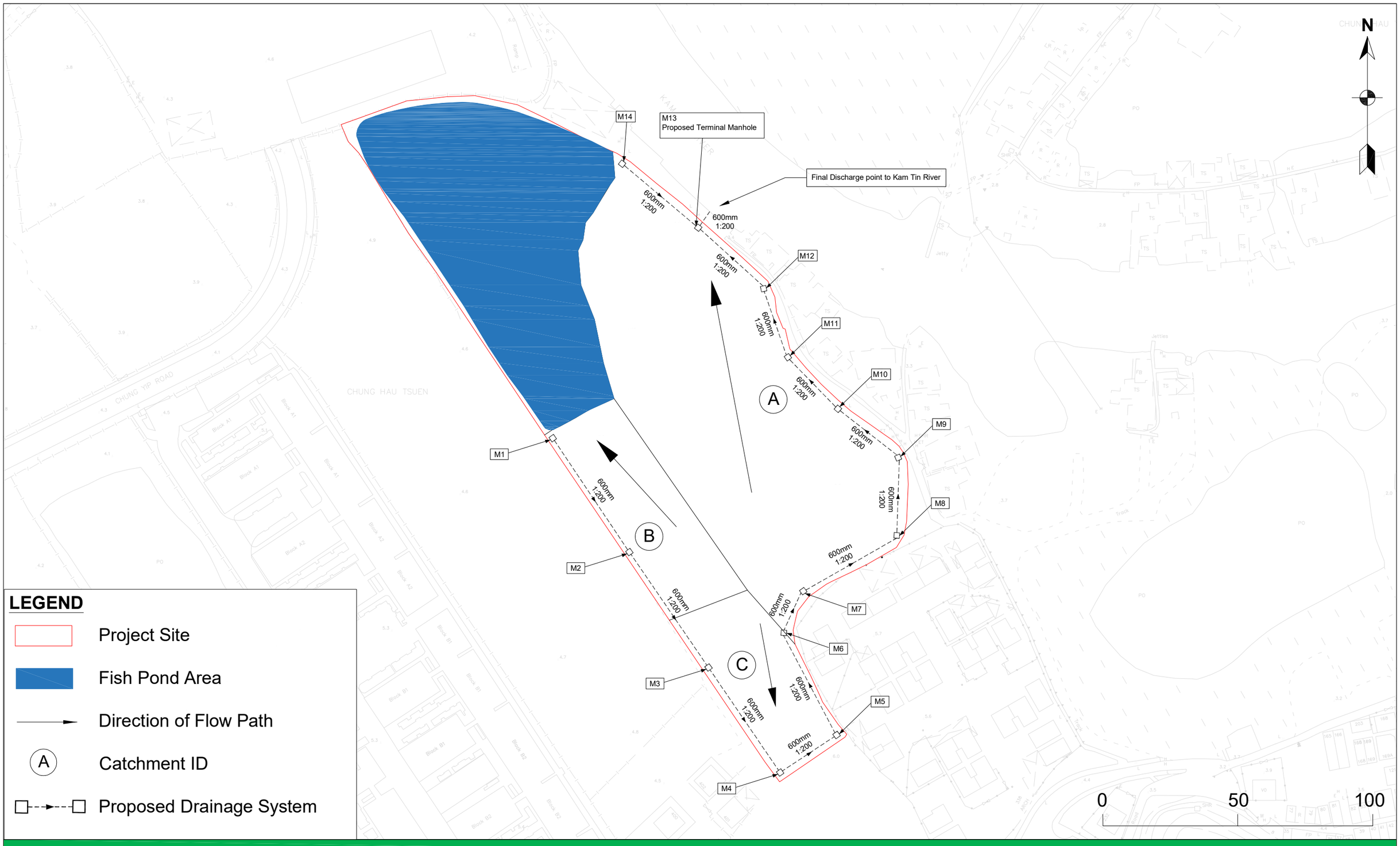

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Section 16 Application for Filling of Pond for Permitted Agricultural Use in Sub-section 1 and the Remaining Portion (Portion) of Section E of Lot No. 1212 in D.D. 115 and the Discrepant Areas (Portion) adjacent to Section E of Lot No. 1212 in D.D. 115, Nam Sang Wai, Yuen Long, New Territories

Drainage Proposal

Figure 3.2

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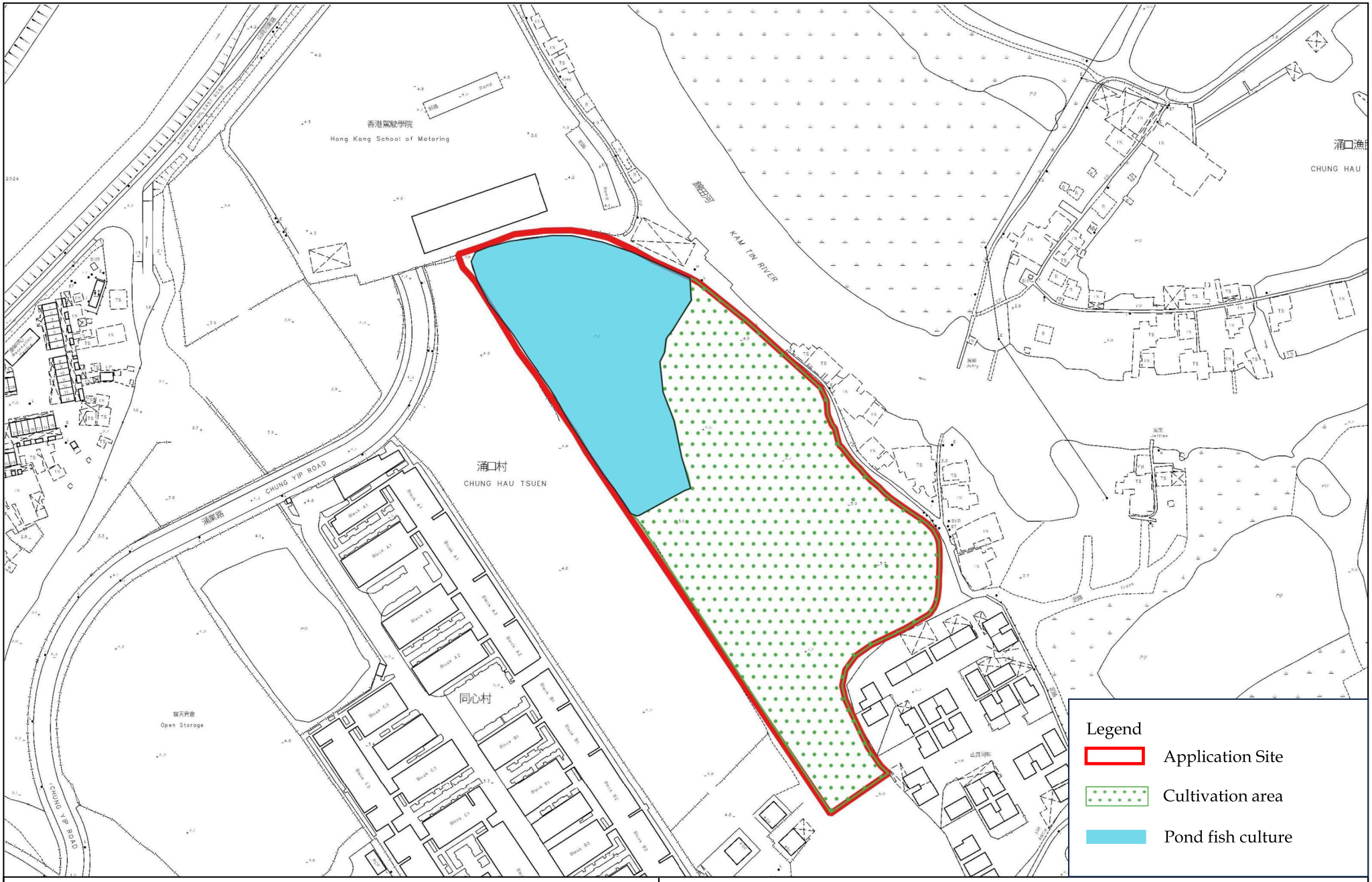
Appendix A

Proposed Layout Plan



LCH Planning and Development Consultants Limited

Figure 7 : Indicative Layout Plan

(Extracted based on Aerial Photo no. A22836 taken on 5.10.1990 by Lands Department)

Section 16 Application for Filling of Pond for Permitted Agricultural Use in Sub-section 1 and the Remaining Portion (Portion) of Section E of Lot No. 1212 in D.D. 115 and the Discrepant Areas (Portion) adjacent to Section E of Lot No. 1212 in D.D. 115, Nam Sang Wai, Yuen Long, New Territories

(Source: HK GEODATA STORE, HKSAR Government)

Appendix B

Detailed Drainage Analysis

Capacity Flow Estimation for Proposed Catchments and Drainage System with 50 Year Return Period

A.Calculation of All Catchment Runoff with Proposed Development

Catchment ID	Surface Type	Catchment Area (A), m^2	Catchment Area (A), km^2	Average Slope (H), m/100m	Flow Path Length (L), m	Inlet Time (t_0), min	Time of Concentration (t_c), min	Duration (t_d), min	a (50 year return period) [2]	b (50 year return period) [2]	c (50 year return period) [2]	Runoff Intensity mm/hr	Runoff Coefficient (C)	C x A	Peak Runoff (Q_p), m^3/s
A	100% Grassland (heavysoil), flat	10,514	0.0105	2.11	151.30	7.46	7.46	7.46	505.5	3.29	0.355	218	0.25	0.0026	0.1590
B	100% Grassland (heavysoil), flat	2,504	0.0025	2.21	94.86	5.35	5.35	5.35	505.5	3.29	0.355	235	0.25	0.0006	0.0409
C	100% Grassland (heavysoil), flat	2,053	0.0021	1.66	72.15	4.40	4.40	4.40	505.5	3.29	0.355	245	0.25	0.0005	0.0350
														Total	**0.2349**

B. Capacity Flow Estimation and Adequacy Check for Proposed Drainage System

Pipe Segement	Shape	Diameter, m	Depth, m	Slope	Length, m	Manning's Roughness Coefficient [3]	Cross Section Area, m^2	Wetted Perimeter, m	Hydraulic Radius, m	Mean Velocity, m/s	Capacity Flow, m^3/s	Catchments Served	Runoff, m^3/s [1]	% of Capacity Flow	Sufficient Capacity? (Y/N)
M1-M2	U-Channel	0.600	0.600	0.005	48.82	0.016	0.321	1.542	0.21	1.55	0.499	B	0.041	8%	Y
M2-M3	U-Channel	0.600	0.600	0.005	49.81	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.076	15%	Y
M3-M4	U-Channel	0.600	0.600	0.005	45.08	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.076	15%	Y
M4-M5	U-Channel	0.600	0.600	0.005	23.07	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.076	15%	Y
M5-M6	U-Channel	0.600	0.600	0.005	40.74	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.076	15%	Y
M6-M7	U-Channel	0.600	0.600	0.005	15.17	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.235	47%	Y
M7-M8	U-Channel	0.600	0.600	0.005	38.55	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.235	47%	Y
M8-M9	U-Channel	0.600	0.600	0.005	26.91	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.235	47%	Y
M9-M10	U-Channel	0.600	0.600	0.005	26.80	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.235	47%	Y
M10-M11	U-Channel	0.600	0.600	0.005	24.61	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.235	47%	Y
M11-M12	U-Channel	0.600	0.600	0.005	24.96	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.235	47%	Y
M12-M13	U-Channel	0.600	0.600	0.005	31.29	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.235	47%	Y
M14-M13	U-Channel	0.600	0.600	0.005	34.80	0.016	0.321	1.542	0.21	1.55	0.499	A	0.159	32%	Y
M13 to Kam Tin River	U-Channel	0.600	0.600	0.005	6.30	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.235	47%	Y

Note:
[1] Runoff is calculated in accordance with DSD's "Stormwater Drainage Manual - Planning, Design and Management" (SDM), fifth edition, January 2018..
[2] 50 years return period of HKO Headquarters is adopted in the calculation according to Stormwater Drainage Manual - Corrigendum No. 1/2024.
[3] For the proposed U-channel, value of n for concrete-lined channels under fair condition (i.e. n = 0.016) is adopted in the calculation.

Appendix C

Detailed Drainage Analysis with Climate Change Considerations

Capacity Flow Estimation for Proposed Catchments and Drainage System with 50 Year Return Period (Rainfall increased 11.1% due to climate change)

A.Calculation of All Catchment Runoff with Proposed Development

Catchment ID	Surface Type	Catchment Area (A), m^2	Catchment Area (A), km^2	Average Slope (H), m/100m	Flow Path Length (L), m	Inlet Time (t_0), min	Time of Concentration (t_c), min	Duration (t_d), min	a (50 year return period) [2]	b (50 year return period) [2]	c (50 year return period) [2]	Runoff Intensity with 11.1% Increase, mm/hr	Runoff Coefficient (C)	C x A	Peak Runoff (Q_p), m^3/s
A	100% Grassland (heavysoil), flat	10,514	0.0105	2.11	151.30	7.46	7.46	7.46	505.5	3.29	0.355	242	0.25	0.0026	0.1766
B	100% Grassland (heavysoil), flat	2,504	0.0025	2.21	94.86	5.35	5.35	5.35	505.5	3.29	0.355	261	0.25	0.0006	0.0455
C	100% Grassland (heavysoil), flat	2,053	0.0021	1.66	72.15	4.40	4.40	4.40	505.5	3.29	0.355	272	0.25	0.0005	0.0388
														Total	**0.2610**

B. Capacity Flow Estimation and Adequacy Check for Proposed Drainage System

Pipe Segement	Shape	Diameter, m	Depth, m	Slope	Length, m	Manning's Roughness Coefficient [3]	Cross Section Area, m^2	Wetted Perimeter, m	Hydraulic Radius, m	Mean Velocity, m/s	Capacity Flow, m^3/s	Catchments Served	Runoff, m^3/s [1]	% of Capacity Flow	Sufficient Capacity? (Y/N)
M1-M2	U-Channel	0.600	0.600	0.005	48.82	0.016	0.321	1.542	0.21	1.55	0.499	B	0.045	9%	Y
M2-M3	U-Channel	0.600	0.600	0.005	49.81	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.084	17%	Y
M3-M4	U-Channel	0.600	0.600	0.005	45.08	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.084	17%	Y
M4-M5	U-Channel	0.600	0.600	0.005	23.07	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.084	17%	Y
M5-M6	U-Channel	0.600	0.600	0.005	40.74	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.084	17%	Y
M6-M7	U-Channel	0.600	0.600	0.005	15.17	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.261	52%	Y
M7-M8	U-Channel	0.600	0.600	0.005	38.55	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.261	52%	Y
M8-M9	U-Channel	0.600	0.600	0.005	26.91	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.261	52%	Y
M9-M10	U-Channel	0.600	0.600	0.005	26.80	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.261	52%	Y
M10-M11	U-Channel	0.600	0.600	0.005	24.61	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.261	52%	Y
M11-M12	U-Channel	0.600	0.600	0.005	24.96	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.261	52%	Y
M12-M13	U-Channel	0.600	0.600	0.005	31.29	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.261	52%	Y
M14-M13	U-Channel	0.600	0.600	0.005	34.80	0.016	0.321	1.542	0.21	1.55	0.499	A	0.177	35%	Y
M13 to Kam Tin River	U-Channel	0.600	0.600	0.005	6.30	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.261	52%	Y

Note:
[1] Runoff is calculated in accordance with DSD's "Stormwater Drainage Manual - Planning, Design and Management" (SDM), fifth edition, January 2018..
[2] 50 years return period of HKO Headquarters is adopted in the calculation according to Stormwater Drainage Manual - Corrigendum No. 1/2024.
[3] For the proposed U-channel, value of n for concrete-lined channels under fair condition (i.e. n = 0.016) is adopted in the calculation.

Capacity Flow Estimation for Proposed Catchments and Drainage System with 50 Year Return Period (Rainfall increased by 16% due to climate change)

A.Calculation of All Catchment Runoff with Proposed Development

Catchment ID	Surface Type	Catchment Area (A), m^2	Catchment Area (A), km^2	Average Slope (H), m/100m	Flow Path Length (L), m	Inlet Time (t_0), min	Time of Concentration (t_c), min	Duration (t_d), min	a (50 year return period) [2]	b (50 year return period) [2]	c (50 year return period) [2]	Runoff Intensity with 16% Increase, mm/hr	Runoff Coefficient (C)	C x A	Peak Runoff (Q_p), m^3/s
A	100% Grassland (heavysoil), flat	10,514	0.0105	2.11	151.30	7.46	7.46	7.46	505.5	3.29	0.355	252	0.25	0.0026	0.1844
B	100% Grassland (heavysoil), flat	2,504	0.0025	2.21	94.86	5.35	5.35	5.35	505.5	3.29	0.355	273	0.25	0.0006	0.0475
C	100% Grassland (heavysoil), flat	2,053	0.0021	1.66	72.15	4.40	4.40	4.40	505.5	3.29	0.355	284	0.25	0.0005	0.0406
														Total	**0.2725**

B. Capacity Flow Estimation and Adequacy Check for Proposed Drainage System

Pipe Segement	Shape	Diameter, m	Depth, m	Slope	Length, m	Manning's Roughness Coefficient [3]	Cross Section Area, m^2	Wetted Perimeter, m	Hydraulic Radius, m	Mean Velocity, m/s	Capacity Flow, m^3/s	Catchments Served	Runoff, m^3/s [1]	% of Capacity Flow	Sufficient Capacity? (Y/N)
M1-M2	U-Channel	0.600	0.600	0.005	48.82	0.016	0.321	1.542	0.21	1.55	0.499	B	0.047	10%	Y
M2-M3	U-Channel	0.600	0.600	0.005	49.81	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.088	18%	Y
M3-M4	U-Channel	0.600	0.600	0.005	45.08	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.088	18%	Y
M4-M5	U-Channel	0.600	0.600	0.005	23.07	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.088	18%	Y
M5-M6	U-Channel	0.600	0.600	0.005	40.74	0.016	0.321	1.542	0.21	1.55	0.499	B, C	0.088	18%	Y
M6-M7	U-Channel	0.600	0.600	0.005	15.17	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.272	55%	Y
M7-M8	U-Channel	0.600	0.600	0.005	38.55	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.272	55%	Y
M8-M9	U-Channel	0.600	0.600	0.005	26.91	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.272	55%	Y
M9-M10	U-Channel	0.600	0.600	0.005	26.80	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.272	55%	Y
M10-M11	U-Channel	0.600	0.600	0.005	24.61	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.272	55%	Y
M11-M12	U-Channel	0.600	0.600	0.005	24.96	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.272	55%	Y
M12-M13	U-Channel	0.600	0.600	0.005	31.29	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.272	55%	Y
M14-M13	U-Channel	0.600	0.600	0.005	34.80	0.016	0.321	1.542	0.21	1.55	0.499	A	0.184	37%	Y
M13 to Kam Tin River	U-Channel	0.600	0.600	0.005	6.30	0.016	0.321	1.542	0.21	1.55	0.499	A, B, C	0.272	55%	Y

Note:
[1] Runoff is calculated in accordance with DSD's "Stormwater Drainage Manual - Planning, Design and Management" (SDM), fifth edition, January 2018..
[2] 50 years return period of HKO Headquarters is adopted in the calculation according to Stormwater Drainage Manual - Corrigendum No. 1/2024.
[3] For the proposed U-channel, value of n for concrete-lined channels under fair condition (i.e. n = 0.016) is adopted in the calculation.