Attachment 7 –

Drainage Impact Assessment

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

DRAINAGE IMPACT ASSESSMENT

Feb 2024

Report No: RT23042-DIA-01_v1

Submitted to:

DeSPACE (International) Limited

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Project:	PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG DRAINAGE IMPACT ASSESSMENT
Report No.:	RT23042-DIA-01_v1

Revision	Issue Date	Description	Author	Checker	Approver
0	11/01/2024	Issued for Comment	KCC	ZC	HM
1	02/02/2024	Issued for Comment	KCC	ZC	HM

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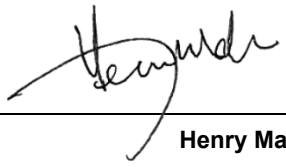
Senior Consultant

Checked by

Zoe Chan

Technical Manager

Approved by:



Henry Mak

Director

Disclaimer:

- This report is prepared and submitted by Beexergy Consulting Limited with all reasonable skill to the best of our knowledge, incorporating our Terms and Conditions and taking account of the resources devoted to it by agreement with the client.
- We disclaim any responsibility to the client and others in respect of any matters outside the project scope.
- This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

TABLE OF CONTENTS

FIGURES

APPENDICES

1 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1. The Joint Great Properties Limited (the Project Proponent) is proposed to develop a composite social welfare facility for Residential Care Home for the Elderly (RCHE) and residential institution for senior hostel at Lot Nos. 257 (Part), 258 RP (Part) and adjoining government land in D.D. 122, Ping Shan, Yuen Long (hereafter refer to the Proposed Development).

1.1.2. BeeXergy Consulting Limited (BXG) was commissioned by DeSpace (International) Limited (Project Planner) to conduct a Drainage Impact Assessment (DIA) for the Proposed Development to support the application under Section 16 of the Town Planning Ordinance. Latest architectural drawings of the Proposed Development and technical information of the Project Site were largely provided by the Project Planner and Project Architect.

1.2 PROJECT LOCATION

1.2.1. The Application Site is located at Ping Shan North in Yuen Long district, bounded by warehouses to the North, East, and South. **Figure 1.1** shows the location of the Application Site, Project Site, and its environs.

1.3 APPLICATION SITE AND PROPOSED DEVELOPMENT

1.3.1. The Application Site is approximately 3,300m^2 while the Project Site is approximately 2,114m^2 within the Application Site.

1.3.2. The Application Site is currently zoned as “Government, Institution or Community” and surrounded by “Green Belt” and “Village Type Development” under the Approved Ping Shan Outline Zoning Plan (OZP) No. S/YL-PS/20.

1.3.3. The Proposed Development is an 8-storey building consisting of senior hostel, dormitory, rehabilitation area, activity rooms, offices, kitchen, laundry, and carpark. An access road will be constructed from the Project Site and connected to Tsui Sing Road. The Master Layout Plan provided by the Project Architect is enclosed in **Appendix A**.

2 DRAINAGE IMPACT ASSESSMENT

2.1 SCOPE OF WORKS

2.1.1. The objectives of this DIA are to assess whether the Proposed Development may cause adverse impacts on drainage and flooding or not and to recommend appropriate mitigation measures to alleviate unacceptable drainage impact, if any.

2.2 SITE LOCATION AND TOPOGRAPHY

2.2.1. The Application Site is located at Ping Shan North with a hill at approximately +30.6mPD to the North West according to topography from Lands Department (LandsD). The Application Site is currently occupied by warehouses with public drainage and village drainage system nearby. The location of the existing drainage system is shown in **Appendix B**.

2.3 DRAINAGE ANALYSIS

2.3.1. Peak instantaneous runoff before and after the Proposed Development is calculated based on the Rational Method. The recommended physical parameters, including runoff coefficient (C) and storm constants (a, b, c) for different return periods, are referred to the Drainage Services Department (DSD)'s *Stormwater Drainage Manual Fifth Edition, January 2018* and *Stormwater Drainage Manual - Corrigendum No. 1/2022* (SDM).

2.3.2. The Rational Method (Equation 1) has been adopted for hydraulic analysis and the peak runoff is given by the following expression:

$$Q_p = 0.278CiA \qquad \text{(Equation 1)}$$

Where:

Q_p = peak runoff in m^3/s

C = runoff coefficient

i = rainfall intensity in mm/hr

A = catchment area in km^2

2.3.3. Rainfall intensity is calculated using the following expression (Equation 2):

$$i = \frac{a}{(t_d+b)^c} \qquad \text{(Equation 2)}$$

Where:

i = rainfall intensity in mm/hr

t_d = duration in minutes ($t_d \leq 240$)

a, b, c = storm constants given in Table 3a and Figure 3 of the SDM with return period of 50 years of the HKO Headquarters

2.3.4. For a single catchment, duration (t_d) can be assumed to be the time of concentration (t_c) which is calculated as follows (Equation 3):

$$t_c = t_0 + t_f \qquad \text{(Equation 3)}$$

Where:

t_c = time of concentration (time needed for water to flow overland from the most remote point in a catchment to its outlet)

t_0 = inlet time

t_f = flow time

2.3.5. Generally, t_0 is much smaller than t_f. As shown in Equation 2 above, t_d is the divisor. Therefore, the larger t_d will result in the smaller rain intensity (i) as well as a smaller Q_p. For the worst-case scenario (Equation 4 and Equation 5), t_0 is assumed to be negligible and so:

$$t_d = t_c = t_0 \qquad \text{(Equation 4)}$$

$$t_c = \frac{0.14465L}{H^{0.2}A^{0.1}} \qquad \text{(Equation 5)}$$

Where:

A = catchment area (m^2)

H = average slope (m per 100m), 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)

2.3.6. The capacities of the drainage pipes have been calculated using the Colebrook-White Equation (Equation 6), assuming full bore flow with no surcharge, as follows, incorporate 10% sedimentation in the calculation of drainage flow capacity in accordance with the SDM:

$$V = -\sqrt{32gRs} \times \log\left(\frac{k_s}{14.8R} + \frac{1.25v}{R\sqrt{32gRs}}\right) \qquad \text{(Equation 6)}$$

Where:

V = mean velocity (m/s)

g = gravitation acceleration (m/s^2)

R = hydraulic radius (m)

k_s = hydraulic pipeline roughness (m)

V = kinematic viscosity of fluid (m^2/s)

S = hydraulic gradient (energy loss per unit length due to friction)

2.4 CHANGES IN SURFACE CHARACTERISTICS

2.4.1. The Proposed Development is an 8-storey building consisting of senior hostel, dormitory, rehabilitation area, activity rooms, offices, kitchen, laundry, and carpark. An access road will be constructed from the Project Site and connected to Tsui Sing Road. The changes in surface characteristics of the Application Site are shown in **Figure 2.1** and summarized in **Table 2.1.**

Table 2.1 Changes in Surface Characteristics of the Application Site

Scenario of Project	Surface Characteristics (Paved)	Surface Characteristics (Unpaved)
Before Development	89%	11%
After Development	100%	0%

2.5 CHANGES IN FLOW CHARACTERISTICS

2.5.1. Before Development, the runoff from the Project Site will be discharged to the downstream Stormwater Inlet SIH1007504 via the existing village channel. In contrast, the runoff from the remaining area of the Application Site will be discharged to the downstream Box Culvert SBP1006180 via the existing U-channel SUP1009961.

2.5.2. Upon the completion of the Proposed Development, the discharge from the Project Site to the existing village channel will be terminated. The runoff from the Project Site will be collected at the Proposed Terminal Manhole PTM1 and discharged to the Proposed Terminal Manhole PTM4 via the Proposed 375mm circular pipes. The runoff from the access road will be collected by the Proposed 600mm U-channels and discharged to the Proposed Terminal Manhole PTM4. All the runoff from the Application Site will be discharged to the Box Culvert SBP1006180 via the Proposed 400mm circular pipes.

2.5.3. Part of the existing U-channel SUP1009961 is located within the Application Site. Those sections (~24m) will be reinstated with covers after the construction of the access road.

2.5.4. The locations of proposed manholes, catchpits, and their connections are shown in **Figure 2.2**.

2.6 CUMULATIVE RUNOFF

2.6.1. Before Development, the Stormwater Inlet SIH1007504 will collect the runoff from the Project Site and its associated upstream catchments, while the Box Culvert SBP1006180 will collect the runoff from the remaining area of the Application Site and its associated upstream catchments.

2.6.2. After Development, the Stormwater Inlet SIH1007504 will no longer collect the runoff from the Project Site. All the runoff from the Application Site will be collected by Box Culvert SBP1006180. The changes in cumulative runoff at the Box Culvert SBP1006180 are summarized in **Table 2.2** and the location of catchments after Development is shown in **Figure 2.3**.

Table 2.2 Changes of Cumulative Runoff at Box Culvert SBP1006180

Catchment	Before Development*		After Development	
	Unpaved Area	Paved Area	Unpaved Area	Paved Area
Catchment S1	-	-	0m^2	2,114m^2
Catchment S2	20m^2	245m^2	0m^2	265m^2
Catchment S3	148m^2	197m^2	0m^2	345m^2
Catchment S4	56m^2	119m^2	0m^2	175m^2
Catchment S5	16m^2	214m^2	0m^2	230m^2
Catchment S6	122m^2	49m^2	0m^2	171m^2
Catchment A1	3,274m^2	446m^2	3,274m^2	446m^2
Catchment A2	2,828m^2	253m^2	2,828m^2	253m^2
Catchment A3	1,854m^2	361m^2	1,854m^2	361m^2
Catchment A4	974 m^2	305m^2	974m^2	305m^2
Catchment A5	125 m^2	225m^2	125m^2	225m^2
Catchment B	2,499m^2	8,274m^2	2,499m^2	8,274m^2
Catchment C	23,853m^2	15,231m^2	23,853m^2	15,231m^2
Catchment D	3,638m^2	7,411m^2	3,638m^2	7,411m^2

*Note: The runoff from Catchment S1 will be discharged to Stormwater Inlet Stormwater Inlet SIH1007504 via the existing village channel before Development.

2.7 ESTIMATED EXISTING AND FUTURE RUNOFF

Peak Runoff to Box Culvert SBP1006180

2.7.1. Based on the changes of cumulative runoff shown in **Table 2.2**, the runoff at the Box Culvert SBP1006180 before and after the development was estimated based on the return periods of 50 years.

2.7.2. As shown in **Table 2.3** below, the estimated peak runoff discharged to the Box Culvert SBP1006180 before and after Development will be 2.551m^3/s and 2.727m^3/s respectively. There will be approximately 1.07 times increase in estimated peak runoff under the assessed return periods of 50 years. The detailed calculations of runoff discharge to Box Culvert SBP1006180 are provided in **Appendix C**.

Table 2.3 Estimated peak runoff discharge to Box Culvert SBP1006180

Return Period	Estimated Peak Runoff		
	Before Development	After Development	% of Changes
50 Years	2.551m^3/s	2.727m^3/s	107%

*Note: The runoff from Catchment S1 will be discharged to Stormwater Inlet SIH1007504 via the existing village channel before Development.

Assessment of Drainage Capacity

2.7.3. As mentioned in **Section 2.5.2**, the runoff from the Project Site (Catchment S1) will be collected at the Proposed Terminal Manhole PTM1 and discharged to the Proposed Terminal Manhole PTM4 via the Proposed 375mm circular pipes. The runoff from the access road (Catchments S2 to S6) will be collected by the Proposed 600mm U-channels and discharged to the Proposed Terminal Manhole PTM4. All the runoff from the Application Site (Catchment S) will be discharged to the Box Culvert SBP1006180 via the Proposed 400mm circular pipes.

2.7.4. Calculation of drainage capacity of the runoff from the Project Site (Catchment S1) is provided in **Appendix D**.

2.7.5. Calculation of drainage capacity of the runoff from the access road (Catchments S2 to S6) and its associated upstream catchments (Catchments A1 to A5) is provided in **Appendix E**.

2.7.6. Calculation of drainage capacity of all runoff from the Application Site (Catchment S) and its associated upstream and downstream catchments (Catchments A, B, C, and D) is provided in **Appendix F**.

2.7.7. The results presented in **Appendices D**, **E**, and **F** suggested that the estimated peak runoff will not higher than 70% capacity of the drainage systems, and it is anticipated that the proposed drainage system will have sufficient capacity to cater to the surface runoff from the Proposed Development.

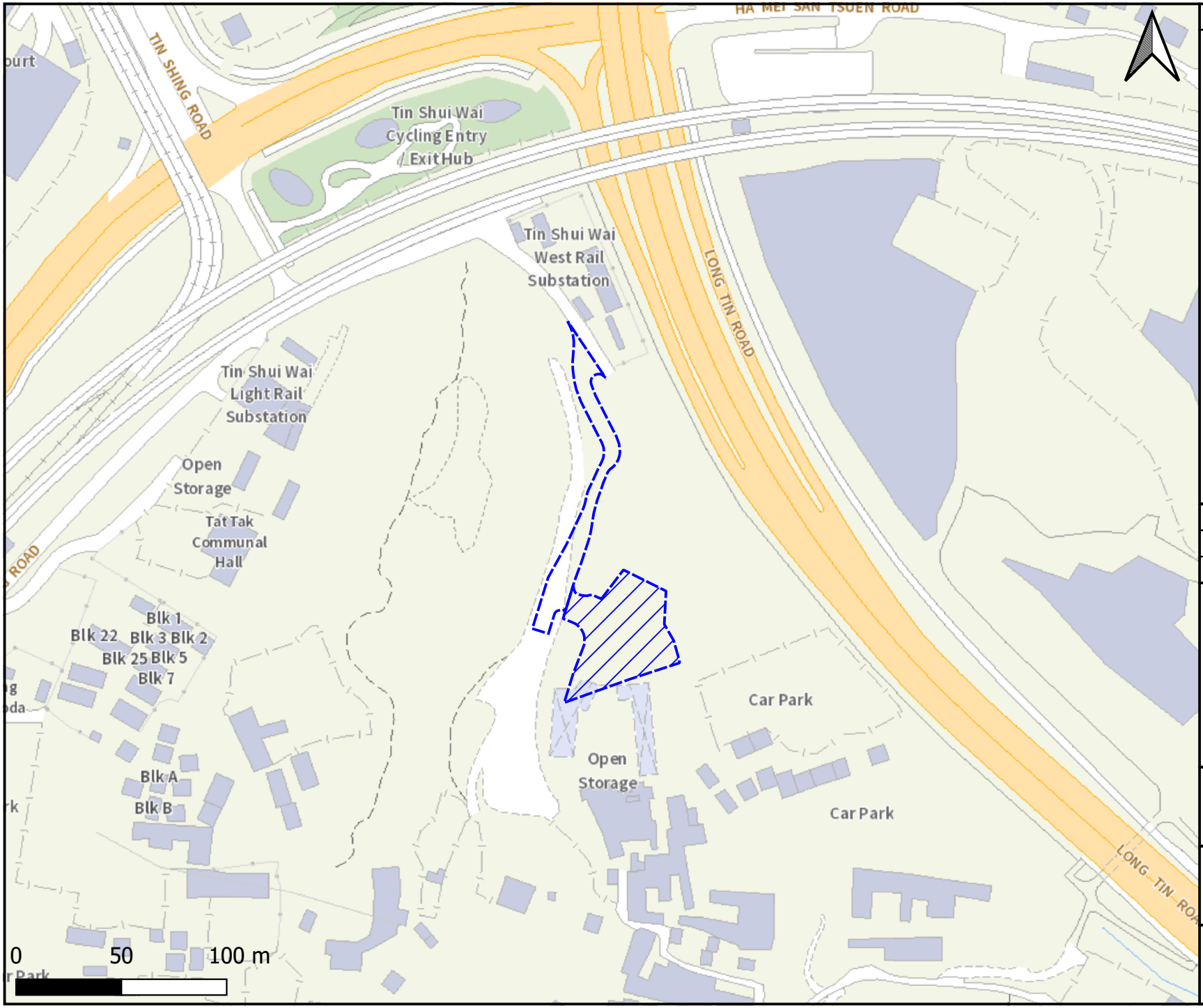
2.7.8. Given the runoff from the Application Site will no longer discharge via U-channel SUP1009961 and the existing village channel after Development, no additional runoff will be contributed to the U-channel SUP1009961 and the existing village channel, and adverse drainage impact is not anticipated.

3 CONCLUSION

3.1.1. The Project Proponent is proposed to develop a composite social welfare facility for Residential Care Home for the Elderly (RCHE) and residential institution for senior hostel at Lot Nos. 257 (Part), 258 RP (Part) and adjoining government land in D.D. 122, Ping Shan, Yuen Long.

3.1.2. Based on this DIA results, it is found that the proposed and existing drainage system serving the area has sufficient capacity to cater for the drainage generation from the Proposed Development and the surrounding catchment areas. Adverse drainage impact is not anticipated, and thus no upgrading or improvement works for existing drainage system are required.

FIGURE 1.1
LOCATION OF APPLICATION SITE, PROJECT SITE AND ITS ENVIRONS



Legend

- Application Site
- Project Site

	Prepared	Checked	Approved
Initial	KCC	ZC	HM
Date	240111	240111	240111

Project Title

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

Figure Title

Location of Application Site, Project Site and its environs

Figure No.	**Rev.**
Figure 1.1	0

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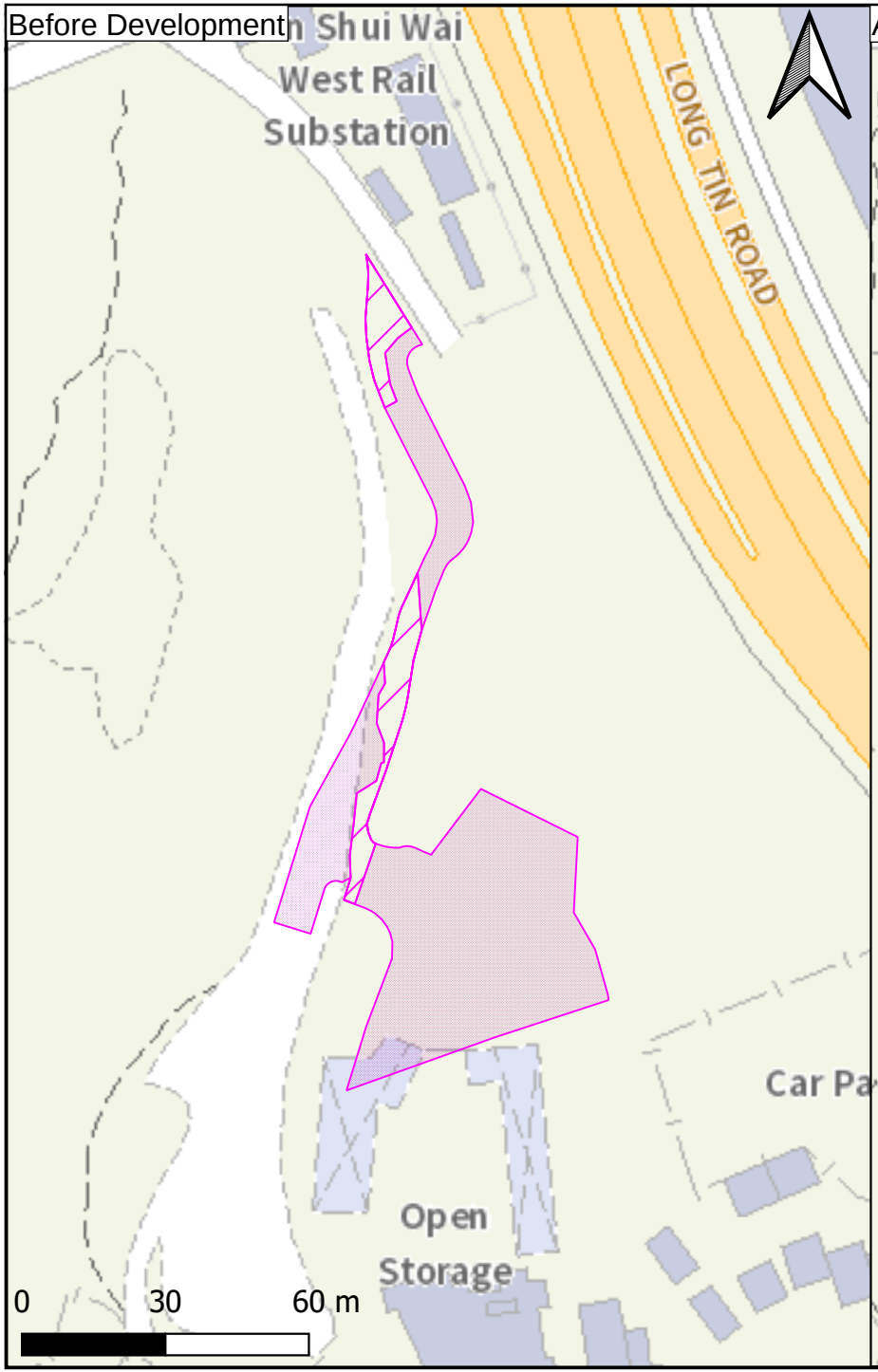
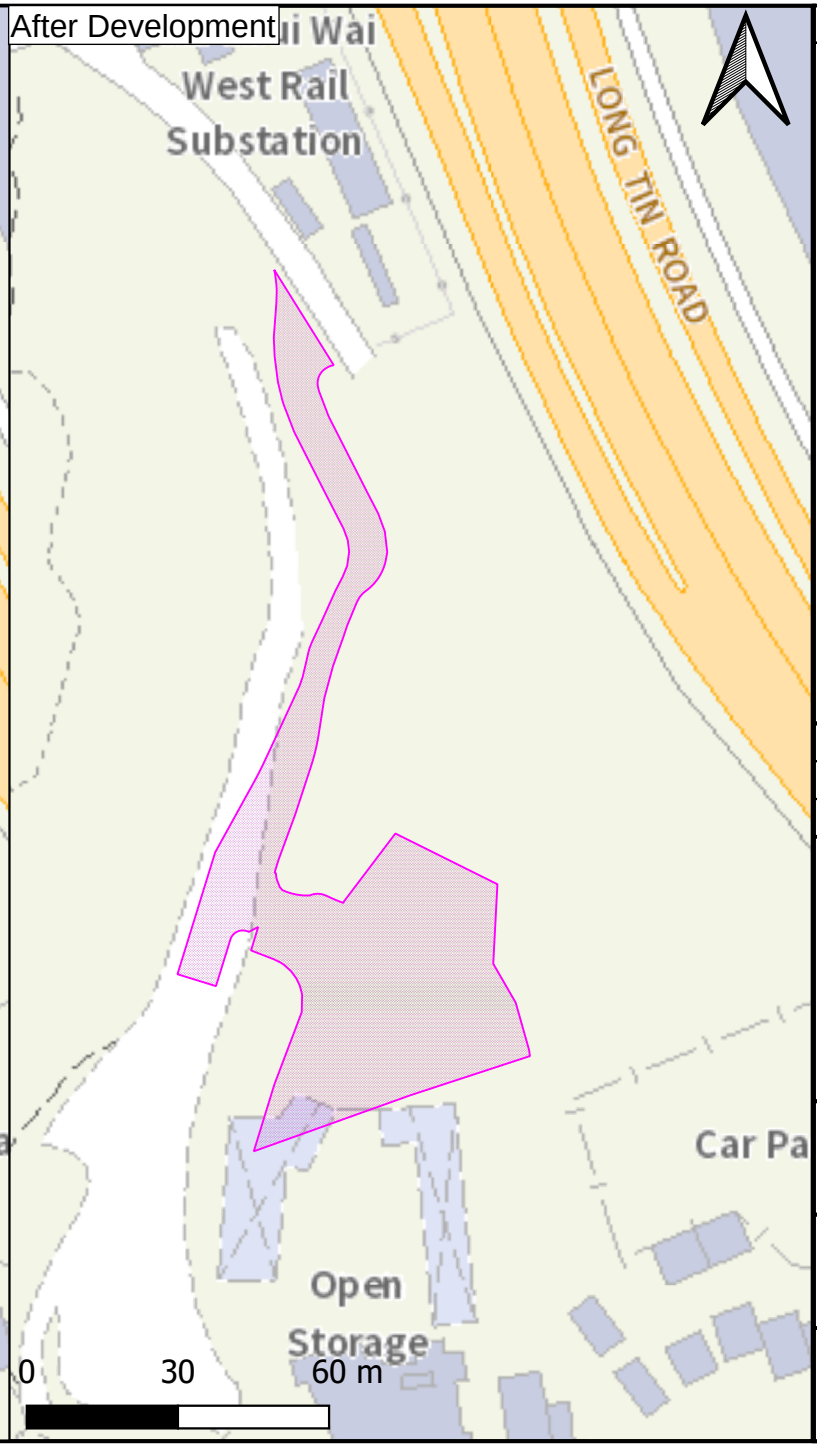
FIGURE 2.1
SURFACE CHARACTERISTICS OF THE APPLICATION SITE





Legend

- Paved Area
- Unpaved Area

	Prepared	Checked	Approved
Initial	KCC	ZC	HM
Date	240110	240110	240110

Project Title

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

Figure Title

Surface Characteristics of the Application Site

Figure No.	**Rev.**
Figure 2.1	0

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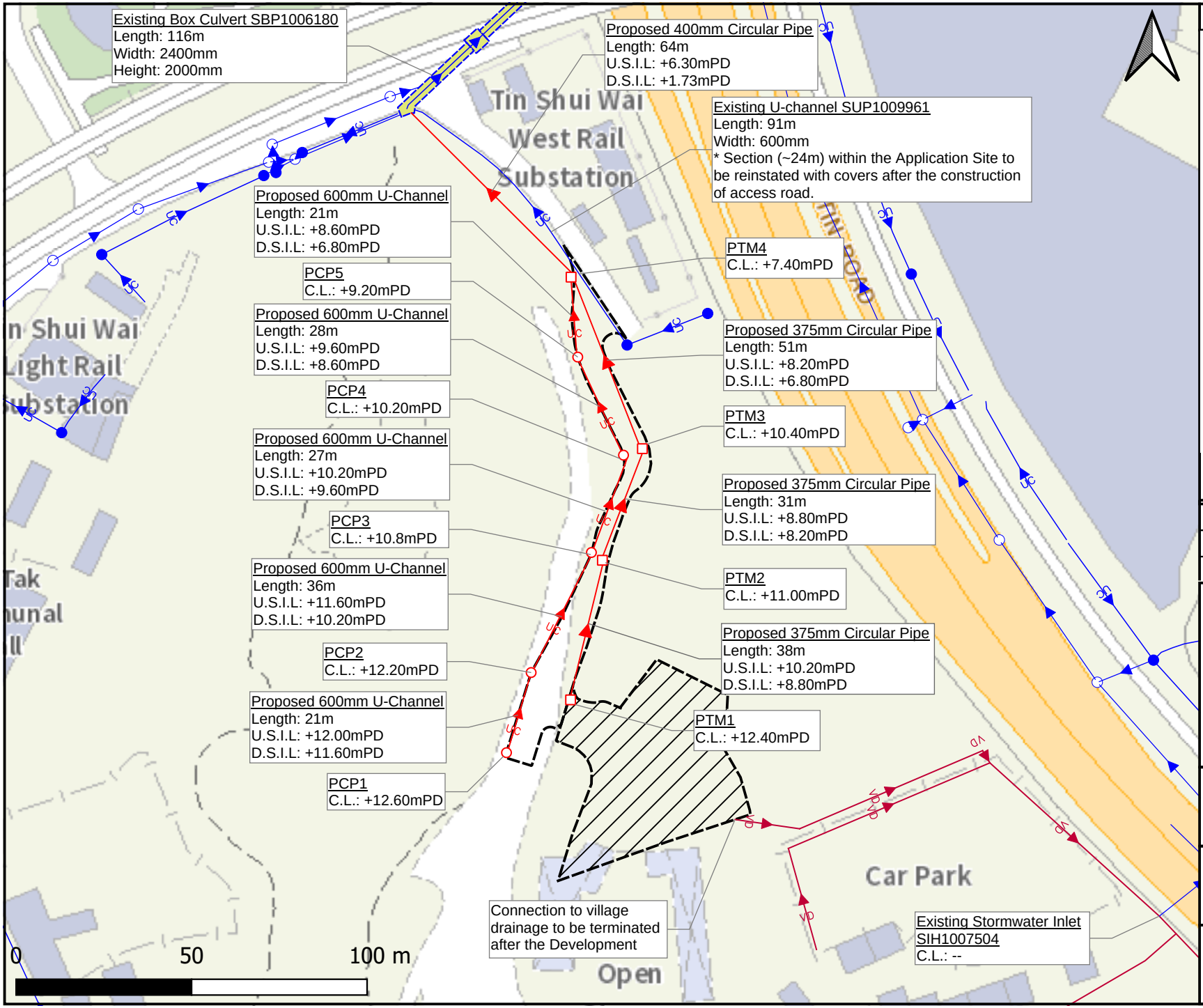
FIGURE 2.2

PROPOSED MANHOLES, CATCHPITS AND ITS CONNECTIONS



Legend

- Application Site
- Project Site
- Catchpit
- Box Culvert
- Stormwater Pipe
- Stormwater Manhole
- U-Channel
- Village Drainage
- Proposed Manhole/Catchpit
- Proposed 375mm Circular Pipe
- Proposed 375mm U-channel

	Prepared	Checked	Approved
Initial	KCC	ZC	HM
Date	240202	240202	240202

Project Title

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

Figure Title

Proposed Manholes, Catchpits, and their Connections

Figure No.	Rev.
Figure 2.2	1

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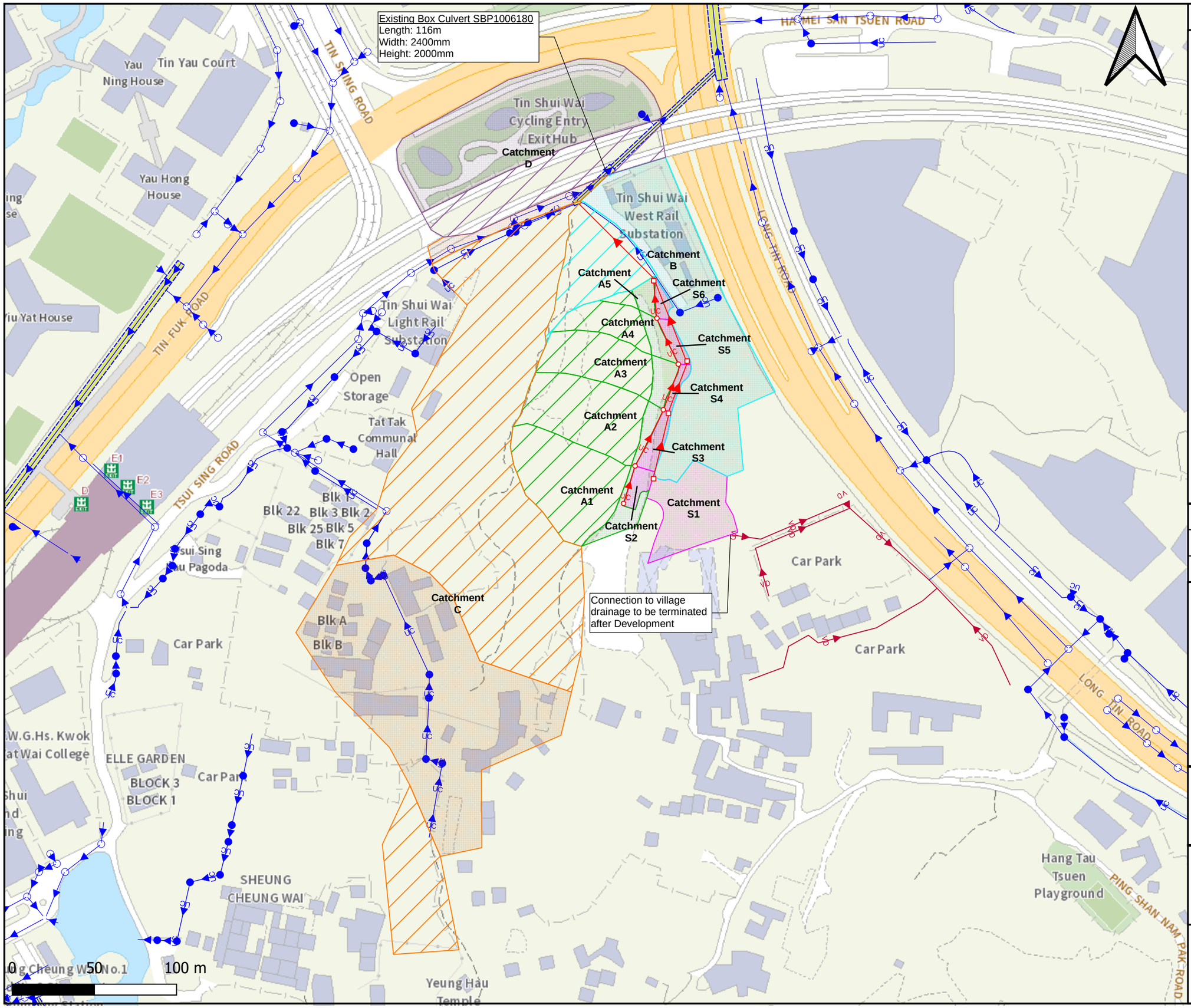
FIGURE 2.3
LOCATION OF CATCHMENTS



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Legend

- Catchpit
- Box Culvert
- Stormwater Pipe
- Stormwater Manhole
- U-Channel
- Village Drainage
- Proposed Manhole/Catchpit
- Proposed 375mm Circular Pipe
- Proposed 375mm U-channel
- Catchment S (Paved)
- Catchment A (Paved)
- Catchment A (Unpaved)
- Catchment B (Paved)
- Catchment B (Unpaved)
- Catchment C (Paved)
- Catchment C (Unpaved)
- Catchment D (Paved)
- Catchment D (Unpaved)

	Prepared	Checked	Approved
Initial	KCC	ZC	HM
Date	240111	240111	240111

Project Title

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

Figure Title

Location of Catchments

Figure No.	Rev.
Figure 2.3	0

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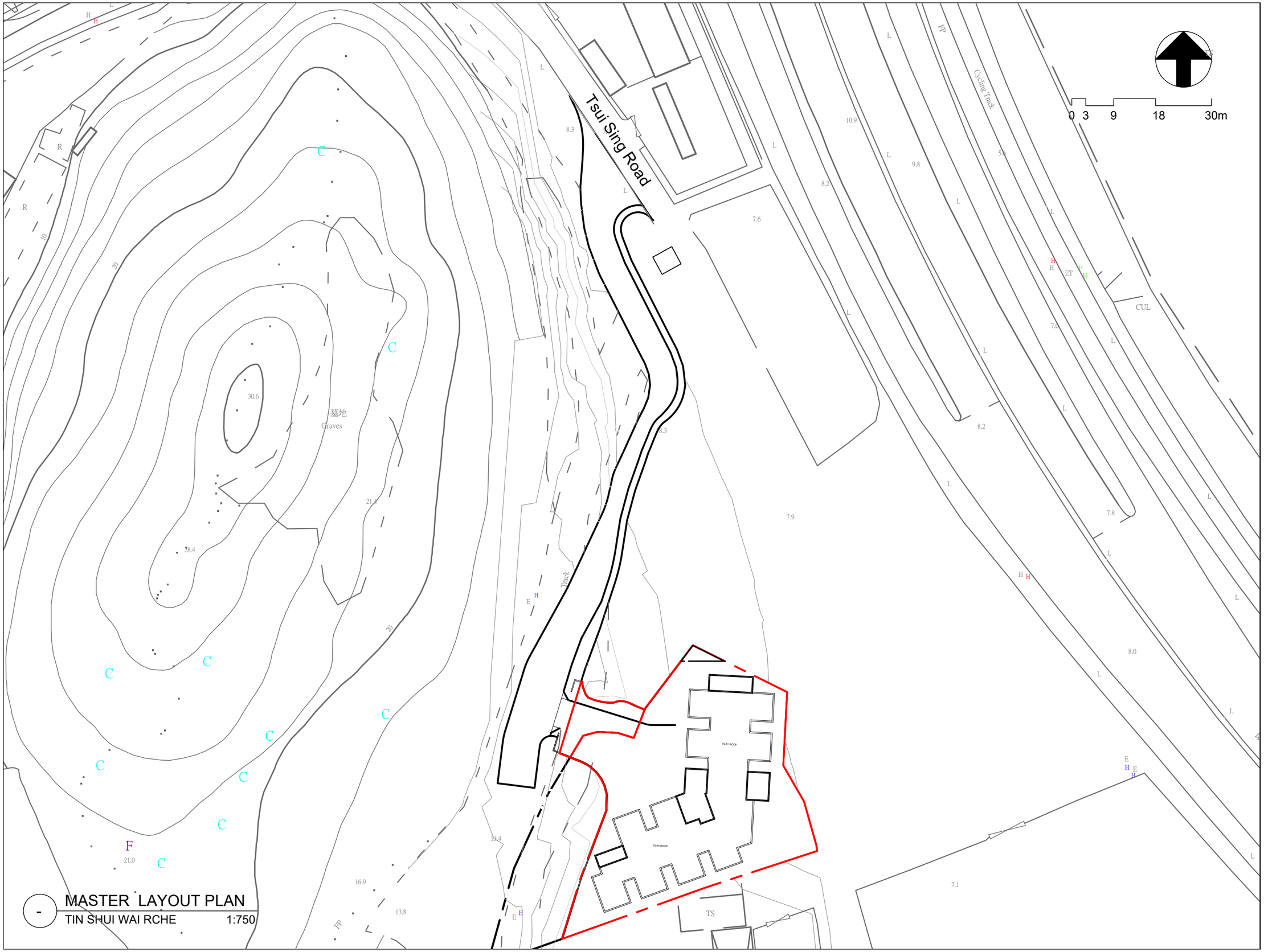
APPENDIX A
MASTER LAYOUT PLAN



- MASTER LAYOUT PLAN
TIN SHUI WAI RCHE 1:750

PROJECT NO. 項目編號 : HK-A22001

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不可縮放圖紙；如有標示尺寸，須以標示尺寸為準。
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除有批核外，此圖不可作為施工用。

AMENDMENT PARTICULARS
更改細節 :

Revision 修正版	Description 內容	Date 日期
A	DESIGN	20220317
B	DESIGN	20220320
C	DESIGN	20220402
D	DESIGN	20220406
E	SUBMISSION	20221012
F	DESIGN	20230702
G	DESIGN	20230720
H	DESIGN	20230809
I	DESIGN	20230818

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PROJECT NAME
項目名稱 :

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

DRAWING TITLE
圖紙名稱 :

MASTER LAYOUT PLAN

DESIGN IN CHARGE
設計負責人 :
KL

DWG NO.
圖紙編號 :
P-000

SCALE
比例 : 1:750@A3

DATE
日期 : 20230818

GFA of CARPARK = 1468.5sq.m.

0 1 6 10m

- B/F LAYOUT PLAN
TIN SHUI WAI RCHE 1:250

PROJECT NO. 項目編號 : HK-A22001

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所有於圖紙上標示的尺寸，須於現場覆核和修正。如在地盤發現有任何與圖紙不符之處，須盡快通知設計師。

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除有批核外，此圖不可作為施工用。

AMENDMENT PARTICULARS
更改細節 :

Revision 修正版	Description 內容	Date 日期
A	DESIGN	20220317
B	DESIGN	20220320
C	DESIGN	20220402
D	DESIGN	20220406
E	SUBMISSION	20221012
F	DESIGN	20230702
G	DESIGN	20230720
H	DESIGN	20230809
I	DESIGN	20230818

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PROJECT NAME
項目名稱 :

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

DRAWING TITLE
圖紙名稱 :

B/F LAYOUT PLAN

DESIGN IN CHARGE
設計負責人 :
KL

DWG NO.
圖紙編號 :
P-100

SCALE
比例 : 1:250@A3

DATE
日期 : 20230818

No. of FLATS IN SENIOR HOUSING = 9
GFA of SENIOR HOSUING = 480.9 sq.m.
GFA of G/F for RCHE = 424.0 sq.m.
GFA of CARPARK = 196.2 sq.m.

0 1 6 10m

RS & MRC
STORE FOR REHAB.
FS CTR.
TX ROOM
MAIN SWITCH ROOM
REHABILITATION AREA
TO BASEMENT
+12.40
RECEPTION
DROP OFF AREA
LOBBY
SMALL GROUP ACTIVITY ROOM
SEATING AREA
LIGHT BUS 3m X 9m
L/UL 3.5m X7m
LOBBY
FLAT 1
FLAT 2
FLAT 3
FLAT 4
FLAT 5
FLAT 6
FLAT 7
FLAT 8
FLAT 9
GARDEN
BOUNDARY OF OZP (GIC ZONE)
13.4
E
H
TS

G/F LAYOUT PLAN
TIN SHUI WAI RCHE 1:250

PROJECT NO. 項目編號 : HK-A22001

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除有批核外，此圖不可作為施工用。

AMENDMENT PARTICULARS
更改細節 :

Revision 修正版	Description 內容	Date 日期
A	DESIGN	20221221
B	DESIGN	20230702
C	DESIGN	20230809
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TOWN PLANNER & SURVEYOR
城市規劃師及測量師 :
DeSPACE (International) Limited
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Tel 電話 : 2493 3626

ARCHITECT 建築師 :
MINOR 細 CREATIVE 作室
E-mail 電郵 : info@minorcreative.com

PROJECT NAME
項目名稱 :

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

DRAWING TITLE
圖紙名稱 :

G/F LAYOUT PLAN

DESIGN IN CHARGE
設計負責人 : KL

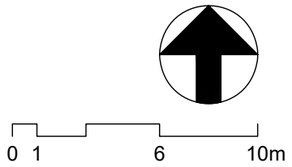
DWG NO.
圖紙編號 : P-101

SCALE
比例 : 1:250@A3

DATE
日期 : 20230809

No. of Beds = 60

GFA of 1/F for RCHE = 1002.8 sq.m.



- 1/F LAYOUT PLAN

TIN SHUI WAI RCHE 1:250

PROJECT NO. 項目編號： HK-A22001

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DRAWING TITLE
圖紙名稱：

1/F LAYOUT PLAN

DESIGN IN CHARGE
設計負責人：
KL

DWG NO.
圖紙編號：
P-102

SCALE
比例： 1:250@A3

DATE
日期： 20230809

No. of Beds = 68

Total No. of Beds = 340

GFA of 2/F-6/F for RCHE = 1002.8 sq.m.

0 1 6 10m

- 2/F-6/F LAYOUT PLAN

TIN SHUI WAI RCHE 1:250

PROJECT NO. 項目編號 : HK-A22001

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DRAWING TITLE 圖紙名稱 :

2/F-6/F LAYOUT PLAN

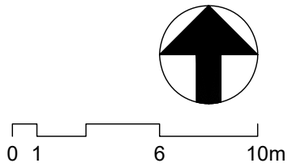
DESIGN IN CHARGE 設計負責人 : KL

DWG NO. 圖紙編號 : P-103

SCALE 比例 : 1:250@A3

DATE 日期 : 20230818

GFA of 7/F for RCHE = 1002.8 sq.m.



- 7/F LAYOUT PLAN
TIN SHUI WAI RCHE 1:250

PROJECT NO.
項目編號： HK-A22001

- Do not scale drawings: figured dimensions are to be taken in preference.
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DRAWING TITLE
圖紙名稱：

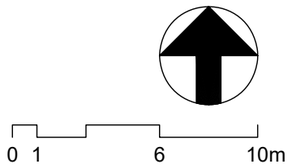
7/F LAYOUT PLAN

DESIGN IN CHARGE
設計負責人：
KL

DWG NO.
圖紙編號：
P-104

SCALE
比例： 1:250@A3

DATE
日期： 20230718



- R/F LAYOUT PLAN
TIN SHUI WAI RCHE 1:250

PROJECT NO. 項目編號 : HK-A22001

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DRAWING TITLE
圖紙名稱 :

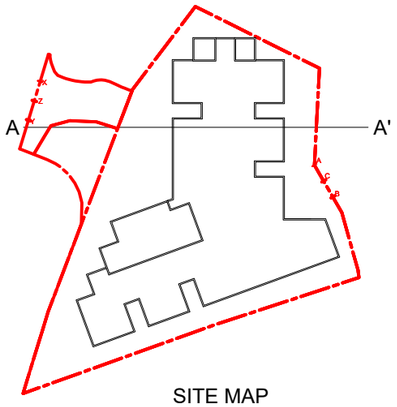
R/F LAYOUT PLAN

DESIGN IN CHARGE
設計負責人 :
KL

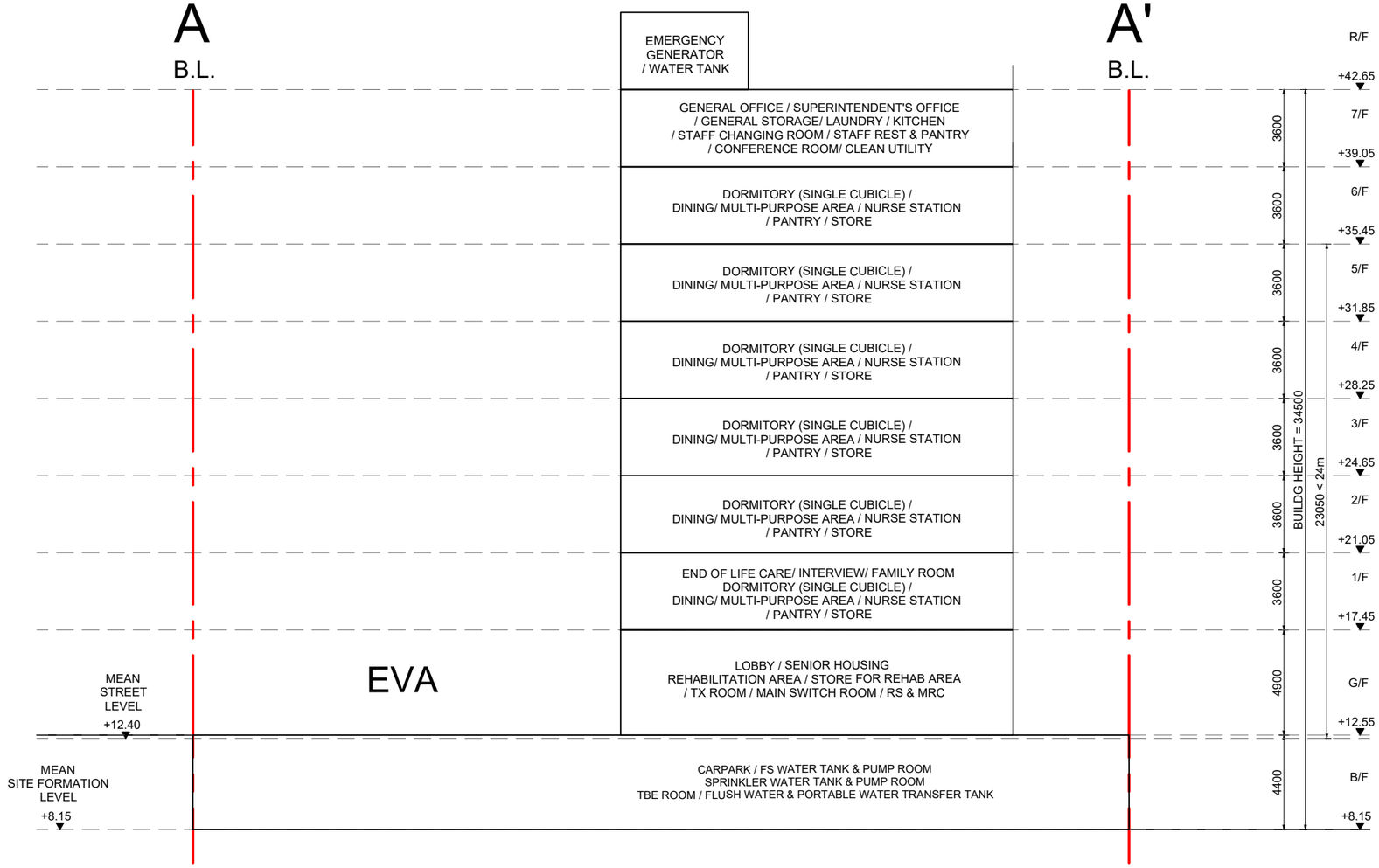
DWG NO.
圖紙編號 :
P-105

SCALE
比例 : 1:250@A3

DATE
日期 : 20230818



SITE MAP



- SCHEMATIC SECTION AA'
TIN SHUI WAI RCHE 1:250

PROJECT NO.
項目編號 : HK-A22001

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PROJECT NAME
項目名稱 :

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

DRAWING TITLE
圖紙名稱 :
SCHEMATIC SECTION AA'

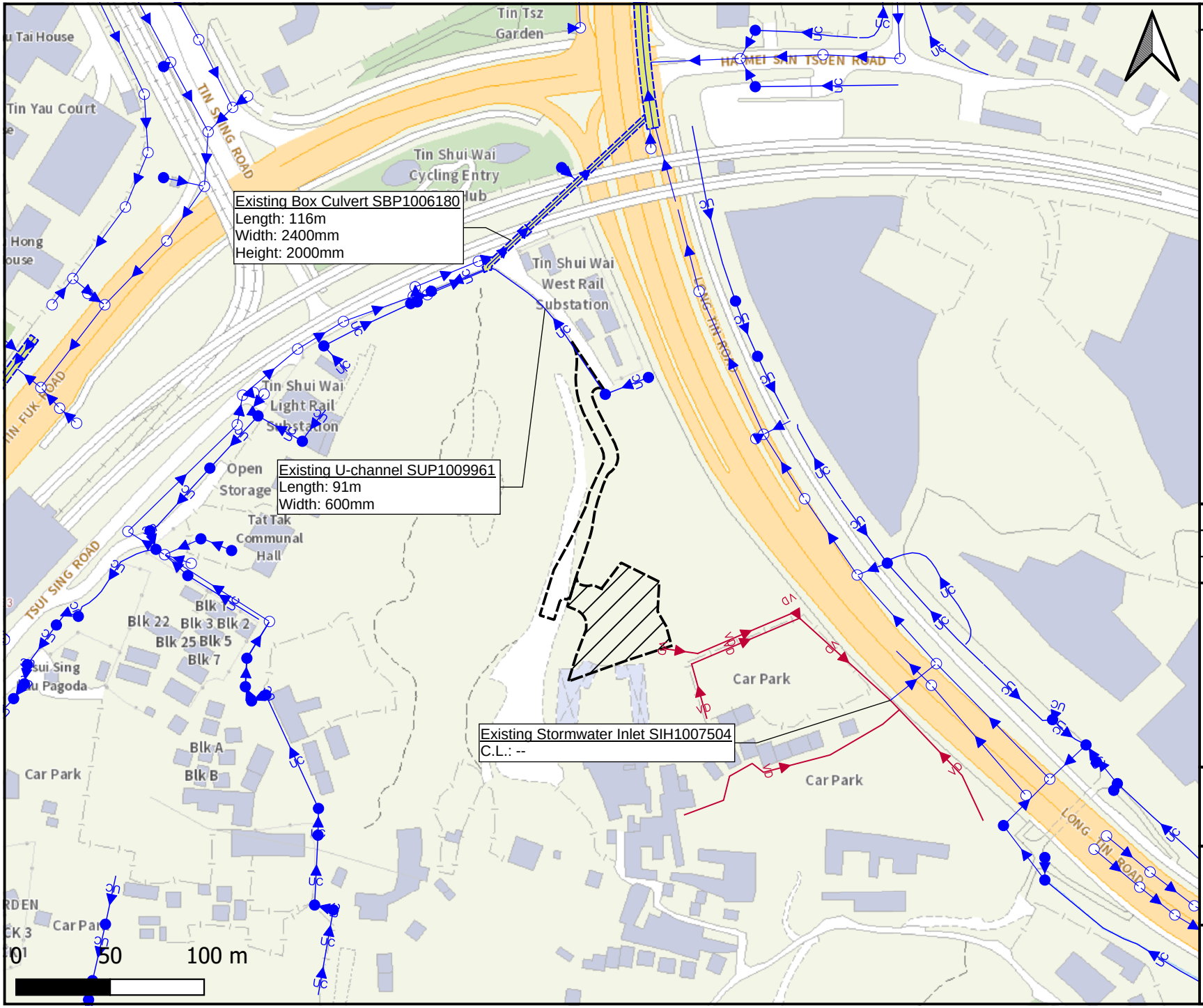
DESIGN IN CHARGE
設計負責人 : KL

DWG NO.
圖紙編號 : S-101

SCALE
比例 : 1:250@A3

DATE
日期 : 20230818

APPENDIX B
EXISTING DRAINAGE SYSTEM



Legend

- Application Site
- Project Site
- Catchpit
- Box Culvert
- Stormwater Pipe
- Stormwater Manhole
- U-Channel
- Village Drainage

	Prepared	Checked	Approved
Initial	KCC	ZC	HM
Date	240111	240111	240111

Project Title

PROPOSED COMPOSITE "SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY)" (RCHE) AND "RESIDENTIAL INSTITUTION" (SENIOR HOSTEL) DEVELOPMENT ON A SITE CURRENTLY ZONED AS "GOVERNMENT, INSTITUTIONAL OR COMMUNITY" (G/IC) IN LOT NOS. 257 (PART), 258 RP (PART) AND ADJOINING GOVERNMENT LAND IN D.D. 122, PING SHAN, YUEN LONG

Appendix Title

Existing Drainage System

Appendix No.	**Rev.**
Appendix B	0

BeeXergy Consulting Limited

\\BEEXERGY_NAS\Proj.Work\23_Work\DeSpace - NIA for RCHE Development at Tin Shui Wai (W23042)\PREP\DIA Report\RT23042-DIA-01_v0\GIS\RT23042-DIA-01.qgz

APPENDIX C

CALCULATION OF RUNOFF FOR RETURN PERIOD OF 50 YEARS

Appendix C

Calculation of Runoff for the Return Period of 50 Years

Catchment ID	Unpaved Catchment Area (km^2)	Paved Catchment Area (km^2)	Catchment Area (A), km^2	Average slope (H), m/100m	Flow path length (L), m	Inlet time (t_0), min	Duration (t_d), min	Storm Constants*			Runoff intensity (i) with climate change factor, mm/hr*	Runoff coefficient for unpaved area (C_{up})	Runoff coefficient for paved area (C_p)	C x A	Peak runoff (Q_p) m^3/s
								a	b	c					
Before the Proposed Development															
Catchment S1	0.000000	0.002114	0.002114	2.90	62	3.37	3.37	451.3	2.46	0.337	289.00	0.25	0.95	0.00201	0.161
Catchment S2	0.000020	0.000245	0.000265	1.15	26	2.09	2.09	451.3	2.46	0.337	314.13	0.25	0.95	0.00024	0.021
Catchment S3	0.000148	0.000197	0.000345	2.63	38	2.53	2.53	451.3	2.46	0.337	304.65	0.25	0.95	0.00022	0.019
Catchment S4	0.000056	0.000119	0.000175	3.55	31	2.08	2.08	451.3	2.46	0.337	314.49	0.25	0.95	0.00013	0.011
Catchment S5	0.000016	0.000214	0.000230	1.94	31	2.28	2.28	451.3	2.46	0.337	309.85	0.25	0.95	0.00021	0.018
Catchment S6	0.000122	0.000049	0.000171	7.41	27	1.56	1.56	451.3	2.46	0.337	327.44	0.25	0.95	0.00008	0.007
Catchment A1	0.003274	0.000446	0.003720	18.19	83	2.95	2.95	451.3	2.46	0.337	296.30	0.25	0.95	0.00124	0.102
Catchment A2	0.002828	0.000253	0.003081	22.32	82	2.85	2.85	451.3	2.46	0.337	298.15	0.25	0.95	0.00095	0.079
Catchment A3	0.001854	0.000361	0.002215	22.22	81	2.92	2.92	451.3	2.46	0.337	296.99	0.25	0.95	0.00081	0.067
Catchment A4	0.000974	0.000305	0.001279	22.41	58	2.20	2.20	451.3	2.46	0.337	311.60	0.25	0.95	0.00053	0.046
Catchment A5	0.000125	0.000225	0.000350	27.78	18	0.75	0.75	451.3	2.46	0.337	353.54	0.25	0.95	0.00025	0.024
Catchment B	0.002499	0.008274	0.010773	0.13	233	20.07	20.07	451.3	2.46	0.337	183.26	0.25	0.95	0.00849	0.432
Catchment C	0.023853	0.015231	0.039084	4.97	294	10.70	10.70	451.3	2.46	0.337	219.65	0.25	0.95	0.02043	1.248
Catchment D	0.003638	0.007411	0.011049	0.26	153	11.38	11.38	451.3	2.46	0.337	215.95	0.25	0.95	0.00795	0.477
														Total	**2.712**

Catchment ID	Unpaved Catchment Area (km^2)	Paved Catchment Area (km^2)	Catchment Area (A), km^2	Average slope (H), m/100m	Flow path length (L), m	Inlet time (t_0), min	Duration (t_d), min	Storm Constants*			Runoff intensity (i) with climate change factor, mm/hr*	Runoff coefficient for unpaved area (C_{up})	Runoff coefficient for paved area (C_p)	C x A	Peak runoff (Q_p) m^3/s
								a	b	c					
After the Proposed Development															
Catchment S1	0.000000	0.002114	0.002114	0.97	62	4.20	4.20	451.3	2.46	0.337	276.35	0.25	0.95	0.00201	0.154
Catchment S2	0.000000	0.000265	0.000265	1.15	26	2.09	2.09	451.3	2.46	0.337	314.13	0.25	0.95	0.00025	0.022
Catchment S3	0.000000	0.000345	0.000345	2.63	38	2.53	2.53	451.3	2.46	0.337	304.65	0.25	0.95	0.00033	0.028
Catchment S4	0.000000	0.000175	0.000175	3.55	31	2.08	2.08	451.3	2.46	0.337	314.49	0.25	0.95	0.00017	0.015
Catchment S5	0.000000	0.000230	0.000230	1.94	31	2.28	2.28	451.3	2.46	0.337	309.85	0.25	0.95	0.00022	0.019
Catchment S6	0.000000	0.000171	0.000171	7.41	27	1.56	1.56	451.3	2.46	0.337	327.44	0.25	0.95	0.00016	0.015
Catchment A1	0.003274	0.000446	0.003720	18.19	83	2.95	2.95	451.3	2.46	0.337	296.30	0.25	0.95	0.00124	0.102
Catchment A2	0.002828	0.000253	0.003081	22.32	82	2.85	2.85	451.3	2.46	0.337	298.15	0.25	0.95	0.00095	0.079
Catchment A3	0.001854	0.000361	0.002215	22.22	81	2.92	2.92	451.3	2.46	0.337	296.99	0.25	0.95	0.00081	0.067
Catchment A4	0.000974	0.000305	0.001279	22.41	58	2.20	2.20	451.3	2.46	0.337	311.60	0.25	0.95	0.00053	0.046
Catchment A5	0.000125	0.000225	0.000350	27.78	18	0.75	0.75	451.3	2.46	0.337	353.54	0.25	0.95	0.00025	0.024
Catchment B	0.002499	0.008274	0.010773	0.13	233	20.07	20.07	451.3	2.46	0.337	183.26	0.25	0.95	0.00849	0.432
Catchment C	0.023853	0.015231	0.039084	4.97	294	10.70	10.70	451.3	2.46	0.337	219.65	0.25	0.95	0.02043	1.248
Catchment D	0.003638	0.007411	0.011049	0.26	153	11.38	11.38	451.3	2.46	0.337	215.95	0.25	0.95	0.00795	0.477
														Total	**2.727**

Remark:

The runoff from Catchment S1 will be discharged to Stormwater Inlet Stormwater Inlet SIH1007504 via the existing village channel before the Proposed Development.

The runoff from Catchment S2-S6, A1-A5, B, C, and D will be discharged to Box Culvert SBP1002932 via the U-channel SUP1009961 before the Proposed Development.

All runoff will be discharged to Box Culvert SBP1002932 via proposed connection after the Proposed Development.

According to SDM Table 3a and Figure 3, the storm constants for the return period of 50 years of the HKO Headquarters will be 451.3 (a), 2.46 (b), and 0.337 (c).

According to Stormwater Drainage Manual CORRIGENDUM No. 1/2022 - Table 28, the rainfall increases due to Climate Change will be 16.0% for end of 21st Century.

APPENDIX D

CALCULATION OF DRAINAGE CAPACITY OF THE RUNOFF FROM THE PROJECT SITE (CATCHMENT S1)

Appendix D

Calculation of drainage capacity of the runoff from the Project Site (Catchment S1)

SECTION		Pipe	Catchment	Length	Upstream Invert Level	Downstream Invert Level	d	r	A_w	P_w	R	s	k_s	V	Q_c	Total Runoff in 50 Years	% of capacity	Remark
From	To			m	mPD	mPD	m	m	m^2	m	m	-	mm	m/s	m^3/s	m^3/s	%	
PTM1	PTM2	1 x 375mm circular pipe	S1	38	+10.20	+8.80	0.375	0.19	0.110	1.178	0.09	0.037	0.06	4.4269	0.489	0.154	32%	OK
PTM2	PTM3	1 x 375mm circular pipe	S1	31	+8.80	+8.20	0.375	0.19	0.110	1.178	0.09	0.019	0.06	3.1814	0.351	0.154	44%	OK
PTM3	PTM4	1 x 375mm circular pipe	S1	51	+8.20	+6.80	0.375	0.19	0.110	1.178	0.09	0.027	0.06	3.8074	0.421	0.154	37%	OK

Legend

d = pipe diameter, m

r = pipe radius (m) = 0.5d

A_w = wetted area (m^2) = πr^2 (circular) ; $\pi r^2/2$ (U-channel) ; WH (Box Culvert)

P_w = wetted perimeter (m) = $2\pi r$ (circular) ; πr (U-channel) ; 2W+2H (Box Culvert)

R = Hydraulic radius (m) = A_w / P_w

s = Slope of the total energy line

k_s = equivalent sand roughness, mm

V = Velocity of flow calculated based on Colebrook White Equation, m/s

Q_c = Flow Capacity (10% sedimentation incorporated), m^3/s

Q_p = Estimated total peak flow from the Site during peak season, m^3/s

APPENDIX E

CALCULATION OF DRAINAGE CAPACITY OF THE RUNOFF FROM THE ACCESS ROAD (CATCHMENTS S2 TO S6) AND ITS ASSOCIATED UPSTREAM CATCHMENTS (CATCHMENTS A1 TO A5)

Appendix E

Calculation of drainage capacity of the runoff from the access road (Catchments S2 to S6) and its associated upstream catchments (Catchments A1 to A5)

SECTION		Pipe	Catchment	Length	Upstream Invert Level	Downstream Invert Level	d	r	A_w	P_w	R	s	k_s	V	Q_c	Total Runoff in 50 Years	% of capacity	Remark
From	To			m	mPD	mPD	m	m	m^2	m	m	-	mm	m/s	m^3/s	m^3/s	%	
PCP1	PCP2	1 x 600mm U-channel	S2+A1	21	+12.00	+11.60	0.600	0.30	0.141	0.942	0.15	0.019	0.06	4.2104	0.595	0.124	21%	OK
PCP2	PCP3	1 x 600mm U-channel	S2+S3+A1+A2	36	+11.60	+10.20	0.600	0.30	0.141	0.942	0.15	0.039	0.06	6.0611	0.857	0.231	27%	OK
PCP3	PCP4	1 x 600mm U-channel	S2+S3+S4+A1+A2+A3	27	+10.20	+9.60	0.600	0.30	0.141	0.942	0.15	0.022	0.06	4.5559	0.644	0.312	48%	OK
PCP4	PCP5	1 x 600mm U-channel	S2+S3+S4+S5+A1+A2+A3+A4	28	+9.60	+8.60	0.600	0.30	0.141	0.942	0.15	0.036	0.06	5.8040	0.821	0.377	46%	OK
PCP5	PTM4	1 x 600mm U-channel	S2+S3+S4+S5+S6+A1+A2+A3+A4+A5	21	+8.60	+6.80	0.600	0.30	0.141	0.942	0.15	0.086	0.06	9.0530	1.280	0.416	32%	OK

Legend

d = pipe diameter, m

r = pipe radius (m) = 0.5d

A_w = wetted area (m^2) = πr^2 (circular) ; $\pi r^2/2$ (U-channel) ; WH (Box Culvert)

P_w = wetted perimeter (m) = $2\pi r$ (circular) ; πr (U-channel) ; 2W+2H (Box Culvert)

R = Hydraulic radius (m) = A_w / P_w

s = Slope of the total energy line

k_s = equivalent sand roughness, mm

V = Velocity of flow calculated based on Colebrook White Equation, m/s

Q_c = Flow Capacity (10% sedimentation incorporated), m^3/s

Q_p = Estimated total peak flow from the Site during peak season, m^3/s

APPENDIX F

CALCULATION OF DRAINAGE CAPACITY OF ALL RUNOFF FROM THE APPLICATION SITE (CATCHMENT S) AND ITS ASSOCIATED UPSTREAM AND DOWNSTREAM CATCHMENTS (CATCHMENTS A, B, C, AND D)

Appendix F

Calculation of drainage capacity of all runoff from the Application Site (Catchment S) and its associated upstream and downstream catchments (Catchments A, B, C, and D)

SECTION		Pipe	Catchment	Length	Upstream Invert Level	Downstream Invert Level	d	r	A_w	P_w	R	s	k_s	V	Q_c	Total Runoff in 50 Years	% of capacity	Remark
From	To			m	mPD	mPD	m	m	m^2	m	m	-	mm	m/s	m^3/s	m^3/s	%	
PTM4	Box Culvert SBP1006180	1 x 400mm circular pipe	S + A	64	6.30	1.73	0.400	0.20	0.126	1.257	0.10	0.071	0.06	6.4464	0.810	0.570	70%	OK
Box Culvert SBP1006180	Box Culvert SBP1002932	2400mm x 2000mm Box Culvert	S + A + B + C + D	116	1.73	1.51	2.400	1.20	4.800	8.800	0.55	0.002	0.06	2.8191	13.532	2.727	20%	OK

Legend

d = pipe diameter, m

r = pipe radius (m) = 0.5d

A_w = wetted area (m^2) = πr^2 (circular) ; $\pi r^2/2$ (U-channel) ; WH (Box Culvert)

P_w = wetted perimeter (m) = $2\pi r$ (circular) ; πr (U-channel) ; 2W+2H (Box Culvert)

R = Hydraulic radius (m) = A_w / P_w

s = Slope of the total energy line

k_s = equivalent sand roughness, mm

V = Velocity of flow calculated based on Colebrook White Equation, m/s

Q_c = Flow Capacity (10% sedimentation incorporated), m^3/s

Q_p = Estimated total peak flow from the Site during peak season, m^3/s

Remark:

(1) The upstream invert level and downstream invert level of Box Culvert are referenced from the downstream invert level of SWD1059683 and SWD1034861 respectively.