Attachment G

Revised Drainage Impact Assessment

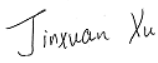
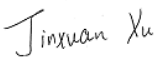
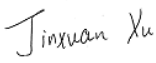
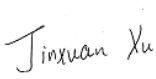
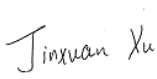
Drainage Impact Assessment (DIA)

Proposed Residential Care Homes for the Elderly (RCHE) at Lot DD101 76 S.G & 76 S.H, Mai Po, Yuen Long

25 July 2025

REVISION 4

QUALITY MANAGEMENT

ISSUE/ REVISION	REVISION 0	REVISION 1	REVISION 2	REVISION 3	REVISION 4
Remarks					
Date	08 Mar. 2024	01. Sept. 2024	05 April. 2025	30 May. 2025	25 July. 2025
Prepared by	Jinxuan. Xu	Jinxuan. Xu	Jinxuan. Xu	Jinxuan. Xu	Jinxuan. Xu
Signature					
Checked by	Alex Cheung	Alex Cheung	Gao, Erica Yunxiang	Gao, Erica Yunxiang	Gao, Erica Yunxiang
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Authorised by	Kau, Paul	Kau, Paul	Kau, Paul	Kau, Paul	Kau, Paul
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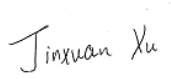
Signatures

Prepared by



Jinxuan Xu
Consultant

Reviewed by

Gao, Erica Yunxiang

ASSOCIATE

Table of Contents

1. INTRODUCTION

1.1 Background

1.1.1 WSP (Asia) Limited (hereinafter "WSP") was commissioned by Gotland Enterprises Ltd. to carry out a Drainage Impact Assessment (DIA) for a proposed residential care homes for the elderly (RCHE) at Lot DD101 76 S.G & 76 S.H, Mai Po, Yuen Long (hereinafter "Application Site").

1.1.2 The Application Site falls under the Mai Po & Fairview Park Outline Zoning Plan No. S/YL-MP/6 (the "OZP"), and is zoned "Village Type Development".

1.2 Application Site and its Environs

1.2.1 The Application Site is about 8,428.9 m^2, generally bounded by Castle Peak Road – Mai Po to the southeast, fishponds and an open storage to the northwest, Hop Shing Wai to the northeast, and Tam Kon Chau Road, Mai Po Lo Wai and a fishpond to the southwest, as shown in **Figure 1**.

1.2.2 The proposed Application Site comprises comprehensive elderly care home facilities, landscaped open spaces, sewerage treatment plant, and car parks. The master layout plan of proposed development is shown in **Appendix A**.

2. ASSESSMENT CRITERIA AND METHODOLOGY

2.1 General

2.1.1 The aim of this study is to assess the changes to runoff from the Application Site as a result of the proposed development and the potential impacts on the existing drainage system and surrounding areas.

2.2 Methodology

2.2.1 This DIA is carried out in accordance with the requirements of "Advice Note No. 1 – Application of the Drainage Impact Assessment Process to Private Sector Projects" issued by Drainage Services Department (DSD), as well as the Stormwater Drainage Manual - Fifth Edition (SDM).

2.2.2 The Application Site is located in the North District Area of rainfall zone. The flood level of 1 in 50-year return period is considered to check whether a higher standard than 10 years can be justified, although the Application Site will drain to a village drainage.

2.2.3 The potential drainage impact considered the climate change effects up to end of 21st century. Referring to the Table 28 and 31 in the Stormwater Drainage Manual- Corrigendum No. 1/2022, 28.1 % rainfall increase due to climate change, including 16% rainfall increase and 12.1% design allowance, is included in the runoff calculations.

2.2.4 As the catchment areas are all fairly small, the Rational Method (as outlined in Section 7.5.2 of the SDM) is used for the calculation of runoff.

$$Q = 0.278CiA$$

Where Q = peak runoff in m^3/s

C = runoff coefficient (dimensionless)

i = rainfall intensity in mm/hr

A = catchment area in km

2.2.5 Runoff coefficients of 0.9, 0.3, and 0 are adopted for the paved areas, unpaved areas (i.e. soft landscape) and pond areas, respectively.

2.2.6 The reclaimed water from the on-site STP is also included in the overall runoff calculations.

2.2.7 Colebrook-White Equation is used for the assessment of the capacity of the storm pipe from the manhole SMH1012332 to the outlet SNF1002684. The upstream inflow from the Catchment A located at east of the Castle Peak Road-Mai Po is taken as the baseflow in the storm pipe, as shown in **Figure 2**. The rainfall runoff generated from the proposed

Application Site accessed to the storm pipe from the manhole SMH1012333, as shown in **Figure 2**.

3. DRAINAGE IMPACT ASSESSMENT

3.1 Existing Drainage Condition

3.1.1 Based on the site visit, an existing ditch around the Application Site collects its runoff before directly discharging to a tributary of Mai Po River (thereafter named as Mai Po Tributary) while the upper reaches of Mai Po Tributary is a shallow water puddle with overgrown weeds. **Appendix B** demonstrates the drainage condition of the Application Site before development and existing condition of Mai Po Tributary.

3.1.2 Under the pre-development scenario, the Catchment A is a mountain forest adopting 0.3 for runoff coefficient, meanwhile, the Application Site is used as an open storage area for container trunk parking adopting 0.9 for runoff coefficient. **Table 3-1** shows the peak runoff before development from the Application Site is 0.49 m^3/s

Table 3-1 Peak Runoff from Application Site Before Development under 50-year Return Period

Catchment	Paved Area (m^2)	Greenery Area (m^2)	Time of Conc. (min) / Rainfall Duration (min)(1)	50-year Intensity with Climate Change (mm/hr)(2)	50-year Runoff (m^3/s)
Application Site	8,428.9	0	10	235.42	0.49

Note: (1). Assume 10 min for the time of concentration for the Catchment of Application Site.
(2). Rainfall Intensity(i)= a / (td + b)c × 1.281(climate change factor, refers to Table 28 and 31 in the Stormwater Drainage Manual-Corrigendum No. 1/2022). Constants a, b, c equal to 474.6, 2.90 and 0.371. respectively, referring to Table 3a of the SDM Corrigendum No.1/2024.

3.1.3 The catchments of the Application Site and A has been delineated based on their boundaries and terrains, as shown in **Figure 2**, and their catchment characteristics before development are summarised in **Table 3-2**.

3.1.4 Mai Po Lo Wai, located west of Catchment A and south of the Project Site, has its own independent drainage pipe and ditch that also discharges into the Mai Po Tributary, as shown in **Appendix B**. Its natural flow direction is shown in **Figure 2**. Thus, their drainage system is not relevant to the current submission.

3.2 Proposed Development and Drainage System

3.2.1 A set of internal peripheral drains are proposed across the Application Site to collect stormwater runoff from the Proposed Development. It runs from a proposed storm pipe with dia. 900mm and slope of 1 in 500 to the existing dia. 1500mm public drains through connecting to the Manhole SMH1012333 from the terminal manhole, as shown in **Figure 2**.

3.2.2 The receiving public drain with size from DN1050 to DN1650 laid along Castle Peak Road-Mai Po and Tam Kon Chau Road, and eventually discharge to the Mai Po Tributary. The

receiving drain only caters the runoff from the Catchment A before the development of Application Site.

3.2.3 The catchments of the Application Site and A has been delineated based on their boundaries and terrains, as shown in **Figure 2**, and their catchment characteristics after development are summarised in **Table 3-2**. While the hydrological characteristics of Catchment A remain consistent with pre-development conditions, 2,242m² and 128.6m² of the Application Site area will be converted to greenery and pond areas with runoff coefficients of 0.3 and 0 (indicating no water drains to the internal and public drainage system), respectively. The remaining 6,058.3m² of the Application Site will retain paved surfaces with a runoff coefficient of 0.9.

3.2.4 The landscape pond with native wetland planting is proposed at the northeastern portion of the Application Site, as shown in **Appendix A**, to enhance the ecological value of the buffer zone adjacent to the Wetland Conservation Area (WCA). Since the pond will not be connected to any drainage systems, its water source will be solely from rainfall, and water will be discharged only through infiltration and evaporation. The pond will have a depth of approximately 1 metre, with a freeboard of 0.35 metres maintained between the normal water level and the top of the pond levee to safely accommodate rainfall from a 4-hour 50-year return period event, as shown in **Appendix D**, and to prevent flooding. The key dimensions of the landscape pond are outlined in **Table 3-3**.

Table 3-2 Summary of Catchment Characteristics

Catchments	Paved Area (m^2)	Greenery Area (m^2)	Pond Area (m^2)	Total Area (m^2)	Assuming Receiving Manhole
	Pre-development Scenario				
A	0	32,934.8	0	32,934.8	SMH1012332
Application Site	8,428.9	0	0	8428.9	To Mai Po Tributary via Existing Ditch
	Post-development Scenario				
A	0	32,934.8	0	32,934.8	SMH1012332
Application Site	6,058.3	2242	128.6	8,428.9	SMH1012333

Table 3-3 Key Dimensions of Landscape Pond

Key Dimensions	
Area	128.6m^2
Pond Depth	1m
Normal Water Level	0.35m from the top of the pond levee (i.e., approximately 0.75m water depth)

3.2.5 As shown in **Appendix C**, the maximum peak rainfall runoff after development under 50-year return period from the Application Site is 0.40 m^3/s. This value is lower than the pre-development scenario due to the increased greenery area and pond area.

3.2.6 The SIA of the Application Site demonstrated that 118.48m^3/day reclaimed water after tertiary treatment of Membrane Bioreactor process by the on-site sewage treatment plant which cannot be reused will also be discharged to the public drainpipes. Assume the worst case where reclaimed water will be discharged to the public drain for 1 hour per day, the additional flow rate would be 0.033m^3/s. Therefore, with consideration of the reclaimed water, the peak runoff from the Application Site is 0.43 m^3/s, which is also lower than the value in the pre-development scenario.

3.2.7 An assessment has been carried out to check the capacity of receiving public drain from the manhole SMH1012332 to the outlet SNF1002684, with details shown in **Appendix C**. As revealed by the assessment result, the peak flow rates under 50-year return period will increase from 0.84 m^3/s to 1.07 m^3/s in the storm pipe SWD1019988 (from manhole SMH1012333 to SMH1012334), from 0.80 to 1.05 m^3/s in the storm pipe SWD1019989 (from manhole SMH1012334 to SNF1002684) after the development of Application Site. However, the receiving public drain from the manhole SMH1012333 to the outlet SNF1002684, with a maximum capacity of 1.82m^3/s, is sufficient to cater the storm runoff from both the Application Site as well as the Catchment A.

4. CONCLUSIONS

4.1.1 This DIA is prepared to assess the impact to the drain from the manhole SMH1012332 to Outlet SNF1002684 arising from the proposed development of Application Site.

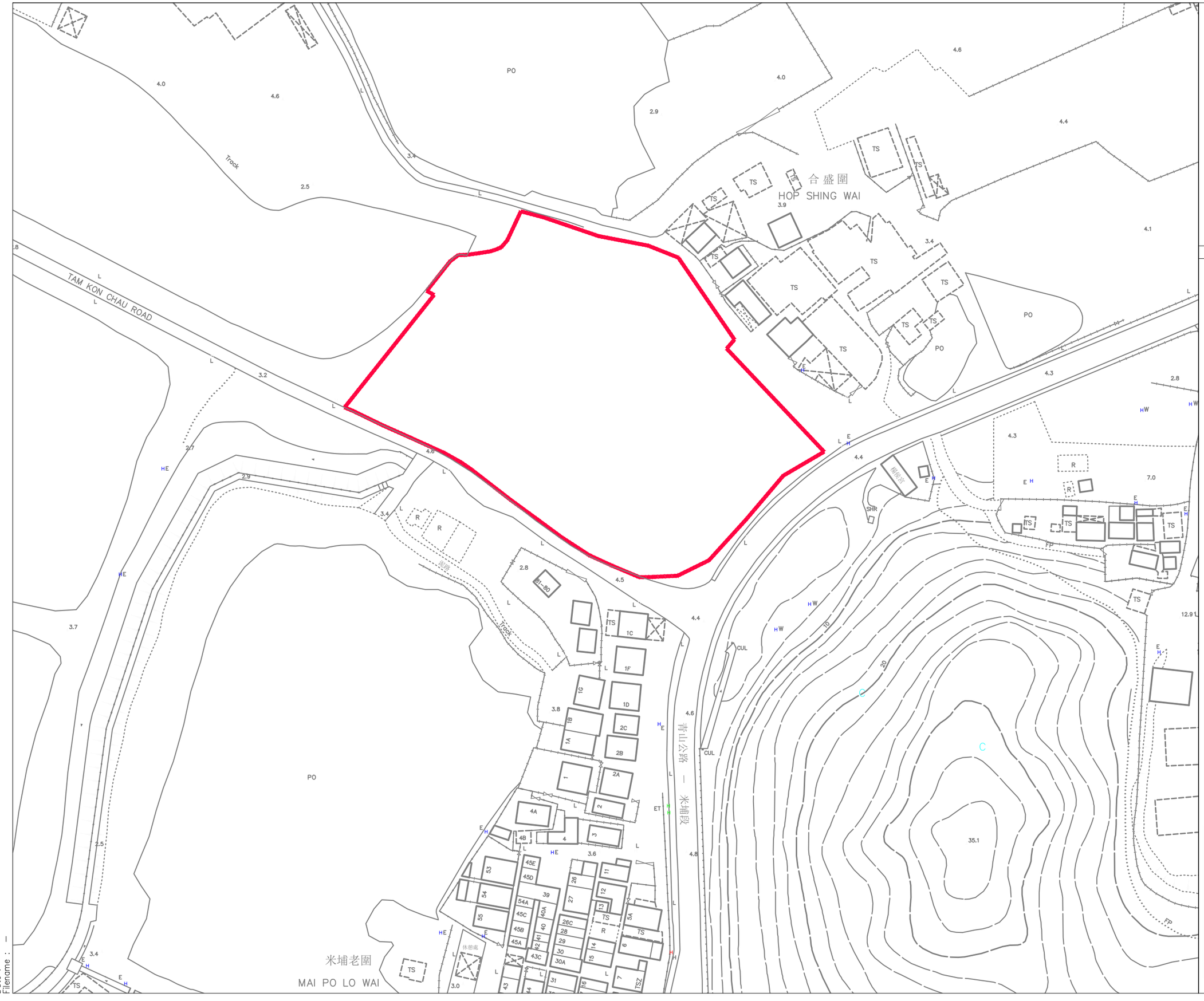
4.1.2 The proposed development comprises comprehensive elderly care home facilities, landscaped open spaces, sewerage treatment plant, and car parks. The total site area is approximately 8,428.9 m².

4.1.3 After development, surface runoff generated from the Application Site would be discharged into an existing pipe via existing manhole SMH1012333. Meanwhile, the residual reclaimed water that cannot be reused would be discharged to the same pipe as the surface runoff.

4.1.4 When accounting for the maximum peak runoff after development under 50-year return period from the Application Site is 0.43m^3/s. This value is lower than the pre-development scenario (0.49m^3/s) due to the increased unpaved area and pond area.

4.1.5 The results of hydraulic analysis demonstrate that the existing pipe has enough capacity to cater for the addition of surface runoff from the Application Site.

Figures



LOCATION PLAN

LEGENDS:

APPLICATION SITE BOUNDARY

Rev	Description	By	Date

Consultant

wsp

Project title

DRAINAGE IMPACT ASSESSMENT

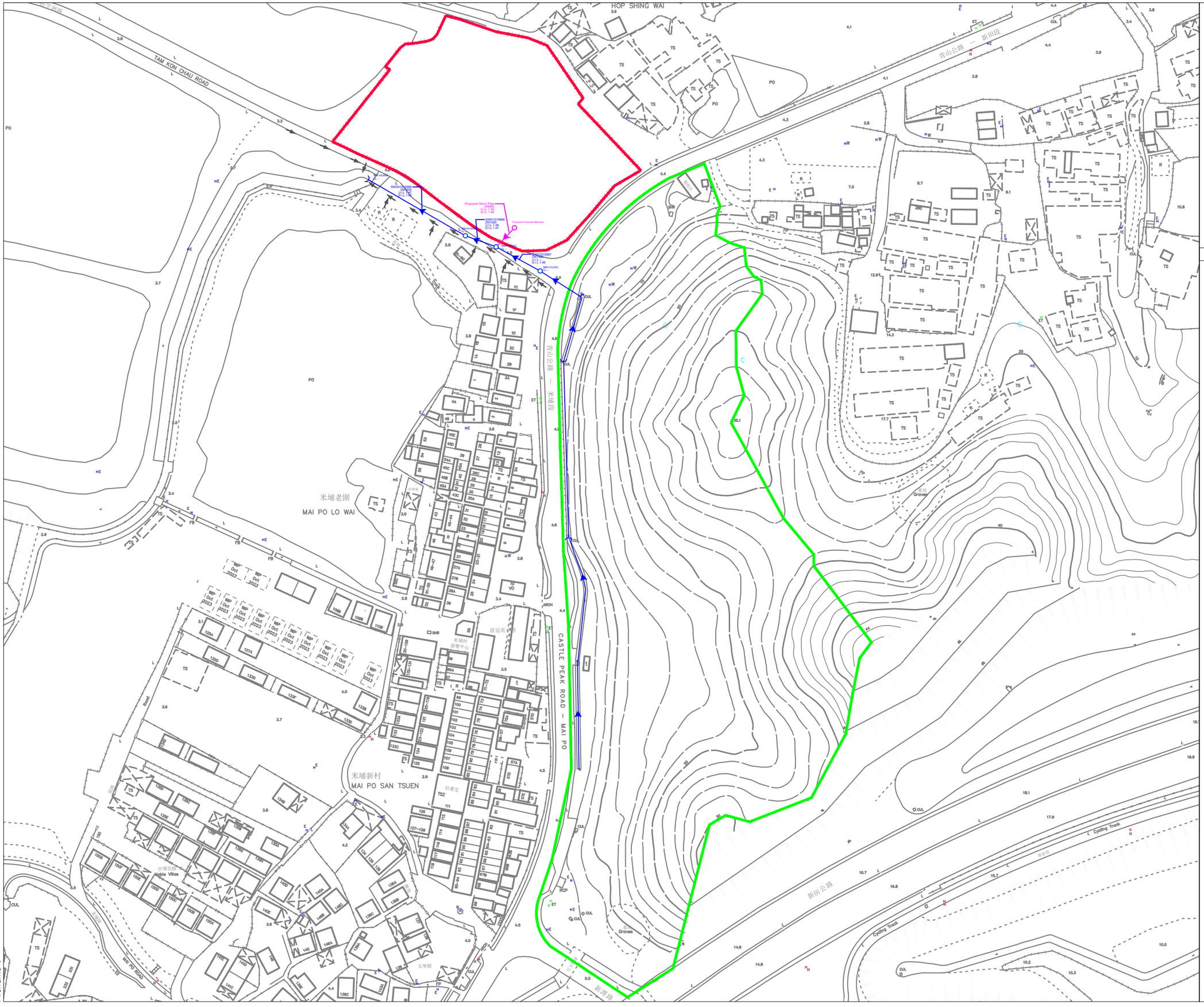
for Proposed Residential Care Homes for the Elderly (RCHE) at Lot DD101 76 S.G & 76 S.H, Mai Po, Yuen Long

Drawing title

SITE LOCATION

Drawing no.			Rev.
FIGURE 1			0
Drawn: JX	Date: MARCH2024	Checked: –	Approved: –
Scale: –		Status:	

Date :
Filename :



LOCATION PLAN

LEGENDS:

- APPLICATION SITE BOUNDARY
- BOUNDARY OF CATCHMENT A
- EXISTING STORM PIPE/CHANNEL
- EXISTING STORM MANHOLE
- **SWD1019988** STORM PIPE NUMBER
- **DN 1500** PIPE DIAMETER
- **U.I.L 1.48** UPSTREAM INVERT LEVEL (mPD)
- **D.I.L 1.47** DOWNSTREAM INVERT LEVEL (mPD)
- **SMH1012333** STORM MANHOLE NUMBER
- **CL --** COVER IEVEL (mPD)
- PROPOSED STORM PIPE
- PROPOSED TERMINAL STORM MANHOLE
- NATURAL FLOW DIRECTION FOR MAI PO LO WAI

Rev	Description	By	Date

Consultant

wsp

Project title

DRAINAGE IMPACT ASSESSMENT

for Proposed Residential Care Homes for the Elderly (RCHE) at Lot DD101 76 S.G & 76 S.H, Mai Po, Yuen Long

Drawing title

CATCHMENTS PLAN AND STORM PIPES UNDER ASSESSMENT

Drawing no.			Rev.
FIGURE 2			0
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Scale: –		Status:	

Date : --
Filename : --

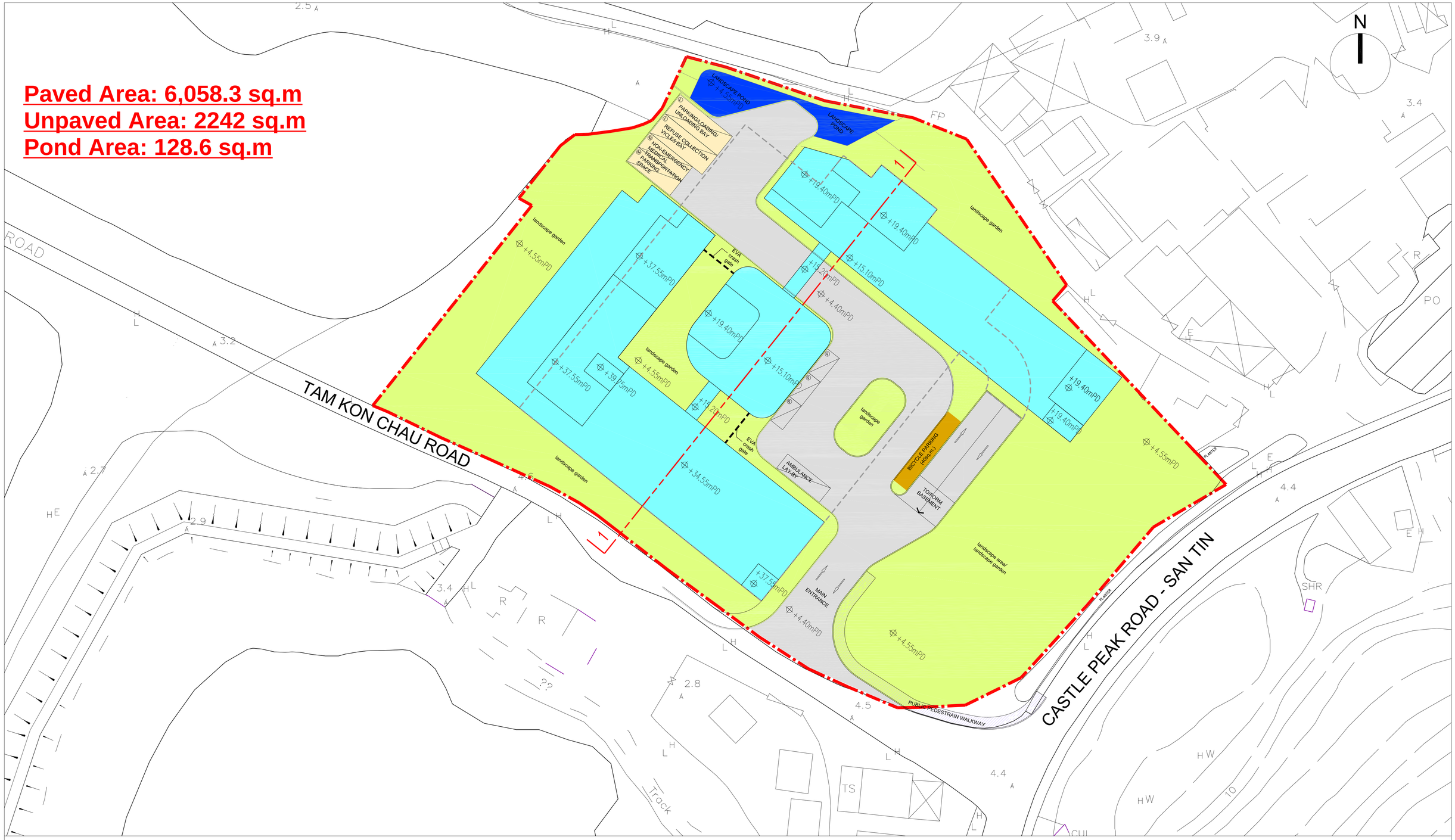
Appendixes

Appendix A

Master Layout Plan of

the Proposed Development

Paved Area: 6,058.3 sq.m
Unpaved Area: 2242 sq.m
Pond Area: 128.6 sq.m



MASTER LAYOUT PLAN

LEGEND

- APPLICATION SITE
- BASEMENT OUTLINE
- PROPOSED DEVELOPMENT INCLUDE (1) RCHE, (2) SHOP & SERVICES (MEDICAL CONSULTING ROOM INCLUDING CLINIC)
- DRIVEWAY
- LANDSCAPE GARDEN/ LANDSCAPE AREA
- PUBLIC PEDESTRAIN WALKWAY
- BICYCLE PARKING
- TAXI / PRIVATE CAR LAY-BY
- NON-EMERGENCY MEDI TRANSPORTATION LAY-BY
- LOADING / UNLOADING BAYS & REFUSE COLLECTION VEHICLE BAYS
- PARKING/LOADING/UNLOADING BAY, REFUSE COLLECTION VICLES BAY, NONO-EMERGENCY MEDICAL TRANSPORTATION PARKING SPACES AREA FOR EMERGENCY VEHICLES INCLUDING AMBULANCES
- LANDSCAPE POND

LWK +PARTNERS

參考編號 REFERENCE No.	繪圖 DRAWING A-1

Appendix B

Site Visit Photos


HOP SHING WAI
N
Photo Spots and Figure Numbers
Perspectives
Boundary of Application Site

Figure 1. Existing outlet of application site and upper reaches of Mai Po Tributary (Downstream of SNF1002684)


Figure 2. Existing outlet of application site

Figure 3. Upper reaches of Mai Po Tributary (Downstream of SNF1002684)

Figure 4. Existing ditch (1)

Figure 5. Existing ditch (2)

Figure 6. Existing drainage system for Mai Po Lo Wai

Figure 7. Outlet SNF1002684

Appendix C

Hydraulic Assessment

Appendix C-Hydraulic Assessment of Existing and Proposed Pipes under 50-Year Return Period (Before Development)

Manhole		Channel/Pipe	Catchment	Paved Area[i]		Unpaved Area[i]		Length (m)	Nominal Diameter (mm)	Invert Level		Gradient, S_f		Velocity (m/s)[ii]	Time of Flow (min) t_f	Time of Conc. (min) t_c[iii]	Rainfall Duration (min)	50-year Intensity (mm/hr)[iv]	50-year Intensity with Climate Change (mm/hr)[iv]	50-year Runoff (m^3/s)[v]	Capacity (m^3/s)	Ratio Capacity Runoff (%)[vi]	Ratio Capacity > Runoff ?
From	To			Increment (m^2)	Accu. (m^2)	Increment (m^2)	Accu. (m^2)			From (mPD)	To (mPD)	(%)	1 in										
Exisiting Ditch[vii]	Mai Po Tributary[vii]	Pipe	Application Site	8428.9	8428.9	0.0	0.0	-	-	-	-	-	-	-	-	10.12	10.12	183.15	234.62	0.49	-	-	-
SMH1012332	SMH1012333	Pipe	A	0.0	0.0	32934.8	32934.8	22.60	1500	1.49viii	1.48	0.0	2260.0	0.89	0.42	3.26	3.26	241.71	309.63	0.85	1.42	60%	Yes
SMH1012333	SMH1012334	Pipe	A	0.0	0.0	0.0	32934.8	13.80	1500	1.48	1.47	0.1	1380.0	1.15	0.20	3.46	3.46	238.85	305.97	0.84	1.82	46%	Yes
SMH1012334	SNF1002684	Pipe	A	0.0	0.0	0.0	32934.8	50.20	1650	1.47	1.45	0.0	2510.0	0.90	0.93	4.40	4.40	227.04	290.84	0.80	1.73	46%	Yes

Remarks:

i. The runoff coefficient is 0.9 for paved area, and 0.3 for unpaved area.

ii. Colebrook-White equation is used for velocity calculation, k_s=0.6 mm, v= 0.000001 m^2/s

iii. Time of concentration (t_c)=inlet time (t_o)+flow time (t_f). Inlet time(t_o)= $0.14465L/H^{0.2}A^{0.1}$. t_o for the Catchment A (natural catchment) = $0.14465\times113.2m/[(44mPD-4.4mPD)/113.2m\times100]^{0.2}(32667m^2)^{0.1}$=2.84min. Flow time ($t_f$)=$L_f/V_f$, t_f for the drain from SMH1012332 to SMH1012333=22.60m/0.893m/s/60=0.42min; t_f for the drain from SMH1012333 to SMH1012334=13.8m/1.146m/s/60=0.2min; t_f for the drain from SMH1012334 to SNF1002684= 50.2m/0.898m/s/60=0.93min. tc for the for the drain from SMH1012332 to SMH1012333= 0.42min+2.84min+10min=**3.26**min. t_c for the for the drain from SMH1012333 to SMH1012334= 0.2min+3.26min=**3.46**min. t_c for the for the drain from SMH1012334 to SNF1002684=3.46+0.93=**4.40**min. Time of concentration(tc) for the catchment of the Application Site is assumed to be **10.12**min, which is consistent with the tc in the post-development scenario.

iv. Rainfall Intensity(i)= a / (t_d + b)c × 1.281(climate change factor, refers to the Table 28 and 31 in the Stormwater Drainage Manual-Corrigendum No. 1/2022). Constants a,b,c equal to 474.6, 2.90 and 0.371. respectively, referring to Table 3a of the SDM Corrigendum No.1/2024.

v. 50-year peak runoff (Q_p)=0.278 CiA

vi. Assumption of 10% reduction in flow area for siltation allowance is included in the capacity calculation.

vii.Application Site has different drainage system from Catchment A before development.

viii. No records found in the DSD Drainage Record Plan, so 1.49 mPD is assumed to be the invert level of the drain from SMH1012332 to SMH1012333.

Appendix C-Hydraulic Assessment of Existing and Proposed Pipes After Development under 50-Year Return Period (After Development)

Manhole		Channel/Pipe	Catchment	Paved Area[i]		Unpaved Area[i]		Pond Area[i]		Length (m)	Nominal Diameter (mm)	Invert Level		Gradient, S_f		Velocity (m/s)[ii]	Time of Flow (min) t_f	Time of Conc. (min) t_c[iii]	Rainfall Duration (min)	50-year Intensity (mm/hr)[iv]	50-year Intensity with Climate Change (mm/hr)[iv]	50-year Runoff (m^3/s)[v]	Reclaimed water (m^3/s)	Total[vi]	Capacity (m^3/s)	Ratio Capacity Runoff (%)[vii]	Ratio Capacity > Runoff ?
From	To			Increment (m^2)	Accu. (m^2)	Increment (m^2)	Accu. (m^2)	Increment (m^2)	Accu. (m^2)			From (mPD)	To (mPD)	(%)	1 in												
Proposed Terminal Manhole	SMH1012333	Pipe	Application Site	6058.3	6058.3	2242.0	2242.0	128.6	128.6	10.00	900	1.50	1.48	0.2	500.0	1.39	0.12	10.12	10.12	183.15	234.62	0.40	0.033	0.43	0.80	54%	Yes
SMH1012332	SMH1012333	Pipe	A	0.0	0.0	32934.8	32934.8	0.0	0.0	22.60	1500	1.49viii	1.48	0.0	2260.0	0.89	0.42	3.26	3.26	241.71	309.63	0.85	-	0.85	1.42	60%	Yes
SMH1012333	SMH1012334	Pipe	A+Application Site	0.0	6058.3	0.0	35176.7	0.0	128.6	13.80	1500	1.48	1.47	0.1	1380.0	1.15	0.20	10.32	10.32	182.12	233.29	1.04	0.033	1.07	1.82	59%	Yes
SMH1012334	SNF1002684	Pipe	A+Application Site	0.0	6058.3	0.0	35176.7	0.0	128.6	50.20	1650	1.47	1.45	0.0	2510.0	0.90	0.93	11.25	11.25	177.57	227.47	1.01	0.033	1.05	1.73	60%	Yes

Remarks:

i. The runoff coefficient is 0.9 for paved area, 0.3 for unpaved area, and 0 for pond area.

ii. Colebrook-White equation is used for velocity calculation, k_s=0.6 mm, v= 0.000001 m^2/s

iii. Time of concentration (t_c)=inlet time (t_o)+flow time (t_f). Inlet time(t_o)= $0.14465L/H^{0.2}A^{0.1}$. t_o for the Catchment A (natural catchment) = $0.14465\times113.2m/[(44mPD-4.4mPD)/113.2m\times100]^{0.2}(32667m^2)^{0.1}$=2.84min. Assume 10 min for the t_o for the catchment of Application Site. Flow time (t_f)=L_f/V_f, tf for the drain from Proposed Terminal Manhole to SMH1012333=10m/1.39m/s/60=0.12min; t_f for the drain from SMH1012332 to SMH1012333=22.60m/0.893m/s/60=0.42min; t_f for the drain from SMH1012333 to SMH1012334=13.8m/1.146m/s/60=0.2min; t_f for the drain from SMH1012334 to SNF1002684= 50.2m/0.898m/s/60=0.93min. tc for the for the drain from Proposed Terminal Manhole to SMH1012333=0.12min+10min=**10.12**min. tc for the for the drain from SMH1012332 to SMH1012333= 0.42min+2.84min=**3.26**min. t_c for the for the drain from SMH1012333 to SMH1012334= 0.2min+10.12min=**10.32**min. t_c for the for the drain from SMH1012334 to SNF1002684=10.32+0.93=**11.25**min.

iv. Rainfall Intensity(i)= $a / (t_d + b)c \times 1.281$(climate change factor, refers to the Table 28 and 31 in the Stormwater Drainage Manual-Corrigendum No. 1/2022). Constants a,b,c equal to 474.6, 2.90 and 0.371. respectively, referring to Table 3a of the SDM Corrigendum No.1/2024.

v. 50-year peak runoff (Q_p)=0.278 CiA

vi. Total runoff from Manhole SMH1012333 to Outlet SNF1002684 =50-year runoff +reclaimed water of 0.033m^3/s

vii. Assumption of 10% reduction in flow area for siltation allowance is included in the capacity calculation.

viii. No records found in the DSD Drainage Record Plan, so 1.49 mPD is assumed to be the invert level of the drain from SMH1012332 to SMH1012333. The assumption does not affect the assessment result, because the runoff from the Application Site is added to the downstream pipe.

Appendix D

Synthetic Rainfall Profile and

Its Calculation Example

Design 4-hr Rainfall Profile

Rainfall intensity is calculated according to Section 4.3.5 of SDM as below

Rain Storm Return / Period Storm Constant	10yr	50yr
a=	454.9	474.6
b=	3.44	2.9
c=	0.412	0.371

Rainfall Intensity(mm/hr) F(t) =

$$F(t) = \begin{cases} \frac{a[b+2(1-c)r]}{(2t+b)^{c+1}} & , \quad 0 \le t \le \frac{t_d}{2} \\ F(-t) & , \quad -\frac{t_d}{2} \le t \le 0 \end{cases}$$

Rainfall Depth (mm) =28.1%*[Rainfall Intensity/60]

with an intensity determined by the IDF relationship should be used.

(b) For other methods of runoff estimation and for storm durations equal to or shorter than 4 hours, a symmetrically distributed rainfall is recommended with the following formulation based on RO (1991):

$$F(t) = \begin{cases} \frac{a[b+2(1-c)r]}{(2t+b)^{c+1}} & , \quad 0 \le t \le \frac{t_d}{2} \\ F(-t) & , \quad -\frac{t_d}{2} \le t \le 0 \end{cases}$$

where F(t) = rate of rainfall or instantaneous intensity in mm/hr at time t (in minutes)
t_d = rainstorm duration (in minutes) ($t_d \le 240$)
a, b, c = storm constants given in Tables 3a, 3b, 3c and 3d, which are the same as those given for the algebraic equation of the IDF relationship

t	Time Series	Rainfall Depth (mm)		t	Time Series	Rainfall Depth (mm)		t	Time Series	Rainfall Depth (mm)		t	Time Series	Rainfall Depth (mm)		t	Time Series	Rainfall Depth (mm)	
		10yr	50yr			10yr	50yr			10yr	50yr			10yr	50yr			10yr	50yr
120	0:00:00	0.60	0.84	70	0:50:00	0.75	1.02	20	1:40:00	1.27	1.64	30	2:30:00	1.07	1.41	80	3:20:00	0.71	0.97
119	0:01:00	0.60	0.84	69	0:51:00	0.76	1.03	19	1:41:00	1.30	1.68	31	2:31:00	1.06	1.39	81	3:21:00	0.71	0.97
118	0:02:00	0.60	0.84	68	0:52:00	0.76	1.03	18	1:42:00	1.33	1.71	32	2:32:00	1.04	1.37	82	3:22:00	0.70	0.96
117	0:03:00	0.61	0.84	67	0:53:00	0.76	1.04	17	1:43:00	1.37	1.75	33	2:33:00	1.03	1.36	83	3:23:00	0.70	0.96
116	0:04:00	0.61	0.85	66	0:54:00	0.77	1.05	16	1:44:00	1.40	1.79	34	2:34:00	1.02	1.34	84	3:24:00	0.70	0.96
115	0:05:00	0.61	0.85	65	0:55:00	0.77	1.05	15	1:45:00	1.44	1.83	35	2:35:00	1.00	1.33	85	3:25:00	0.69	0.95
114	0:06:00	0.61	0.85	64	0:56:00	0.78	1.06	14	1:46:00	1.49	1.88	36	2:36:00	0.99	1.31	86	3:26:00	0.69	0.95
113	0:07:00	0.61	0.86	63	0:57:00	0.78	1.06	13	1:47:00	1.53	1.94	37	2:37:00	0.98	1.30	87	3:27:00	0.69	0.94
112	0:08:00	0.62	0.86	62	0:58:00	0.79	1.07	12	1:48:00	1.59	2.00	38	2:38:00	0.97	1.29	88	3:28:00	0.68	0.94
111	0:09:00	0.62	0.86	61	0:59:00	0.80	1.08	11	1:49:00	1.65	2.07	39	2:39:00	0.96	1.28	89	3:29:00	0.68	0.94
110	0:10:00	0.62	0.86	60	1:00:00	0.80	1.08	10	1:50:00	1.72	2.14	40	2:40:00	0.95	1.26	90	3:30:00	0.68	0.93
109	0:11:00	0.62	0.87	59	1:01:00	0.81	1.09	9	1:51:00	1.80	2.23	41	2:41:00	0.94	1.25	91	3:31:00	0.67	0.93
108	0:12:00	0.63	0.87	58	1:02:00	0.81	1.10	8	1:52:00	1.89	2.34	42	2:42:00	0.93	1.24	92	3:32:00	0.67	0.92
107	0:13:00	0.63	0.87	57	1:03:00	0.82	1.11	7	1:53:00	2.00	2.46	43	2:43:00	0.92	1.23	93	3:33:00	0.67	0.92
106	0:14:00	0.63	0.88	56	1:04:00	0.82	1.11	6	1:54:00	2.14	2.61	44	2:44:00	0.91	1.22	94	3:34:00	0.66	0.92
105	0:15:00	0.63	0.88	55	1:05:00	0.83	1.12	5	1:55:00	2.31	2.80	45	2:45:00	0.90	1.21	95	3:35:00	0.66	0.91
104	0:16:00	0.64	0.88	54	1:06:00	0.84	1.13	4	1:56:00	2.53	3.04	46	2:46:00	0.90	1.20	96	3:36:00	0.66	0.91
103	0:17:00	0.64	0.89	53	1:07:00	0.84	1.14	3	1:57:00	2.84	3.38	47	2:47:00	0.89	1.19	97	3:37:00	0.66	0.91
102	0:18:00	0.64	0.89	52	1:08:00	0.85	1.14	2	1:58:00	3.31	3.88	48	2:48:00	0.88	1.18	98	3:38:00	0.65	0.90
101	0:19:00	0.64	0.89	51	1:09:00	0.86	1.15	1	1:59:00	4.10	4.77	49	2:49:00	0.87	1.17	99	3:39:00	0.65	0.90
100	0:20:00	0.65	0.90	50	1:10:00	0.86	1.16	0	2:00:00	5.84	6.83	50	2:50:00	0.86	1.16	100	3:40:00	0.65	0.90
99	0:21:00	0.65	0.90	49	1:11:00	0.87	1.17	1	2:01:00	4.10	4.77	51	2:51:00	0.86	1.15	101	3:41:00	0.64	0.89
98	0:22:00	0.65	0.90	48	1:12:00	0.88	1.18	2	2:02:00	3.31	3.88	52	2:52:00	0.85	1.14	102	3:42:00	0.64	0.89
97	0:23:00	0.66	0.91	47	1:13:00	0.89	1.19	3	2:03:00	2.84	3.38	53	2:53:00	0.84	1.14	103	3:43:00	0.64	0.89
96	0:24:00	0.66	0.91	46	1:14:00	0.90	1.20	4	2:04:00	2.53	3.04	54	2:54:00	0.84	1.13	104	3:44:00	0.64	0.88
95	0:25:00	0.66	0.91	45	1:15:00	0.90	1.21	5	2:05:00	2.31	2.80	55	2:55:00	0.83	1.12	105	3:45:00	0.63	0.88
94	0:26:00	0.66	0.92	44	1:16:00	0.91	1.22	6	2:06:00	2.14	2.61	56	2:56:00	0.82	1.11	106	3:46:00	0.63	0.88
93	0:27:00	0.67	0.92	43	1:17:00	0.92	1.23	7	2:07:00	2.00	2.46	57	2:57:00	0.82	1.11	107	3:47:00	0.63	0.87
92	0:28:00	0.67	0.92	42	1:18:00	0.93	1.24	8	2:08:00	1.89	2.34	58	2:58:00	0.81	1.10	108	3:48:00	0.63	0.87
91	0:29:00	0.67	0.93	41	1:19:00	0.94	1.25	9	2:09:00	1.80	2.23	59	2:59:00	0.81	1.09	109	3:49:00	0.62	0.87
90	0:30:00	0.68	0.93	40	1:20:00	0.95	1.26	10	2:10:00	1.72	2.14	60	3:00:00	0.80	1.08	110	3:50:00	0.62	0.86
89	0:31:00	0.68	0.94	39	1:21:00	0.96	1.28	11	2:11:00	1.65	2.07	61	3:01:00	0.80	1.08	111	3:51:00	0.62	0.86
88	0:32:00	0.68	0.94	38	1:22:00	0.97	1.29	12	2:12:00	1.59	2.00	62	3:02:00	0.79	1.07	112	3:52:00	0.62	0.86
87	0:33:00	0.69	0.94	37	1:23:00	0.98	1.30	13	2:13:00	1.53	1.94	63	3:03:00	0.78	1.06	113	3:53:00	0.61	0.86
86	0:34:00	0.69	0.95	36	1:24:00	0.99	1.31	14	2:14:00	1.49	1.88	64	3:04:00	0.78	1.06	114	3:54:00	0.61	0.85
85	0:35:00	0.69	0.95	35	1:25:00	1.00	1.33	15	2:15:00	1.44	1.83	65	3:05:00	0.77	1.05	115	3:55:00	0.61	0.85
84	0:36:00	0.70	0.96	34	1:26:00	1.02	1.34	16	2:16:00	1.40	1.79	66	3:06:00	0.77	1.05	116	3:56:00	0.61	0.85
83	0:37:00	0.70	0.96	33	1:27:00	1.03	1.36	17	2:17:00	1.37	1.75	67	3:07:00	0.76	1.04	117	3:57:00	0.61	0.84
82	0:38:00	0.70	0.96	32	1:28:00	1.04	1.37	18	2:18:00	1.33	1.71	68	3:08:00	0.76	1.03	118	3:58:00	0.60	0.84
81	0:39:00	0.71	0.97	31	1:29:00	1.06	1.39	19	2:19:00	1.30	1.68	69	3:09:00	0.76	1.03	119	3:59:00	0.60	0.84
80	0:40:00	0.71	0.97	30	1:30:00	1.07	1.41	20	2:20:00	1.27	1.64	70	3:10:00	0.75	1.02	120	4:00:00	0.60	0.84
79	0:41:00	0.71	0.98	29	1:31:00	1.09	1.43	21	2:21:00	1.25	1.61	71	3:11:00	0.75	1.02				
78	0:42:00	0.72	0.98	28	1:32:00	1.10	1.45	22	2:22:00	1.22	1.58	72	3:12:00	0.74	1.01				
77	0:43:00	0.72	0.99	27	1:33:00	1.12	1.47	23	2:23:00	1.20	1.56	73	3:13:00	0.74	1.01				
76	0:44:00	0.73	0.99	26	1:34:00	1.14	1.49	24	2:24:00	1.18	1.53	74	3:14:00	0.73	1.00				
75	0:45:00	0.73	1.00	25	1:35:00	1.16	1.51	25	2:25:00	1.16	1.51	75	3:15:00	0.73	1.00	**4-hr Total Rainfall Depth(mm)**		**243.34**	**318.31**
74	0:46:00	0.73	1.00	24	1:36:00	1.18	1.53	26	2:26:00	1.14	1.49	76	3:16:00	0.73	0.99				
73	0:47:00	0.74	1.01	23	1:37:00	1.20	1.56	27	2:27:00	1.12	1.47	77	3:17:00	0.72	0.99				
72	0:48:00	0.74	1.01	22	1:38:00	1.22	1.58	28	2:28:00	1.10	1.45	78	3:18:00	0.72	0.98				
71	0:49:00	0.75	1.02	21	1:39:00	1.25	1.61	29	2:29:00	1.09	1.43	79	3:19:00	0.71	0.98				

Noted:

i. The storm constants are based on the SDM Corrigendum No. 1/2024

ii. The climate change effect is adopted in accordance with the DSD-SDM. A total increase of 28.1% in rainfall is added to above four design rainfall profiles, including 16% increase due to climate change up to end of 21st Century as per Table 28 of the SDM Corrigendum No. 1/2022 and 12.1% increase for design allowance as per Table 31 of the SDM Corrigendum No. 1/2022.

Calculational Examples：1 in 2yr 0:00:00(t=120) Rainfall Depth =28.1%*[474.6*[2.9+2*(1-0.371)*120]/(2*120+2.9)$^{0.371+1}$]/60=0.84 (mm)