

Attachment 1

Revised Sewerage Impact Assessment (SIA)

SECTION 12A PLANNING APPLICATION

TO REZONE THE APPLICATION SITE FROM “RESIDENTIAL (GROUP C)” AND “RESIDENTIAL (GROUP D)” TO “GOVERNMENT, INSTITUTION OR COMMUNITY (2) AT LOT 827 RP IN D.D. 130 AND ADJOINING GOVERNMENT LAND, LAM TEI, TUEN MUN, NEW TERRITORIES

Sewage Impact Assessment

September 2026

Applicant: Cyber Epoch Holdings Limited, Glory Day Development Limited
Prepared By: DeSPACE (International) Limited

1. Introduction

The Applicant, **CYBER EPOCH HOLDINGS LIMITED** and **GLORY DAY DEVELOPMENT LIMITED**, proposes to rezone the application site from “Residential (Group C)” (“R(C)”) and “Residential (Group D)” (“R(D)”) to Government, Institution or Community (2)” (“G/IC (2)”) at Lot 827 RP in D.D.130, Lam Tei, Tuen Mun, New Territories (hereinafter referred to as “the Site”) for permitted social welfare facility (Residential Care Home for Persons with Disabilities) (RCHD). The expected intake year of the proposed development is 2031.

The aim of this **Sewage Impact Assessment** is to review the capacity of the existing sewage network resulting from the proposed composite development.

2. Sewage Disposal Network

According to the drainage record plans obtained from the Government, the sewage from the Site is expected to be conveyed to the nearest public manhole FMH1015065 and flow underneath the Fuk Hang Tsuen Road to the north direction (**See Appendix 1**). Two sewers including the Proposed Terminal Manhole (**Appendix 2**) and the Proposed Additional Manhole (**Appendix 3**) are proposed to connect the proposed development with the existing sewage network. The pipe materials of the proposed sewage pipe will be clayware.

3. Assessment Criteria

This assessment has been prepared in accordance with the guidelines and reference as follows:

- A Technical Paper of Environmental Protection Department’s (EPD’s) Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, Version 1.0 (GESF): - It outlines the methodology and provides guidance for estimating sewage flows in sewerage infrastructure planning. Sewage flow parameters and peaking factors are adopted.
- Commercial and Industrial Floor Space Utilization Survey (CIFSUS) conducted by the Planning Department during November 2004 to March 2005: - It is referred to determine the worker density for different economic activities and planned usage type.
- Sewerage Manual (SM) published by the Drainage Services Department (DSD) in May 2013: - It offers guidance on the planning, design, construction, operation and maintenance of public gravity sewerage system in Hong Kong.
- Relevant Drainage Record Plans obtained from the Drainage Service Department: - It shows the details of existing sewerage record.

4. Assessment of Sewerage Impact

For the purpose of this Sewerage Impact Assessment, a total number of 320 residents and 60 staff for the proposed RCHD development have been assumed to be occupied within the proposed composite development. The wastewater generated will be contributed by the residents and employees.

Table: Sewage Flow Estimate

	No. of persons	Unit Flow Factor (m ³ /person/day)	Estimated Dry Weather Flow	Catchment Inflow Factor ^[1]	Flow Rate (m ³ /day)	Contributing Population ^[2]	Peaking Factor ^[3]	Peak Flow (L/s)
RCHD Residents	320	0.19 ^[4]	60.8	1.1	85.36	316.15	8	7.90
RCHD employees	60	0.28 ^[5]	16.8					

Remarks:

[1] Catchment Inflow Factor=1.1 (Tuen Mun) is based on EPD's GESF Table T-4.

[2] It is based on the equation from GESF: Contributing Population = $\frac{\text{Calculated total average flow}}{0.27}$

[3] Peaking Factor= 8 for population <1,000 (including stormwater allowance) as per EPD's GESF Table T-5

[4] Unit flow factor = 0.19 (Institutional and special class) is based on EPD's GESF Table T-1

[5] Unit flow factor = 0.28 (Commercial Employee + J11) is based on EPD's GESF Table T-2

5. Sewer Capacity

Detailed calculations of sewage generation and hydraulic capacity are provided in **Appendix 4**. The total peak flow occupancy of the sewer pipes is ranging from 12.98% to 125.32%.

6. Surcharge Calculation

Surcharge calculation for the downstream sewers is demonstrated to verify compliance with S.5.1.1 of DSD's "Sewerage Manual Part 1". The assessment considers:

- (a) A minimum freeboard of 1m at the manhole; and
- (b) A minimum factor of safety against overflowing of 1.15

The detailed calculation of surcharge assessment for all the manholes is illustrated in **Appendix 4**.

7. Discussion

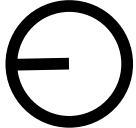
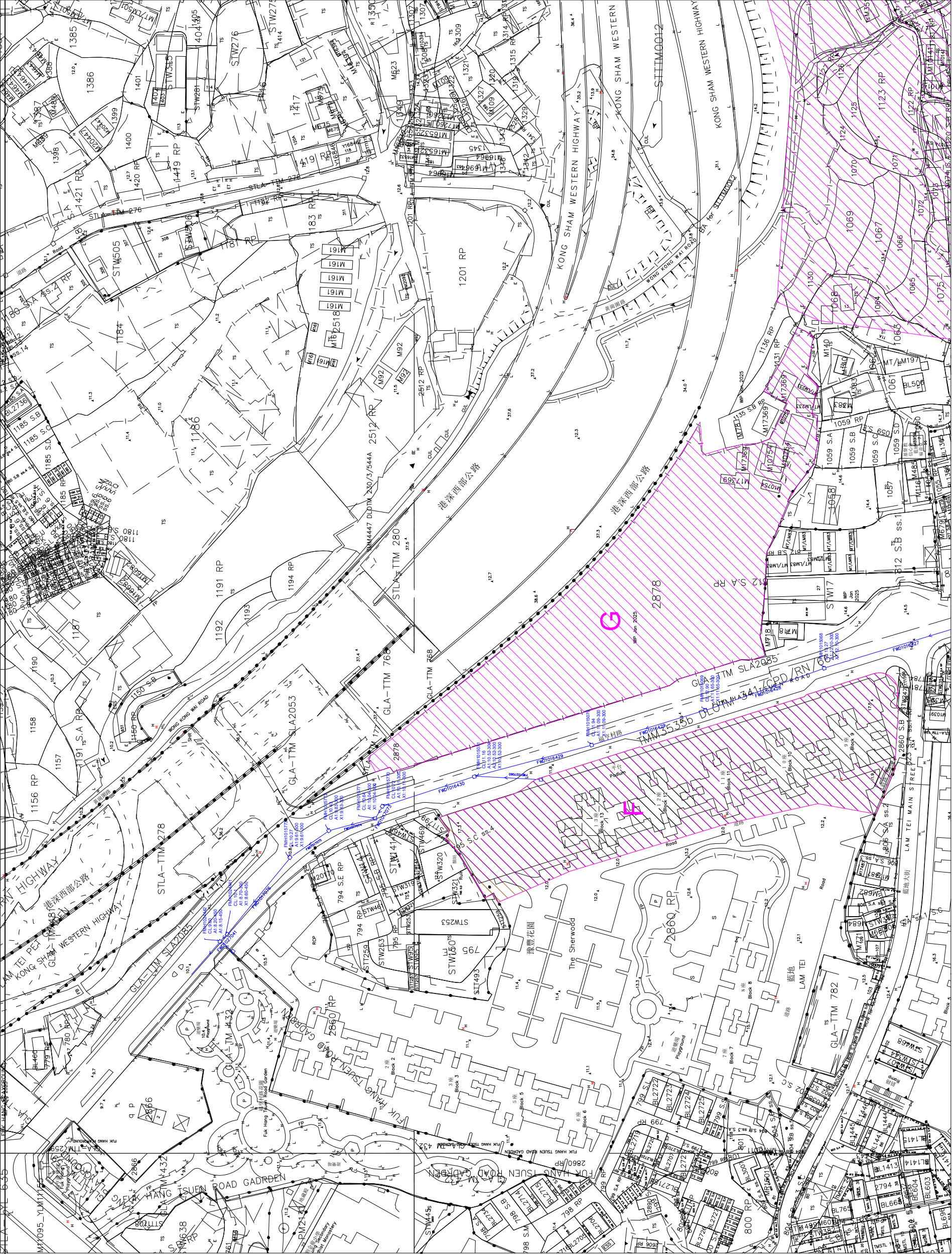
According to the Surcharge Calculation, regarding the sewage generation rate from the Proposed Development and surrounding areas, six of the existing private sewerage pipelines would not have adequate capacity to receive the flow, while the existing government sewerage pipelines would have adequate capacity.

Therefore, a sewage retention tank will be proposed for the Proposed Development such that the sewage will be discharged during non-peak sewage discharge period only (4:00 a.m. to 5:00 a.m. and 4:00 p.m. to 5:00 p.m.). It is committed that the sewage would not be discharge during the peak sewage discharge period. Furthermore, the proposed sewage retention tank will be provided with adequate capacity (2.6m(W) x 6.5m(L) x 3m(H)) to prevent potential overflow of sewage. The detailed calculation of the retention tank capacity and schematic layout plan with the proposed retention tank are illustrated in **Appendix 4** and **Appendix 5**.

The applicant will be responsible to maintain the proposed sewerage pipeline connection which is already implemented, and the construction, operation & maintenance of the proposed sewage retention tank. With the proposed connection and sewage retention tank for the discharge of sewage during non-peak sewage discharge period in place, the sewerage system will have adequate capacity to cater the sewage from the Proposed Development and nearby catchments.

Appendix 1

Sewage Network Plan



DRAWING TITLE:
CATCHMENT PLAN - 1

DRAWING NUMBER:
FIGURE 1

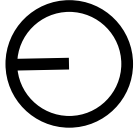
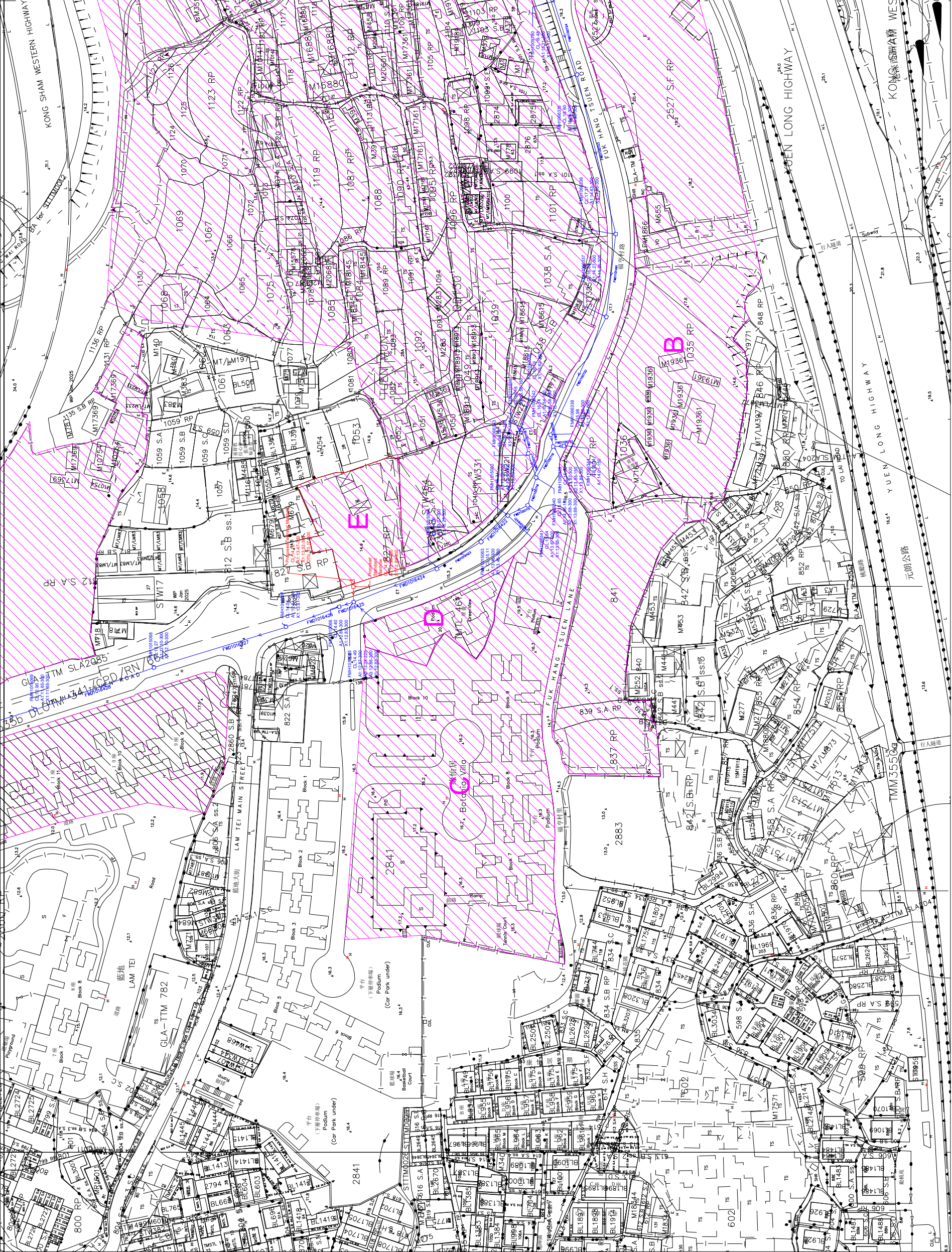
- LEGEND:**
- SITE BOUNDARY
 - CATCHMENT AREA
 - EXISTING SEWAGE PIPE
 - PROPOSED SEWAGE MANHOLE
 - PROPOSED SEWAGE PIPE

SCALE:
N.T.S

DATE:
JULY 2026

PREPARED BY:

 DeSPACE (International) Limited



DRAWING TITLE:

CATCHMENT PLAN - 2

DRAWING NUMBER:

FIGURE 2

LEGEND:



SITE BOUNDARY



PROPOSED SEWAGE PIPE



CATCHMENT AREA



EXISTING SEWAGE PIPE



PROPOSED SEWAGE MANHOLE



EXISTING SEWAGE MANHOLE

SCALE:

N.T.S

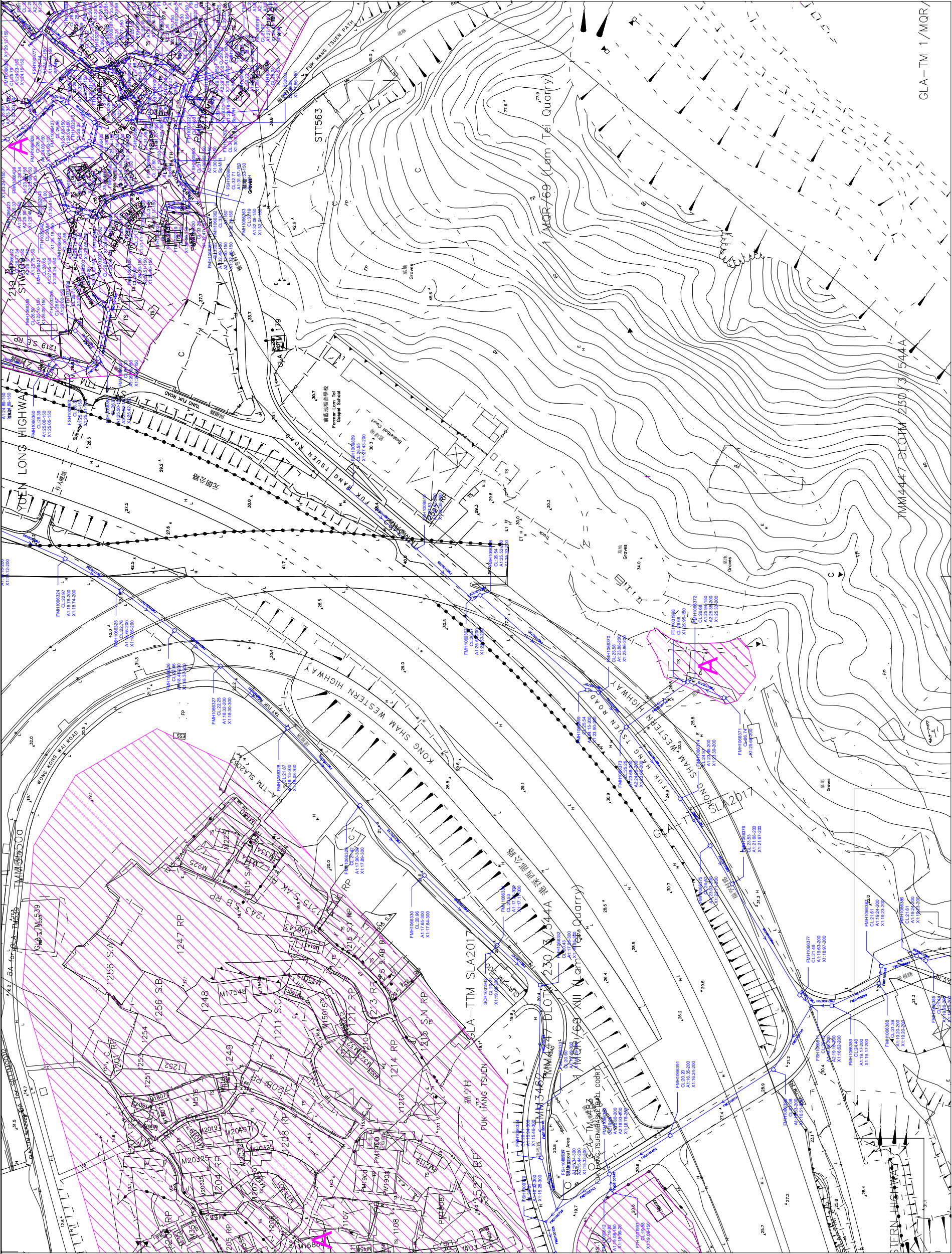
DATE:

JULY 2026

PREPARED BY:



DeSPACE (International) Limited



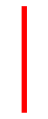
GLA-TM 1/MQR/

DRAWING TITLE:
CATCHMENT PLAN - 3

DRAWING NUMBER:
FIGURE 3

LEGEND:

 SITE BOUNDARY

 PROPOSED SEWAGE PIPE

 CATCHMENT AREA

 EXISTING SEWAGE PIPE

 PROPOSED SEWAGE MANHOLE

 EXISTING SEWAGE MANHOLE

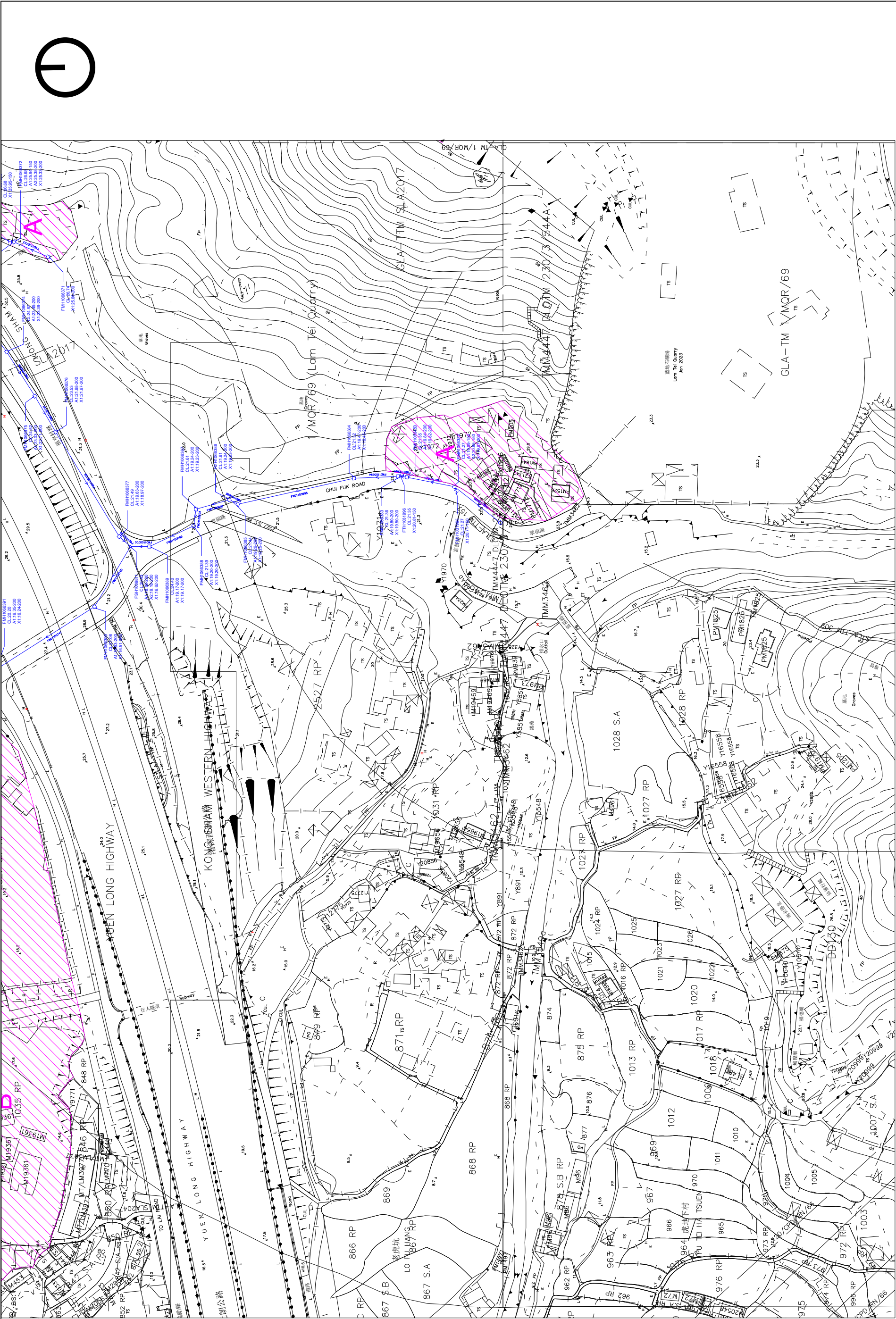
SCALE:
N.T.S

DATE:
JULY 2026

PREPARED BY:



DeSPACE (International) Limited



DRAWING TITLE:

CATCHMENT PLAN - 4

DRAWING NUMBER:

FIGURE 4

LEGEND:



SITE BOUNDARY



CATCHMENT AREA



EXISTING SEWAGE PIPE



PROPOSED SEWAGE PIPE



PROPOSED SEWAGE MANHOLE



EXISTING SEWAGE MANHOLE

SCALE:

N.T.S

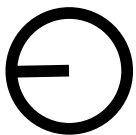
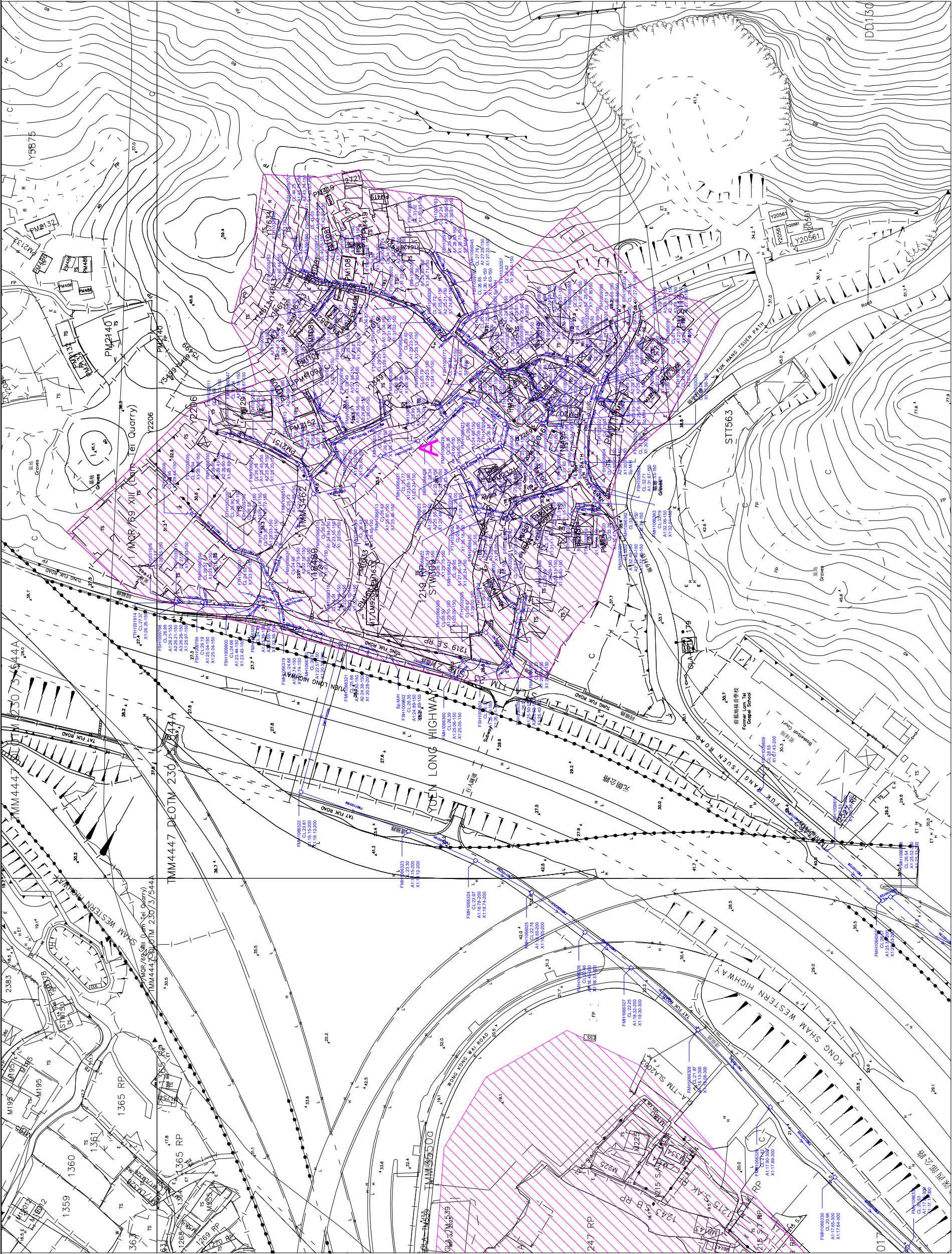
DATE:

JULY 2026

PREPARED BY:



DeSPACE (International) Limited



DRAWING TITLE:
CATCHMENT PLAN - 5

DRAWING NUMBER:
FIGURE 5

- LEGEND:**
- SITE BOUNDARY
 - CATCHMENT AREA
 - EXISTING SEWAGE PIPE
 - PROPOSED SEWAGE MANHOLE
 - PROPOSED SEWAGE PIPE

SCALE:
N.T.S

DATE:
JULY 2026

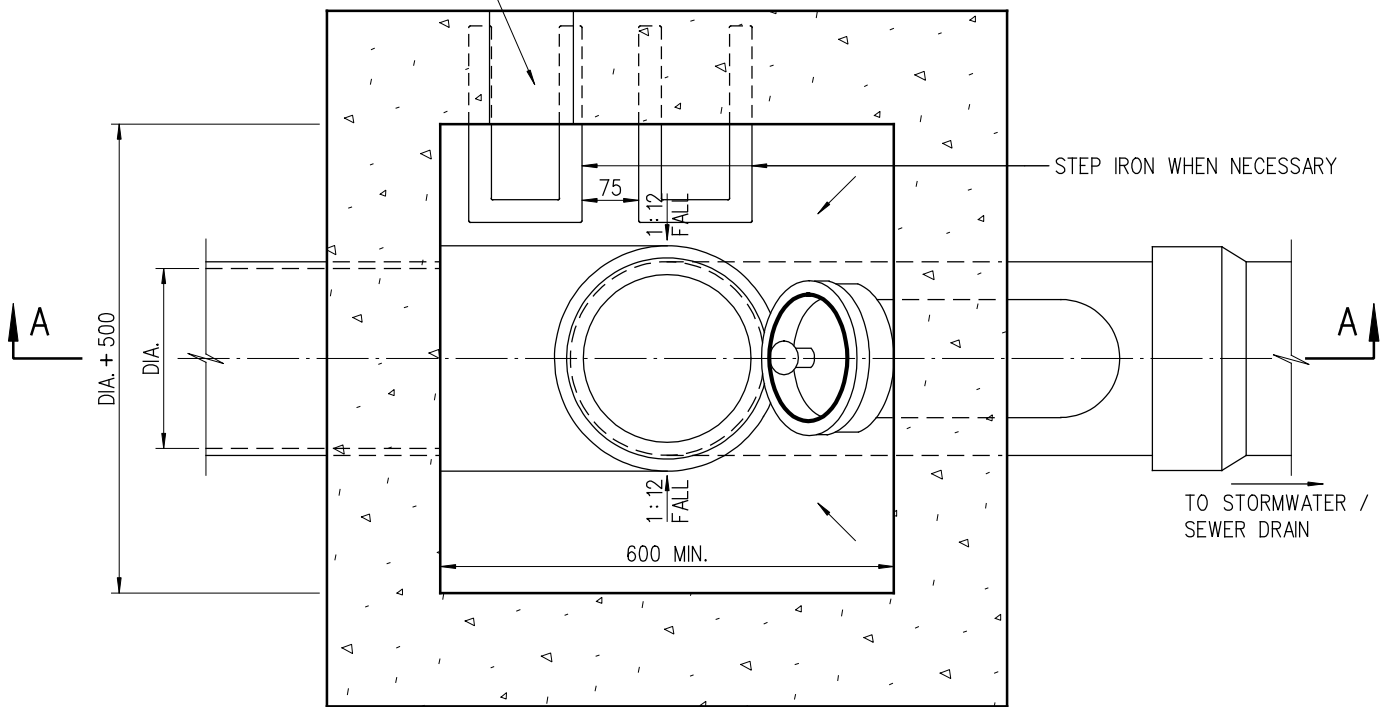
PREPARED BY:


DeSPACE (International) Limited

Appendix 2

Type of Proposed Terminal Manhole

OPENING FOR F.A.I.
(FOR SEWER MANHOLE ONLY)



SECTIONAL PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. CONCRETE IS TO BE GRADE 30/20.
3. PIPE DIAMETER OF PIPE TO BE LESS THAN OR EQUAL TO 450 mm.
4. THIS STANDARD DRAWING IS APPLICABLE TO EXISTING TERMINAL MANHOLE ONLY. THE STANDARD TERMINAL MANHOLE TYPE T1_1 IN DSD STANDARD DRAWING NO. DS1090 SHOULD BE ADOPTED INSTEAD FOR NEW TERMINAL MANHOLE WITH SIMILAR DEPTH AND PIPE SIZE.

C	NOTE 4 ADDED	ORIGINAL SIGNED	13.1.2016
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001
REV.	DESCRIPTION	SIGNATURE	DATE

**TERMINAL MANHOLE
TYPE T1**

DRAINAGE SERVICES DEPARTMENT

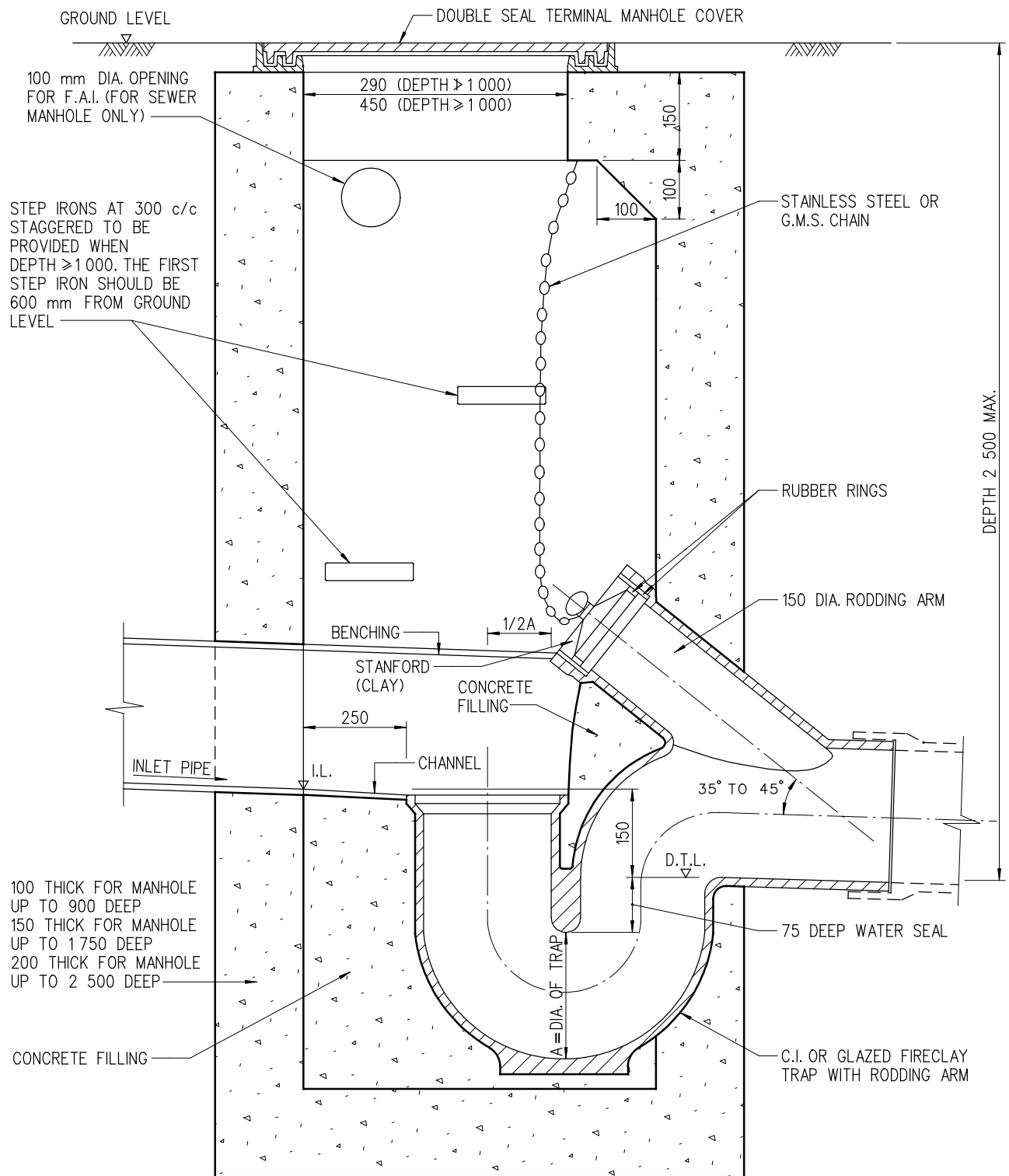
REFERENCE

DRAWING No.

SCALE

1 : 10

DS 1053C
(SHEET 1 OF 2)



SECTION A-A

C	NOTE 4 ADDED	ORIGINAL SIGNED	13.1.2016
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001
REV.	DESCRIPTION	SIGNATURE	DATE

**TERMINAL MANHOLE
TYPE T1**

DRAINAGE SERVICES DEPARTMENT

REFERENCE

DRAWING No.

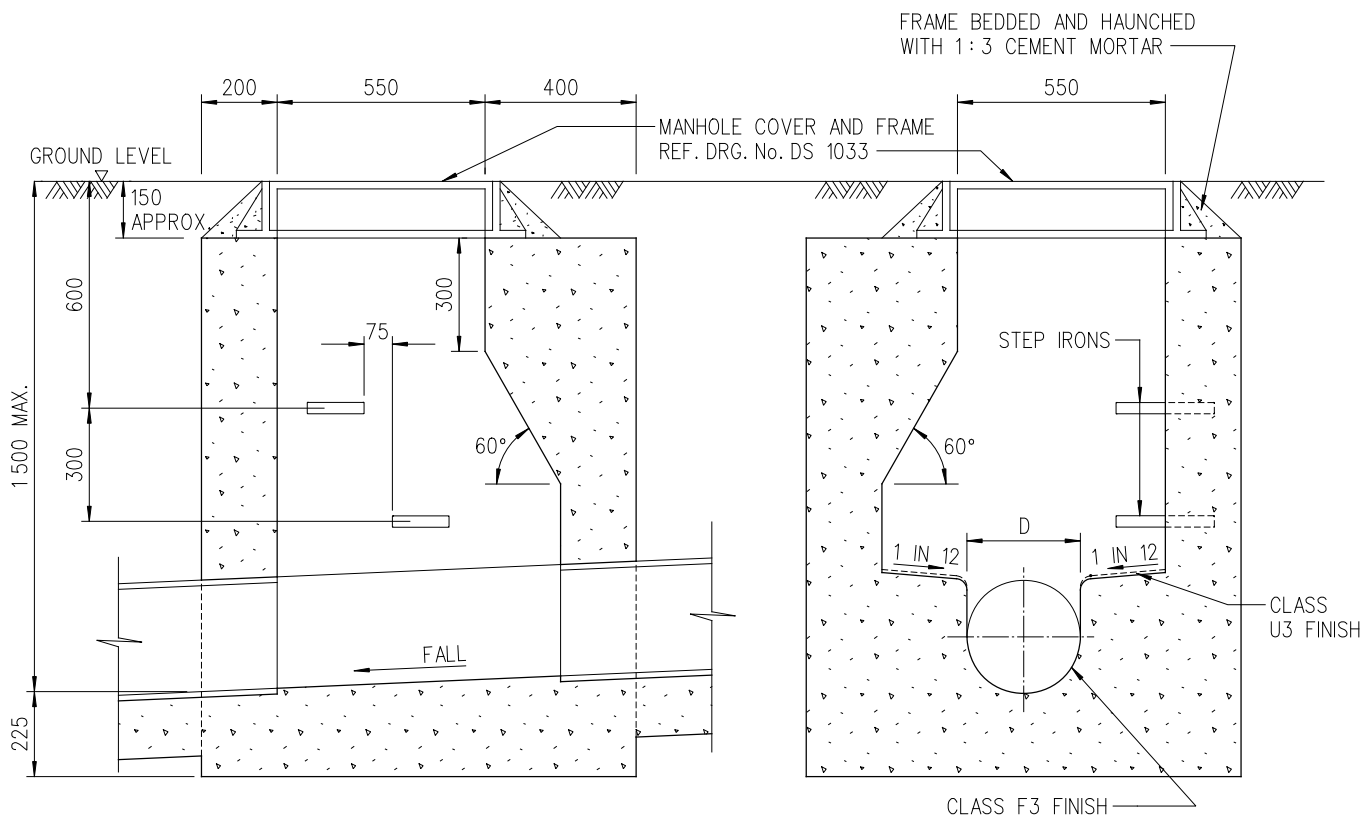
SCALE

1 : 10

DS 1053C
(SHEET 2 OF 2)

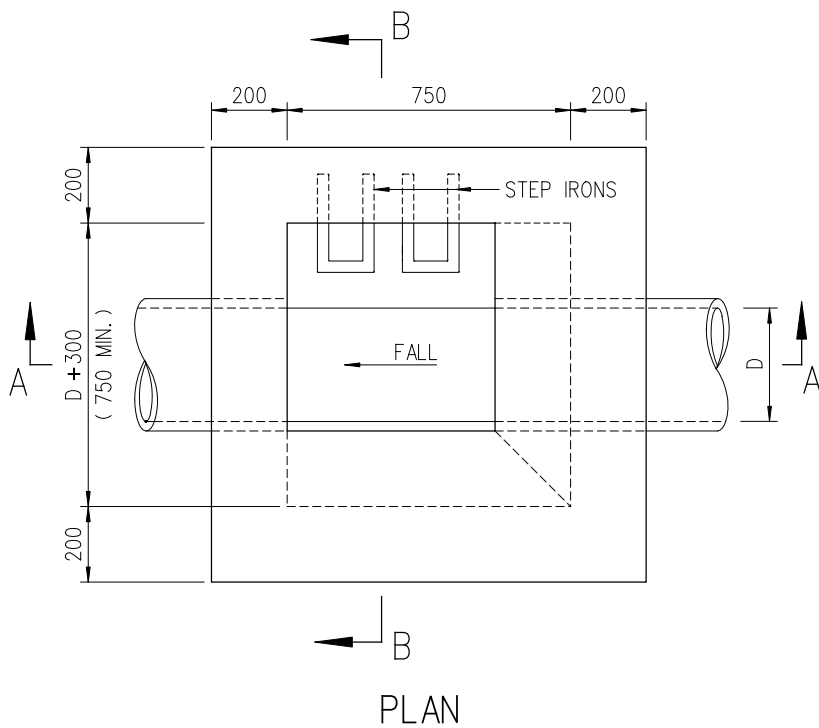
Appendix 3

Type of Proposed Additional Manhole



SECTION A-A

SECTION B-B



PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. PIPE DIAMETER : 150 TO 675 mm
3. NORMAL RANGE : 1000 TO 1500 mm (FROM ROAD LEVEL TO LOWEST INVERT)
4. USED IN : STORMWATER DRAIN AND SEWER
5. JUNCTION : POSITION OF JUNCTION TO BE DETERMINED IN EACH INDIVIDUAL CASE. CHANNELS IMMEDIATELY UNDER ACCESS TO MANHOLE SHOULD BE AVOIDED.
6. TOP TREATMENT : SEE DRG. No. DS 1032
7. FOUNDATION : FOUNDATION OF MANHOLE VARIES WITH SITE CONDITION. THEREFORE, IT SHOULD BE DETERMINED ON SITE BY THE ENGINEER.
8. CONCRETE : GRADE 30/20
9. COVER AND FRAME NOT SHOWN ON PLAN FOR CLARITY
10. THIS DSD STANDARD DRAWING IS APPLICABLE TO EXISTING MANHOLE ONLY. THE STANDARD MANHOLE TYPE D1 IN DSD STANDARD DRAWING NO. DS1079 WITH 675mm OPENING SHOULD BE ADOPTED FOR NEW MANHOLE OF THIS SIZE. FOR EXISTING MANHOLE WITH 570 MANHOLE COVER, THE MAINTENANCE AUTHORITY WOULD REPLACE THE COVER WITH 675 MANHOLE COVER AND OPENING WHERE SITUATION WARRANTS.

C	NOTE 10 ADDED	ORIGINAL SIGNED	29.4.2014
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001
REV.	DESCRIPTION	SIGNATURE	DATE

STANDARD MANHOLE
TYPE D

DRAINAGE SERVICES DEPARTMENT

REFERENCE

DRAWING No.

SCALE

1 : 20

DS 1004C

Appendix 4

Detailed Calculations of Sewage Generation and Hydraulic Capacity

Table 1: Calculation for Sewage Generation Rate of the Proposed Development

1. RCHD		
Nos. of Beds	320 the upper-end provision in the proposal	
Nos. of Staff	60 As advised by the Applicant	
Unit Flow Factor for the Residents Unit Flow Factor for staff Estimated Dry Weather Flow	0.19	m ³ /day/person - from GESF(Table T-1) - UFF for Domestic Flows (Institutional and special class)
	0.28	m ³ /day/person - from GESF(Table T-2) - UFF for Commercial Flows and Student Flows (Commercial Emppolycee and J11 Community, Social & Personal Services)
	77.60	m ³ /day
Total Flow from Proposed Development		
Catchment Inflow Factor	1.1	Catchment Inflow Factor = 1.10 (Tuen Mun) from EPD's GESF Table T-4
Flow Rate	85.36	m ³ /day
Contributing Population	316.15	0.27 from EPD's GESF
Peaking Factor	8	Peaking Factor=8 for population <1,000 (including stormwater allowance) from EPD's GESF Table T-5
Peak Flow	7.90	L/s

Table 2: Calculation for Sewage Generation

Existing Development

A	Fuk Hang Tsuen		
	Number of Houses	140	Data as provided by EPD
	Average Domestic Household Size	2.6	from 2026 Population Census
	Population	364	
	Unit Flow Factor	0.27 m ³ /person/day	from GESF(Table T-1) - UFF for Domestic Flow (Village House) under Datum (2002)
	Estimated Dry Weather Flow	98.28 m ³ /day	
B	Planning Application (A/TM-LTTY/249-3)'s Flats (apartment)		
	Total number of units	115 units	from SIA of Planning Application (A/TM-LTTY/249-3)
	Average Domestic Household Size	2.6	from 2026 Population Census
	Total number of residents	299 people	
	Unit Flow Factor	0.37 m ³ /person/day	from GESF(Table T-1) - UFF for Domestic Flow (Private R4) under Datum (2002)
	Estimated Dry Weather Flow	110.63 m ³ /day	
	Planning Application (A/TM-LTTY/249-3)'s Club House		
	Site Area	233 m ²	from SIA of Planning Application (A/TM-LTTY/249-3)
	Assumed Floor Area Per Employee	15.0 m ² per worker	from SIA of Planning Application (A/TM-LTTY/249-3)
	Total number of Employees	16	from SIA of Planning Application (A/TM-LTTY/249-3)
	Unit Flow Factor For Commercial Activities	0.28 m ³ /person/day	from GESF(Table T-2) - UFF for Domestic Flow (J11 Community, Social & Personal Services) under Datum (2002)
	Estimated Dry Weather Flow	4.48 m ³ /day	
C	Botania Villa Block 7-10 Residential Flats & Swimming Pool		
	Total number of units	675 units	from Centaline Property Hong Kong
	Average Domestic Household Size	2.6	from 2026 Population Census
	Total number of residents	1755 people	
	Unit Flow Factor	0.27 m ³ /person/day	from GESF(Table T-1) - UFF for Domestic Flow (Private R2) under Datum (2002)
	Estimated Dry Weather Flow	473.85 m ³ /day	
	Assumed Area of Pool	585.00 m ²	
	Average Depth of Water	1.2 m	ordinary assumption
	Volume of Water Feature	702.00 m ³	
	Turnover Rate	6.00 hr	
	Adopted Surface Loading Rate of Filter	50 m ³ /m ² /hr	
	Adopted Filter Area	2 m ²	
	Backwash Duration	3 min/d	
	Backwash flow rate	30 m ³ /m ² /hr	
	Design flow for Water Feature Backwashing	4 m ³ /day	
	Estimated Dry Weather Flow (including backwash of water feature)	477 m ³ /day	
D	GreenView 2/F-11/F Residential Flats		
	Total number of units	32 units	from Centaline Property Hong Kong
	Average Domestic Household Size	2.6	from 2026 Population Census
	Total number of Residents	83	
	Unit Flow Factor	0.27 m ³ /person/day	from GESF(Table T-1) - UFF for Domestic Flow (Private R2) under Datum (2002)
	Estimated Dry Weather Flow	22.46 m ³ /day	
	GreenView Clubhouse		
	Assumed Area	585 m ²	
	Assumed Floor Area Per Employee	30.3 m ² per worker	from Table 8 of CIFSUS - Community, Social & Personal Services
	Total number of Employees	19	
	Unit Flow Factor For Commercial Activities	0.28 m ³ /person/day	from GESF(Table T-2) - UFF for Domestic Flow (J11 Community, Social & Personal Services) under Datum (2002)
	Estimated Dry Weather Flow	5.41 m ³ /day	
E	Proposed Development		
	Estimated Dry Weather Flow	77.60 m ³ /day	refer to Table 1 - Calculation for Sewage Generation Rate of the Proposed Development
F	Pok Oi Hospital Tuen Mun Lam Tei Nursing and Residential Care Home for the Elderly		
	Estimated Dry Weather Flow	387.40 m ³ /day	Data as provided by EPD
	Pok Oi Hospital Day Care Centre for Elderly		
	Estimated Dry Weather Flow	53.87 m ³ /day	Data as provided by EPD
G	The Sherwood Block 9-13 Residential Flats & Swimming Pool		
	Total number of units	656 units	from Centaline Property Hong Kong
	Average Domestic Household Size	2.6	from 2026 Population Census
	Total number of residents	1706 people	
	Unit Flow Factor	0.27 m ³ /person/day	from GESF(Table T-1) - UFF for Domestic Flow (Private R2) under Datum (2002)
	Estimated Dry Weather Flow	460.51 m ³ /day	
	Assumed Area of Pool	605.00 m ²	
	Average Depth of Water	1.2 m	ordinary assumption
	Volume of Water Feature	726.00 m ³	
	Turnover Rate	6.00 hr	
	Adopted Surface Loading Rate of Filter	50 m ³ /m ² /hr	
	Adopted Filter Area	2 m ²	
	Backwash Duration	3 min/d	
	Backwash flow rate	30 m ³ /m ² /hr	
	Design flow for Water Feature Backwashing	4 m ³ /day	
	Estimated Dry Weather Flow (including backwash of water feature)	464 m ³ /day	

Table 3: Total Estimated Peak Flow

Segment	Included Catchment	Total Estimated Dry Weather Flow (m ³ /day)	Catchment Inflow Factor ^[1]	Cumulative Average Dry Weather Flow (m ³ /day)	Contributing Population ^[2]	Peaking Factor ^[3]	Total Estimated Peak Flow (m ³ /day)	Total Estimated Peak Flow (L/s)
S1 S2, S3, S4, S5 S6, S7, S8, S9, S10, S11 and S12	A + B + C + D + E	796.22	1.1	875.84	3243.87	6	5255.07	60.82
	A + B + C + D + E + F	1237.49	1.1	1361.24	5041.64	6	8167.45	94.53
	A + B + C + D + E + F + G	1701.63	1.1	1871.80	6932.59	5	9358.99	108.32

Remarks:

^[1] Catchment Inflow Factor = 1.10 (Tuen Mun) based on EPD's GESF Table T-4

^[2] Based on the equation from GESF:

$$\text{Contributing Population} = \frac{\text{Calculated total average flow (m}^3\text{/day)}}{0.27 \text{ (m}^3\text{/person/day)}}$$

^[3]Peaking Factor= 6 for population 1,000-5,000 and 5 for population 5,000-10,000 (including stormwater allowance) base on EPD's GESF Table T-5

Table 4: Sewer Capacity Check

Segment	Pipe Name	Manhole Reference		Pipe Diameter (m)	Pipe Length (m)	Invert Level (mPD)		g_s (m/s ²)	k_s (m)	s	v (m ² /s)	V (m/s)	Sectional Area (m ²)	Q (m ³ /s)	Sewer Capacity (L/s)	Estimated Sewage Flow (L/s)	% of Peak Flow to Sewer Capacity
S1	FWD1016425	Downstream	FWD1016425	0.3	5.5	12.89	12.83	9.81	0.003	0.0109	0.0000014	1.2985	0.071	0.092	91.79	60.82	66.27%
S2	FWD1016426	FWD1015065	FWD1015066	0.3	22	12.83	12.61	9.81	0.006	0.0100	0.0000014	1.0986	0.071	0.078	77.65	94.53	121.74%
S3	FWD1016427	FWD1015066	FWD1015067	0.3	55.5	12.61	12.1	9.81	0.003	0.0092	0.0000014	1.1915	0.071	0.084	84.22	94.53	112.24%
S4	FWD1016428	FWD1015068	FWD1015069	0.3	48	12.1	11.65	9.81	0.003	0.0094	0.0000014	1.2035	0.071	0.085	85.07	94.53	111.12%
S5	FWD1016429	FWD1015069	FWD1015070	0.3	50	11.65	11.09	9.81	0.003	0.0112	0.0000014	1.3158	0.071	0.093	93.01	94.53	101.64%
S6	FWD1016430	FWD1015070	FWD1015071	0.3	51.5	11.09	10.52	9.81	0.003	0.0111	0.0000014	1.3080	0.071	0.092	92.45	108.32	117.16%
S7	FWD1016348	FWD1015071	FWD1015070	0.3	36	10.52	10.11	9.81	0.003	0.0114	0.0000014	1.3268	0.071	0.094	93.79	108.32	115.50%
S8	FWD1017073	FWD1015770	FWD1017771	0.3	4.5	10.11	10.04	9.81	0.003	0.0156	0.0000014	1.5512	0.071	0.110	109.65	108.32	98.79%
S9	FWD1017074	FWD1017771	FWD1017772	0.3	19	10.04	9.83	9.81	0.003	0.0111	0.0000014	1.3070	0.071	0.092	92.39	108.32	117.24%
S10	FWD1017075	FWD1017772	FWD1015773	0.3	18.5	9.83	9.61	9.81	0.003	0.0119	0.0000014	1.3559	0.071	0.096	95.84	108.32	113.02%
S11	FWD1017076	FWD1015773	FWD1024441	0.3	40.3	9.61	8.7	9.81	0.003	0.0226	0.0000014	1.8695	0.071	0.132	132.15	108.32	81.97%
S12	FWD1027041	FWD1024441	FWD1024442	0.45	3.7	8.6	8.2	9.81	0.003	0.1081	0.0000014	5.3592	0.159	0.852	852.34	108.32	12.71%

Remarks:

(1) A sewer connection is proposed from the Proposed Terminal Manhole to the Proposed Standard Manhole (without disconnecting trap). The details of the proposed sewer are provided below:

Pipe Name	Manhole Reference Upstream	Manhole Reference Downstream	Pipe Diameter (m)	Pipe Length (m)	Invert Level (mPD) Upstream	Invert Level (mPD) Downstream	g_s (m/s ²)	k_s (m)	s	v (m ² /s)	Sectional Area (m ²)	Q (m ³ /s)	Sewer Capacity (L/s)	Estimated Sewage Flow (L/s)	% of Peak Flow to Sewer Capacity
Proposed Sewerage Pipe 1	Proposed Terminal Manhole	Proposed Additional Manhole	0.3	0.73	13.17	13.03	9.81	0.003	0.1918	0.0000014	5.4542	0.071	0.386	7.90	2.05%

(2) A sewer connection is proposed from the Proposed Standard Manhole to the existing sewerage network. The details of the proposed sewer are provided below:

Pipe Name	Manhole Reference Upstream	Manhole Reference Downstream	Pipe Diameter (m)	Pipe Length (m)	Invert Level (mPD) Upstream	Invert Level (mPD) Downstream	g_s (m/s ²)	k_s (m)	s	v (m ² /s)	Sectional Area (m ²)	Q (m ³ /s)	Sewer Capacity (L/s)	Estimated Sewage Flow (L/s)	% of Peak Flow to Sewer Capacity
Proposed Sewerage Pipe 2	Proposed Additional Manhole	FWD1015065	0.3	4.94	13.03	12.98	9.81	0.003	0.0101	0.0000014	1.2506	0.071	0.088	88.40	8.94%

(3) The value of $k_s = 0.3\text{mm}$ is adopted for the calculation of slined polyethylene sewer, poor condition (based on Table 5: Recommended Roughness Values in Sewerage Manual)

(4) The mean velocity is calculated using the Goldbrock-White Equation:
$$v = \sqrt{\frac{8gDs}{3.7D}} \left(\frac{k_s}{2.51v} + \frac{2.51v}{D} \right)$$

Table 5: Sewer Surcharge

Hydraulic Capacity of Existing Sewer - Surcharged Condition

Step	Hydraulic Capacity of Crossing Sewer - Straight Configuration										2. Friction Factor				3. Hydraulic Gradient		4. Friction Loss		5. Entry Loss		6. Foulwater level		7. Foulwater level 2		8. Check	
Item	Pipe Dia. (D)	Pipe Length (L)	Invert Level 1	Invert Level 2	Cover Level 1	Cover Level 2	Area (A)	Peak Flow (Q)	kinematic viscosity of water (v)	Flow Velocity (V)	Reynolds Number (Re)	coefficient (Ks)	(Ks/3.7D) ^{1/4}	6/Re	sqr t f	Friction factor (f)	gravity (g)	Hydraulic Gradient	Friction Loss (Hf)	Entry Loss (Hv)	Exit Loss (H2)	Foulwater level 1	Foulwater level 2	Foulwater level 2	Foulwater level 2	Check
Unit	mm	m	mPD	mPD	mPD	mPD	m ²	L/s	m/s	m/s	(Re)	m		m			m/s ²		(s)	m	m	m				
P1-S1	300	5.5	12.89	12.83	14.49	14.40	0.071	60.32	0.000001004	0.8905	257170.5230	0.0330	0.0000000003	0.00003	0.1215	0.0148	9.8100	0.0019	0.0102	0.0189	0.0377			12.2940	2.1010	OK
S1-S2	300	55.0	12.83	12.61	14.40	14.04	0.071	94.53	0.000001004	1.3373	396022.2817	0.0660	0.0000000007	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	2.1010	1.9887	OK
S2-S3	300	22.5	12.61	12.50	14.04	13.27	0.071	94.53	0.000001004	1.3373	396022.2817	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	1.9887	1.5889	OK
S3-S4	300	55.0	12.50	12.28	13.27	12.91	0.071	138.32	0.000001004	1.5324	457898.7529	0.0660	0.0000000007	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	1.5889	1.1901	OK
S4-S5	300	51.5	11.69	11.69	12.91	11.84	0.071	94.53	0.000001004	1.3373	396022.2817	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	1.1901	0.9135	OK
S5-S6	300	51.5	11.69	11.69	11.84	11.16	0.071	108.32	0.000001004	1.5324	457898.7529	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	0.9135	0.5658	OK
S6-S7	300	36.0	10.52	10.11	11.16	10.72	0.071	108.32	0.000001004	1.5324	457898.7529	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	0.5658	0.1660	OK
S7-S8	300	44.5	10.11	10.04	10.72	10.64	0.071	108.32	0.000001004	1.5324	457898.7529	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	0.1660	0.0353	OK
S8-S9	300	36.0	10.04	9.81	10.64	10.43	0.071	108.32	0.000001004	1.5324	457898.7529	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	0.0353	0.0070	OK
S9-S10	300	38.5	9.83	9.61	10.43	10.27	0.071	108.32	0.000001004	1.5324	457898.7529	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	0.0070	0.0020	OK
S10-S11	300	40.3	9.61	9.61	10.27	10.10	0.071	108.32	0.000001004	1.5324	457898.7529	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	0.0020	0.0000	OK
S11-S12	300	40.3	9.61	9.61	10.27	10.10	0.071	108.32	0.000001004	1.5324	457898.7529	0.0330	0.0000000003	0.00002	0.1166	0.0136	9.8100	0.0041	0.0910	0.0456	0.0912	12.5940	12.0713	0.0000	0.0000	OK

Hydraulic Capacity of Existing Sewer - Surcharged Condition with 1.15 Safety Factor

Hydraulic Calculations of Existing Sewer - Sewerage Pipe Condition from 1.10 Street - 2.00m															
Step	Pipe Data (D)			Invert Level 1			Invert Level 2			Cover Level 1			Cover Level 2		
Item	Pipe Dia. (D)	Pipe Length (L)	Unit	mPD	m	mm	mPD	m	mm	mPD	m	mm	mPD	m	mm
1 Reynolds Number															
Kinematic viscosity of water (v)			mm ² /s	Flow Velocity (V)			m/s	Reynolds Number (Re)							
Peak Flow (Q)			L/s	Area (A)			m ²	Friction Factor (f)							
		</													

Table 6: Retention Tank Capacity

Total Flow from Proposed Development		
Flow Rate	85.36	m ³ /day
Safety Factor	1.15	factor of safety
Peak Flow	98.164	m ³ /day
Retention Tank Capacity		
Number of Sewage Discharges from the Retention Tank	2 times/day (based on the non-peak hours of Figure VIII-F3 : Typical Diurnal Flow Pattern of Kwun Tong PTW (Taken as a Typical Major PTW) in EPD/TP 1/05)	
Peak Flow of the Retention Tank	49.082	m ³ /day

Remarks:

- (1) With reference to the non-peak hours of Figure VIII-F3 : Typical Diurnal Flow Pattern of Kwun Tong PTW in EPD/TP 1/05, the periods from 4:00 a.m. to 5:00 a.m. and from 4:00 p.m. to 5:00 p.m. have been identified as the non-peak hours for the operation of the retention tank.
- (2) As all sewage generated by the proposed development will be temporarily stored in the retention tank (2.6m(W) x 6.5m(L) x 3m(H)) and discharged during the designated non-peak hours, no adverse impact on the capacity and operation of the surrounding sewerage system is anticipated.

Appendix 5

Schematic Layout Plan with the Proposed Retention Tank

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APPLICATION SITE BOUNDARY

[illegible]

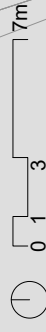
DeSPACE (International) Limited

PROJECT MANAGER

PROPOSED RESIDENTIAL CARE HOMES
FOR PERSONS WITH DISABILITIES AT
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G/F LAYOUT PLAN

1:250@A3