Appendix 7

SEWERAGE IMPACT ASSESSMENT

AtkinsRéalis

Application for Amendment of Plan Under Section 12A of the Town Planning Ordinance (Cap. 131)
Gain Million Development Limited

16 October 2026

Sewerage Impact Assessment (SIA) Report

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1. Introduction

1.1 Background

1.1.1 This Sewerage Impact Assessment (SIA) Report is prepared by AtkinsRealis Asia Limited on behalf of the Applicant, Gain Million Development Limited, in support of a Section 12A Planning Application for the Proposed Amendment to the Approved Lam Tei and Yick Yuen Outline Zoning Plan No. S/TM-LTYY/14 from "Comprehensive Development Area", "Green Belt" and "Residential (Group B) 3" Zones to "Residential (Group B) 4" Zone at Lot Nos. 837 RP (Part), 839 S.A RP (Part), 841 (Part), 1035 RP, 1037 RP and 2527 S.F RP (Part) in D.D. 130 and Adjoining Government Land, Lam Tei, Tuen Mun, to facilitate a Proposed Residential Development with supporting commercial uses and social welfare facilities (Proposed Development).

1.2 Purpose of this Report

1.2.1 This SIA considers the potential sewerage impact due to the Proposed Development. The objective of the SIA is to identify, assess and mitigate – if required – the potential adverse sewerage impacts which may arise from the Proposed Development.

1.3 Abbreviations

1.3.1 The following abbreviations are used in this Report:

DSD	Drainage Services Department
DRA	Drainage Reserve Area
EPD	Environmental Protection Department
GESF	Guidelines for Estimating Sewage Flows
HKPSG	Hong Kong Planning Standards and Guidelines
NBA	Non-Building Area
OZP	Outline Zoning Plan
SIA	Sewerage Impact Assessment
SPS	Supplementary Planning Statement

2. Site Characteristics

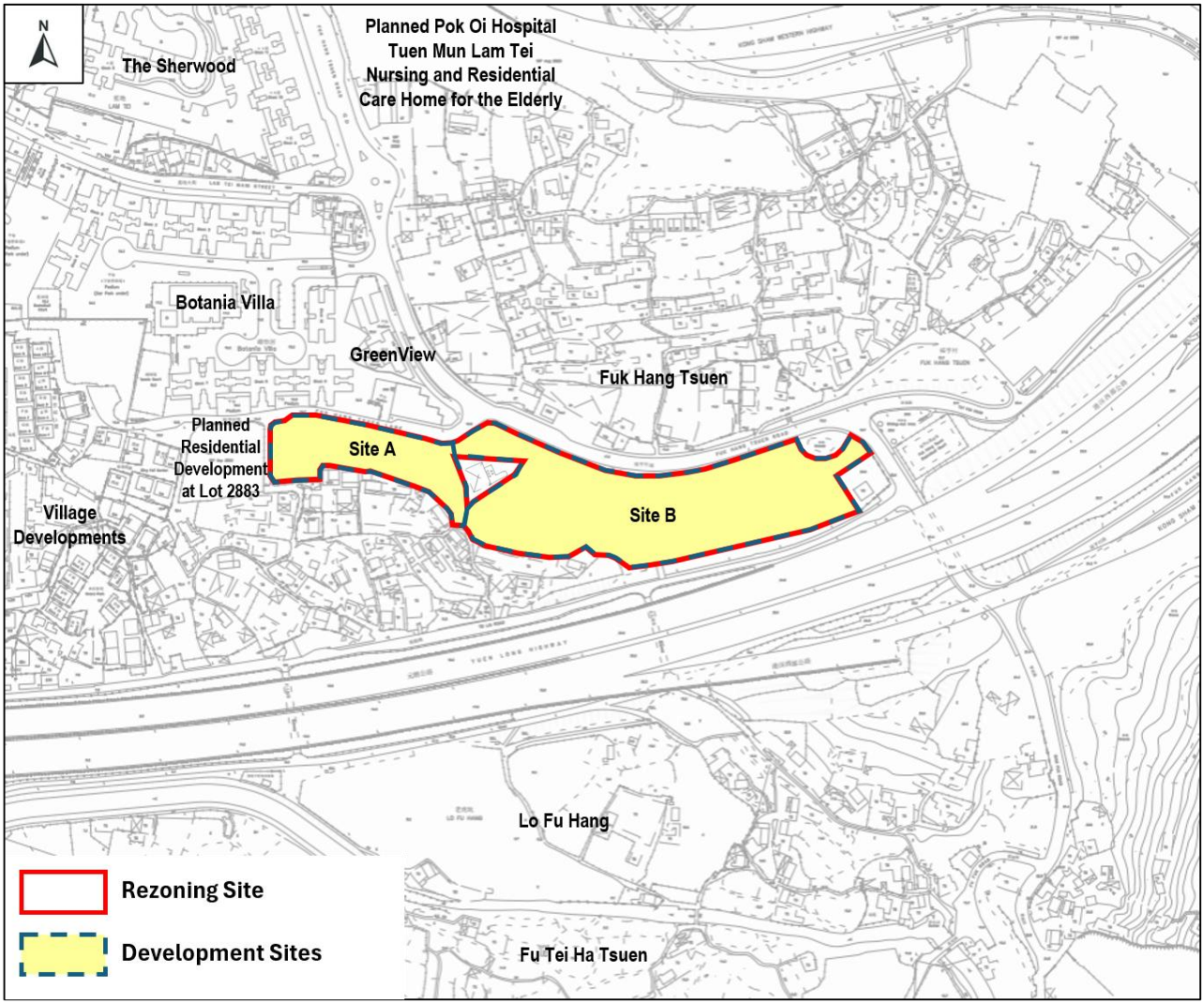
2.1 Rezoning Site and Development Sites

2.1.1 The Rezoning Site is currently zoned “CDA”, with minor portions falling within the “R(B)3” and “GB” zones, under the Approved Lam Tei and Yick Yuen Outline Zoning Plan No. S/TM-LTYY/14 (“Approved OZP”).

2.1.2 The Rezoning Site has a total site area of approximately 14,036m^2 and comprises two Development Sites, namely Site A, located on the western side, with a site area of approximately 3,325m^2 and Site B, located on the eastern side, with a site area of approximately 10,711m^2.

2.1.3 **Figure 2.1** illustrates the location and boundaries of the Rezoning Site and the two Development Sites. The sites currently consist of open storage and vegetation.

Figure 2.1 - Location of the Rezoning Site



3. Methodology and Design Parameters for Sewerage Impact Assessment

3.1 General Approach

3.1.1 The following approach and methodology have been adopted in this SIA:

- To conduct desktop study and site visit to collect relevant information for assessment;
- To investigate and review existing sewerage networks and determine the sewage flow generated from existing buildings in the vicinity of the site;
- To determine the potential sewage generated from the Proposed Development;
- To identify the sewerage impacts to the existing sewerage system; and
- To recommend mitigation measures for the impacts, if needed.

3.1.2 Colebrook-White equation is applied in the assessment of hydraulic conditions of existing and proposed sewers, if applicable.

3.2 Design Standards, Guidelines, and References

3.2.1 The sewage flow generated from the Proposed Development and existing buildings in the vicinity of the Development Sites is based on the following standards, guidelines, and references:

- Sewerage Manual, Drainage Services Department (DSD) (2013);
- Guidelines for Estimating Sewage Flows (GESF) for Sewage Infrastructure Planning, Environmental Protection Department (EPD) (2005);
- Hong Kong Planning Standards and Guidelines (HKPSG); and
- Sewerage Impact Assessment for Class B Amendment Application under Application No. A/TM/-LTYY/249-3.

3.3 Design Parameters and Assumptions

3.3.1 The existing sewers at Fuk Hang Tsuen Road serve serveral buildings, as shown in **Appendix A**. The population from these buildings are estimated and listed in **Appendix C**.

3.3.2 The estimated population of the Development Sites is shown in **Table 3.1**.

Table 3.1 – Estimated Population

Type	Population	Assumptions
Residential	1,420 persons	Refer to the SPS. 546 residential units x plot ratio of 2.6
Club House	8 persons	It is assumed that the Club Houses have a total of 8 staff, including one each at the Club House at Site A, one each at those located at Towers 1 to 4 at Site B, and one lifeguard for each of the three swimming pools located at both sites. Club House usage is for residents only, i.e., the number of users is already captured under the above-mentioned residential population.
Retail	14 persons	The total retail GFA is 370.00 square metres based on the SPS. 370.00 square metres = 3,983 square feet. It is assumed that there will be 9 retail units (440 square feet each for 8 units, and 463 square feet for one unit). Each unit has 1.5 staff at a given time. 9 x 1.5 = 14 after rounding up.
Social Welfare Facilities	41 persons	A total of 36 beds (36 persons) will be provided at the Residential Care Home for the Elderly (RCHE). Number of staff includes 1 nurse, 2 care workers, 1 ancillary worker, and 1 general staff. The number of staff refers to the maximum number at a given time[1].
Total	**1,483 persons**	

3.3.1 The Unit Flow Factors (UFF) for Domestic Flow and Commercial/Institutional Flow have been adopted in accordance with Table T-1 and Table T-2 of the "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning" (GESF). The category of the components and the Unit Flow Factors adopted in the assessment are indicated in **Table 3.2**.

Table 3.2 – Unit Flow Factors

Component	Category / Use	Unit	Unit Flow Factor
Domestic Flow	Private (R3)	m^3/d per person	0.37
Commercial / Institutional Flow	General – Territorial Average	m^3/d per person	0.28
Commercial / Institutional Flow	J11 Community, Social & Personal Services	m^3/d per person	0.28
Retail	J10 Commercial	m^3/d per person	1.58
Social Welfare Facilities	J11 Community, Social & Personal Services	m^3/d per person	0.28

[1] Staff requirement is based on Hong Kong e-Legislation, Cap. 459A Residential Care Homes (Elderly Persons) Regulation, https://www.elegislation.gov.hk/hk/cap459A!zh-Hant-HK, last accessed: 9 October 2026.

3.3.2 The Catchment Inflow Factors (Pcif) cater for the net overall ingress of water or wastewater to the sewerage system. They are catchment-dependent and applicable to major sewerage facilities of a catchment. For the existing sewerage system in Tuen Mun, Pcif = 1.10 will be adopted in accordance with Table T-4 of the GESF.

3.3.3 Peaking factors cater for seasonal / diurnal fluctuation and normal amount of infiltration and inflow. The peaking factors shall be in accordance with Table T-5 of GESF and are shown in **Table 3.3**.

Table 3.3 - Peaking Factors for Various Population Ranges

Population Range	Peaking Factor (including stormwater allowance) for facility with existing upstream sewerage	Peaking Factor (excluding stormwater allowance) for facility with new upstream sewerage
(a) Sewers		
< 1,000	8	6
1,000 – 5,000	6	5
5,000 – 10,000	5	4
10,000 – 50,000	4	3
> 50,000	Max (7.3/N^0.15, 2.4)	Max (6/N^0.175, 1.6)
(b) Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations		
< 10,000	4	3
10,000 – 25,000	3.5	2.5
25,000 – 50,000	3	2
> 50,000	Max (3.9/N^0.065, 2.4)	Max (2.6/N^0.065, 1.6)

N = Contributing population in thousands. Contributing Population = Calculated Total Average Flow (m^3/day) ÷ 0.27 (m^3/day per person).

3.3.4 Under normal condition, peaking factors (excluding stormwater allowance) are applicable to planned sewerage facilities receiving flow from new upstream sewerage systems which essentially have no misconnections and defects for infiltration. In view that separated drainage and sewerage systems have been provided for sewage catchment served by the assessed sewers, peaking factors (excluding stormwater allowance) is adopted in this SIA.

4. Estimation of Sewage Flow

4.1 Existing Sewage Flow

4.1.1 Existing sewerage system in the vicinity of the Development Sites is shown in **Appendix A**. The existing sewerage system includes 300 mm diameter sewers which are laid along Fuk Hang Tsuen Road.

4.1.2 Sewage flow estimation of sub-catchments for existing condition (**Appendix B**) which will discharge to the concerned pipes, are calculated. An overview of which is provided in **Table 4.1** and the detailed sewage flow estimation is presented in **Appendix C**.

Table 4.1 – Estimated Sewage Flow of the Sub-catchment for Existing Condition

Sub-catchment ID	Discharge Manhole	Average Dry Weather Flow (ADWF) (m3/day)
Sub-catchment 2 – Botania Villa	FMH1015062	535.13
Sub-catchment 3 – Green View	FMH1015065	26.21
Sub-catchment 4 – Cluster of TS	FMH1015067	5.27
Sub-catchment 5 – The Sherwood	FMH1015071	5.54
Sub-catchment 6 – Cluster of TS	FMH1015771	7.29
Sub-catchment 7 – Fuk Hang Tsuen	FMH1066340	44.15
Sub-catchment 8 – Pok Oi Hospital Elderly Home Development	FMH1015071	356.46

4.2 Estimated Sewage Flow from the Development Sites

4.2.1 Based on the design population of the Development Sites and UFF in Section 2, the estimated Average Dry Weather Flow (ADWF) of the Development Sites is 6.50 l/s (561.24 m³/day). Details of the estimated sewage generation for sewers under the proposed condition are given in **Appendix C**.

Table 4.2 – Estimated Sewage Flow of the Development Sites

Type	No. of Population	Unit	Average Dry Weather Flow (ADWF) (l/s)
Residential	1,420	Persons	6.08
Club House	8	Persons	0.03
Retail	14	Persons	0.26
Social Welfare Facilities	41	Persons	0.13
Total	**1,483**		**6.50**

5. Qualitative Assessment of the Rezoning Site

5.1 Sewage Discharge Arrangements

5.1.1 It is proposed to discharge the sewage generated from the Proposed Development from the proposed terminal manhole S1 via a proposed 300 mm diameter sewer connecting to FMH1066341 as shown in **Appendix B**.

5.2 Sewerage Impact Assessment

5.2.1 As discussed in Section 4, the estimated Average Dry Weather Flow (ADWF) from the Proposed Development is 6.50 l/s (561.24 m³/day).

5.2.2 The hydraulic capacities of the existing and proposed sewers have been assessed using the Colebrook-White equation.

5.2.3 The hydraulic conditions of the proposed 300 mm diameter sewer connecting the proposed terminal manhole S1 to FMH1066341, together with the downstream existing 300 mm diameter sewers along Fuk Hang Tsuen Road, have been assessed. Refer to **Appendix C**.

5.2.4 Results of the hydraulic capacities of proposed and existing sewers laid along Fuk Hang Tsuen Road under Existing and Proposed Conditions are respectively summarized in **Table 5.1** and **Table 5.2** below. Details of the calculation are provided in **Appendix C**.

Table 5.1 – Hydraulic Capacities of Existing Sewers along Fuk Hang Tsuen Road under Existing Condition

Upstream Manhole	Downstream Manhole	Pipe Size (mm)	Full Bore Capacity (l/s)	Design Peak Sewage Flow (l/s)	Utilization (%)
FMH1015062	FMH1015063	300	84.88	41.95	49
FMH1015063	FMH1015064	300	85.85	41.95	49
FMH1015064	FMH1015065	300	88.08	41.95	48
FMH1015065	FMH1015066	300	84.63	43.29	51
FMH1015066	FMH1015067	300	88.08	43.29	49
FMH1015067	FMH1015068	300	84.06	43.55	52

Table 5.2 – Hydraulic Capacities of Existing and Proposed Sewers along Fuk Hang Tsuen Road under Proposed Condition with Sewage Flow from the Proposed Development

Upstream Manhole	Downstream Manhole	Pipe Size (mm)	Full Bore Capacity (l/s)	Design Peak Sewage Flow (l/s)	Utilization (%)
S1 (Terminal manhole)	FMH1066341	300	137.79	47.24	34
FMH1066341	FMH1015062	300	124.80	47.24	38
FMH1015062	FMH1015063	300	101.42	82.37	81
FMH1015063	FMH1015064	300	104.20	82.37	79

FMH1015064	FMH1015065	300	112.15	83.37	73
FMH1015065	FMH1015066	300	108.14	83.37	77
FMH1015066	FMH1015067	300	108.19	83.58	77
FMH1015067	FMH1015068	300	105.32	83.58	79

Note:

1. The discharge manhole for the Proposed Development is S1 (Terminal Manhole).
2. The proposed 300 mm diameter sewer connecting the Development from the proposed terminal manhole S1 FMH1066341 is the new sewer proposed under the Proposed Development.

5.2.5 Based on the hydraulic assessment, the design peak sewage flow generated from the Proposed Development is about 47.24 l/s, which is about 34% of the capacity of the proposed 300 mm diameter sewer between the terminal manhole and public sewers. The results of the hydraulic assessment have indicated that the capacity of the existing 300 mm sewers would result in a reasonable remaining spare capacity for several Downstream Manholes as per **Table 5.2**.

5.2.6 It is noted that the SIA for Class B Amendment Application under Planning Application No. A/TM/-LTYY/249-3, previously submitted to the DSD, has only assessed the hydraulic capacities of up to and including downstream manhole FMH1015068 located near the junction of Fuk Hang Tsuen Road and Lam Tei Main Street. The capacity of the sewer segment between manholes FMH1015071 and FMH1015073, i.e., further downstream FMH1015068, is subject to further assessment upon the consultant receiving further information, such as the record plans, from the relevant agencies.

6. Conclusion

6.1.1 There are existing 300 mm diameter sewers laid along Fuk Hang Tsuen Road. The daily sewage generation from the site due to the Proposed Development will be 6.50 l/s (561.24 m³/day).

6.1.2 The sewage generated from the Proposed Development will be discharged to the proposed terminal manhole S1 and conveyed via the proposed 300 mm diameter sewer to FMH1066341.

6.1.3 Based on the results of the hydraulic assessment, the utilization of the proposed sewer under the proposed condition will be 34%, which is within the acceptable range.

APPENDICES

Appendix A.

Existing Sewerage System and Existing Sub-catchment Plan

Millimetres 0 10 100

FMH1015068
FMH1015067
FMH1015066
FMH1015065
FMH1015064
FMH1015063
FMH1015062
Φ300
Φ300
Φ300
Φ300
Φ300

4
2
3
1 Rezoning Site

LEGEND:
Sub-catchments
Existing Sewer Pipe
Existing Sewer Manhole
Sewage Discharge Point

Rev.	Date	Description	By	Chk'd	App'd
A	JUL 2026	FIRST ISSUE	AC	WKC	AF

Drawing Status: PRELIMINARY SUBMISSION
Suitability: -

AtkinsRéalis

Project Title

Section 12A Planning Application for rezoning Lot Nos. 837 RP (part), 839 S.A RP (part), 841 (part), 1035 RP,1037 RP and 2527 S.F RP (part) in D.D. 130 and Adjoining Government Land at Lam Tei, Tuen Mun

Drawing Title

EXISTING SEWERAGE SYSTEM AND EXISTING SUB-CATCHMENT PLAN

Scale	Designed	Drawn	Checked	Authorised
AS SHOWN	AC	AC	WKC	AF
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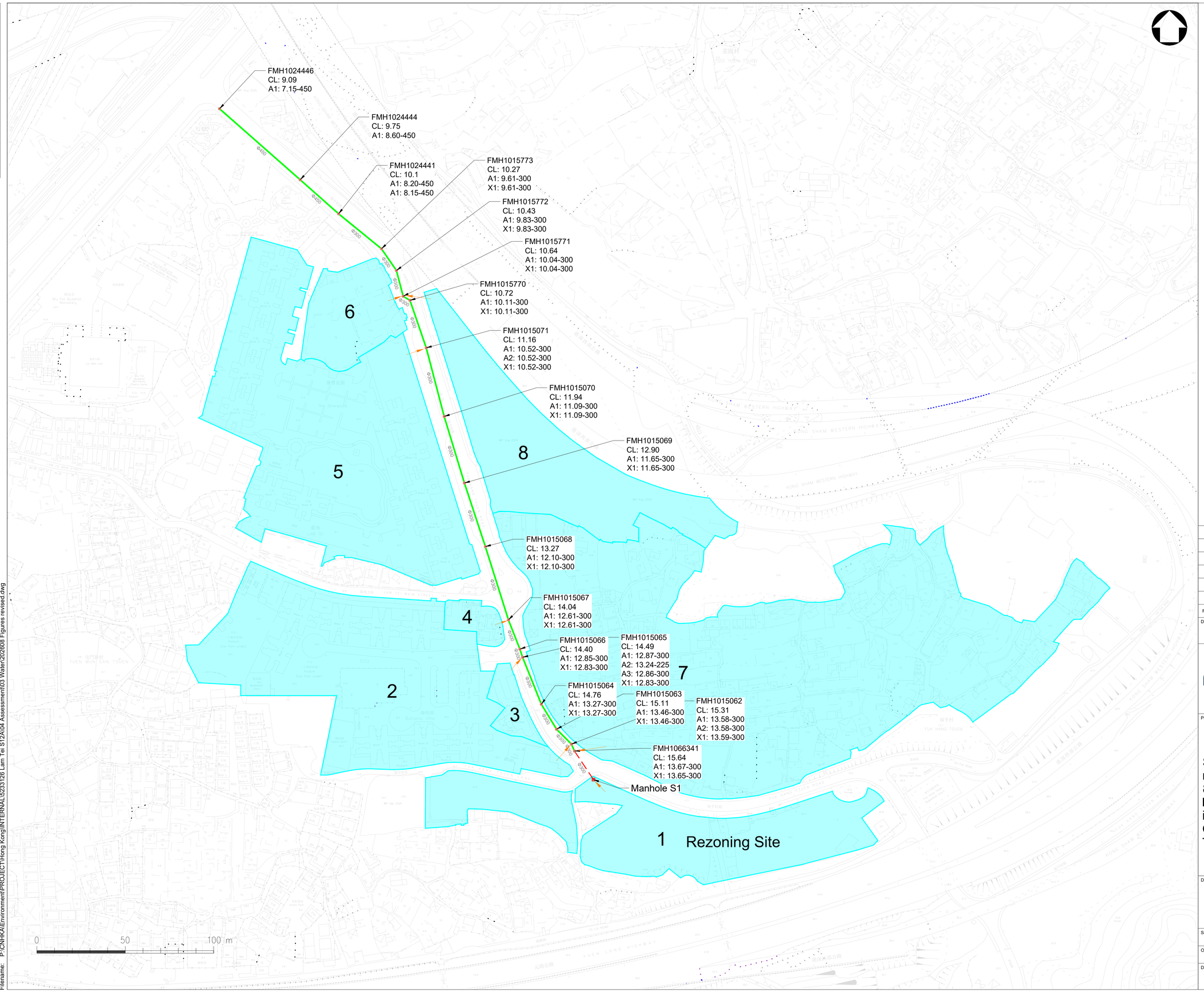
Drawing Number: FIGURE 2
Revision: A

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User name:CHENG_ATHENA Date:July 27, 2026 Time: 7:17:51 PM
Filename: P:\CNHKA\Environment\PROJECT\Hong Kong\INTERNAL\5233126 Lam Tei S12A\04 Assessment\03 Water\202608 Figures revised.dwg

Appendix B.

Proposed Sewerage System



Rev.	Date	Description	By	Chk'd	App'd
A	JUL 2026	FIRST ISSUE	AC	WKC	AF

Drawing Status: PRELIMINARY SUBMISSION

Suitability: -

AtkinsRéalis

Project Title

Section 12A Planning Application for rezoning Lot Nos. 837 RP (part), 839 S.A RP (part), 841 (part), 1035 RP, 1037 RP and 2527 S.F RP (part) in D.D. 130 and Adjoining Government Land at Lam Tei, Tuen Mun

Drawing Title

PROPOSED SEWERAGE SYSTEM

Scale	Designed	Drawn	Checked	Authorised
AS SHOWN	AC	AC	WKC	AF
Original Size	**Date**	**Date**	**Date**	**Date**
A1	OCT 2026	OCT 2026	OCT 2026	OCT 2026

Drawing Number: FIGURE 2

Revision: A

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User name:CHENG, ATHENA Date: July 27, 2026 Time: 7:17:51 PM
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Appendix C.

Sewage Estimation and Hydraulic Calculation

Appendix D: Detailed Sewage Estimation and Hydraulic Calculation

Estimation for Proposed Sewage Flow

Sub-catchment 1: Proposed Development			Notes
Residential			
From client's development schedule			
Population	1,420.00	persons	
Global unit Flow Factor	0.37	m3/d per person (For R3)	EPD GESF Table T-1, Domestic Flow, Private R3
Sewage Flow	525.40	m3/d	
	6.08	l/s	
Club House			
From client's development schedule			
Site Area	2,603.92	m2	
Assumed worker density	2.30	workers per 100m2 GFA	CIFSUS Table 8, Community, Social & Personal Services, Private Commercials
Estimated number of employees	8.00	Persons	It is assumed that the Club Houses have a total of 8 staff, including one each at the Club House at Site A, one each at those located at Towers 1 to 4 at Site B, and one lifeguard for each of the three swimming pools located at both sites. Club House are for residents only: the number of users is already captured under Residential Population.
Global Unit Flow Factor	0.28	m3/d per person	EPD's Technical Paper No. EPD/TP1/05
Sewage Flow	2.24	m3/d	
	0.03	l/s	
Retail			
Number of staff	14.00		The total retail GFA is 370.00 square metres based on the SPS. 370.00 square metres = 3,983 square feet. It is assumed that there will be 9 retail units (440 square feet each for 8 units, and 463 square feet for one unit). Each unit has 1.5 staff at a given time. 9 x 1.5 = 14 after rounding up.
Unit Flow Factor	1.58	m3/d/head	Commercial J10
Sewage Flow	22.12	m3/d	
	0.26	l/s	
Social Welfare Facilities			
Users	36.00		A total of 36 beds (36 persons) will be provided at the Residential Care Home for the Elderly (RCHE), number of staff includes 1 nurse, 2 care workers, 1 ancillary worker, and 1 general staff. The number of staff refers to the maximum number at a given time. Staff requirement is based on Hong Kong e-Legislation, Cap. 459A Residential Care Homes (Elderly Persons) Regulation, https://www.elegislation.gov.hk/hk/cap459A!zh-Hant-HK
Staff	5.00		
Unit Flow Factor: User / Staff	0.28	m3/d/head	Commercial J11
	11.48	m3/d	
	0.13	l/s	

Swimming Pool (Fuk Hang Tsuen Lane Tower 1, as shown in the Master Layout Plan)			
Pool Area	185.67	m2	
Pool depth	1.50	m	
Pool Volume	278.51	m3	
Turnover period	6.00	hrs	
Circulation flow rate	46.42	m3/hr	
	12.89	l/s	
Filter surface loading rate	48.00	m3/m2/hr	
Required filter area	0.97	m2	
Filter backwash rate	30.00	m3/m2/hr	
Average backwash water volume	2.50	m3/m2	WHO Guidelines for safe recreational water environments Table 5.1, average wash water for medium-rate sand
Daily filter backwash wastewater volume	0.06	m3/d	
Assumed backwash discharge duration	3.00	min/day	EPD Appendix 12.1
Equivalent backwash discharge rate, given assumed duration	0.02	m3/min	
	0.00	m3/s	
	0.34	l/s	
Instantaneous filter backwash flow adopted for peak-flow assessment for Site 2	8.06	l/s	
Swimming Pool (Fuk Hang Tsuen Road Tower 1, as shown in the Master Layout Plan)			
Pool Area	270.04	m2	
Pool depth	1.50	m	
Pool Volume	405.06	m3	
Turnover period	6.00	hrs	
Circulation flow rate	67.51	m3/hr	
	18.75	l/s	
Filter surface loading rate	48.00	m3/m2/hr	
Required filter area	1.41	m2	
Filter backwash rate	30.00	m3/m2/hr	
Average backwash water volume	2.50	m3/m2	WHO Guidelines for safe recreational water environments Table 5.1, average wash water for medium-rate sand
Daily filter backwash wastewater volume	0.09	m3/d	
Assumed backwash discharge duration	3.00	min/day	EPD Appendix 12.1
Equivalent backwash discharge rate, given assumed duration	0.03	m3/min	
	0.00	m3/s	
	0.49	l/s	
Instantaneous filter backwash flow adopted for peak-flow assessment	11.72	l/s	

Swimming Pool (Fuk Hang Tsuen Lane Tower 3, as shown in the Master Layout Plan)			
Pool Area	138.71	m2	
Pool depth	1.50	m	
Pool Volume	208.06	m3	
Turnover period	6.00	hrs	
Circulation flow rate	34.68	m3/hr	
	9.63	l/s	
Filter surface loading rate	48.00	m3/m2/hr	
Required filter area	0.72	m2	
Filter backwash rate	30.00	m3/m2/hr	
Average backwash water volume	2.50	m3/m2	WHO Guidelines for safe recreational water environments Table 5.1, average wash water for medium-rate sand
Daily filter backwash wastewater volume	0.05	m3/d	
Assumed backwash discharge duration	3.00	min/day	EPD Appendix 12.1
Equivalent backwash discharge rate, given assumed duration	0.02	m3/min	
	0.00	m3/s	
	0.25	l/s	
Instantaneous filter backwash flow adopted for peak-flow assessment	6.02	l/s	
Total Sewage Discharge for Sub-catchment 1			
Total ADWF excluding pool backwash	**561.24**	**m3/d**	
Equivalent ADWF	**6.50**	**l/s**	
Total instantaneous filter backwash flow for the 3 pools	**25.80**	**l/s**	
Sewage Discharge to	S1 Manhole		

Sub-catchment 2: Botania Villa			**Notes**
Botania Villa Block 1			
Estimated no. of flats	88.00	flats	
Average Household size	2.70	Persons per flat	
Population	237.60	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	64.15	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.74	l/s	
Botania Villa Block 2			
Estimated no. of flats	88.00	flats	
Average Household size	2.70	Persons per flat	
Population	237.60	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	64.15	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.74	l/s	
Botania Villa Block 3			
Estimated no. of flats	88.00	flats	
Average Household size	2.70	Persons per flat	
Population	237.60	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	64.15	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.74	l/s	

Botania Villa Block 5			
Estimated no. of flats	88.00	flats	
Average Household size	2.70	Persons per flat	
Population	237.60	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	64.15	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.74	l/s	
Botania Villa Block 6			
Estimated no. of flats	66.00	flats	
Average Household size	2.70	Persons per flat	
Population	178.20	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	48.11	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.56	l/s	
Botania Villa Block 7			
Estimated no. of flats	88.00	flats	
Average Household size	2.70	Persons per flat	
Population	237.60	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	64.15	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.74	l/s	
Botania Villa Block 8			
Estimated no. of flats	88.00	flats	
Average Household size	2.70	Persons per flat	
Population	237.60	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	64.15	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.74	l/s	
Botania Villa Block 9			
Estimated no. of flats	88.00	flats	
Average Household size	2.70	Persons per flat	
Population	237.60	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	64.15	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.74	l/s	
Botania Villa Block 10			
Estimated no. of flats	44.00	flats	
Average Household size	2.70	Persons per flat	
Population	118.80	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	32.08	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.37	l/s	
Botania Villa Clubhouse			
Estimated GFA of building	1,036.00	m2	
Worker density	50.00	m2/worker	Assumption of 50 m2/worker
Workers	21.00	persons	
Global unit Flow Factor	0.28	m3/d per visitor	From EPD's Technical Paper
Sewage Flow	5.88	m3/d	GESF Table T-2 J11 Community & Social Services use
	0.07	l/s	

Botania Villa Swimming Pool			
Pool Volume	508.00	m3	
Turnover period	6.00	hours	
Surface Loading Rate of Filter	48.00	m3/m2/hr	Filtration Rate (medium) = 48 m3/m2/hr
Filter Areas Required	1.76	m2	
Backwash Duration	3.00	min/day	
Backwash Flow Rate	30.00	m3/m2/hr	
Daily filter backwash wastewater volume	2.65	m3/d	
Equivalent 24-hour average backwash rate	0.03	l/s	
Instantaneous filter backwash flow adopted for peak-flow assessment	52.92	m3/hr	
	14.70	l/s	
Total Sewage Discharge for Sub-catchment 2			
Total ADWF excluding pool backwash	**535.13**	**m3/d**	
Equivalent ADWF	**6.19**	**l/s**	
Instantaneous filter backwash flow adopted for peak-flow assessment	**14.70**	**l/s**	
Sewage Discharge to	FMH1015062		
Sub-catchment 3: Green View			**Notes**
Green View Block 1			
Estimated no. of flats	35.00	flats	
Average Household size	2.70	Persons per flat	
Population	94.50	persons	
Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
Sewage Flow	25.52	m3/d	GESF Table T-1 Domestic (Private - R2)
	0.30	l/s	
Green View Clubhouse			
Estimated GFA of building	124.00	m2	
Worker density	50.00	m2/worker	Assumption of 50 m2/worker
Workers	2.48	persons	
Global unit Flow Factor	0.28	m3/d per visitor	From EPD's Technical Paper
Sewage Flow	0.69	m3/d	GESF Table T-2 J11 Community & Social Services use
	0.01	l/s	
Total Sewage Discharge for Sub-catchment 3			
Equivalent ADWF	**26.21**	**m3/d**	
	0.30	**l/s**	
Sewage Discharge to	FMH1015065		
Sub-catchment 4: Cluster of TS			**Notes**
Cluster of TS			
Estimated Residential Units	13.00	units	
Average Household size	2.70	Persons per floor	
Population	35.10	persons	
Global unit Flow Factor	0.15	m3/d per person	From EPD's Technical Paper, GESF Table IV, UFF Temp and non-domestic
Sewage Flow	5.27	m3/d	
	0.06	l/s	
Total Sewage Discharge for Sub-catchment 4			
Equivalent ADWF	**5.27**	**m3/d**	
	0.06	**l/s**	
Sewage Discharge to	FMH1015067		

Sub-catchment 5: The Sherwood				**Notes**
The Sherwood Block 1-3, 5-13 (12 blocks)				
	Total no. of flats	1,576.00	flats	
	Average Household size	2.70	Persons per flat	
	Population	4,255.20	persons	
	Global unit Flow Factor	0.27	m3/d per person	From EPD's Technical Paper
	Sewage Flow	1,148.90	m3/d	GESF Table T-1 Domestic (Private - R2)
		13.30	l/s	
The Sherwood Clubhouse				
	Estimated GFA of building	1,500.00	m2	
	Worker density	50.00	m2/worker	Assumption of 50 m2/worker
	Workers	30.00	persons	
	Global unit Flow Factor	0.28	m3/d per visitor	From EPD's Technical Paper
	Sewage Flow	8.40	m3/d	GESF Table T-2 J11 Community & Social Services use
		0.10	l/s	
The Sherwood Swimming Pool				
	Length of swimming pool	35.00	m	
	Estimated Pool Volume	550.00	m3	
	Turnover period	6.00	hours	
	Filter surface loading rate	48.00	m3/m2/hr	Filtration Rate (medium) = 48 m3/m2/hr
	Required filter area	1.91	m2	
	Assumed backwash discharge duration	3.00	min/day	
	Filter backwash rate	30.00	m3/m2/hr	
	Daily filter backwash wastewater volume	2.86	m3/d	
	Equivalent 24-hour average backwash rate	0.03	l/s	
	Instantaneous filter backwash flow adopted for peak-flow assessment	57.29	m3/hr	
		15.91	l/s	
Total Sewage Discharge for Sub-catchment 5				
	Block 9-13 (5 blocks)	**5.54**	**l/s**	
	Sewage Discharge to	FMH1015071		
Equivalent ADWF	**Remaining blocks (7 blocks + clubhouse + swimming pool)**	**23.77**	**l/s**	
	Sewage Discharge to	FMH1024441		
	Total ADWF excluding pool backwash	1,157.30	m3/d	
	Equivalent ADWF	13.39	l/s	
	Instantaneous filter backwash flow adopted for peak-flow assessment	15.91	l/s	
	Sewage Discharge to	FMH1015071		

Sub-catchment 6: Cluster of TS			Notes
Cluster of TS			
Estimated Residential Units	18.00	units	
Average Household size	2.70	Persons per floor	
Population	48.60	persons	
Global unit Flow Factor	0.15	m3/d per person	From EPD's Technical Paper, GESF Table IV, UFF Temp and non-domestic
Sewage Flow	7.29	m3/d	
	0.08	l/s	
Total Sewage Discharge for Sub-catchment 6			
Equivalent ADWF	**7.29**	**m3/d**	
	0.08	**l/s**	
Sewage Discharge to	FMH1015771		

Sub-catchment 7: Fuk Hang Tsuen			Notes
Cluster of TS and private housing			
Estimated Residential Units	109.00	units	
Average Household size	2.70	Persons per floor	
Population	294.30	persons	
Global unit Flow Factor	0.15	m3/d per person	From EPD's Technical Paper, GESF Table IV, UFF Temp and non-domestic
Sewage Flow	44.15	m3/d	
	0.51	l/s	
Total Sewage Discharge for Sub-catchment 7			
Equivalent ADWF	**44.15**	**m3/d**	
	0.51	**l/s**	
Sewage Discharge to	FMH1066341		

Sub-catchment 8: Pok Oi Hospital Elderly Home Development			Notes
Pok Oi Hospital Tuen Mun Lam Tei Nursing and Residential Care Home for the Elderly Project (Lam Tei Project)			Information obtained from POH project website: Scheduled plan of commencement in 2027 (https://pokoi.org.hk/news/donation-activities/112518-together-we-shape-future-elderly-care)
Residential care places	1,434.00	residents	
Global Unit Flow Factor for residents	0.19	m3/d per person	EPD GESF Table T-1 Institutional and Special Class
Resident Sewage Flow	272.46	m3/d	
Reported total building area	28,762.00	m2	(https://www.guandian.hk/article/20260902/596282.html)
Published minimum nursing staff	300.00	employees	(https://www.thestandard.com.hk/news/article/223195/HKs-largest-elderly-home-set-to-open-by-2027-in-Tuen-Mun)
Global Unit Flow Factor for employees	0.28	m3/d per person	EPD GESF Table T-2 J11 Community, Social and Personal Services
Employee Sewage Flow	84.00	m3/d	
Total Sewage Flow	356.46	m3/d	
	4.13	l/s	
Total Sewage Discharge for Sub-catchment 8			
Equivalent ADWF	**356.46**	**m3/d**	
	4.13	**l/s**	
Sewage Discharge to	FMH1015071		

Appendix D - Sewer Pipeline Design Check (Existing Sewerage Scheme)

1. Hydraulic Capacity of Existing Sewerage Pipe

			Inv Level	Inv Level			Approx.	At design											At pipe flow full		
From	To	Pipe	of	of		Horizontal	Pipe														
Manhole	Manhole	Diameter (mm)	Inlet Pipe (mPD)	Outlet Pipe (mPD)	Gradient (1 in)	Distance (m)	Length (m)	Discharge (l/s)	Cumulative Discharge (l/s)	Pcif	ADWF with Pcif (l/s)	Equivalent population (person)	Peaking factor	Peak factor cumulative sewage flow (l/s)	Instant peak flow from swimming pool (l/s)	Total Peak factor cumulative sewage flow (including instant peak flow from swimming pool)	% utilization	No. of Pipe	Pipe Area (m^2)	Pipe Capacity (l/s)	Velocity (m/s)	Ok/Fail
FMH1015062	FMH1015063	300	13.59	13.46	107.69	14.0	14.0	6.19	6.19	1.10	6.81	2180.17556	4.00	27.25	14.70	41.95	49%	1	0.07068578	84.8789275	1.201	Ok
FMH1015063	FMH1015064	300	13.46	13.27	105.26	20.0	20.0	0.00	6.19	1.10	6.81	2180.17556	4.00	27.25	14.70	41.95	49%	1	0.07068578	85.8526932	1.215	Ok
FMH1015064	FMH1015065	300	13.27	12.89	100.00	38.0	38.0	0.00	6.19	1.10	6.81	2180.17556	4.00	27.25	14.70	41.95	48%	1	0.07068578	88.0829565	1.246	Ok
FMH1015065	FMH1015066	300	12.89	12.83	108.33	6.5	6.5	0.30	6.50	1.10	7.15	2286.95459	4.00	28.59	14.70	43.29	51%	1	0.07068578	84.6274391	1.197	Ok
FMH1015066	FMH1015067	300	12.83	12.61	100.00	22.0	22.0	0.00	6.50	1.10	7.15	2286.95459	4.00	28.59	14.70	43.29	49%	1	0.07068578	88.0829565	1.246	Ok
FMH1015067	FMH1015068	300	12.61	12.10	109.80	56.0	56.0	0.06	6.56	1.10	7.21	2308.40459	4.00	28.86	14.70	43.55	52%	1	0.07068578	84.0588389	1.189	Ok

Remarks:

1. A pipe roughness coefficient, ks of 3 mm has been adopted for the existing slimed clayware sewers in accordance with Table 5 of the DSD Sewerage Manual. The roughness coefficient for the proposed sewer has been adopted based on the proposed pipe material.
2. Transitional flow and water at 15 degree celcius, i.e. kinematic viscosity is 1.14*10^-6 m2/s.

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