

Appendix 11

Sewerage Impact Assessment

SECTION 12A PLANNING APPLICATION

**PROPOSED REZONING FROM “OTHER SPECIFIED USES” ANNOTATED
“BUSINESS”(“OU(B)”) TO “RESIDENTIAL (GROUP E) 2” (“R(E)2”) AT LOT 316 IN D.D.
444 AND KWAI CHUNG TOWN LOT (KCTL) 146, 97-107 WO YI HOP ROAD, NEW
TERRITORIES**

Sewerage Impact Assessment

July 2025

1. Introduction

The Applicant, **LAI SUN TEXTILES COMPANY LIMITED**, proposes to redevelop the existing 15-storey industrial building (IB), known as Park Sun Building, into a 28-storey Commercial-cum-Residential Development with Social Welfare Facilities (Residential Care Home for the Elderly and/or Residential Care Homes for Persons with Disabilities) (RCHEs and/or RCHDs) atop 1 basement carpark floors at Lot 316 in D.D. 444 and Kwai Chung Town Lot (KCTL) 146, 97-107 Wo Yi Hop Road, New Territories.

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

2. Sewerage 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 FMH4020964 and flow underneath the Wo Yi Hop Road to the north direction (**See Figure 1**). The sewage generated will be discharged via Wo Yi Hop Road, Lam Tin Street and subsequently directed to the Kwai Chung Preliminary Treatment Works for treatment.

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 3 staff for the proposed Shop and Services on G/F, 380 residents and 60 staff for the proposed RCHE and/or RCHD development on 1/F to 6/F, and 683 residents for the proposed Flat on 7/F to 26/F 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)
Shop Employees	3	0.28 ^[4]	0.84	1.1	274.28	1,015.84	6	20.95
RCHE and/or RCHD Residents	380	0.19 ^[5]	72.2					
RCHE and/or RCHD employees	60	0.28 ^[6]	16.8					
Residents on 7/F to 26/F	683	0.27 ^[7]	184.44					

Remarks:

[1] Catchment Inflow Factor=1.1 (Kwai Chung) 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=6 for population 1,000-5,000 (including stormwater allowance) as per EPD's GESF Table T-5

[4] Unit flow factor = 0.28 (Commercial Employee + J4) is based on EPD's GESF Table T-2

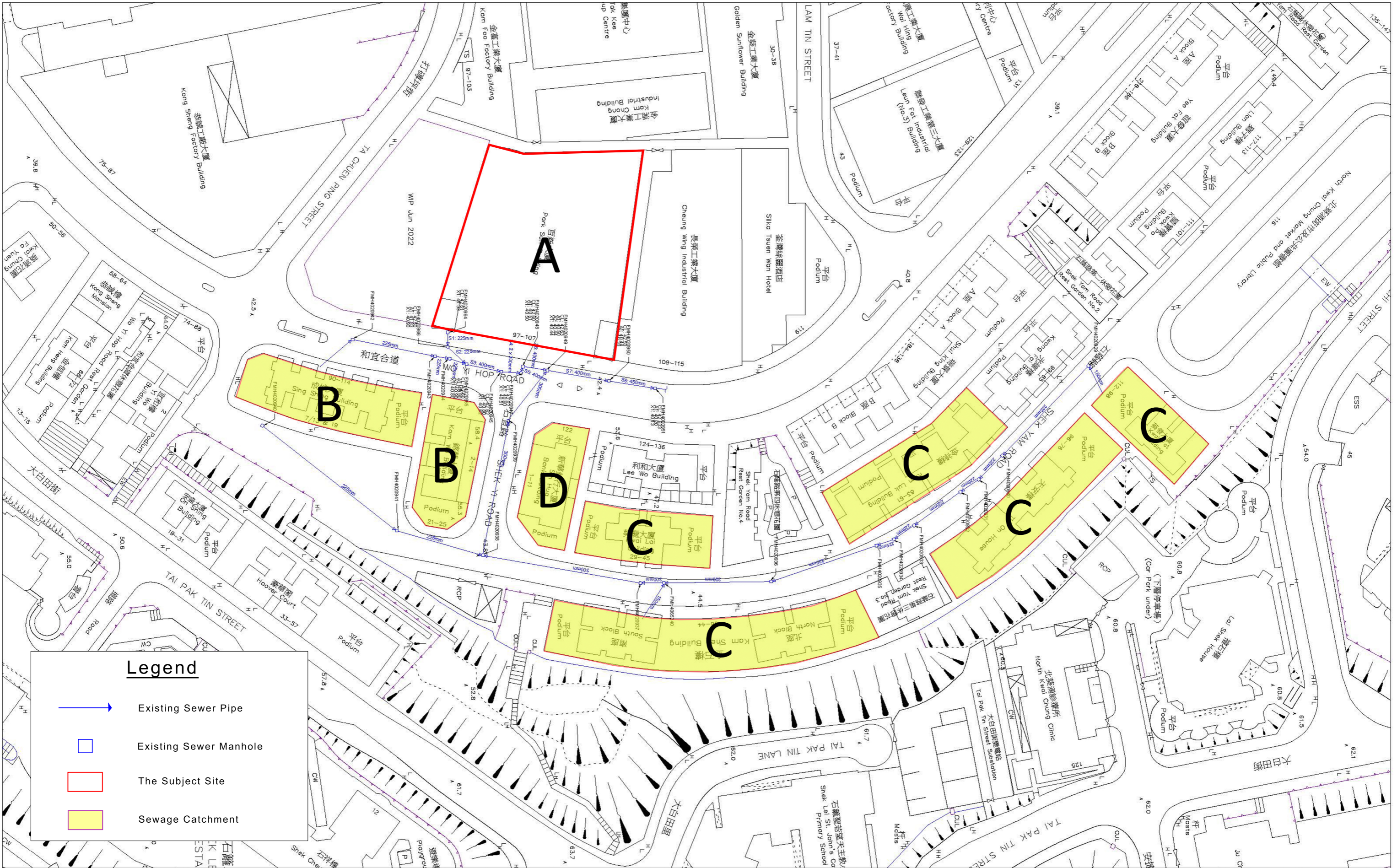
[5] Unit flow factor = 0.19 (Institutional and special class) is based on EPD's GESF Table T-1

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





[7] Unit flow factor = 0.27 (Private R2) is based on EPD's GESF Table T-1

5. Overall Sewer Capacity

The estimated cumulative peak discharge of all downstream sewerage generated from the proposed development with the concerned catchments account for no more than 35% of the hydraulic capacity of the concerned sewer (from manholes FMH4020964 to FMH4020951). No exceedance of hydraulic capacity for all cumulative peak discharge is anticipated. Detailed calculations of sewage generation and hydraulic capacity are provided in **Appendix 1**. All existing sewers have sufficient capacity and no upgrading is required to serve the proposed composite development.



Legend

-  Existing Sewer Pipe
-  Existing Sewer Manhole
-  The Subject Site
-  Sewage Catchment



DeSPACE (International) Limited

Title

SECTION 12A APPLICATION FOR AMENDMENT TO THE APPROVED KWAI CHUNG OUTLINE ZONING PLAN NO. S/KC/32
TO REZONE THE APPLICATION SITE FROM "OTHER SPECIFIED USES" ANNOTATED "BUSINESS" TO "RESIDENTIAL (GROUP E) 2",
LOT 316 IN D.D. 444 AND KWAI CHUNG TOWN LOT (KTCL) 146, 97-107 WO YI HOP ROAD, NEW TERRITORIES

Drawn By

ML

Date

July 2025

Figure No.

2

Scale

1:1000@A3

Appendix 1

Detailed Calculations of Sewage Generation and Hydraulic Capacity

Table 1 Calculation for Sewage Generation Rate of the Proposed Development

1. Park Sun Redevelopment on G/F Shop		
Total GFA	131	m ²
Worker Density	2.1	worker/100m ² - from CIFSUS (Table 8) - Worker Density (Retail Trade - Private Commercials)
Estimated Population	3	
Unit Flow Factor	0.28	m ³ /day/person - from GESF(Table T-2) - UFF for Commercial Flow and Student Flows (Commercial Employee and J4 Wholesale & Retail)
Estimated Dry Weather Flow	0.84	m ³ /day
2. Park Sun Redevelopment on 1/F - 3/F RCHD and 4/F - 6/F RCHE		
Nos. of Beds	380	the upper-end provision in the proposal
Nos. of Staff	60	As advised by the Applicant
Unit Flow Factor for the Residents	0.19	m ³ /day/person - from GESF(Table T-1) - UFF for Domestic Flows (Institutional and special class)
Unit Flow Factor for staff	0.28	m ³ /day/person - from GESF(Table T-2) - UFF for Commercial Flows and Student Flows (Commercial Employee and J11 Community, Social & Personal Services)
Estimated Dry Weather Flow	89.00	m ³ /day
3. Park Sun Redevelopment on 7/F to 26/F Residential		
Nos. of Flat Units	253	the upper-end provision in the proposal
Average Domestic Household Size	2.7	from 2024 Population Census
Total Estimated Population	683	
Unit Flow Factor	0.27	m ³ /day/person - from GESF(Table T-1) - UFF for Domestic Flow(Private R2, Planning for Future)
Estimated Dry Weather Flow	184.44	m ³ /day
Total Flow from Proposed Development		
Catchment Inflow Factor	1.1	Catchment Inflow Factor = 1.10 (Kwai Chung) from EPD's GESF Table T-4
Flow Rate	274.28	m ³ /day
Contributing Population	1015.84	0.27 from EPD's GESF
Peaking Factor	6	Peaking Factor=6 for population 1000 - 5000 (including stormwater allowance) from EPD's GESF Table T-5
Peak Flow	20.95	L/s

Table 2 Calculation for Sewage Generation

Existing Development

B	B1 Sing Shing Building G/F Retails		Remarks
	Total GFA	791.9 m ²	from Hong Kong Geodata store
	Worker Density	2.10 worker/100m ²	from CIFSUS (Table 8) - Worker Density (Retail Trade - Private Commercials)
	Estimated Population	17	
	Unit Flow Factor	0.28 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J4 Wholesale & Retail under Datum (2002)
	Estimated Dry Weather Flow	4.76 m ³ /day	
	B2 Sing Shing Building 1/F Restaurant		
	Total GFA	791.9 m ²	from Hong Kong Geodata store
	Worker Density	5.10 worker/100m ²	from CIFSUS (Table 8) - Worker Density (Restaurants - Private Commercials)
	Estimated Population	40	
	Unit Flow Factor	1.58 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J10 Restaurants & Hotels under Datum (2002)
	Estimated Dry Weather Flow	63.20 m ³ /day	
	B3 Sing Shing Building 2/F-11/F Residential Flats		
	Total number of units	90 units	from Centaline Property Hong Kong
	Average Domestic Household Size	2.7	from 2024 Population Census
	Total number of residents	243	
	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	65.61 m ³ /day	
	B4 Kam Wa Building G/F Retails		
	Total GFA	572.7 m ²	from Hong Kong Geodata store
	Worker Density	2.10 worker/100m ²	from CIFSUS (Table 8) - Worker Density (Retail Trade - Private Commercials)
	Estimated Population	12	
	Unit Flow Factor	0.28 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J4 Wholesale & Retail under Datum (2002)
	Estimated Dry Weather Flow	3.36 m ³ /day	
	B5 Kam Wa Building 1/F-3/F Residential Care Home for the Elderly		
	Total Nos. of the Elderly's Residents	209	from SWD Elderly Website (209 Licensing Capacity and 34 nos. of Staffing)
	Total Nos. of Staff	34	from SWD Elderly Website (209 Licensing Capacity and 34 nos. of Staffing)
	Unit Flow Factor for the Elderly's Residents	0.19 m ³ /person/day	from EPD's GESF(Table T-1) - UFF for Domestic Flows (Institutional and special class) under Datum (2002)
	Unit Flow Factor for the staff	0.28 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J11 Community, Social & Personal Services under Datum (2002)
	Estimated Dry Weather Flow	49.23 m ³ /day	
	B6 Kam Wa Building 4/F-22/F Residential Flats		

C	Total number of units		114 units	from Centaline Property Hong Kong
	Average Domestic Household Size		2.7	from 2024 Population Census
	Total number of residents		308 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		83.11 m ³ /day	
	C1 Kwai Fat Building, Tin On House, Kam Luk Building, Kam Shek Building and Kwai Lai Building G/F Retails			
	Total GFA		3220.7 m ²	from Hong Kong Geodata store and Land Registry
	Worker Density		2.10 worker/100m ²	from CIFSUS (Table 8) - Worker Density (Retail Trade - Private Commercials)
	Estimated Population		68	
	Unit Flow Factor		0.28 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J4 Wholesale & Retail under Datum (2002)
	Estimated Dry Weather Flow		19.04 m ³ /day	
	C2 Tin On House, Kam Luk Building, Kam Shek Building and Kwai Lai Building G/F Restaurants			
	Total GFA		1026.9 m ²	from Hong Kong Geodata store and Land Registry
	Worker Density		5.10 worker/100m ²	from CIFSUS (Table 8) - Worker Density (Restaurants - Private Commercials)
	Estimated Population		52	
	Unit Flow Factor		1.58 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J10 Restaurants & Hotels under Datum (2002)
	Estimated Dry Weather Flow		82.16 m ³ /day	
	C3 Kwai Fat Building 1/F- 2/F and 3/F-15/F Residential Flats			
	Total number of units		74 units	from Land Registry and Centaline Property Hong Kong
	Average Domestic Household Size		2.7	from 2024 Population Census
	Total number of residents		200 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		53.95 m ³ /day	
	C4 Tin On House 1/F Residential Care Home for the Elderly			
	Total Nos. of the Elderly's Residents		124	from SWD Elderly Website (124 Licensing Capacity and 32 nos. of Staffing)
	Total Nos. of Staff		32	from SWD Elderly Website (124 Licensing Capacity and 32 nos. of Staffing)
	Unit Flow Factor for the Elderly's Residents		0.19 m ³ /person/day	from EPD's GESF(Table T-1) - UFF for Domestic Flows (Institutional and special class) under Datum (2002)
	Unit Flow Factor for the staff		0.28 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J11 Community, Social & Personal Services under Datum (2002)
	Estimated Dry Weather Flow		32.52 m ³ /day	
	C5 Tin On House 2/F-15/F Residential Flats			
	Total number of units		112 units	from Centaline Property Hong Kong
	Average Domestic Household Size		2.7	from 2024 Population Census

	Total number of residents		302 people	from GESF(Table T-1) - UFF for Domestic Flow (Private R2) under Datum (2002)
	Unit Flow Factor		0.27 m ³ /person/day	
	Estimated Dry Weather Flow		81.65 m ³ /day	
	C6 Kam Luk Building 1/F-5/F Residential Flats			from Centaline Property Hong Kong and Land Registry from 2024 Population Census from GESF(Table T-1) - UFF for Domestic Flow (Private R2) under Datum (2002)
	Total number of units		56 units	
	Average Domestic Household Size		2.7	
	Total number of residents		151 people	
	Unit Flow Factor		0.27 m ³ /person/day	
	Estimated Dry Weather Flow		40.82 m ³ /day	
	C7 Kam Shek Building 1/F Restaurant			from Hong Kong Geodata store and Land Registry from CIFSUS (Table 8) - Worker Density (Restaurants - Private Commercials) from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J10 Restaurants & Hotels under Datum (2002)
	Total GFA		1424.2 m ²	
	Worker Density		5.10 worker/100m ²	
	Estimated Population		73	
	Unit Flow Factor		1.58 m ³ /person/day	
	Estimated Dry Weather Flow		115.34 m ³ /day	
	C8 Kam Shek Building 2/F-23/F Residential Flats			from Centaline Property Hong Kong from 2024 Population Census from GESF(Table T-1) - UFF for Domestic Flow (Private R2) under Datum (2002)
	Total number of units		236 units	
	Average Domestic Household Size		2.7	
	Total number of residents		637 people	
	Unit Flow Factor		0.27 m ³ /person/day	
	Estimated Dry Weather Flow		172.04 m ³ /day	
	C9 Kwai Lai Building 1/F-24/F Residential Flats			from Centaline Property Hong Kong from 2024 Population Census from GESF(Table T-1) - UFF for Domestic Flow (Private R2) under Datum (2002)
	Total number of units		133 units	
	Average Domestic Household Size		2.7	
	Total number of residents		359 people	
	Unit Flow Factor		0.27 m ³ /person/day	
	Estimated Dry Weather Flow		96.96 m ³ /day	
	D1 Sin Hua Bank Building G/F Retails			from Hong Kong Geodata store from CIFSUS (Table 8) - Worker Density (Retail Trade - Private Commercials) from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J4 Wholesale & Retail under Datum (2002)
	Total GFA		495.1 m ²	
	Worker Density		2.10 worker/100m ²	
	Estimated Population		10	
	Unit Flow Factor		0.28 m ³ /person/day	
	Estimated Dry Weather Flow		2.8 m ³ /day	
	D2 Sin Hua Bank Building 1/F-2/F Offices			

D	Total GFA		495.1 m ²	from Hong Kong Geodata store
	Worker Density		5.0 worker/100m ²	from CIFSUS (Table 8) - Worker Density (Financial, Insurance, Real Estate & Business Services - Private Commercials)
	Estimated Population		25	
	Unit Flow Factor		0.08 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J6 Finacne, Insurance, Real Estate & Business Services under Datum (2002)
	Estimated Dry Weather Flow		2.0 m ³ /day	
	D3 Sin Hua Bank Building 3/F Residential Care Home for the Elderly			
	Total Nos. of the Elderly's Residents		54	from SWD Elderly Website (54 Licensing Capacity and 20 nos. of Staffing)
	Total Nos. of Staff		20	from SWD Elderly Website (54 Licensing Capacity and 20 nos. of Staffing)
	Unit Flow Factor for the Elderly's Residents		0.19 m ³ /person/day	from EPD's GESF(Table T-1) - UFF for Domestic Flows (Institutional and special class) under Datum (2002)
	Unit Flow Factor for the staff		0.28 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J11 Community, Social & Personal Services under Datum (2002)
	Estimated Dry Weather Flow		15.86 m ³ /day	
	D4 Sin Hua Bank Building 4/F-8/F Offices			
	Total GFA		286.5 m ²	from Hong Kong Geodata store
	Worker Density		5.0 worker/100m ²	from CIFSUS (Table 8) - Worker Density (Financial, Insurance, Real Estate & Business Services - Private Commercials)
	Estimated Population		14	
	Unit Flow Factor		0.08 m ³ /person/day	from EPD's GESF(Table T-2) - UFF of Commercial Flows and Student Flows for Commercial Employee and J6 Finacne, Insurance, Real Estate & Business Services under Datum (2002)
	Estimated Dry Weather Flow		1.1 m ³ /day	
	D5 Sin Hua Bank Building 9/F-21/F Residential Flats			
	Total number of units		52 units	from Centaline Property Hong Kong
	Average Domestic Household Size		2.7	from 2024 Population Census
	Total number of residents		140 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		37.91 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 and S2	A	274.28	1.1	301.70	1117.42	6	1810.23	20.95
S3, S4, S5 and S6	A + B	543.54	1.1	597.90	2214.43	6	3587.38	41.52
S7	A + B + C	1238.02	1.1	1361.82	5043.79	5	6809.12	78.81
S8	A + B + C + D	1297.71	1.1	1427.48	5286.97	5	7137.41	82.61

Remarks:

^[1] Catchment Inflow Factor = 1.10 (Kwai Ching) 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 (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
		Upstream	Downstream			Upstream	Downstream										
S1	FWD4021686	FMH4020964	FMH4020966	0.225	3.5	41.33	41.2	9.81	0.0006	0.0371	0.00000114	2.5298	0.040	0.101	100.59	20.95	20.83%
S2	FWD4021687	FMH4020966	FMH4020965	0.225	6.5	40.9	40.8	9.81	0.0006	0.0154	0.00000114	1.6229	0.040	0.065	64.53	20.95	32.47%
S3	FWD4021667	FMH4020965	FMH4020945	0.4	9.5	40.8	40.62	9.81	0.0006	0.0189	0.00000114	2.6011	0.126	0.327	326.87	41.52	12.70%
S4 ⁽⁴⁾	FMD4000640	FMH4020945	FMH4020947	0.3	5	40.6	40.51	9.81	0.0006	0.0180	0.00000114	2.1120	0.141	0.299	298.57	41.52	13.91%
	Unkown	FMH4020947	FMH4020948	0.4	1.25	40.51	40.5	9.81	0.0006	0.0080	0.00000114	1.6851	0.126	0.212	211.76	41.52	19.61%
S6	FWD4021669	FMH4020948	FMH4020949	0.4	6.25	40.5	40.44	9.81	0.0006	0.0096	0.00000114	1.8473	0.126	0.232	232.14	41.52	17.89%
S7	FWD4021685	FMH4020949	FMH4020950	0.4	17.5	40.44	40.2	9.81	0.0006	0.0137	0.00000114	2.2108	0.126	0.278	277.81	78.81	28.37%
S8	FWD4021671	FMH4020950	FMH4020951	0.45	12.5	40.2	40.13	9.81	0.0006	0.0056	0.00000114	1.5165	0.159	0.241	241.19	82.61	34.25%

Remarks:

- (1) g=gravitational acceleration; k_s=equivalent pipeline roughness; s=hydraulic gradient; v=kinematic viscosity of fluid; V=mean velocity
- (2) The value of k_s = 0.6mm (for velocities approximately greater than 1.2m/s) is adopted for the calculation of slimed clayware sewer, poor condition (based on Table 5: Recommended Roughness Values in Sewerage Manual)
- (3) The mean velocity is calculated using the Colebrook-White Equation:

$$V=-\sqrt{(8gDs)}\log(-\frac{k_s}{3.7D}+\frac{2.51v}{D\sqrt{(2gDs)}})$$

(4) The Segment S4 contains two numbers of 300mm dia. sewerage pipes