Section 16 Planning Application for Amendments to an Approved Master Layout Plan for the Proposed Comprehensive Redevelopment of Tai Hang Sai Estate, with Minor Relaxation of Plot Ratio, Building Heights and Non-Building Area Restrictions in "Comprehensive Development Area" Zone at Tai Hang Sai Estate, Shek Kip Mei, Kowloon

Sewerage Impact Assessment

September 2026

Prepared By
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1. Introduction

1.1. Background

1.1.1. The Application Site is located in Shek Kip Mei, which is bounded by Tai Hang Sai Street to the northeast, Tai Hang Tung Road to the southeast, Woh Chai Street to the south, Wai Chi Street to the west and Shek Kip Mei Central Playground to the northwest (***Figure 1***). It covers a total land area of about 20,910.6m^2.

1.1.2. In the Approved Scheme, the Application Site comprised two sites, namely Site 1 and Site 2. Site 1 was designated for HKSHCL to provide rehousing units for affected THSE residents, while Site 2 was developed by URA.

1.1.3. This SIA report has taken into account (i) the SIA for Approved S16 (Application No.: A/K4/76) dated 2021, (ii) the SIA for Site 2 to satisfy the approval condition (f) in support of application of S16 Application No. A/K4/76 in July 2024, and (iii) the SIA for Site 1 to satisfy the approval condition in support of application of S16 Application No. A/K4/76 in August 2025, which the EPD & DSD had no in-principle objection on the (ii) & (iii).

1.1.4. Meinhardt (C&S) Ltd (MCS) is commissioned by the Applicant to conduct a revised Sewerage Impact Assessment (SIA) for the proposed development with respect to the latest development scheme to assess the potential sewerage impact and to recommend mitigation measures as necessary in support of this S16 Planning Application.

1.2. Objectives of the SIA

1.2.1. The objectives of this SIA are to assess whether the capacity of the existing sewerage networking to the Project Site is sufficient to cope with the sewage flow from proposed development.

1.2.2. The purpose of this SIA is to support the new Section 16 Planning Application for the proposed development.

1.3. Report Structure

1.3.1. The remaining chapters of this report are shown below:

Chapter 2 – The Current S16 Planning Proposal
Chapter 3 –Existing Sewerage Condition
Chapter 4 – Sewerage Impact Assessment
Chapter 5 – Estimation of Sewage Flow from Proposed Development
Chapter 6 – Sewage Capacity
Chapter 7 – Result and Discussion
Chapter 8 – Conclusion

2. The Current S16 Planning Proposal

2.1.1. In order to adopt MiC for the Proposed Development and to further optimise the development potential of the Application Site, the Applicants take the opportunity to refine the Approved Scheme (under Application No. A/K4/76).

2.1.2. The proposed development comprises of six residential towers ranged from 28 to 42 storeys on top of Retail and GIC podium. GIC comprises of Care and Attention Home for Severely Disabled Persons (C&A/SD), Residential Care Homes for the Elderly cum Day Care Unit (RCHE cum DCU), Neighbourhood Elderly Centre (NEC), Centre for Home Care Services for Frail Elderly Persons (HCS), and Child Care Centre (CCC). The key development parameters of the proposed development is listed in ***Table 2-1*** and the development plans are shown in **Appendix A**. The proposed development is expected to be completed by Year 2030.

Table 2-1 Key Development Parameters of the Proposed Scheme

	Site 1 (a)		**Site 2 (b)**		**Total (a)+(b)**
Site Area *(m^2)*	5,500		15,410.6		20,910.6
PR	**Total: About 8.24** *Domestic: About 7.5* *Non-domestic: About 0.74*				N/A
GFA *(m^2)*	**Total:**	**46,920**	**Total:**	**125,484**	**172,404**
	Domestic:	*36,346*	*Domestic:*	*120,484 (1)*	*156,830*
	Non-domestic:	*10,574*	*Non-domestic:*	*5,000*	*15,574*
	GIC:	*0*	*GIC:*	*6,500 (2)*	*6,500 (2)*
No. of Units	Not more than 1,289		Not more than 2,900		Not more than 4,189
Average Flat Size *(m^2)*	About 28		About 42		N/A
Estimated Population	3,416		6,960		10,376(4)
POS *(m^2)*	0		Not less than 2,200		Not less than 2,200(5)
Private Open Space *(m^2)*	Not less than 3,420		To be provided in accordance with the latest requirements in the Hong Kong Planning Standards and Guidelines (HKPSG)		
Parking Provision(6)	**Total:**	**93**	**Total:**	**360**	**453**
	Private car	*70*	*Private car*	*320*	*390*
	Motorcycle	*6*	*Motorcycle*	*22*	*28*
	Light bus spaces	*0*	*Light bus spaces*	*4*	*4*
	Loading/ unloading bays	*14*	*Loading/ unloading bays*	*9*	*23*
	Disabled Car Parking Space	*2*	*Disabled Car Parking Space*	*4*	*6*
	Refuse Collection Vehicle Parking Space	*1*	*Refuse Collection Vehicle Parking Space*	*1*	*2*
Completion Year	2029		2031/2032		N/A

Subject to detailed design
(1) A maximum 10% of MiC floor area could be disregarded from calculation of GFA as per JPN No. 8 for MiC adoption.
(2) GIC facilities are disregarded from PR calculation under the OZP.
(3) Calculated based on an assumed person per flat ratio of 2.65 for Site 1 and 2.4 for Site 2.
(4) The POS will contain covered, uncovered or open-sided area. Pursuant to PNAP APP-42, it is proposed that these covered areas be disregarded from GFA calculation.
(5) Parking provision for Site 1 is accordance to the TIA submitted under approval condition (e), which was approved by TD on 7 August 2025. For Site 2, it will be subjected to liaison and agreement with Transport Department and the actual provision will follow the latest standard in the HKPSG.

3. Existing Sewerage Condition

3.1.1. Drainage information was obtained from current Drainage Plan, which is same as previous SIA in Section 16 Planning Application stage and the GeoInfo Map services of the Lands Department in December 2023 to gather the background information on sewerage infrastructure in the vicinity of the Project Site. Concerned sewage network was identified for estimation of the potential sewage impact to the downstream sewers associated with the proposed development. A series of public sewers with diameter ranged from 300mm to 800mm were found along service lane at the southeastern boundary of the Project Site. Sewage generated from the Project Site is currently discharged to an existing Government foul water manhole (FMH4018021). A CCTV survey has been conducted and submitted under the separation submission on 6 Feb 2025 (Ref: B22006/48).

4. Sewerage Impact Assessment

4.1. Legislation, Standards and Guidelines

4.1.1. With reference to ProPECC PN 1/23 Drainage Plans Subject to Comment by the Environmental Protection Department ("EPD"), foul water should be discharged to a foul sewer under the Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations 40(1) and 41(1).

4.1.2. The following standards and guidelines are adopted for estimation, assessment and evaluation of sewerage implication of the proposed development:

- "Hong Kong Planning Standards and Guidelines" issued by the Planning Department;
- "Sewerage Manual Part 1" published by DSD; and
- "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Version 1.0 (Report No.: EPD/TP1/05)" ("GESF") published by Environmental Protection Department ("EPD").

4.2. Assessment Methodology and Assessment

4.2.1. As shown in the ***Figure 2***, the sewage generated from the proposed development will be discharged through the terminal manhole of Site 1 (FTMH1) and Site 2 (FTMH2-1 & FTMH2-2). A series of new sewers and manholes (FMH02, FMH12-FMH16) is proposed along the southeastern side of the Project Site to collect the sewage flow from terminal manhole respectively then

conveyed to existing public sewer. The proposed connection pipe material will be polyethylene pipe for 225 to 450mm diameter pipes. All sewage generated from the proposed development will be discharged into the existing manhole FMH4018021, and then will be discharged into the existing sewer at the existing manhole FMH4017935. Sewers from FMH02 to FMH4018021 will be connected while the existing sewer and manhole from FMH4018043 to FMH4018021 will be abandoned, and existing sewers from FMH4018021 to FMH4017935 to be upgraded from 300 to 450 as shown in ***Figure 2***.

4.2.2. The adequacy in capacities of the existing sewers and the proposed sewer to be connected to the manhole FMH4017935 have been checked based on the estimation of the existing upstream / downstream and future sewage generation from the proposed development. The proposed connection pipe size and material will be 450 mm diameter and polyethylene pipe, respectively. ***Figure 2*** illustrates an overview of corresponding catchment areas, proposed and existing sewerage network for this study.

4.2.3. A hydraulic assessment, which will take into account of the sewage discharge from proposed development as well as the surrounding developments will be conducted. The quantity of sewage generated from existing development and proposed development will be compared.

4.2.4. According to the "Sewerage Manual – Key Planning issues and Gravity Collection System" published by DSD in 2013, the capacities of respective sewers have been calculated based on Colebrook-White equation for circular pipes:

$$V = -2(2gDS)^{0.5}\log\left(\frac{k}{3.7D}+\frac{2.5\nu}{D(2gDS)^{0.5}}\right)$$

Where
V = mean velocity (m/s)
g = gravitational acceleration (m/s²)
D = pipe diameter (m)
ks = hydraulic pipeline roughness (m) (0.006m is adopted for the "poor" condition of concrete slimed sewers as worst-case scenario)
v = kinematic viscosity of fluid (m2/s)
s = frictional slope (energy gradient due to frictional loss)

4.2.5. The detailed calculations of sewage generation have been provided in ***Appendix B*** and ***Appendix C*** for reference.

5. Estimation of Sewage Flow from Proposed Development

5.1. Methodology for Estimation of Average Dry Weather Flow

5.1.1. The global unit flow factors as recommended in the *Guideline for Estimating Sewage Flows for Sewage Infrastructure Planning* (hereafter as "GESF") published by EPD in 2005 has been adopted in the assessment to estimate sewage flow. Relative unit flow factors applied for the sewage generation estimation are tabulated in ***Table 5-1*** *Unit Flow Factors* ***Adopted for the Assessment*** below.

Table 5-1 Unit Flow Factors Adopted for the Assessment

Type of People	Unit Flow Factors [2]	Category [1]
Residents	0.27m^3/person/day	R2 in Table T-1 of GESF.
Residents in RCHE	0.19 m^3/person/day	Institutional and special class in Table T-1 of GESF
Employee from Retail	0.28 m^3/person/day	Commercial Employee + Commercial Activities (J4 -Wholesale & Retail)
Employee for Food and Beverage	1.58 m^3/person/day	Commercial Employee + Commercial Activities (J10 - Restaurants & Hotels)
Employee from RCHE	0.28 m^3/person/day	Commercial Employee + Commercial Activities (J11 – Community, Social & Personal Services)
Employee from Property Management	0.28 m^3/person/day	Commercial Employee + Commercial Activities (General-Territorial average)

Notes:
[1] Environmental Protection Department, HKSARG [EPD] (2005). Guidelines for estimating sewage flows for sewage infrastructure planning (EPD/TP 1/05). Hong Kong
[2] UFF for various occupancy types are adopted according to Table T-1 and Table T-2 of the GESF.

5.2. Estimation of Sewage Flow from Proposed Developments

5.2.1. Foul water from Site 2 will be discharged in the terminal manhole located to the south of the Project Site (FTMH2-1 and FTMH2-2). FTMH2-1 collects approximately 1/4 of the sewage discharged from Site 2, which is connected to proposed sewers and manholes FMH12-FMH16 and FMH02 along Woh Chai Street, and then will be connected to public manhole FMH4018021, while approximately 3/4 of the sewage from Site 2 will be collected at FTMH2-2 and discharged to manhole FMH02. Foul water from Site 1 will be discharged into FTMH1 which is connected to FMH16 and FMH02 at Woh Chai Street. The subsequent existing sewers FMH4018021 to FMH4018047, FMH4018047 to FMH4018048, FMH4018048 to FMH4046300, FMH4046300 to FMH4017935 will be upgraded by the Site 1 from 300Ø to 450Ø.

5.2.2. The estimated sewerage flow for the proposed developments of Site 1 and Site 2 is given in ***Table 5-2*** and ***Appendix B***.

5.2.3. With reference to ***Table 5-2***, the total estimated Average Dry Weather Flow ("ADWF") from the proposed developments for Site 1 and Site 2 are 1251.1 m^3/day and 2153 m^3/day respectively.

Table 5-2 Sewage Flow Estimation for the proposed development

Proposed Development			
Site 1			
Category	**Unit (person)**	**Unit Flow Factor (m^3/day)**	**Average Dry Weather Flow (m^3/day)**
Domestic Flows			
Private R2	3416	0.270	922.32
Commercial Flows			
J10 Restaurant	454	1.580	717.32
Average Dry Weather (m^3/day)			1,639.64

Proposed Development		
Site 2		
Type	**Total**	**Remarks**
Residential		
No. of Units	2900 units	Advised by Project Proponent
Average Household Size	2.4 person/unit	Advised by Project Proponent
No. of residents	6960persons	
Unit Flow Factor	0.27 m^3/person/day	Refer to the planning unit flow for R2 in Table T-1 of GESF.
Average Sewage Discharge	1879.2 m^3/day	
Retail		
Total Floor Area	436.81 m^2	
Worker Density (in 100m^2)	3.5 person/100 m^2	Refer to worker density for "Retail Trade" in Table 8 of CIFSUS.
Total number of person	16 persons	
Unit Flow Factor	0.28 m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J4 Wholesale & Retail" in Table T-2 of GESF.
Average Sewage Discharge	4.5 m^3/day	
F&B		
Total Floor Area	2305.57 m^2	
Worker Density (in 100m^2)	5.1 person/100 m^2	Refer to worker density for "Restaurants" in Table 8 of CIFSUS.
Total number of person	118 persons	
Unit Flow Factor	1.58 m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J10 Restaurants & Hotels" in Table T-2 of GESF.
Average Sewage Discharge	186.44 m^3/day	
GIC		
RCHE (100-place Residential Care Homes for the Elderly cum Day Care Unit (UG1/F - UG2/F))		
From Staff		
Total Floor Area	3050 m^2	

Worker Density (in 100m^2)	3.3 person/100 m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of overnight staff	4 persons	Refer to Cap. 459A Residential Care Homes (Elderly Persons) Regulation,1 care worker for every 30 residents or part thereof, between 10 p.m. and 7 a.m
Total number of person	105 persons	
Unit Flow Factor	0.28 m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	29.4 m^3/day	
From residents		
Total number of residents	100 persons	
Unit Flow Factor	0.19 m^3/person/day	Refer to the planning unit flow for R1 in Table T-1 of GESF.
Average Sewage Discharge	19.0 m^3/day	
Child Care Centre (2/F)		
Total floor area	899 m^2	
Worker Density (in 100m^2)	3.3 person/100m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of person	30 persons	
Unit Flow Factor	0.28 m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF
Average Sewage Discharge	8.40 m^3/day	
Centre for Home Care Services for Frail Elderly Persons (2/F)		
Total floor area	390 m^2	
Worker Density (in 100m^2)	3.3 person/100m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of person	13 persons	
Unit Flow Factor	0.28 m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	3.64 m^3/day	
Care and Attention Home for Severely Disabled Persons (1/F)		
Total floor area	1550 m^2	
Worker Density (in 100m^2)	3.3 person/100m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.

Total number of person	52 persons		
Unit Flow Factor	0.28 m^3/person/day		Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	14.56 m^3/day		
Neighborhood Elderly Centre(1/F)			
Total floor area	520 m^2		
Worker Density (in 100m^2)	3.3 person/100m^2		Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of person	18 persons		
Unit Flow Factor	0.28 m^3/person/day		Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	5.04 m^3/day		
Property Management			
	Domestic	Non-domestic	
Total floor area	125 m^2	66 m^2	
Worker Density (in 100m^2)	5.5 person/100m^2		Refer to worker density for "Financial, Insurance, Real Estate & Business Services" in Table 8 of CIFSUS.
Total number of person	7 persons	4 person	
Unit Flow Factor	0.28 m3/person/day		Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	1.96 m^3/day	1.12 m^3/day	
Swimming Pool			
Volume	337.5 m^3		Pool Area: 255 m^2, average height of 1.2m Kid's Pool Area: 70 m^2, average height of 0.45m
Turnover Rate	6hr		
Surface Loading Rate of Filter	30 m^3/m^2/hr		Swimming Pools: Design and Construction, Fourth Edition By Philip H. Perkins (30 m^3/m^2/hr adopted)
Required filter area	1.9 m^2		
Backwash duration	7mins/day		With reference to Section B8.5.5 of General Specification for Swimming Pool Water Treatment Installation in Government Buildings of the HKSAR published by the ArchSD, "the water velocity chosen shall be effective in

		cleaning the filter in duration of 7 minutes for sand filter"
Backwash flow rate	30 $m^3/m^2/hr$	Technical Paper - Domestic Swimming Pool Filtration by European Union of Swimming pool and Spa Associations
Maximum backwash volume	6.6 m^3/day	
Maximum backwash volume	15.6 L/s	
Peak Flow	0.016 m^3/s	
Total Average dry weather flow of the Proposed Development	2153 m^3/day	

5.3. Estimation of Sewage Flow from Streams

5.3.1. Different streams (i.e. Stream A, B and C) are defined as shown in ***Figure 2*** to consider existing sewage generation. The streams consist mainly of residential and commercial buildings. Stream A is the discharge of Project Site whereas Stream B and C cover the sewage flow from surrounding catchment areas and the sewage is discharged into the existing 300 - 800mm public sewerage pipes along the Tai Hang Sai Street. Stream B is discharged at FMH4017935 to join Stream A while Stream C join Stream A and B at FMH4017936.

5.3.2. Both Stream B and C is assumed to have 100% capacity at the convergent sewer of all discharge to the stream to estimate the total average day flow generated from the surrounding of the Project Site.

5.4. Estimation of Peak Discharge

5.4.1. Catchment inflow factor ("PCIF") caters for the net overall ingress of wastewater to the sewerage system. They are catchment-dependent and applicable to major sewerage facilities of a catchment.

5.4.2. In accordance with Table T-4 of the GESF, PCIF of 1.30 is adopted for existing sewerage as concerned sewerage system is identified in "North West Kowloon".

5.4.3. Revised average dry weather flow ("revised ADWF") is determined by production of average dry weather flow and catchment inflow factor. Contributing population is then calculated by dividing the revised ADWF by 0.27. The calculated contributing population is finally used for selection of peaking factors.

5.4.4. Based on ***Table 5.3*** which is also presented in Table T-5 in GESF, the peaking factors for each sewer are chosen in the hydraulic calculation for peak flow estimation.

Table 5-3 Peaking Factors

Population Range for Sewers [1] [2]	Peaking Factor (including storm water allowance) for facility with existing upstream sewerage	Peaking Factor (excluding storm water allowance) for facility with new upstream sewerage
< 1000	8	6
1000 - 5000	6	5
5000 - 10000	5	4
10000 - 50000	4	3
> 50000	Max (7.3 / $N^{0.15}$, 2.4)	Max (6 / $N^{0.175}$, 1.6)

Notes:
[1] N is the contributing population in thousands.
[2] According to Section 12.1 of GESF, Contributing Population = Calculated Total Average Flow (m^3/day) ÷ 0.27 (m^3/person/day)

6. Sewerage Capacity

6.1.1. According to the "Sewerage Manual – Key Planning Issues and Gravity Collection System" (Sewerage Manual) published by DSD in 2013, the capacities of respective sewers have been calculated based on the Colebrook White's equation. The roughness coefficient (ks) is determined by Table 5 of the Sewerage Manual. For Clayware slimed sewer in poor condition, the roughness coefficients (ks) value of 3mm and 0.6mm are adopted when the mean velocity is less than 0.75m/s or greater than 1.2m/s respectively. For sewers from terminal manhole to public manhole, ks of 0.3mm for uPVC slimed sewers in poor condition is adopted.

6.1.2. The sewerage impact on various segments of the sewer were evaluated by comparing the estimated peak flow against the capacity of the respective sewer segments. The detailed calculations are provided in ***Appendix C***.

7. Result and Discussion

7.1. Sewage Generation of Proposed Development

7.1.1. The final discharge point from the proposed development will be connected to the existing 600mm diameter sewer at manhole FMH4017935. The proposed connection pipe size and material will be 450 mm diameter and polyethylene pipe, respectively.

7.1.2. With reference to the approved SIA dated August 2025, the capacity of each segment for the proposed connection pipe and the existing 800 mm diameter downstream sewers (i.e., from terminal manhole FTMH2-1 to FMH4017937 as shown in ***Figure 2***) between each manhole has been evaluated and are summarized in ***Table 7-1***. The percentages of used capacity range for the downstream sewers will be ranged from about 20.3% to 87.3%. Estimation of the flows and capacities are detailed in ***Appendix C***.

Table 7-1 Estimated Downstream Sewer Capacities

Pipe Segments	Diameter (m)	Gradient	Pipe Capacity, m^3/s	Estimated Cumulative Peak Flow, m^3/s	% of Used Capacity
FTMH2-1– FMH12	0.225	0.156	0.226	0.056	25.0%
FMH12– FMH13	0.300	0.021	0.174	0.056	32.6%
FMH13– FMH14	0.300	0.032	0.217	0.056	26.0%
FMH14– FMH15	0.300	0.041	0.246	0.056	23.0%
FMH15– FMH16	0.300	0.012	0.130	0.056	43.6%
FMH16 – FMH02	0.450	0.035	0.660	0.147	22.3%
FTMH2-2 – FMH02	0.300	0.154	0.478	0.097	20.3%
FMH02 – FMH4018021	0.450	0.010	0.354	0.187	52.8%
FMH4018021– FMH4018047	0.450*	0.009	0.323	0.187	58.0%
FMH4018047– FMH4018048	0.450*	0.006	0.270	0.187	69.4%
FMH4018048– FMH4046300	0.450*	0.005	0.255	0.187	73.5%
FMH4046300– FMH4017935	0.450*	0.004	0.214	0.187	87.3%
FMH4017935– FMH4017936	0.600	0.007	0.578	0.434	75.1%
FMH4017936– FMH4017937	0.800	0.004	0.881	0.545	61.8%

Notes:
ks (clayware slimed sewer)=3.0mm for V<0.75m/s, ks (clayware slimed sewer)=0.6mm for V>1.2m/s,
ks (polyethylene sewer)=0.3mm for V>1.2m/s
*Proposed Sewer to be upgraded by the Project Proponent (Site 1)

7.1.3. The results of the assessment as presented in ***Table 7-1*** and ***Appendix C*** have indicated that there are no sewer segments that will exceed the capacity after the discharged of proposed development under the worst-case scenario.

7.2. Liability

7.2.1. The Project Proponent (Site 1) will be responsible for the construction works for the new proposed pipe at southeastern of the site, connection pipe convey sewerage from terminal manhole to existing public sewer and the proposed sewer upgrading works from existing manholes FMH4018021 to FMH4017935. All drainage facilities shall be designed and constructed to conform to the requirements laid down in below while future maintenance of the sewers outside the Project Site boundary will be carried out by the DSD.

a. The Stormwater Drainage Manual, DSD
b. The General Specification for Civil Engineering Works, Hong Kong Government
c. The DSD Standard Drawings

7.2.2. During operational phase, regular inspection of the sewers within the Project Site should be conducted by the property management office to ensure proper performance. Regular maintenance should also be carried out in accordance with standard practices stated in the DSD's "Sewerage Manual Part 1".

8. Conclusion

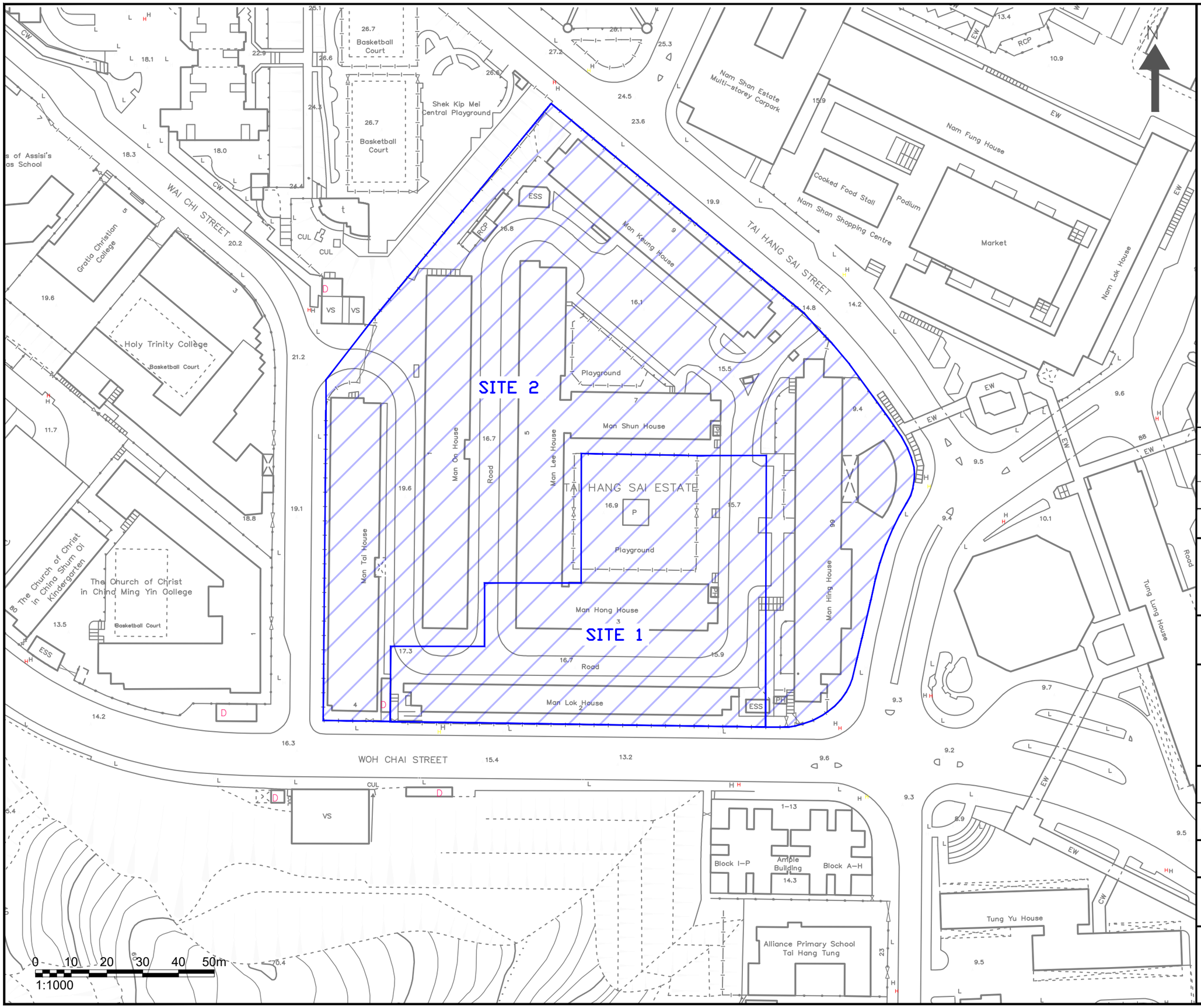
8.1.1. This Sewerage Impact Assessment (SIA) aims to evaluate the sewerage impacts on the local sewerage network due to the operation of the proposed development under no DSD's upgrading works scenario.

8.1.2. A new series of sewer system with diameter range from 225 to 450mm is proposed at Woh Chai Street to collect sewage generated from proposed development and then conveyed to public sewer system at manhole FMH4017935, abandoning the existing sewers and manhole between FMH4018043 and FMH4018021. The maximum occupied capacity of the proposed sewer is 87.3%, there is sufficient capacity for the new proposed sewer. Project Proponent will be responsible for the construction of new proposed sewer.

8.1.3. The findings of the assessment have demonstrated all segments have sufficient sewer capacity to cope with the sewage flow. The maximum occupied capacity of proposed sewer is 87.3%. Significant sewerage impact arising from the proposed development on the existing sewer is not expected.

8.1.4. Based on the above, it is concluded that the sewerage impact arising from the proposed development should be acceptable.

Figure



NOTES :

APPLICATION SITE

REVISIONS TO DRAWING	No.	DATE	BY

IMPORTANT: DO NOT SCALE THIS DRAWING
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PROJECT

PROPOSED COMPREHENSIVE DEVELOPMENT AT TAI HANG SAI ESTATE (SITE 2), SHEK KIP MEI, KOWLOON, N.K.I.L. NO.6655

CLIENT

TITLE

SITE LOCATION AND ITS ENVIRONS

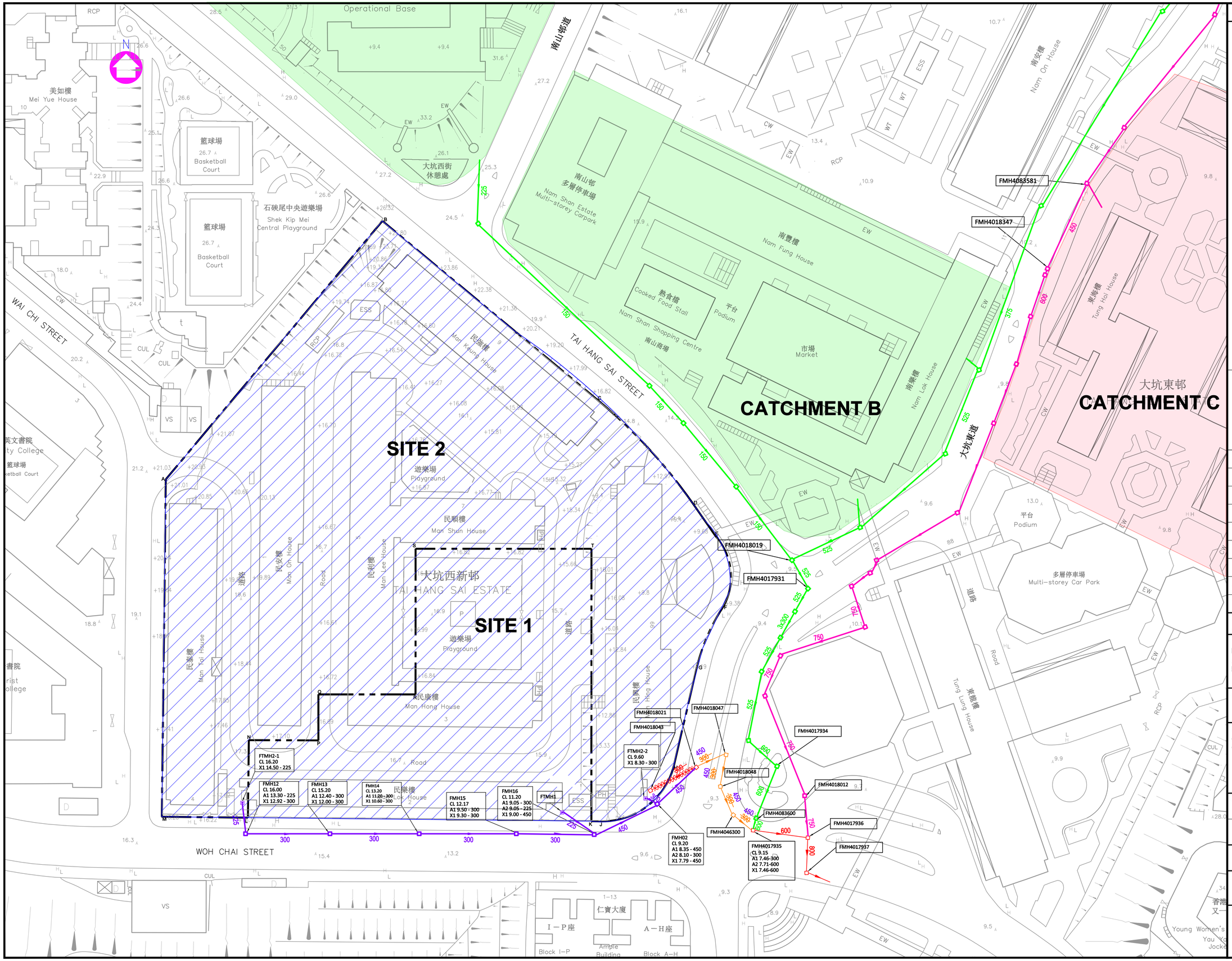
PROJECT NO.	DRG. NO.	DATE	REV.
CS 2093	FIGURE 1	OCT 2024	--

SCALE	DESIGNED	DRAWN	CHECKED	APPROVED
AS SHOWN	KH	KH	GY	PW

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Consulting Engineers
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Telephone: 2858 0738
2858 2918
Facsimile: 2517 6107

A3 420 x 297



B.D. REF. No.

LEGENDS:

- APPLICATION SITE
- EXISTING SEWER AND MANHOLE
- ABANDONED SEWER AND MANHOLE
- 450 / 300 — SEWER AND MANHOLE TO BE UPGRADED
- RPOPOSED SEWER AND MANHOLE/ STREAM A
- STREAM B
- STREAM C
- 375 — DIAMETER OF SEWER
- CATCHMENT AREA
- 300 / 300 / 450 — MANHOLE NUMBER
  - FMH16
  - CL 11.20 — COVER LEVELOR GROUND LEVEL
  - A1 8.70–300 — 300mm dia. INCOMING PIPE INVERT LEVEL
  - A2 9.95–225 — 225mm dia. INCOMING PIPE INVERT LEVEL
  - X1 8.30–450 — 450mm dia. OUTGOING PIPE INVERT LEVEL

REVISIONS TO DRAWING	NO.	DATE	BY
–	–	–	–

IMPORTANT: DO NOT SCALE THIS DRAWING
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PROJECT
PROPOSED COMPREHENSIVE DEVELOPMENT AT TAI HANG SAI (SITE 2), SHEK KIP MEI, KOWLOON, N.K.I.L. NO. 6655

CLIENT

TITLE
OVERVIEW OF SEWAGE NETWORK AND CATCHMENT

PROJECT NO.	DRG. NO.	DATE	REV.
CS2093	FIGURE 2	OCT 2024	–

SCALE	DESIGNED	DRAWN	CHECKED	APPROVED
1:500	GY	SS	PW	PW

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2858 2918
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Appendix A

Existing Record Plan

11-NW-9D-3

11-NW-14A-2

11-NW-14B-2

Site 2

Site 1

大坑西新邨
TAI HANG SAI ESTATE

石硤尾邨第二期
Shek Kip Mei Estate Phase 2

石硤尾邨第六期
Shek Kip Mei Estate Phase 6

石硤尾健康院
Shek Kip Mei Health Centre

WIP Jan 2020

1 4 FEB 2023

11-NW-14B-3

Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Tunnel/Box Culvert (Storm/Sewer)
- Drainage Reserve
- Tunnel Protection Zone
- Existing Y-Junction (Storm/Sewer/Combined)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Rising Main (Storm/Sewer)
- Existing Rising Main (Storm/Sewer) (Planning / Identifying to be Abandoned)
- Vaccum Sewer
- Existing Vaccum Sewer (Planning / Identifying to be Abandoned)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Existing Submarine Outfall with Diffuser
- Proposed Submarine Outfall with Diffuser
- Works In Progress Submarine Outfall with Diffuser
- Slope Sign Board
- Slope Number
- Slope Boundary
- Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)
- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)

Notes :

1. All levels are in metres principle datum.
2. All dimensions shown are in millimetres unless otherwise stated.
3. The information shown on the record drawings are subject to verification on site and no guarantee can be given that this is a complete record.
4. Abbreviations for Channels of width smaller or equal to 1200mm:
   900C = 900mm width Surface Channel
   900SC = 900mm width Stepped Channel
   900UC = 900mm width U Channel
   900DWFC = 900mm width Dry Weather Flow Channel
5. The Incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.

eg.

- Manhole number
- Cover Level or Ground Level
- 225mm dia. Incoming Pipe Invert Level
- 375mm dia. Incoming Pipe Invert Level
- 525mm dia. Outgoing Pipe Invert Level

6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Metres 10 0 20 40 60 80 100 Metres

SCALE 1 : 500

Drainage Record Sheet Number

11-NW-14B-1

Last Updating : 25-05-2020

Map data renewed on February 2020

Mainland South Division
Drainage Services Department

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Legend for Drainage Record Plan

- Storm Water Manhole
- Storm Woter Terminal Manhole
- SSH — Storm Water Special Monhole
- Sewer Monhole
- Sewer Terminal Manhole
- FSH — Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- ZIA — Inspection Opening
- DWF Interceptor — Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Gully Sump / Gully
- H/H — Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- + / + — Spot Level (Storm/Sewer)
- Water Gauge
- Fencing/Railing/Concrete Parapet
- Tunnel / Box Culvert (Storm/Sewer)
- Drainage Reserve
- Tunnel Protection Zone
- SYJXXXXXXX 450-LEFT / FYJXXXXXXX 450-LEFT / CYJXXXXXXX 450-LEFT — Existing Y-Junction (Storm/Sewer/Combined)

- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- RM — Rising Main (Storm/Sewer)
- Existing Rising Main (Storm/Sewer) (Planning / Identifying to be Abandoned)
- VS — Vaccum Sewer
- Existing Vaccum Sewer (Planning / Identifying to be Abandoned)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- P — Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- N — Not Yet Commissioned Pipe (Storm/Sewer)
- UC / SC — Existing U Channel / Stepped Channel (Storm)
- P UC / SC P — Proposed U Channel / Stepped Channel (Storm)
- UC / SC — Works In Progress U Channel / Stepped Channel (Storm)
- 2100 SUBMARINE OUTFALL — Existing Submarine Outfall with Diffuser
- 2100 SUBMARINE OUTFALL — Proposed Submarine Outfall with Diffuser
- 2100 SUBMARINE OUTFALL — Works In Progress Submarine Outfall with Diffuser

- Slope Sign Board
- 1SW-D/CR8888 — Slope Number
- Slope Boundary
- SSDS(100) / SSDS(100) — Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width)

(Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)

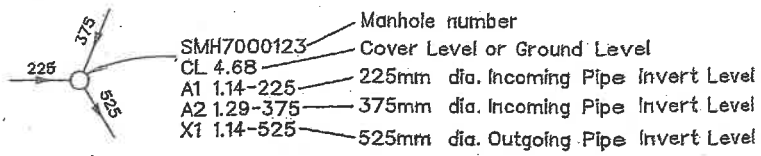
- SSDS(200) / SSDS(200) — Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width)

(Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)

Notes :

1. All levels are given in metres above principal datum.
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   - 900DWFC = 900mm width Dry Weather Flow Channel
5. The incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.

eg.



6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

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Appendix B

Building Plans of the Proposed Development


SITE 2
SITE 1
TOWER 2A
+180
TOWER 2B
+143
TOWER 3A &
TOWER 3B
+180
TOWER 5A &
TOWER 5B
+180
TOWER 1
+143
BLOCK 1
+135
BLOCK 2
+115
GIC
EVA
NON-BUILDING AREA
25000
EXISTING SLOPE
PEDESTRIAN ACCESS
5000
MTR EXIT
VS
CUL
TAI HANG SAI STREET
TAI HANG TUNG ROAD
WAI CHI STREET
WOH CHAI STREET
籃球場
Basketball Court
石硤尾中央遊樂場
Shek Kip Mei Central Playground
大坑西街休憩處
南山邨多層停車場
Nam Shan Estate Multi-storey Carpark
南豐樓
Nam Fung House
熟食檔
Cooked Food Stall
平台
Podium
南山商場
Nam Shan Shopping Centre
市場
Market
南樂樓
Nam Lok House
大坑東道
宏恩基督教學院
Gratia Christian College
寶血會上智英文書院
Holy Trinity College
中華基督教會銘賢書院
The Church of Christ in China Ming Yin College
中華基督教會深愛堂幼稚園
The Church of Christ in China Shum Oi Kindergarten
仁寶大廈
I－P座
A－H座
Ample
RESIDENTIAL TOWERS OF SITE 1
RESIDENTIAL TOWERS OF SITE 2
PROPOSED GIC FACILITIES
PUBLIC OPEN SPACE
PRIVATE LANDSCAPE PODIUM
PRIVATE LANDSCAPE ROOF
EVA
SETBACK AREA AT GRADE
COVERED WALKWAY
FOOTBRIDGE
PRIVATE AREA
SITE BOUNDARY OF SITE 1
SITE BOUNDARY OF SITE 2

UNEXCAVATED

UNEXCAVATED

NON-BUILDING AREA

25000

UNDERGROUND MTR STRUCTURE

SITE 2

UNEXCAVATED

UNEXCAVATED

25000

NON-BUILDING AREA

CARPARK

SITE 1

UNEXCAVATED

TAI HANG TUNG ROAD

南樂樓
Nam Lok House

大坑東道

道路
Road

東龍樓
Tung Lung House

SITE BOUNDARY OF SITE 1

SITE BOUNDARY OF SITE 2

Proposed Scheme - Basement (Site 1)

UNEXCAVATED

UNEXCAVATED

CARPARK

NON-BUILDING AREA

25000

UNDERGROUND MTR STRUCTURE

UNEXCAVATED

25000

NON-BUILDING AREA

CARPARK

RETAIL / E&M

CARPARK

UNEXCAVATED

南樂樓
Nam Lok House

大坑東道

道路
Road

東龍樓
Tung Lung House

TAI HANG TUNG ROAD

仁寶大廈
1–13
A－H座
P－P座
Ample

SITE BOUNDARY OF SITE 1

SITE BOUNDARY OF SITE 2

Proposed Scheme - LG/F

UNEXCAVATED

UNEXCAVATED

UNEXCAVATED

CARPARK

NON-BUILDING AREA 25000

UNDERGROUND MTR STRUCTURE

NON-BUILDING AREA 25000

SHOP & SERVICES /EATING PLACE

GIC (UG1/F)

BLOCK 1 LIFT LOBBY

BLOCK 2 LIFT LOBBY

RAMP 1/8

TO BASEMENT CARPARK

G SAI STREET

TAI HANG TUNG ROAD

南豐樓 Nam Fung House

熟食檔 Cooked Food Stall

平台 Podium

Shan Shopping Centre 南山商場

市場 Market

南樂樓 Nam Lok House

大坑東道

道路 Road

東龍樓 Tung Lung House

1–13 仁寶大廈

I – P 座

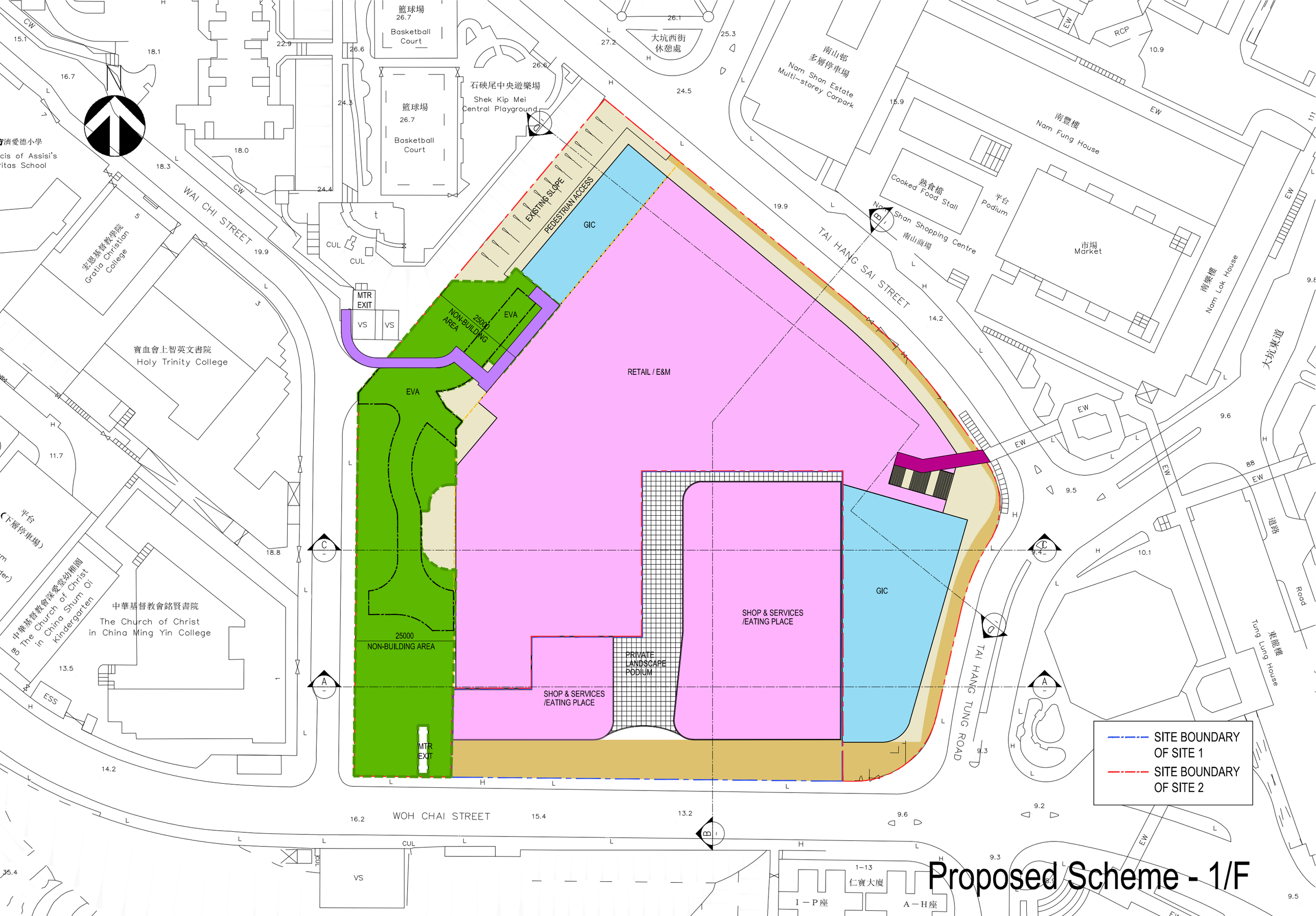
A – H 座

Ample

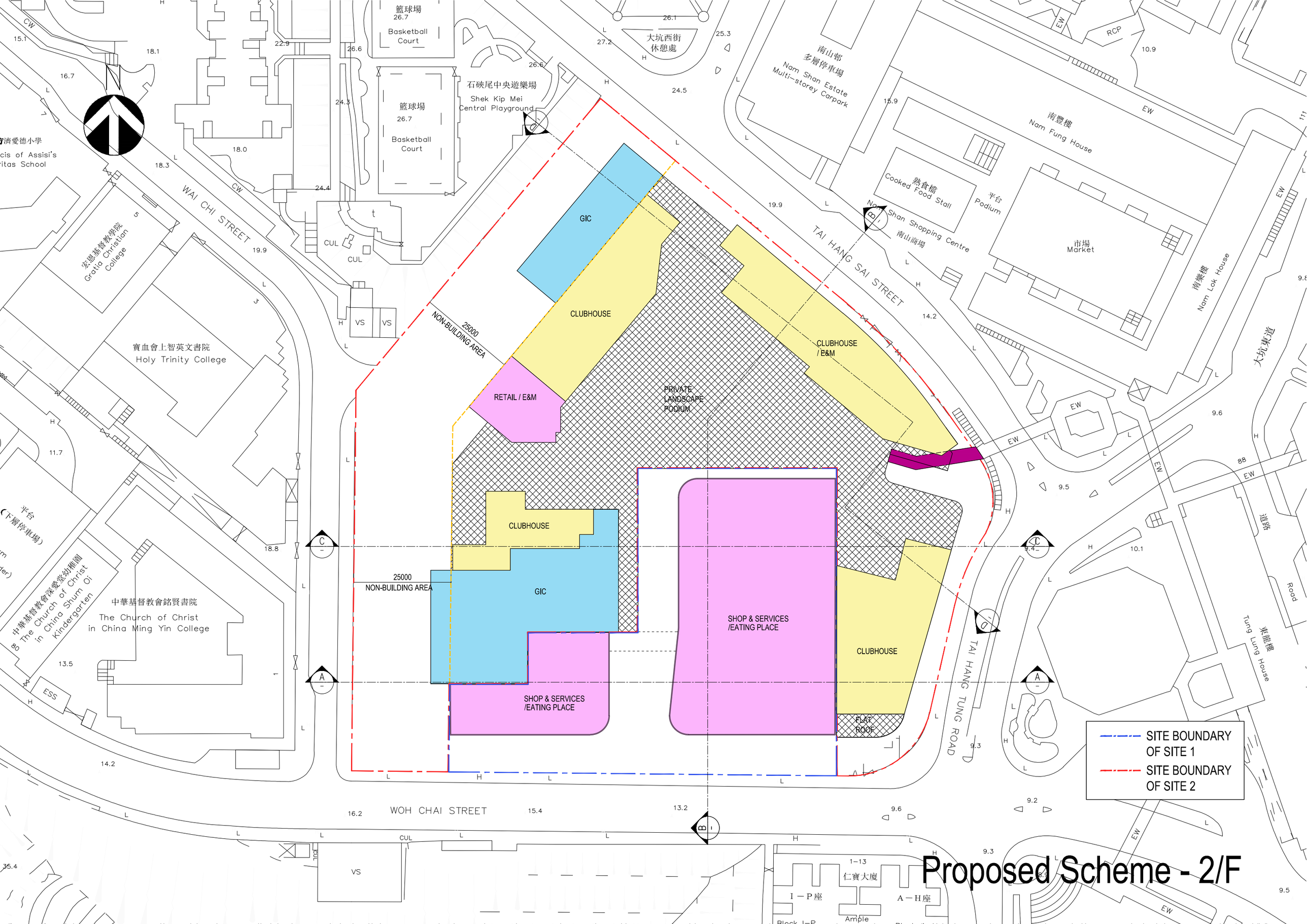
SITE BOUNDARY OF SITE 1

SITE BOUNDARY OF SITE 2

Proposed Scheme - UG/F



Proposed Scheme - 1/F



Proposed Scheme - 2/F

籃球場
26.7
Basketball Court

籃球場
26.7
Basketball Court

石硤尾中央遊樂場
Shek Kip Mei Central Playground

大坑西街休憩處

南山邨多層停車場
Nam Shan Estate Multi-storey Carpark

南豐樓
Nam Fung House

熟食檔
Cooked Food Stall

平台
Podium

Nam Shan Shopping Centre
南山商場

市場
Market

南樂樓
Nam Lok House

大坑東道

濟愛德小學
cis of Assisi's
ritas School

WAI CHI STREET

TAI HANG SAI STREET

TAI HANG TUNG ROAD

宏恩基督教學院
Gratia Christian College

寶血會上智英文書院
Holy Trinity College

中華基督教會深愛堂幼稚園
The Church of Christ in China Shum Oi Kindergarten

中華基督教會銘賢書院
The Church of Christ in China Ming Yin College

WOH CHAI STREET

FLAT ROOF

CLUBHOUSE

PRIVATE LANDSCAPE ROOF

CLUBHOUSE

25000
NON-BUILDING AREA

PRIVATE LANDSCAPE ROOF

CLUBHOUSE/ E&M

25000
NON-BUILDING AREA

PRIVATE LANDSCAPE ROOF

CLUBHOUSE/ E&M/ TRANSFER PLATE

FLAT ROOF

1–13 仁寶大廈

I – P 座

A – H 座

Ample

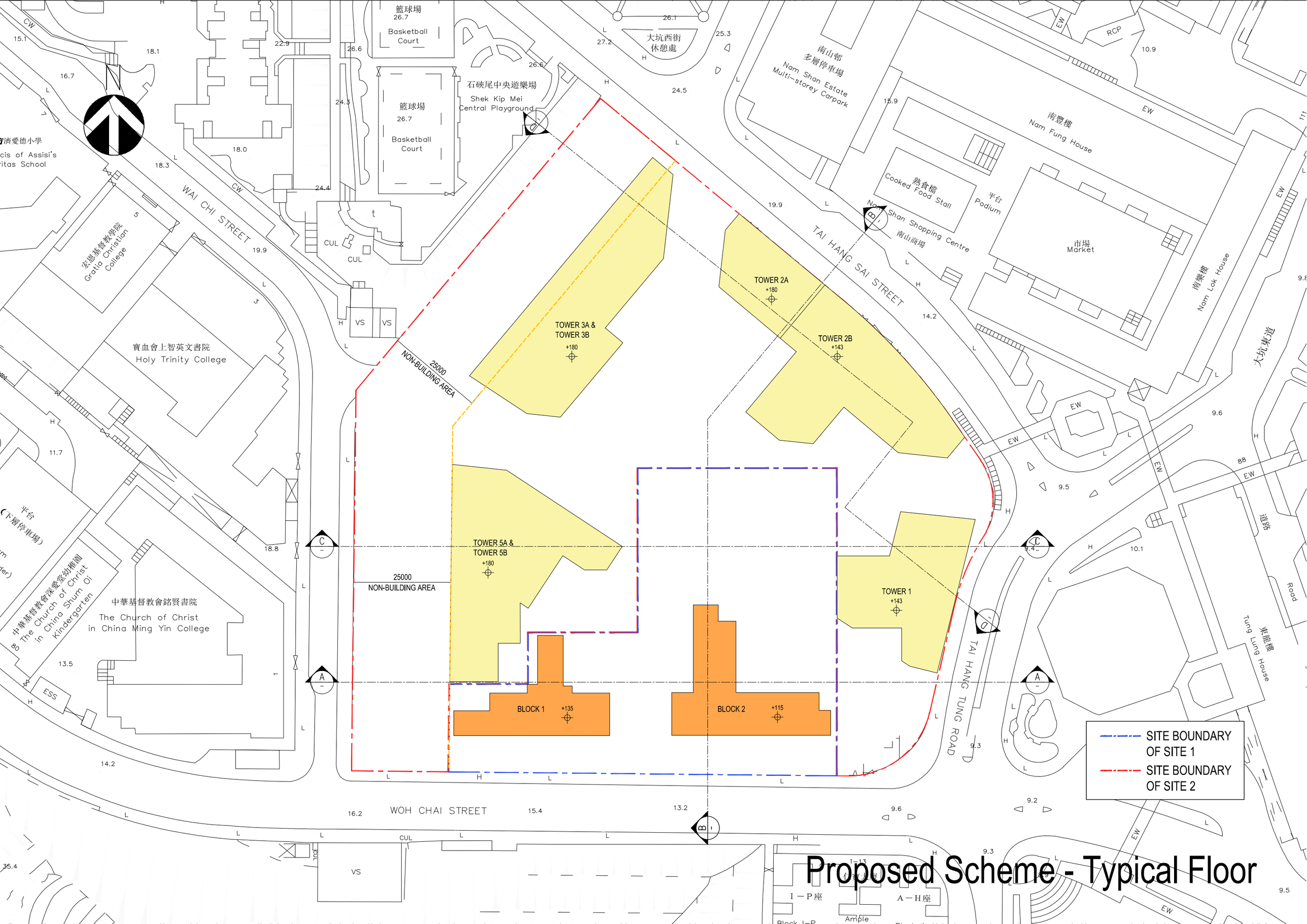
道路
Road

東龍樓
Tung Lung House

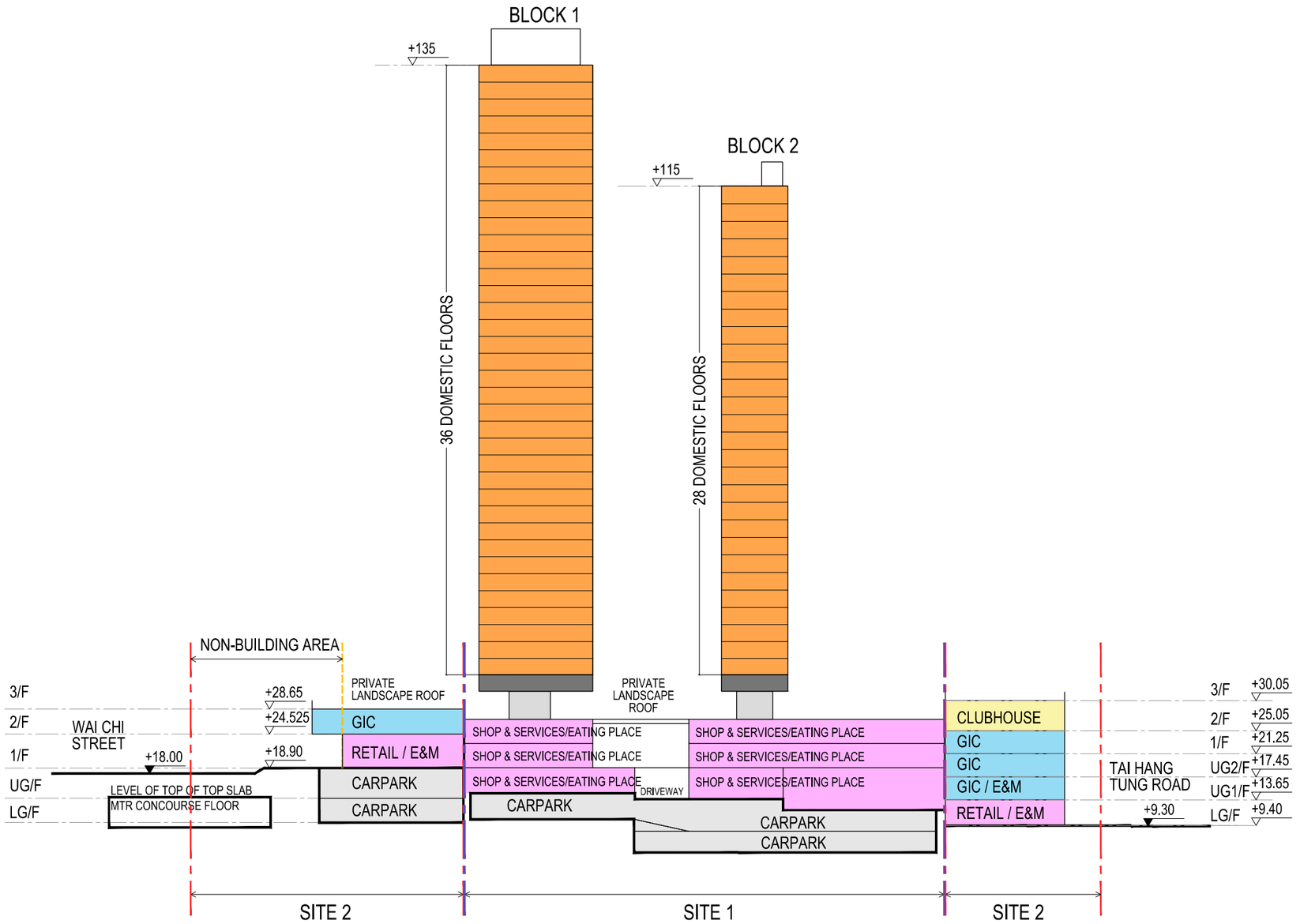
SITE BOUNDARY OF SITE 1

SITE BOUNDARY OF SITE 2

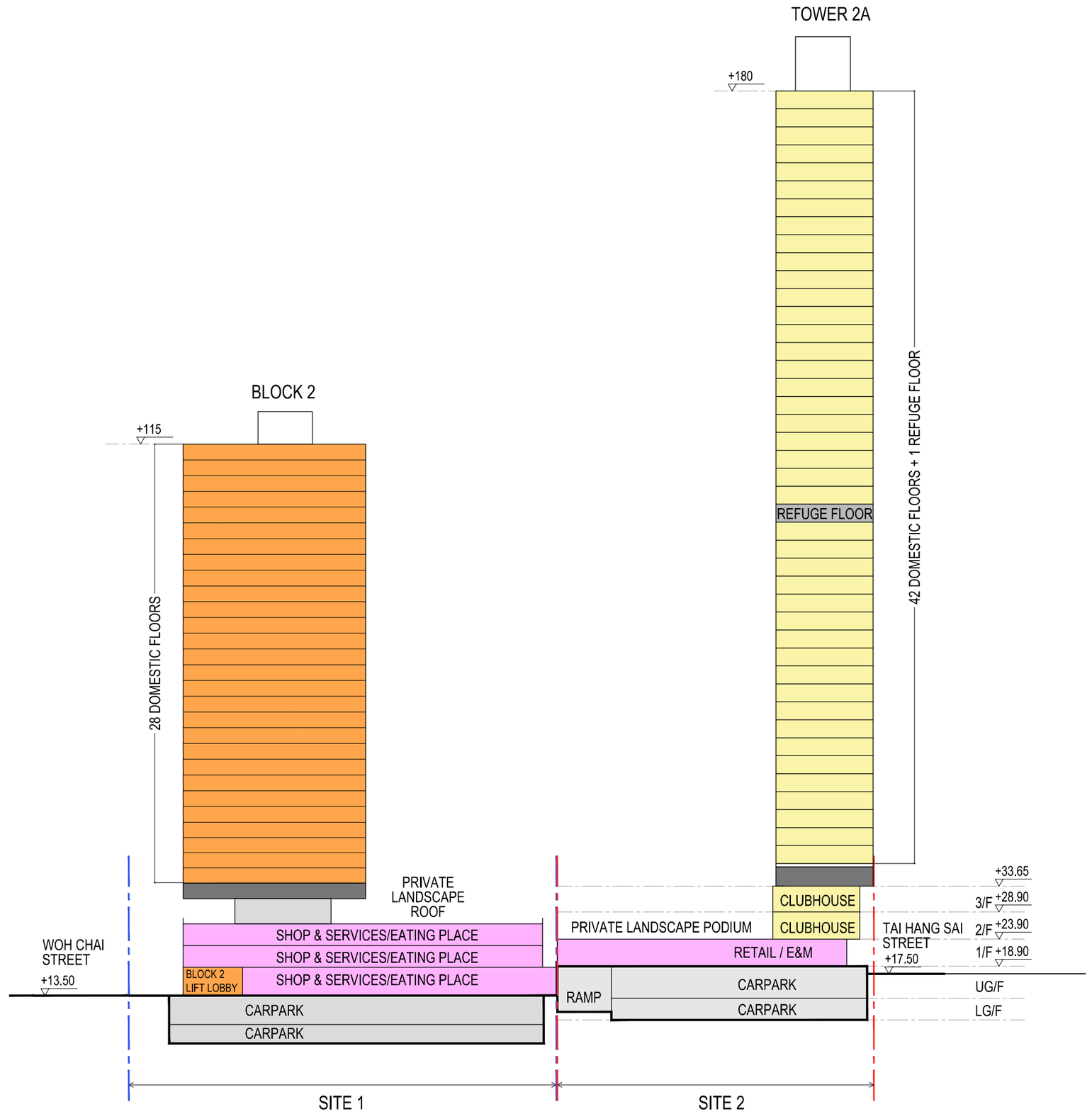
Proposed Scheme - 3/F



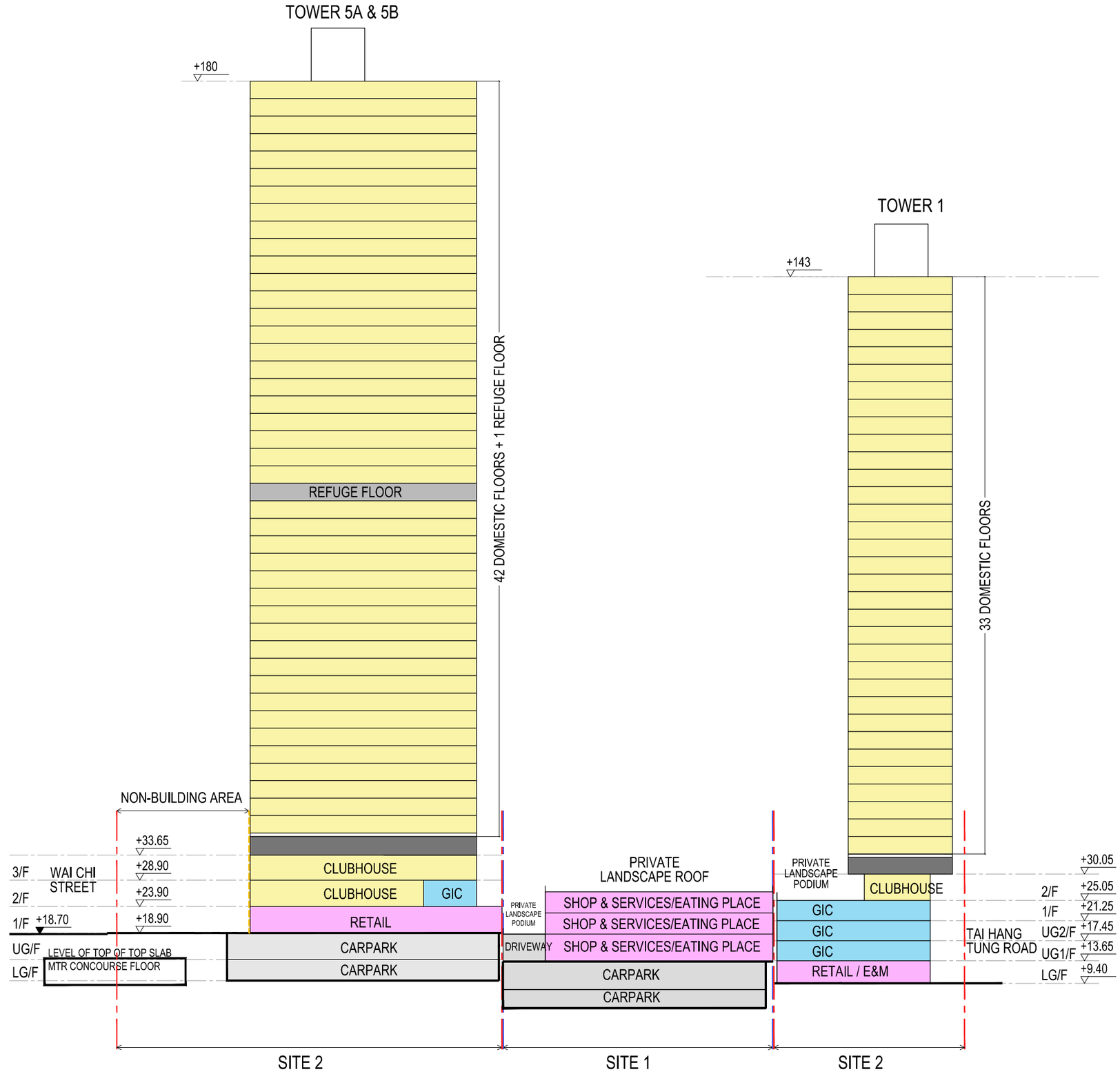
Proposed Scheme - Typical Floor



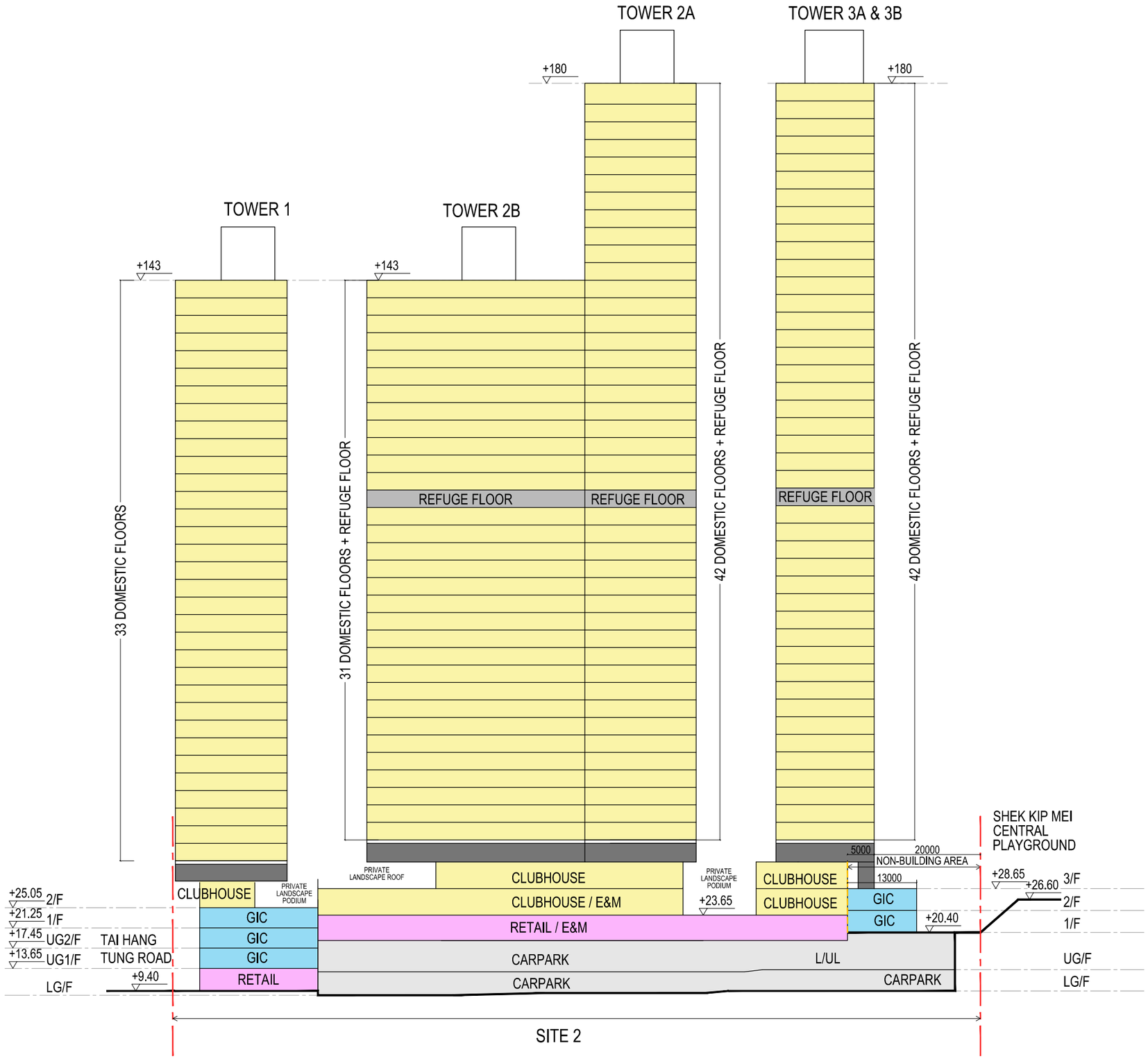
Proposed Scheme - Section A-A



Proposed Scheme - Section B-B



Proposed Scheme - Section C-C



Proposed Scheme - Section D-D

Appendix C

Estimation of Sewage Discharge from the Site

Table 1 Estimation of Sewage Flow from the Proposed Development

Site 1

i) Generation from Residential Area

No of Units	1289	Unit	
Average Household Size	2.65	persons/unit	Advised by the project proponent.
No of Residents	3416	persons	
Unit Flow Factor[1]	0.27	m^3/person/day	Refer to the planning unit flow for R2 in Table T-1 of GESF.
Average Sewage Discharge	922.32	m^3/day	

ii) Generation from Employees Activities from F&B

Total number of person	454	persons	
Unit Flow Factor[1]	1.58	m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J10 Restaurants & Hotels" in Table T-2 of GESF.
Average Sewage Discharge	717.32	m^3/day	

Total

Total Average Dry Weather Flow	**1639.64**	**m^3/day**

Site 2

Generation from Domestic Area

i) Generation from residents

No of Units	2900	Unit	Advised by the project proponent.
Average Household Size	2.4	persons/unit	Advised by the project proponent.
No of Residents	6960	persons	Advised by the project proponent.
Unit Flow Factor[1]	0.27	m^3/person/day	Refer to the planning unit flow for R2 in Table T-1 of GESF.
Average Sewage Discharge	1879.2	m^3/day	

iii) Generation from swimming pool

Volumn of Swimming Pool	337.5	m^3	Pool Area: 255m^2, average height of 1.2m; Kid's Pool Area: 70m^2, average height of 0.45m
Turnover Rate	6	hr	General Specification for Swimming Pool Water Treatment Installation in Government Buildings of The Hong Kong Special Administrative Region (6 hr for outdoor
Surface Loading Rate of Filter	30	$m^3/m^2/hr$	Swimming Pools: Design and Construction, Fourth Edition By Philip H. Perkins (30 m3/m2/hr adopted)
Required Filter Area	1.9	m^2	
Backwash Duration	7	mins/day	With reference to Section B8.5.5 of General Specification for Swimming Pool Water Treatment Installation in Government Buildings of the HKSAR published by the
Backwash Flow Rate	30	$m^3/m^2/hr$	Technical Paper - Domestic Swimming Pool Filtration by European Union of Swimmingpool and Spa Associations
Maximum backwash volume	6.6	m^3/day	
Maximum backwash volume	15.6	L/s	
Peak Flow	0.016	m^3/s	

iv) Generation from Property Management

Total of GFA	125	m^3	
Worker Density per GFA (in $100m^2$) [2]	5.5	person/100 m^2	Refer to worker density for "Financial, Insurance, Real Estate & Business Services" in Table 8 of CIFSUS.
Total number of person	7	persons	
Unit Flow Factor[1]	0.28	m^3/person/day	Refer to the planning unit flow factor for Commercial Employee + Commercial Activities (General –territorial average) in Table T-2 of GESF.
Average Sewage Discharge	1.96	m^3/day	

Total Average Sewage Discharge	1881.16	m^3/day

Generation from Non-Domestic Area

i) Generation from Employees Activities from Retail

Total Floor Area	436.81	m^2	
Worker Density (in $100m^2$) [2]	3.5	person/100 m^2	Refer to worker density for "Retail Trade" in Table 8 of CIFSUS.
Total number of person	16	persons	
Unit Flow Factor[1]	0.28	m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J4 Wholesale & Retail" in Table T-2 of GESF.
Average Sewage Discharge	4.5	m^3/day	

ii) Generation from Employees Activities from F&B

Total Floor Area	2305.57	m^2	
Worker Density (in $100m^2$) [2]	5.1	person/100 m^2	Refer to worker density for "Restaurants" in Table 8 of CIFSUS.
Total number of person	118	persons	
Unit Flow Factor[1]	1.58	m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J10 Restaurants & Hotels" in Table T-2 of GESF.
Average Sewage Discharge	186.44	m^3/day	

iii) Generation from Property Management

Total Floor Area	66	m^3	
Worker Density (in $100m^2$) [2]	5.5	person/100 m^2	Refer to worker density for "Financial, Insurance, Real Estate & Business Services" in Table 8 of CIFSUS.
Total number of person	4	person	
Unit Flow Factor[1]	0.28	m^3/person/day	Refer to the planning unit flow factor for Commercial Employee + Commercial Activities (General –territorial average) - J11 in Table T-2 of GESF.
Average Sewage Discharge	1.12	m^3/day	

Total Average Sewage Discharge 192.06 m^3/day

Generation from from RCHE

i) 100-place Residential Care Homes for the Elderly cum Day Care Unit (LG/F Lower-1/F Upper, 3-storey)

a) Generation from Staff

Total Floor Area	3050	m^2	
Worker Density (in $100m^2$) [2]	3.3	person/100 m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of overnight staff	4	persons	Refer to Cap. 459A Residential Care Homes (Elderly Persons) Regulation,1 care worker for every 30 residents or part thereof, between 10 p.m. and 7 a.m
Total number of person	105	persons	
Unit Flow Factor[1]	0.28	m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	29.4	m^3/day	

b) Generation from Residents

Total number of residents	100	persons	full capacity of 100-place residential care home for elderly
Unit Flow Factor	0.19	m^3/person/day	Refer to the planning unit flow for Institutional and special class in Table T-1 of GESF.
Average Sewage Discharge	19.0	m^3/day	

ii) Child Care Centre (2/F)

Generation from staff

Total Floor Area	899	m^2	
Worker Density (in $100m^2$) [2]	3.3	person/100 m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of person	30	persons	
Unit Flow Factor[1]	0.28	m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	8.40	m^3/day	

iii) Centre for Home Care Services for Frail Elderly Persons (2/F)

Generation from staff

Total Floor Area	390	m^2	
Worker Density (in $100m^2$) [2]	3.3	person/100 m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of person	13	persons	
Unit Flow Factor[1]	0.28	m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	3.64	m^3/day	

iv) Care and Attention Home For Severely Disabled Persons (UG/F)

Generation from staff

Total Floor Area	1550	m^2	
Worker Density (in $100m^2$) [2]	3.3	person/100 m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of person	52	persons	
Unit Flow Factor[1]	0.28	m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	14.56	m^3/day	

v) Neighbourhood Elderly Centre (1/F)

Generation from staff

Total Floor Area	520	m^2	
Worker Density (in $100m^2$) [2]	3.3	person/100 m^2	Refer to worker density for "Community, Social & Personal Services" in Table 8 of CIFSUS.
Total number of person	18	persons	
Unit Flow Factor[1]	0.28	m^3/person/day	Refer to the planning unit flow factor for "Commercial Employee" + "Commercial Activities: J11 Community, Social & Personal Services" in Table T-2 of GESF.
Average Sewage Discharge	5.04	m^3/day	

Sum of Sewage Discharge from GIC 80.04 **m^3/day**

Total

Total Average Dry Weather Flow 2153 **m^3/day**

Notes:

[1] The worker density is made reference to CIFSUS - *"Commercial and Industrial Floor Space Utilization Survey "* published by Planning Department (PlanD)

[2] The unit flow factor is made reference to *"Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0)"*, published by EPD.

Appendix D
Calculation of Flow Capacity of Proposed Development

Calculation of Flow Capacity of Proposed Development

Sewer No.				Material	Internal Diameter (m)	Cross-section Area (m^2)	Length (m)	Inlet mPD US_IL (m)	Outlet mPD DS_IL (m)	Hydraulic pipeline roughness (m)	Hydraulic Gradient	Mean Velocity V(m/s)	Max Capacity of Sewer (m3/s)	Total Average Dry Weather Flow m3/day	Catchment Inflow Factor	Revised Total Average Dry Weather Flow m3/day **[g]**	Contributing Population	Peaking Factor	Peak Discharge from Project Site m3/day	Peak Discharge through Manhole m3/s	Swimming Pool Discharge through Manhole m3/s	Total Discharge through Manhole m3/s	Percentage of capacity	Remark
ID	From	ID	To		D	A	l	**[a]**	**[a]**	**[b]**	s	**[c]**	(m3/s)	m3/day	**[f]**	m3/day **[g]**	**[d]**	**[e]**					**[h]**	
FTMH2-1	Site 2 Terminal Manhole	P1	FMH12	Polyethylene	0.225	0.040	7.7	14.50	13.30	0.0003	0.156	5.689	0.226	538.25	1.3	699.725	2591.574	5	3498.625	0.0405	0.016	0.056	25.0%	Site 2 (FTMH2-1)
P1	FMH12	P2	FMH13	Polyethylene	0.300	0.071	25.18	12.92	12.40	0.0003	0.021	2.455	0.174	538.25	1.3	699.725	2591.574	5	3498.625	0.0405	0.016	0.056	32.6%	Site 2 (FTMH2-1)
P2	FMH13	P3	FMH14	Polyethylene	0.300	0.071	24.9	12.00	11.20	0.0003	0.032	3.070	0.217	538.25	1.3	699.725	2591.574	5	3498.625	0.0405	0.016	0.056	26.0%	Site 2 (FTMH2-1)
P3	FMH 14	P4	FMH15	Polyethylene	0.300	0.071	26.7	10.60	9.50	0.0003	0.041	3.481	0.246	538.25	1.3	699.725	2591.574	5	3498.625	0.0405	0.016	0.056	23.0%	Site 2 (FTMH2-1)
P4	FMH 15	P5	FMH16	Polyethylene	0.300	0.071	21.5	9.30	9.05	0.0003	0.012	1.834	0.130	538.25	1.3	699.725	2591.574	5	3498.625	0.0405	0.016	0.056	43.6%	Site 2 (FTMH2-1)
P5	FMH16	P6	FMH02	Polyethylene	0.450	0.159	18.4	9.00	8.35	0.0003	0.035	4.148	0.660	2177.89	1.3	2831.257	10486.137	4	11325.028	0.1311	0.016	0.147	22.3%	Site 1 + Site 2 (FTMH2-1)
FTMH2-2	Site 2 Terminal Manhole	P8	FMH02	Polyethylene	0.300	0.071	1.3	8.30	8.10	0.0003	0.154	6.769	0.478	1614.75	1.3	2099.175	7774.722	4	8396.7	0.0972	/	0.097	20.3%	Site 2 (FTMH2-2)
P8	FMH02	S1	FMH4018021	Polyethylene	0.450	0.159	15.5	7.80	7.64	0.0003	0.010	2.228	0.354	3792.64	1.3	4930.432	18260.859	3	14791.296	0.1712	0.016	0.187	52.8%	Site 1+Site2
S1	FMH4018021	S2	FMH4018047	Polyethylene	0.450	0.159	8.2	7.64	7.57	0.0003	0.009	2.028	0.323	3792.64	1.3	4930.432	18260.859	3	14791.296	0.1712	0.016	0.187	58.0%	Site 1+Site2
S2	FMH4018047	S3	FMH4018048	Polyethylene	0.450	0.159	8.3	7.57	7.52	0.0003	0.006	1.697	0.270	3792.64	1.3	4930.432	18260.859	3	14791.296	0.1712	0.016	0.187	69.4%	Site 1+Site2
S3	FMH4018048	S4	FMH4046300	Polyethylene	0.450	0.159	7.4	7.52	7.48	0.0003	0.005	1.601	0.255	3792.64	1.3	4930.432	18260.859	3	14791.296	0.1712	0.016	0.187	73.5%	Site 1+Site2
S4	FMH4046300	S5	FMH4017935	Polyethylene	0.450	0.159	5.2	7.48	7.46	0.0003	0.004	1.348	0.214	3792.64	1.3	4930.432	18260.859	3	14791.296	0.1712	0.016	0.187	87.3%	Site 1+Site2
S8	FMH4018019	S9	FMH4017931	Clayware	0.525	0.216	8.4	7.92	7.9	0.0030	0.002	0.877	0.189	3154.1	1.3	4100.33	15186.407	4	16401.32	0.1894	N/A	N/A	**<u>100%</u>**	Stream B: assume 100% capacity
S5	FMH4017935	S6	FMH4017936	Clayware	0.600	0.283	14.1	7.46	7.36	0.0006	0.007	2.045	0.578	6946.74	1.3	9030.762	33447.267	4	36123.048	0.4181	0.016	0.434	75.1%	Stream A+StreamB
S10	FMH4083581	S11	FMH4018347	Clayware	0.450	0.159	24.5	8.61	8.54	0.0030	0.003	0.868	0.138	1835.3	1.3	2385.89	8836.630	5	11929.45	0.1380	N/A	N/A	**<u>100%</u>**	Stream C: assume 100% capacity
S6	FMH4017936	S7	FMH4017937	Clayware	0.800	0.503	8.21	7.36	7.33	0.0006	0.004	1.752	0.881	8782.04	1.3	11416.652	42283.896	4	45666.608	0.5285	0.016	0.545	61.8%	Stream A+StreamB+StreamC

[a] Reference from GeoInfo Map
[b] Roughness values adopted in the calculations is based on the interpolated values for velocities between 0.75 m/s and 1.2 m/s in accordance with the DSD's Sewerage Manual.
For clayware slimed sewers, ks=3.0mm=0.0030m (V<0.75m/s), ks=0.6mm=0.0006m (V>1.2m/s)
For polyethylene sewers, ks=0.3mm=0.0003m (V>1.2m/s)
[c] The velocity is calculated using the Colebrook-White Formula:

$$V = -2\sqrt{2gDS}\log_{10}\left(\frac{k}{3.7D} + \frac{2.5\nu}{D\sqrt{2gDS}}\right)$$

where
k = Colebrook-White roughness coefficient, in meter
V = mean velocity (m/s)
D = circular cross-section pipe, inside diameter (m)
S = slope, in meters per meter
v = kinematic viscosity of water, in meter per second (0.000001306 m/s)
g = gravitational acceleration (m/s^2) (9.807m/s^2)
[d] The Contributing Population is defined as:

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

[e] Reference from Table T-5 of Guidelines for Estimating Sewage Flows for Sewerage Infrastructure Planning
[f] Reference from Table T-4 of Guidelines for Estimating Sewage Flows for Sewerage Infrastructure Planning
[g] Revised Total Average Dry Weather Flow = Total Average Dry Weather Flow x Catchment Inflow Factor
[h] Pipe segment that exceeded 100% used capacity are bolded and underlined