
Appendix A
Sewerage Impact Assessment

Section 16 Planning Application for Proposed Mixed-Use Development (Proposed Flat with Permitted Commercial Uses) in Planning Area 32C (Southern Site and Lower Central Site), Hung Shui Kiu, New Territories (Application No.: A/HSK/620)

Sewerage Impact Assessment

August 2026

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1. Introduction

1.1 Background

- 1.1.1 AECOM Asia Company Limited (AECOM) has been commissioned by the project proponent to act as the engineering consultant to conduct a Sewerage Impact Assessment (SIA) for a private Residential and Commercial development in Hung Shui Kiu, New Territories.
- 1.1.2 The S16 Planning Application involves Area 32C with total area of 17,503m²; referred as the "Application Site". The Application Site is located next to the Kong Sham Western Highway. The location of the Application Site is indicated in **AREA 32C/SIA/Figure 1**.
- 1.1.3 The site falls within "Commercial (2)" ("C(2)") zone under the current Hung Shui Kiu & Ha Tsuen (HSK & HT) Outline Zoning Plan (OZP) with various types of commercial use (e.g. office, retail, hotel, etc.) permitted as of right within this zone. The Applicant proposes to include 'Flat' use in this zone to form a mixed-use development. As 'Flat' use is a Column 2 use under the OZP requiring planning permission from Town Planning Board (TPB), S.16 Planning Application is submitted for the proposed inclusion of residential element in the zone.
- 1.1.4 This SIA report reviews the sewerage impact of the proposed development and serves as a supporting document for the S16 Planning Application.

1.2 Objective of this Submission

- 1.2.1 This report outlines the assessment results of the potential sewerage impacts caused by the Proposed Development at the Application Site. The main objectives of this assessment include the followings:
 - (i) Identify any increase in sewage flow due to the Proposed Development.
 - (ii) Review the existing sewerage condition of the Application Site based on available information.
 - (iii) Outline the methodology adopted in this assessment.
 - (iv) Assess any potential impact on the existing or planned sewerage facilities nearby due to the Proposed Development.
 - (v) Propose mitigation measures and/or improvement works to minimize any potential sewerage impact from the Proposed Development.
 - (vi) Discuss the responsibility of the construction and maintenance aspects of the proposed sewerage system.

1.3 Nomenclature

1.3.1 The following abbreviations and shortened expressions in **Table 1** are adopted in this report.

ADWF	Average Dry Weather Flow
AECOM	AECOM Asia Company Limited
CIF	Catchment Inflow Factor
CIFSUS	Commercial and Industrial Floor Space Utilization Survey (PlanD)
DSD	Drainage Services Department
EIA	Environmental Impact Assessment
EPD	Environmental Protection Department
F&B	Food and Beverage
GESF	Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Version 1.0 (EPD)
GFA	Gross Floor Area
mPD	Metres above Principal Datum
PlanD	Planning Department
SWSTW	San Wai Sewage Treatment Works
HSKEPP	Hung Shui Kiu Effluent Polishing Plant
SIA	Sewerage Impact Assessment
UFF	Unit Flow Factor

Table 1 – Nomenclature

2. Development Proposal

2.1 The Proposed Development

- 2.1.1 The Application Site area is approximately 17,503m². Under the Proposed Development, the total plot ratio is not more than 8. (i.e. the total GFA is not more than 140,024m².) The Applicant proposed 112,019 m² as non-domestic GFA for the permitted commercial use, whereas the remaining 28,005m² as domestic GFA would be used for the proposed residential development.
- 2.1.2 The Proposed Development consists of Site A and Site B. Site A will be developed with 590 residential units and recreational facilities (e.g. clubhouse). Site B will be developed with office development, as well as a hotel which provides 1,640 rooms. The anticipated completion year of the Application Site (except for the remaining non-domestic GFA to be implemented at a later stage under the arrangement of “Pay for What You Build” Pilot Scheme) is 2033. Details refers to **Remark (3) of Table 2**.
- 2.1.3 The Master Layout Plan (MLP) of the proposed development is shown in **AREA 32C/SIA/Figure 2**.

2.2 Base Case for Area 32C

- 2.2.1 With reference to OZP, the allowed maximum plot ratio is 8.0 and the total GFA is not more than 140,024m². As specified in the Outline Development Plan (ODP) No. D/HSK/1, the development mix for Area 32C (Southern Site) is: 50% GFA for office use, 30% GFA for hotel use and 20% for retail use. Based on this mix, a hypothetical base case scenario is formed for sewage generation estimation.

2.2.2 The comparison table of development parameters between the base case and proposed development is summarized in **Table 2** below.

	Base Case	Proposed Development (Site A)	Proposed Development (Site B)
Site Area	17,503m ²	7,089m ²	10,414m ²
Total PR (not more than)	8	4.0	10.8
		8 (Site A + Site B)	
Total GFA (not more than)	140,024m ²	28,005m ²	112,019m ² ⁽³⁾
		140,024m ² (Site A + Site B)	
Domestic Portion			
Total Domestic GFA (not more than)	-	28,005m ²	-
No. of Units	-	590	-
Population ⁽¹⁾	-	1,593	-
Non-Domestic Portion – Resident's Recreational Facilities ⁽²⁾			
Total Non-Domestic GFA	-	1,260m ²	-
Non-Domestic Portion – Retail			
Total Non-Domestic GFA	28,005m ²	-	
Non-Domestic Portion – Hotel (Completed in 2033)			
Total Non-Domestic GFA	42,007m ²	-	67,211m ² ⁽³⁾
No. of Hotel Rooms	-	-	1,640
Non-Domestic Portion – Office (Remaining)			
Total Non-Domestic GFA	70,012m ²	-	44,808m ²

Table 2 – Key Development Parameters

Remarks:

- (1) A person per flat of 2.7 is assumed.
- (2) Or such other areas of clubhouse as may be approved by the Buildings Department based on the total permissible domestic GFA for individual land parcel (site under the Buildings Ordinance) at the future General Building Plans.
- (3) Drawing upon the spirit of the "Pay for What You Build" Pilot Scheme, about 60% of the non-domestic GFA in Area 32C (i.e. about 67,211m²) will be implemented first by the target completion year 2033. The GFA will be situated in Site B.

3. Assessment Methodology

3.1 Overview of Methodology

- 3.1.1 This assessment is carried out to assess the sewerage impact arising from the Proposed Development on the sewerage system.
- 3.1.2 The sewage generated from the Proposed Development is estimated according to “Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning” (GESF) published by Environmental Protection Department (EPD). The sewage calculation is in accordance with the Sewerage Manual published by Drainage Services Department (DSD).

3.2 Methodology and Assumptions

- 3.2.1 The adopted sewage unit flow factors for sewage estimation and calculation are summarized in **Table 3**.

Development Type	Flow Type	Unit Flow Factor (UFF) (m ³ /head/day)
Residential	R2	0.27
Finance, Insurance, Real Estate & Business Services	J6	0.08
Restaurants & Hotels	J10	1.58
Community, Social & Personal Services (Clubhouse)	J11	0.28

Table 3 – Unit Flow Factors

- 3.2.2 For the non-domestic population, the worker density adopted for business use is referred to Commercial and Industrial Floor Space Utilization Survey (CIFSUS). The adopted worker density is summarised in **Table 4**.

Commercial Activities	Workers per GFA (in 100 m ²)
Restaurants & Hotels	5.1
Retail Trade	3.5
Financial, Insurance, Real Estate & Business Services	5.5
Community, Social & Personal Services (Clubhouse)	3.3

Table 4 – Worker Density

- 3.2.3 The peaking factor is referred to Table T-5 of GESF. The adopted peaking factor is summarized in **Table 5**.

Population Range	Peaking Factor (including stormwater allowance) for facility with existing upstream sewerage	Peaking Factor (excluding stormwater allowance) for facility with new upstream sewerage
5,000 – 10,000	5	4

Table 5 – Peaking Factor

4. Review on Existing and Planned Sewerage System

4.1 Existing and Planned Sewerage System

- 4.1.1 The Application Site is currently unsewered and it is within the sewerage catchments for Hong Shui Kiu/ Ha Tsuen New Development Area (HSK/HT NDA). It is noted new sewerage network (including pumping stations) is proposed under CEDD consultancy Agreement No. CE 1/2020(CE) HSK/HT NDA Package A Works for Second Phase Development – Design and Construction to cater for sewage flows due to population intensification of HSK/HT NDA. The Proposed Development will rely on the proposed sewerage infrastructure proposed by CEDD.
- 4.1.2 With reference to Planning Application No.: A/HSK/452, the design capacity of the Sewage Pumping Station No.1 (SPS1) and the Sewage Pumping Station No.2 (SPS2) is 28,874 m³/day and 42,255 m³/day respectively. The sewage would be ultimately conveyed to the planned Hung Shui Kiu Effluent Polishing Plant (HSKEPP). With reference to HSKEPP website, the treatment capacity (i.e. ADWF) of HSKEPP is 90,000m³/day.
- 4.1.3 Under DSD project PWP No. 4463DS, the HSKEPP is currently under Phase 1 construction to provide a sewage treatment capacity of 60,000m³/day and is anticipated to be completed in mid-2031. Under DSD project PWP No. 4428DS, the HSKEPP will increase the sewage treatment capacity from 60 000 m³ /day to 90 000 m³ /day. It is currently under planning and design stage.

4.2 Base Case Sewage Estimation

- 4.2.1 A base case scenario of sewage estimation for Area 32C is calculated based on ODP development mix aforementioned in Para 2.2.1 to predict the sewage estimation under HSK/HT NDA. The total estimated ADWF of Area 32C is approximately 1,988.8 m³/day. Detailed calculation refers to **Annex 4. Table 6** below presents the summary of sewage flow estimation of the base case scenario.

Flow Type	Average Dry Weather Flow (ADWF) (m ³ /day)
Base Case	
Hotel	810.5
Office	308.1
Retail – Retail Trade	192.4
Retail – Restaurant	677.8
Total ADWF	1988.8

Table 6 – Sewage Estimation for the Base Case Scenario

4.3 Impact on Sewerage System

- 4.3.1 With reference to approved EIA for HSK/HT NDA, the Proposed Development is within the sewerage catchment of proposed SPS1 under HSK/HT NDA.
- 4.3.2 The estimated ADWF generated from the Proposed Development is about 1934.7 m³/d. The peak flow generated from the Proposed Development including the backwash for swimming pool is 0.124 m³/s. Detailed calculation refers to **Annex 1**. The swimming pool backwash calculation refers to **Annex 2**. **Table 7** below presents the summary of sewage flow estimation of the Proposed Development.

Flow Type	Average Dry Weather Flow (ADWF) (m ³ /day)
Site A	
Residential	430.1
Clubhouse	11.8
Site B	
Hotel (completed in 2033)	1295.6
Office (Remaining)	197.2
Total ADWF (excl. Backwash)	1934.7
Outdoor Swimming Pool Backwash	0.019m ³ /s
Indoor Swimming Pool Backwash	0.016m ³ /s

Table 7 – Sewage Estimation for the Proposed Development

Note:

- (1) Swimming pool backwash will last for 3 minutes per day.

4.4 Sewage Discharge Comparison between Base Case and Proposed Development

- 4.4.1 Sewage estimation results show that the sewage discharge (i.e. ADWF) from Proposed Development is less than the base case scenario. (i.e. 1934.7m³/d < 1988.8m³/d) It is anticipated the planned sewerage infrastructure under HSK/HT NDA is sufficient to cater for the Proposed Development for Area 32C.

5. Proposed Sewerage System

5.1 Proposed Sewerage Connection

- 5.1.1 The sewage generated from the Application Site would be discharged via internal sewerage network leading to the proposed terminal manhole no. FTMH01 located close to the site boundary and connected to proposed sewer manhole no. FMH01 to be constructed by CEDD under HSK/HT NDA project via proposed 375mm diameter sewer by this Application. The proposed sewerage layout refers to figure no. **Area 32C/SIA/Figure 3**.
- 5.1.2 The sewage will be conveyed to the proposed SPS1 through planned gravity sewers, and then to the proposed SPS2 through planned rising mains and gravity sewers constructed by CEDD under HSK/HT NDA. The sewage will subsequently be discharged to the CEDD planned HSKEPP. The location of the proposed sewerage facilities and indicative sewerage alignment constructed by CEDD refers to figure no. **Area 32C/SIA/Figure 4**.
- 5.1.3 Hydraulic calculation as shown in **Annex 3** shows that sewage discharged from the Proposed Development utilises about 70% of the capacity of the proposed 375mm diameter sewer connected from FTMH01 to CEDD proposed sewer manhole FMH01.
- 5.1.4 Sewage discharged from the Application Site contribute to about 6.7% of the capacity of the SPS1. Hence, the sewerage impact is considered insignificant.

6. Maintenance Responsibility

- 6.1.1 The development will be responsible for construction of the internal sewer and sewerage manholes within the Application Site. The development will be responsible for the maintenance of the internal sewer and manholes within the Application Site.
- 6.1.2 The Proposed Development will be responsible for construction of all necessary sewerage connection works to the public sewerage system. The sewerage systems outside the site boundary are proposed to be handed over to relevant government department for future maintenance.

7. Conclusion

- 7.1.1 This SIA report serves as a supporting document for proposing a mixed-use development with residential and commercial uses. The SIA has been carried out to assess the potential sewerage impact due to the Proposed Development.
- 7.1.2 The ADWF generated from the Application Site is about 1934.7m³/d m³/day (excluding the backwash for swimming). The peak flow generated from the Proposed Development including the backwash for swimming pool is 0.124m³/s.
- 7.1.3 The sewage will be conveyed to the proposed SPS1 and then to the proposed SPS2. The sewage will subsequently be discharged to the planned HSKEPP. With the implementation of the proposed sewerage arrangement, no adverse impact from sewerage aspect is anticipated.

End of Report

Figure

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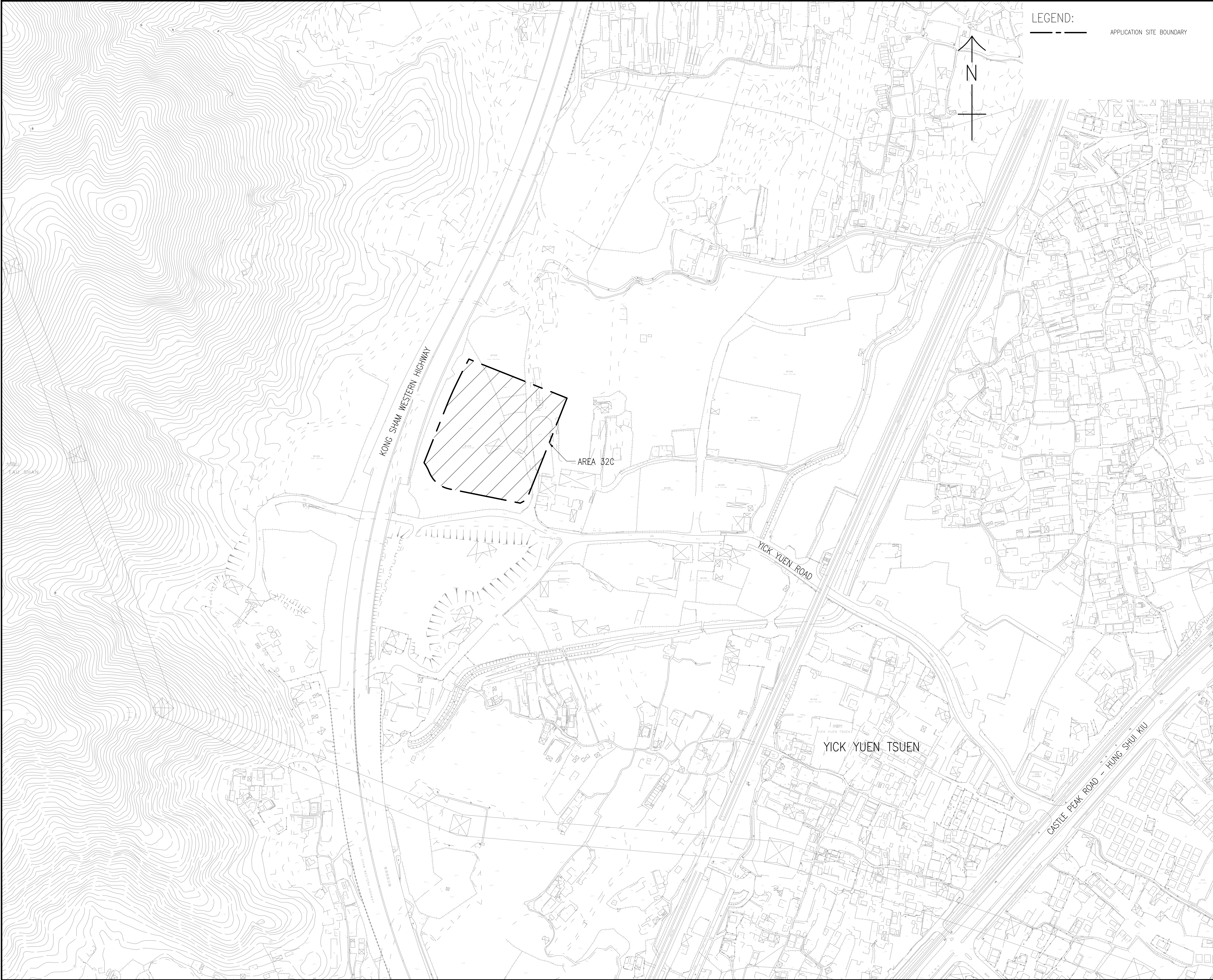
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LEGEND:

APPLICATION SITE BOUNDARY

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項目

SECTION 16 PLANNING
APPLICATION FOR PROPOSED
RESIDENTIAL DEVELOPMENT
IN PLANNING AREA 32C
(SOUTHERN SITE AND LOWER
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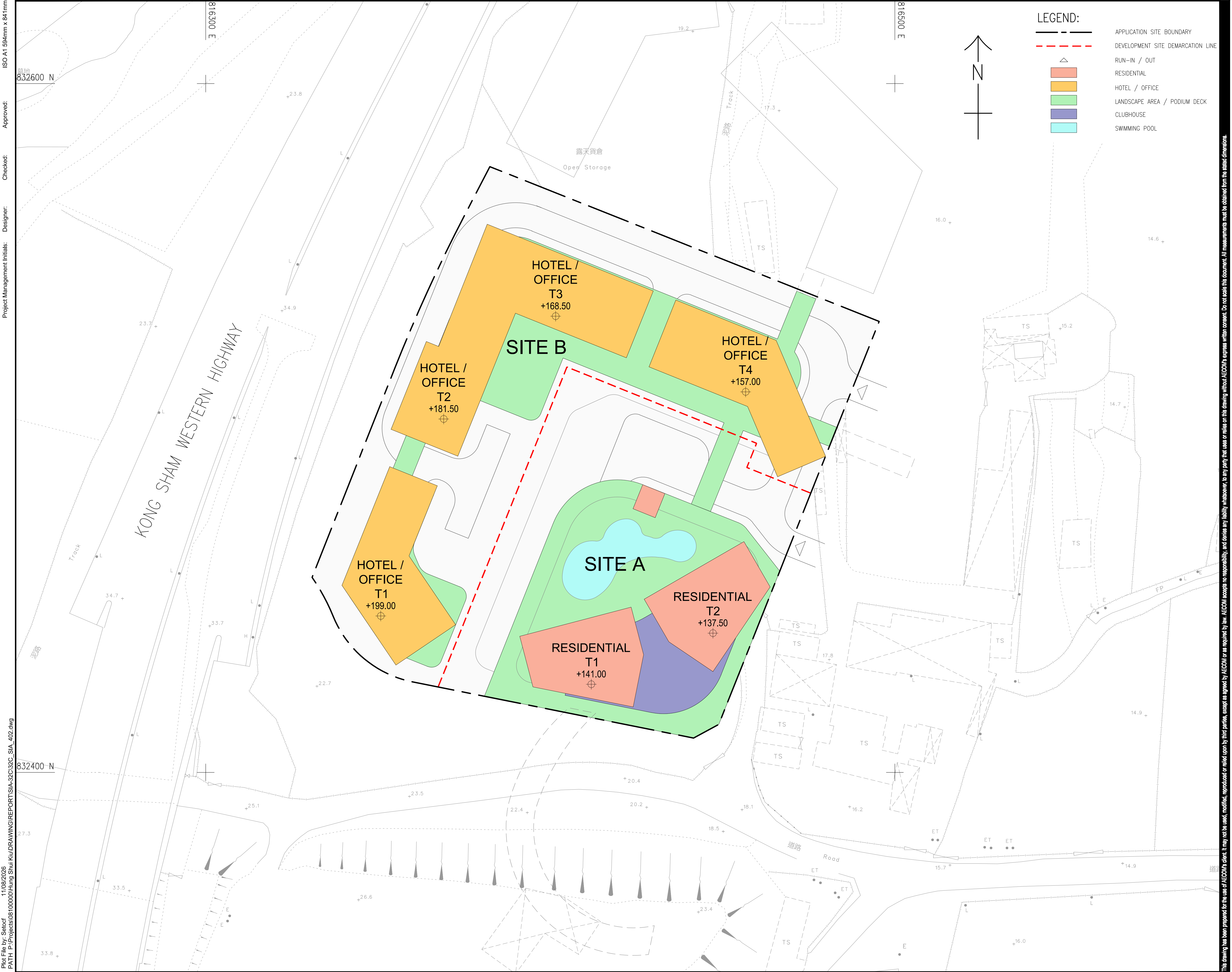
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LOCATION PLAN

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AREA 32C/SIA/FIGURE 1

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PROJECT

SECTION 16 PLANNING APPLICATION FOR PROPOSED RESIDENTIAL DEVELOPMENT IN PLANNING AREA 32C (SOUTHERN SITE AND LOWER CENTRAL SITE), HUNG SHUI KIU, NEW TERRITORIES

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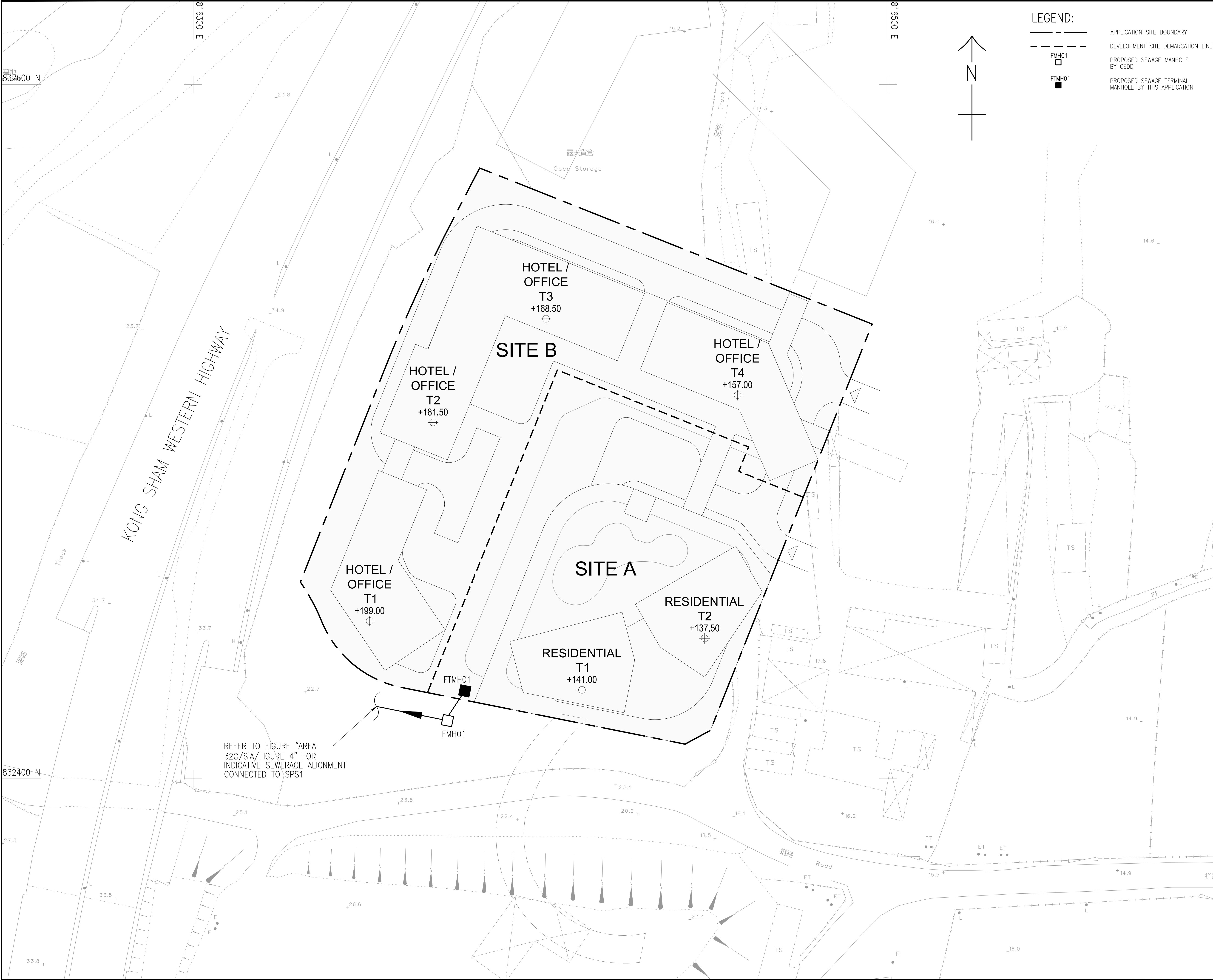
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REFER TO FIGURE "AREA 32C/SIA/FIGURE 4" FOR INDICATIVE SEWERAGE ALIGNMENT CONNECTED TO SPS1

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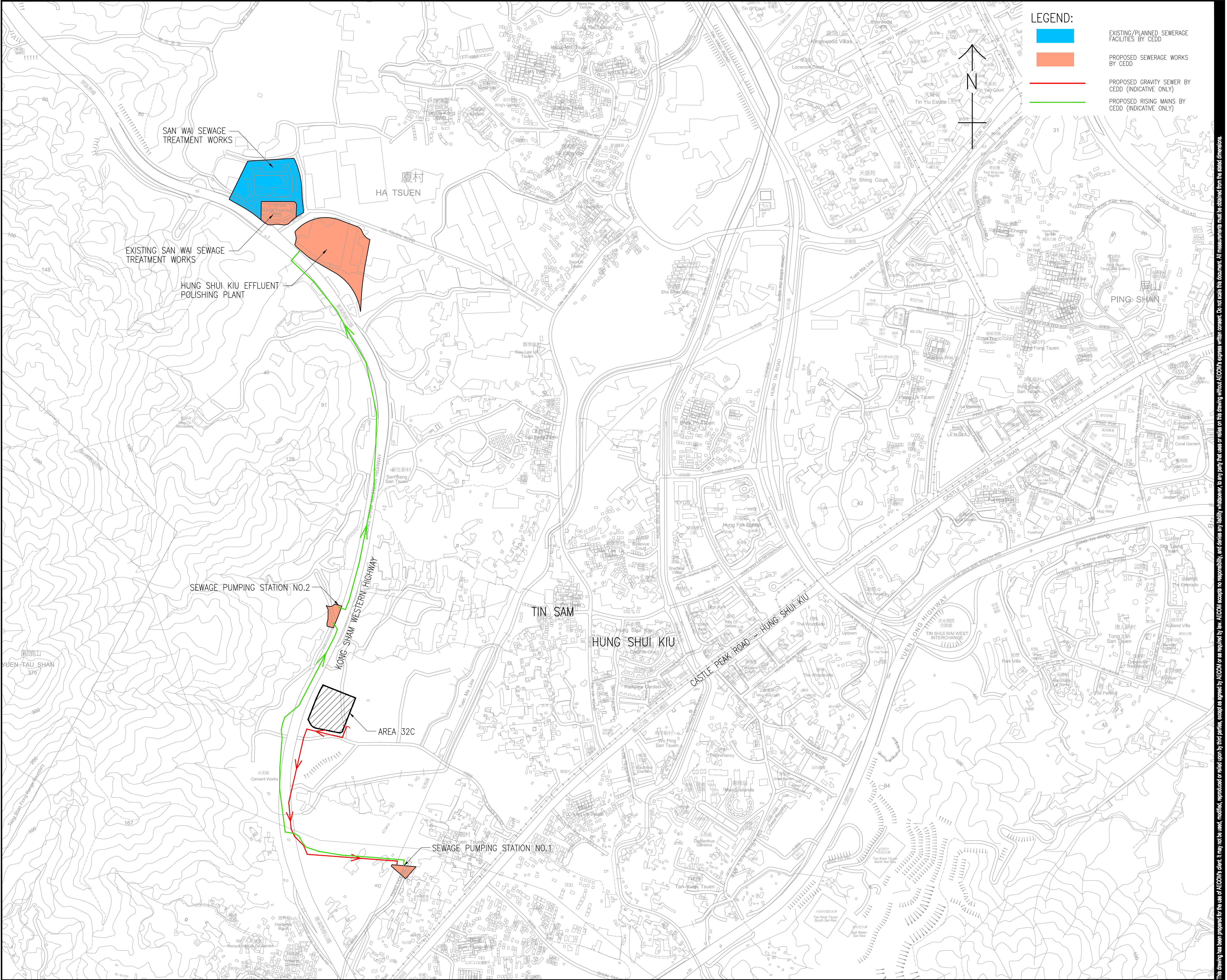
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PROPOSED SEWERAGE LAYOUT

SHEET NUMBER

图号
AREA 32C/SIA/FIGURE 3



LEGEND:

EXISTING/PLANNED SEWERAGE FACILITIES BY CEDD

PROPOSED SEWERAGE WORKS BY CEDD

PROPOSED GRAVITY SEWER BY CEDD (INDICATIVE ONLY)

PROPOSED RISING MAINS BY CEDD (INDICATIVE ONLY)

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SECTION 16 PLANNING APPLICATION FOR PROPOSED RESIDENTIAL DEVELOPMENT IN PLANNING AREA 32C (SOUTHERN SITE AND LOWER CENTRAL SITE), HUNG SHUI KIU, NEW TERRITORIES

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HUNG SHUI KIU

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AREA 32C/SIA/FIGURE 4

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Annex 1

Proposed Development Sewage Estimation

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Annex 1 - Proposed Development Sewage Estimation

Proposed Development

Site A						
Residential						
No. of Units		590				
PPoF ⁽¹⁾		Development Type		Population	Unit Flow Factor	ADWF (m³/d)
2.7		Private R2		1,593	0.27	430.11
Workers	GFA (m²)	Worker's Type	Workers per GFA (in 100m²) ⁽²⁾	Employee	Unit Flow Factor	ADWF (m³/d)
GFA for Clubhouse (m²)	1,260	Community, Social & Personal Services	3.3	42	0.28	11.76
					Sub-total	441.87

Site B								
Hotel								
No. of Rooms	No. of Rooms							
	1,640							
Workers			Worker's Type		Employee		Unit Flow Factor	ADWF (m³/d)
1 employee serves 2 rooms			J10 Restaurants & Hotels		820		1.58	1,295.60
Office								
GFA for Office (m²)	GFA (m²)		Worker's Type	Workers per GFA (in 100m²) ⁽²⁾	Employee		Unit Flow Factor	ADWF (m³/d)
	Completed in 2033	-	Finance, Insurance, Real Estate & Business Services	5.5	Completed in 2033	-	0.08	-
	Remaining ⁽⁸⁾	44,808			Remaining ⁽⁸⁾	2465		197.20
								Sub-total

Total ADWF from the Proposed Development (Site A + Site B) (m³/day)	1,934.67
Contributing Population ⁽⁵⁾	7,165.44
Peaking Factor ⁽⁷⁾	4.00
Total Peak Flow from the Proposed Development (m³/s)	0.090
Total Peak Flow from the Proposed Development including swimming pools(m³/s) ⁽⁶⁾	0.124

Remarks:

⁽¹⁾ A person per flat of 2.7 is assumed.

⁽²⁾ Worker density is in GFA per worker according to T-8 CIFSUS is adopted.

⁽³⁾ For the no. of hotel employee, it is assumed to be 1 employee serving 2 rooms.

⁽⁴⁾ Catchment Inflow Factor P_{CE} = 1 is based on the catchment area in Yuen Long.

⁽⁵⁾ Contributing population = Projected Flow (ADWF in m³/day) / 0.27 (m³/person/day)

⁽⁶⁾ Worst case scenario (all swimming pools will undergo backwash at the same time) is assumed.

⁽⁷⁾ Peaking factor excluding stormwater allowance is adopted for hydraulic checking for proposed new constructed sewer.

⁽⁸⁾ Remaining indicates the non-domestic GFA to be implemented at a later stage under the arrangement of "Pay for What You Build"Pilot Scheme.

Annex 2

Swimming Pool Backwash Calculation

Estimation of Outdoor Pool Backwash

Pool area	=	365 m ²
Pool depth	=	1.5 m
Pool volume	=	547.5 m ³
Turnover rate	=	6 hrs
Flow rate	=	91.25 m ³ /hr
Surface loading rate of filter	=	20 m ³ /m ² /hr
Filter Areas Required	=	4.56 m ²
Assume backwash duration	=	3 min/day
Assume backwash flow rate	=	30 m ³ /m ² /hr
Volume of backwash	=	6.84 m ³ /day
Peak flow	=	<u>0.019 m³/s</u>

Note

(1)Swimming pool backwash will last for 3 minutes per day.

Estimation of Indoor Pool Backwash

Pool area	=	200 m ²
Pool depth	=	1.5 m
Pool volume	=	300 m ³
Turnover rate	=	4 hrs
Flow rate	=	75.00 m ³ /hr
Surface loading rate of filter	=	20 m ³ /m ² /hr
Filter Areas Required	=	3.75 m ²
Assume backwash duration	=	3 min/day
Assume backwash flow rate	=	30 m ³ /m ² /hr
Volume of backwash	=	5.63 m ³ /day
Peak flow	=	<u>0.016 m³/s</u>

Note

(1)Swimming pool backwash will last for 3 minutes per day.

Annex 3

Hydraulic Checking

Annex 3 - Hydraulic Check of Proposed Sewer

V of water = 0.000001

Manhle No.		Pipe												
U/S	D/S	Size	Hydraulic Radius	Flow Area	Pipe Gradient	Pipe Velocity	Capacity	Roughness	Accumulated ADWF	Contributing Population	Peaking Factor	Estimated Peak Discharge	Capacity Check	Remark
		mm	m	m ²	(1 in)	m/s	m ³ /s	mm	m ³ /d			m ³ /s	%	
FTMH01	FMH01	375	0.094	0.11	100	1.60	0.18	1.50 ⁽²⁾	1,934.67	7,166	4.00	0.124	70	

- Note
- (1) Assume the pipe flows under full-bore capacity.
 - (2) Assumed proposed slimed sewer is at normal condition, when flowing half full, velocity is about 1.2 m/s.
 - (3) Peaking factor excluding stormwater allowance is adopted for hydraulic checking for proposed sewer.
 - (4) FMH01 indicates CEDD proposed sewer manhole

Annex 4

Baseline Sewage Estimation

Appendix 4 Baseline for Area 32C

Estimated Sewage Flow from Area 32C Baseline Commercial Development		
Site Area	=	17,503
Plot Ratio	=	8.00
Non-domestic GFA(m ²)	=	140,024
Retail Ratio	=	20%
Hotel Ratio	=	30%
Office Ratio	=	50%
Retail GFA (m ²)	=	28,005
Retail GFA (m ²)	=	19,603
Occupation Density (person/100m ² or person/room)	=	3.5
Retail staff (no.)	=	687
Unit Flow Factor (m ³ /d/head)	=	0.28
DWF (m ³ /day)	=	192.4
Retail GFA (m ²)	=	8,401
Occupation Density (person/100m ² or person/room)	=	5.1
Restaurant staff (no.)	=	429
Unit Flow Factor (m ³ /d/head)	=	1.58
DWF (m ³ /day)	=	677.8
Hotel GFA (m ²)	=	42,007
Occupation Density (no. of rooms)	=	1025
Hotel staff (no.)	=	513
Unit Flow Factor (m ³ /d/head)	=	1.58
DWF (m ³ /day)	=	810.5
Office GFA (m ²)	=	70,012
Occupation Density (person/100m ² or person/room)	=	5.5
Office Staff (no.)	=	3,851
Unit Flow Factor (m ³ /d/head)	=	0.08
DWF (m ³ /day)	=	308.1
Total ADWF (m ³ /day)	=	1988.8

- Notes:
- 1. Adopt retail = 20% of non-domestic GFA, hotel = 30% of non-domestic GFA, office = 50% of non-domestic GFA
 - 2. According to CIFSUS, the worker density for retail trade is assumed as 3.5 workers per GFA (in 100 m²)
 - 3. According to CIFSUS, the worker density for office is assumed as 5.5 workers per GFA (in 100 m²)
 - 4. According to CIFSUS, the worker density for private commericals' restaurants is assumed as 5.1 workers per GFA (in 100 m²)
 - 5. Assumed 1 hotel staff serves 2 rooms
 - 6. Catchment Inflow Factors (PCIF): Yuen Long = 1.00 is adopted.
 - 7. For retail GFA, it is assumed 30% for restaurant and 70% for retail trade usage.

