

Section 12A Application for Proposed Rezoning from “Government, Institution or Community” to “Government, Institution or Community (6)” at Tuen Mun, New Territories and to Amend the Notes of the Zone Applicable to the Site for the Proposed Social Welfare Facility (Residential Care Home for the Elderly) at Section C of Lot No. 496 in D.D 132 and the adjoining Government Land, Tuen Mun, New Territories

Sewerage Impact Assessment Report

Reference: P166-SIA-I1

Date: 16 June 2026

Confidential

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Checked and Approved by:



Joan Choi
Director

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Date: 16 Jun 2026

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1 Introduction

1.1 Background

This Sewerage Impact Assessment Report is prepared in support of the Section 12A Application for Proposed Rezoning from “Government, Institution or Community” to “Government, Institution or Community (6)” at Tuen Mun, New Territories and to Amend the Notes of the Zone Applicable to the Site for the Proposed Social Welfare Facility (Residential Care Home for the Elderly) at Section C of Lot No. 496 in D.D 132 and the adjoining Government Land, Tuen Mun, New Territories (hereafter “the Proposed Development”). The Application Site falls within an area zoned “Government, Institution or Community” (G/IC) on the Approved Tuen Mun Outline Zoning Plan (OZP) No. S/TM/41.

Due to the concerns of possible sewerage impact arising from the Proposed Development, Urban Green Consultants Limited (UGC) has been commissioned by the Applicant to conduct a Sewerage Impact Assessment (SIA) to assess the potential sewerage impacts arising from the change of sewage generation due to the Proposed Development.

1.2 Report Structure

The remaining chapters of this report are shown below:

Chapter 2 – Site Context

Chapter 3 –Evaluation of Sewerage Impact

Chapter 4 –Results and Discussion

Chapter 5 –Conclusion

2 Site Context

2.1 Site Characteristics and Proposed Uses

The Site intends to develop a social welfare facility with site area of approximately 1,770 m². [Table 2.1](#) shows the development parameters. The layout plans and section of the Proposed Development are presented in [Appendix A](#).

Currently, the Site is fenced off by some temporary structure. Tuen Fu Road Disciplined Services Quarters is located to the south of the Site. Ching Leung Nunnery is located to the north. Gig Lok Monastery is located to the east. Tuen Mun Road and MTR Tuen Ma Line are located to the west. [Figure 2.1](#) shows the Site location and its environs.

Table 2.1 Development Parameters

Development Parameters	
Site Area	1,770 m ²
Gross Floor Area	Not more than 12,000 m ²
Zoning under OZP	Government, Institution or Community (G/IC)
No. of Block	1
No. of Storeys	13
Height of Building	Not more than 52 mPD
No. of Rooms	252
No. of Beds	504
Expected Completion Year	2032
Use	G/F: Lobby and Carpark 2/F – 7/F: RCHE 8/F: Refuge Floor 9/F – 13/F: RCHE

2.2 Operation Year

According to the latest programme, the operation year of the Proposed Development is expected to be in Year 2032.

2.3 Existing Sewerage Conditions

Drainage plans (plan no.: 6_NW_21D_1, 6_NW_21D_3 and 6_SW_1B_1) were obtained from Drainage Services Department (DSD) on 13 November 2025 to gather the background information on sewerage infrastructure in the vicinity of the Site. The relevant sewerage information is extracted from the existing drainage plans. Based on the drainage plans from DSD, the Site is currently served by existing sewerage system located to the north of the Site. [Figure 3.1](#) shows the existing sewerage system.

3 Evaluation of Sewerage Impact

3.1 Assessment Methodology and Assumptions

The sewage generated from the Proposed Development will be collected at the proposed terminal manhole P1 and discharged into the existing public manhole (Manhole No.: FMH1015188) via the proposed 225mm circular pipes. The adequacy of the capacities of the existing sewer along Tuen Fu Road has been checked based on the estimated upstream and downstream flow, as well as the estimation of the sewage generated from the Proposed Development.

The sewage generated from Lingnan University (Item 2) and Tuen Mun Treatment Works (Item 5) is assumed to be discharged at existing public manhole (Manhole No.: FMH1015197). Besides, the sewage generated from Tuen Mun Treatment Works Staff Quarters (Item 3) will be discharged at existing public manhole (Manhole No.: FMH1015189).

For the Tuen Fu Road Disciplined Services Quarters, the sewage will be discharged at existing public manhole (Manhole No.: FMH1015103) based on the Sewerage Impact Assessment Report of Approved Planning Application No. A/TM/422 provided in [Appendix D](#). Therefore, it is not included in the hydraulic calculation.

For Tuen Mun North Offtake and Piggery Station (Item 4), the sewage will be discharged at the existing public manhole (Manhole No.: FMH1015187). Sewage generated from the village house (Item 17) next to the Proposed Development is assumed to be discharged at the existing public manhole (Manhole No.: FMH1015186).

For the remaining buildings and facilities (Item 6 to 16) to the north of the Proposed development, the sewage is assumed to be discharged at the existing public manhole (Manhole No.: FMH1015184).

The unit flow factors as recommended in the Guideline for Estimating Sewage Flows for Sewage Infrastructure Planning (hereafter as “GESF”) published by EPD in 2005 are adopted in the assessment.

3.2 Sewage Generation

For sewage flow estimation, the global unit flow factors as stated in the GESF, and the unit flow factor from the Waste Engineering Treatment and Reuse (Four Edition) are adopted. Relative unit flow factors applied for the sewage generation estimation are tabulated in [Table 3.1](#) below. The detailed calculations of sewage generation have been provided in [Appendix B](#).

Table 3.1 Unit Flow Factors Adopted for the Assessment

Location	Occupants	Estimated No. of Person	Unit Flow Factor (m ³ /person/day)
Proposed Development	Resident	504	0.19
	Staff	236	0.28
	Visitor	1008	0.015
	Staff at kitchen	2	1.58
Chan Tak Tai Auditorium	Student	1040	0.04
	Staff	44	0.28
Staff Quarters	Resident - Staff	80	0.19
Forward Living (Dormitory)	Resident - Student	322	0.19
Forward Living (Office)	Staff	8	0.28
Lam Woo Hall, Yee Min Hall, Chung Shun Hall	Resident - Student	500	0.19
	Resident - Staff	32	0.19
Wong Administration Building	Staff	141	0.28
	Student	70	0.04
Lingnan Hub (two-bedroom units)	Resident	72	0.19
Lingnan Hub (three-bedroom units)	Resident	68	0.19
Lingnan Hub (studios)	student	150	0.04
Tuen Mun Treatment Works Staff Quarters	Resident	10	0.27
Tuen Mun North Offtake and Pigging Station	Staff	8	0.33

Location	Occupants	Estimated No. of Person	Unit Flow Factor (m ³ /person/day)
Tuen Mun Treatment Works	Staff	28	0.33
The Yuen Yuen Institute Chan Kwok Chiu Hing Tak Primary School	Staff	39	0.28
	Student	366	0.04
Ecclesia Bible College	Visitors	400	0.015
	Overnight occupants	60	0.19
Wofoo Joseph Student Activity Centre	Staff	329	0.28
Diamond Jubilee Building	Staff	55	0.28
Lam Tei Raw Water Pumping Station Staff Quarters	Resident	10	0.27
Napa Valley	Resident	255	0.27
Parkland Villas (Block 4 to Block 9)	Resident	2996	0.27
Tuen Fu Road Community Garden	Visitors	600	0.015
	Staff	4	0.28
Fu Tei Fire Station	Staff	50	0.28
Ching Leung Nunnery	Staff	100	0.28
Casphalt	Staff	29	0.28
Village House	Resident	50	0.27

3.3 Sewerage Capacity

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 Colebrook-White equation (for circular pipes flowing full) as below:

$$V = -\sqrt{(8gDs)} \log\left(\frac{ks}{3.7D} + \frac{2.51\nu}{D\sqrt{(2gDs)}}\right)$$

where A_w = Wetted Area (Cross-sectional area of water body, m²)
 V = Velocity of flow
 g = gravitational acceleration, m/s²
 R = Hydraulic radius (m) = A_w/P_w
 ks = hydraulic pipeline roughness (m)
 ν = kinematic viscosity of fluid (m²/s)
 s = hydraulic gradient (energy loss per unit length due to friction)

The sewerage impact on various segments of the sewer was evaluated by comparing the estimated peak flow against the capacity of the respective sewer segments. The hydraulic calculations are provided in [Appendix C](#).

4 Results and Discussion

Based on results, the estimated daily flow (i.e. average dry weather flow) of the Proposed Development will be approximately 181m³/day. The capacity of the existing sewers has been evaluated and the percentage of the used capacity range from 40.0% to 171.9%. For the proposed sewer, the percentage of used capacity is 17.3%. Table 4.1 and Table 4.2 shows the percentage of utilized capacity of existing and proposed sewer.

Table 4.1 Percentage of Utilized Capacity of the Existing Sewer

Manhole No.		Flow Capacity, m ³ /s	Estimated Peak Flow, m ³ /s	% Of Capacity
FMH1015197	FMH1015198	0.050	0.024	48.9%
FMH1015198	FMH1015191	0.061	0.024	40.0%
FMH1015191	FMH1015189	0.060	0.024	40.5%
FMH1015189	FMH1015188	0.026	0.024	92.4%
FMH1015188	FMH1015187	0.044	0.038	86.3%
FMH1015187	FMH1015186	0.054	0.038	70.6%
FMH1015186	FMH1015185	0.066	0.039	59.7%
FMH1015185	FMH1015184	0.061	0.039	64.4%
FMH1015272	FMH1015184	0.082	0.083	<u>102.2%</u>
FMH1015184	FMH1015183	0.060	0.102	<u>171.8%</u>
FMH1015183	FMH1015182	0.063	0.102	<u>161.2%</u>
FMH1015182	FMH1015181	0.066	0.102	<u>154.4%</u>
FMH1015181	FMH1015220	0.066	0.102	<u>154.1%</u>
FMH1015220	FMH1015269	0.079	0.102	<u>129.2%</u>
FMH1015269	FMH1015270	0.072	0.102	<u>142.6%</u>

Table 4.2 Percentage of Utilized Capacity of the Proposed Sewer

Manhole No.		Flow Capacity, m ³ /s	Estimated Peak Flow, m ³ /s	% Of Capacity
P1	FMH1015188	0.106	0.018	17.2%

Based on the result in [Table 4.1](#), sewer between Manhole No. FMH1015197 to FMH1015184 have sufficient capacity to cater the additional sewage generation from the Proposed Development.

For the sewer between Manhole No. FMH1015272 to FMH1015184, there are inadequate capacity to cater the sewage generation from surrounding buildings and facilities. This also led to insufficient capacity of the sewer between FMH1015184 to FMH1015270. As such, freeboard is calculated and summarised in [Table 4.3](#). The calculation of freeboard is provided in [Appendix C](#).

Table 4.3 Estimation of Downstream Freeboard

Manhole	Cover Level, mPD	Final Water Level, mPD	Freeboard, m	Overflow? (Y/N)
FMH1015269	5.82	2.30	3.52	N
FMH1015220	5.63	2.56	3.07	N
FMH1015181	5.6	2.74	2.86	N
FMH1015182	5.4	2.92	2.48	N
FMH1015183	5.36	3.09	2.27	N
FMH1015184	6.06	3.24	2.82	N

Given that there is sufficient freeboard at the existing manhole, no adverse sewerage impact is anticipated.

5 Conclusion

A Sewerage Impact Assessment (SIA) has been conducted to evaluate the possible impacts on the local sewerage network due to the operation of the Proposed Development.

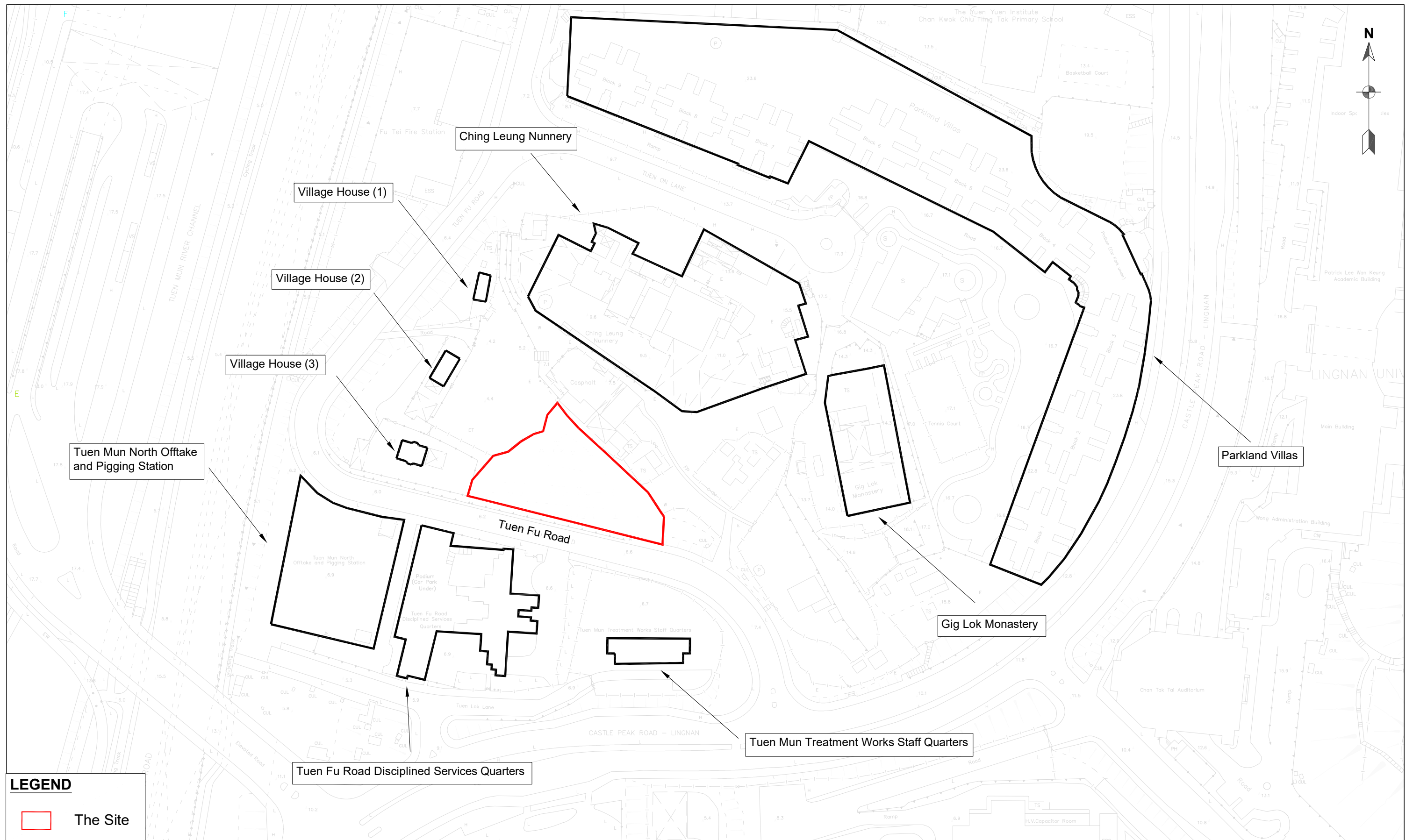
The assessment result demonstrated that sewer between Manhole No. FMH1015197 to FMH1015184 have sufficient capacity to cater the peak discharge flows as estimated under the worst-case scenario.

As there are inadequate capacity for the sewer between Manhole No. FMH1015184 to FMH1015270, freeboard have been checked and the results show that there is sufficient freeboard.

Based on the above, it is concluded that the Proposed Development shall not result in any adverse sewerage impact.

Project Proponent will be responsible for the design and construction of the proposed sewerage connection works. Upon completion of the connection works, the sewerage pipe will be handed over to DSD for regular maintenance.

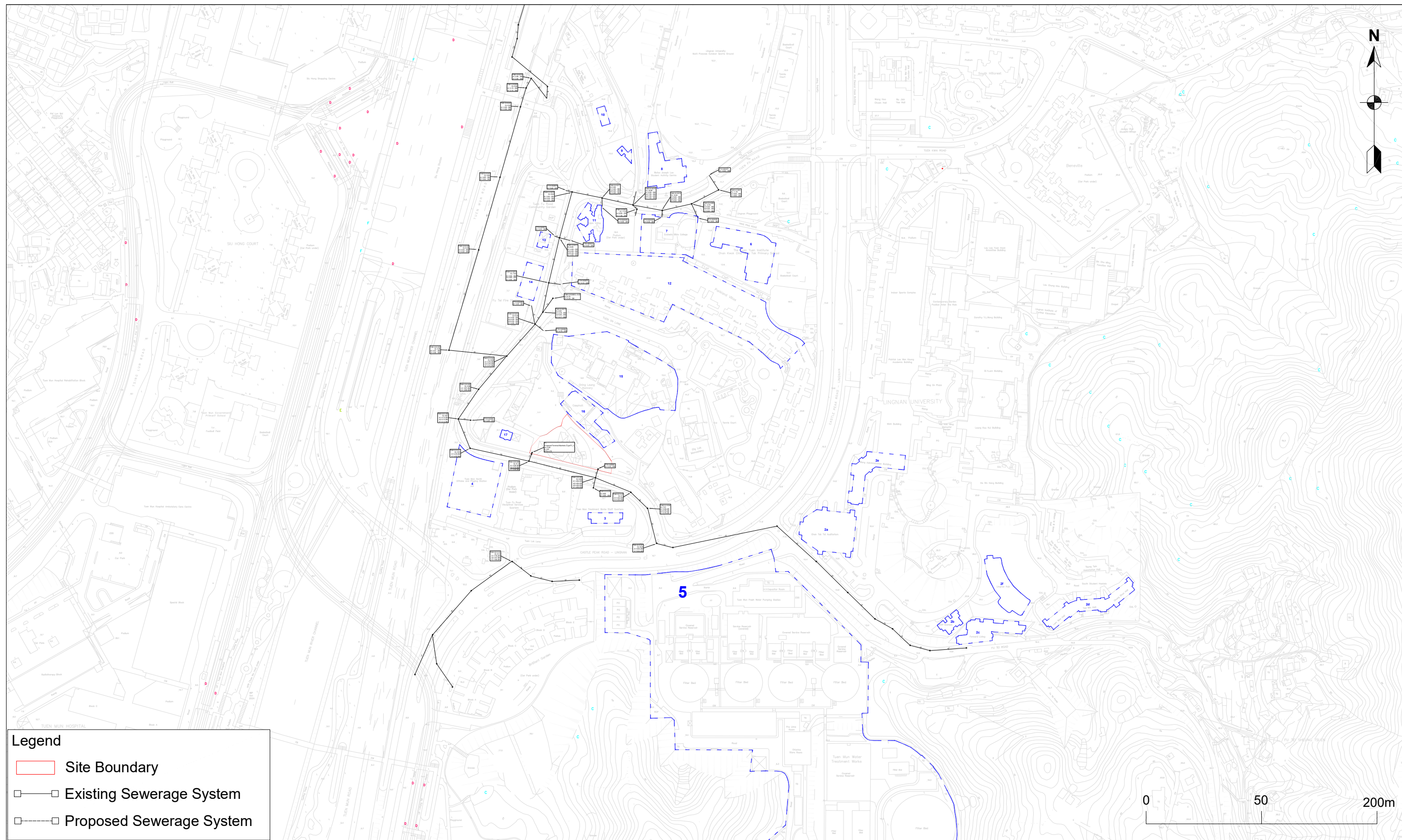
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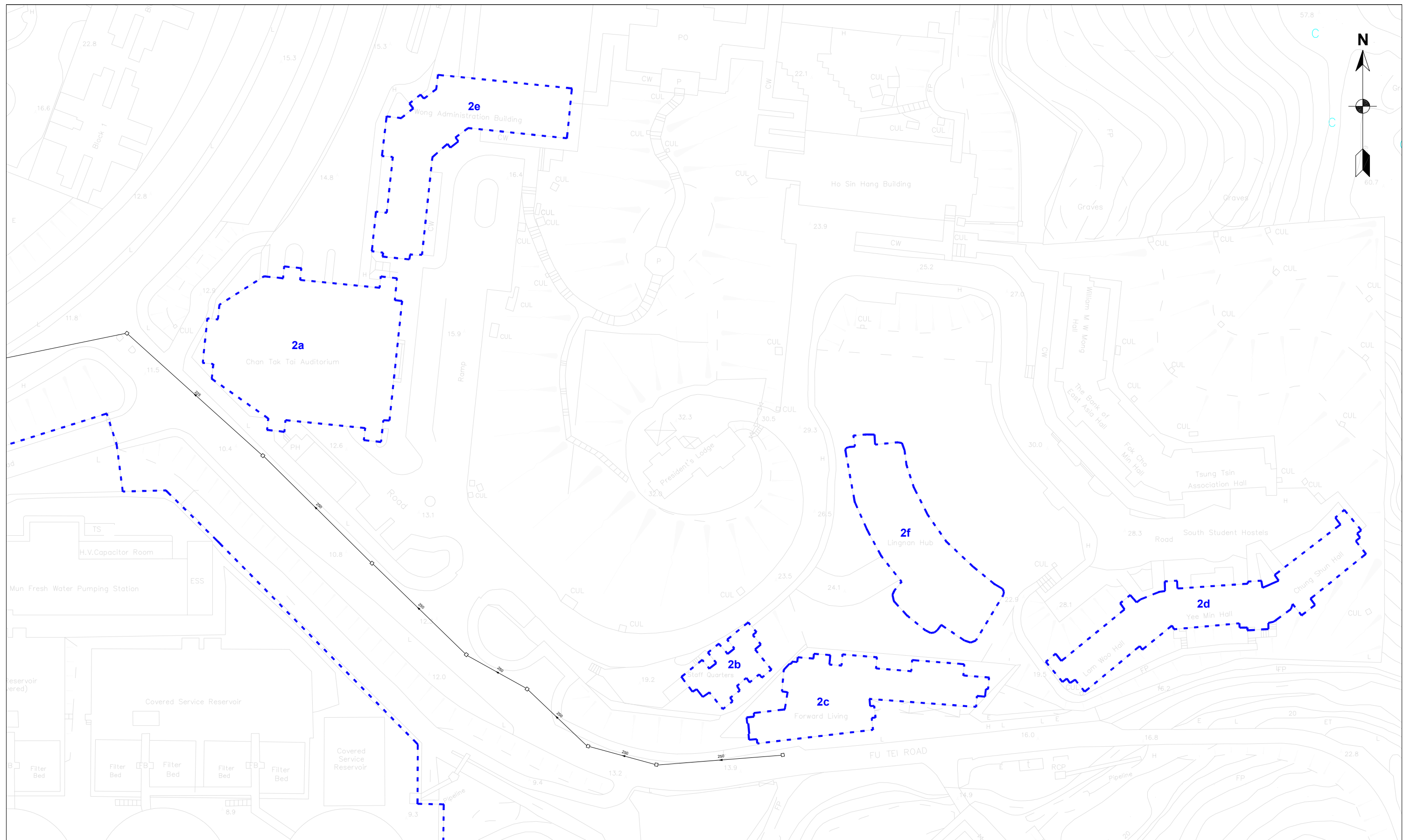


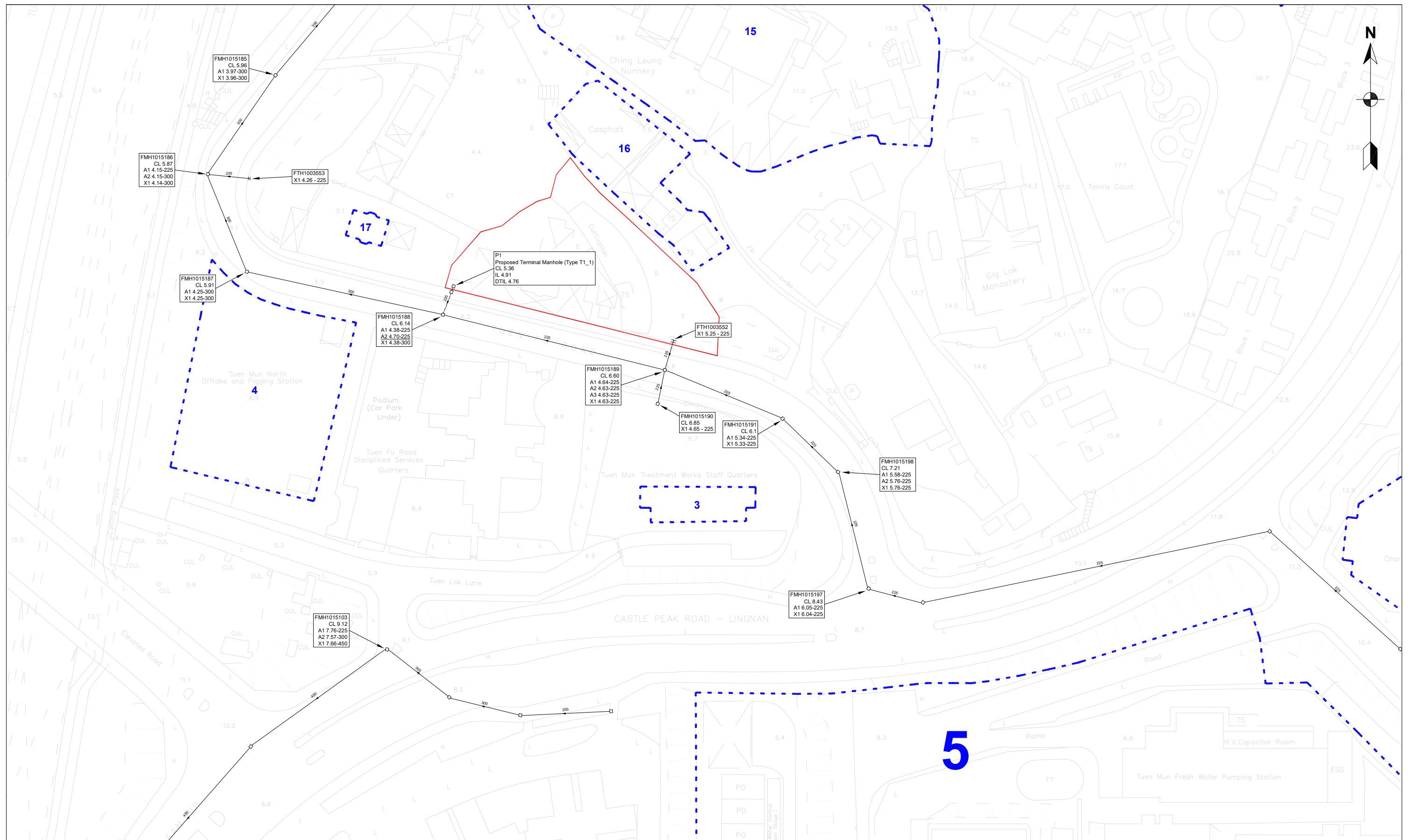
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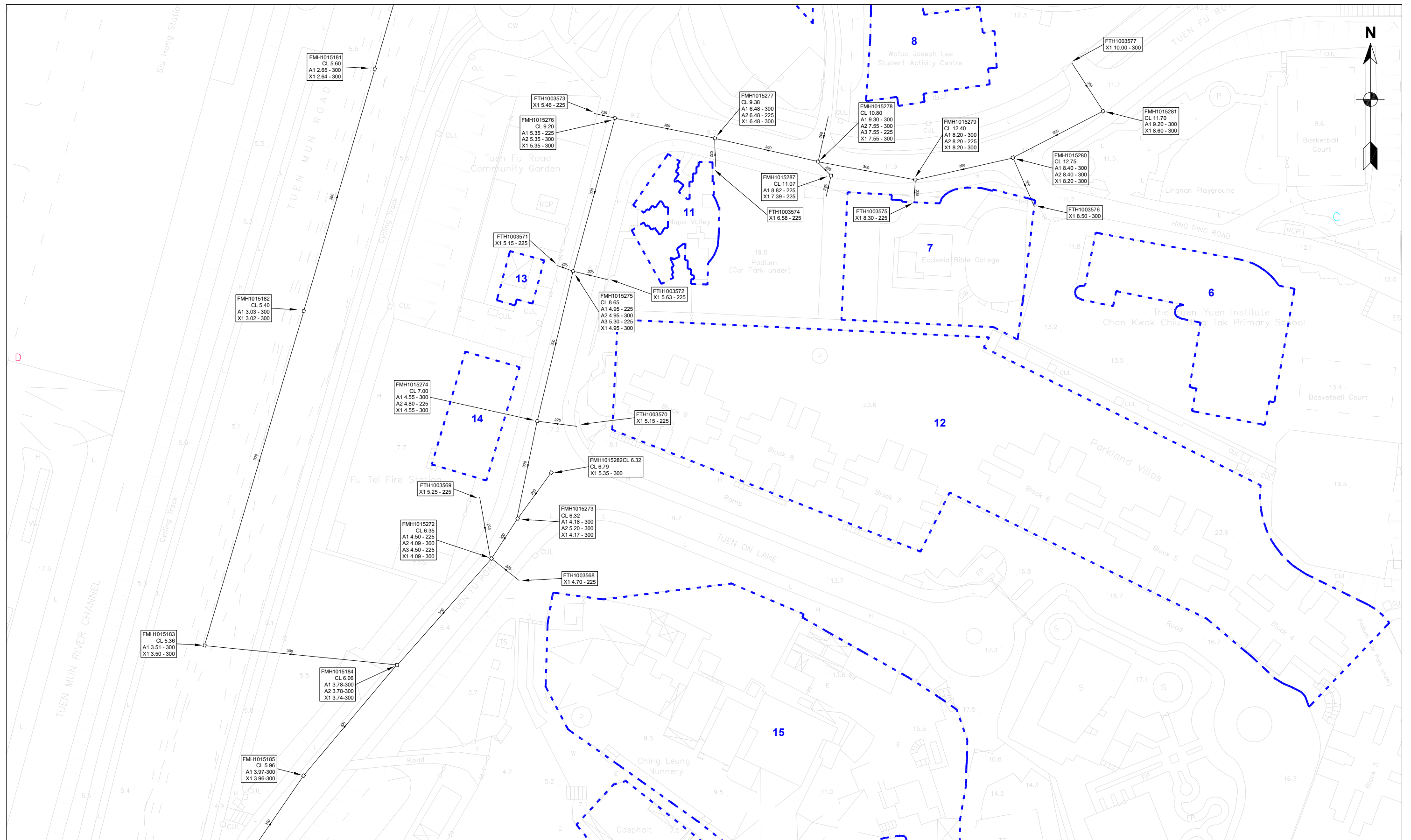
Figure 2.1

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Appendix A

Proposed Layout Plan

Appendix B

Calculation of Daily Flow

Generation from the Proposed Development			Remark
1a	Total number of residents	504 people	Based on the information provided by Project Team. Refer to Private R1 in Table T-1 of GESF.
	Unit flow	0.19 m ³ /person/day	
	Estimated daily flow	95.8 m ³ /day	
1b	Total gross floor area (excluding refuge floor and dormitories)	7,140 m ²	Based on the information provided by Project Team.
	Worker density	3.3 workers/GFA in 100m	Refer to Community, Social & Personal Services (All Types) in Table 8 of CIFSUS.
	Total number of staff	236 people	Refer to Commercial Employee + J11 Community ,Social & Personal Services in Table T-2 of GESF.
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	66.0 m ³ /day	
1c	Total number of visitors	1,008	Based on the information provided by Project Team. Referred to the unit flow factor for "Visitor" of Table 3-4 of "Wastewater Engineering Treatment and Reuse" published by Metcalf & Eddy.
	Unit flow	0.015 m ³ /person/day	
	Estimated daily flow	15.1 m ³ /day	
	Generation from kitchen		
1d	Total gross floor area of kitchen	23.8 m ²	Based on the information provided by Project Team.
	Worker density	5.1 workers/GFA in 100m	Refer to Restaurants (All Types) in Table 8 of CIFSUS.
	Total number of persons	2.0 workers	Refer to Commercial Employee + J10 Restaurants & Hotels in Table T-2 of GESF.
	Unit flow	1.58 m ³ /person/day	
	Estimated daily flow	3.2 m ³ /day	
Total estimated daily flow from the Proposed Development		180.0 m ³ /day	
Lingnan University			
2a Chan Tak Tai Auditorium	Total number of person	1040 people	BRAVO File Ref No. 2/9319/92/5 Drawing No. 2819 C-01 (Appendix E) Refer to School Student in Table T-2 of GESF.
	Unit flow	0.04 m ³ /person/day	
	Estimated daily flow	41.6 m ³ /day	
	Total number of staff (dressing room)	44 people	BRAVO File Ref No. 2/9319/92/5 Drawing No. 2819 C-01 (Appendix E) Refer to Commercial Employee + J11 Community, Social & Personal Services in Table T-2 of GESF.
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	12.32 m ³ /day	
2b Staff Quarters	Total number of person	80 people	BRAVO File Ref No. 2/9319/92/2 Drawing No. 2700 C-01 (Appendix E) Refer to Private R1 in Table T-1 of GESF.
	Unit flow	0.19 m ³ /person/day	
	Estimated daily flow	15.2 m ³ /day	
2c Forward Living	Total number of students (dormitory)	322 people	BRAVO File Ref No. 2/9208/08 Drawing No. G-1 (Appendix E) Refer to Private R1 in Table T-1 of GESF.
	Unit flow	0.19 m ³ /person/day	
	Estimated daily flow	61.18 m ³ /day	
	Total number of staff (Office)	8 people	BRAVO File Ref No. 2/9208/08 Drawing No. G-1 (Appendix E) Refer to Commercial Employee + J11 Community, Social & Personal Services in Table T-2 of GESF.
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	2.24 m ³ /day	
2d Lam Woo Hall, Yee Min Hall, Chung Shun Hall	Total number of students (dormitory)	500 people	BRAVO File Ref No. 2/9319/92/1 Drawing No. 2700 C-06 (Appendix E) Refer to Private R1 in Table T-1 of GESF.
	Unit flow	0.19 m ³ /person/day	
	Estimated daily flow	95 m ³ /day	
	Total number of staff (staff quarters)	32 people	BRAVO File Ref No. 2/9319/92/1 Drawing No. 2700 C-06 (Appendix E) Refer to Private R1 in Table T-1 of GESF.
	Unit flow	0.19 m ³ /person/day	
	Estimated daily flow	6.08 m ³ /day	
2e Wong Adminstartion Building	Total number of staff	141 people	BRAVO File Ref No. 2/9319/92 Drawing No. 2538 C-01 (Appendix E) Refer to Commercial Employee + J11 Community, Social & Personal Services in Table T-2 of GESF.
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	39.48 m ³ /day	
	Total number of student (council chamber)	70 people	BRAVO File Ref No. 2/9319/92 Drawing No. 2538 C-01 (Appendix E) Refer to School Student in Table T-2 of GESF.
	Unit flow	0.04 m ³ /person/day	
	Estimated daily flow	2.8 m ³ /day	
2f Lingnan Hub			https://www.ln.edu.hk/news/press-releases/20240105/lingnan-university-holds-topping-out-ceremony-for-lingnan-hub-new-integrated-building-to-provide-shared-livine-spaces-for-staff-and-students
	(i) Total number of unit (two-bedroom units)	24 units	
	Assumed number of residents per unit	3 people	
	Total number of residents	72 people	https://www.ln.edu.hk/news/press-releases/20240105/lingnan-university-holds-topping-out-ceremony-for-lingnan-hub-new-integrated-building-to-provide-shared-livine-spaces-for-staff-and-students
	(ii) Total number of unit (three-bedroom units)	17 units	
	Assumed number of residents per unit	4 people	
	Total number of residents	68 people	Refer to Private R1 in Table T-1 of GESF.
	Unit flow	0.19 m ³ /person/day	
	Estimated daily flow	26.6 m ³ /day	
(iii)	Total number of studios	15 units	https://www.ln.edu.hk/news/press-releases/20240105/lingnan-university-holds-topping-out-ceremony-for-lingnan-hub-new-integrated-building-to-provide-shared-livine-spaces-for-staff-and-students Since no information is available to public, the number of students are assumed as 10 per studios.
	Assumed number of students per studio	10 people	
	Total number of students	150 people	
	Unit flow	0.04 m ³ /person/day	Refer to School Student in Table T-2 of GESF.
	Estimated daily flow	6 m ³ /day	
Total estimaed daily flow from Lingnan University		308.5 m ³ /day	
3 Generation from Tuen Mun Treatment Works Staff Quarters	Total number of residents	10 people	Refer to the SIA of planning application no. A/TM/422. Referred to the planning unit flow factor for Domestic (Private - R2) in Table T-1 of GESF.
	Unit flow	0.27 m ³ /person/day	
	Estimated daily flow	2.7 m ³ /day	
4 Generation from Tuen Mun North Offtake and Pigging Station	Gross Floor Area	1,903 m ²	Based on the area measured on basemap
	Worker density	0.4 workers/GFA in 100m	Refer to Storage (All Types) in Table 8 of CIFSUS.
	Total number of staff	8 workers	Refer to Commercial Employee + J2 Electricity Gas & Water in Table T-2 of GESF.
	Unit flow	0.33 m ³ /person/day	
	Estimated daily flow	2.6 m ³ /day	
5 Generation from Tuen Mun Water Treatment Works	Gross Floor Area	6,885 m ²	Refer to Storage (All Types) in Table 8 of CIFSUS.
	Worker density	0.4 workers/GFA in 100m	
	Total number of staff	28 workers	
	Unit flow	0.33 m ³ /person/day	
	Estimated daily flow	9.1 m ³ /day	

6	Generation from The Yuen Yuen Institute Chan Kwok Chiu Hing Tak Primary School		
	Total number of staff	39 people	
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	<u>10.9</u> m ³ /day	
	Total number of students	366 people	
	Unit flow	0.04 m ³ /person/day	
	Estimated daily flow	<u>14.6</u> m ³ /day	
7	Generation from Ecclesia Bible College		
	Total number of visitors	400 people	
	Unit flow	0.015 m ³ /person/day	
	Estimated daily flow	<u>6.0</u> m ³ /day	
	Total number of overnight occupants	60 people	
	Unit flow	0.19 m ³ /person/day	
	Estimated daily flow	<u>11.4</u> m ³ /day	
8	Generation from Wofoo Joseph Student Activity Centre		
	Total number of students	329 people	
	Unit flow	0.280 m ³ /person/day	
	Estimated daily flow	<u>92.1</u> m ³ /day	
9	Generation from Diamond Jubilee Building		
	Total number of person	55 people	
	Unit flow	0.280 m ³ /person/day	
	Estimated daily flow	<u>15.4</u> m ³ /day	
10	Generation from Lam Tei Raw Water Pumping Station Staff Quarters		
	Total number of person	10 people	
	Unit flow	0.27 m ³ /person/day	
	Estimated daily flow	<u>2.7</u> m ³ /day	
11	Generation from Napa Valley		
	Total number of residential units	98 units	
	Average domestic household size	2.6 people	
	Total number of residents	255 people	
	Unit flow	0.27 m ³ /person/day	
	Estimated daily flow	<u>68.9</u> m ³ /day	
12	Generation from Parkland Villas (Block 4 to Block 9)		
	Total number of residential units	1,152 units	
	Average domestic household size	2.6 people	
	Total number of person	2,996 people	
	Unit flow	0.27 m ³ /person/day	
	Estimated daily flow	<u>808.9</u> m ³ /day	
13	Generation from Tuen Fu Road Community Garden		
	Estimated no. of visitors per hour	50 people	
	Estimated no. of visitors per day	600 people	
	Unit flow	0.015 m ³ /person/day	
	Estimated daily flow	<u>9.0</u> m ³ /day	
	Gross floor area	115.0 m ²	
	Worker density	3.3 workers/GFA in 100m ²	
	Total number of staff	4 people	
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	<u>1.1</u> m ³ /day	
14	Generation from Fu Tei Fire Station		
	Total number of person	50 people	
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	<u>14.0</u> m ³ /day	
15	Generation from Ching Leung Nunnery		
	Total number of staff	100 people	
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	<u>28.0</u> m ³ /day	
16	Generation from Casphalt		
	Gross floor area	864.0 m ²	
	Worker density	3.3 workers/GFA in 100m ²	
	Total number of staff	29 people	
	Unit flow	0.28 m ³ /person/day	
	Estimated daily flow	<u>8.0</u> m ³ /day	
17	Generation from Village House		
	Total number of person	50 people	
	Unit flow	0.27 m ³ /person/day	
	Estimated daily flow	<u>13.5</u> m ³ /day	
	Total generation from Item 6 to Item 16	1,091.0 m ³ /day	
	Total generation from Item 1 to Item 17	1,607.4 m ³ /day	
	Total generation from Item 2 to Item 17	1,427.4 m ³ /day	

Notes:

- (a) GESF – “Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning” published by Environmental Protection Department (EPD) in 2005.
- (b) CIFSUS - Commercial and Industrial Floor Space Utilization Survey conducted by the Planning Department during November 2004 to March 2005.

Appendix C

Hydraulic Calculations

Section 12A Application for Proposed Rezoning from “Government, Institution or Community” to “Government, Institution or Community (6)” at Tuen Mun, New Territories and to Amend the Notes of the Zone Applicable to the Site for the Proposed Social Welfare Facility (Residential Care Home for the Elderly) at Section C of Lot No. 496 in D.D 132 and the adjoining Government Land, Tuen Mun, Sewerage Impact Assessment
Hydraulic Calculations

A. Estimated Pipe Capacity and Adequacy Check for the Existing Sewerage System (with development)

Manhole no.		Length	Level (out)	Level (in)	d	A _w	k _s ^[1]	v	s	g	V	Q _c	Q _d	PF	P _{CIF} ^[2]	Q _p	Is Q _c > Q _p ?	% of capacity	Remarks
		m	mPD	mPD	m	m ²	m	m ² /s	-	m/s ²	m/s	m ³ /s	m ³ /day	-	-	m ³ /s	Y/N	%	
FMH1015197	FMH1015198	31	6.04	5.58	0.225	0.040	0.003	1E-06	0.015	9.810	1.248	0.050	317.6	6	1.10	0.024	Y	48.9%	Qd= flow from Item 2 and Item 5
FMH1015198	FMH1015191	19	5.76	5.34	0.225	0.040	0.003	1E-06	0.022	9.810	1.524	0.061	317.6	6	1.10	0.024	Y	40.0%	Qd= flow from Item 2 and Item 5
FMH1015191	FMH1015189	32	5.33	4.64	0.225	0.040	0.003	1E-06	0.022	9.810	1.505	0.060	317.6	6	1.10	0.024	Y	40.5%	Qd= flow from Item 2 and Item 5
FMH1015189	FMH1015188	59	4.63	4.38	0.225	0.040	0.003	1E-06	0.004	9.810	0.666	0.026	320.3	6	1.10	0.024	Y	92.4%	Qd= flow from Item 2, item 3 and Item 5
FMH1015188	FMH1015187	51	4.38	4.25	0.300	0.071	0.003	1E-06	0.003	9.810	0.626	0.044	500.3	6	1.10	0.038	Y	86.3%	Qd= flow from Item 1, Item 2, item 3 and Item 5
FMH1015187	FMH1015186	26	4.25	4.15	0.300	0.071	0.003	1E-06	0.004	9.810	0.770	0.054	502.9	6	1.10	0.038	Y	70.6%	Qd= flow from Item 1, Item 2, item 3, item 4 and Item 5
FMH1015186	FMH1015185	30	4.14	3.97	0.300	0.071	0.003	1E-06	0.006	9.810	0.935	0.066	516.4	6	1.10	0.039	Y	59.7%	Qd= flow from Item 1, Item 2, item 3, item 4, Item 5 and item17
FMH1015185	FMH1015184	37	3.96	3.78	0.300	0.071	0.003	1E-06	0.005	9.810	0.867	0.061	516.4	6	1.10	0.039	Y	64.4%	
FMH1015272	FMH1015184	36	4.09	3.78	0.300	0.071	0.003	1E-06	0.009	9.810	1.154	0.082	1091.0	6	1.10	0.083	N	102.2%	Qd= flow from Item 6 to Item 16
FMH1015184	FMH1015183	50	3.74	3.51	0.300	0.071	0.003	1E-06	0.005	9.810	0.843	0.060	1607.4	5	1.10	0.102	N	171.8%	Qd= flow from Item 1 to Item 17
FMH1015183	FMH1015182	90	3.50	3.03	0.300	0.071	0.003	1E-06	0.005	9.810	0.898	0.063	1607.4	5	1.10	0.102	N	161.2%	Ditto
FMH1015182	FMH1015181	65	3.02	2.65	0.300	0.071	0.003	1E-06	0.006	9.810	0.938	0.066	1607.4	5	1.10	0.102	N	154.4%	Ditto
FMH1015181	FMH1015220	63	2.64	2.28	0.300	0.071	0.003	1E-06	0.006	9.810	0.939	0.066	1607.4	5	1.10	0.102	N	154.1%	Ditto
FMH1015220	FMH1015269	16	2.28	2.15	0.300	0.071	0.003	1E-06	0.008	9.810	1.121	0.079	1607.4	5	1.10	0.102	N	129.2%	Ditto
FMH1015269	FMH1015270	9	2.15	2.09	0.300	0.071	0.003	1E-06	0.007	9.810	1.015	0.072	1607.4	5	1.10	0.102	N	142.6%	Ditto

B. Estimated Pipe Capacity and Adequacy Check for the Proposed Sewerage System (with development)

Manhole no.		Length	Level (out)	Level (in)	d	A _w	k _s ^[1]	v	s	g	V	Q _c	Q _d	PF	P _{CIF} ^[2]	Q _p	Is Q _c > Q _p ?	% of capacity	Remarks
		m	mPD	mPD	m	m ²	m	m ² /s	-	m/s ²	m/s	m ³ /s	m ³ /day	-	-	m ³ /s	Y/N	%	
P1	FMH1015188	7	4.91	4.70	0.225	0.040	0.00015	1E-06	0.030	9.810	2.676	0.106	180.0	8	1.10	0.018	Y	17.2%	Qd= flow from Proposed Development (item 1)

C. Estimated Pipe Capacity and Adequacy Check for the Existing Sewerage System (without proposed development)

Manhole no.		Length	Level (out)	Level (in)	d ^[3]	A _w	k _s ^[4]	v	s	g	V	Q _c	Q _d	PF	P _{CIF} ^[2]	Q _p	Is Q _c > Q _p ?	% of capacity	Remarks
		m	mPD	mPD	m	m ²	m	m ² /s	-	m/s ²	m/s	m ³ /s	m ³ /day	-	-	m ³ /s	Y/N	%	
FMH1015184	FMH1015183	50	3.74	3.51	0.300	0.071	0.003	1E-06	0.005	9.810	0.843	0.060	1427.4	5	1.10	0.091	N	152.6%	Qd= flow from Item 1 to Item 17
FMH1015183	FMH1015182	90	3.50	3.03	0.300	0.071	0.003	1E-06	0.005	9.810	0.898	0.063	1427.4	5	1.10	0.091	N	143.2%	Qd= flow from Item 1 to Item 17
FMH1015182	FMH1015181	65	3.02	2.65	0.300	0.071	0.003	1E-06	0.006	9.810	0.938	0.066	1427.4	5	1.10	0.091	N	137.1%	Ditto
FMH1015181	FMH1015220	63	2.64	2.28	0.300	0.071	0.003	1E-06	0.006	9.810	0.939	0.066	1427.4	5	1.10	0.091	N	136.9%	Ditto
FMH1015220	FMH1015269	16	2.28	2.15	0.300	0.071	0.003	1E-06	0.008	9.810	1.121	0.079	1427.4	5	1.10	0.091	N	114.7%	Ditto
FMH1015269	FMH1015270	9	2.15	2.09	0.300	0.071	0.003	1E-06	0.007	9.810	1.015	0.072	1427.4	5	1.10	0.091	N	126.7%	Ditto

Note:

- [1] For existing sewer k_s = 3mm = 0.003m is adopted for the "Poor" condition of slimed sewer (concrete), when flowing half full, approximately 1.2m/s at existing sewer with reference to Table 5 of Sewerage Manual - Key Planning Issues and Gravity Collection System published by DSD in 2013
For proposed sewer, k_s = 0.15mm = 0.00015m is adopted for the "Normal" condition of slimed sewer (uPVC), when flowing half full, approximately 1.2m/s at existing sewer with reference to Table 5 of Sewerage Manual - Key Planning Issues and Gravity Collection System published by DSD in 2013
[2] Catchment Inflow factors, PCIF is referred to Table T-4 of Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (GESF)" published by EPD in 2005.

Legend

A_w = Wetted Area, m²
V = Velocity of flow, m/s
g = gravitational accerlation, m/s2
D = internal pipe diameter,m
k_s = hydrualic pipeline roughness, m
v = kinematic viscosity of fluid, m2/s
s = hydraulic gradient, energy loss per unit length due to friction

Q_c = Flow Capacity, m³/s
Q_d = Estimated cumulative daily flow, m³/s
PF = Peaking Factor
P_{CIF} = Catchment Inflow Factor
Q_p = Estimated cumulative peak flow, m³/s

Colebrook-White Equation (for circular pipes flowing full):

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

Calculation of freeboard

Basis Water Level at FMH1015270	2.09 mPD
FMH1015269 to FMH1015270	
A) Hydraulic Loss	
Peak Flow	0.1023 m ³ /s
Capacity Flow	0.0717 m ³ /s
% of Capacity Flow	143%
Volumetric Flow	0.072 m ³ /s
Effective Cross Section Area	0.071 m ²
Cross-Sectional mean Velocity (V)	1.0148 m/s
Diameter (D)	0.3 m
Reynolds number (Re)	304442
Surface roughness (ks)	0.003 m
Kinematic viscosity @ 15C (v)	0.000001 m ² /s
Acceleration due to gravity (g)	9.81 m/s ²
Darcy friction factor (f)	0.0077
Friction gradient (Sf)	0.0014
Friction Loss	0.1355 m
B) Head Loss	
Head Loss Coefficient for Entry and Loss (K1)	1
Head Loss Coefficient for Elbow (K2)	0.5
Total K	1.5
Head Loss	0.0787 m
C) Total Loss	
Total Loss	0.2142 m
Final Water Level	2.30 mPD
Cover Level at FMH1015269	5.82 mPD
Freeboard	3.52 >0.5m

Calculation of freeboard

Basis Water Level at FMH1015269	2.30 mPD
FMH1015220 to FMH1015269	
A) Hydraulic Loss	
Peak Flow	0.1023 m ³ /s
Capacity Flow	0.0792 m ³ /s
% of Capacity Flow	129%
Volumetric Flow	0.079 m ³ /s
Effective Cross Section Area	0.071 m ²
Cross-Sectional mean Velocity (V)	1.1206 m/s
Diameter (D)	0.3 m
Reynolds number (Re)	336178
Surface roughness (ks)	0.003 m
Kinematic viscosity @ 15C (v)	0.000001 m ² /s
Acceleration due to gravity (g)	9.81 m/s ²
Darcy friction factor (f)	0.0078
Friction gradient (Sf)	0.0017
Friction Loss	0.1674 m
B) Head Loss	
Head Loss Coefficient for Entry and Loss (K1)	1
Head Loss Coefficient for Elbow (K2)	0.5
Total K	1.5
Head Loss	0.0960 m
C) Total Loss	
Total Loss	0.2634 m
Final Water Level	2.56 mPD
Cover Level at FMH1015220	5.63 mPD
Freeboard	3.07 >0.5m

Calculation of freeboard

Basis Water Level at FMH1015220	2.56 mPD
FMH1015181 to FMH1015220	
A) Hydraulic Loss	
Peak Flow	0.1023 m ³ /s
Capacity Flow	0.0664 m ³ /s
% of Capacity Flow	154%
Volumetric Flow	0.066 m ³ /s
Effective Cross Section Area	0.071 m ²
Cross-Sectional mean Velocity (V)	0.9393 m/s
Diameter (D)	0.3 m
Reynolds number (Re)	281800
Surface roughness (ks)	0.003 m
Kinematic viscosity @ 15C (v)	0.000001 m ² /s
Acceleration due to gravity (g)	9.81 m/s ²
Darcy friction factor (f)	0.0077
Friction gradient (Sf)	0.0011
Friction Loss	0.1148 m
B) Head Loss	
Head Loss Coefficient for Entry and Loss (K1)	1
Head Loss Coefficient for Elbow (K2)	0.5
Total K	1.5
Head Loss	0.0675 m
C) Total Loss	
Total Loss	0.1823 m
Final Water Level	2.74 mPD
Cover Level at FMH1015181	5.6 mPD
Freeboard	2.86 >0.5m

Calculation of freeboard

Basis Water Level at FMH1015181	2.74 mPD
FMH1015182 to FMH1015181	
A) Hydraulic Loss	
Peak Flow	0.1023 m ³ /s
Capacity Flow	0.0663 m ³ /s
% of Capacity Flow	154%
Volumetric Flow	0.066 m ³ /s
Effective Cross Section Area	0.071 m ²
Cross-Sectional mean Velocity (V)	0.9375 m/s
Diameter (D)	0.3 m
Reynolds number (Re)	281256
Surface roughness (ks)	0.003 m
Kinematic viscosity @ 15C (v)	0.000001 m ² /s
Acceleration due to gravity (g)	9.81 m/s ²
Darcy friction factor (f)	0.0077
Friction gradient (Sf)	0.0011
Friction Loss	0.1144 m
B) Head Loss	
Head Loss Coefficient for Entry and Loss (K1)	1
Head Loss Coefficient for Elbow (K2)	0.5
Total K	1.5
Head Loss	0.0672 m
C) Total Loss	
Total Loss	0.1816 m
Final Water Level	2.92 mPD
Cover Level at FMH1015182	5.4 mPD
Freeboard	2.48 >0.5m

Calculation of freeboard

Basis Water Level at FMH1015182	2.92 mPD
FMH1015183 to FMH1015182	
A) Hydraulic Loss	
Peak Flow	0.1023 m ³ /s
Capacity Flow	0.0635 m ³ /s
% of Capacity Flow	161%
Volumetric Flow	0.063 m ³ /s
Effective Cross Section Area	0.071 m ²
Cross-Sectional mean Velocity (V)	0.8979 m/s
Diameter (D)	0.3 m
Reynolds number (Re)	269359
Surface roughness (ks)	0.003 m
Kinematic viscosity @ 15C (v)	0.000001 m ² /s
Acceleration due to gravity (g)	9.81 m/s ²
Darcy friction factor (f)	0.0076
Friction gradient (Sf)	0.0010
Friction Loss	0.1043 m
B) Head Loss	
Head Loss Coefficient for Entry and Loss (K1)	1
Head Loss Coefficient for Elbow (K2)	0.5
Total K	1.5
Head Loss	0.0616 m
C) Total Loss	
Total Loss	0.1659 m
Final Water Level	3.09 mPD
Cover Level at FMH1015183	5.36 mPD
Freeboard	2.27 >0.5m

Calculation of freeboard

Basis Water Level at FMH1015183	3.09 mPD
FMH1015184 to FMH1015183	
A) Hydraulic Loss	
Peak Flow	0.1023 m ³ /s
Capacity Flow	0.0596 m ³ /s
% of Capacity Flow	172%
Volumetric Flow	0.060 m ³ /s
Effective Cross Section Area	0.071 m ²
Cross-Sectional mean Velocity (V)	0.8425 m/s
Diameter (D)	0.3 m
Reynolds number (Re)	252754
Surface roughness (ks)	0.003 m
Kinematic viscosity @ 15C (v)	0.000001 m ² /s
Acceleration due to gravity (g)	9.81 m/s ²
Darcy friction factor (f)	0.0075
Friction gradient (Sf)	0.0009
Friction Loss	0.0910 m
B) Head Loss	
Head Loss Coefficient for Entry and Loss (K1)	1
Head Loss Coefficient for Elbow (K2)	0.5
Total K	1.5
Head Loss	0.0543 m
C) Total Loss	
Total Loss	0.1453 m
Final Water Level	3.24 mPD
Cover Level at FMH1015184	6.06 mPD
Freeboard	2.82 >0.5m

Appendix D

SIA of Approved Planning Application No.
A/TM/422

Drainage and Sewage Impact Assessment for Proposed Redevelopment of Ex-fire Services Married Quarters, in Fu Tei, Tuen Mun

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1.0 Introduction

1.1 Project Background

- 1.1.1 Both Drainage Impact Assessment (DIA) and Sewage Impact Assessment (SIA) are performed to support the planning of the Proposed Redevelopment of Ex-fire Services Married at Fu Tei, Tuen Mun, N.T., hereinafter called the Site which is shown on **Figure 1**.
- 1.1.2 This Report is based on the following information:
- (i) Fig. 1 Location Plan,
 - (ii) Fig. 2 Layout Plans provided by the client,
 - (iii) Drainage information in Tuen Mun copied from DSD,
 - (iv) 1:5000 Survey maps,
 - (v) Stormwater Drainage Manual (SDM) by Drainage Services Department (2000),
 - (vi) EPD Technical Paper (EPD/TP 1/05) – Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Version 1.0 (GESF)
 - (vii) Sewerage Manual – Part 1 (SM1) by Drainage Services Department (1995),
 - (viii) OZP Zoning from website of the Town Planning Board, Planning Department (OZP)
 - (ix) Tuen Mun Outline Zoning Plan No. S/TM/28, and;
 - (x) Site visit on 22 January 2011.

1.2 Project Location and Scope

- 1.2.1 The Site is located at Tuen Fu Road, Tuen Mun, N.T. with an area of about 3,390m², see Photo No. 2.
- 1.2.2 The Site is bounded by Tuen Fu Road on the North and a track road on the South. It is adjoining the WSD Tuen Mun Water Treatment Works Staff Quarters on the East and the Tuen Mun North Offtake & Pigging Station on the West; a 10m access road exists between the site and the offtake and pigging station, see **Figure 1**.
- 1.2.3 The track road at South is connected to the Castle Peak Road-San Hui Section via a 15m long ramp. The ground levels of Castle Peak Road-San Hui Section and the track road are 8.5mPD and 5.5mPD respectively.
- 1.2.4 The ground levels of the Site and Tuen Fu Road are 6.9mPD and 6.2mPD respectively.

3.0 Sewage Impact Assessment

3.1 Existing sewage conditions

- 3.1.1 According to the existing sewage layout extracted from DSD, the Site is at south side of a sewage catchment bounded by Tuen Mun Road and Yuen Long Highway at West, the Castle Peak Road-Lingnan Section at East, the Tuen Fu Road at South and a nullah at North, see **Figure 5**.
- 3.1.2 Sewage within this sewage catchment is collected by a sewerage system of existing DN225 to DN300 sewers running underneath Tuen Fu Road.
- 3.1.3 A DN300 sewer section (FWD1016227) downstream of this sewage catchment is connecting to a series of DN300 to DN750 sewers at Tuen Mun Road and Yuen Long Highway and discharge to the Siu Hong Sewage Pumping Station.

3.2 Potential sewage impacts

- 3.2.1 The sewage from the Site could be discharged into the DN300 sewer (FWD1016561) via the existing sewer manhole (FMH1015188) at Tuen Fu Road. Detail estimations are included in **Appendix C**.
- 3.2.2 The design sewage flow from the Site is estimated based on the following parameters.
- (i) Global Unit Flow Factors = 0.190 m³/day/person for Domestic, Private, R1 (Table T-1 of GESF refers)
 - (ii) Global Peaking Factors = 8.0 for Sewers Population Range <1000, Including stormwater allowance (Table T-5 of GESF refers)
 - (iii) Population of redevelopment = 570 person (designed population intake for the proposed redevelopment)
 - (iv) Quarter Unit Area of Ex-Fire Services Married Quarters = 70 m² (assumed)
- 3.2.3 The design sewage flow for the redevelopment and estimated population and sewage before the redevelopment are as follow:
- (i) Total sewage from the Site
before redevelopment = 294.45 m³/day
after redevelopment = 866.4 m³/day
 - (ii) Additional population of the redevelopment = 380 person
 - (iii) Additional sewage from the Site = 571.95 m³/day
- 3.2.4 The existing sewage within the Catchment area are estimated based on the following parameters and summarized in Table 1:
- (i) The type of developments of the Catchment area obtained from the OZP Zoning for Tuen Mun area,
 - (ii) Global Unit Flow Factors are from Table T-1 and T-2 of GESF,
 - (iii) Global Peaking Factors are from Table T-5 of GESF, and;

(iv) Population estimation based on the site inspection on 22 January 2011 and reference from website of the occupant.

Table 1 Parameters used in Estimation of Sewage within Catchment Area

Type of Development	Occupant	Maximum Plot Ratio	Estimated Population	Unit Flow Factor (m ³ /d/person)
G/IC	Lingnan University Student Activities Centre (photo 24)	N/A	329	0.08
	Lam Tei SW PS Staff Quarters (photo 22)		10	0.15
	Diamond Jubilee Building (photo 23)		55	0.08
	Ching Leung Nunnery (photo 8 to 15)		100	0.08
	Buddhist Kin Sau Kindergarten		100	0.04
	Student		10	0.08
	Teacher		10	0.15
	WSD Staff Quarter (photo 4)		79	0.19
	Gig Lok Monastery (photo 16 & 18)		50	0.15
	Fu Tei Fire Station (photo 17)		400	0.08
	Ecclesia Bible College (photo 19)		60	0.19
	Visitors		366	0.04
	Occupants		39	0.08
R(C)	A residential development (photo 25 & 26)	0.4	50	0.37
	Napa Valley & Parkland Villas (photo 8 & 18)	3.3	4,020	0.37

3.2.5 The capacities of existing sewers are calculated using the following parameters:

- Diameters and invert levels from DSD information, and;
- The Roughness Coefficient of the sewer is 6.0 mm (slimed sewers (sewers slimed to about half depth; velocity, when flowing half full, approximately 0.75m/s) for concrete, spun or vertically cast in Table 5 of SM1 refers)

3.2.6 The existing sewage flow within the Catchment area and capacity of the sewers are as follows:

- Total sewage from the Catchment area = 7984.35 m³/day
- Total sewage from the Catchment area and the Site = 8850.75 m³/day

(v) Capacity of the DN300 sewer (FWD1016557) = 4548.49 m³/day

3.2.7 The existing DN300 sewer (FWD1016557) is not capable to discharge the sewage from the Site and the existing catchment, therefore, remedial and mitigation measures are required.

3.3 Remedial and Mitigation Measures

3.3.1 In this remedial and mitigation measures, the sewage from the Site is proposed to discharge into another sewage system at south of the Castle Peak Road-San Hui Section, see **Figure 5**.

3.3.2 Since the invert level (7.66mPD) of the closest sewer manhole (FMH1015103) of the sewage system to the Site is above the ground level (6.9mPD) of the Site, sewage flow by gravity to this sewer section is not possible. A DN150 sewer section (FWD1016466) and another DN300 sewer section (FWD1016500) underneath the ramp at South of the Site are connecting to this sewer manhole. The upstream invert level of the pipe is 5.2mPD as shown in the DSD information, however, no sewer manhole was found at this location during the site visit. A DN450 sewer (FWD1016467) is connecting to the sewer manhole (FMH1015103) at downstream.

3.3.3 The capacity of the DN450 sewer is as follows:

- (i) Capacity of the DN450 sewer (FWD1016467) = 5162.08 m³/day
- (ii) Additional sewage from the Site = 16.78% of the capacity of the DN450 sewer.

3.4 Results and recommendations

- 3.4.1 The DN450 sewer (FWD1016467) is capable to discharge the sewage from the Site and the increase in sewage flow is about 16.78% of the pipe full flow capacity. As the capacity of the downstream sewers and treatment facilities are larger than the existing sewer, the percentage increase in sewer flow is diminishing, thus, checking on the downstream treatment facilities and beyond is therefore not required.
- 3.4.2 The sewage from the Site is required to be discharged into the existing DN150 sewer at the ramp by a rising main and a pumping facility.
- 3.4.3 Proper sewerage system within the lot boundary shall be designed to collect all sewage and transmitted to the existing DN450 sewer at Castle Peak Road-San Hui Section. Detailed design calculation of the pumping facility and rising mains will be submitted to relevant statutory authority during the detail design stage of the redevelopment.
- 3.4.4 A proposed sewer terminal manhole and pumping facility close to south site boundary is proposed to connect to the existing DN150 sewer (FWD1016466) at Castle Peak Road-San Hui Section, see **Figure 6**.
- 3.4.5 The proposed redevelopment will overload the system when discharged via the existing DN300 sewer at Tuen Fu Road. If the sewage is discharged via the existing DN450 sewer at Castle Peak Road – San Hui Section employing a pumping station, any impact on the downstream system, if any, can be mitigated by pumping the sewers at non-peak flow period.

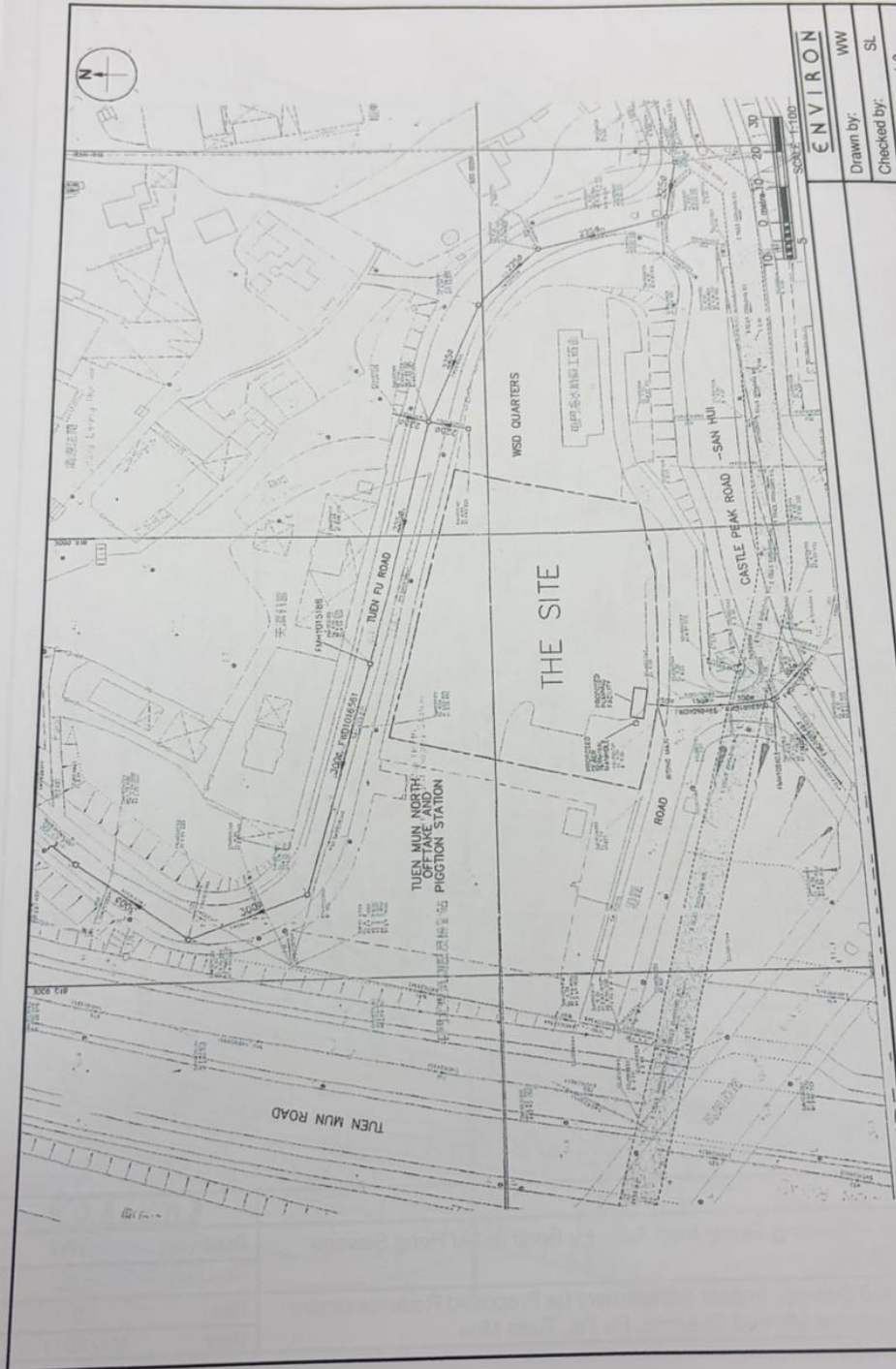


Figure: 6

Title: Proposed Sewage Layout

Project: Drainage and Sewage Impact Assessment for Proposed Redevelopment of Ex-fire Services Married Quarters, Fu Tai, Tuen Mun

ENVIRON

Drawn by: WW

Checked by: SL

Rev.: 1.0

Date: May 2011

**Estimation of Sewage Flow for the Section of Existing Sewer
From Tuen Fu Road & Tuen Mun Road to Siu Hong Sewage Pumping Station**

Type of Development	Occupant	Maximum Number of Storeys	Maximum Plot Ratio	Site Area (m ²)	Floor Area (m ²)	Estimated Population	Unit Flow Factor (m ³ /d/person)	Reference of Unit Flow Factor in GESF	Sewage Generated Rate (m ³ /d)
G/C	Lingnan University Student Activities Centre	1	N/A	47,597	898	329	0.08	Commercial employee in Table T-2 of GESF (Note 1)	26.32
	Lam Tei SW PS Staff Quarters	2		2,330	120	10	0.15	Temporary housing type in Table T-1 of GESF	1.5
	Diamond Jubilee Building				76	55	0.08	Commercial employee in Table T-2 of GESF (Note 1)	4.4
	Ching Leung Nunnery					100	0.08	Commercial employee in Table T-2 of GESF (Note 1)	8
	Buddhist Kin Sau Kindergarten	Student		29,971	1,039	100	0.04	School student in Table T-2 of GESF	4
		Teacher				10	0.08	Commercial employee in Table T-2 of GESF	0.8
	WSD Staff Quarter				254	10	0.15	Temporary housing type in Table T-1 of GESF	1.5
	Gig Lok Monastery			6,757	832	79	0.19	Institutional and special class housing type in Table T-1 of GESF	15.01
	Fu Tei Fire Station	5		3,593	451	50	0.15	Temporary housing type in Table T-1 of GESF	7.5
	Ecclesia Bible College	Visitors				400	0.08	Commercial employee in Table T-2 of GESF (Note 1)	32
		Overnight Occupants				60	0.19	Institutional and special class housing type in Table T-1 of GESF	11.4
	Hing Tak School	Student				366	0.04	School student in Table T-2 of GESF	14.64
		Teacher				39	0.08	Commercial employee in Table T-2 of GESF	3.12
R(C)		3	0.4	2,391	399	50	0.37	Private R3 in Table T-1 of GESF	18.5
R(B)10	Napa Valley & Parkland Villas		3.3	54,255	4,204	3914	0.37	Private R3 in Table T-1 of GESF	1448.18
Total									1,596.87

Peaking Factor = 5
 Estimated Flow of the Catchment (m³/d) = 7,984.35
 Sewage from the Site (m³/d) = 866.40
 Existing Catchment + Site (m³/d) = 8,850.75

Capacity of Existing DN300 Sewer between manholes FMH1015184 and FMH1015183 (m³/d) = 4,548.49
 Not OK

Note 1: Same UFF is adopted for employee and visitors as similar sewage generation activities and patterns are assumed.

Appendix E

Records from BRAVO

Chan Tak Tai Auditorium

III. SCHEDULE OF SANITARY FITMENT (Under B(SSFPDWL)R Reg. 4, 5, 8 & B(P)R 72)

Storey	Location	Population (person)		Provision of Sanitary Fitment					
				Req'd			Prov'd		
				WC	Urinal	Basin	WC	Urinal	Basin
Tier/F, UG/F, LG/F	Auditorium Seating and foyers (Reg 6)	Total = <u>1037</u>	M = <u>519</u>	6	11	6	10	11	10
		M:F = 1:1 F = <u>518</u>		9	-	6	12	-	<u>10</u>
LG2/F	Dressing Room (Reg 5)	Total = <u>44</u>	M = <u>22</u>	1	1	1	<u>3</u>	3	<u>4</u>
		(assuming 2 m ² /p) M:F = 1:1 F = <u>22</u>		2	-	1	<u>3</u>	-	<u>5</u>
G/F	Disable Seatings in Auditorium (B(P)R72)	Total = 3		1 unisexural	1 unisexural	1 unisexural	1 unisexural	1 unisexural	1 unisexural

Total number of students = 519+518+3 = 1040

Total number of staff (dressing room) = 44

Staff Quarters

III. Schedule of Sanitary Fitments

1) Basic Figures

<u>Total Population</u>	<u>Male/Female Ratio</u>	<u>Male No.</u>	<u>Female No.</u>
Staff 80	1:1	40	40

2) Summary of Sanitary Fitments (General Provision)

In accordance with Building (Standard of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations 1990 Reg.4.

<u>Fitments</u>	<u>Required</u>	<u>Provided</u>
WC	4	20
Basin	4	20
Shower/Bath	4	20

Assessment of Accommodation

No. of Persons	=	16 x 5 (storeys)
	=	80 p

Total number of person = 80

CALCULATIONS OF DISCHARGE VALUE :

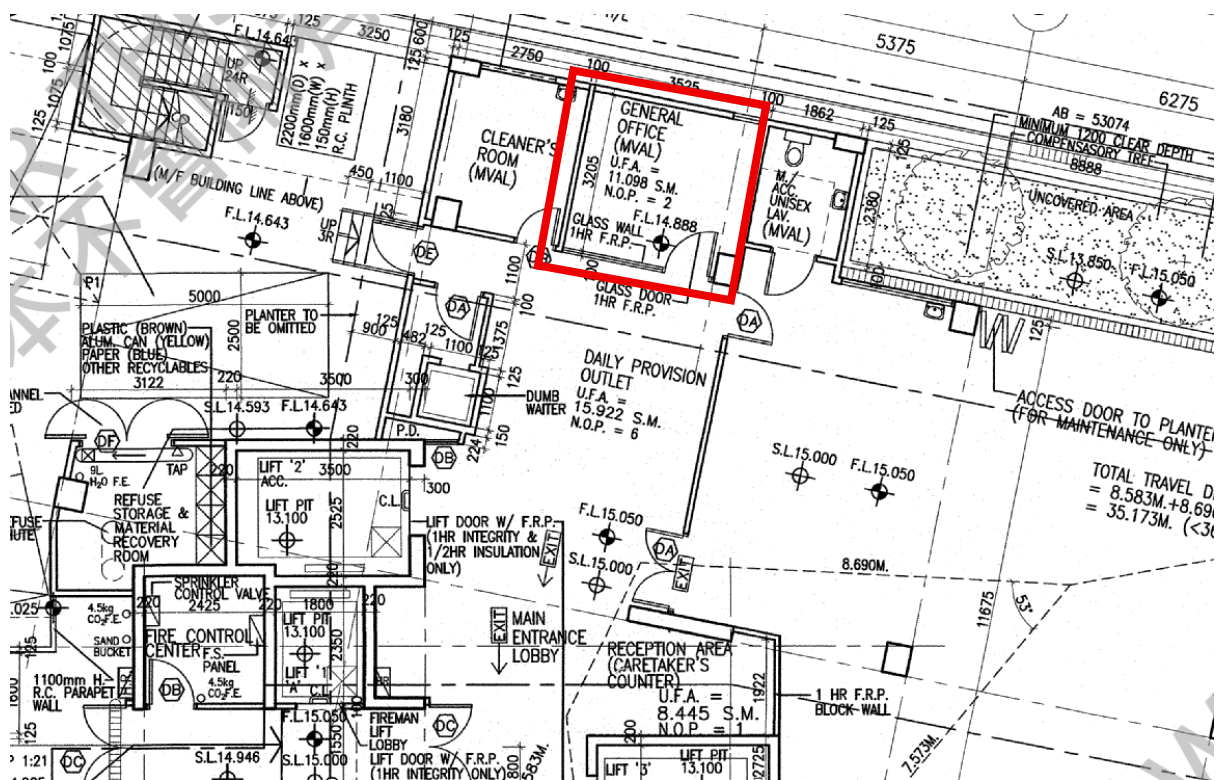
9 STOREYS ABOVE GROUND SERVED BY 2 NOS. 1100mm WIDE

DISCHARGE VALUE :

2 x 676	=	1352 PERSONS
ACTUAL CAPACITY OF PERSON :		
MEZZ.	=	76 PERSONS
1ST	=	58 PERSONS
2ND FL.	=	63 PERSONS
3RD FL.	=	38 PERSONS
5TH - 7TH FL. 44 P. x 3	=	132 PERSONS
8TH FL.	=	31 PERSONS
ROOF	=	9 PERSONS

TOTAL = 407 PERSONS

1352 PERSONS (PERMITTED) > 407 PERSONS (ACTUAL)



Lam Woo Hall, Yee Min Hall, Chung Shun Hall

Assessment of Accommodation

	<u>No. of Student</u>	<u>No. of Staff</u>	<u>Total</u>
Students' Hostels 1	250	16	266 p
Students' Hostels 2	250	16	266 p
Students' Hostels 3	250	-	250 p
Students' Hostels 4	250	32	286 p

Student hostel 1 and Student hostel 2 refer to William M W Mong Hall, The Bank of East Asia Hall, Fok Cho Min Hall and Tsung Tsin Association Hall.

Student hostel 3 and Student hostel 4 refer to Lam Woo Hall, Yee Min Hall, Chung Shun Hall.

Therefore, the total number of students = $250+250 = 500$ and the total number of staff = 32.

Wong Administration Building

Administration Block (Grid I-N/23-28)

Storey or Room	Total Capacity	No. of Exit Door or Exit Route		Min. Total Width of Exit Door		Min. Width of Each Exit Door		Min. Total Width of Exit Route		Min. Width of Each Exit Route	
		Req.	Provided	Req.	Provided	Req.	Provided	Req.	Provided	Req.	Provided
I2											
President Office	8	1	2	-	-	750	1x850 1x1700	-	-	900	1x1175 1x1325
General Reception	28	1	2	-	-	850	1x850 1x1700	-	-	1050	1x1175 1x1325
I1											
General Reception Grid 23-24	13	1	2	-	-	750	1x850 1x1700	-	-	900	1x1175 1x1325
General Reception Grid 24-28	29	1	2	-	-	850	1x850 1x1700	-	-	1050	1x1175 1x1325
G/F											
Council Chamber	70	1	1	-	-	850	1700	-	-	1050	1700
Grid K-M/23-24	38	1	2	-	-	850	2x1700	-	-	1050	1x1750 1x1325
General Reception	25	1	2	-	-	750	1x850 1x1100	-	-	900	1x1175 1x1325

Total number of staff (office) = 8+28+13+29+38+25 = 141

Total number of students (council chamber) = 70