Annex 8

Revised Sewerage Impact Assessment

S16 Planning Application for Proposed Residential Development cum Residential Care Home for the Elderly and Shop and Services

Sewerage Impact Assessment Report

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Submitted to

Fonnie Holdings Limited

Prepared By

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1 INTRODUCTION

1.1 Project Background

1.1.1 The Applicant, Fonnie Holdings Limited intends to develop the residential development cum Resident Care Home for the Elderly and Shop and Services (hereafter as "the Proposed Development") in D.D.94 and the adjoining Government land in Hang Tau Tai Po, Kwu Tung South (hereafter as "the Application Site").

1.1.2 This planning application is submitted under Section 16 of the Town Planning Ordinance ("the Ordinance") for the proposed development with minor relaxation of plot ratio and building height restrictions in the prevailing Draft Kwu Tung South Outline Zoning Plan No. S/NE-KTS/21.

1.1.3 Meinhardt Infrastructure and Environment Limited (MIEL) was commissioned by the Applicant to conduct a Sewerage Impact Assessment (SIA) to support the Section 16 Planning Application of the proposed development, and to assess the environmental impact due to / upon the proposed development.

1.2 Objective of the Report

1.2.1 The objectives of this SIA are to assess the potential sewerage impacts arising from the proposed development and recommend the mitigation measures, if necessary, to alleviate the impacts.

1.3 Report Structure

1.3.1 The remaining chapters of this report are shown below:

- Chapter 2 – Site Description
- Chapter 3 – Sewerage Impact Assessment
- Chapter 4 – Result and Discussion
- Chapter 5 – Conclusion

2 SITE DESCRIPTION

2.1 Site Location and Its Environs

2.1.1 The Proposed Development will be located at the various lots in D.D.94 and the adjoining Government land in Hang Tau Tai Po, Kwu Tung South.

2.1.2 The Proposed Development is currently occupied by unused structures including a 2-story house, a pavilion, swimming pool and landscape garden. The proposed development is located in the "Comprehensive Development Area" Zone bounded by "Agriculture" (AGR) Zone, "Residential (Group D)" (R(D)) Zone and "Government Institution or Community" (G/IC) Zone according to the Draft Kwu Tung South Outline Zoning Plan (OZP) (OZP No.: S/NE-KTS/21). Existing land uses in the surroundings include low-rise village type development and temporary structures.

2.1.3 **Figure 2.1** shows the Application Site location and its environs.

2.2 Proposed Development

2.2.1 The Proposed Development includes four residential towers, a retail, a residential care homes for the elderly, a clubhouse & aboveground carpark, and surrendered area, with a total site area of about 17,990.9 m^2. The development schedule of the Proposed Development is tabulated in **Table 2-1**. The layout plans of the Application Site are shown in **Appendix A**.

Table 2-1 Proposed Development Schedule

	Development Items	Design Parameter
The Proposed Development	No. of Tower	4
	No. of Flat Unit	334
	No. Clubhouse & Aboveground Carpark	1
	No. of Swimming Pool	1
	No. of RCHE	1
	No. of Retail	1
	Site Area (Including 1,076m^2 surrendered area)	17,990.9m^2

2.2.2 Based on the information provided by the Project Architect, the estimated maximum population of the Proposed Development is tabulated in **Table 2-2**.

Table 2-2 Estimated Population of the Proposed Development

Type of User	Estimated Population
Residents	936
Management Staff (Including Clubhouse & RCHE)	50
Employees (Retail/Shop)	14
RCHE Residents	100

2.2.3 According to the latest programme, the year of population intake of the Proposed Development is expected to be Year 2031.

2.3 Existing Sewerage Condition

2.3.1 The background information on the current sewerage infrastructure in vicinity of the Application Site obtained from the GeoInfo Map and provided by EPD have been reviewed. The Application Site and the nearest public sewer are shown in **Figure 2.1**.

2.3.2 The Application Site is currently served by the public sewerage facilities along Hang Tau Road (eastern side of the Application Site) to the existing Hang Tau Sewage Pumping Station (HTSPS) (Station no. XPS1001532) and further discharge to Tsung Pak Long Sewage Pumping Station (TPLSPS) through 200mm dia. Rising main; and 300mm dia. to 600mm dia. gravity sewers.

2.4 Existing Sewage Pumping Station

2.4.1 According to the information provided by DSD in **Appendix D**, the design dry weather flow of the HTSPS is 1,970m^3/day, maximum daily flow is 2,290m^3/day, and the average daily flow is around 300m^3/day, while the design dry weather flow of the TPLSPS is 21,070m^3/day, maximum daily flow is 4,007m^3/day, and the average daily flow is around 1041m^3/day.

2.4.2 The impacts on the capacities of the existing sewage pumping stations with the Proposed Development have been evaluated by comparing the average daily flow against the design dry weather flow of HTSPS and TPLSPS.

3 SEWERAGE IMPACT ASSESSMENT

3.1 Calculation Assumptions

3.1.1 Sewage flows from the population of the Proposed Development, as well as the existing, and planned development, have been adopted using the Unit Flow Factors (UFF) as recommended in the Guideline for Estimating Sewage Flows for Sewage Infrastructure Planning (hereafter as "GESF") published by EPD in 2005. The adopted UFF for the calculation are tabulated in **Table 3-1** below.

Table 3-1 Unit Flow Factors Adopted for the Assessment

Type of People	Unit Flow Factors (m^3/person/day)	Category
General Resident	0.37	Domestic (Private R3)
Resident of Existing Village House	0.27	Domestic (Modern Village)
Employees (Retail)	0.28	Commercial Employee + J4 (Wholesale & Retail)
Employees (Management, School, Clubhouse & RCHE Staff, and Participants)	0.28	Commercial Employee + J11 (Community, Social & Personal Services)
Student	0.04	School Student
Employees (Restaurants)	1.58	Commercial Employee + J10 (Restaurants & Hotels)
RCHE Residents	0.19	Special Class

3.1.2 According to currently available information from Outline Zoning Plan (OZP) and the available SIA reports of other planned developments from Planning Department (Planning Enquiry Counters), a total eleven planned developments are identified in the vicinity of the Application Site as listed in **Table 3-2**. In order to take into account for the cumulative impact from the planned development, only those planned developments with an anticipated completion time on or prior to the Proposed Development (i.e. on or before Year 2031), have been considered in the calculation. The anticipated completion time of the development proposal of planned developments were assumed to coincide with the population intake year. Details of anticipated completion year and sewage to be generated from the planned developments and the correspondence concerned manholes connected to these planned developments are tabulated in **Table 3-3**.

Table 3-2 Sewage Generation of the Planned Developments

Planned Development	Anticipated Completion Time of the Development Proposal	ADWF (m^3/day)	Swimming Pool Backwash (l/s)	Manhole*	Included in Calculation? (Yes/No)
A/NE-KTS/460	2021[3]	2.22[1]	-	FMH1029682	Yes
A/NE-KTS/466	2022[3]	49[2]	-	FMH1029681	Yes
A/NE-KTS/525 (local STP)	2028[3]	45.8[2]	-	FMH1029681	Yes
A/NE-KTS/538 (septic tank)	2027[3]	4.5[2]	-	FMH1029681	Yes
A/NE-KTS/541	2032[3]	2.22[1]	-	FMH1029681	Yes
Y/NE-KTS/15 (Formerly A/NE-KTS/484)	2024[3]	792[2]	8.3[2]	FMH1021544	Yes
A/NE-KTS/506 (Formerly Y/NE-KTS/12)	2028[3]	2166.4[2]	8.3[2]	FMH1021544	Yes
Y/NE-KTS/14 and Y/NE-KTS/17	2025 & 2027[3]	1074[2]	14.4[2]	FMH1021544	Yes
Y/KTN/2	2026[3]	492[2]	3.5[2]	FMH1021543	Yes
Y/FSS/19	2028[3]	798.9[2]	5.8[2]	FMH1021561	Yes
Tai Tau Leng Public Housing	2032[4]	3057[2]	-	FMH1021561	No

Note:
[*] The receiving manhole for the planned development's sewage discharge.
[1] Source of Information from Outline Zoning Plan.
[2] Source of Information: latest available SIAs of planning developments. The estimate may be subject to further adjustments based on specific designs of individual developments.
[3] Source of Information from available SIA reports of other planned developments from Planning Department (Planning Enquiry Counters)
[4] Source of information from https://www.districtcouncils.gov.hk/north/doc/2020_2023/en/committee_meetings_doc/ldhwc/22666/n_ldhwc_2023_009_ch.pdf

3.1.3 The sewage generated from the surrounding developments including existing developments, public toilet, planned developments anticipated completion time on or before 2031 (Population intake year of the Proposed Development, see **Section 2.2.3**), and the Proposed Development will be considered in the calculation. The details calculations of sewage generation have been provided in **Appendix B** for reference.

3.1.4 Sewer upgrading works proposed by other planned developments, including A/NE-KTS/506, A/NE-KTS/565 and Y/FSS/19, are derived from the respective Sewerage Impact Assessment (SIA) reports available at the Planning Department (Planning Enquiry Counters). These upgrading works from the SIA reports have been incorporated into the calculations, as summarized in **Table 3-3**.

Table 3-3 Proposed Sewerage Upgrading Works by Responsible Projects

Manhole		Pipe Length (m)	Existing Pipe Size (mm)	Upgraded Pipe Size (mm)	Responsible Planned Development[2]
FMH1021545	FMH1021546	44.9	600	750	A/NE-KTS/506
FMH1021551	FMH1021552	31.1	600	750	A/NE-KTS/506
FMH1021552	FMH1021553	37.6	600	750	A/NE-KTS/506
FMH1021553	FMH1021554	50.3	600	750	A/NE-KTS/506
FMH1021554	FMH1021555	32.5	600	750	A/NE-KTS/506
FMH1021555	FMH1021556	33	600	750	A/NE-KTS/506
FMH1021556	FMH1021557	17.6	600	750	A/NE-KTS/506
FMH1021557	FMH1021558	9.3	600	750	A/NE-KTS/506
FMH1021558	FMH1021559	13.7	600	675	A/NE-KTS/565
FMH1021559	FMH1021560	13	600	750	A/NE-KTS/506
FMH1021560	FMH1021561	11.3	600	750[1]	A/NE-KTS/506
FMH1021561	FMH1021562	13.3	600	800	A/NE-KTS/506
FMH1021562	FMH1021563	8.8	600	750	A/NE-KTS/506
FMH1021563	FMH1021564	13.4	600	750	A/NE-KTS/506
FMH1021564	FMH1021565	10.7	600	750	A/NE-KTS/506
FMH1021565	FMH1021566	7.3	600	900	Y/FSS/19

Note:
[1] For the sewer section between FMH1021560 and FMH1021561, the Planned Development A/NE-KTS/506 will be responsible for the upgrading of pipe size from 600 mm to 750 mm. A further upgrade of the pipe size from 750 mm to the ultimate pipe diameter of 800 mm is required under the Proposed Development, as discussed in **Section 4.1.5**.
[2] The extraction of SIA reports of sewer upgrading works from these planned developments are illustrated in **Appendix E**.

3.2 Sewerage Capacity

3.2.1 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 equation as below:

$$V = -\sqrt{(8gDs)}\log\left(\frac{ks}{3.7D} + \frac{2.5\,1v}{D\sqrt{(2gDs)}}\right)$$

where V = mean velocity (m/s)
g = gravitational acceleration (m/s^2)
D= pipe diameter (m)
ks = hydraulic pipeline roughness (m)
(ks = 3mm is adopted for the "poor" condition of claywareslimed sewers)
v = kinematic viscosity of fluid (m^2/s)
s= frictional slope (energy gradient due to frictional loss)

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

3.3 Assessment of the Sewerage Capacity

3.3.1 Three scenarios as listed below are assessed in the estimation and the calculation are detailed in **Appendix C**. The categories of the three scenarios are summarized in **Table 3-4**.

Table 3-4 Different Scenario for Sewerage Impact Assessment

Scenario	Estimation Assumption
1	Existing development, and Planned developments anticipated intake year at 2031 (Upgraded Sewers by Responsible Planned Developments)*
2	Proposed development, Existing development, and planned developments anticipated intake year at 2031 (Upgraded Sewers by Responsible Planned Developments)*
3	Proposed development, Existing development, and planned developments anticipated intake year at 2031 (Upgraded Sewers by Responsible Planned Developments & Upgraded Sewers by Proposed Development)*

Note: [*] Proposed sewer upgrading works by (A/NE-KTS/506 and Y/FSS/19) are incorporate in the calculation.

4 RESULT AND DISCUSSION

4.1 Sewerage Capacity Check

4.1.1 All assessment scenarios have incorporated the sewer upgrading works proposed by A/NE-KTS/506, A/NE-KTS/565, and Y/FSS/19.

4.1.2 Under Scenario 1, the capacity of the sewers has adequate capacity to cater for all existing and planned development completion year on or before 2031.

4.1.3 Under Scenario 2, when the additional sewage flow from the Proposed Development is included in the assessment, four sewer sections are projected to exceed their hydraulic capacity, as detailed below:

- The section between manholes FMH1028569 and FMH1028568, with a capacity utilization of **126%**;
- The section between manholes FMH1021544 and FMH1021543, with a capacity utilization of **101%**;
- The section between manholes FMH1021546 and FMH1021547, with a capacity utilization of **101%**; and
- The section between manholes FMH1021560 and FMH1021561, with a capacity utilization of **100%**.

4.1.4 As these sections would operate beyond their design capacity, mitigation measures shall be provided. The capacity estimation is detailed in **Appendix D**. The location plan and catchment area of the concerned sewers is indicated in **Figure 4.1a** and **4.1b**.

4.1.5 Under Scenario 3, in order to mitigate the overloading identified in Scenario 2, the following upgrading of the existing sewer main is recommended:

- Sewer between manholes FMH1028569 and FMH1028568: **From 400mm to 500mm**
- Sewer between manholes FMH1021544 and FMH1021543: **From 500mm to 600mm**
- Sewer between manholes FMH1021546 and FMH1021547: **From 600mm to 650mm**
- Sewer between manholes FMH1021560 and FMH1021561: **From 600mm to 800mm** (If the 750 mm upgrade under A/NE-KTS/506 has been completed, the Applicant will implement the remaining upgrade from 750 mm to 800 mm)

4.1.6 Following implementation of the recommended upgrades listed in Section 4.1.5, the capacity utilization of the affected sewer sections under Scenario 3 will be reduced to the following levels:

- Sewer between manholes FMH1028569 and FMH1028568: **70%**
- Sewer between manholes FMH1021544 and FMH1021543: **62%**
- Sewer between manholes FMH1021546 and FMH1021547: **82%**
- Sewer between manholes FMH1021560 and FMH1021561: **85%**

4.1.7 Alternatively, twin pipes may be provided for the concerned sewers as mitigation measures to enhance capacity for sewage conveyance. Upon completion of the proposed upgrading works, there will be no adverse impacts on the sewerage system arising from the proposed development. Detail of the upgraded capacity estimation is detailed in **Appendix C**. The pipe location as shown in **Figure 4.1**. The proposed upgrading works will be undertaken by the Applicant, except for any section already covered by the upgrading works committed under other planned developments.

4.1.8 The responsibility for the proposed upgrading works is allocated as follows. The upgrades at FMH1028569 and FMH1028568, FMH1021544 and FMH1021543, and FMH1021546 and FMH1021547 shall be undertaken by the Applicant. The FMH1021560 and FMH1021561 section is to be upgraded to 750 mm under A/NE-KTS/506; if that upgrade has not commenced, the Applicant will implement the full upgrade to the ultimate 800 mm, otherwise only the remaining 750 mm to 800 mm. An updated SIA will be carried out in the detailed design stage to confirm the responsibility of proposed sewer upgrading works by the Applicant. If the proposed upgrading works under A/NE-KTS/506, A/NE-KTS/565, and Y/FSS/19 could not be completed before the population intake of the Proposed Development, the Applicant will be responsible for implementing the outstanding upgrading works. In such circumstances, the sewer upgrading works to be taken up by the Applicant are summarized in **Table 4-1**.

Table 4-1 Required Upgrading of Pipe Size by the Applicant if the Proposed Sewer Upgrading Works under Other Planned Developments Could not be Completed Before the Population Intake of the Proposed Development

Manhole		Pipe Length (m)	Existing Pipe Size (mm)	Upgraded Pipe Size (mm)
FMH1028569	FMH1028568	9.1	400	500
FMH1021544	FMH1021543	54.9	500	600
FMH1021545	FMH1021546	44.9	600	750
FMH1021546	FMH1021547	39	600	650
FMH1021551	FMH1021552	31.1	600	750
FMH1021552	FMH1021553	37.6	600	750
FMH1021553	FMH1021554	50.3	600	750
FMH1021554	FMH1021555	32.5	600	750
FMH1021555	FMH1021556	33	600	750
FMH1021556	FMH1021557	17.6	600	750
FMH1021557	FMH1021558	9.3	600	750
FMH1021558	FMH1021559	13.7	600	675
FMH1021559	FMH1021560	13	600	750
FMH1021560	FMH1021561	11.3	600	800
FMH1021561	FMH1021562	13.3	600	800
FMH1021562	FMH1021563	8.8	600	750
FMH1021563	FMH1021564	13.4	600	750
FMH1021564	FMH1021565	10.7	600	750
FMH1021565	FMH1021566	7.3	600	900

4.2 Construction and Maintenance of Sewerage System

4.2.1 The terminal manhole, the sewers connecting the property to the terminal manhole and the sewage upgrading works shall be constructed and maintained by the Applicant at its own

cost and to DSD's satisfaction, while the public sewers and the sewers linking the terminal manhole to the public sewer shall be constructed and maintained by DSD.

4.3 Capacity of Sewers from Proposed Development to Hang Tau Sewage Pumping Station

4.3.1 A new 225 mm diameter sewer pipe will be installed to connect the terminal manhole of the Proposed Development to the existing 300mm dia. sewer at manhole no. FMH1029683, as shown in **Figure 3.1**. The capacity of the existing sewers along Hang Tau Road and further downstream up to TPLSPS has been checked based on the estimation of existing sewage and future sewage from the Proposed Development and other planned development anticipated completion time on or before 2031 at upstream and downstream.

4.3.2 The estimated daily flow generated from the proposed development is approximately 383.2 m^3/day. The peak flow with the swimming pool backwash of the Proposed Development is approximately 6.37 l/s. The sewage from the Proposed Development will discharge to the existing manhole (FMH1029683). The utilization of the sewers from FMH1029683 to FMH1029680 is approximately 56%. Flow estimation and capacity checking are detailed in **Appendix B** and **Appendix C**, respectively.

4.3.3 The assessment results as presented in **Appendix C** indicates that sewer segment from FMH1029683 to FMH1029680 has enough sewage capacity to cater with the peak discharge flows from the Proposed Development and the surrounding existing and planned developments with population intake prior to the Proposed Development.

4.4 Capacity of Hang Tau Sewage Pumping Station and Tsung Pak Long Sewage Pumping Station

Hang Tau Sewage Pumping Station

4.4.1 Sewage generated from the Proposed Development and the surrounding existing and planned developments (including A/NE-KTS/460, A/NE-KTS/466, A/NE-KTS/525, A/NE-KTS/538 and A/NE-KTS/541) will be conveyed to HTSPS. In order to evaluate whether HTSPS has sufficient capacity to accommodate the additional sewage arising from the Proposed Development, the impact on HTSPS has been assessed against two criteria: (i) the total Average Dry Weather Flow (ADWF) against the design daily flow; and (ii) the estimated peak flow against the installed pump rate.

4.4.2 As shown in **Table 4-2**, the total ADWF reaching HTSPS is approximately 788.14 m^3/day, representing about 40.0% of the design daily flow of 1,970 m^3/day. Therefore, HTSPS retains approximately 60.0% spare daily capacity.

Table 4-2 Design Capacity against ADWF

Description	**ADWF (m^3/day)**	
Average Daily HTSPS [1](A)	**300 (average daily flow)**	
ADWF from Planned Developments (B) [2]	A/NE-KTS/460	2.22
	A/NE-KTS/466	49
	A/NE-KTS/525	45.8
	A/NE-KTS/538	4.5
	A/NE-KTS/541	2.22
	ADWF from Proposed Development	383.24 + 1.15[3] = 384.4
Total Planned ADWF (A+B)	**788.14**	

Description	ADWF (m³/day)
Design Daily Flow of HTSPS [1] (C)	**1,970**
Utilization ((A)+(B) / (C))	**40.0%**

Note:
[1] The information is provided by DSD in Appendix D.
[2] Sewage flows from the planned surrounding developments are based on the available information from Outline Zoning Plan and latest available SIAs of planning developments.
[3] Swimming Pool (m^3/day), assuming a backwash duration of 3 minutes per day.

4.4.3 As shown in **Table 4-3** , the estimated peak flow reaching HTSPS is approximately 56.1 l/s, representing a utilization of approximately 82.0% of the installed pump rate of 68.4 l/s.

Table 4-3 Estimated Peak Flow to HTSPS against Installed Pump Rate of the HTSPS

Description	Items	
Installed Pump Rate of HTSPS (A)	**1970 x 3[3] = 68.4 l/s**	
Maximum Daily Flow [1] (B)	**2290 m³/day**	
Peak Flow from Planned Developments [2] (C1)	A/NE-KTS/460	2.22 x 4[3] = 8.9 m³/day
	A/NE-KTS/466	49 x 4[3] = 196 m³/day
	A/NE-KTS/525	45.8 x 4[3] = 183.2 m³/day
	A/NE-KTS/538	4.5 x 4[3] = 18 m³/day
	A/NE-KTS/541	2.22 x 4[3] = 8.9 m³/day
Peak Flow from Existing Development (C2)	Goodwood Park	13.69 x 4[3] = 54.8 m³/day
Peak Flow from Proposed Development (C3)	Proposed Development	383.24 x 4[3] = 1533.0 m³/day
Total Flow to HTSPS (D) = (B)+(C)	**4292.7 m³/day**	
Backwash (peak) from Swimming Pool (E)	**6.37 l/s**	
Total Peak Flow to HTSPS (F) = (D)+(E)	**56.1 l/s**	
Utilization (F) / (A)	**82.0%**	

Note:
[1] The information is provided by DSD in Appendix D.
[2] Sewage flows from the planned surrounding developments are based on the available information from Outline Zoning Plan and latest available SIAs of planning developments.
[3] Based on GESF, Table T-5: Peaking Factors, P, (b) Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations, population range <10000 (P=4); 10,000 – 25,000 (P=3.5); 25,000 – 50,000 (P=3).

4.4.4 As both the daily flow and the peak flow remain within the available capacity of HTSPS, no adverse impact is anticipated arising from the Proposed Development. The velocity estimation of the raising main from HTSPS to FMH1028600 is assessed and is indicated in **Appendix C**.

Tsung Pak Long Sewage Pumping Station

4.4.5 The total sewage flow to TPLSPS is the sum of maximum daily flow, peak flow from the planned development (i.e. A/NE-KTS/460, A/NE-KTS/466, A/NE-KTS/525, A/NE-KTS/538, A/NE-KTS/541, Goodwood Park, La Regent Park, Y/NE-KTS/15 (formerly A/NE-KTS/484), A/NE-KTS/506 (formerly Y/NE-KTS/12), Y/NE-KTS/14 and Y/NE-KTS/17, Y/KTN/2, and Y/FSS/19) and the peak flow from our proposed development. The total sewage flow to TPLSPS is approximate 28,782.1 m^3/day, which contribute to approximately 45.5% of capacity of the TPLSPS. **Table 4-4** summarizes the sewage generation from the surrounding development and the Proposed Development.

4.4.6 According to **Table 4-4** , the TPLSPS will still have approximately 54.5% of its capacity to cater for future additional sewage. Hence, no adverse impact upon the TPLSPS is anticipated after receiving the sewage flow from the Proposed Development.

Table 4-4 Sewage Contribution on the TPLSPS

Items	**Flow (m^3/day)**	
Sewage Flow to Tsung Pak Long Sewage Pumping Station (TPLSPS)		
Maximum daily flow (A) [2]	4007	
Peak Flow from Planned Developments (B1) [1]	A/NE-KTS/460	2.22 x 8[4] = 17.8
	A/NE-KTS/466	49 x 8[4] = 392
	A/NE-KTS/525	45.8 x 8[4] = 366.4
	A/NE-KTS/538	4.5 x 8[4] = 36
	A/NE-KTS/541	2.22 x 8[4] = 17.8
	Y/NE-KTS/15 (formerly A/NE-KTS/484)	792 x 4[4] +1.49[3] = 3169.5
	A/NE-KTS/506 (formerly Y/NE-KTS/12)	2166.4 x 4[4] + 1.49[3] = 8667.1
	Y/NE-KTS/14 and Y/NE-KTS/17	1074 x 4[4] +2.59[3] = 4298.6
	Y/KTN/2	492 x 4[4] +0.63[3] = 1968.6
	Y/FSS/19	798.9 x 4[4] + 1.04[3] = 3196.6
Peak Flow from Existing Development (B2) [1]	Goodwood Park	13.69 x 6[4] = 82.1
	La Regent Park	43.66 x 6[4] = 262
Total Peak Flow (B) = (B1) + (B2)	Total (B)	22474.5
Peak Proposed Development (C)	383.24 x 6[4] + 1.15[3] = 2300.6	
Total Peak Flow to TPLSPS (D) = (A) + (B) + (C)	28,782.1	
Design Flow for TPLSPS	21,070	
Peak Wet Weather Flow (E)	21070 x 3[5] = 63210	
Used Capacity of TPLSPS (D/E)	**45.5%**	

Note:
[1] Sewage flow from planned surrounding developments is based on the available information from Outline Zoning Plan and latest available SIAs of planning developments.
[2] The design dry weather flow is provided by DSD. The advice from DSD is extracted from previous study report which is provided in **Appendix D**.
[3] Swimming Pool (m^3/day), assuming a backwash duration of 3 minutes per day.
[4] Based on GESF, Table T-5: Peaking Factors, P, (a) For sewers, population range <1,000 (P=8); 1,000-5,000 (P=6); 5,000-10,000 (P=4).
[5] Based on GESF, Table T-5: Peaking Factors, P, (b) Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations, population range <10000 (P=4); 10,000 – 25,000 (P=3.5); 25,000 – 50,000 (P=3).

5 CONCLUSION

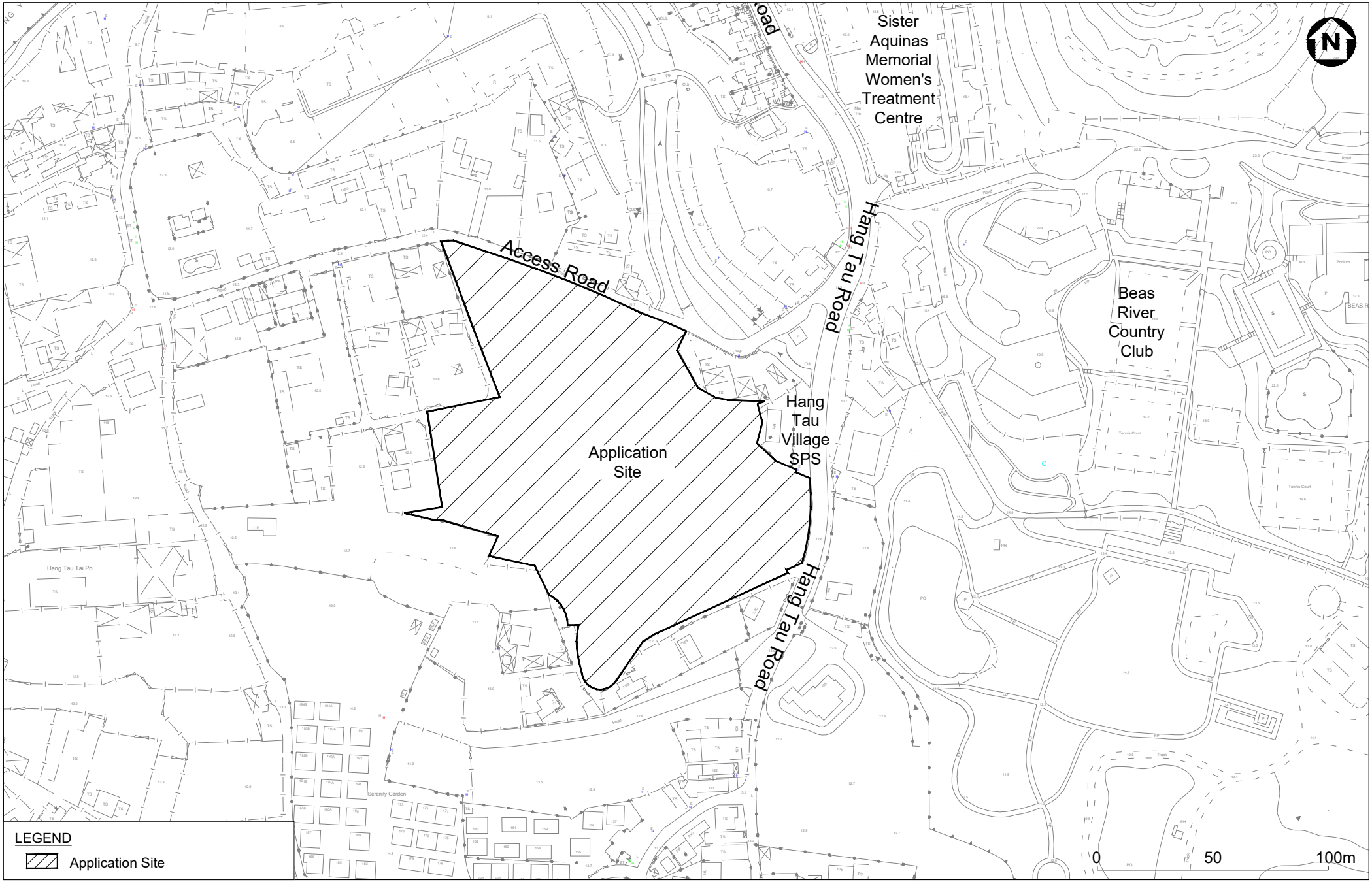
5.1.1 A Sewerage Impact Assessment (SIA) has been conducted to evaluate the possible impacts on the public sewerage network arising from the Proposed Development.

5.1.2 According to the sewerage assessment based on the information obtained from DSD and EPD, four existing sewers are incapable due to the Proposed Development. Therefore, upgrading work for the concerned pipe is required for the Proposed Development.

5.1.3 Both HTSPS and TPLSPS will still have spare capacity after receiving the additional sewage from the Proposed Development.

5.1.4 To sum up, it is concluded that the sewerage impact arising from the Proposed Development should be acceptable with the proposed upgrading works.

Figures



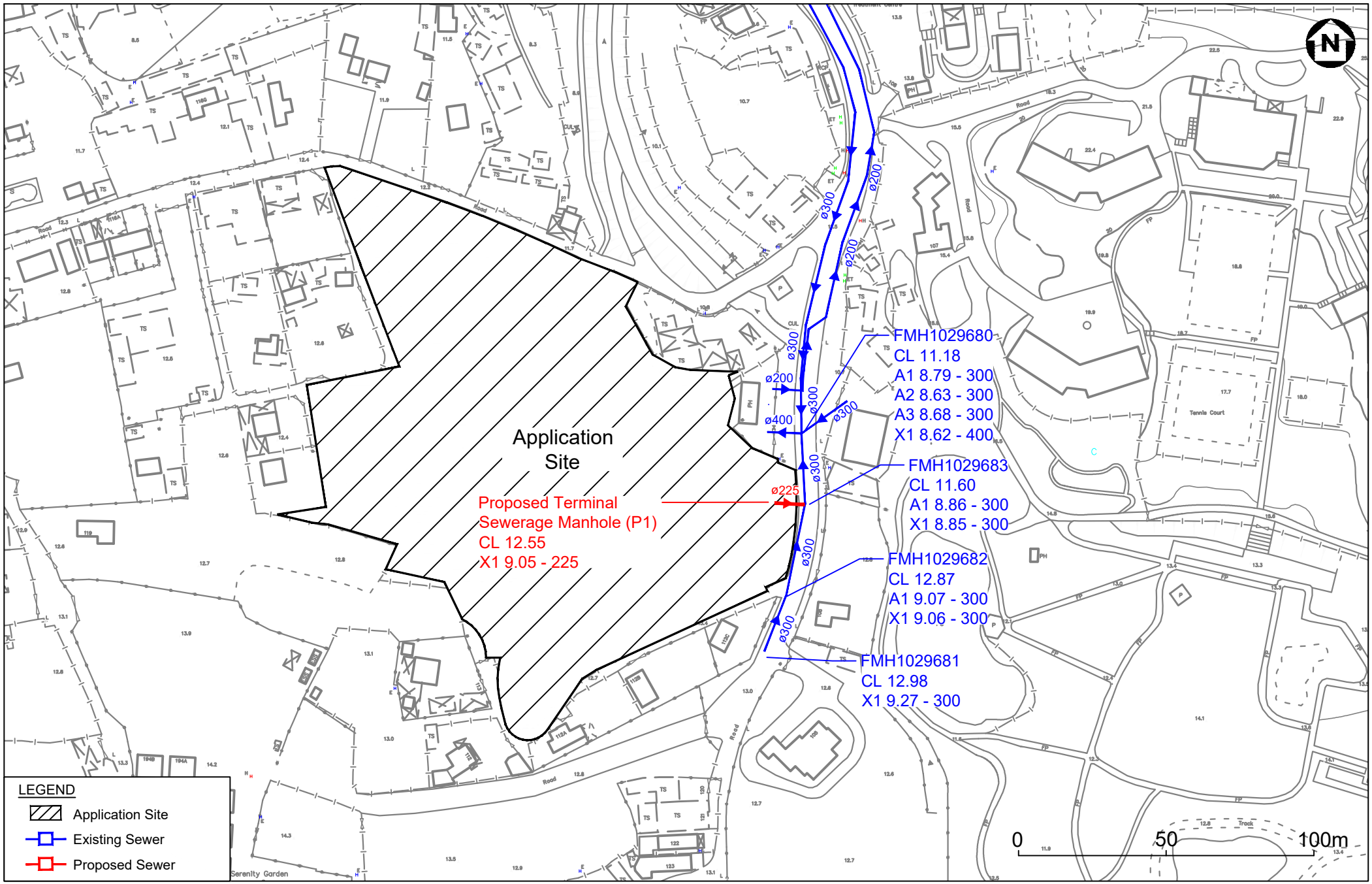
Meinhardt Infrastructure and Environment Limited
通過基建環保工程顧問有限公司

Section 16 Planning Application for Proposed Comprehensive Development ('Flat', 'Social Welfare Facility (Residential Care Home for the Elderly)' and 'Shop and Services' Uses) with Minor Relaxation of Plot Ratio and Building Height Restrictions at Various Lots in D.D. 92 and 94 and the Adjoining Government Land, Hang Tau Tai Po, Kwu Tung South

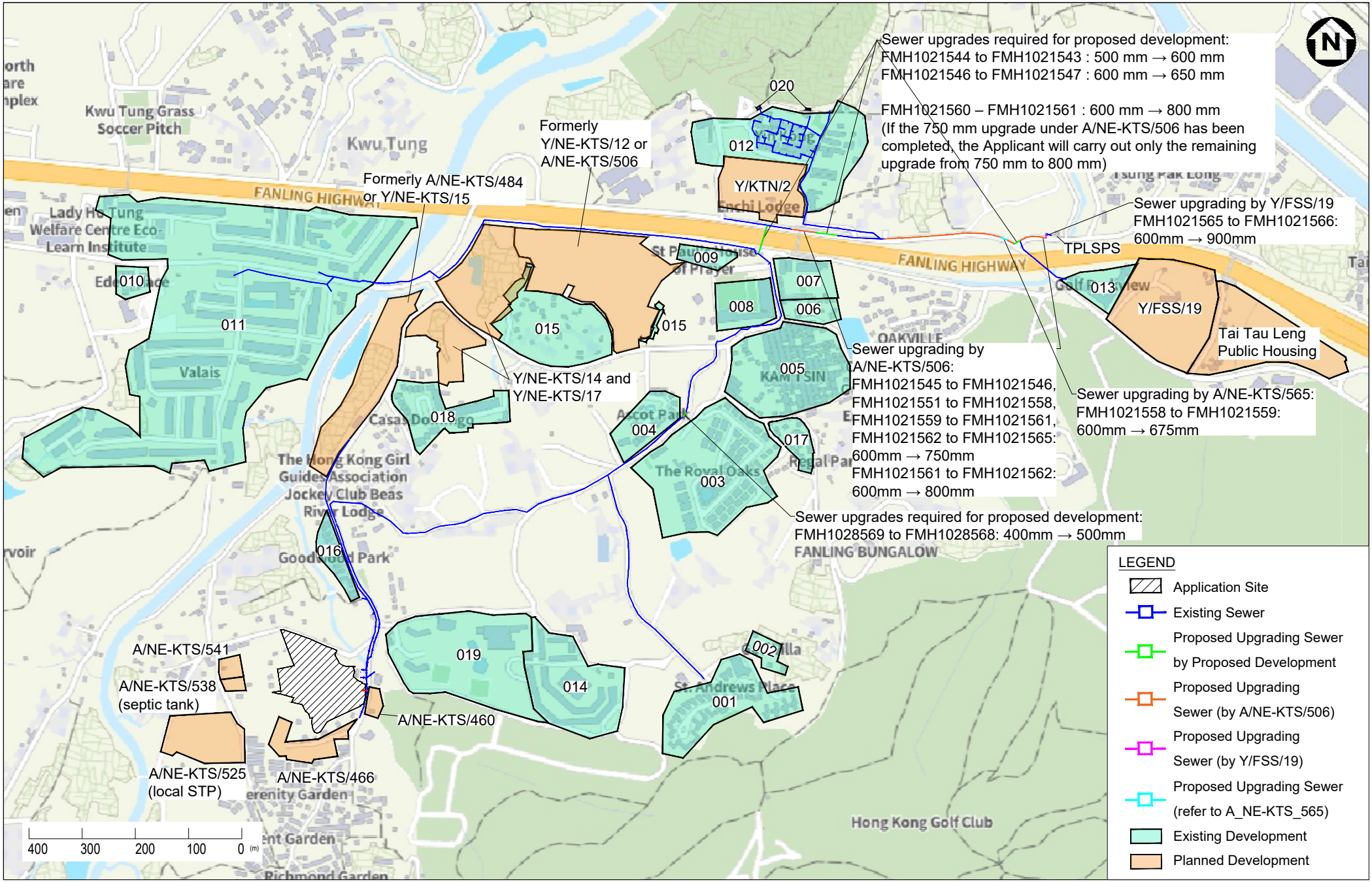
Site Location and its Environs

Figure 2.1

Scale As Shown



Meinhardt Infrastructure and Environment Limited 邁進基建環保工程顧問有限公司	Section 16 Planning Application for Proposed Comprehensive Development ('Flat', 'Social Welfare Facility (Residential Care Home for the Elderly)' and 'Shop and Services' Uses) with Minor Relaxation of Plot Ratio and Building Height Restrictions at Various Lots in D.D. 92 and 94 and the Adjoining Government Land, Hang Tau Tai Po, Kwu Tung South Existing Sewerage System along Hang Tau Road and Proposed Sewerage Pipeline	Figure 3.1 Scale As Shown



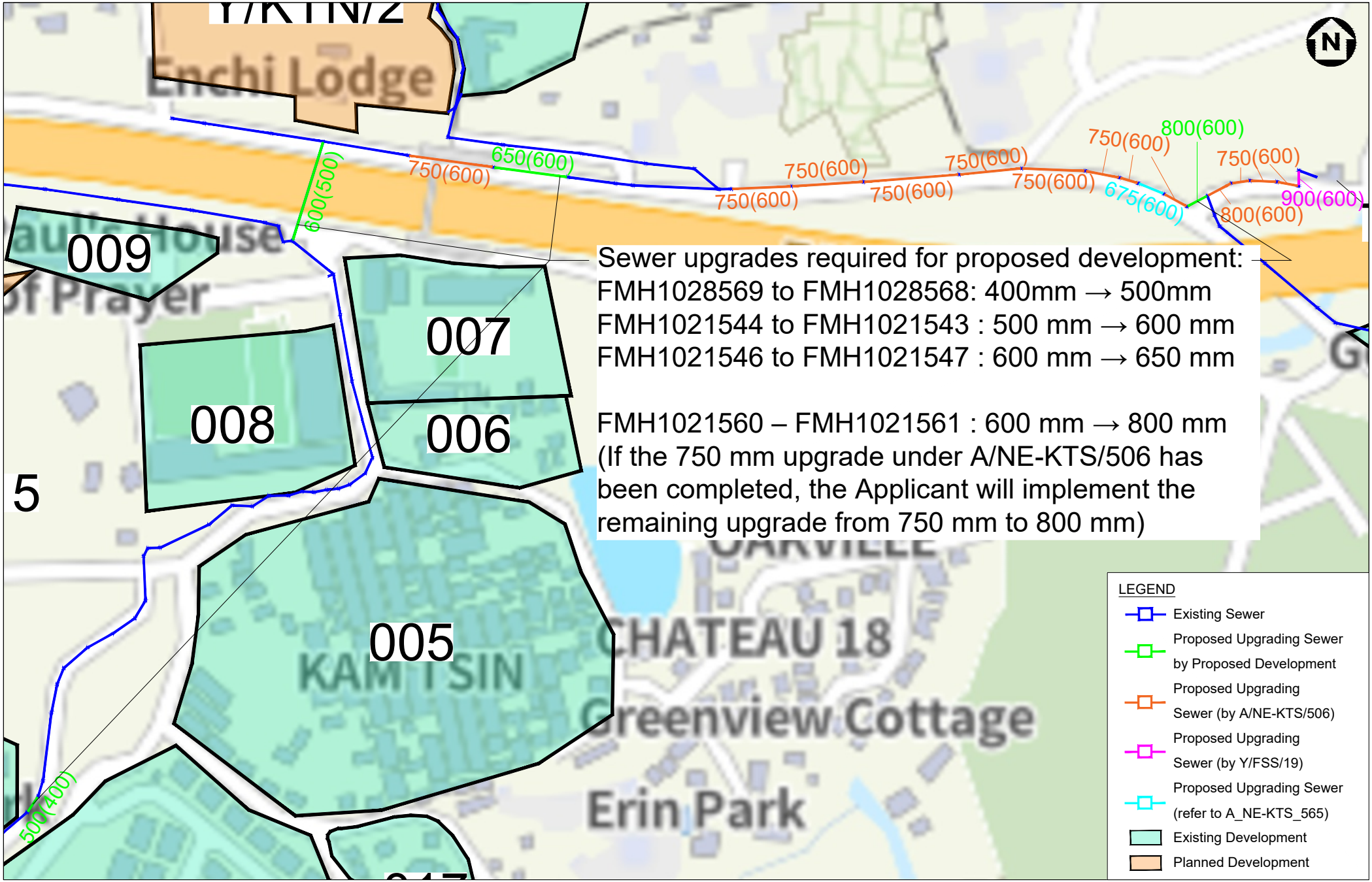
Meinhardt Infrastructure and Environment Limited
通過基建環保工程顧問有限公司

Section 16 Planning Application for Proposed Comprehensive Development ('Flat', 'Social Welfare Facility (Residential Care Home for the Elderly)' and 'Shop and Services' Uses) with Minor Relaxation of Plot Ratio and Building Height Restrictions at Various Lots in D.D. 92 and 94 and the Adjoining Government Land, Hang Tau Tai Po, Kwu Tung South

Catchment Area and Proposed Upgrading Sewerage System

Figure 4.1a

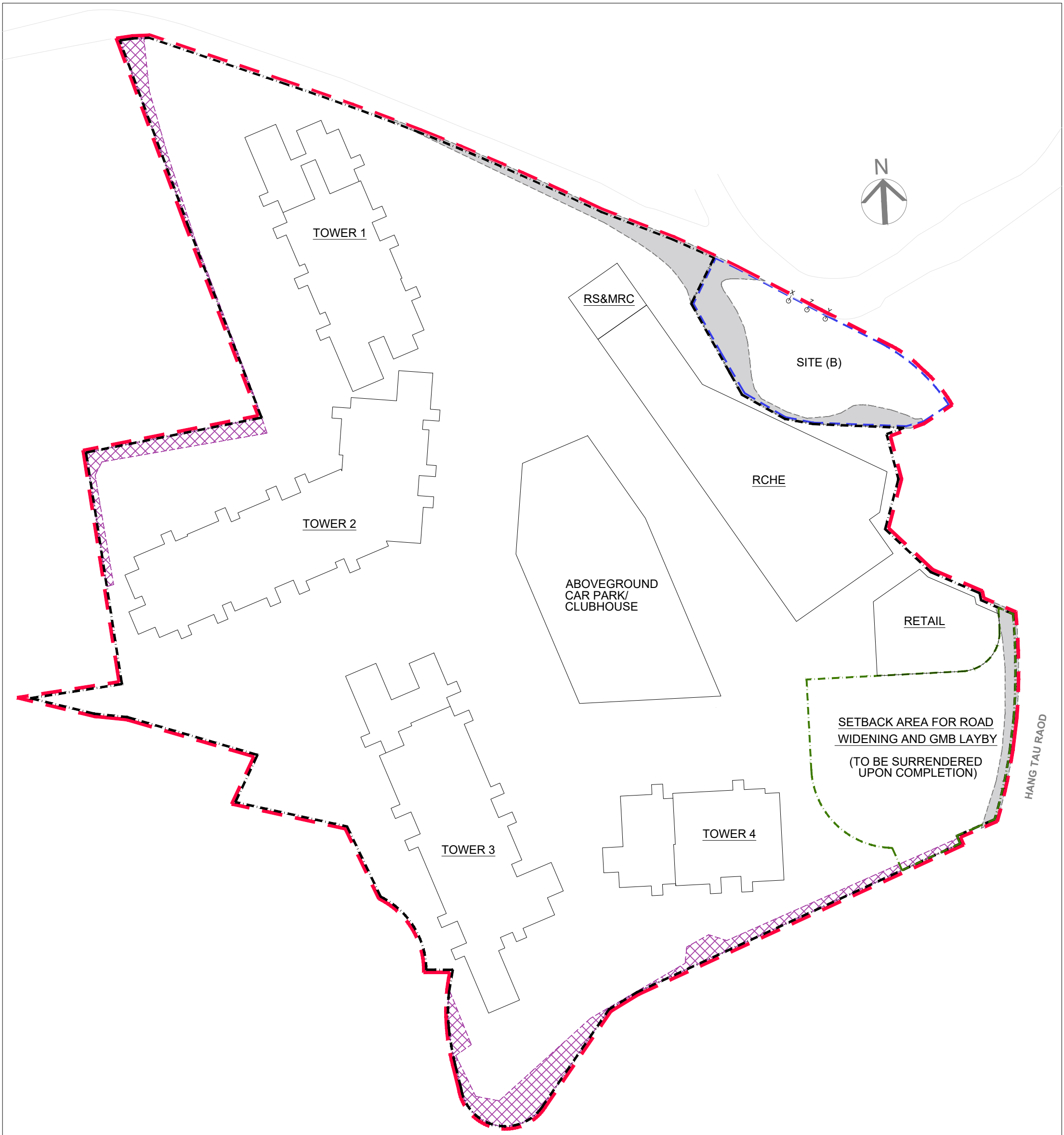
Scale As Shown



Meinhardt Infrastructure and Environment Limited 邁進基建環保工程顧問有限公司	Section 16 Planning Application for Proposed Comprehensive Development ('Flat', 'Social Welfare Facility (Residential Care Home for the Elderly)' and 'Shop and Services' Uses) with Minor Relaxation of Plot Ratio and Building Height Restrictions at Various Lots in D.D. 92 and 94 and the Adjoining Government Land, Hang Tau Tai Po, Kwu Tung South Catchment Area and Proposed Upgrading Sewerage System	Figure 4.1b Scale As Shown

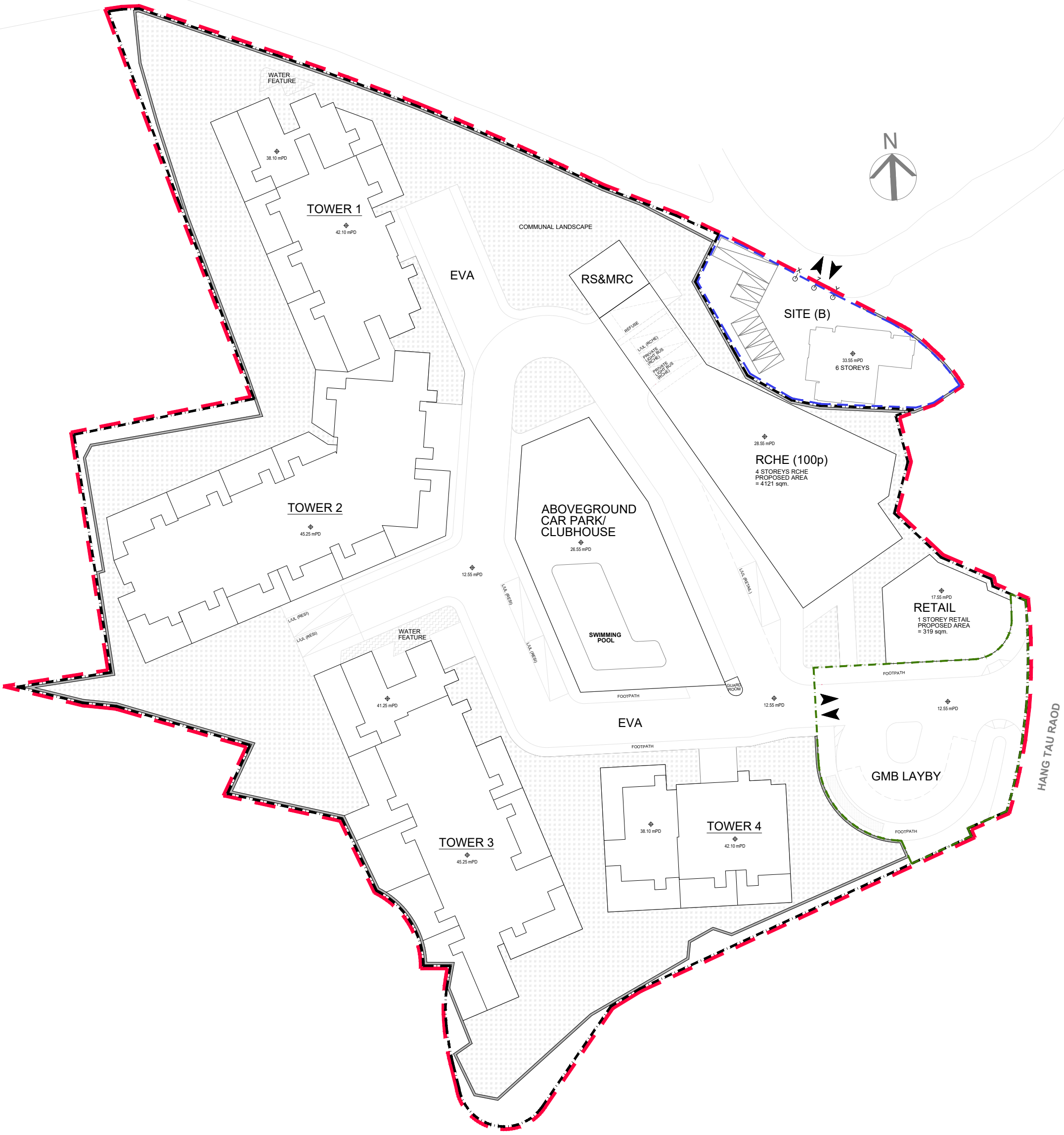
Appendix A

General Layout Plans of the Development



LOT PLAN

Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

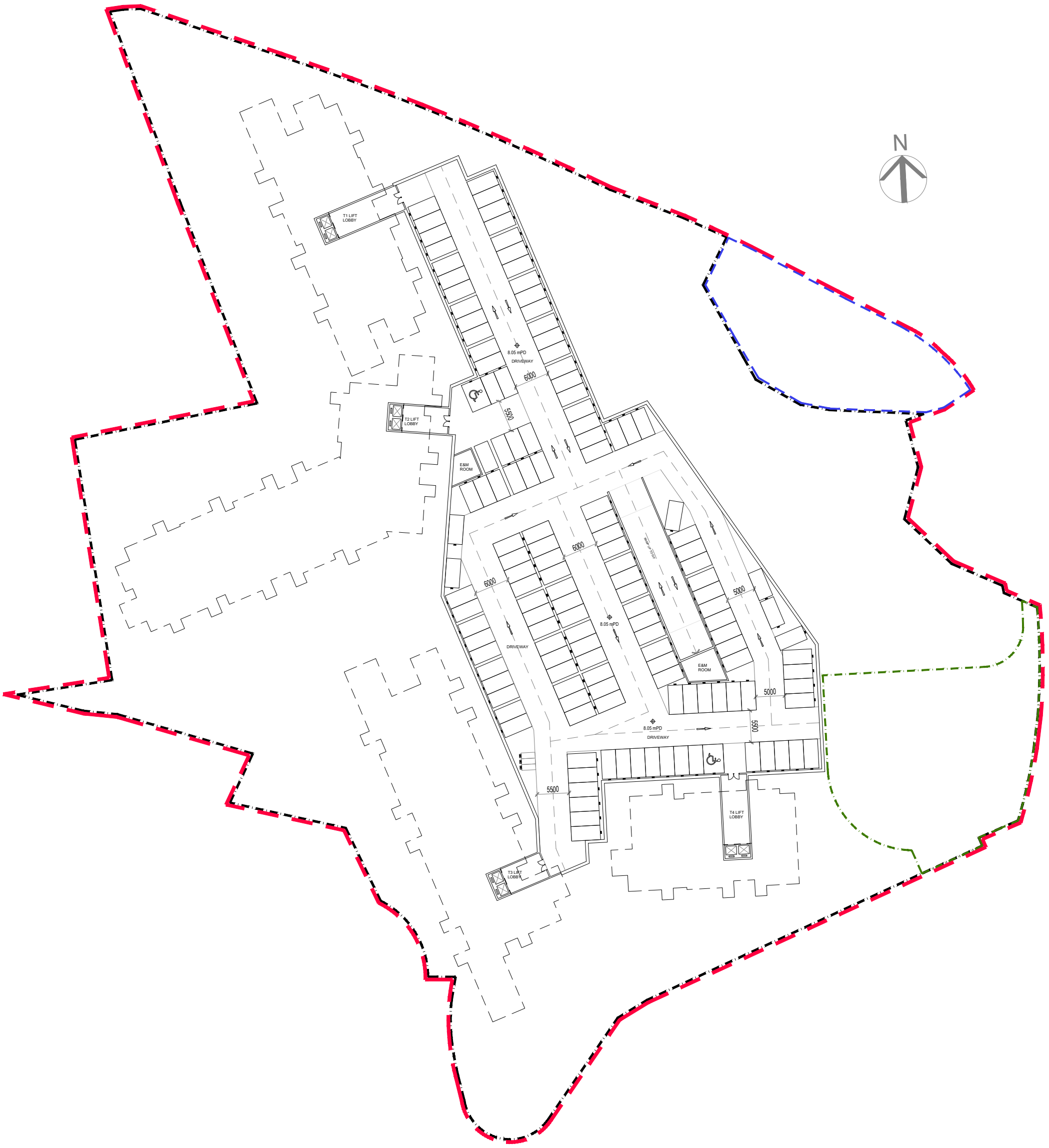


MASTER LAYOUT PLAN

LEGEND

- CDA Zone Boundary
- Application Site Boundary
- Site (B) Boundary
- Surrender Area

Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories



B1/F FLOOR PLAN

LEGEND

- CDA Zone Boundary
- Application Site Boundary
- Site (B) Boundary
- Surrender Area

Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK +PARTNERS



FIRST FLOOR PART PLAN

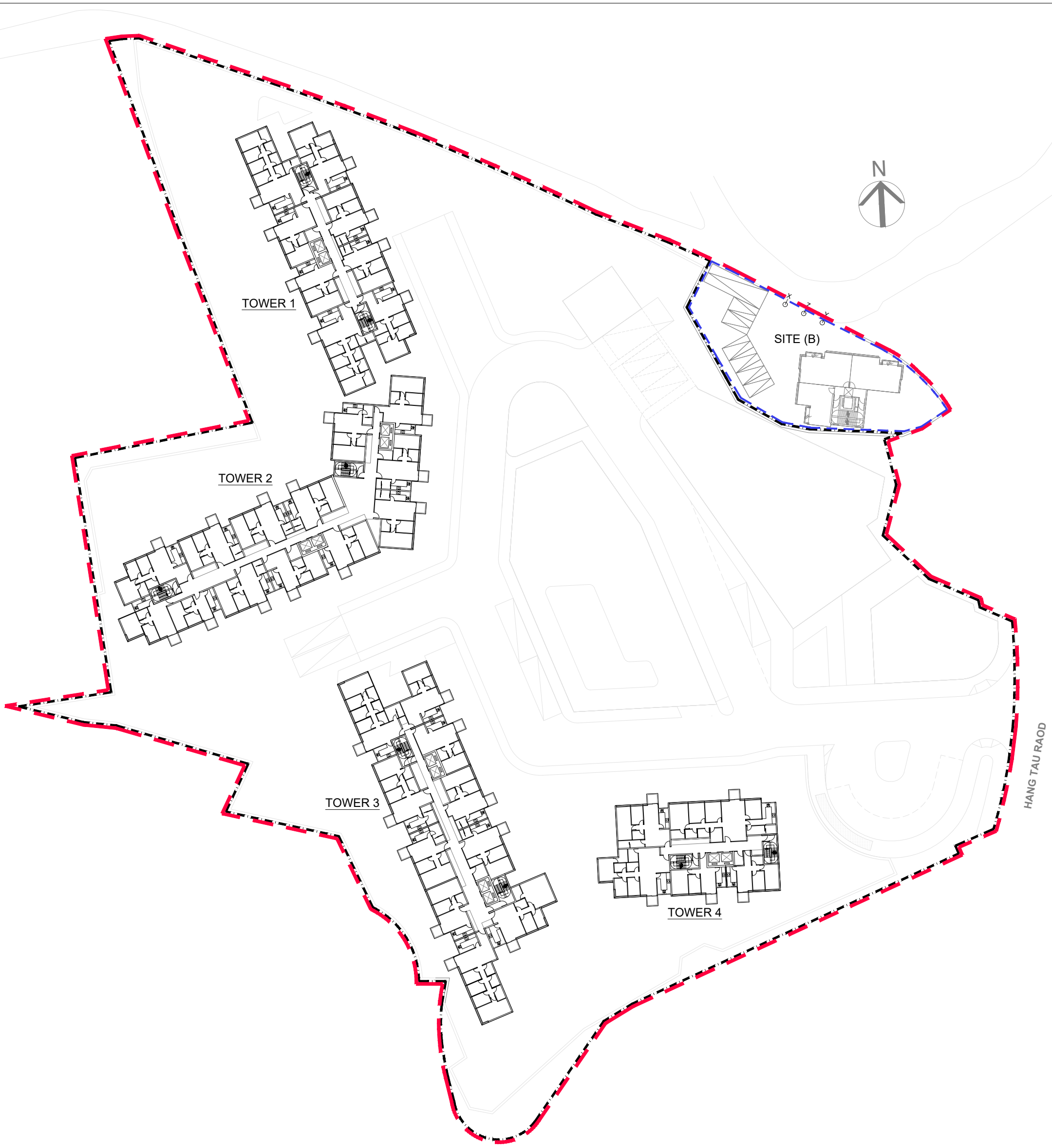
GROUND FLOOR PLAN

LEGEND

- CDA Zone Boundary
- Application Site Boundary
- Site (B) Boundary
- Surrender Area

Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS



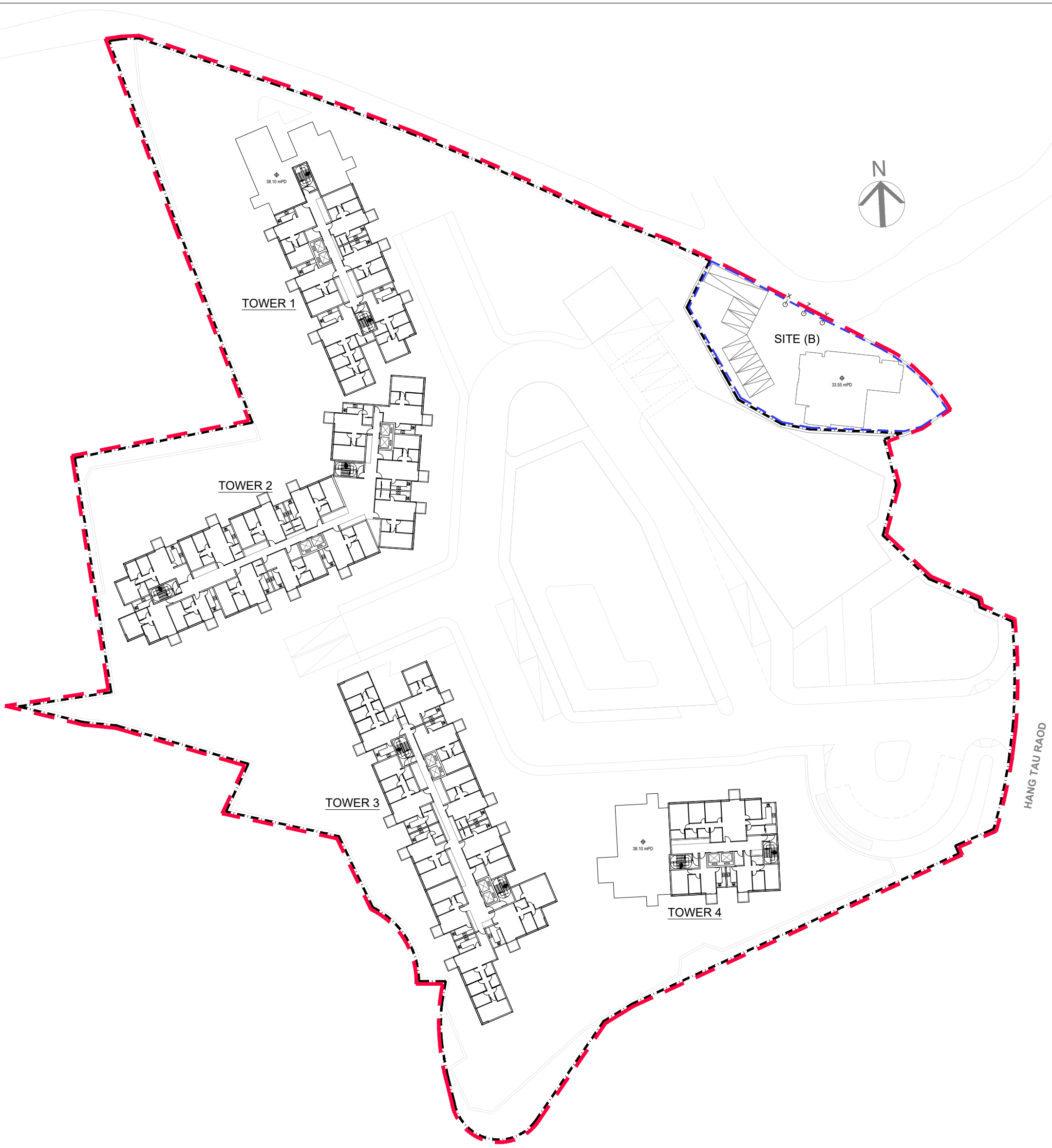
TYPICAL FLOOR PLAN (1/F to 7/F)

LEGEND

- CDA Zone Boundary
- Application Site Boundary
- Site (B) Boundary

Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS



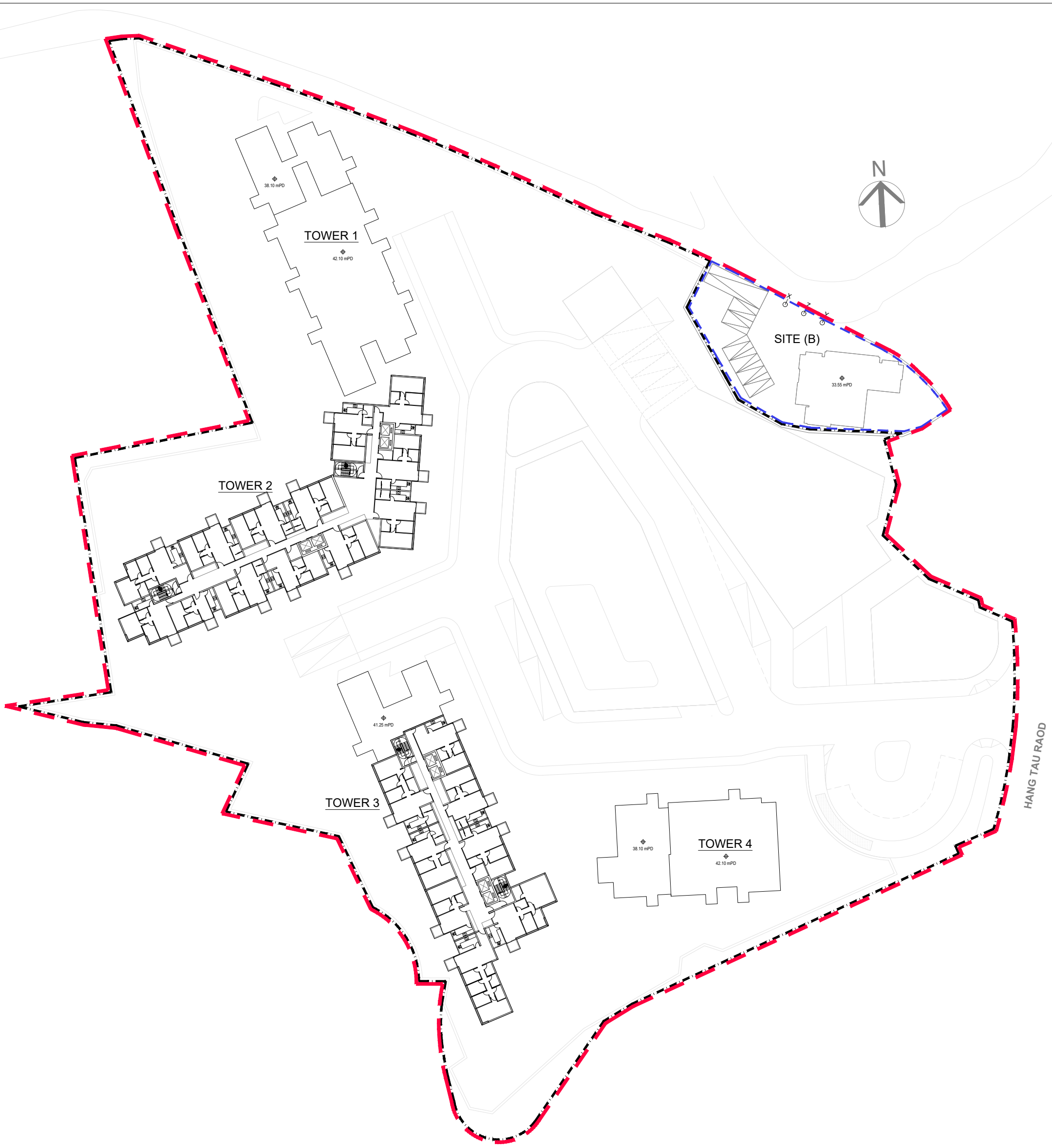
8/F FLOOR PLAN

LEGEND

- CDA Zone Boundary
- Application Site Boundary
- Site (B) Boundary

Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS



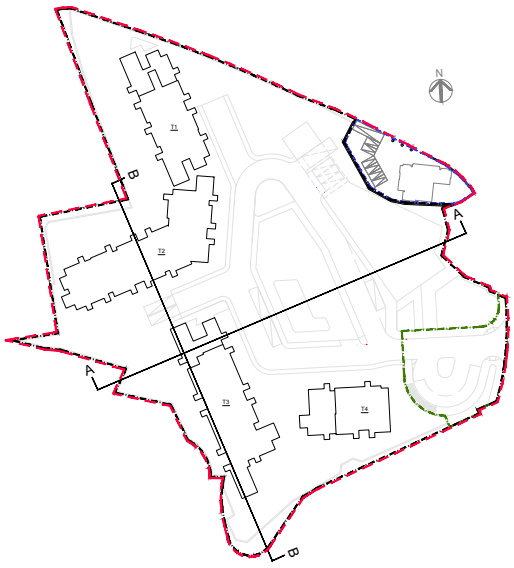
9/F FLOOR PLAN

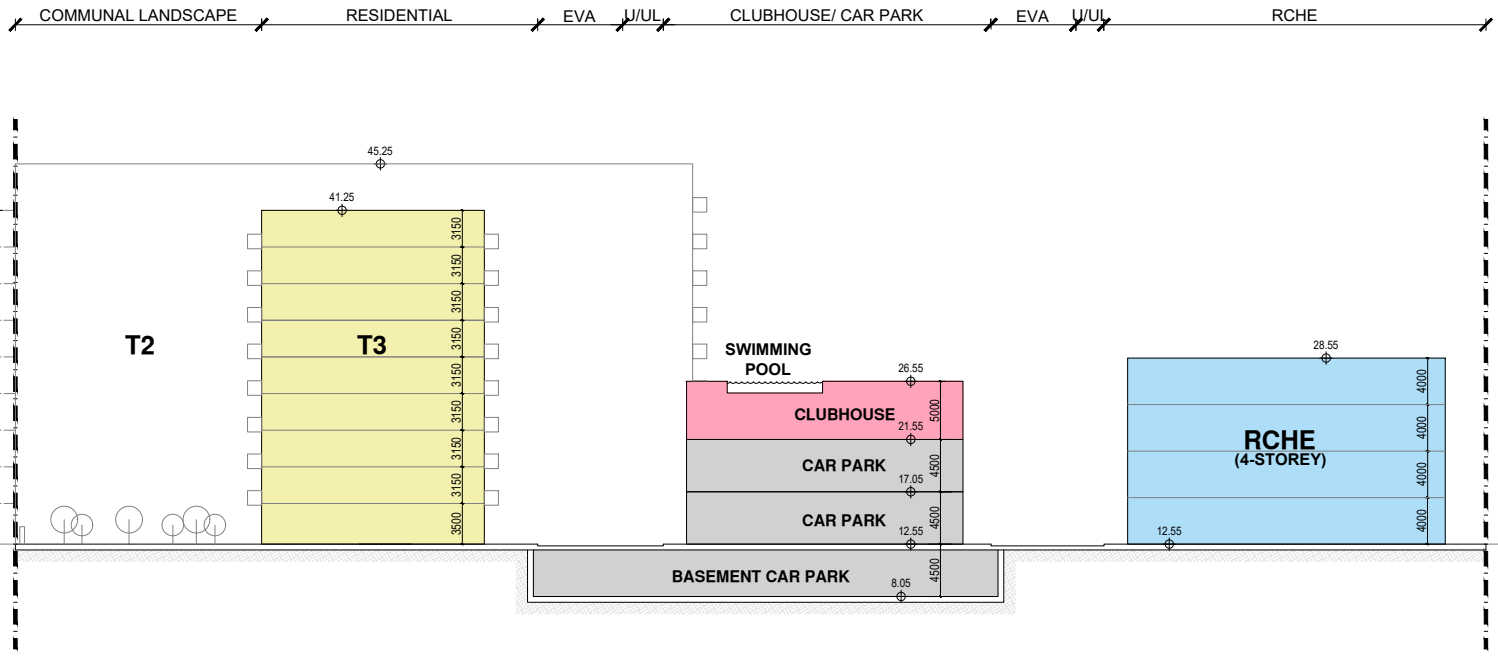
LEGEND

- CDA Zone Boundary
- Application Site Boundary
- Site (B) Boundary

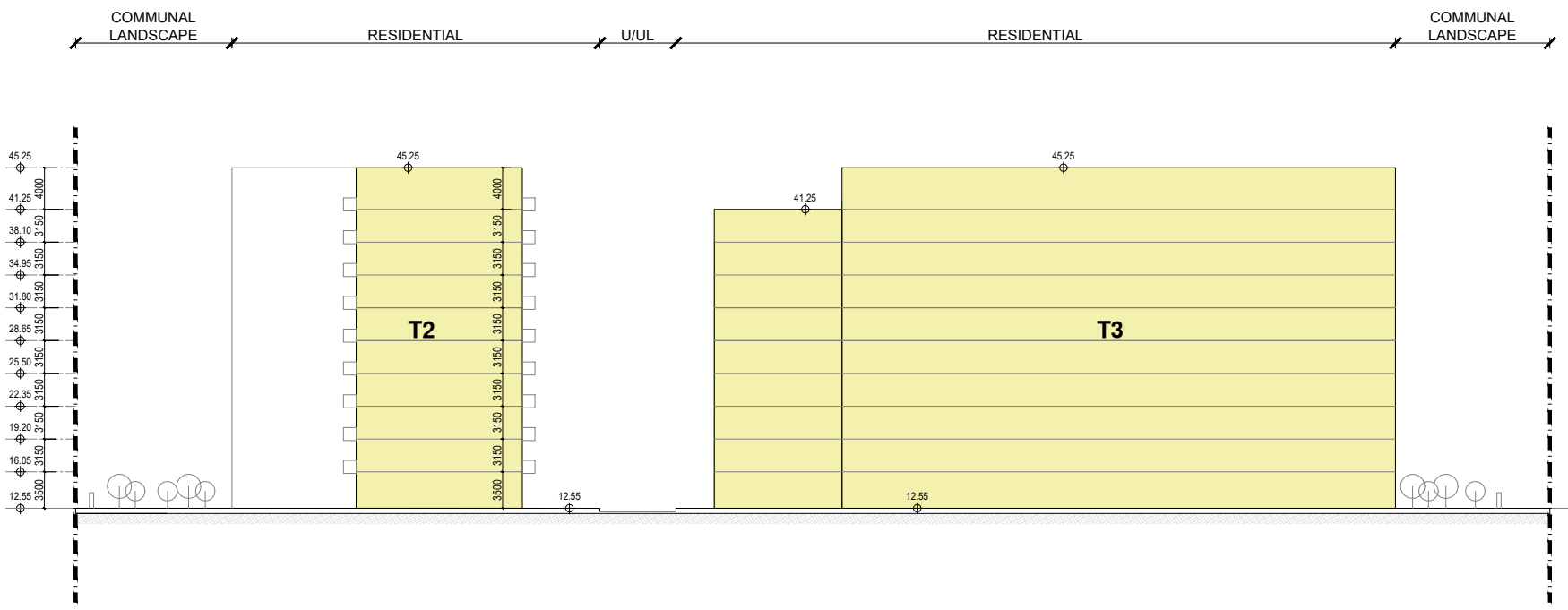
Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS





SCHEMATIC SECTION A



SCHEMATIC SECTION B

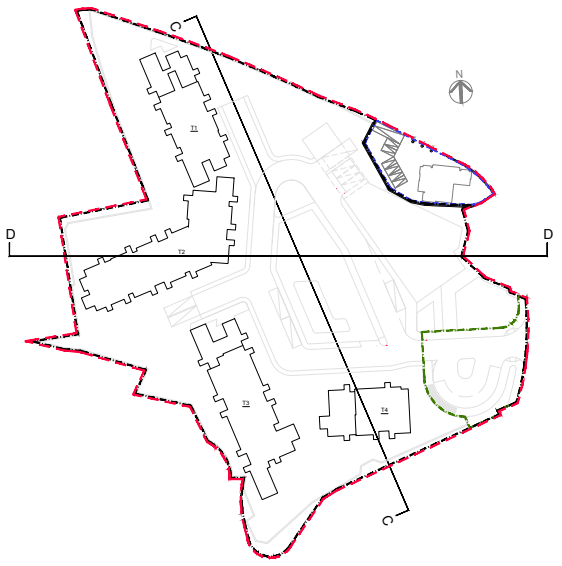
LEGEND

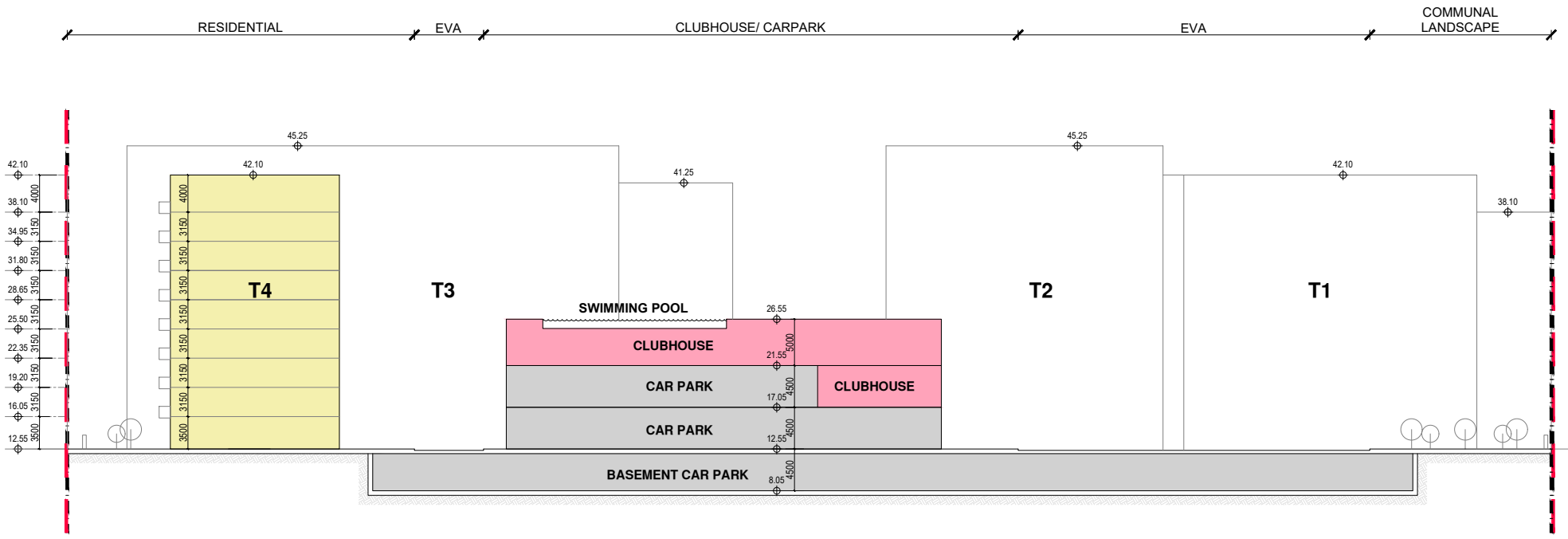
CDA Zone Boundary

Application Site Boundary

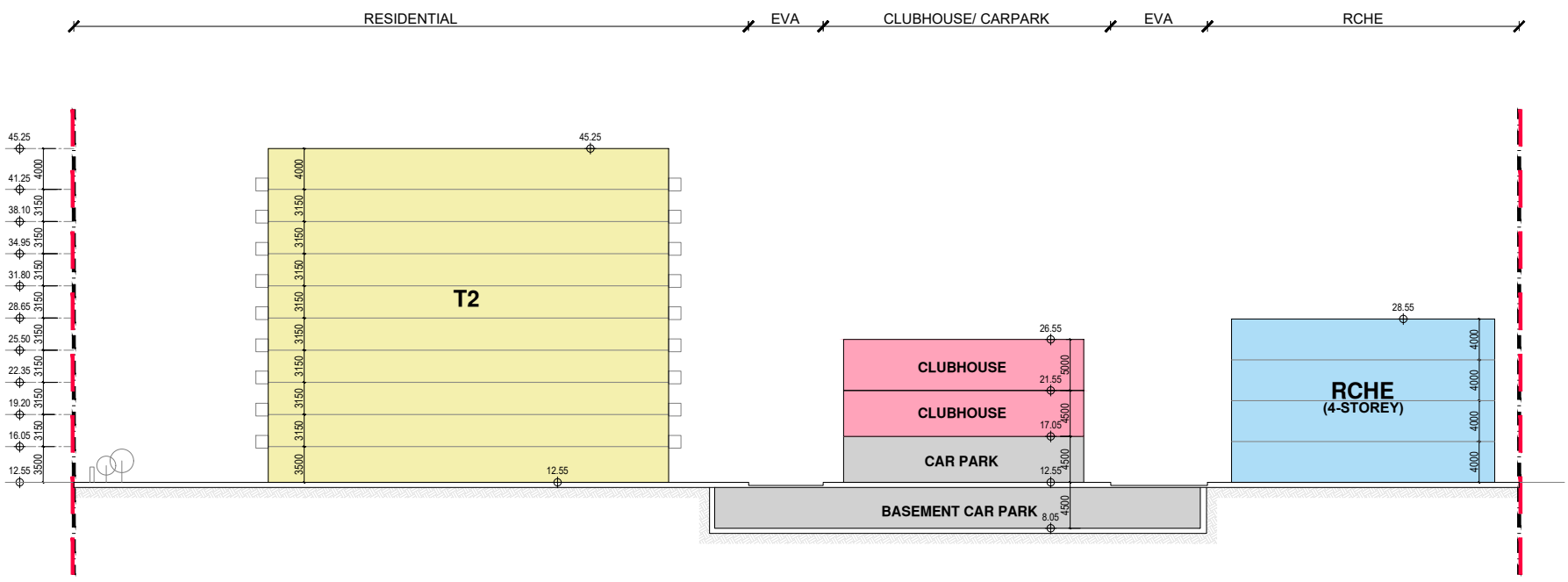
Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS





SCHEMATIC SECTION C



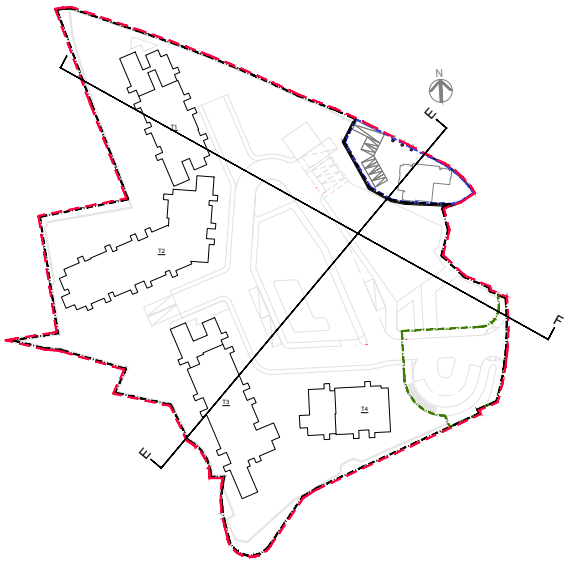
SCHEMATIC SECTION D

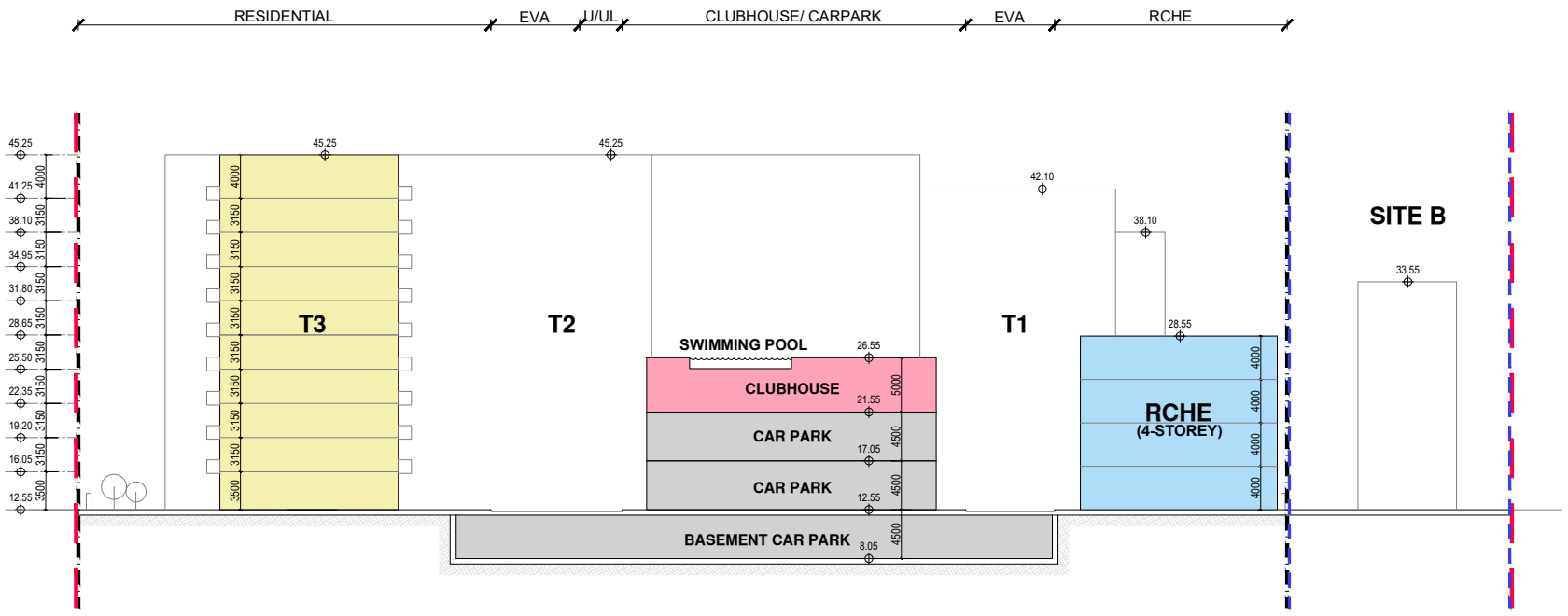
LEGEND

- CDA Zone Boundary
- Application Site Boundary

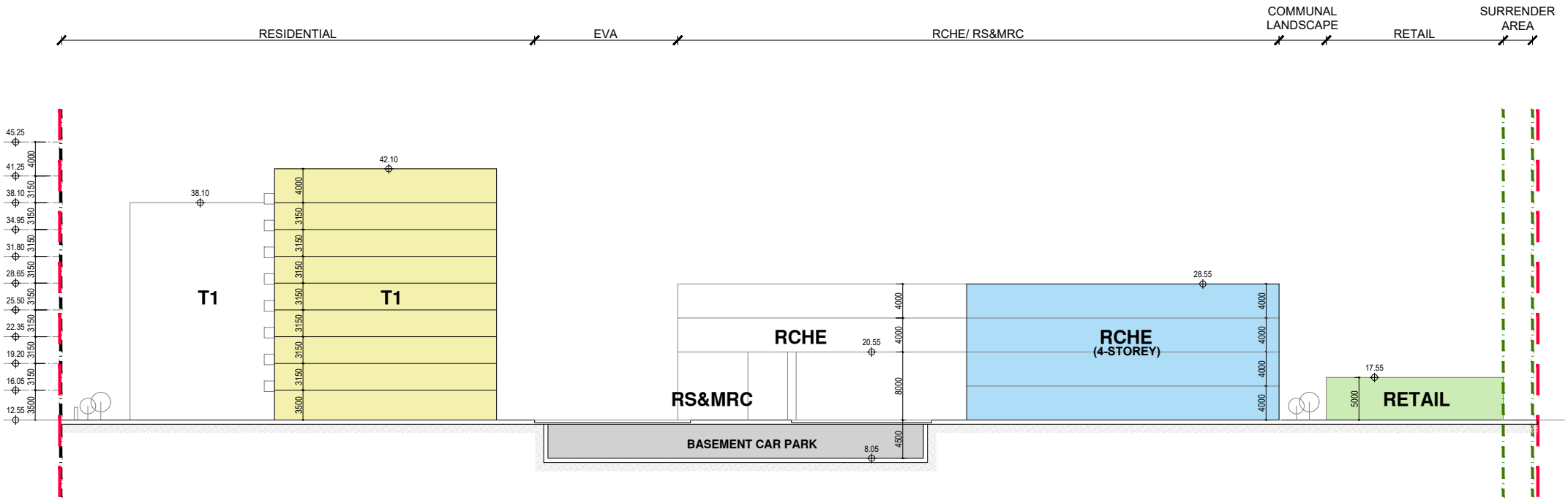
Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS





SCHEMATIC SECTION E



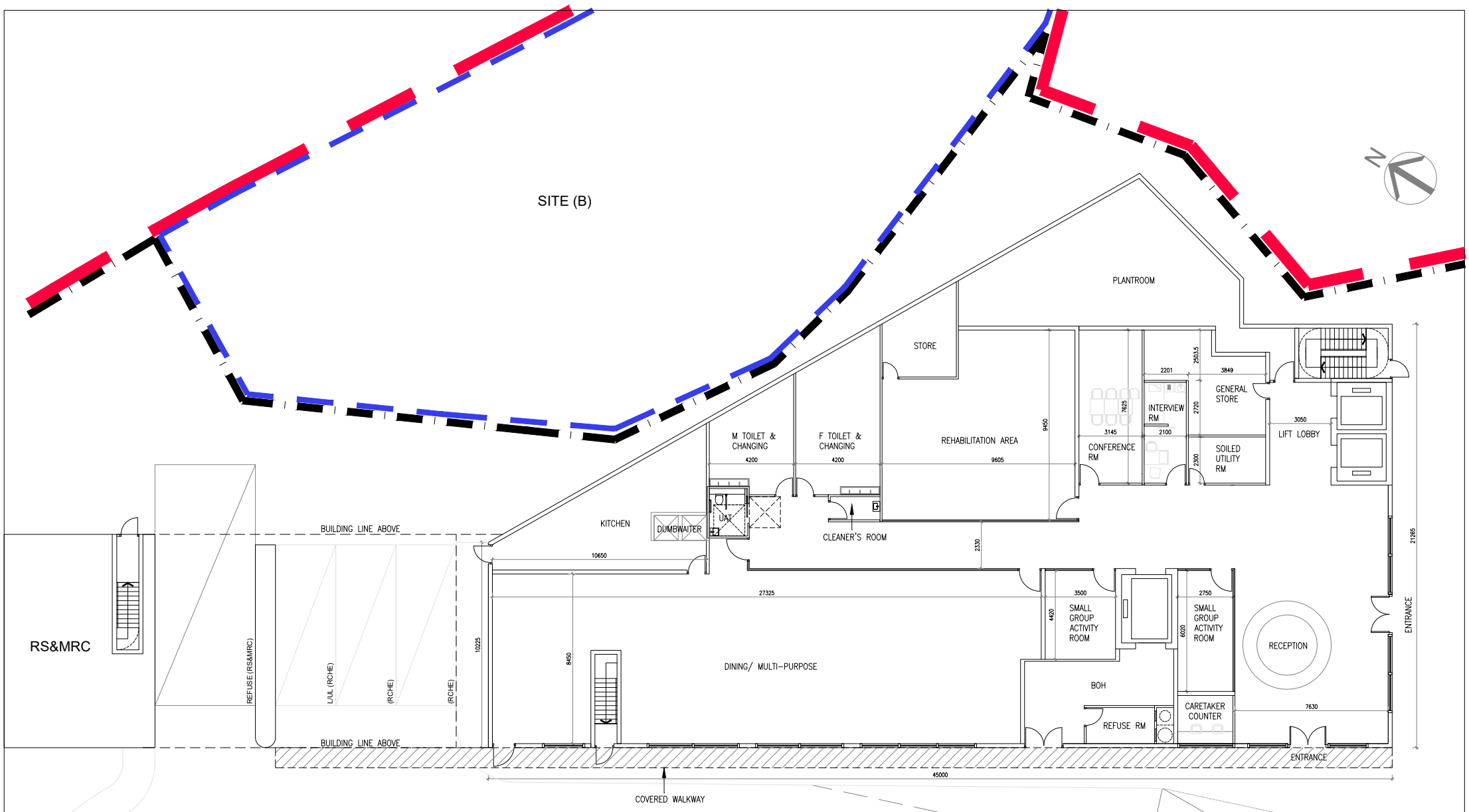
SCHEMATIC SECTION F

LEGEND

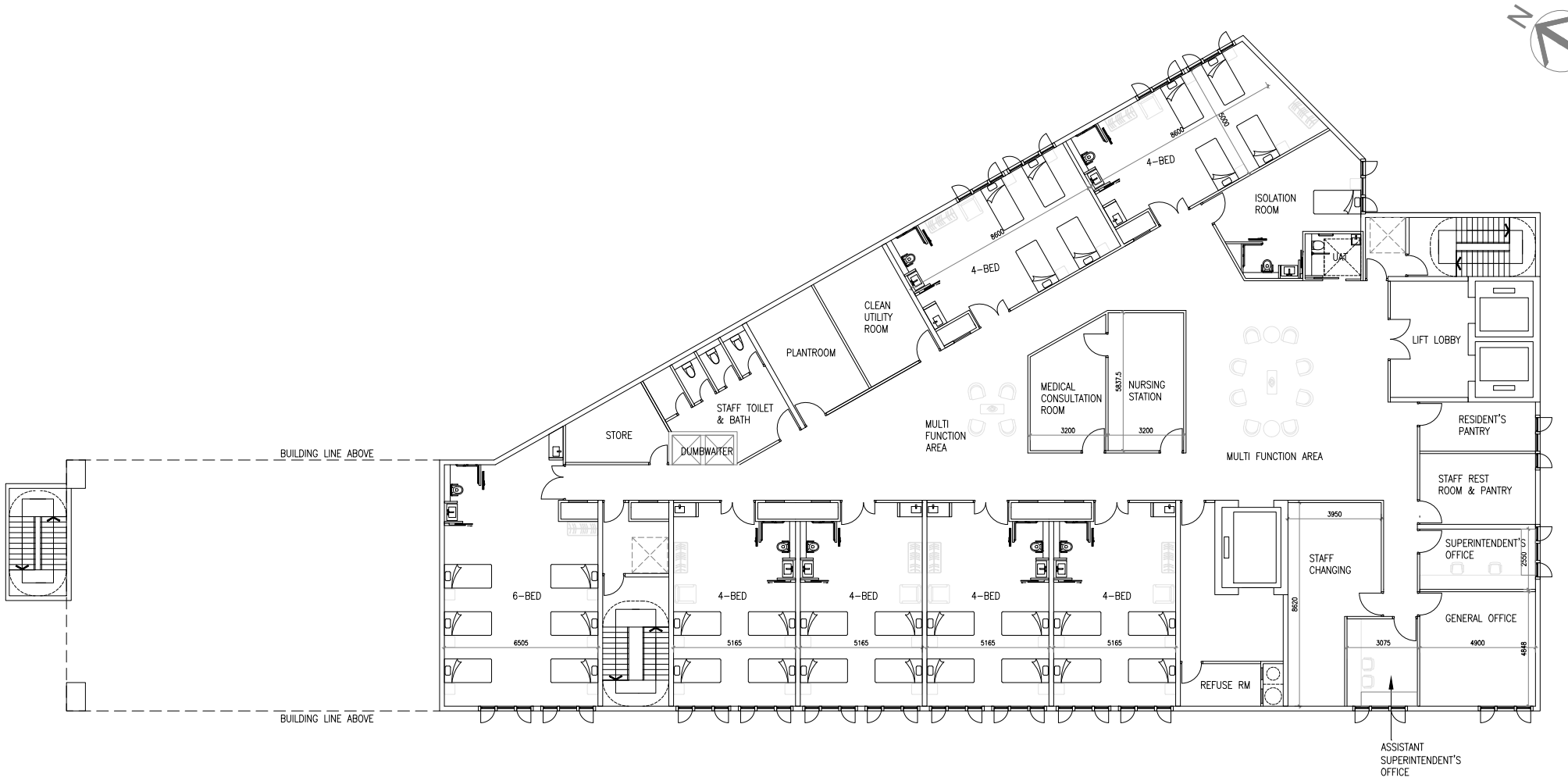
- CDA Zone Boundary
- Application Site Boundary
- Site (B) Boundary
- Surrender Area

Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS



RCHE GROUND FLOOR PLAN



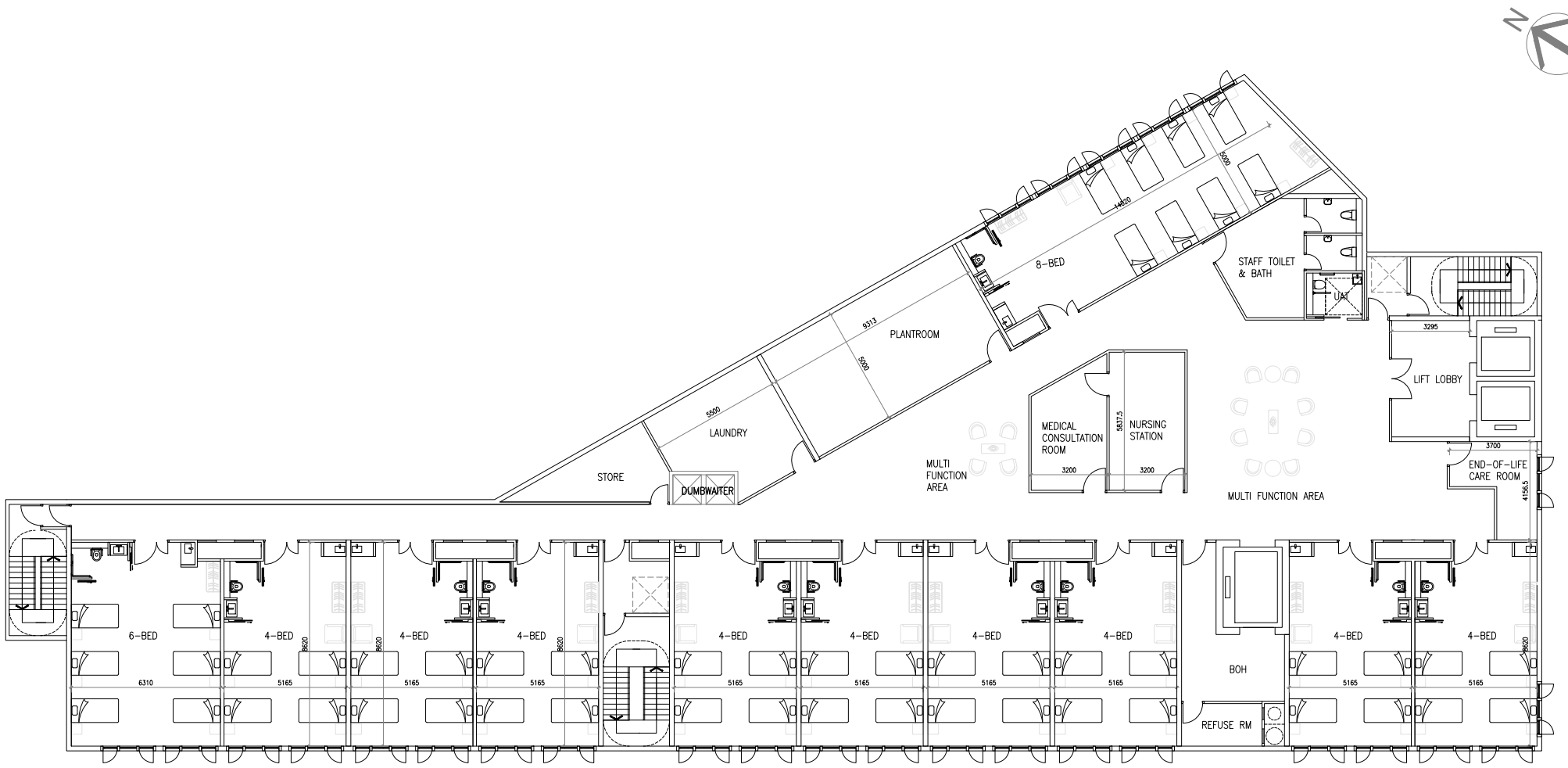
RCHE FIRST FLOOR PLAN

NUMBER OF BEDS: 30

REMARK: THE LAYOUT IS FOR INDICATION ONLY AND IS SUBJECT TO DETAILED DESIGN.

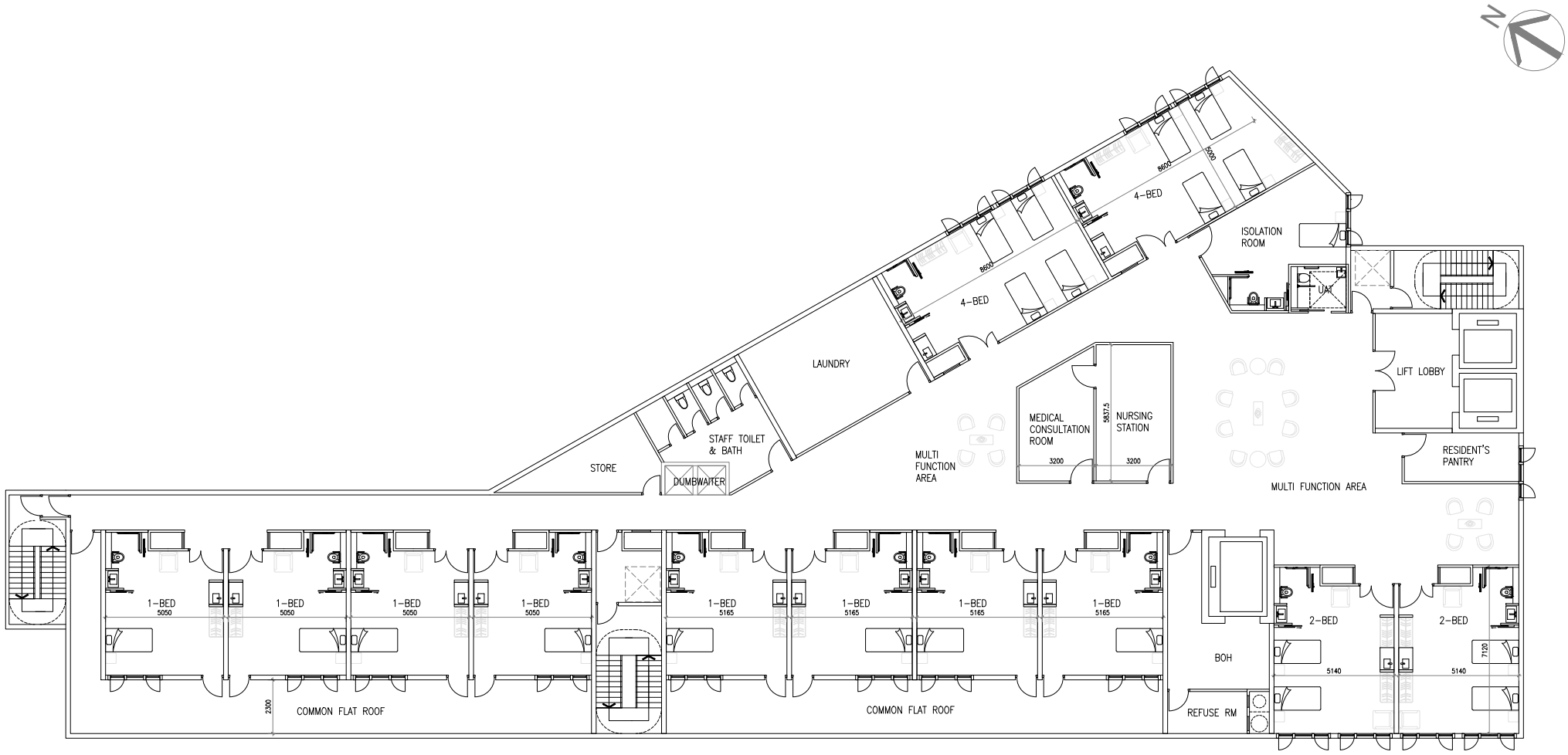
Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS



NUMBER OF BEDS: 50

RCHE SECOND FLOOR PLAN



NUMBER OF BEDS: 20

RCHE THIRD FLOOR PLAN

REMARK: THE LAYOUT IS FOR INDICATION ONLY AND IS SUBJECT TO DETAILED DESIGN.

Master Layout Plan for Residential Development at Various Lots
in D.D. 92 and D.D. 94 and Adjoining Government Land in "CDA" zone
Hang Tau Tai Po, Kwu Tung South, New Territories

LWK + PARTNERS

Appendix B

Calculation of Peak Flow

Meinhardt Infrastructure & Environment Ltd.
10/F Genesis
33-35 Wong Chuk Hang Road
Hong Kong

Contract:			Job Ref:
S16 Planning Application for Proposed Residential Development cum Residential Care Home for the Elderly and Shop and Services			-
Subject: Sewerage Impact Assessment			Calc.Sheet No. 1
Drawing Ref. -	Calculations by PT	Checked by ST	Date: 16-Oct-26

Ref.

Estimation of Sewage Flow

1.1 Proposed Development

Residential development and other ancillaries involving clubhouse, swimming pool and shops

1.2 Reference Document

1) Guidelines for Estimating Sewage Flows, published by EPD (GESF)
2) Sewerage Manual, published by DSD (SM)
3) Hong Kong Planning Standards and Guidelines (HKPSG), published by PlanD

1.3 Assumptions

1) The worker density of office and retail/ business is assumed below:-

Office	20	m^2/worker
Retail/ business	22.5	m^2/worker

2) The Gross Floor Area (GFA) is assumed as the floor area x no. of storey
3) 90% of GFA is assumed as Usable Floor Area (UFA)
4) The unit flow factors of visitor is assumed below:-

Visitor - Toilets & Ablution	0.025	m^3/head/day

1) Assume 30 students per classroom
1) According to Hong Kong 2021 Population By-census - Main Results, average household size was assumed as 2.8head/unit
2) For St Paul's House of Prayer, 15 staff was assumed for 100m^2/staff

1.4 Drawings

1) Catchment Area Plan refers to Drawing Nos.

Ref.

1.5 Estimation of Sewage Flow from Existing Development

001) St Andrews Place 雙魚河

No. of Unit	26	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	73	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	27.01	
ADWF (l/s)	0.31	

Be accounted to FMH1028584

002) Golf Villa 金錢花園別墅

No. of Unit	18	(Centaline Property)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	51	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	18.87	
ADWF (l/s)	0.22	

Be accounted to FMH1028584

003) The Royal Oak 御林皇府

No. of Unit	44	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	124	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	45.88	
ADWF (l/s)	0.53	

Discharged to FMH1028570

004) Ascot Park 翡翠園

No. of Unit	16	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	45	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	16.65	
ADWF (l/s)	0.19	

Discharged to FMH1028570

005) Kam Tsin Village 金錢村

ADWF (m^3/d)	1147	(CE 58/2020(DS) SIA Report (Arup) [Jun 2022])
ADWF (l/s)	13.28	

Discharged to FMH1028523

Ref.

006) Kam Tsin Village Ho Tung Kindergarten 金錢村何東幼稚園

No. of Student	64	(Schooland)
Category of unit flow factors	School student	
Unit flow factors (m^3/head/day)	0.04	(GESF)
No. of Staff	6	(Schooland)
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	4.24	
ADWF (l/s)	0.05	

Discharged to FMH1028523

007) Kam Tsin Village Ho Tung School 金錢村何東學校

No. of classroom	10	(Schooland)
No. of student per classroom	30	
No. of Student	300	
Category of unit flow factors	School student	
Unit flow factors (m^3/head/day)	0.04	(GESF)
No. of Staff	26	(Schooland)
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	19.28	
ADWF (l/s)	0.22	

Discharged to FMH1028522

008) De La Salle Secondary School NT 新界喇沙中學

No. of classroom	25	(Schooland)
No. of student per classroom	30	
No. of Student	750	
Category of unit flow factors	School student	
Unit flow factors (m^3/head/day)	0.04	(GESF)
No. of Staff	86	(School Website)
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	54.08	
ADWF (l/s)	0.63	

Discharged to FMH1028520

009) St Paul's House of Prayer 沙爾德聖保祿女修會聖保祿樂靜院

No. of person (head)	50	(SRSPC)
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	18.5	
ADWF (l/s)	0.21	
Management Staff	15	
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	4.2	
ADWF (l/s)	0.05	
Total ADWF (m^3/d)	22.7	
Total ADWF (l/s)	0.26	

Discharged to FMH1021544

Ref.

010) Eden Place 桃苑

No. of Unit	8	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	23	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	8.51	
ADWF (l/s)	0.10	

Be accounted to FMH1021544

011) Valais 天巒

No. of Unit	330	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	924	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	341.88	
ADWF (l/s)	3.96	

Be accounted to FMH1021544

012) Yin Kong Village 燕崗村

No. of building	94	(Base Map)
No. of storey	3	
No. of Unit	282	
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	790	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	292.3	
ADWF (l/s)	3.38	

Be accounted to FMH1021550

013) Golf Parkview (高爾夫景園)

No. of Unit	48	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	135	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	49.95	
ADWF (l/s)	0.58	

Be accounted to FMH1021561

014) Beas River Equestrian (雙魚河馬術中心)

ADWF (m^3/d)	272	(Sewage Treatment Preliminary Proposal for Proposed Works at Beas River Equestrian Centre (M&P) [Jan 2026])
ADWF (l/s)	3.15	

Discharged to FMH1028584

Ref.

015) Village areas at north of Kam Hang Road at Kam Tsin

No. of building	84	(Base Map)
No. of storey	2	
No. of Unit	168	
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	471	
Category of unit flow factors	Modern Village	
Unit flow factors (m^3/head/day)	0.27	(GESF)
ADWF (m^3/d)	127.17	
ADWF (l/s)	1.47	

Be accounted to FMH1021544

016) Goodwood Park (高爾夫景園)

No. of Unit	13	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	37	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	13.69	
ADWF (l/s)	0.16	

Be accounted to FMH1029663

017) La Regent Park 匯駿山莊

No. of Unit	42	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	118	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	43.66	
ADWF (l/s)	0.51	

Be accounted to FMH1028548

018) Casas Domingo 嘉麗山莊

No. of Unit	44	(Midland Realty)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	124	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	45.88	
ADWF (l/s)	0.53	

Be accounted to FMH1029640

Ref.

019) Beas River Country Park

Arena Room		
Total number of the people (participants)	120	(HKJC Website)
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	33.6	
ADWF (l/s)	0.39	
Area (m^2)	275	(HKJC Website)
Floor area per staff (m^2)	31.25	(Table 8 of CIFSUS - Hotels and Boarding Houses)
Total number of staff	9	
Category of unit flow factors	J10	
Design flow for staff	1.58	(GESF)
ADWF (m^3/d)	13.9	
ADWF (l/s)	0.16	
Conference Suite		
Total number of the people (participants)	20	(HKJC Website)
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	5.6	
ADWF (l/s)	0.06	
Area (m^2)	35	(HKJC Website)
Floor area per staff (m^2)	31.25	(Table 8 of CIFSUS - Hotels and Boarding Houses)
Total number of staff	1	
Category of unit flow factors	J10	
Design flow for staff	1.58	(GESF)
ADWF (m^3/d)	1.8	
ADWF (l/s)	0.02	
The Lawn		
Total number of the people (participants)	360	(HKJC Website)
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	100.8	
ADWF (l/s)	1.17	
Area (m^2)	805	(HKJC Website)
Floor area per staff (m^2)	31.25	(Table 8 of CIFSUS - Hotels and Boarding Houses)
Total number of staff	26	
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	8.8	
ADWF (l/s)	0.10	
Total ADWF (m^3/d)	164	
Total ADWF (l/s)	1.90	

Discharged to FMH1029680

020) Yin Kong Public Toilet

ADWF (l/s)	26.80	(Proposed Development at Lot 2579 in D.D. No. 92, Kwu Tung South - SIA Report (Binnies) [Mar 2025])

Discharged to FMH1021550

Ref.

1.6 Estimation of Sewage Flow from Planning Development

Project: A/NE-KTS/460

No. of Unit	2	(OZP)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	6	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	2.22	
ADWF (l/s)	0.03	

Be accounted to FMH1029682

Project: A/NE-KTS/466

ADWF (m^3/d)	49	(A/NE-KTS/466 SIA Report [May 2019])
ADWF (l/s)	0.57	

Be accounted to FMH1029681

Project: A/NE-KTS/525 (local STP)

ADWF (m^3/d)	45.8	(Provided by EPD)
ADWF (l/s)	0.53	

Be accounted to FMH1029681

Project: A/NE-KTS/538 (septic tank)

ADWF (m^3/d)	4.5	(Provided by EPD)
ADWF (l/s)	0.05	

Be accounted to FMH1029681

Project: Y/NE-KTS/15 (formerly A/NE-KTS/484)

ADWF (m^3/d)	792	(A/NE-KTS/565 SIA Report (Binnies)[Dec 2025])
Design flow for swimming pool backwashing (l/s)	8.3	
ADWF (l/s)	9.17	
ADWF (with Swimming Pool Backwashing) (l/s)	17.47	

Be accounted to FMH1021544

Project: A/NE-KTS/506 (formerly Y/NE-KTS/12)

ADWF (m^3/d)	2166.4	(Proposed Development at Lot No. 2579 in D.D. No. 92 SIA Report (Binnies) [Mar 2025])
Design flow for swimming pool backwashing (l/s)	8.3	
ADWF (l/s)	25.07	
ADWF (with Swimming Pool Backwashing) (l/s)	33.37	

Be accounted to FMH1021544

Project: A/NE-KTS/541

No. of Unit	2	(OZP)
Average household size (head/unit)	2.8	(Hong Kong 2021 Population By-census - Main Results)
No. of person (head)	6	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	2.22	(Provided by EPD)
ADWF (l/s)	0.03	

Be accounted to FMH1029681

Meinhardt Infrastructure & Environment Ltd. 10/F Genesis 33-35 Wong Chuk Hang Road Hong Kong	Contract: S16 Planning Application for Proposed Residential Development cum Residential Care Home for the Elderly and Shop and Services			Job Ref: -
	Subject: Sewerage Impact Assessment			Calc.Sheet No. 1
	Drawing Ref. -	Calculations by PT	Checked by ST	Date: 16-Oct-26

Ref.

Project: Y/NE-KTS/14 and Y/NE-KTS/17

ADWF (m^3/d)	1074	(Y/NE-KTS/14 SIA report (Ramboll) [Apr 2020] and Y/NE/KTS/17 SIA report (Ramboll) [Jan 2023])
Volume for swimming pool backwashing (l/s)	14.4	
ADWF (l/s)	12.43	
ADWF (with Swimming Pool Backwashing) (l/s)	26.83	

Be accounted to FMH1021544

Project: Y/KTN/2

ADWF (m^3/d)	492	(Y/KTN/2 SIA report(Ramboll) [Jun 2022])
Volume for swimming pool backwashing (l/s)	3.5	
ADWF (l/s)	5.69	
ADWF (with Swimming Pool Backwashing) (l/s)	9.19	

Be accounted to FMH1021543

Project: Y/FSS/19

ADWF (m^3/d)	798.9	(Y/FSS/19 SIA report(Ramboll) [Jul 2022])
Volume for swimming pool backwashing (l/s)	5.8	
ADWF (l/s)	9.25	
ADWF (with Swimming Pool Backwashing) (l/s)	15.05	

Be accounted to FMH1021561

Project: Tai Tau Leng Public Housing

ADWF (m^3/d)	3057	(CE78/2021 SIA report (Atkins) [Aug 2023])
ADWF (l/s)	35.38	

Be accounted to FMH1021561

Ref.

1.7 Estimation of Sewage Flow from Proposed Development

1) Residential Building

No. of person (head)	936	
Category of unit flow factors	R3	
Unit flow factors (m^3/head/day)	0.37	(GESF)
ADWF (m^3/d)	346.32	
ADWF (l/s)	4.01	

2) Management Staff (Including Clubhouse & RCHE)

No. of Staff	50	
Category of unit flow factors	J11	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	14	
ADWF (l/s)	0.16	

3) Shop

No. of Staff	14	
Category of unit flow factors	J4	
Unit flow factors (m^3/head/day)	0.28	(GESF)
ADWF (m^3/d)	3.92	
ADWF (l/s)	0.05	

4) Swimming Pool

Pool Volume (m^3)	220	
Turnover Rate (hr)	6	(Cap. 132CA - Open Air pool)
Flow factors (m^3/hr)	36.67	
Flow factors (l/s)	10.19	
Surface Loading Rate of Filter (m^3/m^2/hr)	48	
Filter Area Required (m^2)	0.76	
Backwash Duration (mins/day)	3	
Backwash flow rate (m^3/m^2/hr)	30	
Volume of Swimming Pool Backwashing (m^3/d)	1.15	
Volume of Swimming Pool Backwashing (l/s)	6.37	

5) RCHE Residents

No. of residents (beds)	100	
Category of unit flow factors	Special class	
Unit flow factors (m^3/head/day)	0.19	(GESF)
ADWF (m^3/d)	19.0	
ADWF (l/s)	0.22	

Ref.

1.8 Total Estimated Peak Flow from the Proposed Development

Residential Building ADWF (m^3/d)	346.32	
Management Staff ADWF (m^3/d)	14.00	
Shop ADWF (m^3/d)	3.92	
RCHE Residents ADWF (m^3/d)	19.00	
Total Estimated Daily Flow (m^3/d)	383.24	
Catchment Inflow Factors, PCIF	1.00	(GESF)
Total Estimated Daily Flow (m^3/d) (with catchment inflow factor)	383.24	
Population	1100	
Peaking Factor	6	(GESF)
Peak Flow (l/s) (with Peaking factor)	26.61	
Peak Flow (with Swimming Pool Backwashing) (l/s)	32.98	

Be accounted to FMH1029683

Appendix C

Calculation of Flow Capacity

Meinhardt Infrastructure & Environment Ltd.
10/F Genesis
33-35 Wong Chuk Hang Road
Hong Kong

Contract:
Proposed Amendments to the Kwu Tung South Outline Zoning Plan for Residential Development at Various Lots in D.D. 92 and D.D 94 and Adjoining Government Land in "CDA" Zone, Hang Tau Tai Po, Kwu Tung South, New Territories

Job Ref: -

Subject: Sewerage Impact Assessment

Calc. Sheet No. -

Drawing Ref.	Calculations By	Checked By	Date
-	AL	AL	10/14/2026

Sewerage Impact Assessment (Appendix D)

Scenario 1: Existing development, and Planned developments anticipated intake year at 2031
(Upgraded Sewers by Responsible Planned Developments)

Foulwater Drains Capacity Design Check (By Colebrook White Equation)

By Colebrook White Equation

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

V = mean velocity (m/s)
g = gravitational acceleration (m/s²)
D = internal pipe diameter (m)
k_s = hydraulic pipeline roughness (m)
v = kinematic viscosity of fluid (m²/s)
s = hydraulic gradient (energy loss per unit length due to friction)

Planned Development	ADWF (m^3/d)	ADWF (L/s)	Manhole
A/NE-KTS/460	2.22	-	0.03 FMH1029682
A/NE-KTS/466	49	-	0.57 FMH1029681
A/NE-KTS/525 [1]	45.8	-	0.53 FMH1029681
A/NE-KTS/538 [1]	4.5	-	0.05 FMH1029681
Y/NE-KTS/15 (formerly A/NE-KTS/484)	792	8.3	9.17 FMH1021544
A/NE-KTS/506 (formerly Y/NE-KTS/12)	2166.4	8.3	25.07 FMH1021544
A/NE-KTS/541 [1]	2.22	-	0.03 FMH1029681
Y/NE-KTS/14 and Y/NE-KTS/17	1074	14.4	12.43 FMH1021544
Y/KTN/2	492	3.5	5.69 FMH1021543
Y/FSS/19	798.9	5.8	9.25 FMH1021561

	Existing Development		Manhole
1	St Andrews Place 聖	27.01	0.31 FMH1028584
2	Golf Villa 金錢花園(	18.87	0.22 FMH1028584
3	The Royal Oak 御林	45.88	0.53 FMH1028570
4	Ascot Park 翡翠園	16.65	0.19 FMH1028570
5	Kam Tsin Village 金	1147	13.28 FMH1028523
6	Kam Tsin Village H(	4.24	0.05 FMH1028520
7	Kam Tsin Village H(	19.28	0.22 FMH1028520
8	De La Salle Seconc	54.08	0.63 FMH1028520
9	St Paul's House of I	22.7	0.26 FMH1021544
10	Eden Place 桃苑	8.51	0.10 FMH1021544
11	Valais 天巒	341.88	3.96 FMH1021544
12	Yin Kong Village 燕	292.3	3.38 FMH1021550
13	Golf Parkview (高爾	49.95	0.58 FMH1021561
14	Beas River Equestr	272	3.15 FMH1028584
15	Village areas at nor	127.17	1.47 FMH1021544
16	Goodwood Park	13.69	0.16 FMH1029663
17	La Regent Park	43.66	0.51 FMH1028548
18	Casas Domingo	45.88	0.53 FMH1021544
19	Beas River Country	164	1.90 FMH1028584
20	Toilet	-	26.80 FMH1021550

Assumptions:

1. Pipe roughness, k_s [2]=	3	mm	(Refer to Sewerage Manual Part 1 - Table 5, assume "Clayware" under normal condition)
	0.3		
2. Gravitational acceleration, g =	9.81	m/s²	
3. Kinematic viscosity, v =	1.00E-06	m²/s	(Transitional flow and water at 15 degree celcius)
4. Catchment Inflow Factor, $P_{CIF=}$	1		(Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning -Table T4 - North District)

Pipe Information											Capacity and Velocity Check									
Pipe Segment	From Manhole ID Upstream	To Manhole ID Downstream	Pipe **(d)** Diameter mm	Pipe **(m)** Length m	Ground Level (US) mPD	Invert Level **(out)** (US) mPD	Ground Level (DS) mPD	Invert Level **(in)** (DS) mPD	Slope **(s)** Gradient 1 in	Culmulative Sewage Flow **(Q_d)** l/s	Catchment Inflow Factor **(P_{CIF})** [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow **(Q_p)** l/s	Peak Flow with Swimming Pool and Public Toilet l/s	Pipe Full Flow **(Q_c)** Capacity l/s	Pipe Full Flow **(v)** Velocity m/s	Utilization %	Flow Capacity Check
A/NE-KTS/466, A/NE-KTS/525, A/NE-KTS/538, A/NE-KTS/541	FMH1029681	FMH1029682	300	22	12.980	9.270	12.870	9.070	110	1.18	1	**376**	8	9.40	9.40	83.8	1.19	11%	OK
A/NE-KTS/460	FMH1029682	FMH1029683	300	31	12.870	9.060	11.600	8.860	155	1.20	1	**384**	8	9.61	9.61	70.6	1.00	14%	OK
Goodwood Park	FMH1029683	FMH1029680	300	24	11.600	8.850	11.180	8.680	141	1.36	1	**435**	8	10.87	10.87	73.9	1.05	15%	OK
	FMH1028600	FMH1028601	300	22	24.840	23.470	22.920	21.620	12	1.36	1	**435**	8	10.87	10.87	254.1	3.59	4%	OK
	FMH1028601	FMH1028602	300	19	22.920	21.620	21.230	20.080	12	1.36	1	**435**	8	10.87	10.87	249.9	3.54	4%	OK
	FMH1028602	FMH1028603	300	38.8	21.230	20.070	19.240	17.640	16	1.36	1	**435**	8	10.87	10.87	220.2	3.12	5%	OK
	FMH1028603	FMH1028591	300	20.2	19.240	17.630	19.070	17.200	47	1.36	1	**435**	8	10.87	10.87	128.3	1.82	8%	OK
	FMH1028591	FMH1028590	300	18.2	19.070	17.190	18.580	16.610	31	1.36	1	**435**	8	10.87	10.87	157.1	2.22	7%	OK
	FMH1028590	FMH1028589	300	27.3	18.580	16.600	17.010	15.560	26	1.36	1	**435**	8	10.87	10.87	171.7	2.43	6%	OK
	FMH1028589	FMH1028588	300	29.1	17.010	15.540	16.170	14.720	35	1.36	1	**435**	8	10.87	10.87	147.7	2.09	7%	OK
	FMH1028588	FMH1028587	300	30.9	16.170	14.710	15.730	14.380	94	1.36	1	**435**	8	10.87	10.87	90.8	1.29	12%	OK

Pipe Information										Capacity and Velocity Check									
Pipe Segment	From Manhole ID Upstream	To Manhole ID Downstream	Pipe **(d)** Diameter mm	Pipe **(m)** Length m	Ground Level (US) mPD	Invert Level **(out)** (US) mPD	Ground Level (DS) mPD	Invert Level **(in)** (DS) mPD	Slope **(s)** Gradient 1 in	Culmulative Sewage Flow **(Q_d)** l/s	Catchment Inflow Factor **(P_{CIF})** [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow **(Q_p)** l/s	Peak Flow with Swimming Pool and Public Toilet l/s	Pipe Full Flow **(Q_c)** Capacity l/s	Pipe Full Flow **(v)** Velocity m/s	Utilization %	Flow Capacity Check
	FMH1028587	FMH1028586	400	25.3	15.730	14.300	15.480	13.750	46	1.36	1	**435**	8	10.87	10.87	279.2	2.22	4%	OK
	FMH1028586	FMH1028585	400	24.9	15.480	13.750	15.440	13.670	311	1.36	1	**435**	8	10.87	10.87	107.1	0.85	10%	OK
	FMH1028585	FMH1028584	400	24.6	15.440	13.660	15.340	13.560	246	1.36	1	**435**	8	10.87	10.87	120.6	0.96	9%	OK
St Andrews Place, Golf Villa, Beas River Equestrian, Beas River Country Park	FMH1028584	FMH1028583	400	15.3	15.340	13.550	15.410	13.500	306	6.94	1	**2220**	6	41.62	41.62	108.1	0.86	39%	OK
	FMH1028583	FMH1028582	400	32.4	15.410	13.490	15.560	13.390	324	6.94	1	**2220**	6	41.62	41.62	105.0	0.84	40%	OK
	FMH1028582	FMH1028581	400	35.4	15.560	13.380	15.680	13.280	354	6.94	1	**2220**	6	41.62	41.62	100.4	0.80	41%	OK
	FMH1028581	FMH1028580	400	17.2	15.680	13.270	15.820	13.210	287	6.94	1	**2220**	6	41.62	41.62	111.7	0.89	37%	OK
	FMH1028580	FMH1028570	400	38.2	15.820	13.200	16.130	13.100	382	6.94	1	**2220**	6	41.62	41.62	96.7	0.77	43%	OK
The Royal Oak, Ascot Park	FMH1028570	FMH1028569	400	32.8	16.130	13.090	16.490	12.980	298	7.66	1	**2451**	6	45.96	45.96	109.5	0.87	42%	OK
	FMH1028569	FMH1028568	400	9.1	16.490	12.970	16.420	12.960	910	7.66	1	**2451**	6	45.96	45.96	62.5	0.50	74%	OK
	FMH1028568	FMH1028567	400	7.7	16.420	12.950	16.390	12.920	257	7.66	1	**2451**	6	45.96	45.96	118.0	0.94	39%	OK
	FMH1028567	FMH1028566	400	35.7	16.390	12.910	17.620	12.800	325	7.66	1	**2451**	6	45.96	45.96	104.9	0.83	44%	OK
	FMH1028566	FMH1028565	400	14.2	17.620	12.790	18.210	12.750	355	7.66	1	**2451**	6	45.96	45.96	100.3	0.80	46%	OK
	FMH1028565	FMH1028564	400	8.3	18.210	12.740	18.360	12.710	277	7.66	1	**2451**	6	45.96	45.96	113.7	0.90	40%	OK
	FMH1028564	FMH1028563	400	15.8	18.360	12.700	18.290	12.660	395	7.66	1	**2451**	6	45.96	45.96	95.1	0.76	48%	OK
	FMH1028563	FMH1028562	400	13.9	18.290	12.650	18.050	12.600	278	7.66	1	**2451**	6	45.96	45.96	113.4	0.90	41%	OK
	FMH1028562	FMH1028561	400	13.4	18.050	12.590	17.820	12.550	335	7.66	1	**2451**	6	45.96	45.96	103.3	0.82	45%	OK
	FMH1028561	FMH1028560	400	10	17.820	12.540	17.600	12.510	333	7.66	1	**2451**	6	45.96	45.96	103.5	0.82	44%	OK
La Regent Park	FMH1028560	FMH1028548	400	22.6	17.600	12.500	17.660	12.270	98	8.17	1	**2613**	6	48.99	48.99	191.0	1.52	26%	OK
	FMH1028548	FMH1028547	400	3.7	17.660	12.210	17.220	12.130	46	8.17	1	**2613**	6	48.99	48.99	278.5	2.22	18%	OK
	FMH1028547	FMH1028546	400	5.4	17.220	12.100	17.080	11.930	32	8.17	1	**2613**	6	48.99	48.99	336.1	2.67	15%	OK
	FMH1028546	FMH1028545	400	27.8	17.080	11.920	14.780	11.110	34	8.17	1	**2613**	6	48.99	48.99	323.3	2.57	15%	OK
	FMH1028545	FMH1028544	400	15	14.780	11.100	13.280	10.500	25	8.17	1	**2613**	6	48.99	48.99	378.9	3.02	13%	OK
	FMH1028544	FMH1028543	400	9.7	13.280	10.490	12.930	10.150	29	8.17	1	**2613**	6	48.99	48.99	354.7	2.82	14%	OK
	FMH1028543	FMH1028542	400	9.3	12.930	10.140	12.540	9.890	37	8.17	1	**2613**	6	48.99	48.99	310.6	2.47	16%	OK
	FMH1028542	FMH1028541	400	9.4	12.540	9.880	12.160	9.520	26	8.17	1	**2613**	6	48.99	48.99	370.7	2.95	13%	OK
	FMH1028541	FMH1028540	400	6.3	12.160	9.510	12.080	9.430	79	8.17	1	**2613**	6	48.99	48.99	213.3	1.70	23%	OK
	FMH1028540	FMH1028528	400	5.3	12.080	9.420	11.810	9.290	41	8.17	1	**2613**	6	48.99	48.99	296.6	2.36	17%	OK
	FMH1028528	FMH1028527	400	5.9	11.810	9.280	11.900	9.170	54	8.17	1	**2613**	6	48.99	48.99	258.6	2.06	19%	OK
	FMH1028527	FMH1028526	300	5.2	11.900	9.160	11.440	9.030	40	8.17	1	**2613**	6	48.99	48.99	278.2	1.97	18%	OK
	FMH1028526	FMH1028525	400	5.1	11.440	9.020	11.320	8.760	20	8.17	1	**2613**	6	48.99	48.99	427.8	3.40	11%	OK
	FMH1028525	FMH1028524	400	9.2	11.320	8.740	11.110	8.710	307	8.17	1	**2613**	6	48.99	48.99	107.9	0.86	45%	OK
Kam Tsin Village	FMH1028524	FMH1028523	400	8.1	11.110	8.700	10.830	8.630	116	21.44	1	**6861**	5	107.20	107.20	175.9	1.40	61%	OK
	FMH1028523	FMH1028522	500	41.3	10.830	8.620	10.230	8.250	112	21.44	1	**6861**	5	107.20	107.20	324.3	1.65	33%	OK
	FMH1028522	FMH1028521	500	35.2	10.230	8.240	9.790	7.930	114	21.44	1	**6861**	5	107.20	107.20	321.5	1.64	33%	OK
	FMH1028521	FMH1028520	500	20.8	9.790	7.920	9.640	7.620	69	21.44	1	**6861**	5	107.20	107.20	411.6	2.10	26%	OK
Kam Tsin Village Ho Tung Kindergarten, Kam Tsin Village Ho Tung School, De La Salle Secondary School NT	FMH1028520	FMH1021544	500	27.2	9.640	7.610	10.030	7.480	209	22.34	1	**7149**	5	111.70	111.70	236.7	1.21	47%	OK
Y/NE-KTS/15 (formerly A/NE-KTS/484), A/NE-KTS/506 (formerly Y/NE-KTS/12), Y/NE-KTS/14 and Y/NE-KTS/17, Eden Place, Valais, Village areas at north of Kam Hang Road at Kam Tsin, Casas Domingo, St Paul's House of Prayer	FMH1021544	FMH1021543	500	54.9	10.030	7.440	10.130	6.860	95	75.33	1	**24106**	4	301.33	332.33	352.2	1.79	94%	OK

Pipe Information										Capacity and Velocity Check									
Pipe Segment	From Manhole ID Upstream	To Manhole ID Downstream	Pipe **(d)** Diameter mm	Pipe **(m)** Length m	Ground Level (US) mPD	Invert Level **(out)** (US) mPD	Ground Level (DS) mPD	Invert Level **(in)** (DS) mPD	Slope **(s)** Gradient 1 in	Culmulative Sewage Flow **(Q_d)** l/s	Catchment Inflow Factor **(P_{CIF})** [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow **(Q_p)** l/s	Peak Flow with Swimming Pool and Public Toilet l/s	Pipe Full Flow **(Q_c)** Capacity l/s	Pipe Full Flow **(v)** Velocity m/s	Utilization %	Flow Capacity Check
Y/KTN/2	FMH1021543	FMH1021545	600	45.1	10.130	6.410	9.750	6.060	129	81.03	1	**25928**	4	324.10	358.60	489.7	1.73	73%	OK
[6]	FMH1021545	FMH1021546	750	44.9	9.750	5.960	9.230	5.870	499	81.03	1	**25928**	4	324.10	358.60	448.9	1.02	80%	OK
	FMH1021546	FMH1021547	600	39	9.230	5.850	8.790	5.670	217	81.03	1	**25928**	4	324.10	358.60	377.4	1.33	95%	OK
	FMH1021547	FMH1021548	600	24.8	8.790	5.670	8.420	5.020	38	81.03	1	**25928**	4	324.10	358.60	900.5	3.18	40%	OK
	FMH1021548	FMH1021549	600	8.1	8.420	5.000	8.330	4.830	48	81.03	1	**25928**	4	324.10	358.60	805.7	2.85	45%	OK
	FMH1021549	FMH1021550	600	44.9	8.330	4.830	8.110	4.480	128	81.03	1	**25928**	4	324.10	358.60	490.7	1.74	73%	OK
Yin Kong Village, Toilet	FMH1021550	FMH1021551	600	5.6	8.110	4.480[9]	8.080	4.480	- [10]	84.41	1	**27011**	4	337.64	398.94	- [10]	- [10]	- [10]	OK
[6]	FMH1021551	FMH1021552	750	31.1	8.080	4.470	7.930	4.370	311	84.41	1	**27011**	4	337.64	398.94	568.9	1.29	70%	OK
[6]	FMH1021552	FMH1021553	750	37.6	7.930	4.350	7.740	4.240	342	84.41	1	**27011**	4	337.64	398.94	542.6	1.23	74%	OK
[6]	FMH1021553	FMH1021554	750	50.3	7.740	4.230	7.450	4.060	296	84.41	1	**27011**	4	337.64	398.94	583.3	1.32	68%	OK
[6]	FMH1021554	FMH1021555	750	32.5	7.450	4.060	7.370	3.930	250	84.41	1	**27011**	4	337.64	398.94	634.7	1.44	63%	OK
[6]	FMH1021555	FMH1021556	750	33	7.370	3.930	7.340	3.840	367	84.41	1	**27011**	4	337.64	398.94	523.8	1.19	76%	OK
[6]	FMH1021556	FMH1021557	750	17.6	7.340	3.840	7.280	3.780	293	84.41	1	**27011**	4	337.64	398.94	585.8	1.33	68%	OK
[6]	FMH1021557	FMH1021558	750	9.3	7.280	3.780	7.190	3.750	310	84.41	1	**27011**	4	337.64	398.94	569.8	1.29	70%	OK
[7]	FMH1021558	FMH1021559	675	13.7	7.190	3.740	7.110	3.680	228	84.41	1	**27011**	4	337.64	398.94	502.4	1.40	79%	OK
[6]	FMH1021559	FMH1021560	750	13	7.110	3.680	7.030	3.650	433	84.41	1	**27011**	4	337.64	398.94	481.8	1.09	83%	OK
[6]	FMH1021560	FMH1021561	750	11.3	7.030	3.650	7.120	3.630	565	84.41	1	**27011**	4	337.64	398.94	421.8	0.95	95%	OK
Y/FSS/19, Golf Parkview [6]	FMH1021561	FMH1021562	800	13.3	7.120	3.630	7.340	3.600	443	94.23	1	**30155**	4	376.93	444.03	565.0	1.12	79%	OK
[6]	FMH1021562	FMH1021563	750	8.8	7.340	3.600	7.490	3.600	- [10]	94.23	1	**30155**	4	376.93	444.03	- [10]	- [10]	- [10]	OK
[6]	FMH1021563	FMH1021564	750	13.4	7.490	3.600	7.510	3.530	191	94.23	1	**30155**	4	376.93	444.03	725.4	1.64	61%	OK
[6]	FMH1021564	FMH1021565	750	10.7	7.510	3.530	7.370	3.480	214	94.23	1	**30155**	4	376.93	444.03	686.1	1.55	65%	OK
[8]	FMH1021565	FMH1021566	900	7.3	7.370	3.470	7.380	3.460	730	94.23	1	**30155**	4	377.93	445.03	600.9	0.94	74%	OK
	FMH1021566	XPS1000860	600	9.9	7.380	3.450	7.380	3.450	- [10]	94.23	1	**30155**	4	377.93	445.03	- [10]	- [10]	- [10]	OK

Note:

[1] A conservative approach has been adopted, assuming that sewage discharge from the development will be discharged into the public sewage system.

[2] ks = 3mm is adopted for the "poor" condition of concrete slimed sewers. (Refer to Sewerage Manual - Key Planning Issues and Gravity Collection System by DSD, Table 5 : Recommended Roughness Values ks)

[3] Catchment Inflow factors, PCIF = 1 for North District. (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-4 : Catchment Inflow Factors, PCIF)

[4] Contribution Population= Calculation total average flow (m3/day)/0.27 (m3/person/day), where the calculated total average flow Qaverage = Qd x PCIF. (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Section 12.1)

[5] The peaking factor of 8 is adopted, when population range is <1,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 6 is adopted, when population range is 1,000 - 5,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 5 is adopted, when population range is 5,000-10,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 4 is adopted, when population range is 10,000-50,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)

[6] Upgraded by A/NE-KTS/506

[7] Upgraded by others, refer to A/NE-KTS/565

[8] Upgraded by Y/FSS/19

[9] As there is no invert level of the outlet of FMH1021550, the invert level of the inlet and outlet are assumed to be the same level, i.e. inlet invert level of FMH1021550 and outlet invert level of FMH1021550 are at +4.480 mPD.

[10] Since the invert level (out) and the invert level (in) is the same for the pipe segments between manholes FMH1021550 and FMH1021551, FMH1021562 and FMH1021563, and FMH1021566 and XPS1000860 as referred to the DSD's drainage record pipes, zero slope is encountered, and the capacity, flow velocity and utilization for these segments cannot be determined and calculated. UU survey will be conducted at the detailed design stage for these pipe segments to review the actual invert levels of these concerned sewage pipes and determine the necessity of upgrading of these pipe segments in the future. An updated SIA will be submitted for DSD approval during the detailed design stage. Should any capacity shortfall be identified, the Project Proponent will propose and implement necessary upgrading works at their own cost to the DSD's satisfaction.

Meinhardt Infrastructure & Environment Ltd.
10/F Genesis
33-35 Wong Chuk Hang Road
Hong Kong

Contract:
Proposed Amendments to the Kwu Tung South Outline Zoning Plan for Residential Development at Various Lots in D.D. 92 and D.D 94 and Adjoining Government Land in "CDA" Zone, Hang Tau Tai Po, Kwu Tung South, New Territories

Job Ref: -

Subject: Sewerage Impact Assessment

Calc. Sheet No. -

Drawing Ref.	Calculations By	Checked By	Date
-	AL	AL	10/14/2026

Sewerage Impact Assessment (Appendix D)

Scenario 2: Proposed development, Existing development, and planned developments anticipated intake year at 2031 (Upgraded Sewers by Responsible Planned Developments)

Foulwater Drains Capacity Design Check (By Colebrook White Equation)

By Colebrook White Equation

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

V = mean velocity (m/s)
g = gravitational acceleration (m/s²)
D = internal pipe diameter (m)
k_s = hydraulic pipeline roughness (m)
v = kinematic viscosity of fluid (m²/s)
s = hydraulic gradient (energy loss per unit length due to friction)

Planned Development	ADWF (m^3/d)	ADWF (L/s)	Manhole
A/NE-KTS/460	2.22	-	0.03 FMH1029682
A/NE-KTS/466	49	-	0.57 FMH1029681
A/NE-KTS/525 [1]	45.8	-	0.53 FMH1029681
A/NE-KTS/538 [1]	4.5	-	0.05 FMH1029681
Y/NE-KTS/15 (formerly A/NE-KTS/484)	792	8.3	9.17 FMH1021544
A/NE-KTS/506 (formerly Y/NE-KTS/12)	2166.4	8.3	25.07 FMH1021544
A/NE-KTS/541 [1]	2.22	-	0.03 FMH1029681
Y/NE-KTS/14 and Y/NE-KTS/17	1074	14.4	12.43 FMH1021544
Y/KTN/2	492	3.5	5.69 FMH1021543
Y/FSS/19	798.9	5.8	9.25 FMH1021561
Proposed development	383.24	6.37	4.44 FMH1029683

Existing Development		Manhole
1 St Andrews Place 聖	27.01	0.31 FMH1028584
2 Golf Villa 金錢花園別	18.87	0.22 FMH1028584
3 The Royal Oak 御林	45.88	0.53 FMH1028570
4 Ascot Park 翡翠園	16.65	0.19 FMH1028570
5 Kam Tsin Village 金	1147	13.28 FMH1028523
6 Kam Tsin Village He	4.24	0.05 FMH1028520
7 Kam Tsin Village He	19.28	0.22 FMH1028520
8 De La Salle Seconc	54.08	0.63 FMH1028520
9 St Paul's House of I	22.7	0.26 FMH1021544
10 Eden Place 桃苑	8.51	0.10 FMH1021544
11 Valais 天巒	341.88	3.96 FMH1021544
12 Yin Kong Village 燕	292.3	3.38 FMH1021550
13 Golf Parkview (高爾	49.95	0.58 FMH1021561
14 Beas River Equestr	272	3.15 FMH1028584
15 Village areas at nor	127.17	1.47 FMH1021544
16 Goodwood Park	13.69	0.16 FMH1029663
17 La Regent Park	43.66	0.51 FMH1028548
18 Casas Domingo	45.88	0.53 FMH1021544
19 Beas River Country	164	1.90 FMH1028584
20 Toilet	-	26.80 FMH1021550

Assumptions:

1. Pipe roughness, k_s [2]=	3	mm	(Refer to Sewerage Manual Part 1 - Table 5, assume "Clayware" under normal condition)
	0.3		
2. Gravitational acceleration, g =	9.81	m/s²	
3. Kinematic viscosity, v =	1.00E-06	m²/s	(Transitional flow and water at 15 degree celcius)
4. Catchment Inflow Factor, $P_{CIF=}$	1		(Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning -Table T4 - North District)

Pipe Information											Capacity and Velocity Check									
Pipe Segment	From Manhole ID Upstream	To Manhole ID Downstream	Pipe **(d)** Diameter mm	Pipe **(m)** Length m	Ground Level (US) mPD	Invert Level **(out)** (US) mPD	Ground Level (DS) mPD	Invert Level **(in)** (DS) mPD	Slope **(s)** Gradient 1 in	Culmulative Sewage Flow **(Q_d)** l/s	Catchment Inflow Factor **(P_{CIF})** [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow **(Q_p)** l/s	Peak Flow with Swimming Pool and Public Toilet l/s	Pipe Full Flow **(Q_c)** Capacity l/s	Pipe Full Flow **(v)** Velocity m/s	Utilization %	Flow Capacity Check
A/NE-KTS/466, A/NE-KTS/525, A/NE-KTS/538, A/NE-KTS/541	FMH1029681	FMH1029682	300	22	12.980	9.270	12.870	9.070	110	1.18	1	**376**	8	9.40	9.40	83.8	1.19	11%	OK
A/NE-KTS/460	FMH1029682	FMH1029683	300	31	12.870	9.060	11.600	8.860	155	1.20	1	**384**	8	9.61	9.61	70.6	1.00	14%	OK
Proposed development	P1 [11]	FMH1029683	225	10.1	12.550	9.050	11.600	8.950	101	4.44	1	**1419**	6	26.61	32.98	40.5	1.02	81%	OK
Proposed development, Goodwood Park	FMH1029683	FMH1029680	300	24	11.600	8.850	11.180	8.680	141	5.79	1	**1854**	6	34.77	41.13	73.9	1.05	56%	OK
	FMH1028600	FMH1028601	300	22	24.840	23.470	22.920	21.620	12	5.79	1	**1854**	6	34.77	41.13	254.1	3.59	16%	OK
	FMH1028601	FMH1028602	300	19	22.920	21.620	21.230	20.080	12	5.79	1	**1854**	6	34.77	41.13	249.9	3.54	16%	OK
	FMH1028602	FMH1028603	300	38.8	21.230	20.070	19.240	17.640	16	5.79	1	**1854**	6	34.77	41.13	220.2	3.12	19%	OK
	FMH1028603	FMH1028591	300	20.2	19.240	17.630	19.070	17.200	47	5.79	1	**1854**	6	34.77	41.13	128.3	1.82	32%	OK
	FMH1028591	FMH1028590	300	18.2	19.070	17.190	18.580	16.610	31	5.79	1	**1854**	6	34.77	41.13	157.1	2.22	26%	OK
	FMH1028590	FMH1028589	300	27.3	18.580	16.600	17.010	15.560	26	5.79	1	**1854**	6	34.77	41.13	171.7	2.43	24%	OK
	FMH1028589	FMH1028588	300	29.1	17.010	15.540	16.170	14.720	35	5.79	1	**1854**	6	34.77	41.13	147.7	2.09	28%	OK

Pipe Information										Capacity and Velocity Check									
Pipe Segment	From	To	Pipe **(d)**	Pipe **(m)**	Ground Level	Invert Level **(out)**	Ground Level	Invert Level **(in)**	Slope **(s)**	Culmulative Sewage Flow (Q_d)	Catchment Inflow Factor (P_{CIF}) [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow (Q_p)	Peak Flow with Swimming Pool and Public Toilet	Pipe Full Flow (Q_c)	Pipe Full Flow **(v)**	Utilization	Flow Capacity
	Manhole ID Upstream	Manhole ID Downstream	Diameter mm	Length m	(US) mPD	(US) mPD	(DS) mPD	(DS) mPD	Gradient 1 in	l/s				l/s	l/s	Capacity l/s	Velocity m/s	%	Check
	FMH1028588	FMH1028587	300	30.9	16.170	14.710	15.730	14.380	94	5.79	1	**1854**	6	34.77	41.13	90.8	1.29	45%	OK
	FMH1028587	FMH1028586	400	25.3	15.730	14.300	15.480	13.750	46	5.79	1	**1854**	6	34.77	41.13	279.2	2.22	15%	OK
	FMH1028586	FMH1028585	400	24.9	15.480	13.750	15.440	13.670	311	5.79	1	**1854**	6	34.77	41.13	107.1	0.85	38%	OK
	FMH1028585	FMH1028584	400	24.6	15.440	13.660	15.340	13.560	246	5.79	1	**1854**	6	34.77	41.13	120.6	0.96	34%	OK
St Andrews Place, Golf Villa, Beas River Equestrian, Beas River Country Park	FMH1028584	FMH1028583	400	15.3	15.340	13.550	15.410	13.500	306	11.37	1	**3639**	6	68.23	74.60	108.1	0.86	69%	OK
	FMH1028583	FMH1028582	400	32.4	15.410	13.490	15.560	13.390	324	11.37	1	**3639**	6	68.23	74.60	105.0	0.84	71%	OK
	FMH1028582	FMH1028581	400	35.4	15.560	13.380	15.680	13.280	354	11.37	1	**3639**	6	68.23	74.60	100.4	0.80	74%	OK
	FMH1028581	FMH1028580	400	17.2	15.680	13.270	15.820	13.210	287	11.37	1	**3639**	6	68.23	74.60	111.7	0.89	67%	OK
	FMH1028580	FMH1028570	400	38.2	15.820	13.200	16.130	13.100	382	11.37	1	**3639**	6	68.23	74.60	96.7	0.77	77%	OK
The Royal Oak, Ascot Park	FMH1028570	FMH1028569	400	32.8	16.130	13.090	16.490	12.980	298	12.10	1	**3871**	6	72.58	78.94	109.5	0.87	72%	OK
	FMH1028569	FMH1028568	400	9.1	16.490	12.970	16.420	12.960	910	12.10	1	**3871**	6	72.58	78.94	62.5	0.50	126%	Fail
	FMH1028568	FMH1028567	400	7.7	16.420	12.950	16.390	12.920	257	12.10	1	**3871**	6	72.58	78.94	118.0	0.94	67%	OK
	FMH1028567	FMH1028566	400	35.7	16.390	12.910	17.620	12.800	325	12.10	1	**3871**	6	72.58	78.94	104.9	0.83	75%	OK
	FMH1028566	FMH1028565	400	14.2	17.620	12.790	18.210	12.750	355	12.10	1	**3871**	6	72.58	78.94	100.3	0.80	79%	OK
	FMH1028565	FMH1028564	400	8.3	18.210	12.740	18.360	12.710	277	12.10	1	**3871**	6	72.58	78.94	113.7	0.90	69%	OK
	FMH1028564	FMH1028563	400	15.8	18.360	12.700	18.290	12.660	395	12.10	1	**3871**	6	72.58	78.94	95.1	0.76	83%	OK
	FMH1028563	FMH1028562	400	13.9	18.290	12.650	18.050	12.600	278	12.10	1	**3871**	6	72.58	78.94	113.4	0.90	70%	OK
	FMH1028562	FMH1028561	400	13.4	18.050	12.590	17.820	12.550	335	12.10	1	**3871**	6	72.58	78.94	103.3	0.82	76%	OK
	FMH1028561	FMH1028560	400	10	17.820	12.540	17.600	12.510	333	12.10	1	**3871**	6	72.58	78.94	103.5	0.82	76%	OK
La Regent Park	FMH1028560	FMH1028548	400	22.6	17.600	12.500	17.660	12.270	98	12.60	1	**4032**	6	75.61	81.97	191.0	1.52	43%	OK
	FMH1028548	FMH1028547	400	3.7	17.660	12.210	17.220	12.130	46	12.60	1	**4032**	6	75.61	81.97	278.5	2.22	29%	OK
	FMH1028547	FMH1028546	400	5.4	17.220	12.100	17.080	11.930	32	12.60	1	**4032**	6	75.61	81.97	336.1	2.67	24%	OK
	FMH1028546	FMH1028545	400	27.8	17.080	11.920	14.780	11.110	34	12.60	1	**4032**	6	75.61	81.97	323.3	2.57	25%	OK
	FMH1028545	FMH1028544	400	15	14.780	11.100	13.280	10.500	25	12.60	1	**4032**	6	75.61	81.97	378.9	3.02	22%	OK
	FMH1028544	FMH1028543	400	9.7	13.280	10.490	12.930	10.150	29	12.60	1	**4032**	6	75.61	81.97	354.7	2.82	23%	OK
	FMH1028543	FMH1028542	400	9.3	12.930	10.140	12.540	9.890	37	12.60	1	**4032**	6	75.61	81.97	310.6	2.47	26%	OK
	FMH1028542	FMH1028541	400	9.4	12.540	9.880	12.160	9.520	26	12.60	1	**4032**	6	75.61	81.97	370.7	2.95	22%	OK
	FMH1028541	FMH1028540	400	6.3	12.160	9.510	12.080	9.430	79	12.60	1	**4032**	6	75.61	81.97	213.3	1.70	38%	OK
	FMH1028540	FMH1028528	400	5.3	12.080	9.420	11.810	9.290	41	12.60	1	**4032**	6	75.61	81.97	296.6	2.36	28%	OK
	FMH1028528	FMH1028527	400	5.9	11.810	9.280	11.900	9.170	54	12.60	1	**4032**	6	75.61	81.97	258.6	2.06	32%	OK
	FMH1028527	FMH1028526	300	5.2	11.900	9.160	11.440	9.030	40	12.60	1	**4032**	6	75.61	81.97	278.2	1.97	29%	OK
	FMH1028526	FMH1028525	400	5.1	11.440	9.020	11.320	8.760	20	12.60	1	**4032**	6	75.61	81.97	427.8	3.40	19%	OK
	FMH1028525	FMH1028524	400	9.2	11.320	8.740	11.110	8.710	307	12.60	1	**4032**	6	75.61	81.97	107.9	0.86	76%	OK
Kam Tsin Village	FMH1028524	FMH1028523	400	8.1	11.110	8.700	10.830	8.630	116	25.88	1	**8281**	5	129.38	135.75	175.9	1.40	77%	OK
	FMH1028523	FMH1028522	500	41.3	10.830	8.620	10.230	8.250	112	25.88	1	**8281**	5	129.38	135.75	324.3	1.65	42%	OK
	FMH1028522	FMH1028521	500	35.2	10.230	8.240	9.790	7.930	114	25.88	1	**8281**	5	129.38	135.75	321.5	1.64	42%	OK
	FMH1028521	FMH1028520	500	20.8	9.790	7.920	9.640	7.620	69	25.88	1	**8281**	5	129.38	135.75	411.6	2.10	33%	OK
Kam Tsin Village Ho Tung Kindergarten, Kam Tsin Village Ho Tung School, De La Salle Secondary School NT	FMH1028520	FMH1021544	500	27.2	9.640	7.610	10.030	7.480	209	26.77	1	**8568**	5	133.87	140.24	236.7	1.21	59%	OK

Pipe Information											Capacity and Velocity Check									
Pipe Segment	From Manhole ID Upstream	To Manhole ID Downstream	Pipe **(d)** Diameter mm	Pipe **(m)** Length m	Ground Level (US) mPD	Invert Level **(out)** (US) mPD	Ground Level (DS) mPD	Invert Level **(in)** (DS) mPD	Slope **(s)** Gradient 1 in	Culmulative Sewage Flow **(Q_d)** l/s	Catchment Inflow Factor **(P_{CIF})** [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow **(Q_p)** l/s	Peak Flow with Swimming Pool and Public Toilet l/s	Pipe Full Flow **(Q_c)** Capacity l/s	Pipe Full Flow **(v)** Velocity m/s	Utilization %	Flow Capacity Check
Y/NE-KTS/15 (formerly A/NE-KTS/484), A/NE-KTS/506 (formerly Y/NE-KTS/12), Y/NE-KTS/14 and Y/NE-KTS/17, Eden Place, Valais, Village areas at north of Kam Hang Road at Kam Tsin, Casas Domingo, St Paul's House of Prayer	FMH1021544	FMH1021543	500	54.9	10.030	7.440	10.130	6.860	95	79.77	1	**25525**	4	319.07	356.43	352.2	1.79	101%	Fail
Y/KTN/2	FMH1021543	FMH1021545	600	45.1	10.130	6.410	9.750	6.060	129	85.46	1	**27348**	4	341.85	382.71	489.7	1.73	78%	OK
[6]	FMH1021545	FMH1021546	750	44.9	9.750	5.960	9.230	5.870	499	85.46	1	**27348**	4	341.85	382.71	448.9	1.02	85%	OK
	FMH1021546	FMH1021547	600	39	9.230	5.850	8.790	5.670	217	85.46	1	**27348**	4	341.85	382.71	377.4	1.33	101%	Fail
	FMH1021547	FMH1021548	600	24.8	8.790	5.670	8.420	5.020	38	85.46	1	**27348**	4	341.85	382.71	900.5	3.18	43%	OK
	FMH1021548	FMH1021549	600	8.1	8.420	5.000	8.330	4.830	48	85.46	1	**27348**	4	341.85	382.71	805.7	2.85	47%	OK
	FMH1021549	FMH1021550	600	44.9	8.330	4.830	8.110	4.480	128	85.46	1	**27348**	4	341.85	382.71	490.7	1.74	78%	OK
Yin Kong Village, Toilet	FMH1021550	FMH1021551	600	5.6	8.110	4.480[9]	8.080	4.480	- [10]	88.84	1	**28430**	4	355.38	423.04	- [10]	- [10]	- [10]	OK
[6]	FMH1021551	FMH1021552	750	31.1	8.080	4.470	7.930	4.370	311	88.84	1	**28430**	4	355.38	423.04	568.9	1.29	74%	OK
[6]	FMH1021552	FMH1021553	750	37.6	7.930	4.350	7.740	4.240	342	88.84	1	**28430**	4	355.38	423.04	542.6	1.23	78%	OK
[6]	FMH1021553	FMH1021554	750	50.3	7.740	4.230	7.450	4.060	296	88.84	1	**28430**	4	355.38	423.04	583.3	1.32	73%	OK
[6]	FMH1021554	FMH1021555	750	32.5	7.450	4.060	7.370	3.930	250	88.84	1	**28430**	4	355.38	423.04	634.7	1.44	67%	OK
[6]	FMH1021555	FMH1021556	750	33	7.370	3.930	7.340	3.840	367	88.84	1	**28430**	4	355.38	423.04	523.8	1.19	81%	OK
[6]	FMH1021556	FMH1021557	750	17.6	7.340	3.840	7.280	3.780	293	88.84	1	**28430**	4	355.38	423.04	585.8	1.33	72%	OK
[6]	FMH1021557	FMH1021558	750	9.3	7.280	3.780	7.190	3.750	310	88.84	1	**28430**	4	355.38	423.04	569.8	1.29	74%	OK
[7]	FMH1021558	FMH1021559	675	13.7	7.190	3.740	7.110	3.680	228	88.84	1	**28430**	4	355.38	423.04	502.4	1.40	84%	OK
[6]	FMH1021559	FMH1021560	750	13	7.110	3.680	7.030	3.650	433	88.84	1	**28430**	4	355.38	423.04	481.8	1.09	88%	OK
[6]	FMH1021560	FMH1021561	750	11.3	7.030	3.650	7.120	3.630	565	88.84	1	**28430**	4	355.38	423.04	421.8	0.95	100%	Fail
Y/FSS/19, Golf Parkview [6]	FMH1021561	FMH1021562	800	13.3	7.120	3.630	7.340	3.600	443	98.67	1	**31574**	4	394.68	468.14	565.0	1.12	83%	OK
[6]	FMH1021562	FMH1021563	750	8.8	7.340	3.600	7.490	3.600	- [10]	98.67	1	**31574**	4	394.68	468.14	- [10]	- [10]	- [10]	OK
[6]	FMH1021563	FMH1021564	750	13.4	7.490	3.600	7.510	3.530	191	98.67	1	**31574**	4	394.68	468.14	725.4	1.64	65%	OK
[6]	FMH1021564	FMH1021565	750	10.7	7.510	3.530	7.370	3.480	214	98.67	1	**31574**	4	394.68	468.14	686.1	1.55	68%	OK
[8]	FMH1021565	FMH1021566	900	7.3	7.370	3.470	7.380	3.460	730	98.67	1	**31574**	4	395.68	469.14	600.9	0.94	78%	OK
	FMH1021566	XPS1000860	600	9.9	7.380	3.450	7.380	3.450	- [10]	98.67	1	**31574**	4	395.68	469.14	- [10]	- [10]	- [10]	OK

Note:

[1] A conservative approach has been adopted, assuming that sewage discharge from the development will be discharged into the public sewage system.

[2] ks = 3mm is adopted for the "poor" condition of concrete slimed sewers. (Refer to Sewerage Manual - Key Planning Issues and Gravity Collection System by DSD, Table 5 : Recommended Roughness Values ks)

[3] Catchment Inflow factors, PCIF = 1 for North District. (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-4 : Catchment Inflow Factors, PCIF)

[4] Contribution Population= Calculation total average flow (m3/day)/0.27 (m3/person/day), where the calculated total average flow Qaverage = Qd x PCIF. (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Section 12.1)

[5] The peaking factor of 8 is adopted, when population range is <1,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 6 is adopted, when population range is 1,000 - 5,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 5 is adopted, when population range is 5,000-10,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 4 is adopted, when population range is 10,000-50,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)

[6] Upgraded by A/NE-KTS/506

[7] Upgraded by others, refer to A/NE-KTS/565

[8] Upgraded by Y/FSS/19

[9] As there is no invert level of the outlet of FMH1021550, the invert level of the inlet and outlet are assumed to be the same level, i.e. inlet invert level of FMH1021550 and outlet invert level of FMH1021550 are at +4.480 mPD.

[10] Since the invert level (out) and the invert level (in) is the same for the pipe segments between manholes FMH1021550 and FMH1021551, FMH1021562 and FMH1021563, and FMH1021566 and XPS1000860 as referred to the DSD's drainage record pipes, zero slope is encountered, and the capacity, flow velocity and utilization for these segments cannot be determined and calculated. UU survey will be conducted at the detailed design stage for these pipe segments to review the actual invert levels of these concerned sewage pipes and determine the necessity of upgrading of these pipe segments in the future. An updated SIA will be submitted for DSD approval during the detailed design stage. Should any capacity shortfall be identified, the Project Proponent will propose and implement necessary upgrading works at their own cost to the DSD's satisfaction.

[11] P1 refers to the proposed terminal sewer illustrated in Figure 3.1 of the SIA Report. A nominal sewer gradient of 1:100 has been adopted for the preliminary design. The final invert levels of the proposed manhole will be confirmed and may be adjusted during the detailed design stage.

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Contract:
Proposed Amendments to the Kwu Tung South Outline Zoning Plan for Residential Development at Various Lots in D.D. 92 and D.D 94 and Adjoining Government Land in "CDA" Zone, Hang Tau Tai Po, Kwu Tung South, New Territories

Job Ref: -

Subject: Sewerage Impact Assessment

Calc. Sheet No. -

Drawing Ref.	Calculations By	Checked By	Date
-	AL	AL	10/14/2026

Sewerage Impact Assessment (Appendix D)
Scenario 3: Proposed development, Existing development, and planned developments anticipated intake year at 2031 (Upgraded Sewers by Responsible Planned Developments & Upgraded Sewers by Proposed Development)

Foulwater Drains Capacity Design Check (By Colebrook White Equation)

By Colebrook White Equation

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

V = mean velocity (m/s)
g = gravitational acceleration (m/s²)
D = internal pipe diameter (m)
k_s = hydraulic pipeline roughness (m)
v = kinematic viscosity of fluid (m²/s)
s = hydraulic gradient (energy loss per unit length due to friction)

Planned Development	ADWF (m^3/d)	ADWF (L/s)	Manhole
A/NE-KTS/460	2.22	-	0.03 FMH1029682
A/NE-KTS/466	49	-	0.57 FMH1029681
A/NE-KTS/525 [1]	45.8	-	0.53 FMH1029681
A/NE-KTS/538 [1]	4.5	-	0.05 FMH1029681
Y/NE-KTS/15 (formerly A/NE-KTS/484)	792	8.3	9.17 FMH1021544
A/NE-KTS/506 (formerly Y/NE-KTS/12)	2166.4	8.3	25.07 FMH1021544
A/NE-KTS/541 [1]	2.22	-	0.03 FMH1029681
Y/NE-KTS/14 and Y/NE-KTS/17	1074	14.4	12.43 FMH1021544
Y/KTN/2	492	3.5	5.69 FMH1021543
Y/FSS/19	798.9	5.8	9.25 FMH1021561
Proposed development	383.24	6.37	4.44 FMH1029683

Existing Development		Manhole
1 St Andrews Place 聖	27.01	0.31 FMH1028584
2 Golf Villa 金錢花園別	18.87	0.22 FMH1028584
3 The Royal Oak 御林	45.88	0.53 FMH1028570
4 Ascot Park 翡翠園	16.65	0.19 FMH1028570
5 Kam Tsin Village 金	1147	13.28 FMH1028523
6 Kam Tsin Village He	4.24	0.05 FMH1028520
7 Kam Tsin Village He	19.28	0.22 FMH1028520
8 De La Salle Seconc	54.08	0.63 FMH1028520
9 St Paul's House of I	22.7	0.26 FMH1021544
10 Eden Place 桃苑	8.51	0.10 FMH1021544
11 Valais 天巒	341.88	3.96 FMH1021544
12 Yin Kong Village 燕	292.3	3.38 FMH1021550
13 Golf Parkview (高爾	49.95	0.58 FMH1021561
14 Beas River Equestr	272	3.15 FMH1028584
15 Village areas at nor	127.17	1.47 FMH1021544
16 Goodwood Park	13.69	0.16 FMH1029663
17 La Regent Park	43.66	0.51 FMH1028548
18 Casas Domingo	45.88	0.53 FMH1021544
19 Beas River Country	164	1.90 FMH1028584
20 Toilet	-	26.80 FMH1021550

Assumptions:

1. Pipe roughness, k_s [2]=	3	mm	(Refer to Sewerage Manual Part 1 - Table 5, assume "Clayware" under normal condition)
	0.3		
2. Gravitational acceleration, g =	9.81	m/s²	
3. Kinematic viscosity, v =	1.00E-06	m²/s	(Transitional flow and water at 15 degree celcius)
4. Catchment Inflow Factor, $P_{CIF=}$	1		(Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning -Table T4 - North District)

Pipe Information											Capacity and Velocity Check									
Pipe Segment	From Manhole ID Upstream	To Manhole ID Downstream	Pipe **(d)** Diameter mm	Pipe **(m)** Length m	Ground Level (US) mPD	Invert Level **(out)** (US) mPD	Ground Level (DS) mPD	Invert Level **(in)** (DS) mPD	Slope **(s)** Gradient 1 in	Culmulative Sewage Flow **(Q_d)** l/s	Catchment Inflow Factor **(P_{CIF})** [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow **(Q_p)** l/s	Peak Flow with Swimming Pool and Public Toilet l/s	Pipe Full Flow **(Q_c)** Capacity l/s	Pipe Full Flow **(v)** Velocity m/s	Utilization %	Flow Capacity Check
A/NE-KTS/466, A/NE-KTS/525, A/NE-KTS/538, A/NE-KTS/541	FMH1029681	FMH1029682	300	22	12.980	9.270	12.870	9.070	110	1.18	1	**376**	8	9.40	9.40	83.8	1.19	11%	OK
A/NE-KTS/460	FMH1029682	FMH1029683	300	31	12.870	9.060	11.600	8.860	155	1.20	1	**384**	8	9.61	9.61	70.6	1.00	14%	OK
Proposed development	P1 [11]	FMH1029683	225	10.1	12.550	9.050	11.600	8.950	101	4.44	1	**1419**	6	26.61	32.98	40.5	1.02	81%	OK
Goodwood Park	FMH1029683	FMH1029680	300	24	11.600	8.850	11.180	8.680	141	5.79	1	**1854**	6	34.77	34.77	73.9	1.05	47%	OK
	FMH1028600	FMH1028601	300	22	24.840	23.470	22.920	21.620	12	5.79	1	**1854**	6	34.77	41.13	254.1	3.59	16%	OK
	FMH1028601	FMH1028602	300	19	22.920	21.620	21.230	20.080	12	5.79	1	**1854**	6	34.77	41.13	249.9	3.54	16%	OK
	FMH1028602	FMH1028603	300	38.8	21.230	20.070	19.240	17.640	16	5.79	1	**1854**	6	34.77	41.13	220.2	3.12	19%	OK
	FMH1028603	FMH1028591	300	20.2	19.240	17.630	19.070	17.200	47	5.79	1	**1854**	6	34.77	41.13	128.3	1.82	32%	OK
	FMH1028591	FMH1028590	300	18.2	19.070	17.190	18.580	16.610	31	5.79	1	**1854**	6	34.77	41.13	157.1	2.22	26%	OK
	FMH1028590	FMH1028589	300	27.3	18.580	16.600	17.010	15.560	26	5.79	1	**1854**	6	34.77	41.13	171.7	2.43	24%	OK
	FMH1028589	FMH1028588	300	29.1	17.010	15.540	16.170	14.720	35	5.79	1	**1854**	6	34.77	41.13	147.7	2.09	28%	OK

Pipe Information										Capacity and Velocity Check									
Pipe Segment	From	To	Pipe **(d)**	Pipe **(m)**	Ground Level	Invert Level **(out)**	Ground Level	Invert Level **(in)**	Slope **(s)**	Culmulative Sewage Flow (Q_d)	Catchment Inflow Factor (P_{CIF}) [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow (Q_p)	Peak Flow with Swimming Pool and Public Toilet	Pipe Full Flow (Q_c)	Pipe Full Flow **(v)**	Utilization	Flow Capacity
	Manhole ID Upstream	Manhole ID Downstream	Diameter mm	Length m	(US) mPD	(US) mPD	(DS) mPD	(DS) mPD	Gradient 1 in	l/s				l/s	l/s	Capacity l/s	Velocity m/s	%	Check
	FMH1028588	FMH1028587	300	30.9	16.170	14.710	15.730	14.380	94	5.79	1	**1854**	6	34.77	41.13	90.8	1.29	45%	OK
	FMH1028587	FMH1028586	400	25.3	15.730	14.300	15.480	13.750	46	5.79	1	**1854**	6	34.77	41.13	279.2	2.22	15%	OK
	FMH1028586	FMH1028585	400	24.9	15.480	13.750	15.440	13.670	311	5.79	1	**1854**	6	34.77	41.13	107.1	0.85	38%	OK
	FMH1028585	FMH1028584	400	24.6	15.440	13.660	15.340	13.560	246	5.79	1	**1854**	6	34.77	41.13	120.6	0.96	34%	OK
St Andrews Place, Golf Villa, Beas River Equestrian, Beas River Country Park	FMH1028584	FMH1028583	400	15.3	15.340	13.550	15.410	13.500	306	11.37	1	**3639**	6	68.23	74.60	108.1	0.86	69%	OK
	FMH1028583	FMH1028582	400	32.4	15.410	13.490	15.560	13.390	324	11.37	1	**3639**	6	68.23	74.60	105.0	0.84	71%	OK
	FMH1028582	FMH1028581	400	35.4	15.560	13.380	15.680	13.280	354	11.37	1	**3639**	6	68.23	74.60	100.4	0.80	74%	OK
	FMH1028581	FMH1028580	400	17.2	15.680	13.270	15.820	13.210	287	11.37	1	**3639**	6	68.23	74.60	111.7	0.89	67%	OK
	FMH1028580	FMH1028570	400	38.2	15.820	13.200	16.130	13.100	382	11.37	1	**3639**	6	68.23	74.60	96.7	0.77	77%	OK
The Royal Oak, Ascot Park	FMH1028570	FMH1028569	400	32.8	16.130	13.090	16.490	12.980	298	12.10	1	**3871**	6	72.58	78.94	109.5	0.87	72%	OK
	FMH1028569	FMH1028568	500	9.1	16.490	12.970	16.420	12.960	910	12.10	1	**3871**	6	72.58	78.94	113.2	0.58	70%	OK
	FMH1028568	FMH1028567	400	7.7	16.420	12.950	16.390	12.920	257	12.10	1	**3871**	6	72.58	78.94	118.0	0.94	67%	OK
	FMH1028567	FMH1028566	400	35.7	16.390	12.910	17.620	12.800	325	12.10	1	**3871**	6	72.58	78.94	104.9	0.83	75%	OK
	FMH1028566	FMH1028565	400	14.2	17.620	12.790	18.210	12.750	355	12.10	1	**3871**	6	72.58	78.94	100.3	0.80	79%	OK
	FMH1028565	FMH1028564	400	8.3	18.210	12.740	18.360	12.710	277	12.10	1	**3871**	6	72.58	78.94	113.7	0.90	69%	OK
	FMH1028564	FMH1028563	400	15.8	18.360	12.700	18.290	12.660	395	12.10	1	**3871**	6	72.58	78.94	95.1	0.76	83%	OK
	FMH1028563	FMH1028562	400	13.9	18.290	12.650	18.050	12.600	278	12.10	1	**3871**	6	72.58	78.94	113.4	0.90	70%	OK
	FMH1028562	FMH1028561	400	13.4	18.050	12.590	17.820	12.550	335	12.10	1	**3871**	6	72.58	78.94	103.3	0.82	76%	OK
	FMH1028561	FMH1028560	400	10	17.820	12.540	17.600	12.510	333	12.10	1	**3871**	6	72.58	78.94	103.5	0.82	76%	OK
La Regent Park	FMH1028560	FMH1028548	400	22.6	17.600	12.500	17.660	12.270	98	12.60	1	**4032**	6	75.61	81.97	191.0	1.52	43%	OK
	FMH1028548	FMH1028547	400	3.7	17.660	12.210	17.220	12.130	46	12.60	1	**4032**	6	75.61	81.97	278.5	2.22	29%	OK
	FMH1028547	FMH1028546	400	5.4	17.220	12.100	17.080	11.930	32	12.60	1	**4032**	6	75.61	81.97	336.1	2.67	24%	OK
	FMH1028546	FMH1028545	400	27.8	17.080	11.920	14.780	11.110	34	12.60	1	**4032**	6	75.61	81.97	323.3	2.57	25%	OK
	FMH1028545	FMH1028544	400	15	14.780	11.100	13.280	10.500	25	12.60	1	**4032**	6	75.61	81.97	378.9	3.02	22%	OK
	FMH1028544	FMH1028543	400	9.7	13.280	10.490	12.930	10.150	29	12.60	1	**4032**	6	75.61	81.97	354.7	2.82	23%	OK
	FMH1028543	FMH1028542	400	9.3	12.930	10.140	12.540	9.890	37	12.60	1	**4032**	6	75.61	81.97	310.6	2.47	26%	OK
	FMH1028542	FMH1028541	400	9.4	12.540	9.880	12.160	9.520	26	12.60	1	**4032**	6	75.61	81.97	370.7	2.95	22%	OK
	FMH1028541	FMH1028540	400	6.3	12.160	9.510	12.080	9.430	79	12.60	1	**4032**	6	75.61	81.97	213.3	1.70	38%	OK
	FMH1028540	FMH1028528	400	5.3	12.080	9.420	11.810	9.290	41	12.60	1	**4032**	6	75.61	81.97	296.6	2.36	28%	OK
	FMH1028528	FMH1028527	400	5.9	11.810	9.280	11.900	9.170	54	12.60	1	**4032**	6	75.61	81.97	258.6	2.06	32%	OK
	FMH1028527	FMH1028526	300	5.2	11.900	9.160	11.440	9.030	40	12.60	1	**4032**	6	75.61	81.97	278.2	1.97	29%	OK
	FMH1028526	FMH1028525	400	5.1	11.440	9.020	11.320	8.760	20	12.60	1	**4032**	6	75.61	81.97	427.8	3.40	19%	OK
	FMH1028525	FMH1028524	400	9.2	11.320	8.740	11.110	8.710	307	12.60	1	**4032**	6	75.61	81.97	107.9	0.86	76%	OK
Kam Tsin Village	FMH1028524	FMH1028523	400	8.1	11.110	8.700	10.830	8.630	116	25.88	1	**8281**	5	129.38	135.75	175.9	1.40	77%	OK
	FMH1028523	FMH1028522	500	41.3	10.830	8.620	10.230	8.250	112	25.88	1	**8281**	5	129.38	135.75	324.3	1.65	42%	OK
	FMH1028522	FMH1028521	500	35.2	10.230	8.240	9.790	7.930	114	25.88	1	**8281**	5	129.38	135.75	321.5	1.64	42%	OK
	FMH1028521	FMH1028520	500	20.8	9.790	7.920	9.640	7.620	69	25.88	1	**8281**	5	129.38	135.75	411.6	2.10	33%	OK
Kam Tsin Village Ho Tung Kindergarten, Kam Tsin Village Ho Tung School, De La Salle Secondary School NT	FMH1028520	FMH1021544	500	27.2	9.640	7.610	10.030	7.480	209	26.77	1	**8568**	5	133.87	140.24	236.7	1.21	59%	OK

Pipe Information											Capacity and Velocity Check									
Pipe Segment	From Manhole ID Upstream	To Manhole ID Downstream	Pipe **(d)** Diameter mm	Pipe **(m)** Length m	Ground Level (US) mPD	Invert Level **(out)** (US) mPD	Ground Level (DS) mPD	Invert Level **(in)** (DS) mPD	Slope **(s)** Gradient 1 in	Culmulative Sewage Flow **(Q_d)** l/s	Catchment Inflow Factor **(P_{CIF})** [3]	Population **(CP)** [4]	Peak Factor **(PF)** [5]	Culmulative Sewage Flow **(Q_p)** l/s	Peak Flow with Swimming Pool and Public Toilet l/s	Pipe Full Flow **(Q_c)** Capacity l/s	Pipe Full Flow **(v)** Velocity m/s	Utilization %	Flow Capacity Check
Y/NE-KTS/15 (formerly A/NE-KTS/484), A/NE-KTS/506 (formerly Y/NE-KTS/12), Y/NE-KTS/14 and Y/NE-KTS/17, Eden Place, Valais, Village areas at north of Kam Hang Road at Kam Tsin, Casas Domingo, St Paul's House of Prayer	FMH1021544	FMH1021543	600	54.9	10.030	7.440	10.130	6.860	95	79.77	1	**25525**	4	319.07	356.43	571.4	2.02	62%	OK
Y/KTN/2	FMH1021543	FMH1021545	600	45.1	10.130	6.410	9.750	6.060	129	85.46	1	**27348**	4	341.85	382.71	489.7	1.73	78%	OK
[6]	FMH1021545	FMH1021546	750	44.9	9.750	5.960	9.230	5.870	499	85.46	1	**27348**	4	341.85	382.71	448.9	1.02	85%	OK
	FMH1021546	FMH1021547	650	39	9.230	5.850	8.790	5.670	217	85.46	1	**27348**	4	341.85	382.71	466.7	1.41	82%	OK
	FMH1021547	FMH1021548	600	24.8	8.790	5.670	8.420	5.020	38	85.46	1	**27348**	4	341.85	382.71	900.5	3.18	43%	OK
	FMH1021548	FMH1021549	600	8.1	8.420	5.000	8.330	4.830	48	85.46	1	**27348**	4	341.85	382.71	805.7	2.85	47%	OK
	FMH1021549	FMH1021550	600	44.9	8.330	4.830	8.110	4.480	128	85.46	1	**27348**	4	341.85	382.71	490.7	1.74	78%	OK
Yin Kong Village, Toilet	FMH1021550	FMH1021551	600	5.6	8.110	4.480[9]	8.080	4.480	- [10]	88.84	1	**28430**	4	355.38	423.04	- [10]	- [10]	- [10]	OK
[6]	FMH1021551	FMH1021552	750	31.1	8.080	4.470	7.930	4.370	311	88.84	1	**28430**	4	355.38	423.04	568.9	1.29	74%	OK
[6]	FMH1021552	FMH1021553	750	37.6	7.930	4.350	7.740	4.240	342	88.84	1	**28430**	4	355.38	423.04	542.6	1.23	78%	OK
[6]	FMH1021553	FMH1021554	750	50.3	7.740	4.230	7.450	4.060	296	88.84	1	**28430**	4	355.38	423.04	583.3	1.32	73%	OK
[6]	FMH1021554	FMH1021555	750	32.5	7.450	4.060	7.370	3.930	250	88.84	1	**28430**	4	355.38	423.04	634.7	1.44	67%	OK
[6]	FMH1021555	FMH1021556	750	33	7.370	3.930	7.340	3.840	367	88.84	1	**28430**	4	355.38	423.04	523.8	1.19	81%	OK
[6]	FMH1021556	FMH1021557	750	17.6	7.340	3.840	7.280	3.780	293	88.84	1	**28430**	4	355.38	423.04	585.8	1.33	72%	OK
[6]	FMH1021557	FMH1021558	750	9.3	7.280	3.780	7.190	3.750	310	88.84	1	**28430**	4	355.38	423.04	569.8	1.29	74%	OK
[7]	FMH1021558	FMH1021559	675	13.7	7.190	3.740	7.110	3.680	228	88.84	1	**28430**	4	355.38	423.04	502.4	1.40	84%	OK
[6]	FMH1021559	FMH1021560	750	13	7.110	3.680	7.030	3.650	433	88.84	1	**28430**	4	355.38	423.04	481.8	1.09	88%	OK
[6]	FMH1021560	FMH1021561	800	11.3	7.030	3.650	7.120	3.630	565	88.84	1	**28430**	4	355.38	423.04	500.4	1.00	85%	OK
Y/FSS/19, Golf Parkview [6]	FMH1021561	FMH1021562	800	13.3	7.120	3.630	7.340	3.600	443	98.67	1	**31574**	4	394.68	468.14	565.0	1.12	83%	OK
[6]	FMH1021562	FMH1021563	750	8.8	7.340	3.600	7.490	3.600	- [10]	98.67	1	**31574**	4	394.68	468.14	- [10]	- [10]	- [10]	-
[6]	FMH1021563	FMH1021564	750	13.4	7.490	3.600	7.510	3.530	191	98.67	1	**31574**	4	394.68	468.14	725.4	1.64	65%	OK
[6]	FMH1021564	FMH1021565	750	10.7	7.510	3.530	7.370	3.480	214	98.67	1	**31574**	4	394.68	468.14	686.1	1.55	68%	OK
[8]	FMH1021565	FMH1021566	900	7.3	7.370	3.470	7.380	3.460	730	98.67	1	**31574**	4	395.68	469.14	600.9	0.94	78%	OK
	FMH1021566	XPS1000860	600	9.9	7.380	3.450	7.380	3.450	- [10]	98.67	1	**31574**	4	395.68	469.14	- [10]	- [10]	- [10]	OK

Note:

[1] A conservative approach has been adopted, assuming that sewage discharge from the development will be discharged into the public sewage system.

[2] ks = 3mm is adopted for the "poor" condition of concrete slimed sewers. (Refer to Sewerage Manual - Key Planning Issues and Gravity Collection System by DSD, Table 5 : Recommended Roughness Values ks)

[3] Catchment Inflow factors, PCIF = 1 for North District. (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-4 : Catchment Inflow Factors, PCIF)

[4] Contribution Population= Calculation total average flow (m3/day)/0.27 (m3/person/day), where the calculated total average flow Qaverage = Qd x PCIF. (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Section 12.1)

[5] The peaking factor of 8 is adopted, when population range is <1,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 6 is adopted, when population range is 1,000 - 5,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 5 is adopted, when population range is 5,000-10,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)
The peaking factor of 4 is adopted, when population range is 10,000-50,000 (including stormwater allowance). (Refer to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning by EPD, Table T-5 : Peaking Factors, P)

[6] Upgraded by A/NE-KTS/506

[7] Upgraded by others, refer to A/NE-KTS/565

[8] Upgraded by Y/FSS/19

[9] As there is no invert level of the outlet of FMH1021550, the invert level of the inlet and outlet are assumed to be the same level, i.e. inlet invert level of FMH1021550 and outlet invert level of FMH1021550 are at +4.480 mPD.

[10] Since the invert level (out) and the invert level (in) is the same for the pipe segments between manholes FMH1021550 and FMH1021551, FMH1021562 and FMH1021563, and FMH1021566 and XPS1000860 as referred to the DSD's drainage record pipes, zero slope is encountered, and the capacity, flow velocity and utilization for these segments cannot be determined and calculated. UU survey will be conducted at the detailed design stage for these pipe segments to review the actual invert levels of these concerned sewage pipes and determine the necessity of upgrading of these pipe segments in the future. An updated SIA will be submitted for DSD approval during the detailed design stage. Should any capacity shortfall be identified, the Project Proponent will propose and implement necessary upgrading works at their own cost to the DSD's satisfaction.

[11] P1 refers to the proposed terminal sewer illustrated in Figure 3.1 of the SIA Report. A nominal sewer gradient of 1:100 has been adopted for the preliminary design. The final invert levels of the proposed manhole will be confirmed and may be adjusted during the detailed design stage.

Meinhardt Infrastructure & Environment Ltd.
10/F Genesis
33-35 Wong Chuk Hang Road
Hong Kong

Contract:	Job Ref:
Proposed Amendments to the Kwu Tung South Outline Zoning Plan for Residential Development at Various Lots in D.D. 92 and D.D 94 and Adjoining Government Land in "CDA" Zone, Hang Tau Tai Po, Kwu Tung South, New Territories	-
Subject:	Calc. Sheet No.
Sewerage Impact Assessment	-

Drawing Ref.	Calculations By	Date
-	AL	10/14/2026

Sewerage Impact Assessment
Raising Main
Sewers Velocity Check

$$V = 4Q/\pi D^2$$

V = velocity (m/s)
Q = Flow(m3/s)
D = internal pipe diameter (m)

Assumption:

Proposed development	383.24	m^3/d	4.44	L/s
A/NE-KTS/460	2.22	m^3/d	0.03	L/s
A/NE-KTS/466	49	m^3/d	0.57	L/s
A/NE-KTS/525	45.8	m^3/d	0.53	L/s
A/NE-KTS/538	4.5	m^3/d	0.05	L/s
A/NE-KTS/541	2.22	m^3/d	0.03	L/s
HTVSPS Average Daily Fl	300	m^3/d	3.47	L/s
Sum	786.98	m^3/d	9.11	L/s

Q = Proposed + Planned Development + Existing daily flow

According to DSD Sewerage Manual, self cleansing for small diameter sewers of diameter less than 300mm can generally be achieved by ensuring either that a velocity of at least 0.7m/s. For sewers of diameter up to 900mm, it should be designed to achieve a self-cleansing velocity of 1.0m/s in full pipe condition.

Pipe Segment	Pipe	Sewage Flow	Velocity	Full Flow Velocity
	Diameter			If >0.7, OK
	mm	l/s	m/s	Check
FRD1002660	200	9.11	2.90	OK
FRD1005420	200	9.11	2.90	OK
FRD1005421	200	9.11	2.90	OK
FRD1005422	200	9.11	2.90	OK
FRD1002661	200	9.11	2.90	OK
FRD1002661	200	9.11	2.90	OK
FRD1005441	200	9.11	2.90	OK
FRD1005460	200	9.11	2.90	OK
FRD1005461	200	9.11	2.90	OK
FRD1005480	200	9.11	2.90	OK
FRD1002662	200	9.11	2.90	OK
FRD1002600	200	9.11	2.90	OK
FRD1002601	200	9.11	2.90	OK
FRD1002603	200	9.11	2.90	OK
FRD1002605	200	9.11	2.90	OK
FRD1002606	200	9.11	2.90	OK
FRD1002609	200	9.11	2.90	OK
FRD1002610	200	9.11	2.90	OK
FRD1002611	200	9.11	2.90	OK
FRD1002612	200	9.11	2.90	OK
FRD1002614	200	9.11	2.90	OK

Appendix D

Advice from DSD

Parisa Tsui, Ching Ching

From: Keith Qi LIU/MND/DSD <qliu@dsd.gov.hk>
Sent: Thursday, July 9, 2026 4:00 PM
To: Parisa Tsui, Ching Ching
Cc: Dorothy Tse, Uen Yung
Subject: Re: Enquiry on Installed Pump Rate – Hang Tau Sewage Pumping Station (Project Ref: A/NE-KTS/465-1)

Dear Parisa,

Please find the below information for your necessary reference.

The daily capacity of Hang Tau Sewage Pumping Station is **1970m3/day.**

Regards,
Keith LIU
E/N1
DSD
3965 8905 / 6050 0267

From: Parisa Tsui, Ching Ching <parisatsui@meinhardt.com.hk>
Sent: Tuesday, July 7, 2026 11:31 AM
To: Keith Qi LIU/MND/DSD <qliu@dsd.gov.hk>
Cc: Dorothy Tse, Uen Yung <dorothytse@meinhardt.com.hk>
Subject: [Internet]Enquiry on Installed Pump Rate – Hang Tau Sewage Pumping Station (Project Ref: A/NE-KTS/465-1)

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Dear Mr. Liu,

Thank you for your comment on the Sewerage Impact Assessment for our captioned project (A/NE-KTS/465-1).

In order to follow up on your comment, could you kindly provide the installed pump rate of the Hang Tau Sewage Pumping Station (HTSPS)?

We would appreciate your reply by 15 July 2025.

Should you require any further information, please feel free to contact [redacted]

Best Regards,

Parisa Tsui
Environmental Consultant

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www.meinhardt-china.com

www.meinhardtgroup.com

[redacted]

[redacted]



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Parisa Tsui, Ching Ching

From: David Tsz Wai LAW/ST1/DSD <twlaw@dsd.gov.hk>
Sent: Monday, October 6, 2025 2:55 PM
To: Parisa Tsui, Ching Ching
Cc: Adi Lee, Yuk Ming; Dorothy Tse, Uen Yung; Sylar Tsui, Siu Wai
Subject: Re: [Internet]RE: Request for Information on Tsung Pak Long Sewage Pumping Station

Dear Parisa

Please find the below information:

Tsung Pak Long SPS
Design daily flow = 21,070 m^3
Average daily flow = 1,041 m^3
Maximum daily flow = 4,007 m^3

Thanks
Best Regards
David LAW

From: Parisa Tsui, Ching Ching <[redacted]>
Sent: Thursday, September 11, 2025 5:31 PM
To: David Tsz Wai LAW/ST1/DSD <twlaw@dsd.gov.hk>
Cc: Adi Lee, Yuk Ming <adilee@meinhardt.com.hk>; Dorothy Tse, Uen Yung <dorothytse@meinhardt.com.hk>; Sylar Tsui, Siu Wai <sylartsui@meinhardt.com.hk>
Subject: [Internet]RE: [Internet]RE: Request for Information on Tsung Pak Long Sewage Pumping Station

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Dear Mr. Law,

Further to our phone conversation, we would like to request information on the Tsung Pak Long Sewage Pumping Station to address the EPD's comments on the Sewerage Impact Assessment report. Thank you.

Following are the details we would like to request:
1. Average daily flow (m^3)
2. Design daily flow (m^3)
3. Maximum daily flow (m^3)
4. Peak wet weather flow (m^3)

For your reference, the EPD's comments on the Sewerage Impact Assessment Report are as follows:
Table 4-2:
- Please update the flows for the existing and planned developments and revise SPS used capacity.

We would greatly appreciate your support in providing the above information. Please feel free to let us know if any further clarification is required.

Best Regards,
Parisa Tsui

From: David Tsz Wai LAW <twlaw@dsd.gov.hk>
Sent: Wednesday, February 12, 2025 3:56 PM
To: Parisa Tsui, Ching Ching <[redacted]>
Subject: Re: [Internet]RE: Request for the Design Flow & Average Daily Flow for Hang Tau Sewage Pumping Station (no. XPS1001532)

Dear Ms. Tsui

Design flow remain unchanged. average daily flow is around 300m3.

From: "Parisa Tsui, Ching Ching" <parisatsui@meinhardt.com.hk>
To: "twlaw@dsd.gov.hk" <twlaw@dsd.gov.hk>
Cc: "Adi Lee, Yuk Ming" <adilee@meinhardt.com.hk>, "Sylar Tsui, Siu Wai" <sylartsui@meinhardt.com.hk>
Date: 12/02/2025 15:41
Subject: [Internet]RE: Request for the Design Flow & Average Daily Flow for Hang Tau Sewage Pumping Station (no. XPS1001532)
Serial No.:

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Dear Mr. Law,

Since the original email of information obtain cannot be found, the attachment has been extracted from the Appendix E of SIA report (Application No. Y/NE-KTS/13, "Proposed Amendments to the Kwu Tung South Outline Zoning Plan for Residential Development at Various Lots in D.D. 92 and D.D. 94 and Adjoining Government Land in “CDA” Zone, Hang Tau Tai Po, Kwu Tung South, New Territories").

I apologize for the inconvenience caused by the missing original email.

If you have any further queries, please kindly contact the undersigned at 2859 5652. Thank you.

Best Regards,
Parisa Tsui
From: Parisa Tsui, Ching Ching
Sent: Wednesday, February 12, 2025 2:56 PM
To: twlaw@dsd.gov.hk
Cc: Adi Lee, Yuk Ming <[redacted]>; Sylar Tsui, Siu Wai <[redacted]>
Subject: Request for the Design Flow & Average Daily Flow for Hang Tau Sewage Pumping Station (no. XPS1001532)

Dear Mr. Law,

We are the Environmental Consultant on behalf of Fonnie Holdings Limited, conducting the drainage and sewage impact assessment for Section 16 application of the Town Planning Ordinance for the at the various lots in D.D.92 and D.D.94 and the adjoining Government land in Hang Tau Tai Po, Kwu Tung.

Based on the SIA report (Application No. Y/NE-KTS/13, "Proposed Amendments to the Kwu Tung South Outline Zoning Plan for Residential Development at Various Lots in D.D. 92 and D.D. 94 and Adjoining Government Land in “CDA” Zone, Hang Tau Tai Po, Kwu Tung South, New Territories"), the Average Daily Water Flow (ADWF) for the Hang Tau Sewage Pumping Station (HTSPS) (no. XPS1001532) is 430m3 in 2020, and the Design daily flow is 1970m3, as provided by DSD. We would like to confirm whether these value are still current or if there have been any updates.

Attached please find the project location and the authorization letter.

If you have any further queries, please kindly contact the undersigned at 2859 5652. Thank you.
Best Regards,

Parisa Tsui
Environmental Consultant

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[redacted]

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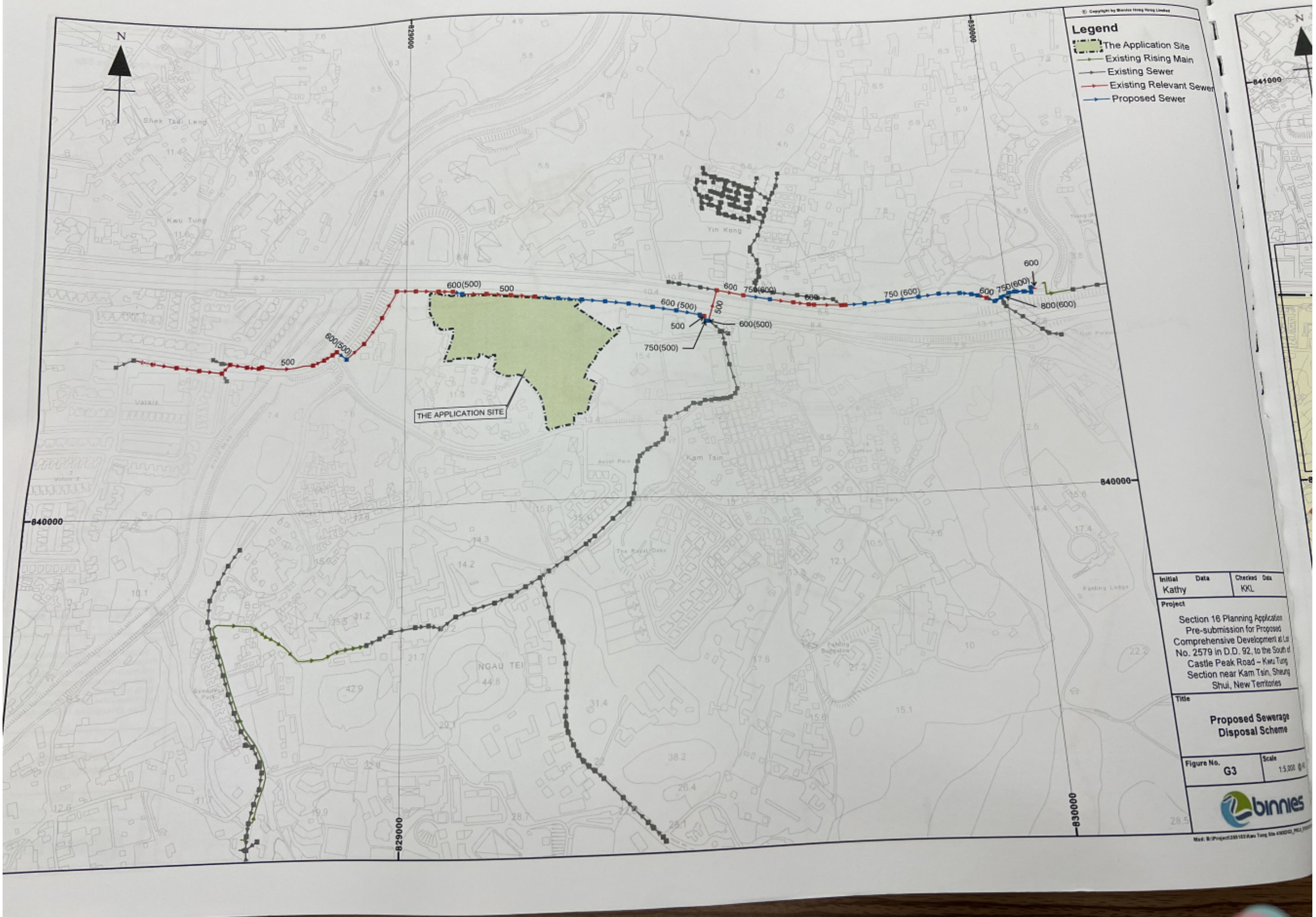
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Appendix E

Extraction of SIA Reports of Sewer Upgrading Works from Other Planned Developments

A/NE-KTS/506


N
Legend
The Application Site
Existing Rising Main
Existing Sewer
Existing Relevant Sewer
Proposed Sewer
THE APPLICATION SITE
600(500)
500
600 (500)
750(500)
600
750 (600)
800(600)
Shek Tsai Leng
Kwu Tung
Yin Kong
Valais
Ascot Park
Kam Tsin
The Royal Oaks
Fanling Bungalow
Golf Park
NGAU TEI
829000
830000
840000
841000
Initial Data
Kathy
Checked Data
KKL
Project
Section 16 Planning Application
Pre-submission for Proposed
Comprehensive Development at Lot
No. 2579 in D.D. 92, to the South of
Castle Peak Road – Kwu Tung
Section near Kam Tsin, Sheung
Shui, New Territories
Title
Proposed Sewerage
Disposal Scheme
Figure No.
G3
Scale
1:5,000 @ A
binnies

Annex G2 Design Checking of Existing Sewer at Proposed Sewage Disposal Scheme (With Proposed and Planned Development)

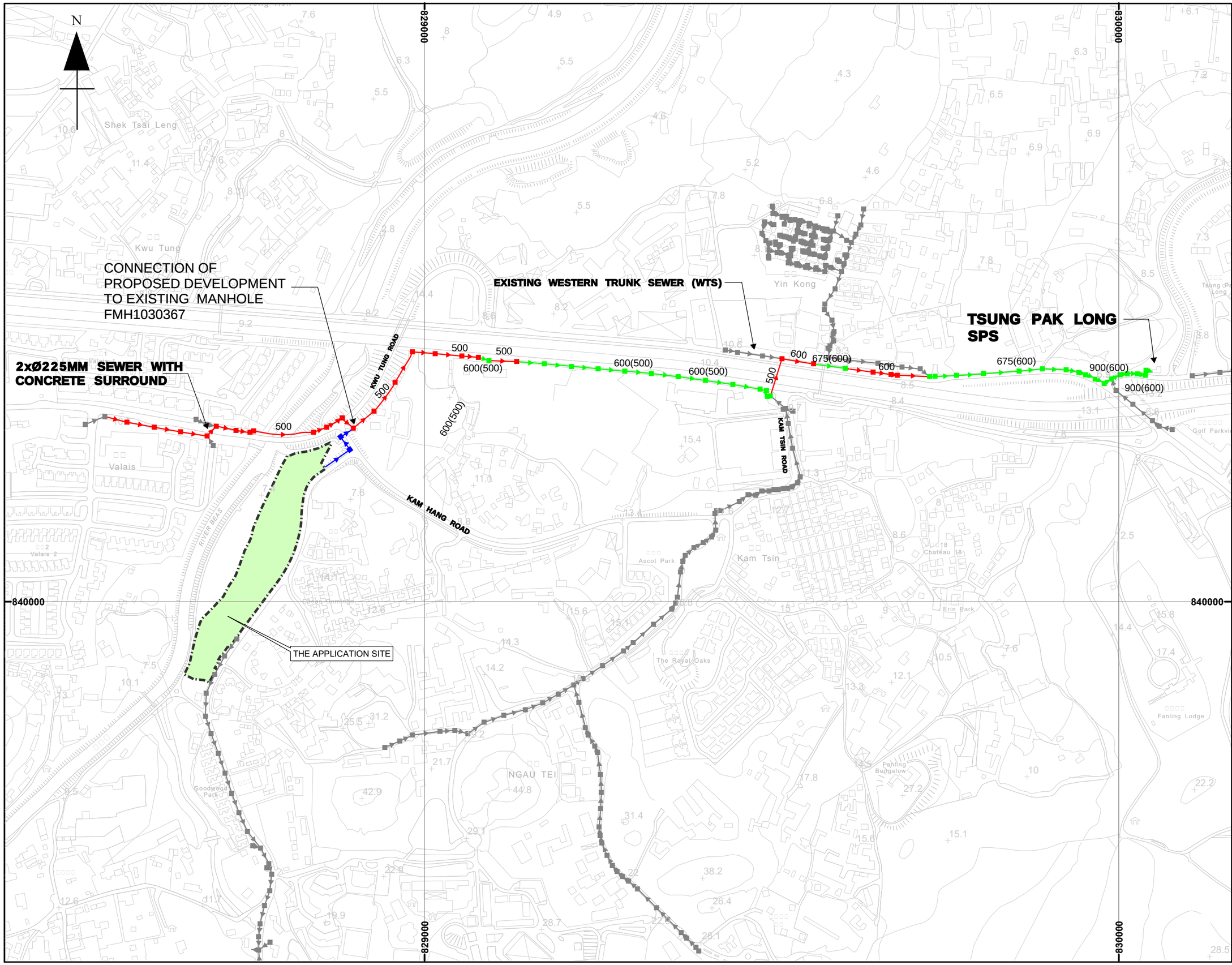
Note:

1) Colebrook-White's equation is adopted for full-bore pipe velocity calculation.
2) Backwash Flowrate generated by swimming pool from developments, if any, has been included in the Design Peak Flowrate.
3) Upgraded pipes are highlighted in yellow colour.

Pipe	Feature Number	Diameter (mm)	Upstream Invert Level (mPD)	Downstream Invert Level (mPD)	Pipe Length (m)	Gradient (1 in)	Roughness (mm)	No. of Pipes	Catchment No.	ADWF (m^3/s)	Contributing Population	Peak Factor	Design Peak Flowrate (m^3/s)	Full Bore Velocity (m/s)	Full Bore Capacity (m^3/s)	Utilization (%)
FMH1030348 to FMH1030349	FWD1035235	500	9.82	9.74	31.073	388	3.00	1	1	0.0001	34	8	0.0009	0.884	0.174	0.5%
FMH1030349 to FMH1030350	FWD1035236	500	9.73	9.65	38.527	482	3.00	1	1	0.0001	34	8	0.0009	0.794	0.156	0.5%
FMH1030350 to FMH1030353	FWD1035239	500	9.64	9.56	36.929	462	3.00	1	1	0.0001	34	8	0.0009	0.811	0.159	0.5%
FMH1030353 to FMH1030355	FWD1035241	500	9.55	9.48	36.643	523	3.00	1	1	0.0001	34	8	0.0009	0.761	0.149	0.6%
FMH1030355 to FMH1030358	FMD1001500	225	9.47	9.37	20.261	203	3.00	2	1	0.0001	34	8	0.0009	0.719	0.057	1.5%
FMH1030358 to FMH1030359	FWD1035246	500	9.36	9.28	27.515	344	3.00	1	1, 2	0.0046	1,462	6	0.0274	0.940	0.185	14.9%
FMH1030359 to FMH1030360	FWD1035247	500	9.27	9.24	18.546	618	3.00	1	1, 2	0.0046	1,462	6	0.0274	0.700	0.137	19.9%
FMH1030360 to FMH1030361	FWD1035248	500	9.23	9.22	3.922	392	3.00	1	1, 2	0.0046	1,462	6	0.0274	0.880	0.173	15.9%
FMH1030361 to FMH1030362	FWD1035250	500	9.21	9.02	85.318	449	3.00	1	1, 2	0.0046	1,462	6	0.0274	0.822	0.161	17.0%
FMH1030362 to FMH1030363	FWD1035252	500	9.01	8.98	18.564	619	3.00	1	1, 2	0.0046	1,462	6	0.0274	0.700	0.137	19.9%
FMH1030363 to FMH1030364	FWD1035253	500	8.97	8.94	14.778	493	3.00	1	1, 2	0.0046	1,462	6	0.0274	0.785	0.154	17.8%
FMH1030364 to FMH1030366	FWD1035255	500	8.93	8.92	6.916	692	3.00	1	1, 2	0.0046	1,462	6	0.0274	0.662	0.130	58.9%
FMH1030366 to FMH1030367	FWD1035254	600 (500)	8.92	8.91	20.534	2053	3.00	1	1, 2, 3	0.0127	4,069	6	0.0765	0.432	0.122	62.6% *
FMH1030367 to FMH1030369	FWD1035256	500	8.90	8.82	36.527	457	3.00	1	1, 2, 3	0.0127	4,069	6	0.0765	0.815	0.160	81.5%
FMH1030369 to FMH1030371	FWD1035257	500	8.81	8.71	50.279	503	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.777	0.153	85.6%
FMH1030371 to FMH1030373	FWD1035260	500	8.70	8.60	48.777	488	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.789	0.155	84.3%
FMH1030373 to FMH1030374	FWD1035261	500	8.59	8.53	31.310	522	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.762	0.150	87.2%
FMH1030374 to FMH1030375	FWD1035262	500	8.52	8.44	37.021	463	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.810	0.159	82.1%
FMH1030375 to FMH1030380	FWD1035280	500	8.43	8.37	22.322	372	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.903	0.177	73.6%
FMH1030380 to FMH1030381	FWD1035281	600 (500)	8.36	8.34	14.130	707	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.738	0.209	62.5%
FMH1030381 to FMH1030382	FWD1035282	500	8.33	8.26	38.068	544	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.747	0.147	89.0%
FMH1030382 to FMH1030383	FWD1035283	500	8.25	8.18	38.457	549	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.743	0.146	89.5%
FMH1030383 to FMH1030384	FWD1035284	500	8.17	8.09	37.336	467	3.00	1	1, 2, 3, B	0.0261	8,339	5	0.1305	0.806	0.158	82.4%
FMH1030384 to FMH1030385	FWD1035285	600 (500)	8.08	8.01	37.173	531	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.852	0.241	85.6%
FMH1030385 to FMH1030386	FWD1035286	600 (500)	8.00	7.92	37.690	471	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.904	0.256	80.6%
FMH1030386 to FMH1030387	FWD1035287	600 (500)	7.91	7.84	37.538	536	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.848	0.240	86.0%
FMH1030387 to FMH1030388	FWD1035288	600 (500)	7.83	7.76	37.842	541	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.844	0.239	86.3%
FMH1030388 to FMH1030389	FWD1035289	600 (500)	7.75	7.67	38.940	487	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.890	0.252	81.9%
FMH1030389 to FMH1030390	FWD1035290	600 (500)	7.66	7.58	38.925	487	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.890	0.252	81.9%
FMH1030390 to FMH1030391	FWD1035291	600 (500)	7.57	7.49	38.958	487	3.00	1	1, 2, 3, B, F	0.0494	-	-	-	-	-	-
FMH1030391 to FMH1030392	FWD1035292	500	7.48	7.48	6.302	-	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.810	0.358	57.6%
FMH1030392 to FMH1030393	FWD1035293	750 (500)	7.47	7.46	7.846	785	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.967	0.273	75.4%
FMH1030393 to FMH1021544	FWD1035294	600 (500)	7.45	7.44	4.123	412	3.00	1	1, 2, 3, B, F	0.0494	15,807	4	0.2061	0.844	0.239	86.3%
FMH1021544 to FMH1021543	FWD1022560	500	7.44	6.86	54.856	95	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0757	24,211	4	0.3111	1.794	0.352	88.3%
FMH1021543 to FMH1021545	FWD1022564	600	6.41	6.06	45.093	129	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.732	0.490	69.1%
FMH1021545 to FMH1021546	FWD1022565	750 (600)	5.96	5.87	44.902	499	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.016	0.449	75.4%
FMH1021546 to FMH1021547	FWD1022566	600	5.85	5.67	39.000	217	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.335	0.377	89.7%
FMH1021547 to FMH1021548	FWD1022567	600	5.67	5.02	24.832	38	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	3.183	0.900	37.6%
FMH1021548 to FMH1021549	FWD1022568	600	5.00	4.83	8.088	48	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	2.852	0.806	42.0%
FMH1021549 to FMH1021550	FWD1022569	600	4.83	4.48	44.891	128	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.736	0.491	69.0%
FMH1021550 to FMH1021551	FWD1022570	600	0.00	4.48	5.633	-	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	-	-	-	-	-	-
FMH1021551 to FMH1021552	FWD1022571	750 (600)	4.47	4.37	31.087	311	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.288	0.569	59.5%
FMH1021552 to FMH1021553	FWD1022572	750 (600)	4.35	4.24	37.583	342	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.228	0.543	62.4%
FMH1021553 to FMH1021554	FWD1022573	750 (600)	4.23	4.06	50.307	296	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.320	0.583	58.0%
FMH1021554 to FMH1021555	FWD1022574	750 (600)	4.06	3.93	32.485	250	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.437	0.635	53.3%
FMH1021555 to FMH1021556	FWD1022575	750 (600)	3.93	3.84	32.982	366	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.186	0.524	64.6%
FMH1021556 to FMH1021557	FWD1022576	750 (600)	3.84	3.78	17.605	293	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.326	0.586	57.8%
FMH1021557 to FMH1021558	FWD1022577	750 (600)	3.78	3.75	9.245	308	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.294	0.572	59.2%
FMH1021558 to FMH1021559	FWD1022578	600	3.74	3.68	13.719	229	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.299	0.367	92.1%
FMH1021559 to FMH1021560	FWD1022579	750 (600)	3.68	3.65	12.954	432	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	1.092	0.483	70.1%
FMH1021560 to FMH1021561	FWD1022580	750 (600)	3.65	3.63	11.251	563	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	0.957	0.423	80.1%
FMH1021561 to FMH1021562	FWD1022581	800 (600)	3.63	3.60	13.323	444	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 9, 10, 11	0.0825	26,403	4	0.3385	0.957	0.423	80.1%
FMH1021562 to FMH1021563	FWD1022583	750 (600)	3.60	3.60	8.798	157	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1156	37,004	4	0.4711	1.123	0.565	83.4%
FMH1021563 to FMH1021564	FWD1022584	750 (600)	3.60	3.53	13.370	191	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1156	37,004	4	0.4711	1.812	0.800	58.9%
FMH1021564 to FMH1021565	FWD1022585	750 (600)	3.53	3.48	10.724	214	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1156	37,004	4	0.4711	1.644	0.726	64.9%
FMH1021565 to FMH1021566	FWD1022587	750 (600)	3.47	3.46	7.247	362	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1156	37,004	4	0.4711	1.551	0.685	68.7%
FMH1021566 to XPS1000860	FWD1022588	600	3.45	-	9.858	-	3.00	1	1, 2, 3, B, F, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1156	-	-	-	-	-	-

* The segment of sewer is located at the upstream of the Application Site. Thus, the proposed sewer upgrading works in this submission is for indicative purpose only and is to be implemented by developers of proposed developments in the upstream .

A/NE-KTS/565



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Legend

- The Application Site
- Existing Rising Main
- Existing Sewer
- Existing Sewer
- Proposed Sewer By Developer
- Proposed Sewer Upgrading By Others
- Proposed Manhole By Developer

Initial Data	Checked Data
Kathy	KKL

Project

Section 16 Planning Application for Proposed Residential Development with Minor Relaxation of Plot Ratio Restriction at Lots 1027, 1029, 1030, 1034A, 1034B, 1039 (Part), 1040, 1042 RP, 1043 RP, 1044 RP(Part), 1045, 1047, 2233 (Part), 2251 S.A RP,2256 RP, 2315 (Part) and 2316 RP (Part) in D.D. 92 and Adjoining Government Land (New Lot to be known as Lot 2644 in D.D. 92), Kwu Tung South, Sheung Shui, New Territories

Title

Proposed Sewerage Disposal Scheme

Figure No.	Scale
KT3/SIA/003	1:5,000 @ A3

Plot date: 2021-10-27

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Annex B - Hydraulic Capacity Check of Existing Sewerage Pipe at Proposed Disposal Scheme (With Existing Development, Planned Development and Proposed Development)

Note:
1) Colebrook-White's equation is adopted for full-bore pipe velocity calculation.
2) Proposed upgrading pipes by others are highlighted in green colour.
3) Catchment No. F1 and F2 denoted as the two proposed sewage discharge points in Kwu Tung Site 4 respectively.
4) The existing pipes are Vitrified Clayware with a normal condition of slimed sewers. Roughness is assumed to be 1.5mm.

Pipe	Feature Number	Diameter (mm)	Upstream Invert Level (mPD)	Downstream Invert Level (mPD)	Pipe Length (m)	Gradient (1 in)	Roughness (mm)	No. of Pipes	Catchment No.	ADWF (m^3/s)	Contributing Population	Peak Factor	Design Peak Flowrate (m^3/s)	Full Bore Velocity (m/s)	Full Bore Capacity (m^3/s)	Utilization (%)
FMH1030348 to FMH1030349	FWD1035235	500	9.82	9.74	31.073	388	1.50	1	1	0.0001	34	8	0.001	0.977	0.192	0.4%
FMH1030349 to FMH1030350	FWD1035236	500	9.73	9.65	38.527	482	1.50	1	1	0.0001	34	8	0.001	0.877	0.172	0.5%
FMH1030350 to FMH1030353	FWD1035239	500	9.64	9.56	36.929	462	1.50	1	1	0.0001	34	8	0.001	0.896	0.176	0.5%
FMH1030353 to FMH1030355	FWD1035241	500	9.55	9.48	36.643	523	1.50	1	1	0.0001	34	8	0.001	0.841	0.165	0.5%
FMH1030355 to FMH1030358	FMD1001500	225	9.47	9.37	20.261	203	1.50	2	1	0.0001	34	8	0.001	0.805	0.064	1.3%
FMH1030358 to FMH1030359	FWD1035246	500	9.36	9.28	27.515	344	1.50	1	1, 2	0.0046	1,462	6	0.027	1.039	0.204	13.4%
FMH1030359 to FMH1030360	FWD1035247	500	9.27	9.24	18.546	618	1.50	1	1, 2	0.0046	1,462	6	0.027	0.774	0.152	18.1%
FMH1030360 to FMH1030361	FWD1035248	500	9.23	9.22	3.922	392	1.50	1	1, 2	0.0046	1,462	6	0.027	0.973	0.191	14.4%
FMH1030361 to FMH1030362	FWD1035250	500	9.21	9.02	85.318	449	1.50	1	1, 2	0.0046	1,462	6	0.027	0.908	0.178	15.4%
FMH1030362 to FMH1030363	FWD1035252	500	9.01	8.98	18.564	619	1.50	1	1, 2	0.0046	1,462	6	0.027	0.773	0.152	18.1%
FMH1030363 to FMH1030364	FWD1035253	500	8.97	8.94	14.778	493	1.50	1	1, 2	0.0046	1,462	6	0.027	0.867	0.170	16.1%
FMH1030364 to FMH1030366	FWD1035255	500	8.93	8.93	6.916	-	1.50	1	1, 2	0.0046	-	-	-	-	-	-
FMH1030366 to FMH1030367	FWD1035254	500	8.92	8.91	20.534	2053	0.60	1	1, 2	0.0046	1,462	6	0.027	0.470	0.092	29.7%
FMH1030367 to FMH1030369	FWD1035256	500	8.90	8.82	36.527	457	1.50	1	1, 2, B, 3	0.0271	8,666	5	0.144	0.901	0.177	81.2%
FMH1030369 to FMH1030371	FWD1035257	500	8.81	8.71	50.279	503	1.50	1	1, 2, B, 3	0.0271	8,666	5	0.144	0.858	0.169	85.3%
FMH1030371 to FMH1030373	FWD1035260	500	8.70	8.60	48.777	488	1.50	1	1, 2, B, 3	0.0271	8,666	5	0.144	0.871	0.171	84.0%
FMH1030373 to FMH1030374	FWD1035261	500	8.59	8.53	31.310	522	1.50	1	1, 2, B, 3	0.0271	8,666	5	0.144	0.842	0.165	86.9%
FMH1030374 to FMH1030375	FWD1035262	500	8.52	8.44	37.021	463	1.50	1	1, 2, B, 3	0.0271	8,666	5	0.144	0.895	0.176	81.8%
FMH1030375 to FMH1030380	FWD1035280	500	8.43	8.37	22.322	372	1.50	1	1, 2, B, 3	0.0271	8,666	5	0.144	0.999	0.196	73.3%
FMH1030380 to FMH1030381	FWD1035281	600 (500)	8.36	8.34	14.130	707	1.50	1	1, 2, B, 3	0.0271	8,666	5	0.144	0.813	0.230	62.5%
FMH1030381 to FMH1030382	FWD1035282	500	8.33	8.26	38.068	544	1.50	1	1, 2, B, 3	0.0271	8,666	5	0.144	0.825	0.162	88.7%
FMH1030382 to FMH1030383	FWD1035283	600 (500)	8.25	8.18	38.457	549	1.50	1	1, 2, F1, B, 3	0.0363	11,629	4	0.154	0.923	0.261	58.9%
FMH1030383 to FMH1030384	FWD1035284	600 (500)	8.17	8.09	37.336	467	1.50	1	1, 2, F1, B, 3	0.0363	11,629	4	0.154	1.002	0.283	54.3%
FMH1030384 to FMH1030385	FWD1035285	600 (500)	8.08	8.01	37.173	531	1.50	1	1, 2, F1, B, 3	0.0363	11,629	4	0.154	0.939	0.265	57.9%
FMH1030385 to FMH1030386	FWD1035286	600 (500)	8.00	7.92	37.690	471	1.50	1	1, 2, F1, B, 3	0.0363	11,629	4	0.154	0.997	0.282	54.5%
FMH1030386 to FMH1030387	FWD1035287	600 (500)	7.91	7.84	37.538	536	1.50	1	1, 2, F1, F2, B, 3	0.0522	16,690	4	0.225	0.934	0.264	85.3%
FMH1030387 to FMH1030388	FWD1035288	600 (500)	7.83	7.76	37.842	541	1.50	1	1, 2, F1, F2, B, 3	0.0522	16,690	4	0.225	0.930	0.263	85.6%
FMH1030388 to FMH1030389	FWD1035289	600 (500)	7.75	7.67	38.940	487	1.50	1	1, 2, F1, F2, B, 3	0.0522	16,690	4	0.225	0.981	0.277	81.2%
FMH1030389 to FMH1030390	FWD1035290	600 (500)	7.66	7.58	38.925	487	1.50	1	1, 2, F1, F2, B, 3	0.0522	16,690	4	0.225	0.981	0.277	81.2%
FMH1030390 to FMH1030391	FWD1035291	600 (500)	7.57	7.49	38.958	487	1.50	1	1, 2, F1, F2, B, 3	0.0522	16,690	4	0.225	0.981	0.277	81.2%
FMH1030391 to FMH1030392	FWD1035292	600 (500)	7.48	7.48	6.302	-	1.50	1	1, 2, F1, F2, B, 3	0.0522	-	-	-	-	-	-
FMH1030392 to FMH1030393	FWD1035293	675 (500)	7.47	7.46	7.846	785	1.50	1	1, 2, F1, F2, B, 3	0.0522	16,690	4	0.225	0.832	0.298	75.7%
FMH1030393 to FMH1021544	FWD1035294	600 (500)	7.45	7.44	4.123	412	1.50	1	1, 2, F1, F2, B, 3	0.0522	16,690	4	0.225	1.066	0.301	74.7%
FMH1021544 to FMH1021543	FWD1022560	500	7.44	6.86	54.856	95	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 9, 10, 11	0.0789	25,260	4	0.332	1.986	0.390	85.2%
FMH1021543 to FMH1021545	FWD1022564	600	6.41	6.06	45.093	129	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.911	0.540	66.6%
FMH1021545 to FMH1021546	FWD1022565	700 (600)	5.96	5.87	44.902	499	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.069	0.411	87.5%
FMH1021546 to FMH1021547	FWD1022566	600	5.85	5.67	39.000	217	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.473	0.416	86.4%
FMH1021547 to FMH1021548	FWD1022567	600	5.67	5.02	24.832	38	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	3.514	0.994	36.2%
FMH1021548 to FMH1021549	FWD1022568	600	5.00	4.83	8.088	48	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	3.149	0.890	40.4%
FMH1021549 to FMH1021550	FWD1022569	600	4.83	4.48	44.891	128	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.916	0.542	66.4%
FMH1021550 to FMH1021551	FWD1022570	675 (600)	0.00	4.48	5.633	-	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	-	-	-	-	-	-
FMH1021551 to FMH1021552	FWD1022571	675 (600)	4.47	4.37	31.087	311	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.325	0.474	75.9%
FMH1021552 to FMH1021553	FWD1022572	675 (600)	4.35	4.24	37.583	342	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.263	0.452	79.6%
FMH1021553 to FMH1021554	FWD1022573	675 (600)	4.23	4.06	50.307	296	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.358	0.486	74.0%
FMH1021554 to FMH1021555	FWD1022574	675 (600)	4.06	3.93	32.485	250	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.478	0.529	68.0%
FMH1021555 to FMH1021556	FWD1022575	675 (600)	3.93	3.84	32.982	366	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.219	0.436	82.4%
FMH1021556 to FMH1021557	FWD1022576	675 (600)	3.84	3.78	17.605	293	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.363	0.488	73.7%
FMH1021557 to FMH1021558	FWD1022577	675 (600)	3.78	3.75	9.245	308	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.330	0.476	75.6%
FMH1021558 to FMH1021559	FWD1022578	675 (600)	3.74	3.68	13.719	229	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.545	0.553	65.1%
FMH1021559 to FMH1021560	FWD1022579	900 (600)	3.68	3.65	12.954	432	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.348	0.858	41.9%
FMH1021560 to FMH1021561	FWD1022580	900 (600)	3.65	3.63	11.251	563	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 9, 10, 11	0.0858	27,452	4	0.360	1.180	0.751	47.9%
FMH1021561 to FMH1021562	FWD1022581	900 (600)	3.63	3.60	13.323	444	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1310	41,904	4	0.540	1.329	0.846	63.9%
FMH1021562 to FMH1021563	FWD1022583	900 (600)	3.60	3.60	8.798	-	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1310	-	-	-	-	-	-
FMH1021563 to FMH1021564	FWD1022584	900 (600)	3.60	3.53	13.370	191	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1310	41,904	4	0.540	2.030	1.291	41.9%
FMH1021564 to FMH1021565	FWD1022585	900 (600)	3.53	3.48	10.724	214	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1310	41,904	4	0.540	1.915	1.218	44.4%
FMH1021565 to FMH1021566	FWD1022587	900 (600)	3.48	3.46	7.247	362	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1310	41,904	4	0.540	1.472	0.937	57.7%
FMH1021566 to XPS1000860	FWD1022588	900 (600)	3.45	-	9.858	-	1.50	1	1, 2, F1, F2, B, 3, C, 5, 6, 7, E, 8, A, 9, 10, 11, 12	0.1310	-	-	-	-	-	-

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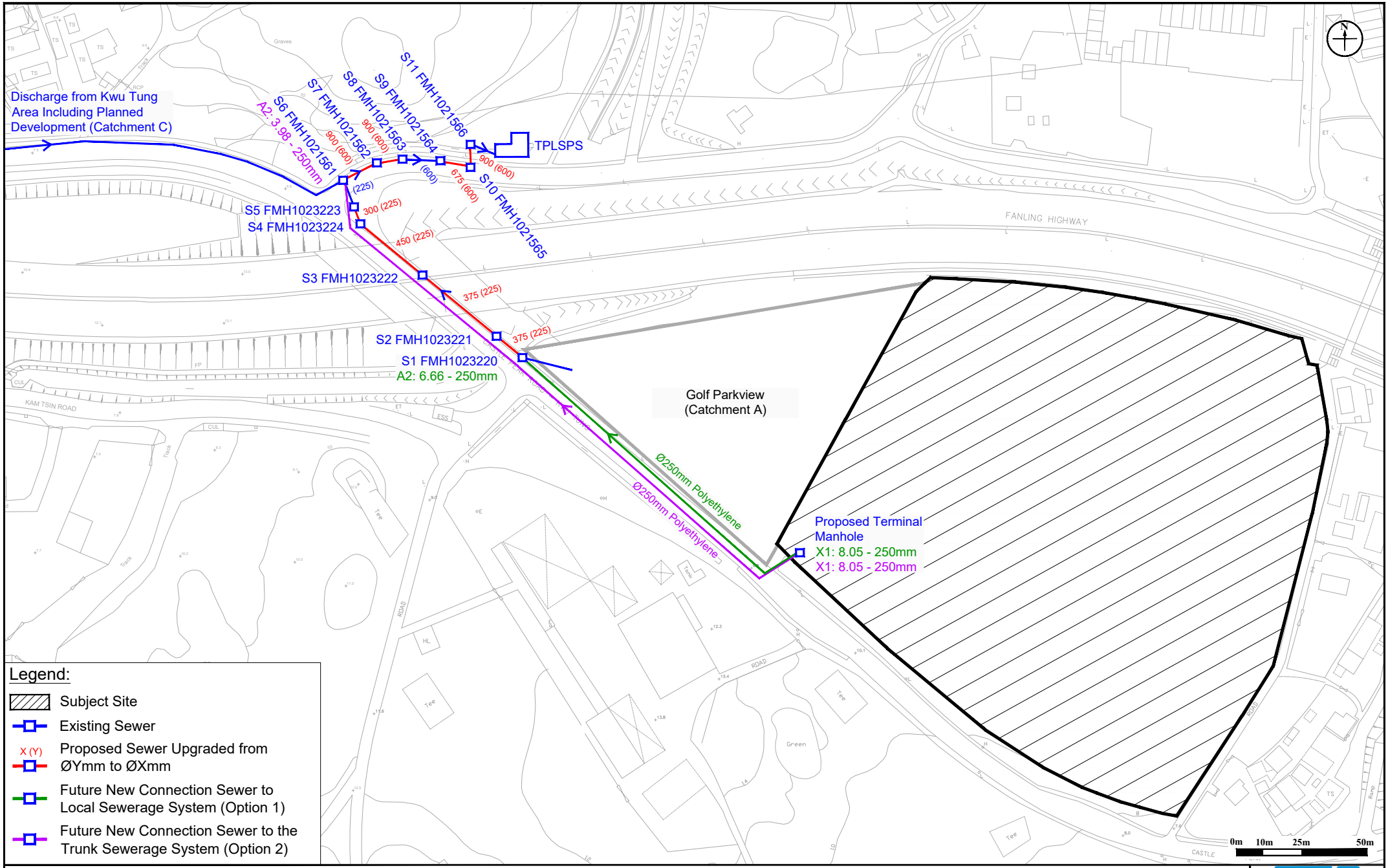


Figure: 2

Title: Existing and Future Sewerage Arrangement

Project: Proposed Residential Development at Tsung Pak Long at Lot SSL 2RP in DD92, Sheung Shui

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Rev.:	2.0
Date:	Dec 2021

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Table 2a Hydraulic Capacity of Existing Sewers at Castle Peak Road-Kwu Tung, Shueng Shui

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k_s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
S1-S2	FMH1023220	FMH1023221	225	11.2	6.53	6.30	9.81	0.00060	0.020	0.000001	1.88	0.04	0.07	75
S2-S3	FMH1023221	FMH1023222	225	35.2	6.30	5.54	9.81	0.00060	0.022	0.000001	1.93	0.04	0.08	77
S3-S4	FMH1023222	FMH1023224	225	29.1	5.54	5.34	9.81	0.00220	0.007	0.000001	0.89	0.04	0.04	36
S4-S5	FMH1023224	FMH1023223	225	5.1	5.34	5.18	9.81	0.00060	0.031	0.000001	2.32	0.04	0.09	92
S5-S6	FMH1023223	FMH1021561	225	9.2	5.18	3.61	9.81	0.00060	0.170	0.000001	5.43	0.04	0.22	216
S6-S7	FMH1021561	FMH1021562	600	12.9	3.63	3.60	9.81	0.00300	0.001	0.000001	0.74	0.28	0.21	208
S7-S8	FMH1021562	FMH1021563	600	8.4	3.60	3.60	9.81	0.00300	0.001	0.000001	0.74	0.28	0.21	208
S8-S9	FMH1021563	FMH1021564	600	12.9	3.60	3.53	9.81	0.00060	0.005	0.000001	1.79	0.28	0.51	506
S9-S10	FMH1021564	FMH1021565	600	10.3	3.53	3.48	9.81	0.00060	0.005	0.000001	1.69	0.28	0.48	478
S10-S11	FMH1021565	FMH1021566	600	7.1	3.47	3.46	9.81	0.00300	0.001	0.000001	0.74	0.28	0.21	208

Table 2b Hydraulic Capacity of Existing Sewers at Castle Peak Road-Kwu Tung, Shueng Shui (After Upgrading)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k_s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
S1-S2	FMH1023220	FMH1023221	375	11.2	6.53	6.30	9.81	0.00060	0.020	0.000001	2.60	0.11	0.29	287
S2-S3	FMH1023221	FMH1023222	375	35.2	6.30	5.54	9.81	0.00060	0.022	0.000001	2.67	0.11	0.29	295
S3-S4	FMH1023222	FMH1023224	450	29.1	5.54	5.34	9.81	0.00060	0.007	0.000001	1.68	0.16	0.27	268
S4-S5	FMH1023224	FMH1023223	300	5.1	5.34	5.18	9.81	0.00060	0.031	0.000001	2.79	0.07	0.20	197
S5-S6	FMH1023223	FMH1021561	225	9.2	5.18	3.61	9.81	0.00060	0.170	0.000001	5.43	0.04	0.22	216
S6-S7	FMH1021561	FMH1021562	900	12.9	3.63	3.60	9.81	0.00140	0.001	0.000001	1.06	0.64	0.67	674
S7-S8	FMH1021562	FMH1021563	900	8.4	3.60	3.60	9.81	0.00140	0.001	0.000001	1.06	0.64	0.67	674
S8-S9	FMH1021563	FMH1021564	600	12.9	3.60	3.53	9.81	0.00060	0.005	0.000001	1.79	0.28	0.51	506
S9-S10	FMH1021564	FMH1021565	675	10.3	3.53	3.48	9.81	0.00060	0.005	0.000001	1.82	0.36	0.65	651
S10-S11	FMH1021565	FMH1021566	900	7.1	3.47	3.46	9.81	0.00140	0.001	0.000001	1.06	0.64	0.67	673

Table 2c Hydraulic Capacity of Proposed Sewers from the Terminal Manhole of the Proposed Development for Sewage generated from the Proposed Development (Option 1)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k_s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
T1-S1	-	FMH1023220	250	135.1	8.05	6.66	9.81	0.00030	0.010	0.000001	1.54	0.05	0.08	76

Table 2d Hydraulic Capacity of Proposed Sewers from the Terminal Manhole of the Proposed Development for Sewage generated from the Proposed Development (Option 2)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k_s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
T1-S6	-	FMH1021561	250	239.2	8.05	3.98	9.81	0.00030	0.017	0.000001	1.99	0.05	0.10	98

Notes: (1) T1 is the proposed terminal manhole as shown in Figure 2 of the SIA report. Nominal assumption of 1 in 100 gradient is applied for the proposed sewer. The exact invert levels of the proposed manhole is subject to change during detailed design stage.
(2) According to DSD Drainage Records, invert level 1 and 2 of S7-S8 are the same. Therefore, the gradient of S6-S8 is estimated by its overall gradient.

Remarks: (1) g=gravitational acceleration; k_s=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity
(2) Table 2a: The value of k_s = 3.0-0.6mm is used for the calculation of slimed clayware sewer, poor condition (based on Table 5: Recommended roughness values in Sewerage Manual)
(3) Table 2c&d: The value of k_s = 1.5-0.3mm is used for the calculation of slimed polyethelyene for the proposed sewers, poor condition (based on Table 5: Recommended roughness values in Sewerag
(4) Table 2: The value of k_s is interpolated for pipe velocities between 0.75 m/s and 1.2 m/s.
(5) The value of velocity (V) is referred to the Tables for the hydraulic design of pipes, sewers and channels (8th edition)
(6) Equation used: $$V=-\sqrt{(8gDs)}\log\left(\frac{k_s}{3.7D}+\frac{2.51v}{D\sqrt{(2gDs)}}\right)$$

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