

4.3 Proposed Discharge Location and Sewers

- 4.3.1 A new sewerage system will be required to collect sewage flow within the proposed housing site and convey sewage flow from the site to existing public sewerage system. Two new terminal manholes FTMH01 and FTMH02 are proposed at the northwest and east of the site. Two new 375mm dia. (OD 400mm) HDPE pipes are proposed from the terminal manholes FTMH01 and FTMH02 to the existing manholes FMH1036015 & FMH1043421 respectively. Existing 600mm dia. pipe and 750mm dia. pipe from FMH1036015 to MTSPS shall remain to take up the additional flow to MTSPS from the proposed development. Detailed assessment is presented in **Appendix A-2**.
- 4.3.2 The proposed alignment, manhole location, number of connection points and invert levels for the Development in this report are indicative only and should be further reviewed subject to the final layout of the proposed housing development.
- 4.3.3 Figure 5210095-ATK-SIA-1021 shows the layout of the proposed sewerage system for the proposed housing development.

5. Sewerage Impact Assessment

5.1 Potential Impact on the Existing Sewerage

- 5.1.1 Sewage generated from the proposed housing site will be discharged via the new terminal manholes FTMH01 & FTMH02 and conveyed to MTSPS through the existing sewerage system along Shap Pat Heung Road. Existing pipes from FMH1036015 to MTSPS are found to be sufficient to accommodate the additional flow from the proposed housing development.
- 5.1.2 The proposed housing site falls within sewerage catchment area of SWSTW. The estimated sewage generated from the housing development is 770.37 m³/day with as illustrated in **Appendix A1-1**.
- 5.1.3 Based on TPEDM, the total population in year 2026 and 2031 under the planning data zone 179 and 180 are smaller than that in 2019. Therefore, the population in 2019 has been adopted in our assessment to give a conservative assessment.
- 5.1.4 The design capacity of MTSPS is 7,344 m³/day and the additional flow due to the proposed housing development is 770.37 m³/day which will contribute about 10.5% of the total design capacity. And based on TPEDM data, the total sewage generated from the catchment area after the development is 3,258.54 m³/day. The utilization rate at MTSPS is about 44% and hence there is sufficient capacity for MTSPS to cater the additional flow from the Development and no mitigation measures or upgrading works would be necessary.
- 5.1.5 The design capacity of PSSSPS is 43,200 m³/day. The additional flow due to the proposed housing development is 770.37 m³/day which will contribute about 1.78% of the total design capacity. And based on TPEDM data, the total sewage convey to PSSSPS is 41,499.34 m³/day, the utilization rate of PSSSPS is 96.1%. Therefore, no mitigation measures or upgrading works would be necessary to the PSSSPS.

- 5.1.6 The current design capacity of SWSTW is 200,000 m³/day. The additional flow only utilizes approximately 0.39% of the treatment capacity, it is considered that the potential sewerage impact to SWSTW would be minimal and hence no mitigation measures or upgrading works would be necessary.
- 5.1.7 EPD advised that this Development is within the catchment of SWSTW and that sufficient capacity will be timely provided in phase with the TPEDM forecasted population to be accommodated by all existing and planned developments within its catchment including the latest forecasted population of this development.

6. Maintenance Matrix for Proposed Sewerage Works

- 6.1.1 The parties responsible for maintaining the proposed sewerage works are listed in Table 6.1.

Table 6.1 Maintenance Matrix

Description of Proposed Sewerage Works	Maintenance Party
Proposed new sewer after proposed terminal manholes FTMH1 & FTMH2	DSD
Manholes FTMH1 & FTMH2 and internal sewer for the proposed housing site	HD

7. Conclusions

- 7.1.1 Proposed option for conveying sewage flow from the proposed housing site to public sewerage system was discussed in above section. Terminal manholes FTMH01 & FTMH02 associated with 375 dia. (OD 400mm). HDPE pipes are proposed to convey the sewage flow to existing sewerage system at Shap Pat Heung Road.
- 7.1.2 The project sewerage flow from the proposed housing site has been estimated. The ADWF and PDWF are 770.37 m³/d and 0.054m³/s respectively. 10% added allowance of population is incorporate for design flexibility of the proposed housing site for the sewerage impact assessment.

The additional sewage loading on the MTSPS, PSSSPS and HTSPS due to the proposed housing development is found to be insignificant to the related infrastructure. SWSTW is also capable to cater the sewage loading from proposed housing site with no insurmountable impact anticipated no mitigation measures or upgrading works would be necessary.

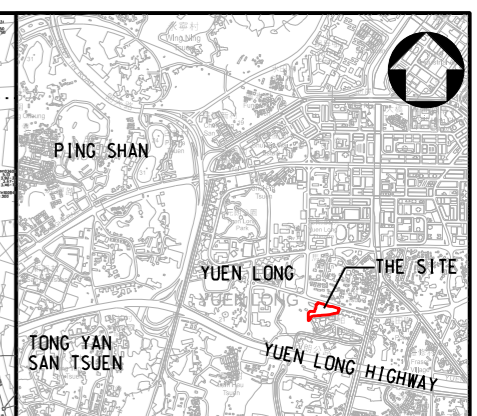
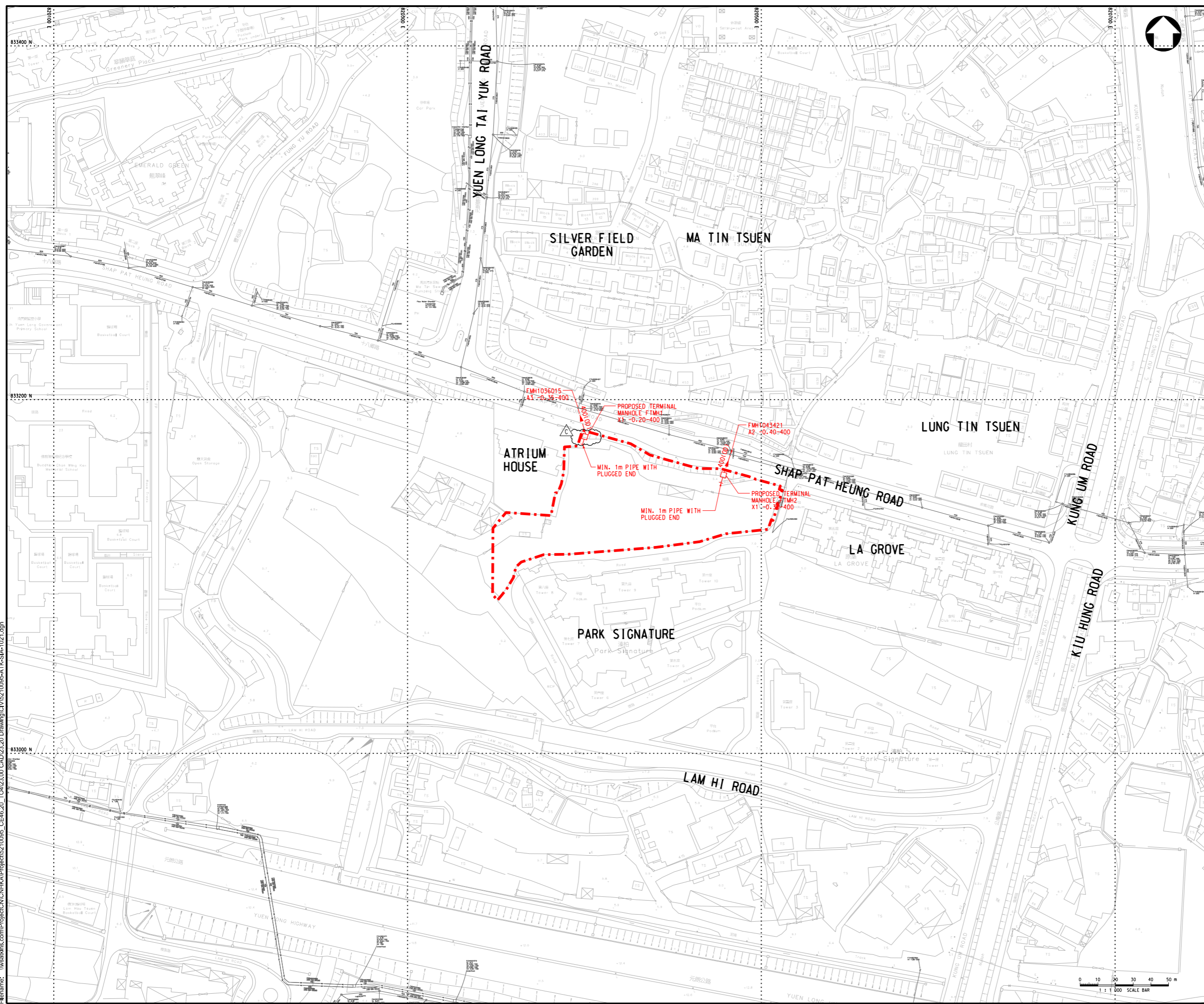
Checking the capacity of the existing sewerage system

- a) Hydraulic calculation are conducted in accordance with the Sewerage Manual Part 1.
- b) velocity (v) = $-2(2gDs)^{1/2} \log [Ks/3.7D + 2.51v/D(2gDs)^{1/2}]$
- c) As advised by Table 8(a) of Sewerage Manual, vitrified clay is used in small to medium size sewers and concrete is widely used in gravity sewers with diameter between 600mm and 2100mm.
- d) From Table 5 of Sewerage Manual, ks for clay sewers slimed to about half depth; velocity, when flowing half full, approximately 1.2m/s = 0.6 (poor)
 ks for concrete, spun or vertically cast, sewers slimed to about half depth; velocity, when flowing half full, approximately 1.2m/s = 3 (poor)
 ks for polyethylene sewers slimed to about half depth; velocity, when flowing half full, approximately 1.2m/s = 0.3 (poor)
 ks for concrete, spun or vertically cast, sewers slimed to about half depth; velocity, when flowing half full, approximately 0.75m/s = 6 (poor)
 ks for clay sewers slimed to about half depth; velocity, when flowing half full, approximately 0.75m/s = 3 (poor)
- e) Kinematic Viscosity, $\nu = 1.003E-06 \text{ m}^2/\text{sec} @ 20^\circ\text{C}$
- f) Catchment Inflow Factor for Yuen Long = 1.00 is taken account in the design calculation for the existing sewerage network
- g) 10% reduction in flow area of pipe due to sediment is taken account in the design calculation
- h) The gradient and area of flow for the existing sewers were derived from the DSD's Drainage Record Plan.

Sewer Hydraulics													Design Flow Checking																						
Pipe details													Before Redevelopment (Baseline)							After Redevelopment															
Manhole ID	Nominal Diameter	Pipe Material	Ks	US Ground Level	DS Ground Level	US Invert Level	DS Invert Level	Pipe Length	Gradient	Area of Flow	Velocity of Flow	Pipe Capacity	ADWF				Peaking factor	PWDF	Estimated Baseline Flow	Spare Capacity - Baseline	Spare Capacity - Baseline	Capacity Check	ADWF				Peaking factor	PWDF	Projected Flow of Pipe Section	Spare Capacity - Projected Flow	Spare Capacity - Projected Flow	Utilization % of capacity	Capacity Check		
From	To	(mm)	(mm)	(mPD)	(mPD)	(mPD)	(mPD)	(m)	(m/m)	(1-in)	(m ²)	(m/sec)	(m ³ /sec)	(m3/d)	Contributing ppl	Pcif	Q ave (m3/d)	(m3/s)	(m ³ /sec)	(m ³ /sec)	(%)		(m3/d)	Contributing ppl	Pcif	Q ave (m3/d)	(m3/s)	(m ³ /sec)	(m ³ /sec)	(%)	(%)				
FTMH02	FMH1043421	375	HDPE	0.3	6.50	6.85	-0.30	-0.40	10.0	0.0100	100	0.110	1.963	0.195	N/A							770.37	2853	1.00	770.4	6	0.053	0.053	0.142	72.6%	27.4%	OK			
		400 (OD)																																	
FMH1043421	FMH1036013	450	Concrete	3	6.85	6.85	-0.50	-0.58	2.5	0.0320	31	0.159	2.915	0.417	486.0	1800	1.00	486.0	6	0.034	0.034	0.383	91.9%	OK	1256.4	4653	1.00	1256.4	6	0.087	0.087	0.330	79.1%	20.9%	OK
FMH1036013	FMH1036014	600	Concrete	3	6.85	6.88	-0.58	-0.64	37.0	0.0016	617	0.283	0.790	0.201	486.0	1800	1.00	486.0	6	0.034	0.034	0.167	83.2%	OK	1256.4	4653	1.00	1256.4	6	0.087	0.087	0.114	56.6%	43.4%	OK
FMH1036014	FMH1036015	600	Concrete	3	6.88	6.60	-0.65	-0.71	52.4	0.0011	873	0.283	0.664	0.169	486.0	1800	1.00	486.0	6	0.034	0.034	0.135	80.0%	OK	1256.4	4653	1.00	1256.4	6	0.087	0.087	0.082	48.3%	51.7%	OK
FTMH01	FMH1036015	375	HDPE	0.3	6.50	6.60	-0.20	-0.35	15.0	0.0100	100	0.110	1.963	0.195	N/A							770.37	2853	1.00	770.4	6	0.053	0.053	0.142	72.6%	27.4%	OK			
		400 (OD)																																	
FMH1036015	FMH1063016	600	Concrete	3	6.60	6.39	-0.72	-0.79	32.1	0.0022	459	0.283	0.917	0.233	1407.8	5214	1.00	1407.8	5	0.081	0.081	0.152	65.1%	OK	2178.2	8067	1.00	2178.2	5	0.126	0.126	0.107	46.0%	54.0%	OK
FMH1063016	FMH1035981	600	Concrete	3	6.39	6.51	-0.80	-0.88	38.2	0.0021	477	0.283	0.899	0.229	1407.8	5214	1.00	1407.8	5	0.081	0.081	0.147	64.4%	OK	2178.2	8067	1.00	2178.2	5	0.126	0.126	0.103	44.9%	55.1%	OK
FMH1035981	FMH1035972	600	Concrete	3	6.51	6.62	-0.89	-0.99	48.8	0.0021	488	0.283	0.889	0.226	1407.8	5214	1.00	1407.8	5	0.081	0.081	0.145	64.0%	OK	2178.2	8067	1.00	2178.19	5	0.126	0.126	0.100	44.3%	55.7%	OK
FMH1035972	MTSPS	750	Concrete	3	6.62	6.62	-1.14	-1.17	44.5	0.0007	1483	0.442	0.588	0.234	2488.2	9215	1.00	2488.2	5	0.144	0.144	0.090	38.4%	OK	3258.5	12069	1.00	3258.54	4	0.151	0.151	0.083	35.5%	64.5%	OK

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KEY PLAN
N.T.S.

- LEGEND:**
- PROPOSED HOUSING DEVELOPMENT BOUNDARY (SUBJECT TO DETAILED SURVEY AND DESIGN)
 - EXISTING SEWERAGE SYSTEM
 - PROPOSED SEWERAGE SYSTEM

Rev.	Date	Description	By	Crk'd	App'd
C	OCT 2022	THIRD ISSUE	WL	SW	DL
B	MAR 2022	SECOND ISSUE	WL	KL	DL
A	DEC 2021	FIRST ISSUED	WL	KL	DL

Drawing Status: **FEASIBILITY STUDY** Substability:



Client: **CEDD** 土木工程拓展署
 Civil Engineering and Development Department
 土木工程處
 房屋工程3部
 Civil Engineering Office
 Housing Projects 3 Division

Project Title: AGREEMENT NO. 46/2020 (CE)
 TERM CONSULTANCY FOR SITE FORMATION AND INFRASTRUCTURE WORKS FOR PROPOSED HOUSING DEVELOPMENT IN ZONE 1 (2021-2024) - FEASIBILITY STUDY (TASK ORDER 4 - SHAP PAT HEUNG ROAD)

Drawing Title: **PROPOSED SEWERAGE SYSTEM**

Scale	Designed	Drawn	Checked	Authorised
1:1000	WL	CAD	KL	DL
Original Size	Date	Date	Date	Date
A1	DEC 2021	DEC 2021	DEC 2021	DEC 2021
Drawing Number	Revision			
5210095-ATK-SIA-1021	C			

