
Appendix E –

Review of Drainage and Sewerage Impact

Prepared for

Faith Luck Corporation Limited and Win Million International Limited

Prepared by

Ramboll Hong Kong Limited

SECTION 16 PLANNING APPLICATION FOR PROPOSED MINOR RELAXATION OF PLOT RATIO AND BUILDING HEIGHT RESTRICTIONS FOR PERMITTED FLAT DEVELOPMENT WITH SOCIAL WELFARE FACILITY AND PUBLIC VEHICLE PARK (PROPOSED AMENDMENTS TO AN APPROVED SCHEME UNDER APPLICATION NO. A/FSS/294) AT VARIOUS LOTS IN D.D. 51 AND ADJOINING GOVERNMENT LAND AT MA SIK ROAD, FANLING

REVIEW OF DRAINAGE & SEWERAGE IMPACT

Date

August 2026

Prepared by

Miko Wan
Environmental Consultant

Signed

Approved by

Billy Fan
Principal Consultant

Signed

Project Reference

TSLFLMSREI00

Document No.

R10239_v1.0

No part of this document may be reproduced or transmitted, in any form or by any means electronic, mechanical, photographic, recording or otherwise, or stored in a retrieval system of any nature without the written permission of Ramboll Hong Kong Ltd, application for which shall be made to Ramboll Hong Kong Ltd, 21/F, BEA Harbour View Centre, 56 Gloucester Road, Wan Chai, Hong Kong.

Disclaimer: This report is made on behalf of Ramboll Hong Kong Ltd. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any third party relying on it accepts that no individual is personally liable in contract, tort or breach of statutory duty (including negligence).

Ramboll Hong Kong Limited



Q:\Projects\TSLFLMSREI00\04 Deliverables\04 DSIA Report\R10239_v1.0.docx

CHAPTERS

	Page
1. INTRODUCTION	1-1
1.1 Background and Objectives.....	1-1
1.2 Application Site and its Environs.....	1-1
1.3 Proposed Development.....	1-1
2. APPRAISAL OF DRAINAGE IMPACT	2-1
2.1 Discussion	2-1
3. APPRAISAL OF SEWERAGE IMPACT	3-1
3.1 Discussion	3-1
4. OVERALL CONCLUSION	4-1
4.1 Conclusion	4-1

FIGURES

Figure 1.1 Location of the Application Site and its Environs

APPENDICES

Appendix 1.1	Indicative MLP of the Proposed Development
Appendix 2.1	Proposed Stormwater Discharge Connection Extracted from Previous DSIA Report
Appendix 3.1	Sewerage Impact Assessment Extracted from Previous DSIA Report

1. INTRODUCTION

1.1 Background and Objectives

- 1.1.1 A residential development with Social Welfare Facility and Public Vehicle Park is proposed at various lots in D.D. 51, Fanling, New Territories. The Application site is zoned "Residential (Group A)12" ("R(A)12") under the Approved Fanling/Sheung Shui Outline Zoning Plan No. S/FSS/28.
- 1.1.2 A Section 16 (S16) planning application (No. A/FSS/294) was submitted by the Applicant to the Town Planning Board (TPB) for minor relaxation of plot ratio and building height restrictions for the proposed development at the Application Site. Technical assessments including drainage and sewerage impact assessment (DSIA) were prepared for the S16 planning application (No. A/FSS/294), drainage and sewerage impacts were addressed. The application was approved in June 2024.
- 1.1.3 Recently, due to further development of the design, further amendment to the Approved Scheme under the approved S16 planning application (No. A/FSS/294) is considered necessary. The current application proposes amendments to the Approved Scheme to provide carpark on G/F and 1/F, while maintaining all other major development parameters, including GFA, plot ratio, and the number of residential units, unchanged from those of the Approved Scheme.
- 1.1.4 Ramboll Hong Kong Limited has been commissioned by Faith Luck Corporation Limited and Win Million International Limited (hereinafter referred as "Applicant") and is responsible for preparing this Review of Drainage and Sewerage Impact (RDSI) in support of the above-mentioned S16 Planning Application for the proposed development at the Application Site to TPB.

1.2 Application Site and its Environs

- 1.2.1 The Application Site area is about 13,232 m². The Application Site is bounded by Ma Sik Road to the north and Fan Ling Lau Road to the east. Good View New Village is located to the northwest of the Application Site, while Wing Fok Centre is to the east of the Application Site.

1.3 Proposed Development

- 1.3.1 The proposed development includes 5 nos. of blocks with 1,898 nos. of flats comprising a maximum domestic GFA of 79,392 m². The GFA of clubhouse, social welfare facility (120-place Residential Care Home for the Elderly (RCHE)) and Neighbourhood Elderly Centre is 3,000 m², 2,382m² and 300 m² respectively. For conservative purpose, the 3rd party lots not owned by the Applicant within "R(A)12" zone with GFA of about 5,050 m² or 126 units (based on PR of 5) is also included to ascertain the technical feasibility of the subject S16 application.
- 1.3.2 The tentative intake year of the proposed development is 2029, which is consistent with that assumed under the Approved Scheme.
- 1.3.3 **Appendix 1.1** shows the indicative Master Layout Plan of the proposed development.

2. APPRAISAL OF DRAINAGE IMPACT

2.1 Discussion

- 2.1.1 As mentioned in **Section 1.1.3**, carpark would be accommodated on G/F and 1/F. The total catchment area for the drainage system will remain unchanged after development at the Application Site. Not less than 20% greenery will be provided in the proposed development, the overall unpaved area at the site would increase after development. The existing unpaved area is around 19%, which is less than the future condition. Thus, the total stormwater runoff from the Application Site is expected to decrease after development.
- 2.1.2 Similar to the Approved Scheme, peripheral channels within the Application Site are proposed and will be connected to the existing twin 3000 mm × 2500 mm box culvert to the north of the Site, which will eventually discharge the collected runoff to Ng Tung River. As the total paved area is expected to decrease after development, it is anticipated that the twin box culvert will have sufficient capacity to cater for the runoff from the site. The figure showing the proposed stormwater discharge connection in the future scenario in the previous DSIA report is extracted and provided **Appendix 2.1**.
- 2.1.3 The drainage proposal and the exact location of peripheral channels will be confirmed in the detailed design stage.
- 2.1.4 As mentioned in the previous DSIA report, part of the drainage system within the Site serving the nearby catchments would be affected by the proposed development, reprovision of the affected u-channels/ drainage pipelines/ stream is proposed (**Appendix 2.1**). The surface runoff for the existing nearby catchments would remain unchanged and would be discharged to the same catchpit after the reprovision. It is anticipated that the overall runoff to the box culvert would decrease after the development.

3. APPRAISAL OF SEWERAGE IMPACT

3.1 Discussion

- 3.1.1 As mentioned in **Section 1.1.3**, carpark would be accommodated on G/F and 1/F. Other major development parameters including GFA, PR and number of residential units would not be changed. The tentative intake year of the proposed development is 2029, which is consistent with that assumed under the Approved Scheme. Accordingly, the assumptions, calculations and proposed upgrading works in the sewerage impact assessment of the previous DSIA report are considered to remain applicable. With the proposed upgrading works in place, the sewerage system will have adequate capacity to accommodate the sewage flow generated from the proposed development as well as the nearby catchments. The assessment of the previous DSIA report is extracted and provided in **Appendix 3.1**.

4. OVERALL CONCLUSION

4.1 Conclusion

Drainage

- 4.1.1 The total catchment area in the Application Site for the drainage system will remain unchanged. Not less than 20% greenery will be provided in the proposed development. As the surface runoff from the proposed development will be decreased due to the greenery area increased after development, it is anticipated that the twin box culvert would have enough capacity to cater the runoff. Therefore, adverse drainage impact due to the proposed development is not anticipated.
- 4.1.2 Detail Building Drainage Plan will be submitted in the detail design stage of the project and relevant details will be submitted to DSD's comment and approval.

Sewerage

- 4.1.3 The assumptions, calculations and proposed upgrading works in the previous DSIA report remain applicable. With the proposed upgrading works in place, it is confirmed that the proposed development is feasible in terms of impacts to the public sewerage system.

Figures

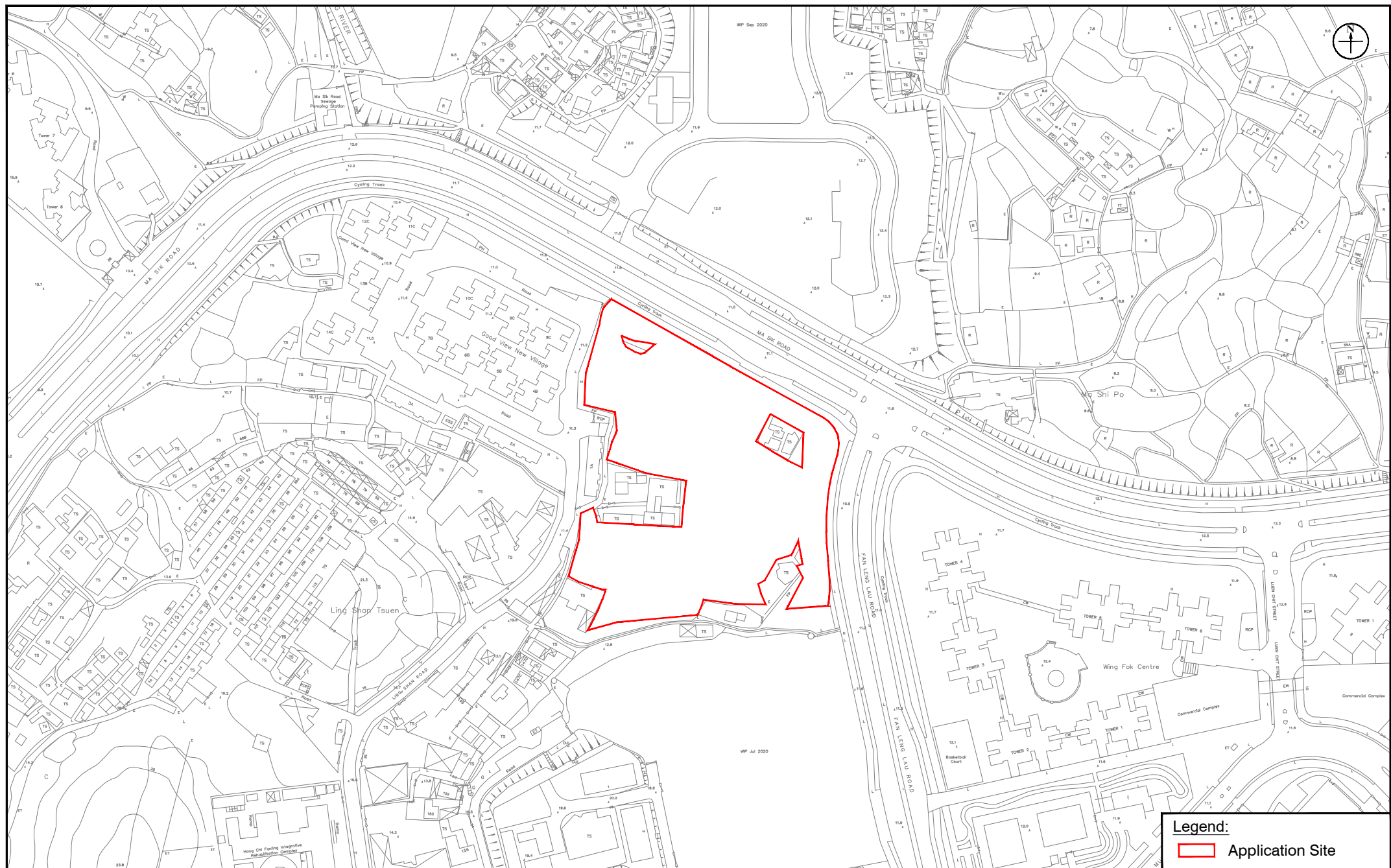


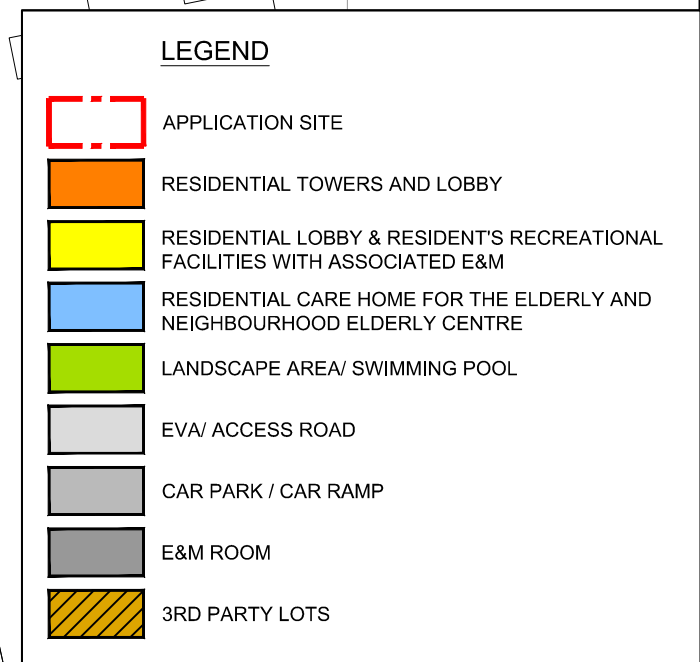
Figure: 1.1	RAMBOLL
Title: Location of the Application Site and its Environs	Drawn by: MW Checked by: BF
Project: Section 16 Planning Application for Proposed Minor Relaxation of Plot Ratio and Building Height Restrictions for Permitted Flat Development with Social Welfare Facility and Public Vehicle Park (Proposed Amendments to an Approved Scheme under Application No. A/FSS/294) at Varous Lots in D.D. 51 and Adjoining Governmnet Land at Ma Sik Road, Fanling	Rev.: 1.0 Date: Aug 2026

Appendix 1.1 Indicative MLP of the Proposed Development

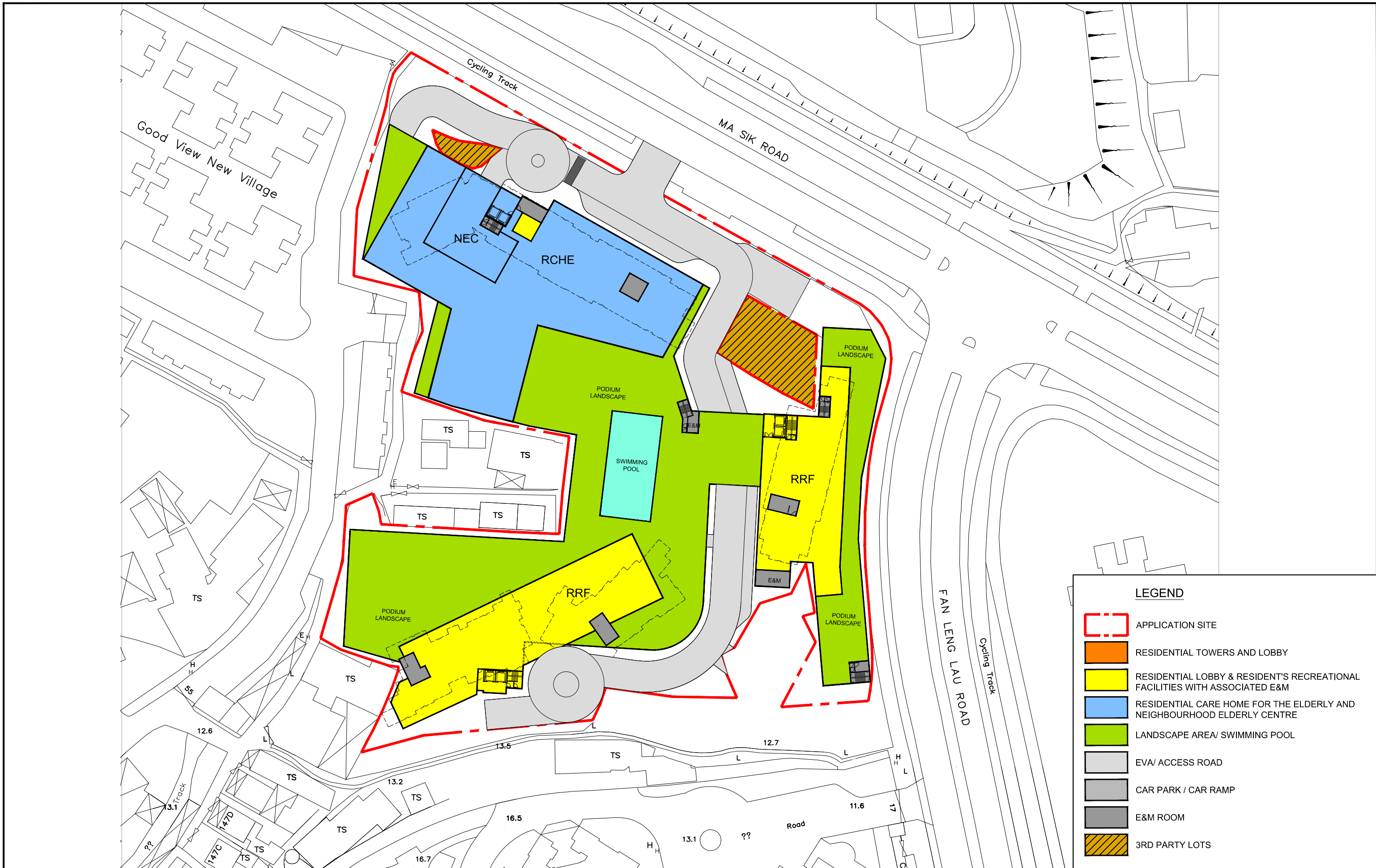


PROPOSED RESIDENTIAL DEVELOPMENT CUM SOCIAL WELFARE FACILITY AND PUBLIC VEHICLE PARK
AT VARIOUS LOTS IN DD51, MA SIK ROAD, FANLING

INDICATIVE BLOCK PLAN

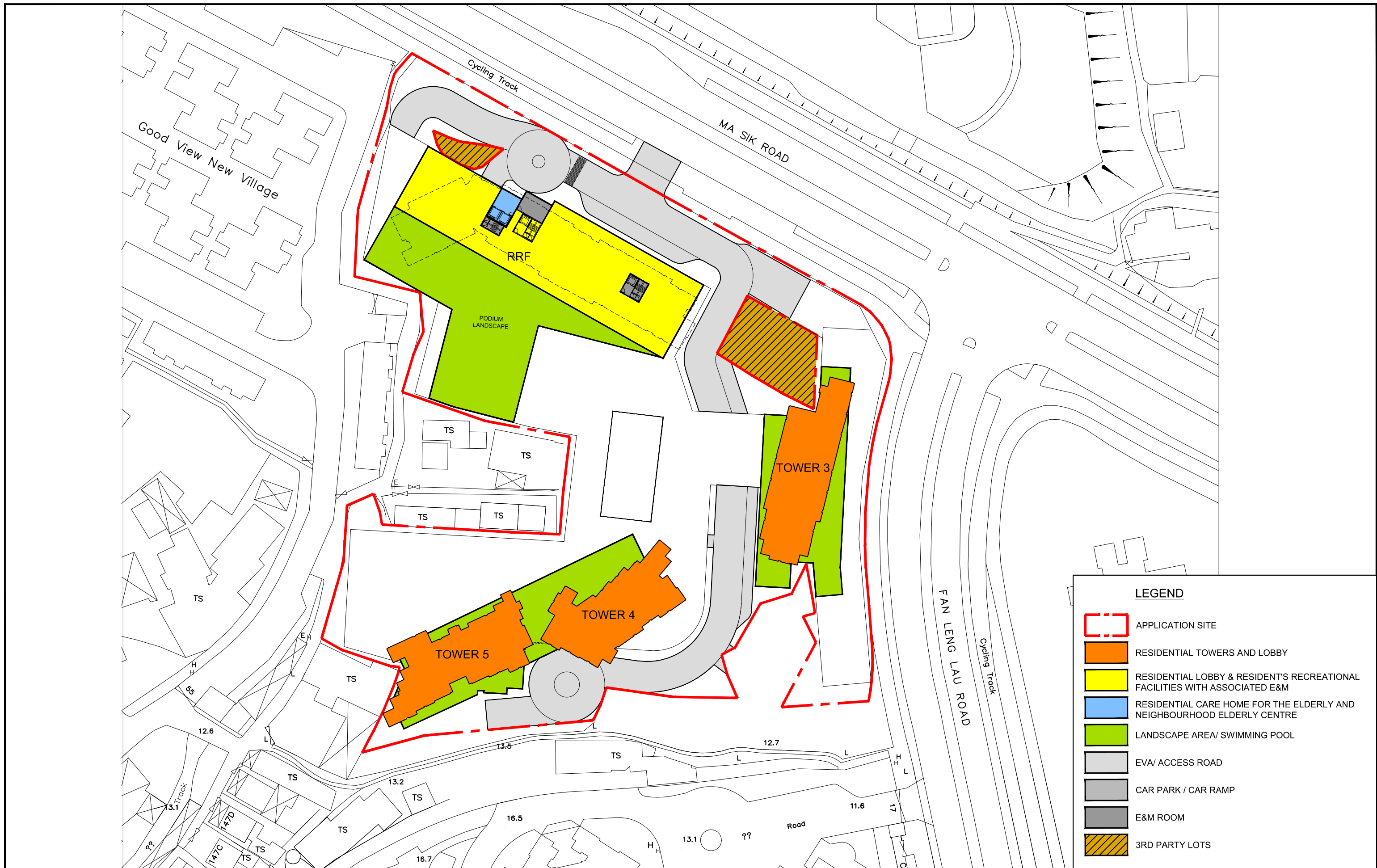


INDICATIVE FIRST FLOOR PLAN



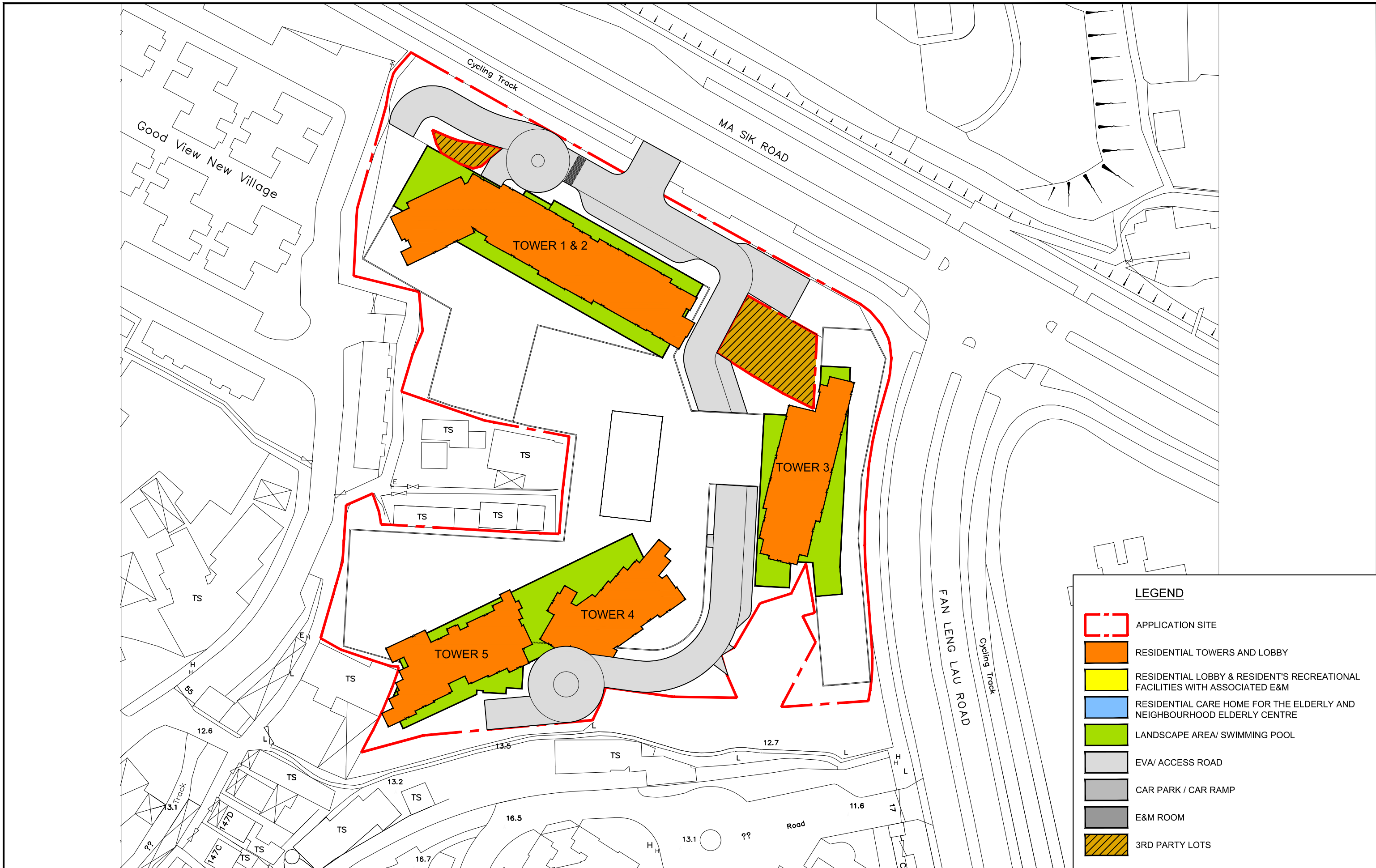
PROPOSED RESIDENTIAL DEVELOPMENT CUM SOCIAL WELFARE FACILITY AND PUBLIC VEHICLE PARK
AT VARIOUS LOTS IN DD51, MA SIK ROAD, FANLING

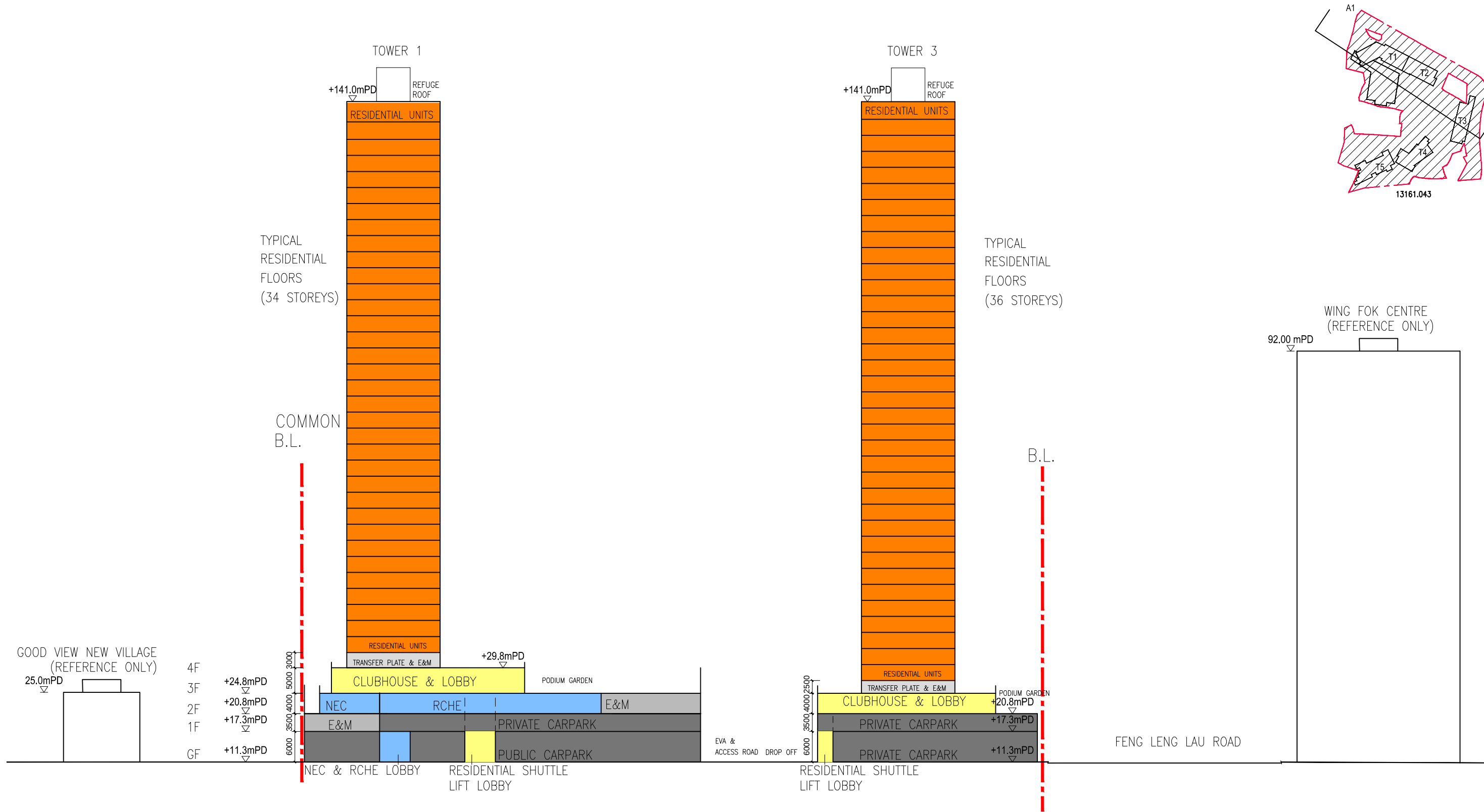
INDICATIVE SECOND FLOOR PLAN



PROPOSED RESIDENTIAL DEVELOPMENT CUM SOCIAL WELFARE FACILITY AND PUBLIC VEHICLE PARK
AT VARIOUS LOTS IN DD51, MA SIK ROAD, FANLING

INDICATIVE THIRD FLOOR PLAN





SECTION A1-A1'

PROPOSED RESIDENTIAL DEVELOPMENT CUM SOCIAL WELFARE FACILITY AND PUBLIC VEHICLE PARK
AT VARIOUS LOTS IN DD51, MA SIK ROAD, FANLING

- NOTES:
1. OVERALL HEIGHT OF CAR PARKING FLOORS KEPT AT 9m AS PER PREVIOUS UNDERGROUND CAR PARKING SCHEME
 2. RESIDENTIAL FLOOR TO FLOOR HEIGHT KEPT AT 3.15m AS PER PREVIOUS SCHEME
 3. BUILDING HEIGHT IS MAXIMIZED TO +141mPD. THIS IS 9m HIGHER THAN THE PREVIOUSLY APPROVED +132mPD.
 4. WITHIN THIS NEW BUILDING HEIGHT AND FLOOR-TO-FLOOR HEIGHTS, THE NUMBER OF RESIDENTIAL FLOORS IS MAXIMIZED.

Appendix 2.1 Proposed Stormwater Discharge Connection Extracted from Previous DSIA

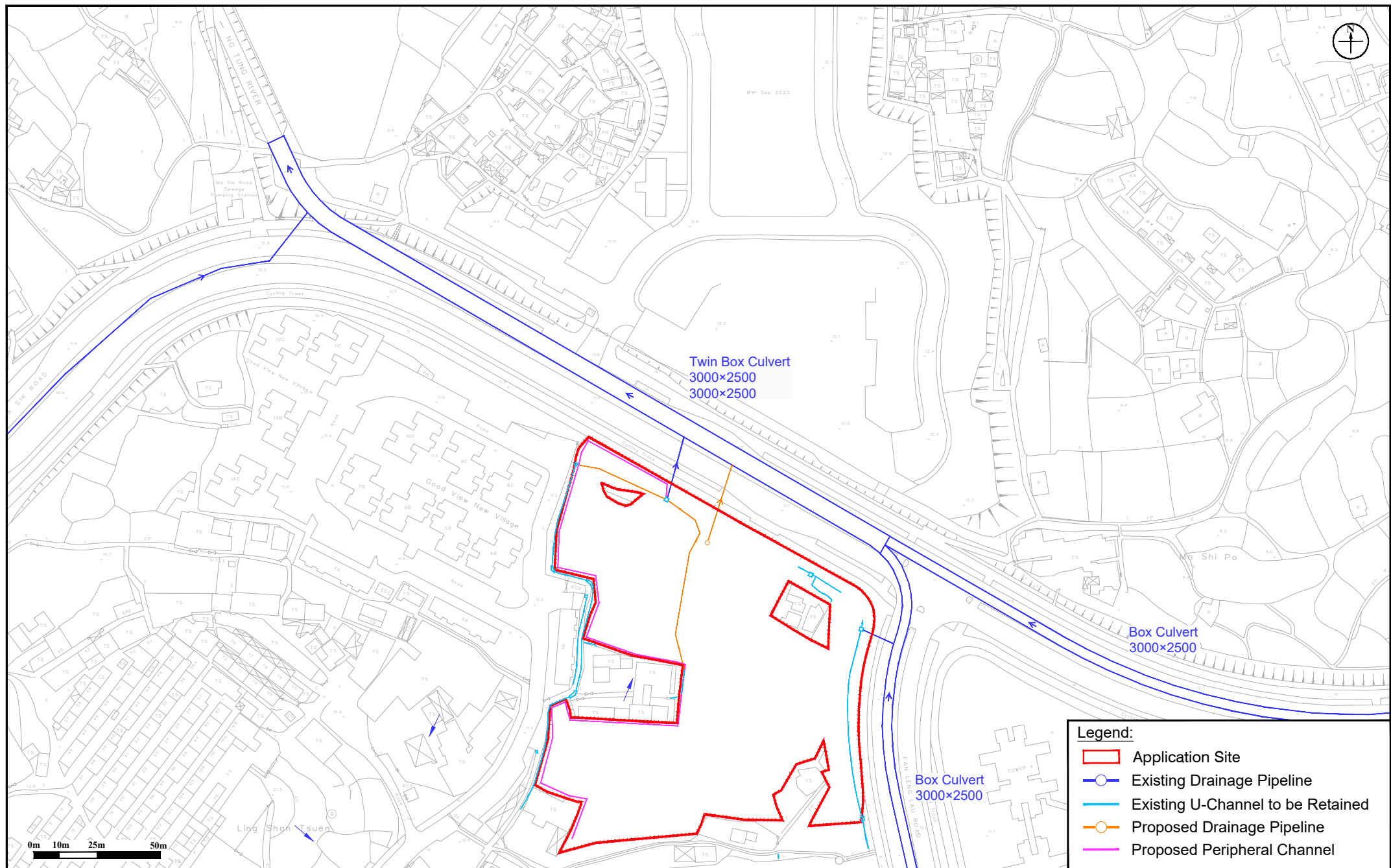


Figure: 2.1b

Title: Existing Drainage System in the Vicinity of the Application Site and Proposed Drain Connection (Future Condition)

Project: S16 Minor Relaxation of Plot Ratio and Building Height Restrictions for Permitted Residential Development with Social Welfare Facilities at Varous Lots in D.D. 51 and Adjoining Governmnet Land at Ma Sik Road, Fanling, New Territories

RAMBOLL

Drawn by: MW

Checked by: BF

Rev.: 2.1

Date: Nov 2023

Appendix 3.1 Sewerage Impact Assessment Extracted from Previous DSIA

3. SEWERAGE IMPACT ASSESSMENT

3.1 Scope of Work

- 3.1.1 The aim of this Sewerage Impact Assessment (SIA) is to assess whether the capacity of the existing sewerage networking to the Application Site is sufficient to cope with the sewage flow generated from the proposed development and existing developments in the vicinity. Drainage Record Plans from the Drainage Services Department (DSD) were obtained for the information of sewerage impact assessment.

3.2 Existing Sewerage System

- 3.2.1 According to the Drainage Record obtained from the DSD, there are existing Ø450 mm sewers running along Ma Sik Road (manhole reference no. FMH1004048 to FMH1003788).
- 3.2.2 The existing sewers serving the Application Site are shown in **Figure 3.1**.

3.3 Assessment Criteria and Methodology

- 3.3.1 Environmental Protection Department's (EPD's) Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, Version 1.0 (GESF) is referred to estimate the quantity of the sewage generated from the proposed development and the existing development. Sewage flow parameters and global peaking factors in this document are adopted.
- 3.3.2 The Commercial and Industrial Floor Space Utilization Survey (CIFSUS) conducted by the Planning Department is used to determine the worker density for various economic activities and planned usage type.
- 3.3.3 The following unit flow factors from GESF are referred to in this SIA:
- Domestic residents: 0.27 m³/day (Private R2)
 - Clubhouse, Social Welfare Facility and Neighbourhood Elderly Centre employees: 0.28 m³/employee/day (J11 - Community, Social & Personal Services)
 - Residents: 0.19 m³/day (Private R1)
 - Residents: 0.37 m³/day (Private R4)
 - Retail employees: 0.28 m³/employee/day (J4 - Wholesale & Retail)
 - F & B employees: 1.58 m³/employee/day (J10 - Restaurants & Hotels)
 - Temporary housing residents: 0.15 m³/person/day (Temporary and non-domestic)
- 3.3.4 Catchment Inflow Factor (P_{CIF}) of North District (1.0) has been applied in the assessment.

3.4 Assessment of Sewerage Impact

- 3.4.1 Wastewater arising from the proposed redevelopment will be primarily contributed by the residential population, clubhouse staff and social welfare facility employee. Backwash discharge of the swimming pools would happen occasionally and are also included in the assessment. Yet, it is noted that the backwashing operations could be easily controlled to avoid coinciding with peak sewage generation. According to GESF, the relative flow during non-peak sewage discharge period: 0400-0600 is below 60% of the Average Dry Weather Flow (ADWF). The Applicant committed to have backwashing operation and discharge only during non-peak sewage discharge period

(e.g. during 0400-0600). Therefore, no backwash contribution from the Application Site is accounted in peak discharge scenario.

3.4.2 Sewage generated from the Application Site will be discharged to the existing manhole FMH1004048 (S1) as shown in **Figure 3.1**.

3.4.3 **Appendix 3.1** shows the detailed calculation on the estimated hydraulic capacity of the existing sewer sections and the calculation of the amount of the sewage entering each segment of the said sewer network.

3.4.4 Calculation for the proposed development is given in **Table 3.1**.

Table 3.1 Estimated Peak Flow of the Proposed Development

Development Parameters	Proposed Development						
	Residential Units	Clubhouse	Social Welfare Facility		Neighbourhood Elderly Centre	Swimming Pool	Residential Units of 3 rd Parties Lots
Area (m ²)	-	3,000	2,382	-	722	-	-
Number of Residential Units	1,898	-	-	-	-	-	126
Average Household Size	2.7 ⁽¹⁾	-	-	-	-	-	2.7 ⁽¹⁾
Assumed Population	5,125	99	79	120	24	-	340
Design Flow (m ³ /person/day)	0.27 ⁽²⁾	0.28 ⁽³⁾	0.28 ⁽³⁾	0.27 ⁽²⁾	0.28 ⁽³⁾	-	0.27 ⁽²⁾
Flow Rate (m ³ /day)	1,383.6	27.7	22.0	32.4	6.7	-	91.9
Backwash Flow Rate (L/s)	-	-	-		-	12.5	-
Total Flow Rate (m ³ /day)	1,564.3						
Peak Flow (L/s)	90.5 ⁽⁴⁾						

Remarks:

(1) 2021 Population By-census - Average Household Size of 2.7 for Fanling Town

(2) Refer to Table T-1 of GESF - Private R2

(3) Refer to Table T-2 of GESF - J11

(4) Excluding backwash from swimming pool

3.5 Discussion

3.5.1 The potential sewerage impact due to the proposed development has been quantitatively addressed as shown in **Appendix 3.1**.

3.5.2 The average and peak flowrates from the proposed development area about 1,564.3 m³/day and 90.5 litre/sec (excluding backwash from swimming pool) respectively.

- 3.5.3 The estimated sewage flow from the proposed development has been compared with the capacity of the existing sewerage system. Based on the assessment, 8 numbers of existing Ø450mm pipe segments are found with inadequate capacity.
- 3.5.4 The proposed upgrading works are summarized in **Table 3.2** below. The project proponent will be responsible for the implementation of the required sewerage connection and the upgrading works.

Table 3.2 Proposed Upgrading Works

Segment	Length (m)	Original Size (Ø) (mm)	Upgraded Size (Ø) (mm)
S1-S2	68.0	450	525
S2-S3	38.6	450	525
S3-S4	37.7	450	525
S4-S5	78.1	450	525
S6-S7	68.8	450	525
S8-S9	48.2	450	525
S9-S10	28.0	450	525

- 3.5.5 With the proposed upgrading works in place, the sewerage system will have adequate capacity to cater for the proposed development and the nearby catchments.
- 3.5.6 The key facility in the local sewerage system is the Ma Sik Road Sewage Pumping Station (SPS), which has a designed ADWF capacity of 17,620 m³/day and average daily flow of 1,580 m³ in 2019 according to DSD (**Appendix 3.2**). The Fan Garden Government Police Married Quarters has been completed in the first quarter of 2021. With the inclusion of expected flows from the newly completed Quarters, the total future flow would be in the order of 2,443.1 m³/day (13.9% of designed capacity) before the proposed development. With the addition of the flow from the Site after development, the overall ADWF flow to be pumped at the SPS would be 4007.4 m³/day. When compared to the design capacity, it amounts to be about 22.7% of the capacity.

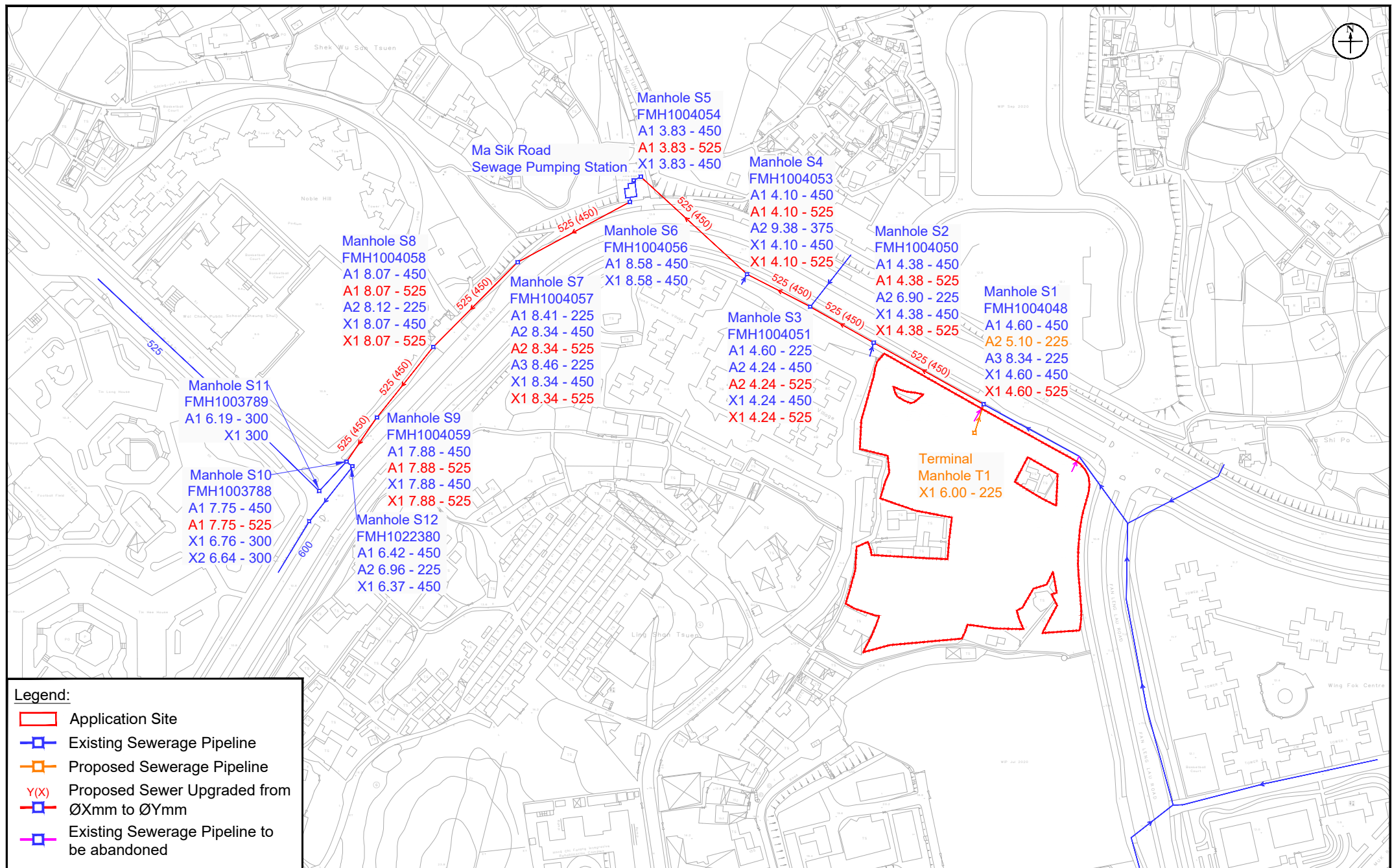


Figure: 3.1	RAMBOLL
Title: Existing Sewerage System in the Vicinity of the Application Site and Proposed Sewerage Upgrading Works	Drawn by: MW
Project: S16 Minor Relaxation of Plot Ratio and Building Height Restrictions for Permitted Residential Development with Social Welfare Facilities at Varous Lots in D.D. 51 and Adjoining Governmnet Land at Ma Sik Road, Fanling, New Territories	Checked by: BF
	Rev.: 2.1
	Date: Nov 2023

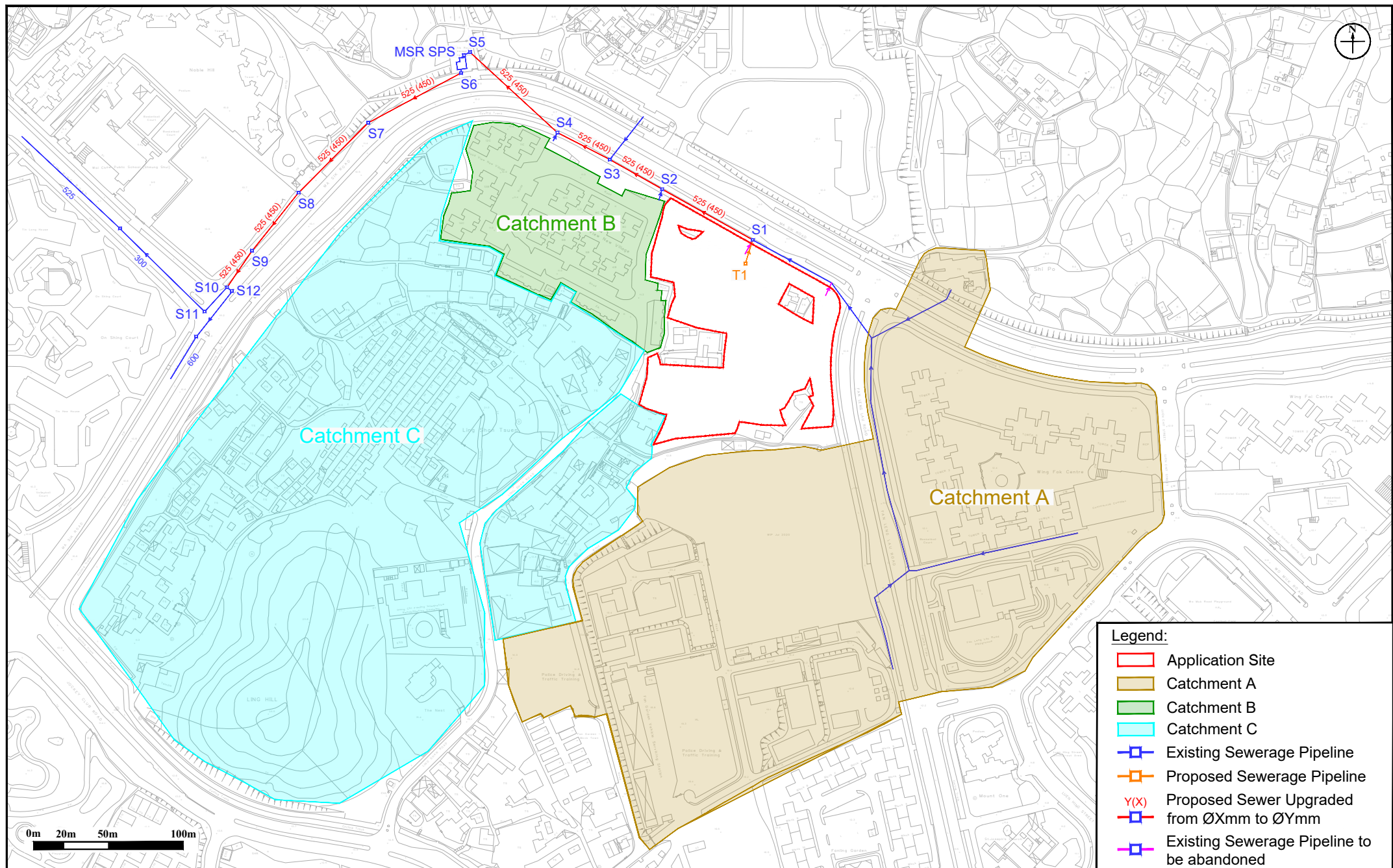


Figure: 3.2

Title: Existing Sewerage System and Catchment Areas in the Vicinity of the Application Site

Project: S16 Minor Relaxation of Plot Ratio and Building Height Restrictions for Permitted Residential Development with Social Welfare Facilities at Varous Lots in D.D. 51 and Adjoining Governmnet Land at Ma Sik Road, Fanling, New Territories

RAMBOLL

Drawn by: MW

Checked by: BF

Rev.: 2.1

Date: Nov 2023

Appendix 3.1 Detailed Sewerage Impact Assessment Calculations

Table 1 Calculation for Sewage Generation Rate of the Proposed Development at the Subject Site

1. Residential Tower		
1a. Total number of residential units	=	1898 units
1b. Total number of residents	=	5125 people -- (2021 Population By-census: Average Household Size of 2.7 for Fanling Town)
1c. Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
1d. Sewage Generation rate	=	1383.6 m ³ /day
2. Clubhouse		
2a. Assumed Area	=	3000 m ²
2b. Assumed floor area per employee	=	30.3 m ² per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
2c. Total number of employees	=	99 employees
2d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - J11)
2e. Sewage Generation rate	=	27.7 m ³ /day
3. Social Welfare Facility		
3a. Assumed Area	=	2382 m ²
3b. Assumed floor area per employee	=	30.3 m ² per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
3c. Total number of employees	=	79 employees
3d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - J11)
3e. Sewage Generation rate	=	22.0 m ³ /day
3f. Total number of residents	=	120 people
3g. Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
3h. Sewage Generation rate	=	32.4 m ³ /day
4. Neighbourhood Elderly Centre		
4a. Assumed Area	=	722 m ²
4b. Assumed floor area per employee	=	30.3 m ² per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
4c. Total number of employees	=	24 employees
4d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - J11)
4e. Sewage Generation rate	=	6.7 m ³ /day
5. Swimming Pools (Outdoor)		
5a. Assumed Area of Swimming Pool	=	750 m ²
5b. Average Depth of Water	=	1.2 m
5c. Volume of Swimming Pool (Ordinary Assumption)	=	900 m ³
5d. Turnover Rate	=	6 hr
5e. Required Surface Loading Rate of Filter	=	50 m ³ /m ² /hr (based on min. 2 identical filters)
5f. Filter Area required	=	3.0 m ²
5g. Backwash Duration	=	3 min/d
5h. Backwash flow rate	=	30 m ³ /m ² /hr (based on min. 2 identical filters)
5i. Design flow for Swimming Pool Backwashing	=	4.5 m ³ /day (based on min. 2 identical filters)
5j. Design flow for Swimming Pool Backwashing	=	25.0 litre/sec (based on min. 2 identical filters)
5k. Design Flowrate for Each Filter	=	12.5 litre/sec (assuming 2 identical filters to be used and operated sequentially)
6. Residential Tower of 3rd Parties Lots		
6a. Total number of residential units	=	126 units
6b. Total number of residents	=	340 people -- (2021 Population By-census: Average Household Size of 2.7 for Fanling Town)
6c. Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
6d. Sewage Generation rate	=	91.9 m ³ /day
Total Flow from Proposed Development		
Flow Rate	=	1564.3 m ³ /day
Contributing Population	=	5794 people
Peaking factor	=	5 Refer to Table T-5 of GESF for population 5,000-10,000 incl. stormwater allowance
Peak Flow	=	90.5 litre/sec
Peak Flow with backwash from swimming pool	=	<u>103.0</u> litre/sec

Table 2a Hydraulic Capacity of Existing Sewers at Ma Sik Road, Fanling

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	FMH1004048	FMH1004050	450	68.0	4.60	4.38	9.81	0.00167	0.003	0.000001	1.01	0.16	0.16	160
S2-S3	FMH1004050	FMH1004051	450	38.6	4.38	4.24	9.81	0.00060	0.004	0.000001	1.22	0.16	0.19	194
S3-S4	FMH1004051	FMH1004053	450	37.7	4.24	4.10	9.81	0.00060	0.004	0.000001	1.23	0.16	0.20	196
S4-S5	FMH1004053	FMH1004054	450	78.1	4.10	3.83	9.81	0.00060	0.003	0.000001	1.19	0.16	0.19	189
S6-S7	FMH1004056	FMH1004057	450	68.8	8.58	8.34	9.81	0.00060	0.003	0.000001	1.20	0.16	0.19	190
S7-S8	FMH1004057	FMH1004058	450	64.6	8.34	8.07	9.81	0.00060	0.004	0.000001	1.31	0.16	0.21	208
S8-S9	FMH1004058	FMH1004059	450	48.2	8.07	7.87	9.81	0.00060	0.004	0.000001	1.30	0.16	0.21	208
S9-S10	FMH1004059	FMH1003788	450	28.0	7.87	7.75	9.81	0.00060	0.004	0.000001	1.33	0.16	0.21	211
S10-S11	FMH1003788	FMH1003789	300	21.9	6.64	6.19	9.81	0.00060	0.021	0.000001	2.26	0.07	0.16	160
S10-S12	FMH1003788	FMH1022380	450	4.0	6.76	6.42	9.81	0.00060	0.085	0.000001	5.97	0.16	0.95	949

Table 2b Hydraulic Capacity of Proposed Sewers from the Terminal Manhole of the Proposed Development for Sewage generated from the Proposed Development

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	-	FMH1004048	225	14.9	6.00	5.10	9.81	0.00030	0.0604	0.000001	3.53	0.04	0.14	140

Table 2c Hydraulic Capacity of Existing Sewers at Ma Sik Road, Fanling (After Upgrading Segments S1-S5)

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	FMH1004048	FMH1004050	525	68.0	4.60	4.38	9.81	0.00030	0.003	0.000001	1.37	0.22	0.30	296
S2-S3	FMH1004050	FMH1004051	525	38.6	4.38	4.24	9.81	0.00030	0.004	0.000001	1.45	0.22	0.31	313
S3-S4	FMH1004051	FMH1004053	525	37.7	4.24	4.10	9.81	0.00030	0.004	0.000001	1.47	0.22	0.32	317
S4-S5	FMH1004053	FMH1004054	525	78.1	4.10	3.83	9.81	0.00030	0.003	0.000001	1.41	0.22	0.31	306
S6-S7	FMH1004056	FMH1004057	525	68.8	8.58	8.34	9.81	0.00030	0.003	0.000001	1.42	0.22	0.31	307
S7-S8	FMH1004057	FMH1004058	525	64.6	8.34	8.07	9.81	0.00030	0.004	0.000001	1.56	0.22	0.34	337
S8-S9	FMH1004058	FMH1004059	525	48.2	8.07	7.87	9.81	0.00030	0.004	0.000001	1.55	0.22	0.34	336
S9-S10	FMH1004059	FMH1003788	525	28.0	7.87	7.75	9.81	0.00030	0.004	0.000001	1.58	0.22	0.34	341
S10-S11	FMH1003788	FMH1003789	300	21.9	6.64	6.19	9.81	0.00060	0.021	0.000001	2.26	0.07	0.16	160
S10-S12	FMH1003788	FMH1022380	450	4.0	6.76	6.42	9.81	0.00060	0.085	0.000001	5.97	0.16	0.95	949

Notes: (1) T1 is the proposed manhole as shown in Figure 3.1 of the SIA report. The exact invert level of the proposed manhole is subject to change during detailed design stage.

Remarks: (1) g=gravitational acceleration; k_s=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity

(2) Table 2a, 2c: The value of k_s = 3-0.6mm is used for the calculation of slimed clayware sewer, poor condition (based on Table 5: Recommended roughness values in Sewerage Manual)

(3) Table 2b: The value of k_s = 0.3mm is used for the calculation of slimed polyethelyene for the proposed sewers, poor condition (based on Table 5: Recommended roughness values in Sewerage Manual)

(4) Table 2a: 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:

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

Table 3 Calculation for Sewage Generation Rate of the Surrounding Buildings

Catchment A

1. Fan Garden Government Police Married Quarters

Total number of units	=	1184 units
Total number of residents	=	3197 people -- (2021 Population By-census: Average Household Size of 2.7 for Fanling Town)
Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
Sewage Generation rate	=	863.1 m³/day

2. Wing Fok Centre

Total number of units	=	1680 units
Total number of residents	=	4536 people -- (2016 Population By-census: Average Household Size of 2.7 for Luen Wo Hui)
Design flow	=	0.19 m ³ /person/day -- (refer to Table T-1 of GESF - Private R1)
Sewage Generation rate	=	861.8 m³/day

3. Wing Fok Centre Commercial Complex G/F (Retail)

3a. Assumed Area	=	518 m ²
3b. Assumed floor area per employee	=	28.6 m ² per worker -- (refer to Table 8 of CIFSUS - Retail Trade)
3c. Total number of employees	=	18 employees
3d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - J4)
3e. Sewage Generation rate	=	5.1 m³/day

4. Wing Fok Centre Commercial Complex G/F (F&B)

4a. Assumed Area	=	518 m ²
4b. Assumed floor area per employee	=	19.6 m ² per worker -- (refer to Table 8 of CIFSUS - Restaurants)
4c. Total number of employees	=	26 employees
4d. Design flow for commercial activities	=	1.58 m ³ /employee/day -- (refer to Table T-2 of GESF - J10)
4e. Sewage Generation rate	=	41.7 m³/day

5. Karbo Anglo Chinese Kindergarten (Fanling)

5a. Total number of teachers & staff	=	25 teachers & staff
5c. Design flow for teachers & staff	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - J11)
5b. Total number of students	=	352 students
5d. Design flow for students	=	0.04 m ³ /person/day -- (refer to Table T-2 of GESF, School Student)
5e. Sewage Generation rate	=	21.1 m³/day

6. Public Lavatory near Fan Leng Lau Road Playground

6a. Discharge from WC (K * Qty * DU)	=	9 litre/sec
6b. Discharge from Single Urinal with Cistern (K * Qty * DU)	=	2 litre/sec
6c. Discharge from Basin (K * Qty * DU)	=	1.8 litre/sec
<i>Frequency of use, K = 1, extracted from Table 6 of Plumbing Engineering Services Design Guide (PESDG)</i>		
<i>Discharge Unit (DU) of WC = 1.8 L/s; DU of Basin = 0.3 L/s, extracted from Table 5 of PESDG</i>		

7. Temporary Housing in Ma Shi Po

Total number of units	=	6 units
Total number of residents	=	17 people -- (2021 Population By-census: Average Household Size of 2.8 for Tin Ping East)
Design flow	=	0.15 m ³ /person/day -- (refer to Table T-1 of GESF - Temporary and non-domestic)
Sewage Generation rate	=	2.5 m³/day

8. Police Driving & Traffic Training Centre

8a. Assumed Area	=	6883 m ²
8b. Assumed floor area per employee	=	30.3 m ² per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
8c. Total number of employees	=	227 employees
8d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - J11)
8e. Sewage Generation rate	=	63.6 m³/day

Catchment B

1. Good View New Village

Total number of units	=	216 units
Total number of residents	=	605 people -- (2021 Population By-census: Average Household Size of 2.8 for Tin Ping East)
Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
Sewage Generation rate	=	163.3 m³/day

Catchment C

1. Ling Shan Tsuen

1a. Total number of residents	=	996 people -- (2021 Population Census - Subunit 625/46-47)
1b. Design flow	=	0.37 m ³ /person/day -- (refer to Table T-1 of GESF - Private R4)
1c. Sewage Generation rate	=	368.5 m³/day

2. Village House

Total number of units	=	8 units
Total number of residents	=	22 people -- (2021 Population By-census: Average Household Size of 2.8 for Tin Ping East)
Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
Sewage Generation rate	=	6.0 m³/day

Sub-total with Catchment Inflow Factors = 1.0 (North District)

Total Flow at S1 (not including Proposed Development, Catchment A)	=	1859.0 m³/day
Total Flow at S2 (not including Proposed Development, Catchment A-B)	=	2022.3 m³/day
Total Flow at S7 (not including Proposed Development, Catchment A-C)	=	2396.8 m³/day

Table 4a Comparison of the Hydraulic Capacity of Existing Sewers for Sewerage generated from the Proposed Development and Surrounding Catchment Areas

Segment	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	ADWF (m ³ /day)	Contributing Population	Peaking Factor	Swimming Pool/Public Toilet (L/s)	Peak Flow from the Proposed Development and Catchment Areas (L/s)	Contribution from the Proposed Development and the Surrounding Catchment Areas (%)	Status
S1-S2	450	68.0	0.003	160	3423.3	12679	4	25.3	183.8	114.5%	Spill
S2-S3	450	38.6	0.004	194	3586.6	13284	4	25.3	191.3	98.7%	Spill
S3-S4	450	37.7	0.004	196	3586.6	13284	4	25.3	191.3	97.5%	Spill
S4-S5	450	78.1	0.003	189	3586.6	13284	4	25.3	191.3	101.1%	Spill
S6-S7	450	68.8	0.003	190	3955.1	14649	4	25.3	208.4	109.6%	Spill
S7-S8	450	64.6	0.004	208	3955.1	14649	4	25.3	208.4	100.0%	Spill
S8-S9	450	48.2	0.004	208	3955.1	14649	4	25.3	208.4	100.4%	Spill
S9-S10	450	28.0	0.004	211	3955.1	14649	4	25.3	208.4	98.7%	Spill
S10-S11	300	21.9	0.021	160	1977.5	7324	5	25.3	139.7	87.4%	OK
S10-S12	450	4.0	0.085	949	1977.5	7324	5	25.3	139.7	14.7%	OK

Table 4b Comparison of the Hydraulic Capacity of Proposed Sewers from the Terminal Manhole of the Proposed Development for Sewage generated from the Proposed Development

Segment	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	ADWF (m ³ /day)	Contributing Population	Peaking Factor	Swimming Pool/Public Toilet (L/s)	Peak Flow from the Proposed Development and Catchment Areas (L/s)	Contribution from the Proposed Development (%)	Status
T1-S1	225	14.9	0.060	140	1564.3	5794	5	12.5	103.0	73.4%	OK

Table 4c Comparison of the Hydraulic Capacity of Existing Sewers for Sewerage generated from the Proposed Development and Surrounding Catchment Areas (After Upgrading Segments S1-S5)

Segment	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	ADWF (m ³ /day)	Contributing Population	Peaking Factor	Swimming Pool/Public Toilet (L/s)	Peak Flow from the Proposed Development and Catchment Areas (L/s)	Contribution from the Proposed Development and the Surrounding Catchment Areas (%)	Status
S1-S2	525	68.0	0.003	296	3423.3	12679	4	25.3	183.8	62.1%	OK
S2-S3	525	38.6	0.004	313	3586.6	13284	4	25.3	191.3	61.1%	OK
S3-S4	525	37.7	0.004	317	3586.6	13284	4	25.3	191.3	60.3%	OK
S4-S5	525	78.1	0.003	306	3586.6	13284	4	25.3	191.3	62.5%	OK
S6-S7	525	68.8	0.003	307	3955.1	14649	4	25.3	208.4	67.8%	OK
S7-S8	525	64.6	0.004	337	3955.1	14649	4	25.3	208.4	61.8%	OK
S8-S9	525	48.2	0.004	336	3955.1	14649	4	25.3	208.4	62.1%	OK
S9-S10	525	28.0	0.004	341	3955.1	14649	4	25.3	208.4	61.0%	OK
S10-S11	300	21.9	0.021	160	1977.5	7324	5	25.3	139.7	87.4%	OK
S10-S12	450	4.0	0.085	949	1977.5	7324	5	25.3	139.7	14.7%	OK

Remarks: (1) The value of peaking factor = 5 is used for population 5,000-10,000 incl. stormwater allowance (refers to Table T-5 of GESF)
(2) The value of peaking factor = 4 is used for population 10,000-50,000 incl. stormwater allowance (refers to Table T-5 of GESF)

Table 5 Existing & Future Flows to Ma Sik Road Sewage Pumping Station

ADWF

1. Designed Capacity

Design Daily Flow = 17620 m³/day (DSD)

2. 2019 Situation

Average Daily Flow = 1580 m³/day (DSD)

3. Future Situation (including sewerage generated by the newly completed development)

Average Flow of 2019 = 1580 m³/day

Fan Garden Government Police Married Quarters = 863 m³/day

Total = 2443.1 m³/day
13.9% (of designed capacity)

4. Future Situation (including sewerage generated by newly completed development and the Proposed Development)

Existing and Planned Development = 2443.1 m³/day

Proposed Development = 1564.3 m³/day

Total = 4007.4 m³/day
22.7% (of designed capacity)

Appendix 3.2 Relevant Information from DSD

Lily Chow

From: cyleung@dsd.gov.hk
Sent: 09 December 2020 1:35 PM
To: Lily Chow
Cc: Billy Fan; paulchau@dsd.gov.hk
Subject: RE: Request for Information of Box Culverts from SBP1000617 to SBP1001326 and Ma Sik Road Sewage Pumping Station
Attachments: 61983_1201C.PDF; 61983_2001D.PDF; 61983_2101B.PDF; 61983_2102B.PDF; 308629_B_FOM.PDF

Dear Lily,

Please see your requested information as below:

The Ma Sik Road SPS flow data in 2019 is shown as follows:

Design daily flow = 17620 m3
Average daily flow = 1580 m3
Maximum daily flow = 2706 m3

Please note that the information provided are for reference only. The actual layout should be verified on site.

The data of the SPS provided has no indication about whether or not there will be spare capacity, a SIA is required for the assessment.

Regards,
Chiny LEUNG
E/N1, MND, DSD
Tel: 2300 1629