

Prepared for

Kam Luk Investment Company Limited

Prepared by

Ramboll Hong Kong Limited

**PROPOSED PUBLIC RESIDENTIAL HOUSING / STARTER
HOMES DEVELOPMENT AT UDWYT LOT 14RP AND
ADJOINING GOVERNMENT LAND (SITE A) & PROPOSED
PRIVATE RESIDENTIAL DEVELOPMENT AT UDWYT LOT 11
RP AND ADJOINING GOVERNMENT LAND (SITE B), WONG
YUE TAN, TAI PO**

SEWERAGE IMPACT ASSESSMENT

Date **February 2025**

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Signed

Approved by **Calvin Chiu**
Technical Director



Signed

Project Reference **NFDUDWYTEI00**

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1. INTRODUCTION

1.1 Project Background

- 1.1.1 Referring to the Lands Sharing Pilot Scheme ("LSPS") application at Lo Fai Road/ Ting Kok Road with application no. LSPS/001 on 19 July 2021, the applicant has revised the submission.
- 1.1.2 The application involves two private lots, namely Lot 14 RP and Lot 11 RP in Unserved District at Wong Yue Tan ("UDWYT") and adjoining Government Lands ("GL"). Lot 14 RP and adjoining Government Land (Site A) would be designated for public housing / Starter Homes Housing development, whereas Lot 11 RP and adjoining Government Land (Site B) would be designated for proposed private residential development.
- 1.1.3 As per request from Drainage Services Department (DSD) (dated 1 September 2021) and LSO, Sewerage Impact Assessment (SIA) with calculation on drainage provisions is submitted herewith for further information.
- 1.1.4 Ramboll Hong Kong Limited has been commissioned by the Applicant to provide environmental consultancy services for the SIA for the Proposed Development at Site A and Site B.

1.2 Site A and Site B and its Environ

- 1.2.1 Site A and Site B are located at Ting Kok Road in Tai Po with residential developments and Tai Po Industrial Estate nearby. The existing use of the sites is vacant.
- 1.2.2 Site A is bounded by Ting Kok Road to the south, and Lo Fai Road to the west. The area to the north to east is vegetated slope area zoned Green Belt.
- 1.2.3 Site B is bounded by Ting Kok Road to the south. The area to the south to east is vegetated slope area zoned Green Belt.
- 1.2.4 The location and its environs are shown in **Figure 1**.

1.3 Proposed Development

- 1.3.1 Site A will consist of 1,290 public residential housing / SH housing units with population density of 2.8 (Average Household Size under LSPS) while Site B will have 460 private housing units with population density of 2.8 (based on 2021 population census average domestic household size in Tai Po New Town). In addition, GIC uses such as residential care home for elderly (RCHE) and retail facilities will be included in Site A as well. The expected year for completion of the Proposed Development is 2030 tentatively. Yet, it may take extra time to design and complete the development so that the project may be completed as late as by 2033.
- 1.3.2 **Appendix 3** shows the Indicative MLP of the Proposed Scheme.

2. SEWERAGE IMPACT ASSESSMENT

2.1 Scope of Work

- 2.1.1 The aim of this SIA is to assess whether the capacity of the existing sewerage network serving Site A and Site B is sufficient to cope with the sewage flow from the proposed development. Drainage Record Plans from Drainage Services Department (DSD) were obtained for the purposes of this SIA.

2.2 Assessment Criteria and Methodology

- 2.2.1 Environmental Protection Department's (EPD's) Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, Version 1 (GESF) has been referred to for the purposes of estimating the quantity of the sewage generated from the proposed development and the existing catchment area. Sewage flow parameters and global peaking factors in this document have been adopted for this SIA.
- 2.2.2 Based on the building types in the area, the following unit flow factors are used in the SIA calculation:
- Public and private housing domestic residents: 0.27 m³/day (Private R2)
 - Clubhouse and G/IC Staff: 0.28 m³/day (J11 - Community, Social & Personal Services)
 - Office employee: 0.28 m³/day (General Territorial Average)
 - Retail employee: 0.28 m³/day (J4 Wholesale & Retail)
 - F&B employee: 1.58 m³/day (J10 Restaurant & Hotel)
 - G/IC residents: 0.27 m³/day (Private R2)
- 2.2.3 Catchment Inflow Factor (P_{CIF}) of Tai Po (1.00) has been applied in the assessment.

2.3 Existing and Future Sewerage System

- 2.3.1 For Site A, there are existing Ø300 mm sewerage pipes along Lo Fai Road to the west. The pipe is then connected to the Ø600 mm sewerage pipes along Ting Kok Road. The existing sewers in the vicinity of Site A are shown in **Figure 2**.
- 2.3.2 For Site B, there are existing Ø600 mm sewerage pipes along Ting Kok Road to the south. The sewer eventually discharges the collected sewage to Ting Kok Road Pumping Station No. 5 (see **Figure 2**).
- 2.3.3 The sewage generated from Site A and Site B will be discharged to manhole N1 (FMH1005270) and S1 (FMH1027320) respectively as shown in **Figure 2**. It is noted that information about realignment of sewers and relocation of Ting Kok Road Sewage Pumping Station No. 5 under DSD's Contract No. DC/2018/02 is adopted.

2.4 Wastewater Generated by the Proposed Development

- 2.4.1 Wastewater arising from the proposed development will be primarily contributed by the domestic and G/IC residents; clubhouse, F&B, office and retail. Detailed calculation for the Proposed Development is given in **Table 2.1** and **Table 2.2** below and in **Appendix 1**.

Table 2.1 Estimated Peak Flow for Site A

Development Parameters	Proposed Development					
	Residential Units	Office	F&B	Retail	G/IC	G/IC residents
Area (m ²)	-	128	350	650	3,226	-
Number of Residential Units	1,290	-	-	-	-	-
Number of Residential Units (+10%) ⁽¹⁾	1,419	-	-	-	-	-
Average Household Size	2.8 ⁽⁷⁾	-	-	-	-	-
Assumed Population ⁽¹⁾	3,973	7	18	23	106	150
Design Flow (m ³ /person/day)	0.27 ⁽²⁾	0.28 ⁽³⁾	1.58 ⁽⁶⁾	0.28 ⁽⁴⁾	0.28 ⁽⁵⁾	0.27 ⁽²⁾
Flow Rate (m ³ /day)	1072.8	2.0	28.2	6.4	70.3	
Total Flow Rate (m ³ /day)	1179.6					
Peak Flow (L/s)	68.3					

Table 2.2 Estimated Peak Flow for Site B

Development Parameters	Proposed Development		
	Residential Units	Clubhouse	Office
Area (m ²)	-	1,150	46
Number of Residential Units	460	-	-
Average Household Size	2.8 ⁽⁸⁾	-	-
Assumed Population	1,288	38	3
Design Flow (m ³ /person/day)	0.27 ⁽²⁾	0.28 ⁽⁵⁾	0.28 ⁽³⁾
Flow Rate (m³/day)	347.8	10.6	0.7
Total Flow Rate (m³/day)	359.1		
Peak Flow (L/s)	20.8		

(1) "+10%" variation is allowed for flexibility in detailed design stage

(2) Refer to Table T-1 of GESF – R2

(3) Refer to Table T-2 of GESF – General Territorial Average

(4) Refer to Table T-2 of GESF – J4

(5) Refer to Table T-2 of GESF – J11

(6) Refer to Table T-2 of GESF – J10

(7) Based on the Land Sharing Pilot Scheme

(8) Based on 2021 population census average domestic household size in Tai Po New Town

2.5 Assessment of Sewerage Impact

2.5.1 **Appendix 1** shows the detailed calculation on the estimated hydraulic capacity of the proposed sewer sections and existing downstream sewers and the calculation of the

amount of the sewage entering each segment of the said sewer network. Total flow from the Proposed Development is assessed in the calculations.

2.6 Discussion

- 2.6.1 The potential sewerage impact due to the Proposed Development has been quantitatively addressed. Total sewage generation rate from the Proposed Development (including Site A and Site B) is estimated to be 1538.7 m³/day (i.e. peak flow 89.0 litre/sec).
- 2.6.2 After calculating the appropriate capacities as mentioned above, the estimated sewage flow from the Proposed Development and contribution from other existing and planned (Sports Centre at the Education University of Hong Kong tentatively completed by 2029) developments has been compared with the capacity of the existing and proposed sewerage system to determine whether it has adequate spare capacity to accommodate the flow from the proposed development.
- 2.6.3 According to Table 4 of **Appendix 1**, regarding the sewage generation rate from the Proposed Development and surrounding catchment areas (**Figure 5**), it is found that 3 of the existing pipe segments (N1-N2 and N2-S14) are close to 100% capacity based on comparison with cumulative discharge.
- 2.6.4 For N1-N2 and N2-S14, the proposed upgrading works are summarized in **Table 2.3** below.

Table 2.3 Proposed Upgrading Works

Segment	Manhole Reference	Manhole Reference	Length (m)	Original Size (Ø)	Upgraded Size (Ø)
N1-N2	FMH1005270	FMH1005269	27.3	300	375
N2-S14	FMH1005269	FMH1027333	54.3	300	375

- 2.6.5 A Ø225 mm sewerage pipe is proposed to be constructed to connect the terminal manhole of the Site A (TA) to existing manhole N1. The Proposed sewerage connection of Site A is shown in **Figure 3**.
- 2.6.6 A Ø225 mm and Ø300 mm sewerage pipes is proposed to be constructed to connect the terminal manhole of the Site B (TB) to existing manhole S1. The Proposed sewerage connection of Site B is shown in **Figure 4**. It is noted that the section of sewer within the future roundabout will be concrete surrounded. In addition, it will ensure that the proposed sewers and manholes would not be constructed in planting areas.
- 2.6.7 The proposed sewer location is shown in **Figure 6** and **Figure 7**. The sewer alignment, invert level and size are tentative and will be subject to detailed design stage.
- 2.6.8 With the proposed new connection and upgrading works in place, the sewerage system will have adequate capacity to cater the sewerage from the Proposed Development and nearby catchments.
- 2.6.9 The key facility in the local sewerage system are the Ting Kok Road Pumping Station No.5 (TKRSPS No.5) and the Tai Po Sewage Treatment Works (TPSTW). Planned upgrade works would be carried out for TKRSPS No.5 to be completed in 2024. As the expected year for completion of the development is 2033 tentatively, the planned upgrading for TKRSPS No.5 is accounted in the assessment. Also, the flow from the proposed development in addition to the existing flow of existing Tai Po STW is lower than the design capacity of Tai Po STW. Detailed calculation for the capacities of TKRSPS No.5 and existing Tai Po STW are given in **Table 2.4** below and **Appendix 1**.

Therefore, the SPS and Tai Po STW would have sufficient capacity to cater the sewage generated from the proposed development and related existing and planned catchments. The applicant will be responsible for the implementation of the required sewerage connection and upgrading works.

Table 2.4 Estimated Capacity for TKRSPS No.5 and TPSTW

	TKRSPS No.5 (after upgrade)
Designed ADWF (m ³ /day)	21,194 [^]
Existing Average Daily Flow (m ³ /day)	7,682 [^]
Average Flow with Planned Developments [#] (m ³ /day)	12,032.5(56.8%*)
Average Flow with Planned Developments and the Proposed Development (m ³ /day)	13,571.3 (64.0%*)
	TPSTW
Designed ADWF (m ³ /day)	120,000
Existing Average Daily Flow (m ³ /day)	110,754 (92.3%*)
Average Flow with Planned Developments and the Proposed Development (m ³ /day)	112,293 (93.6%*)

[^] According to DSD (**Appendix 2**)

* Contribution of flow to designed ADWF

3. OVERALL CONCLUSION

3.1 Conclusion

- 3.1.1 The potential sewerage impact arisen from the Proposed Development has been quantitatively assessed.
- 3.1.2 Based on the sewerage impact assessment results, the existing sewerage from FMH1005270 to FMH1027333 (N1-N2 and N2-S14) contributes close to 100% capacity.
- 3.1.3 Two of existing dia. 300mm sewerage pipe (N1-N2 and N2-S14) will be upgraded to dia. 375mm sewerage pipes. New dia. 225mm and dia. 300mm sewerage pipes and manhole will be proposed to connect the existing pipe.
- 3.1.4 TKRSPS No.5 and TPSTW that the sewerage system would be connecting to has adequate capacity for the expected daily flows from the Proposed Development based on the assessment results.
- 3.1.5 With the proposed new connection and upgrading works in place, this SIA confirms the feasibility of the Proposed Development with no adverse impacts imposed to the public sewerage system. For the design of the proposed sewerage system to be handed over to DSD, reference will be made to DSD Practice Note No. 1/2024 - Design Checklists on Operation & Maintenance Requirements where applicable.

Figures

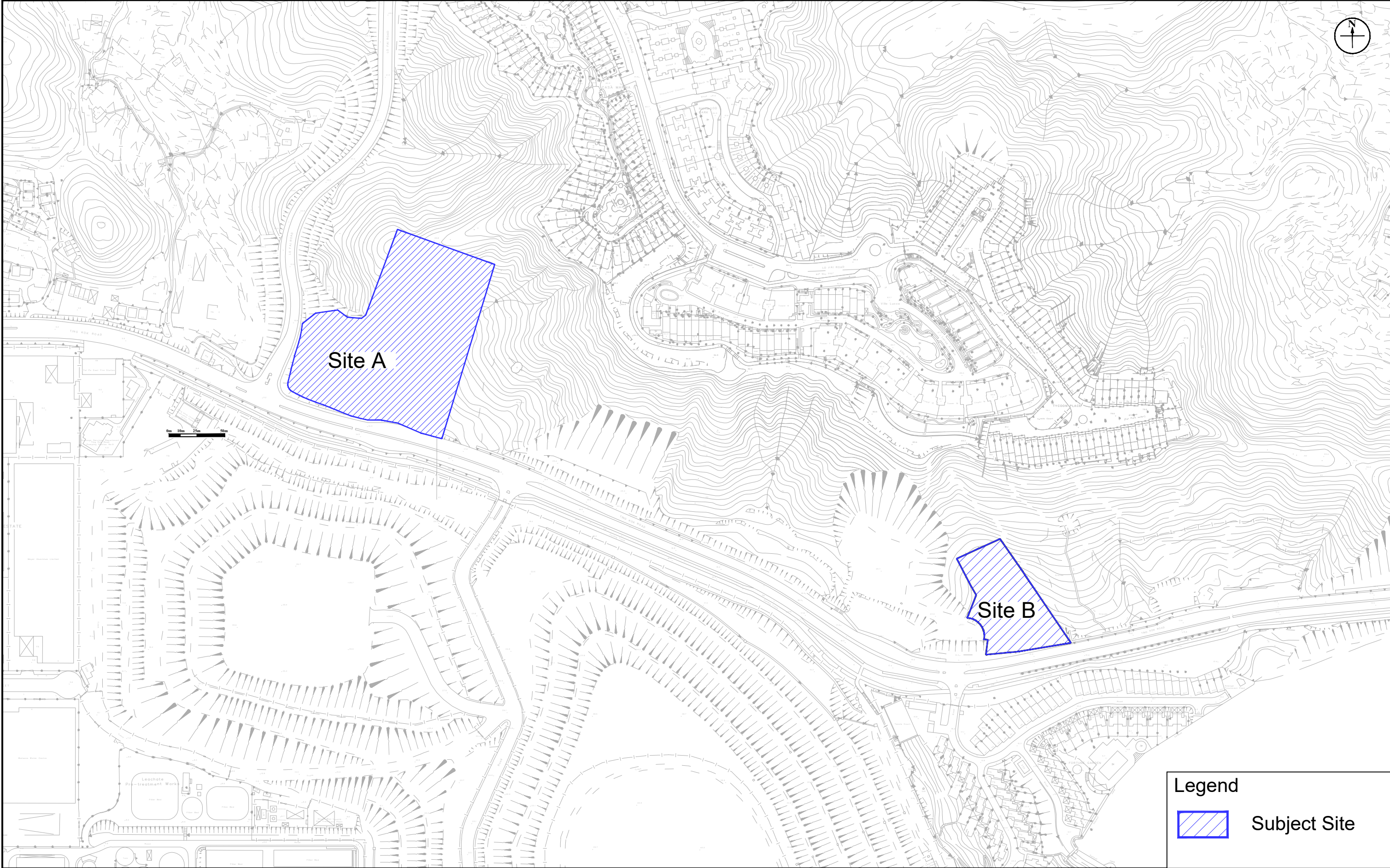


Figure: 1
Title: Location of the Subject Site and its Environ
Project: Proposed Public Residential Housing / Starter Homes Development at UDWYT Lot 14RP (Site A) & UDWYT Lot 11 RP (Site B), Wong Yue Tan, Tai Po

RAMBOLL	
Drawn by:	MW
Checked by:	CC
Rev.:	1.4
Date:	Oct 2024

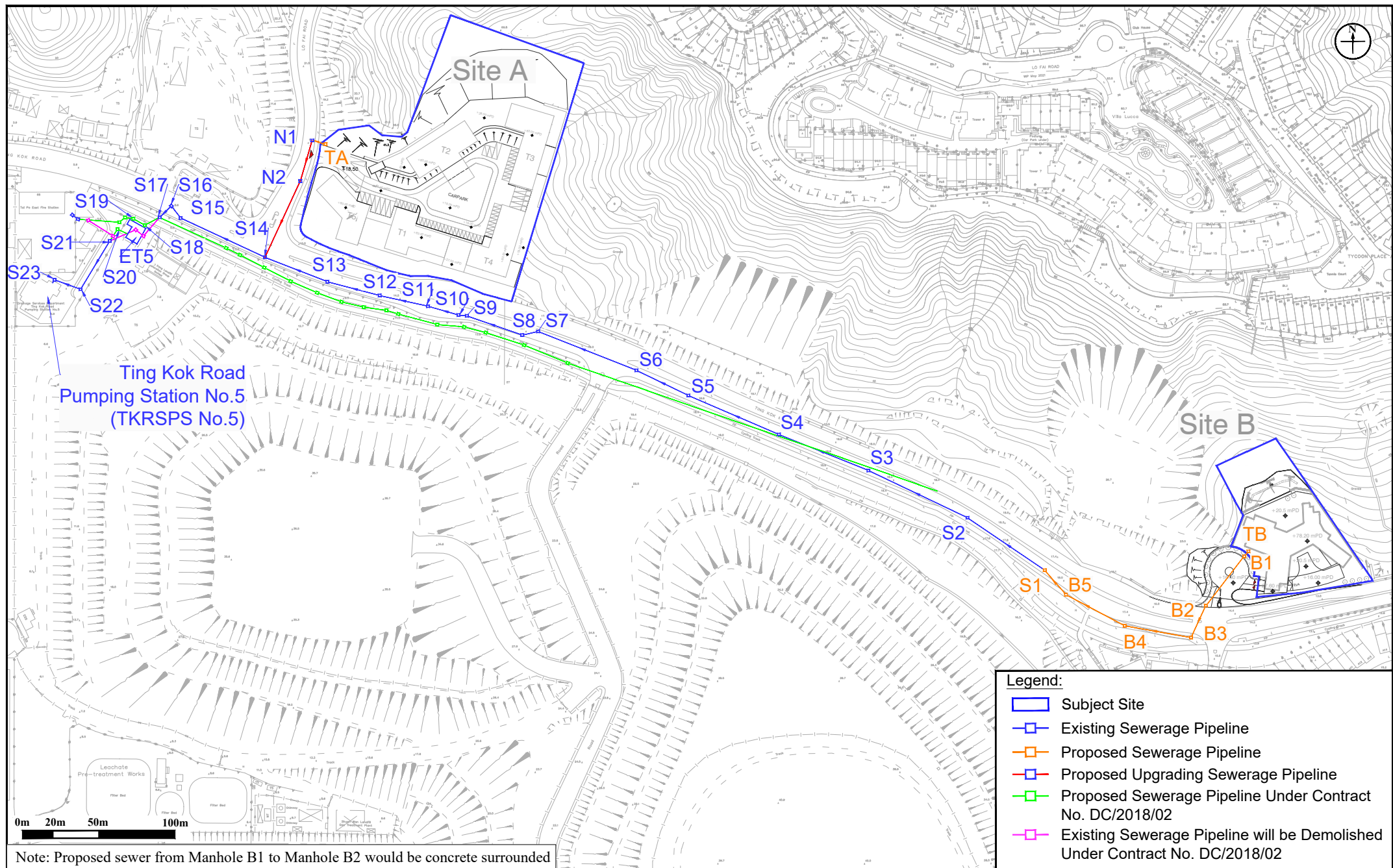


Figure: 2	RAMBOLL
Title: Existing Sewerage System in the Vicinity of Site A and Site B and Proposed Sewerage Pipeline	Drawn by: MW
Project: Proposed Public Residential Housing / Starter Homes Development at UDWYT Lot 14RP and Adjoining Government Land (Site A) & Proposed Private Residential Development at UDWYT Lot 11 RP and Adjoining Government Land (Site B), Wong Yue Tan, Tai Po	Checked by: CC
	Rev.: 1.4
	Date: Nov 2023

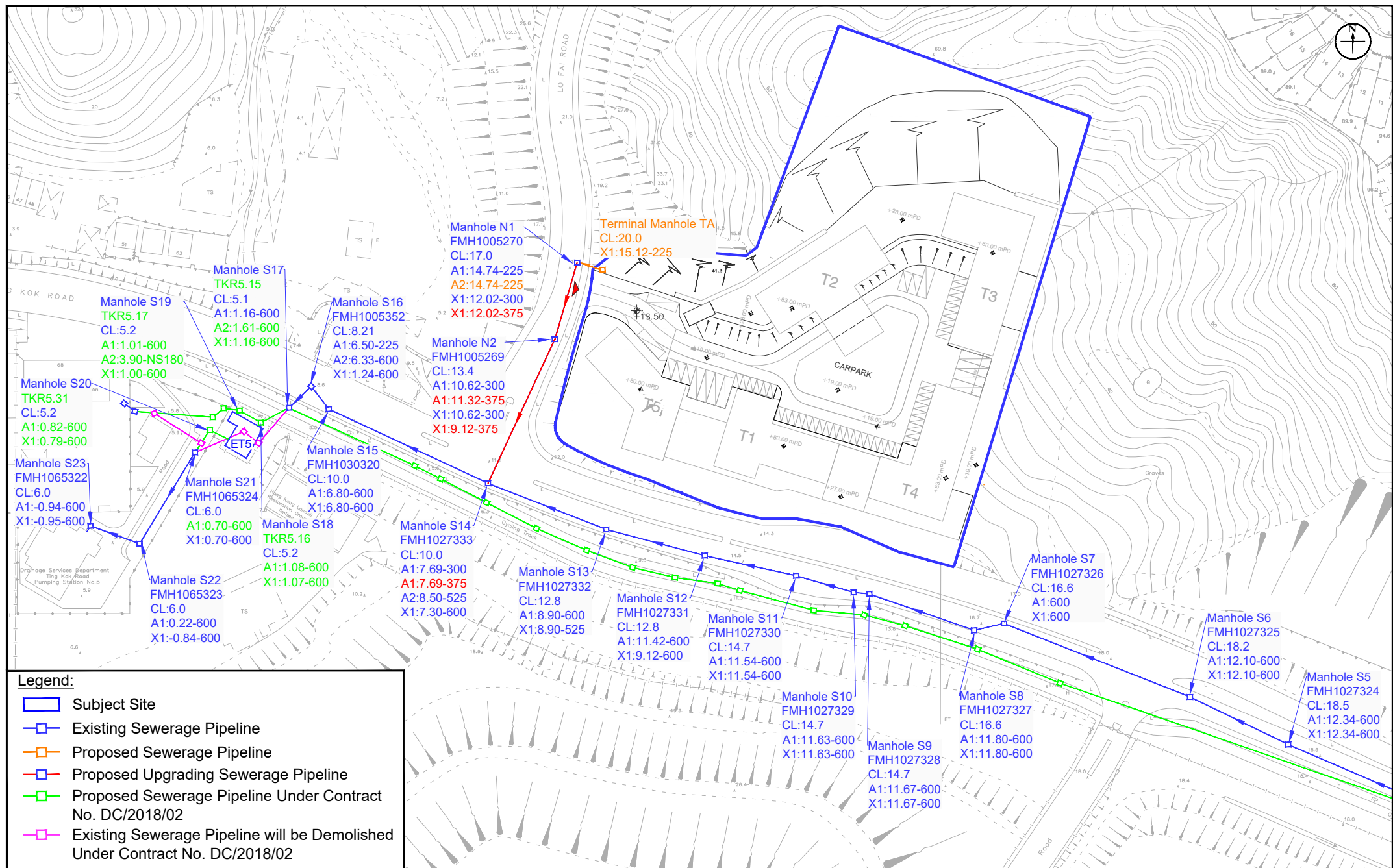


Figure: 3	RAMBOLL
Title: Existing Sewerage System in the Vicinity of Site A and Proposed Sewerage Pipeline	Drawn by: MW
Project: Proposed Public Residential Housing / Starter Homes Development at UDWYT Lot 14RP and Adjoining Government Land (Site A) & Proposed Private Residential Development at UDWYT Lot 11 RP and Adjoining Government Land (Site B), Wong Yue Tan, Tai Po	Checked by: CC
	Rev.: 1.4
	Date: Nov 2023

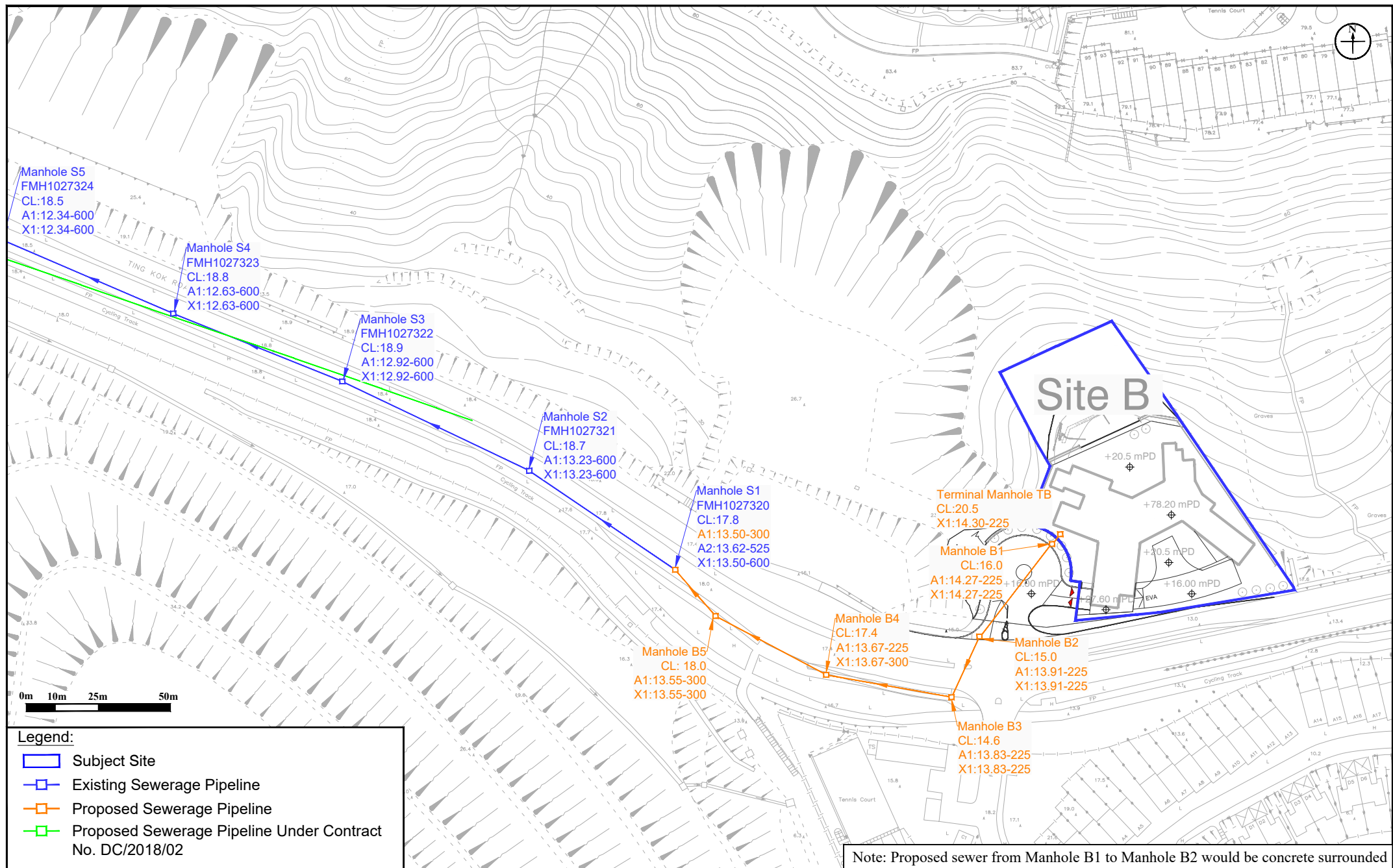


Figure: 4	RAMBOLL
Title: Existing Sewerage System in the Vicinity of Site B and Proposed Sewerage Pipeline	Drawn by: MW
Project: Proposed Public Residential Housing / Starter Homes Development at UDWYT Lot 14RP and Adjoining Government Land (Site A) & Proposed Private Residential Development at UDWYT Lot 11 RP and Adjoining Government Land (Site B), Wong Yue Tan, Tai Po	Checked by: CC
	Rev.: 1.4
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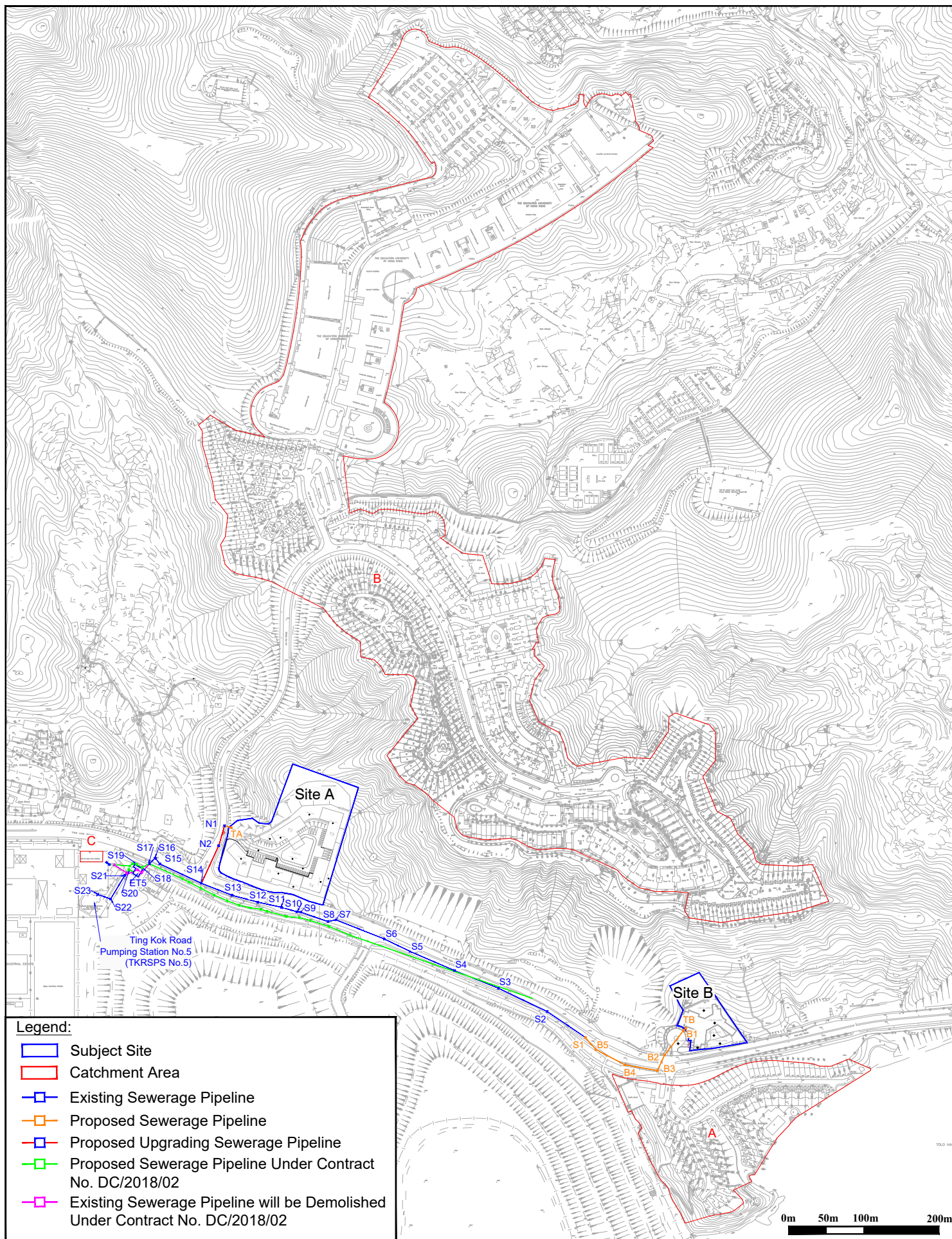




Figure: 6		RAMBOLL
Title: Proposed Sewerage Pipeline Location (Site A)		Drawn by: MW
		Checked by: CC
Project: Proposed Public Residential Housing / Starter Homes Development at UDWYT Lot 14RP and Adjoining Government Land (Site A) & Proposed Private Residential Development at UDWYT Lot 11 RP and Adjoining Government Land (Site B), Wong Yue Tan, Tai Po		Rev.: 1.8
		Date: Dec 2024

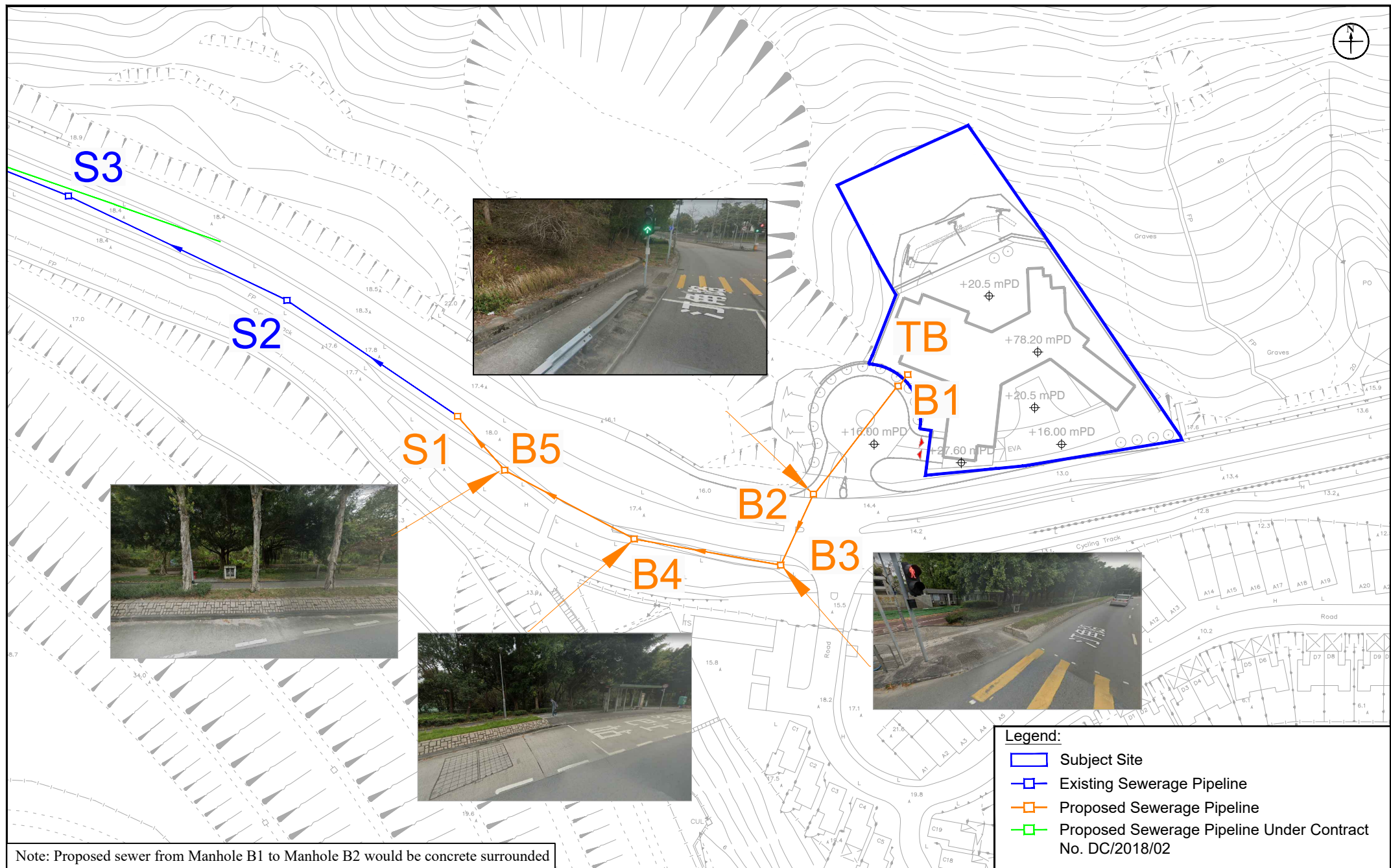


Figure: 7	RAMBOLL
Title: Proposed Sewerage Pipeline Location (Site B)	Drawn by: MW Checked by: CC
Project: Proposed Public Residential Housing / Starter Homes Development at UDWYT Lot 14RP and Adjoining Government Land (Site A) & Proposed Private Residential Development at UDWYT Lot 11 RP and Adjoining Government Land (Site B), Wong Yue Tan, Tai Po	Rev.: 1.8 Date: Dec 2024

Appendix 1 Detailed Sewerage Impact Assessment Calculations

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

Site A

1. Residential Tower

1a. Total number of residential units	=	1290 units
1a. Total number of residential units (+10%) ⁽¹⁾	=	1419 units
1b. Total number of residents ⁽¹⁾	=	3973 people -- (average housing size of 2.8- Under LSPS)
1d. Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
1e. Sewage Generation rate	=	1072.8 m ³ /day

2. Management Office

2a. Assumed Area	=	128 m ²
2b. Assumed floor area per employee	=	18.2 m ² per worker -- (refer to Table 8 of CIFSUS - Business Services)
2c. Total number of employees	=	7 employees
2d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - General territorial average)
2e. Sewage Generation rate	=	2.0 m ³ /day

3. Commercial Area (Retail) (65%)

3a. Assumed Area	=	650 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	=	23 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	=	6.4 m ³ /day

4. Commercial Area (F&B) (35%)

4a. Assumed Area	=	350 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	=	18 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	=	28.2 m ³ /day

5. G/IC

5a. Assumed Area	=	3226 m ²
5b. Assumed floor area per employee	=	30.3 m ² per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
5c. Total number of employees	=	106 employees
5d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - J11)
5e. Sewage Generation rate	=	29.8 m ³ /day

RCHE

Total number of beds	=	150 beds
Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
Sewage Generation rate	=	40.5 m ³ /day

Total Flow from Site A

Flow Rate	=	1179.6 m ³ /day
Contributing Population	=	4369 people
Peaking factor	=	5 Refer to Table T-5 of GESF for population 1,000-5,000 excl. stormwater allowance
Peak Flow	=	68.3 litre/sec

Note

(1) "+/-10%" variation is allowed for flexibility in detailed design stage

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

Site B

1. Residential Tower

1a. Total number of residential units	=	460 units
1b. Total number of residents	=	1288 people -- (2021 Population Census: Average Household Size of 2.8 - Tai Po District)
1c. Design flow	=	0.27 m ³ /person/day -- (refer to Table T-1 of GESF - Private R2)
1d. Sewage Generation rate	=	347.8 m ³ /day

2. Clubhouse

2a. Assumed Area	=	1150 m ²
2b. Assumed floor area per employee	=	30.3 m ² per worker -- (refer to Table 8 of CIFSUS - Community & Social Services)
2c. Total number of employees	=	38 employees
2d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - J11 Community, Social & Personal Services)
2e. Sewage Generation rate	=	10.6 m ³ /day

3. Management Office

3a. Assumed Area	=	46 m ²
3b. Assumed floor area per employee	=	18.2 m ² per worker -- (refer to Table 8 of CIFSUS - Business Services)
3c. Total number of employees	=	3 employees
3d. Design flow for commercial activities	=	0.28 m ³ /employee/day -- (refer to Table T-2 of GESF - General territorial average)
3e. Sewage Generation rate	=	0.7 m ³ /day

Total Flow from Site B

Flow Rate	=	359.1 m ³ /day
Contributing Population	=	1330 people
Peaking factor	=	5 Refer to Table T-5 of GESF for population 1,000-5,000 excl. stormwater allowance
Peak Flow	=	20.8 litre/sec

Table 2a Hydraulic Capacity of Existing Sewers at Ting Kok Road, Tai Po

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Cover Level 1	Cover Level 2	Invert Level 1	Invert Level 2	g	k _s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	mPD	mPD	m/s ²	m		m ² /s	m/s	m ²	m ³ /s	L/s
S1-S2	FMH1027320	FMH1027321	600	60.4	17.8	18.7	13.50	13.23	9.81	0.00300	0.004	0.000001	1.30	0.28	0.37	368
S2-S3	FMH1027321	FMH1027322	600	70.8	18.7	18.9	13.23	12.92	9.81	0.00300	0.004	0.000001	1.30	0.28	0.37	368
S3-S4	FMH1027322	FMH1027323	600	62.3	18.9	18.8	12.92	12.63	9.81	0.00300	0.005	0.000001	1.34	0.28	0.38	379
S4-S5	FMH1027323	FMH1027324	600	63.4	18.8	18.5	12.63	12.34	9.81	0.00300	0.005	0.000001	1.33	0.28	0.38	376
S5-S6	FMH1027324	FMH1027325	600	37.0	18.5	18.2	12.34	12.10	9.81	0.00300	0.006	0.000001	1.58	0.28	0.45	448
S6-S7	FMH1027325	FMH1027326	600	65.7	18.2	16.6	12.10	-	9.81	0.00300	0.004	0.000001	1.24	0.28	0.35	352
S7-S8	FMH1027326	FMH1027327	600	9.2	16.6	16.6	-	11.80	9.81	0.00300	0.004	0.000001	1.24	0.28	0.35	352
S8-S9	FMH1027327	FMH1027328	600	37.7	16.6	14.7	11.80	11.67	9.81	0.00300	0.003	0.000001	1.15	0.28	0.33	326
S9-S10	FMH1027328	FMH1027329	600	4.1	14.7	14.7	11.67	11.63	9.81	0.00300	0.010	0.000001	1.95	0.28	0.55	552
S10-S11	FMH1027329	FMH1027330	600	19.8	14.7	14.7	11.63	11.54	9.81	0.00300	0.005	0.000001	1.32	0.28	0.37	374
S11-S12	FMH1027330	FMH1027331	600	31.5	14.7	12.8	11.54	11.42	9.81	0.00300	0.004	0.000001	1.21	0.28	0.34	343
S12-S13	FMH1027331	FMH1027332	600	34.4	12.8	12.8	9.12	8.90	9.81	0.00300	0.006	0.000001	1.57	0.28	0.44	444
S13-S14	FMH1027332	FMH1027333	525	43.5	12.8	10.0	8.90	8.50	9.81	0.00060	0.009	0.000001	2.15	0.22	0.46	465
S14-S15	FMH1027333	FMH1030320	600	60.5	10.0	10.0	7.30	6.80	9.81	0.00300	0.008	0.000001	1.79	0.28	0.51	506
S15-S16	FMH1030320	FMH1005352	600	11.8	10.0	8.2	6.80	6.33	9.81	0.00300	0.040	0.000001	3.93	0.28	1.11	1111
S16-S17	FMH1005352	TKR5.15	600	8.6	8.2	5.1	1.24	1.16	9.81	0.00300	0.009	0.000001	1.89	0.28	0.53	534
S17-S18	TKR5.15	TKR5.16	600	11.1	5.1	5.2	1.16	1.08	9.81	0.00300	0.007	0.000001	1.69	0.28	0.48	477
S18-S19	TKR5.16	TKR5.17	600	8.6	5.2	5.2	1.07	1.01	9.81	0.00300	0.007	0.000001	1.63	0.28	0.46	461
S19-ET5	TKR5.17	-	600	1.6	5.2	5.2	1.00	0.90	9.81	0.00015	0.064	0.000001	7.18	0.28	2.03	2029
ET5-S20	-	TKR5.31	600	7.4	5.2	5.2	0.90	0.82	9.81	0.00015	0.011	0.000001	2.94	0.28	0.83	830
S20-S21	TKR5.31	FMH1065324	600	8.8	6.0	6.0	0.79	0.70	9.81	0.00300	0.010	0.000001	1.99	0.28	0.56	562
S21-S22	FMH1065324	FMH1065323	600	34.4	6.0	6.0	0.70	0.22	9.81	0.00300	0.014	0.000001	2.32	0.28	0.66	656
S22-S23	FMH1065323	FMH1065322	600	15.8	6.0	-	-0.84	-0.94	9.81	0.00300	0.006	0.000001	1.57	0.28	0.44	443

Table 2b Hydraulic Capacity of Existing Sewers at Lo Fai Road, Tai Po

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Cover Level 1	Cover Level 2	Invert Level 1	Invert Level 2	g	k _s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	mPD	mPD	m/s ²	m		m ² /s	m/s	m ²	m ³ /s	L/s
N1-N2	FMH1005270	FMH1005269	300	27.3	17.0	13.4	12.02	10.62	9.81	0.00060	0.051	0.000001	3.58	0.07	0.25	253
N2-S14	FMH1005269	FMH1027333	300	54.3	13.4	10.0	10.62	7.69	9.81	0.00060	0.054	0.000001	3.67	0.07	0.26	259

Table 2c Hydraulic Capacity of Existing Sewers at Lo Fai Road, Tai Po (After Upgrade)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Cover Level 1	Cover Level 2	Invert Level 1	Invert Level 2	g	k _s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	mPD	mPD	m/s ²	m		m ² /s	m/s	m ²	m ³ /s	L/s
N1-N2	FMH1005270	FMH1005269	375	27.3	17.0	13.4	12.02	11.32	9.81	0.00060	0.026	0.000001	2.91	0.11	0.32	321
N2-S14	FMH1005269	FMH1065324	375	54.3	13.4	10.0	9.12	7.69	9.81	0.00060	0.026	0.000001	2.95	0.11	0.33	326

Table 2d 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. mm	Pipe Length m	Cover Level 1 mPD	Cover Level 2 mPD	Invert Level 1 mPD	Invert Level 2 mPD	g m/s ²	k _s m	s	v m ² /s	V m/s	Area m ²	Q m ³ /s	Estimated Capacity L/s
TB-B1	-	-	225	4.5	20.5	16.0	14.30	14.27	9.81	0.00070	0.007	0.000001	1.05	0.04	0.04	42
B1-B2	-	-	225	40.9	16.0	15.0	14.27	13.91	9.81	0.00070	0.009	0.000001	1.20	0.04	0.05	48
B2-B3	-	-	225	23.3	15.0	14.6	13.91	13.83	9.81	0.00150	0.003	0.000001	0.67	0.04	0.03	27
B3-B4	-	-	225	44.4	14.6	17.4	13.83	13.67	9.81	0.00150	0.004	0.000001	0.70	0.04	0.03	28
B4-B5	-	-	300	43.7	17.4	18.0	13.67	13.55	9.81	0.00150	0.003	0.000001	0.70	0.07	0.05	49
B5-S1	-	FMH1027320	300	21.3	18.0	17.8	13.55	13.50	9.81	0.00137	0.002	0.000001	0.70	0.07	0.05	49
TA-N1	-	FMH1005270	225	9.3	20.0	17.0	15.12	14.74	9.81	0.00030	0.041	0.000001	2.90	0.04	0.12	115

Notes: (1) TA & TB are the proposed terminal manholes as shown in Figure 2 of the SIA report. Nominal assumption of 1 in 100 gradient is applied for the proposed sewers. The exact invert levels of the proposed manholes are subject to change during detailed design stage.
(2) According to DSD Drainage Records, the invert levels of S7 are not available. Therefore, the gradient of S6-S8 is estimated by its overall gradient. The assumed outgoing level of S1 is included in table 2a & 2b.

Remarks: (1) g=gravitational acceleration; k_s=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity
(2) Table 2a & 2b: The value of k_s = 3.0-0.6mm is used for the calculation of slimed clayware sewer, poor condition (Table 5: Recommended roughness values in Sewerage Manual)
(3) Table 2a & 2b: The value of k_s = 6.0-3.0mm is used for the calculation of slimed precast concrete sewer, poor condition (Table 5: Recommended roughness values in Sewerage Manual)
(4) Table 2c & 2d: The value of k_s = 1.5-0.3mm is used for the calculation of slimed polyethylene for the proposed sewers, poor condition (Table 5: Recommended roughness values in Sewerage Manual)
(5) Table 2: The value of k_s is interpolated for pipe velocities between 0.75 m/s and 1.2 m/s.
(6) The value of velocity (V) is referred to the Tables for the hydraulic design of pipes, sewers and channels (8th edition)
(7) 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 Existing Surrounding Building

Remarks:	(1) 2021 Population Census: Average Household Size of 2.8; Tai Po District (2) PR: Public rental; TV: Traditional village; MY: Modern village; IS: Institutional and special class; TN: Temporary and non-domestic; MB: Mobile residents (3) Residential UFF = 6.35 m²/person/day is adopted for PR; RL: 15 and MB: UFF = 0.27 m²/person/day is adopted for R2 and MY; UFF = 0.37 m²/person/day is adopted for RL and RA; UFF = 0.15 m²/person/day is adopted for TV and TN (refer to Table T-1 of CSF3) (4) Assumed floor area per Classroom = 30.3 m² per worker (refer to Table 6 of CSF3S - Community & Social Services) (5) Classroom employee UFF = 0.20 m²/employee/day (refer to Table T-2 of CSF3 - 111 Community, Social & Personal Services) (6) Assumed floor area per retail employee: 28.6 m² per worker (refer to Table 6 of CSF3S - Retail Trade) (7) Retail employee UFF = 0.28 m²/employee/day (refer to Table T-2 of CSF3 - 14 Wholesale & Retail) (8) Assumed floor area per F&B employee = 156 m² per worker (refer to Table 6 of CSF3S - Restaurants) (9) F&B / Host employee UFF = 1.50 m²/employee/day (refer to Table T-2 of CSF3 - 110 Restaurants & Hotels) (10) Assumed floor area per G/C employee / teacher = 30.3 m² per worker (refer to Table 6 of CSF3S - Community & Social Services) (11) G/C & G/C teacher employee UFF = 0.26 m²/employee/day (refer to Table T-2 of CSF3 - 111 Community, Social & Personal Services) (12) Student UFF = 0.04 m²/employee/day (refer to Table T-2 of CSF3, School Student) (13) Based on confirmation with fire station (14) Ordinary assumption (15) Turnover Rate = 4 hrs (indoor pool), 5 hrs (outdoor pool). Required Surface Loading Rate = 50 m³/hr / based on 1 m, 2 identical filters (16) Assuming 2 identical filters to be used and operated sequentially. Backwash Duration = 3 minutes. Backwash Flow Rate = 30 m³/hr / based on 1 m, 2 identical filters (17) ADWT provided from EPD
	(a) Number of Residential Flats is referenced to Censusmap, http://hk.census.gov (b) Number of Teachers and Student of The Education University of Hong Kong is referenced to https://www.eduhk.hk/about/facts-and-figures/en/enselement (c) Number of Teachers and Student of The Education University of Hong Kong Jockey Club Primary School is referenced to https://www.edupjs.edu.hk/download/document/2021/295604054425285-61611501.pdf

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/Pumping Station (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	600	60.4	0.004	368	437.8	1622	6	144.8	175.2	47.7%	OK
S2-S3	600	70.8	0.004	368	437.8	1622	6	144.8	175.2	47.7%	OK
S3-S4	600	62.3	0.005	379	437.8	1622	6	144.8	175.2	46.2%	OK
S4-S5	600	63.4	0.005	376	437.8	1622	6	144.8	175.2	46.6%	OK
S5-S6	600	37.0	0.006	448	437.8	1622	6	144.8	175.2	39.1%	OK
S6-S7	600	65.7	0.004	352	437.8	1622	6	144.8	175.2	49.8%	OK
S7-S8	600	9.2	0.004	352	437.8	1622	6	144.8	175.2	49.8%	OK
S8-S9	600	37.7	0.003	326	437.8	1622	6	144.8	175.2	53.7%	OK
S9-S10	600	4.1	0.010	552	437.8	1622	6	144.8	175.2	31.7%	OK
S10-S11	600	19.8	0.005	374	437.8	1622	6	144.8	175.2	46.8%	OK
S11-S12	600	31.5	0.004	343	437.8	1622	6	144.8	175.2	51.1%	OK
S12-S13	600	34.4	0.006	444	437.8	1622	6	144.8	175.2	39.4%	OK
S13-S14	525	43.5	0.009	465	437.8	1622	6	144.8	175.2	37.7%	OK
S14-S15	600	60.5	0.008	506	5302.9	19640	4	158.3	403.8	79.9%	OK
S15-S16	600	11.8	0.040	1111	5302.9	19640	4	158.3	403.8	36.3%	OK
S16-S17	600	8.6	0.009	534	5302.9	19640	4	158.3	403.8	75.7%	OK
S17-S18	600	11.1	0.007	477	5302.9	19640	4	158.3	403.8	84.7%	OK
S18-S19	600	8.6	0.007	461	5302.9	19640	4	158.3	403.8	87.5%	OK
S19-ET5	600	1.6	0.064	2029	5314.6	19684	4	158.3	404.4	19.9%	OK
ET5-S20	600	7.4	0.011	830	5314.6	19684	4	158.3	404.4	48.7%	OK
S20-S21	600	8.8	0.010	562	5314.6	19684	4	158.3	404.4	72.0%	OK
S21-S22	600	34.4	0.014	656	5314.6	19684	4	158.3	404.4	61.6%	OK
S22-S23	600	15.8	0.006	443	5314.6	19684	4	158.3	404.4	91.3%	OK

Table 4b 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
N1-N2	300	27.3	0.051	253	4865.0	18019	4	26.8	252.0	99.7%	Not OK
N2-S14	300	54.3	0.054	259	4865.0	18019	4	26.8	252.0	97.2%	Not OK

Table 4c Comparison of the Hydraulic Capacity of Existing Sewers for Sewerage generated from the Proposed Development and Surrounding Catchment Areas (After Upgrade)

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
N1-N2	375	27.3	0.026	321	4865.0	18019	4	26.8	252.0	78.5%	OK
N2-S14	375	54.3	0.026	326	4865.0	18019	4	26.8	252.0	77.4%	OK

Remarks: (1) The value of peaking factor = 6 is used for population 1,000-5,000 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)
(3) For each sewer segment, only one upstream swimming pool in surrounding catchment with the highest peak flow is accounted

Table 4c 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
TB-B1	225	4.5	0.007	42	359.1	1330	5	0.0	20.8	49.8%	OK
B1-B2	225	40.9	0.009	48	359.1	1330	5	0.0	20.8	43.5%	OK
B2-B3	225	23.3	0.003	27	359.1	1330	5	0.0	20.8	78.0%	OK
B3-B4	225	44.4	0.004	28	359.1	1330	5	0.0	20.8	74.9%	OK
B4-B5	300	43.7	0.003	49	359.1	1330	5	0.0	20.8	42.0%	OK
B5-S1	300	21.3	0.002	49	359.1	1330	5	0.0	20.8	42.1%	OK
TA-N1	225	9.3	0.041	115	1179.6	4369	5	0.0	68.3	59.2%	OK

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

Table 5 Existing & Future Flows to Ting Kok Road Pumping Station No.5 (TKRSPS No.5)

ADWE

1. Designed Capacity (after planned upgrading in 2024)

Design Daily Flow = 21194 m³/day (DSD)

2. Existing Situation

Average Flow (2022) = 7682 m³/day (DSD)
36.2% (of designed capacity)

3. Future Situation (including sewerage generated by future planned development)

Average Flow = 7682 m³/day
Villa Lucca (TPTL 223 & 229) = 291 m³/day
Planned Development Discharge to Ting Kok Road SPS No.5 = 4060 m³/day (EPD)

Total = 12032.5 m³/day
56.8% (of designed capacity)

4. Future Situation (including sewerage generated by the Proposed Development)

Existing and Planned Development = 12033 m³/day
Proposed Development = 1539 m³/day

Total = 13571.3 m³/day
64.0% (of designed capacity)

Table 6 Existing & Future Flows to Tai Po Sewage Treatment Works (TPSTW)

ADWF

1. Designed Capacity

Design Daily Flow = 120000 m³/day (DSD)

2. Existing Situation

Average Flow (2022) = 110754 m³/day (DSD)
92.3% (of designed capacity)

3. Future Situation (including sewerage generated by Proposed Development)

Existing Development = 110754 m³/day

Proposed Development = 1539 m³/day

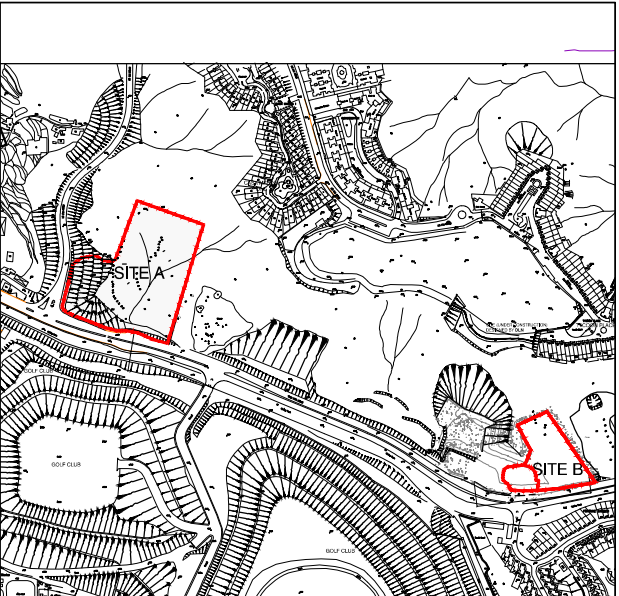
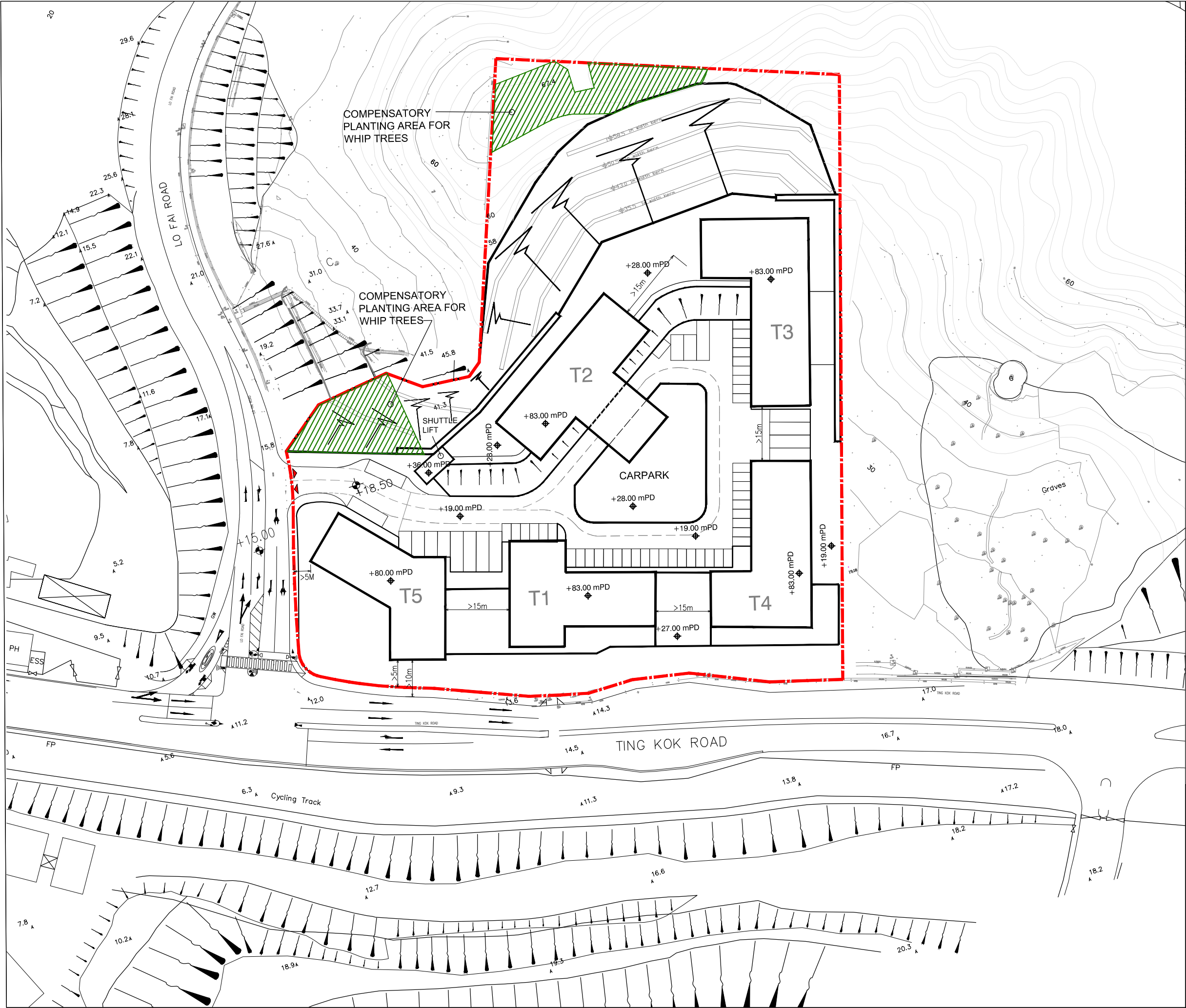
Total = 112293 m³/day
93.6% (of designed capacity)

Appendix 2 Relevant Information from DSD and EPD

Plant/Pumping Station	Pump Capacity (l/s)	Design daily flow (m3/day)	Year	Average daily flow in Jan	Average daily flow in Feb	Average daily flow in Mar	Average daily flow in April	Average daily flow in May	Average daily flow in June	Average daily flow in July	Average daily flow in Aug	Average daily flow in Sep	Average daily flow in Oct	Average daily flow in Nov	Average daily flow in Dec	Average daily flow
Ting Kok Road SPS No.5	200	11,500	2022	7,002.9	7,557.1	7,267.2	6,308.8	8,258.2	9,022.5	7,845.5	9,751.9	7,600.4	7,070.8	7,131.6	7,366.0	7,681.9
Ting Kok Road SPS No.6	220	6,330	2022	5,185.8	5,837.4	5,432.2	5,618.6	7,057.7	7,538.9	6,582.9	7,833.2	5,978.8	5,446.1	5,464.3	4,899.6	6,073.0
Ting Kok Road SPS No.7	88.5	5,060	2022	4,000.0	4,621.4	4,171.0	4,296.8	6,199.6	6,641.3	5,709.0	5,415.8	4,050.2	4,133.5	3,571.6	3,040.9	4,654.3
Tai Po STW Stage I/II & IV	-	120,000		101,465.6	109,601.5	108,134.0	102,661.1	123,908.2	118,778.8	109,569.5	116,195.2	113,329.4	107,001.1	106,327.6	112,078.5	110,754.2

TPSTW Planned Intake		
Target Intake Year	Estimated ADWF (m ³ /day)	Discharge Point
-	4060.0	Ting Kok Road SPS No.5

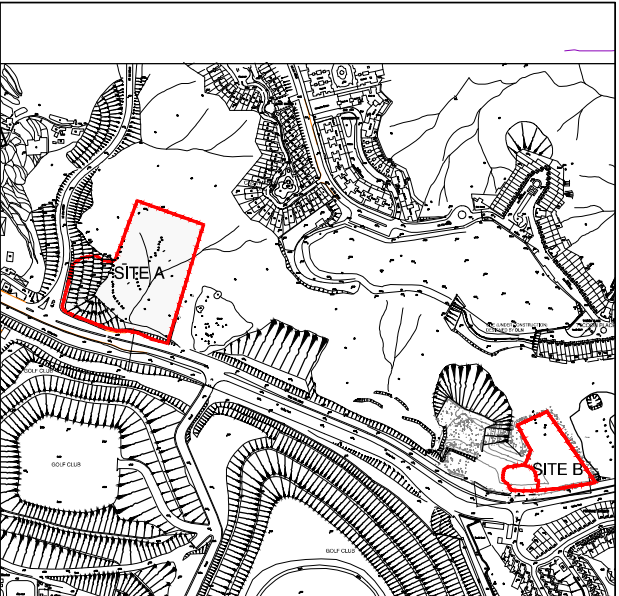
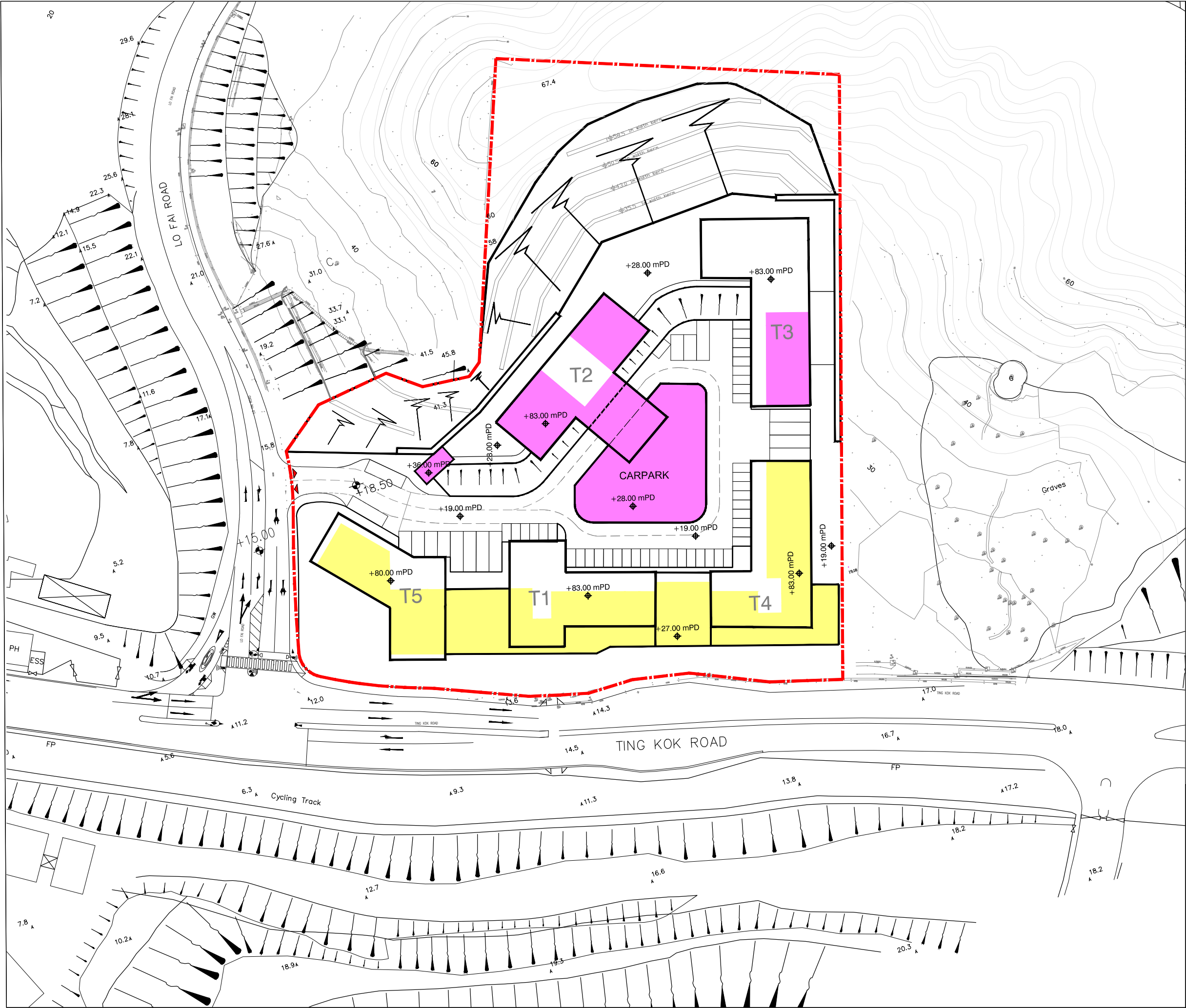
Appendix 3 Indicative MLP of the Proposed Scheme



SITE KEY PLAN

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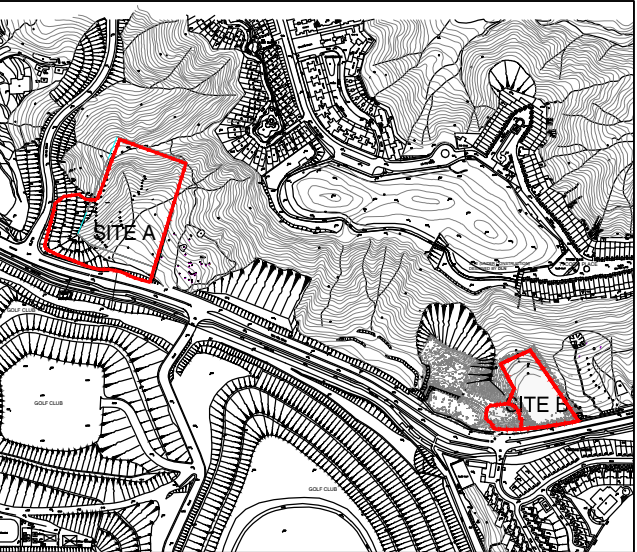
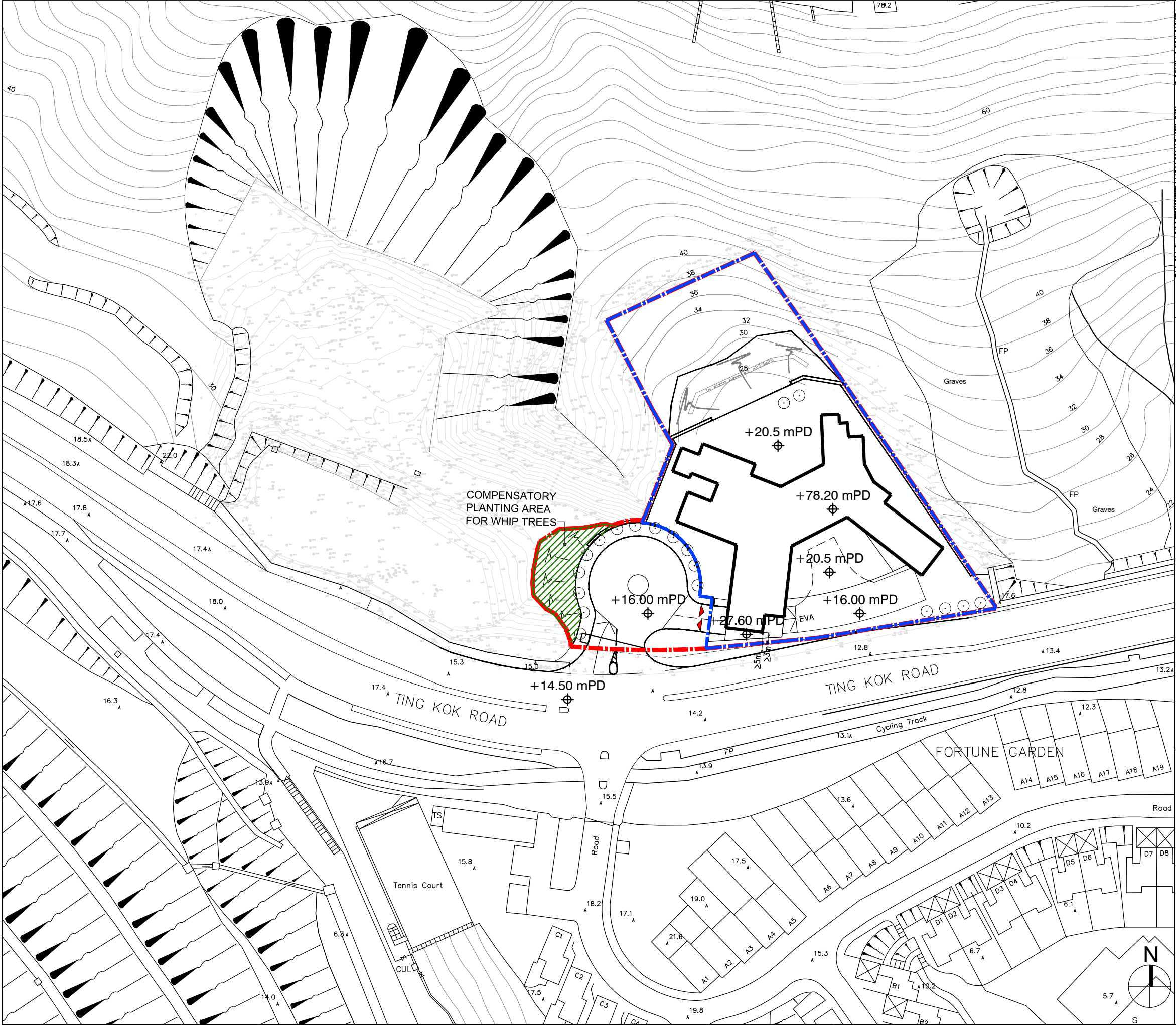
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-  PROPOSED SITE BOUNDARY
 -  PROPOSED INGRESS AND EGRESS
 -  PROPOSED WHIP TREE PLANTING AREA



SITE KEY PLAN

DATE:20250210

- LEGEND**
- PROPOSED SITE BOUNDARY
 - PROPOSED INGRESS AND EGRESS
 - UPPER PODIUM
 - LOWER PODIUM



SITE KEY PLAN

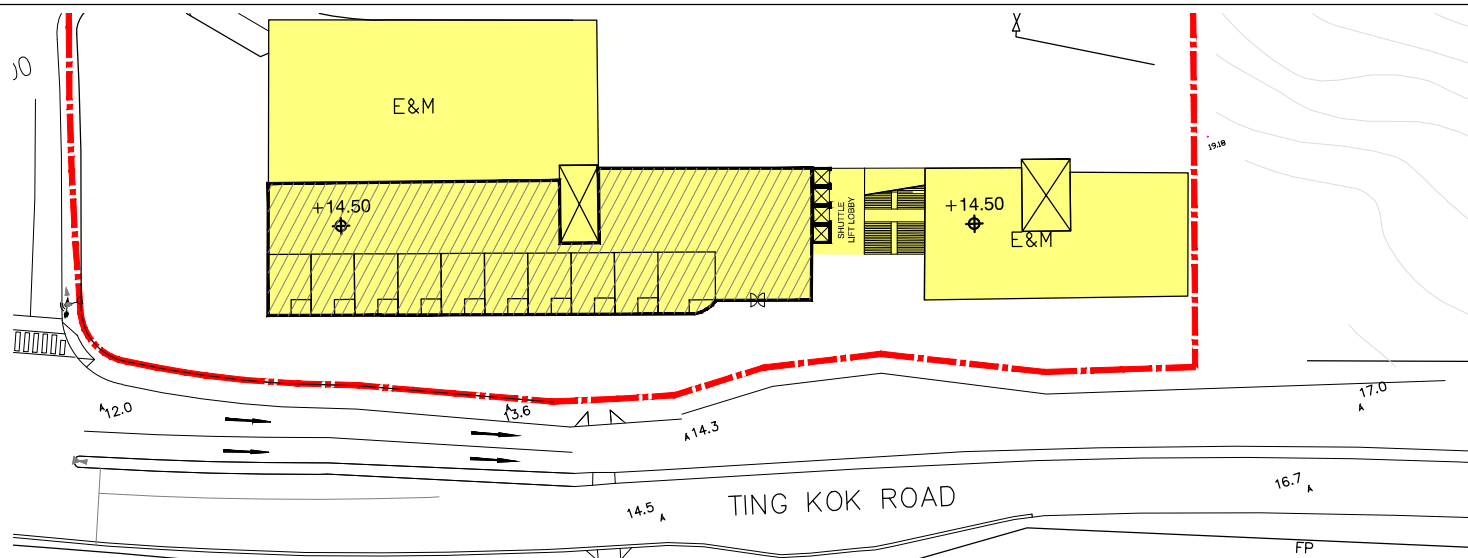
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- PROPOSED DEVELOPMENT SITE BOUNDARY
- PROPOSED INGRESS AND EGRESS
- PROPOSED WHIP TREE PLANTING AREA

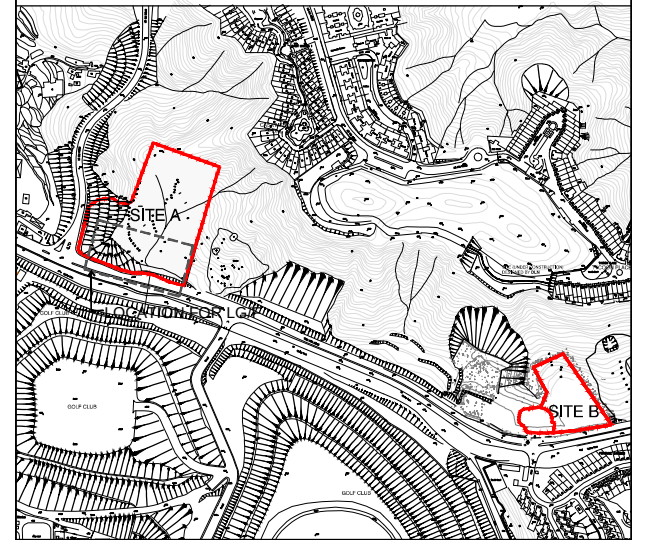
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G/F



LG/F



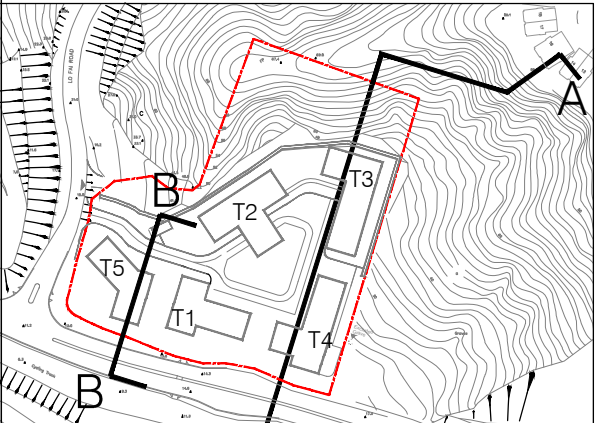
SITE KEY PLAN

DATE:20250210

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED INGRESS AND EGRESS
- GIC
- RETAIL
- UPPER PODIUM
- LOWER PODIUM

Site A - LG/F & G/F Part Plan
Scale 1:1000 (A3)

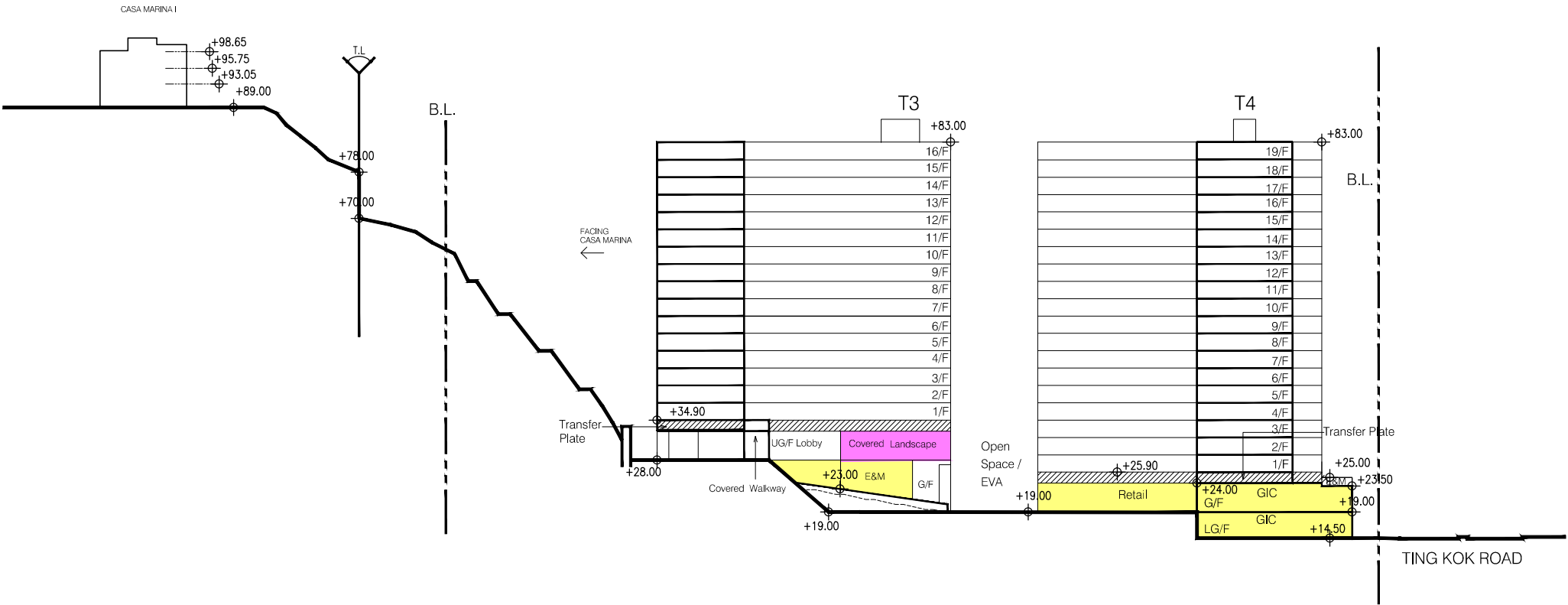


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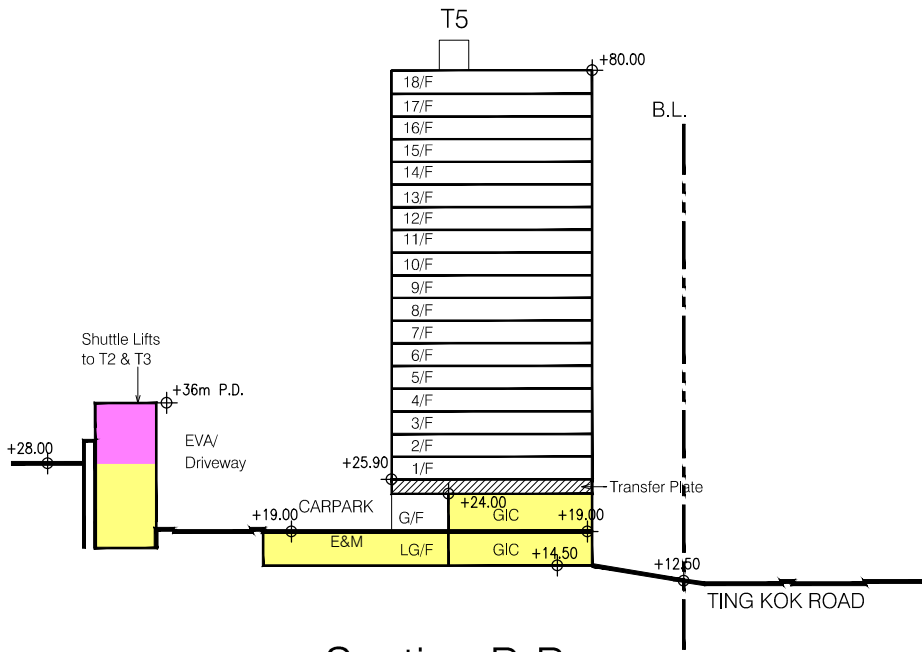
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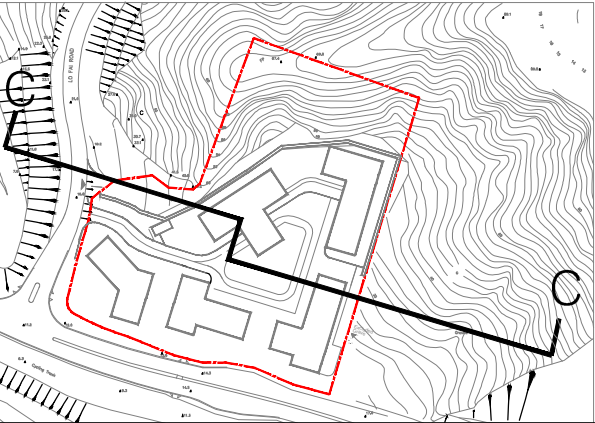
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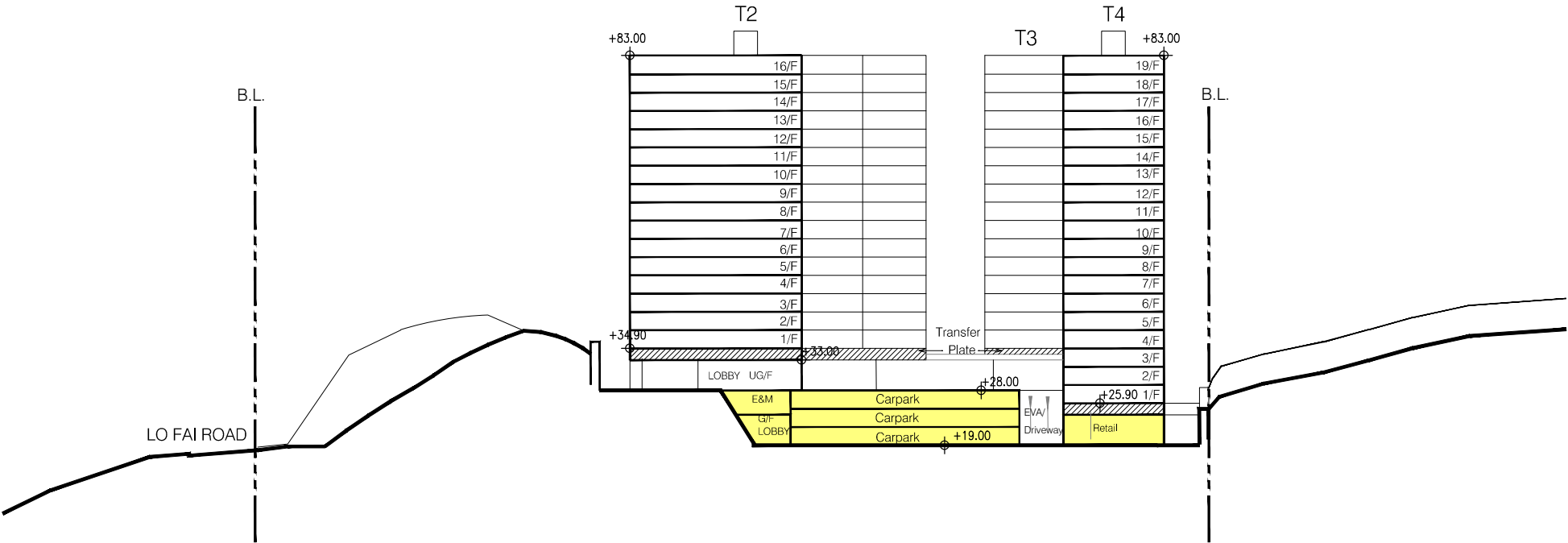
Section A-A



Section B-B



KEY PLAN

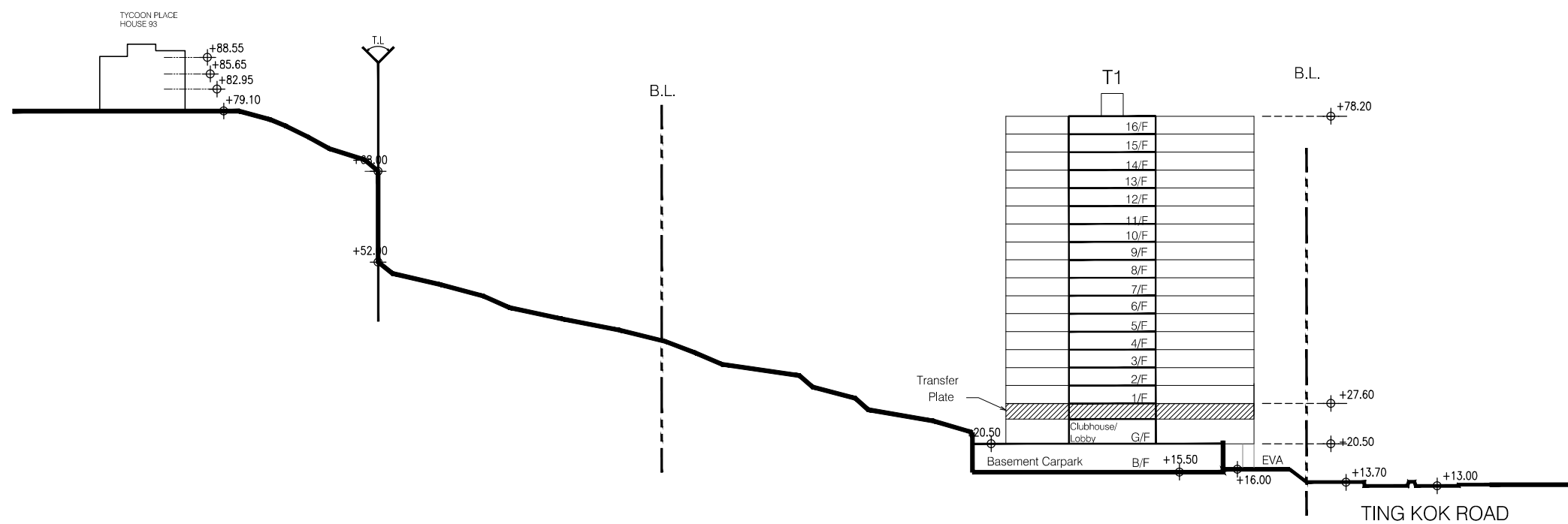


Section C-C

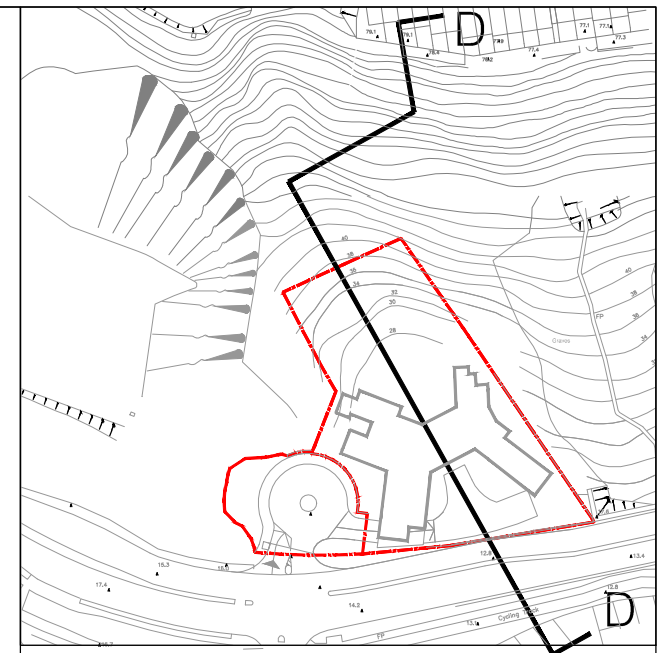
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LEGEND

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Section D-D



KEY PLAN

DATE:20250210

Site B - Section D-D
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