

Annex I Revised Water Supply Impact Assessment

Issue No. : 4
Issue Date : Apr 2024
Project No. : 2127



WATER SUPPLY IMPACT ASSESSMENT

FOR

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A FOR THE TOWN PLANNING ORDINANCE (CAP. 131) FOR MIXED USE DEVELOPMENT AT LOTS 796 AND 1008RP IN D.D. 77 AND ADJOINING GOVERNMENT LAND IN PING CHE, TA KWU LING, NEW TERRITORIES

Prepared by

Allied Environmental Consultants Limited

COMMERCIAL-IN-CONFIDENCE

Allied Environmental Consultants Limited

Member of AEC Group (HKEX Stock Code: 8320.HK)

27/F, Overseas Trust Bank Building, 160 Gloucester Road, Wan Chai, Hong Kong

www.asecg.com T: +852 2815 7028 F: +852 2815 5399

沛然環境評估工程顧問有限公司

沛然環保集團成員 (港交所股份代號: 8320.HK)

香港灣仔告士打道 160 號海外信託銀行大廈 27 樓

Document Verification



Project Title APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A FOR THE TOWN PLANNING ORDINANCE (CAP. 131) FOR MIXED USE DEVELOPMENT AT LOTS 796 AND 1008RP IN D.D. 77 AND ADJOINING GOVERNMENT LAND IN PING CHE, TA KWU LING, NEW TERRITORIES

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Issue No.	Issue Date	Description	Prepared by	Checked by	Approved by
1	Oct 2023	1st Submission	Various	Cathy Man	Grace Kwok
2	Dec 2023	2nd Submission	Various	Cathy Man	Grace Kwok
3	Jan 2024	3rd Submission	Various	Cathy Man	Grace Kwok
4	Apr 2024	4th Submission	Various	Cathy Man	Grace Kwok

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1. INTRODUCTION

1.1.1. Allied Environmental Consultants (“AEC”) has been appointed to conduct a Water Supply Impact Assessment (“WSIA”) to support of a Section 12A application for the mixed use development at Lot 796 & 1008 RP at D.D. 77 and adjoining government land in Ping Che, Ta Kwu Ling, New territories (hereinafter referred to as “Application Site”).

1.2. OBJECTIVES

1.2.1. This WSIA is conducted to examine the technical feasibility of the Proposed Development.

1.2.2. The report outlines the assessment results of the potential water supply impacts caused by the Proposed Development. The main objectives of the study include the following:

- Review the existing supply condition of the Application Site;
- Estimate the water demand of the Proposed Development;
- Identify any potential impact on the current water supply system due to the additional water supply demand from the proposed development;
- Propose water supply mitigation measures where appropriate to mitigate the potential water supply impact.

1.3. Report Structure

1.3.1. The remaining chapters of this report are shown below:

Chapter 2 – Site Context

Chapter 3 – Assessment Methodology

Chapter 4 – Water Supply Impact Assessment

Chapter 5 – Result and Discussion

Chapter 6 – Conclusion

2. SITE CONTEXT

2.1. Site Location and Its Environs

2.1.1. The proposed development is located at Ping Che Road from the north to northeast, the unnamed village road to the east, village, agricultural land and open storage area to the south and west.

2.1.2. **Figure 2.1** shows the Site location and its environs.

2.1.3. According to the approved Ping Che and Ta Kwu Ling Outline Zoning Plan (OZP No.: S/NE-TKL/14) gazette on 12/03/2010, the Application Site is currently zoned as “Open Storage” (“OS”), the southern part of the Application Site is zoned as “Agriculture” (“AGR”) and a minor portion of the Application Site is shown as “Road”. Re-zoning is required of the Proposed Development.

2.1.4. The surrounding areas of the Application Site are characterized by a mixture of various land uses. These include villages, workshops, open storage uses and major roads.

2.1.5. According to the Study Brief ESB-341/2021, the Application Site is within the New Territories North (NTN) New Town and Man Kam To Development plan under the New Territories. No relevant development plan and programme can be obtained during the course of study.

2.2. Proposed Development Scheme

2.2.1. The proposed site area of the subject site is 17,822m², with a plot ratio of 5.9 for domestic use and 1.1 for non-domestic use. The total GFA for domestic use is 105,145 m², and the 19,603 m² for non-domestic use. The proposed development will consist of 5 blocks of residential tower ranging from 47 to 48-storey (excluding basement) in height, provided 2,205 residential unit, and 1 block of commercial tower with 35-storey (excluding basement) in height.

2.2.2. The commercial tower accommodating retail facilities, office, hotel or service apartment and social welfare facilities are planned strategically along Ping Che Road.

2.2.3. Key Development Parameters are summarized in **Table 2-1** below. The Master Layout Plan (MLP) and sectional drawing is shown in **Appendix A**.

Table 2-1 Key Development Parameters

Key Development Parameters	Indicative Scheme		
Site Area (About)	17,822 sq.m		
GFA and PR		GFA (sq.m)	Plot Ratio
	Domestic	105,145	5.9
	Non-domestic	19,603	1.1
No. of Blocks	Domestic	5.9	
	Non-domestic	1.1	
Building Height (Main Roof) (About) No. of Storeys	Domestic	Not more than 175 mPD	
		47 to 48 storeys (excluding basement)	
	Non-domestic	Not more than 170 mPD	
		35 storeys (excluding basement)	
Site Coverage	Domestic	Below 15m	Not more than 75%
		Above 15m	Not more than 37.5%
	Non-domestic	Below 15m	Not more than 100%
		Over 24m but not exceeding 27m	Not more than 90%
		Above 27m	Not more than 62.5%
No. of Flats	2,205		
Anticipated Population (About) ^[1]	6,174		
No. of Hotel Rooms	About 70 rooms		
Local Open Space	Not less than 6,174m ²		
Greenery Provision	Not less than 3,565m ² (20%)		
No. of Parking Spaces and Loading / Unloading Spaces	Private Car Parking Spaces:	725 (including 6 no. of parking space for disabled users)	
	Motorcycle parking spaces:	33	
	Goods vehicle loading / unloading bays:	18	
	Lay-bys for taxi and private car:	2	
	Lay-by for single deck tour bus:	1	
Anticipated Completion Year	2032		

2.2.4. Based on the tentative implementation programme, the planned population intake would be

in year 2032.

2.3. Existing Water Supply Condition

- 2.3.1. The Application Site is within the supply zone of Ping Che Fresh Water Service Reservoir (PCFWSR) located around 1km away from the Application Site. According to information obtained from WSD, the capacity of PCFWSR is 20,000 m³.
- 2.3.2. Based on the fresh water record plan provided by WSD, here is an existing **900mm raw water pump main and existing 300mm** freshwater distribution main running at the northeast of the Application Site along Ping Che Road. From there, a 150mm freshwater distribution main branches off from the 300mm pump main at the northeast of the Application Site, then an 80mm water supply main branch off again from the 150mm main and running at the east of the Application Site, along the village road. Additionally, a 40mm freshwater distribution main then branch off from the 80mm main at the southeast side of the Application Site and run along the southern side of the Application Site. The existing water supply condition is shown in **Figure 2.1**.

3. ASSESSMENT METHODOLOGY

3.1. Design Guidelines

3.1.1. The following approach is adopted in carrying out this WSIA:

- a) Review interface projects which may have bearing on the development;
- b) Identify existing and planned water supply systems within the study area;
- c) Assess the water demands for the development;
- d) Propose the water supply scheme arising from the development including preparation of a hydraulic analysis;
- e) Examine the short- and long-term impacts on existing water mains and any interface projects;
- f) Recommend suitable mitigation measures and/or diversion schemes and arrangement to mitigate the permanent impacts on existing water supply system and minimize the disturbance to the normal operation of the system during construction stage.

3.1.2. The estimate of water demands for the proposed development is based on the development parameters shown in **Section 2**. Estimates are generally based on unit water demands provided by WSD Departmental Instruction (DI) No. 1309.

3.2. Unit Demand

3.2.1. Assumptions have been made for the unit daily demand (UDD) for each type of land use, for both fresh water and flush water. The UDD is used for estimating the total demand of the proposed development and the required water supply capacity to support the development.

3.2.2. The water supply demand estimation is presented in **Appendix B**.

3.2.3. The unit flow factors adopted for water demand estimation and calculation are summarized in **Table 3-1**.

Table 3-1 Unit Daily demand Adopted in Water Supply Impact Assessment

Development Type	Flow Type	Fresh Water UFF ^[1] (m ³ /person or room/day)	Flush Water UFF ^[1] (m ³ /person or room/day)
Domestic	Residential R2 + Service Trade	0.34 m ³ /h/d	0.104 m ³ /h/d

Office	Wholesale & Retail – J4	0.04 m ³ /h/d	-
Hotel/Service Apartment	Restaurants & Hotels – J10	1.0 m ³ /room/d	0.36 m ³ /room/d

Note:

[1] Referred to Table 1 & Table 2 of WSD Departmental Instruction (DI) No. 1309

3.3. PEAKING FACTORS

3.3.1. The peaking demand factors below shall be adopted for design:

- Peak flow rate in fresh water distribution mains = 3 x mean daily demand
- Peak flow in flushing water distribution mains = 2 x mean daily demand
- Peak flow rate in fresh water trunks mains = 1.5 x mean daily demand
- Peak flow rate in flushing water trunks mains = 1.2 x mean daily demand

3.4. FIRE-FIGHTING

3.4.1. In addition to the aforementioned facilities of the Proposed Development, water supply for fire-fighting service has been considered in this WSIA. Fire-fighting requirement for residential zone is 6,000 m³/day with discharge pressure of 17m head. The fire hydrant should be of standard pattern with minimum output pressure of not less than 25 psi. With multiple hydrants operating at the same time, total output of not less than 4,000 L/min shall last for 60 minutes. **Table 3-2** summarises the fire-fighting requirements.

Table 3-2 Fire-Fighting Requirements

Requirements	Minimum Values
Minimum fresh water supply	6000 m ³ /day
Discharge pressure	17 m
Minimum output not less than 25 psi	Not less than 4,000 L/min to last for an hour

3.5. RESIDUAL HEADS

3.5.1. The minimum residual heads at extremity of the fresh water and flush water supply systems for the Proposed Development are adopted as follow:

- Fresh Water: 20 m
- Flush Water: 15 m

3.6. DESIGN VELOCITY

3.6.1. The desirable flow velocities for hydraulic checking are as follows:

Maximum velocity (under peak flow condition)

Fresh water mains:

>DN700	≤ 3 m/s
DN700 – DN525	≤ 2.5 m/s
DN450 – DN375	≤ 2 m/s
DN300 – DN200	≤ 1.5 m/s

Flush water mains:

>DN1000	≤ 3 m/s
DN900 – DN800	≤ 2.5 m/s
DN700 – DN300	≤ 2 m/s
DN450 – DN300	≤ 1.5 m/s

Minimum velocity (under peak flow condition)

Fresh water mains: ≥ 0.9 m/s

Flush water mains: ≥ 0.9 m/s

3.6.2. The pipeline shall have a minimum gradient of 1:400. Pipes shall be laid at a minimum separation of 300mm away from existing utilities and underground structures.

4. WATER SUPPLY IMPACT ASSESSMENT

4.1. Estimation of Water Demand for Proposed Development

4.1.1. The estimated daily fresh water demand for the proposed development is **2184.8 m³/day** and the estimated daily flush water demand is **667.3 m³/day**. The detailed calculation of water demand estimation is shown in **Table 4-1** and **Appendix B**.

Table 4-1 Water Demand of Proposed Development

Type of Development	Fresh Water Demand (m ³ /day)	Flush Water Demand (m ³ /day)	Total Water Demand (m ³ /day)
Residential + Service Trades	2099.2	642.1	2741.3
Office	15.64	-	15.64
Hotel/Service Apartment	70.0	25.2	95.2
Total	2184.8	667.3	2852.1

4.1.2. The peaking factor adopted for the sizing of distribution main is 3 for fresh water and 2 for flush water. According to the calculation, the total water demand is **2852.1 m³/day** and the required peak flow rate for the proposed development is **0.076 m³/s for fresh water and 0.015 m³/s for flush water.**

5. RESULTS AND DISCUSSION

- 5.1.1. Based on WSD, the total capacity of PCFWSR is 20,000 m³/day. The water demand from the proposed development will utilize approximately 14.3% of the design capacity of PCFWSR and occupied approximate 51.7% capacity of existing 300mm freshwater distribution main.
- 5.1.2. Currently there is no salt water supply system at the nearby area of the Application Site. Therefore, the fresh water supply will also cater for flushing demand of the proposed development. The fresh water and flush water supplied will be connected to Application Site in 2 different main.
- 5.1.3. Based on the water demand of proposed development discussed in **Section 4** and **Appendix B**, a DN200 fresh water supply and a DN100 flush water supply lead-in valve is proposed to be tee-off from existing DN300 fresh water main along Ping Che Road. The fresh water demand will be occupied approximately 51.7% of the proposed DN300 freshwater distribution main, and the flush water demand will be occupied approximately 78.7% of the proposed DN100 flush water distribution main. the detailed calculation is shown in **Appendix C**. It is recommended to construct the inlet at the northeast side of the Application Site which is tee-off from Ping Che Road located at northeast of the application site.
- 5.1.4. The proposed fresh water supply system within the site will be further developed in detailed design stage.
- 5.1.5. The indicative location of the proposed water supply main to be tee-off from public water supply system refer to **Figure 5.1**. Detailed water mains calculation can be referred to **Appendix C**.
- 5.1.6. Based on the fresh water main record plan provided by WSD, there are existing water mains found within the Application Site. The option of diversion of water main is proposed to protect the water main. The existing water mains falls within Application Site will be diverted and running along the southern site boundary within Application Site and connected to the existing water main at the southeast and southwest of the site. The preliminary proposed routing for diversion of water main can be referred to **Figure 5.2**.
- 5.1.7. The diverted water main will be fulfilled the requirement by WSD, such as:
- The proposed diverted water main will be lied in Government Land;
 - A strip of land with minimum of 1.5m in width will be provided for the diverted water

main;

- Free access for staff of the WSD to carry out construction, inspection, operation, maintenance and repair works;
- The cost of diversion of existing water mains upon request will be borne by the Applicant; and
- The detail of diversion will be further provided during the detailed design stage, and the relevant proposal will submit to WSD for consideration and agreement before the work commence.

5.2. Proposed Fire-fighting System

5.2.1. The provision of fire-fighting requirement is discussed in **Section 3.4**.

5.2.2. The provision of fire hydrants and fire mains is in accordance with the relevant stipulations in “Technical Circular No. 4/2010: Fire Mains and Hydrants on New Trunk Roads and Elevated Highway Structures” published by Highway Department (HyD). The average spacing of fire hydrants to at-grade trunk road shall be at a distance of 100m. The detailed arrangement will be submitted to Fire Services Department (FSD) for approval during detailed design stage.

5.3. Liability

5.3.1. The Applicant will be responsible for the construction works of all water supply facilities, including all internal watermains and water supply lead-in valves. The regular inspection and maintenance work of the facilities within the Application Site should be conducted by the property management.

5.3.2. During operational phase, regular inspection and maintenance works of the facilities outside the Application Site boundary will be carried out by the WSD.

6. CONCLUSION

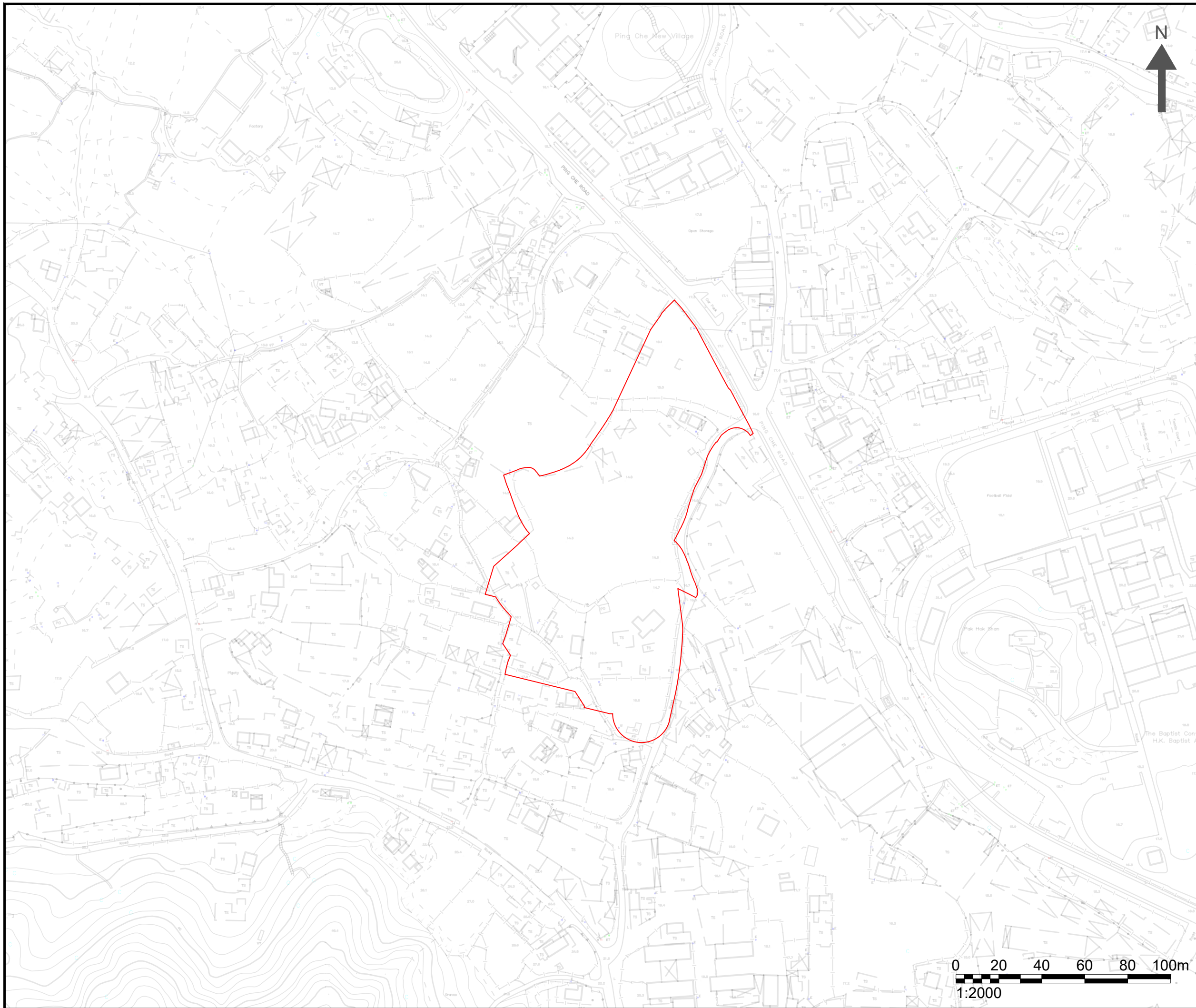
- 6.1.1. The WSIA has been carried out to evaluate the possible impact on the existing water supply system due to the proposed development. The Application Site is within the supply zone of the PCFWSR, supply by the existing 300mm water distribution main running along Ping Che Road.
- 6.1.2. The estimated daily fresh water demand for Proposed Development is 2184.8 m³/day and the estimated daily flush water demand is 667.3 m³/day. The existing water supply is enough to cater with the addition water demand due to proposed development, which will utilize approximately 14.3% of the design capacity of PCFWSR. Therefore, significant water supply impact arising from the proposed development on the existing water supply is not expected, no mitigation measures are considered necessary.
- 6.1.3. There are existing water mains found within the Application Site. To protect the water main, the diversion of water main is proposed and will be fulfilled the requirement by WSD. The proposal will be provided during the detailed design stage later.
- 6.1.4. Based on the above, it is concluded that the water supply impact arising from the proposed development should be acceptable.

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Figure 2.1

Application Site Location & Its Environs



NOTES :

 APPLICATION SITE

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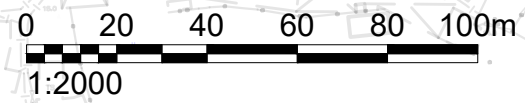
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Drawing Title :
 APPLICATION SITE LOCATION & ITS ENVIRONS

Drawing No : FIGURE 2.1	Revision : 1
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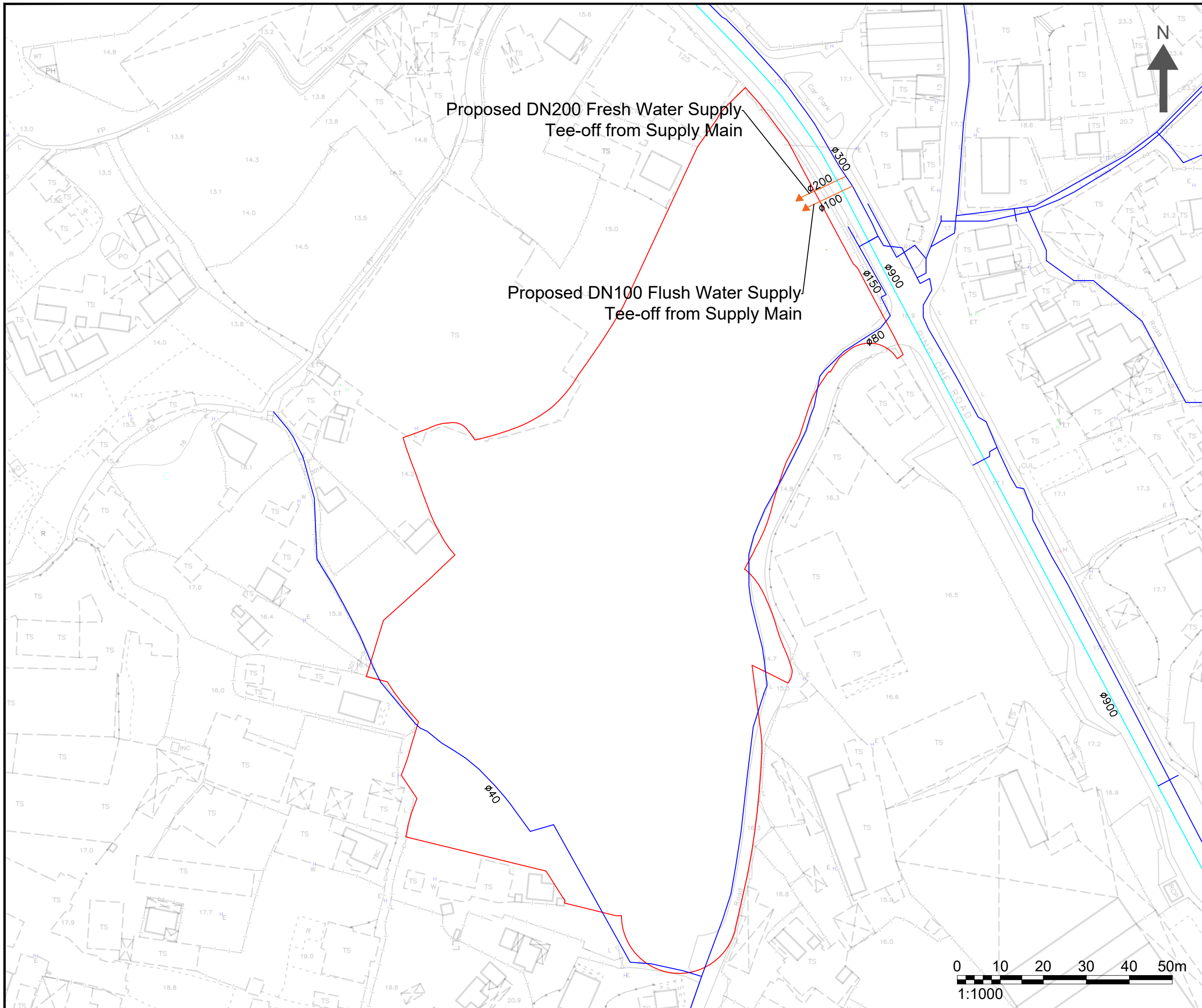
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Figure 5.1

Overview of Existing & Proposed Water Supply Main



NOTES :

- APPLICATION SITE
- EXISTING FRESH WATER SUPPLY
- EXISTING RAW WATER SUPPLY
- PROPOSED TEE-OFF FROM EXISTING SUPPLY MAIN

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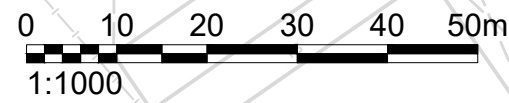
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Drawing Title :
 OVERVIEW OF EXISTING & PROPOSED WATER SUPPLY MAIN

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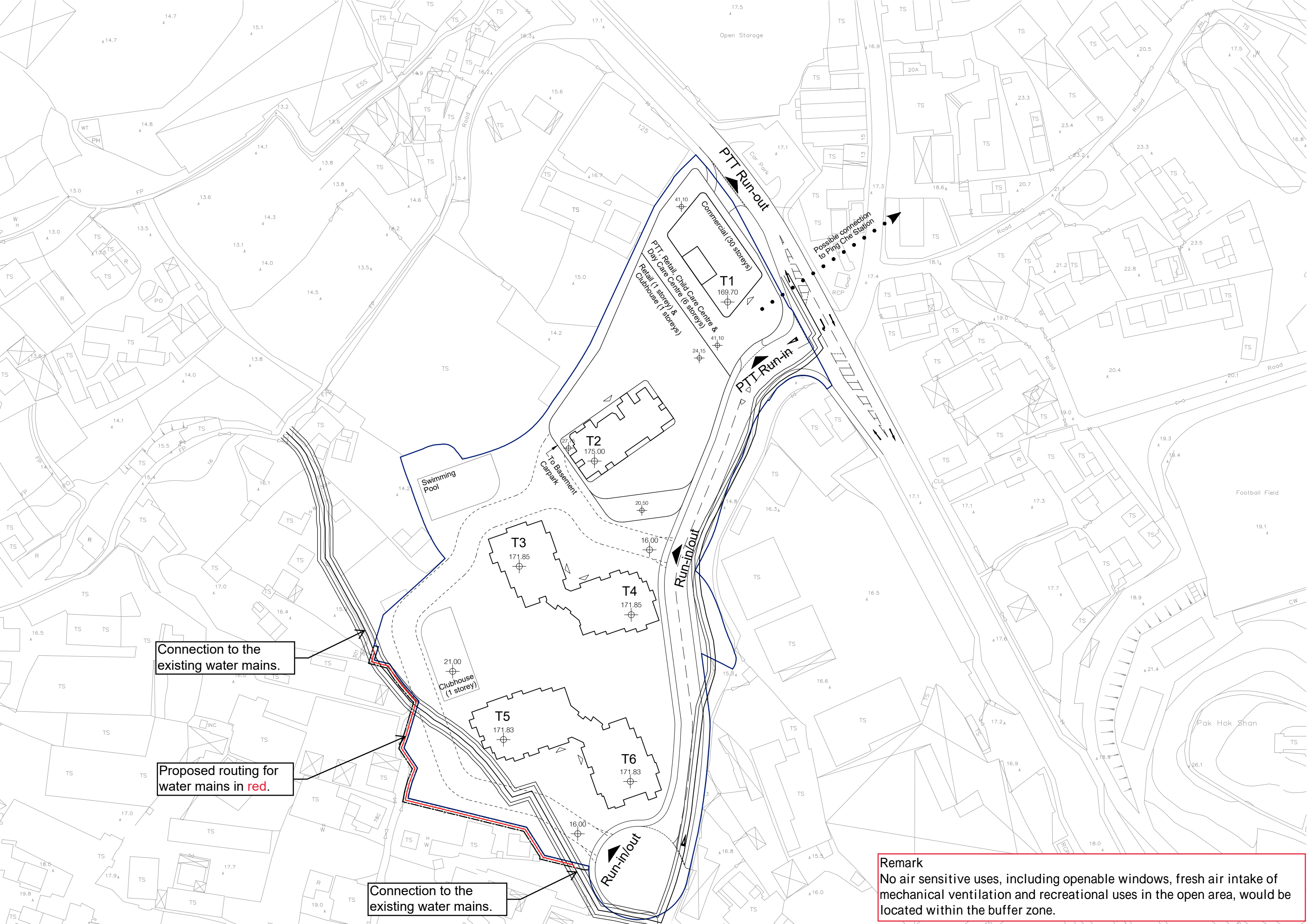


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Figure 5.1

Preliminary Proposed Routing for Diversion of Water
Mains



Connection to the existing water mains.

Proposed routing for water mains in red.

Connection to the existing water mains.

Remark
No air sensitive uses, including openable windows, fresh air intake of mechanical ventilation and recreational uses in the open area, would be located within the buffer zone.

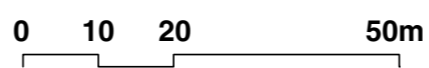
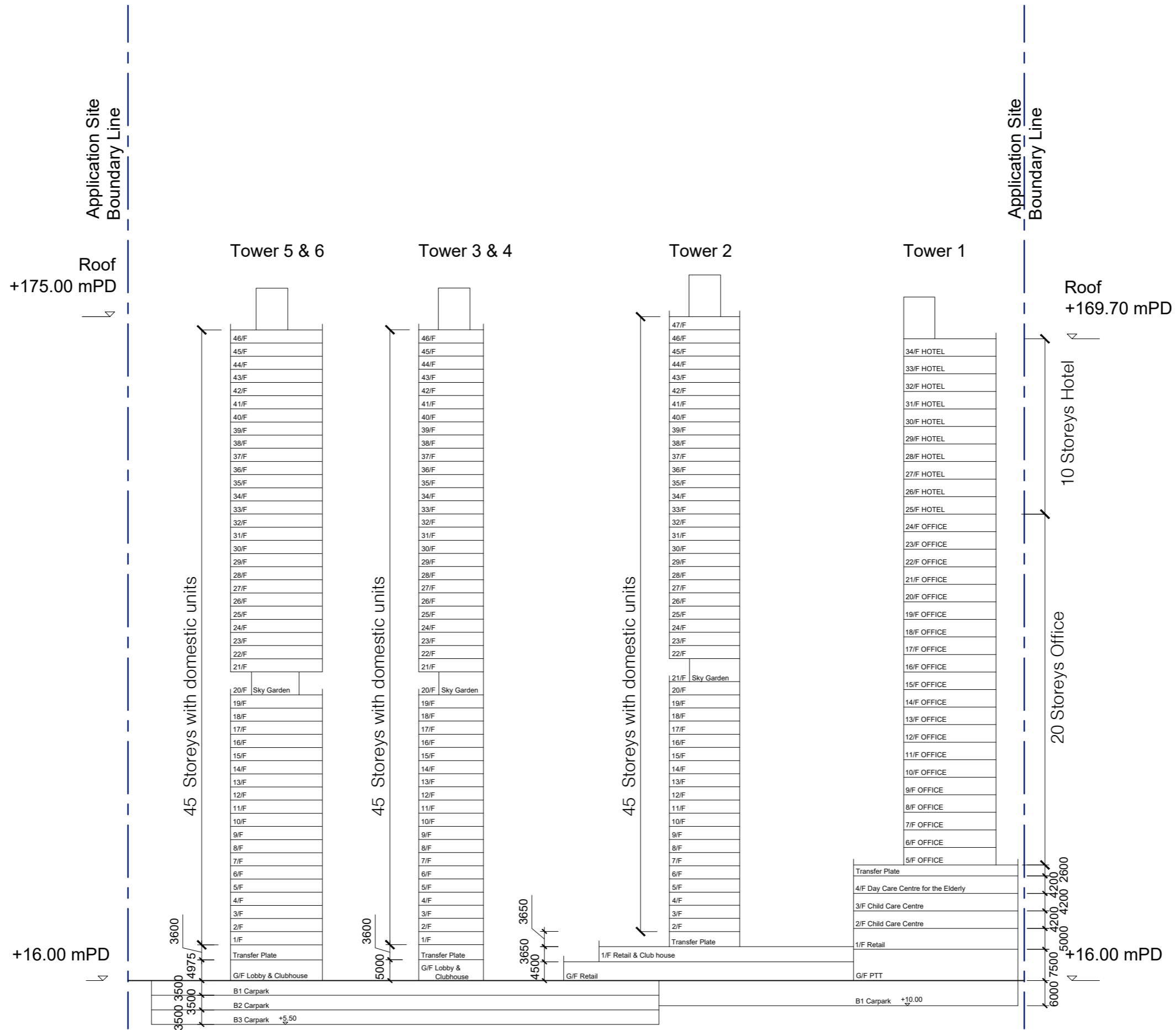
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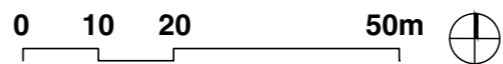
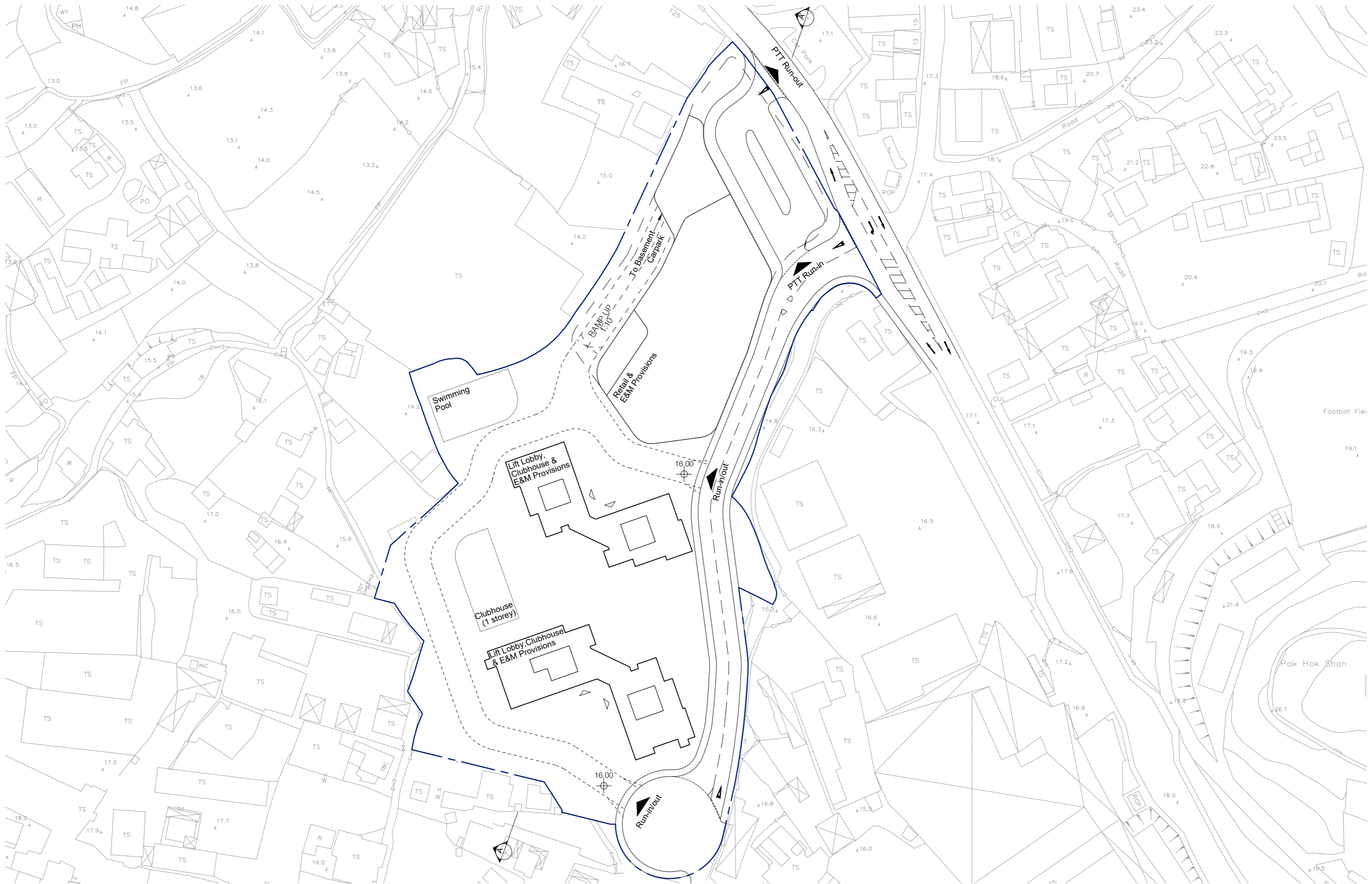
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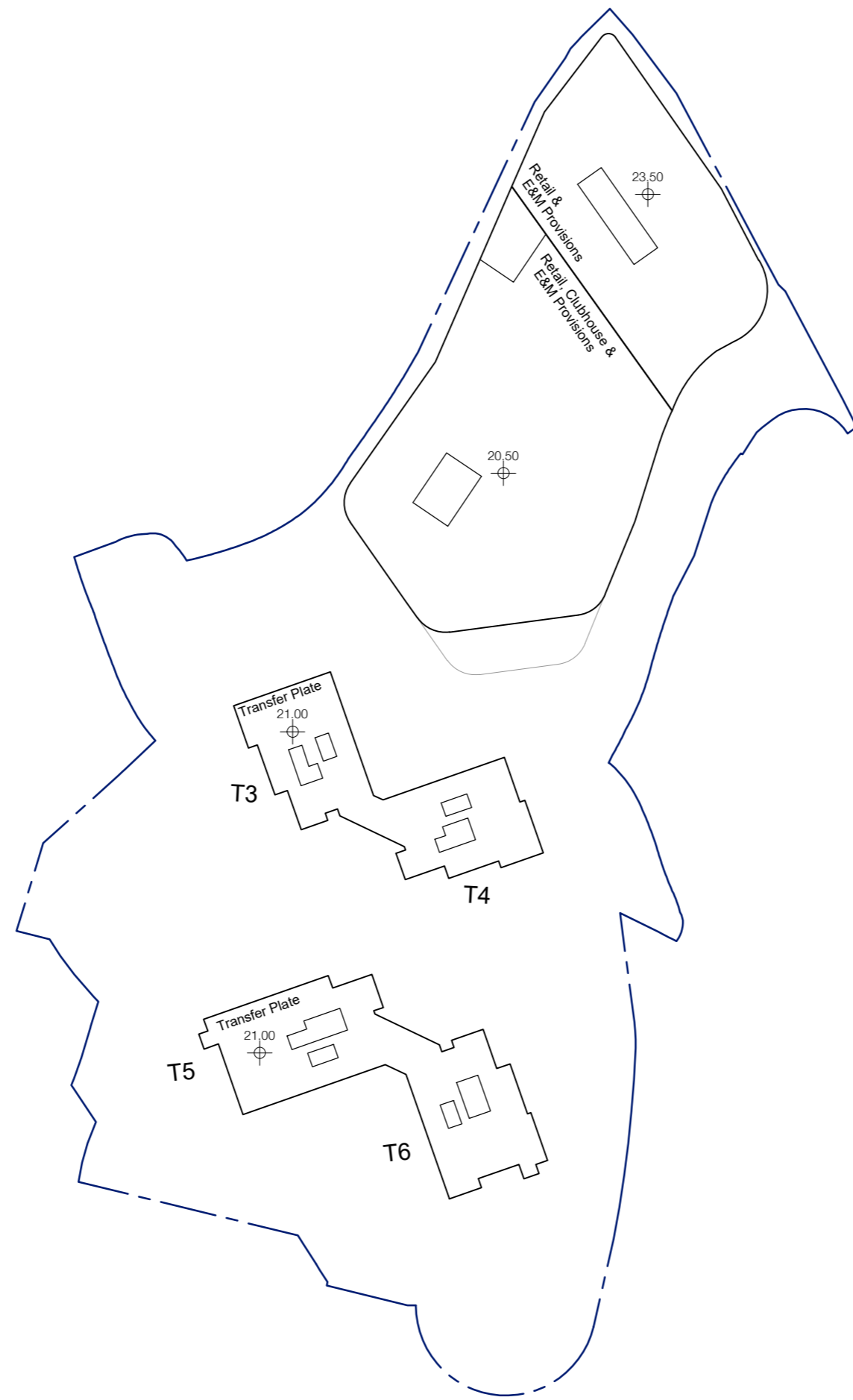
Appendix A

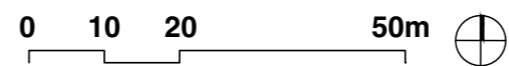
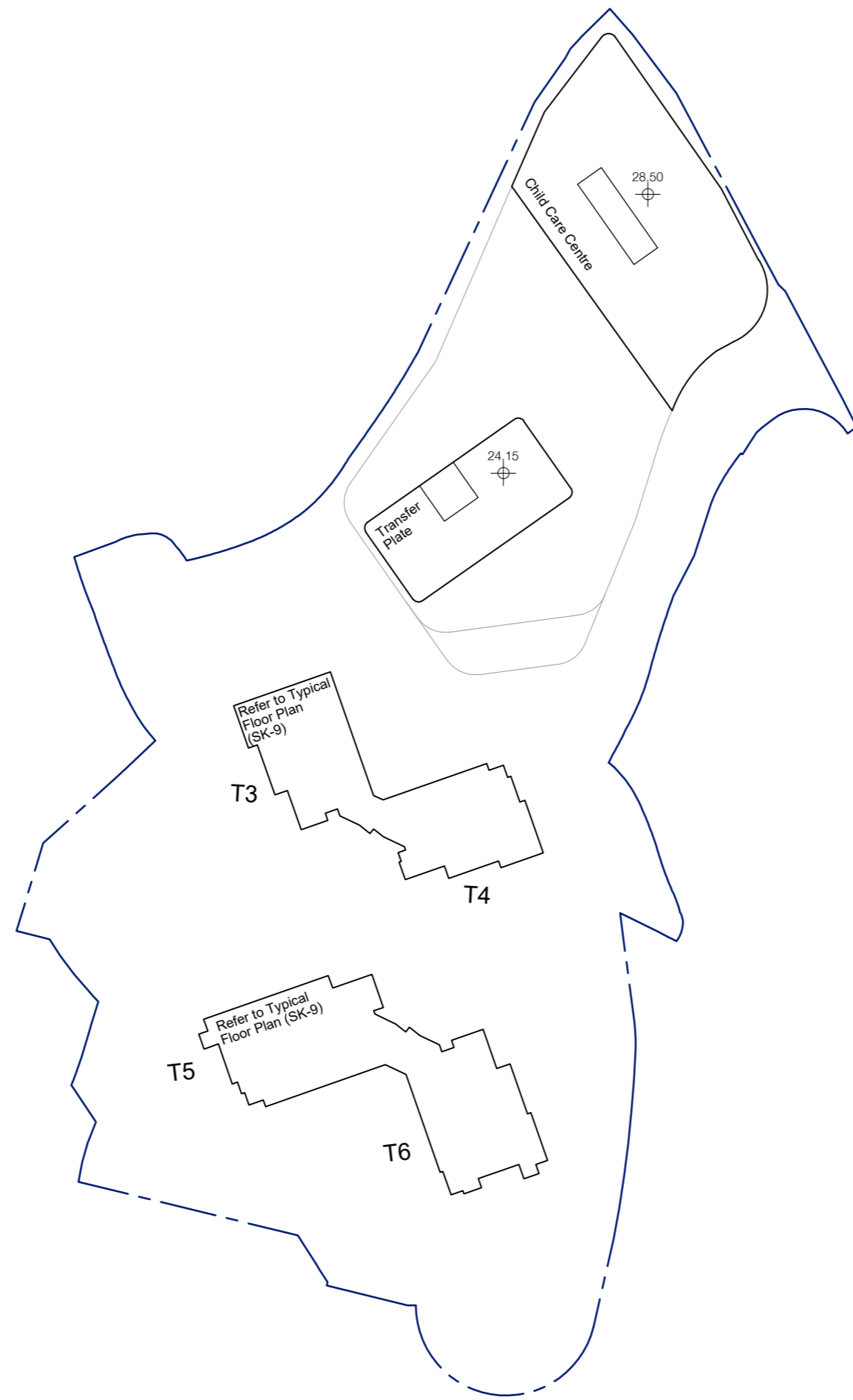
Master Layout Plan and Sectional Drawings

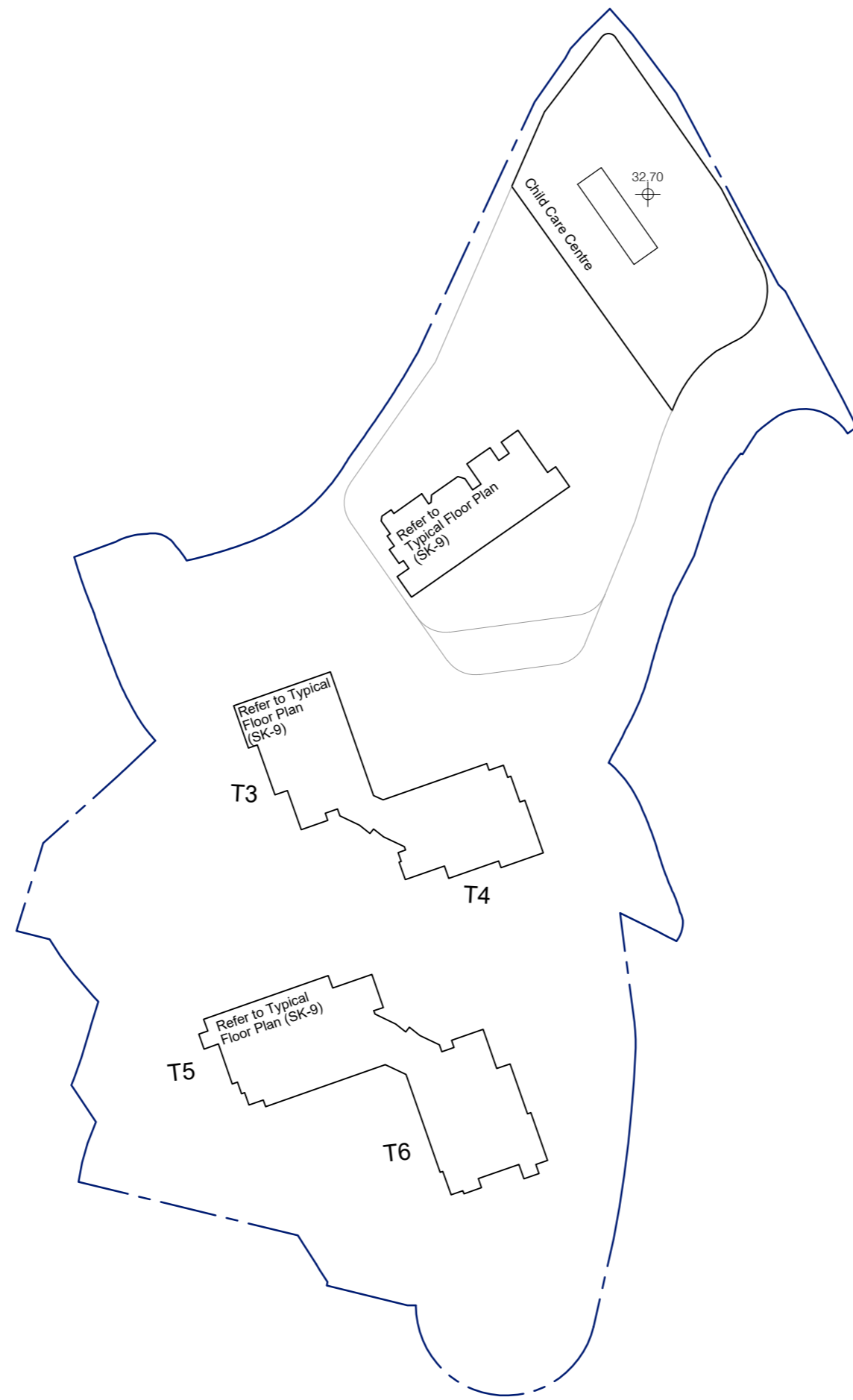


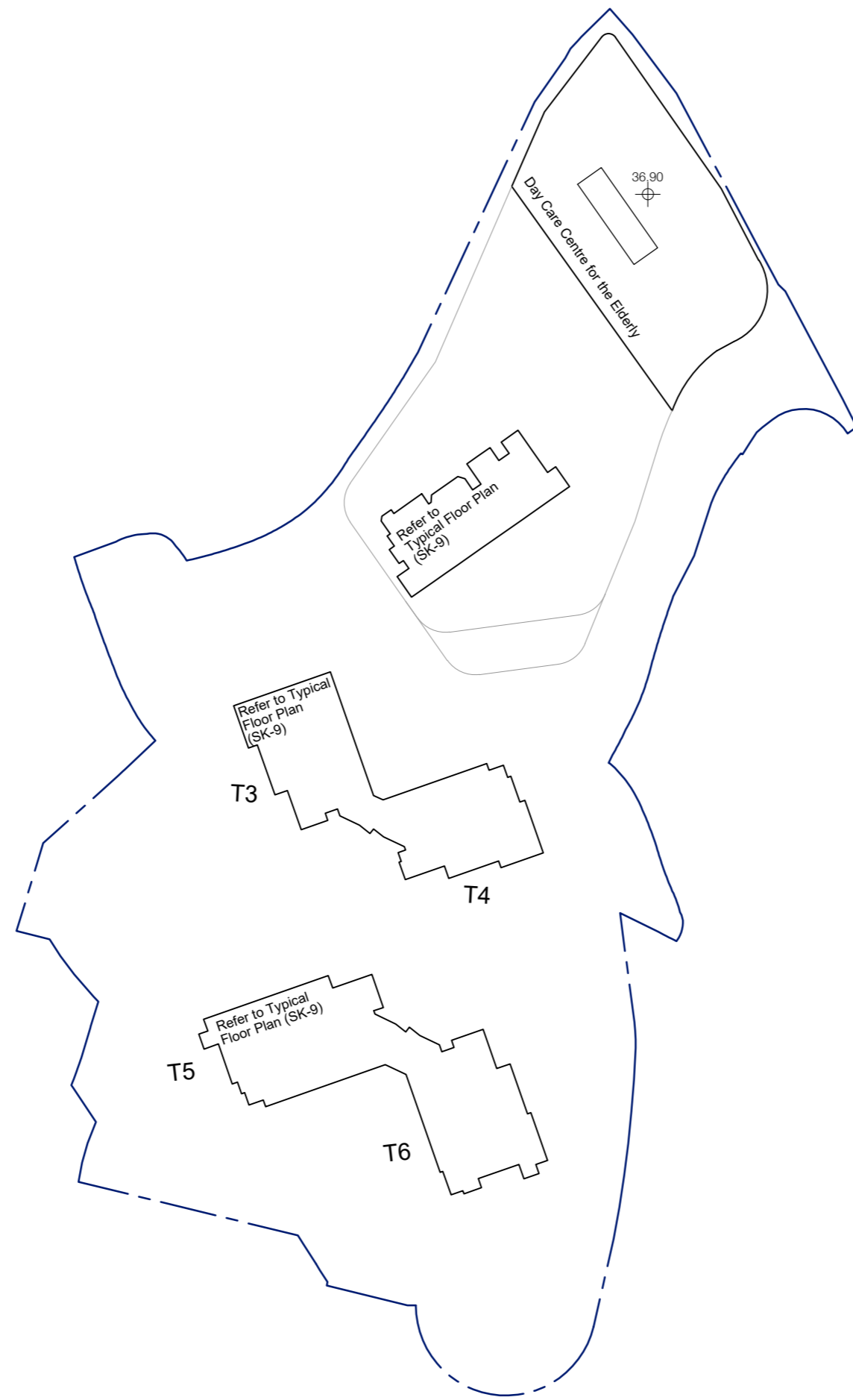


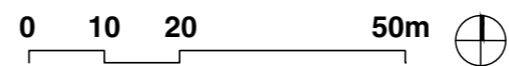
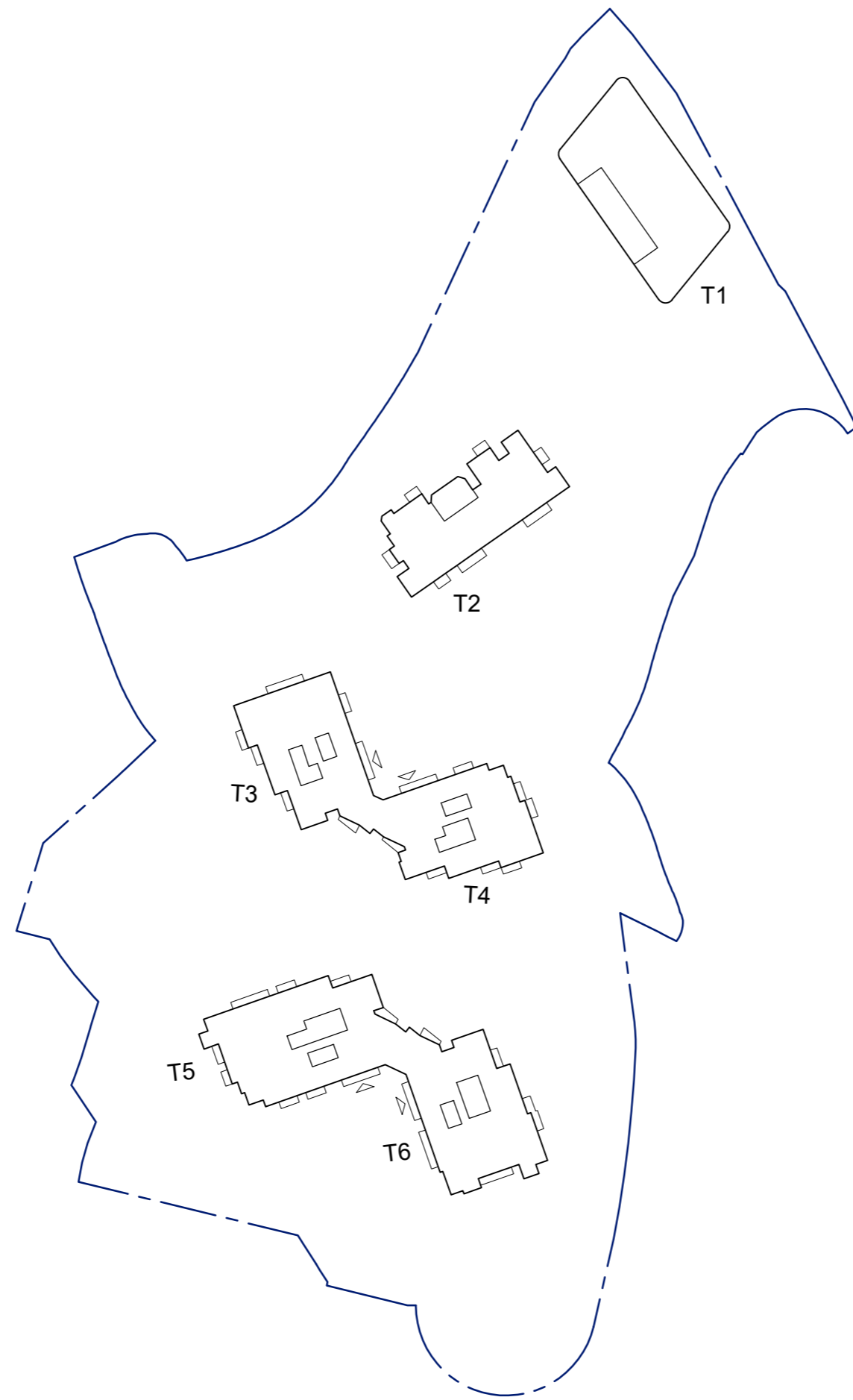


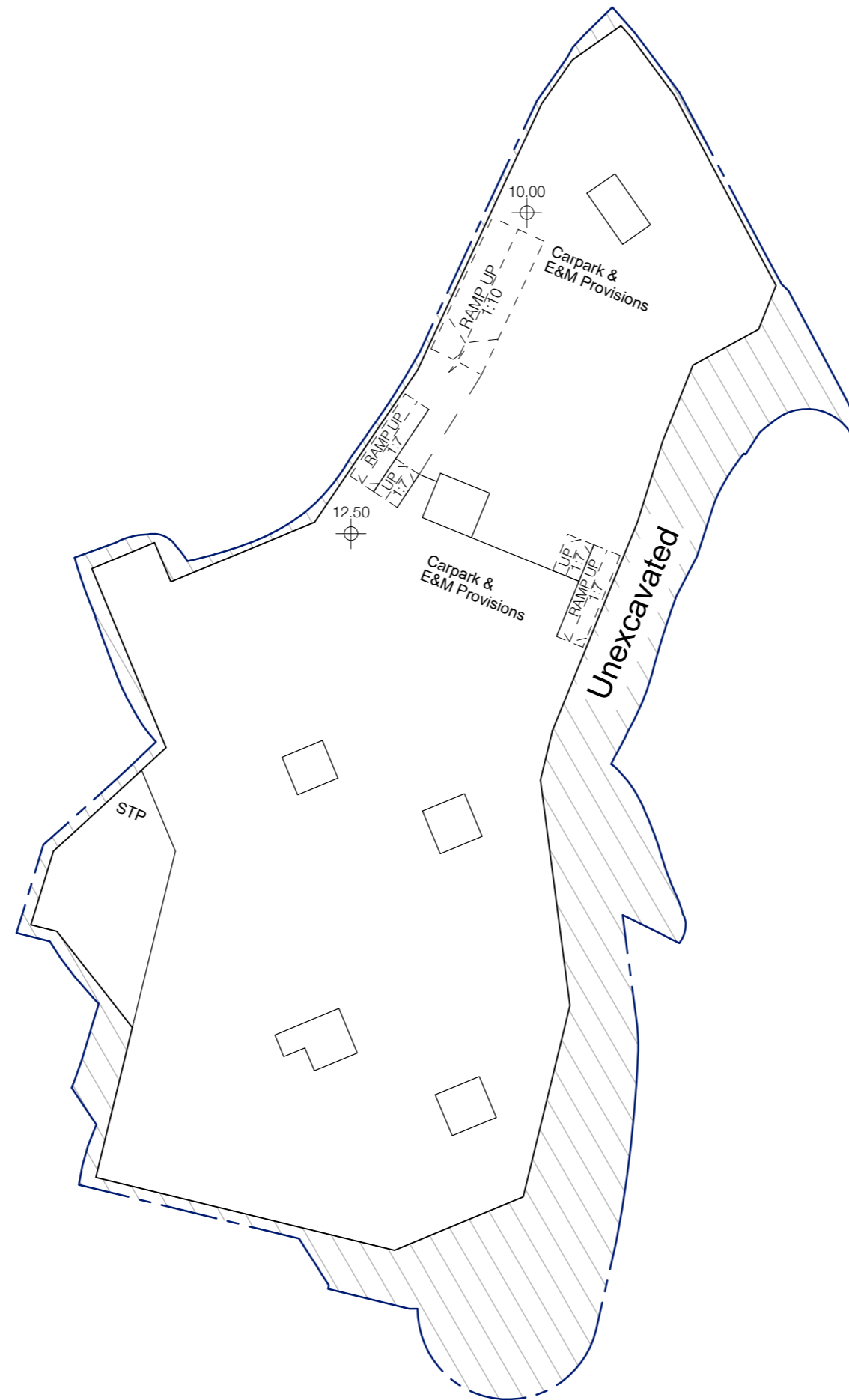


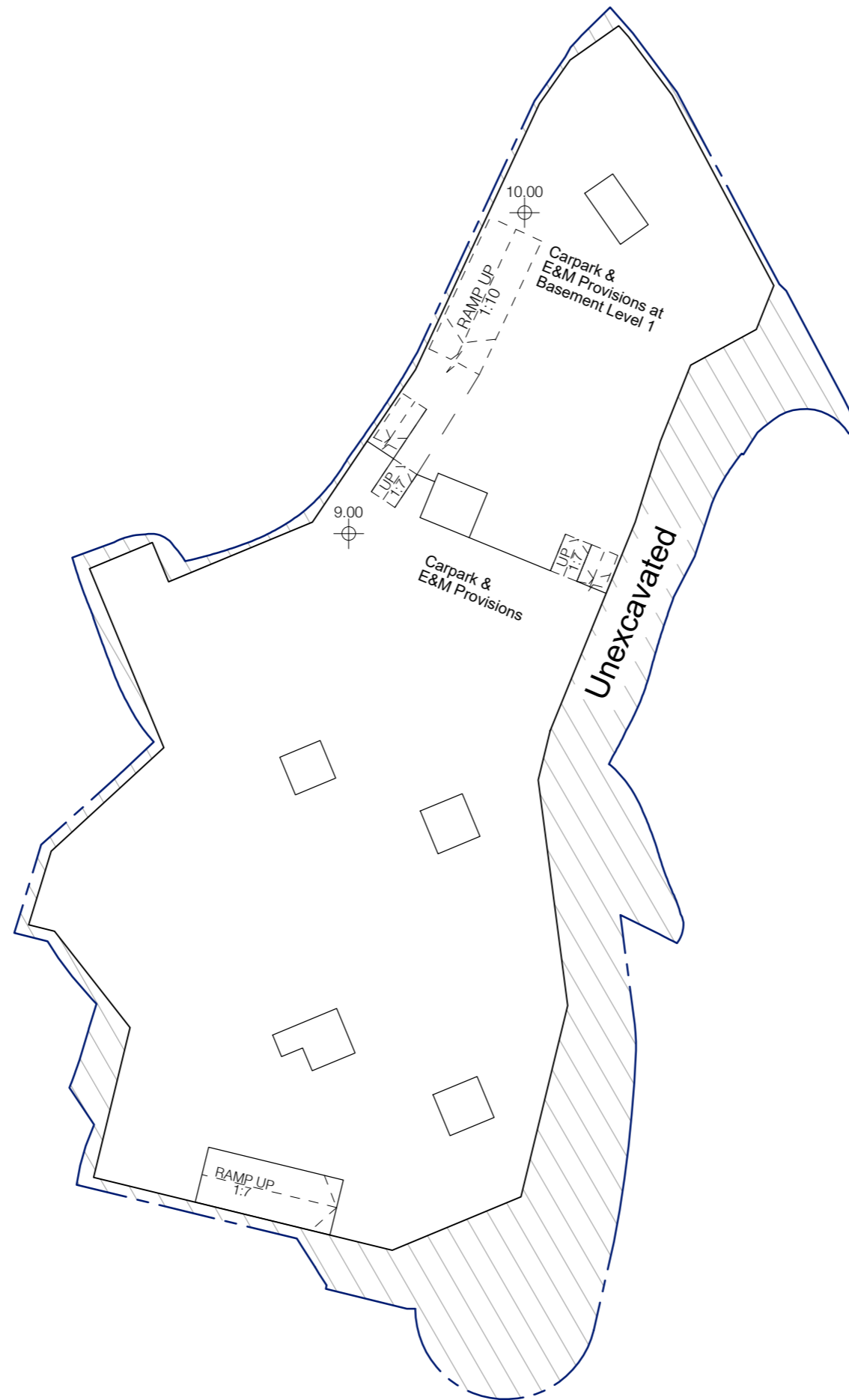


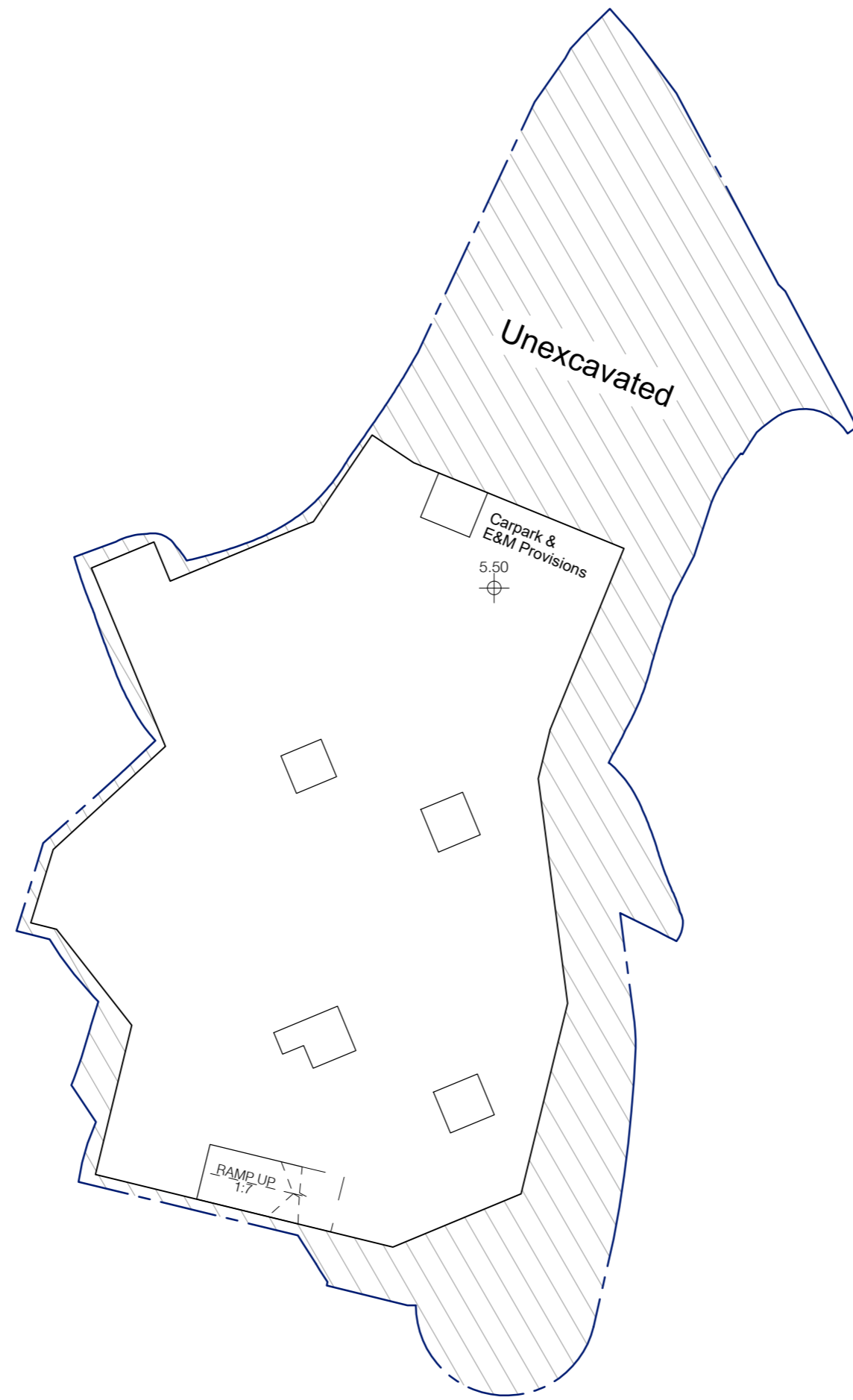


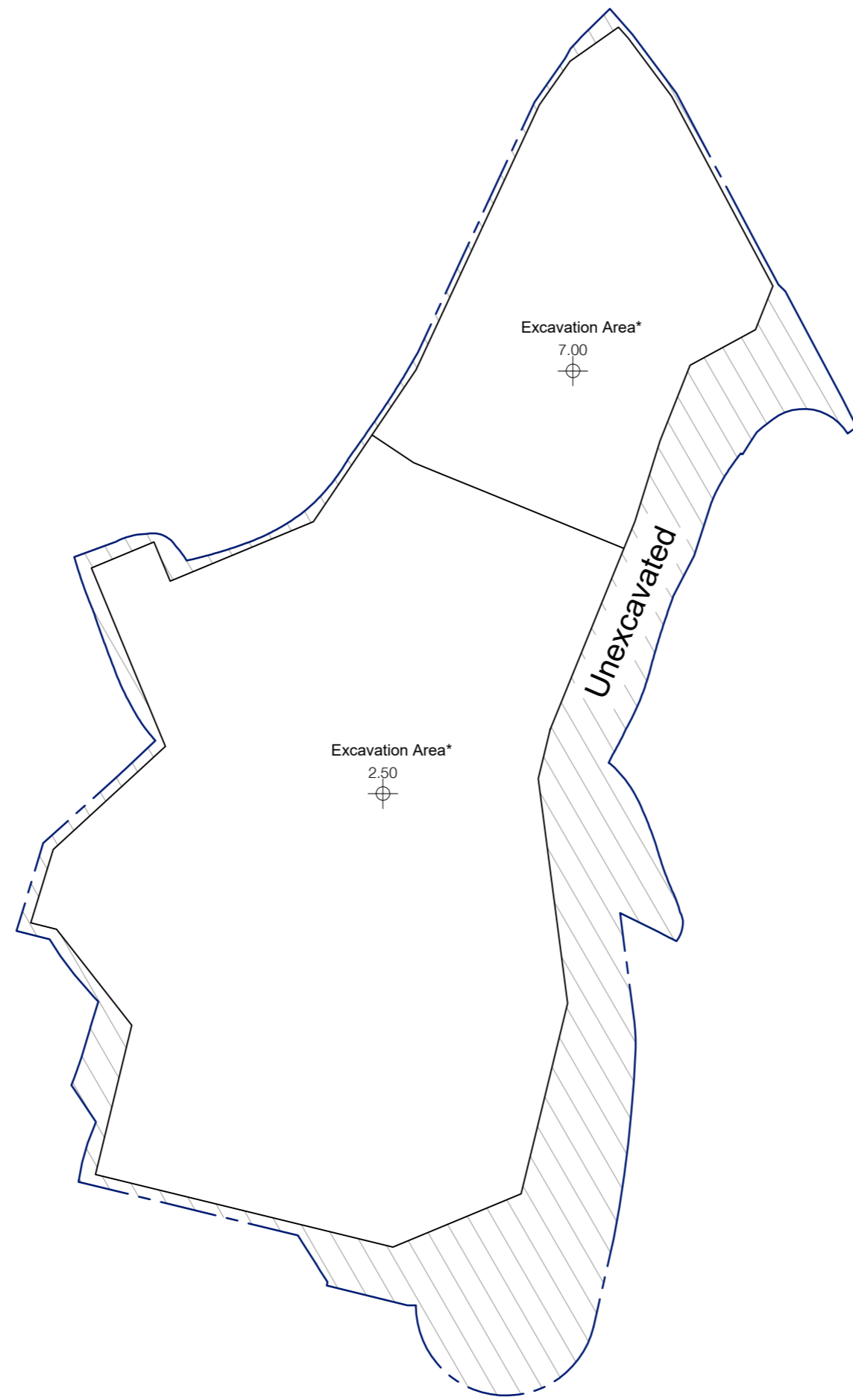




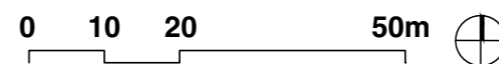








*The excavation area is about 13,500m² and the excavation depth is about 13.5m. The excavation area and depth are subject to future detailed design on foundation based on further geotechnical information.







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Appendix B

Water Demand Estimation

Water Demand Estimation of Proposed Development

Proposed Development

Domestic**Residential + Service Trade**

Total Number of Residents	6174	persons	Referred to submitted GBP.
Fresh Water Unit Daily Demand	0.340	m ³ /person/day	Referred to input from WSD
Average Fresh Water Demand	2099.16	m³/day	
Flush Water Unit Daily Demand	0.104	m ³ /person/day	Referred to WSD Departmental Instruction (DI) No. 1309 Table 1 - Flushing Water for Residential R2 All Area
Average Flush Water Demand	642.1	m³/day	

Commercial**Office**

Total Floor Area	11500.0	m ²	Referred to submitted GBP.
Worker Density per GFA (in 100m ²)	3.4	person/100 m ²	Referred to the worker density of All Economic Activities (All Types) in Table 8 of CIFSUS
Total number of person	391	persons	
Fresh Water Unit Daily Demand	0.04	m ³ /person/day	Referred to WSD Departmental Instruction (DI) No. 1309 Table 2 - Yuen Long, Fanling/Sheung Shui
Average Fresh Water Demand	15.64	m³/day	

Hotel/Service Apartment

Total Floor Area	5703.0	m ²	Referred to submitted GBP.
Total No. of Rooms	70	rooms	Referred to submitted GBP.
Fresh Water Unit Daily Demand	1.00	m ³ /room/day	Referred to input from WSD
Average Fresh Water Demand	70	m³/day	
Flush Water Unit Daily Demand	0.36	m ³ /room/day	Referred to input from WSD
Average Flush Water Demand	25.2	m³/day	

Total Fresh Water Demand	2184.8	m ³ /day
Total Flush Water Demand	667.3	m ³ /day

Total Water Demand	2852.1	m³/day
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Appendix C

Hydraulic review of Water Main

Calculation of Flow Capacity of Proposed Development (Fresh Water)

Sewer No.				Material	Internal Diameter (m) [a]	Cross-section Area (m ²)	Mean Velocity (m/s) [c]	Peak Flow rate of existing pipe (m ³ /s)	Total Fresh Water Demand (m ³ /day)	Peaking Factor	Total Water Demand (m ³ /day)	Peak Flow Rate (m ³ /s)	Percentage of Contribution by Development	Remark
ID	From	ID	To		D	A	V							
Existing DN300				Ductile Iron	0.300	0.071	2.50	0.177	2184.8	3.0	6554.4	0.076	42.9%	Demand from Proposed Site
Proposed DN300 Tee-off from Supply Main				Lined Galvanised Iron	0.300	0.071	2.50	0.177	2184.8	3.0	6554.4	0.076	42.9%	Demand from Proposed Site

Calculation of Flow Capacity of Proposed Development (Flush water)

Sewer No.				Material	Internal Diameter (m) [a]	Cross-section Area (m ²)	Mean Velocity (m/s) [c]	Peak Flow rate of existing pipe (m ³ /s)	Total Flush Water Demand	Peaking Factor	Total Water Demand	Peak Flow Rate	Percentage of Contribution by Development	Remark
ID	From	ID	To		D	A	V		m ³ /day		m ³ /day	m ³ /s		
Existing DN300				Ductile Iron	0.300	0.071	2.50	0.177	667.3	2.0	1334.6	0.015	8.7%	Demand from Proposed Site
Proposed DN100 Tee-off from Supply Main				Lined Galvanised Iron	0.100	0.008	2.50	0.020	667.3	2.0	1334.6	0.015	78.7%	Demand from Proposed Site

Calculation of Flow Capacity of Proposed Development

Sewer No.				Material	Internal Diameter (m) [a]	Cross-section Area (m ²)	Mean Velocity (m/s) [c]	Peak Flow rate of existing pipe (m ³ /s)	Total Fresh Water Demand	Peaking Factor	Total Flush Water Demand	Peaking Factor	Total Water Demand	Peak Flow Rate	Percentage of Contribution by Development	Remark
ID	From	ID	To		D	A	V		m ³ /day		m ³ /day		m ³ /day			
Existing DN300				Ductile Iron	0.300	0.071	2.50	0.177	2184.8	3.0	667.3	2.0	7889.0	0.091	51.7%	Demand from Proposed Site
Proposed DN300 Tee-off from Supply Main				Lined Galvanised Iron	0.300	0.071	2.50	0.177	2184.8	3.0	667.3	2.0	7889.0	0.091	51.7%	Demand from Proposed Site