

# Annex G Revised Air Ventilation Assessment - Expert Evaluation

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**AIR VENTILATION ASSESSMENT  
- EXPERT EVALUATION**

**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

**Project No.** 2127

**Document Title** AIR VENTILATION ASSESSMENT - EXPERT EVALUATION

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**Allied Environmental Consultants Limited**

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

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**Appendix B Broad Land Use Concept for TKLPDA**

## **1. INTRODUCTION**

1.1.1. Allied Environmental Consultants (“AEC”) has been appointed to conduct an Air Ventilation Assessment – Expert Evaluation (“AVA-EE”) to support of a Section 12A application for the mixed use development at LOT 796 & 1008RP at D.D. 77 and adjoining government land in Ping Che, Ta Kwu Ling, New Territories (hereinafter referred to as “Application Site”).

## **2. OBJECTIVES**

2.1.1. The main objectives of the study are to conduct a qualitative review and to evaluate potential air ventilation impact on the pedestrian wind environment within and in the vicinity of the Application Site using the methodology framework set out by relevant environmental standards, guidelines and technical circulars.

2.1.2. The methodology framework of this study is set out in the Technical Circular No. 1/06 and its Annex A - Technical Guide for Air Ventilation Assessment for Development in Hong Kong. The Technical Circular is jointly issued by Housing, Planning and Lands Bureau (HPLB) and Environment, Transport and Work Bureau (ETWB) in July 2006 (Technical Guide).

2.1.3. The scope of this study shall cover the following:

- To identify any potentially affected areas due to the proposed building design including building heights, layout and deposition;
- To provide recommendations for alleviating the potential air ventilation impact identified;
- To identify any major wind corridors which should be preserved or reserved; and
- To identify good design features.

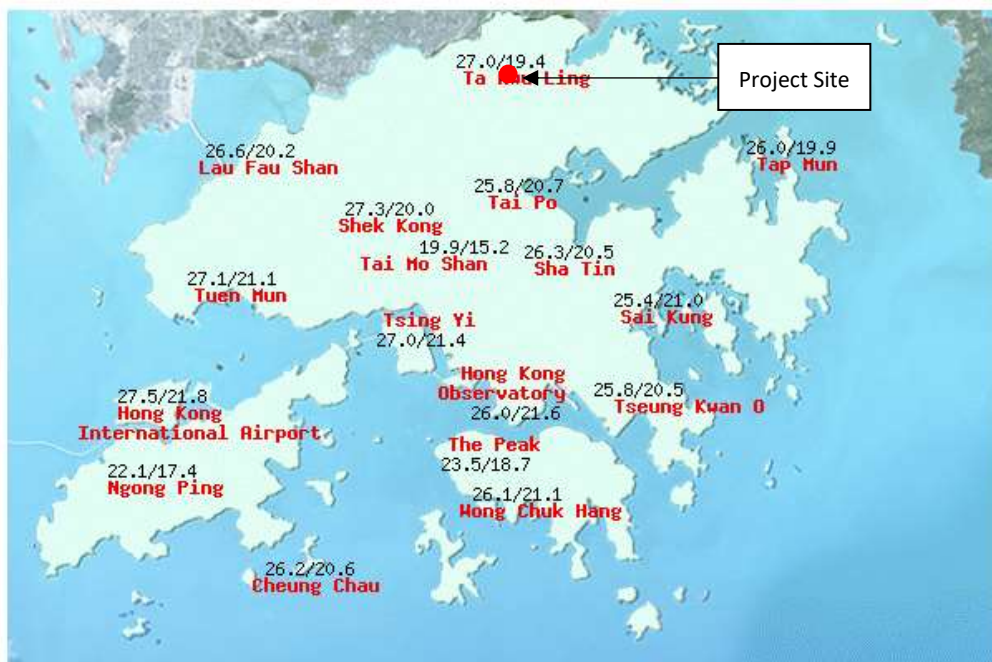
### 3. ASSESSMENT METHODOLOGY

#### 3.1. WIND AVAILABILITY DATA

##### Hong Kong Observatory

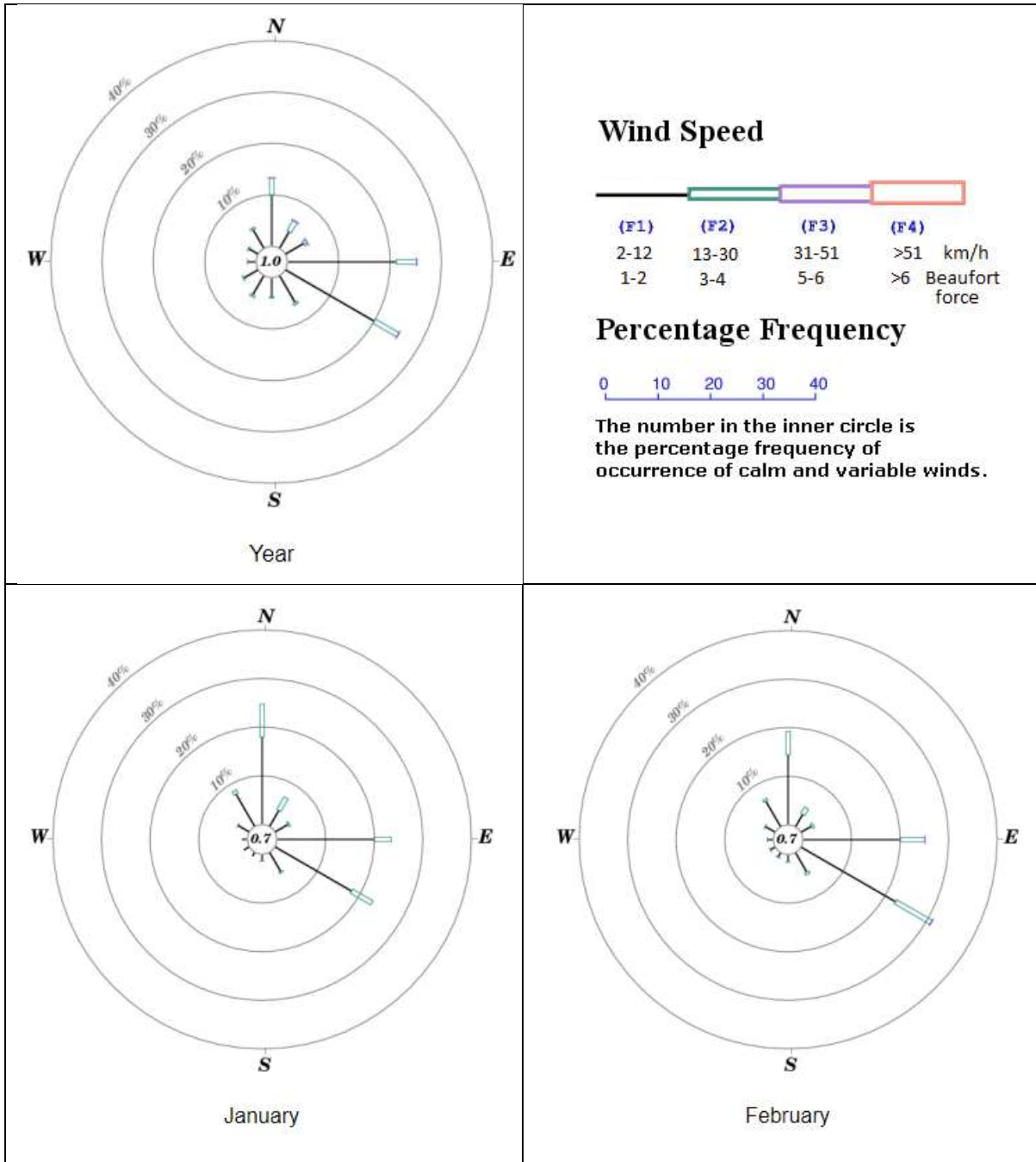
3.1.1. The Hong Kong Observatory records the metrological data in Hong Kong. Among all the weather stations in Hong Kong, the nearest weather station to the Application Site is Ta Kwu Ling Weather Station. Thus, the wind data from Ta Kwu Ling Weather Station shall be used for the discussion on overall wind environment in the region.

3.1.2. According to the wind availability data from Ta Kwu Ling Weather Station from 1986-2020, the annual wind rose revealed winds flowing from **E and ESE** while summer wind rose revealed winds flowing from **E**.

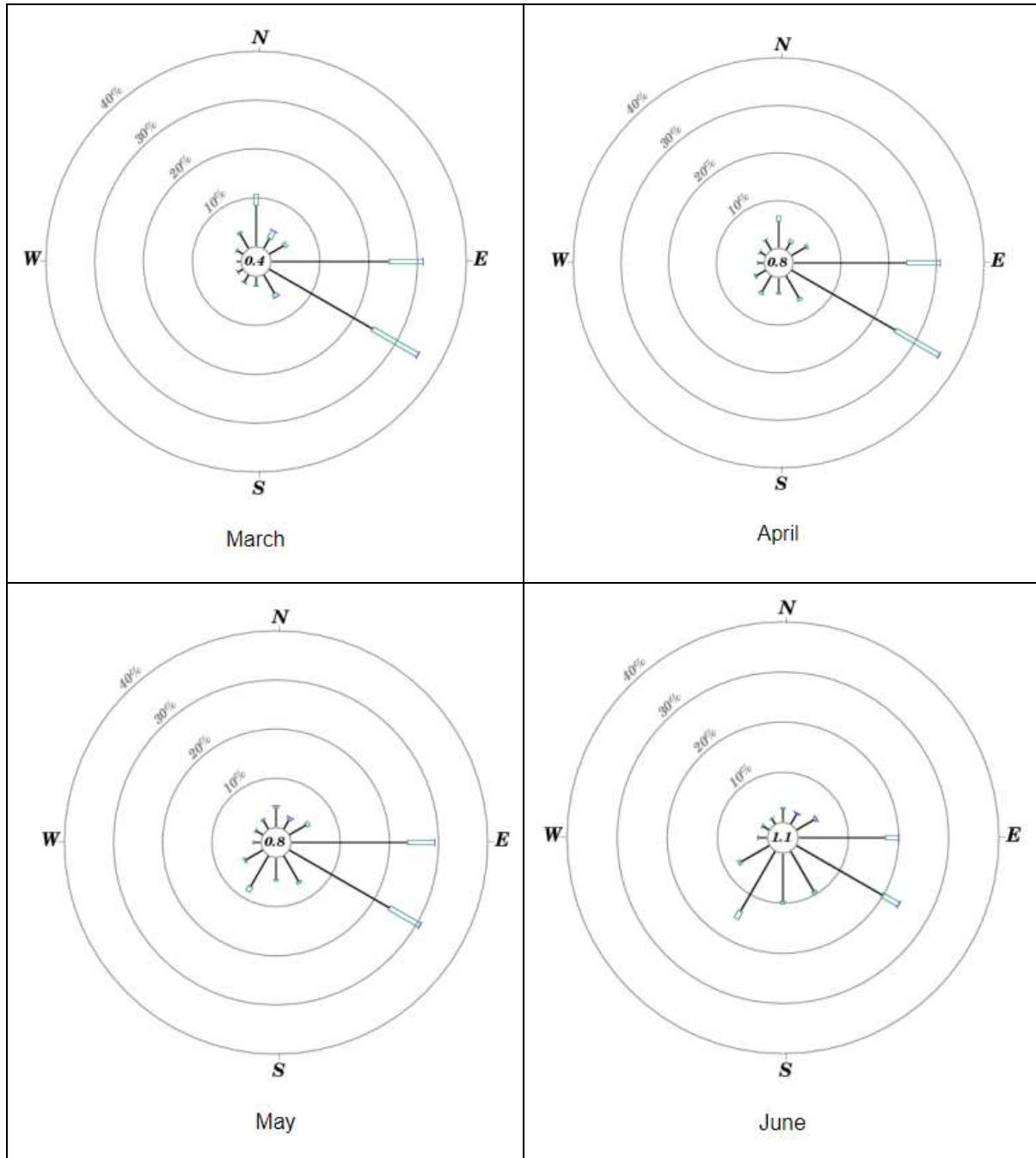


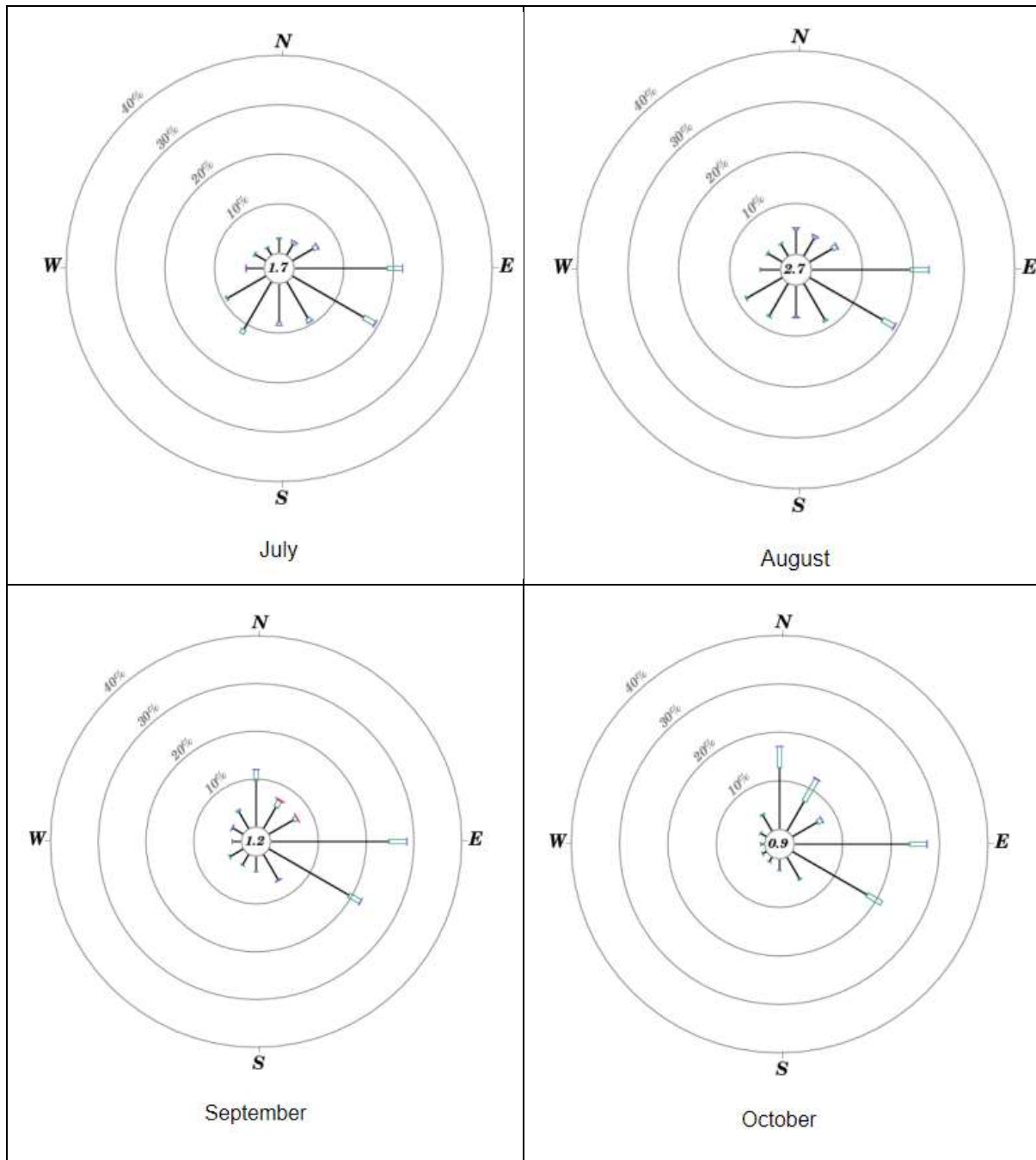
Regional Climate of Hong Kong  
Annual Mean Daily Maximum/Minimum Air Temperature (deg. C)

Figure 3-1 Location of Hong Kong Observatory Weather Station









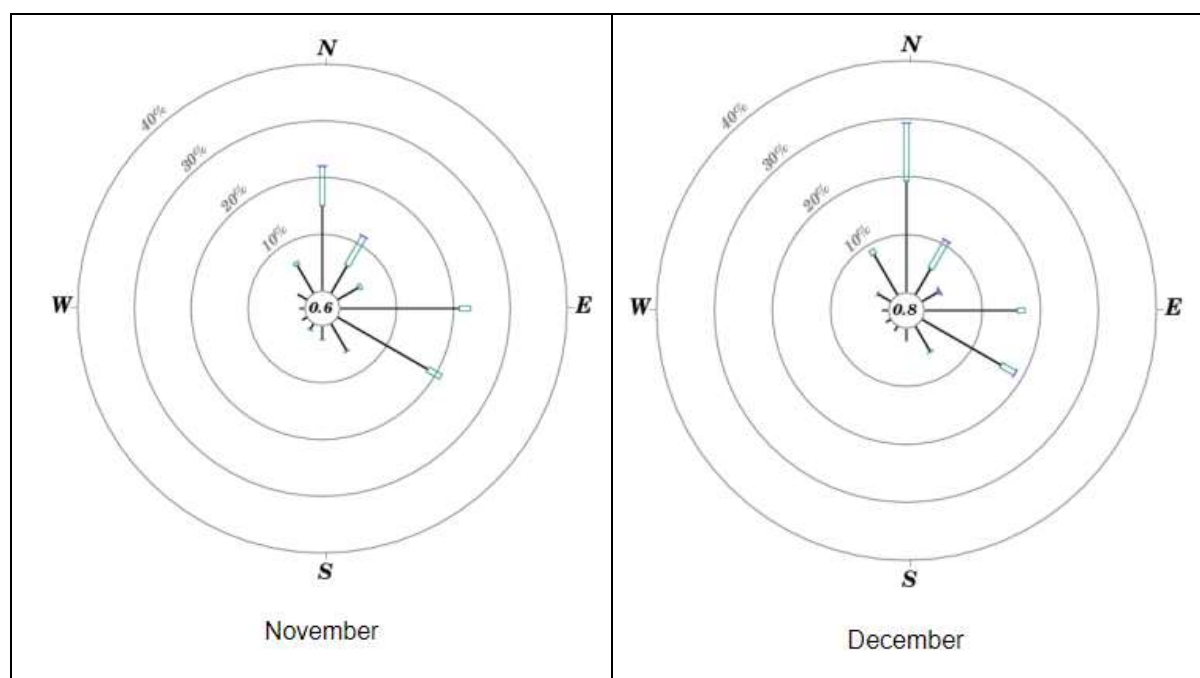


Figure 3-2 Annual Wind Rose of Ta Kwu Ling Weather Station between 1986-2020

### **Regional Atmospheric Modelling System (RAMS)**

- 3.1.3. Wind availability to the Application Site is evaluated with reference to the “Consultancy Study on Establishment of Simulated Site Wind Availability Data for Air Ventilation Assessments in Hong Kong” simulated by the meso-scale model of Regional Atmospheric Modelling System (RAMS) Version 6.0 at the horizontal resolution of 0.5km \* 0.5km.
- 3.1.4. The Application Site is located within grid (077, 087) and grid (078, 087) in DD77 lot 796 and 1008RP, Ping Che. Wind availability data at 200m was adopted in this assessment. According to Planning Department’s simulated data, wind roses, wind direction and wind probability data are provided in **Figure 3-3** and **Figure 3-4**. The simulated windroses show that the annual prevailing is coming from E direction (26.3% from grid 077,087 and 28.3% from grid 078,087) with contribution from ESE (14.4% from grid 077,087 and 13.4% form grid 078,087); while the summer prevailing is coming from E direction (13.3% from grid 077,087 and 13.9% from grid 078,087) with summer prevailing winds are in southeast quadrant.
- 3.1.5. **Table 3-1** summarized the simulated wind availability data including probability of Occurrence.

**Table 3-1 Summary of RAMS Data and Wind Direction**

Wind Director	Grid (077,087)		Grid (078,087)	
	Probability for Annual Condition (%)	Probability for Summer Condition (%)	Probability for Annual Condition (%)	Probability for Summer Condition (%)
N	5.8	1.4	5.1	1.3
NNE	6.9	1.1	5.5	1.0
NE	4.5	1.1	5.0	1.1
ENE	10.3	3.2	11.7	3.6
E	26.3	13.3	28.3	13.9
ESE	14.4	10.2	13.4	10.4
SE	6.2	11.1	5.8	10.7
SSE	4.8	10.6	5.0	11.2
S	4.2	10.3	4.1	10.1
SSW	3.8	10.1	3.7	9.8
SW	3.1	8.4	3.1	8.4
WSW	2.8	7.7	2.7	7.4
W	3.0	7.2	2.9	6.9
WNW	1.1	1.8	1.1	1.8
NW	1.0	1.3	0.9	1.2
NNW	1.8	1.2	1.8	1.2

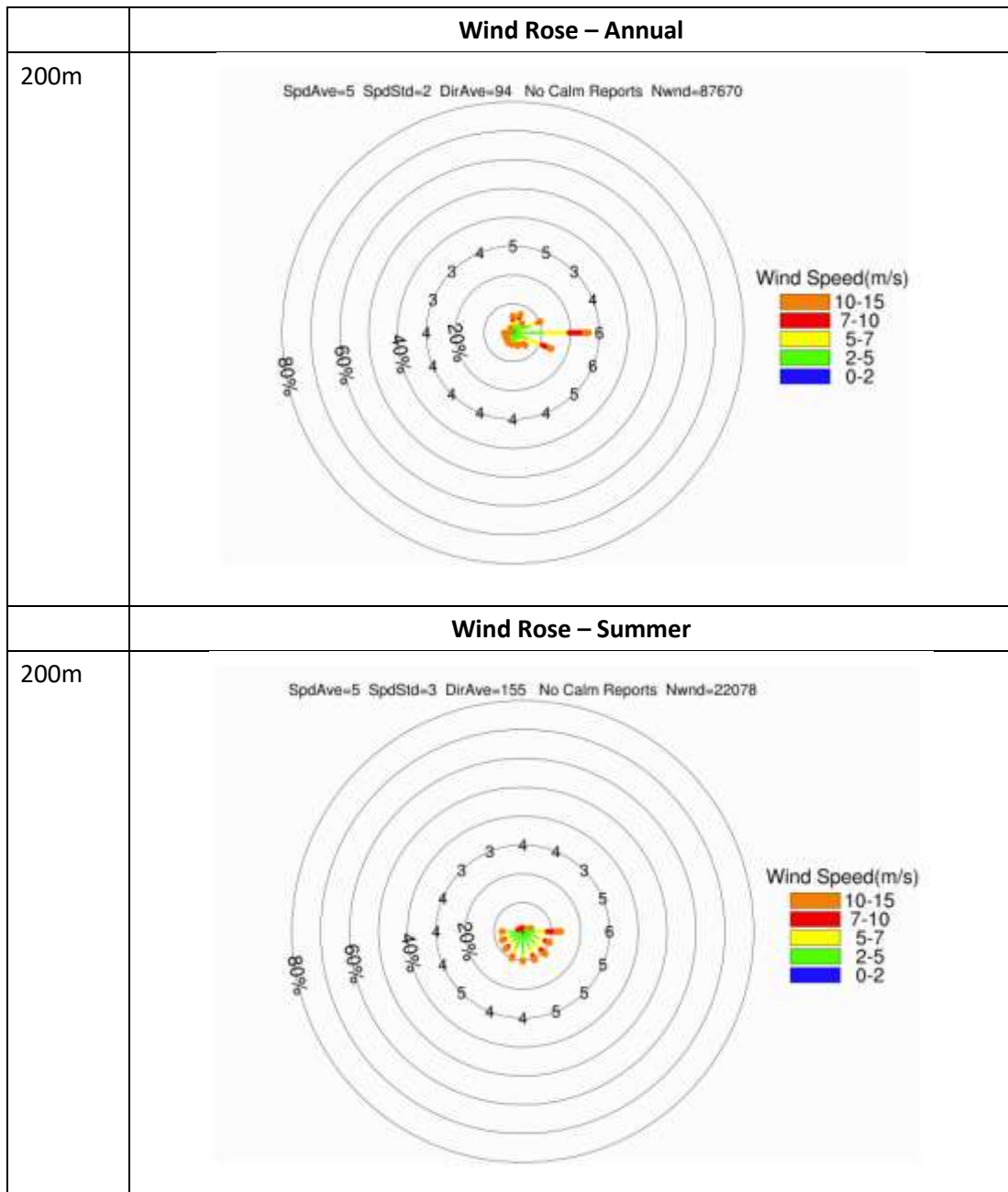


Figure 3-3 Wind Rose at Grid (077, 087)

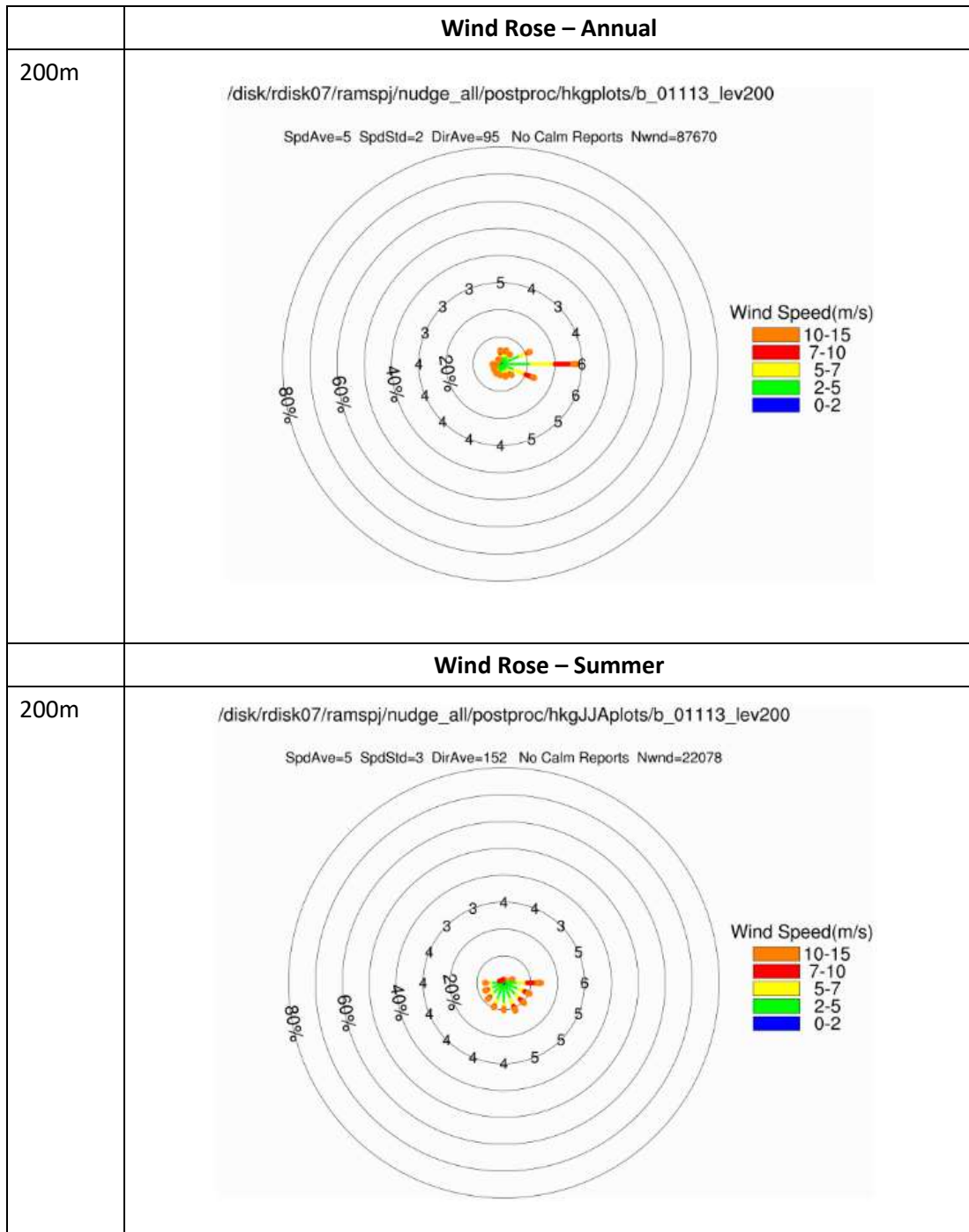


Figure 3-4 Wind Rose at Grid (078, 087)

3.1.6. According to RAMS wind data, annual prevailing winds are the incoming winds flowing from **E and ESE**, while summer prevailing winds are flowing from **E, SE and SSE** directions.

**Wind Data from Previous Studies**

3.1.7. There are several air ventilation assessments in Ta Kwu Ling area. Their wind availability are summarized in below:

- Liantang/Heung Yuen Wai Boundary Control Point and Associated Works (AVG/G/40); and
- Public Housing Development at Queen's Hill Site 1, Fanling (AVG/G/148)

3.1.8. The following air ventilation assessments do not cover the Application Site. The distance of site of assessment AVG/G/40 is 3km from Application Site, while the distance of site of assessment AVG/G/148 is 2km from Application Site. Therefore, the wind data from previous assessment around Application Site are considered not included as reference.

3.1.9. In summary, different wind data reference have been reviewed, **Table 3-2** summarises the identified prevailing wind conditions of Lot 796 and 1008RP, Ping Che. For a comprehensive discussion on air ventilation performance of the Application Site and the wind environment at pedestrian level, RAMS data is more appropriate as it is the most updated. In view of the close proximity of the HKO Ta Kwu Ling Weather Station to the Application Site, the wind data from HKO Ta Kwu Ling Weather Station is also adopted in this AVA-EE.

*Table 3-2 Wind Data Summary*

Sources	Annual Wind	Summer Wind
HKO Ta Kwu Ling Weather Station (1986-2020)	E, ESE	E
RAMS data (grid 077, 087)	NNE, ENE, E, ESE, SE	E, ESE, SE, SSE, S
Summary	NNE, ENE, E, ESE, SE	E, ESE, SE, SSE, S

## 4. PROJECT DESCRIPTION

### 4.1. SITE LOCATION AND PROPOSED DEVELOPMENT

- 4.1.1. The Application Site area is approximately 17,822 m<sup>2</sup>. It is bounded by Ping Che Road from the north to northeast, the unnamed village road to the east, village, agricultural land and open storage area at the south and west. The Application Site is currently used as an open storage area.
- 4.1.2. 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. The plot ratio for domestic use is 5.9 and for non-domestic use is 1.1. The total GFA for domestic use is 105,145 m<sup>2</sup>, and 19,603 m<sup>2</sup> for non-domestic use. The non-domestic use consisted of retail, office, hotel or service apartment, clubhouse, day care centre for the elderly and child care centre.
- 4.1.3. The Application Site is zoned as "Open Storage" ("OS") on the approved Ping Che and Ta Kwu Ling Outline Zoning Plan ("OZP") No. S/NE-TKL/14. The southern part of the Application Site is zoned as "Agriculture" ("AGR") and a minor portion of the Application Site is shown as "Road". The surrounding areas are the Ping Che New Village and Ta Kwu Ling Rural Centre Government Offices ("G/IC" zone) to the north, the industrial area (Group D) ("I(D)") zone to the northeast, agriculture land ("AGR" zone) to the south, industrial area and open storage ("OS" zone) to the east. shows the location of the Application Site.



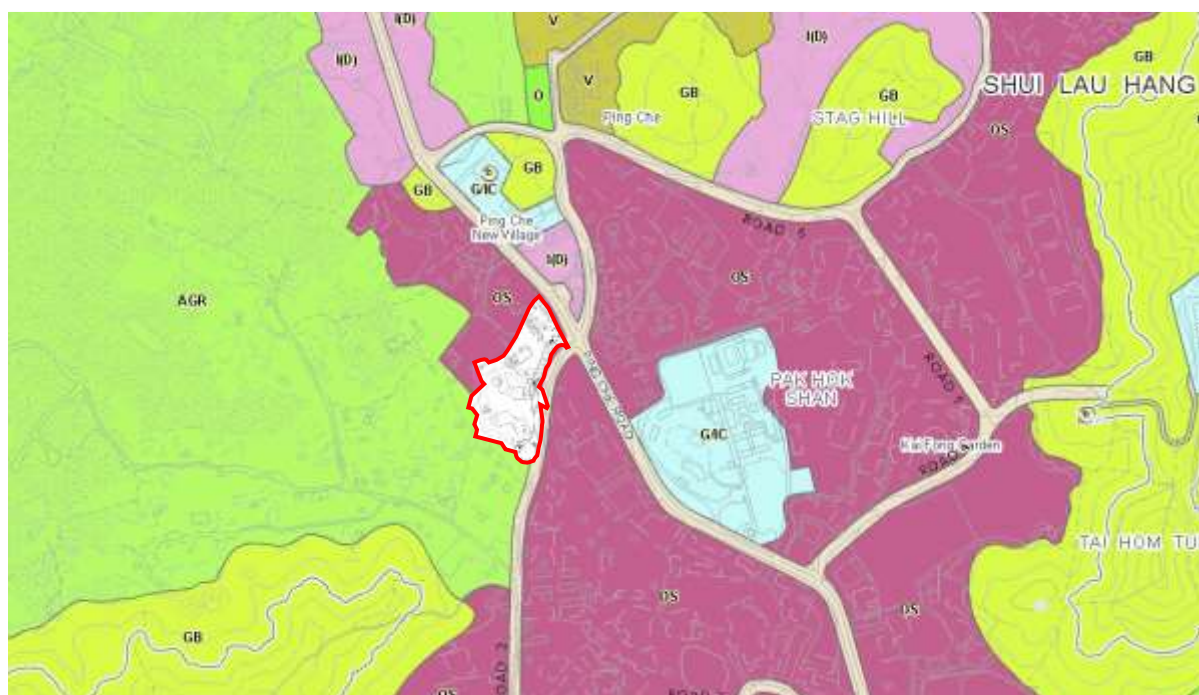


Figure 4-1 Application Site Location

- 4.1.4. The Application Site is largely open land currently where a minor portion is occupied by temporary structures.
- 4.1.5. In December 2017, Planning Department (PlanD) and Civil Engineering and Development Department (CEDD) completed Preliminary Feasibility Study on Developing the New Territories North (NTN) (the Preliminary NTN Study). The Preliminary NTN Study has formulated an overall Concept Plan (for the NTN as well as the respective Broad Land Use Concept Plans for the PDAs identified where their broad brushed land use and strategic infrastructure requirements were outlined and preliminary feasibilities were examined.
- 4.1.6. According to the Broad Land Use Concept Plan of TKLPDA extracted in Agreement No. CE 42/2013 (CE) Preliminary Feasibility Study on Developing the New Territories North as shown in **Appendix B**, the area to the northeast of the Application Site is proposed as residential developments with plot ratio of 5 and maximum building height of 120 mPD. Further to the southeast and east of the Application Site will accommodate a concentration of high-rise commercial developments with plot ratio at 6.5 and building height ranging from 210- 234 mPD. Existing settlement and few parcel of G/IC Uses of 2-8 storeys high are found to the north and northeast of the Application Site. To the north of the Application Site, existing settlement and residential developments with maximum building height of 45 mPD are identified. The Figure 4.6 shows the Application Site incorporated in the broad land use

concept of NTN Development.

## 4.2. SURROUNDING ENVIRONMENT AND WIND CHARACTERISTICS

### Topography

4.2.1. The Application Site is a relatively hilly area (with ground level of around 14 to 16 mPD) and surrounded by the mountains in its east, northeast and southwest. Tsung Shan is elevated around 90mPD to 99mPD located at the southwest to the Application Site, and Tai Hom Tuk elevated at around 52mPD to 93mPD is located at the east of Application Site, making the Application Site located at relatively low ground between two hills. Stag hill with height around 34mPD to 47mPD is located at northeast to the Application Site. The topography around the Application Site is illustrated in **Figure 4.5**.

### Urban Morphology

4.2.2. As mentioned in Section 4.1 and shown in **Figure 4-1** and **Table 4-1**, existing developments are focusing on the Application Site is surrounding by “OS”, “G/IC”, “I(D)” and “ARG” zone with different building height. The Application Site is located in rural area, the surrounding buildings are low rise with a relatively low in building height. As the building is scattered around and not densely surrounding the Application Site, it is mainly open area and open storage around. The morphology is mostly flat at the ground area. **Figure 4-2** and **Table 4-1** show the location of the surrounding developments and the relevant building height respectively.

**Table 4-1 Building Heights of Major Development in the Surroundings**

	<b>Surrounding Buildings</b>	<b>Existing/ Proposed Height (m)</b>	<b>OZP Building Height Restriction (m)</b>
<b>Existing Buildings</b>			
1	29 Ping Che New Village	7	19
2	Hong Kong Baptist Assembly	3	19
3	13 Ng Chau Road	3	13
4	Ta Kwu Ling Rural Centre Government Offices	5	19
5	Ping Che Commercial Centre	10	19
6	50C Ping Che	8	3 Storey (8.23m)

7	246 PING CHE	8	3 Storey (8.23m)
<b>Committed/ Planned Developments</b>			
8	Tai Kwu Ling Ping Che Tsuen	8.23m	-
Remarks: [1] The higher building height among existing building height and OZP building height restrictions is adopted in the AVA. * Planning Application No. A/NE-TKL/529			

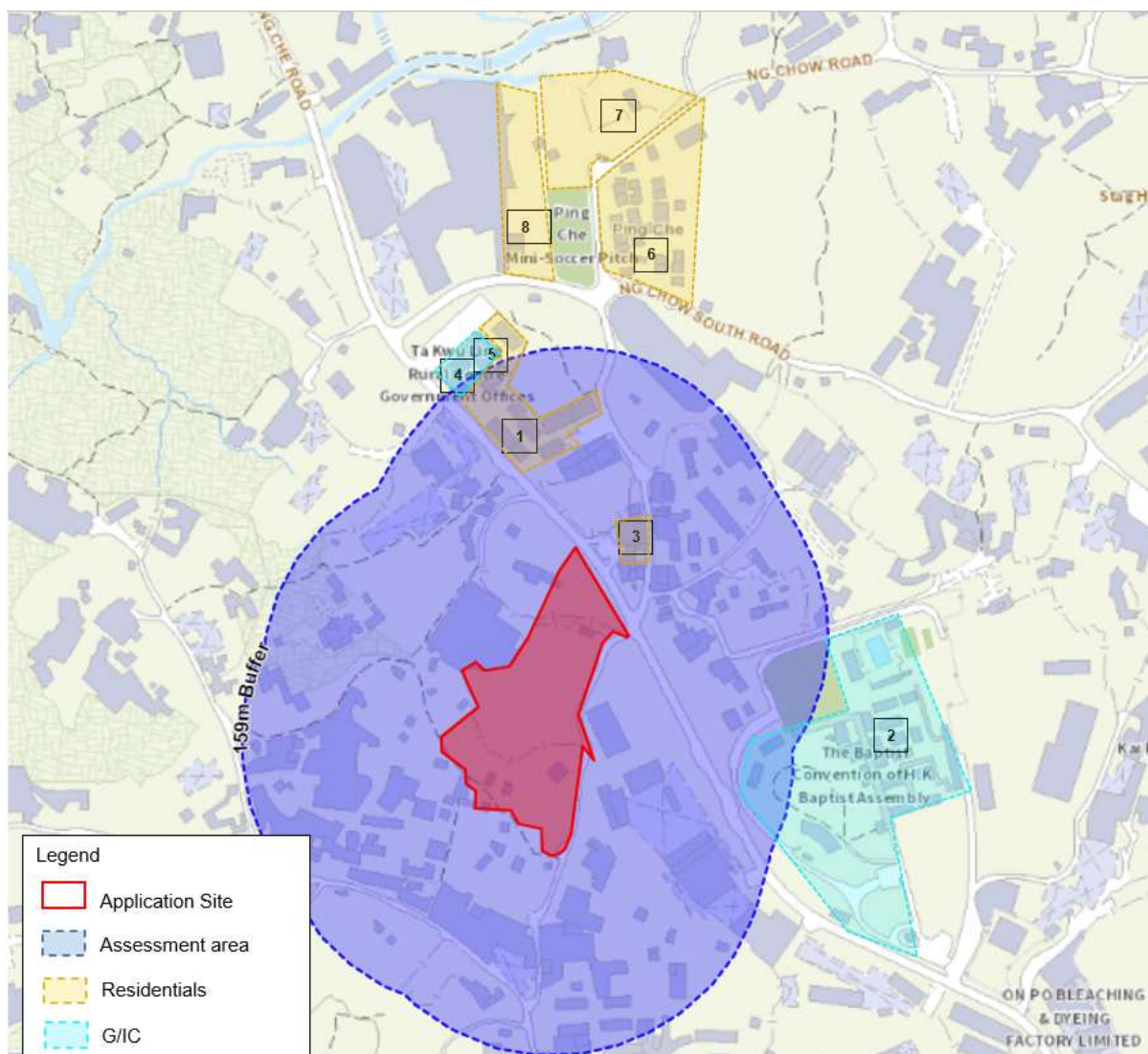


Figure 4-2 Existing and Proposed Surrounding Developments

4.2.3. Noted that the Application Site is located within the proposed tentative boundary of New Territories North New Town which the EIA study for such is under preparation during the course of the study for this application. However, the exact programme and development

details for its implementation is yet to be confirmed.

- 4.2.4. Based on the EIA Project Profile and Study brief for Development of New Territories North New Town and Man Kam To (NTN Development) (ESB-341/2021), the NTN remaining phase development is proposed for housing, economic and employment-generating developments. As refer to the Project Profile, the broad land use concepts identified for the NTN development would be further review, such as commercial, residential, industrial estate, science park, logistic industries, etc.
- 4.2.5. Since the implementation details of NTN Development is yet to be confirmed, the urban morphology cannot be identified at this stage. The assessment will evaluate the scenario of existing OZP compliance scheme and the scenario with NTN development (extracted from broad land use concept plan of TKLPDA) in place for completeness and aims to demonstrate that there is feasible solution to meet relevant standards.

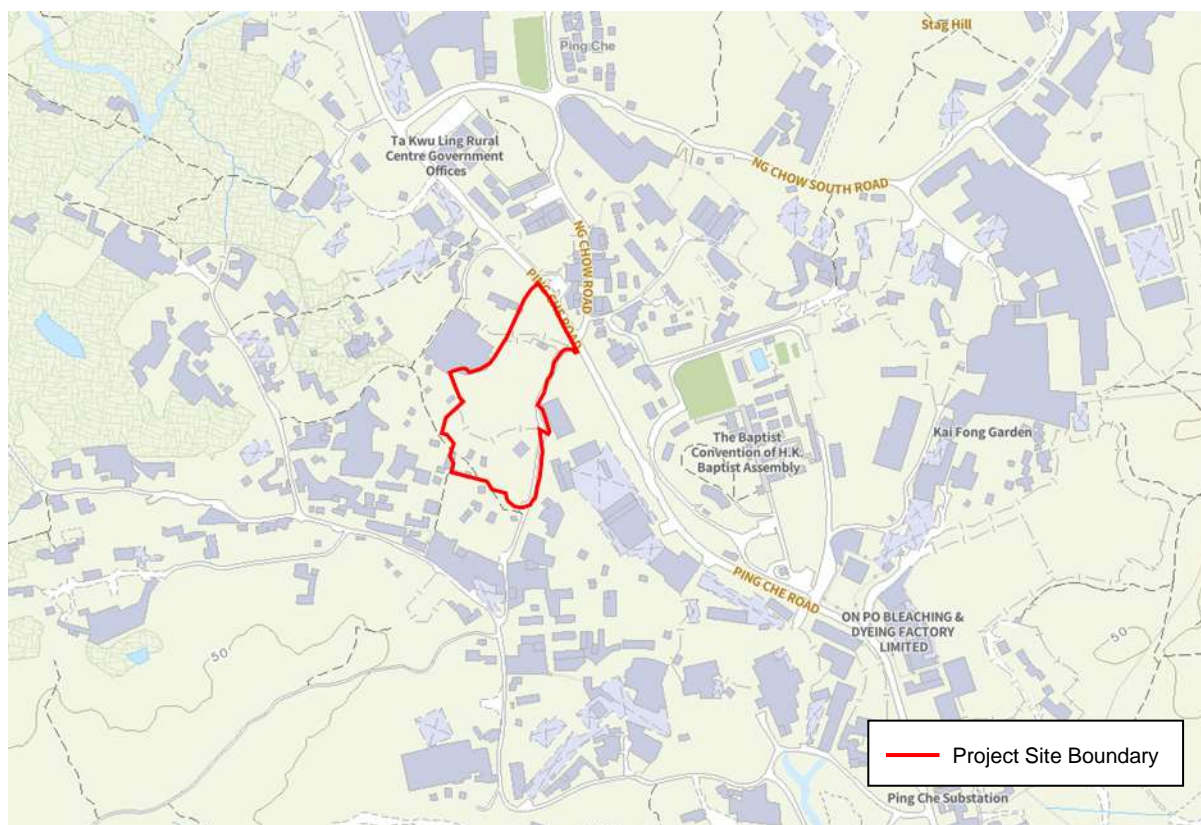


Figure 4-3 Existing Surrounding Developments

### **Current Site Wind Environment**

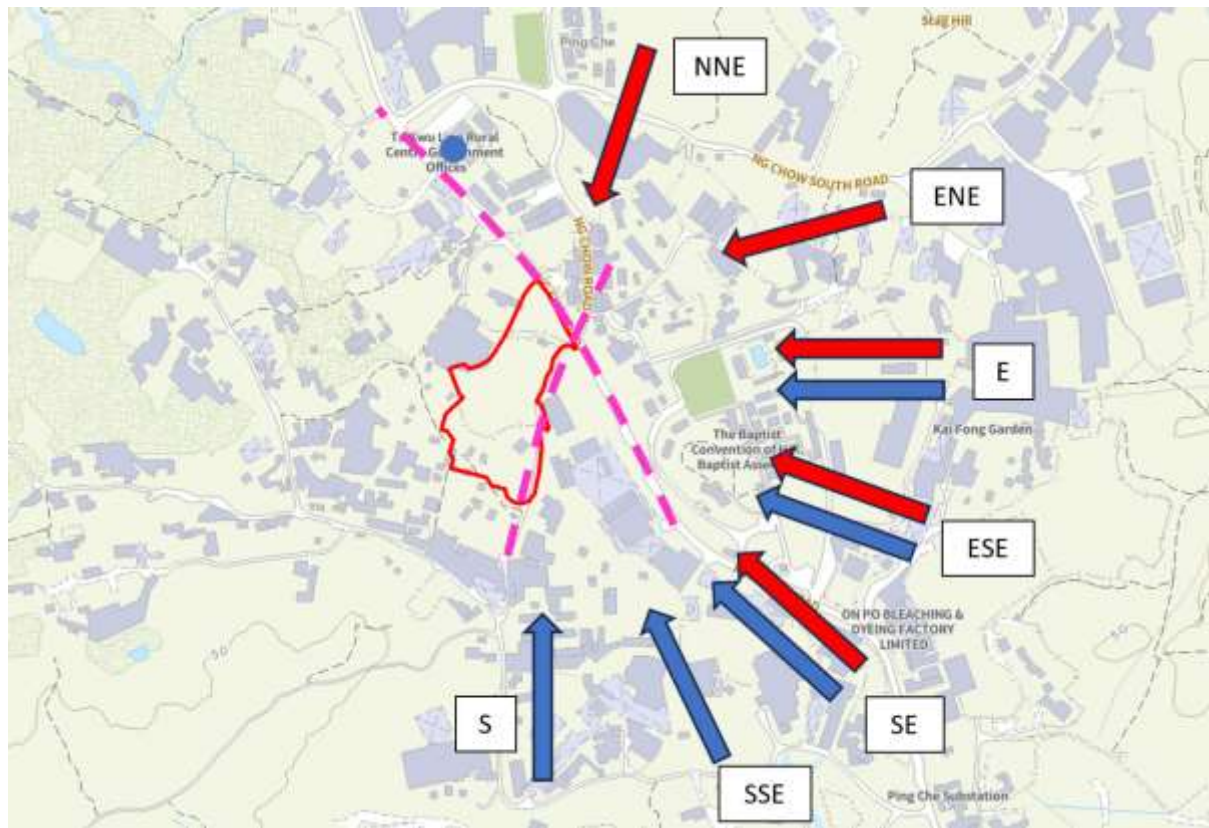
- 4.2.6. Refer to **Section 3.1.9 and Table 3-2**, the wind availability in the Application Site mainly come from **NNE, ENE, E, ESE and SE** in annual condition while winds from **E, ESE, SE, SSE and S** are available in summer condition.
- 4.2.7. The Application Site is currently used as open storage area at the ground level, the major wind path will be the Ping Che Road along the northeast side and the unnamed village road along the southeast area of the Application Site. The ESE and SE wind flow through the Application Site and further to the downwind area such as Ping Che New Village located at the **north** side of the Application Site, the prevailing wind environment is shown in **Figure 4-4**. The ENE wind also flow through the Application Site and reaching the agriculture land and open space at downwind area.

### **Road/ Street Pattern**

- 4.2.8. Road network facilitates wind penetration to the Application Site and the surrounding areas. The summer **SSE/SE wind** would be facilitated by the major air path of Ping Che Road. The annual **NNE wind** would be facilitated by the village road and penetrate surrounding the site. The major air paths around the Application Site are illustrated in **Figure 4-4**.

### **Open Space**

- 4.2.9. There is an open storage area and an open greenery located at the north of the Application Site. Locating at the downwind area of the Application Site under ESE and SE wind. The open areas are expected to receive sufficient downwind wind.
- 4.2.10. The open space located at the west of the Application Site are mostly greenery and open storage. These areas located at the downwind area and expected to receive sufficient downwind wind under E wind.



Legend






-  Project Site
-  Annual Prevailing Wind
-  Summer Prevailing Wind
-  Air Path
-  Ping Che New Village

Figure 4-4 Prevailing Wind Environment in the Application Site

## 5. EVALUATION OF AIR VENTILATION PERFORMANCE

### 5.1. Assessment Area

5.1.1. The Proposed Development comprised of 1 block of 48-storey residential tower with the maximum height of approximately 175mPD, another 4 blocks of 47-storey residential tower with the maximum height of approximately 172mPD, 1 commercial block with the maximum height of approximately 170mPD located near Ping Che Road. It also consists of a one-storey clubhouse, and a swimming pool is provided.

5.1.2. The highest building height of the Proposed Development is 159m above ground level. An assessment area of 1H (159m) is therefore adopted for the purpose of the assessment. The sensitive areas that frequently assessed by public within the 159m assessment area from the Application Site are identified as following:

- Ping Che Village to the North
- Ta Kwu Ling Rural Government Office to the North
- Hong Kong Baptist Assembly to the East
- Planned Residential Area to the Northwest
- Planned Commercial Site to the South and Southeast

5.1.3. The location of the listed areas is shown in **Figure 5.1**.

### 5.2. Assessment Methodology

5.2.1. Section 3 and **Table 3-2** describes the wind availability at the Application Site and the prevailing wind flows during annual and summer conditions. It is noted that the annual prevailing wind directions for the site are from E and ESE. The summer prevailing wind directions would be from E, SE and SSE.

5.2.2. The ventilation performance of the proposed development at Application Site on the nearby areas frequently assessed by public will be evaluated by comparing the OZP compliance scheme of the area before and after the proposed development, with respect to the identified dominant wind directions stated in **Table 3-1**, i.e. NNE, ENE, E, ESE, SE, SSE and S.

5.2.3. In order to portray a more realistic and accurate scenario in the future, the ventilation performance will also be evaluated with consideration of TKLPDA of the NTN Development

Scheme within the assessment area, respect to the dominant prevailing wind direction.

### 5.3. Wind Flow from NNE Direction

5.3.1. **Figure 5.2a** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5.2b** illustrates the wind flow at the Application Site in consideration of NTN Development Scheme, under NNE direction.

#### **OZP Compliance Scheme without Proposed Development**

5.3.2. Before the development, the wind flows through the application site without obstruction. Under the OZP compliance scheme, the upwind area is mostly open space, the NNE wind flows towards downwind area which are agriculture land and Tung Shan area.

#### **OZP Compliance Scheme with Proposed Development**

5.3.3. Under the OZP compliance scheme, the upwind area are mostly open space and temporary structure. Since there are no mid-rise or high-rise buildings at the upwind area, the NNE wind is expected to pass through the Proposed Development, and flow along the wind path at the local road to reach the downwind area, i.e. agriculture land and Tsung Shan to the southwest. In addition, the good design such as the vast opening at ground level PTT and reduce in clubhouse's building height and ground coverage area allow wind to pass through smoothly. Therefore, it is expected the proposed development would not have significant impact in terms of air ventilation to the surrounding downwind area which is an agriculture land and hill.

5.3.4. The wind path of NNE wind will be experienced a change in direction when passing through the PTT from NNE to N direction. The wind flow will then merge with the NNE wind again after the diversion.

#### **NTN Development Scheme**

5.3.5. With the consideration of NTN Development, the NNE wind is expected to flow through the open space and residential area, as well as across the G/IC area and finally reach the Application Site. As the residential area with PR5 is planned to have a height of 130mPD, it is expected to block partial of the upcoming NNE wind. However, the open space is expected to help improving the wind environment at the downwind area. The wind will flow through the Proposed development and also flow along the wind path at the local road, finally reach



the downwind area zoned as commercial area under NTN Development.

5.3.6. With the good design features such as the vast opening at ground level PTT and reduce in clubhouse's building height and ground coverage area, it allows upcoming NNE wind to pass through smoothly. Nevertheless, there is permeable design on sky garden which also allow high level wind to pass through the building.

5.3.7. Therefore, it is believed that the Proposed Development would not contribute to any significant air ventilation impact towards the downwind area.

#### 5.4. Wind Flow from ENE and E Direction

5.4.1. **Figure 5.3a** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5.3b** illustrates the wind flow at the Application Site in consideration of NTN Development Scheme, under ENE and E direction.

#### **OZP Compliance Scheme without Proposed Development**

5.4.2. Before the development, the wind flows through the application site without obstruction. Under the OZP compliance scheme, the upwind area are mostly open space and G/IC area, the ENE and E wind flows towards downwind area which are agriculture land and green belt.

#### **OZP Compliance Scheme with Proposed Development**

5.4.3. Under the OZP compliance scheme, the ENE and E wind flow through the open space and G/IC area located at upwind area. Since there are no mid-rise or high-rise buildings at the upwind area, the ENE and E wind is expected to reach the Application Site without any blockage. The wind flow is expected to pass through the Proposed Development, and flow to the downwind area, which mostly are agriculture land and green belt. In addition, the building separation of the Proposed Scheme allows the wind to pass through. Due to the downwind location is not an area frequently assessed by public, the air ventilation impact towards the downwind area is not anticipated.

#### **NTN Development Scheme**

5.4.4. With the consideration of NTN Development, the upwind area is expected to have a planned PR5 residential zone with height of 130mPD and a planned PR6.5 commercial zone with expected height of 195mPD. The planned high rise building at upwind location is expected to

block the upcoming ENE and E wind. Therefore, limited wind is reaching the Application Site and the downwind area. According to the preliminary feasibility study of NTN Development, the commercial area will adapt of sustainable building design, which expected to facilitate the air ventilation.

5.4.5. Nevertheless, the Proposed Development is adopted with good design features, such as building orientation and separation facilitates the wind to flow in between buildings, reduce in clubhouse's building height and ground coverage area that allows the low and mid-level wind to flow through the site and permeable design at sky garden allows the high-level wind to flow through.

5.4.6. Therefore, the air ventilation impact towards the downwind area is not anticipated.

## 5.5. Wind Flow from ESE and SE Direction

5.5.1. **Figure 5.4a** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5.4b** illustrates the wind flow at the Application Site in consideration of NTN Development Scheme, under ESE and SE direction.

### **OZP Compliance Scheme without Proposed Development**

5.5.2. Before the development, the wind flows through the application site without obstruction. Under the OZP compliance scheme, the upwind area are mostly open space and G/IC area, the ESE and SE wind flows towards downwind area which are mostly open space, agriculture land and green belt.

### **OZP Compliance Scheme with Proposed Development**

5.5.3. Under the OZP compliance scheme, the upwind area are mostly open space and G/IC area. The ESE and SE wind will flow through these area and flow along the major air path at Ping Che Road. Since there are no mid-rise or high-rise buildings at the upwind area, the ESE and SE wind is expected to reach the Application Site without any blockage. The wind flow is expected to pass through the Proposed Development, and flow to the downwind area, which mostly are open space, agriculture land and green belt. In addition, the building orientation and building separation of the Proposed Scheme allows the wind to pass through. Therefore, it is expected the proposed development would not have significant impact in terms of air ventilation to the surrounding downwind area with open space and agriculture land which

are not area frequently assessed by public.

#### **NTN Development Scheme**

5.5.4. With the consideration of NTN Development, the upwind area is expected to have a planned PR6.5 commercial zone with height of 195mPD and a planned PR7.5 mixed use zone expected height of 235mPD. The planned high rise building at upwind location is expected to block the upcoming ESE and SE wind. Therefore, limited wind is reaching the Application Site and the downwind area. According to the preliminary feasibility study of NTN Development, the commercial and mixed-use area will adapt of sustainable building design, which expected to facilitate the air ventilation.

5.5.5. Nevertheless, the Proposed Development is adopted with good design features, such as building orientation and separation facilitates the wind to flow in between buildings, reduce in clubhouse's building height and ground coverage area that allows the low and mid-level wind to flow through the site and permeable design at sky garden allows the high-level wind to flow through.

5.5.6. Therefore, the air ventilation impact towards the downwind area is not anticipated.

#### **5.6. Wind Flow from SSE and S Direction**

5.6.1. **Figure 5.5a** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5.5b** illustrates the wind flow at the Application Site in consideration of NTN Development Scheme, under ESE and SE direction.

#### **OZP Compliance Scheme without Proposed Development**

5.6.2. Before the development, the wind flows through the application site without obstruction. Under the OZP compliance scheme, the upwind area are mostly open space and G/IC area, the SSE and S wind flows towards downwind area, such as G/IC zone with Ta Kwu Ling Government Office, Ping Che New Village and open space.

#### **OZP Compliance Scheme with Proposed Development**

5.6.3. Under the OZP compliance scheme, since there are no mid-rise or high-rise buildings at the upwind area, the SSE and SE wind is expected to pass through the Proposed Development to reach the downwind area, i.e. G/IC zone with Ta Kwu Ling Rural Government Office, Ping Che

**New Village and open space.**

5.6.4. The good design features such as the vast opening at ground level PTT, reduce in clubhouse's building height and ground coverage area and building separation allow wind flow to pass through smoothly. As such, it is expected the proposed development would not have significant impact in terms of air ventilation to the downwind area.

**NTN Development Scheme**

5.6.5. With the consideration of NTN Development, the upwind area is expected to have a planned PR6.5 commercial zone with height of 210mPD and a planned PR7.5 mixed use zone expected height of 235mPD. The planned high rise building at upwind location is expected to block the upcoming SSE and S wind. Therefore, limited wind is reaching the Application Site and the downwind area. According to the preliminary feasibility study of NTN Development, the commercial and mixed-use area will adapt of sustainable building design, which expected to facilitate the air ventilation.

5.6.6. Nevertheless, the Proposed Development is adopted with good design features, such as the vast opening at ground level PTT, reduce in clubhouse's building height and ground coverage area and building separation allow low and mid-level wind flow to pass through smoothly. The permeable design at sky garden allows the high-level wind to flow through.

5.6.7. Therefore, the air ventilation impact towards the downwind area is not anticipated.

## 6. MITIGATION MEASURES

### 6.1. GOOD DESIGN FEATURES

#### Permeable Design at Ground Floor

6.1.1. The permeable design of PTT which is 7.5m tall with opening on 3 sides is adopted. The not enclosed ground level is expected to facilitate the east and southeast wind systems towards the downwind regions. **Figure 6-1** and **Figure 6-2** shows the layout of ground level PTT and the opening.

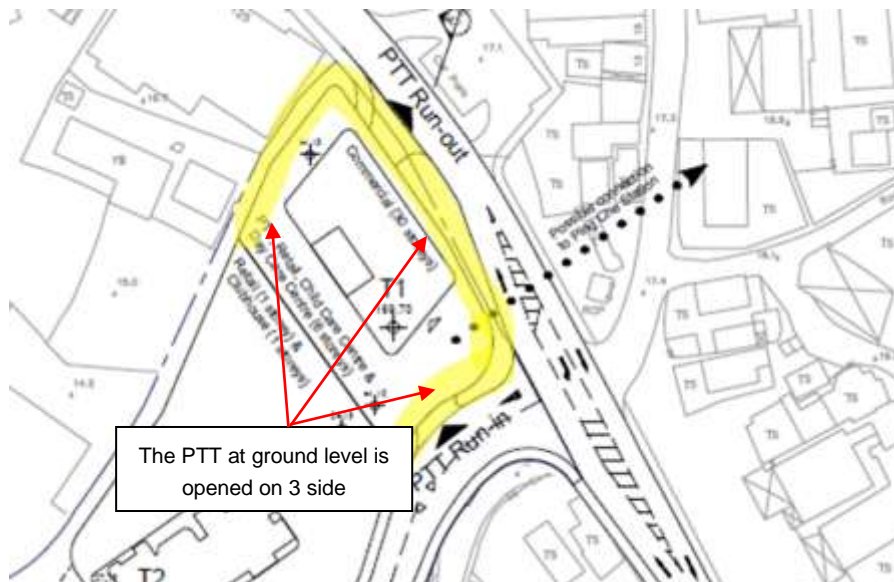


Figure 6-1 Ground Floor Layout Plan

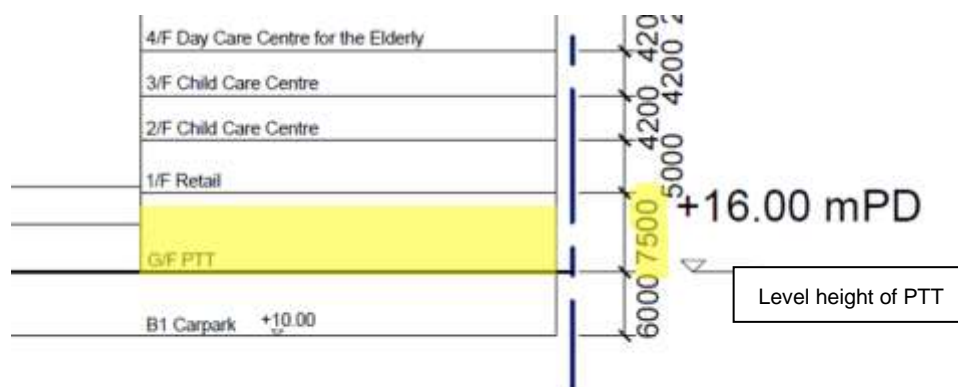


Figure 6-2 Cross section of Layout

### Chamfered Design at Building Corner

6.1.2. Chamfered building corners would be adopted for the commercial building block and the podium, allowing smoother wind flow around the building structure. There is an air path between the commercial building and residential building, between podium and residential building, and air path at Ping Che Road, which the wind flows from the E, ESE, SE and SSE direction penetrate the building groups flow to the downwind area of northwest side of the Application Site. Chamfered building corners allows the building group to attract incoming east and southeast wind into the air path.

6.1.3. The design of the chamfered design are illustrated in **Figure 6-3**.

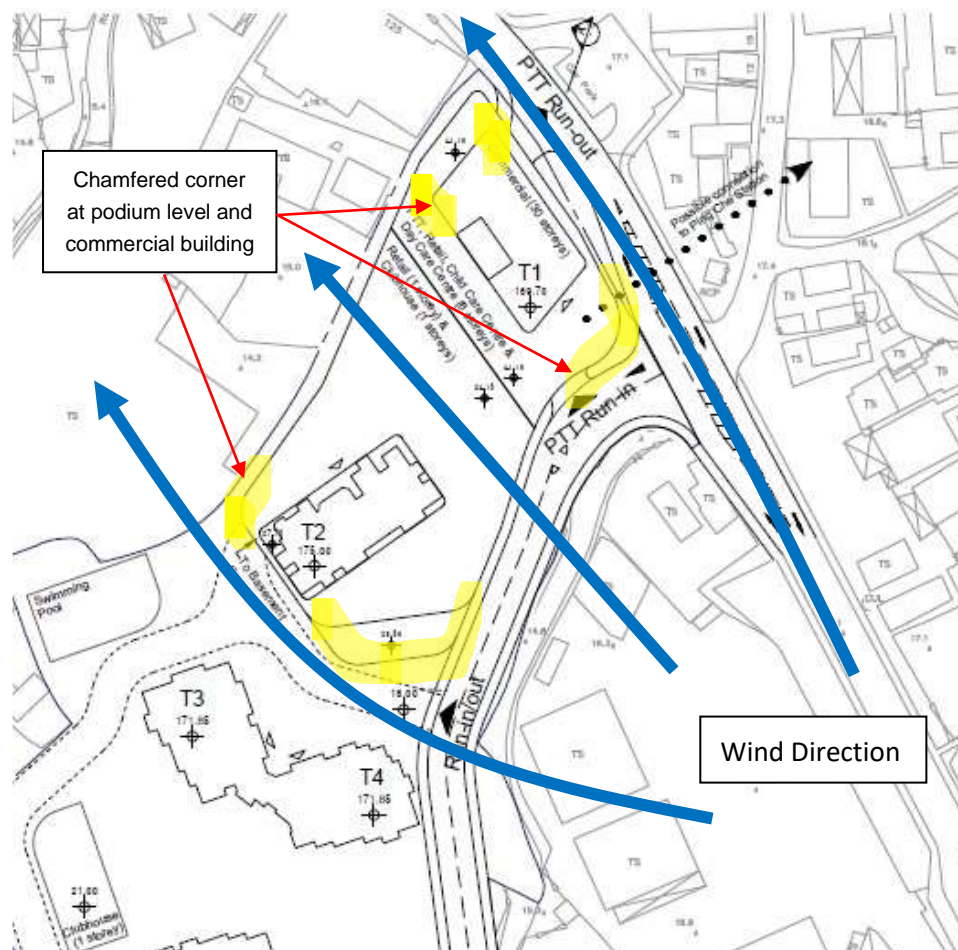


Figure 6-3 Layout Plan of Chamfered Building Corner

**Building Orientation Align with Wind Direction**

6.1.4. Under the Proposed Development, T3 and T4 are aligned together, and the orientation of the towers are position in line from southeast to northwest, same goes to T5 and T6. The axis of tower blocks is aligned parallelly with the prevailing wind direction from E, ESE, SE and SSE. There is not more than one turning point of the wind flow direction after implemented this orientation parallel to wind flow. The building orientation provides air path to enhance the wind penetration through the gap between blocks. The layout design is illustrated in Figure 6-4.

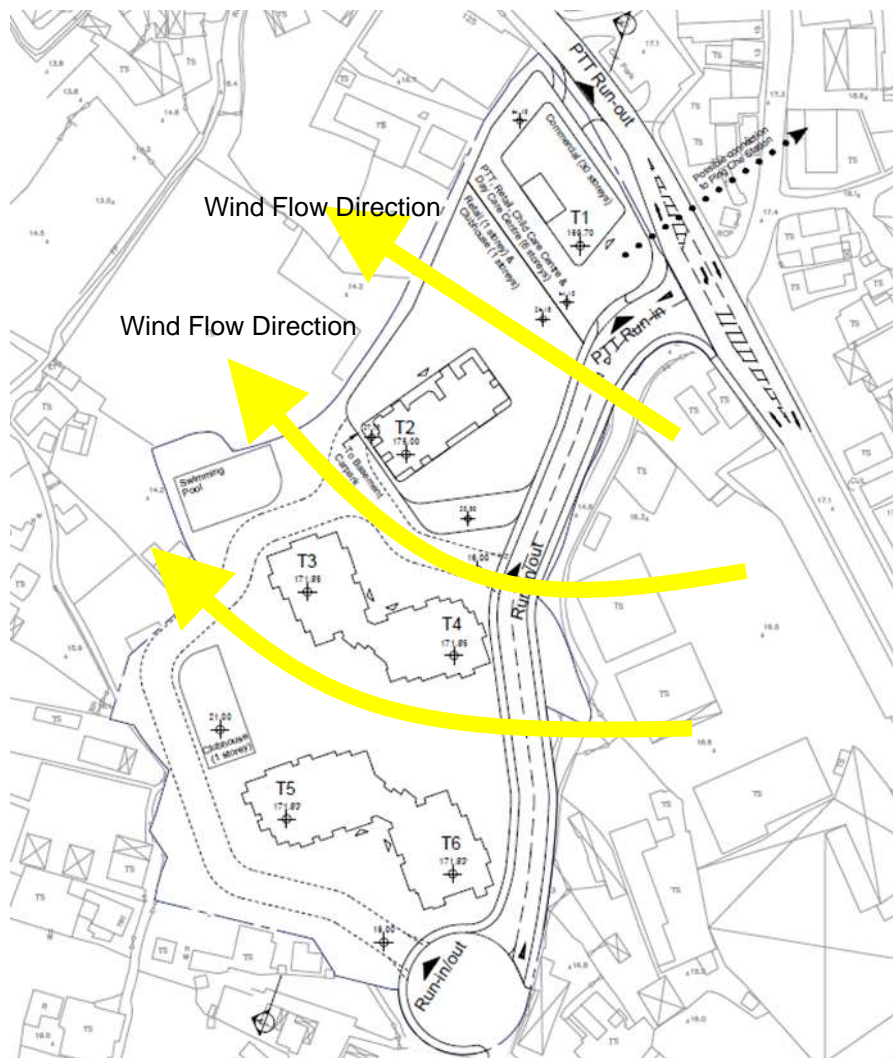
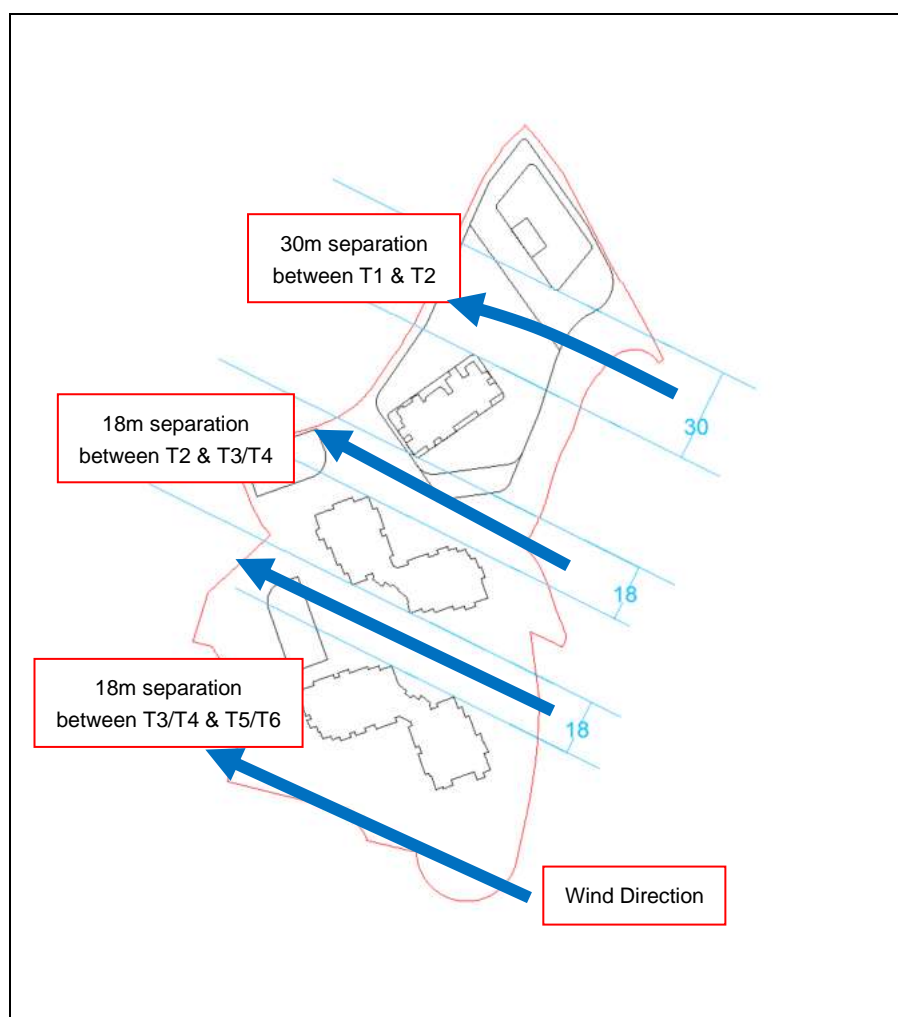


Figure 6-4 Layout of Building Orientation

### **Building Separation**

- 6.1.5. The gap between commercial building and residence tower T2, gap between tower T2 and tower T3 & T4, and the gap between tower T3 & T4 and tower T5 & T6 is indicated to improve the air ventilation. The gap distance from range of 18m to 30m in MLP which facilitates more E, ESE, SE and SSE wind flow between the buildings towards the downwind area.
- 6.1.6. The layout and the gap distance of are illustrated in **Figure 6-5**.



*Figure 6-5 Building Gap Separation of Proposed Development*

### **Reduced Ground Coverage of Clubhouse**

- 6.1.7. The area of clubhouse building is reduced with a smaller ground coverage which is having lesser restriction to wind flow, thus allows more wind flow at ground level. The proposed



clubhouse also located at the downwind area of Block T5, allowed enough gap distance between clubhouse and Block T3, allowed the wind flow from east and northeast direction flow through and reach the downwind area. The design of clubhouse is illustrated in Figure 6-6.

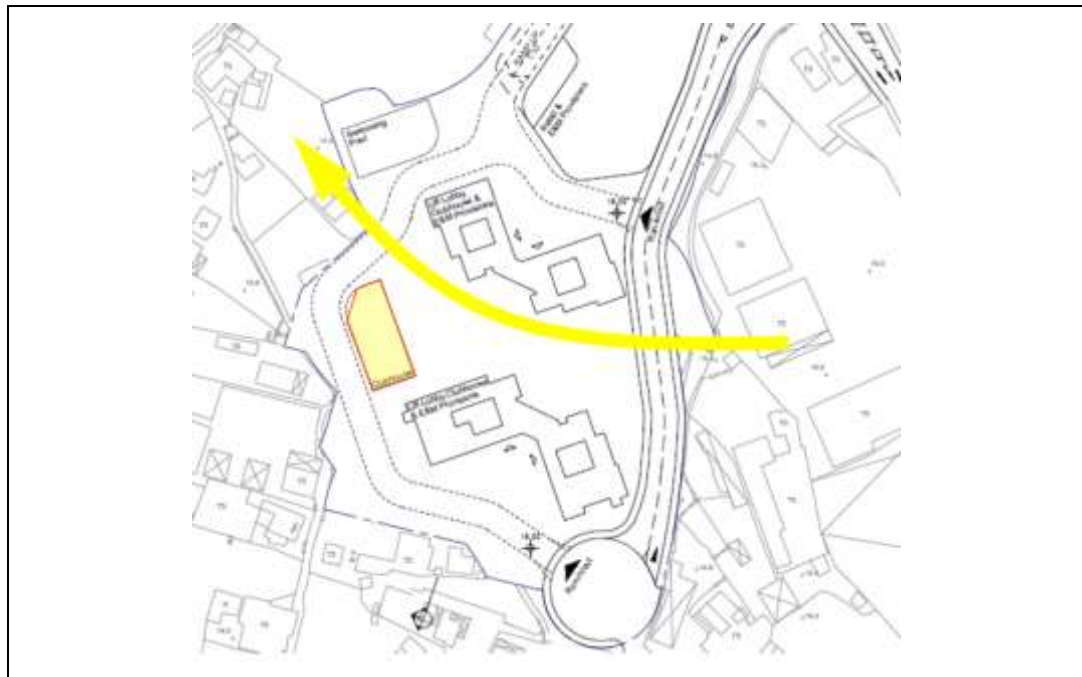


Figure 6-6 Comparison of Clubhouse Layout Plan

#### **Permeable Design at Sky Garden**

6.1.8. There are 3 sky garden design located at 21/F of T2, 20/F of T3 & T4, and 20/F of T5 & T6 respectively. The sky garden provided a vast opening at façade of the building, allows more wind flow through the building at the façade that facing east and southeast direction. Besides that, the sky garden is shaded by the building itself, allows the users of the building enjoy the thermally comfortable environment in the building.

6.1.9. The section layout of the sky garden is illustrated in Figure 6-7.

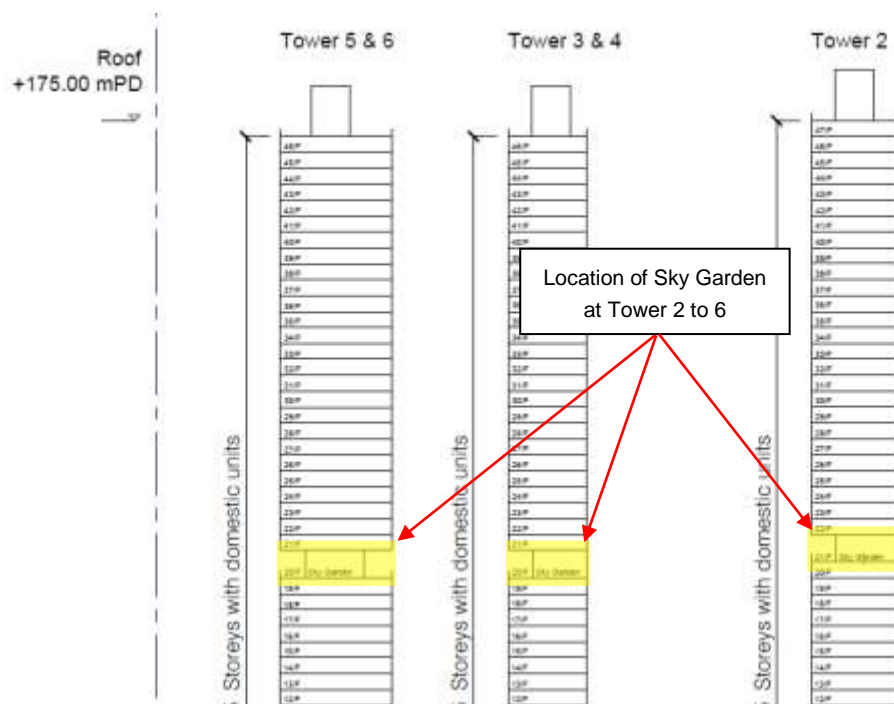


Figure 6-7 Section Layout of Sky Garden

### **Building Setback**

6.1.10. Under proposed scheme, the distance of building setback at northeast, northern and southern side of the site boundary measuring from centreline of the street/site boundary to building structure are as below:

- Northeast (to podium) : 6m
- Northeast (to commercial tower T1) : 9m
- North (to podium) : 3m
- North (to commercial tower T1) : 10m
- South (to residential tower T6) : 20m

6.1.11. The building setback is providing along full frontage of Ping Che Road and the unnamed local road. The setback provided the stepping effect and enhanced the prevailing wind from E, ESE, ENE, SE and SSE direction, which the main air path is along Ping Che Road and the local road. It is expected to benefit the downwind area such as Ping Che new Village, existing settlement and open space. The layout is shown in **Figure 6-8**.

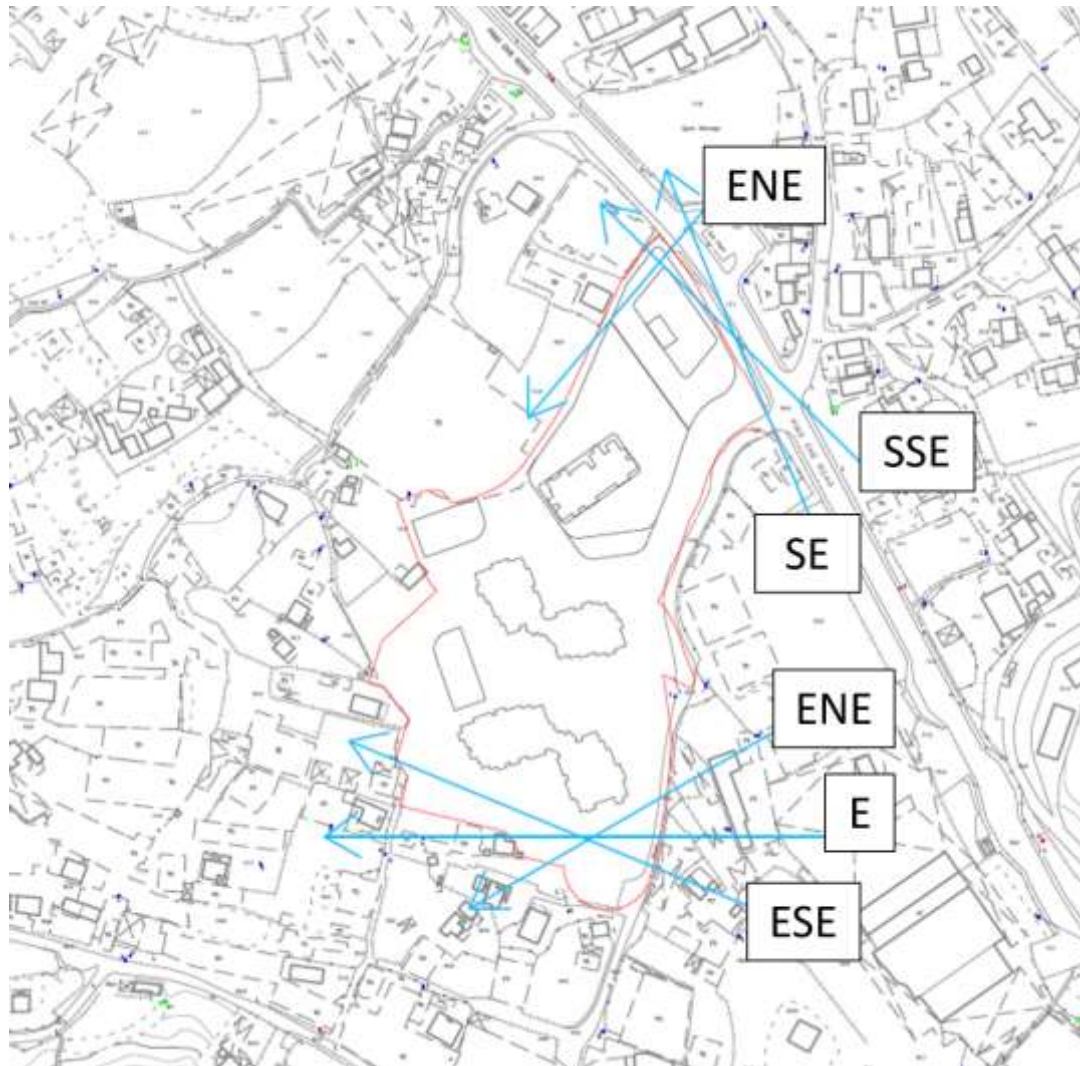


Figure 6-8 Layout of Building Setback with Wind Air Path

## 7. CONCLUSION

- 7.1.1. An AVA-EE study was conducted for the proposed mixed use development at Lot 796 & 1008 RP at D.D. 77 and adjoining government land in Ping Che, Ta Kwu Ling, New Territories to provide qualitative evaluation of wind performance of the proposed development under the OZP compliance scheme and the NTN Development scheme.
- 7.1.2. There are some good design features are provided in the proposed development, such as the permeable design of the ground level PTT at direction northeast and southeast facing the wind flow direction, and chamfered corner design of the building structure, allows the wind flow through the building unrestricted.
- 7.1.3. The layout under the Proposed scheme would keep the major air path along Ping Che Road and incorporate several good design measures mentioned in the Section 5 of report to facilitate the wind flow and keep it unblock. It includes the orientation of the building blocks align with the direction of the wind flow allows wind to skim through the building, maintained the separation distance between the building is more than 15m and design of sky garden to provide the vast opening on the façade to allow the wind flow unrestricted. The incorporated club house design such as reduced in ground coverage of the clubhouse also lower the blockage to the wind flow. The building setback of from the centreline of the road and site boundary to building structure also enhanced the wind flow especially at Air Path of Ping Che Road, towards the downwind area of northwest site of Application Site such as Ping Che New Village and open space.
- 7.1.4. In conclusion, the proposed development has implemented the strategies and good design for design optimization as recommended. As such, significant wind deterioration on district level after the construction of proposed development is not anticipated.

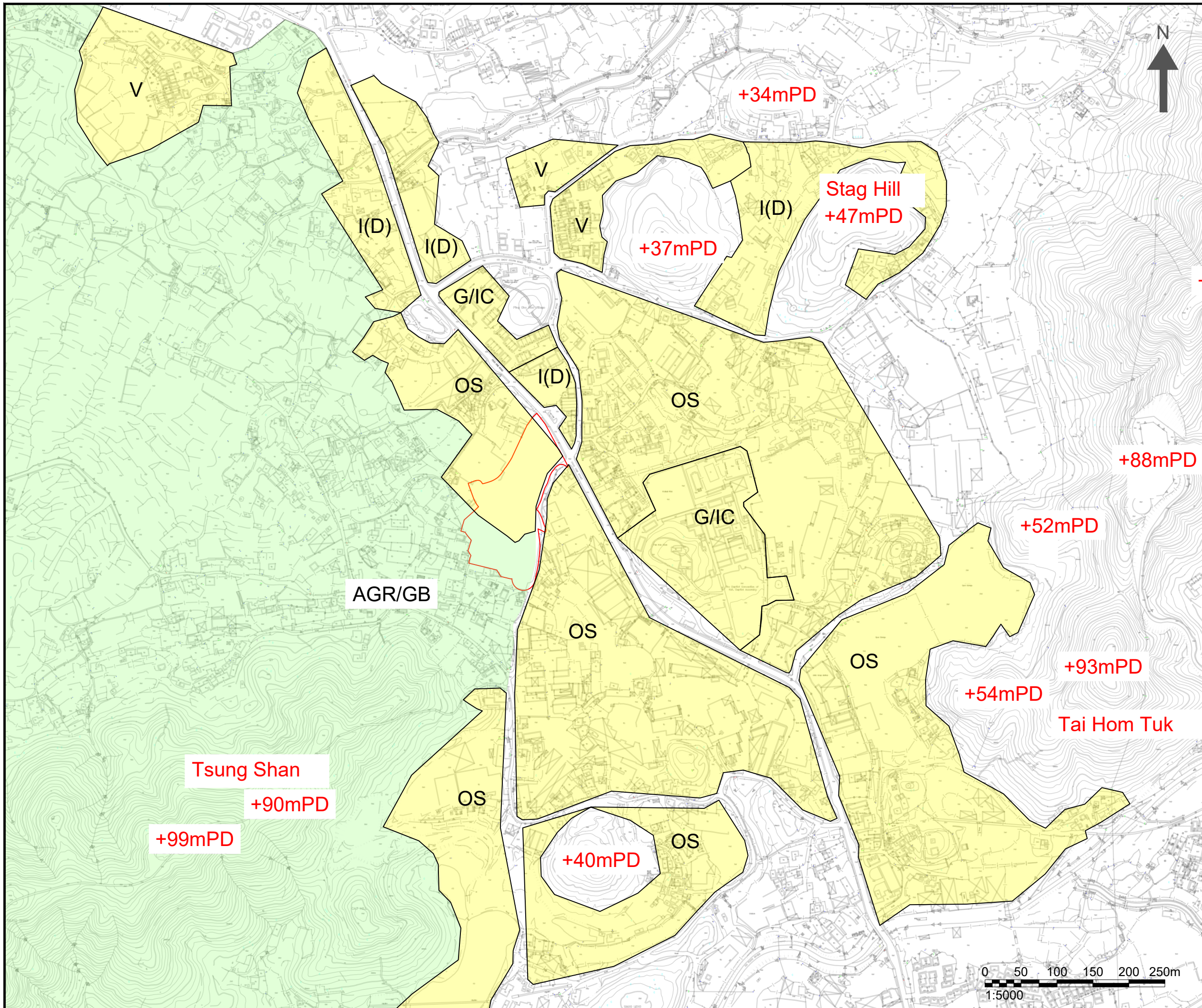
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***Figure***

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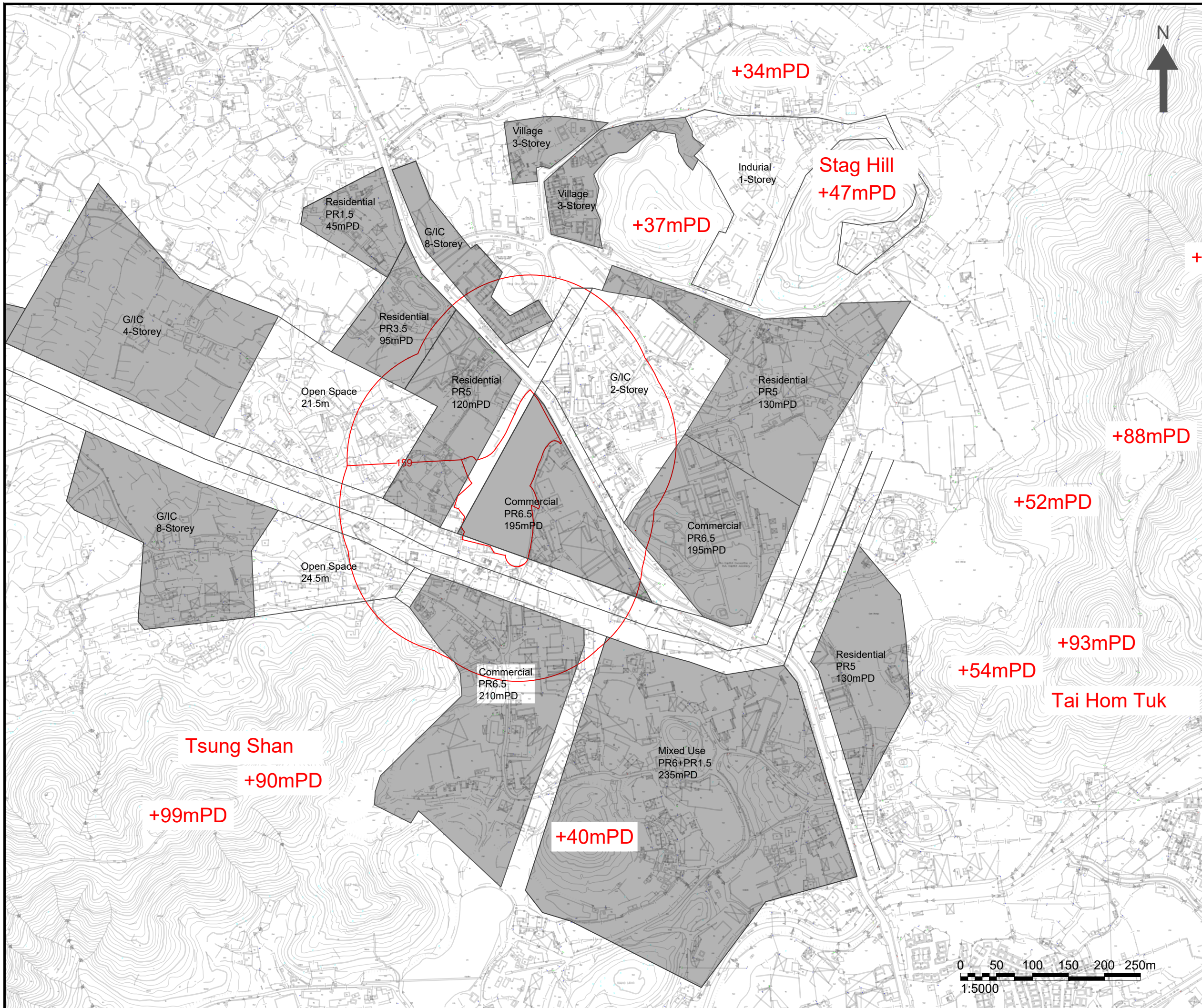
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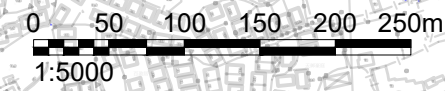
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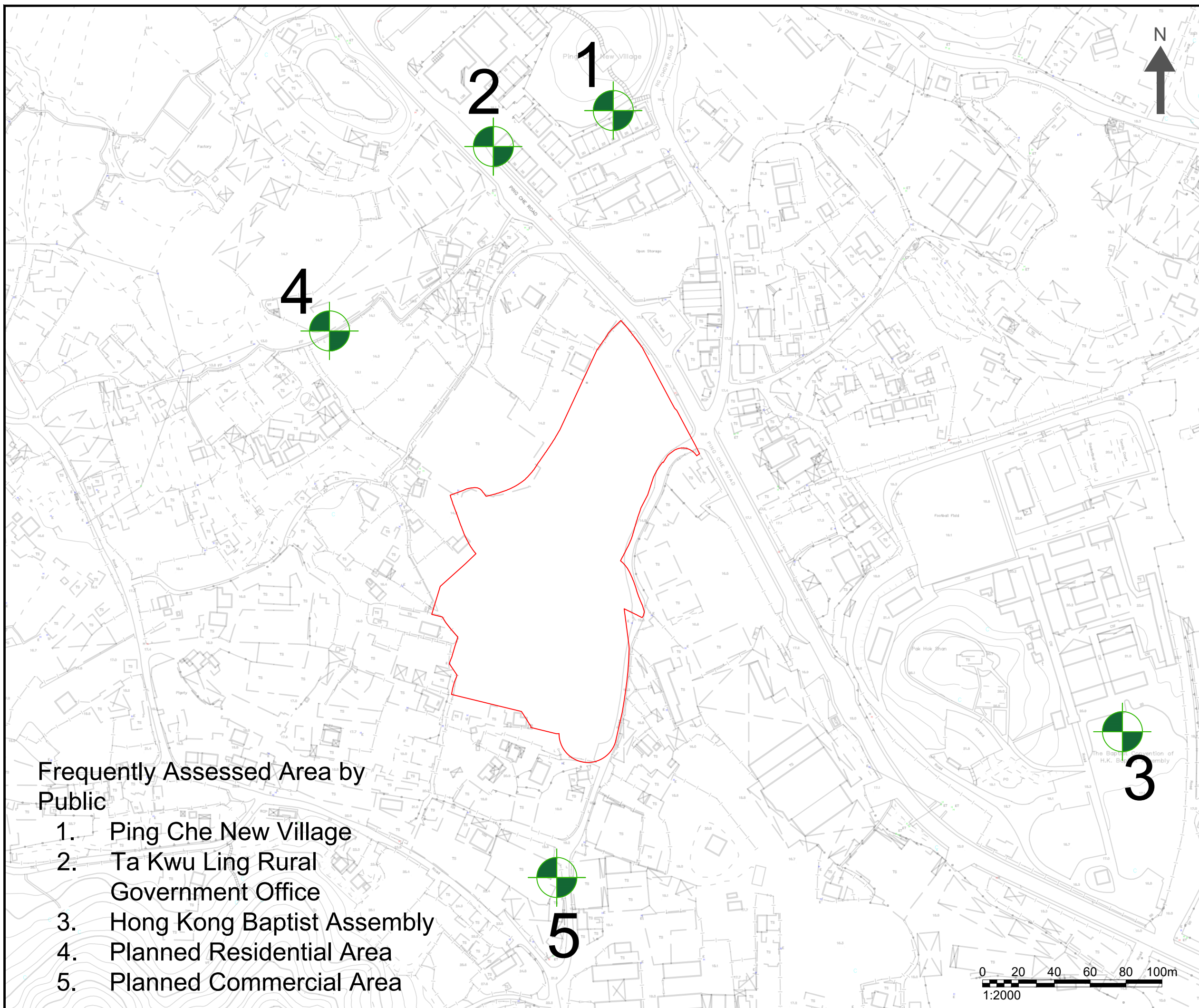
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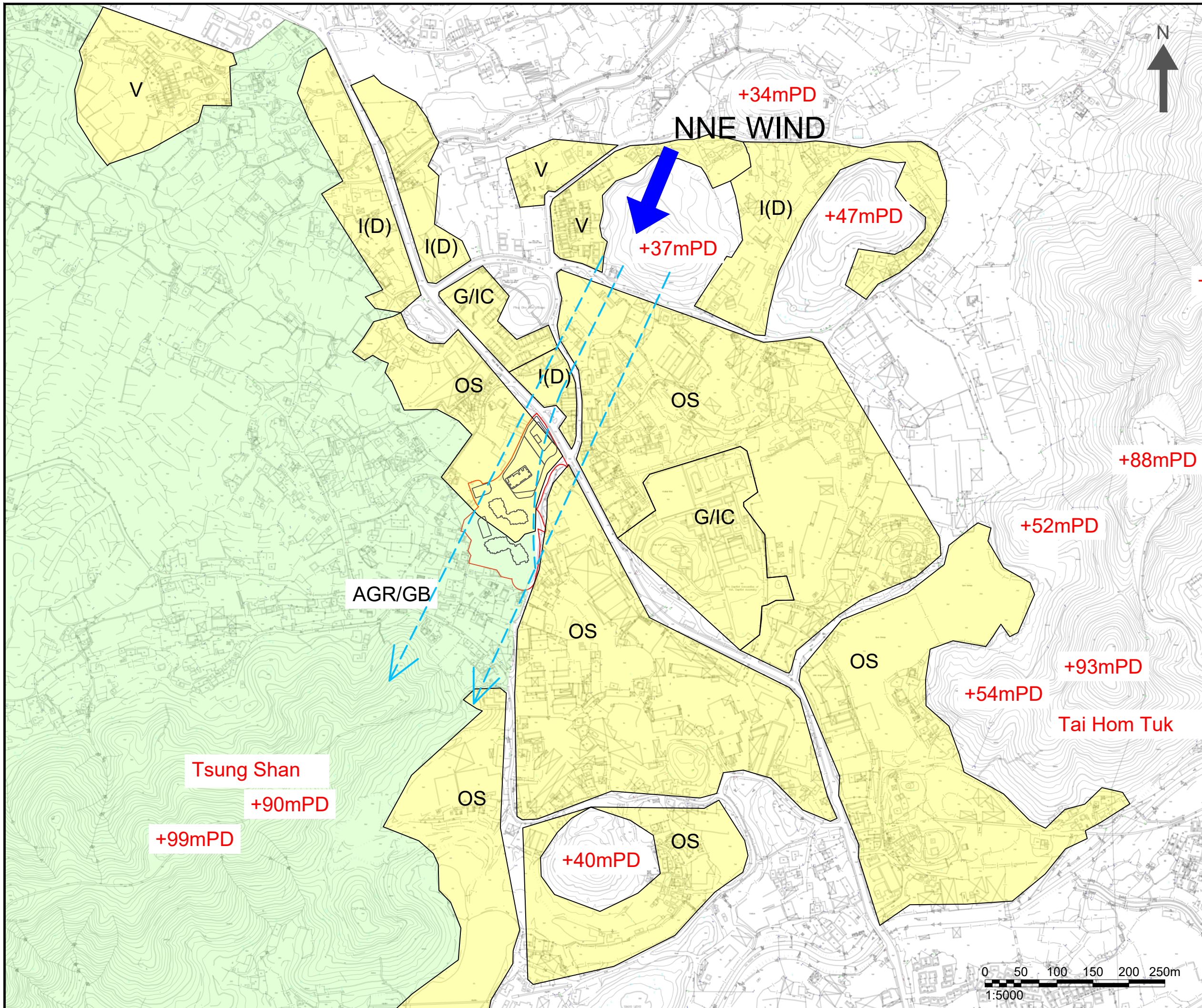
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**Frequently Assessed Area by Public**

1. Ping Che New Village
2. Ta Kwu Ling Rural Government Office
3. Hong Kong Baptist Assembly
4. Planned Residential Area
5. Planned Commercial Area






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- EXISTING ZONING
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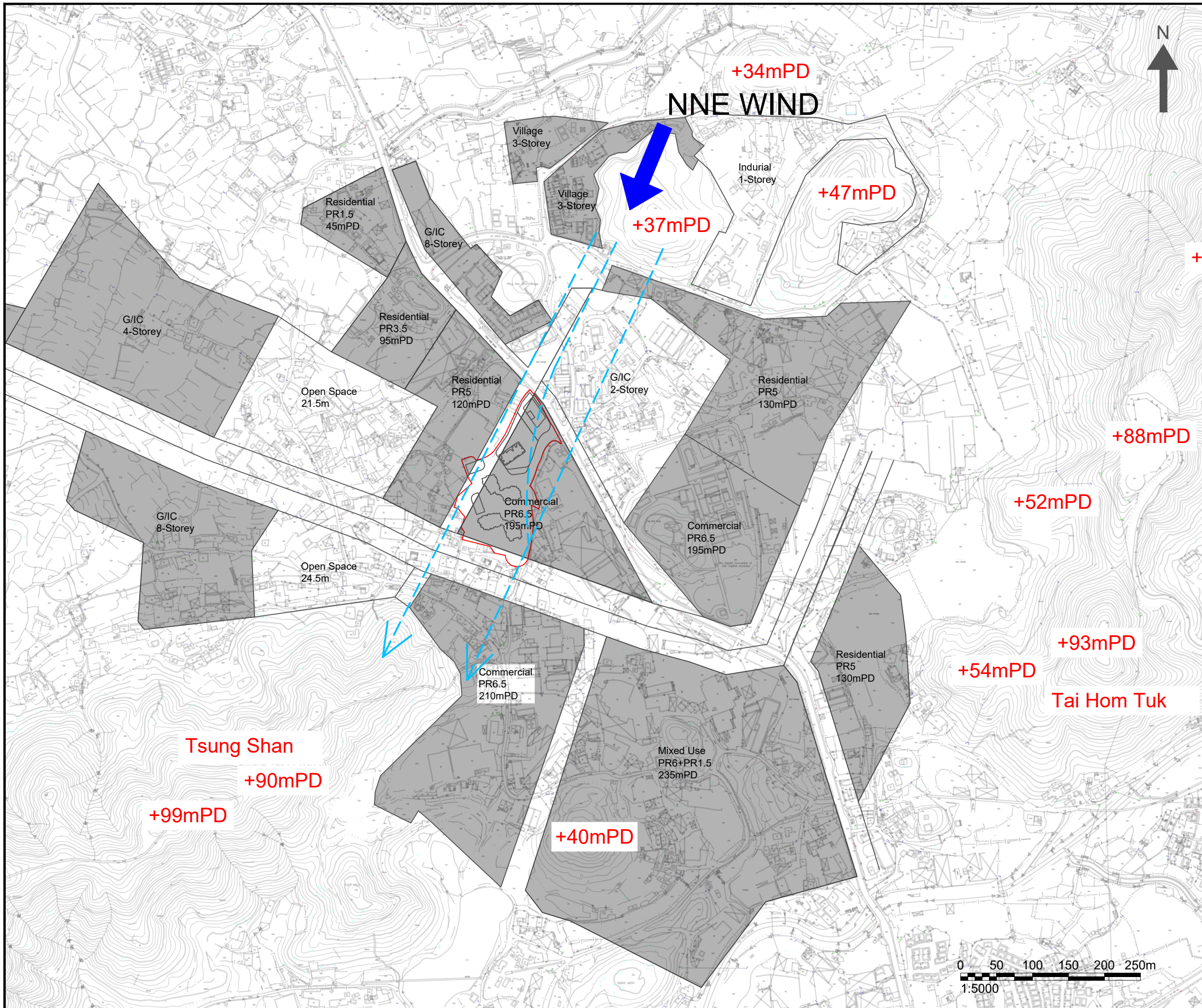
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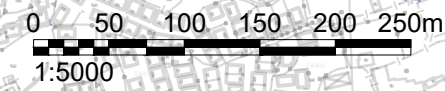
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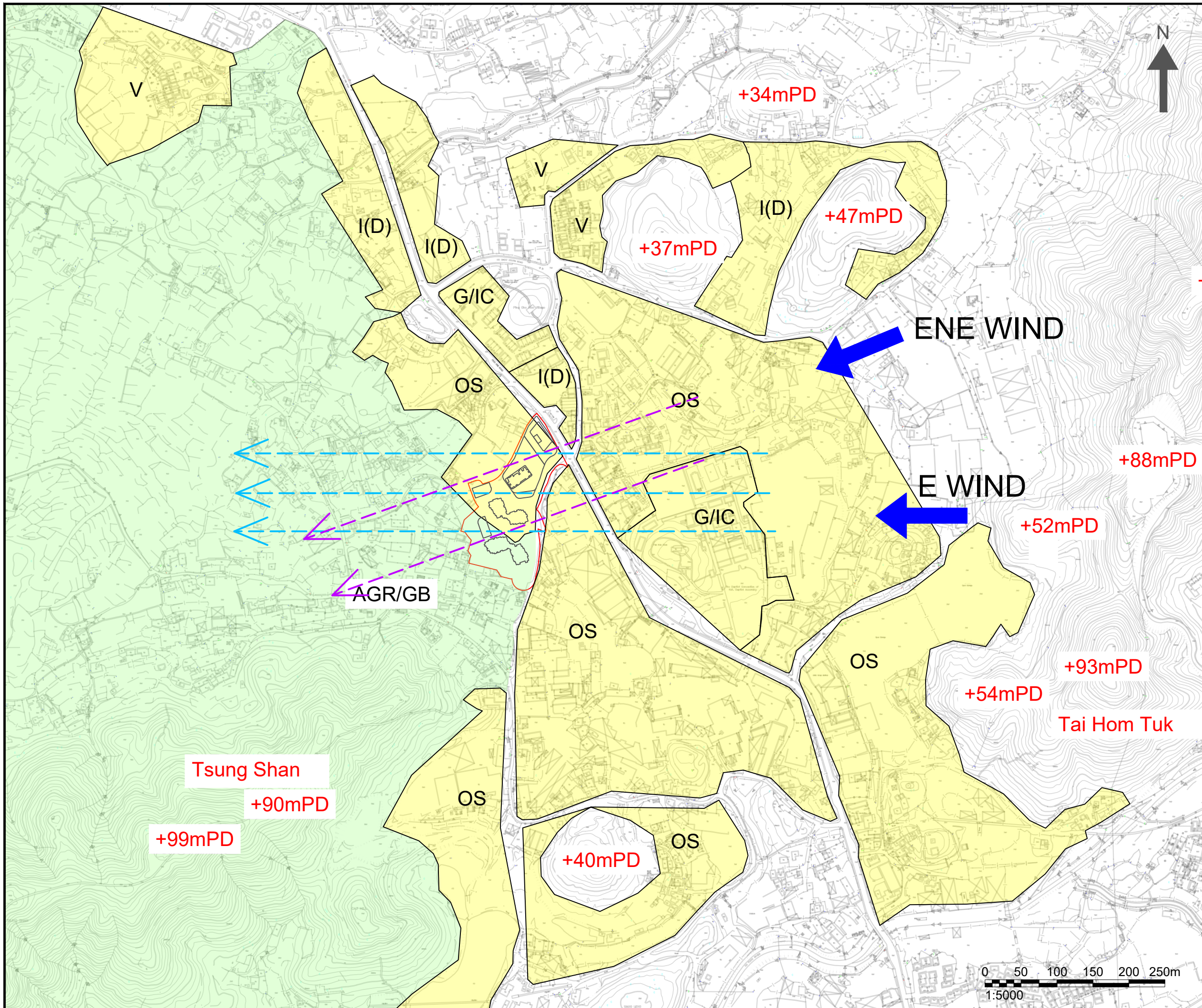
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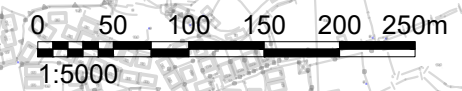
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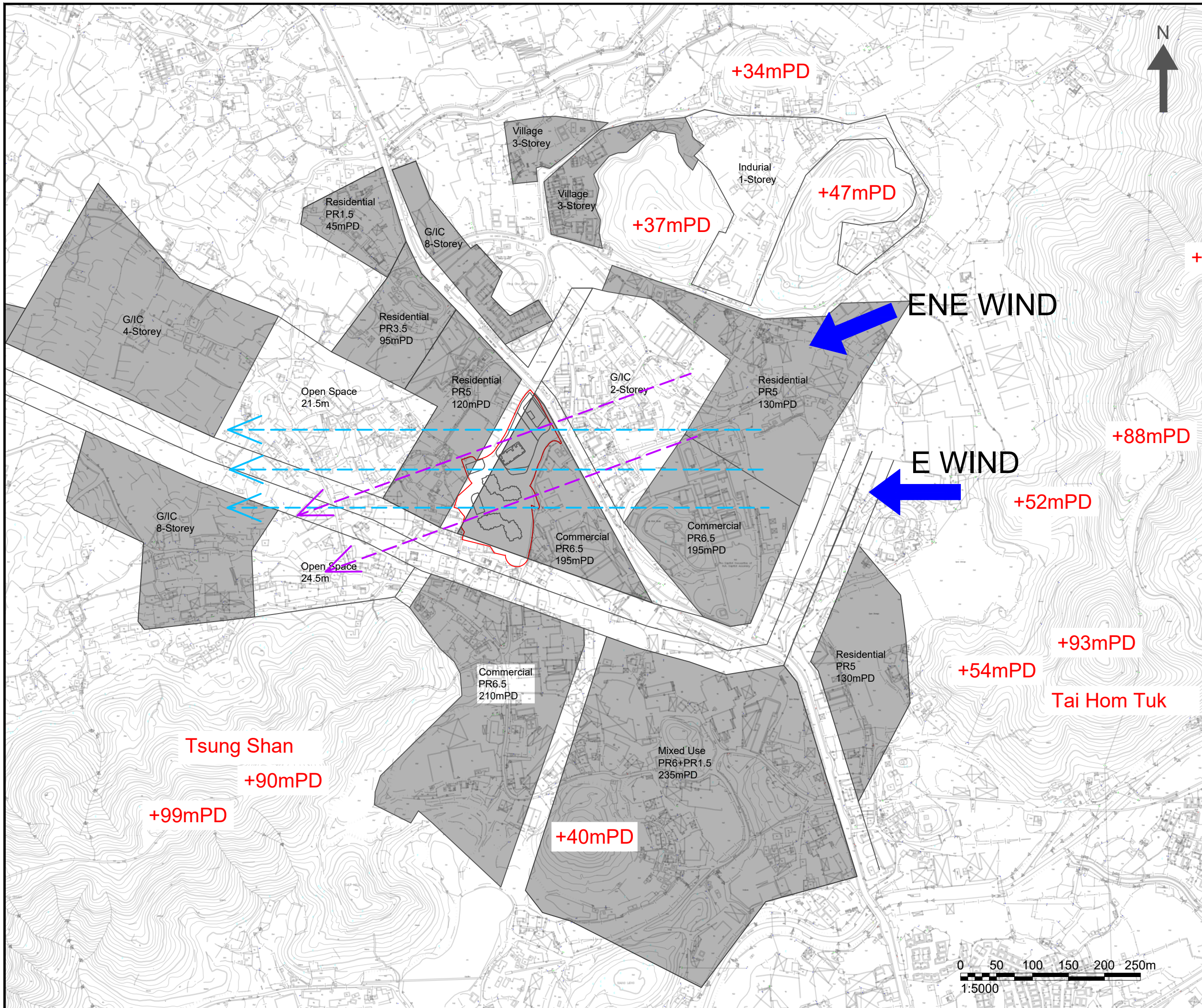
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 WIND FLOW FROM E & ENE DIRECTION IN OZP COMPLIANCE SCHEME

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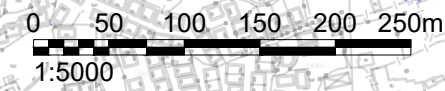
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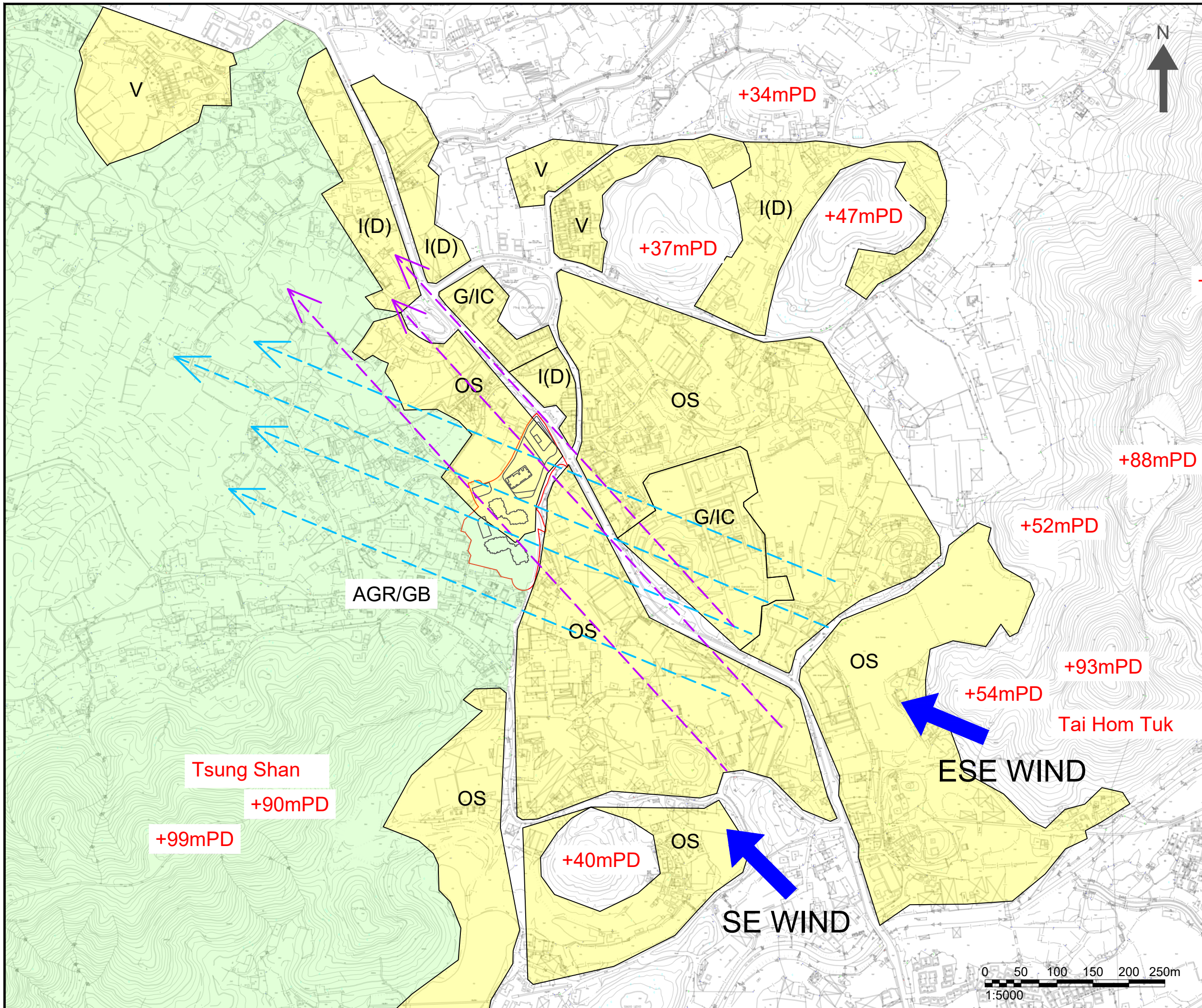
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Drawing Title :  
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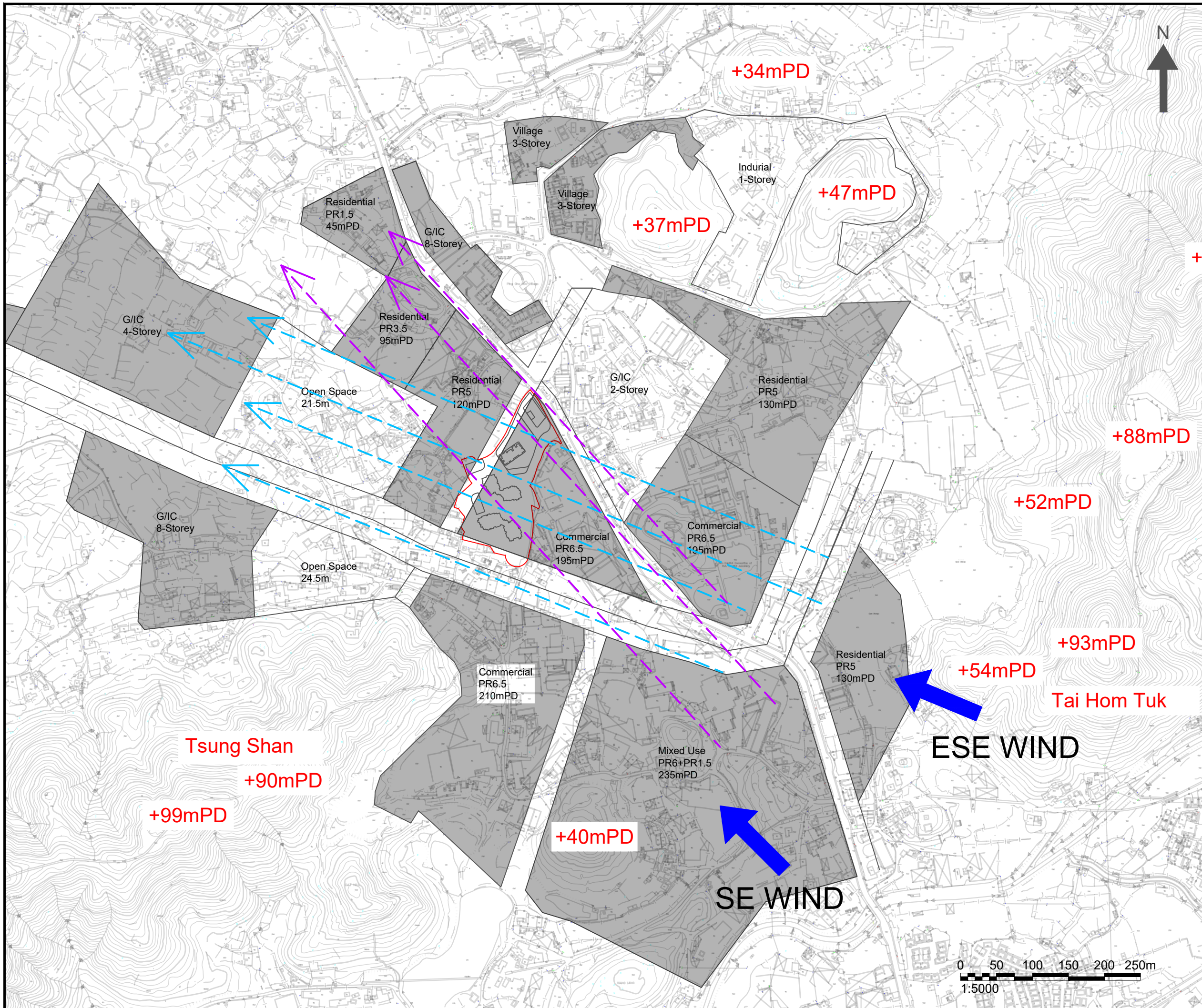
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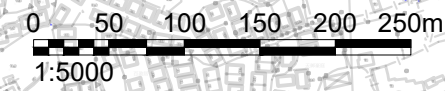
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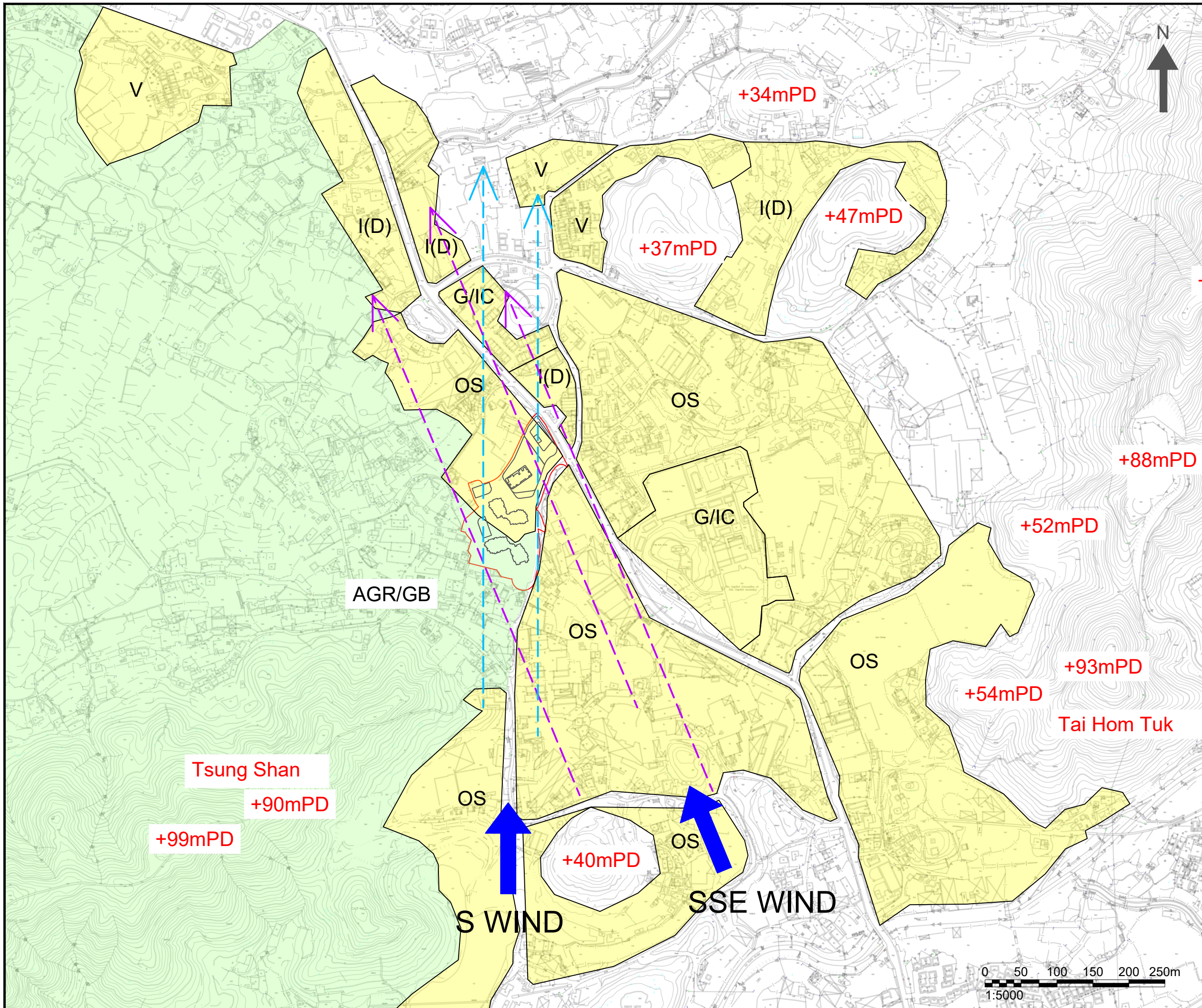
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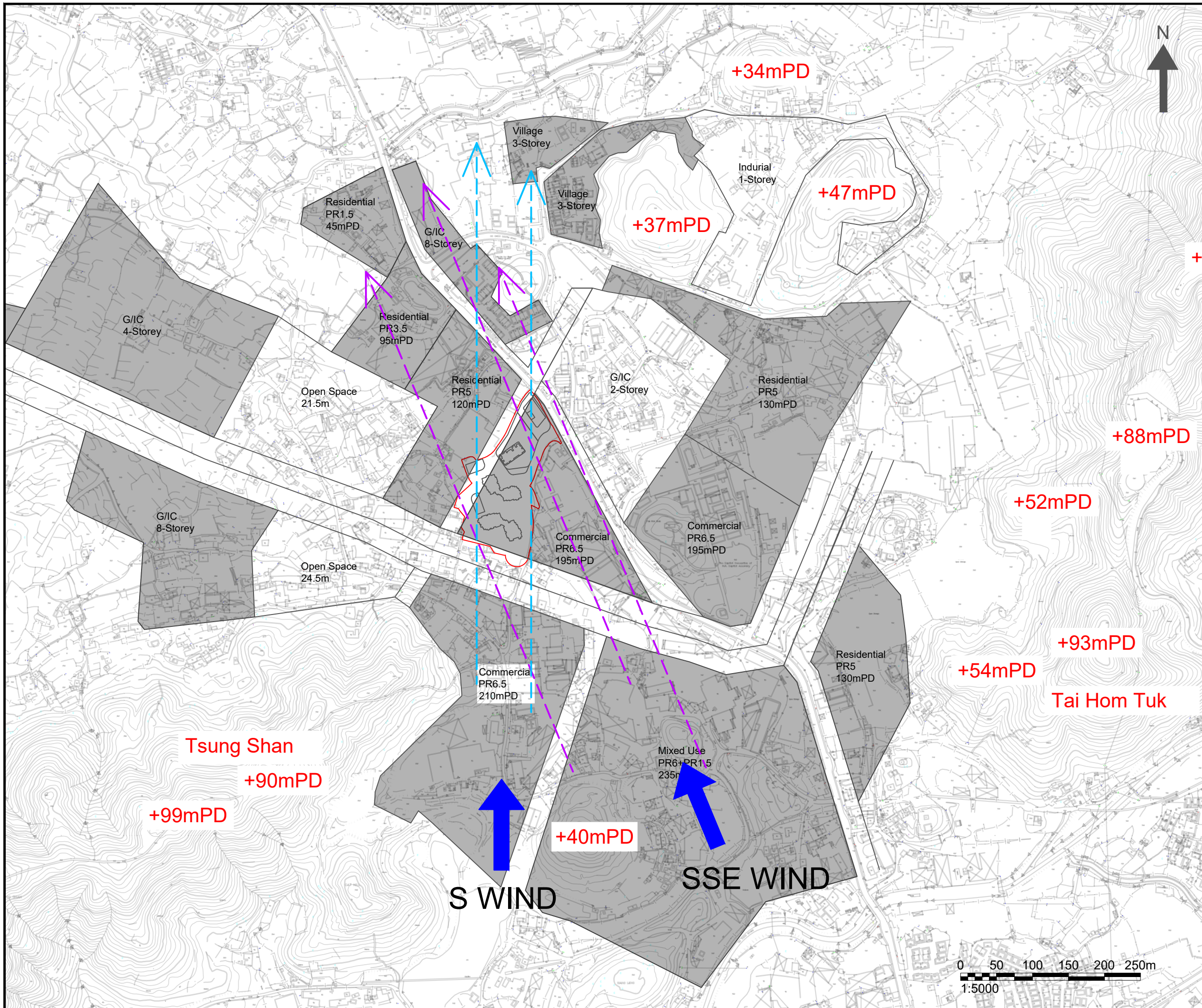
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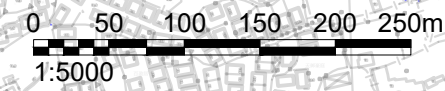
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Project No. 2127

AIR VENTILATION ASSESSMENT - EXPERT EVALUATION 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

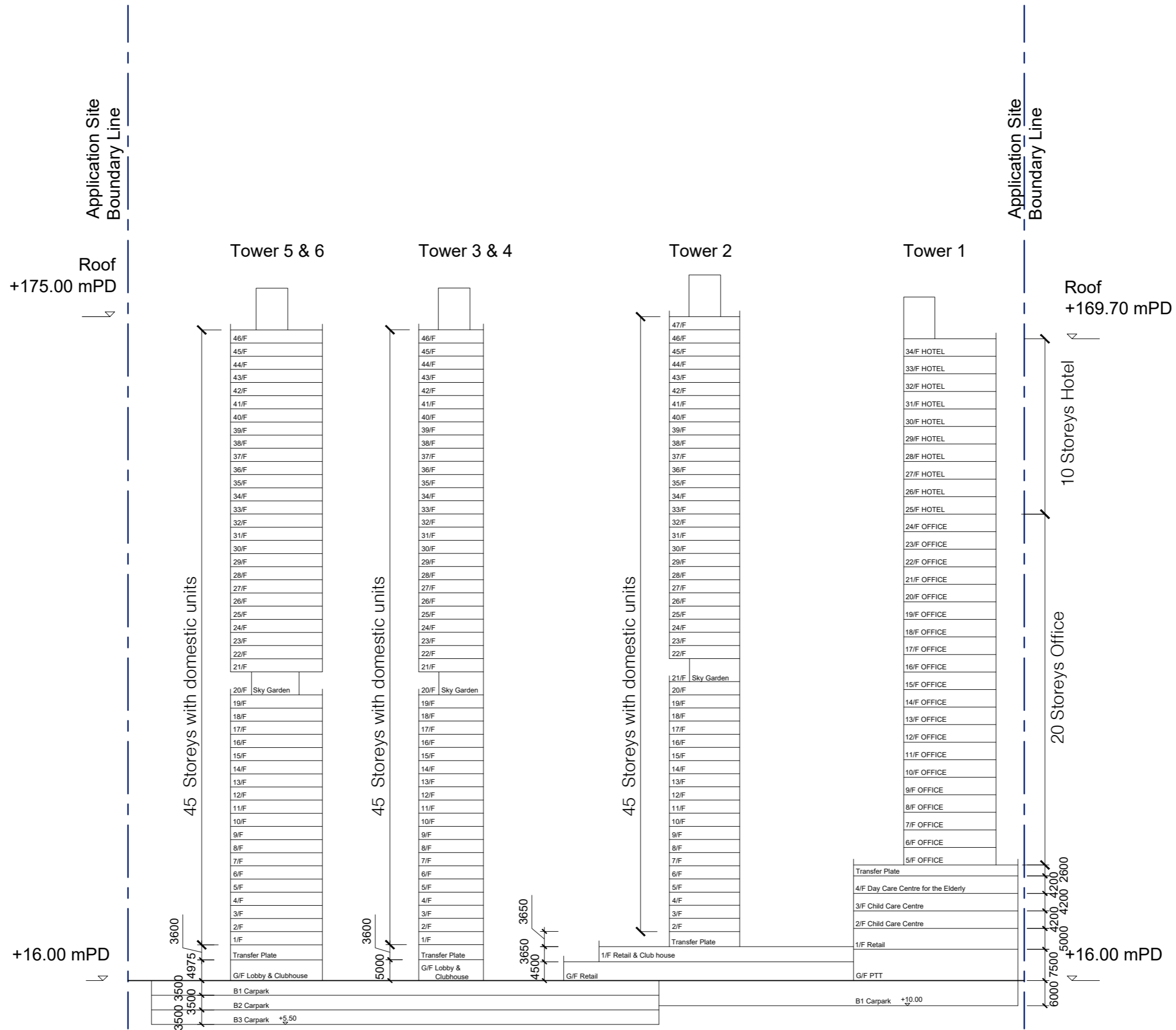
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## ***Appendix A***

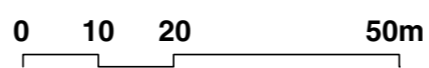
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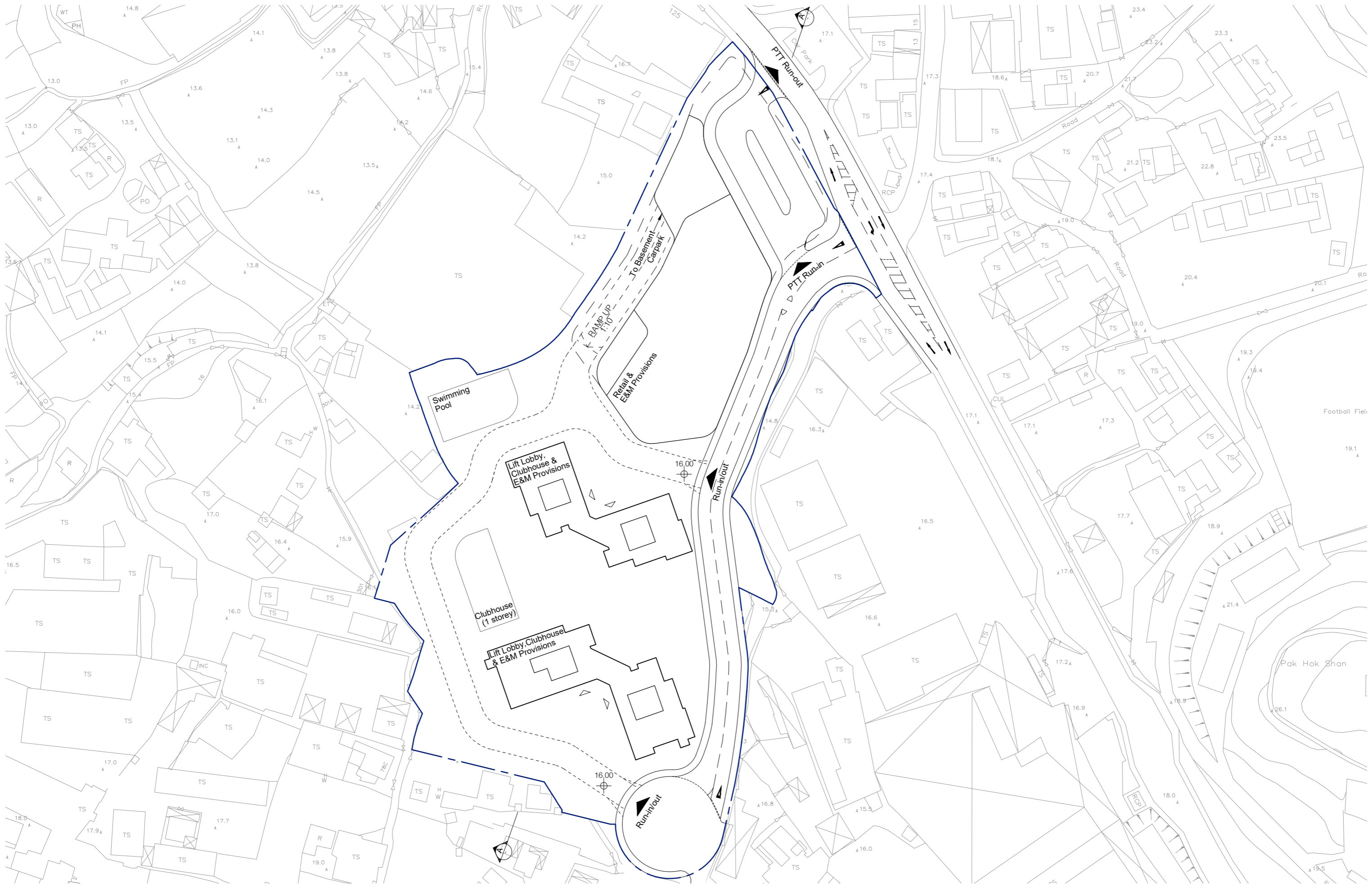
MLP of the Proposed Development

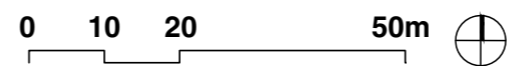
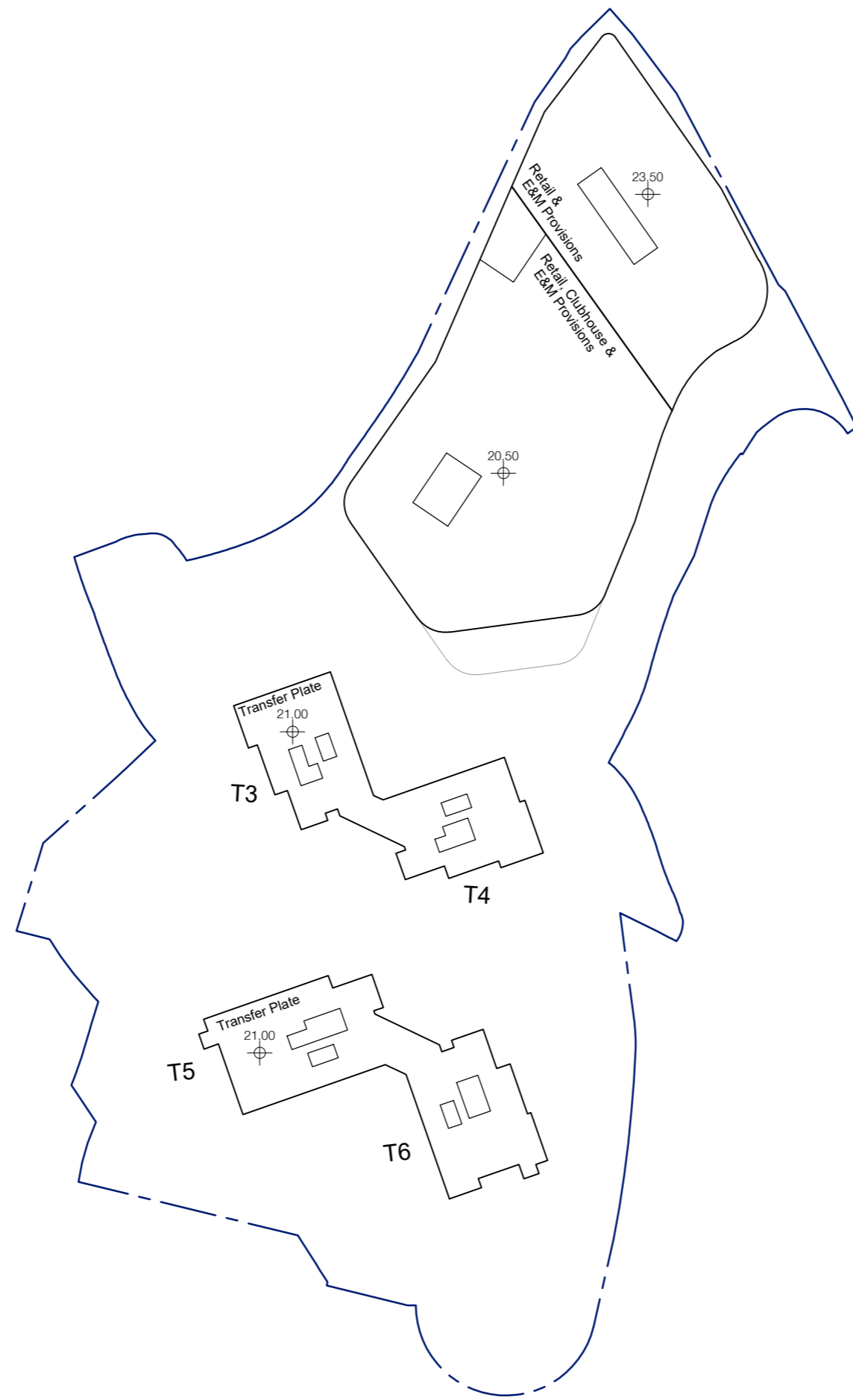


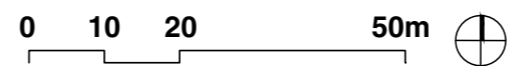
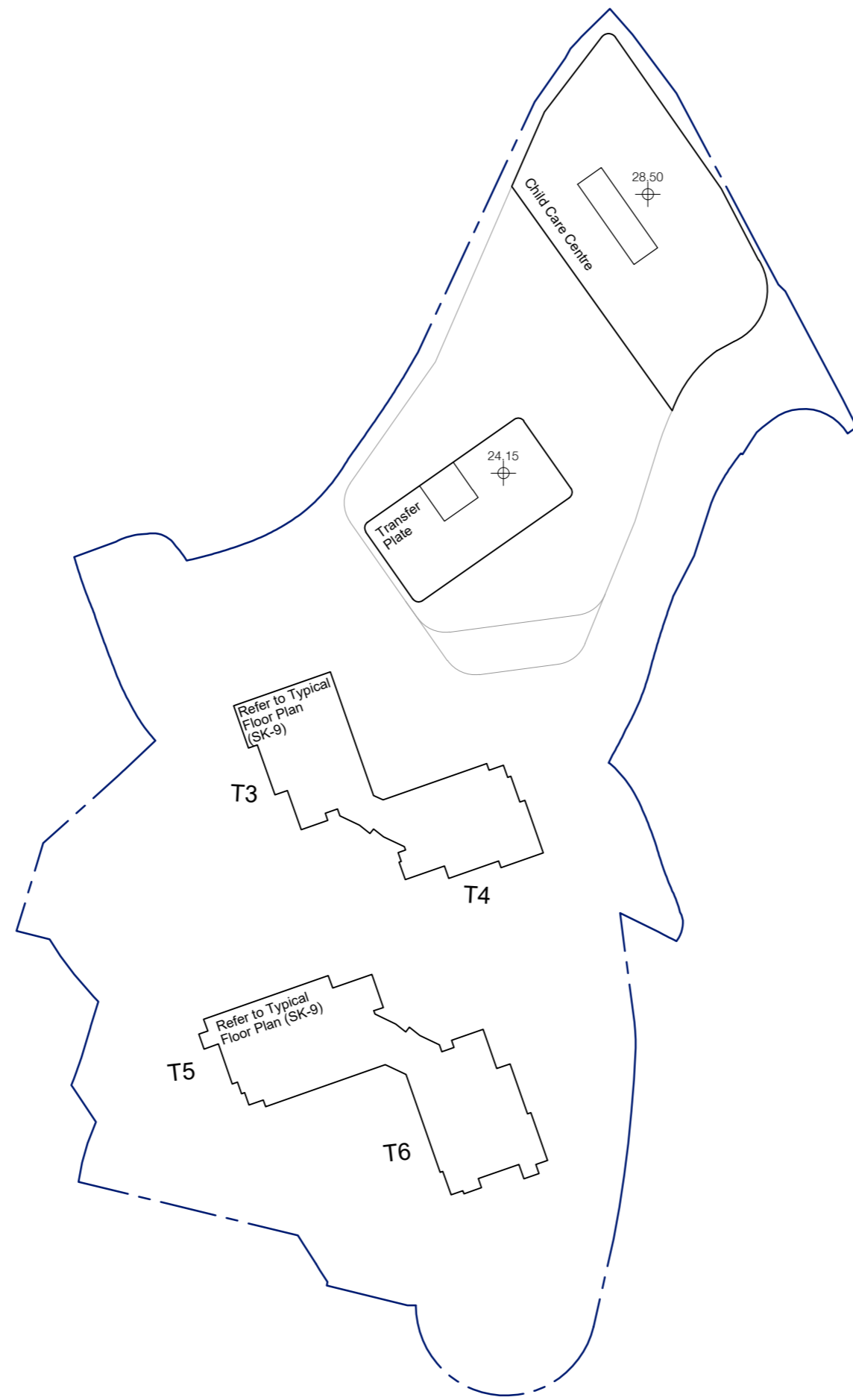


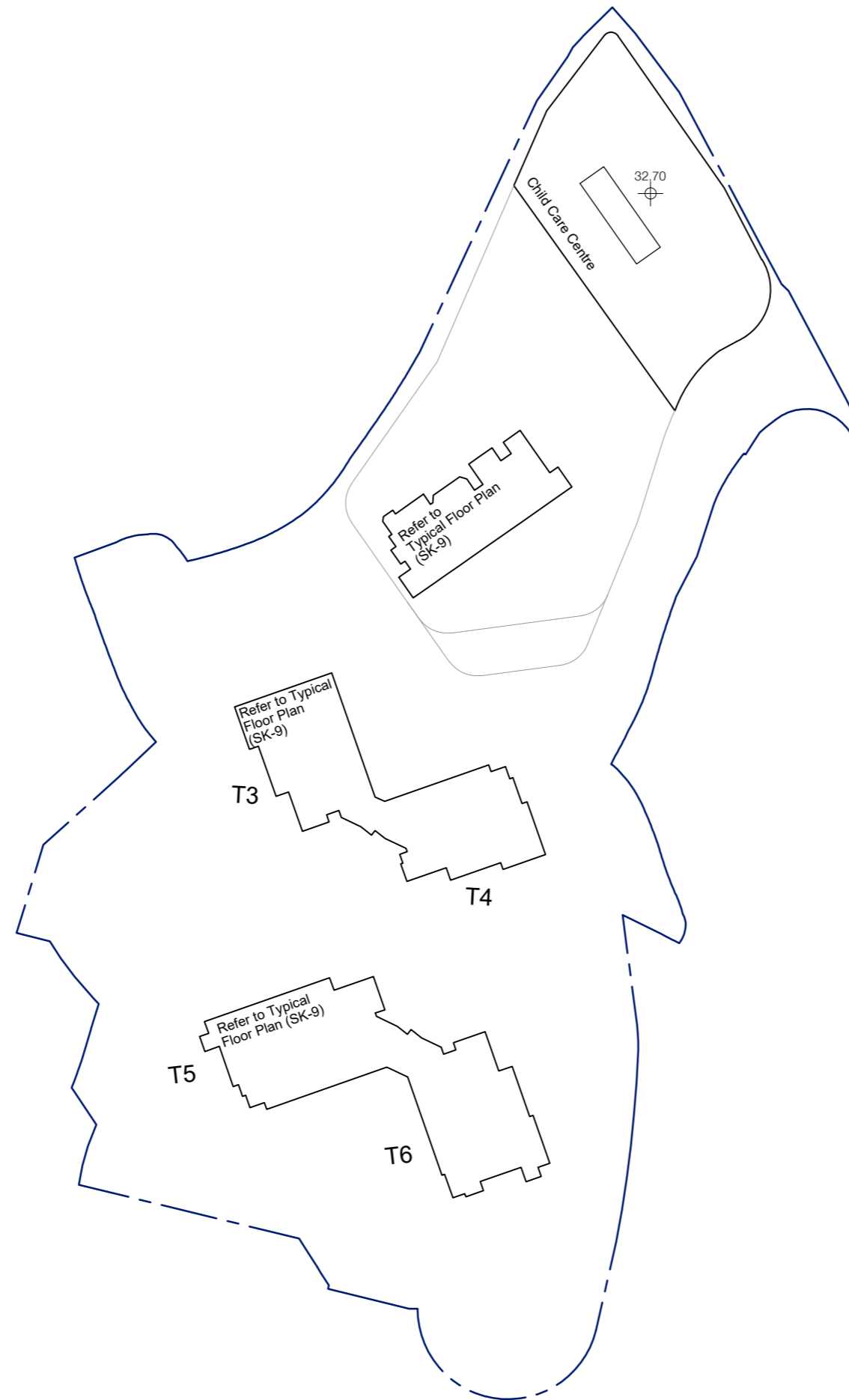
**SCHEMATIC SECTION AA' SK-2**  
 PROPOSED DEVELOPMENT AT PING CHE DD77, N.T.

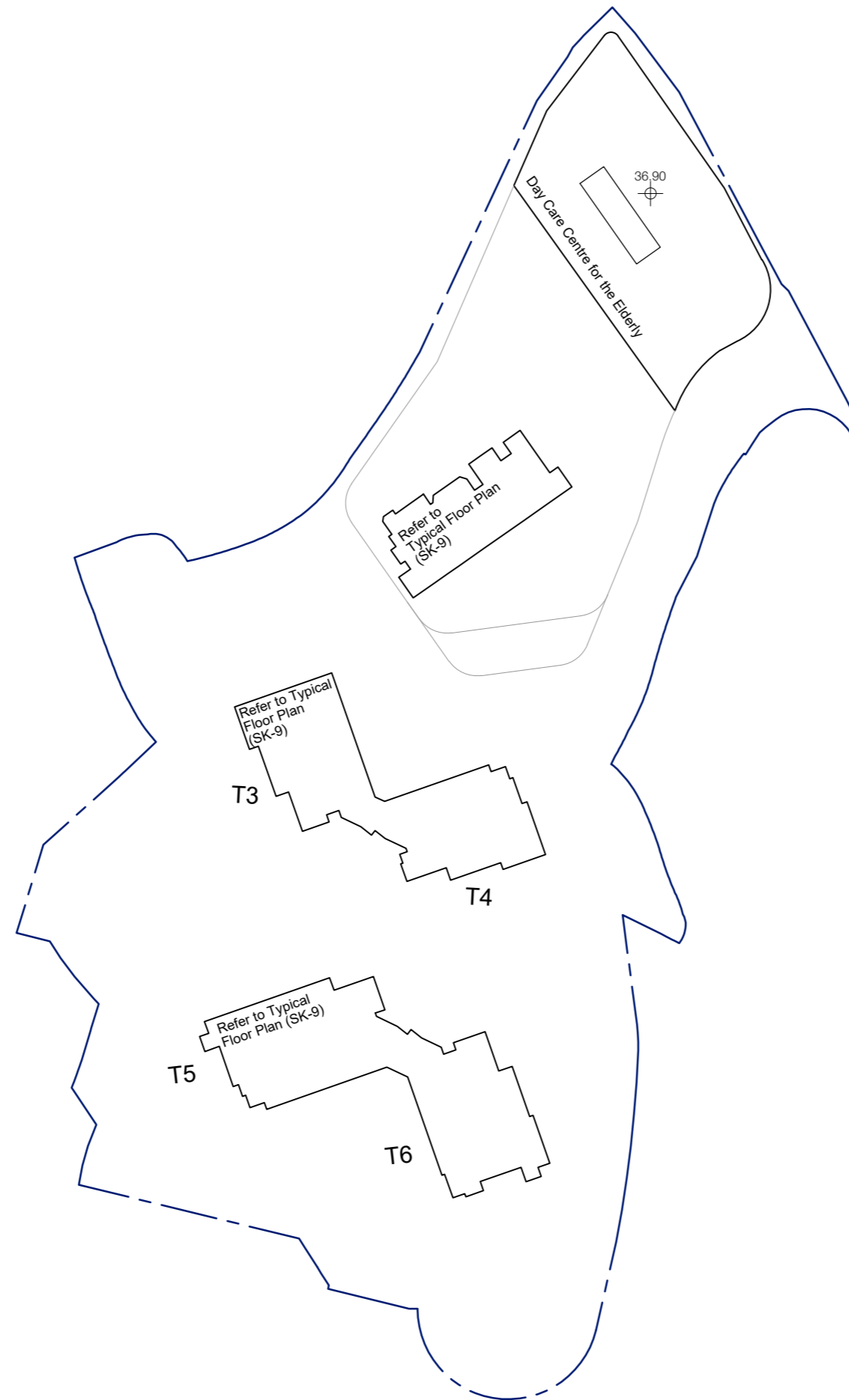




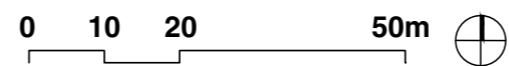
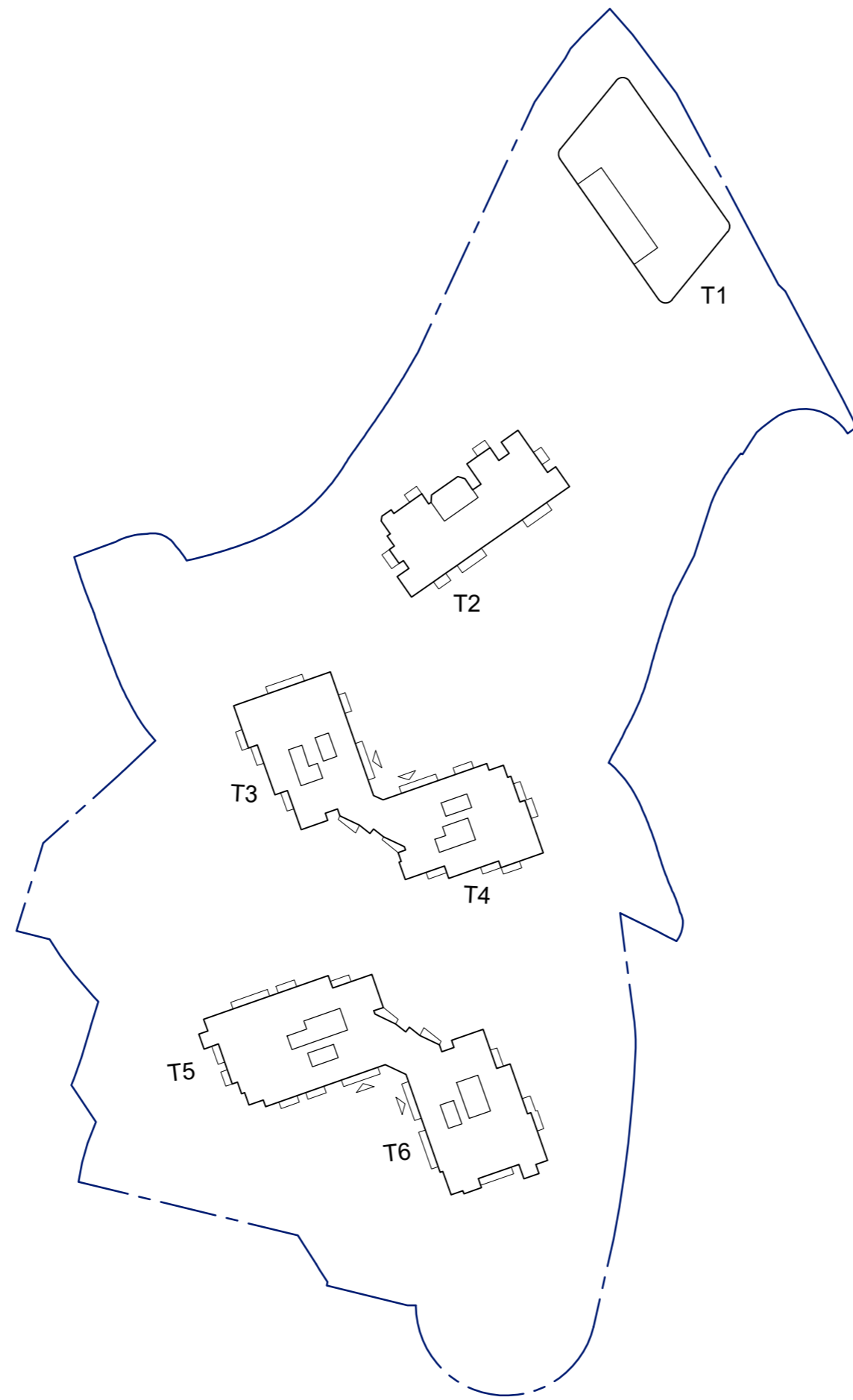


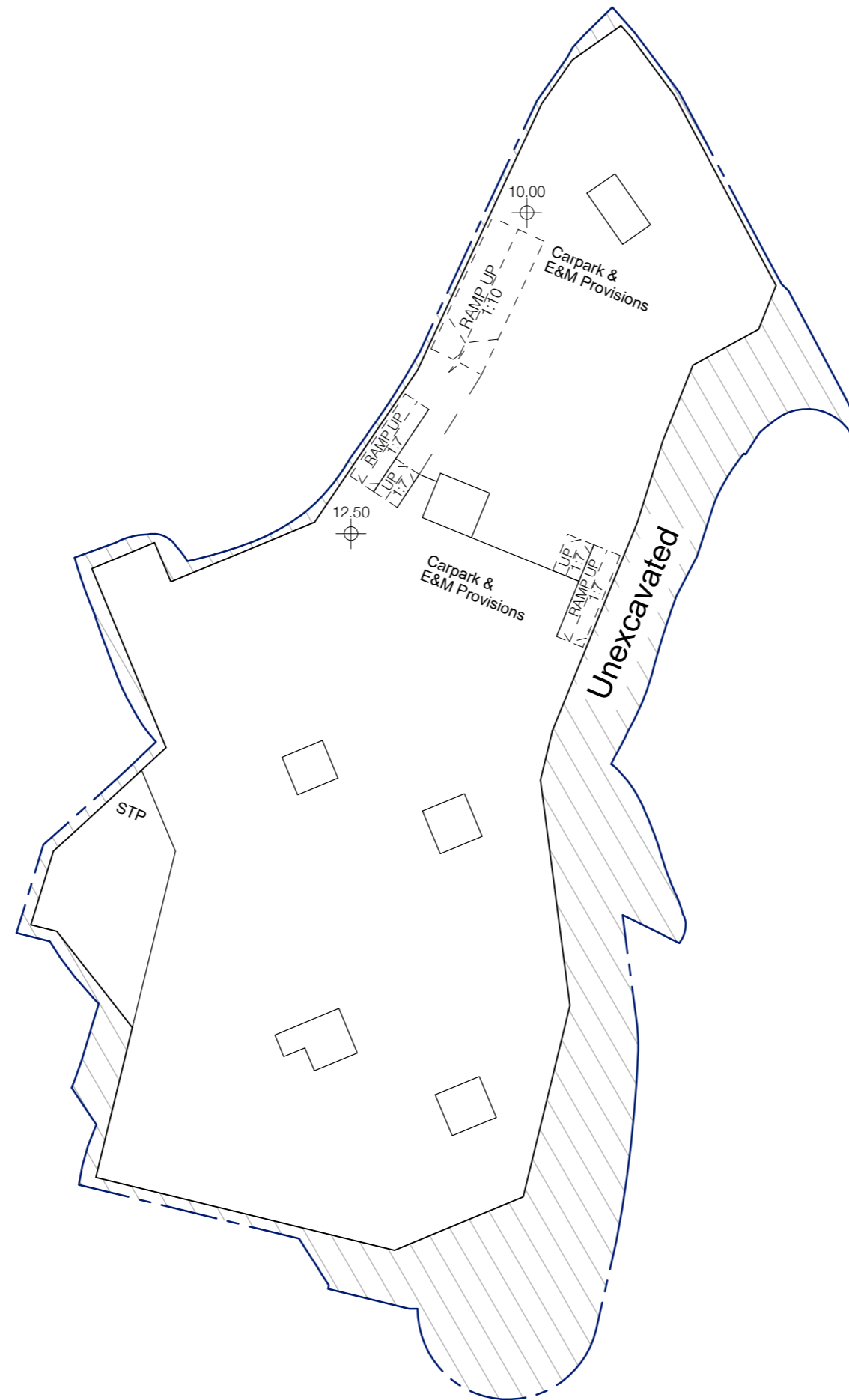


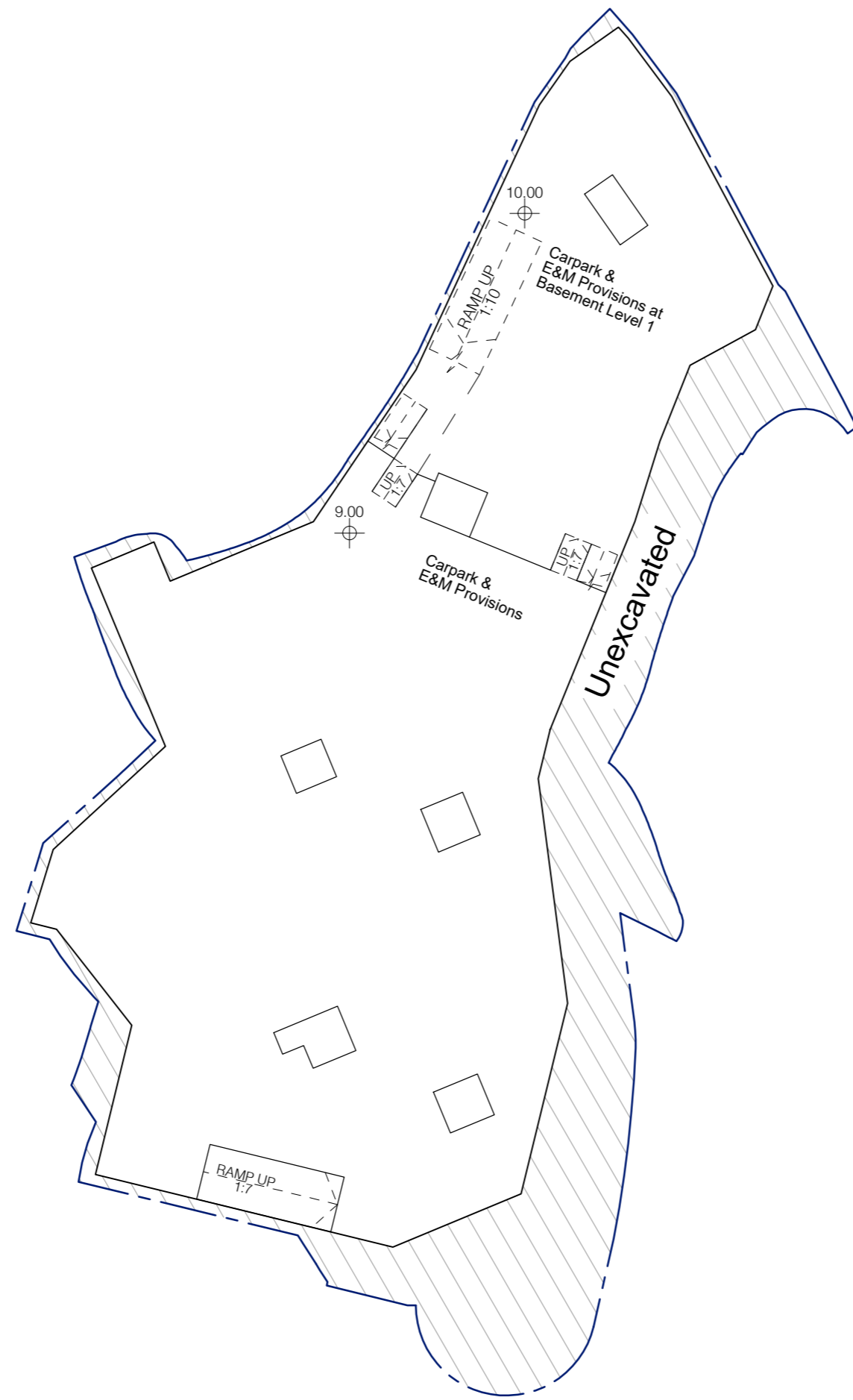


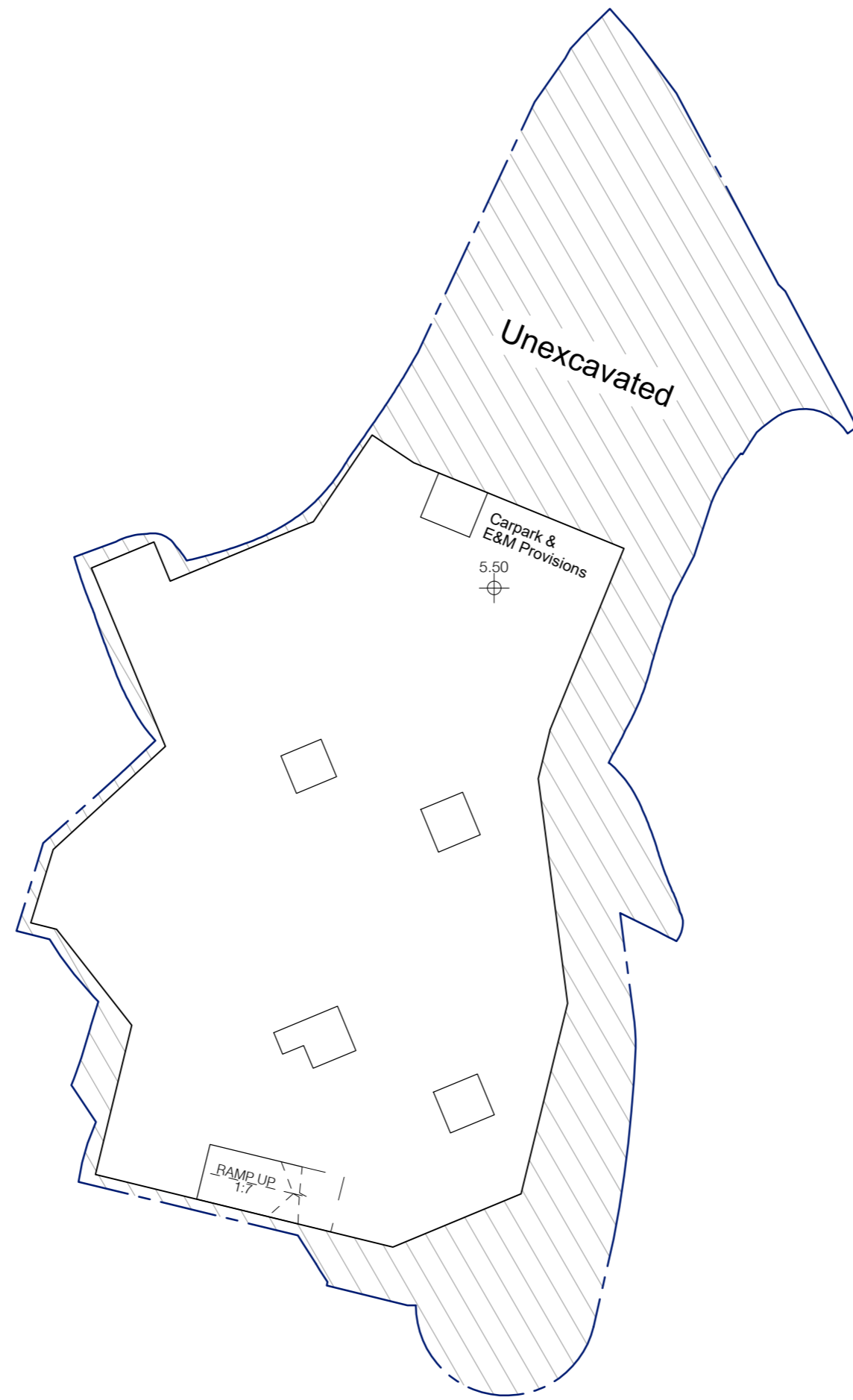


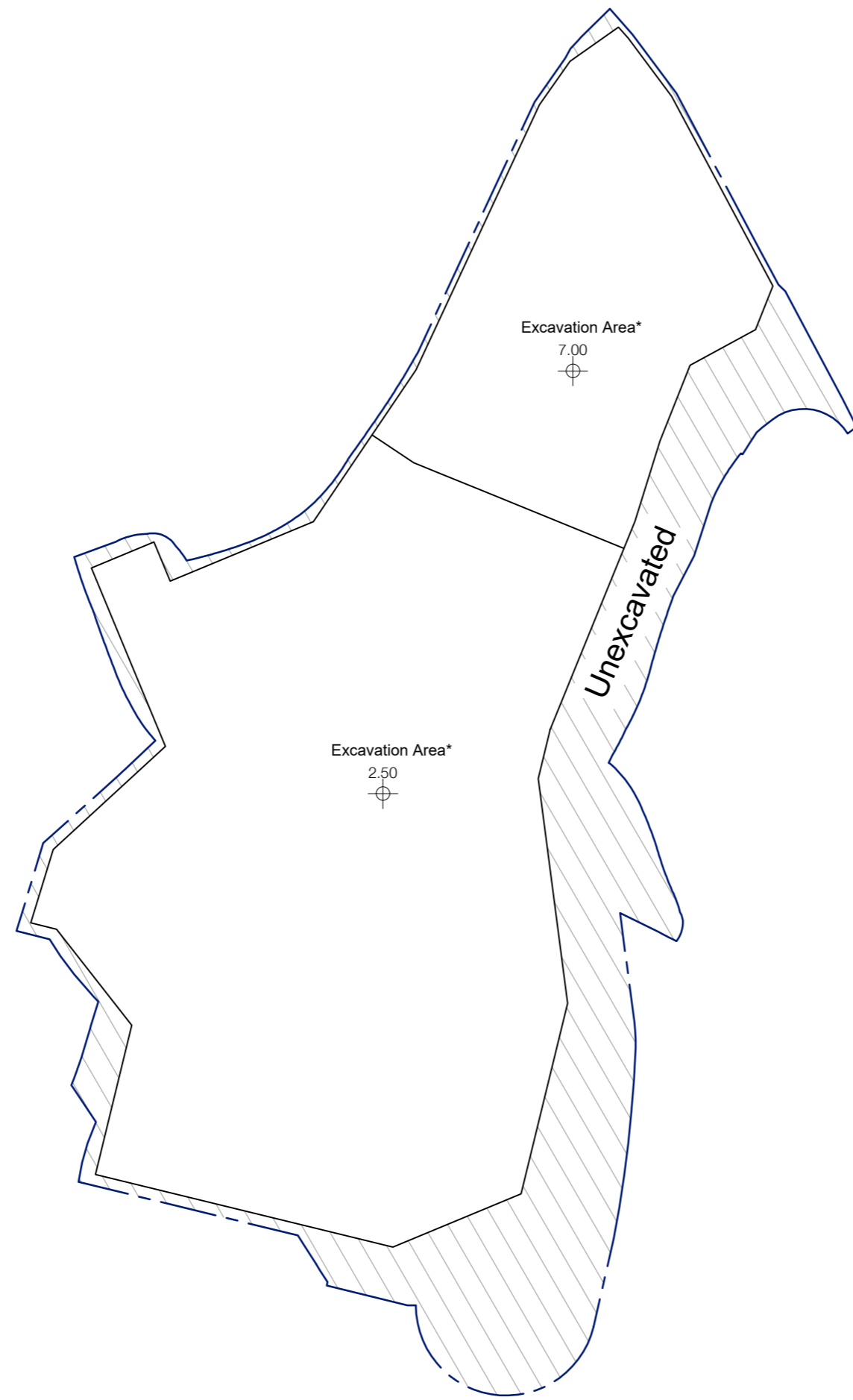




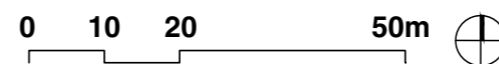








\*The excavation area is about 13,500m<sup>2</sup> and the excavation depth is about 13.5m. The excavation area and depth are subject to future detailed design on foundation based on further geotechnical information.







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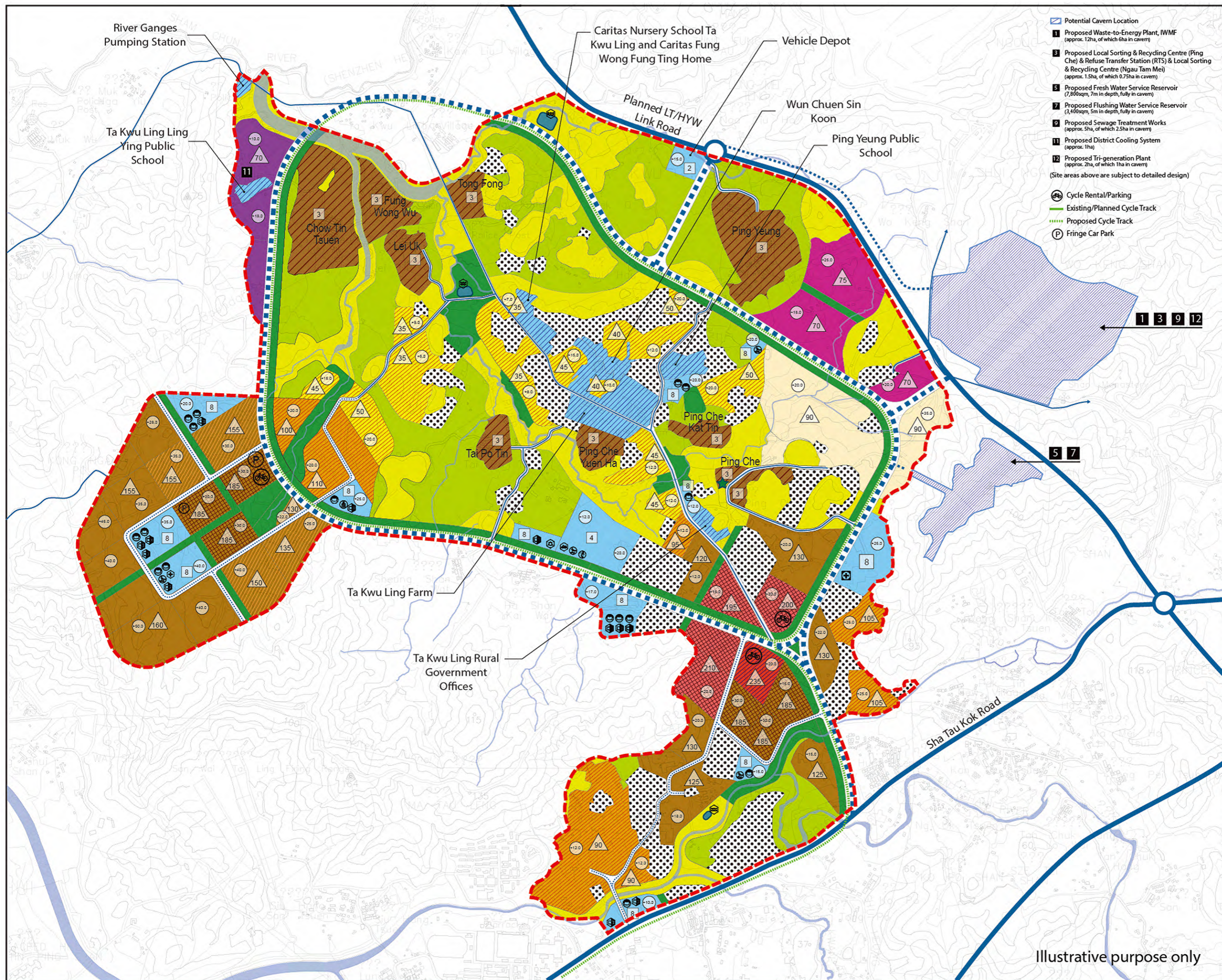
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## ***Appendix B***

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Broad Land Use Concept of TKLPDA





- Potential Cavern Location**
- 1 Proposed Waste-to-Energy Plant, IWMF (approx. 12ha, of which 6ha in cavern)
  - 3 Proposed Local Sorting & Recycling Centre (Ping Che) & Refuse Transfer Station (RTS) & Local Sorting & Recycling Centre (Ngau Tam Mei) (approx. 1.5ha, of which 0.75ha in cavern)
  - 5 Proposed Fresh Water Service Reservoir (7,800sqm, 7m in depth, fully in cavern)
  - 7 Proposed Flushing Water Service Reservoir (3,400sqm, 5m in depth, fully in cavern)
  - 9 Proposed Sewage Treatment Works (approx. 5ha, of which 2.5ha in cavern)
  - 11 Proposed District Cooling System (approx. 1ha)
  - 12 Proposed Tri-generation Plant (approx. 2ha, of which 1ha in cavern)
- (Site areas above are subject to detailed design)
- Cycle Rental/Parking
  - Existing/Planned Cycle Track
  - Proposed Cycle Track
  - Fringe Car Park

- Legend**
- Commercial (PR6.5)
  - Commercial (PR5)
  - Residential (PR7.5)
  - Residential (PR6)
  - Residential (PR5)
  - Residential (PR3.5)
  - Residential (PR1.5)
  - Residential (PR1.5)
  - Mixed Use (PR6+PR1.5)
  - Science Park (PR3)
  - Industrial Estate (PR4)
  - Logistic Industries (PR3)
  - G/I/C (Existing/Planned)
  - G/I/C (Proposed)
  - Agriculture
  - Open Space
  - Green Belt
  - Village
  - Existing Settlement
  - Roads (Existing/Planned)
  - Roads (Proposed)\*
  - G/I/C Primary School
  - G/I/C Secondary School
  - G/I/C Sports Ground
  - G/I/C Sports Centre
  - G/I/C Swimming Pool Complex
  - G/I/C Fire Station Cum Ambulance Depot
  - G/I/C Police Station
  - G/I/C General Clinic/Health Centre
  - G/I/C Hospital
  - Max. Building Height (mPD)
  - Max. Building Height (storeys)
  - Site Formation Level
  - PDA Boundary
  - Retention Pond
  - Ping Che Egretty
  - River/Stream

\* Proposed road location and width are indicative

Scale and Orientation

N

0 100 200 300 400 500m

Drawing No. Figure 3.8.2d	Drawn CR/ JH	Date Mar 2016
	Checked	Approved

Drawing Title  
**Broad Land Use Concept Plan  
- TKL PDA Scenario II**

Job Title  
Agreement No. CE 42/2013 (CE)  
Preliminary Study on Developing  
the New Territories North

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