

Annex D 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

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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 B Broad Land Use Concept for TKLPDA
- Appendix C Supplementary Drawing for Visual and Air Ventilation Mitigation Measures

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.

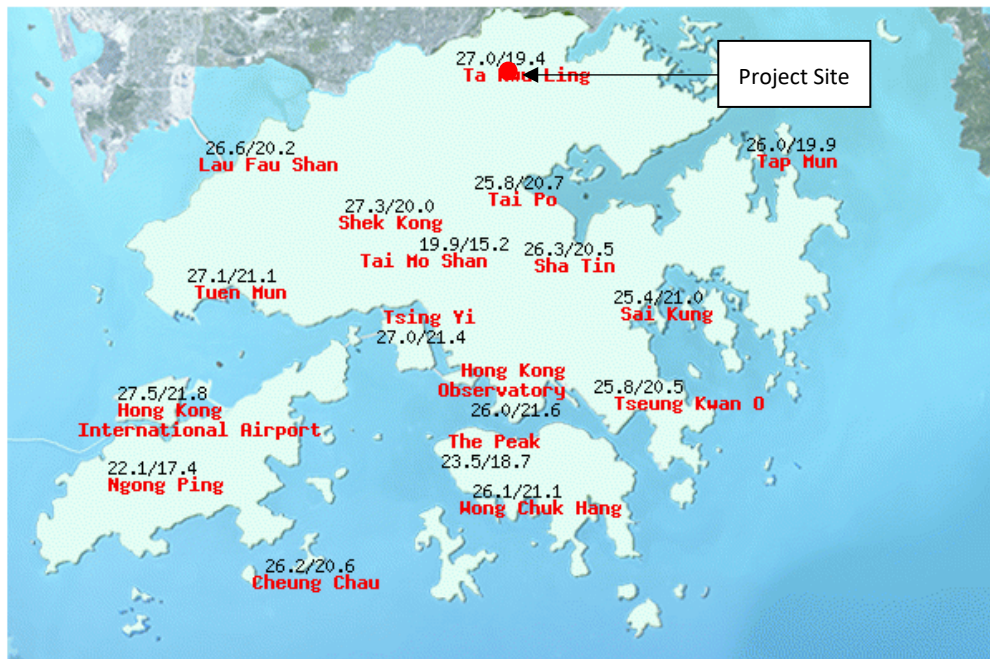
3. ASSESSMENT METHODOLOGY

3.1. WIND AVAILABILITY DATA

Hong Kong Observatory

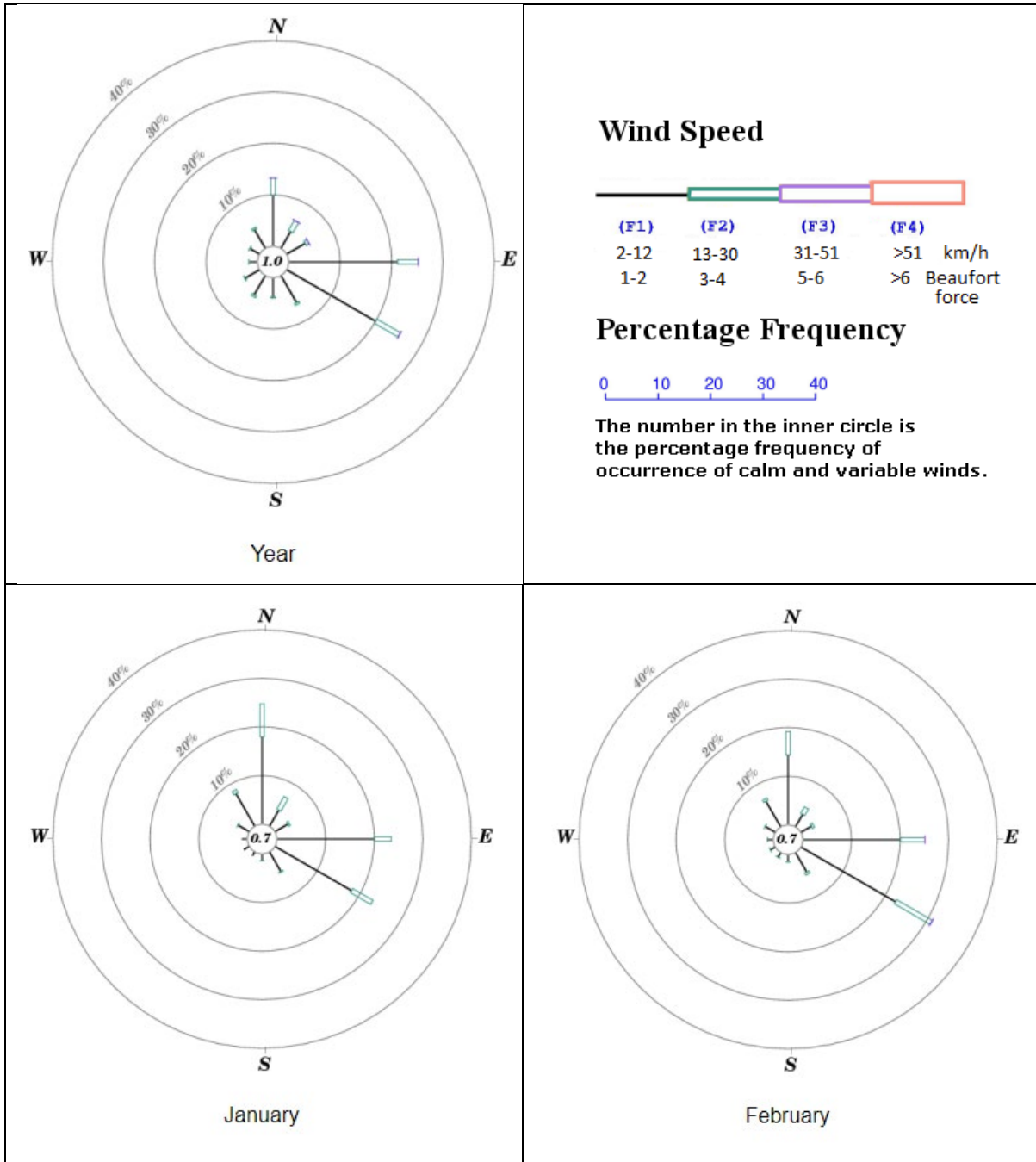
3.1.1. The Hong Kong Observatory records the metrological data in Hong Kong. Among all the weather stations in Hong Kong, the nearest weather station to the Application Site is Ta Kwu Ling Weather Station. Thus, the wind data from Ta Kwu Ling Weather Station shall be used for the discussion on overall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

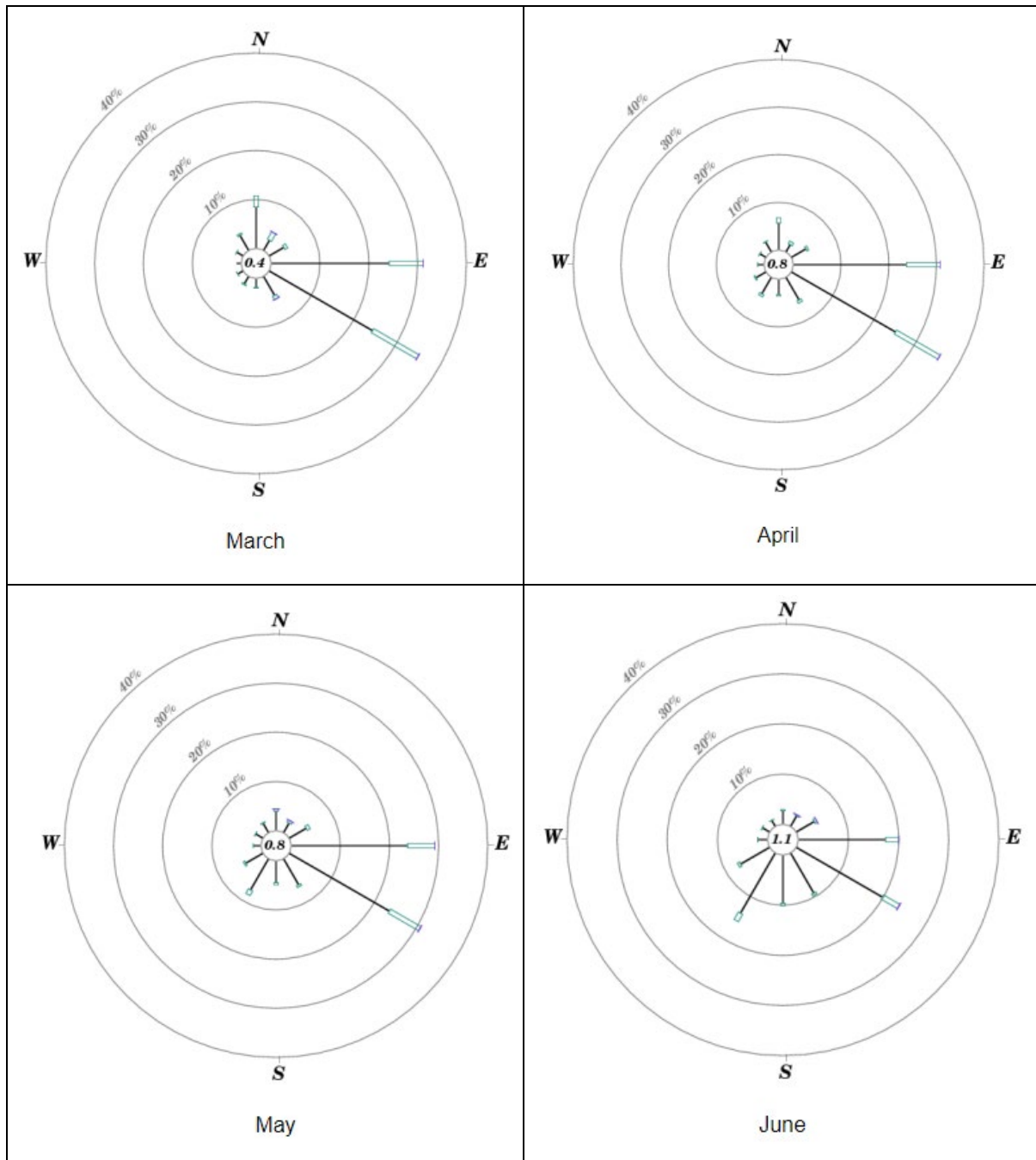
3.1.2. According to the wind availability data from Ta Kwu Ling Weather Station from 1986-2020, the annual wind rose revealed winds flowing from N, E and ESE while summer wind rose revealed winds flowing from E, ESE and SSW.

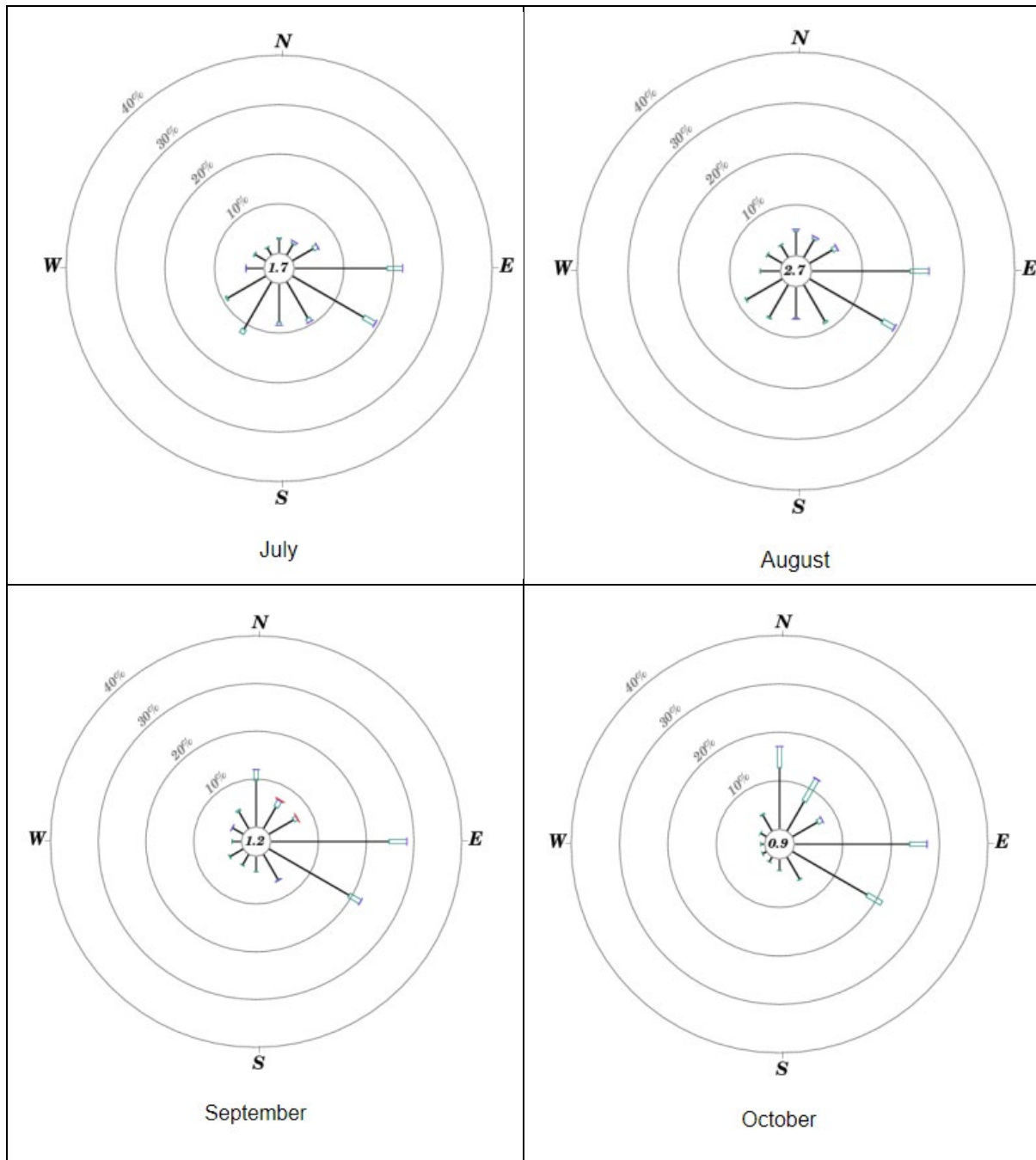


Regional Climate of Hong Kong
Annual Mean Daily Maximum/Minimum Air Temperature (deg. C)

Figure 3-1 Location of Hong Kong Observatory Weather Station







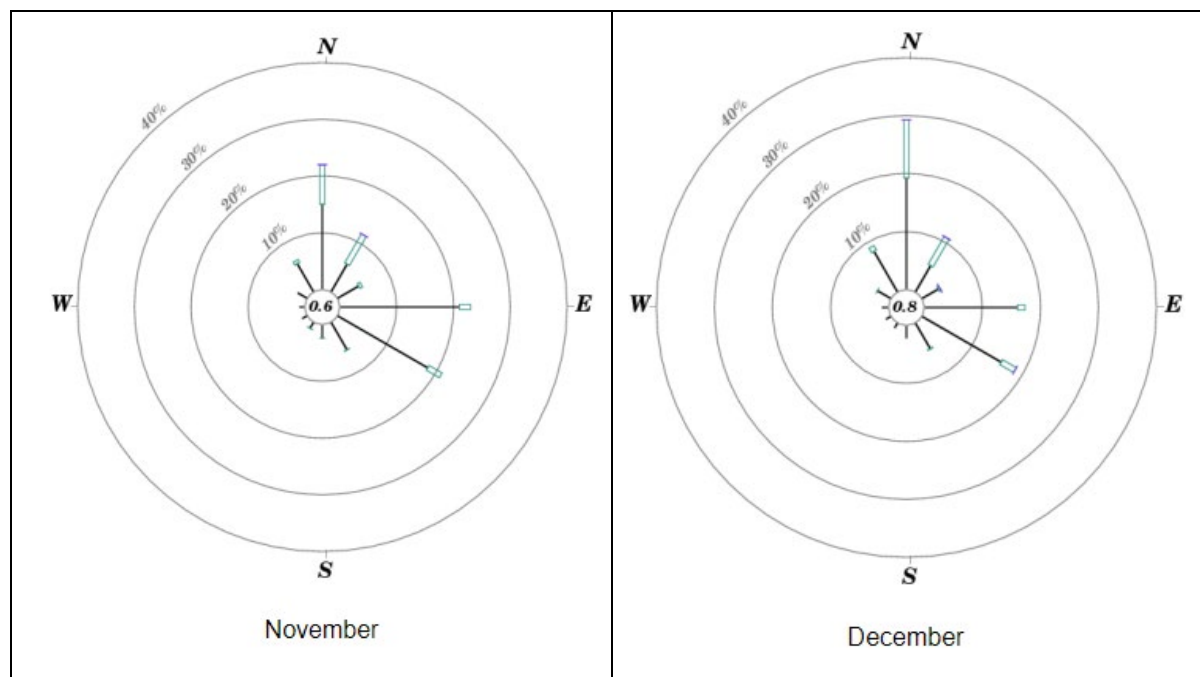


Figure 3-2 Annual Wind Rose of Ta Kwu Ling Weather Station between 1986-2020

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 ENE direction (10.3% from grid 077,087 and 11.7% from grid 078,087), E direction (26.3% from grid 077,087 and 28.3% from grid 078,087) and ESE (14.4% from grid 077,087 and 13.4% form gird 078,087); while the summer prevailing is coming from E direction (13.3% from grid 077,087 and 13.9% from grid 078,087), SE direction (11.1% from grid 077,087 and 10.7% from grid 078,087) and SSE direction (10.6% from grid 077,087 and 11.2% from grid 078,087).
- 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

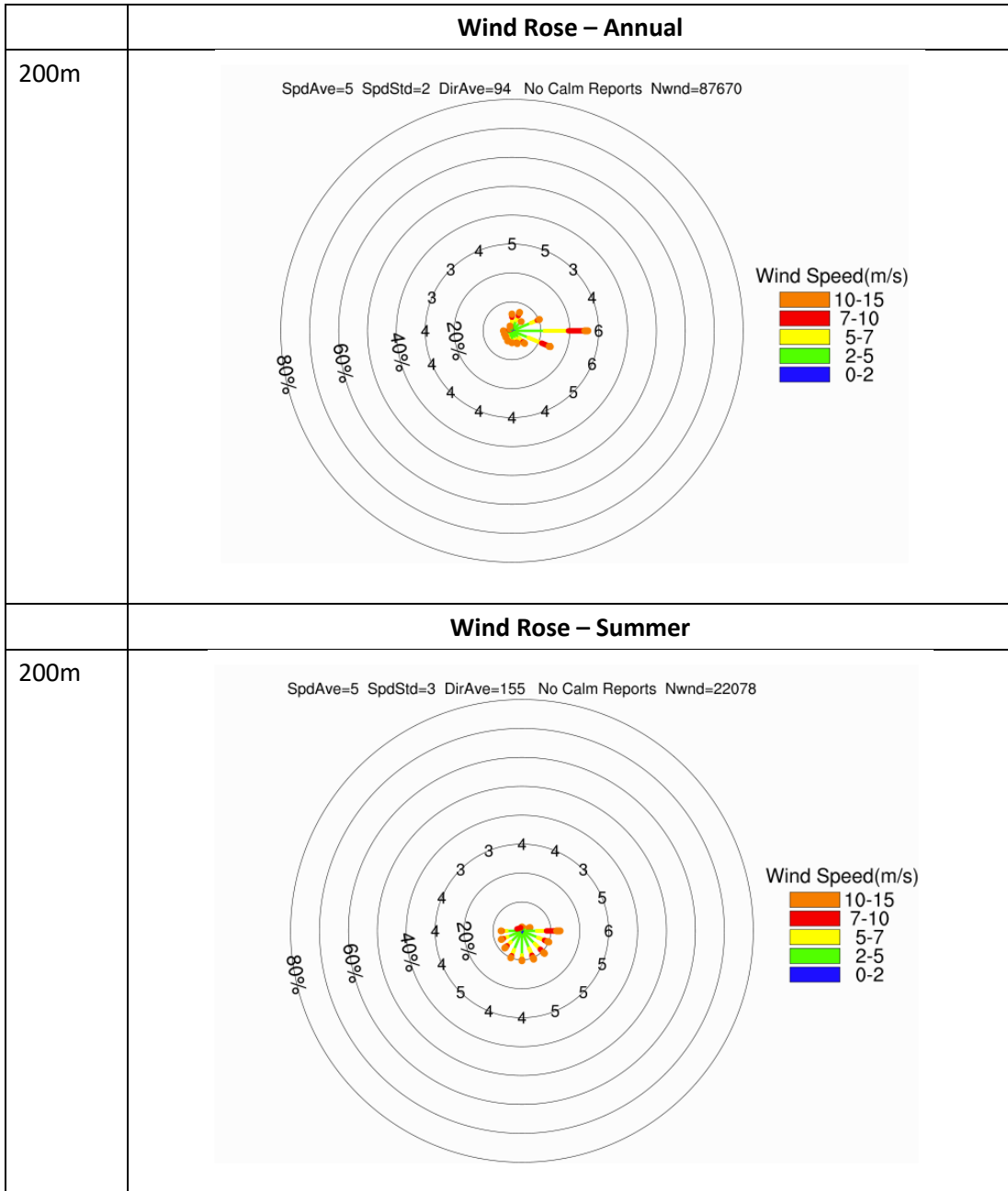


Figure 3-3 Wind Rose at Grid (077, 087)

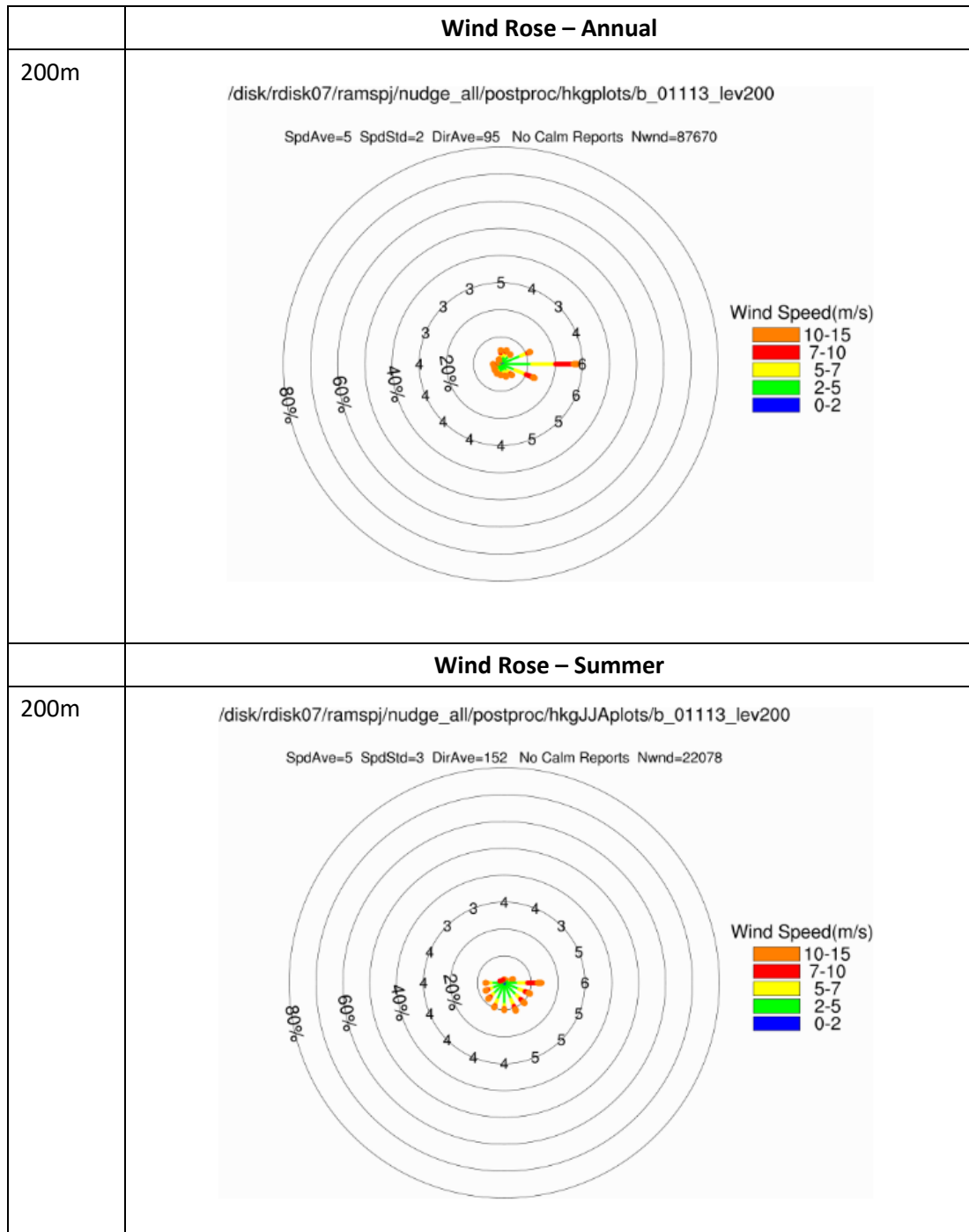


Figure 3-4 Wind Rose at Grid (078, 087)

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)	N, E, ESE	E, ESE, SSW
RAMS data (grid 077, 087)	ENE, E, ESE	E, SE, SSE
Summary	N, ENE, E, ESE	E, ESE, SE, SSE, SSW

4. PROJECT DESCRIPTION

4.1. SITE LOCATION AND PROPOSED DEVELOPMENT

- 4.1.1. The Application Site area is approximately 17,822 m². 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 m², and 19,603 m² 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. **Figure 4-1** shows the location of the Application Site.

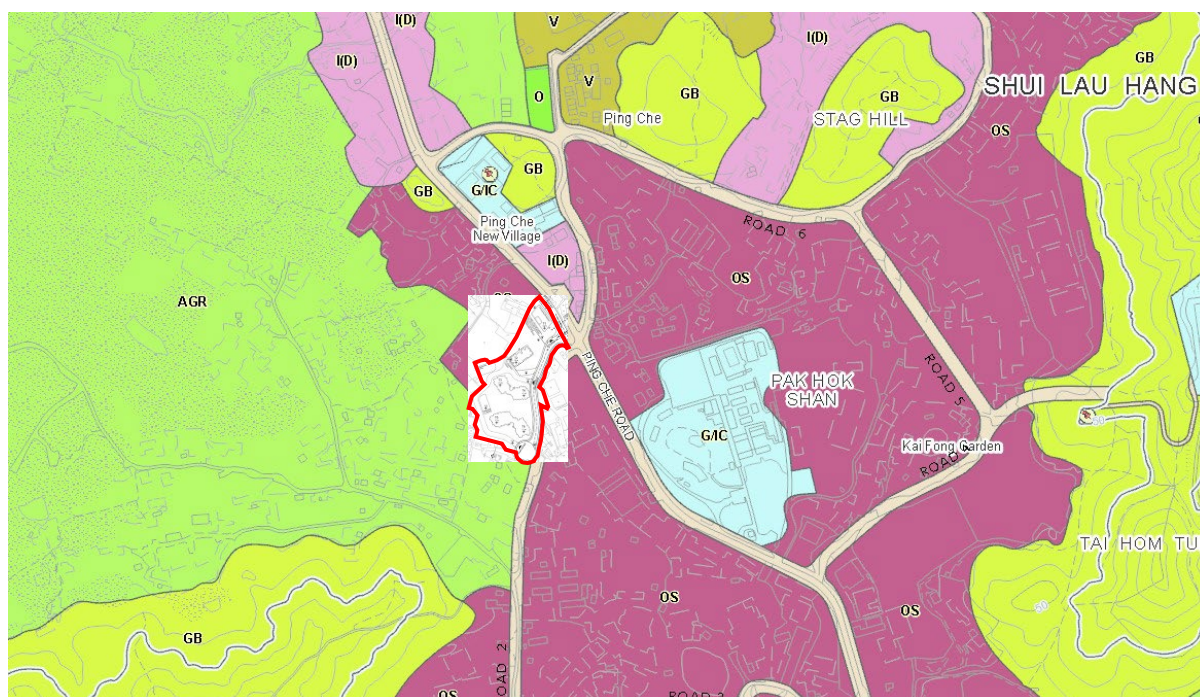


Figure 4-1 Application Site Location

- 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 4b** shows the 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 4a**.

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

	Surrounding Buildings	Existing/ Proposed Height (m)	OZP Building Height Restriction (m)
Existing Buildings			
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)

Committed/ Planned Developments			
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			

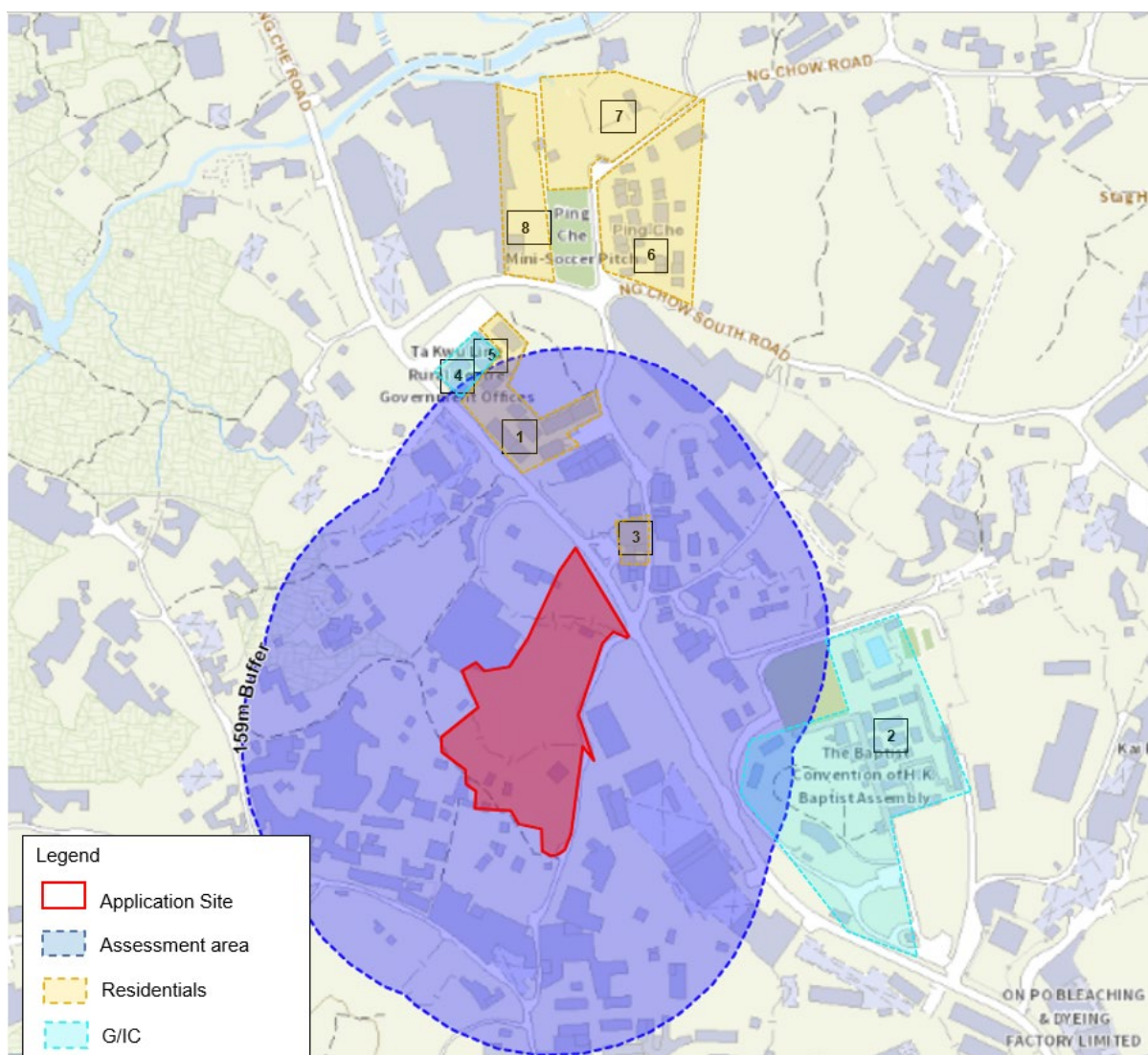


Figure 4-2 Existing and Proposed Surrounding Developments

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 and aims to demonstrate that there is feasible solution to meet relevant standards.

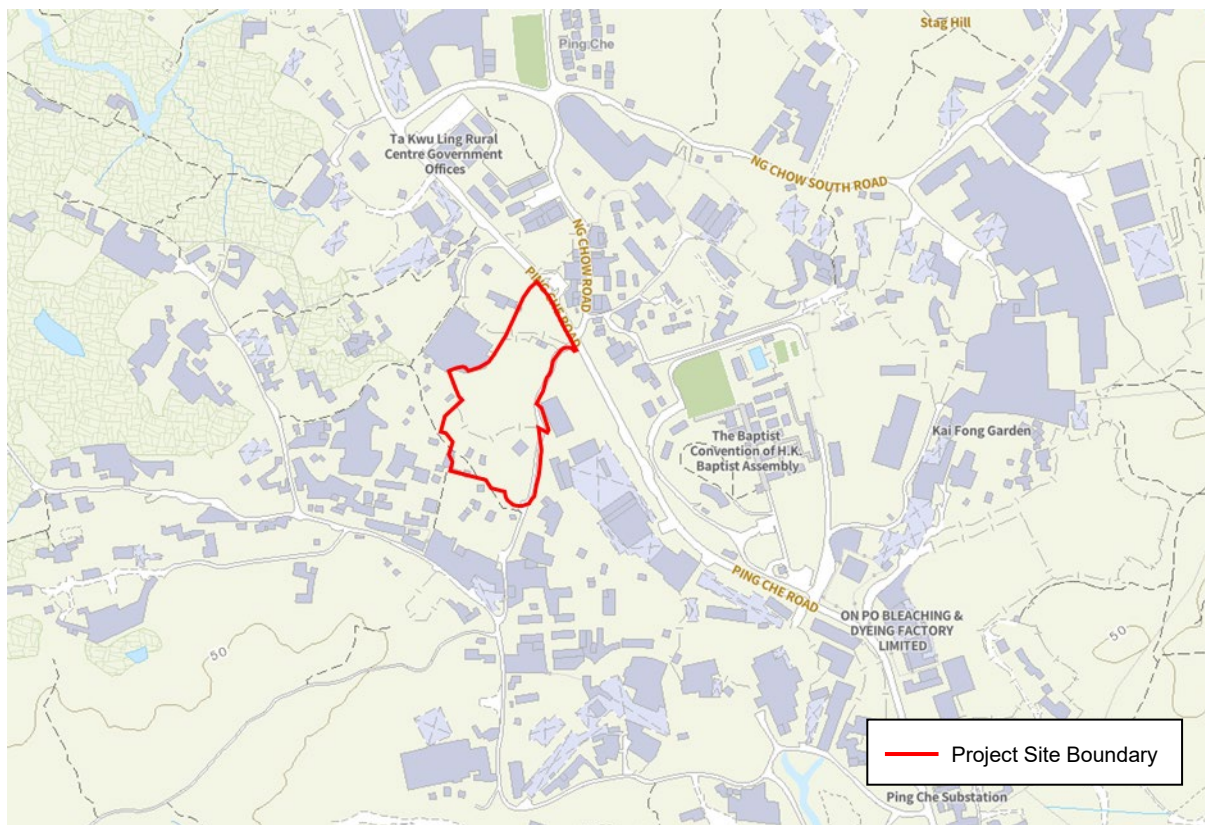


Figure 4-3 Existing Surrounding Developments

Current Site Wind Environment

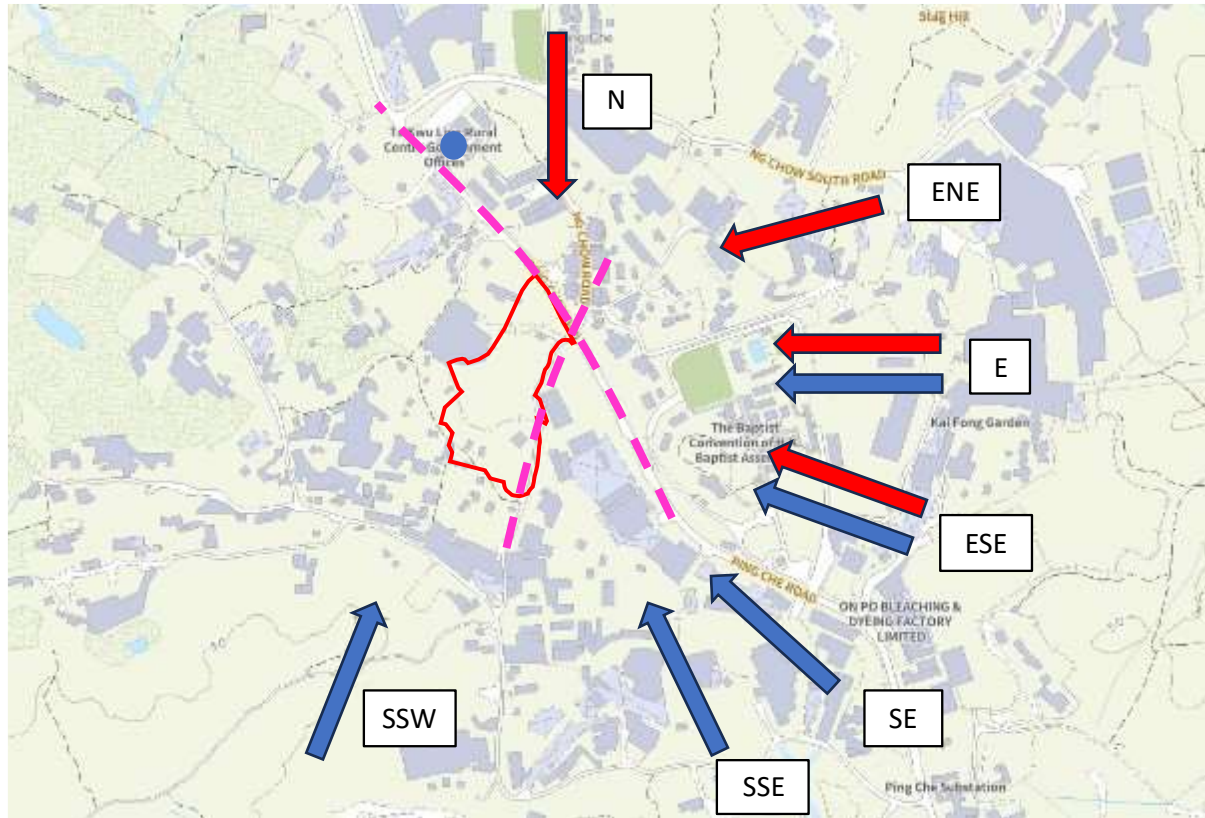
- 4.2.6. Refer to *Section 3.1.9* and **Table 3-2**, the wind availability in the Application Site mainly come from NNE, ENE, E, ESE and SE in annual condition while winds from E, ESE, SE, SSE and S are available in summer condition.
- 4.2.7. The Application Site is currently used as open storage area 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 5a**.

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 **N, ENE, E and ESE**. The summer prevailing wind directions would be from **E, ESE, SE, SSE and SSW**.

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. **N, ENE, E, ESE, SE, SSE and SSW**.

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 N Direction

5.3.1. **Figure 5b** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5c** illustrates the wind flow at the Application Site in consideration of NTN Development Scheme, under N 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 comprises mixed of industrial zone, G/IC zone and open space, the NNE wind flows towards downwind area which are agriculture land and open space.

5.3.3. Upon the N wind reaching the Application Site, it is expected to flow along the 2 paths: through the wind path along the local road at the east of the site, and the wind path at the west portion of the site. At the same time when the N wind reached Tower 2, the direction of the wind flow changed to SSE direction. After the diversion, the wind will merge again with the incoming N wind flow along the wind path, maintaining the overall flow pattern. **Figure 5-1** illustrates the prevailing N wind flow pattern.

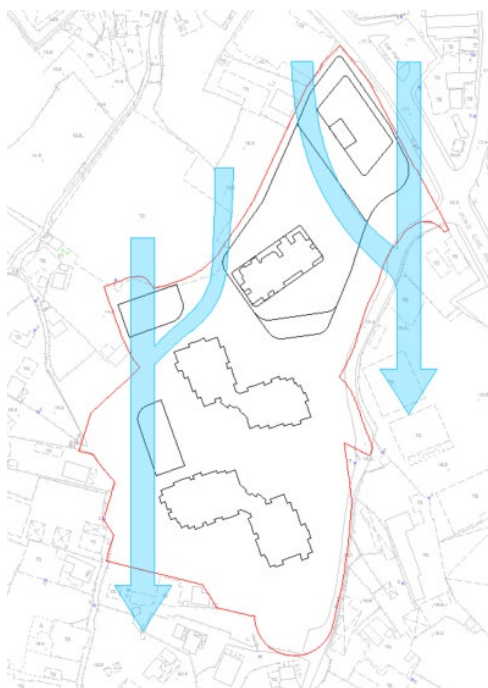


Figure 5-1 Zoom in plan for the N wind flow pattern

OZP Compliance Scheme with Proposed Development

5.3.4. Under the OZP compliance scheme, the upwind area comprises mixed of industrial zone, G/IC zone and open space. Since there are no mid-rise or high-rise buildings in the upwind area, the N wind is expected to reach Application Site without obstruction. The N wind will penetrate the site then continue to reach the downwind area, i.e. agriculture land and open space to the south. Additionally, the good design features such as the vast opening at ground level PTT and the reduction in clubhouse's building height and ground coverage area will facilitate smooth wind flow. Therefore, it is expected that the proposed development will not have significant impact in terms of air ventilation to the surrounding downwind area, which consist of agriculture land and open space.

NTN Development Scheme

5.3.5. With the consideration of NTN Development, the N wind is expected to flow through open space and G/IC zones, as well as across residential area located in the upwind direction, before finally reach the Application Site. The residential area planned with a PR5 and a height of 120mPD, is expected to partially block the incoming N wind. However, presence of the open space is expected to improving the wind environment in the downwind area. The wind will flow through the Proposed development and along the local road within the site, finally reach the downwind area, which is zoned as a commercial area under NTN Development.

5.3.6. With the good design features such as the vast opening at ground level PTT and the reduction in clubhouse's building height and ground coverage area will facilitate smooth wind flow. Nevertheless, the permeable design elements in the sky garden 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 5d** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5e** 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 is mostly open space and G/IC zone, the ENE and E wind flows towards downwind area which are agriculture land and green belt.

5.4.3. Upon the ENE wind reaching the Application Site, it is expected to flow along the path in between Tower 1 and Tower 2. At the same time the ENE wind is also expected to flow along the SSE of the site, where the building setback is implemented. The ENE wind is also expected to flow along the path in between Tower 2 and Tower 3/4, then the wind flow will experience the change in direction towards NW direction, then merge again with the incoming ENE wind and maintaining the overall flow pattern.

5.4.4. There are 4 paths that E wind is expected to penetrate through the site, which are: the flow path in between Tower 1 and Tower 2, in between Tower 3/4 and Tower 5/6, and the flow path along the north and south portion of the Application Site, where the building setback is implemented. **Figure 5-2** illustrates the prevailing ENE wind flow pattern and **Figure 5-3** illustrates the prevailing E wind flow pattern.

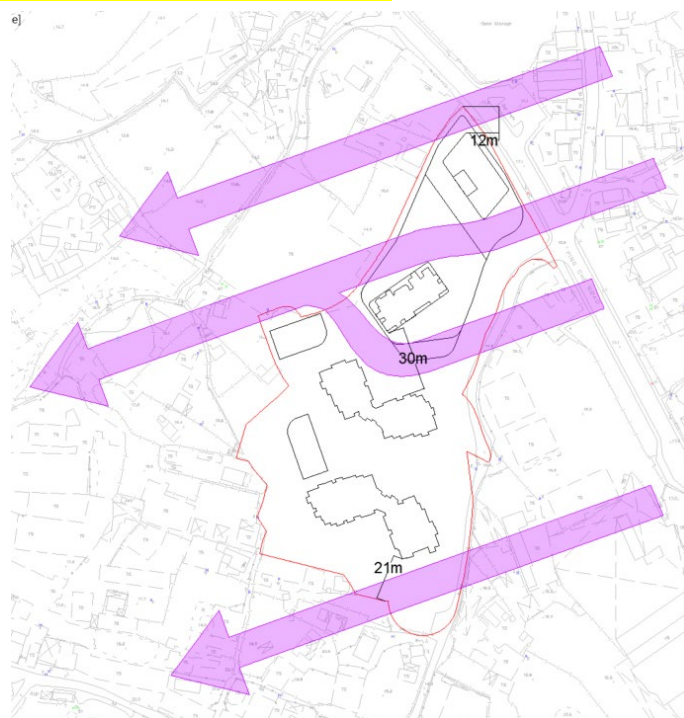


Figure 5-2 Zoom in plan for the ENE wind flow pattern



Figure 5-3 Zoom in plan for the E wind flow pattern

OZP Compliance Scheme with Proposed Development

5.4.5. Under the OZP compliance scheme, the ENE and E wind flow through the upwind area comprises open space and G/IC zone. Since there are no mid-rise or high-rise buildings in the upwind area, the ENE and E wind is expected to reach the Application Site without any obstruction. The wind flow is expected to pass through the Proposed Development then continue to the downwind area, which primarily consists of agriculture land and green belt. Additionally, the good design features such as the vast opening at ground level PTT, building separation and building setback in the Proposed Scheme facilitated the wind flow. As the downwind area is not an area frequently assessed by public, the air ventilation impact on the downwind area is not anticipated to be significant.

NTN Development Scheme

5.4.6. With the consideration of NTN Development, the upwind area is expected to have a G/IC area, a planned PR5 residential zone with a height of 130mPD and a planned PR6.5 commercial zone with expected height of 195mPD. The high rise buildings in the upwind location are anticipated to block the incoming ENE and E wind, resulting in limited wind reaching the Application Site and the downwind area. According to the preliminary feasibility

study of NTN Development, the commercial area will incorporate of sustainable building design, which expected to enhance the air ventilation.

5.4.7. Nevertheless, with the good design features adopted in the proposed development, including vast opening at ground level PPT, building orientation and separation, building setback, and reduction in clubhouse's building height and ground coverage area to allow low and mid-level wind to flow through the site, and a permeable design in the sky garden allows the high-level wind to flow through.

5.4.8. Therefore, the air ventilation impact on the downwind area is not anticipated to be significant.

5.5. Wind Flow from ESE and SE Direction

5.5.1. **Figure 5f** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5g** 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.

5.5.3. Upon the ESE wind reaching the Application Site, it is expected to flow along the 5 paths, which are in between Tower 1 and Tower 2, Tower 2 and Tower 3/4, Tower 3/4 and Tower 5, and the wind path along the north and south of the Application Site, where the building setback is implemented.

5.5.4. SE wind is expected to penetrate the site through 3 paths, which are the flow path in between Tower 1 and Tower 2, and the flow path along the northeast and southwest of the Application Site, where the building setback is implemented. At the same time, the SE wind is also expected to flow through in between the Tower 2 and 3/4, and in between Tower 3/4 and Tower 5/6. However, the wind flow is expected to have slight degree of change in direction and return to the original flow path after the diversion, maintaining the overall flow pattern. **Figure 5-4** illustrates the prevailing ESE wind flow pattern and **Figure 5-5** illustrates the prevailing SE wind flow pattern.

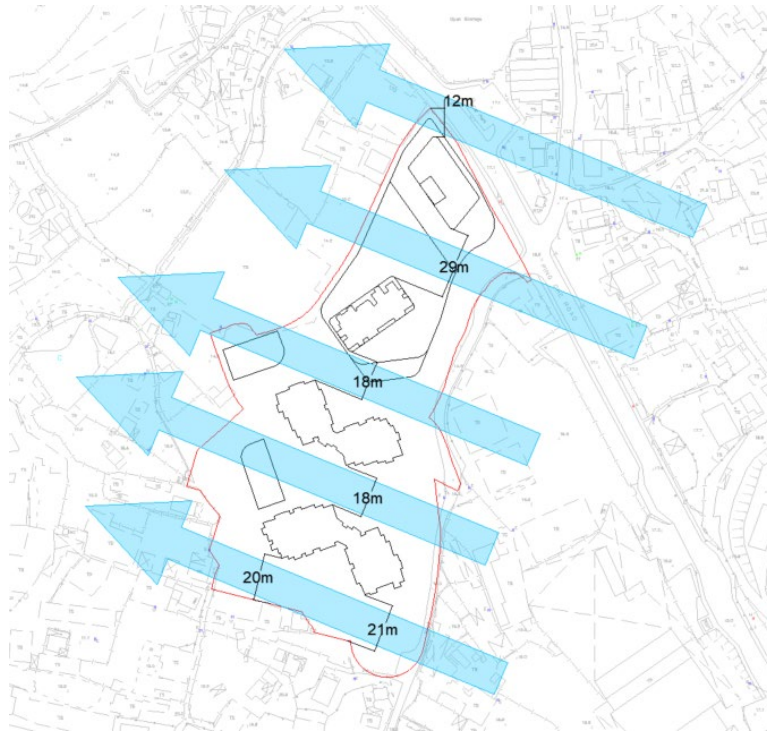


Figure 5-4 Zoom in plan for the ESE wind flow pattern

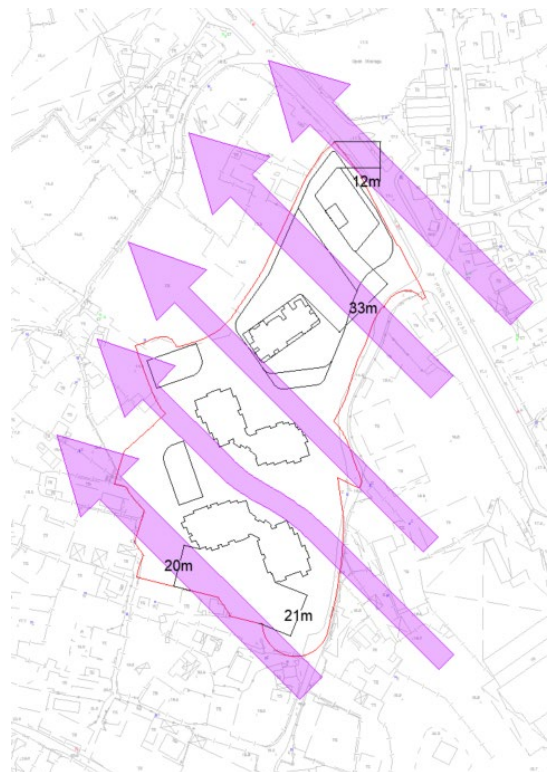


Figure 5-5 Zoom in plan for the SE wind flow pattern

OZP Compliance Scheme with Proposed Development

5.5.5. Under the OZP compliance scheme, the ESE and SE wind flow through the upwind area comprises open space and G/IC zone. Since there are no mid-rise or high-rise buildings in the upwind area, the ESE and SE wind is expected to reach the Application Site without any obstruction. The wind flow is expected to pass through the Proposed Development then continue to the downwind area, which primarily consists of open space, agriculture land and green belt, and partially of the industrial area. Additionally, the good design features such as the vast opening at ground level PTT, building separation and orientation, building setback and the reduction in clubhouse's building height and ground coverage area in the Proposed Scheme facilitated the smooth wind flow. As the downwind area is not an area frequently assessed by public, the air ventilation impact on the downwind area is not anticipated to be significant.

NTN Development Scheme

5.5.6. With the consideration of NTN Development, the upwind area is expected to have a planned PR6.5 commercial zone with expected height of 195mPD and a planned PR7.5 mixed use development with expected height of 235mPD. The high rise buildings in the upwind location are anticipated to block the incoming ESE and SE wind, resulting in limited wind reaching the Application Site and the downwind area. According to the preliminary feasibility study of NTN Development, the commercial area will incorporate of sustainable building design, which expected to enhance the air ventilation.

5.5.7. Nevertheless, with the good design features adopted in the proposed development, including vast opening at ground level PPT, building orientation and separation, building setback, and reduction in clubhouse's building height and ground coverage area to allow low and mid-level wind to flow through the site, and a permeable design in the sky garden allows the high-level wind to flow through.

5.5.8. Therefore, the air ventilation impact on the downwind area is not anticipated to be significant.

5.6. Wind Flow from SSE Direction

5.6.1. **Figure 5h** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5i** illustrates the wind flow at the Application Site in consideration of NTN

Development Scheme, under SSE 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 consists of open space, the SSE wind flows towards downwind area, such as G/IC zone with Ta Kwu Ling Government Office, Ping Che New Village and open space.

5.6.3. Upon the SSE wind reaching the Application Site, it is expected to flow along the 2 paths: through the wind path in between Tower 1 and Tower 2, and the wind path along the southwest portion of the site. At the same time when the SSE wind reached Tower 3/4, the direction of the wind flow changed to WNW direction. After the diversion, the wind will merge again with the incoming SSE wind flow along the wind path, maintaining the overall flow pattern. **Figure 5-6** illustrates the prevailing N wind flow pattern.

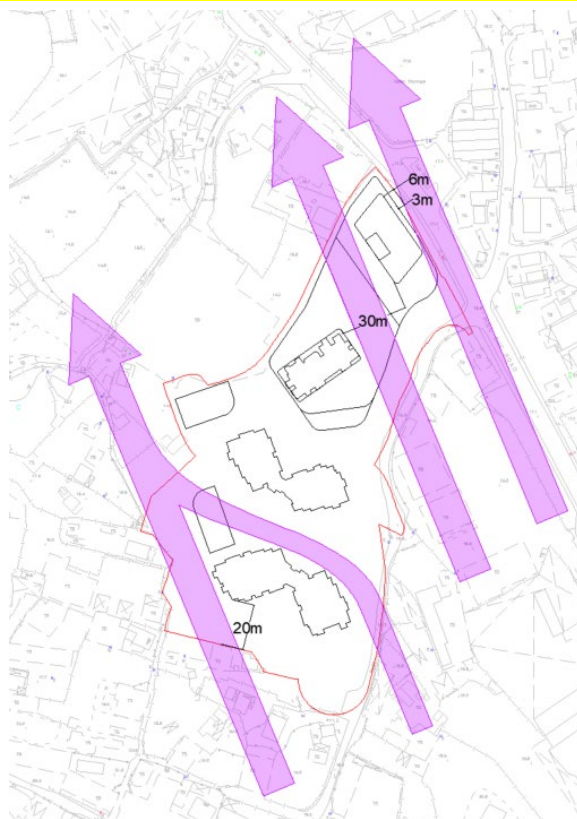


Figure 5-6 Zoom in plan for the SSE wind flow pattern

OZP Compliance Scheme with Proposed Development

5.6.4. Under the OZP compliance scheme, since there are no mid-rise or high-rise buildings at the

upwind area, the SSE 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.

5.6.5. 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

5.6.6. With the consideration of NTN Development, the upwind area is expected to have a planned PR6.5 commercial zone with height of 195mPD, 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 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.

5.6.7. 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.

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

5.7. Wind Flow from SSW Direction

5.7.1. **Figure 5j** illustrates the wind flow at the Application Site under OZP compliance scheme, while **Figure 5k** illustrates the wind flow at the Application Site in consideration of NTN Development Scheme, under SSW direction.

OZP Compliance Scheme without Proposed Development

5.7.2. Before the development, the wind flows through the application site without obstruction. Under the OZP compliance scheme, the upwind area consists of open space, agriculture land and green belt, the SSW wind flows towards downwind area, such as industrial zone, Ping

Che New Village and open space.

- 5.7.3. Upon the SSW wind reaching the Application Site, it is expected to flow along the 2 paths: through the wind path along the local road at the east of the site, and the wind path at the west portion of the site. **Figure 5-7** illustrates the prevailing N wind flow pattern.

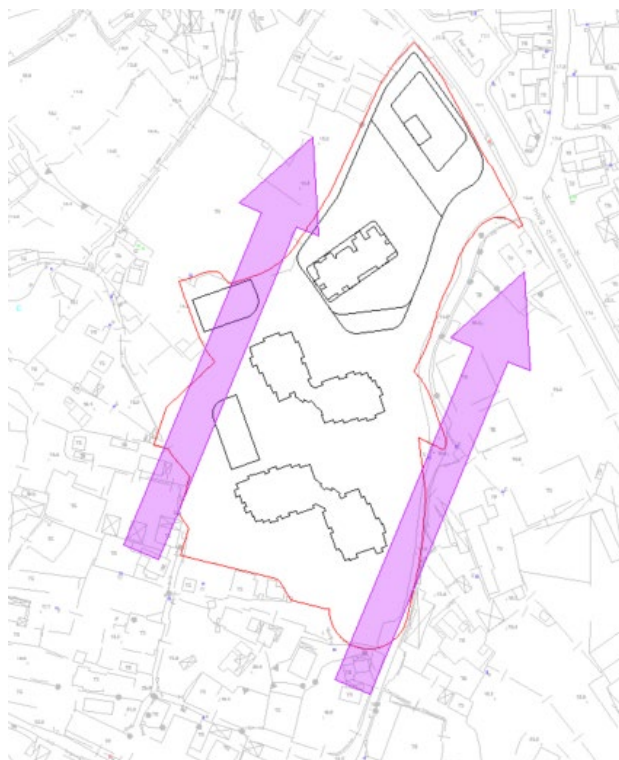


Figure 5-7 Zoom in plan for the SSW wind flow pattern

OZP Compliance Scheme with Proposed Development

- 5.7.4. Under the OZP compliance scheme, since there are no mid-rise or high-rise buildings at the upwind area, the SSW wind is expected to pass through the Proposed Development to reach the downwind area, i.e. industrial zone, Ping Che New Village and open space. The good design features such as the vast opening at ground level PTT, reduce in clubhouse's building height and ground coverage area 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

- 5.7.5. With the consideration of NTN Development, the upwind area is expected to have a planned PR6.5 commercial zone with expected height of 210mPD. The planned high rise building at

upwind location is expected to block the upcoming SSW 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.

5.7.6. Nevertheless, the Proposed Development is adopted with good design features, such as the vast opening at ground level PTT and reduce in clubhouse's building height and ground coverage area 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.

5.7.7. 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.

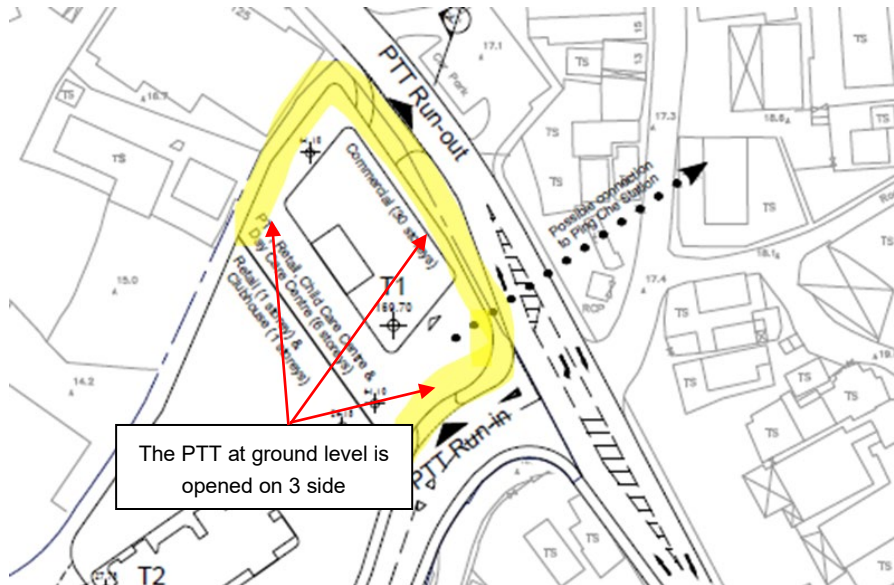


Figure 6-1 Ground Floor Layout Plan

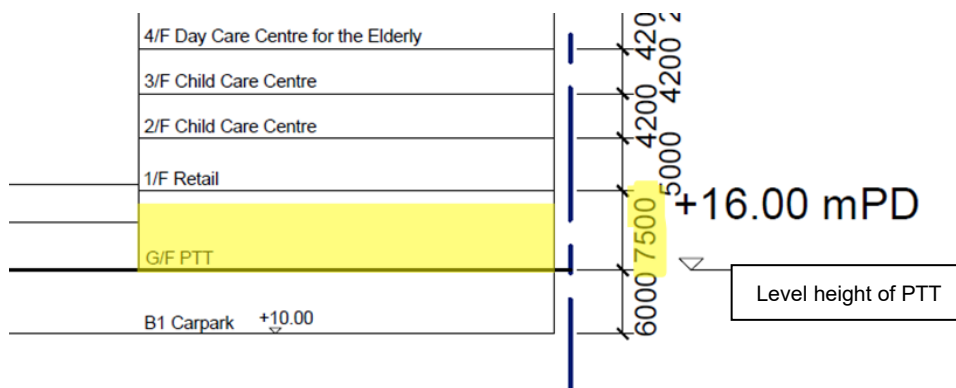


Figure 6-2 Cross section of Layout

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**.

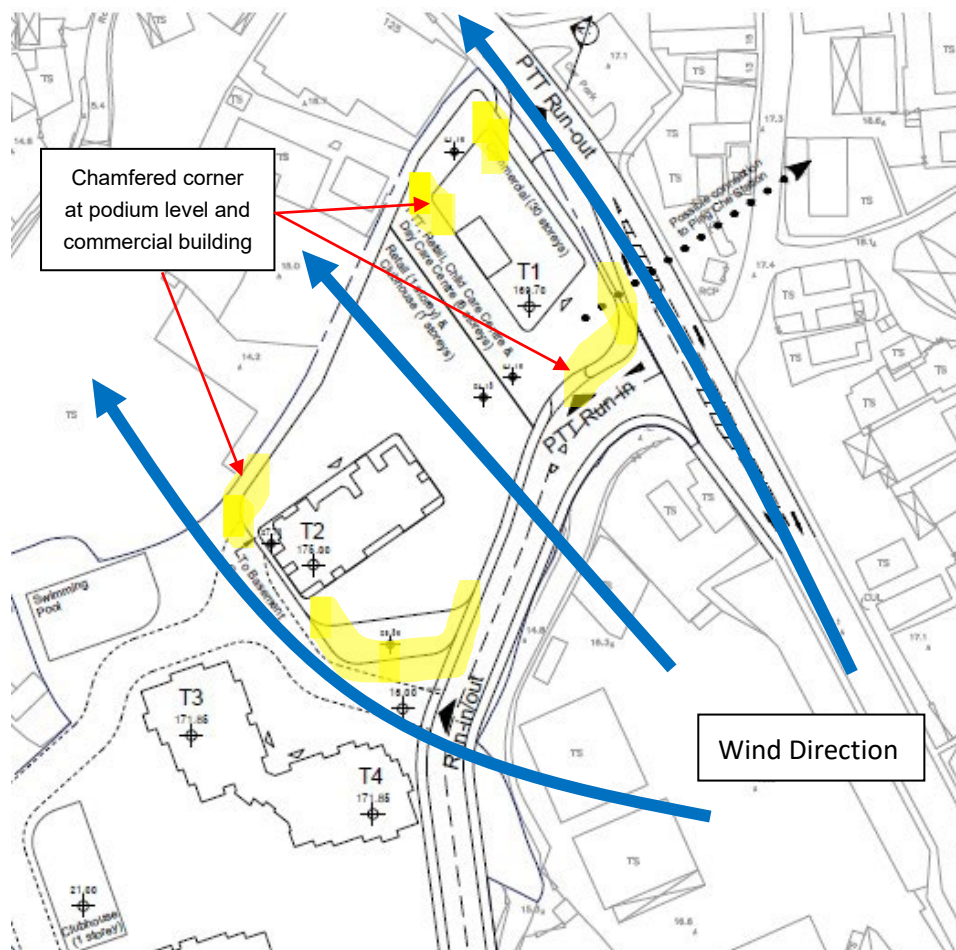


Figure 6-3 Layout Plan of Chamfered Building Corner

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.

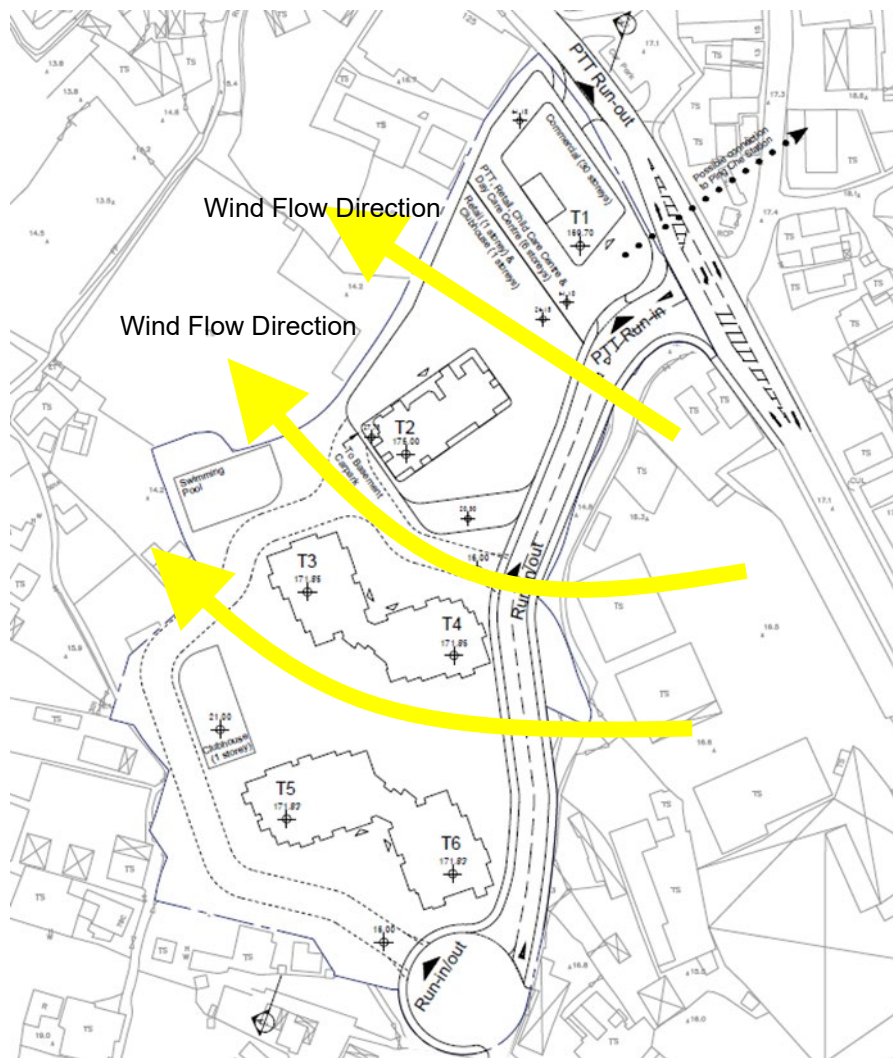


Figure 6-4 Layout of Building Orientation

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 example of layout and the gap distance for ESE direction are illustrated in **Figure 6-5** and **Appendix C**. The layout of building separation for each wind flow of E, SE and SSE are illustrated in **Figure 5-8**, **Figure 5-12** and **Figure 5-15** respectively in **Section 5**.

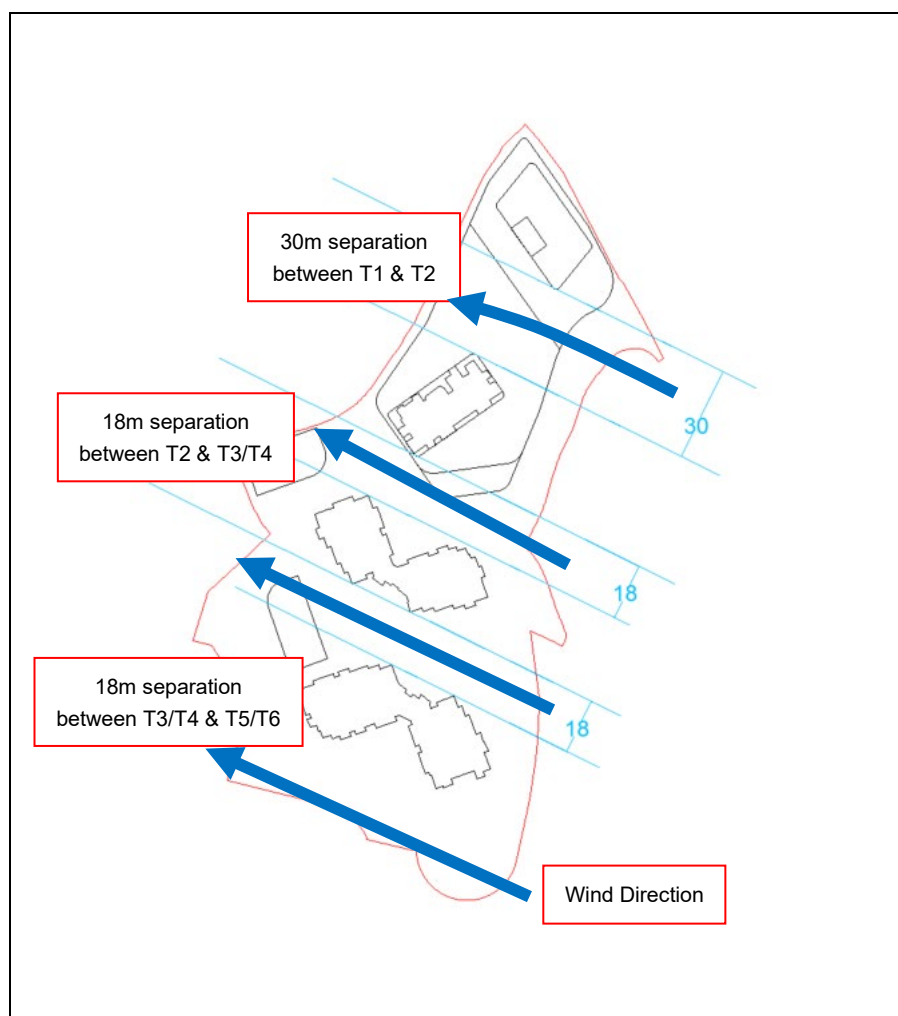


Figure 6-5 Building Gap Separation of Proposed Development

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.

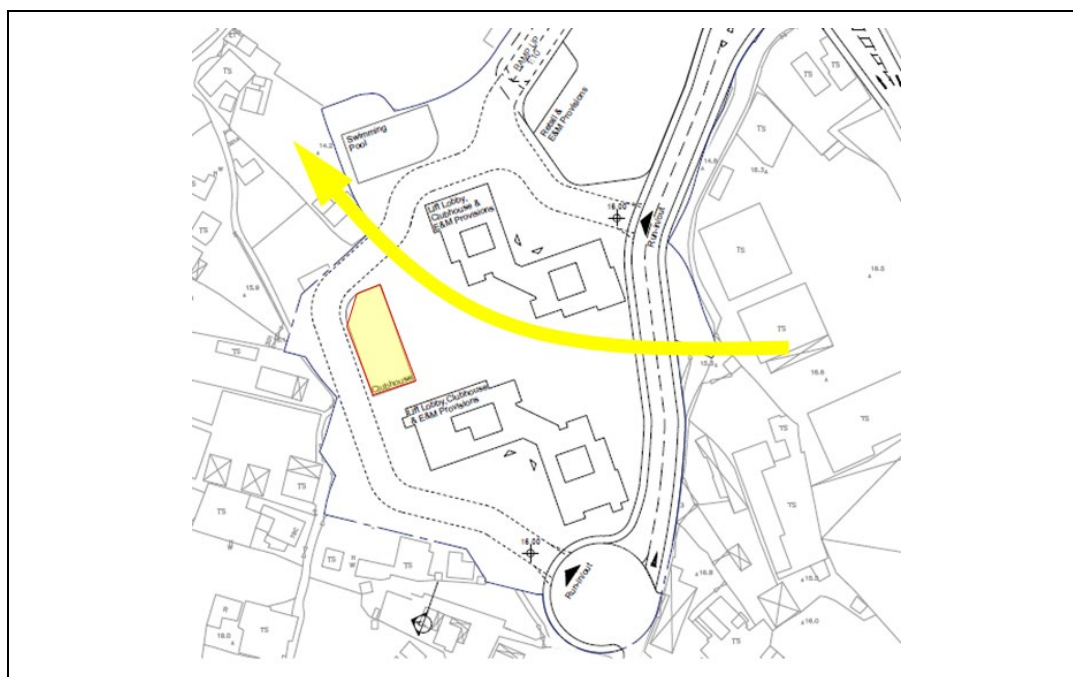


Figure 6-6 Comparison of Clubhouse Layout Plan

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.

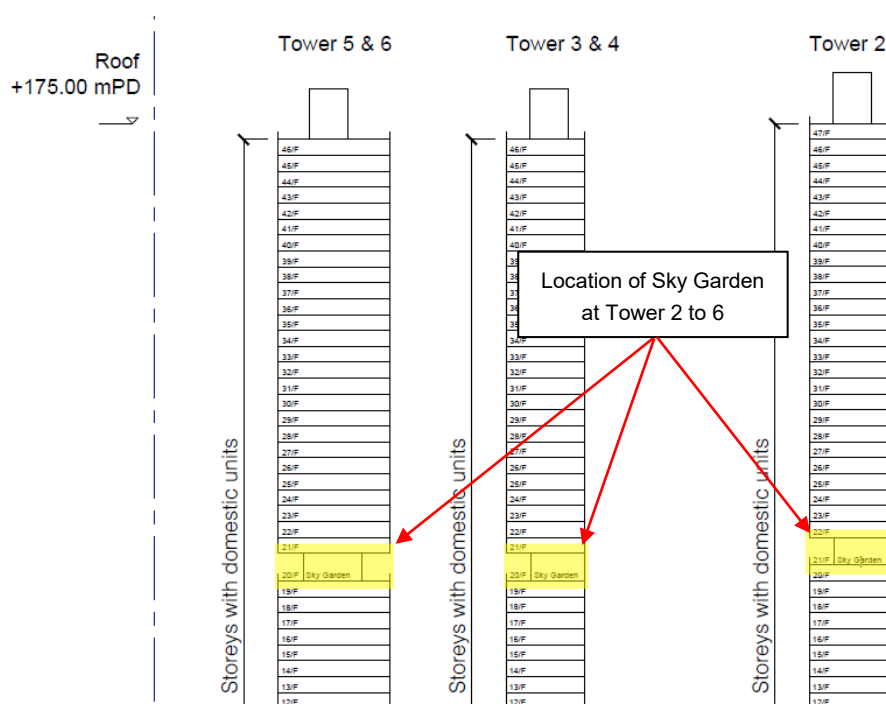


Figure 6-7 Section Layout of Sky Garden

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 site boundary to building structure are as below:

- Northeast (to podium) : 3m
- Northeast (to commercial tower T1) : 6m
- North (to podium) : 4m
- North (to commercial tower T1) : 12m
- 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 ENE, E, ESE, 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** and **Appendix C**. **The wind flow facilitated by the building setback are illustrated in Figure 5-7, Figure 5-8, Figure 5-11, Figure 5-12 and Figure 5-15 in Section 5 respectively for each wind flow direction.**

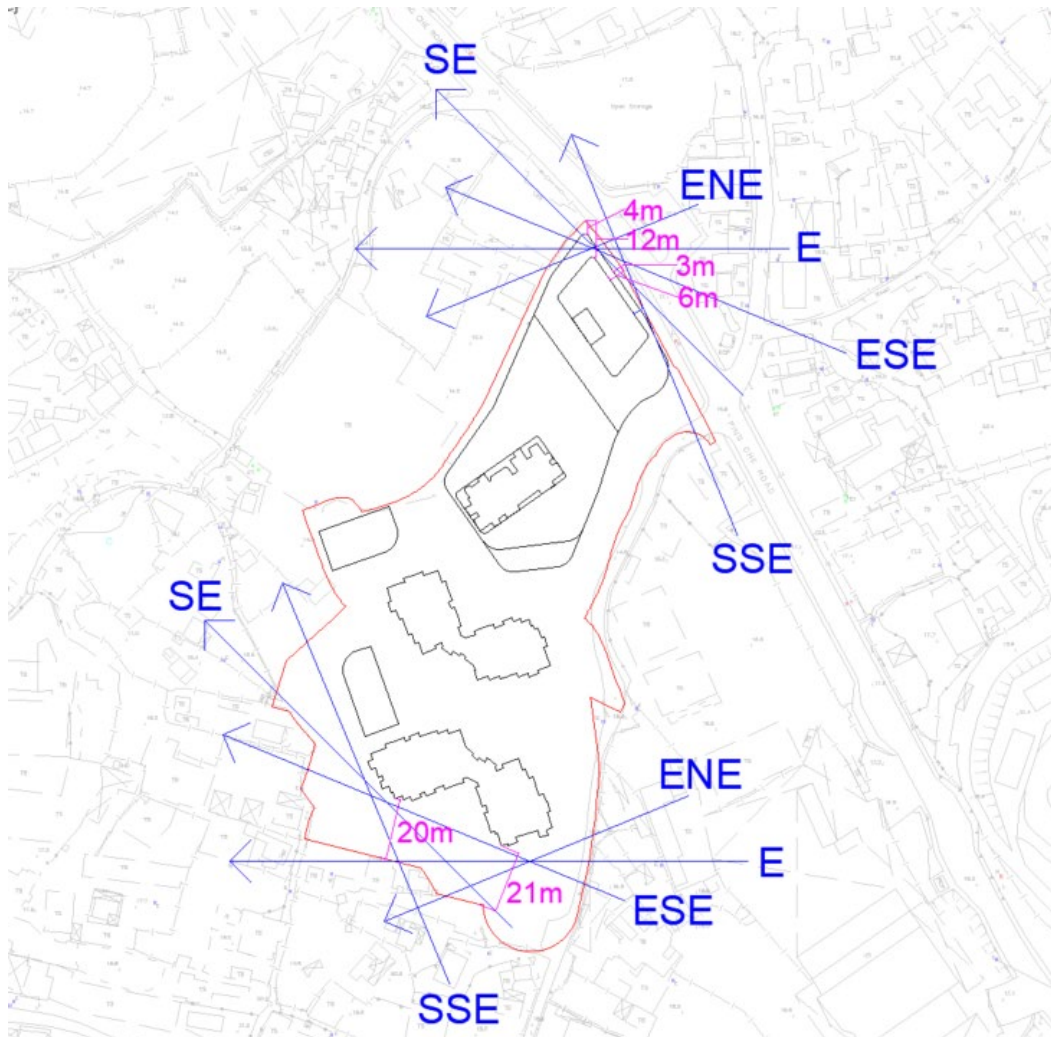


Figure 6-8 Layout of Building Setback with Wind Air Path

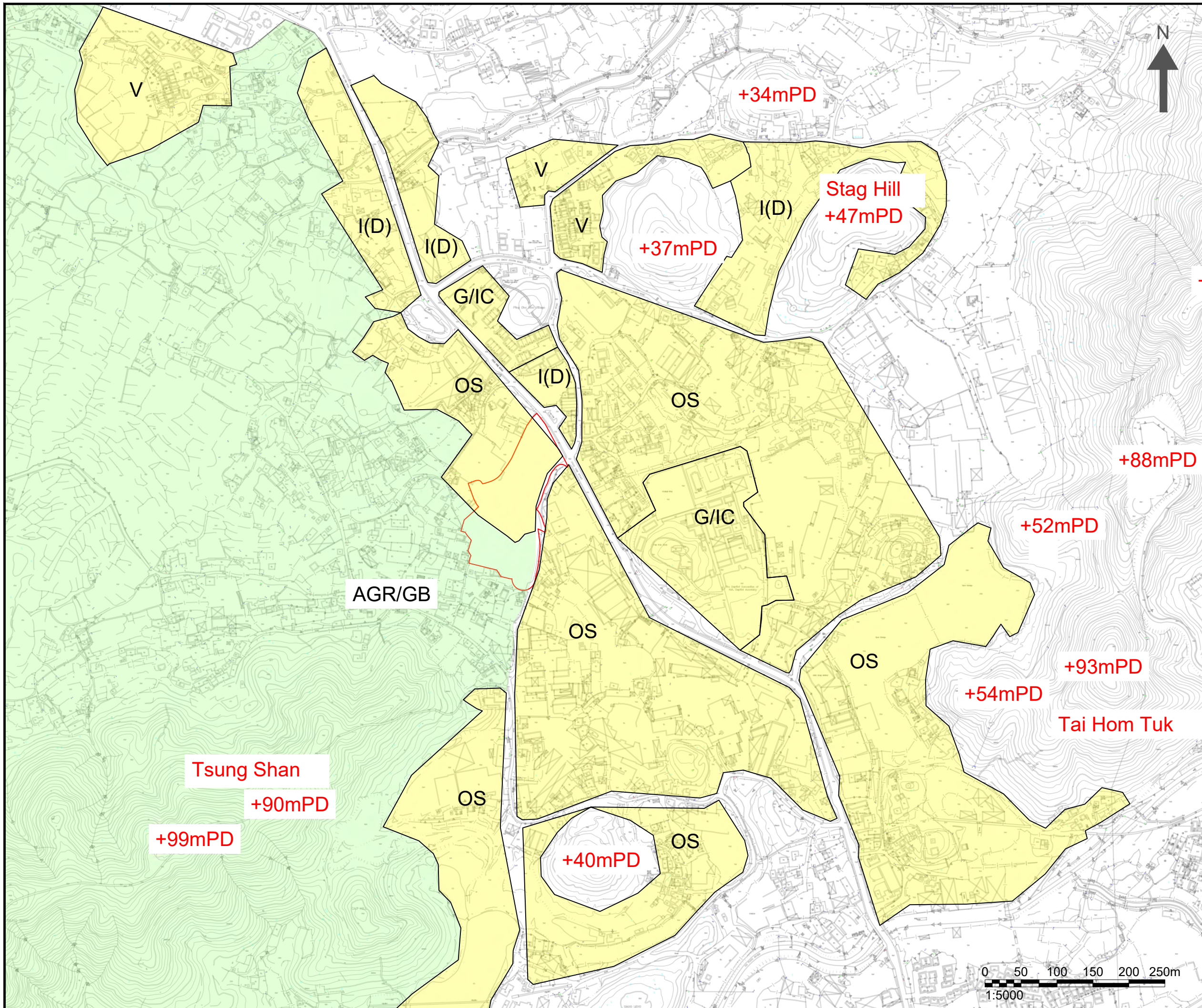
7. CONCLUSION

- 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 optimization as recommended. As significant wind deterioration on district level after the construction of proposed development is not anticipated.

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

Figure



NOTES :

- APPLICATION SITE
- EXISTING ZONING
-

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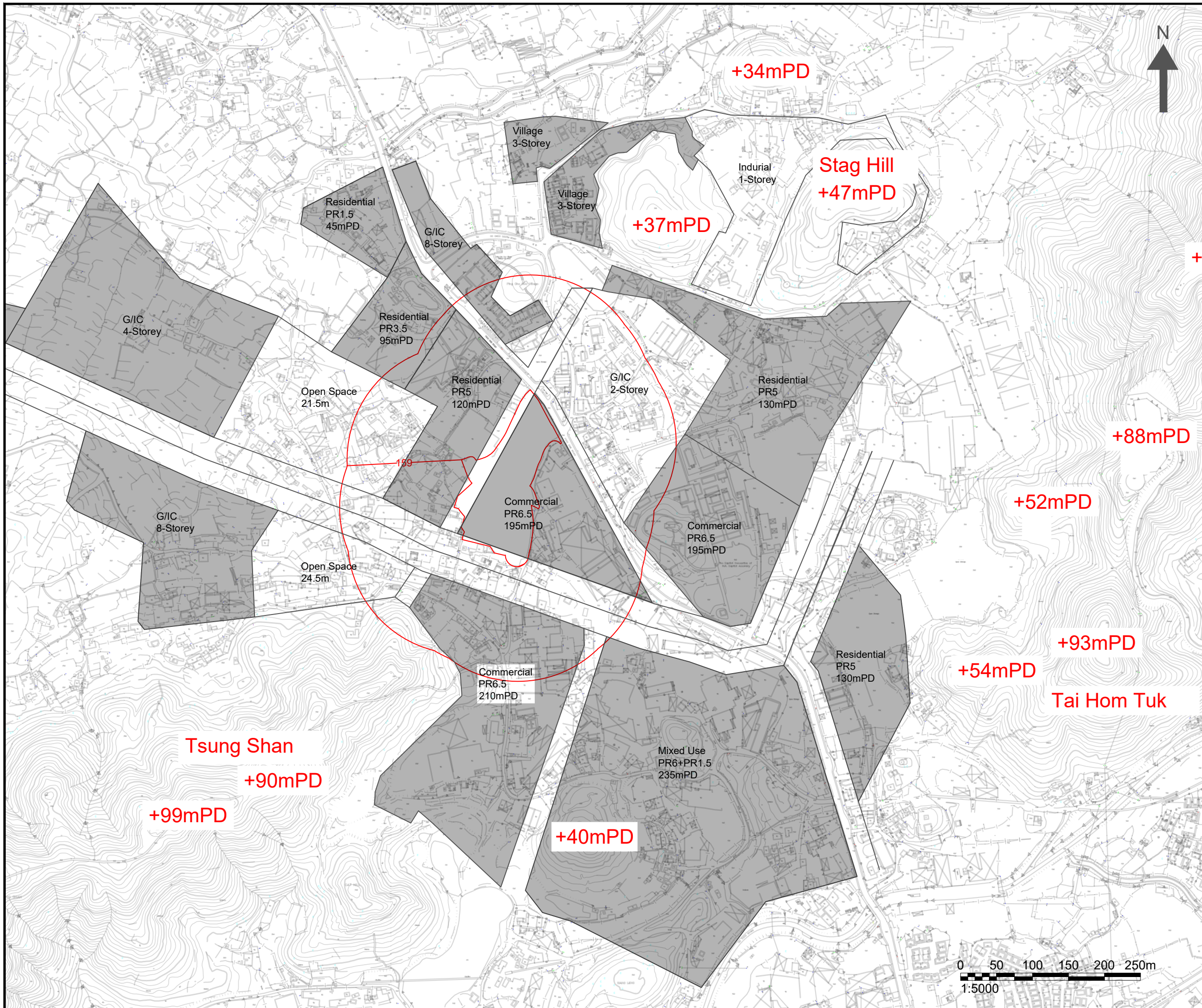
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 Drawing By : SC

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

Drawing Title :
 EXISTING ZONING AND APPLICATION SITE

Drawing No : FIGURE 4a	Revision : 1
Scale : AS SHOWN	Date : FEB 2024

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NOTES :

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- NTN DEVELOPMENT
- ASSESSMENT AREA

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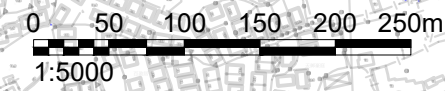
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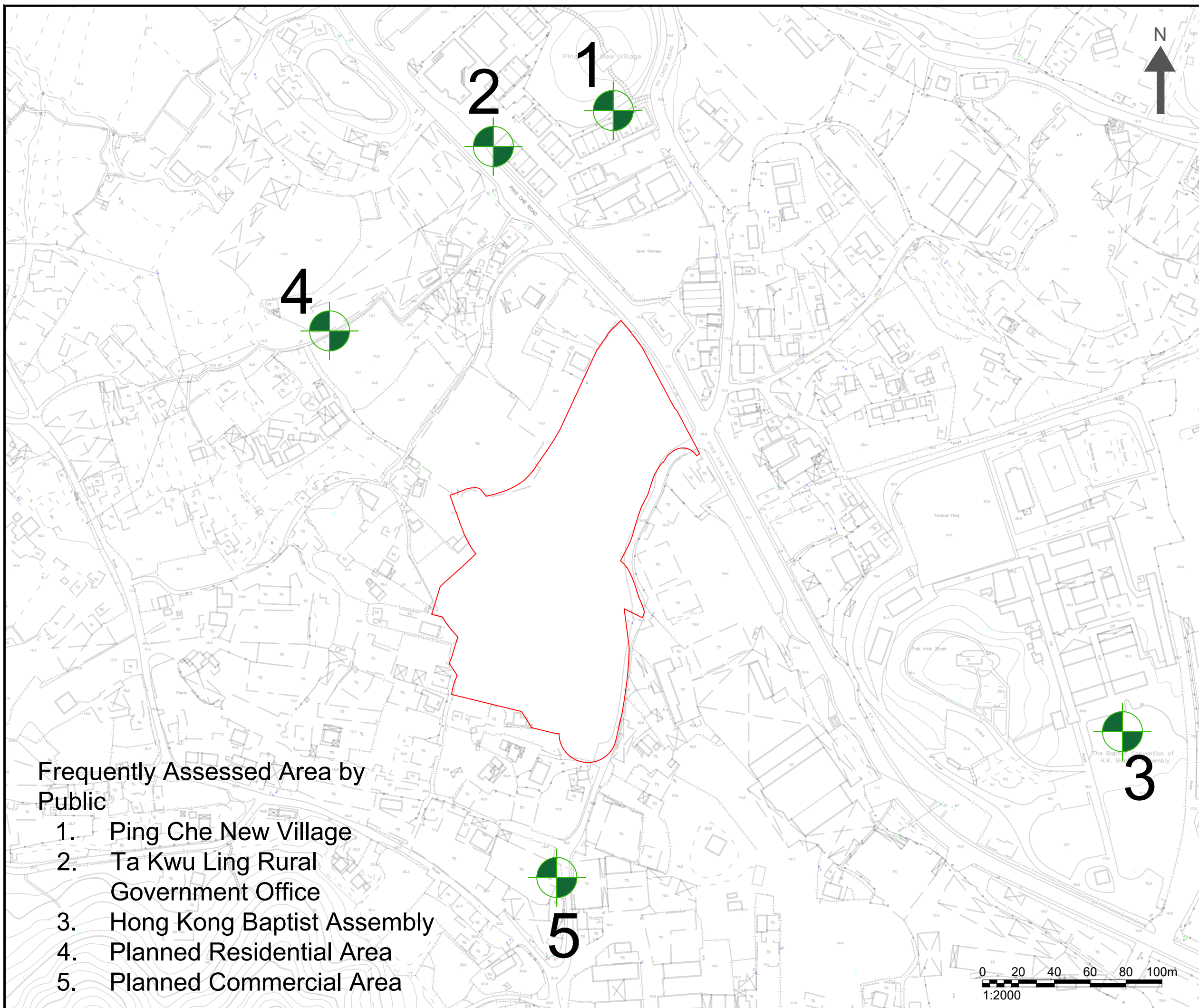
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Drawing No : FIGURE 4b	Revision : 1
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-  FREQUENTLY ASSESSED AREA BY PUBLIC

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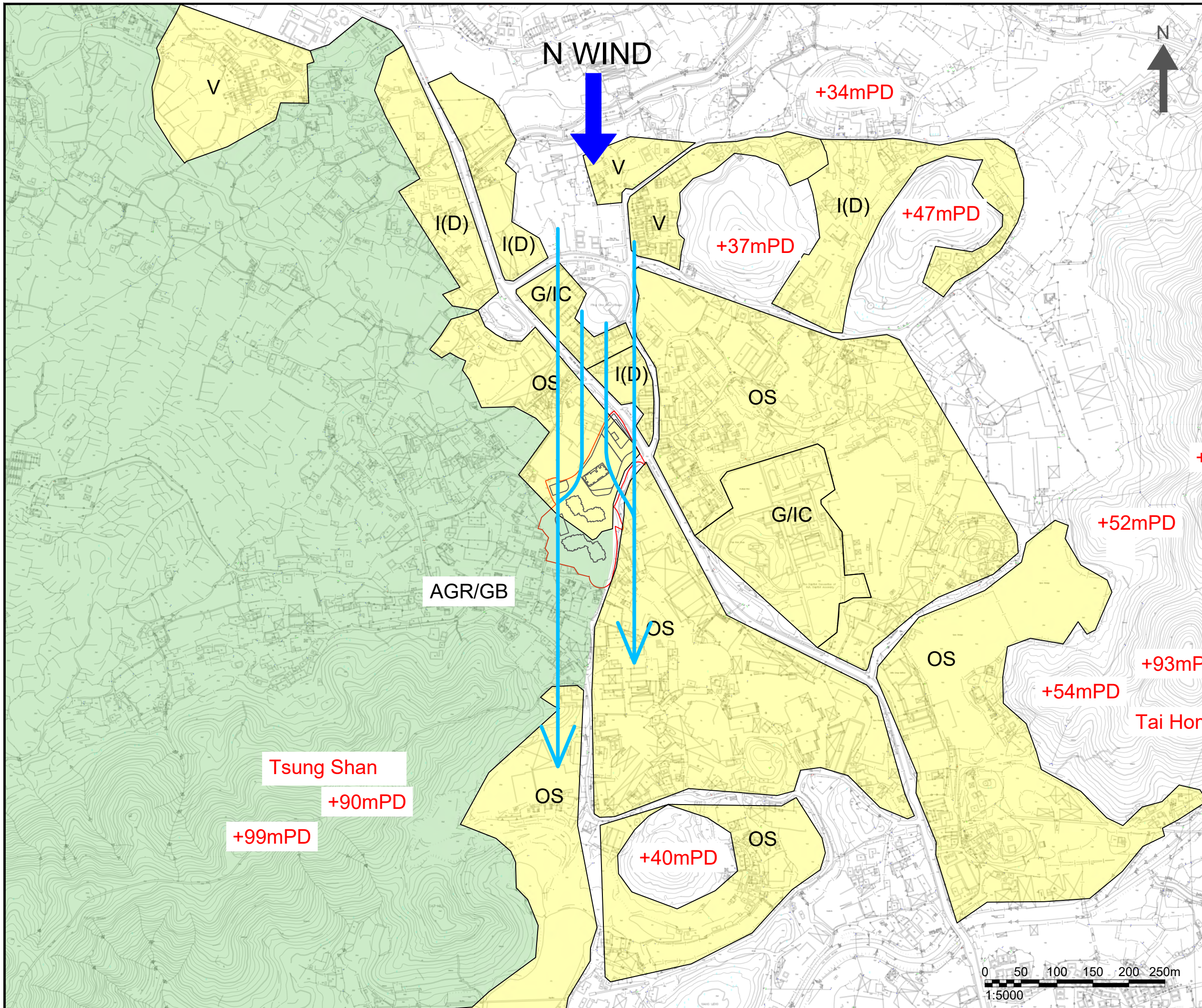
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Frequently Assessed Area by Public


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



NOTES :

- APPLICATION SITE
- EXISTING ZONING
-
- N WIND FLOW

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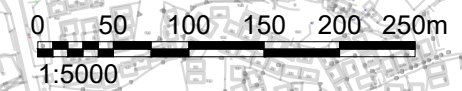
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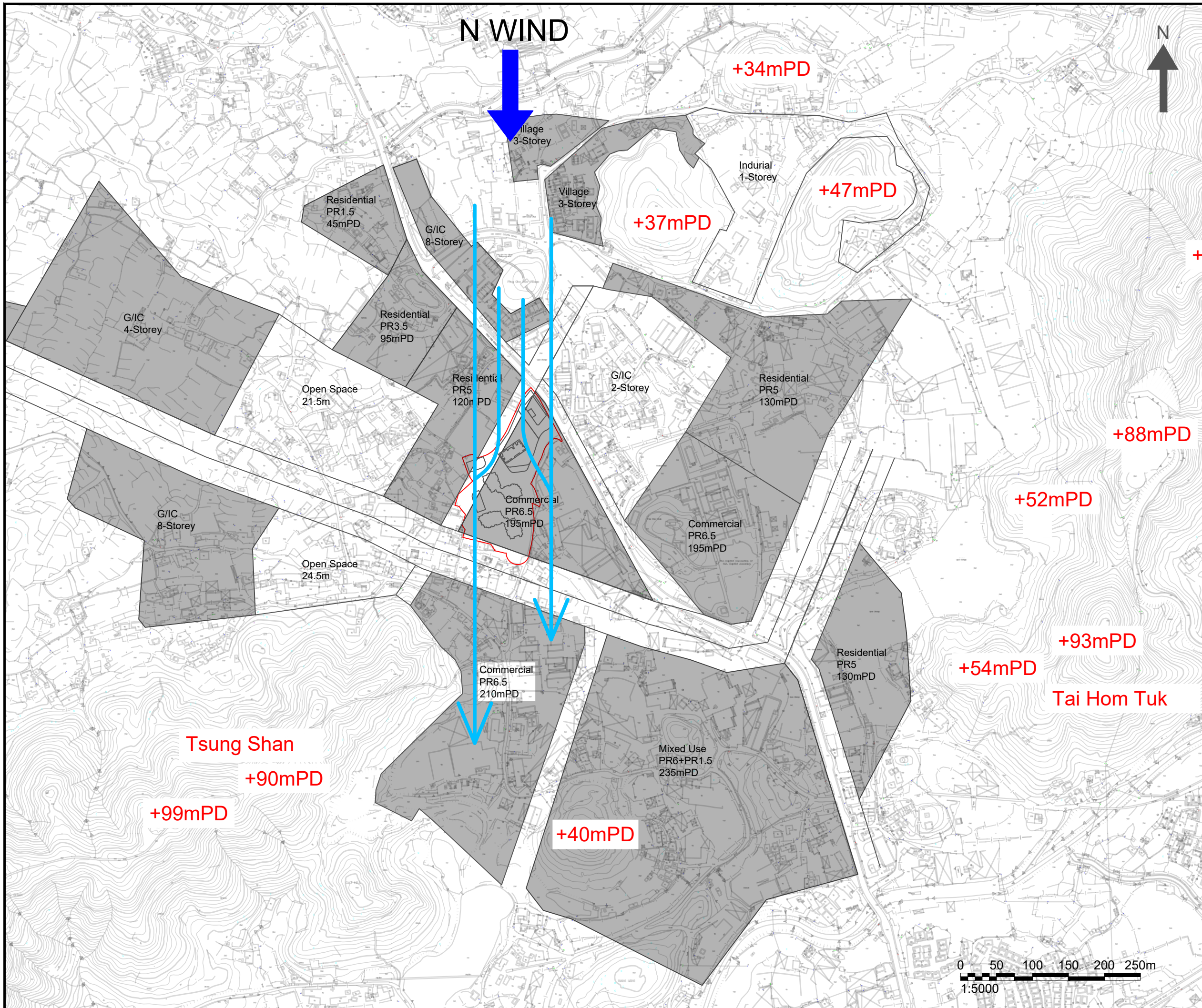
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Drawing Title :
 WIND FLOW FROM N DIRECTION IN OZP COMPLIANCE SCHEME

Drawing No : FIGURE 5b	Revision : 3
Scale : AS SHOWN	Date : JUN 2024

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NOTES :

- APPLICATION SITE
- NTN DEVELOPMENT
- N WIND FLOW

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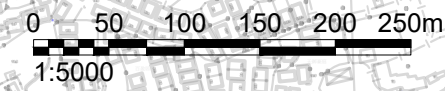
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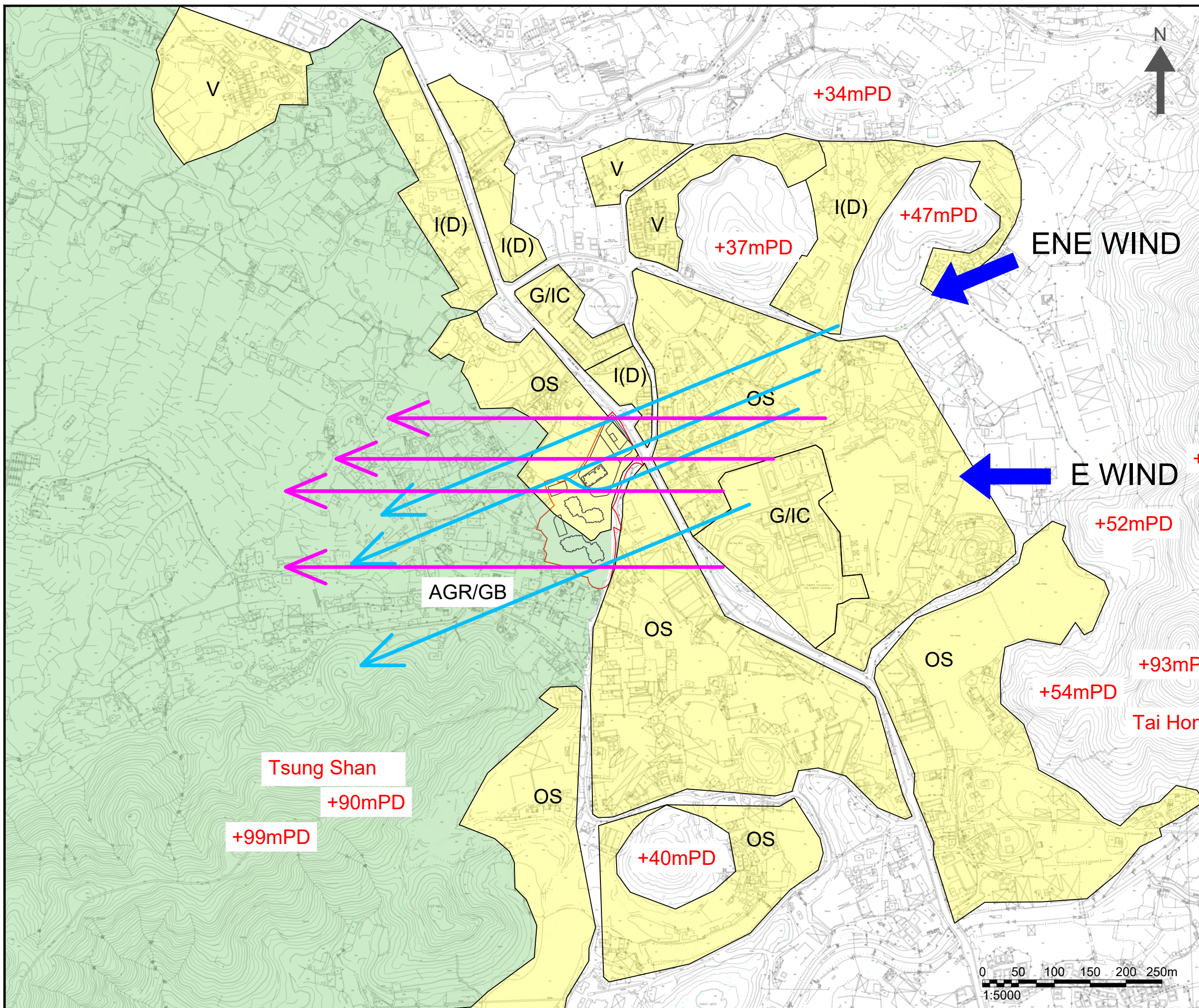
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Drawing Title :
 WIND FLOW FROM NNE DIRECTION IN NTN DEVELOPMENT SCHEME

Drawing No : FIGURE 5c	Revision : 3
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NOTES :

- APPLICATION SITE
- EXISTING ZONING
- EXISTING ZONING
- ENE WIND FLOW
- E WIND FLOW

Consultant



AEC

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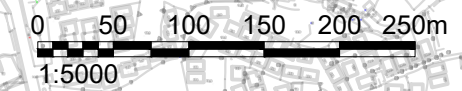
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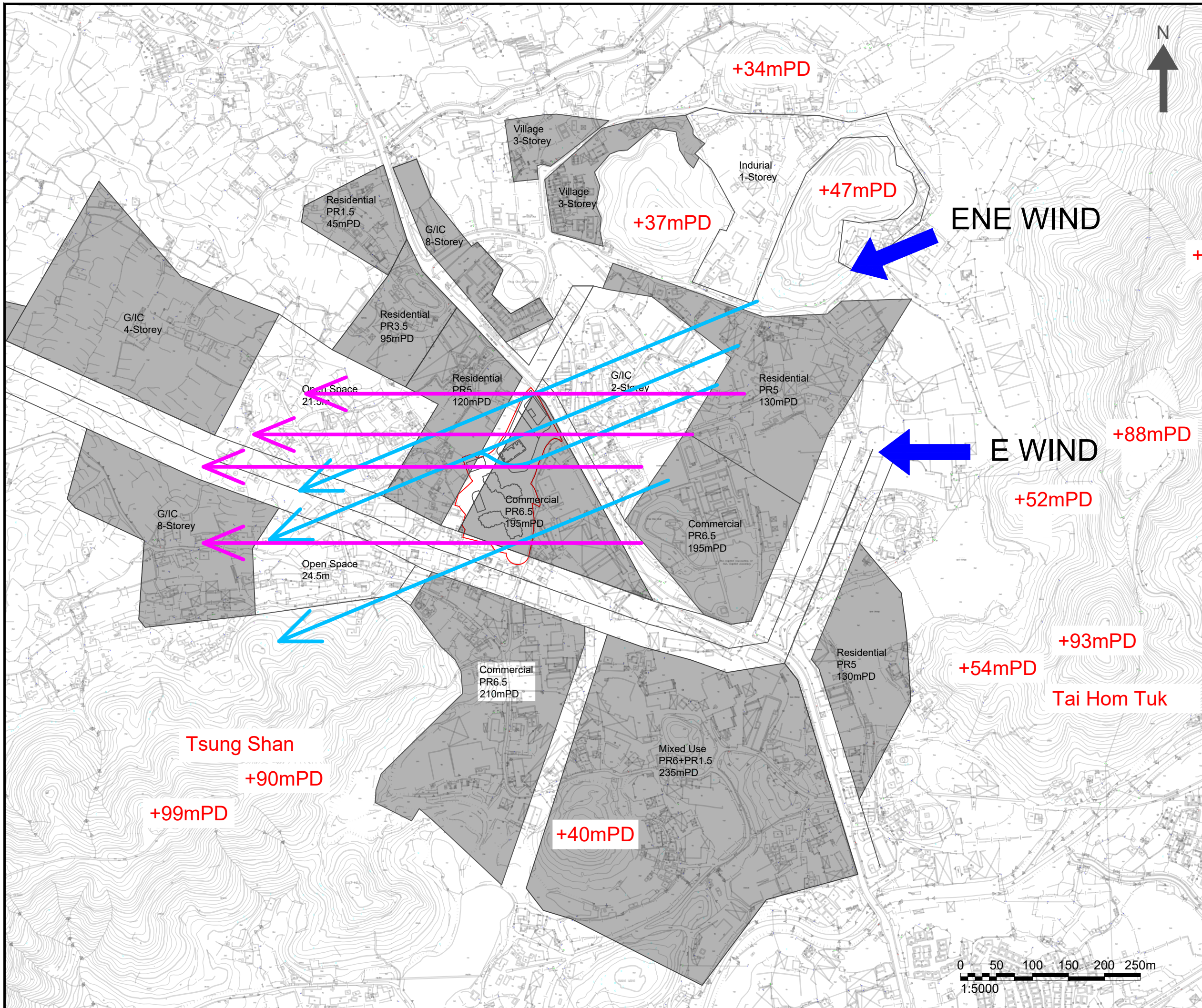
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Drawing Title :
 WIND FLOW FROM ENE & E DIRECTION IN OZP COMPLIANCE SCHEME

Drawing No : FIGURE 5d	Revision : 3
Scale : AS SHOWN	Date : JUN 2024

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NOTES :

- APPLICATION SITE
- NTN DEVELOPMENT
- ← ENE WIND FLOW
- ← E WIND FLOW

Consultant



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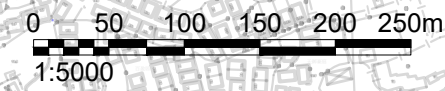
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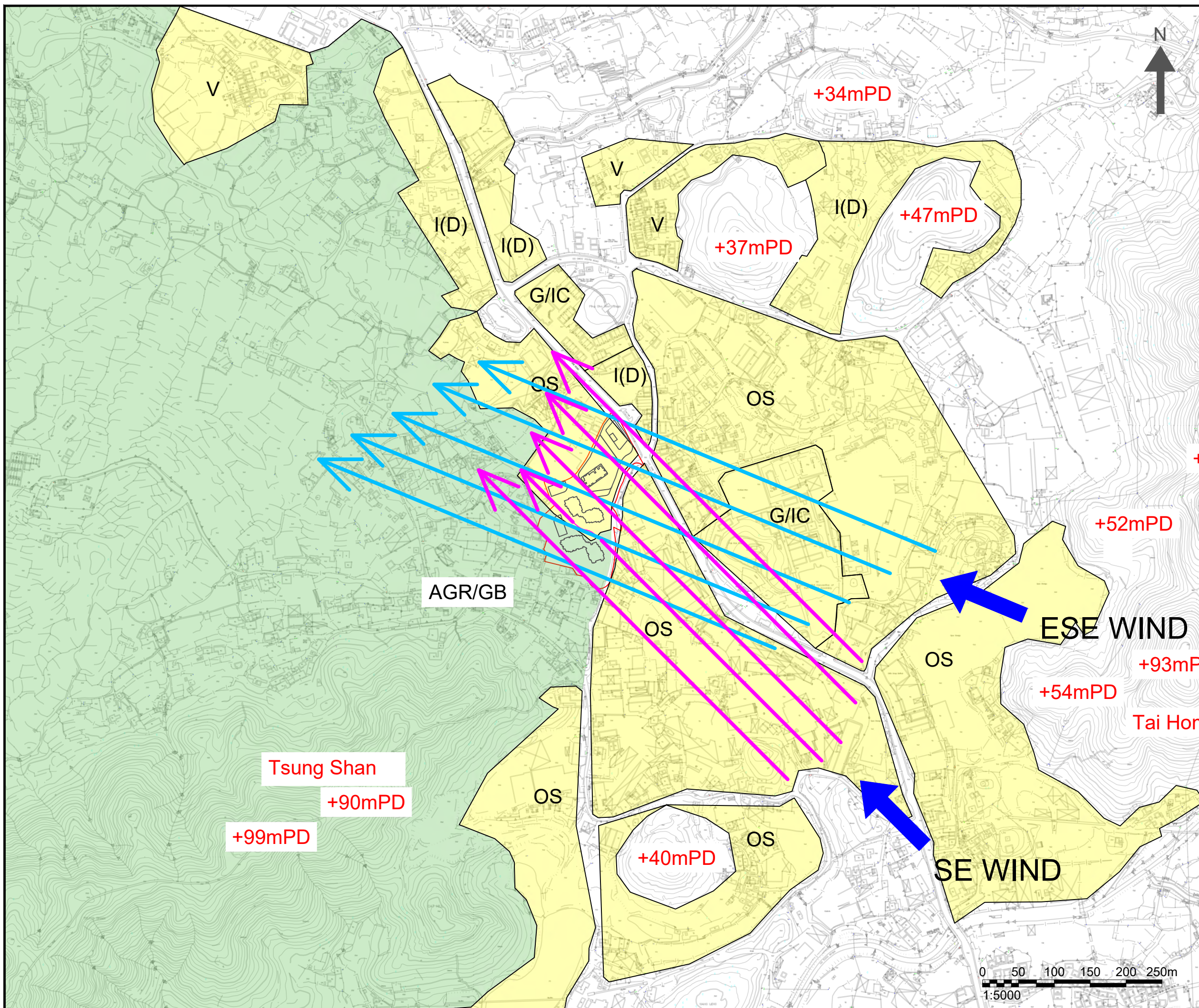
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Drawing Title :
 WIND FLOW FROM ENE & E DIRECTION IN NTN DEVELOPMENT SCHEME

Drawing No : FIGURE 5e	Revision : 3
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NOTES :

- APPLICATION SITE
- EXISTING ZONING
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- ESE WIND FLOW
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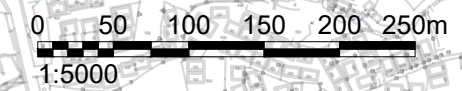
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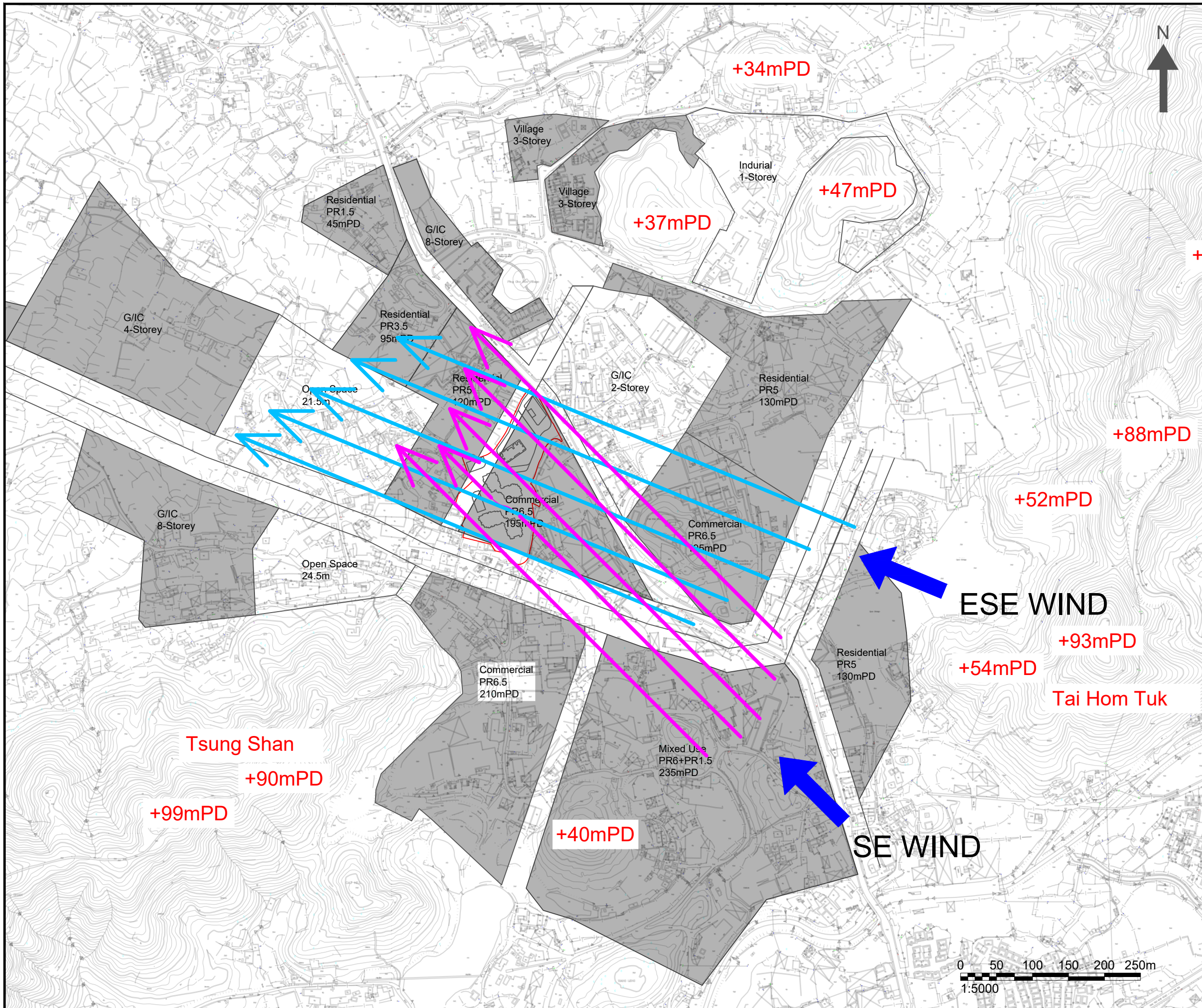
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Drawing Title :
 WIND FLOW FROM ESE & SE DIRECTION IN OZP COMPLIANCE SCHEME

Drawing No : FIGURE 5f	Revision : 3
Scale : AS SHOWN	Date : JUN 2024

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NOTES :

- APPLICATION SITE
- NTN DEVELOPMENT
- ENE WIND FLOW
- E WIND FLOW

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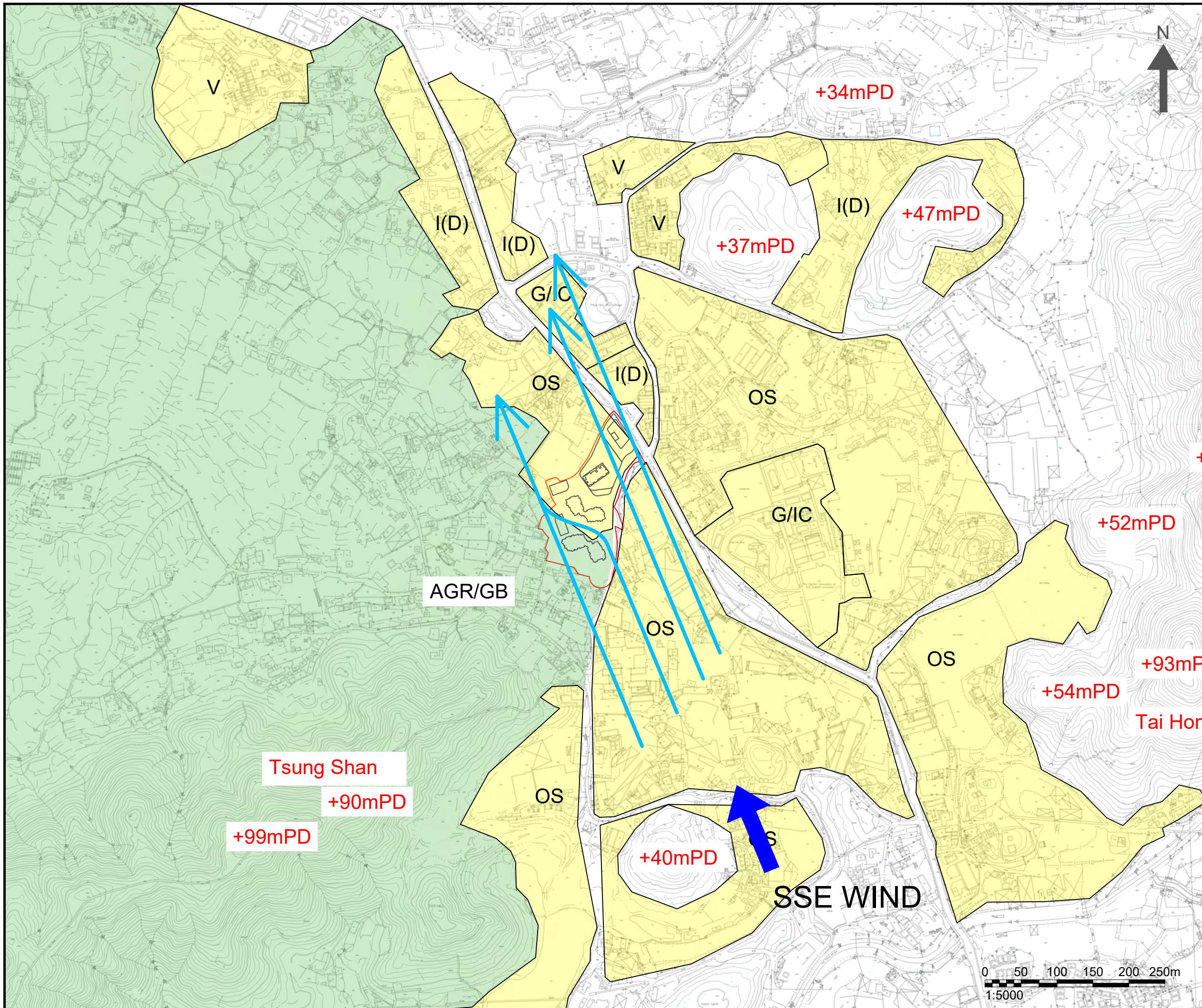
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Drawing Title :
 WIND FLOW FROM ESE & SE DIRECTION IN NTN DEVELOPMENT SCHEME

Drawing No : FIGURE 5g	Revision : 3
Scale : AS SHOWN	Date : JUN 2024

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NOTES :

- APPLICATION SITE
- EXISTING ZONING
- EXISTING ZONING
- SSE WIND FLOW

Consultant



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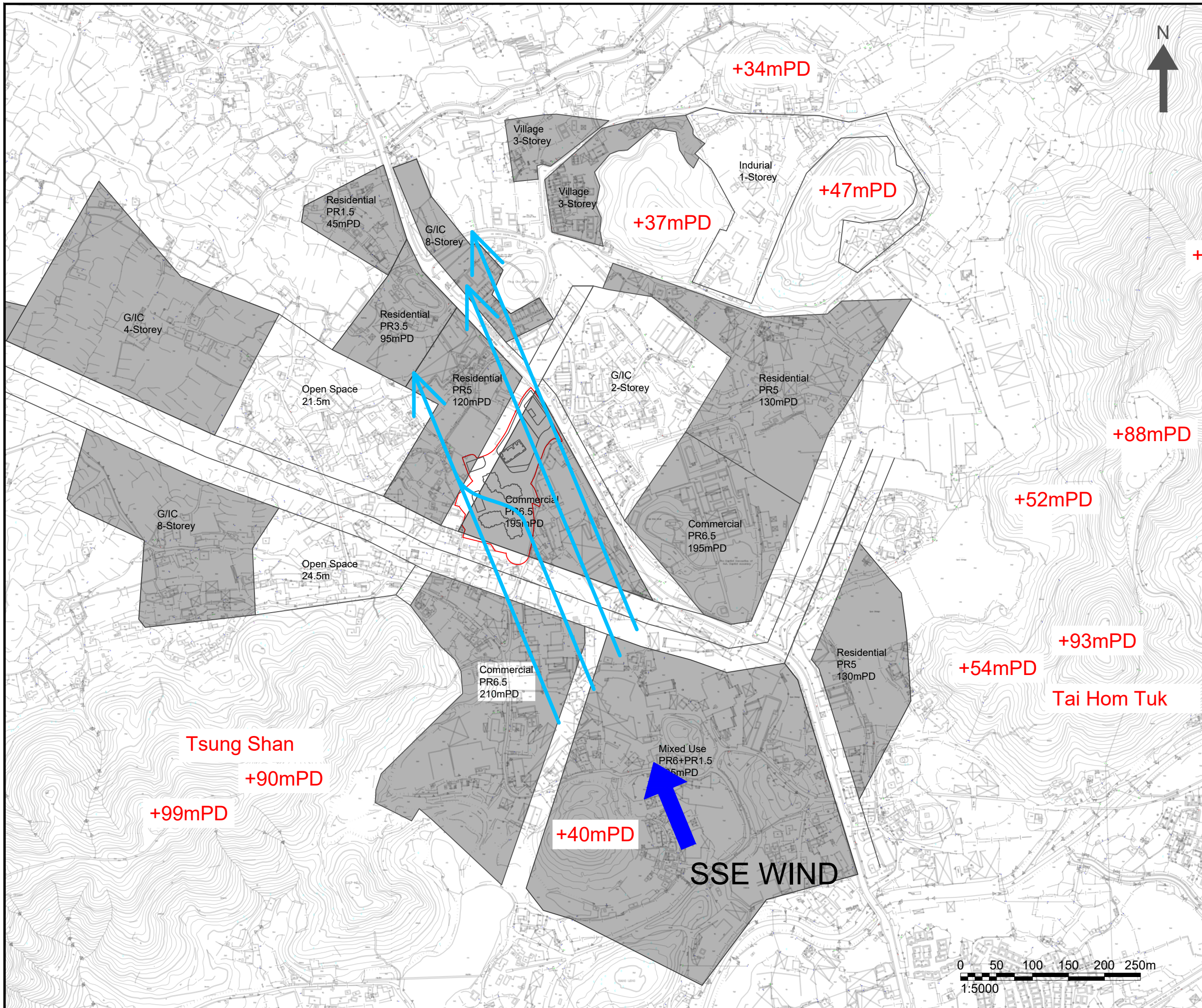
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Drawing Title :
 WIND FLOW FROM SSE DIRECTION IN OZP COMPLIANCE SCHEME

Drawing No : FIGURE 5h	Revision : 3
Scale : AS SHOWN	Date : JUN 2024

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NOTES :

- APPLICATION SITE
- NTN DEVELOPMENT
- SSE WIND FLOW

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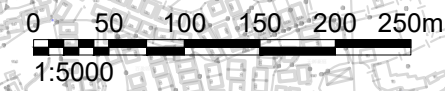
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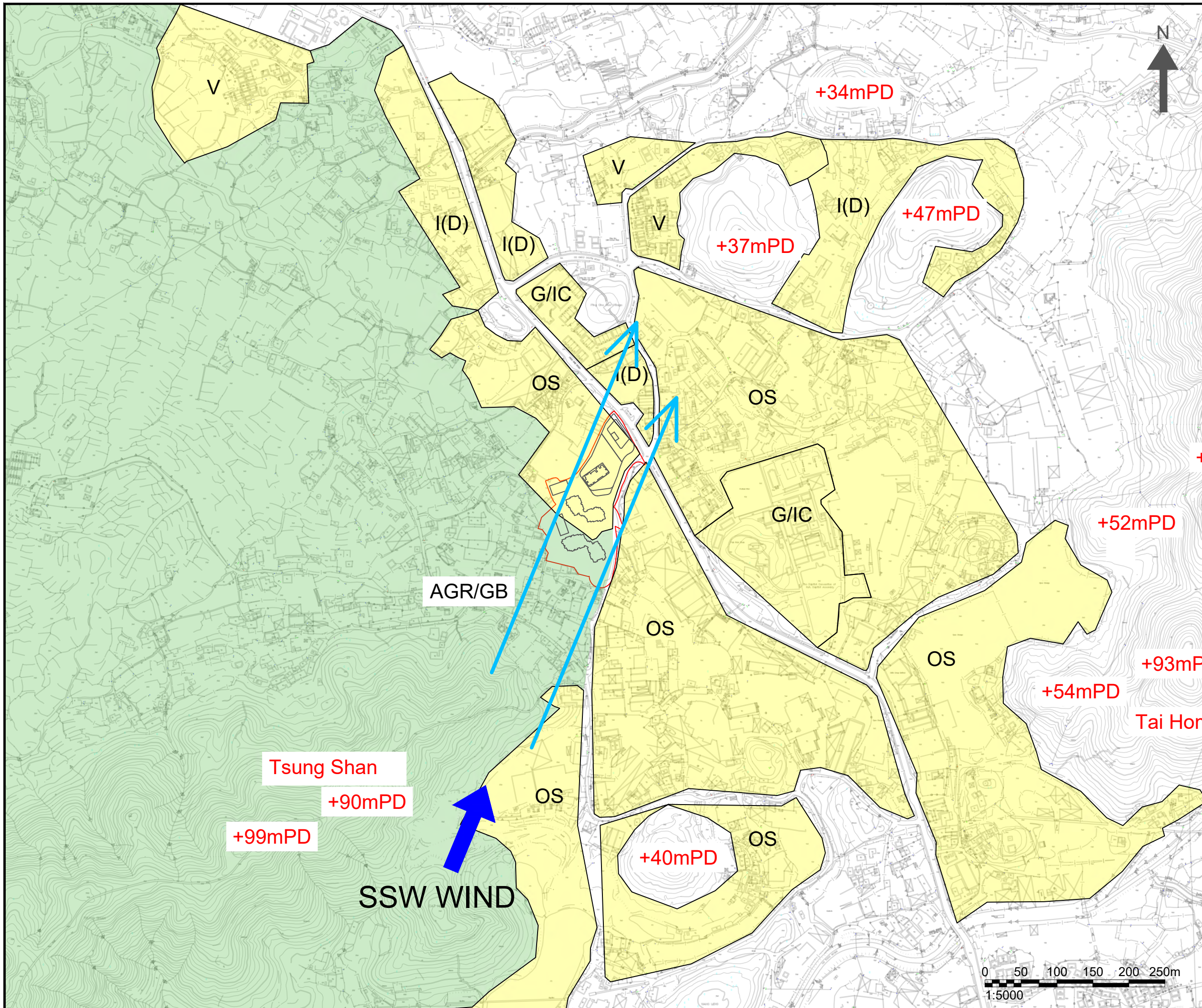
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Drawing Title :
 WIND FLOW FROM SSE DIRECTION IN NTN DEVELOPMENT SCHEME

Drawing No : FIGURE 5i	Revision : 3
Scale : AS SHOWN	Date : JUN 2024

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NOTES :

- APPLICATION SITE
- EXISTING ZONING
- EXISTING ZONING
- SSW WIND FLOW

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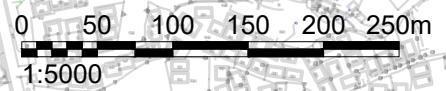
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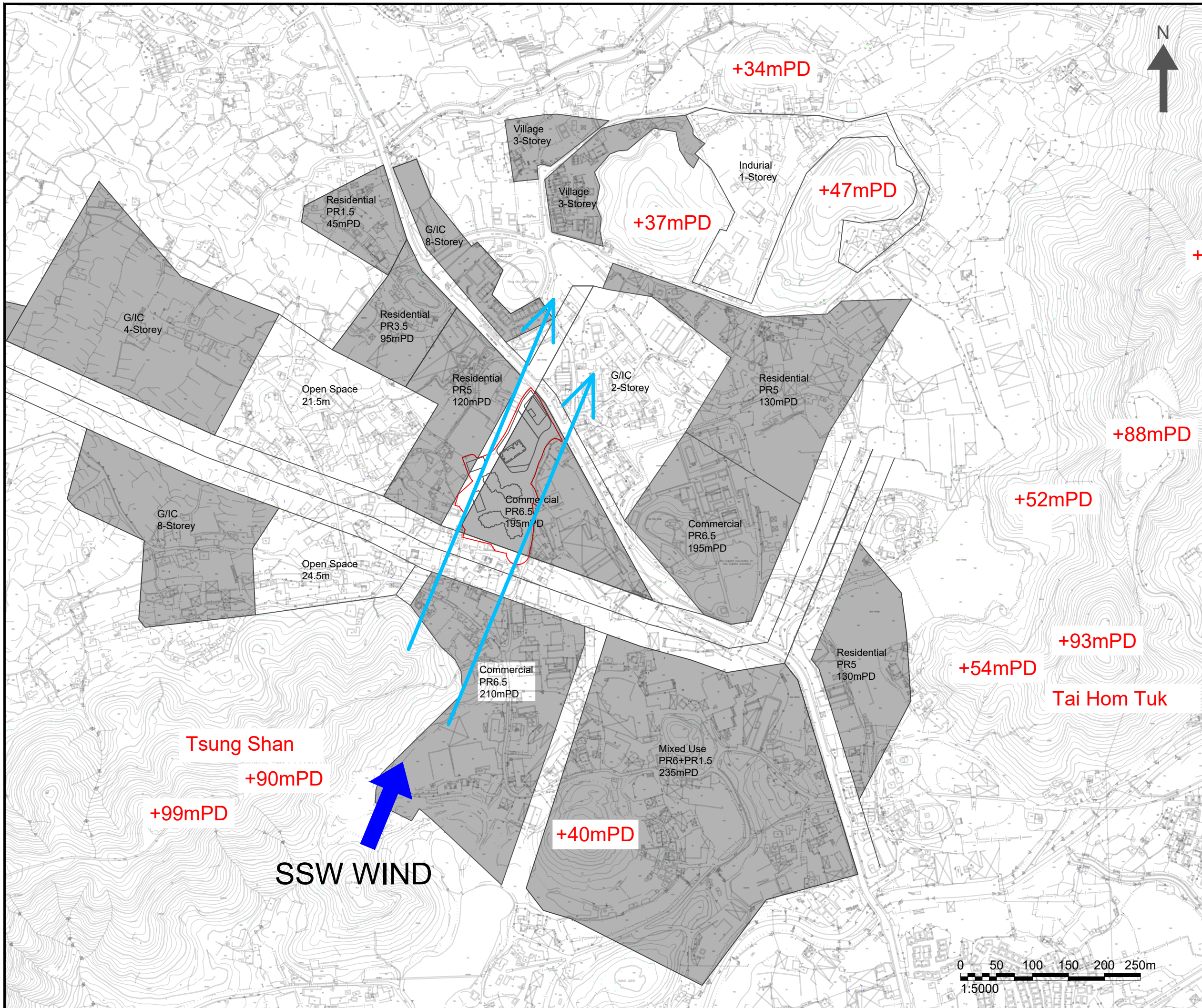
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Drawing Title :
 WIND FLOW FROM SSW DIRECTION IN OZP COMPLIANCE SCHEME

Drawing No : FIGURE 5j	Revision : 3
Scale : AS SHOWN	Date : JUN 2024

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NOTES :

- APPLICATION SITE
- NTN DEVELOPMENT
- SSW WIND FLOW

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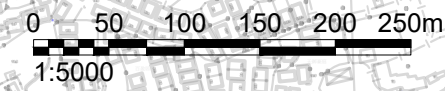
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 Drawing By : CS

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Drawing Title :
 WIND FLOW FROM SSW DIRECTION IN NTN DEVELOPMENT SCHEME

Drawing No : FIGURE 5k	Revision : 3
Scale : AS SHOWN	Date : JUN 2024

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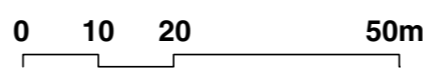
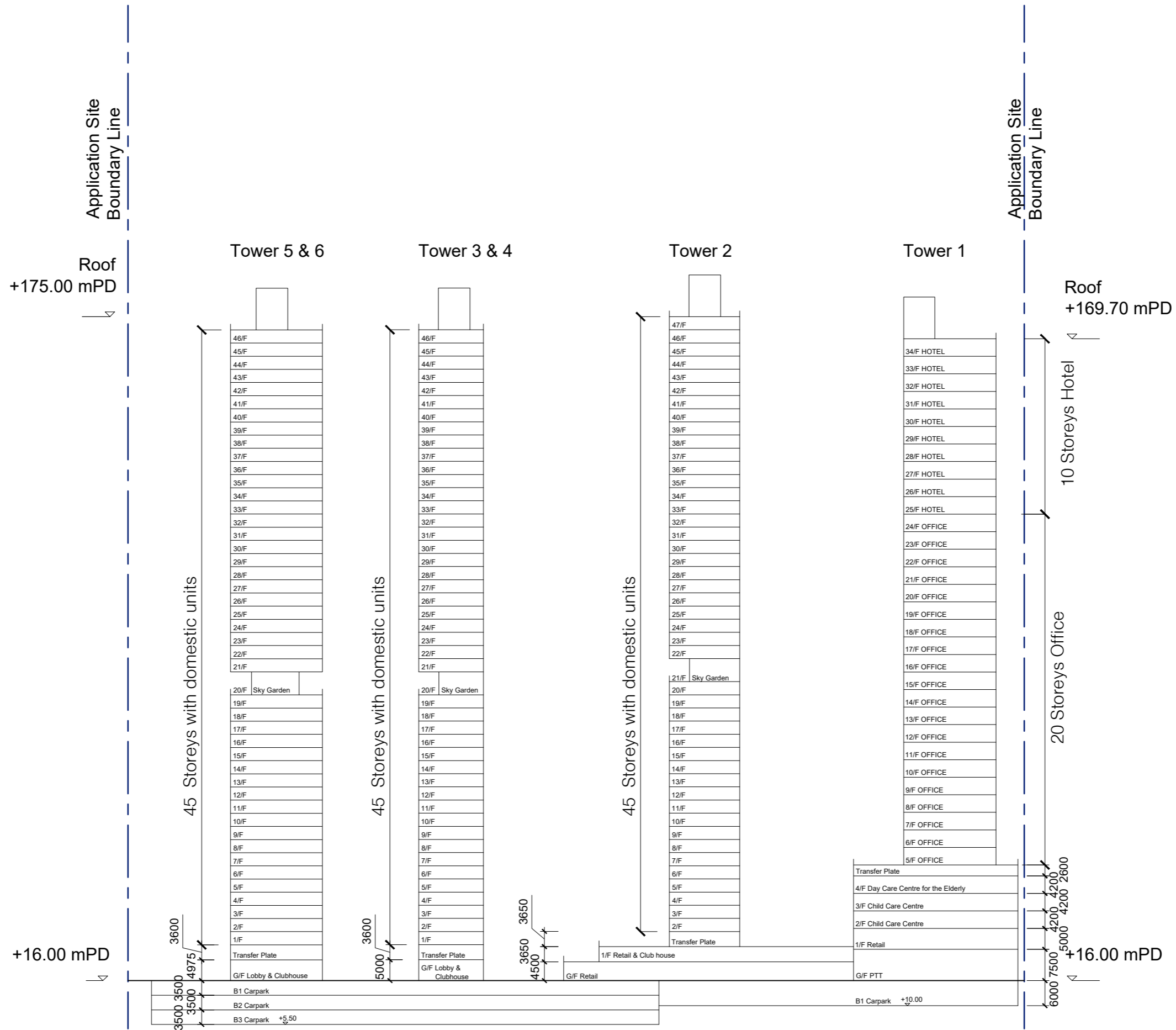
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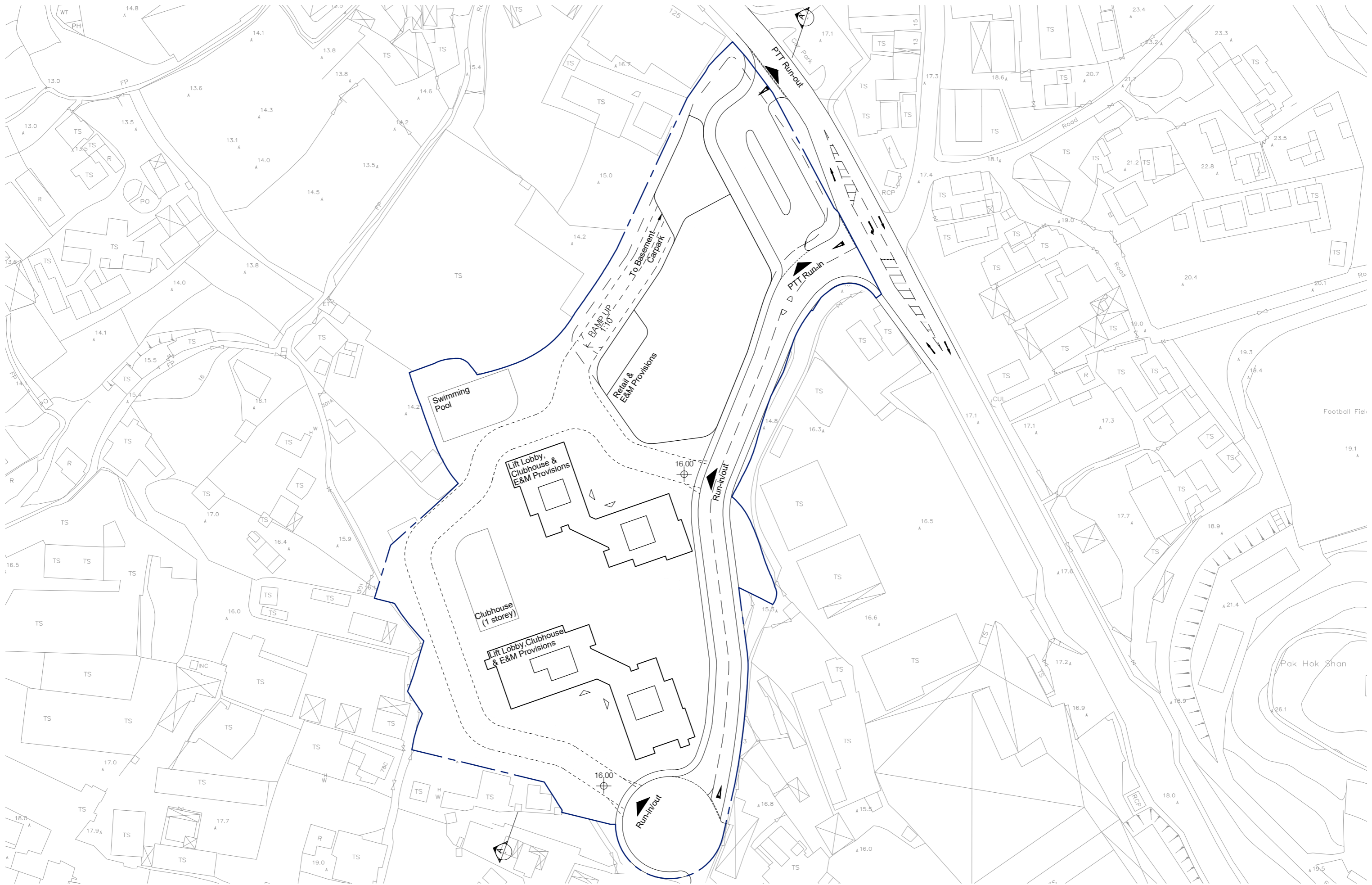
AIR VENTILATION ASSESSMENT - EXPERT EVALUATION for APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A FOR THE TOWN PLANNING ORDINANCE (CAP. 131) FOR MIXED USE DEVELOPMENT AT LOTS 796 AND 1008RP IN D.D. 77 AND ADJOINING GOVERNMENT LAND IN PING CHE, TA KWU LING, NEW TERRITORIES

Appendix A

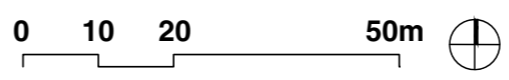
MLP of the Proposed Development

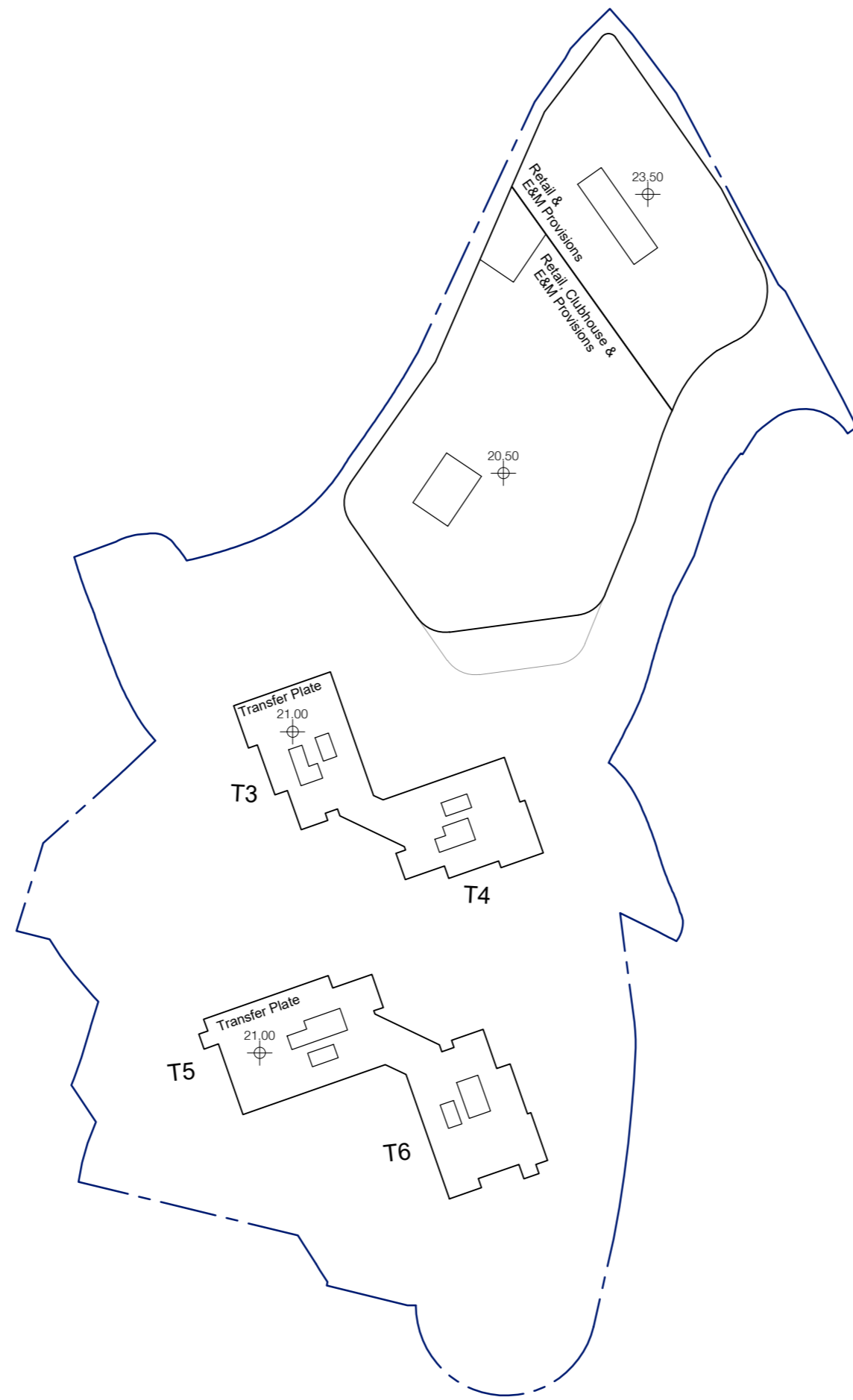


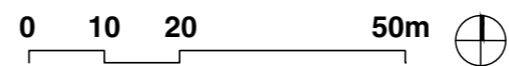
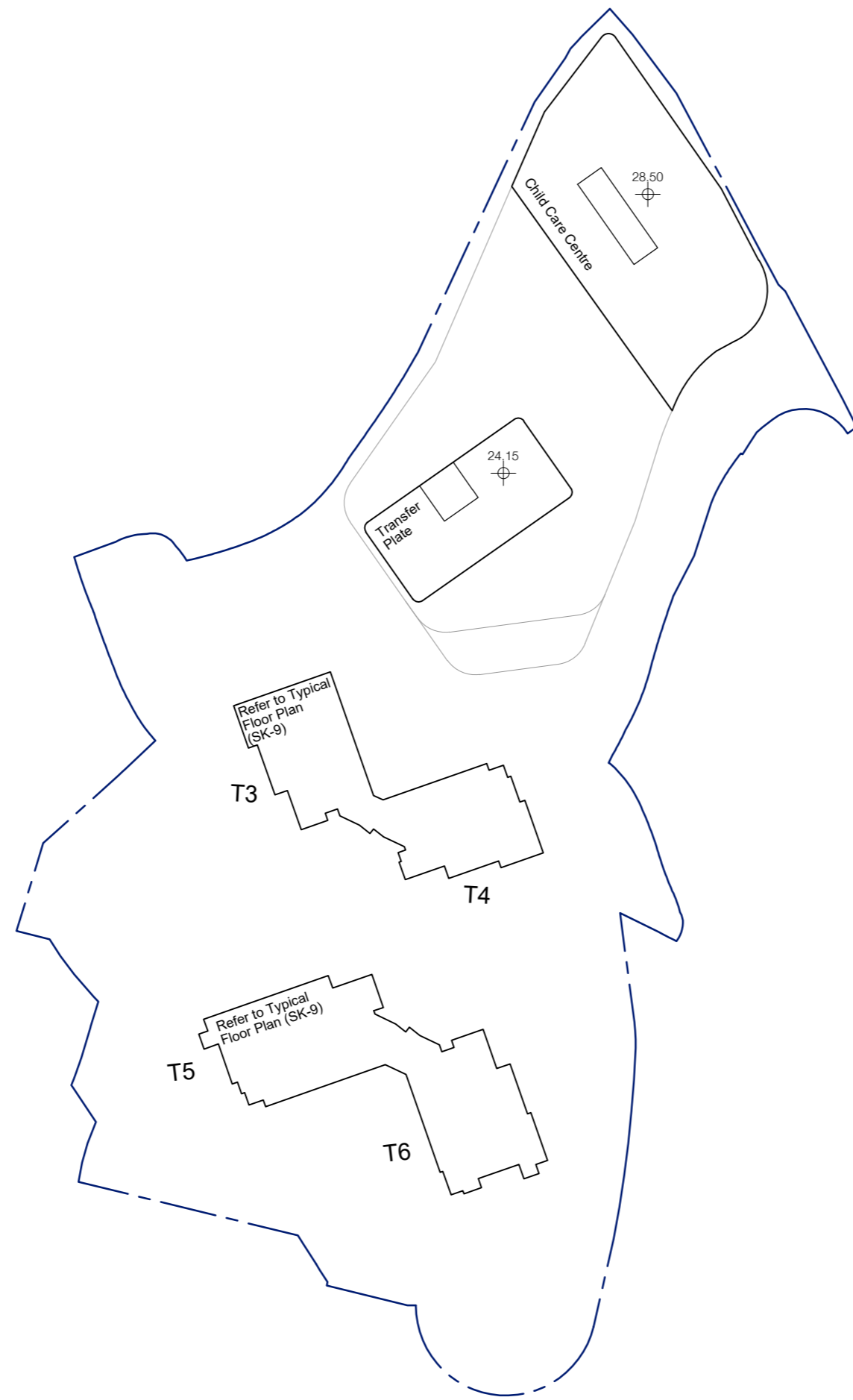


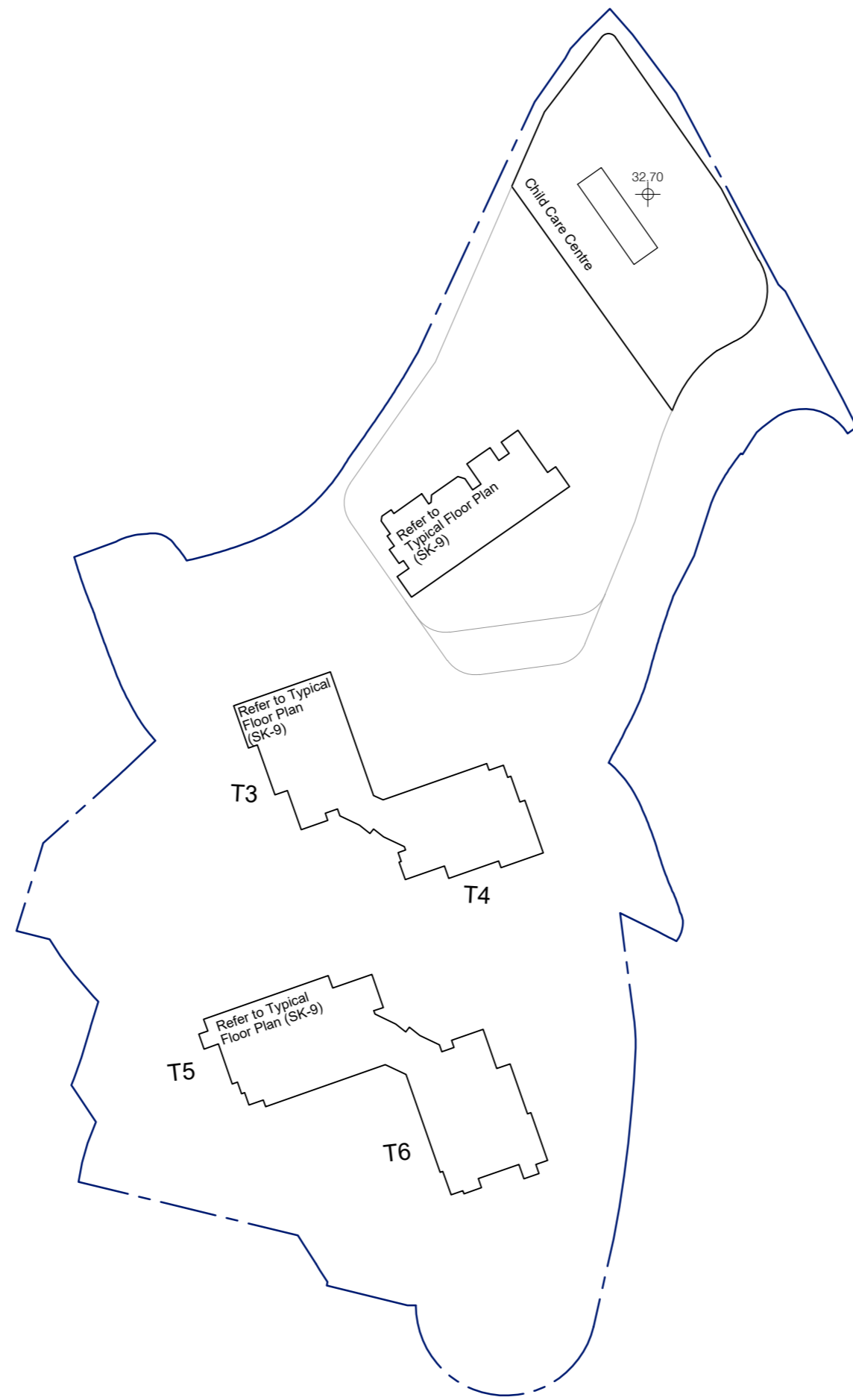


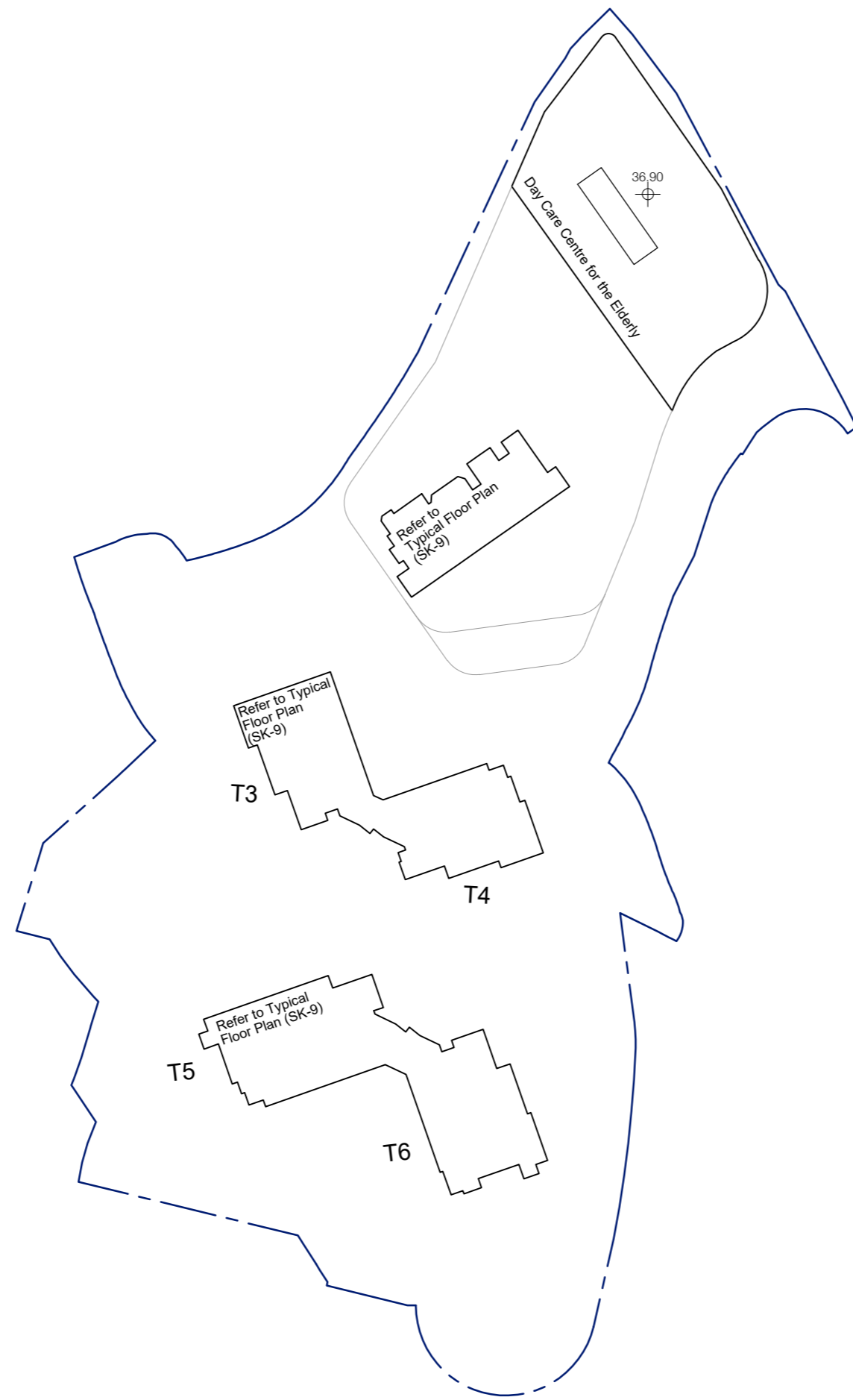
GROUND FLOOR PLAN SK-3
PROPOSED DEVELOPMENT AT PING CHE DD77, N.T.

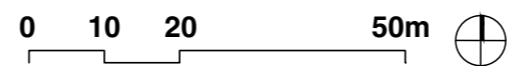
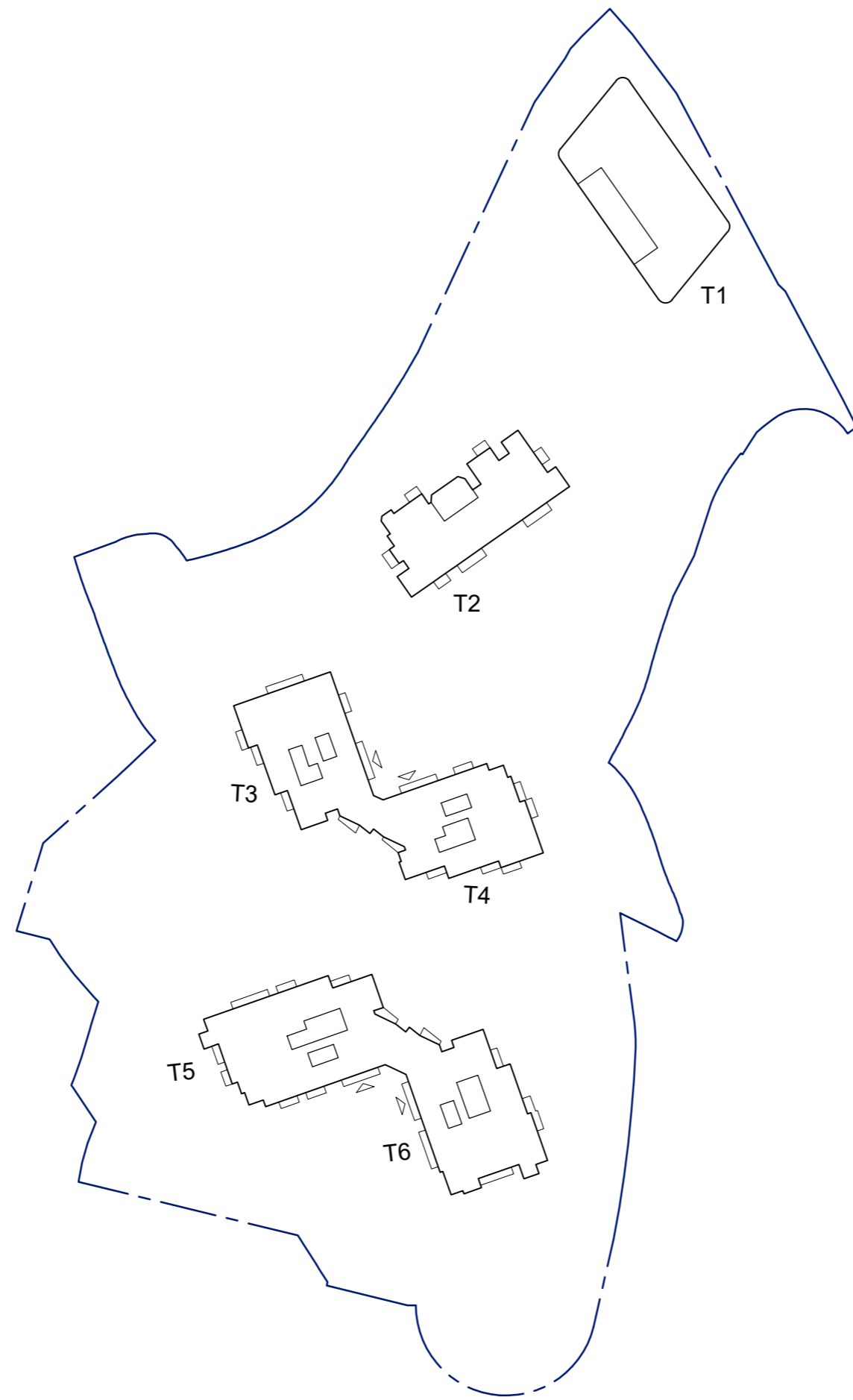


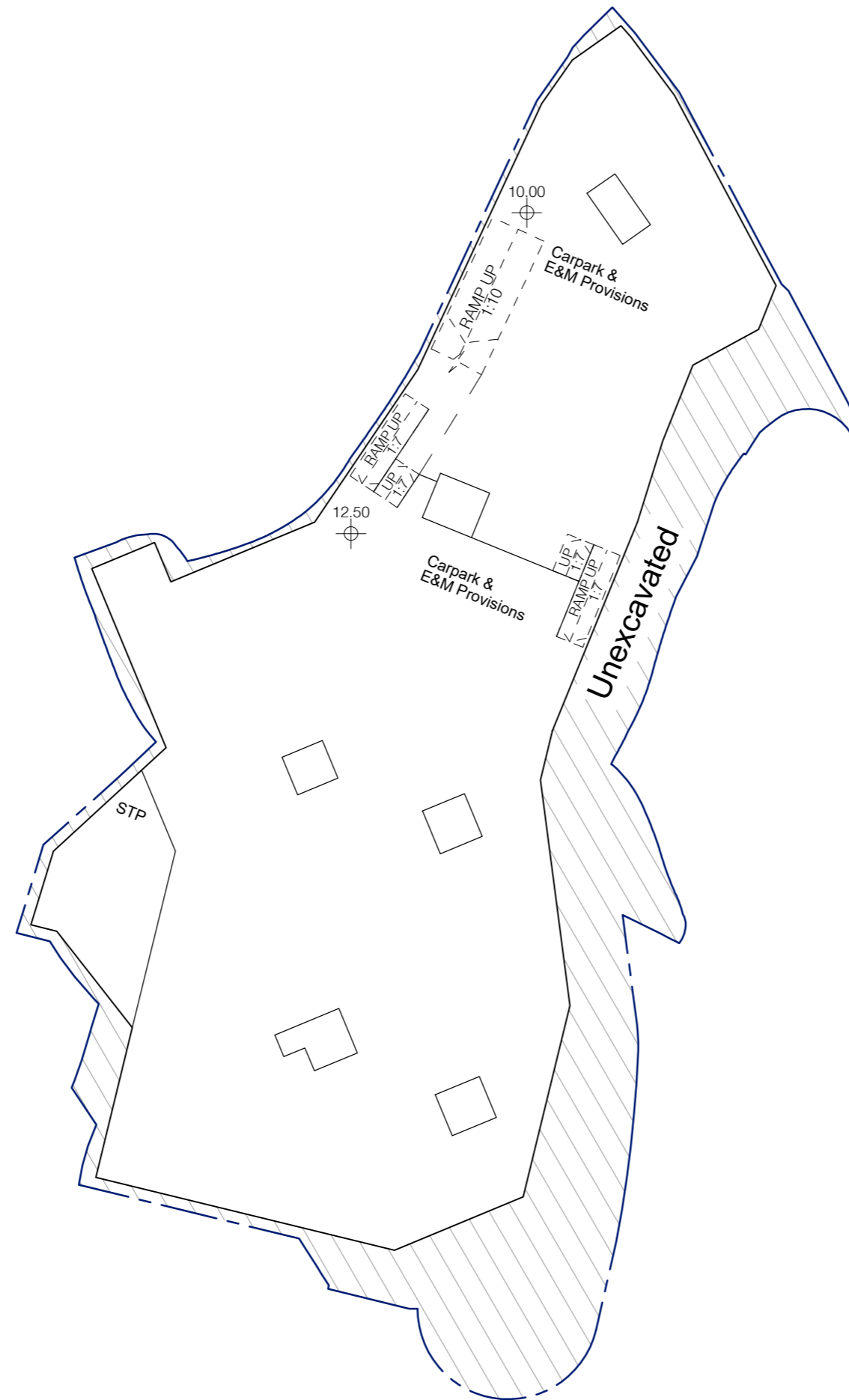


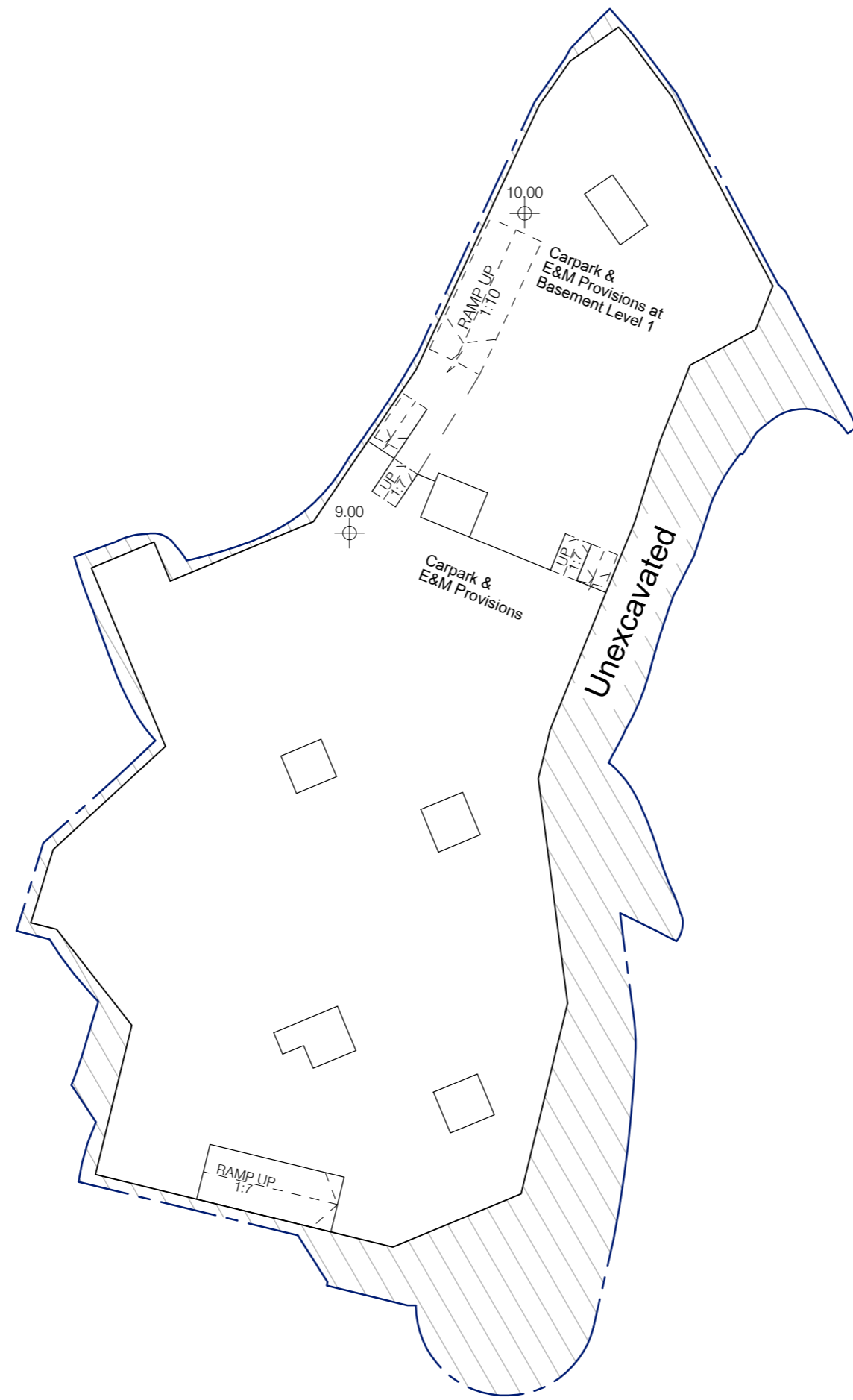


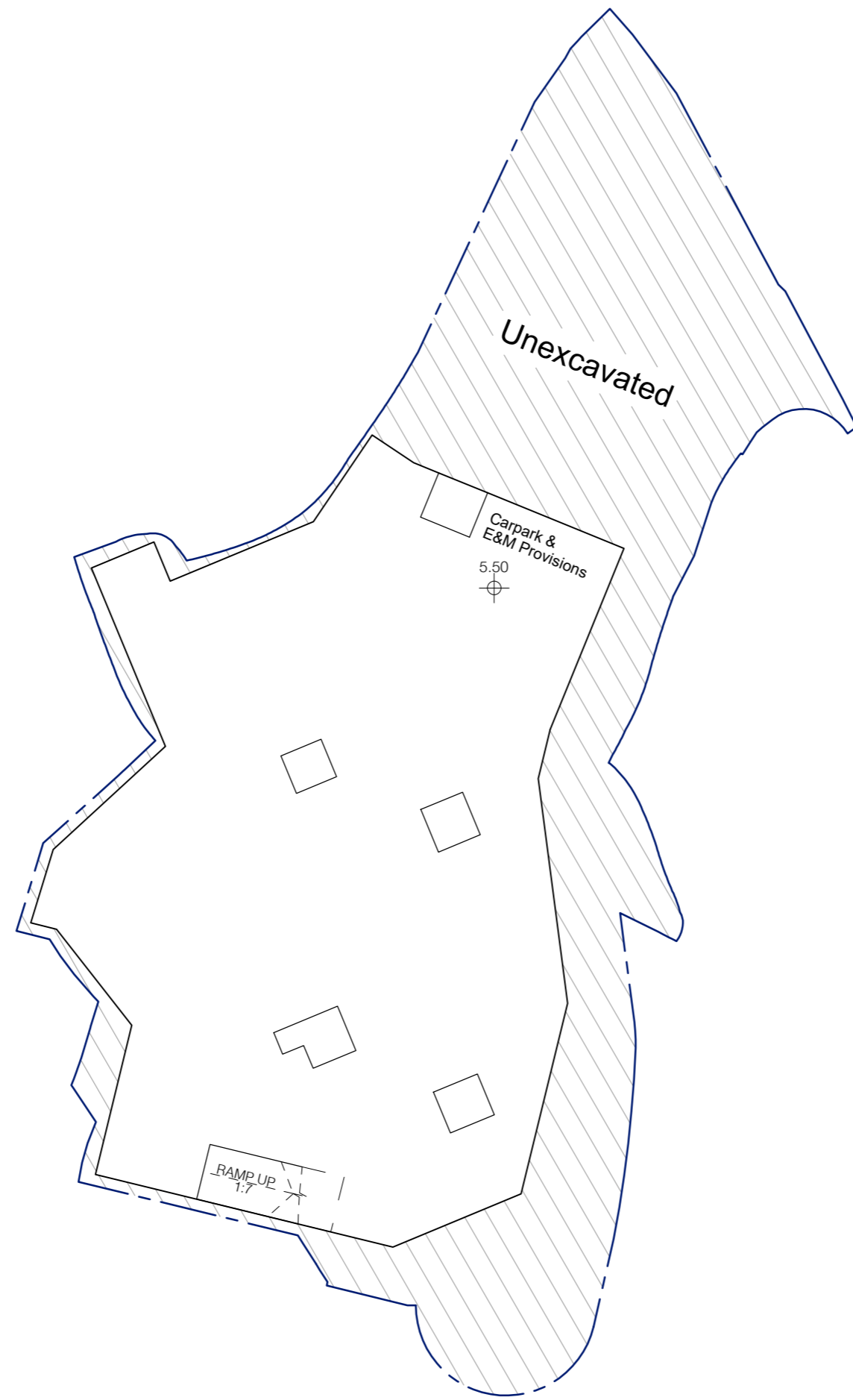


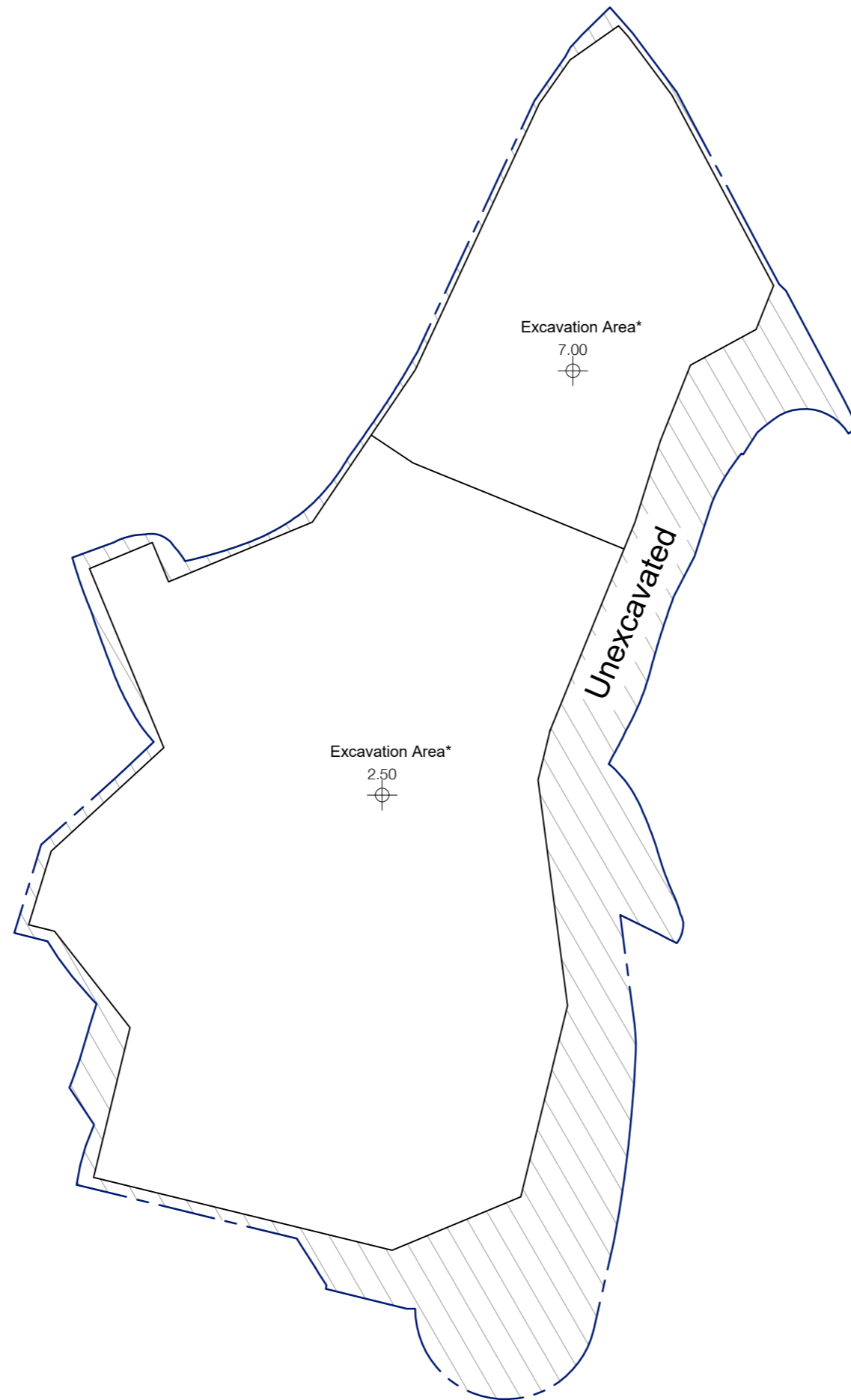




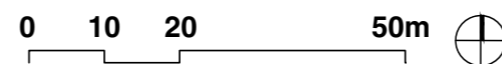


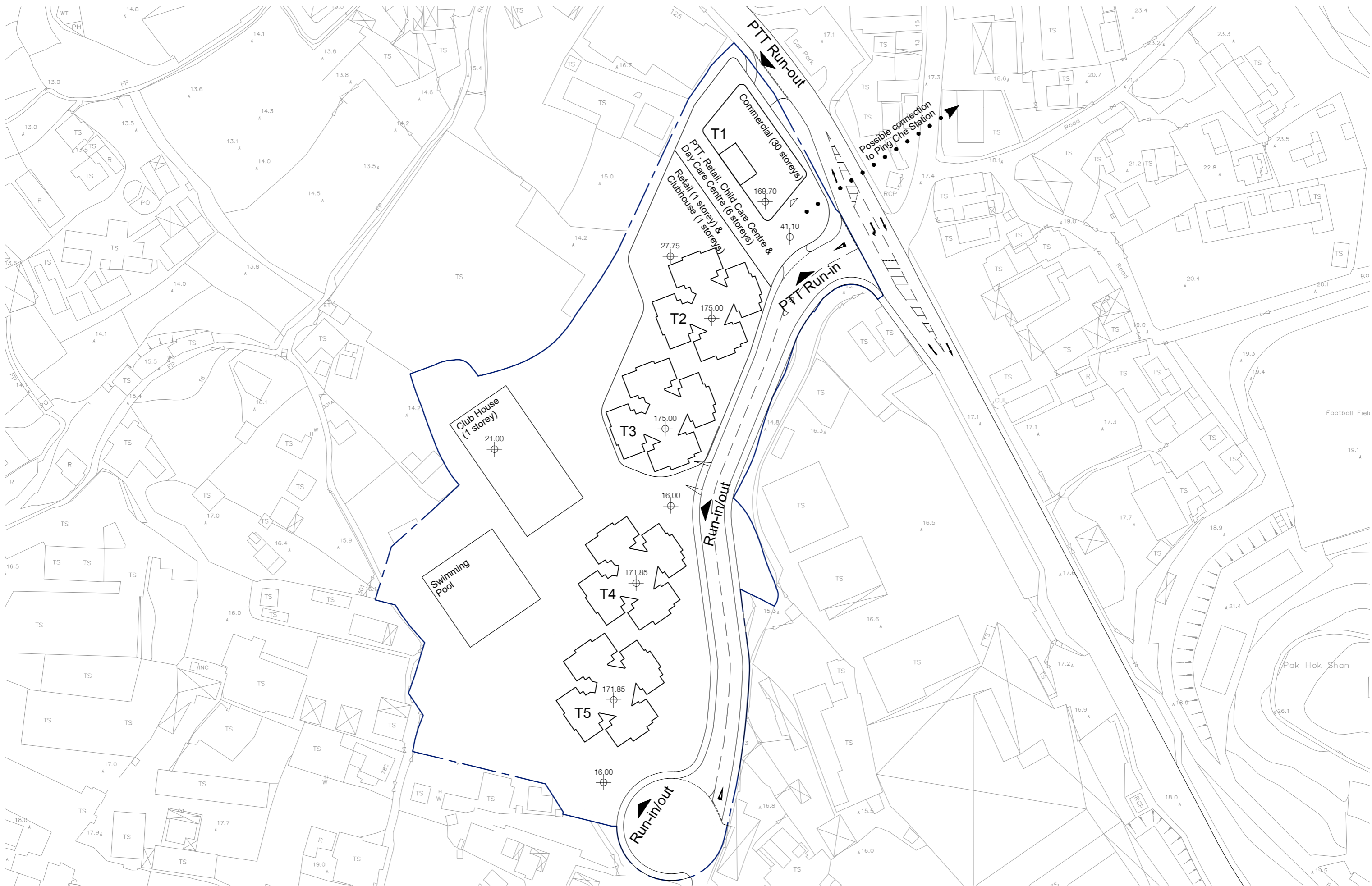






*The excavation area is about 13,500m² and the excavation depth is about 13.5m. The excavation area and depth are subject to future detailed design on foundation based on further geotechnical information.





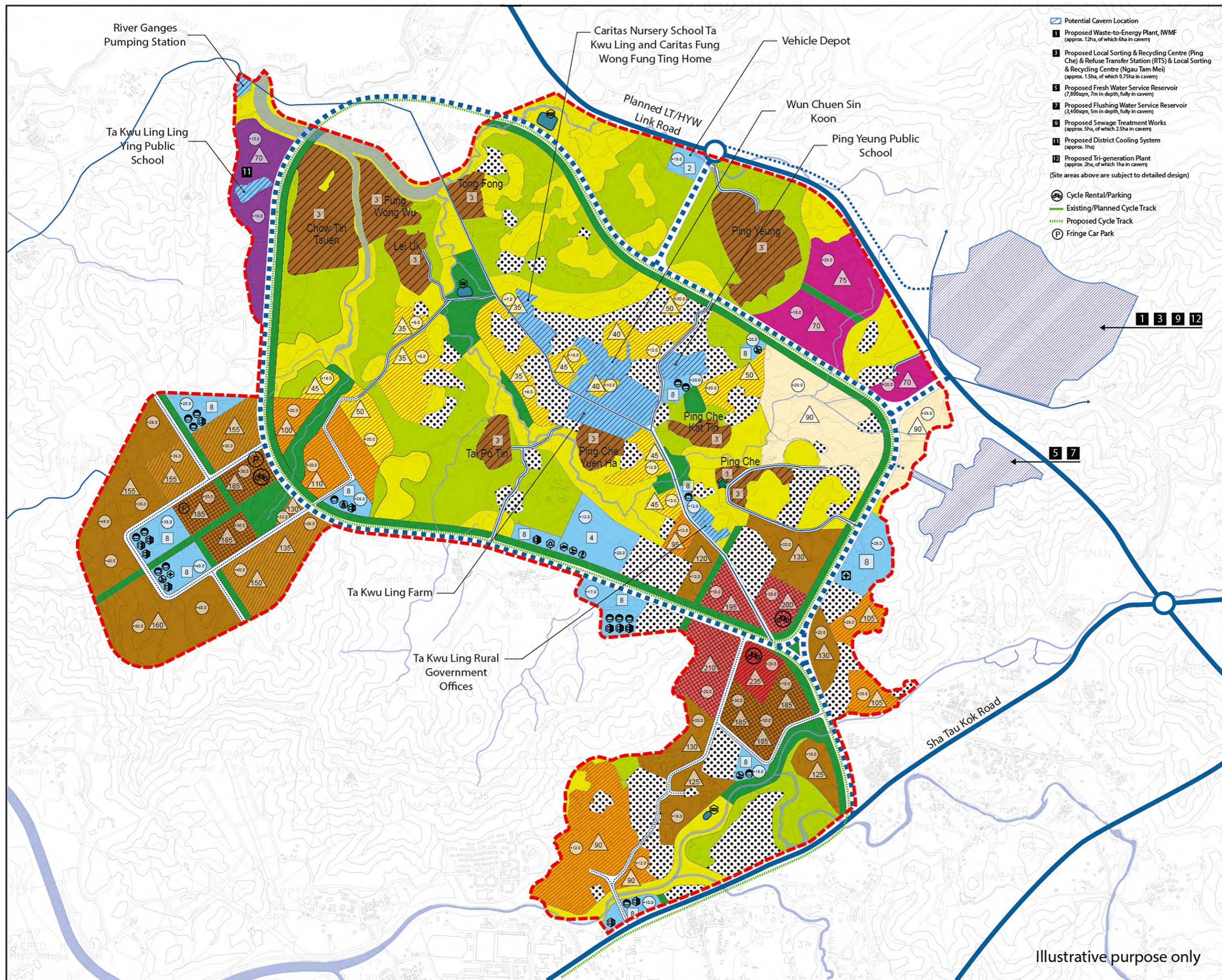


Project No. 2127

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

Appendix B

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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