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Expert Evaluation and Advisory Services on
Air Ventilation Assessment**

An Instructed Project for So Kwun Wat

Expert Evaluation – Final Report

February 2015

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1 INTRODUCTION

Background

- 1.1 The land use of the approved So Kwun Wat Outline Zoning Plan (OZP) No. S/TM-SKW/11 (the Plan) is being reviewed. It is considered necessary that an expert evaluation be conducted to analyse the existing wind environment, identify breezeways, as well as to assess the preliminary air ventilation impacts of the new development proposals and development restrictions to be imposed to guide future development or redevelopment.
- 1.2 In May 2014, AECOM Asia Company Ltd. (the Consultant) was commissioned by the Planning Department (PlanD) to undertake this expert evaluation study for an overall analysis of the Planning Area and Initial Planned Scenario with the new development proposals.
- 1.3 This expert evaluation report is based on the following materials given by the PlanD to the Consultant:
- Base Map of the Study Area and its surroundings
 - Outline Zoning Plan of the So Kwun Wat Area and Tuen Mun New Town Area
 - Existing Building Height Profile for So Kwun Wat Area and Tuen Mun New Town Area
 - Tuen Mun New Town – Expert Evaluation (Final Report, May 2014)
- 1.4 In the preparation stage of the expert evaluation report, the Consultant has studied the given materials listed in paragraph 1.3 and carried out site visit and inspection.

Objectives of the Expert Evaluation Study

- 1.5 This expert evaluation identifies the major breezeways and problematic areas within the Study Area (the Study Area being the Planning Area of the So Kwun Wat OZP). Its objectives also include assessing the air ventilation impacts of the new development proposals and development restrictions to be incorporated into the OZP within the So Kwun Wat area. Analysis on the localized wind effects of a proposed development site located between Tuen Mun Road and Castle Peak Road east of Siu Sau, and another potential development site situated near Tak Bond Godown at the western shore of Tai Lam Chung Nullah will be provided and appropriate mitigation measures will be recommended. The expert evaluation study has made reference to Technical Circular No. 1/06 issued jointly by the then Housing, Planning and Lands Bureau and Environment, Transport and Work Bureau.
- 1.6 This Expert Evaluation Report aims to present the following findings in a systematic approach as follows:
- Analyse the relevant wind data to understand the wind environment of the Study Area as well as its surroundings;
 - Identify and analyse the major topographical features of the Study Area and its immediate vicinity. In addition, greeneries / landscape characteristics of the Study Area and its surroundings will also be identified;
 - Identify and analyse the land use and built form of the Study Area including existing developments and committed future developments within / near the Study Area;
 - Based on the wind data, identify air paths and wind flow characteristics towards the Study Area through open spaces, streets, gaps and non-building areas between buildings, and stagnation / shadow zones if they exist;
 - Based on the analyses of existing urban conditions, identify existing good features that shall be retained/ strengthened at the same time spotting wind problematic regions that warrant attention;

- Based on the understanding of existing urban conditions, evaluate and compare qualitatively the prima facie impact, merits or demerits of the development proposals within the Study Area as proposed by the PlanD in terms of air ventilation performance. In addition, problematic areas will be highlighted and improvements and mitigation measures will be proposed with reference to the Urban Design Guidelines in the Hong Kong Planning Standards and Guidelines and also relevant statutory plans, building regulations and planning briefs; and
- Recommend appropriate technical methodologies if further quantitative AVA for the development sites are required.

Study Area

- 1.7 The Study Area covering So Kwun Wat is about 473.58 hectares. The Area is situated along the southern coast of the North West New Territories (NWNT) near the south-eastern approach to the Tuen Mun New Town. The Study Area is shown in **Figure 1.1**.

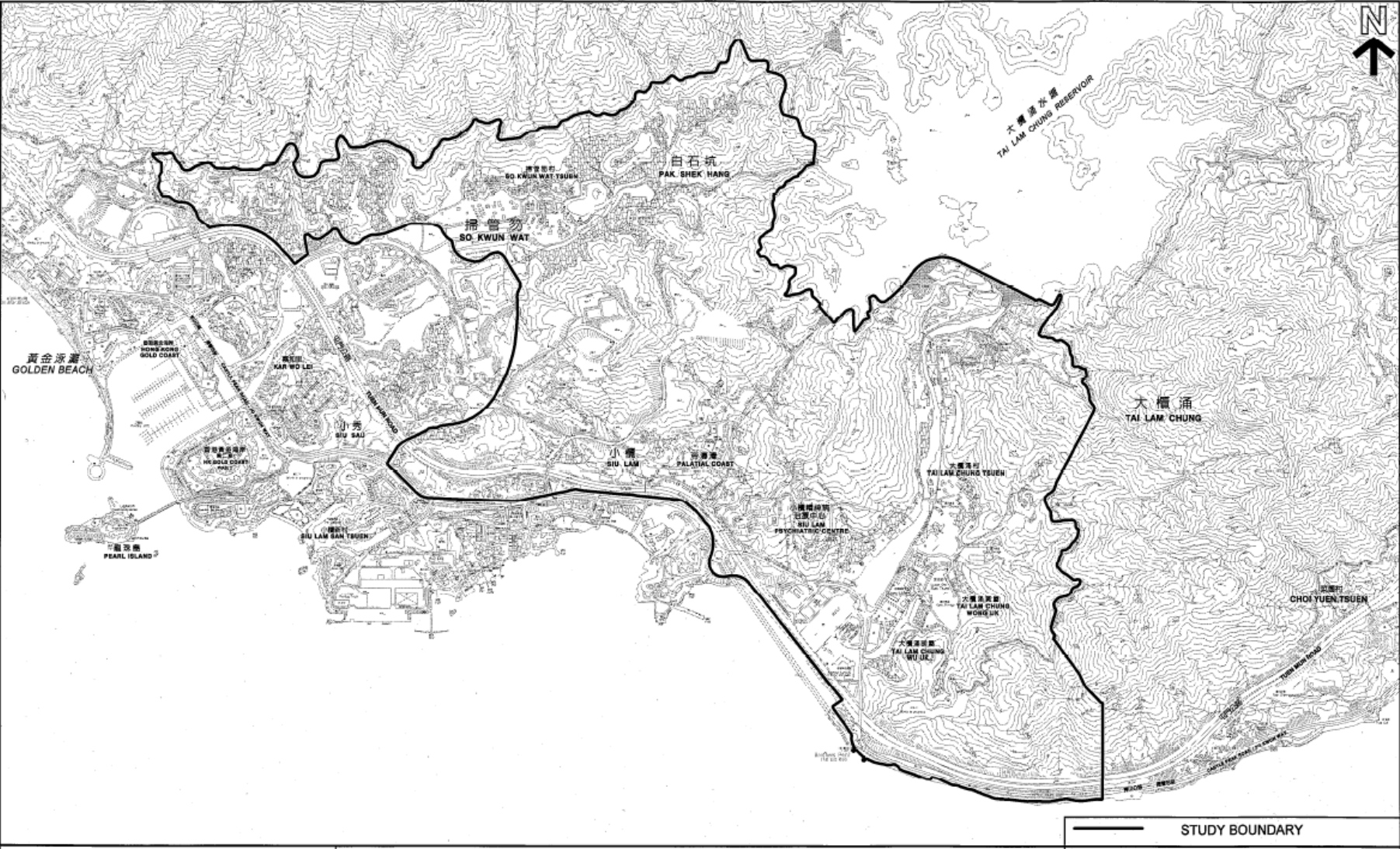


Figure 1.1 Extent of So Kwun Wat Area

2 THE WIND ENVIRONMENT

Wind Data from HKO Weather Stations

- 2.1 Natural wind availability is crucial to the investigation of wind ventilation performance. There are a total of 46 weather stations (See **Figure 2.1**) operated by Hong Kong Observatory (HKO) which provide reliable data on the wind environment in Hong Kong. The wind information and weather data from these stations provide reference to aid a general understanding of the surface wind environment especially near pedestrian level.

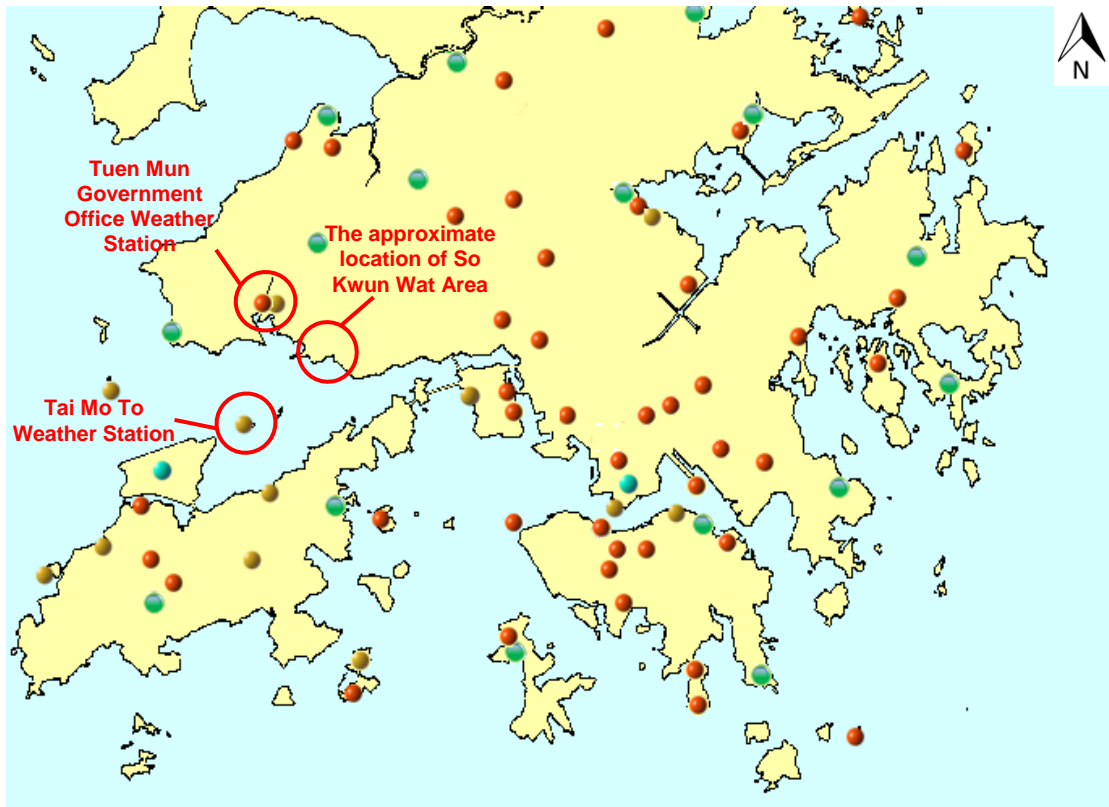


Figure 2.1 Location of Tuen Mun Government Office Weather Station, Tai Mo To Weather Station and So Kwun Wat Area

2.2 The Tuen Mun Government Office Weather Station is the nearest station from the Study Area. However, this weather station has a height of 69mPD. The wind data obtained from this station will be affected by local topography and building morphology. Nevertheless, the wind data from this automatic weather station is also presented as reference. **Figure 2.2** shows the annual wind rose from the Tuen Mun Government Office Weather Station and it is observed that the annual prevailing wind is from the NNE, SSE and S directions. **Figure 2.3** is the summer wind rose which shows that the summer prevailing wind is mainly from the S and SSE.

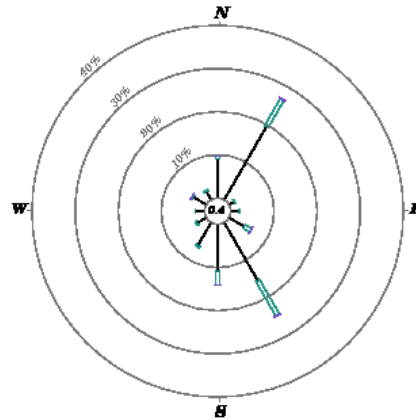


Figure 2.2 Annual Wind Rose of Tuen Mun Government Office Weather Station (1988 – 2013)

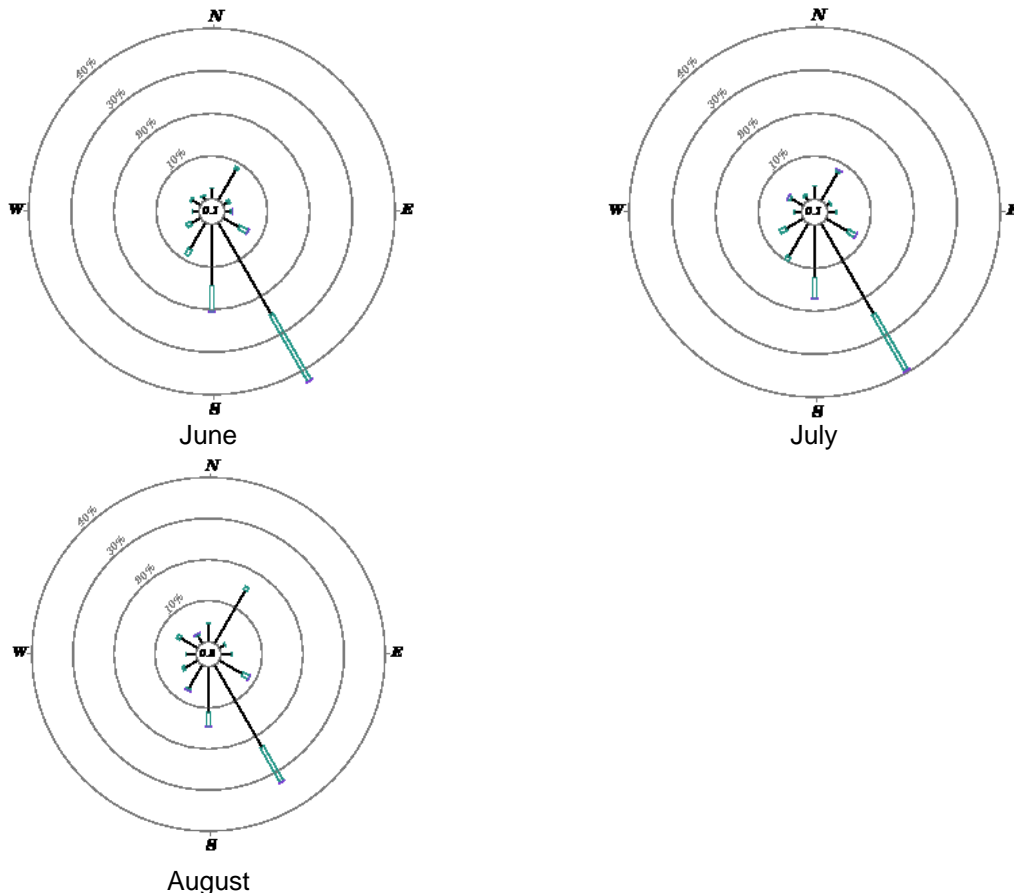


Figure 2.3 Wind Rose (June to August) of Tuen Mun Government Office Weather Station (1988 – 2013)

2.3 There is also another weather station located at the south-western side of the Study Area – Tai Mo To Weather Station. The recent five years annual wind roses are extracted from the Summary of Meteorological and Tidal Observations in Hong Kong as shown in **Figure 2.4**. Summer wind rose however is not provided in the summary report. The annual prevailing winds at Tai Mo To Weather Station are ESE and E.

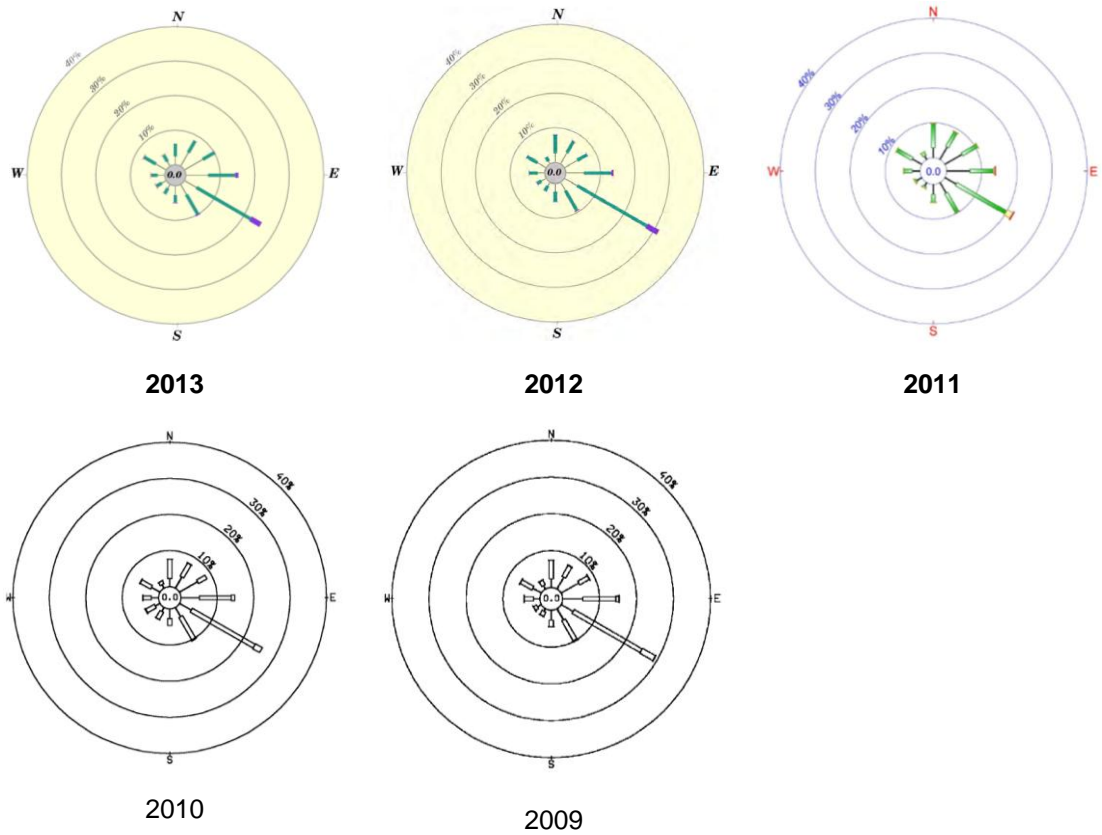


Figure 2.4 Annual Wind Roses of Tai Mo To Weather Station (2009-2013)

Wind Data from MM5 Model

- 2.4 Apart from the wind data from the HKO automatic weather station mentioned above, a set of wind simulation data obtained from the Fifth-Generation Penn State/NCAR Mesoscale Model (MM5) is presented in the “Tuen Mun New Town – Expert Evaluation Final Report” (May 2014). This set of data also provides information on the general wind pattern within the Study Area taking into account influence by the nearby topographical features.
- 2.5 MM5 wind data presented in the “Tuen Mun New Town – Expert Evaluation Final Report” is extracted from the location marked in **Figure 2.5** below. As shown, the data extraction location is situated near So Kwun Wat Study Area.

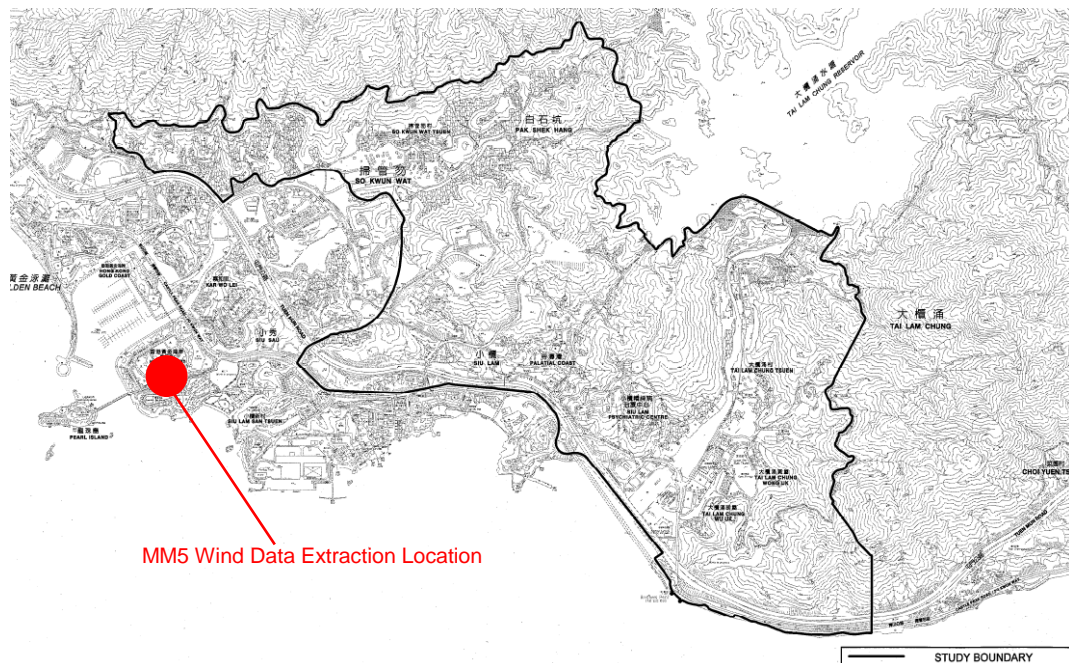


Figure 2.5 MM5 Wind Data Extraction Location

- 2.6 Based on the annual MM5 wind data in **Figure 2.6**, the annual prevailing wind towards the Study Area is mainly from the NE, E and SE directions. By referring to the summer MM5 wind data (**Figure 2.7**), the summer wind mainly comes from the SE direction, with observable portion coming from the S, SW and E directions.

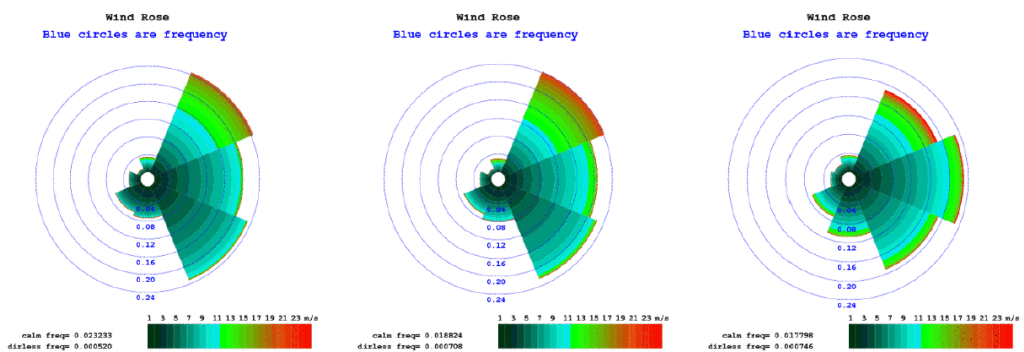


Figure 2.6 Annual Wind Rose at Extraction Location (left: 60m; middle: 120m; right: 450m)

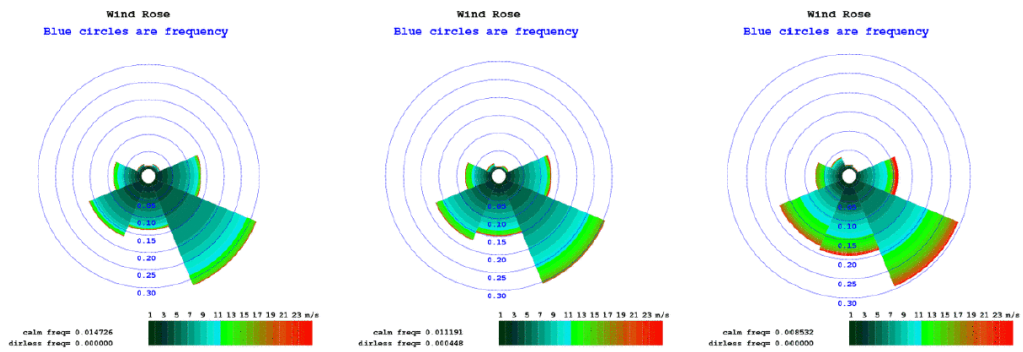


Figure 2.7 Summer Wind Rose at Extraction Location (left: 60m; middle: 120m; right: 450m)

Wind Data from Wind Tunnel Experiment

2.7 In the “Experimental Site Wind Availability Study for Tuen Mun East Area, Hong Kong”, wind characteristics in Tuen Mun East Area which is near the So Kwun Wat Study Area have been analysed by wind tunnel experiments. There are two measurement positions in the wind tunnel experiment as marked in **Figure 2.8**.

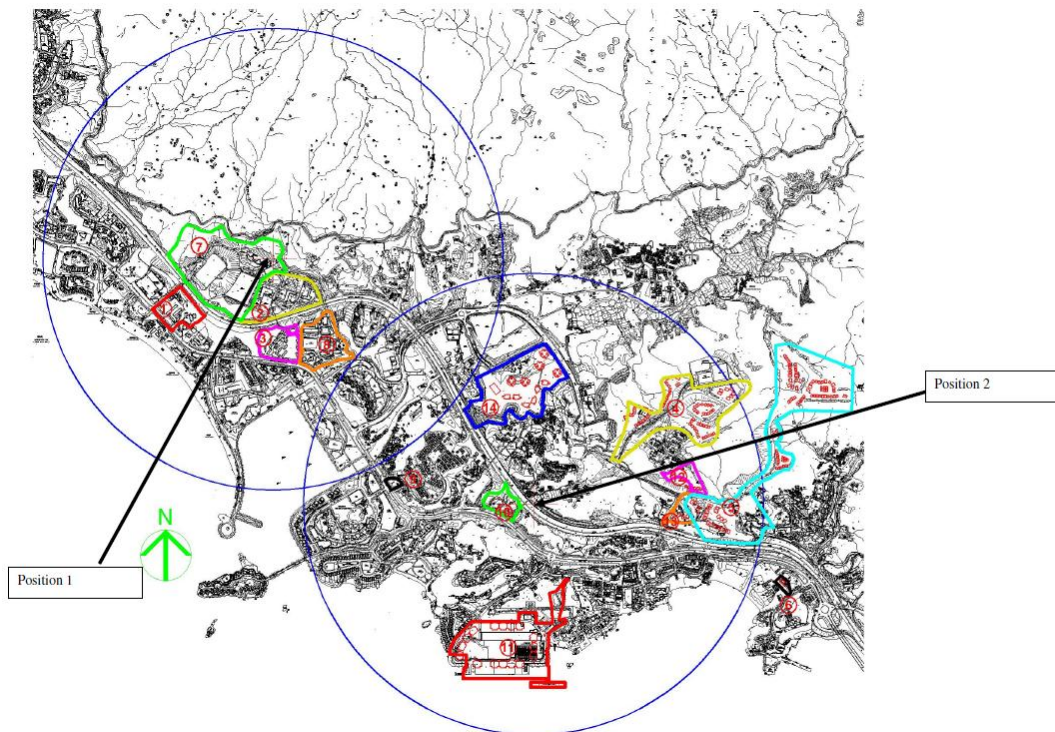


Figure 2.8 Wind Data Extraction Locations of HKUST Wind Tunnel Experiment

2.8 By referring to the wind tunnel experiment data at Position 2 as shown in **Figure 2.8**, the Study Area relies heavily on northeast quadrant winds, as they possess a total occurrence of around 70% in a year. It is noticed that the N, E and ENE winds have contributed around 50% of the annual winds. On the other hand, summer winds are mainly from the E and SW directions which contribute more than 10% individually during the summer period.

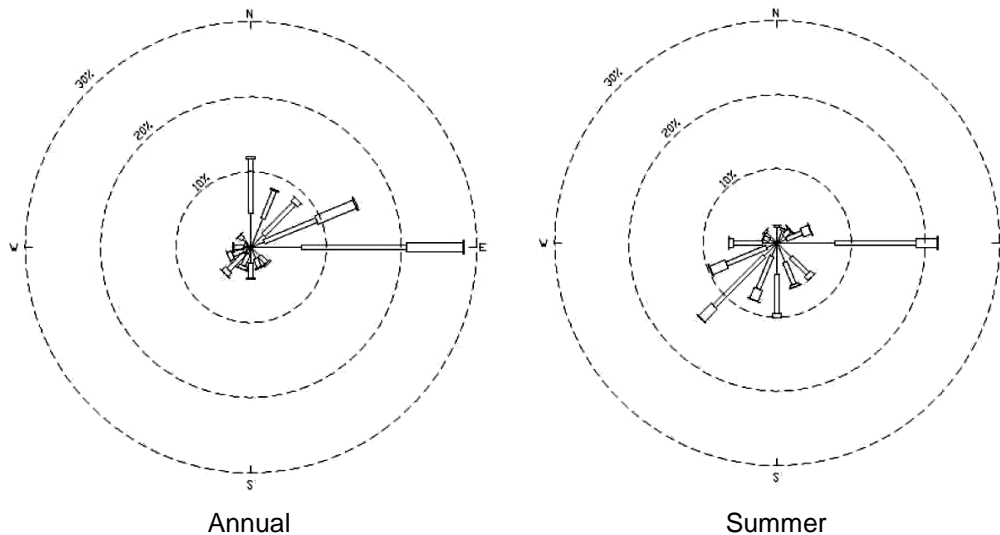


Figure 2.9 Annual and Summer Wind Roses extracted at 150m above ground at Position 2

2.9 **Table 2.1** shows the summary of the prevailing wind directions extracted from different wind data sources. As both HKO weather stations are located far from the Study Area and the surrounding topographical characteristics are quite different, the HKO data is excluded from the consideration of the prevailing wind directions of the Study Area.

Table 2.1 Summary of the prevailing wind directions from different data sources

	HKO Tuen Mun Government Office wind data	HKO Tai Mo To wind data	MM5 model (450m)	Wind Tunnel Experiment
Annual Wind	NNE, SSE, S	ESE, E	NE, E, SE	N, ENE, E
Summer Wind	S, SSE	--	E, SE, S, SW	E, SW

2.10 Based on the summary of data from the MM5 model and HKUST wind tunnel experiment, the annual prevailing winds are mainly from the north east quadrant with some from the south east quadrant. The N, NE, ENE, E and SE winds are the most dominate annual winds. In summer, the major prevailing winds come from east and southerly quadrant, i.e. E, SE, S and SW winds. **Figure 2.10** present the summary of the annual and summer wind directions towards the Study Area.

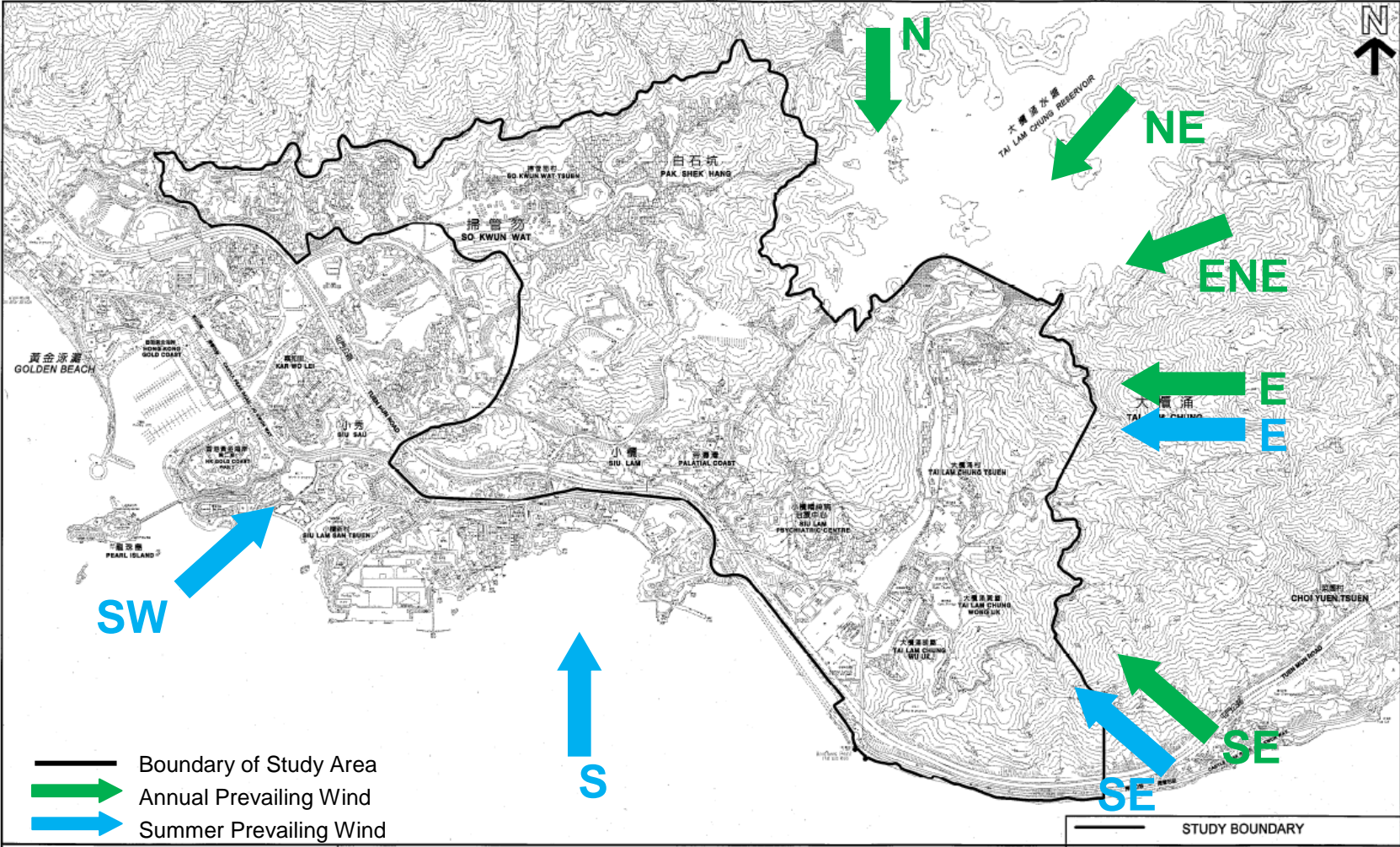
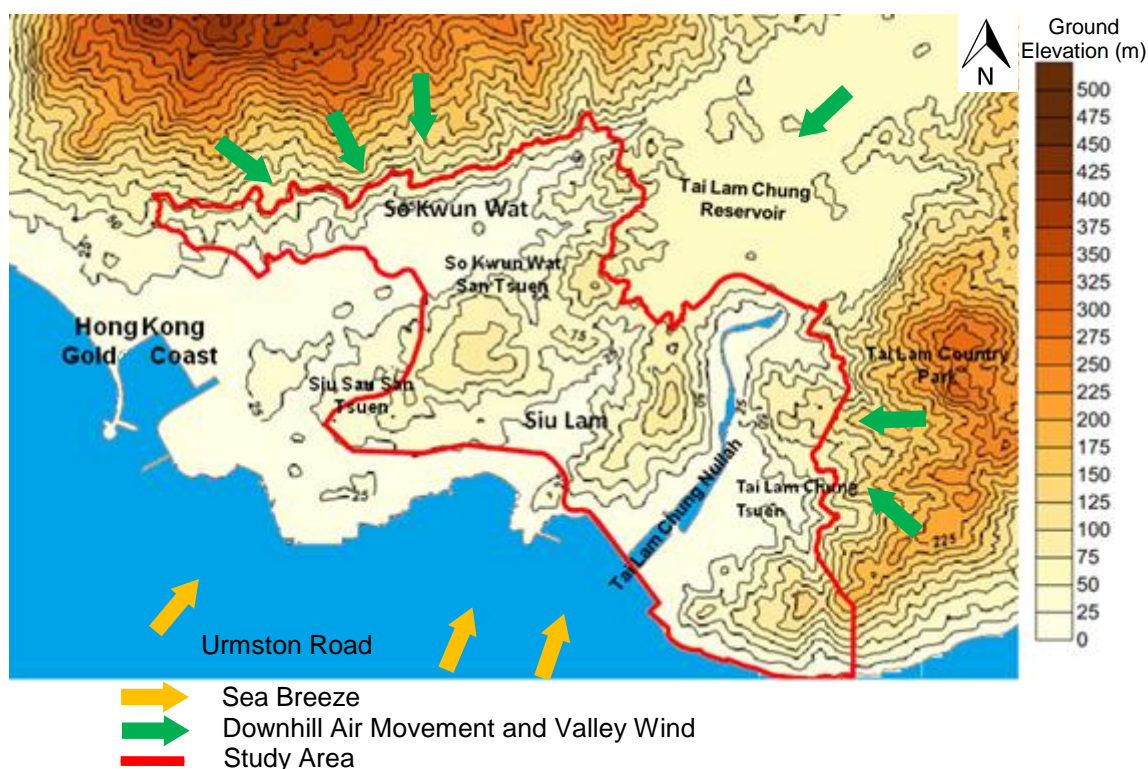


Figure 2.10 Summary of Prevailing Winds towards the Study Area

3 TOPOGRAPHY AND THE WIND ENVIRONMENT

- 3.1 **Figure 3.1** shows a digital elevation map of the Study Area. The Study Area is situated at the south west of Tai Lam Country Park and Tai Lam Chung Reservoir, fronting the sea of Urmston Road to its south and southwest. It is bordered by two large hilly terrains situated at its east/southeast and northwest boundary and with increasing gradient from west to east and from south to north respectively. A valley is formed by the two large hilly terrains. The highest point in the region near the Study Area is around 450mPD in height, located to the northwest of the Study Area.
- 3.2 The Study Area is traversed by two ridges with maximum height of about 140mPD. In between is some relatively low land area below 50mPD.
- 3.3 Due to the high hilly terrain at north / northwest (maximum height of approximately 450mPD) of the Study Area, the prevailing wind from the north is expected to be weakened before reaching the Study Area. The NE and ENE winds can penetrate into the Study Area freely as they are generally aligned with the direction of the valleys. There are also hilly terrains located to the easterly and south easterly directions of the Study Area. Hence, winds from E and SE would be shielded and reduced to reach the eastern region of the study Area. The S and SW wind can reach the south eastern part of the Study Area freely, but they will be weakened in flowing to the south western and north western most part as these areas are more remote from the sea shore.
- 3.4 In addition to the prevailing winds, since the Study Area is located near hilly terrain, katabatic (downhill) air movement from the nearby vegetated hill slopes and valleys can be expected, and facilitate the wind flow surrounding the northern and eastern part of the Study Area. The south/southeast part of the Study Area can benefit from the sea breeze. These winds are indicated in **Figure 3.1**.



4 EXISTING CONDITIONS, LAND USE AND URBAN MORPHOLOGY

Existing Conditions

- 4.1 The building heights of existing developments within the Study Area are shown in **Figure 4.1**. The heights of most of the existing developments within the Study Area are lower than 25mPD. These low-rise developments are located mainly at the north western and the south eastern sectors of the Study Area.
- 4.2 The existing development of Palatial Coast located in the central sector of Study Area is comparatively higher than the rest of the developments. Its building height range from 75mPD to 100mPD, and the buildings form continuous frontages which affect the wind environment of its immediate vicinity (e.g. Siu Lam Tsuen and the Christian Cherith Ministry Institute) under the easterly and southerly prevailing wind conditions.
- 4.3 In the immediate neighbourhood of the Study Area is the Tuen Mun East Area. Some of the buildings in Tuen Mun East are in areas adjoining the Study Area and would impose negative impacts on wind environment to the western most region of So Kwun Wat Area. The building height of the existing developments within this area is shown in **Figure 4.2**. While buildings within the portion of Tuen Mun East Area close to the Study Area are mostly low-rise structures at below 25mPD, there are a few mid-rise developments at 50mPD-75mPD. Meanwhile, the high-rise developments in Tuen Mun East Area including Hong Kong Gold Coast and Aegean Coast, are more than 300m away from the So Kwun Wat Area and are less likely to affect the wind environment in the Study Area.
- 4.4 A committed development with maximum building height at around 70mPD at the eastern part of the Study Area (see **Figure 4.1**) may impose certain impact on its immediate vicinity area (e.g. Wong Uk, Wu Uk, Luen On San Tsuen and Tai Lam Chung Tsuen) under the easterly and southerly prevailing wind condition.

Land Use and Urban Morphology within the Study Area

- 4.5 The Statutory Outline Zoning Plan (OZP) No. S/TM-SKW/11 is shown in **Figure 4.3**. The land use zones within the Study Area include “Green Belt”, “Open Space”, “Government, Institution or Community”, residential zones, “Village Type Development”, and “Comprehensive Development Area”.

“Green Belt” and “Open Space”

- 4.6 It is noticed that most parts of the Study Area are zoned “Green Belt” (“GB”) as depicted in **Figure 4.4**. As there is a general presumption against development within “GB” zones, it is not expected at this stage that any significant developments would exist within these areas to cause blockages against prevailing winds. Thus, the “GB” areas would not give rise to wind environment impacts to the whole Study Area. There is also a small strip of land zoned “Open Space” (“O”) near Tai Lam Chung Nullah. Together with the areas zoned “GB”, these relatively open areas are useful in facilitating air ventilation in the Study Area.

“Government, Institution or Community” (“G/IC”)

- 4.7 There are three major areas designated as “G/IC” zone. The northern area is occupied by Tai Lam Correctional Institute located south of Tai Lam Reservoir. The other areas are located near the eastern and western shores of Tai Lam Chung Nullah, and are occupied by the Customs and Excise Training School and Maritime Services Training Institute and Siu Lam Psychiatric Centre respectively.
- 4.8 Tai Lam Correctional Institute consists of mostly low-rise developments ranging from 25mPD-30 mPD. It is surrounded by areas zoned “GB” to its east and west. The low-rise low-density nature of the development with separation distances between buildings are

unlikely to give rise to significant air ventilation impact on the existing developments located in its surroundings including the low-rise village houses to its south.

- 4.9 The other GIC developments (i.e. Customs and Excise Training School and Maritime Services Training Institute) on the eastern shore of Tai Lam Chung Nullah are also low-rise buildings at below 25mPD in height which are similar in nature to the development of Tai Lam Correctional Institute. Furthermore, given that there are open grounds near these two institutes, the developments in these “G/IC” areas are also unlikely to give rise to significant air ventilation impacts on the existing developments located in the surrounding. Meanwhile, Siu Lam Psychiatric Centre (ranging from 63-79mPD) on the western shore of Tai Lam Chung Nullah comprises buildings of around five storeys above ground and are sparsely scattered on the hill top. Considering the low-rise nature of these buildings, no significant blockages of winds are expected to be induced by these developments on its surrounding areas.
- 4.10 There are two other “G/IC” areas located south of So Kwun Wat Tsuen, i.e. the AD and FD of Pok Oi Hospital Mrs Cheng Yam On Millennium School and the Siu Lam Fresh Water Service Reservoir. The school development consists of a building of 8-storeys in height (58mPD), while the reservoir is a structure of 5m above ground. Owing to the low-rise nature of these G/IC facilities, it is not expected that they would cause any significant adverse impacts in terms of air ventilation.

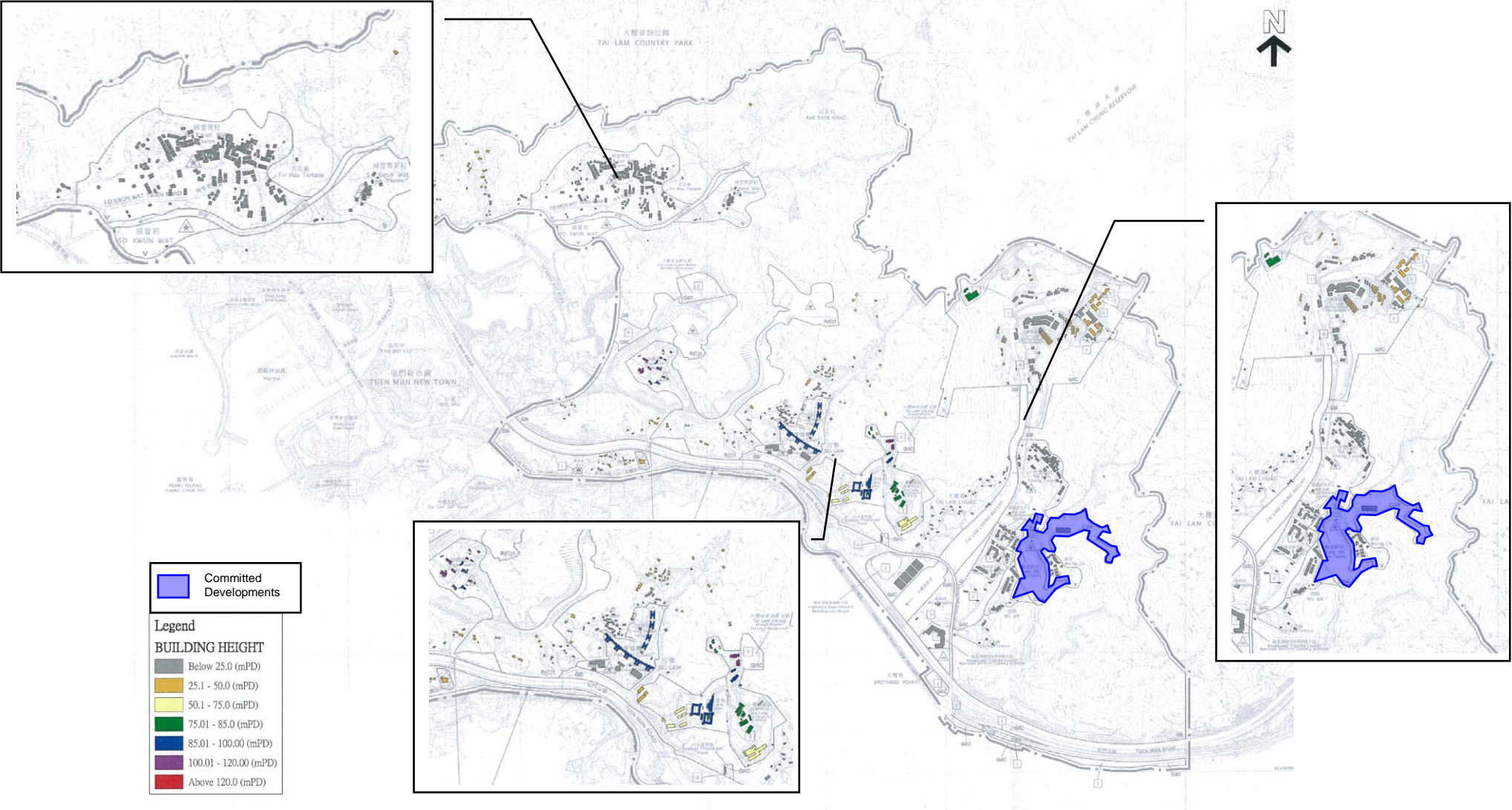


Figure 4.1 Existing Building Height Profiles within So Kwun Wat Study Area in mPD



Figure 4.2 Existing Building Height Profiles within Tuen Mun East Area in mPD

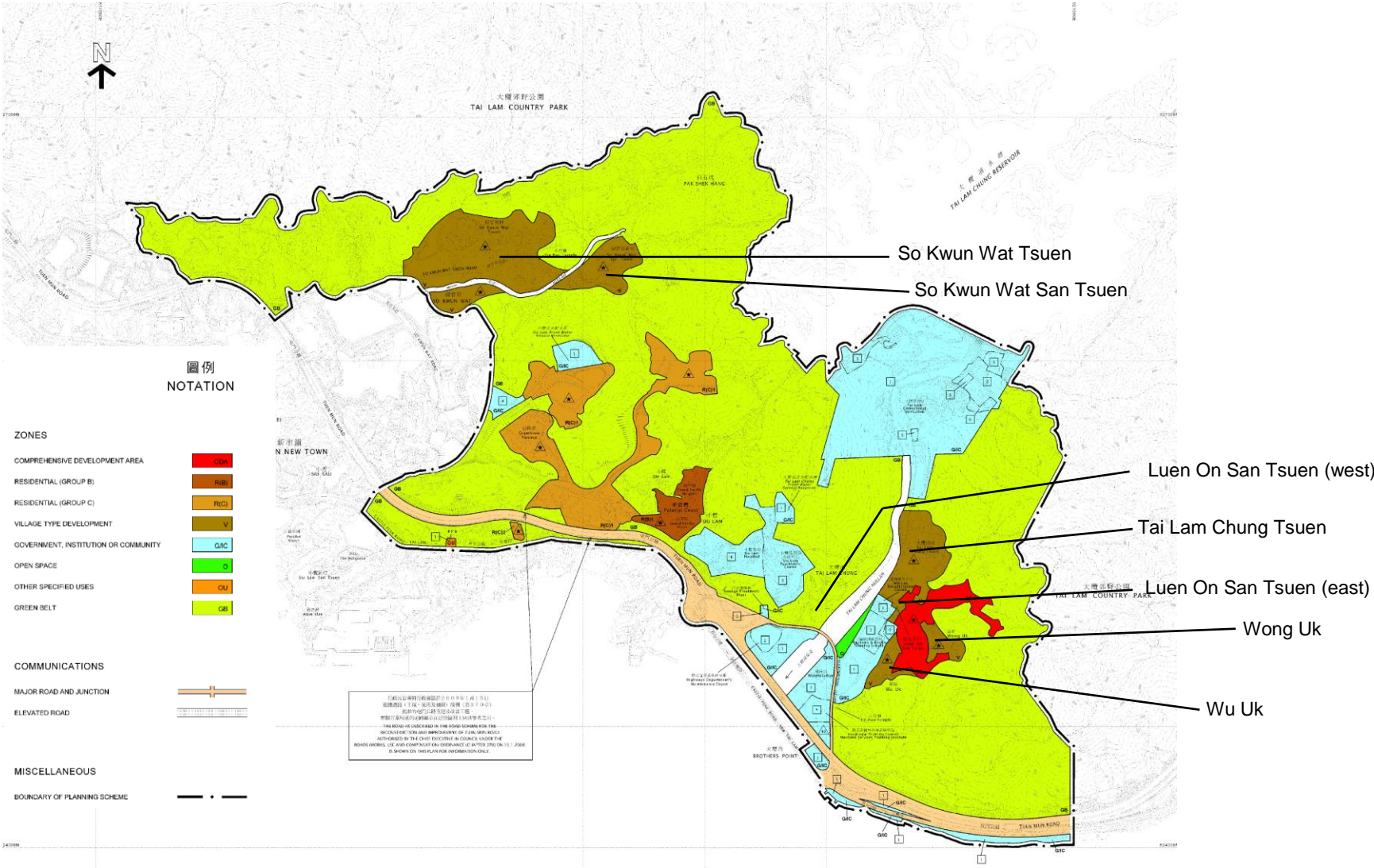


Figure 4.3 Land Uses within So Kwun Wat Area

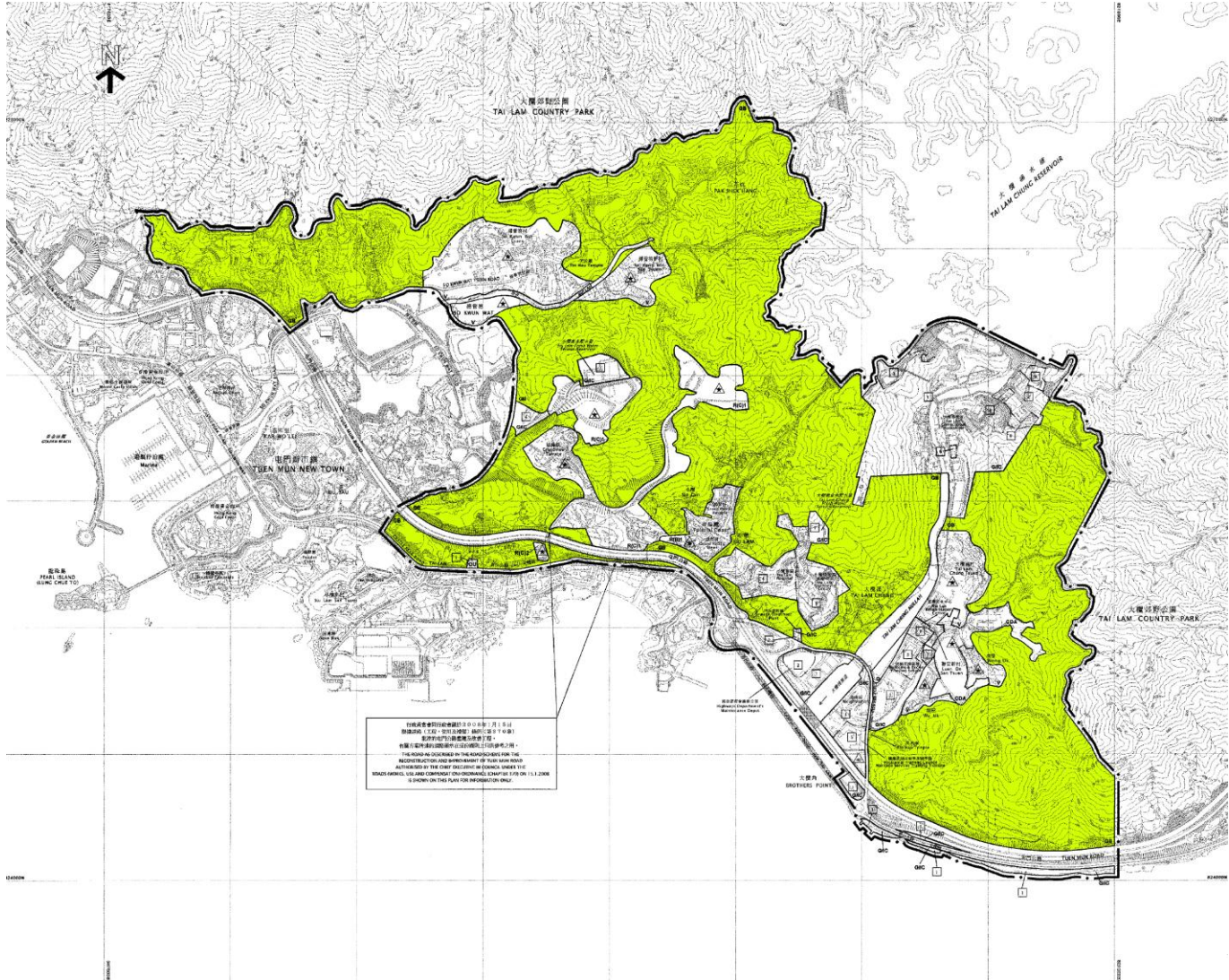


Figure 4.4 Green Areas within So Kwun Wat Area

Residential Land Uses

- 4.11 A large area to the west of Siu Lam is designated as “Residential (Group C)” (“R(C)”) as shown in **Figure 4.3** above. Most existing developments in this “R(C)” area are the houses of Grandview Terrace. With the planning intention of “R(C)” areas primarily for low-rise low-density residential developments, future developments/redevelopments within this zone are not expected to cast severe air ventilation impacts on the surroundings.
- 4.12 To the east of the “R(C)” zone are land denoted as “Residential (Group B)” (“R(B)”) Reflecting the high-rise residential blocks of Palatial Coast. These high-rise developments would impose adverse air ventilation impact to its immediate surrounding areas, as discussed in Paragraph 4.2.

“Village Type Development”

- 4.13 There are four areas designated as “Village Type Development” with So Kwun Wat Tsuen, So Kwun Wat San Tsuen, Tai Lam Chung Tsuen / Luen On San Tsuen (east), Wong Uk and Wu Uk as marked on **Figure 4.3**. Given that the developments in all of these villages are low-rise low density buildings at around 3 to 4-storeys in height, they would not cause significant blockage to the prevailing winds. It is not expected that these village developments would cause any adverse impact on the wind environments.

“Comprehensive Development Area”

- 4.14 There is one “Comprehensive Development Area” (“CDA”) within the So Kwun Wat region, (**Figure 4.1**). It is located to the SE of Tai Lam Chung Tsuen and the proposed development has a maximum height at 70mPD. Since the developments of Wu Uk and the Customs and Excise Training School are located at the immediate downwind side of this “CDA” under the prevailing winds from the north and north eastern quadrant, development of the “CDA” is expected to shelter off a certain amount of winds towards the developments of Wu Uk and the Customs and Excise Training School.

Summary

- 4.15 With the current situation of and planning intention for the Study Area with mainly low-rise low-density buildings and only a few high-rise developments, the current air ventilation performance is considered satisfactory. Any future increase in building heights and/or development intensity in these areas is expected to cause deterioration in the current wind environment. Mitigation measures should be explored to alleviate the probable negative wind impacts arisen from such intensified future developments. It is essential that these future developments should adopt good design practices including provision of gaps between buildings to maintain wind permeability and avoiding blockage of existing wind corridors.

Existing and Committed Developments in Tuen Mun East area

- 4.16 There are several existing and proposed building developments within the adjoining Tuen Mun East area. They include both low-rise residential houses (such as Fiona Garden, The Castle Bay, Jade View Villa, etc.) and mid to high-rise residential buildings (including The Aegean, The Hillgrove, Peridot Court, Avignon etc.) with maximum height at around 75mPD. The low-rise houses are not expected to cause negative impact upon wind environments. However, the mid to high-rise residential blocks are likely to create blockages and impose unfavourable effect in terms of air ventilation performance to its downwind side under the SW summer winds. The affected areas are the “GB” zone located at the south western most regions and north western most portion of So Kwun Wat Study Area. While under the prevailing NE wind, these mid to high-rise developments are at the downwind side of the Study Area and would not affect the wind environment of the Study Area.

- 4.17 Other existing high-rise residential buildings in the area include the Hong Kong Gold Coast and Aegean Coast. Owing to the distances between these developments and the So Kwun Wat area at more than 300m, the So Kwun Wat Area is not expected to lie within the wind shadow region generated by these high-rise residential developments. Generally speaking, significant impact on the wind environment within the Study Area due to the blockage of these high-rise residential developments is not likely to occur.
- 4.18 An area with two committed developments within the Tuen Mun East area is indicated in **Figure 4.2**. It is bounded by Siu Sau Village, Tuen Mun New Town, Peridot Court and The Hillgrove, and the committed developments are mainly designed as mid-rise residential buildings with building heights ranging from 43mPD to 84mPD. Under the summer SW wind, air ventilation performance at the part of Siu Sau Village near Tuen Mun Road may be slightly affected due to blockage of the prevailing wind by the committed developments. For the other prevailing wind directions, the committed developments are located at the downstream region of the Study Area and would not impose any adverse impact to its wind environment.

5 BREEZEWAYS AND WIND CORRIDORS WITHIN THE STUDY AREA

- 5.1 As mentioned in Section 2, the annual prevailing wind comes from the north east quadrant and south east quadrant while the summer wind comes from the east and southerly. By understanding the prevailing wind directions and studying the topography and building morphology within the So Kwun Wat area, major wind corridors are identified and discussed in the following paragraphs and illustrated in **Figure 5.1**.

Major breezeways within Study Area

- 5.2 There are three major valleys between the hill slopes within the Study Area: one runs along Tai Lam Chung Nullah (aligning in NNE to SSW direction), another in Siu Lam (aligning in NE to SW direction) and the third valley along Pak Shek Hang near So Kwun Wat Tsuen / So Kwun Wat Road (aligning in ENE to WSW direction), located in the eastern, middle and northwestern portions of the Study Area respectively. These valleys all penetrate the Study Area and serve as major breezeways under both major annual and summer prevailing winds.
- 5.3 The eastern breezeway follows the Tai Lam Chung Nullah which links up Tai Lam Chung Reservoir and the sea. It allows the annual N/ NE wind and summer S/ SW wind to penetrate through the Study Area. It helps to enhance the wind environment of Tai Lam Chung Tsuen / Luen On San Tsuen (east and west) and GIC developments (Customs and Excise Training School, etc.) in Tai Lam, under these prevailing winds.
- 5.4 The breezeway in the middle part of the Study Area mainly follows Siu Lam Road which connects Tai Lam Reservoir and the open space and the low-rise government developments at the sea front. It allows the summer SW wind to access the inland area and also allows the annual NE wind to penetrate in facilitating the air flows near the residential areas in Siu Lam
- 5.5 The nullah near So Kwun Wat Tsuen forms a major part of the northwest breezeway. This breezeway connects to the valley of Pak Shek Hang and allows the valley wind to penetrate across this part of the Study Area. Although there is a residential development (Avignon) on top of the nullah, there is a large separation within Avignon which aligns with the nullah and allows wind to flow along this breezeway freely. The breezeway further extends to So Kwan Tan and the sea shore area. This breezeway allows the annual ENE/E and summer SW wind to flow through and enhance the wind environment at So Kwun Wat Tsuen and So Kwun Wat San Tsuen.

Local wind corridors

- 5.6 There are three major regions in / near the Study Area that are frequently accessed by pedestrian. They are areas near So Kwun Wat Tsuen, along Castle Peak Road and Tai Lam Chung. The local wind corridors benefiting the wind environment of these areas are discussed as follow:

Wind corridors near So Kwun Wat Tsuen

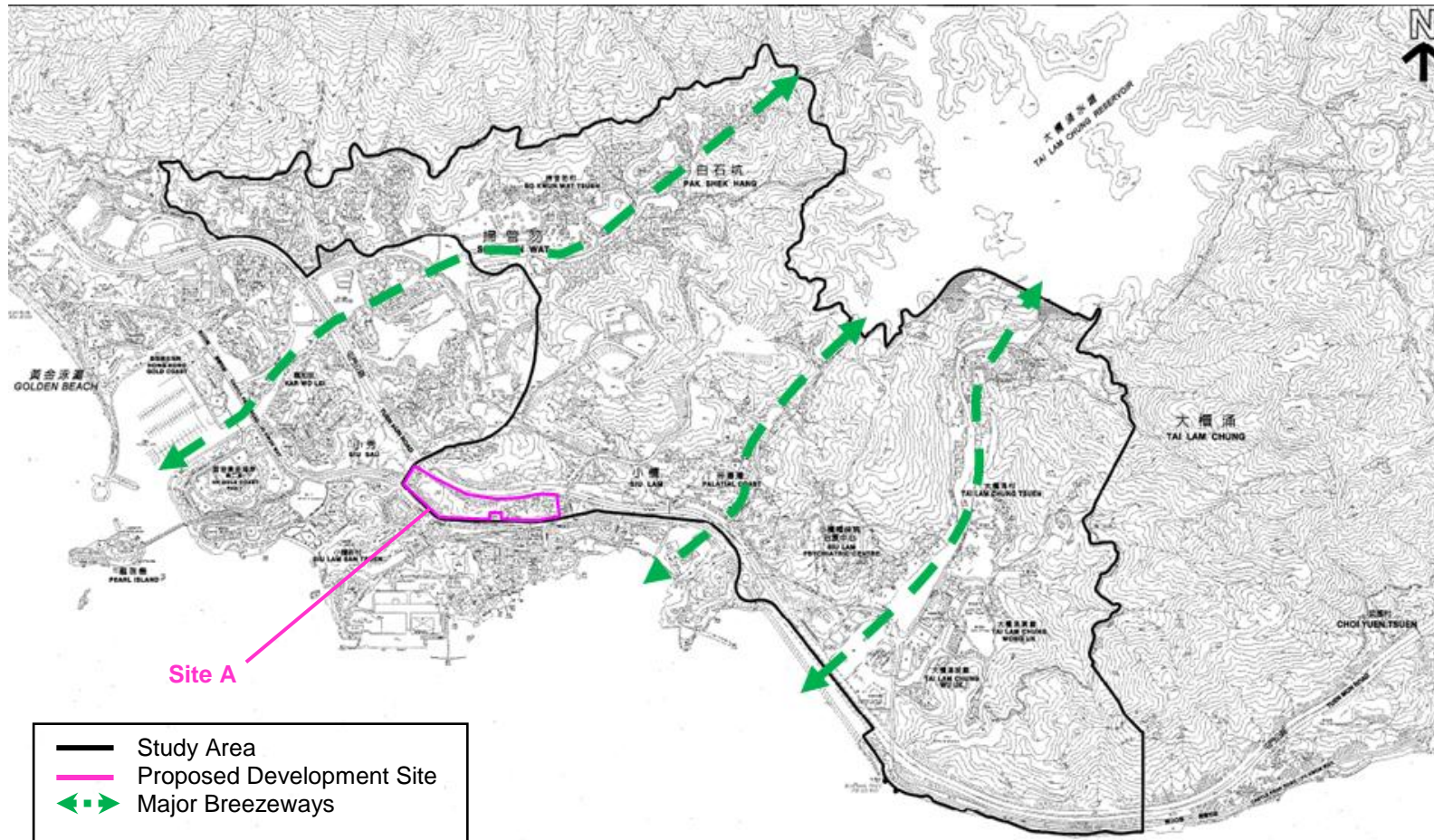
- 5.7 As mentioned, the major northwest breezeway passes through this area of So Kwun Wat Tsuen. The low-rise nature of this area also allows the prevailing wind to flow through easily. Under the NE/ENE/E prevailing winds, So Kwun Wat Tsuen Road serves as wind corridor. Together with the major breezeway along the nullah, they further facilitate air flows through So Kwun Wat Tsuen and So Kwun Wat San Tsuen and ventilate the downstream area (Avignon, Aegean Coast and the waterfront area).
- 5.8 Under the S/SE winds, the prevailing wind can flow through freely as the upstream area are mainly open areas and low-rise residential development. There is no designated wind corridor as the wind can flow through freely and the wind environment is expected to be satisfactory under these prevailing wind directions.
- 5.9 The above mentioned wind corridors are shown and illustrated in **Figure 5.2**.

Wind corridors at Castle Peak Road (near Site A)

- 5.10 Under the E and ENE prevailing winds, Tuen Mun Road, Castle Peak Road (Section between Siu Lam and Siu Sau) and Tsing Tai Road which are parallel to one another, serve as wind corridors that enhance the wind permeability through the local area. These three wind corridors are shown in **Figure 5.3**. Under the SW summer winds, Tsing Fat Road and the “GB” zone between The Hillgrove and Peridot Court act as the wind corridors allowing SW wind and sea breeze to enter the inland area near Site A.
- 5.11 Lok Yi Street and a section of Tsing Tai Road next to Fiona Garden aligning north-south would facilitate the summer S wind to penetrate through to reach Site A area and areas further inland.

Wind corridors at Tai Lam Chung

- 5.12 At the south and south-western sides of So Kwun Wat Study Area are the sea and road network. There is little obstruction during summer and annual SE wind conditions.
- 5.13 The major breezeway and wind corridor at Tai Lam Chung are illustrated in **Figure 5.4**. The Tai Lam Chung Nullah acts as the major breezeway which allows the annual N/NE and summer S/SW wind to ventilate the area on the two sides of the nullah.
- 5.14 Castle Peak Road – Tai Lam section serves as a wind corridor enhancing wind permeability in the area near Siu Lam Psychiatric Centre under the annual and summer E prevailing wind direction. In the summer condition, it also facilitates wind flow from S/SE and sea breeze to Tai Lam Chung Road and ventilates the inland area.



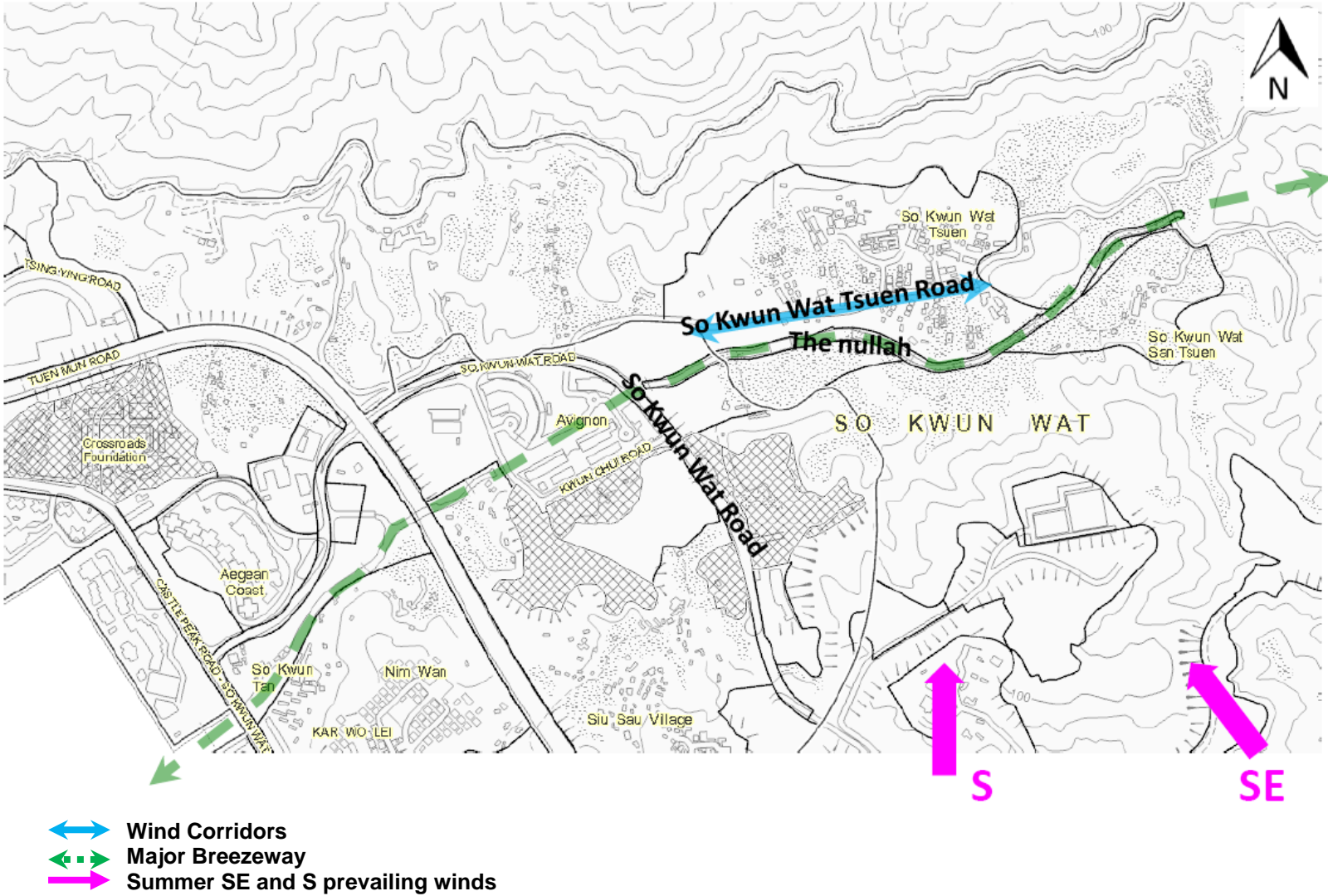


Figure 5.2 Wind Corridors within/near So Kwun Wat Tsuen

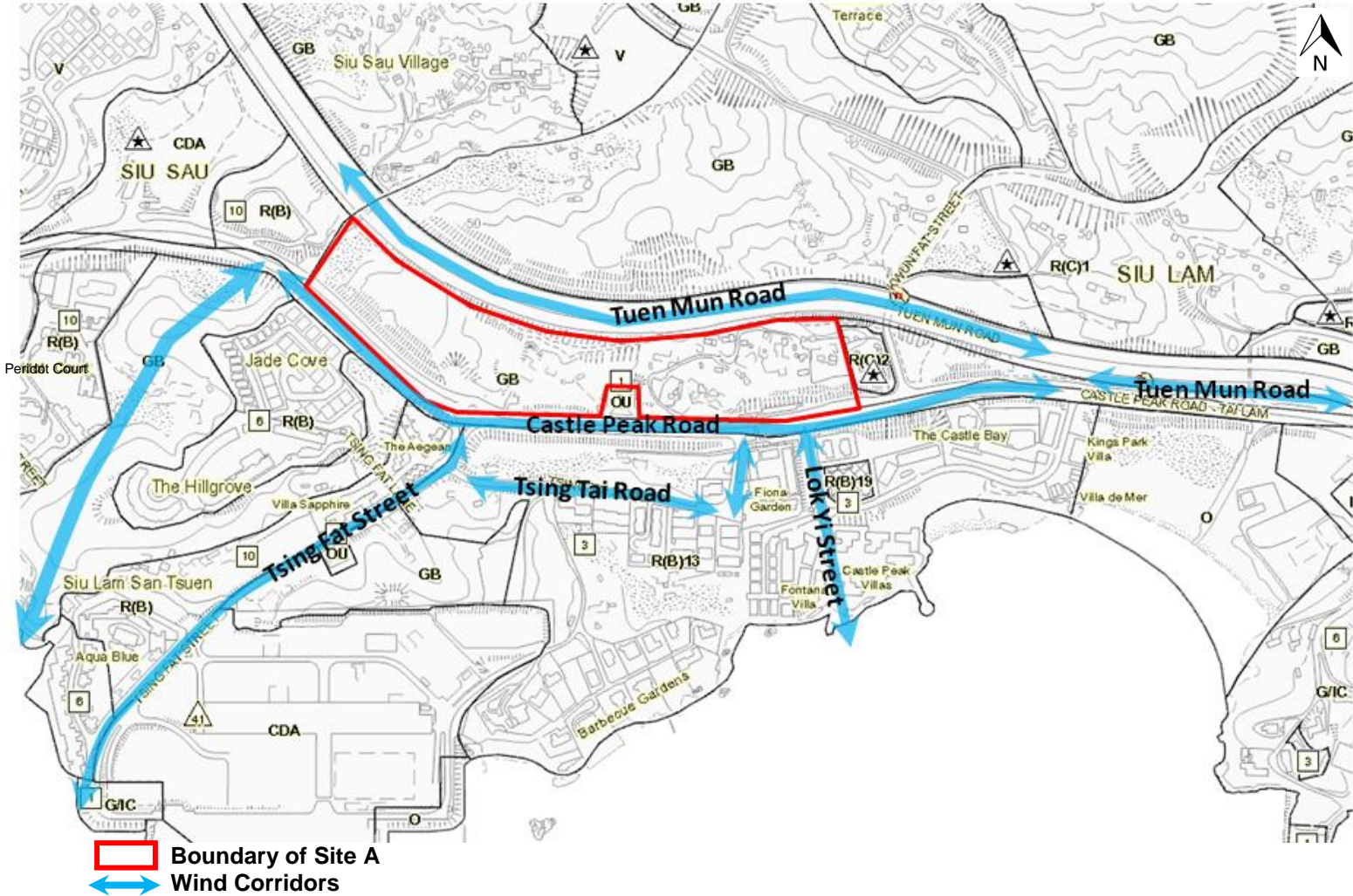
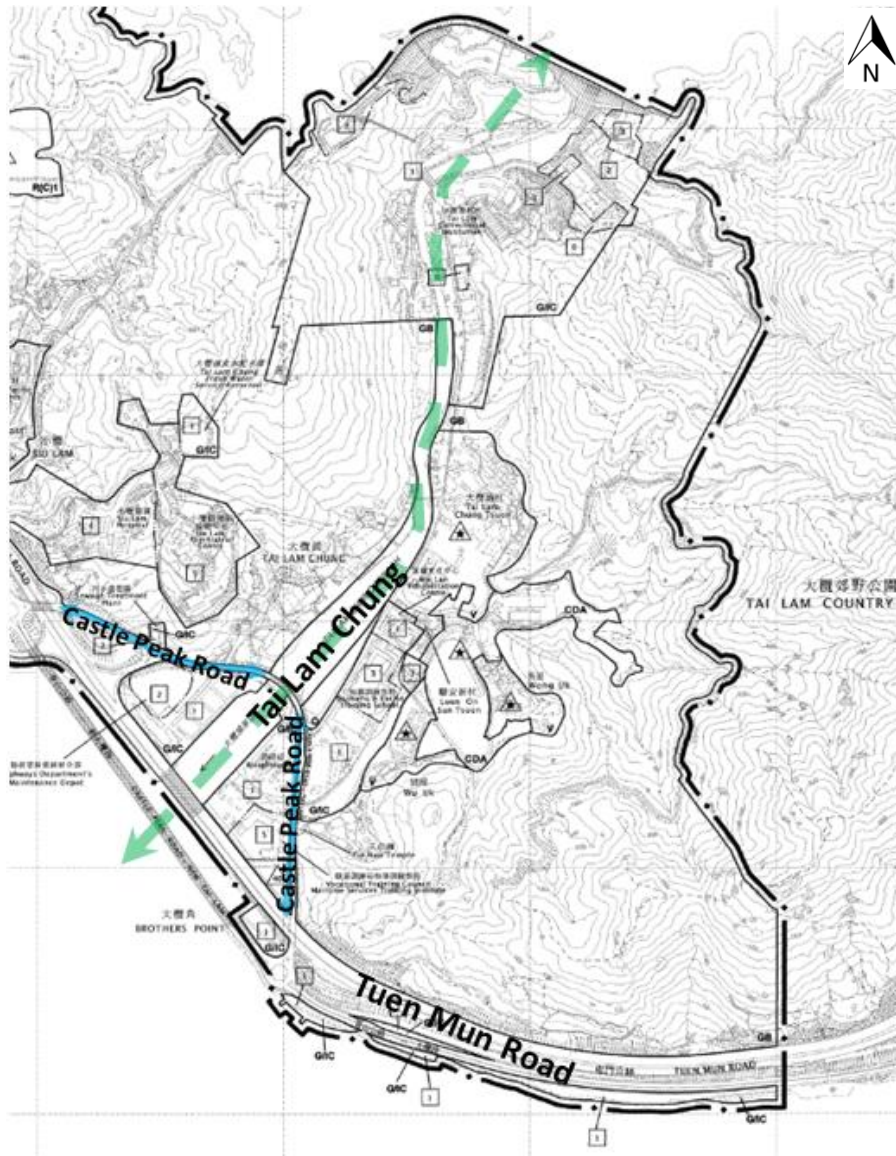


Figure 5.3 Wind Corridors near the Site A



- ↔ Wind corridors
- ↔ Major Breezeway

Figure 5.4 Major Wind Corridors near Tai Lam Chung

6 PROPOSED PROJECT AREA AND MAJOR DEVELOPMENTS

- 6.1 A proposed amendment to the Approved So Kwun Wat OZP for housing development is shown in **Figure 6.1**. It is located between Tuen Mun Road and Castle Peak Road east of Siu Sau / Tuen Mun New Town (namely Site A hereafter)
- 6.2 Photos of the buildings near Site A are shown in **Figure 6.2** below.

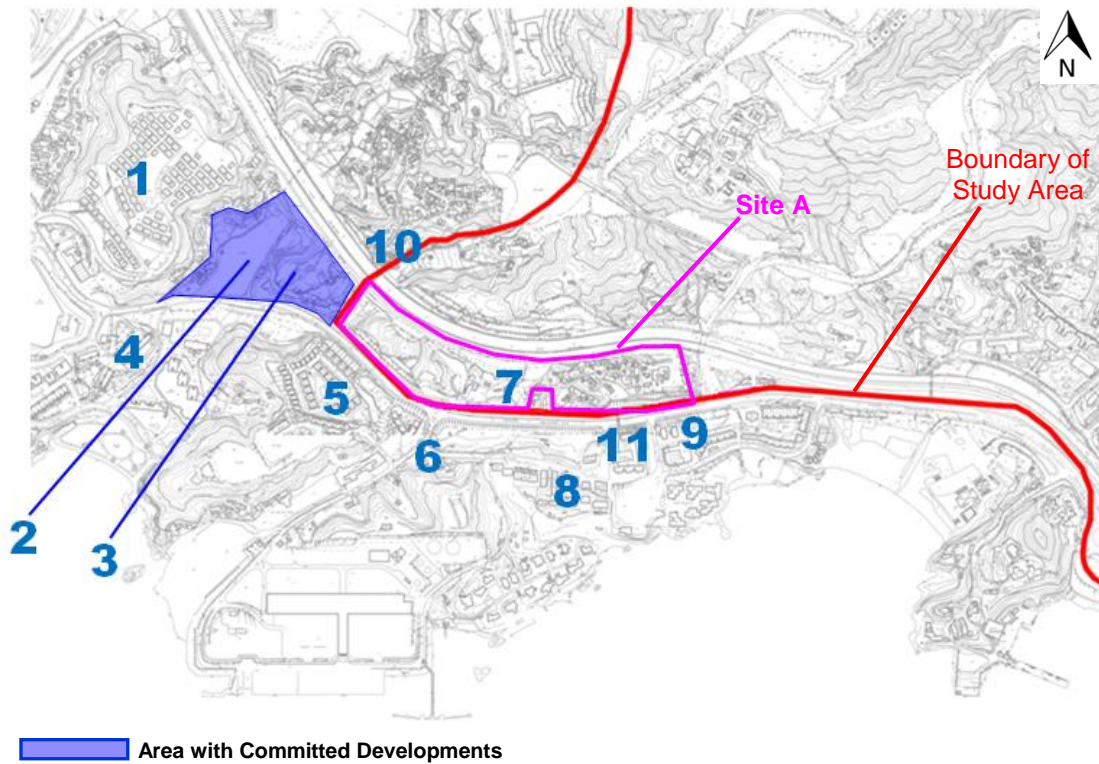


Figure 6.1 Existing and Committed Developments in the vicinity of Site A

	
<p>1. Nim Wan</p>	<p>2. Area with Committed Development zoned "CDA"</p>
	
<p>3. Area with Committed Development zoned "R(B)"</p>	<p>4. Peridot Court</p>
	
<p>5. The Hillgrove</p>	<p>6. The Aegean</p>
	
<p>7. Site A</p>	<p>8. Houses at Tsing Tai Road</p>




	
<p>9. The Ivanhoe Villa</p>	<p>10. Siu Sau Village</p>
	
<p>11. Fiona Garden</p>	

Figure 6.2 Photos of Existing Developments and Sites with Committed Developments in the vicinity of Site A

7 EXPERT EVALUATION ON THE PROJECT AREA

- 7.1 As mentioned, a Project Area located within the Study Area of So Kwun Wat, namely Site A, has been targeted for housing development. Its air ventilation performance has been assessed based on development parameters provided by PlanD.
- 7.2 The evaluation will also be based on existing topography and morphology, future development of the surrounding and wind environment. Specific measures such as breezeways, open spaces and building gaps would be recommended for enhancing wind permeability through the local region and promoting air ventilation performance.

Site A

- 7.3 Site A is planned for mid to high-rise residential developments with a site area of about 6.03ha. The proposed maximum building height of Site A is around 80mPD. This site has an elongated shape located between Siu Sau Village and the residential development along Castle Peak Road (i.e. Fiona Garden, The Aegean and The Hillgrove, etc). The area is currently designated as “GB”. Considering the site configuration and other circumstances, the developments within this site would probably form “wall-like” buildings with continuous façade affecting wind penetration in the area.
- 7.4 There are several existing / committed developments in the west and southwest vicinity of Site A including an adjacent committed development zoned “R(B)” located at Tuen Mun East area, Jade Cove and The Aegean. The buildings within these developments fronting Site A area, ranging from 35mPD to around 70mPD in height, may create wind blockage on Site A under the summer SW prevailing wind. However, the SW wind can enter the site from sea front through the wind corridor along the “GB” next to Jade Cove. Also, Site A has an relatively open exposure to the prevailing winds from the N, ENE, NE, SE and S since the upstream vicinity areas in these directions are open ground or occupied only by low-rise developments (i.e. Fiona Garden, Castle Bay, which are no higher than 3-storeys) and village type developments (Siu Sau Village) with various streets serving as wind corridors.
- 7.5 In general, the building with height H is possible to have a wind environment influence area (wind shadow area) of approximately H extended from the building to its downwind side. Decline in terms of air ventilation performance is likely to occur within the wind shadow area. Under the incoming N winds, the affected areas induced by the future development clusters in Site A may reach the existing residential area of Fiona Garden, The Aegean, and the northern most buildings of Jade Cove.
- 7.6 While under the prevailing wind from E and SE, the influenced area generated by Site A developments may reach the eastern portion of the committed development in Tuen Mun East and Siu Sau Village. Thus, slightly decline in terms of air ventilation performance can be expected under these prevailing winds in the aforementioned areas after the construction of developments in Site A.
- 7.7 Under the S and SW winds, the affected region would reach the hill slope / “GB” located to the north and northeast of Site A and may cause impact on the wind environments there. However, owing to the lack of pedestrian access in these areas, it is not expected that the developments in Site A would cause significant impacts upon the pedestrian wind comfort in the vicinity under these summer prevailing winds.
- 7.8 In order to reduce the potential impact of development in Site A to the surrounding area, 5 non-building-areas (NBAs) are recommended as shown in **Figure 7.1**.
- 7.9 The detailed discussion and recommended mitigation measures are as follows:
- An NBA of around 20m in width measured from the western zoning boundary of Site A is proposed. This air path aligning in approximately NNE to SSW would allow penetration of winds towards Jade Cove area under the N prevailing winds. Under the summer southerly wind, the blockage against Siu Sau Village is also expected to be alleviated through this air path.

- A 20m wide NBA is recommended to align with Tsing Fat Street to facilitate annual and summer winds. This NBA would extend the wind corridor of Tsing Fat Street, and facilitate the sea-land breeze as well as southern prevailing winds through Site A into the inland region. Under the N and NE winds, this NBA would be effective in reducing the wind shelter of development in Site A on The Aegean and Tsing Fat Street.
 - An NBA of 20m in width is recommended to the north of the existing petrol filling station. Considering the long lot frontage of Site A along Castle Peak Road, this NBA would be required to ensure the permeability of the site making use of the relatively open petrol filling station to facilitate northerly and southerly prevailing winds.
 - Two NBAs of 20m in width are proposed to align with Tsing Tai Road and Lok Yi Street respectively. These two NBAs are expected to mitigate the blockage of winds against Fiona Garden / Ivanhod Villa under the annual prevailing winds.
- 7.10 Further to the proposed NBAs, general mitigation measures are recommended for the Project Area, i.e. (i) encouragement to minimize the podia for enhancing air ventilation at pedestrian level based on Chapter 11 of the Hong Kong Planning Standards and Guidelines (HKPSG); and (ii) the need to fulfil the requirement of building separation in accordance with the Sustainable Building Design (SBD) Guidelines (APP-152) where appropriate.

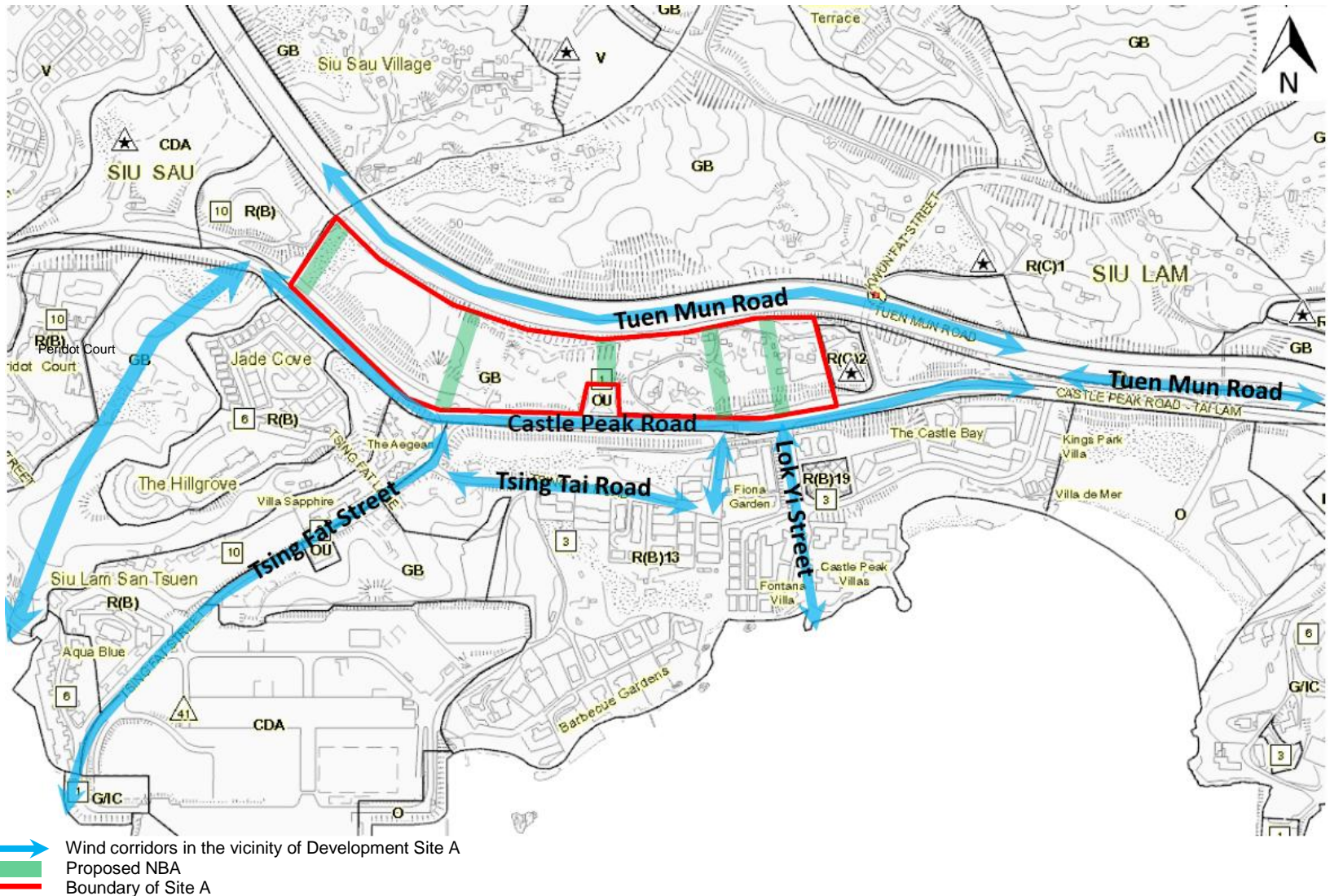


Figure 7.1 Recommended NBAs within Site A and major wind corridors nearby

8 OTHER POTENTIAL SITE

- 8.1 In addition to the proposed Site A, another potential site has been identified for housing development (namely Site B hereafter). It involves an area currently zoned “G/IC” on the western shore of Tai Lam Chung Nullah (**Figure 8.1**). It is mainly comprised of a site accommodating the existing Tak Bond Godown (next to Tai Lam Nullah) and a parking area with an access road in between. This “G/IC” zone is bounded by sections of Castle Peak Road and Tuen Mun Road. At the time of the air ventilation assessment, the boundary and development parameters of Site B are yet to be finalized, subject to detailed study. However, according to the Airport Height Restriction (AHR), the existing Tak Bond Godown site and the parking area are subject to height restrictions of 99mPD and 100mPD respectively. Hence, for the air ventilation assessment on Site B, the assessment is conducted based on the “G/IC” zoning boundary and on future developments at the maximum potential height of 100mPD.
- 8.2 For Site B, the buildings to the east and north are all low-rise developments, and those to the northwest are mid to high-rise buildings of Palatial Coast (with a distance of around 400m away from Site B). The committed development to the further NE of Site B will be a residential development at maximum 70mPD. Photos of the buildings near Site B are shown in **Figure 8.2**.

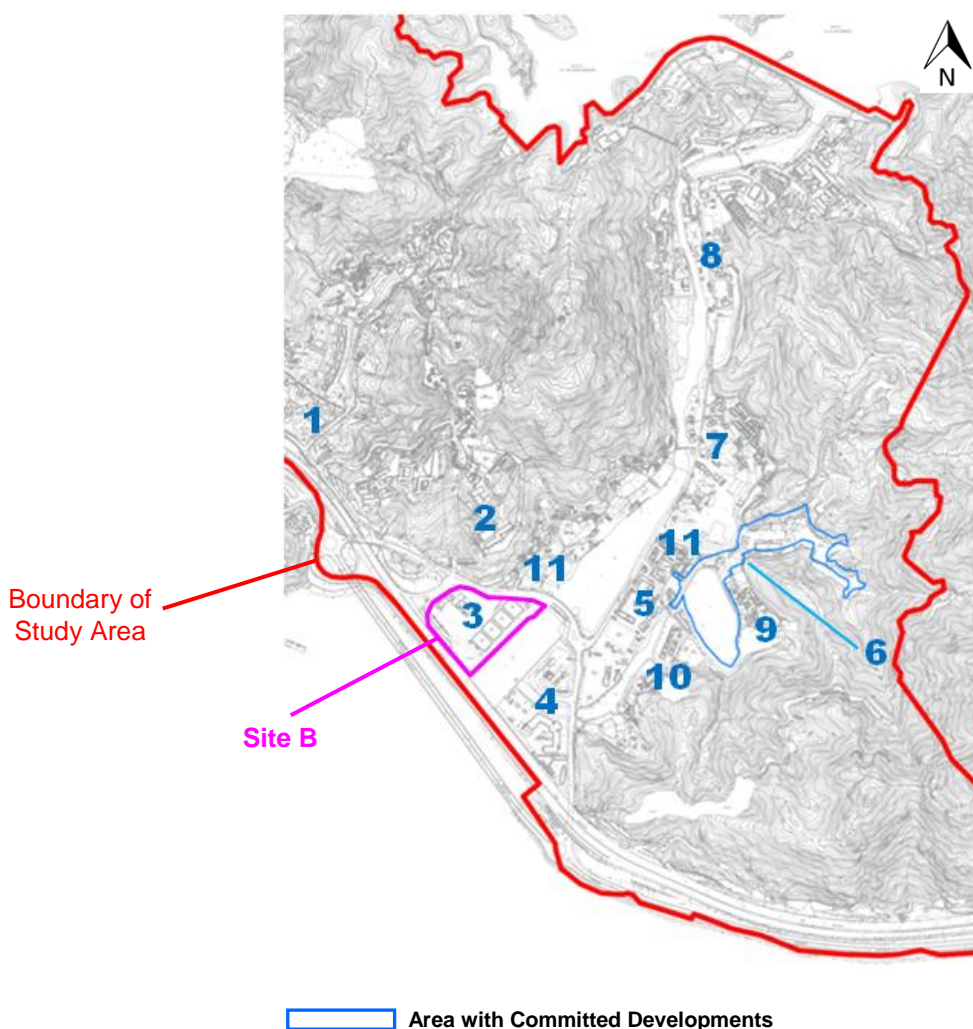








Figure 8.1 Existing and Committed Developments in the vicinity of Site B

	
<p>1. Palatial Coast</p>	<p>2. Siu Lam Psychiatric Centre</p>
	
<p>3. Tak Bond Godown</p>	<p>4. Maritime Services Training Institute</p>
	
<p>5. Customs and Excise Training School</p>	<p>6. Area with Committed Development near Tai Lam Chung Tsuen</p>






	
<p>7. Tai Lam Chung Tsuen</p>	<p>8. Tai Lam Correctional Institute</p>
	
<p>9. Tai Lam Chung Wong Uk</p>	<p>10. Tai Lam Chung Wu Uk</p>
	
<p>11. Luen On San Tsuen (East and West)</p>	

Figure 8.2 Photos of Existing Developments and Site with Committed Developments in the vicinity of Site B within the Southeast Region of the Study Area

8.3 Site B is located on Tai Lam Chung Nullah as shown in **Figure 8.3**. Sea-land breeze are expected to reach this region with little obstruction. The wind environment at Site B and its nearby areas is expected to be satisfactory under the summer S, SE and SW wind condition.

- 8.4 There are a few GIC developments located to the north and east of Site B, including Siu Lam Psychiatric Centre, Maritime Services Training School and Customs and Excise Training School, etc. Due to the relative far distances between these buildings and Site B (approximately 100m), these developments would not induce significant impact to the wind environment of Site B under the annual north eastern quarter prevailing winds.
- 8.5 As mentioned, there is a committed development with a proposed building height of around 70mPD at the “CDA” site located east of Tai Lam Chung Wong Uk area. Given the distance between this “CDA” and Site B of more than 200m, it is not likely that the “CDA” development will induce adverse impact to the wind environment of Site B.
- 8.6 In general, a building of height of H would possibly generate a wind wake approximately H from the building. Thus the wind wake induced by Site B developments is likely to lower the air ventilation performance within the 100m area from the site on the leeward side. Under the annual north eastern quadrant winds, the affected area is likely to be Tuen Mun Road and the open sea. However, due to the lack of pedestrian access within this area, it is not expected it will give rise to pedestrian wind comfort issues.
- 8.7 Under the summer southerly winds, the wake area of Site B is likely to reach the southernmost portion of Luen On San Tsuen (west) at the western shore of Tai Lam Chung Nullah and Siu Lam Psychiatric Centre. Slight decline in terms of wind performance at these locations are expected.
- 8.8 It is therefore recommended to incorporate an NBA of at least 15m wide in the north-south alignment. It could make use of the existing road between Tak Bond Godown and the parking area as the NBA to create an air path in redirecting the southerly prevailing winds as well as the sea-land breeze towards the area of Castle Peak Road near Siu Lam Psychiatric Centre and the Luen On San Tsuen (west) (**Figure 8.3**). This air path would also facilitate the air flow under the annual NE prevailing winds and enhance the wind permeability at Site B.
- 8.9 To further minimize the potential impact that may induced by future developments at Site B to the surrounding environment, general mitigation measures are recommended, i.e. (i) encouragement to minimize the podia for enhancing air ventilation at pedestrian level based on Chapter 11 of the HKPSG; and (ii) the need to fulfil the requirement of building separation in accordance with the SBD Guidelines (APP-152) where appropriate.

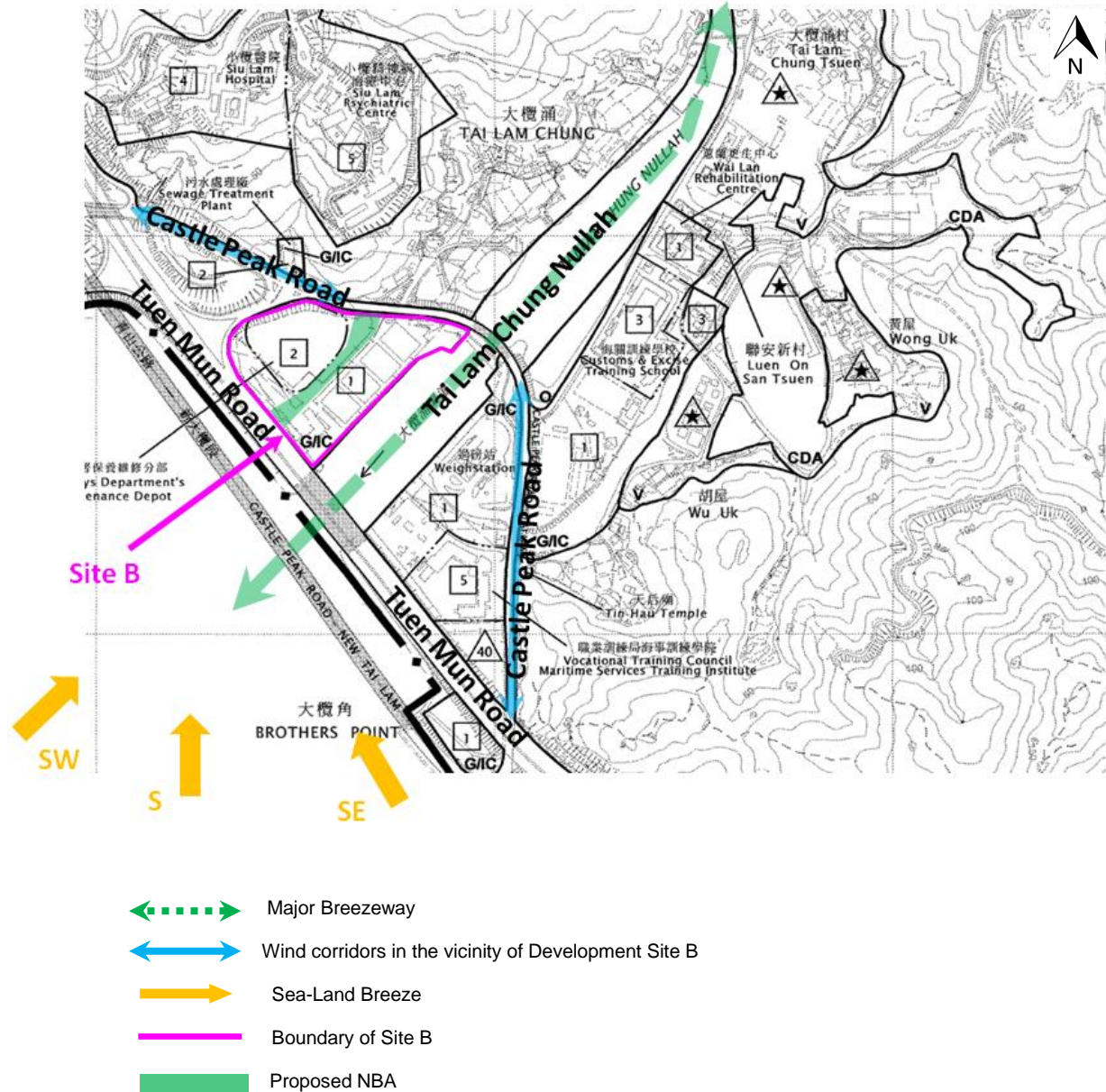


Figure 8.3 Major Wind Corridors in/near the Site B

9 FURTHER WORK

9.1 The current wind environment of the Study Area is considered satisfactory given that the area is relatively open with mainly green belt, open space and low-rise developments. Given that NBAs are recommended for the potential development sites, the Study Area would have no major air ventilation issues. If the requirements of the NBAs cannot be met, further quantitative AVA studies should be conducted to assess the air ventilation performance.

10 SUMMARY AND CONCLUSION

- 10.1 The Study Area is situated to the southwest of the hilly terrain of Tai Lam Country Park and Tai Lam Reservoir, as well as fronting the Urmston Road Sea to its south. The highest spot of the aforementioned hilly terrain is around 450mPD in height, situated north to northwest of the Study Area.
- 10.2 By summarizing the wind data from the MM5 model and the wind tunnel study conducted by the HKUST, it can be concluded that the annual wind comes from the N, NE, ENE, E and SE while summer wind come from E, SE, S and SW directions.
- 10.3 The katabatic (downhill) air movements from the hills of Tai Lam Country Park and valley wind are expected. These air movements would help improve the wind environment in the northern and eastern part of the Study Area. Meanwhile, sea-land breeze may occur near the shoreline, and may facilitate the air flow in the southern/southeast part of Study Area.
- 10.4 The land use mainly composes of “Green Belt”, “Open Space”, “Government, Institution or Community”, residential zones, “Village Type Development”, and “Comprehensive Development Area”. As there are quite a lot of “Green Belt”, “Open Space” and low rise development which facilitates the wind to flow through, the wind environment for this area is generally satisfactory.
- 10.5 Three major breezeways are identified which are mainly along the valleys (So Kwun Wat Tsuen, Siu Lam and Tai Lam Chung) in the Study Area. They allow the major summer and annual winds to ventilate the whole study area.
- 10.6 There is one Project Area (Site A) proposed for housing development which is assessed in this assignment. It is located between Tuen Mun Road and Castle Peak Road, east of Siu Sau / Tuen Mun New Town.
- 10.7 Site A covers the area between Tuen Mun Road and Castle Peak Road near Siu Sau, with the maximum building height of around 80mPD. The shadow zone induced by the proposed developments in Site A could reach the nearby existing or committed residential areas on its downwind side. 5 NBAs are recommended for Site A allowing the major annual and summer prevailing winds to penetrate through the site and alleviating the potential impact to the surrounding environment.
- 10.8 Another potential site (Site B) is located in the area which is currently zoned “G/IC” on the western shore of Tai Lam Chung Nullah. It consists of the site currently accommodating the Tak Bond Godown and a parking area with an access road in-between. The air ventilation performance of future developments in Site B is assessed based on the “G/IC” zoning boundary and the AHR at a maximum height of 100mPD. Certain impact to the surrounding wind environment is expected when compared to the existing condition. An NBA is recommended to make use of the north-south aligned access road within Site B in order to facilitate the sea breeze to enter the inland area.
- 10.9 To further minimize the potential impact that may be induced by developments at Site A and Site B to the surrounding environment, general mitigation measures are recommended in minimizing the podia for enhancing air ventilation at pedestrian level based on Chapter 11 of the HKPSG; and in fulfilling the requirement of building separation in accordance with the SBD Guidelines (APP-152) where appropriate.
- 10.10 Given that NBAs are recommended for the potential development sites, the Study Area would have no major air ventilation issues. If the requirements of the NBAs cannot be met, further quantitative AVA studies should be conducted to assess the air ventilation performance.