Our ref SHC/HTC/IL/EC/II/T255228/06.028/L1382
T 2828 5747
E Eddie.chan@mottmac.com.hk
Your ref

Mott MacDonald

To Distribution

13 August 2010

Dear Sir/Madam,

Agreement No. CE 45/2008 (CE)
Liantang/Heung Yuen Wai Boundary Control Point and Associated Works – Investigation
Final Report on Air Ventilation Assessment (Expert Evaluation)
Report No.255228/06.028B

Further to the discussions held with Mr. Raymond Leung of Planning Department for the captioned, could you please kindly superseded the Report on Air Ventilation Assessment (Revision B) circulated under our letter ref. SHC/HTC/IL/II/T255228/06.028/L0927 dated 29 June 2010 with the enclosed report.

Due to the tight programme of the Project, your further comment on the above Report on or before 27 August 2010 would be highly appreciated. Nil return is also required.

Should you have any queries, please do not hesitate to contact our Mr. Eddie Chan at 2828 5747.

Yours faithfully
for MOTT MACDONALD HONG KONG LIMITED

H. T. Cheng

Encl. Recd 4 copies.

CE/BCP	SE1	SE2	SE3	SE4	SE			
	E	E	E	E		STO	GR	PS
B.U.			C.C.					

Distribution to :
SE2
E3
E4
File

Distribution List

CE/BCP, CEDD (Attn : Mr. H. W. Chan)
ACTP/UDL, PlanD (Attn : Ms. Ginger K. Y. Kiang)

3/F, CEDD

20/F Two Landmark East, 100 How Ming Street, Kwun Tong, Kowloon, Hong Kong
T +852 2828 5757 F +852 2827 1823 W www.mottmac.com.hk
Mott MacDonald Hong Kong Limited

Drawing/document register & transmittal

Mott MacDonald

Transportation and Infrastructure Division
20/F Two Landmark East,
100 How Ming Street,
Kwun Tong,
Kowloon, Hong Kong

Project Title Agreement No. CE 45/2008 (CE) Liantang / Heung Yuen Wai Boundary Control Point and Associated Works - Investigation

Project No. 255228

Title	***Ref.***	***Date of issue***											
		23-Apr-10	29-Jun-10	13-Aug-10									
		Revision											
Draft Report on Air Ventilation Assessment	255228/06.028	A											
Final Report on Air Ventilation Assessment	255228/06.028		B										
Final Report on Air Ventilation Assessment (Expert Evaluation)	255228/06.028			B									

Distribution	***Number of copies / Medium***											
CE/BCP, CEDD (Attn: Mr. S.M. Li)	4P											
ACTP/UDL, PlanD (Attn: Ms. Ginger K.Y. Kiang)		1P	1P									
CE/BCP, CEDD (Attn: Mr. H.W. Chan)		4P	4P									

State the purpose of issue:
Example: FI = For Information, FC = For Comment,
FC & A = For Comment & Approval

State the medium employed: C = CDROM; D = Diskette;
E = Email; I = Internet; N = Negative; P = Paper

Purpose of issue												
FC	FC & A	FC & A										

Issued by H. T. Cheng

Agreement No. CE 45/2008 (CE)
Liantang/Heung Yuen Wai Boundary Control Point and Associated Works

Final Report on Air Ventilation Assessment (Expert Evaluation)
Report No.255228/06.028B

August 2010

Civil Engineering and Development Department

EDMS No.	
File No.	

Mott MacDonald

Agreement No. CE 45/2008 (CE)
Liantang/Heung Yuen Wai Boundary Control Point and Associated Works

Final Report on Air Ventilation Assessment (Expert Evaluation)
Report No.255228/06.028B

August 2010

Civil Engineering and Development Department

Civil Engineering Office, Boundary Control Point Division

Mott MacDonald, 20/F Two Landmark East, 100 How Ming Street, Kwun Tong, Kowloon, Hong Kong
T +852 2828 5757 F +852 2827 1823 W www.mottmac.com

Mott MacDonald

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
A	Apr 2010	Eddie Chan	Ivan Law	H.T. Cheng	Draft
B	Aug 2010	Eddie Chan	Ivan Law	H.T. Cheng	Final

T +852 2828 5757 F +852 2827 1823 W www.mottmac.com

Mott MacDonald

Content

Appendices

Tables

Figures

1. Introduction

1.1 General

1.1.1 Civil Engineering and Development Department (CEDD) of the Government of the Hong Kong Special Administrative Region appointed Mott MacDonald Hong Kong Ltd. (hereinafter called MMHK), under Agreement No. CE 45/2008 (CE), to provide professional services in respect of Liantang/Heung Yuen Wai Boundary Control Point and Associated Works – Investigation (hereinafter called "the Assignment"). The date for the commencement of the Assignment was 24 April 2009.

1.1.2 Nowadays, there are total of four Boundary Control Points (BCPs) in the HKSAR providing vehicular crossing at the Hong Kong – Shenzhen boundary at present. On the eastern part, the existing vehicular crossing points at Man Kam To and Sha Tau Kok have already reached their design capacity, while the expansion works to enhance their capacities is limited by existing site constraints. It is anticipated that the volume of cross-boundary traffic will continue to increase with the closer ties of Hong Kong - Shenzhen and the completion of the Eastern Corridor in Shenzhen. The establishment of a new BCP border area of North-eastern New Territories is thus required to meet the future traffic demand and alleviate traffic congestion at Man Kam To Boundary Control Point and the adjoining areas.

1.1.3 In 2006, the Hong Kong and Shenzhen governments jointly commissioned a study, namely "Preliminary Planning Study on Developing Liantang/Heung Yuen Wai Control Point" (the Joint Study) to examine the need, benefit and function of a new BCP at Liantang/Heung Yuen Wai (LT/HYW). The Joint Study confirmed the need for a new BCP at LT/HYW.

1.1.4 As part of this Assignment, the Consultant is required to conduct an Air Ventilation Assessment (AVA) in accordance with the ETWB TC No.1/06 as specified under the Clause 6.14.19 in the Project Brief to ensure that the potential impacts on air ventilation performance and wind environment are duly considered in the planning process.

1.2 Objective

1.2.1 The objective of this assessment is to qualitatively assess the potential impact on air ventilation performance caused by the proposed buildings/structures within the LT/HYM BCP Site (BCP Site) to its immediate surrounding area.

1.3 Scope of Study

1.3.1 The scope of this study includes the following tasks:-

- To identify and review the characteristic of study area, key wind corridors and the prevailing wind directions;
- To qualitative assess the potential impact on the air ventilation performance caused by the proposed buildings/structures within the BCP Site, identify good design features, potential problem areas and recommend mitigation measure if required; and
- To advise if further study should be carried out at later stage.

1.4 Characteristic of Study Area

1.4.1 The BCP Site is situated at the south-west of Liantang of Shenzhen and at the west of Heung Yuen Wai of Hong Kong as illustrated in Figure 1.1.

Figure 1.1: Aerial photo of the proposed BCP Site

1.4.2 The Shenzhen River is running along the Hong Kong Shenzhen Administrative Region Boundary as illustrated by the ***Orange*** Line. The BCP Site inside the Hong Kong boundary is enclosed by the ***Green*** Line in Figure 1.1 and is approximately 18.3 hectares (ha) in area.

1.4.3 The Chuk Yuen Village (CYV) is currently situated inside the BCP Site and the relocation of CYV will be completed prior to the commencement of the site formation works. CYV will be relocated within approximately 0.5Km radius from the boundary of the BCP Site and it will be consisted of low-rise town houses.

1.4.4 Within the Hong Kong Boundary, the surrounding area of the BCP Site is predominately occupied by the natural landscape with the North East New Territories (NENT) Landfill site situated in the vicinity as illustrated by the aerial photo in Figure 1.1. In addition, there are villages and open storages situated at the North-East, East, South-East and South of the BCP Site.

1.4.5 The existing Lin Ma Hang Road running through the centre of the BCP Site will be realigned along the BCP Site boundary. There is no other major road presence in the vicinity apart from the existing border road along the Shenzhen River.

1.4.6 Across the broader in Shenzhen, the surrounding of the BCP Site is predominately occupied by urban fabrics comprised of high rise buildings in particular to the North-East and West of the BCP Site. While the natural landscape of Tang Pai Shan and the Shenzhen reservoir are occupying the North of the BCP Site.

1.5 The Proposed Layout of the BCP

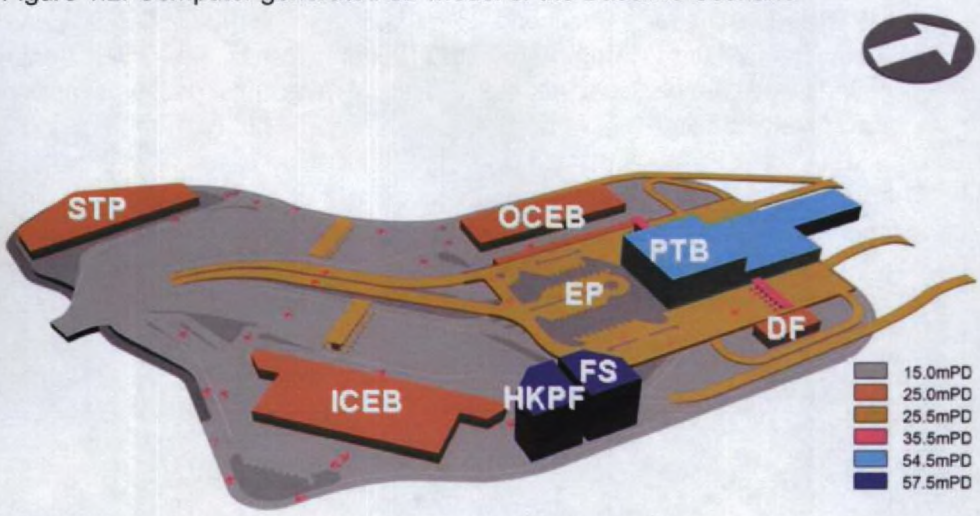
1.5.1 The detail (i.e. the actual size, shape and appearance) of the proposed buildings/structures within the BCP Site is currently unavailable at this Investigation Stage. The Design Competition is currently being prepared and it is anticipate to be completed prior to the commencement of the Detailed Design Stage.

1.5.2 The current footprints and dimensions of the proposed buildings/structures are based on the requirements specified in the Schedule of Accommodation (SoA) under the revision C of the "Report on Design Parameters Preliminary Layout of BCP".

1.5.3 The current footprint is appropriately 30% converge of the BCP Site footprint and the dimensions adopted to create the massing of the proposed buildings/structures in the computer generated 3D model are anticipated to be the upper limit (i.e. the worst case).

1.5.4 The latest layout for the cluster of buildings/structures within the BCP Site and the massing of proposed buildings/structures with their respective maximum height are illustrated in Figure 1.2. This will be considered as the Baseline Scenario.

Figure 1.2: Computer generated 3D model of the Baseline Scenario



1.5.5 There are abbreviations assigned for each individual building/structure for easy reference and they are as follows:-

STP	-	Sewage Treatment Plant
ICEB	-	Inbound Cargo Examination Building
HKPF	-	Hong Kong Police Force Building
FS	-	Fire Station
OCEB	-	Outbound Cargo Examination Building
EP	-	Elevated Platform
PTB	-	Passenger Terminal Building
DF	-	Disinsection Facility

1.5.6 The formation level of the BCP Site will be approximately +15.0mPD as illustrated in Figure 1.2. The majority of the proposed buildings/structures (i.e. the STP, ICEB, OCEB, EP and DF) situated within the BCP Site are approximately 10.0m to 11.0m in height and they are not expect to have any significant impact on the air ventilation performance to the immediate surrounding area of the BCP Site due to their low rise nature and the large spacing between them.

1.5.7 The following proposed buildings/structures within the BCP Site will be considered in this assessment.

- The HKPF Building is one of the tallest buildings/structures within the BCP Site and it footprints is approximately 46.0m in width x 40.0m in length. It will have outdoor antenna poles and an observation tower at the highest point of the BCP Site for security surveillance purpose. The outdoor antenna poles and an observation tower are anticipated to reach approximately 57.5mPD.

- The FS of Fire Services Department (FSD) is also one of the tallest buildings/structures within the BCP Site and it footprints is approximately 46.0m in width x 40.0m in length. It will have a drill tower to be built as an independent structure within its compound. The Fire Station is anticipated to be between 3-5 storey heights but the drill tower is anticipated to reach approximately 57.5mPD.

- The PTB is the largest and second tallest building within the BCP Site and its footprint is approximately 73.0m in width x 150.0m in length. It has the largest frontage against the incoming winds in particular to the E and W directions and it is anticipated to reach approximately +54.5mPD.

- The EP has the largest footprint and its footprint is approximately 165.0m in width x 265.0m in length. It is an open air platform with cover for the pedestrian walkway but there will be no cover for the cross-boundary coach loading/unloading bays at the upper deck of this elevated platform. It is anticipated to reach approximately +25.5mPD.

2. Wind Environments

2.1 Source of Wind Availability Data

2.1.1 The wind availability data provided by the Hong Kong Observatory (HKO) and Fifth-Generation NCAR/Penn State Mesoscale Model (MM5) published in the website of Planning Department are acceptable as recommended in the "Technical Guide for Air Ventilation Assessment for Developments in Hong Kong" published by Housing, Planning and Lands Bureau (HPLB) and Environmental, Transport and Works Bureau (ETWB).

2.1.2 In this study, the wind availability data observed by the nearby HKO weather station located at Ta Kwu Ling (TKL) and simulated by MM5 have been reviewed in order to understand the local wind condition of the TKL area and the BCP Site.

2.1.3 The HKO wind data observed by the TKL Station provide the lower level wind availability (i.e. closer to the pedestrian level), where the wind environment is influenced by the local topography in the surrounding environment/landscape.

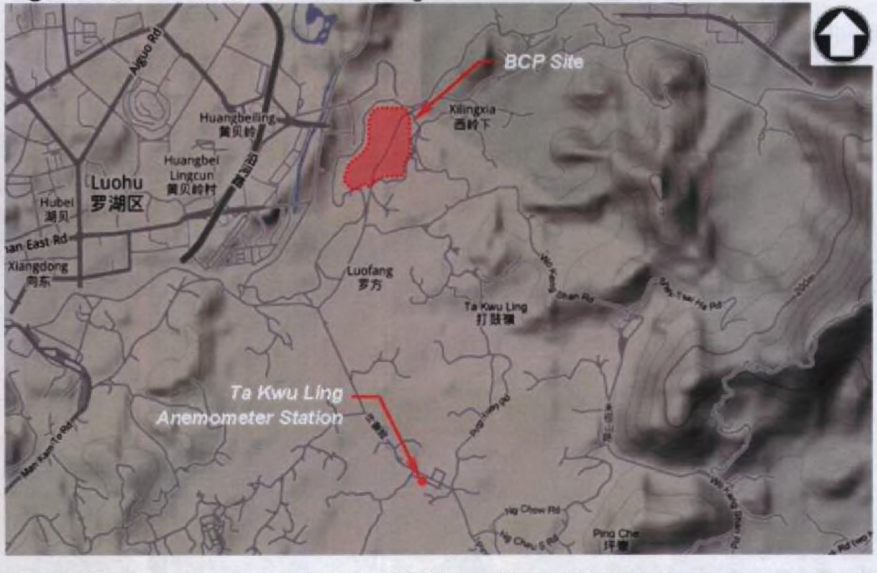
2.1.4 The wind data simulated by MM5 provide the wind availability data at the atmospheric boundary layer (i.e. 596m above the terrain), where the wind environment is free from any influenced by the local topography in the surrounding environment/landscape.

2.1.5 The annual and summer wind roses will be considered in this qualitative assessment since the prevailing wind directions may be very different from each other in the summer and non-summer period.

2.2 Wind Roses of Ta Kwu Ling Station

2.2.1 The TKL Station is located at the Ta Kwu Ling Farm adjacent to the existing Ping Che Road (22°31'43"N and 114°09'24"E) as shown in Figure 2.1. Although this HKO weather station is approximately 2.5km away from the BCP Site but it share a highly similar topography features with the BCP Site.

Figure 2.1: Location of Ta Kwu Ling Station and BCP Site



2.2.2 The anemometer of TKL Station is situated at 28.0m above the mean sea-level (i.e. +29.3mPD) according to Table A of Appendix of "Summary of Meteorological and Tidal Observations in Hong Kong" published by the HKO.

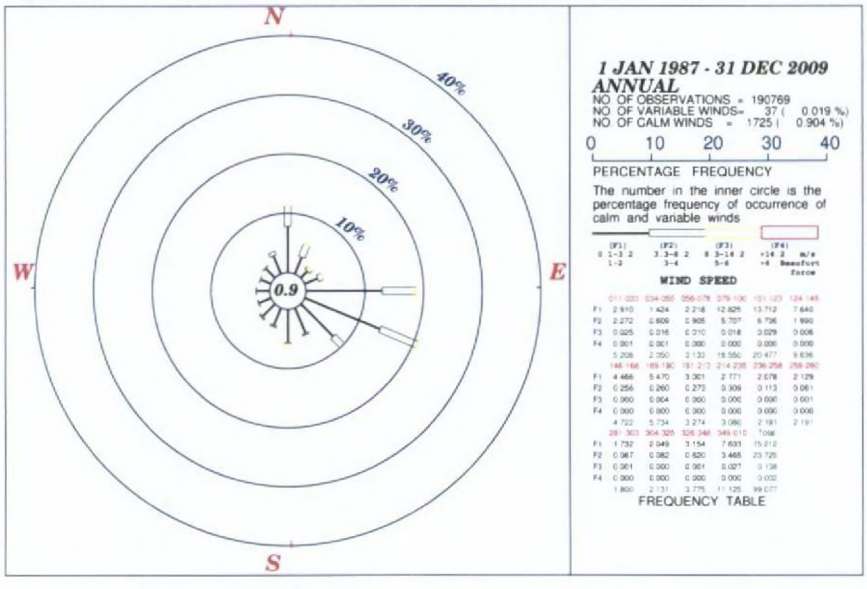
2.2.3 The "Monthly Means of Meteorological Elements for Ta Kwu Ling, 1986-2009" presented in Table 2.1 were extracted from The HKO website. The annual mean wind speed and the prevailing wind direction are 8.5km/h (i.e. 2.361m/s) and at 110° respectively.

Table 2.1: Monthly Means of Wind Speed at Ta Kwu Ling, 1986-2009

Month	Prevailing Wind Direction (degrees)	Wind Speed (km/h)
January	110°	9.0
February	110°	9.7
March	110°	10.3
April	110°	9.8
May	110°	8.7
June	110°	7.4
July	110°	7.2
August	110°	6.8
September	110°	7.7
October	110°	8.7
November	110°	8.7
December	110°	8.2
Year	110°	8.5

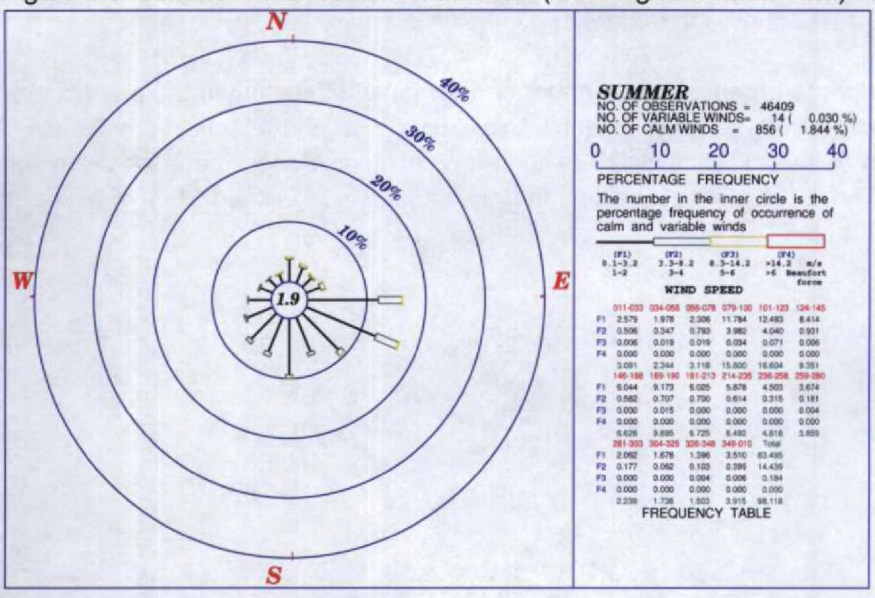
2.2.4 In addition, the annual wind rose of TKL Station between 1987 and 2009 as shown in Figure 2.2 indicate the annual prevailing wind direction is East-South-East or 110°. The other major component of wind is from the East and the minor but an observable component is from the North.

Figure 2.2: Annual wind rose of TKL Station (running 60-minute wind) 1987 - 2009



2.2.5 The summer wind rose of TKL Station between 1987 and 2009 as shown in Figure 2.3 indicate the summer prevailing wind direction are East & East-South-East or 90° &110° respectively.

Figure 2.3: Summer wind rose of TKL Station (Running 60-minute wind) 1987 – 2009



2.2.6 In summary, the wind data recorded by the TKL Station indicated that during the non-summer period, the prevailing wind directions are mainly from the East & East-South-East with some contributions from the North. While in the summer period, the prevailing wind directions are also from the East & East-South-East.

2.2.7 The wind data suggested that winds from the East & East-South-East directions are predominant in the TKL area throughout the year.

2.3 Wind Roses and Data of Grid (25, 44)

2.3.1 The nearest grid to the site is Grid (25, 44) illustrated that East-North-East and East directions dominate the annual wind frequency as shown in Figure 2.4.

2.3.2 It is appropriate to reduce the number of directions in the study if the probability of wind coming from the reduced set of directions exceeded 75% of the time in a typical reference year according to the "Technical Guide for Air Ventilation Assessment for Developments in Hong Kong". The eight most probable wind directions which exceed 75% of a year at this grid are shown in Table 2.2.

Figure 2.4: Wind rose of Grid (25,44)

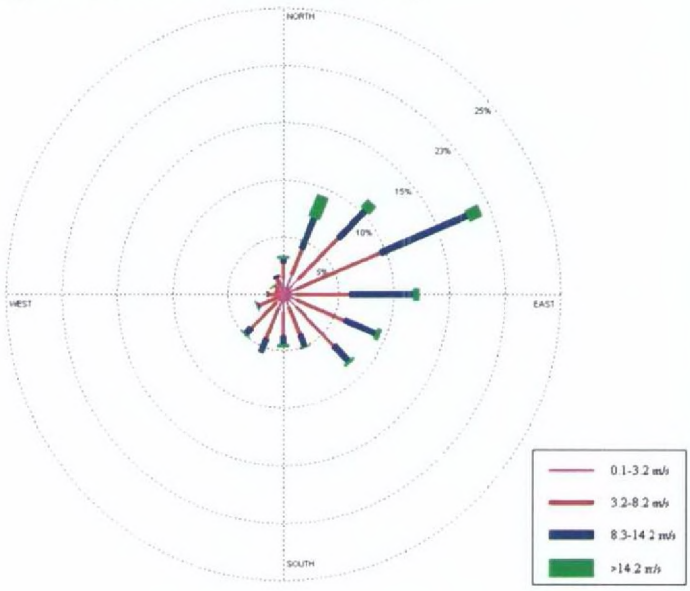


Table 2.2: Summary of the eight most probable wind directions which exceed 75% of a year

Prevailing Wind Directions	Degree of Wind Direction in Whole Circle Bearing (WCB)	Probability (%)
NNE	22.5°	9.20%
NE	45.0°	11.20%
ENE	67.5°	19.00%
E	90.0°	12.10%
ESE	112.5°	9.30%
SE	135.0°	8.40%
SSE	157.5°	5.00%
SSW	202.5°	5.40%

2.3.3 The eight most probable wind directions are 22.5°, 45.0°, 67.5°, 90.0°, 112.5°, 135.0°, 157.5° and 202.5° and the total sum of probability of the above wind directions are 79.6% of time in a year.

Table 2.3: Summary of wind velocity of the eight most probable wind directions at 596m above terrain

Velocity infinity (m/s)	NNE	NE	ENE	E	ESE	SE	SSE	SSW
0_to_1	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
1_to_2	0.50%	0.40%	0.40%	0.30%	0.40%	0.40%	0.40%	0.50%
2_to_3	1.00%	1.00%	0.50%	0.50%	0.60%	0.70%	0.40%	0.50%
3_to_4	0.70%	1.30%	1.10%	0.70%	0.50%	0.90%	0.50%	0.50%
4_to_5	0.70%	1.10%	1.50%	0.90%	0.80%	0.90%	0.60%	0.50%
5_to_6	0.50%	1.20%	1.90%	0.80%	1.00%	1.00%	0.50%	0.70%
6_to_7	0.30%	0.80%	1.80%	1.00%	1.30%	1.10%	0.70%	0.50%
7_to_8	0.30%	0.90%	1.60%	1.20%	0.90%	0.80%	0.50%	0.60%
8_to_9	0.40%	0.60%	1.80%	1.40%	0.90%	0.70%	0.40%	0.60%
9_to_10	0.70%	0.80%	2.10%	1.20%	0.90%	0.50%	0.30%	0.30%
10_to_11	0.60%	0.80%	1.90%	1.20%	0.60%	0.40%	0.20%	0.20%
11_to_12	0.60%	0.70%	1.40%	0.80%	0.50%	0.20%	0.10%	0.20%
12_to_13	0.30%	0.20%	0.90%	0.80%	0.20%	0.10%	0.00%	0.10%
13_to_14	0.30%	0.30%	0.70%	0.40%	0.20%	0.00%	0.10%	0.00%
14_to_15	0.40%	0.30%	0.20%	0.30%	0.00%	0.10%	0.00%	0.00%
15_to_16	0.40%	0.20%	0.20%	0.20%	0.00%	0.00%	0.00%	0.00%
16_to_17	0.50%	0.20%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%
17_to_18	0.50%	0.10%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%
18_to_19	0.20%	0.10%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%
19_to_20	0.10%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%
20_to_21	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%
21_to_22	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
22_to_23	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
23_to_24	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

2.3.4 The wind availability data indicate that the wind velocity ranges from 0 to 24m/s from 8 wind directions at 596m above the terrain and the mean speed at the nearest grid (i.e. 25,44) simulated by MM5 is approximately 6.923m/s.

2.3.5 The wind availability data simulated by MM5 suggested that prevailing wind directions are the East-North-East and East as their probabilities are 19.0% and 12.1% of a time in a year respectively.

2.4 Conclusion on Local Wind Environment

2.4.1 The TKL Station is the nearest HKO Weather Station and located approximately 2.5km away from the BCP Site. The wind condition observed by the TKL Station is made at 28.0m above the mean sea-level (i.e. +29.3mPD). The formation level of the proposed BCP Site is approximately +15.0mPD and the heights of the proposed buildings are between +25mPD and +57.5mPD.

2.4.2 The TKL Station and BCP Site are situated on a relatively level ground and their surrounding areas are both dominated by the natural landscape with low-density villages scattered in the vicinity. These two locations sharing a highly similar topography features between them. The wind data observed by TKL Station is therefore can be considered as representative of the winds approaching the BCP Site and appropriate to be used in this qualitative assessment.

2.4.3 In addition to the wind data observed by the TKL Station, the wind availability data simulated by MM5 should also be considered in the qualitative assessment since the local wind environment at the low/pedestrian level may be very different from the boundary layer (i.e. 596m above terrain). The wind availability data simulated by MM5 indicate that the prevailing winds are come from the East and the East-North-East directions.

2.4.4 With reference to the wind data observed from the TKL Station and the wind availability data simulated by MM5, it can be concluded that the prevailing winds are come from the East-North-East (ENE), East (E) and East-South-East (ESE) directions in both summer and non-summer period.

3. Expert Evaluation

3.1 General

3.1.1 It is imperative to remember that the BCP Site is located in a rural area and its surrounding area is predominately occupied by the natural landscape with many isolated villages and open storages comprised of low-rise buildings scattered in the vicinity.

3.1.2 The road pattern with its connection to wind corridors and the height of the built-up area are normally considered to have significant influence on the existing wind environment in the urban area but this principle may not apply in the rural area where open spaces dominates.

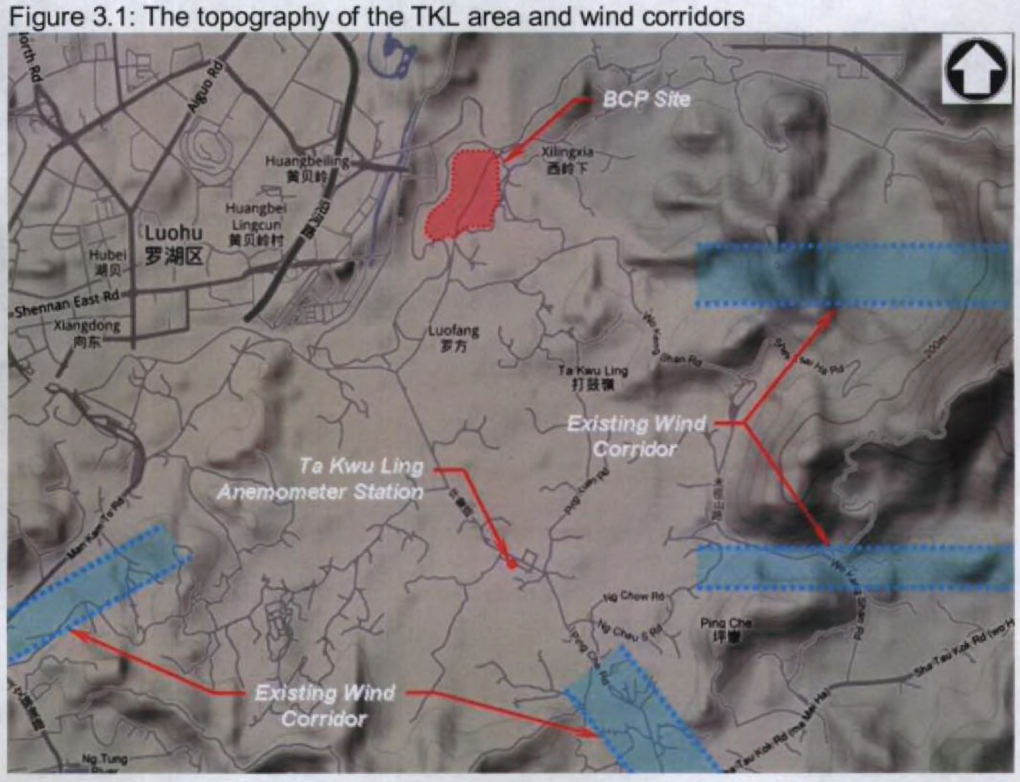
3.1.3 The influence of the disposition and height of the proposed buildings/structures within the BCP Site (i.e. the Baseline Scenario) as well as the current landform such as the open spaces in the surrounding area on the wind environment will be assessed qualitatively.

3.1.4 There will be limited discussion on the building morphology due to the absence of the design for the proposed buildings/structures within the BCP Site as mentioned in 1.6.1.

3.2 Prevailing Wind Environment

3.2.1 This section identify the wind environment of the TKL area in relation with the important features such as (1) Breezeways/Air Path, (2) Existing Road Network/Pattern, (3) Height Profile of the surrounding buildings and landscape features and (4) Open Spaces and their connections with the existing wind corridors. The natural topography including wind corridors and the aerial photo of the TKL area are shown in Figure 3.1 and 3.2 respectively.

Figure 3.1: The topography of the TKL area and wind corridors



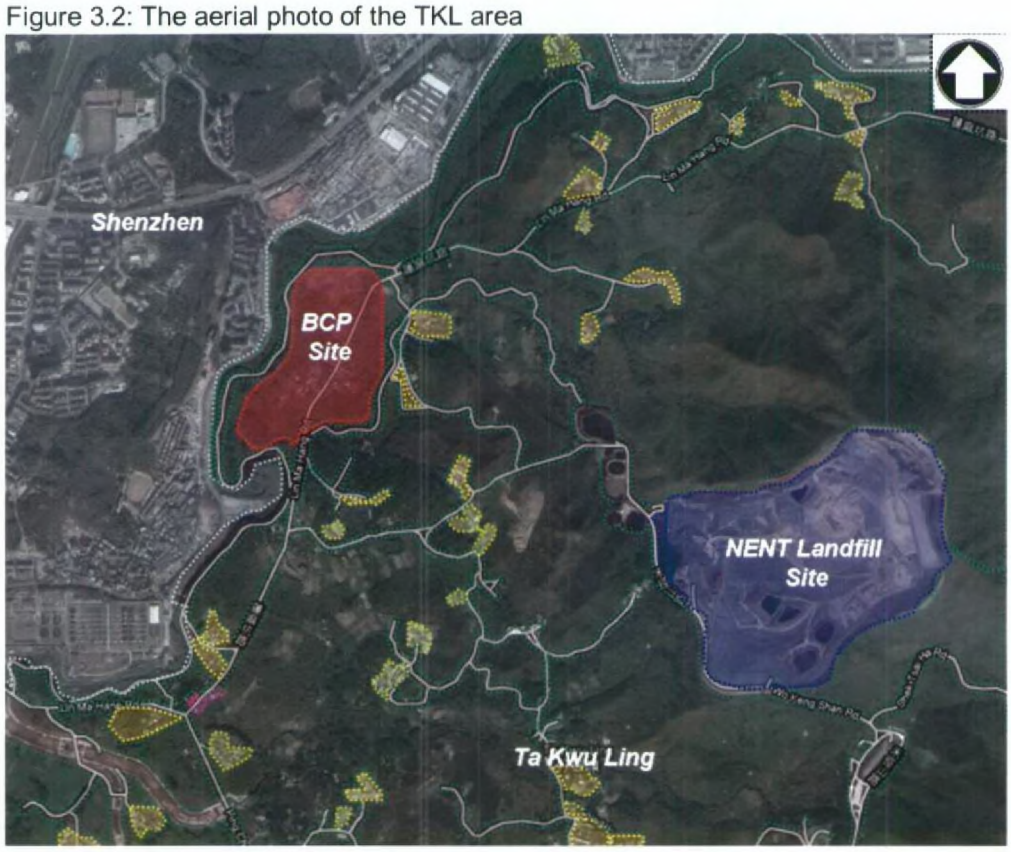
3.2.2 The TKL area and it surrounding area are relatively flat and the mountains have dominates the landscape situated on the East of the TKL area and BCP Site. The natural topography created by the open spaces, mountains and hills situated in the surrounding area of the TKL have created a number of major wind corridors as shown in Figure 3.1.

3.2.3 As illustrated by the topography of the TKL area in Figure 3.1, the influence of the breezeways/air paths on the existing wind environment of this area is discussed as follows:-

- **Breezeways/Air Paths**

  The existing wind corridors, inter-linked open spaces, non-building areas, low-rise buildings scattered in the vicinity of the TKL area have provided the major breezeways for the prevailing winds from the ENE, E and ESE directions. These winds will be allowed to penetrate into the TKL area and reach the pedestrian level without any significant impediment.

Figure 3.2: The aerial photo of the TKL area



Legend:

- **Open Spaces (Natural Landscape)**
- **Open Spaces (NENT Landfill Site)**
- **Building Height unknown (Shenzhen Area)**
- **Building Height between 10 - 20mPD (Villages & Open Storages)**
- **Building Height below 30mPD (TKL Police and Fire Station)**
- **Proposed Maximum Building Height 42mPD (BCP Site)**
- **Existing Roads**

3.2.4 The aerial photo illustrated that the existing road network/pattern, the villages, open storages and NENT Landfill Site in the TKL area. In addition to the natural landscape as mentioned in 3.2.2, the NENT Landfill Site have occupied a substantial amount of the area situated on the East of the TKL area. The prevailing winds are from E and ESE directions and therefore the urban setting of Shenzhen area has no relevancy on the local wind environment.

3.2.5 As illustrated by the aerial photo of the TWL area in Figure 3.2, the influence of the important features on the existing wind environment of the area is discussed as follows:-

- **Existing Road Network/Pattern**

  The existing road network is not well developed in this rural area at TKL. Ping Che Road, Ping Yeung Road, Wo Keng Shan Road and Lin Ma Hang Road are the major roads providing access to the TKL area. In addition, there is a border road situated along Hong Kong Shenzhen Administrative Region Boundary.

  i) Ping Yeung Road is running from South to North direction and through the centre of the TKL area;

  (ii) Ping Che Road and Wo Keng Shan Road are running from South-east to North-west direction on the east and west of the TKL area respectively;

  (iii) Lin Ma Hang Road is running from the South-west to North-east direction on the east of TKL area and which provides access to the existing CYV and the proposed BCP Site; and

  (iv) the border road is running in parallel along the Shenzhen River.

  The presences of these roads have provided the necessary air-paths, maintain the overall porosity and enhanced the wind penetration into the TKL area.

- **Height Profile**

  There are many isolated villages comprised of low-rise buildings scattered in the vicinity of the TKL area and the majority of these buildings are 2-3 storey height. The overall porosity of the area is high and the permeability of the area is very good.

  The low-rise buildings are not expected to have any significant impact on the breezeways and air paths but the presence of mountains and hills (i.e. maximum height is appropriately 200m) situated on the East of TKL area as shown in Figure 3.1 may have greater influence on the breezeways and air paths.

- **Open Spaces**

  Open spaces and the NENT Landfill Site occupied a substantial portion of the East of TKL area. These open spaces enable wind from higher level to reattach to the lower level (i.e. the pedestrian level) and they are connected to the wind corridors as shown in Figure 3.1. This allows wind penetration and further enhances air movement while maintaining the high porosity of the TKL area.

3.3 Prevailing Wind Environment in TKL area & BCP Site - Non-Summer and Summer Period

3.3.1 In the TKL area, the prevailing winds are from ENE, E and ESE directions during both non-summer and summer periods according to the wind data observed by the TKL Station and the wind availability data simulated by MM5.

3.3.2 The major roads are usually acted as wind corridor and facilitate winds to disperse into the nearby local area. In contrast, the road network/pattern in the TKL area does not play a significant role or having no influential impact on the overall air ventilation of the TKL area because the surrounding is dominated by the open spaces. The presence of these open spaces ensured that there will be high permeability to wind penetration into the TKL area.

3.3.3 It is anticipated that winds from the prevailing wind directions as shown in Figure 3.3a, 3.3b and 3.3c will penetrate into the TKL area without significant impediment and will reattach to the pedestrian level when passing through the NENT Landfill Site and open spaces in the TKL area.

Figure 3.3a: The aerial photo of TKL area with prevailing wind from ENE direction

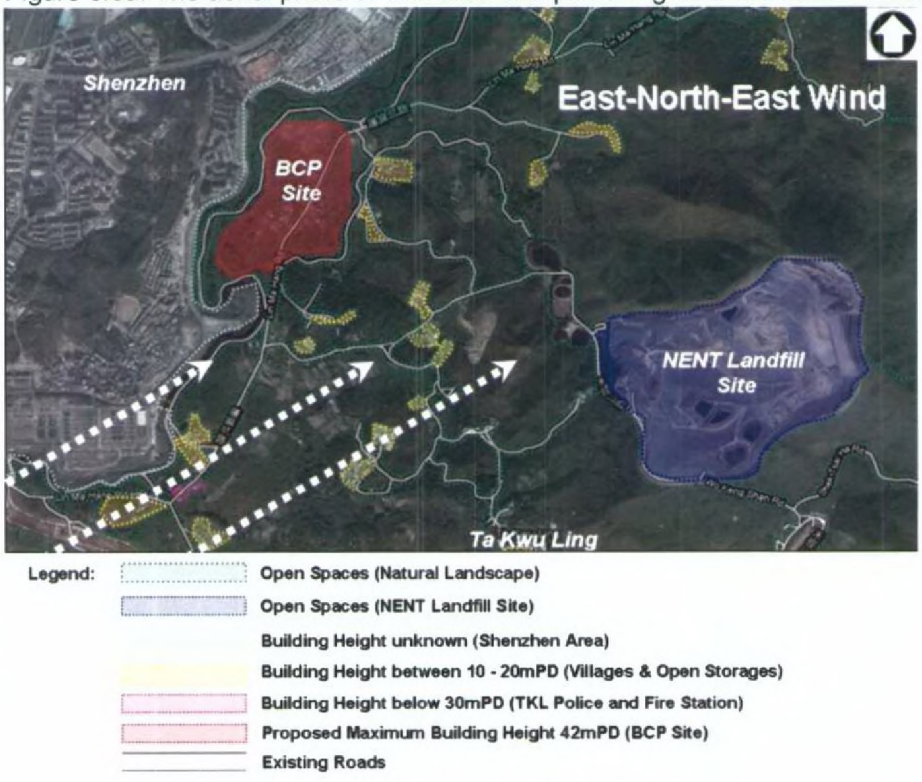


Figure 3.3b: The aerial photo of the TKL area with prevailing wind from E direction

Figure 3.3c: The aerial photo of the TKL area with prevailing wind from ESE direction

Legend:

- Open Spaces (Natural Landscape)
- Open Spaces (NENT Landfill Site)
- Building Height unknown (Shenzhen Area)
- Building Height between 10 - 20mPD (Villages & Open Storages)
- Building Height below 30mPD (TKL Police and Fire Station)
- Proposed Maximum Building Height 42mPD (BCP Site)
- Existing Roads

3.4 Local Wind Environment with Proposed Layout of BCP Site - Non-Summer and Summer Period

3.4.1 As discussed in previous sections, the TKL area and the existing surrounding of the BCP Site are sharing a highly similar topography features and the prevailing winds from the ENE, E and ESE directions are allow to penetrate through and disperse into the BCP Site with no significant impediment.

Figure 3.4a: The layout of the BCP Site with prevailing wind from ENE direction

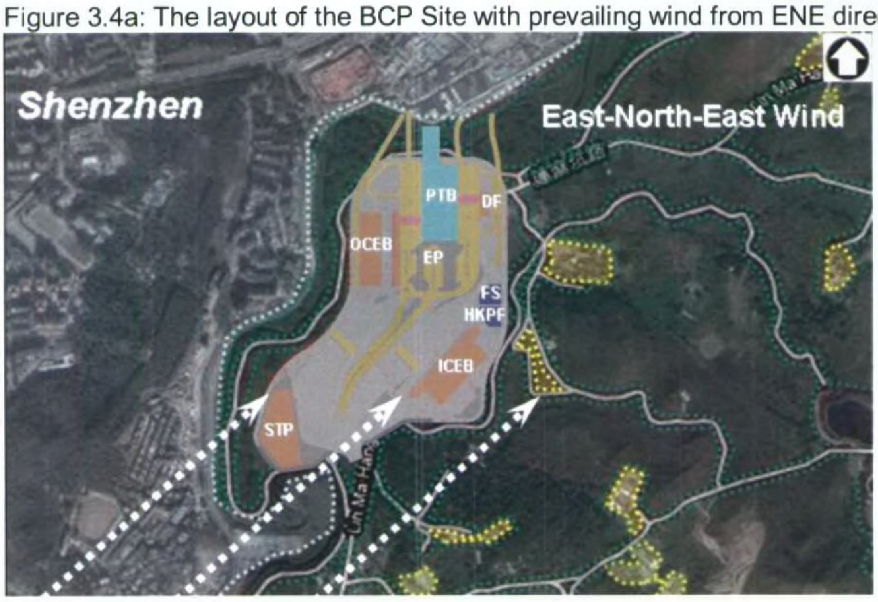


Figure 3.4b: The layout of the BCP Site with prevailing wind from E direction

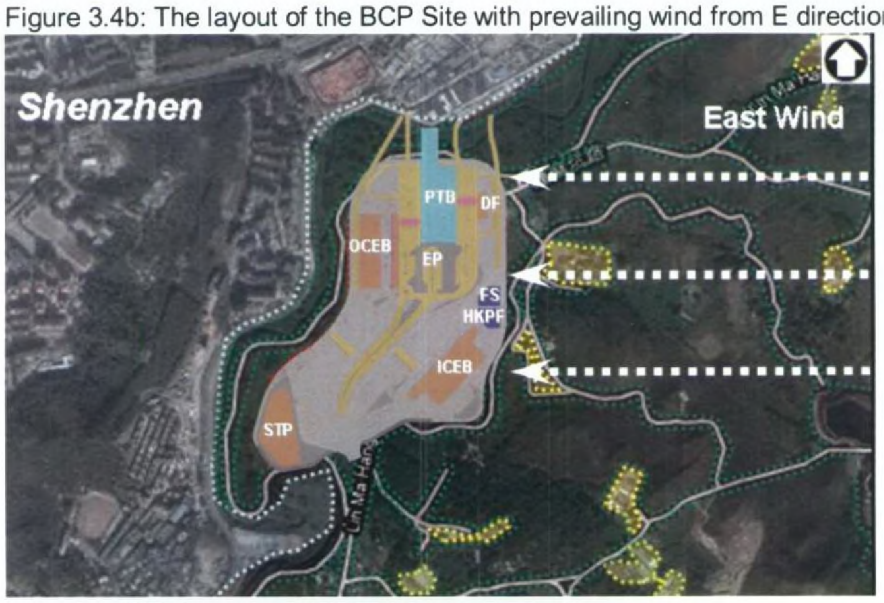


Figure 3.4c: The layout of the BCP Site with prevailing wind from ESE direction

3.4.2 The BCP Site footprint will occupied approximately 18.3 hectares (ha) in area but such large extend of the development will not affect the existing breezeways and wind corridors owning to their low-rise nature with large spacing/separation between the proposed buildings/structures. It is anticipated that the potential changes to the existing ventilation environment caused by the proposed buildings/structures will be mainly localised within the BCP Site. These localised effects are discussed as follows:-

- **Non-Summer and Summer Period**

  At the BCP Site, the prevailing winds are from ENE, E and ESE directions during both non-summer and summer periods as discussed in the previous sections. These prevailing winds will reattach to the low level at the open spaces in the vicinity of the TKL area and then reach the pedestrian level at the BCP Site.

  In view of the low-rise nature of the majority of the proposed buildings/structures as illustrated in Figure 3.4a, 3.4b and 3.4c (i.e. STP, ICEB, OCEB, EP and DF), the prevailing winds from the ENE, E and ESE directions will flow over the top of them, penetrate into and through the BCP Site without any significant impediment. The overall porosity and permeability of the BCP Site remains very good even after incorporated the proposed buildings/structures.

  The height adopted for HKPF Building and FS as shown in Figure 1.2 illustrated the maximum height of the observation tower and drill tower. The actual height of the HKPF building and FS are not expected to exceed 5 storeys. Hence, there will be some but

insignificant impediment on the easterly wind since the orientation of these two buildings is aligned perpendicularly to the east.

On the other hand, the and east-north-easterly, easterly and east-south-easterly winds are anticipated to flow around the facade of the proposed building and forming air paths in particular to the PTB owning to its large facade against the prevailing winds. Such large facade enables more downwash winds to reach the pedestrian level on the EP and further enhance the air flow within the BCP Site.

While the EP has a largest footprint but this is situated at a low level and the prevailing winds will be allowed to penetrate through it due to its large height clearance from the ground (i.e. approximately 10m). The presence of this elevated platform is expected to have insignificant impediment on the prevailing winds.

3.4.3 There are technical and operational constraints imposed on the layout, footprint, dimension and height of the proposed buildings/structures within the BCP Site. For instance, the footprint of the PTB may not be able to further reduce since it has to accommodate the Customs, Immigration and Quarantine (CIQ) facilities and associated equipments while maintaining a handling capacity of 30,000 passengers. Moreover, the height of the observation tower will be built to reach the highest point within the BCP Site in order to provide unobstructed security surveillance. Hence, the bulk effect and the height profile of certain buildings/structures may not be avoided.

3.4.4 Despite the aforesaid constraints in 3.4.3, there are good design features can be adopted in order to further minimise the possible impediment on the local wind environment within the BCP Site with due consideration of the prevailing wind direction and limitation on the physical settings. The good design features are related to the building height profile, building bulk, orientation of building and spacing/separation between the proposed buildings and they are as follows:-

- **Height Profile**

  The building mass should take the form of gradual change of the height with decreasing heights towards the prevailing wind directions (i.e. ENE, E and ESE directions in this case). Varying the height profile of the PTB, HKPF and FS will encourage wind deflection and promote air movement.

- **Building Bulk**

  The building bulk and footprint shall be reduced as far as practicable in order to minimise the bulk effect. The use of basement floor shall be considered to reduce the building height as well as any possible impediment to the localised air paths.

- **Building Orientation**

  The orientation of the proposed buildings within BCP Site shall be aligned in parallel or up to 30° to the prevailing wind directions in order to maximise the air penetration and reduce any possible impediment.

- **Spacing/Separation**

  The spacing /separation between the buildings with the largest facade within the BCP Site (i.e. the PTB) and its nearby proposed buildings/structures (i.e. OCEB and FS) shall be at maintain between 30m to 40m in order to maximise the air penetration and minimise any possible impediment to the localised air paths.

  As mentioned in 3.4.2, the actual height of the HKPF building and FS are not expected to exceed 5 storeys and hence these two proposed buildings are approximately 15m in height. It is therefore considered that 5m to 10m spacing/separation between these two buildings shall be maintained.

  The majority of the other proposed buildings/structures within the BCP Site (i.e. STP, ICEB, OCEB, EP and DF) do not play a significant role or having no influential impact on the overall air ventilation performance due to their low-rise nature (i.e. approximately 10.0m to 11.0m in height).

4. Conclusion

4.1.1 An Expert Evaluation on the AVA has been conducted for the Baseline Scenario in accordance with the ETWB Technical Circular No. 1/06 Air Ventilation Assessment and Chapter 11 of the Hong Kong Planning Standards and Guidelines.

4.1.2 With reference to the wind data observed by from the TKL Station and wind availability data simulated by MM5, a qualitative assessment on the characteristic of the TKL area, BCP Site and wind availability have been carried out.

4.1.3 The wind roses and data of the TKL Station and simulated by MM5 were carefully studied. The key wind corridors, the prevailing wind directions in both non-summer and summer period and the possible impediment have been identified.

4.1.4 In consideration of the prevailing wind environment, topographical features of the TKL area and proposed layout of the BCP Site as discussed in Section 3.0, the proposed buildings/structures does not play any significant role or having no influential impact on the prevailing winds from the East and East-South-East directions and the air ventilation performance in the surrounding area and the localised area of the BCP Site. Further air ventilation study is therefore considered unnecessary.

5. Recommendation

5.1.1 It is not recommended to conduct any further study on the air ventilation performance unless the design of the proposed buildings exceeded the dimension of the buildings adopted for the Baseline Scenario in this Expert Evaluation.

5.1.2 In the detail design stage, the design consultant shall liaise with the Planning Department upon the completion of the design for the proposed buildings and demonstrate that the design of the proposed buildings within the BCP Site will not play any significant role or having no influential impact on the prevailing winds and the air ventilation performance.

Appendix A: Responses to Comments

Agreement No. CE 45/2008 (CE)
Liantang/Heung Yuen Wai Boundary Control Point and Associated Works - Investigation

Draft Report on Air Ventilation Assessment (Rev. A)

Comments & Responses

Comments	Responses
CE/BCP **Civil Engineering and Development Department** **Ref. (0FKRH-01) in BCP CS CE45/2008/07.01 Pt.** **Date : 18 May 2010** I refer to your above referenced letter dated 23 April 2010. 2. I have the following comments on the captioned report: Clause 1.5.4 **(a)** It is noted that HKPF Building and Fire Station are the tallest building/structures within the BCP site. Please check whether it is the requirement of HKPF and FSD. **(b)** Please check if cover to the cross-boundary coach loading/unloading bays at the upper deck is required. If yes, the cover should be taken into account in the air ventilation assessment.	HKPF confirmed that the HKPF will have an observation tower at the highest point of the site for security surveillance. FSD confirmed that the tallest structure within the Fire Station Compound would be the drill tower. The drill tower may reach up to 30-35m in height and will be an independent structure within the compound. Please be advised that there is no cover for the cross-boundary coach loading/ unloading bays at the upper deck.
Sr Town Plnr/Urban Design & Landscape **Planning Department** **Ref. E-mail from Miss Paulina Kwan** **Date : 21 June 2010 (at 11:49)** I refer to your e-mail dated 10.6.2010 attaching a copy of the above draft AVA Expert Evaluation (EE) report for our comment. Please note that our observations on the draft report are summarized below for your follow-up action : **(a)** It is noticed that only wind data collected at Waglan Island and MM5 modelled data at Grid (25,44) have been adopted in the EE. As Waglan Island is located quite far away from LT/HYW, it is considered necessary to also make reference to the data collected at the nearby weather station, i.e. Ta Kwu Ling, in estimating the prevailing wind directions and magnitudes of the BCP Site. Based on data available in the website of the Hong Kong Observatory, the prevailing wind direction at Ta Kwu Ling for annual, January and July are	Note. The wind data collected at WGL and the relevant discussion have withdrawn from this report. The wind data collected by the Ta Kwu Ling Station between 1986 and 2009 has now incorporated accordingly.

Comments		Responses
	the east of south-east (ESE) which is different from those at Waglan Island. Omission of Ta Kwu Ling data renders the evaluation incomplete and may result in a distorted conclusion.	
(b)	Owing to the nature of the wind data adopted, the analysis on wind condition is only limited to the boundary layer. However, because of the presence of mountains and hills at the north and the concentration of urban development with higher density situated further to the north-east and west of the BCP Site in Shenzhen, the local wind environment at the BCP Site, particular at the low/pedestrian level, could be substantially different from what at the high level. In the absence of a systematic and logical analysis on the low level wind environment, it seems too early to draw the conclusion though there is no disagreement that the proposed buildings /structures on the BCP Site with maximum building height of about 57.5mPD and large gaps/spaces in-between may not induce significant adverse impact on the air ventilation performance to its surrounding.	Note. Please be advised that there is a substantial amendment to the report after the incorporated the wind data collected by the Ta Kwu Ling Station. Furthermore, the natural topography of the surrounding area of the Ta Kwu Ling has also taken into consideration in this Expert Evaluation.