Appendix 7

Air Ventilation Assessment – Expert Evaluation

Air Ventilation Assessment Report – Expert Evaluation

Section 12A Proposed Amendment to the Notes of the Approved Quarry Bay OZP relating to the " Other Specified Uses" zone annotated "Cultural and/or Commercial Leisure and Tourism Related Uses"

Prepared for: Masterplan Limited
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1. INTRODUCTION

1.1 Background

1.1.1 The landholding of Marine Riches III (the Applicant) is a prime waterfront site located at IL 8590 R.P. and IL 8723 R.P. in Quarry Bay (the Original Site). The Original Site is currently zoned "Other Specified Use (Cultural and/or Commercial, Leisure and Tourism Related Uses)" (OU(1)) and "Open Space" (O) on the Quarry Bay Outline Zoning Plan (OZP) No. S/H21/28.

1.1.2 The Original Site was previously zoned "Industrial", and the approved S16 planning application No. A/H21/150 on 22 February 2019 for a proposed mixed development comprises of 10 storey office block and 4 hotel blocks, (2 blocks of 11 storey, 1 block of 12 storey and 1 block of 13 storeys) including 1 storey (G/F) commercial podium, 1 basement level of commercial use and 1 basement level of internal transport facilities with a total Gross Floor Area (GFA) of 37,155m^2, a height of 41mPD for office and 34 to 41mPD for hotel, and a site coverage of 92%, for Cultural and /or Commercial, Leisure and Tourism Related Uses

1.1.3 The approved Building Amendment Plans for the industrial building remain valid, despite the subsequent change in zoning, and construction of the industrial building commenced with work on the foundation in 2017.

1.1.4 However, the Development Bureau, the District Council Members and the General Public have visions for the waterfront site that do not include industrial use. Therefore, the previous landowner has revisited the use of the Original Site for a hotel and office development.

1.1.5 The Applicant is aware of the Government's intention to develop a continuous Public Waterfront Promenade along the Quarry Bay Waterfront. In this regard, this OU zone has always been intended for use for cultural, leisure and tourism taking advantage of the waterfront setting the Applicant is thus willing to partly surrender the Original Site in exchange for the government land zoned OU(1) to form a new Development Site (or "Proposed Development") with an area of 8,532m^2. The Development Site is proposed to be developed into residential, commercial and cultural facilities (the Proposed Development), rather than the hotel and office building. The Proposed Development will provide a total GFA of about 39,480m^2 with maximum building heights of 44mPD on Hoi Yu Street (the Site), about 67% of Residential area (Est 26,545m^2) and about 33% of Cultural / Entertainment (including Eating Place and Shops and Services, and Covered Public Open Space) (Est. 12,935 m^2).

1.1.6 The Application Site will comprise the aforementioned Development Site currently zoned OU(1) on the Approved Quarry Bay OZP No. S/H21/28. The main purpose of this application is to identify an alternative way for achieving the Planning Intention for the "OU(1)" zone. The Planning Intention of the "OU(1)" zone is retained as in the Notes to the zone and the "cultural and/or commercial, leisure and tourism" related uses will be the main focus. The only change proposed is to request the inclusion of "flat" in Column 2 of the Notes to the "OU(1)", thus requiring to submit a planning application under Section 12A of the Town Planning Ordinance (TPO) to grant a permission from the Town Planning Board (TPB) by the Applicant. Furthermore, the maximum building height of OU(1) zone is restricted to 35mPD and so a permission from the TPB is also required for the amendment to the building height restriction.

1.1.7 SMEC Asia Limited (SMEC) has been appointed to prepare this Air Ventilation Assessment – Expert Evaluation (AVA-EE) Report summarising the assessment of ventilation impacts arising from the Proposed Development to support the planning application.

1.1.8 This AVA-EE Report has been prepared in accordance with Technical Circular No. 1/06 issued jointly by House, Planning and Lands Bureau (HPLB) and Environment, Transport and Works Bureau (ETWB) and its Annex A – Technical Guide for Air Ventilation Assessment for Development in Hong Kong (the "Technical Guide") issued by Housing, Planning and Lands Bureau.

1.1.9 Good design features such as adequate separation to reduce screening effect, podium free design to maximise the open space area, increase set back distance between development and the surrounding buildings to reduce any adverse ventilation performance issues identified have been identified in the proposed development.

1.2 Site Description

1.2.1 The Application Site was visited on 4th October 2024 and 28th May 2025. The Proposed Development is situated at a prime waterfront site, which is a narrow strip of land between Island East Corridor (IEC) and the Harbour, located in Hoi Yu Street, Quarry Bay, including more than half of the above-mentioned IL 8590 RP and IL 8723RP. IL 8590 RP and IL 8723RP are fenced and construction works already commenced as mentioned above. For the government land portion of the Site, majority of the area is vacant whilst part of it is occupied by car parking and container operations.

1.2.2 The location of the Proposed Development and its environs are shown in **Figure 1-1**, in which the uses surrounding the Proposed Development include:

- To the north: the seafront and Victoria Harbour;
- To the east: MTR Corporation Quarry Bay Substation and Eastern Harbour Crossing (EHC) Quarry Bay Ventilation Building;
- To the south: Hoi Yu Street, Island East Corridor, Quarry Bay Park Phase II, and Food and Environmental Hygiene Department (FEHD) Transport Section Quarry Bay Depot;
- To the west: Water Supplies Department (WSD) Quarry Bay Saltwater Pumping Station.

1.2.3 The area of the Proposed Development is roughly rectangular in shape, at an elevation of approximately 4mPD. There is an existing vehicular access to the Application Site from Hoi Yu Street.

1.3 Project Description

1.3.1 The Proposed Development will comprise the following:

- One single podium with three-storey basement of car parking facilities.
- Three 10-storey residential blocks, and one 5-storey cultural / entertainment towers on the podium.
- The approximate GFA for Residential, and Cultural / Entertainment Uses would be about 26,545 m^2, and 12,935 m^2 respectively.

1.3.2 Previously, the development permitted within the area of the Proposed Development included the hotel and office building mentioned in para.1.1.2, as well as a Leisure, Tourism and Commercial building in the remaining part of the area of the Proposed Development currently zoned OU(1) according to the statutory planning parameters in the OZP that the massing has been adopted from the "Hong Kong Island East Harbourfront Study" (the HKIEH Study) and is fully complaint with the BH restrictions prescribed within OU(1) zone of the Approved OZP. This AVA-EE includes the comparison of the Approved Scheme with the Proposed Development Scheme. Under this Approved Scheme, the proposed development would comprise one single podium with two storeys based of retail, Food and Beverage (F&B) Services, and car parking facilities, One 10 storey hotel tower, One 9 Storey hotel tower and Two 8 storey hotel tower, with one 7 storey office tower on the podium.

1.3.3 In the HKIEH Study, there were three options presented to develop the "OU(1)" portion of Hoi Yu Street, including a "Recreation-Themed Waterfront", a "Cultural and Leisure-Themed Waterfront" and a "Tourism and Entertainment-themed Waterfront". Under the preferred "Tourism and Entertainment-themed Waterfront" option, the Study proposes medium-sized developments of 5-6 storeys high within the maximum building height permitted under the OZP (35mPD). The Leisure, Tourism and Commercial building under the OZP Complaint Scheme adheres to the building height recommended as it is within 35mPD.

1.3.4 The indicative layout and sectional plans of the Proposed Development are provided in the Planning Statement.

1.3.5 As per OZP, "OU(1)" sites are subject to building height restrictions of 35mPD. To incorporate better design features for the Proposed Development, the new building is anticipated to adopt a maximum building height of 44mPD. For details, please refer to the Planning Statement. **Table 1-1** summarises the development parameters of the original Approved Scheme and the current Proposed Development Scheme.

Table 1-1 Development Parameters of the Two Schemes

Parameters	Approved Scheme	Proposed Development Scheme
Proposed Maximum Building Height	41 mPD	44 mPD
Site Coverage	36% (up to 41mPD) 92% at Ground Level	60% (on L02 deck level) 55% at Roof level
Plot Ratio	4.4	4.62
Total GFA	37,155 m^2 [1]	39,480m^2

Note: 1. Site coverage, plot ratio and total GFA data are only for the Hotel and Office development within the Approved Scheme.

1.3.6 The indicative layout and sectional plans of the Proposed Development are provided in the Planning Statement.

1.4 Objectives of this Report

1.4.1 The objectives of this AVA-EE are to:

- Qualitatively review and evaluate the potential air ventilation impact on the pedestrian and the environment within the vicinity of the subject site.
- Assess the characteristics of wind condition of the Site.
- Use graphical means to illustrate general wind flow patterns.
- Identify opportunities, obvious problem areas and good design features of both the Original and Current layouts.
- Identify good design features and observe area require mitigation measures.
- Present design recommendations for airflow and ventilation.
- Determine if further / detailed study should be carried out in next stage.

1.4.2 To achieve these objectives, the AVA-EE will be carried out:

- To evaluate the preliminary layout of the Proposed Development and identify wind availability; annual wind conditions; summer wind conditions; and the wind environment of the existing Site, to provide design recommendations to be incorporated into the final layout.

1.5 Good Design Features from Air Ventilation Perspectives

1.5.1 The Base Case is the existing site of the Proposed Development, which is an open car park. The Approved Scheme with the five-building layout and the Proposed Development Scheme with the three-tower layout are based on the final design provided by Foster and Partners Limited. The good design features of both Approved Scheme and the Proposed Development Scheme are shown in **Figures 1-2**, **1-3** and **1-4** respectively.

Building Setback

1.5.2 The purpose of incorporating building setback is to improve air ventilation and enhance the environmental quality at pedestrian level.

1.5.3 The Proposed Development Scheme provides a set back from Hoi Yu Street, the ground floor podium has been setback by approximately 15.5m and 19.9m at each side, which increases the setback distance (approximate 7.5m) compared to the Approved Scheme.

1.5.4 For the Proposed Development Scheme, the continuous ground floor podium combined with the setback creates a wider breezeway along the street frontage, facilitating wind entry from the waterfront and adjacent open space.

Building Separation

1.5.5 The purpose of incorporating building separation is similar to building setback, i.e. to improve air ventilation and enhance environmental quality at pedestrian level. In addition, it helps to mitigate urban heat island effect arising from the buildings.

1.5.6 In the Approved Scheme, the separation between each tower is 15m. These building separations begin from the top of the podium upwards, starting from 10mPD. Within the building separations, there are skybridges connecting each tower which range from 5.8m to 6.4m in height. There is also provision of a 7.5m building separation between the façade of the towers and the site boundaries on the western and eastern side of the Site of the Approved Scheme. there is separation of 75m between the tower at the further west side and the WSD Quarry Bay Salt Water Pumping Station. The continuous projected façade length of the Approved Scheme under this scheme is 140m.

1.5.7 In the Proposed Development Scheme, adopted the following approaches: Each tower has inter building separation distance of approximately 15m, the separation distance exceeds the minimum standards of the SBD guidelines, enhance the cross ventilation through the site.

Effective Inter-Tower Spacing:

Each residential tower is separated by an inter-building distance of approximately 15 metres at levels above the podium (+10.7mPD). This exceeds the minimum standard of the Sustainable Building Design Guidelines (SBDG), facilitating better cross-ventilation across the site and allowing prevailing winds from Victoria Harbour to penetrate further inland.

Non-Continuous Massing:

The towers are arranged with deliberate gaps and varied building heights, rather than forming a single continuous slab. This broken massing significantly enhances permeability, allowing breeze paths between and across volumes and mitigating the “wall effect” typical of slab-like developments. Compared to the Approved Scheme, which had a more solid massing geometry, this approach is notably more conducive to air movement.

Skybridges Designed for Air Permeability:

Where skybridges are introduced to connect the towers, they are positioned above 10.7mPD and confined to modest vertical dimensions (approximately 6.4m or less). Their elevated and limited form ensures that wind can flow freely at ground and pedestrian levels, maintaining low-level wind corridors vital for air ventilation performance and thermal comfort.

Building Height

1.5.8 The height of building structures influences the wind flow as taller buildings create a greater blockage effect.

1.5.9 In the Approved Scheme, the building height of 34 to 41mPD for the five towers, which was classified to a mid-rise building, which lessening the air ventilation impact the Proposed Development would cause.

1.5.10 In the Proposed Development Scheme, the proposed building height is slightly higher than the Approved Scheme (from 41mPD to 44mPD). Despite this minor increase, the height remains within an acceptable range and consistent with the planning intentions to maintain a suitable height profile.

Summary of Design Features

1.5.11 The differences among the three Cases are shown in **Table 1-2.**

Table 1-2 Differences Among the Three Cases

Parameter	Base Case	Approved Scheme	Proposed Development Scheme
No. of Towers	Vacant (open car park)	5	5
Maximum Building Height	-	41mPD	44mPD
Setback Distance	-	7.5m	7.5m
Total Building Separation	-	75m	75m
Continuous Projected Façade Length	-	140m	

1.5.12 An Alternative Scheme is also being considered which is an enhanced design for the development, this scheme provide a more distinctive architectural profile, in this scheme the central residential block above the cultural venue will be removed, resulting in a greater visual and ventilation permeability, the maximum building height would be increased to 47mPD which is slightly higher than the proposed scheme, but still much lower than the surrounding buildings.

Figure 1-1 Site Location and Its Environs

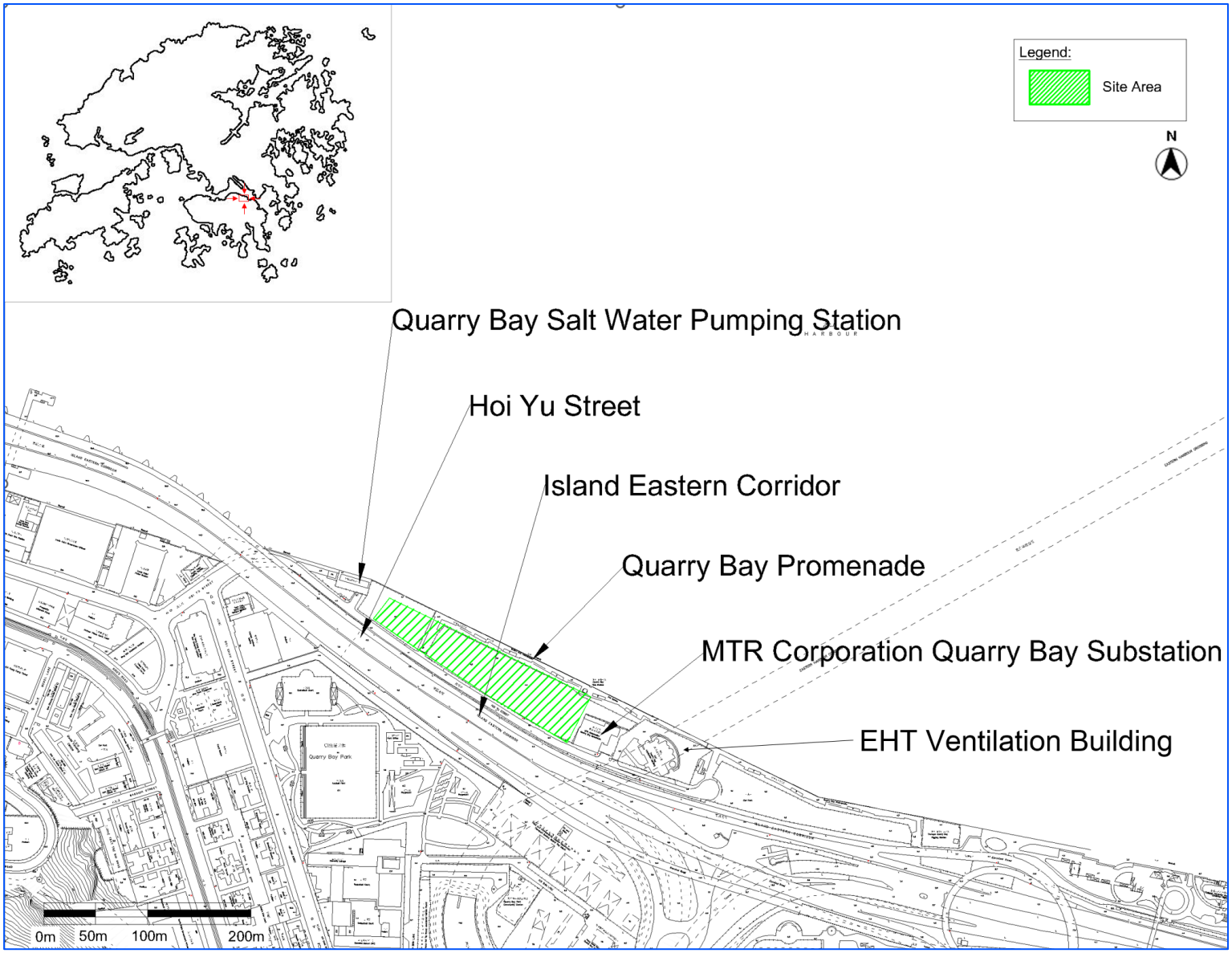


Figure 1-2 Approved Scheme

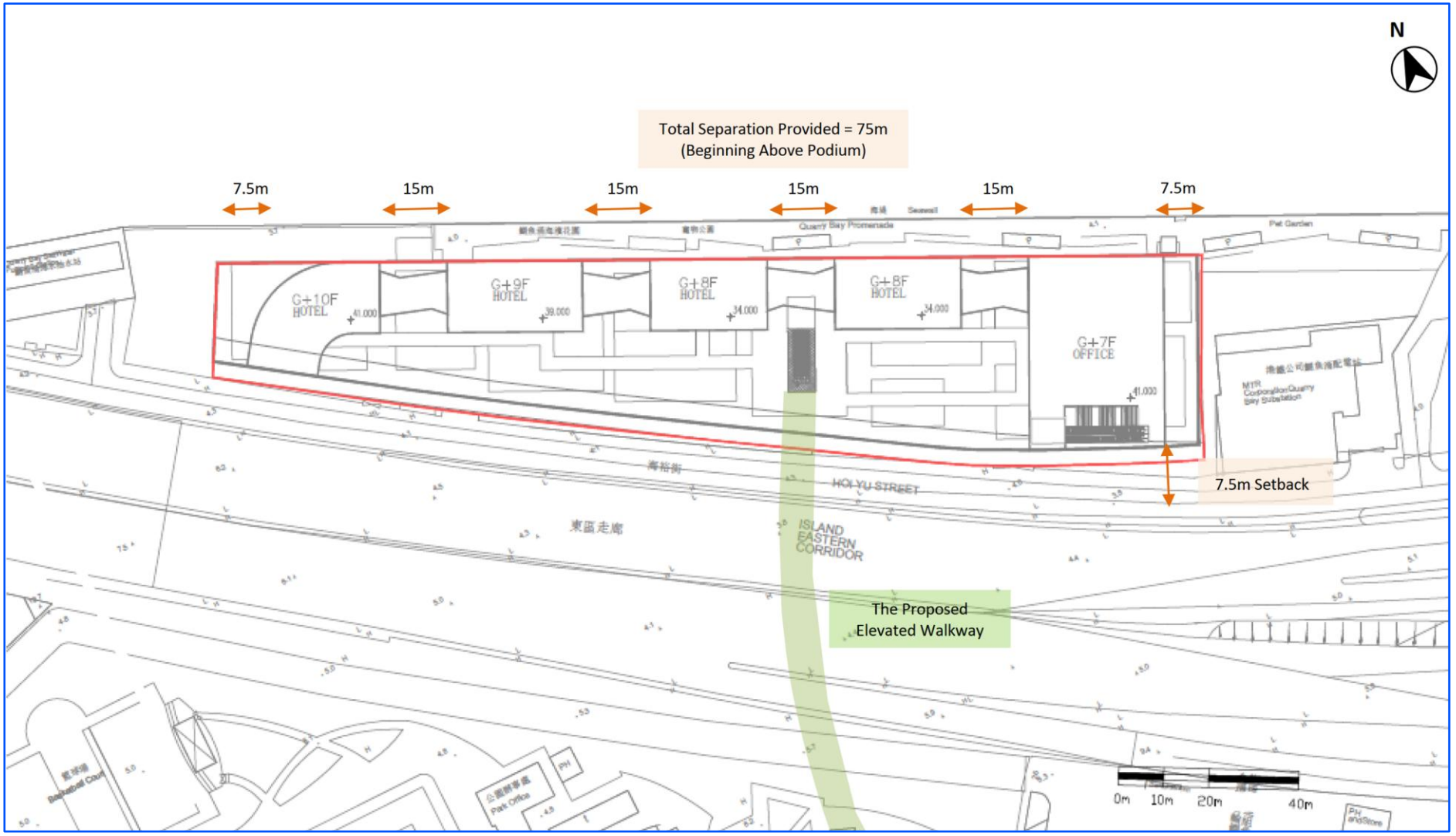
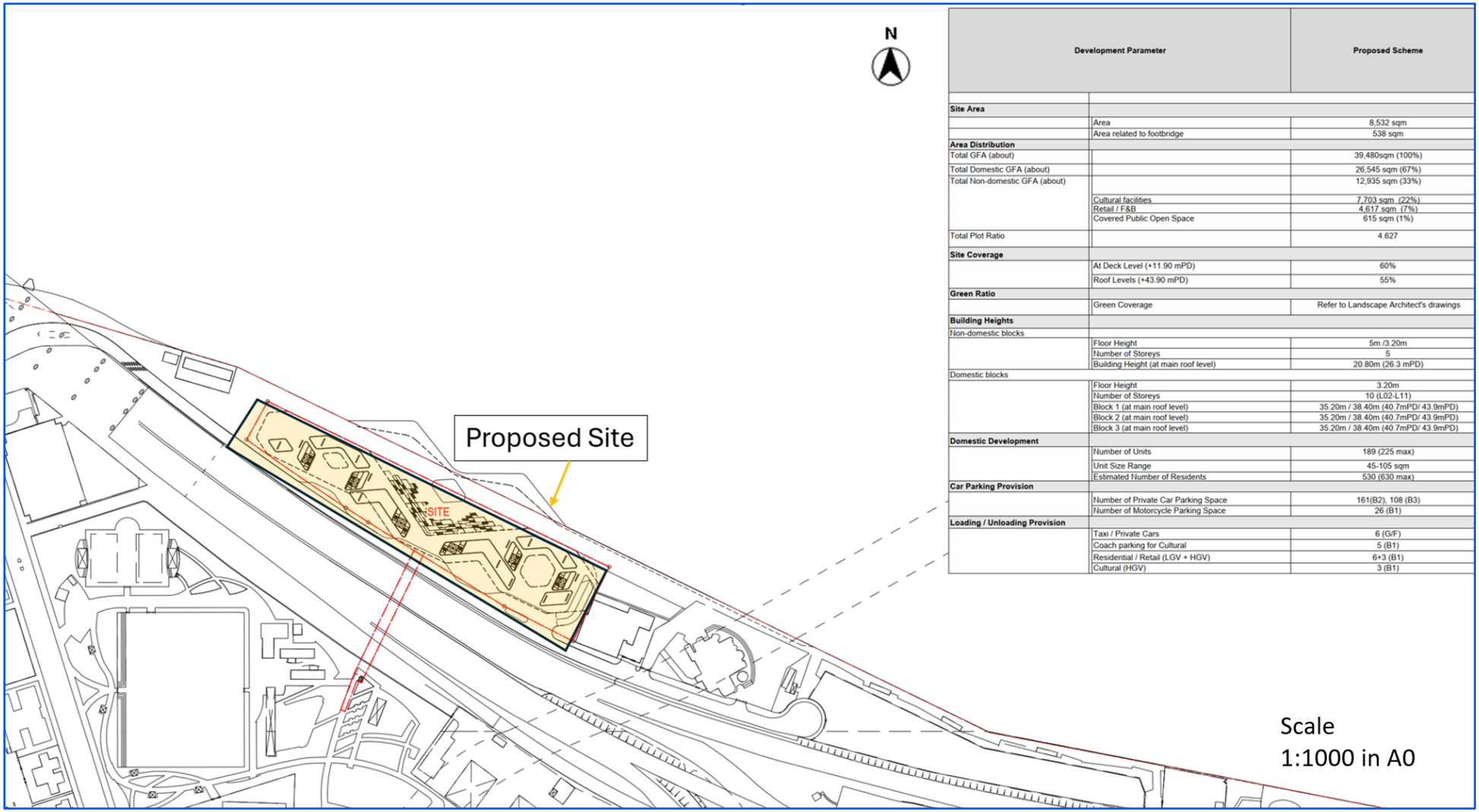


Figure 1-3 Proposed Development Scheme



Development Parameter		Proposed Scheme
Site Area		
	Area	8,532 sqm
	Area related to footbridge	538 sqm
Area Distribution		
Total GFA (about)		39,480sqm (100%)
Total Domestic GFA (about)		26,545 sqm (67%)
Total Non-domestic GFA (about)		12,935 sqm (33%)
	Cultural facilities	7,703 sqm (22%)
	Retail / F&B	4,617 sqm (7%)
	Covered Public Open Space	615 sqm (1%)
Total Plot Ratio		4.627
Site Coverage		
	At Deck Level (+11.90 mPD)	60%
	Roof Levels (+43.90 mPD)	55%
Green Ratio		
	Green Coverage	Refer to Landscape Architect's drawings
Building Heights		
Non-domestic blocks		
	Floor Height	5m /3.20m
	Number of Storeys	5
	Building Height (at main roof level)	20.80m (26.3 mPD)
Domestic blocks		
	Floor Height	3.20m
	Number of Storeys	10 (L02-L11)
	Block 1 (at main roof level)	35.20m / 38.40m (40.7mPD/ 43.9mPD)
	Block 2 (at main roof level)	35.20m / 38.40m (40.7mPD/ 43.9mPD)
	Block 3 (at main roof level)	35.20m / 38.40m (40.7mPD/ 43.9mPD)
Domestic Development		
	Number of Units	189 (225 max)
	Unit Size Range	45-105 sqm
	Estimated Number of Residents	530 (630 max)
Car Parking Provision		
	Number of Private Car Parking Space	161(B2), 108 (B3)
	Number of Motorcycle Parking Space	26 (B1)
Loading / Unloading Provision		
	Taxi / Private Cars	6 (G/F)
	Coach parking for Cultural	5 (B1)
	Residential / Retail (LGV + HGV)	6+3 (B1)
	Cultural (HGV)	3 (B1)

Figure 1-4 Cross Section View of Proposed Development Scheme

2. Expert Evaluation

2.1 Site Wind Analysis

2.1.1 In order to conduct the Expert Evaluation, it is essential to investigate the wind availability and assess the characteristics of wind entering the Application Site. Wind data has been obtained from the following two sources:

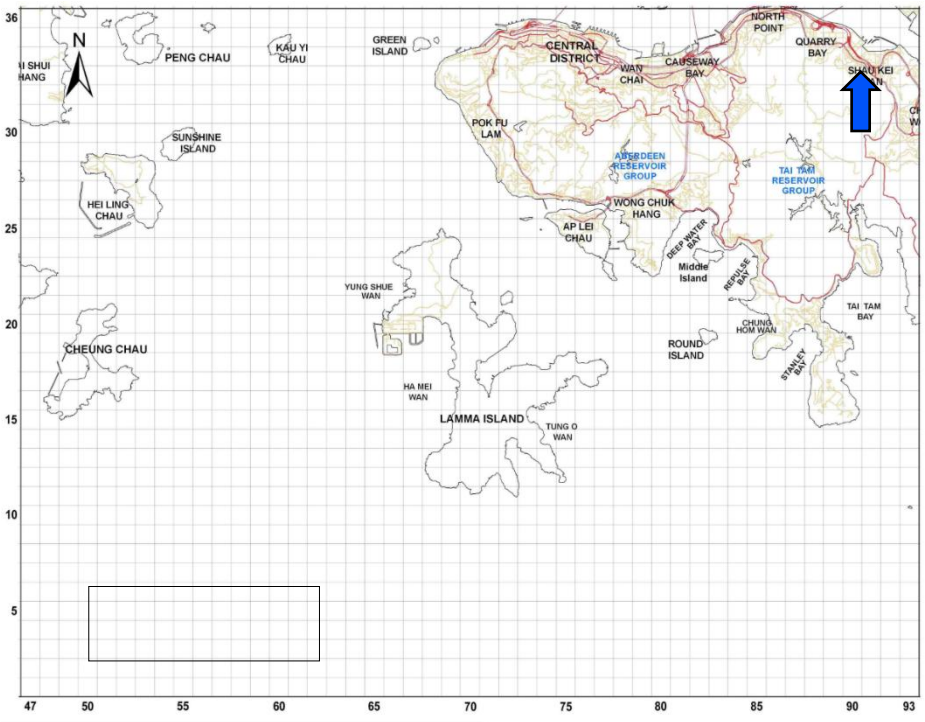
- "RAMS" published by PlanD in July 2015
- "Climatological Information Services" from the Hong Kong Observatory (HKO)
-

RAMS – by Plan D

2.1.2 Regional Atmospheric Model System (RAMS) is a highly versatile numerical code developed by scientists at Colorado State University for simulating and forecasting meteorological phenomena. It is capable of representing atmospheric dynamics, thermodynamics as well as resolving detailed topographic effects.

2.1.3 RAMS runs in three nested domains (in horizontal resolutions of 12.5km x 12.5km, 2.5km x 2.5km and 0.5km x 0.5km, for the outermost, middle and innermost domain, respectively), with the innermost modelled region covering the whole of Hong Kong SAR. The Site is located in RAMS Grid (088, 036), as shown in **Figure 2-1**.

Figure 2-1 RAMS Map Identifying the Site in Grid (088, 036)



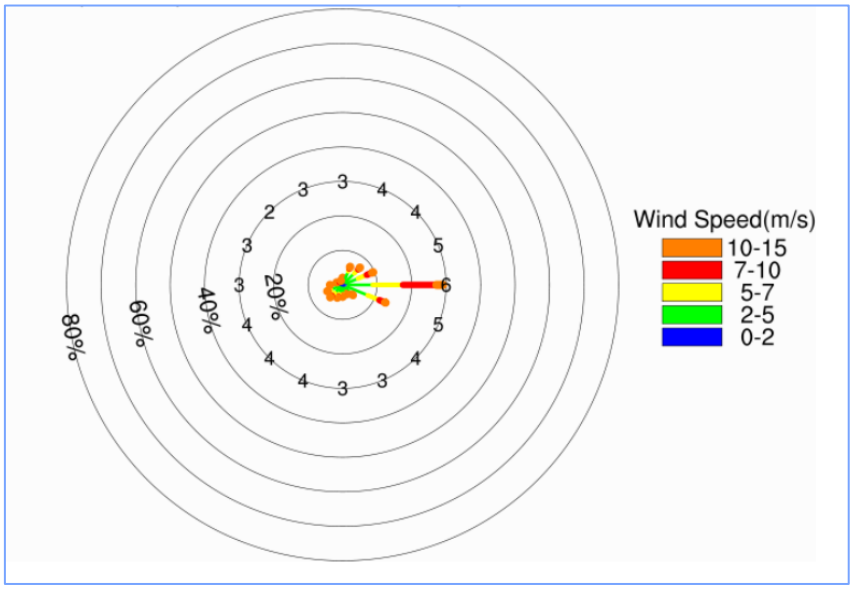
Source: RAMS Data https://www.pland.gov.hk/pland_en/info_serv/site_wind/site_wind/domain_h.html

2.1.4 Considering the topography and morphology of the surrounding areas, wind data at 200m has been adopted in the following annual and summer wind analysis.

Annual Wind Analysis

2.1.5 The RAMS Wind Rose for Grid (088, 036) is shown in **Figure 2-2** and presents the frequency of annual wind speed and directions at the Application Site.

Figure 2-2 RAMS Annual Wind Rose at 200m for Grid (088, 036)



Source: RAMS Data https://www.pland.gov.hk/pland_en/info_serv/site_wind/site_wind/088036.html

2.1.6 The RAMS probability of speed and frequency of occurrence of annual wind from 16 directions is shown in **Table 2-1** below. Seven wind directions (E, ESE, ENE, NE, NNE, SW and WSW) cumulatively exceed the 75% frequency (actually, 75.1%) specified in the Technical Guide and thereby represent the annual prevailing winds at the Application Site.

Table 2-1 Annual Wind Availability Data from RAMS Grid (088, 036)

Wind Direction	Wind Speed at Elevation of 500m (m/s)	Frequency of Occurrence
E	6.32	29.2%
ESE	4.59	13.5%
ENE	4.95	9.7%
NE	4.07	7.1%
NNE	3.77	5.7%
SW	4.27	5.1%
WSW	3.47	4.8%
SE	3.44	4.2%
SSW	3.83	4%
W	2.73	3.7%
S	3.06	3.5%
SSE	2.88	3%

75.1%

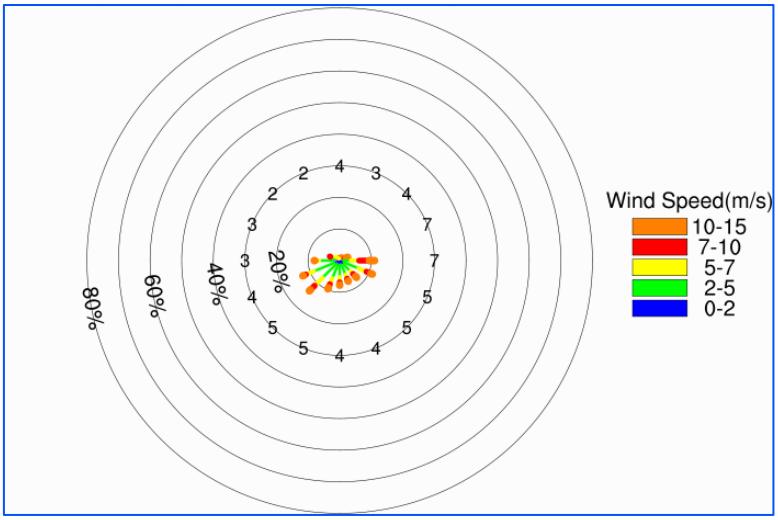
Wind Direction	Wind Speed at Elevation of 500m (m/s)	Frequency of Occurrence
N	2.62	2.1%
WNW	2.42	1.9%
NNW	2.42	1.3%
NW	1.67	1.2%

2.1.7 The occurrences of wind from north eastern quadrant (E, ESE and ENE) directions comprise 52.4% of the annual wind direction and are therefore considered to be the most predominant winds in the Application Site area.

Summer Wind Analysis

2.1.8 The RAMS Wind Rose for Grid (088, 036) is shown in **Figure 2-3** and presents the frequency of summer wind speed and directions at the Application Site.

Figure 2-3 RAMS Summer Wind Rose at 200m for Grid (088, 036)



Source: RAMS Data https://www.pland.gov.hk/pland_en/info_serv/site_wind/site_wind/088036.html

2.1.9 The RAMS probability of speed and frequency of occurrence of summer wind from 16 directions is shown in **Table 2-2**. Eight wind directions (SW, WSW, ESE, E, SSW, W, S and SE) cumulatively exceed the 75% frequency (actually, 81.7%) specified in the Technical Guide and thereby represent the summer prevailing winds at the Application Site.

Table 2-2 Summer Wind Availability Data from RAMS Grid (088, 036)

Wind Direction	Wind Speed at Elevation of 500m (m/s)	Frequency of Occurrence
SW	4.73	13.6%
WSW	4.02	12.6%
ESE	4.60	11.3%

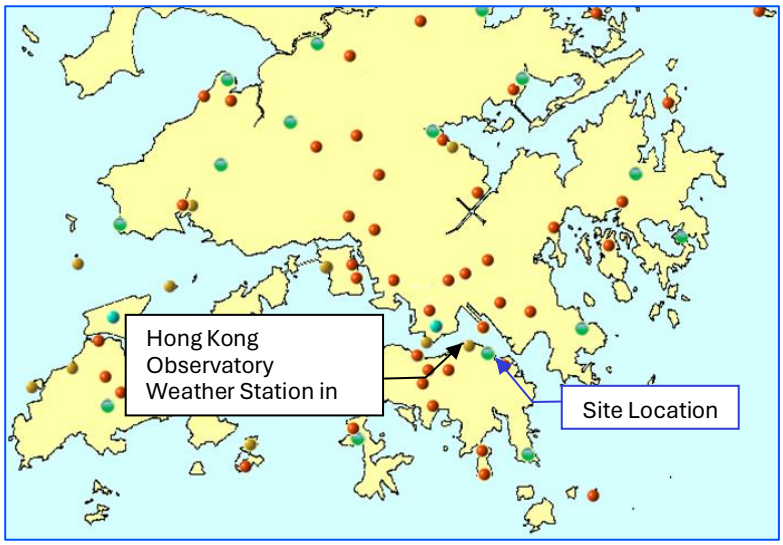
81.7%

Wind Direction	Wind Speed at Elevation of 500m (m/s)	Frequency of Occurrence
E	6.50	11.1%
SSW	4.33	9.7%
W	3.14	8.0%
S	3.83	7.8%
SE	4.39	7.6%
SSE	3.96	7.0%
WNW	3.13	3.4%
ENE	5.16	2.9%
NW	2.24	1.7%
NE	3.95	1.1%
NNE	2.31	0.8%
NNW	2.14	0.7%
N	1.75	0.6%

Climatological Information Services – HKO

2.1.10 As an alternative to RAMS data, there is also data from Hong Kong Observatory (HKO) weather stations. Reference has been made to the nearest HKO weather station that records wind speed and direction, which is located at North Point as shown in **Figure 2-4**.

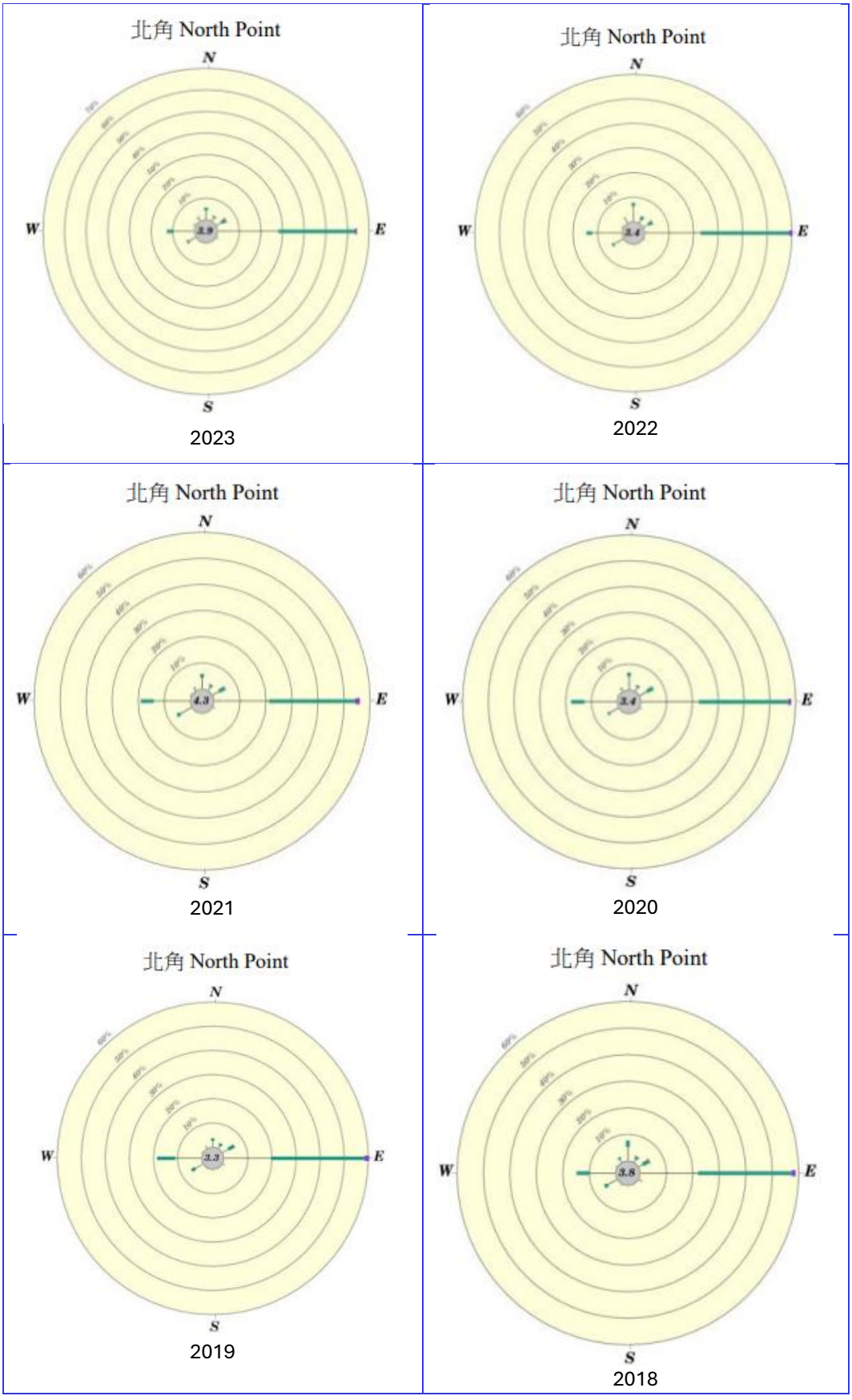
Figure 2-4 Location of the Nearest Weather Station to the Site with Wind Speed and Direction Data



2.1.11 The annual wind rose measured at the North Point Weather Station from 2016 to 2023 is shown on **Figure 2-5**.

2.1.12 From the monthly prevailing wind direction provided by HKO, summer wind is represented by the identified prevailing winds from June to August.

Figure 2-5 Annual Wind Rose at North Point Weather Station (2016 to 2023)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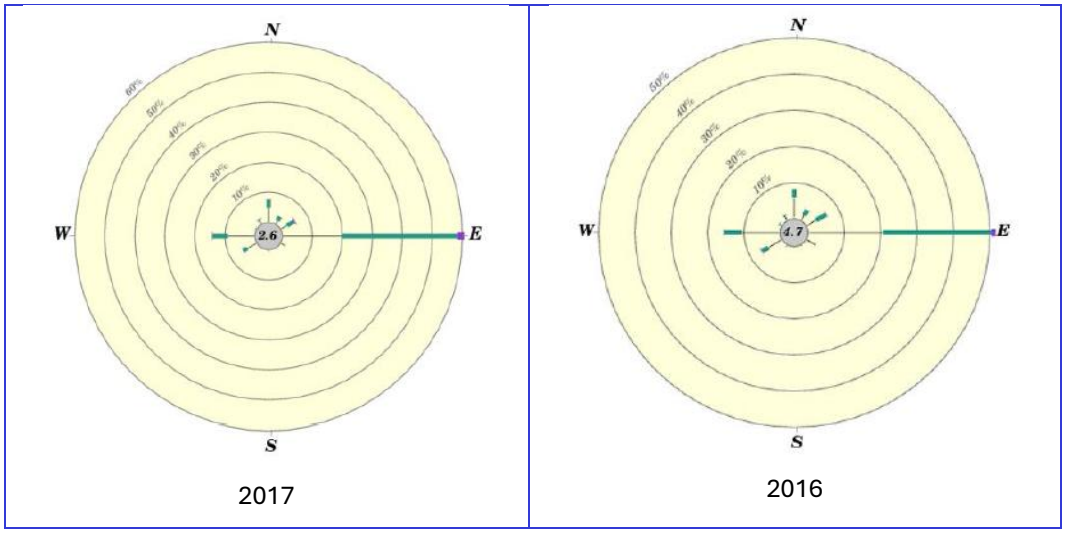


2017 2016

Source: Summary of Meteorological and Tidal Observations in Hong Kong https://www.hko.gov.hk/en/publica/pubsmo.htm

[1] Monthly Prevailing Wind Direction (deg.) at North Point https://www.hko.gov.hk/en/publica/pubsmo.htm

Conclusion

2.1.13 While similar prevailing winds have been identified in both data sets, there are some differences between the two. To ensure this assessment makes best use of the available data, it has been decided to use the data from RAMS in preference to that from HKO North Point Weather Station for the following reasons:

- **Location.** The RAMS grid (088, 036) covers the Site exactly, whereas the HKO Weather Station is more than 6 km from the Application Site.
- **Accuracy.** The RAMS data is based on 16 wind directions, whereas the HKO data is based on 12 directions. Furthermore, RAMS is capable of representing atmospheric dynamics, thermodynamics as well as resolving detailed topographic effects.

2.1.14 RAMS data identifies the following prevailing wind directions:

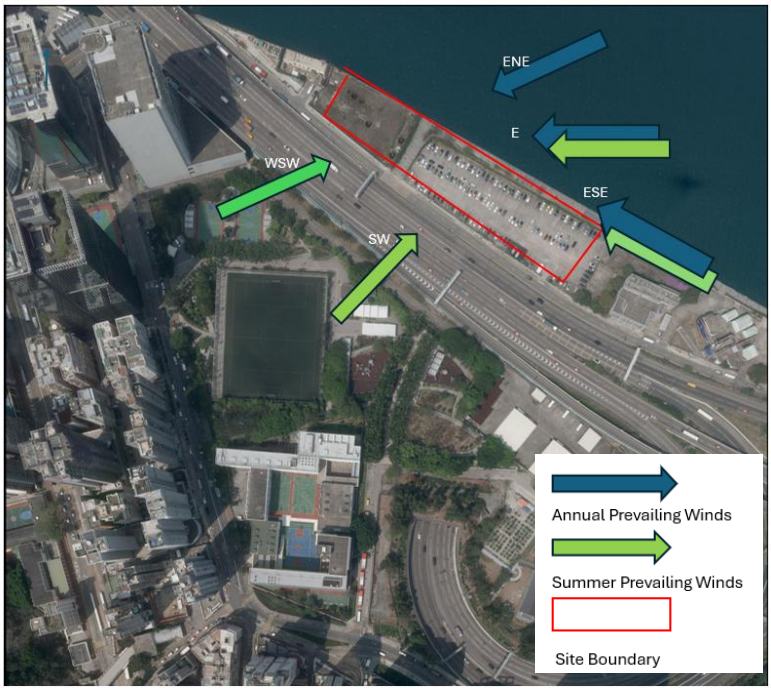
- Annual Prevailing Winds: E, ESE and ENE
- Summer Prevailing Winds: SW, WSW, ESE and E

2.1.15 HKO data identifies the following prevailing wind directions:

- Annual Prevailing Winds: E, W and WSW
- Summer Prevailing Winds: W and E

2.1.16 Therefore, based on RAMS, the prevailing wind directions are shown on **Figure 2-6.**

Figure 2-6 Annual and Summer Prevailing Wind Directions



Source: Land's Department Aerial Photo E221443C, (2024)

2.2 Wind Environment Due to Topography

2.2.1 **Figure 2-7** shows the topography in the vicinity of the Application Site, which is located on the south side of Victoria Harbour at an elevation of around 4mPD.

Figure 2-7 Existing Topography in the Vicinity of the Application Site

2.2.2 The Application Site is bounded by Victoria harbour to the north, and Island Eastern Corridor to the south. To the west and east side of the Application Site along the harbour, the terrain remains at the same elevation. To the southwest and southeast of the Application Site, the land remains relatively flat until it reaches King's Road. In the southeast direction, Kornhill can be found at an elevation of around 60m. Further beyond King's Road, the land gradually rises up to form the slopes of Tai Tam Country Park where peaks of 400-500m can be found.

2.2.3 The topography of the entire valley at Quarry Bay is relatively flat, so the area surrounding the Application Site is at the same elevation, resulting in no hilly terrain that could shelter the Site from the winds.

2.2.4 Since there are hillsides to the southwest, the Application Site is expected to benefit from katabatic winds from the slopes – this is downhill air movement from the higher, cooler elevations towards lower ground. Another air ventilation benefit arising from the geographical positioning of the Application Site is that the Application Site will receive plenty of sea breeze under annual prevailing wind conditions.

2.3 Land Use and Urban Morphology

Land Use

2.3.1 An excerpt from Outline Zoning Plan (OZP) No. S/H21/28 Quarry Bay showing the area around the Application Site is presented on **Figure 2-8,** with the types of land use are listed in **Table 2-3**.

Figure 2-8 Types of Land Use Near the Application Site

Source: Excerpt from OZP No. S/H21/28 – Quarry Bay from Statutory Planning Portal 2.

Table 2-3 Colour Code for Type of Land Use

Colour	Type of Land Use	Abbreviation
CDA	Comprehensive Development Area	CDA
O	Open Space	O
GB	Green Belt	GB
R(A)	Residential (Group A)	R(A)
C/R	Commercial/Residential	C/R
C	Commercial	C
G/IC	Government Institution or Community	G/IC
OU	Other Specified Uses	OU
R(B)	Residential (Group B)	R(B)

Other Specified Uses

2.3.2 The areas in orange are zoned as "Other Specified Uses" (OU). The Application Site itself is zoned as OU. Other than this, there are five other areas zoned as OUs in the vicinity of the Site.

2.3.3 Towards the east-southeast direction along the harbour, there are three OU zones, namely the Dog Park and Quarry Bay Promenade. Towards the south-southwest direction, across from King's Road, the OU areas are Sinopec King's Road Petrol Station and Quarry Bay MTR station. Toward the west direction, Hong Kong Funeral Home is sandwiched between Hoi Yu Street and King's Road.

Comprehensive Development Area

2.3.4 The area in bright red are zoned as "Comprehensive Development Area" (CDA). There is one area zoned as CDA to the south of the Application Site, across Hoi Tai Street, comprising Taikoo Place Cornwall house, Taikoo Place Cambridge House and Taikoo Place PCCW Tower.

Commercial

2.3.5 The area in pink are zoned as "Commercial" (C). There are altogether 13 areas zoned as C in the vicinity of the Application Site.

2.3.6 Toward the southeast direction, near the Island Eastern corridor, the two commercial area are City Plaza Car Park and City Plaza Four. Further southeast, Cityplaza One can be found. Towards the south-southeast direction, there are several commercial buildings, including Kornhill Plaza, Grand Plaza, Wah Ha Factory Building, Zung Fu Industrial Building and Eastern Centre.

2.3.7 Towards the southern direction, across the Hoi Tai Street, there is one commercial zone occupied by Oxford House and Berkshire House. At the west side of this area, across the CDA area, there is another commercial area occupied by Chinachem Exchange Square, Sea View Building and Hoi Wan Building. Across Tong Chong Street, there is one C area that includes Executive Centre Taikoo Place and Kam Shan Building.

2.3.8 Towards the western direction, across Quarry Bay Park Phase 2, there are several commercial land uses, including Kerry Centre, Towngas Showcase and Eastern Harbour Centre. Across from Java Road, there are ALA HK tower, Technology Plaza, Prosperity Industry Millennium Plaza and Tung Chong Factory Building. Further west, across Healthy Street East, are the Water Supplies Department and Kodak House Phase 2.

Residential (Group A)

2.3.9 The areas in reddish brown are zoned "Residential (Group A)" (R(A)). There are altogether 24 areas zoned R(A) in the vicinity of the Application Site.

2.3.10 Towards the southeast direction, there are two R(A) areas next to the Quarry Bay Park occupied by Taikoo Shing Harbour View Garden. In between Taikoo Wan Road and Taikoo Shing Road, there are several residential blocks in two R(A) areas, namely Taikoo Shing, Horizon Gardens Yat Tien Mansion and Taikoo Sing Sing Fai Terrace. There is one residential area located at the western side of the Tai Mou Ave, namely Taikoo Shing Din Terrace. Further to the southeast side, two residential areas are occupied by Kornhill Garden and Taikoo Shing Kao Shan Terrace.

2.3.11 Towards the south-southeast direction, across the Kornhill Road, one R(A) area is occupied by several blocks of Kornhill blocks.

2.3.12 Towards the southern direction, there are two residential areas, namely Sunway Gardens and Westlands Gardens. Five residential areas are located across the King's Road, The Parkwe Court, Oceanic Building, Fok Cheong Building, Yick Fat Building, Yick Cheong Building, Montane Mansion, Parkvale Mansion, Tai Kut House, Tai Ming House and Bo Fung Gardens.

2.3.13 Towards the southwest direction, there are six residential areas. Across Hoi Chak Street, there are King's View Court, Ritz Garden Apartments, Bo Sun Court, Wai Fong court and Tak Fat Building. Across King's Road, there is one residential area, several blocks are occupied, namely Mansion Building, Golden Horse Mansion, Lido Apartments and Casa 880 Podium.

2.3.14 Towards to western direction, there is one residential area occupied by Model Housing Estate. Across Healthy Street East, the developments in this zone are Healthy Village Phase 1, la place de Victoria and Elegance House. Across Puk Fuk Road, there are Healthy Village Estate and Braemar Terrace.

2.3.15 There is one R(A) area located towards north where there are a few residential blocks sandwiched between Po Hong Road and To Lok Road at Serenity Place. In between Po Hong Road and Yuk Nga Lane, there are three other residential areas, namely Well On Garden, Finery Park and Radiant Towers. Further towards north behind Po Tsui Park, the area occupied by residential developments of Po Lam Estate and Ying Ming Court.

Residential (Group B)

2.3.16 The areas in green are zoned "Residential (Group B)" (R(B)). There is one area zoned R(B) in the vicinity of the Application Site. Towards the western direction, across Tsat Tsz Mui Road, the one R(B) area is occupied by Tung Kin Factory Building, Lok's Industrial Building and Cheong Lee Building.

Open Space

2.3.17 The areas in green are zoned "Open Space" (O). There are altogether 14 areas zoned as O in the vicinity of the Application Site.

2.3.18 Towards the southeast direction, across the Island Eastern Corridor, there are two large open areas namely Quarry Bay Park and Quarry Bay Phase 1. Across the Taikoo Wan Road, there are two relatively small open areas occupied by Piazza Verde Taikoo Shing.

2.3.19 Toward the south-southeast direction, Taikoo Park is sandwiched between Hoi Tai Street and Taikoo Shing Road. Further south-southeast side, there are three small open areas occupied by Kornhill Park, Quarry Bay Community Complex and Bo Fung Garden Parking.

2.3.20 Towards the southwest direction, Quarry Bay Park Phase II occupies a large open area. Across Hoi Chak Street, there is an open area where Java Road Playground can be found. Additionally, Finnie Street sitting-out Area is located at the south-southwest direction.

2.3.21 Towards the western direction, across Pak Fuk Road, there are two open areas, namely Healthy Village Playground and Pak Fuk Road Playground.

2.3.22 Towards the northwest direction, there is an open area occupied by Man Hong Street Playground along the harbour.

Green Belt

2.3.23 The areas in yellowish green are zoned as "Green Belt" (GB). There is one area zoned as GB in the vicinity of the Site. The "Green Belt" area are mainly the hilly slopes of Braemar Hill which is located southwest part of the Application Site.

Government Institution or Community

2.3.24 The areas in light blue are zoned as "Government Institution or Community". There are only 16 area zoned as G/IC in the vicinity of the Application Site.

2.3.25 Towards the east-southeast direction, along the harbour and next to Island Eastern Corridor, there is Quarry Bay MTR Substation.

2.3.26 Towards the south-southeast direction, across Kornhill Road, there are two institutions, namely Po Leung Kok Wai Yin Kindergarten and Taikoo Primary School. The other G/IS building is Quarry Bay Community.

2.3.27 Towards the south direction, Quarry Bay Municipal Services Building and Quarry Bay Public Library are sandwiched between Quarry Bay Street and Mount Parker Road. Another G/IC building is Hong Kong Association of Youth Development Training Centre which is across King's Road.

2.3.28 Towards the southwest direction, there is Canossa College next to Quarry Bay Park Phase 2. Across King's Road, there is North Point Government Primary School.

2.3.29 Towards the west-southwest direction, there is a G/IC zone consisting of Hong Kong Society for the Aged and Hong Kong Federation of Youth Groups Building.

2.3.30 Towards the western direction, there are few institutions including Chinese Methodist School North Point and Chinese Methodist Church North Point. Further west, there are several community uses found, namely Pak Fuk Road Safety Town, Anne Black Maternal and Child Health Centre, Anne Black General Out-Patient Clinic and North Point Public Library. Chinese Methodist School - Tanner Hill is sandwiched by Healthy Street West and Healthy Village Playground.

2.3.31 Toward the northwest direction, Quarry Bay Salt Water Pumping Station can be found next to the Site. Across Hoi Yu Street, there is North Point Offtake Station sandwiched by Hoi Chak Street and King's Road. Several community use developments are located across the Hoi Yu Street along the Harbour, namely North Point Fire Station, Fire Services Headquarters Building, North Point Fire Services Married Quarters, North Point Government Offices, North Point Police Report Room and Town Planning Board Office. Further northwest along the harbour is ICAC Headquarters Building.

Commercial/Residential

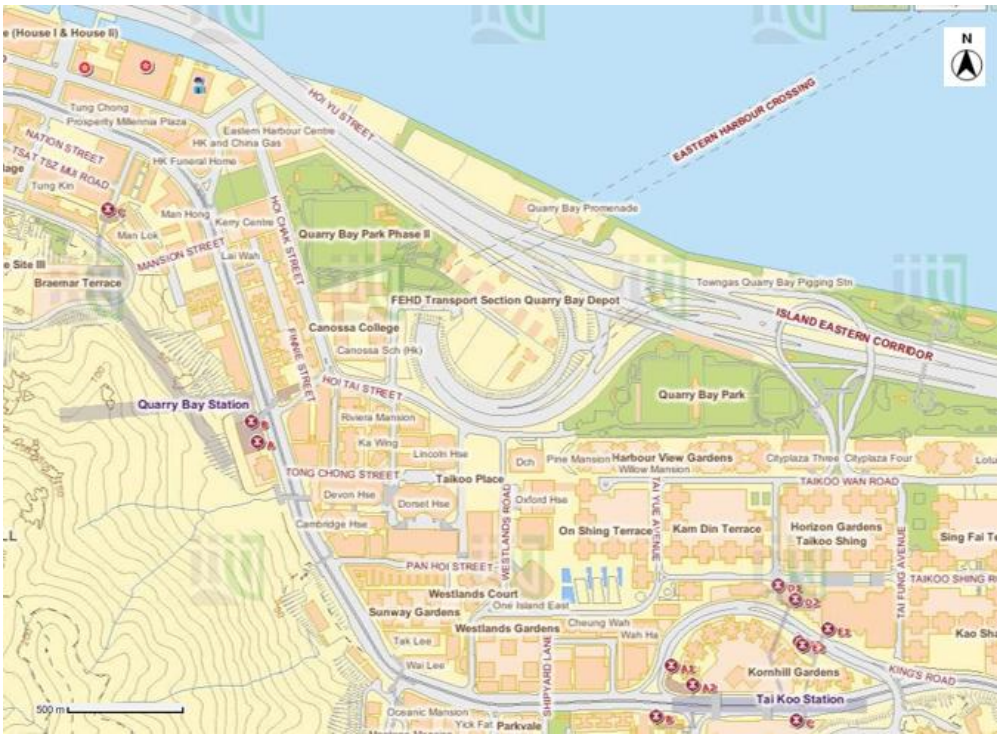
2.3.32 The areas in red are zoned as "Commercial/Residential". There are two areas zoned as C/R in the vicinity of the Application Site.

2.3.33 Towards the west direction, AXA Hong Kong Tower and North Point Mansion are within the two C/R areas.

Nearby Planned and Committed Developments

2.3.34 There are a few new development projects in the vicinity of the Application Site that are planned or currently under construction. These developments include Taikoo Place One Phase 2A (228.6mPD), Taikoo Place One Phase 2B (195mPD) a commercial development at 704-730 King's Road (126mPD) and Novum East (91mPD), a residential development at 856 King's Road, as shown in **Figure 2-9.**

Figure 2-9 Nearby Planned and Committed Developments



Urban Morphology

2.3.35 The heights of surrounding developments are provided in **Table 2-4** and the urban morphology surrounding the Application Site is illustrated on **Figure 2-10.**

Table 2-4 Height of Developments in the Vicinity of the Application Site

No.	Description	Approx. Building Height (mAG)
1	Application Site	-
2	FEHD Transport Section Quarry Bay Depot	4
3	Canossa College	24
4	Berkshire House	137
5	Harbour View Gardens	78 - 90
6	Oxford House	165
7	Westlands Centre	80
8	On Shing Terrace	84 - 87
9	Kam Din Terrace	78 - 81
10	Taikoo Place One (Planned Development - Completion in 2018)	221
11	Dorset House / PCCW Tower	153 / 164
12	Cambridge House	159
13	Devon House	118
14	R(A) Developments: Hoi Kwong Court, Rivera Mansion, Ka Wing Building, Tai Koo Place Apartments	70 - 100
15	R(A) Developments: Tor Po Mansion, King's House, Tai Fung Building	30 - 70
16	Sea View Building	25
17	Hoi Wan Building	25

No.	Description	Approx. Building Height (mAG)
18	Chinachem Exchange Square	83
19	Lincoln House	97
20	R(A) Developments: Wai Fong Court, Bo Sun Court, Tak Fat Building, Oceanic Building, King's View Court, Ritz Garden Apartments, Royal Terrace, Showboat Mansion, Grandview Court, Lai King Building, Lai Wah Mansion	33-110
21	Kerry Centre	138
22	Eastern Harbour Centre	63
23	HK and China Gas Company Limited	63
24	Quarry Bay Park Phase II	2
25	Quarry Bay Park	6
26	Quarry Bay Substation	18
27	Eastern Harbour Crossing Ventilation Building	18
28	WSD Quarry Bay Salt Water Pumping Station	5
29	Noise Barrier along Quarry Bay Park	5

Figure 2-10 Site Location and its Environs

2.4 Wind Corridors Near the Application Site

2.4.1 Wind corridors near the Application Site are shown on **Figures 2-11 to 2-15**. Given the exposed nature of the Application Site along the Harbour, these wind corridors are not as significant in ventilating the Application Site as they would be for a dense urban high-rise area. Wind corridors at annual and summer prevailing winds are discussed below to show the air paths leading into and around the Application Site area.

Wind Corridors Under Wind Direction E

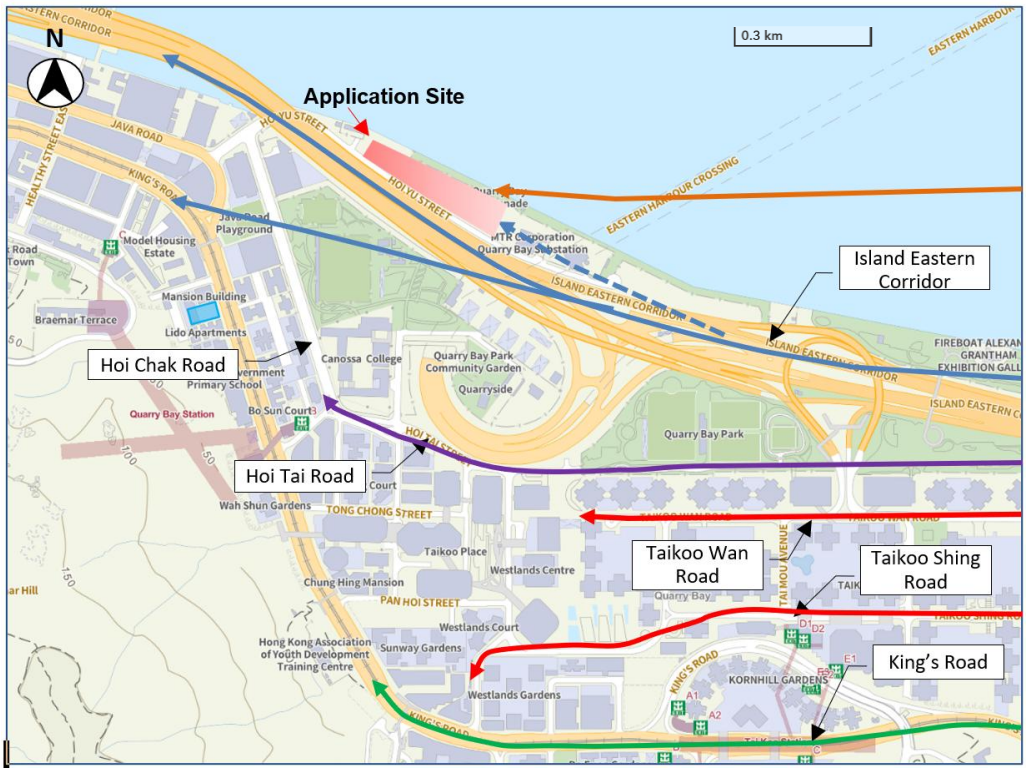
2.4.2 The E prevailing wind largely originates from Victoria Harbour further east, initially passing through Shau Kei Wan Typhoon Shelter to enter Quarry Bay (orange arrow), as shown on **Figure 2-11**. Greenery and open spaces play a big role in ventilating the northern portion of Quarry Bay, where the Application Site is located. There are virtually no mid- to high-rise buildings in this area, thus creating a large open space to act as a wind corridor. This wind corridor consists of the Island Eastern Corridor, FEHD Transport Section Quarry Bay Depot and various park spaces (blue arrows). This area is also substantial in length, extending through most of Quarry Bay, allowing the wind to flow through easily.

2.4.3 The air movement for the E wind is plentiful in this region as it is unobstructed and can reach leeward areas freely due to the openness of the space. The E wind flows along the Island Eastern Corridor into Quarry Bay Park Phase II, then reconnects onto Kings Street into the North Point district. The wind runs westward from Quarry Bay Park and connects to Hoi Tai Road and then Hoi Chak Street (purple arrow).

2.4.4 The Application Site not only benefits from the wind from Victoria Harbour directly, but the wind is also able to travel along Quarry Bay Promenade to ventilate the eastern and southern parts of the Application Site. There are two low-rise buildings to the east of the Site, which is the MTR Quarry Bay Substation and Eastern Harbour Crossing Ventilation Building. However, the low-rise nature of the buildings does not affect the wind flow significantly and would even facilitate the E wind penetration to the surrounding area downwind (blue dash arrow).

2.4.5 Although the building density increases south of Quarry Bay Park, the street network facilities the East wind as the streets are mostly of rectangular grid running east-west and north-south. A major wind corridor in this area is King's Road since it is a wide street with a six-lane carriageway (green arrow). King's Road eventually bend northwards where the E wind is diverted by the bend and turns towards the northwest direction. Taikoo Shing Road and Taikoo Wan Road are also east-west streets that facilitate the E wind to ventilate the area (red arrows). Taikoo Shing Road is ultimately blocked at its western end as the road bends at right angle, thus reducing the wind flow. Therefore, the E wind is either dispersed amongst the buildings at the western end or is diverted onto King's Roads.

Figure 2-11 Wind Corridors Under Wind Direction E



Legend:

: Planned/Committed New Developments

East Prevailing Wind

Wind Corridor for East Prevailing Wind

East Prevailing Wind to westward

Wind Corridor for East Prevailing Wind (Low)

East Prevailing Wind (major to Kings road)

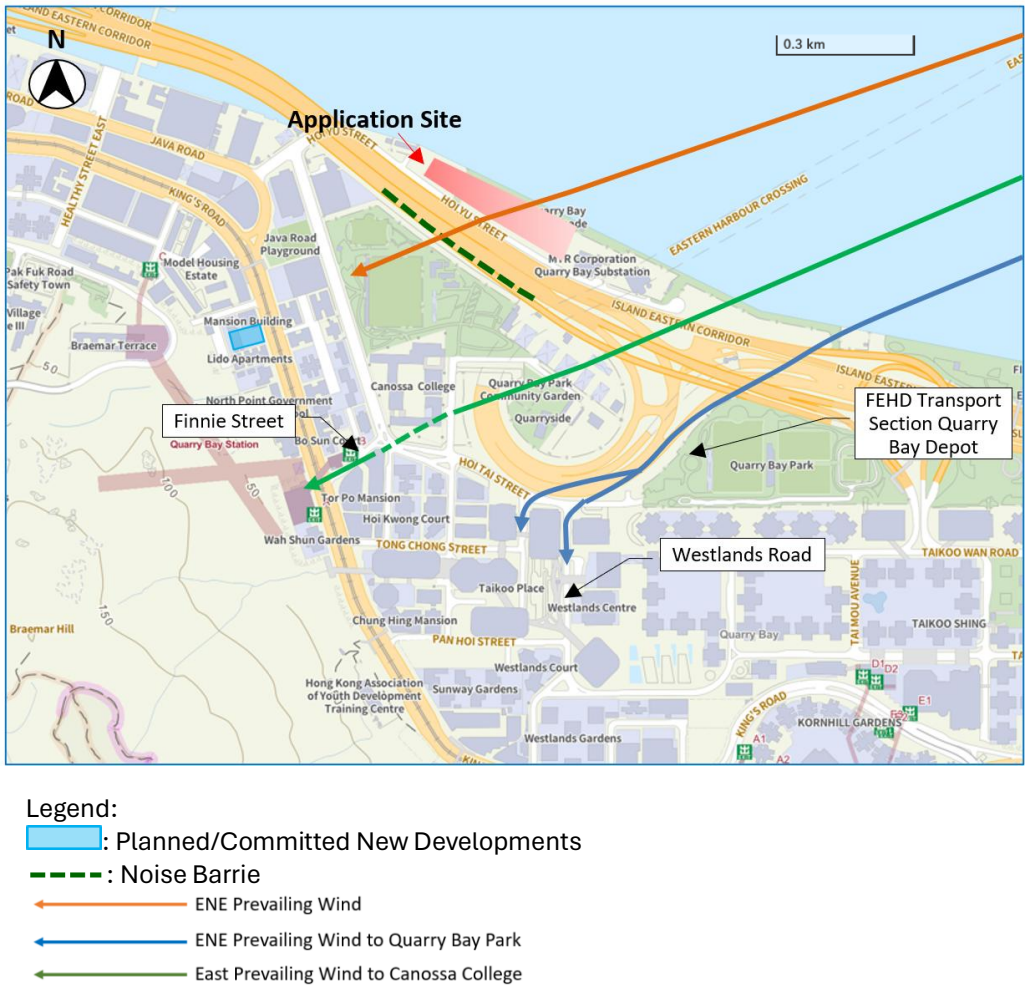
East Prevailing Wind (Major to Taikoo Shing)

Wind Corridors Under Wind Direction ENE

2.4.6 The ENE prevailing wind is channelled through Victoria Harbour directly and reaches the Site Area (orange arrow), as shown on **Figure 2-12**. The Application Site receives an abundance of wind since it is located right by the harbour without terrain obstruction in its windward area. ENE wind flows across Island Eastern Corridor and skims over the noise barrier into Quarry Bay Park (orange arrow). The noise barrier, which is approximately 5m in height, creates a slight blockage of pedestrian level wind only.

2.4.7 As mentioned above, the northern portion of Quarry Bay by the harbour is very open with long strips of parks. The ENE would flow through FEHD Transport Section Quarry Bay Depot (blue arrow), allowing the ENE wind to enter the southern portion of Quarry Bay where the building development grid begins, which ENE will then be weakened. The wind is then diverted onto streets such as Westlands Road, as the wind will be blocked by the planned development of Taikoo Place One (blue arrows). ENE wind is also able to skim over Canossa College (green dash) and is diverted on Finne Street (green arrow).

Figure 2-12 Wind Corridors Under Wind Direction ENE



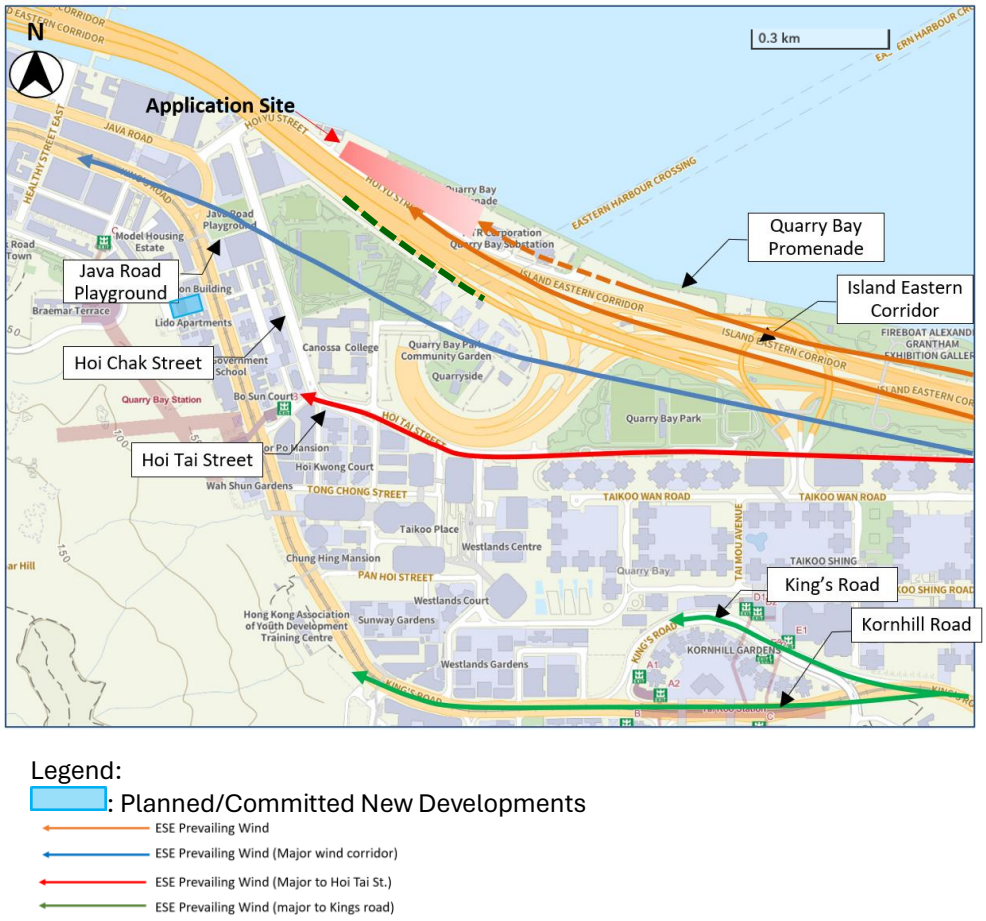
Wind Corridors Under Wind Direction ESE

2.4.8 Also originating from Victoria Harbour, the ESE wind passes through Quarry Bay Promenade and Island Eastern Corridor to reach the Application Site freely (orange arrows), as shown on **Figure 2-13**. The exposed nature of the Application Site along the harbour does not disturb the wind pathway, thus allowing adequate ventilation. The wind is able to skim over the two low-rise developments to the east of the Site, MTR Quarry Bay Substation and Eastern Harbour Tunnel Ventilation Building, to penetrate into the Site (orange dash).

2.4.9 A major wind corridor for the ESE wind in this area is Quarry Bay Park, in which the ESE wind flows through FEHD Transport Section Quarry Bay Depot, onto Quarry Bay Park Phase II and Java Road Playground, then eventually attaches onto King's road (blue arrow). The long stretch of parks that extends through the entire area combined with Island Eastern Corridor widens the pathway for ESE, enhancing the air ventilation in the Site and also in the area south of the Application Site. Another wind path would be through Hoi Tai Street where the wind will turn to ventilate the building developments on Hoi Chak Street (red arrow).

2.4.10 Further south, an important wind corridor is King's Road and Kornhill Road (green arrows). The circular shape of King's road facilitates the diversion of the ESE wind to ventilate more building developments in that area.

Figure 2-13 Wind Corridors Under Wind Direction ESE



Wind Corridors Under Wind Direction SW

2.4.11 The SW summer prevailing wind would reach the Application Site through the "GB" area which is the foothills of Tai Tam Country Park, located southwest to the Application Site, as shown on **Figure 2-14**.

2.4.12 The "GB" zone is a large open area filled with vegetated hillside slopes which facilities the SW wind (blue arrow). The wind skims over the MTR depot at Quarry Bay Station before it is diverted onto Finnie Street and reaches Canossa College, which is a low-rise with a building height of 24m (orange dash). High level wind is able to skim over Canossa College to pass through, the wind path continues as it reaches the open space where Quarry Bay Park Phase II and FEHD Transport Section Quarry Bay Depot are located. The erection of a noise barrier along Quarry Bay Park Phase II creates a wind barrier effect and reduces the wind speed at pedestrian level, but the effect is minor since the noise barrier is only approximately 5m tall and SW wind is able to skim over it to reach the Site (orange dash). The open nature of the area south of the Application Site allows the SW wind to penetrate into the Application Site, therefore adequate ventilation is brought by the SW wind. A portion of SW will be diverted onto Island Eastern Corridor.

Figure 2-14 Wind Corridors Under Wind Direction SW

Wind Corridors Under Wind Direction WSW

2.4.13 The WSW summer prevailing wind passes through streets and the open area to the south side of the Application Site and reaches the Application Site, as shown on **Figure 2-15.**

2.4.14 The foothills of Tai Tam Country Park is a large area for WSW to flow through (blue arrow). After skimming over the MTR depot at Quarry Bay Station, wind is then diverted onto Finnie Street; the wind passes through the street and skims over the low-rise building of Canossa College towards Quarry Bay Park Phase II (orange dash), even though Canossa College would still block some WSW wind. A portion of the WSW flow along Mansion Street but would be shielded by Kerry Centre (red arrow). There are not a lot of streets that facilitate the WSW wind path and the wind is expected to be weakened by the cluster of residential buildings sandwiched between Hoi Chak Street and King's Road. Incoming wind would be redirected into the large open space located south of the Site. WSW is able to flow though Quarry Bay Park without any major obstructions and is expected to skim over the noise barrier erected along Quarry Bay Park (green arrow).

Figure 2-15 Wind Corridors Under Wind Direction WSW

2.5 Evaluation of the Approved Scheme and Proposed Development Scheme

2.5.1 As discussed in **Section 1.3**, the Application Site is currently zoned as "OU (1)" and currently there is no existing development there other than a public car park. The wind performance at the Application Site and its surrounding area under this Base Scheme is generally good since there is an open area that promotes wind availability in the local environment.

2.5.2 The Application Site is located by the Harbour within a larger extension of open space that is made up of various parks such as Quarry Bay Promenade, Quarry Bay Park, Quarry Bay Park Phase II, and FEHD Transport Section Quarry Bay Depot. As the Application Site is located right next to open sea and is situated in an open space, wind availability at the Site is not likely to be greatly affected by surrounding mid to high-rise buildings, most of which are located further south in the Quarry Bay urban area. The few developments that are present in closer vicinity of the Application Site are low-rises (i.e. Quarry Bay Substation, Eastern Harbour Tunnel Ventilation Building and Canossa College) that allow wind to skim over the top of these buildings. Thus incoming prevailing winds are still able to reach the Proposed Development.

2.5.3 An additional building structure would reduce the amount of wind received by areas located downwind of the building. However, the open nature of this area already promotes wind availability so the wind sheltering effect that is induced by the Proposed Development is not expected to have a significant impact and should not be a major blockage to wind paths. Also, given the geographical location of the Proposed Development facing the Harbour directly, the Proposed Development would not have any impact on the local wind environment under certain prevailing wind conditions, particularly the summer prevailing winds, as there is only the Harbour situated downwind.

2.5.4 In the Proposed Development Scheme, the maximum building height range from 41mPD to 44mPD, which represents a minimal change. The building will be considered a mid-rise building. This height generally allows for most of the middle level winds to pass through the Proposed Development, as the wind skims over the building structure and reattaches at the pedestrian level. Therefore, the wind availability is not likely to be affected by the Proposed Development at the Application Site.

2.5.5 The air ventilation performances of the Approved Scheme and Proposed Development Scheme are to be evaluated and compared in the following sections. The proposed building section and typical building floor plan, respectively, used for the wind condition assessment are shown in planning statement.

2.5.6 Referring to **Section 1.5** of this Report, there are two good design features from an air ventilation perspective (building setback and building separation), both of which would improve air ventilation and enhance the environmental quality at pedestrian level.

Wind Performance Under Wind Direction E

2.5.7 E wind contributes 29.2% under annual wind condition and 11.1% under summer wind condition.

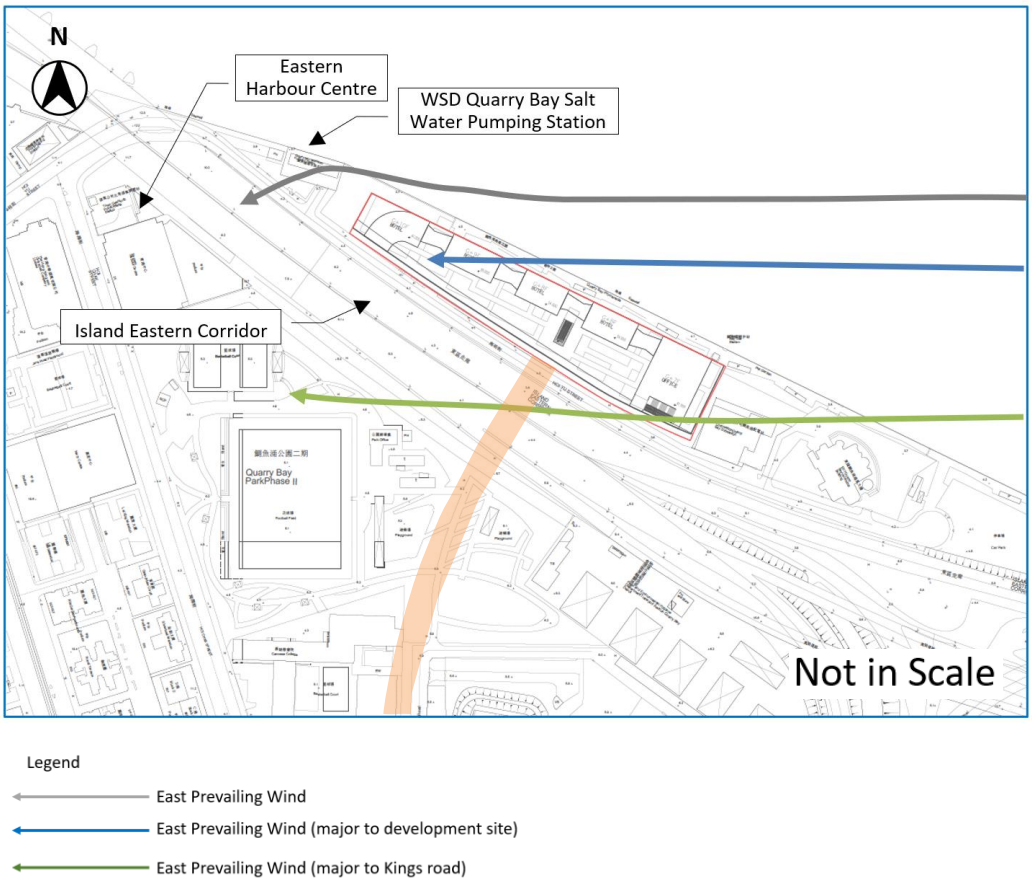
Approved Scheme

2.5.8 In the Approved Scheme, five building towers was proposed. The E wind is channelled through Victoria Harbour directly and reaches the Application Site freely to ventilate the northern portion of the Application Site. the overall frontal width has increased, the building heights building heights was limited which reduced the sheltering effect the development would have, High level wind is able to pass through the Site. Four 15m building separation was provided—which offers openings for E wind to penetrate the site. There was skybridges connect the towers and present some minor airflow blockage (5.8 – 6.4m tall), wind can still flow over and under these structures. (as indicated by blue arrows on **Figure 2-16a**).

2.5.9 The continuous podium block on ground level would cause some blockage and reduce the ventilation at pedestrian level within leeward areas. the scheme creates a localized wind wake on the immediate section of Island Eastern Corridor, slightly reducing airflow further downwind; however, the separation distance of approximately 64m between the site and Quarry Bay Park Phase II helps to alleviate any potential impact, resulting in no significant air ventilation impact on the Park. Some E wind is expected to bypass the development after skimming over the Eastern Harbour Tunnel Ventilation Building, while a portion will be diverted by the eastern edge of the site onto the Island Eastern Corridor. The proposed elevated walkway linking with the Quarry Bay hinterland presents a minor obstruction, as it is relatively short and situated in an open area, allowing wind to flow above and below.

2.5.10 The building line of the Approved Scheme was set back within the site boundary, thus create a sufficient gap between the development and the WSD Quarry Bay Salt Water Pumping Station. this enables wind to pass through and beneficial for downstream developments such as Eastern Harbour Centre and HK and China Gas Company Limited. While there remains some slight blockage, the overall effect is mitigated by the 64m distance and continued airflow along Island Eastern Corridor, meaning sufficient air ventilation is maintained at Eastern Harbour Centre.

Figure 2-16a Wind Performance Under Wind Direction E (Approved Scheme)

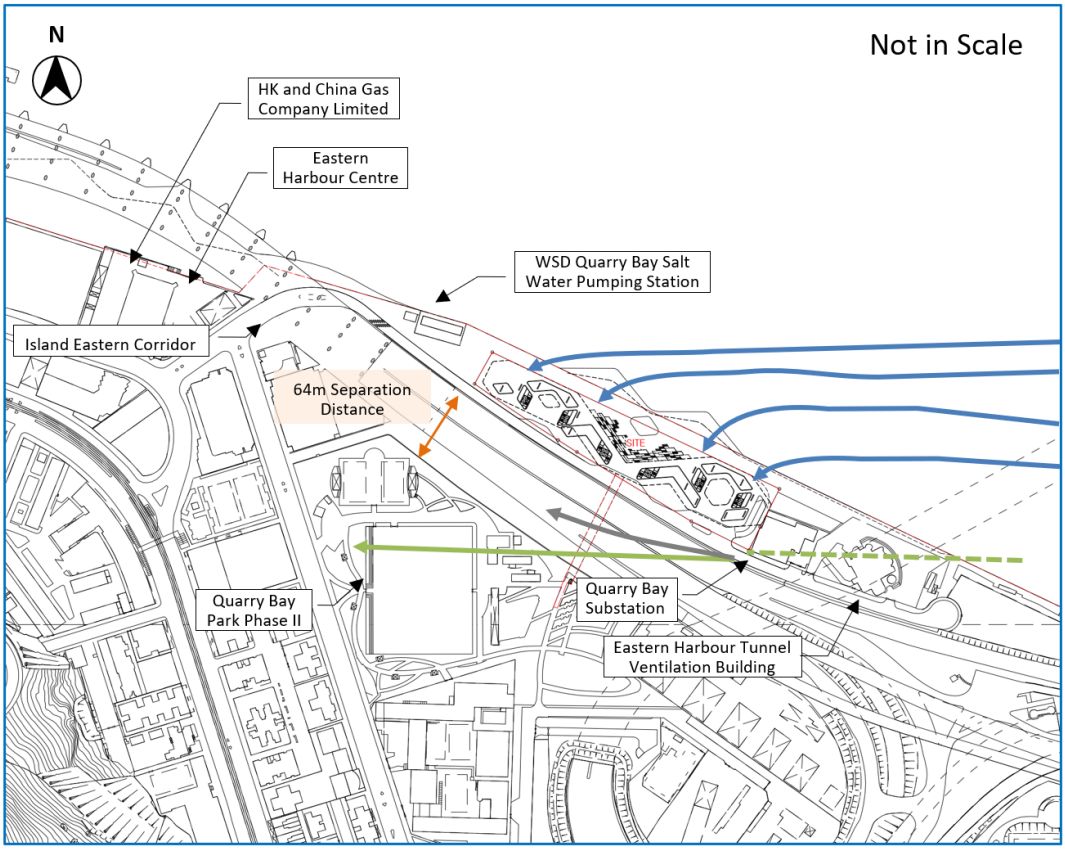


Proposed Development Scheme

2.5.11 In the Proposed Development Scheme, the number of towers is reduced from five to three, resulting in a slightly taller building height compared to the Approved Scheme. This can also be able to avoid sheltering effect, especially on the development like Eastern Harbour Centre and HK and China Gas Company Limited. High level wind is still able to pass through the site.

2.5.12 Therefore, the revised layout shown in **Figure 2-16b** has improved the penetration of E wind slightly compared to the Approved Scheme.

Figure 2-16b Wind Performance Under Wind Direction E (Proposed Development)



Wind Performance Under Wind Direction ENE

2.5.13 ENE wind contributes 9.7% under annual wind condition. Originating from the open sea, the ENE prevailing wind directly penetrates into the Application Site.

Approved Scheme

2.5.14 All five towers are able to benefit from the ENE wind brought by the sea. The layout of the building allows a considerable amount of the ENE wind to pass straight through the building separation between the towers, as shown on **Figure 2-17a**. The ENE wind permeates through the building openings directly onto Island Eastern Corridor to ventilate the areas downstream (blue arrows).

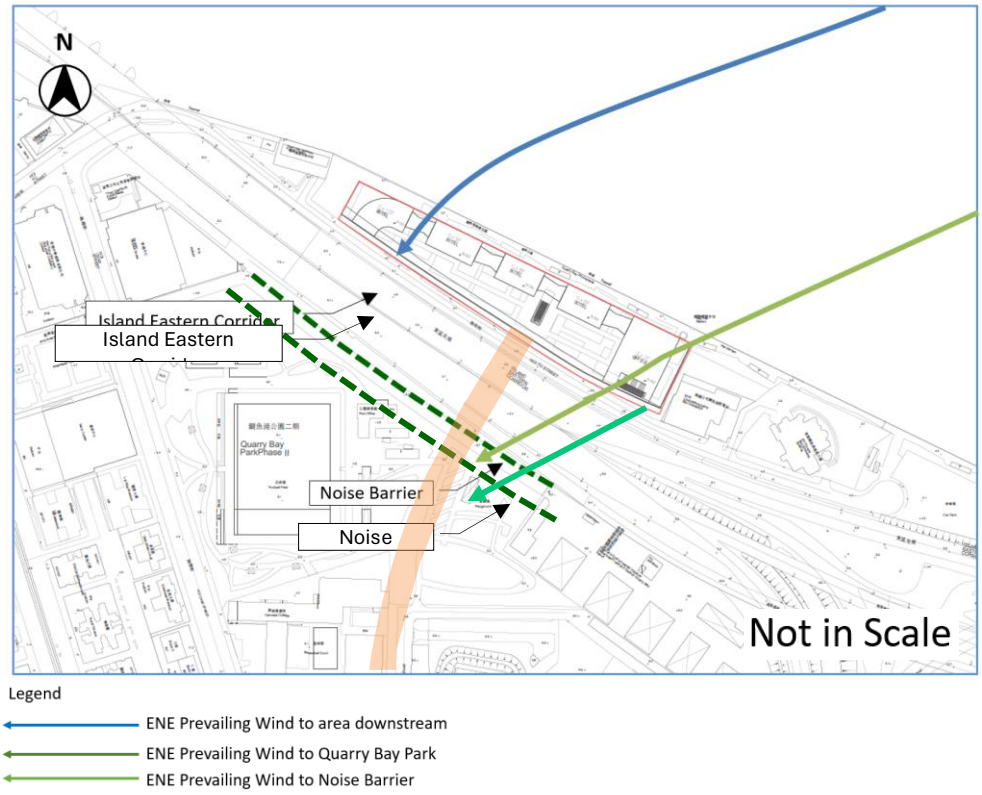
2.5.15 With the increase in the number of building separation openings within the Proposed Development, the possibility for more wind to infiltrate through the gaps increases as well, which improves the air ventilation performance within and beyond the Application Site. The tower heights range from 34 to 41mPD

2.5.16 Another obstruction for this wind path is the planned elevated walkway connecting to Quarry Bay hinterland (orange). The ENE wind is able to skim over the noise barrier and elevated walkway, and wind speeds would pick up again through the Quarry Bay Park as it is a large open area.

2.5.17 The skybridges connecting the towers decreases the amount of ENE wind passing through to the leeward areas, but the impact is not anticipated to be significant as skybridges only occupy 5.8 – 6.4m of the openings.

2.5.18 Since the building separations only begins above the podium level starting from 10mPD, the continuous ground level retail podium inhibits the wind flow through the Site, leading to a poorer air ventilation performance at pedestrian level in the southern portions of the Approval Scheme. However, since the air ventilation performance is already generally good in the leeward areas due to the openness of Island Eastern Corridor, the effect of the podium is not significant.

Figure 2-17a Wind Performance Under Wind Direction ENE (Approved Scheme)

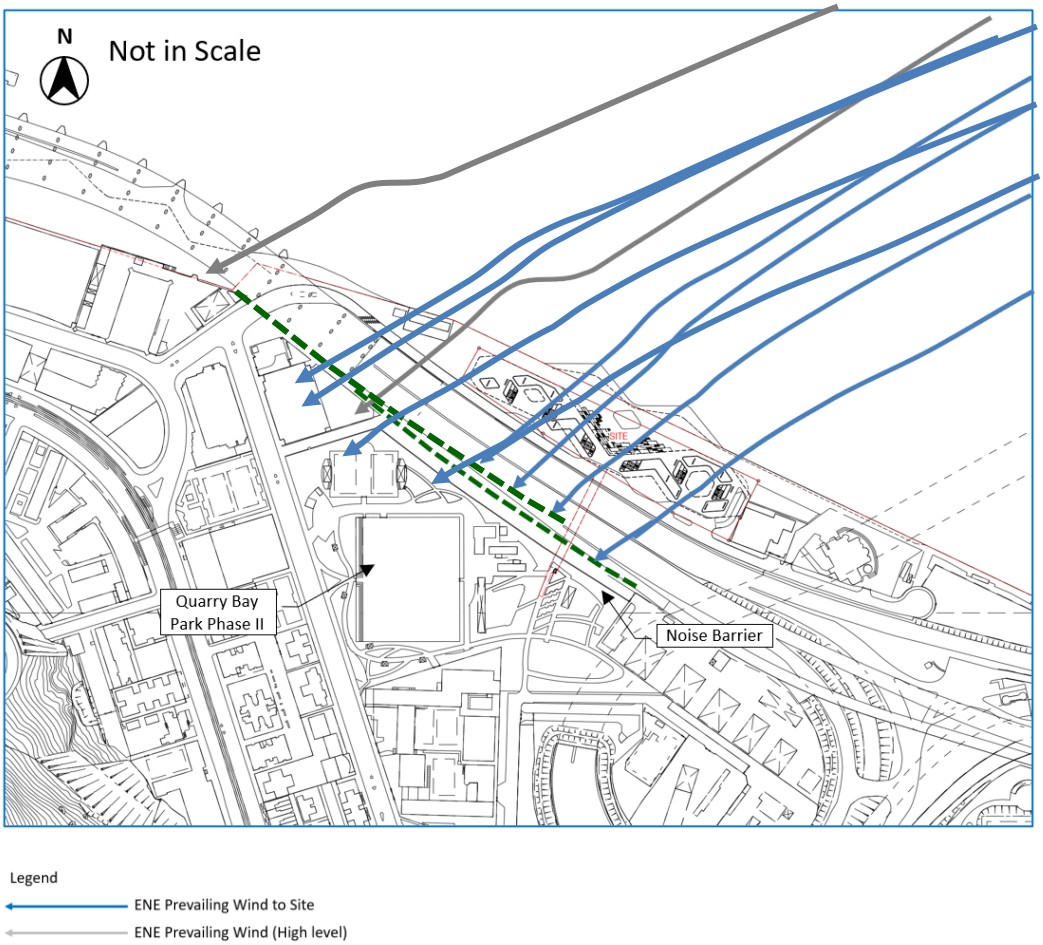


Proposed Development Scheme

2.5.19 In the Proposed Development Scheme, the building separation has been widened from 15m to 22m most. The enlarged building separation distance is considered to be a more effective air path for wind penetration between the towers. The total building separation under this scheme is now increased compared to the Approved Scheme.

2.5.20 The shielding effect of the proposed development is lessened and also more high-level ENE wind is then able to pass through the Site onto its downward vicinity., as shown on **Figure 2-17b.** The greater wind penetration creates a downwash wind effect where the air flow would better ventilate the pedestrian wind environment. Developments in the leeward area such as Canossa College, Java Road Playground, Quarry Bay Park Phase II, and the buildings in the southern portion of Quarry Bay would receive the ENE wind more effectively under this scheme. There is a stretch of a noise barrier erect along Quarry Bay Park that stands in the wind path of ENE which results in lower wind speeds at pedestrian level in the immediate leeward region past the barrier. Therefore, the Proposed Development Scheme would not affect the overall site permeability, the shorter footbridge in this Scheme can also allowed greater penetration of the ENE wind into Quarry Bay and thus improve the ventilation, compared to the Approved Scheme.

Figure 2-17b Wind Performance Under Wind Direction ENE (Proposed Development)



Wind Performance Under Wind Direction ESE

2.5.21 ESE wind contributes 13.5% under annual wind condition and 11.3% under summer wind condition.

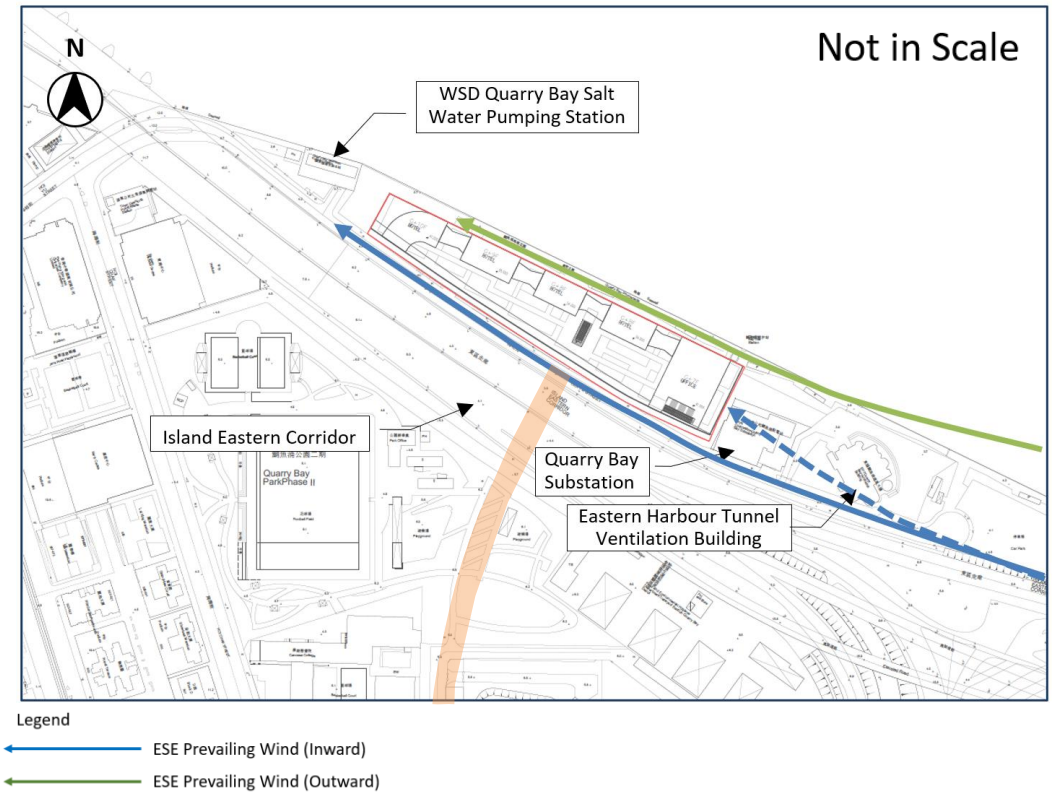
Approved Scheme

2.5.22 The ESE wind is brought by Victoria Harbour and the Quarry Bay Promenade to the Application Site area (green arrow), as shown on **Figure 2-18a**. ESE wind also travels along Island Eastern Corridor to ventilate the southern portion of the Application Site adequately (blue arrow). In the Approved Scheme, the hotel tower on the far eastern side receives the greatest amount of ESE wind, as shown on **Figure 2-18b.**

2.5.23 The Elevated Walkway connecting to Quarry Bay hinterland would cause minor blockage to ESE wind. However, this structure is only a few meters in height and suspended in the air, which allows good permeability of wind flow above and beneath the walkway.

2.5.24 There are two low-rise buildings located upwind of the Application Site area, Quarry Bay substation and Eastern Tunnel Ventilation Building. These buildings are not expected to negatively impact the wind performance at the Site as the ESE wind is able to skim over the low-rises and reattach at ground level when it reaches the Application Site (blue dash arrow).

Figure 2-18a Wind Performance Under Wind Direction ESE (Approved Scheme)



Proposed Development Scheme

2.5.25 In the Proposed Development Scheme, it will not hinder the ESE wind availability along the waterfront north of the Site. There is no development between the Proposed Development and the open sea, allowing the ESE wind to directly ventilate the backside of the building (green arrow). If the Proposed Development was not located next to Victoria Harbour, the wind performance under the ESE would be more negatively impacted.

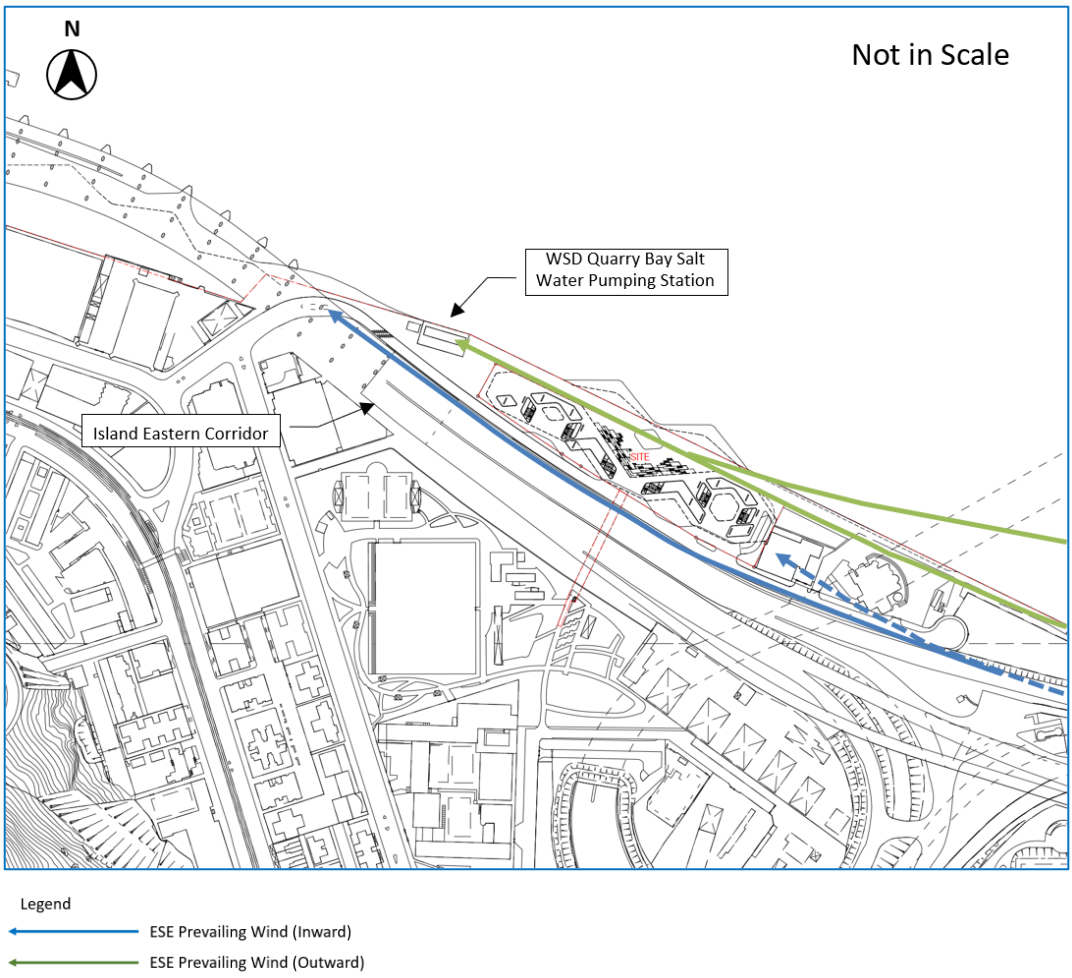
2.5.26 The primary concern is whether the residential building could obstruct a portion of the ESE winds at the pedestrian level, as the tower extends slightly further. Fortunately, ESE winds also travel along the Island Eastern Corridor, so the southern part of the Application Site should receive adequate ventilation (blue arrow).

2.5.27 Since the Proposed Development runs parallel to the Island Eastern Harbour wind corridor, it is not expected to create significant blockage along this wind path.

2.5.28 Other than the WSD Quarry Bay Salt Water Pumping Station, there are no other developments located downwind of the Application Site under this prevailing wind. The pumping station will be well-ventilated by ESE through the Island Eastern Corridor and Victoria Harbour on both sides. The tower heights also avoid the blockage effect the proposed development would have, allowing more high-level wind to pass through. As such, no negative impact is expected under this wind direction for the areas located leeward of the Application Site.

2.5.29 The two low rises located upwind of the Application Site area, Quarry Bay substation and Eastern Tunnel Ventilation Building, are not expected to negatively impact the wind performance at the Application Site as the ESE wind is able to skim over and reattach at ground level when it reaches the Application Site (blue dash arrow).

Figure 2-18b Wind Performance Under Wind Direction ESE (Proposed Development)



Wind Performance Under Wind Direction SW

2.5.30 SW wind contributes 13.6% under summer wind condition.

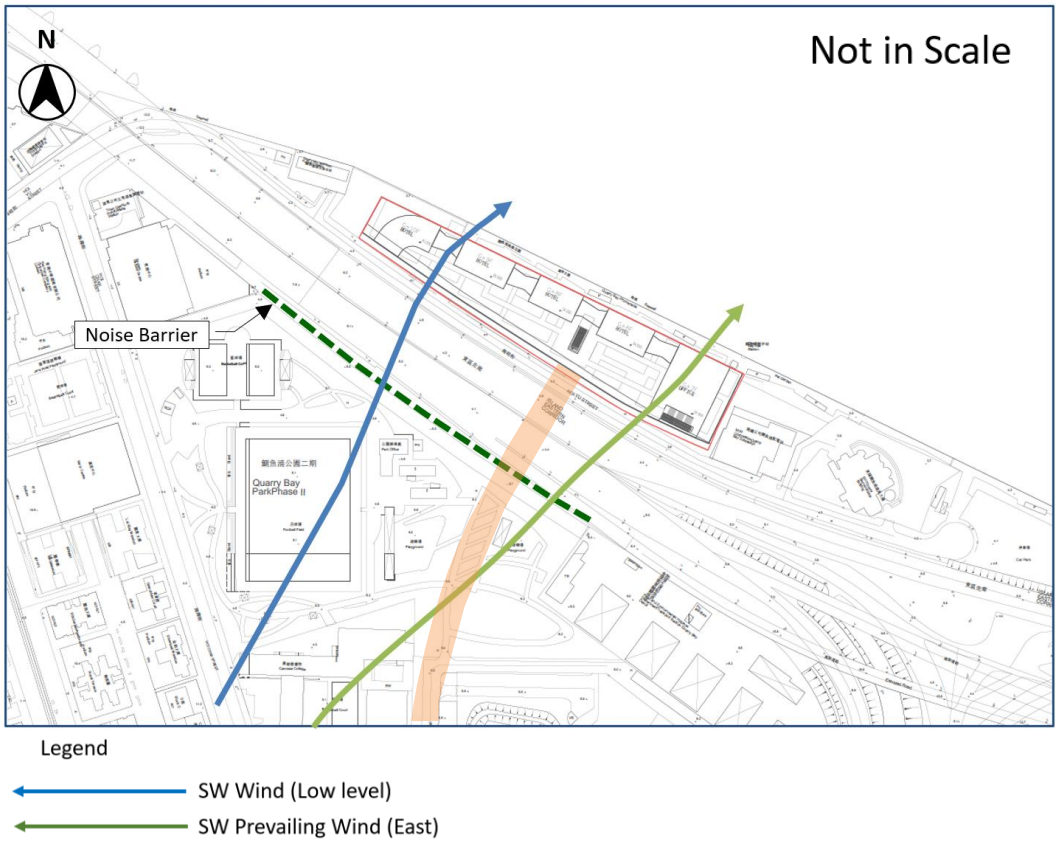
Approved Scheme

2.5.31 The SW wind flows into the Application Site through the open area located south of the Application Site, as shown on **Figure 2-19a**. In the Approved Scheme, SW wind could penetrate the Application Site mostly through the east side of the Application Site (green arrow).

2.5.32 The noise barrier erected along Quarry Bay Park would block a portion of low-level SW wind, but the impact is localised at pedestrian level only. In any case, the distance between the noise barrier and the Application Site is wide enough for the wind to regain speed before it reaches the Application Site.

2.5.33 The Approved Scheme could reduce wind availability to its leeward region, However, the site permeability under SW wind conditions is not as important as there are no developments located downwind of the Application Site where the open sea is found. The area that would suffer from the Proposed Development is the small stretch of waterfront area north of the Application Site creates a blockage effect for the SW wind. The building creates a wind wake where wind availability is reduced at pedestrian level.

Figure 2-19a Wind Performance Under Wind Direction SW (Approved Scheme)



Proposed Development Scheme

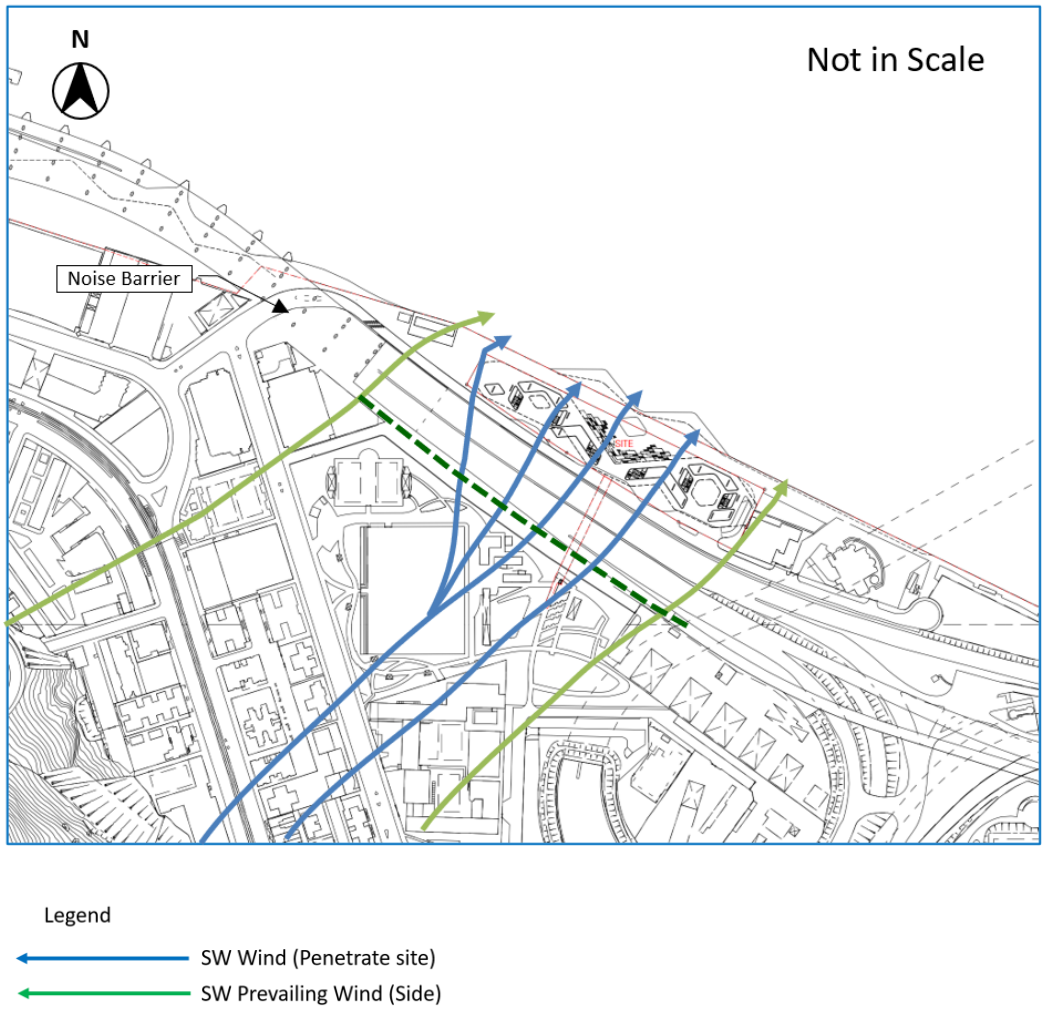
2.5.34 In the Proposed Development Scheme, not only could the SW wind penetrate, the Proposed Development through the western and eastern site boundary setbacks on the two sides, but also between the three building separations located in between each tower (blue arrows), as shown on **Figure 2-19b**. The ventilation performance within the Application Site is therefore enhanced by the additional building openings between the towers.

2.5.35 However, the promenade area north of the Proposed Development would increase the amount of SW wind at pedestrian level due to the additional setback and reduce the G/F wind that runs throughout most of the Proposed Development. the podium at ground level blocks low-level wind from passing through, the openness of the sea north of the Proposed Development already promotes a high air ventilation performance at the promenade. The design of building heights also allows for great wind availability to its downwind vicinity, especially on the western portion of the Application Site. SW wind is anticipated to travel along the sides of the proposed development towards the harbour (green arrows).

2.5.36 The noise barrier along Quarry Bay Park does not have a large impact on the amount of SW wind reaching the Application Site as the wind is able to regain speed as it passes through Island Eastern Corridor. The blockage effect is very minor especially since the noise barrier is only approximate 5m tall, so there should be no significantly reduced ventilation performance on the Proposed Development.

2.5.37 Under both development Schemes, SW wind would not affect the ventilation performance in the area north to the Application Site.

Figure 2-19b Wind Performance Under Wind Direction SW (Proposed Development)



Wind Performance Under Wind Direction WSW

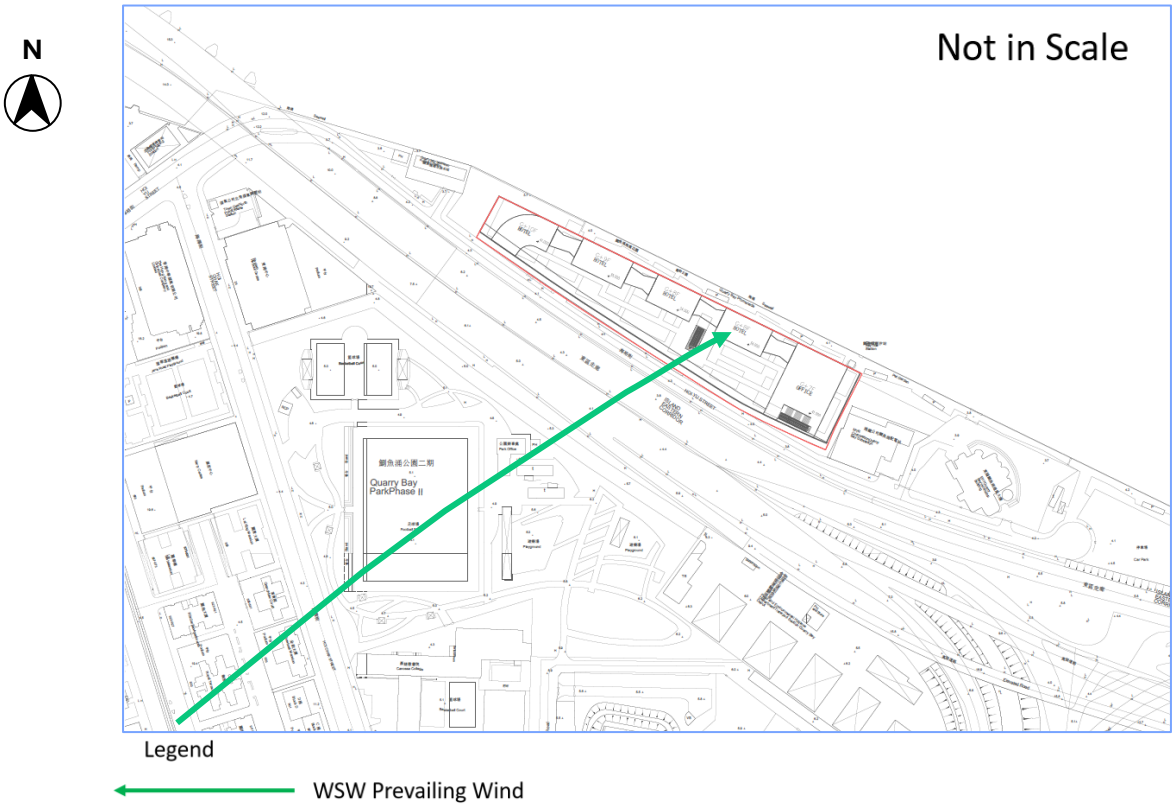
2.5.38 WSW wind contributes 12.6% under summer wind condition.

Approved Scheme

2.5.39 The WSW wind passes through open areas such as Quarry Bay Park Phase II and FEHD Transport Section Quarry Bay Depot to arrive at the Application Site. In the Approved Scheme, the building separation of 15m between the five towers allow some WSW wind to penetrate into the site area (blue arrows), as shown on **Figure 2-20a**, but the angle of the building separations do not align with the direction of the wind. Less WSW wind will be able to pass through the eastern side of the development due to the reduced open space compared to the Approved Scheme (green arrow).

2.5.40 The skybridges connecting the towers reduce the WSW wind flow through the openings, although the impact is not significant as they only occupy 5.8 - 6.4m of the openings. The continuous podium at ground level also further reduces the wind availability at pedestrian level as low-level wind is not able to pass through. This issue is still not considered to be a significant as the open sea promotes a high ventilation performance at the promenade, taking into account the blockage from the site. A small portion of WSW would be obstructed by the Proposed Elevated Walkway connecting to Quarry Bay hinterland (orange) in reaching the Proposed Development, but as the structure promote wind permeability by being suspended in the air, no adverse impact is anticipated.

Figure 2-20a Wind Performance Under Wind Direction WSW (Approved Scheme)



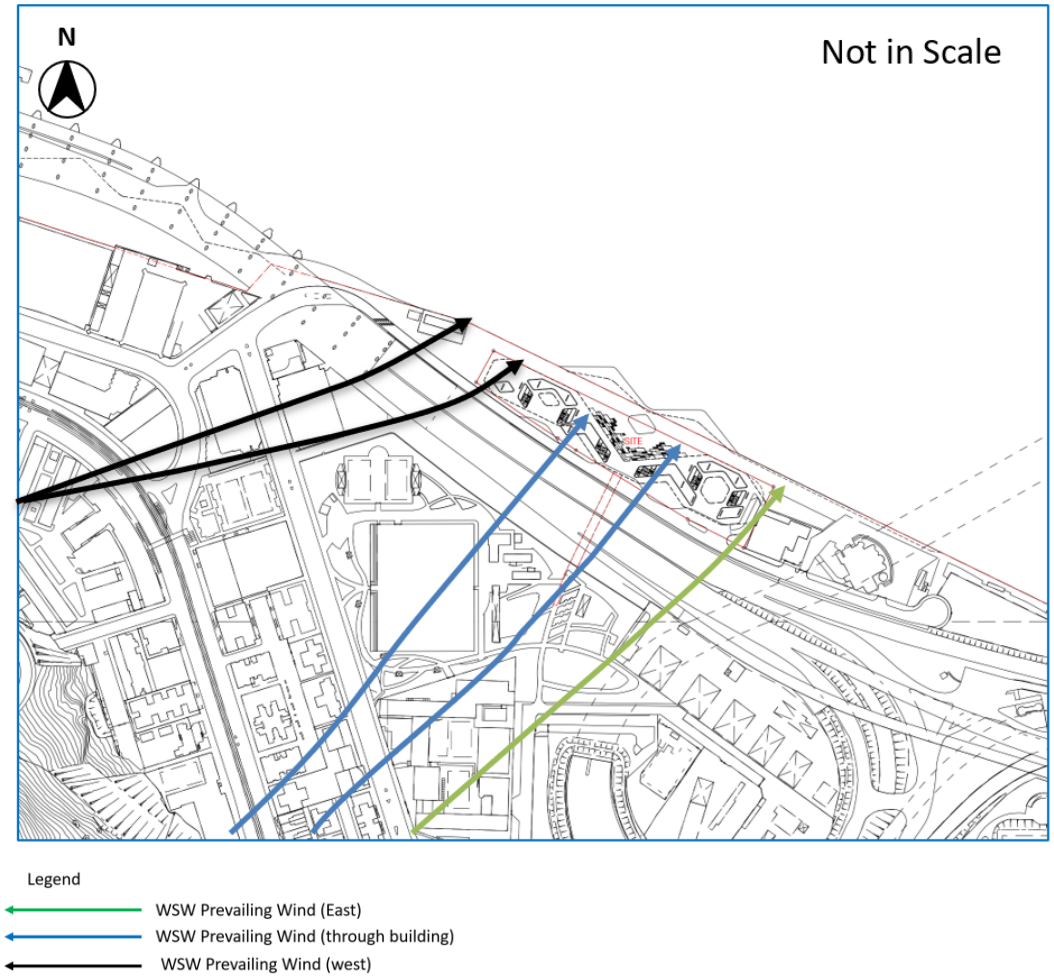
Proposed Development Scheme

2.5.41 Even though the wind performance for WSW wind is not as critical as other prevailing winds since there are no major development located downwind of the Application Site, the waterfront area will still be affected by the Proposed Development in terms of wind availability. The potential wind wake at the leeward side of the building reduces the amount of wind at pedestrian level shown in **Figure 2-20b.**

2.5.42 The proposed building height can reduce the shielding effect of the surrounding area. There are further set back at the podium at ground level which improve the wind availability at pedestrian level as more low-level wind can pass through compared to the previous scheme. The enlarged building separation up to 22m between the three towers allow additional WSW wind to penetrate into the Proposed Development (arrows)

2.5.43 Under the WSW wind conditions, there would also be no developments located downwind of the Application Site alike SW wind. Therefore, the blockage effect of the Proposed Development on the surrounding area should not be of significant concern in this case.

Figure 2-20b Wind Performance Under Wind Direction WSW (Proposed Development)



2.6 Conclusion

2.6.1 The majority of the annual prevailing wind is from the east and east-southeast and will reach the Application Site through the Victoria Harbour. The majority of the summer prevailing wind is from the southwest and will reach the Application Site through the open spaces of Quarry Bay Park Phase II, FEHD Transport Section Quarry Bay Depot and Island Eastern Corridor.

2.6.2 For the Base Case, i.e. the existing car park, there are no buildings within the car park and no impediment to air flow. There is full penetration of annual prevailing winds and summer prevailing winds and thereby full wind availability within the Application Site.

2.6.3 For the Approved Scheme, the five-tower layout also allows the annual prevailing winds from the east and northeast to penetrate much of the Proposed Development. However, annual winds to penetrate through the eastern portion of the Application Site is reduced due to a reduced building separation between the hotel tower on the furthest east and the eastern site boundary. There is now provision of four building separations situated in between each tower, each with a larger gap of 15m. A significant amount of annual winds will be able to penetrate all the way through the Proposed Development. Besides, there is an additional building separation on the west part of the Application Site with the industrial building removed. With more openings provided, the overall ventilation performance throughout the Application Site is improved as permeability is greatly enhanced. There are now more possibilities to allow winds to pass through at different directions, effectively creating more wind paths to also ventilate the areas downstream. The building setback from the centreline of Hoi Yu Street is 7.5m, which allows southerly and easterly winds to travel along the wind corridor to ventilate the Application Site.

2.6.4 For the Proposed Development Scheme, annual prevailing winds from the east and northeast are able to penetrate most of the Proposed Development due to the increase of building separation. The western and eastern side of the Proposed Development now have more building gap of 19.5 m and 15.5m approximately from both site boundary, which enhance more permeability compared to the Approved Scheme.

2.6.5 Under SW and WSW summer winds, even though the promenade area is expected to receive reduced wind flow at pedestrian level due to the wind wake effect caused by the Proposed Development, the open sea generally promotes high air ventilation performance in that area.

2.6.6 With more openings provided, the overall ventilation performance throughout the Proposed Development is improved as the permeability is enhanced. There are now more possibilities to allow winds to pass through at different directions under both annual and summer wind conditions, effectively creating more wind paths. This also reduces the potential impact on the developments in the downstream area and at pedestrian wind environment overall. The maximum building height remains similar level to 44mPD, which can still prevent the blockage effect the Proposed Development may have on the areas located downwind of the Site.

2.6.7 Compared to the Approved Scheme with to the Proposed Development Scheme with a three-tower layout provides greater wind availability within the Site and therefore better air flow and ventilation can be achieved. The three-tower layout also permits more wind to pass through the Site with more building separations and therefore reduces impacts to developments to the south (i.e. Quarry Bay Park Phase II, Eastern Harbour Centre, HK and China Gas Company Limited, etc.) of the Application Site.

3. CONCLUSION AND RECOMMENDATIONS

3.1.1 In this AVA-EE, the Application Site located at Hoi Yu Street in Quarry Bay has been evaluated. Three scenarios have been compared; a Base Case, which is the existing car park without any buildings; the Approved Scheme, which comprises a five-tower layout; and the Proposed Development Scheme, which comprises of a three tower layout.

3.1.2 Based on the analysis from the RAMS data, the annual and summer prevailing wind directions have been determined: E, ESE and ENE are the annual prevailing winds, whereas SW, WSW, ESE and E are the summer prevailing winds.

3.1.3 The Application Site is located along Victoria Harbour at an elevation of around 4m. The surrounding topography and urban morphology have been reviewed. Given the fact that the Application Site is located directly next to an open sea and the abundance of open space where the Site is situated in, the surrounding topography and urban morphology are unlikely to cause significant air ventilation problems towards the Application Site.

3.1.4 According to the wind availability under annual and summer prevailing winds, wind corridors have been identified. Given the fact that the Application Site is located in area of open space, these wind corridors are not as significant in ventilating the Application Site as they would be for a dense urban high-rise area.

3.1.5 For the Base Case, i.e. the existing car park, there are no buildings within the car park and no impediment to air flow. There is full penetration of annual prevailing winds and of the summer prevailing winds and thereby full wind availability within the Application Site under the Base Case.

3.1.6 For the Approved Scheme, the five-building layout allows the annual prevailing winds from the east and northeast to penetrate most of the eastern portion of the Application Site, however the layout blocks a significant portion of the north winds from reaching the southern part of the Application Site. A building separation of 15m between the four buildings that allows annual wind to pass through the Application Site and a setback of 7.5m from the centreline of Hoi Yu Street allows southerly and easterly winds to travel along the wind corridor to ventilate the Application Site.

3.1.7 The three-tower layout in the Proposed Development Scheme continues to facilitate penetration of annual prevailing winds (east, northeast) across the site, aided by consistent building heights that prevent excessive blockage effects. The building heights in the scheme gradually rise from +24.7mPD at the edges to +44mPD, with building separations of 3m to 23m widening breeze paths and avoiding the wall effects. These design strategies combine to enhance permeability and wind movement from both northern and southern directions, markedly improving ventilation at pedestrian level.

3.1.8 With the introduction of more openings, overall ventilation performance across the Application Site has improved significantly. The increased permeability allows winds to pass through from various directions, effectively creating additional wind paths for downstream ventilation.

3.1.9 As discussed in Section 1.5.12, an additional Alternative Scheme is also under consideration during the design phase. Under the alternative scheme, the central residential block will be removed and the building height will be slightly increased from 44mPD to 47mpD, however the slightly increased height would not cause any additional impact on ventilation, and the removal of the residential tower on top of central block would provide additional ventilation to the surrounding which enhance the overall ventilation performance.

3.1.10 Unlike a dense urban high rise area, given that the location of the Application Site is next to the open sea, the generally open nature of the surrounding environment and the numerous wind corridors, it is unlikely that the Proposed Development (either Approved Scheme or Proposed Development Scheme) will result in any adverse wind environment or lack of ventilation – with unobstructed access to the Harbour, the Application Site is considered to be well ventilated.

3.1.11 Having said that, compared to the Approved Scheme with a five-building layout, the Proposed Development Scheme with a three-tower layout provides additional wind availability within the Application Site and therefore even better air flow and ventilation can be achieved. The design of three-tower layout also permits more wind to pass through the Application Site due to the increased building separations and therefore reduces the impact on the developments downwind of the Application Site. On this basis, the Proposed Development Scheme is recommended in preference to the Approved Scheme in terms of downwind air ventilation.

3.1.12 This AVA-EE has not identified any problem areas within the Proposed Development Scheme that require further study. The wind penetration through the Application Site is generally good and no areas or locations of excessive wind or insufficient ventilation have been identified. No modifications to the design of the Proposed Development Scheme are needed as the three-tower design appears to perform acceptably in terms of air ventilation. Therefore, it can be concluded that the three good design features have contributed to less adverse wind impact on pedestrian level ventilation performance.

3.1.13 Had the Application Site been in a dense urban high rise area, Computational Fluid Dynamics (CFD) modelling would have been recommended to confirm the findings of the AVA-EE. However, given the location of the Application Site next to the Harbour and the generally open nature of the surrounding environment, it is considered not necessary to carry out CFD modelling – the conclusions of this AVA-EE are considered as robust and the results of any CFD modelling are unlikely to affect the conclusions of this AVA-EE.

3.1.14 However, should there be any significant design changes to the Proposed Development Scheme that could affect wind availability, then the AVA-EE should be carried out again, and supplemented with CFD modelling if required.

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