Agreement No. CE 80/2014 (CE)

Site Formation and Infrastructural Works for Eight Housing Sites in Ma On Shan - Feasibility Study

FINAL AIR VENTILATION ASSESSMENT (EXPERT EVALUATION) REPORT FOR SITES 3 TO 5 (UPDATED DEVELOPMENT PARAMETERS)

October 2019

(188563/B&V/082/Issue 1)

土木工程拓展署
Civil Engineering and Development Department

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1 INTRODUCTION

1.1 Project Background

1.1.1 Eight pieces of potential land have been identified by the Government as proposed housing sites for the housing development in Ma On Shan (MOS). All of the proposed housing sites are currently zoned as "Green Belt" on the approved Ma On Shan Outline Zoning Plan No. S/MOS/22 whilst amendments to the respective Outline Zoning Plan (OZP) are required to meet the relevant statutory town planning requirements for implementation of the developments. To facilitate the rezoning exercise, this Engineering Feasibility Study (EFS) under Agreement No. CE80/2014(CE) has been conducted for the proposed housing sites with the aim to review the technical feasibility for housing developments.

1.1.2 Black & Veatch Hong Kong Limited (B&V) was commissioned by the Civil Engineering and Development Department (CEDD) in April 2015 to investigate, evaluate and establish the engineering feasibility for public and private housing developments (Development) at eight housing sites (Housing Sites) in Ma On Shan (hereinafter referred as the Project).

1.2 Description and Need of the Project

1.2.1 The proposed housing development under this feasibility study comprises public and private housing sites at various locations in MOS. Amongst them, four pieces of land (i.e. Sites 1 to 4) are for public housing whilst one piece of land (i.e. Site 5) will be for a primary school. In addition, the remaining sites (i.e. Sites A, C and D) are for a private housing development.

1.2.2 The proposed site formation and infrastructure works for the Project to support the housing development in Ma On Shan comprise the followings:

a) Site formation works, including slope cutting and earth filling works, as well as geotechnical works, earth retaining structures and natural terrain hazard mitigation measures;

b) Road works (including construction of new roads, footpaths, improvement and upgrading of existing roads, provision of new junction etc.);

c) Drainage and sewerage infrastructures;

d) Environmental mitigation measures;

e) Other infrastructural works including water supply and utility services connections (by respective agencies or utility undertakings); and

f) Natural Terrain Hazards Mitigation Measures.

1.2.3 To meet the soaring demand for public housing units, the Government recommended in the Long Term Housing Strategy (LTHS) Annual Progress Report 2018 that the development intensity of public housing sites can be enhanced for ongoing projects, if such increase in development intensity is technically feasible. In view of this, the technical assessment has taken into account the latest development parameters by adopting a higher domestic plot ratio for the public housing Sites 1 and 2.

1.2.4 The proposed Housing Sites 3 & 4 are located at the northwest of Ma On Shan Country

Park, along Ma On Shan Tsuen Road and close to Ma On Shan Bypass. Site 5 is located at the southwest of Sites 3 & 4. The location plan of Sites 3 & 4 and Site 5 is shown in **Figure 1.1**. The conceptual building block layout plan is shown in **Figure 1.2**, which is developed from the latest development parameters available at this stage and are provided in the following table:

		Sites 3&4	**Site 5**
Gross Site Area (ha) (About)		2.26	0.73
Net Site Area (ha) (About)		Same as Gross Site Area	0.62
Plot Ratio (1)	**Domestic**	6.5	-
	Non-Domestic (Retail)	0.2	-
	Non-Domestic (Kindergarten)	0.06	---
	Non-Domestic (Carpark)	0.5 (SSF) 0.4 (PRH)	-
Gross Floor Area (m^2)	**Non-Domestic (Retail)**	4,520	-
	Non-Domestic (Kindergarten)	1,360	---
	Non-Domestic (Welfare/Community)	14,460	-
	Non-Domestic (Carpark)	11,300 (SSF) 9,000 (PRH)	-
Maximum Building Height (mPD) (about)		+223	+102 (Assumed)

Note:
(1) Welfare/Community facilities and carpark within Sites 3&4 are exempted from Plot Ratio/ Gross Floor Area calculation.
(2) The development parameters are subject to review at detailed design stage.

1.2.5 The performance of air ventilation for Sites 3 & 4 and Site 5 will be addressed in this report whilst the other sites will be addressed in separate reports. Sites 3, 4 & 5 are close to Ma On Shan Bypass, which is located at the northwest of the Subject Site. Yiu On Estate is located at the opposite side of Ma On Shan Bypass, which is at the northwest of the Subject Site. Kam Ying Court is located at the north of the Subject Site. Heng On Estate is located at the west of the Subject Site. And Ma On Shan Country Park is located at the northeast to the south of the Subject Site. There is an existing local access road serving Ma On Shan Tsuen and crossing Sites 3, 4 & 5. This local access road is proposed to be upgraded and a roundabout is proposed between Sites 3 & 4 and Site 5.

1.3 Objective of the Air Ventilation Assessment (Expert Evaluation)

1.3.1 The key purposes of the Expert Evaluation are

- to identify the good design features of the proposed development;
- to identify obvious problematic areas;
- to propose appropriate mitigation measures; and
- To recommend whether further Initial Study or Detailed Study is required based on the findings of this Expert Evaluation.

1.4 Subject Site and its Environs

1.4.1 **Figure 1.1** shows the location of Sites 3 & 4, Site 5 and its environs. The sites are located over 150m away from any nearby high-rise building.

Sites 3 & 4

1.4.2 As shown in **Figure 1.1**, the site formation area is currently undeveloped. With reference to the latest approved Ma On Shan Outline Zoning Plan (OZP) No. S/MOS/22, the site area is now zoned as Green Belt (GB). To the immediate northeast to south of Sites 3 & 4 is Ma On Shan Country Park. To the immediate west to north is Ma On Shan Tsuen Road and Ma On Shan Bypass. To the immediate southwest of Sites 3 & 4 is Site 5, which is currently zoned as GB. Other residential developments (e.g. Yiu On Estate, Park Belvedere and Kam Ying Court, etc.), Ma On Shan Fire Station and an area zoned as GB are located at the opposite side of Ma On Shan Bypass.

1.4.3 Ma On Shan Tsuen Road is the existing local access road serving Ma On Shan Tsuen and crossing Sites 3 & 4. This local access road is proposed to be upgraded and a roundabout is proposed between Sites 3 & 4 and Site 5. Entrance of Sites 3 & 4 will be at the proposed roundabout.

Site 5

1.4.4 As shown in **Figure 1.1**, Site 5 is located close to Ma On Shan Bypass. Site 5 is located at the southwest of Sites 3 & 4.

1.4.5 Currently, the site area is undeveloped. With reference to the latest approved Ma On Shan Outline Zoning Plan (OZP) No. S/MOS/22, the site area is zoned as Green Belt (GB). To the immediate east to south of Site 5 is Ma On Shan Country Park. Site 5 is located to the southeast of Park Belvedere and Yiu On Estate and the northeast of Heng On Estate. Ma On Shan Tsuen Road is the existing local access road serving Ma On Shan Tsuen and crossing Site 5. This local access road is proposed to be upgraded and a roundabout is proposed.

1.5 Proposed Development

1.5.1 The master layout plans of Sites 3 & 4 and Site 5 is shown in **Figure 1.2**.

Sites 3 & 4

1.5.2 Sites 3 & 4 will consist of three residential blocks with proposed building height at +211mPD (Block 1), +223mPD (Block 2) and +199mPD (Block 3). The platform level of Sites 3 & 4 will be around +75mPD to +81mPD. Several non-domestic blocks (around +84mPD to +98mPD) would be standing at the north-western part of Sites 3 & 4. Moreover, there will be a podium carpark at Sites 3 & 4.

1.5.3 Under the current layout, 15m building separations are allowed between (**Figure 1.2**):

- Block 1 and 2 along ENE to WSW direction;
- Block 3 and the proposed non-domestic block along ENE to WSW direction;
- Block 1 and the proposed non-domestic block along SSE to NNW direction; and
- Block 2 and 3 along SSE to NNW direction.

Site 5

1.5.4 Site 5 will be developed by Education Bureau for educational use. The platform of Site 5 will be at +77mPD. The height of the proposed school will be 35m at maximum (around +102mPD) and in L-shape. According to the preliminary design of the proposed school, an open space will be located to the south of the proposed school within Site 5.

1.6 Subject Constraints

1.6.1 Ma On Shan Bypass runs along the north-western side of Sites 3 & 4. Due to close proximity to Ma On Shan Bypass, it is anticipated that Sites 3 & 4 would be subject to high traffic noise.

1.6.2 In order to minimize the road traffic noise impact, the current indicative layout of the residential blocks of Sites 3 & 4 would set back (around 54m) from Ma On Shan Bypass for assessment at Engineering Feasibility Study (EFS) stage. Increasing buffer distance between the noise source and the residential blocks of Sites 3 & 4 for reducing the noise impact to the residential units.

2 SITE WIND AVAILABLILTY

2.1 Site Wind Availability Data

2.1.1 Expert evaluation is not a detailed study of air ventilation performance. It is therefore considered acceptable to use the Regional Atmospheric Modelling System (RAMS) data for Site Wind Availability initially as a starting point. Based on the RAMS data for the grid (093,064) extracted from the Site Wind Availability Data of Planning Department's web, where Sites3, 4 and 5 are located.

2.1.2 **Figure 2.1** shows the relevant windrose diagrams representing the frequency and wind speed distribution at 200m and 500m height of the district concerned during the annual condition and summer condition (Jun – Aug). Based on the windrose, the 500m wind data is representative of the wind characteristics giving a good indication of the free wind at the Subject Site. The 200m site wind availability data represents wind data that takes into account the topographical effect around the Subject Site. Therefore, a lower level of windrose at 200m height is selected to study the prevailing wind condition as it represents the incoming wind to the Subject Site and considers the influence on the prevailing winds by the surrounding topography.

2.1.3 According to the wind data at 200m altitude, the annual prevailing wind directions for the sites are from NE, ENE, E and ESE; where summer prevailing wind directions are from E, SSW and SW. The wind frequency data under the annual and summer condition is shown in **Table 2.1** below.

Table 2.1 Summary of RAMS Data and Wind Direction under Annual and Summer Condition

Wind Direction	Probability for Annual Condition	Probability for Summer Condition
N	1.2%	0.6%
NNE	4.2%	1.3%
NE	**17.1%**	2.6%
ENE	**13.0%**	4.8%
E	**19.5%**	**10.8%**
ESE	**10.3%**	8.0%
SE	4.3%	6.2%
SSE	3.9%	8.6%
S	3.9%	8.4%
SSW	5.7%	**12.9%**
SW	8.2%	**20.2%**
WSW	3.0%	6.6%
W	2.1%	4.2%
WNW	1.5%	2.5%
NW	1.1%	1.4%
NNW	1.0%	0.9%

Note: **Bold** characters with the highlight in grey represent the selected prevailing wind directions for evaluation

2.1.4 With reference to the Final Report – Ma On Shan Area for Cat. A1 – Term Consultancy for Expert Evaluation and Advisory Services on Air Ventilation Assessment (PLNQ 37/2007) (AVA Report for Ma On Shan Area) prepared by Department of Architecture, and Chinese University of Hong Kong, Sites 3 & 4 and Site 5 are located close to the Location B mentioned in the "AVA Report for Ma On Shan Area". The 450m wind data is representative of the wind characteristics of the free wind at the Subject Site while the 120m wind data represents wind data that takes into account the topographical effect around the Subject Site. Therefore, the wind data at 120m at Location B has been referred and adopted for the current study. As shown by the windroses for the annual and summer periods in **Figure 2.2**, the NNE, NE and ENE winds are the dominant wind directions in the year, and SSE, SSW and SW are the dominant wind directions during summer period.

2.1.5 After reviewing the wind data from RAMS and AVA Report for Ma On Shan Area (120m wind data), it is concluded that the annual winds mainly come from NNE, NE, ENE, E and ESE directions. During the summer period, the winds from E, SSE, SSW and SW are the dominant wind directions.

2.2 Topography and Building Morphology

2.2.1 **Figure 2.3** and **Figure 2.4** show the topography and building morphology of the area under concern.

Topography

2.2.2 The waterfront is located at about 1200m away from Sites 3 & 4 and Site 5 in the north and northwest direction. The topography near the waterfront is generally flat. The ground elevation of the three sites is about 70mPD and increases gradually towards eastern and south eastern sides.

2.2.3 Ma On Shan Country Park occupies the northeast to the southwest area of Sites 3 & 4 and Site 5. The Tiu Shau Ngam and Hunch Backs (Ngau Ngak Shan) are located about 1km and 1.2km to the south-east side of the proposed sites with hill top at around +589mPD and +676mPD levels respectively. Given the large distance between the sites and the hilly terrain, the sheltering effect on the SE to S winds by the hill would not be significant. Therefore, the wind flow pattern at the sites would only be slightly influenced by the surrounding topography.

2.2.4 For the wind from E, ESE and SSE directions, wind availability would be slightly influenced by the Tiu Shau Ngam and Hunch Backs (Ngau Ngak Shan). Wind from E, ESE and SSE directions will be slowed and weakened by shielding effects of the hill before arriving at the Subject Site. For NNE, NE and ENE winds, open space is located at upwind areas which act as wind entrance for the Subject Site. Since the surrounding developments are located at further north-east side, the NNE, NE and ENE wind reach to the Subject Site. For SW and SSW wind during the summer period, the Subject Site and its downstream areas including Shun Yee San Tsuen are currently unobstructed and wind availability from these directions is considered as optimal.

Building Morphology

2.2.5 Sites 3&4 and Site 5 are sitting inside green belt area under the approved MOS OZP

No. S/MOS/22. As shown in **Figure 2.4**, the surrounding developments are a cluster of village houses (i.e. Shun Yee San Tsuen) and a cluster of high-rise residential development such as Kam Ying Court, Park Belvedere, Yiu On Estate and Heng On Estate etc. As the mentioned developments are located at about 400m away from Sites 3 & 4 and Site 5 in the N and NW directions, therefore potential building blockage of wind is considered noticeable. The surrounding developments will obstruct the penetration of prevailing NE wind in the upwind side. However, it is anticipated that Ma On Shan Bypass along the building cluster forms a major air corridor of the district area under annual condition.

2.2.6 High-rise residential development are identified on the southwest to northwest of the sites, which includes Yan On Estate, Yan On Estate Extension, Planned public housing developments at Hang Kin Street and along Ma On Shan Road, Ocean View, La Costa, Sausalito, Vista Paradiso, Chung On Estate, Kam Fung Court, Monte Vista, Lake Silver, Lee On Estate and Kam Lung Court etc. **Figure 2.3** indicates the topography feature of the Subject Site and its surrounding developments.

2.2.7 The high-rise residential developments (Park Belvedere, Yiu On Estate and Heng On Estate) located close to Sites 3 & 4 and Site 5 in W to NW direction would slightly obstruct the incoming wind from NW. As Kam Ying Court is located close to Sites 3 & 4 and Site 5 in N direction, it would reduce the wind flow to the Subject Site. Furthermore, it is observed that noise barriers (around 2 to 5m in height) are located along Ma On Shan Bypass and the Ma On Shan Line (as indicated in **Figure 2.4**). They would slightly obstruct the incoming wind and would possibly induce small wind shadow regions at the nearby residential development.

2.2.8 The building height and location of the surrounding developments from two sites are tabulated in**Table 2.2** and illustrated in **Figure 2.4**. It is noted that Kam Ying Court, Park Belvedere and Yiu on Estate are located close to the proposed sites.

Table 2.2 Building Height of Existing and Future Neighbouring Development

Name of Development	Building Height	Location from Sites 3 & 4	Location from Site 5
Lake Silver	~160 to ~183mPD	NE	NE
Wu Kai Sha Village	~18 to 27mPD	NE	NE
Lee On Estate	~117 to 130mPD	NE	NE
Monte Vista	~110mPD	NE	NE
Kam Lung Court	~119mPD	NE	NE
Villa Athena	~104 to 111mPD	N	NNE
Saddle Ridge Garden	~123 to 137mPD	NNE	NNE
Kam Ying Court	~155 to 157mPD	N	NNE
Villa Oceania	~56mPD	NNW	N
Ma On Shan Centre	~93 to 124mPD	NNW	N
Fuk Fai Garden	~88 to 103mPD	NNW	N
Bayshore Towers	~98 to 109mPD	NW	NNW
Tolo Place	~100 to 113mPD	NW	NNW
Sunshine City	~102 to 143mPD	NW	NNW
Park Belvedere	~128 to 131mPD	NNW	N
Fuk On Garden	~100mPD	NW	NW
Marbella	~108mPD	NW	NW

Name of Development	Building Height	Location from Sites 3 & 4	Location from Site 5
The Waterside	~130mPD	NW	NW
Kam Fung Court	~115mPD	WNW	NW
Chung On Estate	~108mPD	WNW	NW
Kam Hay Court	~104mPD	NW	NW
Yiu On Estate	~106 to 113mPD	WNW	NW
Vista Paradiso	~86 to 106mPD	W	WNW
Baycrest	~79mPD	W	W
Kam On Court	~106mPD	WSW	W
Heng On Estate	~106mPD	WSW	W
Oceanaire	~20 to 80mPD	SW	SW
Ocean View	~99mPD	SW	SW
La Costa	~98mPD	SW	SW
Sausalito	~90mPD	SW	SW
Yan On Estate and Yan On Estate Extension	~120mPD to Max. 140mPD	SW	SW
Planned public housing developments at Hang Kin Street	Max. 120mPD	SW	SW
Planned public housing developments along Ma On Shan Road	Max. 140mPD	NW	NW
Private residential developments along Hang Kwong Street	~60mPD	NW	NW
Private residential developments along Ma Kam Street	Max. 90mPD	N	N
Commercial development along Po Tai Street	Max. 30mPD	SW	SW
Shun Yee San Tsuen	~30 to 40mPD	NE	NE

2.3 Summary of Site Wind Availability

2.3.1 **Figure 2.3** and **Figure 2.4** indicate the pedestrian wind flows and the future development under annual and summer conditions in the concerned area.

Annual Condition

2.3.2 As mentioned in **Section 2.1**, the annual prevailing winds come from the NNE, NE, ENE, E and ESE.

2.3.3 Due to the blockage from the hilly terrain of Ngau Ngak Shan located at the northeast of Sites 3 & 4 and Site 5, the ENE prevailing wind is weakened before reaching the sites. Ma On Shan Bypass and Ma On Shan Tsuen Road are generally aligned in NE to SW direction, it is expected that NNE and NE prevailing winds would flow along these roads. In addition, considering that the entire strip of land along the foot of the

mountain is open, the prevailing wind will not only flow along Ma On Shan Bypass and Ma On Shan Tsuen Road, but also the entire open area adjacent to the roads. Therefore, wind could still reach and penetrate the subject sites under existing condition.

2.3.4 However, for NNE wind, the northeast portion of Sites 3 & 4 is located at downwind side of Kam Ying Court, under the shelter effect created by Kam Ying Court and Saddle Ridge Garden, NNE winds would be weakened before reaching northeast portion of Sites 3 & 4. Meanwhile, southern portion Sites 3 & 4 and Site 5 are facing the open space between Kam Ying Court and Park Belvedere, which act as free entrance for NNE wind to free penetrate through and reach southern portion Sites 3 & 4 and Site 5 towards Ma On Shan Country Park.

2.3.5 Open space located at north-east side of Sites 3 & 4 would act as wind entrance for the Subject Site, with Ma On Shan Bypass and Ma on Shan Tsuen Road as wind corridor, the NE prevailing winds can approach freely towards Sites 3 & 4 and reach Site 5 and downwind areas including Heng On Estate, Yan On Estate, Yan On Estate Extension and Public housing Development along Ma On Shan Road.

2.3.6 Under E and ESE wind conditions, Hunch Backs located at the upwind side of Sites 3 & 4 and Site 5 would shelter the approaching wind. In considering the long distance between the Hunch Backs and the Subject Sites, it is anticipated that the weakened prevailing wind can still arrive the Subject Sites and flows to its surrounding areas such as Yiu On Estate, Heng On Estate and Kam Hay Court. Because the existing condition of the Subject Sites is open spaces, the incoming wind is expected to penetrate across the Subject Sites and to flow freely towards its downstream areas such as Yiu On Estate, Heng On Estate and Kam Hay Court. The wind environment at the sites under E and ESE directions are expected to be satisfactory.

Summer Condition

2.3.7 Apart from E wind direction, the summer prevailing winds also come from SSE, SSW and SW wind directions.

2.3.8 Under SSE and SSW winds, due to the high hilly terrain at the south-east and south-west of the Subject Site, it is expected that the prevailing winds would be weakened before reaching the Subject Site. The SSE and SSW winds would penetrate through the subject sites under the existing condition.

2.3.9 Under SW wind, the existing high-rise residential buildings (Yan On Estate, Yan On Estate Extension, Heng On Estate and the further La Costa, Ocean View and Oceanaire) may obstruct the incoming SW and SSW wind. On the other hand, Ma On Shan Bypass which generally aligns in parallel to the NE - SW direction would act as a potential air path. The SW incoming wind is expected to flow along Ma On Shan Bypass and arrive the Subject Site and its surrounding areas. Thus, it is anticipated that the wind would still be able to reach the Subject Site and its downstream areas such as Kam Ying Court and Shun Yee San Tsuen.

2.3.10 To sum up, due to the nearby building clusters from south west to north and high topography from northeast to southwest, blockage and sheltering effect on the prevailing winds are anticipated. Ma On Shan Bypass and Ma On Shan Tsuen Road are

considered as the major air corridors which can promote the ventilation performance of surrounding areas under annual NNE, NE and summer SSW and SW conditions. In addition, considering that the entire strip of land along the foot of the mountain is open, the prevailing wind will not only flow along Ma On Shan Bypass and Ma On Shan Tsuen Road, but also the entire open area adjacent to the roads. Therefore, wind could still reach and penetrate the subject sites under existing condition.

3 EXPERT EVALUATION OF AIR VENTILATION PERFORMANCE OF THE PROPOSED DEVELOPMENT

3.1 Assessment Methodology

3.1.1 **Section 2** describes the site wind availability at the Subject Sites and the prevailing annual and summer wind conditions. It is noted that the annual prevailing wind are from NNE, NE, ENE, E and ESE directions; where summer prevailing winds are from E, SSE, SW and SSW directions. The proposed building design of Subject Site has been evaluated against the dominant wind directions identified, i.e. northeast portion, east portion, southeast portion and southwest portion.

3.2 Wind Flow from Northeast Portion

3.2.1 **Figure 3.1** to **Figure 3.3** illustrate the winds flowing from NNE to NE wind directions respectively.

NNE wind

3.2.2 The open space at the northern portion of Sites 3 & 4 is located at wake region by Kam Ying Court, NNE winds would be weakened before flowing to Sites 3 & 4. The open space between Kam Ying Court and Park Belvedere would act as free entrance for NNE wind to free penetrate through and reach south-western portion of Sites 3 & 4 and Site 5 then towards Ma On Shan Country Park.

3.2.3 Since high-rise residential building blocks are proposed in Sites 3 & 4, the proposed building blocks at Sites 3 & 4 would obstruct the NNE prevailing wind from reaching Site 5 and its surrounding areas leading to a decline of wind environment at surrounding areas. As the downstream area of the Subject Sites is not frequently visited by the public, the potential impact of the Subject Sites is insignificant in this scenario.

NE wind

3.2.4 Ma On Shan Bypass and Ma On Shan Tsuen Road are generally aligned in NE to SW direction. They allow wind penetration at north and northeast part of the Subject Sites under NE wind. The open space located at north-east side of Sites 3 & 4 would act as wind entrance which allows the NE prevailing wind to arrive Sites 3 & 4.

3.2.5 Similar to NNE wind condition, the proposed building blocks at Sites 3 & 4 would partially block the NE prevailing wind from reaching Site 5 and its surrounding areas. It is expected to have decline of wind environment at downstream areas such as Heng On Estate and Yan On Estate. However, various building gaps are incorporated in the design of the proposed development at Sites 3 & 4, which would allow wind penetration. The building orientation of blocks would be able to capture the high-level NE wind reaching the pedestrian level, which reduces the extent of air ventilation impact.

3.2.6 As shown in **Figure 1.2,** there is a 15m building separation along ENE to WSW wind direction between Block 1 and Block 2. It allows NE wind to penetrate through and reach the proposed garden inside Sites 3 & 4, Site 5 and the downstream areas

including Yan On Estate and Yan On Estate Extension.

3.2.7 Since a low-rise school is proposed in Site 5, the NE prevailing wind would flow atop the school towards to its downstream area. In addition, there are some open spaces along the site boundary of Site 5, it is anticipated that the proposed school would not have significant impact on the penetration of NE Wind. Moreover, over Ma On Shan Bypass would allow NE wind penetration to the surroundings.

ENE Wind

3.2.8 For Sites 3 & 4, similar to NE wind, the ENE prevailing wind would be sheltered by the proposed development at Sites 3 & 4. It is expected to have decline of wind environment at downstream areas such as Heng On Estate and Yiu On Estate. Since there are building separation of 15m between block 1 and block 2 and building separation of 15m between the proposed non-domestic block and Block 3 in Sites 3 & 4, they would channel the ENE prevailing wind to pass through the proposed buildings and reach its surrounding areas. Moreover, the low-rise non-domestic block (around +98mPD) in Sites 3 & 4 also allows ENE wind to flow atop the building towards the downstream areas including Heng On Estate. On the contrary, the school at Site 5 is located in the immediate downstream of the proposed housing development at Sites 3 & 4 under ENE wind. Wind availability at Site 5 will be affected.

3.2.9 For Site 5, as there is a proposed low-rise school in Site 5, slightly lower wind availability is anticipated when compared with the existing condition. Moreover, the potential impact of the L-shape school on the open space would affect the wind flow to the surroundings. **Figure 3.3** illustrates the wind flowing from ENE wind direction.

3.3 Wind Flow from East Portion

3.3.1 Both annual and summer prevailing winds include the wind from east. **Figure 3.4** illustrates the wind flows of E wind.

E wind

3.3.2 Under E wind condition, the proposed development at Sites 3 & 4 is expected to block the incoming wind. It is expected that the surrounding developments, such as Yiu On Estate, Heng on Estate and Kam On Court, would experience lower wind availability in comparison with the existing ventilation condition. However, as those surrounding developments are far from Sites 3 & 4, it is expected that the potential impact will not be significant. Furthermore, high building height (around +199mPD to +223mPD) of the proposed development at Sites 3 & 4 is expected to have downwash effect which would induce the upper wind down to the pedestrian level at open space near north-eastern site boundary of Sites 3 & 4. Therefore, it is expected that the proposed development at Sites 3 & 4 would not have any significant impact on the surrounding areas.

3.3.3 For Site 5, it is expected that the proposed school would induce a small wind shadow and resulting a slightly reduced ventilation performance in a localised area. The proposed school is a low-rise structure which enables E prevailing wind to flow atop the building then towards the downstream areas such as Yiu On Estate, Kam Hay

Court and Heng On Estate. Thus, it is expected that the ventilation impact on its surrounding is minimal. However, there may be potential impact of Sites 3 & 4 on Site 5 where is in the immediate wake region of the proposed development of Sites 3 & 4 under E wind.

3.4 Wind Flow from Southeast Portion

3.4.1 **Figure 3.5** and **Figure 3.6** illustrate the winds flowing from ESE and SSE directions respectively.

3.4.2 As mentioned in **Section 2.3**, under ESE and SSE winds, Ma On Shan Country Park would obstruct some of the ESE and SSE winds from reaching the Subject Sites, it is expected that these prevailing winds are weakened.

ESE Wind

3.4.3 Under the prevailing ESE wind, the proposed development would create a wind shadow at leeward region, hence wind availability of downstream areas such as Park Belvedere is considered slightly lowered. However, as those surrounding developments are far from Sites 3 & 4, it is expected that the potential impact will not be significant. Also, the high building height (around +199mPD to +223mPD) of the proposed development in Sites 3 & 4 is expected to have downwash effect located at Block 2 and Block 3 which convey to upper wind down to the pedestrian level at the open space near southern site boundary of Sites 3 & 4 and then flow to its surrounding areas. In addition, the ESE wind would flow through the building separation between Sites 3 & 4 and Site 5, and reach Yiu On Estate. Moreover, as those surrounding developments are far from Sites 3 & 4, it is expected that the potential impact will not be significant. Therefore, it is anticipated that unfavourable impact in terms of wind environment is expected to be minimal.

3.4.4 For Site 5, it is expected that the low-rise proposed school would only induce a small wind shadow in a localized region. As open area located near the north-east side of Site 5, the ESE wind would penetrate the Subject Site and further flow to the surroundings. The low-rise proposed school allows wind penetration at high level. In addition, there are large open space on the west of Site 5, it is expected that the ventilation impact on its surrounding is minimal.

SSE Wind

3.4.5 Under the prevailing SSE wind, the downstream areas include Park Belvedere and Sunshine City. The proposed development would shelter the incoming wind and induce localized air ventilation impact. The wind availability of downstream areas is considered slightly lowered. However, as those surrounding developments are far from Sites 3 & 4, it is expected that the potential impact will not be significant. Similar to ESE wind condition, the proposed development in Sites 3 & 4 is expected to have downwash effect located at Block 2 and Block 3 which convey the upper wind down to the pedestrian level near south-eastern site boundary of Sites 3 & 4 and its surrounding areas. Therefore, it is expected that the ventilation impact on its surrounding is minimal.

3.4.6 In addition, there is a 15m building separation along SSE to NNW wind direction between Block 2 and Block 3 which allows some portion of SSE wind flow through the proposed garden inside Sites 3 & 4 and reach Park Belvedere. Thus, the unfavourable impact in terms of wind environment at the downstream areas including Yiu On Estate and Park Belvedere is expected to be minimal.

3.4.7 For Site 5, similar to ESE wind, a small wind shadow is created by the proposed school. The low-rise proposed school with large open space on the west of Site 5 and the low-rise proposed school allows wind penetration at high level. Therefore, these would minimise the air ventilation impact on the leeward region including Park Belvedere, Yiu On Estate, etc.

3.5 Wind Flow from Southwest Portion

3.5.1 **Figure 3.7** and **Figure 3.8** illustrate the winds flowing from SSW and SW directions respectively.

3.5.2 As mentioned in **Section 2.3**, Ma On Shan Country Park would obstruct some of the SSW wind from reaching the Subject Sites, it is expected that the prevailing SSW wind is weakened.

SSW Wind

3.5.3 Since Ma On Shan Country Park is located at the upstream region, this hilly terrain would obstruct the SSW winds from reaching the Subject Sites, the wind performance of the Subject Site and its downstream areas such as Shun Yee San Tsuen would slightly be reduced under the SSW wind condition. As there is the setback from Ma On Shan Bypass, it is expected that the wind performance on the other side of Ma On Shan Bypass would not be worsen by the proposed buildings. More portion of SSW prevailing wind would flow along the Ma On Shan Bypass and reach the surrounding residential areas. On the contrary, the proposed development would partially block some prevailing SSW wind from flowing to leeward areas such as Shun Yee San Tsuen. Thus, the potential impact on the Shun Yee San Tsuen is anticipated.

3.5.4 For Site 5, it is expected that the proposed school would partially block the incoming SSW wind and slightly reduce ventilation performance at Sites 3 & 4. Since the proposed school is a low-rise structure and the stepped height profile of Site 5 and Block 2 and 3 of Sites 3 & 4 could have downwash effect which convey the upper wind down to the pedestrian level of the area between Block 3 and the proposed school. Also, the SSW prevailing wind could flow atop the proposed school towards the downstream areas such as Park Belvedere and significant impact is not anticipated.

SW Wind

3.5.5 As mentioned in **Section 2.3**, Ma On Shan Bypass is generally aligned in parallel to the NE - SW direction, which would act as a summer air path. The SW incoming wind would flow along Ma On Shan Bypass, it is expected that the wind performance on the other side of Ma On Shan Bypass (such as Park Belvedere, Yiu On Estate and Kam Ying Court) would not be worsen by the proposed buildings. The SW incoming wind

penetrates the Subject Site through setbacks from Ma On Shan Bypass and Ma On Shan Tsuen Road and the proposed building gaps (between the proposed non-domestic block & Block 3, and Block 1 & Block 2) to the surrounding areas (such as Shun Yee San Tsuen and Kam Ying Court). Thus, it is anticipated that the ventilation performance of the surrounding areas would not experience any significant impact.

3.5.6 In addition, Ma On Shan Bypass and the adjacent open area would facilitate the wind to flow towards the downstream areas such as Kam Ying Court. It is favourable for winds penetration and maintaining the air ventilation performance. As such, unfavourable impact in terms of wind environment is expected to be minimal.

3.5.7 For Site 5, it is expected that the proposed school would only induce a small wind shadow and resulting a slightly reduced ventilation performance. As the proposed school is a low-rise structure and the stepped height profile of Site 5 and Block 3 of Site 3 and Site 4 could result in some downwashed wind to reach the pedestrian level of the area between Block 3 and the proposed school. Also the incoming wind would flow atop the building towards the downstream areas including Sites 3 & 4. Thus, it is expected that the ventilation impact to its surrounding would be minimal.

3.6 Summary of Air Ventilation Performance

3.6.1 There is no high building structure in the existing condition of the Subject Site. It is expected that the new high-rise development would obstruct wind to flow towards the downwind areas. Under the annual NNE to ENE wind conditions, the proposed development would not cause significant air ventilation impact to the downstream areas. However, as the proposed school at Site 5 is located in the immediate downstream area of the proposed housing development at Sites 3 & 4 under ENE wind, wind availability at Site 5 will be affected. With the 15m building separation between Block 1 and Block 2, it is expected that the pedestrian wind comfort would be enhanced.

3.6.2 Under annual and summer E wind condition, the proposed development would induce blockage on the incoming E winds towards the downstream areas such as Yiu On Estate, Heng On Estate and Kam On Court. However, as those surrounding developments are far from Sites 3 & 4, it is expected that the potential impact will not be significant. Thus, it is expected that the ventilation impact on its surrounding is minimal. However, there may be potential impact of Sites 3 & 4 on Site 5 where is in the immediate wake region of the proposed development of Sites 3 & 4 under E wind.

3.6.3 Under annual ESE and summer SSE wind direction, the leeward areas include Park Belvedere, Yiu On Estate and Sunshine City. It is expected that the high-rise of proposed development would induce minimal wind blockage impact to the downstream areas as those surrounding developments are far from Sites 3 & 4. Under SSE wind, there is a 15m building separation along SSE to NNW wind direction between Block 2 and Block 3. More portion of SSE wind flow through the proposed garden inside Sites 3 & 4, and reach Park Belvedere.

3.6.4 While under summer SW and SSW wind condition, the prevailing winds would flow along Ma On Shan Bypass, it is expected that the wind performance on the other side of Ma On Shan Bypass (such as Park Belvedere, Yiu On Estate and Kam Ying Court)

would not be worsen by the proposed buildings. On the contrary, the proposed development would partially block some prevailing SSW wind from flowing to leeward areas such as Shun Yee San Tsuen. Thus, the potential impact on the Shun Yee San Tsuen is anticipated. However, there is a 15m building separation along ENE to WSW wind direction between Block 1 and Block 2. For the SW incoming wind, it is expected that it can penetrate the Subject Site through setbacks from Ma On Shan Bypass and Ma On Shan Tsuen Road and the proposed building gaps (between the proposed non-domestic block & Block 3, and Block 1 & Block 2) to the surrounding areas (such as Shun Yee San Tsuen and Kam Ying Court). Thus, it is anticipated that the ventilation performance of the surrounding areas would not experience any significant impact.

3.7 Building Design Features

3.7.1 The proposed block layout is illustrated in **Figure 1.2.** The proposed design has adopted the following good design features:

A. Building separation of 15m wide, aligning in approximately ENE to WSW direction is incorporated between Block 1 and Block 2, which would facilitate wind penetration mainly from NE, ENE and SW winds and benefit its downstream areas such as Heng On Estate, Kam On Court, Kam Ying Court and Shun Yee San Tsuen;

B. Building separation of 15m wide, aligning in approximately SSE to NNW direction is incorporated between Block 2 and Block 3 at Sites 3 & 4, which would facilitate wind penetration mainly from SSE winds and benefit within Subject Site;

C. Building separation of about 45m between the non-domestic block at Site 5 from the closest domestic block (Block 3 of Sites 3 and 4); and

D. Building setback (around 54m) from site boundary along Ma On Shan Bypass.

3.8 Further Recommended Design Principles for Scheme Optimization

3.8.1 As discussed in the above section, mitigation measures would be adopted in the proposed development in order to enhance air ventilation to surrounding areas. These mitigation measures are essential in enhancing the wind flow nearby and in the surrounding area effectively. Further recommended design principles for consideration at the detailed design stage to facilitate wind penetration are as follow:

- Building Permeability with reference to PNAP APP-152;
- Minimisation of podium bulk with ground coverage of no more than 65%;
- Building setback with reference to PNAP APP-152;
- Greenery of at least 20% and an overall target of 30% is aimed to be achieved, preferably at grade;
- Avoidance continuous long continuous façades; and
- Reference could also be made to recommendations of design measures in the Hong Kong Planning Standards and Guidelines.

3.8.2 The design shall incorporate the mentioned recommendations and relevant urban design features under APP-152 as far as possible at the next stage of the Project.

3.8.3 However, it is recommended that quantitative AVA should be carried out at the detailed design stage to demonstrate that the wind performance of the future scheme would not have any significant air ventilation impact on the surroundings and for scheme design optimisation.

4 CONCLUSIONS

4.1.1 Qualitative assessment of the wind environment regarding the proposed housing development in Ma On Shan has been carried out. Based on the findings of this AVA Study, it is observed that the annual prevailing winds come from NNE, NE, ENE, E and ESE directions while the summer prevailing winds come from E, SSE, SSW and SW directions.

4.1.2 In order to minimise the potential ventilation impacts upon the Subject Sites, the layout of the proposed housing development has been carefully designed. It is a qualitative assessment of wind performance of the site under existing condition and the proposed indicative Schemes. A preliminary assessment on site characteristic and wind availability is conducted. The expert evaluation indicates that:

For existing condition at Subject Site:

- The annual prevailing wind will be dominated by the surrounding mountains.
- Summer winds will provide good ventilation at and around the Subject Site.

For indicative Scheme of Sites 3 & 4 and Site 5 at Subject Site:

- Wind shadow may be casted by the building blocks, which may affect wind availability at the downstream areas such as Shun Yee San Tsuen under the summer prevailing SW wind.
- Two building separations of 15m wide aligned ENE-WSW and SSE-NNW directions is implemented to improve wind penetration through the Subject Site.
- Building setback from site boundary along Ma On Shan Bypass.
- Building separation between the non-domestic block (Site 5) and the closest domestic block (i.e. Block 3 of Sites 3 & 4).

4.1.3 In considering the location of the existing built areas and provision of good design features, it is considered that the Proposed Development would not have significant adverse impact on the surrounding environment.

4.1.4 As discussed in above section, building design features proposed for the development would be beneficial to the air ventilation performance in the surrounding areas. Further recommended design principles for consideration at the detailed design stage to facilitate wind penetration are as below:

- Building Permeability with reference to PNAP APP-152;
- Minimization of podium bulk with ground coverage of no more than 65%;
- Building setback with reference to PNAP APP-152;
- Greenery of at least 20% and an overall target of 30% is aimed to be achieved, preferably at grade;
- Avoidance continuous long continuous façades; and
- Reference could also be made to recommendations of design measures in the Hong Kong Planning Standards and Guidelines.

4.1.5 A quantitative AVA should be carried out to show the wind performance of the future scheme which would not have any significant air ventilation impact on the surroundings and to optimize scheme design at the detailed design stage.

END OF TEXT

FIGURES

Legend :

N

Private residential developments along Hang Kwong Street

Marbella

The Waterside

Fuk On Garden

Tolo Place

Bayshore Towers

Private residential developments along Ma Kam Street (max.90mPD)

Villa Oceania

Ma On Shan Centre

Villa Athena

SAI SHA ROAD

Wu Kai Sha Village

Lee On Estate

Kam Lung Court

Lake Silver

Monte Vista

R

Site 1

Fuk Fai Garden

Saddle Ridge Garden

Sunshine City

MA ON SHAN BYPASS

Noise Barrier

Kam Fung Court

Kam Ying Court

Ma On Shan Tsuen Road

Chung On Estate

Kam Hay Court

Park Belvedere

Shun Yee San Tsuen

MA ON SHAN ROAD

Yiu On Estate

Vista Paradiso

SAI SHA ROAD

HENG HONG STREET

Baycrest

Kam On Court

Heng On Estate

Public Housing Development at Hang Kin Street (max.120mPD)

Commercial development (max. 30mPD)

Oceanaire

Ocean View

Noise Barrier

Yan On Estate and Yan On Estate redevelopment

MA ON SHAN ROAD

La Costa

Public Housing Development along Ma On Shan Road (max.120mPD)

Sausalito

0m 100m 250m 500m

Sites 3 &4

Site 5

~1.2km

~1.4km

~1.0km

~1.1km

~+676mPD

NGAU NGAK SHAN

~+589mPD

TIU SHAU NGAM

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Initial					
Date					

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Contract no.
CE 80/2014 (CE)

Contract title
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5

Drawing title
Location of the Subject Site and its Environs

Drawing no.
Figure 1.1

Revision

Scale

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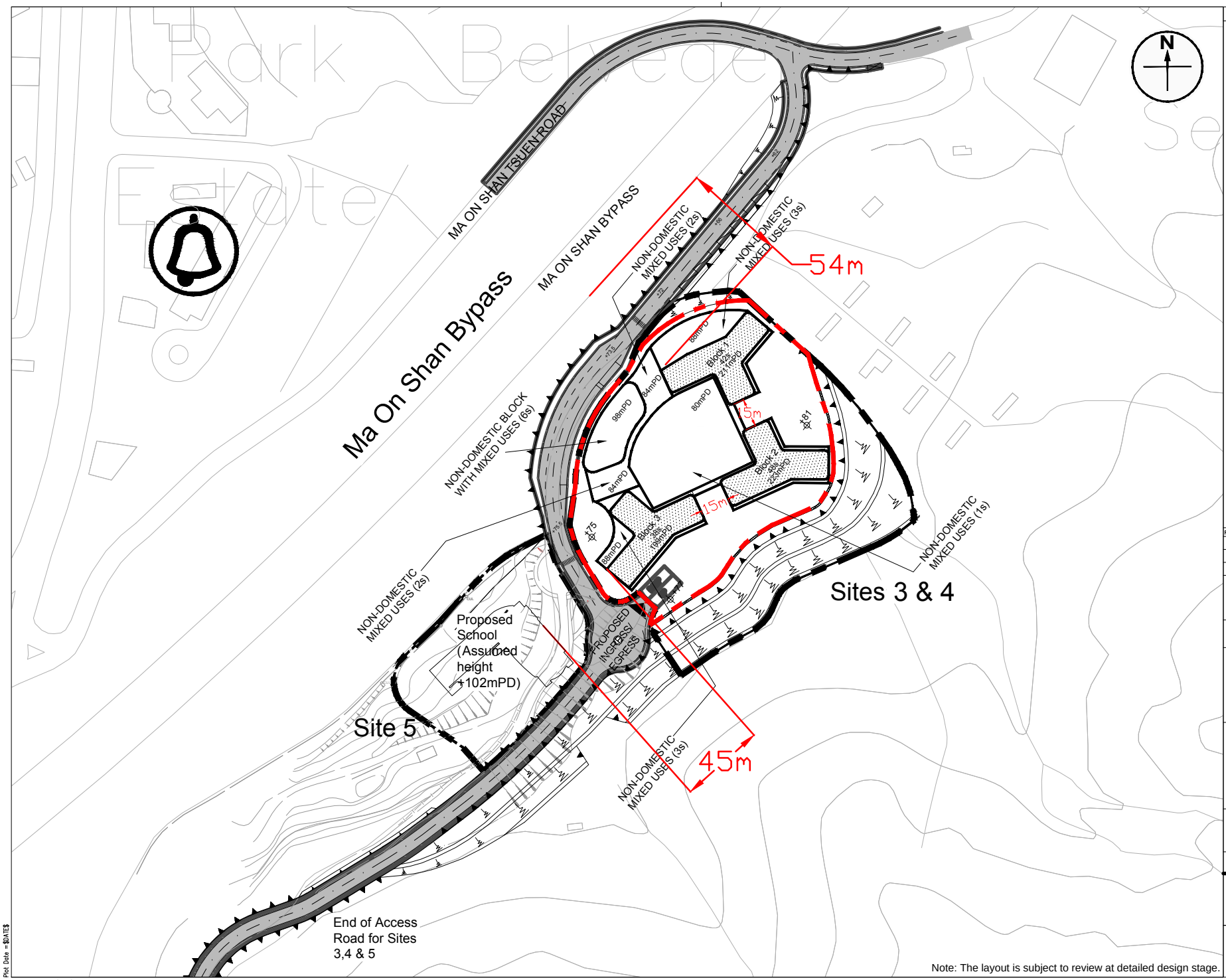

Legend :

- Building Separation Distance
- Proposed Site Boundary
- Proposed Housing Boundary subject to Detailed Design
- 15M Building Separation
- Proposed Slope
- Proposed Retaining Wall
- Proposed Rigid Barrier (Subject to Detailed Design)

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Initial					
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Contract no.
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Contract title
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Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5

Drawing title
Master Layout Plan and Blocking Layouts of Proposed Development

Drawing no.
Figure 1.2

Revision

Scale

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Note: The layout is subject to review at detailed design stage.

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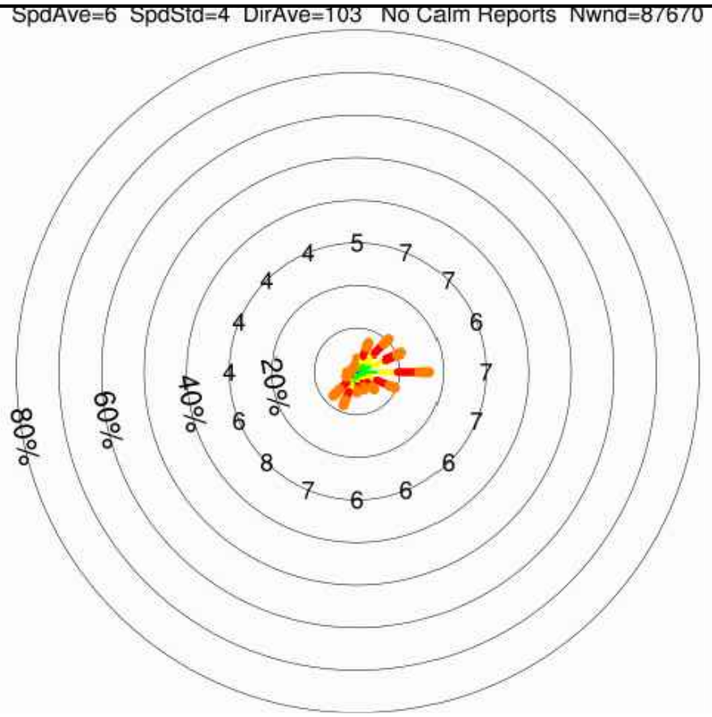
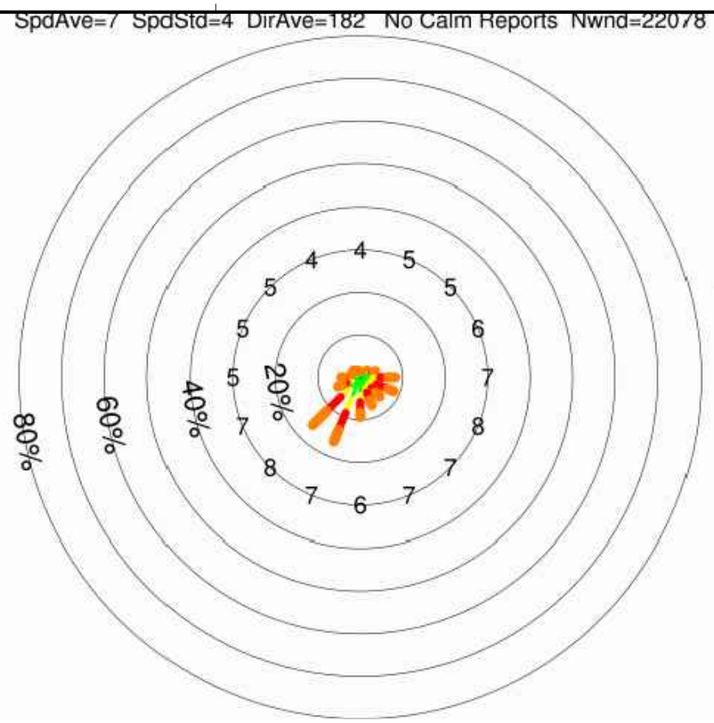
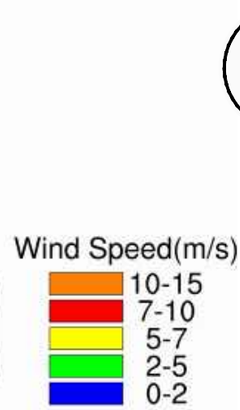


500m Annual Condition





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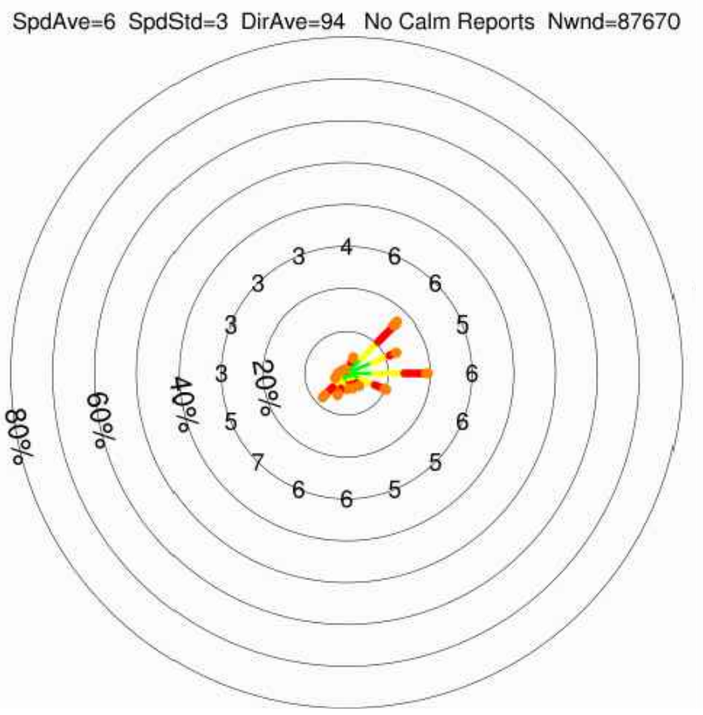

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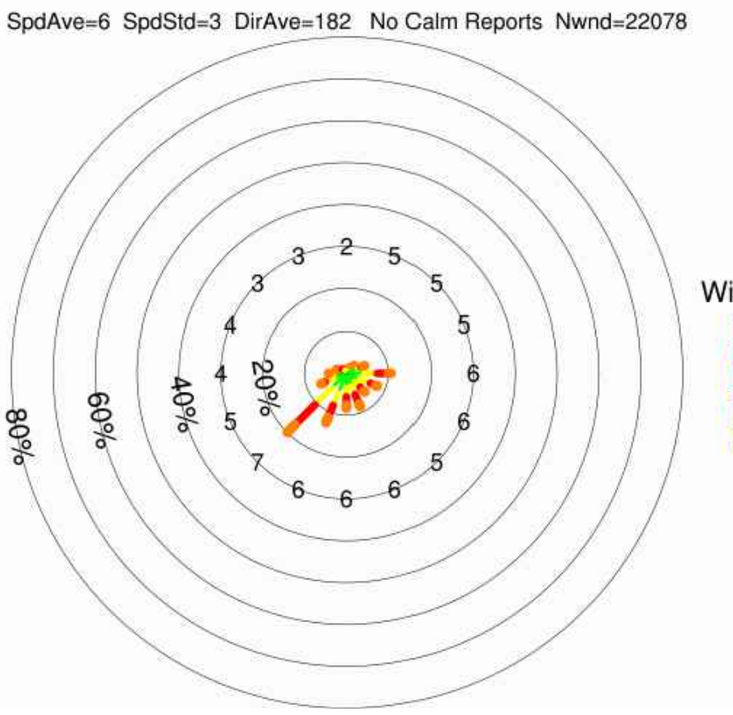

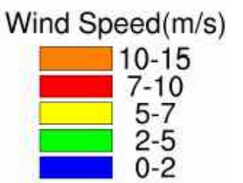

200m Summer Condition

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Date					

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Contract no.
CE 80/2014 (CE)

Contract title
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for
Eight Housing Sites in Ma On Shan - Site 3 ,4&5

Drawing title
Windrose Representing Velocity at 500m and 200m of the Area Under Concern

Drawing no.
Figure 2.1

Revision

Scale

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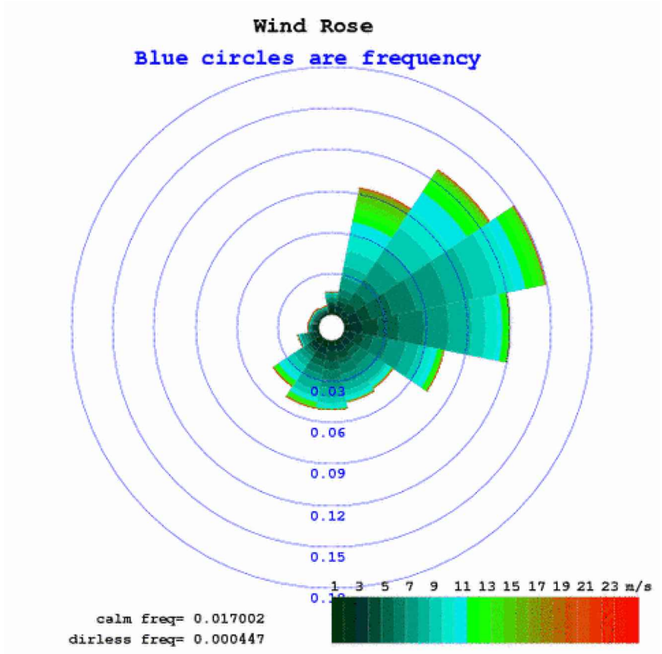

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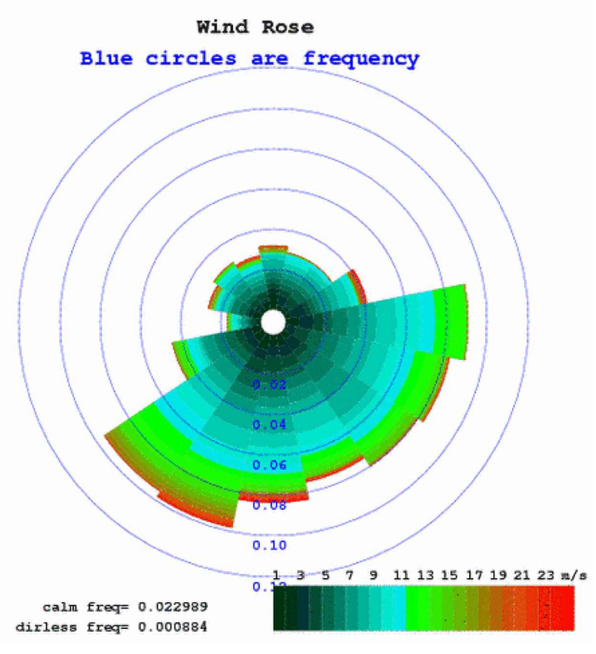
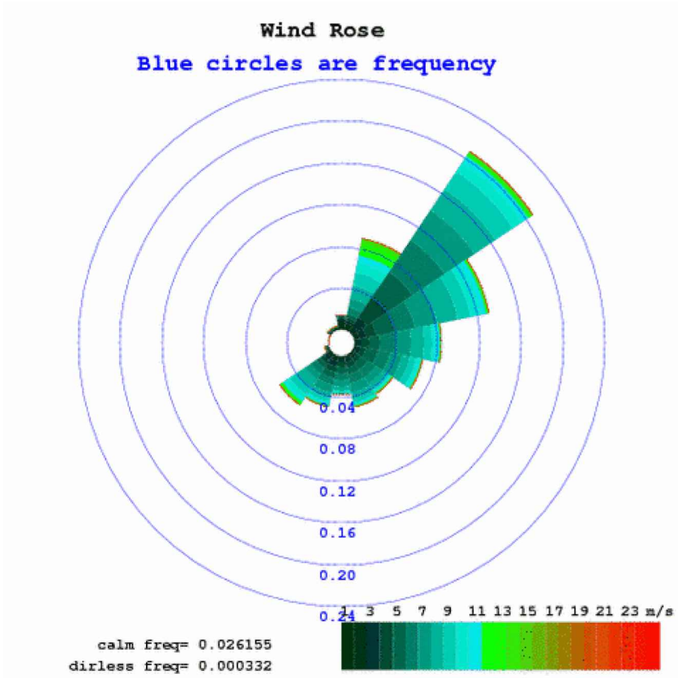


450m Summer Condition



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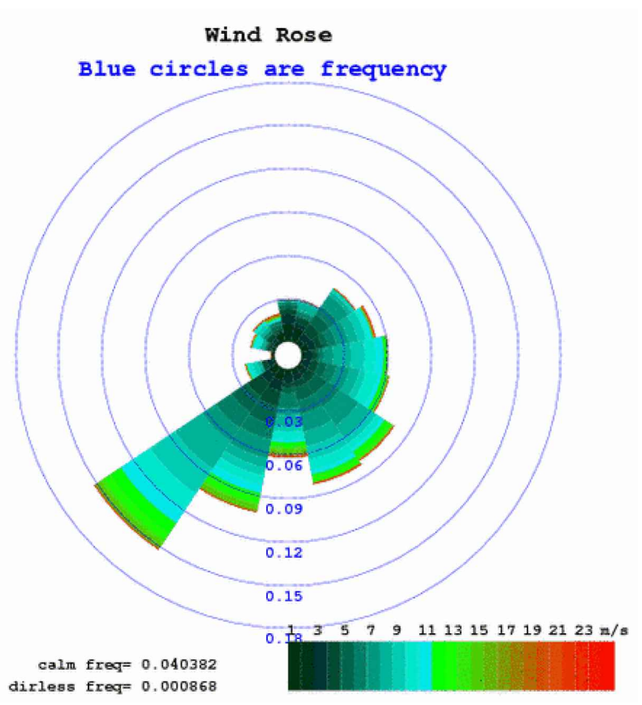

120m Summer Condition

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Contract no.
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Contract title
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for
Eight Housing Sites in Ma On Shan - Site 3 ,4&5

Drawing title
Windrose Representing Velocity at 450m and 120m of the Area Under Concern of Referenced AVA Report For Ma On Shan Area

Drawing no.
Figure 2.2

Revision

Scale

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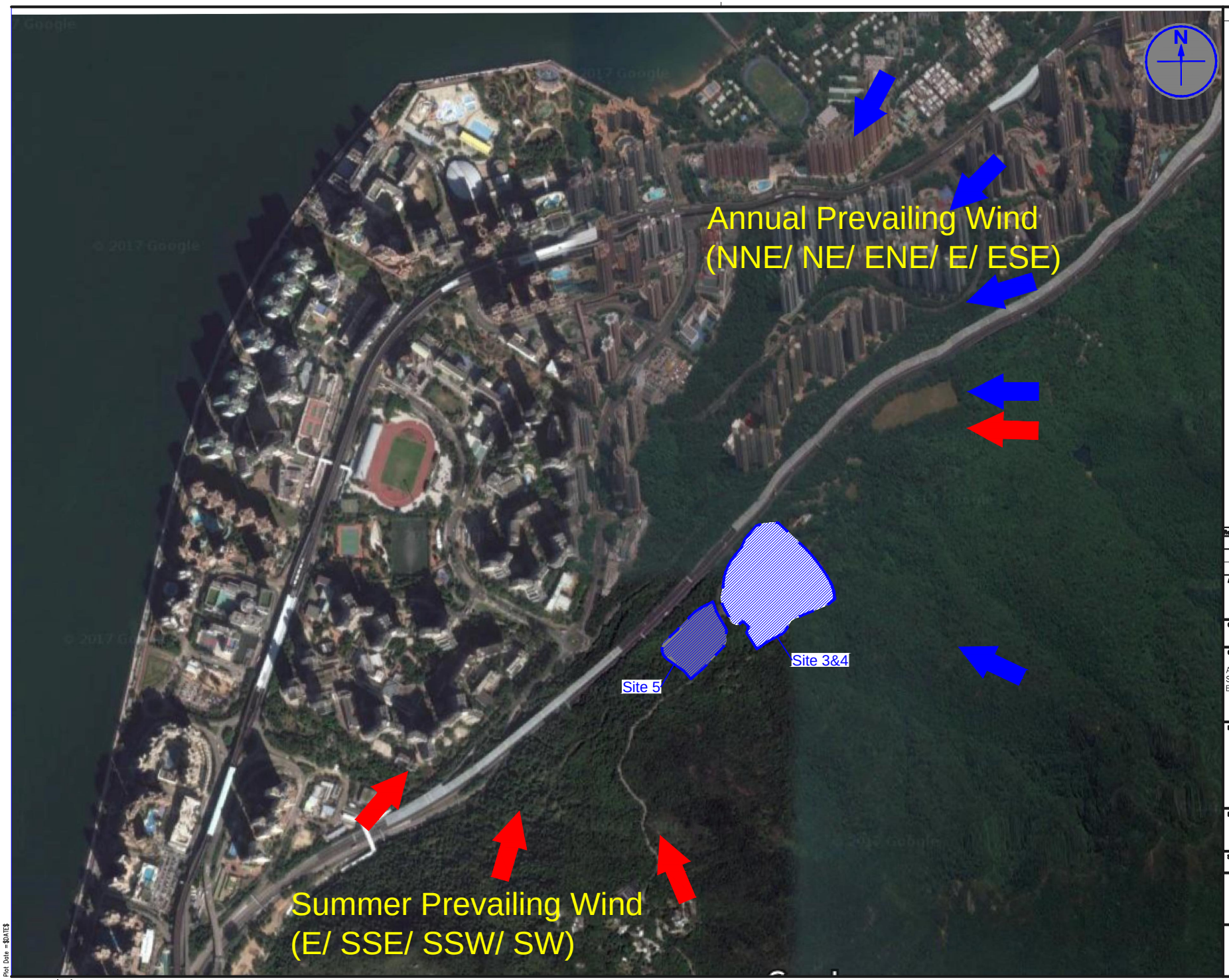

Summer Prevailing Wind

Annual Prevailing Wind

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Date					

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Contract no.
CE 80/2014 (CE)

Contract title
Agreement No. CE 80/2014
Site Formation and Infrastructure Works for
Eight Housing Sites in Ma On Shan - Site 3&4, 5

Drawing title
Annual and Summer Prevailing Winds for Subject Site

Drawing no.
Figure 2.3

Revision

Scale

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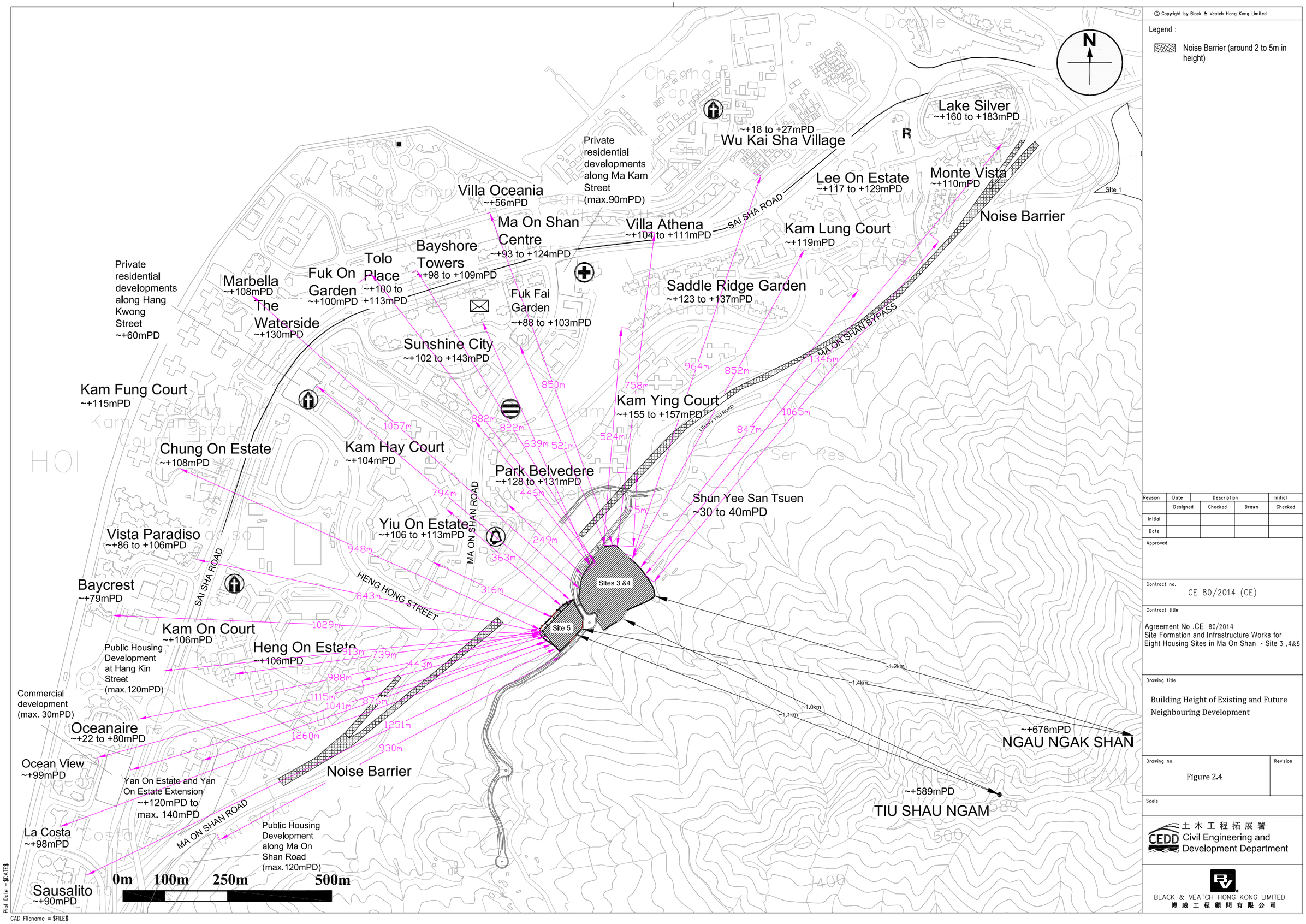

Legend :

Noise Barrier (around 2 to 5m in height)

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Initial				
Date				

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Contract no.
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Contract title
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5

Drawing title
Building Height of Existing and Future Neighbouring Development

Drawing no.
Figure 2.4

Revision

Scale

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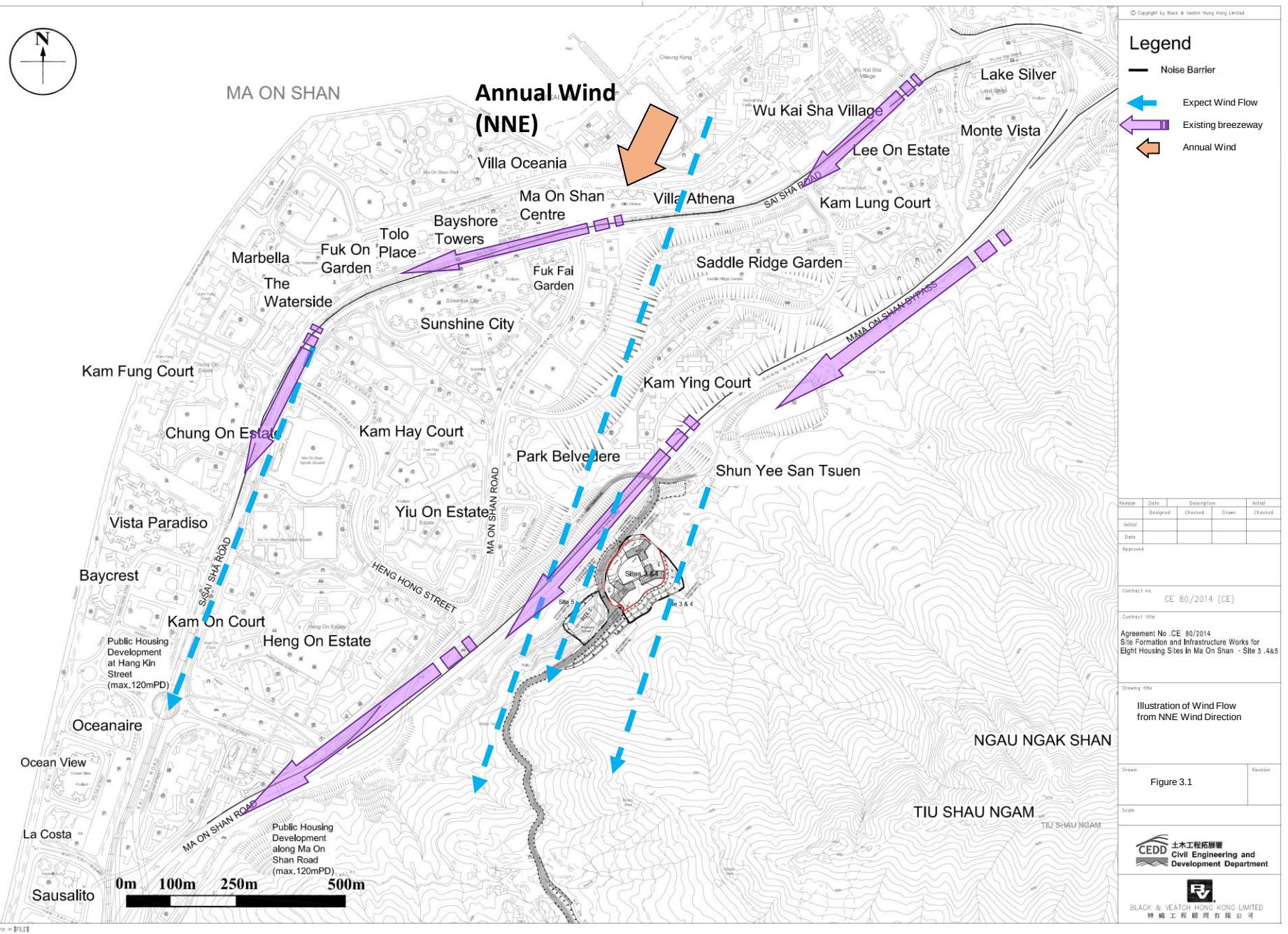
MA ON SHAN
Annual Wind (NNE)
Villa Oceania
Ma On Shan Centre
Villa Athena
Wu Kai Sha Village
Lake Silver
Monte Vista
Lee On Estate
Kam Lung Court
SAI SHA ROAD
Bayshore Towers
Tolo Place
Fuk On Garden
Marbella
The Waterside
Fuk Fai Garden
Saddle Ridge Garden
Sunshine City
MA ON SHAN BYPASS
Kam Fung Court
Kam Ying Court
Chung On Estate
Kam Hay Court
Park Belvedere
Shun Yee San Tsuen
Yiu On Estate
MA ON SHAN ROAD
Vista Paradiso
HENG HONG STREET
Baycrest
Kam On Court
Heng On Estate
Public Housing Development at Hang Kin Street (max.120mPD)
Oceanaire
Ocean View
La Costa
Sausalito
Public Housing Development along Ma On Shan Road (max.120mPD)
NGAU NGAK SHAN
TIU SHAU NGAM
0m 100m 250m 500m
Legend
Noise Barrier
Expect Wind Flow
Existing breezeway
Annual Wind
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Contract no. CE 80/2014 (CE)
Agreement No .CE 80/2014 Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5
Illustration of Wind Flow from NNE Wind Direction
Figure 3.1
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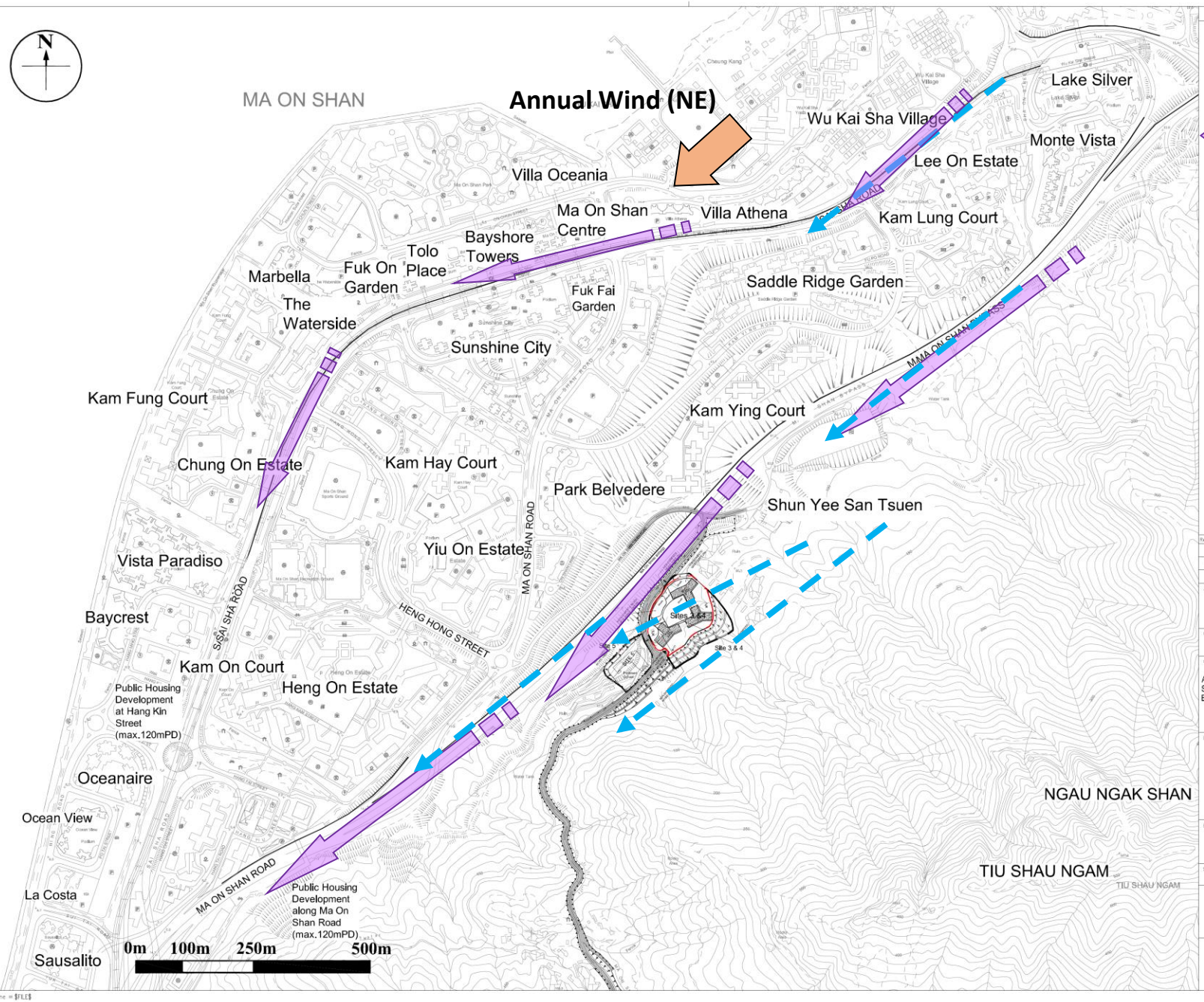

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Contract no.
CE 80/2014 (CE)

Contract title
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5

Drawing title
Illustration of Wind Flow from NE Wind Direction

Drawn
Figure 3.2

Revision

Scale

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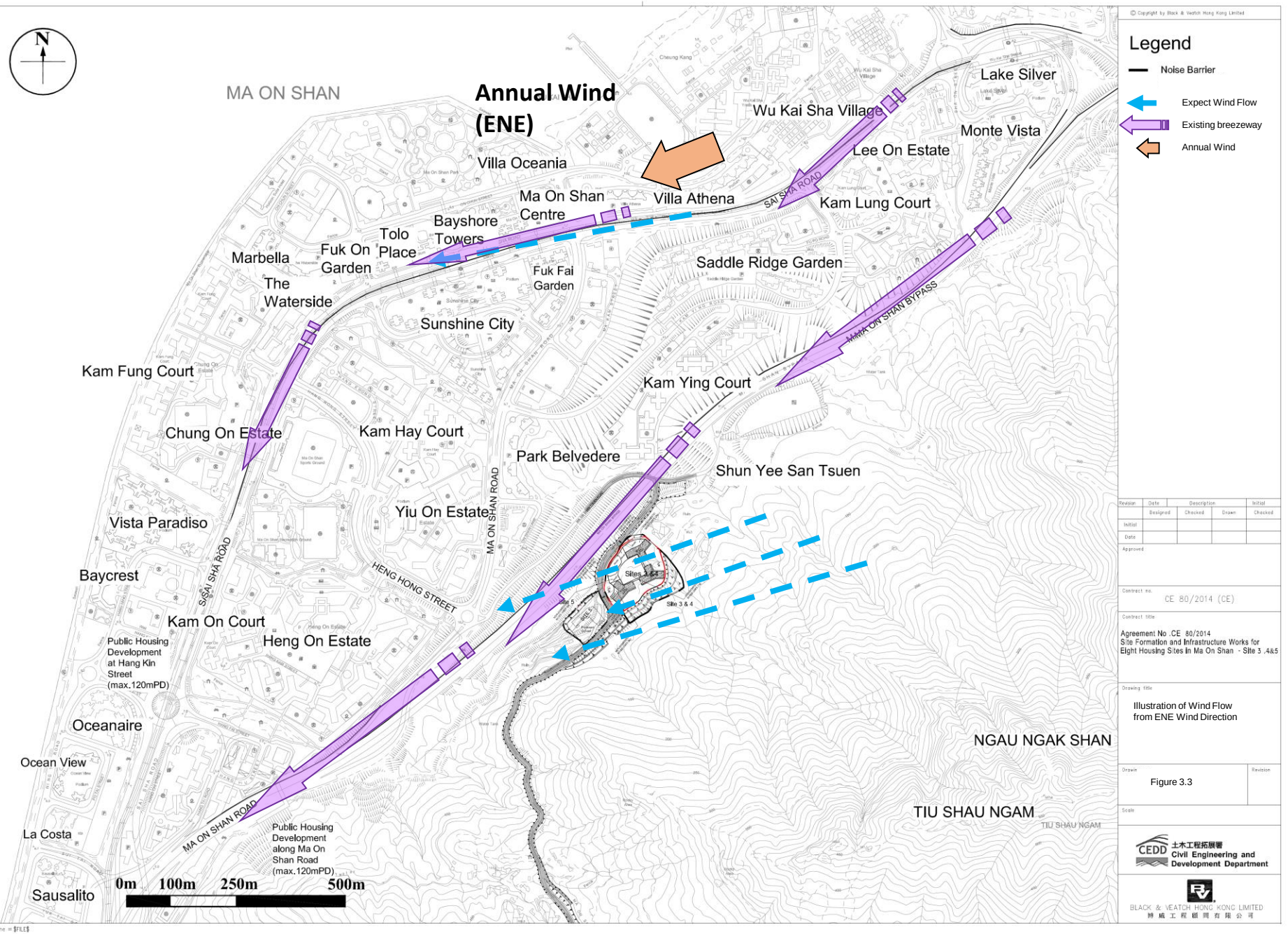
MA ON SHAN
Annual Wind
(ENE)
Villa Oceania
Ma On Shan
Centre
Villa Athena
Wu Kai Sha Village
Lake Silver
Monte Vista
Lee On Estate
Kam Lung Court
SAI SHA ROAD
Bayshore
Towers
Tolo
Place
Fuk On
Garden
Marbella
The
Waterside
Fuk Fai
Garden
Saddle Ridge Garden
Sunshine City
MA ON SHAN BYPASS
Kam Fung Court
Kam Ying Court
Chung On Estate
Kam Hay Court
Park Belvedere
Shun Yee San Tsuen
Yiu On Estate
Vista Paradiso
MA ON SHAN ROAD
HENG HONG STREET
Baycrest
Kam On Court
Heng On Estate
Public Housing
Development
at Hang Kin
Street
(max.120mPD)
Oceanaire
Ocean View
La Costa
Sausalito
Public Housing
Development
along Ma On
Shan Road
(max.120mPD)
Site 1 & 2
Site 3 & 4
Site 5
NGAU NGAK SHAN
TIU SHAU NGAM
0m
100m
250m
500m
Legend
Noise Barrier
Expect Wind Flow
Existing breezeway
Annual Wind
CE 80/2014 (CE)
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for
Eight Housing Sites in Ma On Shan - Site 3 ,4&5
Illustration of Wind Flow
from ENE Wind Direction
Figure 3.3
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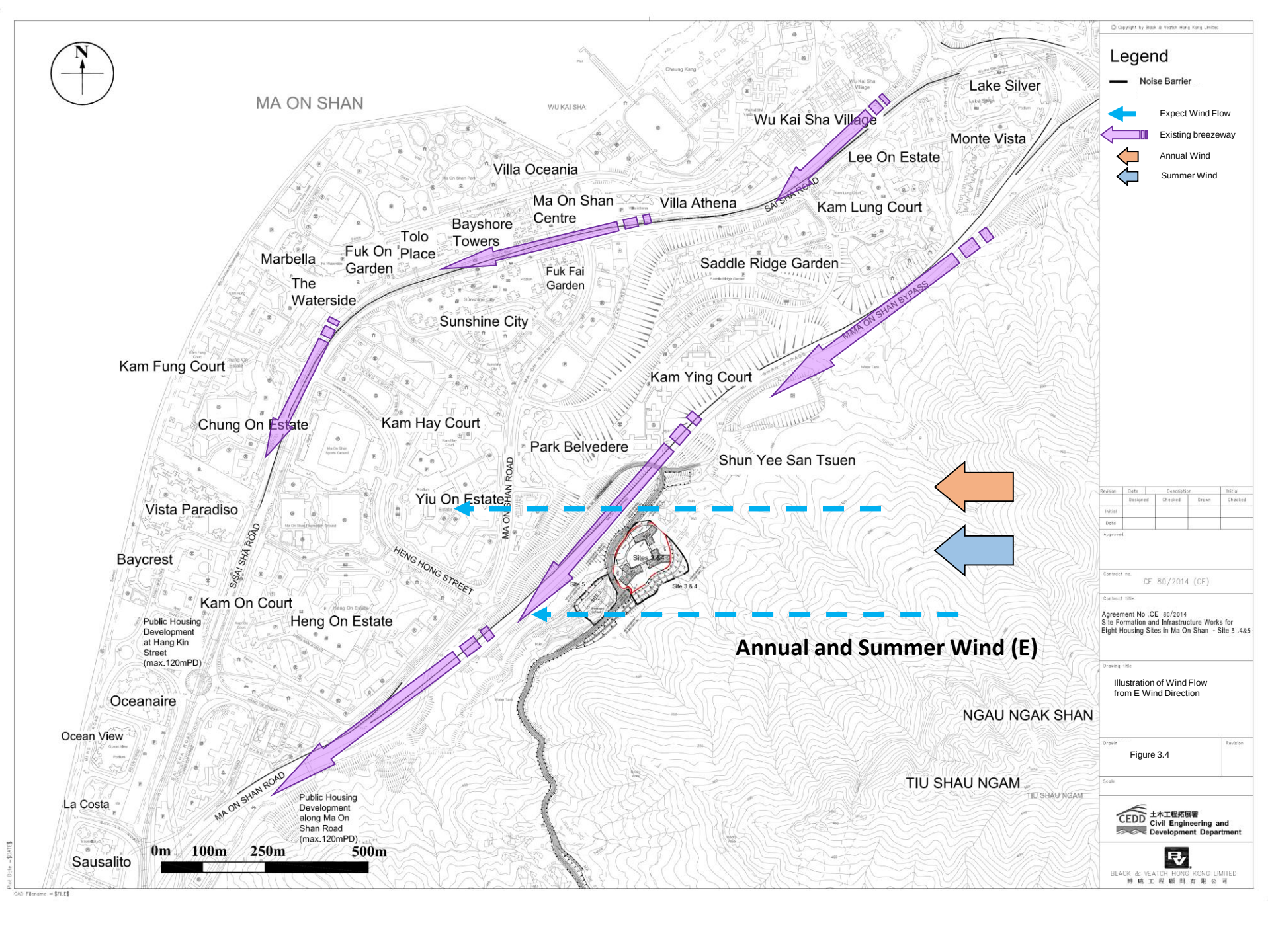
N
MA ON SHAN
WU KAI SHA
Cheung Kang
Wu Kai Sha Village
Lake Silver
Monte Vista
Lee On Estate
Villa Oceania
Ma On Shan Centre
Villa Athena
SAI SHA ROAD
Kam Lung Court
Bayshore Towers
Tolo Place
Fuk On Garden
Marbella
The Waterside
Fuk Fai Garden
Saddle Ridge Garden
Sunshine City
MA ON SHAN BYPASS
Kam Fung Court
Kam Ying Court
Chung On Estate
Kam Hay Court
Park Belvedere
Shun Yee San Tsuen
Yiu On Estate
Vista Paradiso
MA ON SHAN ROAD
SAI SHA ROAD
HENG HONG STREET
Baycrest
Kam On Court
Heng On Estate
Public Housing Development at Hang Kin Street (max.120mPD)
Site 1 & 2
Site 3 & 4
Site 5
Annual and Summer Wind (E)
Oceanaire
Ocean View
NGAU NGAK SHAN
TIU SHAU NGAM
La Costa
Public Housing Development along Ma On Shan Road (max.120mPD)
Sausalito
0m 100m 250m 500m
Legend
Noise Barrier
Expect Wind Flow
Existing breezeway
Annual Wind
Summer Wind
Illustration of Wind Flow from E Wind Direction
Figure 3.4
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Agreement No .CE 80/2014 Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5
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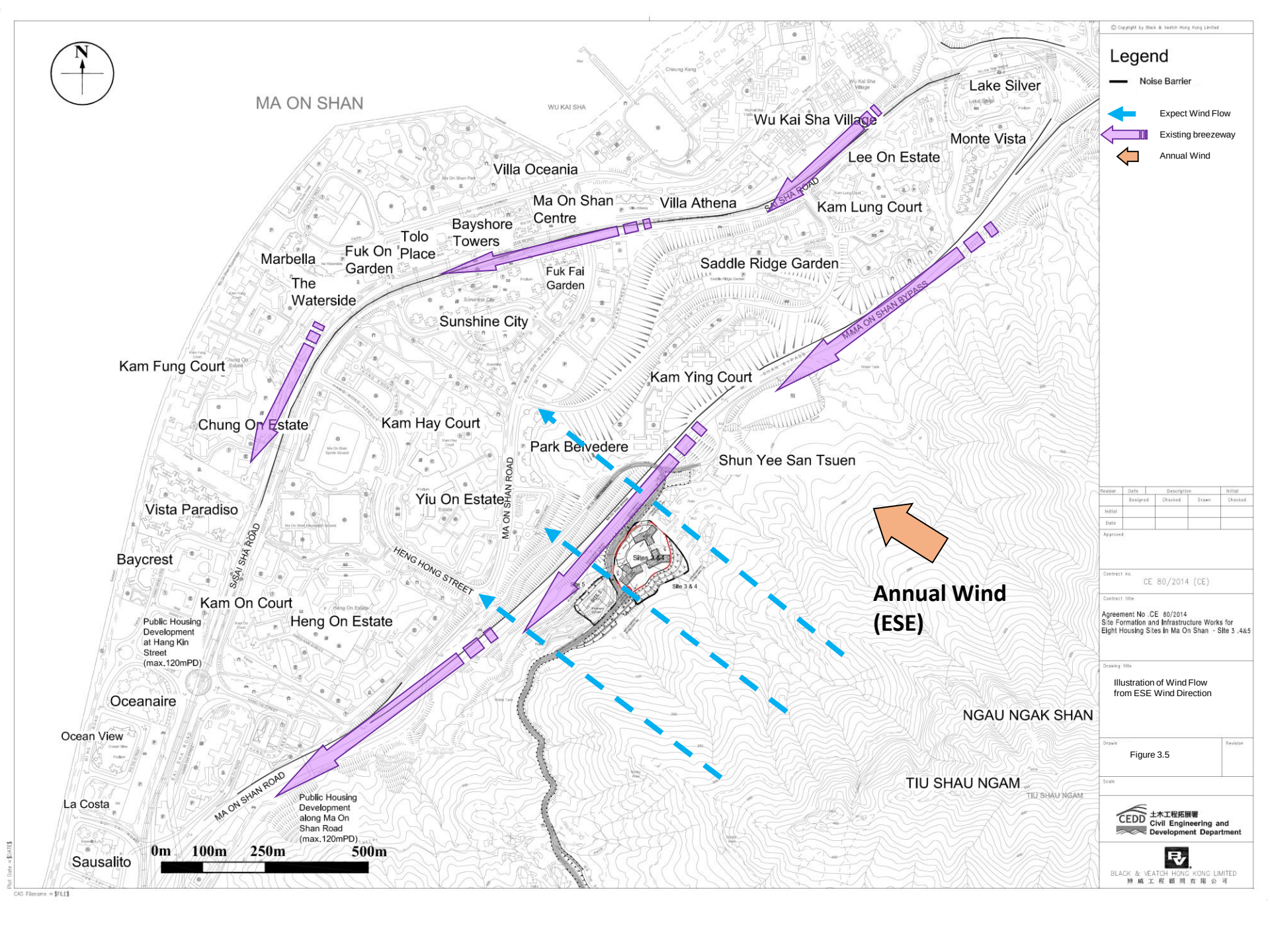
N
MA ON SHAN
WU KAI SHA
Lake Silver
Wu Kai Sha Village
Monte Vista
Lee On Estate
Villa Oceania
Ma On Shan Centre
Villa Athena
SAI SHA ROAD
Kam Lung Court
Bayshore Towers
Tolo Place
Fuk On Garden
Marbella
The Waterside
Fuk Fai Garden
Saddle Ridge Garden
MA ON SHAN BYPASS
Sunshine City
Kam Fung Court
Kam Ying Court
Chung On Estate
Kam Hay Court
Park Belvedere
Shun Yee San Tsuen
Yiu On Estate
MA ON SHAN ROAD
Vista Paradiso
HENG HONG STREET
Baycrest
Kam On Court
Heng On Estate
Public Housing Development at Hang Kin Street (max.120mPD)
Oceanaire
Ocean View
La Costa
Sausalito
MA ON SHAN ROAD
Public Housing Development along Ma On Shan Road (max.120mPD)
Sites 1 & 2
Site 5
Site 3 & 4
Annual Wind (ESE)
NGAU NGAK SHAN
TIU SHAU NGAM
0m 100m 250m 500m
Legend
Noise Barrier
Expect Wind Flow
Existing breezeway
Annual Wind
Illustration of Wind Flow from ESE Wind Direction
Figure 3.5
CE 80/2014 (CE)
Agreement No .CE 80/2014 Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5
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N
MA ON SHAN
WU KAI SHA
Lake Silver
Wu Kai Sha Village
Monte Vista
Lee On Estate
Villa Oceania
Ma On Shan Centre
Villa Athena
SAI SHA ROAD
Kam Lung Court
Bayshore Towers
Tolo Place
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Sunshine City
Kam Fung Court
Kam Ying Court
Chung On Estate
Kam Hay Court
Park Belvedere
Shun Yee San Tsuen
Yiu On Estate
MA ON SHAN ROAD
Vista Paradiso
SHA SAI ROAD
HENG HONG STREET
Baycrest
Kam On Court
Heng On Estate
Public Housing Development at Hang Kin Street (max.120mPD)
Sites 3 & 4
Site 5
Site 3 & 4
Summer Wind (SSE)
Oceanaire
Ocean View
NGAU NGAK SHAN
TIU SHAU NGAM
TIU SHAU NGAM
La Costa
MA ON SHAN ROAD
Public Housing Development along Ma On Shan Road (max.120mPD)
Sausalito
0m 100m 250m 500m
Legend
Noise Barrier
Expect Wind Flow
Existing breezeway
Summer Wind
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5
Illustration of Wind Flow from SSE Wind Direction
Figure 3.6
CE 80/2014 (CE)
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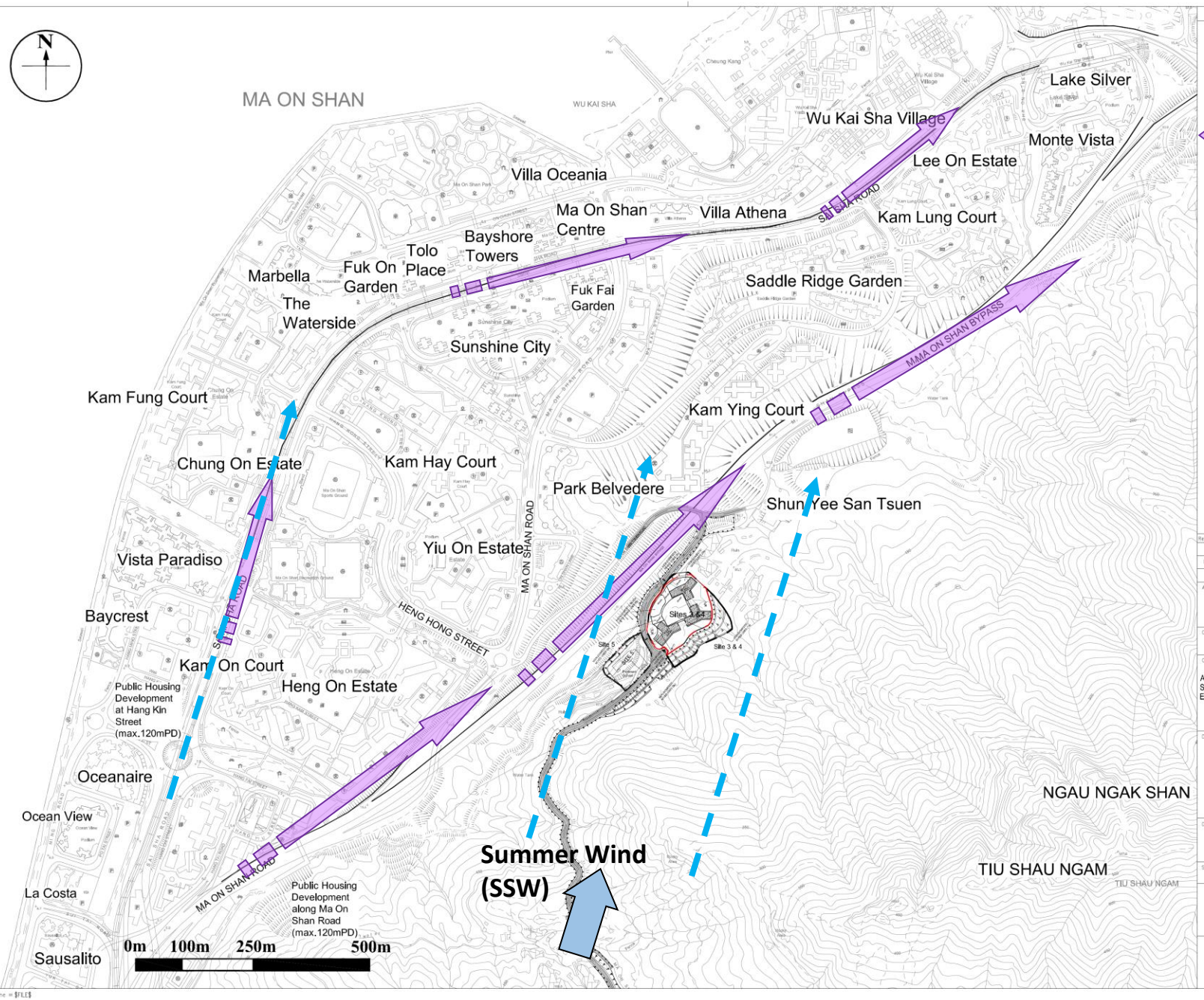

Revision	Date	Description			Initial
	Designed	Checked	Drawn		Checked
Initial					
Date					

Approved

Contract no.
CE 80/2014 (CE)

Contract title
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5

Drawing title
Illustration of Wind Flow from SSW Wind Direction

Drawn
Figure 3.7

Revision

Scale

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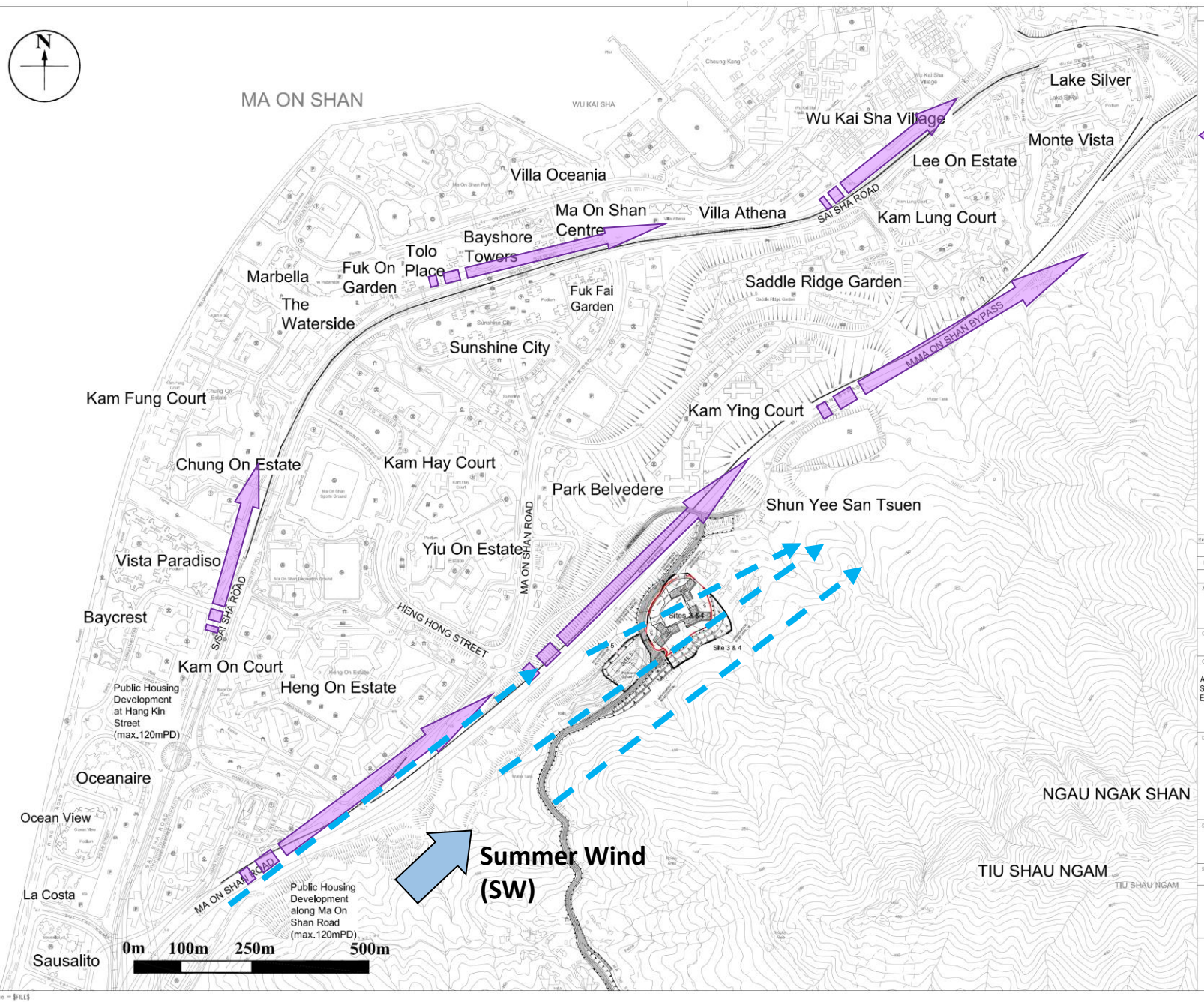

Revision	Date	Description			Initial
	Designed	Checked	Drawn		Checked
Initial					
Date					

Approved

Contract no.
CE 80/2014 (CE)

Contract title
Agreement No .CE 80/2014
Site Formation and Infrastructure Works for Eight Housing Sites in Ma On Shan - Site 3 ,4&5

Drawing title
Illustration of Wind Flow from SW Wind Direction

Drawn

Figure 3.8

Revision

Scale

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