

Air Ventilation Appraisal

Date	13 September 2024
Project	Public Housing Development at Tung Chung Area 114 and 117
Reference	HK-20024-RPT-ES0001 (06)
Subject	Air Ventilation Appraisal for Public Housing Development at Tung Chung Area 114 and 117

1.0 Introduction

1.1 Objective

Inhabit has been appointed by Yau Lee Construction Limited to conduct an Air Ventilation Appraisal of the proposed development. According to OZP, the maximum height of the proposed development is 105mPD. The building height of the proposed development is 108.39mPD, which exceeds the maximum height of OZP by 3.39m. This air ventilation appraisal aims to describe the expected wind environment with the height increase and good design features of the proposed development in support of the application of Section 16 for minor height relaxation.

1.2 Proposed Development

1.2.1 Overview of the Development

The proposed residential development 'Public Housing Development at Tung Chung Area 114 and 117' is located Tung Chung New Town Extension East. Area 114 is surrounded by a cluster of high-rise planned residential developments to its north, east and west whilst a high-rise comprehensive development area is located to the south. Similarly, Area 117 is also surrounded by a cluster of high-rise planned residential developments to its north, east and west whilst a high-rise comprehensive development area is located to the south. Figure 1 shows an overview of the Development and its surrounding area.

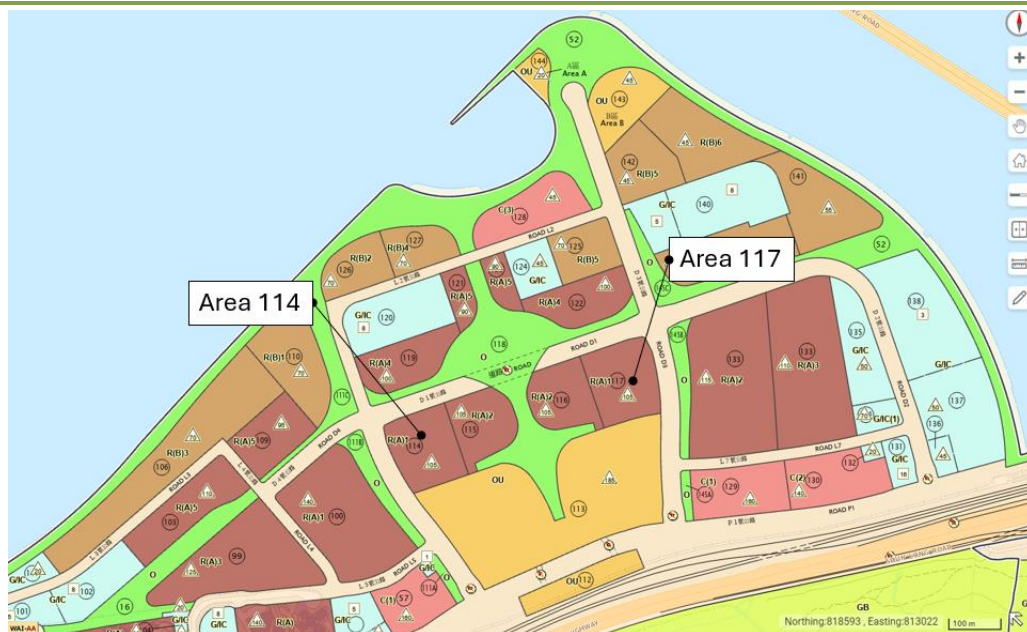


Figure 1 – Overview of the Development and its Surrounding Area

1.2.2 Development Parameters

Area 114 and Area 117 will each house 4 residential towers of public housing with a podium beneath. **Table 1** and **Table 2** below show the development parameters of the baseline scheme and proposed scheme of Area 114 and Area 117 respectively. The baseline scheme is an OZP compliance scheme. In the proposed scheme, the 10m non-building area is maintained while the setback distance of the residential towers from the north site boundary is increased to at least 5m. These design features will be discussed in Section 3.2.

Table 1: Development Parameters of Area 114

Development Parameters	Baseline Scheme	Proposed Scheme
Site Area	About 1.59 ha	About 1.59 ha
Total GFA	Not more than 109,848m ²	Not more than 109,848m ²
Building Height (Main roof level)	105.00mPD	108.39mPD
No. of Storeys	30 (Domestic) Storeys + 3 (Podium) Storeys	
No. of Blocks	4	4
Total No. of Flats	About 2,577 flats	About 2,577 flats

Table 2: Development Parameters of Area 117

Development Parameters	Baseline Scheme	Proposed Scheme
Site Area	About 1.68 ha	About 1.68 ha
Total GFA	Not more than 115,920m ²	Not more than 115,920m ²
Building Height (Main roof level)	105.00mPD	108.39mPD
No. of Storeys	30 (Domestic) Storeys + 3 (Podium) Storeys	
No. of Blocks	4	4
Total No. of Flats	About 2,710 flats	About 2,710 flats

2.0 Site Wind Availability Data

The Regional Atmospheric Modelling System (RAMS) wind data is adopted as it most closely reflects the location of the Project Area. According to the location grid from RAMS, the project site is located within grid X:036, Y:038. Therefore, data at the grid corresponds to the location of the Project Area and annual wind conditions at 200m above ground are referenced in this study.

The extracted wind roses show that eastern and southeastern winds are the prevailing wind directions under annual conditions. Meanwhile, summer prevailing winds are expected to come from the southeast and southwestern quadrants. **Figure 2** shows the annual and summer wind roses at 200m above ground level for grid.



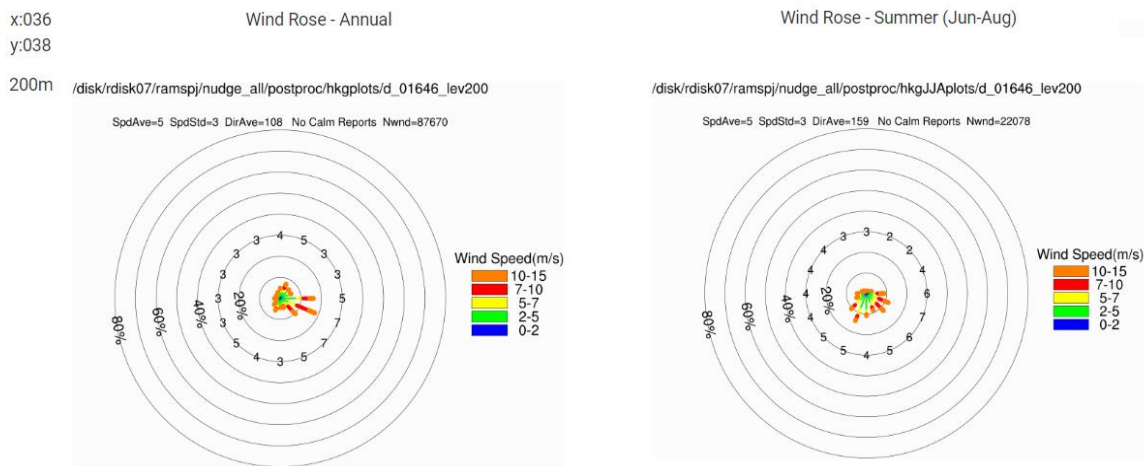


Figure 2 – Annual and Summer Wind Roses at 200m above Ground Level at Grid X:036, Y:038

According to the RAMS wind data of the Project Site, ESE, E and SE winds contribute to 18.1%, 16.2% and 10.4% of the annual wind frequency respectively, while SSW, SE and ESE winds contribute to 14.4%, 12.0% and 11.9% of the summer wind frequency respectively. Hence, ESE, E and SE winds are identified as the annual prevailing wind direction while SSW, SE and ESE winds are identified as the summer prevailing wind direction for the Project Site.

Table 3: Prevailing Winds under Annual and Summer Conditions by RAMS Wind Data

	Annual Condition			Summer Condition		
Direction	ESE	E	SE	SSW	SE	ESE
Frequency	18.1%	16.2%	10.4%	14.4%	12.0%	11.9%



3.0 Air Ventilation Appraisal

3.1 Wind Flow Pattern

3.1.1 Urban Design Concept

As described in Section 1.2, the sites of both Area 114 and Area 117 are surrounded by a cluster of high-rise planned residential developments and high-rise comprehensive development areas. As shown in the Urban Design Concept of Tung Chung Extension Area from the Explanatory Statement of the approved Tung Chung Extension Area Outline Zoning Plan No. S/I-TCE/2, it is expected that the major breezeways/view corridors are located along the roads/ street at the north, east and west of Area 114 and north, east and west of Area 117 as shown in **Figure 3**.



Figure 3 – Urban Design Concept of Tung Chung Extension Area



3.1.2 Annual Prevailing Conditions

The annual prevailing winds are mainly from ESE, E, and SE directions.

E

Under E wind, incoming wind will flow along the major breezeway at the north of both Area 114 and Area 117 along Road D1. A minor breezeway is also identified along the 20m non-building area (NBA) in Area 133 to the east which is expected to channel incoming wind to the south of Area 117. The breezeway extends to Central Green which brings wind to the south of Area 114.

Under the proposed scheme of both Area 114 and Area 117, the setback distance of the residential tower from the north site boundary is increased. The setback distance is increased from 4.7m to 5.4m for the residential tower of Area 114 while that of Area 117 is increased from 4.1m to 5.1m. The increase in setback allows more wind to flow along the major breezeway. Hence, it reduces the blockage of wind to further downwind locations as well as enhances the local wind environment at the north portion.

ESE

Under ESE Wind, a minor breezeway along the 20m non-building area (NBA) in Area 133 is expected to channel incoming wind to the south of Area 117. The breezeway extends to Central Green which brings wind to the south of Area 114.

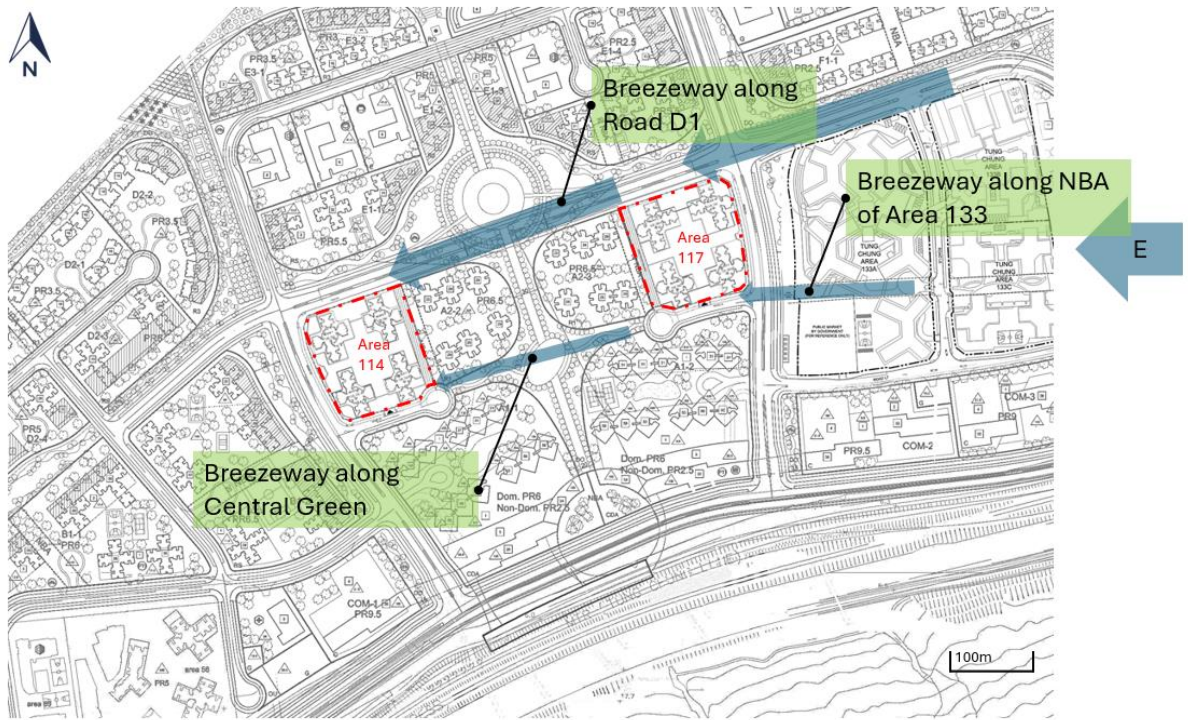
The wind environment under the proposed scheme and baseline scheme is expected to be similar.

SE

Under SE wind, the incoming wind to Area 114 and Area 117 is obstructed by the high-rise comprehensive development southeast and south of the site. A breezeway along Road D5 is identified which can bring downhill wind from Por Kai Shan to the west of Area 114. For Area 117, the majority of wind is blocked by upwind development. Therefore, wind availability of Area 117 would be impeded.

The wind environment under the proposed scheme and baseline scheme is expected to be similar.





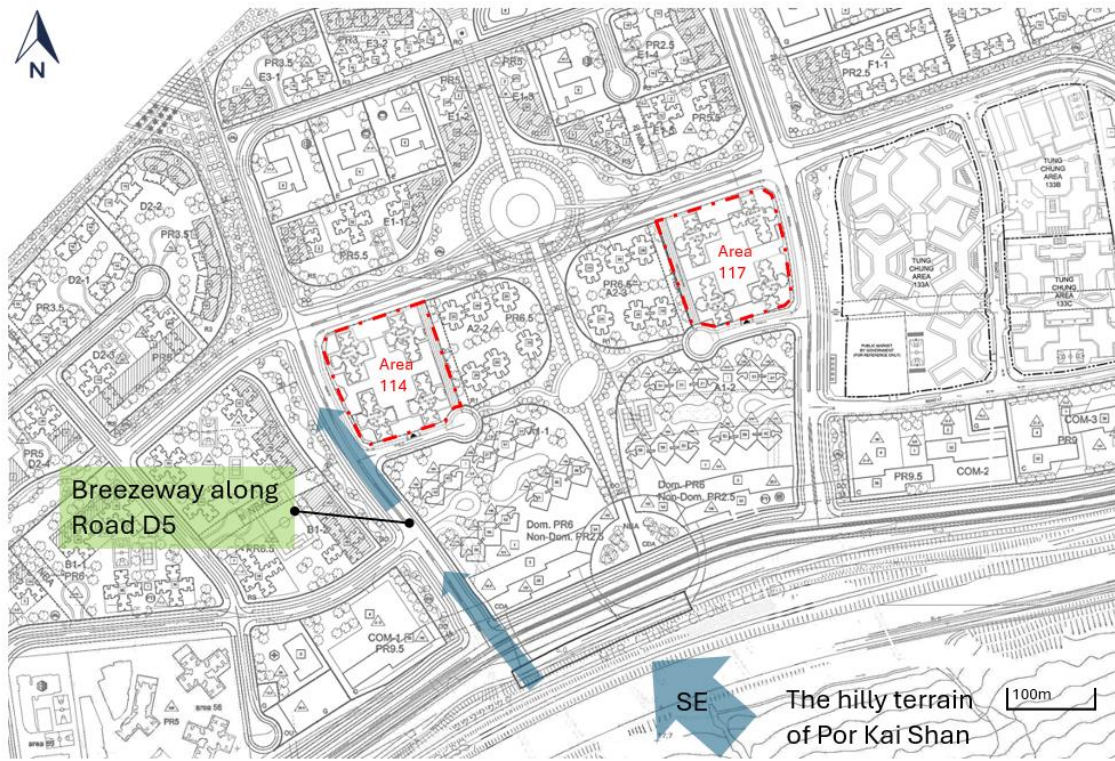


Figure 4 – Expected Wind Flow Pattern under Annual Prevailing E (Top), ESE (Middle) and SE Wind (Bottom)



3.1.3 Summer Prevailing Conditions

The summer prevailing winds are mainly from SSW, SE, and ESE directions.

SSW

Under SSW wind, Area 114 and Area 117 are located at the downwind location. Upwind high-rise residential and comprehensive development buildings at the south and southwest of the sites are expected to block the incoming wind.

Incoming wind will flow along the major breezeway at the north of both Area 114 and Area 117 along Road D1. Downhill wind from the hilly terrain of Por Kai Shan will flow along the breezeway along Road D3 to bring wind to the east of Area 117.

Under the proposed scheme of both Area 114 and Area 117, the setback distance of the residential tower from the north site boundary is increased. The setback distance is increased from 4.7m to 5.4m for the residential tower of Area 114 while that of Area 117 is increased from 4.1m to 5.1m. Hence, it reduces the blockage of wind to further downwind locations as well as enhances the local wind environment at the north portion.

ESE

Under ESE Wind, a minor breezeway along the 20m non-building area (NBA) in Area 133 is expected to channel incoming wind to the south of Area 117. The breezeway extends to Central Green which brings wind to the south of Area 114.

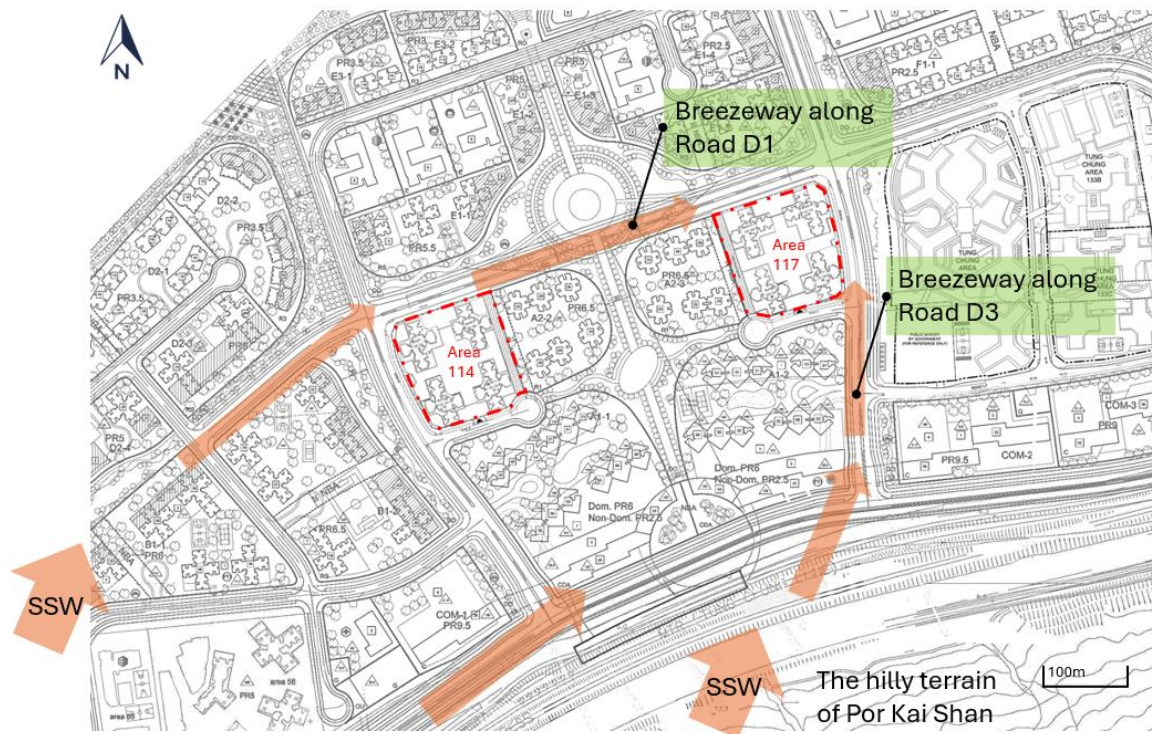
The wind environment under the proposed scheme and baseline scheme is expected to be similar.

SE

Under SE wind, the incoming wind to Area 114 and Area 117 is obstructed by the high-rise comprehensive development southeast and south of the site. A breezeway along Road D5 is identified which can bring downhill wind from Por Kai Shan to the west of Area 114. For Area 117, the majority of wind is blocked by upwind development. Therefore, wind availability of Area 117 would be impeded.

The wind environment under the proposed scheme and baseline scheme is expected to be similar.





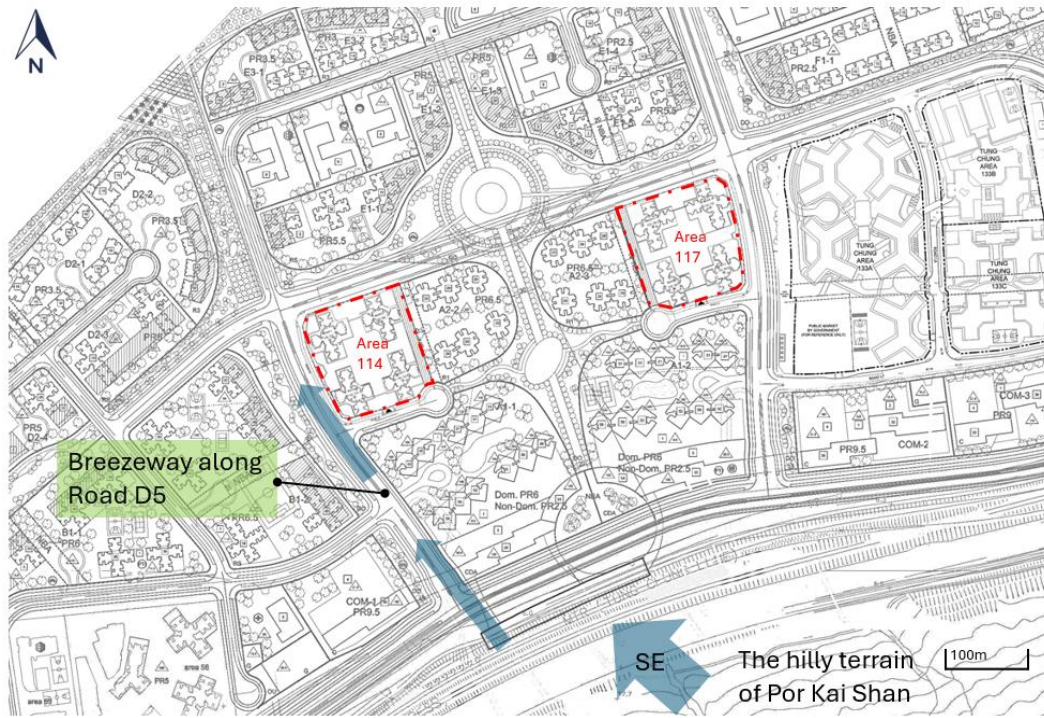


Figure 5 – Expected Wind Flow Pattern under Summer Prevailing SSW Wind (Top), ESE (Middle) and SE Wind (Bottom).



3.2 Good Design Feature

3.2.1 Non-Building Area

A 10m non-building area from the east boundary of Area 114 is maintained. It combines with the 10m non-building area of the east adjacent Area 115 to form a 20m non-building area to create an adequate building separation between the tall buildings of the two sites. The non-building area maintains a good ventilation environment in the localized areas.

Similarly, a 10m non-building area from the west boundary of Area 117 is maintained which combines with that of the west adjacent Area 116 to form a 20m non-building area. The non-building area maintains a good ventilation environment in the localized areas.

The maintained 10m non-building area of Area 114 and Area 117 are illustrated in **Figure 6** and **Figure 7** respectively.

3.2.2 Set Back from North Site Boundary

As described in the wind flow pattern analysis in Section 3.1.2, the sites are abutting major breezeway to the north (Road D1). To mitigate impedance to downwind development, the residential towers of both Area 114 and Area 117 are set back at least 5m from the north site boundary as illustrated in **Figure 6** and **Figure 7**.

For Area 114, the setback distance of the tower is increased from 4.7m to 5.4m from the baseline scheme to the proposed scheme. For Area 117, the setback distance is increased from 4.1m to 5.1m. The increase in setback distance allows more wind to flow along the breezeway. It is expected to reduce the blockage of wind to the downwind locations.

Regarding the podium, for Area 114, the setback distance of the podium is decreased from 2.8m to 2.4m from the baseline scheme to the proposed scheme. For Area 117, the setback distance is decreased from 2.8m to 2.5m. The decrease is considered minimal and is expected to cause an insignificant effect on the wind environment.

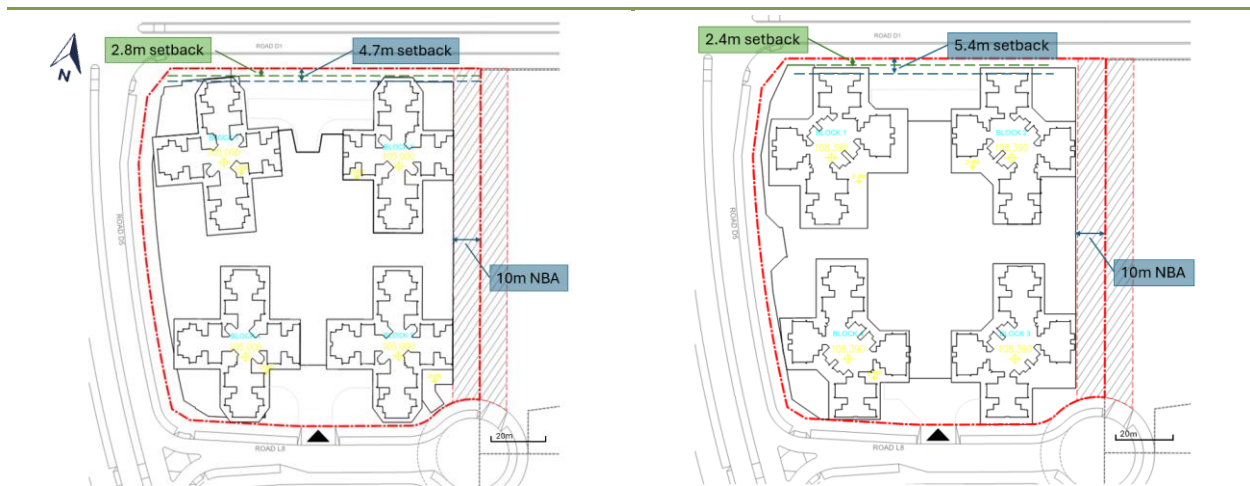


Figure 6 – Master Layout Plan of Baseline Scheme (left) and Proposed Scheme (right) of Area 114



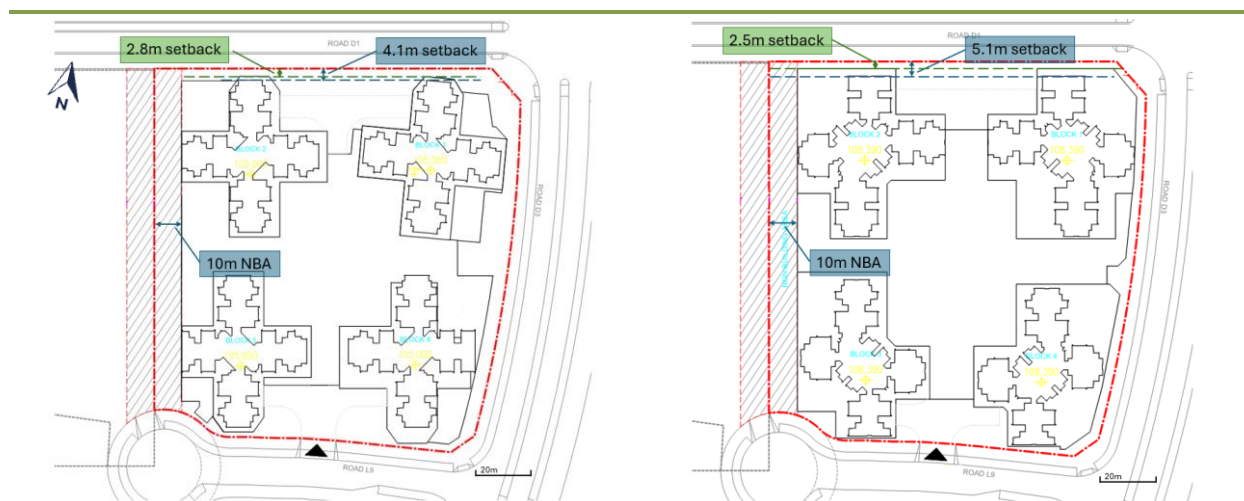


Figure 7 – Master Layout Plan of Baseline Scheme (left) and Proposed Scheme (right) of Area 117

3.3 Minor Height Increase

According to OZP, the maximum height of the proposed development is 105mPD. The building height of the proposed development is 108.39mPD, which exceeds the maximum height of OZP by 3.39m. The increase in height is considered minimal and does not lead to a significant increase in the building's bulkiness.

Under E and ESE wind, the high-level incoming wind is blocked by upwind high-rise residential development such as Area 133 which has a height limit of 125mPD – 135mPD according to approved s.16 application no. A/I-TCE-4. These upwind buildings have a major effect on the wind blockage of high-level wind. The minor increase in height of the proposed development has minimal effect on wind blockage.

Under SE and SSW wind, the high-level incoming wind is blocked by upwind high-rise comprehensive development buildings at the south and southwest of the sites which have a height limit of 145mPD-180mPD. These upwind buildings have a major effect on the wind blockage of high-level wind. The minor increase in height of the proposed development has minimal effect on wind blockage.

Therefore, the minor increase in height is not expected to impede the wind environment of the site and the nearby surroundings.

4.0 Conclusion

According to the site wind availability analysis, the annual prevailing wind of the Development comes from ESE, E and SE directions, and the summer prevailing wind is from SSW, ESE and SE directions. Two schemes, namely baseline scheme and proposed scheme are compared in this appraisal. In the proposed scheme, the 10m non-building area is maintained while the setback distance from the north site boundary is increased to at least 5m.

These good design features aim at reducing potential impedance to surroundings and downwind locations. The good design features in the proposed scheme are summarized below.

- A non-building area of 10m is maintained
- A setback distance of at least 5m of the residential tower from the north site boundary

With the aid of the aforementioned good design features, it is expected that the proposed development does not create an adverse air ventilation impact to the surroundings.

