Public Housing Development at Lei Yue Mun Phase 4

Air Ventilation Assessment Report

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1 Introduction

1.1 Background

1.1.1.1 Hong Kong Housing Authority intends to develop a public housing development (hereafter as "the proposed development") at Lei Yue Mun Phase 4 (hereafter as "the Site"). Figure 1.1 shows the location of the Site and its environs.

1.1.1.2 According to the approved Cha Kwo Ling, Yau Tong & Lei Yue Mun Outline Zoning Plan (OZP) No. S/K15/25, the subject Site is currently zoned "Residential (Group A)" ("R(A)").

1.1.1.3 BMT Hong Kong Limited (BMT) has been commissioned to conduct an Air Ventilation Assessment (AVA) for the proposed development at Lei Yue Mun Phase 4.

1.1.1.4 This study aims to qualitatively and quantitatively evaluate the air ventilation condition of the proposed development and to advise on any adverse effect on wind environment caused by the development and the structure to the immediate local area.

1.2 Development Schemes

1.2.1.1 The proposed development consists of two domestic blocks (Block 6 and Block 7) with 43 domestic storeys and one refuge floor in each block with a building height of 150.0 mPD. Besides, one 8 storeys non-domestic Ancillary Facilities Block (AFB) with a building height of 44.6 mPD is proposed in the west of the subject Site to accommodate kindergarten, study room, Well Being Centre and Estate Management Office Else there is a podium deck to cater the carpark and other facilities at 16.3 mPD with a landscape garden over the covered decks.

1.2.1.2 The General Layout Plan are presented in Appendix A1.

1.3 Broad Approach of AVA Study

1.3.1.1 The methodology of the AVA study strictly follows the guidelines set out in the Technical Circular No. 1/2006 on Air Ventilation Assessments issued by the Government of HKSAR on 19th July 2006 [1].

1.3.1.2 The study approaches are to:

- Review the prevailing wind condition and general wind availability with reference to the best available wind data;
- Identify the prevailing wind condition;
- Identify the wind corridor and review the general wind environment characteristics ;
- Evaluate the wind environment of the subject Site and its surrounding;

- Identify problem areas which warrant attention, and good design features that need to be kept or strengthened;
- Recommend improvements and mitigation measure if any;
- Identify focus area or issue that may need further studies;
- Obtain precise approaching site wind availability data and characteristic information at atmospheric boundary layer for various wind directions accounting for not less than 75% of the annual and summer probable winds
- Assess the wind velocity ratios at the test points at pedestrian level;
- Compare and to analyse the assessment results of the Baseline Scheme and the Proposed Scheme in the view of air ventilation performance;
- Prepare a report documenting the comparison of the assessment results and findings of the Baseline Scheme and the Proposed Scheme

2 Qualitative Assessment - Expert Evaluation

2.1 Wind Availability

2.1.1 Introduction

2.1.1.1 As recommended in “Technical Guide for Air Ventilation Assessment for Developments in Hong Kong” published by Housing, Planning and Lands Bureau (HPLB) and Environment, Transport and Works Bureau (ETWB) [1], weather data provided by Hong Kong Observatory (HKO) [2] and simulated site wind availability data [i.e. simulated by Regional Atmospheric Modelling System (RAMS)] [3] published in the website of Planning Department are acceptable for assessment.

2.1.2 Wind Data from Weather Stations

2.1.2.1 According to the automatic weather stations operated by Hong Kong Observatory (HKO), there are two automatic weather stations within 3.5 km form the site boundary of the subject Site, which can represent the wind availability at lower level. One is Tseung Kwan O Automatic Weather Station while the other one is Kai Tak Automatic Weather Station. Figure 2.1 shows the location of the weather stations.

2.1.2.2 First reference station is Tseung Kwan O Automatic Weather Station, which is adjacent to the Haven of Hope Hospital and its anemometer is at 52 mPD locating about 3.0 km away from the subject Site to the northeast. In consideration of its surrounding topography and the anemometer height, the wind could be slightly affected by the hills locating between Lam Tin and Tseung Kwan O (i.e. Mau Wu Shan with peak at 233 mPD and Black Hill with peak at 304 mPD). The recorded monthly wind data from 2010 to 2019 indicated that wind from 190 degree (45%; i.e. S) dominates in summer months while in non-summer months, winds from 60 degree and 70 degree (33% and 15% respectively; i.e. ENE) dominates with contribution from 20 degree (13%; i.e. NNE). Throughout a year, winds from 60 degree (22%; i.e. ENE) are predominant with contributions from 190 degree (18%; i.e. S).

2.1.2.3 Second reference station is Kai Tak Automatic Weather Station, which is located at the apron of Kai Tak and its anemometer at 16 mPD is located at about 3.2 km away from the subject Site to the northwest. Such station can be considered as the most representative wind data for the site as its location is relatively open. The recorded monthly wind data from 2010 to 2019 indicated that throughout a year, wind from 110 degree (39%; i.e. ESE) dominates with contribution from 100 degree (20%; i.e. E). In summer months, winds from 130 degree (30%; i.e. SE) dominates with contribution from 110 degree and 230 degree (18%; i.e. ESE and SW respectively) while in non-summer months, wind from 110 degree (50%; i.e. ESE) dominates with contribution from 100 degree (28%; i.e. E).

2.1.3 RAMS Data

2.1.3.1 According to the simulated Site Wind Availability Data (i.e. RAMS) for Hong Kong published by Planning Department [3], the subject Site is in square grid cell

(093,037). The wind data shows that E and ENE would be the dominant annual and winter prevailing winds while wind from southwest quarter (i.e. WSW, SW) would be the dominant summer prevailing wind with some contributions from E. Figure 2.2 illustrates the wind rose from RAMS at different levels, and also prevailing winds in a year, summer and winter tabulates in below Table 2.1.

Table 2.1 Summary of RAMS Wind Data

Grid 087,045	Annual	Summer [1]	Winter [2]
At 200 m	E (22.8%) ENE (16.7%) ESE (8.9%)	WSW (12.6%) SW (10.6%) E (10.5%)	ENE (26.9%) E (23.4%) NE (17.5%)
At 300 m	E (23.0%) ENE (16.7%) ESE (8.9%)	WSW (12.2%) SW (11.0%) E (10.7%)	ENE (27.0%) E (23.9%) NE (17.6%)
At 500 m	E (20.0%) ENE (15.1%) ESE (10.1%)	SW (14.3%) SSW (14.2%) S (9.5%)	ENE (24.6%) E (23.7%) NE (16.1%)

Notes: 1. Winter represents December to February while Summer represents June to August.

2.1.4 Wind Data from Previous Study

2.1.4.1 There are several air ventilation assessments in Kowloon East and Tseung Kwan O area, only few of them can be considered as reference. Their wind availability are summarized in below and their locations of study areas area indicated in Figure 2.3.

- Experimental Site Wind Availability Study for Tseung Kwan O, Hong Kong [4]
- Term Consultancy for AVA Services – Expert Evaluation on Air Ventilation Assessment of Ngau Tau Kok and Kowloon Bay [5]
- Kai Tak Planning Review [6,7];

2.1.4.2 According to the report of Experimental Site Wind Availability Study for Tseung Kwan O [4], where is about 3.3 km away from the subject Site to its north-eastern side. The wind data measured by Hong Kong Observatory at Waglan Island was employed in the experiment. The experimental results show that at 500 mPD, wind from east direction (~23.4%) dominates in a year with some contribution from east-northeast (~15.1%) and north (~12.1%). While in summer, wind from southwest direction (~14.5%) dominates with contributions from east (~13.8%) and south (~10.1%).

2.1.4.3 In the Expert Evaluation and Advisory Report for Proposed Amendments to Ngau Tau Kok and Kowloon Bay [5], where the concerned areas are located to the northwest of subject Site with a separation distance of approximately 3.6 km. It mentioned that the wind data at various height (i.e. 60 m, 120 m and 450 m) is with reference to the experimental data conducted by the CLP Power Wind/ Wave

Tunnel Facility at The Hong Kong University of Science and Technology for the Ngau Tau Kok and Kowloon Bay Study Area. It is indicated that at all presented level in the report, the annual prevailing wind directions are north-easterlies, easterlies and south-easterlies while the summer prevailing winds are easterlies, south-easterlies, southerlies and south-westerlies.

2.1.4.4 According to the Air Ventilation for Kai Tak Development (Feb 2010) [7], it was with reference to the Experimental Site Wind Availability Study for Proposed Kai Tak Development (Sep 2009) [8]. The Study Area A listed in the aforementioned report covered the project sites and the wind data was with reference to Kai Tak Automatic Station, which distance between the subject Site and the measurement point at Study Area A of the aforementioned Experimental Site Wind Availability Study is about 3.2 km (to the NW of the subject Site). The results of site wind availability at 150 m for the relevant study area show that the annual prevailing is coming from ESE direction (19.2%) with contributions from E (17.5%) and SE (13.9%) while the summer prevailing is coming from SE direction (19.0%) with contributions from WSW (12.7%) and ESE (11.4%). It concluded that the annual prevailing winds are south-east quadrant in major and the summer prevailing winds are dominated in the south-east and south-west quadrants.

2.1.5 Conclusion

2.1.5.1 In summary, different wind data references have been reviewed. Table 2.2 summaries the annual and summer prevailing wind directions of the different wind data references discussed in above.

Table 2.2 Summary of Wind Data References

References			Annual Prevailing Wind	Summer Prevailing Winds
Weather Stations	Tseung Kwan O [2]	52mPD	60 (ENE) 22% 190 (S) 18%	190 (S) 45%
	Kai Tak [2]	16mPD	110 (ESE) 39% 100 (E) 20%	130 (SE) 30% 110 (ESE) 18% 230 (SW) 18%
RAMS	Grid Cell 093,037 [3]	200m, 300m	E 22.8%, 23.0% ENE 16.7%, 16.7% ESE 8.9%, 8.9%	WSW 12.6%, 12.2% SW 10.6%, 11.0% E 10.5%, 10.7%
		500m	E 20.0% ENE 15.1% ESE 10.1%	SW 14.3% SSW 14.2% S 9.5%
Previous Studies	Tseung Kwan O [4]	500mPD	E 23.4% ENE 15.1% N 12.1%	SW 14.5% E 13.8% S 10.1%
	Ngau Tau Kok and Kowloon Bay [5]	60m, 120m and 450m	NE -- E -- SE --	E -- SE -- S -- SW --
	Kai Tak Development [7,8]	150m	ESE 19.2% E 17.5% SE 13.9%	SE 19.0% WSW 12.7% ESE 11.4%

2.1.5.2 In consideration of urban morphologies and their relevancy, it is concluded that the RAMS data [3] and wind data used in Kai Tai Development [7,8] are the most representative reference, which will be adopted in this study. The other wind data sources are considered as not relevant due to their localities and the impacts on the topography. Thus the annual prevailing is coming from ENE, E, ESE and SE direction while the summer prevailing is coming from E and ESE, SE, SW and WSW direction.

2.2 Site Environs and Key Wind Characteristic

2.2.1 Site Location and Surrounding Environment

2.2.1.1 The subject Site is bounded by Yan Wing Street, Cha Kwo Ling Road and access/ estate road to Lei Lung House of Lei Yue Mun Estate in Yau Tong. The subject Site has an area of about 11,000 m^2 with heavy vegetation, rocky slopes and nullah along east boundary, where it is currently zoned as “Residential (Group A)”.

2.2.1.2 To the immediate north, it is known as Lei Wong House of Lei Yue Mun Phase 3 with a building height of 142.0 mPD. To the immediate northeast to east, it is Lei Yue Mun Estate with building height ranged from 125.8 mPD up to 150.5 mPD. To the south to southeast across the access/ estate road to Lei Lung House of Lei Yue Mun Estate, they are public toilet, kindergarten with height of 8.2 mPD, church with height of 10.0 mPD, Lei Yue Mun Municipal Services Building with height of 38.8 mPD and a residential development named One East Coast with 2 residential towers of less than 100 mPD. To the further south-southwest, it is Sam Ka Tsuen Typhoon Shelter. To the southwest to west across Cha Kwo Ling Road, they are Yau Tong Industrial Building Block 1 with height of 51.2 mPD and Football Field (at 20.2 mPD) of Sam Ka Tsuen Recreation Ground. To the northwest across Yan Wing Street, they are St. James Church with building height of 36.8 mPD and Yau Tong Centre with building height of 51.2 mPD.

2.2.1.3 Figure 1.1 illustrates the location of the Site and its environs.

2.2.2 General Wind Environment Characteristics

2.2.2.1 In respect of the topography of the Yau Tong area, its northeast and east portion are covered by hilly topographies. It is sloped upwards from southwest to northeast, then reach Devil’s Peak (up to 222 mPD) to the east and Chiu Keng Wan Shan (up to 247 mPD) to the further northeast. Hence winds from northeast as well as east quarter could be limited due to the flow separation while approaching the ridge. The slope of the nearest peak of Devil’s Peak is about 26 degrees downhill to existing Lei Yue Mun Estate. Wind either flows over hills or bends around the hill and creates turbulence and re-circulated wind (i.e. lee eddies) when the wind moves downhill towards Yau Tong. In general, the wind from hill side will be slowed and weakened by the hills. However there is a valley between Devil’s Peak and Chiu Keng Wan Shan. The presence of the valley could redirect some local winds, which speed up when passing through the valley. Figure 2.4 shows the digital elevation map of Yau Tong area. Evidently Yau Tong is next to the waterfront, it could be easier for the winds entering the Yau Tong area from sea side through Sam Ka Tsuen Typhoon Shelter, which is likely a favorable air path in particular for summer prevailing wind from sea side. Figure 2.5 illustrates the topography of Yau Tong area and its surroundings.

2.2.2.2 In consideration of the urban morphologies of the Yau Tong area, the street array is irregular, which is not favorable for wind penetration. Although Lei Yue Mun Road is the major road of the Yau Tong area as a major ventilation corridor throughout the area, it is mainly beneficial to the ventilation at northern part of the area rather than the area to the southwest. Nevertheless there are provision of public waterfront promenade with not less than 15 m wide as well as non-building areas with not less than 15 m wide within the Comprehensive Development Areas (CDAs) to the southwest near waterfront. The promenade and Non-Building Areas (NBAs) can facilitate the summer wind entering from sea side towards the inland areas, which locations of promenade and NBAs are illustrated in Figure 2.6.

2.2.2.3 Regarding the open space, the major one is Sam Ka Tsuen Recreation Ground, while there are some minor one, including Yau Tong Centre Rest Garden, the promenade around Sam Ka Tsuen Typhoon Shelter and Lei Yue Mun Rest Garden. With the connection of open space (especially Sam Ka Tsuen Recreation Ground) aforementioned NBAs and nearby roads/ streets, air paths are created, which would improve wind penetration in the area through the roads/ streets including Cha Kwo Ling Road, Yan Wing Street, Ko Fai Road, Tung Yuen Street, Sze Shan Street and Yan Yue Wai, etc., promoting air movement in the area.

2.2.2.4 Figure 2.6 shows the general wind environment of the area.

2.2.3 General Site Wind Environment

2.2.3.1 Aforesaid that the wind availability in the area mainly come from ENE, E, ESE and SE directions in a year while winds from E, ESE SE, SW and WSW direction are available in summer period.

2.2.3.2 Under ENE and E wind directions, the hilly terrain may weaken the air flows towards the area. ENE wind could flow through the valley between hills and reach Yau Tong area, then wind either flow along Ko Chiu Road towards the sea or flow through space to the north of Lei Yue Mun Estate and flow over the low-rises of Yau Tong Centre and St. James Church as well as Sam Ka Tsuen Recreation Ground, then towards the sea. Else, some ENE and E winds would also penetrate the space to the north of Lei Lung House at Lei Yue Mun Estate to reach the subject site then further downstream to Sam Ka Tsuen Recreation Ground. Figure 2.7 shows the flow pattern under ENE and E prevailing wind while Figure 2.8 supplements a sectional diagram of ENE and E prevailing wind flow through the valley to the area.

2.2.3.3 Under ESE wind conditions, wind could be limited in the area as it is likely in connection with the hilly terrain, yet some weaken winds might reach the subject Site and the downwind area at lower level. Alternatively, wind could flow through the valley between hills and reach the area. Some downhill winds may pass through the spaces between buildings formulating ventilation path at higher level and flow towards sea side, which is similar to ENE/ E wind. Nevertheless the area will generally experience low wind environment at lower level. High-altitude southeast easterly likely skim over the buildings and towards sea side. Further, some ESE wind could reach the subject site and part of Cha Kwo Ling Road via the space to the south of Lei Lung House at Lei Yue Mun Estate. Figure 2.9 shows the flow pattern under ESE prevailing winds.

2.2.3.4 Under SE wind condition, wind likely comes along the hill side and reaches the subject Site, then flows towards St. James Church, through Sam Ka Tsuen Recreation Ground and along Cha Kwo Ling Road. Figure 2.10 presents the flow pattern under SE prevailing wind and Figure 2.11 shows the sectional diagram of SE prevailing wind flow through the area.

2.2.3.5 Under SW and WSW wind conditions, wind easily enters the area through Sam Ka Tsuen Typhoon Shelter, nevertheless winds could be slightly influenced by the One East Coast to the south of the subject Site. Such residential development would impede the wind reaching the subject Site and other inland area. It is also expected that the wind flow along Shung Shun Street. The wind could rather reach the subject Site via Shung Shun Street, but then encounter the building block of Lei Yue Mun Phase 3. The wind could then reach the downwind area through Yan Wing Street. Alternatively, wind could flow through Yan Yue Wai, NBA2 and Sam Ka Tsuen Recreation Ground to reach the subject Site, then either flow along Yan Wing Street or Cha Kwo Ling Road towards inland area. Figure 2.12 illustrates the flow patterns under present flow pattern under SW/ WSW prevailing wind.

2.3 Potential Impacts

2.3.1.1 The hilly topographies and urban morphologies of Yau Tong could limit the wind from the hill side, however its location is close to water front and wind could easily enter the area from sea side. With the proposed development on site, northeast easterly, easterly and southeast easterly could be limited as the hilly terrain weaken the air flow towards the area. Even though the northeast easterly, easterly and southeast easterly flow through the valley between hills, the subject Site is at the lee side of the existing Lei Yue Mun Estate and the flow mainly flow over the low-rises towards the side sea. Alternatively, some northeast easterlies and easterlies would penetrate the space around Lei Lung House and reach the subject Site. Such with the proposed development on site, influencing the flow to Sam Ka Tsuen Recreation Ground is noticed under ENE and E winds. Nevertheless the wind flow from the valley can still supply some winds to Sam Ka Tsuen Recreation Ground. Further, the southeast easterly, southeasterly, southwesterly and southwest westerly could be redirected by the proposed development. Under ESE/ SE wind, the wind will encounter the proposed development, less wind flow to St. James Church and Yan Wing Street while more flow is redirected to Cha Kwo Ling Road and Sam Ka Tsuen Recreation Ground. For the south westerly and southwest westerly, channelization could be occurred at Yan Wing Street, but not Cha Kwo Ling Road (which part is adjacent to the perimeter of the subject Site) where is relatively spacious, even though under ESE/ SE winds, channelization is unlikely.

2.3.1.2 In summary, it is expected that the localized wind distribution and wind flow to St. James Church, Yan Wing Street, Sam Ka Tsuen Recreation Ground and Cha Kwo Ling Road could be influenced especially under the ESE, SE, SW and WSW wind conditions. Lessening the wind flow to St. James Church and Yan Wing Street is relatively obvious than the impacts on Sam Ka Tsuen Recreation Ground and Cha Kwo Ling Road.

2.4 Good Design Features

2.4.1.1 The uncertainties on site conditions and existing site constraints, such as its small scale, existing drainage reserve and slopes, basically confine the building planning and design. Nevertheless some viable design features with respect to the urban morphology and the concerned prevailing wind directions have been considered so as to remedy the potential impacts/ problematic areas in particular for nearby St. James Church and Yan Wing Street (refer to Section 2.3).

2.4.1.2 Reservation of wider building separation intends for promoting wind penetration. According to the layout plan (Appendix A), there is a building separation between Blocks 6 and 7 to encourage the air movement and allow ENE/ E/ ESE wind penetration as well as further downstream to St. James Church and Sam Ka Tsuen Recreation Ground. It is expecting that this building separation within the proposed development allows air path flow passing through between two domestic blocks and allows the wind flowing to Yan Wing Street as well as St. James Church and Sam Ka Tsuen Recreation Ground. Given that the building separations between domestic blocks are not fully aligned, there could be certain reduction.

2.4.1.3 As there is a Drainage Reserve (DR) in the western part of the subject Site, a minimum 5.1m clear headroom is required for Drainage Services Department's future maintenance. As such, void is introduced at M/F of Block 7 above the Drainage Reserve. The proposed void is believed to allow much wind permeation across lower portion of Block 7 and improve the wind environment within the subject Site.

2.4.1.4 The landscape garden at upper ground floor level (+20.8mPD) could also act as ventilation bay and effectively enhance the wind environment of the proposed development and the neighbourhood.

2.4.1.5 Besides, the building configuration and disposition of domestic blocks are optimised to provide wind corridors across the subject Site. For example, the domestic blocks are oriented to capture the prevailing winds without substantial impediment to the as-built surroundings.

3 Quantitative Assessment – Initial Study

3.1 Study Scheme

3.1.1 Introduction

3.1.1.1 This Initial Study aims to carry out a quantitative Air Ventilation Assessment, using Computational Fluid Dynamic (CFD), comparing two design schemes, i.e. the Baseline Scheme and the Proposed Scheme with reference to the Technical Circular for Air Ventilation Assessments [1].

3.1.2 Baseline Scheme

3.1.2.1 The Baseline Scheme of the Initial Study consists of 3 domestic blocks with building height from 121.1 mPD to 140.3 mPD. The master layout plan of the Baseline Scheme is indicated in Appendix A2.

3.1.3 Proposed Scheme

3.1.3.1 The Proposed Scheme of the Initial Study refers to the development schemes as mention in Section 1.2, which mainly consists of two domestic blocks with a building height of 150.0 mPD and one Ancillary Facilities Block (AFB) with a building height of 44.6 mPD.

3.2 Methodology and Assumptions

3.2.1 Computational Fluid Dynamics (CFD) Approach

3.2.1.1 With reference to the Technical Circular for Air Ventilation Assessments [1], CFD method is used as "fit for the purpose".

3.2.1.2 The optimum CFD Model is created based on "the Quality Assurance Manual on Environment Wind Studies (AWES-QAM-1-2001)" [9] and the "Guide for the Verification and Validation of Computational Fluid Dynamics Simulations (American Institute of Aeronautics and Astronautics 1998) [10]". The details of CFD modelling verification are described in the following sections.

3.2.2 Domain of CFD Model

3.2.2.1 Both the width and length of the domain of the computational model is 2500m, while the height of the model is 1000m. Based on the updated layout design, the maximum building height within the site is 150mPD. The extent of the assessment area and surrounding area are identified as approximately 200m and 500m respectively. All existing and planned buildings and topographical features are included within the assessment area and surrounding area. Appendix B presents different views for the CFD model of bounding surfaces for the Baseline Scheme and the Proposed Scheme. Figure 3.1 shows the extent of the assessment and surrounding areas.

3.2.3 Validity of CFD Modelling

3.2.3.1 Reference [11] recommends benchmark tests of the partial differential equations and their finite volume representation to investigate any CFD coding errors. However, for this project, one of the most reliable and fully verified commercial 3D CFD tools in Fluent v17.1, which is widely used in Hong Kong & Asia Pacific, has been adopted. Therefore, verification of the code is not required for the present analysis. For an extensive description of the Fluent code verification and benchmark tests, details are referred to reference [11].

3.2.4 General Settings of CFD Model

3.2.4.1 The CFD model was generated with the combination of tetrahedral and prism cells. Four layers of equally spaced prism cells are generated from the ground level up to 2m above the ground level for the entire computational model. This was intended to predict the steep velocity gradient close to the ground level. The rest of the computational volume was filled with high quality un-skewed tetrahedral cells. The grid size on the proposed development was the smallest with a minimum size of 0.5m. The mesh size was expanded out from the proposed development with an expansion ratio of approximately 1.05. For this study, about 9.75 million-cells hybrid CFD models were created.

3.2.4.2 CFD modelling is a three dimensional turbulent air flow modelling based on steady state RANS equation. The Realizable k-ε turbulence model and a 2nd-order discretization scheme were used in the simulations. The convergence criterion used was the requirement that the sum of the absolute normalised residuals be less than $1x10^{-3}$.

3.2.4.3 Illustrations of the model with mesh generated are shown Appendix B.

3.2.5 Boundary Conditions

3.2.5.1 For the upwind boundary (i.e. velocity inlet), precise wind availability and characteristic information in terms of wind rose (directions, magnitudes and frequencies), wind profiles and wind intensity profiles are complied with using information obtained from the RAMS Data [3].

3.2.5.2 RAMS Data in grid cell (093,037) at 500m height was adopted as wind boundary condition for the Initial Study. In order to comply with the Technical Circular for Air Ventilation Assessment [1], not less than 75% of the annual probable winds will be accounted for which includes the following eight wind directions (i.e. E, ENE, ESE, NE, SSW, SW, SE and NNE) covering 78.0% of the total availability of the Site. Meanwhile, not less than 75% of summer probable winds will be accounted for which includes the total of eight wind directions (i.e. SW, SSW, S, WSW, E, ESE, SSE, and SE) covering 79.5% of the total wind availability of Site. The considered wind directions and their annual and summer probabilities are shown in Table 3.1.

Table 3.1 Wind Boundary Conditions Applied in the Initial Study

No.	Annual		Summer	
	Wind Boundary Condition	Annual Probability	Wind Boundary Condition	Annual Probability
1	E, 90°	20.0%	SW, 225°	14.3%
2	ENE, 67.5°	15.1%	SSW, 202.5°	14.2%
3	ESE, 112.5°	10.1%	S, 180°	9.5%
4	NE, 45°	9.0%	WSW, 247.5°	9.3%
5	SSW, 202.5°	6.2%	E, 90°	9.0%
6	SW, 225°	6.1%	ESE, 112.5°	8.8%
7	SE, 135°	6.0%	SSE, 157.5°	7.8%
8	NNE, 22.5°	5.5%	SE, 135°	6.6%
	Total:	**78.0%**	**Total:**	**79.5%**

3.2.5.3 In regard of the assessing approaching wind directions, three categories (i.e. Category 0, 1, 2) of profile for wind speed and turbulent intensity are applied to determine the wind and turbulence profile for the wind from those approaching wind directions. The approach profiles for wind speed and turbulent intensity extracted from RAMS Data are presented in Appendix B.

3.2.6 Test points

3.2.6.1 Wind Velocity Ratios (VR)s will be adopted as an indicator of wind performance for the Site and its surrounding to show the amount of wind available at pedestrian level. It is defined as V_p/V_∞ (V pedestrian/V infinity). V_∞ captures the wind velocity at the top of the wind boundary layer (i.e. at over 500 m) and is taken as the wind availability of the subject Site. Vp captures the wind velocity at the pedestrian level (i.e. 2 m above ground).

3.2.6.2 Aforementioned the assessment area is approximately 200 m from the site boundary so as to cover more pedestrian areas (Figure 3.1). The test points mainly at the site boundary are finely positioned to provide enough wind characteristic information around the subject Site, which are known as perimeter test points. These points are used to assess Site Spatial Average Velocity Ratio (SVR) and give a hint of how the development proposal may affect the wind environment of its immediate vicinity. The perimeter test points are labelled as ID# P01 – P38 at interval of 10 to 11 m alongside the site boundary and used to assess the SVR.

3.2.6.3 The assessment area covers neighbouring roads as well as car parking area, open areas and adjacent pedestrian access/ footpaths. The test points distributed within the assessment area are considered as overall test points with ID# O01 – O61 at interval of 30 to 40 m. The overall test points (ID#O01-O61) and perimeter test points (ID#P01 – P38) are used to assess Local Spatial Average Velocity Ratio (LVR). This gives a hint of how the proposed development may affect the wind environment of the local area. Figure 3.2 shows the distribution of the perimeter and overall test points for the AVA study. Furthermore, there are special test points within the Proposed Scheme, aiming to review the wind penetration of the proposed development. All test points are elevated at 2 m above ground.

3.3 Results and Key Findings

3.3.1 Local Spatial Average Velocity Ratios (LVR)s

3.3.1.1 Local spatial average Velocity Ratios (LVR)s were determined from all perimeter and overall test points in order to quantify the air ventilation effects of the proposed development on the assessment area. The annual and summer LVRs for the Baseline Scheme and the Proposed Scheme are tabulated in Table 3.2.

Table 3.2 Summary of Local Spatial Average Velocity Ratios

	Annual		Summer	
	Baseline Scheme	Proposed Scheme	Baseline Scheme	Proposed Scheme
LVR	0.12	0.13	0.16	0.16

3.3.1.2 The annual LVRs for Baseline Scheme and Proposed Scheme are 0.12 and 0.13 respectively, whilst their directional LVRs range from 0.07 to 0.18 and 0.08 to 0.18 respectively. In terms of the summer LVRs, the Baseline Scheme and the Proposed Scheme are both 0.16, whilst the respective directional LVRs are ranging from 0.07 to 0.21 and 0.08 to 0.19. The annual, summer and their directional LVRs in the Proposed Scheme are basically similar to those of Baseline Scheme.

3.3.2 Site Spatial Average Velocity Ratios (SVR)s

3.3.2.1 Site spatial average Velocity Ratios (SVR)s were determined for the subject Site area in order to quantify the air ventilation effects of the Proposed Development on its immediate surrounding areas. The annual and summer SVRs for the Baseline Scheme and the Proposed Scheme are tabulated in Table 3.3.

Table 3.3 Summary of Site Spatial Average Velocity Ratios

	Annual		Summer	
	Baseline Scheme	Proposed Scheme	Baseline Scheme	Proposed Scheme
SVR	0.10	0.11	0.16	0.15

3.3.2.2 The annual SVRs for Baseline Scheme and Proposed Scheme are 0.10 and 0.11 respectively, whilst their directional LVRs range from 0.04 to 0.22 and 0.05 to 0.20 respectively. Under summer condition, SVRs of Baseline Scheme and Proposed Scheme are 0.16 and 0.15 respectively, and their directional SVRs vary from 0.04 to 0.25 and 0.05 to 0.23 respectively. The simulation result indicates that the wind environment of the immediate vicinity of the subject Site are comparable under Baseline Scheme and Proposed Scheme.

3.3.2.3 The VRs of the overall, perimeter, special test points under each wind boundary condition are summarised in Appendix C. The velocity ratio contour and vector plots are illustrated in Appendix D.

3.3.3 Overall Analysis

Annual Condition

3.3.3.1 Under annual condition, the LVRs of the of the Baseline Scheme and Proposed Scheme are 0.12 and 0.13 respectively, while their corresponding SVRs are 0.10 and 0.11. Compared to the LVRs, the lower SVRs in both schemes suggests that wind environment of the subject Site and its immediate vicinity are worse than the general wind environment of the whole assessment area. That is mainly because half of the tested annual prevailing winds are from N to E sector, which would be weaken by the hilly terrain (i.e. Devil's Peak and Chiu Keng Wan Shan). Although some of the prevailing winds from N to E sector could still make it to the assessment area, the subject Site still falls into the wind shadow caused by its surrounding high-rise development (e.g. Lei Wong House of Lei Yue Mun Phase 3, Lei Yue Men Estate and Yau Tong Centre), thus the ventilation performance of the study Site is affected. Nevertheless, SE wind is the only annual prevailing wind that the directional SVR is higher than the corresponding directional LVR, that gives a hint that the subject Site and its immediate vicinity could enjoy better wind environment than the whole assessment area under SE wind. This is because the subject Site is located in upwind area under SE wind so there is no significant obstacle to block the incoming wind except the hilly terrain to the southeast of the subject Site.

3.3.3.2 Cha Kwo Ling Road and Sze Shan Street are the major wind corridor of the assessment area as they are observed with high VRs under SE wind condition. Open spaces in the assessment area are also playing significant role to allow air flow to enter into the assessment. For example, Sam Ka Tsuen Recreation Ground are having relative high VR under ENE wind, while air flow are obviously penetrating to the subject Site via Sam Ka Chuen Typhoon Shelter under ESE and SSW winds.

3.3.3.3 The annual LVRs for Baseline Scheme and Proposed Scheme are 0.12 and 0.13 respectively, while their summer LVRs are both 0.16. Meanwhile, the annual SVRs for Baseline Scheme and Proposed Scheme are 0.10 and 0.11 respectively, while their summer SVR are 0.16 and 0.15. This suggests that the whole assessment area as well as the subject Site and its immediate vicinity would have a better annual wind environment with adoption of Proposed Scheme. When in summer, the ventilation performance of the assessment area and the subject Site are basically similar.

Summer Condition

3.3.3.4 Under summer condition, the LVRs for both schemes are 0.16, while the SVRs for Baseline Scheme and Proposed Scheme are 0.16 and 0.15 respectively. As there is no or little difference between LVR and SVR in summer, the wind environment of the assessment and subject Site and its immediate vicinity are generally similar.

3.3.3.5 It is also noted that the assessment area and subject Site would achieve obvious higher VRs in summer compared to annual condition, which indicates that the summer wind environment surpass that of annual condition. That is mainly because the assessment area is located near the sea where most of the summer prevailing winds come from, while most of the annual prevailing winds would be obstructed by the hilly terrain in the upwind area. Thus the assessment area and the subject Site would generally experience better wind environment in summer.

3.3.3.6 Similar to annual condition, Sam Ka Chuen Typhoon Shelter and Sam Ka Tsuen Recreation Ground provide large scale of open space for the air flow to enter into assessment area under SW, SSW and S winds. Meanwhile, the CDAs zone near the waterfront could effectively capture the incoming winds from the sea as flow paths are formed in Yan Yue Wai and Shung Wo Path. Other effective wind corridors in the assessment area include Cha Kwo Ling Road and Sze Shan Street.

3.3.3.7 The summer LVRs for Baseline Scheme and Proposed Scheme are both 0.16, while their summer SVRs are 0.16 and 0.15 respectively. This suggests that the ventilation performance between two schemes are basically similar. As the subject Site and the assessment area are located in the upwind area, their wind patterns would not be largely affected by the design schemes of the proposed development since the incoming prevailing winds could reach to the assessment area without too much obstruction, thus there is just minor VRs difference between Baseline Scheme and Proposed Scheme.

3.3.4 Summary

3.3.4.1 The LVR and SVR of Baseline Scheme and Proposed Scheme are tabulated in Table 3.4.

Table 3.4 Summary of LVR and SVR of Baseline Scheme and Proposed Scheme

	Annual		Summer	
	Baseline Scheme	Proposed Scheme	Baseline Scheme	Proposed Scheme
LVR	0.12	0.13	0.16	0.16
SVR	0.10	0.11	0.16	0.15

3.3.4.2 It is observed that the LVR and SVR would be higher under summer condition, which indicates that the subject Site and the assessment area would have better wind environment in summer compared to annual condition. Besides, the general annual wind environment of the assessment area would be better than that of the subject Site, while their wind environment are basically comparable in summer.

3.3.4.3 In comparison between Baseline Scheme and Proposed Scheme, it could be concluded from Table 3.4 that the Proposed Scheme would achieve better wind environment through the year, while the wind environment between two schemes are comparable in summer.

4 Conclusion

4.1.1.1 This AVA study investigates the pedestrian wind environment and provides the necessary information for a balanced decision on the overall planning and design process. It also identifies the ventilation corridors and wind availability in the assessment area.

4.1.1.2 The subject Site is bounded by Yan Wing Street, Cha Kwo Ling Road and access/ estate road to Lei Lung House of Lei Yue Mun Estate in Yau Tong.

4.1.1.3 Two schemes (i.e. Baseline Scheme and Proposed Scheme) have been reviewed in this study. The Baseline Scheme consists of 3 domestic blocks with building height from 121.1 mPD to 140.3 mPD. The Proposed Scheme mainly consists of two domestic blocks with a building height of 150.0 mPD and one Ancillary Facilities Block (AFB) with a building height of 44.6 mPD.

4.1.1.4 With reference to best available wind data in previous experimental study, it is found that the annual prevailing wind in the area come from ENE, E, ESE and SE while the summer prevailing wind come from E, ESE, SE, SW and WSW.

4.1.1.5 In consideration of the surrounding environment and prevailing wind directions, adequate spacing between buildings and nearby buildings will promote air movement while increasing building mass permeability allow better wind penetration.

4.1.1.6 According to the simulation result, the annual LVR and SVR of Proposed Scheme is 0.13 and 0.11 respectively, comparing 0.12 and 0.10 of Baseline Scheme. In terms of the summer condition, the LVR and SVR of the Proposed Scheme are 0.16 and 0.15 respectively, comparing 0.16 and 0.16 of Baseline Scheme. The quantitative assessment results have demonstrated that the general wind environment of the subject Site would be better in summer, while the proposed development and the assessment area would achieve better ventilation performance with the adoption of Proposed Scheme, which has a reduction of massive building bulk.

4.1.1.7 In summary, with adoption of the Proposed Scheme, no significant air ventilation impact upon the assessment area is anticipated. And it is expected that the overall ventilation performance of the Proposed Scheme would be generally better than that of Baseline Scheme.

5 References

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Figures

Public Housing Development
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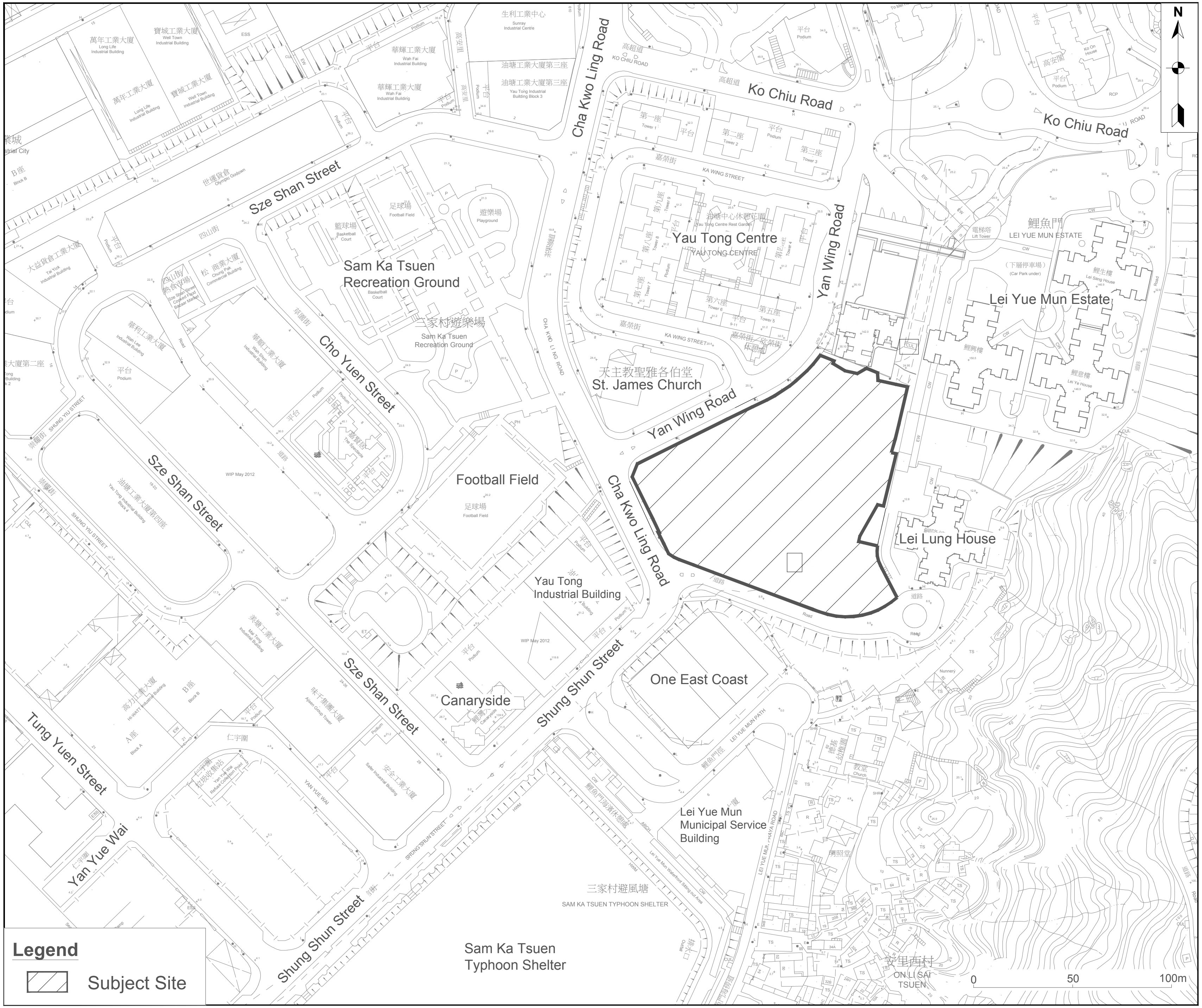
Air Ventilation Assessment
Initial Study Report

Site Location and its Environs

Figure 1.1



Scale: As shown

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Air Ventilation Assessment Initial Study Report

Location of the Weather Stations

Figure 2.1

Legend:

● Automatic Weather Station ● Subject Site

Scale: As Shown

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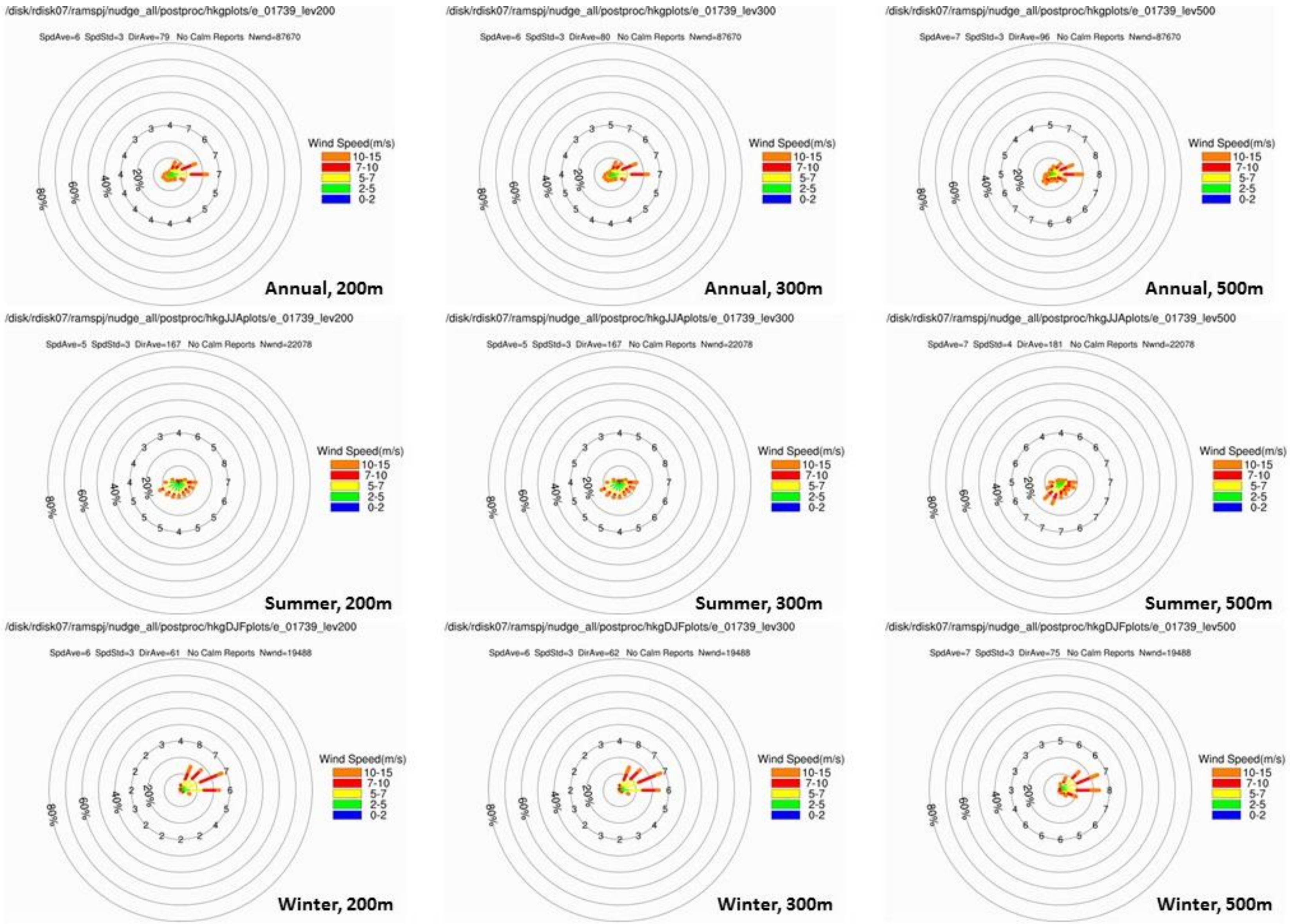
Air Ventilation Assessment Initial Study Report

Wind Rose form RAMS

Figure 2.2



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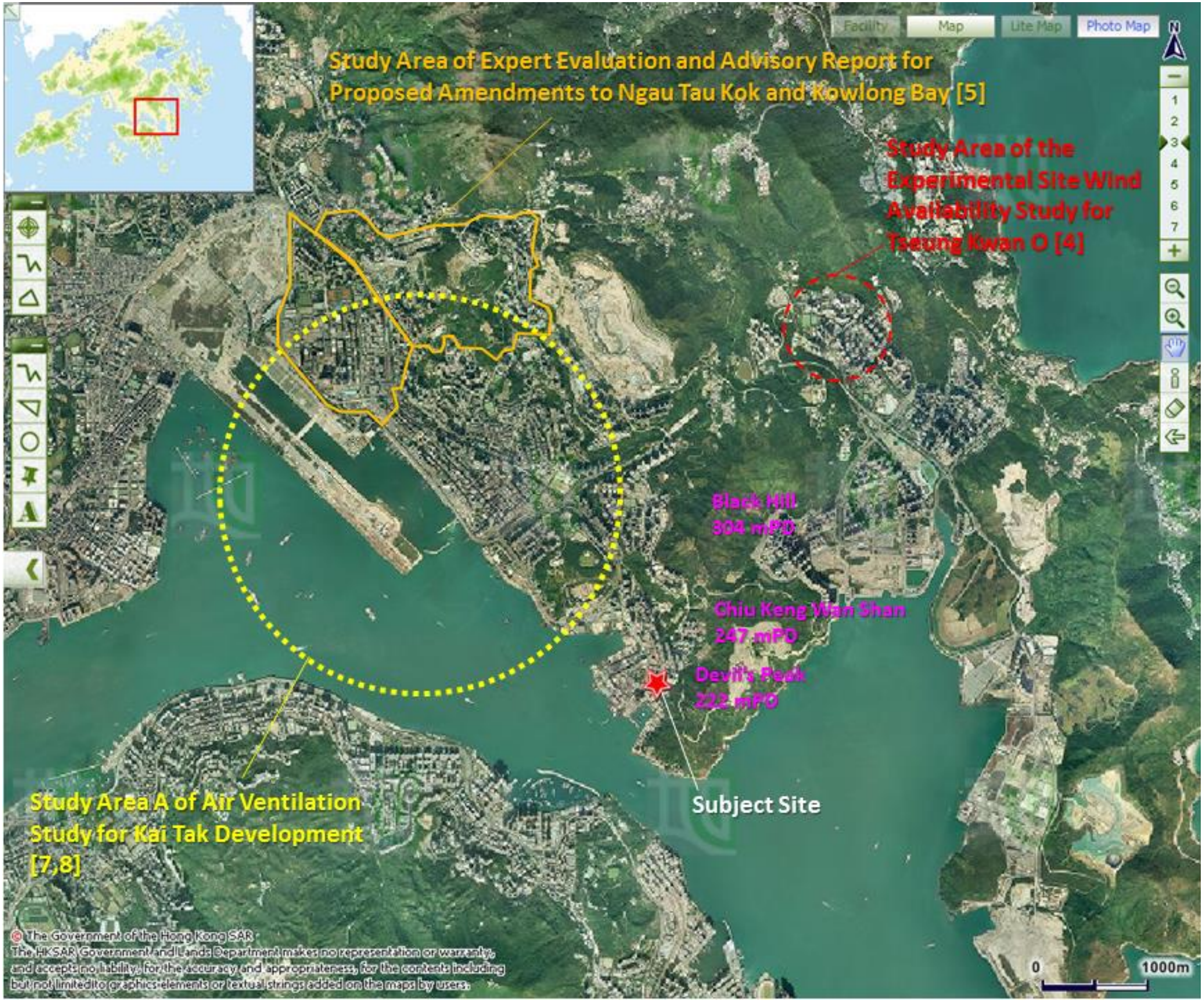
Study Areas in the Previous Studies

Figure 2.3



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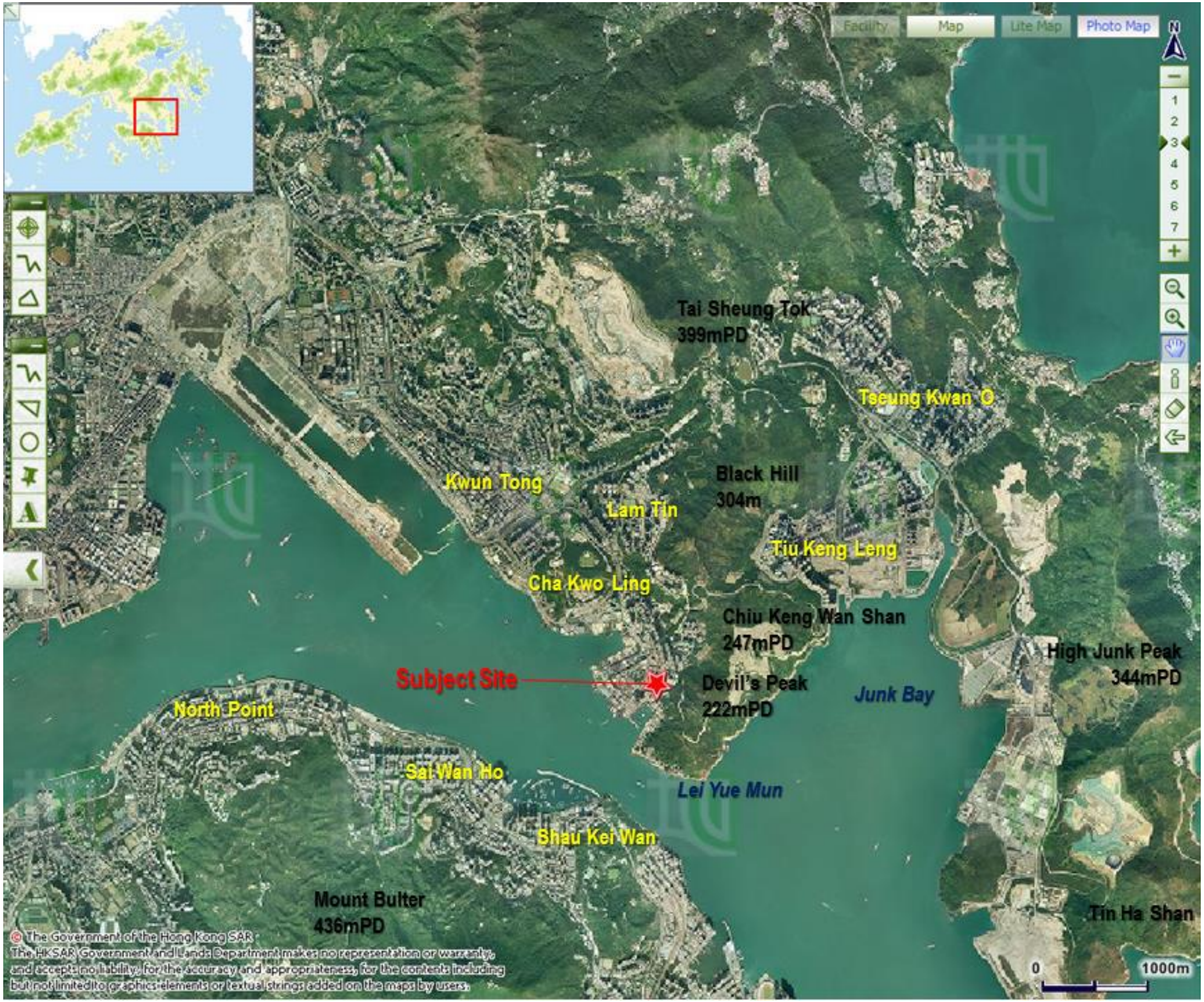
Initial Study Report

Surrounding Topography

Figure 2.5



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Air Ventilation Assessment Initial Study Report

General Wind Environment

Figure 2.6

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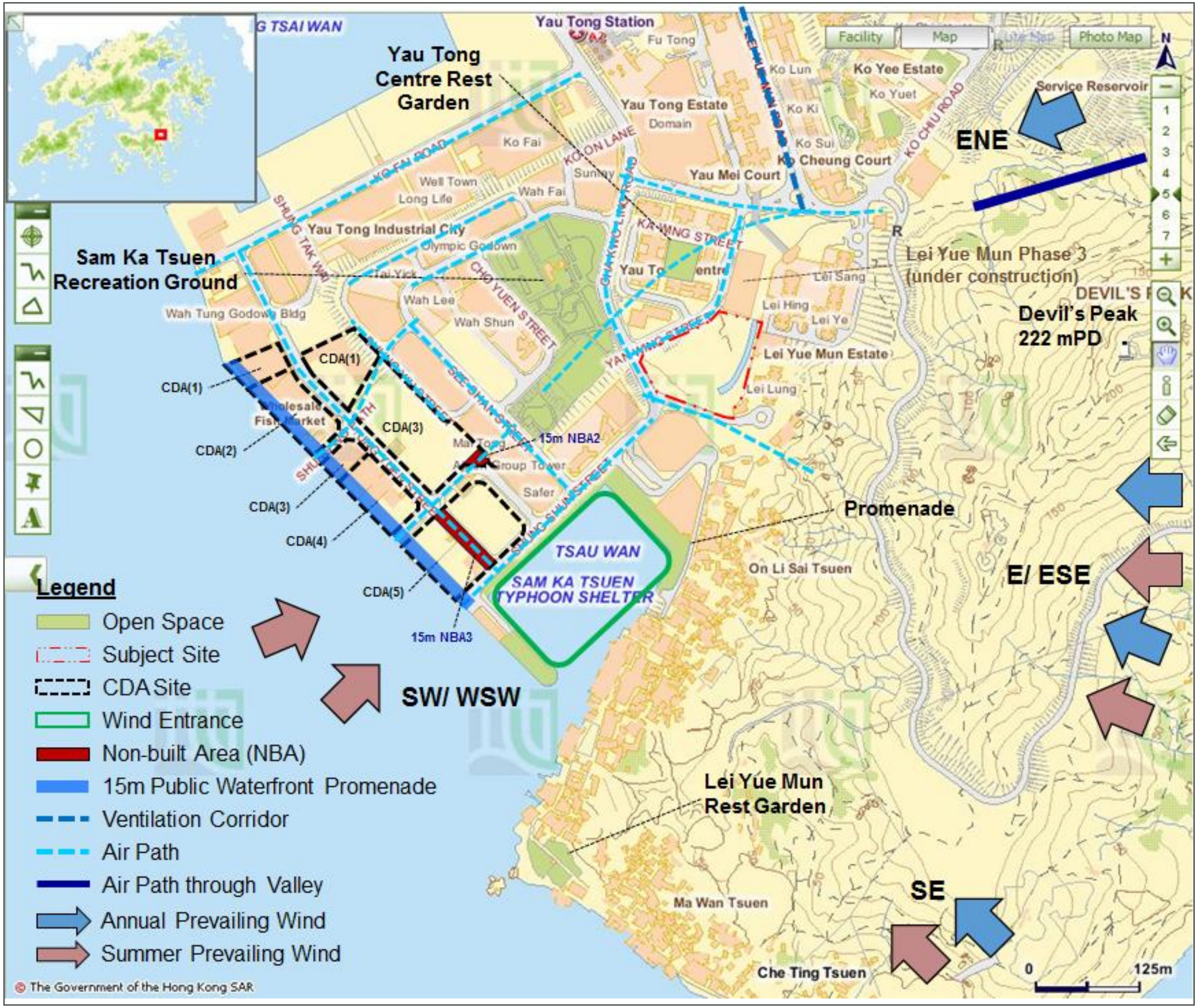

Note: Ventilation corridor is wider (like major district road) which is beneficial from one area to the other area while air path is considered as more localized pathway.

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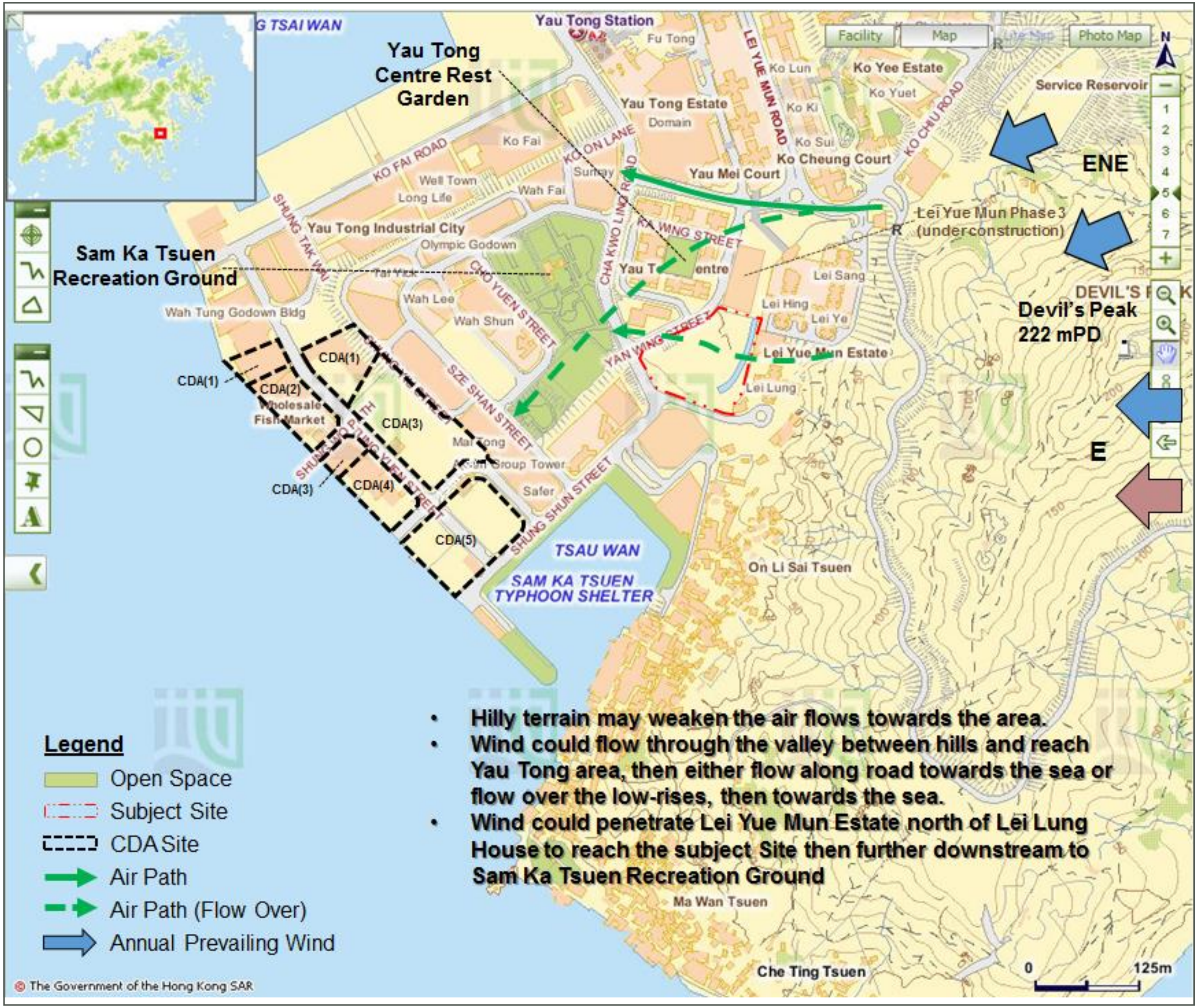
Air Ventilation Assessment
Initial Study Report

Flow Pattern under ENE/ E Prevailing Wind Condition

Figure 2.7



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Sectional Diagram of ENE/E Prevailing Wind Flow through the Area

Figure 2.8

Scale: As Shown

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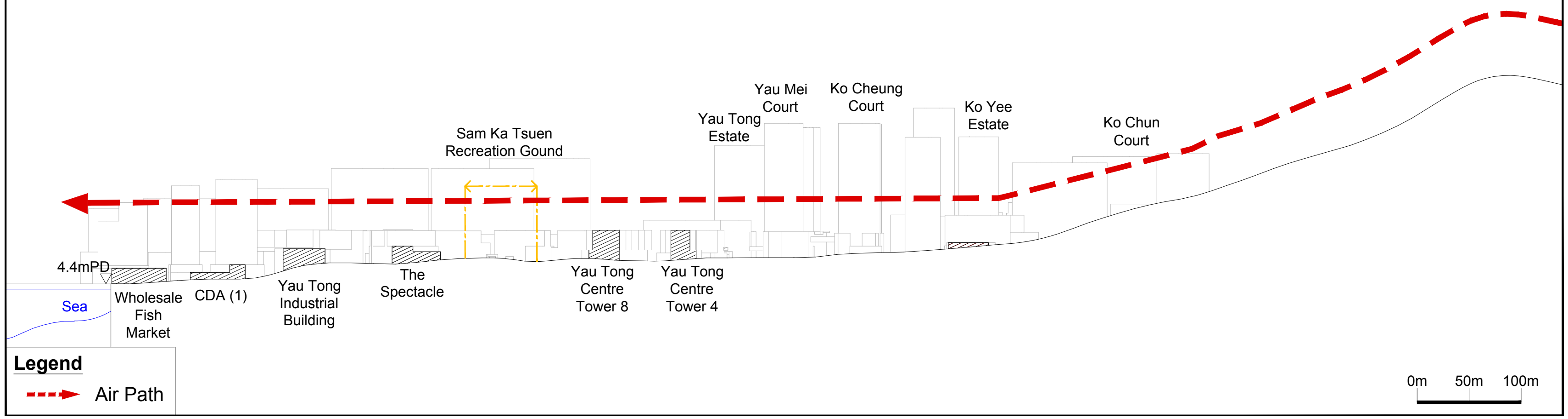

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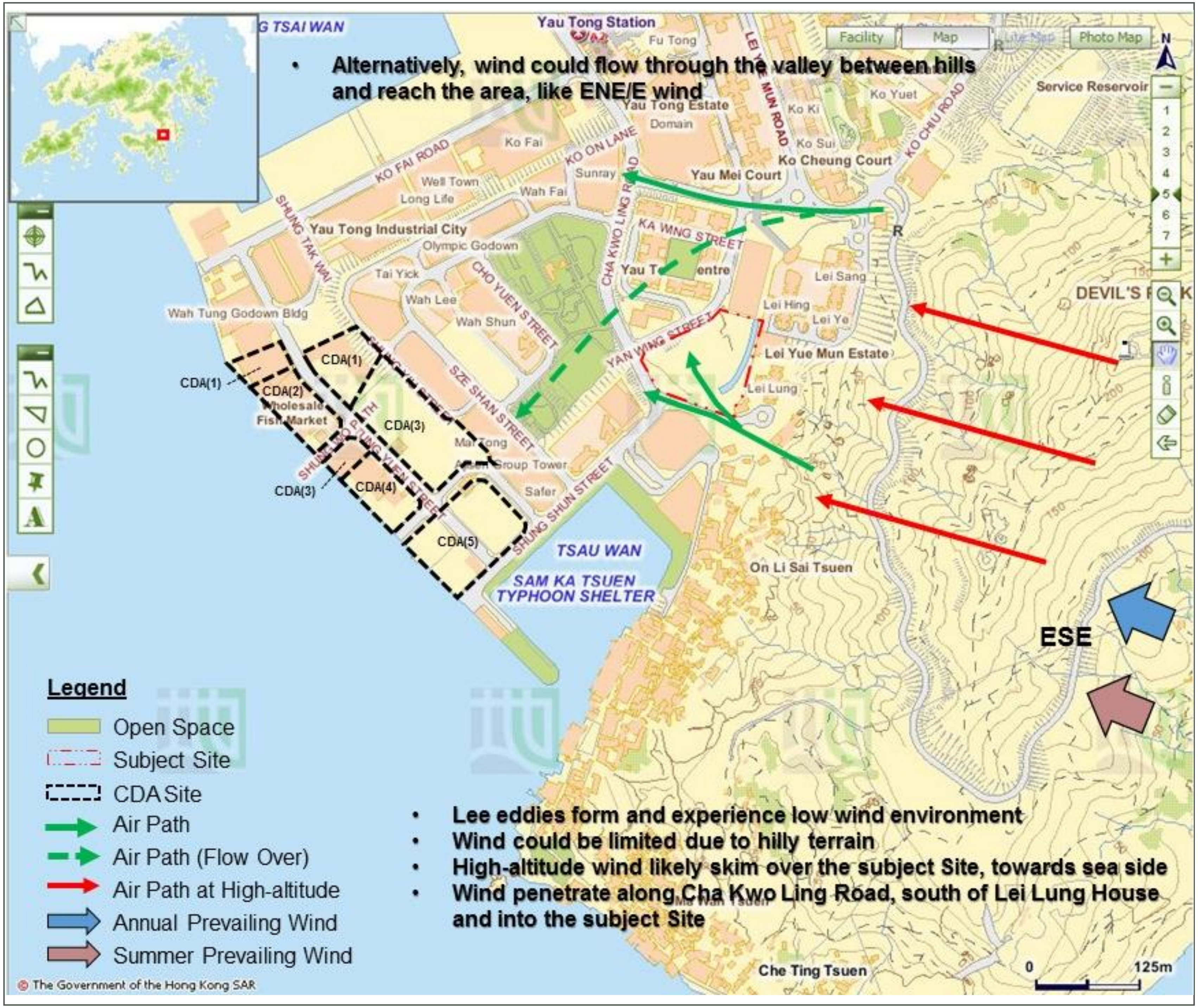
Flow Pattern under ESE Prevailing Wind Condition

Figure 2.9



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Flow Pattern under SE Prevailing Wind Condition

Figure 2.10

Scale: As Shown

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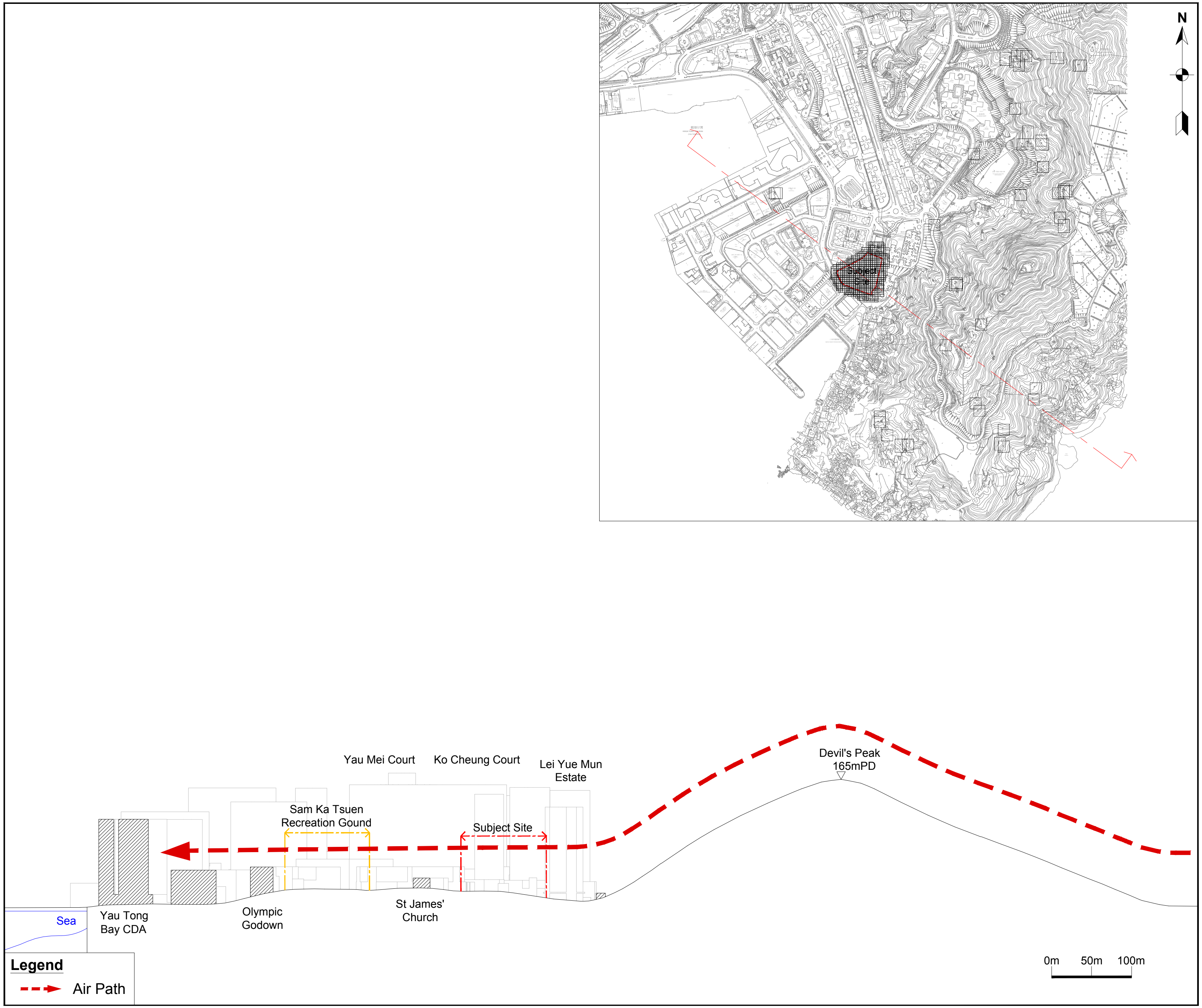
Air Ventilation Assessment
Initial Study Report

Sectional Diagram of SE Prevailing Wind Flow through the Area

Figure 2.11



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Flow Pattern under SW/ WSW Prevailing Wind Condition

Figure 2.12

Scale: As Shown

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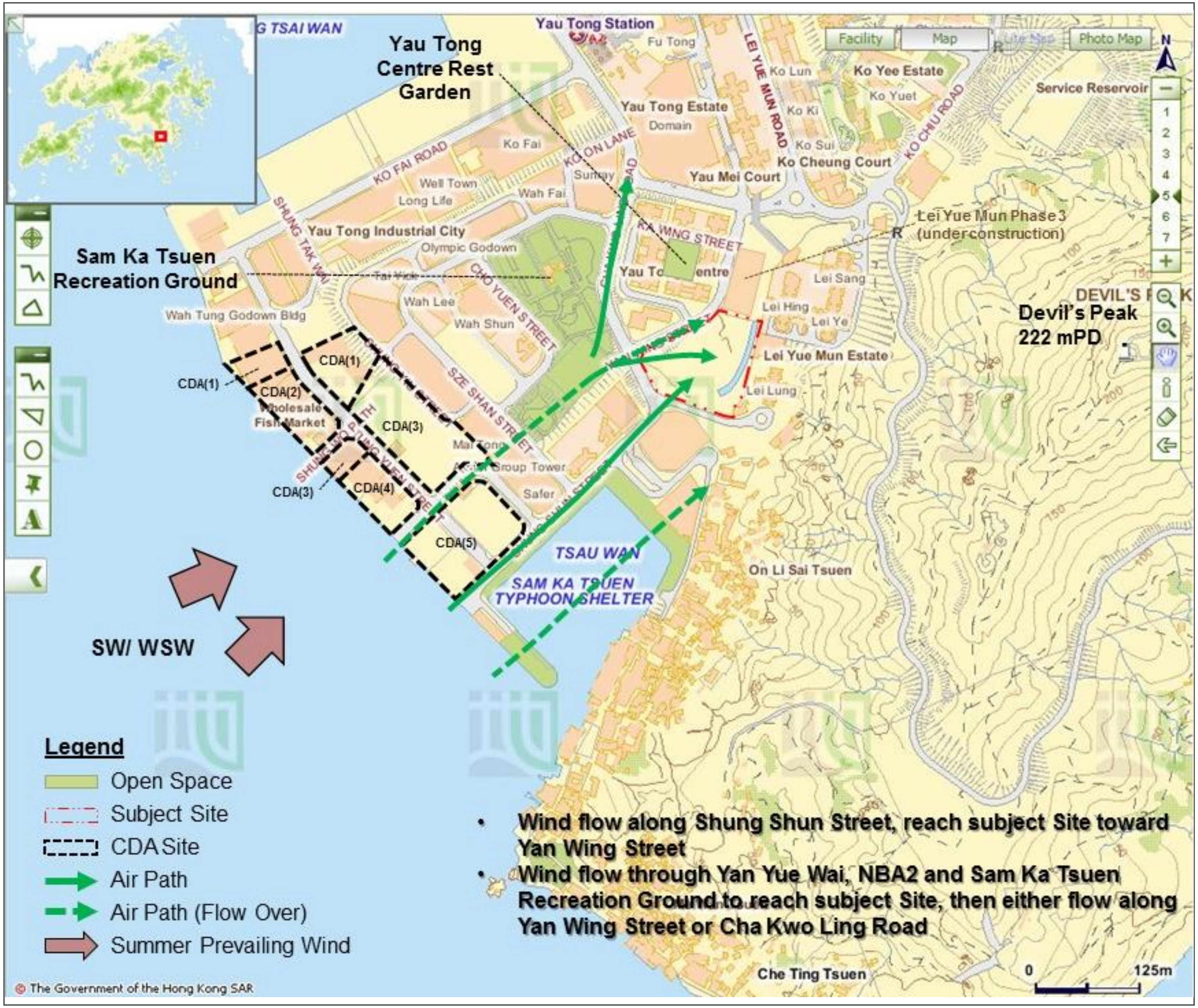

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Air Ventilation Assessment Initial Study Report

Extent of Assessment and Surrounding Areas

Figure 3.1

Scale: As shown

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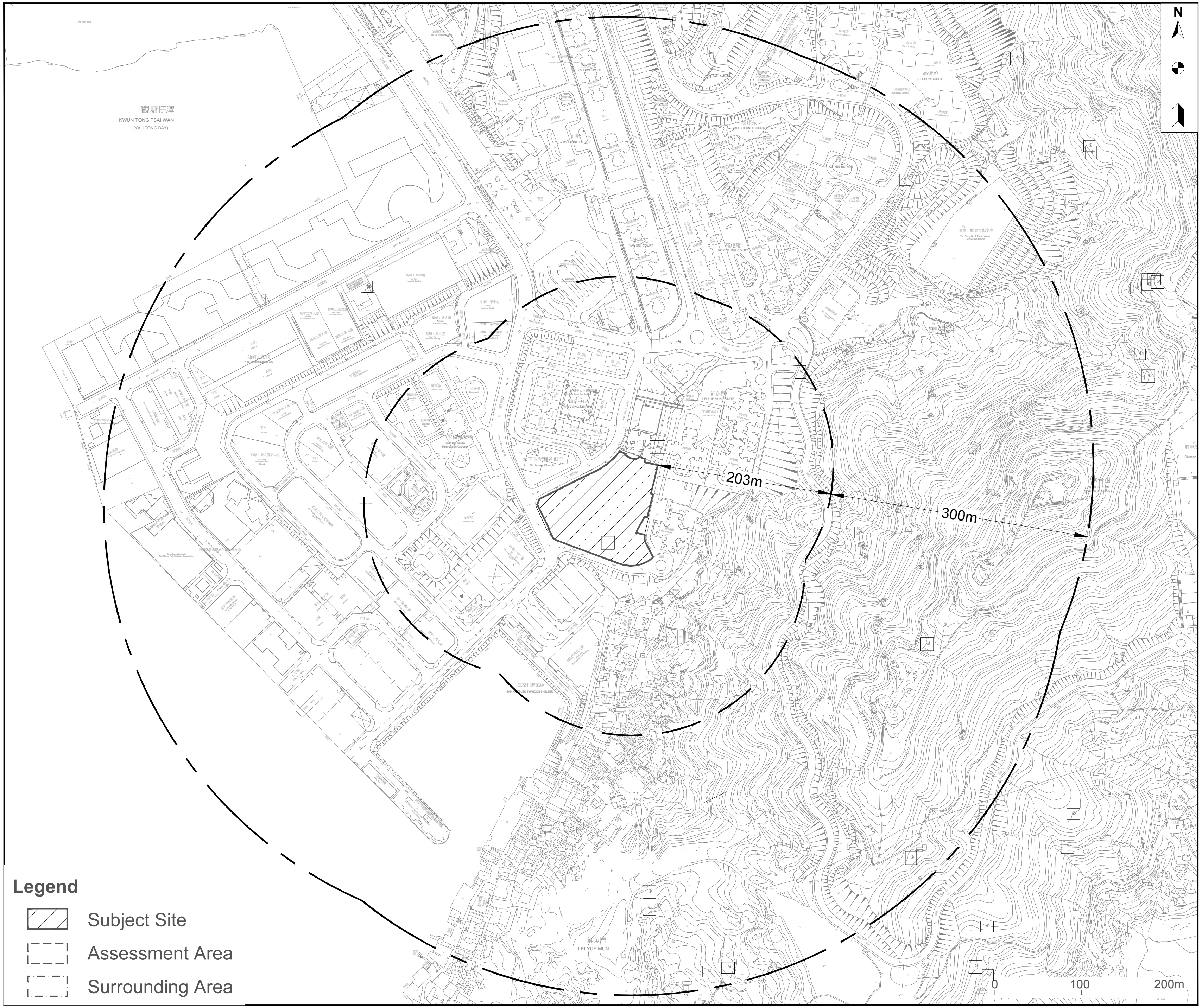

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Air Ventilation Assessment
Initial Study Report

Locations of the Perimeter and Overall Test Points

Figure 3.2

Scale: As shown

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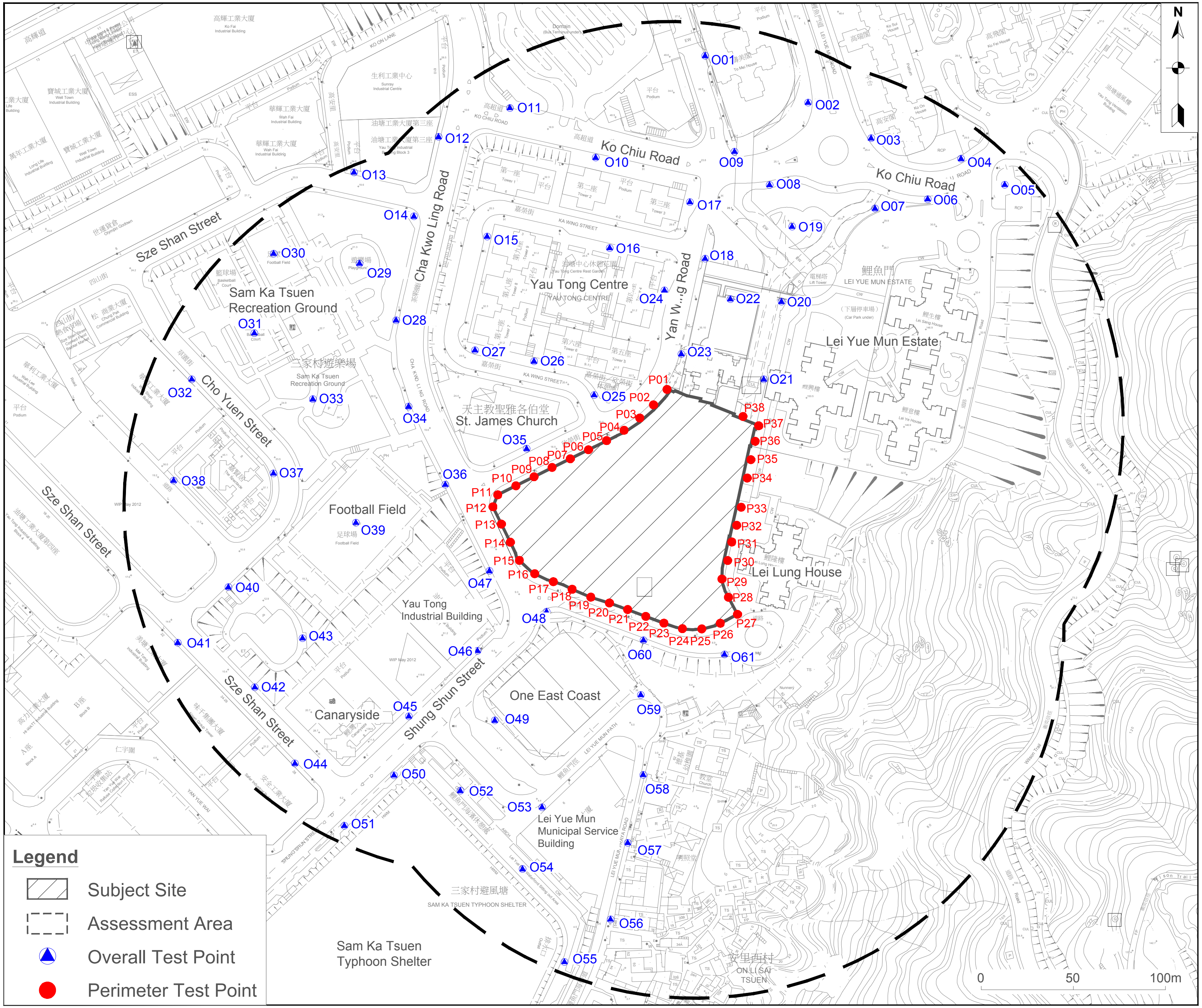
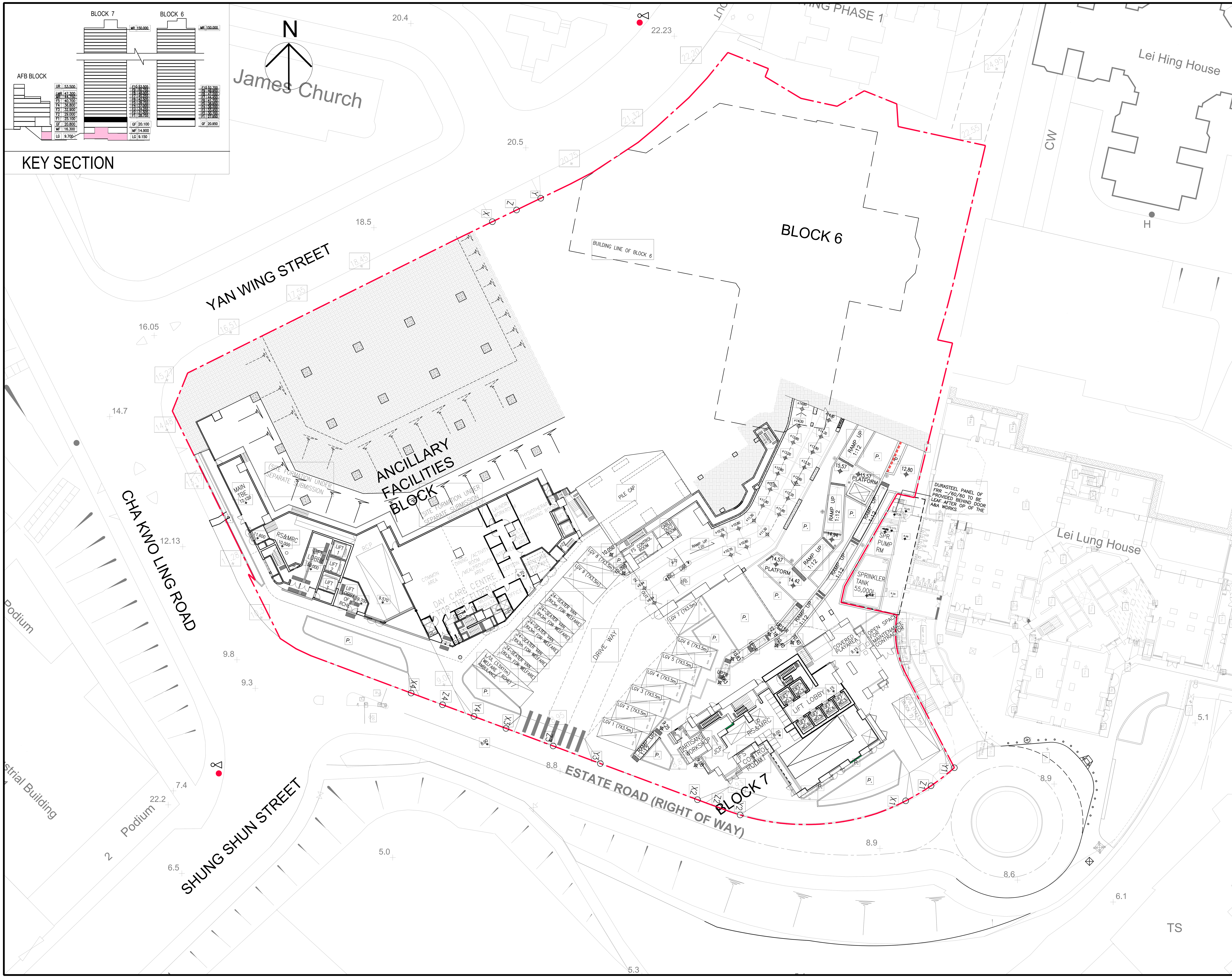


Appendix A1

Master Layout Plan of the Proposed Scheme



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PROJECT
PUBLIC HOUSING DEVELOPMENT
AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE LAYOUT PLAN
AT LEVEL +9.0

SCALE 1:300 (A1) ; 1:600 (A3)

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KT25/4/DDRP1/SITE/A/LO-13

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ICU NO. HD(ICU)NW-EPS-K125NR-4

AutoCAD 2000 A1 594 x 841

A013

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AT YAN WING STREET, YAU TONG

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SITE LAYOUT PLAN
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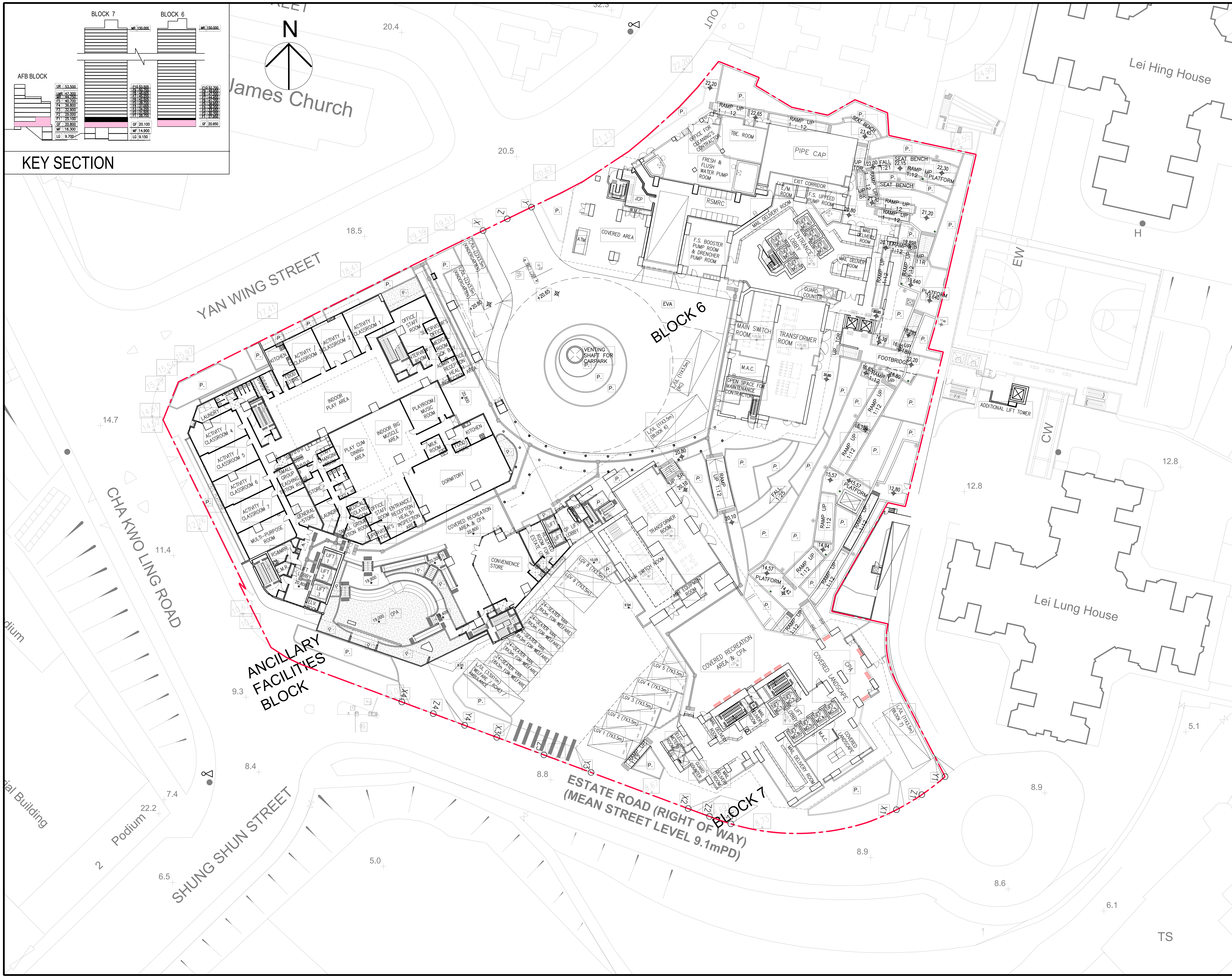

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PROJECT
PUBLIC HOUSING DEVELOPMENT AT LEI YUE MUN PHASE 4 AT YAN WING STREET, YAU TONG

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SITE LAYOUT PLAN AT LEVEL +20.80

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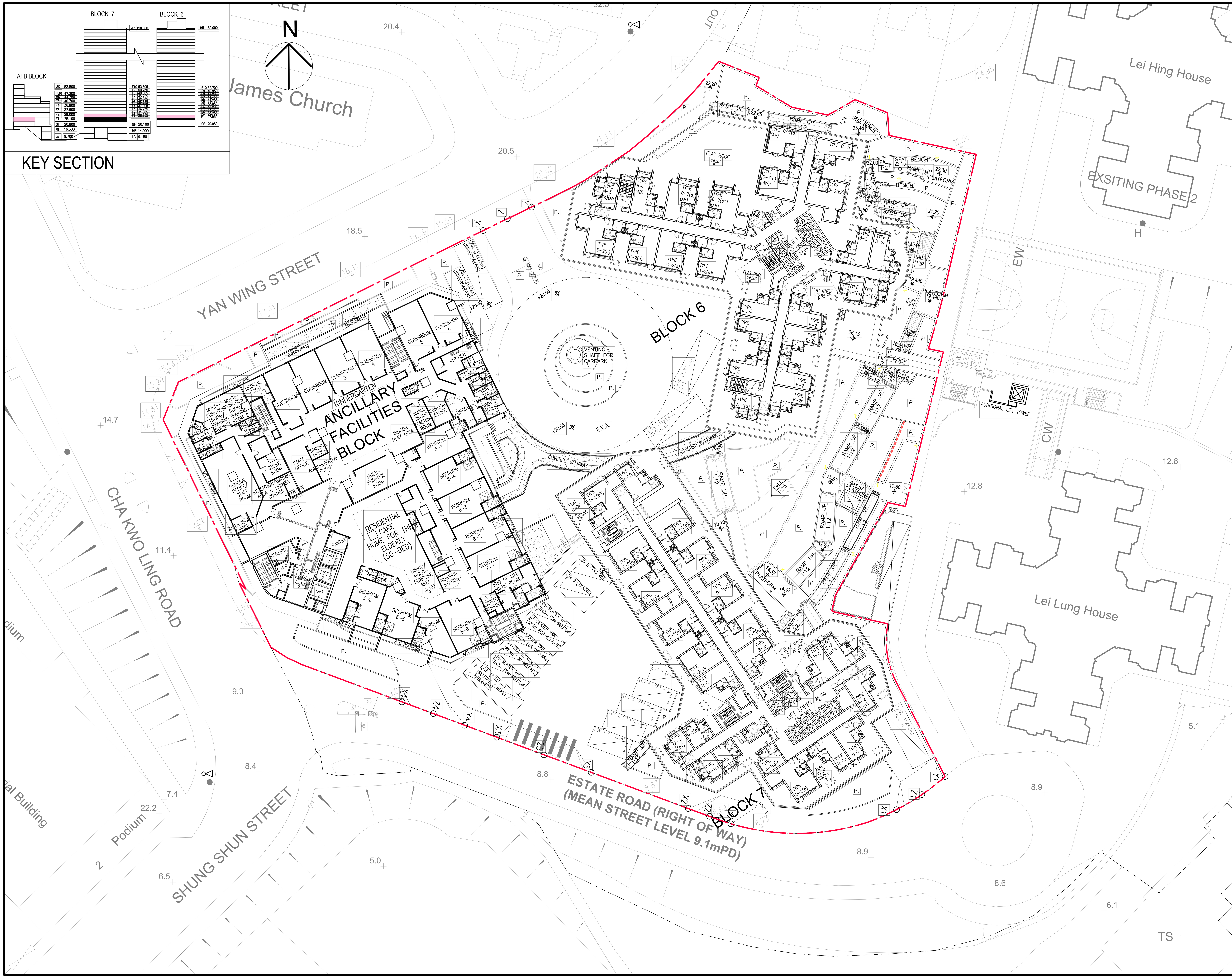

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PROJECT
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AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE LAYOUT PLAN
AT LEVEL +25.10

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PUBLIC HOUSING DEVELOPMENT AT LEI YUE MUN PHASE 4 AT YAN WING STREET, YAU TONG

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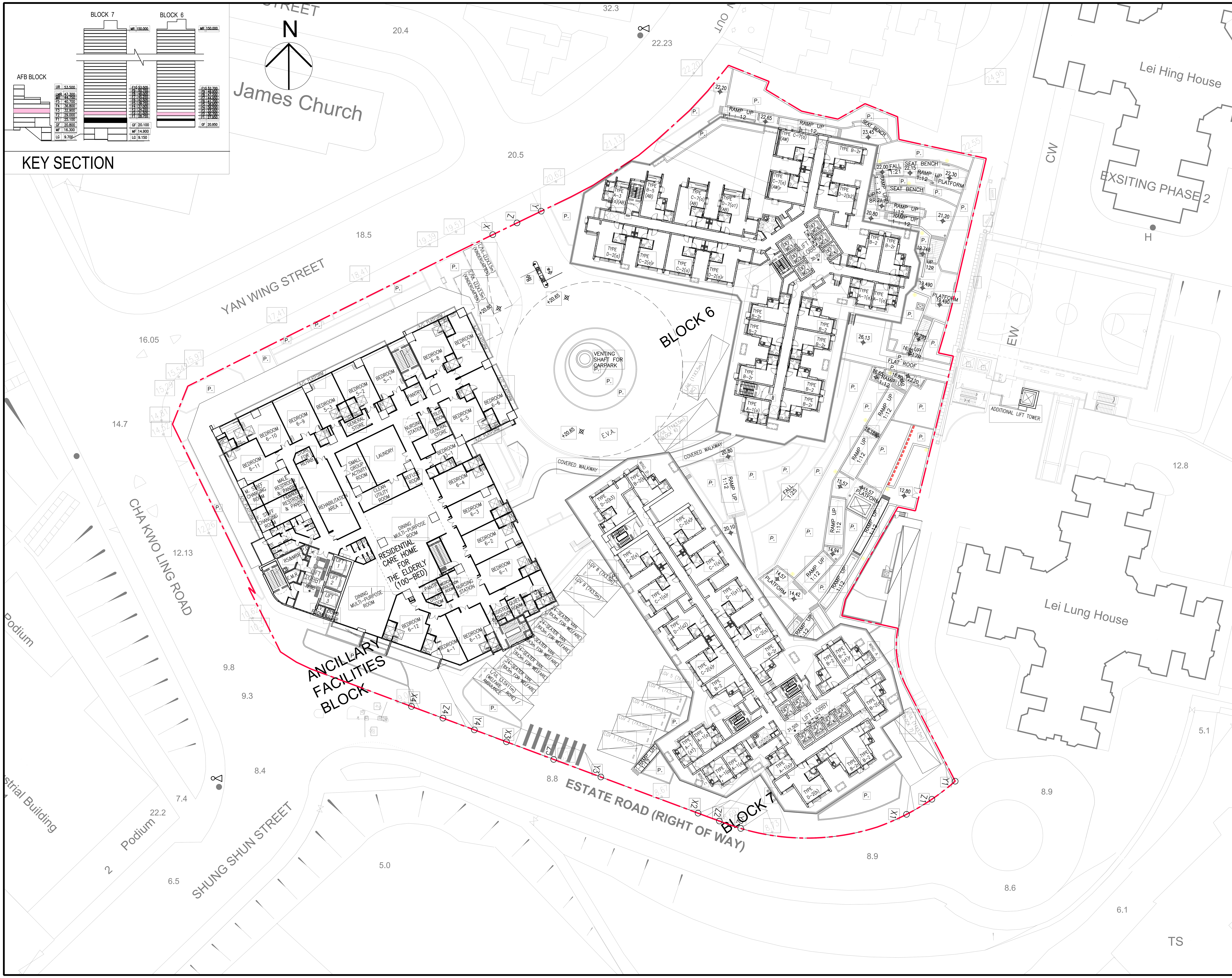

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AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

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PROJECT
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AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE LAYOUT PLAN
AT LEVEL +36.80

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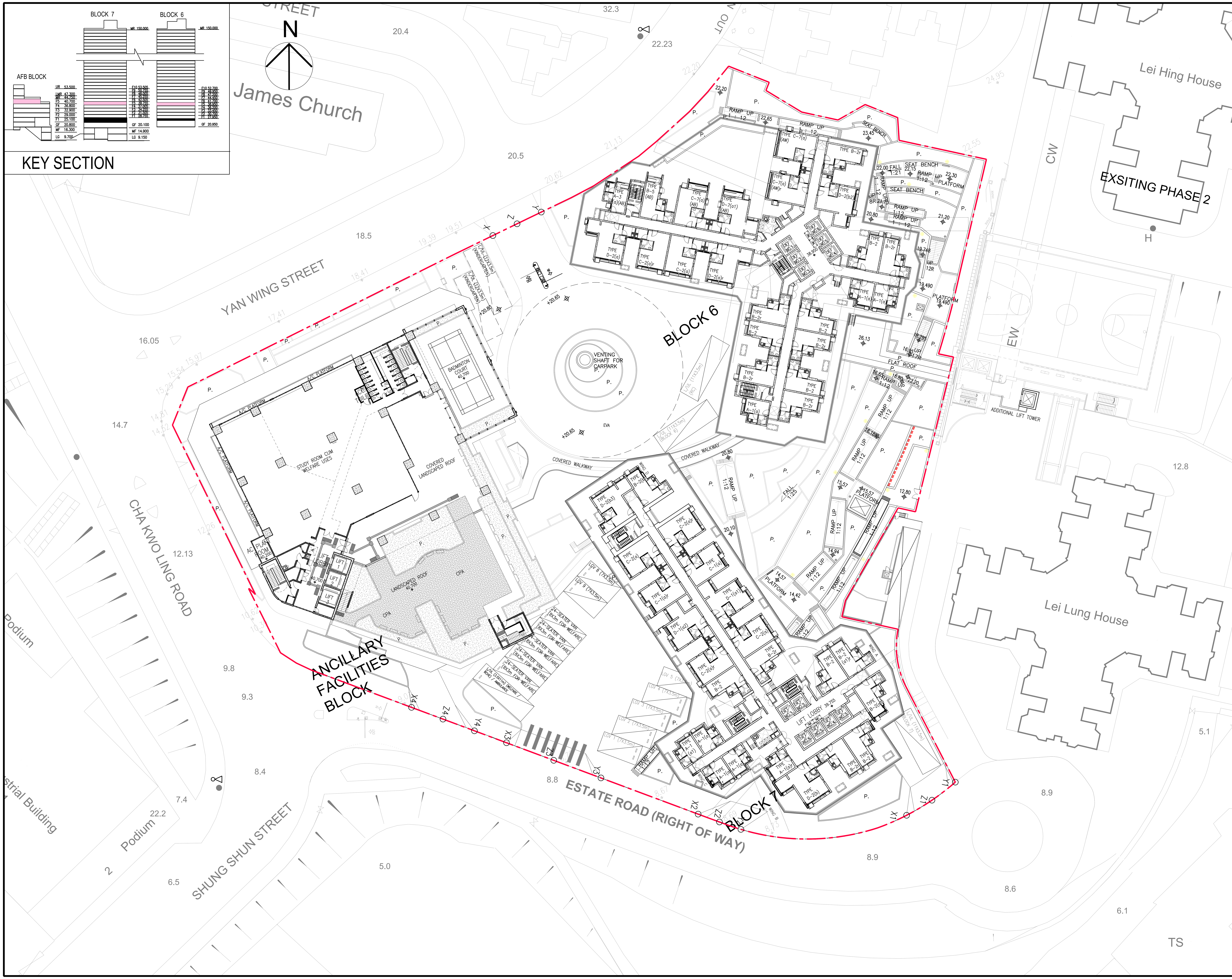

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DRAWN	JOHN TSOI DOTL	[signature]	14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT
AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE LAYOUT PLAN
AT LEVEL +40.70

SCALE 1:300 (A1) ; 1:600 (A3)

DRAWING NO.
KT25/4/DDRP1/SITE/A/LO-20

SOURCE

ICU NO.
HD(ICU)NW–EPS–K125NR–4

AutoCAD 2000 A1 594 x 841

A020
HOUSING DEPARTMENT

Signature of Applicant (HD / PSP) :

ICU Approval Signature :

Signature for Record Plan :

REVISIONS				INITIAL AND DESIGNATION	
NO.	DESCRIPTION AND DATE		DWN	CKD	AUTH

	NAME AND POSITION	INITIAL	DATE
AUTHORISED FOR ISSUE BY HD	MR. STEPHEN Y.C.YIM CA/D&S		

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AUTHORISED	EDWIN LEUNG DESIGN DIRECTOR	[signature]	14.03.2019
ENDORSED	ALEX TONG SENIOR DESIGN PROFESSIONAL	[signature]	14.03.2019
CHECKED	GAVIN WONG DESIGN PROFESSIONAL	[signature]	14.03.2019
DRAWN	JOHN TSOI DOTL	[signature]	14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT AT LEI YUE MUN PHASE 4 AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE LAYOUT PLAN AT LEVEL +44.75

SCALE 1:300 (A1) ; 1:600 (A3)

DRAWING NO.
KT25/4/DDRP1/SITE/A/LO-21

SOURCE

ICU NO.
HD(ICU)NW-EPS-K125NR-4

AutoCAD 2000 A1 594 x 841

A021
HOUSING DEPARTMENT

Signature of Applicant (HD / PSP) :

ICU Approval Signature :

Signature for Record Plan :

REVISIONS

NO.	DESCRIPTION AND DATE	DWN	CKD	AUTH

	NAME AND POSITION	INITIAL	DATE
AUTHORISED FOR ISSUE BY HD	MR. STEPHEN Y.C.YIM CA/D&S		

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AUTHORISED	EDWIN LEUNG DESIGN DIRECTOR	[signature]	14.03.2019
ENDORSED	ALEX TONG SENIOR DESIGN PROFESSIONAL	[signature]	14.03.2019
CHECKED	GAVIN WONG DESIGN PROFESSIONAL	[signature]	14.03.2019
DRAWN	JOHN TSOI DOTL	[signature]	14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT
AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE LAYOUT PLAN
AT LEVEL +47.30

SCALE 1:300 (A1) ; 1:600 (A3)

DRAWING NO.
KT25/4/DDRP1/SITE/A/LO-22

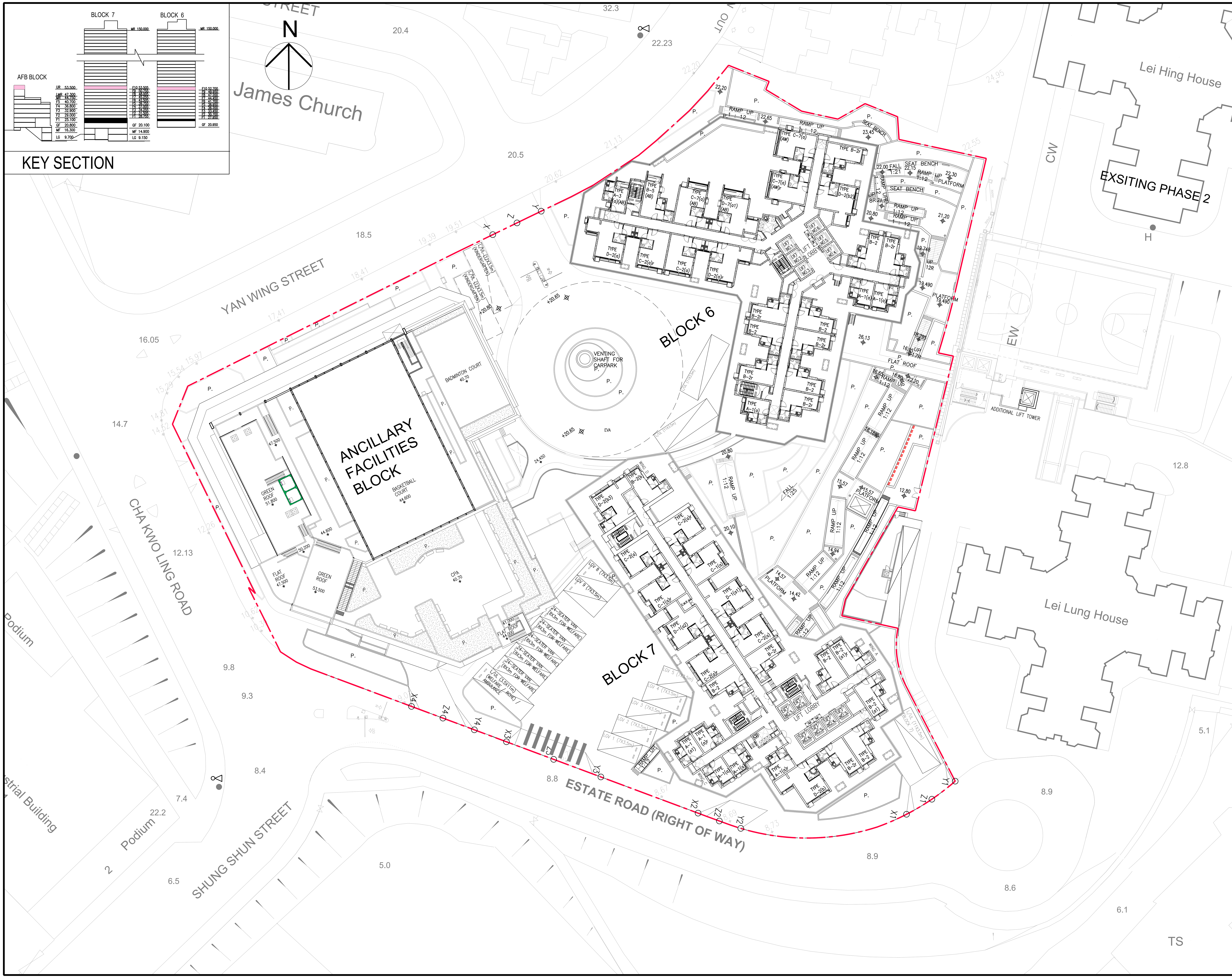
SOURCE

ICU NO. HD(ICU)NW−EPS−K125NR−4

AutoCAD 2000 A1 594 x 841

A022

HOUSING DEPARTMENT



Signature of Applicant (HD / PSP) :

ICU Approval Signature :

Signature for Record Plan :

REVISIONS

NO.	DESCRIPTION AND DATE	DWN	CKD	AUTH

	NAME AND POSITION	INITIAL	DATE
AUTHORISED FOR ISSUE BY HD	MR. STEPHEN Y.C.YIM CA/D&S		

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	NAME AND DESIGNATION	INITIAL	DATE
AUTHORISED	EDWIN LEUNG DESIGN DIRECTOR		14.03.2019
ENDORSED	ALEX TONG SENIOR DESIGN PROFESSIONAL		14.03.2019
CHECKED	GAVIN WONG DESIGN PROFESSIONAL		14.03.2019
DRAWN	JOHN TSOI DOTL		14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT
AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE LAYOUT PLAN
AT TYPICAL FLOOR

SCALE 1:300 (A1) ; 1:600 (A3)

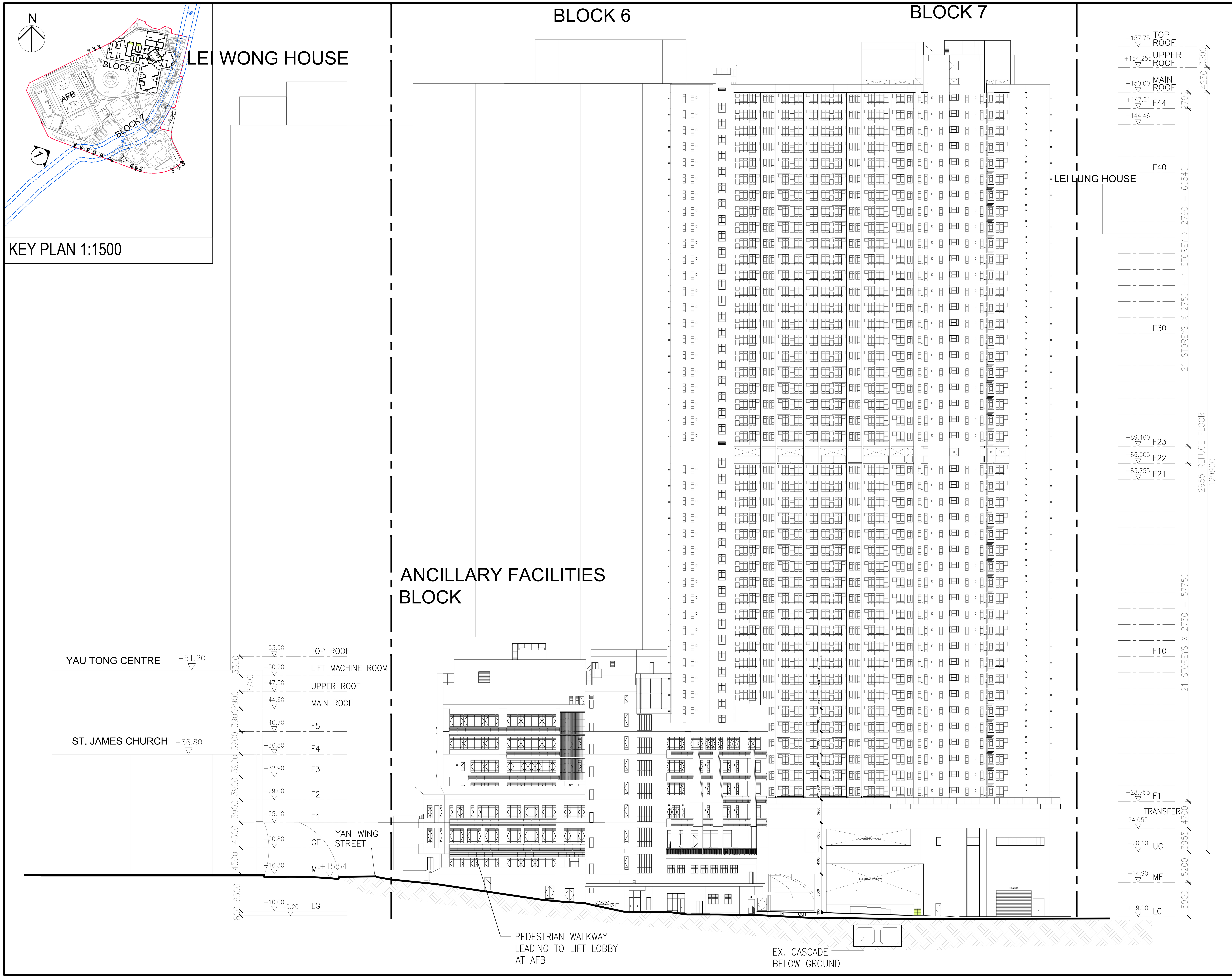
DRAWING NO.
KT25/4/DDRP1/SITE/A/LO-23

SOURCE

ICU NO.
HD(ICU)NW-EPS-K125NR-4

AutoCAD 2000 A1 594 x 841

A023
HOUSING DEPARTMENT



Signature of Applicant (HD / PSP) :

ICU Approval Signature :

Signature for Record Plan :

REVISIONS

NO.	DESCRIPTION AND DATE	INITIAL AND DESIGNATION: DWN	CKD	AUTH

	NAME AND POSITION	INITIAL	DATE
AUTHORISED FOR ISSUE BY HD	MR. STEPHEN Y.C.YIM CA/D&S		

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	NAME AND DESIGNATION	INITIAL	DATE
AUTHORISED	EDWIN LEUNG DESIGN DIRECTOR		14.03.2019
ENDORSED	ALEX TONG SENIOR DESIGN PROFESSIONAL		14.03.2019
CHECKED	GAVIN WONG DESIGN PROFESSIONAL		14.03.2019
DRAWN	JOHN TSOI DOTL		14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT
AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE ELEVATION 1

SCALE 1:300(A1) ; 1:600 (A3)

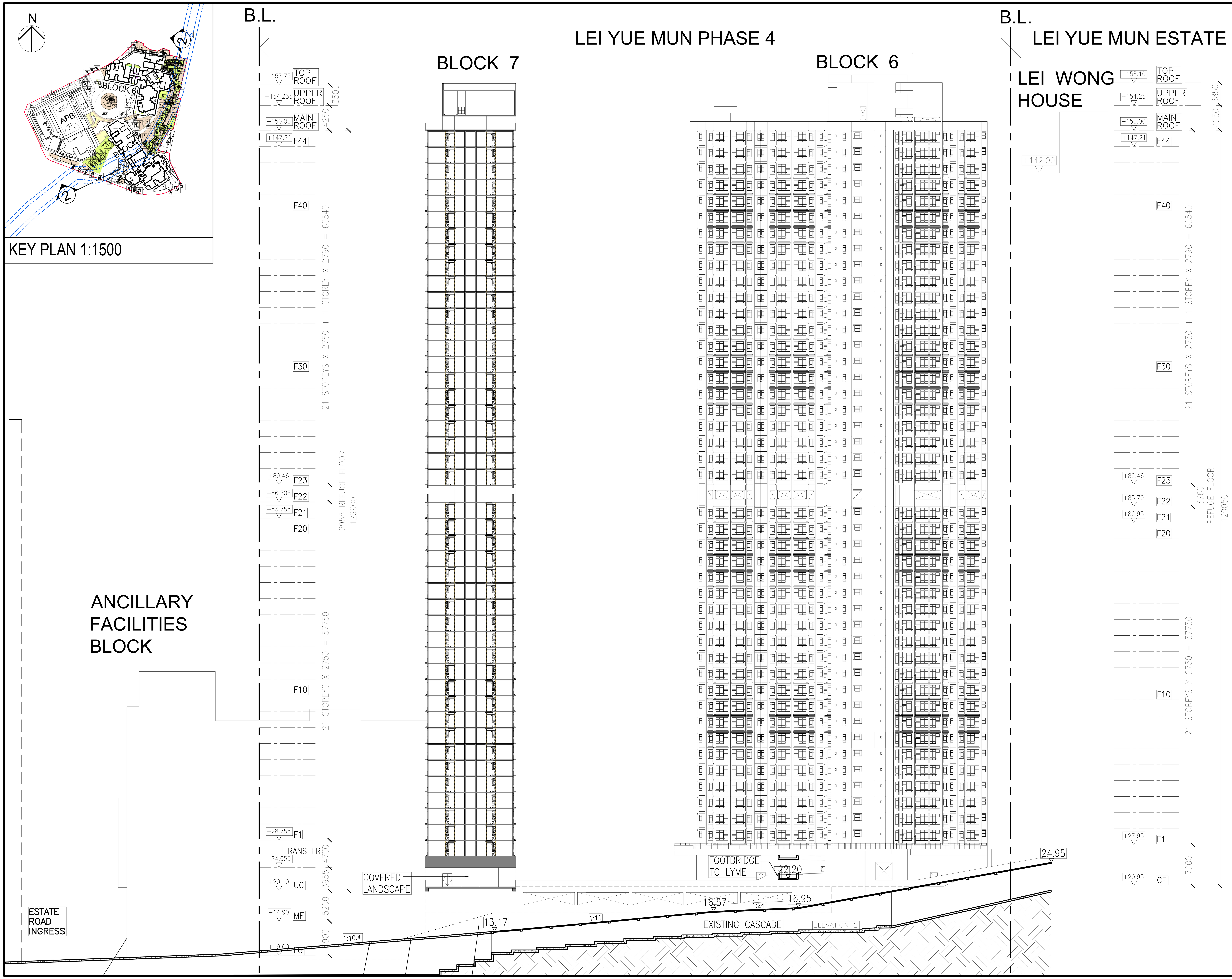
DRAWING NO.
KT25/4/DDRP1/SITE/A/LO-24

SOURCE

ICU NO.
HD(ICU)NW-EPS-K125NR-4

AutoCAD 2000 A1 594 x 841

A024
HOUSING DEPARTMENT



Signature of Applicant (HD / PSP) :

ICU Approval Signature :

Signature for Record Plan :

REVISIONS				
NO	DESCRIPTION AND DATE	DWN	CKD	AUTH

	NAME AND POSITION	INITIAL	DATE
AUTHORISED FOR ISSUE BY HD	MR. STEPHEN Y.C.YIM CA/D&S		

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	NAME AND DESIGNATION	INITIAL	DATE
AUTHORISED	EDWIN LEUNG DESIGN DIRECTOR		14.03.2019
ENDORSED	ALEX TONG SENIOR DESIGN PROFESSIONAL		14.03.2019
CHECKED	GAVIN WONG DESIGN PROFESSIONAL		14.03.2019
DRAWN	JOHN TSOI DOTL		14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT
AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE ELEVATION 2

SCALE 1:300 (A1) ; 1:600 (A3)

DRAWING NO.
KT25/4/DDRP2/SITE/A/LO-25

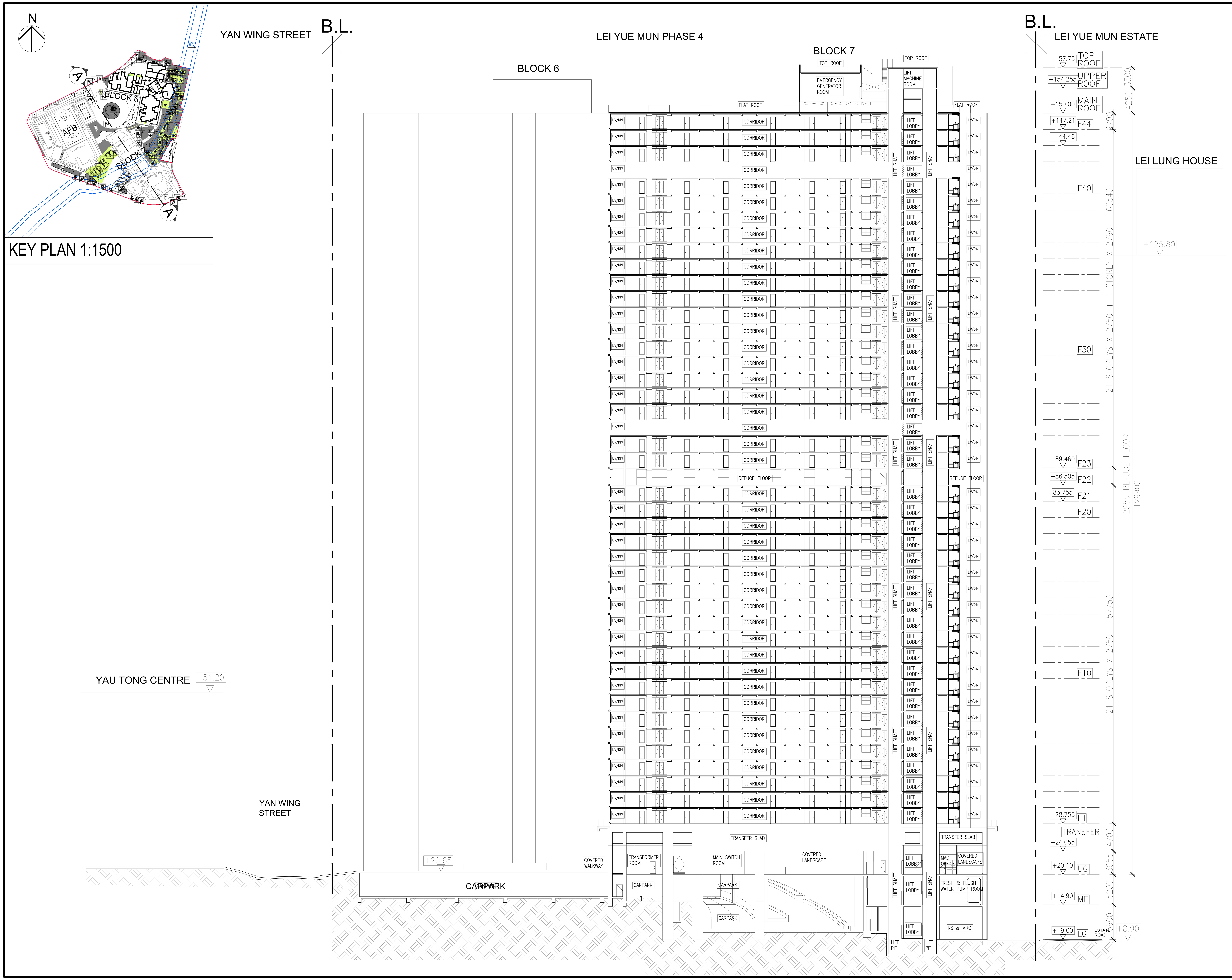
SOURCE

ICU NO. HD(ICU)NW-EPS-K125NR-4

AutoCAD 2000 A1 594 x 841

A025

HOUSING DEPARTMENT



Signature of Applicant (HD / PSP) :

ICU Approval Signature :

Signature for Record Plan :

REVISIONS		INITIAL AND DESIGNATION		
NO	DESCRIPTION AND DATE	DWN	CKD	AUTH

	NAME AND POSITION	INITIAL	DATE
AUTHORISED PERSON	MR. STEPHEN Y.C.YIM		

K&W — K & W ARCHITECTS LTD 關富建築師有限公司

	NAME AND DESIGNATION	INITIAL	DATE
AUTHORISED	EDWIN LEUNG DESIGN DIRECTOR		14.03.2019
ENDORSED	ALEX TONG SENIOR DESIGN PROFESSIONAL		14.03.2019
CHECKED	GAVIN WONG DESIGN PROFESSIONAL		14.03.2019
DRAWN	JOHN TSOI DOTL		14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT
AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE SECTION A-A

SCALE 1:400 (A1) ; 1:800 (A3)

DRAWING NO.
KT25/4/DDRP2/SITE/A/LO-26

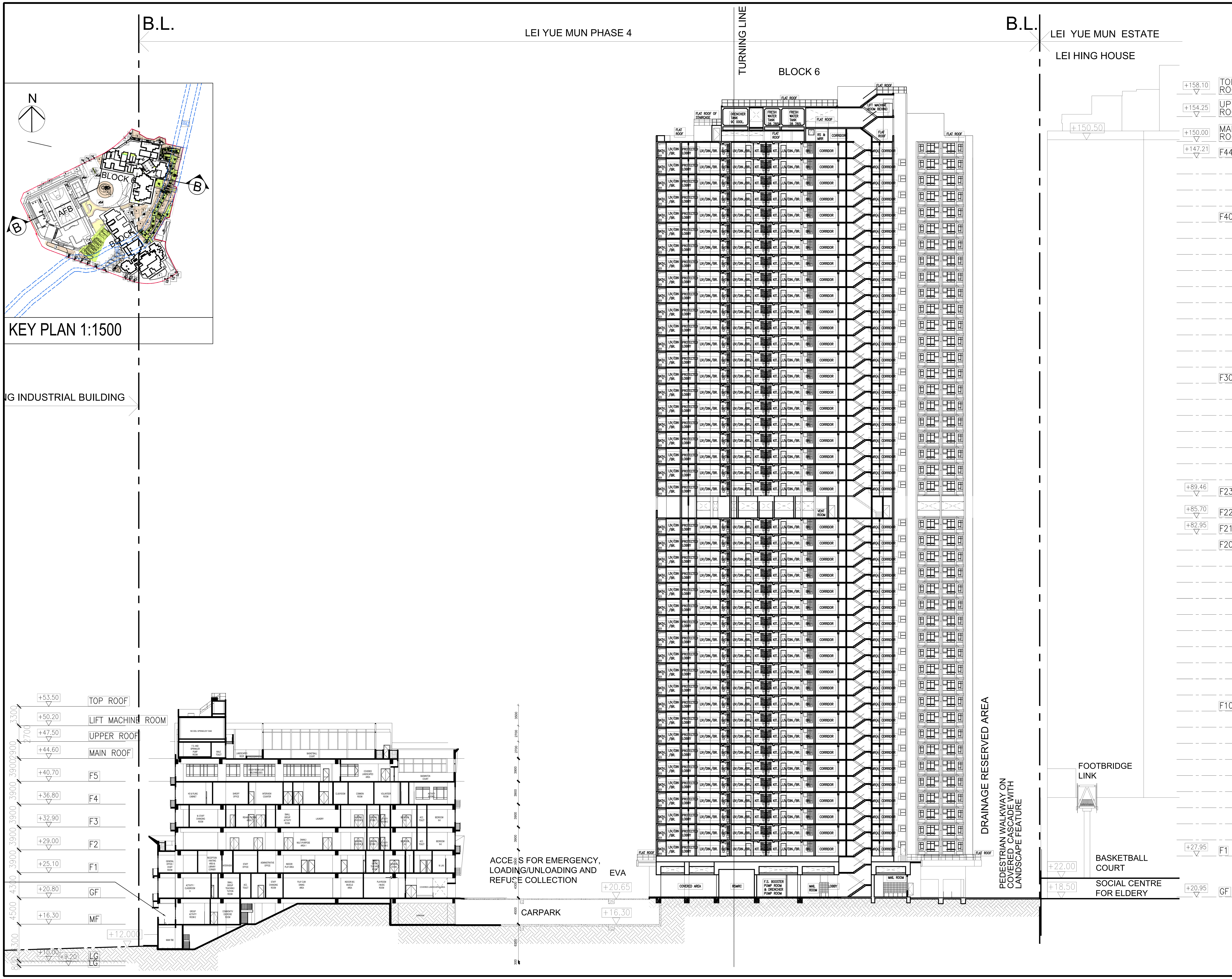
SOURCE

ICU NO. HD(ICU)NW-EPS-K125NR-4

AutoCAD 2000 A1 594 x 841

A026

HOUSING DEPARTMENT



Signature of Applicant (HD / PSP) :

ICU Approval Signature :

Signature for Record Plan :

REVISIONS		INITIAL AND DESIGNATION		
NO	DESCRIPTION AND DATE	DWN	CKD	AUTH

	NAME AND POSITION	INITIAL	DATE
AUTHORISED FOR ISSUE BY HD	MR. STEPHEN Y.C.YIM CA/D&S		

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ENDORSED	ALEX TONG SENIOR DESIGN PROFESSIONAL		14.03.2019
CHECKED	GAVIN WONG DESIGN PROFESSIONAL		14.03.2019
DRAWN	JOHN TSOI DOTL		14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT
AT LEI YUE MUN PHASE 4
AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE SECTION B-B

SCALE 1:400 (A1) ; 1:800 (A3)

DRAWING NO.
KT25/4/DDRP1/SITE/A/LO-27

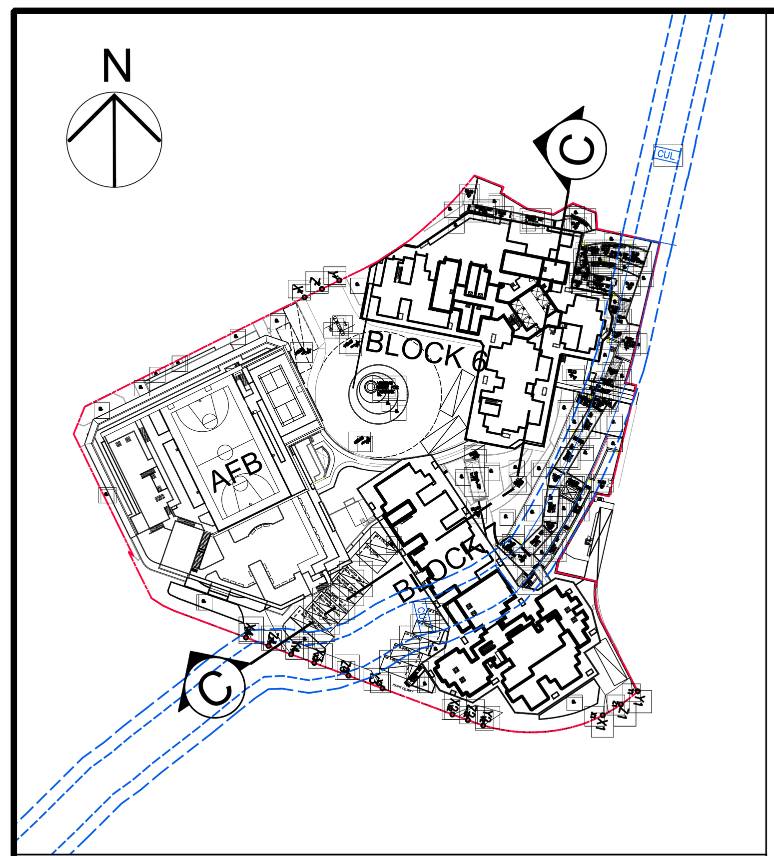
SOURCE

ICU NO. HD(ICU)NW-EPS-K125NR-4

AutoCAD 2000 A1 594 x 841

A027

HOUSING DEPARTMENT



KEY PLAN 1:1500

Signature of Applicant (HD / PSP) :

ICU Approval Signature :

Signature for Record Plan :

REVISIONS

NO	DESCRIPTION AND DATE	INITIAL AND DESIGNATION DWN	CKD	AUTH

	NAME AND POSITION	INITIAL	DATE
AUTHORISED FOR ISSUE BY HD	MR. STEPHEN Y.C.YIM CA/D&S		

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CHECKED	GAVIN WONG DESIGN PROFESSIONAL		14.03.2019
DRAWN	JOHN TSOI DOTL		14.03.2019

PROJECT
PUBLIC HOUSING DEVELOPMENT AT LEI YUE MUN PHASE 4 AT YAN WING STREET, YAU TONG

DRAWING TITLE
SITE SECTION B-B

SCALE 1:400 (A1) ; 1:800 (A3)

DRAWING NO.
KT25/4/DDRP1/SITE/A/LO-27

SOURCE

ICU NO. HD(ICU)NW-EPS-K125NR-4

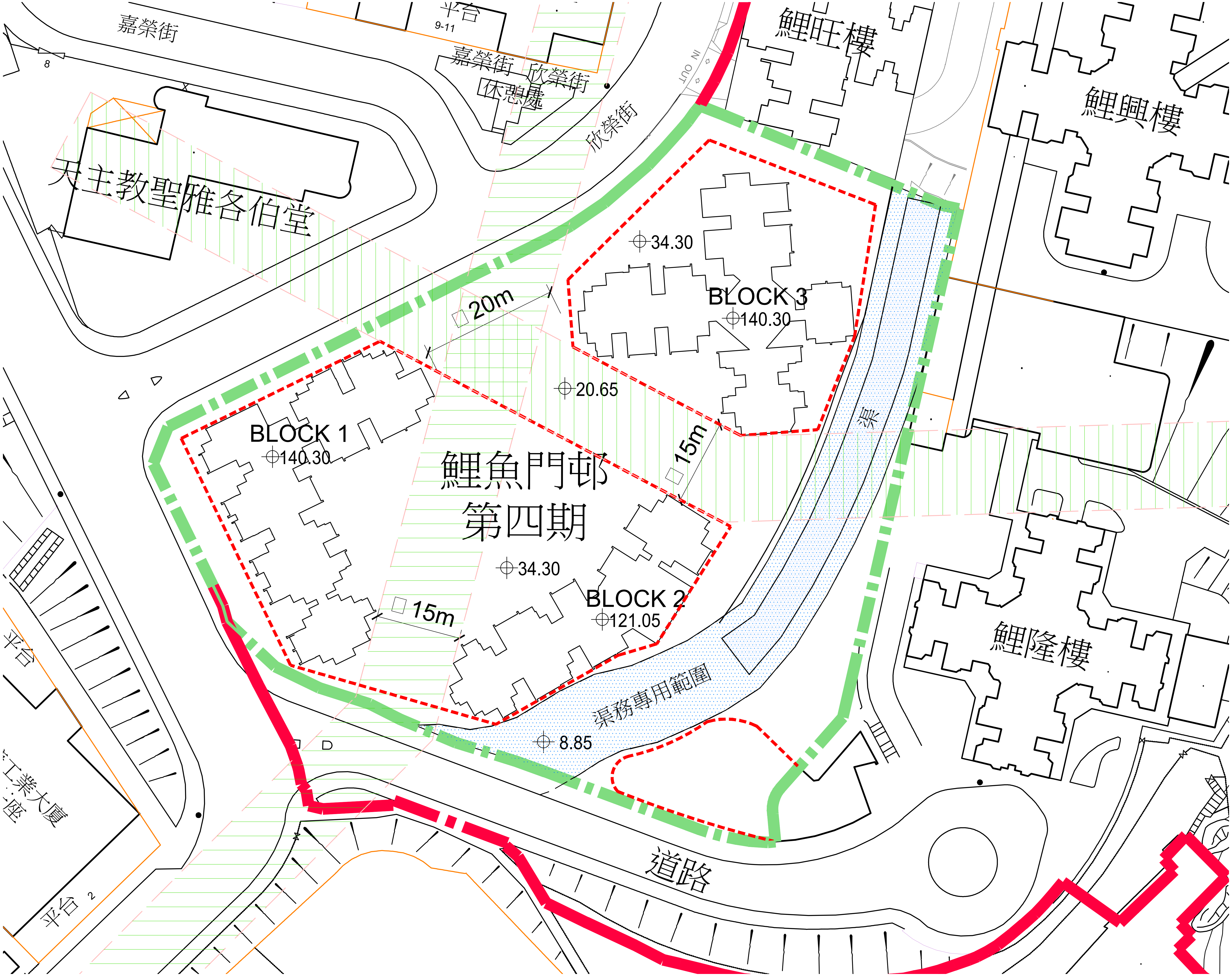
AutoCAD 2000 A1 594 x 841

A027

HOUSING DEPARTMENT

Appendix A2

Master Layout Plan of the Baseline Scheme



嘉榮街
平台
9-11
8
嘉榮街 欣榮街
休憩處
欣榮街
天主教聖雅各伯堂
鯉旺樓
鯉興樓
20m
34.30
BLOCK 3
140.30
20.65
15m
渠
BLOCK 1
140.30
鯉魚門邨
第四期
34.30
BLOCK 2
121.05
15m
鯉隆樓
渠務專用範圍
8.85
道路
平台
工業大廈
平台 2

Appendix B

CFD Model and Approach Profiles

Figure B1 CFD Model for Baseline Scheme

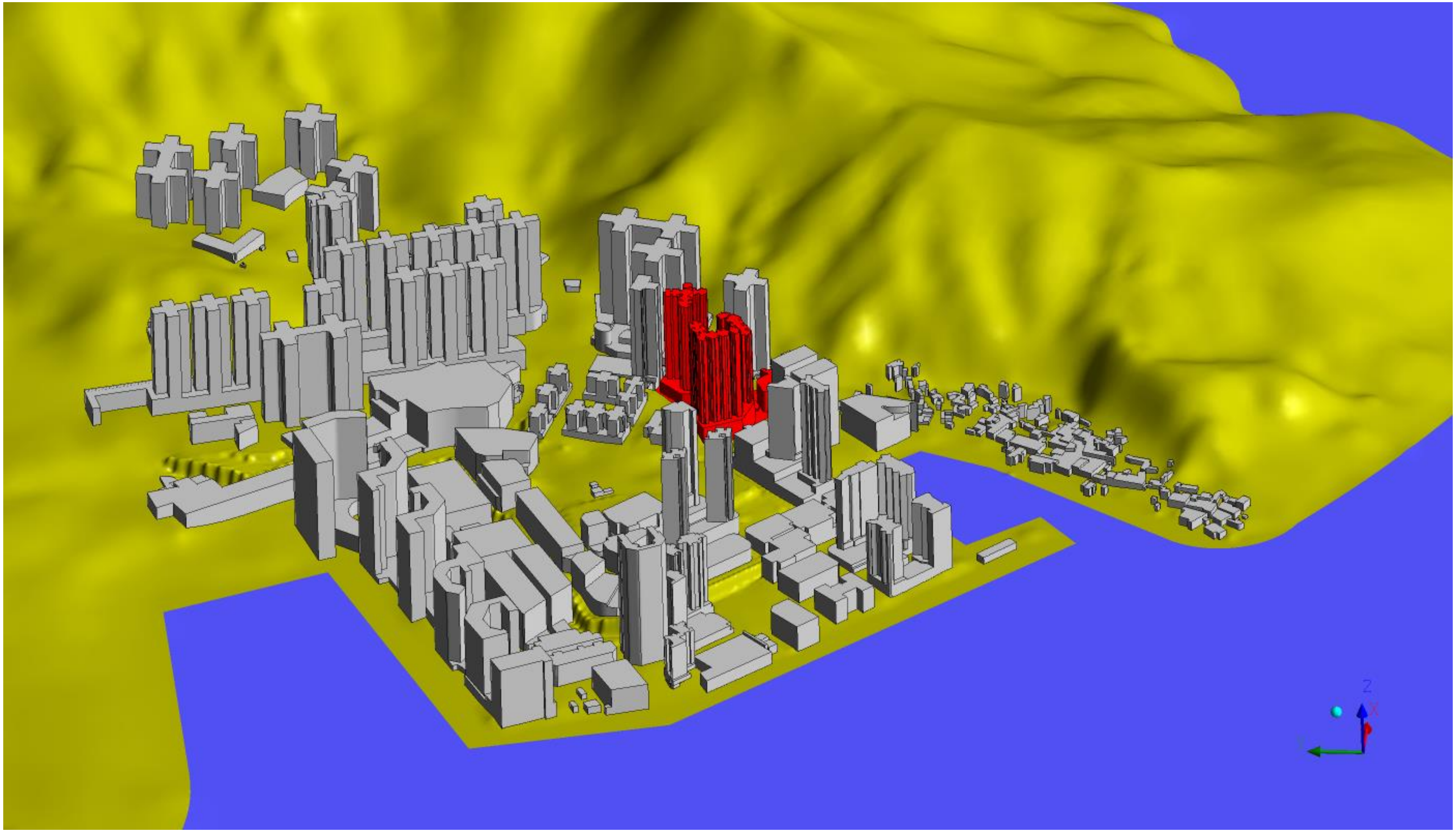


Figure B2 CFD Model for Baseline Scheme

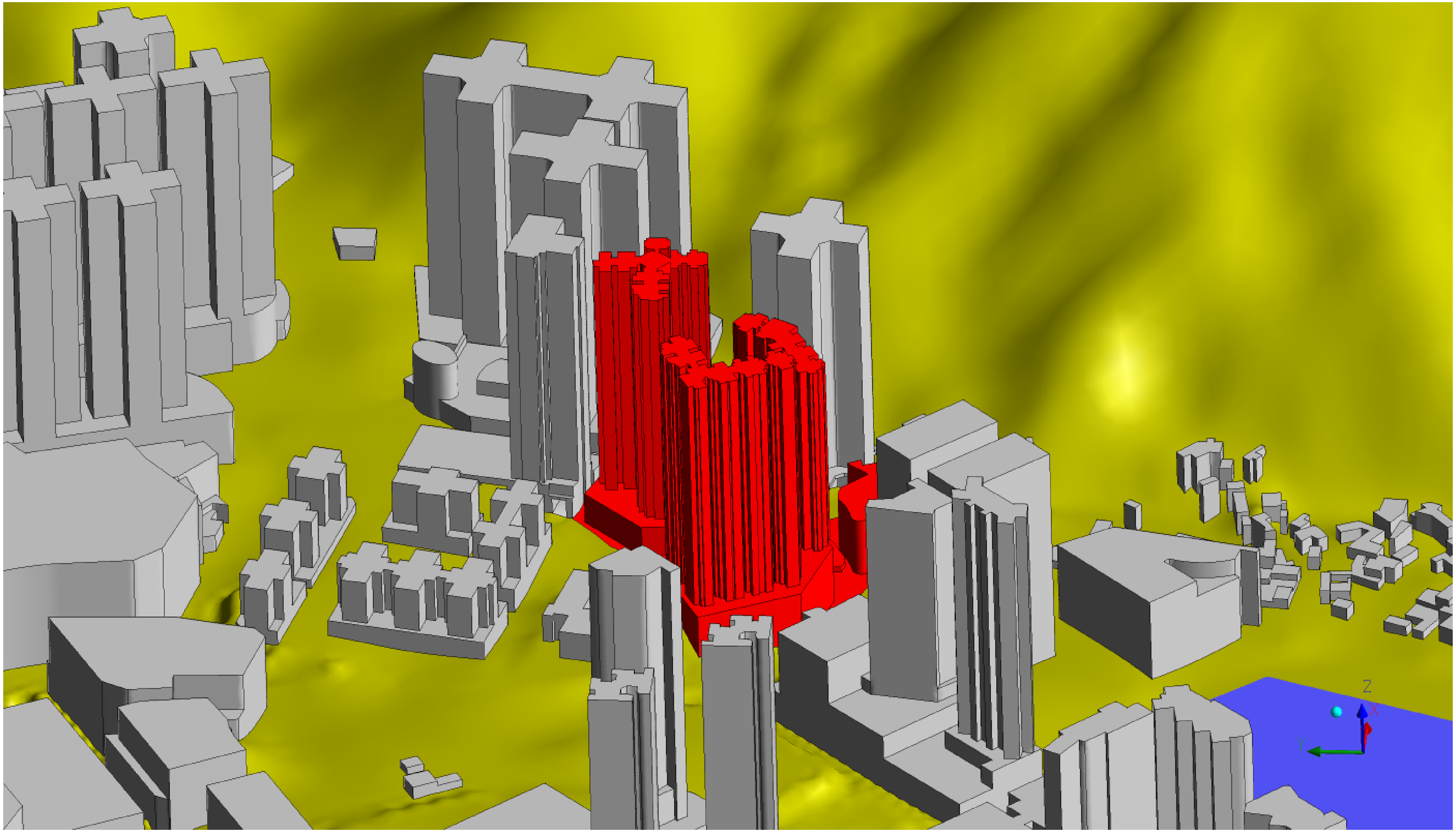


Figure B3 CFD Model for Baseline Scheme with Mesh

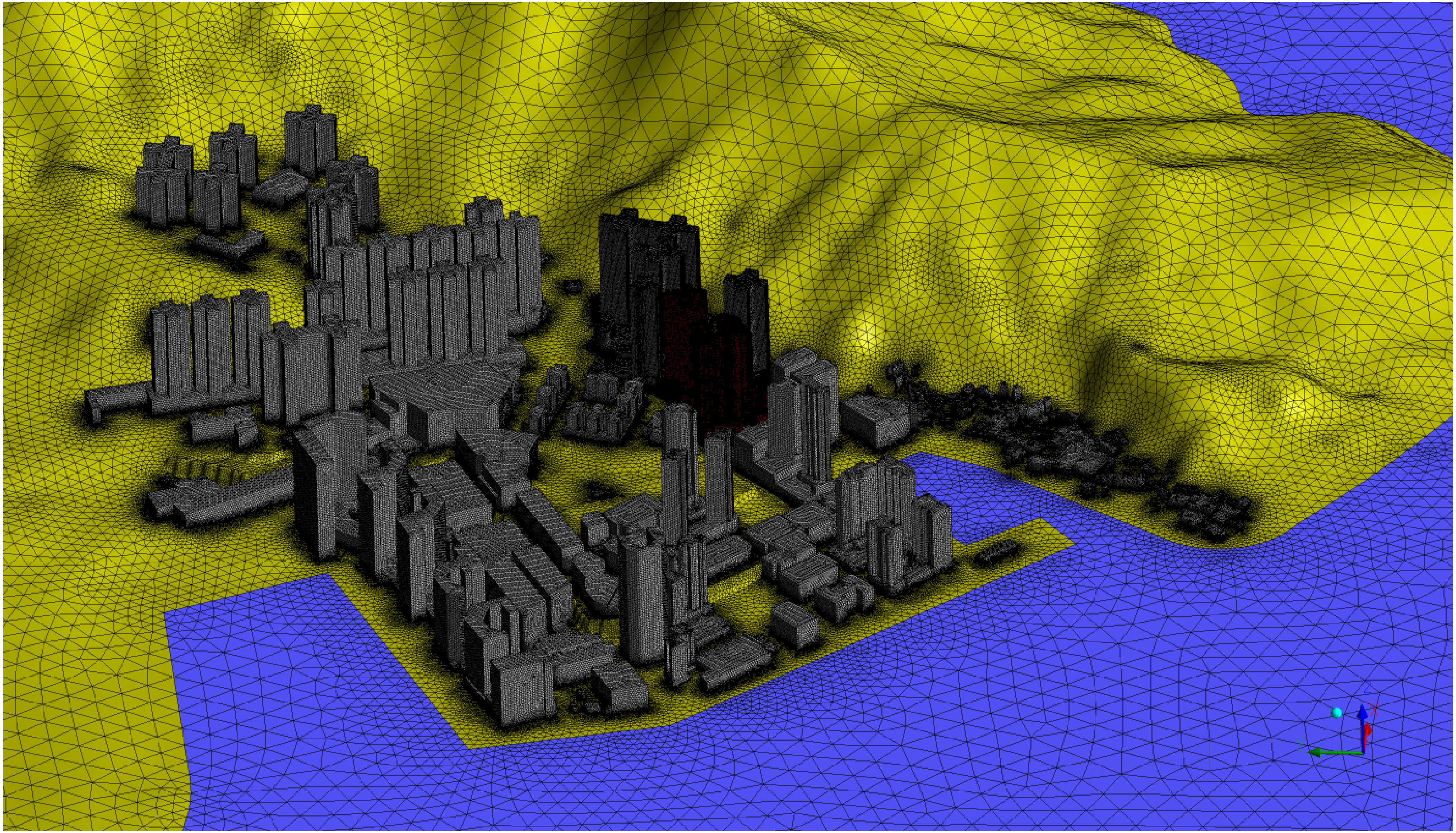


Figure B4 CFD Model for Baseline Scheme with Mesh

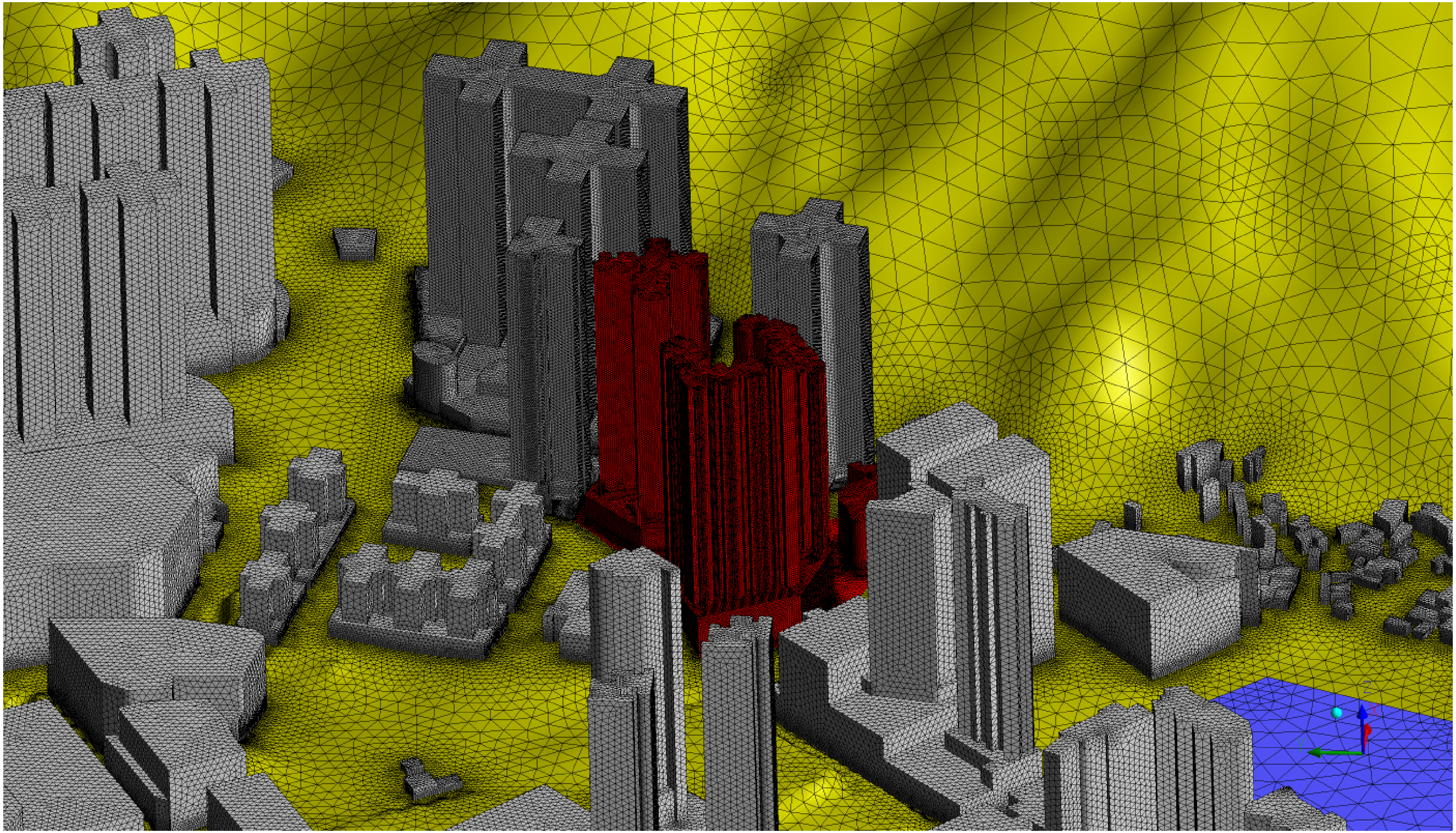


Figure B5 CFD Model for Proposed Scheme

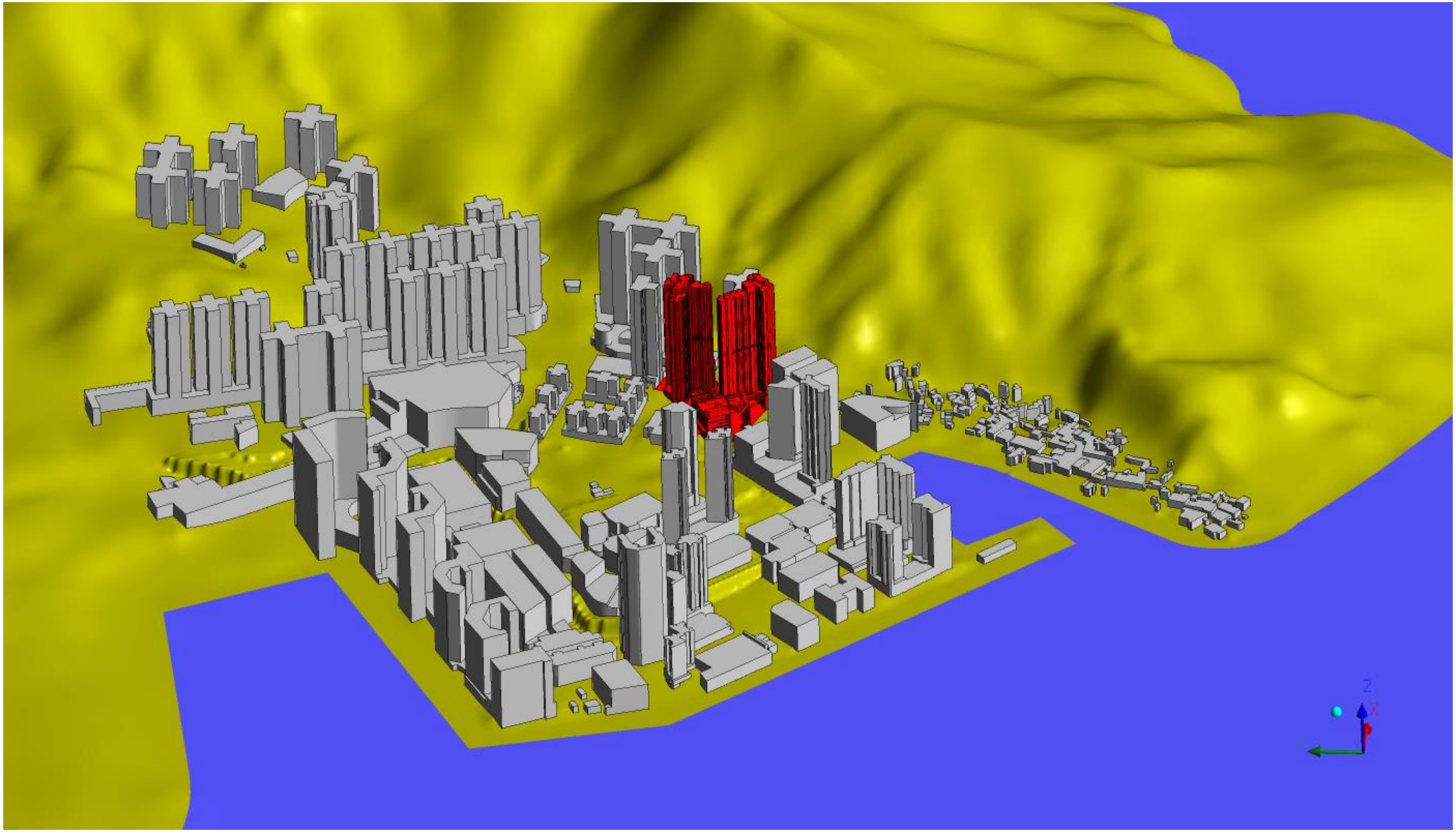


Figure B6 CFD Model for Proposed Scheme

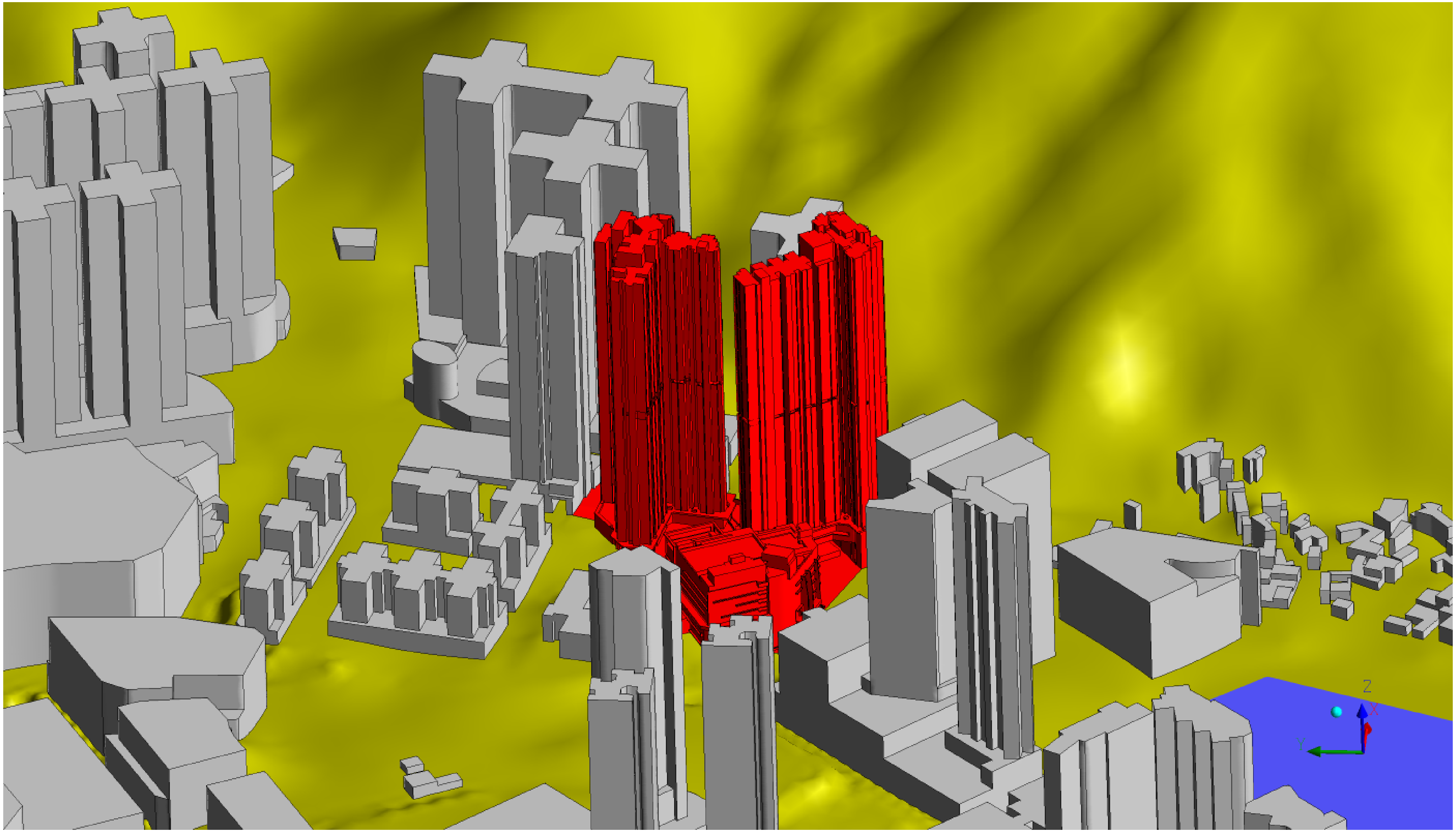


Figure B7 CFD Model for Proposed Scheme with Mesh

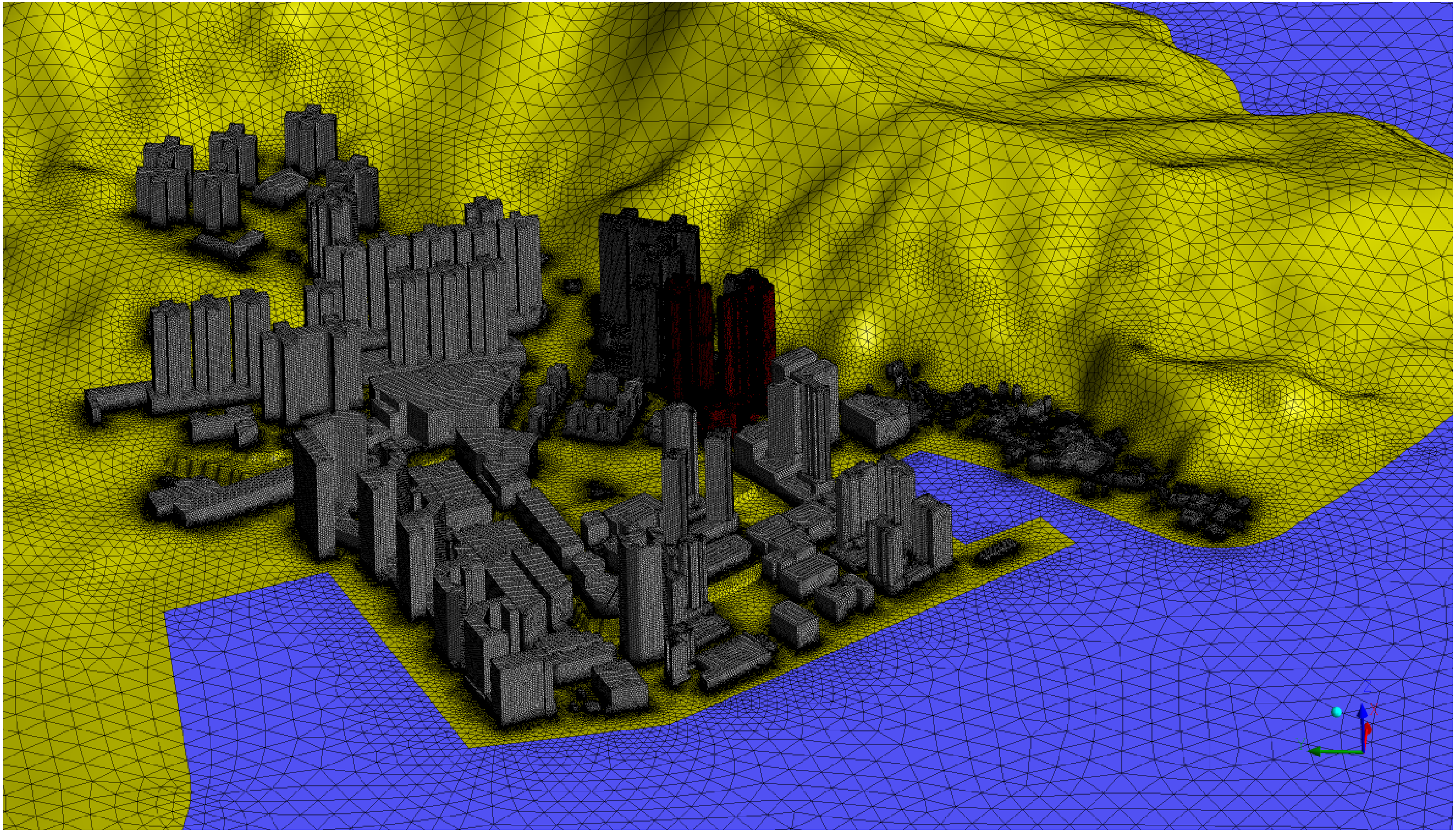


Figure B8 CFD Model for Proposed Scheme with Mesh

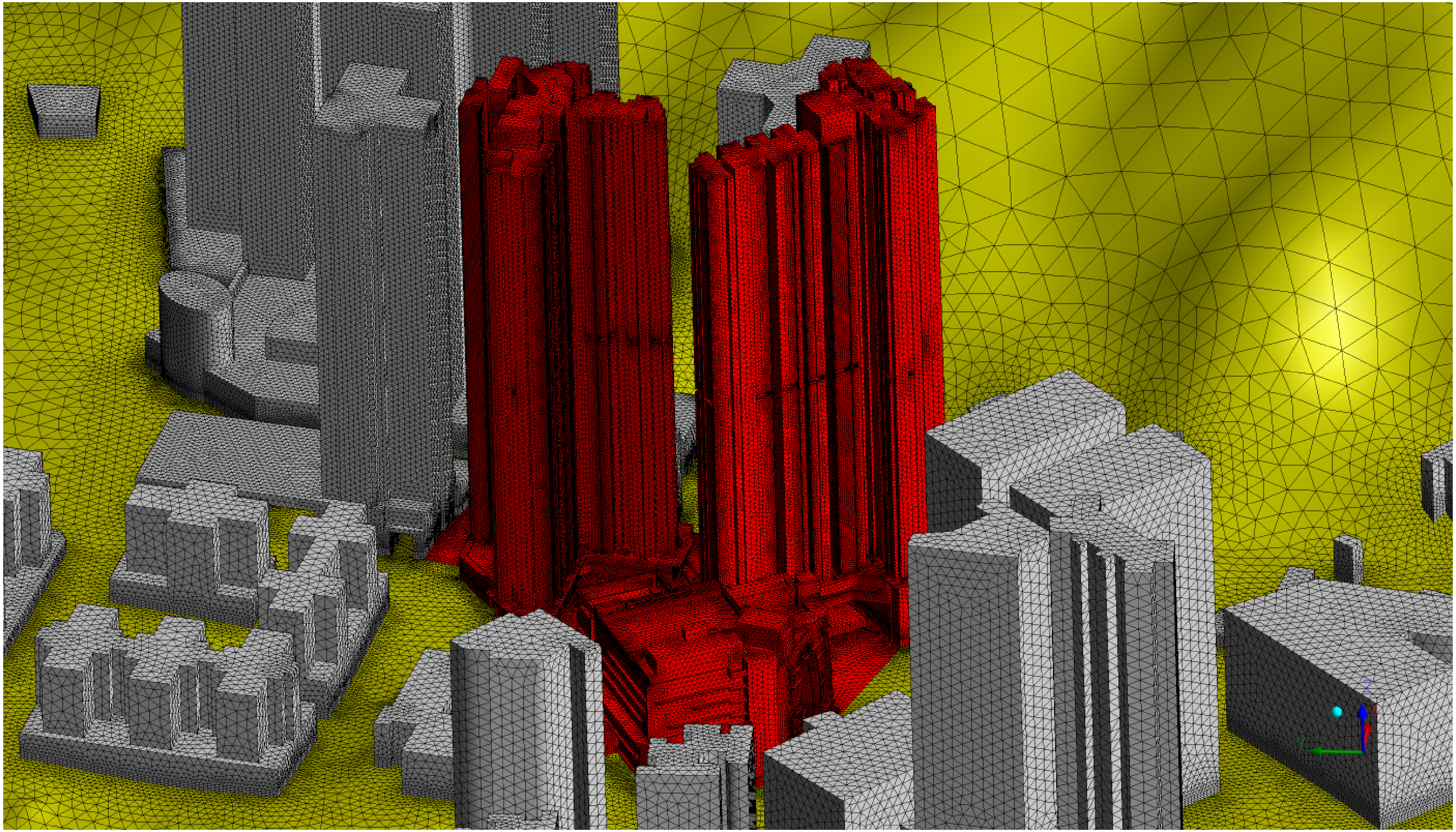
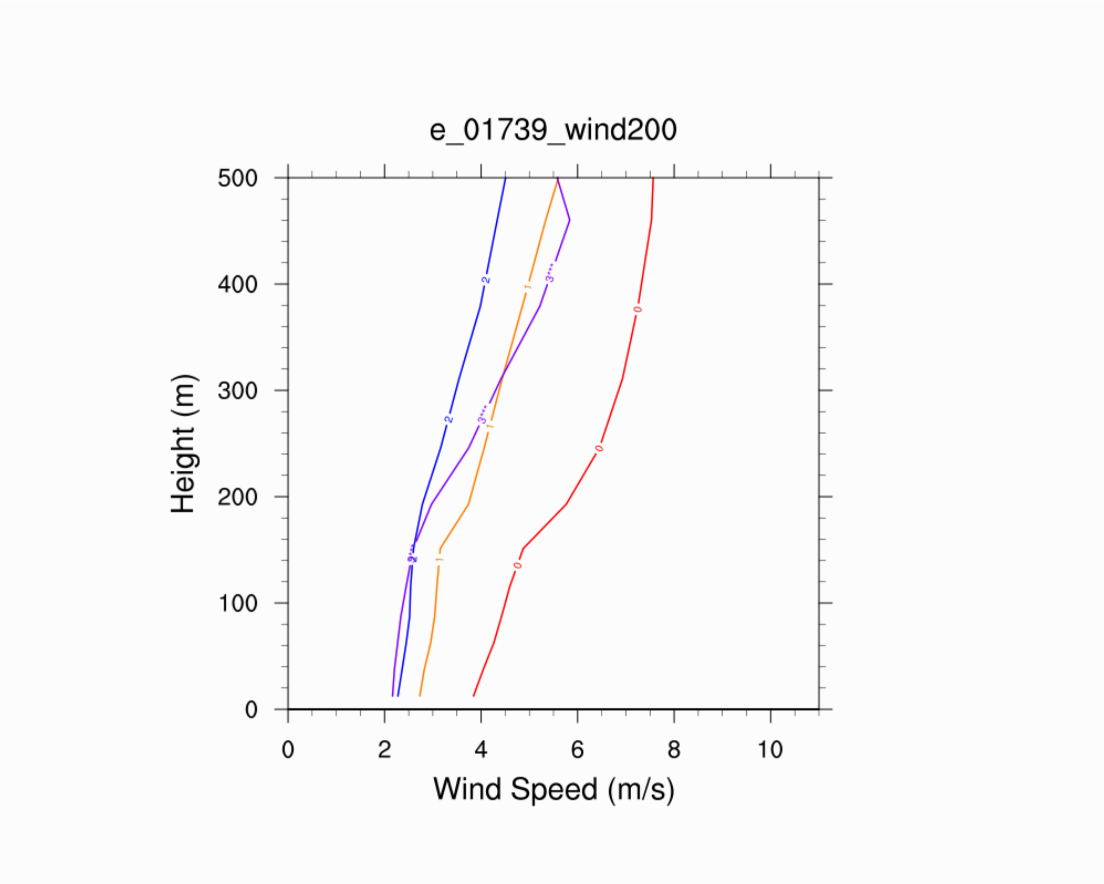


Figure B9 Wind Speed at RAMS Grid



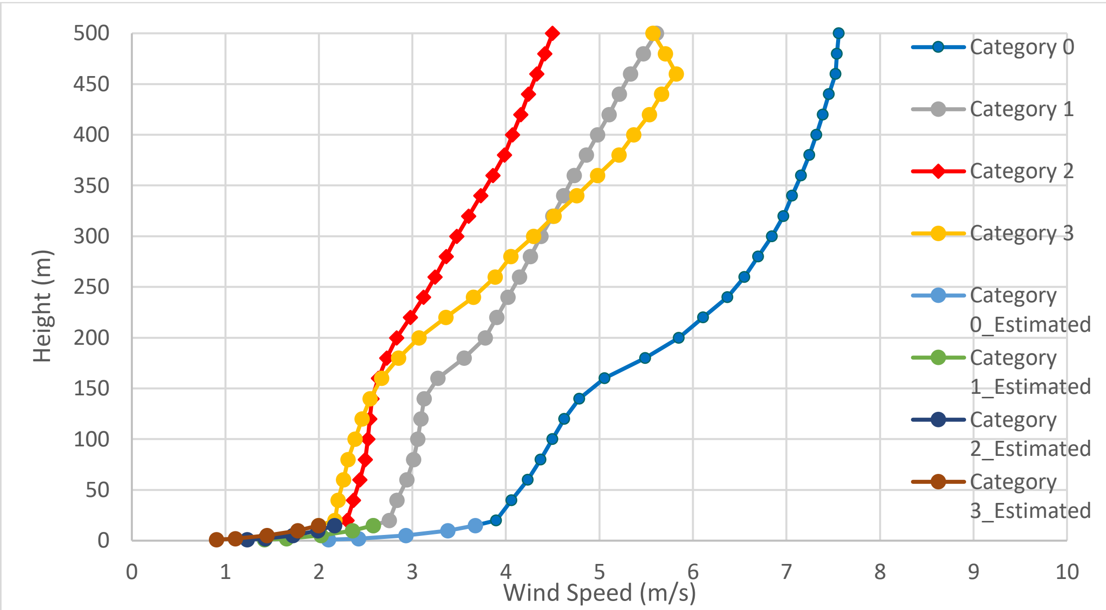
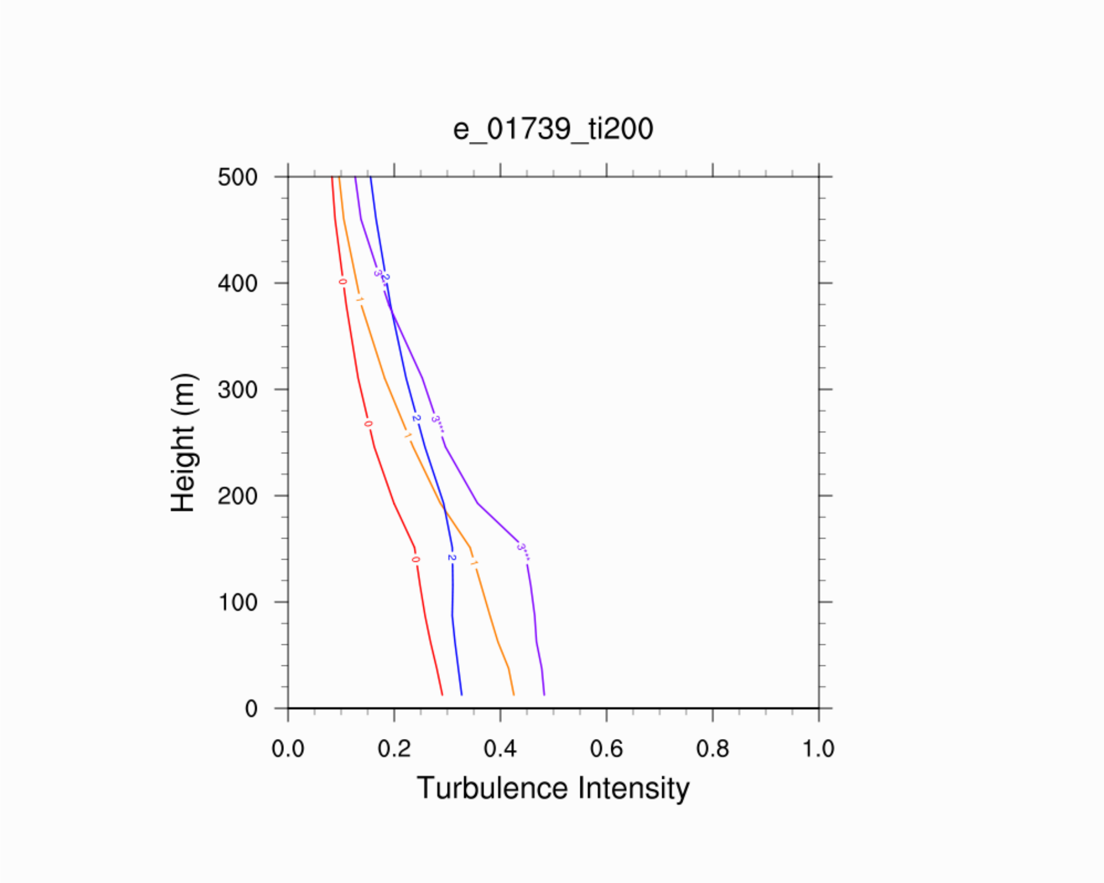
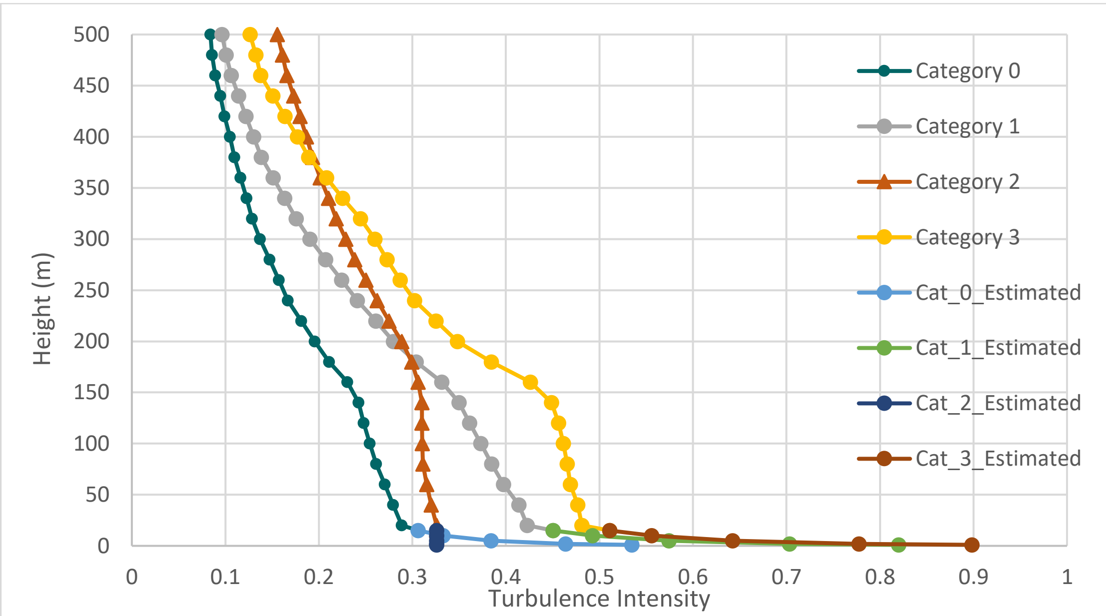


Figure B10 Turbulent Intensity at RAMS Grid





Appendix C

Velocity Ratios of Overall and Perimeter Special Test Points

Table C1 VRs at Test Point Under Annual Condition (Baseline Scheme)

Annual Prevailing Wind	Prevailing Wind Occurrence								
	NNE	NE	ENE	E	ESE	SE	SSW	SW	Overall
Percentage	5.5%	9.0%	15.1%	20.0%	10.1%	6.0%	6.2%	6.1%	78.0%
Test Point	Directional Velocity Ratio								Annual
	NNE	NE	ENE	E	ESE	SE	SSW	SW	
P01	0.08	0.05	0.28	0.14	0.21	0.23	0.13	0.10	0.16
P02	0.10	0.05	0.23	0.10	0.13	0.05	0.15	0.12	0.13
P03	0.10	0.05	0.29	0.11	0.15	0.08	0.12	0.11	0.14
P04	0.09	0.01	0.30	0.08	0.13	0.08	0.09	0.13	0.13
P05	0.11	0.00	0.17	0.05	0.05	0.02	0.21	0.13	0.09
P06	0.12	0.01	0.10	0.03	0.01	0.36	0.16	0.08	0.08
P07	0.12	0.01	0.05	0.01	0.02	0.40	0.13	0.03	0.07
P08	0.08	0.01	0.05	0.02	0.02	0.06	0.08	0.10	0.04
P09	0.04	0.03	0.08	0.03	0.02	0.11	0.07	0.11	0.05
P10	0.07	0.03	0.08	0.02	0.01	0.15	0.05	0.04	0.05
P11	0.11	0.02	0.10	0.02	0.07	0.38	0.46	0.32	0.13
P12	0.11	0.04	0.06	0.02	0.08	0.43	0.42	0.27	0.13
P13	0.07	0.04	0.07	0.03	0.11	0.46	0.40	0.25	0.13
P14	0.11	0.05	0.09	0.03	0.15	0.50	0.41	0.26	0.15
P15	0.15	0.06	0.08	0.03	0.24	0.52	0.41	0.26	0.17
P16	0.19	0.06	0.05	0.03	0.22	0.46	0.35	0.24	0.15
P17	0.17	0.04	0.04	0.03	0.21	0.24	0.26	0.17	0.11
P18	0.17	0.04	0.06	0.04	0.28	0.23	0.29	0.22	0.13
P19	0.19	0.05	0.04	0.06	0.31	0.23	0.26	0.22	0.14
P20	0.19	0.08	0.03	0.06	0.30	0.20	0.17	0.18	0.13
P21	0.18	0.10	0.03	0.05	0.22	0.20	0.05	0.02	0.09
P22	0.18	0.05	0.02	0.05	0.11	0.17	0.07	0.08	0.07
P23	0.18	0.02	0.02	0.05	0.06	0.04	0.11	0.05	0.05
P24	0.16	0.07	0.04	0.05	0.08	0.08	0.12	0.05	0.07
P25	0.13	0.17	0.05	0.04	0.13	0.22	0.08	0.05	0.09
P26	0.06	0.16	0.06	0.01	0.12	0.30	0.01	0.10	0.08
P27	0.01	0.06	0.07	0.02	0.06	0.32	0.07	0.16	0.08
P28	0.03	0.06	0.02	0.02	0.01	0.06	0.10	0.05	0.03
P29	0.03	0.03	0.02	0.01	0.02	0.15	0.24	0.06	0.05
P30	0.04	0.01	0.03	0.03	0.04	0.34	0.23	0.25	0.09
P31	0.05	0.07	0.04	0.05	0.05	0.16	0.24	0.24	0.09
P32	0.02	0.06	0.02	0.03	0.05	0.21	0.25	0.23	0.08
P33	0.02	0.13	0.03	0.02	0.03	0.15	0.16	0.14	0.07
P34	0.04	0.06	0.08	0.03	0.04	0.05	0.06	0.02	0.05
P35	0.04	0.10	0.17	0.02	0.05	0.17	0.11	0.08	0.09
P36	0.16	0.02	0.30	0.07	0.11	0.23	0.18	0.11	0.15
P37	0.18	0.05	0.33	0.15	0.18	0.17	0.14	0.07	0.17
P38	0.02	0.02	0.24	0.02	0.02	0.12	0.08	0.03	0.08
O001	0.37	0.03	0.02	0.02	0.08	0.06	0.07	0.04	0.06
O002	0.41	0.11	0.17	0.21	0.21	0.09	0.08	0.13	0.18
O003	0.06	0.07	0.23	0.09	0.31	0.08	0.03	0.10	0.14
O004	0.09	0.27	0.12	0.14	0.13	0.03	0.11	0.20	0.14
O005	0.08	0.11	0.39	0.36	0.33	0.13	0.15	0.22	0.27
O006	0.23	0.46	0.15	0.38	0.33	0.09	0.15	0.23	0.27
O007	0.20	0.43	0.22	0.28	0.43	0.07	0.11	0.17	0.26

Annual Prevailing Wind	Prevailing Wind Occurrence								
	NNE	NE	ENE	E	ESE	SE	SSW	SW	Overall
Percentage	5.5%	9.0%	15.1%	20.0%	10.1%	6.0%	6.2%	6.1%	78.0%
Test Point	Directional Velocity Ratio								Annual
	NNE	NE	ENE	E	ESE	SE	SSW	SW	
O008	0.28	0.42	0.25	0.31	0.39	0.06	0.10	0.12	0.27
O009	0.25	0.39	0.25	0.19	0.33	0.05	0.22	0.22	0.24
O010	0.06	0.30	0.11	0.16	0.08	0.07	0.18	0.12	0.14
O011	0.25	0.04	0.24	0.10	0.05	0.18	0.15	0.03	0.13
O012	0.09	0.07	0.07	0.09	0.08	0.06	0.05	0.02	0.07
O013	0.05	0.02	0.12	0.03	0.08	0.11	0.20	0.02	0.07
O014	0.10	0.08	0.02	0.07	0.12	0.10	0.28	0.05	0.09
O015	0.05	0.28	0.05	0.23	0.24	0.04	0.09	0.12	0.15
O016	0.05	0.15	0.17	0.23	0.24	0.07	0.03	0.11	0.16
O017	0.11	0.26	0.34	0.20	0.35	0.06	0.05	0.09	0.22
O018	0.21	0.37	0.31	0.32	0.47	0.07	0.09	0.09	0.28
O019	0.12	0.05	0.32	0.05	0.10	0.01	0.09	0.11	0.12
O020	0.07	0.27	0.11	0.12	0.19	0.05	0.07	0.10	0.13
O021	0.08	0.05	0.07	0.02	0.09	0.13	0.05	0.06	0.06
O022	0.10	0.17	0.13	0.05	0.13	0.16	0.08	0.08	0.11
O023	0.10	0.04	0.13	0.06	0.06	0.13	0.06	0.11	0.08
O024	0.01	0.13	0.12	0.05	0.12	0.07	0.39	0.15	0.12
O025	0.04	0.08	0.16	0.03	0.11	0.08	0.35	0.16	0.11
O026	0.05	0.07	0.15	0.04	0.07	0.10	0.08	0.11	0.08
O027	0.15	0.09	0.13	0.06	0.08	0.22	0.13	0.15	0.11
O028	0.22	0.02	0.12	0.06	0.07	0.09	0.13	0.12	0.09
O029	0.22	0.11	0.11	0.08	0.16	0.26	0.38	0.27	0.16
O030	0.09	0.17	0.07	0.04	0.14	0.15	0.32	0.20	0.12
O031	0.08	0.03	0.12	0.02	0.03	0.36	0.21	0.22	0.10
O032	0.11	0.12	0.11	0.04	0.05	0.15	0.16	0.20	0.10
O033	0.40	0.20	0.16	0.00	0.07	0.07	0.41	0.34	0.16
O034	0.07	0.05	0.07	0.02	0.15	0.09	0.22	0.21	0.09
O035	0.12	0.09	0.04	0.04	0.19	0.44	0.11	0.25	0.12
O036	0.09	0.08	0.09	0.04	0.39	0.44	0.43	0.18	0.18
O037	0.11	0.12	0.10	0.04	0.06	0.17	0.19	0.12	0.10
O038	0.28	0.16	0.01	0.04	0.28	0.55	0.36	0.28	0.18
O039	0.15	0.06	0.16	0.03	0.36	0.16	0.17	0.02	0.13
O040	0.01	0.01	0.09	0.05	0.51	0.43	0.51	0.44	0.21
O041	0.14	0.07	0.02	0.04	0.08	0.30	0.03	0.03	0.07
O042	0.14	0.03	0.08	0.02	0.38	0.24	0.34	0.30	0.15
O043	0.02	0.02	0.05	0.03	0.15	0.15	0.18	0.18	0.08
O044	0.19	0.04	0.06	0.05	0.24	0.20	0.28	0.11	0.12
O045	0.01	0.10	0.13	0.07	0.27	0.08	0.27	0.25	0.14
O046	0.01	0.03	0.08	0.06	0.10	0.21	0.06	0.07	0.07
O047	0.28	0.42	0.25	0.31	0.39	0.06	0.10	0.12	0.27
O048	0.25	0.39	0.25	0.19	0.33	0.05	0.22	0.22	0.24
O049	0.06	0.30	0.11	0.16	0.08	0.07	0.18	0.12	0.14
O050	0.25	0.04	0.24	0.10	0.05	0.18	0.15	0.03	0.13
O051	0.09	0.07	0.07	0.09	0.08	0.06	0.05	0.02	0.07
O052	0.05	0.02	0.12	0.03	0.08	0.11	0.20	0.02	0.07
O053	0.10	0.08	0.02	0.07	0.12	0.10	0.28	0.05	0.09

Annual Prevailing Wind	Prevailing Wind Occurrence								
	NNE	NE	ENE	E	ESE	SE	SSW	SW	Overall
Percentage	5.5%	9.0%	15.1%	20.0%	10.1%	6.0%	6.2%	6.1%	78.0%
Test Point	Directional Velocity Ratio								Annual
	NNE	NE	ENE	E	ESE	SE	SSW	SW	
O054	0.04	0.15	0.06	0.04	0.23	0.09	0.14	0.13	0.10
O055	0.03	0.21	0.06	0.02	0.16	0.20	0.20	0.33	0.12
O056	0.01	0.27	0.09	0.03	0.16	0.20	0.32	0.37	0.15
O057	0.01	0.06	0.05	0.01	0.23	0.23	0.10	0.12	0.08
O058	0.03	0.10	0.06	0.04	0.19	0.28	0.12	0.12	0.10
O059	0.03	0.13	0.06	0.05	0.22	0.17	0.24	0.20	0.12
O060	0.12	0.13	0.03	0.05	0.10	0.16	0.18	0.06	0.08
O061	0.09	0.23	0.04	0.04	0.16	0.20	0.09	0.12	0.10

Table C2 VRs at Test Point Under Annual Condition (Proposed Scheme)

Annual Prevailing Wind	Prevailing Wind Occurrence								
	NNE	NE	ENE	E	ESE	SE	SSW	SW	Overall
Percentage	5.5%	9.0%	15.1%	20.0%	10.1%	6.0%	6.2%	6.1%	78.0%
Test Point	Directional Velocity Ratio								Annual
	NNE	NE	ENE	E	ESE	SE	SSW	SW	
P01	0.09	0.12	0.27	0.04	0.26	0.19	0.19	0.16	0.16
P02	0.10	0.09	0.22	0.14	0.14	0.08	0.22	0.21	0.16
P03	0.03	0.08	0.21	0.11	0.14	0.05	0.21	0.01	0.12
P04	0.04	0.08	0.23	0.11	0.18	0.10	0.17	0.11	0.14
P05	0.09	0.02	0.11	0.06	0.11	0.13	0.17	0.23	0.10
P06	0.14	0.00	0.20	0.04	0.10	0.19	0.10	0.09	0.10
P07	0.15	0.02	0.06	0.05	0.04	0.09	0.14	0.04	0.06
P08	0.14	0.02	0.07	0.03	0.01	0.04	0.14	0.11	0.06
P09	0.04	0.01	0.05	0.04	0.01	0.10	0.07	0.08	0.04
P10	0.13	0.05	0.03	0.05	0.01	0.02	0.05	0.04	0.05
P11	0.07	0.10	0.09	0.02	0.03	0.17	0.05	0.10	0.07
P12	0.09	0.04	0.08	0.02	0.09	0.42	0.30	0.26	0.12
P13	0.11	0.03	0.09	0.03	0.11	0.41	0.32	0.26	0.13
P14	0.16	0.03	0.13	0.04	0.19	0.46	0.42	0.30	0.17
P15	0.27	0.04	0.14	0.05	0.28	0.49	0.47	0.33	0.20
P16	0.25	0.03	0.11	0.03	0.18	0.31	0.32	0.24	0.14
P17	0.21	0.01	0.07	0.00	0.24	0.12	0.27	0.17	0.11
P18	0.19	0.03	0.06	0.00	0.28	0.05	0.24	0.18	0.10
P19	0.19	0.01	0.02	0.01	0.28	0.13	0.13	0.15	0.09
P20	0.17	0.06	0.04	0.01	0.24	0.23	0.05	0.09	0.09
P21	0.15	0.11	0.12	0.04	0.19	0.32	0.12	0.06	0.12
P22	0.16	0.04	0.02	0.05	0.11	0.34	0.12	0.10	0.09
P23	0.17	0.02	0.03	0.03	0.07	0.22	0.08	0.10	0.07
P24	0.15	0.12	0.03	0.03	0.10	0.05	0.03	0.13	0.07
P25	0.02	0.13	0.01	0.02	0.14	0.11	0.05	0.19	0.07
P26	0.03	0.12	0.20	0.05	0.12	0.16	0.07	0.19	0.12
P27	0.05	0.10	0.20	0.12	0.10	0.15	0.07	0.18	0.13
P28	0.05	0.03	0.19	0.13	0.00	0.23	0.12	0.13	0.12
P29	0.06	0.04	0.15	0.12	0.00	0.30	0.24	0.13	0.12
P30	0.05	0.01	0.08	0.07	0.01	0.38	0.34	0.25	0.12
P31	0.03	0.02	0.05	0.03	0.02	0.28	0.38	0.27	0.10
P32	0.01	0.10	0.14	0.02	0.02	0.27	0.33	0.23	0.11
P33	0.01	0.17	0.12	0.03	0.01	0.23	0.21	0.10	0.09
P34	0.06	0.05	0.15	0.03	0.04	0.03	0.06	0.03	0.06
P35	0.08	0.08	0.17	0.03	0.07	0.14	0.19	0.13	0.10
P36	0.18	0.05	0.24	0.05	0.18	0.33	0.20	0.07	0.15
P37	0.19	0.09	0.32	0.10	0.20	0.15	0.17	0.05	0.17
P38	0.17	0.09	0.20	0.06	0.19	0.23	0.10	0.13	0.14
O001	0.38	0.08	0.02	0.08	0.09	0.07	0.08	0.01	0.08
O002	0.41	0.07	0.14	0.21	0.20	0.10	0.06	0.10	0.16
O003	0.03	0.04	0.23	0.09	0.31	0.08	0.02	0.09	0.13
O004	0.12	0.29	0.12	0.10	0.14	0.03	0.09	0.24	0.14
O005	0.11	0.11	0.33	0.36	0.33	0.13	0.12	0.27	0.26
O006	0.22	0.43	0.15	0.36	0.34	0.10	0.11	0.27	0.27
O007	0.20	0.41	0.22	0.29	0.44	0.07	0.09	0.22	0.26

Annual Prevailing Wind	Prevailing Wind Occurrence								
	NNE	NE	ENE	E	ESE	SE	SSW	SW	Overall
Percentage	5.5%	9.0%	15.1%	20.0%	10.1%	6.0%	6.2%	6.1%	78.0%
Test Point	Directional Velocity Ratio								Annual
	NNE	NE	ENE	E	ESE	SE	SSW	SW	
O008	0.29	0.39	0.24	0.34	0.39	0.08	0.10	0.18	0.28
O009	0.26	0.35	0.24	0.21	0.33	0.06	0.26	0.22	0.25
O010	0.05	0.24	0.17	0.23	0.08	0.14	0.21	0.07	0.17
O011	0.23	0.15	0.24	0.14	0.04	0.09	0.12	0.04	0.14
O012	0.08	0.05	0.14	0.11	0.10	0.07	0.14	0.03	0.10
O013	0.03	0.02	0.09	0.01	0.08	0.05	0.19	0.01	0.05
O014	0.09	0.11	0.07	0.05	0.11	0.13	0.26	0.07	0.10
O015	0.12	0.03	0.03	0.03	0.06	0.14	0.08	0.02	0.05
O016	0.05	0.21	0.11	0.26	0.22	0.03	0.20	0.09	0.17
O017	0.11	0.12	0.18	0.26	0.24	0.02	0.03	0.15	0.17
O018	0.05	0.17	0.17	0.22	0.38	0.09	0.15	0.12	0.19
O019	0.21	0.34	0.30	0.33	0.47	0.04	0.07	0.19	0.28
O020	0.07	0.05	0.13	0.05	0.14	0.09	0.09	0.18	0.10
O021	0.09	0.16	0.19	0.15	0.25	0.32	0.08	0.09	0.17
O022	0.05	0.11	0.04	0.09	0.16	0.06	0.16	0.08	0.09
O023	0.12	0.10	0.25	0.04	0.33	0.02	0.09	0.11	0.14
O024	0.11	0.15	0.17	0.13	0.18	0.05	0.10	0.06	0.13
O025	0.08	0.04	0.06	0.04	0.06	0.12	0.19	0.04	0.07
O026	0.10	0.13	0.18	0.08	0.09	0.08	0.05	0.02	0.10
O027	0.12	0.04	0.18	0.09	0.03	0.07	0.06	0.11	0.10
O028	0.02	0.15	0.12	0.04	0.13	0.22	0.38	0.12	0.13
O029	0.04	0.11	0.19	0.02	0.09	0.12	0.33	0.17	0.12
O030	0.06	0.07	0.15	0.07	0.05	0.01	0.09	0.11	0.08
O031	0.15	0.09	0.13	0.08	0.08	0.03	0.13	0.14	0.10
O032	0.22	0.05	0.10	0.09	0.07	0.06	0.13	0.12	0.10
O033	0.24	0.10	0.08	0.07	0.16	0.06	0.37	0.27	0.14
O034	0.13	0.20	0.05	0.03	0.15	0.24	0.33	0.18	0.13
O035	0.13	0.07	0.11	0.03	0.05	0.10	0.12	0.14	0.08
O036	0.14	0.14	0.08	0.03	0.05	0.23	0.18	0.20	0.11
O037	0.40	0.19	0.17	0.06	0.10	0.11	0.40	0.33	0.18
O038	0.09	0.05	0.03	0.01	0.11	0.08	0.21	0.22	0.07
O039	0.27	0.19	0.21	0.05	0.06	0.19	0.38	0.21	0.16
O040	0.21	0.08	0.12	0.05	0.13	0.26	0.36	0.32	0.15
O041	0.13	0.10	0.02	0.06	0.15	0.44	0.12	0.25	0.12
O042	0.07	0.09	0.14	0.05	0.39	0.45	0.43	0.18	0.19
O043	0.10	0.13	0.17	0.03	0.07	0.20	0.20	0.13	0.11
O044	0.27	0.16	0.14	0.06	0.27	0.54	0.36	0.29	0.21
O045	0.20	0.03	0.10	0.01	0.36	0.16	0.17	0.02	0.12
O046	0.08	0.01	0.13	0.03	0.49	0.46	0.51	0.43	0.21
O047	0.10	0.05	0.01	0.03	0.14	0.30	0.11	0.06	0.08
O048	0.12	0.02	0.08	0.01	0.36	0.32	0.31	0.25	0.14
O049	0.03	0.02	0.05	0.02	0.14	0.15	0.18	0.18	0.08
O050	0.12	0.15	0.08	0.06	0.21	0.14	0.18	0.15	0.12
O051	0.23	0.05	0.08	0.06	0.25	0.20	0.28	0.12	0.13
O052	0.04	0.12	0.07	0.06	0.28	0.09	0.27	0.24	0.13
O053	0.02	0.03	0.01	0.04	0.10	0.20	0.06	0.06	0.05

Annual Prevailing Wind	Prevailing Wind Occurrence								
	NNE	NE	ENE	E	ESE	SE	SSW	SW	Overall
Percentage	5.5%	9.0%	15.1%	20.0%	10.1%	6.0%	6.2%	6.1%	78.0%
Test Point	Directional Velocity Ratio								Annual
	NNE	NE	ENE	E	ESE	SE	SSW	SW	
O054	0.03	0.18	0.07	0.06	0.24	0.10	0.14	0.12	0.11
O055	0.04	0.20	0.06	0.04	0.17	0.20	0.20	0.33	0.13
O056	0.01	0.33	0.04	0.04	0.16	0.20	0.32	0.36	0.15
O057	0.01	0.11	0.01	0.01	0.21	0.23	0.09	0.12	0.08
O058	0.03	0.09	0.02	0.03	0.18	0.28	0.11	0.11	0.09
O059	0.05	0.07	0.05	0.01	0.20	0.23	0.23	0.19	0.10
O060	0.19	0.15	0.02	0.03	0.10	0.30	0.14	0.06	0.09
O061	0.11	0.18	0.19	0.03	0.18	0.14	0.08	0.15	0.13

Table C3 VRs at Test Point Under Summer Condition (Baseline Scheme)

Summer Prevailing Wind	Prevailing Wind Occurrence								
	E	ESE	SE	SSE	S	SSW	SW	WSW	Overall
Percentage	9.0%	8.8%	6.6%	7.8%	9.5%	14.2%	14.3%	9.3%	79.5%
Test Point	Directional Velocity Ratio								Summer
	E	ESE	SE	SSE	S	SSW	SW	WSW	
P01	0.14	0.21	0.23	0.35	0.29	0.13	0.10	0.12	0.17
P02	0.10	0.13	0.05	0.04	0.07	0.15	0.12	0.10	0.10
P03	0.11	0.15	0.08	0.08	0.15	0.12	0.11	0.06	0.11
P04	0.08	0.13	0.08	0.08	0.12	0.09	0.13	0.07	0.11
P05	0.05	0.05	0.02	0.29	0.32	0.21	0.13	0.21	0.17
P06	0.03	0.01	0.36	0.53	0.41	0.16	0.08	0.26	0.21
P07	0.01	0.02	0.40	0.57	0.48	0.13	0.03	0.29	0.21
P08	0.02	0.02	0.06	0.08	0.06	0.08	0.10	0.28	0.09
P09	0.03	0.02	0.11	0.16	0.11	0.07	0.11	0.25	0.10
P10	0.02	0.01	0.15	0.16	0.10	0.05	0.04	0.15	0.08
P11	0.02	0.07	0.38	0.47	0.44	0.46	0.32	0.19	0.29
P12	0.02	0.08	0.43	0.48	0.47	0.42	0.27	0.20	0.28
P13	0.03	0.11	0.46	0.44	0.47	0.40	0.25	0.20	0.28
P14	0.03	0.15	0.50	0.43	0.48	0.41	0.26	0.22	0.30
P15	0.03	0.24	0.52	0.53	0.48	0.41	0.26	0.23	0.32
P16	0.03	0.22	0.46	0.52	0.42	0.35	0.24	0.25	0.30
P17	0.03	0.21	0.24	0.40	0.18	0.26	0.17	0.21	0.21
P18	0.04	0.28	0.23	0.34	0.14	0.29	0.22	0.19	0.22
P19	0.06	0.31	0.23	0.31	0.19	0.26	0.22	0.16	0.22
P20	0.06	0.30	0.20	0.30	0.22	0.17	0.18	0.13	0.19
P21	0.05	0.22	0.20	0.31	0.24	0.05	0.02	0.05	0.13
P22	0.05	0.11	0.17	0.13	0.21	0.07	0.08	0.15	0.12
P23	0.05	0.06	0.04	0.12	0.16	0.11	0.05	0.14	0.10
P24	0.05	0.08	0.08	0.10	0.08	0.12	0.05	0.12	0.10
P25	0.04	0.13	0.22	0.10	0.08	0.08	0.05	0.07	0.10
P26	0.01	0.12	0.30	0.10	0.15	0.01	0.10	0.11	0.11
P27	0.02	0.06	0.32	0.03	0.14	0.07	0.16	0.22	0.12
P28	0.02	0.01	0.06	0.03	0.13	0.10	0.05	0.19	0.07
P29	0.01	0.02	0.15	0.12	0.25	0.24	0.06	0.15	0.13
P30	0.03	0.04	0.34	0.17	0.29	0.23	0.25	0.27	0.19
P31	0.05	0.05	0.16	0.16	0.28	0.24	0.24	0.11	0.16
P32	0.03	0.05	0.21	0.20	0.27	0.25	0.23	0.19	0.18
P33	0.02	0.03	0.15	0.13	0.18	0.16	0.14	0.12	0.12
P34	0.03	0.04	0.05	0.03	0.03	0.06	0.02	0.09	0.05
P35	0.02	0.05	0.17	0.27	0.22	0.11	0.08	0.09	0.13
P36	0.07	0.11	0.23	0.39	0.28	0.18	0.11	0.13	0.19
P37	0.15	0.18	0.17	0.38	0.21	0.14	0.07	0.08	0.17
P38	0.02	0.02	0.12	0.32	0.19	0.08	0.03	0.03	0.09
O001	0.02	0.08	0.06	0.10	0.09	0.07	0.04	0.11	0.07
O002	0.21	0.21	0.09	0.04	0.01	0.08	0.13	0.15	0.12
O003	0.09	0.31	0.08	0.09	0.08	0.03	0.10	0.01	0.09
O004	0.14	0.13	0.03	0.08	0.02	0.11	0.20	0.28	0.15
O005	0.36	0.33	0.13	0.23	0.11	0.15	0.22	0.33	0.25
O006	0.38	0.33	0.09	0.18	0.06	0.15	0.23	0.32	0.23
O007	0.28	0.43	0.07	0.13	0.04	0.11	0.17	0.26	0.19

Summer Prevailing Wind	Prevailing Wind Occurrence								
	E	ESE	SE	SSE	S	SSW	SW	WSW	Overall
Percentage	9.0%	8.8%	6.6%	7.8%	9.5%	14.2%	14.3%	9.3%	79.5%
Test Point	Directional Velocity Ratio								Summer
	E	ESE	SE	SSE	S	SSW	SW	WSW	
O008	0.31	0.39	0.06	0.19	0.10	0.10	0.12	0.30	0.19
O009	0.19	0.33	0.05	0.23	0.12	0.22	0.22	0.35	0.22
O010	0.16	0.08	0.07	0.13	0.12	0.18	0.12	0.14	0.13
O011	0.10	0.05	0.18	0.13	0.14	0.15	0.03	0.10	0.11
O012	0.09	0.08	0.06	0.08	0.01	0.05	0.02	0.14	0.06
O013	0.03	0.08	0.11	0.07	0.04	0.20	0.02	0.02	0.08
O014	0.07	0.12	0.10	0.08	0.17	0.28	0.05	0.02	0.11
O015	0.01	0.05	0.05	0.06	0.05	0.08	0.02	0.04	0.05
O016	0.23	0.24	0.04	0.06	0.10	0.09	0.12	0.02	0.11
O017	0.23	0.24	0.07	0.21	0.11	0.03	0.11	0.02	0.11
O018	0.20	0.35	0.06	0.11	0.12	0.05	0.09	0.12	0.13
O019	0.32	0.47	0.07	0.17	0.15	0.09	0.09	0.16	0.18
O020	0.06	0.11	0.25	0.33	0.25	0.10	0.08	0.12	0.15
O021	0.16	0.22	0.33	0.50	0.38	0.23	0.11	0.21	0.25
O022	0.08	0.15	0.04	0.04	0.00	0.12	0.11	0.07	0.08
O023	0.05	0.10	0.01	0.09	0.06	0.09	0.11	0.19	0.09
O024	0.12	0.19	0.05	0.08	0.04	0.07	0.10	0.09	0.10
O025	0.02	0.09	0.13	0.18	0.27	0.05	0.06	0.12	0.11
O026	0.05	0.13	0.16	0.31	0.31	0.08	0.08	0.05	0.14
O027	0.06	0.06	0.13	0.20	0.21	0.06	0.11	0.05	0.10
O028	0.05	0.12	0.07	0.28	0.26	0.39	0.15	0.07	0.18
O029	0.03	0.11	0.08	0.32	0.24	0.35	0.16	0.07	0.17
O030	0.04	0.07	0.10	0.09	0.18	0.08	0.11	0.08	0.09
O031	0.06	0.08	0.22	0.14	0.28	0.13	0.15	0.09	0.13
O032	0.06	0.07	0.09	0.03	0.15	0.13	0.12	0.01	0.09
O033	0.08	0.16	0.26	0.17	0.36	0.38	0.27	0.08	0.22
O034	0.04	0.14	0.15	0.36	0.23	0.32	0.20	0.16	0.20
O035	0.02	0.03	0.36	0.51	0.41	0.21	0.22	0.23	0.23
O036	0.04	0.05	0.15	0.37	0.28	0.16	0.20	0.14	0.17
O037	0.00	0.07	0.07	0.26	0.52	0.41	0.34	0.19	0.24
O038	0.02	0.15	0.09	0.22	0.32	0.22	0.21	0.09	0.17
O039	0.06	0.04	0.04	0.10	0.08	0.38	0.21	0.34	0.18
O040	0.03	0.12	0.23	0.24	0.30	0.36	0.31	0.20	0.23
O041	0.04	0.19	0.44	0.12	0.21	0.11	0.25	0.31	0.20
O042	0.04	0.39	0.44	0.36	0.48	0.43	0.18	0.05	0.28
O043	0.04	0.06	0.17	0.09	0.10	0.19	0.12	0.11	0.11
O044	0.04	0.28	0.55	0.39	0.42	0.36	0.28	0.19	0.31
O045	0.03	0.36	0.16	0.21	0.14	0.17	0.02	0.02	0.14
O046	0.05	0.51	0.43	0.35	0.41	0.51	0.44	0.16	0.35
O047	0.04	0.08	0.30	0.39	0.33	0.03	0.03	0.28	0.16
O048	0.02	0.38	0.24	0.26	0.17	0.34	0.30	0.22	0.24
O049	0.03	0.15	0.15	0.10	0.13	0.18	0.18	0.04	0.12
O050	0.07	0.20	0.14	0.14	0.09	0.18	0.15	0.08	0.13
O051	0.05	0.24	0.20	0.19	0.24	0.28	0.11	0.10	0.18
O052	0.07	0.27	0.08	0.20	0.08	0.27	0.25	0.17	0.18
O053	0.06	0.10	0.21	0.09	0.03	0.06	0.07	0.04	0.07

Summer Prevailing Wind	Prevailing Wind Occurrence								
	E	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**Overall**
Percentage	**9.0%**	**8.8%**	**6.6%**	**7.8%**	**9.5%**	**14.2%**	**14.3%**	**9.3%**	**79.5%**
Test Point	**Directional Velocity Ratio**								**Summer**
	E	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	
O054	0.04	0.23	0.09	0.09	0.06	0.14	0.13	0.15	0.11
O055	0.02	0.16	0.20	0.10	0.11	0.20	0.33	0.35	0.19
O056	0.03	0.16	0.20	0.06	0.19	0.32	0.37	0.31	0.23
O057	0.01	0.23	0.23	0.11	0.06	0.10	0.12	0.09	0.11
O058	0.04	0.19	0.28	0.07	0.03	0.12	0.12	0.13	0.12
O059	0.05	0.22	0.17	0.03	0.20	0.24	0.20	0.09	0.15
O060	0.05	0.10	0.16	0.13	0.22	0.18	0.06	0.05	0.12
O061	0.04	0.16	0.20	0.12	0.09	0.09	0.12	0.17	0.13

Table C4 VRs at Test Point Under Summer Condition (Proposed Scheme)

Summer Prevailing Wind	Prevailing Wind Occurrence								
	E	ESE	SE	SSE	S	SSW	SW	WSW	Overall
Percentage	9.0%	8.8%	6.6%	7.8%	9.5%	14.2%	14.3%	9.3%	79.5%
Test Point	Directional Velocity Ratio								Summer
	E	ESE	SE	SSE	S	SSW	SW	WSW	
P01	0.04	0.26	0.19	0.34	0.10	0.19	0.16	0.07	0.16
P02	0.14	0.14	0.08	0.06	0.10	0.22	0.21	0.08	0.14
P03	0.11	0.14	0.05	0.04	0.09	0.21	0.01	0.05	0.09
P04	0.11	0.18	0.10	0.19	0.23	0.17	0.11	0.07	0.15
P05	0.06	0.11	0.13	0.08	0.26	0.17	0.23	0.11	0.16
P06	0.04	0.10	0.19	0.24	0.22	0.10	0.09	0.19	0.14
P07	0.05	0.04	0.09	0.13	0.09	0.14	0.04	0.06	0.09
P08	0.03	0.01	0.04	0.08	0.09	0.14	0.11	0.02	0.08
P09	0.04	0.01	0.10	0.13	0.10	0.07	0.08	0.03	0.07
P10	0.05	0.01	0.02	0.06	0.01	0.05	0.04	0.02	0.04
P11	0.02	0.03	0.17	0.05	0.19	0.05	0.10	0.05	0.08
P12	0.02	0.09	0.42	0.35	0.45	0.30	0.26	0.06	0.24
P13	0.03	0.11	0.41	0.36	0.44	0.32	0.26	0.13	0.25
P14	0.04	0.19	0.46	0.42	0.48	0.42	0.30	0.14	0.30
P15	0.05	0.28	0.49	0.48	0.47	0.47	0.33	0.15	0.33
P16	0.03	0.18	0.31	0.39	0.35	0.32	0.24	0.10	0.24
P17	0.00	0.24	0.12	0.31	0.17	0.27	0.17	0.05	0.17
P18	0.00	0.28	0.05	0.31	0.21	0.24	0.18	0.03	0.16
P19	0.01	0.28	0.13	0.30	0.23	0.13	0.15	0.02	0.15
P20	0.01	0.24	0.23	0.33	0.29	0.05	0.09	0.05	0.14
P21	0.04	0.19	0.32	0.36	0.35	0.12	0.06	0.08	0.17
P22	0.05	0.11	0.34	0.34	0.36	0.12	0.10	0.09	0.18
P23	0.03	0.07	0.22	0.30	0.30	0.08	0.10	0.10	0.15
P24	0.03	0.10	0.05	0.19	0.11	0.03	0.13	0.09	0.10
P25	0.02	0.14	0.11	0.12	0.08	0.05	0.19	0.10	0.11
P26	0.05	0.12	0.16	0.07	0.13	0.07	0.19	0.14	0.11
P27	0.12	0.10	0.15	0.06	0.13	0.07	0.18	0.17	0.12
P28	0.13	0.00	0.23	0.13	0.17	0.12	0.13	0.15	0.13
P29	0.12	0.00	0.30	0.29	0.32	0.24	0.13	0.13	0.18
P30	0.07	0.01	0.38	0.35	0.42	0.34	0.25	0.19	0.24
P31	0.03	0.02	0.28	0.37	0.39	0.38	0.27	0.21	0.25
P32	0.02	0.02	0.27	0.33	0.21	0.33	0.23	0.21	0.21
P33	0.03	0.01	0.23	0.23	0.30	0.21	0.10	0.11	0.14
P34	0.03	0.04	0.03	0.11	0.03	0.06	0.03	0.04	0.06
P35	0.03	0.07	0.14	0.17	0.08	0.19	0.13	0.07	0.12
P36	0.05	0.18	0.33	0.27	0.14	0.20	0.07	0.03	0.16
P37	0.10	0.20	0.15	0.28	0.14	0.17	0.05	0.08	0.15
P38	0.06	0.19	0.23	0.24	0.25	0.10	0.13	0.19	0.16
O001	0.08	0.09	0.07	0.06	0.05	0.08	0.01	0.11	0.07
O002	0.21	0.20	0.10	0.03	0.09	0.06	0.10	0.17	0.12
O003	0.09	0.31	0.08	0.05	0.03	0.02	0.09	0.03	0.08
O004	0.10	0.14	0.03	0.07	0.03	0.09	0.24	0.27	0.15
O005	0.36	0.33	0.13	0.26	0.08	0.12	0.27	0.34	0.25
O006	0.36	0.34	0.10	0.19	0.03	0.11	0.27	0.33	0.23
O007	0.29	0.44	0.07	0.05	0.07	0.09	0.22	0.27	0.19

Summer Prevailing Wind	Prevailing Wind Occurrence								
	E	ESE	SE	SSE	S	SSW	SW	WSW	Overall
Percentage	9.0%	8.8%	6.6%	7.8%	9.5%	14.2%	14.3%	9.3%	79.5%
Test Point	Directional Velocity Ratio								Summer
	E	ESE	SE	SSE	S	SSW	SW	WSW	
O008	0.34	0.39	0.08	0.14	0.12	0.10	0.18	0.29	0.20
O009	0.21	0.33	0.06	0.19	0.15	0.26	0.22	0.34	0.23
O010	0.23	0.08	0.14	0.09	0.18	0.21	0.07	0.13	0.14
O011	0.14	0.04	0.09	0.20	0.19	0.12	0.04	0.08	0.12
O012	0.11	0.10	0.07	0.17	0.10	0.14	0.03	0.13	0.10
O013	0.01	0.08	0.05	0.21	0.14	0.19	0.01	0.03	0.09
O014	0.05	0.11	0.13	0.11	0.19	0.26	0.07	0.03	0.12
O015	0.03	0.06	0.14	0.11	0.19	0.08	0.02	0.04	0.08
O016	0.26	0.22	0.03	0.11	0.14	0.20	0.09	0.05	0.14
O017	0.26	0.24	0.02	0.08	0.02	0.03	0.15	0.02	0.10
O018	0.22	0.38	0.09	0.08	0.14	0.15	0.12	0.21	0.17
O019	0.33	0.47	0.04	0.12	0.10	0.07	0.19	0.14	0.18
O020	0.05	0.14	0.09	0.23	0.16	0.09	0.18	0.18	0.14
O021	0.15	0.25	0.32	0.40	0.29	0.08	0.09	0.21	0.21
O022	0.09	0.16	0.06	0.05	0.03	0.16	0.08	0.14	0.10
O023	0.04	0.33	0.02	0.07	0.13	0.09	0.11	0.18	0.13
O024	0.13	0.18	0.05	0.03	0.06	0.10	0.06	0.15	0.11
O025	0.04	0.06	0.12	0.02	0.14	0.19	0.04	0.08	0.10
O026	0.08	0.09	0.08	0.17	0.23	0.05	0.02	0.01	0.09
O027	0.09	0.03	0.07	0.20	0.14	0.06	0.11	0.04	0.09
O028	0.04	0.13	0.22	0.17	0.24	0.38	0.12	0.07	0.18
O029	0.02	0.09	0.12	0.14	0.19	0.33	0.17	0.06	0.15
O030	0.07	0.05	0.01	0.15	0.19	0.09	0.11	0.08	0.09
O031	0.08	0.08	0.03	0.17	0.24	0.13	0.14	0.08	0.12
O032	0.09	0.07	0.06	0.01	0.14	0.13	0.12	0.02	0.08
O033	0.07	0.16	0.06	0.15	0.36	0.37	0.27	0.08	0.20
O034	0.03	0.15	0.24	0.23	0.24	0.33	0.18	0.13	0.20
O035	0.03	0.05	0.10	0.23	0.18	0.12	0.14	0.16	0.12
O036	0.03	0.05	0.23	0.31	0.33	0.18	0.20	0.15	0.18
O037	0.06	0.10	0.11	0.25	0.52	0.40	0.33	0.19	0.25
O038	0.01	0.11	0.08	0.21	0.31	0.21	0.22	0.09	0.16
O039	0.05	0.06	0.19	0.11	0.12	0.38	0.21	0.34	0.20
O040	0.05	0.13	0.26	0.26	0.30	0.36	0.32	0.20	0.23
O041	0.06	0.15	0.44	0.12	0.21	0.12	0.25	0.31	0.20
O042	0.05	0.39	0.45	0.37	0.48	0.43	0.18	0.05	0.28
O043	0.03	0.07	0.20	0.09	0.10	0.20	0.13	0.11	0.12
O044	0.06	0.27	0.54	0.37	0.41	0.36	0.29	0.19	0.31
O045	0.01	0.36	0.16	0.21	0.15	0.17	0.02	0.03	0.14
O046	0.03	0.49	0.46	0.38	0.43	0.51	0.43	0.14	0.35
O047	0.03	0.14	0.30	0.33	0.31	0.11	0.06	0.16	0.17
O048	0.01	0.36	0.32	0.09	0.08	0.31	0.25	0.06	0.19
O049	0.02	0.14	0.15	0.11	0.13	0.18	0.18	0.05	0.12
O050	0.06	0.21	0.14	0.13	0.10	0.18	0.15	0.08	0.13
O051	0.06	0.25	0.20	0.18	0.25	0.28	0.12	0.09	0.19
O052	0.06	0.28	0.09	0.19	0.09	0.27	0.24	0.17	0.18
O053	0.04	0.10	0.20	0.07	0.03	0.06	0.06	0.05	0.07

Summer Prevailing Wind	Prevailing Wind Occurrence								
	E	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**Overall**
Percentage	**9.0%**	**8.8%**	**6.6%**	**7.8%**	**9.5%**	**14.2%**	**14.3%**	**9.3%**	**79.5%**
Test Point	**Directional Velocity Ratio**								**Summer**
	E	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	
O054	0.06	0.24	0.10	0.08	0.06	0.14	0.12	0.15	0.12
O055	0.04	0.17	0.20	0.09	0.10	0.20	0.33	0.35	0.19
O056	0.04	0.16	0.20	0.07	0.18	0.32	0.36	0.31	0.22
O057	0.01	0.21	0.23	0.11	0.07	0.09	0.12	0.09	0.11
O058	0.03	0.18	0.28	0.03	0.05	0.11	0.11	0.12	0.11
O059	0.01	0.20	0.23	0.09	0.19	0.23	0.19	0.08	0.16
O060	0.03	0.10	0.30	0.32	0.37	0.14	0.06	0.07	0.16
O061	0.03	0.18	0.14	0.17	0.10	0.08	0.15	0.18	0.13

Appendix D

Velocity Ratio Contour and Vector Plots

Figure D1 Velocity Ratio Contour and Vector Plot under E Wind in the Baseline Scheme

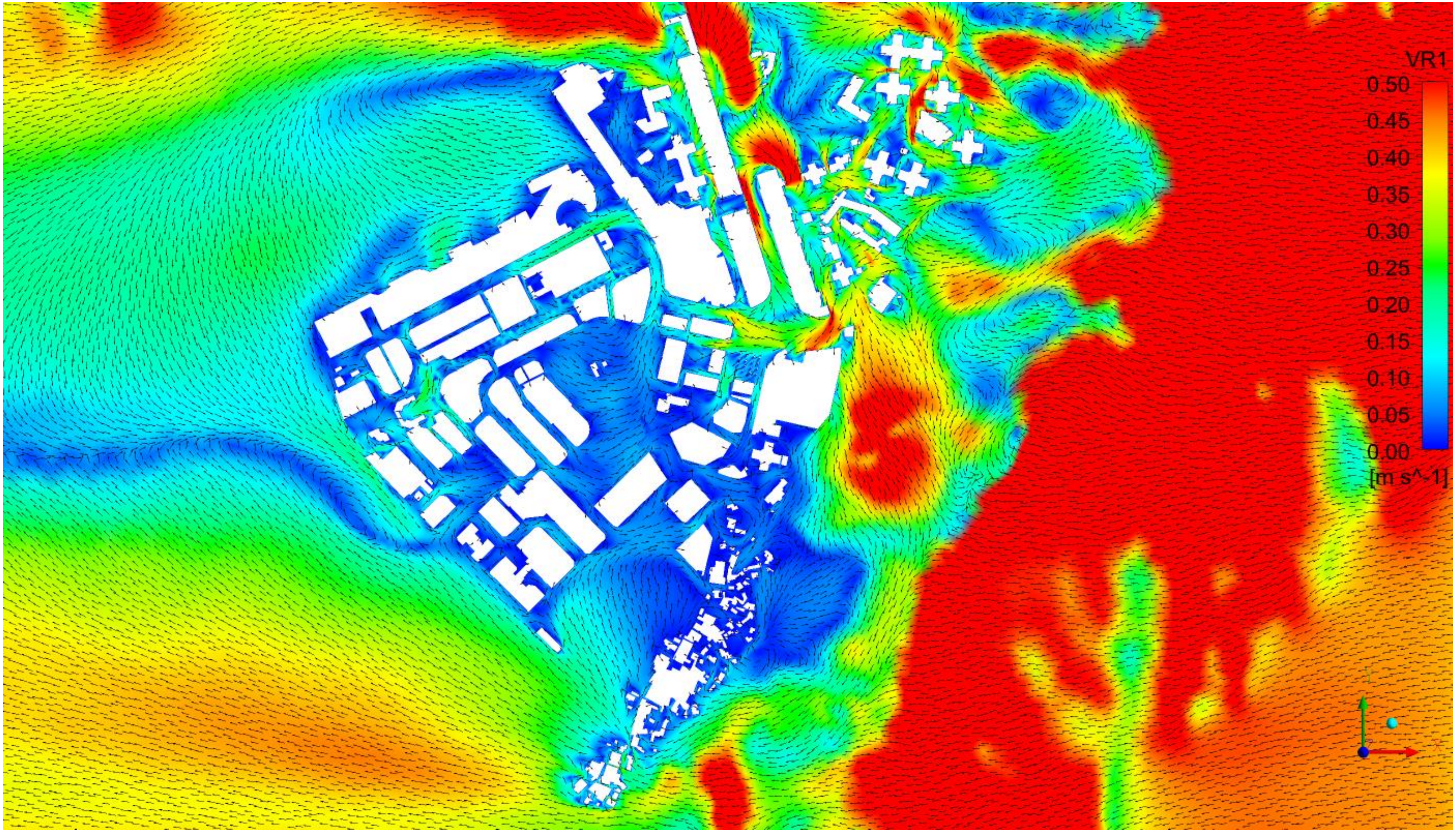


Figure D2 Velocity Ratio Contour and Vector Plot under E Wind in the Proposed Scheme

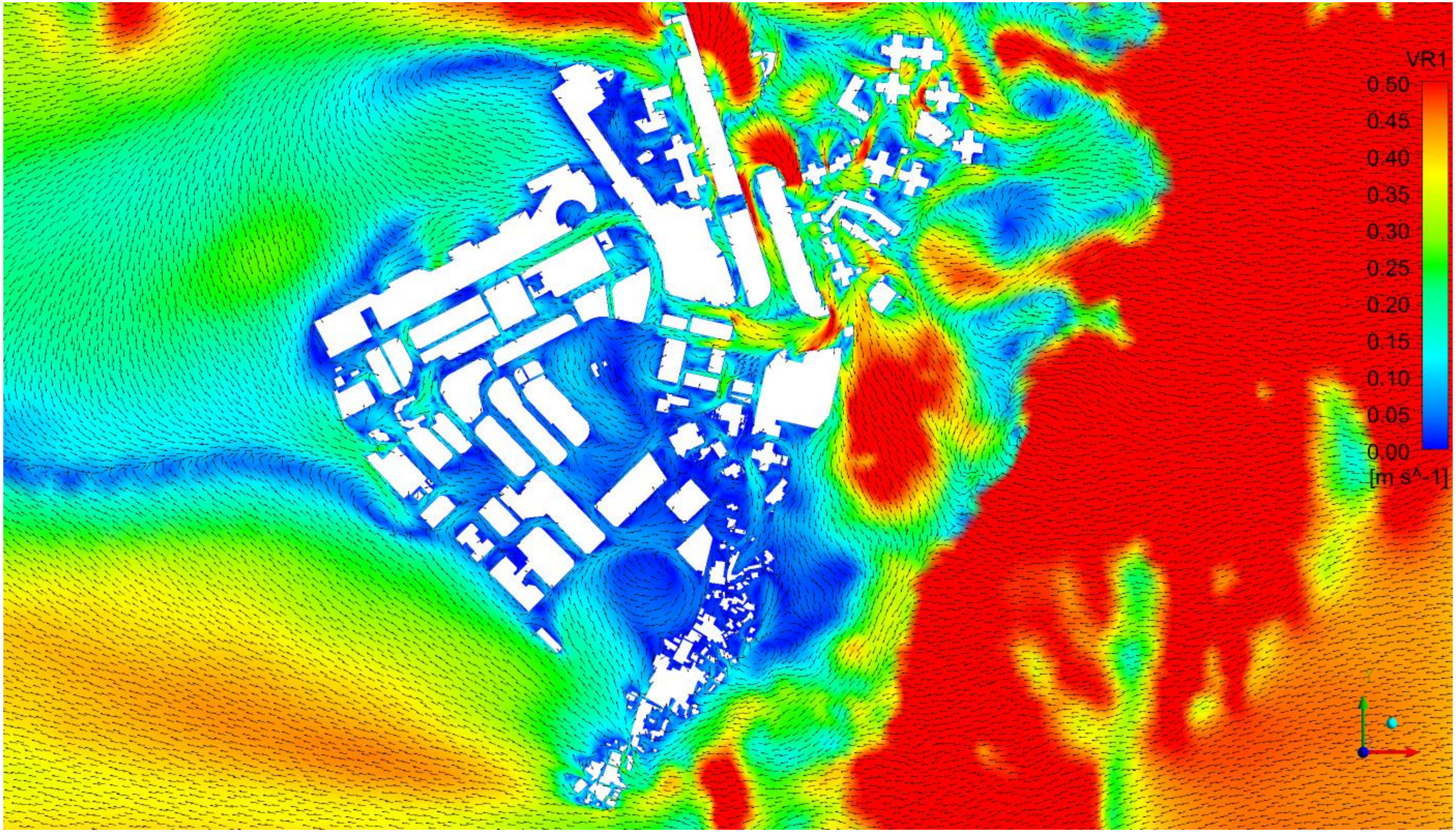


Figure D3 Velocity Ratio Contour and Vector Plot under ENE Wind in the Baseline Scheme

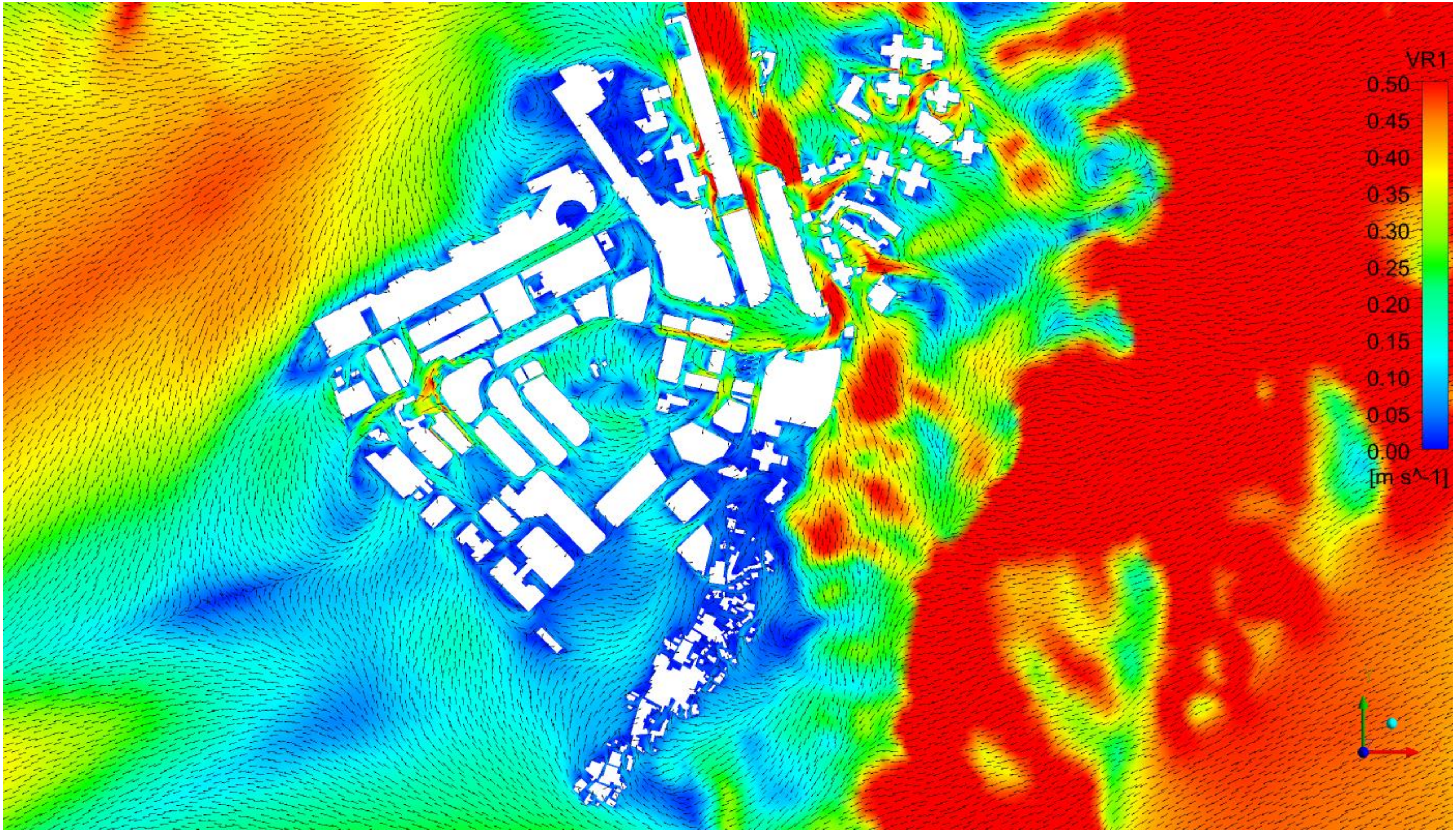


Figure D4 Velocity Ratio Contour and Vector Plot under ENE Wind in the Proposed Scheme

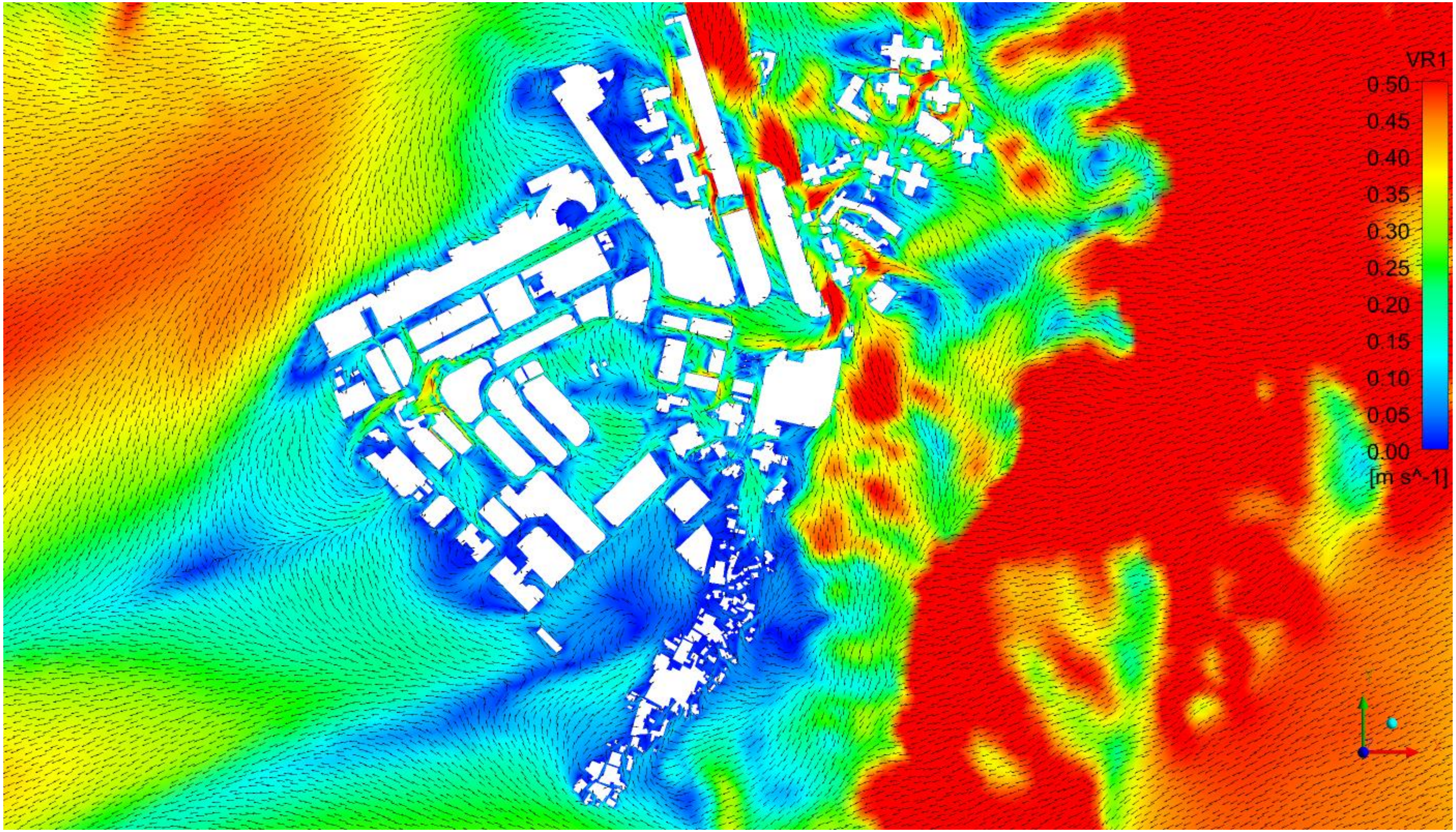


Figure D5 Velocity Ratio Contour and Vector Plot under ESE Wind in the Baseline Scheme

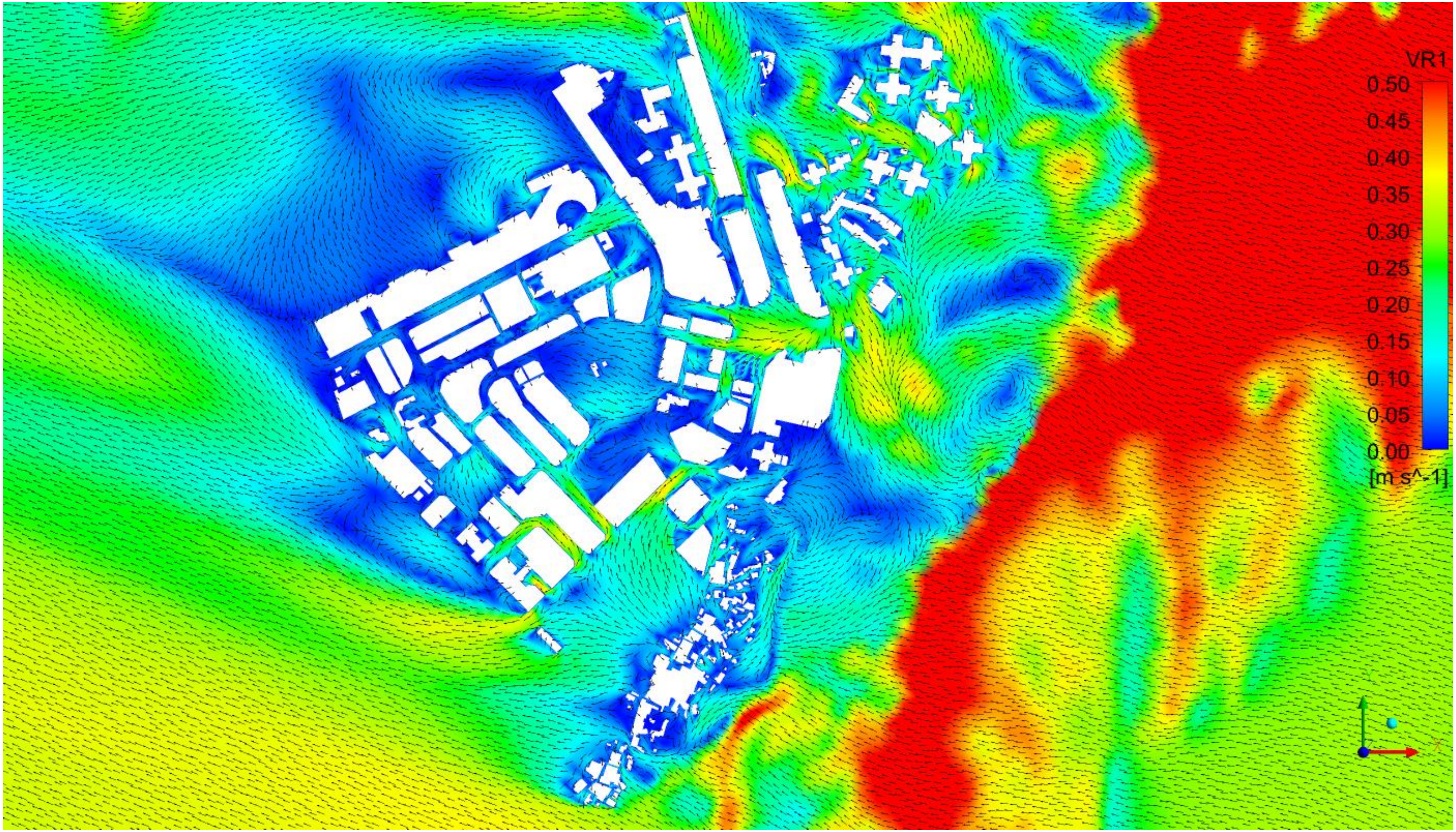


Figure D6 Velocity Ratio Contour and Vector Plot under ESE Wind in the Proposed Scheme

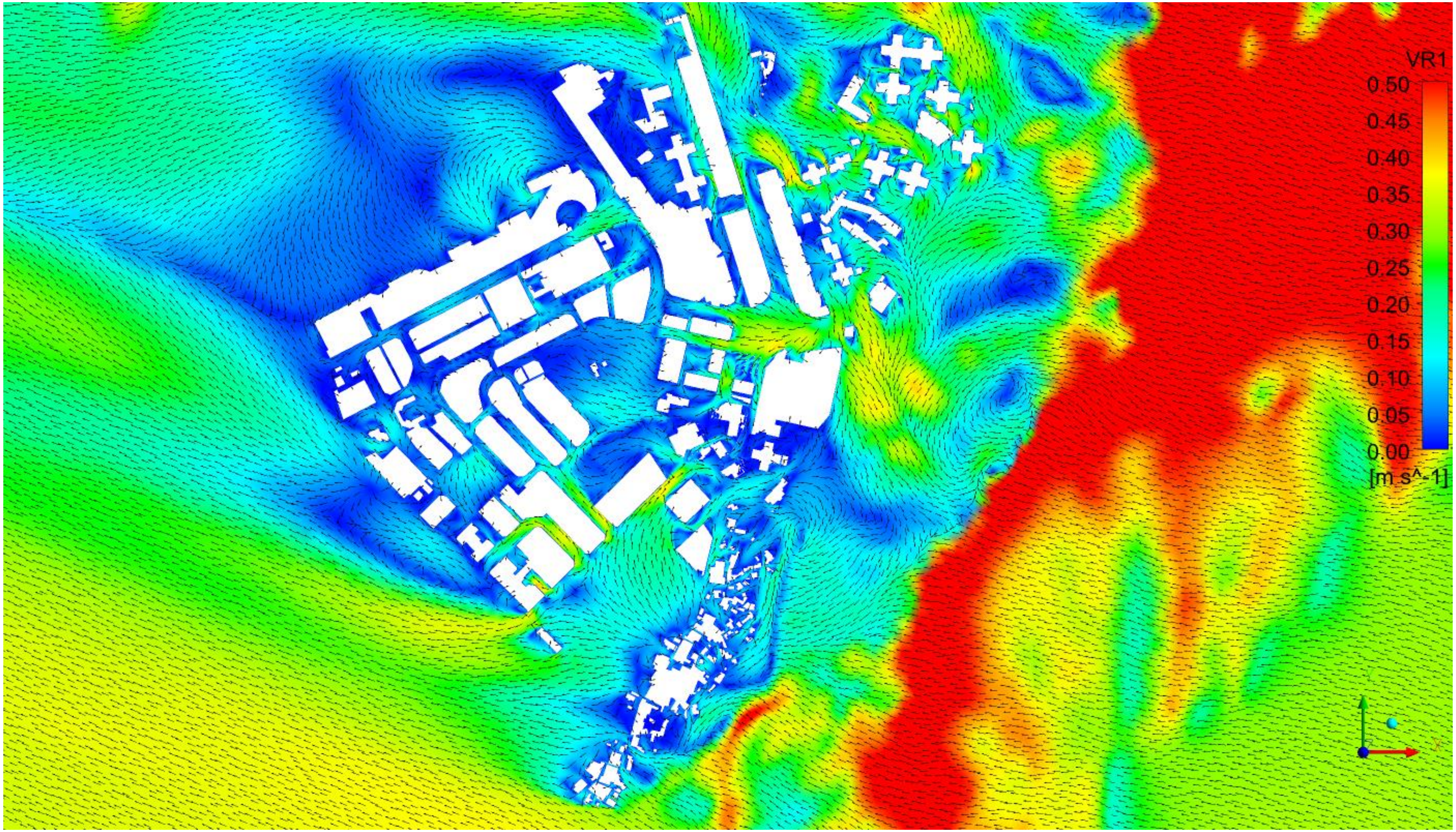


Figure D7 Velocity Ratio Contour and Vector Plot under NE Wind in the Baseline Scheme

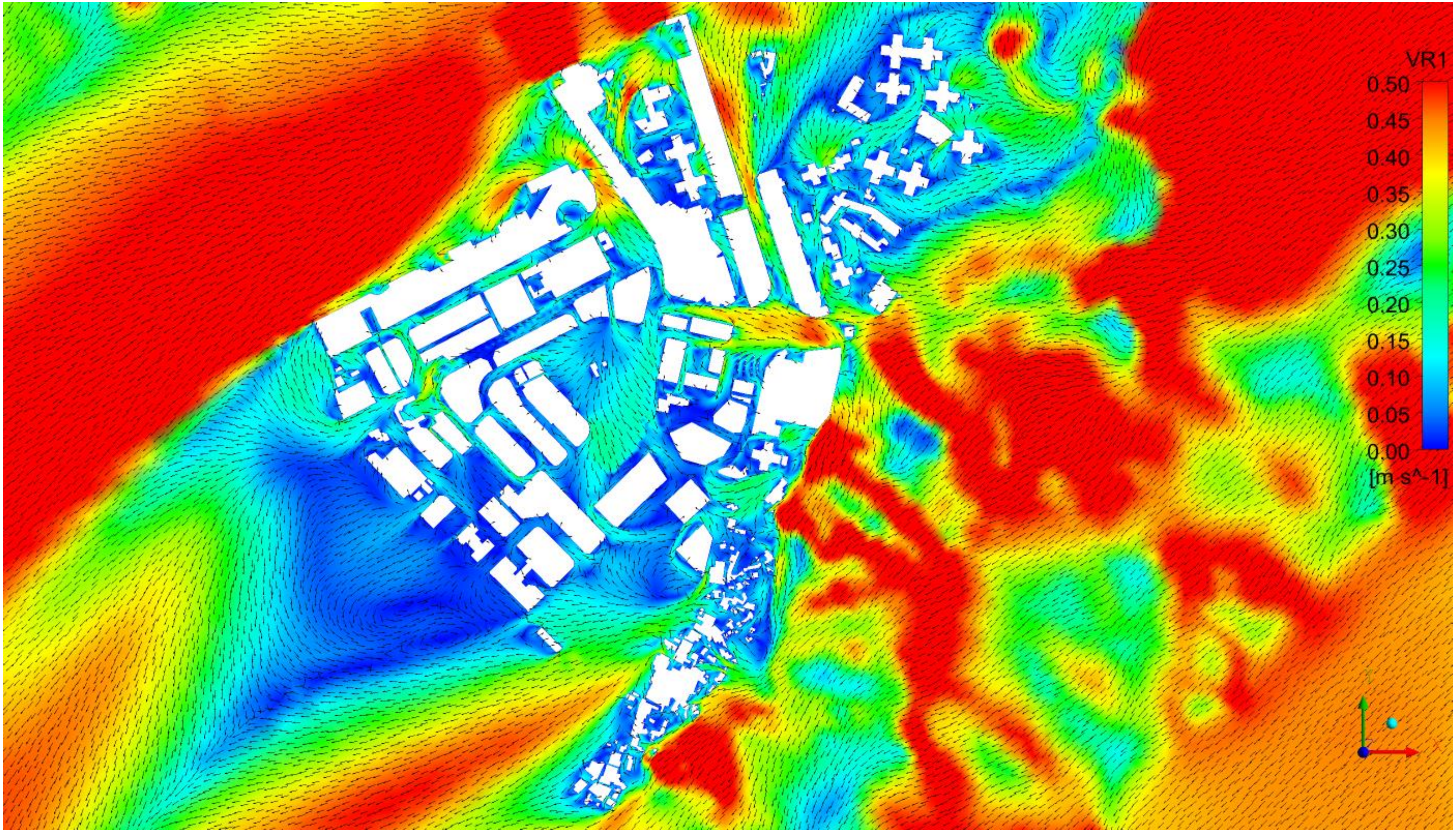


Figure D8 Velocity Ratio Contour and Vector Plot under NE Wind in the Proposed Scheme

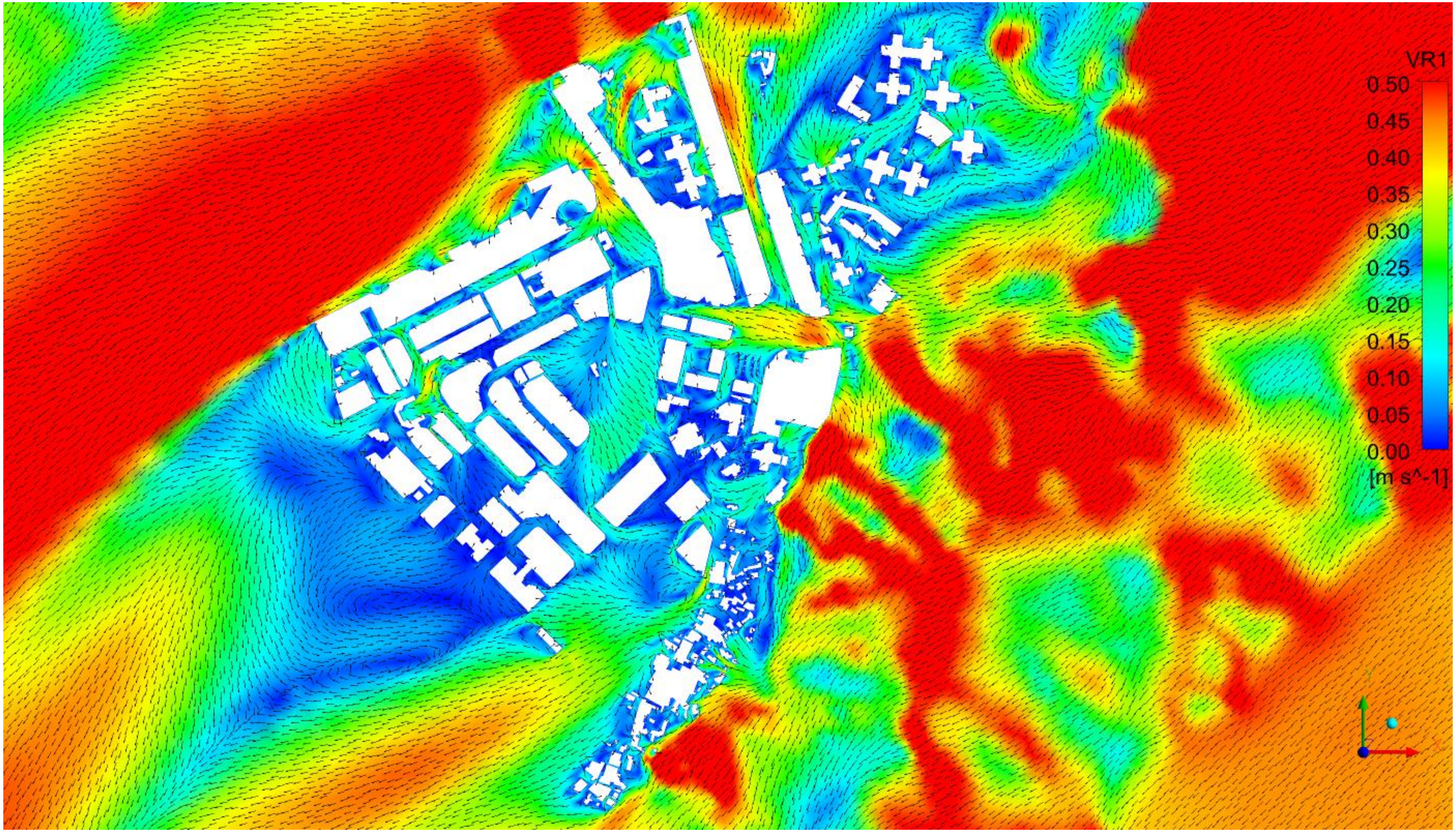


Figure D9 Velocity Ratio Contour and Vector Plot under NNE Wind in the Baseline Scheme

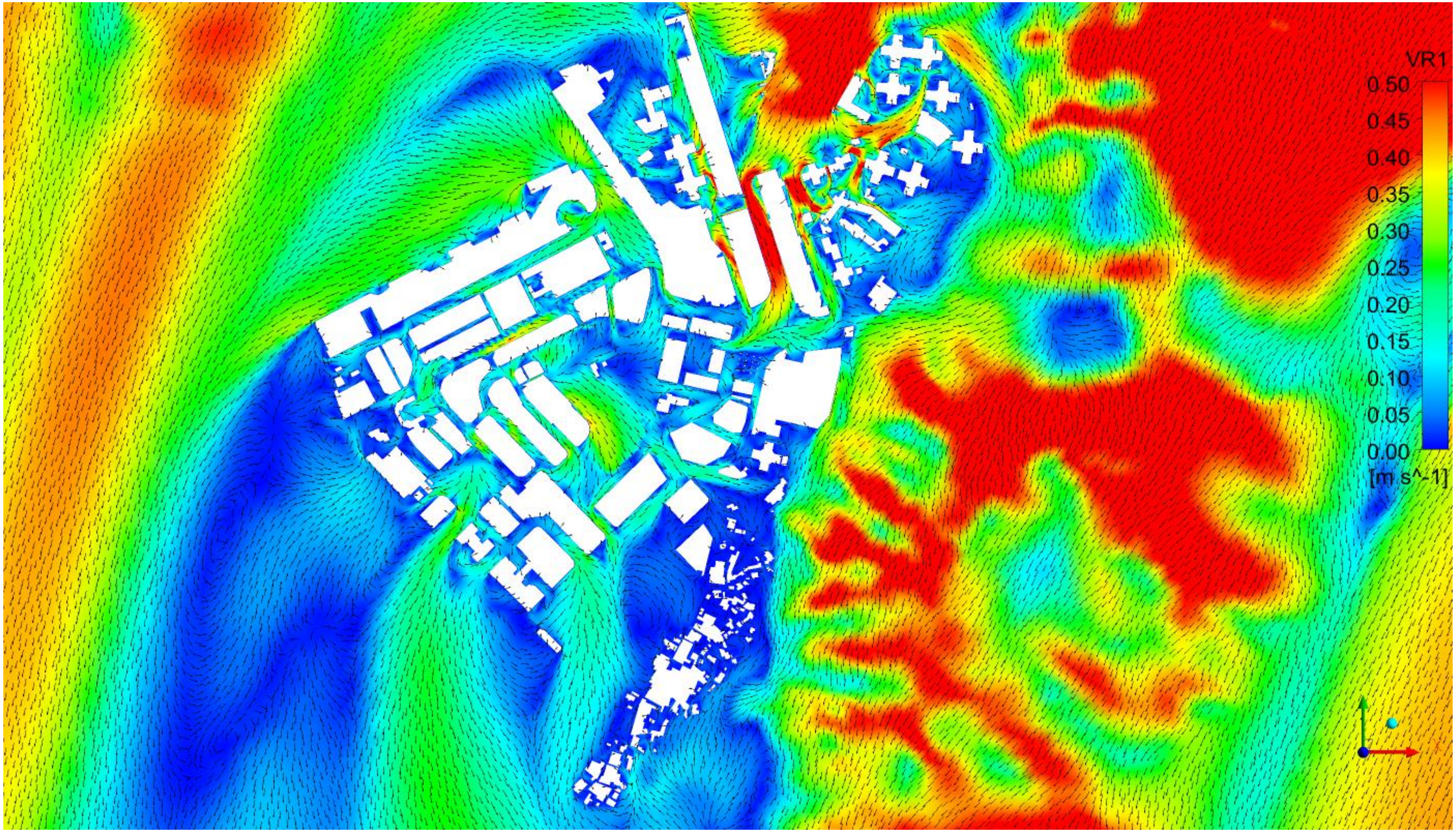


Figure D10 Velocity Ratio Contour and Vector Plot under NNE Wind in the Proposed Scheme

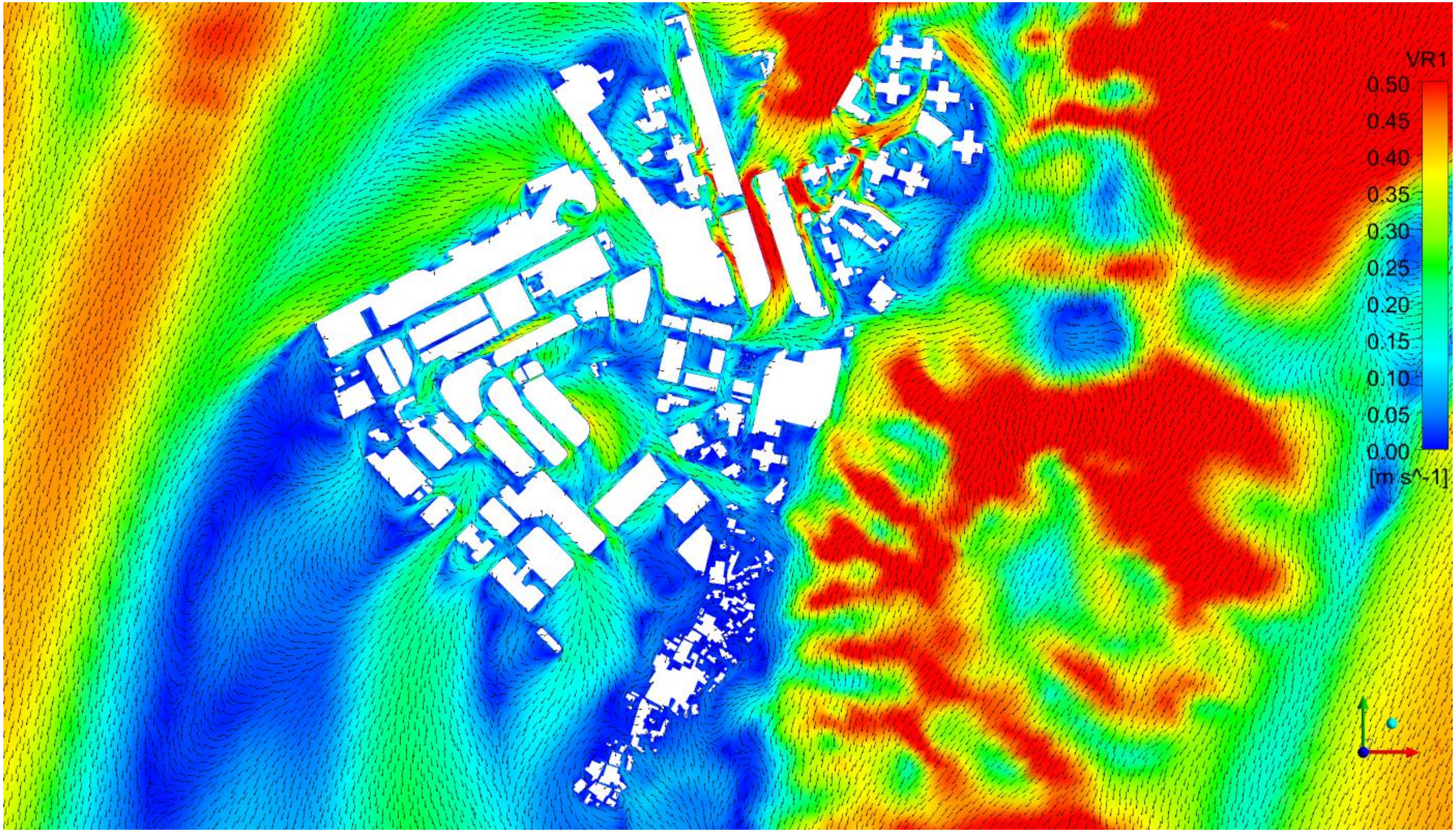


Figure D11 Velocity Ratio Contour and Vector Plot under S Wind in the Baseline Scheme

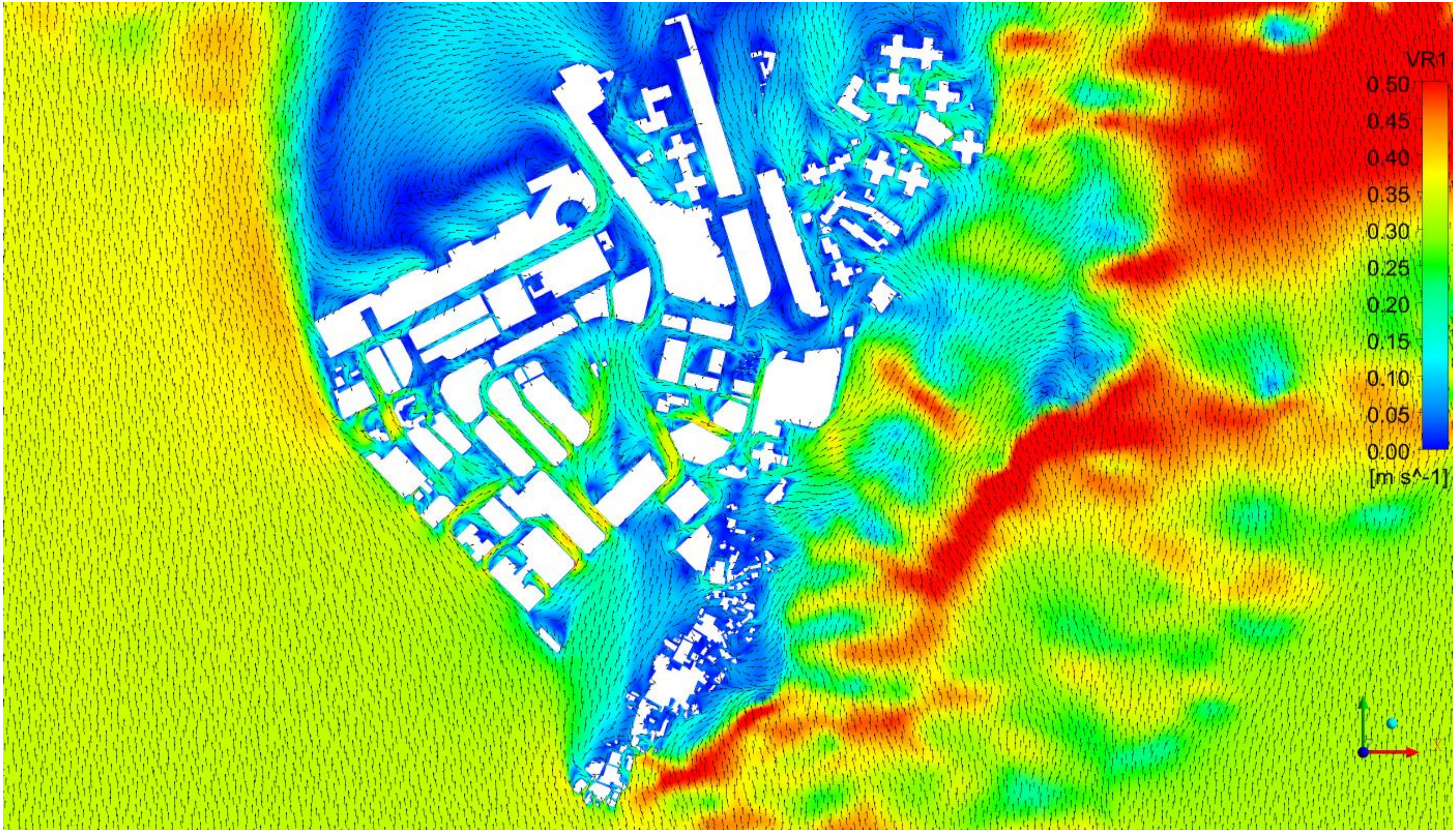


Figure D12 Velocity Ratio Contour and Vector Plot under S Wind in the Proposed Scheme

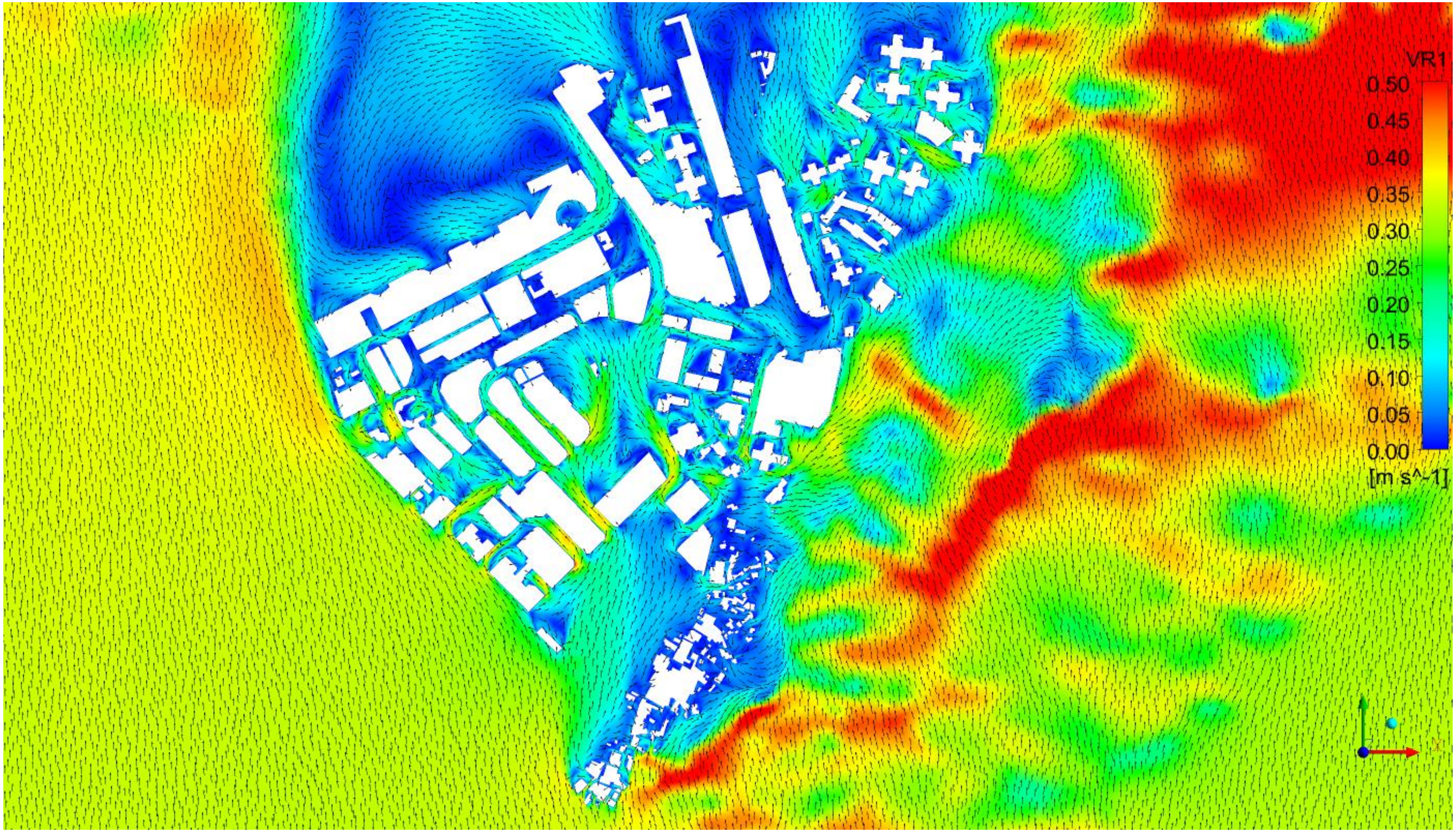


Figure D13 Velocity Ratio Contour and Vector Plot under SE Wind in the Baseline Scheme

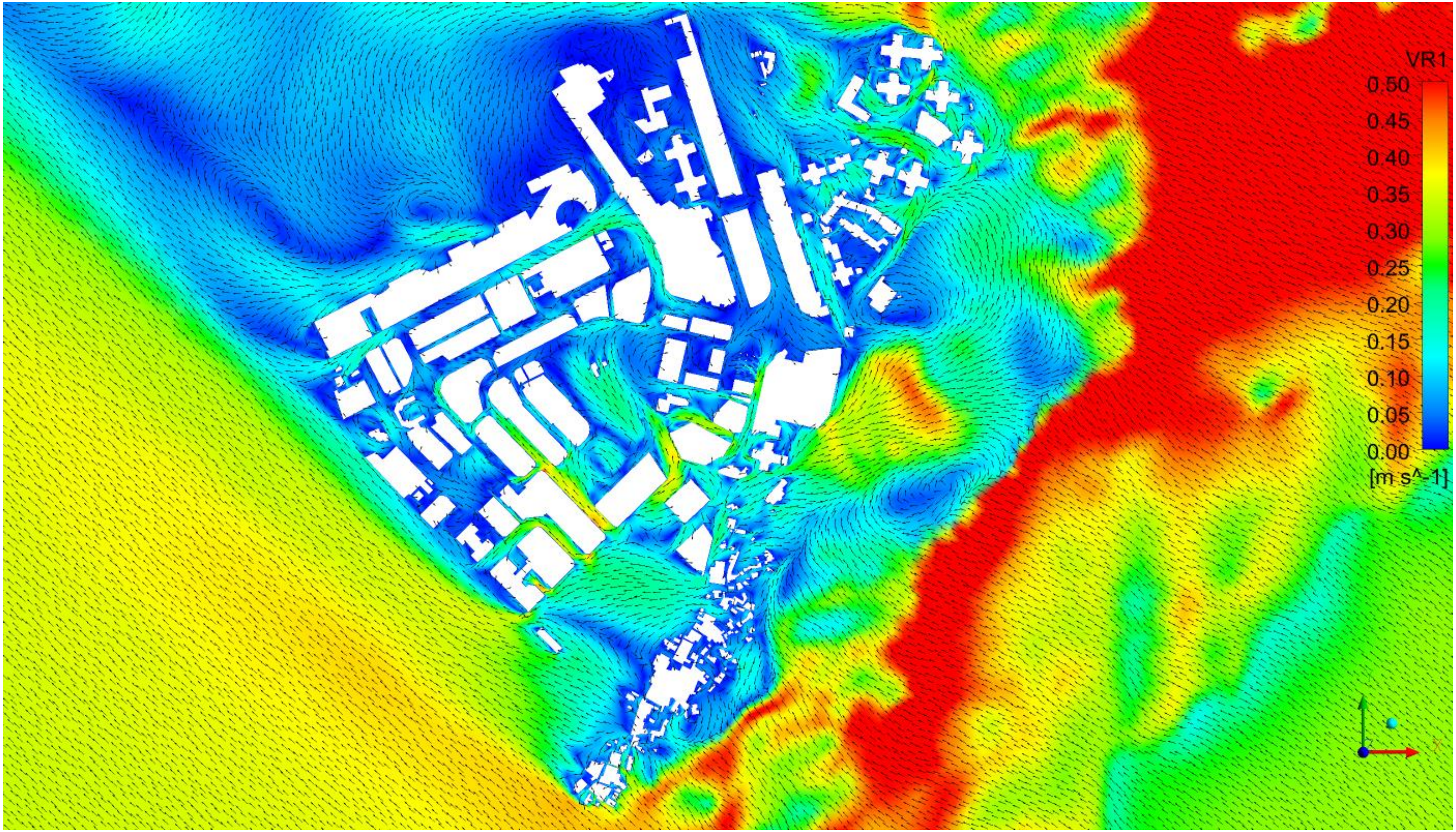


Figure D14 Velocity Ratio Contour and Vector Plot under SE Wind in the Proposed Scheme

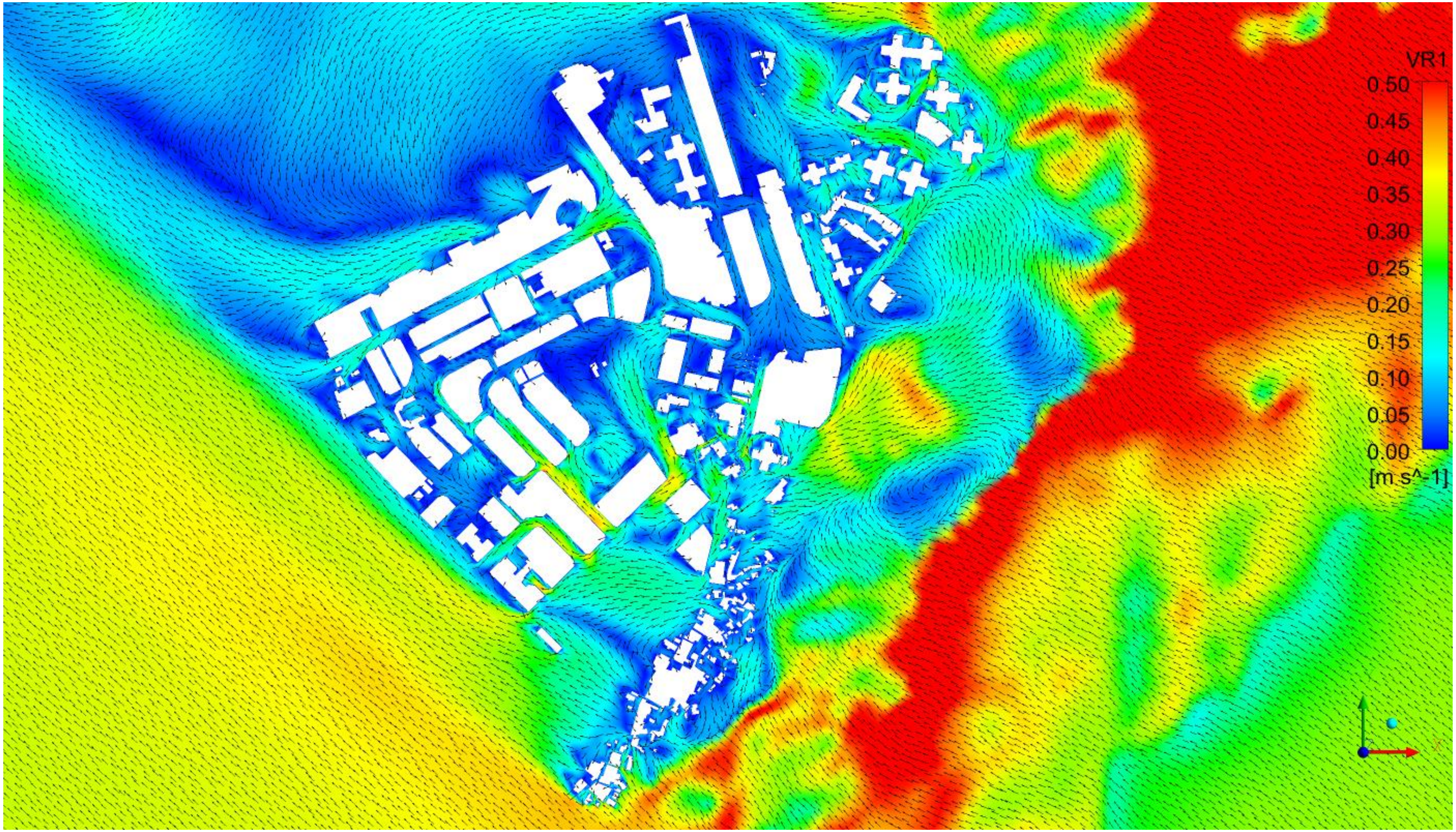


Figure D15 Velocity Ratio Contour and Vector Plot under SSE Wind in the Baseline Scheme

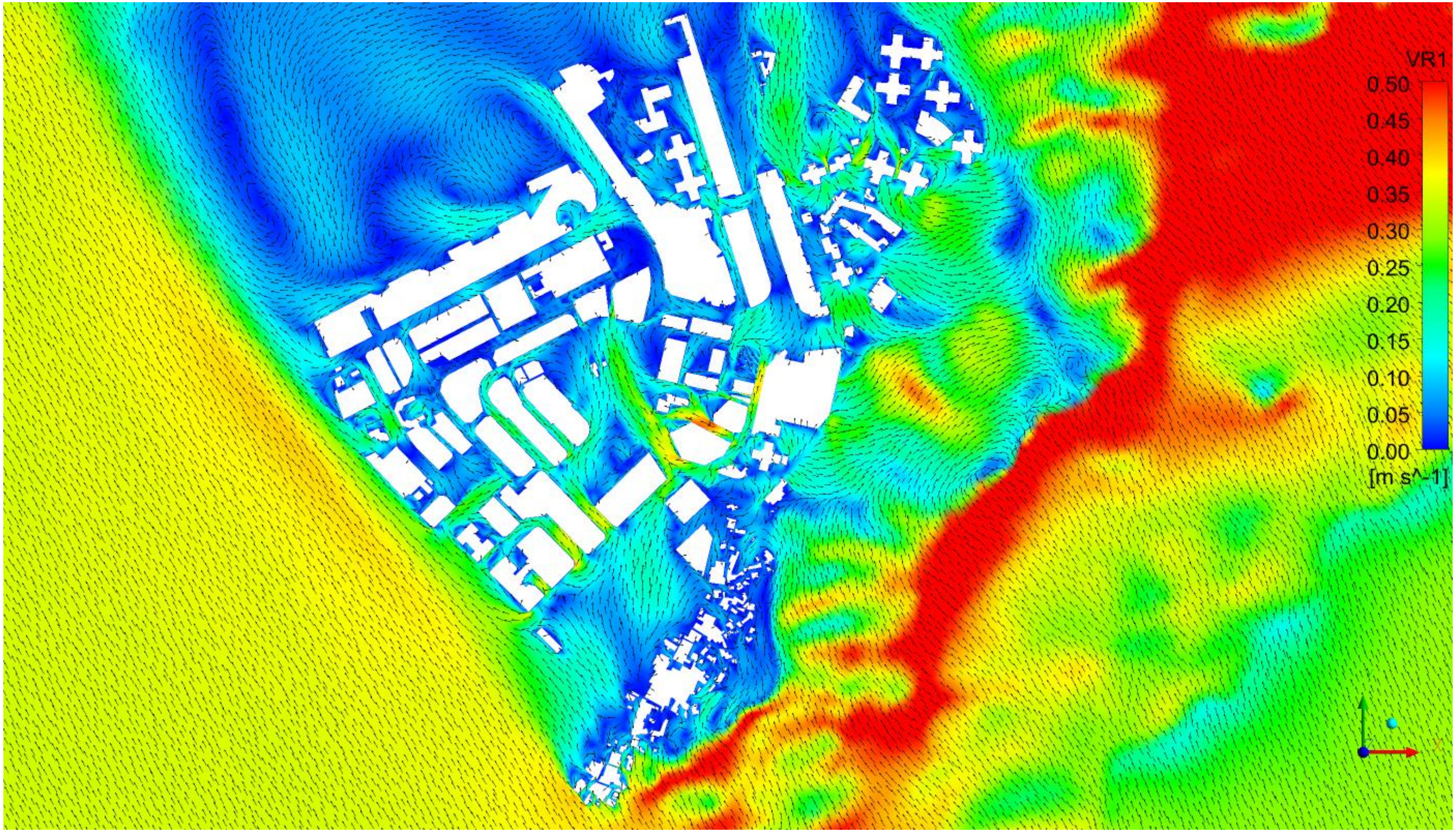


Figure D16 Velocity Ratio Contour and Vector Plot under SSE Wind in the Proposed Scheme

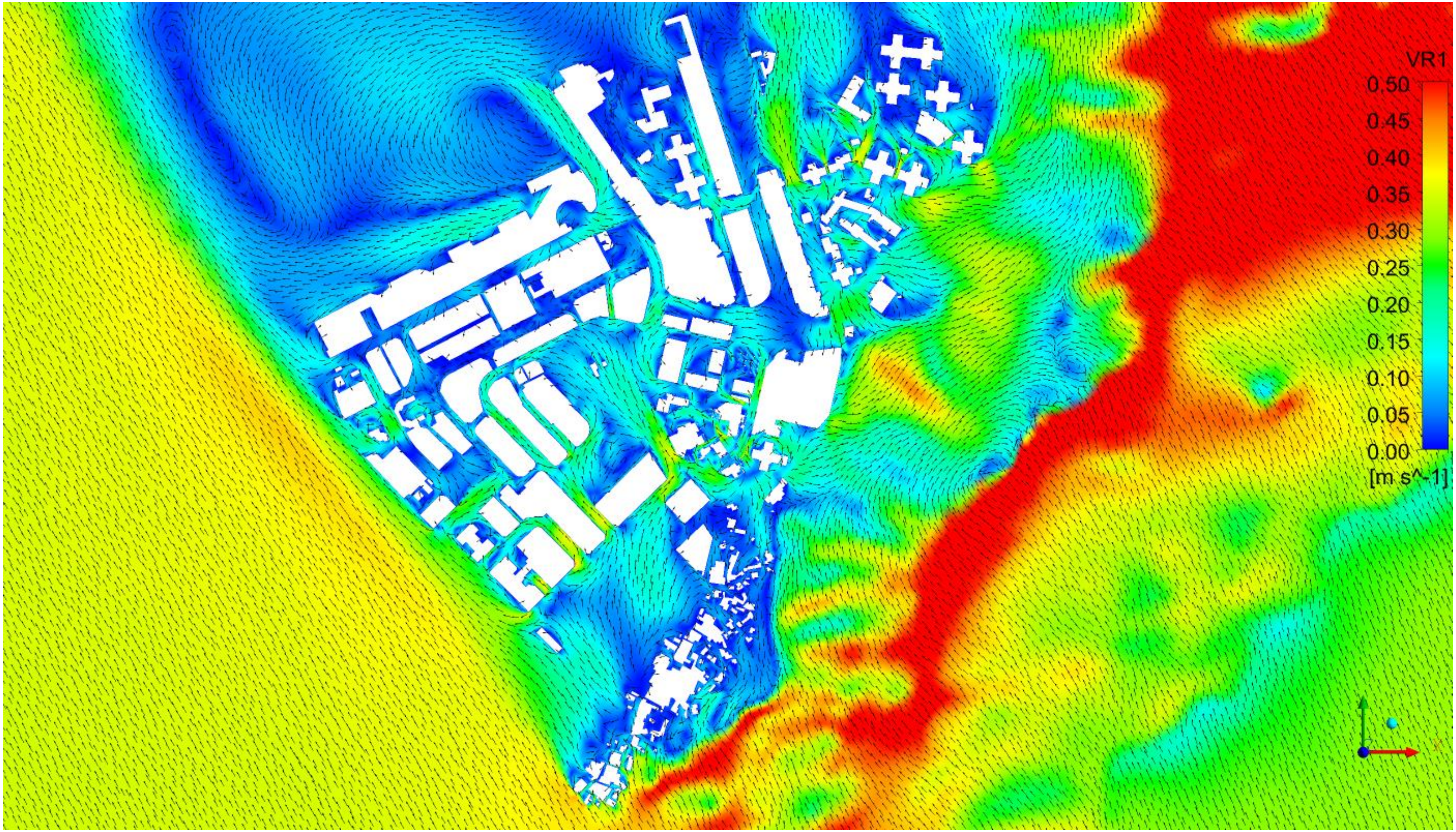


Figure D17 Velocity Ratio Contour and Vector Plot under SSW Wind in the Baseline Scheme

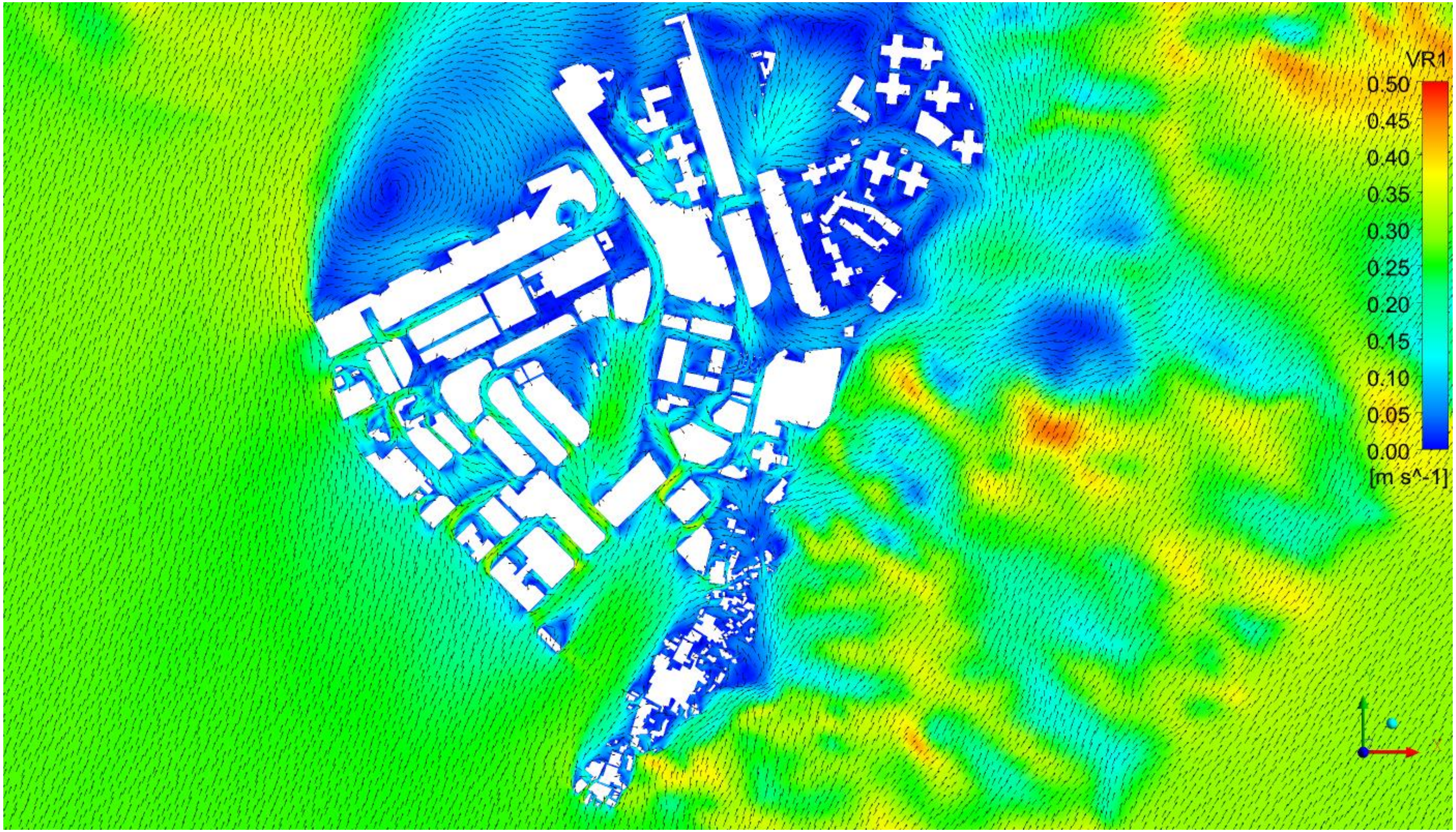


Figure D18 Velocity Ratio Contour and Vector Plot under SSW Wind in the Proposed Scheme

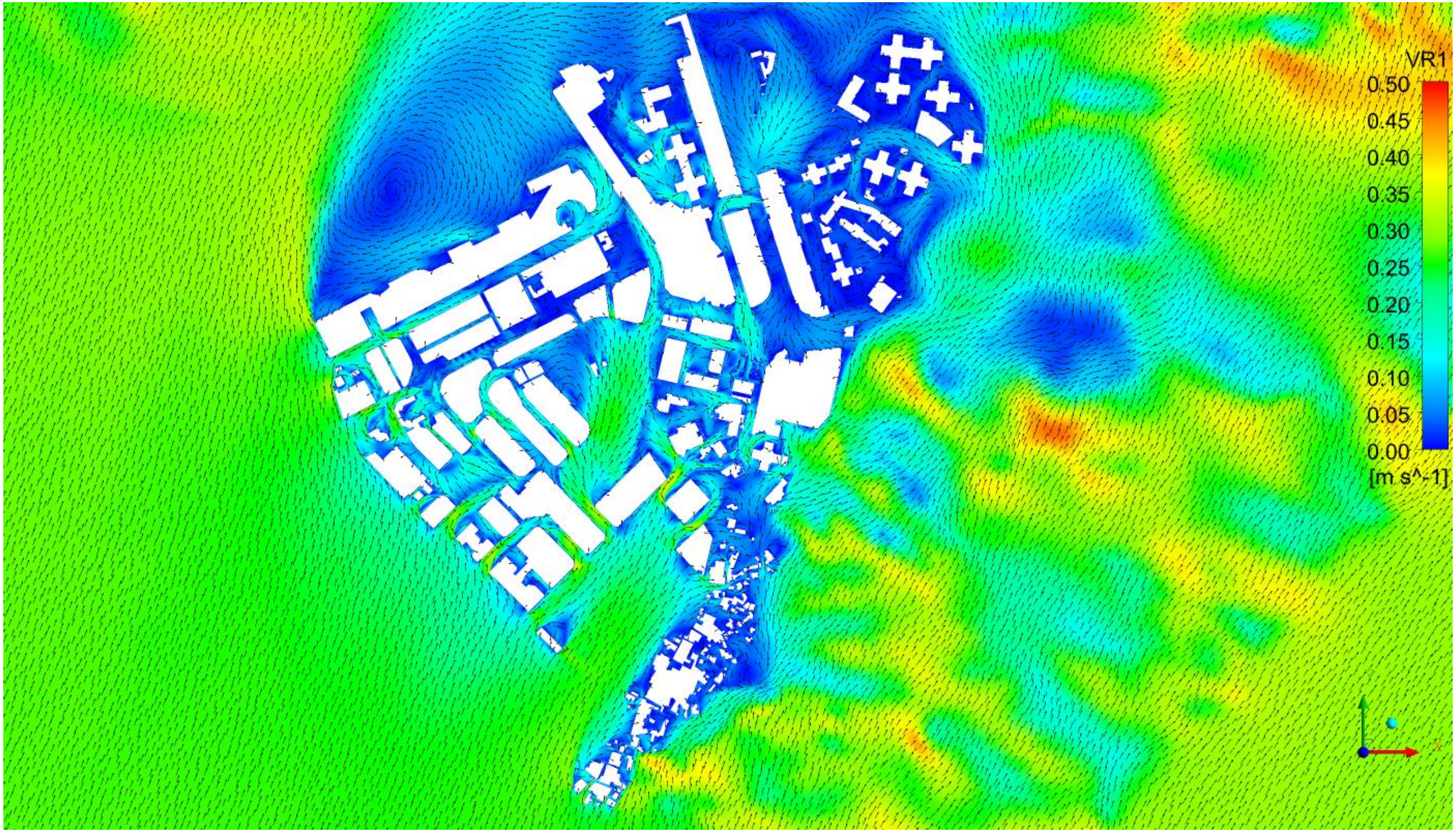


Figure D19 Velocity Ratio Contour and Vector Plot under SW Wind in the Baseline Scheme

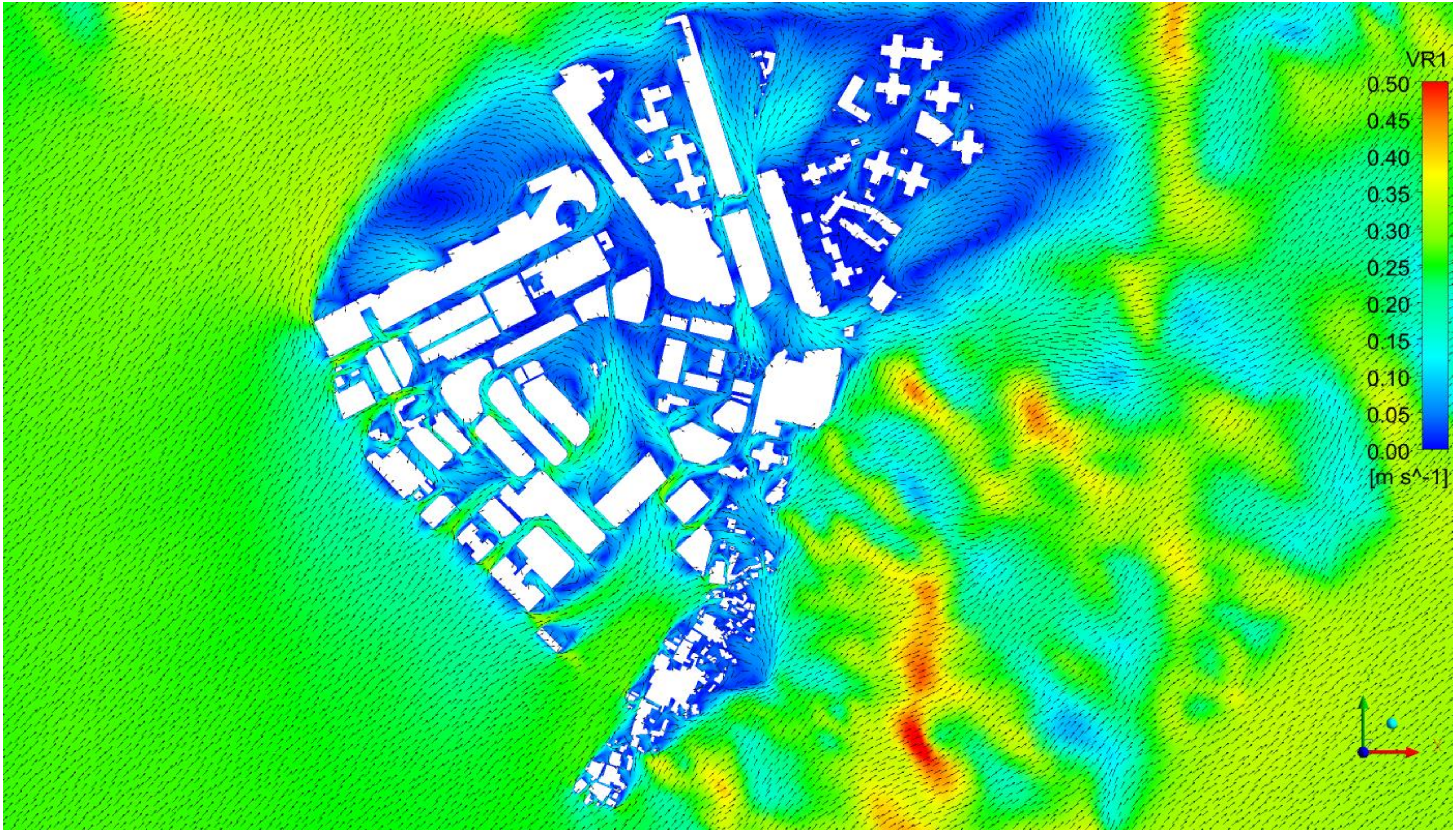


Figure D20 Velocity Ratio Contour and Vector Plot under SW Wind in the Proposed Scheme

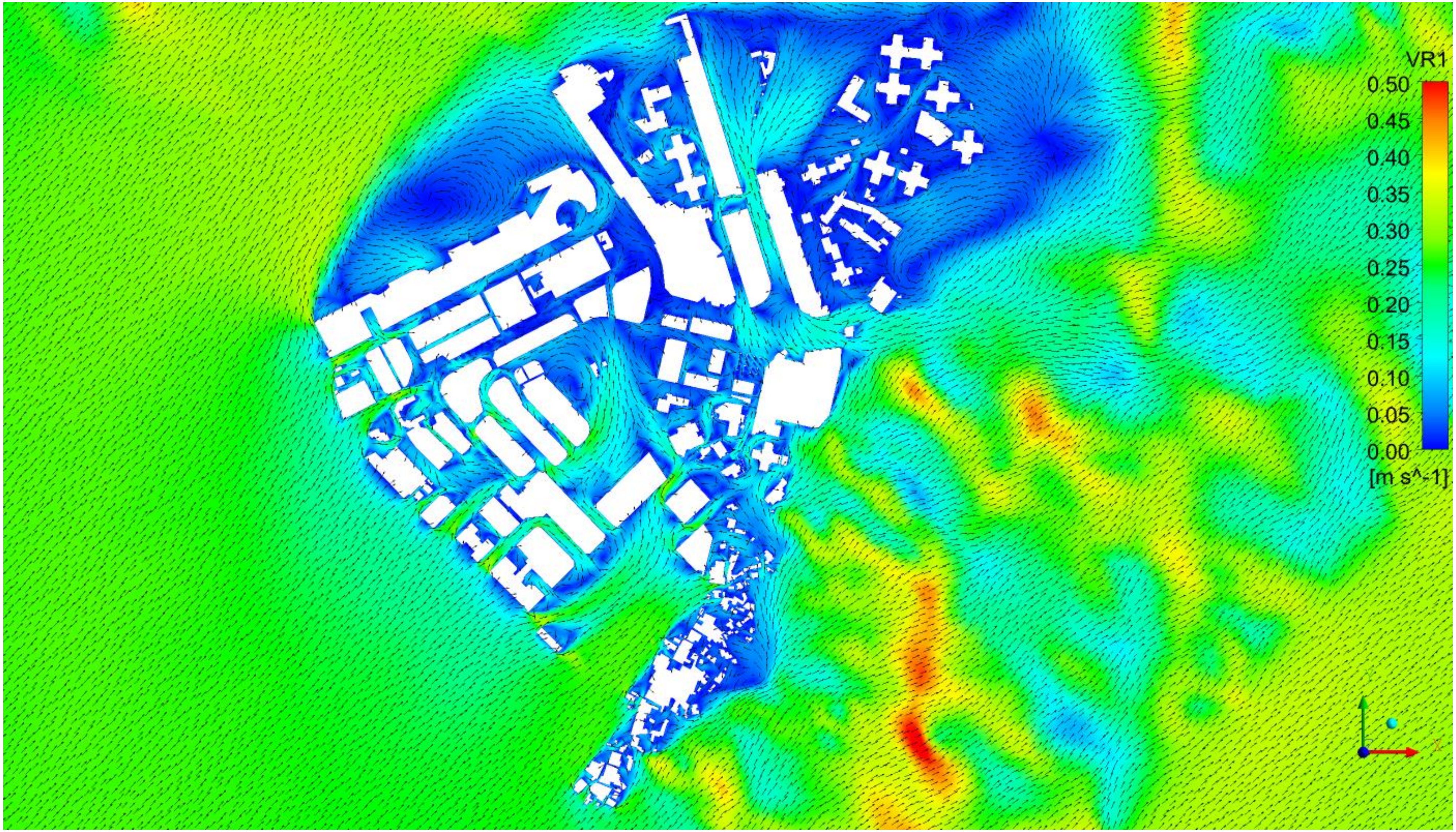


Figure D21 Velocity Ratio Contour and Vector Plot under WSW Wind in the Baseline Scheme

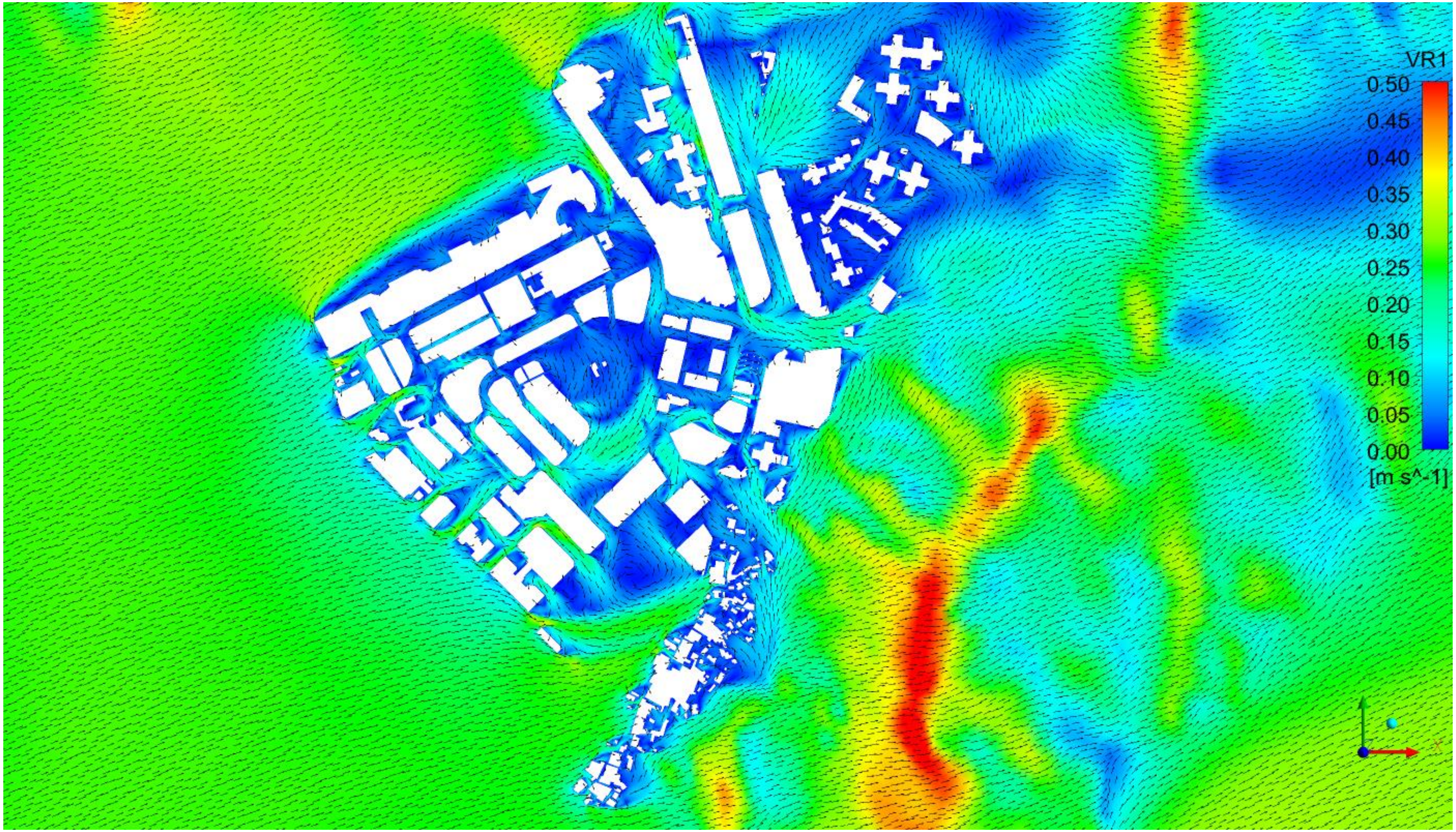
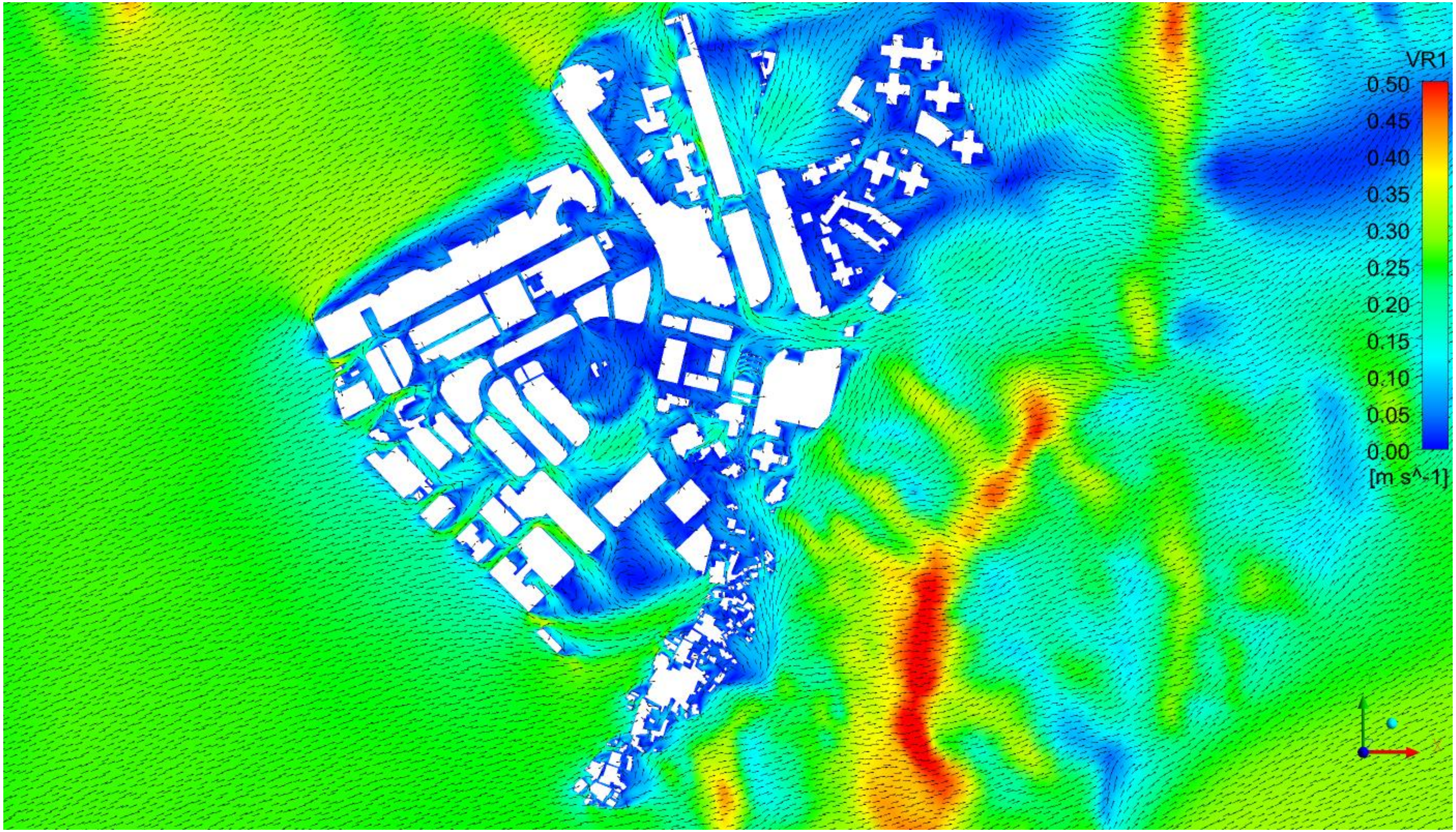
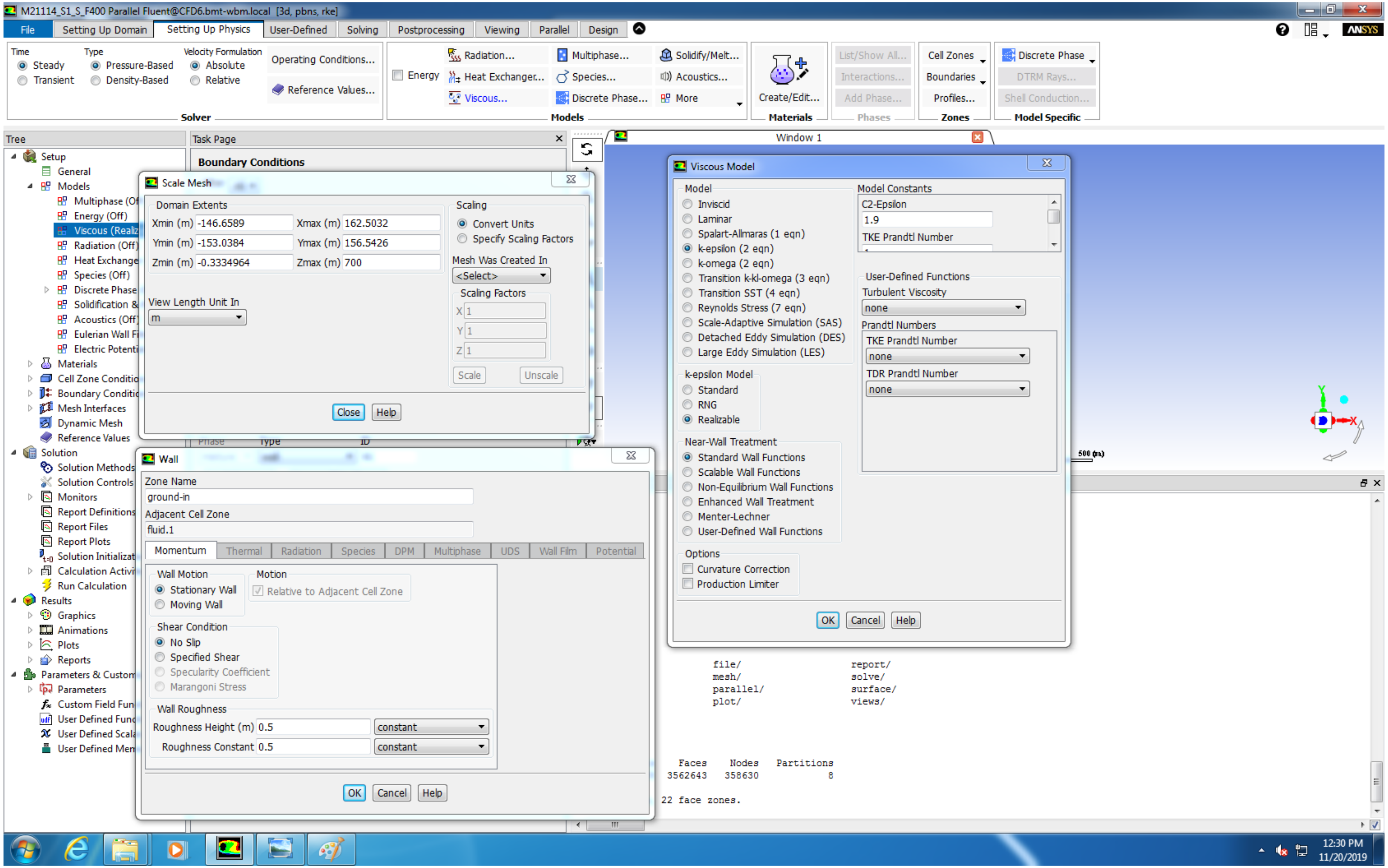


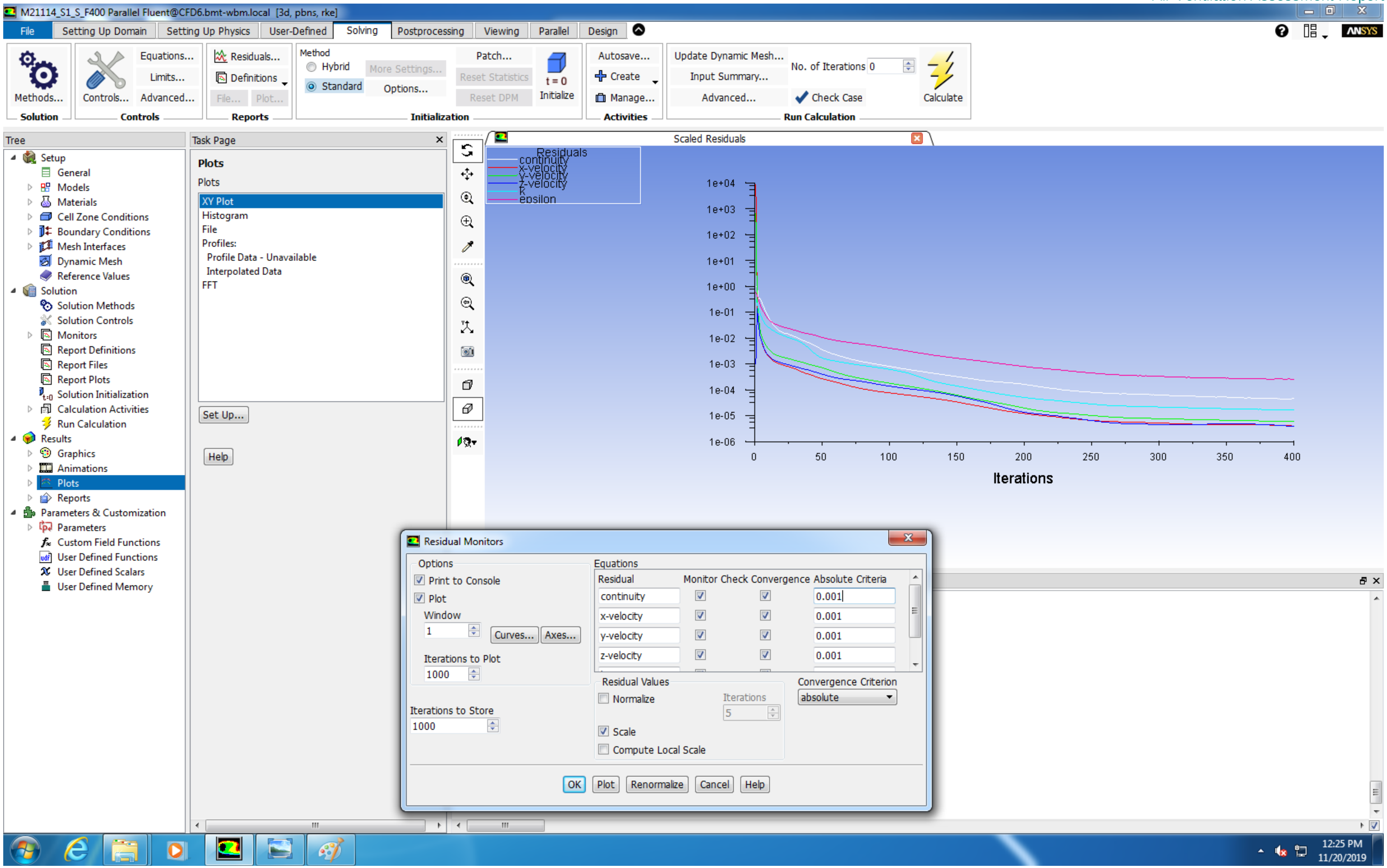
Figure D22 Velocity Ratio Contour and Vector Plot under WSW Wind in the Proposed Scheme

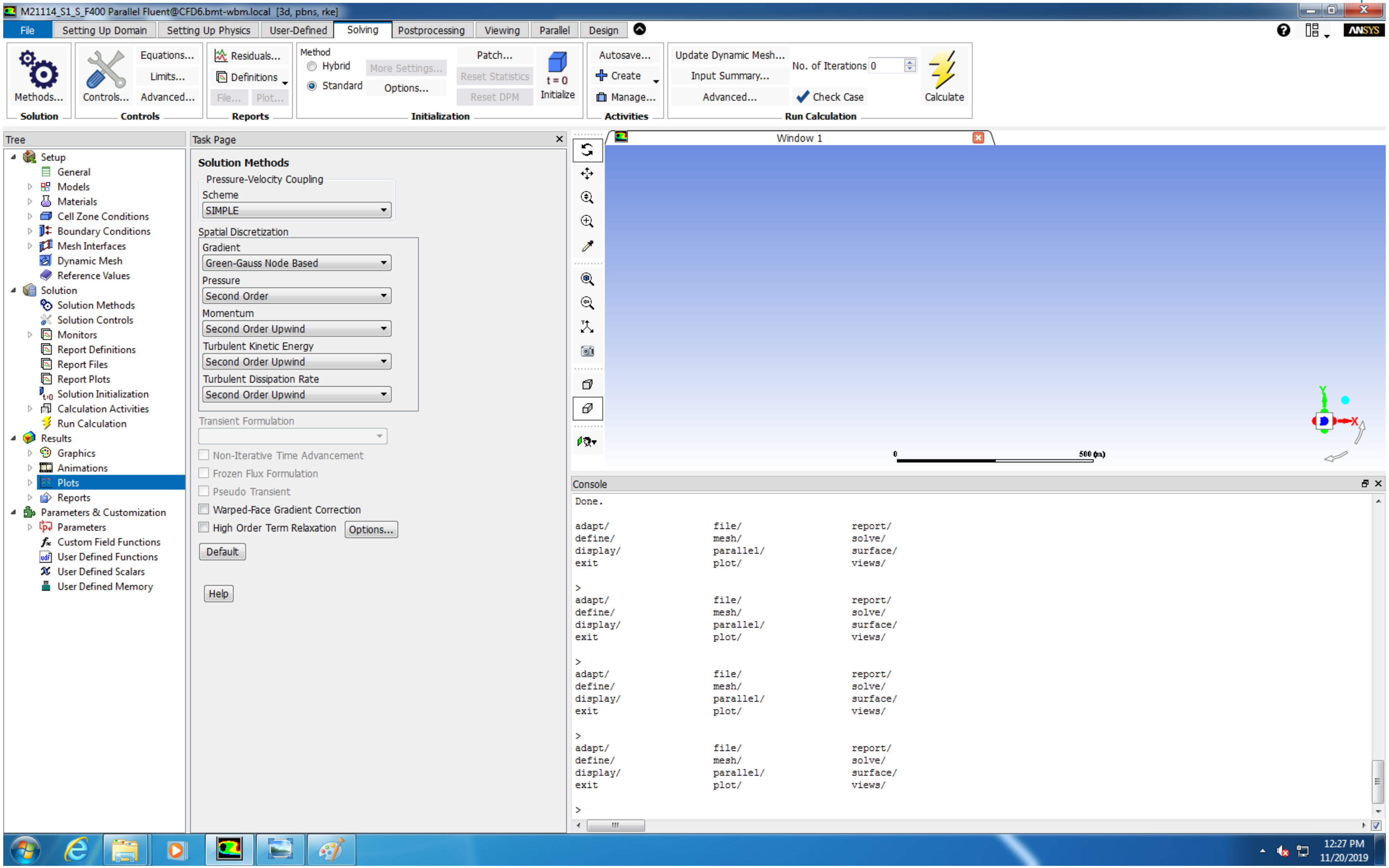


Appendix E
Screenshots of Model Settings

APPENDIX F: Screenshots of Model Setting




M21114_S1_S_F400 Parallel Fluent@CFD6.bmt-wbm.local [3d, pbns, rke]
Scaled Residuals
Residuals
continuity
x-velocity
y-velocity
z-velocity
k
epsilon
Iterations
Residual Monitors
Options
Print to Console
Plot
Window
Iterations to Plot
1000
Iterations to Store
1000
Equations
Residual
Monitor
Check Convergence
Absolute Criteria
continuity
x-velocity
y-velocity
z-velocity
0.001
Residual Values
Normalize
Scale
Compute Local Scale
Convergence Criterion
absolute
OK
Plot
Renormalize
Cancel
Help


M21114_S1_S_F400 Parallel Fluent@CFD6.bmt-wbm.local [3d, pbns, rke]
File
Setting Up Domain
Setting Up Physics
User-Defined
Solving
Postprocessing
Viewing
Parallel
Design
Tree
Task Page
Solution Methods
Pressure-Velocity Coupling
Scheme
SIMPLE
Spatial Discretization
Gradient
Green-Gauss Node Based
Pressure
Second Order
Momentum
Second Order Upwind
Turbulent Kinetic Energy
Second Order Upwind
Turbulent Dissipation Rate
Second Order Upwind
Transient Formulation
Non-Iterative Time Advancement
Frozen Flux Formulation
Pseudo Transient
Warped-Face Gradient Correction
High Order Term Relaxation
Options...
Default
Help
Window 1
Console
Done.
12:27 PM
11/20/2019