土木工程拓展署
Civil Engineering and Development Department

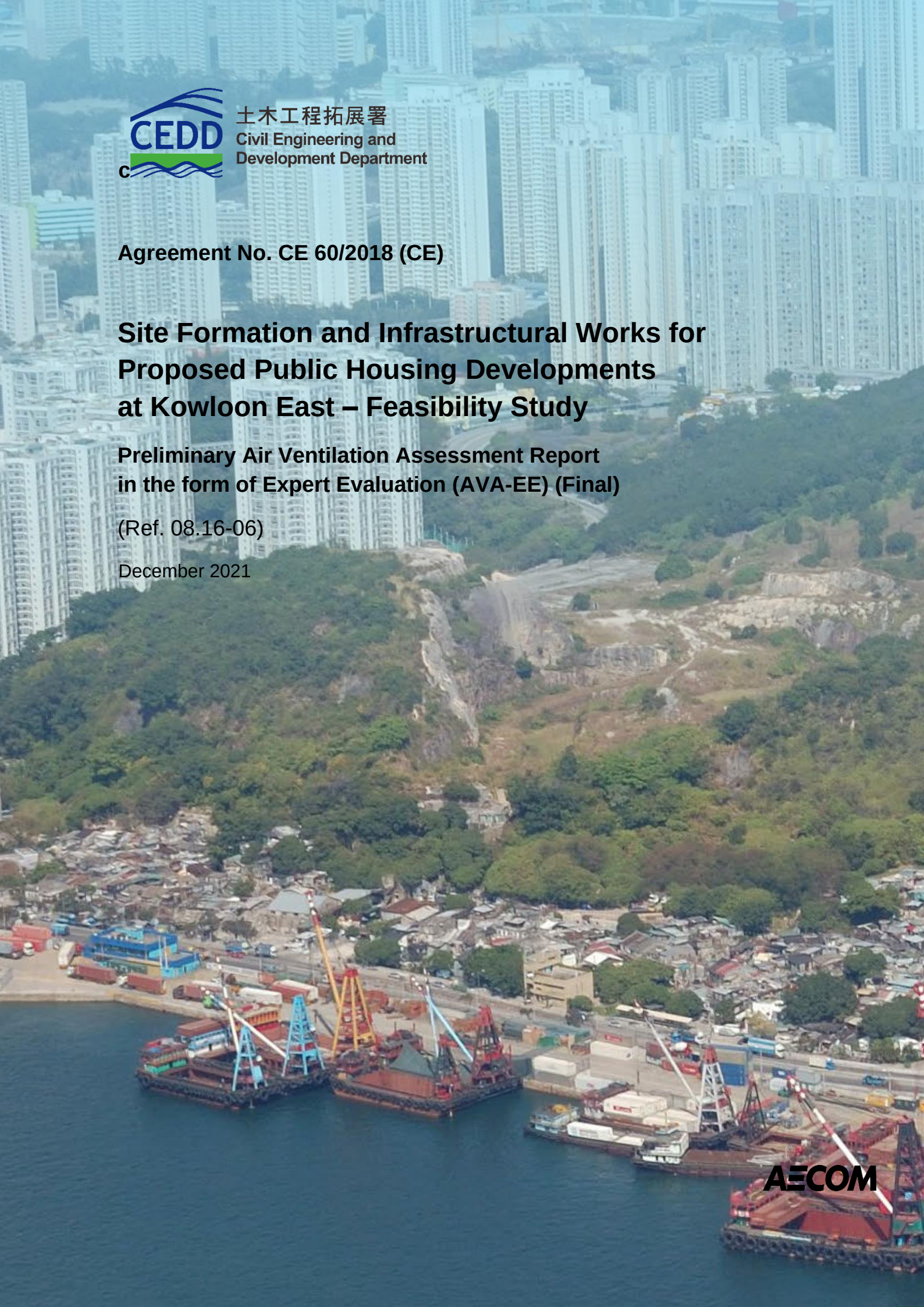
Agreement No. CE 60/2018 (CE)

Site Formation and Infrastructural Works for Proposed Public Housing Developments at Kowloon East – Feasibility Study

Preliminary Air Ventilation Assessment Report in the form of Expert Evaluation (AVA-EE) (Final)

(Ref. 08.16-06)

December 2021



AECOM

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December 2021

Reviewed:	Karl An	23 December 2021
Approved for Issue:	David Ho	23 December 2021

AECOM ASIA COMPANY LIMITED

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List Of Abbreviations

The following words and expressions shall have the meaning hereby assigned to them except when the context of this discussion requires otherwise:

Abbreviation	Description
Government	Government of the Hong Kong Special Administrative Region
Assignment	Site Formation and Infrastructural Works for Proposed Public Housing Developments at Kowloon East – Feasibility Study
Project	The Project, of which the Assignment forms a part, consists of engineering feasibility studies, investigation and detailed design, implementation of site formation and infrastructure works so as to support the Developments. The Project under the Assignment with Agreement No. CE60/2018(CE) is at its engineering feasibility studies stage.
Site	The site at Cha Kwo Ling Village proposed for public housing development with supporting facilities and related infrastructure as shown in **Figure No. 60608618/AVA/FIGURE 1.1.**
Developments	Means collectively the various proposed developments including public housing developments at Cha Kwo Ling Village and the supporting government, institution or community facilities, retail, welfare and/ or amenities. Developments may also include re-provision of any existing facilities therein and improvements of existing or addition of facilities/ services outside the Site that are necessary to support and enable the population intake of the proposed public housing developments.
Infrastructural Works	The site formation works and the essential engineering infrastructural works within/ outside the Site necessary to enable the Developments, including but not limited to the proposed site access, upgrading/ reprovisioning of existing and provision of proposed new landscaping, public transportation interchange, roadworks, footbridges, stormwater drains, sewers, waterworks, natural terrain hazard mitigation works, land decontamination works and any environmental mitigation measures, etc.

The following abbreviations shall have the meaning hereby assigned to them except when the context of this Report otherwise requires:

Abbreviation	Full Title
ArchSD	Architectural Services Department
AVA-EE	Preliminary Air Ventilation Assessment Report in the form of Expert Evaluation
B/Ds	Bureaus/ Departments
CEDD	Civil Engineering and Development Department
CKL Tunnels	Cha Kwo Ling Tunnels
CKLV	Cha Kwo Ling Village
DH	Department of Health
CKLKMS	ex-Cha Kwo Ling Kaolin Mine Site
FSD	Fire Services Department
G/IC	Government, Institute and Community
HD	Housing Department
HKHS	Hong Kong Housing Society
HKPSG	Hong Kong Planning Standards and Guidelines
HyD	Highways Department

Abbreviation	Full Title
LCSD	Leisure and Cultural Services Department
OZP	Outline Zoning Plan
PlanD	Planning Department
SWD	Social Welfare Department
TD	Transport Department

1 INTRODUCTION

1.1 Project Background

1.1.1 It is the prevailing Government's policy to increase land supply to meet the demand of the public. In the 2019 Policy Address, the Government has identified the Site, an urban squatter area in Cha Kwo Ling (known as the Cha Kwo Ling Village (CKLV)), for high-density public housing development and related infrastructure development. The Site is located in Cha Kwo Ling in Kowloon East with an approximate area of 4.65 hectares as shown in **Figure no. 60608618/AVA/FIGURE 1.1** for public housing developments, of which land use is currently zoned as "Undetermined" ("U") on the approved Cha Kwo Ling, Yau Tong, Lei Yue Mun Outline Zoning Plan (OZP) No. S/K15/25.

1.1.2 According to 2020 Policy Address, the Government will invite the Hong Kong Housing Society (HKHS) to implement the public housing development at CKLV in the view of the experience of the HKHS in housing production, rehousing of residents and integrated community planning. Upon confirmation of the technical feasibility of the proposed developments at CKLV and after consultation of relevant stakeholders, the Planning Department (PlanD) will initiate relevant OZP rezoning amendments and the Civil Engineering and Development Department (CEDD) will carry out the corresponding investigation, detailed design and implementation of site formation and infrastructure works for handing-over to HKHS for construction of public housing flats thereafter.

1.1.3 The Project consists of engineering feasibility studies, investigation and detailed design, implementation of site formation and infrastructure works so as to support the Developments.

1.2 The Assignment

1.2.1 AECOM Asia Company Ltd. has been commissioned by the CEDD on 2 May 2019 to undertake the Assignment. It forms part of the Project and shall examine the feasibility of the Developments by conducting various preliminary engineering and environmental assessments.

1.2.2 Through carrying out various preliminary technical assessments and proposing mitigation measures/ recommended works, the technical feasibility of the proposed development with supporting facilities and related infrastructure works would be demonstrated for supporting the subsequent proposed zoning amendment. The proposed zoning amendment will be followed by the commissioning of an investigation and construction assignment in order to implement the required site formation and infrastructure works.

1.2.3 The objectives of the Assignment is to carry out an engineering feasibility study so as to support the proposed zoning amendment for CKLV for public housing development with supporting government, institution or community (G/IC) facilities and infrastructure. The Assignment required to determine the scope of the Infrastructural Works for supporting the Developments; to assess the various impacts pertaining to the Developments and the associated Infrastructural Works; to recommend the mitigation measures to keep the potential impacts due to the Developments and Infrastructural Works within the acceptable level of prevailing standards/regulations and to the satisfaction of relevant B/Ds; and to establish implementation strategies and programmes for the Infrastructural Works to support the Developments. The Assignment shall take into account the cumulative demand/impact of other adjoining, existing, planned and committed developments in the area so as to recommend the Infrastructural Works and the required mitigation measures. To facilitate the proposed zoning amendments to the OZP, the assessments and studies under the Assignment, which have to be satisfied by relevant departments, shall ascertain the technical feasibility of the Developments and demonstrate that there would be no insurmountable impacts arising from the Developments.

1.2.4 Site boundary is extended to suit the site conditions and optimise development potential of the Site, with a view to accommodate all the required facilities as far as possible. The revised boundary (named "Development Boundary") with approximately area of 8.89 hectares is

shown in **Figure no. 60608618/AVA/FIGURE 1.2**. The development boundary would be subject to review throughout the course of the Assignment and subject to determination from the findings of the Assignment and agreement from respective government departments.

1.3 Scope of this Report

1.3.1 According to Clause 5.17 of the Brief, the objective of Preliminary Air Ventilation Assessment Report in the form of Expert Evaluation (AVA-EE) is to ensure that air ventilation impacts are duly considered as one of the main criteria in the planning and design process for the public housing developments. The AVA-EE shall provide a qualitative assessment to the design and/or design options and facilities (including the planned development(s) of the nearby area and identification of problems and issues. It shall identify major breezeway(s), air-path(s), problematic area(s) and localized wind effects of the Developments; and propose possible design improvements and mitigation measures and recommend if further study should be staged into AVA Initial Study and Detailed Study.

1.4 Structure of this Report

1.4.1 Apart from this introductory section, there will be other sections as follows:

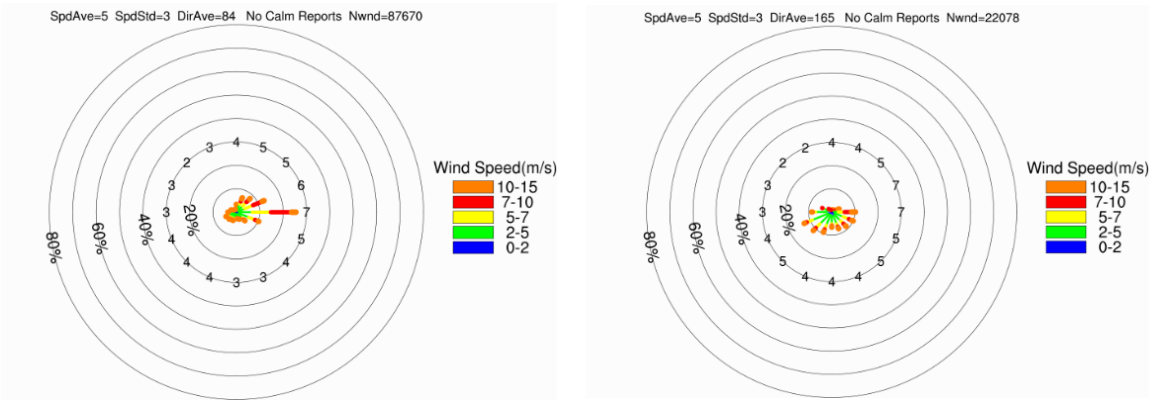
- **Section 2** – Identification of wind availability at/near the Project Site;
- **Section 3** – Identification of topography, land uses and urban morphology near the Project Site;
- **Section 4** – Scenarios for evaluation;
- **Section 5** – Existing Wind Conditions and Air Paths;
- **Section 6** – Evaluation of the probable wind impacts induced by the Baseline Scenario and the Proposed Scenario;
- **Section 7** – Recommend good air ventilation measures to Proposed Scenario;
- **Section 8** – Summary and Conclusion

2 WIND AVAILABILITY

2.1.1 Identification of the annual and summer prevailing winds at Cha Kwo Ling area is essential in determining the wind condition and air ventilation performance at the Project Site. As reference to the site wind availability data simulated via RAMS model released by PlanD, the Project Site is located approximately at Grid (091, 038).

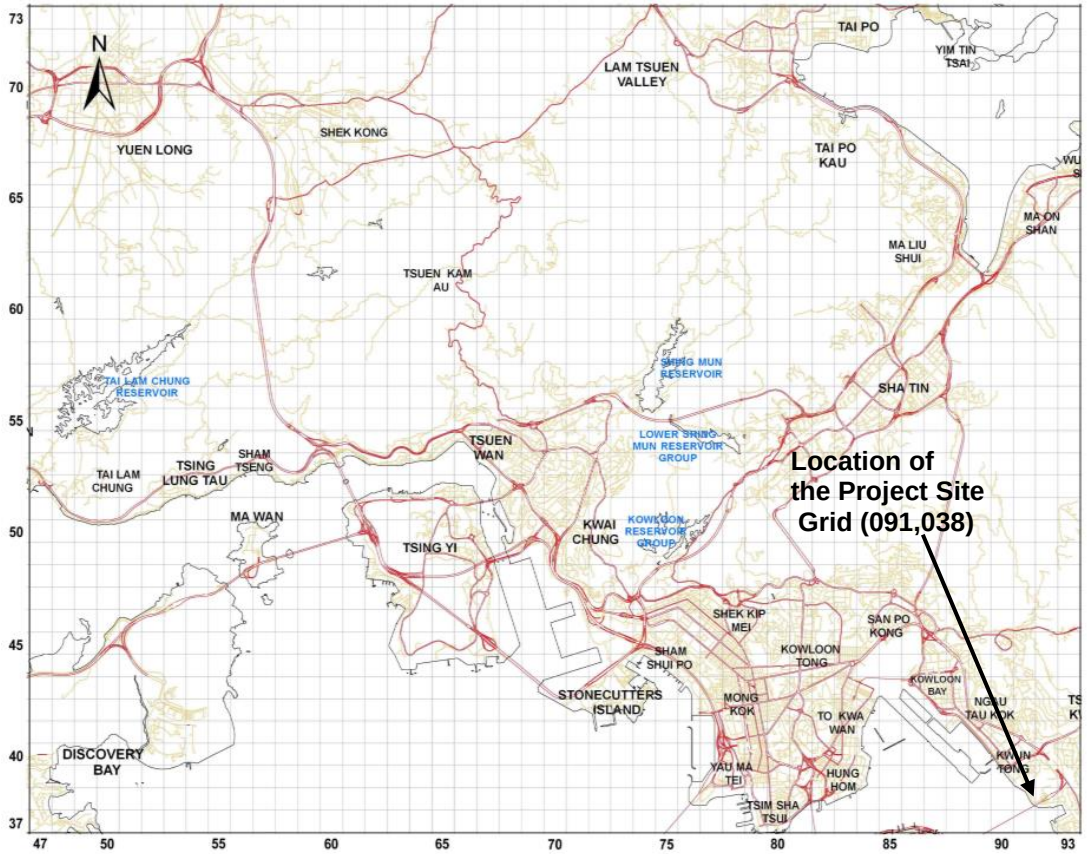
2.1.2 The prevailing winds from NE, ENE, E and ESE would generally dominate the wind availability over a whole year, while in summer, the local wind environment would be determined by WSW, SW and E, ESE and SE winds. The wind roses, the data extraction location and the Project Site location with prevailing winds can be seen in **Figure 2.1**, and **Figure 2.3** respectively.

Figure 2.1 Wind Rose Extracted from RAMS Model at Grid (091, 038)



(a) Annual Wind Rose, 200m (b) Summer Wind Rose, 200m

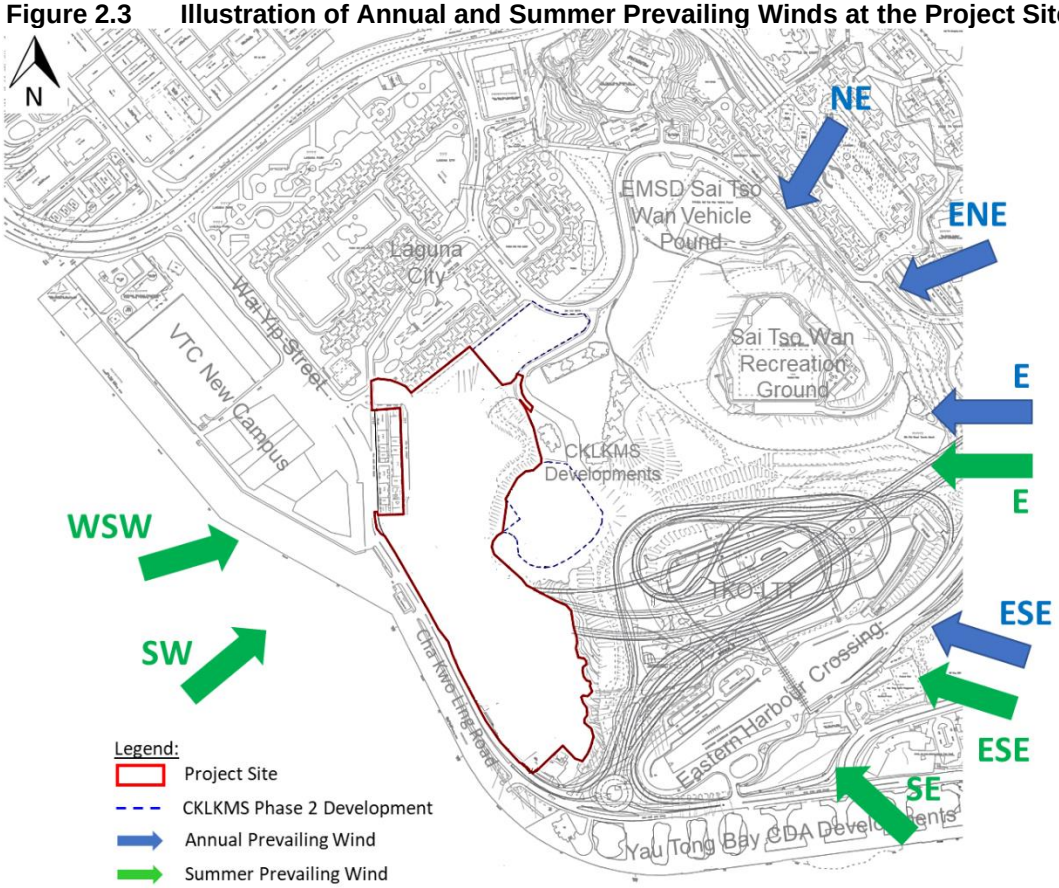
Figure 2.2 Illustration of Location for Wind Data Extraction at the Project Site



2.1.3 Apart from the RAMS wind data, a set of prevailing wind towards the CKLKMS is also identified in the *"Working Paper 4 (Final Report) of the Planning Review on Development of Ex-Cha Kwo Ling Kaolin Mine Site in 2014 (Quotation Ref. PLNQ 21/2011)"* ("Planning Review (2014)") based on the simulated sets of wind data from the Air Ventilation Assessment report for the North Apron Grid Neighborhood and Area 2 and available information and research conducted by the Hong Kong University of Science and Technology. It is concluded that the north-easterly (NE), the east north easterly (ENE), the east south easterly (ESE) and the easterly (E) wind dominate the annual wind conditions, while the summer wind mainly comes from the southeast (SE) and the southwest (SW) directions.

2.1.4 In reference to the identified prevailing wind directions from sources discussed in **Section 2.1.1** to **2.1.3**, the annual and summer prevailing wind towards the Project Site are clearly illustrated in **Figure 2.3** below.

Figure 2.3 Illustration of Annual and Summer Prevailing Winds at the Project Site



3 SITE ENVIRONMENT

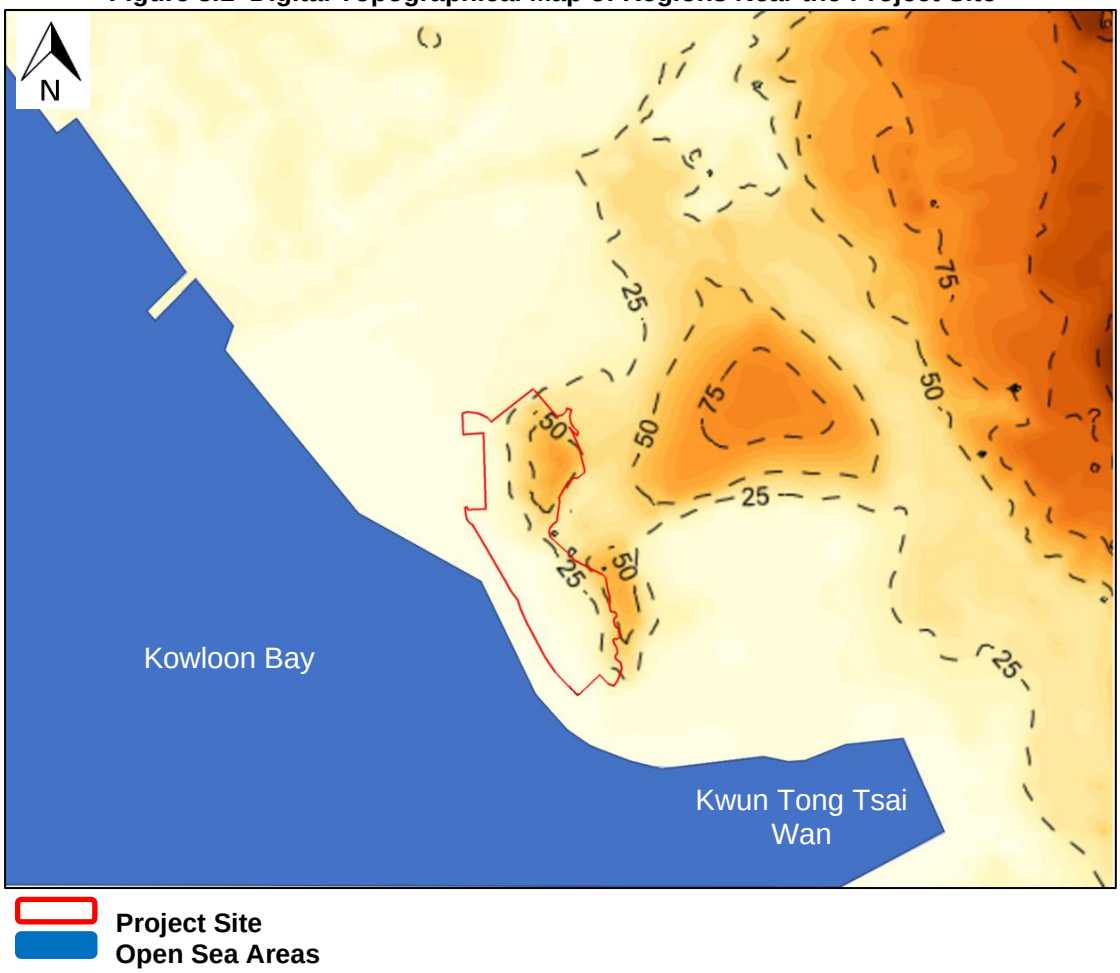
3.1 Local Topography

3.1.1 The Project Site is located at the south western direction of the hillslope of Cha Kwo Ling, the topographical feature near the Project Site gradually rises from southwest towards the northeast, with the height of terrain within the Project Site ranging around +5mPD to its southern portion and +70mPD at its northern portion.

3.1.2 The inland areas to the northeast/ east of the Cha Kwo Ling Village (CKLV) are mainly high-rise hilly terrains, the area to the south and north of the Project Site are mainly flat lands and relatively low-rise developments, with terrain heights ranging from +5mPD to +10mPD. The Project Site is also fronting the open sea of Kowloon Bay to the west.

3.1.3 Based on the general terrain characteristic near the CKLV, it can be anticipated that the wind flows driven by the NE, E, ENE and ESE prevailing winds may be moderated and weakened by the hilly terrain, while air flows driven under the SE, SW and WSW directions would not be blocked by terrain features before reaching the Project Site.

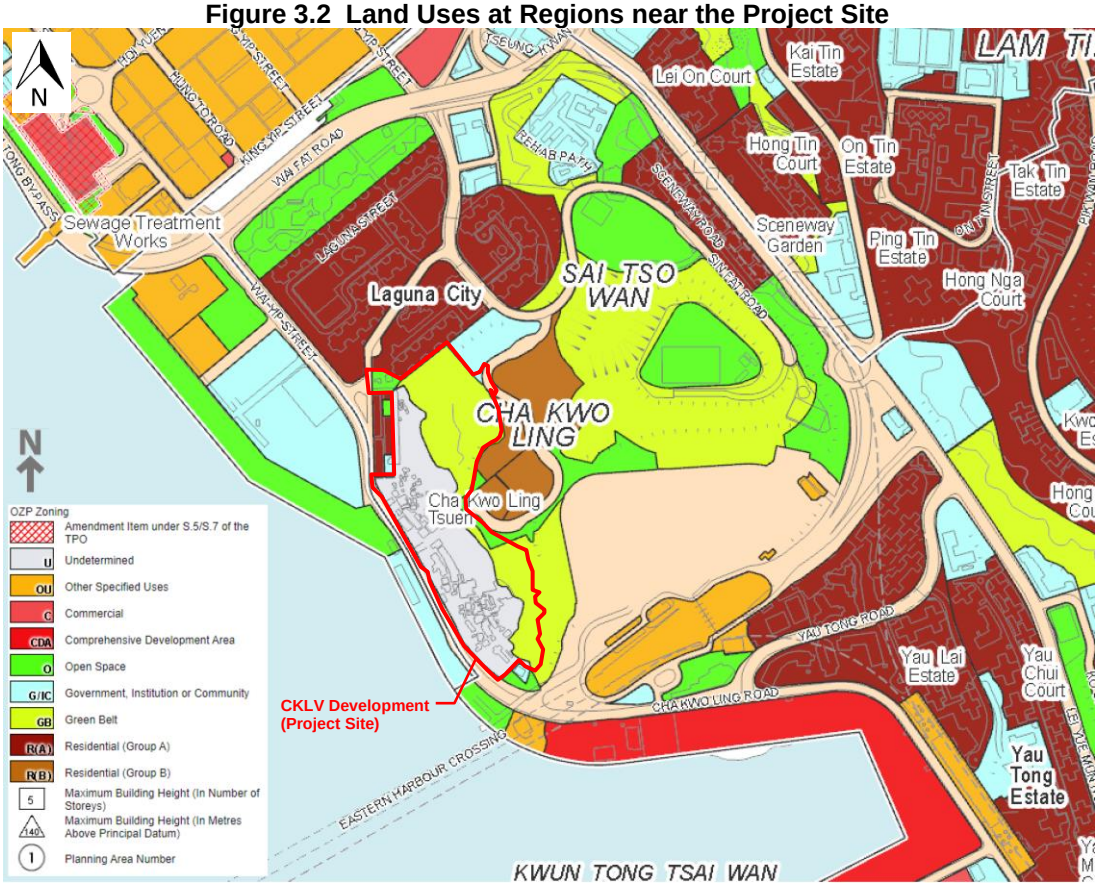
Figure 3.1 Digital Topographical Map of Regions Near the Project Site



3.2 Land Uses

3.2.1 The land-use zonings of the Project Site for CKLV Development and the nearby area are dictated by the approved OZP No. S/K15/25 – Cha Kwo Ling, Yau Tong, Lei Yue Mun. The land-use zonings of the region are shown in **Figure 3.2**.

Figure 3.2 Land Uses at Regions near the Project Site

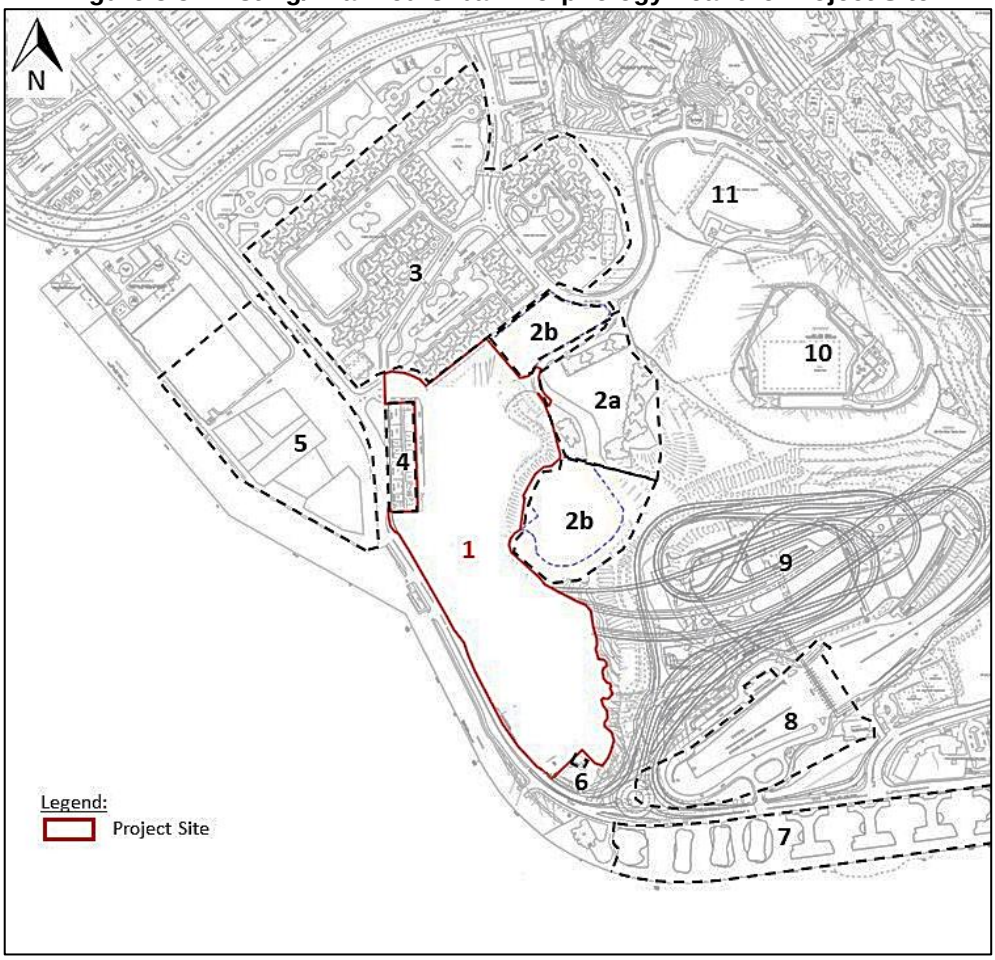


3.2.2 The Project Site at CKLV is currently zoned as “Undetermined” (“U”), “Green Belt” (“GB”), “Open Space” (“O”) and “Road”, while the Project Site is bounded by the planned CKLKMS Phase 2 Development to the northeast with the existing zoning of “Residential Group (B)” (R(B) under the current OZP. There are also lands designated as “Open Spaces” (O) located to the further northeast of the Project Site, which are the Sai Tso Wan Recreation Ground and EMSD Sai Tso Wan Vehicle Pound.

3.2.3 The area to the north of the CKLV site is a large region mainly designated as “Residential Group (A)” (R(A)). Meanwhile, areas along waterfront are zoned as mixing of “Government, Institution and Community” (“G/IC”), “Open Space” (“O”) and “Other Specified Uses” (“OU”). Furthermore, the areas to the far southeast of the Project Site are mainly comprised by “Comprehensive Development Area” of the planned Yau Tong Bay Comprehensive Development Area (YTB CDA).

3.3 Existing/ Planned Urban Morphology

Figure 3.3 Existing/ Planned Urban Morphology near the Project Site



Adjacent Structures/ Buildings	Building Height (mPD)
1. Squatter area of Cha Kwo Ling Village (the Project Site)	N/A
2. (a) Planned CKLKMS Phase 1 Development (Koko Hills)	+90 to +110
2. (b) Planned CKLKMS Phase 2 Development (OZP compliant scheme)	+61 to +94
3. Laguna City	+80 to +92
4. Old Tenement building at Fan Wa Street	+9 to +38
5. Planned Vocational Training Council (VTC) new campus	+60 to +70
6. Tin Hau Temple	~+9
7. Planned Yau Tong Bay Development	+60.5 to +120
8. Eastern Harbour Crossing (EHC) and ancillary buildings	~27*
9. Planned TKO-LTT and ancillary buildings	~26
10. Sai Tso Wan Recreation Ground	-
11. EMSD Sai Tso Wan Vehicle Pound	-

** BH of administration building of EHC is estimated based on limited available information.*

3.3.1 Majority of area within the Project Site is currently covered by low-rise squatters, while the area upon the hilltop towards the northeast of the Project Site is being developed with a primary school and residential buildings under the CKLKMS Phase 1 and Phase 2 Developments. Meanwhile, the lands towards the east of the Project Site and the southeast of CKLKMS Developments will be the proposed TKO-LTT and their low-rise ancillary buildings and ancillary buildings for EHC.

3.3.2 The area to the near west outside the Project Site locates the existing low-rise old tenement buildings at Fan Wa Street, while the region to the further west/ northwest is planned to be developed into planned VTC new campus, with a building height of around +70mPD and will anticipate to have a relatively large building coverage. The area north to the Project Site is currently occupied by high-rise residential developments of Laguna City, in where several arrays of high-rise developments exists.

3.3.3 The developments to the south of the Project Site are relatively less compacted than those located to the northeast, north and west. A single-storey Tin Hau Temple is located to the immediate south of the Project Site, while to the further southeast locates the planned Yau Tong Bay Development with comprehensive development including hotel and private housing development with approximately +60.5mPD to +120mPD in height.

3.3.4 Based on the identification of existing / planned buildings in the vicinity of the Project Site, the areas to the near east will be occupied by high-rise developments of CKLKMS developments, which would weaken the east quadrant prevailing winds towards the Project Site. Meanwhile, area to the west and southwest of the Project Site are open sea/ open areas, allowing prevailing winds to reach the Project Site without blockage.

4 PROPOSED DEVELOPMENTS

4.1 Development Proposals

4.1.1 The CKLV Development is bounded by the planned CKLKMS Phase 2 Development to the northeast which is undergoing a separate study of "Agreement No. CE3/2014(CE) – Development of ex-Cha Kwo Ling Kaolin Mine Site – Design and Construction" to provide public housing development and school site development. Given the close proximity of the two Developments (i.e. CKLV Developments and CKLKMS Phase 2 Developments) and their scale, the potential cumulative air ventilation impacts of two developments would be assessed in one go in this Report.

4.1.2 The location of CKLV Development and CKLKMS Phase 2 Development (hereafter named as "Development Proposals") area are presented in **FIGURE 4.1**.

4.2 CKLV Development

4.2.1 The Project Site at CKLV is planned to be developed with public housing developments as well as the G/IC facilities/ buildings that are necessary to support the CKLV Development. Three major areas include the (i) public housing site area at the central and southern portion, (ii) G/IC site area at the north; and (iii) FSD site area at the west are proposed for the CKLV Developments. The development layout is subjected to update with changes in the proposed design building morphologies provided by HKHS and relevant government departments.

(i) Public Housing Site

4.2.2 The proposed Developments will be rezoned for the public housing development with 6 residential blocks which are subject to review in the detailed design stage. The proposed development plan is illustrated in **FIGURE 4.2**. The design heights of the proposed building structures are summarized as **Table 4.1** accordingly.

4.2.3 The proposed development layout for the Developments by HKHS is shown in **Appendix A.**

Table 4.1 Maximum Building Height of Housing Site of CKLV Development

Location of Site	Building Block	Approx. Max. Building Height
Housing Site	Tower T1	+110mPD to +130 mPD
	Tower T2	+130 mPD
	Tower T3	+110mPD to +130 mPD
	Tower T4	+110mPD to +130 mPD
	Tower T5	+110mPD to +130 mPD
	Tower T6	+130 mPD

4.2.4 After reviewing HKHS's development scheme, several wind enhancement features were identified in below:

- *Provision of Opening at Lower Floor of Building:* An observable opening at Tower T6 in Site G is proposed to provide a permeable void to facilitate the penetration of sea wind to inland areas and maintain the identified wind corridor (Refers to **Section 5** in below). Based on HKHS proposed building block layout, it is noted that an urban window is proposed at lower floor of the residential tower with a width of more than 15m (20m has been provided) to allow the prevailing wind to penetrate it and reach the downwind areas. The proposed width of air corridor along its path is considered adequate in accordance with the Sustainable Building Design Guidelines. Moreover,

taking into account the road level of adjacent new vehicular access road and the CKLKMS Phase 2 Development with platform level at +32mPD, the proposed base level of the void at below +30mPD facilitates the prevailing wind to flow pass it and reach the CKLKMS Development more easily. Development potential could be enhanced for the void base level starting from approximate +30mPD instead of starting at lower level, without worsen the air ventilation at that area. For the top level of the void at +74.9mPD, as it is higher than the adjacent proposed road and man-made slopes with the highest level at ~+60mPD, blockage of the air flows through the void to CKLKMS Development is not anticipated. Therefore, the dimensions of void as proposed by HKHS is considered a good design measures for CKLV Development based on the expert evaluation.

- *Building Separation:* Building separations of no less than 15m in width between buildings is proposed in accordance with the Sustainable Building Design (SBD) Guidelines to enhance wind permeability and facilitate the wind flow.
- *Optimise Site Coverage of the Podia*: Two- to three-storey of podiums with height less than ~15m from the ground level beneath building blocks of Towers T1 to T6 are proposed for the provision of retails and social welfare facilities. The size and coverage of the podia among the housing site are minimized and break down as far as practicable with provision of footbridge links (footbridge with vertical clear headroom of 5.1m above-ground and permeable underneath) in between to facilitate the airflow to the pedestrian level.
- *Stepped Building Height Profile*: Stepping building height concept was adopted at housing site of CKLV Development by proposing a lower building height of 110mPD at Towers T1, T3, T4 and T5 for the portion facing the seafront and a higher building height of 130mPD at all towers for the inland portion of buildings. By adopting the stepped building height profile at CKLV Development, it can divert winds to lower levels and help optimise the wind capturing potential of development itself.

(ii) G/IC Site at North

4.2.5 In order to accommodate the supporting G/IC facilities as far as practical under CKLV Development, a medium-rise standalone G/IC building is proposed at the north of the CKLV Development Area to house the public transport facilities, clinic facilities, the sports centre and social welfare facilities as requested by TD, DH, LCSD and SWD as listed in **Table 4.2** below. It also acts as a buffer between the existing and planned residential developments nearby. Since no detailed design of G/IC building is carried out by relevant works agent (i.e. ArchSD) at this stage, after carrying out a broad-brush estimation based on gross floor area requirement and proposed site area, the maximum building height of G/IC building is estimated to be +70mPD for assessment. Actual provision of G/IC facilities is subject to confirmation by relevant Government departments at detailed design stage. An indicative location with proposed building height of G/IC building is shown in **FIGURE 1.2** which are subject to detailed building design by the relevant works agent.

Table 4.2 Provision of G/IC Facilities at G/IC Building

Location of Site	User Departments	Proposed Facilities
G/IC Site at North (G/IC Building)	LCSD	Sport Center
	DH	Clinic Facilities with Staff Office
	SWD	Social Welfare Facilities
	TD	Public Transport Interchange (PTI) (~9m height)

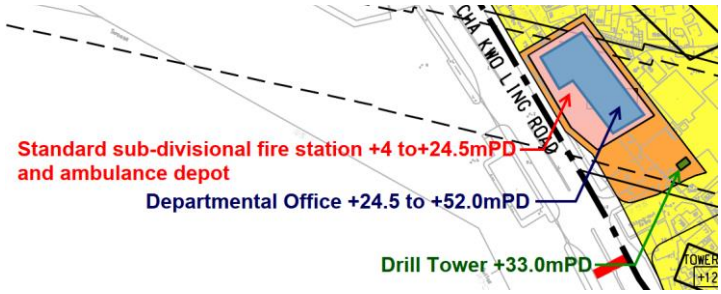
4.2.6 The building footprint of G/IC with site coverage of 60% is assumed in accordance with the Cap. 123 Building Ordinance. By optimising the site coverage, the building massing can be reduced to increase building separation among the Developments.

(iii) G/IC Site at the West above CKL Tunnels (FSD Site)

4.2.7 For the G/IC site at the west, it is underlain by a section of the CKL Tunnels. By considering its technical requirement, developments above ground are subject to technical constraints and limited from high-rise development. Therefore, a medium-rise standard sub-divisional fire station cum ambulance depot with departmental office was proposed to be placed above the tunnel footprint in order to maximise the development potential of the CKLV Development. Taking into account technical requirement of CKL Tunnels and making reference to existing and planned FSD facilities, the development layout with proposed building height of +52mPD is illustration in **FIGURE 1.2** for assessment in this Report. Information of FSD Site are summarized in **Table 4.3** in below:

Table 4.3 Maximum Building Height of FSD Site of CKLV Development

Location of Site	FSD Facilities	Approx. Max. Building Height
G/IC Site at West above CKL Tunnels (FSD Site)	Standard sub-divisional fire station cum ambulance depot	+4* to +24.5
	Departmental Office	+24.5 to +52.0
	Drill Tower	+33mPD



** Minimum proposed site formation level of FSD is +4mPD.*

4.2.8 The site coverage (~65%) and building orientation/ layout of the proposed FSD Site is optimised with reference to latest planned FSD facilities to reduce the footprint and building massing to increase building separation among the Developments.

4.3 CKLKMS Phase 2 Development

4.3.1 CKLKMS Phase 2 Development will comprise two sites which are identified for the development of residential buildings and an associated educational building. The proposed development plan for CKLKMS is illustrated in **FIGURE 4.3**.

4.3.2 The proposed housing development under CKLKMS at a higher platform level of +32mPD will be delineated into two housing sites, namely Site A and Site B. Site A and Site B will be rezoned for the public housing development with 3 residential blocks. Social welfare facilities and podium garden will be provided at ground/ podium floors of the housing site. Besides, premises-based retail facilities, kindergarten would be provided within the housing site. The design heights of the proposed building structures are summarized as **Table 4.2** accordingly.

4.3.3 The proposed development layout for the CKLKMS by HD is shown in **Appendix B.**

Table 4.4 Maximum Building Height of the Proposed Developments

Location of Site	Building Block	Approx. Max. Building Height
Site A	Block 1	+135 mPD
Site B	Block 1	+140 mPD
	Block 2	+140 mPD

4.3.4 After reviewing HD's development scheme, several wind enhancement features were identified in below:

- *Provision of Podium Garden*: Podium structures are proposed beneath the residential towers in each Site. To facilitate penetrating of prevailing wind, podium gardens of approximately 4m in height are incorporated into the building layout design.
- *Building Separation:* Building separations of no less than 15m in width between buildings is proposed in accordance with the Sustainable Building Design (SBD) Guidelines to enhance wind permeability and facilitate the wind flow.

Details of the identified wind enhancement features are subject to change in detailed design stage.

4.4 Scenarios for Air Ventilation Assessment

4.4.1 In order to examinate the magnitude of change to the existing condition and OZP-compliant development scheme caused by the Development Proposals, two assessment scenarios are formulated for the Developments in CKLV and CKLKMS Phase 2 Development.

Baseline Scenario

4.4.2 The **Baseline Scenario** illustrated the existing low-rise squatters in existing Cha Kwo Ling Village (hereafter named as "Cha Kwo Ling Village site") and the OZP-compliant scheme for CKLKMS Phase 2 Development, which was proposed in Planning Review (2014). The public housing site of CKLKMS Phase 2 Development has been proposed to construct 7 residential buildings with podium free design and building height ranged from +90mPD to +95mPD. Meanwhile, the school site of CKLKMS Phase 2 Development to the north contains a school of around 8-storeys in height (~+61mPD). The existing and planned developments in the surrounding areas (e.g. planned new campus of VTC) are also illustrated in the Baseline Scenario based on the available information at the time for preparation of this Report. The Cha Kwo Ling Village site is currently zoned "Undetermined" on the OZP without development restrictions specified on the Notes, therefore, the existing conditions of the site has been adopted for the Baseline Scenario. The Baseline Scenario and design parameters are illustrated in **FIGURE 4.4**.

Proposed Scenario

4.4.3 The **Proposed Scenario** is based on the housing development layout provided by HKHS for CKLV Development and Scheme 24 provided by HD for CKLKMS Phase 2 Development. For CKLV Development (Details refer to **Section 4.2** above), it will comprise six residential blocks which will have a maximum BH of 120mPD. While the maximum BH of two G/IC sites at north and at west within the CKLV Development were proposed to be about +70mPD and +52mPD respectively.

4.4.4 For CKLKMS Phase 2 Development (Details refer to **Section 4.3** above), it will comprise 3 housing blocks with building height ranging from +135mPD (for the Site at the southwestern part closer to the waterfront) to +140mPD (inner part) with an average plot ratio of 7.5 to be developed on the platform at +32mPD of the site. Comparing to the Baseline Scenario, the number of proposed buildings in housing site is reduced to three numbers but with a larger individual building footprint, while the building heights are increased to 135mPD/ 140mPD,

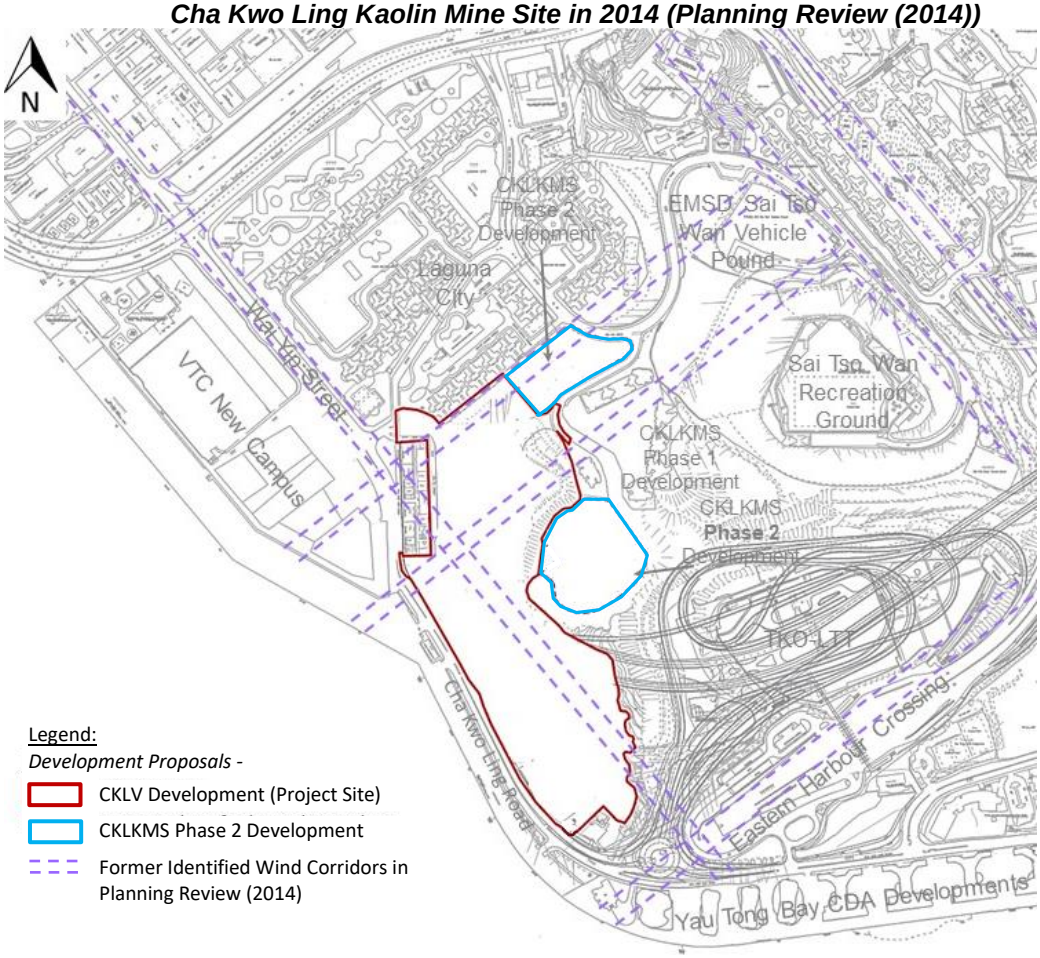
meanwhile the school structure in school site at north is unchanged. This AVA report will cover the potential air ventilation impacts arising from the CKLV Development and the housing developments in CKLKMS Phase 2 Development. The Proposed Scenario and design parameters are illustrated in **FIGURE 4.4**.

5 EXISTING WIND CONDITIONS AND AIR PATHS

5.1 Wind Corridors Identified in Previous AVA Study

5.1.1 As mentioned in the broad air ventilation study in the Planning Review (2014), three northeast–southwest and three southeast–northwest aligning visual / ventilation corridors are identified for the area of Development Proposals as shown in **Figure 5.1**.

Figure 5.1 Wind Corridors identified in *Planning Review on Development of Ex-Cha Kwo Ling Kaolin Mine Site in 2014 (Planning Review (2014))*



5.1.2 For the three northeast–southwest aligning wind corridors, the north most one of these corridors runs through the region near Laguna City, connecting the planned VTC new campus and the EMSD Sai Tso Wan Vehicle Pound. The central wind corridor is identified to link up the Sai Tso Wan Recreation Ground and existing CKLV, while the south most one is aligned with the EHC.

5.1.3 Among the above-mentioned corridors, the north most corridor is retained through the region in immediate vicinity of Laguna City. Meanwhile, the planned CKLKMS Phase 1 Development slightly shifted the identified central wind corridor to the north, penetrating in between the building separation within the area of CKLKMS Phase 1 Development. For the south most air path, which is located relatively far from the Development Proposals, therefore it is not expected to be affected by the proposed building morphologies within it.

5.1.4 For the three southeast–northwest aligning wind corridors, two of them are located at the northeast to the Sai Tso Wan Recreation Ground, and the southwest one penetrates through the CKLV Development and Wai Yip Street. With consideration of the layout of Development Proposals as discussed in **Section 4** above, the Development Proposals would not affect and create blockage to majority of these corridors.

6 EXPERT EVALUATION ON AIR VENTILATION IMPACT

6.1 Annual and Summer Prevailing Wind

6.1.1 Comparing to the existing/ planned conditions of areas within the Development Proposals, the proposed development for the public housing development with high-rise residential buildings and supporting G/IC facilities in CKLV and CKLKMS would impose a certain magnitude of blockage in wind flow through the area of Development Proposals. The wind influence may be roughly estimated qualitatively by the extent of the wind wake areas downwind. The good design features of the preliminary development layouts for the Development Proposals and the anticipated wind flow as well as the potential wind impacts induced by the Development Proposals under nine different prevailing wind directions are discussed below. The annual and summer prevailing wind directions include:

- NE Annual Prevailing Wind
- ENE Annual Prevailing Wind
- E Annual Prevailing Wind
- ESE Annual Prevailing Wind
- E Summer Prevailing Wind
- ESE Summer Prevailing Wind
- SE Summer Prevailing Wind
- SW Summer Prevailing Wind
- WSW Summer Prevailing Wind

6.2 Under NE Annual Prevailing Wind

Potential Wind Wakes and Wind Sensitive Areas under the NE Wind

6.2.1 The potential wind wake and sensitive areas under the NE prevailing wind are the CKLV Development located at the downstream of the CKLKMS developments, Cha Kwo Ling Road and the open sea areas located at the further downwind. As the open sea areas are less frequently pedestrian access areas, therefore, attention should be paid to the wind environment within the CKLV Development and along the Cha Kwo Ling Road under the NE prevailing wind.

Baseline Scenario

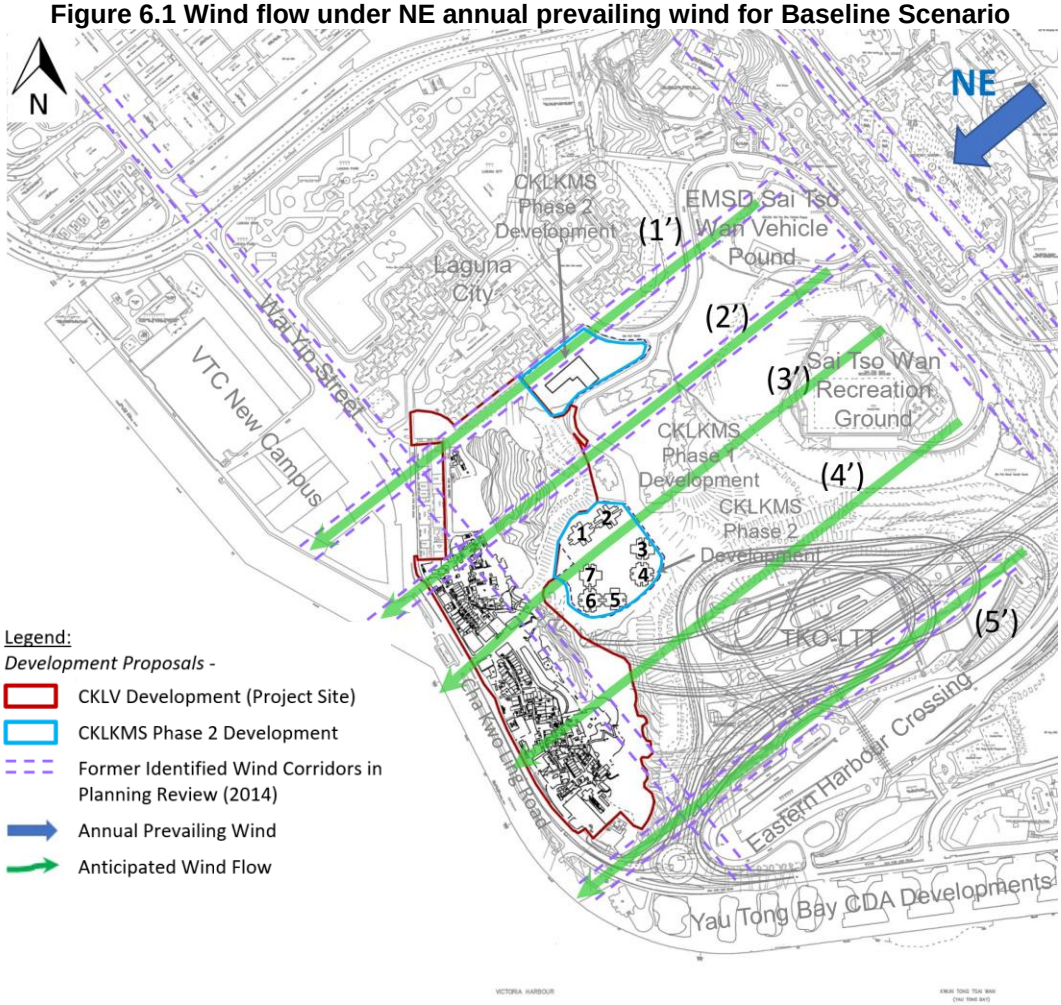
6.2.2 As illustrated in **Figure 6.1**, under the NE prevailing wind, the 8-storey proposed school under CKLKMS Phase 2 Development in the Baseline Scenario would not obstruct the wind corridor that originates from the EMSD Sai Tso Wan Vehicle Pound and runs through the area near Laguna City, connecting the VTC Campus (see *Marker 1'* in **Figure 6.1**).

6.2.3 In addition, the NE wind originated from the EMSD Sai Tso Wan Vehicle Pound could also flow via the building separations in between the residential blocks of the CKLKMS Phase 1 Development and reach the low-rise squatters of the Cha Kwo Ling Village site. By skimming over the squatters, NE wind could continue its path towards the open sea areas further downstream. (see *Marker 2'* in **Figure 6.1**).

6.2.4 NE prevailing wind originated from the Sai Tso Wan Recreation Ground would be able to penetrate via the building separations between Blocks 1/2 and Blocks 3/7 of CKLKMS Phase 2 Development under the Baseline Scenario and reach the existing squatters within the CKLV Development. Owing to the low-rise nature of the existing squatters, NE wind would be able to skim over these structures and reach the Cha Kwo Ling Road and the open sea areas, maintaining a relatively satisfactory wind permeability (see *Marker 3*' in **Figure 6.1**).

6.2.5 The CKLKMS Phase 2 Development is located to the northeast of the squatters within CKLV site. Therefore, the proposed buildings within the CKLKMS Phase 2 Development are not likely to influence the wind environment to area at the south of CKLV site. In addition, owing to the relatively open area in the south-east to the CKLKMS Phase 2 Development and the non-obstructed wind corridor along EHC, north easterly prevailing wind would be able to reach the southern portion of the Development Proposals under the Baseline Scenario, maintaining a relatively good wind environment there (see *Markers 4'* and *5*' in **Figure 6.1)**.

Figure 6.1 Wind flow under NE annual prevailing wind for Baseline Scenario



Proposed Scenario

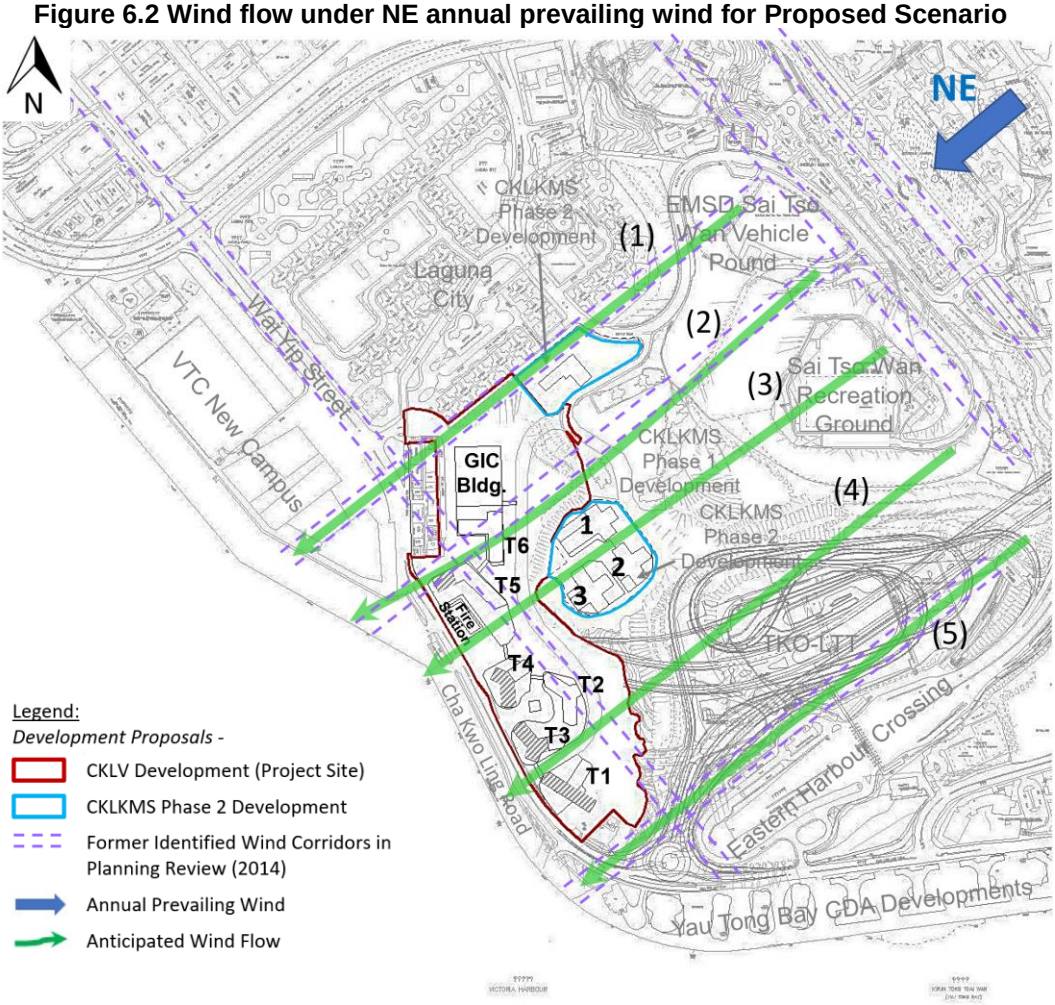
6.2.6 Under the NE prevailing wind, the downwind of the Development Proposals is the Cha Kwo Ling Road, waterfront promenade of the planned VTC new campus and the open sea areas.

6.2.7 Under the Proposed Scenario, since the wind corridor between the Laguna City and the proposed school site under CKLKMS Phase 2 Development (see *Marker 1* in **Figure 6.2**) remain unblocked, the NE prevailing wind flows along the northmost northeast–southwest aligning wind corridor towards the building separation between blocks of the planned VTC new campus, and reaches the open sea areas.

6.2.8 After flowing via the building separation between blocks of the CKLKMS Phase 1 Development, with consideration of the planned and existing nearby developments, the central NE-SW wind corridor (see *Marker 2* in **Figure 6.2**) would be slightly deviated and continue its path towards the southwest direction. Nevertheless, with sufficient distance of slope area between the platform area of ex-CKLKMS housing site and the CKLV Development, the NE prevailing wind would be reattached within the slope area and reach the platform area of CKLV Development. The NE wind will continue to flow through the CKLV Development by the implementation of the good design of urban window at the Tower T6 of

the CKLV housing site. The NE prevailing wind would flow further downstream to reach the waterfront promenade of the planned VTC new campus and the open sea areas. The NE prevailing wind originated from the Sai Tso Wan Recreation Ground is also able to flow via the building separations between the proposed blocks of the ex-CKLKMS Phase 2 Development, skim over the low-rise podium of Tower T5, open area at fire station within the central portion of CKLV Development and then to the open sea areas. Furthermore, the provision of the at least 15m width building separations between the building blocks at the housing site of CKLV Development would also facilitate the flow of NE prevailing wind.

Figure 6.2 Wind flow under NE annual prevailing wind for Proposed Scenario



** Hatched area represents a lower BH of 110mPD while non-hatched area represents a higher BH of 130mPD within the Project Site*

6.2.9 The NE prevailing wind originated from the Sai Tso Wan Recreation Ground is able to flow via the building separations between the proposed blocks of the CKLKMS Phase 2 Development, skim over the low-rise podium of Tower 5, open area at fire station within the central portion of CKLV Development and then to the open sea areas (see *Marker 3* in **Figure 6.2**), facilitating the wind environment at these areas.

6.2.10 By the provision of the at least 15m width building separation between the building blocks at the housing site of CKLV Development, the NE prevailing wind would penetrate through the new vehicular access road at southern portion to reach the open sea areas and help in alleviating the wind wakes generated by the proposed Towers T1 to T4 under CKLV Development (see *Marker 4* in **Figure 6.2**).

6.2.11 Further to the above, the NE prevailing wind would remain unobstructed along the southmost northeast-southwest aligning wind corridor along the southern portion of CKLV boundary and would not be affected by the Development Proposals under the Proposed Scenario (see

Marker 5 in **Figure 6.2**).

6.2.12 In addition, the CKLV Development is located at the toe of the hillslope of Cha Kwo Ling area would be benefited by the mountain wind coming from the hilly terrain of Cha Kwo Ling area under the NE prevailing wind. It is concluded that the air ventilation performance at the assessment area of the Development Proposals and the surrounding affected areas could be maintained under the NE annual prevailing wind with the implementation of the merit of the preliminary development layout under the Proposed Scenario as discussed in **Section 4** above.

6.3 Under ENE Annual Prevailing Wind

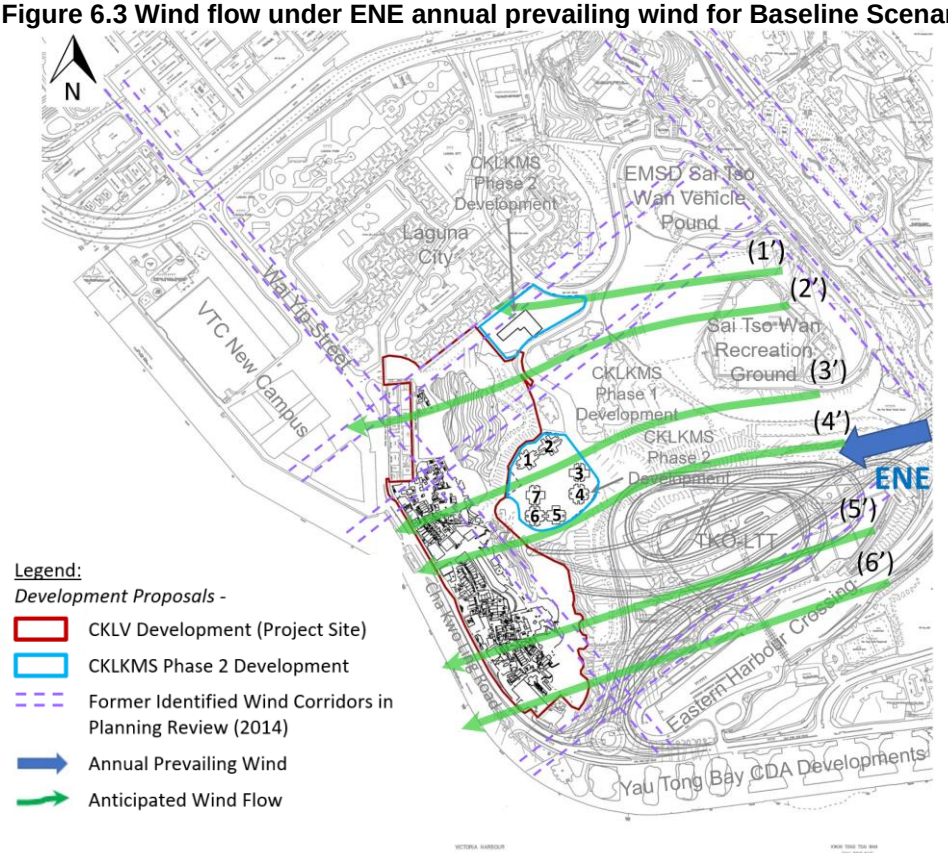
Potential Wind Wakes and Wind Sensitive Areas under the ENE Wind

6.3.1 The potential wind wake and sensitive areas under the ENE prevailing wind cover the area of Development Proposals, Cha Kwo Ling Road, waterfront promenade of the planned VTC new campus and the open sea areas. As the open sea areas are less frequently pedestrian access areas, therefore, attention should be paid to the wind environment within the area of Development Proposals and along the Cha Kwo Ling Road and the waterfront promenade of the planned VTC new campus.

Baseline Scenario

6.3.2 As shown in **Figure 6.3** (*Markers 1'* and *2'*), there would be two streams of ENE wind originated from the Sai Tso Wan Recreation Ground. The first stream (*Marker 1'*) of ENE wind could approach Laguna City without obstruction, as the proposed school layout under the CKLKMS Phase 2 Development is placed towards its south-western boundary, leaving plenty open spaces at the eastern boundary, facilitating the flow of ENE wind. The second stream (*Marker 2'*) of ENE wind would flow via the building separation between building blocks of the CKLKMS Phase 1 Development towards the planned VTC new campus, promoting the air ventilation performance there under the existing situation.

Figure 6.3 Wind flow under ENE annual prevailing wind for Baseline Scenario



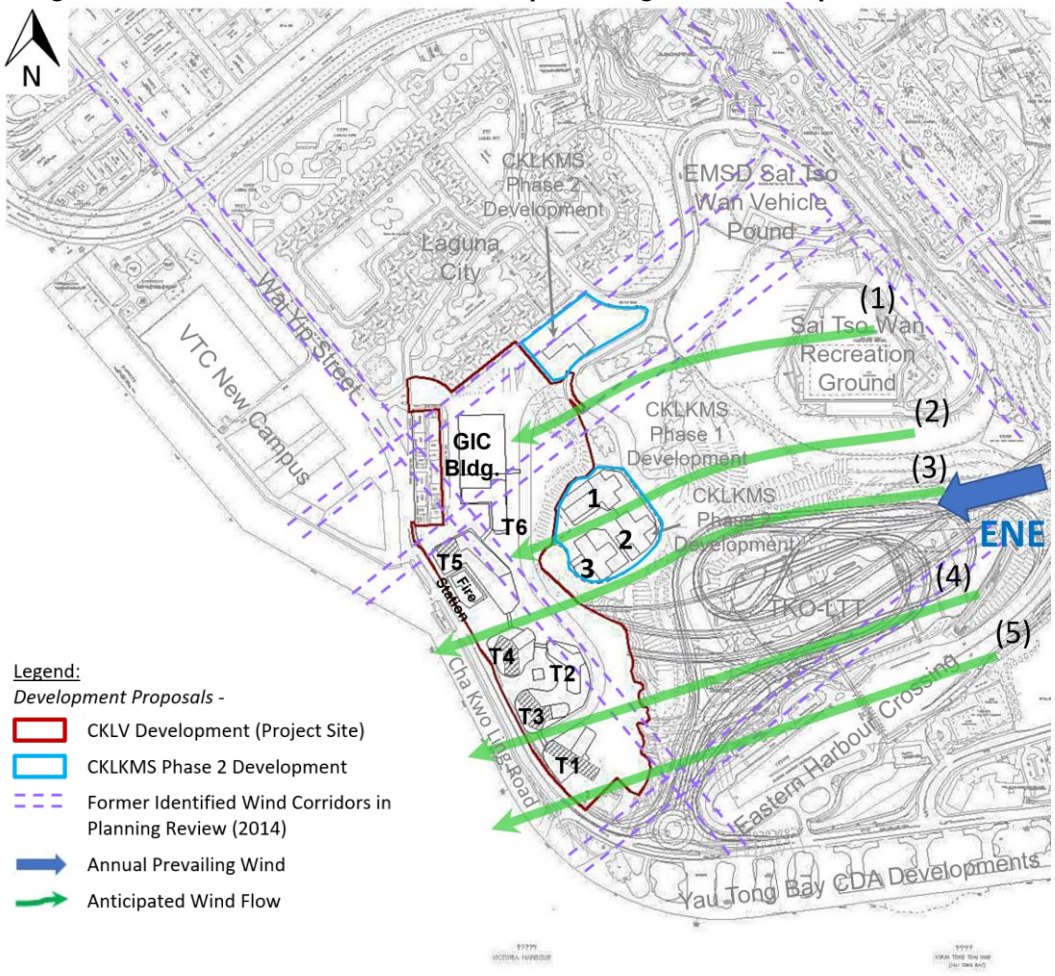
6.3.3 The wind wake areas generated from the construction of the Baseline Scenario within CKLKMS Phase 2 Development under the ENE wind would be the northern sector of the Cha Kwo Ling Village site. Owing to the relatively large building separation between building blocks of the CKLKMS Phase 2 Development under the Baseline Scenario, ENE prevailing wind would be able to approach the current squatters via the building gaps between Blocks 1/2 and Blocks 3/7 of CKLKMS Phase 2 Development, skimming over these low-rises and reach the open sea areas (see *Marker 3'* in **Figure 6.3**).

6.3.4 The sideway streams of ENE wind (*Markers 4'-6'* in **Figure 6.3**), which would not be affected by the development layouts of the CKLKMS Phase 2 Development under the Baseline Scenario, could reach the southern portion of the Cha Kwo Ling Village Site without obstruction. The wind environment at southern portion of the Cha Kwo Ling Village Site is anticipated to be relatively good under the ENE wind and this directional wind would be able to further travel towards the open sea areas after skimming over the existing low-rise squatters.

Proposed Scenario

6.3.5 Similar to that under the NE prevailing wind, the downwind of the Development Proposals covers the Cha Kwo Ling Road, waterfront promenade of the planned VTC new campus and the open sea areas.

Figure 6.4 Wind flow under ENE annual prevailing wind for Proposed Scenario



** Hatched area represents a lower BH of 110mPD while non-hatched area represents a higher BH of 130mPD within the Project Site*

6.3.6 The ENE prevailing wind originated from the Sai Tso Wan Recreation Ground flowing via the separation between building blocks of the CKLKMS Phase 1 Development towards the planned VTC new campus under the Baseline Scenario would be hindered by proposed G/IC

building from reaching it under the Proposed Scenario (see *Marker* 1 in **Figure 6.4**). Further enhancement on the building layout design of the proposed G/IC in perspective of air ventilation aspects (e.g. providing a semi-enclosed permeable PTI at pedestrian level of G/IC building) are suggested to be further explored.

6.3.7 The ENE prevailing wind could penetrate the CKLKMS Phase 2 Development through its design of 15m width building separation and the provision of podium voids and podium gardens of CKLKMS in low level zones, the relatively long façade of Tower T5 and the podium underneath at the housing site facing the ENE prevailing wind may hinder the wind from reaching the open sea areas. Further enhancement on the building layout design in perspective of air ventilation aspects (e.g. create voids in façades facing wind direction of Tower T5 to maximise the penetration of ENE prevailing wind towards the planned VTC new campus and open sea areas) are suggested to be further explored to minimize the obstruction of airflow in **Section 7** below (see *Marker 2* in **Figure 6.4**).

6.3.8 Streams of ENE prevailing wind shown in *Markers 3 to 5* in **Figure 6.4** located at sideward of the CKLKMS Phase 2 Development would still reach the downwind areas (i.e. Cha Kwo Ling Road and open sea areas) via the 15m width building separations by skimming over/beneath the footbridges between the building blocks at the southern portion of the CKLV Development. Similar to that under the NE prevailing wind, the CKLV Development would also be benefited from the fall wind from the hills of Cha Kwo Ling area under the ENE prevailing wind.

6.3.9 In view of these, although the low-rise squatters are to be re-developed into high-rise residential blocks, the air ventilation impacts on the identified potential sensitive areas due to the Developments are anticipated to be minimised with implementation of adequate enhancement measures under the ENE annual prevailing wind.

6.4 Under E Annual and Summer Prevailing Wind

Potential Wind Wakes and Wind Sensitive Areas under the E Wind

6.4.1 Similar to that of the NE and ENE prevailing wind as discussed in **Section 6.3** and **6.4** above, the area of Development Proposals, Cha Kwo Ling Road, waterfront promenade of the planned VTC new campus and the open sea areas located at the downwind are considered as potential wind wake and sensitive areas under the E annual and summer prevailing wind.

Baseline Scenario

6.4.2 The proposed school under the CKLKMS Phase 2 Development is a low-rise development of approximately 8-storey in height. The disposition of the proposed school would not obstruct the major wind corridors identified in **Section5** and the easterly wind from the Sai Tso Wan Recreational Ground could reach the Laguna City either by skimming over the proposed school site or via the extensive open spaces at its sideway without much obstruction (see *Marker 1'* in **Figure 6.5**). Therefore, the impacts on wind performance due to the construction of the proposed school site is regarded minimal.

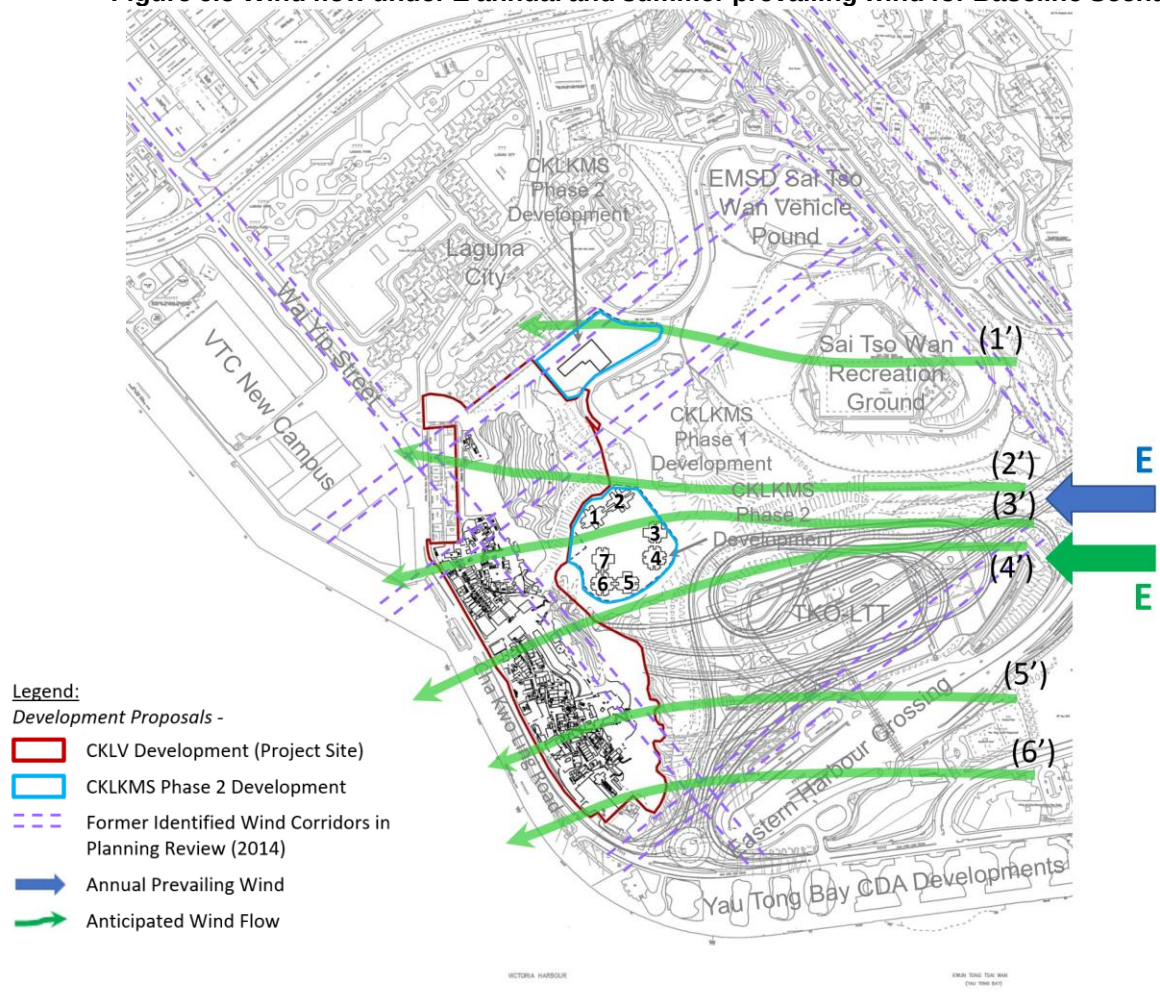
6.4.3 Streams of easterly prevailing wind would flow around both the Blocks 1/2 and Blocks 5/6 of CKLKMS Phase 2 Development under the Baseline Scenario towards the CKLV Development. The northern stream of easterly wind (see *Marker 2'* in **Figure 6.5**) would flow via the separation between the CKLKMS Phase 1 Development and Block 2 of CKLKMS Phase 2 Development, skim over the existing low-rise squatters within the Cha Kwo Ling Village site and reach the waterfront promenade of the planned VTC new campus. The southern stream (see *Marker 4'* in **Figure 6.5**) would flow along the sideway of Blocks 5 and 6 of the CKLKMS Phase 2 Development, skim over the existing low-rise squatters then towards the open sea areas. Hence the wind influence at Cha Kwo Ling Village site is minimal.

6.4.4 Wind flow at area in between the Sai Tso Wan Recreation Ground and the planned TKO-LTT would approach the CKLKMS Phase 2 Development. Under the Baseline Scenario, the buildings with maximum height of +94mPD under the CKLKMS Phase 2 Development would generally induce wind wake areas covering the area to the west side of it, i.e. the hillslope

and Cha Kwo Ling Village site. However, with the adequate building disposition, the easterly prevailing wind (*Marker 3'* in **Figure 6.5**) could be maintained by flowing through the wind corridor between Blocks 2/3 and 1/7 of CKLKMS Phase 2 Development is maintained and then reach the northern portion of Cha Kwo Ling Village site which is located at its downwind. The easterly wind could reach the waterfront promenade of the planned VTC campus and the sea areas after skimming over the low-rise squatters.

6.4.5 The areas located to the southeast of CKLKMS Phase 2 Development are relatively open. The wind under this prevailing wind direction could reach the southern portion of the CKLV Development without obstruction. By skimming over the existing low-rise squatters, the easterly wind is capable to reach the Cha Kwo Ling Road and the further open sea areas (see *Marker 5'* and *Marker 6'* in **Figure 6.5**). From the discussions in **Section 6.4.2** to **Section 6.4.5**, wind impacts under the E prevailing wind on the CKLV Development and the waterfront promenade of the planned VTC campus under the Baseline Scenario is minimal.

Figure 6.5 Wind flow under E annual and summer prevailing wind for Baseline Scenario



Proposed Scenario

6.4.6 As there are no changes in the layout of proposed school site, the easterly wind under the Proposed Scenario originated from the Sai Cho Wan Recreation Ground could reach the Laguna City without much obstruction as similar to the anticipated wind flow pattern in the Baseline Scenario (see *Marker 1* in **Figure 6.6**).

6.4.7 Similar to the ENE prevailing wind, the proposed G/IC building block would hinder the easterly prevailing wind towards the planned VTC new campus and reach the downwind areas including the waterfront promenade of VTC new campus and the open sea areas (see *Marker*

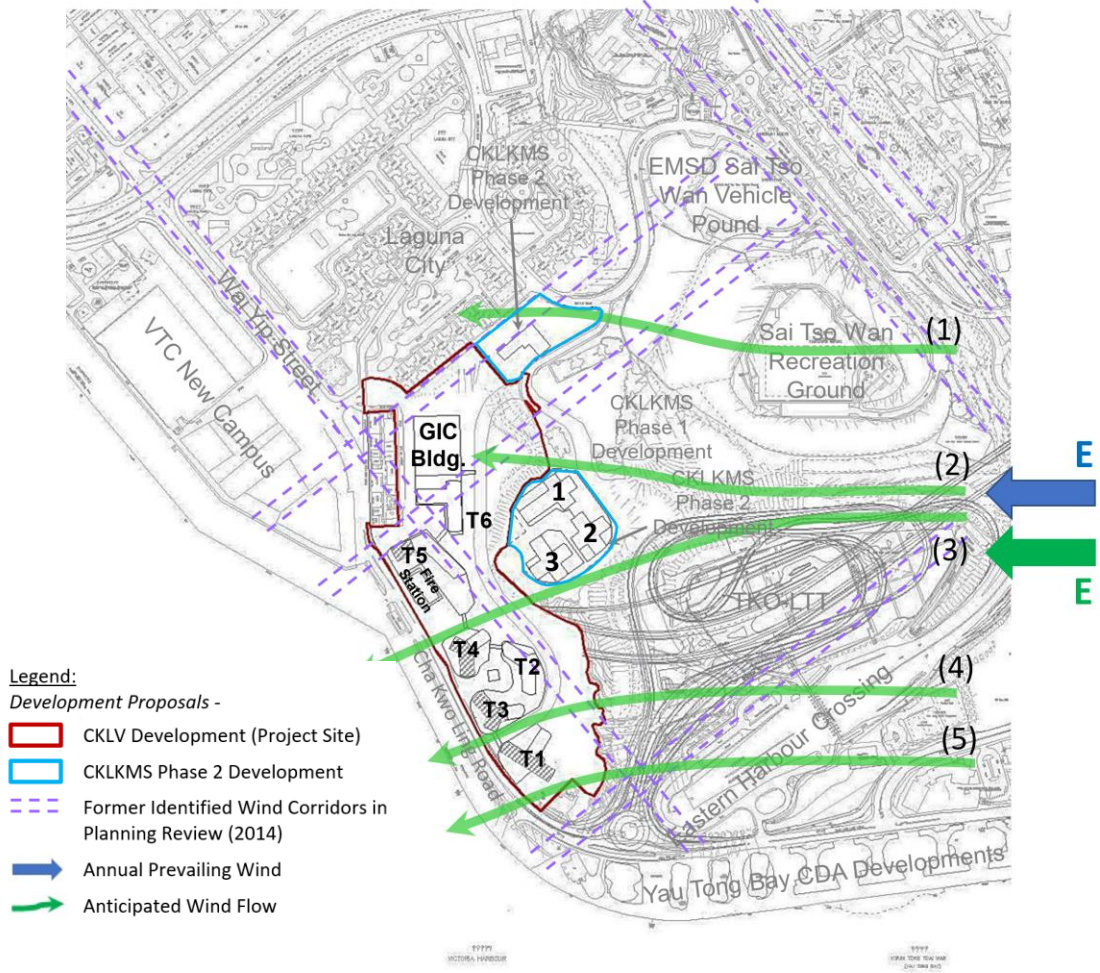
2 in **Figure 6.6**). Further enhancement on the building layout design of the proposed G/IC in perspective of air ventilation aspects are suggested to be explored in the future design stages.

6.4.8 The easterly prevailing wind from the south of the CKLKMS Phase 2 Development (see *Marker 3* in **Figure 6.6**) could penetrate the CKLV Development to the open sea areas via the building separation of at least 15m in width between Tower T4 and FSD site and also by skimming over/beneath the footbridges between podia of Tower T4 and Tower T5 in the central portion of the CKLV Development.

6.4.9 Since the planned TKO-LTT is relatively open, the easterly prevailing wind originated from that area (see *Marker 4* and *Marker 5* in **Figure 6.6**) would flow across the building gaps in between the Towers T1 and T3 and also via the sideways of Tower T1 at the southern portion of the CKLV Development and to the open sea areas without any obstruction.

6.4.10 With the adequate building disposition and building permeability design of the preliminary development layout, the easterly annual and summer prevailing wind across the Development Proposals and its surrounding wind environment is maximised and the air ventilation impacts due to two developments is minimised.

Figure 6.6 Wind flow under E annual & summer prevailing winds for Proposed Scenario



** Hatched area represents a lower BH of 110mPD while non-hatched area represents a higher BH of 130mPD within the Project Site*

6.5 Under ESE Annual and Summer Prevailing Wind

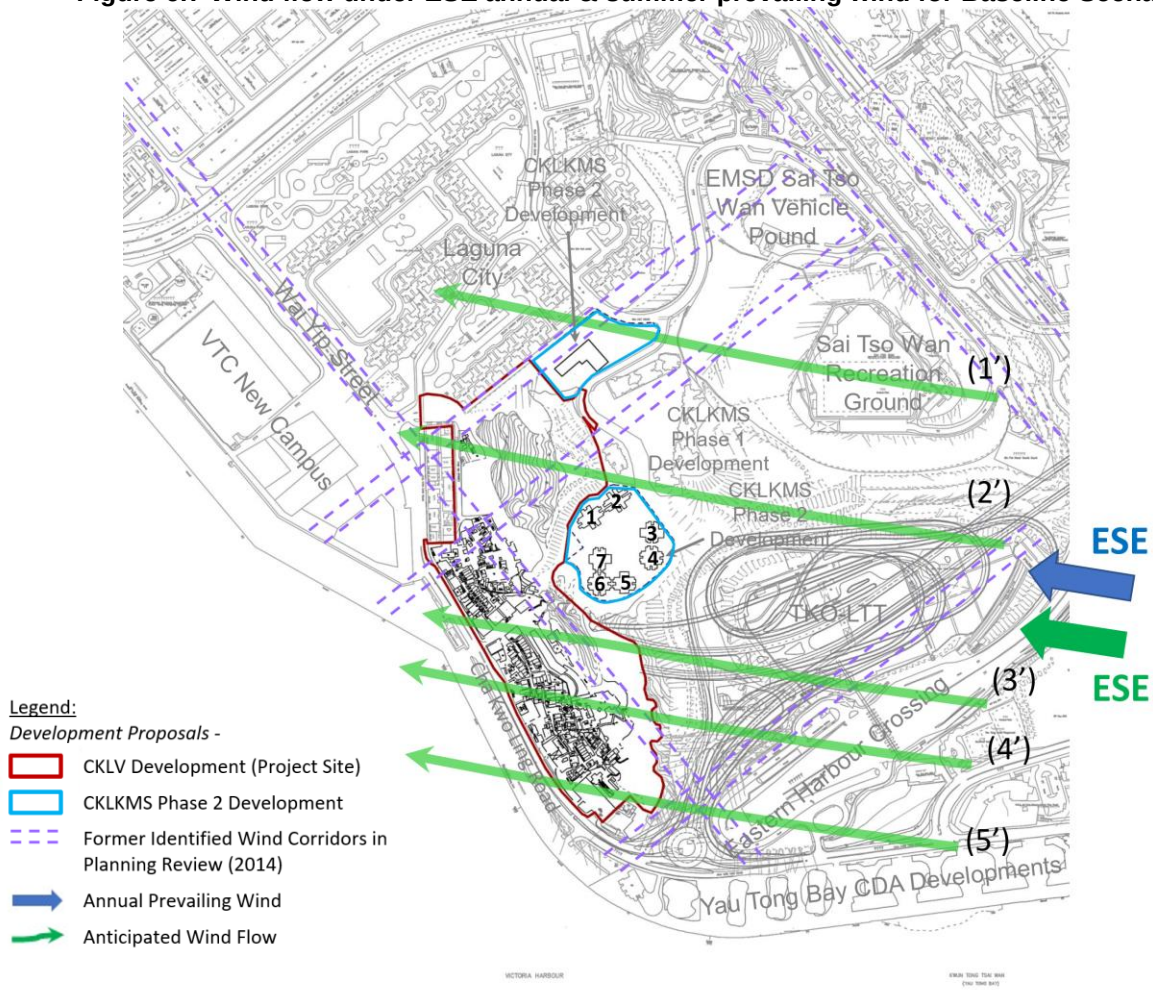
Potential Wind Wakes and Wind Sensitive Areas under the ESE Wind

6.5.1 The CKLV Development located at the downwind of the CKLKMS Phase 2 Development, Cha Kwo Ling Road, waterfront promenade of the planned VTC new campus and the open sea areas are considered as potential wind wake and sensitive areas under the ESE annual and summer prevailing wind.

Baseline Scenario

6.5.2 As shown in **Figure 6.7**, the ESE annual and summer prevailing wind originated from the Sai Tso Wan Recreation Ground is capable to reach the Laguna City without much obstruction via the sideway of the low-rise proposed school under the CKLKMS Phase 2 Development (see *Marker 1'* in **Figure 6.7**).

Figure 6.7 Wind flow under ESE annual & summer prevailing wind for Baseline Scenario



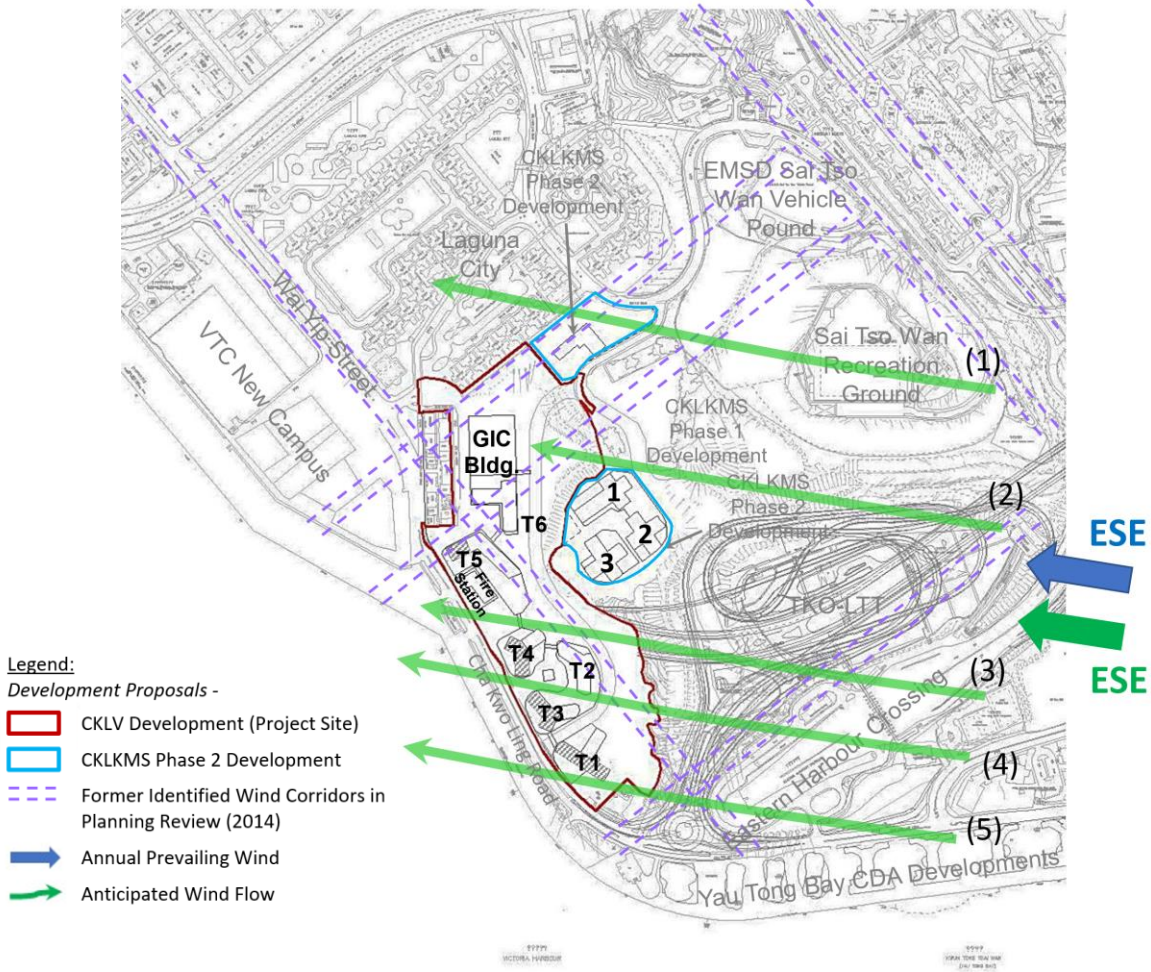
6.5.3 Wind environment at the VTC new campus is unlikely to be affected. A stream of ESE prevailing wind can flow through the gap between Block 2 of CKLKMS Phase 2 Development and the CKLKMS Phase 1 Development and reach the VTC new campus, benefiting the wind environment there (see *Marker 2'* in **Figure 6.7**).

6.5.4 As shown by *Markers 3', 4' and 5'* in **Figure 6.7**, these three streams of ESE prevailing wind can reach the Cha Kwo Ling Road and the open sea areas further downwind via the sideway of the CKLKMS Phase 2 Development without blockage after skimming over the low-rise squatters of CKLV Development. In view of the above, the wind environment at the Development Proposals and its surroundings would be satisfactory under the Baseline Scenario.

Proposed Scenario

6.5.5 Similar to the Baseline Scenario, without changes on school site layout, the Proposed Scenario would not limit the ESE annual and summer prevailing wind originated from the Sai Tso Wan Recreation Ground to reach the Laguna City without much obstruction via the sideway of the low-rise proposed school under the CKLKMS Phase 2 Development (see *Marker 1* in **Figure 6.8**).

Figure 6.8 Wind flow under ESE annual & summer prevailing wind for Proposed Scenario



** Hatched area represents a lower BH of 110mPD while non-hatched area represents a higher BH of 130mPD within the Project Site*

6.5.6 The proposed G/IC block under the Proposed Scenario would prevent the stream of ESE prevailing wind to reach the VTC New Campus and the open sea areas located downwind (see *Marker 2* in **Figure 6.8**). To facilitate the flow of ESE prevailing wind, good design measure such as inclusion of permeable elements into the design of the G/IC block should

be explored in future design stages.

6.5.7 With the consideration of the merits of the preliminary development layouts under the Proposed Scenario for CKLV Development including optimisation on the building height, building footprint and massing of the proposed fire station at FSD site near the waterfront area, provision of internal road in between the FSD site and the Tower T4 in housing site, provision of 5.1m heigh vertical clearance between the footbridge and internal road, and the building gap provision between building blocks at the housing site, streams of ESE prevailing wind (see *Markers 3 and 4* in **Figure 6.8**) could penetrate across the CKLV Development and maximise the air permeability of the Developments to reach the planned VTC new campus and the open sea areas.

6.5.8 By providing sufficient buffer distance and a smooth transition design from the housing block of Tower T1 to the Tin Hau Temple in the southern portion of CKLV Development, the southern ESE prevailing wind (see *Marker 5* in **Figure 6.8**) effectively skims over the low-rise structure of Tin Hau Temple and moves further west towards the downwind area to avoid blockage of wind.

6.5.9 In general, the wind environment at the identified potential wind sensitive areas and its surroundings would be maintained after the implementation of preliminary development layout under the ESE annual and summer prevailing wind.

6.6 Under SE Summer Prevailing Wind

Potential Wind Wakes and Wind Sensitive Areas under the SE Wind

6.6.1 The potential wind wakes and wind sensitive areas are the Laguna City and the planned VTC new campus. These areas need to have warrant attention in terms of air ventilation performance under the SE prevailing wind.

Baseline Scenario

6.6.2 The effective wind corridors under the SE prevailing wind as identified in Planning Review (2014) remain unobstructed under the Baseline Scenario, which include the corridor along the Lei Yue Mun Road Road (*Marker 1'* in **Figure 6.9**), Sin Fat Road (*Marker 2'* in **Figure 6.9**) and the elongation of the Wai Yip Street (*Marker 6'* in **Figure 6.9**).

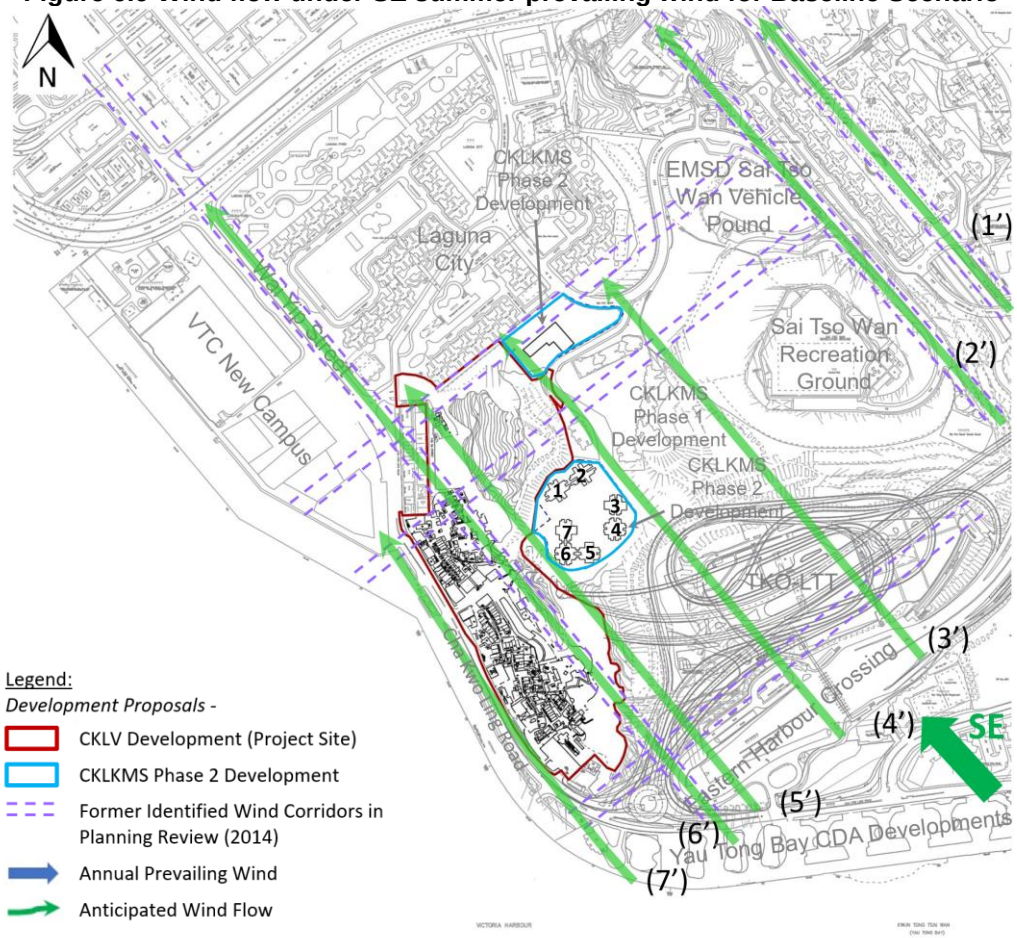
6.6.3 The Laguna City and the planned VTC campus are located at the downwind of the Development Proposals under the SE prevailing wind. The proposed low-rise school building is not likely to create observable wind impact to the Laguna City as the SE wind could skim over it and reach the Laguna City. In addition, SE wind can reach the Laguna City via the sideway of CKLKMS Phase 2 Development near the open spaces of Sai Tso Wan Recreation Ground and Sai Tso Wan Vehicle Pound (see *Marker 3'* in **Figure 6.9**).

6.6.4 *Markers 4' and 5'* in **Figure 6.9** illustrate two sideway streams of SE wind passing by CKLKMS Phase 2 Development, reaching the Laguna City. The SE wind in *Marker 4'* would flow via the building separations of the blocks at the CKLKMS Phase 1 Development along the access road under CKLKMS Phase 2 Development, then along the sideward of the proposed school site and continues its path towards the Laguna City. The other stream of SE wind would be directed towards low rise squatters, and then towards the Laguna City. The SE prevailing wind originated from the Yau Tong Bay CDA Developments will penetrate the CKLV Development and continue its flow along Wai Yip Street (see *Marker 6'* in **Figure 6.9**).

6.6.5 The sea wind under the SE wind direction would flow along the Cha Kwo Ling Road and reach the planned VTC new campus, benefiting the wind environment there (see *Marker 7'* in **Figure 6.9**).

6.6.6 In view of the above, the wind environment at the identified wind sensitive areas (i.e. the planned VTC new campus and the Laguna City) would not greatly decline, as SE prevailing wind can reach these areas without obstruction.

Figure 6.9 Wind flow under SE summer prevailing wind for Baseline Scenario



Proposed Scenario

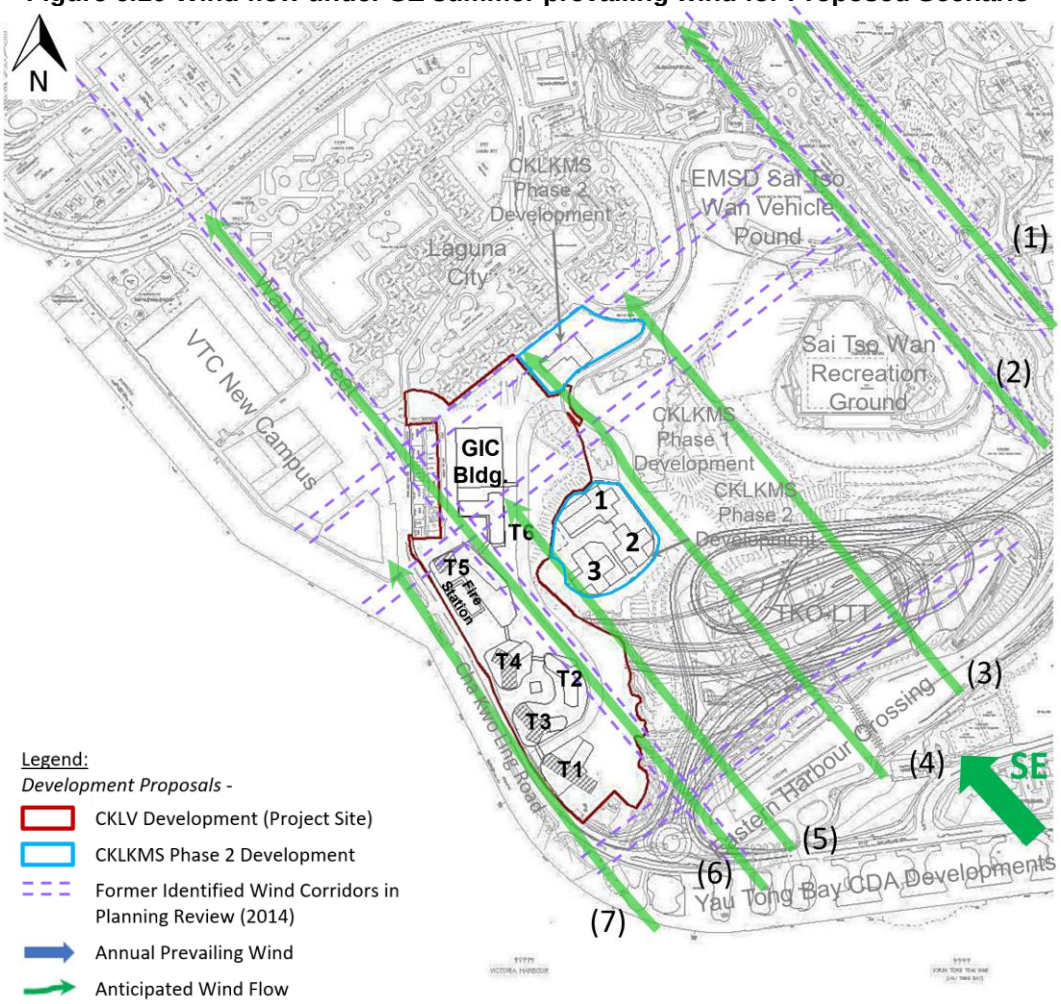
6.6.7 By avoidance of bulky podium design and provision of minimum 25m building separations among the high-rise residential buildings in planned YTB CDA, complete blockage of SE prevailing wind by these high-rises could be avoided which aids the SE prevailing wind to reach the area of Development Proposals and its further downwind areas.

6.6.8 As discussed in **Section 5.1.4**, three southeast–northwest aligning wind corridors were identified in the Planning Review (2014). For the effective identified wind corridors that along the Lei Yue Mun Road (*Marker 1* in **Figure 6.10**) and the Sin Fat Road (*Marker 2* in **Figure 6.10**), due to their far location from the Development Proposals, there is no direct local influence on the wind environment at and near the Development Proposals area.

6.6.9 The well-considered building disposition and orientation of Towers T2 and T5, although slightly alters the westmost NW-SE wind corridor elongating the Wai Yip Street (*Marker 6* in **Figure 6.10**) flowing across the CKLV Development, it is roughly retained into the CKLV building layout design by HKHS. South easterly wind is still able to flow towards the Wai Yip Street after penetrating the Project Site which would create benefit to the wind environment within the CKLV and promote the air ventilation performance at the surroundings of Laguna City and the planned VTC new campus.

6.6.10 The Laguna City and the planned VTC new campus are located at the downwind of the Development Proposals under the SE prevailing wind. The SE wind could penetrate towards the Laguna City via the building separations of CKLKMS Phase 1 Development, along the sideway of the proposed school site under the CKLKMS Phase 2 Development and reach the Laguna City. (*Markers 3 and 4* in **Figure 6.1010**).

Figure 6.10 Wind flow under SE summer prevailing wind for Proposed Scenario



** Hatched area represents a lower BH of 110mPD while non-hatched area represents a higher BH of 130mPD within the Project Site*

6.6.11 The sideway stream of SE prevailing wind passing by CKLKMS Phase 2 Development, reaching the Laguna City under the Baseline Scenario as illustrated by *Marker 5'* in **Figure 6.8** is anticipated to be obstructed by the proposed G/IC building block under the Proposed Scenario (see *Marker 5* in **Figure 6.10**). Good design measures such as inclusion of permeable elements into the design of the G/IC block should be considered.

6.6.12 The sea wind under the SE prevailing wind direction would flow along the Cha Kwo Ling Road and reach the planned VTC new campus at downwind area which benefiting the wind environment there (see *Marker 7* in **Figure 6.1010**).

6.6.13 It is inevitable that there would be stronger influence on the wind environment under the Proposed Scenario due to the increased in bulkiness and building heights of the proposed buildings when compared to the Baseline Scenario. In order to alleviate the potential wind impacts, the proposed building blocks within the CKLV Development are placed with short frontages facing the SE prevailing wind as far as practical, this would reduce the air ventilation impacts to the downwind areas and avoid blockage of wind corridors. The retained wind corridors would then help to break down the wind wakes and mitigate the wind influence at the downwind areas.

6.7 Under SW Summer Prevailing Wind

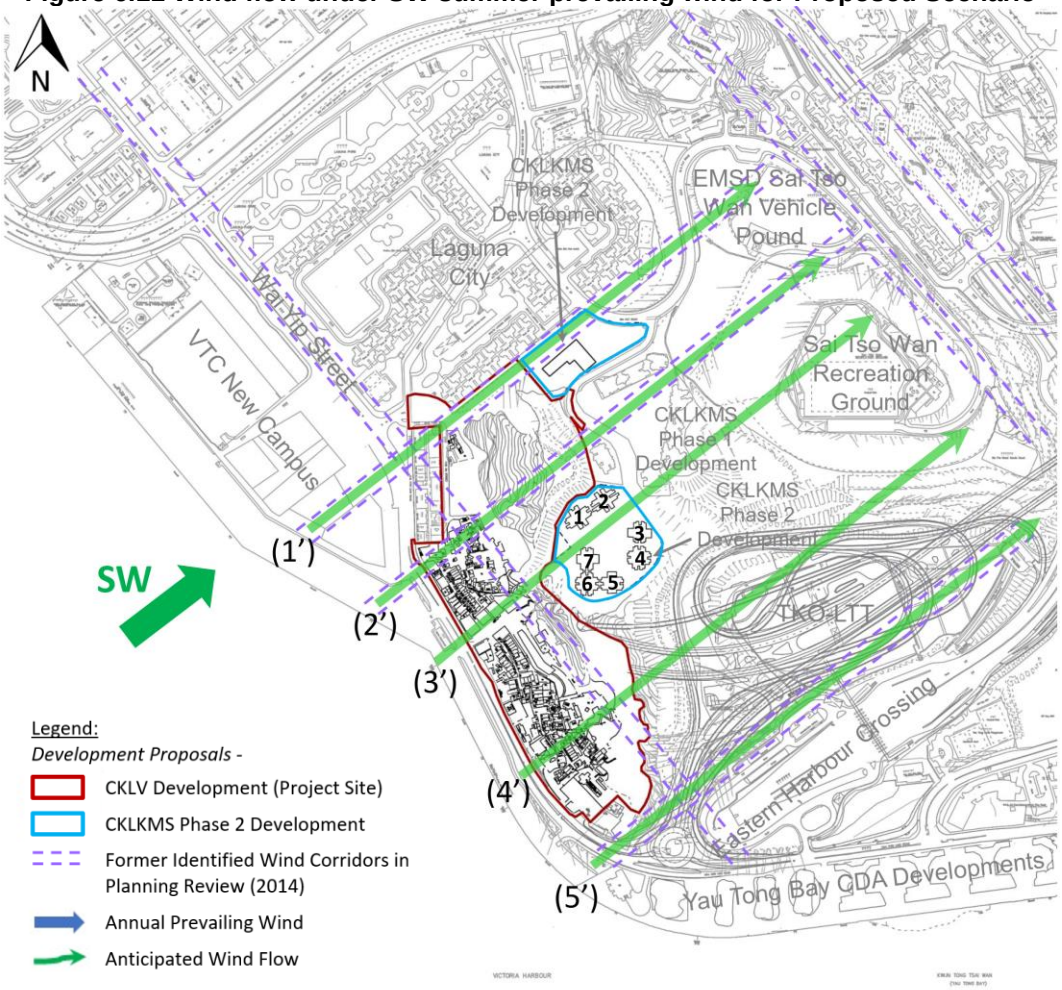
Potential Wind Wakes and Wind Sensitive Areas under the SW Wind

6.7.1 The potential wind wakes and wind sensitive areas under the SW wind are the CKLKMS Phase 1 Development, the EMSD Sai Tso Wan Vehicle Pound and Sai Tso Wan Recreation Ground, in which these places are located at the downstream areas.

Baseline Scenario

6.7.2 The south westerly sea wind would skim over the existing low-rise squatters at the Cha Kwo Ling Village site and then across the CKLKMS Phase 1 Development via the building separations and retained air paths towards the inland areas of Sai Tso Wan Vehicle Pound and the Sai Tso Wan Recreation Ground. Meanwhile, the airpath reserved between the proposed school site under the CKLKMS Phase 2 Development and Laguna City also allows south-westerly wind to reach the area north to Sai Tso Wan Recreation Ground. The above discussed summer season wind movements under the Baseline Scenario can be referred to *Markers 1' and 2'* in **Figure 6.11**.

Figure 6.11 Wind flow under SW summer prevailing wind for Proposed Scenario



6.7.3 The SW prevailing wind could skim over the existing low-rise squatters within the CKLV Development and reach the CKLKMS Phase 1 and Phase 2 Developments without much obstruction under the Baseline Scenario. Hence, the wind wakes would mainly be generated by the proposed buildings of the CKLKMS Developments. While the wind wakes induced by these proposed buildings within the CKLKMS Phase 2 Development may reach the planned residential buildings CKLKMS Phase 1 Development, regions such as Sai Tso Wan

Recreation Ground are unlikely to be affected due to its far away distance (~200m). Furthermore, with well-planned building orientation of Blocks 1 and 2 of CKLKMS Phase 2 Developments, a shorter building frontage facing the SW wind is provided which could minimise the blockage of SW wind. In addition, the building separation between Blocks 1/7 and Blocks 2/3 of CKLKMS Phase 2 Development would allow the south-westerly wind to flow via the CKLKMS Phase 2 Development and reach the inland areas (see *Marker 3'* in **Figure 6.11**).

6.7.4 The SW sea wind can also reach the inland areas by flowing along the unobstructed wind corridors along southern portion of CKLV boundary and its adjacent open area (see *Markers 4' and 5'* in **Figure 6.11**). Furthermore, the proposed buildings within CKLKMS Phase 2 Development are located at a higher platform level at +32mPD as compared to the low-rise squatters (average ground level at ~+4mPD) within the Cha Kwo Ling Village site. Therefore, the south westerly sea wind is anticipated to reach the CKLKMS Phase 1 and Phase 2 Developments, resulting in a relatively good local wind environment under the existing situation.

Proposed Scenario

6.7.5 The south westerly sea wind would flow along the three major northeast-southwest aligning wind corridors that were identified in Planning Review (2014) (*Markers 1, 2 and 5* in **Figure 6.12**) towards the inland areas of Sai Tso Wan Vehicle Pound and the Sai Tso Wan Recreation Ground. It should be pointed out the urban window design of Tower T6 slightly altered the alignment and orientation of the NE-SW wind corridor, formerly identified in the Planning Review 2014. Despite the slight alteration, the SW prevailing wind is still capable to reach the inland areas of Sai Tso Wan Vehicle Pound and the Sai Tso Wan Recreation Ground. Furthermore, the incorporation the urban window in the design of the Tower T6 at the northern portion of the CKLV Development will facilitate the wind penetration and avoid blockage due to the Developments to adjacent planned developments.

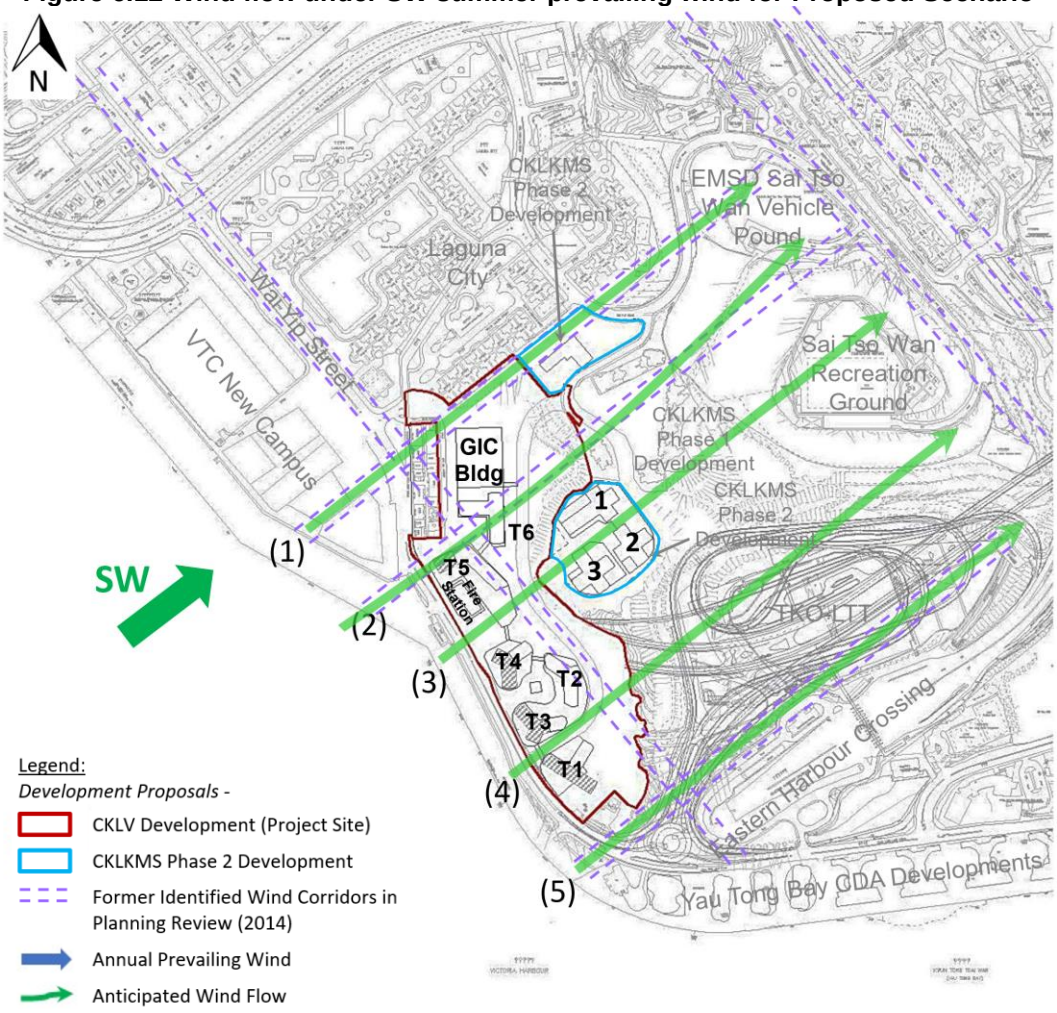
6.7.6 The air flow driven under the SW prevailing wind would approach the CKLV Development via the open sea areas to the west of Cha Kwo Ling Road. The SW sea wind would flow via the sideway of the proposed FSD site (i.e. the internal road of the housing site) at the central portion of the CKLV Development after skimming over the low-rise podium beneath Tower T5 and reach the CKLKMS Phase 2 Development on hill and flow effectively further into the inland areas through the building gaps in between the housing blocks at CKLKMS Phase 2 Development (*Marker 3* in **Figure 6.12**).

6.7.7 The SW sea wind can also reach the inland open areas by flowing via the building gaps between the Towers T1 and T3 along the new vehicular access road at the southern portion of the CKLV Development (see *Marker 4* in **Figure 6.12**).

6.7.8 Variation in building heights is incorporated into the designs of Towers T1, T3, T4 and T5, with lower building height of 110mPD for the portions facing the seafront and a higher building height of 130mPD for the inland portions. With consideration of the ascending building height of CKLKMS Development (BH increases from +135mPD to +140mPD). This good design feature would not only improve visual perception, it would also promote vertical air movements under the south western quadrant prevailing wind and maintain the wind environment at regions among the Development Proposals.

6.7.9 Furthermore, the proposed buildings of the CKLKMS Phase 2 Development are located at higher platform level of +32mPD as compared with those proposed buildings (with lowest site formation level of +4mPD) within the CKLV Development. This would create stepped height profile, resulting in downwash wind and vertical air movements at regions among the Development Proposals, enhancing the local wind environment. Based on the above analysis, the summer air ventilation performance at and near the Development Proposals under the SW summer prevailing wind should be maintained as compared to the Baseline Scenario.

Figure 6.12 Wind flow under SW summer prevailing wind for Proposed Scenario



** Hatched area represents a lower BH of 110mPD while non-hatched area represents a higher BH of 130mPD within the Project Site*

6.8 Under WSW Summer Prevailing Wind

Potential Wind Wakes and Wind Sensitive Areas under the WSW Wind

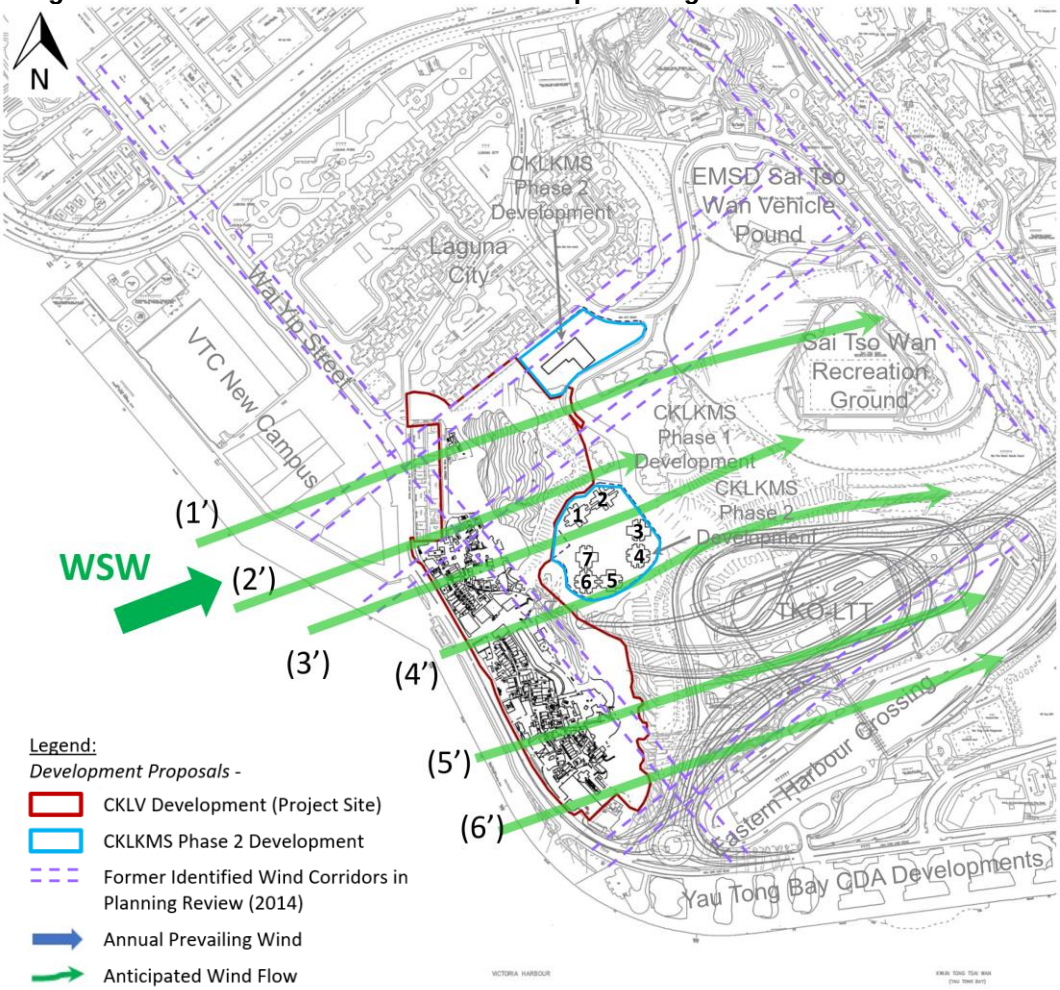
6.8.1 Similar to that under the SW wind, the potential wind wakes and wind sensitive areas under the WSW wind are the CKLKMS Phase 1 Development, the EMSD Sai Tso Wan Vehicle Pound and Sai Tso Wan Recreation Ground.

Baseline Scenario

6.8.2 The WSW prevailing wind can reach the inland areas from the sidewards of CKLKMS Phase 2 Development. One of the streams would skim over the gaps between the building structures of the planned VTC campus, low-rise squatter structures at CKLV Development and continue its pathway to the CKLKMS Phase 1 Development and reach the Sai Tso Wan Recreation Ground (see *Marker 1'* in **Figure 6.13**). The other three streams would skim over the existing low-rise squatters at the southern portion of the CKLV Development and reach further inland areas (see *Markers 4'-6'* in **Figure 6.13**).

6.8.3 With the current low-rise squatters situated within the CKLV Development, the WSW wind can easily skim over the squatter area and reach the CKLKMS Phase 1 and Phase 2 Developments without major blockage. One of the streams of WSW prevailing wind would flow through the Cha Kwo Ling Village squatter area and reach CKLKMS Phase 1 Development, which enhancing the local wind environment there (see *Marker 2'* in **Figure 6.13**).

Figure 6.13 Wind flow under WSW summer prevailing wind for Baseline Scenario



6.8.4 While the other stream of wind reaching the CKLKMS Phase 2 Development would continue its flow path via the building separations between Blocks 1/7 and Blocks 2/3 of CKLKMS Phase 2 Development and reach further inland areas of Sai Tso Wan Recreation Ground (see *Marker 3'* in **Figure 6.13**).

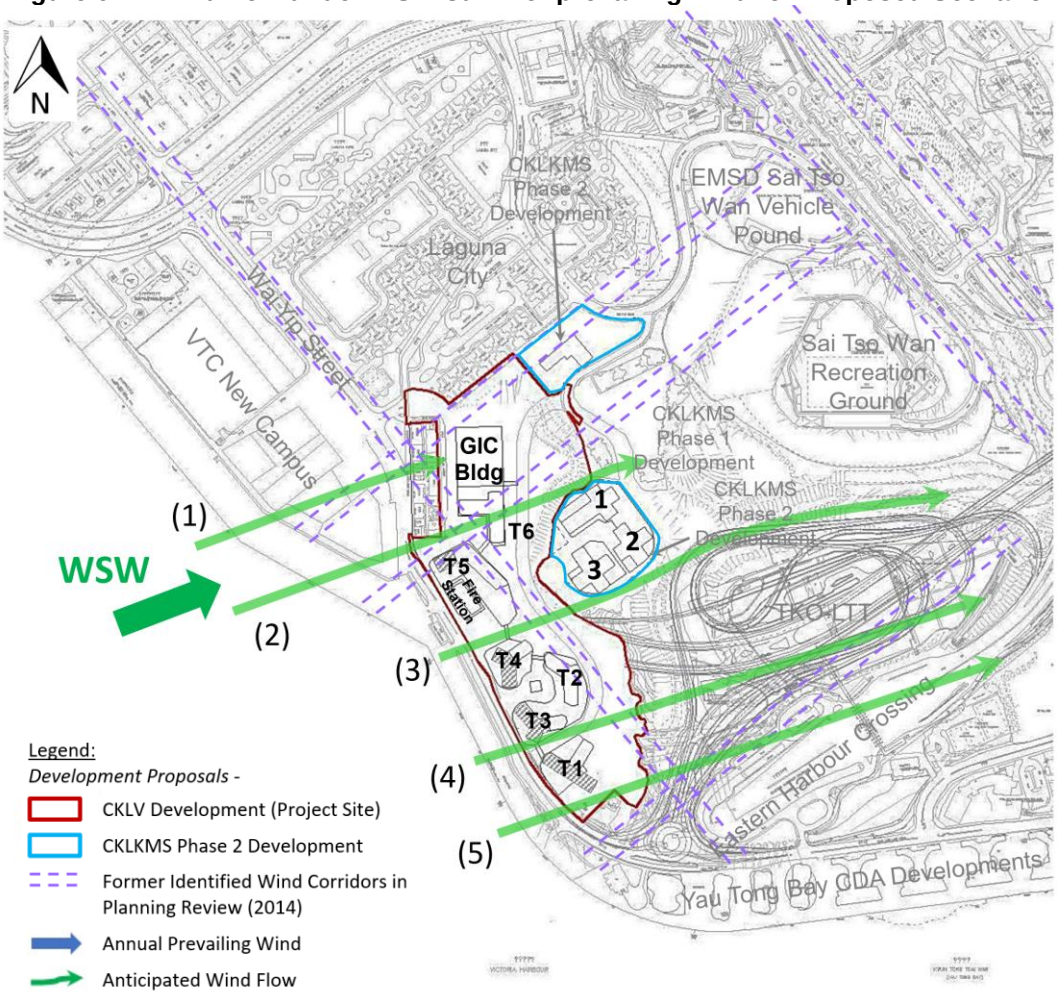
Proposed Scenario

6.8.5 The proposed G/IC building may block the WSW prevailing wind from the sea (see *Marker 1* in **Figure 6.14**) and induce downwash which may enhance the vertical air movement by reattaching the wind at pedestrian level of CKLV Development but limit the WSW prevailing wind from the sea to reach the ex-CKLKMS Phase 1 Development and the further inland areas, implying incorporation of permeable elements into the design of the G/IC building should be further considered.

6.8.6 The provision of urban window at the Tower T6 at housing site of the CKLV Development would maximise the WSW prevailing wind flowing from the waterfront promenade of the planned VTC new campus across the CKLV Development and then towards the CKLKMS Phase 1 Development and maintain the local wind permeability (see *Marker 2* in **Figure 6.14 14**).

6.8.7 The stream of wind flow (*Marker 3* in **Figure 6.14**) under the Baseline Scenario would disappear in the Proposed Scenario due to the proposed FSD facilities and the Tower T5 at housing site within the CKLV Development. In addition to the difference in building layouts of the CKLKMS Phase 2 development, all of the above factors would shelter and redirect the path of WSW wind flow under the Proposed Scenario that originally appears under the Baseline Scenario.

Figure 6.14 Wind flow under WSW summer prevailing wind for Proposed Scenario



** Hatched area represents a lower BH of 110mPD while non-hatched area represents a higher BH of 130mPD within the Project Site*

6.8.8 Taking advantage of the provision of building separations among the building blocks in the CKLV and CKLKMS Developments, the WSW prevailing wind (*Markers 3, 4 and 5* in **Figure 6.14**) could penetrate the central and southern portions of the CKLV Development effectively towards the inland areas.

6.8.9 Similar to the SW wind, stepped building height concept incorporated into the designs of housing blocks would not only improve visual perception, it would also promote vertical air movements under the WSW prevailing wind and maintain the wind environment at regions among the Development Proposals.

6.8.10 In addition, the variation in building heights between CKLV Development (with platform level at ~+4 to +8mPD) and CKLKMS Phase 2 Development (with platform level at +32mPD) due to the variation in geographical terrains would result in vertical air movements under the WSW prevailing wind, enhancing the local site wind environment at areas within the Development Proposals. Similar to the SW prevailing wind, summer wind environment at and near the Project Site under the WSW prevailing wind should be maintained.

6.9 Summary of Evaluation

6.9.1 Based on the wind directional analysis of the major prevailing wind reaching the Development Proposals, the site setting of CKLV and CKLKMS under the *Baseline Scenario* would facilitate the wind penetrating through two developments and reach the inland areas when comparing with site setting under the *Proposed Scenario*.

6.9.2 However, great efforts have been carried out on the building design, building disposition, orientation to maintain the former identified wind corridors within the area of the Development Proposals. As a result, the broad wind flow patterns of the *Proposed Scenario* will be generally similar to that of the *Baseline Scenario* even with the implementation of the public housing developments. Moreover, with good air ventilation design measures incorporated into the proposed building designs, it can be ensured that the prevailing wind could reach the identified potential wind wake areas and wind sensitive areas, so as to alleviate the potential air ventilation impacts there. With all the design measures taken, it is envisaged that the wind environment could be maintained after the development of the *Proposed Scenario*.

7 RECOMMENDATIONS FOR PRELIMINARY DEVELOPMENT LAYOUT

7.1.1 Comparing to the existing/ planned condition of low-rise squatter area within the CKLV Development and CKLKMS Phase 2 Development, the proposed development for the public housing development with high-rise residential buildings and supporting G/IC facilities would inevitably impose a certain magnitude of blockage in wind flow through the area, moderate the wind environment and affect the wind availability at downstream area under both annual and summer prevailing winds. Based on the discussion in **Section 4** above, the preliminary development layout for two public housing developments have incorporated several good design measures in terms of air ventilation performance and is unlikely to cause observable declination of the surrounding wind environment, these good design measures are briefly listed below:

CKLV Development

- The former identified wind corridors in Planning Review (2014) aligning in prevailing wind directions are maintained under the preliminary development layout;
- A large permeable opening is created at lower floor of Tower T6 at the housing site;
- Site coverage of the podia in remaining towers are minimised as far as possible to allow more open space at grade;
- Adequate building separation distances with not less than 15 meters in width are incorporated in building design;
- Optimization the site coverage and building orientation/ layout of proposed FSD Site with reference to latest planned FSD facilities to reduce the footprint and building massing;
- Provision of adequate vertical clearance headroom of 5.1m for the footbridges above ground among the housing sites;
- Stepped building height concept is adopted at housing site with consideration of adjacent existing/ planned developments; and
- Adequate setback distance from the adjacent existing/ planned developments is provided.

CKLKMS Development

- The former identified wind corridors in Planning Review (2014) aligning in prevailing wind directions are maintained;
- Adequate building separation distances with not less than 15 meters in width are incorporated in building design; and
- Provision of podium garden with approximately 4m height to allow better air ventilation at podium level.

Also, stepping building height profile is introduced in the overall Development Proposals to strengthen vertical air movement, divert the winds to lower level and enhance the pedestrian level wind environment.

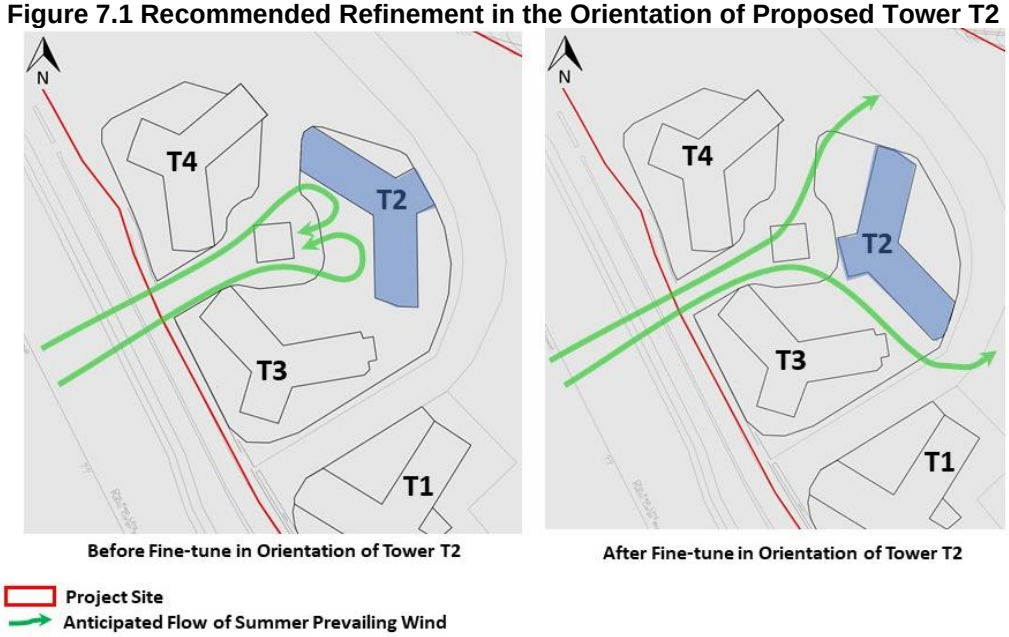
7.1.2 On top of the current good design measures, in order to maximise the penetration of SE and ENE prevailing winds across the Developments towards the planned VTC new campus and open sea areas, urban window at facades facing wind direction of Tower T5 at CKLV housing site may be considered without compromising the development potential at the detailed design stage.

7.1.3 In addition, provision of higher permeability of building masses can be achieved by providing a semi-enclosed permeable PTI at pedestrian level of G/IC building. The PTI with structural form of column-beam structure is proposed so that the PTI would not be fully enclosed to act as a permeable element to allow any prevailing wind penetration through the G/IC site.

7.1.4 It is observed the current separation distance between the proposed G/IC building and Tower T6 is approximately 7.5m under the Proposed Scenario. If considered feasible, it is recommended to increase the building separation distance to at least 15m, aiming to facilitate the penetration of the prevailing wind.

7.1.5 The orientation of the Tower T2 at housing site under CKLV Development can be refined as shown in **Figure 7.1** if feasible. The minor change is anticipated to reduce wind trapping and result in better flow of the summer sea wind to reach the inland areas as compared to the current design scheme. The suggested refinement in the orientation of proposed Tower T2 will be further studied at the detailed design stage.

Figure 7.1 Recommended Refinement in the Orientation of Proposed Tower T2



7.1.6 Despite that air ventilation would not become a major concern for the CKLV Development and CKLKMS Phase 2 Development, Sustainable Building and Design (SBD) Guidelines from the building level design perspective and Hong Kong Planning Standards and Guidelines (HKPSG) from the district wise planning perspective should always be referenced in refining the development layout.

7.1.7 The SBD Guidelines is an administrative means to promote sustainable building design by granting gross floor area (GFA) concessions with a view to contributing to a better built environment. In air ventilation perspective, SBD Guidelines aims to enhance building permeability in avoiding screen wall effect and to promote air movements amongst developments to enhance better dispersion and air mixing.

7.1.8 Several principles for planning have been listed out in the Chapter 11 of the HKPSG and one of the most important principles is the alignments of breezeways and / or air paths in prevailing wind directions, accompanied by perpendicular insertion of air paths. This would promote wind penetration through urbanized areas. Breezeways could be achieved by connecting major roads, open spaces, amenity areas, non-building areas (NBAs), building setbacks and low-rise building corridors.

7.1.9 Other than the specific mitigation measures proposed above, if feasible, several general recommendations are also suggested to be taken into consideration in detailed design stages of the CKLV Development, which are listed as follows:

- Avoid long continuous façades of building clusters;
- Greenery (preferably tree planting at grade) covering no less than 30% within the Development Proposals and;

- Refer to the recommendations of design measures in the HKPSG and SBD Guidelines.

8 SUMMARY AND CONCLUSION

8.1.1 The AVA-Expert Evaluation has compared the wind flow patterns between a *Baseline Scenario* reflecting the existing condition of CKLV, OZP-compliant scheme of CKLKMS Phase 2, and existing and/or planned/committed conditions of their surroundings; and a *Proposed Scenario* incorporating the proposals for CKLV and the intensified scheme of CKLKMS Phase 2 The potential cumulative air ventilation impacts induced collectively by both Development Proposals have been assessed in the AVA-Expert Evaluation. The assessment findings and recommends on development layout discussed in this section are applicable to both development sites of CKLV and CKLKMS.

8.1.2 The Development Proposals are situated at the southwest hillslope of a small knoll and facing the open sea of Kowloon Bay. The annual prevailing wind towards the CKLV Development, CKLKMS Phase 2 Development and vicinity areas are mainly from NE, E, ENE and ESE directions. While the summer prevailing wind include wind from E, ESE, SE, SW and WSW directions.

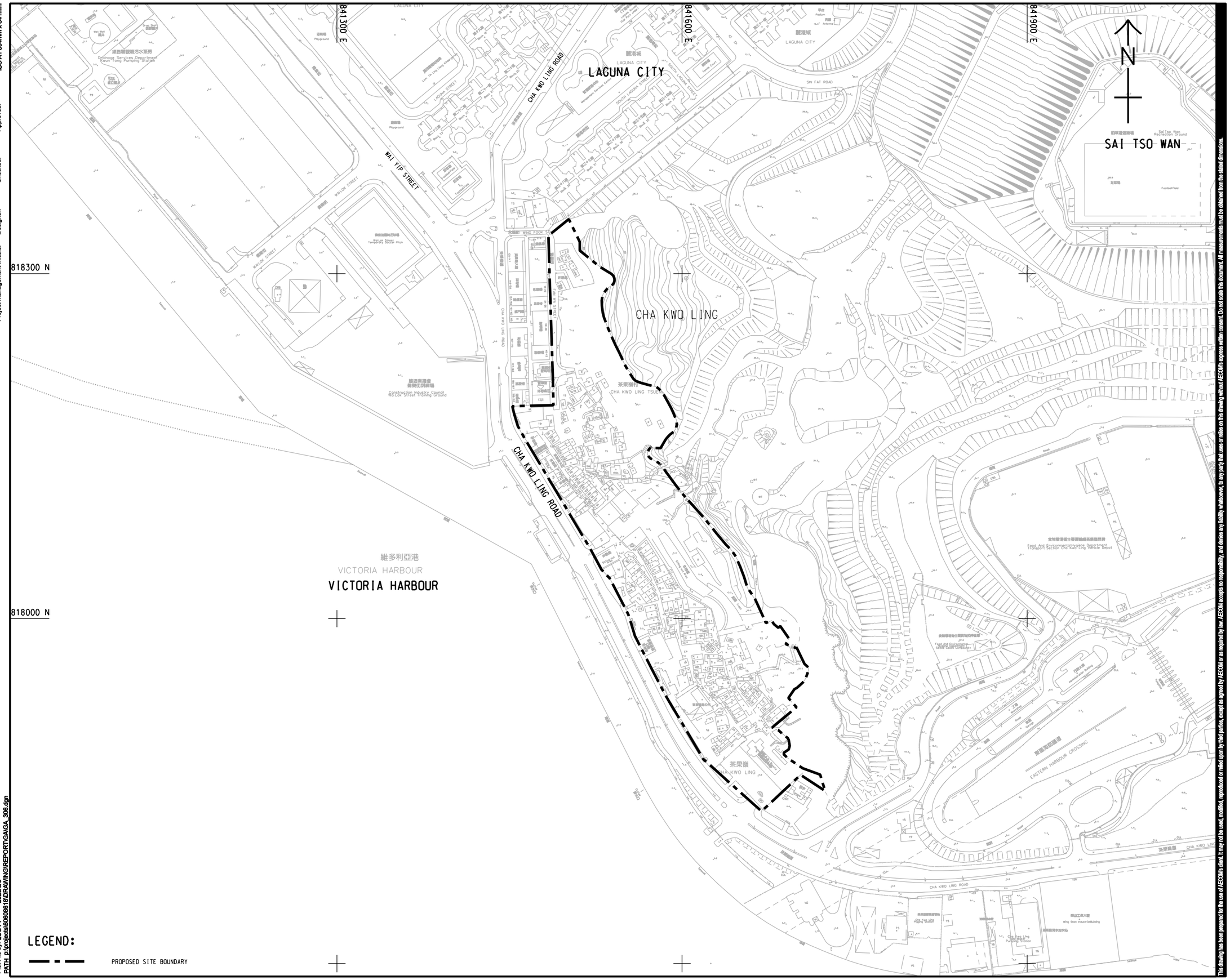
8.1.3 The proposed development for public housing development with high-rise residential buildings and supporting G/IC facilities would inevitably impose a certain magnitude of blockage in wind flow through the area, moderate the wind environment and affect the wind availability at downstream area under bother annual and summer prevailing winds. With implementation of mitigation measures including building separations, podium gardens and urban window of no less than 20m in width, the preliminary development layout is capable to maintain the wind environment as compared to the existing and planned condition. Additional good design measures on the layout have been recommended to be further reviewed and examined in next stage in order to enhance the surrounding wind environment as far as practicable. These measures include the provision of permeable design elements, increase the separation distances between proposed buildings, a more observable variation in building height profiles and fine tuning the building orientation.

8.1.4 The preliminary development layout is expected to induce wind influence zone reaching the downstream direction, which would reach the open sea areas, the planned VTC new campus and the CKLKMS Phase 1 Development under the easterly prevailing wind (i.e. NE, ENE, E, ESE annual/ summer prevailing wind), south easterly prevailing wind (SE summer wind) and south-westerly prevailing wind (i.e. SW and WSW summer winds) respectively. However, given the placement of the proposed housing towers, which reserved/ retained air paths to allow both the annual prevailing winds and summer prevailing wind to penetrate through the Development Proposals, limited blockage of wind is anticipated due to the Development Proposals. Furthermore, the proposed building disposition have generally avoided encroaching onto the wind corridors, which have been identified in the "*Working Paper 4 (Final Report) of the Planning Review on Development of Ex-Cha Kwo Ling Kaolin Mine Site in 2014 (Quotation Ref. PLNQ 21/2011)"* ("Planning Review (2014)"). These wind corridors have generally been retained and unobstructed. This would also facilitate in maintaining the wind environment at/ in the vicinity of the Development Proposals.

8.1.5 In view of the above and with air ventilation good design measures being incorporated and implemented, the proposed development layout would unlikely to have any insurmountable adverse air ventilation effects to the surroundings. However, to further enhance the surrounding wind environment, quantitative AVA may be conducted as appropriate at detailed design stage to ascertain the air ventilation impacts of the future developments to help refine the design for scheme optimisation.

8.1.6 It should be noted that this qualitative air ventilation assessment by Expert Evaluation is based on the preliminary formulation of public housing block layout, fire station and G/IC building at the CKLV Development which is subjected to change in the proposed design building morphologies provided by HKHS and relevant government departments.

Figures



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Designer:

Project Management Initials:

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項目

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR PROPOSED PUBLIC HOUSING DEVELOPMENTS AT KOWLOON EAST – FEASIBILITY STUDY

CLIENT
業主

土木工程拓展署
Civil Engineering and Development Department

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I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核實

STATUS
用途

SCALE 比例
A3 1 : 3000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60608618

AGREEMENT NO. 協議編號
CE 60/2018 (CE)

SHEET TITLE
圖紙名稱

SITE LOCATION PLAN

SHEET NUMBER
圖紙編號

60608618/AVA/FIGURE 1.1

ISO A1 594mm x 841mm

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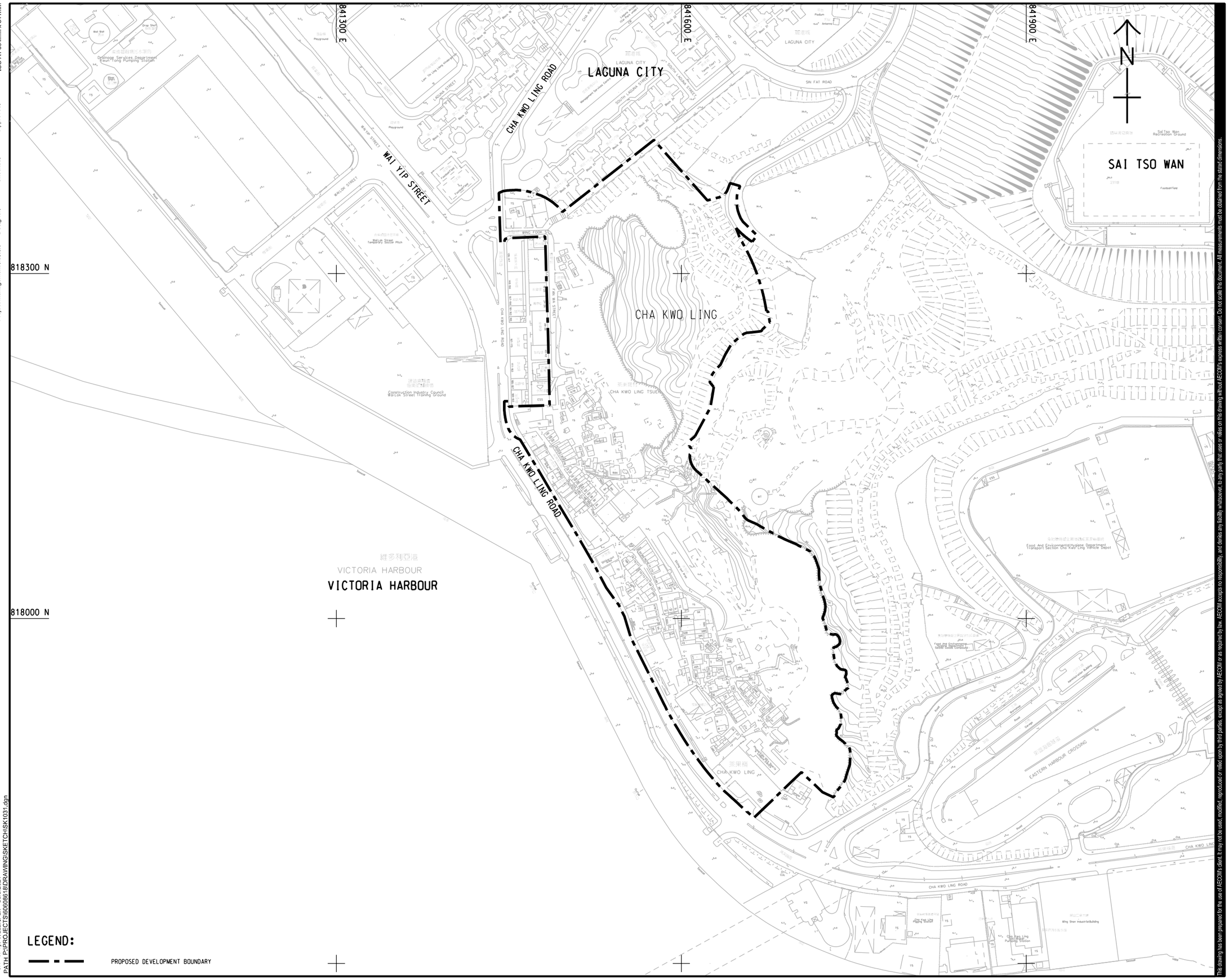

LEGEND:

PROPOSED DEVELOPMENT BOUNDARY

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STATUS
階段

SCALE 比例: A1 1 : 3000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60608618

AGREEMENT NO. 合約編號: CE 60/2018 (CE)

SHEET TITLE
圖紙名稱

REVISED SITE BOUNDARY

SHEET NUMBER
圖紙編號

60608618/AVA/FIGURE 1.2

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

841300 E

841600 E

841600 E

818300 N

818000 N

LAGUNA CITY

CHA KWO LING ROAD

WAI YIP STREET

WALOK STREET

SAI TSO WAN

SCHOOL SITE OF CKLKMS PHASE 2 DEVELOPMENT

SCHOOL SITE OF CKLKMS PHASE 2 DEVELOPMENT

CHA KWO LING

CHA KWO LING ROAD

維多利亞港

VICTORIA HARBOUR

VICTORIA HARBOUR

TSEUNG KWUN O - LAM TIN TUNNEL MAIN TUNNEL AND ASSOCIATED WORKS (BY OTHERS)

EASTERN HARBOUR CROSSING

CHA KWO LING ROAD

LEGEND:

PROPOSED DEVELOPMNET BOUDNARY FOR CKLV DEVELOPMENT

CKLKMS PHASE 2 DEVELOPMENT

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STATUS
地位

SCALE 比例
A3 1 : 3000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60608618

AGREEMENT NO. 合約編號
CE 60/2018 (CE)

SHEET TITLE
圖紙名稱

LOCATION OF DEVELOPMENT PROPOSALS

SHEET NUMBER
圖紙編號

60608618/AVA/FIGURE 4.1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

841300 E

841600 E

841600 E

LAGUNA CITY

CHA KWO LING ROAD

WAI YIP STREET

SAI TSO WAN

N

818300 N

818000 N

DEVELOPMENTS OF EX-CHA KWO LING KAOLIN MINE (EX-CKLKM) SITE (BY OTHERS)

GIC BUILDING +70.0

CHA KWO LING

TOWER T6 +130.0

TOWER T5 +110.0

TOWER T5 +130.0

+52.0

TOWER T4 +130.0

TOWER T4 +110.0

TOWER T2 +130.0

TOWER T3 +110.0

TOWER T3 +130.0

TOWER T1 +130.0

TOWER T1 +110.0

維多利亞港

VICTORIA HARBOUR

VICTORIA HARBOUR

SITE F & G OF HOUSING SITE

SITE E OF HOUSING SITE

EASTERN HARBOUR CROSSING

TSEUNG KWUN O - LAM TIN TUNNEL MAIN TUNNEL AND ASSOCIATED WORKS (BY OTHERS)

NOTE:

1. DEVELOPMENT LAYOUT IS TENTATIVE ONLY WHICH IS SUBJECT TO REVIEW AT DESIGN STAGE.

LEGEND:

- PROPOSED DEVELOPMENT BOUNDARY
- PROPOSED HOUSING SITE (SIX TOWERS)
- PROPOSED G/IC BUILDING
- PROPOSED STANDARD SUB-DIVISIONAL FIRE STATION CUM AMBULANCE DEPOT
- WIDENING AND REALIGNMENT OF WING FOOK STREET AND FAN WA STREET
- PROPOSED FOOTPATH
- EXISTING REFUSE COLLECTION POINT (PRESERVED IN-SITU)
- PROPOSED VEHICULAR ACCESS ROAD
- LAW MANSION (PRESERVED IN-SITU)
- REPROVISION OF EXISTING STAIRCASE
- PROPOSED SLOPE FORMATION WORKS
- PROPOSED SLOPE MODIFICATION WORKS
- PROPOSED ROADSIDE VERGE GREENING WORKS
- EXISTING CROSSING
- PROPOSED FOOTBRIDGE
- PROPOSED RETAINING WALL

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I/R 修訂	DATE 日期	DESCRIPTION 內容簡要	CHK. 核對

STATUS
階段

SCALE 比例: A3 1 : 3000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60608618

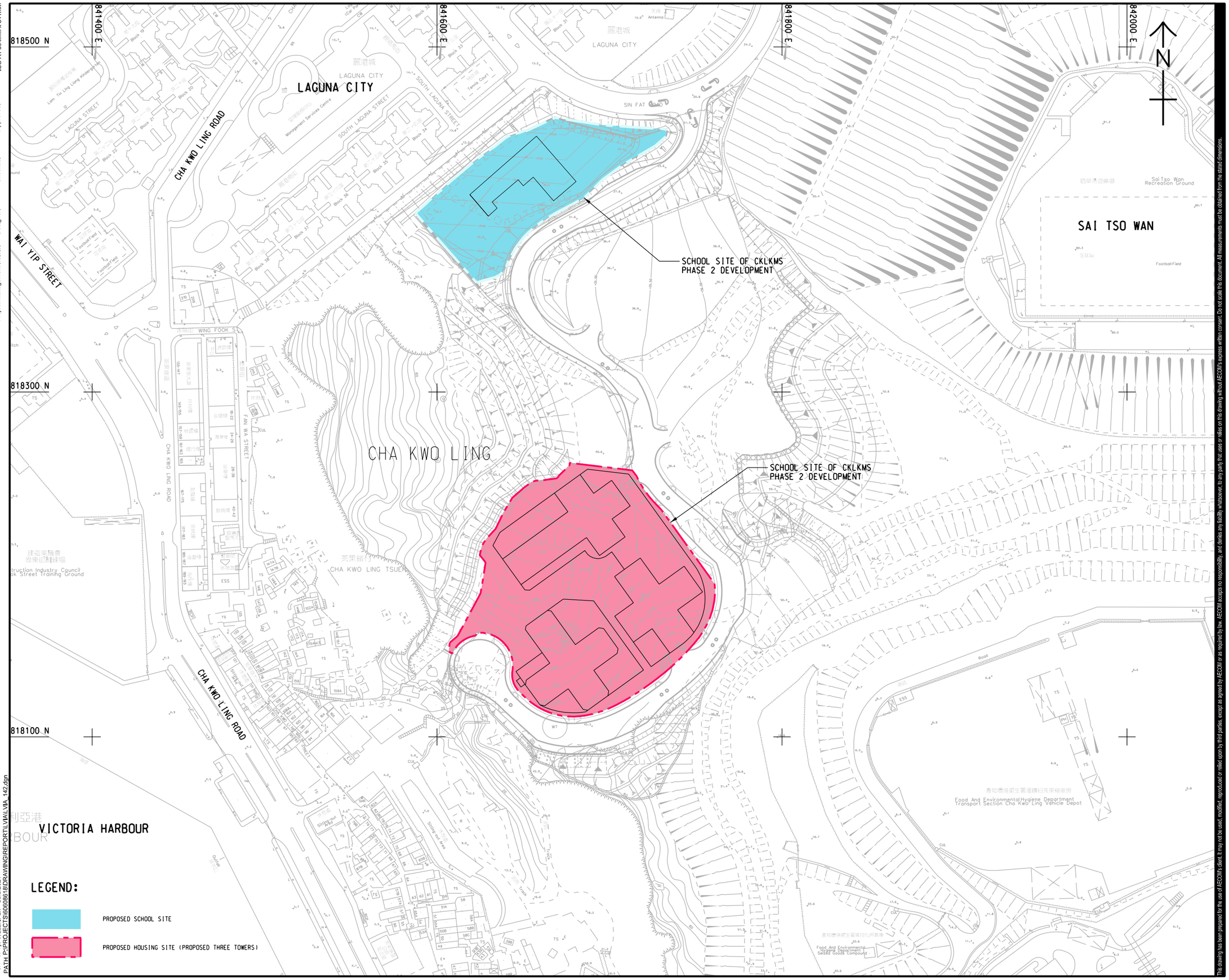
AGREEMENT NO. 協議編號: CE 60/2018 (CE)

SHEET TITLE
圖紙名稱

SITE DEVELOPMENT LAYOUT

SHEET NUMBER
圖紙編號

60608618/AVA/FIGURE 4.2



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: Weilun.Pan 30/9/2021
PATH P:\PROJECTS\60608618\DRAWING\REPORT\LV\AL\VIA_142.dgn

AECOM

PROJECT
項目

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR PROPOSED PUBLIC HOUSING DEVELOPMENTS AT KOWLOON EAST – FEASIBILITY STUDY

CLIENT
業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對

STATUS
狀況

SCALE 比例
A1 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60608618

AGREEMENT NO. 協議編號
CE 60/2018 (CE)

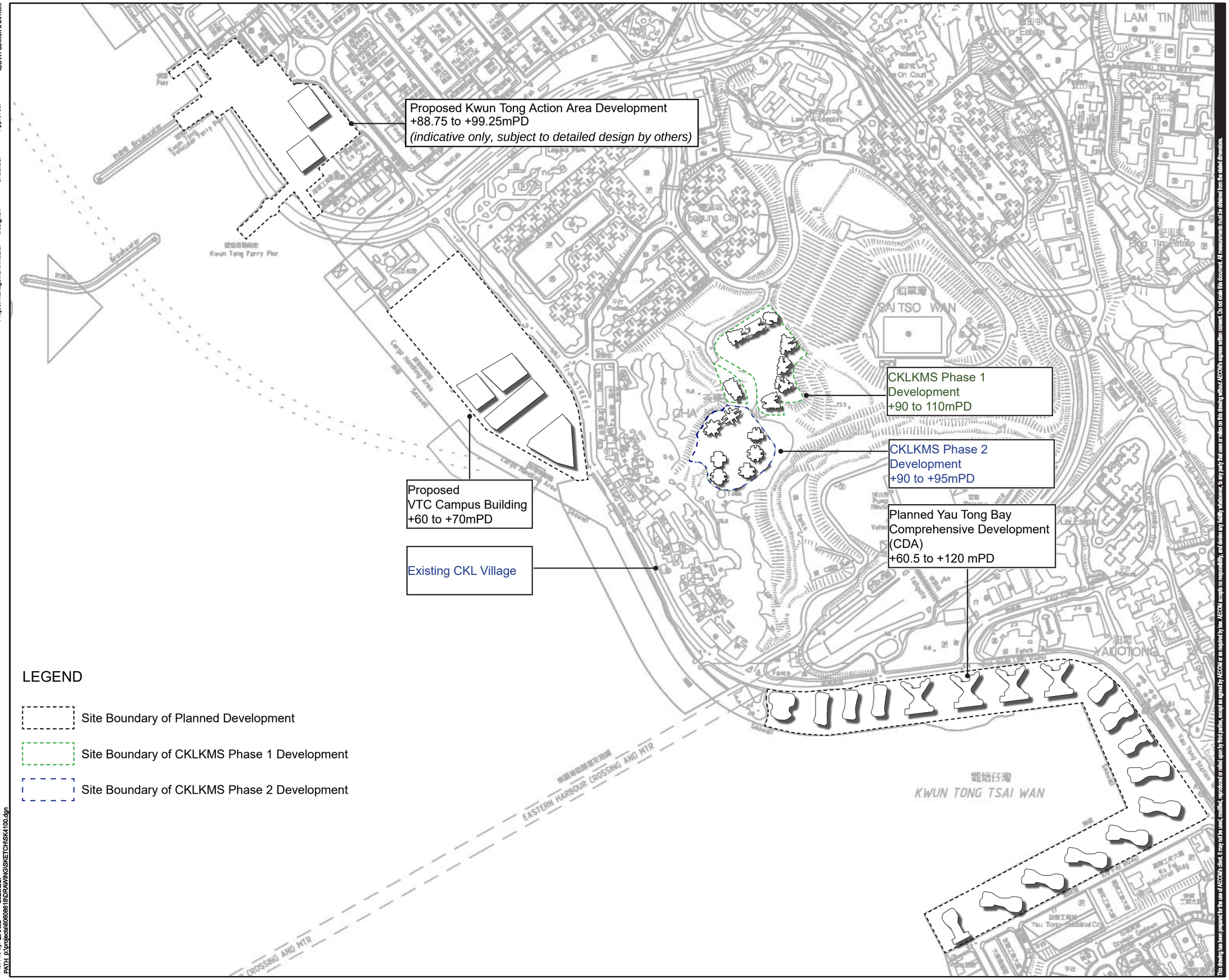
SHEET TITLE
圖紙名稱

CKLKMS PHASE 2 DEVELOPMENT

SHEET NUMBER
圖紙編號

60608618/AVA/FIGURE 4.3

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm



LEGEND

- Site Boundary of Planned Development
- Site Boundary of CKLKMS Phase 1 Development
- Site Boundary of CKLKMS Phase 2 Development

Plot File by: LIAN.J2 2020/2/27
PATH: p:\projects\60608618\DRAWING\SKETCH\SK4100.dgn

AECOM

PROJECT
項目

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR PROPOSED PUBLIC HOUSING DEVELOPMENTS AT KOWLOON EAST – FEASIBILITY STUDY

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ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核核

STATUS
階段

SCALE 比例: A1 1 : 3000
DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60608618
CONTRACT NO. 合約編號: CE 60/2018 (CE)

SHEET TITLE
圖紙名稱

BASELINE SCENARIO OF THE DEVELOPMENT PROPOSAL

SHEET NUMBER
圖紙編號

60608618/AVA/FIGURE 4.4

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Proposed Kwun Tong Action Area Development
+88.75 to +99.25mPD
(indicative only, subject to detailed design by others)

CKLKMS Phase 1
Development
+90 to 110mPD

CKLKMS Phase 2
Development
+135 to +140mPD

Planned Yau Tong Bay
Comprehensive Development
(CDA)
+60.5 to +120 mPD

Proposed
VTC Campus Building
+60 to +70mPD

CKLV Housing
Development
+52 to +130mPD

LEGEND

- Site Boundary of Planned Development
- Site Boundary of CKLKMS Phase 1 Development
- Site Boundary of CKLKMS Phase 2 Development
- Site Boundary of CKLV Housing Development

Plot File by: LIANJ2 2020/2/27
PATH: p:\projects\60608618\DRAWING\SKETCH\SK4100.dgn

AECOM

PROJECT
項目

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR PROPOSED PUBLIC HOUSING DEVELOPMENTS AT KOWLOON EAST – FEASIBILITY STUDY

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I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對

STATUS
階段

SCALE 比例: A1 1 : 3000
DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60608618
CONTRACT NO. 合約編號: CE 60/2018 (CE)

SHEET TITLE
圖紙名稱

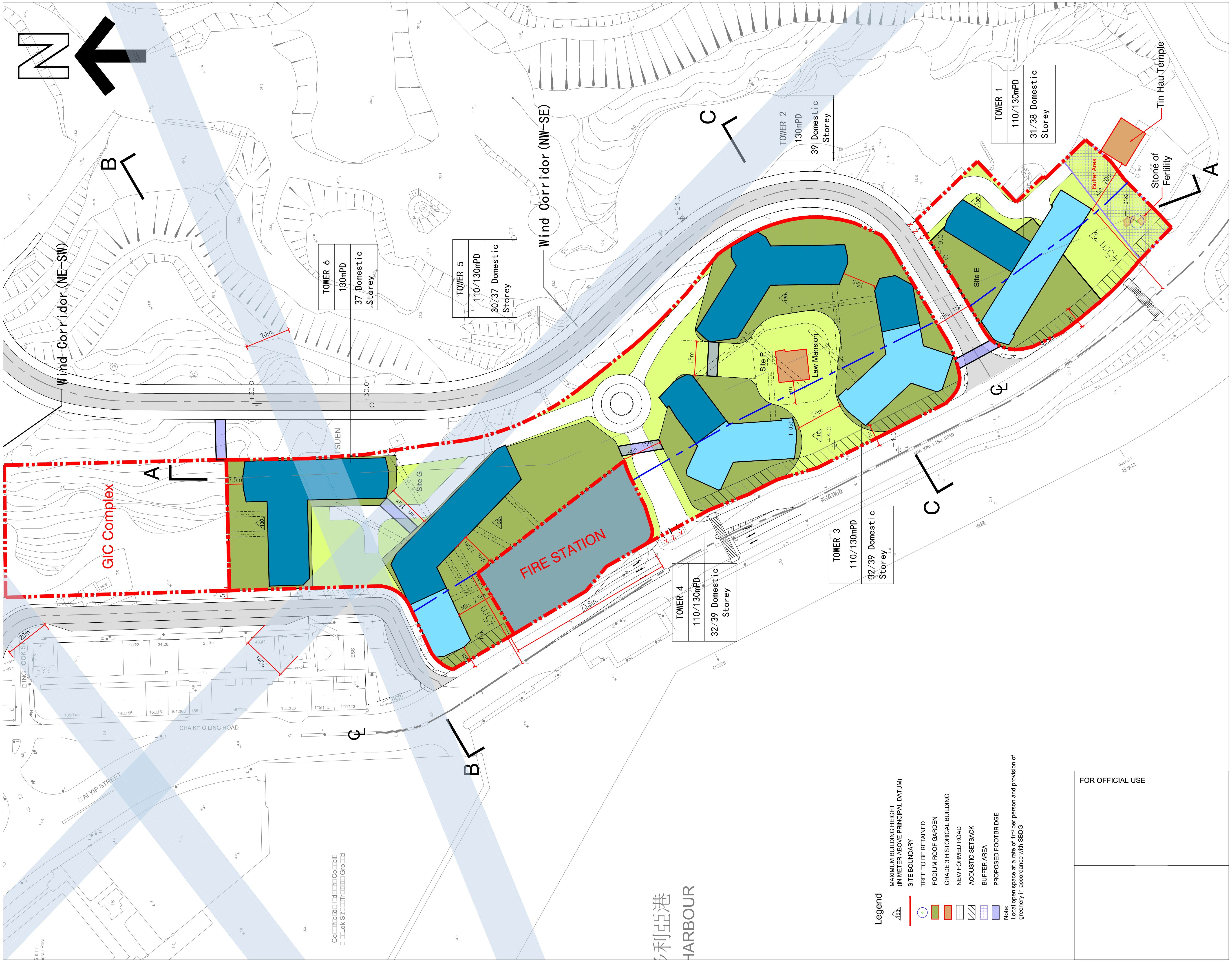
PROPOSED SCENARIO OF THE DEVELOPMENT PROPOSAL

SHEET NUMBER
圖紙編號

60608618/AVA/FIGURE 4.5

Appendix A

Master Layout Plan of Housing Development by HKHS for CKLV Development (*For Information Only****)***



N
Wind Corridor (NE-SW)
Wind Corridor (NW-SE)
TOWER 1
110/130mPD
31/38 Domestic Storey
TOWER 2
130mPD
39 Domestic Storey
TOWER 3
110/130mPD
32/39 Domestic Storey
TOWER 4
110/130mPD
32/39 Domestic Storey
TOWER 5
110/130mPD
30/37 Domestic Storey
TOWER 6
130mPD
37 Domestic Storey
Tin Hau Temple
Stone of Fertility
Buffer Area
Site E
Site F
Site G
Law Mansion
GIC Complex
FIRE STATION
CHA KWO LING ROAD
HARBOUR
Legend
MAXIMUM BUILDING HEIGHT (IN METER ABOVE PRINCIPAL DATUM)
SITE BOUNDARY
TREE TO BE RETAINED
PODIUM ROOF GARDEN
GRADE 3 HISTORICAL BUILDING
NEW FORMED ROAD
ACOUSTIC SETBACK
BUFFER AREA
PROPOSED FOOTBRIDGE
Note: Local open space at a rate of 1m2 per person and provision of greenery in accordance with SBDG
FOR OFFICIAL USE

B.D. REFERENCE 屋宇署檔案

F.S.D. REFERENCE 消防處檔案

W.W.O. REFERENCE 水務署檔案

CAD FILE NAME 檔案編號

NOTES 注釋

NO. 修定號	REVISIONS 修定內容	DATE 日期	BY 經手人

DLN Architects Limited
劉榮廣伍振民建築師有限公司
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Matheson Street, Causeway Bay, Hong Kong
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時代廣場一座46至47樓
t +852 2895 6888 f +852 2576 4074
email general@dln.com.hk www.dln.com.hk

ALL MEASUREMENTS MUST BE CHECKED AT THE WORK BY THE CONTRACTOR
所有尺寸應由承建商於工地核實

DO NOT SCALE FROM DRAWINGS 尺寸不應由圖紙直接量度

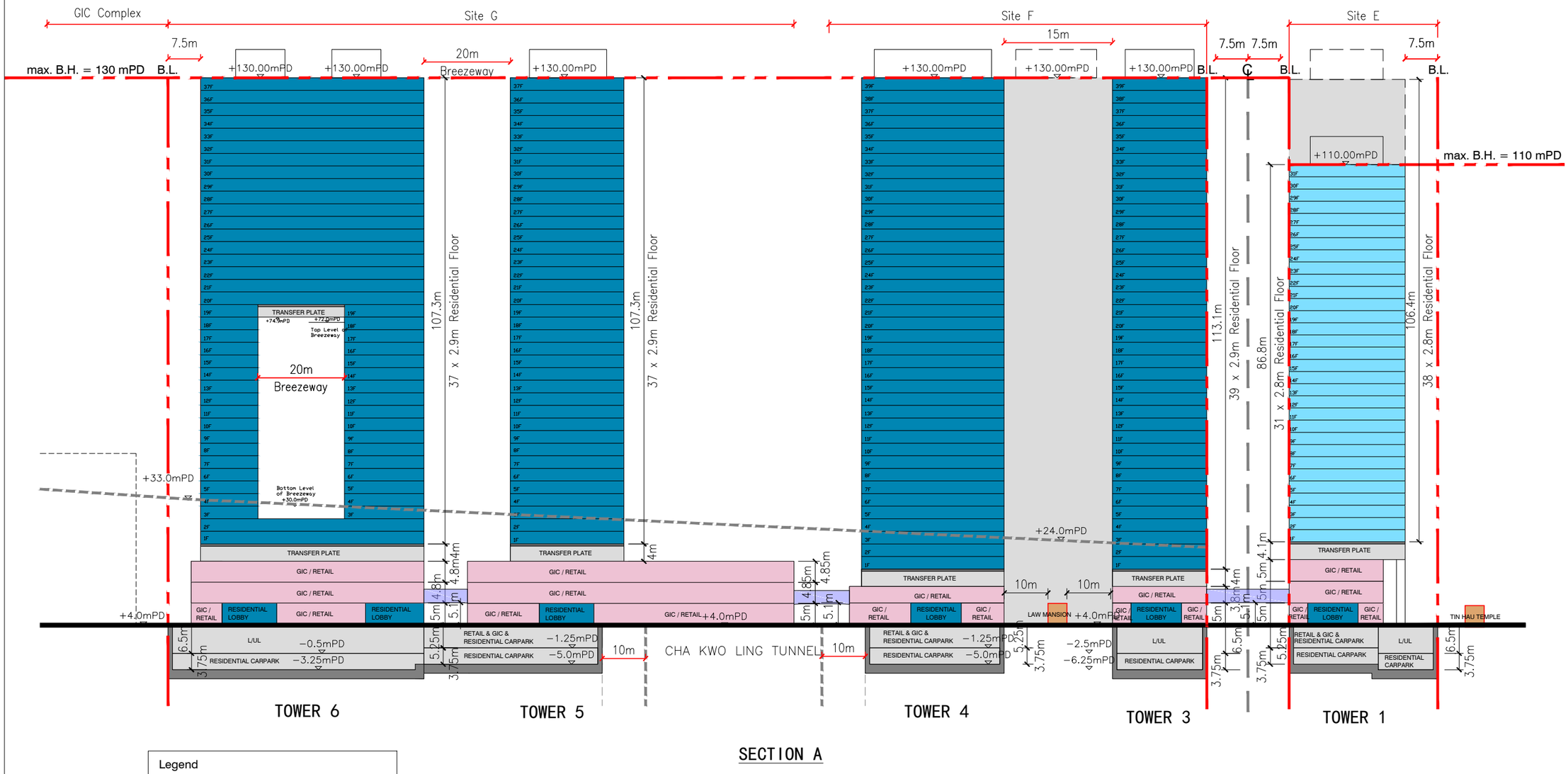
PROJECT 項目名稱

FEASIBILITY STUDY ON CHA KWO LING VILLAGE

DRAWING TITLE 標題

SCHEME ALT-2C23 (+110 mPD & 130 mPD)

SCALE 比例	DATE 日期
1:1500	OCT 2021
DRAWN BY 製作人	CHECKED BY 檢查
B.C.	P.C.
JOB NO. 工程項目	DRAWING NO. 圖號
N2990-H	CKL-01



SECTION A

Legend

- Site Boundary
- GIC / RETAIL
- 110 mPD
- 130 mPD
- HISTORICAL BUILDING
- EXISTING GROUND PROFILE
- PROPOSED FOOTBRIDGE

FOR OFFICIAL USE

B.D. REFERENCE 屋宇署檔案

F.S.D. REFERENCE 消防處檔案

W.W.O. REFERENCE 水務署檔案

CAD FILE NAME 檔案編號

NOTES 注釋

NO. 修定號	REVISIONS 修定內容	DATE 日期	BY 經手人

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HONG KONG HOUSING SOCIETY
香港房屋協會

PROJECT 項目名稱

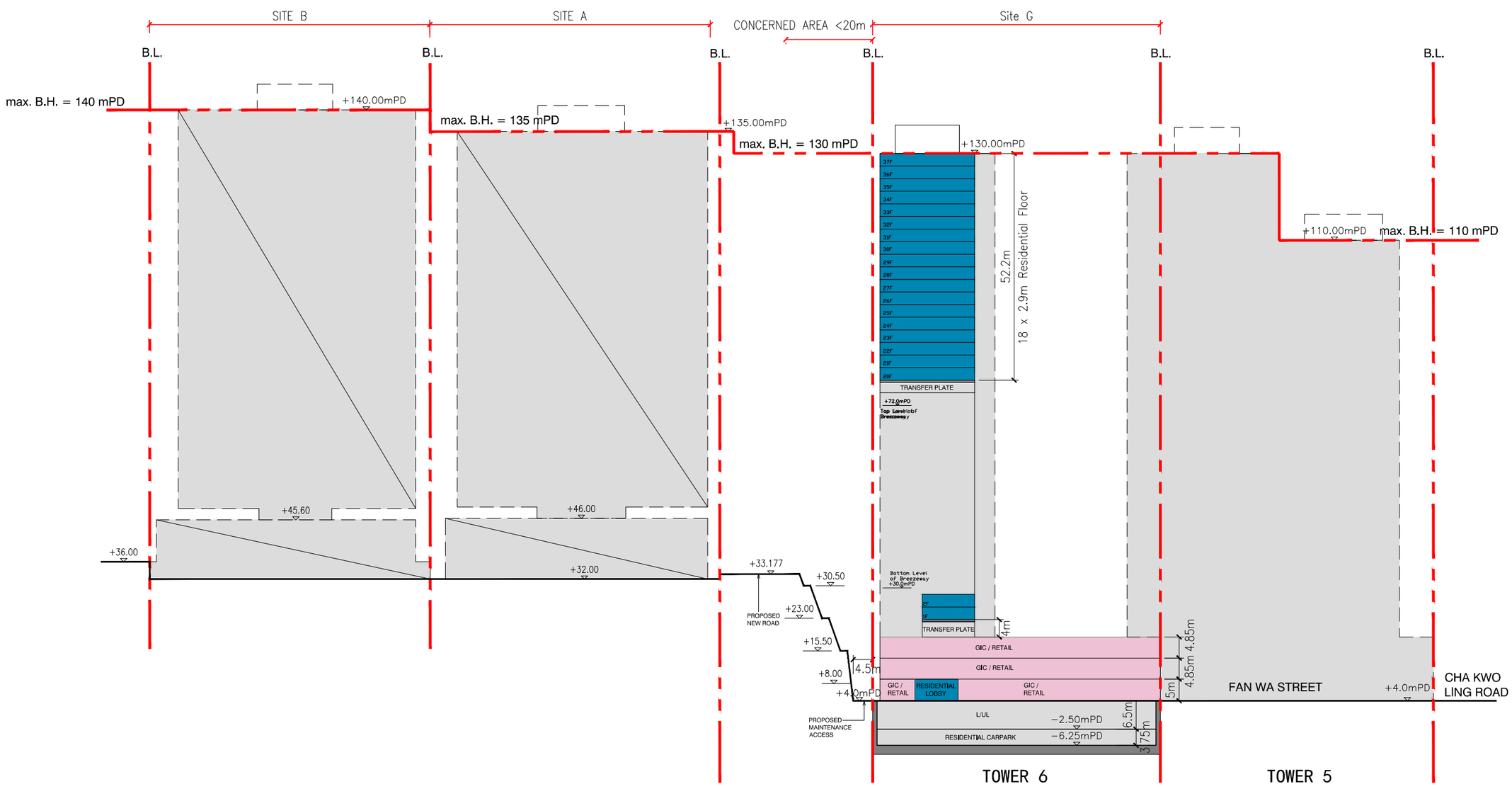
FEASIBILITY STUDY ON CHA KWO LING VILLAGE

DRAWING TITLE 標題

SCHEME ALT-2C23 (+110 mPD & 130 mPD)

SCALE 比例	DATE 日期
1:1000	OCT 2021
DRAWN BY 製作人	CHECKED BY 檢查
B.C.	P.C.
JOB NO. 工程項目	DRAWING NO. 圖號
N2990-H	CKL-02

KAOLIN MINE SITE



Legend

- Site Boundary
- GIC / RETAIL
- 130 mPD

SECTION B

FOR OFFICIAL USE

B.D. REFERENCE	屋宇署檔案
F.S.D. REFERENCE	消防處檔案
W.W.O. REFERENCE	水務署檔案
CAD FILE NAME	檔案編號
NOTES	注釋

NO. 修定號	REVISIONS 修定內容	DATE 日期	BY 經手人

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email:general@dln.com.hk www.dln.com.hk

HONG KONG HOUSING SOCIETY
香港房屋協會

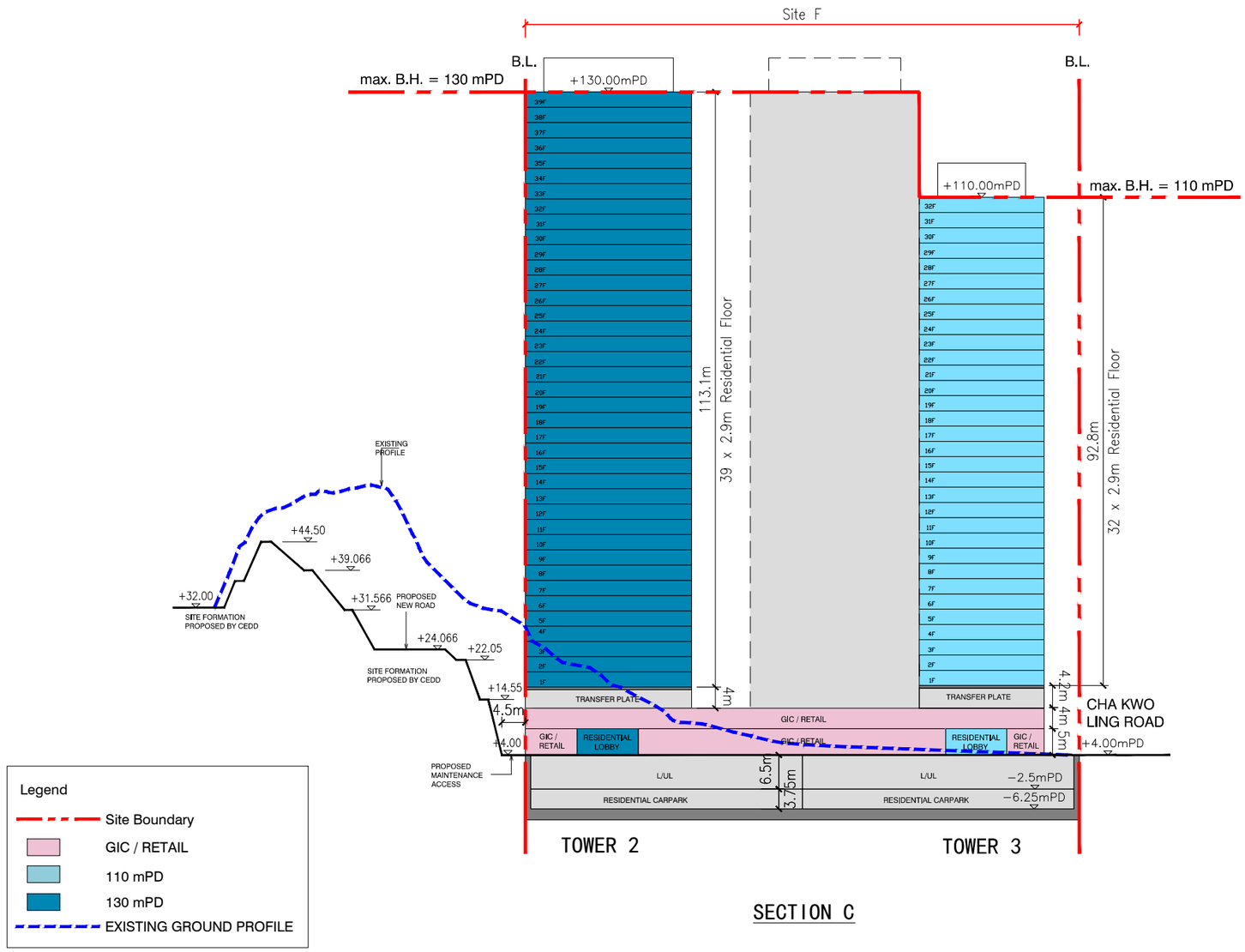
PROJECT 項目名稱

FEASIBILITY STUDY ON CHA KWO LING VILLAGE

DRAWING TITLE 標題

SCHEME ALT-2C23 (+110 mPD & 130 mPD)

SCALE 比例	DATE 日期
1:1000	OCT 2021
DRAWN BY 製作人	CHECKED BY 檢查
B.C.	P.C.
JOB NO. 工程項目	DRAWING NO. 圖號
N2990-H	CKL-03



Legend

- Site Boundary
- GIC / RETAIL
- 110 mPD
- 130 mPD
- EXISTING GROUND PROFILE

SECTION C

B.D. REFERENCE	屋宇署檔案
F.S.D. REFERENCE	消防處檔案
W.W.O. REFERENCE	水務署檔案
CAD FILE NAME	檔案編號
NOTES	注釋

NO. 修定號	REVISIONS 修定內容	DATE 日期	BY 經手人

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HONG KONG HOUSING SOCIETY
香港房屋協會

PROJECT 項目名稱

FEASIBILITY STUDY ON CHA KWO LING VILLAGE

DRAWING TITLE 標題

SCHEME ALT-2C23 (+110 mPD & 130 mPD)

FOR OFFICIAL USE

SCALE 比例	DATE 日期
1:1000	OCT 2021
DRAWN BY 製作人	CHECKED BY 檢查
B.C.	P.C.
JOB NO. 工程項目	DRAWING NO. 圖號
N2990-H	CKL-04

Appendix B

Master Layout Plan of Housing Development by HD for CKLKMS Phase 2 Development (For Information Only)

N 北

Block 1

SITE B
+45.6

+36.0

15m

+36.0

Block 2

15m

SITE A
+46.0

+32.0

+32.0

Block 1

PROPOSED
15m LAYBY

PROPOSED LAYBY

以詳細設計為準
SUBJECT TO DETAILED DESIGN

圖例:
LEGEND:

擬建公營房屋地盤界線
PROPOSED PUBLIC HOUSING SITE BOUNDARY

擬建住宅大樓
PROPOSED DOMESTIC BLOCKS

行車通道
ACCESS ROAD

擬建車輛出入口
PROPOSED VEHICULAR INGRESS / EGRESS

平台花園
PODIUM