

Executive Summary

Introduction

The Redevelopment of Lee Tung Street / McGregor Street (the Development) comprises two sites located at Lee Tung Street and McGregor Street in Wanchai. Arup was commissioned in August 2005 to conduct preliminary environmental performance assessment. In November 2009, Grand Site Development Limited requested Arup to launch the AVA Initial Study for the H15 Development using the methodology as stipulated in the “Technical Circular No. 1/06 – Air Ventilation Assessment” (Technical Circular) jointly issued by Housing, Planning and Lands Bureau and Environmental, Transport and Works Bureau on 19th July 2006.

AVA Guidelines

In September 2005, the Planning Department has finished a consultancy study on Air Ventilation Assessment System (AVA), i.e. the “Feasibility Study for Establishment of Air Ventilation Assessment System”. This study has proposed a number of possible strategies to improve the urban wind environments under the unique high-rise and high-density built environment of Hong Kong. The AVA study has also come up with a methodology for quantitative assessment of ventilation performance of building development, featuring the Wind Velocity Ratio (VR) as the key performance indicator of wind environment.

In July 2006, the Housing, Planning and Lands Bureau and Environmental, Transport and Works Bureau jointly issued the “Technical Circular No. 1/06 – Air Ventilation Assessments” (Technical Circular), which laid out the implementation framework of AVA in Hong Kong.

This study follows the AVA design guidelines and Technical Circular to assess the local wind condition resulted from the Development Schemes.

Studied Scenarios

Totally three cases were studied in this study, which includes:

- (i) The development scheme based on the previous approved MLP plan (**Baseline Scheme**) (dated on October 2010).
- (ii) **Proposed Schemes Case 1** based on the design scheme dated on November 2011.
- (iii) **Proposed Schemes Case 2** (such layout was identical to that as shown on the Building (Amendment) Plan submitted to Buildings Department (BD) on 21 December 2011 / re-submitted to BD on 16 January 2012 and being vetted by District Planning Office)

Major Changes and Mitigation Measures

The overall designs for the three development schemes are generally the same, such as the height and shape of the building blocks and podiums, except the footbridge arrangement. In order to compensate the adverse impact by the incorporation of footbridges structural dimension that is technically feasible, it is trying to propose to remove some canopies and footbridges to enhance the wind performance. In this connection, two schemes namely Case 1

and Case 2 are proposed. The detail information and description of the proposed design of each scheme is elaborated as below:

For Proposed Case 1 Scheme,

- All footbridges used with amended structural dimensions
- Remove canopies above footbridge at 3/F between Tower C podium and the No-Tower podium
- Remove the footbridge between Tower C podium and the No-Tower podium at 2/F.

For Proposed Case 2 Scheme,

- All footbridges used with amended structural dimensions
- Remove canopies above footbridge at 3/F between Tower C podium and the No-Tower podium
- Remove the footbridge between Tower C podium and the No-Tower podium at 2/F
- Remove the footbridge at UG/F between Tower A podium and Tower B podium

Wind Environment Assessment

A series of CFD simulations using $k-\omega$ SST turbulence model were performed with reference to the Air Ventilation Assessment (AVA) methodology for Initial Study as stipulated in the Technical Circular and Technical Guide. Eight wind directions were considered: north-northerly, north-northerly, east-northerly, easterly, east-south-easterly, south-easterly and south-south-westerly, south-westerly winds, which totally cover 79.4% of wind availability in a year. The ventilation performances for three scenarios were assessed, including the Baseline Scheme and Proposed Schemes Case 1 and Case 2.

The Velocity Ratio (VR) as proposed by the Technical Circular was employed to assess the ventilation performance of the Proposed Development and its impact to the surroundings. With reference to the Technical Guide, totally 41 perimeter test points and 66 overall test points were selected to assess the ventilation performance of the Development. The results of the overall ventilation performance could be summarized as follows:

	Baseline	Proposed Case 1	Proposed Case 2
SVR:	0.12	0.12	0.12
LVR:	0.15	0.15	0.15

The results indicate that both SVR and LVR values are the same for three schemes, indicating that at the immediately surrounding area and local area within the 1H boundary have are relatively similar ventilation performances as compared to the previous scheme. Generally, the air ventilation of the local area is mainly controlled by the existing high-density building context.

For Proposed Scheme Case 1, the structural dimension of all bridge has been increased and the footbridge at 2/F between Tower C and no building Tower podium is removed. Owing to

the increased dimension on the footbridges, the VRs for some focus areas, i.e. Amoy Street, Cross Street, Public Open Space linking Lee Tung Street and Amoy Street have reduced, indicated that the respective proposed changes in such scheme were not sufficient to totally recover the adverse impact.

Proposed Scheme Case 2 compensates the increase on footbridge dimension by further eliminating UG/F footbridge to maintain the overall permeability. This measure makes the VRs for most of focus areas between baseline scheme and this proposed scheme become comparable, demonstrated that incorporation of the proposed changes would well recover the ventilation environment to a standard similar to the previous approved scheme.