

Agreement No. C11081 Detailed Design for Re-provisioning of Ma Chai Hang Recreation Ground

AVA-EE Brief Report

Comparison of the Air Ventilation Assessment between Approved
S16 Application Scheme & Proposed S16A Application Scheme



WSP (Asia) Limited

7/F One Kowloon
1 Wang Yuen Street
Kowloon Bay, Hong Kong

Tel +852 2579-8899
Fax +852 2856-9902
wsp.com

1 Site Wind Availability

In the assessment of air ventilation at the pedestrian level inside an urban area, the long-term characteristics of the approaching wind would need to be known in advance. For instance, the occurrence, i.e. the frequency of a typical wind direction is the key parameter for the subsequent assessment. This information is also essential for the performance comparison for different building forms for a special site. The site wind availability data of the Proposed Development Site is obtained from Hong Kong PlanD's website, which is simulated by the mesoscale model Regional Atmospheric Modelling System (RAMS). The natural ventilation performance is assessed under annual and summer (June to August) prevailing wind directions. In the present study, the height level of 200m is adopted in determining the prevailing annual/summer winds. The annual prevailing wind directions are considered as NNE, ENE, E and ESE directions in the Development Site; while the summer prevailing winds are under S, SSW and SW directions (see **Figure 1.1**)

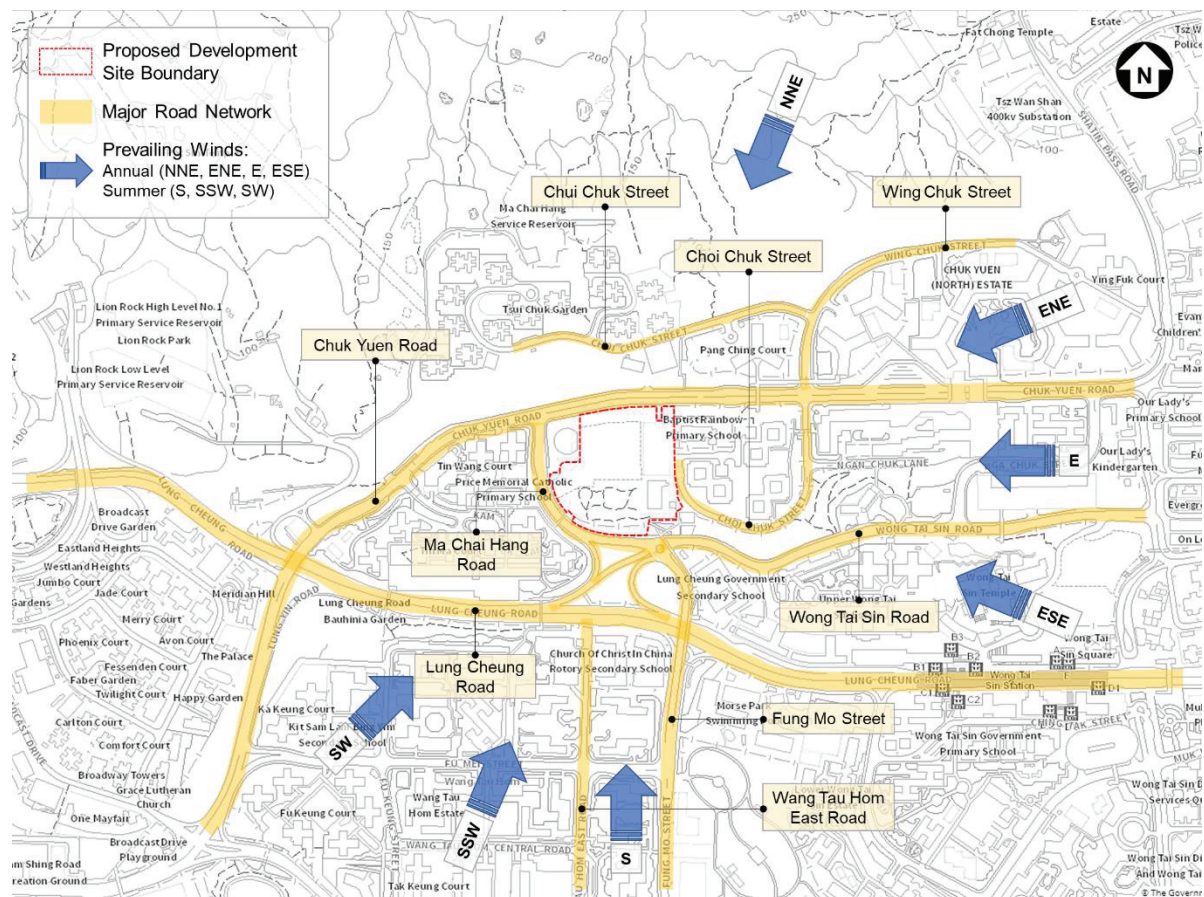


Figure 1.1 – Summary of Annual and Summer Prevailing Winds of the Site

2 Comparison Study of Two Difference Application Schemes

A comparison study of wind environment within/around the Proposed Development Site area between the Approved S16 Application Scheme (see **Figure 2.1**) and the Proposed S16A Application Scheme (see **Figure 2.2**) has been carried out.

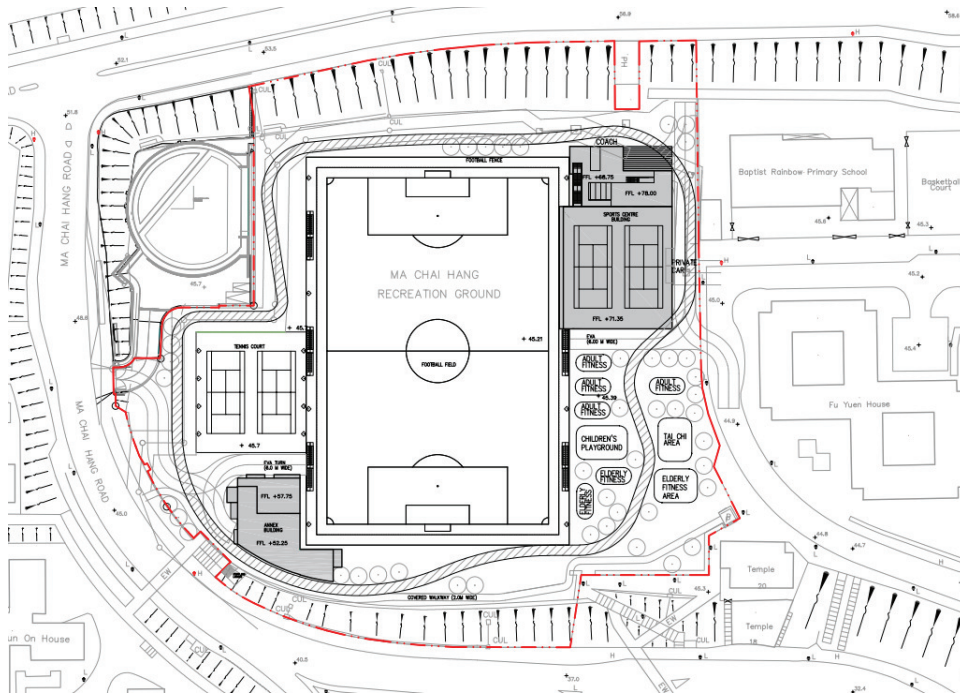


Figure 2.1 Master Layout Plan under Approved S16 Application Scheme

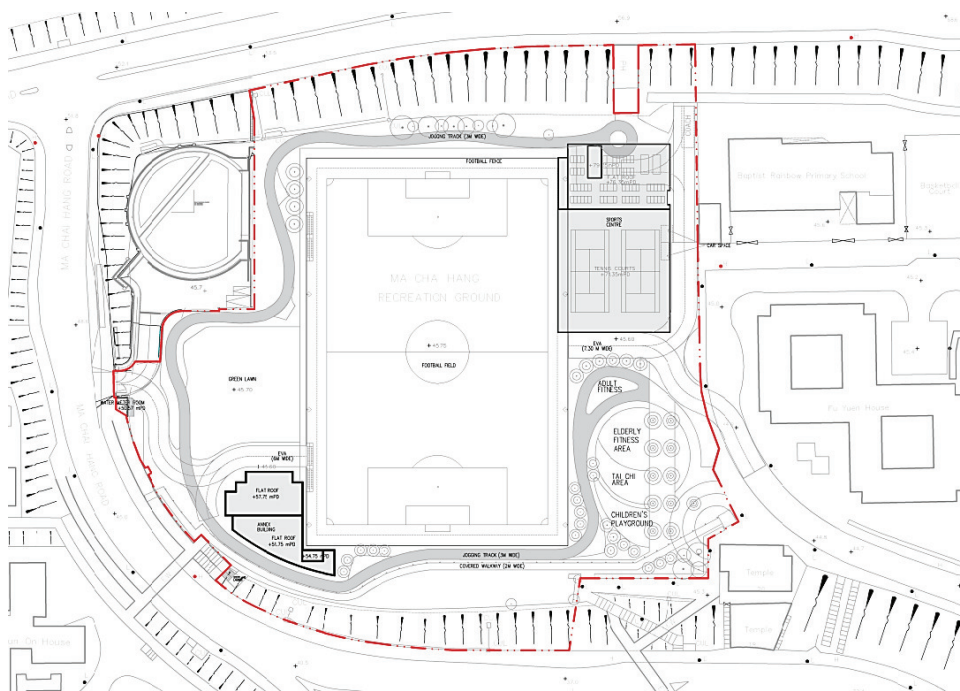


Figure 2.2 Master Layout Plan under Proposed S16A Application Scheme

The details of building heights of the two schemes have been summarized in **Table 2.1**.

Table 2.1 – Summary of Proposed Development Parameters

Blocks	Storeys	Maximum Building Height	
		<u>Approved S16</u> Application Scheme	<u>Proposed S16A</u> Application Scheme
Sports Centre	5	+78.00mPD	+79.35mPD
Annex Building	2	+58.25mPD	+57.75mPD
Water Meter Cabinet	1	NA	+49.97mPD

2.1 Existing Wind Environment

In general, the study area has a good ventilation network for air paths. The result of the evaluation on annual and summer prevailing winds and the surrounding topography revealed that the annual and summer prevailing winds could flow through the Proposed Development Site under the action of existing wind corridors.

Both the Approved S16 Application Scheme and the Proposed S16A Application Scheme mentioned above have the similar impact on the surrounding wind environment. Although several possible existing problematic areas around the Site might attenuate ventilation performance, with some open areas, NBAs and wind corridors around to drive the prevailing winds flowing through the Development Site, the impact on wind captures of these possible affected problematic areas could be improved.

2.2 Ventilation Performance around the Proposed Sports Centre

Table 2.1 summaries the detailed building information for both the Approved S16 Application Scheme and the Proposed S16A Application Scheme have the same storeys of 5 for the Sports Centre. It may block the incoming winds and create a weak wind performance in the immediate leeward region. Though the maximum building height of the S16A Application Scheme is +79.35mPD level, which is slightly higher than the Approved S16 Application Scheme of +78.00mPD high, it may have less impact on the ventilation at pedestrian level.

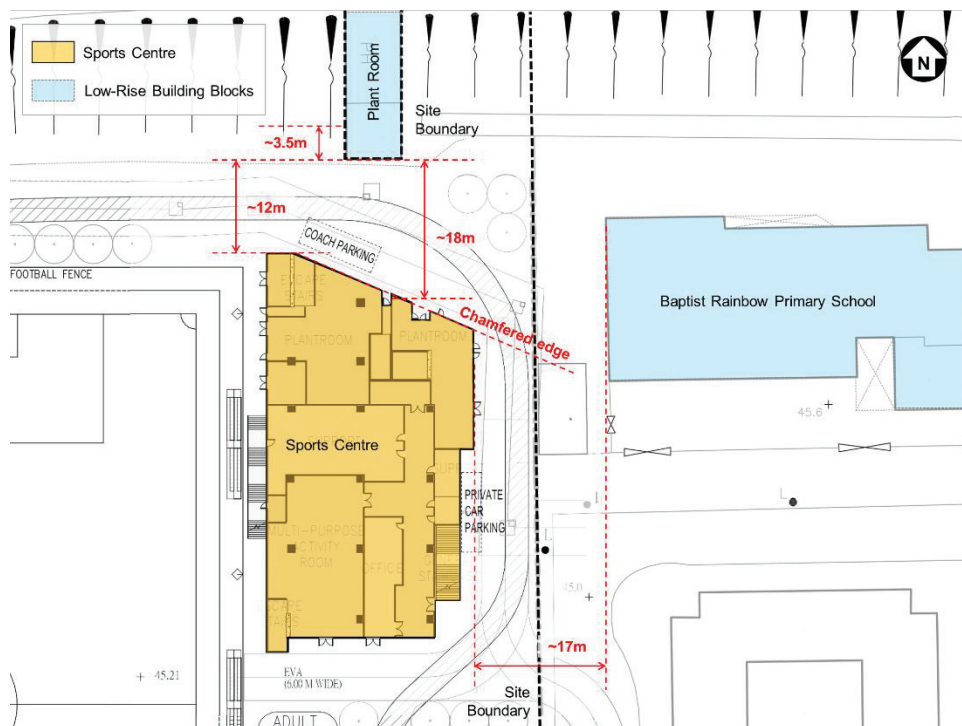


Figure 2.3 Layout Plan of Sports Centre at Ground Floor Level under Approved S16 Application Scheme

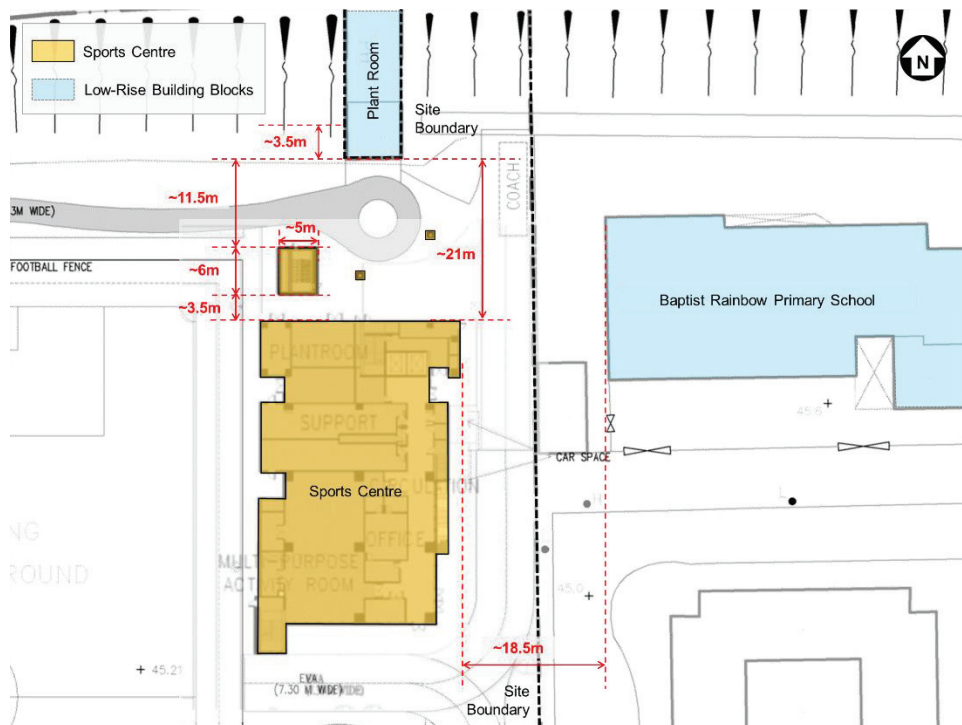


Figure 2.4 Layout Plan of Sports Centre at Ground Floor Level under Proposed S16A Application Scheme

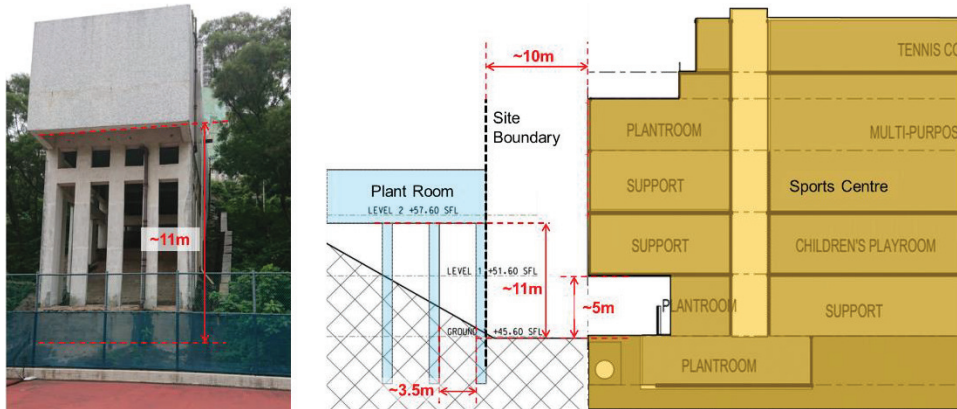


Figure 2.5 Schematic Section View of the Existing Plant Room and the Proposed Sports Centre under Approved S16 Application Scheme



Figure 2.6 Schematic Section View of the Existing Plant Room and the Proposed Sports Centre under Proposed S16A Application Scheme

As shown in **Figures 2.3 and 2.4**, the building separation between the Sports Centre and the Baptist Rainbow Primary School has increased from ~17m to ~18.5m for the Proposed S16A Application Scheme in comparison with the Approved S16 Application Scheme, which may result in enhancing air permeability under prevailing NNE and S winds.

Building setback at ground level with a clear headroom could enhance air permeability at the pedestrian level. As shown in **Figures 2.5 and 2.6**, there is a building setback with a clear headroom of about ~5m high for the proposed Sports Centre under both Schemes. Referring to **Figure 2.3**, the building setback between the Sports Centre and the existing Plant Room is 12m to 18m wide at the pedestrian level for the Approved S16 Application Scheme. While there is a 6m wide permanent supporting structure between the Sports Centre and the Plant Room in

the Proposed S16 Application Scheme as per **Figure 2.4**. In complying with the minimum requirement of building setback in “Sustainable Building Design Guidelines PNAP APP-152”, it results in a building setback distance of about 15m (11.5m + 3.5m) to 21m wide at pedestrian level. Due to the increase of the building separation range between Sports Centre and the existing Plant Room at the pedestrian level from ~12-18m to ~15-21m wide for the Proposed S16A Application Scheme, it may enhance the air permeability to the north portion of the Site area under prevailing ENE and E winds in comparison with the Approved S16 Application Scheme.

Under other prevailing wind directions, the similar ventilation performance at the pedestrian level of the Sports Centre and its vicinity could be observed under both two Schemes.

2.3 Ventilation Performance around the Proposed Annex Building

Referring to **Table 2.1**, both two Schemes have the same storeys of 2 for the Annex Building. Due to the blockage effect, a possible affected problematic area may be observed at the pedestrian level in its downstream area, i.e., part of Ma Chai Hang Road near the Site under prevailing NNE wind in both Application Schemes. The Annex Building adopts a mitigation measure of applying a large filleting of building edge on the south-west elevation under both Schemes, which allows a passage of prevailing wind not being impeded by the proposed built form and maintain the air permeability of the development. As a result, the prevailing ESE wind along the Ma Chai Hang Road could pass through the south side of the Annex Building easily (see **Figures 2.7 and 2.8**). On the other hand, under the Proposed S16A Application Scheme, the building setback of the Annex Building from the footbridge on the southwest side of the Site has been increased from ~5.5m to ~8.5m in comparison with the Approved S16 Application Scheme. The wider setback of the Proposed S16A Application Scheme may enhance air permeability under prevailing ESE wind.

Referring to **Figure 2.8**, a new Water Meter Cabinet of +49.97mPD high is located in the western corner of the Site under the Proposed S16A Application Scheme. The absolute building height of this Water Meter Cabinet is 2.3m. Thus, with the consideration of the current large site area, the impact on the air ventilation at the pedestrian level by this Water Meter Cabinet could be neglected.

Under other prevailing wind directions, the similar ventilation performance at the pedestrian level of the Annex Building and its vicinity could be observed under both two Schemes.

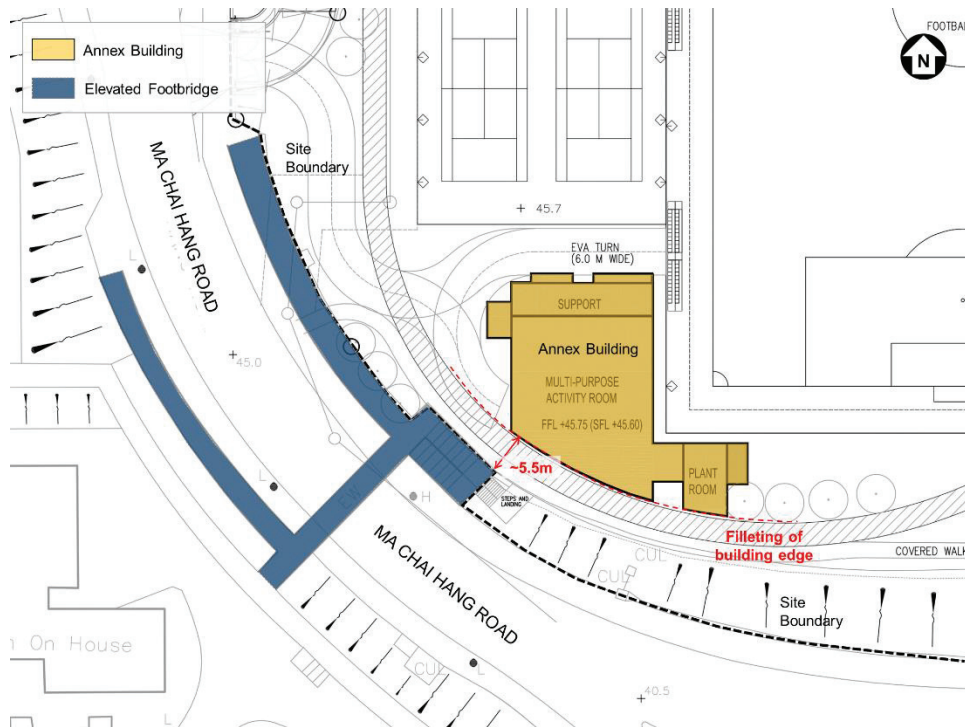


Figure 2.7 Layout Plan of Annex Building at Ground Floor Level under Approved S16 Application Scheme

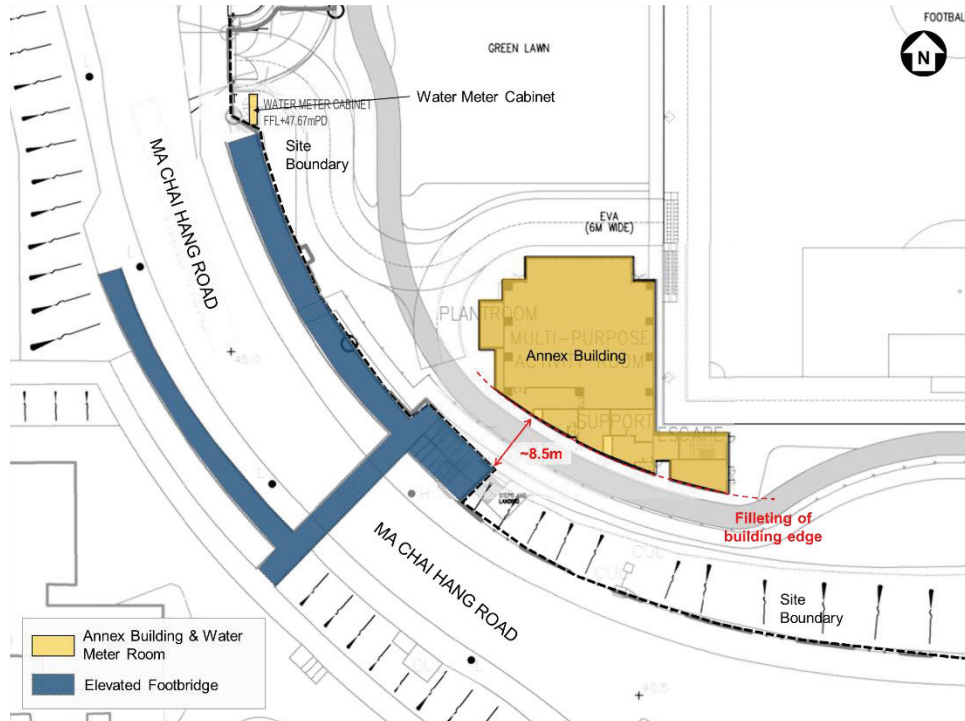


Figure 2.8 Layout Plan of Annex Building & Water Meter Cabinet at Ground Floor Level under Proposed S16A Application Scheme

3 Conclusion

In general, the Proposed S16A Application Scheme would achieve a better wind environment at the pedestrian level in comparison with the Approved S16 Application Scheme.

The building separation between the Sports Centre and the Baptist Rainbow Primary School has increased from ~17m to ~18.5m, and together with the increase of the building separation range between Sports Centre and the existing Plant Room at a pedestrian level from ~12-18m to ~15-21m for the Proposed S16A Application Scheme, may enhance the incoming winds penetrating the Site under prevailing NNE and S winds, and ENE and E winds respectively.

For the Annex Building, the building setback distance from the footbridge on the southwest side of the site has been increased from ~5.5m to ~8.5m under the Proposed S16A Application Scheme may also enhance the air permeability under ESE wind direction. Thus, ventilation performance at the pedestrian level of the Proposed S16A Application Scheme would be enhanced.