SUMMARY

As the Housing and Development Board (HDB) is the biggest public housing provider (86%) in Singapore, the latest integrated development approach is vital to ensure high quality of living for the 21st century. In this development concept, there will be no setback between MSCP and residential blocks and the residents can enter their units more directly after parking their vehicles.

The study covers sequential developments of car parks by HDB over the period and compares the new integrated MSCP developments with the earlier standard MSCP. The study also tries to explore the impact of integrated MSCP on adjacent residential units' performance to some extent.

The study is broadly divided into three parts. The first part is based on literature review and case studies. In the second part, a subjective analysis was carried out through project document review, designers' interview and occupancy survey. The final part is the objective analysis through instrumentation and laboratory tests.

Two of the HDB's neighborhood were selected to carry out the research, one is non-integrated MSCP (Choa Chu Kang, N-4, C-13) and the other is integrated MSCP (Punggol C-1). A third neighborhood (Sengkang N-1, C-19) is also selected as a compliment to Punggol C-1 for onsite measurements, because the Punggol C-1 was under construction at the time of the study.

Due to the vast range of performance mandates, limitation of time, equipment and personal constrains to the study, the measurements and tests are carried out for selective mandates only. The onsite measurements cover wind speed, noise and daylight for both sites (Choa Chu Kang & Sangkang).
Wind tunnel tests were also conducted at wind tunnel laboratory, National University of Singapore with 1:200 scale models for both Choa Chu Kang & Punggol. These tests result provide a clear perception about ventilation performance that could occur inside an MSCP and the impacts on adjacent residential units for both non-integrated and integrated development situations.

The general findings from project document analysis show that the designers had little choice to compromise performance for higher GPA, which is crucial for Singapore, a small state of 648 square kilometers. The occupancy survey indicates that most of the residents owning cars are in favor of integrated development.

Finally the objective analysis proves that the overall performance drop in an integrated development compared to a non-integrated one. Both from the site measurements and wind tunnel test, Punggol, the integrated development has a lower wind speed observed than a similar non-integrated development, Choa Chu Kang. For daylight, the results are more critical, some of the internal illuminance for integrated MSCP are as low as zero. The noise level is also recorded high at integrated development though most of the MSCP is found unoccupied. The reason is the expressway adjacent to the site as a high noise source.

Although this study reveals that integrated development does not perform better than the non-integrated one, yet there is scope for further improvement in design of an integrated approach since it would result in economic uses of land for this small island state.