REPORT

LAKEVIEW VILLAGE

MISSISSAUGA, ONTARIO
WIND COMFORT ASSESSMENT

PROJECT #1804164

AUGUST 16TH, 2019

SUBMITTED TO

Brian Sutherland
Director of Development
brian@argoland.com

Argo Development Corporation
2173 Turnberry Rd
Burlington, Ontario L7M 4P8
T: 416.576.1330

SUBMITTED BY

Priya Patel, EIT, LEED GA
Technical Coordinator
Priya.Patel@rwdi.com

Dan Bacon
Senior Project Manager / Associate
Dan.Bacon@rwdi.com

RWDI
600 Southgate Drive
Guelph, ON N1G 4P6
T: 519.823.1311 x2245

1. INTRODUCTION

Rowan Williams Davies & Irwin Inc. (RWDI) was retained by Argo Development Corporation to provide a wind assessment for the proposed Lakeview Village in Mississauga, ON (Image 1). This qualitative assessment is based on the following:

- a review of regional long-term meteorological data from local weather stations;
- design drawings and 3D model received by RWDI on August 9th, 2019;
- A wind tunnel study of the previous Lakeview model conducted in October 2016 (hereby referred to as "Test 1"); and
- our engineering judgement and knowledge of wind flows around buildings[1-3].

This qualitative approach provides a screening-level estimation of potential wind comfort conditions and compares the updated massing against the original massing.

In order to quantify these conditions or refine any conceptual measures, physical scale-model tests in a boundary-layer wind tunnel would be required.

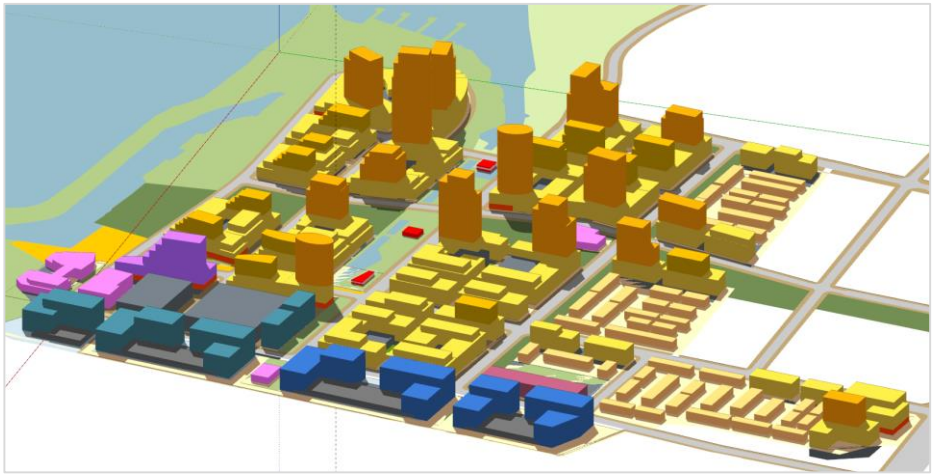


Image 1: Rendering of the Proposed Project

1. H. Wu and F. Kriksic (2012). "Designing for Pedestrian Comfort in Response to Local Climate", *Journal of Wind Engineering and Industrial Aerodynamics*, vol.104-106, pp.397-407.
2. H. Wu, C.J. Williams, H.A. Baker and W.F. Waechter (2004), "Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions", *ASCE Structure Congress 2004,* Nashville, Tennessee.
3. C.J. Williams, H. Wu, W.F. Waechter and H.A. Baker (1999), "Experience with Remedial Solutions to Control Pedestrian Wind Problems", *10th International Conference on Wind Engineering*, Copenhagen, Denmark.

2. SUMMARY OF DESIGN CHANGES.

The purpose of this assessment is to compare the changes in pedestrian wind environment between the original massing tested in the wind tunnel and the updated massing. The following summary provides a brief overview of the major massing changes in the Lakeview development. The original model (as tested in the wind tunnel) and the newest model (received August 9th, 2019, 2019) are presented in Images 2 and 3. The numbers in Image 3 refer to the notes as follows.

- (1) Curved towers present on Blocks 1, 2, 3, 6, 11 and 21 have become more 'rectangular' (less aerodynamic).
- (2) There is now a park and open space area between Blocks 2 and 3 and between Blocks 9 and 10
- (3) New, stepped mid-rise developments located near the southern perimeter of the masterplan
- Towers on most other blocks have been repositioned and re-massed.

Image 2: Original model tested in wind tunnel

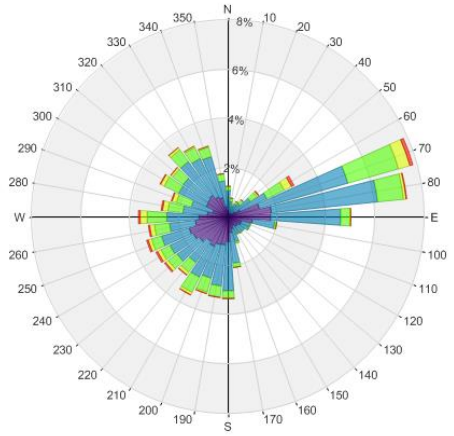
Image 3: Updated model received August 9, 2019

3. METEOROLOGICAL DATA

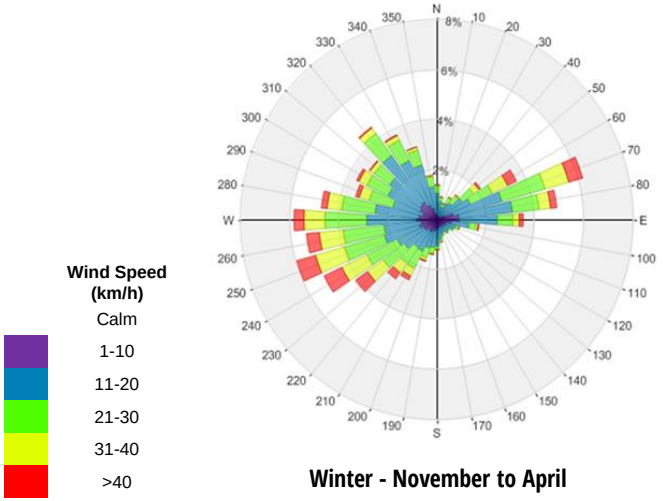
The development has a similar distance to both Toronto Pearson International Airport and Billy Bishop Toronto City Airport, as shown in Image 4. The weather data recorded at Billy Bishop Toronto City Airport between 1985 to 2015 were used as a reference for winds around the current project due to its proximity to the lake.

The distributions of wind frequency and directionality for the summer (May through October) and winter (November through April) seasons are shown by the wind roses in Image 5. When all winds are considered, winds are most frequent from the east-northeast, east and southwest through north-northwest directions in both seasons. The south and south-southwest winds are also frequent in the summer. Strong winds of a mean speed greater than 30 km/h measure at the airport (yellow and red bands in Image 5) occur more often in the winter than in the summer and they are often from the east-northeast and west-southwest directions.

Image 4: Locations of the Site and Airports



Summer - May to October



Winter - November to April

Image 5: Directional Distribution of Winds Approaching Billy Bishop Toronto City Airport (1985 – 2015)

4. PREDICTED WIND CONDITIONS

The following discussion summarizes the wind conditions expected as a result of the altered massing, referencing the RWDI pedestrian wind assessment submitted February 26th, 2019. It should be noted that the discussion summarizes the wind conditions around the project site without no landscaping. It can be assumed that the addition of landscaping will result in reduced wind conditions from what is predicted.

Parks Near Lake Ontario

- In Test 1, wind conditions around the parks near Lake Ontario were expected to be suitable for standing and walking during the summer. Winter wind conditions were expected to be suitable for walking, with uncomfortable conditions expected in grade levels areas around Block 1.

- Buildings on Block 1 have become shorter in comparison to the Test 1 model. Furthermore, the podiums feature 'steps' which are beneficial for wind control. Therefore, the acceleration of northerly and northwesterly winds around the Block 1 development are expected to result in reduced wind speeds in comparison to the Test 1 model.

- The towers on the southern perimeter of masterplan (around Blocks 2 and 3) have not considerably increased in height, and feature a stepped design on a podium. This is not expected to significantly alter wind conditions around the park.

- However, there is a tall tower at the northwest corner of Block 2. Predominant wind speeds from the northwesterly directions are expected to accelerate around the perimeter of the tower and result in accelerated wind speeds around grade level (marked with a blue circle in Image 6).

Image 6: Wind conditions around parks

4. PREDICTED WIND CONDITIONS

Southern Blocks

- In Test 1, wind conditions around Blocks 1 through 4 were expected to be primarily suitable for standing during the summer and walking during the winter (winter conditions presented in Image 8). Higher wind speeds were expected around Block 1 as winds were redirected by the high-rise developments down to grade level .
- Wind conditions around Block 1 are expected to improve due to the reduction in tower height in comparison to the wind tunnel model. Wind speeds around Block 2 are expected to increase as the prevailing winds will be redirected by the tall northwest tower and result in accelerated wind speeds at grade level.
- Wind speeds around Block 2 are expected to improve in other areas due to the stepped features of the developments.
- In Test 1, wind safety exceedances were expected around Block 1. These safety conditions are expected to remain with the altered massing.

Image 7: Wind conditions southern blocks

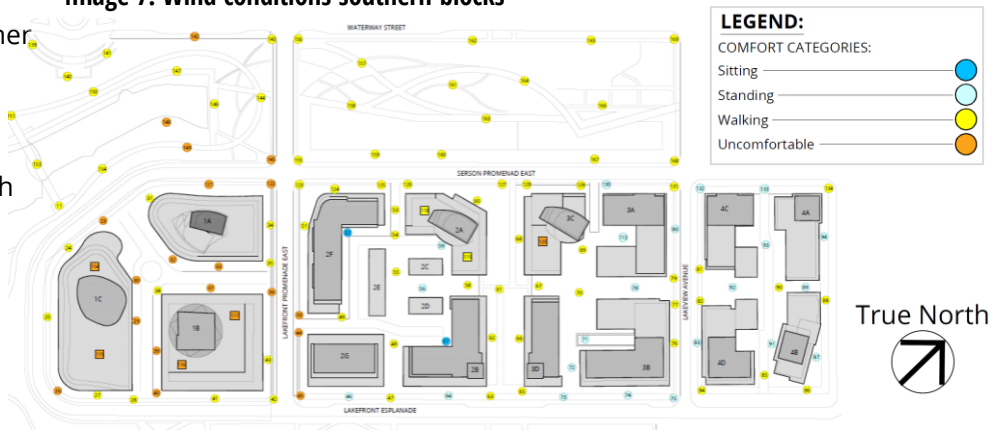


Image 8: Winter wind conditions around southern blocks from Test 1

4. PREDICTED WIND CONDITIONS

East Blocks

- Wind conditions around the east blocks were expected to be suitable for standing and walking in the winter (presented in Image 10) , with calmer wind speeds (suitable for standing and walking) expected during the summer months.
- In the latest model, the proposed towers are more aerodynamic, which is beneficial for wind comfort as it reduced the likelihood of corner accelerations.
- The proposed massing is more condensed, with fewer wide, open spaces when compared to the Test 1 model (as shown in Image 9).
- Although the towers are more condensed and closer together, the aerodynamic shape is expected to result in wind conditions that are similar to the wind tunnel test.
- However, wind speeds on the podiums of the high-rise towers are expected to be higher than desired for pedestrian use without some mitigation. Winds are also expected to channel between the taller towers and result in higher wind speeds around the perimeter of the tall towers (marked with blue circles).

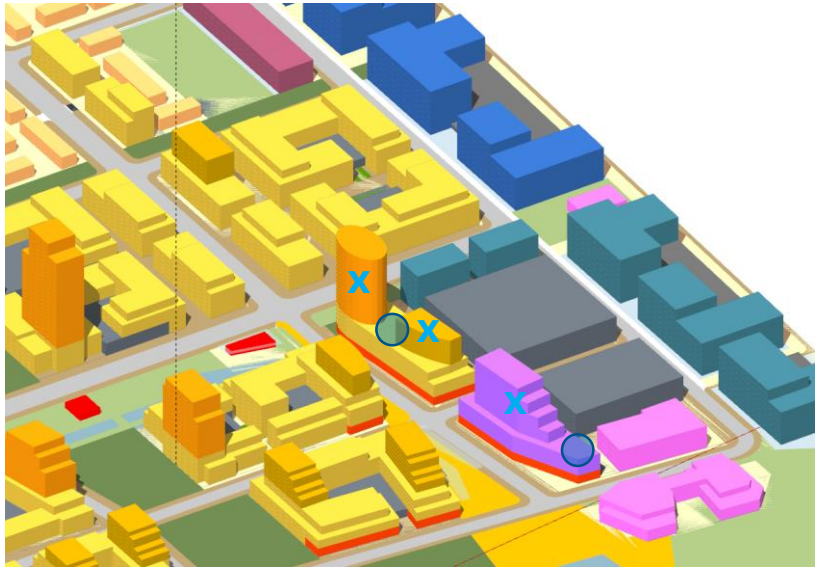


Image 9: Wind conditions around east blocks

Image 10: Winter wind conditions around east blocks from Test 1

4. PREDICTED WIND CONDITIONS

Northwest Blocks

- Wind conditions in the original pedestrian wind tunnel assessment were generally suitable for standing during the summer and walking during the winter. Wind speeds at a few isolated areas around Block 11 were expected to be uncomfortable.
- In the latest massing model, the taller developments are more dispersed in comparison to the wind tunnel test. The heights of the towers are also slightly reduced. This will reduce the impact of downwashing and channeling at grade level. Therefore, wind speeds are expected to be slightly reduced from the original wind tunnel test results .
- Overall, wind conditions are expected to become more suitable for strolling during the summer months due to the reduced wind speeds.
- During the winter months, uncomfortable wind conditions are expected to remain prevalent around the bases of taller buildings without any landscaping or mitigation solutions.

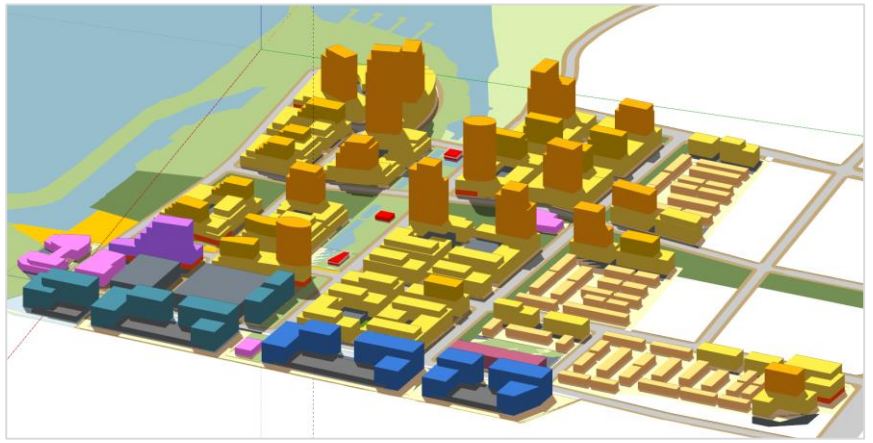


Image 11: Updated massing model

Image 12: Winter wind conditions around northwest blocks from Test 1