

REPORT

210-222 COLLEGE AVENUE EAST

GUELPH, ONTARIO

PEDESTRIAN WIND COMFORT ASSESSMENT

PROJECT #2600560

January 12, 2026



SUBMITTED TO

**EM Guelph Developments Limited
Partnership**

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1. INTRODUCTION



Rowan Williams Davies & Irwin Inc. (RWDI) was retained to conduct a pedestrian wind assessment for the proposed project at 210-222 College Avenue East located in Guelph, Ontario. The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development in support of Zoning By-Law Amendment (ZBA) and Official Plan Amendment (OPA).

The project site is located on the north side of College Avenue East, west of the intersection with Dundas Lane and north of the University of Guelph campus. The site is currently occupied by three single family homes and is primarily surrounded by open fields, low-rise buildings, and parking areas (Image 1).

The project is a post secondary student residence development that will consist primarily of a 10-storey building with 153 units and have a total gross floor area of approximately 15,441 m². Key areas of interest for this assessment include the main entrance on College Avenue East, the central at-grade courtyard, the exterior amenities on the ground level and at Level 10, as well as the public sidewalks and properties surrounding the project site (Image 3).



Image 1: Aerial View of the Existing Site and Surroundings
Source: Google Maps

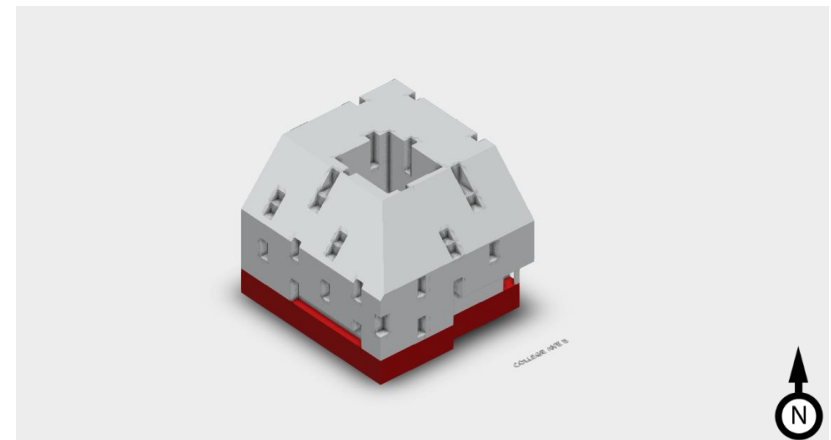
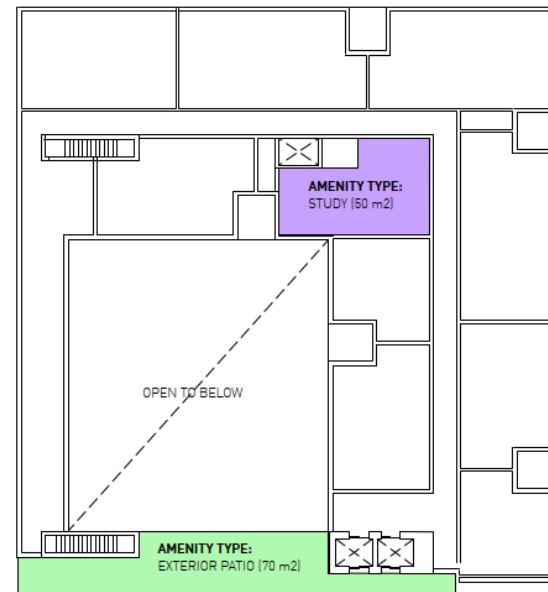
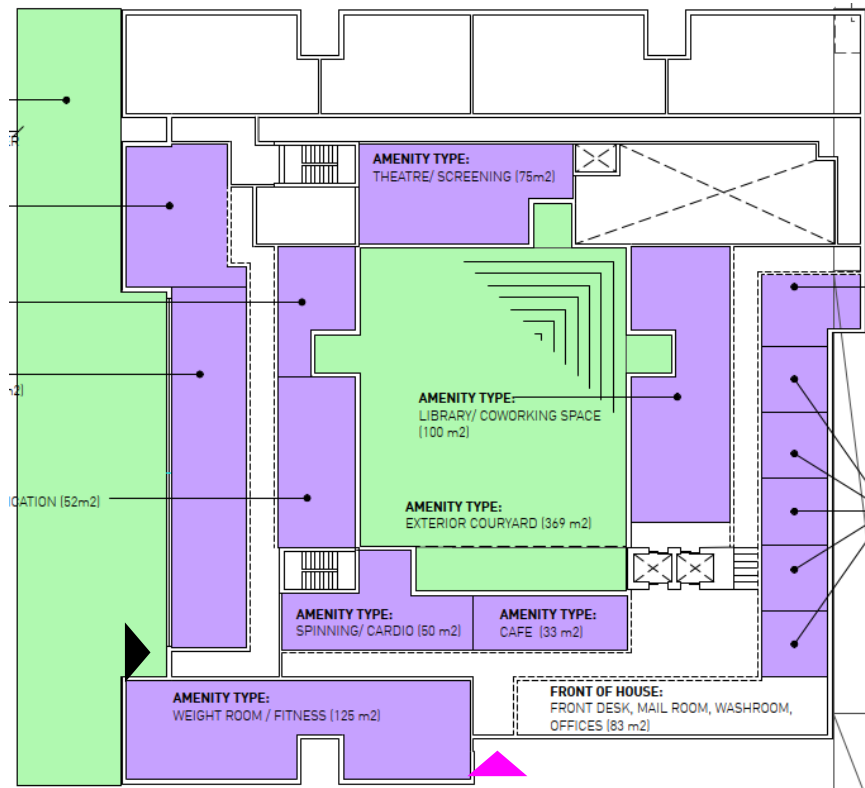


Image 2: Conceptual Massing of Proposed Development

1. INTRODUCTION



(a) Ground Floor Plan

(b) Level 10 - Floor plan



Image 3: Floor Plans Identifying Key Outdoor Areas of Interest

2. METHODOLOGY



2.1 Objective

The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development on wind conditions in pedestrian areas on and around it based on Computational Fluid Dynamics (CFD) modelling. The assessment is based on the following:

- A review of the regional long-term meteorological data from the Region of Waterloo International Airport;
- 3D model and architectural plans of the proposed development received on December 1 and 2, 2023, respectively;
- The use of *Orbital Stack*, an in-house CFD tool;
- RWDI's engineering judgment, experience, and expert knowledge of wind flows around buildings¹⁻³; and,
- The criteria specified in the *Pedestrian Level Wind Studies Terms of Reference* (May 2019) prepared by the city of Guelph.

Note that other microclimate issues such as those relating to cladding and structural wind loads, door operability, air quality, snow impact, noise, vibration, etc. are not part of the scope of this assessment

2.2 CFD for Wind Simulation

CFD is a numerical technique that can be used for simulating wind flows in complex environments. For this analysis, CFD techniques were used to generate a virtual wind tunnel where flows around the site and its surroundings were simulated in full scale. The computational domain that covered the site and its surroundings was divided into millions of small cells where calculations were performed, yielding a prediction of wind conditions across the entire study domain. CFD excels as a tool for wind modelling, presenting early design advice, comparing different design and site scenarios, resolving complex flow physics, and helping diagnose problematic wind conditions.

While the computational modelling method used in the current assessment does not explicitly simulate the transient behaviour of turbulent wind, its effects were estimated based on other calculated quantities. RWDI has found this approach to be appropriate for the assessment of typical wind comfort conditions. Wind safety issues, which relate to transient, higher-speed gusts, are discussed qualitatively, based on the CFD predictions and our extensive wind-tunnel experience for similar projects.

In order to quantify the transient behaviour of wind and refine any conceptual mitigation measures, a more detailed assessment would be required using either boundary-layer wind tunnel or transient computational modelling.

2. METHODOLOGY

2.3 Simulation Model

CFD simulations were completed for two scenarios:

- Existing: Existing site and surroundings, and
- Proposed: Proposed development with the existing surroundings.

The computer model of the proposed building is shown in Image 4, and the Existing and Proposed configurations with the proximity model are shown in Images 5 and 6, respectively. The 3D models were simplified to include only the necessary building and terrain details that would affect the local wind flows in the area and around the site. Small architectural and accessory features were not included in the computer model in order to provide more conservative wind conditions (as is the norm for this level of assessment).

The wind approaching the modelled area were simulated for 16 directions (starting at 0°, at 22.5° increments around the compass), accounting for the effects of the atmospheric boundary layer and terrain impacts. Wind data were obtained in the form of ratios of wind speeds at approximately 1.5 m above concerned levels, to the mean wind speed at a reference height. The data was then combined with meteorological records obtained from the Region of Waterloo International Airport to determine the wind speeds and frequencies in the simulated areas.

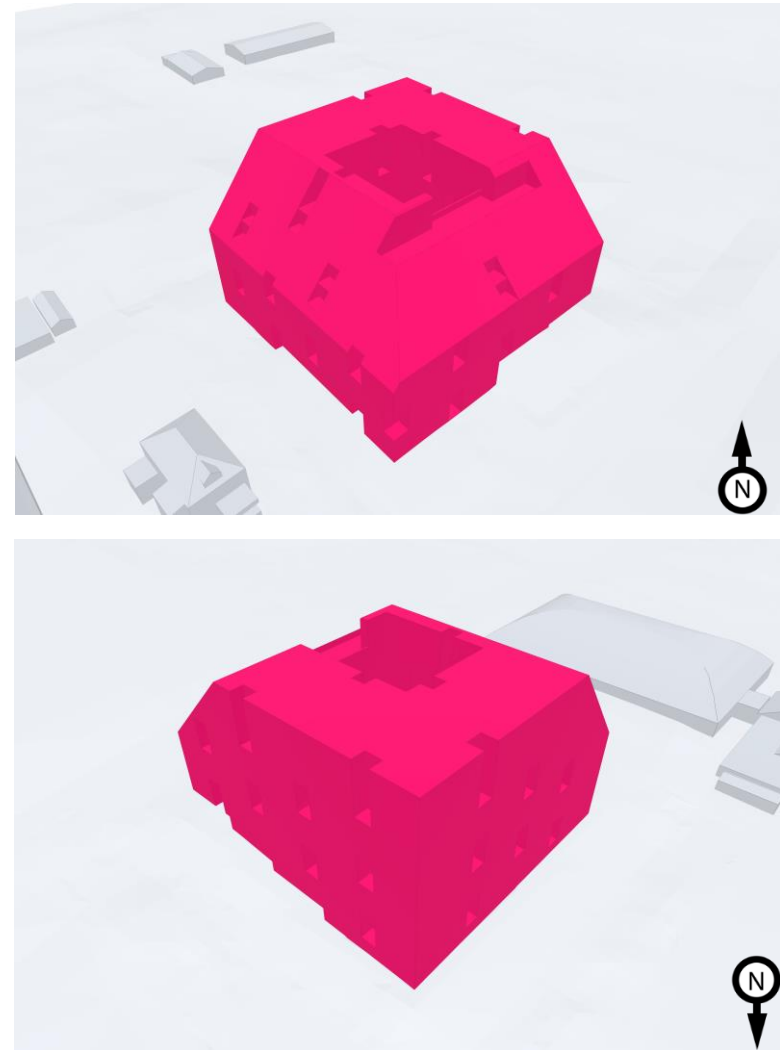


Image 4: Computer Model of the Proposed Development

2. METHODOLOGY

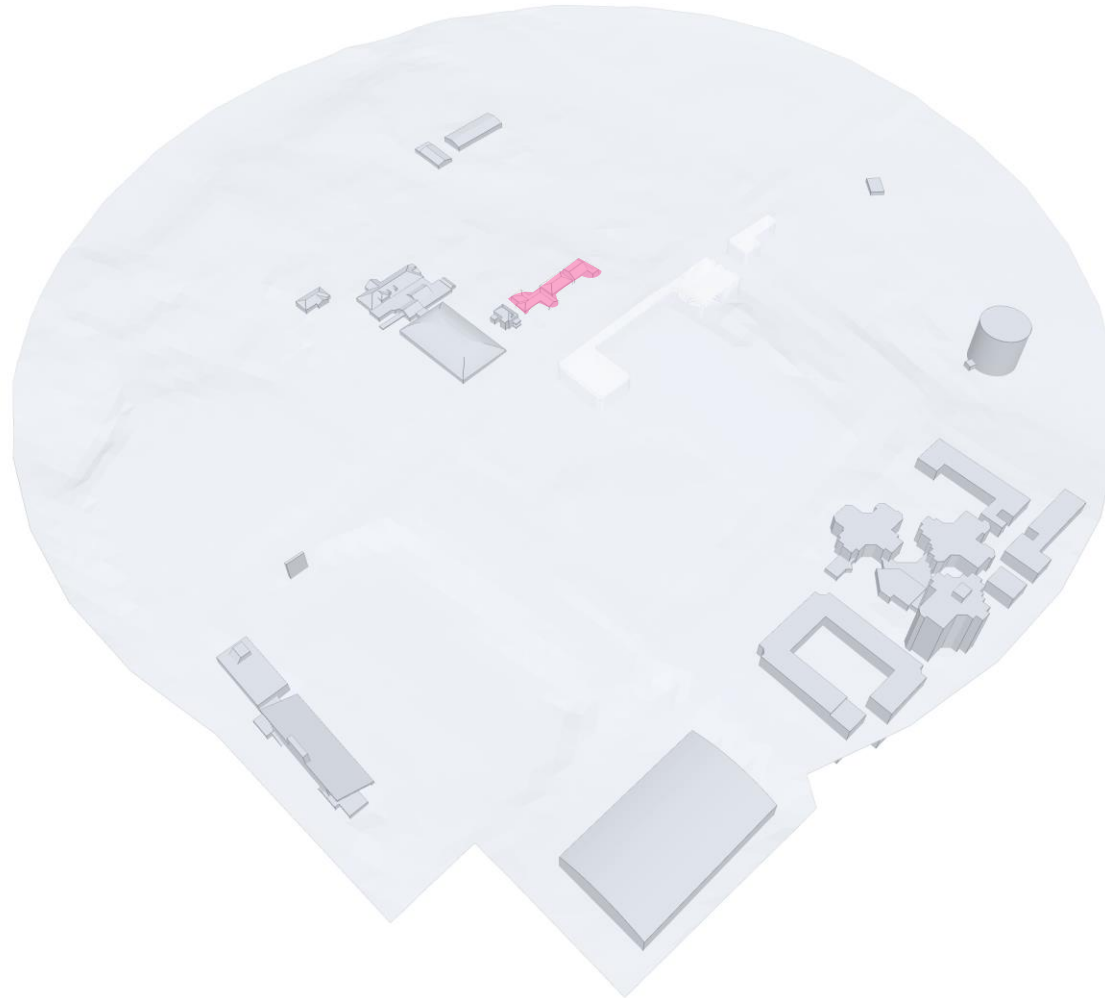


Image 5: Computer Model of the Existing Site and Extended Surroundings

2. METHODOLOGY

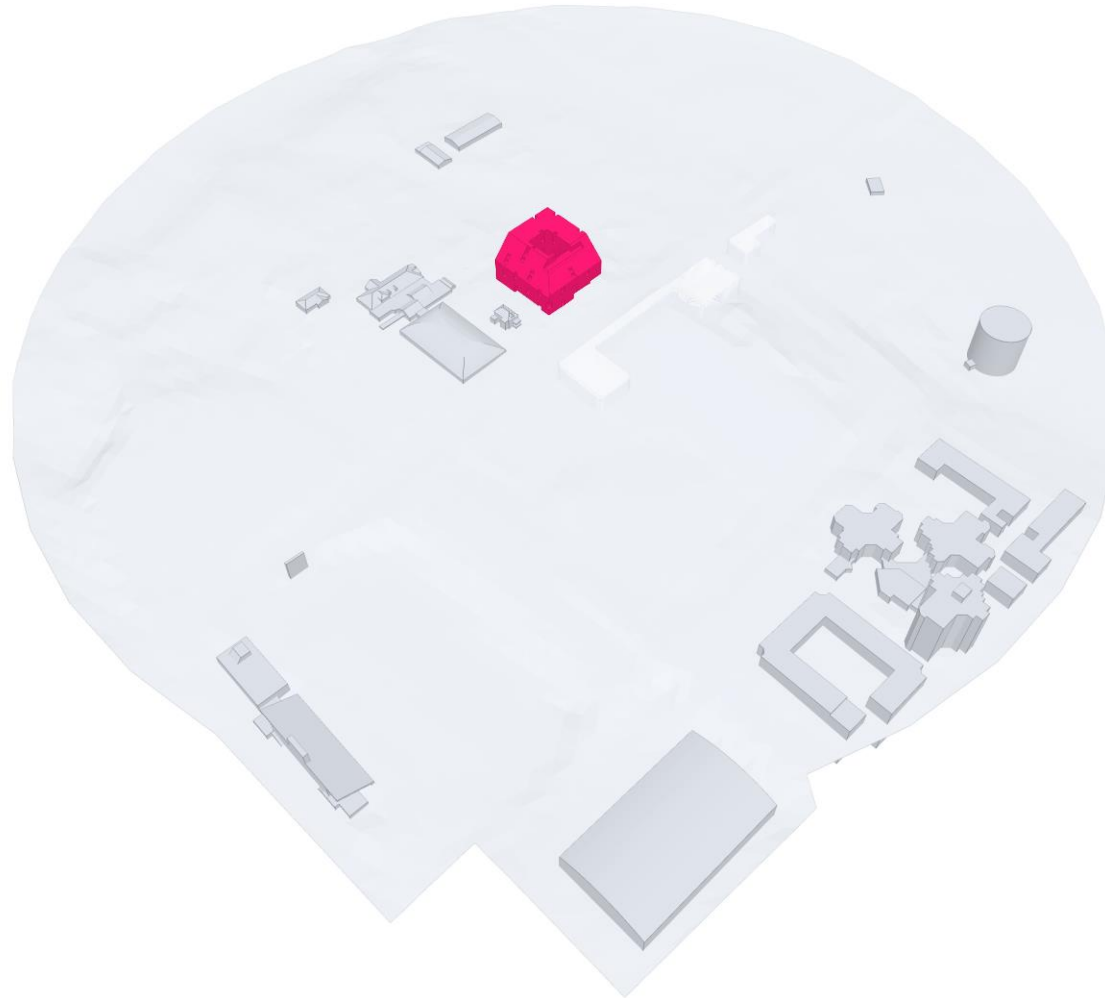


Image 6: Computer Model of the Proposed Site and Extended Surroundings

2. METHODOLOGY



Long-term wind data recorded at the Region of Waterloo International Airport between 1994 and 2024, inclusive, were analyzed for the summer (May to October) and winter (November to April) months. Image 6 graphically depicts the directional distributions of wind frequencies and speeds for these periods.

Winds from the southwest and northwest quadrants, as well as the east are predominant in both seasons.

Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10 m) are more frequent in the winter (red and yellow bands in Image 7). These winds potentially could be the source of uncomfortable or severe wind conditions, depending on the site exposure and development design.

Wind statistics were combined with the simulated data to predict the wind conditions at the project site and assessed against the wind criteria for pedestrian comfort.

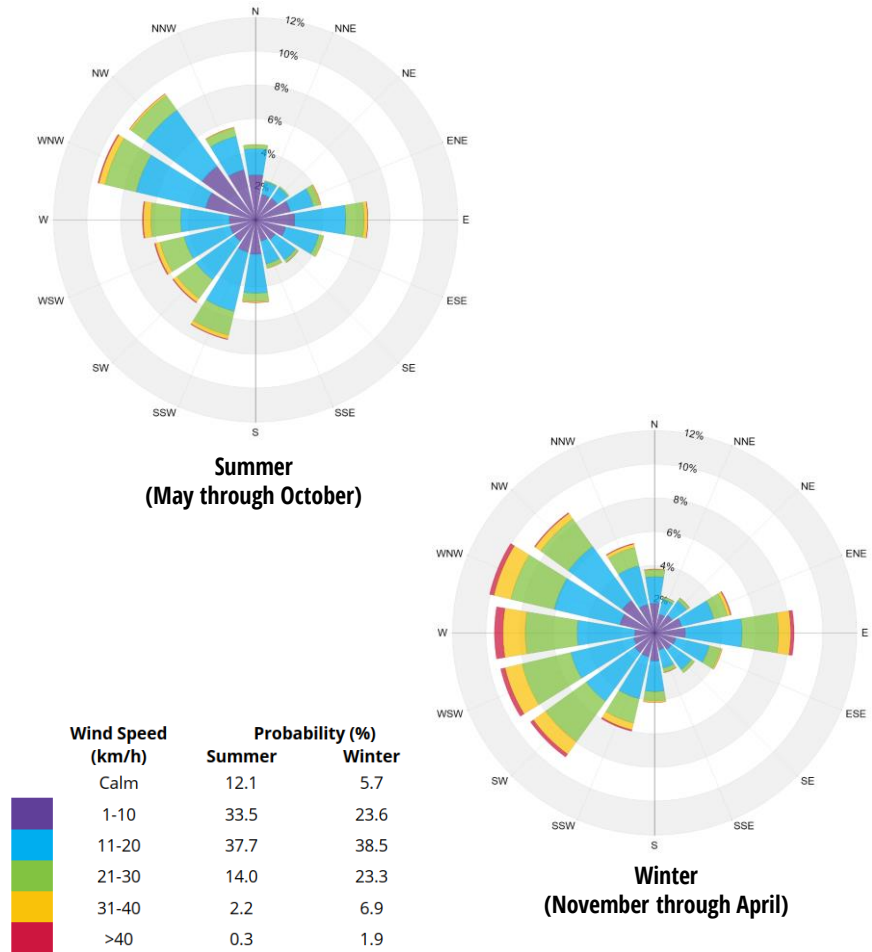


Image 7: Directional Distribution of Wind Approaching the Region of Waterloo International Airport (1994 to 2024)

3. WIND CRITERIA



The criteria specified in the *Pedestrian Level Wind Studies Terms of Reference* (May 2019) prepared by the City of Guelph are used in the current study and presented below.

Comfort Category	GEM Speed (km/h)	Description
Sitting	≤ 10	Calm or light breezes desired for outdoor restaurants and seating areas where one can read a paper without having it blown away.
Standing	≤ 15	Gentle breezes suitable for main building entrances, bus stops, plazas, and other places where pedestrians may linger.
Walking	≤ 20	Relatively high speeds that can be tolerated if one's objective is to walk, run, or cycle without lingering.
Uncomfortable	> 20	Strong winds of this magnitude are considered a nuisance for all pedestrian activities, and wind mitigation is typically recommended.
Safety Criterion	Gust Speed (km/h)	Description
Exceeded	> 90	Excessive gust speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required

Notes:

- 1) GEM speeds are equal to the gust speed divided by 1.85, or the mean speed (whichever is larger); and,
- 2) GEM speeds listed above are based on a seasonal exceedance of 20% of the time between 06:00 and 23:00.
- 3) The safety criterion is based on an annual exceedance of 9 hours or 0.1% of the time for 24 hours a day.

Wind conditions are considered suitable for sitting, standing, or walking if the associated mean wind speeds are expected for at least four out of five days (80% of the time). Wind control measures are typically required at locations where winds are rated as unsafe, uncomfortable or are not compatible with the intended pedestrian use.

Note that these wind speeds are assessed at the pedestrian height (i.e., 1.5 m above grade or the concerned floor level), typically lower than those recorded in the airport (10 m height and open terrain).

These criteria for wind forces represent average wind tolerance. They are sometimes subjective and regional differences in wind climate and thermal conditions as well as variations in age, health, clothing, etc. can also affect people's perception of the wind climate.

Pedestrian safety is associated with excessive Gust Speeds that can adversely affect a person's balance and footing. These are usually infrequent events but deserve special attention due to the potential impact on pedestrian safety.

4. RESULTS AND DISCUSSION



4.1 Wind Flow around the Project

Wind generally tends to flow over buildings of uniform height, without disruption. Buildings that are taller than their surroundings tend to intercept and redirect winds around them. The mechanism in which winds are directed down the height of a building is called *Downwashing*. These flows subsequently move around exposed building corners, causing a localized increase in wind activity due to *Corner Acceleration*. These flow patterns are illustrated in Image 8.

The proposed development will be taller than the buildings that exist in the surrounding area. The project is expected to redirect winds around it; however, potential wind impacts would be limited and localized due to the moderate building height and several positive design features for wind control.

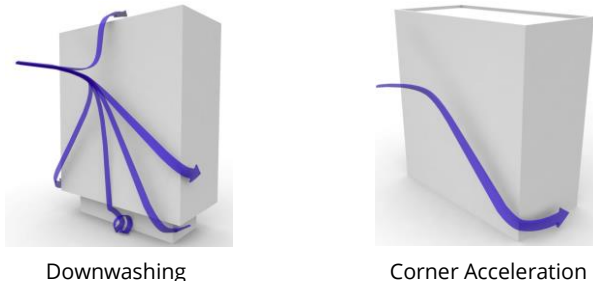


Image 8: General Wind Flow Patterns

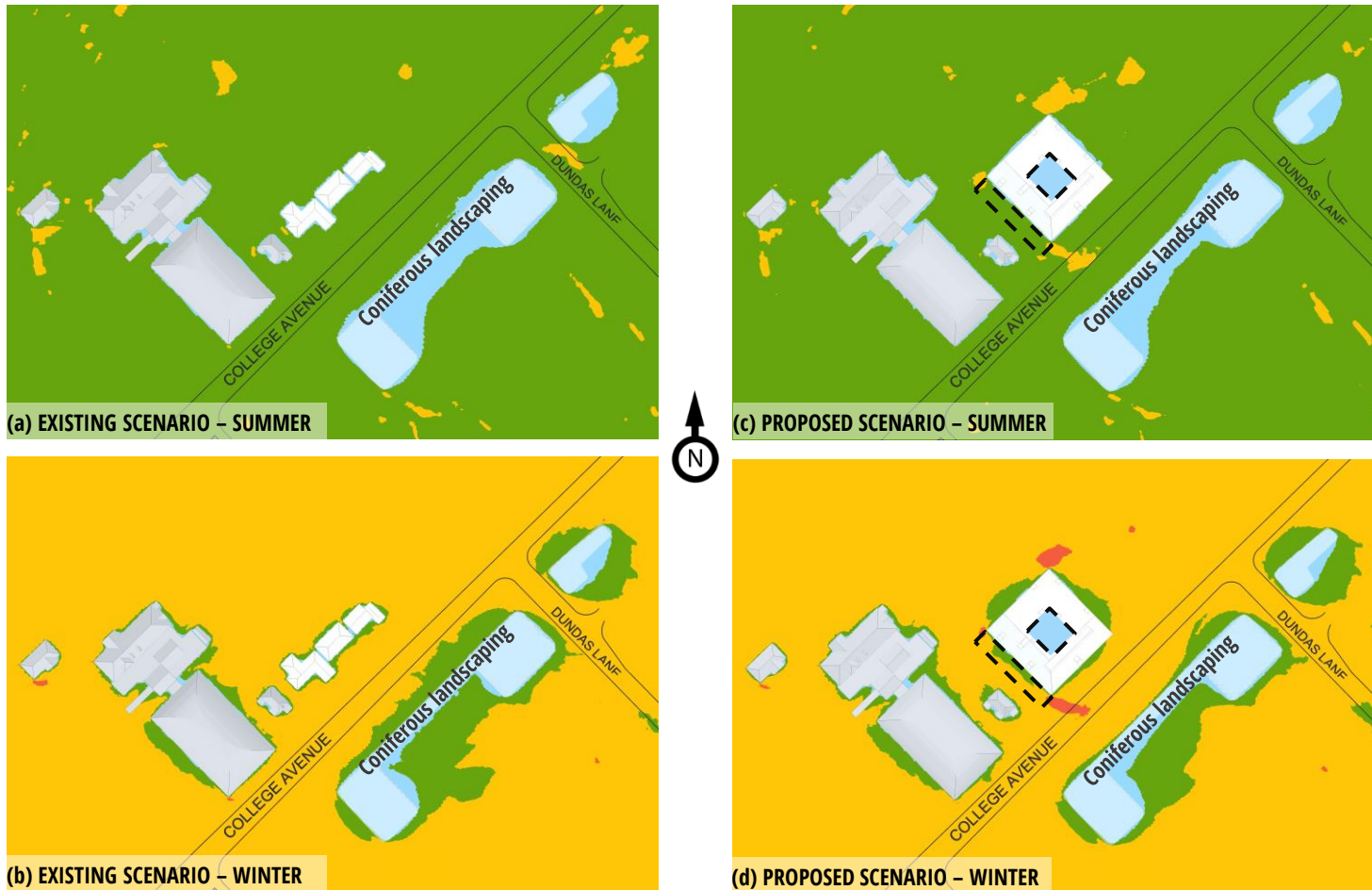
4.2 Presentation of Results

The results of the assessment are presented and discussed in detail in Sections 4.3 and 4.4. The graphical presentation is in the form of colour contours of wind speeds calculated based on the wind comfort criteria, approximately 1.5 m above the concerned level in Images 9 through 11. The assessment against the safety criterion was conducted qualitatively based on the predicted wind conditions and our extensive experience with wind tunnel assessments. Where necessary, the discussion includes recommendations for wind control to reduce the potential for high wind speeds for the consideration of the design team.

Target Conditions

For the current development, wind speeds comfortable for walking are appropriate for sidewalks and walkways where pedestrians are likely to be active and moving intentionally. Lower wind speeds comfortable for standing are required for entrances and areas where people are expected to be engaged in passive activities. Calm wind speeds suitable for sitting or standing are desired in areas where prolonged use of passive spaces are anticipated, such as outdoor amenities, especially during the summer when these areas are typically in use.

4. RESULTS AND DISCUSSION



COMFORT: SITTING (blue) STANDING (green) WALKING (yellow) UNCOMFORTABLE (red)

SAFETY: The criterion will be met at all areas. Outdoor Amenity

Image 9: Predicted Wind Conditions – GROUND LEVEL

4. RESULTS AND DISCUSSION



4.3 Existing Scenario

The existing buildings on the site are low-rise, like the adjacent buildings and trees, and therefore will not redirect winds to create any notable impact. Wind conditions at most areas in the existing scenario are comfortable for standing in the summer (Image 9a) and for walking in the winter (Image 9b).

Wind conditions at all areas near the project site are expected to meet the safety criterion.

4.4 Proposed Scenario

Wind conditions at grade around the proposed project are also expected to meet the safety criterion, based on the moderate building massing and the predicted wind comfort conditions.

4.4.1 Sidewalks and Neighbouring Properties

Although the introduction of a relatively tall building within a low-rise context will result in increased wind speeds, the addition of the proposed massing is not anticipated to worsen wind conditions on neighbouring properties.

The resulting wind speeds at most sidewalks and areas outside the property are expected to continue to be comfortable for standing in the summer, and walking in the winter, similar to the existing scenario (Images 9c and 9d). These conditions are appropriate for sidewalk and parking uses.

During the winter months, higher wind speeds that are potentially uncomfortable for pedestrian use are expected occasionally in small areas at the exposed corners of the proposed development, due to corner-accelerated wind flows (Image 9d).

If improved conditions are desired along the College Avenue sidewalk, the design team may consider incorporating evergreen landscaping or wind screens around the southwest building corners.

4.4.2 Grade Level Outdoor Amenity

Wind conditions at the outdoor amenity area to the west side of the proposed development are expected to be comfortable for standing during summer, which is appropriate for passive use, and comfortable for walking during winter, which is suitable for active pedestrian use. These wind conditions are generally appropriate for the intended use. Higher wind speeds are expected near the southwest corner, as a result of corner acceleration at this exposed corner.

If lower wind speeds are desired, the design team may consider following the recommendations proposed in the previous section 4.4.1.

4.4.3 Central Courtyard

This area is enclosed and sheltered from winds from all directions; therefore, wind conditions within this outdoor amenity are expected to be comfortable for sitting throughout the year, which is favourable for outdoor amenity use.

4. RESULTS AND DISCUSSION



4.4.4 Main Entrances

The main and secondary entrance are in recessed areas under building overhangs along the south and west façades of the building. As a result, wind conditions near the entrance areas are comfortable for sitting in the summer and winter (Image 10). These conditions are appropriate for the intended pedestrian operation.

COMFORT CATEGORIES

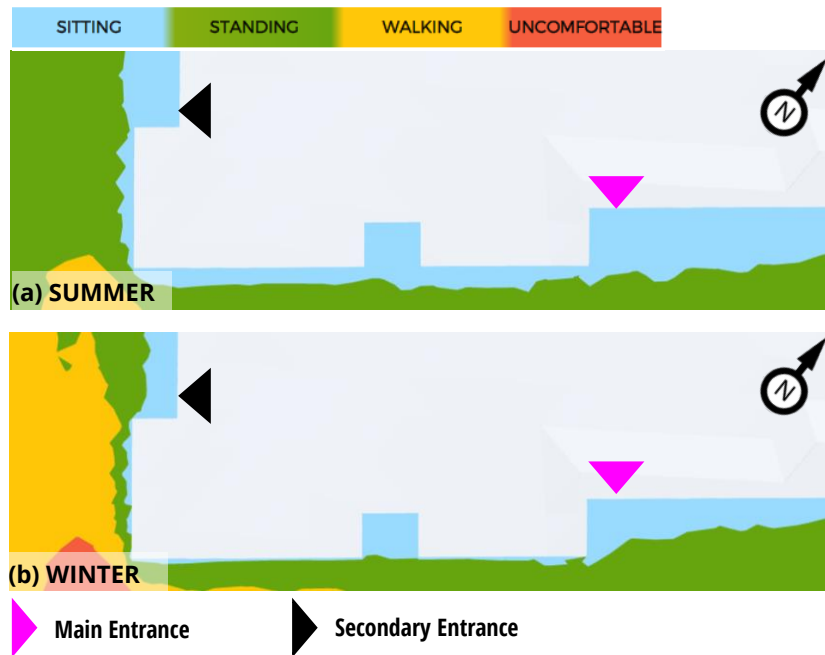


Image 10: Predicted Wind Conditions – MAIN ENTRANCES

4.4.5 Level 10 - Outdoor Amenity

A roof terrace is proposed at Level 10 along College Avenue East (Image 3). In the summer, wind speeds are generally comfortable for walking (Image 11 a). Conditions comfortable for walking are acceptable for active uses, and conditions comfortable for standing or sitting would be desired for areas where one may linger or passively use the space. Higher wind speeds that are potentially uncomfortable are expected in one isolated area to the southwest of the amenity area.

Without any wind control measures, during the winter, uncomfortable wind conditions are mostly anticipated around the outdoor amenity (Image 11 b). Elevated wind conditions may be acceptable, as these areas are not occupied during the colder months.

Higher wind speeds in the above-grade amenity area are the result of direct exposure to prevailing southwesterly and westerly winds. As a result, the wind safety criterion is expected to be exceeded in some localized areas to the southwest of this amenity space.

To improve the wind conditions during the summer (i.e., to make them comfortable for sitting), the design team may consider implementing wind mitigation elements such as tall guardrails along the terrace perimeter, as well as local wind screens, partitions or planters around seating areas to diffuse prevailing wind flows. We recommend any screen material to be at a maximum of 30% open porosity and at a minimum height of 2 m. Examples of these elements are shown in Image 12.

4. RESULTS AND DISCUSSION



(a) SUMMER



(b) WINTER



Image 11: Predicted Wind Conditions – LEVEL 10 OUTDOOR AMENITY

4. RESULTS AND DISCUSSION

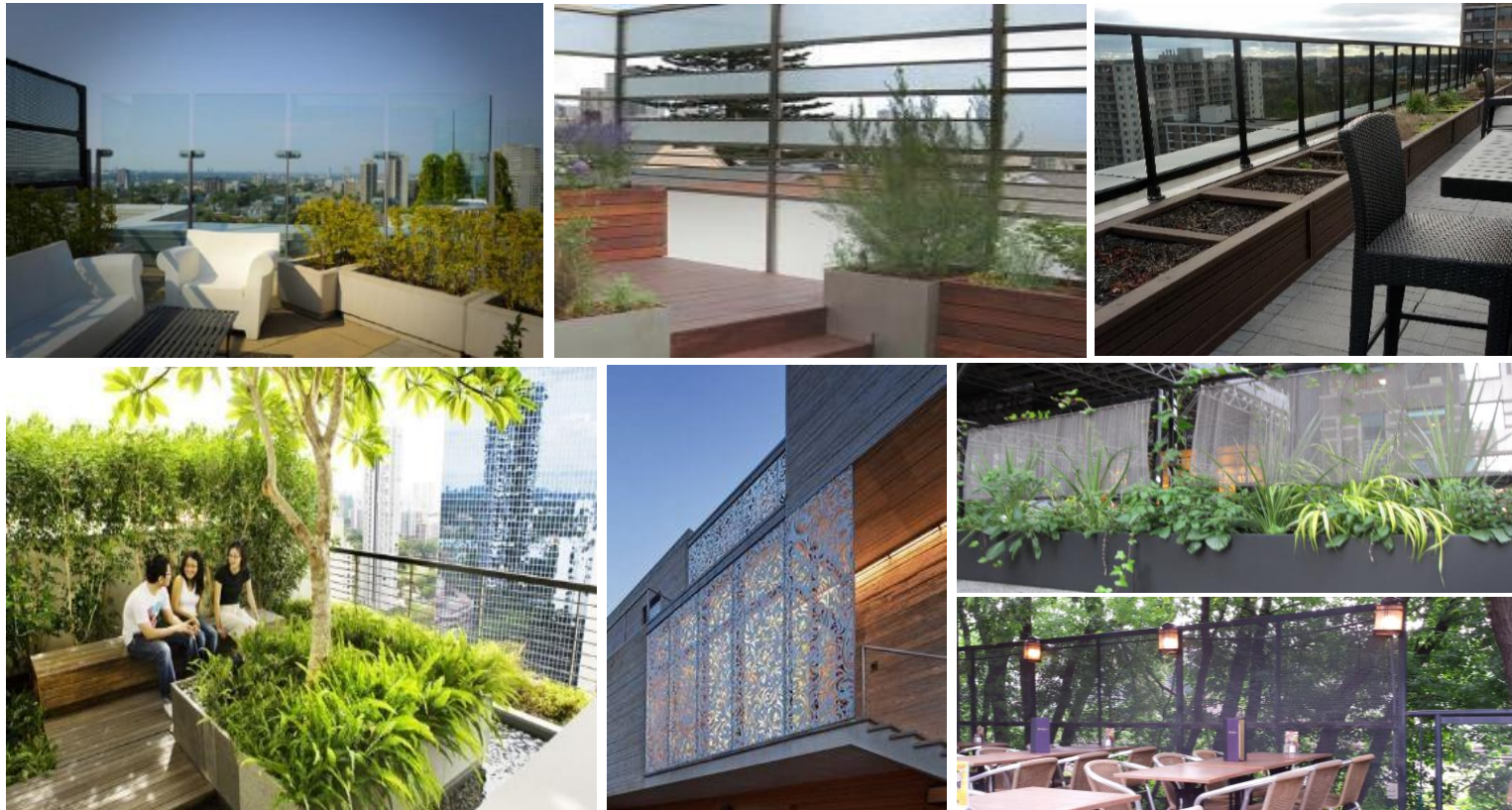


Image 12: Design Strategies for the Outdoor Amenities

5. SUMMARY



RWDI was retained to provide an assessment of the potential pedestrian-level wind impact of the proposed development at 210-222 College Avenue East located in Guelph, Ontario. Our assessment was based on computational modelling, simulation and analysis of wind conditions for the proposed development design, in conjunction with the local wind climate data and the RWDI wind criteria for pedestrian comfort and safety. Our findings are summarized as follows:

- Existing wind conditions are considered suitable for the intended use throughout the year, where wind speeds meet the pedestrian safety criterion.
- The proposed building is taller than its surroundings and therefore will redirect wind to the ground level. However, it is not expected to adversely affect wind conditions on adjacent properties.
- Wind conditions at ground level, including the main and secondary entrances, the outdoor amenity and central courtyard, are expected to be appropriate for the intended usage.
- Potentially uncomfortable wind speeds are expected in small areas near the exposed corners of the proposed building in the winter.
- Wind conditions at grade around the proposed project are predicted to meet the safety criterion.
- Wind speeds on the Level 10 exterior amenity are predicted to be appropriate for active use in most areas during the summer, while

higher than desirable conditions are expected in the winter that are uncomfortable and may exceed the wind safety criterion. Wind control strategies have been provided.

6. DESIGN ASSUMPTIONS



The findings/recommendations in this report are based on the building geometry and architectural drawings communicated to RWDI in December 2025, listed below. Should the details of the proposed design and/or geometry of the building change significantly, results may vary.

File Name	File Type	Date Received (mm/dd/yyyy)
5468796_210-214-222 College Ave East_Architectural Drawings for OPA ZBA for client review_v3	PDF	01/08/2026
25.12.01 0820 YARRA massing model [SENT]	SketchUp	12/01/2025

Changes to the Design or Environment

It should be noted that wind comfort is subjective and can be sensitive to changes in building design and operation that are possible during the life of a building. In the event of changes to the design, construction, or operation of the building in the future, RWDI could provide an assessment of their impact on the discussions included in this report. It is the responsibility of others to contact RWDI to initiate this process.

7. STATEMENT OF LIMITATIONS



This report was prepared by Rowan Williams Davies & Irwin Inc. for EM Guelph Developments Limited Partnership (“Client”). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein and authorized scope. The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

8. REFERENCES



1. 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.
2. 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.
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.