REPORT

ORLEANS TOWN CENTRE

ORLEANS, ONTARIO

PEDESTRIAN WIND COMFORT ASSESSMENT

PROJECT #2507872
December 2, 2025

SUBMITTED TO

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1. INTRODUCTION

Rowan Williams Davies & Irwin Inc. (RWDI) was retained to conduct a pedestrian wind assessment for the proposed project, Orleans Town Centre, at Centrum Boulevard, Orleans, Ontario. The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development in support of a Zoning By-Law Amendment application as part of an ongoing P3 partnership between Forum and the City of Ottawa.

The project site is located between Centrum Blvd and Queensway, surrounded by low-rise and mid-rise suburban neighbourhoods (Image 1).

The proposed master plan development consists of two lots with multiple development blocks. The towers (A to E) on the Orleans Town Centre lot range from 6 to 40 storeys. The buildings will be on podiums, which is favourable for reducing wind impacts on the ground. The Bayview Development on the other lot is also assessed as part of the proposed project. Key areas of interest for this assessment include the main entrances to the proposed buildings, amenity spaces on podiums and public sidewalks and properties near the project site (Image 3).

Image 1: Aerial view of the existing site and surroundings
Source: Google Maps

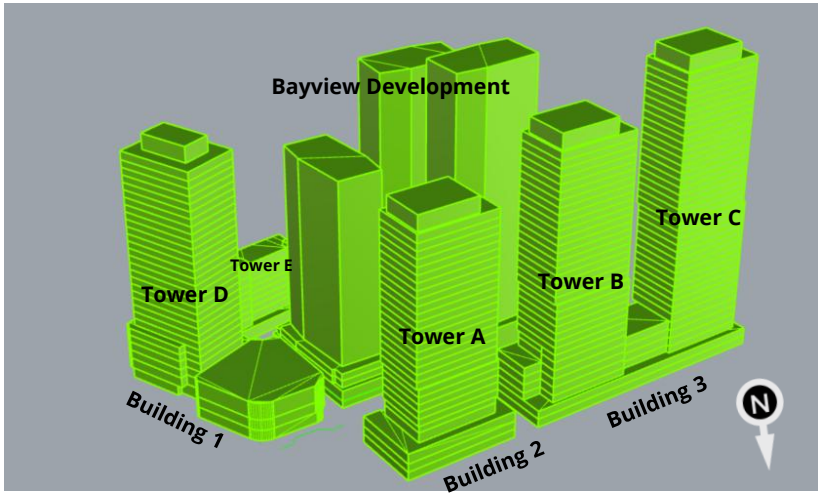

Image 2: Conceptual Massing of the Proposed Project

1. INTRODUCTION

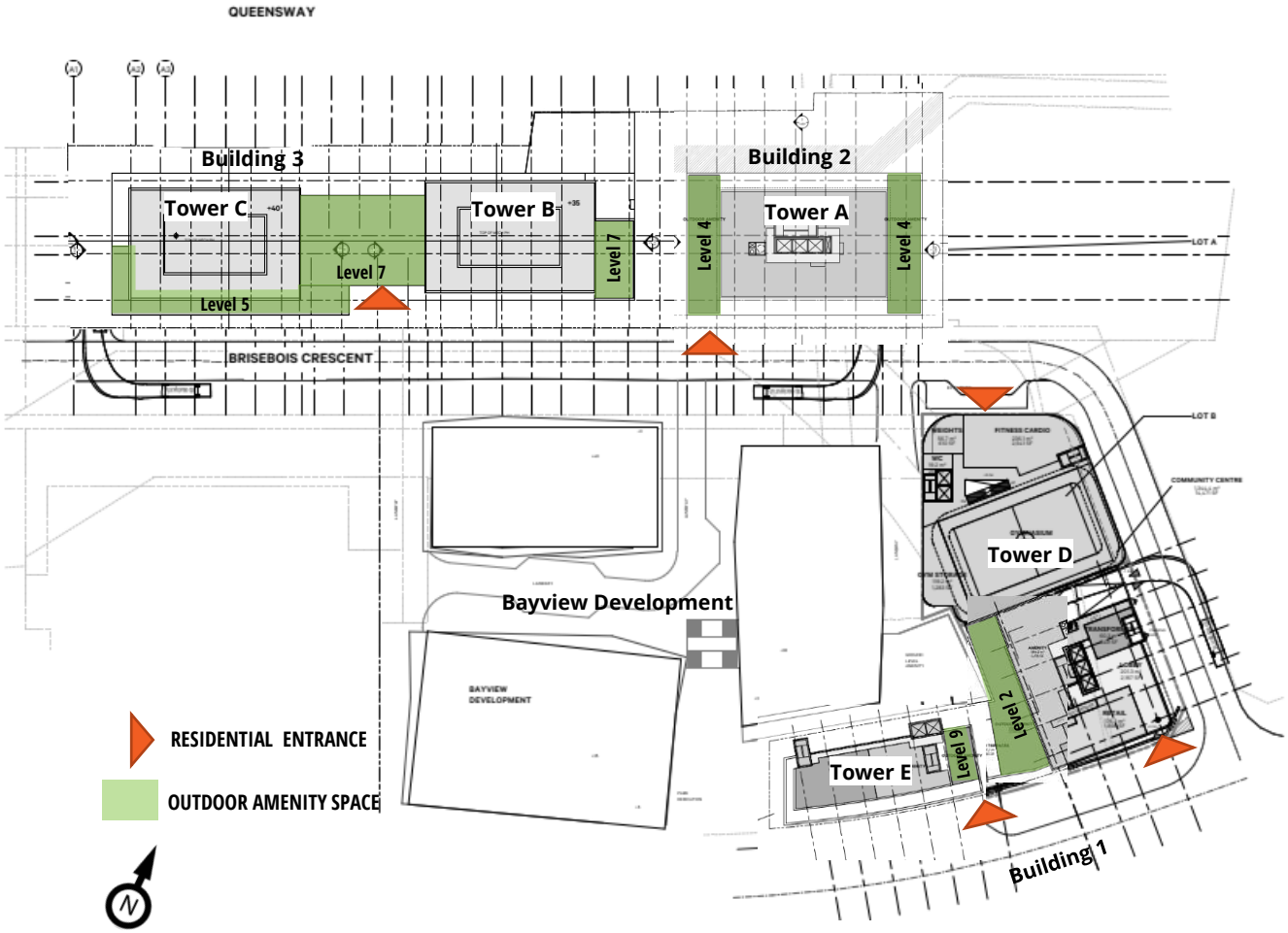

Image 3: Floor Plans identifying Key Outdoor Areas of Interest

2. METHODOLOGY

2.1 Objective

The objective of this assessment is to provide an evaluation of the potential 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 Ottawa Macdonald-Cartier International Airport;
- 3D model of the proposed project received on October 22, 2025.
- The use of *Orbital Stack*, an in-house CFD tool;
- RWDI's engineering judgment, experience, and expert knowledge of wind flows around buildings[1-3]; and,
- The RWDI wind comfort and safety criteria.

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 5a and 5b, respectively. The Bayview Development is also assessed as part of the proposed scenario. 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. Landscaping and other smaller 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 was 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 1.5m above concerned levels, to the mean wind speed at a reference height. The data was then combined with meteorological records obtained from Ottawa Macdonald-Cartier International Airport to determine the wind speeds and frequencies in the simulated areas.

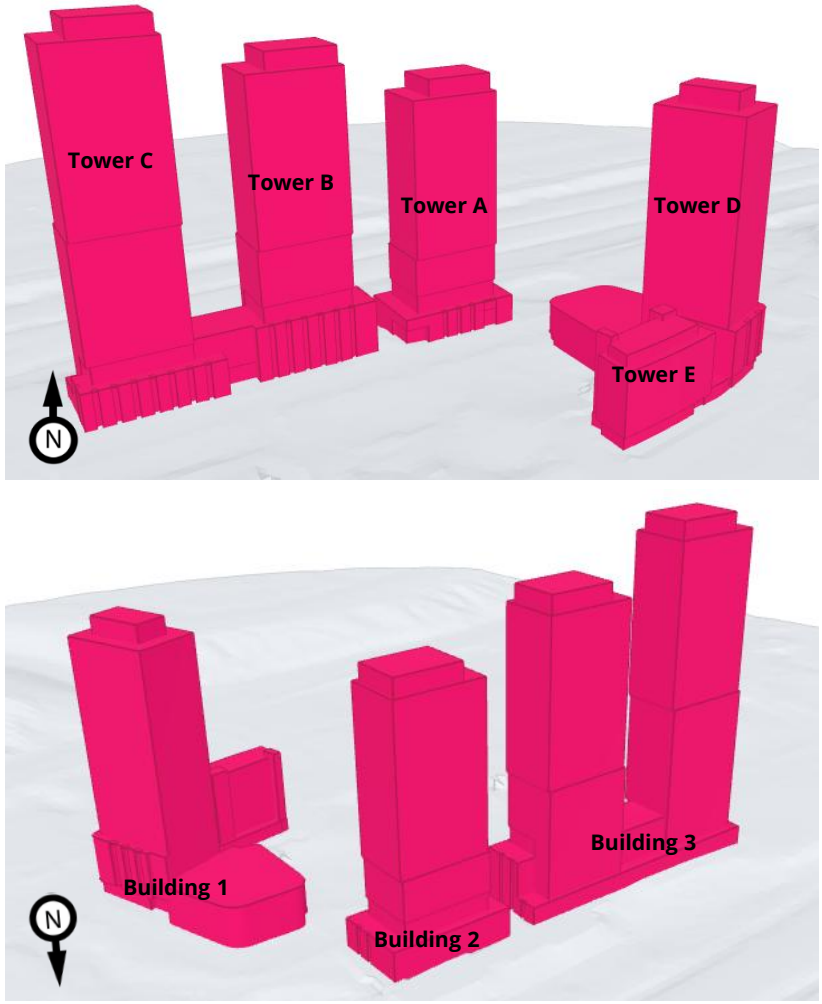

Image 4: Computer model of the proposed project

2. METHODOLOGY

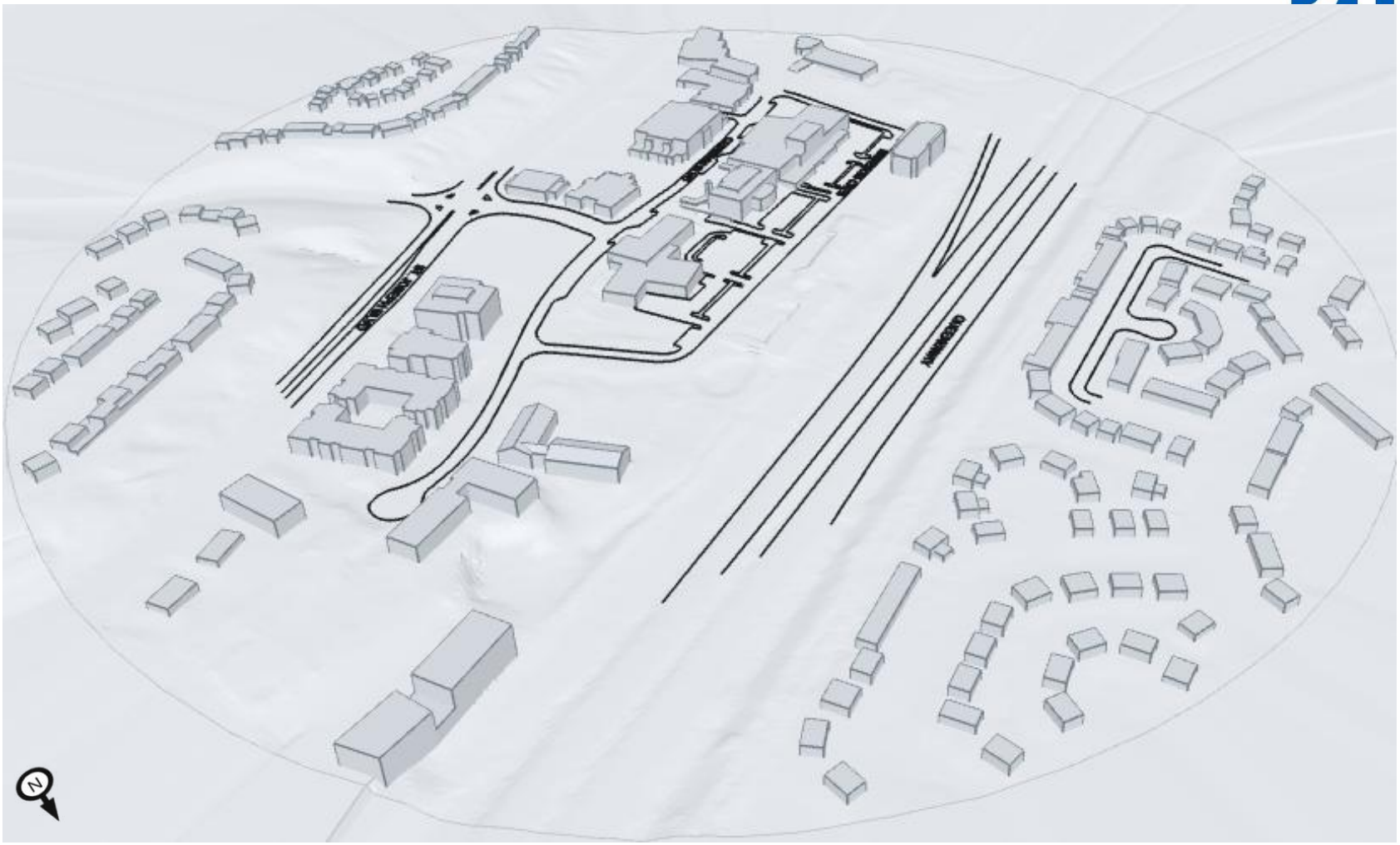

Image 5a: Computer model of the existing site and extended surroundings

2. METHODOLOGY

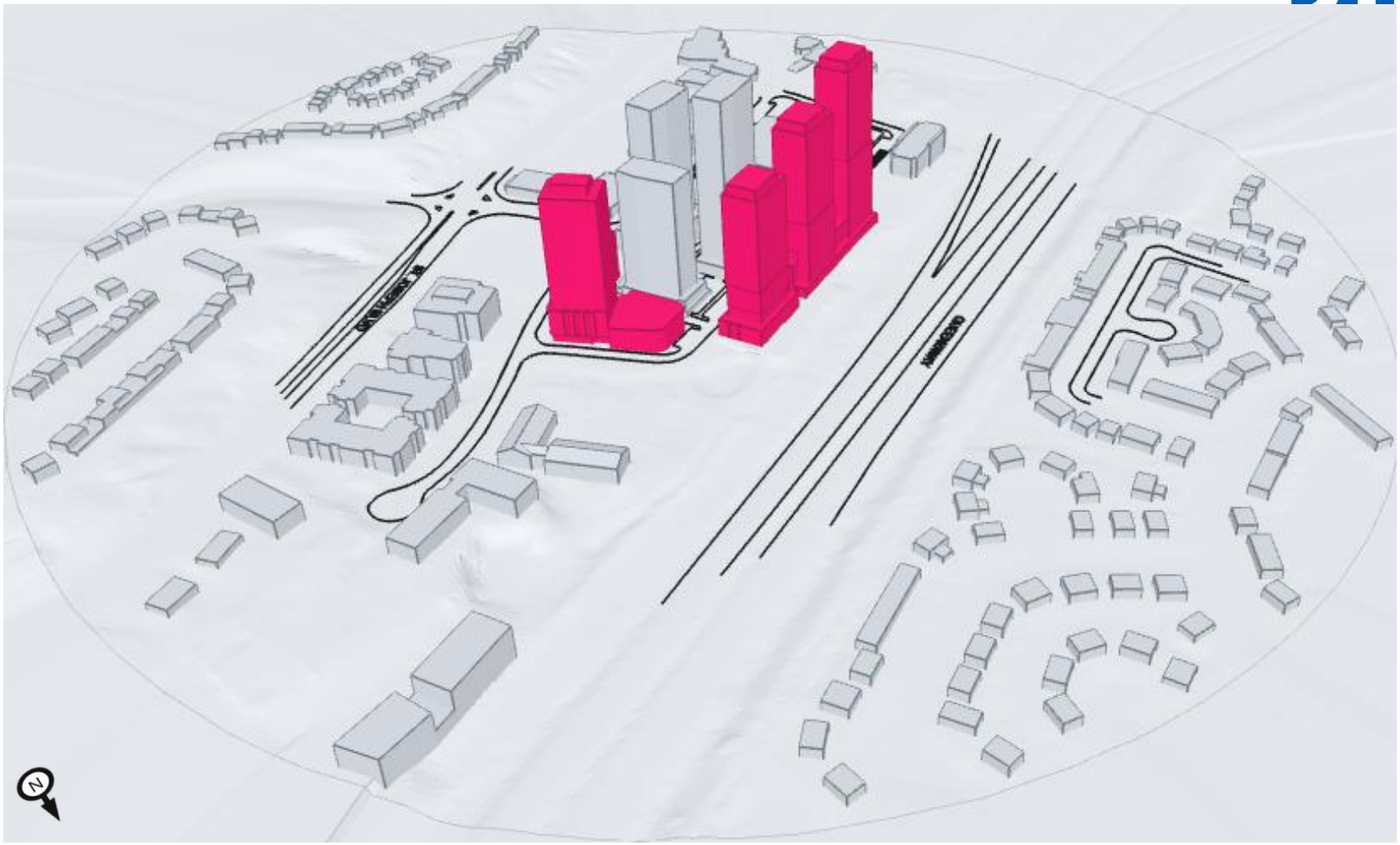

Image 5b: Computer Model of the Proposed Development and Extended Surroundings

2. METHODOLOGY

2.4 Meteorological Data

Long-term wind data recorded at approaching Ottawa Macdonald-Cartier International Airport between 1994 and 2024, inclusive, were analyzed for four seasonal periods – spring (March to May), summer (June to August), fall (September to November) and winter (December to February) months. Image 6 graphically depicts the directional distributions of wind frequencies and speeds for these periods.

Winds from the northeast, northwest and southwest quadrants are predominant throughout the year, with seasonally higher wind speeds during the winter and spring months.

Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10m) are more frequent in the winter and spring (red and yellow bands in Image 6). 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.

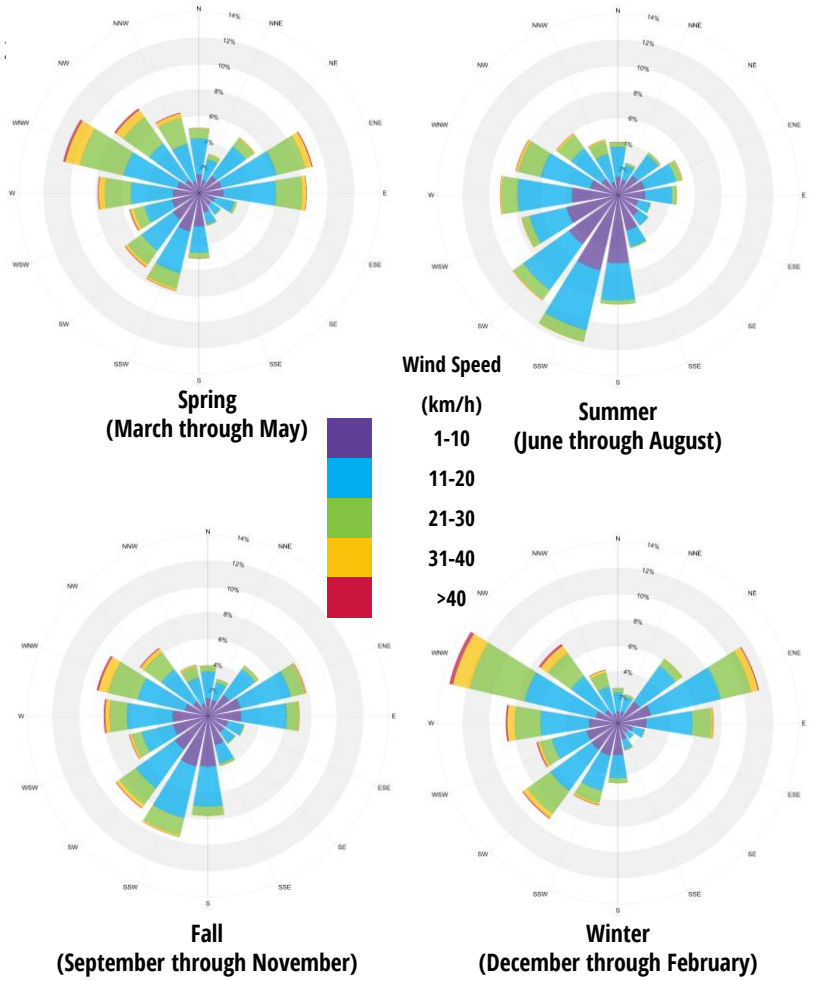

Image 6: Directional distribution of wind approaching Ottawa Macdonald-Cartier International Airport (1994-2024)

3. WIND CRITERIA

The City of Ottawa pedestrian wind criteria are used in the current study; the criteria presented in the table below, addresses pedestrian safety and comfort.

3.1 Pedestrian Comfort

Pedestrian comfort is associated with common wind speeds conducive to different levels of human activity. Wind conditions are considered suitable for sitting, standing, strolling or walking if the associated mean wind speeds (see table) are expected for at least four out of five days (80% of the time). The assessment considers winds occurring between 6 AM and midnight. Limited usage of outdoor spaces is anticipated in the excluded period. Speeds that exceed the criterion for Walking are categorized Uncomfortable. 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.

Comfort Category	GEM Speed (km/h)	Description (Based on seasonal compliance of 80%)
Sitting	≤ 10	Outdoor public and private amenity spaces (e.g. restaurant patios and seating areas)
Standing	≤ 14	Major building entrances and bus stops
Strolling	≤ 17	Sidewalks association with a mainstreet, plazas and parks
Walking	≤ 20	Sidewalks other than those associated with a mainstreet, bicycle paths and parking lots
Uncomfortable	> 20	Winds of this magnitude are considered a nuisance for most activities and wind mitigation measures are recommended.

3.2 Pedestrian Safety

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.

Safety Criterion	Gust Speed (km/h)	Description (Based on annual exceedance of 9 hrs or 0.1% of time)
Exceeded	> 90	At any test location, wind speeds of this magnitude are considered a safety hazard and wind mitigation is required.

4. RESULTS AND DISCUSSION

4.1 Wind Flow around Buildings

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*. Also, when two buildings are situated side by side, winds tend to accelerate in the gap between them, which is called *Channeling*. Stepped massing, low roofs and canopies diffuse downwash and reduce the potential wind impact on the ground level. These flow patterns are illustrated in Image 7.

The project, with towers ranging in height from 30 to 40 storeys, will be significantly 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 moderated by the podiums and stepped tower massing, which helps to disrupt downwashing wind flows.

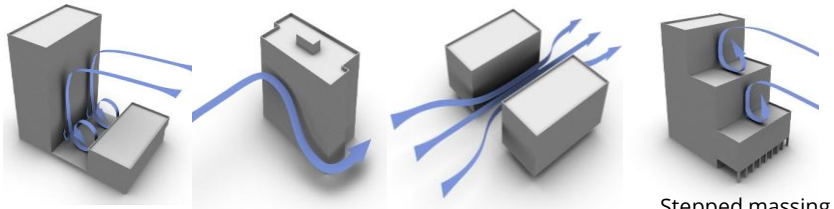

Image 7: General wind flow patterns

4.2 Presentation of Results

The results of the assessment are presented and discussed in detail in Sections 4.3 and 4.4. Images 8 and 9 are the predicted seasonal wind conditions at grade for the Existing and Proposed configurations, while Images 10 and 11 show the predicted wind conditions on above above-ground terraces. The graphical presentation is in the form of colour contours of wind speeds calculated based on the wind comfort criteria (Section 3.1), approximately 1.5 m above the concerned levels. The assessment against the safety criterion (Section 3.2) was conducted qualitatively based on the predicted wind conditions and our extensive experience with wind tunnel assessments. The discussion also includes recommendations for wind control, where necessary, to reduce the potential for high wind speeds for the design team's consideration.

Target Conditions

For the current development, wind speeds comfortable for walking or strolling 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 are desired in areas where prolonged periods of passive activities are anticipated, such as outdoor amenity areas, seating areas etc., especially during the summer when these areas are typically in use.

4. RESULTS AND DISCUSSION

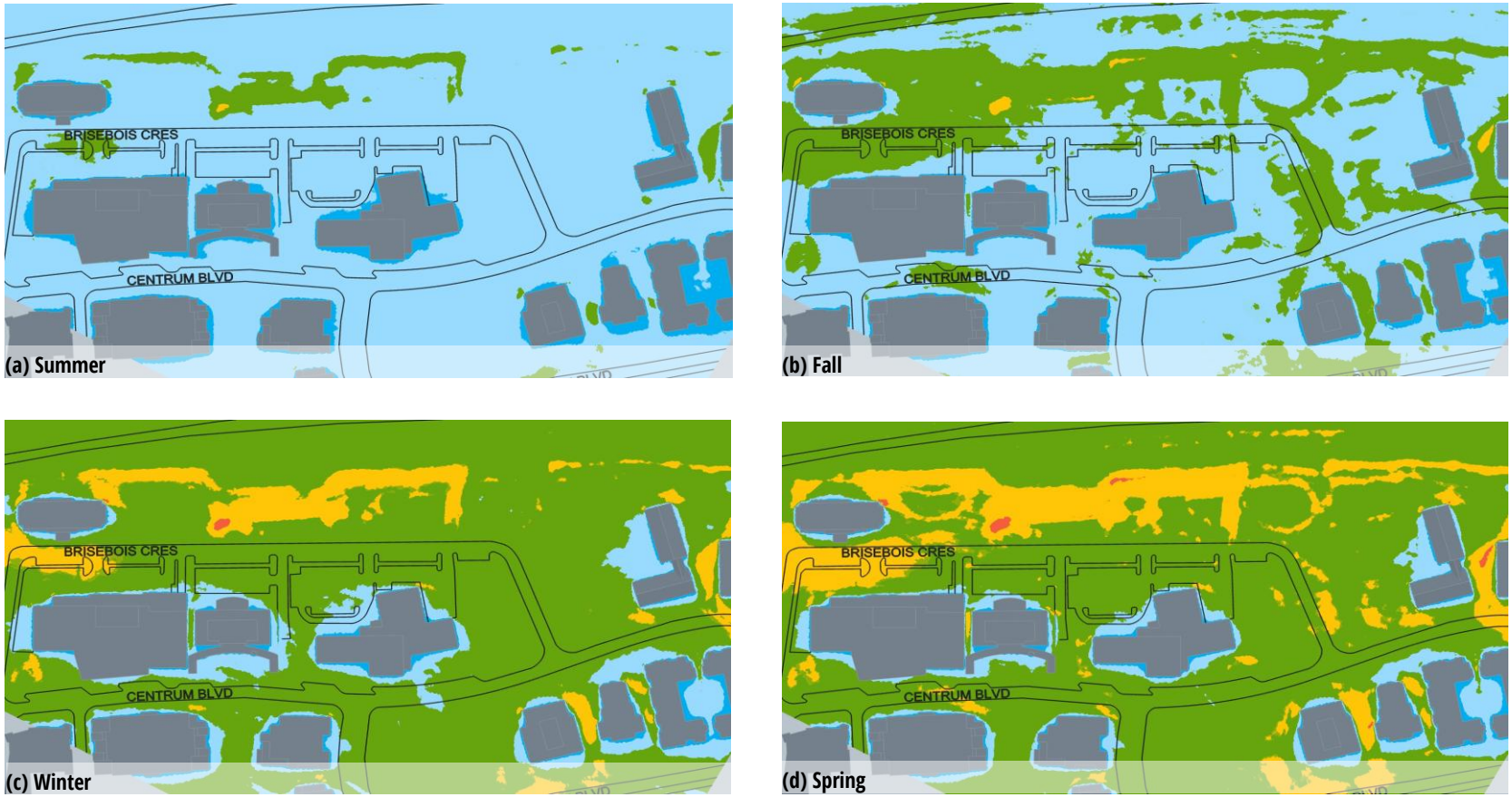

Image 8: Predicted wind conditions – GROUND LEVEL - Existing

4. RESULTS AND DISCUSSION

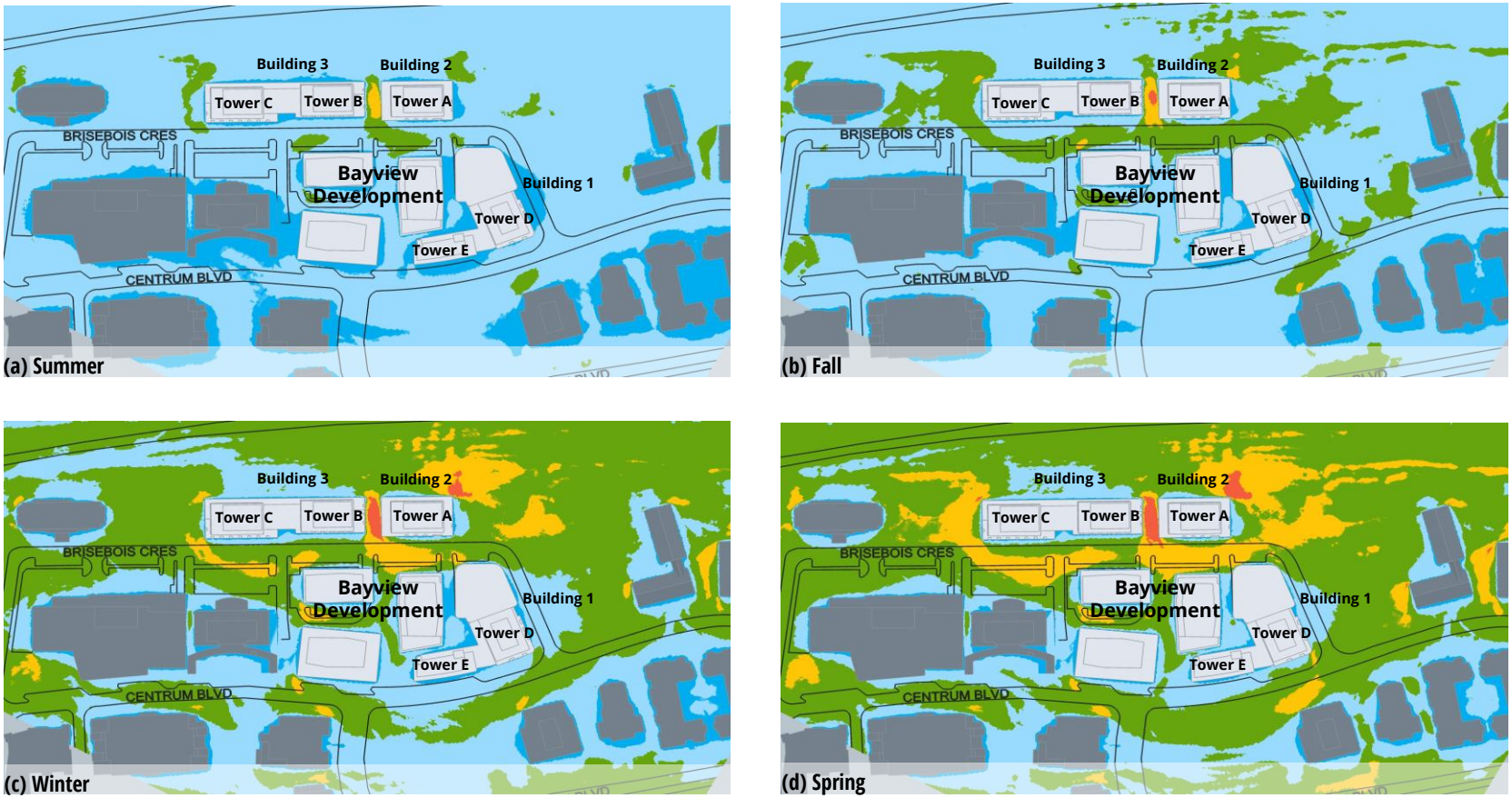

Image 9: Predicted wind conditions – GROUND LEVEL - Proposed

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4. RESULTS AND DISCUSSION

Image 10: Predicted wind conditions – PODIUM LEVELS – Building 1

4. RESULTS AND DISCUSSION

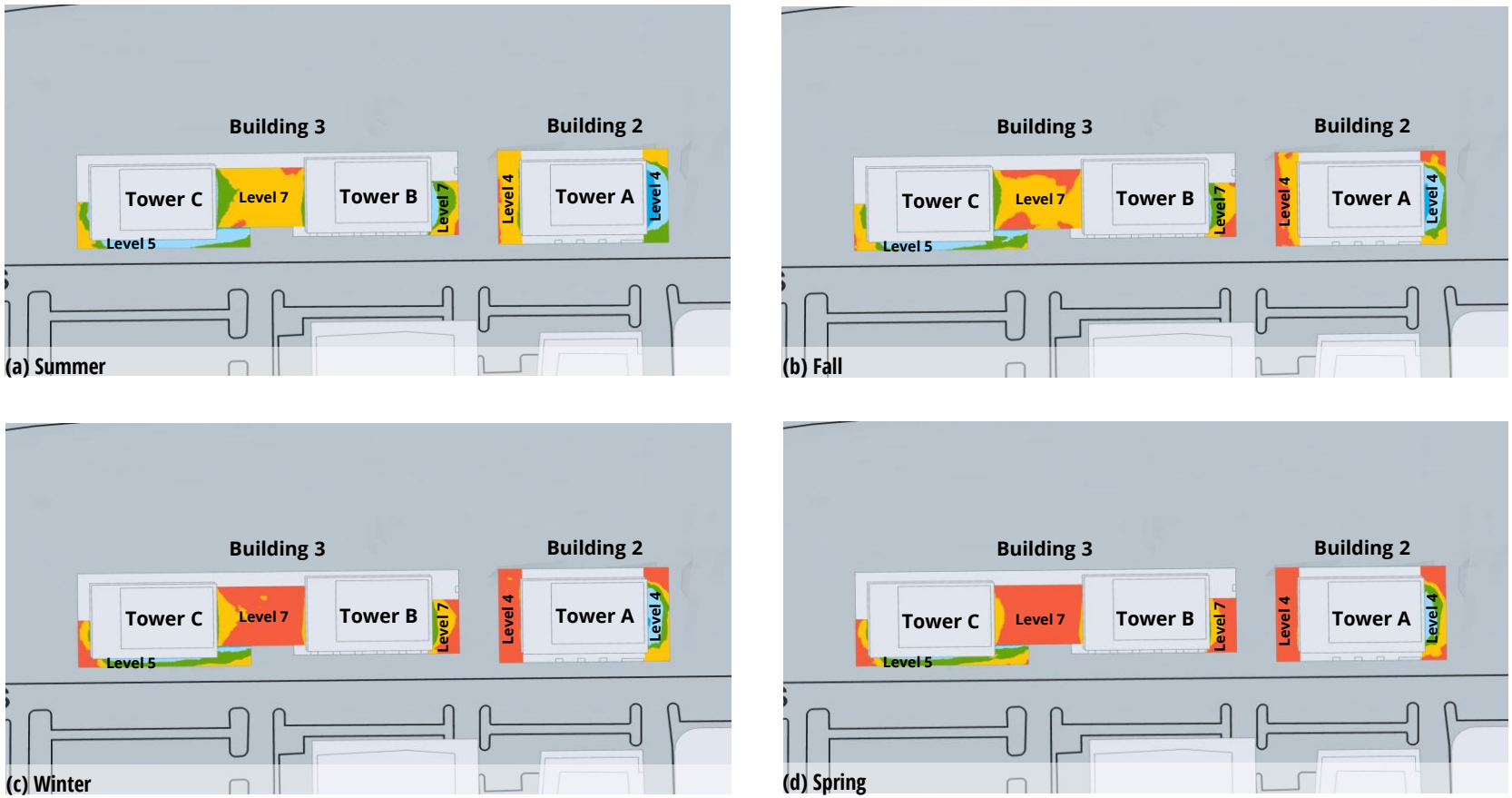

Image 11: Predicted wind conditions – PODIUM LEVELS – Buildings 2 and 3

4.3 Existing Scenario

The existing building on the site is low-rise, like the neighbouring buildings, and therefore does not redirect winds in a way that would cause any notable impact. In the existing scenario, wind conditions at most areas are considered comfortable for standing in the summer and the fall (blue regions in Images 8a and 8b) and for strolling in the winter and the spring (green regions in Images 8c and 8d). Conditions near the building perimeters are considered comfortable for sitting or standing year-round.

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

4.4 Proposed Scenario

4.4.1 Grade Level

The proposed buildings will occupy most of the site, and wind speeds in many areas to the south and the north are expected to be lower than those under existing conditions due to the sheltering provided by the new massing. The project is not expected to worsen wind conditions on neighbouring properties. However, because of the height and size of the development, localized areas of increased wind activity are expected immediately around the proposed buildings.

Wind conditions along the building perimeter are expected to be comfortable for sitting or standing throughout the year (Image 9), which is appropriate for the intended pedestrian usage. Relatively higher wind speeds are anticipated around the northeast corner of Building 2, along Brisebois Crescent, and in the area between Building 2 and Building 3, where conditions are generally comfortable for strolling or walking.

During the winter and spring, occasional periods of potentially uncomfortable wind conditions are expected at the northeast corner of Building 2 and in the area between Building 2 and Building 3 (see orange regions in Images 9c and 9d). These elevated wind speeds are primarily associated with winds from the west and northwest accelerating around building corners and between the buildings.

Wind speeds at the southern entrances of Building 1, as well as the Building 3 entrance, are predicted to be comfortable for sitting or standing throughout the year and suitable for the intended usage. Windier conditions, comfortable for standing or walking, are expected at the Building 2 entrance and at the northern entrance of Building 1 due to exposure to the dominant wind.

4. RESULTS AND DISCUSSION

Lower wind speeds may be achieved by relocating the entrance, recessing the door, or installing local wind control elements that help diffuse accelerating winds at grade and around entrances. Potential measures include the evergreen landscaping and/or wind screens (minimum 2 m tall and no more than 30% porous) in the identified areas. Image 12 presents examples of these wind control features.

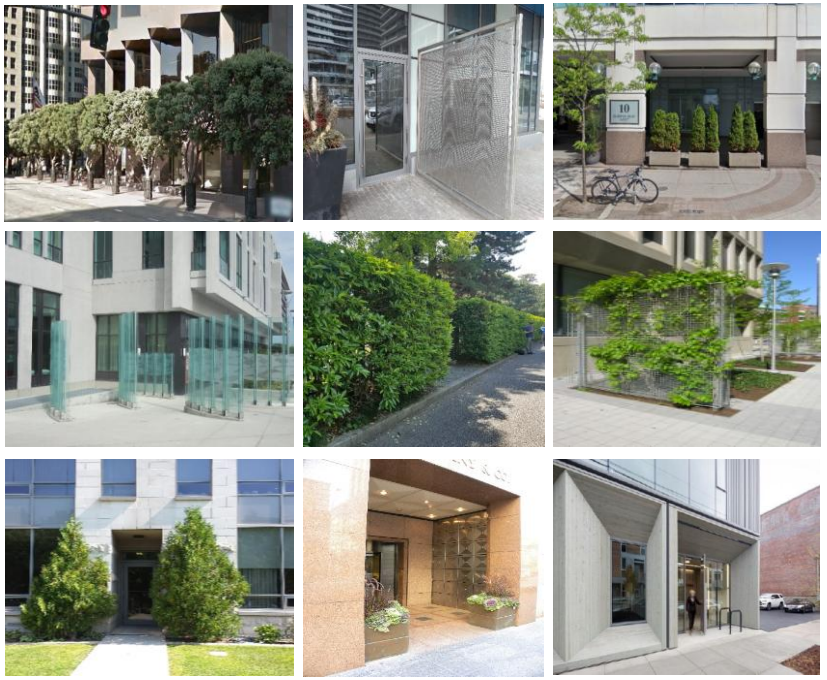

Image 12: Wind control examples at grade

4.4.2 Upper Grade Amenity Areas

Wind speed increases with elevation; the terraces and upper-grade amenity areas will be subject to stronger ambient winds than the ground level, and building-induced flows like downwashing and corner acceleration flows, as well as channelling.

Wind conditions suitable for sitting or standing are expected in the Level 2 amenity space, as well as in most areas of the Level 9 terrace of Building 1 and the Level 4 east terrace of Building 2 throughout the year, which is suitable for passive use. Some areas near the outer edges of the Level 9 terrace of Building 1 and the Level 4 east terrace of Building 2 are expected to be windier—particularly during the spring due to elevation and exposure (Images 10 and 11).

In the summer, most areas on the remaining terraces on Buildings 2 and 3 are expected to be comfortable for walking or better, with higher wind speeds near the outer edges (Image 11a). In the winter and spring, most terraces are predicted to be uncomfortable (Images 10c and 10d). Windier winter conditions may be less of a concern due to reduced use during colder months; However, wind control measures are recommended to reduce wind speeds to appropriate levels in the summer and shoulder seasons.

While conditions comfortable for standing are considered appropriate for general passive uses, winds comfortable for sitting are ideal in areas intended for prolonged use for seating, dining and lounging. To reduce wind speeds throughout the above-ground amenity areas, we suggest installing tall guardrails (at least 2 m tall) around the amenity perimeter. We also recommended incorporating additional vertical features (wind screens, partitions, or landscaping that are at least 1.5 m tall) throughout the spaces, especially around any designated seating areas, to further reduce wind exposure. Image 13 presents examples of these wind control features.

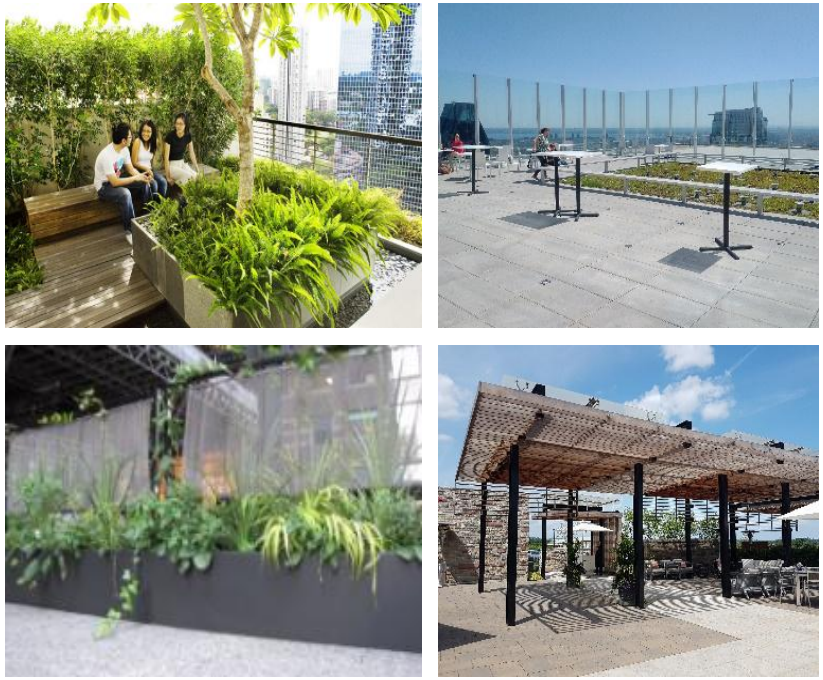

Image 13: Wind control examples for upper grade amenity areas

5. SUMMARY

RWDI was retained to provide an assessment of the potential pedestrian level wind impact of the proposed Orleans Town Centre project at Centrum Blvd in Orleans, Ontario. Our assessment was based on computational 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. Our findings are summarized as follows:

- Wind conditions on and around the existing site are predicted to be appropriate for pedestrian usage.
- The proposed buildings are taller than the surrounding context and will redirect winds to the ground level; however, several positive aspects of the massing and site layout help moderate wind impacts.
- Due to wind blockage from the proposed buildings, the wind speeds in areas to the north and the south of the site are predicted to be lower than in the existing conditions.
- Wind conditions in most areas, including the adjacent side walks, are expected to be appropriate for their intended pedestrian use.
- Increases in wind speeds are expected at the northeast corner of Building 2 and in the area between Building 2 and Building 3 with the addition of the proposed buildings.
- Wind conditions on the Building 1 upper-grade amenity areas are expected to be suitable for passive use during the summer and fall, while higher-than-desirable wind speeds are predicted on upper-grade amenity areas of the other buildings.
- Wind control strategies have been provided to enhance wind conditions at grade level and on the above-grade amenity areas, making them more suitable for prolonged activities such as sitting, dining, and lounging.

RWDI can help guide the placement of wind control features, including landscaping, to achieve appropriate levels of wind comfort based on the programming of the various outdoor spaces.

6. DESIGN ASSUMPTIONS

The findings/recommendations in this report are based on the building geometry and architectural drawings communicated to RWDI, 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)
42305-Centrum_ARCH-MAIN_R24	PDF	10/27/2025
2025-11-11 - 3D massing	DWG	11/11/2025
2025-11-10 - Updated Plans	PDF	11/11/2025

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 Forum Asset Management ("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.

7. 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.