REPORT

1746 CARLING AVENUE

OTTAWA, ONTARIO

PEDESTRIAN WIND COMFORT ASSESSMENT

PROJECT #2403794
September 10, 2025

SUBMITTED TO

Andrew Glass
Director, Development & Acquisitions
andrew@prpgrp.com

The Properties Group Management Ltd.
236 Metcalfe Street
Ottawa, ON K2P 1R3
Direct: 613-369-5495
Mobile: 613-614-4644

SUBMITTED BY

Xiangdong Du, Ph.D., P.Eng.
Technical Director/Principal
Xiangdong.Du@rwdi.com

Neetha Vasan, M.A.Sc., LEED A.P.
Senior Technical Coordinator/Associate
Neetha.Vasan@rwdi.com

Kathryn Kim, P.Eng.
Senior Project Manager
Kathryn.Kim@rwdi.com

RWDI
625 Queen Street West
Toronto, ON M5V 2B7
T: 647.475.1048 x2031

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rwdi.com

1. INTRODUCTION

Rowan Williams Davies & Irwin Inc. (RWDI) was retained to conduct a pedestrian wind assessment for the proposed project at 1746 Carling Avenue in Ottawa, 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 & Site Plan Control applications with the City of Ottawa.

The project site is located south of Carling Avenue between Boyd Avenue and Broadview Avenue, surrounded by low-rise suburban neighbourhoods (Image 1). A taller building exists to northeast of the proposed site.

The project includes three residential towers that will be 32-storeys (Tower A), 28-storeys (Tower B) and 9-storeys (Tower C) tall. Key areas of interest for this assessment include sidewalks and properties near the project site, the proposed main entrances, courtyard and multitenant terraces (Image 3).

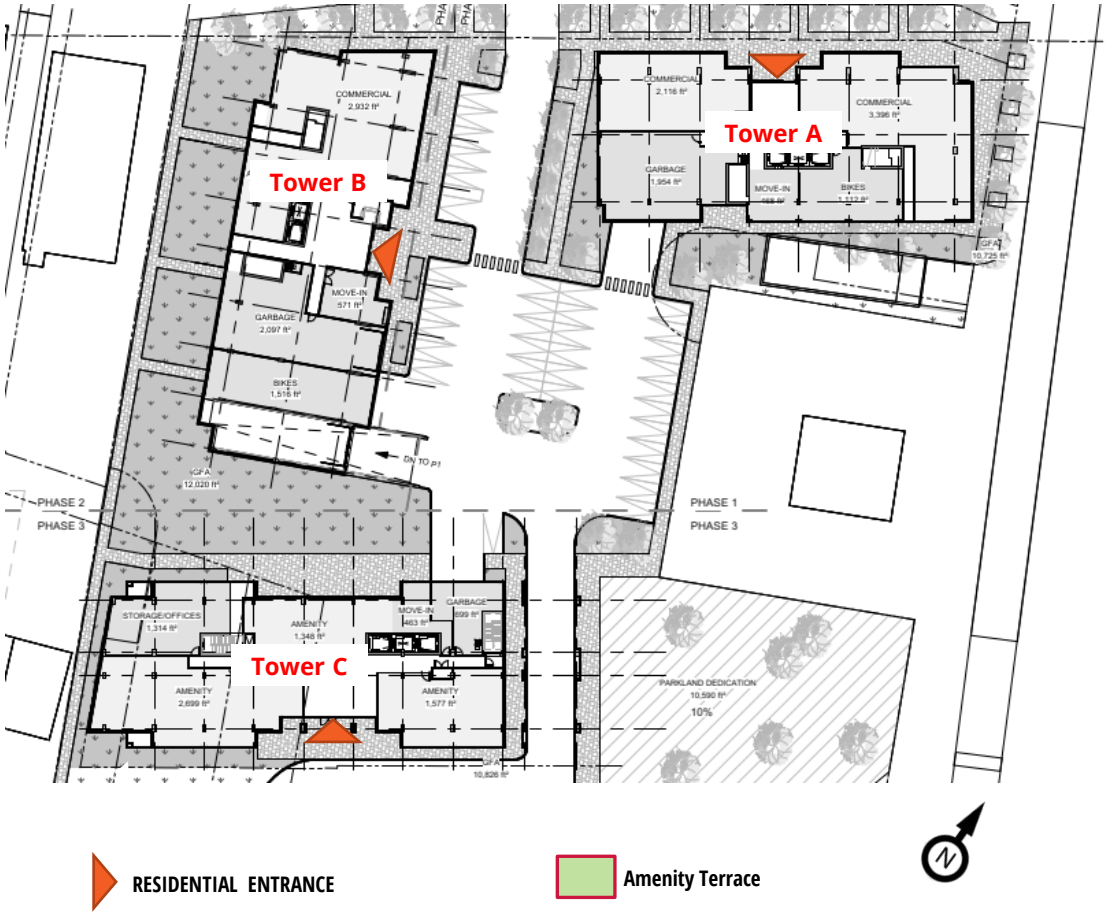
A wind assessment was completed for the project in November 2024. Since then, the design has been updated – the revisions are minor from a wind impact perspective. RWDI has reviewed the latest design information to confirm congruence with the assessment completed previously and concluded that the results presented herein continue to be applicable to the current design.

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

South View North View

Image 2: Conceptual Massing/Rendering of the Proposed Project (November 2024)

1. INTRODUCTION



Level 7 Terraces of Tower A

Level 6 Terraces of Tower B

Image 3: Floor Plans identifying Key Outdoor Areas of Interest – Design information received in November 2024

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;
- The use of *Orbital Stack*, an in-house CFD tool;
- CFD simulations completed in November 2024 on the project design based on information received on November 13 and updated plans received on November 6, 2024;
- A review of the latest site plan received on July 31, 2025;
- RWDI's engineering judgment, experience, and expert knowledge of wind flows around buildings[1-3]; and,
- The RWDI wind comfort and safety criteria.

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

The CFD simulations were completed in November 2024 for two scenarios:

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

The computer model of the proposed towers is shown in Image 4, and the Existing and Proposed configurations with the proximity model are shown in Images 5a and 5b, 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. 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 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 Ottawa Macdonald-Cartier International Airport to determine the wind speeds and frequencies in the simulated areas.

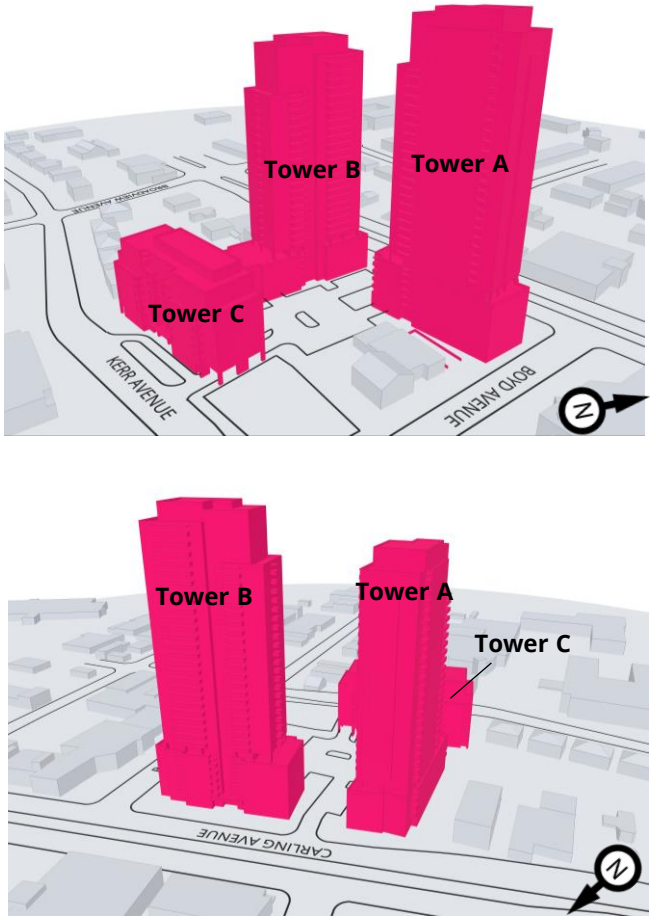


Image 4: Computer Model of the Proposed Project

2. METHODOLOGY

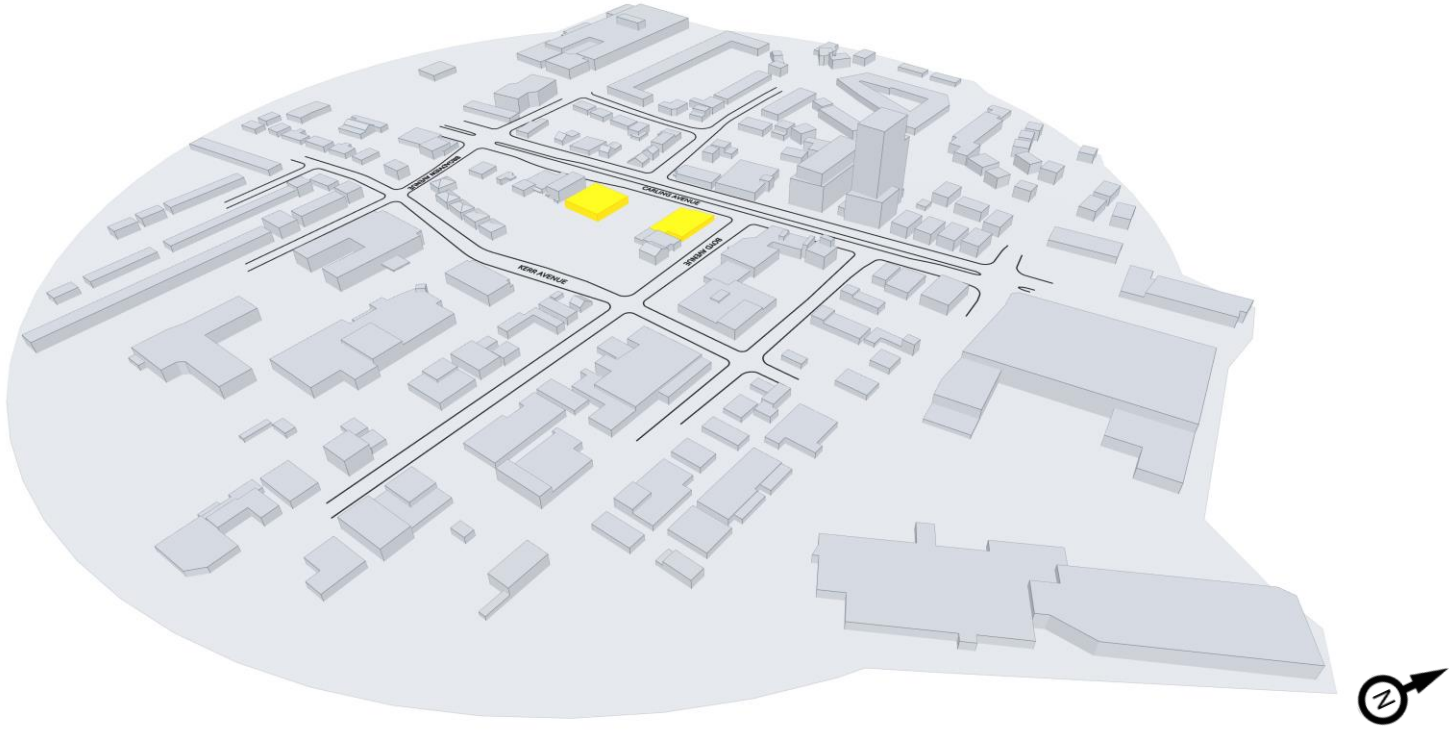


Image 5a: Computer Model of the Existing Site and Surroundings

2. METHODOLOGY

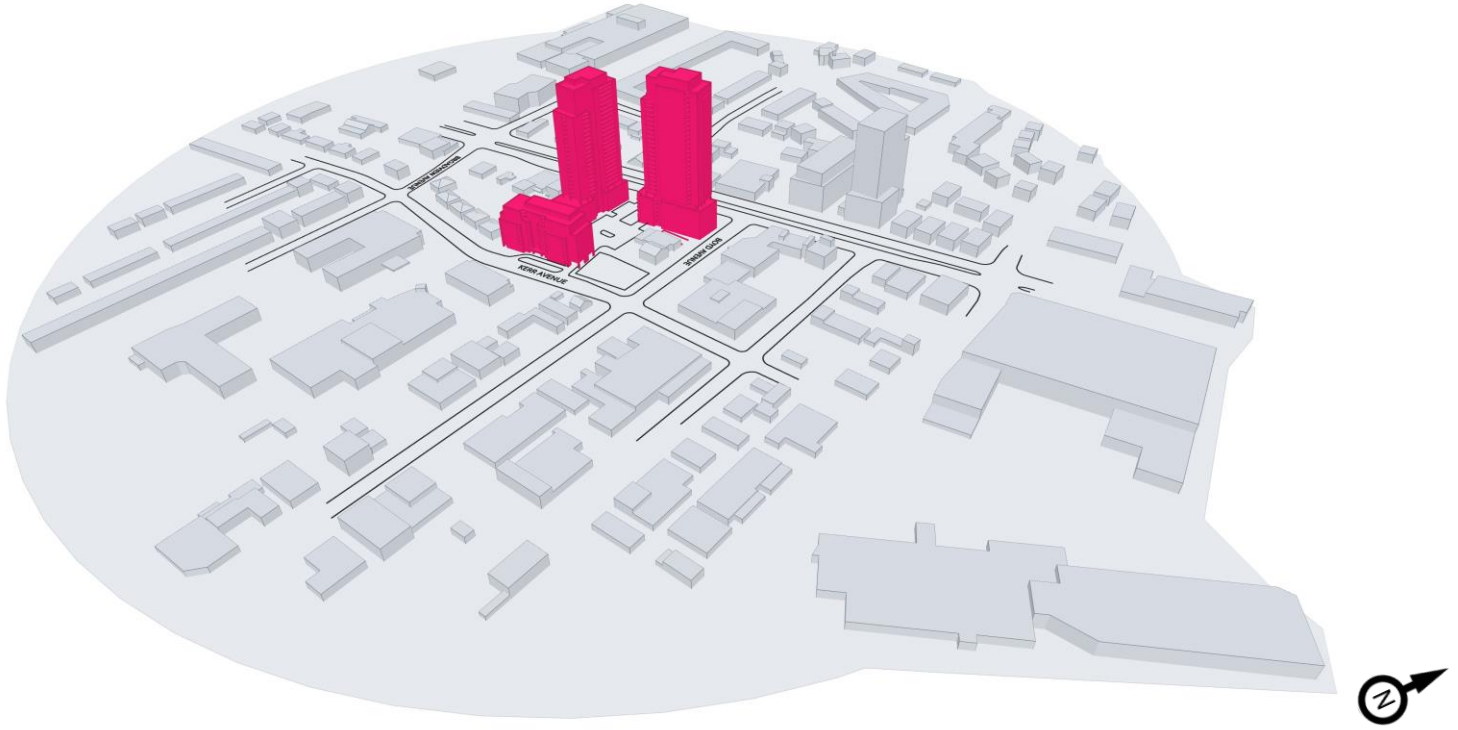


Image 5b: Computer Model of the Proposed Towers and Existing Surroundings

3. METEOROLOGICAL DATA

Wind statistics recorded at Ottawa Macdonald-Cartier International Airport between 1991 and 2021, inclusive, were analyzed for the spring (March through May), summer (June through August), fall (September through November) and winter (December through February) seasons. Image 3 graphically depicts the directional distributions of wind frequencies and speeds for these four seasons.

Winds from the southwest through northwest are predominant throughout the year, with secondary contribution from the east and northeast as indicated by the wind roses. Strong winds of a mean speed greater than 30 km/h measured at the airport occur primarily from these directions and are most common in the winter, followed by spring, fall and summer in decreasing order of frequency.

Wind statistics were combined with the simulated wind data to predict the full-scale wind conditions, which were then compared with the wind criteria.

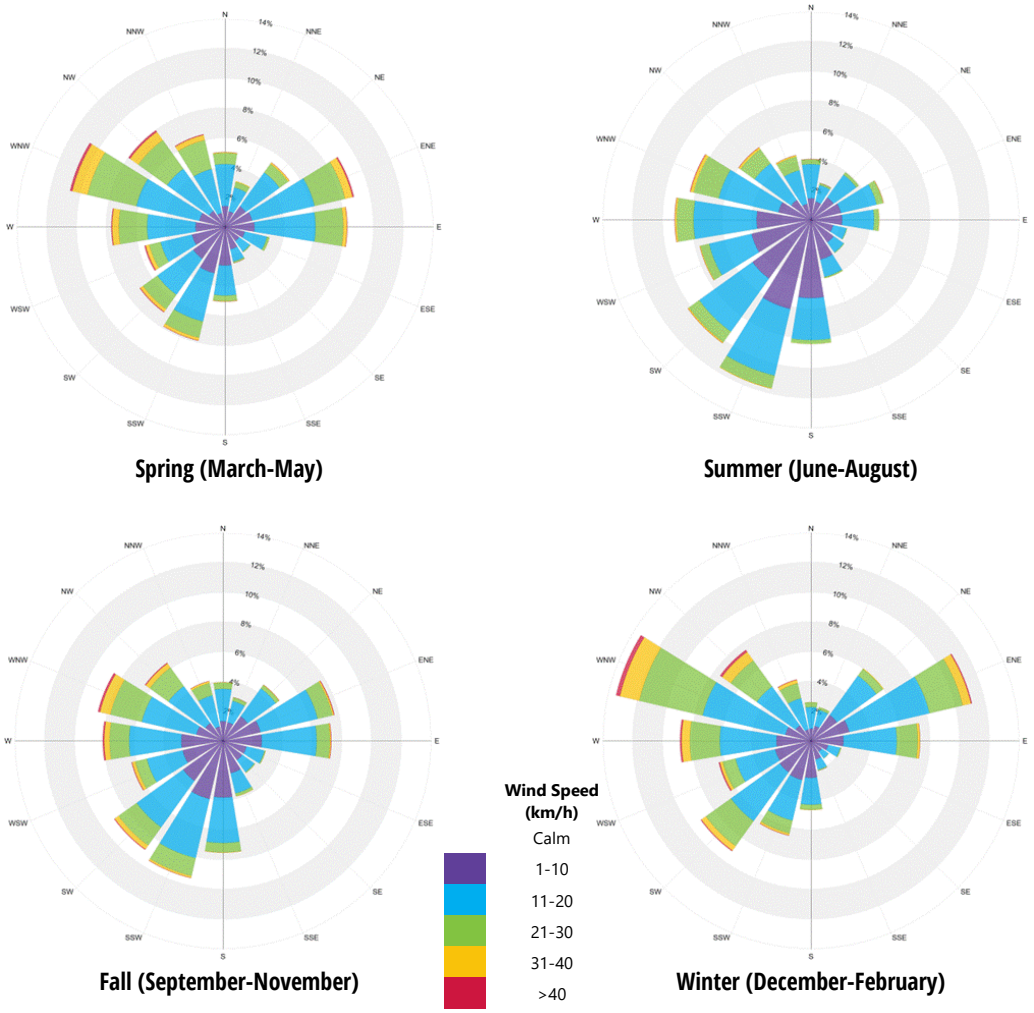


Image 6: Directional Distribution of Winds Approaching Ottawa Macdonald-Cartier International Airport (1991-2021)

4. WIND CRITERIA

The pedestrian wind criteria prescribed in the Wind Analysis Terms of Reference by the City of Ottawa are used in the current study.

4.1 Wind Comfort Criteria

Both mean wind and wind gusts will be used to measure the comfort of the wind. The speeds are based on a seasonal 20% exceedance factor (between 6:00am-11:00pm). In other words the criterion has been met if the wind speeds occur at least 80% of the time or four out of five days.

Comfort Category	Speed (km/h)	Where Applicable
Sitting	≤ 10	Outdoor public and private amenity spaces (e.g. restaurant patio's and seating areas)
Standing	≤ 14	Major building entrances and bus stops
Strolling	≤ 17	Sidewalks association with a main street, plazas and parks
Walking	≤ 20	Sidewalks other than those associated with a main street, bicycle paths and parking lots
Uncomfortable	> 20	Winds of this magnitude are considered a nuisance for most activities and wind mitigation measures are recommended.

4.2 Wind Safety Criterion

Wind gusts will be used to measure the safety of the wind on all test locations. The speeds are based on an annual exceedance of 9 hours or 0.1% of the time for a 24-hour day. Should a proposed development not be able to meet the wind safety criteria, appropriate mitigation measures (e.g. redesign of the site, reduction in height, etc.) will be required to eliminate the safety issue.

Safety Criterion	Speed (km/h)	Where Applicable
Exceeded	> 90	At any test location, wind speeds of this magnitude are considered a safety hazard and wind mitigation is required.

5. RESULTS AND DISCUSSION

5.1 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. *Downwashing* is the mechanism in which winds are directed down the height of a building. These flows subsequently move around exposed building corners, causing a localized increase in wind activity due to *Corner Acceleration*. When two buildings are situated side by side, wind flow tends to accelerate in the space between the buildings due to *channelling* effect. Podium or other 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, consist of two high towers and one mid-rise tower, will be taller than the buildings that exist in the surrounding area. The project is expected to intercept winds around it and increase wind activity around it. With three towers being situated close to each other, the channelling effects may potentially elevate local wind activities at the project side.

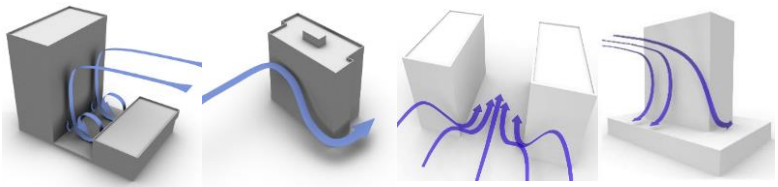


Image 7: General wind flow patterns

5.2 Presentation of Results

The predicted seasonal wind comfort conditions for the Existing and Proposed configurations are presented in Images 8 through 11. The results are presented as colour contours of wind speeds calculated based on the wind criteria (Section 4). The contours represent wind speeds at a horizontal plane approximately 1.5 m above the concerned level. The wind conditions for the entrances and on the terraces are also presented in Images 13 and 14, respectively, and discussed in Section 5.4.

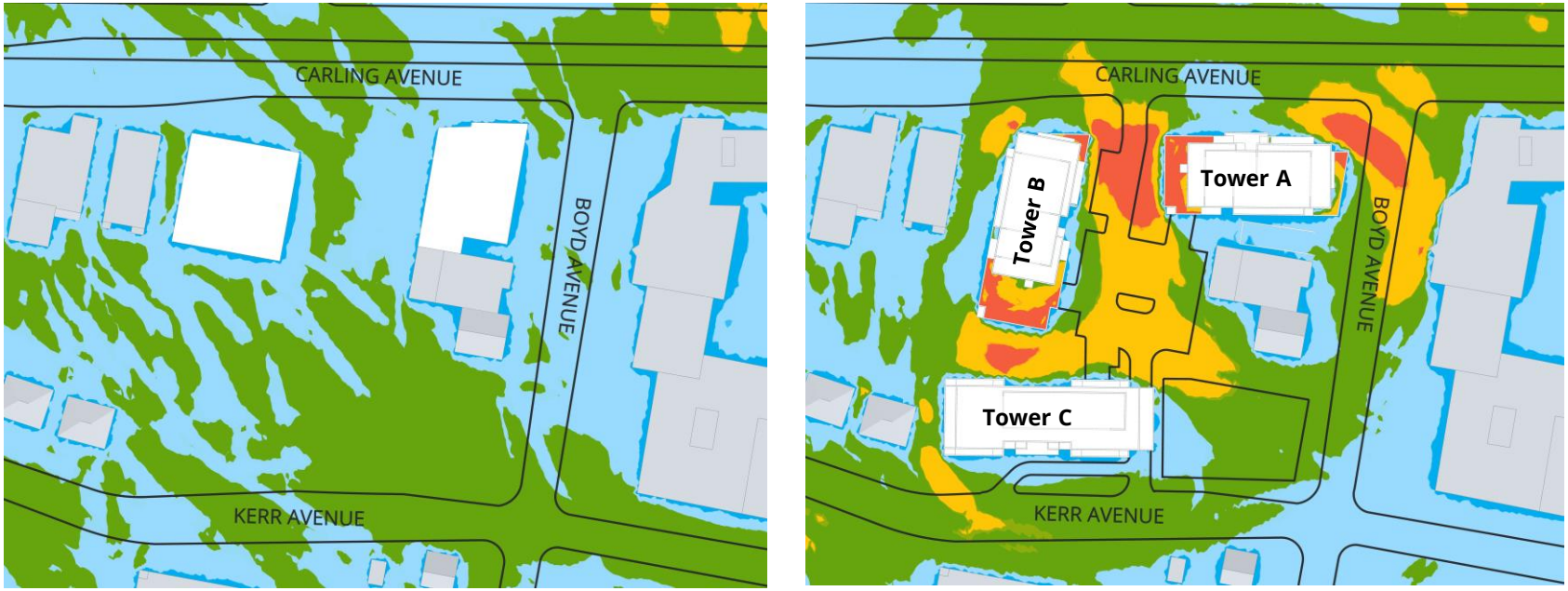
The assessment against the safety criterion (Section 4) was conducted qualitatively based on the predicted wind conditions and our extensive experience with wind tunnel assessments for similar projects in Ottawa.

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.

A detailed discussion of the expected wind conditions with respect to the prescribed criteria and applicability of the results follows in Sections 5.3. and 5.4.

5. RESULTS AND DISCUSSION



(a) EXISTING

(b) PROPOSED

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

Image 8: Predicted Wind Conditions – GROUND LEVEL – SPRING SEASON

5. RESULTS AND DISCUSSION

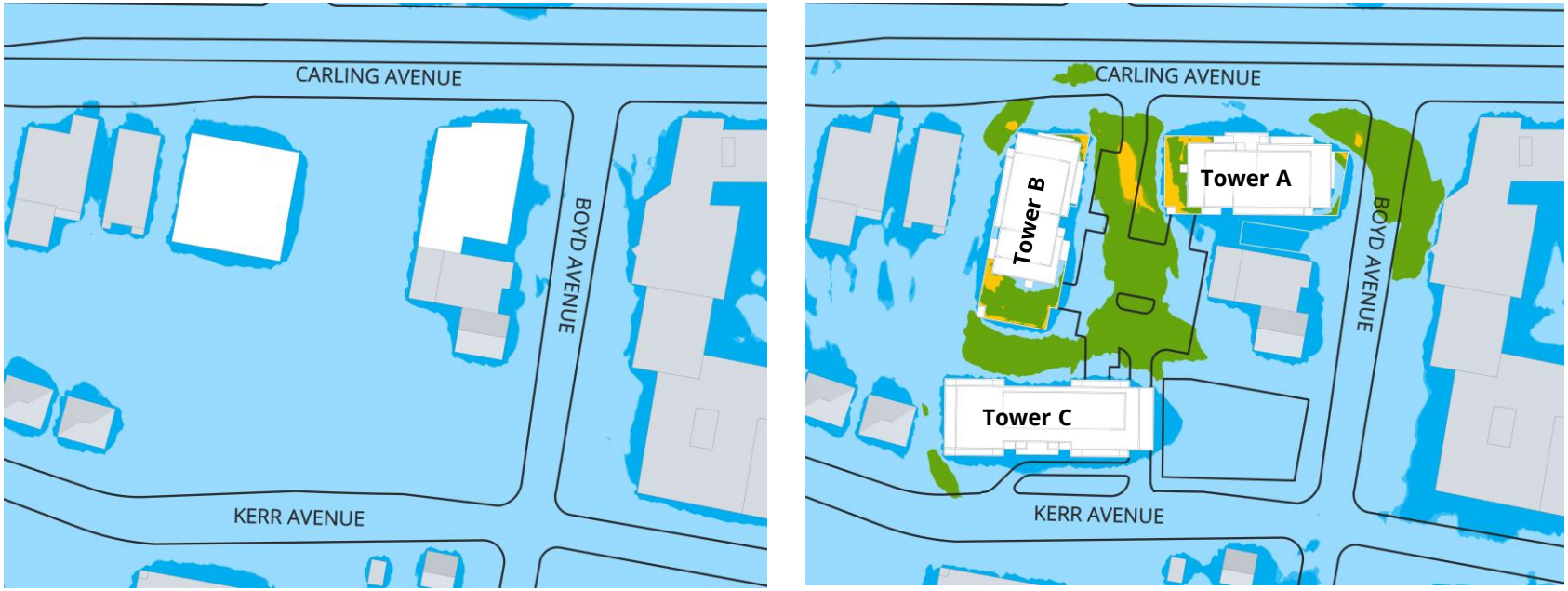


Image 9: Predicted Wind Conditions – GROUND LEVEL – SUMMER SEASON

5. RESULTS AND DISCUSSION

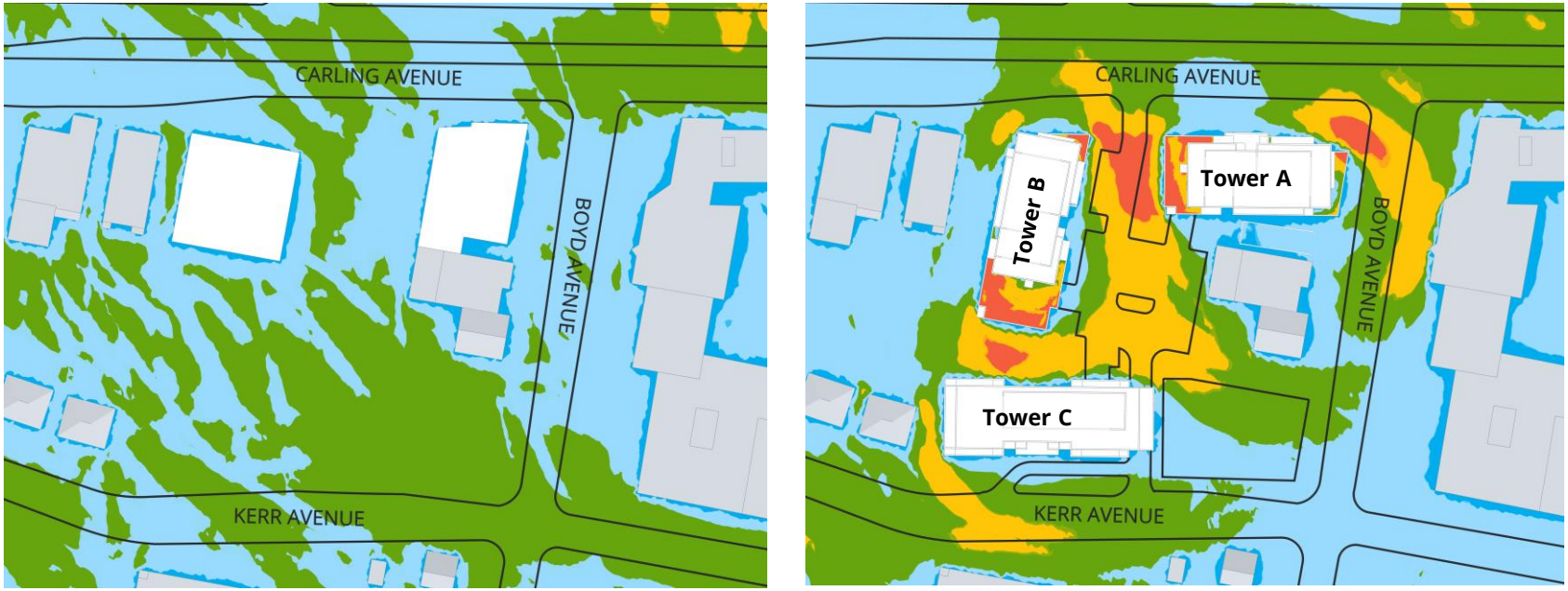
(a) EXISTING

(b) PROPOSED

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

Image 10: Predicted Wind Conditions – GROUND LEVEL – FALL SEASON

5. RESULTS AND DISCUSSION



(a) EXISTING

(b) PROPOSED

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

Image 11: Predicted Wind Conditions – GROUND LEVEL – WINTER SEASON

5.3 Existing Scenario

The existing building on the site is low rise, similar to the neighbouring buildings, and therefore will not redirect winds to create any notable impact. Seasonal results for the Existing scenario are presented in Image 8a, 9a, 10a and 11a. Wind conditions at most areas on and around the existing site are considered comfortable for sitting or standing in the summer and fall, and for standing or strolling in the spring and winter. Higher wind speeds are expected near the midrise building on the north side of Carling Avenue causing wind conditions comfortable for standing or strolling in the summer and fall and walking in the spring and winter.

5.4 Proposed Scenario

The introduction of relatively tall buildings in a low-rise context will result in an increase in wind activity around them. The height and proximity of the three towers can cause downwash, corner acceleration and channelling effects. The podium roofs are positive and would help disrupt downwash albeit to a small extent due to their limited size.

Wind approaching from the northwest and east would accelerate between the proposed towers. Northwesterly winds would accelerate around the northeast corner of Tower A as the wind flows take the path of least resistance around it. The buildings will increase wind speeds immediately around them but are not expected to have a notable impact on wind conditions farther away. **Wind conditions near the project site are expected to meet the safety criterion.**

5.4.1 Sidewalks

As shown in Images 9b and 10b, wind conditions are comfortable for standing or strolling at most areas around the site in the summer and fall. The elevated wind activity is predicted in the area between Towers A and B and Tower C and northeast corner of Tower A due to the channelling effect and corner acceleration. As a result, the wind conditions in these areas are suitable for walking which is considered appropriate for intended use. Due to strong seasonal wind in the spring and winter, potentially uncomfortable wind conditions are expected for these areas (Images 8b and 11b).

Considering the localized nature of the high wind activity, the addition of evergreen trees or tall screens (perforated to a porosity of approximately 30%, and height of 2 m) may be considered to address the wind activity as these features can disrupt corner acceleration flows. Note that street trees will generally lower wind speeds around them when they have their maximum leaves. Evergreen trees afford wind control benefits in the winter months as well. Other larger measures that may address the wind conditions in a similar way include fileted or reentrant corner massing for the full height of the podium that can streamline wind flows and a textured façade that could help slow winds as well. Some examples are presented in Image 12.

We recommend confirming the wind conditions through wind tunnel testing so that the wind control solutions may be validated and further developed.

5. RESULTS AND DISCUSSION

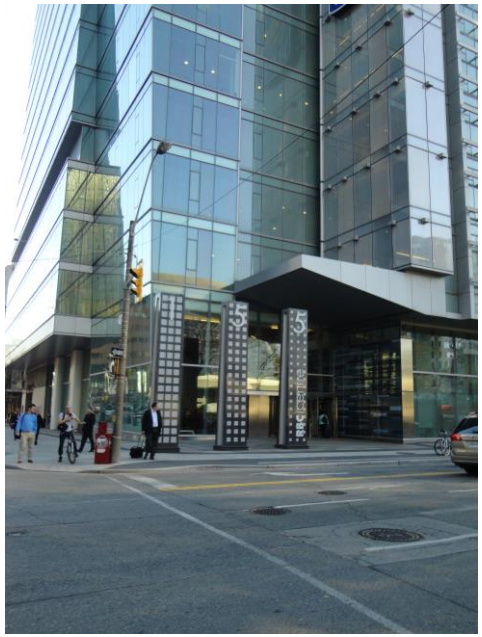





Image 12: Wind Control Examples at Grade

5.4.2 Entrances

The main entrances of the three towers are recessed from the sidewalk in building undercuts and under canopies. These are positive design features as the entrances would be protected from the ambient wind flow. As a result, wind conditions at the main entrances and nearby areas will be comfortable for sitting or standing throughout the year (Image 13). This is suitable for the intended use.

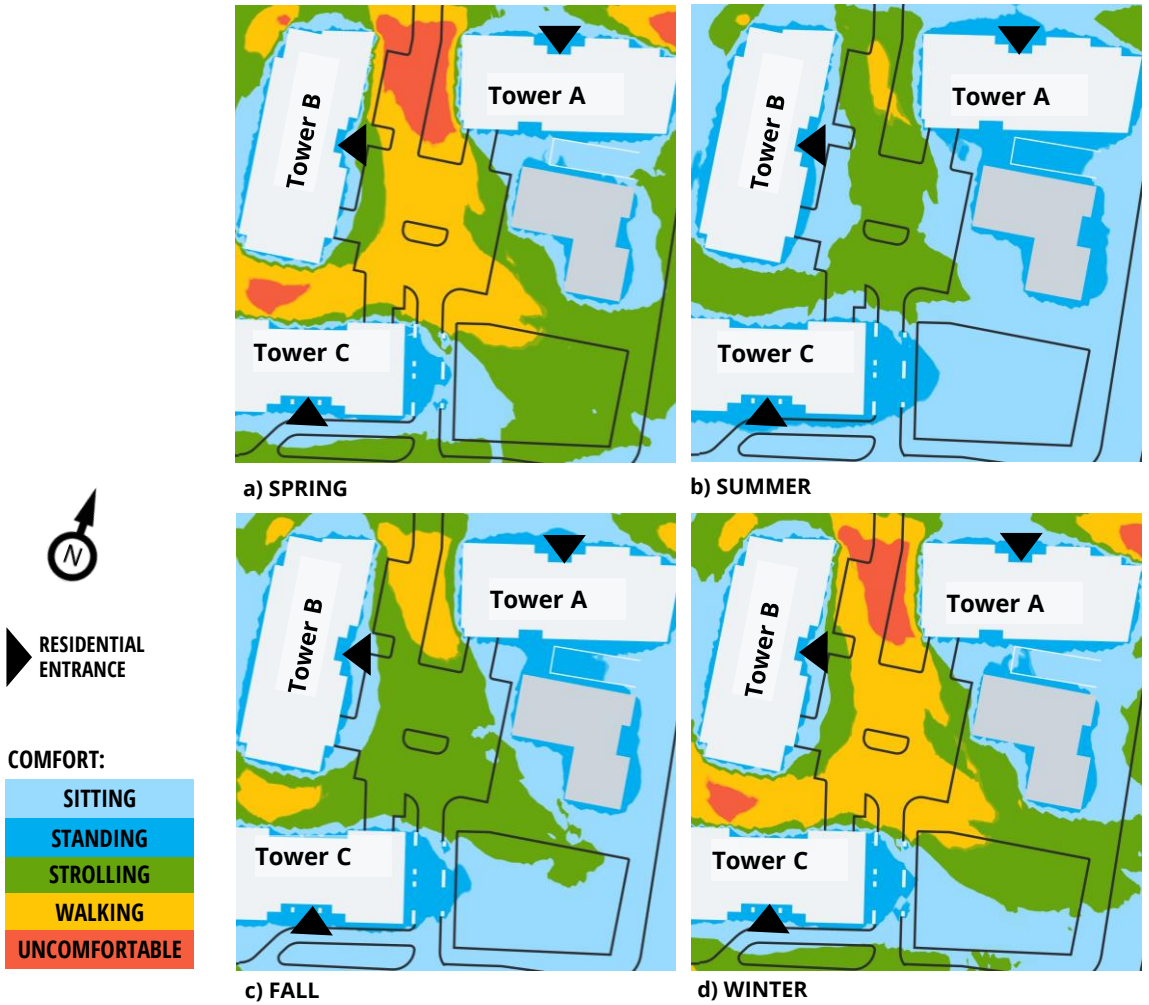


Image 13: Predicted Wind Conditions – PROPOSED ENTRACES

5.4.3 Outdoor Amenity Terraces

Wind conditions predicted on the terraces on Level 7 of Tower A and Level 6 of Tower B are presented in Image 14. It is generally desirable for wind conditions on terraces intended for passive activities to be comfortable for sitting, particularly in the warmer seasons. Wind speed increases with elevation; the terraces will be subject to stronger ambient winds than the ground level. The terraces would also be subject to building-induced flows like downwashing and corner acceleration flows.

The towers will have undercuts at these terrace levels and some terrace portions of the amenity terraces are located within these undercut regions and other portions would be exposed on the podium roofs. During the summer when the outdoor terraces would be used the most, wind conditions are expected to be suitable for sitting in the recessed undercut area. Conditions comfortable for strolling are expected in some of the exposed areas outside of the undercuts (Image14b) which are windier than desired for passive activities.

Lower wind speeds are expected in most of the undercut areas in the other seasons as well. Conditions in the exposed parts of the terraces are expected to be comfortable for strolling or walking in the fall and potentially uncomfortable in the spring and winter.

The wind speeds on a large part of the terraces are considered higher than desired for prolonged passive activities. Wind control measures for above-ground terraces may include tall guardrails to reduce the overall wind exposure, and/or windscreens and planters locally around patron-activity areas to create smaller sheltered zones. These wind control features should be at least 2 m tall and no more than 30% open/porous to be effective for wind control. Image 15 provides photo examples for your reference. RWDI can guide the selection and placement of such features for wind control as the design advances.

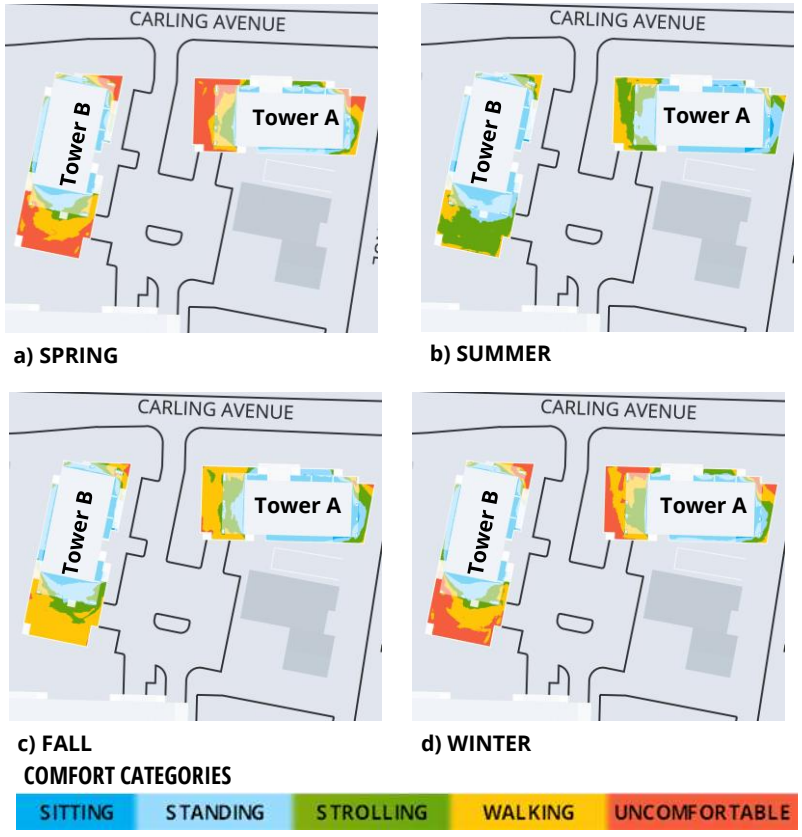


Image 14: Predicted Wind Conditions on Outdoor Amenity Terraces

5. RESULTS AND DISCUSSION

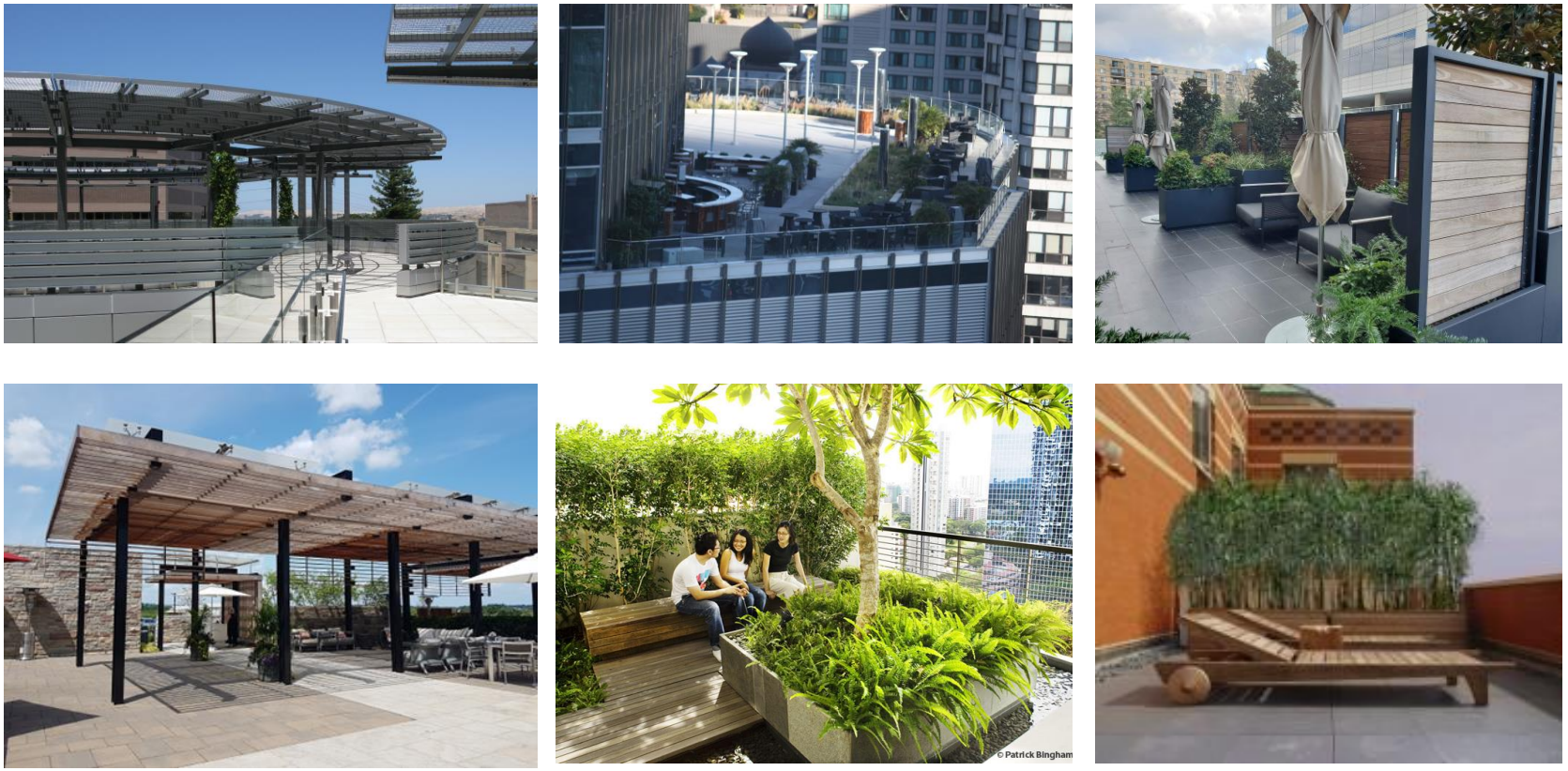


Image 15: Design strategies for wind control on terraces

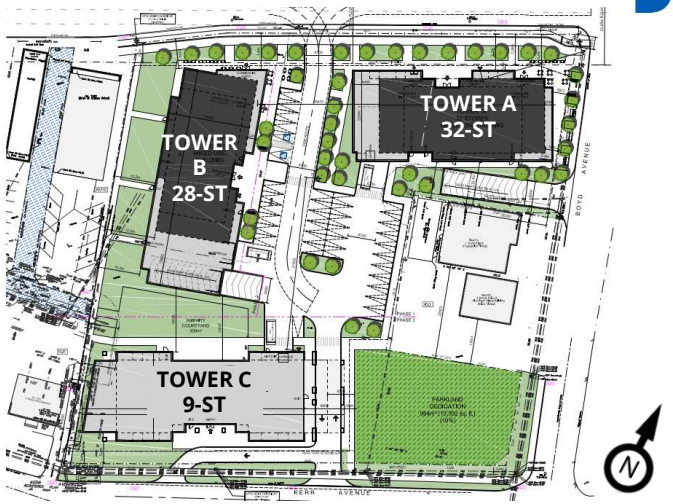
6. COMMENTS ON DESIGN CHANGES

Following the CFD simulation, minor design modifications were made by the design team, as reflected in the updated drawings received by RWDI on July 31, 2025. A comparison between the site plan used in the CFD simulation and the updated design is shown in Image 16. The overall relative location and spacing of the towers remain similar, indicating that the original CFD results are still applicable to the new design scheme.

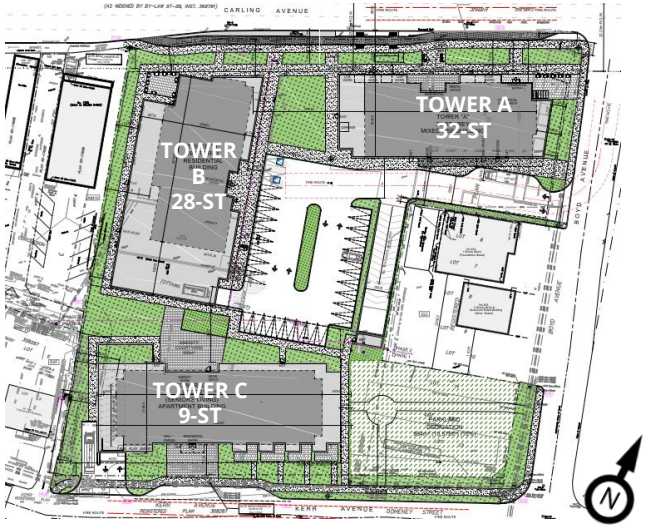
The podium of Tower B (Image 16a) has been expanded westward (see Image 16b). This modification may potentially result in slightly improved or comparable wind conditions in the area between Towers B and C.

Tower C has undergone changes in massing and floor heights. However, these adjustments are not expected to affect wind conditions at the pedestrian level.

In the updated site plan, new seating areas have been introduced at the northeast corner of Tower A and the northwest corner of Tower B. These locations were predicted to be windier in the CFD simulation. It is recommended to either relocate these seating areas or implement appropriate mitigation measures to improve wind comfort for the intended usage.



(a) Modeled Design (November 2024)



(b) Updated Design (July 2025)

Image 16: Comparison between modelled design and updated design

7. SUMMARY

RWDI was retained to provide an assessment of the potential pedestrian level wind impact of the proposed project at 1746 Carling Avenue in Ottawa, 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 wind criteria prescribed by the City of Ottawa for pedestrian comfort and safety. Our findings are summarized as follows:

- Wind conditions at most areas on and around the existing site are suitable for the intended pedestrian use throughout the year. The proposed buildings are taller than its surroundings and therefore will redirect wind to ground level. The low podiums of Towers A and B will help moderate wind impacts at ground level to an extent, but high winds are still predicted at localized areas across the site.
- Higher wind speeds that could potentially be uncomfortable in the spring and winter are predicted in the areas between Towers A, B and C, as well as at the northeast corner of Tower A.
- Wind conditions at the main entrances are expected to be appropriate for the intended usage.
- Higher wind speeds than desired for passive activities are also predicted at the terraces on Towers A and B in the summer when the outdoor terraces would be used the most. Some areas with uncomfortable conditions are expected in the spring and winter.
- The pedestrian wind safety criterion is anticipated to be met at all pedestrian areas on and around the project site.
- Wind control strategies have been discussed in the report to improve the undesired conditions, and we recommend confirming the wind conditions through wind tunnel testing so that the wind control solutions may be validated and further developed.
- 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.

8. DESIGN ASSUMPTIONS

The findings/recommendations in this report are based on CFD simulations completed in November 2024 on the design represented by the building geometry and architectural drawings communicated to RWDI in November 2024, listed below. The updated site plan information received in July 2025 (also listed below) have been reviewed to confirm congruence with the assessment previously completed and inform the recommendations as well. 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)
1746 Carling - Drawing package 2024-11-06 - reduced	PDF	11/06/2024
1746 Carling - Central_R22 - Building B1 - revised tower.rvt	Revit	11/13/2024
1746 Carling - Central_R22 - Building B2 - revised tower.rvt	Revit	11/13/2024
1746 Carling - Central_R22 - Building B3 - Lowered Front .rvt	Revit	11/13/2024
1746 Carling - Central_R22 - Extra site.rvt	Revit	11/13/2024
2210 SP-1 Overall Zoning 2025 07 10.pdf	PDF	07/31/2025

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.

9. STATEMENT OF LIMITATIONS

This report was prepared by Rowan Williams Davies & Irwin Inc. for the Properties Group Management Ltd. ("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.

10. 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.