REPORT

1452 UPPER JAMES STREET

HAMILTON, ONTARIO

PEDESTRIAN WIND COMFORT ASSESSMENT

PROJECT #2303003
February 6, 2026

SUBMITTED TO

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1. INTRODUCTION

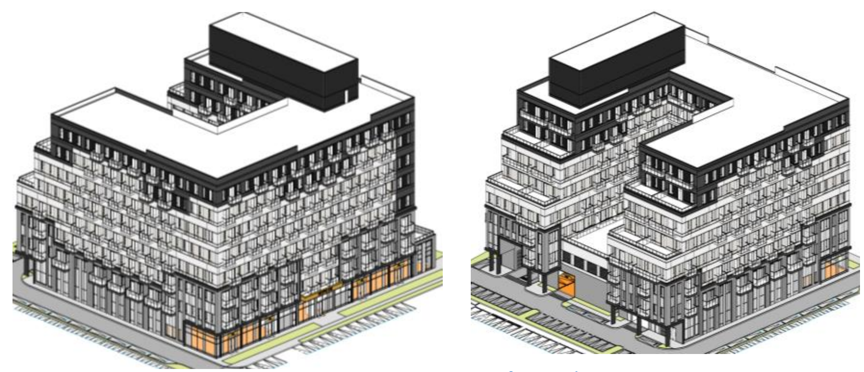
Rowan Williams Davies & Irwin Inc. (RWDI) was retained to conduct a pedestrian wind assessment for the proposed project at 1452 Upper James Street in Hamilton, Ontario. The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development.

The project site is located at 1452 Upper James Street, between Stone Church Road and Regina Drive. The project is surrounded by low-rise suburban neighbourhoods with an open terrain in the northwest direction (Image 1).

The project is a mixed-use development that will consist of a C-shaped 8-storey building with 252 residential units and 2 retail units. The building will have a stepped form on the west side, which is favourable for reducing wind impacts. An outdoor amenity area is proposed at Level 3, which is largely sheltered by the building envelope.

Key areas of interest for this assessment include the main entrances and retails entrances to the building on Upper James Street, the outdoor amenity area at Level 3, the rear of the building, and public sidewalks and properties near the project site (Image 3).

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



Southeast view

Southwest view

Image 2: Isometric Views of the Project

1. INTRODUCTION

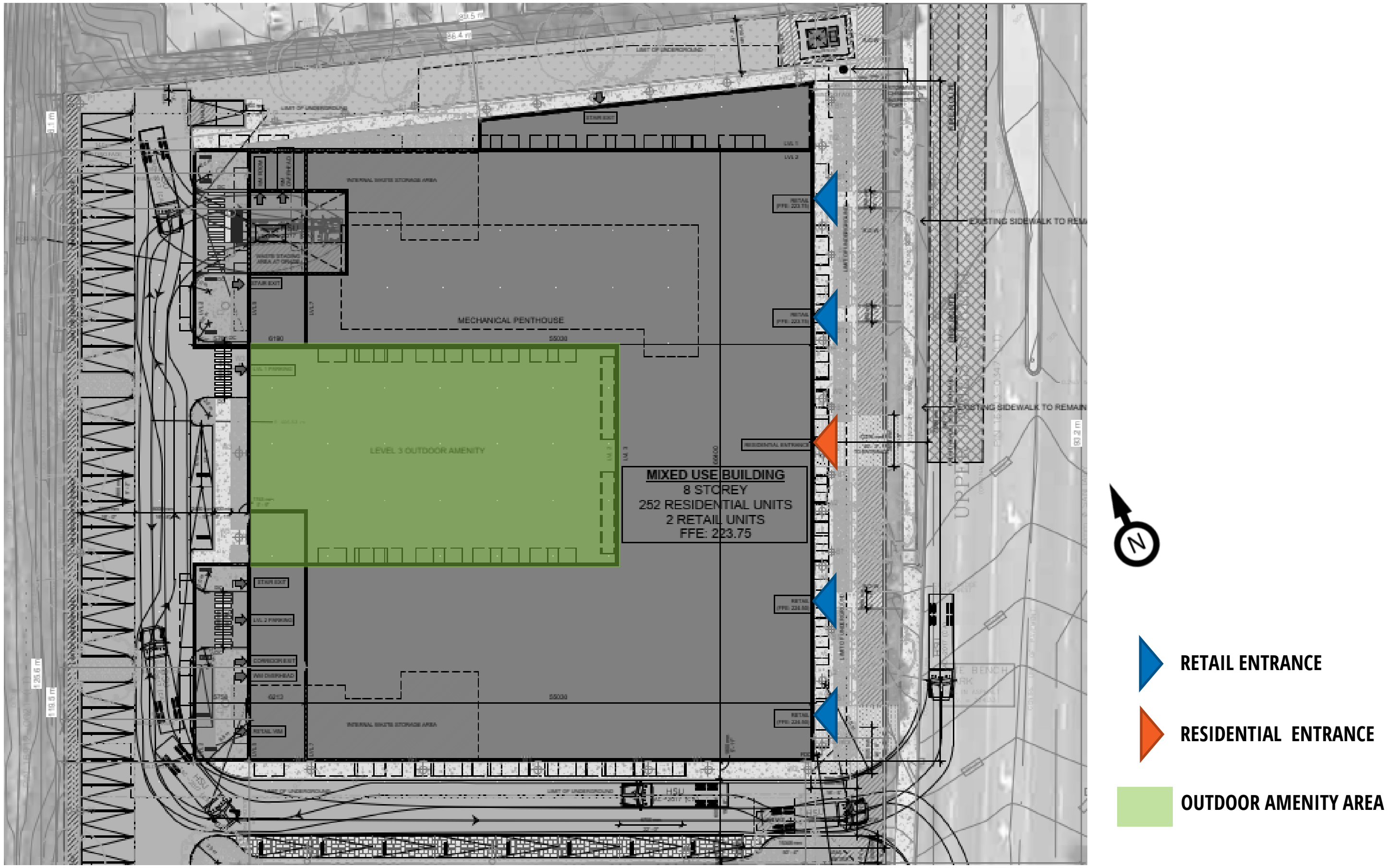


Image 3: Floor Plans identifying Key Outdoor Areas of Interest

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 Hamilton International Airport;
- 3D model and drawings of the proposed project were received on January 20, 2026, and the most recent drawings were received on February 6, 2026.
- 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, which have been adopted by the City of Hamilton in their Development Application Guidelines for Wind Study.

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 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 1.5m above concerned levels, to the mean wind speed at a reference height. The data was then combined with meteorological records obtained from Hamilton International Airport to determine the wind speeds and frequencies in the simulated areas.

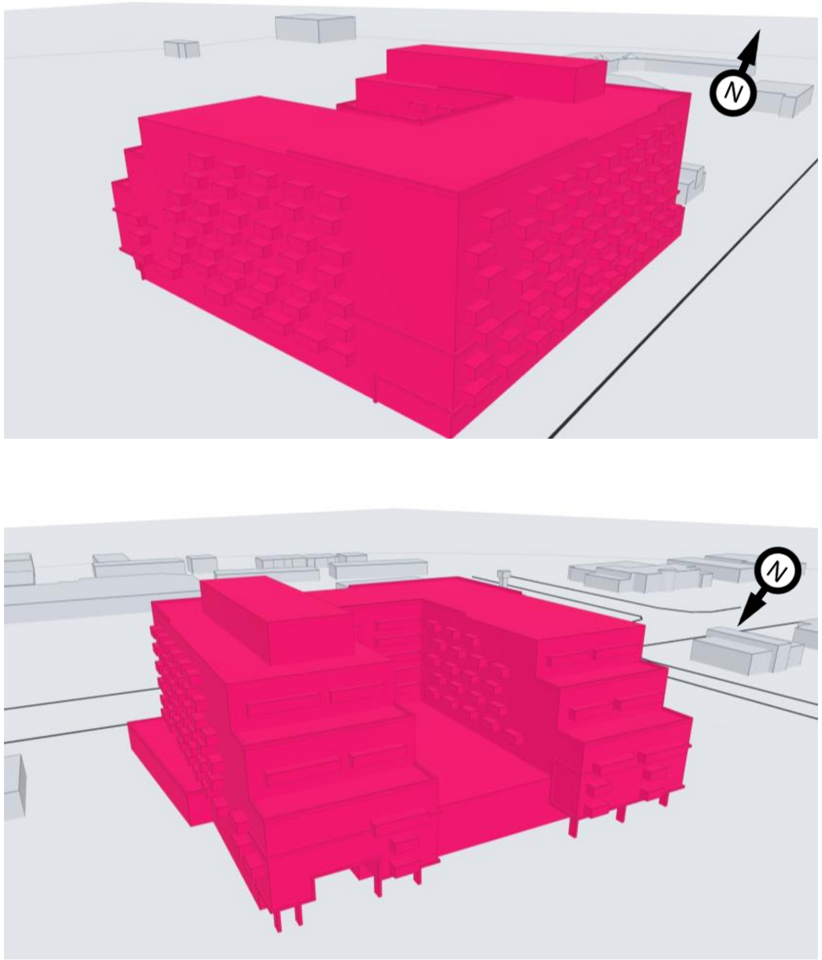


Image 4: Computer model of the proposed project

2. METHODOLOGY

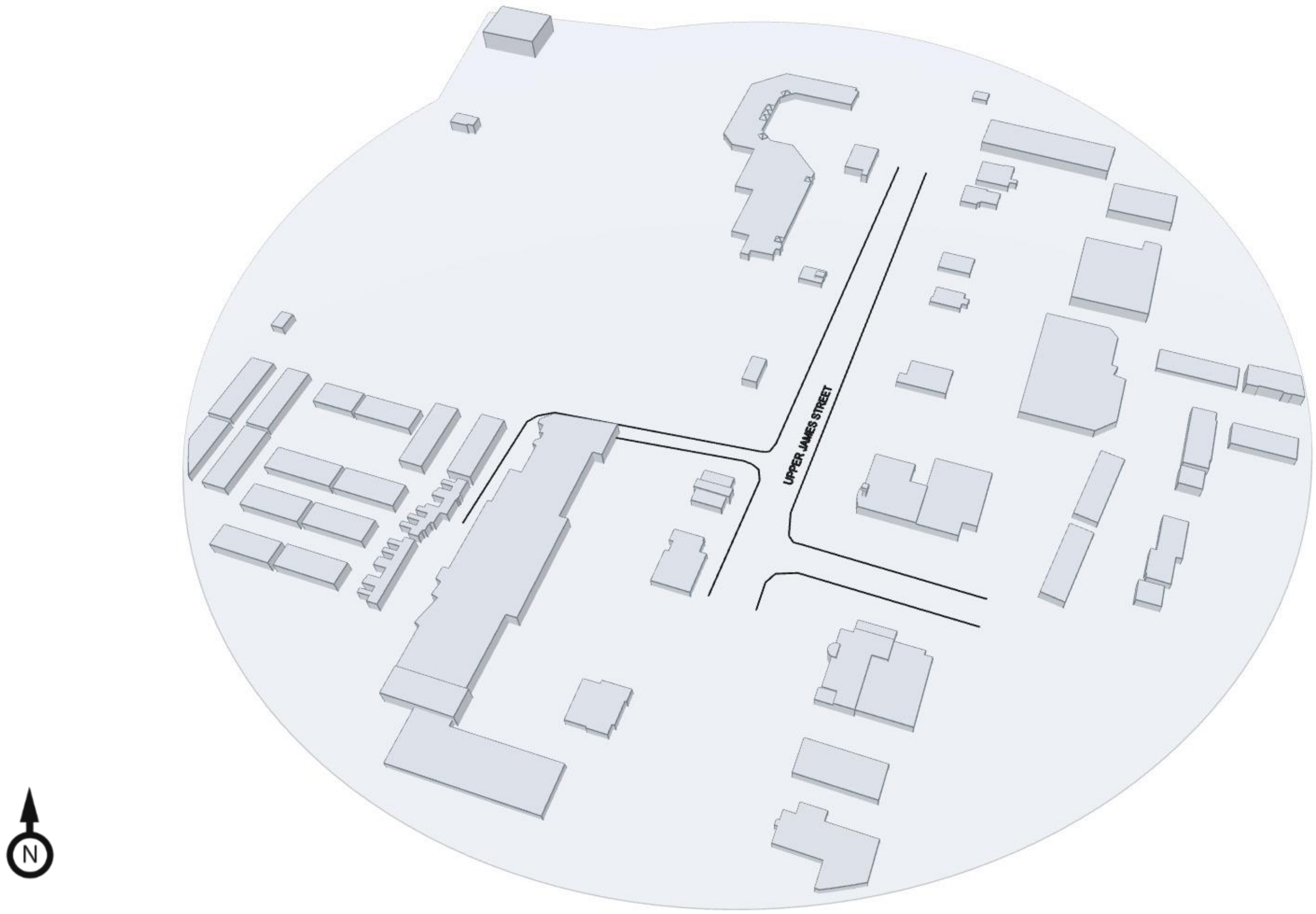


Image 5a: Computer model of the existing site and extended surroundings

2. METHODOLOGY

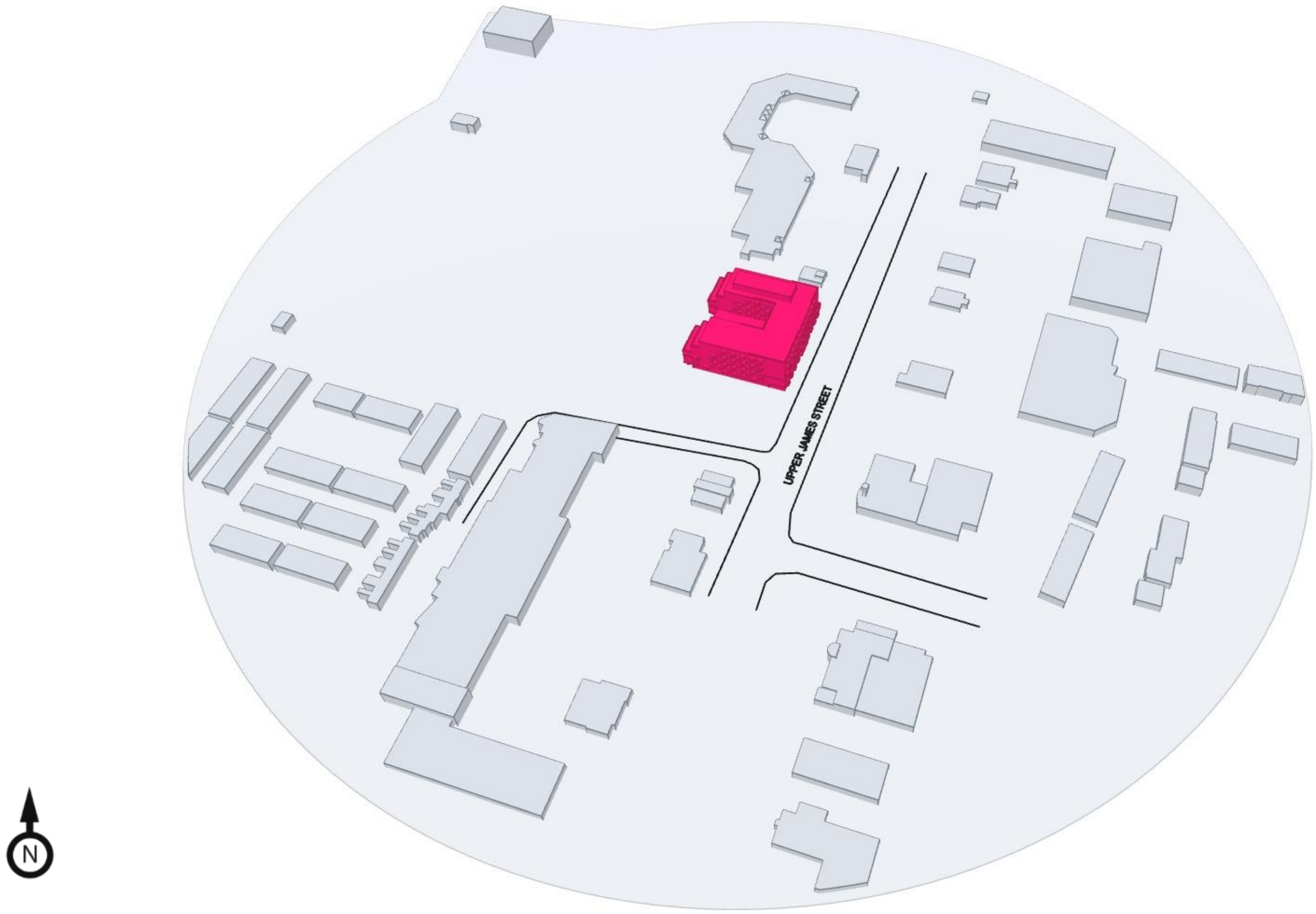


Image 5b: Computer model of the project site and extended surroundings

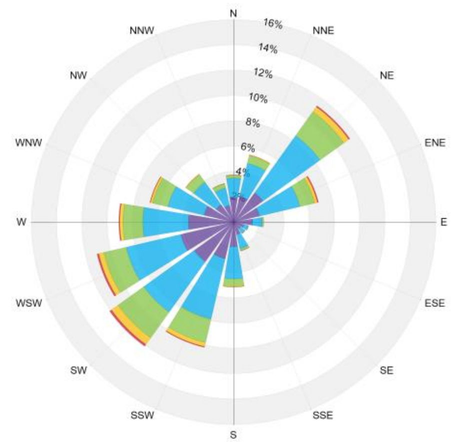
2.4 Meteorological Data

Long-term wind data recorded at Hamilton 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.

In both the seasons, winds from the southwest quadrant and northeasterly directions are predominant, as indicated by the wind roses.

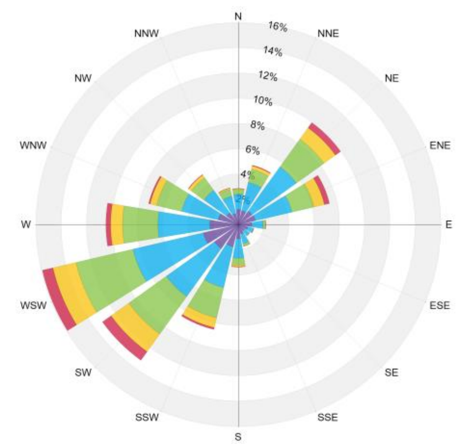
Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10m) are more frequent in the winter (red and yellow bands in Image 6). These winds potentially could result in slightly elevated wind conditions on the development site.

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.



Summer
(May through October)

Wind Speed (km/h)	Probability (%)	
	Summer	Winter
Calm	3.3	2.0
1-10	35.2	22.4
11-20	42.7	39.4
21-30	15.4	24.3
31-40	2.8	8.7
>40	0.7	3.3



Winter
(November through April)

Image 6: Directional distribution of wind approaching Hamilton International Airport (1994 to 2024)

3. WIND CRITERIA

The RWDI pedestrian wind criteria are used in the current study; the criteria presented in the table below, addresses pedestrian safety and comfort. These criteria have been developed by RWDI through research and consulting practice since 1974. They have also been widely accepted by municipal authorities, building designers and the city planning community, including the City of Hamilton.

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**	**Calm or light breezes desired for outdoor seating areas where one can read a paper without having it blown away**
Standing	**≤ 14**	**Gentle breezes suitable for main building entrances, bus stops, and other places where pedestrians may linger**
Strolling	**≤ 17**	**Moderate winds appropriate for window shopping and strolling along a downtown street, plaza or park**
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 considered a nuisance for all pedestrian activities. Wind mitigation is typically 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.

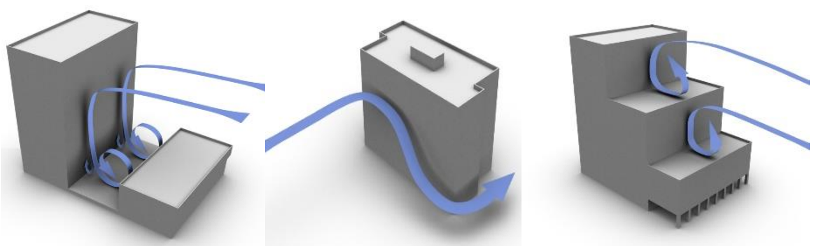
Safety Criterion	Gust Speed (km/h)	Description (Based on annual exceedance of 9 hrs or 0.1% of time)
Exceeded	**> 90**	**Excessive gusts that can adversely affect one's balance and footing. Wind mitigation is typically required**

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*. 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, at eight storeys, will be taller than the surrounding low-rise buildings. Due to the building's orientation relative to the prevailing winds and its stepped massing, the development is not expected to result in adverse wind conditions on or around the site.



Downwashing — Corner Acceleration — Stepped massing and low roofs

Image 7: General wind flow patterns

4.2 Presentation of Results

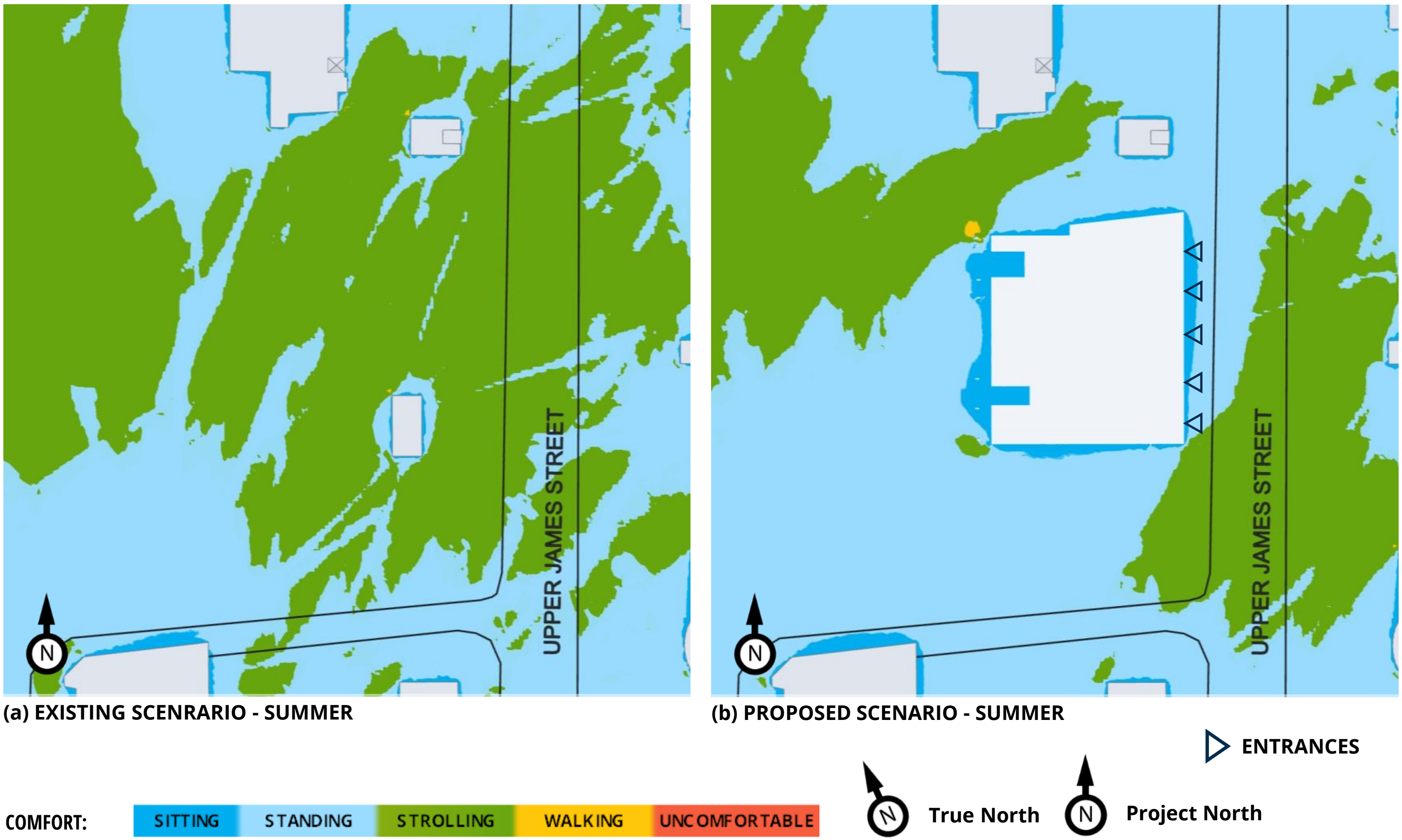
The results of the assessment are presented and discussed in detail in Sections 4.3 and 4.4. Images 8 and 9 are the predicted seasonal wind conditions at grade for the Existing and Proposed configurations, while Image 10 shows the predicted wind conditions on above ground terraces. The graphical presentation 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.

Wind speeds are expected to met the pedestrian wind safety criterion for both the Existing and Proposed scenarios.

<u>Target Conditions</u>

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.

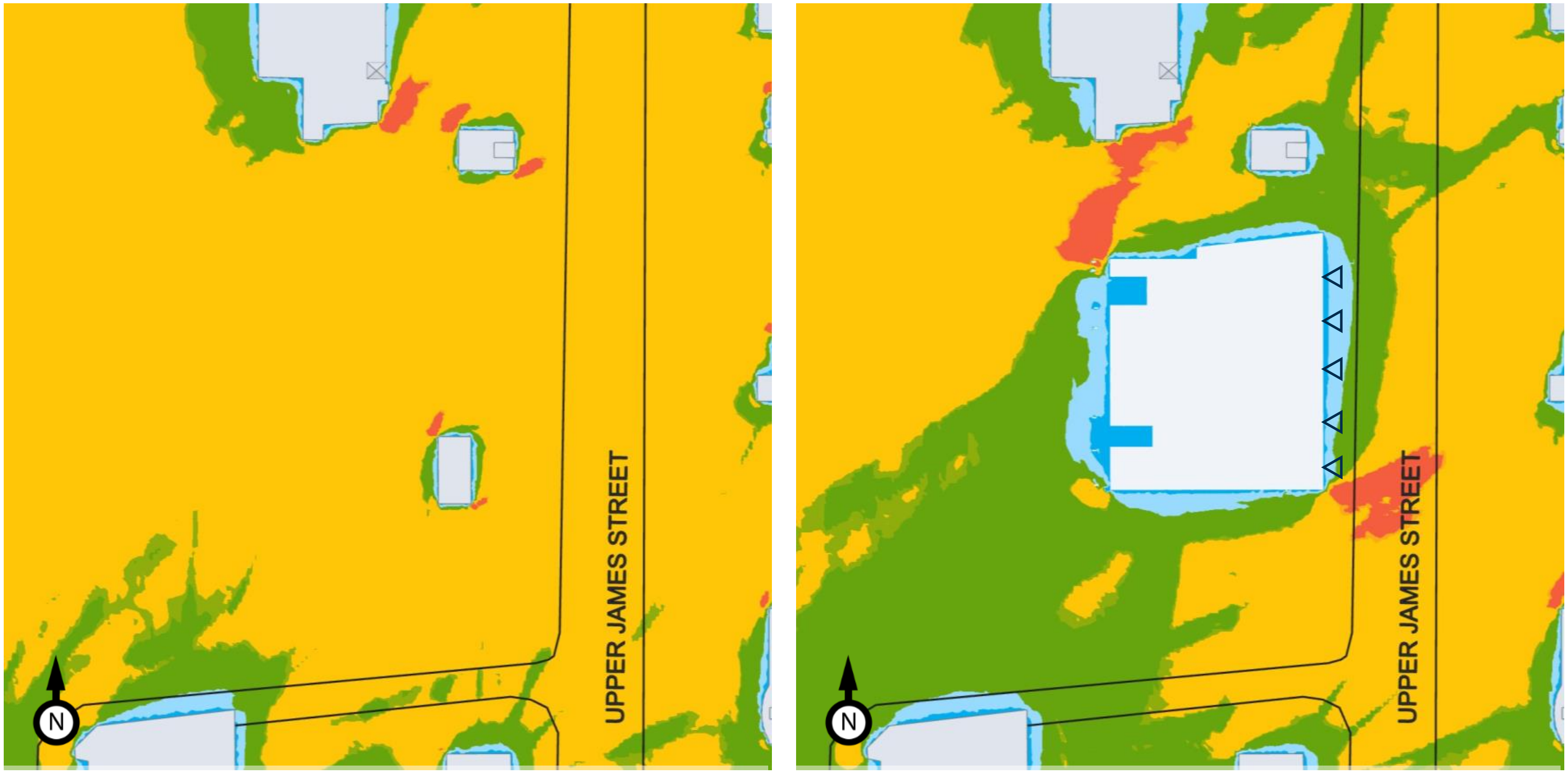
5. RESULTS AND DISCUSSION



(a) EXISTING SCENRARIO - SUMMER

(b) PROPOSED SCENARIO - SUMMER

Image 8: Predicted wind conditions – GRADE LEVEL - SUMMER



(b) EXISTING SCENARIO - WINTER

(b) PROPOSED SCENARIO - WINTER

ENTRANCES

COMFORT: SITTING STANDING STROLLING WALKING UNCOMFORTABLE

True North

Project North

Image 9: Predicted wind conditions – GRADE LEVEL - WINTER

4.3 Existing Scenario

The existing site includes a small building surrounded by low-rise neighbourhoods in most directions with an open field to the west and northwest. Local winds are relatively high in areas with less obstructions. Therefore, wind conditions at most areas in the existing scenario are considered comfortable for strolling or standing in the summer (green and blue regions in Image 8a) and walking in the winter (yellow regions in Image 9a). Closer to the building perimeters, conditions are considered comfortable for sitting or standing in both the seasons (blue in Images 8a and 9a) but localized uncomfortable wind conditions may occur around the northwest and southeast building corners in the winter (orange zones in Image 9a).

4.4 Proposed Scenario

The inclusion of the proposed building creates an obstruction to the local winds, with its corners exposed to the prevailing west-southwest and northeast wind directions. This configuration can result in localized sheltered zones around the building perimeter, where lower wind speeds are expected. Additionally, the stepped-terrace design on the west façade and the extruded balconies on the remaining façades help diffuse the intensity of redirected winds. Therefore, in the Proposed scenario (Images 8b and 9b), wind conditions at most locations remain similar to or improve upon those observed in the Existing scenario.

Uncomfortable wind speeds are expected to be limited to the exposed northwest and southeast corners of the building during the colder months (Image 9b).

4.4.1 Sidewalks and Neighbouring Properties

During the summer, wind conditions comfortable for standing are expected across the project site, with lower wind speeds suitable for sitting anticipated near the building perimeter. Slightly stronger wind speeds suitable for strolling are expected primarily at the northwest and southeast corners (see Image 8b). These conditions are appropriate for the intended pedestrian use.

In the winter, wind conditions at most locations are expected to remain comfortable for strolling or walking. Areas with lower wind speeds, comfortable for sitting or standing, are anticipated immediately adjacent to the building facades, where the building provides shelter from prevailing and building–induced wind flows. Higher wind speeds that may be uncomfortable for pedestrian use are expected occasionally at the northwest and southeast corners (see red regions in Image 9b).

4. RESULTS AND DISCUSSION

4.4.2 Entrances

The residential and retail entrances are located on the east façade, along the sidewalk of Upper James Street, and they are sheltered from the prevailing southwest and west winds by the proposed building and from the northeasterly winds by balcony overhangs. As a result, wind conditions along the building perimeter, including the entrance areas, are expected to be comfortable for sitting or standing throughout the year (see entrance markings in Images 8b and 9b). These conditions are appropriate for the intended entrance use.

4.4.3 Outdoor Amenity Area at Level 3

The outdoor amenity area at Level 3 is largely sheltered from the prevailing winds by the enclosed building envelop. Wind conditions within the space are predicted to be comfortable for sitting or standing during the summer season, which is suitable for passive use (Image 10a).

During the winter, the western portion of the amenity area can be exposed to the stronger southwest and west winds, resulting in elevated wind conditions appropriate for walking or strolling near the western edge. The inner (eastern) portion of the area remains well-sheltered, and conditions in the area, near the building façade, are expected to be comfortable for sitting or standing (see Image 10b). Slightly higher wind speeds in the area are considered acceptable as the area will likely not be occupied frequently in the cold months.

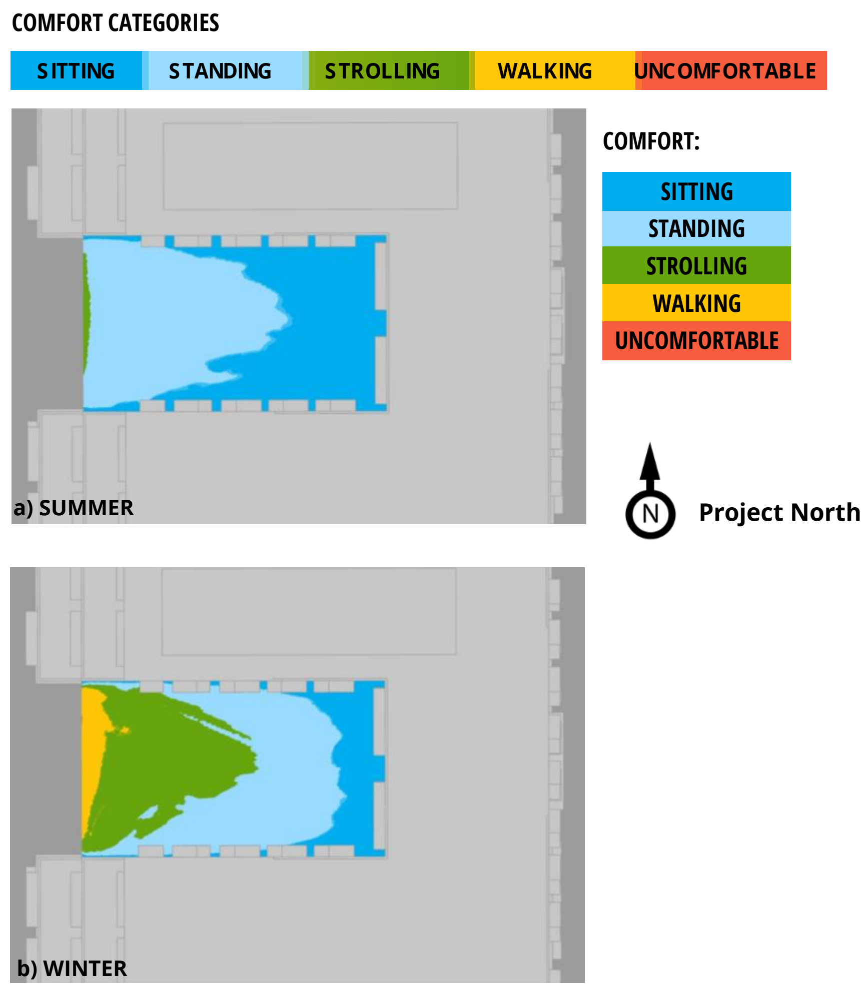


Image 10: Predicted wind conditions – LEVEL 3 OUTDOOR AMENITY AREA

4. RESULTS AND DISCUSSION

4.5 Landscape Plan

4.5.1 Grade Level Plan

RWDI received landscape plans on February 6, 2026 (see Images 11 and 12). The grade-level plan (Image 11) includes various deciduous plantings, such as trees and shrubs. Deciduous trees generally help reduce wind speeds in their vicinity during the summer months, while coniferous species provide year-round benefits, particularly offering improved wind control during the winter season.

To address elevated wind conditions on the sidewalks or walkway near the exposed northwest and southeast corners, localized interventions such as wind screens (approximately 2 m tall with at least 30% porosity) or evergreen planters of the similar height are preferrable for year-round wind control benefits (see example in Image 13).

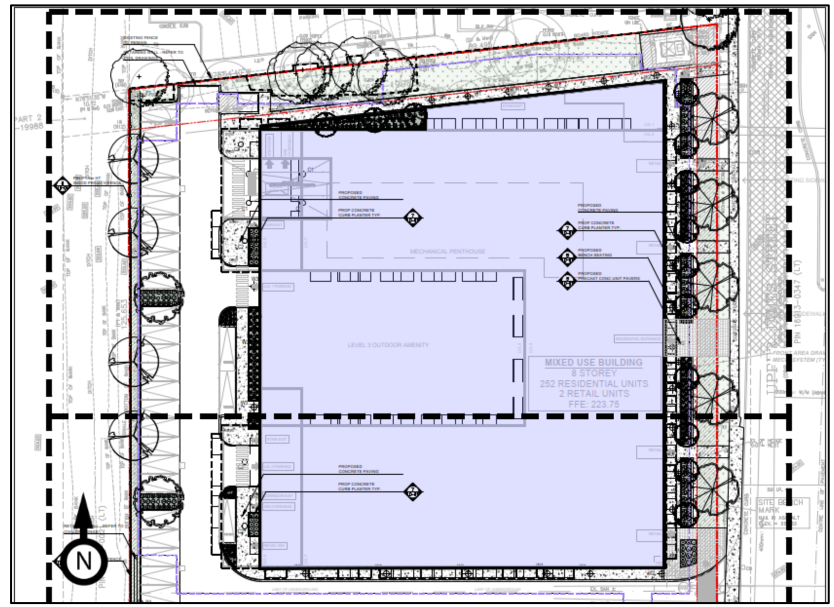


Image 11: Grade-Level Landscape Plan

4.5.2 Level 3 Plan

The proposed landscape plan for Level 3 outdoor amenity area (as shown in Image 12) includes deciduous plantings around the seating or gathering programming. This is beneficial during the summer season, when conditions are expected to be comfortable for leisure use.

Considering outdoor use of the amenity area would be limited or restricted during the winter months, wind conditions may not be of concern during the winter.

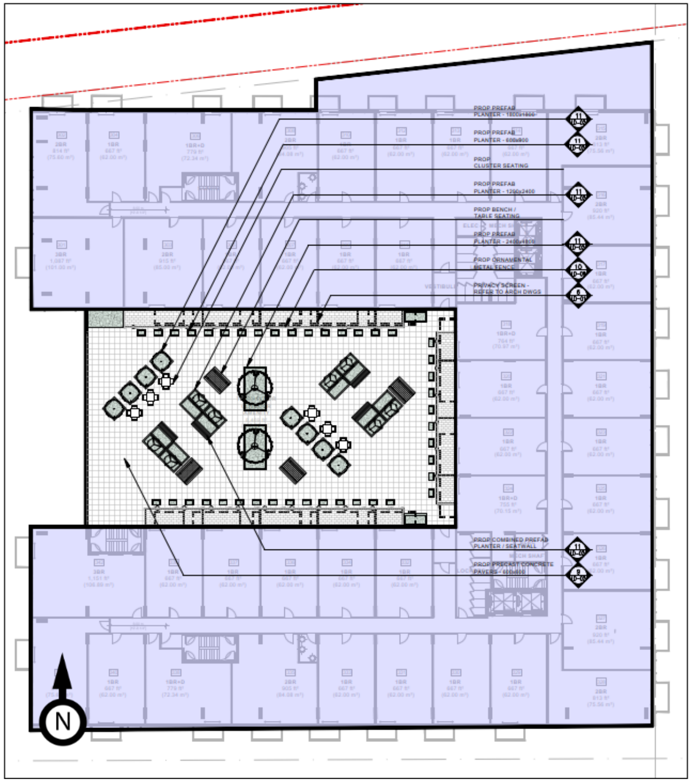


Image 12: Level 3 Outdoor Amenity Area Landscape Plan

5. SUMMARY

RWDI was retained to provide an assessment of the potential pedestrian level wind impact of the proposed project at 1452 Upper James Street in Hamilton, 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:

- The existing wind conditions on and around the site are comfortable for the intended pedestrian use throughout the year, with localized uncomfortable conditions around building corners in the winter.
- With the addition of the proposed development, wind conditions are expected to remain similar to improved upon to that in the Existing scenario, with conditions comfortable for pedestrian activities on a year-round basis. Exceptions are the northwest and southeast building corners, where localized uncomfortable wind conditions may occasionally occur during the winter months.
- Wind conditions at the residential and retail entrances are expected to be suitable for their intended use, with sheltered conditions provided by the building's massing and façade features.
- Wind speeds in the Level 3 outdoor amenity area are predicted to be suitable for passive use in the summer. Slightly elevated wind conditions, less appropriate for passive use, may occur along the western portion of the terrace during the winter. These conditions are acceptable given the limited use of the space during colder months.
- The latest drawings received on February 6, 2026, have been reviewed and found to be consistent with the previous version. Therefore, the results presented in this report remain applicable to the latest drawings.
- The landscape plans received by RWDI on February 6, 2026, have been reviewed for both the grade-level and Level 3 areas, and they are positive in reducing local wind activity. Additional wind control strategies have been discussed in the main body of the report. 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 on January 20, 2026, listed. Should the details of the proposed design and/or geometry of the building change significantly, results may vary.

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.

File Name	File Type	Date Received (mm/dd/yyyy)
125049 - Elite - Upper James - Architectural Coordination Drawings - 2026.01.16	PDF	01/20/2026
3DView.dwg	CAD	01/20/2026
125049 - Elite - Upper James - Architectural Drawings - SPA Submission - 2026.02.06	PDF	02/06/2026
1452 Upper James St. - rev.04 - Landscape Drawing Set	PDF	02/06/2026

7. STATEMENT OF LIMITATIONS

This report was prepared by Rowan Williams Davies & Irwin Inc. for Upper James M.D. Developments Inc. ("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.