REPORT

1 OLD ANCASTER ROAD

HAMILTON, ON

PEDESTRIAN WIND COMFORT ASSESSMENT

PROJECT #2512159
November 7, 2025

SUBMITTED TO

Sandyford Holdings Limited
242 Main Street East
Hamilton, ON, L8N

CC: Scott Beedie, MCIP, RPP
Senior Planner
sbeedie@urbansolutions.info

Urban Solutions Planning & Land Development
3 Studebaker Place, Unit 1,
Hamilton, ON L8L 0C8
T: 905.546.1087
C: 905.807.7727

SUBMITTED BY

Jennifer Shoniker
Technical Coordinator / Associate
Jennifer.Shoniker@rwdi.com

Hanqing Wu, Ph.D., P.Eng.
Technical Director / Principal
Hanqing.Wu@rwdi.com

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

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

rwdi.com

1. INTRODUCTION

Rowan Williams Davies & Irwin Inc. (RWDI) was retained to conduct a pedestrian wind assessment for the proposed project at 1 Old Ancaster Road in Hamilton, Ontario. The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development in support of the OPA/Rezoning Application.

The project site is located at the southeast corner of the intersection of Dundas Street and Oglivie Street and north of Old Ancaster Road. The site is surrounded by low to mid-rise suburban neighbourhoods with heavily forested areas to the north, east and south of site (Image 1).

The project is a residential development that will consist primarily of a 12-storey building containing 144 units and underground parking (Image 2). The building will have a stepped form, which is favourable for reducing wind impacts. Key areas of interest for this assessment include the main entrance to the building off Oglivie Street, secondary residential and retail entrances, a terrace on Level 5 and public sidewalks near the project site (Image 3).

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

Image 2: Rendering of the Proposed Project

1. INTRODUCTION

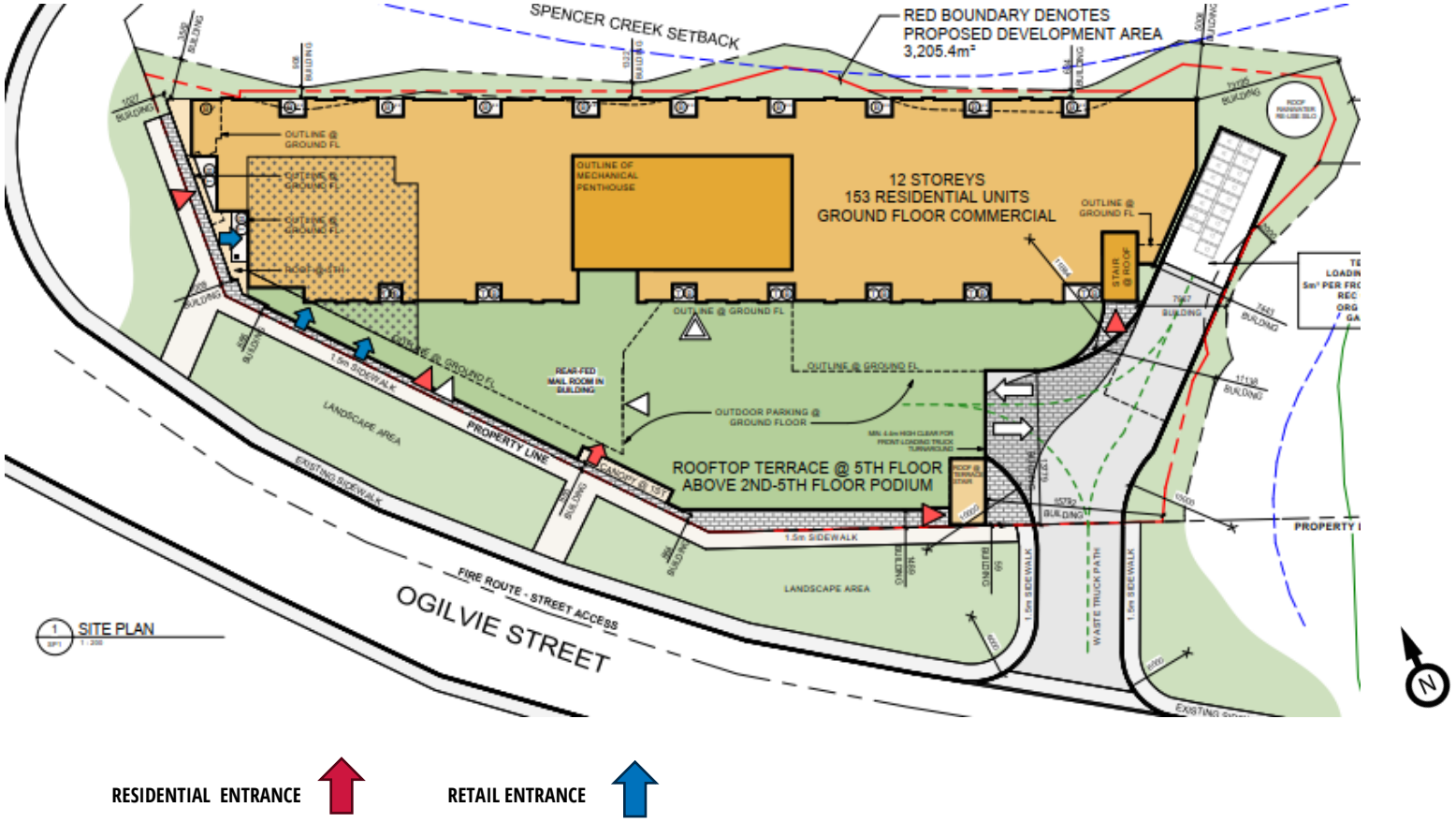


Image 3: Site Plan Identifying Key Areas of Interest

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 of the proposed project received on October 14, 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. 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. The existing forested areas close to the site were including in the model; however, 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.

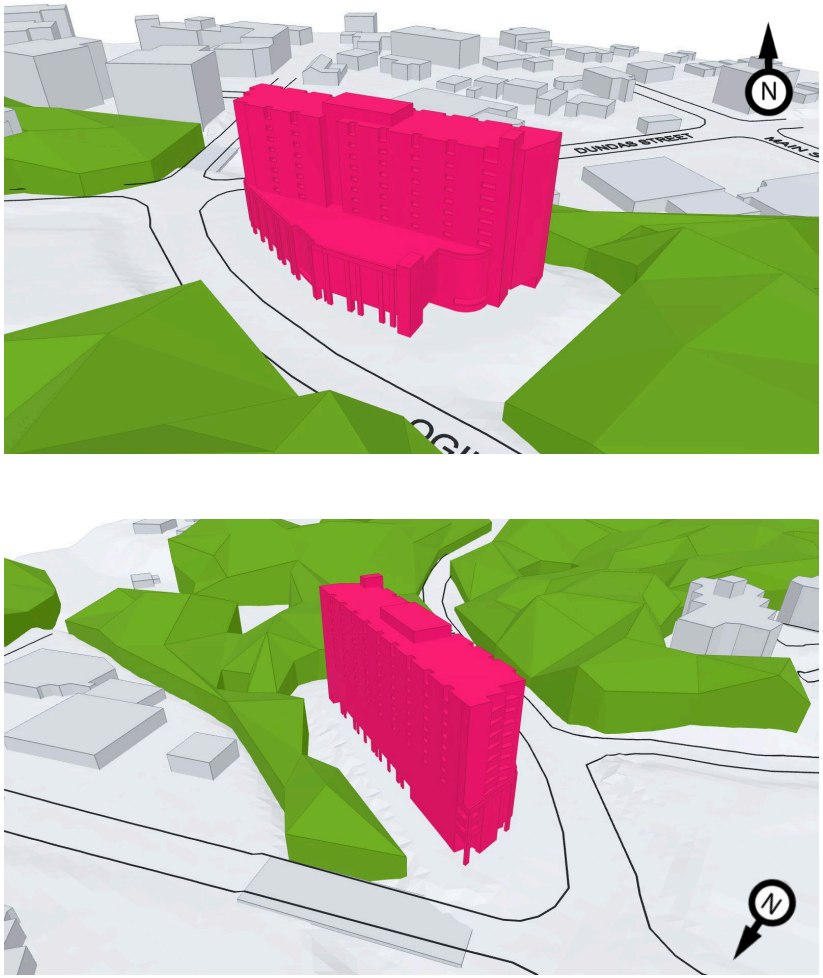


Image 4: Computer Model of the Proposed Project

2. METHODOLOGY

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

2. METHODOLOGY

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

2. METHODOLOGY

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.

Winds from the southwest and northeast directions are predominant in both the summer and winter seasons, 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 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 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.

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.

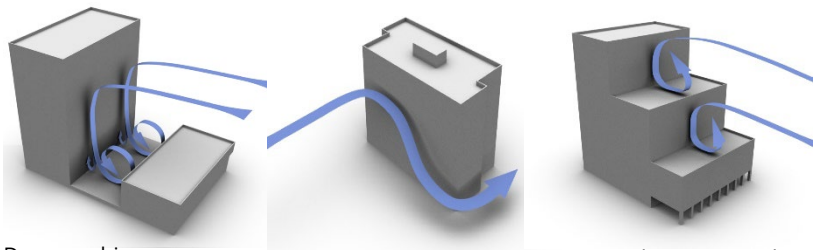
Safety Criterion	Gust Speed (km/h)	Description (Based on annual exceedance of 9 hrs or 0.1% of time)
Exceeded	> 90	Excessive gusts that can adversely affect one's balance and footing. Wind mitigation is typically required

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 12 storeys, will be taller or similar in height to most 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 stepped massing of the building disrupting downwash and dense trees and buildings in the surrounding areas.



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, respectively, while Image 11 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.

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

(a) EXISTING

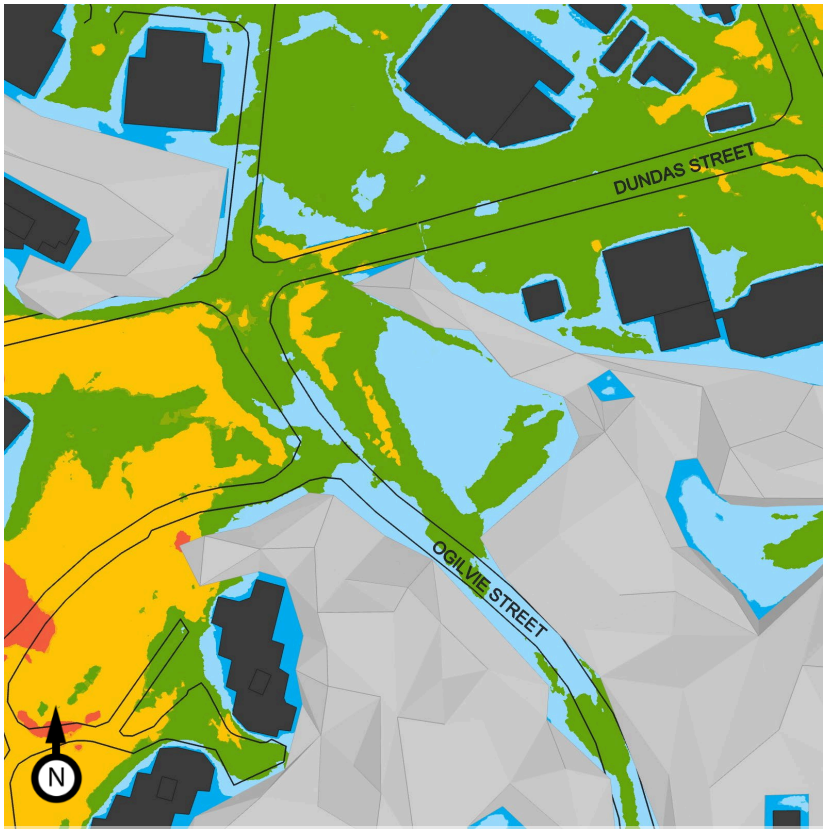
(b) PROPOSED

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

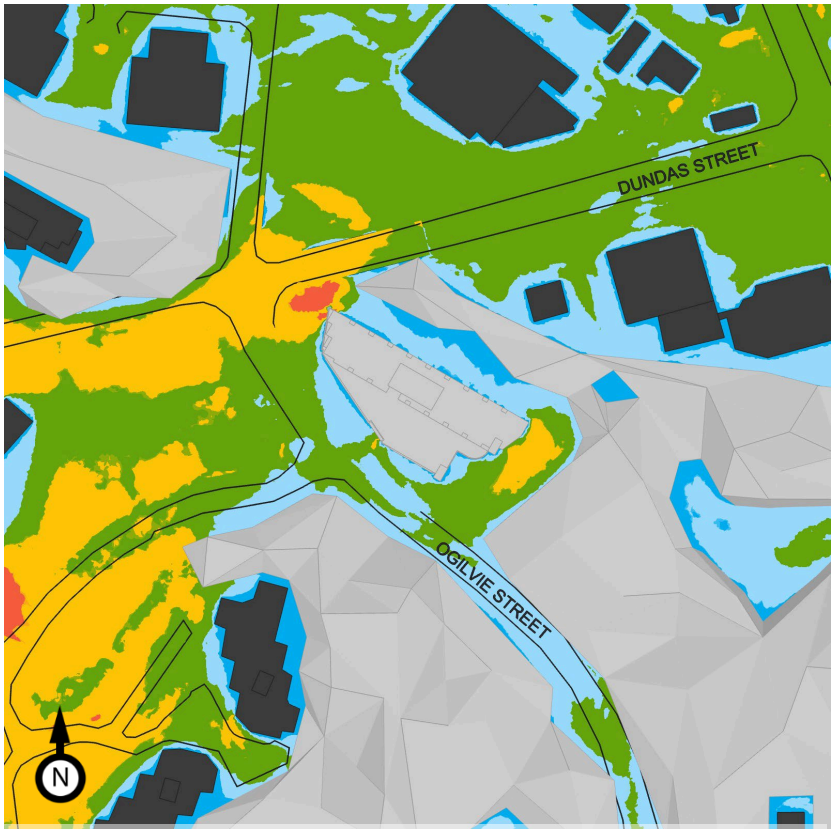
N

Image 8: Predicted Wind Conditions – GROUND LEVEL – SUMMER

4. RESULTS AND DISCUSSION



(a) EXISTING



(b) PROPOSED

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

N

Image 9: Predicted Wind Conditions – GROUND LEVEL – WINTER

4.3 Existing Scenario

The existing site is vacant and therefore will not redirect winds to create any notable impact. Wind conditions at most areas in the Existing scenario are considered comfortable for sitting or standing in the summer, with slightly higher wind speeds comfortable for standing, strolling or walking in the winter (Images 8a and 9a).

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

4.4 Proposed Scenario

The proposed project is taller or similar in height to most buildings that currently exist in the vicinity of the site; however, at 12 storeys, the height is not considered substantial from a wind impact perspective. The proposed building has a stepped massing which will act as horizontal breaks for downwashing flows and thereby reduce the wind impact of the building on grade level areas. The proposed development is not expected to have a notable impact on wind conditions farther away.

4.4.1 Sidewalks and Neighbouring Properties

Wind conditions are expected to continue to be comfortable for sitting or standing at most areas around the site in the summer (Image 8b). Slightly higher wind speeds are predicted at the northern and southern corners of the proposed building (green/yellow regions), where conditions are predicted to be comfortable for strolling or walking. These conditions are appropriate for sidewalk or walkway use.

During the winter months, higher wind speeds are expected around site and along Dundas Street with conditions comfortable for strolling or walking at most locations with standing conditions close to the building perimeter (Image 9b). Potentially, uncomfortable conditions are predicted at a localized area at the northern building corner. It is expected that this uncomfortable area is relatively small and does not exceed the walking criteria by a great margin.

All areas near the proposed project are anticipated to meet the wind safety criterion.

All proposed and existing landscaping/trees are positive features which will help reduce wind speeds around them. Coniferous and marcescent trees, which retain their foliage during colder months, provide extended wind protection throughout these seasons.

4.4.2 Main Entrance on Oglivie Street

The main residential entrance is recessed, under the building overhang. As a result, wind conditions along the building perimeter, including the main entrance and retail entrances on the west side, will be comfortable for sitting or standing in the summer and winter (Image 10). These conditions are appropriate for an entrance location.

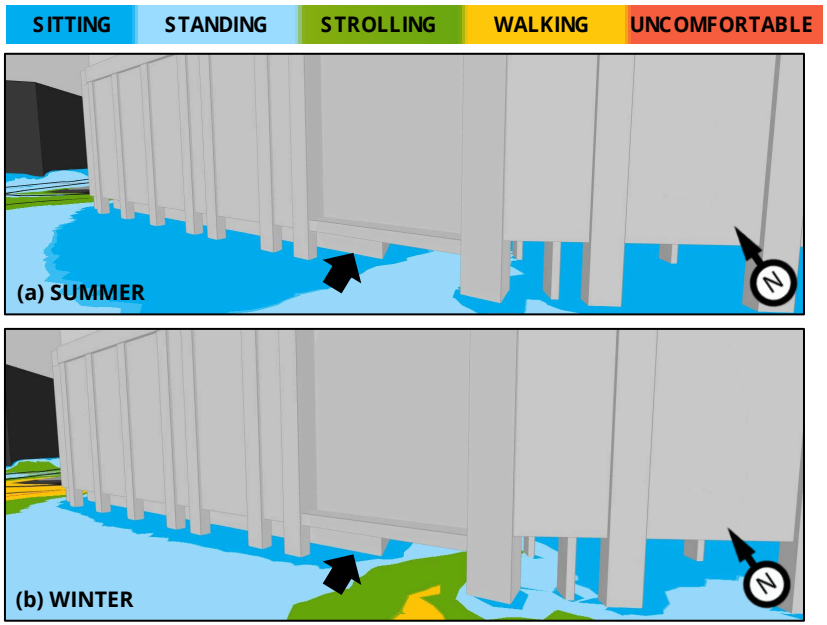


Image 10: Predicted Wind Conditions – MAIN ENTRANCE

4.4.3 Terrace Level 5

The Level 5 terrace is bordered on the southwest by a forested area, which is in full foliage in summer, offering effective wind shelter. Wind conditions are expected to be comfortable for sitting or standing in the summer (Image 11a). Slightly higher winds comfortable for standing or strolling are predicted at most locations on the terrace level during the winter (Image 11b), These wind conditions may not be of concern as the terrace would not be frequented in the colder months.

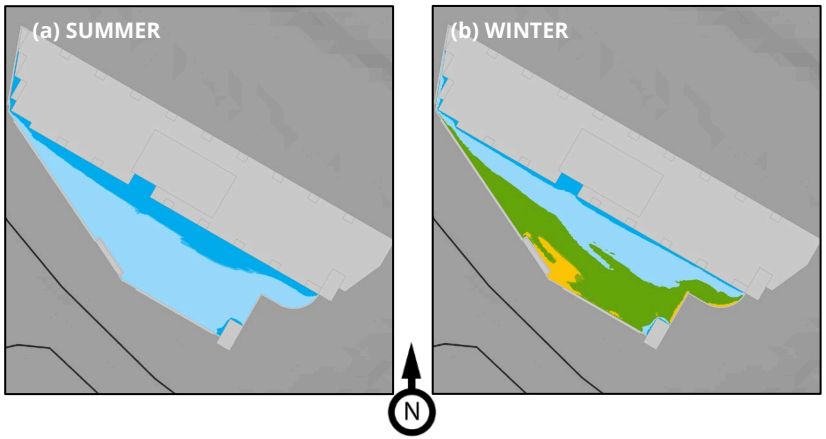


Image 11: Predicted Wind Conditions – LEVEL 5 TERRACE

5. SUMMARY

RWDI was retained to provide an assessment of the potential pedestrian level wind impact of the proposed project at 1 Old Ancaster Road 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:

- Wind conditions at all areas on and around the existing site are suitable for the intended pedestrian use throughout the year. The pedestrian wind safety criterion is anticipated to be met at all pedestrian areas on and around the project site.
- The proposed building is taller than its surroundings and therefore will redirect wind to ground level. However, positive features in the massing design and dense surrounding trees will help moderate wind impact.
- The pedestrian wind safety criterion is expected to be met at all pedestrian locations for the proposed scenario
- Wind conditions at most ground level locations, including the main and retail entrances and sidewalks are expected to be appropriate for the intended usage during both the summer and winter. The project is not expected to have a notable influence on wind conditions on other properties.
- Potentially uncomfortable wind conditions are predicted at a small area around the northern building corner during the winter.
- Wind speeds on the Level 5 terrace are predicted to be appropriate for passive use during the summer.

6. DESIGN ASSUMPTIONS

The findings/recommendations in this report are based on the building geometry and architectural drawings communicated to RWDI in October 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)
18080 - Sandyford - 1 Old Ancaster Road_detached	Revit	10/14/2025
18080 - Sandyford - 1 Old Ancaster Road - Zoning Coord Set 2025-09-25	PDF	10/14/2025

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 Sandyford Holdings Limited ("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.