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February 9, 2016

Main Carling Investments Ltd.
Attn: David Horwood
242 Main Street East
Hamilton, ON L8N 1H5
dh@effortrust.ca

**Re: Pedestrian Wind Assessment – Letter of Opinion
Beverly Hills Apartments
Hamilton, Ontario
RWDI Reference No. 1603916**

Dear Mr. Horwood:

Rowan Williams Davies & Irwin Inc. (RWDI) has prepared this letter to present our opinion on the potential pedestrian wind conditions on and around the proposed Beverly Hills Apartments in Hamilton, Ontario. This letter is in support of the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applications for this project.

This Letter of Opinion provides a discussion on the qualitative assessment of the development in the context of the local wind climate and current building design.

Wind tunnel testing is required to provide a quantitative evaluation of the wind flows around a development in support of the future Site Plan Approval (SPA) application.

Site Information

The proposed development will be located on a street block bordered by Carling Street to the north, Highway 403 to the east, Main Street W to the south and Macklin Street S to the west (see Image 1).

The area surrounding the site consists primarily of single-family residential buildings to the west and north, with the existing 17-storey Beverly Hills apartment building immediately to the west. There are commercial and industrial areas to the east, south and southwest across Highway 403 (Image 1a).



Image 1a – Aerial View of the Site (Courtesy of Google earth™)

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Based on the drawings received by RWDI on February 8, 2017, the proposed building will consist of an 18-storey residential building with 17 floors of multiple dwelling units and one storey podium level. Pedestrian areas on and around the development include entrances and sidewalks along Carling Street, balconies and potential outdoor amenity spaces on the podiums and rooftop.

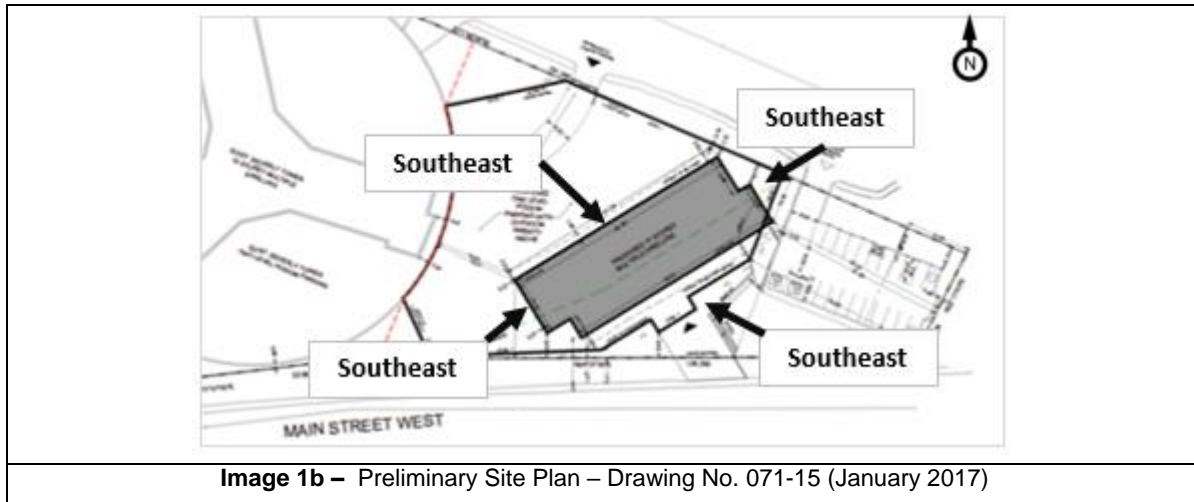


Image 1b – Preliminary Site Plan – Drawing No. 071-15 (January 2017)

Meteorological Information

Long-term meteorological data recorded from Hamilton International Airport, for the period from 1985 to 2015, were used as a reference for wind conditions in the area (see Image 2). When all winds are considered, winds from the southwest quadrant, northeast and east-northeast directions are predominant in the summer. The right wind rose shows the winter data, indicating the predominance of winds from the southwest quadrant, northeast and east-northeast during this season. Strong winds (yellow and red bands) are also from these directions, with a considerably higher frequency in the winter than the summer.

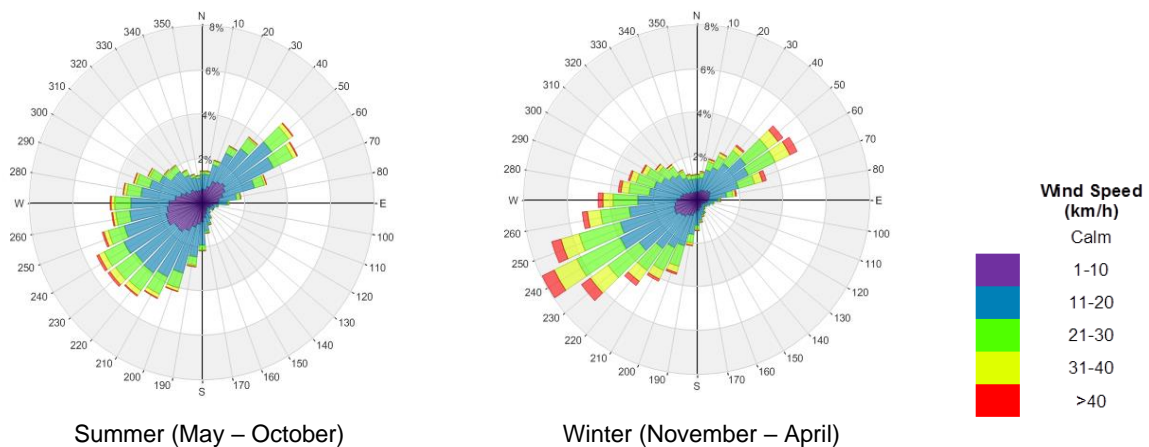


Image 2 – Wind Directional Distribution (%) – Hamilton International Airport (1985 – 2015)



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Pedestrian Wind Assessment

To provide an opinion on the overall wind conditions expected around the proposed development, RWDI reviewed the meteorological data for the area (as described previously); drawings of the proposed development; and information regarding the surroundings. This information, in conjunction with our past experience in the area and our engineering judgement, allowed us to summarize the expected wind conditions as summarized below.

Wind Flow Patterns

- The proposed building will be taller than its surroundings and comparable in height to the existing Beverly Hills tower to the west. As such, the building will be exposed to the prevailing winds from the northeast and southwest.
- In general, tall buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground. Such a *Downwashing Flow* is often the main cause for wind accelerations around large buildings at the pedestrian level (see Image 3). The proposed building is aligned with its long axis nearly parallel to the prevailing winds from the northeast and southwest quadrants. This orientation is considered a positive design feature from a pedestrian wind comfort and safety perspective, as the narrower facades facing the northeast and southwest reduce the potential for downwashing of the prevailing winds from these directions.
- The proposed building also has a large podium with a stepped form on the west side, which is a highly favourable from a wind control perspective. The podium and steps would disrupt winds that would be directed downward by the tower and thereby reduce potential of the building to create large areas of undesirable wind activity at grade. This is schematically illustrated in Images 4 and 5.



Image 3 –
Downwashing Flow

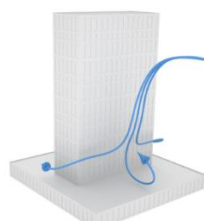


Image 4 – Large
Podium for Wind
Control

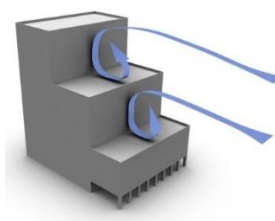


Image 5 - Stepped
façade disrupts
downwashing winds

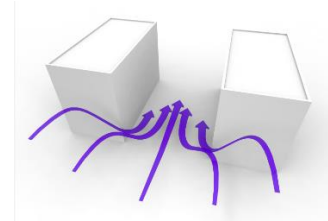


Image 6 – Channelling
Effect

- When two buildings are situated side by side, wind flow tends to accelerate through the space between the buildings due to the *Channelling Effect* (see Image 6). This would result in higher wind speeds than would be desired for areas intended for passive pedestrian activities on the northwest podium areas of the proposed building. The effect of channelling of the prevailing northeast and southwesterly winds between the existing Beverly Hills Apartment and the proposed tower may also yield potentially uncomfortable wind speeds around the southwest corners of the towers at the podium level. Recommended wind control measures are discussed in the following sections of this letter to mitigate the effect of channelling winds between the buildings.



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Predicted Wind Conditions

The following is a discussion on the anticipated wind conditions and their suitability for the intended pedestrian activity on and around the development. The discussion focussed on the key pedestrian areas as indicated in Images 7 and 8.

- The main tenant street entrance is located at the south mid area of the proposed building (A1 on Image 7). The main tenant street entrance is designed with a vestibule and a lobby, which are positive features in terms of wind protection. The vestibule and lobby will provide a sheltered waiting area for the patrons on windy or cold days.
- Wind conditions at the parking lot to the northeast of the proposed building (Location B1 in Image 7) would generally be appropriate for active pedestrians (i.e., walking or strolling).
- The area surrounding the site consists primarily of single-family residential buildings to the west and north of the site. Given the existing configuration of the surrounding buildings (i.e., size and locations of the existing surrounding buildings), including the 17-storey building to the west, and the positive design features of the proposed building, the addition of the proposed building is expected to have minimal impact on the wind conditions on the sidewalks along Macklin and Carling Streets and along Tope Crescent (Locations B in Image 8).
- The southeast areas of the podium (C1 in Image 8) would be exposed to the predominant winds from the northeast and southwest quadrants. Moderate wind speeds comfortable for pedestrians idling, standing or strolling are predicted in these areas during the summer, while marginally higher wind speeds predominantly suitable for more active pedestrians are predicted during the winter. Without wind control measures, these wind speeds may be higher than desired if the area is intended for passive activities in during the summer. During winter, the area would not be used frequently and therefore higher wind speeds may be considered appropriate.
- Without any wind control measures, wind speeds on the northwest areas of the podium (C2 in Image 8) are predicted to be higher than would be desired for passive pedestrian activities, due to channelling of winds between the existing Beverly Hill Apartment and the proposed tower. It is recommended that wind control measures such as tall balustrades, trellises, planters and windscreens be considered for these areas in order to achieve lower wind activity in the summer. During the winter, it is anticipated that the podium would not be used for passive activities; therefore, the high wind activity may be acceptable. It is to be noted that during the winter, seasonal strong winds are likely to generate wind speeds that would be unsafe for occupant use of the podium and access to it should be prohibited during the winter.

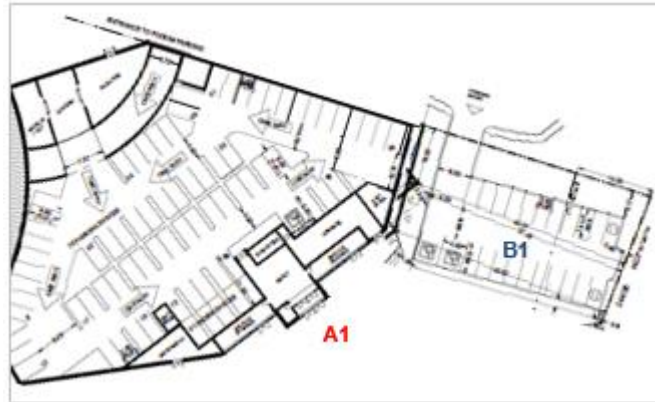


Image 7 – Preliminary Site Plan – Drawing No. AA400
(2016/10/13)



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LEGEND

- Sidewalks – B
- Southeast Podium – C1
- Northwest Podium – C2
- Podium Level Building Corners – D

Image 8 – Aerial View Looking Northeast – Existing Building (Left) and Proposed Building (Right)

- Due to the exposure of the proposed building to the predominant winds, winds would accelerate around the tower corners on the podium level (Locations D in Image 8), resulting conditions that may be higher than desirable for sitting or standing, but appropriate for more active pedestrians during the summer season. In the winter, seasonal stronger winds have the potential to create uncomfortable wind conditions that may potentially exceed the wind safety criterion at these locations.
- Wind comfort conditions on balconies can vary significantly depending upon wind directions and where a person stands relative to railings, partitions, privacy screens, etc. For the current project, balconies along the southeast façade will be mostly sheltered by the tower from the prevailing southwesterly winds, while balconies along the southwest, northwest and northeast facades will be more exposed to one or more of the prevailing wind directions.

CONCLUSIONS

The proposed building is of a moderate height, but taller than its surroundings. Overall, the addition of the proposed building to the site is expected to have minimal impact on the existing conditions of the surrounding sidewalks along Macklin Street S, Carling Street and Tope Crescent.

Wind conditions at the main entrance lobby, parking lot and sidewalks are expected to be suitable for the intended use. Higher-than-desired wind speeds are likely to occur on the podium and especially at the corners of the tower on the podium. Wind speeds can be reduced through the use of several wind control features and a strategically planned landscape design.

The upcoming wind tunnel tests in support of the SPA submission would help quantify these wind conditions and develop appropriate wind control solutions, if necessary.



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CLOSING

We trust this satisfies your requirements for the project. Should you have any questions or require additional information, please do not hesitate to contact us.

Yours very truly,

ROWAN WILLIAMS DAVIES & IRWIN Inc.

A handwritten signature in black ink, appearing to read 'Kelly Baah', written over a circular stamp or seal.

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Technical Coordinator

A handwritten signature in blue ink, appearing to read 'Neetha Vasan', written over a horizontal line.

Neetha Vasan, M.A.Sc.
Senior Technical Coordinator

A handwritten signature in black ink, appearing to read 'John Alberico', written over a horizontal line.

John Alberico, M.Sc., CCEP, LEED AP
Senior Project Manager / Principal

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