

October 9, 2019

Kyle Bittman, Director of Development
Waldemar Limited Partnership
3410 South Service Road
Suite G5 (Garden Level 5)
Burlington, ON L7N 3T2

Dear Mr. Bittman:

Re: Qualitative Pedestrian Level Wind Assessment
418 and 422 Guelph Line, Burlington
Gradient Wind File # 19-062-DTPLW R1

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Waldemar Limited Partnership to undertake a qualitative pedestrian level wind assessment for the proposed residential condominium development located at 418 and 422 Guelph Line in Burlington, Ontario. This report provides a qualitative assessment of pedestrian level wind comfort for the noted site based on architectural drawings and a three-dimensional model provided by KNYMH Inc. in October 2019, consideration of existing and approved future surrounding buildings, statistical knowledge of the Burlington wind climate, and experience with similar projects in Burlington.

In the early stages of design development, a qualitative wind assessment is useful to identify any significant massing features or design elements which may adversely impact pedestrian activities within the study area, and to provide initial recommendations for mitigation strategies, as may be required.

1. TERMS OF REFERENCE

The focus of this qualitative pedestrian wind assessment is the proposed residential condominium development located at 418 and 422 Guelph Line, which is situated at the south corner of the intersection of Guelph Line and New Street in Burlington, Ontario. The proposed development comprises a 13- storey, irregular planform condominium building, rising above a 3-storey podium. The ground floor and second floor are served by covered parking spaces at the west side. The grade-level space at the east side comprises a lobby, indoor amenity space, and building support facilities. The east side of Level 2 features

storage space. For Levels 3 and above, the building is reserved primarily for residential occupancy, with balconies and terraces at all elevations, excluding the east side of Level 3 which is occupied by indoor amenity areas. The floorplan remains uniform for Levels 4-11. At Level 12 the floorplan steps back from all elevations to accommodate private terraces. Additional parking is provided below-grade, which is accessed by a ramp from Guleph Line.

Regarding wind exposures, the near-field and far-field surroundings of the development are characterized primarily by a mixture of low-rise residential, and commercial buildings in all directions. Notably, a gas station is situated to the northwest, a parking lot to the north, and the Waterfront Trail to the southeast. Additionally, existing one-storey brick buildings will remain adjacent to the southwest and northwest sides of the study site.

The ground floor and 3rd floor terrace plans are illustrated in Figures 1 and 2, respectively (following the main text), with letter tags identifying wind sensitive pedestrian locations considered in this assessment.

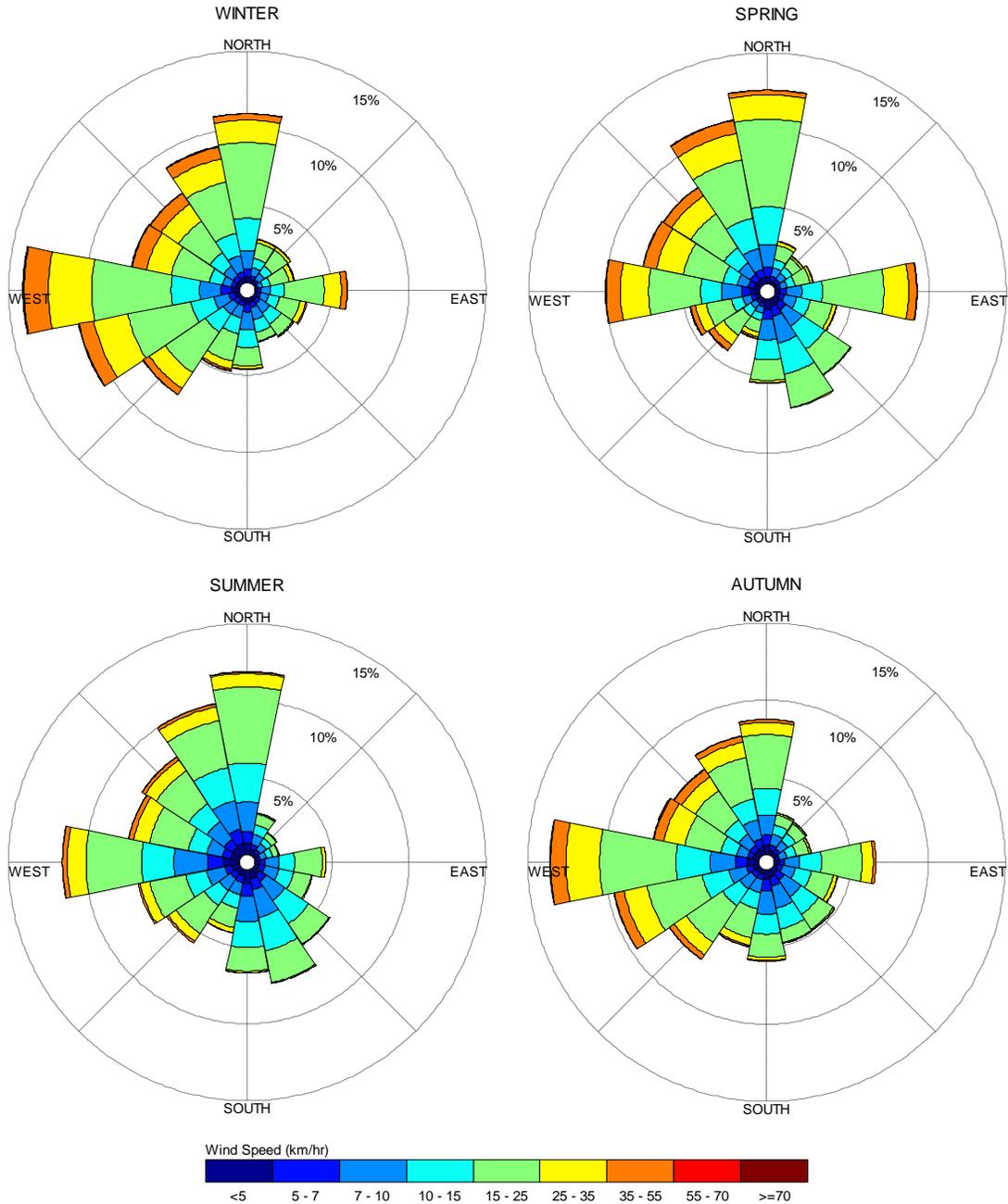
2. METHODOLOGY

The main aspects of a qualitative pedestrian level wind assessment include (i) consideration of the statistical properties of the local wind climate; (ii) knowledge of wind flow behaviour in typical suburban environments; and (iii) an understanding of how common wind conditions relate to typical pedestrian activity types.

2.1 Burlington Wind Climate

The statistical model of the Burlington wind climate, which indicates the directional character of local winds on a seasonal basis, is illustrated on the following page. The plots illustrate seasonal distribution of measured wind speeds and directions in kilometers per hour (km/h). Probabilities of occurrence of different wind speeds are represented as stacked polar bars in sixteen azimuth divisions. The radial direction represents the percentage of time for various wind speed ranges per wind direction during a 40-year measurement period. The preferred wind speeds and directions can be identified by the longer length of the bars. For Burlington, the most common winds concerning pedestrian comfort occur from the southwest clockwise to the north, as well as those from the east. The directional preference and relative magnitude of the wind speed varies somewhat from season to season, with the summer months displaying the calmest winds relative to the remaining seasonal periods.

SEASONAL DISTRIBUTION OF WINDS FOR VARIOUS PROBABILITIES PEARSON INTERNATIONAL AIRPORT, TORONTO, ONTARIO



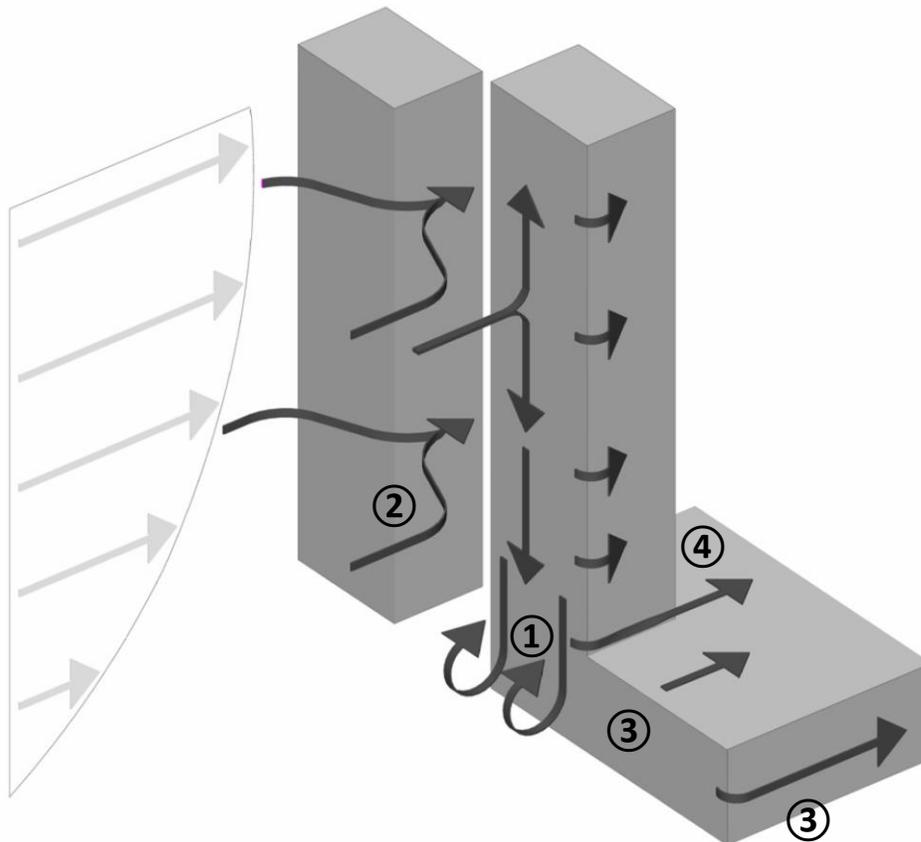
Notes:

1. Radial distances indicate percentage of time of wind events.
2. Wind speeds are mean hourly in km/h, measured at 10 m above the ground.

2.2 Massing vs. Climate – Geometric Effects

The physical features of a development site that are most influential to the local wind conditions include the massing and relative spacing of surrounding buildings, the geometry and orientation of the study building, and the alignment of the study building with respect to statistically prominent wind directions.

Wind flow characteristics which combine to determine how conditions will develop include phenomena known as downwash, channelling coupled with acceleration, and shielding, as illustrated in the image below. Downwash ① relates to the effect of winds against a tall building, whereby much of the impinging flow on the windward side of the building, nominally below two-thirds of the total height, is directed to lower levels. Taller buildings with smooth façades and no podiums produce the strongest downwash effects at grade, while the presence of protruding balconies and a tower setback from the podium edge mitigates downwash effects at the ground level. Channelling ② refers to acceleration of wind through gaps between buildings, while acceleration of wind ③ occurs around building corners. Shielding ④ relates to calm zones on the leeward side of buildings, protected from prevailing winds.



2.3 Pedestrian Comfort and Safety Guidelines

The pedestrian wind comfort guidelines used by Gradient Wind, which correspond to industry-accepted standards, are based on the correlation between a variety of pedestrian activity types and acceptable wind speed ranges for those activities. More specifically:

- Wind conditions are comfortable for *sitting* when gust wind speeds no greater than 16 km/h occur at least 80% of the time;
- Wind conditions are comfortable for *standing* when gust wind speeds no greater than 22 km/h occur at least 80% of the time; and
- Wind conditions are comfortable for *walking* when gust wind speeds no greater than 30 km/h occur at least 80% of the time.

These guidelines are based on gust wind speeds, since people are most sensitive to wind gusts rather than to constant wind speeds. The guidelines are applied to the intended use of an outdoor area. For example, an entrance to a building should be suitable for standing, but need not be suitable for sitting, while a public sidewalk need only be suitable for walking in most circumstances.

3. ANTICIPATED PEDESTRIAN COMFORT

Based on consideration of the proposed residential development at 418 and 422 Guelph Line in Burlington, surrounding building massing, and the relationship to the local wind climate, the following statements summarize our assessment of wind comfort at key pedestrian areas.

Sidewalk along Guelph Line, inclusive of Building Entrances (Figure 1, Tags A and B): The sidewalk area along Guelph Line (Tag A) will be exposed to prominent northwesterly winds, as well as less prominent southeasterly winds approaching the site unbuffered from the waterfront. Wind conditions are therefore expected to be comfortable for standing during the summer, and for walking or better throughout the remainder of the year. Calmer conditions are expected at the various building access points fronting Guelph Line (Tag B) on account of added protection from the entrance canopies and the building façade. Wind conditions at the building entrances are expected to be suitable for sitting throughout the year. The noted conditions are considered acceptable for public sidewalks and primary building entrances.

Sidewalk along New Street, inclusive of Transit Stop (Figure 1, Tag C): On account of minimal upwind resistance, the sidewalk along New Street is expected to experience wind conditions suitable for standing or better during the summer months, becoming comfortable for walking or better throughout the remaining seasonal periods, which is acceptable. The transit stop situated on this sidewalk near the intersection of New Street and Guelph Line, is equipped with a transit shelter and therefore the noted wind conditions are still considered appropriate as pedestrians can seek shelter during windier periods.

Existing Parking Areas (Figure 1, Tag D): The existing parking areas along the northwest side of the study building are somewhat sheltered from salient winds by the study building itself and the existing 1-storey commercial development referred to as ‘Roseland Square’. Therefore, the area is expected to be comfortable for standing or better throughout the summer and autumn months, becoming suitable for walking or better during the remaining colder seasons, which is considered appropriate for the intended uses of the spaces.

Waterfront Trail (Figure 1, Tag E): The portion of Waterfront Trail along the southeast side of the study site will be sheltered from prominent northwesterly winds by the study building itself, and from the remaining wind directions by the surrounding low-rise massing and vegetation. Overall, the area is expected to be comfortable for standing or better during the summer and autumn, and for walking or better throughout the spring and winter, which is acceptable.

Level 3 Elevated Terrace (Figure 2, Tag F): Regarding wind conditions over the Level 3 podium roof (Tag F), along the northwest and southwest sides of the building, conditions are expected to be comfortable for standing during the summer months and for walking or better throughout the rest of the year. Along the northeast and southeast sides of the building, terrace conditions are expected to be slightly calmer, given the added protection provided by the study building against prominent northwesterly winds, being suitable for sitting during the summer, standing or better during the autumn, and for walking or better throughout the remaining colder seasons. If the podium roof will accommodate an outdoor amenity space, it is recommended to consider targeted vertical wind barriers upwind of designated seating areas to ensure the spaces will be comfortable for sitting or more sedentary activities throughout the typical use period of late spring to early autumn. These barriers would need to measure at least 1.8 m in height and may comprise raised planters with coniferous plantings, solid wind screens, or a combination of the two options.

Influence of the Proposed Development on Existing Wind Conditions near the Study Site: The introduction of the proposed 418 and 422 Guelph Line development is not expected to significantly influence pedestrian wind comfort over neighbouring areas. Nearby building entrances, sidewalks, laneways, parking areas, and other pedestrian-sensitive areas beyond the development site are expected to continue to experience acceptable wind conditions.

Applicability of Predictions: The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g. thunderstorms, tornadoes, and downbursts), pedestrian safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate cover.

4. SUMMARY AND RECOMMENDATIONS

Based on a qualitative analysis of architectural drawings, surrounding building massing, and the Burlington wind climate, the following general statements summarize our prediction of future wind conditions for the proposed residential development at 418 and 422 Guelph Line in Burlington, Ontario.

1. Wind comfort at all grade-level pedestrian-sensitive locations across the full study site is expected to be suitable for the anticipated uses without mitigation. These grade-level areas include nearby sidewalks, parking areas, transit stops, trails, and building access points.
2. For the Level 3 elevated terrace spaces that are to serve as outdoor amenity areas, mitigation may be desired as detailed in Section 3.
3. The introduction of the proposed building is not expected to significantly influence pedestrian wind comfort at neighbouring areas beyond the development site. In particular, nearby building entrances, sidewalks, laneways, parking areas, and other pedestrian-sensitive areas beyond the development site are expected to continue to experience wind conditions similar to those that presently exist without the proposed building in place.
4. The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g. thunderstorms, tornadoes, and downbursts), pedestrian safety is



the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate cover.

This concludes our qualitative assessment of pedestrian wind comfort. Please advise the undersigned of any questions or comments.

Sincerely,

Gradient Wind Engineering Inc.



Nick Petersen, B.Eng., EIT,
Junior Wind Scientist



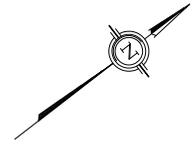
Justin Ferraro, P.Eng.
Principal

Gradient Wind File #19-062-DTPLW R1



PROJECT	422 GUELPH LINE, BURLINGTON QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT	
SCALE	1:600 (APPROX)	DRAWING NO. GWE19-062-DTPLW-1
DATE	OCTOBER 9, 2019	DRAWN BY K.A.

DESCRIPTION	FIGURE 1: GROUND FLOOR PLAN WITH REFERENCE MARKERS
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PROJECT	422 GUELPH LINE, BURLINGTON QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT	
SCALE	1:400 (APPROX)	DRAWING NO. GWE19-062-DTPLW-2
DATE	OCTOBER 9, 2019	DRAWN BY K.A.

DESCRIPTION	FIGURE 2: LEVEL 3 TERRACE PLAN WITH REFERENCE MARKERS
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