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To: The Infinity Group Inc.
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Re: **Pedestrian Wind Assessment**
1396 Guelph Line
Burlington, ON
SLR Project #241.30476.00000

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Credit: Zedd Architecture



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1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by The Infinity Group Inc. to conduct a pedestrian wind assessment for the proposed development at 1396 Guelph Line in Burlington, Ontario. This report is in support of the combined Official Plan Amendment (OPA) and Zoning Bylaw Amendment (ZBA) application for the development.

As the height of the proposed development was reduced from the pre-consultation meeting height of 19-storeys to the current 11-storeys, a quantitative study is no longer required. Hence, SLR has provided a qualitative study per the City of Burlington's document *Pedestrian Level Wind Study Guidelines and Terms of Reference (June 2020).*

1.1 Existing Development

The proposed development is located at 1396 Guelph Line on the south side of the road between Palmer Drive and St. Frances Drive. The site is currently occupied by a low-rise commercial building and parking lot. Figure 1 provides an aerial view of the immediate study area. A virtual site visit was conducted by SLR using Google Earth images dated August 2021; some of these images are included in Figures 2a through 2d.

Immediately surrounding the site is the hydro corridor to the southwest through northwest, a low-rise institutional building to the north, and low-rise residential buildings to the northeast through south. Beyond the immediate surroundings there are low-rise residential and commercial developments in all directions, with Lake Ontario approximately 4.5 km away to the southeast.



Figure 1: Aerial view of existing site & surroundings
Credit: Google Earth Pro, dated 5/7/2018



Figure 2a: Looking south at existing site



Figure 2b: Looking northwest along Guelph Line

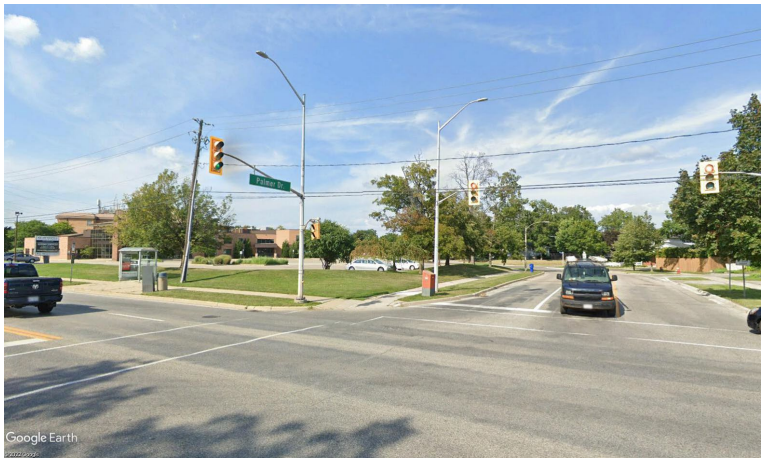


Figure 2c: Looking north from intersection of Guelph Line & Palmer Drive

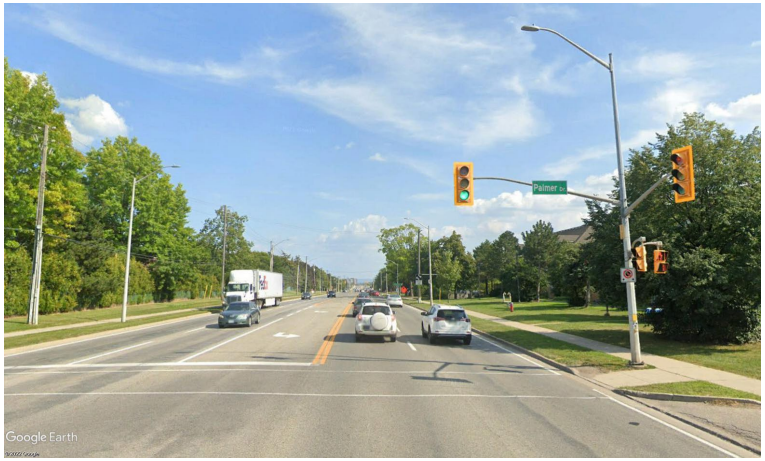


Figure 2d: Looking southeast along Guelph Line

1.2 Proposed Development

The proposed development has a trapezoidal footprint of approximately 73 m by 29 m, with the long axis parallel to the hydro corridor. The building is 11-storeys tall, plus a mechanical penthouse, for a total height of approximately 42 m. The main residential entrance is located at the northwest corner of the building, with secondary entrances and exits along the west and east facades. A rendering of the development is shown in Figure 3.

1.3 Areas of Interest

Areas of interest for pedestrian wind conditions include those areas which pedestrians are expected to use on a frequent basis. Typically these include sidewalks, main entrances, transit stops, plazas and parks. On-site areas of interest are shown in Figure 4.

There are two nearby transit stops, at the northwest and southwest corners of the intersection of Guelph Line and Palmer Drive.



Figure 3: Rendering of development
Credit: Zedd Architecture

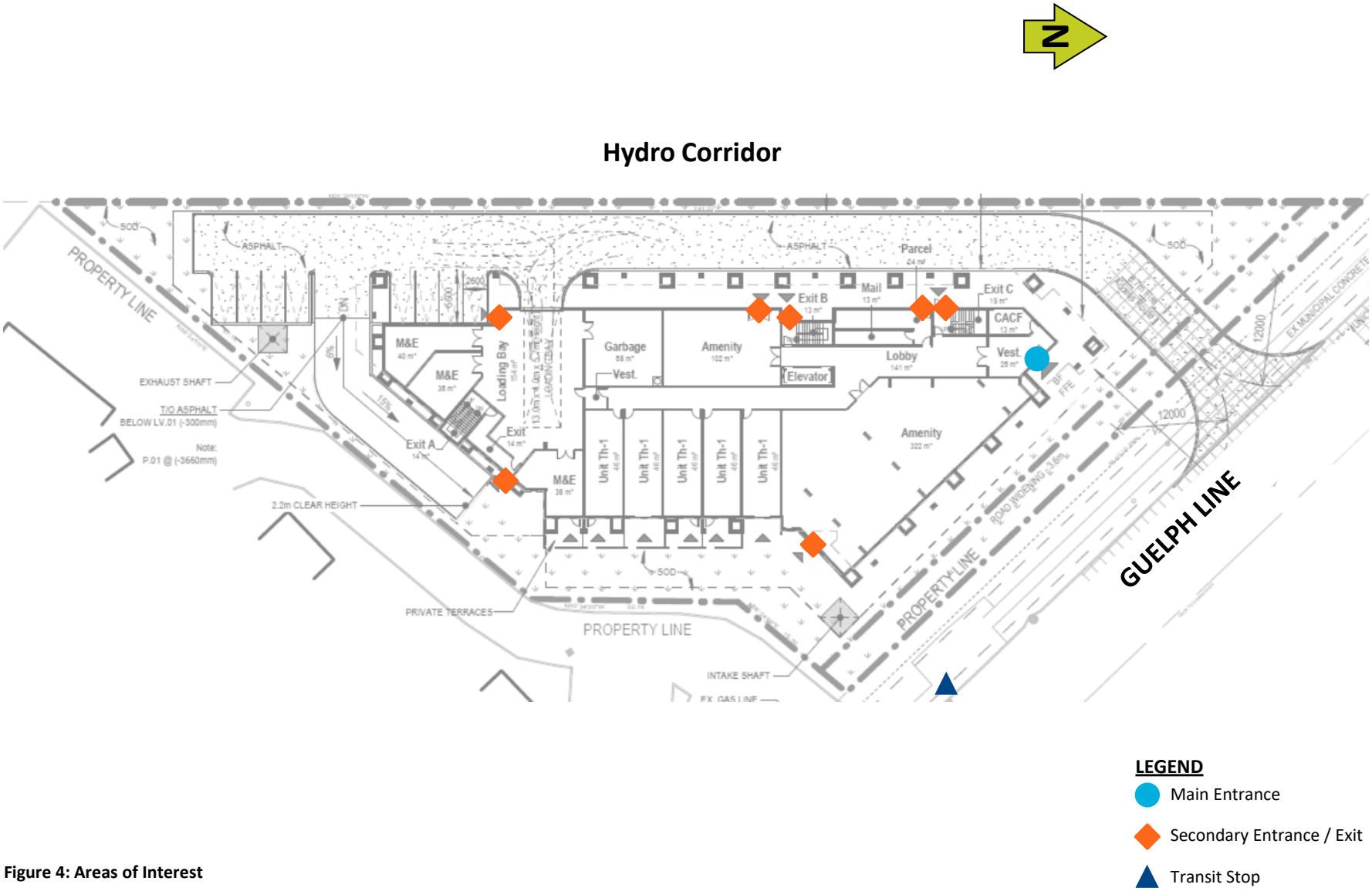


Figure 4: Areas of Interest

2.0 APPROACH

A qualitative, numerical analysis has been undertaken, based on our extensive experience in estimating wind flow patterns around buildings, and using a knowledge-based expert system (KBES) developed by SLR. The analysis tool is based on published numerical models and methods, consistent with our experience in modelling wind flows through wind tunnel testing. This qualitative method provides a screening-level estimate of potential wind comfort conditions at the site, and assists with the initial selection of conceptual mitigation measures, where needed.

This assessment is based on:

- A review of the architectural information received February 23 and March 4, 2022.
- A review of the existing wind climate in the area, through examining historical climate data.
- A numerical analysis of predicted pedestrian wind comfort resulting from the additional buildings.
- A comparison of the predictions against established pedestrian comfort guidelines for the City of Burlington.

2.1 Pedestrian Wind Criteria

The wind comfort conditions are discussed in terms of being suitable for certain pedestrian activities and are based on frequencies of predicted wind force. Pedestrian activity, wind chill, clothing, humidity and exposure to direct sun, for example, all affect pedestrian (thermal) comfort; however, these influences are not considered in wind force criteria.

The criteria utilized for this analysis is provided by the City of Burlington, in the document *Pedestrian Level Wind Study Guidelines and Terms of Reference (June 2020)*. The comfort criteria, which is based on certain predicted hourly gust-equivalent mean (GEM) wind speeds being exceeded 20% of the time, are summarized in **Table 1**. By allowing for a 20% exceedance, it assumes wind speeds will be comfortable for the corresponding activity at least four out of five days. The comfort criteria consider only daytime hours, between 6:00 am and 11:00 pm. GEM is defined as the maximum mean wind speed, or the gust wind speed divided by 1.85. There are four categories for wind comfort:

- **Sitting (< 10 km/h)** = Intended for cafes, terraces and other amenity spaces. These winds will rustle leaves and can be felt on the face.
- **Standing (< 14 km/h) =** Intended for main entrances, transit stops and some outdoor amenity spaces; places where people tend to linger. These winds will disturb hair and cause leaves to move.
- **Leisurely Walking (< 17 km/h):** Intended for sidewalks and other areas pedestrians pass through; this may be difficult to achieve in regions with inherently high winter wind speeds. These winds will move small branches, disarrange hair and raise dust.
- **Fast Walking (< 20 km/h):** Intended for loading facilities, parking lots and other such infrequently used areas. At these wind speeds, trees in leaf begin to move.

If fast walking cannot be achieved, the area is considered to have **uncomfortable** wind conditions.

The criterion for wind safety (> 90 km/h) is based on hourly gust wind speeds of are exceeded nine hours per year (approximately 0.1% of the time). When more than one event is predicted annually, wind mitigation measures are then advised.

2.2 Wind Climate

Wind data recorded at John C. Munro International Airport in Hamilton for the period of 1993 to 2019 were obtained and analysed to create a wind climate model for the region. Annual and seasonal wind distribution diagrams ("wind roses") are shown in Figure 5. These diagrams illustrate the percentage of time wind blows from the 16 main compass directions. Of main interest are the longest peaks that identify the most frequently occurring wind directions. The annual wind rose indicates that wind approaching from the southwest and northeast quadrants are most prevalent. The seasonal wind roses readily show how the prevalent winds shift throughout the year. The seasonal wind roses show daytime winds, from 6:00 – 23:00, while the annual wind rose shows all hours.

The directions from which stronger winds (e.g., > 30 km/h) approach are also of interest as they have the highest potential of creating problematic wind conditions, depending upon site exposure and the building configurations. The wind roses in Figure 5 also identify the directional frequency of these stronger winds, as indicated in the figure's legend colour key. On an annual basis, strong winds occur from the southwest and northeast quadrants. All wind speeds and directions were included in the wind climate model.

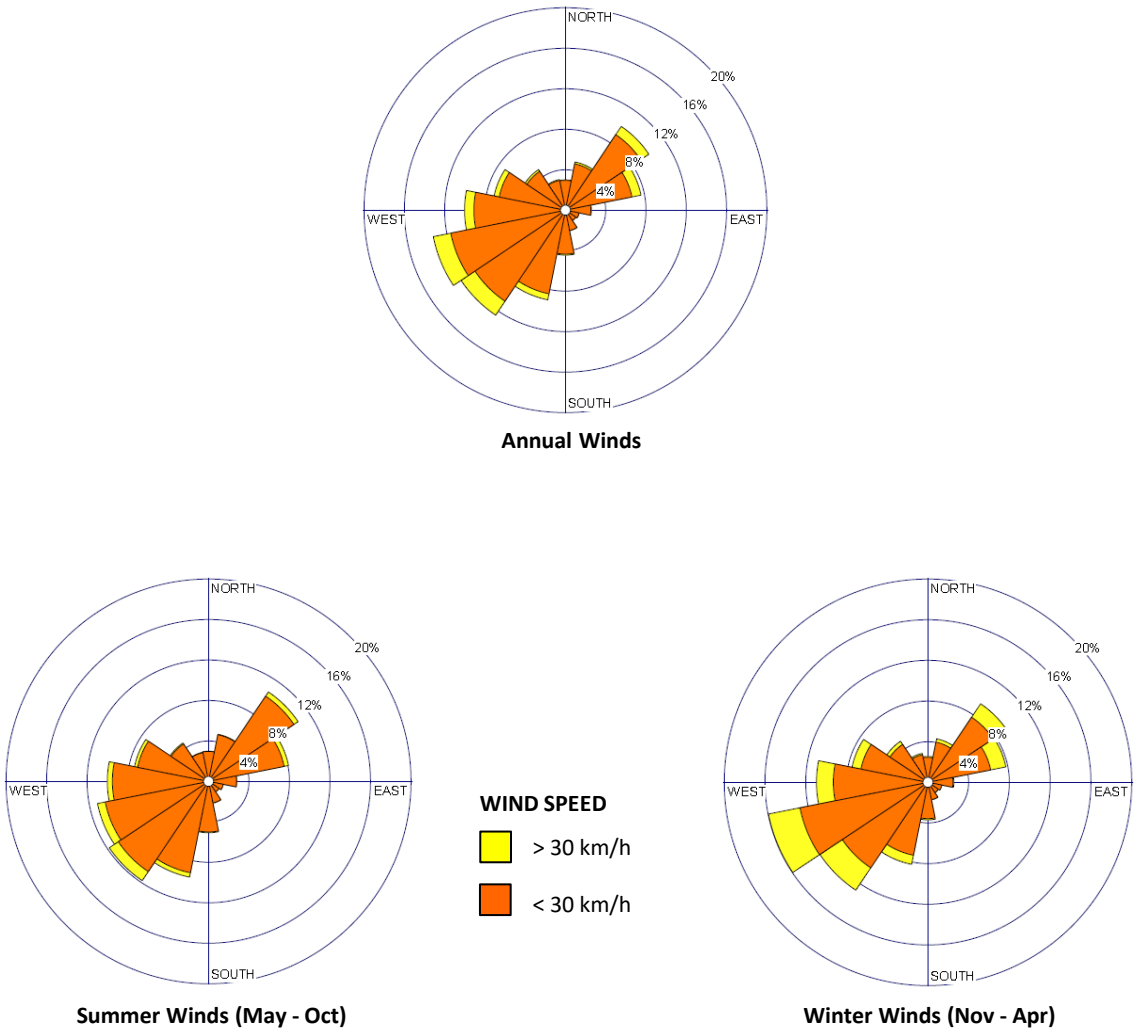


Figure 5: Wind Roses for John C. Munro International Airport (1993-2019, 6am–11pm)

3.0 RESULTS

Wind conditions at areas of interest were predicted using SLR's proprietary knowledge-based expert system (KBES). Results are discussed for the summer and winter seasons, with summary images shown in Figures 5a and 5b.

There are no predicted safety concerns around the proposed development, in either the Existing or Proposed Configuration.

3.1 Building Entrances & Walkways

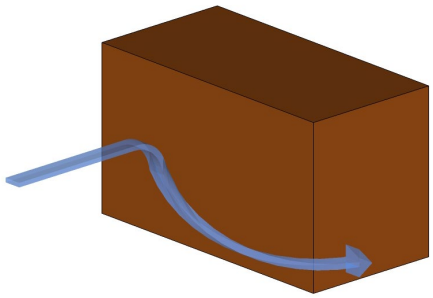
In the summer, wind conditions around the building are expected to be comfortable for standing or leisurely walking (Figure 5a). At the main entrance wind conditions are predicted to be comfortable for standing, as the entrance is located away from the northwest corner. At the exits on the west and east facades, wind conditions are also expected to be suitable for standing in the summer.

Wind conditions in the winter are anticipated to be suitable for leisurely and/or fast walking (Figure 5b). Strong wind flows, conducive to fast walking, are predicted at the northwest and southwest corners of the building, as well as at the northeast corner. At the main entrance and exits, wind conditions are expected to be comfortable for leisurely walking in the winter. These strong wind flows are due the prevailing southwesterly winds being intercepted by the large west facade, and redirected to the corners, where the winds accelerate as they flow around the corner (see image to the right). To ensure wind conditions at the main entrance are comfortable for standing throughout the year, we recommend the design team incorporate a semi-porous wind screen at the northwest corner, on the west side of the entrance, beneath the building overhand. This will provide local wind protection for the entrance.

3.2 Surrounding Sidewalks & Trails

Wind conditions on the surrounding sidewalks and the nearby hydro corridor trail are expected to be suitable for leisurely walking or better throughout the year in the Existing Configuration. At the two nearby transit stops, on either side of Guelph Line at Palmer Drive, wind conditions are expected to be suitable for standing year-round in the Existing Configuration.

With the proposed development in place, wind conditions on the nearby sidewalks and on the trail are anticipated to remain comfortable for leisurely walking or better throughout the year. At the nearby transit stop, on the west side of Guelph Line, wind conditions are expected to be suitable for standing in the summer and leisurely walking in the winter. As there is a transit shelter at this stop, this slight increase in wind speeds is not a concern. On the east side of Guelph Line, wind conditions at the transit stop are expected to remain comfortable for standing throughout the year.



Wind flows accelerating at corner

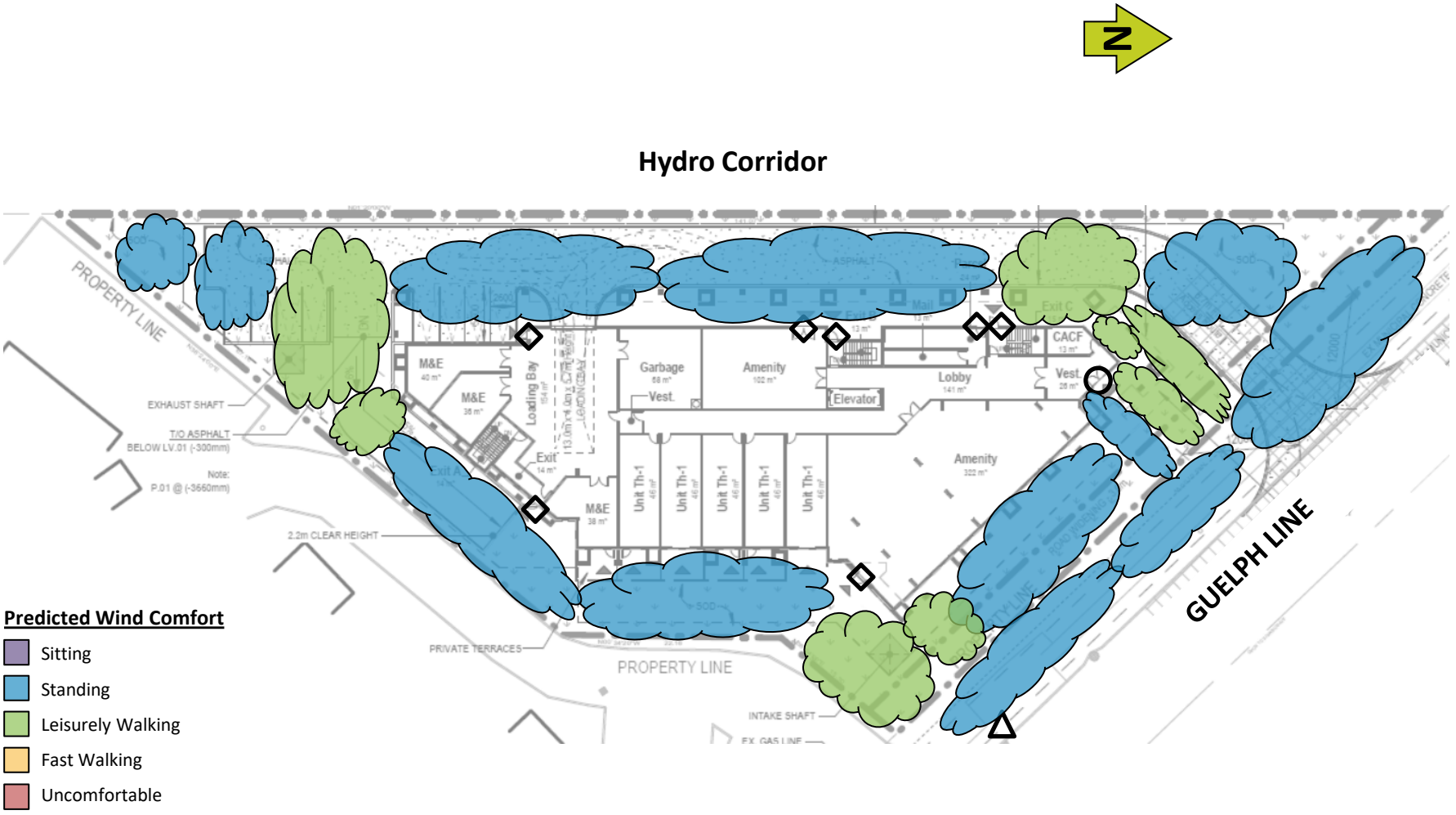


Figure 5a: Summary of predicted wind comfort conditions – Grade – Summer

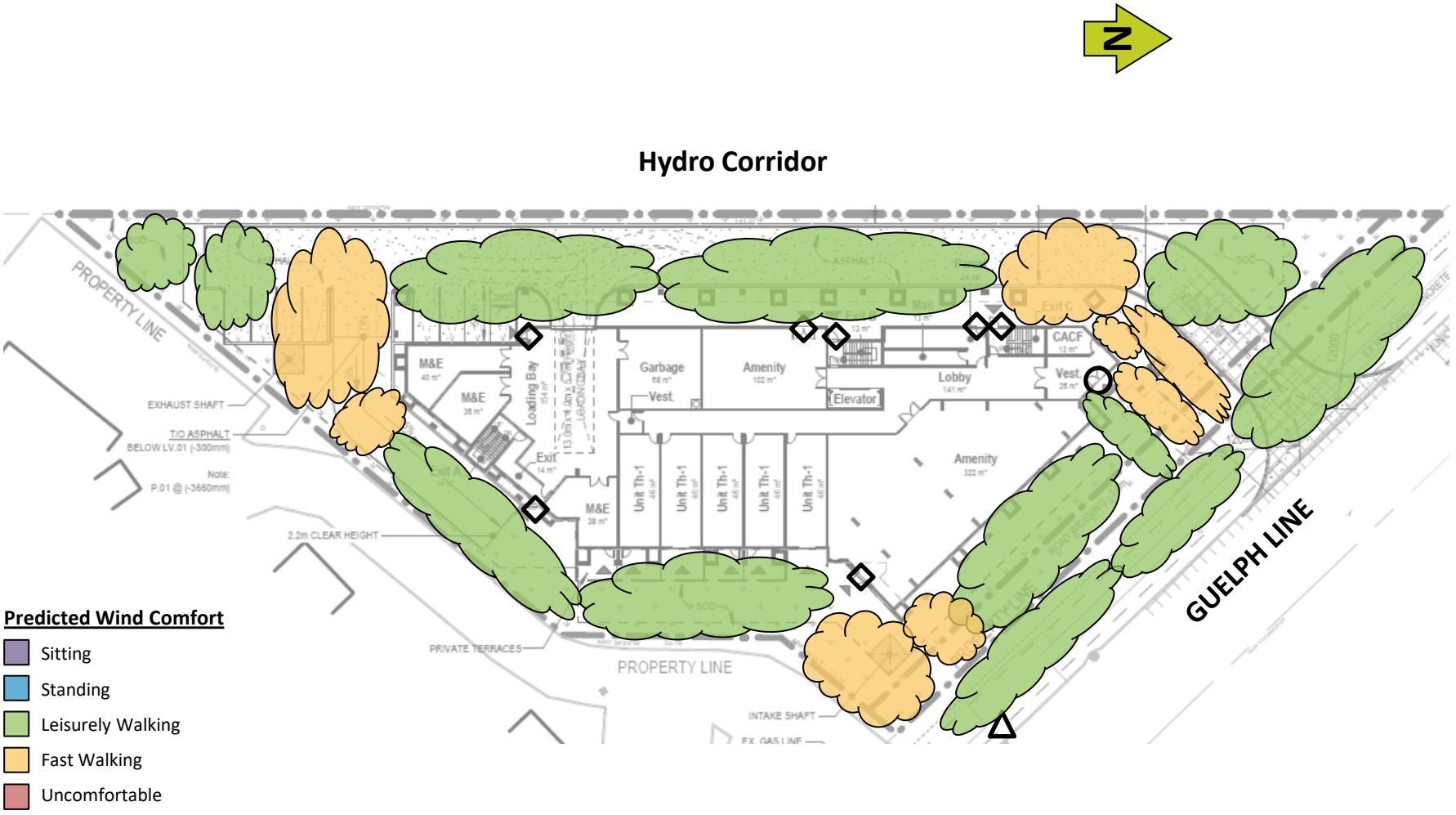


Figure 5b: Summary of predicted wind comfort conditions – Grade – Winter

4.0 CONCLUSIONS & RECOMMENDATIONS

The pedestrian wind conditions predicted for the proposed development at 1396 Guelph Line in Burlington have been assessed through a qualitative numerical analysis. Based on the results of our assessment, the following conclusions have been reached:

- The wind safety criterion is met at all locations surrounding the development in both the Existing and Proposed Configurations.
- Wind conditions on the site, including entrances and amenity spaces, are generally expected to be suitable for the intended use year-round. Wind mitigation measures are recommended for the main entrance.
- On the sidewalks surrounding the proposed development, wind conditions are expected to be suitable for the intended use.

5.0 ASSESSMENT APPLICABILITY

This assessment is based on computer modeling techniques and provides a qualitative overview of the pedestrian wind comfort conditions on and surrounding the proposed development site. Any subsequent alterations to the design may influence these findings, possibly requiring further review by SLR. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

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