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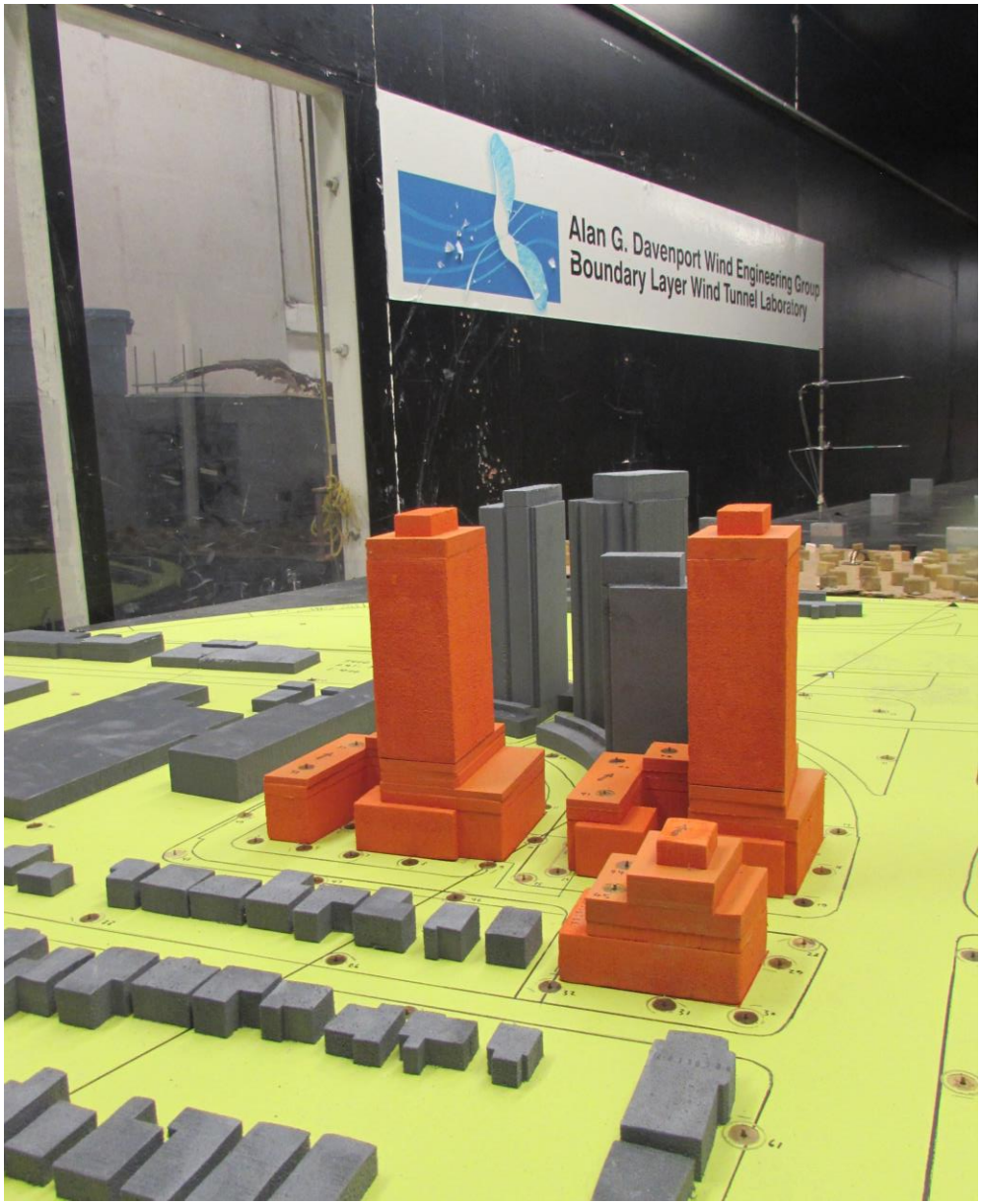
Date: August 5, 2022

Re: **Pedestrian Wind Study 3400 Dufferin Street and 8 Jane Osler Boulevard Toronto, ON SLR Project #241.30588.00000**



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For

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Version	Date
Draft	July 29, 2022
Final	August 5, 2022

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1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Dufferin – 401 Properties Limited to conduct a pedestrian wind study for the proposed development at 3400 Dufferin Street and 8 Jane Osler Boulevard in Toronto, Ontario. This report is in support of the combined planning application for Official Plan Amendment (OPA), Zoning Bylaw Amendment (ZBA) and Site Plan Approval (SPA).

1.1 Existing Site

The proposed development is located at 3400 Dufferin Street, between Bridgeland Avenue and Jane Osler Boulevard, on the west side of Dufferin Street in Toronto. The site is currently occupied by a low-rise commercial building and a 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 June 2019; some of these images are included in Figures 2a through 2d.

Immediately surrounding the site are the approved development of 3450 Dufferin Street to the north, Yorkdale Shopping Mall to the east and southeast, with low-rise residential and commercial developments to the south through northwest. Beyond the immediate surroundings are generally low-rise residential and commercial buildings in all directions.

Per the *Pedestrian Level Wind Study Terms of Reference Guide* for the City of Toronto, developments with ZBA approval within the surrounding extents should be included as part of the existing surroundings, on the assumption these will be constructed prior to the development in question. For this study, the following developments were included: 3450 Dufferin Street and 3300 Dufferin Street.

Figure 1: Aerial view of existing site & surroundings
Credit: Google Earth Pro, dated 6/22/2019

Figure 2a: Looking north at the site

Figure 2b: Looking west at the site

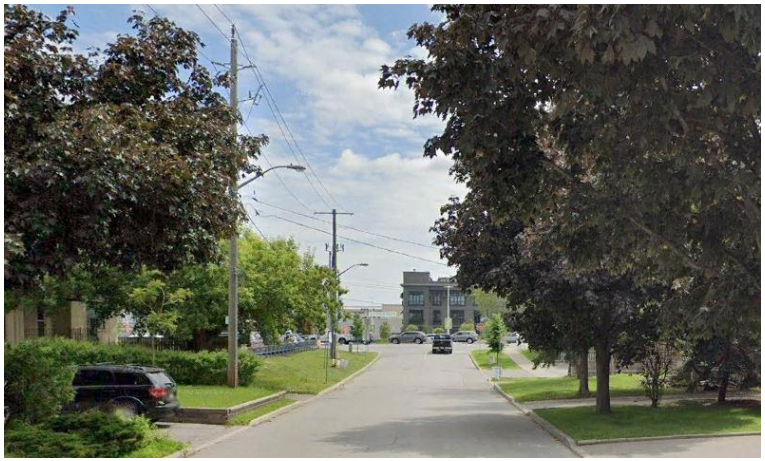


Figure 2c: Looking east along Jane Osler Boulevard

Figure 2d: Looking southeast along Dufferin Street

1.2 Proposed Development

The proposed development includes two 29-storey tall towers (Buildings A and B) along the north edge of the site. In addition, there is a nine-storey tall residential building (i.e., Building C) at the southeast corner of the site.

Building A includes an eight-storey podium, with outdoor amenity terraces on Levels 6 and 7. The main entrance is located along the south facade. Individual unit entrances are located along the north, east and west facades.

Building B also includes an eight-storey podium, with outdoor amenity terraces on Levels 6 and 7. The main entrance is located along the south facade of the building, with retail entrances along the north and east sides. Individual unit entrances are located along the west facade of the building.

A rendering of the proposed 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.

A park associated with 3450 Dufferin Street development is located to the northwest of the proposed development.

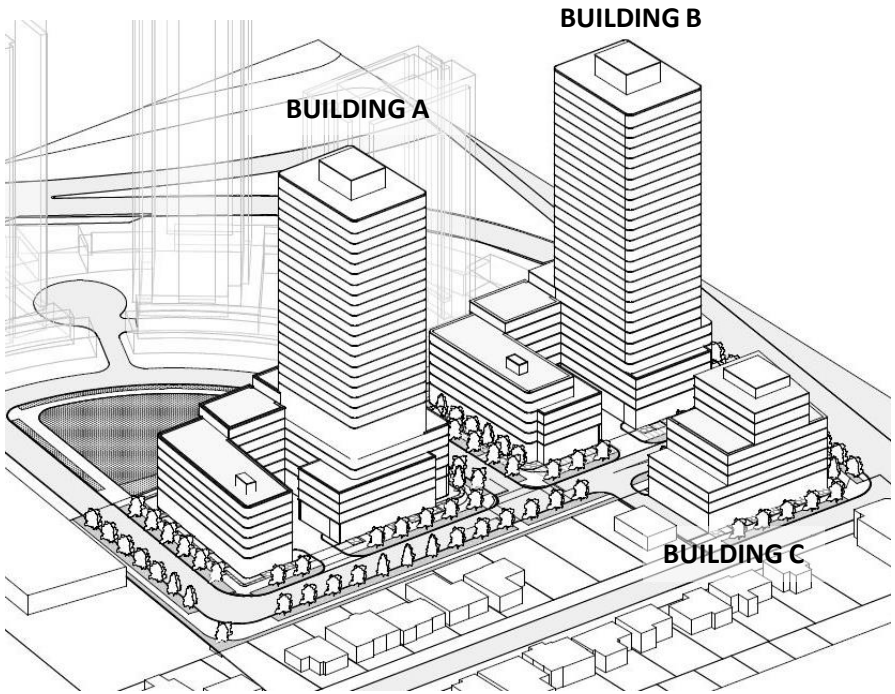


Figure 3: Rendering of proposed development (View from southwest)
Credit: gh3

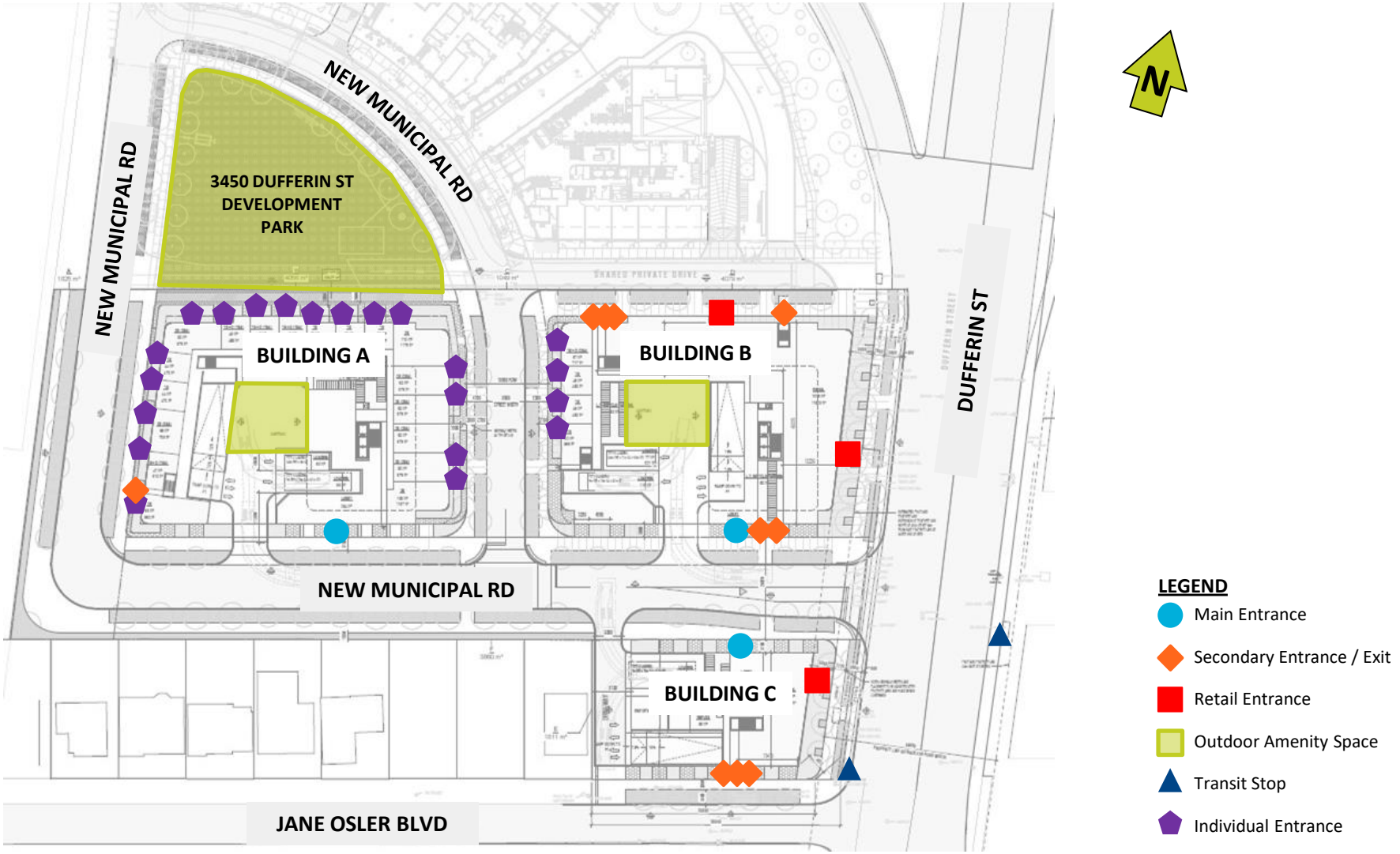


Figure 4: Areas of Interest

2.0 APPROACH

The objective of the wind tunnel study is to assist the design team and City Planning officials in making informed decisions about the building form considered and its influence on pedestrian comfort. This quantitative analysis involves the construction of a physical model of the development and surrounding features that influence wind flow. The physical model is instrumented with probes and tested in a wind tunnel. Afterwards, the wind tunnel data are combined with regional meteorological data; this analysis is then compared to the relevant wind criteria and standards in order to determine how appropriate the wind conditions are for the intended pedestrian usage.

2.1 Scale Model Construction

A 1:400 scale model of the proposed 3400 Dufferin Street Development was constructed based on up-to-date drawing information received by SLR on July 6, 2022.

The proximity model of the surrounding area was built in block form for a radius of approximately 480 m from the site centre. As existing buildings surrounding the site will influence wind characteristics, existing buildings, those under construction and those buildings with Zoning Bylaw Amendment (ZBA) approval were included in the model for both the Existing and Proposed Configurations. Information regarding which approved developments to include within the existing surrounds was determined using the City of Toronto website, as well as discussion with the design team. A list of the approved surrounding development applications was provided to the City Planner for review and comment. Grade differences within the limits of the model were found to be minor, thus the site was modeled as flat.

SLR tested two configurations in the wind tunnel. The descriptions are below:

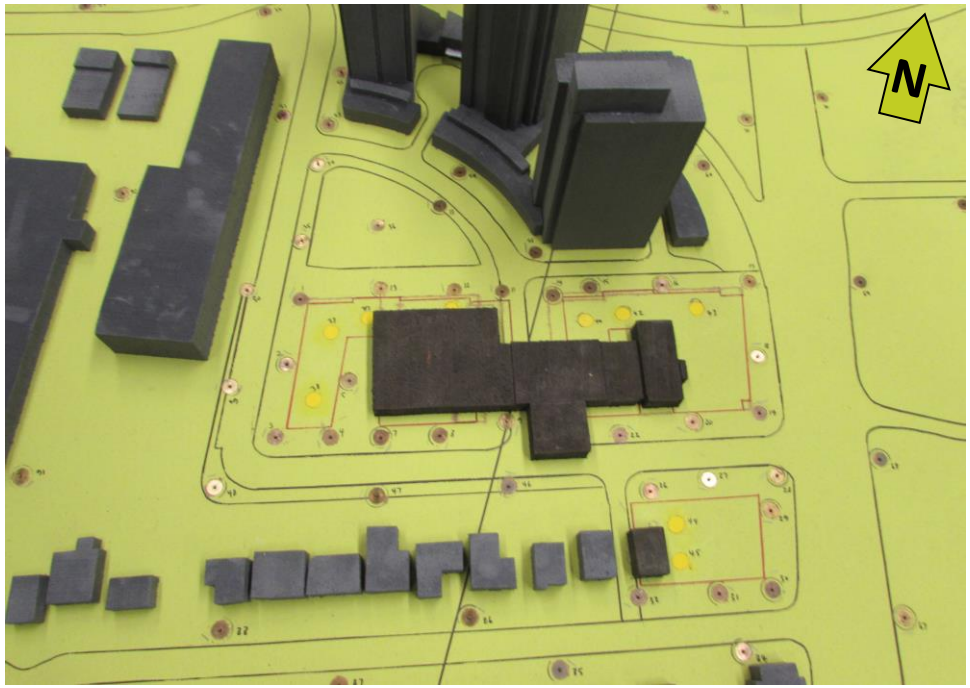
- Existing Configuration: Existing site with existing and approved surroundings.
- Proposed Configuration: Proposed development with existing and approved surroundings.

Photographs of the wind tunnel model showing both the Existing and Proposed Configurations are included in Figures 5a and 5b.

2.2 Wind Tunnel

Wind tunnel tests were conducted in the Alan G. Davenport Wind Engineering Group Boundary-Layer Wind Tunnel Laboratory at the University of Western Ontario. The upstream test section of the wind tunnel included generic roughness blocks and turbulence-generating spires to modify the wind flow approaching the model. These features develop characteristics of the wind flow that are similar to the actual site. The test model is rotated on a turn-table to simulate different wind directions with the upstream terrain being changed as appropriate to reflect the various upwind conditions encountered around the site.

The test model was equipped with 93 omni-directional probes to record wind speed at the pedestrian-level (approximately 1.5 m above grade). The orientation of the model was rotated in 10° intervals on the turn-table to permit measurement of wind speed at each probe location for 36 wind directions. The wind tunnel data were then combined with the wind climate model for this region to predict the occurrence of wind speeds in the pedestrian realm and compare against wind criteria for comfort and safety.



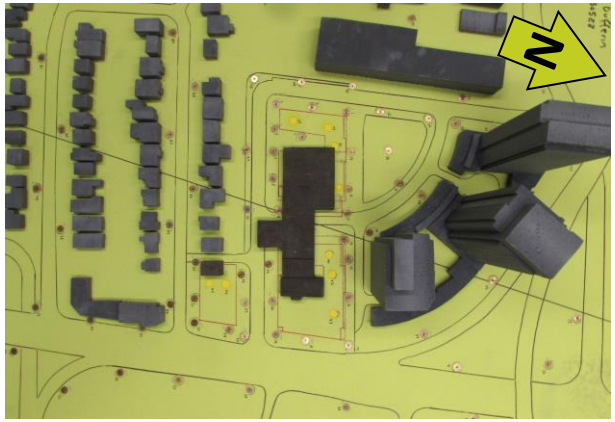


Figure 5a: Existing Configuration

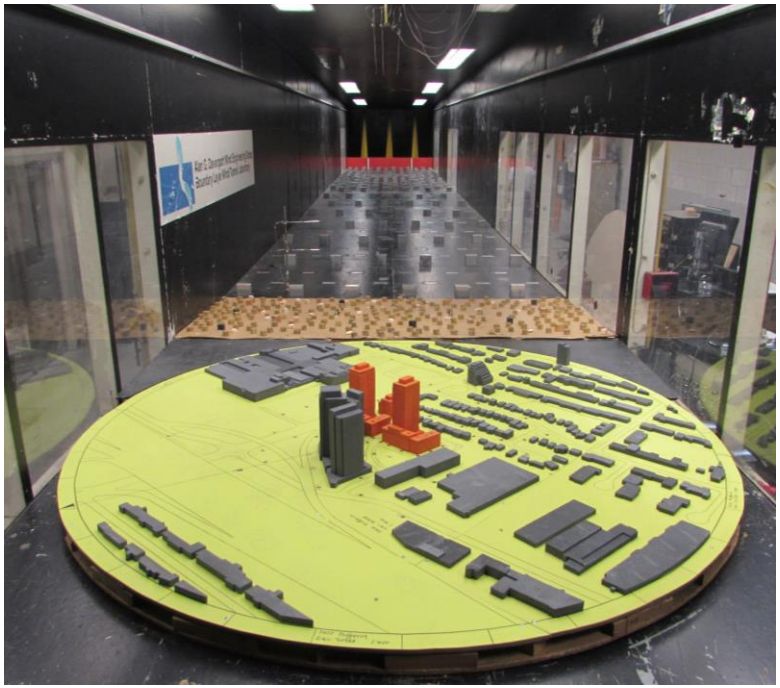


Figure 5b: Proposed Configuration

2.3 Wind Climate

Wind data recorded at the Toronto Pearson International Airport for the period of 1991 to 2020 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 6. 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 northwest quadrant are most prevalent. The seasonal wind roses readily show how the prevalent winds shift throughout the year.

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 6 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 west-southwest through northwest to north directions. All wind speeds and directions were included in the wind climate model.

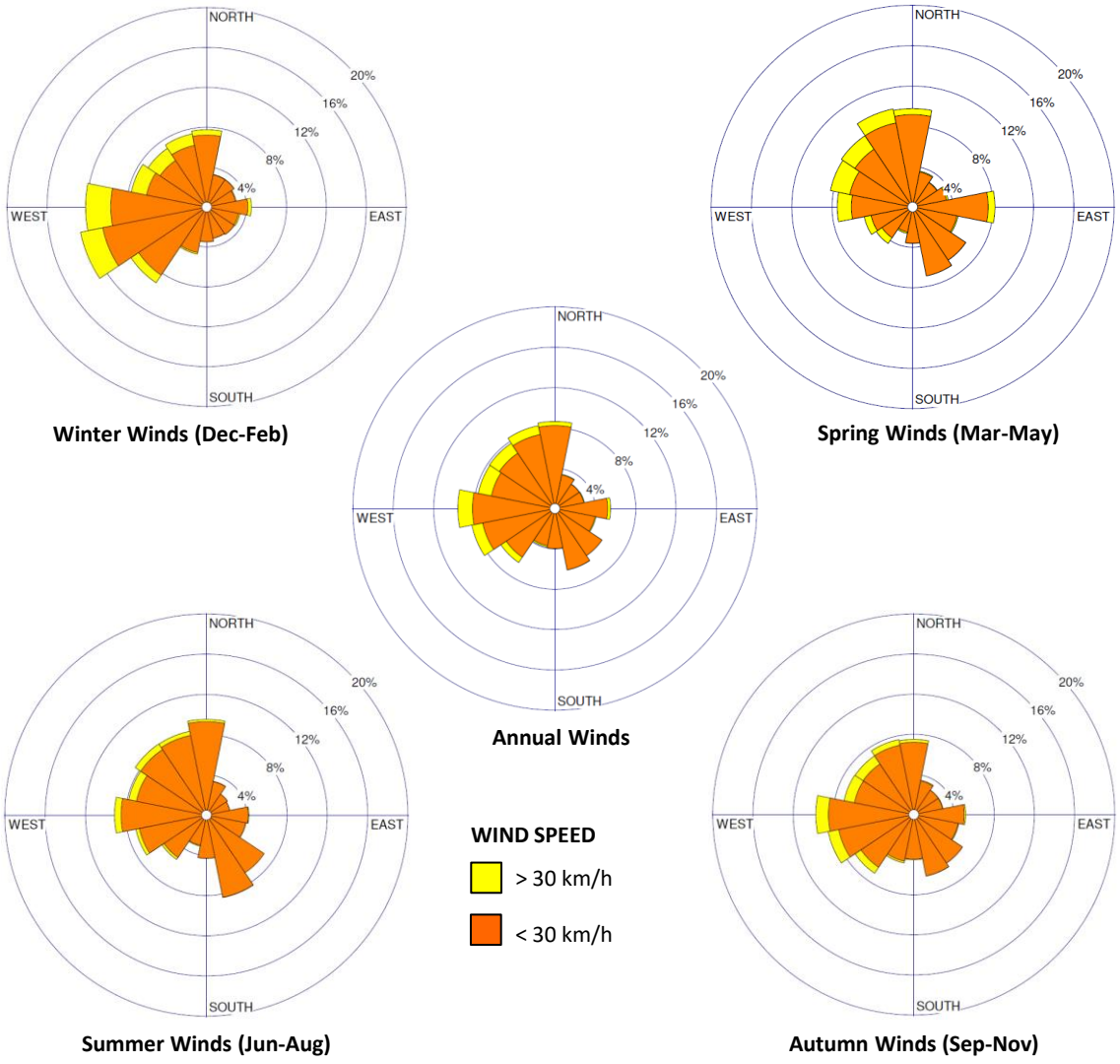


Figure 6: Wind Roses for Toronto Pearson International Airport (1991-2020)

3.0 PEDESTRIAN WIND CRITERIA

Wind comfort conditions are discussed in terms of being acceptable for certain pedestrian activities and are based on predicted wind force and the expected frequency of occurrence. Wind chill, clothing, humidity and exposure to direct sun, for example, all affect a person's thermal comfort; however, these influences are not considered in the wind comfort criteria.

The comfort criteria, which are based on certain predicted hourly 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 6:00am and 11:00pm. GEM is defined as the maximum mean wind speed or the gust wind speed divided by 1.85.

The criterion for wind safety in the table is based on hourly gust wind speeds that are exceeded nine hours per year (approximately 0.1% of the time). When the criterion is exceeded, wind mitigation measures are advised. The wind safety criterion is shown in Table 2.

These criteria are based on the *Pedestrian Level Wind Study Terms of Reference Guide* of the City of Toronto, which came into effect in June 2022.

Table 1: Wind Comfort Criteria

Comfort Category	Comfort Ranges for GEM Wind Speed Exceeded 20% of the Time	Description of Wind Comfort
Sitting	≤ 10 km/h	Light breezes desired for outdoor seating areas where one can read a paper without having it blown away.
Standing	≤ 15 km/h	Gentle breezes suitable for passive pedestrian activities where a breeze may be tolerated.
Walking	≤ 20 km/h	Relatively high speeds that can be tolerated during intentional walking, running and other active movements.
Uncomfortable	> 20 km/h	Strong winds, considered a nuisance for most activities.

Table 2: Wind Safety Criterion

Activity	Safety Criterion Gust Wind Speed Exceeded 0.1% of the Time	Description of Wind Effects
Any	> 90 km/h	Excessive gust speeds that can adversely affect safety and a pedestrian's balance and footing. Wind mitigation is typically required.

4.0 RESULTS

Figures 7a through 9b present graphical images of the wind comfort conditions for the summer and winter months around the proposed development. These represent the seasonal extremes of best and worst case. Wind conditions for spring and autumn are shown in Appendix A. The "comfort zones" shown are based on an integration of wind speed and frequency for all 36 wind directions tested with the seasonal wind climate model. The presence of mature trees can lead to wind comfort levels that are marginally more comfortable than shown, during seasons when foliage is present. Full detailed results for the summer and winter can be found in Appendix B.

There are generally accepted wind comfort levels that are desired for various pedestrian uses. However, in some regions these may be difficult to achieve in the winter due to the overall climate. For sidewalks, walkways loading areas and laneways, wind comfort suitable for walking is desirable year-round. For main entrances, transit stops, and outdoor amenity spaces intended for pets, wind conditions conducive to standing are preferred throughout the year. For areas such as park benches, seating for restaurants and cafes, and outdoor amenity spaces, including play areas for children, wind conditions suitable for sitting are desired throughout the year, as calmer winds are expected for the comfort of patrons and the public.

4.1 Building Entrances & Walkways (Locations 1-32 and 46-50)

Existing wind conditions on-site are generally comfortable for walking or better year-round. Uncomfortable wind conditions exist around the under construction 3450 Dufferin Street development to the north of the proposed development during the winter months (Figures 7a and 7b).

In the Proposed Configuration, wind conditions around Building A are generally comfortable for walking or better throughout the year (Figures 8a and 8b). During the winter months, uncomfortable wind conditions occur near a few corners of the building (Locations 1, 7, 8 and 11). At the main residential entrance (Location 8), wind conditions are comfortable for walking in the summer and uncomfortable in the winter months. At the secondary entrance (near Location 3), wind conditions are comfortable for walking or better year-round. At the individual unit entrances (Locations 2, 10, 12 and 13), wind conditions are comfortable for walking or better throughout the year (Figures 8a and 8b).

Wind conditions around Building B are generally comfortable for walking or better throughout the year (Figures 8a and 8b). However, during the winter months, wind conditions are uncomfortable in most areas around Building B (Locations 14, 15, 17, 23 and 24). At the main residential entrance to Building B (Location 20), and at the retail entrances (Locations 16 and 18), wind conditions are comfortable for walking or better year-round. At the secondary entrance (Location 15), wind conditions are comfortable for walking in the summer and uncomfortable in the winter months (Figures 8a and 8b).

Wind control measures for on-site areas are discussed in Section 5.0.

Figure 7a: Existing Configuration – Pedestrian Wind Comfort – Summer – On-site & Surrounding Sidewalks

Figure 7b: Existing Configuration – Pedestrian Wind Comfort – Winter – On-site & Surrounding Sidewalks

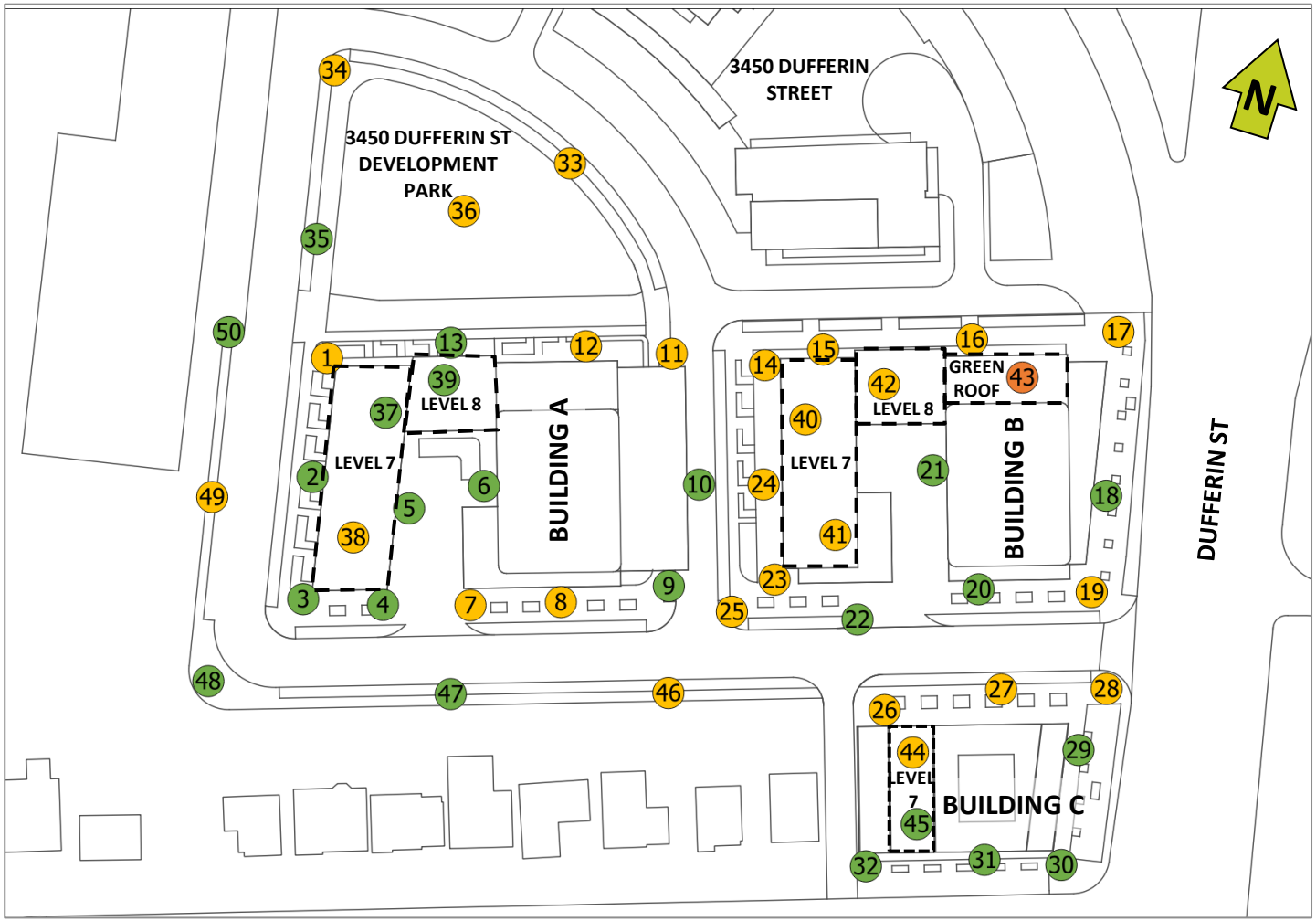


Figure 8a: Proposed Configuration – Pedestrian Wind Comfort – Summer – Building Entrances & Terraces

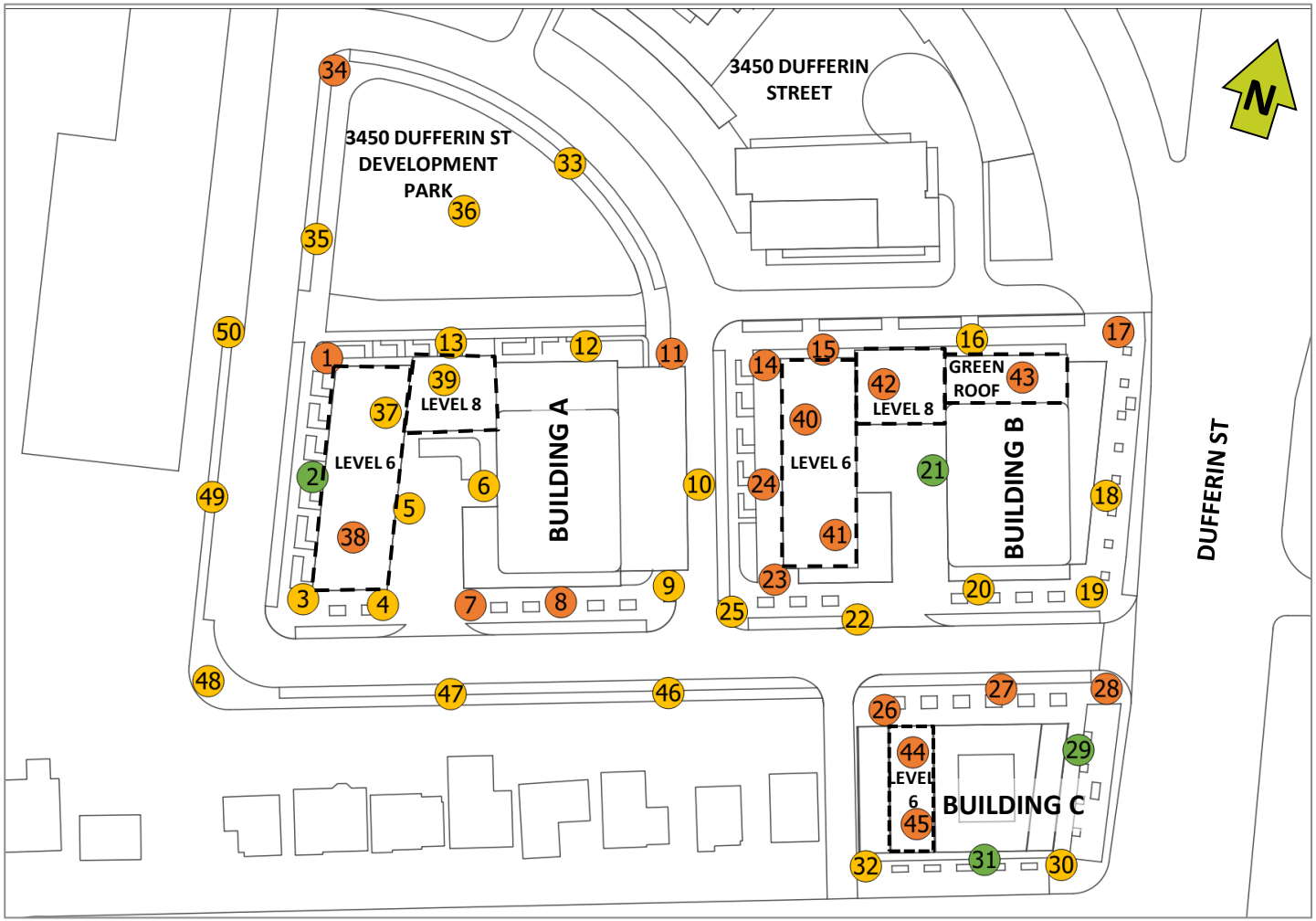


Figure 8b: Proposed Configuration – Pedestrian Wind Comfort – Winter – Building Entrances & Terraces

4.2 Outdoor Amenity Spaces (Locations 33-45)

Existing wind conditions in the nearby park (Location 33 through 36) to the northwest of the proposed development are comfortable for walking or better during the summer (Figure 7a). During the winter, wind conditions are generally uncomfortable in the park (Locations 33, 34 and 36 in Figure 7b).

With the proposed development in place, wind conditions in the park are comfortable for walking or better year-round. However, wind conditions at the northwest corner of the park (Location 34) remain uncomfortable in the winter (Figure 8b).

Wind conditions on the Level 6 and 8 terraces of the proposed development (Locations 37 through 45) are comfortable for walking or better in the summer (Figures 8a and 8b). However, wind conditions are uncomfortable in the winter months on most of the terraces (Locations 38 and 40 through 45 in Figure 8b). Note, Location 43 was on a green roof of Building B.

Wind control measures for the terraces are discussed in Section 5.0.

4.3 Surrounding Sidewalks (Locations 51-93)

In the Existing Configuration, wind conditions along the nearby sidewalks of Dufferin Street, Yorkdale Road, Jane Osler Boulevard, Cartwright Avenue and Bridgeland Avenue are generally comfortable for walking or better year-round (Figures 7a and 7b). During the winter months (Figure 7b), wind conditions are uncomfortable along the sidewalks around the under construction 3450 Dufferin Street development to the north of the proposed site (Locations 51, 53, 55, and 57-59).

In the Proposed Configuration, wind conditions along the surrounding sidewalks are generally similar to the existing conditions year-round (Figures 9a and 9b), with uncomfortable wind conditions again along the sidewalks adjacent to the 3450 Dufferin Street development (Locations 53, 55 and 57 through 59 in Figure 9b).

4.4 Wind Safety

In the Existing Configuration, the wind safety criterion is met at all but the following locations on an annual basis (Figure 10a):

- Around the 3450 Dufferin Street site (Locations 14, 15, 53, 55 and 58 to 60).
- In the park associated with the 3450 Dufferin Street development (Locations 33, 34 and 36).

In the Proposed Configuration, the wind safety criterion is met in most areas on an annual basis. The exceptions include (Figure 10b):

- Adjacent the under construction 3450 Dufferin Street development (Locations 33, 53 and 55).
- At the northeast and northwest corners of Building A (Locations 1 and 11), as well as on the south side of the building (Location 8).
- On the west side of Building B (Locations 23 and 24).
- At the northeast corner of Building C (Location 28).
- On the terraces and green roof (Locations 38, 40, 41, 43 and 44).

Wind control measures are discussed in Section 5.0.

Figure 9a: Proposed Configuration – Pedestrian Wind Comfort – Summer – Surrounding Sidewalks

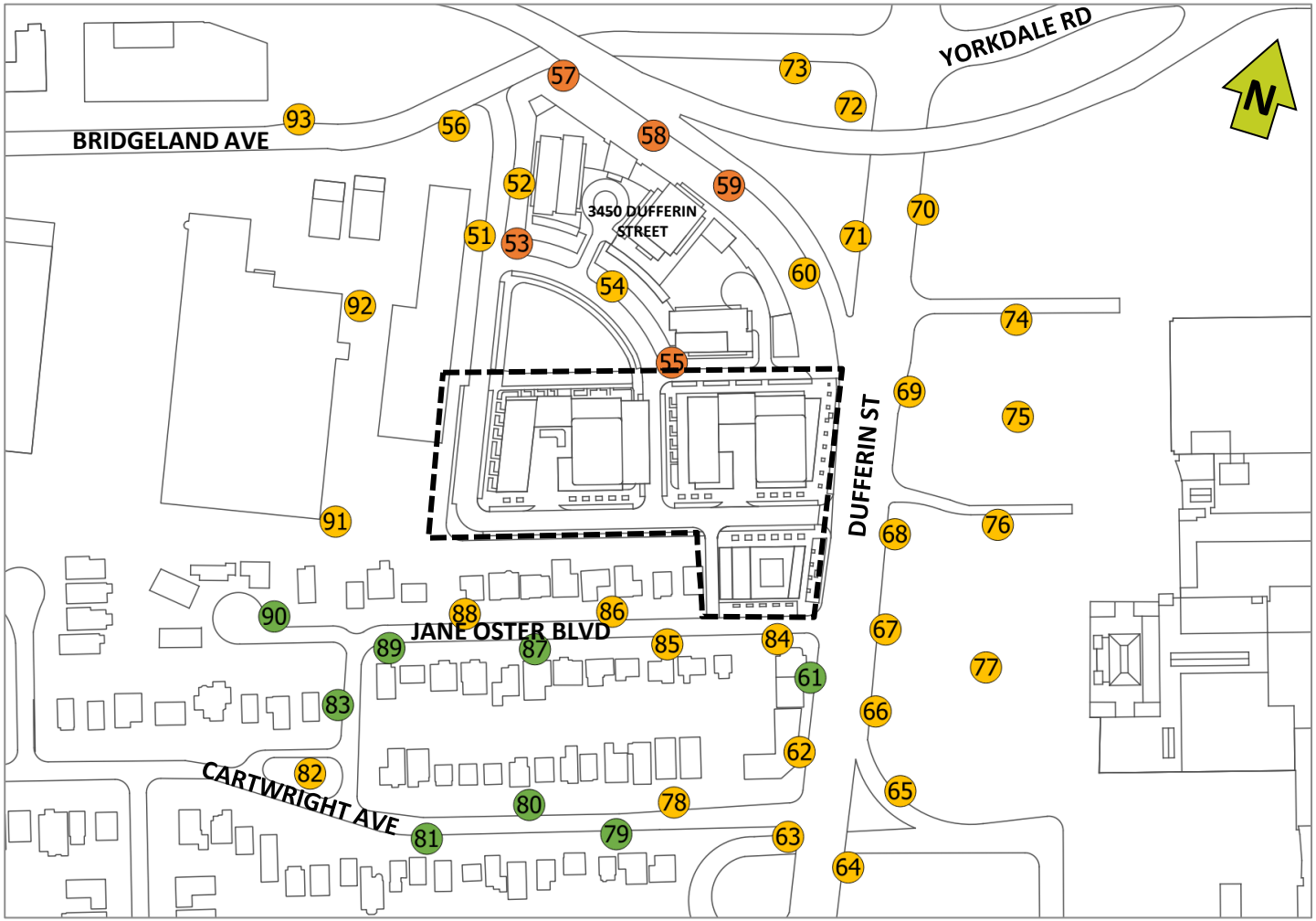


Figure 9b: Proposed Configuration – Pedestrian Wind Comfort – Winter – Surrounding Sidewalks

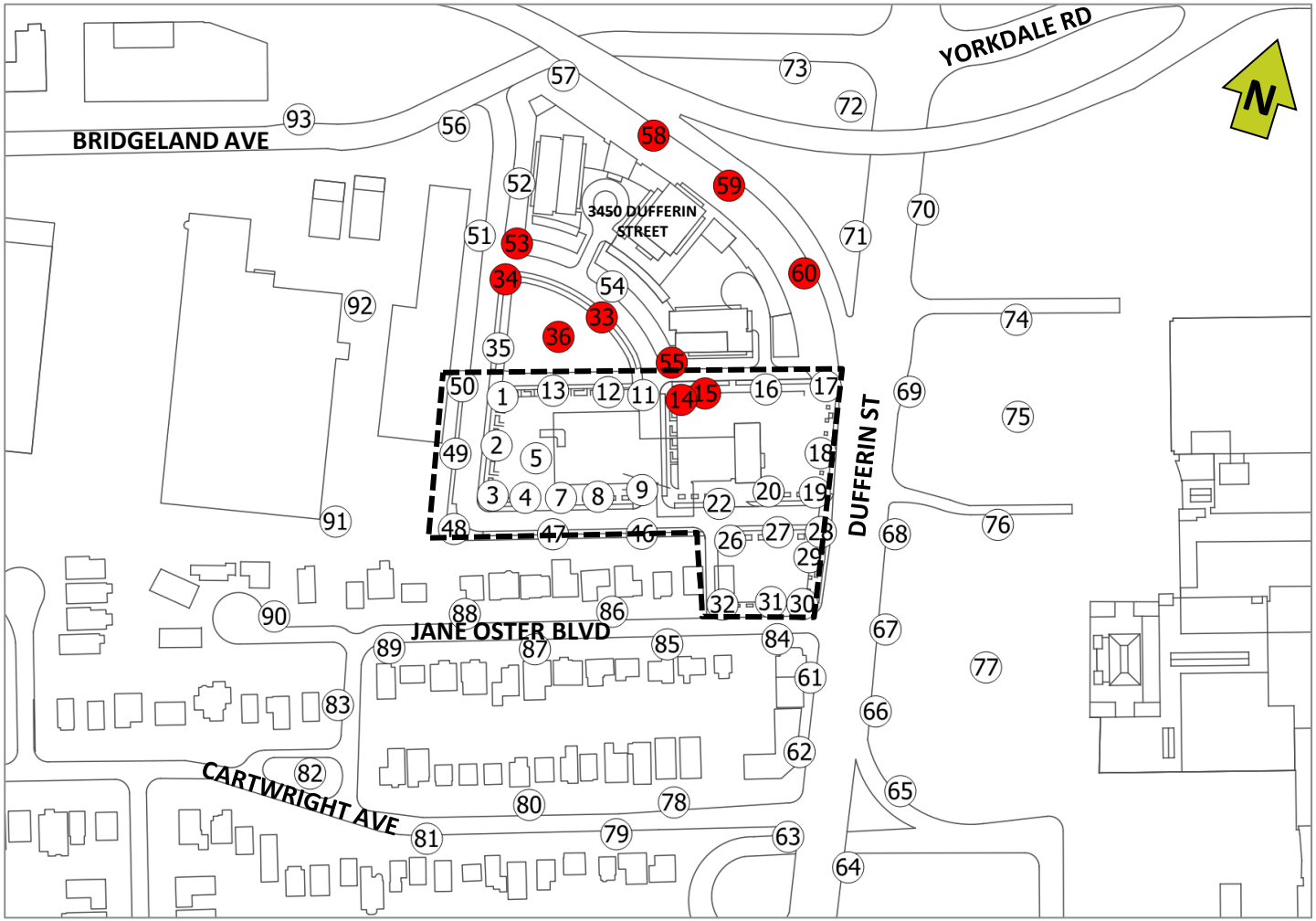


Figure 10a: Existing Configuration – Pedestrian Wind Safety – Annual – On-site & Surrounding Sidewalks

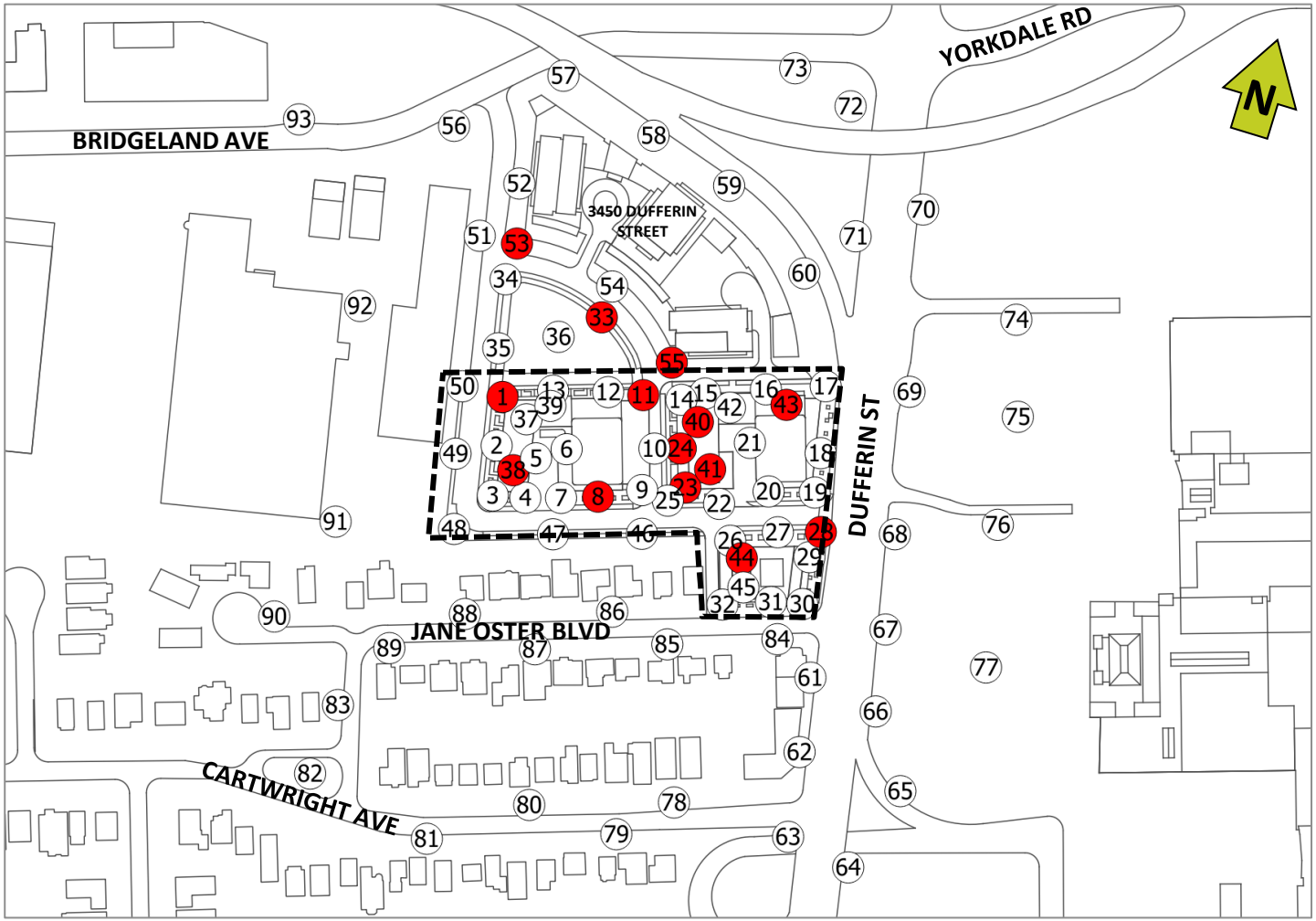


Figure 10b: Proposed Configuration – Pedestrian Wind Safety – Annual – Building Entrances & Terraces

5.0 RECOMMENDATIONS FOR WIND CONTROL MEASURES

Strong wind flows on-site are due to the overall exposure of the site to the prevailing northwesterly and westerly winds. These wind downwash off the tower facades and accelerate at grade around building corners. To improve wind conditions on the site, the design team could consider the following measures:

- Building corner modifications (i.e., rounded, chamfered etc.).
- Installing large canopies (minimum 3 m protrusion from the building facade), wrapping around the building corners.
- Building entrances should be located a minimum 5 m away from building corners to avoid the effect of corner accelerations. For exposed entrances, vertical wind screens minimum 2.2 m tall on both sides of the entrances should be considered. Alternatively, the entrances can be recessed into the building facade for wind protection.

To improve wind conditions on the terraces, we recommend vertical screens (minimum 2.2 m tall) along the edges of the terraces. In addition, vertical screens and/or partitions, as well as horizontal features such as trellises or pergolas should be considered around seating areas for overall enhancement of the wind comfort conditions.

Figure 11 provides examples of wind control measures for windy areas. SLR can work with the design team to refine these wind control measures prior to the next submission.

Figure 11: Examples of Wind Control measures

6.0 CONCLUSIONS & RECOMMENDATIONS

The pedestrian wind conditions predicted for the proposed development at 3400 Dufferin Street in Toronto have been assessed through wind tunnel modeling techniques. Based on the results of our study, the following conclusions have been reached:

- The wind safety criteria is generally met in the Existing Configuration. The exceptions are at ten locations around the under-construction development at 3450 Dufferin Street.
- In the Proposed Configuration, the safety criterion is exceeded on-site at six locations at grade and at five locations on the amenity terraces. Recommendations are provided for the on-site areas. The wind safety criterion was also exceeded at three locations adjacent the future 3450 Dufferin Street development
- Wind comfort conditions on-site are generally suitable for the intended use. Wind control measures are recommended for a few areas. Wind conditions on the proposed terraces are generally windier than desired for passive activities. Wind mitigation measures are recommended.
- Wind conditions along the surrounding sidewalks are generally similar between the Existing and Proposed Configurations.
- SLR will work with the design team to determine practice and effective wind control measures prior the next planning submission.

7.0 LIMITATIONS OF LIABILITY

This report has been prepared and the work referred to in this report has been undertaken by SLR Consulting (Canada) Ltd. (SLR) for Dufferin – 401 Properties Limited., hereafter referred to as the "Client". It is intended for the sole and exclusive use of the Client. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. Other than by the Client and by the City of Toronto in their role as land use planning approval authorities, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

This report has been prepared in a manner generally accepted by professional consulting principles and practices for the same locality and under similar conditions. No other representations or warranties, expressed or implied, are made.

Opinions and recommendations contained in this report are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, locations, time frames and project parameters as outlined in the Scope or Work and agreement between SLR and the Client. The data reported, findings, observations and conclusions expressed are limited by the Scope of Work. SLR is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. SLR does not warranty the accuracy of information provided by third party sources.

8.0 REFERENCES

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Appendix A

Pedestrian Wind Comfort Conditions

Spring (March - May) and Autumn (September - November)

Figure A1a: Existing Configuration – Pedestrian Wind Comfort – Spring – On-site & Surrounding Sidewalks

Figure A1b: Existing Configuration – Pedestrian Wind Comfort – Autumn – On-site & Surrounding Sidewalks

Figure A1c: Proposed Configuration – Pedestrian Wind Comfort – Spring – Building Entrances, Terraces & Surrounding Sidewalks

Figure A1d: Proposed Configuration – Pedestrian Wind Comfort – Autumn – Building Entrances, Terraces & Surrounding Sidewalks

Appendix B

Pedestrian Wind Comfort & Safety Tables

INTERPRETATION OF RESULTS

Table 1 below illustrates the wind comfort and safety criteria. The table provides the GEM (Gust Equivalent Mean) wind speed (in km/h) exceeded 20% of the time for comfort for each of the four seasons for each configuration. It also categorizes the wind speeds as either sitting, standing, walking or uncomfortable. In addition, the table provides the gust wind speed exceeded 0.1% of the time annually.

For instance, at Location 1 there is not data in the Existing Configuration, while in the Proposed Configuration, wind conditions are suitable for walking in the winter, spring and autumn seasons, while in the summer wind conditions are suitable for standing.

At Location 3, wind conditions are suitable for walking in the winter, spring and autumn seasons in the Existing Configuration, while in the summer wind conditions are conducive to sitting. In the Proposed Configuration, wind conditions are suitable for walking in the spring and autumn, standing in the summer, and uncomfortable in the winter. In addition, the safety criteria is exceeded on an annual basis at Location 3 in the Proposed Configuration.

Table 1: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
1	Existing					
1	Proposed	19.3	18.3	15.0	16.1	71.7
2	Existing	12.5	11.3	6.8	11.7	71.4
2	Proposed	16.6	18.1	14.7	15.8	80.0
3	Existing	17.6	14.2	9.8	15.8	79.5
3	Proposed	20.9	15.7	10.3	18.6	95.6

Table 2: Categories

Criteria	Speed
Sitting	≤ 10 km/h
Standing	≤ 15 km/h
Walking	≤ 20 km/h
Uncomfortable	> 20 km/h
Safety	> 90 km/h

Table B1-1: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
1	Existing	16.3	16.8	13.5	14.0	80.9
1	Proposed	20.5	19.9	16.5	17.9	93.0
2	Existing	18.3	18.4	14.9	16.0	86.2
2	Proposed	14.2	13.9	11.5	12.6	71.5
3	Existing	15.7	15.6	12.5	13.6	68.5
3	Proposed	17.1	17.3	14.6	15.5	68.9
4	Existing	17.5	17.3	13.9	15.0	80.9
4	Proposed	16.9	16.2	13.9	14.9	71.4
5	Existing	14.9	15.1	12.2	12.9	74.8
5	Proposed	17.3	16.4	13.2	15.0	72.8
6	Existing					
6	Proposed	15.2	15.4	12.7	13.8	66.9
7	Existing	16.7	15.7	12.8	14.2	72.2
7	Proposed	20.6	18.5	15.4	17.4	83.0
8	Existing	14.1	13.6	11.0	12.1	60.2
8	Proposed	20.7	18.7	15.2	17.2	92.2
9	Existing	10.4	10.1	8.4	9.3	37.9
9	Proposed	16.0	15.1	12.7	14.2	62.0
10	Existing					
10	Proposed	16.9	16.2	13.3	14.9	68.1

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-2: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
11	Existing	18.6	18.2	14.9	16.1	81.6
11	Proposed	22.3	22.7	17.9	19.5	100.9
12	Existing	16.4	17.0	13.6	14.4	76.5
12	Proposed	18.8	19.3	15.2	16.3	87.8
13	Existing	17.4	18.0	14.2	15.0	75.5
13	Proposed	16.3	16.1	12.8	14.2	67.7
14	Existing	22.5	20.0	17.0	19.2	91.6
14	Proposed	20.7	20.7	16.8	18.3	77.7
15	Existing	23.0	19.9	16.8	19.4	98.3
15	Proposed	23.6	23.6	18.8	20.5	89.9
16	Existing	22.1	20.7	17.5	19.3	83.1
16	Proposed	19.3	18.4	15.2	16.9	74.0
17	Existing	21.6	20.4	17.1	18.9	89.8
17	Proposed	23.9	23.5	18.9	21.1	88.4
18	Existing	16.8	17.2	13.7	14.7	72.6
18	Proposed	15.2	15.5	13.1	14.0	60.2
19	Existing	16.4	16.5	13.2	14.4	63.0
19	Proposed	19.5	19.7	15.9	17.6	72.8
20	Existing	16.0	16.0	12.8	14.0	59.1
20	Proposed	18.5	18.3	14.6	16.3	80.6

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-3: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
21	Existing					
21	Proposed	14.4	13.4	11.1	12.5	58.7
22	Existing	12.5	12.2	9.8	10.9	49.2
22	Proposed	17.8	17.6	14.2	15.8	68.2
23	Existing					
23	Proposed	20.7	20.1	16.5	17.7	93.2
24	Existing					
24	Proposed	24.5	20.9	18.4	20.9	102.6
25	Existing					
25	Proposed	19.5	19.5	15.8	17.2	82.1
26	Existing	16.3	15.8	12.7	14.2	64.1
26	Proposed	20.4	20.4	16.2	17.9	79.9
27	Existing	16.8	16.1	13.1	14.5	62.5
27	Proposed	21.5	21.2	17.0	18.8	88.9
28	Existing	17.2	17.0	13.7	14.9	64.8
28	Proposed	20.2	19.8	16.1	17.6	90.2
29	Existing	16.6	16.6	13.2	14.4	63.3
29	Proposed	13.8	14.6	11.6	12.3	54.5
30	Existing	15.8	15.8	12.5	13.8	58.8
30	Proposed	18.4	18.4	14.6	16.3	68.4

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-4: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
31	Existing	15.2	14.9	12.0	13.3	56.0
31	Proposed	14.4	13.4	10.9	12.5	57.9
32	Existing	15.6	15.4	12.2	13.6	67.0
32	Proposed	17.5	15.9	13.5	15.1	76.1
33	Existing	20.4	20.9	16.6	17.5	92.6
33	Proposed	19.4	20.2	15.9	16.9	90.0
34	Existing	23.1	21.5	17.5	19.2	98.2
34	Proposed	20.8	19.8	16.3	17.4	89.9
35	Existing	17.1	17.0	13.8	14.5	83.4
35	Proposed	17.8	16.8	15.0	15.9	71.7
36	Existing	21.8	21.7	17.3	18.4	96.5
36	Proposed	19.7	19.8	15.8	17.3	79.0
37	Existing					
37	Proposed	17.7	17.6	14.8	16.1	76.0
38	Existing					
38	Proposed	21.0	22.1	18.4	19.2	93.4
39	Existing					
39	Proposed	18.4	17.2	14.2	16.1	72.0
40	Existing					
40	Proposed	23.9	21.8	18.8	20.8	101.5

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-5: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
41	Existing					
41	Proposed	21.6	21.8	17.6	19.3	93.2
42	Existing					
42	Proposed	20.5	20.3	16.5	18.2	79.5
43	Existing					
43	Proposed	27.1	26.9	21.1	22.9	109.4
44	Existing					
44	Proposed	22.4	18.4	16.2	18.7	97.1
45	Existing					
45	Proposed	20.1	16.5	14.6	16.7	86.5
46	Existing	16.9	16.7	13.3	14.6	70.4
46	Proposed	19.7	19.0	15.6	17.3	82.8
47	Existing	16.0	15.5	12.5	13.8	64.3
47	Proposed	18.4	17.6	15.0	16.2	70.6
48	Existing	15.6	15.8	12.5	13.6	62.8
48	Proposed	16.8	17.4	14.3	14.9	69.2
49	Existing	17.1	17.3	13.7	15.1	70.4
49	Proposed	18.7	18.7	15.6	16.2	83.7
50	Existing	15.3	16.2	12.7	13.3	69.2
50	Proposed	17.3	17.3	14.6	15.5	65.6

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-6: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
51	Existing	20.8	20.6	16.3	17.9	81.3
51	Proposed	19.4	19.3	15.8	16.8	74.2
52	Existing	18.8	19.4	16.7	17.2	79.7
52	Proposed	17.9	18.3	15.4	16.0	77.2
53	Existing	24.5	22.8	18.8	20.5	103.9
53	Proposed	23.3	21.8	17.9	19.5	100.0
54	Existing	16.4	15.9	13.2	14.1	67.8
54	Proposed	16.9	16.2	13.4	14.5	73.2
55	Existing	22.9	20.4	17.2	19.2	99.0
55	Proposed	23.4	21.6	17.9	20.1	97.2
56	Existing	14.6	14.1	11.7	12.9	57.0
56	Proposed	15.2	14.6	11.9	13.2	58.6
57	Existing	20.4	18.5	15.1	17.5	81.2
57	Proposed	20.4	18.8	15.3	17.6	81.1
58	Existing	21.7	19.6	15.9	18.0	91.9
58	Proposed	21.1	19.6	15.7	17.7	89.0
59	Existing	20.0	20.3	16.5	17.3	93.5
59	Proposed	20.0	20.7	16.2	17.2	89.2
60	Existing	19.2	19.5	16.2	16.9	90.9
60	Proposed	18.8	19.5	15.5	16.6	84.8

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-7: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
61	Existing	13.6	14.7	11.5	11.9	72.2
61	Proposed	12.3	13.3	10.2	10.8	55.9
62	Existing	14.2	13.5	11.3	12.4	52.9
62	Proposed	15.5	14.2	11.9	13.3	60.1
63	Existing	15.9	15.8	12.6	13.9	60.6
63	Proposed	16.4	16.2	12.9	14.2	62.8
64	Existing	17.2	16.8	13.6	14.9	65.7
64	Proposed	17.4	16.8	13.6	15.0	67.5
65	Existing	16.8	17.1	13.6	14.7	69.1
65	Proposed	16.5	16.6	13.3	14.5	62.7
66	Existing	16.3	16.9	13.5	14.5	66.5
66	Proposed	16.2	16.4	13.1	14.3	63.2
67	Existing	16.4	16.4	13.3	14.4	65.2
67	Proposed	15.7	15.7	12.9	13.9	62.3
68	Existing	19.1	18.6	15.3	16.6	73.3
68	Proposed	17.8	18.2	14.9	15.9	72.5
69	Existing	17.3	17.3	14.1	15.2	73.2
69	Proposed	17.8	17.8	14.6	15.8	77.5
70	Existing	18.1	18.0	14.8	16.0	77.5
70	Proposed	17.4	17.6	14.4	15.3	77.7

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-8: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
71	Existing	19.0	18.5	15.5	16.9	81.3
71	Proposed	18.0	17.9	14.6	15.8	80.0
72	Existing	18.9	17.6	14.7	15.9	80.9
72	Proposed	19.1	17.7	14.6	15.9	82.0
73	Existing	19.8	17.9	15.2	16.8	79.9
73	Proposed	20.0	18.0	14.9	16.7	81.0
74	Existing	17.1	16.6	13.9	15.1	67.0
74	Proposed	17.2	17.3	14.3	15.3	74.5
75	Existing	16.7	16.7	13.7	14.8	68.9
75	Proposed	17.2	17.2	14.2	15.3	74.0
76	Existing	16.8	16.5	13.6	14.8	64.2
76	Proposed	15.7	16.0	13.2	14.1	67.4
77	Existing	16.5	16.7	13.6	14.4	69.9
77	Proposed	16.3	16.3	13.3	14.3	68.6
78	Existing	17.2	16.0	13.0	14.8	67.4
78	Proposed	17.7	16.5	13.4	15.3	69.2
79	Existing	13.6	12.9	10.5	11.6	57.4
79	Proposed	13.8	13.1	10.6	11.8	57.3
80	Existing	13.7	12.6	10.1	11.7	54.9
80	Proposed	13.8	12.6	10.2	11.8	54.8

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-9: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
81	Existing	13.7	12.9	10.4	11.7	55.2
81	Proposed	13.9	13.0	10.5	11.8	55.7
82	Existing	15.3	14.6	11.8	13.1	62.5
82	Proposed	15.3	14.6	11.8	13.1	62.7
83	Existing	13.6	13.9	11.5	12.1	59.6
83	Proposed	13.9	14.4	11.7	12.3	60.5
84	Existing	17.2	16.5	13.4	14.9	63.9
84	Proposed	19.7	19.3	15.5	17.0	77.0
85	Existing	14.5	14.0	11.2	12.4	59.3
85	Proposed	16.9	16.4	13.1	14.4	77.6
86	Existing	14.2	13.5	11.0	12.4	53.5
86	Proposed	15.4	14.9	12.1	13.4	59.9
87	Existing	14.4	14.3	11.3	12.4	56.7
87	Proposed	14.4	14.3	11.3	12.4	59.2
88	Existing	15.3	14.6	11.7	13.1	62.2
88	Proposed	15.4	14.9	12.2	13.3	63.1
89	Existing	15.1	13.5	11.1	12.7	63.7
89	Proposed	14.6	13.5	11.1	12.4	60.7
90	Existing	13.7	13.9	11.3	12.2	51.5
90	Proposed	14.3	14.7	12.0	12.9	53.8

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90

Table B1-10: Pedestrian Wind Conditions

Location	Configuration	Wind Comfort				Wind Safety
		GEM Speed Exceeded 20% of the Time (km/h)				Gust Speed Exceeded 0.1% of the Time (km/h)
		Winter	Spring	Summer	Autumn	
91	Existing	15.5	14.9	12.3	13.7	56.0
91	Proposed	15.4	15.2	12.4	13.7	55.6
92	Existing	15.4	15.3	13.1	13.9	62.0
92	Proposed	15.1	15.1	12.9	13.6	61.0
93	Existing	15.8	15.2	13.0	14.0	58.0
93	Proposed	15.6	15.0	12.8	13.8	56.7

Criteria	Speed
Sitting	10
Standing	15
Walking	20
Uncomfortable	20
Safety	90