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Date: July 1, 2022

To: Choice Properties Limited Partnership
22 St Clair Avenue East, Suite 700
Toronto, Ontario M4T 2S5

Re: **Pedestrian Wind Study**
Bloor and Dundas Development
Toronto, ON
SLR Project #241.30128.00000

Team: Nishat Nourin, M.Eng., P.Eng.
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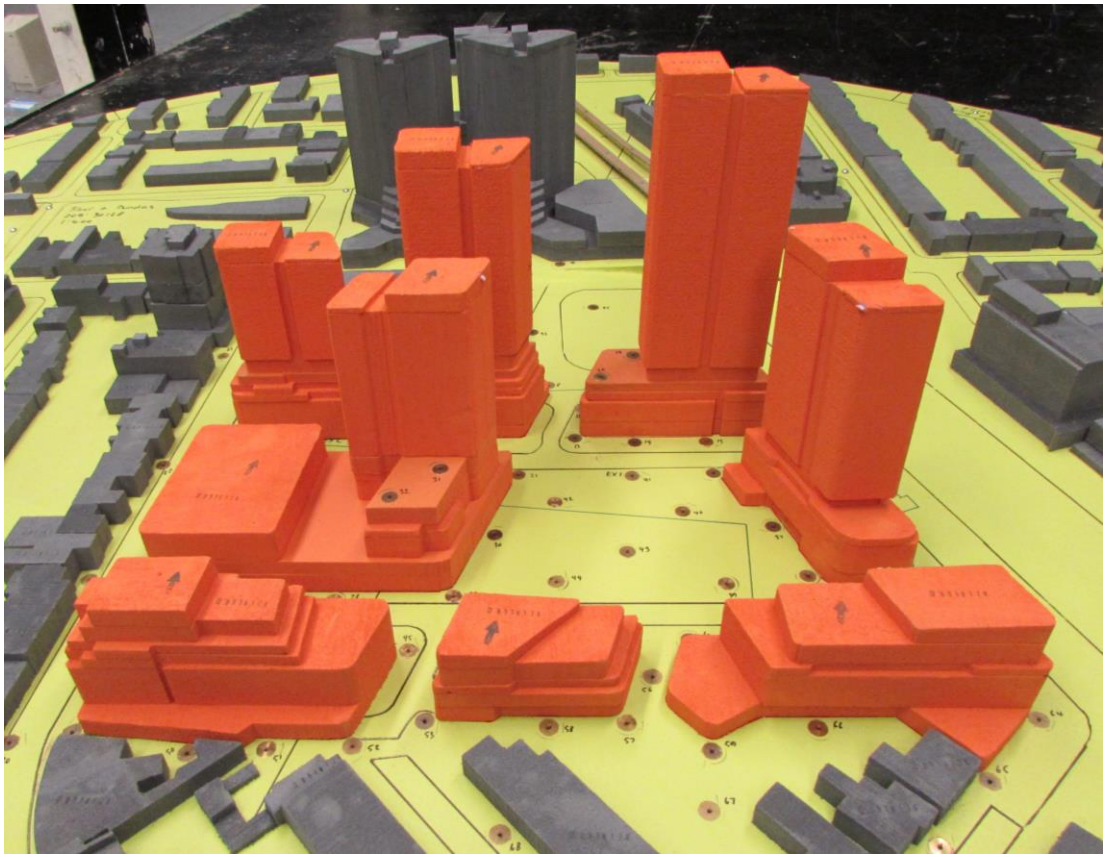

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1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Choice Properties Limited Partnership to conduct a pedestrian wind study for the proposed Bloor and Dundas development in Toronto, Ontario. This report is in support of the combined Zoning Bylaw (ZBA) and Site Plan Approval (SPA) application for the development.

1.1 Existing Site

The proposed development is located at 2238, 2252, 2264, 2280, 2288, and 2290 Dundas Street West, and 104-105 Ritchie Street (In short 2280 Dundas Street West). The site is currently used as a commercial plaza. Figure 1 provides an aerial view of the immediate study area. A virtual site visit was conducted by SLR using Google Earth images dated November 2021; some of these images are included in Figures 2a through 2d.

Immediately surrounding the site is a high school and its field to the north and northeast, the GO Transit rail line to the east and southeast, with low-rise residential and commercial buildings to the south through northwest. Beyond the immediate surroundings there are low-rise residential and commercial buildings in all directions.

Typically, developments with Site Plan Control approval and/or those currently under construction within the context extents are included as existing surroundings. For this assessment, the following SPC-approved developments were included: 2376-2388 Dundas Street West, 72 Perth Avenue and 158, 164, 181, 200 Sterling Road.

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

Figure 2a: Looking northeast at the site

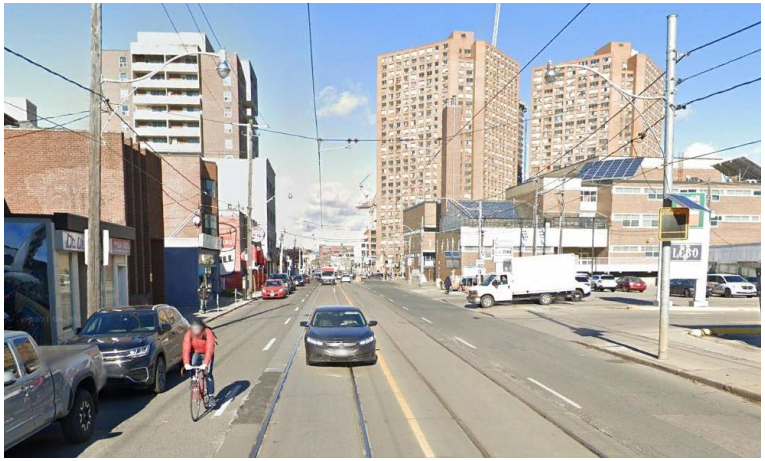


Figure 2b: Looking north along Dundas Street West

Figure 2c: Looking east along Bloor Street West

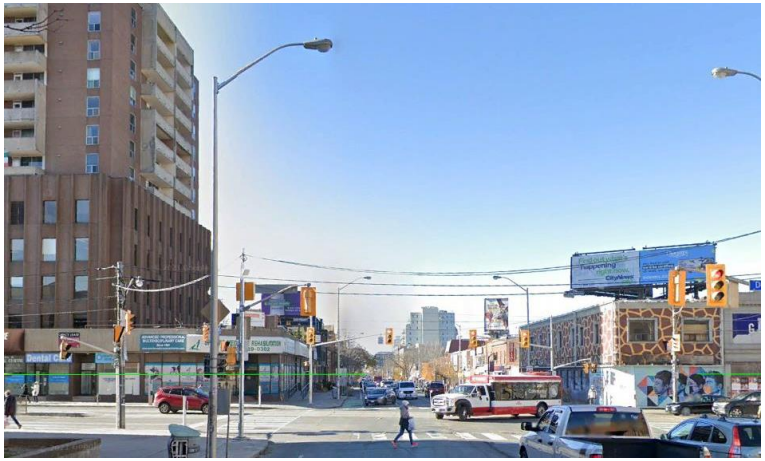


Figure 2d: Looking west along Bloor Street West

1.2 Proposed Development

The proposed development includes seven buildings:

- Building 1 includes two towers atop an eight-storey podium. The east tower is 32-storeys tall and the west tower is 22-storeys tall.
- Building 2 consists of a 38-storey tall tower on top of a seven-storey podium.
- Building 3 includes 24-storey storey tower with a three-storey and a six-storey element.
- Building 4 includes 28-storey tower atop a seven-storey podium.
- Building 5 located at the southwest corner of the site and 10-storey tall.
- Building 6 is located to the east of Building 5 and seven-storey tall.
- Building 7 is located at the southeast corner of the site and 10-storeys tall.

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. A proposed park is planned between Buildings 3 and 4. On-site areas of interest including building entrances are shown in Figure 4. In addition, we have assumed there are outdoor amenity terraces on Level 9 of Building 1, Level 8 of Building 2 and Level 9 of Building 3.

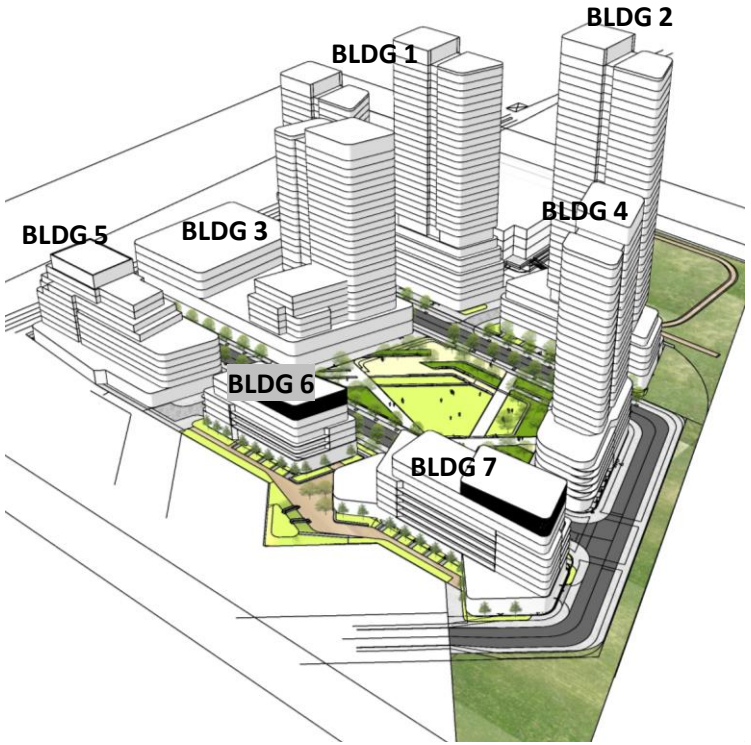


Figure 3: Rendering of proposed development (view from southeast)

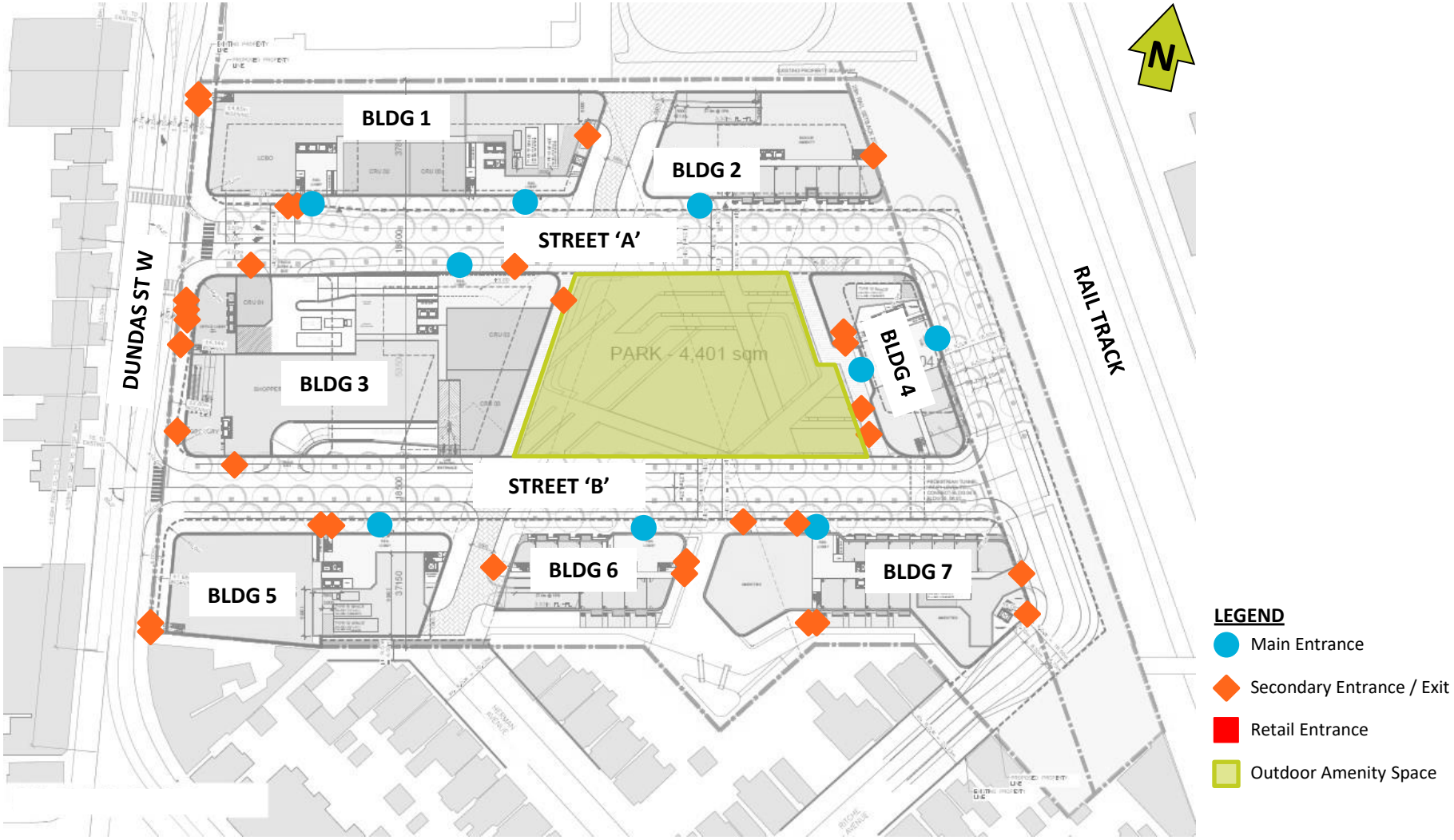


Figure 4: Areas of Interest

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 Bloor and Dundas Development was constructed based on up-to-date drawing information received by SLR on May 19, 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 Site Plan Approval (SPA) 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:

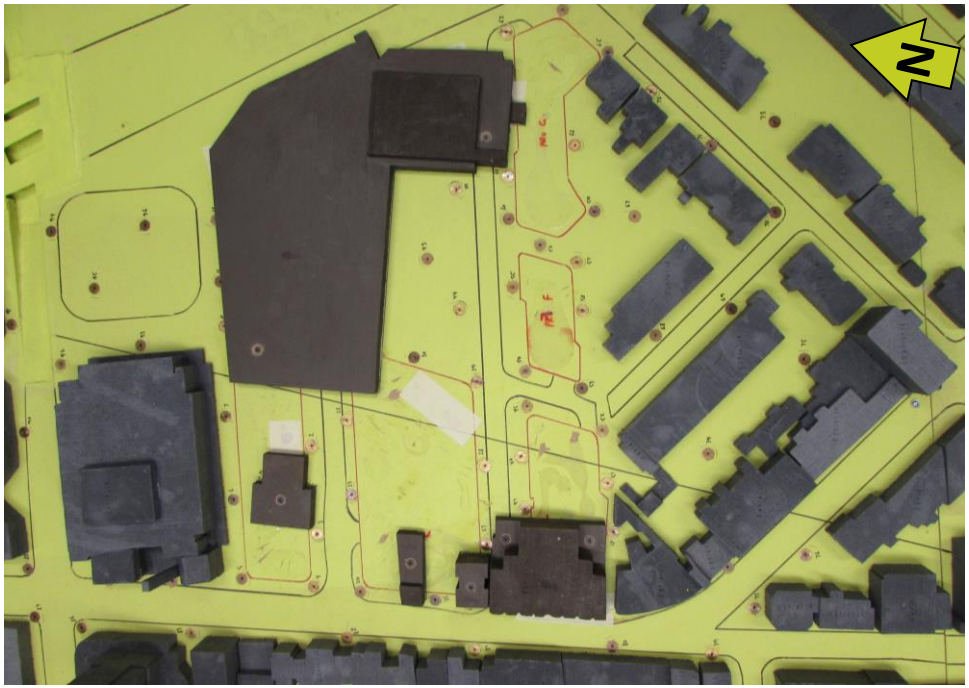
- **Existing Configuration**: Existing site with existing and approved surroundings
- **Proposed Configuration**: Proposed development with existing and approved surroundings

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 96 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^{o} 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.



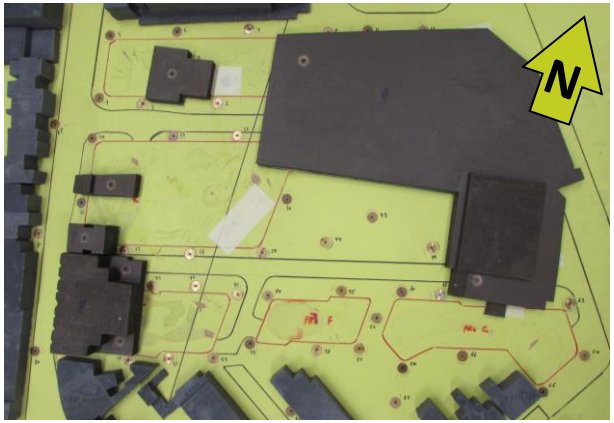
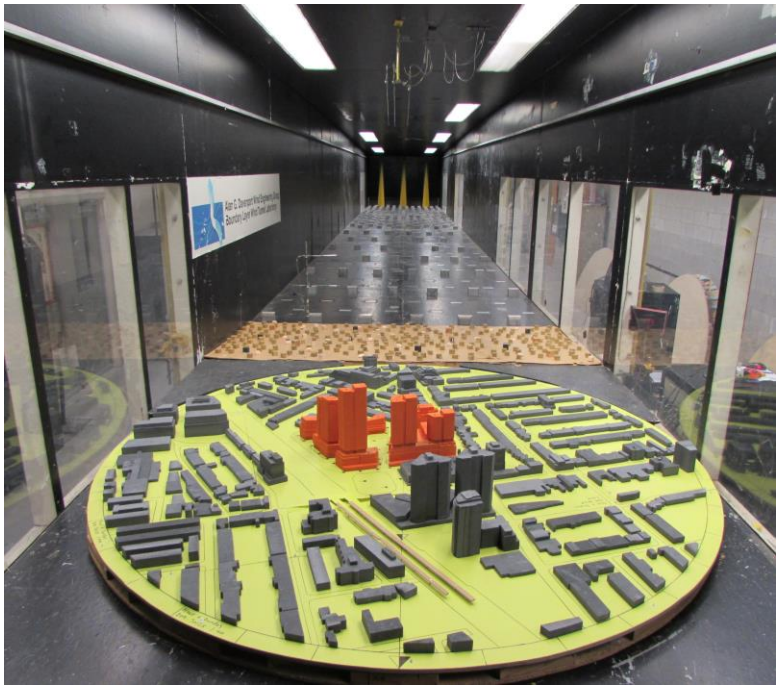
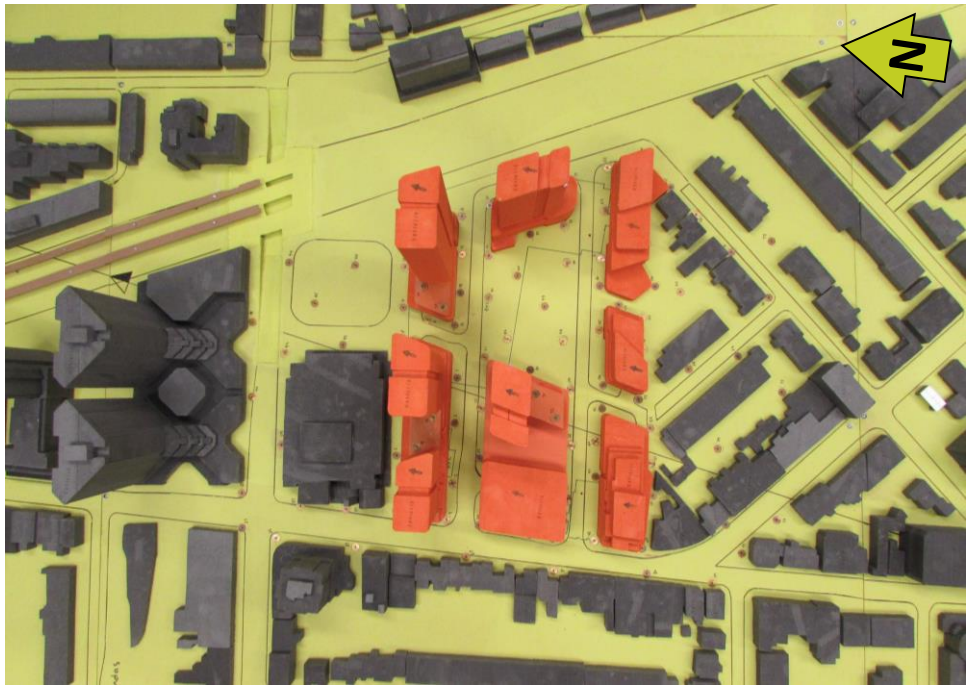


Figure 5a: Existing Configuration





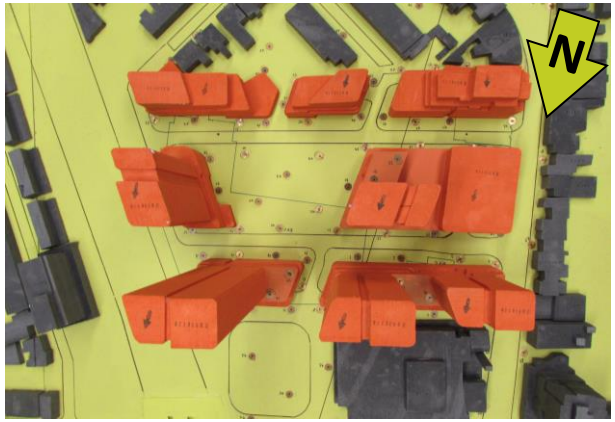


Figure 5b: Proposed Configuration

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.

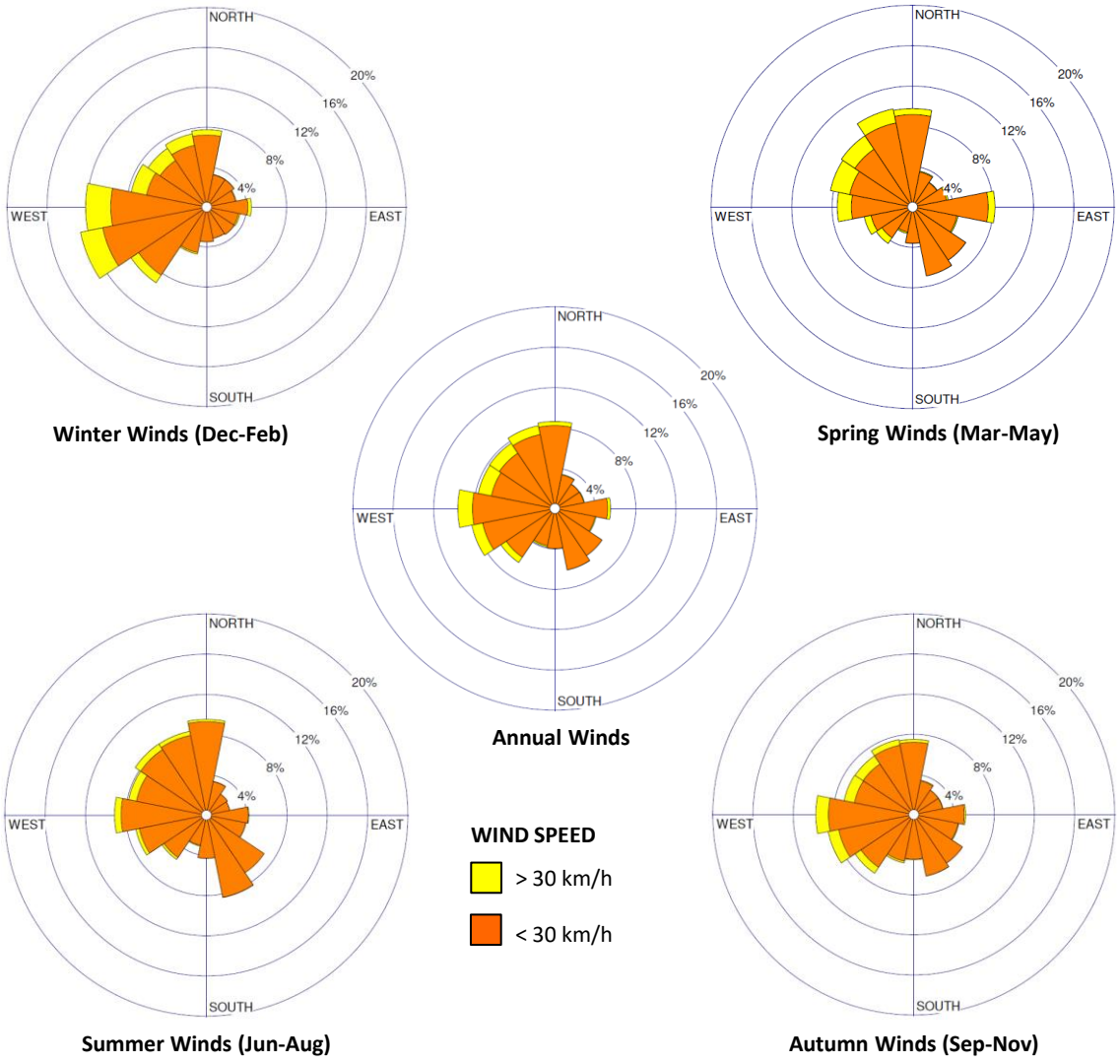


Figure 6: Wind Roses for Toronto Pearson International Airport (1991-2020)

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 10b 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. 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. Annual wind safety conditions are shown in Figures 11a and 11b. Appendix A provides the graphical images of the wind comfort conditions for the spring and autumn seasons and detailed results for all seasons can be found in the tables of 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 1-8, 11-18, 21-30, 33-38, and 45-66)

Existing wind conditions on-site are comfortable for walking or better throughout the year (Figures 7a and 7b).

In the Proposed Configuration, wind conditions on the site generally remain similar to the existing conditions (Figures 8a and 8b). The exceptions are at building corners (Locations 5, 11, 12, 13, 16, 17, 33, 35, 36) as well as along the north side of Buildings 1 and 3 (Locations 6, 7 and 22), where wind conditions are uncomfortable in the winter months.

The main entrances to Building 1 (Locations 1 and 3), Building 2 (Location 14), and Building 3 (Location 22) are comfortable for walking or potentially uncomfortable year-round (Figures 8a and 8b). Wind conditions at the main entrances to Buildings 4 and 5 (Locations 37 and 46) are comfortable for walking or better throughout the year. For Buildings 6 and 7, wind conditions at the main entrances (Locations 55 and 61) are comfortable for standing or better year-round, which is considered suitable for the intended use. Wind conditions at secondary entrances (Locations 26, 27, 38, 47, 49, 56, 60, 64 and 66) are generally comfortable for walking or better throughout the year.

To improve wind conditions on-site, recommendations are provided in Section 5.0.

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

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

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

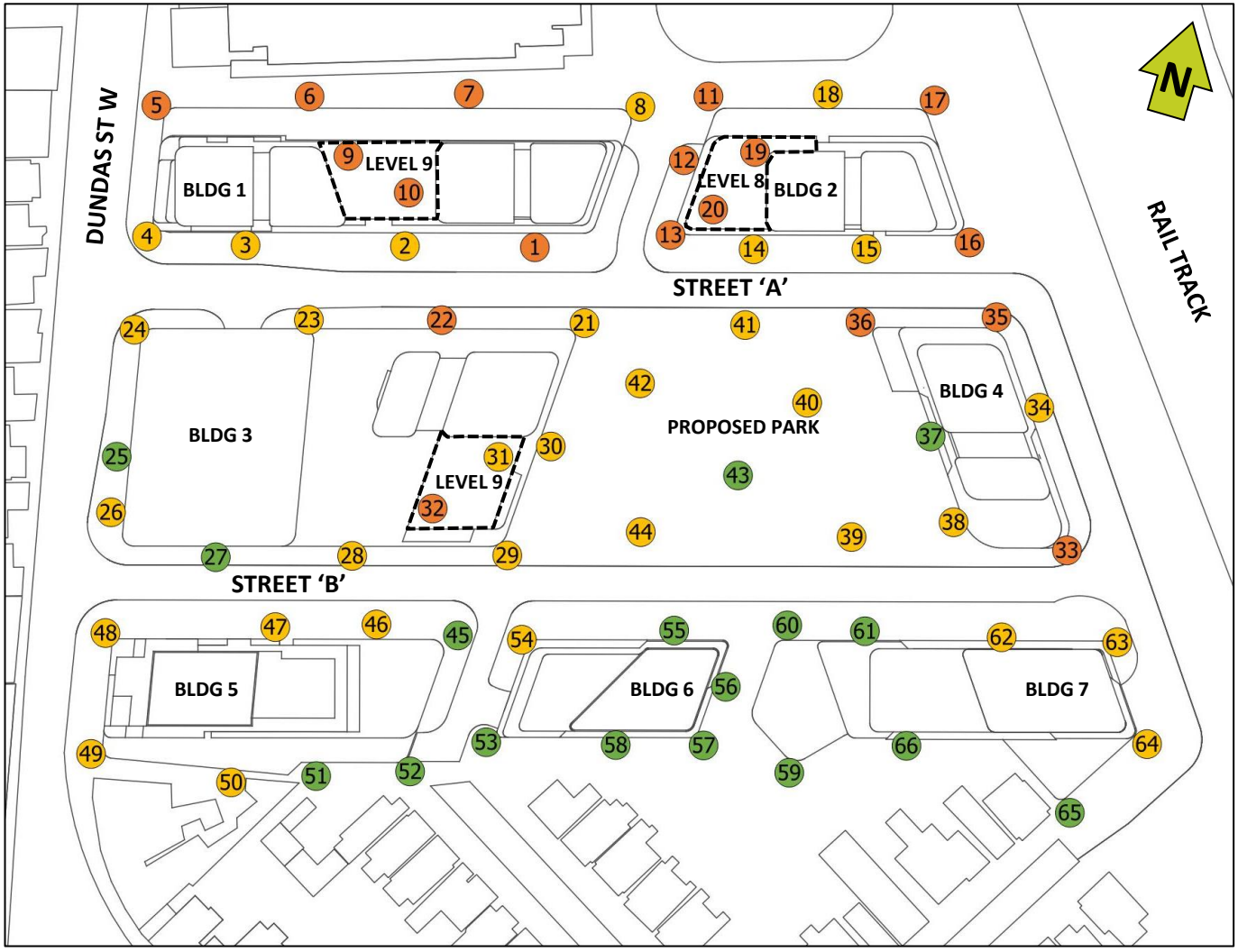


Figure 8b: Proposed Configuration – Pedestrian Wind Comfort – Winter – Building Entrances & Terraces

4.2 Outdoor Amenity Spaces (Locations 9-10, 19-20, 31-32 and 39-44)

In the proposed park (Locations 39 to 44), wind conditions are mainly comfortable for standing in the summer (Figure 8a). During the winter, wind conditions in the park are comfortable for walking or better (Figure 8b).

On the terraces of Building 1 (Locations 9 and 10), Building 2 (Locations 19 and 20) and Building 3 (Locations 31 and 32), wind conditions are generally conducive to walking or better in the summer (Figure 8a). During the winter months, wind conditions are uncomfortable on these terraces (Figure 8b). Recommendations for wind control measures are provided in Section 5.0.

4.3 Surrounding Sidewalks (Locations 67-96)

Existing wind conditions on the sidewalks of Dundas Street West, Bloor Street West and Herman Avenue are generally comfortable for walking or better year-round (Figures 9a and 9b). One exception is along Bloor Street West to the north of project site (Location 92), where wind conditions are uncomfortable during the winter (Figure 9b). Wind conditions at the nearby transit stops along Dundas Street West (Locations 76, 78, 85 and 86) are comfortable for walking or better year-round (Figures 9a and 9b).

In the Proposed Configuration, wind conditions along the surrounding sidewalks including the transit stops are similar to the existing conditions (Figures 10a and 10b).

4.4 Wind Safety

In the Existing Configuration (Figure 11a), the wind safety criterion is met in all areas on-site. On the surrounding sidewalks, the wind safety criterion is exceeded along Bloor Street West (Location 83) and Dundas Street West (Locations 89 and 92).

In the Proposed Configuration (Figure 11b), the wind safety criterion is exceeded on-site around Building 2 (Locations 11, 13 and 17), in the proposed park (Location 42) and on the terraces of Buildings 1 and 2 (Locations 9, 10, 19 and 20). On the surrounding sidewalks, the wind safety criterion is met at all areas except one location along Bloor Street West (Location 92).

5.0 UPDATED ARCHITECTURAL INFORMATION

SLR received updated architectural information on June 27, 2022. the general massing and heights of the proposed buildings remain similar between the latest drawings and previous drawings (received May 19, 2022) that were used to build the wind tunnel model. The exceptions are the heights of Buildings 6 and 7, where slight adjustments are made:

- Building 6 is now six-storeys tall instead of seven-storeys
- Building 7 is now eight-storeys tall instead of ten-storeys

The reduction of heights of Buildings 6 and 7 are considered minor and the resultant wind conditions are expected to be similar to those presented in this report.

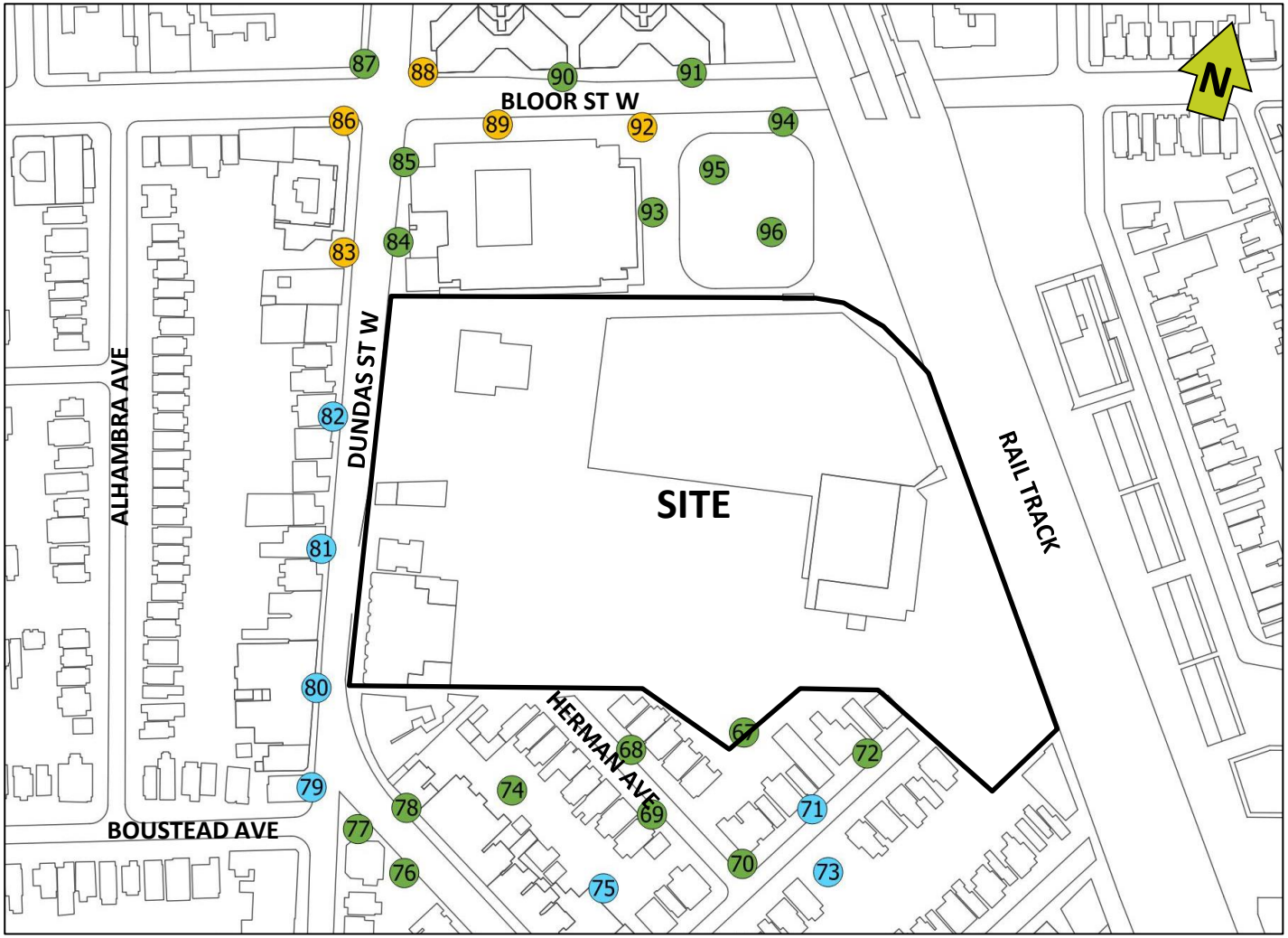


Figure 9a: Existing Configuration – Pedestrian Wind Comfort – Summer – Surrounding Sidewalks

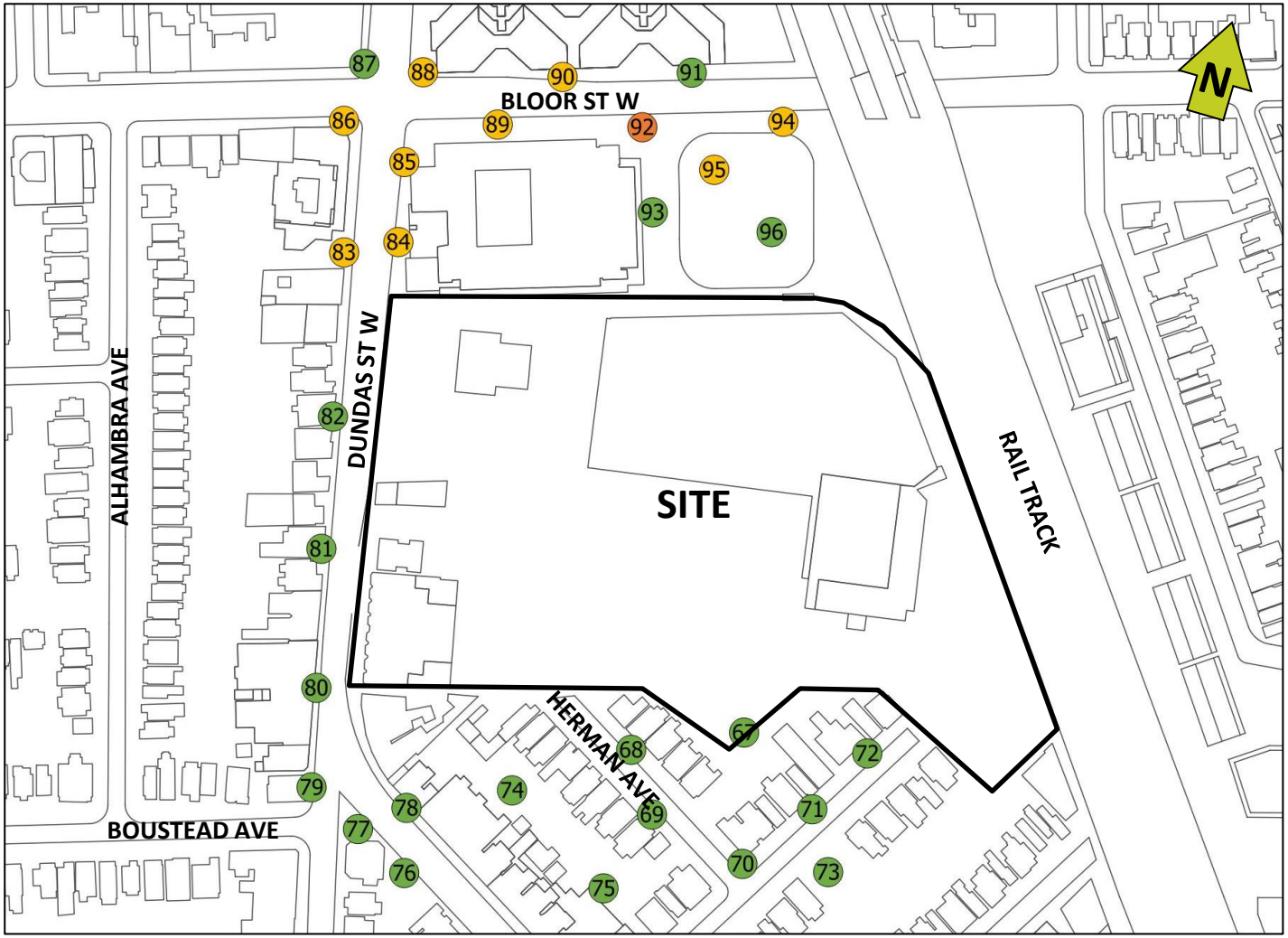


Figure 9b: Existing Configuration – Pedestrian Wind Comfort – Winter – Surrounding Sidewalks

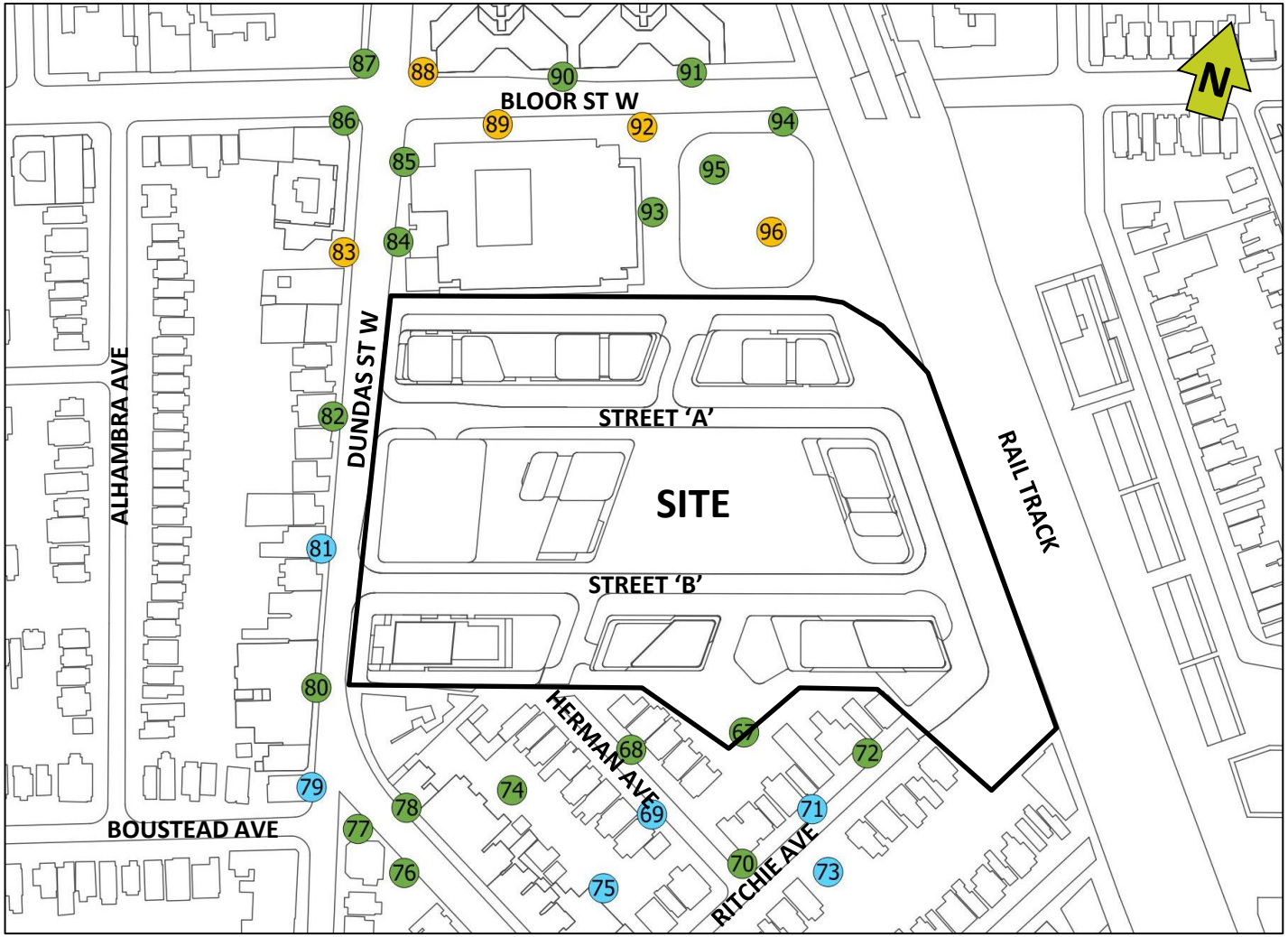


Figure 10a: Proposed Configuration – Pedestrian Wind Comfort – Summer – Surrounding Sidewalks

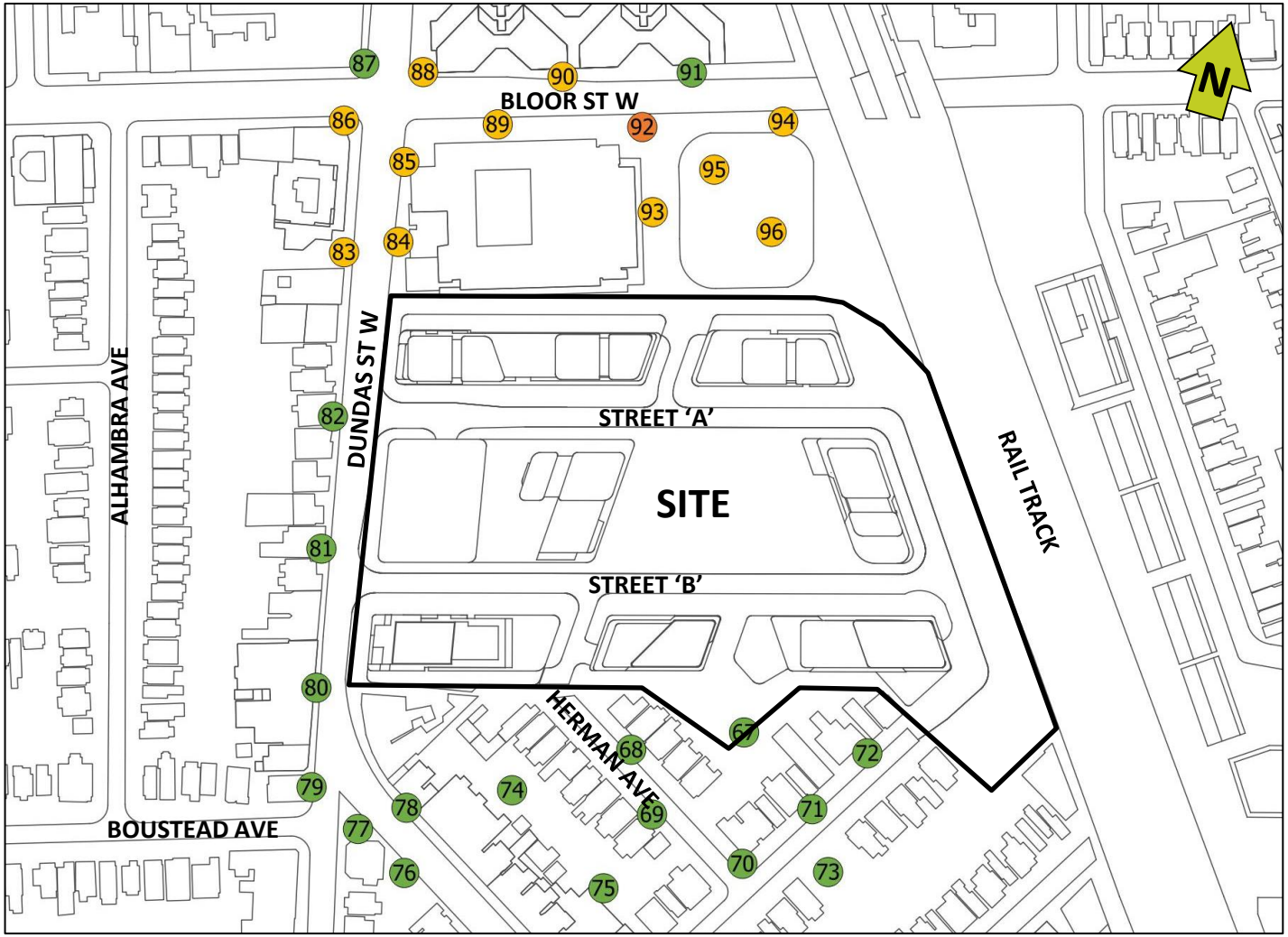


Figure 10b: Proposed Configuration – Pedestrian Wind Comfort – Winter – Surrounding Sidewalks

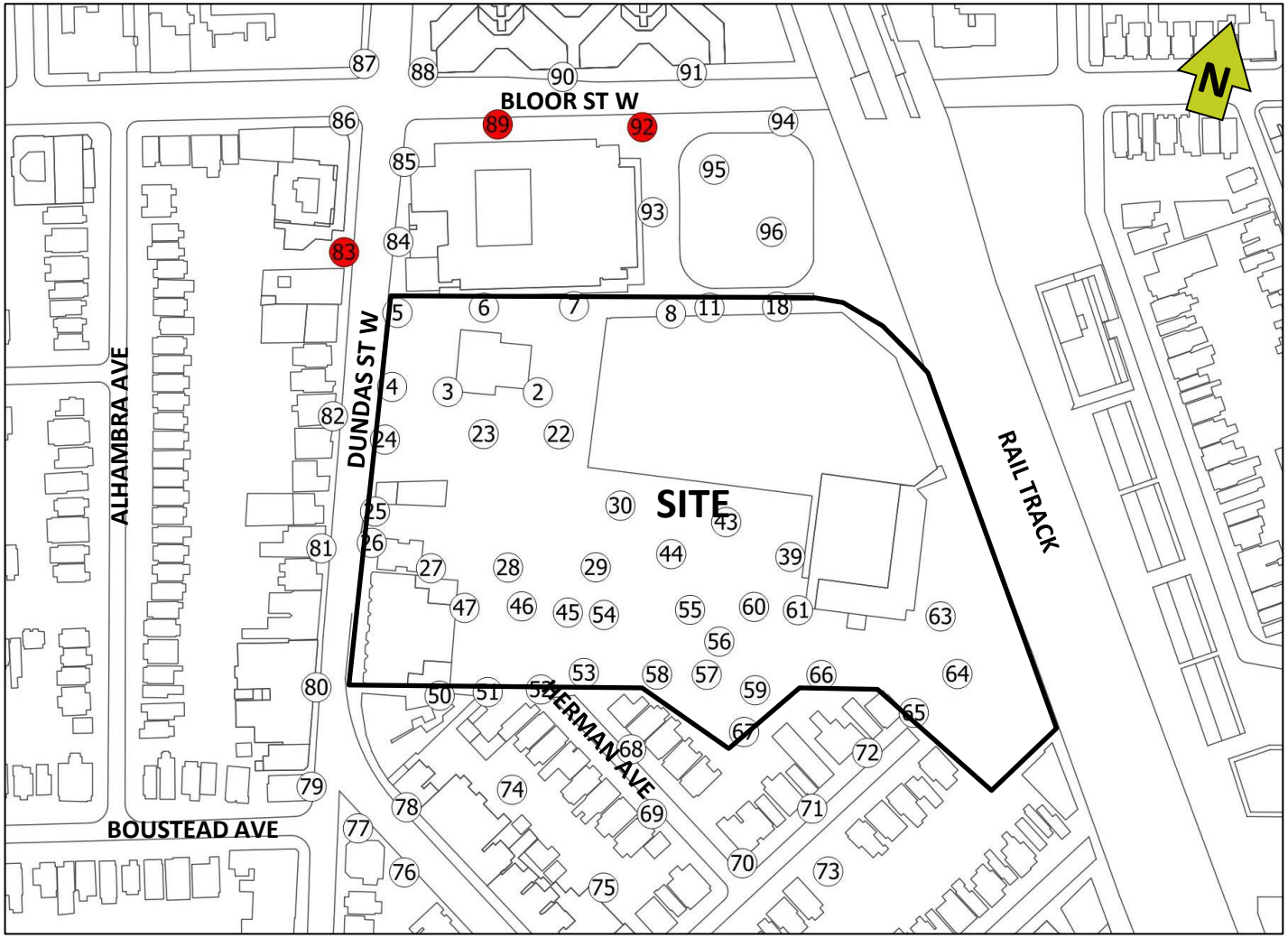


Figure 11a: Existing Configuration – Pedestrian Wind Safety – Annual – On-site & Surrounding Sidewalks

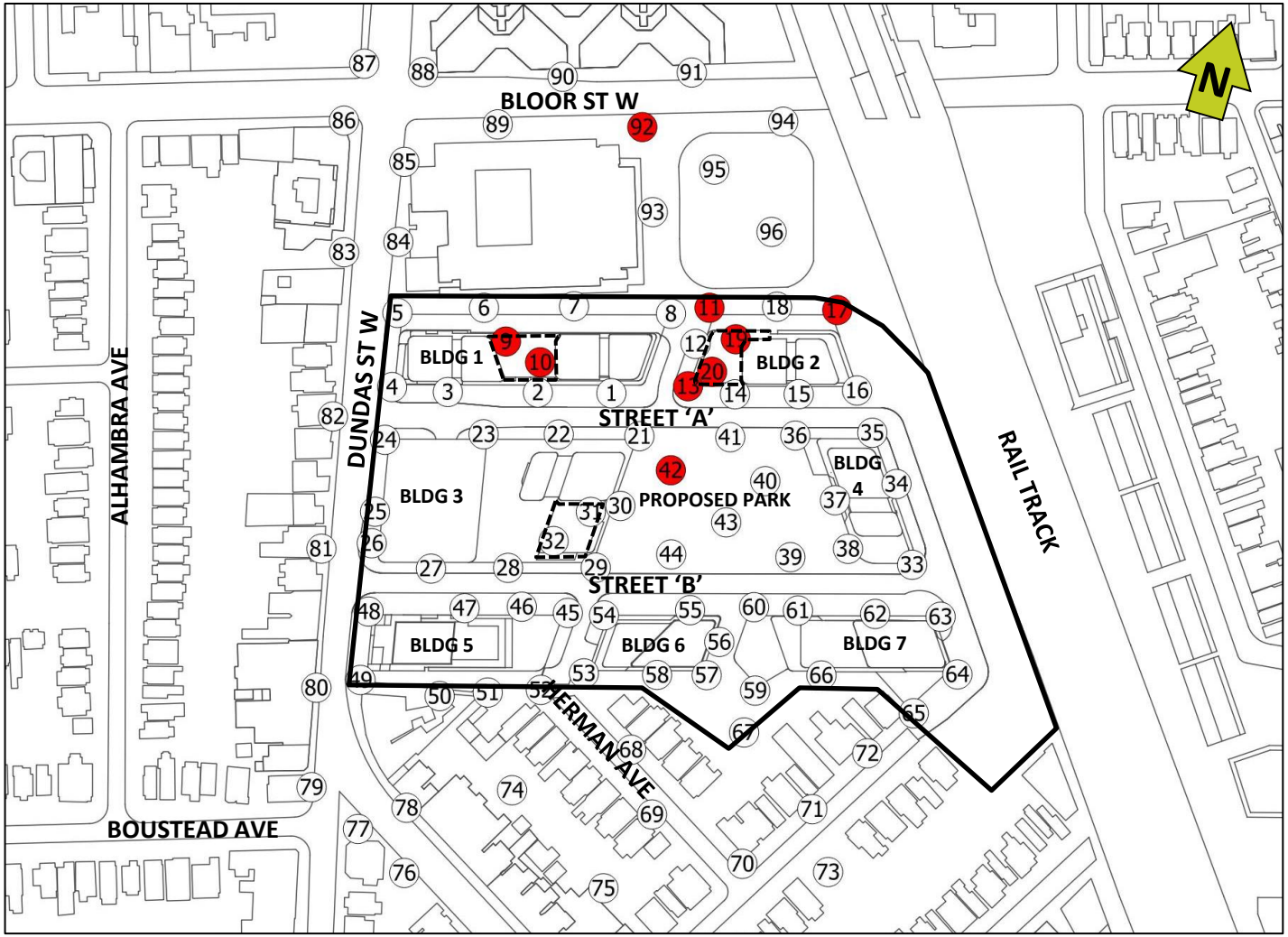


Figure 11b: Proposed Configuration – Pedestrian Wind Safety – Annual – On-site & Surrounding Sidewalks

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SLR received updated architectural information on June 27, 2022. The general massing and heights of the proposed buildings remain similar between the latest drawings and previous drawings (received May 19, 2022) that were used to build the wind tunnel model.

The exceptions are the heights of Buildings 6 and 7, where slight adjustments are made:

- Building 6 is now six-storeys tall instead of seven-storeys.
- Building 7 is now eight-storeys tall instead of ten-storeys.

The reduction of heights of Buildings 6 and 7 are considered minor and the resultant wind conditions are expected to be similar to those presented in this report.

6.0 RECOMMENDATIONS FOR WIND CONTROL MEASURES

Strong wind flows on the site are due to the overall exposure to the northernly and westerly winds, which interact with the buildings. These winds channel through the gaps between the buildings, as well as downwashing off the tower facades, and accelerating around corners.

To improve wind conditions, we recommend the design team consider the following:

- Rearrange the buildings such that the low-rise buildings are upwind to the predominant northerly wind westerly winds (switching the position of Buildings 1 and 2 with Buildings 6 and 7), for overall improvement of wind conditions on-site.
- Incorporating step-backs along the north and west sides of Buildings 1, 2 and 4, which will be beneficial to reduce the impact of downwashing wind flows on the ground. These step-backs should be a minimum of 5 m in width. Building step-backs are more effective close to the ground level (i.e., at second or third floor height).
- At other building corners (Locations 16, 33, 35 and 36), we recommend massing modifications to improve wind conditions (i.e. chamfered, stepped facade at the corner, colonnade etc.). In addition, localized wind control measures in the form of large canopies (i.e., minimum 3 m wide) wrapping around the corners, vertical wind screens and/or other disruptive architectural features should be considered to mitigate the wind flows.
- At the entrances (Locations 1, 3, 14, 22, 34 and 46), we recommend vertical wind screens on both sides of the doors for calmer wind conditions. Alternatively, the entrances can be recessed into the building facade for wind protection. As a general guide, entrances should be a minimum of 5 m away from corners to reduce the impact from the local wind accelerations around building corners.

The strong wind flows in the proposed park (Locations 39 to 43) are caused by interaction of the prevailing winds with the nearby towers. For instance, Building 4 intercepts the strong wind flows that occur at higher elevations and redirects them downwards. To improve wind conditions in the park we recommend the design team consider the following:

- Vertical wind screens and/or fences along the perimeter of the park and near seating areas. Such features should be minimum 2.2 m tall to be effective.
- Horizontal elements such as pergolas, trellises should be considered for seating areas, to reduce the impact of wind flows redirected from the building facade. Additional mitigation measures may need to be considered based on the intended activities.

To improve wind conditions on the terraces of Buildings 1, 2 and 3, we recommend including tall vertical screens along the perimeter of each terrace, to reduce the overall exposure to the predominant winds.

Examples of these wind control measures are shown in Figures 12a and 12b. SLR will work the design team to determine practical and effective mitigation measures prior to the next planning submission.

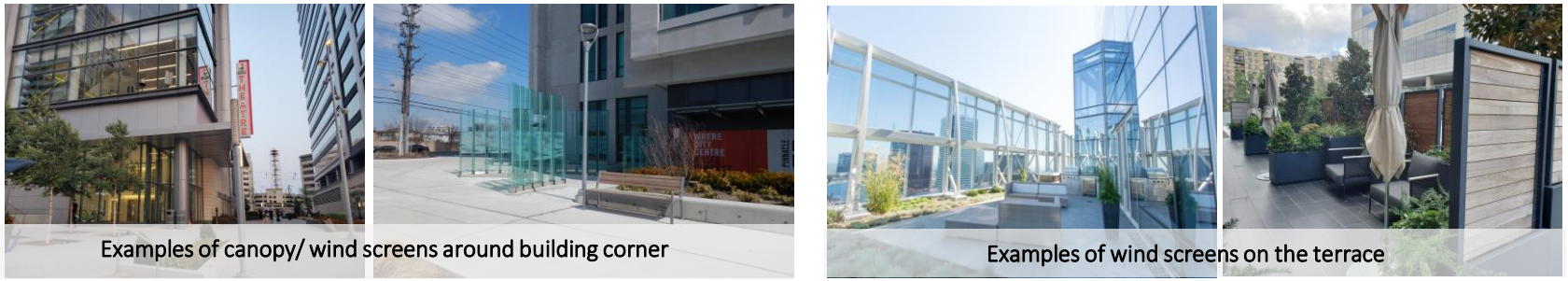

Figure 12b: Examples of wind control measures

7.0 CONCLUSIONS & RECOMMENDATIONS

The pedestrian wind conditions predicted for the proposed development at 2280 Dundas Street West have been assessed through wind tunnel modeling techniques. Based on the results of our study, the following conclusions have been reached:

- The wind safety conditions on-site and, in most areas off-site meet the safety criterion in the Existing Configuration. The exceptions are along a few sidewalk locations to the north and west of the site, where safety criterion is exceeded.
- In the Proposed Configuration, the safety criterion is exceeded on-site in the park, at a few building corners, and on the terraces of Buildings 1 and 2. Wind control measures are recommended for these areas. Off-site, the safety criterion is exceeded at one sidewalk locations to the north of the proposed development. These safety conditions are better than the existing conditions.
- Wind conditions on-site are generally suitable for the intended use. Wind control measures are recommended for a few sidewalk locations on-site, a few entrances, building corners and for the proposed park.
- 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.

8.0 ASSESSMENT APPLICABILITY

This assessment is based on computer modeling techniques and provides a quantitative analysis 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,

SLR Consulting (Canada) Ltd.

Nishat Nourin, M.Eng., P.Eng.
Microclimate Engineer

Tahrana Lovlin, MAES, P.Eng.
Principal – Microclimate

9.0 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

Figure A1bb: Existing Configuration – Pedestrian Wind Comfort – Autumn – On-site

Figure B1a: Proposed Configuration – Pedestrian Wind Comfort – Spring – Building Entrances & Terraces

Figure B1b: Proposed Configuration – Pedestrian Wind Comfort – Autumn – Building Entrances & Terraces

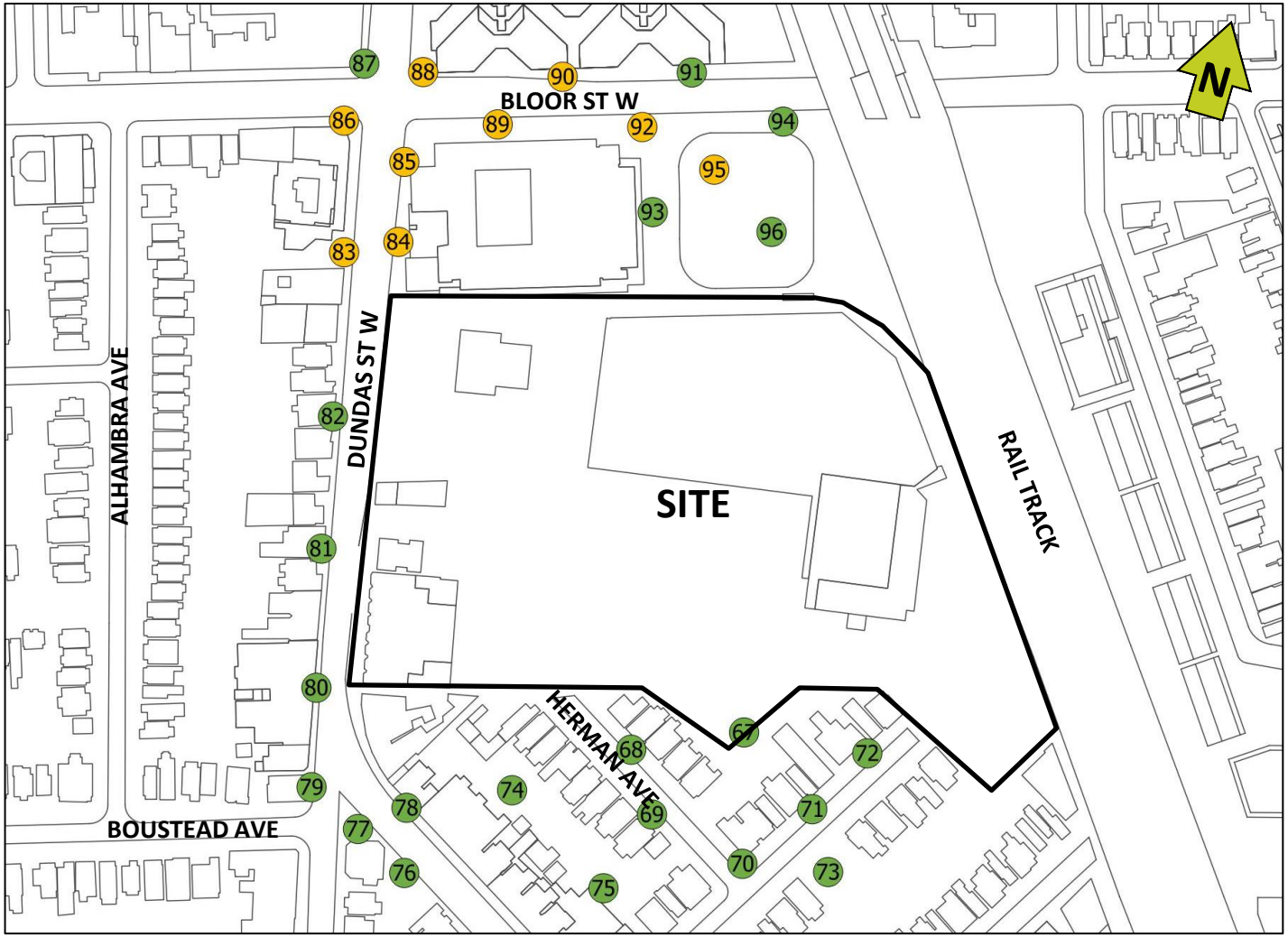

Figure C1a: Existing Configuration – Pedestrian Wind Comfort – Spring – Surrounding Sidewalks

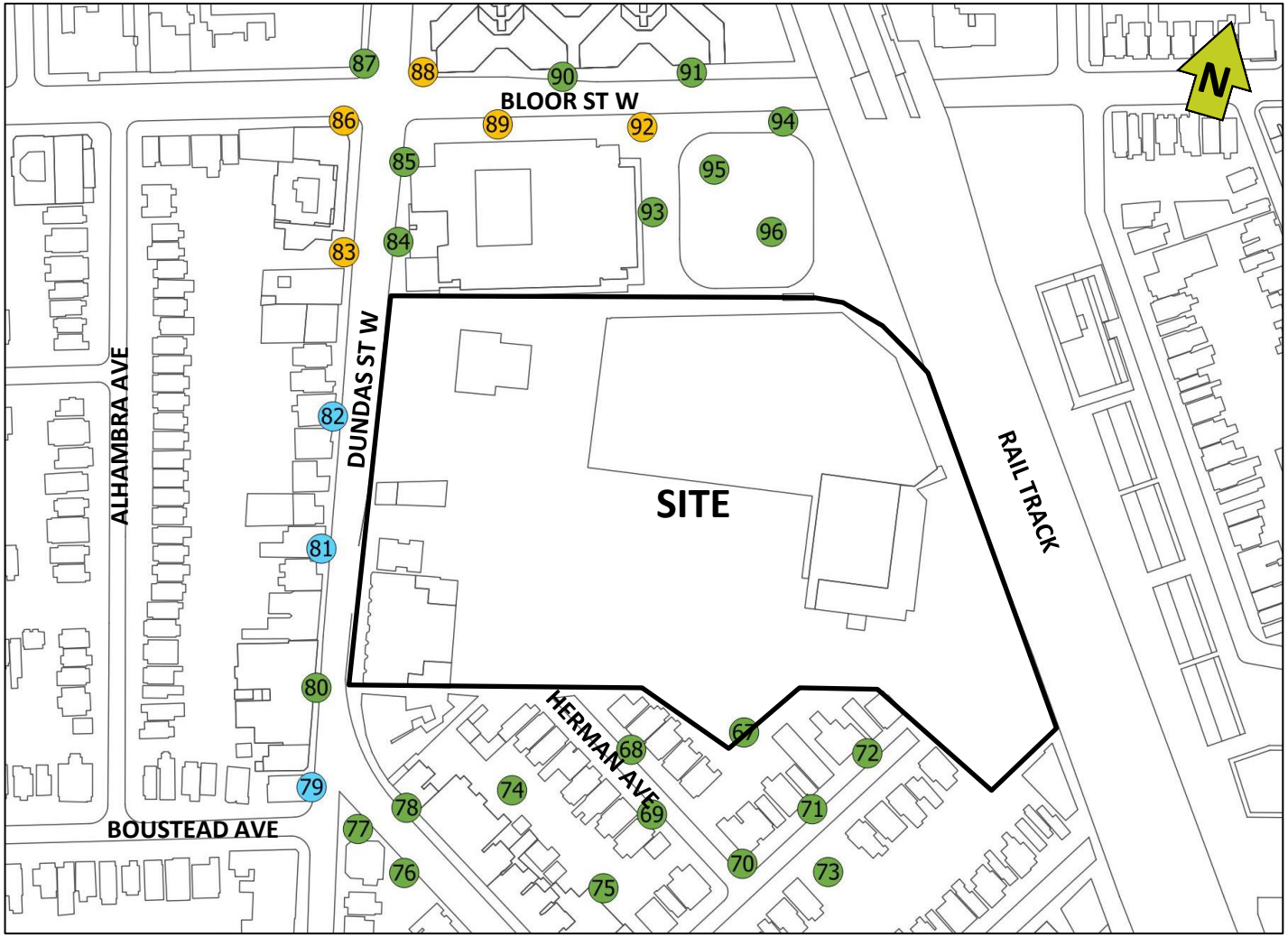

Figure C1b: Existing Configuration – Pedestrian Wind Comfort – Autumn – Surrounding Sidewalks

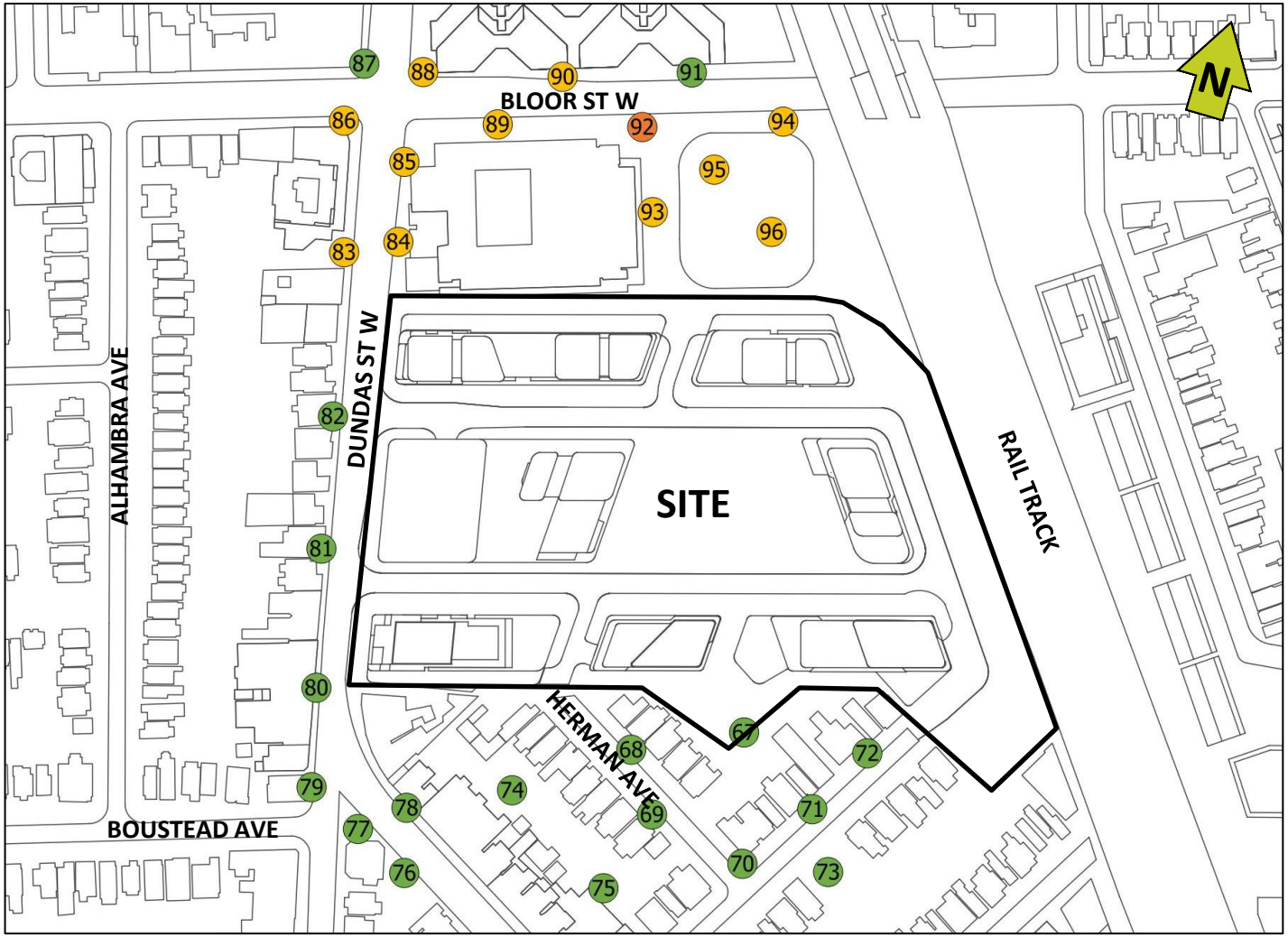

Figure D1a: Proposed Configuration – Pedestrian Wind Comfort – Spring – Surrounding Sidewalks

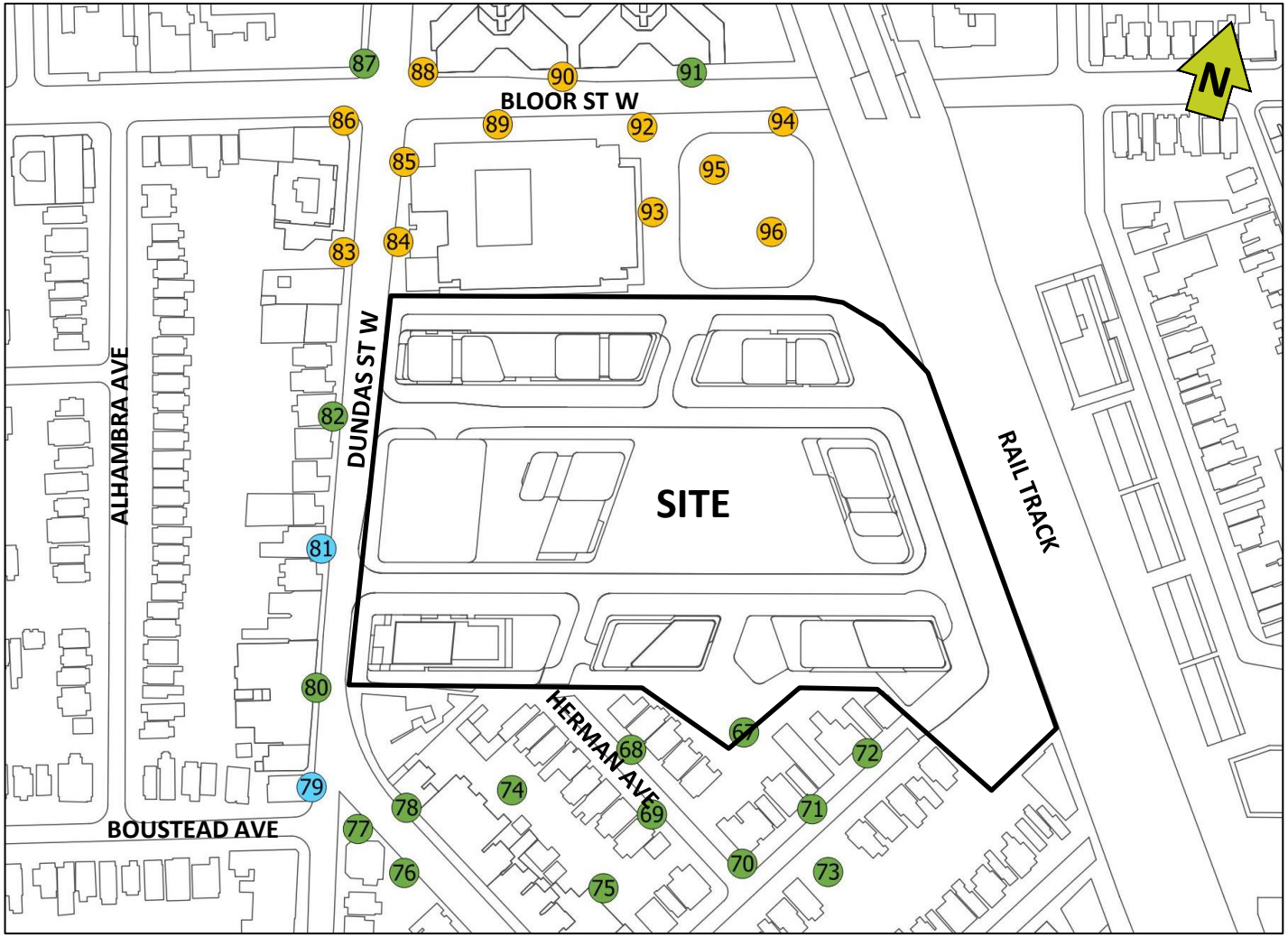

Figure D1b: Proposed Configuration – Pedestrian Wind Comfort – Autumn – Surrounding Sidewalks

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					
1	Proposed	20.1	18.5	15.6	17.7	77.9
2	Existing	13.7	13.4	11.1	12.3	50.3
2	Proposed	19.3	18.9	15.9	17.4	70.7
3	Existing	15.0	14.2	12.0	13.1	60.5
3	Proposed	18.9	18.3	15.4	16.6	74.1
4	Existing	12.6	12.3	10.2	11.1	50.4
4	Proposed	18.7	18.1	15.9	16.9	71.4
5	Existing	17.1	16.3	13.4	14.7	78.9
5	Proposed	21.2	20.2	17.3	18.7	82.1
6	Existing	14.1	13.1	11.2	12.5	53.5
6	Proposed	20.4	18.7	15.7	17.8	78.6
7	Existing	14.1	13.5	11.4	12.6	50.5
7	Proposed	20.2	18.9	15.5	17.5	76.8
8	Existing	14.1	14.1	11.6	12.6	53.4
8	Proposed	17.8	18.7	15.0	16.0	71.2
9	Existing					
9	Proposed	21.5	22.6	19.1	19.4	116.3
10	Existing					
10	Proposed	21.7	21.6	18.2	19.3	102.3

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

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	11.7	12.7	9.9	10.4	52.8
11	Proposed	22.7	21.9	18.7	20.3	91.2
12	Existing					
12	Proposed	22.2	21.1	17.9	19.7	83.9
13	Existing					
13	Proposed	21.9	22.8	19.1	20.2	108.5
14	Existing					
14	Proposed	16.5	15.8	12.9	14.4	63.9
15	Existing					
15	Proposed	19.8	20.2	16.0	17.6	75.2
16	Existing					
16	Proposed	21.6	21.5	18.6	19.7	86.3
17	Existing					
17	Proposed	21.8	23.0	18.4	19.5	102.8
18	Existing	13.4	13.1	10.7	11.7	53.8
18	Proposed	19.9	19.9	16.1	17.7	83.2
19	Existing					
19	Proposed	26.1	24.7	21.1	23.2	99.8
20	Existing					
20	Proposed	26.6	28.3	22.7	24.0	115.1

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

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	18.8	19.6	16.1	16.9	74.6
22	Existing	12.3	11.6	10.0	11.0	46.8
22	Proposed	20.8	21.2	17.0	18.3	84.7
23	Existing	14.1	13.7	11.4	12.4	58.2
23	Proposed	19.6	20.4	16.1	17.0	85.1
24	Existing	11.6	11.8	9.6	10.3	45.8
24	Proposed	17.6	16.7	14.2	15.5	65.6
25	Existing	13.8	13.3	10.8	12.2	51.3
25	Proposed	13.7	12.8	10.7	11.8	63.8
26	Existing	13.1	12.2	10.1	11.5	51.2
26	Proposed	15.9	14.3	12.2	13.6	72.3
27	Existing	11.0	11.2	8.9	9.8	43.4
27	Proposed	14.9	14.4	12.6	13.6	56.1
28	Existing	13.9	14.2	11.6	12.4	54.7
28	Proposed	16.8	16.5	13.7	15.0	66.3
29	Existing	15.0	14.3	11.8	13.1	58.9
29	Proposed	19.9	20.0	16.0	17.5	79.4
30	Existing	13.9	13.2	10.8	12.1	54.8
30	Proposed	15.9	16.5	13.0	13.8	63.6

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

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					
31	Proposed	17.6	15.9	13.4	15.5	70.9
32	Existing					
32	Proposed	20.4	18.9	15.9	17.8	84.7
33	Existing					
33	Proposed	21.5	20.7	17.1	19.0	80.9
34	Existing					
34	Proposed	16.3	16.9	13.5	14.6	68.8
35	Existing					
35	Proposed	20.9	19.9	16.0	18.6	84.5
36	Existing					
36	Proposed	21.7	22.3	17.6	19.3	84.1
37	Existing					
37	Proposed	12.7	12.3	10.1	11.3	52.2
38	Existing					
38	Proposed	19.8	19.3	15.4	17.5	77.7
39	Existing	12.4	11.8	10.1	11.1	48.0
39	Proposed	18.8	18.9	14.9	16.6	74.8
40	Existing					
40	Proposed	17.3	16.4	13.6	15.3	66.5

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

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	18.6	19.8	15.6	16.7	74.4
42	Existing					
42	Proposed	18.4	19.3	15.7	16.5	90.9
43	Existing	14.5	13.2	11.2	12.5	57.2
43	Proposed	14.6	15.1	12.2	13.1	66.6
44	Existing	15.2	14.7	12.1	13.2	58.4
44	Proposed	15.9	16.3	13.2	14.0	65.2
45	Existing	9.7	10.2	8.1	8.7	39.3
45	Proposed	13.2	14.3	12.1	12.1	77.8
46	Existing	14.2	14.3	11.7	12.6	56.8
46	Proposed	18.2	18.1	14.5	15.8	85.6
47	Existing	12.7	13.4	11.0	11.6	51.8
47	Proposed	17.0	16.4	13.3	14.6	73.5
48	Existing					
48	Proposed	17.6	15.4	13.1	15.0	70.2
49	Existing					
49	Proposed	19.1	17.2	15.1	16.2	84.3
50	Existing	13.9	13.9	11.3	12.4	50.8
50	Proposed	15.2	13.8	11.7	12.9	75.6

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

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	12.0	11.7	9.9	10.7	43.7
51	Proposed	11.6	11.2	9.6	10.5	45.5
52	Existing	13.2	13.2	10.6	11.6	49.4
52	Proposed	14.5	15.0	12.3	13.2	64.3
53	Existing	13.6	13.5	11.2	12.0	51.4
53	Proposed	14.7	15.1	12.7	13.4	60.1
54	Existing	14.5	14.4	11.6	12.8	55.0
54	Proposed	17.3	17.5	14.2	15.4	73.4
55	Existing	15.4	14.8	12.3	13.4	60.2
55	Proposed	13.5	14.1	11.4	11.8	65.2
56	Existing	15.4	14.8	12.2	13.3	60.8
56	Proposed	13.2	13.5	11.4	12.2	48.2
57	Existing	15.2	14.7	12.2	13.2	59.0
57	Proposed	13.5	12.7	11.0	12.1	49.8
58	Existing	14.3	14.1	11.6	12.6	55.6
58	Proposed	13.0	12.4	10.3	11.6	47.9
59	Existing	14.7	14.0	11.5	12.7	56.3
59	Proposed	13.8	13.1	11.6	12.6	51.5
60	Existing	13.7	13.5	11.1	12.0	53.4
60	Proposed	14.5	15.0	12.4	13.0	61.1

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

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	13.0	12.6	10.7	11.5	52.0
61	Proposed	14.4	15.8	12.0	12.8	71.4
62	Existing					
62	Proposed	17.6	18.9	14.5	15.8	78.9
63	Existing	12.7	13.0	10.6	11.5	47.4
63	Proposed	18.5	18.6	14.8	16.4	67.3
64	Existing	13.8	14.0	11.5	12.3	52.2
64	Proposed	16.5	17.7	14.7	15.3	66.8
65	Existing	12.4	12.8	10.7	11.3	45.7
65	Proposed	12.1	12.0	9.7	10.8	50.0
66	Existing	14.4	13.5	11.2	12.5	55.8
66	Proposed	12.5	11.8	10.4	11.2	46.4
67	Existing	13.8	13.2	11.0	11.9	53.1
67	Proposed	14.2	13.2	11.2	12.4	54.6
68	Existing	13.7	12.9	11.2	12.1	52.3
68	Proposed	14.0	12.3	10.5	12.0	54.3
69	Existing	12.6	13.0	10.3	11.0	52.0
69	Proposed	11.6	11.1	9.2	10.1	45.4
70	Existing	13.8	13.5	11.3	12.2	54.3
70	Proposed	14.8	14.2	11.6	12.9	63.0

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

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	11.4	11.8	9.6	10.3	43.7
71	Proposed	11.4	12.0	9.5	10.3	48.5
72	Existing	11.9	12.5	10.6	11.2	43.1
72	Proposed	12.7	12.8	10.2	11.4	50.7
73	Existing	11.6	11.6	9.6	10.3	50.1
73	Proposed	11.9	11.7	9.6	10.4	54.5
74	Existing	14.1	13.8	11.3	12.5	51.1
74	Proposed	14.0	13.3	11.0	12.3	52.6
75	Existing	12.3	12.3	10.0	10.9	45.0
75	Proposed	12.2	11.9	9.7	10.8	47.4
76	Existing	13.0	12.8	10.5	11.5	49.8
76	Proposed	13.3	12.9	10.5	11.6	50.5
77	Existing	13.7	13.0	10.6	11.7	58.2
77	Proposed	13.6	12.6	10.4	11.6	57.9
78	Existing	12.6	12.4	10.4	11.3	49.0
78	Proposed	14.4	13.7	11.4	12.5	64.5
79	Existing	10.7	11.0	9.0	9.7	38.1
79	Proposed	11.3	11.3	9.3	10.0	49.5
80	Existing	11.3	11.9	9.8	10.4	45.0
80	Proposed	14.5	14.1	11.6	12.6	60.8

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

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	10.6	10.6	8.6	9.5	42.1
81	Proposed	10.7	10.9	9.1	9.7	42.4
82	Existing	10.1	10.4	8.4	9.1	38.3
82	Proposed	13.0	13.8	11.1	11.7	52.9
83	Existing	19.8	18.8	15.5	17.2	94.1
83	Proposed	19.7	19.4	16.0	17.4	87.2
84	Existing	17.1	16.3	13.4	14.6	77.1
84	Proposed	17.9	16.2	13.8	15.5	73.5
85	Existing	16.6	16.2	13.0	14.7	69.7
85	Proposed	18.1	17.0	14.3	16.1	72.0
86	Existing	18.8	19.2	15.6	16.7	76.1
86	Proposed	17.8	18.3	14.6	15.8	71.7
87	Existing	14.5	14.6	12.1	13.0	55.5
87	Proposed	14.5	14.7	12.1	13.1	56.8
88	Existing	19.8	19.6	16.1	17.2	86.5
88	Proposed	19.5	19.2	15.4	16.9	84.0
89	Existing	19.3	19.8	15.7	16.5	90.4
89	Proposed	19.3	20.0	15.8	16.7	87.8
90	Existing	16.4	15.2	12.9	14.2	68.8
90	Proposed	17.4	16.7	14.1	15.3	69.2

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

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	13.6	13.1	11.2	12.2	51.8
91	Proposed	14.4	14.3	12.1	13.0	54.5
92	Existing	20.2	18.9	15.8	17.4	94.7
92	Proposed	20.9	20.2	16.6	18.2	93.4
93	Existing	12.3	12.5	10.1	11.0	46.8
93	Proposed	17.4	17.5	14.2	15.4	84.7
94	Existing	16.1	14.9	12.6	14.1	61.5
94	Proposed	17.4	16.1	13.4	15.2	66.4
95	Existing	15.4	15.4	12.5	13.6	56.8
95	Proposed	17.9	18.2	14.8	16.0	75.6
96	Existing	14.4	14.1	11.5	12.7	55.8
96	Proposed	19.1	19.0	15.6	17.2	79.0

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