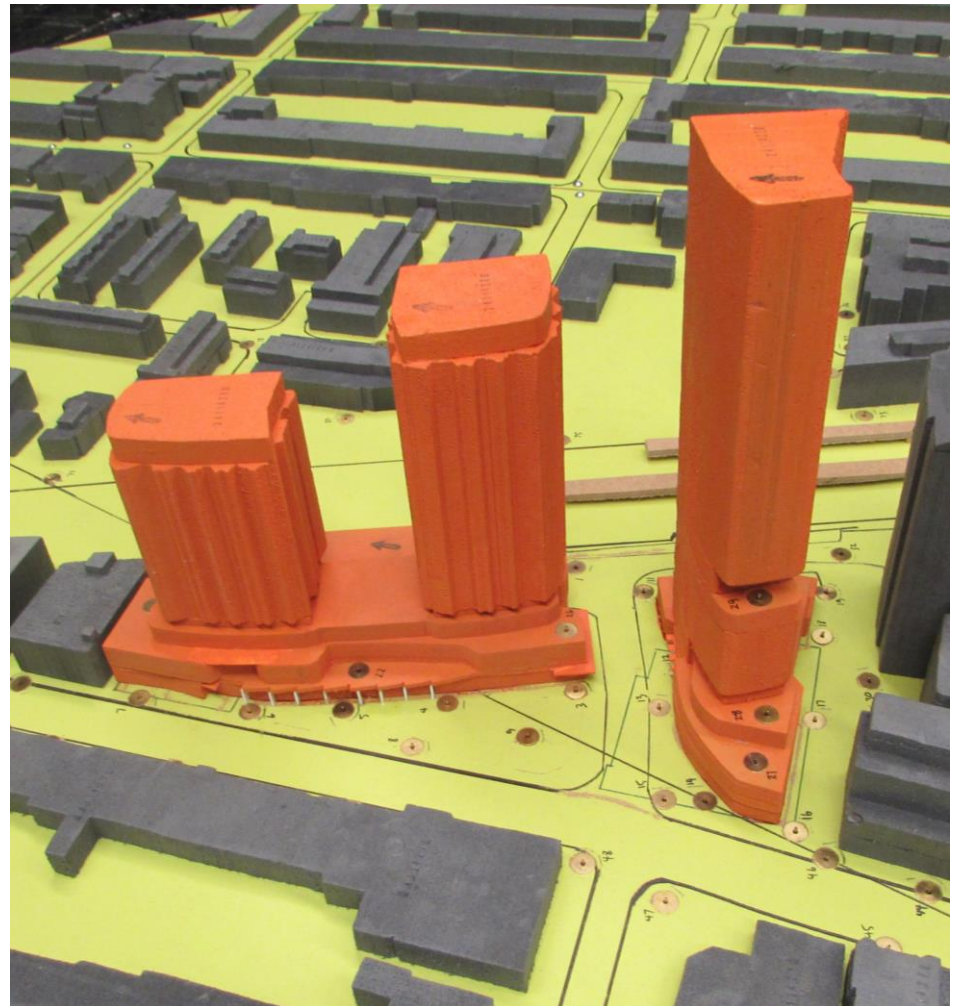




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Date: March 8, 2023

Re: Pedestrian Wind Study
2400 – 2440 Dundas Street West
Toronto, ON
SLR Project #241.V14270.00001



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For
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Microclimate Engineer

A handwritten signature in blue ink, appearing to read "Tahrana Lovlin".

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

Version	Date
Draft 0.1	March 1, 2023
Final	March 8, 2023

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1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Fora Developments to conduct a pedestrian wind study for the proposed development at 2400-2440 Dundas Street West in Toronto, Ontario. This report is in support of the combined Zoning Bylaw Amendment (ZBA) application for the development.

1.1 Existing Site

The proposed development is located at 2400-2440 Dundas Street West, on the east side of the street, between Chelsea Avenue and Glenlake Avenue. The site is currently occupied by a large parking lot and two low-rise commercial buildings. **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. Several images of the site and surroundings are included in **Figures 2a** through **2d**.

Immediately surrounding the site are low-rise commercial developments from southwest through north, the CP Railway to the east, and a high-rise development to the south. Beyond the immediate surroundings are mainly low-rise residential and commercial buildings in all directions.

Typically, developments with Zoning Bylaw Approval within the context extents are included as existing surroundings. For this assessment, the following ZBA-approved developments were included: 340 Wallace Avenue, 1540-1550 Bloor Street West, 1630-1632 Bloor Street West, 1423-1437 Bloor Street West & 278 Sterling Road, 72 Perth Avenue, 26 Ernest Avenue, 1480 Bloor Street West, 2376 Dundas Street West.



Figure 1: Aerial view of existing site & surroundings

Credit: Google Earth Pro, dated 10/4/2022



Figure 2a: Looking north along Dundas Street West (site to the right)



Figure 2c: Looking east along Chelsea Avenue (portion of site terminates with Chelsea Avenue)



Figure 2b: Looking south along Dundas Street West (north of the site)



Figure 2d: Looking west along Ernest Avenue (east of the site)

1.2 Proposed Development

The proposed development will include two buildings. The North Building includes an 18-storey tower (Tower A1, approximately 72 m in height with mechanical) and a 25-storey tower (Tower A2, approximately 94 m in height including mechanical) atop a two-storey podium. The South Building includes a 36-storey tower (Tower B, approximately 126 m in height with mechanical) atop a three-storey podium. **Figure 3** illustrates the west elevation of the proposed development.

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**.

The main entrance to Tower A1 is located on the east facade of the North Building and the main entrance to Tower A2 is on the south side of the building, with the retail entrance is located near the southwest corner. Individual unit entrances are also along the west facade. Secondary entrances and exits are located along the east and west sides of the towers.

The main entrance and the retail entrance to Tower B are located on the north facade of the South Building. Secondary entrances and exits are located along the south and east sides of the building. A Privately Owned Publicly Accessible Space (POPS)/ public park is located on the west side of the proposed site. In addition, numerous outdoor amenity terraces are located at various levels of the proposed development.

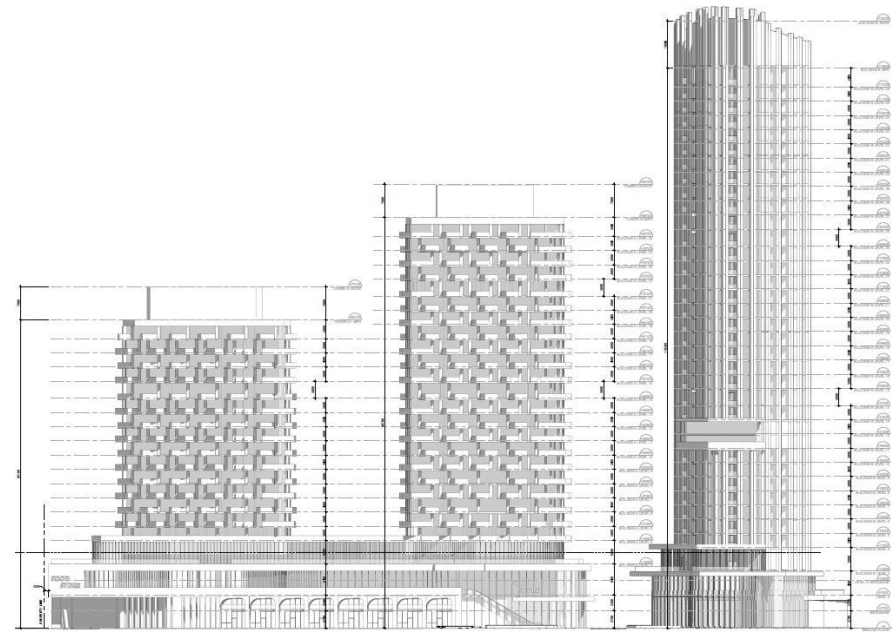


Figure 3: West elevation of proposed development

Credit: Giannone Petricone Associates

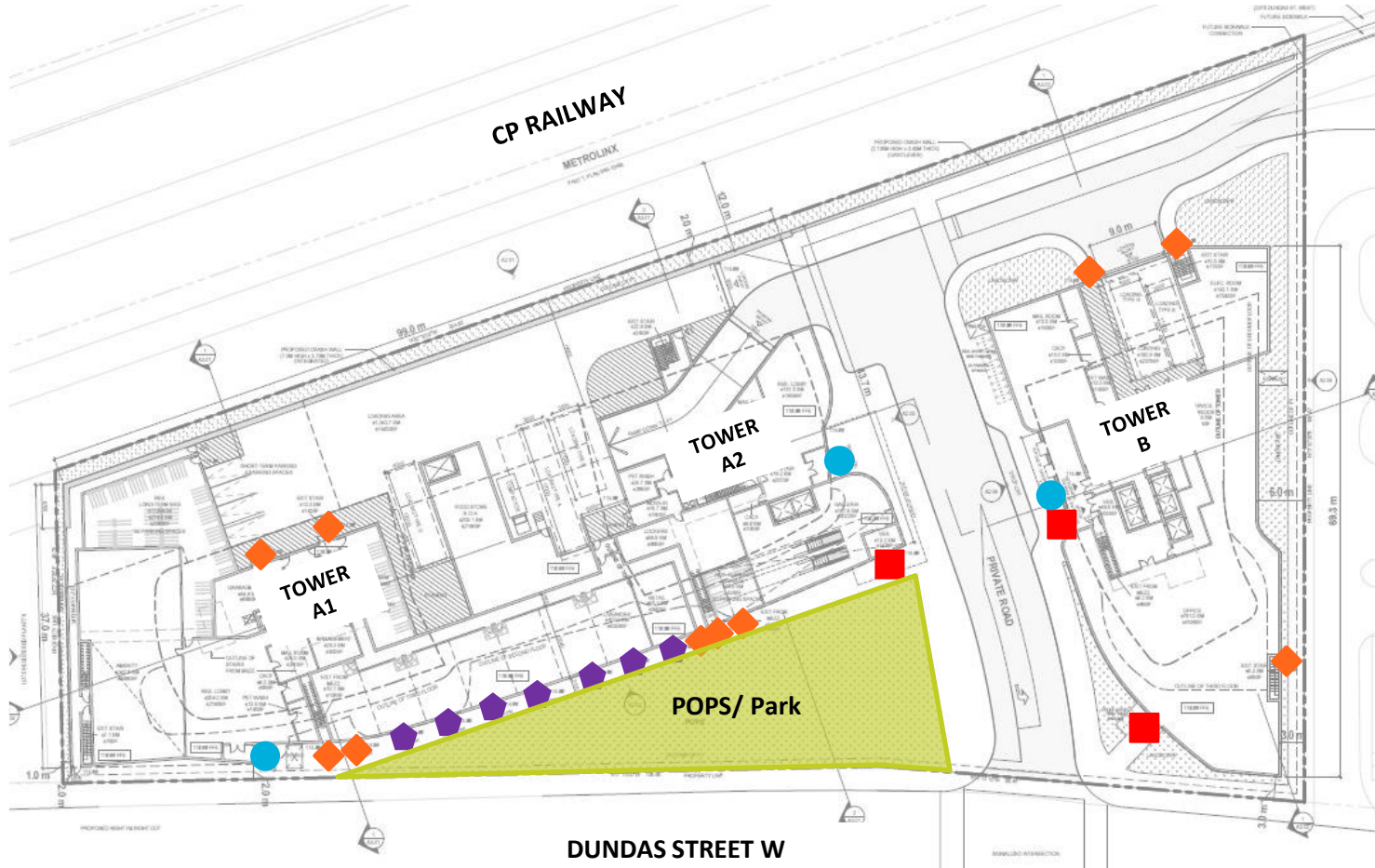


Figure 4: Areas of interest – Grade

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 development was constructed based on up-to-date drawing information received by SLR on February 3, 2023.

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 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 (see Section 1.1). 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 ZBA-approved surroundings.
- **Proposed Configuration:** Proposed development with existing and ZBA-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 91 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.

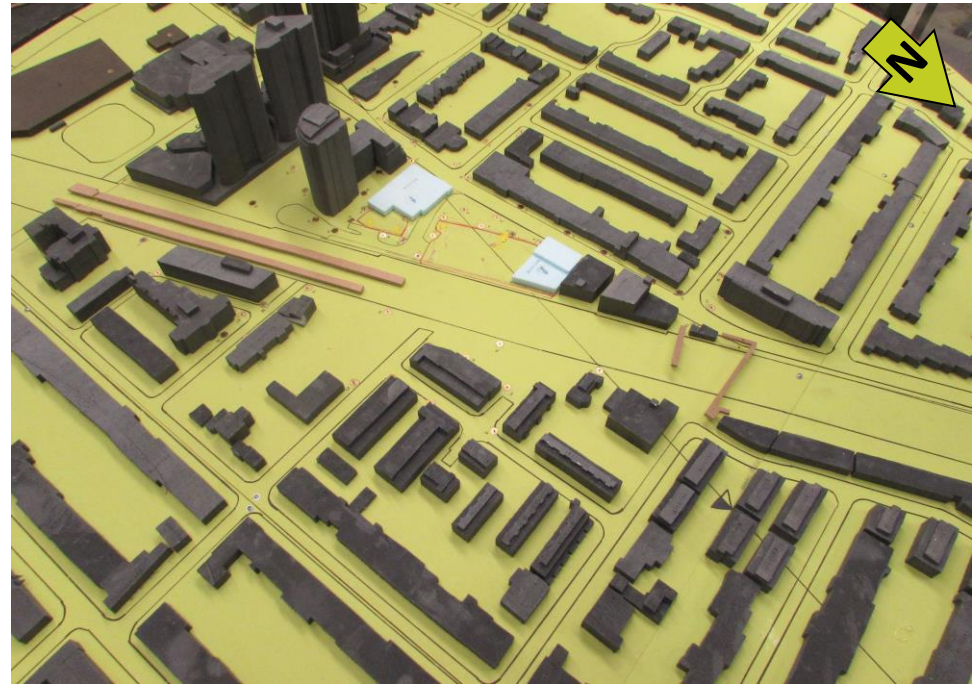


Figure 5a: Existing Configuration



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.

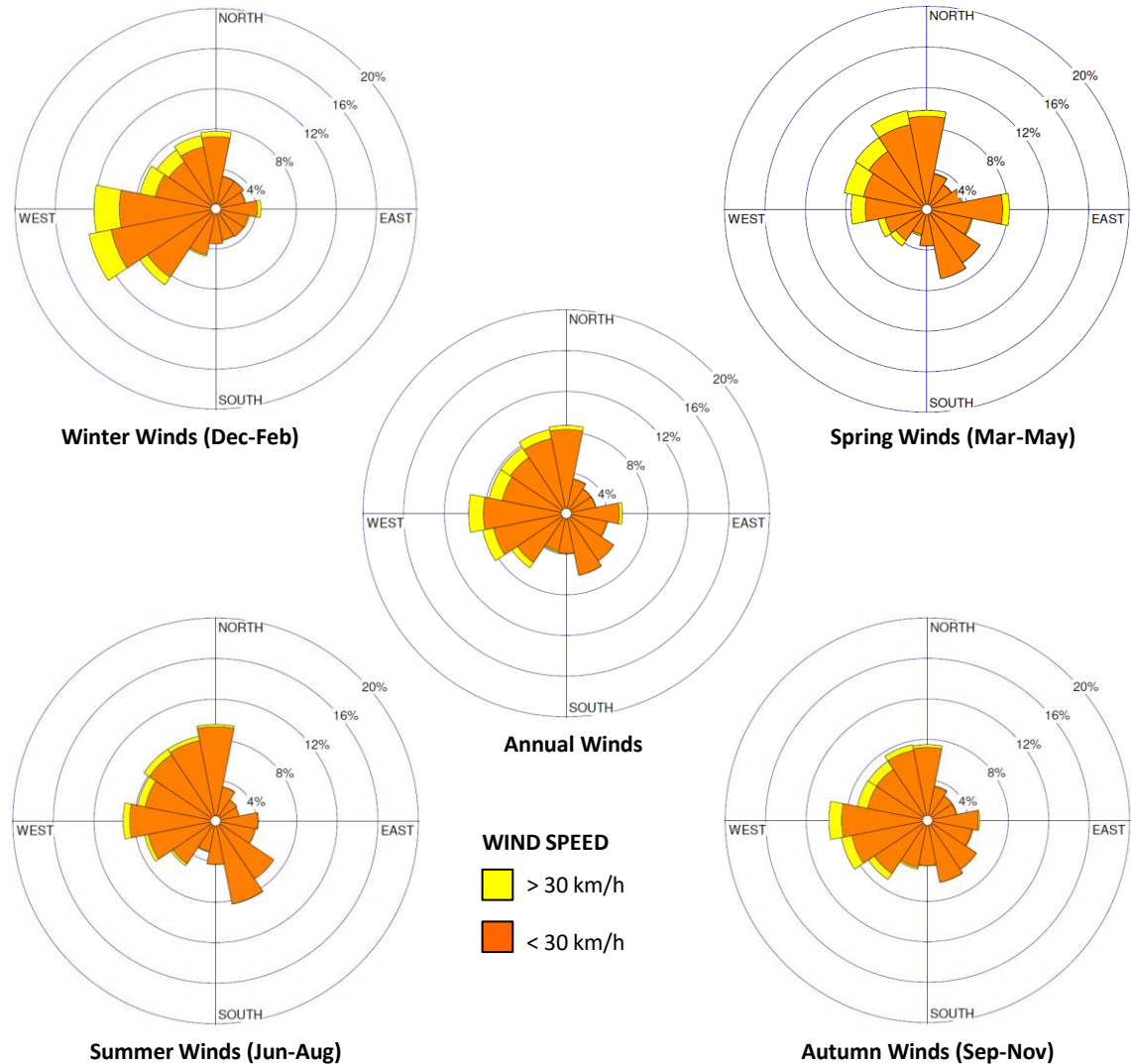


Figure 6: Wind Roses for Toronto Pearson International Airport (1991-2020)

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 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. 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. The annual wind safety conditions are presented in **Figures 11a and 11b** for the Existing and Proposed Configurations. The detailed comfort and safety results for all seasons can be found in a tabular form 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 & POPS (Locations 1-19)

Existing wind conditions on the site are comfortable for walking or better throughout the year (**Figures 7a and 8a**).

In the Proposed Configuration, wind conditions on-site are generally comfortable for walking or better year-round. The exceptions are along the north and south sides of Tower B (Locations 11, 13, and 17 through 19) where wind conditions are uncomfortable in the winter months (**Figure 8b**). To improve wind conditions around Tower B, we recommend including a large canopy wrapping around the northeast corner of Tower B (i.e., Locations 10 and 11), to reduce the influence of downwashing wind flows at the corner. In addition, vertical elements such as wind screens, and/or architectural features should be considered on both sides of Locations 13, and 17 through 19.

At the main entrances to Towers A1 (Location 6) and A2 (Location 2), wind conditions are comfortable for standing throughout the year, which is considered suitable for the intended use (**Figures 7b and 8b**). At the grocery store entrance of Tower A2 (Location 3), wind conditions are comfortable for standing in the summer and walking or better in the winter months. At the secondary entrances and exits, as well as individual unit entrances on the south side of Towers A1 and A2 (Locations 4 and 5), wind conditions are comfortable for standing throughout the year.

Wind conditions at the main entrance to Tower B (Location 12) are comfortable for standing year-round, which is considered suitable for the intended use. At the retail entrances (near Location 12 and at Location 13) wind conditions are comfortable for standing or walking in the summer (**Figure 7b**). During the winter months, wind conditions are comfortable for standing near Location 12, however wind conditions are uncomfortable at the other retail entrance (Location 13 in **Figure 8b**). Wind conditions at the secondary entrances and exits of the South Building (Locations 10 and 16) are comfortable for standing in the summer and walking in the winter months (**Figures 7b and 8b**).



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

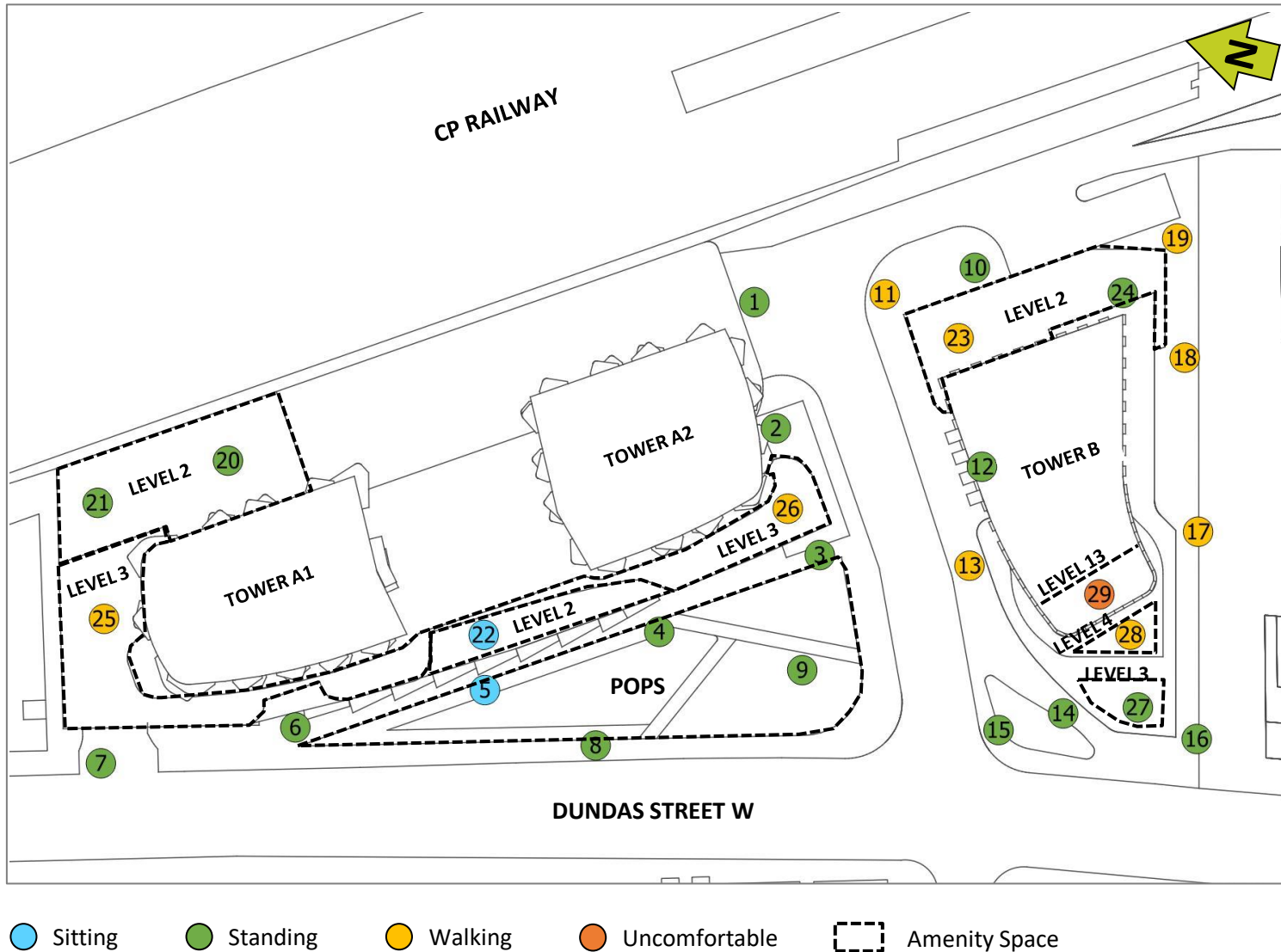
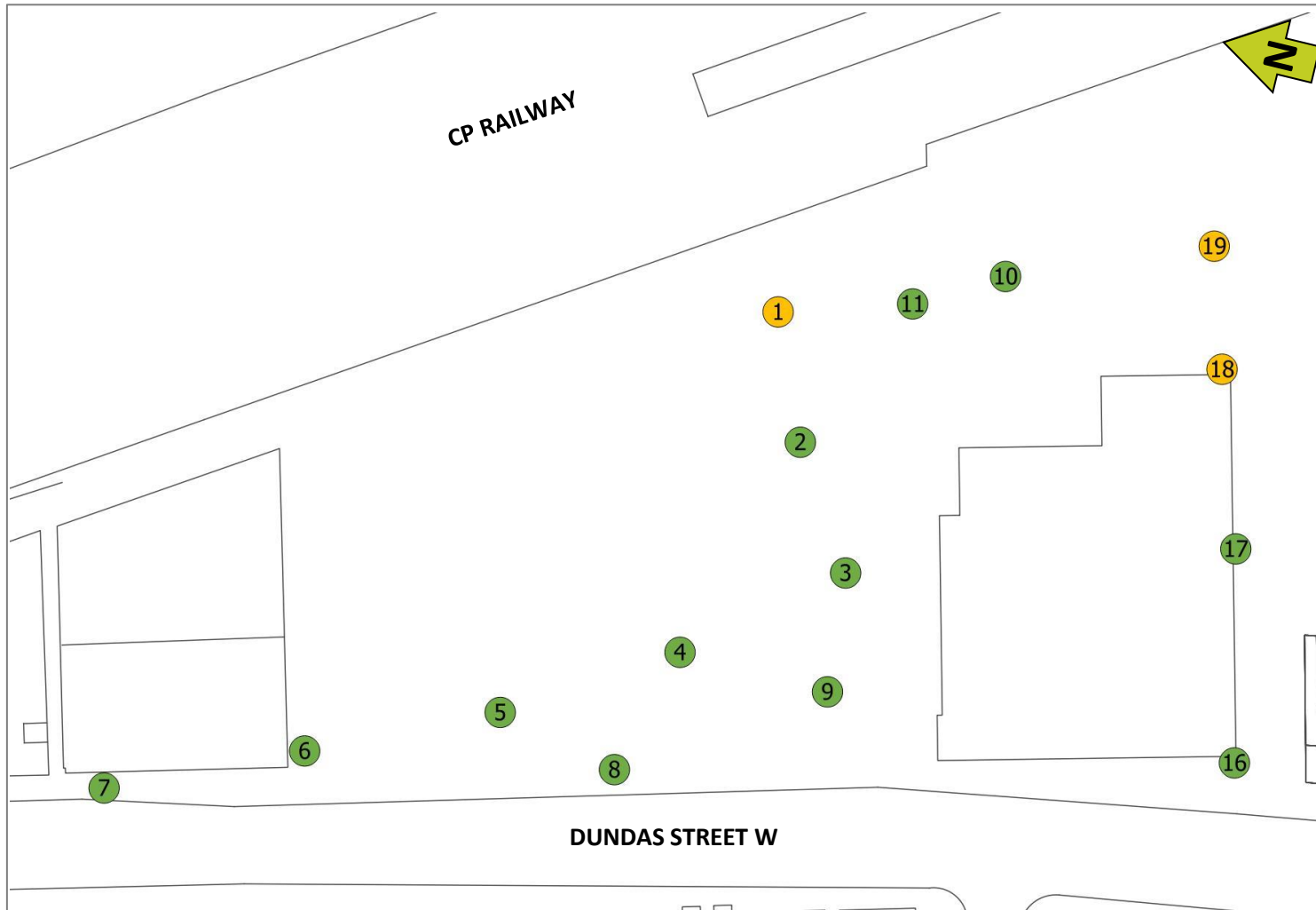
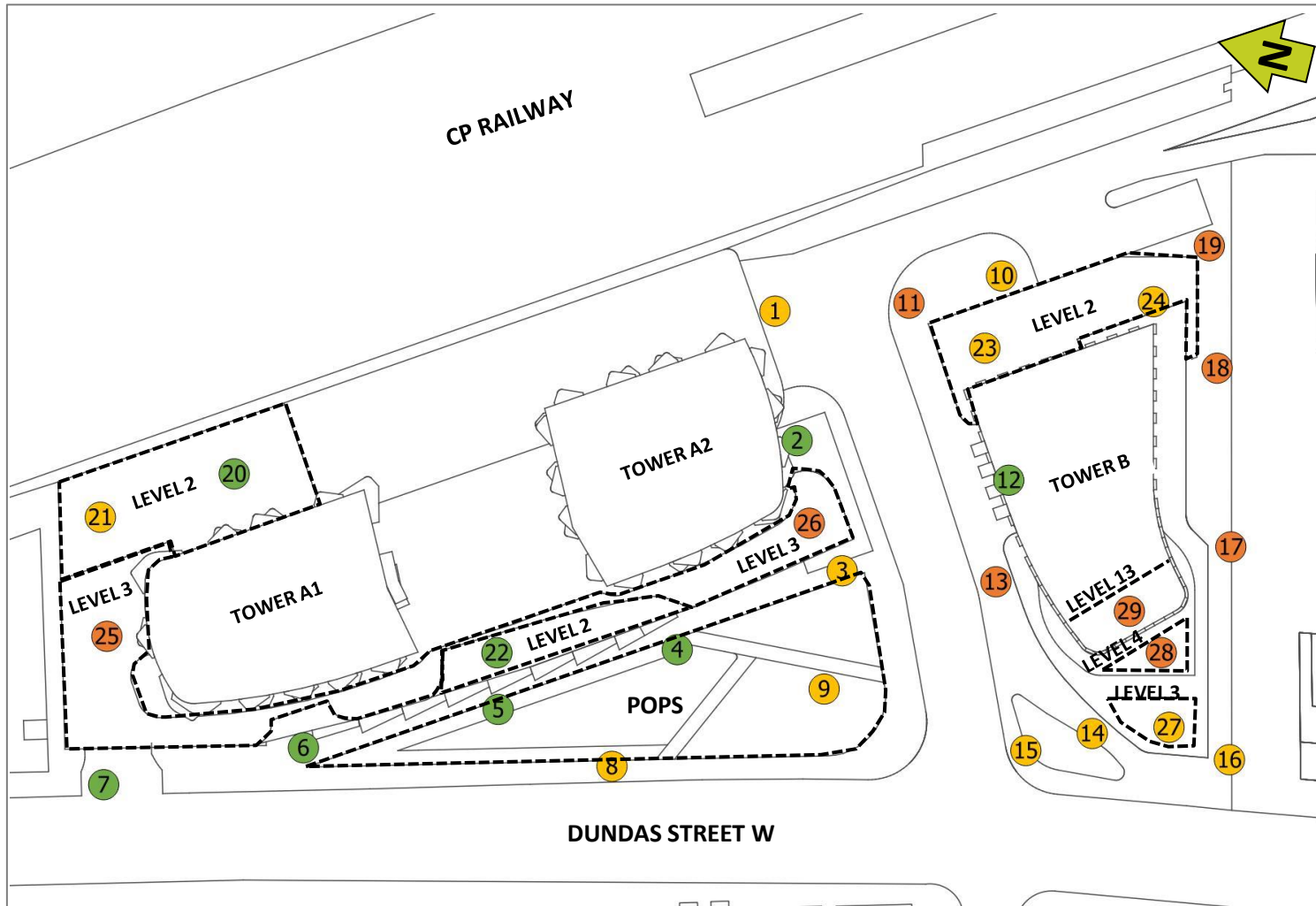


Figure 7b: Proposed Configuration – Pedestrian Wind Comfort – Summer – On-site & Surrounding Sidewalks



- Sitting
- Standing
- Walking
- Uncomfortable

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



● Sitting ● Standing ● Walking ● Uncomfortable □ Amenity Space

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

In the proposed POPS (Locations 4, 5, 8 and 9), wind conditions are comfortable for sitting or standing in the summer (**Figure 7b**). During the winter months, wind conditions are comfortable for walking or better (**Figure 8b**). If calmer wind conditions are desired in the winter, we suggest including vertical screens/ architectural features in staggered arrangement throughout the POPS area.

SLR will work with the design team to refine effective wind control measures.

4.2 Amenity Terraces (Locations 20-29)

On the Level 2 terraces of the North Building (Locations 20 through 22), wind conditions are comfortable for sitting or standing throughout the year. The only exception is near the northeast corner of Tower A1 terrace (Location 21) where wind conditions are comfortable for walking in the winter season (**Figure 8b**). On the Level 3 terraces (Locations 25 and 26), wind conditions are comfortable for walking in the summer (**Figure 7b**). During the winter, these terraces are uncomfortable (**Figure 8b**).

For the South Building, wind conditions on the Level 2 terrace (Locations 23 and 24) are comfortable for walking or better year-round. At the Level 3 terrace (Location 27), wind conditions are comfortable for standing in the summer and for walking in the winter months (**Figures 7b and 8b**). At the Level 4 terrace (Location 28), wind conditions are comfortable for walking in the summer (**Figure 7b**). During the winter months, wind conditions are uncomfortable on this terrace (**Figure 8b**). On the Level 13 terrace (Location 29), wind conditions are uncomfortable throughout the year (**Figures 7b and 8b**).

The strong wind flows on the terraces are due to the overall exposure of the site to the predominant westerly and northwesterly winds. We recommend adding vertical screens (minimum 2.2 m tall) along the terrace edges. In addition, these winds downwash off the tower facades and are redirected to the terraces. We suggest horizontal features, in the form of trellises, pergolas and/or overhead canopies above sitting areas for added protection.

4.3 Surrounding Sidewalks (Locations 30-91)

Existing wind conditions along the sidewalks of Dundas Street West, Chelsea Avenue, Glenlake Avenue, Bloor Street West, and on the west side of the CP railway are generally comfortable for walking or better year-round. Uncomfortable wind conditions exist around the nearby towers to the south (Locations 32, 34 and 40) during the winter months (**Figure 10a**). At the nearby transit stops along Dundas Street West (Locations 38, 41, 48, 56, 57, and 68 through 70) wind conditions are comfortable for walking or better year-round (**Figures 9a and 10a**).

In the Proposed Configuration, wind conditions along the surroundings sidewalks generally remain comfortable for walking or better throughout the year. The exceptions are again to the south of the proposed site around the existing towers, where wind conditions are uncomfortable in some sidewalk areas (Locations 30, 32, and 34 through 36) during the winter months (**Figure 10b**). Wind conditions remain comfortable for walking throughout the year at the nearby transit stops (**Figures 9b and 10b**).

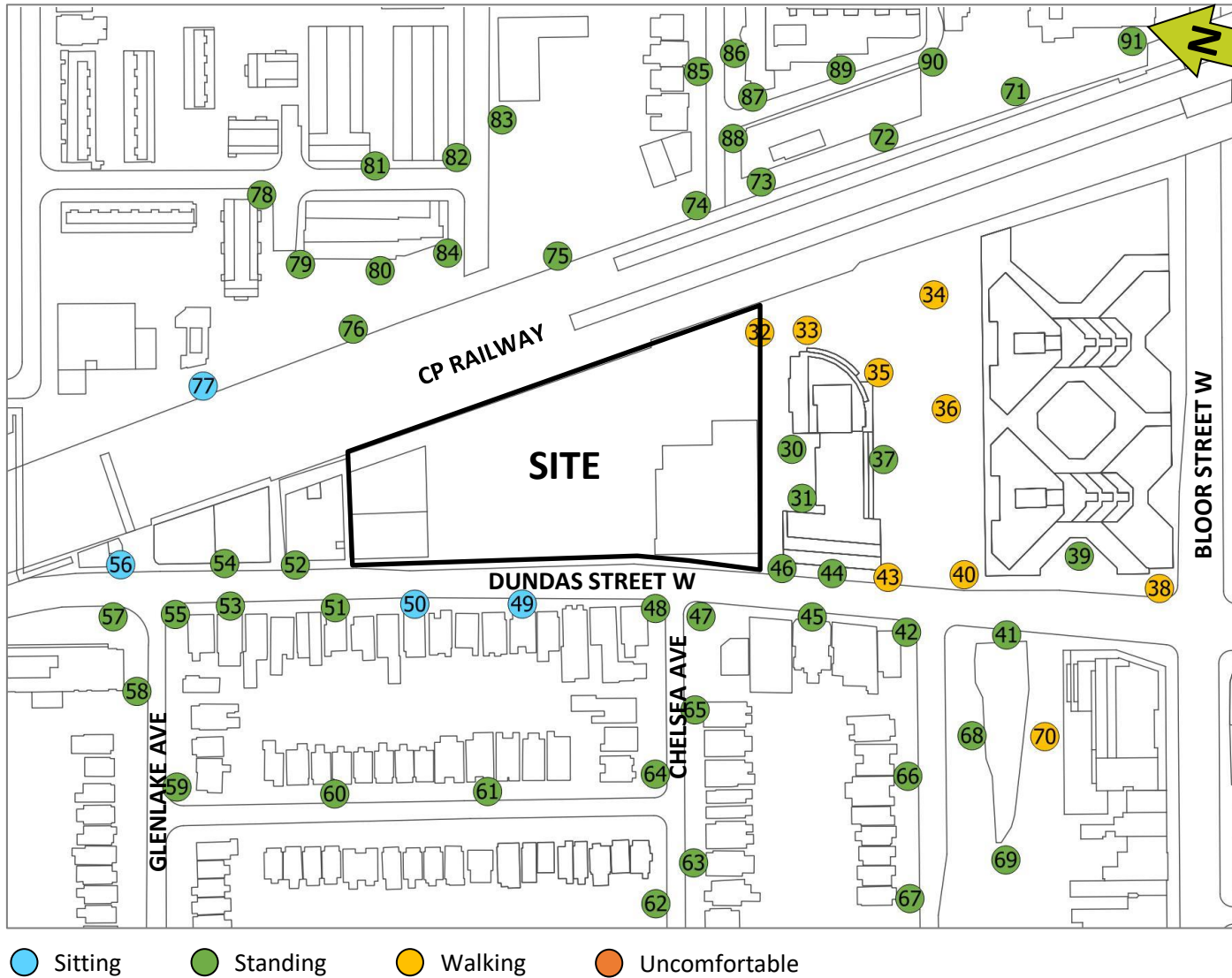


Figure 9a: Existing Configuration – Pedestrian Wind Comfort – Summer – Surrounding Sidewalks

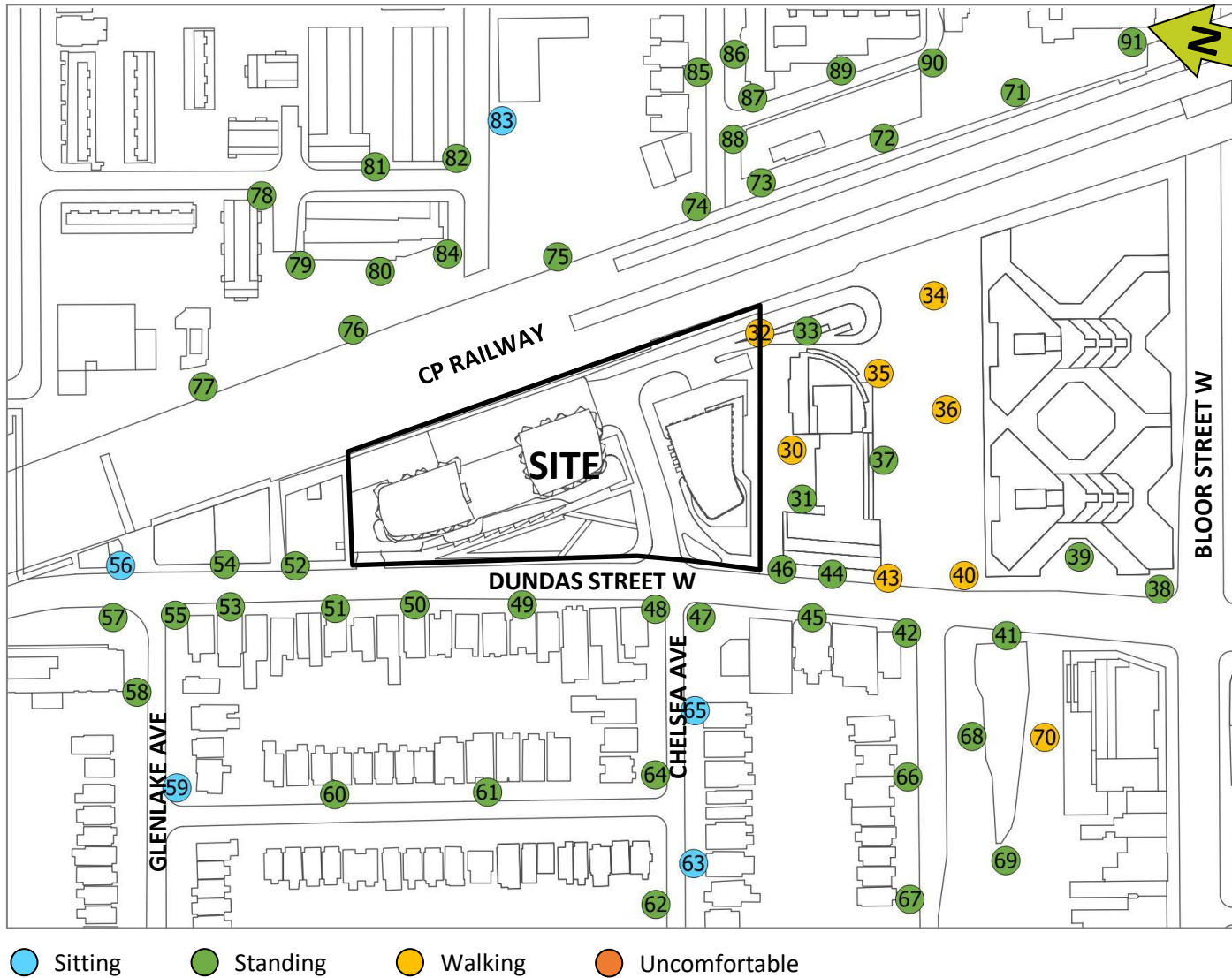


Figure 9b: Proposed Configuration – Pedestrian Wind Comfort – Summer – Surrounding Sidewalks

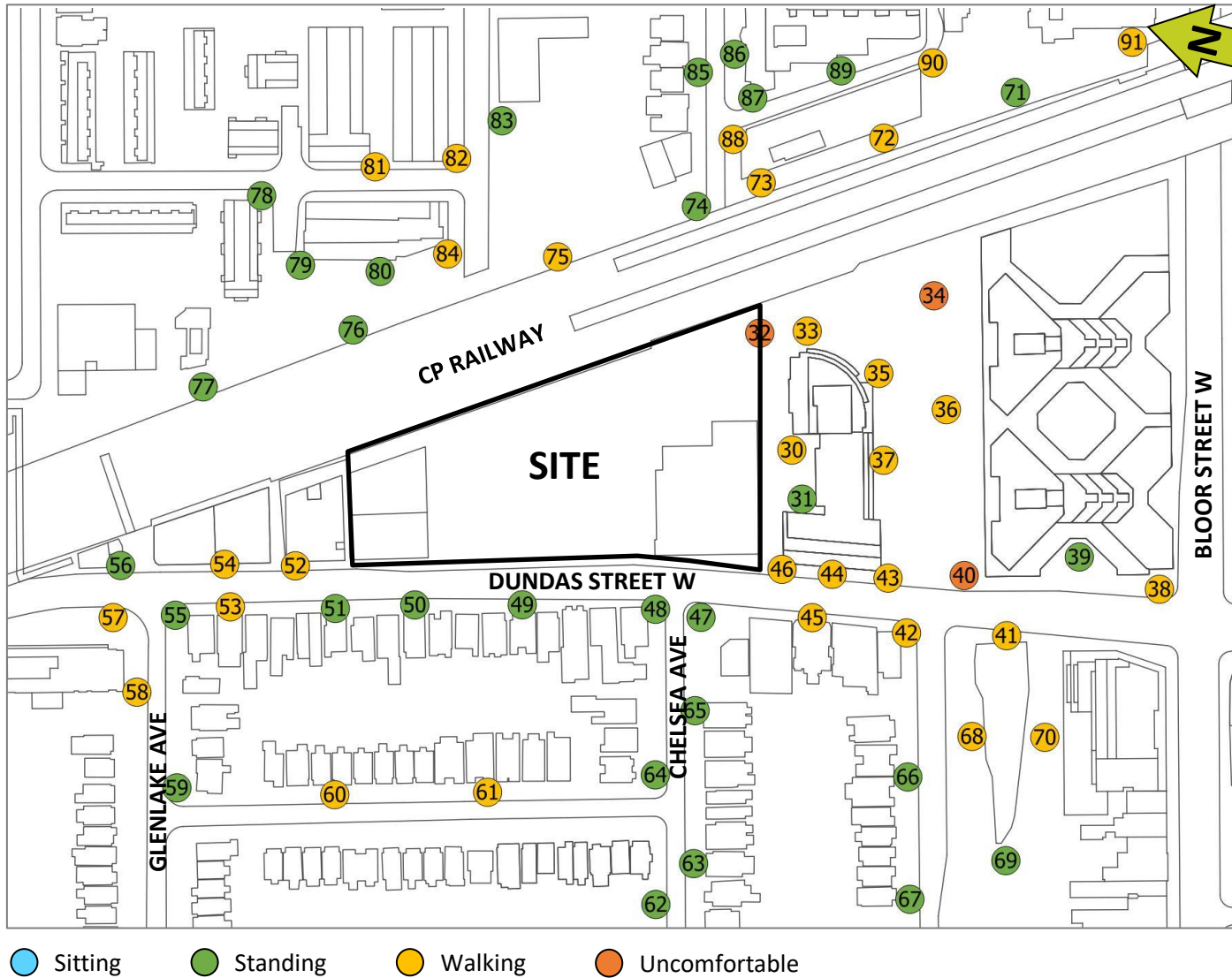


Figure 10a: Existing Configuration – Pedestrian Wind Comfort – Winter – Surrounding Sidewalks

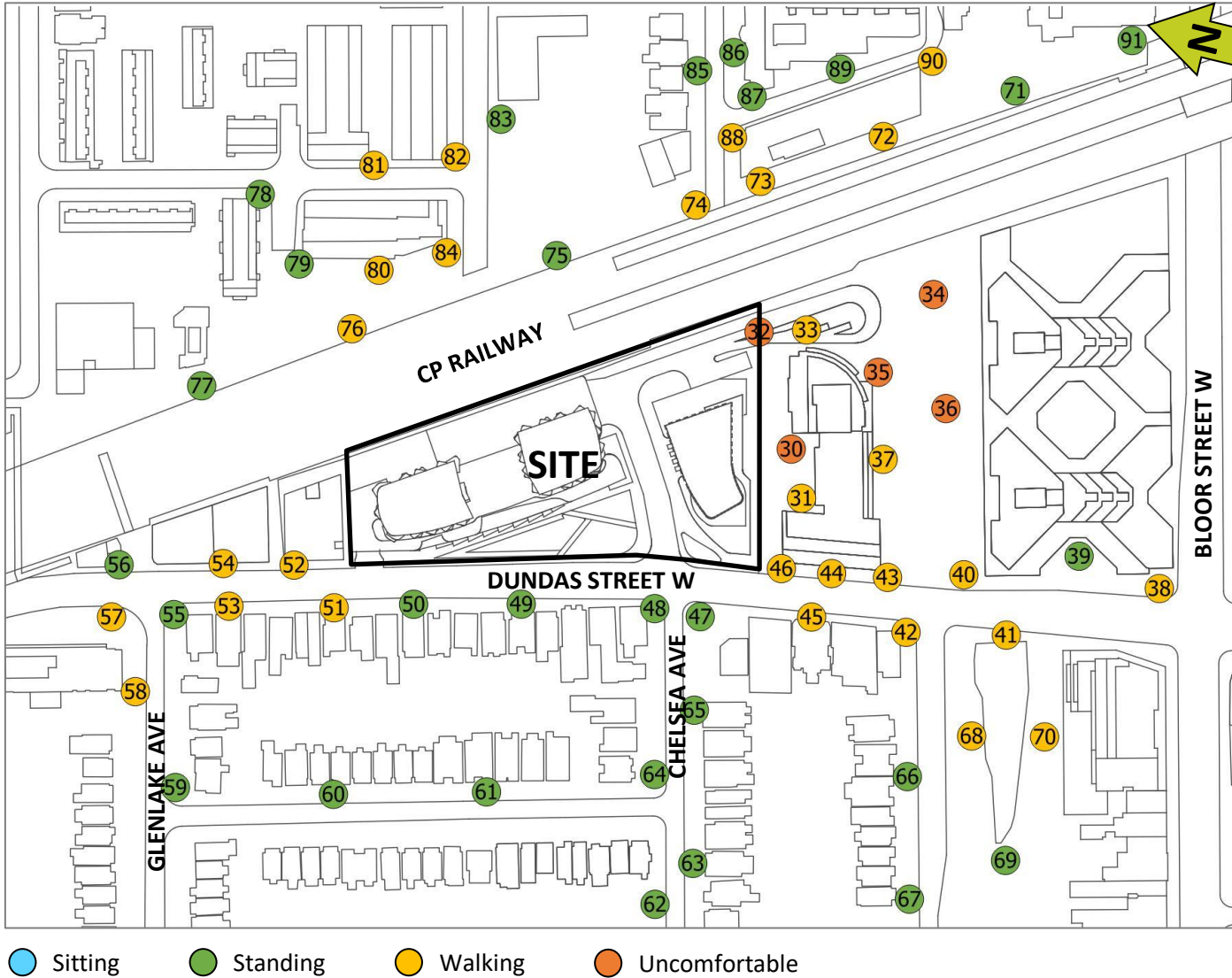


Figure 10b: Proposed Configuration – Pedestrian Wind Comfort – Winter – Surrounding Sidewalks

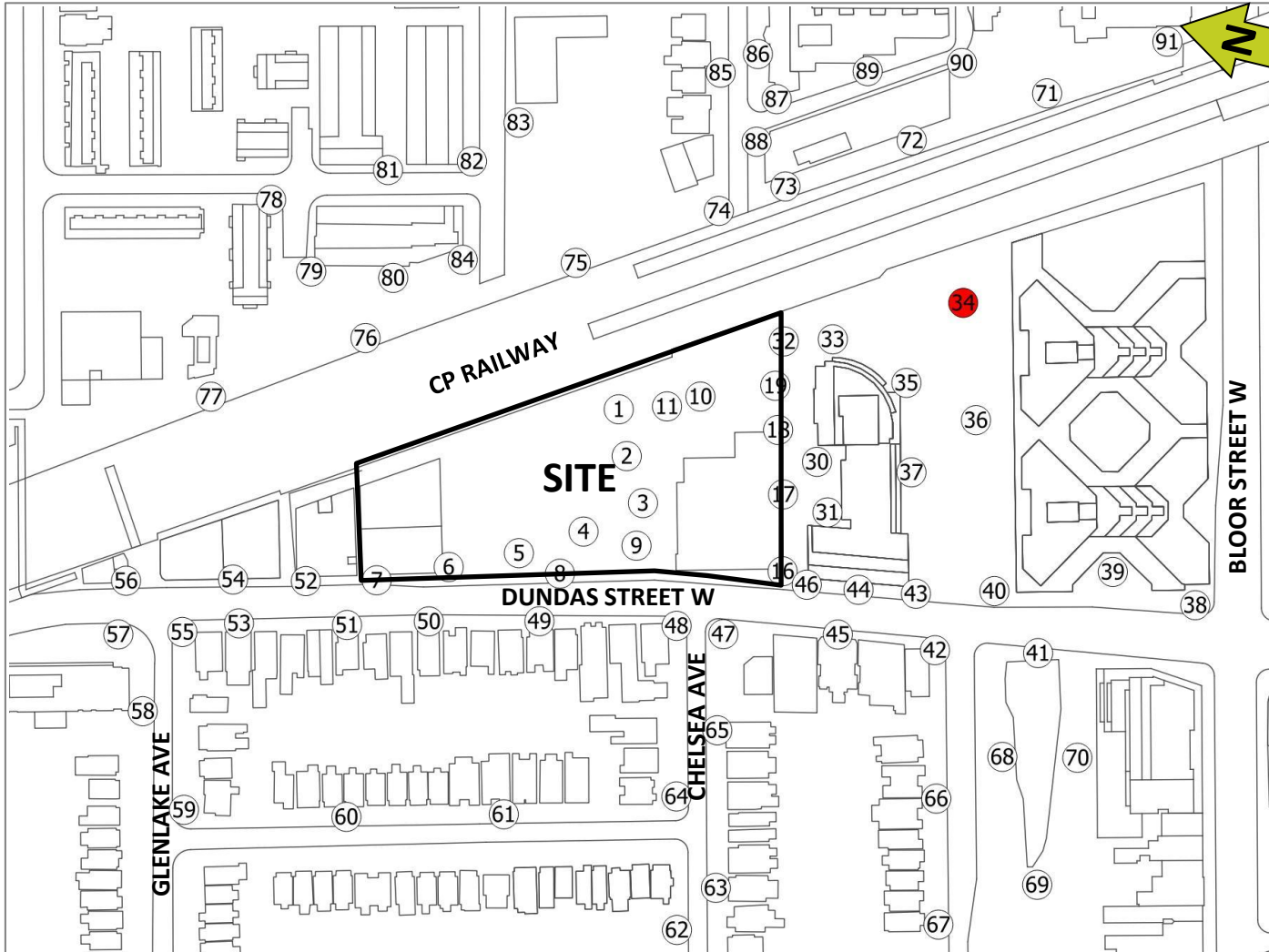
4.4 Wind Safety

In the Existing Configuration, the wind safety criterion is met in almost all areas. The only exception is the off-site sidewalk approximately 70 m to the south of the site, (Location 34), where the safety criterion is exceeded on an annual basis (**Figure 11a**).

In the Proposed Configuration, the wind safety criterion is met at all areas except the following (**Figure 11b**):

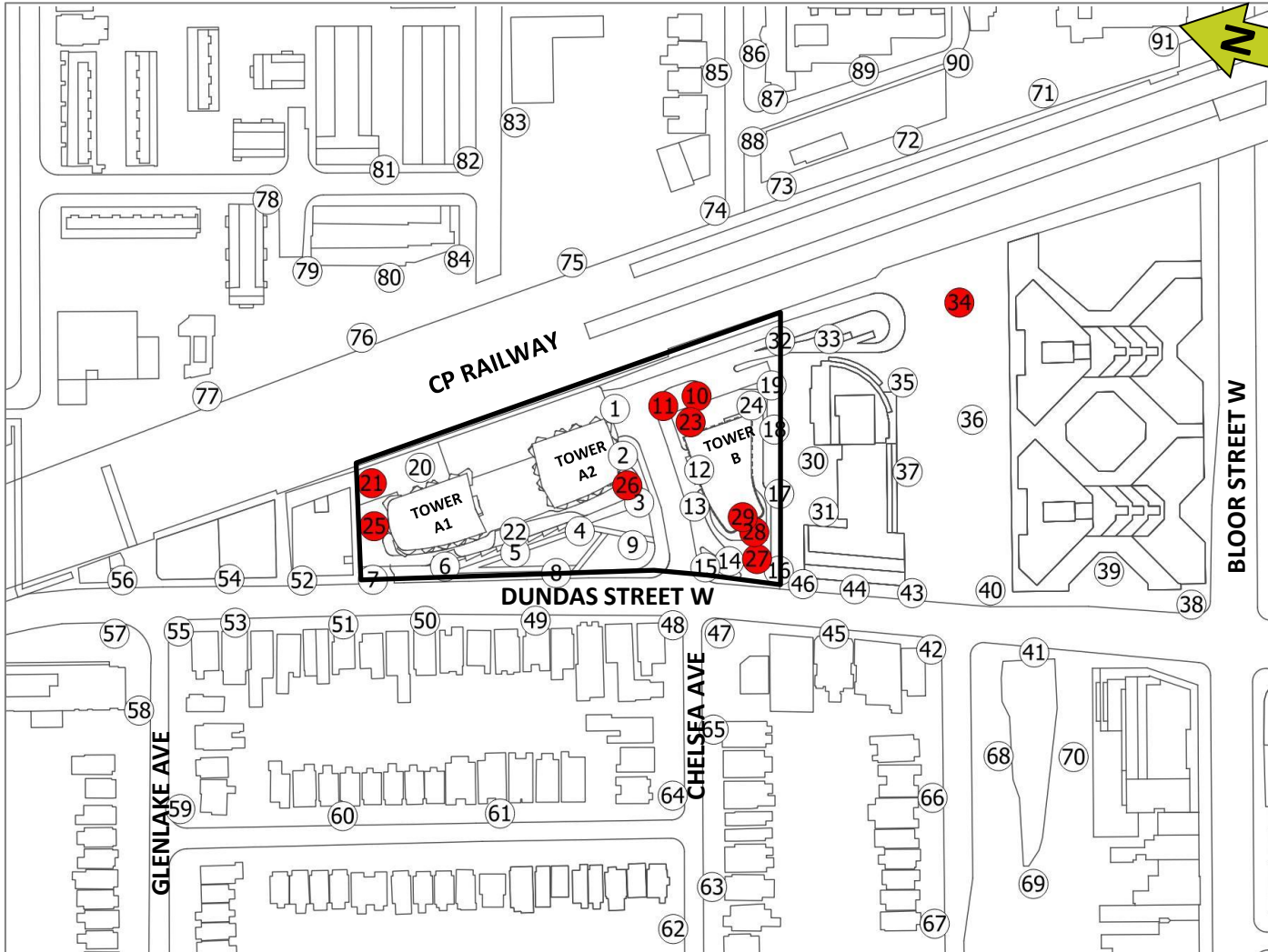
- To the south of the proposed site (Location 34).
- Near the northeast corner of the South Building (Locations 10 and 11).
- On Levels 2 and 3 of the North Building (Locations 21, 25 and 26).
- On all terraces of the South Building (Locations 23 and 27 through 29).

Wind control measures recommended in **Sections 4.2** and **4.3** will be beneficial to eliminate the safety concerns on-site.



○ Acceptable ● Exceeded

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



○ Acceptable ● Exceeded

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

5.0 CONCLUSIONS & RECOMMENDATIONS

The pedestrian wind conditions predicted for the proposed development at 2400-2440 Dundas Street West have been assessed through wind tunnel modeling techniques. Based on the results of our study, the following conclusions have been reached:

- In the Existing Configuration the wind safety criterion was exceeded at one location, approximately 70 m to the south of the site. In the Proposed Configuration, ten locations exceeded the wind safety criterion. These exceedances primarily occurred on the outdoor terraces of the development. Conceptual wind control measures are recommended.
- Wind conditions on the site, including entrances and amenity spaces, are generally expected to be suitable for the intended use year-round. Localized wind control measures are recommended for some building corners, entrances and sidewalks.
- On the sidewalks surrounding the proposed development, wind conditions are suitable for the intended use in both configurations.
- Wind conditions on the proposed terraces are generally windier than desired. Wind control measures are recommended.
- SLR will work with the design team to refine wind control measures.

6.0 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 Fora Developments, 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 of 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 warrant the accuracy of information provided by third party sources.

7.0 REFERENCES

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Wu, H., C.J. Williams, H.A. Baker and W.F. Waechter (2004) "Knowledge-based Desk-top Analysis of Pedestrian Wind Conditions", ASCE Structures Conference 2004.

Appendix A

Pedestrian Wind Comfort Conditions

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

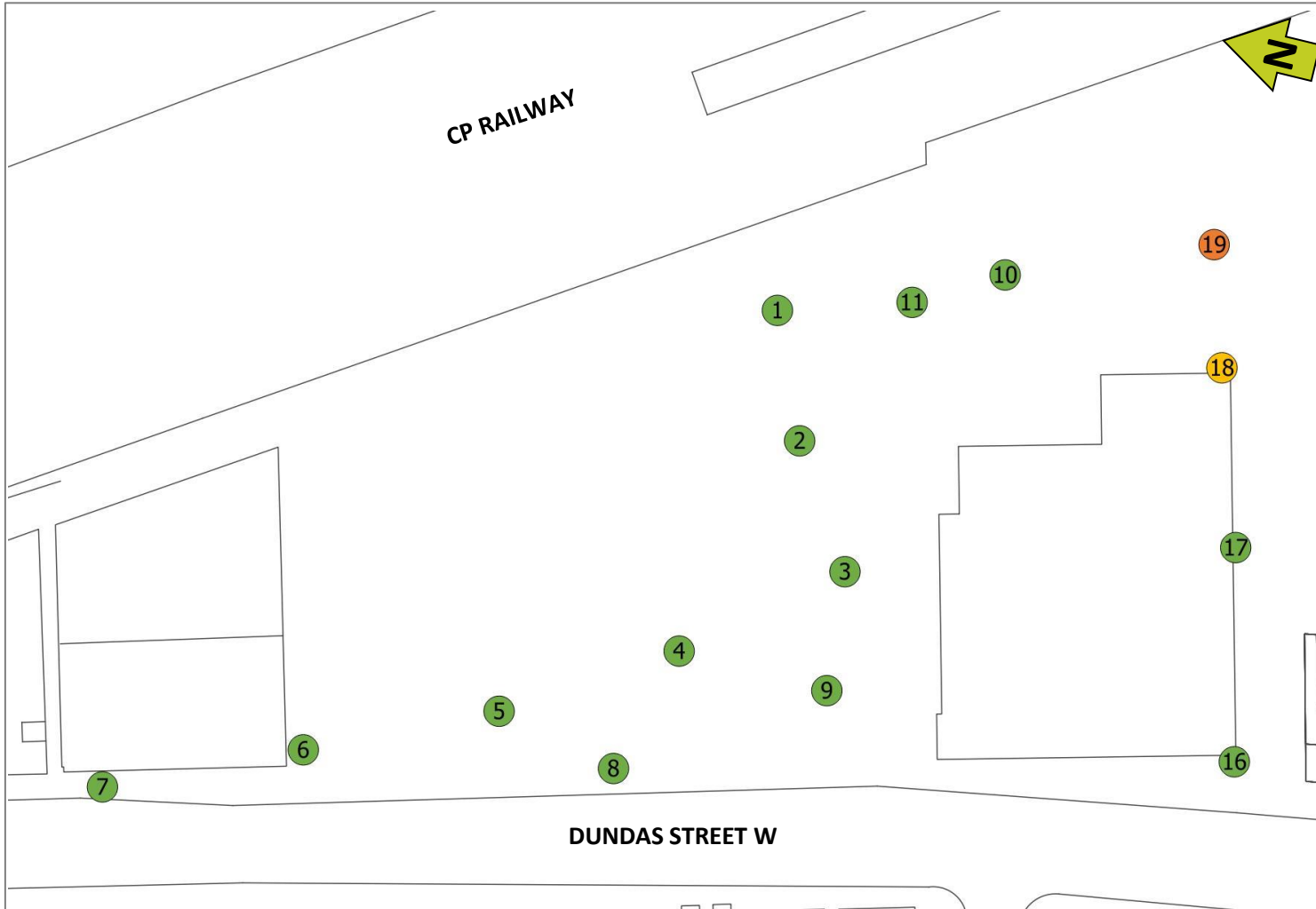


Figure A1a: Existing Configuration – Pedestrian Wind Comfort – Spring – On-site & Surrounding Sidewalks

Figure A1b: Proposed Configuration – Pedestrian Wind Comfort – Spring – Building Entrances & Terraces



Figure A2a: Existing Configuration – Pedestrian Wind Comfort – Autumn – On-site & Surrounding Sidewalks



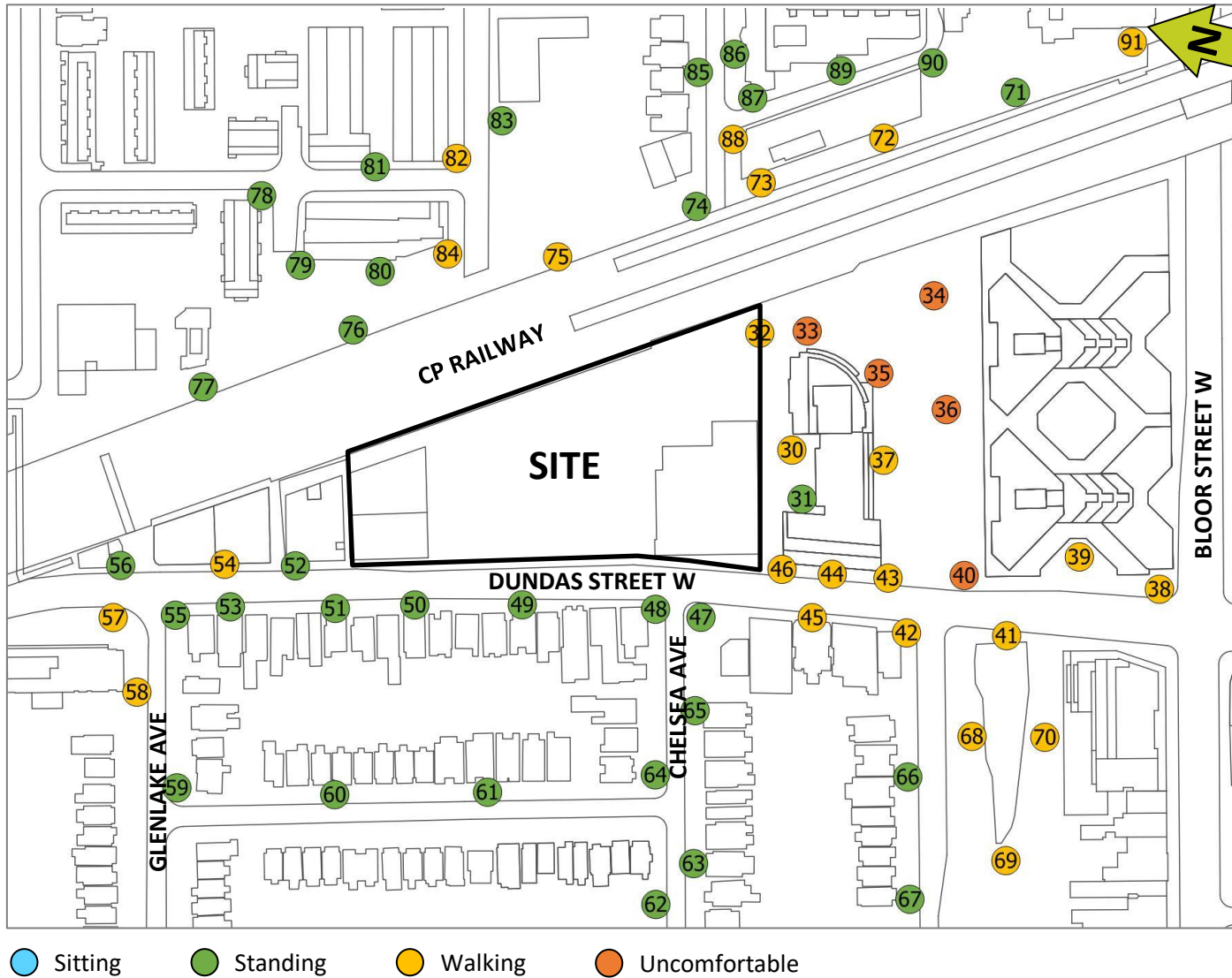


Figure A3a: Exiting Configuration – Pedestrian Wind Comfort – Spring – Surrounding Sidewalks

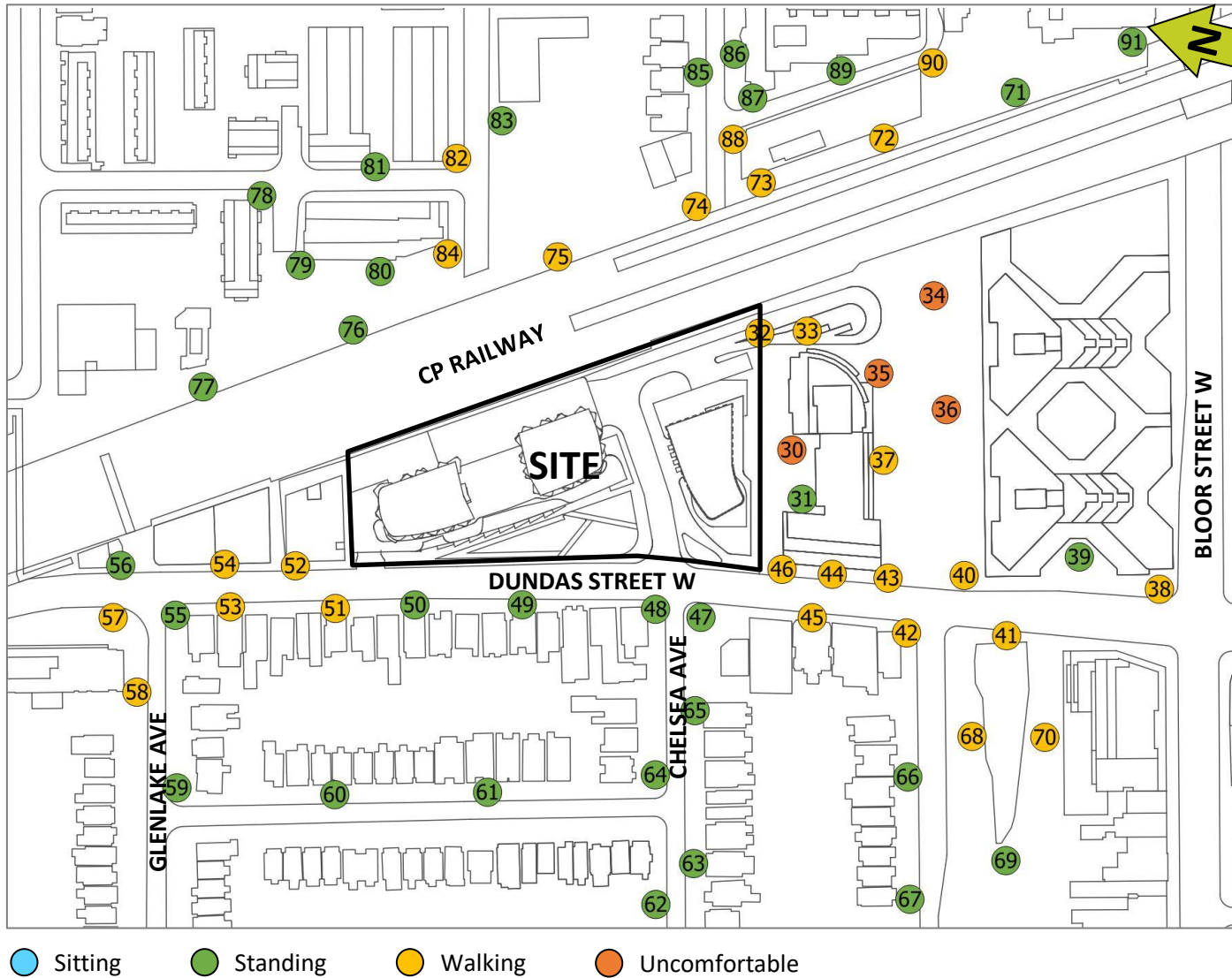


Figure A3b: Proposed Configuration – Pedestrian Wind Comfort – Spring – Surrounding Sidewalks

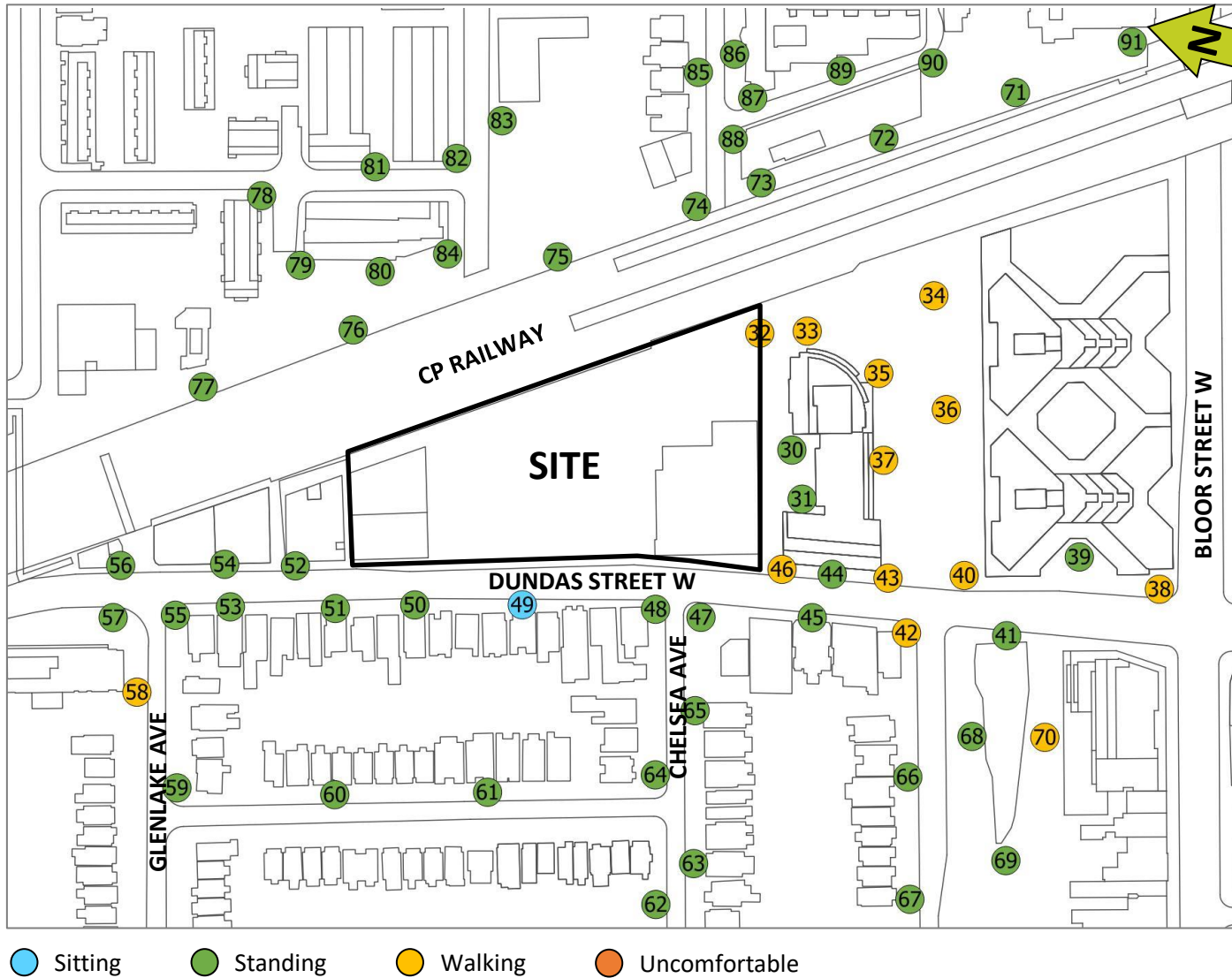


Figure A4a: Exiting Configuration – Pedestrian Wind Comfort – Autumn – Surrounding Sidewalks

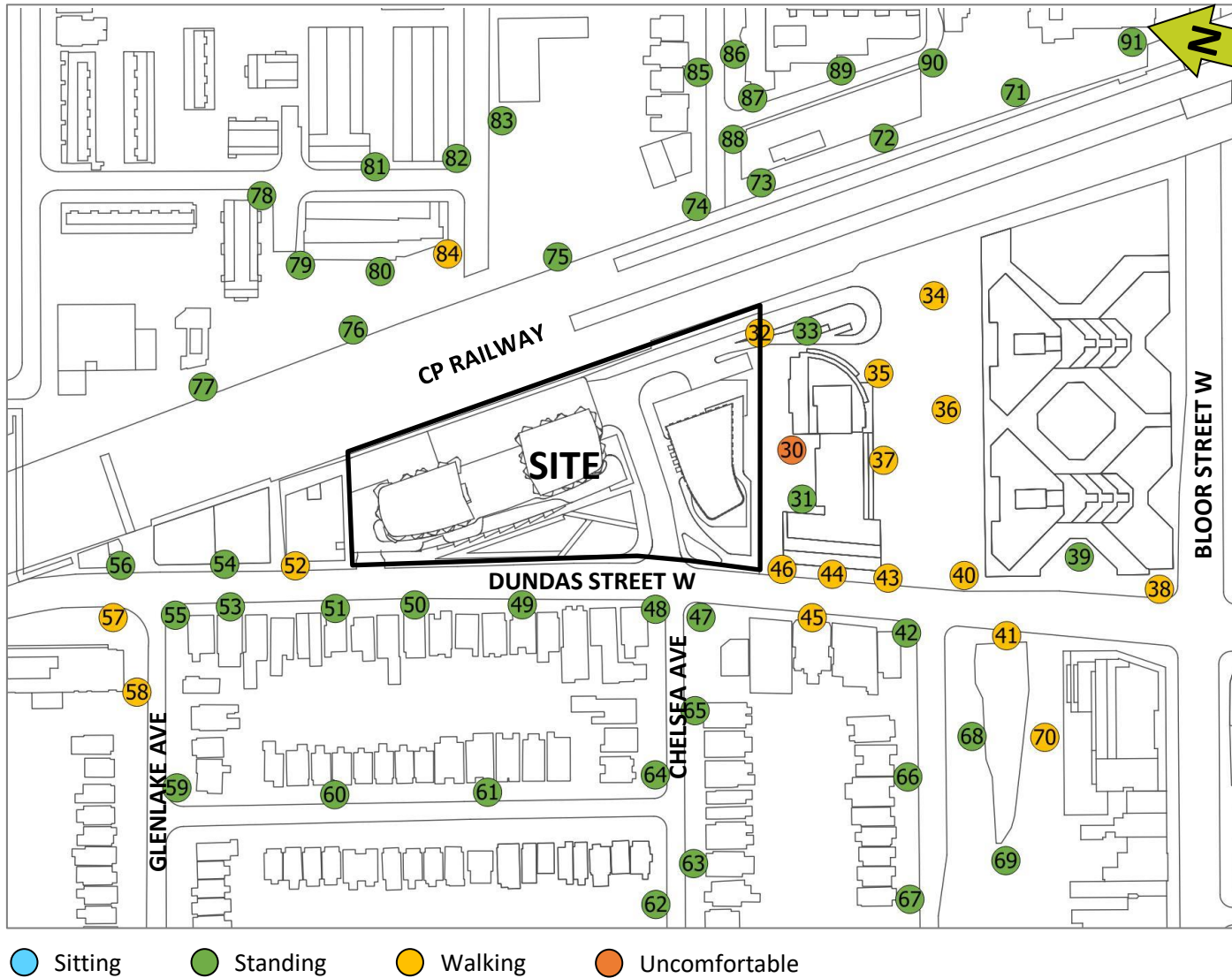


Figure A4b: Proposed Configuration – Pedestrian Wind Comfort – Autumn – Surrounding Sidewalks

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	15.0	14.3	11.9	13.1	58.7
	Proposed	18.5	16.9	14.1	15.8	74.6
2	Existing	14.0	13.9	11.4	12.5	55.2
	Proposed	15.0	14.5	11.8	13.1	57.7
3	Existing	13.8	13.3	11.0	12.2	52.3
	Proposed	18.5	16.1	13.8	15.7	75.4
4	Existing	13.2	12.9	10.6	11.7	49.0
	Proposed	13.0	12.1	10.1	11.2	51.1
5	Existing	12.3	12.2	10.1	11.1	46.1
	Proposed	12.7	11.8	9.8	11.0	51.5
6	Existing	13.5	12.4	10.4	11.6	57.8
	Proposed	13.8	12.7	10.6	11.9	53.4
7	Existing	12.9	12.2	10.0	11.2	54.0
	Proposed	14.8	13.3	11.2	12.8	56.8
8	Existing	11.2	11.4	9.2	10.0	42.6
	Proposed	16.5	15.9	12.9	14.2	65.9
9	Existing	13.4	13.1	10.6	11.8	50.9
	Proposed	17.0	15.6	12.9	14.4	70.2
10	Existing	14.6	14.3	11.8	13.0	56.6
	Proposed	15.5	16.2	12.9	13.8	100.4

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		14.5	14.1	11.6	12.8	57.1
11 Proposed		24.9	21.0	17.8	20.3	100.2
12 Existing						
12 Proposed		13.3	13.6	10.7	11.8	55.1
13 Existing						
13 Proposed		22.4	19.2	16.1	18.9	75.8
14 Existing						
14 Proposed		17.9	17.7	14.2	15.7	80.3
15 Existing						
15 Proposed		18.2	19.0	14.8	16.4	76.2
16 Existing		15.0	14.7	11.8	12.9	56.7
16 Proposed		16.8	17.8	14.1	14.9	78.4
17 Existing		13.5	12.5	10.6	11.7	50.9
17 Proposed		21.4	19.4	16.0	17.7	89.9
18 Existing		18.3	18.4	14.4	15.8	71.7
18 Proposed		23.0	23.0	18.3	20.1	85.1
19 Existing		19.9	20.2	15.7	17.4	77.3
19 Proposed		20.1	18.9	15.5	17.5	77.8
20 Existing						
20 Proposed		12.8	13.8	10.8	11.5	65.2

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		18.7	18.3	14.4	15.7	97.0
22 Existing						
22 Proposed		12.5	11.5	9.4	10.8	48.3
23 Existing						
23 Proposed		17.6	19.8	15.1	16.0	114.2
24 Existing						
24 Proposed		16.2	17.2	13.7	14.5	68.3
25 Existing						
25 Proposed		24.0	21.2	17.5	20.1	99.8
26 Existing						
26 Proposed		26.3	23.5	19.0	22.3	106.7
27 Existing						
27 Proposed		19.2	18.4	15.0	16.5	101.6
28 Existing						
28 Proposed		25.7	23.1	19.3	21.3	123.8
29 Existing						
29 Proposed		29.0	28.6	23.2	24.8	145.3
30 Existing		17.1	17.0	13.3	14.8	68.8
30 Proposed		23.3	23.3	18.4	20.0	90.0

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		12.9	11.4	10.7	11.6	49.3
31 Proposed		16.6	13.0	11.9	13.6	60.0
32 Existing		20.2	19.9	15.9	17.5	78.5
32 Proposed		20.6	19.2	16.1	17.9	81.3
33 Existing		19.2	20.1	15.7	16.6	86.3
33 Proposed		16.7	17.2	13.7	14.7	64.6
34 Existing		21.8	22.3	18.2	18.9	103.6
34 Proposed		22.1	21.3	17.7	18.8	107.3
35 Existing		19.6	20.1	16.0	17.4	75.8
35 Proposed		20.3	20.6	16.4	17.8	77.0
36 Existing		20.0	21.4	16.7	17.5	87.0
36 Proposed		21.6	22.4	17.6	18.9	86.2
37 Existing		16.8	16.5	14.0	15.1	66.3
37 Proposed		17.1	16.8	14.1	15.2	64.6
38 Existing		18.9	19.1	15.4	16.4	85.2
38 Proposed		17.8	17.6	14.1	15.4	82.7
39 Existing		14.6	15.5	12.4	13.0	67.5
39 Proposed		13.7	14.2	11.5	12.2	60.6
40 Existing		20.3	20.6	17.8	18.7	77.1
40 Proposed		19.3	19.6	16.9	17.7	72.7

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		15.2	16.6	13.8	14.5	66.0
41 Proposed		15.9	17.6	14.7	15.3	72.3
42 Existing		16.0	16.5	14.5	15.3	63.1
42 Proposed		15.4	16.2	14.2	14.8	59.9
43 Existing		18.6	17.5	15.4	16.6	75.4
43 Proposed		19.7	18.4	16.0	17.4	84.6
44 Existing		16.1	15.5	13.7	14.7	60.3
44 Proposed		16.6	16.1	14.0	15.0	69.0
45 Existing		16.0	15.9	14.1	14.9	59.3
45 Proposed		17.0	17.1	14.9	15.8	64.0
46 Existing		18.3	16.9	14.4	16.0	69.8
46 Proposed		17.6	17.3	14.6	15.8	75.7
47 Existing		12.7	12.7	10.5	11.4	47.3
47 Proposed		13.4	13.9	11.0	11.9	52.5
48 Existing		14.8	14.5	12.2	13.4	54.9
48 Proposed		13.2	13.6	11.3	12.0	50.3
49 Existing		10.2	10.8	8.7	9.4	42.9
49 Proposed		13.1	14.1	10.8	11.6	53.8
50 Existing		11.4	11.4	9.3	10.2	43.2
50 Proposed		13.6	13.4	10.8	11.9	48.4

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		12.8	13.3	10.4	11.4	53.0
51 Proposed		15.4	15.4	12.1	13.6	66.1
52 Existing		16.3	14.0	12.1	13.9	65.6
52 Proposed		17.7	15.9	13.2	15.2	68.7
53 Existing		15.1	14.5	11.8	13.1	57.0
53 Proposed		15.3	15.0	12.0	13.5	56.4
54 Existing		16.1	15.0	12.5	14.0	63.5
54 Proposed		15.6	15.0	12.2	13.6	59.7
55 Existing		14.6	13.8	11.4	12.5	64.4
55 Proposed		13.1	13.1	10.4	11.5	53.2
56 Existing		11.9	10.9	9.1	10.3	45.8
56 Proposed		12.3	11.5	9.4	10.8	46.4
57 Existing		16.7	16.5	13.4	14.9	65.8
57 Proposed		17.2	16.4	13.5	15.2	63.9
58 Existing		19.2	16.7	14.2	16.3	78.7
58 Proposed		19.3	17.3	14.3	16.5	79.0
59 Existing		12.8	12.9	10.2	11.0	49.4
59 Proposed		11.6	12.9	9.8	10.5	50.8
60 Existing		15.3	14.0	11.9	13.3	62.3
60 Proposed		14.2	13.2	11.3	12.5	56.1

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		15.9	14.6	12.5	14.0	63.4
61 Proposed		14.6	13.4	11.7	12.9	58.4
62 Existing		13.4	13.1	11.2	12.2	49.8
62 Proposed		12.8	12.7	10.9	11.6	47.5
63 Existing		12.6	12.6	10.1	11.2	46.7
63 Proposed		11.3	11.5	9.4	10.1	43.2
64 Existing		13.4	13.1	11.1	12.1	51.6
64 Proposed		11.9	12.2	10.2	11.0	46.7
65 Existing		13.0	13.3	10.4	11.5	49.5
65 Proposed		11.4	11.9	9.6	10.2	45.6
66 Existing		14.3	14.6	12.8	13.4	51.7
66 Proposed		13.6	14.1	12.3	12.8	48.3
67 Existing		13.5	13.3	11.5	12.3	55.5
67 Proposed		13.7	13.6	11.6	12.5	56.6
68 Existing		15.8	15.7	13.0	14.0	60.6
68 Proposed		15.7	16.0	13.3	14.1	60.1
69 Existing		14.8	15.5	13.6	14.0	52.9
69 Proposed		14.1	14.7	12.9	13.4	51.6
70 Existing		19.2	19.3	15.8	17.4	73.2
70 Proposed		18.6	18.9	15.5	17.0	74.0

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		14.8	14.7	12.3	13.3	62.0
71 Proposed		14.1	14.0	11.7	12.7	57.5
72 Existing		16.6	16.2	13.7	14.7	73.9
72 Proposed		15.8	15.1	13.2	14.3	63.8
73 Existing		15.5	16.0	14.2	14.6	66.1
73 Proposed		15.8	16.3	14.4	14.8	65.4
74 Existing		14.0	14.9	13.1	13.4	61.3
74 Proposed		15.1	15.7	14.0	14.2	64.4
75 Existing		15.8	15.1	12.7	13.7	64.9
75 Proposed		14.9	15.1	12.8	13.4	66.1
76 Existing		13.2	12.4	10.4	11.4	58.9
76 Proposed		15.1	14.4	11.7	13.1	60.8
77 Existing		12.3	11.4	9.9	10.6	57.5
77 Proposed		13.3	12.3	10.2	11.4	52.7
78 Existing		14.5	13.7	11.3	12.7	55.0
78 Proposed		13.0	12.3	10.3	11.2	53.3
79 Existing		14.7	13.4	11.3	12.6	56.7
79 Proposed		14.4	12.8	10.8	11.9	62.5
80 Existing		14.3	13.4	11.2	12.3	65.9
80 Proposed		16.5	14.6	12.3	13.8	68.5

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		17.1	14.6	12.4	14.2	74.7
81 Proposed		15.8	13.8	11.6	12.9	77.5
82 Existing		15.6	15.5	13.2	13.8	79.0
82 Proposed		15.2	15.4	13.0	13.5	76.7
83 Existing		13.0	12.3	10.3	11.4	49.1
83 Proposed		11.7	11.3	9.6	10.4	47.7
84 Existing		17.5	16.1	13.7	14.9	71.5
84 Proposed		17.7	16.6	14.0	15.2	80.5
85 Existing		14.8	14.7	12.3	13.0	60.5
85 Proposed		14.0	14.1	11.8	12.8	55.1
86 Existing		14.8	14.7	11.9	12.7	67.5
86 Proposed		13.7	13.9	11.3	12.0	64.5
87 Existing		13.9	14.3	11.3	12.0	57.2
87 Proposed		13.5	14.1	11.2	11.8	58.0
88 Existing		15.7	15.4	12.5	13.3	68.3
88 Proposed		15.2	15.2	12.4	13.2	70.5
89 Existing		12.9	13.2	10.7	11.6	52.9
89 Proposed		12.0	12.2	10.0	10.9	46.9
90 Existing		15.1	14.9	13.0	13.8	59.0
90 Proposed		15.9	15.1	13.3	14.3	67.2

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	15.8	13.7	14.2	81.4
91 Proposed		14.4	14.7	12.8	13.2	75.2