925 MAIN ST. WEST

HAMILTON, ONTARIO

PEDESTRIAN WIND TUNNEL STUDY REPORT

GNOBI #420024

NOVEMBER 20, 2024

PREPARED BY

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PEDESTRIAN WIND COMFORT

PEDESTRIAN WIND SAFETY

No wind safety conditions identified in both schemes (existing and proposed)

1. INTRODUCTION

This report presents the findings of the pedestrian wind tunnel assessment conducted by Gnobi Consulting Inc. for the proposed residential development at 925 Main Street West and 150 Longwood Road South in Hamilton, ON. The report outlines the study objectives, methodology, results, and recommendations for wind mitigation measures where necessary.

1.1. Project Overview

The proposed development is a mixed-use project comprising two 18-storey towers, connected by a six-storey podium featuring outdoor amenities. The site is located at 925 Main Street West and 150 Longwood Road South in Hamilton, Ontario. The site is situated on an irregularly shaped parcel of land with a total gross floor area of approximately 33,454 m2. The surrounding area is mainly characterized by a mix of low-rise commercial and residential buildings, with two mid-rise condo buildings (12 storey tall) immediately to the southwest.

Focal points of pedestrian activity that require careful attention include building entryways such as the main commercial and residential entrances, outdoor amenities at grade and adjacent sidewalks.

The north façade of the project, along Main Street features primary entrances for both residential and commercial spaces. Additionally, there is a commercial entrance situated on the west and east façades. The design of the site includes outdoor commercial amenity areas at grade level in the northwest corner and along the east façade. Above grade level outdoor amenity areas are also proposed on the six (6) storey podium and roof levels of Towers A & B.

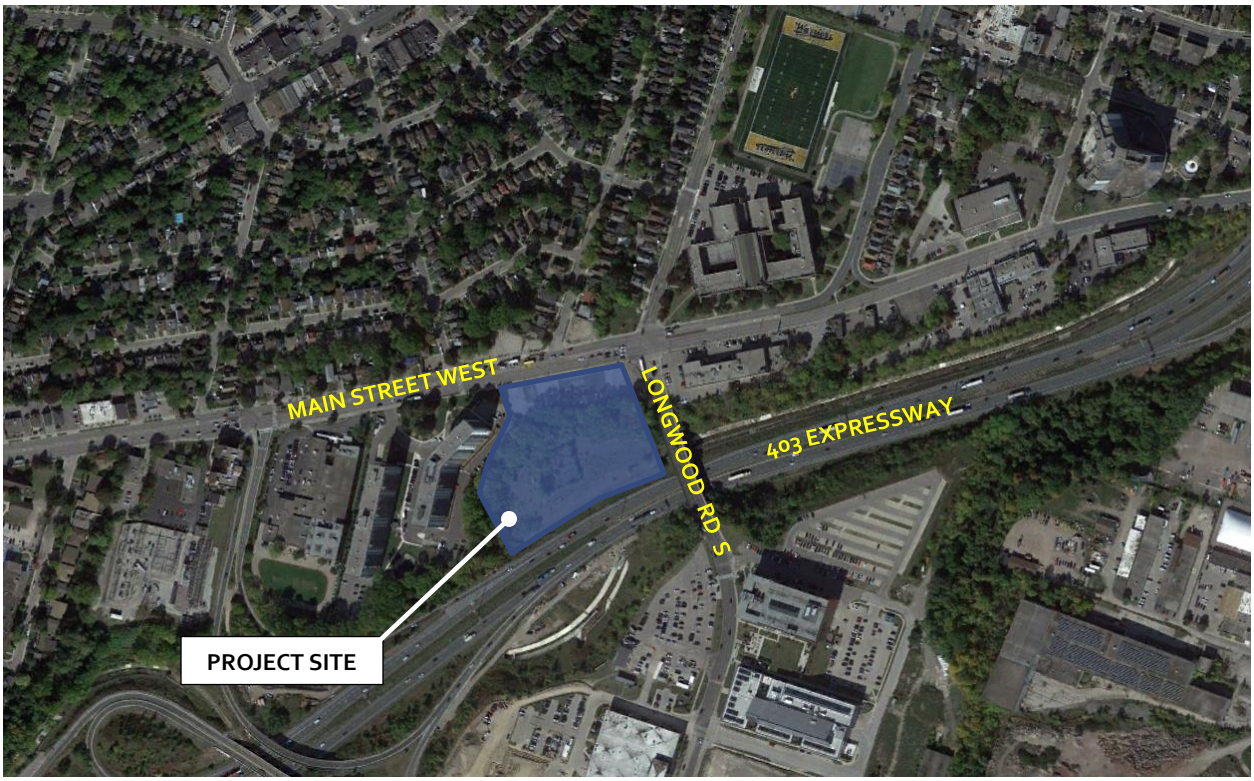

Image 1: Aerial View of the Proposed Site, Source: Google Earth ™.

Image 2: 3D Rendering of the Proposed Project, Courtesy: KNYMH Inc.

1.2. Objectives

The primary objective of this study is to assess the wind conditions and their impact on pedestrians at various locations within and around the project site. The analysis focuses on identifying areas of concern and providing mitigation strategies to ensure optimal pedestrian comfort and safety.

1.3. Scope of the Study

The study considers both the existing conditions and the proposed design, taking into account potential future development scenarios in the surrounding area. The site configurations assessed included the following four scenarios:

(1) **Existing Scheme:** Existing site plus existing surrounding buildings (**Image 3A**).

(2) **Proposed Scheme:** the proposed development plus existing surroundings (**Image 3B**).

Image 3A: Wind Tunnel Model of the Site and Existing Surrounding Buildings

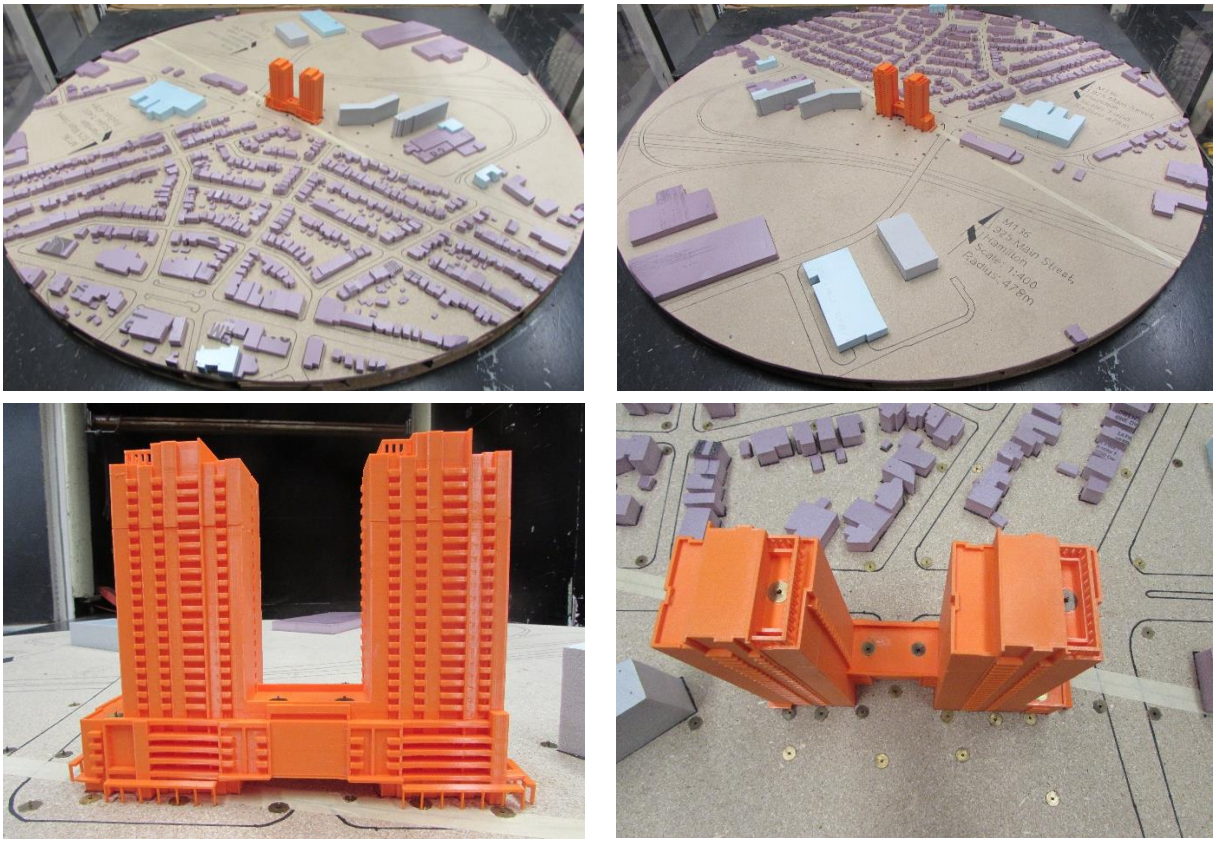

Image 3B: Wind Tunnel Model of the Proposed + Existing Surrounding Buildings

2. METHODOLOGY

2.1. Physical Modelling / Wind Tunnel Testing

The study methodology involved wind tunnel testing of a 1:400 scale model representing the existing and proposed scheme within a 480-meter radius study area. A total of 74 specially designed omnidirectional wind speed probes

were placed at a height of approximately 1.5 meters above the local grade in pedestrian areas of interest on and around the project site.

The wind tunnel tests simulated mean wind speed and gust profiles within the atmospheric boundary layer beyond the modeled area. Wind speed ratios (measured at sensor probes relative to gradient height speeds) were combined with long-term data from a reference meteorological station to predict the magnitude and frequency of wind speeds at various locations across the study area. The tests covered 36 wind directions, assessed in 10-degree increments.

2.2. Meteorological Data Analysis

The local wind climate at the proposed site was evaluated using hourly wind data collected at John C. Munro Hamilton International Airport, situated at a height of 10 meters above ground level, as a point of reference. The wind roses in **Image 4** below present the cumulative probability distribution of wind speeds for the spring (March to May), summer (June to August), fall (September to November), and winter (December to February) months. Analysis of the data reveals that spring and winter months are characterized by a higher frequency of strong winds than the summer and fall months and the strong winds occur primarily from the northeast and west northwest through southwest quadrants.

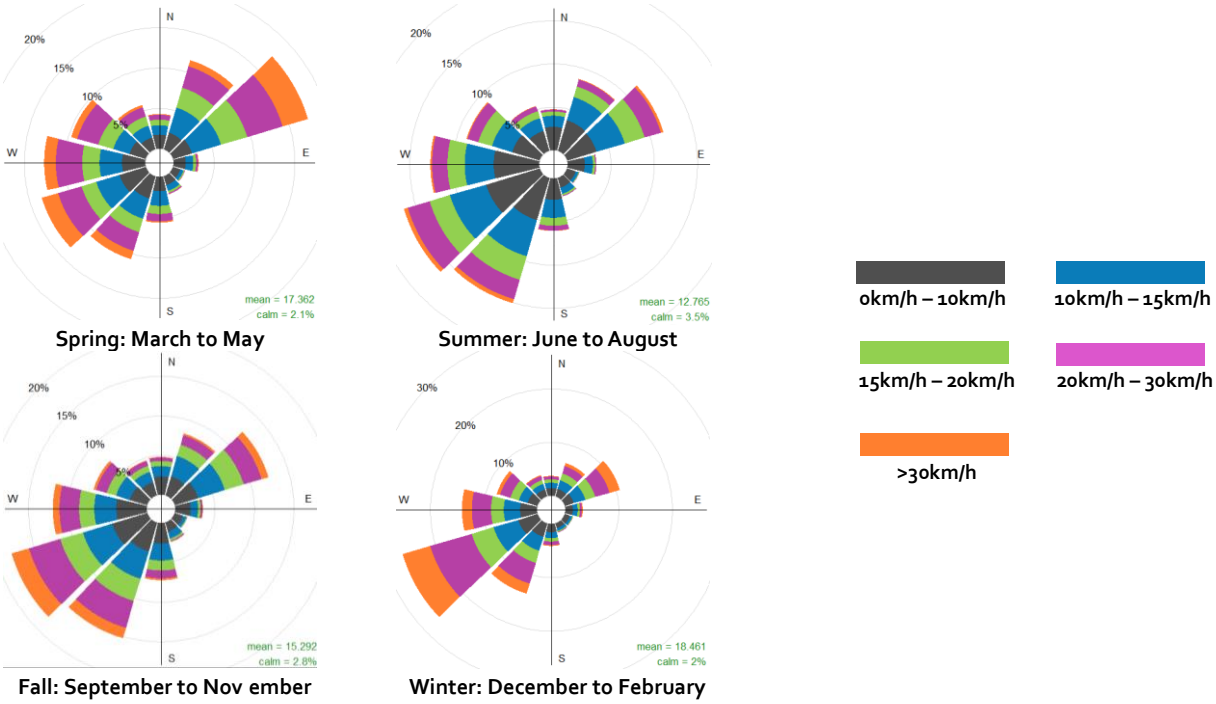

Image 4: Wind Data from John C. Munro Hamilton International Airport (1992 – 2022)

2.3. Wind Criteria

The pedestrian wind criteria used in the current study are specified in the pedestrian level wind Terms of Reference of most cities in southern Ontario and are commonly used in the city of Hamilton, ON. The wind criteria are an essential component of building design in urban areas. They are established guidelines that determine the maximum allowable wind speed and frequency of occurrence that pedestrians can safely and comfortably tolerate

for various passive or active activities such as sitting, standing, strolling, or walking. The criteria are generally based on a combination of scientific data, engineering principles, and human experience. They take into consideration factors such as the intended use of the pedestrian spaces on and around the project.

TABLE 1: WIND CRITERIA FOR PEDESTRIAN COMFORT AND SAFETY

COMFORT CATEGORY	GEM* SPEED (km/h)	DESCRIPTION	AREA OF APPLICATION
Sitting	≤ 10	Light breezes desired for outdoor seating areas where one can read a paper without having it blown away.	Park benches, restaurant seating, balconies, amenity terraces, etc. intended for relaxed, and usually seated activities.
Standing	≤ 15	Gentle breezes suitable for passive pedestrian activities where a breeze may be tolerated	Main entrances, bus-stops, and other outdoor areas where seated activities can be avoided.
Walking	≤ 20	Relatively high speeds that can be tolerated during intentional walking, running and other active movements.	Sidewalks, parking lots, alleyways, and areas where pedestrian activity is infrequent.
Uncomfortable	> 20	Strong winds, considered a nuisance for most activities.	May be accepted in areas not intended for pedestrian access
Notes	1) The required seasonal compliance is 80% of the time for the Sitting, Standing and Walking categories. The Uncomfortable categorization is applicable if the criteria for Walking are not met. 2) Gust Equivalent[2] Mean (GEM) speed = maximum of either mean speed or gust speed/1.85. The gust speed can be measured directly from wind tunnel or estimated as *mean speed + (3 x RMS speed)*. 3) Comfort calculations are to be based on wind events recorded between 6:00 and 23:00 daily. 4) Threshold wind speeds are lower in the winter to account for wind-chill, to consider outdoor comfort in alignment with the Winter City Design Guidelines.		
SAFETY CRITERION / WIND HAZARD	**GUST SPEED (km/h)**	**DESCRIPTION**	**AREA OF APPLICATION**
Exceeded Y/N? **Yes --** **No --**	> 90	Excessive gust speeds can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required.	All areas assessed
Notes	5) Wind safety assessment is to be based on wind events recorded for 24 hours a day.		

The wind criteria referenced include two primary categories:

2.3.1. Pedestrian Wind Safety / Hazard

Pedestrian safety is correlated with gust wind speeds that exceed the threshold (90 km/h) capable of negatively impacting a pedestrian's stability and balance. When wind speeds capable of destabilizing an individual, at around

90 km/h, occur more than 0.1% of the time or for a duration of 9 hours per year, the wind conditions can be classified as hazardous.

2.3.2. Pedestrian Wind Comfort

Sitting (≤ 10 km/h): Tranquil breezes desired for passive pedestrian activities such as outdoor dining or seating areas.

Standing (≤ 15 km/h): Suitable for areas where pedestrians are apt to linger such as main building entrances, drop-off areas, parks and bus stops.

Walking (≤ 20 km/h): Relatively high speeds but are considered suitable for active pedestrian activities such as walking, running or cycling.

Uncomfortable (>20km/h): wind speeds exceeding 20km/h more than 20% of the time.

To determine suitable wind conditions for pedestrian activities such as sitting, standing, or walking, it is recommended that the associated mean wind speeds be expected for at least 80% of the time (approximately five and half out of seven days). In areas where winds surpass the 20km/h limit for over 20% of the time or surpass the wind safety threshold, wind control measures are typically required to ensure the safety and comfort of individuals.

3. RESULTS AND DISCUSSION

The report's Appendix section includes Table 1, which provides data on wind speeds measured at various locations under different site configurations: existing and proposed scenarios. The analysis takes into account hazard and comfort criteria, considering both annual (for wind hazard) and seasonal periods (for wind comfort), as well as specific time frames throughout the day. Visual representations of the assessed conditions are presented in Figures A1.1 through A5.3 in the Appendix.

3.1. Existing Wind Conditions

The proposed site is mainly surrounded by a mix of low-rise commercial and residential buildings, with two mid-rise condo buildings (12 storey tall) immediately to the southwest. The existing wind conditions are generally comfortable for sitting or standing during the summer and standing or walking during the winter, owing to the low-rise nature of the surrounding buildings. In addition, the pedestrian wind hazard safety is predicted to be satisfied in all areas on and around the existing site, indicating that wind conditions are unlikely to pose a hazard to pedestrians.

3.2. Proposed Scheme

3.2.1. Wind Flow around the Proposed Project

Generally, wind flows smoothly over buildings of uniform height. However, taller buildings can disrupt this flow by intercepting and redirecting the wind, leading to effects such as downwashing and corner acceleration. When wind moves around the corners of tall buildings, it can cause localized increases in wind activity known as corner acceleration. Additionally, when two tall buildings are close together, the gap between them can act as a channel,

accelerating the wind that passes through. Factors influencing this phenomenon include the height of the proposed buildings, the size of the gap and the alignment of the buildings with one or more prevailing wind directions at the project site. Narrower gaps tend to create stronger wind tunnel effects, while larger distances reduce the potential for channeling. These wind flow mechanisms are often the main factors contributing to uncomfortable and potentially hazardous wind conditions around buildings. The current pedestrian wind tunnel assessment for the proposed project considers typical urban wind patterns, including wind tunneling/channeling, downwashing, and corner acceleration.

At 18 storeys, the proposed towers are taller than their surroundings and will therefore redirect stronger winds at high elevations down to pedestrian areas at grade. The side-by-side nature of the project is also likely to cause channeling wind flows through the towers as described above.

3.2.2. Proposed Design

The proposed project incorporates several positive design features that are beneficial for achieving favorable wind conditions and should be retained in the final design. These features include:

1. **Strategic Entrance Placement**: Locating the main entrances away from exposed building corners, which are typically more susceptible to accelerated wind speeds.

2. **Residential Entrance Vestibule**: The proposed vestibule at the main residential entrances will provide a sheltered area for pedestrians on particularly windy days.

3. **Canopy and Balcony Extensions**: The second-floor canopy and balcony extending around the northwest corner, along with canopies at the southwest and northeast corners, will help mitigate the impact of accelerating northeasterly and southwesterly winds downwashing from Tower B and northeast winds downwashing from Tower A.

4. **Freestanding Canopy Structures**: Proposed freestanding canopy structures along Main Street and in the commercial outdoor amenity areas on the west and east sides of the site will enhance pedestrian comfort.

5. **Podium Setbacks**: The proposed 5-storey podium setbacks on the north and east facades are effective in reducing wind impacts at the ground level.

6. **Wind Screen/Parapets**: The wind screen proposed for the rooftop amenity level will enhance usability by mitigating wind exposure

These features collectively contribute to a wind environment suitable for the intended uses of the site.

3.2.3. Proposed Wind Conditions

The addition of the proposed project to the site is expected to result in wind conditions at all assessed grade and above-grade areas that are comfortable for their intended uses year-round. Conditions are anticipated to range from being suitable for sitting or standing in the summer and fall to standing or walking during the winter and spring. While winter and spring are expected to bring stronger winds due to prevailing seasonal patterns, these conditions are still predicted to remain appropriate for their intended uses (standing or walking).

Wind speeds at the main residential and commercial entrances are predicted to be comfortable for standing or better throughout the year, which is suitable for entrances where pedestrians may linger. During the summer, wind conditions at the proposed grade and above-grade-level amenities are expected to be comfortable for sitting or standing, ideal for areas intended for passive pedestrian activities.

The inclusion of canopies and trellises throughout the development is a positive design feature that contributes to favorable wind conditions and should be retained in the final design.

Additionally, the recommended annual wind safety criteria are predicted to be met across all grade-level and above-grade areas of the site throughout the year. As a result, no wind mitigation measures are required.

4. CONCLUSION

In summary, the wind analysis for the existing and proposed schemes confirms that the project site is expected to maintain comfortable and safe wind conditions year-round across all assessed grade-level and above-grade areas. The annual wind safety criterion is also anticipated to be met.

These findings demonstrate that the site's design provides a safe and user-friendly environment, aligning with its intended uses from both wind comfort and safety perspectives. As a result, no wind mitigation measures are required.

5. STUDY APPLICABILITY

The assessment presented in this report pertains to the proposed development at 925 Main Street West and 150 Longwood South, Hamilton, ON, and is predicated on the coordination set of architectural drawings by KNYMH Inc. dated July 17 and an updated 3D SketchUp model received October 30, 2024. **Should there be any substantial modifications to the design, Gnobi Consulting Inc. is available to evaluate their potential impact on the pedestrian wind conditions discussed in this report. It is incumbent upon others to initiate this process by contacting Gnobi Consulting Inc**.

6. REFERENCES

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3. Durgin, F.H. (1997) "Pedestrian level wind criteria using the equivalent average" Journal of Wind Engineering and Industrial Aerodynamics 66.

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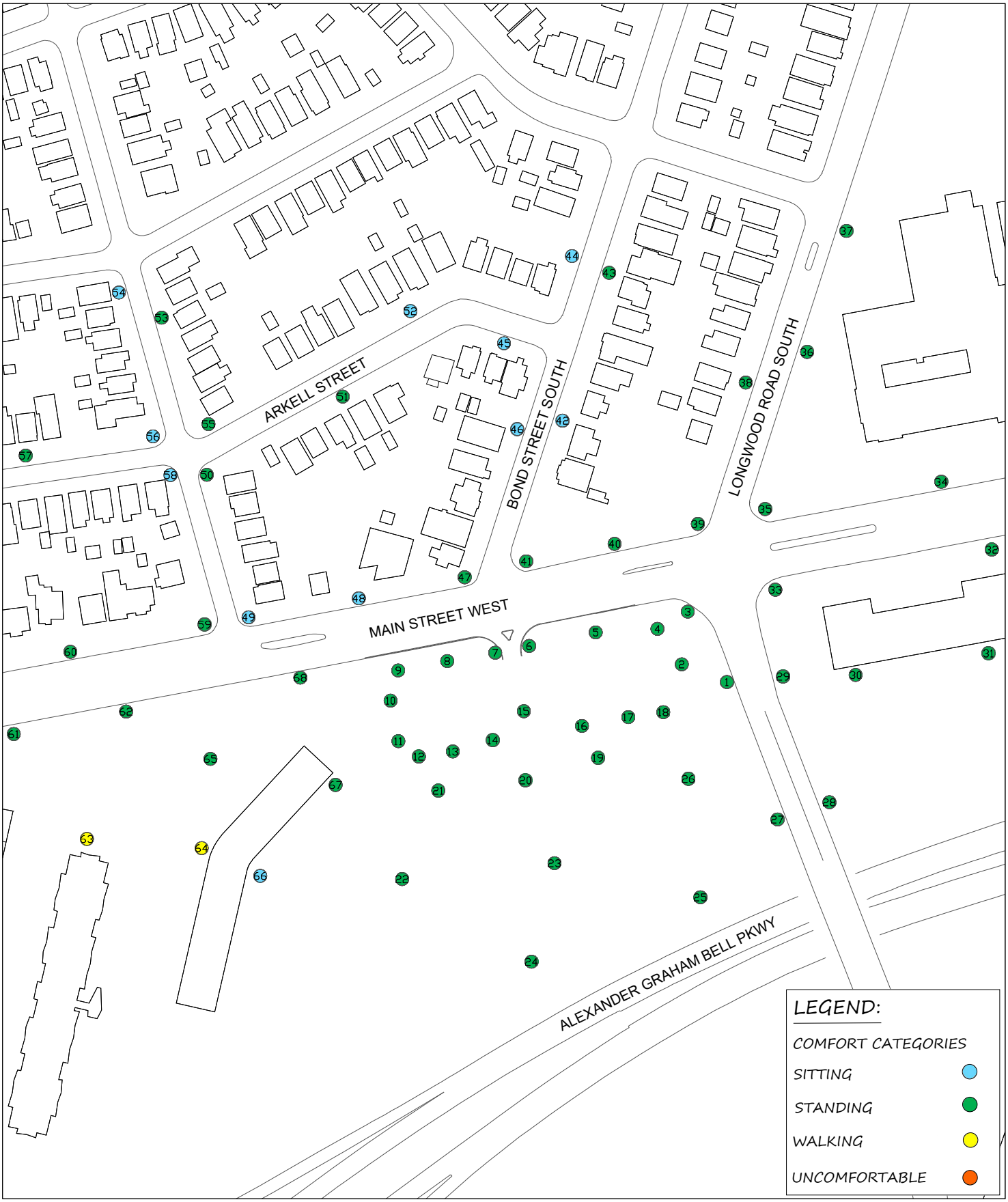
11. Blocken, B., & Carmeliet, J. (2013). Pedestrian Wind Environment Around Buildings: Literature Review and Practical Examples. Journal of Building Physics, 36(3), 256-302.

FIGURES



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925 MAIN ST. WEST

HAMILTON, ON

PEDESTRIAN LEVEL WIND TUNNEL STUDY

1.1 - EXISTING SCHEME (SPRING)

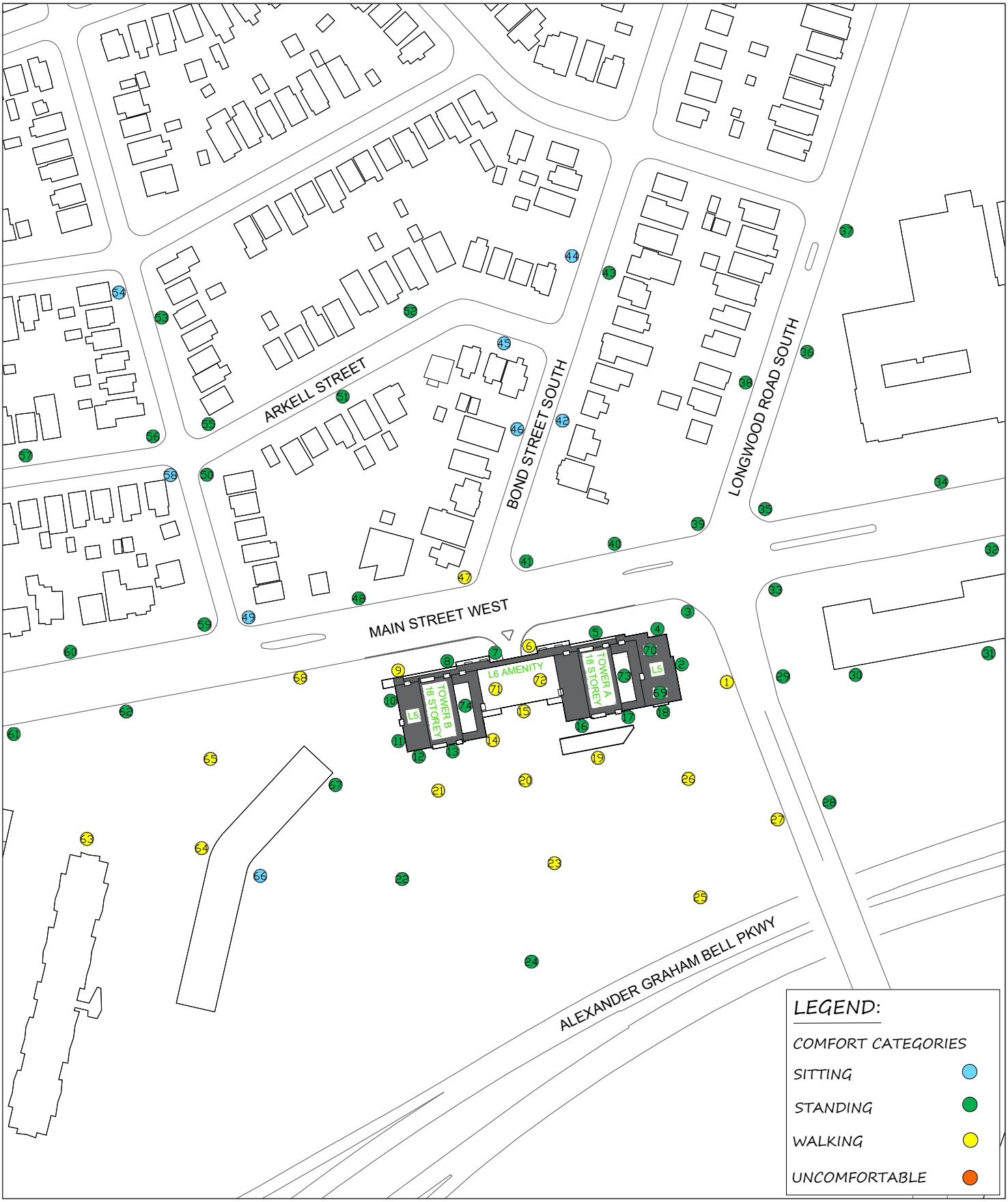
HOURS: 6:00 - 23:00

GNOBI PROJECT #:420023

DATE: NOV. 20, 2024

N

Scale:1:2000



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HAMILTON, ON

PEDESTRIAN LEVEL WIND TUNNEL STUDY

1.2 - PROPOSED SCHEME (SPRING)

HOURS: 6:00 - 23:00

GNOBI PROJECT #:420023

DATE: NOV. 20, 2024

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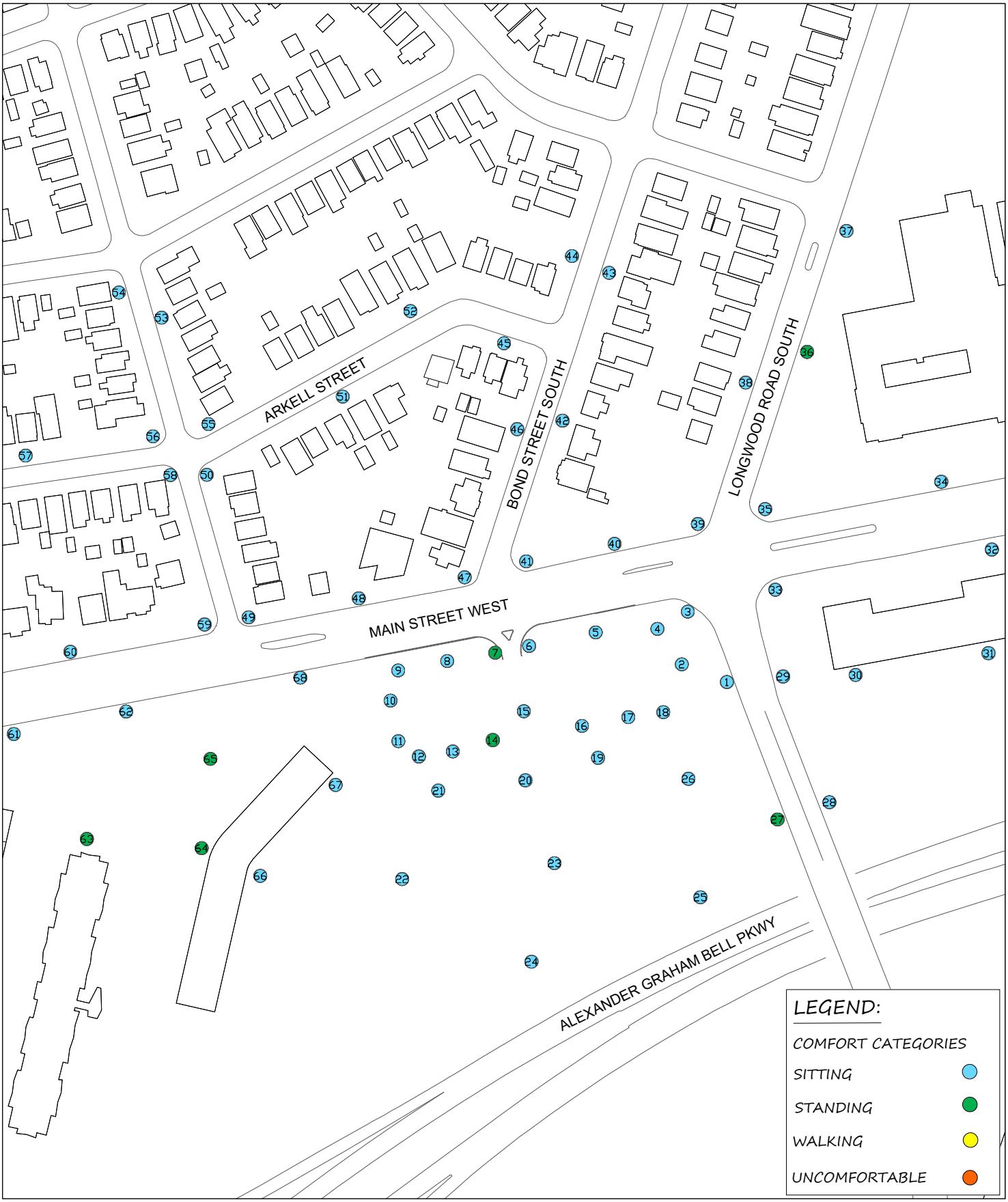
Scale:1:2000



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HAMILTON, ON

PEDESTRIAN LEVEL WIND TUNNEL STUDY

2.1 - EXISTING SCHEME (SUMMER)

HOURS: 6:00 - 23:00

GNOBI PROJECT #:420023

DATE: NOV. 20, 2024

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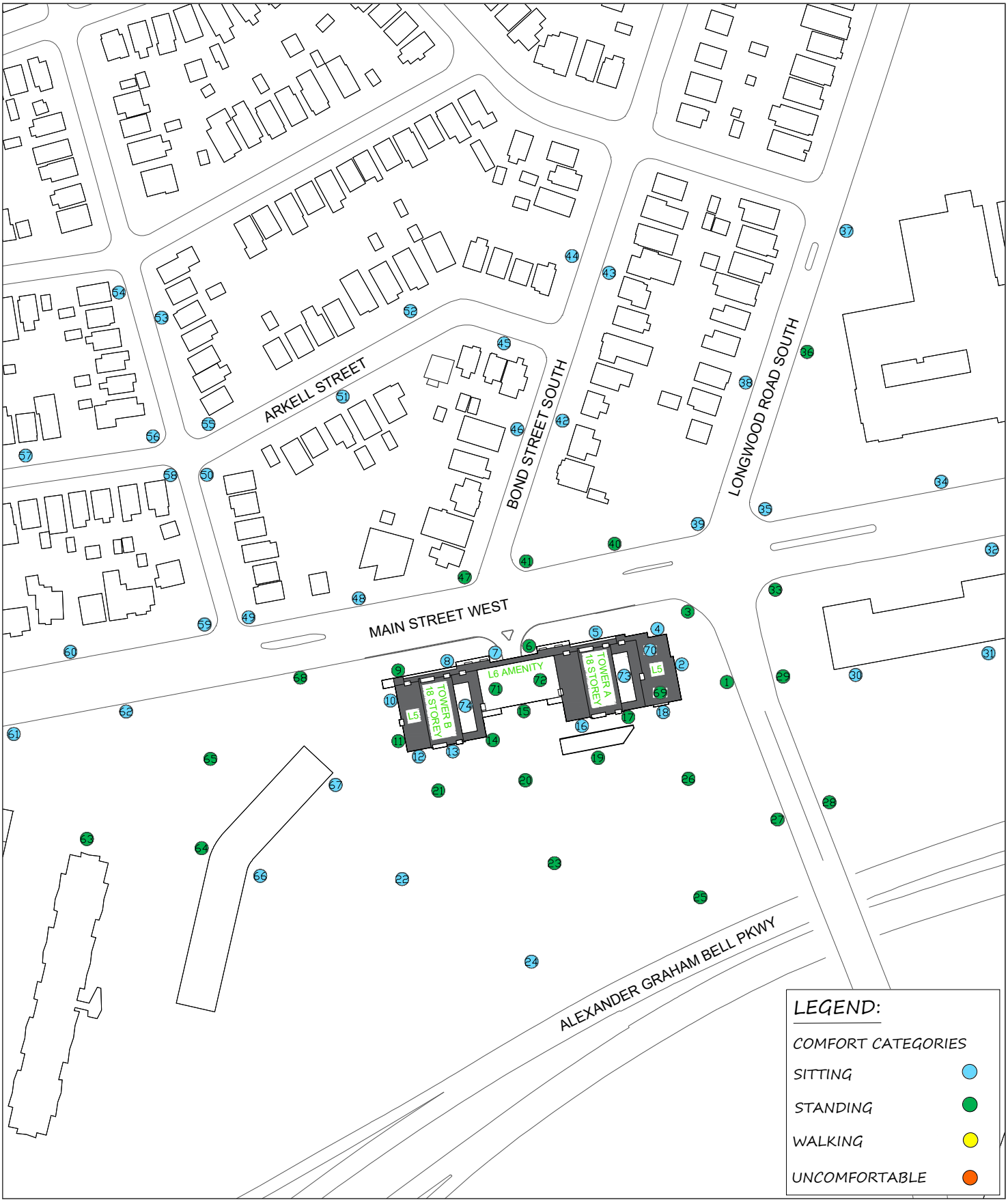
Scale:1:2000



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2.2 - PROPOSED SCHEME (SUMMER)

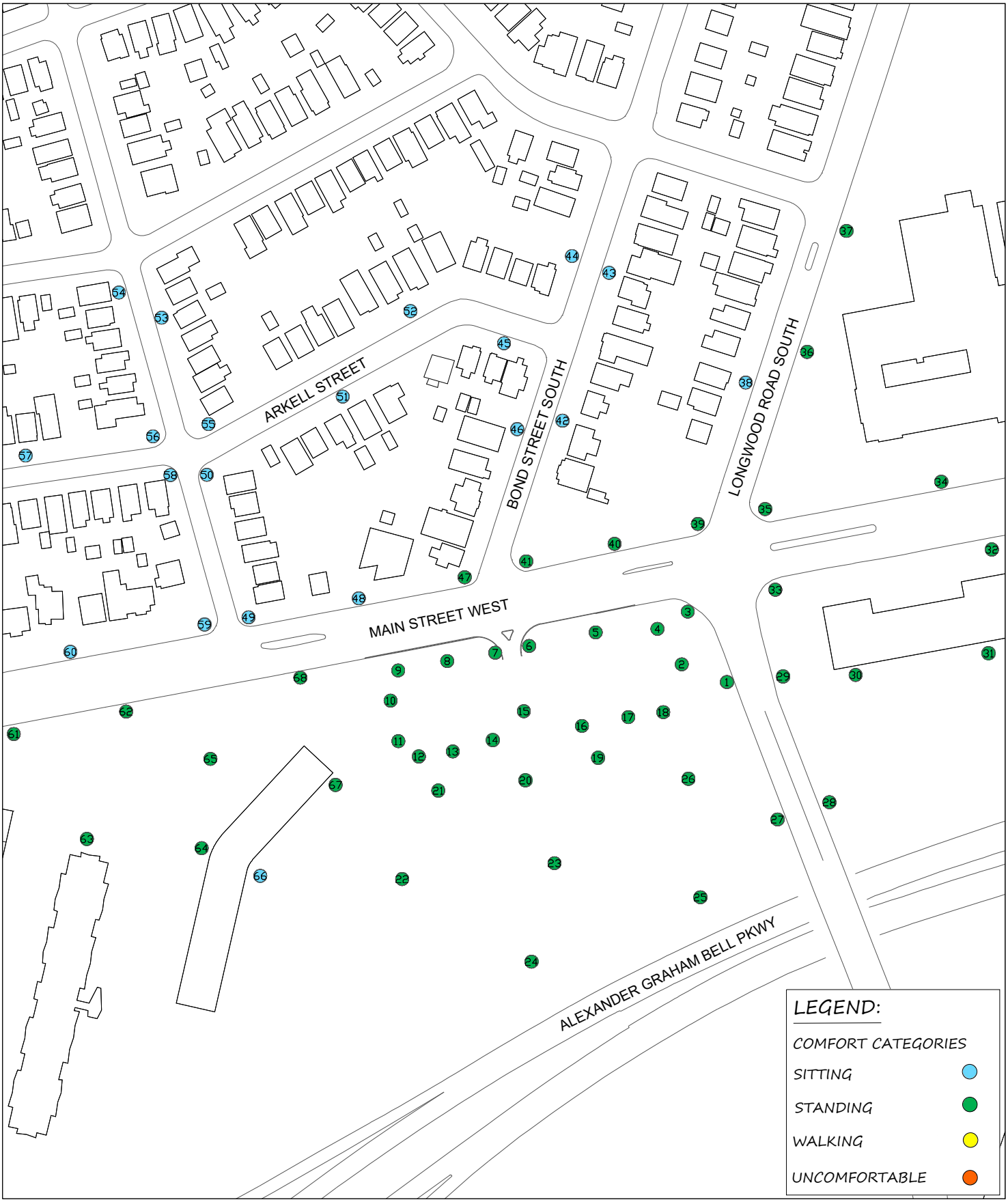
HOURS: 6:00 - 23:00

GNOBI PROJECT #:420023

DATE: NOV. 20, 2024

N

Scale:1:2000



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HAMILTON, ON

PEDESTRIAN LEVEL WIND TUNNEL STUDY

3.1- EXISTING SCHEME (FALL)

HOURS: 6:00 - 23:00

GNOBI PROJECT #:420023

DATE: NOV. 20, 2024

N

Scale:1:2000

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HAMILTON, ON

PEDESTRIAN LEVEL WIND TUNNEL STUDY

3.2 - PROPOSED SCHEME (FALL)

HOURS: 6:00 - 23:00

GNOBI PROJECT #:420023

DATE: NOV. 20, 2024

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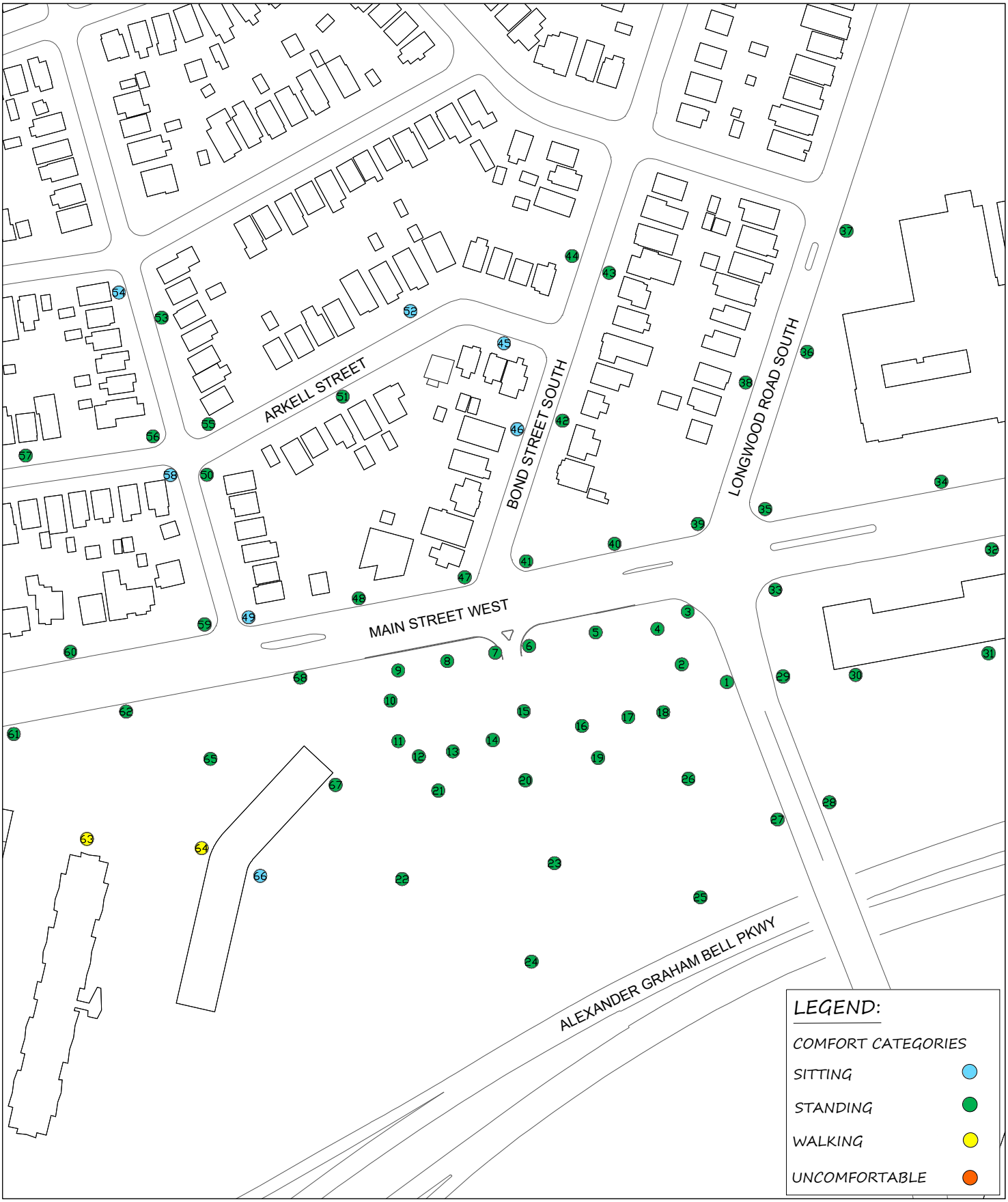

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HAMILTON, ON

PEDESTRIAN LEVEL WIND TUNNEL STUDY

4.1 - EXISTING SCHEME (WINTER)

HOURS: 6:00 - 23:00

GNOBI PROJECT #:420023

DATE: NOV. 20, 2024

N

Scale:1:2000

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PEDESTRIAN LEVEL WIND TUNNEL STUDY

4.2 - PROPOSED (WINTER)

HOURS: 6:00 - 23:00

GNOBI PROJECT #:420023

DATE: NOV. 20, 2024

N

Scale:1:2000

TABLES

Table 1: Assessment of Pedestrian Wind Comfort and Safety

Wind Probe	Assessed Scheme	Safety Criterion		Comfort Criteria							
		Annual: January - December		Spring: April - May		Summer: June - September		Fall: October - November		Winter: December - March	
		Hours: 0:00 - 23:00		Hours: 6:00 - 23:00		Hours: 6:00 - 23:00		Hours: 6:00 - 23:00		Hours: 6:00 - 23:00	
		Gust	Exceeded Yes/No?	Mean	Comfort Category	Mean	Comfort Category	Mean	Comfort Category	Mean	Comfort Category
Loc. 1	Existing	55	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	73	No	17	Walking	13	Standing	15	Standing	17	Walking
Loc. 2	Existing	57	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	50	No	11	Standing	8	Sitting	9	Sitting	11	Standing
Loc. 3	Existing	56	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	64	No	15	Standing	11	Standing	13	Standing	15	Standing
Loc. 4	Existing	57	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	64	No	14	Standing	10	Sitting	11	Standing	13	Standing
Loc. 5	Existing	57	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	47	No	12	Standing	8	Sitting	10	Sitting	11	Standing
Loc. 6	Existing	61	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	80	No	18	Walking	13	Standing	16	Walking	18	Walking
Loc. 7	Existing	56	No	14	Standing	11	Standing	13	Standing	15	Standing
	Proposed	71	No	15	Standing	10	Sitting	10	Sitting	11	Standing
Loc. 8	Existing	54	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	61	No	13	Standing	9	Sitting	11	Standing	12	Standing
Loc. 9	Existing	53	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	68	No	16	Walking	11	Standing	13	Standing	15	Standing
Loc. 10	Existing	56	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	57	No	13	Standing	10	Sitting	12	Standing	14	Standing
Loc. 11	Existing	56	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	61	No	15	Standing	11	Standing	13	Standing	16	Walking
Loc. 12	Existing	55	No	13	Standing	10	Sitting	11	Standing	13	Standing
	Proposed	53	No	12	Standing	9	Sitting	11	Standing	12	Standing
Loc. 13	Existing	60	No	14	Standing	10	Sitting	12	Standing	15	Standing
	Proposed	53	No	12	Standing	9	Sitting	11	Standing	13	Standing
Loc. 14	Existing	59	No	14	Standing	11	Standing	13	Standing	15	Standing
	Proposed	79	No	19	Walking	14	Standing	16	Walking	18	Walking
Loc. 15	Existing	58	No	14	Standing	10	Sitting	12	Standing	15	Standing
	Proposed	79	No	20	Walking	14	Standing	17	Walking	19	Walking
Loc. 16	Existing	56	No	13	Standing	10	Sitting	11	Standing	13	Standing
	Proposed	69	No	13	Standing	9	Sitting	11	Standing	13	Standing
Loc. 17	Existing	56	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	67	No	14	Standing	11	Standing	13	Standing	15	Standing
Loc. 18	Existing	57	No	13	Standing	10	Sitting	12	Standing	15	Standing
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Loc. 22	Existing	54	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	74	No	15	Standing	10	Sitting	12	Standing	14	Standing
Loc. 23	Existing	58	No	14	Standing	10	Sitting	12	Standing	15	Standing
	Proposed	78	No	17	Walking	12	Standing	14	Standing	16	Walking
Loc. 24	Existing	56	No	13	Standing	9	Sitting	11	Standing	13	Standing
	Proposed	64	No	15	Standing	10	Sitting	12	Standing	14	Standing
Loc. 25	Existing	63	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	65	No	16	Walking	11	Standing	13	Standing	15	Standing

Wind Probe	Assessed Scheme	Safety Criterion		Comfort Criteria							
		Annual: January - December		Spring: April - May		Summer: June - September		Fall: October - November		Winter: December - March	
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		Gust	Exceeded Yes/No?	Mean	Comfort Category	Mean	Comfort Category	Mean	Comfort Category	Mean	Comfort Category
Loc. 26	Existing	60	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	67	No	16	Walking	12	Standing	14	Standing	16	Walking
Loc. 27	Existing	62	No	14	Standing	11	Standing	13	Standing	15	Standing
	Proposed	65	No	16	Walking	11	Standing	13	Standing	16	Walking
Loc. 28	Existing	60	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	62	No	15	Standing	11	Standing	13	Standing	15	Standing
Loc. 29	Existing	52	No	13	Standing	10	Sitting	11	Standing	13	Standing
	Proposed	67	No	15	Standing	12	Standing	14	Standing	16	Walking
Loc. 30	Existing	55	No	12	Standing	9	Sitting	11	Standing	13	Standing
	Proposed	62	No	12	Standing	10	Sitting	11	Standing	14	Standing
Loc. 31	Existing	60	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	61	No	14	Standing	10	Sitting	12	Standing	14	Standing
Loc. 32	Existing	57	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	54	No	13	Standing	10	Sitting	12	Standing	14	Standing
Loc. 33	Existing	58	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	62	No	15	Standing	11	Standing	13	Standing	15	Standing
Loc. 34	Existing	56	No	13	Standing	9	Sitting	11	Standing	13	Standing
	Proposed	56	No	13	Standing	9	Sitting	11	Standing	12	Standing
Loc. 35	Existing	55	No	13	Standing	10	Sitting	11	Standing	14	Standing
	Proposed	51	No	13	Standing	10	Sitting	12	Standing	13	Standing
Loc. 36	Existing	55	No	15	Standing	11	Standing	13	Standing	15	Standing
	Proposed	54	No	15	Standing	11	Standing	13	Standing	15	Standing
Loc. 37	Existing	59	No	14	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	56	No	13	Standing	9	Sitting	11	Standing	13	Standing
Loc. 38	Existing	47	No	11	Standing	8	Sitting	10	Sitting	11	Standing
	Proposed	49	No	11	Standing	8	Sitting	10	Sitting	11	Standing
Loc. 39	Existing	54	No	13	Standing	9	Sitting	11	Standing	13	Standing
	Proposed	54	No	13	Standing	10	Sitting	12	Standing	14	Standing
Loc. 40	Existing	53	No	13	Standing	9	Sitting	11	Standing	13	Standing
	Proposed	66	No	14	Standing	11	Standing	13	Standing	16	Walking
Loc. 41	Existing	51	No	12	Standing	9	Sitting	11	Standing	13	Standing
	Proposed	68	No	15	Standing	11	Standing	13	Standing	16	Walking
Loc. 42	Existing	42	No	10	Sitting	8	Sitting	9	Sitting	11	Standing
	Proposed	51	No	10	Sitting	8	Sitting	9	Sitting	11	Standing
Loc. 43	Existing	45	No	11	Standing	8	Sitting	10	Sitting	11	Standing
	Proposed	47	No	11	Standing	8	Sitting	9	Sitting	11	Standing
Loc. 44	Existing	42	No	10	Sitting	8	Sitting	9	Sitting	11	Standing
	Proposed	42	No	10	Sitting	8	Sitting	9	Sitting	11	Standing
Loc. 45	Existing	40	No	10	Sitting	7	Sitting	8	Sitting	10	Sitting
	Proposed	39	No	9	Sitting	7	Sitting	8	Sitting	10	Sitting
Loc. 46	Existing	44	No	10	Sitting	8	Sitting	9	Sitting	10	Sitting
	Proposed	45	No	10	Sitting	7	Sitting	9	Sitting	10	Sitting
Loc. 47	Existing	52	No	12	Standing	9	Sitting	11	Standing	13	Standing
	Proposed	74	No	16	Walking	12	Standing	14	Standing	17	Walking
Loc. 48	Existing	45	No	10	Sitting	8	Sitting	10	Sitting	11	Standing
	Proposed	60	No	14	Standing	10	Sitting	12	Standing	14	Standing
Loc. 49	Existing	34	No	8	Sitting	6	Sitting	7	Sitting	8	Sitting
	Proposed	39	No	8	Sitting	6	Sitting	7	Sitting	8	Sitting
Loc. 50	Existing	52	No	12	Standing	9	Sitting	10	Sitting	12	Standing
	Proposed	55	No	12	Standing	9	Sitting	11	Standing	13	Standing
Loc. 51	Existing	46	No	11	Standing	8	Sitting	10	Sitting	11	Standing
	Proposed	49	No	12	Standing	9	Sitting	10	Sitting	12	Standing
Loc. 52	Existing	41	No	10	Sitting	7	Sitting	9	Sitting	10	Sitting
	Proposed	48	No	11	Standing	8	Sitting	10	Sitting	12	Standing
Loc. 53	Existing	47	No	11	Standing	8	Sitting	10	Sitting	12	Standing
	Proposed	49	No	12	Standing	8	Sitting	10	Sitting	12	Standing

Wind Probe	Assessed Scheme	Safety Criterion		Comfort Criteria							
		Annual: January - December		Spring: April - May		Summer: June - September		Fall: October - November		Winter: December - March	
		Hours: 0:00 - 23:00		Hours: 6:00 - 23:00		Hours: 6:00 - 23:00		Hours: 6:00 - 23:00		Hours: 6:00 - 23:00	
		Gust	Exceeded Yes/No?	Mean	Comfort Category	Mean	Comfort Category	Mean	Comfort Category	Mean	Comfort Category
Loc. 54	Existing	41	No	9	Sitting	7	Sitting	8	Sitting	9	Sitting
	Proposed	44	No	10	Sitting	7	Sitting	8	Sitting	10	Sitting
Loc. 55	Existing	46	No	11	Standing	8	Sitting	9	Sitting	11	Standing
	Proposed	49	No	11	Standing	9	Sitting	10	Sitting	12	Standing
Loc. 56	Existing	43	No	10	Sitting	8	Sitting	9	Sitting	11	Standing
	Proposed	46	No	11	Standing	8	Sitting	10	Sitting	11	Standing
Loc. 57	Existing	49	No	12	Standing	9	Sitting	10	Sitting	12	Standing
	Proposed	53	No	12	Standing	9	Sitting	10	Sitting	12	Standing
Loc. 58	Existing	44	No	10	Sitting	7	Sitting	8	Sitting	10	Sitting
	Proposed	45	No	10	Sitting	7	Sitting	8	Sitting	9	Sitting
Loc. 59	Existing	50	No	11	Standing	9	Sitting	10	Sitting	12	Standing
	Proposed	51	No	12	Standing	9	Sitting	11	Standing	13	Standing
Loc. 60	Existing	50	No	11	Standing	8	Sitting	9	Sitting	11	Standing
	Proposed	54	No	11	Standing	8	Sitting	10	Sitting	11	Standing
Loc. 61	Existing	55	No	13	Standing	9	Sitting	11	Standing	13	Standing
	Proposed	57	No	13	Standing	9	Sitting	11	Standing	13	Standing
Loc. 62	Existing	60	No	13	Standing	10	Sitting	12	Standing	14	Standing
	Proposed	61	No	14	Standing	10	Sitting	12	Standing	14	Standing
Loc. 63	Existing	66	No	16	Walking	11	Standing	13	Standing	16	Walking
	Proposed	66	No	16	Walking	11	Standing	13	Standing	15	Standing
Loc. 64	Existing	68	No	16	Walking	12	Standing	14	Standing	17	Walking
	Proposed	69	No	16	Walking	12	Standing	15	Standing	17	Walking
Loc. 65	Existing	70	No	15	Standing	11	Standing	13	Standing	15	Standing
	Proposed	72	No	16	Walking	11	Standing	14	Standing	15	Standing
Loc. 66	Existing	43	No	10	Sitting	7	Sitting	9	Sitting	10	Sitting
	Proposed	44	No	10	Sitting	8	Sitting	9	Sitting	10	Sitting
Loc. 67	Existing	66	No	14	Standing	10	Sitting	12	Standing	13	Standing
	Proposed	68	No	14	Standing	10	Sitting	12	Standing	13	Standing
Loc. 68	Existing	59	No	14	Standing	10	Sitting	12	Standing	13	Standing
	Proposed	79	No	17	Walking	12	Standing	14	Standing	15	Standing
Loc. 69	Existing	--	--	--	--	--	--	--	--	--	--
	Proposed	69	No	15	Standing	11	Standing	13	Standing	14	Standing
Loc. 70	Existing	--	--	--	--	--	--	--	--	--	--
	Proposed	75	No	14	Standing	10	Sitting	12	Standing	13	Standing
Loc. 71	Existing	--	--	--	--	--	--	--	--	--	--
	Proposed	69	No	16	Walking	11	Standing	13	Standing	15	Standing
Loc. 72	Existing	--	--	--	--	--	--	--	--	--	--
	Proposed	75	No	18	Walking	13	Standing	15	Standing	18	Walking
Loc. 73	Existing	--	--	--	--	--	--	--	--	--	--
	Proposed	55	No	11	Standing	8	Sitting	9	Sitting	11	Standing
Loc. 74	Existing	--	--	--	--	--	--	--	--	--	--
	Proposed	49	No	11	Standing	8	Sitting	9	Sitting	10	Sitting

Notes:

Annual wind Safety probability of exceedance = 0.1%

Seasonal Wind Comfort Probability of Exceedance = 20%

Abbreviations:

Loc. = Location

# of Schemes Assessed: Two (2)

Existing Scheme: Existing Site and Surrounding Buildings

Proposed Scheme: Proposed Project + Existing Surrounding Buildings

GNOBI CONSULTING INC.

Wind Engineering & Microclimate Consultants

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