



WIND ENGINEERING  
CONSULTANTS

PEDESTRIAN WIND ASSESSMENT  
CPP PROJECT 20269  
18 AUGUST 2025

# 180 William Street

*Woolloomooloo, NSW*

CPP Wind Engineering  
Consultants  
2/500 Princes Highway  
St Peters NSW 2044,  
Australia  
Info-syd@cppwind.com  
cppwind.com

PREPARED FOR:

William St. Residential Pty. Ltd.  
Suite 4, Level 8, 68, 14 Martin Place  
Sydney, NSW 2000

John Fitzgerald  
0421 721 702  
[jfitzgerald@rebelproperty.com](mailto:jfitzgerald@rebelproperty.com)

PREPARED BY:

Tomer Libman  
Project Engineer  
[tlibman@cppwind.com](mailto:tlibman@cppwind.com)

Graeme Wood, PhD  
Senior Principal  
[gwood@cppwind.com](mailto:gwood@cppwind.com)

## Executive Summary

This environmental wind assessment report has been prepared by CPP to accompany the proposed State Significant Development Application (SSDA) for a mixed-use infill affordable housing development at 164-172 and 174-194 William Street, Woolloomooloo. The site is made up of two (2) lots. The legal description of the site is outlined in Table 1.

*Table 1: Legal Description*

Property Address	Title Description
164-172 William Street, Woolloomooloo	Lot 52 in DP1049805
174-194 William Street, Woolloomooloo	Lot 1 in DP816050

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-80211463).

This report concludes that the proposed development is suitable and warrants approval with no mitigation requirements.

A wind tunnel study of the development was conducted to assess the surrounding pedestrian wind environment. Measurements of winds likely to be experienced by pedestrians were combined with wind statistics and compared to wind comfort and safety criteria.

The wind tunnel testing was performed in a natural boundary layer wind tunnel of CPP. A model of the project was fabricated to a 1:300 length scale and centred on a turntable in the wind tunnel. Replicas of existing and approved surrounding buildings within a 430 m radius were constructed and placed on the turntable. Approach boundary layers representative of the environment surrounding the proposed development was established in the test section of the wind tunnel.

Measurements of winds likely to be experienced by pedestrians were made with a hot-film anemometer at 24 locations for 16 wind directions each. These points were tested around the development site focusing on pedestrian access routes, entries, and outdoor seating or recreation areas. The measurements were combined with site specific wind statistics to produce results of wind speed versus the percentage of time that wind speed is exceeded for each location.

In general, the proposed site made little impact on wind conditions at specific locations around the site. From an equivalence perspective for pedestrian comfort, on average the Initial proposed scheme marginally improved the wind conditions, while the Affordable Housing scheme increased the wind speed by 2%. The average comfort classification is at the lower end of pedestrian walking in all configurations.

Wind conditions in the additional park to the north of the proposed development are comparable with other city parks in providing an amenable wind conditions.

Three locations on the south-west corner of the site exceeded the Lawson safety criterion in the existing configuration and rated for Able-Bodied pedestrians. With the inclusion of the proposed development, the safety wind conditions around this corner improved, with only two exceedances for the Initial configuration, and a single exceedance for the Affordable Housing configuration. All other locations passed the Lawson safety criterion.

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# 1. Introduction

CPP has been commissioned by William Street Residential Pty. Ltd. to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD-80211463) for the proposed mixed-use infill affordable housing development at 164-172 and 174-194 William Street Woolloomooloo.

Following the Design Excellence Competition, the scheme has been revised to include In-fill Affordable Housing (IAH) in line with the NSW Government's policy under the *State Environmental Planning Policy (Housing) 2021 (Housing SEPP)*. This policy allows for a 30% increase in Floor Space Ratio (FSR) and building height when 15% of the total FSR is provided as affordable housing for 15 years. The proposed development meets these criteria and is eligible for the bonus uplift.

Given the residential component's Capital Investment Value (CIV) exceeds \$75 million, an SSDA pathway can be taken. The proposal retains key design principles recommended by the Design Excellence Panel and aims to provide additional residential dwellings with a 30% increase in GFA and building height, in accordance with the Housing SEPP.

The purpose of the project is to facilitate the delivery of a high-quality mixed-use development containing residential and retail uses as well as a centrally located park, public domain improvements and improved through-site connectivity at a strategically located site. The proposal seeks to deliver a built form outcome that responds appropriately to its location on William Street in Woolloomooloo and in close proximity to Kings Cross Station and the Sydney CBD. Furthermore, the proposed scheme seeks to deliver an outcome that is consistent with the desired and evolving character of the Woolloomooloo and Potts Point area.

This report has been prepared in response to the requirements contained within SEARs dated 21 February 2025 and issued for SSD-80211463. Specifically, this report has been prepared to respond to the SEARs requirement issued in Table 2.

Table 2: SEARs Requirements

Item	Description of Requirement	Section Reference (this Report)
7. Environmental Amenity	Assess amenity impacts on the surrounding locality, including... <b>wind</b> ... impacts. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated.	Section 3 (Results)
23. Public Space	If public space is proposed as part of the development, demonstrate how the development: ... <ul style="list-style-type: none"><li>maximises the amenity of public spaces in line with their intended use, such as through adequate facilities, solar access, shade and <b>wind</b> protection...</li></ul>	Section 3 (Results)

The site is located at 164-172 and 174-194 William Street Woolloomooloo within the City of Sydney LGA, Figure 1. The site is comprised of multiple allotments and is legally described as:

- 164-172 William Street, Woolloomooloo Lot 52 in DP1049805, and
- 174-194 William Street, Woolloomooloo Lot 1 in DP816050.

The land size totals 6,398 m<sup>2</sup> and consists of a southern frontage to William Street, an eastern frontage to Dowling Street, a western frontage to Forbes Street and northern frontage to Judge Lane, Figure 2.

The immediate urban context surrounding the site is characterised by a mix of medium density residential, commercial, and retail uses. The site is in close proximity to Hyde Park, The Domain, and Rushcutters Bay Reserve. There are a number of educational and health services in proximity to the site, providing ample infrastructure support for the community.

William Street, to which the site fronts, is a classified road providing connection between the Eastern Suburbs of Sydney and the CBD. Vehicle access is currently provided from six points on the site from Judge Lane, Forbes Street, and Dowling Street. Pedestrian access to the site is currently available from all frontages.

The site is highly accessible to both bus and rail services, being approximately 300m away from Kings Cross Railway Station and having direct access to bus services on William Street that provide connections through the Metropolitan Transport Network.

At the time of lodgement, the site is improved by a warehouse style structure and glass office building to the site's frontage and an at-grade private carpark to the northwestern portion of the site.

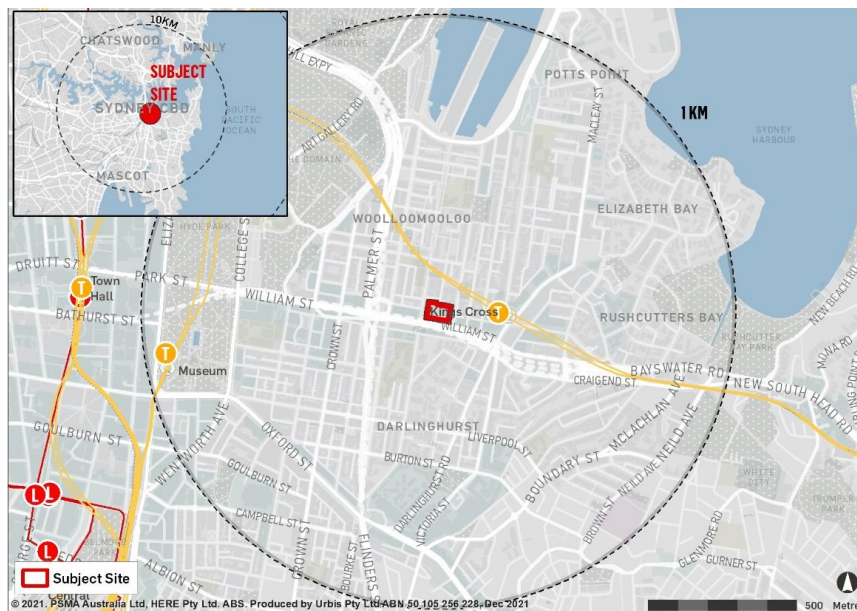


Figure 1: Local Context



Figure 2: The Site

## GENERAL INFORMATION

Pedestrian wind studies are conducted to investigate pedestrian comfort and safety in and around developments. This assessment of the wind environment around developments can inform designers about the suitability of outdoor areas for their intended uses. Where necessary, design modifications can be made, or intervention measures added to mitigate areas with the potential for excessive wind speeds.

This report contains information regarding the local wind climate analysis, wind tunnel testing and analysis procedures, a discussion of the test results, and recommendations to improve wind conditions in areas where any adverse wind conditions may be identified. The test parameters and configurations are summarised in Table 3.

All data collection was performed in accordance with the guidelines of the Australasian Wind Engineering Society (2019), and the American Society of Civil Engineers (1999, 2021). While analytical methods such as Computational Fluid Dynamics (CFD) have some utility in the field of pedestrian wind comfort, they are not yet capable of reliably and accurately predicting gust wind speeds for assessment of wind conditions from a safety perspective.

Table 3: Wind Tunnel Test Parameters

SUMMARY OF TEST PARAMETERS	
GENERAL INFORMATION	
Model Scale	1:300
Surrounding Model Radius (full scale)	430 m
Approach Terrain Category	Open Country/Water approach (0° – 67.5°) Built-up environment approach (90° – 337.5°)
ENVIRONMENTAL WINDS STUDY	
Number of test locations	24
Reference height (full scale)	150 m
TEST CONFIGURATION(S)	
Configuration A	Site and surroundings as they currently exist and any/all approved or under construction developments within the modelled test radius as shown in Figure 3a (top).
Configuration B	Configuration A with the Initial proposed scheme, as shown in Figure 3a (middle).
Configuration C	Configuration A with the Affordable Housing Scheme, as shown in Figure 3a (bottom)

## 2. Methodology

### WIND TUNNEL MODEL

The anticipated wind conditions around the project site were evaluated through wind tunnel testing of a 1:300 scale model of the development and surrounding area. This scale allowed for an adequate portion of surrounding developments and terrain to be included within an approximately 430 m radius of the site and all the relevant building details to be modelled accurately. The boundary-layer wind conditions beyond the modelled area were appropriately simulated in one of CPP's wind tunnels (see Appendix A). The models were mounted on the turntable, located near the downstream end of the wind tunnel test section, allowing rotation of the modelled area for examination of wind speeds from any approach wind direction.

Photographs of the test and surrounds models installed in the wind tunnel are given in Figure 3.

### MEASUREMENT POINTS

For this study, wind speed measurements were recorded at 24 locations to evaluate pedestrian wind comfort and safety in and around the project site, as presented in Figure 5.

Wind speed measurements were made at the model scale equivalent of 1.5 to 2.1 m above the surface for 16 wind directions at 22.5° intervals. Locations were chosen to determine the degree of pedestrian wind comfort and safety at building corners where relatively severe conditions are frequently found, near building entrances and passageways, at outdoor recreation areas and terraces.

The hot-film signal was sampled for a period corresponding to one hour in full scale. All velocity data were digitally filtered to obtain the two to three second running mean wind speed at each point; this is the basis for the various acceptability criteria. These local wind speeds,  $U$ , were normalised by the tunnel reference velocity,  $U_{ref}$ . Mean and turbulence statistics were calculated and used to calculate the normalised effective peak gust using:

$$\frac{U_{pk}}{U_{ref}} = \frac{U + g_f \cdot U_{rms}}{U_{ref}}$$

Where the peak factor  $g_f$  is equal to 3 for a 3-second gust, and 3.6 for a 0.5-second gust.

The mean and gust equivalent mean wind speeds relative to the free stream wind tunnel reference wind speed (wind speed ratio) at a full-scale elevation of 150 m are plotted in polar form in Appendix B. The graphs show the directional magnitude of the wind speed ratio from where the wind was blowing from. The polar plots aid in visualisation of the effects of the nearby structures or topography, the relative significance of various wind azimuths, and whether the mean or gust wind speed is of greater importance.

The measured local wind speeds were combined with wind climate data described in the following section to allow assessment of the pedestrian wind environment.

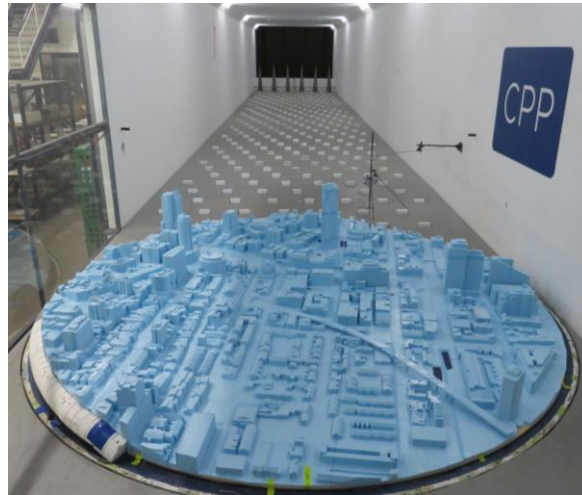


Figure 3a: Photographs of Wind Tunnel Test and Surrounds Model looking south – Configurations A (top), B (middle), and C (bottom)

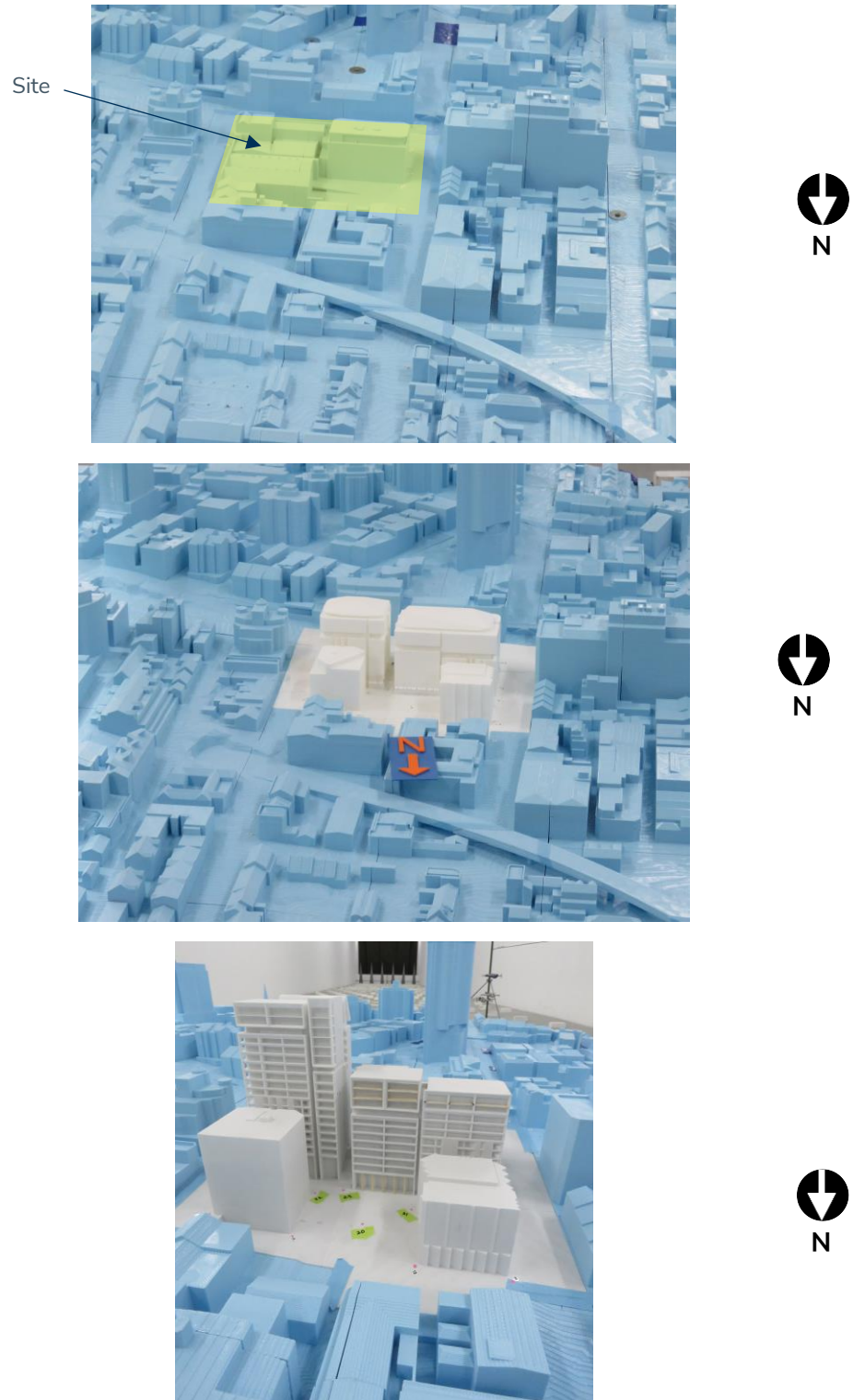


Figure 3b: Photographs of Wind Tunnel Test Model, Configurations A (top), B (middle), and C (bottom)

## WIND CLIMATE

The measured wind speed data were normalized to an approach reference wind speed and then combined with a climatological model (wind frequency and direction) derived from data measured at a standard height of 10 m at Sydney International Airport. The project site is located approximately 10 km to the north-north-east of the anemometer that provides the best source of historical wind data for the project.

The measured data are portrayed in the wind rose in Figure 4. The arms of the wind roses point in the direction from where the wind is blowing from, the width and colour of the arm represent the wind speed, and the length of the arm indicates the percent of the time that the wind blows for that combination of speed and direction. These data were then adjusted to the site location using an analytical method to account for the exposure of the project site for each direction.

The distribution and frequency of winds on an annual basis were analysed to assess the project with regards to wind comfort and safety. As can be seen from the wind rose in Figure 4, winds from the north-east, south, and north-west quadrants are predominant. The locations tested around the development site may be susceptible to winds from these directions, depending on the relative position of the location tested to the geometry of the proposed development and surrounds.

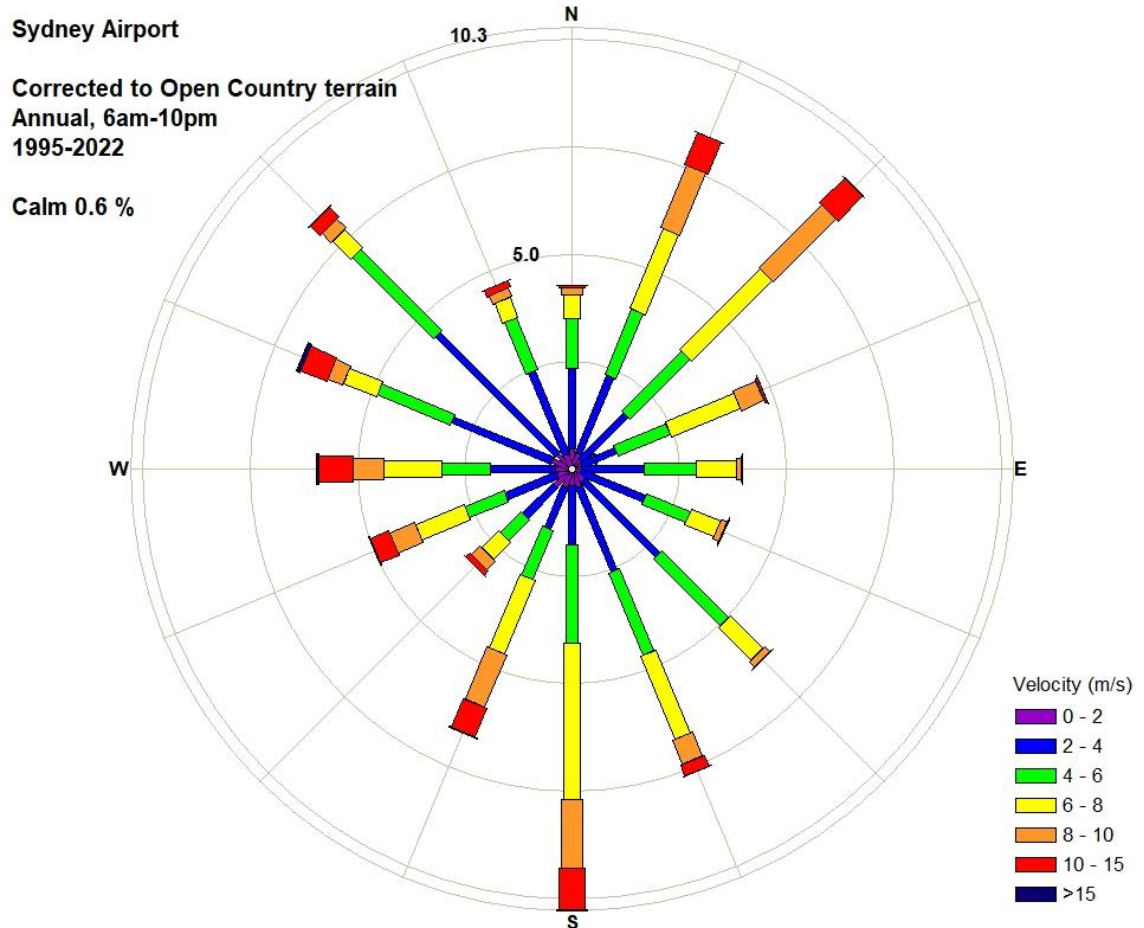


Figure 4: Probability of Wind Speeds by Direction – Sydney International Airport (1995 – 2022, All Hours)

## WIND ASSESSMENT CRITERIA







To enable a quantitative assessment of the wind environment, the wind tunnel data and climatological model are combined to calculate wind speeds for comparison with pedestrian wind comfort and safety criteria at each test point.

A number of researchers have suggested quantitative methods for assessing wind comfort and safety based on wind tunnel data and local climate statistics. CPP uses a modified form of the widely-accepted pedestrian-level wind criteria developed by Lawson (1990). Lawson's criteria are divided into separate categories of comfort and distress (safety). The comfort criteria allow planners to assess the usability, with respect to the wind environment, of different locations for various purposes, such as for long-duration activities (e.g., sitting at an outdoor café) or strolling on walkways.

Lawson's criteria are based on wind speeds exceeded 5% of the time, and are described as categories for comfort ranging from 'Pedestrian Sitting' to 'Business Walking', allowing planners to judge the usability of locations for various intended purposes. The criteria also include a distress rating, for safety assessment, which is based on occasional (once or twice per year) wind speeds, to identify locations where wind speeds may be hazardous to pedestrians.

The categories and criteria are specified in Table 4.

Table 4: Wind Comfort and Safety criteria (after Lawson, 1990)

COMFORT RATING	$U_{EQUIV}^*$	DESCRIPTION
 Dining**	$\leq 2$ m/s	Calm / light breezes suitable for outdoor restaurant uses, seating areas.
 Sitting	$>2-4$ m/s	Calm or light breezes suitable for long duration seating areas, and other amenities.
 Standing	$>4-6$ m/s	Gentle breezes suitable for sitting for shorter periods, main entrances and bus stops where pedestrians may linger.
 Pedestrian Walking	$>6-8$ m/s	Moderate winds appropriate for window shopping and strolling along a downtown street, or park.
 Business Walking	$>8-10$ m/s	Relatively high speeds that can be tolerated if one's objective is to walk, run, or cycle.
 Uncomfortable	$>10$ m/s	Strong winds unacceptable for all pedestrian activities; wind mitigation is typically required.

\* $U_{Equiv} = \text{Max}(U_{Mean}, U_{Gust} / 1.85)$ , based on an annual exceedance of 5% (~8 hours / week) assessed over all hours.  
 \*\* For regular outdoor dining, and in semi-enclosed spaces, it has been the experience of CPP that the comfort rating of Sitting may be windier than desired and a comfort criterion of 2 m/s or less may be more applicable.

SAFETY RATING	$U_{EQUIV}^*$	DESCRIPTION
○ Pass	≤15 m/s	Meets wind safety criterion.
○ Able-Bodied	>15-20 m/s	Acceptable where only able-bodied people would be expected; not acceptable for frail persons or cyclists
○ Fail	>20 m/s	Excessive wind speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is often required.

\*  $U_{Equiv} = \text{Max}(U_{Mean}, U_{Gust} / 1.85)$ , based on an annual exceedance of 0.022% (~2 / year or 1 / season) assessed over all hours.

Pedestrians' perception of wind can often be subjective and vary depending on regional difference in wind climate and thermal conditions, as well as by individual. Calibration to the local wind environment should be taken into account when evaluating predicted wind comfort conditions. Note that the ratings of 'Uncomfortable' and 'Safety' are the words of the published wind criteria and applicability may vary by project and location.

## 3. Results

A summary of the assessed comfort and safety ratings for each test location is given in Table 5. The results of the study are graphically presented in Figure 5 and Figure 6 in which measurement locations are displayed on a site plan and colour coded to denote the predicted wind comfort and safety rating. The number (XX.Y) combines the location identifier (XX) and the test configuration (.Y): XX.1 existing, XX.2 Initial Proposed, and XX.3 Affordable Housing. The central and outer ring colours indicate the comfort rating and safety rating respectively.







From the cumulative wind speed distributions for each location, the percentage of time each of the Lawson comfort rating wind speeds are exceeded are presented in tabular form under the polar plots in Appendix B. These plots include directional criterion lines for the Lawson comfort levels to provide additional information regarding directional sensitivity at each location.

In general, wind conditions comfortable for Sitting and Standing are considered appropriate for areas such as entrances where pedestrians are likely to gather for longer durations, while wind conditions comfortable for Pedestrian Walking are more appropriate for sidewalks where pedestrians are actively in transit. Locations rated as Uncomfortable are generally less suitable for most pedestrian activities and wind control solutions are often sought. Whether mitigation is needed at a location depends upon the intended pedestrian use of the location. Although conditions may be classified as acceptable, there may be certain wind directions that cause regular strong events.

Satisfaction of the safety rating is generally required for areas accessible to the general public. A rating of 'Able-Bodied' may be acceptable for areas with managed access or where pedestrians are unlikely to be present under adverse conditions. Mitigation measures are generally required to address any locations deemed to fail the safety assessment.

Table 5: Summary of wind comfort and safety assessment results

Description / Location		Wind Tunnel Results					
		Comfort rating, 5% exceedance wind speed (m/s)			Safety rating, 0.022% exceedance wind speed (m/s)		
		Configuration			Configuration		
		Existing	Proposed - Low	Proposed - High	Existing	Proposed - Low	Proposed - High
Surrounds	1	4.3	4.6	4.3	8.7	9.6	8.7
	2	10.4	9.8	10.0	18.9	19.4	18.7
	3	6.9	5.9	5.7	12.2	11.3	10.9
	4	6.8	6.2	6.1	13.0	10.7	10.9
	5	4.0	4.4	5.2	6.9	8.0	9.3
	6	5.3	5.2	4.9	9.8	10.0	4.9
Site Edges	7	4.8	5.1	4.3	8.5	9.3	7.8
	8	5.5	6.5	5.7	10.4	12.2	10.2
	9	5.5	6.7	7.2	9.8	12.4	13.6
	10	8.2	8.0	8.2	16.6	15.5	14.4
	11	7.9	7.1	7.7	15.2	12.9	13.6
	12	7.0	6.8	5.3	13.7	14.0	11.7
	13	6.0	6.0	7.6	12.0	11.3	14.7
	14	5.4	5.0	5.3	11.6	11.1	11.1
	15	7.1	6.7	6.5	14.4	11.5	14.4
	16	6.8	4.9	6.3	13.4	8.6	11.5
	17	5.4	6.6	6.6	9.2	12.5	12.6
	18	5.0	5.5	6.6	8.8	9.7	12.9
Central Plaza	19		4.0	5.3		7.3	9.7
	20		3.3	5.1		6.8	9.9
	21		4.2	4.7		8.3	8.6
	22		3.6	4.4		8.8	8.3
	23		3.9	5.1		7.1	9.0
	24		5.4	5.2		10.1	9.1
Average (1-18, -6)		6.3	6.2	6.4			

LEGEND	
<b>Comfort Criteria</b>	<b>Safety Criteria</b>
 Outdoor Dining	 Passes safety criteria
 Pedestrian Sitting	 Able bodied
 Pedestrian Standing	 Fails safety criteria
 Pedestrian Walking	
 Business Walking	
 Uncomfortable	

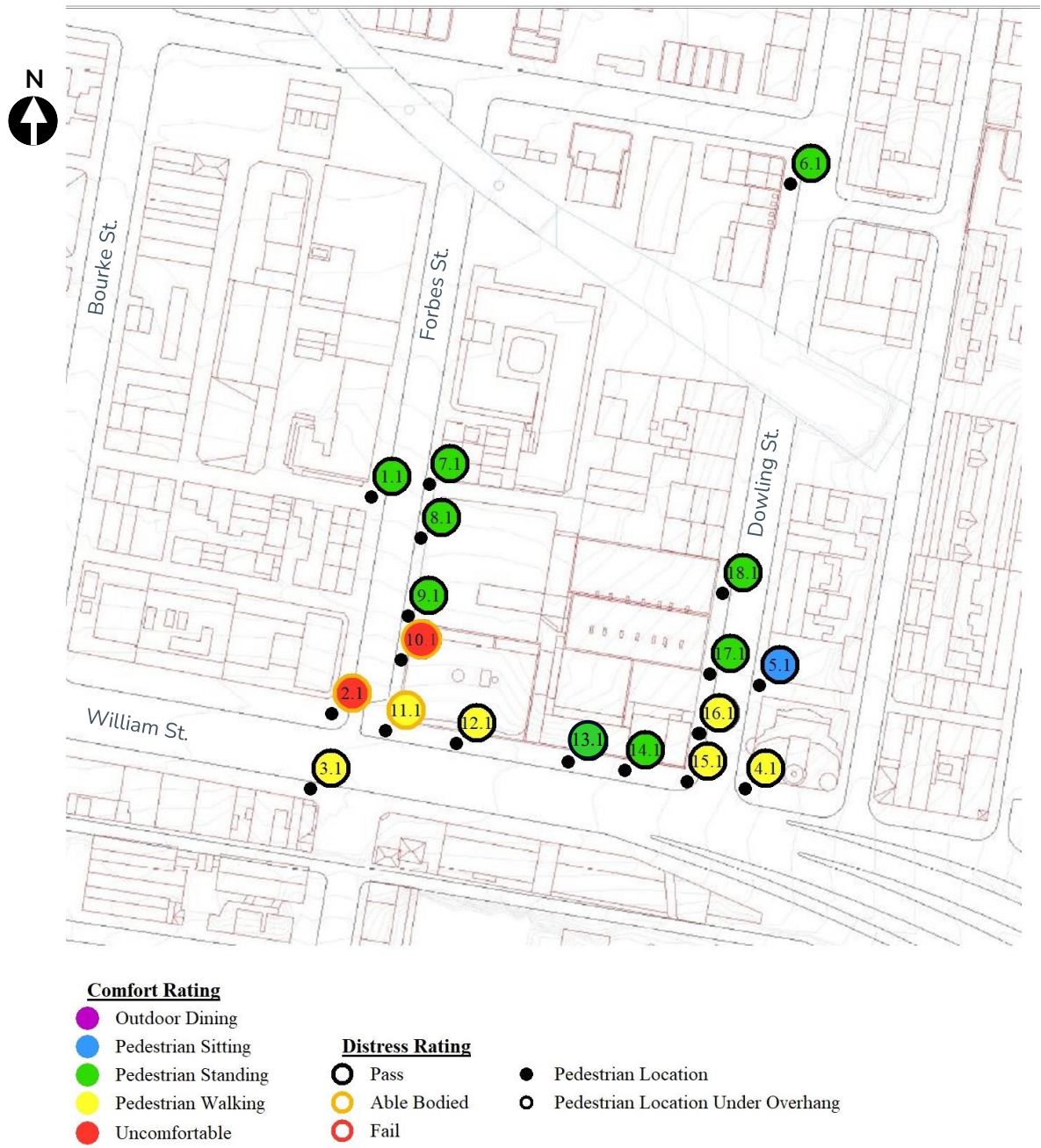


Figure 5: Pedestrian wind speed measurement locations with comfort/safety ratings – Existing Site

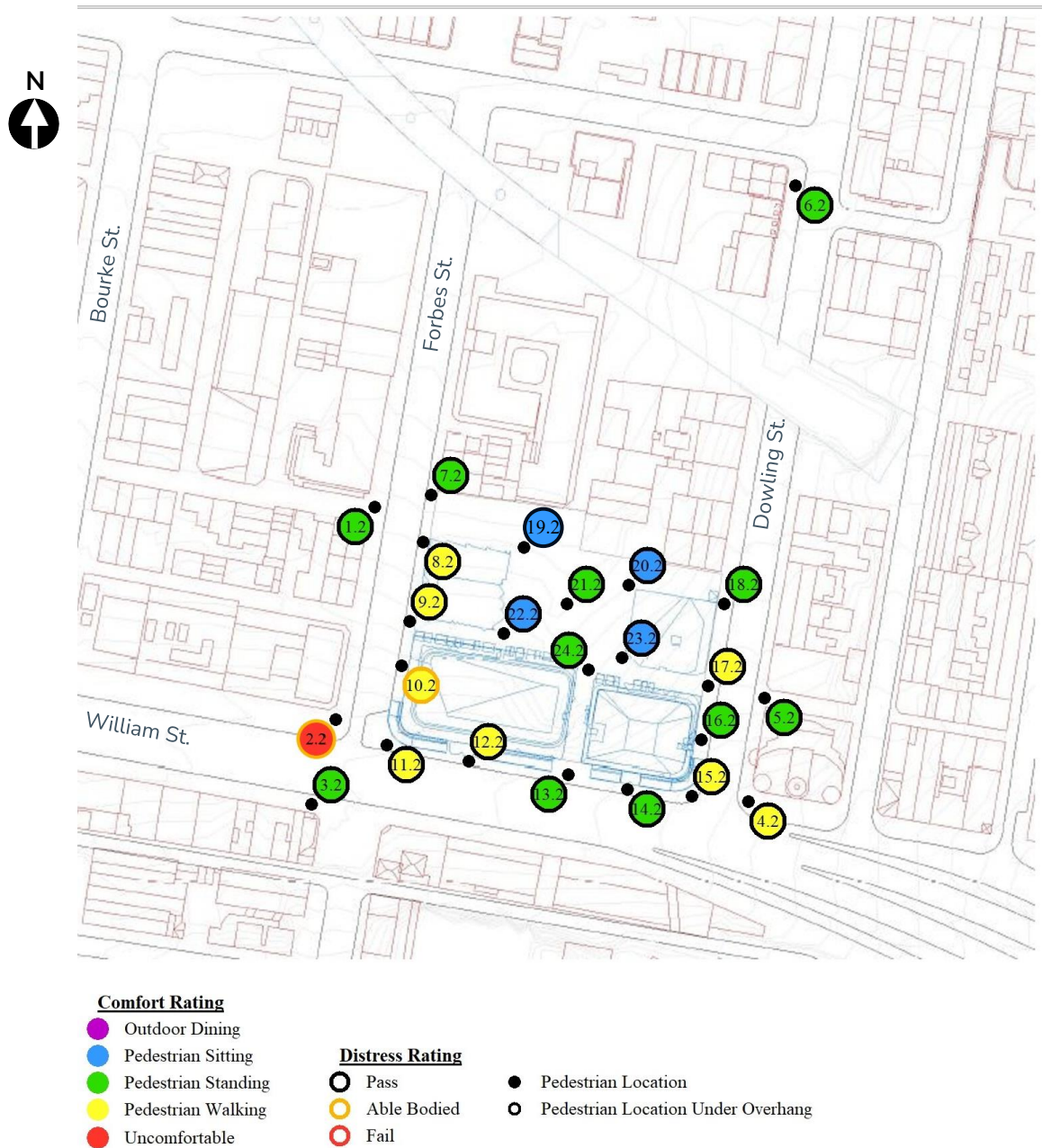


Figure 6: Pedestrian wind speed measurement locations with comfort/safety ratings – Initial Scheme

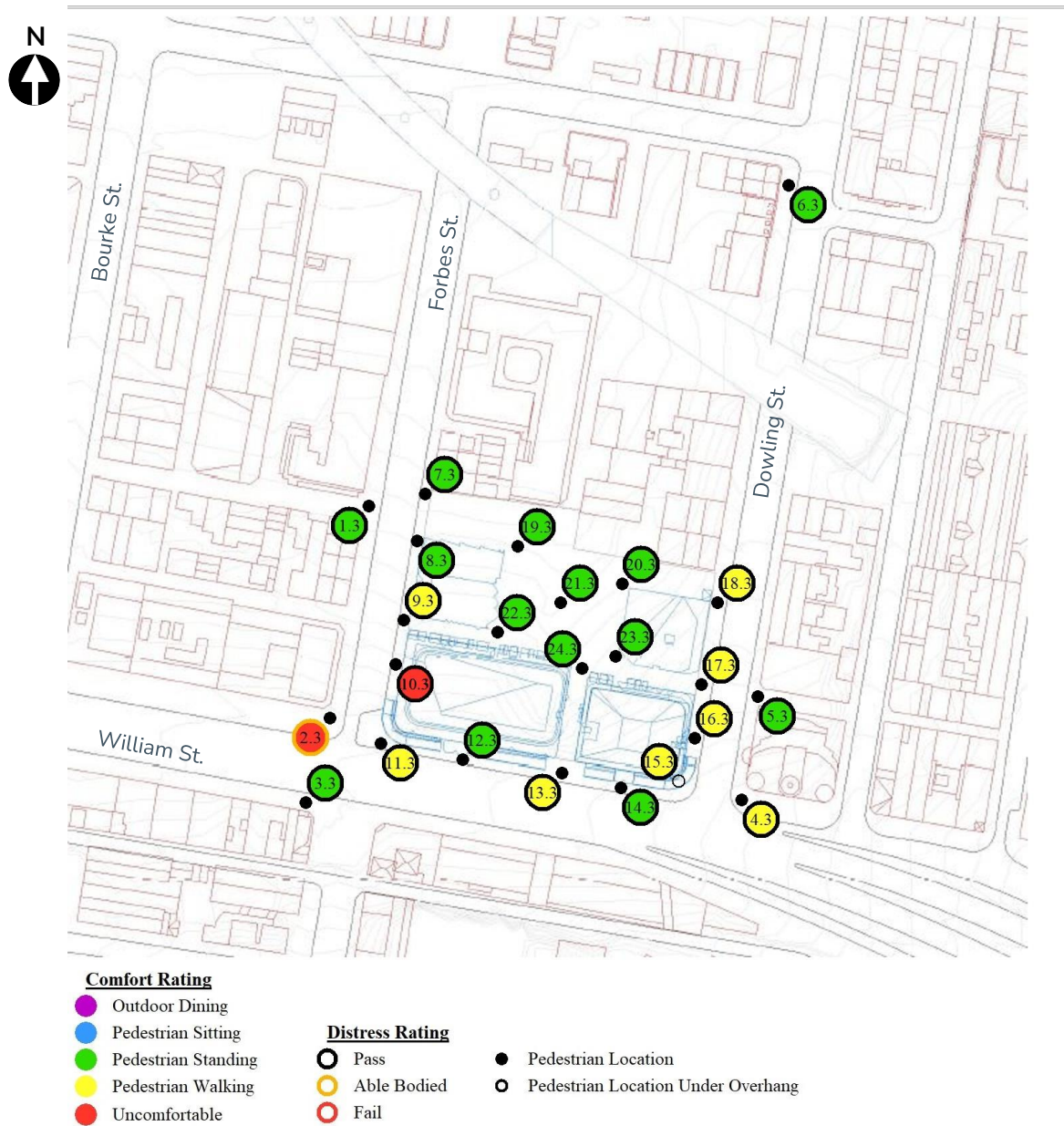


Figure 7: Pedestrian wind speed measurement locations with comfort/safety ratings – Affordable Housing Scheme

## 4. Discussion

### GENERAL CONDITIONS

Pedestrian level winds in Sydney tend to be governed by exposure to prevailing winds from the north-east, south or west. In general, slightly stronger local winds are found near street block corners, or in more open areas such as large parks, while milder areas are available where the nearby buildings can provide shielding from these prevailing wind directions.

In the street-level areas surrounding the site (Locations 1-6, Figure 5 to Figure 7) comfort conditions are generally classified as Pedestrian Standing or Pedestrian Walking, with the exception of Location 2, which is classified as uncomfortable caused by the large building massing on William Street between Forbes and Bourke Streets to the immediate west of the site. The proposed development improves the wind conditions at the site by reducing the impact of winds from the north-east. Location 5.1 has slightly milder conditions and is rated as Pedestrian Sitting.

The proposed site has little measurable impact on the wind conditions in the surrounding area.

Location 2 exceeds the Lawson safety criterion, recording an Able-Bodied rating in all configurations.

### SITE PERIMETER

The comfort and safety ratings along Forbes, William, and Dowling Streets, Locations 7 to 18, are presented in Figure 5 to Figure 7. In general, they are similar to the wind conditions in surrounding areas being classified as suitable for Pedestrian Standing or Walking.

In general, the proposed development makes little difference to the wind conditions around the site edges, with the exception of Locations 9, 13, 17, and 18. These locations are at the ends of new pedestrian thoroughfares in transient areas. In these cases, the proposed site tends to increase the local wind speed through pressure-driven flow during winds from the north-east. These winds are temperature driven and typically occur in summer afternoons, and can provide some thermal comfort. The Lawson wind comfort classification moves from Pedestrian Standing to Pedestrian Walking, hence the measured comfort conditions are considered suitable for the intended use of the space. All of these locations pass the safety criterion.

At Locations 10 and 11, strong wind conditions are caused by winds from the south-west quadrant being channelled along William Street by the existing buildings and accelerating into Forbes Street. Wind conditions improved in Configurations B and C for comfort and safety (particularly Location 10), due to the shielding offered to winds from the south-west by the awning along the corner of William Street and Forbes Street, as well as the building massing for winds from the north-east. In Configuration C, the larger building massing creates slightly stronger wind conditions for winds from the north by channelling the flow through Forbes Street concentrated at ground level. In Configurations B and C, Location 11 is classified as suitable for Pedestrian Walking, and Location 10 is considered Uncomfortable in Configuration C, which is similar to the existing wind conditions.

From a safety perspective, Location 10 is classified as Able-Bodied rating in the existing configuration and Configuration B, while Location 11 marginally exceeded the safety criterion in the existing configuration.

## CENTRAL PLAZA

Wind conditions within the new open central plaza to the north of the site are shown in Figure 6 and Figure 7 (Locations 19-24). Wind comfort levels in this area were milder than in the surrounding area, due to shielding from the courtyard massing of the proposed development. The comfort classification in the area is between Pedestrian Sitting and Pedestrian Standing. The increased height of the south-eastern building in Configuration C increases flow into the plaza, with comfort classifications as suitable for Pedestrian Standing. All locations pass the Lawson safety criterion.

## APPLICABILITY

Testing was performed without landscaping to provide a worst-case assessment. Heavy landscape planting typically reduces wind speeds by less than 10% and in general should not be relied upon to mitigate strong winds due to variation in size and foliage and difficulty in accurate modelling. Further, trees or other plantings may pose a safety risk if damaged during high winds.

The results presented within this report are based on the 3D model, 240918 – Model to CPP.3dm, received by CPP on 18 September 2024 for Configuration B, and the 3D drawing, H180W - Massing Model for Wind Testing.dwg, received by CPP on 1 May 2025 for Configuration C. If significant changes to the design of the development have occurred beyond these dates or new information regarding the status of surrounding buildings becomes available, it is recommended that CPP be contacted to evaluate the impact of any changes.

# 5. Conclusion

CPP has conducted a wind tunnel study to quantify the impact of the proposed 180 William Street development on the pedestrian-level wind environment. In general, most pedestrian-accessible areas around the site are assessed as suitable for Pedestrian Standing or Pedestrian Walking under the Lawson comfort criteria. These wind conditions are typical of the surrounding areas and considered appropriate for the intended use of public domain spaces. Calmer wind conditions are available within the central plaza area to the north of the site.

In general, the proposed development has little impact on the measured wind conditions in and around the site. From an equivalence perspective, Configurations B and C marginally improved and worsened the wind conditions respectively compared with the existing conditions.

Three locations on the south-west corner of the site exceeded the Lawson safety criterion in the existing configuration and rated for Able-Bodied pedestrians. With the inclusion of the proposed development, the safety wind conditions around this corner improved, with only two exceedances for the Initial configuration, and a single exceedance for the Affordable Housing configuration. All other locations passed the Lawson safety criterion.

## References

American Society of Civil Engineers (1999), *Wind tunnel studies of buildings and structures*, ASCE Manuals and reports on engineering practice No.67.

American Society of Civil Engineers (2021), *Wind Tunnel Testing for Buildings and Other Structures* (ASCE 49-21).

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City of Sydney (2022), *Central Sydney Planning Strategy 2016-2036*.

Lawson, T.V. (1990), "The Determination of the Wind Environment of a Building Complex before Construction" Department of Aerospace Engineering, University of Bristol, Report Number TVL 9025.

Standards Australia (2021), *Australian/New Zealand Standard, Structural Design Actions, Part 2: Wind Actions* (AS/NZS1170.2:2021).

## Appendix A – Wind Tunnel Test Facilities

The wind tunnel testing was performed at the CPP wind engineering laboratory in Sydney, Australia. Specifications for the wind tunnel used for this project are given in Figure A2.

The mean velocity profile approaching the modelled area for each direction has the form:

$$\frac{U}{U_{ref}} = \left( \frac{z}{z_{ref}} \right)^n$$

in which  $U$  is the mean velocity at height  $z$ ,  $U_{ref}$  is a reference wind speed at reference height  $z_{ref}$ , and  $n$  is a constant which depends on the characteristics of the upstream roughness for each direction.

Mean velocity and turbulence intensity profiles for the boundary layer flow approaching the model are shown in. The turbulence intensities are appropriate for the approach mean velocity profiles selected.

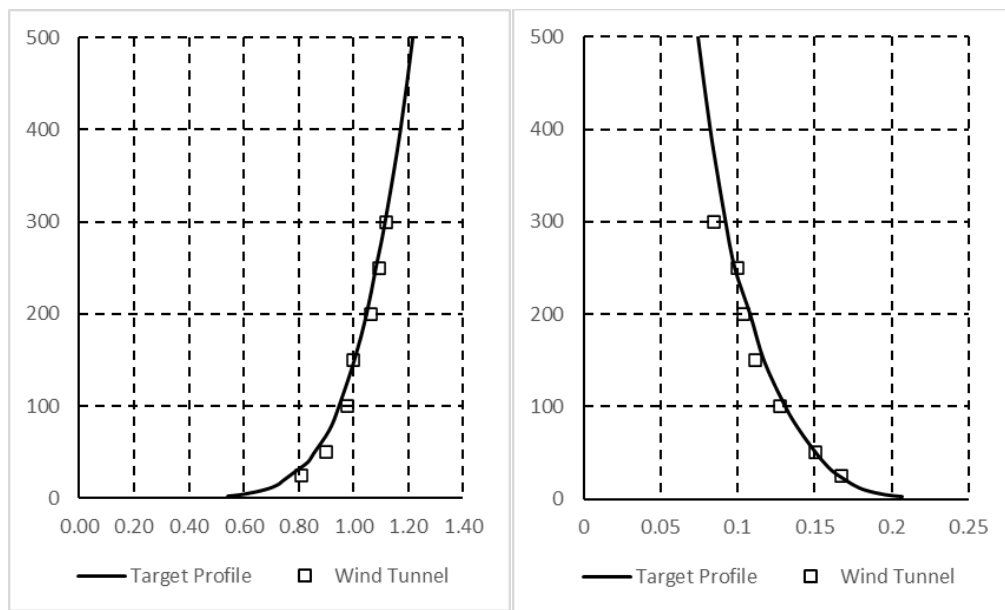


Figure A1a: Mean wind speed (L) and turbulence intensity (R) profiles approaching the model, Open Water approach

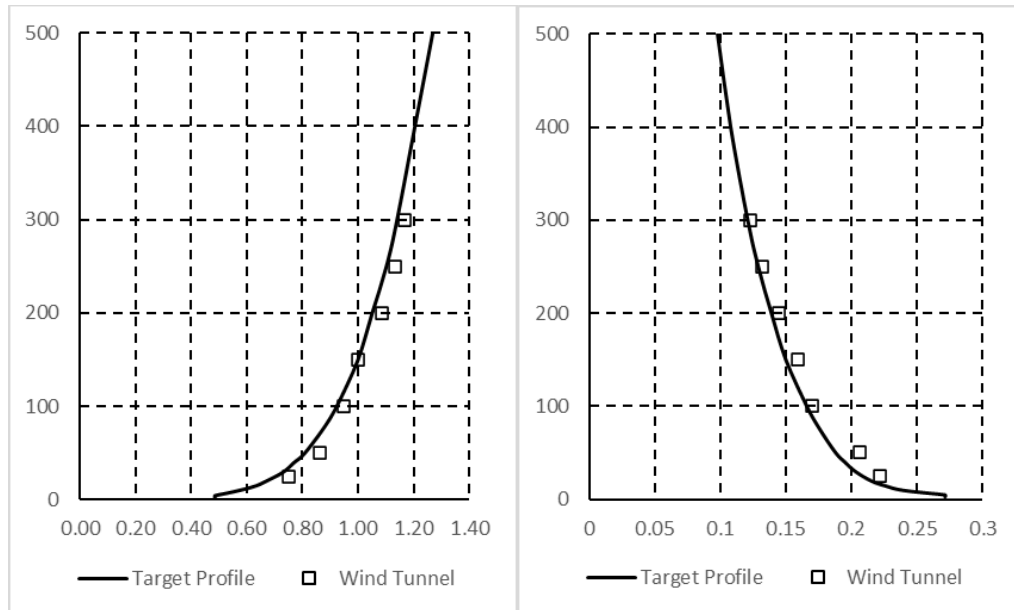


Figure A1b: Mean wind speed (L) and turbulence intensity (R) profiles approaching the model, Built-up approach

CPP SYDNEY WIND TUNNELS	
<b>DIMENSIONS</b>	
Test section length	21 m
Test section width	3 m
Ceiling height	2.4 m
<b>DRIVE SPECIFICATIONS</b>	
Total power	110 kW
Type of drive	Single Axle motor/12 blade axial fan
Speed Control	Variable frequency drive
<b>FLOW CHARACTERISTICS</b>	
Mean Velocity	0 to 20 m/s
Boundary-layer thickness*	1.2 m (nominal)
Turbulence	About 2% at entrance to test section
Longitudinal pressure gradient	Zero by blockage tolerant roof

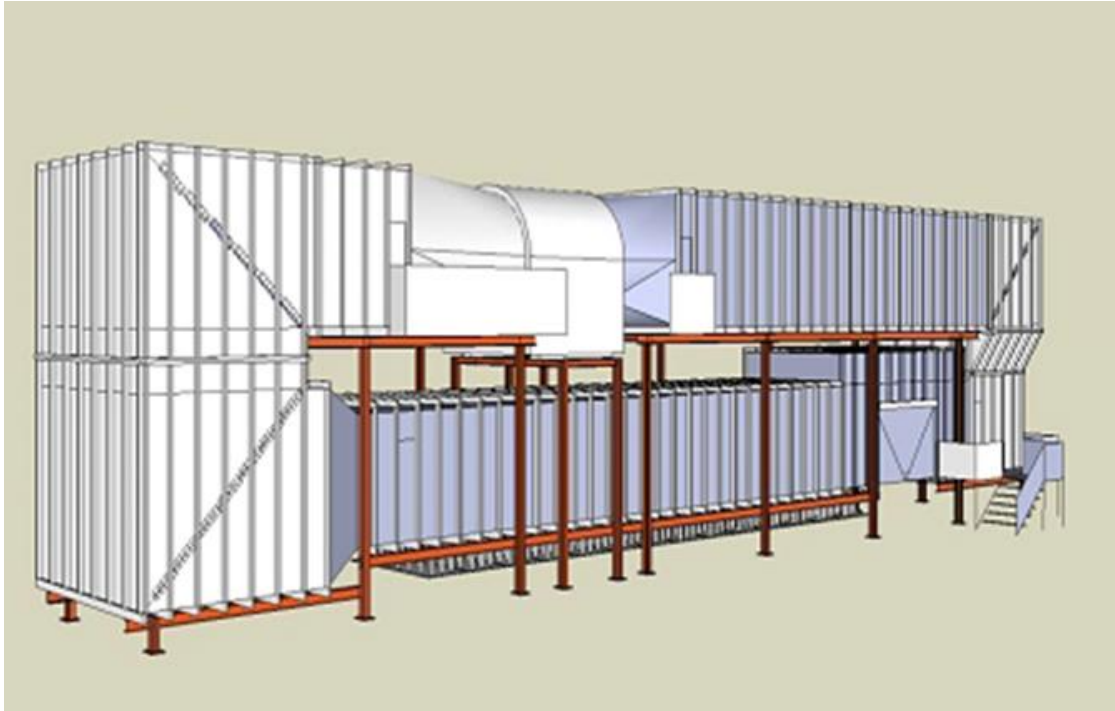
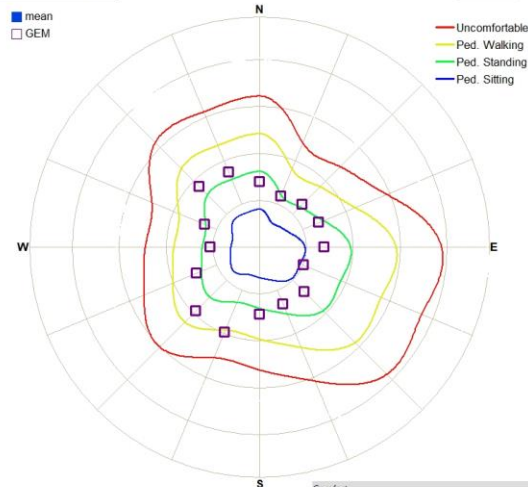


Figure A2: CPP Wind Tunnel - Sydney, Australia

## Appendix B - Directional wind results

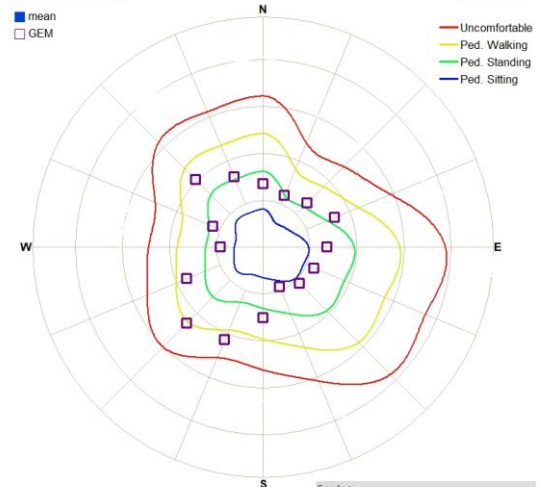
LOCATION 1.1



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	21.65	50.03	50.03
4	2.83	7.19	7.19
6	0.31	0.65	0.65
8	0.02	0.06	0.06
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.4	4.3	4.3
Rating	Ped Sitting	Ped Standing	Ped Standing

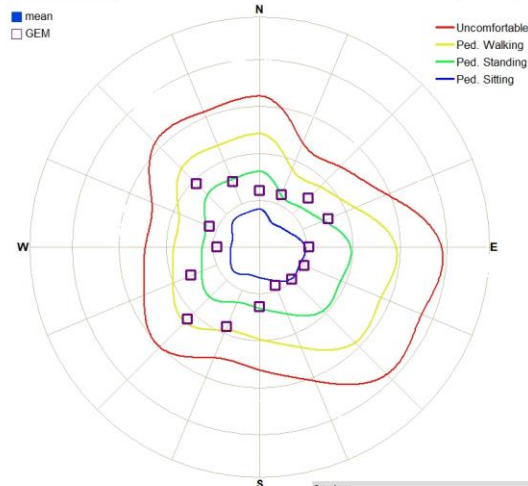
LOCATION 1.2



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	22.51	48.03	48.03
4	3.23	9.35	9.35
6	0.41	1.23	1.23
8	0.03	0.15	0.15
10	0.00	0.01	0.01

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.4	4.6	4.6
Rating	Ped Sitting	Ped Standing	Ped Standing

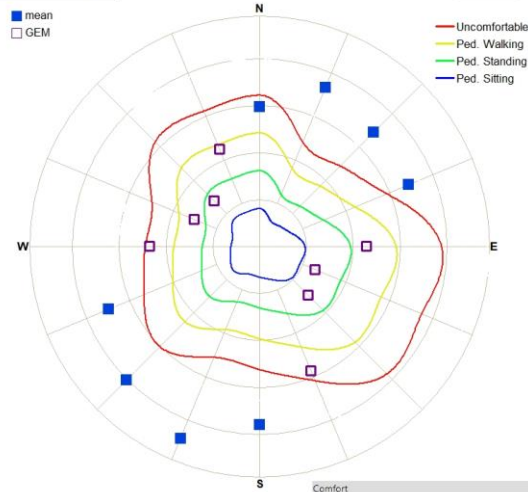
LOCATION 1.3



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	21.76	43.62	43.62
4	1.55	7.75	7.75
6	0.09	0.65	0.65
8	0.00	0.05	0.05
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.1	4.3	4.3
Rating	Ped Sitting	Ped Standing	Ped Standing

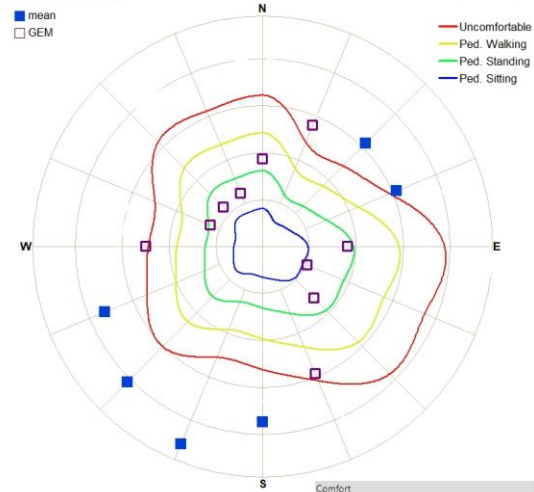
**LOCATION 2.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	66.21	72.57	73.86
4	45.14	44.48	47.94
6	29.55	25.16	30.50
8	15.73	9.38	15.97
10	6.56	2.81	6.60

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	10.4	9.0	10.4
Rating	Uncomfortable	Bus Walking	Uncomfortable

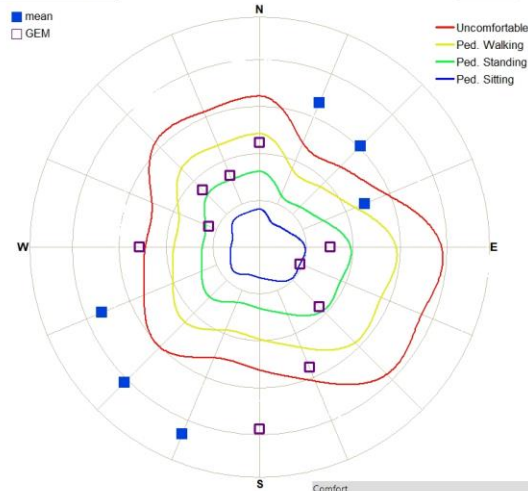
**LOCATION 2.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	60.07	67.13	67.78
4	40.43	42.04	43.53
6	25.73	24.56	27.54
8	11.60	9.50	12.48
10	4.48	3.03	4.70

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	9.7	9.1	9.8
Rating	Bus Walking	Bus Walking	Bus Walking

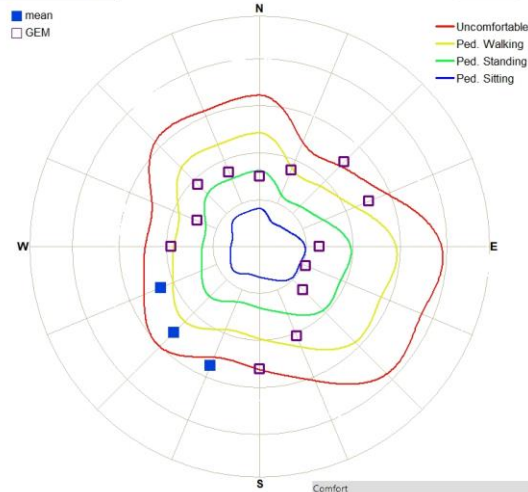
**LOCATION 2.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	62.61	71.02	71.70
4	40.67	42.69	44.47
6	25.54	24.30	27.10
8	12.45	10.15	13.32
10	4.92	3.55	5.25

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	9.9	9.3	10.0
Rating	Bus Walking	Bus Walking	Uncomfortable

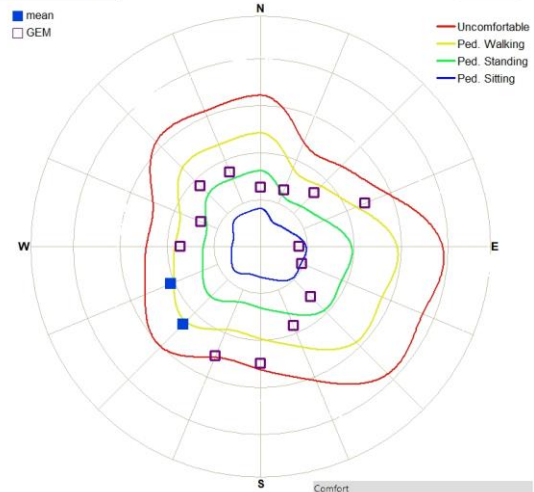
**LOCATION 3.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	49.59	63.22	63.69
4	19.25	30.75	31.59
6	4.76	9.51	10.22
8	0.89	1.72	1.97
10	0.14	0.23	0.28

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.8	6.8	6.9
Rating	Ped Standing	Ped Walking	Ped Walking

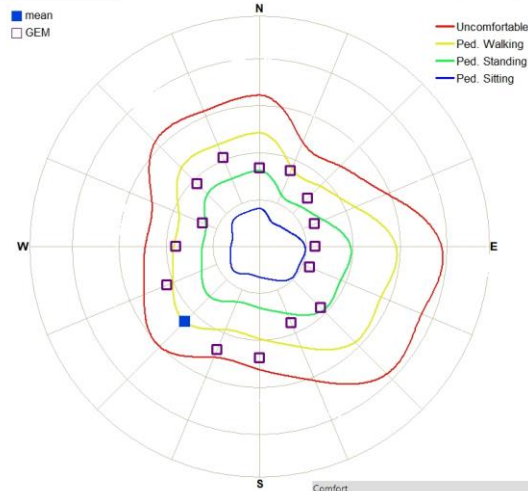
**LOCATION 3.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	42.67	58.03	58.24
4	12.14	22.69	23.03
6	2.77	4.86	5.02
8	0.40	0.73	0.76
10	0.06	0.10	0.10

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.2	5.9	6.0
Rating	Ped Standing	Ped Standing	Ped Standing

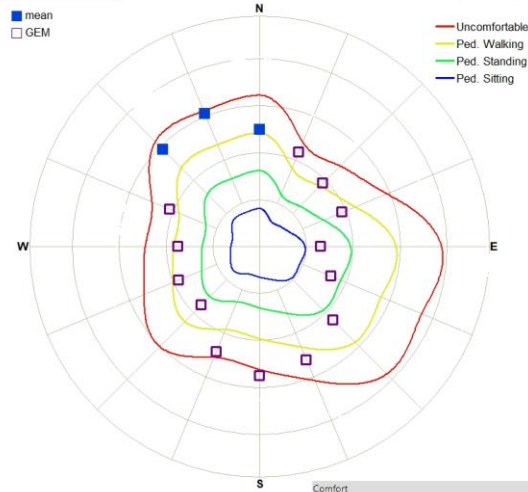
**LOCATION 3.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	45.77	61.45	61.55
4	13.16	20.76	20.88
6	2.37	4.06	4.11
8	0.28	0.54	0.55
10	0.03	0.06	0.06

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.1	5.7	5.7
Rating	Ped Standing	Ped Standing	Ped Standing

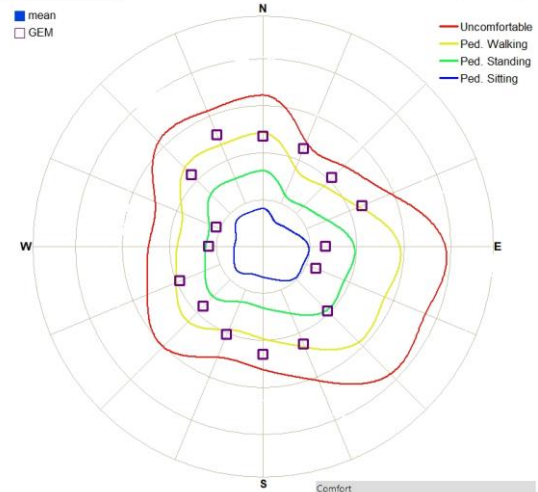
**LOCATION 4.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	67.07	74.82	75.52
4	23.75	33.58	34.18
6	5.22	9.00	9.27
8	0.96	1.82	1.98
10	0.16	0.28	0.32

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.0	6.7	6.8
Rating	Ped Standing	Ped Walking	Ped Walking

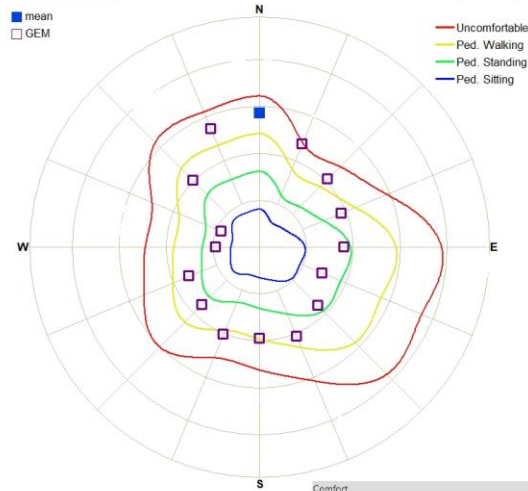
**LOCATION 4.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	54.07	66.92	66.92
4	15.90	27.78	27.78
6	2.22	6.51	6.51
8	0.14	0.82	0.82
10	0.01	0.06	0.06

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.2	6.2	6.2
Rating	Ped Standing	Ped Walking	Ped Walking

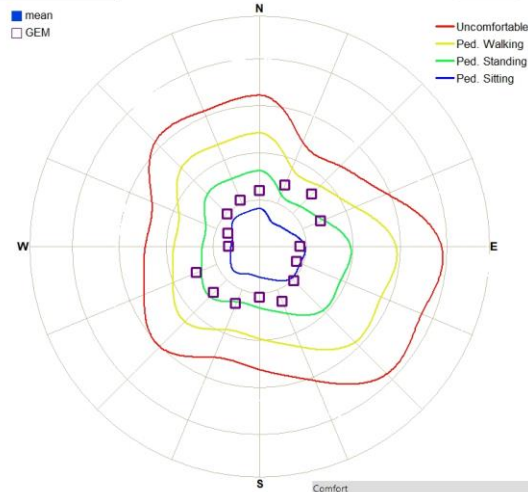
**LOCATION 4.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	49.52	65.04	65.11
4	12.55	23.29	23.41
6	2.44	5.57	5.64
8	0.34	0.83	0.86
10	0.03	0.07	0.07

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.0	6.1	6.1
Rating	Ped Standing	Ped Walking	Ped Walking

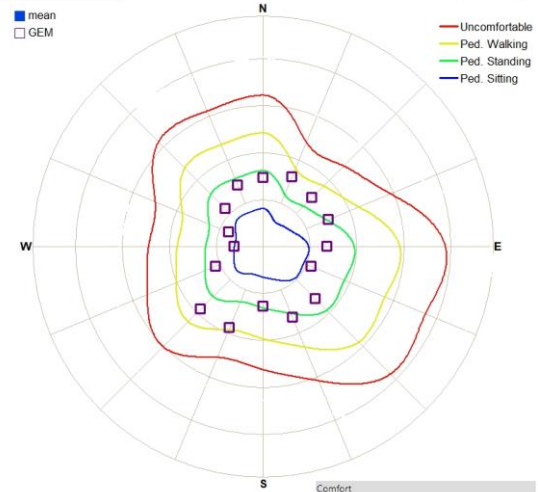
**LOCATION 5.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	17.00	36.19	36.19
4	0.64	5.17	5.17
6	0.00	0.21	0.21
8	0.00	0.00	0.00
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	2.9	4.0	4.0
Rating	Ped Sitting	Ped Sitting	Ped Sitting

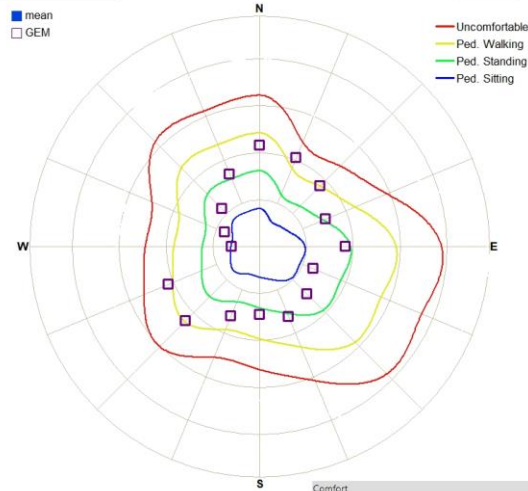
**LOCATION 5.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	25.45	46.08	46.08
4	1.85	8.41	8.41
6	0.03	0.56	0.56
8	0.00	0.03	0.03
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.4	4.4	4.4
Rating	Ped Sitting	Ped Standing	Ped Standing

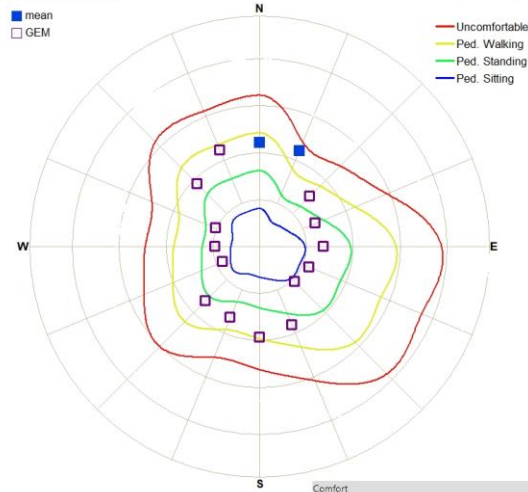
**LOCATION 5.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	39.69	52.92	52.92
4	5.78	14.91	14.91
6	0.26	2.40	2.40
8	0.00	0.14	0.14
10	0.00	0.01	0.01

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.1	5.2	5.2
Rating	Ped Standing	Ped Standing	Ped Standing

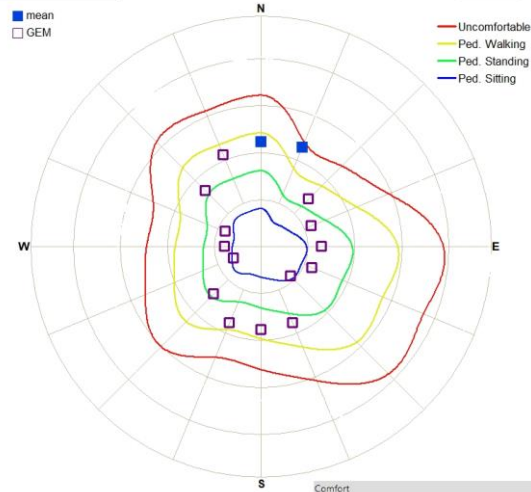
**LOCATION 6.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	30.43	53.77	53.98
4	6.42	14.26	14.42
6	1.77	2.66	2.76
8	0.20	0.25	0.28
10	0.01	0.02	0.02

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.4	5.3	5.3
Rating	Ped Standing	Ped Standing	Ped Standing

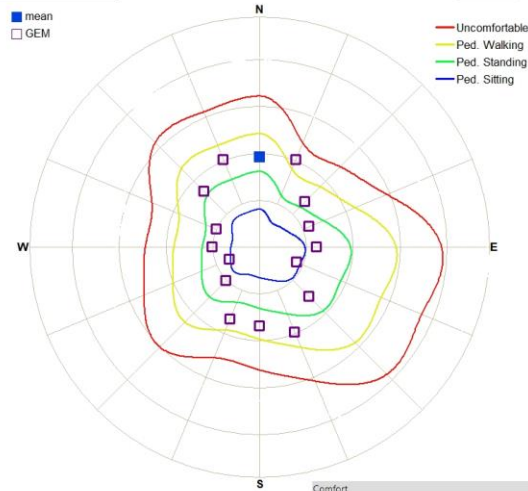
**LOCATION 6.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	26.20	49.15	49.28
4	6.09	12.82	12.94
6	2.00	2.57	2.69
8	0.28	0.28	0.32
10	0.02	0.02	0.02

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	5.2	5.2
Rating	Ped Standing	Ped Standing	Ped Standing

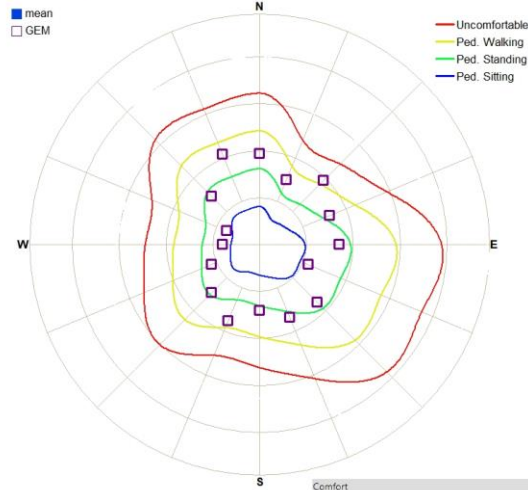
**LOCATION 6.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	25.79	50.46	50.47
4	4.91	11.49	11.50
6	0.80	1.60	1.60
8	0.04	0.07	0.08
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.9	4.9	4.9
Rating	Ped Sitting	Ped Standing	Ped Standing

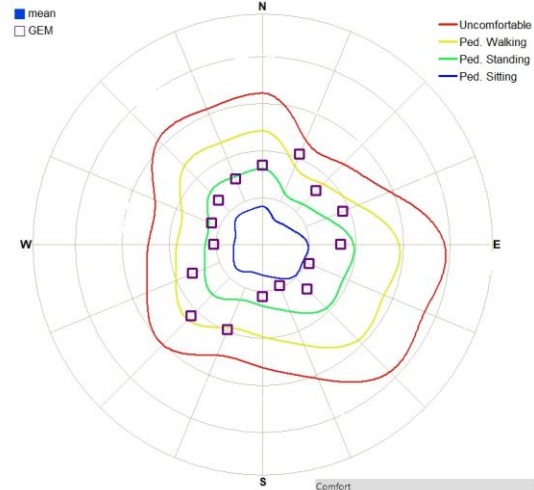
**LOCATION 7.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	26.21	52.10	52.10
4	1.80	11.82	11.82
6	0.03	1.24	1.24
8	0.00	0.07	0.07
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.3	4.8	4.8
Rating	Ped Sitting	Ped Standing	Ped Standing

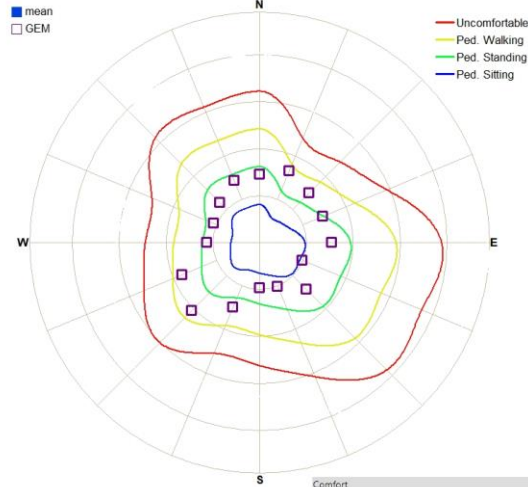
**LOCATION 7.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	25.53	47.88	47.88
4	2.51	13.36	13.36
6	0.06	2.03	2.03
8	0.00	0.15	0.15
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.5	5.1	5.1
Rating	Ped Sitting	Ped Standing	Ped Standing

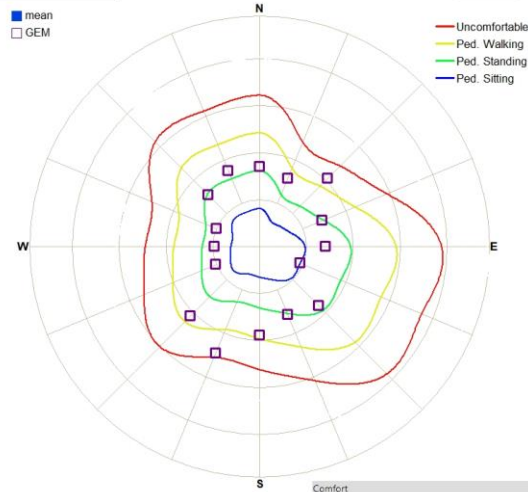
**LOCATION 7.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	18.57	43.15	43.15
4	0.43	7.90	7.90
6	0.01	0.50	0.50
8	0.00	0.02	0.02
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	2.8	4.3	4.3
Rating	Ped Sitting	Ped Standing	Ped Standing

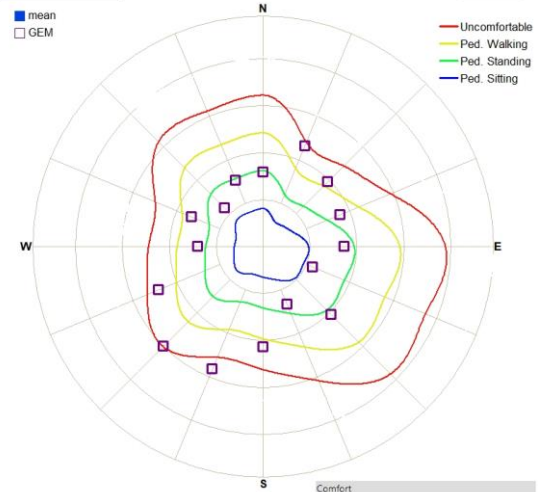
**LOCATION 8.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	29.62	54.25	54.25
4	4.15	16.46	16.46
6	0.28	3.21	3.21
8	0.02	0.39	0.39
10	0.00	0.04	0.04

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.8	5.5	5.5
Rating	Ped Sitting	Ped Standing	Ped Standing

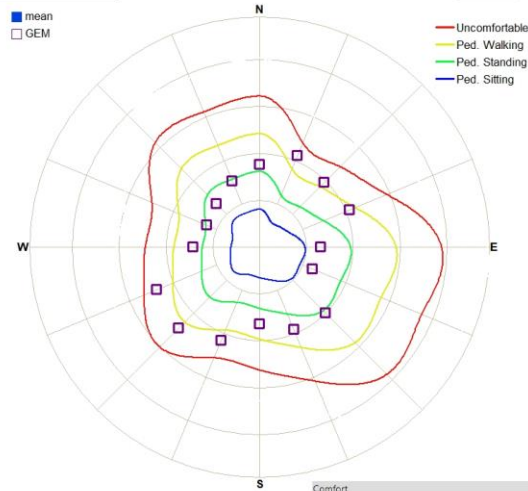
**LOCATION 8.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	41.86	61.87	61.87
4	10.78	25.27	25.27
6	1.70	7.26	7.26
8	0.21	1.32	1.32
10	0.02	0.20	0.20

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.8	6.5	6.5
Rating	Ped Standing	Ped Walking	Ped Walking

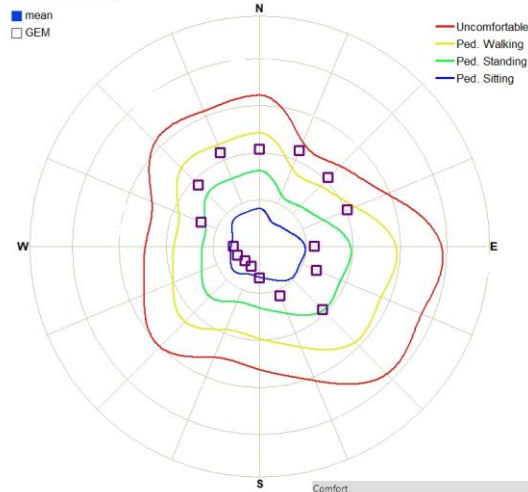
**LOCATION 8.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	40.75	60.64	60.64
4	7.64	22.16	22.16
6	0.49	4.00	4.00
8	0.01	0.41	0.41
10	0.00	0.03	0.03

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	5.7	5.7
Rating	Ped Standing	Ped Standing	Ped Standing

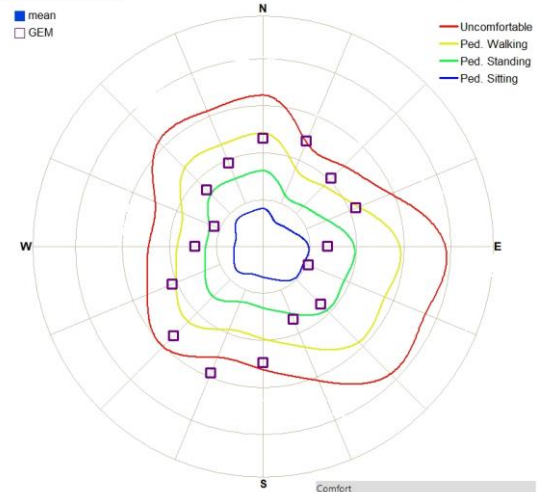
**LOCATION 9.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	24.92	40.09	40.09
4	7.27	14.29	14.29
6	0.98	3.37	3.37
8	0.04	0.36	0.36
10	0.00	0.02	0.02

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.4	5.5	5.5
Rating	Ped Standing	Ped Standing	Ped Standing

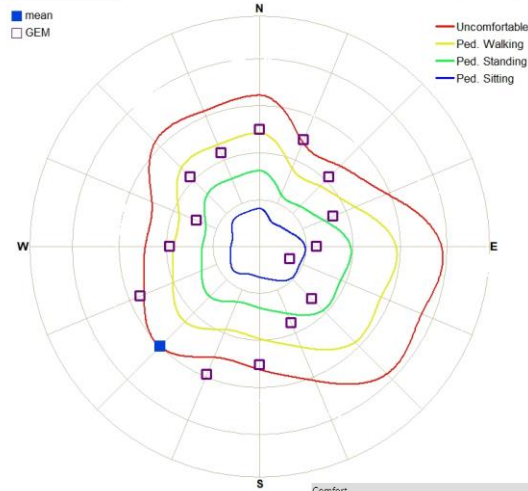
**LOCATION 9.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	49.37	64.47	64.47
4	17.61	29.30	29.30
6	4.65	8.97	8.97
8	0.72	1.78	1.78
10	0.09	0.26	0.26

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.8	6.7	6.7
Rating	Ped Standing	Ped Walking	Ped Walking

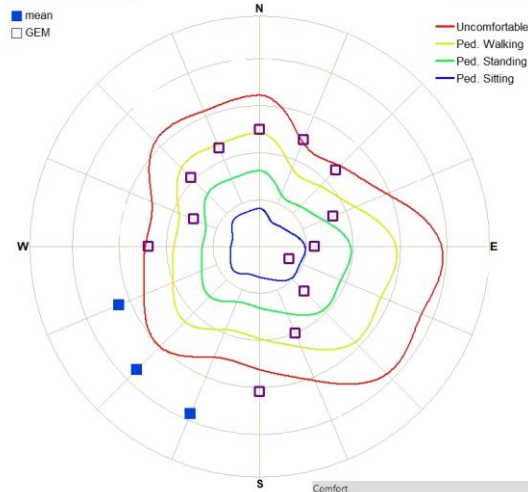
**LOCATION 9.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	56.61	67.37	67.38
4	23.02	31.78	31.79
6	7.21	10.96	10.97
8	1.45	2.44	2.44
10	0.25	0.37	0.38

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.5	7.2	7.2
Rating	Ped Walking	Ped Walking	Ped Walking

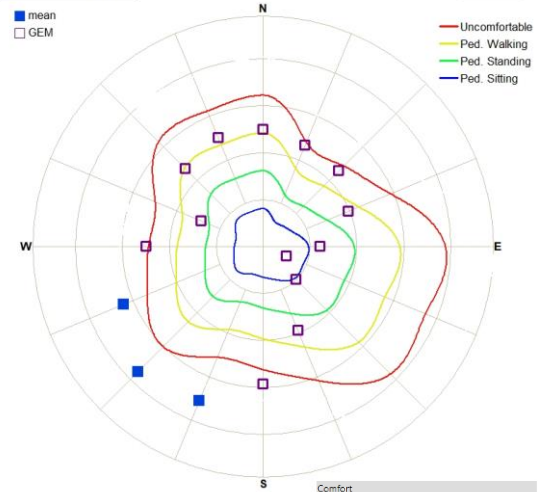
**LOCATION 10.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	57.00	68.84	69.15
4	29.06	36.55	37.03
6	12.18	16.43	17.30
8	4.47	5.20	5.97
10	1.53	1.27	1.80

Comfort			
(%)	MEAN	GEM	COMBINED
V (m/s)	7.7	8.0	8.2
Rating	Ped Walking	Ped Walking	Bus Walking

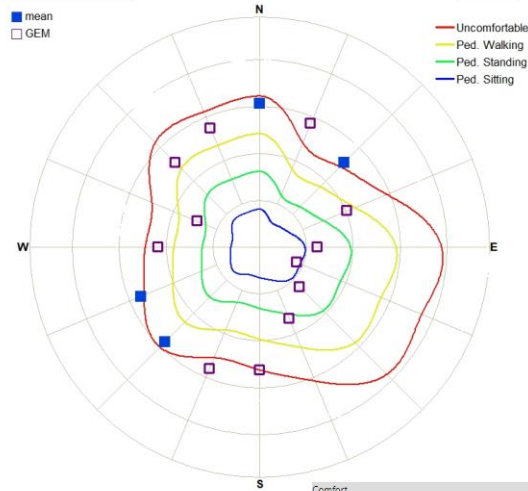
**LOCATION 10.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	58.20	68.40	68.61
4	27.24	37.17	37.47
6	9.93	15.70	16.19
8	3.53	4.73	5.10
10	1.07	1.14	1.35

Comfort			
(%)	MEAN	GEM	COMBINED
V (m/s)	6.0	7.7	8.2
Rating	Bus Walking	Ped Walking	Bus Walking

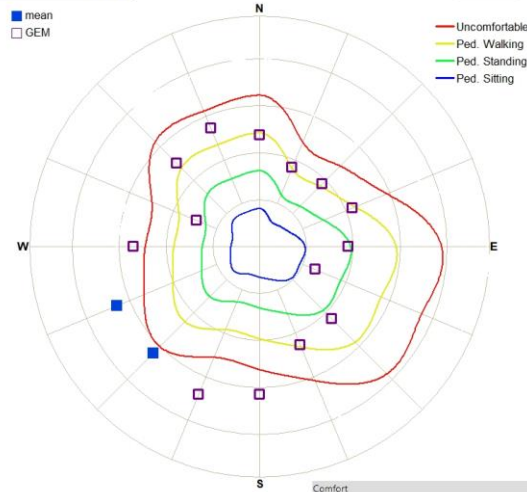
**LOCATION 10.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	60.48	68.96	69.28
4	31.74	35.84	36.53
6	12.99	14.24	15.23
8	3.37	3.73	4.17
10	0.54	0.63	0.73

Comfort			
(%)	MEAN	GEM	COMBINED
V (m/s)	8.0	7.7	8.2
Rating	Bus Walking	Ped Walking	Bus Walking

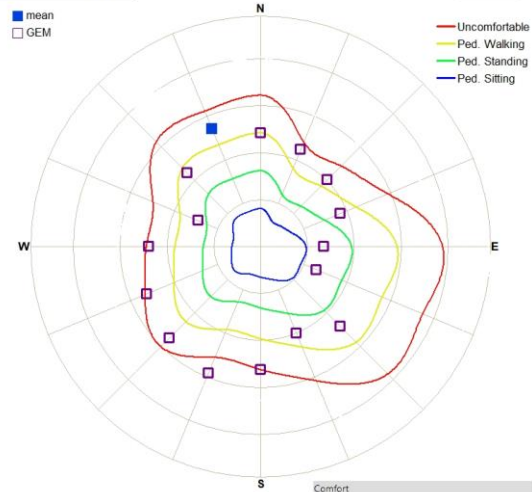
**LOCATION 11.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	61.32	75.32	75.42
4	22.46	37.80	37.92
6	8.94	13.95	14.23
8	3.06	4.72	4.83
10	0.82	1.26	1.35

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	7.1	7.8	7.9
Rating	Ped Walking	Ped Walking	Ped Walking

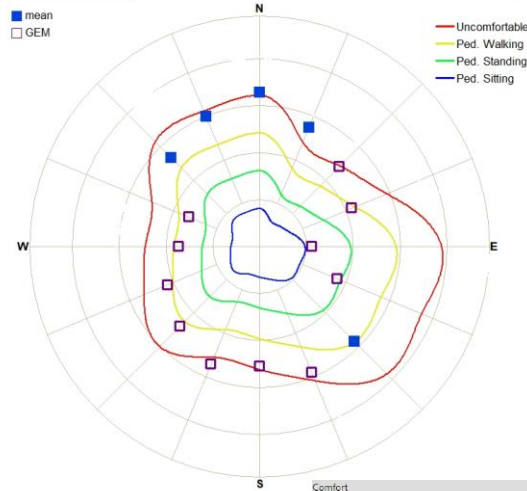
**LOCATION 11.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	61.44	73.02	73.11
4	20.14	34.89	34.95
6	4.53	10.94	10.96
8	0.79	2.31	2.33
10	0.11	0.36	0.36

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.8	7.1	7.1
Rating	Ped Standing	Ped Walking	Ped Walking

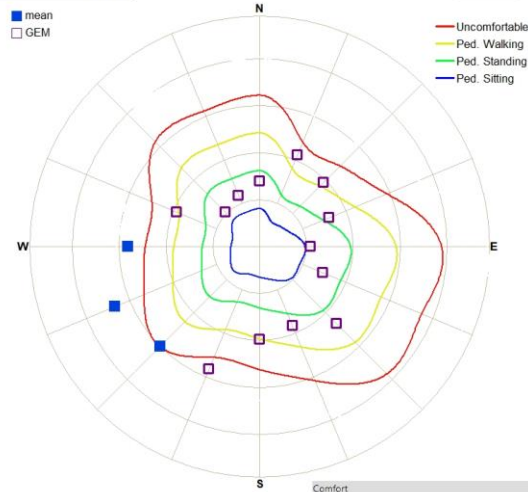
**LOCATION 11.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	71.76	75.74	77.05
4	32.69	38.61	40.26
6	10.38	13.28	14.42
8	2.48	2.83	3.46
10	0.42	0.40	0.58

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	7.2	7.4	7.7
Rating	Ped Walking	Ped Walking	Ped Walking

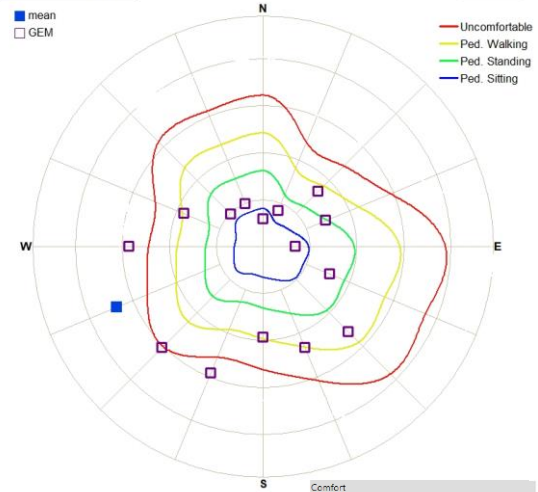
**LOCATION 12.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	50.52	64.05	64.34
4	19.02	28.04	28.43
6	5.94	8.76	9.51
8	1.66	2.06	2.45
10	0.45	0.38	0.59

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.2	6.8	7.0
Rating	Ped Walking	Ped Walking	Ped Walking

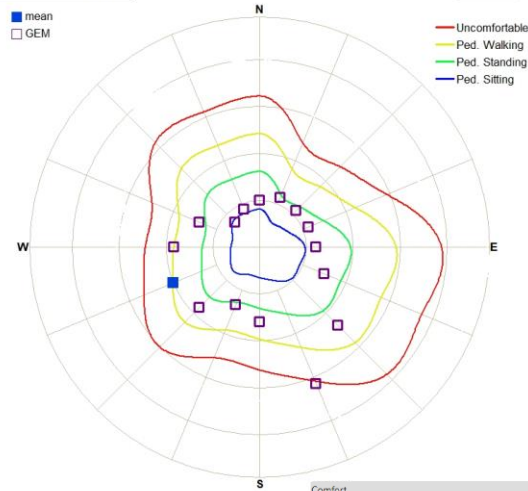
**LOCATION 12.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	40.91	58.10	58.26
4	13.17	24.09	24.26
6	4.89	7.87	8.31
8	1.72	2.28	2.52
10	0.48	0.53	0.68

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	5.3	5.3
Rating	Ped Standing	Ped Standing	Ped Standing

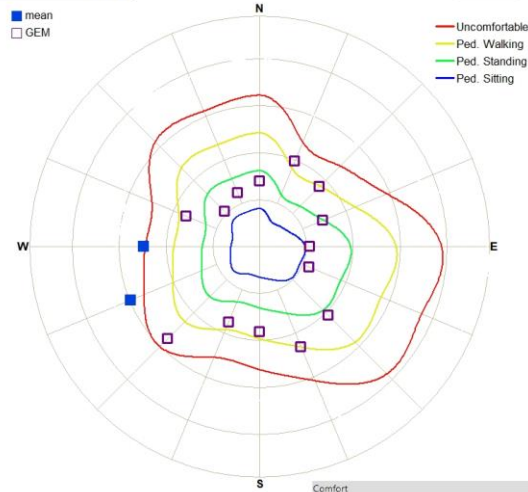
**LOCATION 12.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	31.07	52.10	52.19
4	6.61	11.88	12.04
6	0.92	2.51	2.56
8	0.09	0.47	0.47
10	0.01	0.10	0.10

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	5.3	5.3
Rating	Ped Standing	Ped Standing	Ped Standing

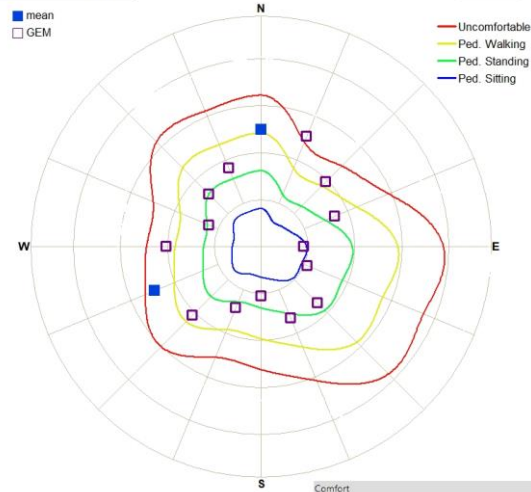
**LOCATION 13.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	45.36	60.73	60.84
4	14.85	23.26	23.46
6	3.80	5.07	5.34
8	0.88	0.92	1.05
10	0.17	0.13	0.18

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.5	6.0	6.0
Rating	Ped Standing	Ped Standing	Ped Walking

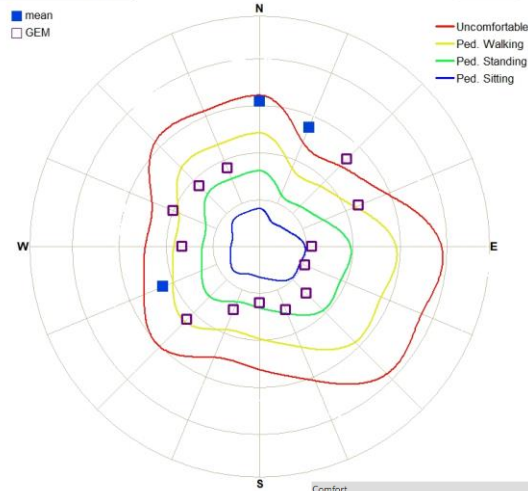
**LOCATION 13.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	41.71	55.61	55.73
4	11.27	18.71	18.91
6	3.00	5.08	5.17
8	0.45	0.94	0.98
10	0.03	0.07	0.08

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.3	6.0	6.0
Rating	Ped Standing	Ped Standing	Ped Standing

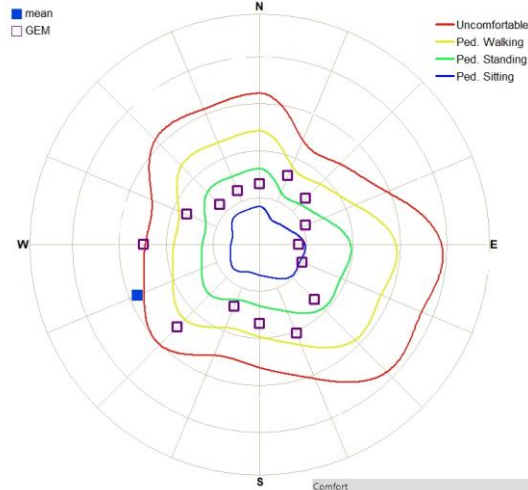
**LOCATION 13.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	49.75	61.13	61.30
4	19.80	23.26	23.62
6	8.45	9.03	9.42
8	2.24	2.12	2.40
10	0.38	0.31	0.39

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	7.4	7.2	7.6
Rating	Ped Walking	Ped Walking	Ped Walking

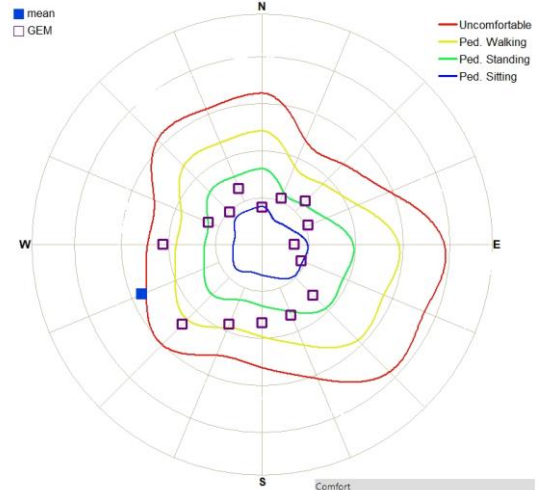
**LOCATION 14.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	38.06	54.00	54.01
4	9.10	15.59	15.61
6	2.37	3.34	3.36
8	0.61	0.78	0.79
10	0.09	0.13	0.13

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.8	5.4	5.4
Rating	Ped Standing	Ped Standing	Ped Standing

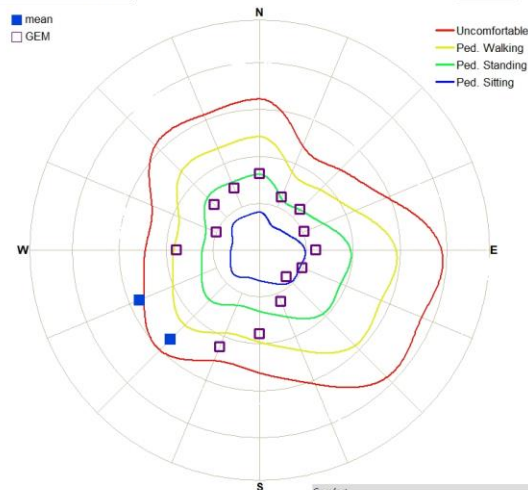
**LOCATION 14.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	29.63	47.77	47.96
4	4.81	11.30	11.69
6	1.37	2.03	2.45
8	0.36	0.29	0.47
10	0.06	0.03	0.07

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.9	4.9	5.0
Rating	Ped Sitting	Ped Standing	Ped Standing

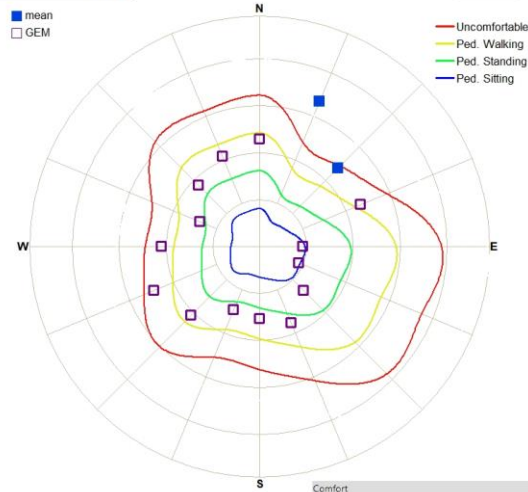
**LOCATION 14.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	28.36	47.13	47.40
4	7.41	12.32	12.82
6	1.97	2.31	2.83
8	0.46	0.35	0.56
10	0.07	0.04	0.08

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.6	5.1	5.3
Rating	Ped Standing	Ped Standing	Ped Standing

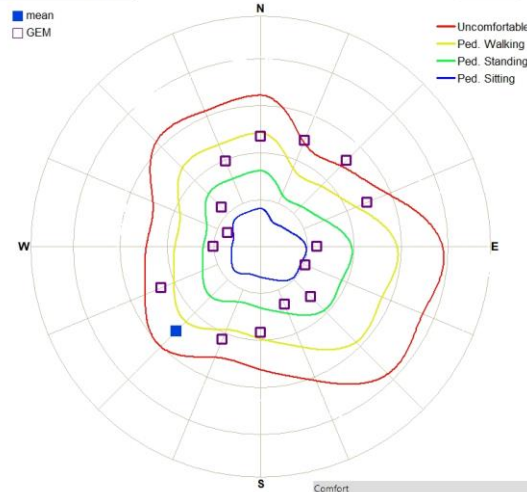
**LOCATION 15.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	44.42	61.48	62.01
4	17.81	23.97	25.35
6	7.64	7.47	9.45
8	2.96	1.31	3.20
10	0.98	0.11	1.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.8	6.5	7.1
Rating	Ped Walking	Ped Walking	Ped Walking

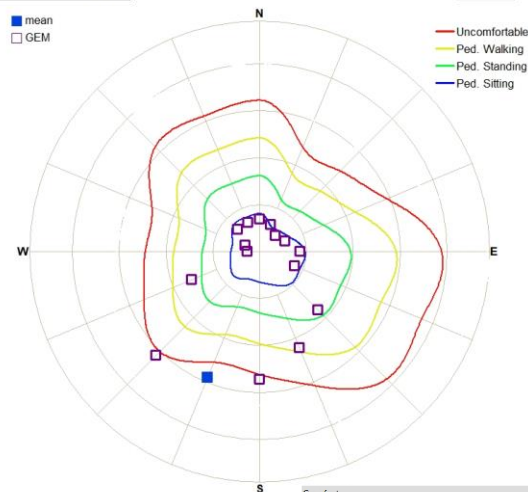
**LOCATION 15.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	44.75	56.77	56.95
4	19.91	24.39	24.63
6	6.70	8.43	8.58
8	1.18	1.54	1.58
10	0.11	0.19	0.20

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.3	6.7	6.7
Rating	Ped Walking	Ped Walking	Ped Walking

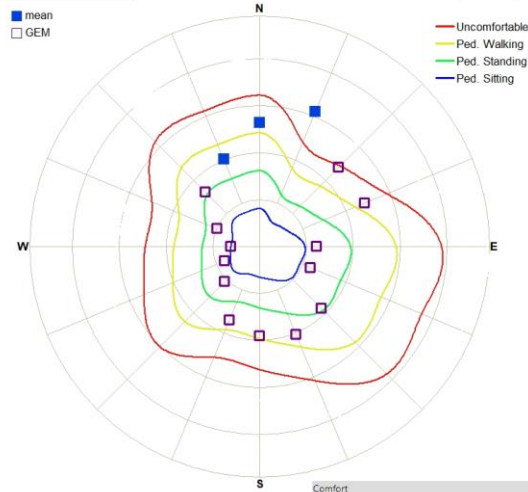
**LOCATION 15.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	21.96	31.32	31.34
4	11.64	15.76	15.82
6	4.14	5.71	5.83
8	1.00	1.52	1.57
10	0.20	0.29	0.31

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.0	6.4	6.5
Rating	Ped Standing	Ped Walking	Ped Walking

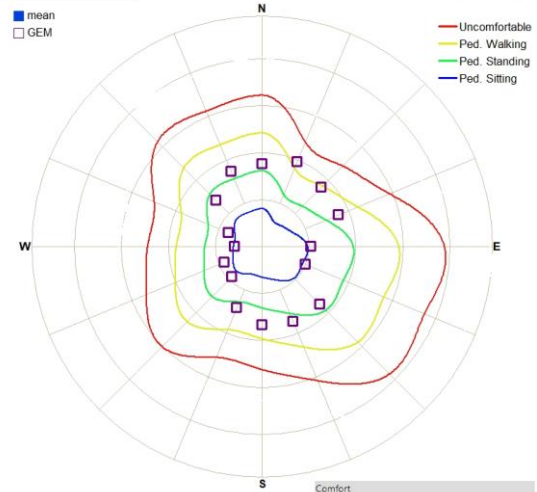
**LOCATION 16.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	49.22	55.66	56.74
4	18.56	21.60	23.24
6	7.06	6.38	8.45
8	2.41	0.88	2.52
10	0.61	0.07	0.63

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.6	6.3	6.8
Rating	Ped Walking	Ped Walking	Ped Walking

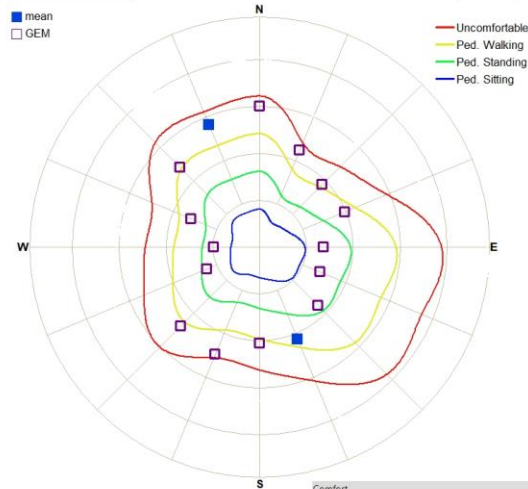
**LOCATION 16.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	31.16	47.56	47.56
4	3.40	12.72	12.72
6	0.07	1.44	1.44
8	0.00	0.06	0.06
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.7	4.9	4.9
Rating	Ped Sitting	Ped Standing	Ped Standing

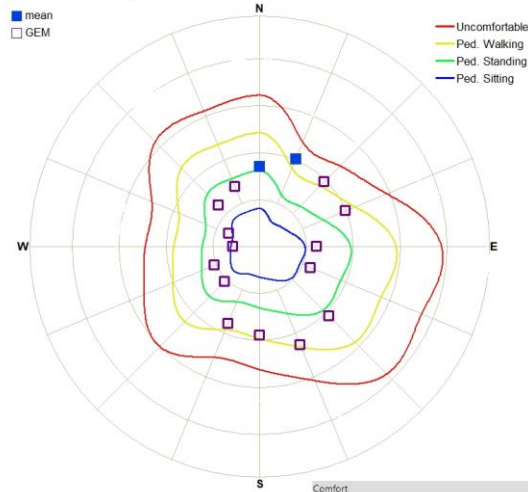
**LOCATION 16.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	53.88	67.53	67.63
4	13.91	26.01	26.14
6	2.35	6.45	6.49
8	0.36	1.01	1.02
10	0.05	0.14	0.14

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.1	6.2	6.3
Rating	Ped Standing	Ped Walking	Ped Walking

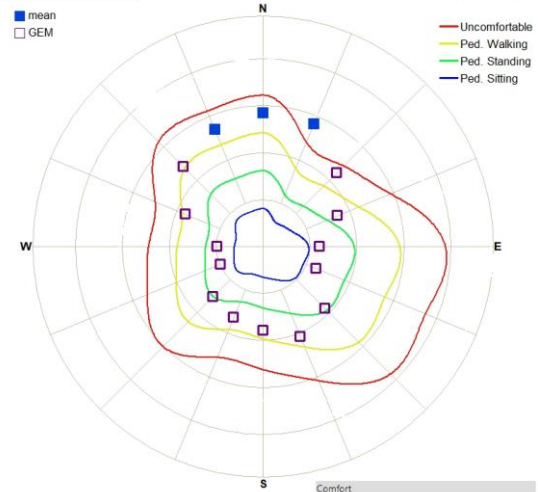
**LOCATION 17.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	39.55	51.74	52.42
4	8.35	17.65	18.60
6	1.21	2.19	2.82
8	0.05	0.14	0.18
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.5	5.3	5.4
Rating	Ped Standing	Ped Standing	Ped Standing

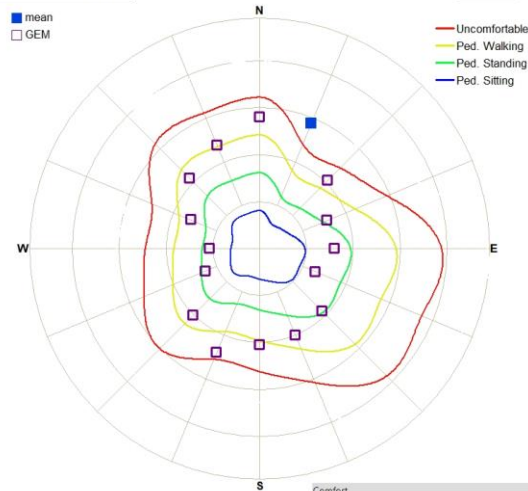
**LOCATION 17.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	53.74	64.54	64.94
4	16.19	21.97	22.56
6	5.31	6.98	7.47
8	1.64	1.59	1.95
10	0.30	0.19	0.32

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.0	6.4	6.6
Rating	Ped Walking	Ped Walking	Ped Walking

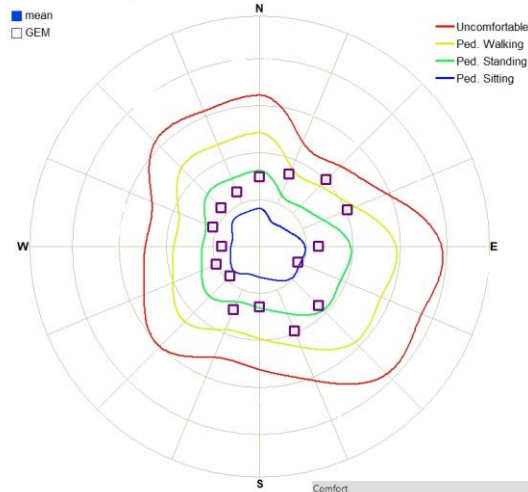
**LOCATION 17.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	54.45	67.04	67.18
4	18.96	24.64	25.03
6	5.60	7.51	8.04
8	1.63	1.55	2.02
10	0.31	0.18	0.35

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	6.1	6.5	6.6
Rating	Ped Walking	Ped Walking	Ped Walking

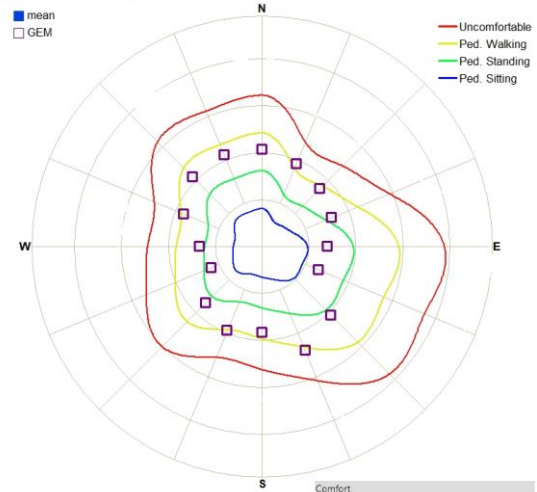
**LOCATION 18.1**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	25.00	47.58	47.58
4	3.16	12.47	12.47
6	0.11	1.53	1.53
8	0.00	0.09	0.09
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.6	5.0	5.0
Rating	Ped Sitting	Ped Standing	Ped Standing

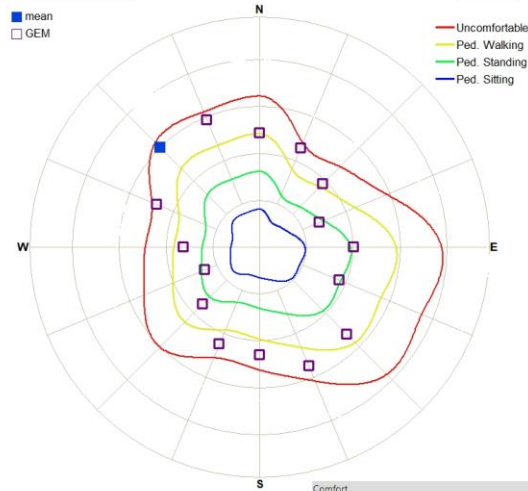
**LOCATION 18.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	46.32	65.78	65.78
4	7.98	20.08	20.08
6	0.86	2.97	2.97
8	0.07	0.24	0.24
10	0.01	0.01	0.01

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.4	5.5	5.5
Rating	Ped Standing	Ped Standing	Ped Standing

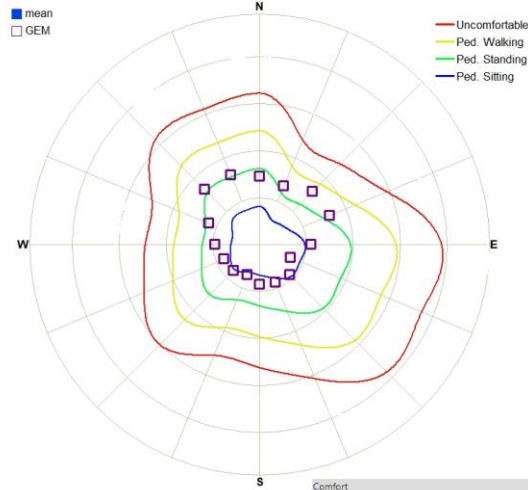
**LOCATION 18.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	65.67	75.93	76.10
4	21.87	31.04	31.22
6	4.81	8.04	8.10
8	0.96	1.61	1.65
10	0.17	0.26	0.28

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	5.9	6.6	6.6
Rating	Ped Standing	Ped Walking	Ped Walking

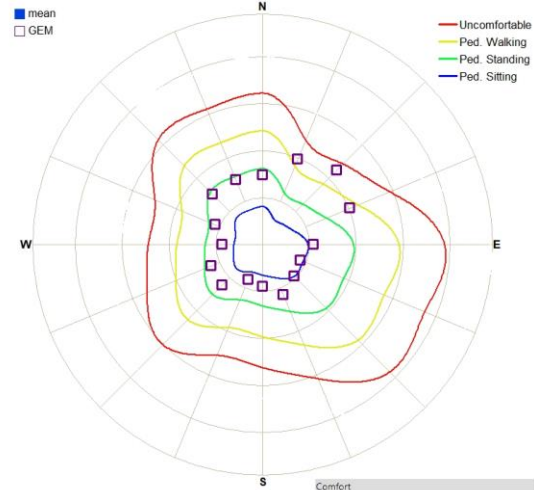
**LOCATION 19.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	12.08	30.76	30.76
4	0.16	5.50	5.50
6	0.00	0.30	0.30
8	0.00	0.01	0.01
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	2.5	4.0	4.0
Rating	Ped Sitting	Ped Standing	Ped Standing

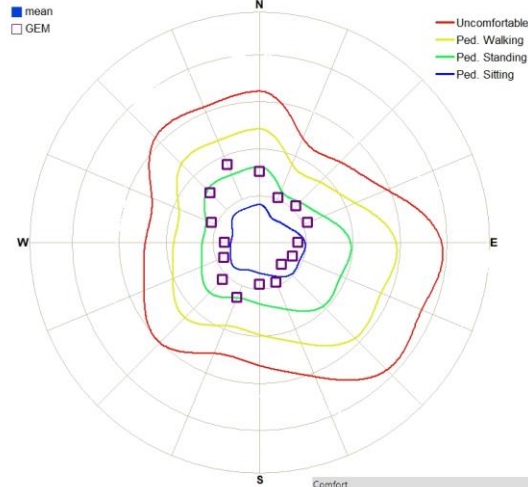
**LOCATION 19.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	20.85	37.68	37.68
4	2.81	12.45	12.45
6	0.07	2.92	2.92
8	0.00	0.32	0.32
10	0.00	0.01	0.01

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.6	5.3	5.3
Rating	Ped Sitting	Ped Standing	Ped Standing

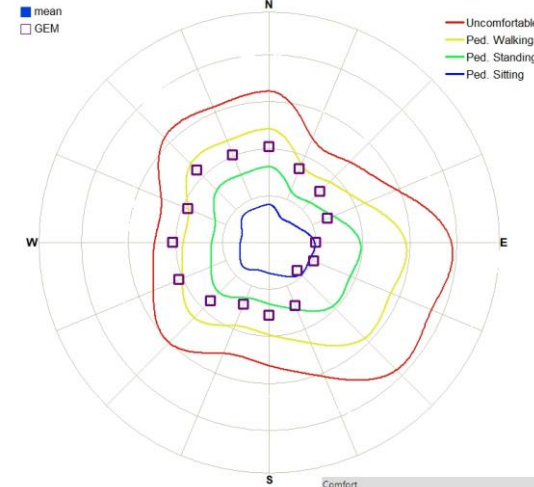
**LOCATION 20.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	6.95	29.26	29.26
4	0.12	1.78	1.78
6	0.00	0.08	0.08
8	0.00	0.00	0.00
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	2.2	3.3	3.3
Rating	Ped Sitting	Ped Sitting	Ped Sitting

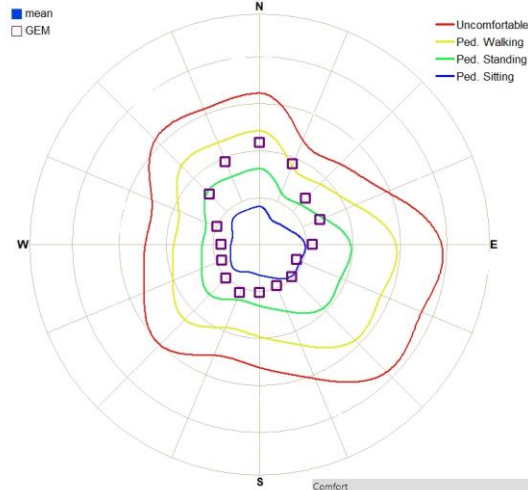
**LOCATION 20.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	30.26	57.01	57.01
4	4.23	14.64	14.64
6	0.36	2.25	2.25
8	0.02	0.23	0.23
10	0.00	0.02	0.02

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.8	5.1	5.1
Rating	Ped Sitting	Ped Standing	Ped Standing

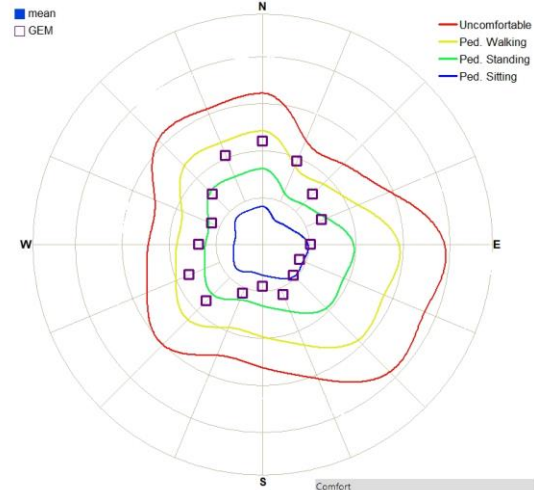
**LOCATION 21.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	16.63	37.05	37.05
4	1.68	6.59	6.59
6	0.05	0.82	0.82
8	0.00	0.04	0.04
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.0	4.2	4.2
Rating	Ped Sitting	Ped Standing	Ped Standing

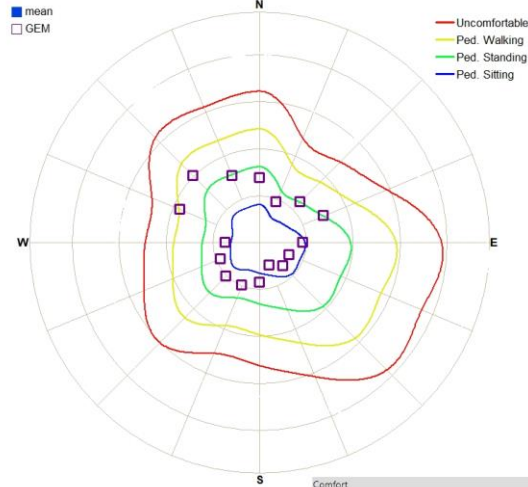
**LOCATION 21.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	22.79	43.42	43.42
4	2.37	9.58	9.58
6	0.06	1.17	1.17
8	0.00	0.06	0.06
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.4	4.7	4.7
Rating	Ped Sitting	Ped Standing	Ped Standing

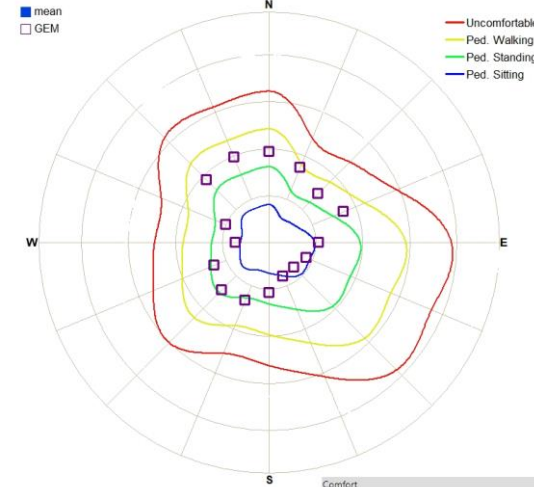
**LOCATION 22.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	9.89	31.25	31.25
4	0.47	3.09	3.09
6	0.01	0.54	0.54
8	0.00	0.07	0.07
10	0.00	0.01	0.01

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	2.3	3.6	3.6
Rating	Ped Sitting	Ped Sitting	Ped Sitting

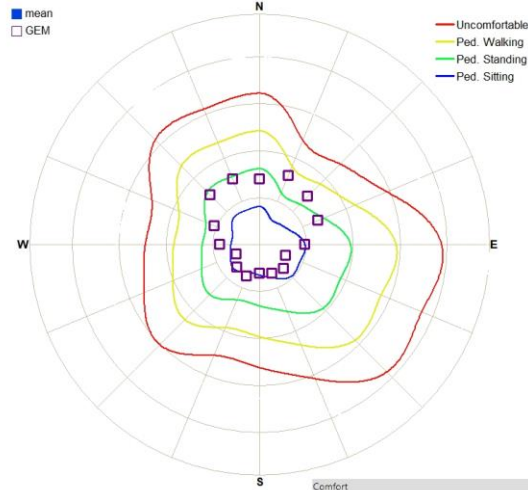
**LOCATION 22.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	20.20	41.12	41.12
4	1.13	8.16	8.16
6	0.02	0.67	0.67
8	0.00	0.03	0.03
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.0	4.4	4.4
Rating	Ped Sitting	Ped Standing	Ped Standing

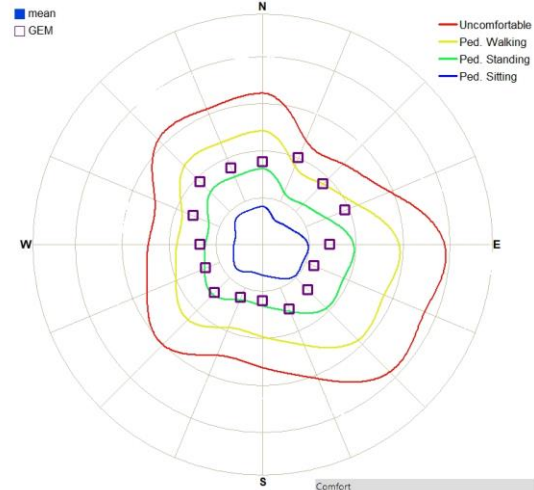
**LOCATION 23.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	12.49	25.20	25.20
4	0.28	4.68	4.68
6	0.00	0.20	0.20
8	0.00	0.00	0.00
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	2.6	3.9	3.9
Rating	Ped Sitting	Ped Sitting	Ped Sitting

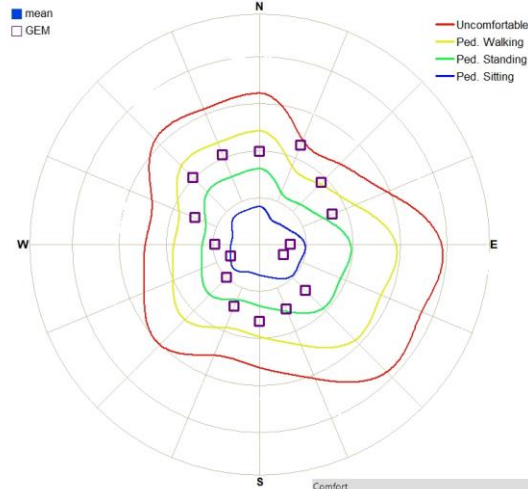
**LOCATION 23.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	35.72	55.42	55.42
4	4.12	13.44	13.44
6	0.14	1.88	1.88
8	0.00	0.09	0.09
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	3.8	5.1	5.1
Rating	Ped Sitting	Ped Standing	Ped Standing

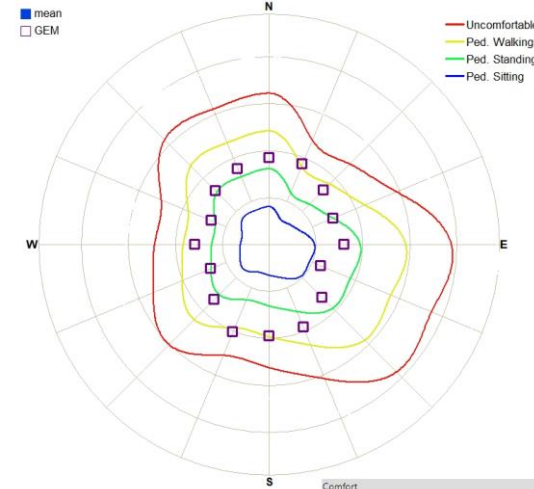
**LOCATION 24.2**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	38.06	52.36	52.36
4	8.45	14.95	14.95
6	1.63	3.08	3.08
8	0.13	0.35	0.35
10	0.01	0.03	0.03

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.6	5.4	5.4
Rating	Ped Standing	Ped Standing	Ped Standing

**LOCATION 24.3**



% of time in excess of wind speed V			
V (m/s)	MEAN	GEM	COMBINED
2	43.78	59.50	59.50
4	7.76	16.81	16.81
6	0.63	2.08	2.08
8	0.03	0.12	0.12
10	0.00	0.00	0.00

Comfort			
(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	5.2	5.2
Rating	Ped Standing	Ped Standing	Ped Standing