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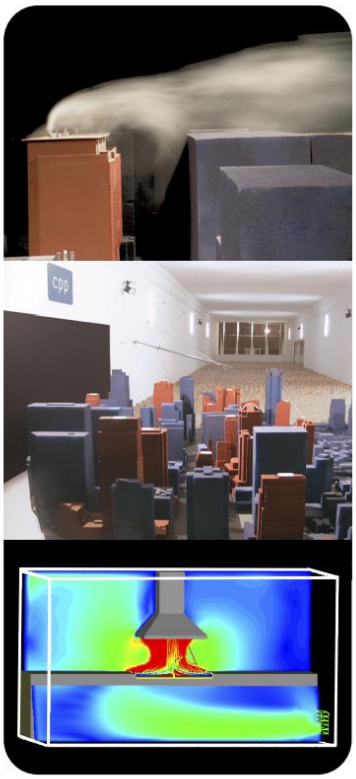
Final Report



Wind Tunnel Test for:

MARTIN PLACE OVERSTATION

Sydney, Australia

Prepared for:

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EXECUTIVE SUMMARY

A wind tunnel study of the proposed Martin Place Overstation development, to be located in Sydney, was conducted to assess pedestrian wind comfort at ground level. A massing model of the envelope of the project was fabricated to a 1:400 length scale and centred on a turntable in the wind tunnel. Replicas of surrounding buildings within a 570 m radius were constructed and placed on the turntable. The testing was conducted in a configuration compliant with setbacks as per the City of Sydney (2012) DCP and with the maximum proposed building envelope with setbacks of the south tower of 6 m and 25 m on Martin Place façade at RL 76.95 m. The results are compared with the wind conditions in the existing configuration on the site.

The wind tunnel testing was performed in the natural boundary layer wind tunnel of Cermak Peterka Petersen Pty. Ltd., St. Peters. Approach boundary layers, representative of the environment surrounding the proposed development, were established in the test section of the wind tunnel. The approach wind flow had appropriate turbulence characteristics corresponding to a suburban approach, as defined in Standards Australia (2011).

Measurements of winds likely to be experienced by pedestrians were made with a hot-film anemometer at 29 locations for 16 wind directions each. These points were tested around the development in the proposed and the LEP/DCP compliant configurations, focusing on access routes, doorways, and outdoor seating 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. All locations were also tested in the existing configuration for comparison.

The wind environment around the development was found to be generally suitable for pedestrian standing and walking activities from a comfort perspective with reference to the Lawson criteria, with some individual locations rated as suitable for business walking only. Most locations passed the Lawson distress criteria except for two locations exposed to winds from the south-east over the exposed Hyde Park, however, the conditions in these locations are not degraded by the proposed development. The wind conditions on the ground plane were found to be similar to the existing conditions in most areas. Some areas to the immediate north and east of the proposed buildings are affected by increased downwash off the northern façades of the proposed buildings, but still satisfy the required comfort and safety criteria.

DOCUMENT VERIFICATION

Date	Revision	Prepared by	Checked by	Approved by
25/08/2017	Final report	JP	JP	JP

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D	Characteristic dimension (building height, width, etc.) (m)
n	Mean velocity profile power law exponent
T_u	Turbulence intensity, U_{stdev}/U
U	Local mean velocity (m/s)
U_{ref}	Reference velocity at reference height z_{ref} (m/s)
U_{pk}	Peak wind speed in pedestrian studies (m/s)
U_{stdev}	Standard deviation of fluctuating velocity (m/s)
z	Height above surface (m)
ν	Kinematic viscosity of approach flow (m^2/s)
$\sigma(\ )$	Standard deviation of $(\ ),=(\ )'_{rms}$
ρ	Density of approach flow (kg/m^3)
$(\ )_{max}$	Maximum value during data record
$(\ )_{min}$	Minimum value during data record
$(\ )_{mean}$	Mean value during data record
$(\ )_{stdev}$	Standard deviation

1. CLIENT PROVIDED PROJECT BACKGROUND

1.1 Introduction

This report supports a Planning Proposal submitted to the Department of Planning and Environment, pursuant to Section 55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the Department of Planning and Environment's *A Guide to Preparing Planning Proposals* (August 2016).

Macquarie Corporate Holdings Pty Limited (Macquarie) is seeking to create a World Class Transport and Employment Precinct at Martin Place, Sydney.

The key objective of the Planning Proposal is to facilitate the delivery of two predominantly commercial office Over Station Development (OSD) towers located above and intricately linked to the future Martin Place Metro Station (part of the NSW Government's Sydney Metro project).

Specifically, the Planning Proposal seeks to amend the *Sydney Local Environment Plan 2012* (Sydney LEP) through enabling greater building height and floor space and thereby realising the Precinct's unique opportunities.

In particular, this report presents the results of wind tunnel testing of the pedestrian level wind environment around the proposed development.

1.2 Background

The New South Wales (NSW) Government is implementing Sydney's Rail Future (Transport for NSW, 2012), a plan to transform and modernise Sydney's rail network so that it can grow with the city's population and meet the needs of customers in the future.

Sydney Metro is a new standalone rail network identified in Sydney's Rail Future. The Sydney Metro network consists of Sydney Metro Northwest (Stage 1) and Sydney Metro City & Southwest (Stage 2).

Stage 2 of the Metro entails the construction and operation of a new Metro rail line from Chatswood, under Sydney Harbour through Sydney's CBD to Sydenham and eventually onto to Bankstown through the conversion of the existing line to Metro standards. The project also involves the delivery of seven (7) new Metro stations, including Martin Place.

This step-change piece of public transport infrastructure once complete will have the capacity for 30 trains an hour (one every two minutes) through the CBD in each direction catering for an extra 100,000 customers per hour across the Sydney CBD rail lines.

On 9 January 2017, the Minister for Planning approved the Stage 2 (Chatswood to Sydenham) Metro application lodged by Transport for NSW (TfNSW) as a Critical State Significant Infrastructure (CSSI) project (reference SSI 15_7400).

TfNSW is also making provision for future Over Station Development (OSD) on the land it has acquired for the Stage 2 Sydney Metro project, including land acquired for the purposes of delivering Martin Place Station. The OSD development is subject to separate applications to be lodged under the relevant provisions of the EP&A Act.

An Unsolicited Proposal submission has been lodged by Macquarie to the NSW Government for the delivery of a single fully integrated station/OSD solution for the new Sydney Metro Martin Place Station Precinct.

1.3 Site Description

The Sydney Metro Martin Place Station Precinct (the Precinct) project relates to the following properties (refer to Figure 1):

- 50 Martin Place, 9 – 19 Elizabeth Street, 8 – 12 Castlereagh Street, 7 Elizabeth Street, 5 Elizabeth Street, and 55 Hunter Street (North Site);
- 39 – 49 Martin Place (South Site); and
- Martin Place (that part bound by Elizabeth Street and Castlereagh Street).

The Planning Proposal relates only to the North and South Site (refer to Figure 2). Each site will accommodate one OSD tower above the future Sydney Metro Martin Place Station (representing the northern and southern entries/gateways to the Sydney Metro station). The land acquired for the Sydney Metro Martin Place Station is the same as for the Macquarie proposal, except that the Macquarie proposal includes the two properties north of Martin Place owned by Macquarie, namely 50 Martin Place and 9-19 Elizabeth Street.

Both the North and South Sites are regular in shape and have area of approximately 6,022 m^2 and 1,897 m^2 respectively, totalling 7,919 m^2.

Located close to the centre of the Sydney CBD, the Precinct comprises of the entire City block bounded by Hunter Street, Elizabeth Street, Martin Place and Castlereagh Street; that portion of Martin Place located between Elizabeth Street and Castlereagh Street and the northern most property in the block bounded by Martin Place, Elizabeth Street, Castlereagh Street, and King Street. Together it

constitutes an above ground site area of approximately 9,400 square metres, with a dimension from north to south of approximately 210 metres and from east to west of approximately 45 metres. It incorporates a significant portion of one of Sydney's most revered public spaces – Martin Place.

Martin Place is recognised as one of Central Sydney's great public, civic and commemorative spaces, as well as being a historically valued commercial and finance location of Sydney's CBD. Martin Place and a large number of buildings on, or in close proximity to, Martin Place are identified as heritage items, either as items of National, State or Local significance. Number 50 Martin Place, which forms part of the Macquarie North Site, is one of these major heritage items.

There has been a number of redevelopment and refurbishment proposals in recent years along Martin Place to improve existing assets and recapture their premium commercial status (e.g. 5 Martin Place, 50 Martin Place, 20 Martin Place, upgrades of the MLC Centre, and 60 Martin Place). The City of Sydney Council has also identified a need to reinvigorate Martin Place and upgrade the public spaces.

The surrounding locality is characterised by a variety of built forms and architectural styles, with many of the buildings, including those of relatively recent years, not complying with the current planning controls with respect to building heights, setbacks and street wall heights.

In terms of land use the area is characterised by a predominance of office uses, with some ground floor retailing, cafés, or restaurants and hotels (most notably the Westin and the Wentworth) to support its primary business centre function.

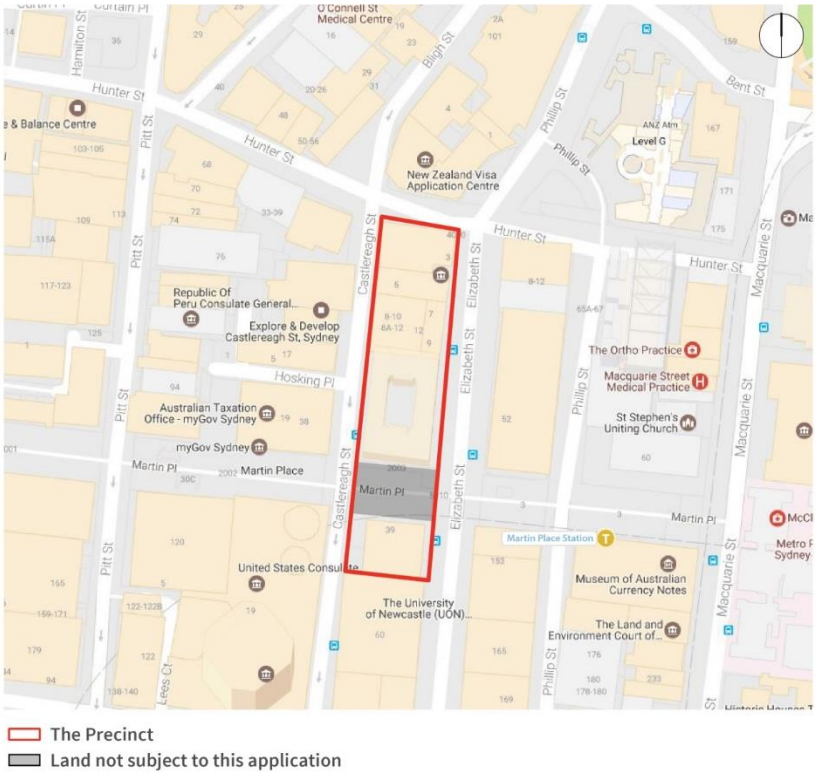


Figure 1: Location map of the Precinct (Google maps and JBA, 2017)

Figure 2: Aerial photo of the North and South Site (Nearmap and JBA, 2017)

1.4 Overview of the Proposal

The proposal by Macquarie is unique and innovative in aligning the aspirations for public transport, civic amenity and the long-term sustainability of Sydney as a financial centre. It is achieved through a development designed to maximise the opportunities for an improved Metro Station, integrate the existing and new public transport infrastructure, coordinate this infrastructure with modern commercial office towers and world class retailing, and rejuvenate and complement some of Sydney's most revered public spaces whilst substantially improving station access and connectivity.

In order to realise this vision, the Planning Proposal seeks to amend the Sydney LEP through enabling greater building height (South Site only) and floor space (North and South Sites). In short, the existing planning controls that apply to the land are out-dated and do not align with the strategic planning framework, nor the aspirations and vision of the NSW Government, City of Sydney Council and Macquarie.

The proposed amendments will establish new maximum allowable Floor Space Ratios (FSRs) for both the North and South Sites, and which are limited generally to employment generating land uses. This increased capacity will greatly strengthen Sydney's historical financial district. The proposed height amendment to the South Site relates to increasing the maximum height of buildings for part of the site from 55m and up to the Hyde Park North Sun Access Plane.

A more detailed and comprehensive description of the proposal is contained within the Planning Proposal prepared by JBA.

1.5 Planning Strategy Context

The Planning Proposal forms part of a comprehensive suite of applications and processes to co-ordinate and deliver a fully integrated station/OSD solution for the new Sydney Metro Martin Place Station Precinct.

As part of this co-ordinated approach, a Stage 1 State Significant Development (SSD) Development Application (DA) is being made pursuant to Section 83B of the EP&A Act. This Stage 1 SSD DA establishes the vision and planning and development framework for the precinct, and forms the basis for the consent authority to assess future detailed development applications (Stage 2 DAs). The concept proposal for the South Site under this DA includes a tower envelope that complies with the building height and FSR controls under Sydney LEP (with this Planning Proposal facilitating an alternative and larger tower). Also submitted separately to this SSD DA is an application to modify the CSSI approval (in order to align with the Macquarie proposal).

For clarity, Figure 3 below is a diagrammatic representation of the suite of applications proposed by Macquarie, to show the relationship of the Planning Proposal (the subject of this report) to OSD Stage 1 SSD DA and the Martin Place Metro CSSI.

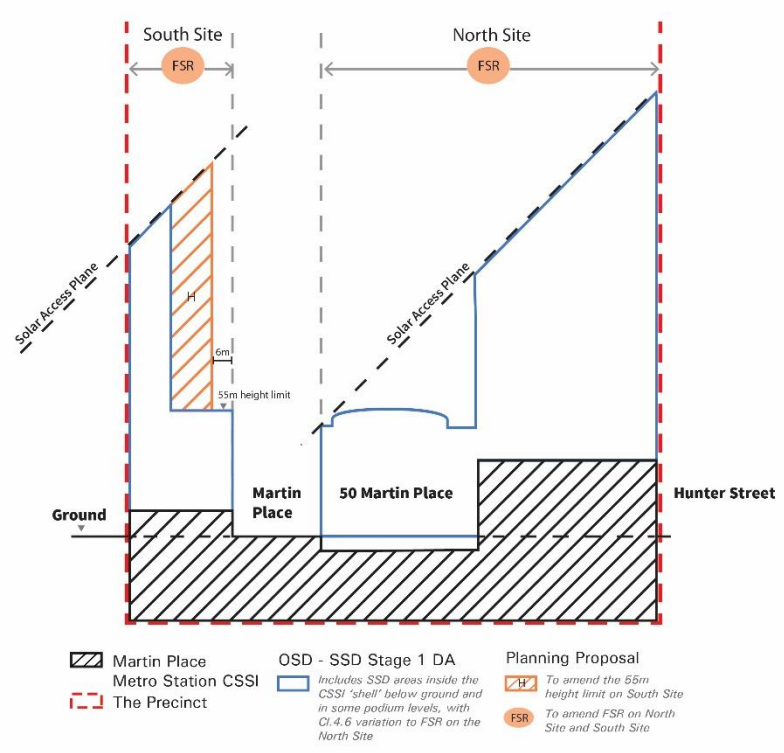


Figure 3: Relationship of planning applications (JBA, 2017)

2. INTRODUCTION

Pedestrian acceptability of footpaths, entrances, plazas, and terraces is often an important design parameter of interest to the development approvals body, building owner, and architect. Assessment of the acceptability of the pedestrian level wind environment is desirable during the project design phase so that modifications can be made, if necessary, to create wind conditions suitable for the intended use of the space.

Analytical methods such as computational fluid dynamics (CFD) are not capable, except in very simple geometries, to estimate wind pressures, frame loads, or windiness in pedestrian areas.

Techniques have been developed which permit boundary layer wind tunnel modelling of buildings to determine wind velocities in pedestrian areas. This report includes wind tunnel test procedures, test results, and a discussion of results. Table 1 summarises the model configurations, test methods, and data acquisition parameters used. All the data collection was performed in accordance with Australasian Wind Engineering Society (2001), and American Society of Civil Engineers (1999, 2010).

Table 1: Configurations for data acquisition

General Information	
Model length scale	1:400
Surrounding model radius (full-scale)	570 m
Reference height (full-scale)	200 m above ground level
Approach Terrain Category	Suburban approach, Terrain Category 3
Test Configuration Specifications	
Configuration A: Existing (Locations denoted XX)	Existing development with surrounding buildings and landscape, as shown in Figure 6 and Figure 7. Pedestrian winds measured at 29 locations for 16 wind directions at 22.5° increments from 0° (north)
Configuration B: LEP/DCP compliant (Locations denoted XX.1)	LEP compliant envelope with DCP setbacks on both towers, as shown in Figure 11. Pedestrian winds measured at 29 locations.
Configuration C: Proposed with 6 m setback (Locations denoted XX.2)	Envelope of the proposed Martin Place Overstation development with 6 m setback on the northern façade of the south tower at RL 76.95 m, as shown in Figure 8, Figure 9, and Figure 12(T). Pedestrian winds measured at 29 locations.
Configuration D: Proposed with 25 m setback (Locations denoted XX.3)	As configuration C with 25 m setback, as shown in Figure 10 and Figure 12(B). Pedestrian winds measured at 29 locations.

3. THE WIND TUNNEL TEST

Modelling of the aerodynamic flow around structures requires special consideration of flow conditions to obtain similitude between the model and the prototype. A detailed discussion of the similarity requirements and their wind tunnel implementation can be found in Cermak (1971, 1975, 1976). In general, the requirements are that the model and prototype be geometrically similar, that the approach mean velocity and turbulence characteristics at the model building site have a vertical profile shape similar to the full-scale flow, and that the Reynolds number for the model and prototype be equal. Due to modelling constraints, the Reynolds number cannot be made equal and Australasian Wind Engineering Society Quality Assurance Manual (2001) suggests a minimum Reynolds number of 50,000, based on representative model width and wind velocity at the top of the model; in this study the modelled Reynolds number was over 50,000.

The wind tunnel test was performed in the boundary layer wind tunnel shown in Figure 4. The wind tunnel test section is 3.0 m wide, by 2.4 m high with a porous slatted roof for passive blockage correction. This wind tunnel has a 21 m long test section, the floor of which is covered with roughness elements, preceded by a vorticity generating fence and spires. The spires, barrier, and roughness elements were designed to provide a modelled atmospheric boundary layer approximately 1.2 m thick with a mean velocity and turbulence intensity profile similar to that expected to occur in the region approaching the modelled area. The approach wind characteristics used for the model test are shown in Figure 5 and are explained more fully in Section 5.1.1.

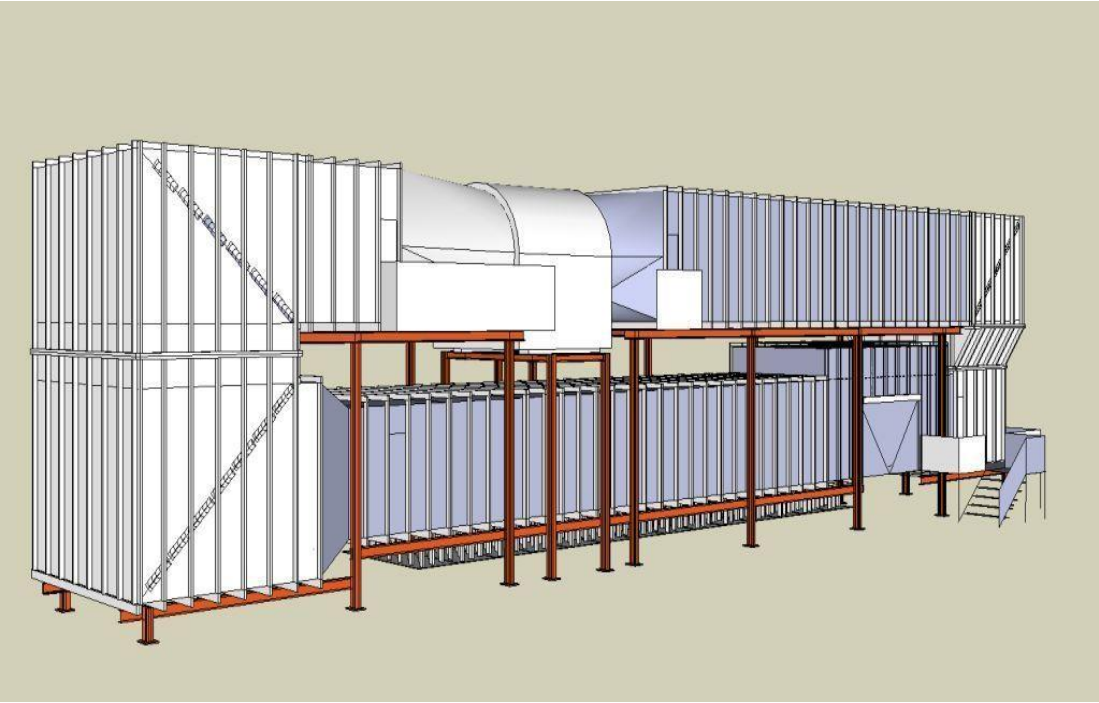


Figure 4: Schematic of the closed circuit wind tunnel

A massing model of the proposed development and surrounds to a radius of 570 m was constructed at a length scale of 1:400, which was consistent with the modelled atmospheric flow, and permitted a reasonable test model size with an adequate portion of the adjoining environment to be included in a proximity model that was within wind tunnel blockage limitations. The model was mounted on the turntable located near the downstream end of the wind tunnel test section, Figure 7. The turntable permitted rotation of the modelled area for examination of velocities from any approach wind direction. Additional photos of the testing are included in Appendix 1.

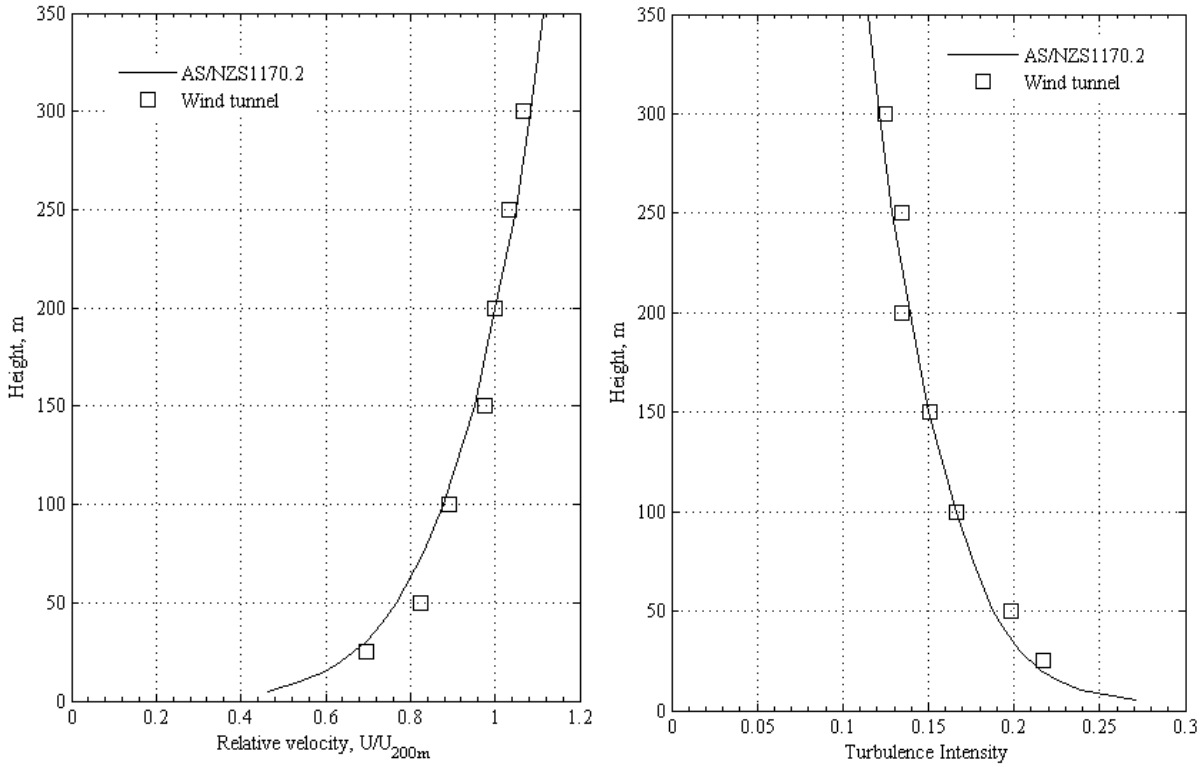


Figure 5: Mean velocity and turbulence profiles approaching the model, terrain category 3

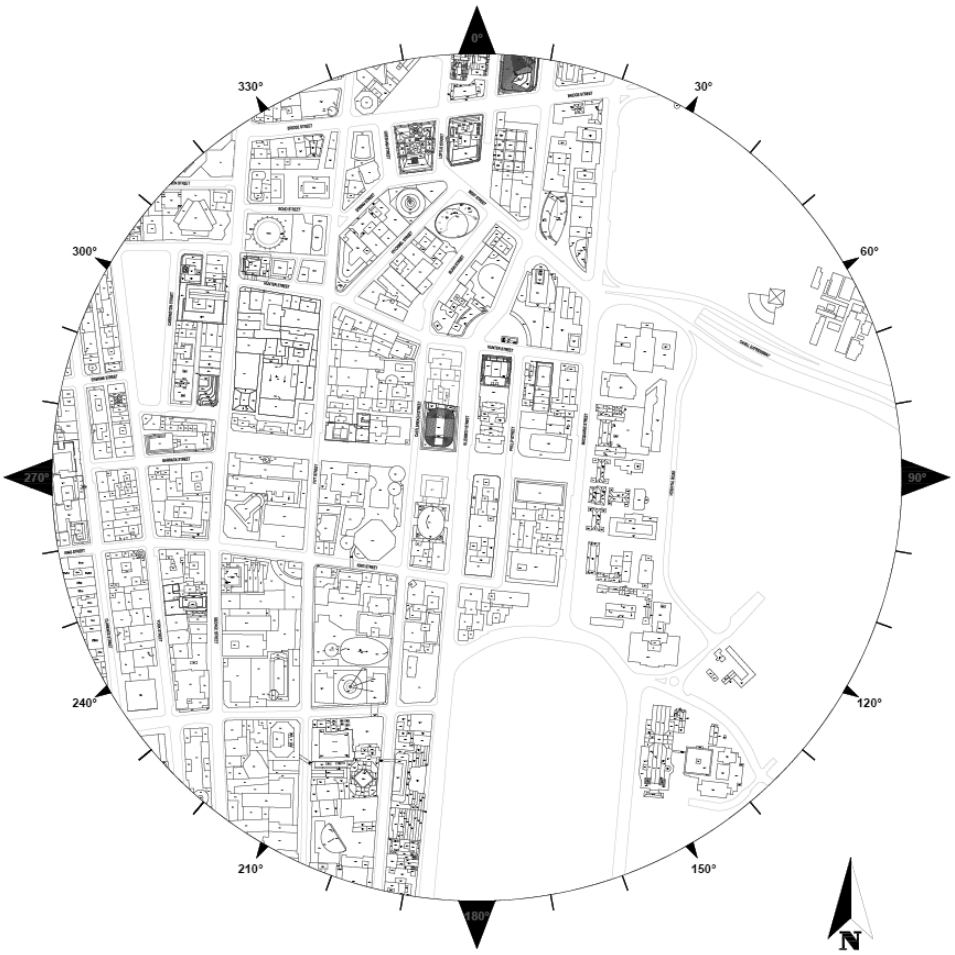


Figure 6: Turntable layout with existing buildings

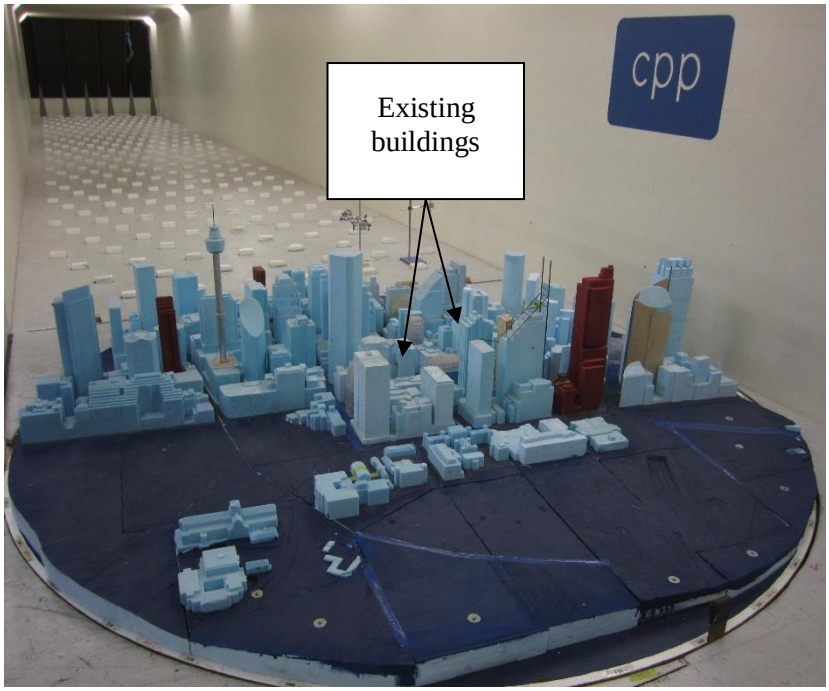


Figure 7: Photograph of the existing configuration model in the CPP wind tunnel viewed from the east

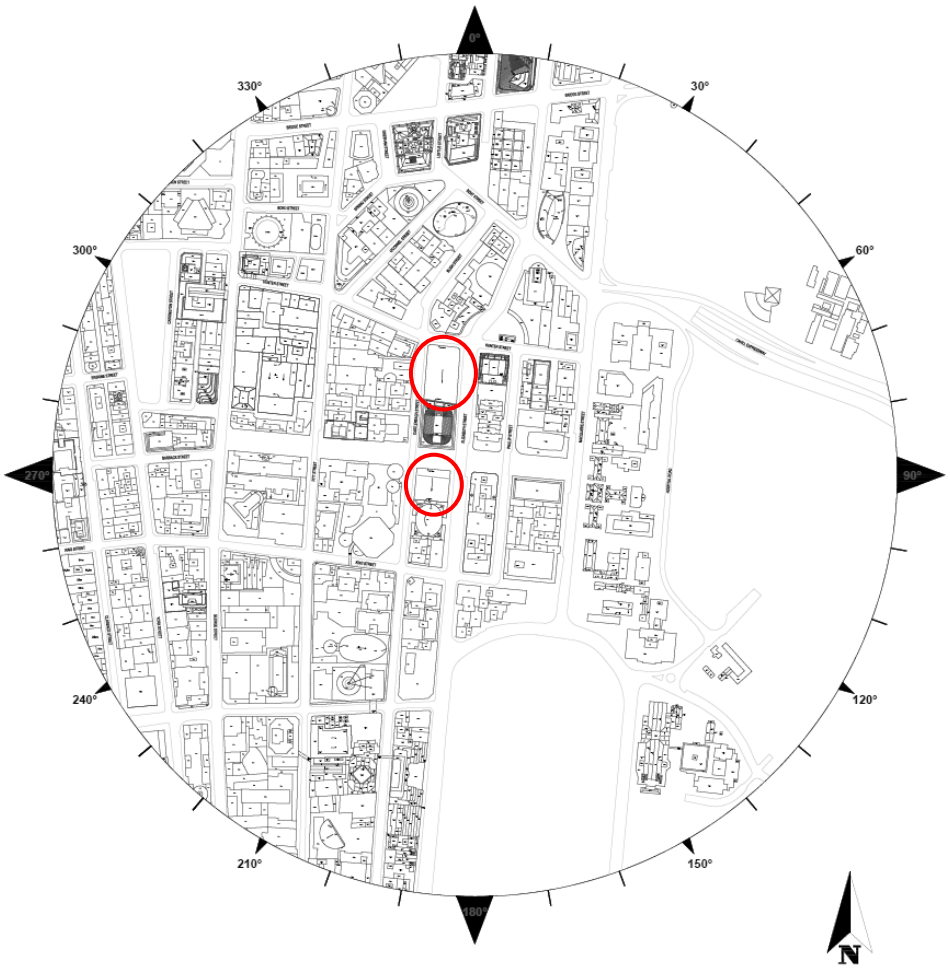


Figure 8: Turntable layout with proposed buildings, Configuration C

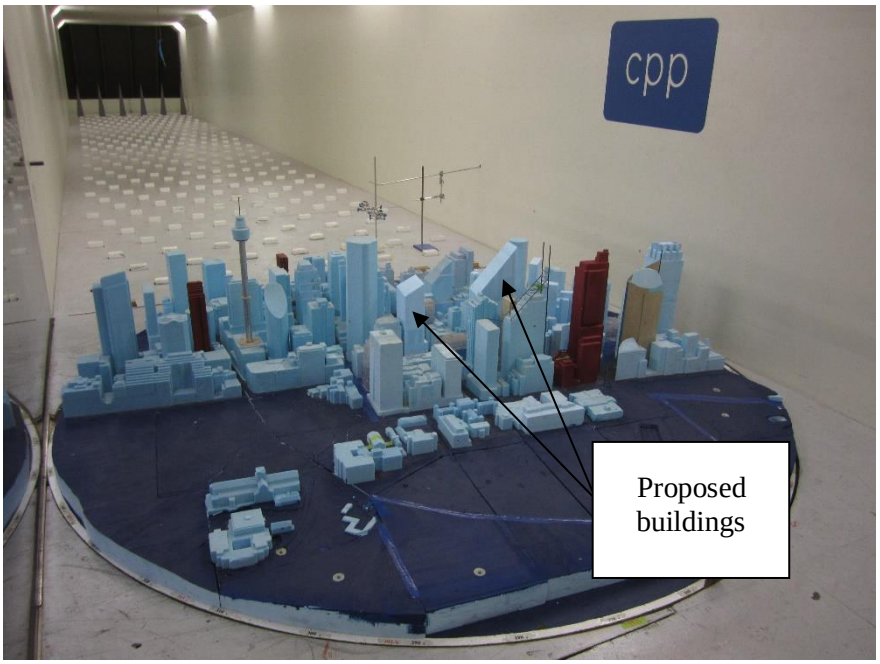


Figure 9: Photograph of the Martin Place Overstation development model in the CPP wind tunnel viewed from the east, Configuration C

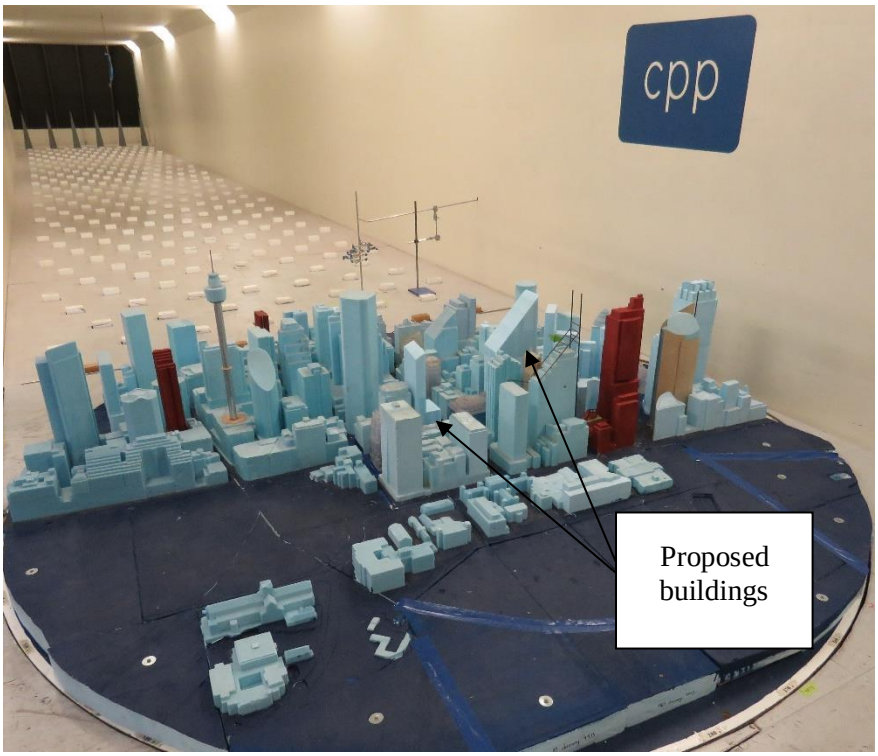


Figure 10: Photograph of the Martin Place Overstation development model in the CPP wind tunnel viewed from the east, Configuration D

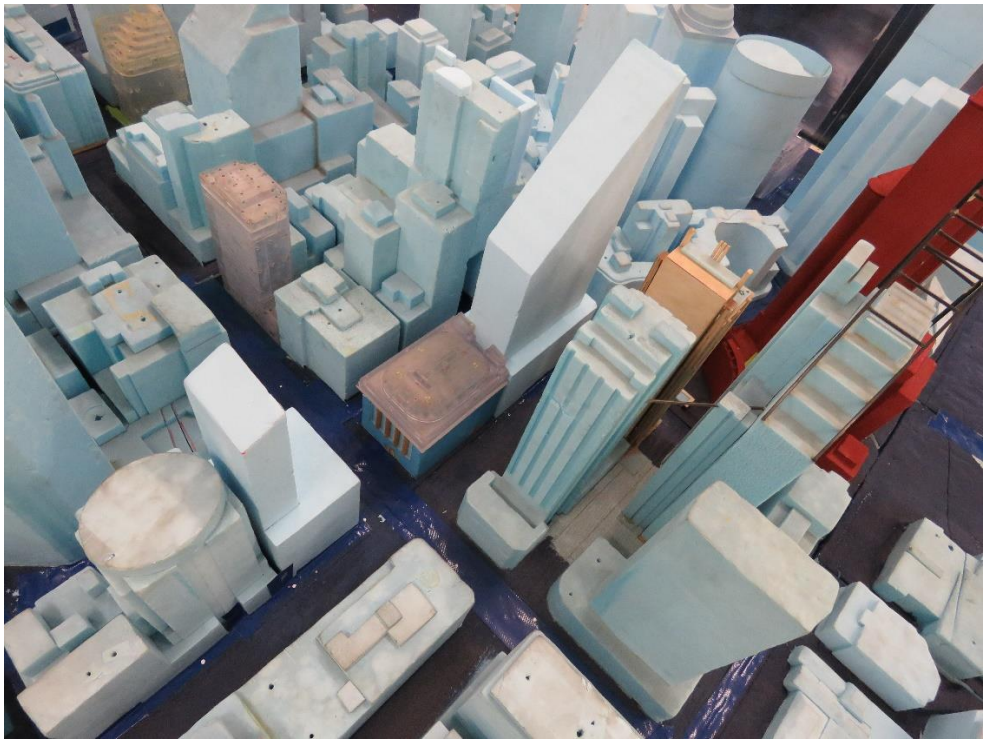
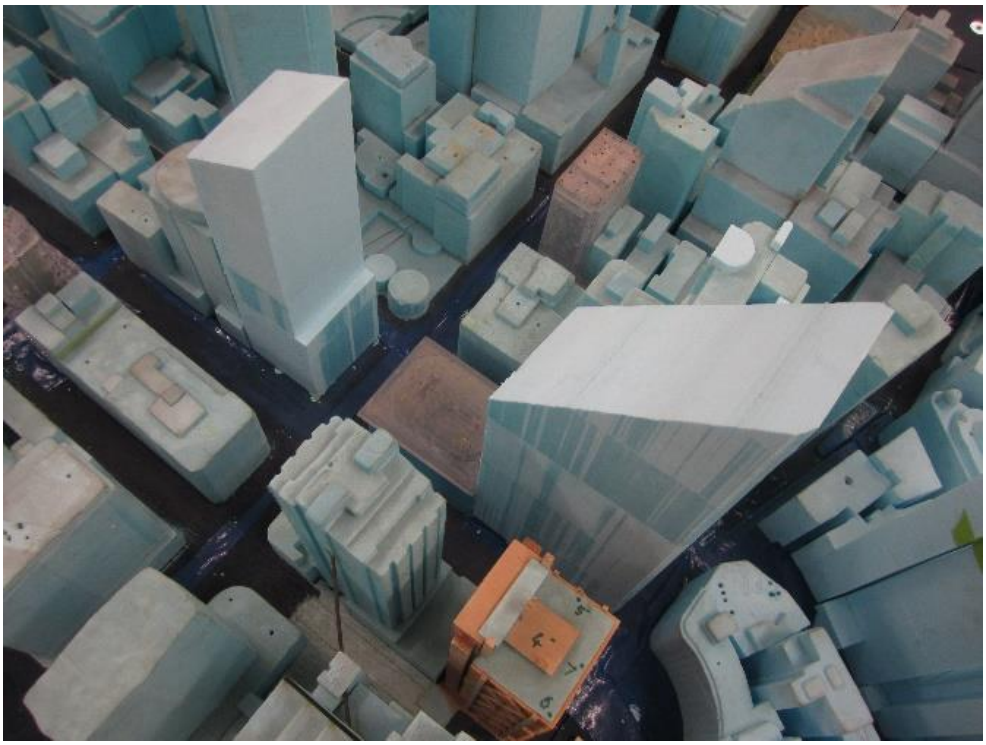


Figure 11: Close up photographs of the wind tunnel models for Configuration B



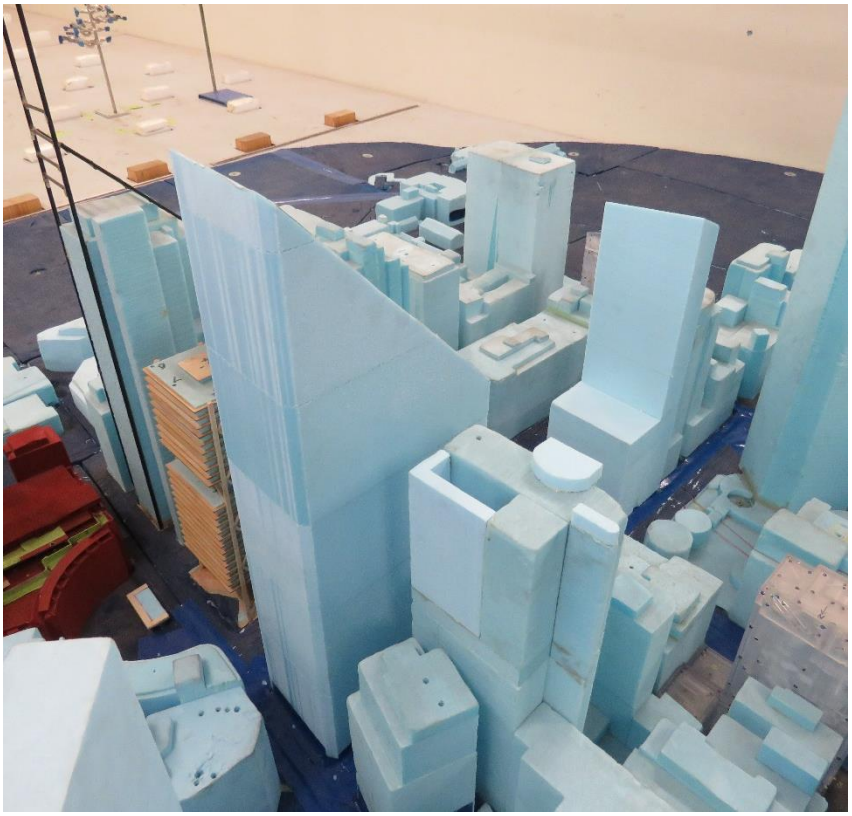


Figure 12: Close-up photographs of the wind tunnel models for Configurations C (T) and D (B)

4. ENVIRONMENTAL WIND CRITERIA

Over the years, a number of researchers have added to the knowledge of wind effects on pedestrians by suggesting criteria for comfort and safety. Because pedestrians will tolerate higher wind speeds for a smaller period of time than for lower wind speeds, these criteria provide a means of evaluating the overall acceptability of a pedestrian location. A location can further be evaluated for its intended use, such as for an outdoor café or a footpath. One of the most widely accepted set of criteria was developed by Lawson (1990), which is described in Table 2.

Table 2: The Lawson comfort criteria

Comfort (maximum of mean or gust equivalent mean ($GEM^{+.}$) wind speed exceeded 5% of the time)	
< 4 m/s	Pedestrian Sitting (considered to be of long duration)
4 - 6 m/s	Pedestrian Standing (or sitting for a short time or exposure)
6 - 8 m/s	Pedestrian Walking
8 - 10 m/s	Business Walking (objective walking from A to B or for cycling)
> 10 m/s	Uncomfortable
Distress (maximum of mean or GEM wind speed exceeded 0.022% of the time)	
<15 m/s	not to be exceeded more than two times per year (or one time per season) for general access area
<20 m/s	not to be exceeded more than two times per year (or one time per season) where only able bodied people would be expected; frail or cyclists would not be expected

Note: $^{+.}$ The gust equivalent mean (GEM) is the peak 3 s gust wind speed divided by 1.85.

Lawson's criteria have categories for discomfort, based on wind speeds exceeded five percent of the time, allowing planners to judge the usability of locations for various intended purposes ranging from "business walking" to "pedestrian sitting". The level and severity of these comfort categories can vary based on individual preference, so calibration to the local wind environment is recommended when evaluating the Lawson ratings. The criteria also include a distress rating, for safety assessment, which is based on occasional (once or twice per year) wind speeds. In both cases, the wind speed used is the larger of a mean or gust equivalent-mean (GEM) wind speed[1]. The GEM is defined as the peak gust wind speed divided by 1.85; this is intended to account for locations where the gustiness is the dominant characteristic of the wind. Assessment using the Lawson criteria provides a similar classification as using the once per annum gust, which was the basis of the City of Sydney (2011) DCP, however provides additional information regarding the serviceability wind climate. The current City of Sydney (2012) DCP specifies wind effects not to exceed 16 m/s, and 10 m/s for 'active frontages'. The draft amendments of the DCP require a wind speed of 8 m/s not to be exceeded for more than 5% of the time between 6 am and 10 pm, aligning with the pedestrian walking criterion by Lawson. The safety criterion

[1] The rating of "uncomfortable" in Table 2 is the word of the acceptance criteria author and may not apply directly to any particular project. High wind areas are certainly not uncomfortable all the time, just on windier days. The word uncomfortable, in our understanding, refers to acceptability of the site by pedestrians for typical pedestrian use; i.e., on the windiest days, pedestrians will not find the areas "acceptable" for walking and will tend to avoid such areas if possible. The distress rating fail indicates some unspecified potential for causing injury to a less stable individual who might be blown over. The likelihood of such events is not well described in the literature and is likely to be strongly affected by individual differences, presence of water, blowing dust or particulates, and other variables in addition to the wind speed.

of the draft amendments requires an annual maximum peak 0.5 second gust wind speed not to be exceeded, which aligns with the Lawson criterion of a GEM wind speed of 15 m/s for a 3 second gust. In the vicinity of the Martin Place Overstation development Martin Place, Hunter Street, and parts of Castlereagh Street are classified as active frontages, while Elizabeth Street is not. There are few locations in Sydney that would meet the current DCP criteria without shielding to improve the wind conditions. From discussions with Council the current DCP criterion wind speed is a once per annum gust wind speed similar to the 2004 DCP, but is meant to be interpreted as a comfort level criterion to promote outdoor café style activities and is not a distress requirement.

The once per annum gust wind speed criterion is based on the work of Melbourne (1978), and the 16 m/s level is classified as acceptable for pedestrian walking along a main accessway, and 10 m/s level is classified as generally acceptable for use for pedestrian sitting. This criterion gives the once per annum (actually 0.1% of the time) gust wind speed, and uses this as an estimator of the general wind conditions at a site, which may be more relevant. To combat this limitation, this study is based upon the criteria of Lawson (1990), which are described above. Assessment using the Lawson criteria provides a similar comfort classification as using the once per annum gust criteria, which is the basis of the City of Sydney (2012) DCP; however, it also provides significantly more information regarding the serviceability wind climate. The Lawson criteria align with the draft amendments of the City of Sydney DCP.

5. DATA ACQUISITION AND RESULTS

5.1 Velocities

Velocity profile measurements were taken to verify that appropriate boundary layer flow approaching the site was established and to determine the likely pedestrian level wind climate around the test site. Pedestrian wind measurements and analysis are described in Section 5.1.2. All velocity measurements were made with hot-film anemometers, which were calibrated against a Pitot-static tube in the wind tunnel. The calibration data were described by a King's Law relationship (King, 1914).

5.1.1 Velocity Profiles

Mean velocity and turbulence intensity profiles for the boundary layer flow approaching the model are shown in Figure 5. Turbulence intensities are related to the local mean wind speed. These profiles have the form as derived from Standards Australia (2011) and are appropriate for the approach conditions.

5.1.2 Pedestrian Winds

The proposed development is situated in the Sydney CBD between Castlereagh and Elizabeth Streets with the proposed towers being located north and south of the existing 50 Martin Place building, Figure 14. The site is surrounded by high-rise buildings of the Sydney CBD. The site is in the centre of the CBD and consequently receives some shielding from all wind directions.

Wind speed measurements were recorded at 29 locations to evaluate pedestrian comfort in and around the project site, Figure 14 to Figure 17. These locations were tested in a full envelope configuration of the proposed development and a configuration with a LEP/DCP compliant envelope on both towers, as well as in the existing building configuration for comparative purposes. 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 pedestrian comfort at the building corners where relatively severe conditions frequently are found, near building entrances, on adjacent pavements with heavy pedestrian traffic, and in areas potentially intended as upper level outdoor terraces.

The hot-film signal was sampled for a period corresponding to one hour in prototype. All wind speed data were digitally filtered to obtain the two to three second running mean wind speed at each point; this is the minimum size of a gust affecting a pedestrian and the gust duration on which the wind criteria are based.

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

$$\frac{U_{pk}}{U_{ref}} = \frac{U + 3 \cdot \sigma_U}{U_{ref}}$$

The mean and gust equivalent mean velocities relative to the free stream wind tunnel reference velocity at a full-scale elevation of 200 m are plotted in polar form in Appendix 2. The graphs show velocity magnitude and the approach wind direction for which that velocity was measured. 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.

To enable a quantitative assessment of the wind environment, the wind tunnel data were combined with wind frequency and direction information measured by the Bureau of Meteorology (BoM) at a standard height of 10 m at Sydney Airport from 1995 to 2015, Figure 13. From these data, directional criterion lines for the Lawson rating wind speeds have been calculated and included on the polar plots in Appendix 2; this gives additional information regarding directional sensitivity at each location.

The criteria of Lawson consider the integration of the velocity measurements with local wind climate statistical data summarized in Figure 13 to rate each location. 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 2. In addition to the rating wind speeds, the percentage of time that 2 m/s is exceeded is also reported. This has been provided as it has been found that the limiting wind speed for long-term stationary activities such as fine outdoor dining should be about 2 to 2.5 m/s rather than 4 m/s.

Interpretation of these wind levels can be aided by the description of the effects of wind of various magnitudes on people. The earliest quantitative description of wind effects was established by Sir Francis Beaufort in 1806, for use at sea; the Beaufort scale is reproduced in Table 3 including qualitative descriptions of wind effects.

The tables in Appendix 2 additionally provide the wind speed exceeded 5% and 0.022% of the time for direct comparison with the Lawson comfort and distress criteria and the associated Lawson ratings for both mean and GEM wind speeds. A colour coded summary assessment of pedestrian comfort and safety with respect to the Lawson criteria is presented in Figure 14 to Figure 17 for each test location. The implications of the results are discussed in Section 6.

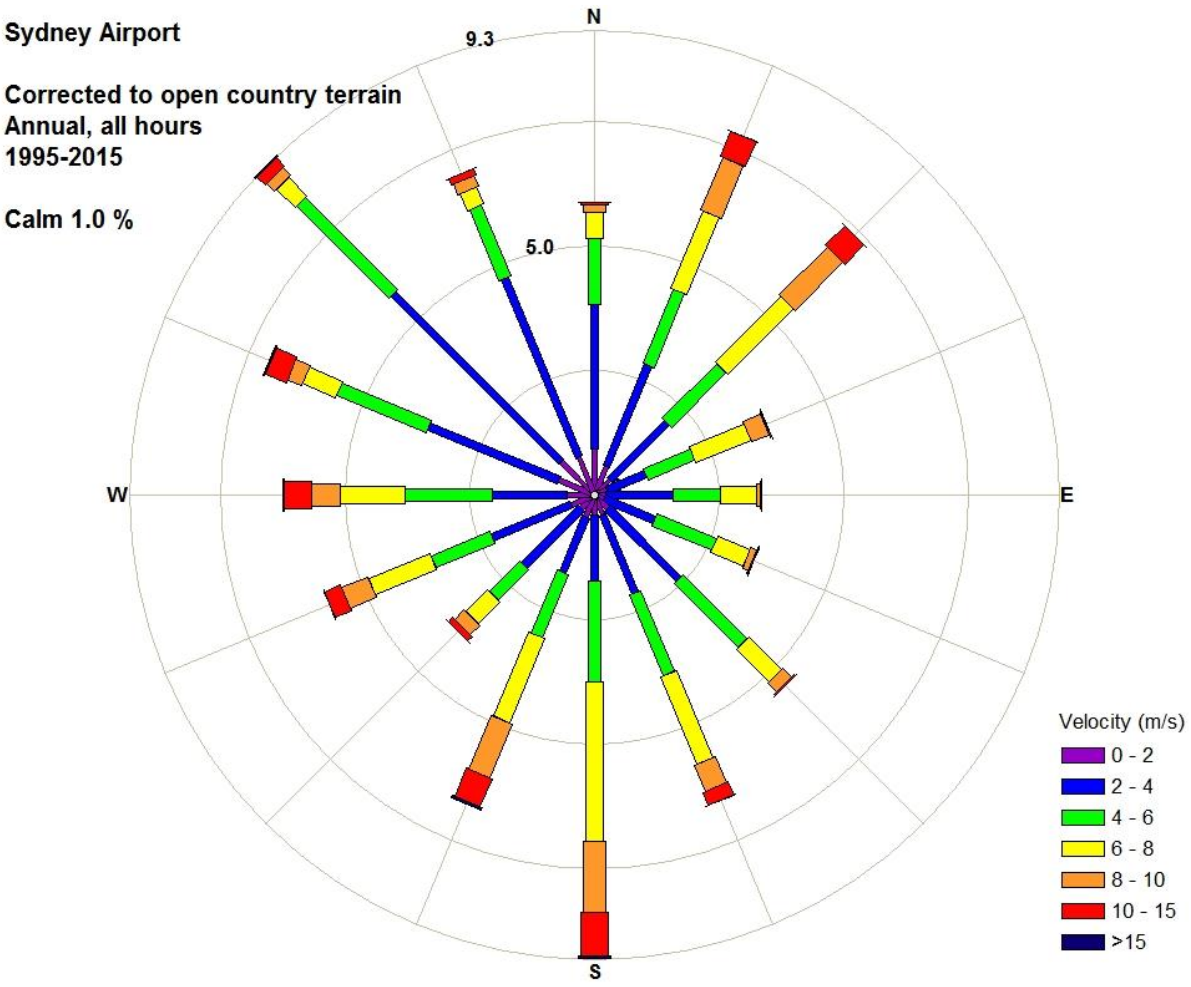


Figure 13: Wind rose of direction and speed for Sydney Airport

Table 3: Summary of wind effects on people, Penwarden (1973)

Description	Beaufort Number	Speed (m/s)	Effects
Calm, light air	0, 1	0–2	Calm, no noticeable wind.
Light breeze	2	2–3	Wind felt on face.
Gentle breeze	3	3–5	Wind extends light flag. Hair is disturbed. Clothing flaps
Moderate breeze	4	5–8	Raises dust, dry soil, and loose paper. Hair disarranged.
Fresh breeze	5	8–11	Force of wind felt on body. Drifting snow becomes airborne. Limit of agreeable wind on land.
Strong breeze	6	11–14	Umbrellas used with difficulty. Hair blown straight. Difficult to walk steadily. Wind noise on ears unpleasant. Windborne snow above head height (blizzard).
Near gale	7	14–17	Inconvenience felt when walking.
Gale	8	17–21	Generally impedes progress. Great difficulty with balance in gusts.
Strong gale	9	21–24	People blown over by gusts.

6. DISCUSSION

The wind climatology chart of Figure 13 indicates that the most frequent strong winds are from the south, and to a lesser extent, the west and north-east. The development is located in a central area of the city leading to some shielding effects from all wind directions. The topography and surrounding building layout relative to the prevailing strong wind directions influence the local wind flow in and around the development. Individual locations around the development are more susceptible to winds from different directions, depending on the relative location of the point tested to the geometry of the surrounding buildings. The influence of wind direction on the suitability of a location for an intended purpose can be ascertained from the polar plots in Appendix 2.

A high-level summary of the target criteria based on the intended use of the space for the pedestrian level measurement locations and the wind tunnel results including the Lawson comfort and safety ratings is provided in Table 4. It is evident that all ground plane locations meet the intended use of the space from a comfort perspective and pass the safety criterion, with the exception of location 29 remote from the site, which is an existing condition and is not affected by the proposed development. In the existing configuration as well as in Configuration D, location 26 also exceeds the safety criterion.

More detailed conclusions of the pedestrian study can be understood by reviewing the colour coded images in Figure 14 to Figure 17, which present the locations selected for investigation of pedestrian wind comfort in and around the site along with the Lawson criteria rating for both comfort and distress. The central colour indicates the comfort rating for the location, and the colour of the outer ring indicates whether the location passes the distress criterion.

Note that testing was performed without planned trees, or other plantings to provide a worst case assessment; heavy streetscape planting typically reduces the wind speeds by less than 10%. Mitigation measures are likely to be required for red and orange locations, and may be necessary for other locations depending on the intended use of the space. Although conditions may be classified as acceptable there may be certain wind directions that cause regular strong events, these can be determined by an inspection of the plots in Appendix 2.

Table 4: Summary of target criteria and wind tunnel results

Description / Location		Target	Wind Tunnel Results											
			Existing Configuration			LEP/DCP Compliant Configuration			Full Envelope, 6 m setback			Full Envelope, 25 m setback		
		Comfort rating, 5% exceedance wind speed (m/s)	Comfort rating, 5% exceedance wind speed (m/s)	Meets target Y/N	Safety rating, 0.022% exceedance wind speed (m/s)	Comfort rating, 5% exceedance wind speed (m/s)	Meets target Y/N	Safety rating, 0.022% exceedance wind speed (m/s)	Comfort rating, 5% exceedance wind speed (m/s)	Meets target Y/N	Safety rating, 0.022% exceedance wind speed (m/s)	Comfort rating, 5% exceedance wind speed (m/s)	Meets target Y/N	Safety rating, 0.022% exceedance wind speed (m/s)
Ground Plane	1	>6 to 8	3.7	Y	7.2	4.3	Y	8.4	4.1	Y	8.1	4.5	Y	8.8
	2	>6 to 8	4.1	Y	8.0	3.8	Y	7.4	4.2	Y	9.3	4.1	Y	8.0
	3	>6 to 8	4.8	Y	9.2	5.3	Y	10.4	6.1	Y	11.8	5.9	Y	11.6
	4	>6 to 8	5.8	Y	11.8	6.2	Y	12.5	4.9	Y	9.1	6.3	Y	12.6
	5	>6 to 8	4.8	Y	9.2	6.4	Y	11.7	6.8	Y	12.5	6.4	Y	11.9
	6	>6 to 8	5.0	Y	10.7	4.2	Y	10.1	4.9	Y	10.1	4.2	Y	10.2
	7	>6 to 8	6.2	Y	12.1	6.0	Y	12.3	6.0	Y	11.4	6.0	Y	11.7
	8	>6 to 8	4.1	Y	7.6	4.2	Y	7.9	5.0	Y	9.2	4.6	Y	8.4
	9	>6 to 8	2.2	Y	4.3	3.3	Y	6.0	3.4	Y	6.4	3.8	Y	7.3
	10	>6 to 8	3.4	Y	7.0	3.7	Y	7.1	3.9	Y	7.6	3.9	Y	7.6
	11	>6 to 8	2.1	Y	4.7	1.6	Y	3.3	2.3	Y	6.2	2.4	Y	5.5
	12	>6 to 8	5.9	Y	11.8	5.4	Y	10.4	6.4	Y	11.8	5.5	Y	10.2
	13	>6 to 8	4.0	Y	8.1	4.1	Y	8.2	4.5	Y	9.0	4.8	Y	9.9
	14	>6 to 8	5.6	Y	10.6	5.9	Y	10.7	6.1	Y	11.3	6.0	Y	11.4
	15	>6 to 8	3.8	Y	7.5	4.1	Y	8.2	4.3	Y	8.8	4.5	Y	9.3
	16	>6 to 8	4.5	Y	9.3	5.3	Y	11.3	5.2	Y	9.9	5.1	Y	9.6
	17	>6 to 8	4.5	Y	9.3	4.9	Y	10.3	4.9	Y	9.6	4.6	Y	9.2
	18	>6 to 8	4.8	Y	10.6	4.9	Y	11.2	5.8	Y	12.1	5.7	Y	11.6
	19	>6 to 8	4.7	Y	8.7	6.3	Y	11.8	6.3	Y	12.1	6.2	Y	11.5
	20	>6 to 8	6.4	Y	11.6	6.7	Y	12.6	6.5	Y	12.4	6.4	Y	12.0
	21	>6 to 8	5.0	Y	8.6	5.2	Y	9.1	5.7	Y	10.2	5.9	Y	10.9
	22	>6 to 8	5.7	Y	10.7	4.6	Y	8.1	5.3	Y	9.3	5.5	Y	10.6
	23	>6 to 8	3.8	Y	7.7	3.8	Y	7.8	3.3	Y	6.6	3.1	Y	6.3
	24	>6 to 8	4.7	Y	9.3	4.8	Y	10.0	4.7	Y	9.8	4.6	Y	9.3
	25	>6 to 8	5.0	Y	9.6	4.4	Y	8.7	5.5	Y	10.4	5.4	Y	10.2
	26	>6 to 8	7.5	Y	15.6	6.5	Y	13.4	6.8	Y	13.9	7.3	Y	15.1
	27	>6 to 8	4.6	Y	8.3	4.8	Y	9.3	4.8	Y	9.1	4.4	Y	9.1
	28	>6 to 8	5.2	Y	10.3	5.0	Y	9.2	5.0	Y	9.6	4.7	Y	9.3
	29	>6 to 8	8.0	N	17.4	8.2	N	17.8	8.5	N	18.3	7.9	Y	17.0

LEGEND

Comfort Criteria

- Outdoor Dining
- Pedestrian Sitting
- Pedestrian Standing
- Pedestrian Walking
- Business Walking
- Uncomfortable

Safety Criteria

- Passes safety criteria
- Able bodied
- Fails safety criteria

6.1.1 – Existing development with existing surroundings

In the surrounding area of the proposed development, the wind conditions at pedestrian level in the existing configuration are generally classified as suitable for pedestrian standing and walking with some specific locations meeting the sitting criterion, Table 4 and Figure 14.

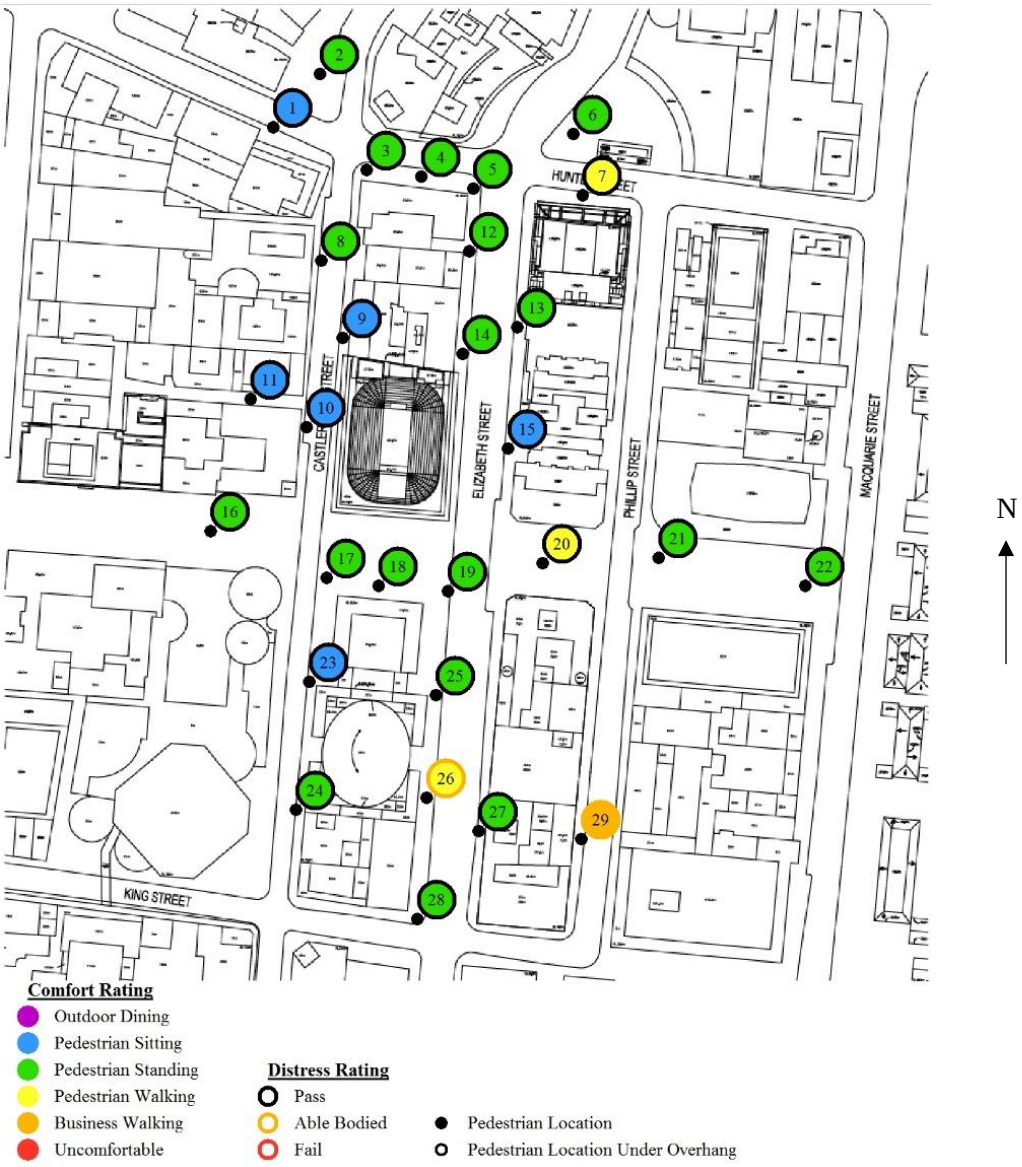


Figure 14: Pedestrian wind speed measurement locations with comfort/distress ratings – Configuration A, existing buildings

Wind conditions to the north of the northern tower site, Locations 1 to 7 along Hunter Street, are generally rated as suitable for pedestrian standing from a comfort perspective with the exception of Location 1, which is at the border between pedestrian sitting and standing, and Location 7, which is rated as suitable for pedestrian walking. This area is affected by winds from the north-east quadrant, in the form of channelled flow along Philip and Hunter Streets augmented by downwash from the north façade of these buildings. Areas to the north of Martin Place along Castlereagh and Elizabeth Streets are relatively calm, with Locations 8-15 rated as suitable for pedestrian sitting or standing. The test locations along Martin Place, Locations 16-22, are all rated as suitable for pedestrian standing except for Location 20, which is rated as suitable for pedestrian walking.

Conditions to the south of Martin Place along Castlereagh and Elizabeth Street are mostly suitable for pedestrian standing and with the exception of Location 26, which is rated as suitable for pedestrian walking and fails the Lawson distress criterion, with a classification as suitable for able bodied pedestrians only. Location 26 experiences windy conditions for winds from the south-east quadrant coming over the exposed Hyde Park area and channelling up Elizabeth Street.

Location 29, remote from the site at the southern end of Philip Street is classified as suitable for business walking from a comfort perspective and fails the Lawson distress criterion being classified as suitable for able bodied pedestrians. This location is affected by strong winds from the south-east quadrant, which approach over the exposed area of Hyde Park.

All locations except Locations 26 and 29 pass the distress criterion.

6.1.2 – Proposed development with existing surroundings and DCP compliant setbacks

The wind conditions at ground level with the proposed buildings with DCP compliant setbacks are generally similar to the existing conditions with most locations being classified as suitable for pedestrian standing or sitting, Figure 15.

Conditions to the north and east of the development sites are slightly degraded by the addition of the two towers. Locations 4.1, 5.1, and 19.1 are classified as suitable for pedestrian walking in this configuration. These areas are most strongly affected by winds from the east. The proposed towers are significantly taller than the existing buildings, and will therefore produce stronger downwash at the ground plane. Areas along Castlereagh Street are largely unaffected by the addition of the proposed development.

Wind conditions along Martin Place to the east and west of the proposed development, Locations 16.1-18.1, and 20.1-22.1, are almost unchanged compared with the existing conditions.

Wind conditions to the south of the site on Elizabeth Street, Location 26, improve slightly from the existing. This area remains suitable for pedestrian walking from a comfort perspective, however no longer fails the distress criterion. At this location, the inclusion of the proposed development has the effect of reducing the influence of winds from the south-east quadrant.

Further away from the site, on Philip Street, Location 29.1 is classified as suitable for business walking and fails the distress criterion with an able bodied rating. The strong wind conditions at this location are not caused by the proposed development and are similar to the existing configuration.

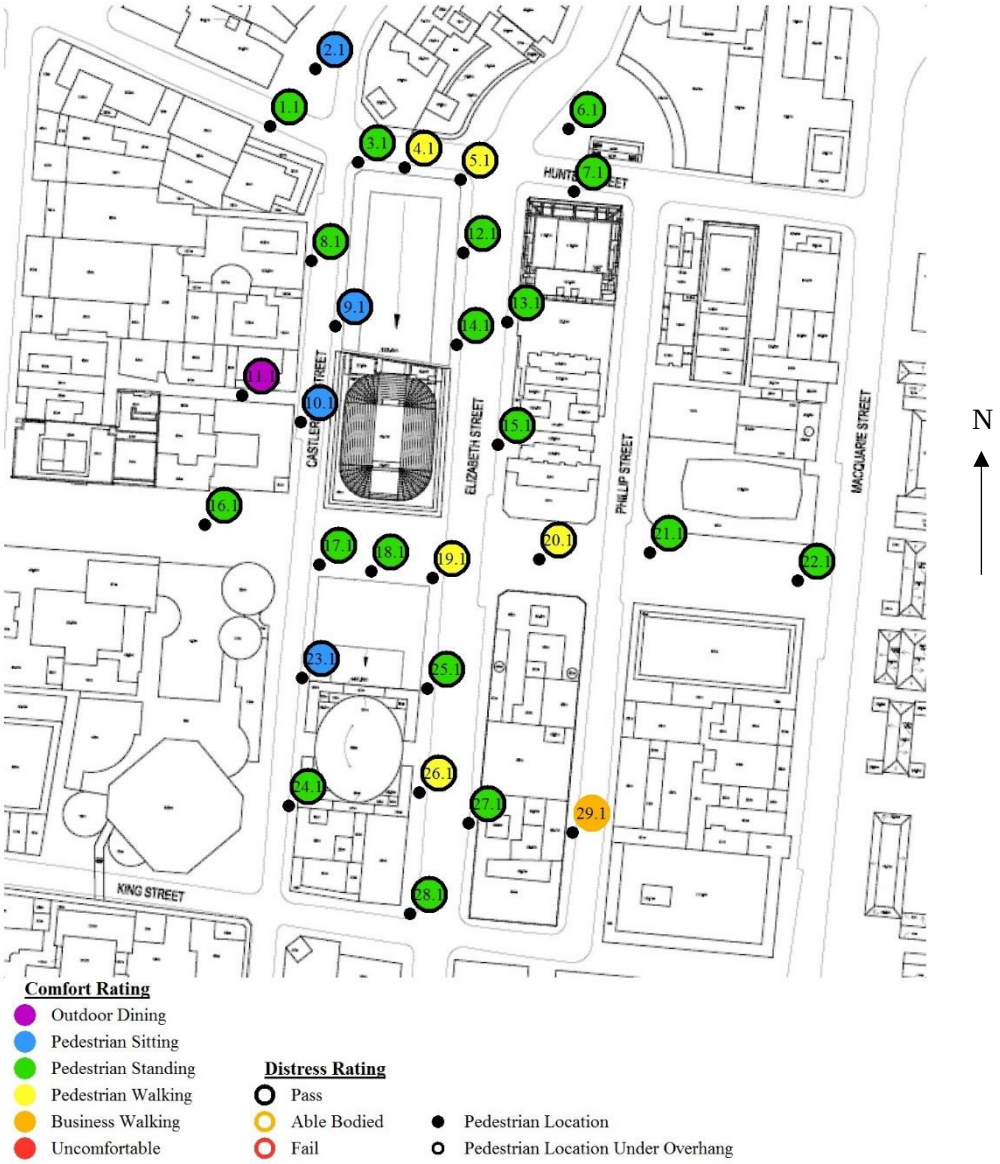


Figure 15: Pedestrian wind speed measurement locations with comfort/distress ratings – Configuration B, LEP/DCP compliant envelope of proposed buildings

6.1.3 – Envelope of proposed development with existing surroundings (6 m setback on south tower)

Conditions in Configuration C generally remain similar to Configuration B, Figure 16. Locations 2.2, 3.2, 7.2, 11.2, 12.2, and 14.2 show a degradation in comfort category, however it should be noted that the comfort mean wind speeds for these locations generally lie on the boundary between two categories, and the difference in conditions between Configurations B and C is not significant in these areas. Location 4.2 improves in comfort rating relative to the LEP/DCP compliant configuration. Overall, wind conditions in this configuration are largely the same as the LEP/DCP-compliant configuration, with wind speeds slightly increasing at some locations and slightly decreasing at others.

Location 29.2 fails the distress criterion, as in the previous two cases.

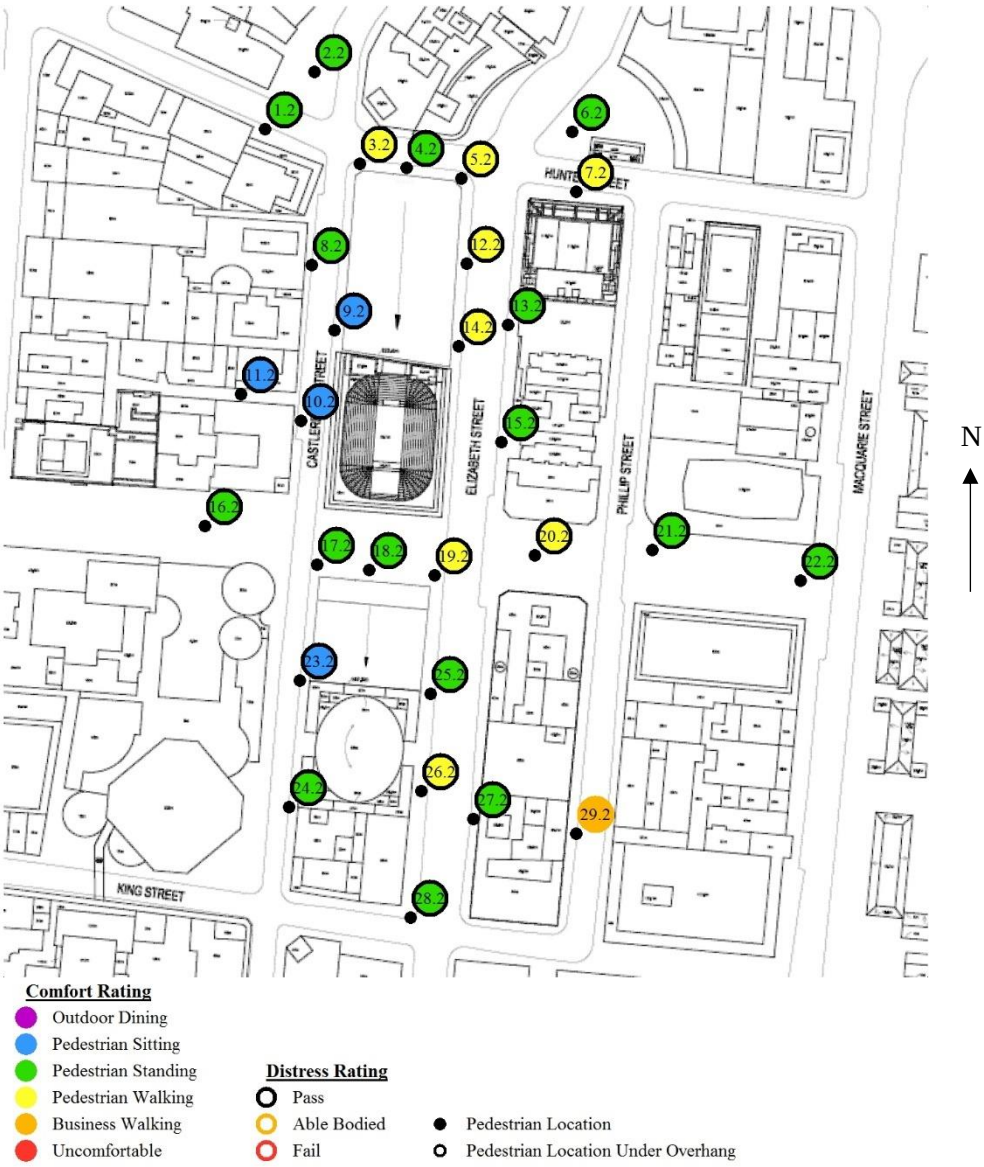


Figure 16: Pedestrian wind speed measurement locations with comfort/distress ratings – Configuration C, full envelope of proposed buildings with 6 m setback at Martin Place

6.1.4 – Envelope of proposed development with existing surroundings (25 m setback on south tower)

Conditions in Configuration D generally remain similar to Configurations B and C, Figure 17. Locations 2.3 and 11.3 show an degradation in comfort category compared with Configuration B, however it should be noted that these locations lie on the boundary between two categories, and the difference in conditions between Configurations B and D is not significant in these areas. Similarly, though Location 29.3 is shown to improve to a rating of pedestrian walking, the difference in wind conditions compared to the previous configurations is insignificant. Overall, wind conditions in this configuration are largely the same as the LEP/DCP-compliant configuration, with wind speeds slightly increasing at some locations and slightly decreasing at others.

Locations 26.3 and 29.3 fail the distress criterion, as in the existing case.

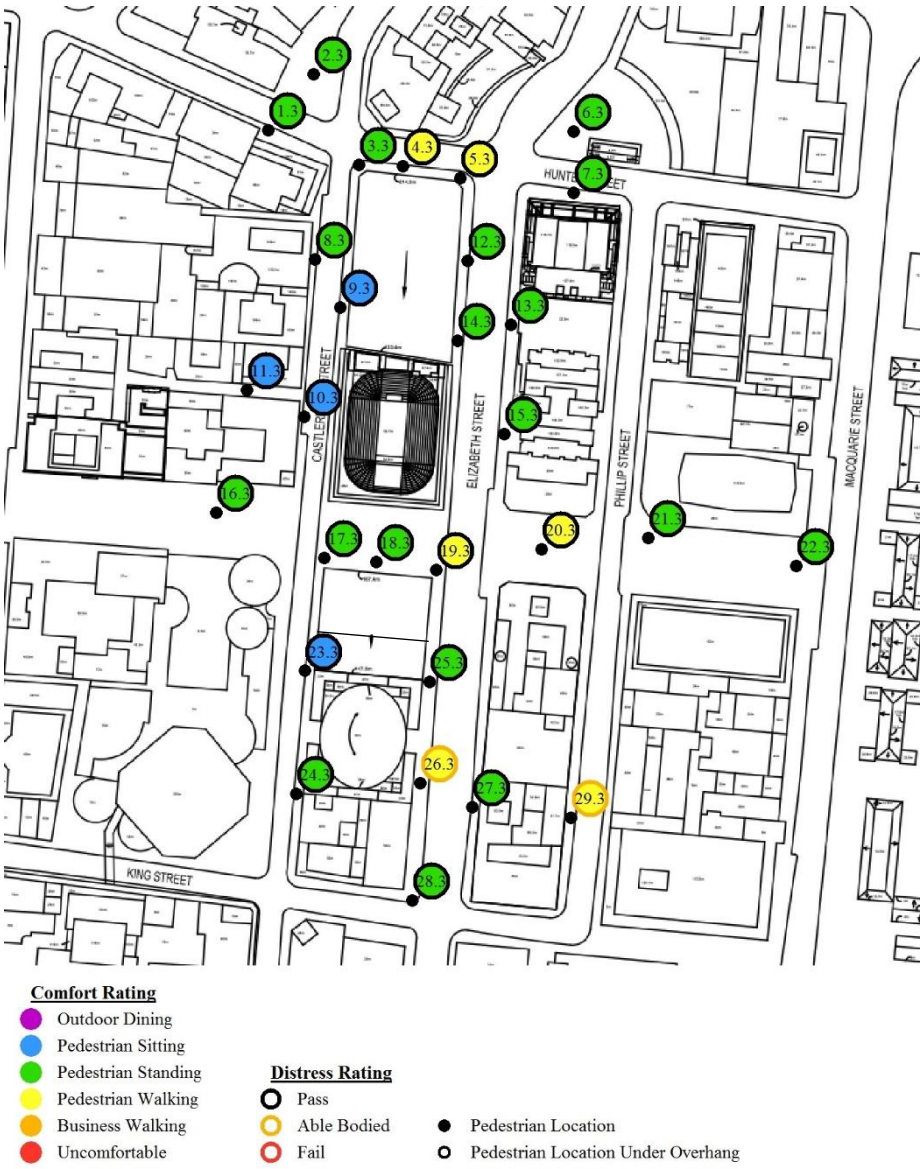


Figure 17: Pedestrian wind speed measurement locations with comfort/distress ratings – Configuration D, full envelope of proposed buildings with 25 m setback at Martin Place

7. CONCLUSIONS

A wind tunnel investigation of the pedestrian level wind environment in and around the proposed Martin Place Overstation development has been conducted. At street level, the existing wind environment near the development site is generally suitable for pedestrian standing and walking. Some areas on Elizabeth and Philip Street to the south of the site are windy and currently exceed the distress criterion, due to being exposed to unimpeded winds flowing over Hyde Park from the south-east quadrant.

The addition of the LEP/DCP-compliant scheme changes the wind flow patterns in the area, causing some areas to be windier and providing shelter for others. In general, conditions at the ground plane remain similar to the existing.

The modifications to the building setbacks in Configurations C and D have a relatively minor impact on wind amenity at the ground plane, with a small improvement in wind conditions at some locations and slight degradation at others. Excluding locations where existing conditions exceed target levels already, all areas are assessed as suitable for the intended use of space in this section of the city.

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Appendix 1: Additional Photographs of the Wind Tunnel Model

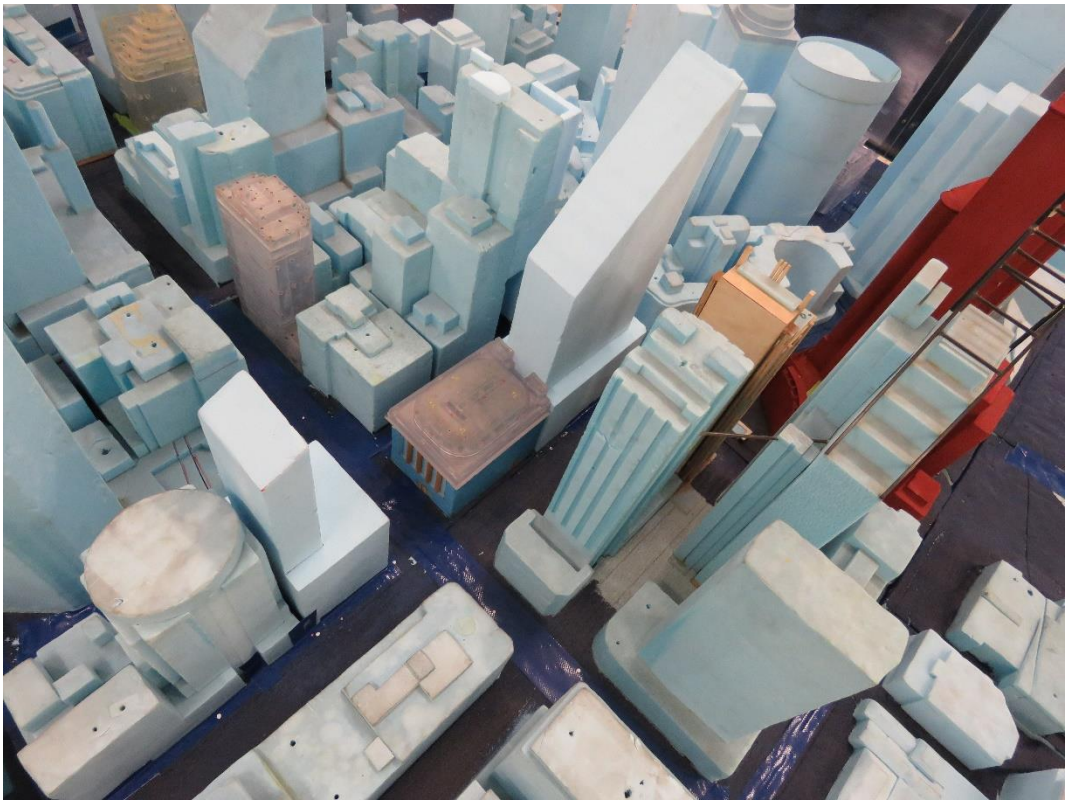


Figure 18: Wind tunnel model of Configuration B, viewed from the south-east

Figure 19: Wind tunnel model of Configuration C, viewed from the east

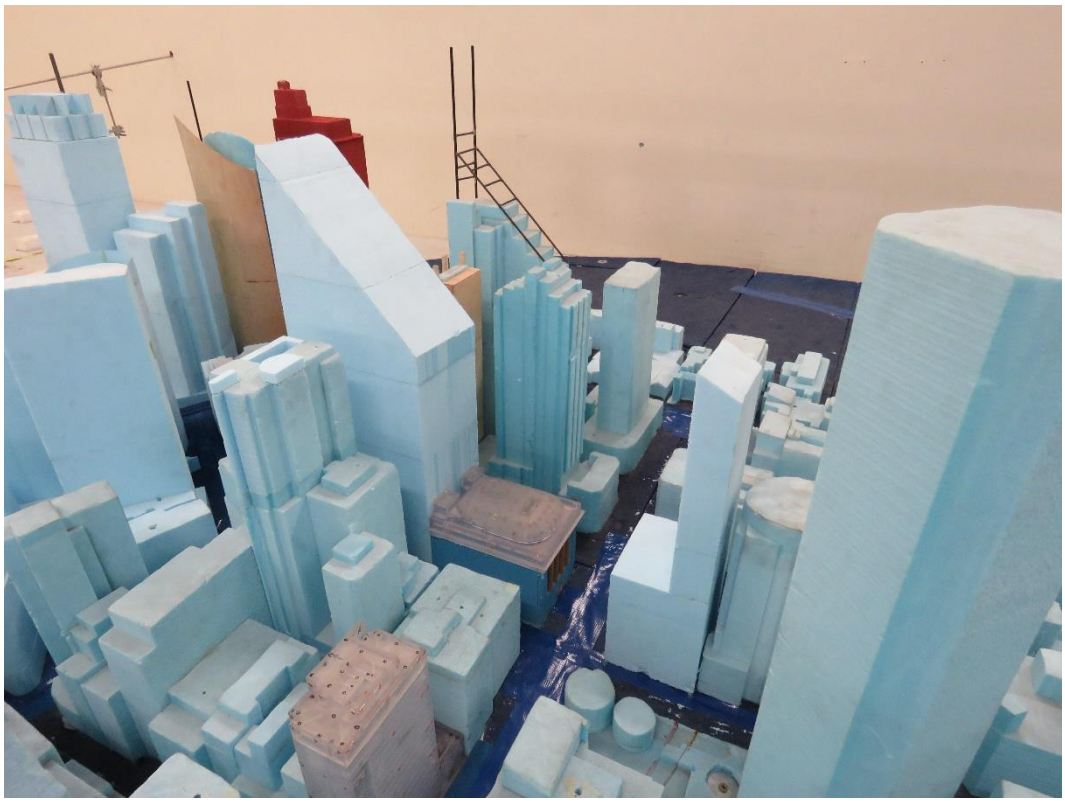
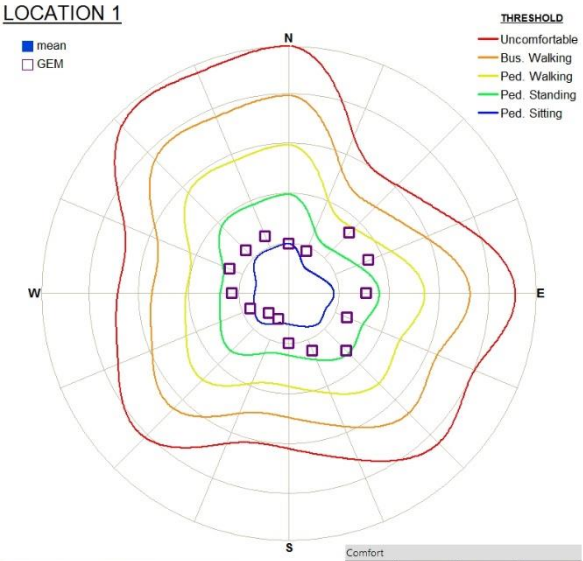


Figure 20:Wind tunnel model of Configuration D, viewed from the west

Appendix 2: Directional Wind Results

Configuration A – Existing

LOCATION 1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	17.94	28.46	28.46
4	0.87	3.65	3.65
6	0.01	0.25	0.25
8	0.00	0.00	0.00
10	0.00	0.00	0.00

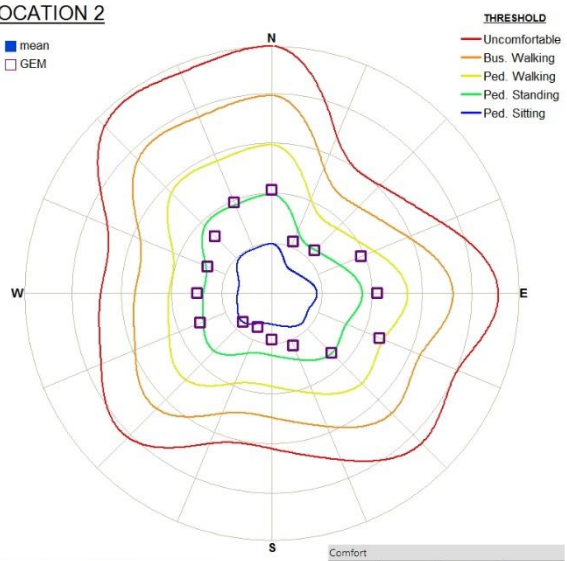
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.0	3.7	3.7
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	5.7	7.2	7.2
Rating	Pass	Pass	Pass

LOCATION 2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	16.18	39.96	39.96
4	1.29	5.91	5.91
6	0.07	0.38	0.38
8	0.00	0.02	0.02
10	0.00	0.00	0.00

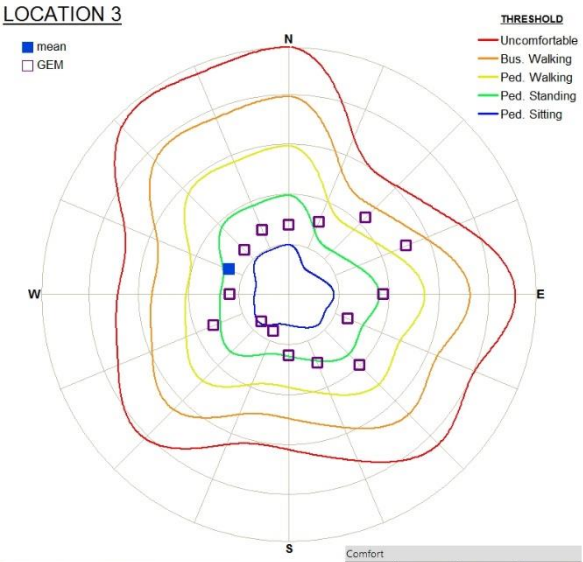
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.0	4.1	4.1
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	6.8	8.0	8.0
Rating	Pass	Pass	Pass

LOCATION 3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	30.76	42.00	42.06
4	5.17	9.42	9.44
6	0.49	1.68	1.68
8	0.01	0.16	0.16
10	0.00	0.00	0.00

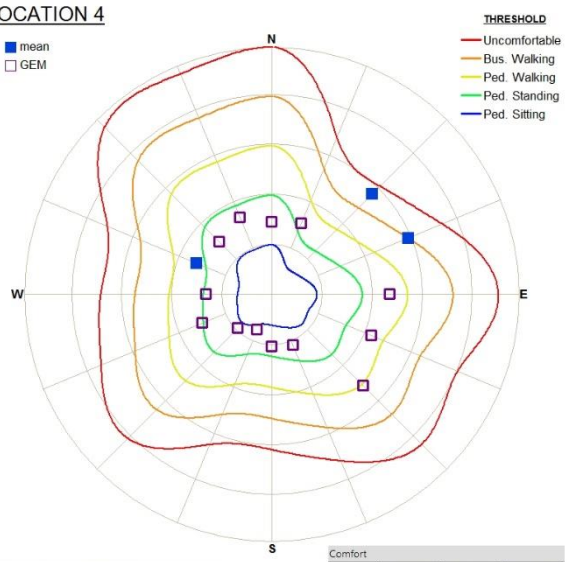
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.0	4.8	4.8
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.7	9.2	9.2
Rating	Pass	Pass	Pass

LOCATION 4



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.34	44.05	44.79
4	9.81	12.60	13.56
6	4.25	2.93	4.68
8	1.08	0.42	1.11
10	0.22	0.03	0.23

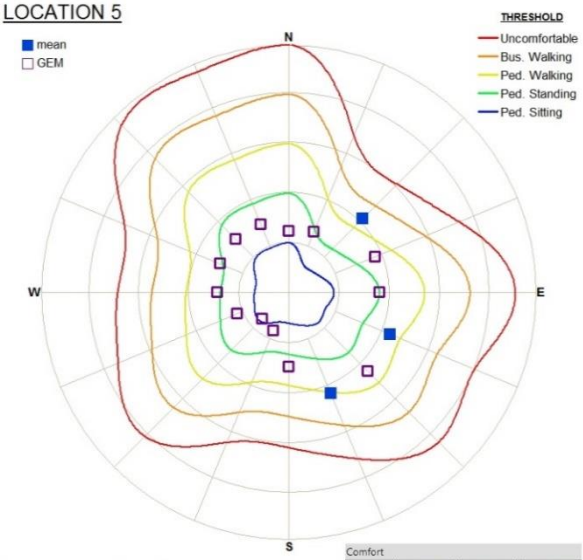
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.5	5.3	5.8
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.8	10.1	11.8
Rating	Pass	Pass	Pass

LOCATION 5



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	37.19	45.07	45.64
4	9.38	10.74	11.81
6	1.33	1.17	1.47
8	0.13	0.08	0.14
10	0.00	0.00	0.00

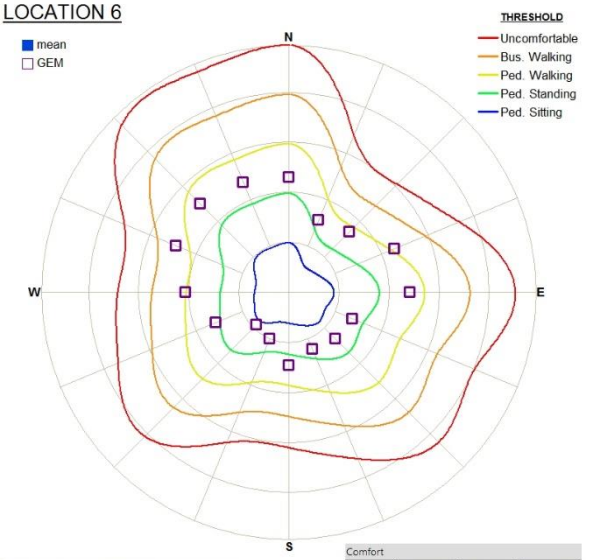
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.7	4.7	4.8
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.2	8.8	9.2
Rating	Pass	Pass	Pass

LOCATION 6



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	36.25	55.65	55.65
4	4.65	12.83	12.83
6	0.60	2.09	2.09
8	0.09	0.34	0.34
10	0.01	0.05	0.05

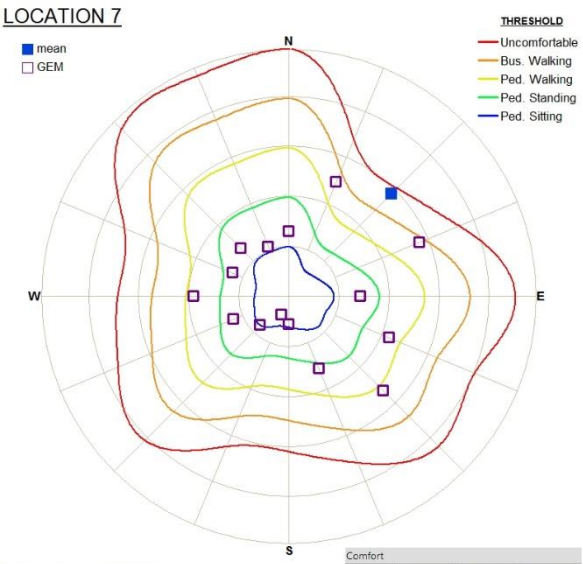
Comfort

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

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.4	10.7	10.7
Rating	Pass	Pass	Pass

LOCATION 7



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	26.14	40.10	40.15
4	9.55	15.54	15.64
6	3.38	5.78	5.94
8	1.00	1.19	1.31
10	0.26	0.23	0.28

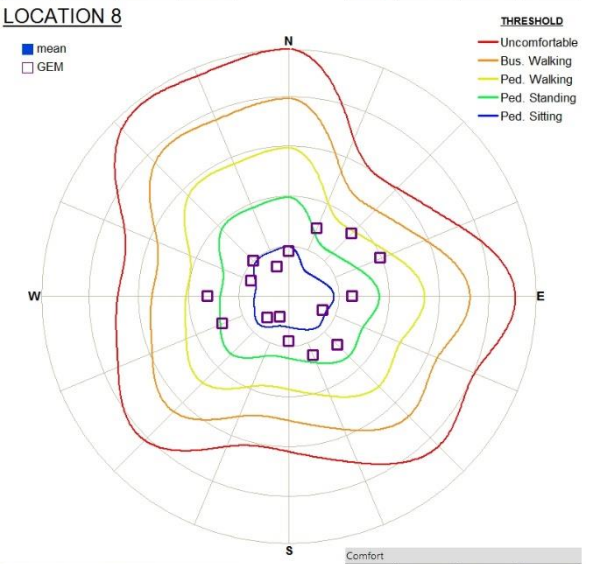
Comfort

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

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	12.1	11.8	12.1
Rating	Pass	Pass	Pass

LOCATION 8



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	16.28	29.41	29.41
4	0.44	5.48	5.48
6	0.00	0.45	0.45
8	0.00	0.01	0.01
10	0.00	0.00	0.00

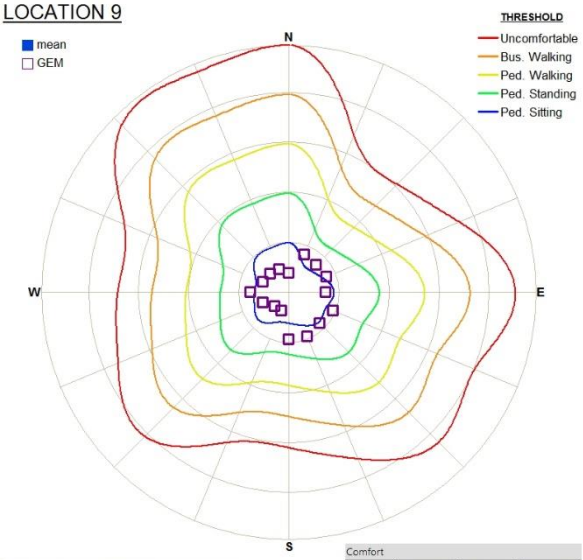
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	2.8	4.1	4.1
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	5.0	7.6	7.6
Rating	Pass	Pass	Pass

LOCATION 9



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	1.20	8.96	8.96
4	0.00	0.06	0.06
6	0.00	0.00	0.00
8	0.00	0.00	0.00
10	0.00	0.00	0.00

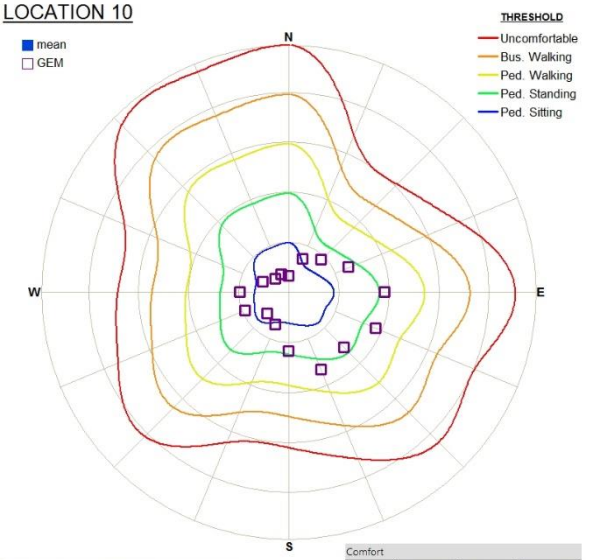
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	1.5	2.2	2.2
Rating	Outdoor Dining	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	3.2	4.3	4.3
Rating	Pass	Pass	Pass

LOCATION 10



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	9.97	25.61	25.61
4	0.22	1.95	1.95
6	0.00	0.11	0.11
8	0.00	0.00	0.00
10	0.00	0.00	0.00

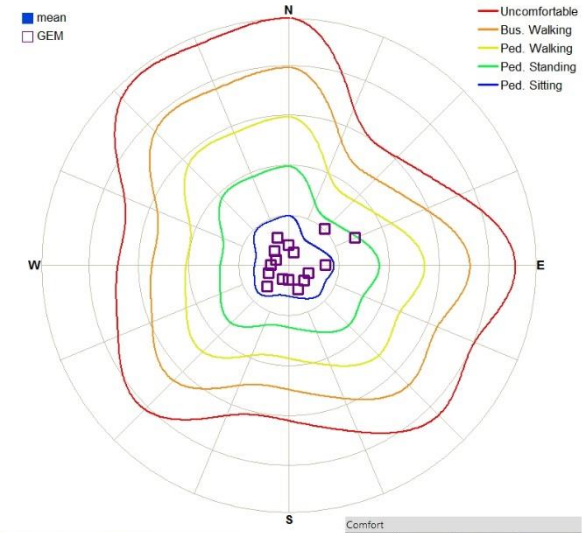
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	2.4	3.4	3.4
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	5.1	7.0	7.0
Rating	Pass	Pass	Pass

LOCATION 11



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	4.56	5.77	5.77
4	0.04	0.18	0.18
6	0.00	0.00	0.00
8	0.00	0.00	0.00
10	0.00	0.00	0.00

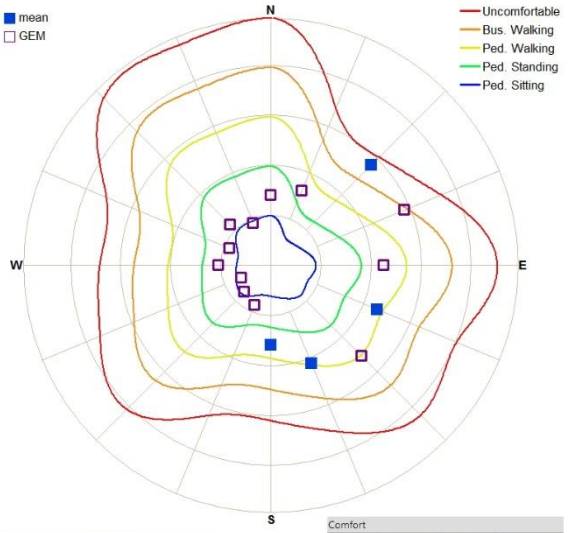
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	1.9	2.1	2.1
Rating	Outdoor Dining	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	4.2	4.7	4.7
Rating	Pass	Pass	Pass

LOCATION 12



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	37.79	42.57	43.42
4	13.29	14.51	15.93
6	4.17	3.79	4.88
8	0.97	0.62	1.09
10	0.22	0.06	0.22

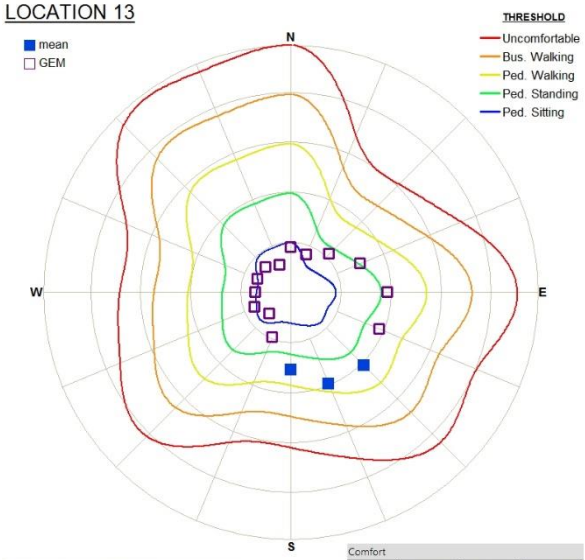
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.6	5.6	5.9
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.8	10.7	11.8
Rating	Pass	Pass	Pass

LOCATION 13



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	24.22	31.35	32.03
4	4.37	4.27	5.21
6	0.36	0.26	0.39
8	0.02	0.01	0.02
10	0.00	0.00	0.00

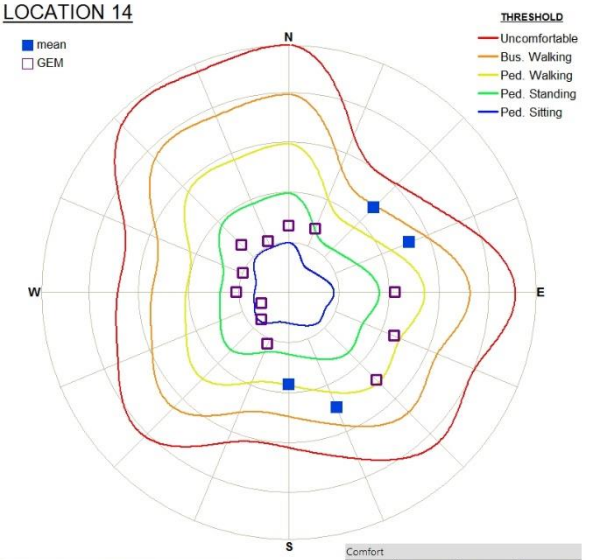
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.9	3.9	4.0
Rating	Ped Sitting	Ped Sitting	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.1	7.6	8.1
Rating	Pass	Pass	Pass

LOCATION 14



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	39.94	44.39	45.24
4	14.34	14.36	16.33
6	3.63	2.36	3.87
8	0.55	0.24	0.57
10	0.05	0.01	0.05

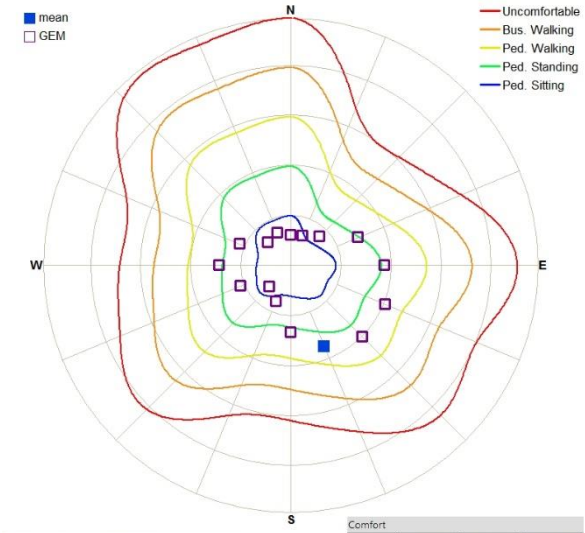
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.5	5.2	5.6
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.5	9.7	10.6
Rating	Pass	Pass	Pass

LOCATION 15



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	25.09	30.88	31.05
4	3.11	3.89	4.04
6	0.18	0.20	0.22
8	0.01	0.01	0.01
10	0.00	0.00	0.00

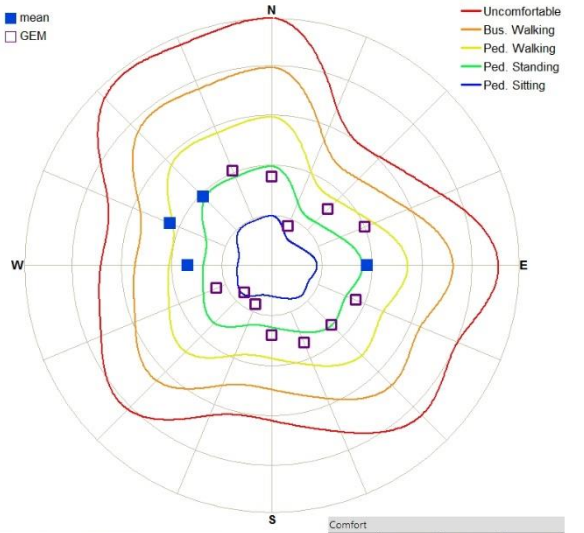
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.6	3.8	3.8
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.4	7.3	7.5
Rating	Pass	Pass	Pass

LOCATION 16



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	39.99	46.09	47.76
4	5.08	7.70	8.32
6	0.74	0.66	0.96
8	0.12	0.04	0.13
10	0.01	0.00	0.01

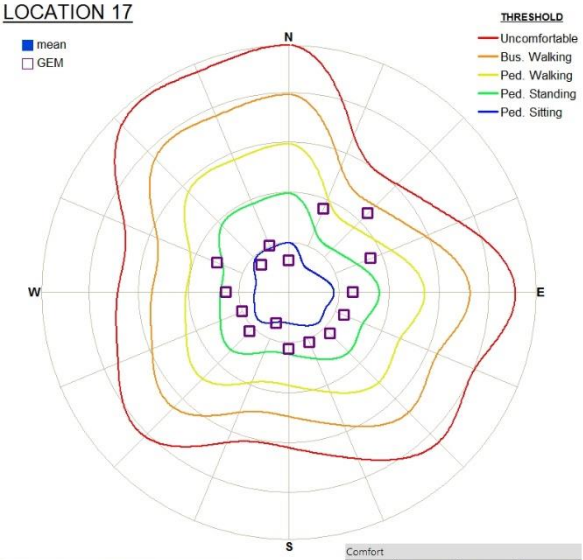
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.0	4.4	4.5
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.3	8.3	9.3
Rating	Pass	Pass	Pass

LOCATION 17



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	14.20	32.97	32.97
4	4.11	7.34	7.34
6	0.79	1.32	1.32
8	0.08	0.18	0.18
10	0.00	0.01	0.01

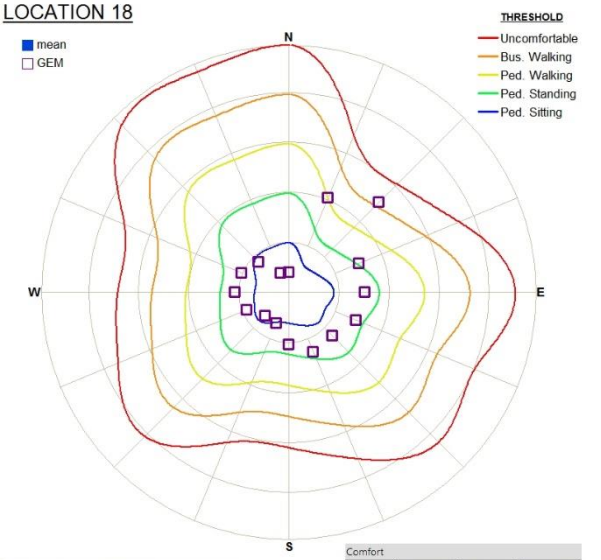
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.6	4.5	4.5
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.7	9.3	9.3
Rating	Pass	Pass	Pass

LOCATION 18



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	16.17	31.19	31.19
4	6.29	7.64	7.64
6	2.09	2.46	2.46
8	0.42	0.48	0.48
10	0.04	0.05	0.05

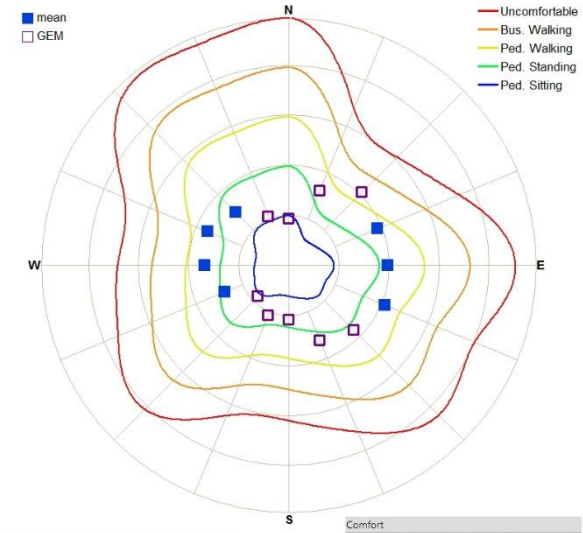
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.5	4.8	4.8
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.4	10.6	10.6
Rating	Pass	Pass	Pass

LOCATION 19



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	37.76	44.30	45.71
4	8.01	9.13	9.95
6	0.84	1.05	1.18
8	0.03	0.07	0.08
10	0.00	0.00	0.00

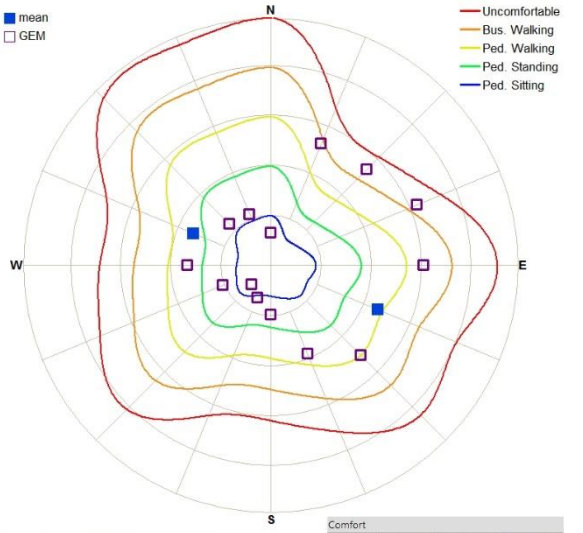
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.4	4.6	4.7
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.2	8.6	8.7
Rating	Pass	Pass	Pass

LOCATION 20



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	36.20	44.57	45.00
4	14.09	18.09	18.27
6	4.31	6.75	6.82
8	0.68	1.37	1.38
10	0.06	0.20	0.20

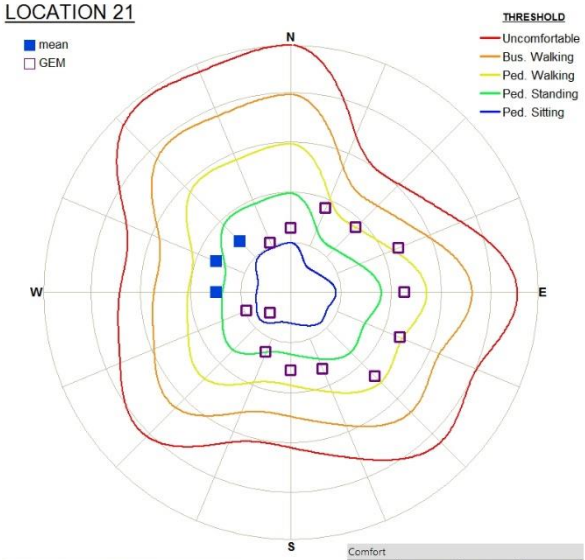
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.7	6.4	6.4
Rating	Ped Standing	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.6	11.6	11.6
Rating	Pass	Pass	Pass

LOCATION 21



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	38.58	47.62	48.80
4	5.32	13.24	13.63
6	0.24	1.38	1.47
8	0.01	0.06	0.06
10	0.00	0.00	0.00

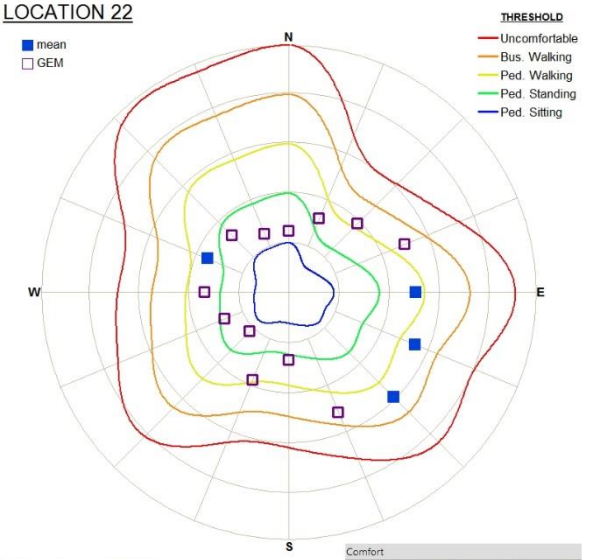
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.0	4.9	5.0
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.2	8.5	8.6
Rating	Pass	Pass	Pass

LOCATION 22



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	44.31	55.16	55.33
4	13.31	19.06	19.56
6	2.33	3.31	3.58
8	0.23	0.37	0.42
10	0.02	0.04	0.05

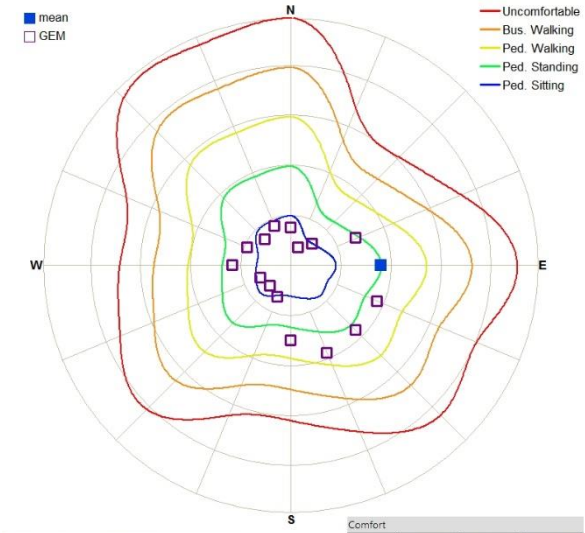
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.2	5.6	5.7
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.9	10.6	10.7
Rating	Pass	Pass	Pass

LOCATION 23



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	17.32	26.31	26.47
4	1.46	3.98	4.03
6	0.07	0.27	0.27
8	0.00	0.02	0.02
10	0.00	0.00	0.00

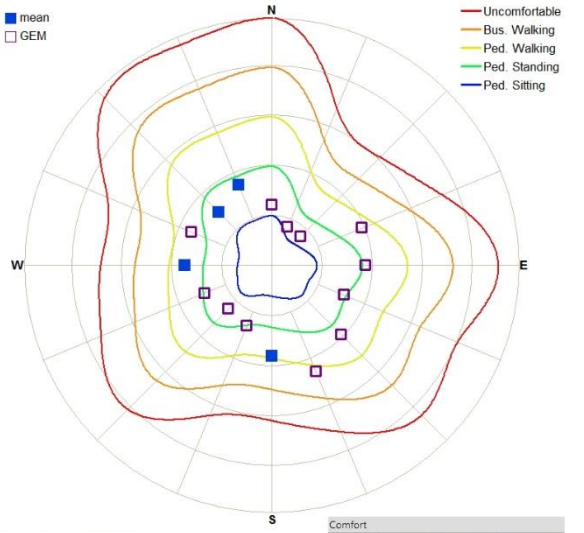
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.2	3.8	3.8
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	6.6	7.7	7.7
Rating	Pass	Pass	Pass

LOCATION 24



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	36.45	44.77	45.72
4	7.67	9.54	10.10
6	0.99	1.07	1.21
8	0.08	0.09	0.11
10	0.00	0.01	0.01

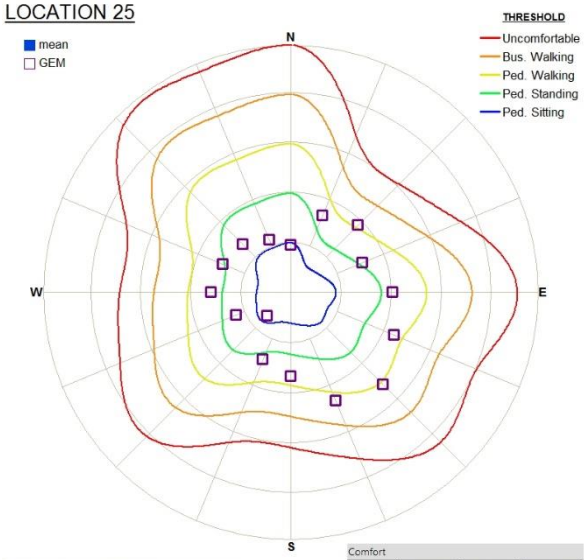
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.4	4.7	4.7
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.0	9.3	9.3
Rating	Pass	Pass	Pass

LOCATION 25



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	38.70	49.75	49.75
4	5.93	14.50	14.50
6	0.32	1.81	1.81
8	0.02	0.14	0.14
10	0.00	0.01	0.01

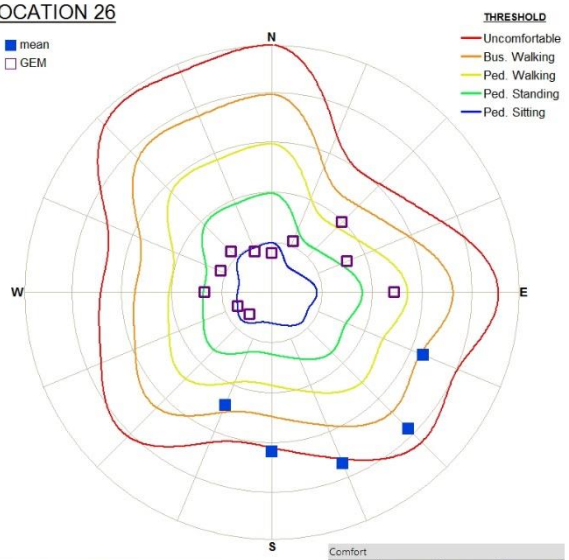
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.1	5.0	5.0
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.8	9.6	9.6
Rating	Pass	Pass	Pass

LOCATION 26



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	43.96	47.77	48.71
4	25.02	23.14	26.67
6	11.67	6.99	11.93
8	3.95	1.53	3.98
10	1.14	0.27	1.14

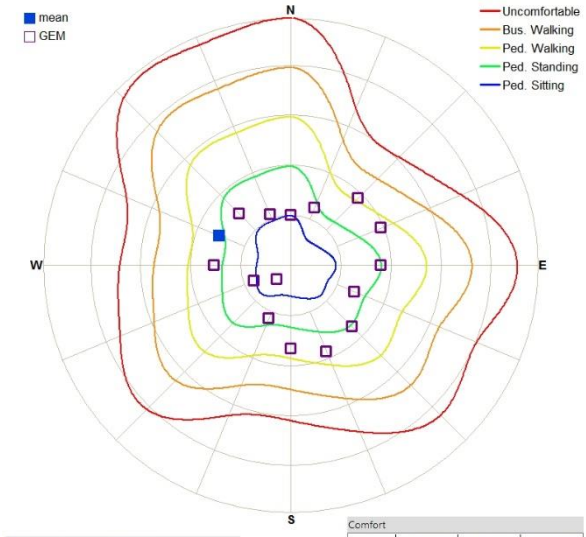
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	7.5	6.4	7.5
Rating	Ped Walking	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	15.6	12.8	15.6
Rating	Able Body	Pass	Able Body

LOCATION 27



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	29.55	42.72	42.80
4	3.79	9.51	9.52
6	0.30	0.93	0.94
8	0.00	0.04	0.04
10	0.00	0.00	0.00

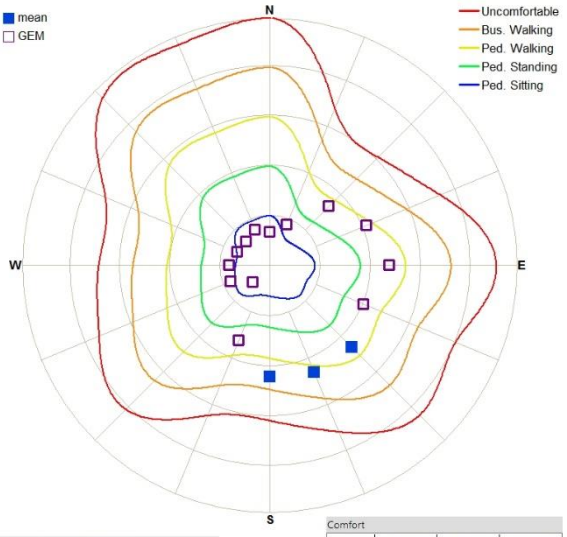
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.7	4.6	4.6
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.2	8.3	8.3
Rating	Pass	Pass	Pass

LOCATION 28



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	34.98	39.47	40.29
4	11.93	13.09	15.33
6	1.99	1.59	2.34
8	0.29	0.12	0.29
10	0.03	0.01	0.03

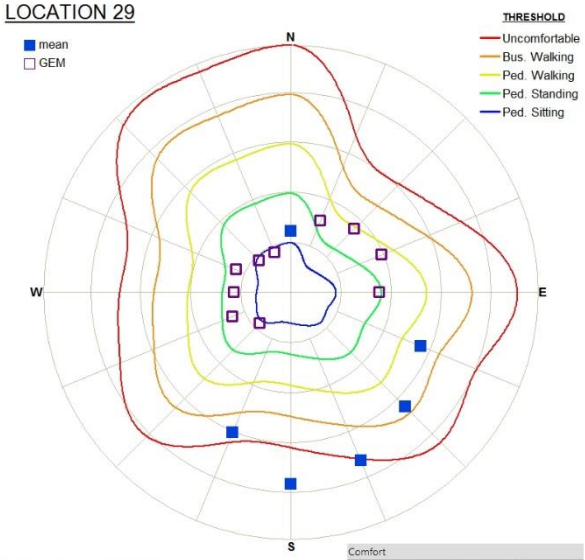
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.9	4.9	5.2
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.3	9.4	10.3
Rating	Pass	Pass	Pass

LOCATION 29



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	44.66	50.42	51.18
4	25.19	24.52	26.65
6	13.22	9.34	13.38
8	5.35	2.67	5.35
10	2.02	0.74	2.02

Comfort

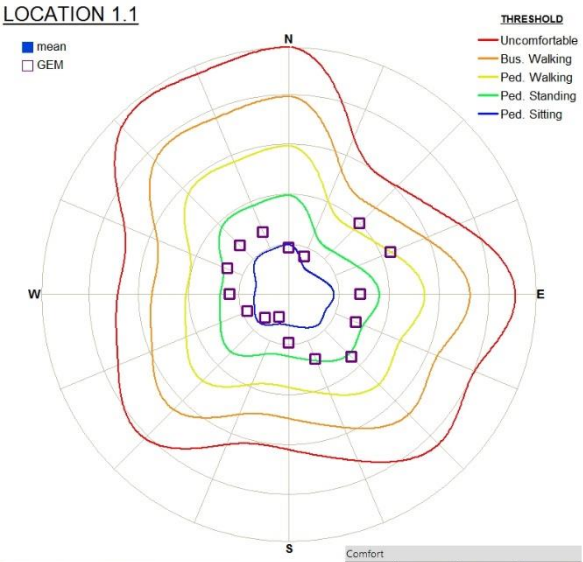
(5%)	MEAN	GEM	COMBINED
V (m/s)	8.0	7.0	8.0
Rating	Bus Walking	Ped Walking	Bus Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	17.4	14.3	17.4
Rating	Able Body	Pass	Able Body

Configuration B – LEP/DCP compliant

LOCATION 1.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	23.03	30.75	30.75
4	4.74	6.33	6.33
6	0.56	0.79	0.79
8	0.04	0.05	0.05
10	0.00	0.00	0.00

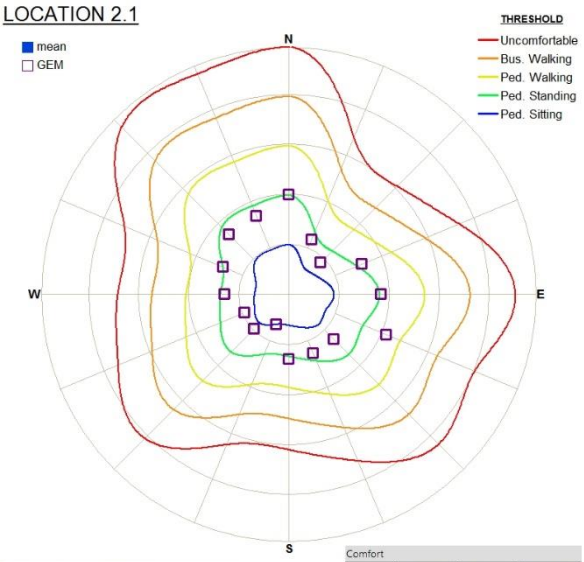
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.9	4.3	4.3
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.2	8.4	8.4
Rating	Pass	Pass	Pass

LOCATION 2.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	18.57	37.37	37.37
4	1.31	3.71	3.71
6	0.07	0.22	0.22
8	0.00	0.01	0.01
10	0.00	0.00	0.00

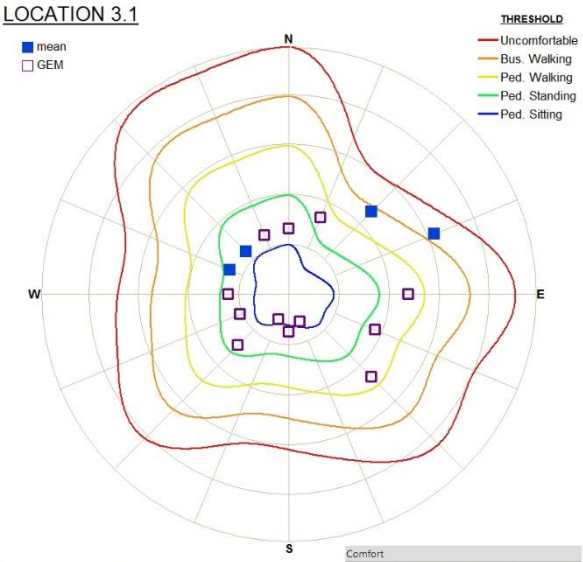
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.0	3.8	3.8
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	6.7	7.4	7.4
Rating	Pass	Pass	Pass

LOCATION 3.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	25.41	34.36	34.64
4	8.21	10.78	11.19
6	2.97	2.45	3.19
8	0.62	0.33	0.63
10	0.04	0.02	0.04

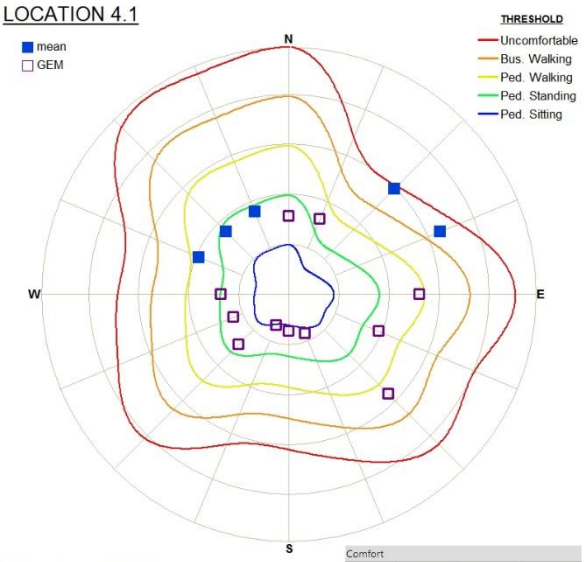
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.9	5.1	5.3
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.4	9.8	10.4
Rating	Pass	Pass	Pass

LOCATION 4.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	35.04	41.73	43.45
4	11.21	13.87	14.92
6	5.21	4.33	5.85
8	1.62	0.75	1.68
10	0.36	0.10	0.37

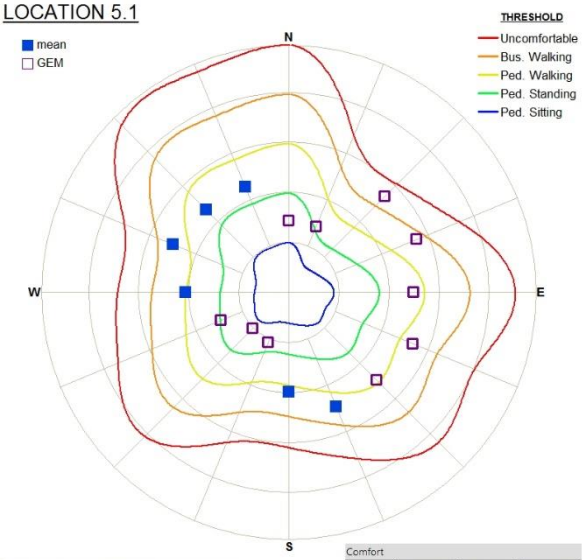
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.0	5.7	6.2
Rating	Ped Standing	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	12.5	11.1	12.5
Rating	Pass	Pass	Pass

LOCATION 5.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	53.31	59.50	62.41
4	18.90	19.23	23.20
6	5.37	5.22	6.73
8	1.10	0.95	1.30
10	0.20	0.16	0.22

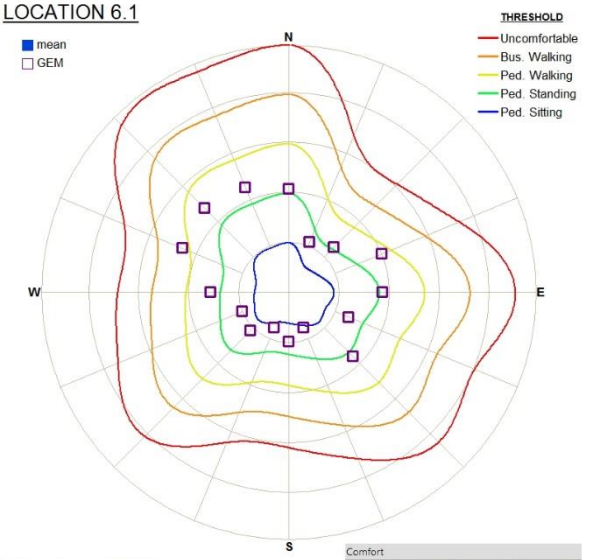
Comfort

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

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.6	11.4	11.7
Rating	Pass	Pass	Pass

LOCATION 6.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	22.19	42.14	42.14
4	2.19	6.21	6.21
6	0.54	1.05	1.05
8	0.10	0.20	0.20
10	0.01	0.03	0.03

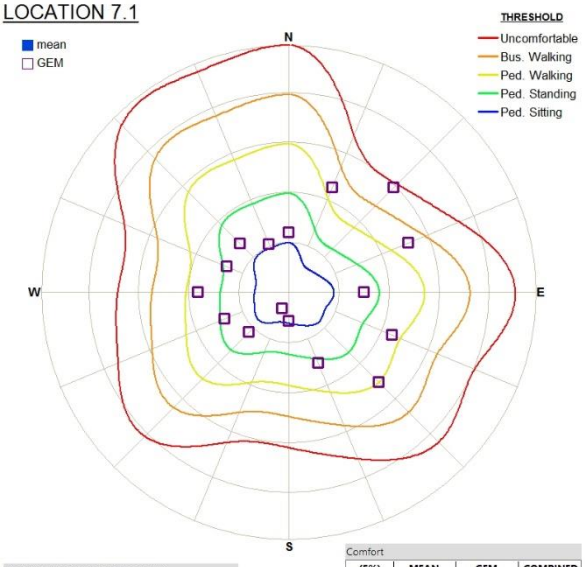
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.1	4.2	4.2
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.1	10.1	10.1
Rating	Pass	Pass	Pass

LOCATION 7.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	26.56	41.05	41.05
4	7.58	15.09	15.09
6	2.86	5.15	5.15
8	0.82	1.22	1.22
10	0.19	0.31	0.31

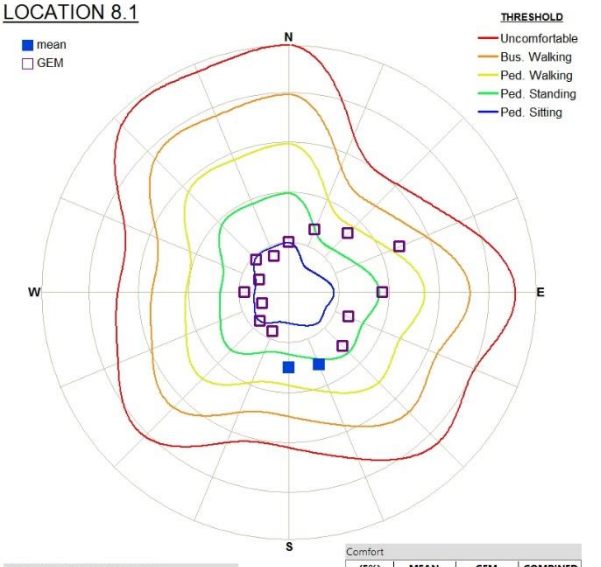
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.7	6.0	6.0
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.7	12.3	12.3
Rating	Pass	Pass	Pass

LOCATION 8.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	23.15	32.61	33.23
4	3.69	5.79	6.36
6	0.26	0.61	0.66
8	0.01	0.02	0.02
10	0.00	0.00	0.00

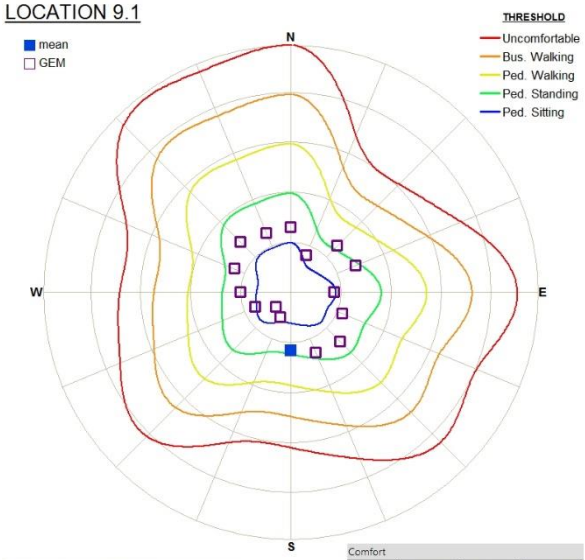
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.6	4.1	4.2
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.3	7.8	7.9
Rating	Pass	Pass	Pass

LOCATION 9.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	15.83	25.80	26.11
4	0.49	1.51	1.55
6	0.01	0.02	0.02
8	0.00	0.00	0.00
10	0.00	0.00	0.00

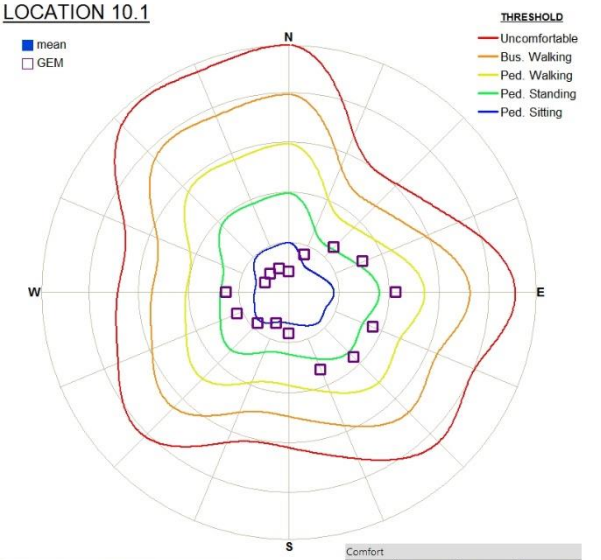
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	2.7	3.3	3.3
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	5.5	6.0	6.0
Rating	Pass	Pass	Pass

LOCATION 10.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	12.74	27.75	27.75
4	0.33	3.25	3.25
6	0.00	0.13	0.13
8	0.00	0.00	0.00
10	0.00	0.00	0.00

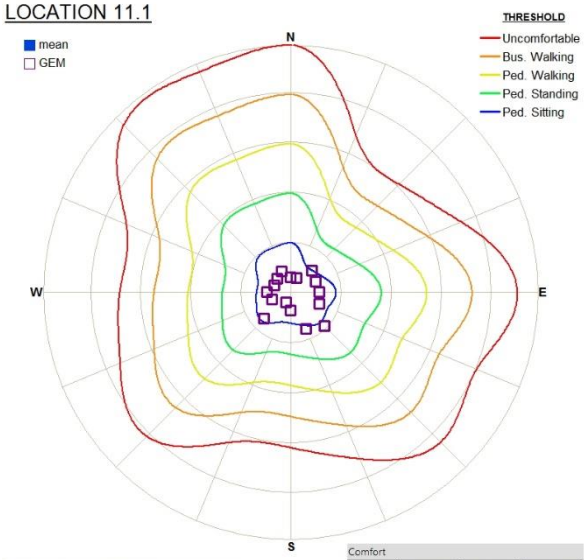
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	2.6	3.7	3.7
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	5.4	7.1	7.1
Rating	Pass	Pass	Pass

LOCATION 11.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	0.09	1.64	1.64
4	0.00	0.00	0.00
6	0.00	0.00	0.00
8	0.00	0.00	0.00
10	0.00	0.00	0.00

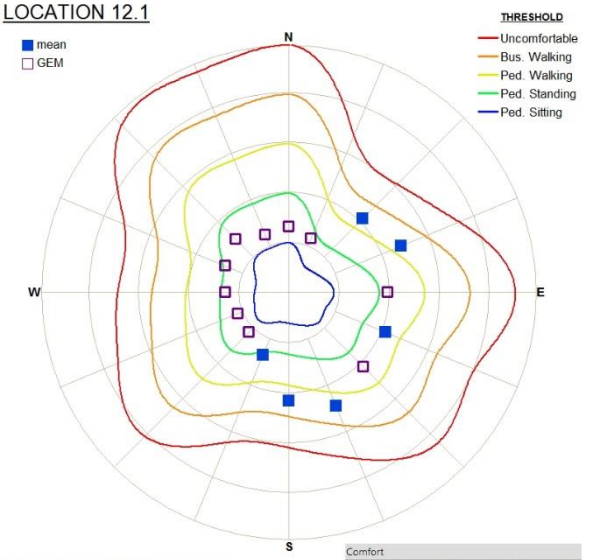
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	1.1	1.6	1.6
Rating	Outdoor Dining	Outdoor Dining	Outdoor Dining

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	2.3	3.3	3.3
Rating	Pass	Pass	Pass

LOCATION 12.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	41.72	47.89	49.45
4	14.76	12.60	16.43
6	2.99	1.62	3.09
8	0.36	0.12	0.36
10	0.04	0.00	0.04

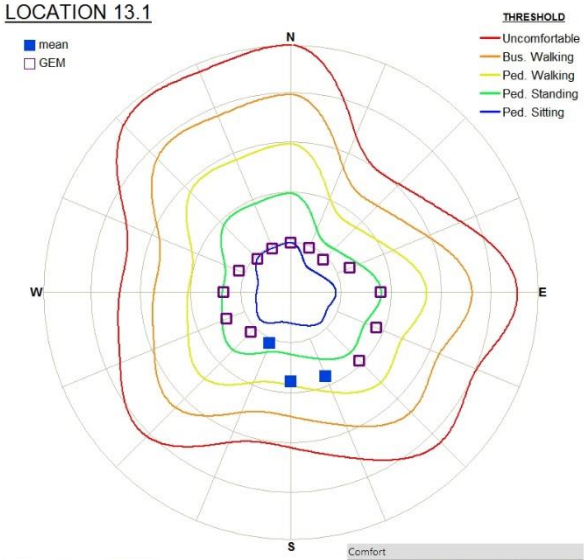
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.4	5.0	5.4
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.4	9.0	10.4
Rating	Pass	Pass	Pass

LOCATION 13.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	28.39	37.34	38.91
4	4.61	4.06	5.62
6	0.48	0.23	0.53
8	0.03	0.01	0.04
10	0.00	0.00	0.00

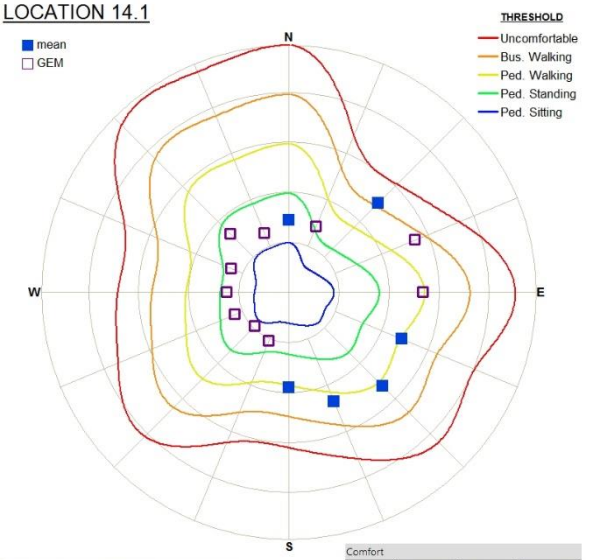
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.9	3.8	4.1
Rating	Ped Sitting	Ped Sitting	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.2	7.4	8.2
Rating	Pass	Pass	Pass

LOCATION 14.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	44.74	49.61	50.74
4	16.91	16.19	18.54
6	4.04	3.30	4.68
8	0.64	0.42	0.73
10	0.07	0.02	0.07

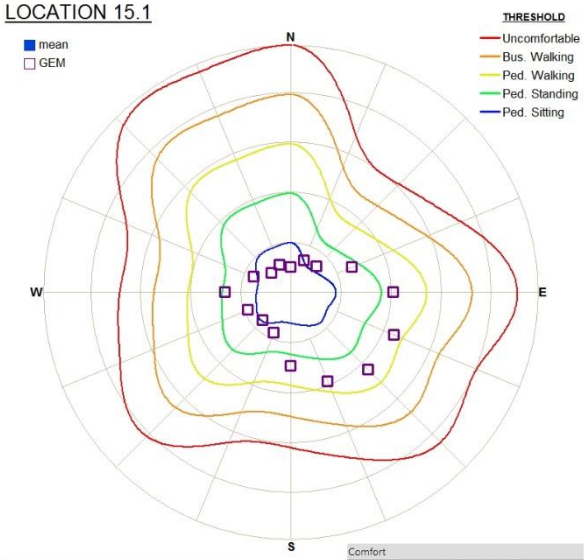
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.7	5.5	5.9
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.7	10.0	10.7
Rating	Pass	Pass	Pass

LOCATION 15.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	20.49	30.83	30.83
4	2.81	5.64	5.64
6	0.18	0.43	0.43
8	0.01	0.03	0.03
10	0.00	0.00	0.00

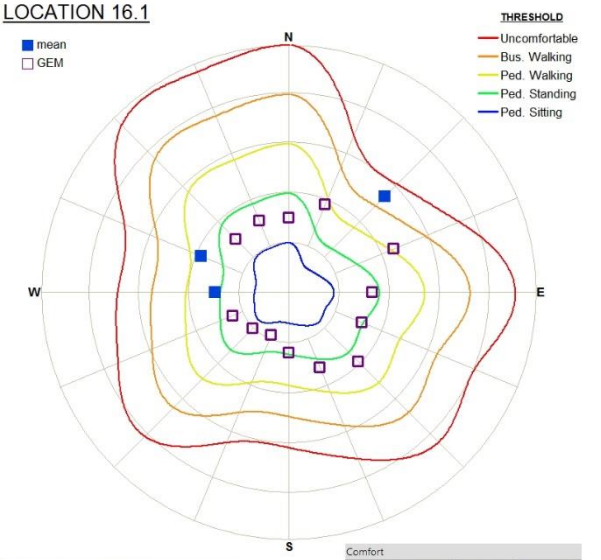
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.5	4.1	4.1
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.5	8.2	8.2
Rating	Pass	Pass	Pass

LOCATION 16.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	38.11	46.95	47.73
4	8.87	11.58	12.15
6	2.82	2.54	3.32
8	0.65	0.42	0.67
10	0.13	0.04	0.13

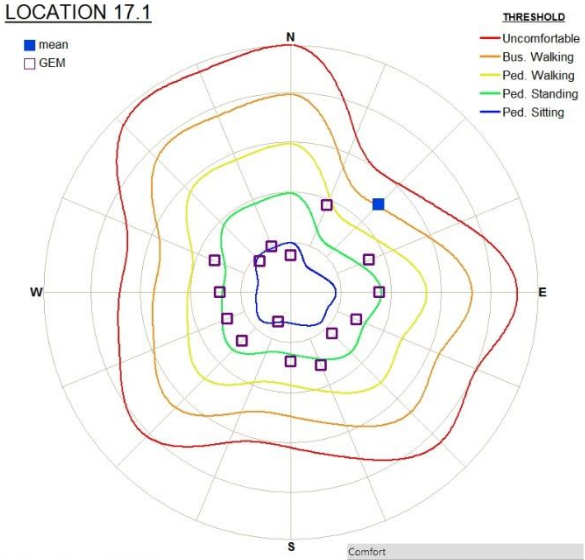
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.9	5.1	5.3
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.3	10.3	11.3
Rating	Pass	Pass	Pass

LOCATION 17.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	20.92	40.73	40.81
4	5.99	9.58	9.72
6	1.93	2.00	2.24
8	0.40	0.33	0.41
10	0.04	0.02	0.04

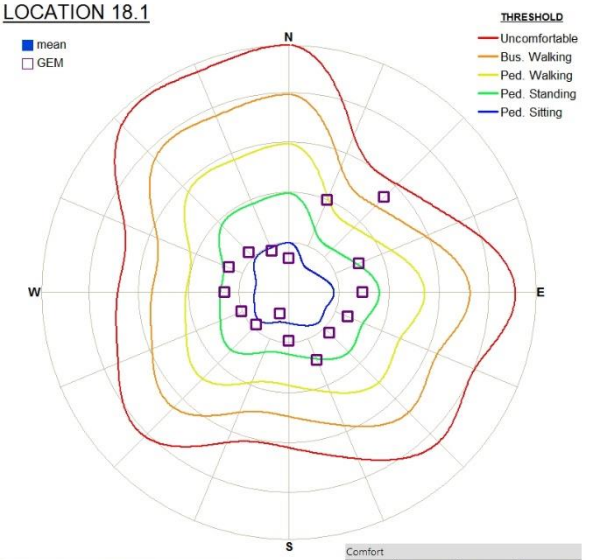
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	4.8	4.9
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.3	10.0	10.3
Rating	Pass	Pass	Pass

LOCATION 18.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	19.85	32.70	32.70
4	6.57	8.13	8.13
6	2.55	2.81	2.81
8	0.57	0.62	0.62
10	0.12	0.12	0.12

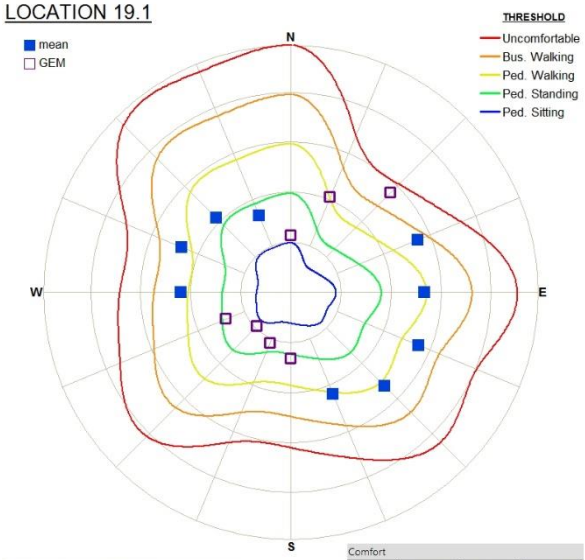
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.5	4.9	4.9
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.2	11.2	11.2
Rating	Pass	Pass	Pass

LOCATION 19.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	51.71	54.94	59.27
4	19.78	17.79	21.95
6	6.09	4.66	6.57
8	1.26	0.95	1.34
10	0.21	0.20	0.24

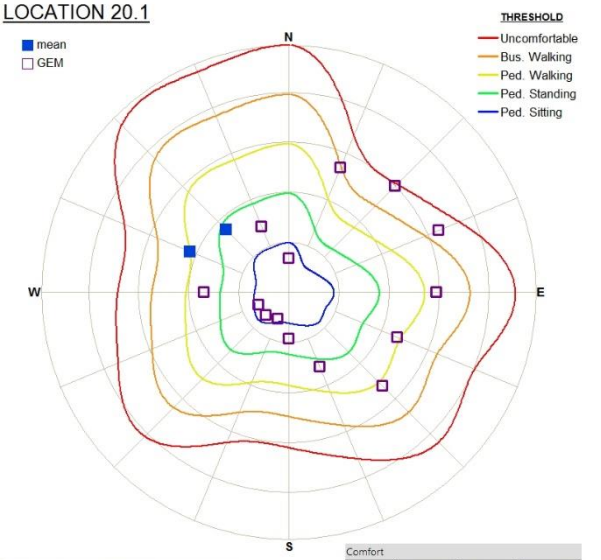
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.2	5.8	6.3
Rating	Ped Walking	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.7	11.7	11.8
Rating	Pass	Pass	Pass

LOCATION 20.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	36.08	44.51	46.54
4	13.46	18.47	18.99
6	4.24	7.69	7.96
8	0.74	2.08	2.16
10	0.06	0.42	0.42

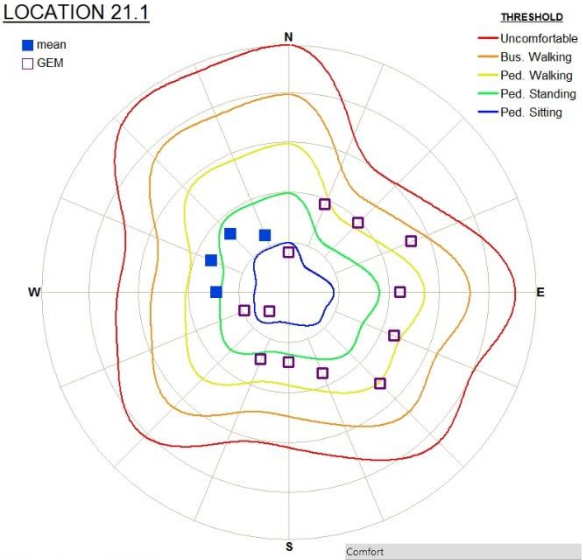
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.7	6.7	6.7
Rating	Ped Standing	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.6	12.6	12.6
Rating	Pass	Pass	Pass

LOCATION 21.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	38.86	47.88	50.17
4	6.66	14.38	14.90
6	0.51	2.16	2.29
8	0.02	0.14	0.14
10	0.00	0.01	0.01

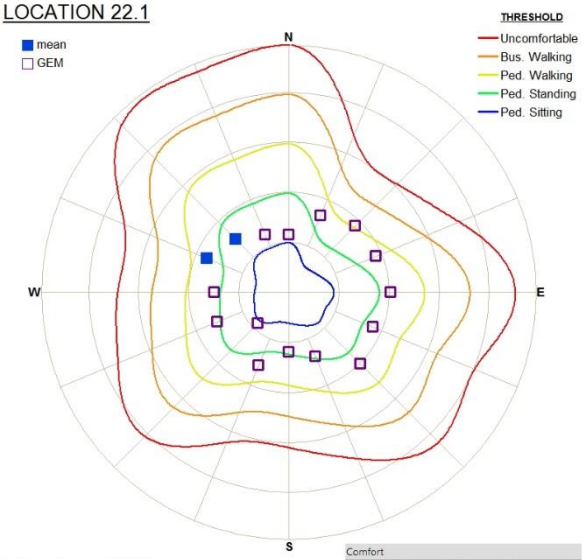
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.2	5.2	5.2
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.9	9.0	9.1
Rating	Pass	Pass	Pass

LOCATION 22.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.76	47.86	48.41
4	5.74	9.95	10.09
6	0.45	0.80	0.84
8	0.01	0.03	0.03
10	0.00	0.00	0.00

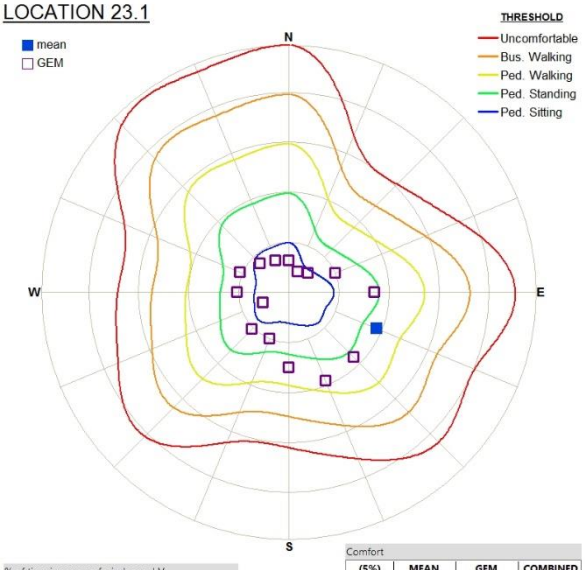
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.1	4.6	4.6
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.6	8.1	8.1
Rating	Pass	Pass	Pass

LOCATION 23.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	18.64	27.20	27.24
4	1.96	4.02	4.08
6	0.10	0.28	0.28
8	0.00	0.02	0.02
10	0.00	0.00	0.00

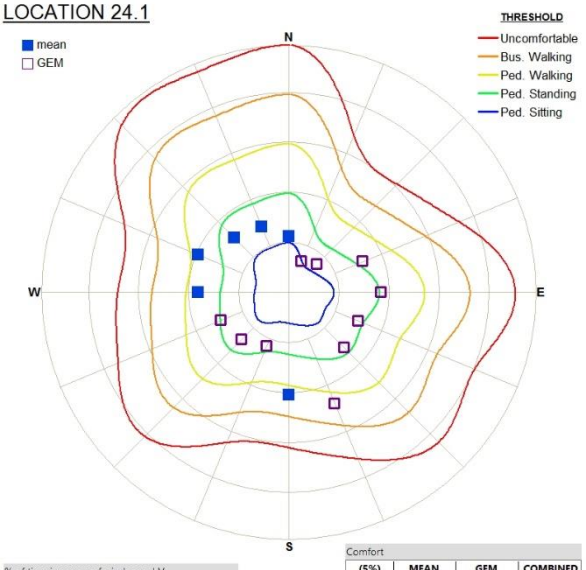
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.3	3.8	3.8
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	6.9	7.8	7.8
Rating	Pass	Pass	Pass

LOCATION 24.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	36.37	41.04	43.14
4	8.99	8.52	10.23
6	1.57	1.24	1.83
8	0.17	0.14	0.22
10	0.01	0.02	0.02

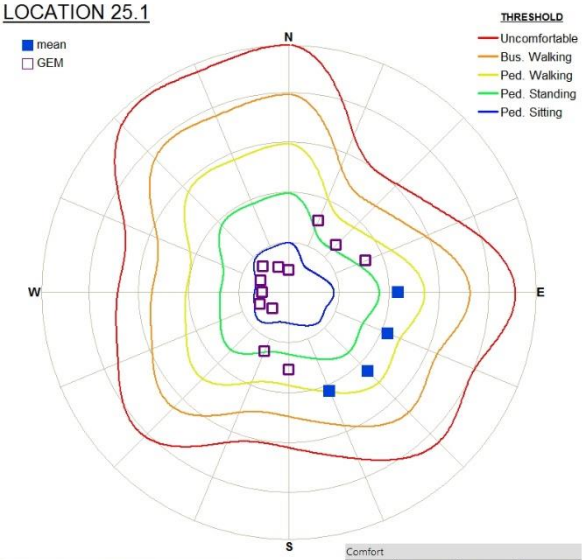
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.6	4.6	4.8
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.6	9.7	10.0
Rating	Pass	Pass	Pass

LOCATION 25.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.97	37.67	38.10
4	7.30	8.14	8.73
6	0.60	0.58	0.65
8	0.05	0.04	0.05
10	0.00	0.00	0.00

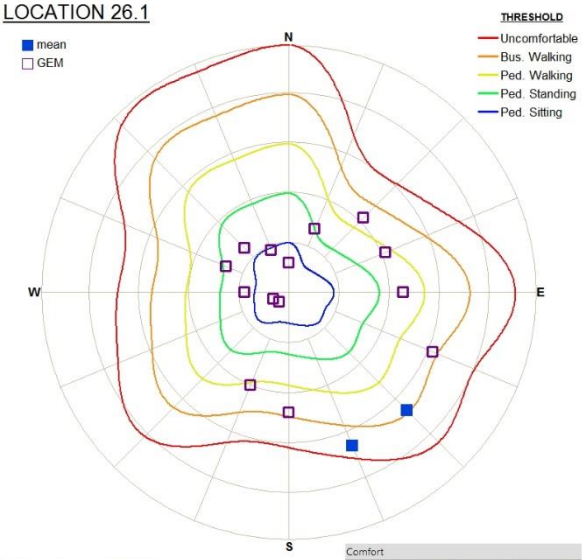
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	4.4	4.4
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.7	8.6	8.7
Rating	Pass	Pass	Pass

LOCATION 26.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	42.58	47.35	47.61
4	18.84	23.40	24.13
6	5.80	6.41	7.43
8	1.26	1.18	1.61
10	0.27	0.19	0.32

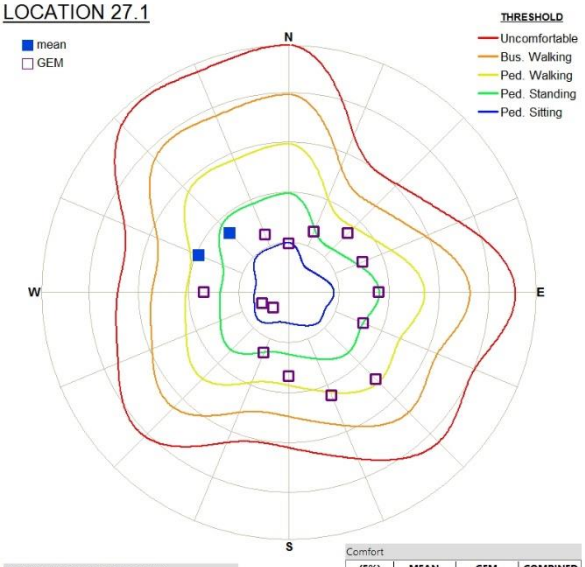
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.2	6.3	6.5
Rating	Ped Walking	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	13.3	12.2	13.4
Rating	Pass	Pass	Pass

LOCATION 27.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.58	47.34	47.97
4	4.06	11.14	11.31
6	0.43	1.31	1.40
8	0.03	0.09	0.12
10	0.00	0.01	0.01

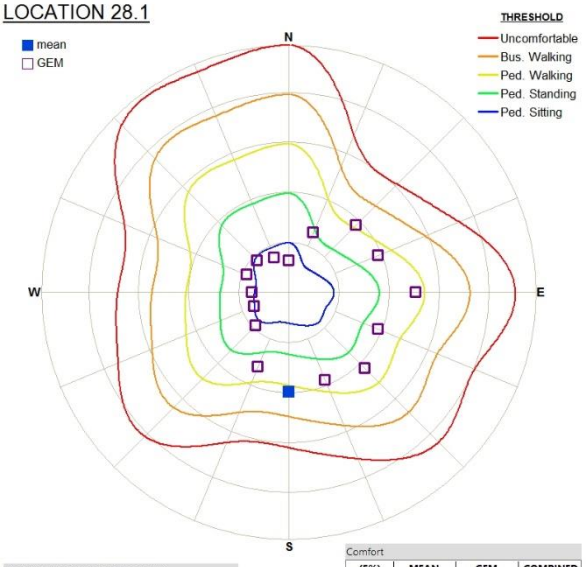
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.8	4.8	4.8
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.1	9.2	9.3
Rating	Pass	Pass	Pass

LOCATION 28.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	34.80	41.81	41.91
4	7.71	12.78	13.09
6	0.94	1.46	1.61
8	0.08	0.10	0.12
10	0.00	0.00	0.01

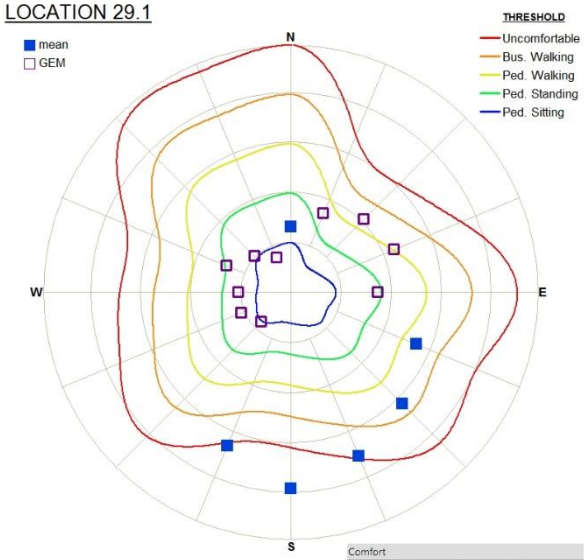
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.4	4.9	5.0
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.0	9.0	9.2
Rating	Pass	Pass	Pass

LOCATION 29.1



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	45.13	51.15	51.94
4	26.41	26.49	28.66
6	13.86	10.01	14.32
8	5.79	2.92	5.84
10	2.25	0.79	2.25

Comfort

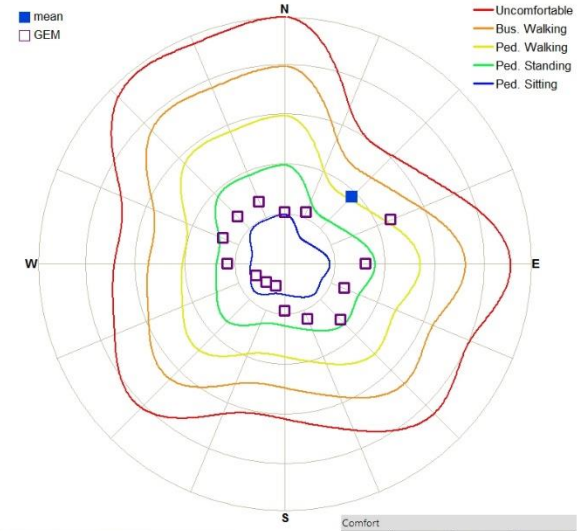
(5%)	MEAN	GEM	COMBINED
V (m/s)	8.2	7.1	8.2
Rating	Bus Walking	Ped Walking	Bus Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	17.8	14.6	17.8
Rating	Able Body	Pass	Able Body

Configuration C – Full envelope of proposed buildings, 6 m setback at Martin Place

LOCATION 1.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	15.54	29.87	29.95
4	4.28	5.46	5.64
6	0.52	0.69	0.74
8	0.02	0.02	0.03
10	0.00	0.00	0.00

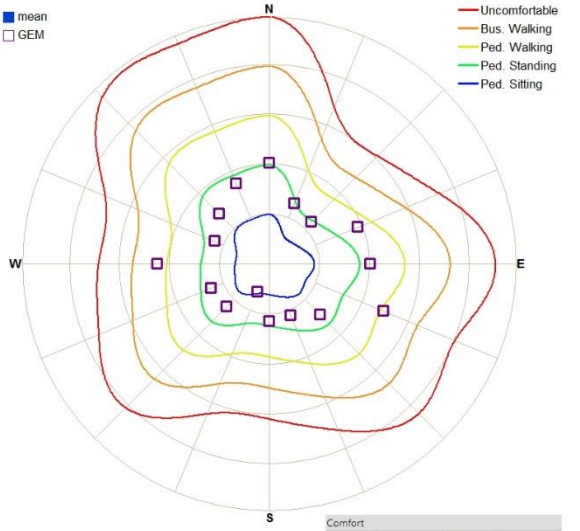
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.7	4.0	4.1
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.9	7.9	8.1
Rating	Pass	Pass	Pass

LOCATION 2.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	17.87	41.07	41.07
4	2.12	6.75	6.75
6	0.21	0.84	0.84
8	0.01	0.12	0.12
10	0.00	0.01	0.01

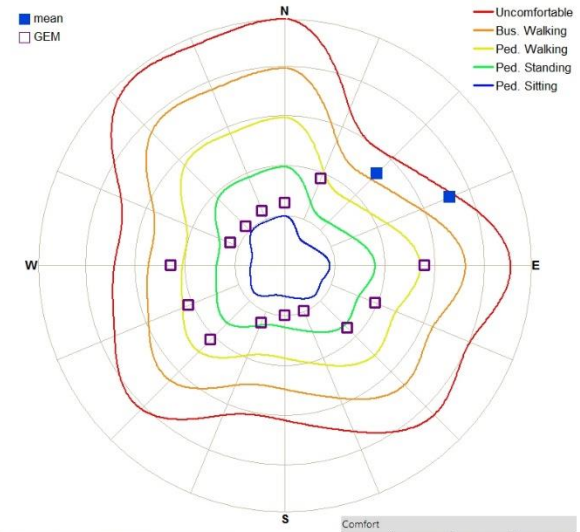
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.2	4.2	4.2
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.5	9.3	9.3
Rating	Pass	Pass	Pass

LOCATION 3.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.99	46.69	47.03
4	11.97	15.51	16.33
6	4.55	3.90	5.50
8	1.36	0.58	1.48
10	0.21	0.04	0.22

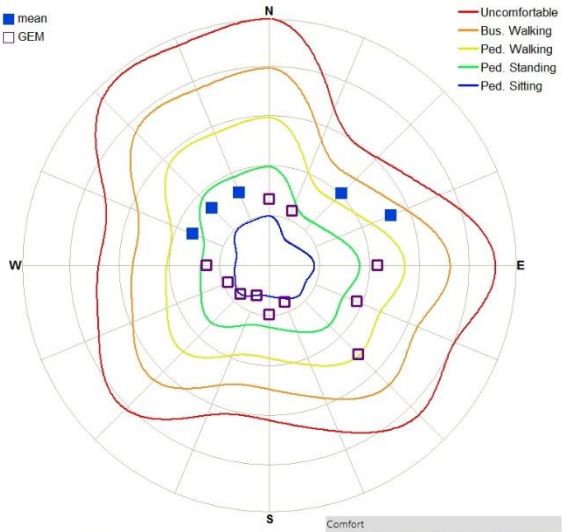
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.7	5.7	6.1
Rating	Ped Standing	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.8	10.5	11.8
Rating	Pass	Pass	Pass

LOCATION 4.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	25.68	35.67	37.22
4	7.21	8.44	9.78
6	1.57	0.98	1.87
8	0.11	0.04	0.13
10	0.00	0.00	0.01

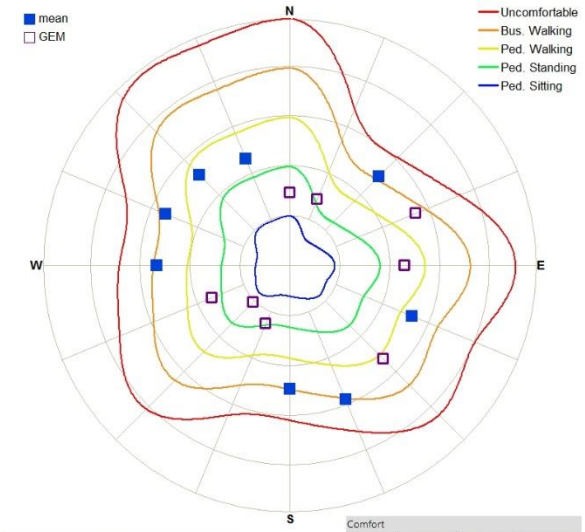
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.5	4.5	4.9
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.9	8.4	9.1
Rating	Pass	Pass	Pass

LOCATION 5.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	57.00	61.75	65.92
4	24.98	22.05	28.17
6	8.06	5.37	9.12
8	1.98	0.79	2.09
10	0.36	0.06	0.37

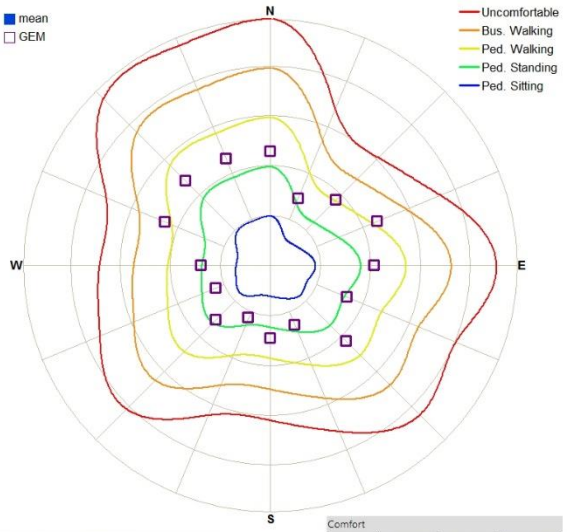
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.6	6.0	6.8
Rating	Ped Walking	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	12.5	10.6	12.5
Rating	Pass	Pass	Pass

LOCATION 6.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	38.73	57.03	57.03
4	4.68	12.19	12.19
6	0.75	1.85	1.85
8	0.14	0.24	0.24
10	0.02	0.03	0.03

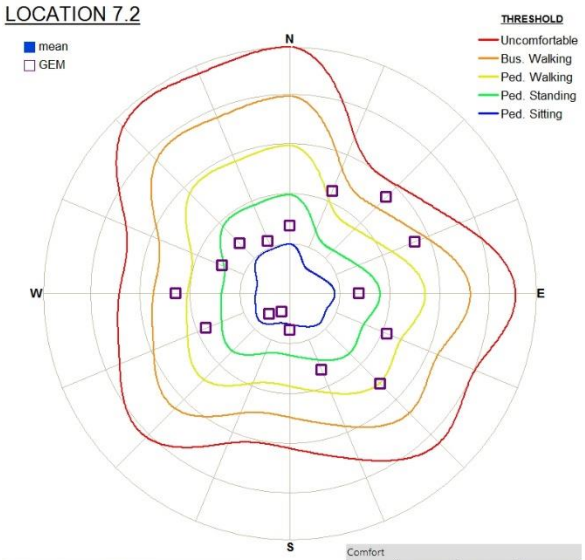
Comfort

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

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.6	10.1	10.1
Rating	Pass	Pass	Pass

LOCATION 7.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	31.48	43.28	43.28
4	10.01	16.62	16.62
6	3.09	5.22	5.22
8	0.63	0.92	0.92
10	0.12	0.16	0.16

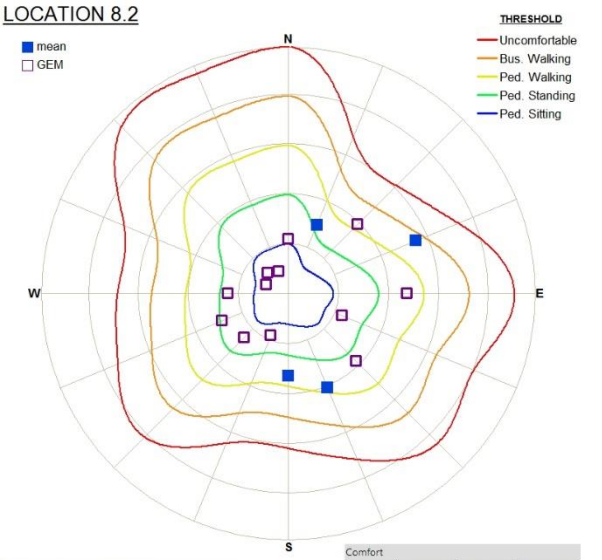
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.1	6.0	6.0
Rating	Ped Standing	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.2	11.4	11.4
Rating	Pass	Pass	Pass

LOCATION 8.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.15	40.22	41.64
4	10.08	9.69	11.94
6	1.86	1.34	1.96
8	0.16	0.07	0.17
10	0.01	0.00	0.01

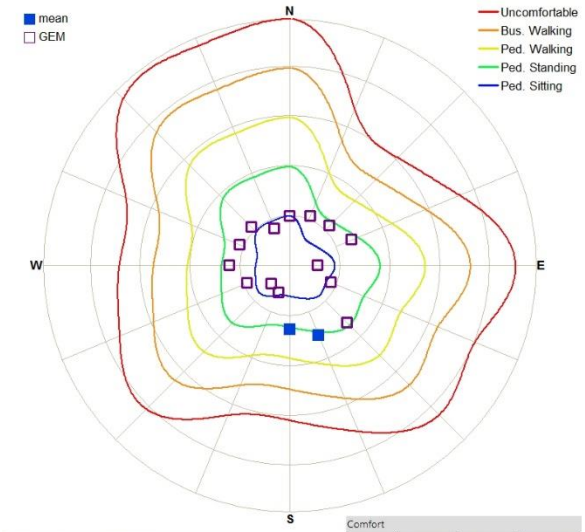
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.8	4.7	5.0
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.2	8.6	9.2
Rating	Pass	Pass	Pass

LOCATION 9.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	21.85	26.79	27.54
4	1.15	1.39	1.76
6	0.04	0.02	0.05
8	0.00	0.00	0.00
10	0.00	0.00	0.00

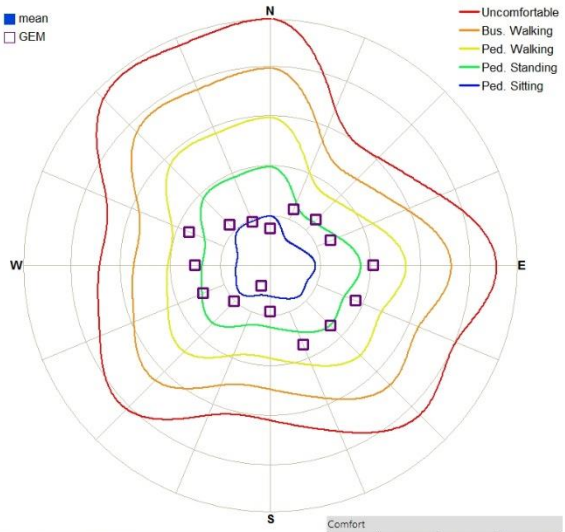
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.1	3.2	3.4
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	6.3	6.0	6.4
Rating	Pass	Pass	Pass

LOCATION 10.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	22.45	36.22	36.22
4	1.00	4.24	4.24
6	0.02	0.29	0.29
8	0.00	0.01	0.01
10	0.00	0.00	0.00

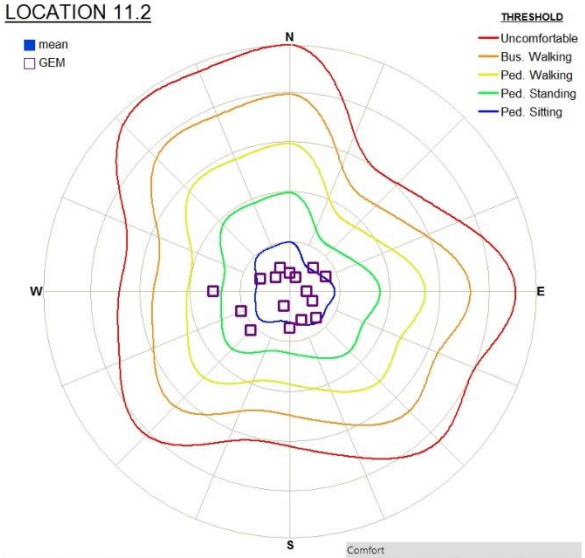
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.1	3.9	3.9
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	6.0	7.6	7.6
Rating	Pass	Pass	Pass

LOCATION 11.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	2.77	7.86	7.86
4	0.12	0.61	0.61
6	0.00	0.03	0.03
8	0.00	0.00	0.00
10	0.00	0.00	0.00

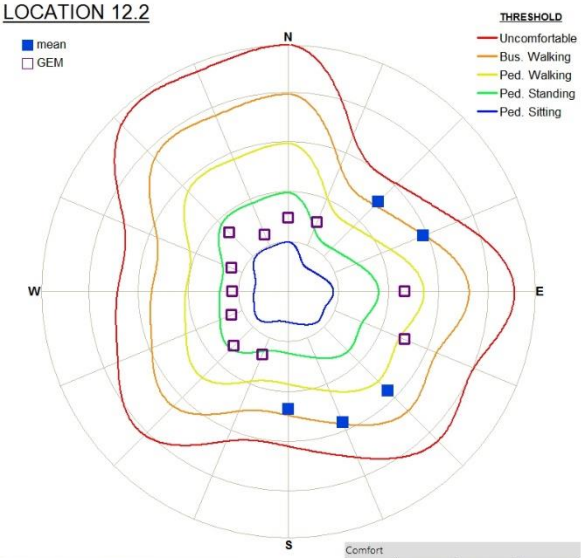
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	1.6	2.3	2.3
Rating	Outdoor Dining	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	4.8	6.2	6.2
Rating	Pass	Pass	Pass

LOCATION 12.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	45.92	53.05	54.14
4	20.32	18.95	22.71
6	6.81	4.20	7.05
8	1.29	0.55	1.33
10	0.17	0.04	0.17

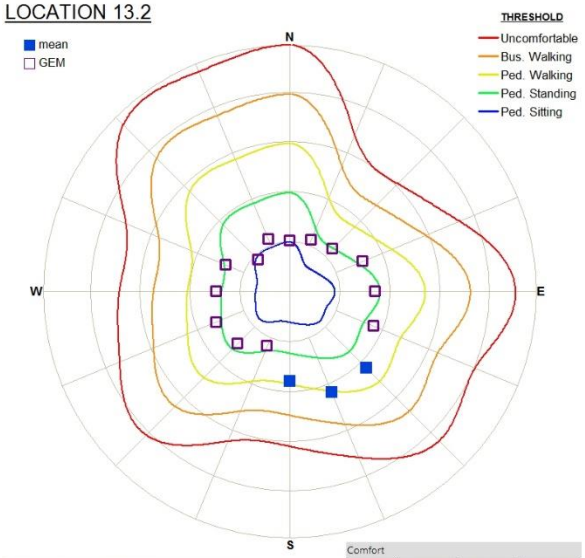
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.4	5.8	6.4
Rating	Ped Walking	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.8	10.3	11.8
Rating	Pass	Pass	Pass

LOCATION 13.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	32.36	44.52	45.57
4	6.38	6.72	8.64
6	0.78	0.41	0.86
8	0.07	0.02	0.08
10	0.00	0.00	0.00

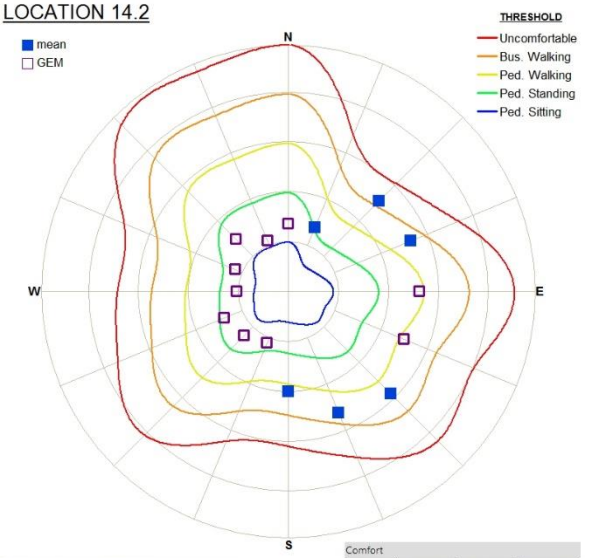
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.2	4.2	4.5
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.0	8.0	9.0
Rating	Pass	Pass	Pass

LOCATION 14.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	45.29	49.59	50.60
4	17.70	17.31	19.81
6	5.21	3.50	5.47
8	0.87	0.41	0.91
10	0.11	0.02	0.11

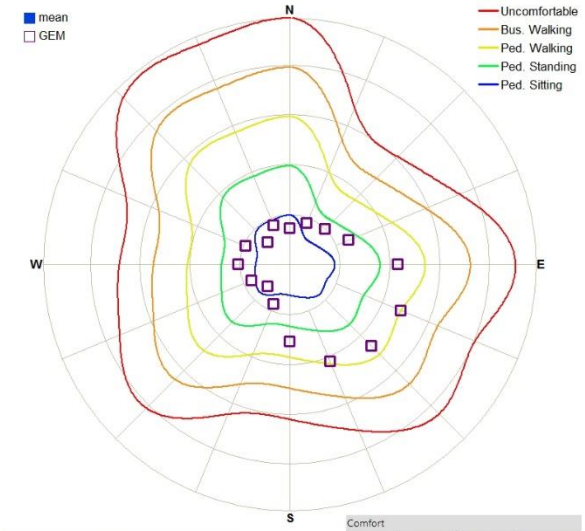
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.0	5.6	6.1
Rating	Ped Standing	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.3	10.0	11.3
Rating	Pass	Pass	Pass

LOCATION 15.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	22.73	34.04	34.04
4	5.24	7.03	7.03
6	0.46	0.70	0.70
8	0.04	0.07	0.07
10	0.00	0.00	0.00

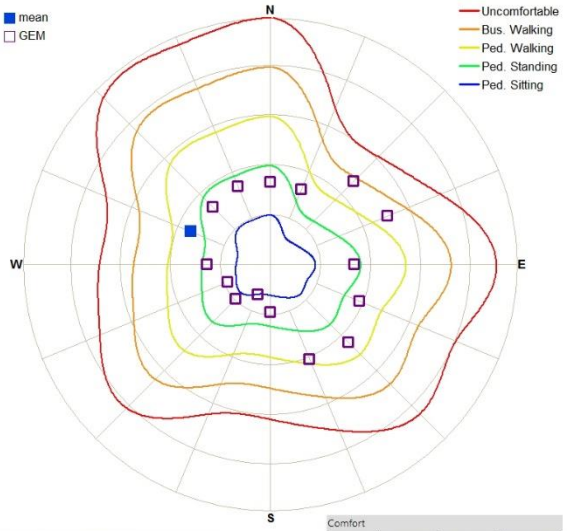
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.0	4.3	4.3
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.4	8.8	8.8
Rating	Pass	Pass	Pass

LOCATION 16.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	30.72	43.52	43.65
4	6.83	12.41	12.45
6	1.02	2.64	2.65
8	0.09	0.36	0.36
10	0.00	0.02	0.02

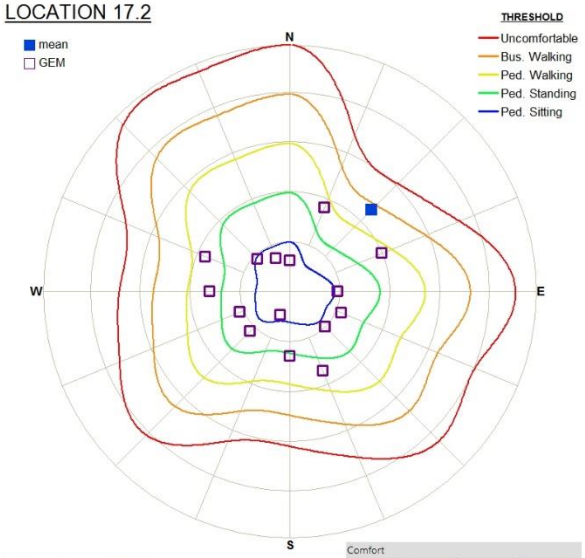
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.4	5.2	5.2
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.7	9.9	9.9
Rating	Pass	Pass	Pass

LOCATION 17.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	23.08	36.52	36.58
4	6.10	9.77	9.87
6	1.46	1.68	1.86
8	0.25	0.21	0.27
10	0.01	0.01	0.01

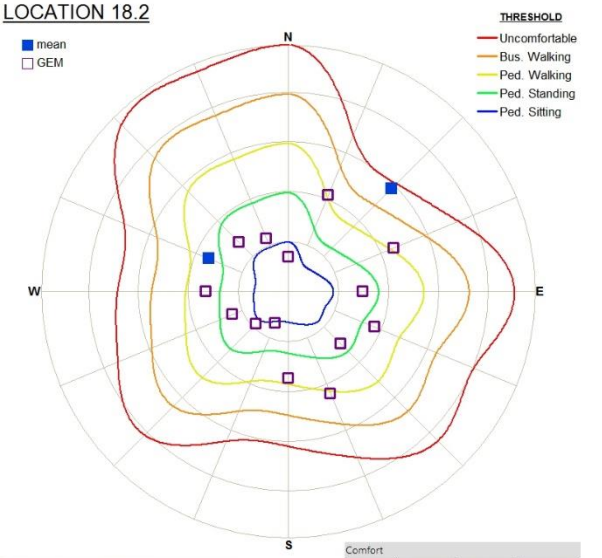
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	4.8	4.9
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.6	9.4	9.6
Rating	Pass	Pass	Pass

LOCATION 18.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	35.58	46.02	46.38
4	9.59	15.68	16.06
6	3.47	4.02	4.63
8	1.01	0.66	1.11
10	0.27	0.12	0.27

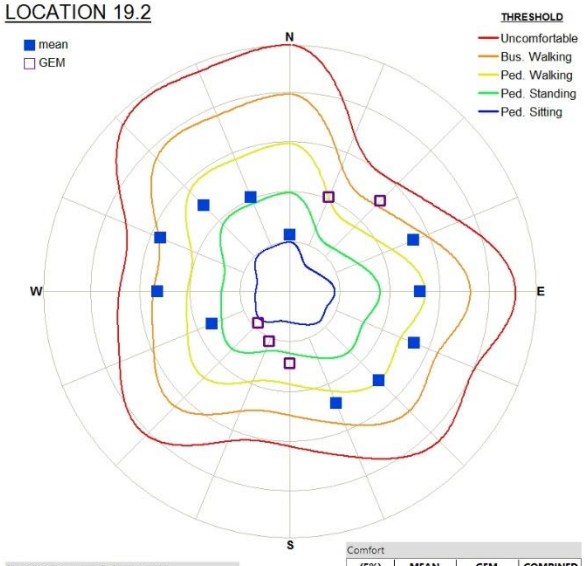
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.2	5.7	5.8
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	12.1	11.2	12.1
Rating	Pass	Pass	Pass

LOCATION 19.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	60.78	57.21	63.10
4	22.01	17.84	24.31
6	5.86	4.12	6.70
8	1.29	0.68	1.44
10	0.23	0.07	0.27

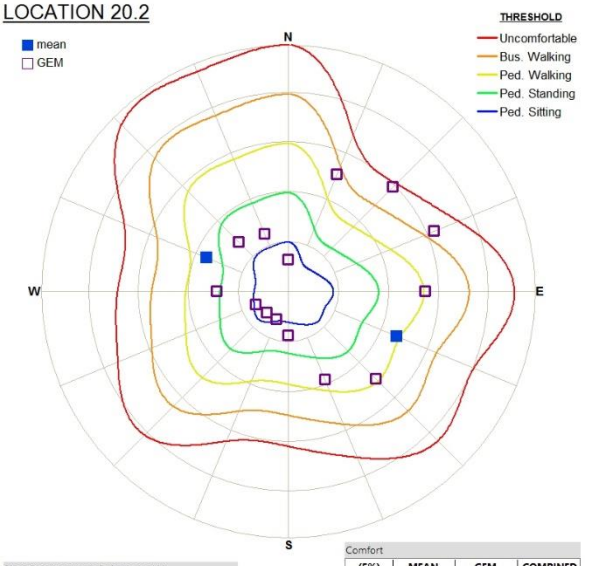
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.2	5.7	6.3
Rating	Ped Walking	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	12.1	10.8	12.1
Rating	Pass	Pass	Pass

LOCATION 20.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	34.93	42.49	42.82
4	13.65	17.84	18.10
6	4.77	6.79	6.84
8	0.82	1.72	1.73
10	0.13	0.35	0.35

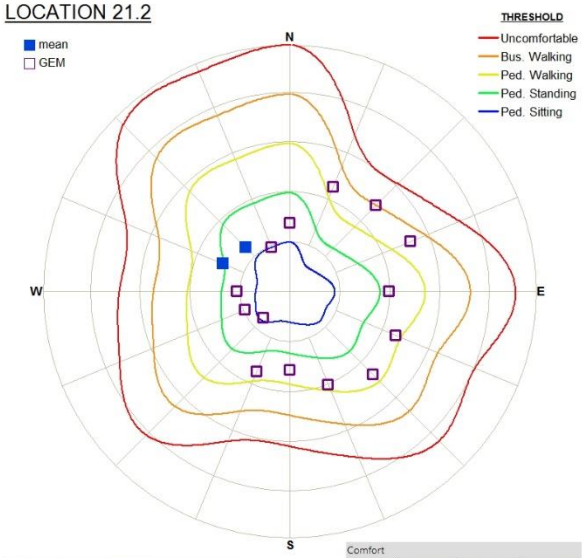
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.9	6.5	6.5
Rating	Ped Standing	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.2	12.4	12.4
Rating	Pass	Pass	Pass

LOCATION 21.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	37.20	49.31	49.60
4	6.89	17.73	17.83
6	0.40	4.03	4.04
8	0.00	0.52	0.52
10	0.00	0.04	0.04

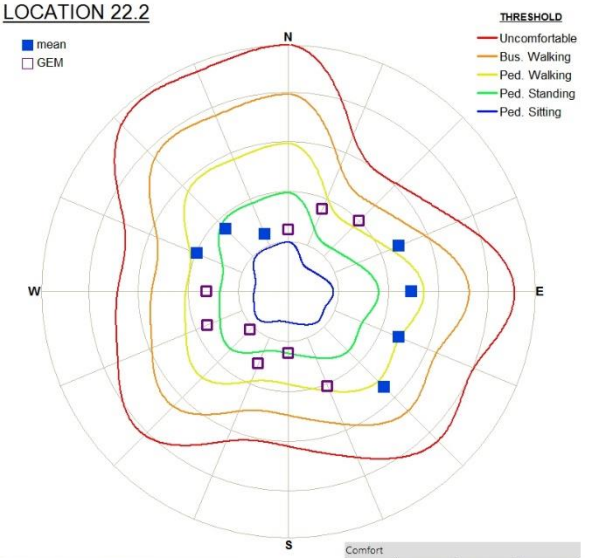
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.2	5.7	5.7
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.4	10.2	10.2
Rating	Pass	Pass	Pass

LOCATION 22.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	46.47	54.56	55.91
4	12.51	15.93	17.27
6	1.88	1.91	2.49
8	0.14	0.14	0.20
10	0.01	0.00	0.01

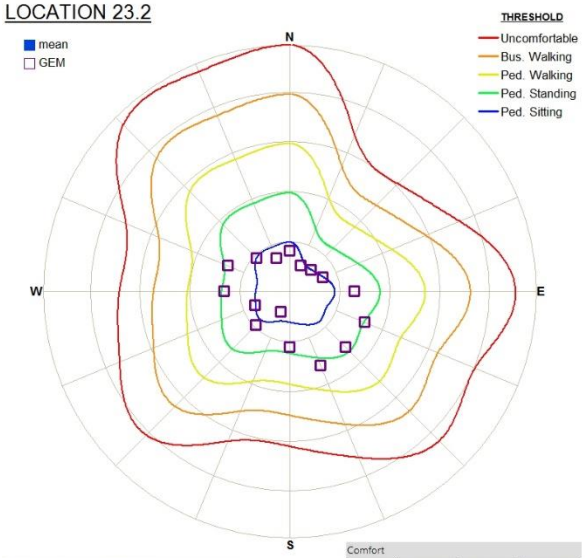
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.0	5.2	5.3
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.2	9.0	9.3
Rating	Pass	Pass	Pass

LOCATION 23.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	11.86	21.88	21.88
4	0.39	1.74	1.74
6	0.00	0.06	0.06
8	0.00	0.00	0.00
10	0.00	0.00	0.00

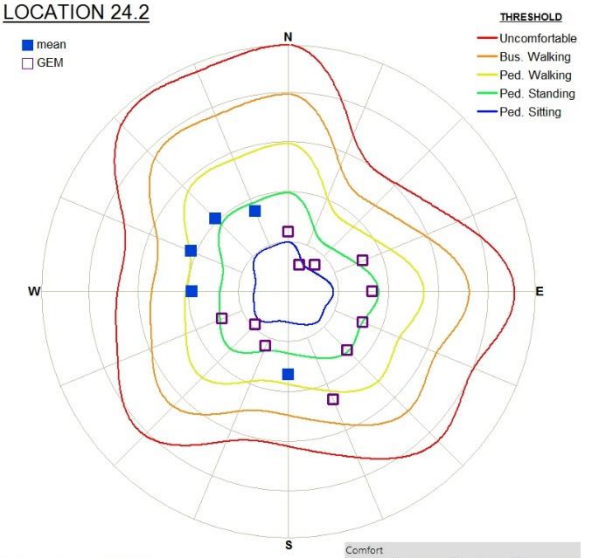
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	2.6	3.3	3.3
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	5.3	6.6	6.6
Rating	Pass	Pass	Pass

LOCATION 24.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	37.22	42.39	45.09
4	6.85	8.40	9.25
6	1.05	1.13	1.47
8	0.14	0.12	0.20
10	0.01	0.01	0.02

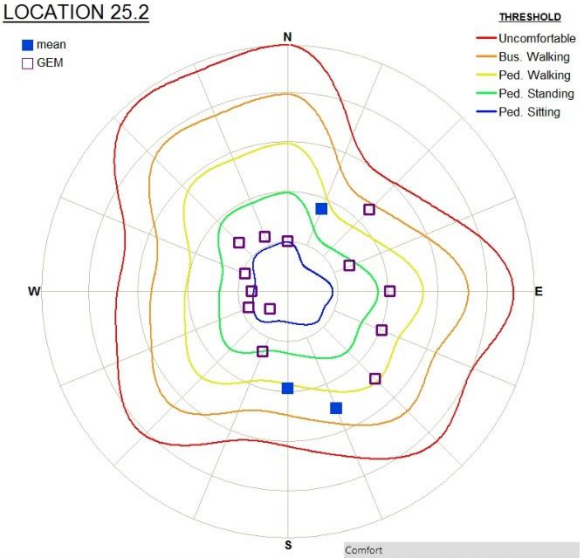
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	4.5	4.7
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.2	9.5	9.8
Rating	Pass	Pass	Pass

LOCATION 25.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	39.70	44.56	44.77
4	13.16	15.03	15.59
6	1.93	2.95	3.18
8	0.21	0.43	0.47
10	0.03	0.04	0.04

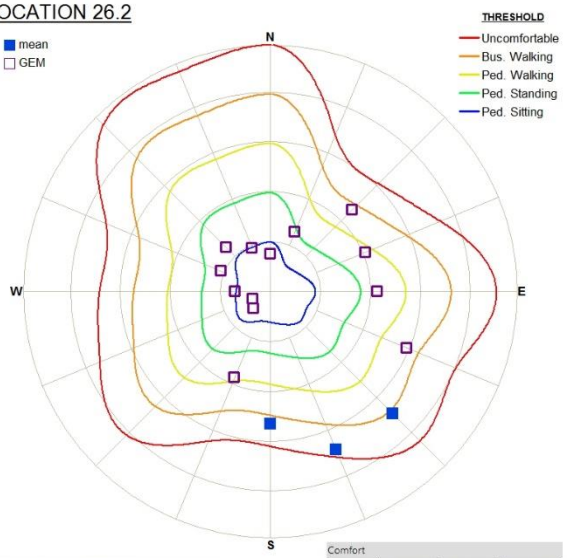
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.1	5.4	5.5
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.2	10.3	10.4
Rating	Pass	Pass	Pass

LOCATION 26.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	42.06	45.94	46.40
4	21.31	22.71	24.19
6	7.97	6.85	8.70
8	2.07	1.36	2.21
10	0.43	0.21	0.45

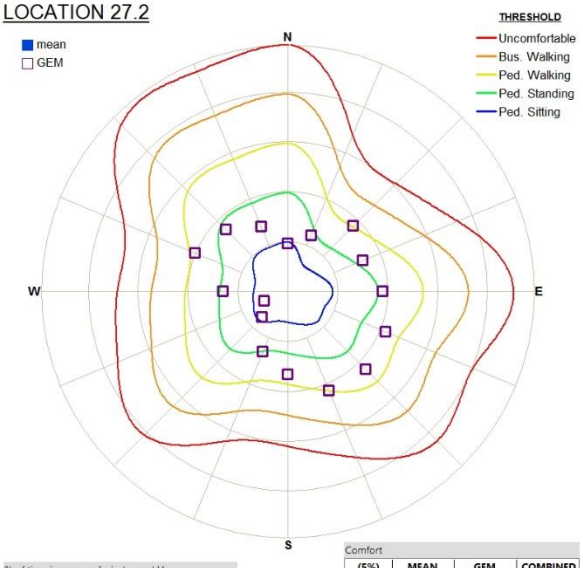
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.7	6.3	6.8
Rating	Ped Walking	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	13.9	12.5	13.9
Rating	Pass	Pass	Pass

LOCATION 27.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	29.04	48.21	48.21
4	3.58	11.64	11.64
6	0.41	1.44	1.44
8	0.01	0.12	0.12
10	0.00	0.01	0.01

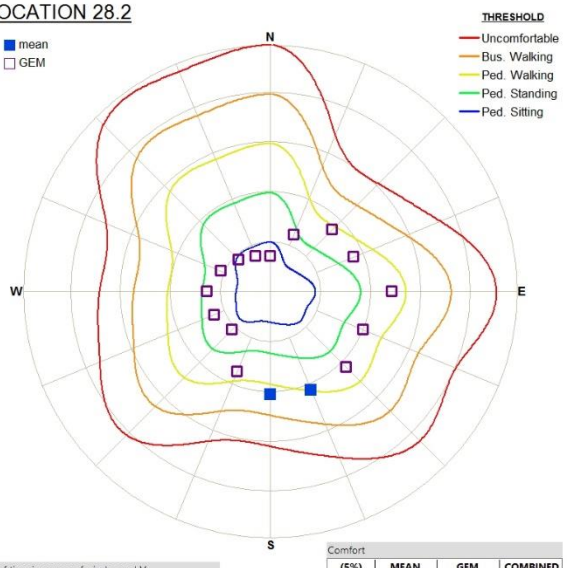
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.6	4.8	4.8
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.7	9.1	9.1
Rating	Pass	Pass	Pass

LOCATION 28.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	36.14	46.26	46.59
4	9.76	13.14	14.12
6	1.34	1.47	1.79
8	0.14	0.11	0.16
10	0.01	0.00	0.01

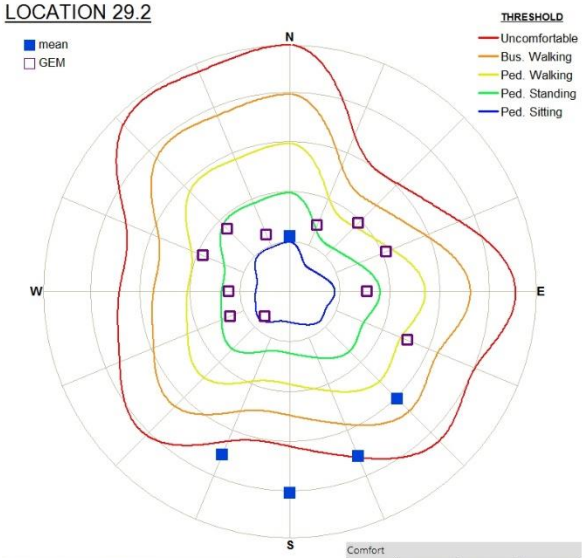
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.6	4.9	5.0
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.5	9.1	9.6
Rating	Pass	Pass	Pass

LOCATION 29.2



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	50.64	55.39	56.18
4	26.73	26.12	28.13
6	14.35	10.47	14.62
8	6.38	3.33	6.43
10	2.64	0.95	2.64

Comfort

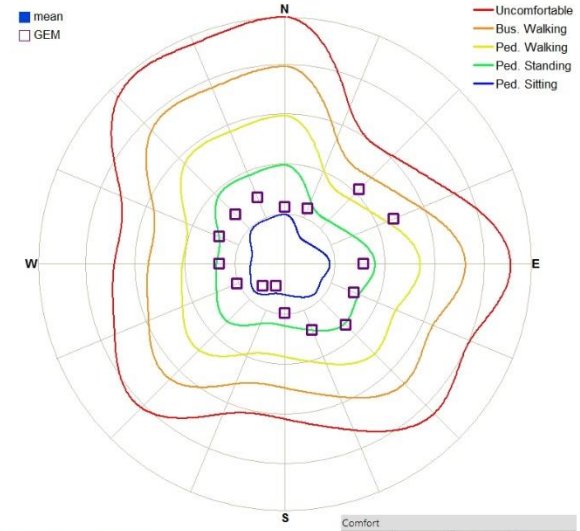
(5%)	MEAN	GEM	COMBINED
V (m/s)	8.5	7.2	8.5
Rating	Bus Walking	Ped Walking	Bus Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	18.3	15.1	18.3
Rating	Able Body	Able Body	Able Body

Configuration D – Full envelope of proposed buildings, 25 m setback at Martin Place

LOCATION 1.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	20.77	35.37	35.37
4	4.65	7.25	7.25
6	0.65	1.21	1.21
8	0.05	0.10	0.10
10	0.00	0.00	0.00

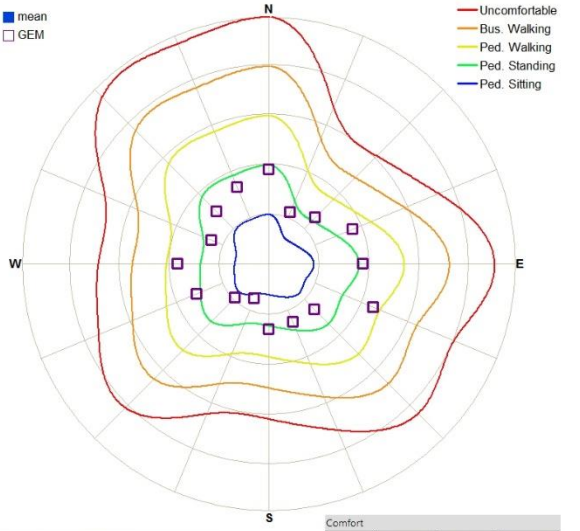
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.8	4.5	4.5
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.4	8.8	8.8
Rating	Pass	Pass	Pass

LOCATION 2.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	23.33	41.72	41.72
4	2.06	5.79	5.79
6	0.14	0.39	0.39
8	0.00	0.02	0.02
10	0.00	0.00	0.00

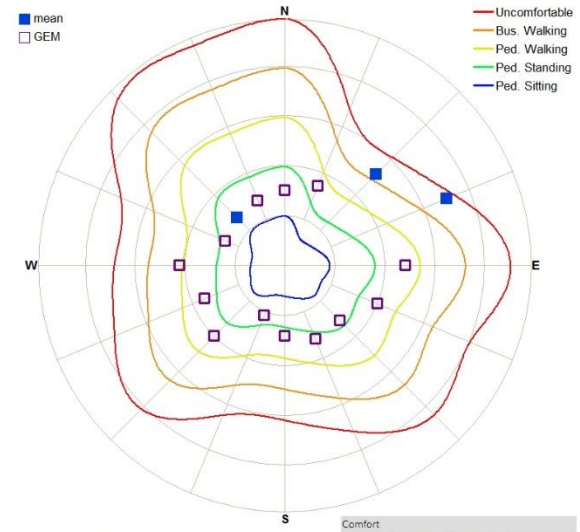
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.3	4.1	4.1
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.2	8.0	8.0
Rating	Pass	Pass	Pass

LOCATION 3.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	38.42	51.28	51.54
4	9.73	14.88	15.44
6	4.11	3.69	4.83
8	1.23	0.60	1.30
10	0.18	0.05	0.18

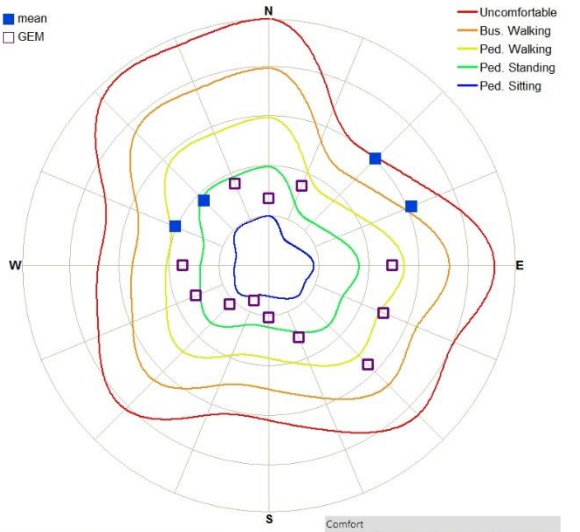
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.4	5.5	5.9
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.6	10.6	11.6
Rating	Pass	Pass	Pass

LOCATION 4.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	41.53	50.73	52.30
4	13.01	15.98	17.28
6	5.28	4.12	6.09
8	1.59	0.64	1.67
10	0.37	0.07	0.38

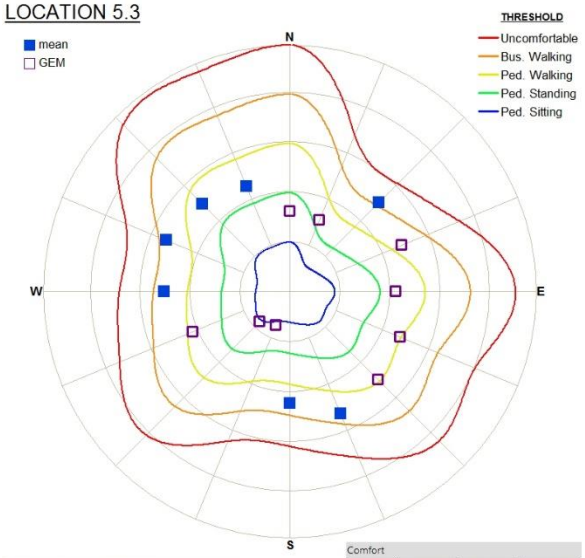
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.0	5.7	6.3
Rating	Ped Walking	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	12.6	10.7	12.6
Rating	Pass	Pass	Pass

LOCATION 5.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	57.65	59.49	62.44
4	23.40	21.78	26.26
6	6.47	4.94	7.07
8	1.44	0.75	1.48
10	0.25	0.06	0.25

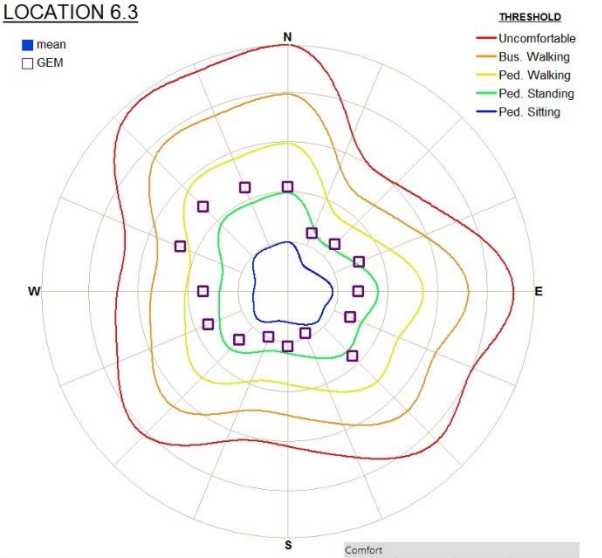
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	6.3	5.9	6.4
Rating	Ped Walking	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.9	10.6	11.9
Rating	Pass	Pass	Pass

LOCATION 6.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.26	48.91	48.91
4	3.09	6.36	6.36
6	0.86	1.09	1.09
8	0.19	0.21	0.21
10	0.03	0.03	0.03

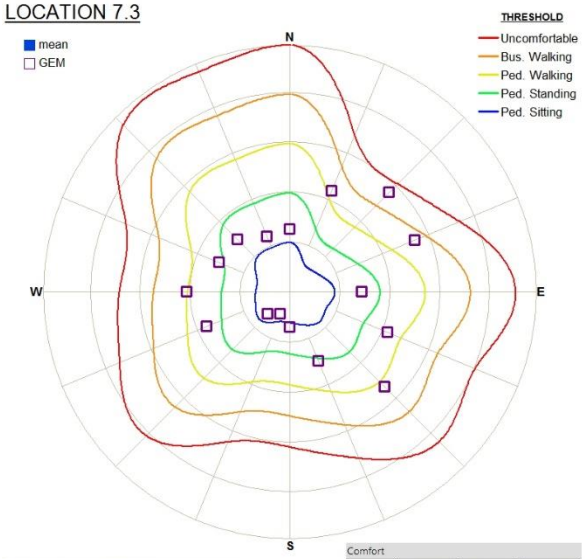
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.5	4.2	4.2
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.2	10.2	10.2
Rating	Pass	Pass	Pass

LOCATION 7.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	31.43	42.86	42.86
4	9.38	16.11	16.11
6	3.03	5.20	5.20
8	0.79	1.02	1.02
10	0.17	0.20	0.20

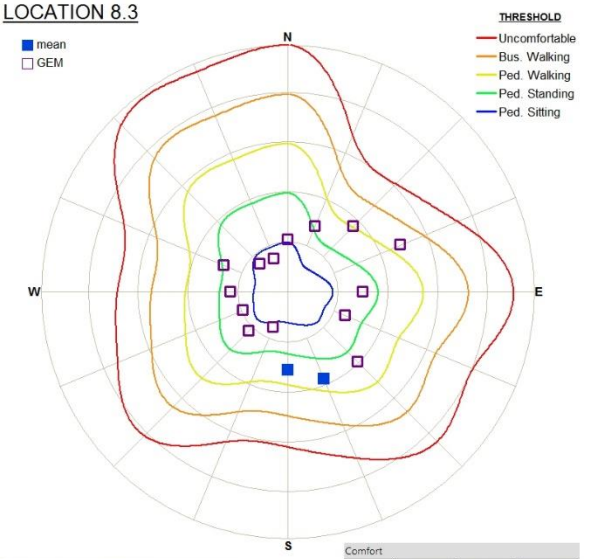
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.0	6.0	6.0
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.6	11.7	11.7
Rating	Pass	Pass	Pass

LOCATION 8.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	28.80	38.26	38.87
4	5.53	8.49	9.33
6	0.32	1.01	1.13
8	0.02	0.04	0.05
10	0.00	0.00	0.00

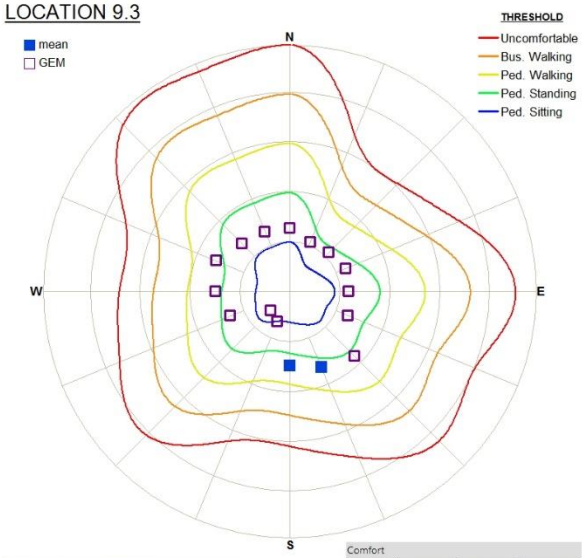
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.0	4.5	4.6
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.8	8.2	8.4
Rating	Pass	Pass	Pass

LOCATION 9.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	26.41	35.72	36.70
4	3.01	3.18	4.02
6	0.15	0.18	0.25
8	0.00	0.00	0.01
10	0.00	0.00	0.00

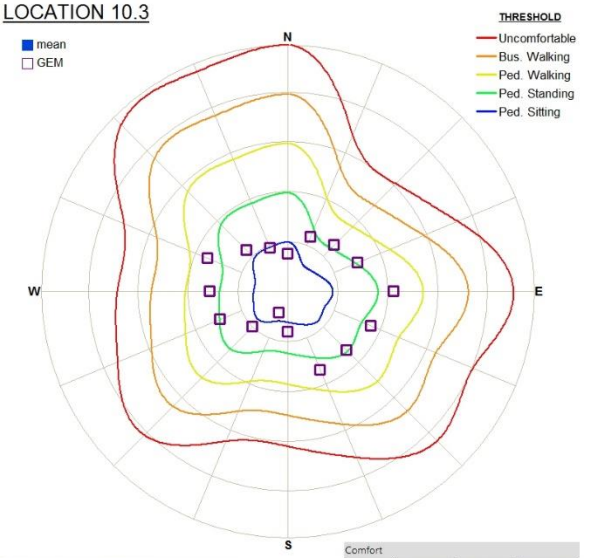
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.6	3.6	3.8
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	7.2	7.0	7.3
Rating	Pass	Pass	Pass

LOCATION 10.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	24.23	35.51	35.51
4	1.45	4.46	4.46
6	0.04	0.30	0.30
8	0.00	0.01	0.01
10	0.00	0.00	0.00

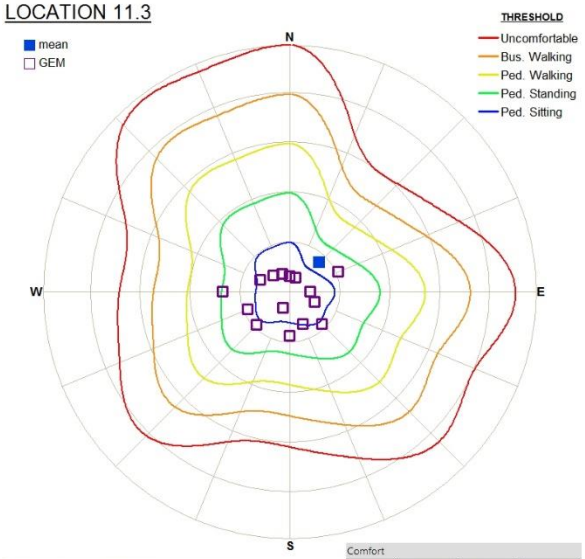
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.2	3.9	3.9
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	6.3	7.6	7.6
Rating	Pass	Pass	Pass

LOCATION 11.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	4.86	10.49	10.60
4	0.03	0.33	0.33
6	0.00	0.01	0.01
8	0.00	0.00	0.00
10	0.00	0.00	0.00

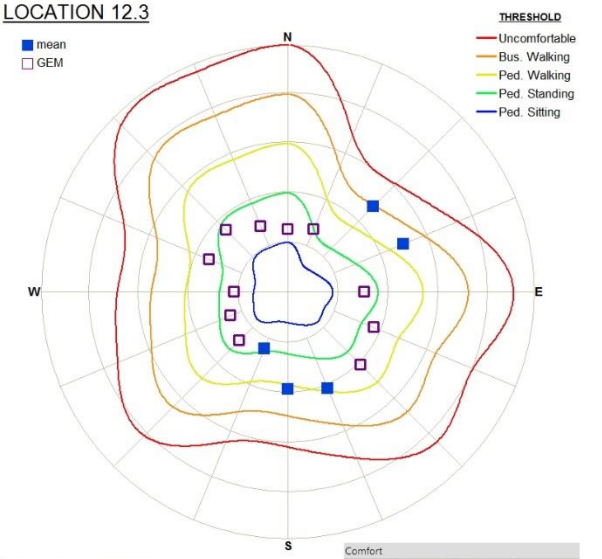
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	2.0	2.4	2.4
Rating	Outdoor Dining	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	4.1	5.5	5.5
Rating	Pass	Pass	Pass

LOCATION 12.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	42.98	49.68	50.86
4	13.21	12.27	14.66
6	3.16	2.11	3.32
8	0.46	0.24	0.47
10	0.03	0.01	0.03

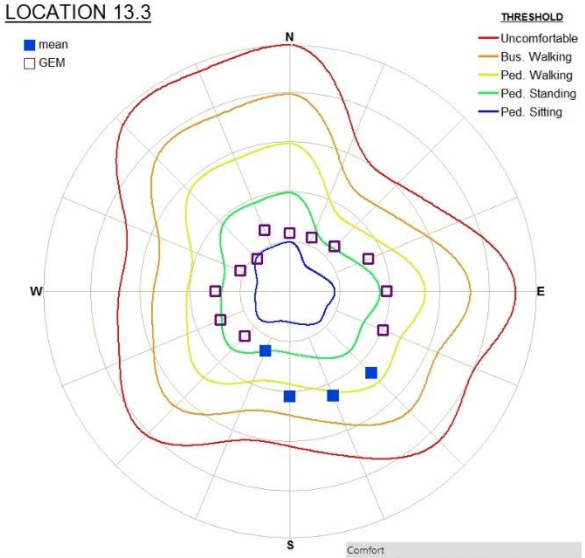
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.4	5.1	5.5
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.2	9.4	10.2
Rating	Pass	Pass	Pass

LOCATION 13.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	37.26	45.37	47.37
4	9.09	7.92	11.61
6	1.52	0.58	1.61
8	0.19	0.03	0.19
10	0.02	0.00	0.02

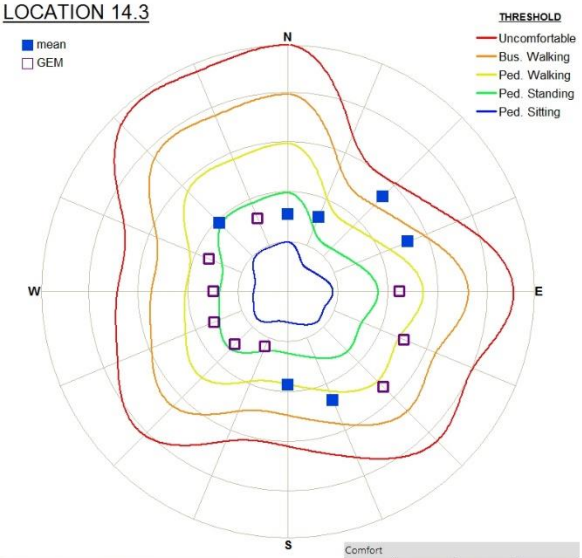
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.7	4.3	4.8
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.9	8.3	9.9
Rating	Pass	Pass	Pass

LOCATION 14.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	53.58	56.99	58.70
4	17.90	18.72	20.40
6	4.81	3.77	5.19
8	0.81	0.47	0.86
10	0.15	0.03	0.15

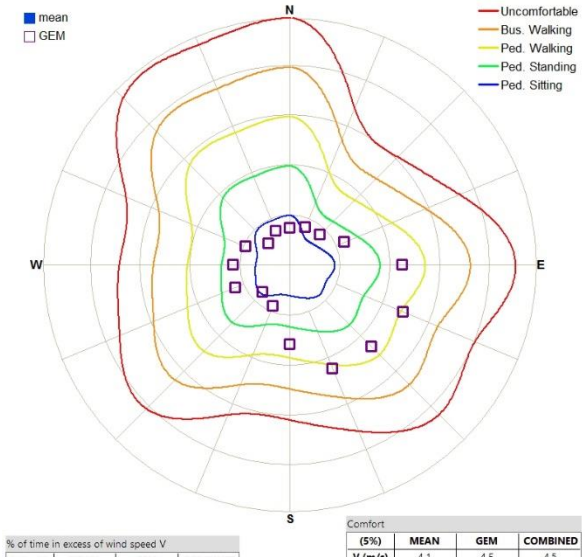
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.9	5.6	6.0
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.3	10.1	11.4
Rating	Pass	Pass	Pass

LOCATION 15.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	23.87	34.76	34.76
4	5.97	7.91	7.91
6	0.58	0.91	0.91
8	0.05	0.10	0.10
10	0.00	0.01	0.01

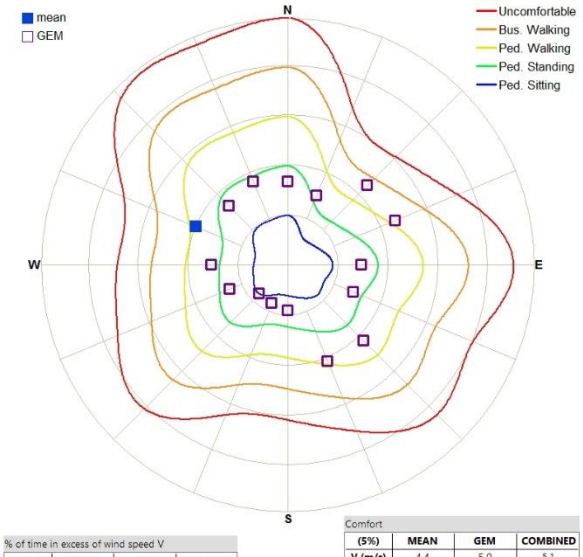
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.1	4.5	4.5
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.8	9.3	9.3
Rating	Pass	Pass	Pass

LOCATION 16.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.33	45.42	45.82
4	7.27	11.76	11.94
6	1.00	2.12	2.22
8	0.09	0.26	0.28
10	0.00	0.01	0.01

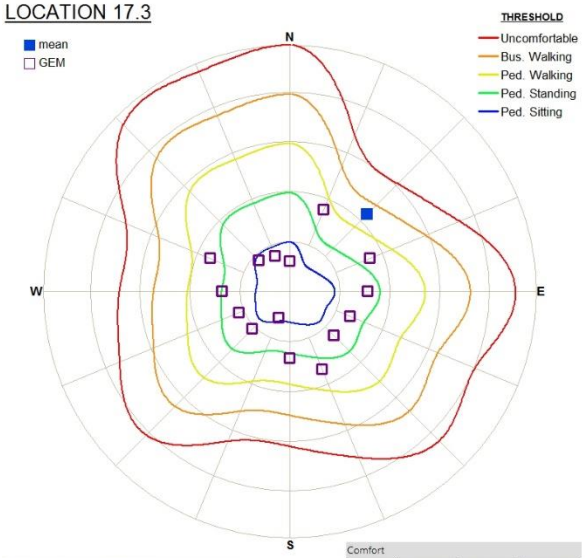
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.4	5.0	5.1
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.8	9.6	9.6
Rating	Pass	Pass	Pass

LOCATION 17.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	21.94	38.01	38.05
4	5.57	8.53	8.60
6	1.12	1.27	1.34
8	0.15	0.14	0.16
10	0.00	0.00	0.00

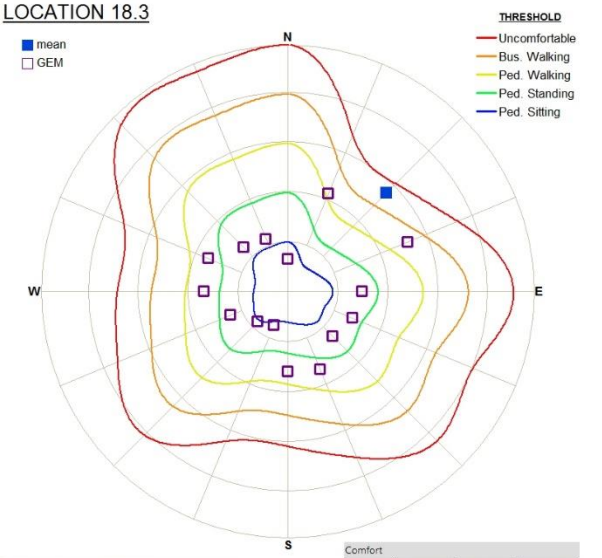
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.1	4.6	4.6
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.1	9.0	9.2
Rating	Pass	Pass	Pass

LOCATION 18.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.51	43.44	43.62
4	8.97	13.34	13.69
6	3.15	3.65	4.31
8	0.80	0.54	0.86
10	0.17	0.06	0.18

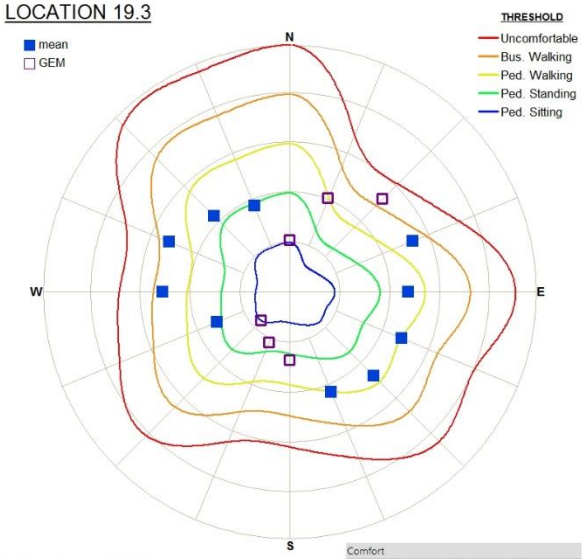
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.0	5.5	5.7
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.6	10.6	11.6
Rating	Pass	Pass	Pass

LOCATION 19.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	56.66	54.94	60.02
4	18.89	16.47	21.58
6	4.63	4.06	5.83
8	0.90	0.69	1.16
10	0.13	0.09	0.20

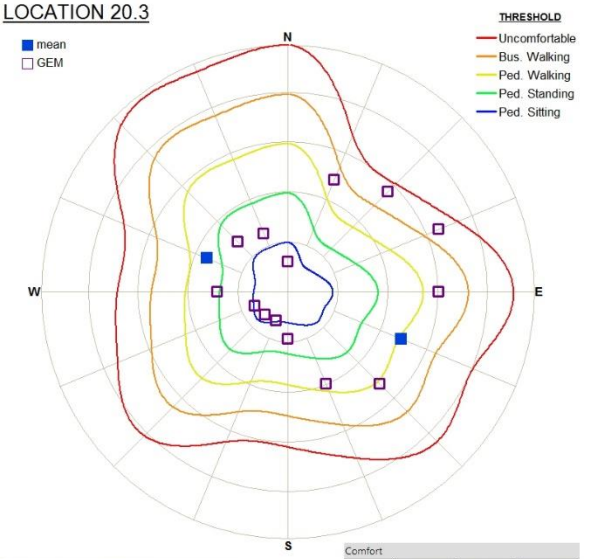
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.9	5.7	6.2
Rating	Ped Standing	Ped Standing	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.2	10.9	11.5
Rating	Pass	Pass	Pass

LOCATION 20.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	35.64	43.52	43.71
4	14.11	18.51	18.70
6	4.80	6.84	6.91
8	0.81	1.57	1.58
10	0.09	0.28	0.28

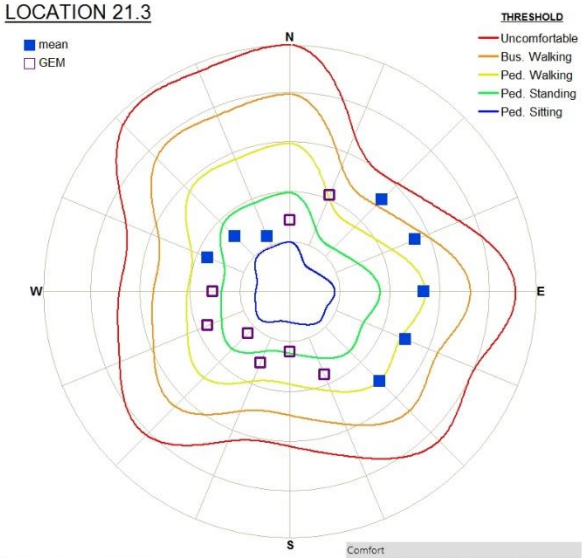
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.9	6.4	6.4
Rating	Ped Standing	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	11.0	12.0	12.0
Rating	Pass	Pass	Pass

LOCATION 21.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	47.40	54.04	55.40
4	16.22	17.23	18.63
6	4.39	3.77	4.62
8	0.69	0.54	0.70
10	0.08	0.05	0.08

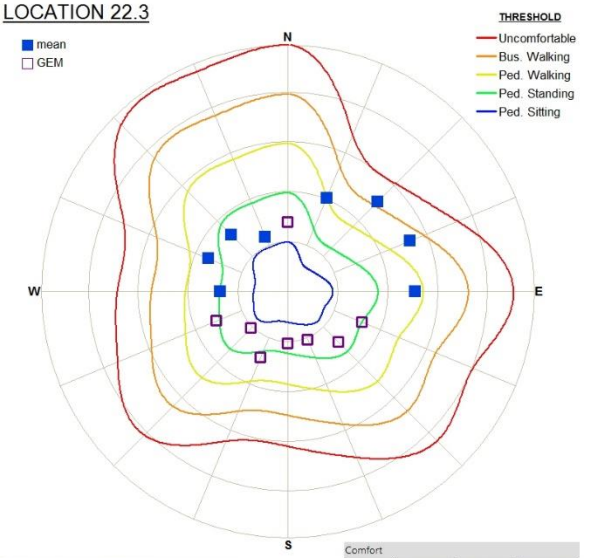
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.8	5.6	5.9
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.9	10.5	10.9
Rating	Pass	Pass	Pass

LOCATION 22.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	39.13	44.53	46.23
4	11.95	11.27	12.89
6	3.45	2.04	3.50
8	0.55	0.25	0.55
10	0.06	0.01	0.06

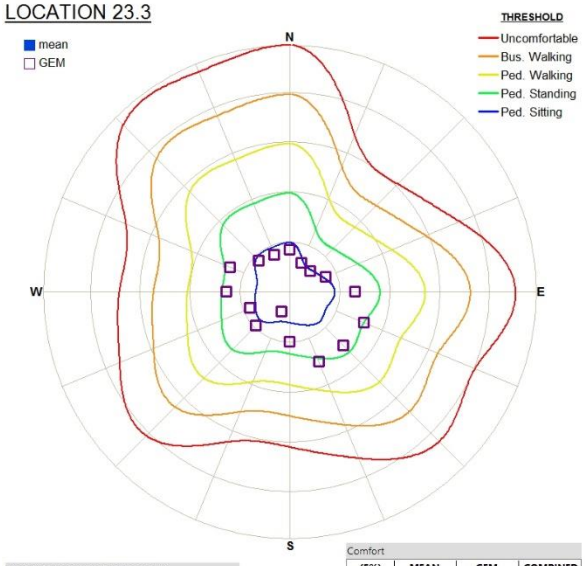
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.4	5.0	5.5
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	10.6	9.5	10.6
Rating	Pass	Pass	Pass

LOCATION 23.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	10.43	20.13	20.13
4	0.26	1.22	1.22
6	0.00	0.04	0.04
8	0.00	0.00	0.00
10	0.00	0.00	0.00

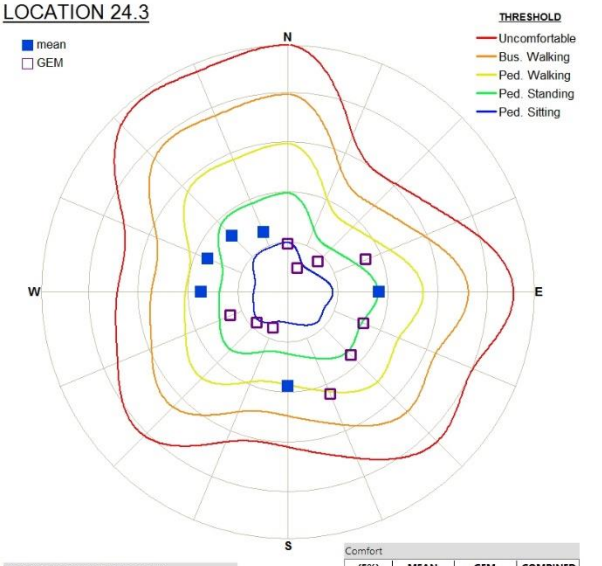
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	2.5	3.1	3.1
Rating	Ped Sitting	Ped Sitting	Ped Sitting

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	5.2	6.3	6.3
Rating	Pass	Pass	Pass

LOCATION 24.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.02	36.36	39.05
4	7.20	7.19	8.68
6	0.96	0.73	1.17
8	0.07	0.06	0.10
10	0.00	0.00	0.01

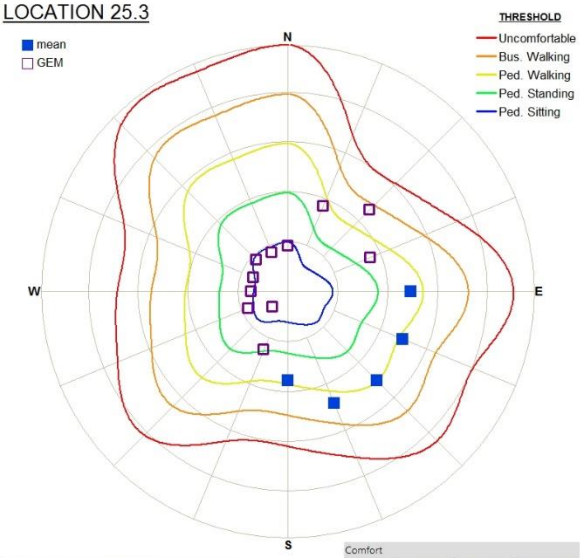
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.3	4.3	4.6
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.8	8.9	9.3
Rating	Pass	Pass	Pass

LOCATION 25.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	40.71	43.70	44.06
4	14.34	15.60	16.69
6	2.01	2.78	3.09
8	0.21	0.39	0.46
10	0.02	0.03	0.03

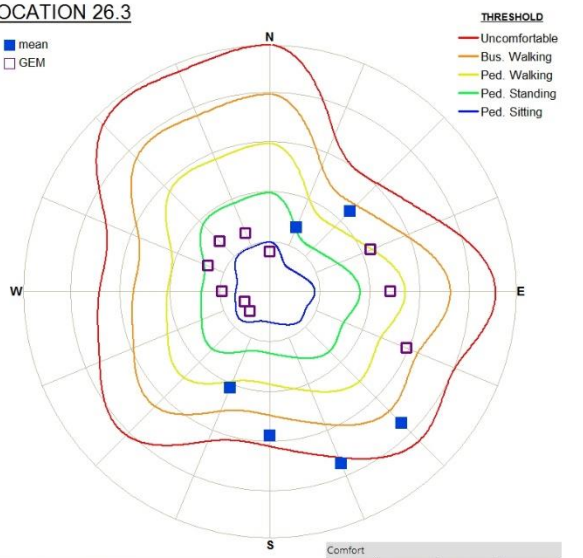
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	5.1	5.3	5.4
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.9	10.1	10.2
Rating	Pass	Pass	Pass

LOCATION 26.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	45.85	49.08	49.68
4	24.72	25.01	27.28
6	10.27	7.61	10.58
8	3.28	1.60	3.31
10	0.78	0.28	0.79

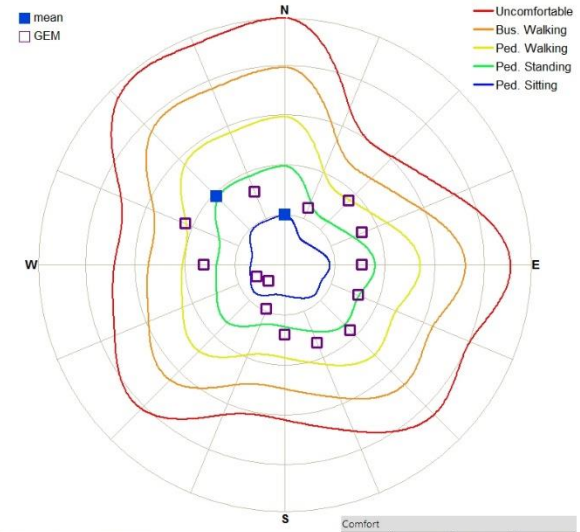
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	7.2	6.5	7.3
Rating	Ped Walking	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	15.1	12.9	15.1
Rating	Able Body	Pass	Able Body

LOCATION 27.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	34.04	44.97	45.15
4	4.40	8.09	8.10
6	0.61	1.01	1.02
8	0.06	0.11	0.12
10	0.00	0.00	0.01

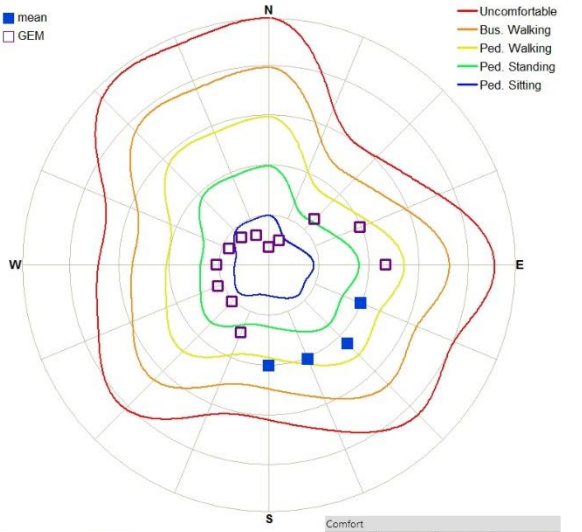
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	3.8	4.4	4.4
Rating	Ped Sitting	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	8.6	9.1	9.1
Rating	Pass	Pass	Pass

LOCATION 28.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	33.44	38.21	39.42
4	9.07	8.44	10.75
6	1.19	0.65	1.28
8	0.11	0.04	0.11
10	0.01	0.00	0.01

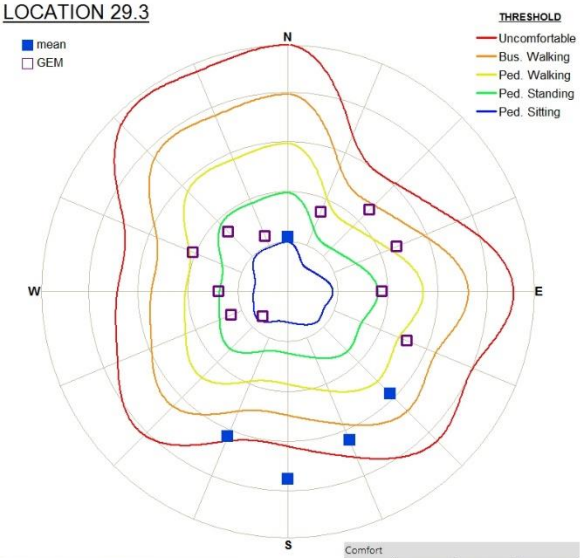
Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	4.5	4.4	4.7
Rating	Ped Standing	Ped Standing	Ped Standing

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	9.3	8.3	9.3
Rating	Pass	Pass	Pass

LOCATION 29.3



% of time in excess of wind speed V

V (m/s)	MEAN	GEM	COMBINED
2	49.57	57.29	57.92
4	26.11	27.94	29.72
6	12.52	10.13	13.94
8	4.74	2.76	5.03
10	1.77	0.62	1.79

Comfort

(5%)	MEAN	GEM	COMBINED
V (m/s)	7.8	7.0	7.9
Rating	Ped Walking	Ped Walking	Ped Walking

Safety

(0.022%)	MEAN	GEM	COMBINED
V (m/s)	17.0	14.1	17.0
Rating	Able Body	Pass	Able Body