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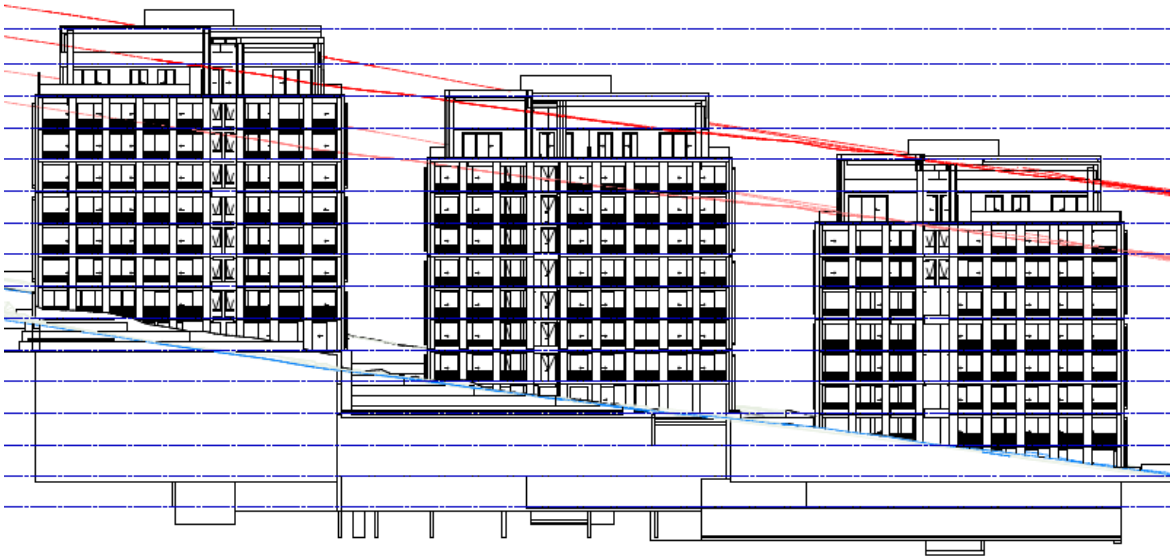

PEDESTRIAN WIND ENVIRONMENT STATEMENT

SITE B, 2-16 POCKLEY AVENUE, ROSEVILLE

WJ384-01BF01(REV3)- WS REPORT

APRIL 16, 2025

Prepared for:

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DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
March 14, 2025	Initial.	0	PM	SWR	KA
April 4, 2025	Updated introduction to include project description.	1	PM	SWR	KA
April 11, 2025	Update ground level for new drawings and landscaping.	2	KA	SWR	TR
April 16, 2025	Minor updates to introduction and description.	3	PM	SWR	KA

EXECUTIVE SUMMARY

This report presents an opinion on the likely impact of the Site B, 2-16 Pockley Avenue, Roseville development, on the local wind environment at the critical outdoor areas within and around the subject site. This report addresses the Secretary's Environmental Assessment Requirements (SEARs) Item 5 (App. No.: SSD-77825469).

The effect of wind activity has been examined for the three predominant wind directions for the region, namely the north-easterly, southerly, and westerly winds. The analysis of the wind effects relating to the proposed development have been carried out in the context of the local wind climate, building morphology and land topography.

The conclusions of this report are drawn from our extensive experience in this field and are based on an examination of the latest architectural drawings. No wind tunnel testing has been undertaken for the subject development, and hence this report addresses only the general wind effects and any localised effects that are identifiable by visual inspection of the architectural drawings provided (received 8 April 2025). The landscape masterplan for this development has also been assessed as part of this report and has been included in Appendix B. Any recommendations in this report are made only in-principle and are based on our extensive experience in the study of wind environment effects.

The results of this assessment indicate that the development has incorporated an extensive landscape strategy. This, in addition to the windy path between the Pavilions that incorporates a mixture of soft landscaping as well as hard landscaping near the southern corners are expected to result in wind conditions that are suited for the intended activities across the ground plane.

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1 INTRODUCTION

The applicant seeks development consent under Division 4.7 State Significant Development of the *Environmental Planning & Assessment Act 1979* (EP&A Act) for a new residential development comprising three residential flat buildings which includes the provision of in-fill affordable housing on the site at 2-16 Pockley Avenue, Roseville.

Specifically, this SSDA seeks approval for:

- *Site preparation including demolition, excavation and tree removal of the site;*
- *Construction of a residential flat building containing 3 building elements of up to 9 storeys including:*
    - *Part-3, part 4 and part 5-level combined basement parking with the provision of 285 car parking spaces,*
    - *178 dwellings including 39 affordable housing dwellings above carpark;*
- *Ground level and on-building landscaping works including communal open spaces in Pavilion A.*
- *Augmentation of, and connection to, existing utilities as required*

An opinion on the likely impact of the proposed design on the local wind environment affecting pedestrians within the critical outdoor areas within and around the subject development is presented in this report. The analysis of wind effects relating to the proposed development has been carried out in the context of the predominant wind directions for the region, building morphology of the development and nearby buildings, and local land topography. The conclusions of this report are drawn from our extensive experience in the field of wind engineering and studies of wind environment effects.

No wind tunnel testing has been undertaken for this assessment. Hence this report addresses only the general wind effects and any localised effects that are identifiable by visual inspection, and any recommendations in this report are made only in-principle.

This report also addresses the Secretary's Environmental Assessment Requirements (SEARs) for the project described in Table 1.

Table 1: Secretary's Environment Assessments Requirements

Declaration		
Name	Kiel Allen	
Qualifications	BEng(Hons) – Aerospace, Member of Engineers Australia	
	The undersigned declares that this Pedestrian Wind Environment Statement has been prepared in response to the following SEARs requirements issued for the Project on 15/11/2024 for SSD-77825469:	
SEARs item no.	SEARs Requirement	Relevant Section of this Report
5	Environmental Amenity Assess amenity impacts on the surrounding locality, including lighting impacts, reflectivity, solar access, visual privacy, visual amenity, view loss and view sharing, overshadowing and wind impacts. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated.	Section 5
Signed	Kiel Allen	
Dated	March 14, 2025	

2 DESCRIPTION OF DEVELOPMENT AND SURROUNDINGS

The development is located at Site B, 2-16 Pockley Avenue, Roseville, and is bounded by Larkin Street to the east, Pockley Avenue to the north and west, and Maclaurin Parade to the south. Further to the south and south-east are mid-rise residential developments.

A survey of the land topography indicates a significant slope on Pockley Avenue and Maclaurin Parade, towards the south-west as well as a gradual slope to the north-west along Larkin Street.

An aerial image of the subject site and the local surroundings is shown in Figure 1, with the frequency and magnitude of the prevailing winds is superimposed for each wind direction.

The existing site consists of 1-2 storey residential buildings. The proposed development consists of three buildings, Pavilion A, B and C, which are 9 storeys high.

The critical outdoor trafficable areas associated with the proposed development, which are the focus of this assessment with regards to wind effects, are listed as follows:

- Ground level areas along the Site Perimeter.
- Through Site Links (Communal Areas).
- Communal Spaces.
- Lobby Entrances.

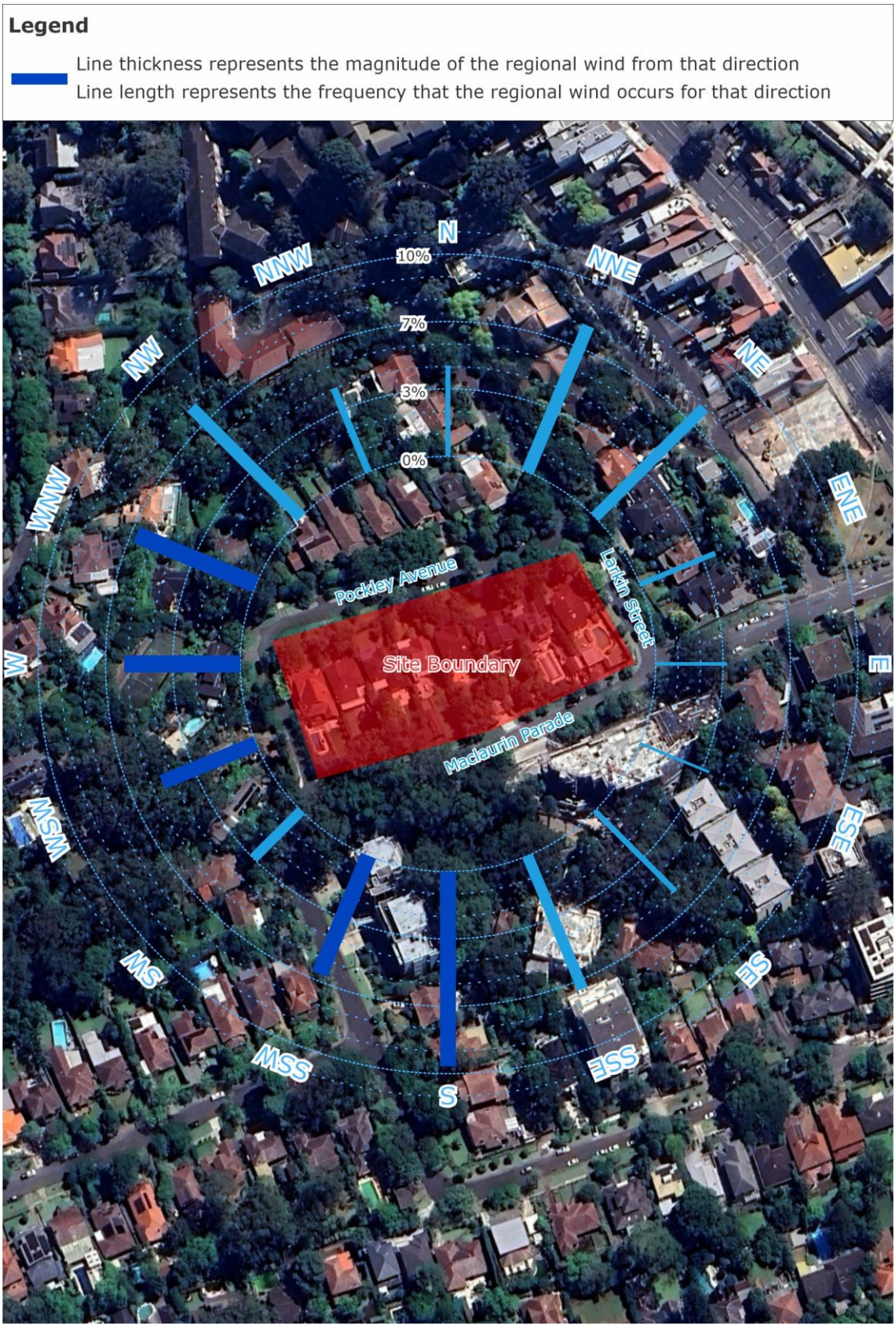

Figure 1: Aerial Image of the Site Location and Prevailing Wind Directions

3 REGIONAL WIND

The Sydney region is governed by three principal wind directions that can potentially affect the subject development. These winds prevail from the north-east, south, and west. These wind directions were determined from an analysis undertaken by Windtech Consultants of recorded directional wind speeds obtained from the meteorological station located at Kingsford Smith Airport by the Bureau of Meteorology (recorded from 1995 to 2016). The data has been corrected to represent winds over standard open terrain at a height of 10m above ground level. The results of this analysis are presented in Figure 2 in the form of a directional plot of the annual and 5% exceedance mean winds for the region. The frequency of occurrence of these winds is also shown in Figure 2.

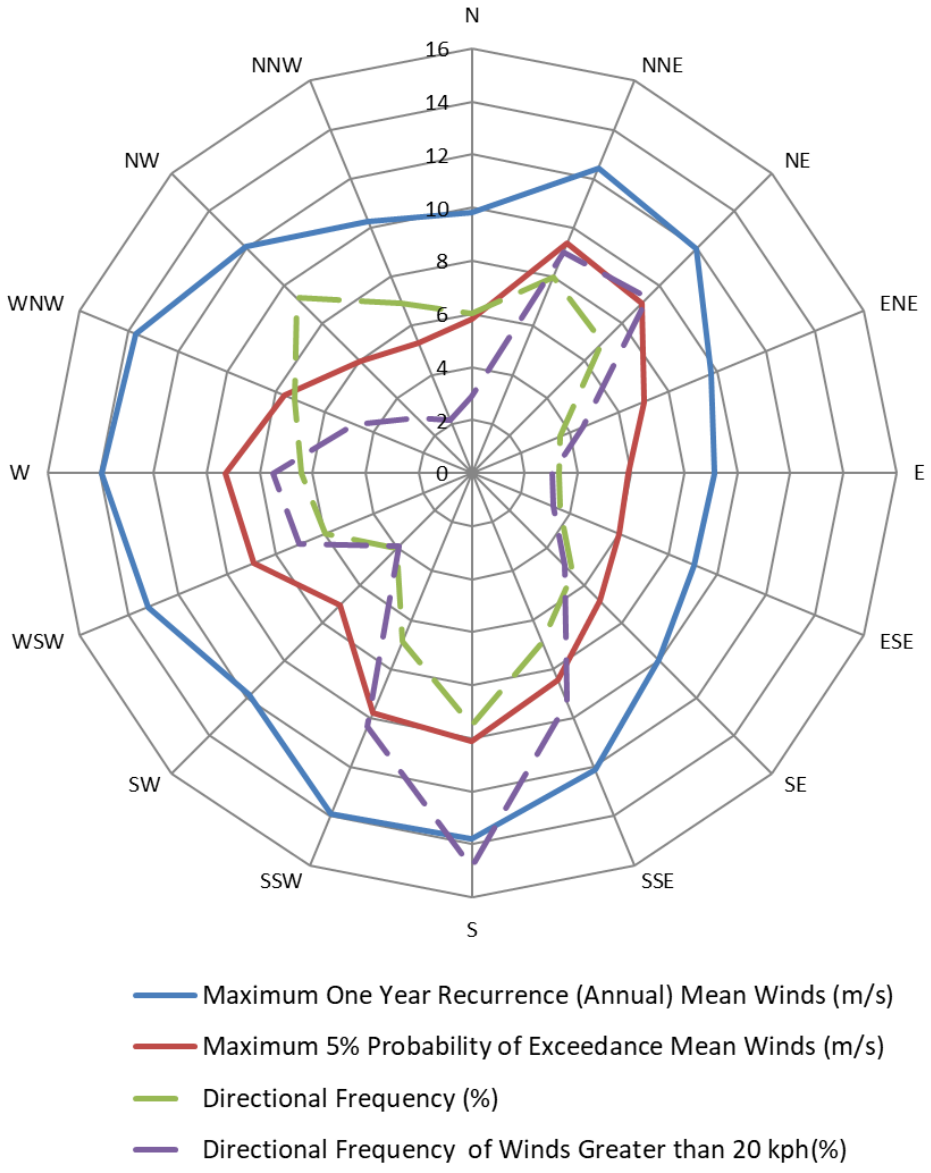

Figure 2: Directional Annual and 5% Exceedance Hourly Mean Wind Speeds (referenced to 10m height in standard open terrain), and Frequencies of Occurrence, for the Sydney Region

4 WIND EFFECTS ON PEOPLE

The acceptability of wind in any area is dependent upon its use. For example, people walking, or window-shopping will tolerate higher wind speeds than those seated at an outdoor restaurant. Various other researchers, such as A.G. Davenport, T.V. Lawson, W.H. Melbourne, and A.D. Penwarden, have published criteria for pedestrian comfort for pedestrians in outdoor spaces for various types of activities. Some Councils and Local Government Authorities have adopted elements of some of these into their planning control requirements.

For example, A.D. Penwarden (1973) developed a modified version of the Beaufort scale which describes the effects of various wind intensities on people. Table 2 presents the modified Beaufort scale. Note that the effects listed in this table refers to wind conditions occurring frequently over the averaging time (a probability of occurrence exceeding 5%). Higher ranges of wind speeds can be tolerated for rarer events.

Table 2: Summary of Wind Effects on People (A.D. Penwarden, 1973)

Type of Winds	Beaufort Number	Mean Wind Speed (m/s)	Effects
Calm	0	Less than 0.3	Negligible.
Calm, light air	1	0.3 – 1.6	No noticeable wind.
Light breeze	2	1.6 – 3.4	Wind felt on face.
Gentle breeze	3	3.4 – 5.5	Hair is disturbed, clothing flaps, newspapers difficult to read.
Moderate breeze	4	5.5 – 8.0	Raises dust, dry soil and loose paper, hair disarranged.
Fresh breeze	5	8.0 – 10.8	Force of wind felt on body, danger of stumbling
Strong breeze	6	10.8 – 13.9	Umbrellas used with difficulty, hair blown straight, difficult to walk steadily, wind noise on ears unpleasant.
Near gale	7	13.9 – 17.2	Inconvenience felt when walking.
Gale	8	17.2 – 20.8	Generally impedes progress, difficulty balancing in gusts.
Strong gale	9	Greater than 20.8	People blown over.

It should be noted that wind speeds affecting this particular development can only be accurately quantified with a wind tunnel study. This assessment addresses only the general wind effects and any localised effects that are identifiable by visual inspection and the acceptability of the conditions for outdoor areas are determined based on their intended use. Any recommendations in this report are made only in-principle and are based on our extensive experience in the study of wind environment effects.

5 RESULTS AND DISCUSSION

The expected wind conditions affecting the development are discussed in the following sub-sections of this report for the various outdoor areas within and around the subject development. The interaction between the wind and the building morphology in the area is considered and important features taken into account including the distances between the surrounding buildings and the proposed building form, as well as the surrounding landform. Note that only the potentially critical wind effects are discussed in this report. A glossary of the different wind effects described in this report included in Appendix A.

For this assessment, the wind speed criteria for pedestrian comfort that are considered are listed as follows:

- Walking Criterion (8m/s with a 5% probability of exceedance)
  for general circulation and pedestrian thoroughfares, e.g. footpaths, private balconies/terraces, through-site links etc.

- Standing (Short Exposure) Criterion (6m/s with a 5% probability of exceedance)
  for stationary activities generally less than an hour, e.g. waiting areas, communal terraces, main entries, café seating etc. This criterion was adopted when assessing the entrances to the Ground lobbies and communal spaces.

Note that the above wind comfort levels are derived from the Lawson (1975) criteria. Although this assessment is qualitative in nature, the abovementioned criteria for pedestrian comfort are considered when assessing the wind environment impacts. However, all areas are also assessed with consideration to a pedestrian safety criterion of 23m/s for the annual maximum gust.

The results of this assessment indicate that the development has incorporated an extensive landscape strategy. This, in addition to the windy path between the Pavilions that incorporates a mixture of soft landscaping as well as hard landscaping near the southern corners are expected to result in wind conditions that are suited for the intended activities across the ground plane.

It is intended to undertake a wind tunnel models study during a future design stage for the proposed development to accurately quantify the wind conditions within and around the site. This will provide a quantitative analysis of the wind conditions to confirm the assessment presented in this report.

5.1 Ground Level Areas along the Site Perimeter

The pedestrian footpaths along Pockley Avenue and Maclaurin Parade are primarily exposed to the north-easterly, southerly and westerly prevailing winds. These winds have the potential to sidestream along the Pavilions and accelerate about the building corners. Due to the setback of the Pavilion from the pedestrian footpaths, and the extensive planting proposed within and around the site, it is expected that the wind conditions will continue to meet the comfortable walking criterion.

5.2 Through Site Links (Communal Areas)

The ground level communal areas within the through site links will be partially shielded from the north-easterly winds. However, the southerly winds are expected to accelerate around the southern corners of the pavilions as well as funnel between the pavilions.

The prevailing southerly winds have the potential to accelerate around the southern corners of the pavilions and funnel through the communal areas between the pavilions. The proposed winding arrangement of the pedestrian footpaths between the pavilions have allowed for landscaping to provide a baffle effect along these areas, which will be effective in ameliorating potential adverse wind conditions within these open spaces. In addition, the dense landscaping and tree planting proposed at the north and south entrance of the communal areas will further assist in providing mitigation of the potential adverse conditions caused by the southerly winds.

5.3 Communal Spaces

The communal space located on the western side of Pavilion C has the potential to be impacted by the prevailing southerly, north-easterly and westerly winds. The southerly winds have the potential to sidestream along the façade of Pavilion C whilst the north-easterly winds have the potential to accelerate around the north-western corner of Pavilion C into the communal open space. In addition, the westerly winds have the potential to directly impact the area as well as sidestream along the western façade of Pavilion C. The western communal space has a similar winding footpath layout as per the communal areas between the Pavilions which allows for trees and landscaping to provide a baffle effect along the edges of the footpath which will assist in ameliorating potential adverse wind conditions.

The communal space located on the south-western corner of the development has the potential to be impacted by the prevailing southerly and north-easterly winds due to sidestreaming and corner acceleration. The proposed dense tree planting on the southern perimeter of this area as well as the existing trees to be retained on Larkin Street are expected to assist in ameliorating these potentially adverse wind conditions.

5.4 Lobby Entrances

The lobby entrances to each Pavilion located on Maclaurin Parade have the potential to be impacted by the prevailing southerly and westerly winds due to sidestreaming, direct impact and downwash. The recessed design of the lobby entrances beneath the floors above provides suitable amelioration from potential downwash caused by the southerly winds. The proposed landscaping at each entrance to the south as well as the east and west will also assist in providing amelioration from the westerly and southerly winds.

6 REFERENCES

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APPENDIX A WIND EFFECTS GLOSSARY

A.1 Downwash and Upwash Effects

The downwash wind effect occurs when wind is deflected down the windward face of a building, causing accelerated winds at pedestrian level. This can lead to other adverse effects as corner acceleration as the wind attempts to flow around the building, as seen in Figure A.1.

This can also lead to recirculating flow in the presence of a shorter upstream building, causing local ground level winds to move back into the prevailing wind.

The upwash effect occurs near upper level edge of a building form as the wind flows over the top of the building. This has the potential to cause acceleration of winds near the leading edge, as well as potentially reattaching onto the roof area. This effect causes wind issues particularly near the leading edges of tall building and on the rooftop areas if there is sufficient depth along the wind direction. Upwash is more apparent in taller towers and podia.

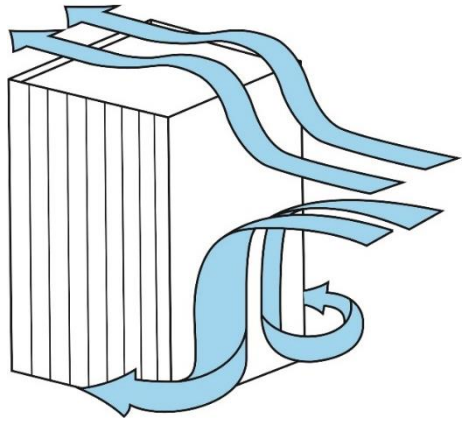

Figure A.1: Downwash Leading to Corner Wind Effect, and Upwash Effects

A.2 Funnelling/Venturi Effect

Funnelling occurs when the wind interacts with two or more buildings which are located adjacent to each other, which results in a bottleneck, as shown in Figure A.2. This causes the wind to be accelerated through the gap between the buildings, resulting in adverse wind conditions and pedestrian discomfort within the constricted space. Funnelling effects are common along pedestrian links and thoroughfares generally located between neighbouring buildings that have moderate gaps between them.

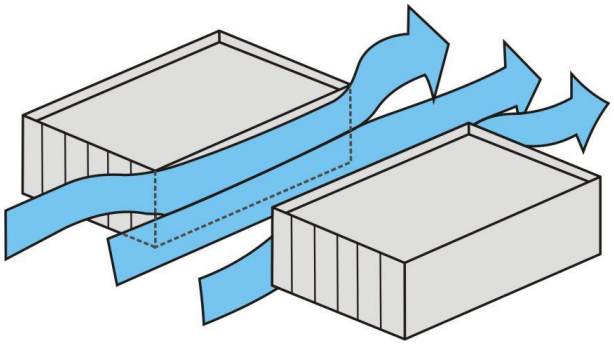

Figure A.2: Funnelling/Venturi Wind Effect

A.3 Gap Effect

The gap effect occurs in small openings in the façade that are open to wind on opposite faces, as seen in Figure A.3. This can involve a combination of funnelling and downwash effects. Presenting a small gap in the façade on the windward aspect as the easiest means through which the wind can flow through can result in wind acceleration through this gap. The pressure difference between the windward façade and the leeward façade also tends to exacerbate the wind flow through this gap.

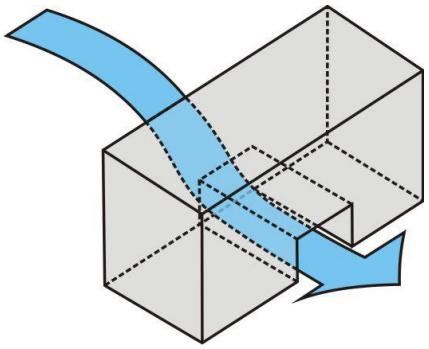

Figure A.3: Gap Wind Effect

A.4 Sidestream and Corner Effects

The sidestream effect is due to a gradual accumulation of wind shearing along the building façade that eventuates in an acceleration corner effect. The flow is parallel to the façade and can be exacerbated by downwash effects as well, or due to corner effect winds reattaching on the façade.

This is shown in Figure A.4. The corner refers to the acceleration of wind at the exterior vertical edge of a building, caused by the interaction of a large building massing with the incident wind, with the flow at the corner being accelerated due to high pressure differentials sets up between the windward façade and the orthogonal aspects. It can be further exacerbated by downwash effects that build up as the flow shears down the façade.

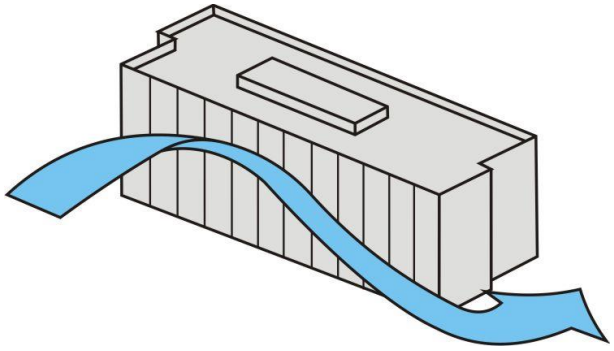

Figure A.4: Sidestream and Corner Wind Effect

A.5 Stagnation

Stagnation in a region refers to an area where the wind velocity is significantly reduced due to the effect of the flow being impeded by the bluff body. For a particular prevailing wind direction, this is typically located near the middle of the windward face of the building form or over a short distance in front of the windward face of a screen or fence. Concave building shapes tend to create an area of stagnation within the cavity, and wind speeds are generally low in these areas.

APPENDIX B LANDSCAPE MASTERPLAN

Figure B.1: Landscape Masterplan