WINDTECH

PEDESTRIAN WIND ENVIRONMENT STATEMENT

SITE R3, MACARTHUR GARDENS NORTH AFFORDABLE HOUSING PROJECT

WJ332-05F02(REV2)- WS REPORT.DOCX

JUNE 24, 2026

Prepared for:

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DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
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May 18, 2026	Updated Executive Summary	-05F02(rev1)	MG	MM	ALD
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EXECUTIVE SUMMARY

This pedestrian wind environment statement has been prepared by Windtech Consultants to accompany a State Significant Development Application (SSDA) for an affordable housing development within the Macarthur Gardens North precinct (MGN) in the Campbelltown Local Government Area (LGA). The MGN precinct is identified as Lot 1097 in DP1182558.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 16 July 2025 and issued for the SSDA (SSD-80482713). Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Table 1: SEARs Requirement Section of Report where response is provided

Item	Description of requirement	Section Reference
7. Environmental Amenity	• Assess amenity impacts on the surrounding locality, including wind impacts. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated.	Section 5

This report presents an opinion on the likely impact of the development at Site R3 of the Macarthur Gardens North Affordable Housing Project, on the local wind environment at the critical outdoor areas within and around the subject site. The effect of wind activity has been examined for the three predominant wind directions for the region, namely the north-easterly, south to south-easterly, 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 May 1, 2026). 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 several design features and wind mitigating strategies and is expected to be suitable for the intended use for the majority of the outdoor trafficable areas. However, there are some areas that are likely to be exposed to stronger winds. It is expected that the wind effects identified in the report can be ameliorated with the consideration of the following treatment strategies into the design of the development. This report concludes that the proposed development is suitable and warrants approval subject to the implementation of the following mitigation measures.

- Ground level trafficable areas:
    - Inclusion of the proposed densely foliating trees and shrubs/hedge planting within and around the subject development as indicated in the Landscape Concept Plan; in particular around the corners of the buildings, along the central through-site link and around areas intended for short

duration stationary activities such as outdoor seating. The densely foliating vegetation are to be of an evergreen species to ensure their effectiveness in wind mitigation throughout the year.

- Level 3 Communal Open Spaces:
    - Retention of dense vegetation along the exposed terrace aspects,
    - Retention of the pergola structure on the western terrace,
    - Retention of the proposed 1.5m tall impermeable balustrade surrounding both terraces.
- North-eastern and north-western corner private balconies:
    - Level 2: Retention of proposed 1.5m high impermeable balustrades, on the northern edges of both balconies.
    - Levels 3-7: Inclusion of full height end screens, on the western edge of the north-western corner balcony and eastern edge of the north-eastern corner balcony.
- All other private balconies:
    - Retention of the proposed balustrades and full-height intertenancy screens along the perimeter edges of the remaining balconies.

With the inclusion of the abovementioned recommendations in the final design, it is expected that wind conditions for the various trafficable outdoor areas within and around the development will be suitable for their intended uses, and that the wind speeds will satisfy the applicable criteria for pedestrian comfort and safety. Following the implementation of the above mitigation measures, the remaining impacts are considered appropriate.

Section 4.55(2) Modification

Since the issue of the previous revision of this report (report ref: WJ332-02F02(rev0), WS Report dated 28 July 2025) Windtech has been provided updated architectural drawings of the proposed development prepared by DKO, received dated June 19, 2026. Windtech has reviewed the design changes to the development, and the notable design changes (with respect to wind effects) to the development include the following:

- Removal of a single typical level
- Minor changes to private balcony layout/façade line
- Updated landscaping on the Level 3 communal terraces

As the updated building design shares a very similar massing and form to the previous assessed design, Windtech expects there to be a negligible impact on the recommended treatments in the abovementioned report. However, due to the reconfiguration of private balconies, the exact position and extent of the recommended treatments have changed slightly. To better communicate these changes effectively, Windtech has provided this report update.

CONTENTS

1 INTRODUCTION

The SSDA seeks development consent for a 100% affordable housing development on site R3 of the MGN Precinct.

Specifically, the SSDA seeks development consent for:

- Construction of two 3 to 9 storey residential flat buildings
- 130 dwellings, all of which are affordable housing
- One basement level for car parking
- Landscaping
- Communal Open Space Area

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.

The purpose of the project is to facilitate the delivery of high-quality affordable housing, on a strategically located site consistent with the vision for MGN.

On 14 December 2022, the Sydney Western City Planning Panel approved 3944/2021/DA-SW which comprised:

- a concept masterplan for mixed use development within MGN (see figure below)
- stage 1 works (parks, civil works, landscaping and subdivision of the site into superlots)

The masterplan sets the planning context for MGN. Importantly, the use and building envelopes for the site subject to this SSDA outlined in red below.

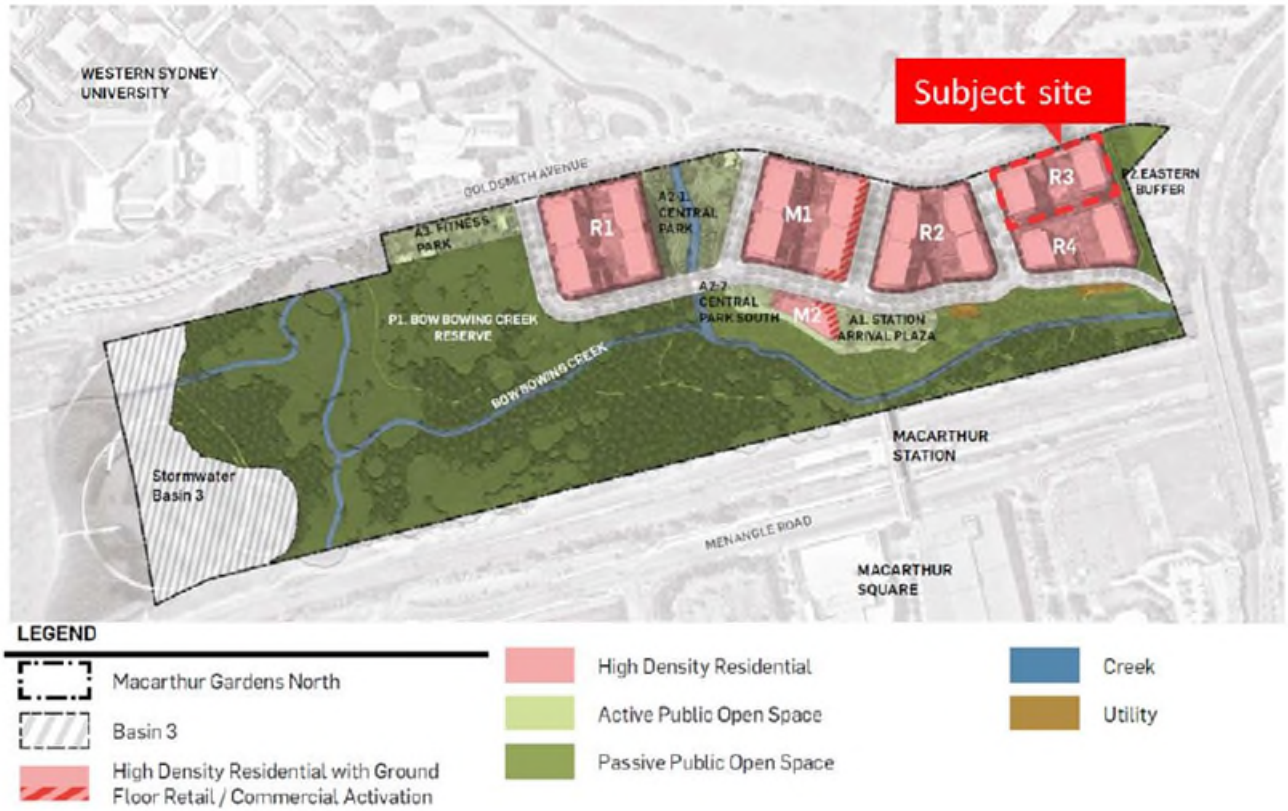

Figure 1: Masterplan

2 DESCRIPTION OF DEVELOPMENT AND SURROUNDINGS

The site is located in the MGN precinct within the Campbelltown LGA. The MGN Precinct is legally described as Lot 1097 in DP1182558.

As shown within the figure below, the site is within the northeastern corner of MGN and is rectangular in shape. The site has an area of 4,895m2 and is currently bound by
Goldsmith Avenue to the north, vacant land (known as site R4 within the 3944/2021/DA- SW concept masterplan) to the south and a pedestrian link and road, which are under construction, to the east and west respectively.

The site is zoned R4 High Density Residential pursuant to the Campbelltown Local Environmental Plan 2015 and is currently vacant land which has been excavated in accordance with Stage 1 of the 3944/2021/DA-SW approval.

Figure 2: The site (Source: Nearmaps)

The site is also strategically located within the Glenfield to Macarthur Urban Renewal Corridor which is identified by the Department of Planning Housing and Infrastructure as a corridor to accelerate housing and jobs.

The vision of MGN is a mixed-use development precinct. Once developed, the site will be immediately bound by high density residential, roads and landscape buffers.

Outside of the MGN precinct, the broader site context is characterised by educational establishments to the north and northwest (Western Sydney University and TAFE), vacant undeveloped land to the west, Macarthur

Train Station, railway lines, commercial premises (including Macarthur Square Shopping Centre) and low density residential to the south and a recreation area known as Gilchrist Oval to the east.

The site is also located approximately 43 kilometres southwest of the Sydney CBD, and 20km southwest of Liverpool.

A survey of the land topography indicates a significant incline towards the north with a measured change in elevation of 24m.

An aerial image of the subject site and the local surroundings is shown in Figure 3, with the frequency and magnitude of the prevailing winds is superimposed for each wind direction.

The existing site is a vacant site that will be redeveloped into two residential buildings with an overall height of 9 storeys.

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 and pedestrian footpath.
- Level 3 Communal Open Spaces.
- Private balconies

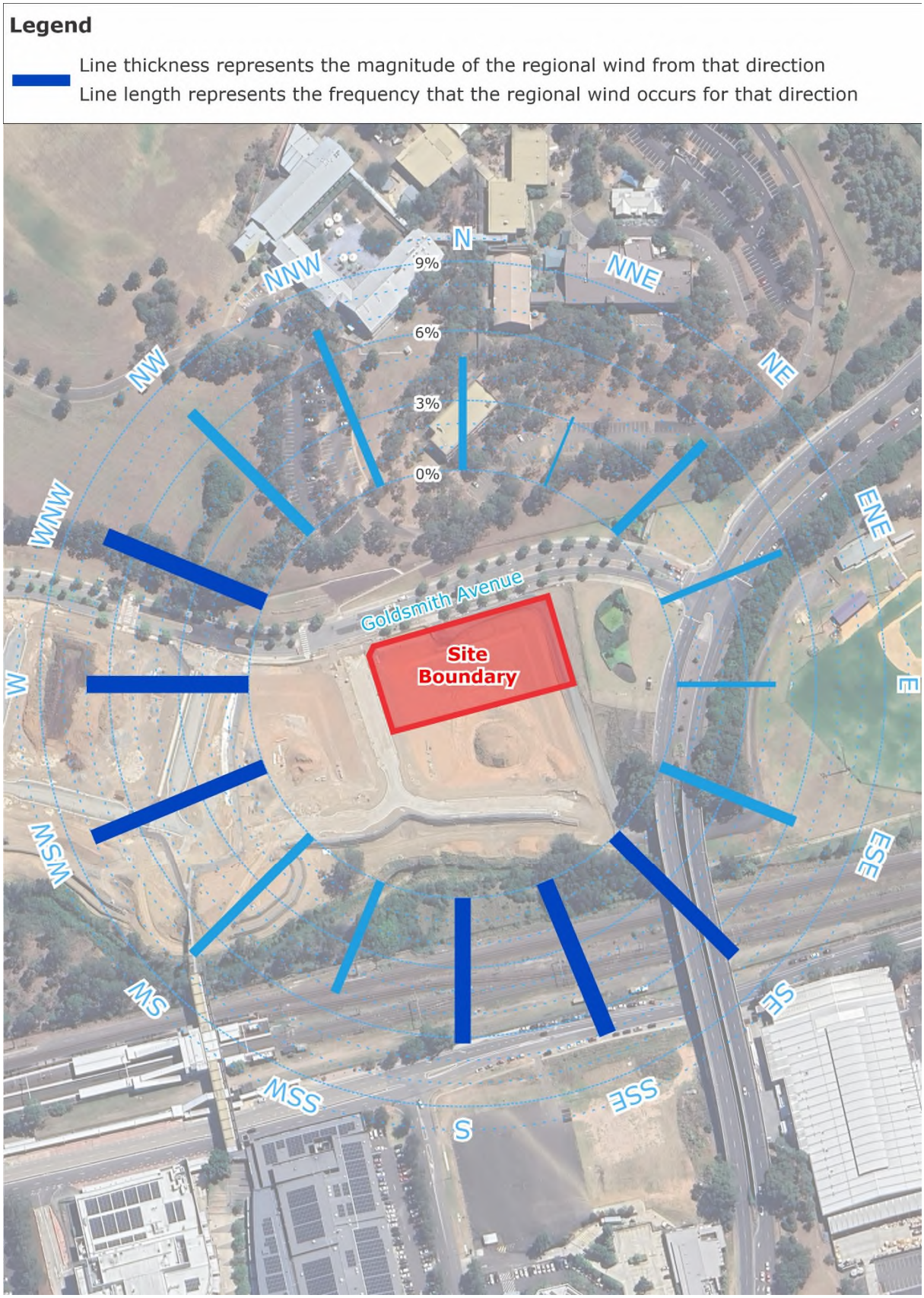

Figure 3: Aerial Image of the Site Location and Prevailing Wind Directions

3 REGIONAL WIND

The Macarthur region is governed by three principal wind directions that can potentially affect the subject development. These winds prevail from the north-east, south to south-east, 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 Bankstown Airport (recorded from 1993 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 4 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 4.

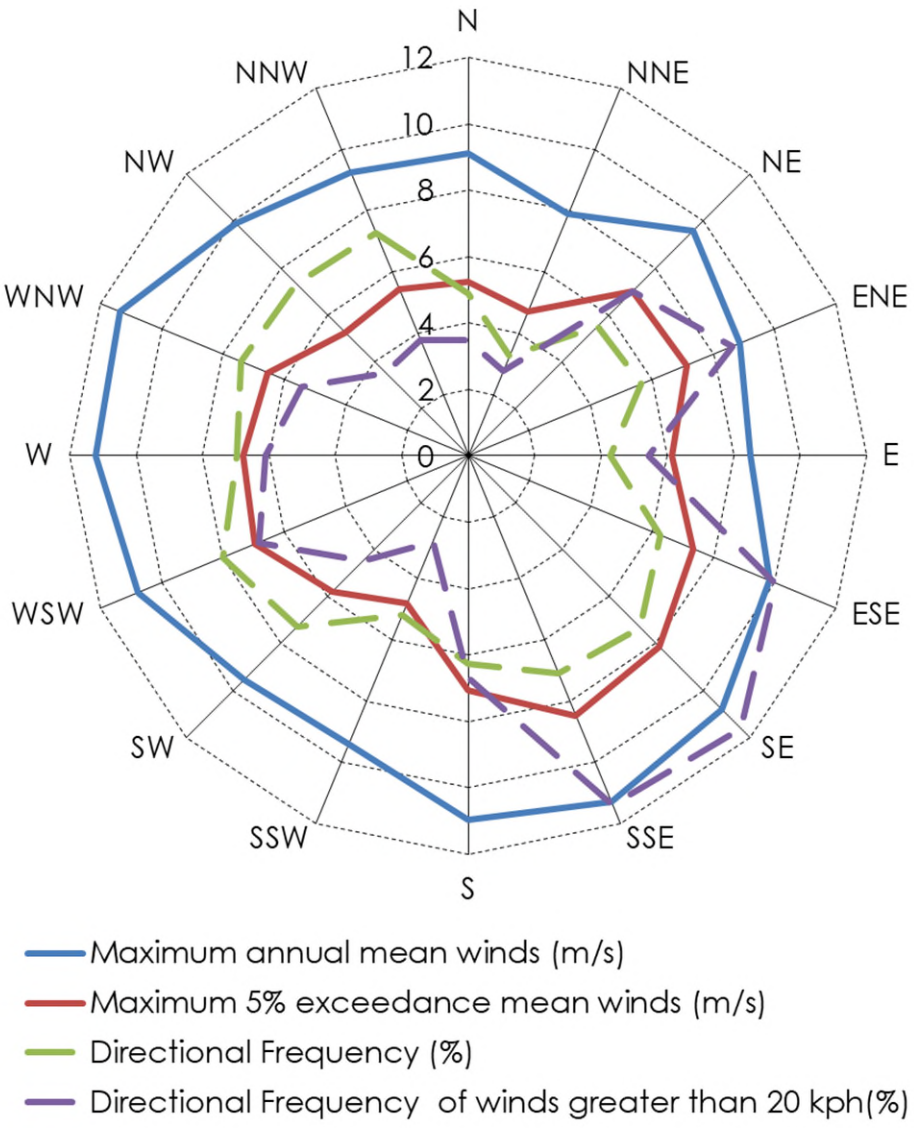

Figure 4: Directional Annual and 5% Exceedance Hourly Mean Wind Speeds (referenced to 10m height in standard open terrain), and Frequencies of Occurrence, for the Macarthur Region

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.

- Sitting (Long Exposure) (4m/s with a 5% probability of exceedance)
  for stationary activities longer than an hour, e.g. outdoor cinemas, outdoor fine dining etc.

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.

5.1 Ground Level Areas

The pedestrian footpaths and outdoor trafficable areas of the site are exposed to the prevailing winds for the region due to the relative openness of the vacant lots surrounding the site. Furthermore, the corner outdoor areas may be susceptible to accelerating flows around the corners of the buildings, and funnelling wind effects from the prevailing north-easterly and south-easterly directions along the central through-site link between the proposed buildings. It should be noted that the proposed developments of the Macarthur Gardens North development site to the west and south of the site is expected to provide some form of shielding to the prevailing westerly and southerly winds. A review of the architectural and landscape concept drawings indicates that significant landscape planting is proposed within and around the development site as indicated in Figure 5 below. The proposed landscaping is expected to be effective in wind amelioration and enhancing the local wind conditions; in particular around the corners of the buildings, along the central through-site link and around areas intended for short duration stationary activities such as outdoor seating. Hence it is recommended that the densely foliating trees and shrubs/hedge planting as indicated in the landscape concept and Figure 5 are included in the final design of the development. Furthermore, they are to be of an evergreen species to ensure their effectiveness in wind mitigation throughout the year.

5.2 Level 3 Communal Open Spaces

The Level 3 communal open spaces facing the central through-site link benefits from some shielding provided by the tower building form of the proposed buildings; however, it is potentially exposed to the direct westerly and north-easterly winds due to its elevated position above the surrounding landscape. Furthermore, it may be susceptible to accelerating flows around the northern corners of buildings as well as the south to south-easterly winds funnelling between the buildings. It is expected that the inclusion of the following treatment strategies will be effective in wind mitigation and enhancing the local wind conditions within communal open spaces and is indicated in Figure 6b:

- The inclusion of 1.5m high impermeable balustrades along the entire exposed perimeter edges of the communal open spaces.
- Consider the inclusion of effective wind mitigation features such as localised free-standing screens or densely foliating evergreen vegetation within the communal open spaces; in particular around areas intended for short duration stationary activities such as outdoor seating etc.
- Consideration to potential outdoor seating areas to be located away from the corner areas of the buildings.

5.3 Private Balconies

The majority of the balconies of the development are expected to be suitable for their intended use due to the inclusion of various wind mitigation features such as their overall recessed design, balustrades and full-height intertenancy screens. These features should be retained in the final design.

The north-eastern and north-western corner balconies on Levels 2-7 are susceptible to stronger wind conditions due to the exposure to direct wind effects from the prevailing north-easterly and westerly directions, and susceptibility to corner accelerations around the balconies from the inherent dual aspect design. The proposed walls along the south-facing sides of the southern corner balconies reduce the flow accelerations that are likely to form at these building corners.

It is expected that the inclusion of the following treatment strategies to be effective in wind mitigation and enhancing the local wind conditions within various private balconies and indicated in Figure 6a to 6d:

North-eastern and north-western corner private balconies:

- Level 2: Retention of proposed 1.5m high impermeable balustrades, on the northern edges of both balconies.
- Levels 3-7: Inclusion of full height end screens, on the western edge of the north-western corner balcony and eastern edge of the north-eastern corner balcony.

All other private balconies:

- Retention of the proposed balustrades and full-height intertenancy screens along the perimeter edges of the remaining balconies.

Figure 5: Recommended Treatment for the Ground Level

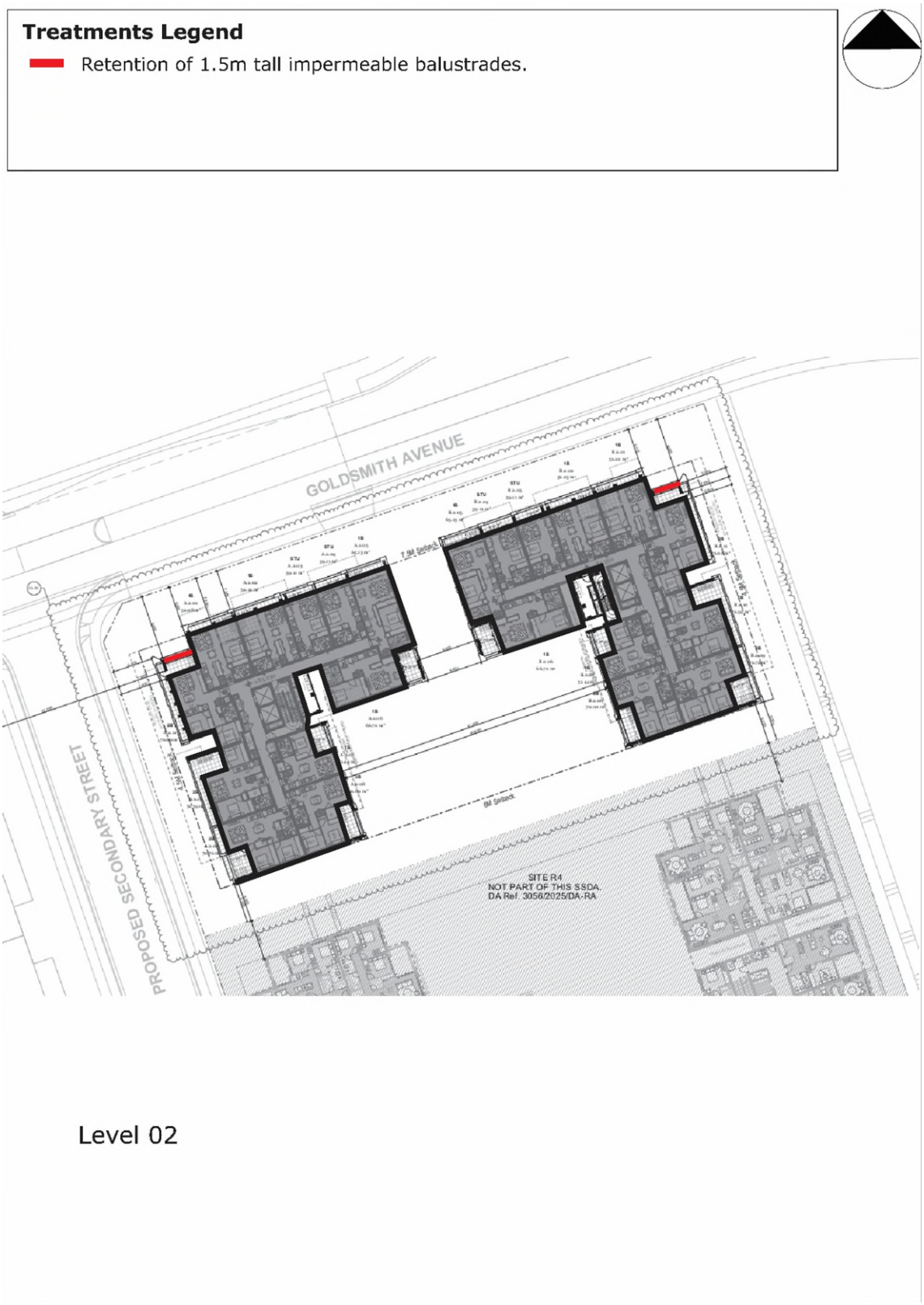

Figure 6a: Recommended Treatment for Level 2

Figure 6b: Recommended Treatment for Level 3

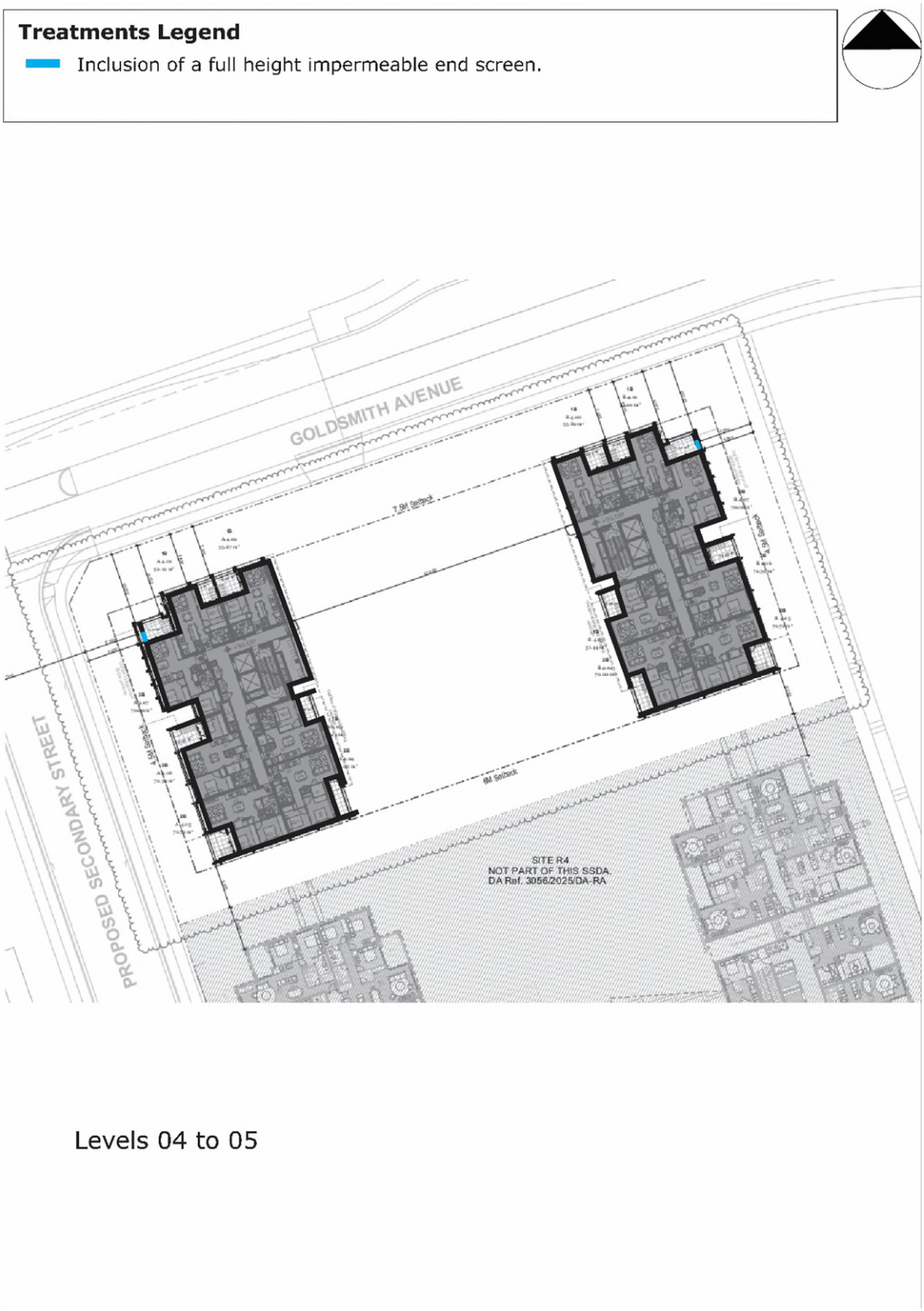

Figure 6c: Recommended Treatment for Level 4 to Level 5

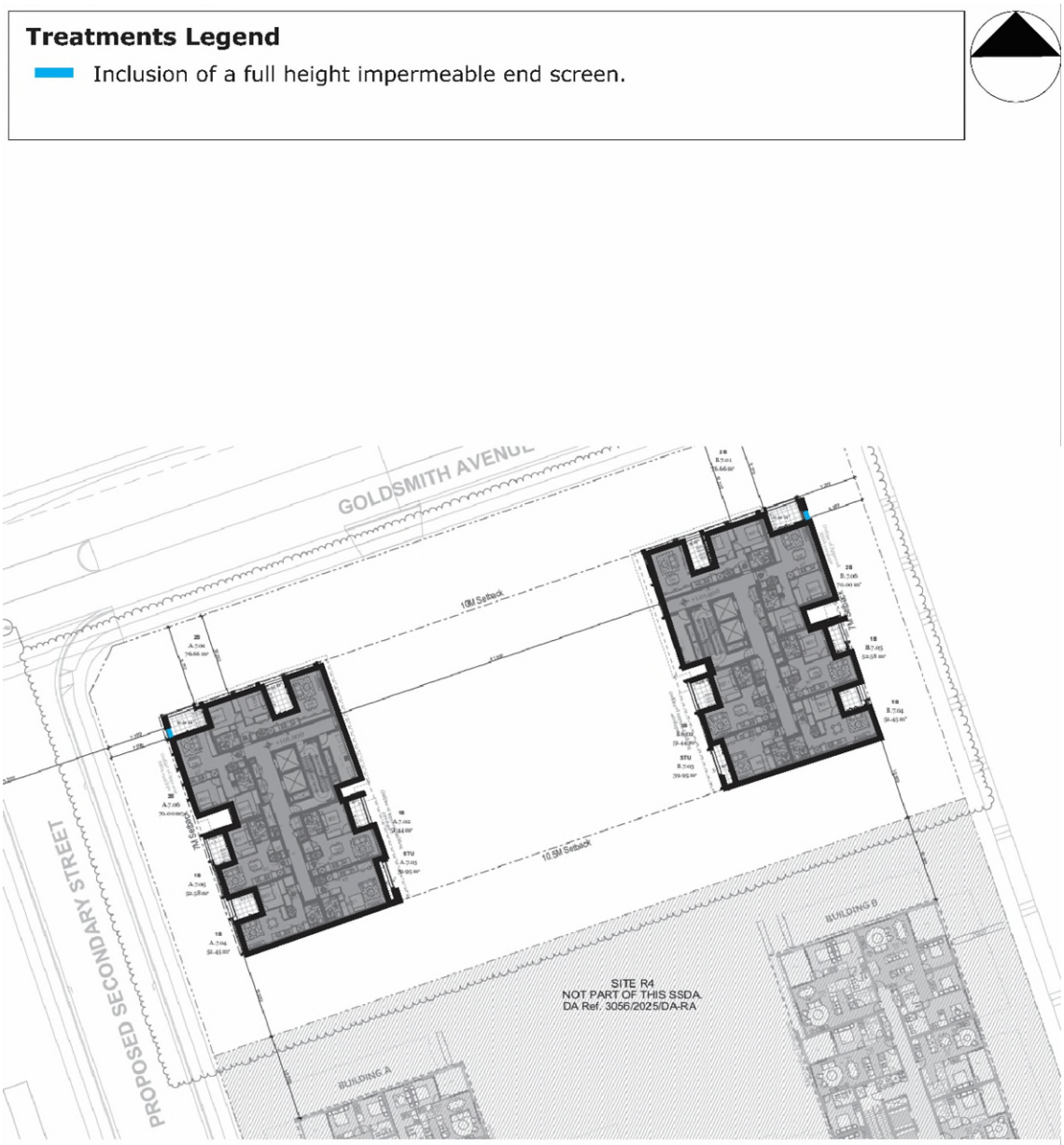

Figure 6d: Recommended Treatment for Level 6 to Level 7

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.

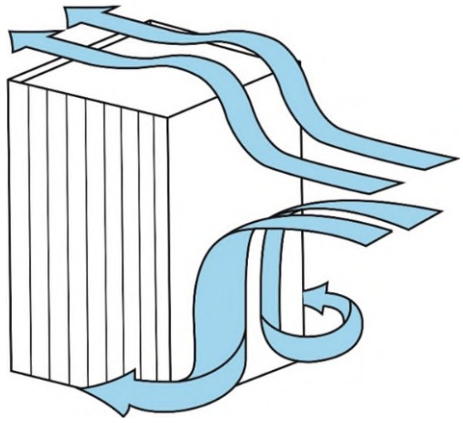

Figure A.1: Downwash Leading to Corner Wind Effect, and Upwash Effects

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.

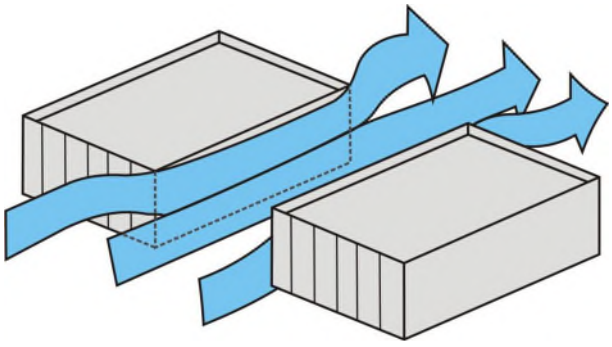

Figure A.2: Funnelling/Venturi Wind Effect

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.

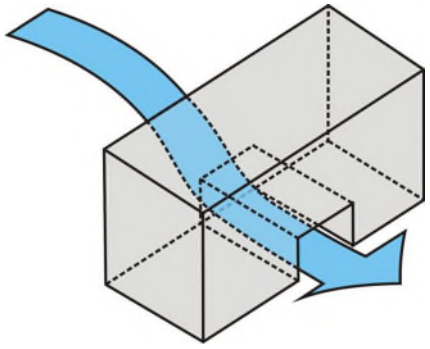

Figure A.3: Gap Wind Effect

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.

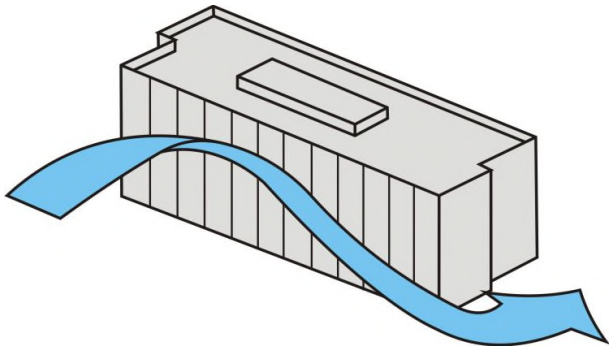

Figure A.4: Sidestream and Corner Wind Effect

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.