



PEDESTRIAN WIND ENVIRONMENT STATEMENT

7-9 SURF PARADE, BROADBEACH

WJ545-01F02(REV0)- WS REPORT

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Prepared for:

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EXECUTIVE SUMMARY

This report presents an opinion on the likely impact of the proposed development, located on 7-9 Surf Parade, Broadbeach, 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-to-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 25 March 2025). 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:

- Ground level trafficable areas:
 - Retention of the proposed planting along the Surf Parade frontage, ensuring they are able to grow to a height and width of 3-m and are of a densely foliating evergreen variety.
- Podium Recreation:
 - Retention of the proposed planting, ensuring they are of a densely foliating and evergreen variety.
 - Increase the height of the impermeable balustrades to 1.5m.
- Private Balconies:
 - Increase the height of the impermeable balustrades to 1.5m OR Addition of full-height end screen/wind blades along one aspect.
- Rooftop Terraces
 - Increase the height of the impermeable balustrades to 1.5m.
 - Retention of the proposed planting, ensuring they are of a densely foliating and evergreen variety.

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.

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INTRODUCTION

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.

A list of the architectural drawings referenced for this assessment is provided in the table below.

Table 1: List of Architectural Drawings Referenced

Drawing/file name	Revision number	Date
EXISTING SITE PLAN	P5	21.03.2025
PROPOSED SITE PLAN	P5	21.03.2025
LEVEL 01 – GROUND FLOOR	P8	21.03.2025
MEZZANINE	P6	21.03.2025
LEVEL 02 - PODIUM	P8	21.03.2025
LEVEL 03 - PODIUM	P8	21.03.2025
LEVEL 04 – PODIUM RECREATION	P6	21.03.2025
LEVEL 05-29 – TYPICAL LEVELS	P6	21.03.2025
PLANT LEVEL	P4	21.03.2025
ROOF LEVEL	P4	21.03.2025
BUILDING SECTIONS 01&02	P6	21.03.2025

DESCRIPTION OF DEVELOPMENT AND SURROUNDINGS

The site is located at 7-9 Surf Parade, Broadbeach, and is bounded by Surf Parade to the west, and low-rise residential buildings to the north, south and east. The buildings surrounding the subject development are predominately low-to-mid-rise residential buildings, with a few high-rise buildings to the west, north and south.

A survey of the land topography indicates a gradual slope towards the west, however, there are no major elevation changes in the area immediately surrounding the site.

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 two 2-storey residential buildings. The proposed development is 30 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 trafficable area.
- Podium Recreation.
- Private balconies.
- Rooftop Terraces

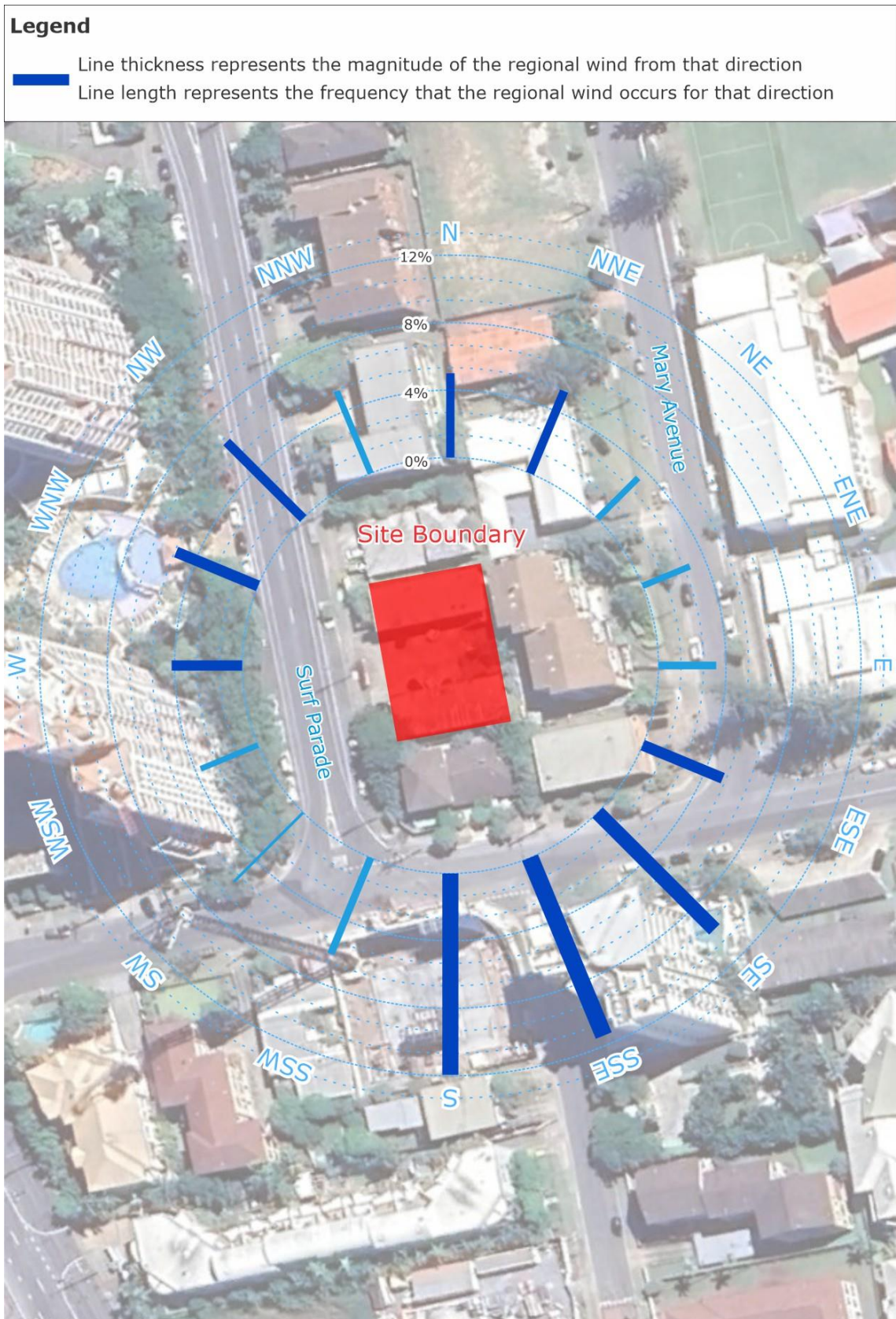


Figure 1: Aerial Image of the Site Location and Prevailing Wind Directions

3 REGIONAL WIND

The Gold Coast region is governed by three principal wind directions that can potentially affect the subject development. These winds prevail from the north-to-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 Gold Coast Seaway 945800 (recorded from 1993 to 2015). 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.

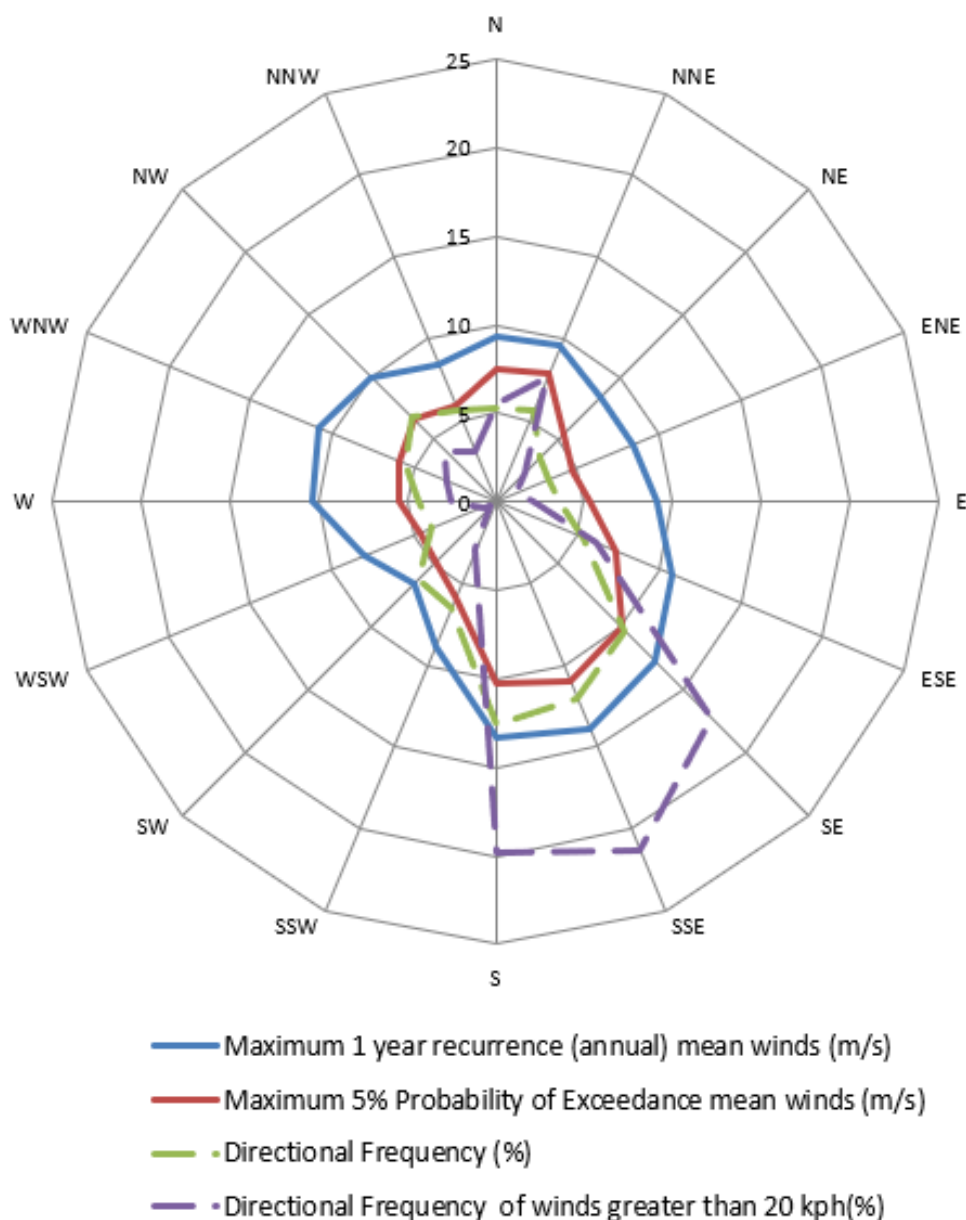


Figure 2: Directional Annual and 5% Exceedance Hourly Mean Wind Speeds (referenced to 10m height in standard open terrain), and Frequencies of Occurrence, for the Gold Coast Region

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.

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 footpath along Surf Parade is primarily exposed to the southerly and westerly prevailing winds. Due to the setback of the tower form, and proposed planting within and around the site, it is expected that the wind conditions will remain suitable and/or equivalent to the existing conditions. It is recommended to retain the proposed planting along the Surf Parade frontage in the final design, ensuring they are able to grow to a height and width of 3-5m and are of a densely foliating evergreen variety.

5.2 Podium Recreation

The Podium Recreation area is located on level 4 and is exposed to the northerly, southerly, and westerly prevailing winds. The setback of the tower form is expected to help mitigate the impact of down washing winds. Additionally, the proposed landscaping is expected to further improve the wind conditions of the area. It is recommended to retain the proposed planting in the final design, ensuring that they are of a densely foliating and evergreen variety. To further improve the wind comfort of the area, it is recommended to increase the height of the impermeable balustrades to a minimum of 1.5m around the podium perimeter.



5.3 Private Balconies

The private balconies of the development are expected to experience corner acceleration due to their exposure on multiple aspects. To mitigate the adverse wind conditions, it is recommended to increase the height of the impermeable balustrades to a minimum of 1.5m or include a full-height end screen/wind blades along one of the balcony aspects.

5.4 Rooftop Terraces

The rooftop terraces are exposed to the northerly and southerly prevailing winds. The south-easterly winds are expected to cause corner acceleration at the north terrace, while north-easterly winds can have a similar effect at the south terrace of the development. To mitigate the impact of the potentially adverse wind effects, it is recommended to increase the height of the impermeable balustrades to a minimum of 1.5m and to retain the proposed landscaping, ensuring they are of a densely foliating and evergreen variety.

Treatments Legend

-  Retention of proposed planting, ensuring they are of a densely foliating and evergreen variety.
-  Increase the height of the impermeable balustrades to 1.5m.

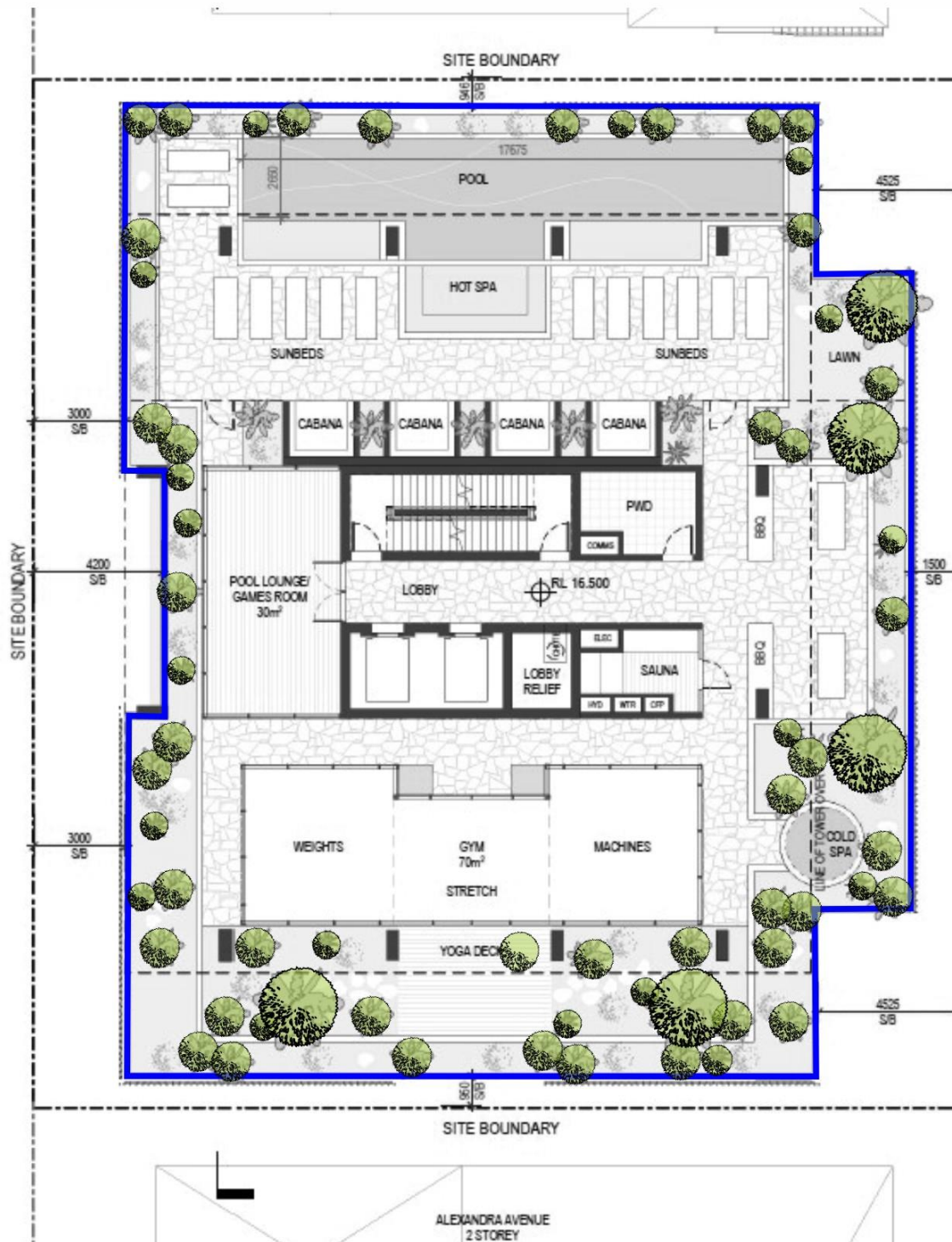


Figure 3: Recommended Treatment for the Podium Recreation Area

Treatments Legend

— Increase the height of the impermeable balustrade to 1.5m.

OR

— Addition of a full-height end screen/wind blades along one aspect.



Figure 4: Recommended Treatment for the Private Balconies

Treatments Legend

- Increase the height of the impermeable balustrade to 1.5m.
- Retention of proposed planting, ensuring they are of a densely foliating and evergreen variety.



Figure 5: Recommended Treatment for the Roof Terraces

Davenport, A.G., 1972, "An approach to human comfort criteria for environmental conditions". Colloquium on Building Climatology, Stockholm.

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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.

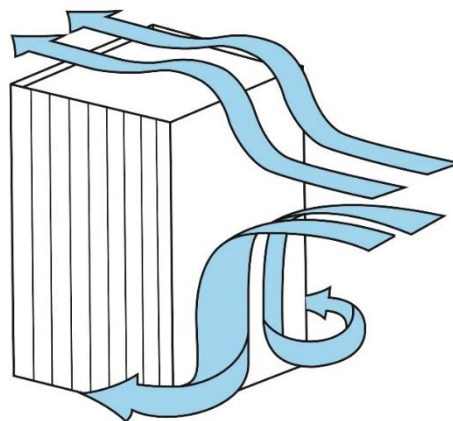


Figure A.1: Downwash Leading to Corner Wind Effect, and Upwash Effects

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.

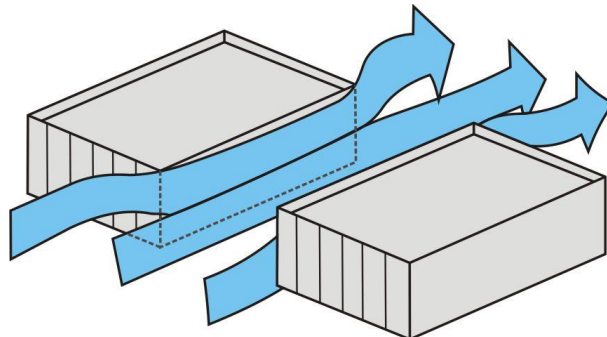


Figure A.2: Funnelling/Venturi Wind Effect

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.

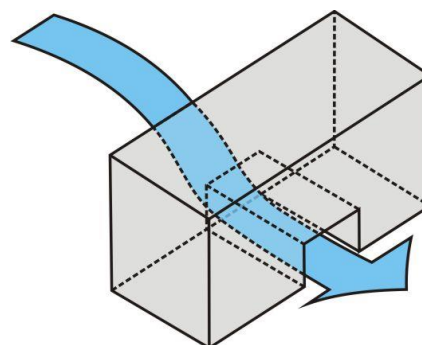


Figure A.3: Gap Wind Effect

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.

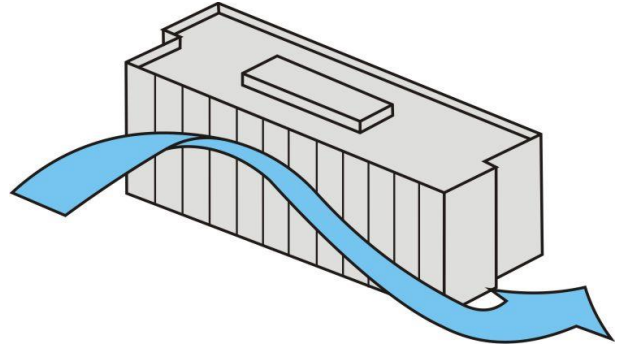


Figure A.4: Sidestream and Corner Wind Effect

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.