# 849-859 Pacific Highway Chatswood

## Quantitative Wind Microclimate Assessment via CFD

### BB Wilson Property Pty Ltd

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Making Sustainability Happen

## Revision Record

| Revision | Date | Prepared By | Checked By | Authorised By |
|---|---|---|---|---|
| R02-v2.0 | 5 March 2025 | Dr Neihad Al-Khalidy | Dr Peter Georgiou | Dr Neihad Al-Khalidy |
| R02-v1.1 | 10 December 2024 | Dr Neihad Al-Khalidy | Dr Peter Georgiou | Dr Neihad Al-Khalidy |
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# Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with BB Wilson Property Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

# Executive Summary

SLR Consulting has been commissioned by BB Wilson Property Pty Ltd to undertake a quantitative wind assessment of a proposed development at 849-859 Pacific Highway, Chatswood.

The wind environment in the breezeway corridors, open at both ends from Levels 28 to 35, has been given particular attention. For the lower levels, the wind environment was previously addressed in the SLR report (610.031413.0002-R01-v1.0), dated December 10, 2024.

This assessment has been performed using Computational Fluid Dynamics (CFD) analysis whereby wind predictions were made to investigate wind conditions at the open corridors within the site.

## Wind Accessibility Criteria

The criteria used in the evaluation of the user level winds at the open corridors are based on the so-called "Lawson" criteria which couple the probability of exceeding winds at given statistical levels with wind speed magnitudes and associated impacts originally related to the Beaufort Wind Speed Land Scale.

## Future Development Environment – Base Case Scenario

The following conclusions can be reached from an analysis of the CFD results:

**Safety Criteria Levels**

- NO areas will experience winds which may pose an actual hazard to the users regardless of the activity; and
- ALL assessed locations remain at the "S2" level (suitable for all-weather use).

**Comfort Criteria Levels**

- All areas are suitable for standing; and
- The conditions at all locations are C3 to C5 mainly due to the dense landscaping assumption and proposed louvres.

## Wind Mitigation Treatments

To address the potential for high-level winds near the ceilings of the open breezeway corridors, the following measures are recommended to mitigate wind speeds:

- Retain dense landscape planting with a porosity no more than 20% at the corridor end planter boxes (refer **Figure 12**),
- Installation of an operable louvre to cover the space above the top of the landscaped area. Refer **Figure 12**
- Installation of a full-height fixed louvre at the opposing end.

## Residual Effects

The already planned landscaping plus implemented mitigation concepts discussed above are expected to reduce wind speeds at relevant locations to levels suited for their intended usage.

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# Acronyms and Abbreviations

| | |
|---|---|
| CFD | Computational Fluid Dynamics |
| GEM | Gust Equivalent Mean |
| LDDC | London Docklands Development Commission |
| m | metre |
| m/s | metre/sec |
| SLR | SLR Consulting Australia Pty Ltd |

# 1.0 Introduction

SLR Consulting has been commissioned by BB Wilson Property Pty Ltd to undertake a quantitative wind assessment of a proposed development at 849-859 Pacific Highway, Chatswood.

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This assessment has been performed using Computational Fluid Dynamics (CFD) analysis whereby wind predictions were made to investigate wind conditions at the open corridors within the site.

## 1.1 Location and Context of the Development Site

The planned residential development consists of two towers, each standing at 36 storeys. It is situated between Pacific Highway to the west, Wilson Street to the north/northeast, North Shore Rail Line to the east, and O'Brien Street to the south. To the south of the site, there are other high-rise towers, and in the further northwestern direction from this development lies Blue Gum Creek - refer **Figure 1**.

**Figure 1 Aerial View of Development Site**


*Image: Courtesy Nearmap, October 2023*

## 1.2 Description of the Proposed Development

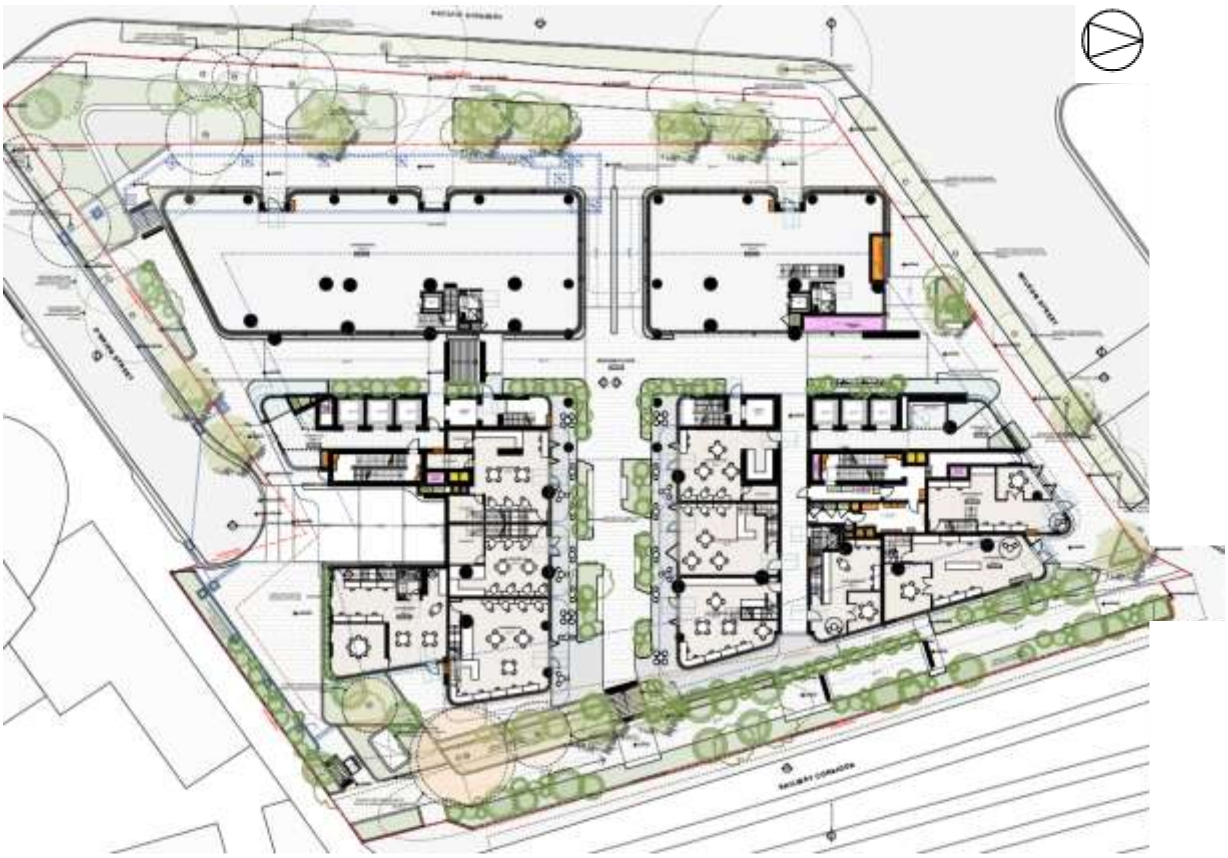
From the plans provided, the proposed development comprises the following features:

- 6 Levels of basement car parking;
- Ground Level with show rooms, retail units;
- Level 1 with residential apartments and outdoor communal space;
- Level 2 with childcare, pool and communal open spaces;
- Levels 3 and 4 with commercial/residential "Live/Work" units and outdoor communal area;
- Level 5 to Level 35 with residential apartments and terraces; and
- Roof with solar panels and open private terraces.

Representative floor plans are shown in Error! Reference source not found..

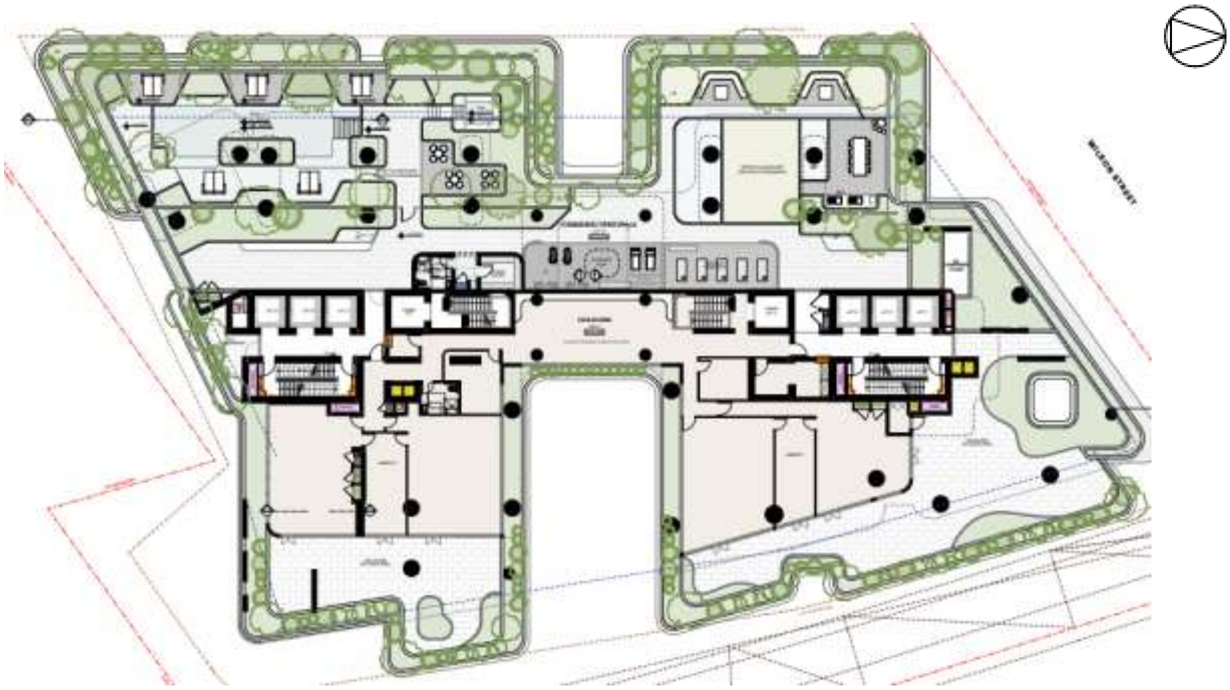
**Figure 2 Architectural Views of the Proposed Development**

Ground Level

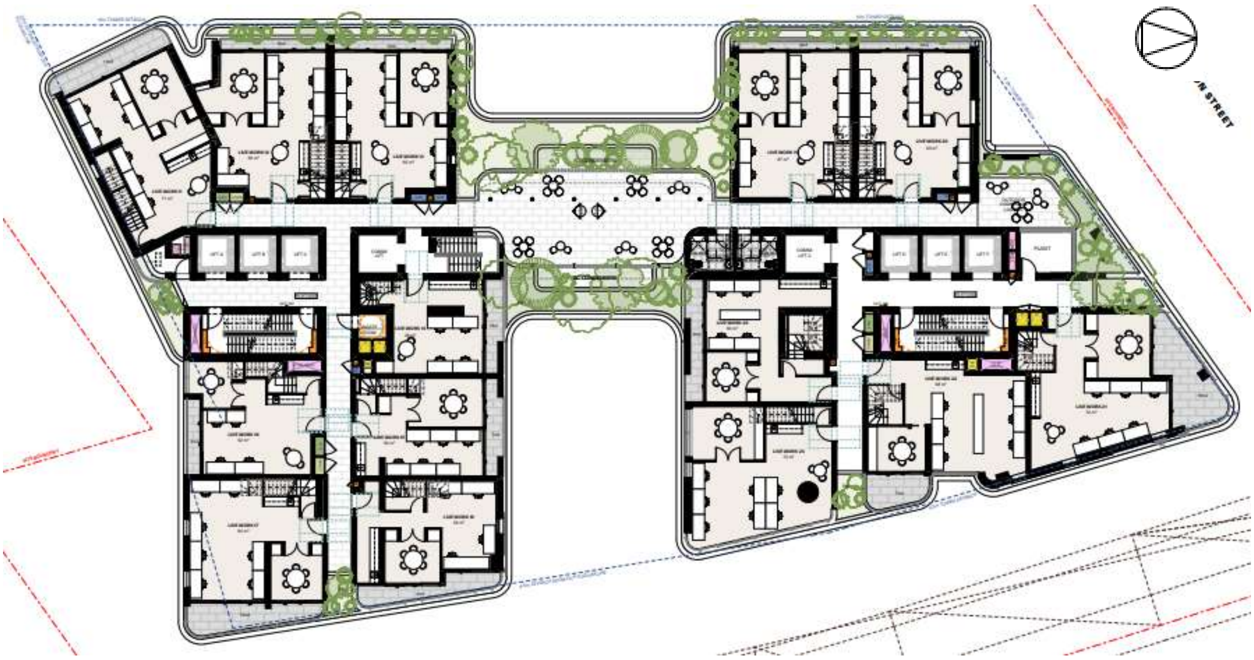


**(Fig. 2 cont'd)**

**Level 2**



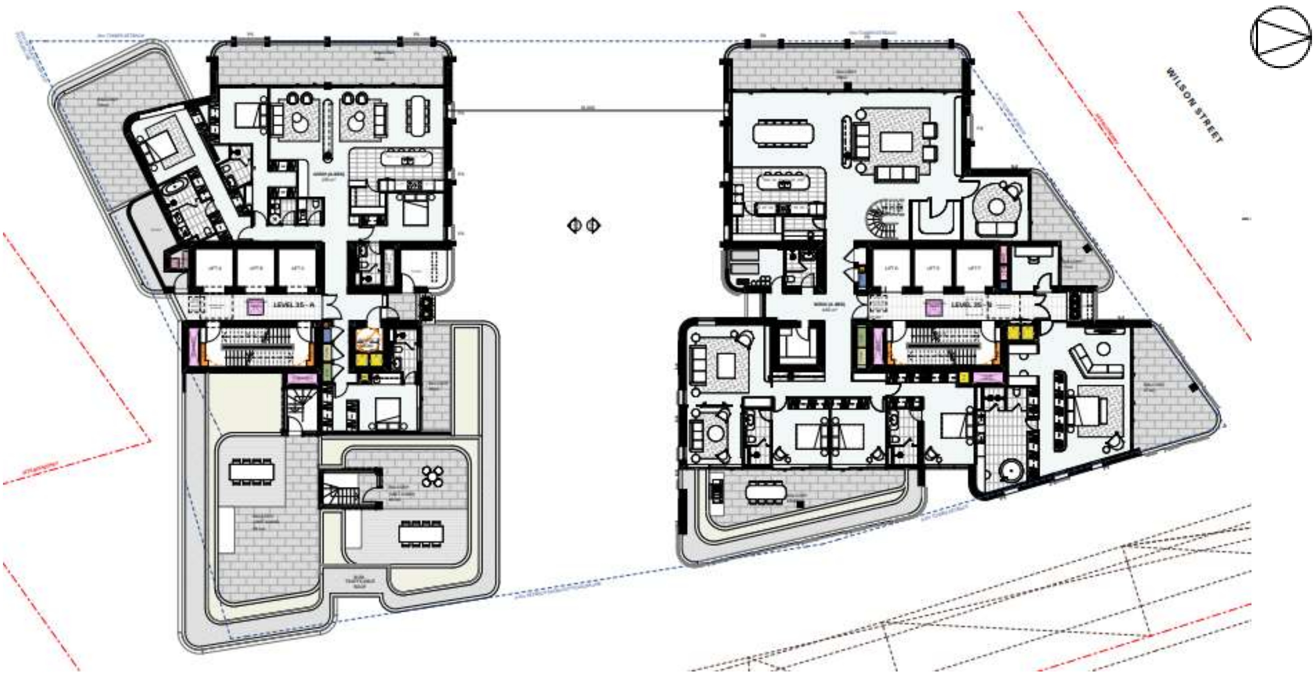
**Level 3**



**(Fig. 2 cont'd)**

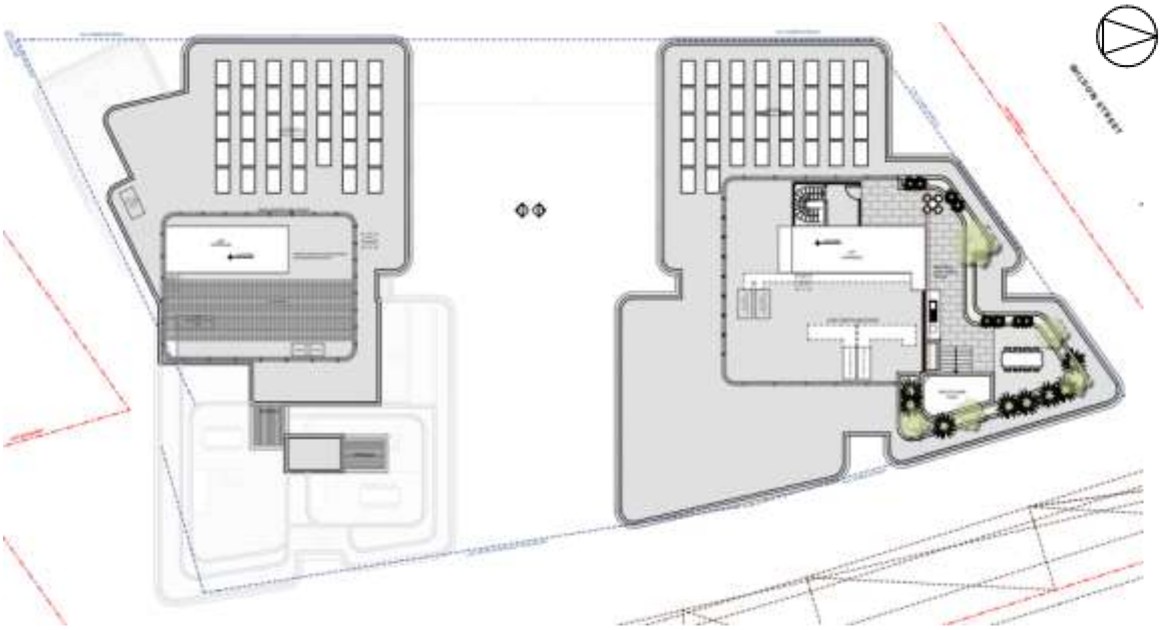
**Level 4**

**Level 35**



**(Fig. 2 cont'd)**

Roof



## 1.3 Surrounds

In terms of the surrounding buildings (refer **Figure 3**):

- The North Shore Rail Line is located immediately to the east of the site.
- Several high-rise residential buildings are situated to the south and southeast of the site.
- Low-rise developments are present to the west and north of the proposed development.
- Densely forested areas are found to the northwest within Blue Gum Park.
- The terrain on the western side of the site undergoes significant elevation changes, impacting the nearby westerly wind patterns and speeds.

## Figure 3 Surrounding Built Environment

*Image: Courtesy Nearmap, July 2023*

# 2.0 Sydney's Wind Climate

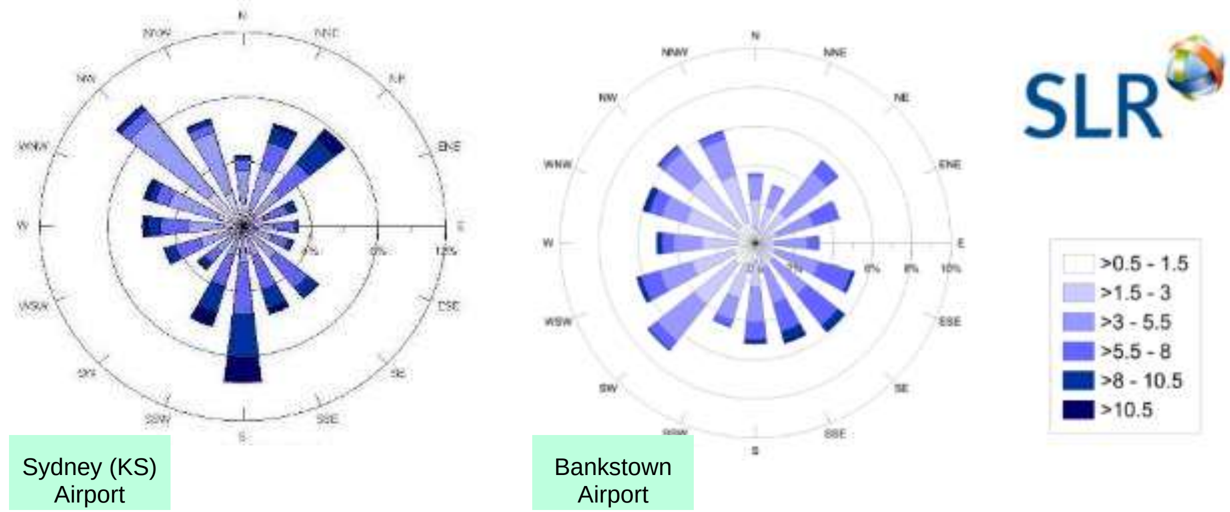
The data of interest in this study are the mean hourly wind speeds and largest gusts experienced throughout the year (especially higher, less frequent winds), how these winds vary with azimuth, and the seasonal break-up of winds into the primary Sydney Region wind seasons.

## 2.1 Annual and Seasonal Variations

Key characteristics of Sydney's Regional Wind Climate are illustrated in two representative wind roses shown in **Figure 4**, taken from Bureau of Meteorology (BoM) data recorded during the period 1999-2017 at Sydney (Kingsford Smith) Airport and Bankstown Airport. A review of the associated seasonal wind roses shows that Sydney is affected by two primary wind seasons with relatively short (1-2 month) transition periods in between:

- Summer winds occur mainly from the northeast, southeast and south. While northeast winds are the more common prevailing wind direction (occurring typically as offshore land-sea breezes), southeast and southerly winds generally provide the strongest gusts during summer. Both northeast winds (as sea breezes) and stronger southerly winds associated with "Southerly Busters" and "East Coast Lows" typically have a significantly greater impact along the coastline. Inland, these systems lose strength and have altered wind direction characteristics.
- Winter/Early Spring winds occur mainly from west quadrants and to a lesser extent from the south. West quadrant winds provide the strongest winds during winter and in fact for the whole year, particularly at locations away from the coast.

**Figure 4 Annual Wind Roses for Sydney (KS) Airport and Bankstown Airport**



## 2.2 Wind Exposure at the Site – the "Local"' Wind Environment

Close to the ground, the "regional" wind patterns described above are affected by the local terrain, topography and built environment, all of which influence the "local" wind environment.

### "Medium-Field" ( areas within a few kms of the site )

- As noted in Section 1.3, the current surroundings of the site consist of low to medium-rise buildings, ranging in height up to 4 storeys, positioned in a clockwise direction from the west to the southeast.
- To the south are numerous high-rise towers.
- The site will therefore receive only modest wind shielding from north, west and east quadrants with increased sheltering (especially at lower levels) from other directions.
- As a result, winds reaching the development site from most oncoming wind directions will receive modest to moderate sheltering from the surrounds close to the ground. Upper level winds will receive less shielding.

### "Near-Field" ( areas immediately surrounding the site )

- The influence of any significant height buildings immediately surrounding the site is accommodated "directly" by incorporating these buildings in the 3D CFD Simulation Domain discussed in Section 4 of this report.

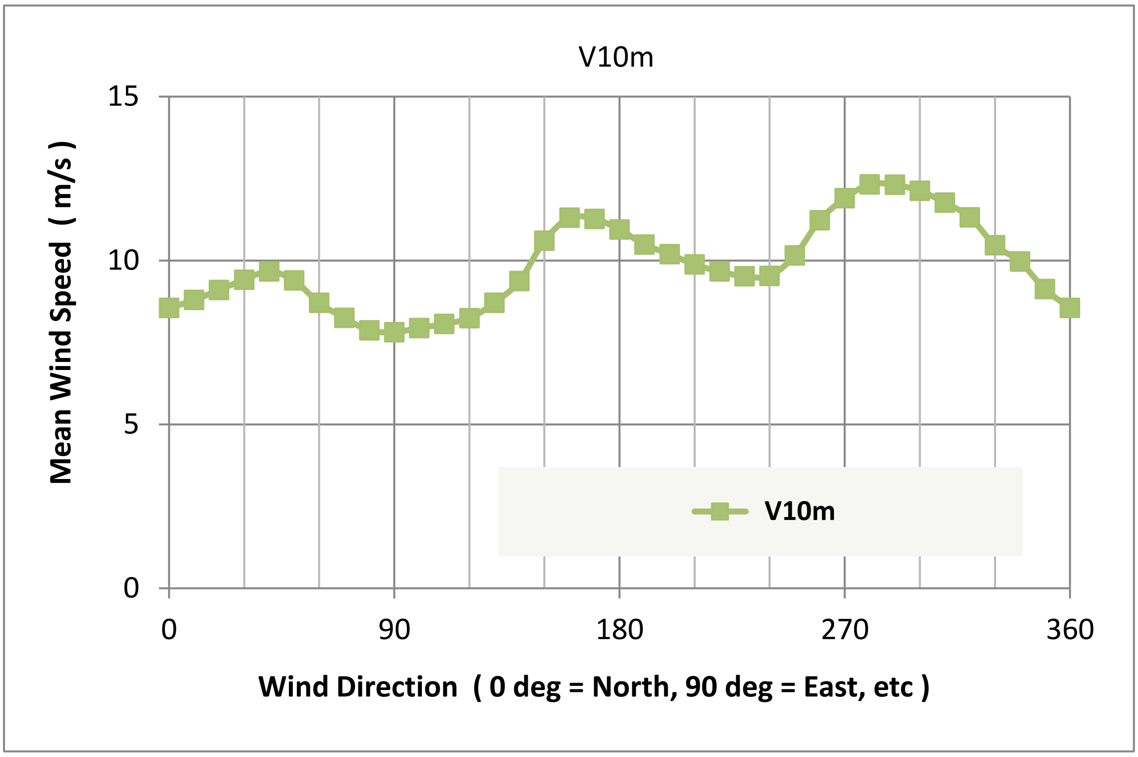
## 2.3 Design Wind Speeds

In the CFD Analysis, the local Project Site wind speed is used to normalise all predicted local wind speeds. As noted in Section 4, this is predicted at a height of 10 m above ground level.

SLR has previously determined the upper-level winds for the project site in the wind tunnel at an equivalent (full-scale) height of 200 m above ground level (500 mm in the wind tunnel). Accordingly, conversion from wind tunnel speeds to full-scale speeds requires the determination of reference height design mean wind speeds for the site.

These are calculated and shown in **Figure 5** and have been based on the adopted Chatswood wind model as described above. The winds shown have a once-per-year exceedance probability.

**Figure 5 Reference Height (10 m) Annual Recurrence Mean Wind Speed at Project Site**




Stronger winds occurring on a once-per-year basis occur from the south and the west with a maximum from the west.

# 3.0 Criteria for Comfort and Safety

The criteria used in the evaluation of pedestrian level winds surrounding the proposed development are based on the so-called “Lawson” criteria which couple the probability of exceeding winds at given statistical levels with wind speed magnitudes and associated impacts originally related to the Beaufort Wind Speed Land Scale – refer **Table 1**.

**Table 1 Beaufort Wind Speed – LAND Scale**

| Beaufort Force | Hourly Average Wind Speed (m/s) | Description of Wind | Noticeable Wind Effect |
|---|---|---|---|
| 0 | < 0.45 | Calm | Smoke rises vertically |
| 1 | 0.45 to 1.55 | Light air | Direction shown by smoke drift but not by wind vanes |
| 2 | 1.55 to 3.35 | Light breeze | Wind felt on face; leaves rustle; wind vanes begin to move |
| 3 | 3.35 to 5.0 | Gentle breeze | Leaves, small twigs in constant motion; Light flags extended |
| 4 | 5.6 to 8.25 | Moderate breeze | Raises dust and loose paper; small branches move |
| 5 | 8.25 to 10.95 | Fresh breeze | Small trees, in leaf, sway |
| 6 | 10.95 to 14.10 | Strong breeze | Large branches begin to move; telephone wires whistle<br>Umbrellas used with difficulty |
| 7 | 14.1 to 17.2 | Moderate Gale | Whole trees in motion<br>Inconvenience felt when walking against the wind. |
| 8 | 17.2 to 20.8 | Gale | Twigs break off trees; personal progress impeded |
| 9 | 20.8 to 24.35 | Strong/Severe Gale | Slight structural damage (chimney pots, slates removed) |
| 10 | 24.35 to 28.4 | Storm | Trees uprooted; considerable structural damage |
| 11 | 28.4 to 32.4 | Violent Storm | Widespread damage – unusual event (in the UK) |
| 12 | > 32.4 | Hurricane | Devastation – only occurs in the tropics |

The Lawson criteria used in this report make use of the same wind speed ranges to address issues of interest in terms of both pedestrian/building users’ comfort and safety.

These criteria, or rather guidelines, have been previously adopted by the London Docklands Development Commission (LDDC) and used for example on numerous building developments, eg within the Canary Wharf precinct. Indeed, they have been widely used for many years for ground level wind assessments surrounding high-rise building developments right across Australia and globally.

There are two distinct sets of wind criteria:

- "Comfort" criteria relate a range of typical pedestrian activities such as purpose-walking, strolling, sitting, etc, to the local "GEM" wind speed which is exceeded 5% of the time, on an annual return period basis – refer **Table 2**; and
- "Safety" criteria cover instances when pedestrians might encounter difficulty in walking. They are defined by the incidence of "GEM" wind speeds occurring once or twice per year (probability exceedance level of 0.02%), ie during the most intense windstorm of the year – refer **Table 3.**

**Table 2 Lawson Wind Acceptability Criteria – COMFORT Guidelines**

| Comfort Level | Beaufort Equivalent | "GEM" Wind Speed 5% Annual Exceedance | Description (see also Notes ) |
|---|---|---|---|
| C5 | 1 | 2.5 m/sec | Dining |
| C4 | 2 | 4 m/sec | Sitting |
| C3 | 3 | 6 m/sec | Standing |
| C2 | 4 | 8 m/sec | Leisure Walking (Strolling ) |
| C1 | 5 | 10 m/sec | Business (Purpose ) Walking |
| CX | > 5 | > 10 m/sec | Exceeds Comfort Criteria |
| Notes: C4 is suitable for promenades, popular recreation areas with seating, reading newspapers, etc.<br>C3 is suitable for locations where pedestrians will likely be waiting for relatively short periods, eg at building entrances, at pedestrian crossings, bus stops, etc.<br>C2 is suitable for activities such as window-shopping.<br>C1 is suitable for footpaths used for purposeful pedestrian traffic only (eg not where shops might induce slower activities like window-shopping).<br>CX suggest winds whose force can be felt by the body (branches on trees would be visibly swaying) and where walking will start to become inconvenient or challenging for certain classes of pedestrians, eg the frail, pedestrians holding parcels, parents holding children, etc. | | | |

The comfort criteria shown in **Table 2** should not be taken as "hard" numbers for the specific activity in the sense of being unsuitable all the time. The probabilistic way in which the criteria are defined indicates that the relevant activity may be unsuitable at a particular location for about 5% of the time (say around 18 days per year). For the rest of the time, the relevant activity may be suitable (given that winds will be lower than the prescribed acceptability level).

**Table 3 Lawson Wind Acceptability Criteria – SAFETY Guidelines**

| Safety Level | Beaufort Equivalent | "GEM" Wind Speed 0.2% Annual Exceedance | Description ( see also Notes ) |
|---|---|---|---|
| S2 | 6 | 15 m/sec | Non-Sensitive Usage |

| Safety Level | Beaufort Equivalent | "GEM" Wind Speed 0.2% Annual Exceedance | Description ( see also Notes ) |
|---|---|---|---|
| S1 | 7 | 20 m/sec | All-Weather / Sensitive Usage |
| SX | > 7 | > 20 m/sec | Exceeds Safety Criteria |
| Notes: S2 should be used to assess areas in constant usage, eg building entry points.<br>S1 may be suitable for less frequently trafficked areas or areas which can be closed off in high wind conditions<br>SX suggest conditions where winds pose an actual hazard to pedestrians regardless of the activity | | | |

The safety criteria shown in **Table 3** reflect the potential for stronger winds to cause a loss of balance and even possible wind knock-down, especially for frail pedestrians.  The criteria are accordingly significantly more stringent.

## 3.1 Significance Criteria

The significance criteria used by SLR in the assessment of wind effects at assessed locations are based on comparing the CFD predicted conditions at any particular location with the target usage at the same location (eg sitting, strolling, leisure walking, etc) as defined by the Lawson Comfort Criteria.

- The proposed development is deemed to have a "Beneficial" impact at a particular location if wind conditions are calmer than the levels associated with the target usage at that location;
- The proposed development is deemed to have an "Unfavourable" impact at a particular location if wind conditions are higher than the levels associated with the target usage at that location; and
- When wind conditions at a particular location, with the addition of the proposed development, are close to the levels associated with the target usage at that location, the impact is termed "Negligible".

The chosen significance criteria are shown in **Table 4**.

All "Unfavourable" impacts (whether minor, moderate or major) are considered to be "significant", requiring mitigation in order for local conditions to become suitable for the intended use of the area.

### Table 4 Significance Criteria Related to Lawson Acceptability Criteria

| Impact | Expected Wind Microclimate |
|---|---|
| **Beneficial** – Major | Wind Conditions are 3-steps **calmer** than those desired |
| **Beneficial** – Moderate | Wind Conditions are 2-steps **calmer** than those desired |
| **Beneficial** – Minor | Wind Conditions are 1-step **calmer** than those desired |
| **Negligible** | Wind Conditions are similar to those desired |
| **Unfavourable** – Minor | Wind Conditions are 1-step **windier** than those desired |
| **Unfavourable** – Moderate | Wind Conditions are 2-steps **windier** than those desired |
| **Unfavourable** – Major | Wind Conditions are 3-steps **windier** than those desired<br>**OR**<br>Wind Conditions are in the Lawson “CX” or “SX” category |

# 4.0 WIND MODELLING METHODOLOGY

SLR has modelled the proposed development including the upper level open corridors using the 3D solid modelling CAD software “ANSYS Spaceclaim”.

The current model accounts  all proposed landscaping elements at the ends of the corridors.

The surrounding buildings and terrain were simplified to reduce computational time.

The model was then moved to the specialised CFD software FLUENT for computation.

Ambient wind profiles have been created for 8 wind directions.

Wind speed ratios were then determined relative to a 10 m height reference wind which could be related to statistical return periods of interest (eg 5% exceedance, annual peak wind speed) for the site, relevant to the adopted wind acceptability criteria.

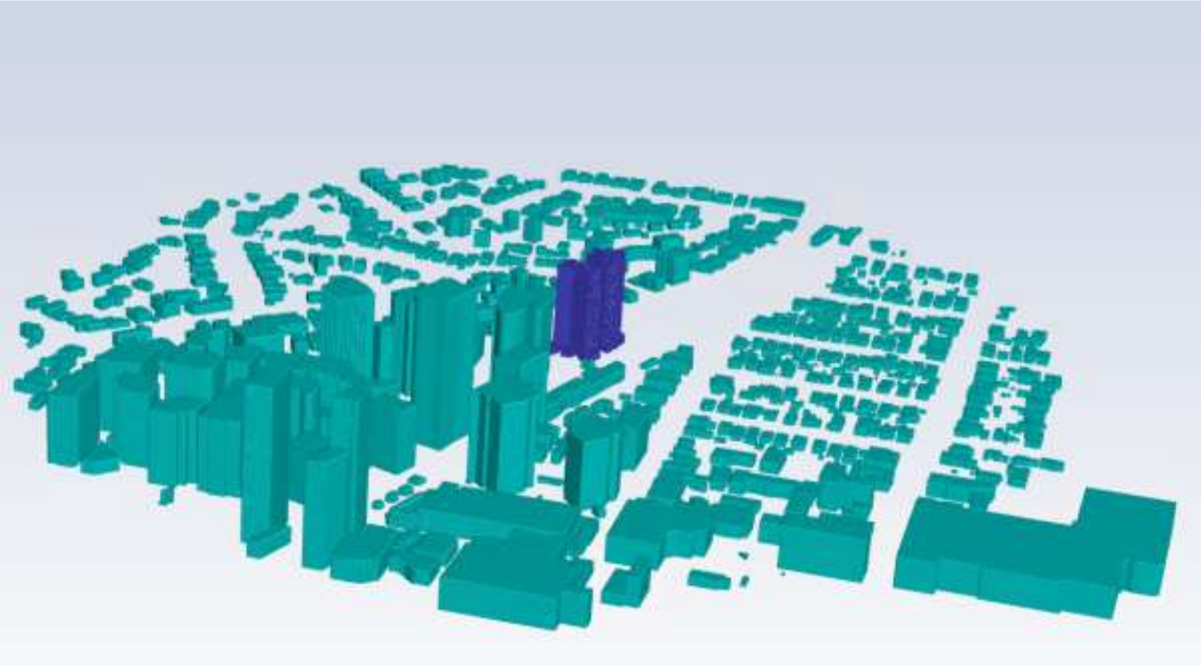
This was then used to assess ground level conditions and other areas of interest for potential adverse winds.

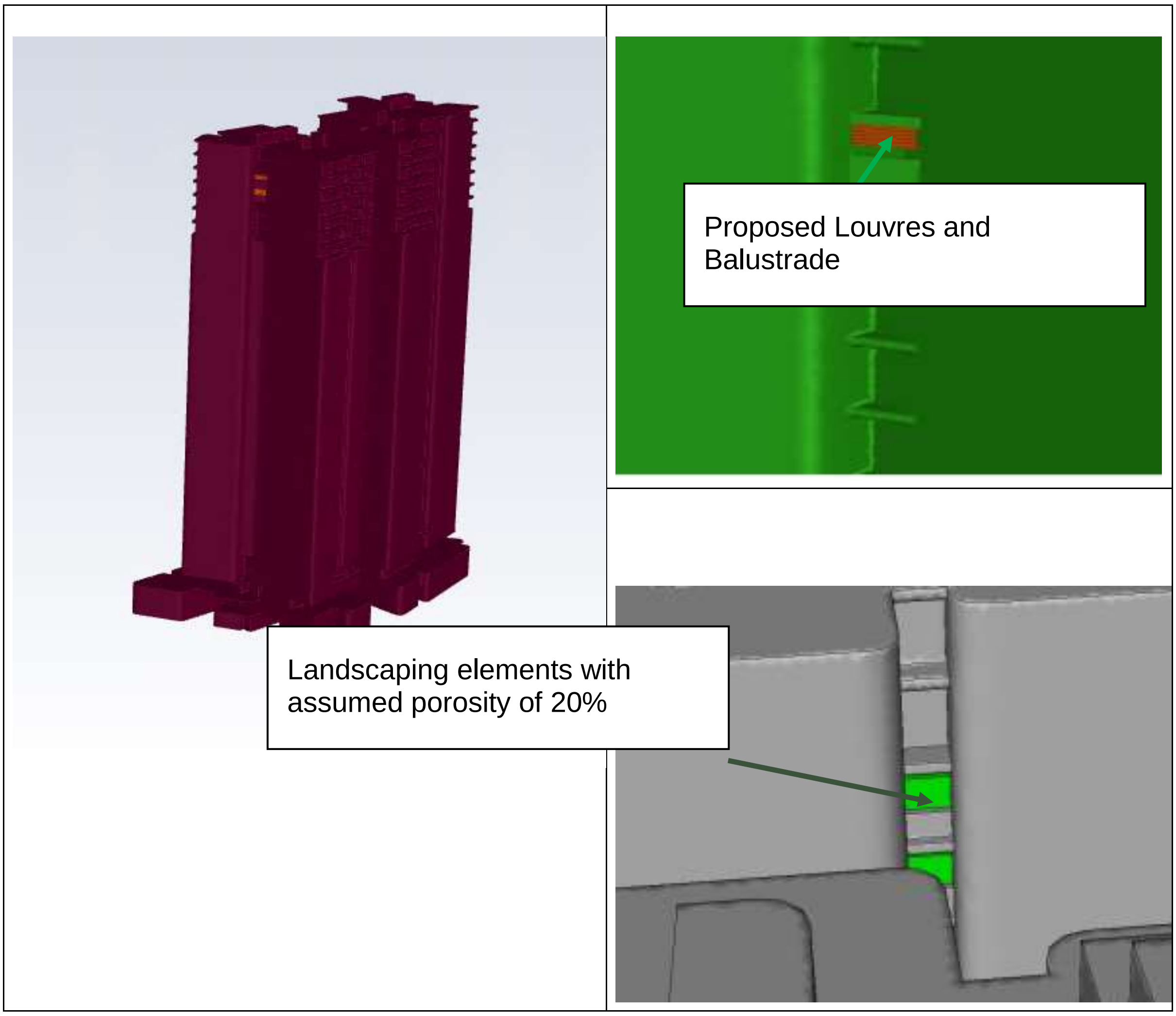
## 4.1 Modelling

To take into account the influence of the immediate surrounding environment, all neighbouring buildings and local topography within a diameter of almost 1,000 m around the site were included in the developed CFD model. The model details are shown in **Figure 6** and **Figure 7.**

**Figure 6 Proposed Development and Surrounds for CFD Model**

**Figure 7 3D Model of Proposed Development**





## 4.2 Boundary Conditions

### 4.2.1 Wind Conditions

The wind speed probability distribution developed for the site was determined as follows:

- A local 10 m height "Reference" wind rose was developed based on a local climate model for the Site.

Modelling was undertaken for eight compass wind directions and open corridors then checked for any exacerbation of the current wind conditions caused by the proposed design scheme.

At the upwind free boundary inlet, velocity profiles were derived from Met Bureau data and the Australian wind code.

At the downwind and upper free boundaries "constant pressure" boundary conditions were applied.

A porose media modelling technique has been used to model the landscape elements for the project.

### 4.2.2 Other Boundary Conditions

The following additional boundary conditions were used:

- Turbulence quantities (kinetic energy and dissipation rate) were calculated from empirical relationships; and
- A wall function data group was used to avoid using a very fine mesh near the wall and improve turbulent flow simulation.

## 4.3 Discretisation

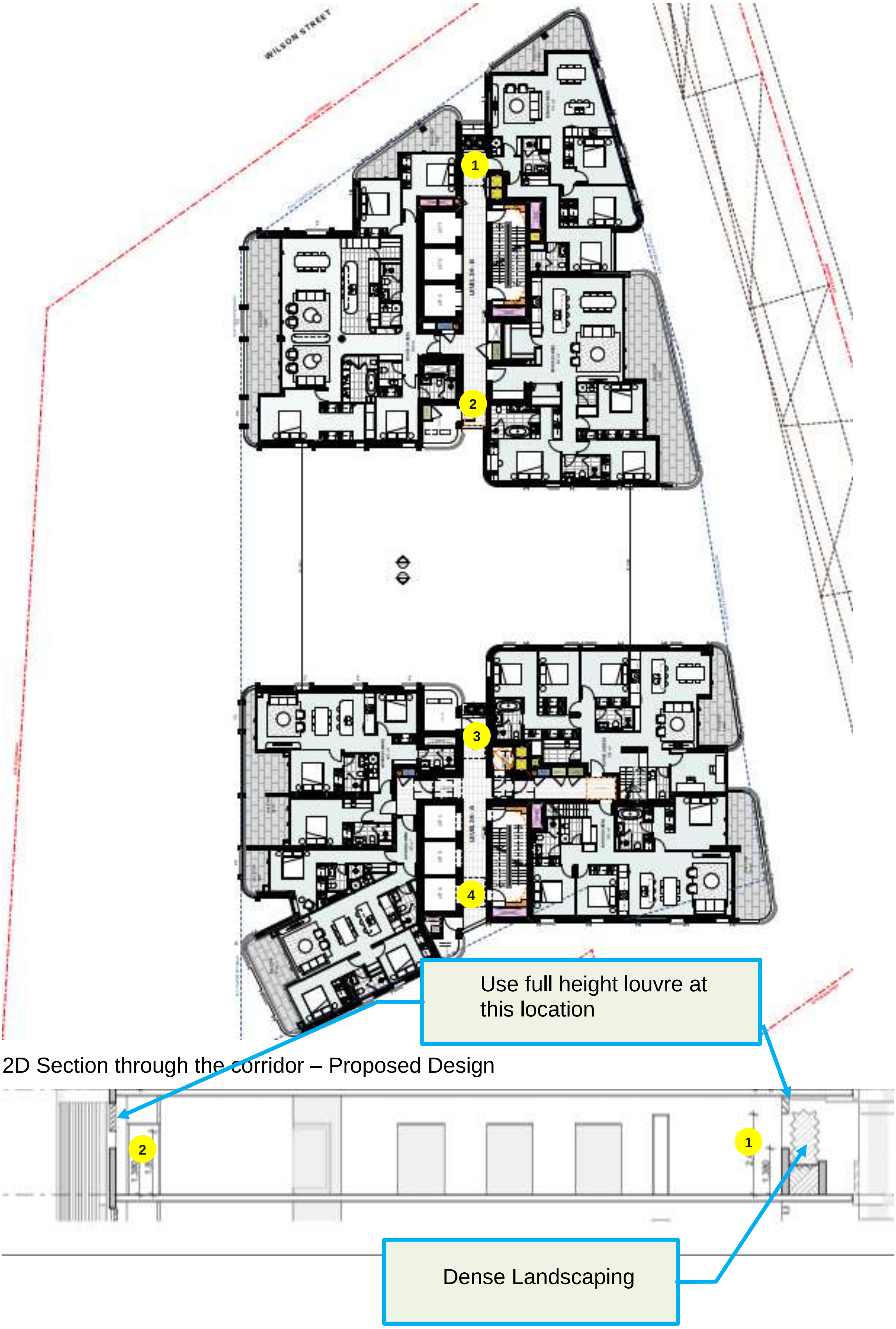
The software package utilised in the current CFD analysis is the commercially available code ANSYS-FLUENT. The CFD model solves continuity, energy and momentum equations in the computational domain to predict the steady state airflow inside and around the proposed development.

- For all cases in this study, a total number of more than 70,000,000 mixed used cells were used to cover the computational domain. The mesh was then converted to polyhedral elements with 72,119,717 nodes within ANSYS software. Polyhedral cells are especially beneficial for handling recirculating flows and used to provide more accurate results than even hexahedra mesh. For a hexahedral cell, there are three optimal flow directions which lead to the maximum accuracy while for a polyhedron with 12 faces there are six optimal directions which, together with the larger number of neighbours, lead to a more accurate solution with a lower cell count;
- Realizable k-epsilon (rke) turbulence was used for all analysed cases due to ability to capture high gradient, air flow recirculation and computational time advantage;
- A second order numerical scheme was used for discretization of pressure and momentum to obtain more accurate results; and
- An iterative procedure was used to estimate the air velocity in terms of three directions, pressure profile and turbulence parameters.

## 4.4 Areas of interest – Representative Assessment Locations

Representative areas for levels 28-35 of interest are shown in **Figure 8.**

**Figure 8 Areas of Interest – Typical Upper-Level Corridor**



# 5.0 CFD Results and Discussions – Open Corridors Comfort Level

## 5.1 Modelled Wind Directions

Eight wind directions were modelled as part of the study, namely:

| | | | |
|---|---|---|---|
| 0° | North wind | 180° | South wind |
| 45° | Northeast wind | 225° | Southwest wind |
| 90° | East wind | 270° | West wind |
| 135° | Southeast wind | 315° | Northwest wind |

### 5.1.1 Northwesterly Winds

The general flow characteristic is shown in **Figure 9**. Wind speed ratios ($V_{local}/V_{ref\ at\ 10m}$) are shown on a colour coded scale between 0 and 1.36. Dark blue represents still conditions at 0 m/s and red representing the strongest wind speed. The following conclusions can be reached from the above figure:

- The CFD model captures the fluid flow characteristics in significant detail. Wind is approaching the site from the west at 315° as per the given boundary condition. Wind is then accelerated near the edges and stagnated and recirculated behind the buildings.
- There is a modest ground level shielding from the upstream buildings to the northwest. Refer to Figure 10.
- The maximum velocity ratio on the ground level for this direction occurs at the edge of the proposed developed. Ground level trees are not included in the current model as the current study focus on the open corridors.

**Figure 10** shows the wind speed ratios ($V_{local}/V_{ref\ at\ 10m}$) at a typical chest level on a colour-coded scale between 0 and 0.5 for ease on interpretation. The following conclusions can be reached:

- A maximum velocity ratio of 0.75 is predicted at location 1.

**Figure 11** shows the wind speed ratios ($V_{local}/V_{ref\ at\ 10m}$) at a 2D vertical section through the corridor The upper part of the corridor experiences high wind speeds and wind penetrate through the louvres due to pressure differences between the openings.

**Figure 9 Mean Velocities Ratios Coloured by Velocity Vector at a typical Chest Level (1.5m above the Ground Level – General Flow Characteristics**

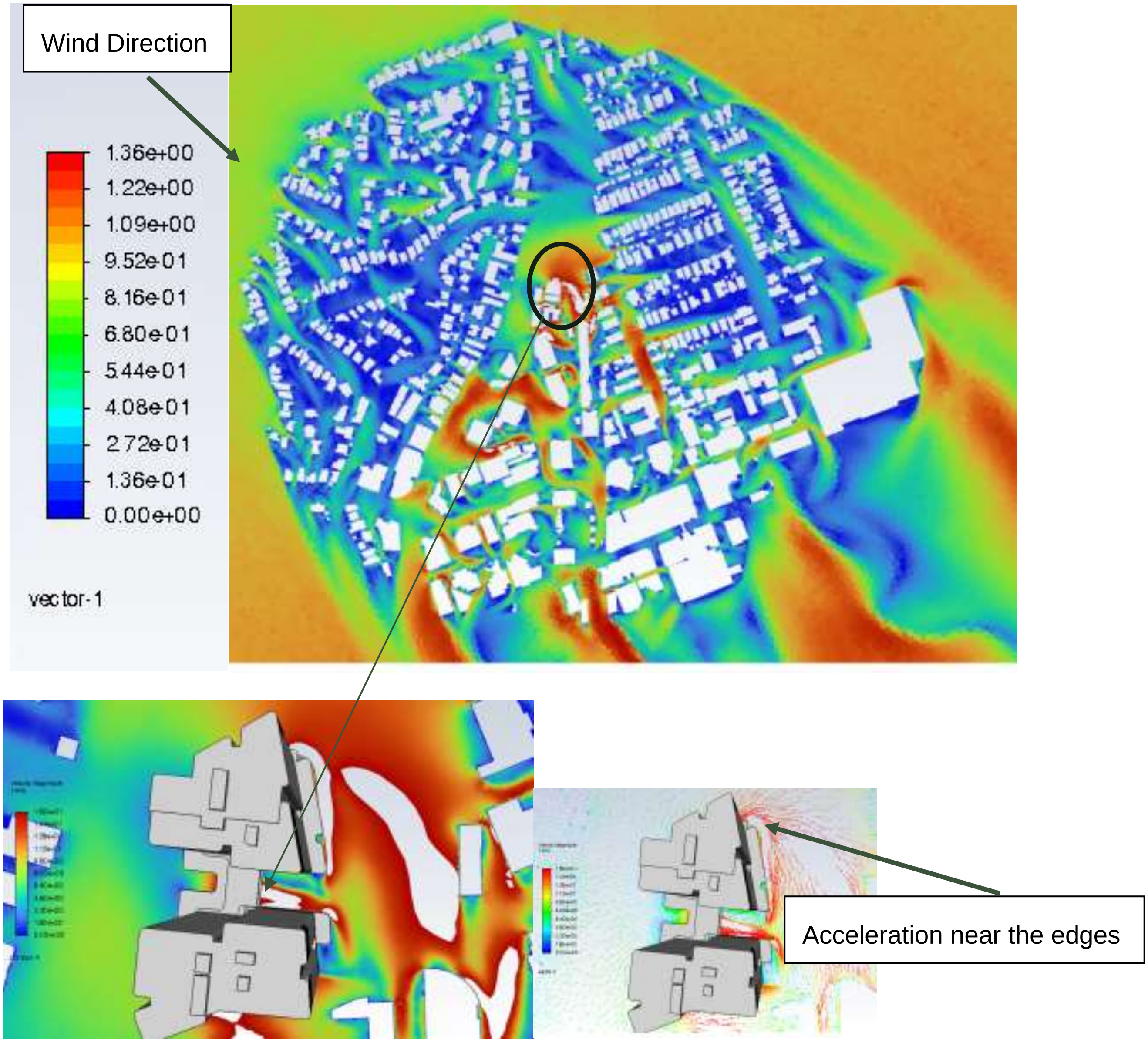


**Figure 10 Mean Velocities Ratios Coloured by Velocity Contours at a typical upper-Level corridor (Level 33)**

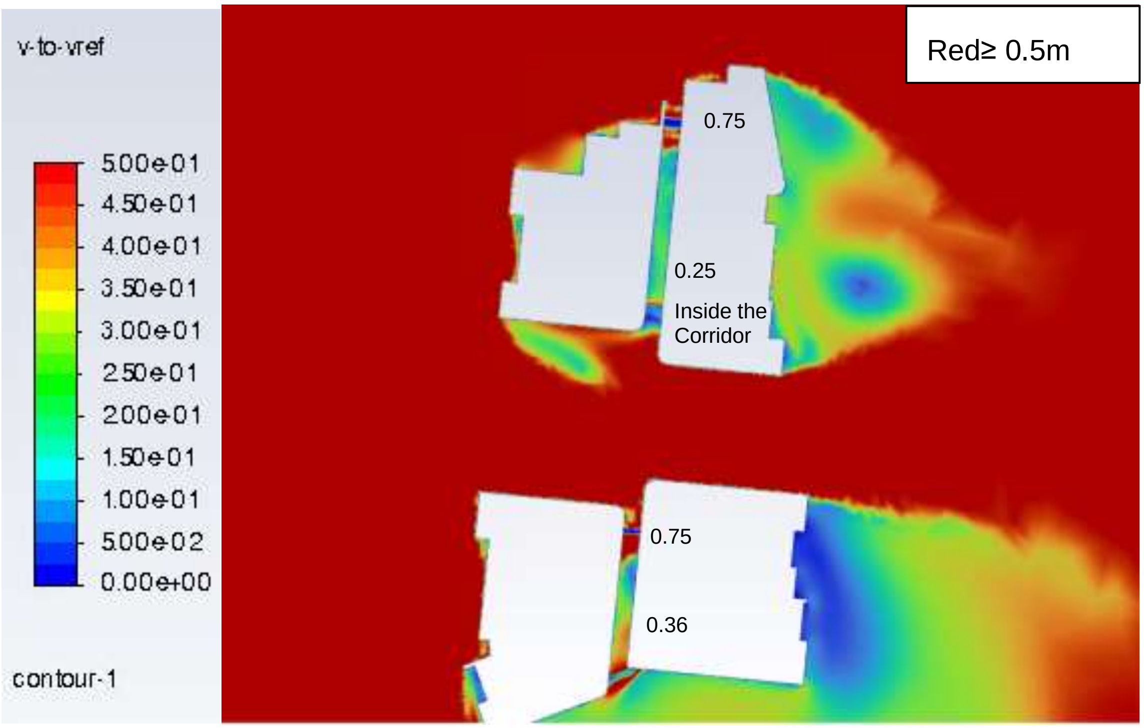
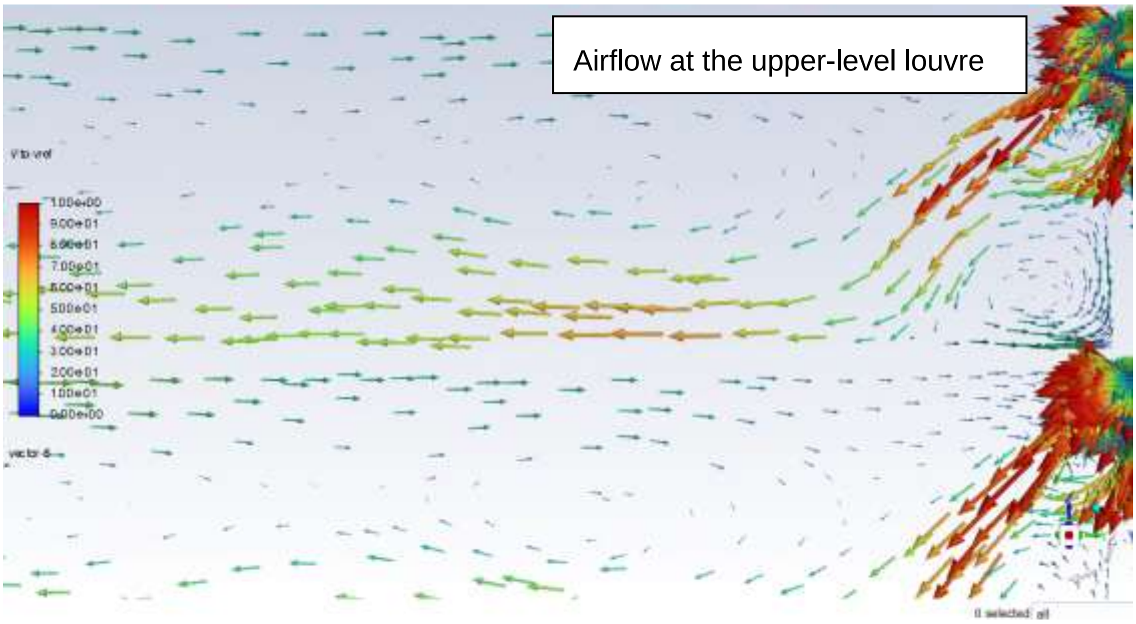



**Figure 11 Mean Velocities Ratios Coloured by Velocity Vector at a typical upper Level corridor**



#### 5.1.2 Other Wind Directions

The CFD velocity vectors for all other wind directions are shown in **Appendix A** and the wind speed ratios at all locations are summarised in **Table 5.**

### 5.2 Summary Results

A summary for all wind directions of the local wind speed at the chosen representative locations, expressed as a ratio of the local speed to the 10 m height reference wind speed, refer to **Table 5**.

**Table 5 Wind Speeds Ratios at the Region of Interest – Level 28 to Level 35**

| Location | 0 | 45 | 90 | 135 | 180 | 225 | 270 | 315 |
|---|---|---|---|---|---|---|---|---|
| **Mean Wind Speed Ratio** | | | | | | | | |
| 1 | 0.65 | 0.08 | 0.05 | 0.22 | 0.10 | 0.14 | 0.15 | 0.75 |
| 2 | 0.25 | 0.08 | 0.06 | 0.13 | 0.10 | 0.14 | 0.30 | 0.25 |
| 3 | 0.12 | 0.12 | 0.25 | 0.30 | 0.13 | 0.14 | 0.15 | 0.75 |
| 4 | 0.10 | 0.13 | 0.06 | 0.50 | 0.20 | 0.42 | 0.07 | 0.36 |
| **Gust Equivalent Mean (GEM) Ratio** | | | | | | | | |
| 1 | 0.72 | 0.09 | 0.06 | 0.25 | 0.12 | 0.16 | 0.17 | 0.82 |
| 2 | 0.29 | 0.09 | 0.07 | 0.15 | 0.12 | 0.16 | 0.34 | 0.29 |
| 3 | 0.14 | 0.14 | 0.29 | 0.34 | 0.15 | 0.16 | 0.17 | 0.82 |
| 4 | 0.12 | 0.15 | 0.07 | 0.56 | 0.23 | 0.47 | 0.08 | 0.41 |

### 5.3 Wind Assessment Results

The CFD results (refer **Section 5.1** and **Section 5.2)** have been combined with the wind probability information from the local wind rose (refer **Section 2**) to develop assessment predictions in terms of Comfort and Safety using the Lawson Criteria (refer **Section 3**).

The results have been computed on a probabilistic basis, enabling calculation of wind events which will occur at the probability levels relevant to the Lawson Criteria, ie 5% and 0.02% exceedance levels on an annual basis, using the local site statistical wind data.

#### 5.3.1 Lawson Safety Criteria Levels

The following conclusions can be reached from an analysis of the CFD results:

- NO areas will experience winds which may pose an actual hazard to pedestrians regardless of the activity; and
- ALL assessed locations remain at the “S2” level (suitable for all-weather use).

#### 5.3.2 Lawson Comfort Criteria Levels

The Comfort Criteria assessment is shown in **Table 6**. The following conclousions can be reached from the analysis:

- All areas are suitable for standing; and

- The conditions at all locations are C4 mainly due to the dense landscaping assumption and proposed louvres.

**Table 6 Assessment of Impacts of the Proposed Development – ANNUAL**

| Location | Predicted Comfort Level | Target Comfort Level | Impact |
|---|---|---|---|
| 1 | C3 | Ideal Target for the corridor is "C3" Standing near the entries *(Since C4/C5 has been achieved through CFD analysis at various locations, it represents an improvement over the minimum ideal target of C3)* | Negligible |
| 2 | C5 | | Beneficial – Moderate |
| 3 | C4 | | Beneficial – Minor |
| 4 | C4 | | Beneficial – Minor |
| | | | |
| | | | |

## 5.4 Significance of the Proposed Development Wind Impact

The wind CFD model predicted Lawson Comfort and Safety levels are compared to the target levels for the areas of interest in **Table 6**.

The results at all locations range from 'Negligible' to 'Beneficial – Moderate'.

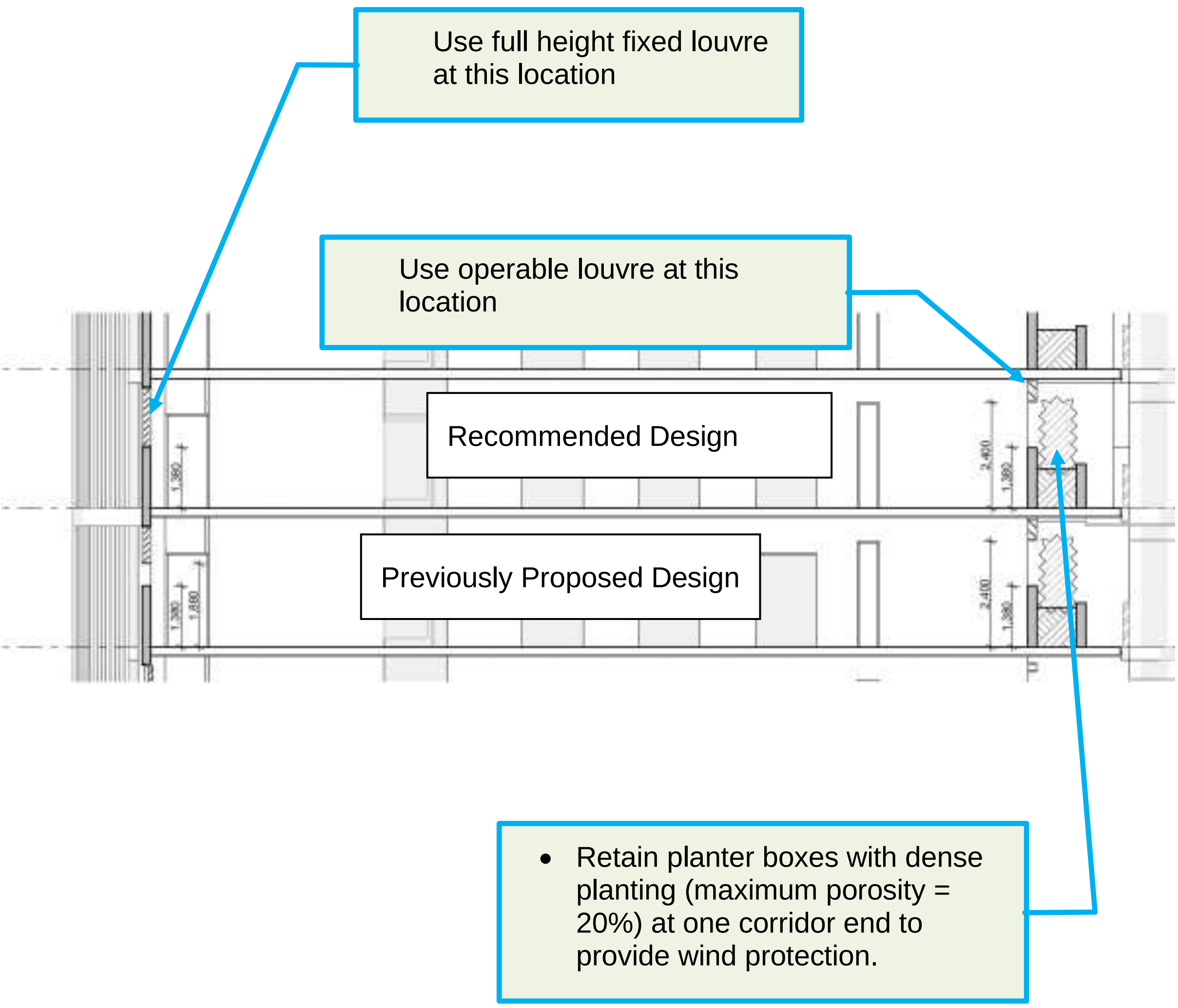
# 6.0 Mitigation Treatment and Recommendations

Based on the "previously proposed design" the wind comfort criteria is satisfied. The adopted "Comfort" criteria relate a range of typical pedestrian activities such as purpose-walking, strolling, sitting, etc, to the local "GEM" wind speed, which is exceeded 5% of the time, on an annual return period basis – refer **Table 2**

Considering the potential for elevated wind activity near the ceiling of the open breezeway corridors, it is advisable to adopt a combination of the following measures to effectively and comfortably reduce high wind speeds:

- Retain dense landscape planting with a porosity no more than 20% at the corridor end planter boxes (refer **Figure 12**),
- Installation of an operable louvre to cover the space above the top of the landscaped area. Refer **Figure 12**
- Installation of a full-height fixed louvre at the opposing end.

**Figure 12 Wind Mitigation Treatments – Open Corridors**



# 7.0 Conclusion

SLR Consulting has been commissioned by BB Wilson Property Pty Ltd to undertake a quantitative wind assessment of a proposed development at 849-859 Pacific Highway, Chatswood.

The wind environment in the breezeway corridors, open at both ends from Levels 28 to 35, has been given particular attention. For the lower levels, the wind environment was previously addressed in the SLR report (610.031413.0002-R01-v1.0), dated December 10, 2024.

This assessment has been performed using Computational Fluid Dynamics (CFD) analysis whereby wind predictions were made to investigate wind conditions at the open corridors within the site.

## Wind Accessibility Criteria

The criteria used in the evaluation of the user level winds at the open corridors are based on the so-called “Lawson” criteria which couple the probability of exceeding winds at given statistical levels with wind speed magnitudes and associated impacts originally related to the Beaufort Wind Speed Land Scale.

## Future Development Environment – Base Case Scenario

The following conclusions can be reached from an analysis of the CFD results:

**Safety Criteria Levels**

- NO areas will experience winds which may pose an actual hazard to the users regardless of the activity; and
- ALL assessed locations remain at the “S2” level (suitable for all-weather use).

**Comfort Criteria Levels**

- All areas are suitable for standing; and
- The conditions at all locations are C3 to C5 mainly due to the dense landscaping assumption and proposed louvres.

## Wind Mitigation Treatments

To address the potential for high-level winds near the ceilings of the open breezeway corridors, the following measures are recommended to mitigate wind speeds:

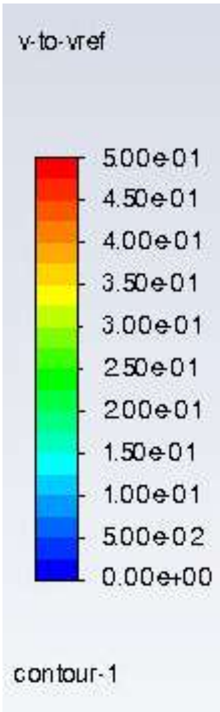
- Retain dense landscape planting with a porosity no more than 20% at the corridor end planter boxes (refer **Figure 12**),
- Installation of an operable louvre to cover the space above the top of the landscaped area. Refer **Figure 12**
- Installation of a full-height fixed louvre at the opposing end.

## Residual Effects

The already planned landscaping plus implemented mitigation concepts discussed above are expected to reduce wind speeds at relevant locations to levels suited for their intended usage.

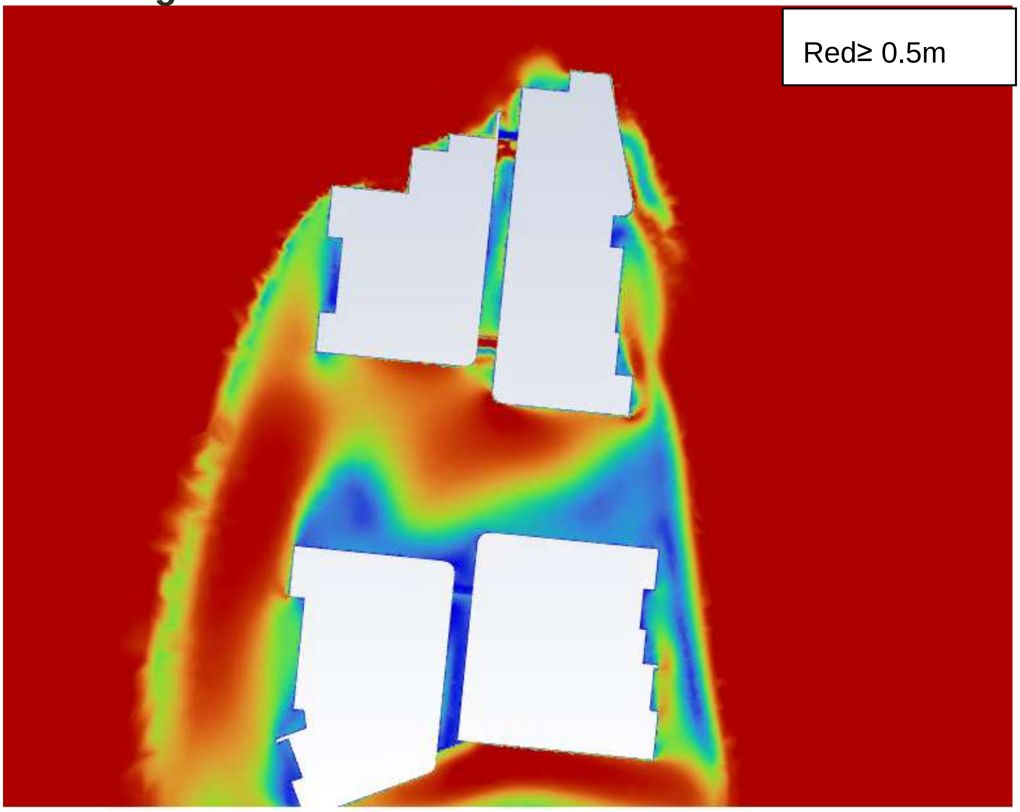
# Appendix A CFD Velocity Ratio Vectors – All wind directions (excluding northwest)

## Mean Velocity Ratios Coloured by Velocity Vector at Typical Chest Height

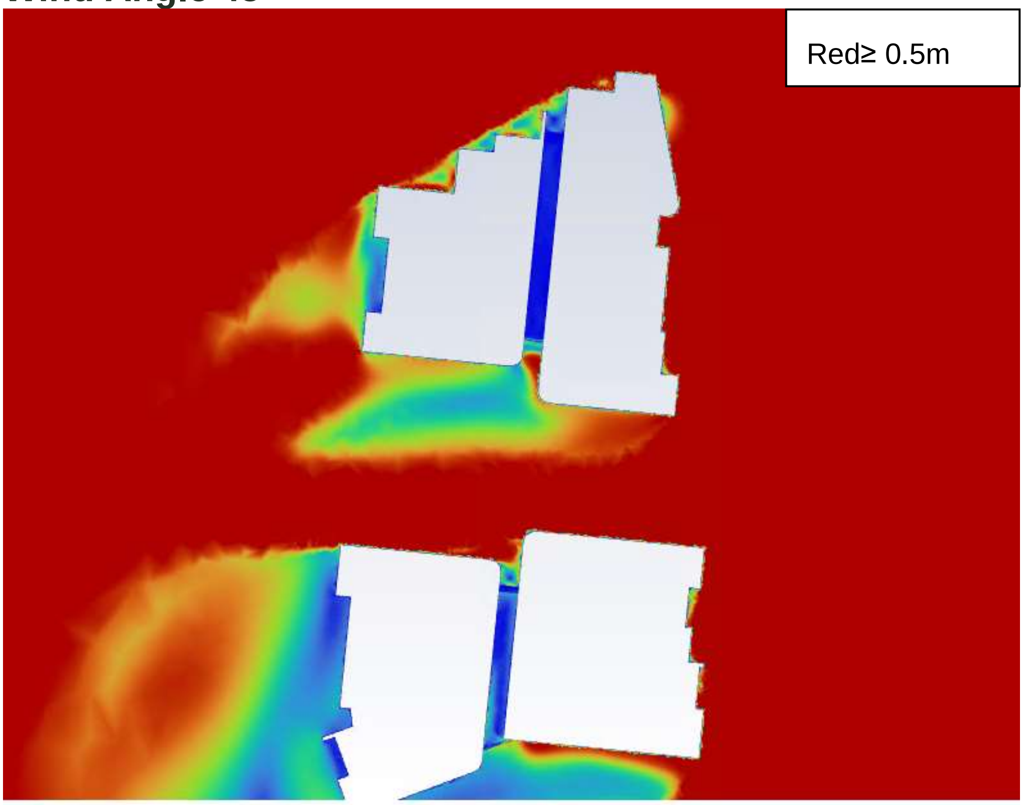



Red Coloured banding is for ratios ≥ 0.5

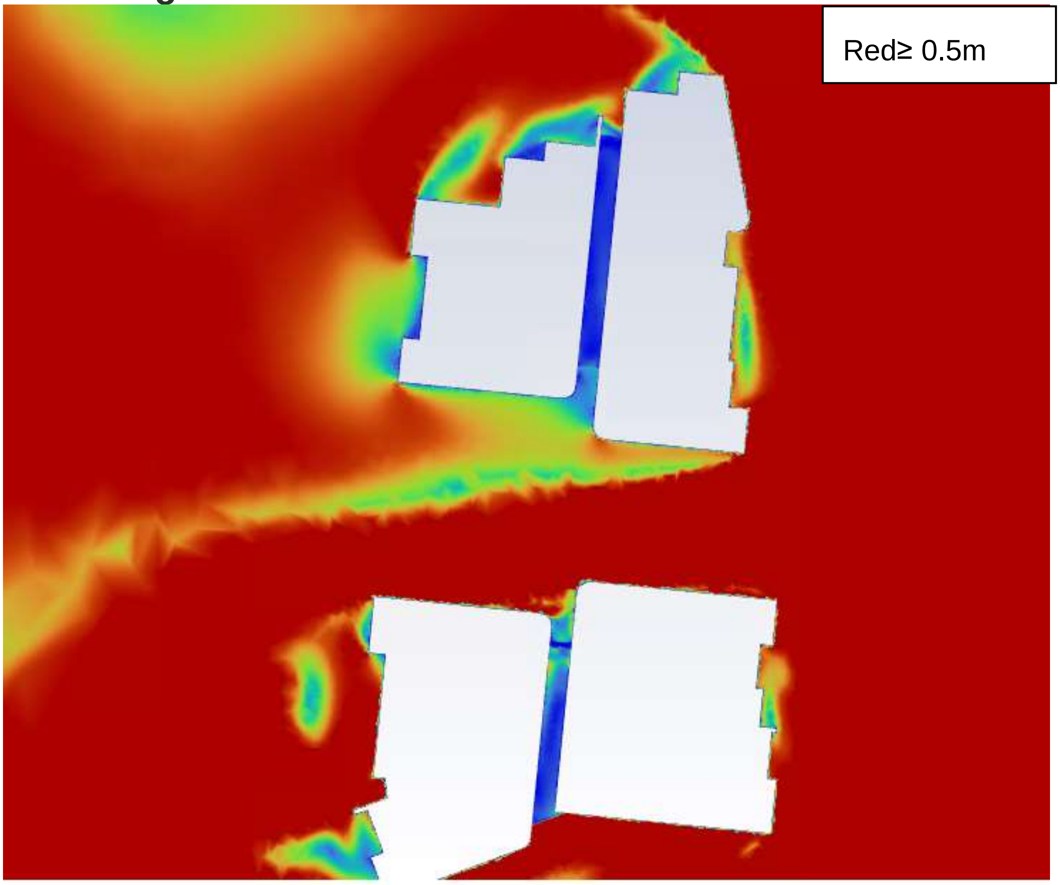
## Wind Angle = 0º



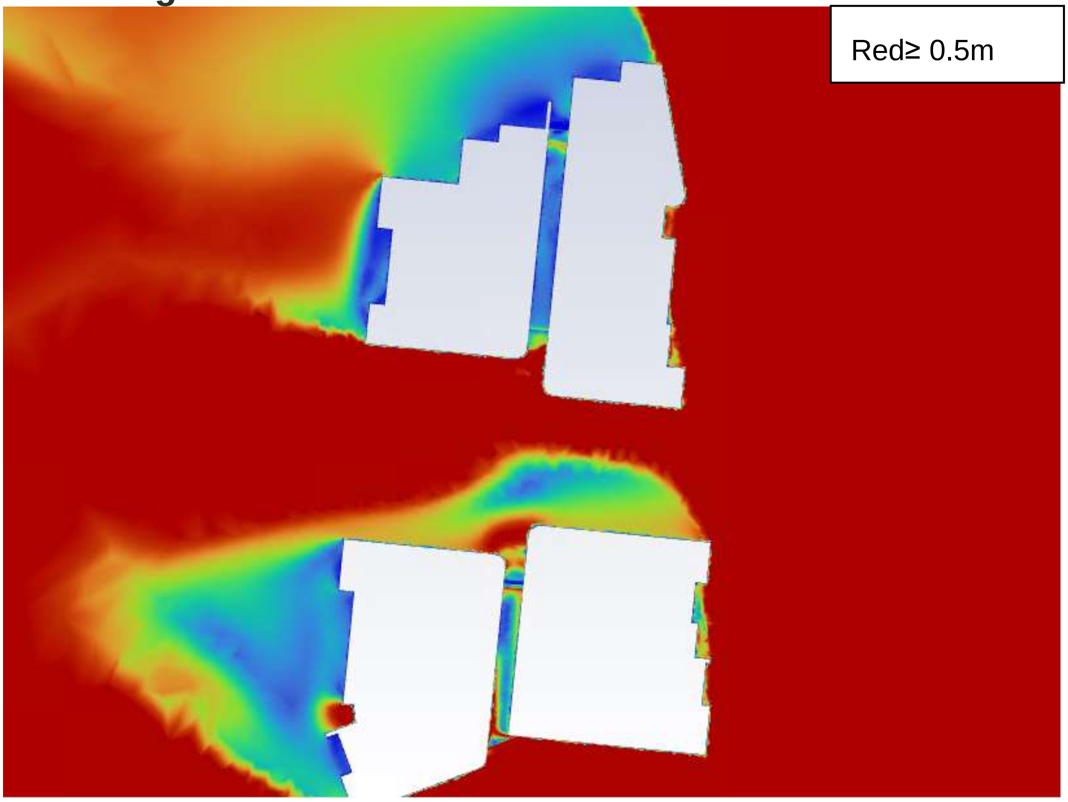

## Wind Angle 45



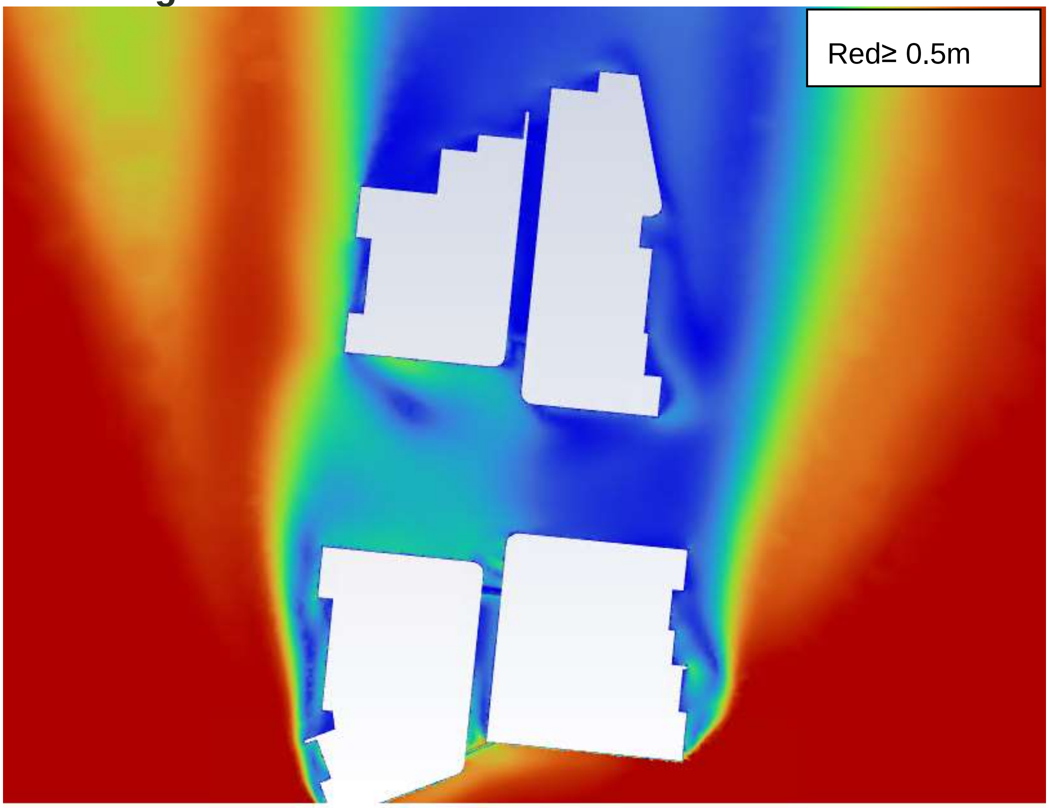
## Wind Angle 90



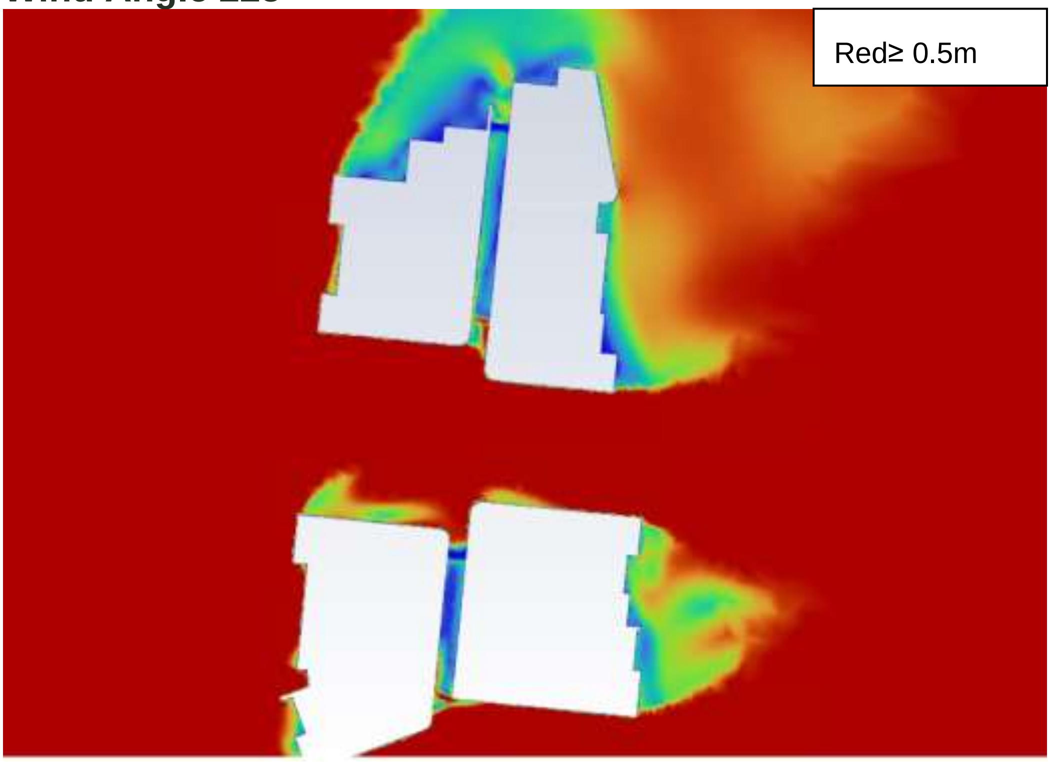

## Wind Angle 135



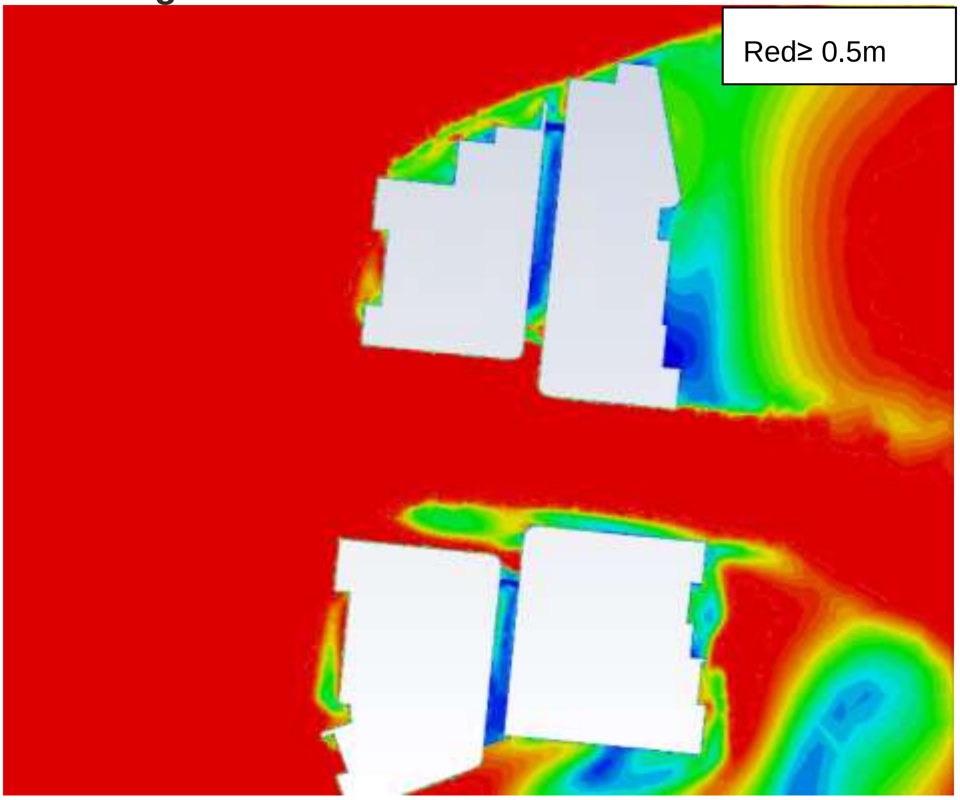
## Wind Angle 180




## Wind Angle 225



## Wind Angle 270



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