59-63 Trafalgar Avenue & 1A-1B Valley Road Linfield

Environmental Wind Impact - Desktop Study

Landmark Group Australia Pty Ltd
Level 29, 2 Chifley Plaza
SYDNEY 2000

Prepared by:

SLR Consulting Australia

SLR Project No.: 610.032787.00001

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29 January 2026

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
R02-v1.0	29 January 2026	Dr Farzin Ghanadi	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
	Click to enter a date.			
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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 Landmark Group Australia 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.

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1.0 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Landmark Group Australia Pty Ltd to provide a qualitative (expert opinion) study assessing the environmental wind impact of a proposed development at 59-63 Trafalgar Avenue & 1A-1B Valley Road Linfield, NSW 2070, Australia.

The assessment has been made on the basis of our best engineering judgment and on the experience gained from (decades of) scale-model Wind Tunnel Testing and CFD Simulation analysis of a range of similar scale developments.

2.0 DEVELOPMENT – DESCRIPTION AND SITE CONTEXT

The site is bordered by Trafalgar Avenue to the west, and existing low-rise buildings in other directions - refer **Figure 1**.

Figure 1 Project Site Location

2.1 Development Description

The proposed multi-building development comprises 4 buildings ranging in height from 5 to 11 storeys above ground and includes the following features:

- 2 levels of basement car parking,
- Lowr ground level with building entrance and residential units,
- Ground level with communal open space, gym, building lobby and storage
- Upper ground level with building lobby, and residential units
- Levels 1 through 9 contain residential units, with Levels 7 and 8 also featuring communal open spaces.
- Roof with communal open space

Representative floor plans of the proposed development are shown in **Figure 2**.

Figure 2 Representative Plans of the Proposed Development

Perspective View from northeast

2.2 Surrounding Built Environment

In terms of the surrounding terrain and topography (refer **Figure 3**):

- The surrounding built environment features Low-rise residential developments to the west, south and east directions
- Low to mid-rise blocks to the northwest
- The topography slopes gently downward from the northwest to the southeast along Trafalgar Avenue.

Figure 3 Project Site Surrounds

3.0 SYDNEY'S WIND CLIMATE

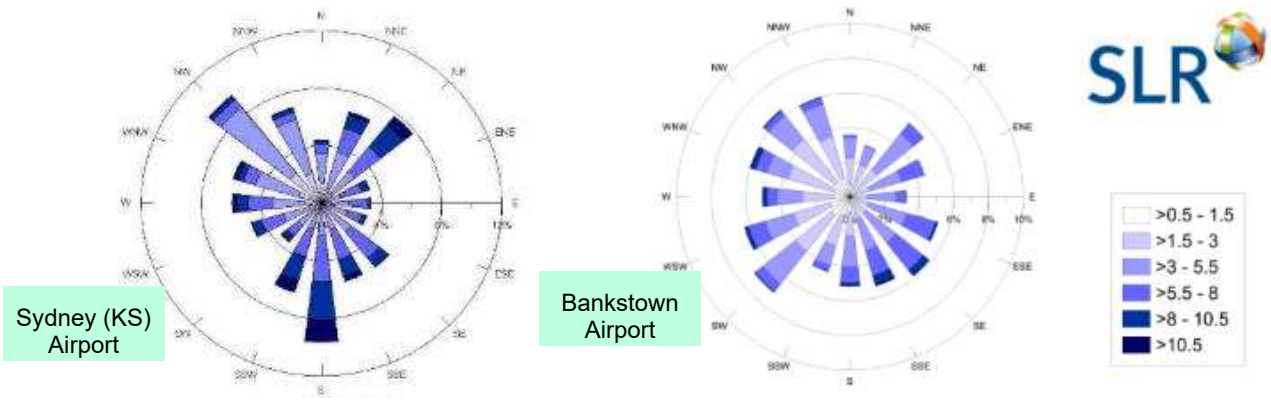
The data of interest in this study are the mean hourly wind speeds and largest gusts experienced throughout the year (especially higher, less frequent winds), how these winds vary with azimuth, and the seasonal break-up of winds into the primary Sydney Region wind seasons.

3.1 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 (refer **Appendix A**) 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 (BoM Data)



3.2 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.

- As noted in **Section 1.3**, the site is currently surrounded by low to mid-rise residential developments to all directions.
- The site will, therefore, receive minimal wind shielding, leaving it exposed to stronger winds from multiple directions.

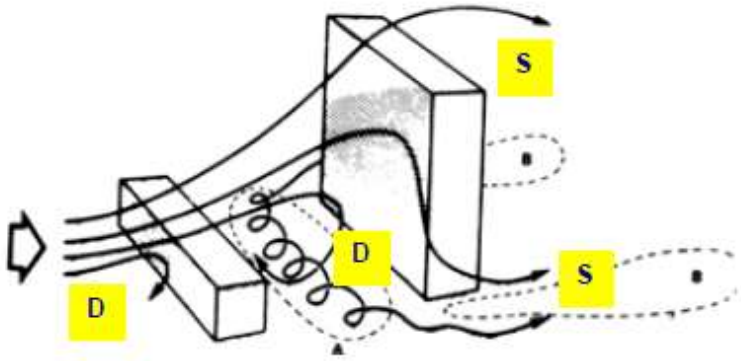
4.0 BUILDING-WIND INTERACTION – GENERAL OBSERVATIONS

The impact of wind flowing past buildings has well known general impacts at ground level – refer **Figure 5.** In general, the taller the building, the more pronounced the impact on ground level winds.

- **Downwash winds "D"** are the winds which impact on the windward face of a building and are then deflected downwards to Ground Level in a vertical direction; and

- Accelerating **Shearflow winds "S"** are the winds which experience acceleration as they pass by the building edges and roof as the wind flow moves around and past the building.

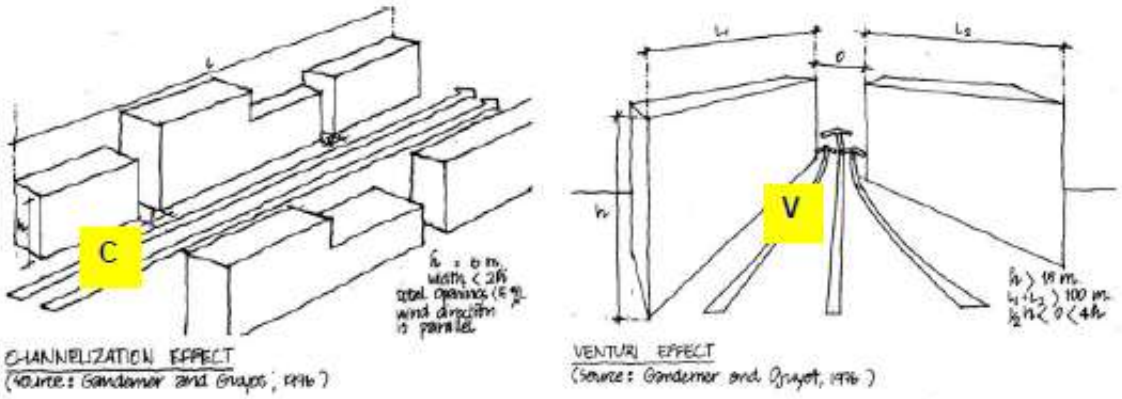
Figure 5 Windflow Patterns Past Regular-Shaped Buildings



The grouping of buildings can also have an impact on resulting pedestrian winds – refer to **Figure 6.**

- **Channelling Effect winds "C"** result when there are rows of parallel buildings (especially taller ones) where the gaps in between line up with prevailing wind directions.
- **Venturi Effect winds "V"** result when wind flow is forced to pass between two converging buildings or groups of buildings with a resulting increase in flow.

Figure 6 Windflow Patterns Past Groups of Buildings

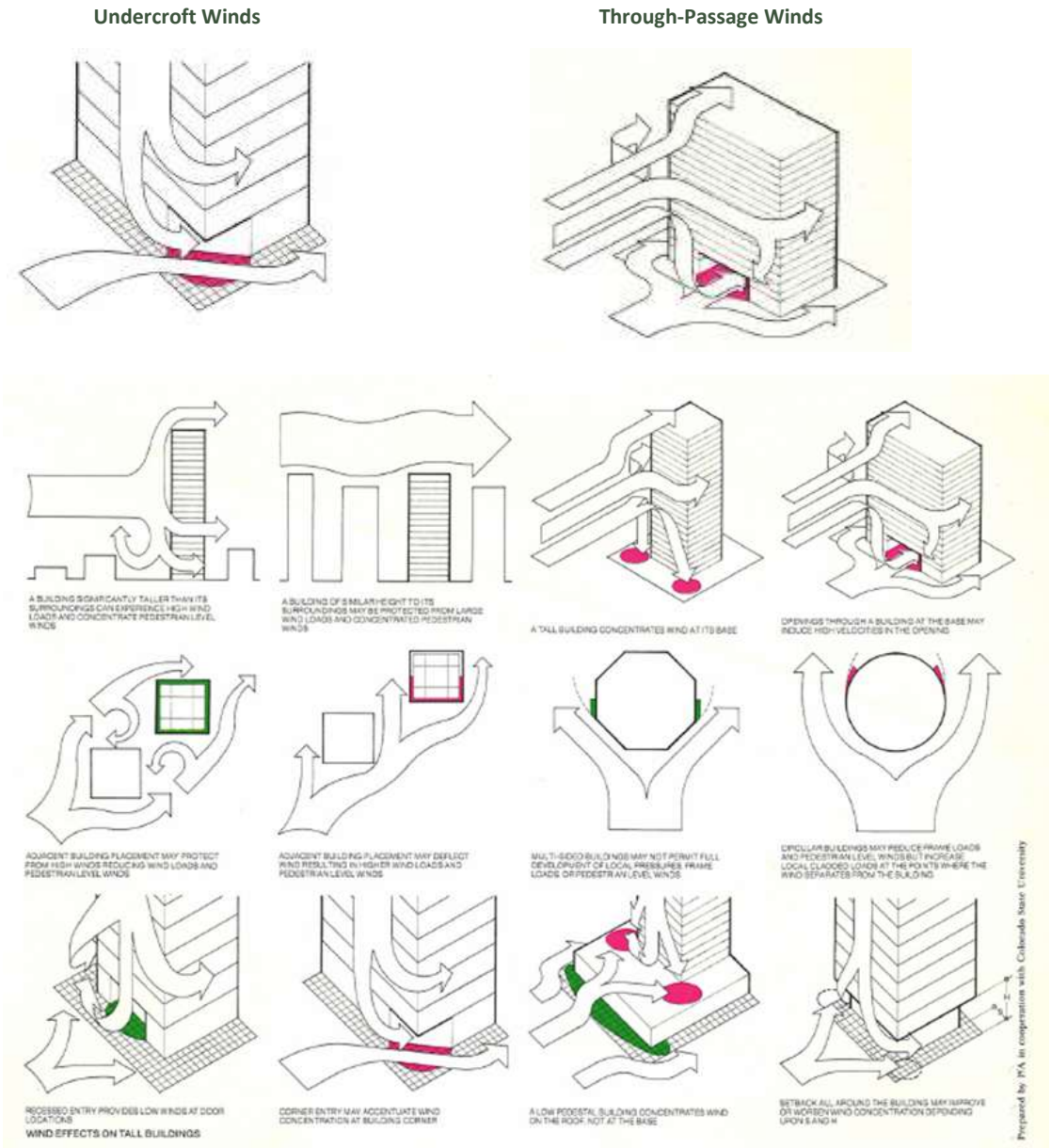


Local building details can also influence winds in the immediate vicinity – refer **Figure 7**.

The **"Undercroft"** effect is a well-known adverse building-wind characteristic as depicted in the generic building wind effect diagrams shown below. The winds are induced towards the negative pressure area within the undercroft, creating concentrated adverse wind flow through undercroft. This same pressure difference between the windward and leeward facades of a building can induce a strong wind tunnel effect through any open passage located at the base of a building – the **"Through Passage"** effect.

These and other common building-related wind impacts are depicted in **Figure 7**.

Figure 7 Undercroft Winds and Through-Passage Winds



5.0 WIND ACCEPTABILITY CRITERIA

5.1 Standard Local Government Criteria

The choice of suitable criteria for evaluating the acceptability of particular ground level conditions has been the subject of international research over the past few decades. One of the commonly accepted set of acceptability criteria developed from this research, currently referenced by many Australian Local Government Development Control Plans, is summarised in **Table 1.** The limiting wind speed criteria in **Table 1** are based on the maximum wind gust occurring (on average) once per year.

Table 1 Standard Local Government Wind Acceptability Criteria

Type of Criteria	Limiting Gust Wind Speed Occurring Once Per Year	Activity Concerned
Safety	24 m/s	Knockdown in Isolated Areas
	23 m/s	Knockdown in Public Access Areas
Comfort	16 m/s	Comfortable Walking
	13 m/s	Standing, Waiting, Window Shopping
	10 m/s	Dining in Outdoor Restaurant

The primary objectives relating to the above wind impact criteria are as follows:

- The general objective is for annual 3-second gust wind speeds to remain at or below the so-called 16 m/s “Walking Comfort” criterion. Whilst this magnitude may appear somewhat arbitrary, its value represents a level of wind intensity above which the majority of the population would find unacceptable for comfortable walking on a regular basis at any particular location.

- In many urban locations, either because of exposure to open water conditions or because of street “canyon” effects, etc, the 16 m/s “Walking Comfort” level may already be currently exceeded. In such instances a new development should ideally not exacerbate existing adverse wind conditions and, wherever feasible and reasonable, ameliorate such conditions.

- It can be seen in **Table 1** that the recommended limiting wind speeds for spaces designed for activities such as seating, outdoor dining, etc., are lower (ie more stringent) than for “walking comfort”.

5.2 Application of Wind Criteria

The criteria provided in Table 1 (especially in relation to Comfort) should not be viewed as “hard” numbers as the limiting values were generally derived from subjective assessments of wind acceptability. Such assessments have been found to vary considerably with the height, strength, age, etc., of the pedestrian concerned. A further factor for consideration is the extent of windy conditions, and some relaxation of the above criteria may be acceptable for small areas under investigation provided the general site satisfies the relevant criteria.

6.0 WIND IMPACT OF THE PROPOSED DEVELOPMENT

6.1 Areas of Interest in Relation to Wind Impact

Based on the design many aspects of the proposed development have been designed in such way as to avoid direct exposure to the stronger prevailing winds impacting the site. The previous section provided guidance as to the areas where the adopted wind acceptability criteria had the potential to be exceeded and an indication as to the likely local optimum wind treatment strategy, eg whether the wind condition of interest is likely to arise from accelerating winds which require vertical windbreaks (such as landscaping) or downwash winds which require horizontal windbreaks (such as awnings, canopies). In the absence of dedicated wind mitigation solutions, the wind conditions of potential concern in relation to the proposed development include:

- The adjacent pedestrian walkways
- Development entrances
- Communal open space on ground level
- The elevated communal open areas
- Elevated corner balconies

6.2 Future Wind Impact at All Areas of Interest

The wind impact of the proposed development is described by examining the impact of key prevailing wind conditions on areas of interest within and external to the development.

The key directions analysed are:

- NE and S/SE winds for summer months and
- SW-NW (Westerly) winds for winter months.

The predicted wind environment at the site is examined in terms of both the:

- Existing Winds, and
- Future Winds with the addition of the proposed development.

The above predictions are made on the basis of our best engineering judgement and (decades of) experience in carrying out Environmental Wind Tunnel Testing and CFD Simulation Studies.

The above predictions are made without necessarily assuming any benefit from the already planned landscaping for the proposed development.

Prevailing Wind Direction:
NORTHEAST Winds

Period of Annual Cycle:
Summer

Location	Existing Compliance	Future Compliance	Key Factors
Trafalgar Avenue Footpath	**Likely comply**	**Likely comply**	While the alignment of the development will limit the influence of prevailing winds, there is a possibility of high-speed winds swirling around the corners of the proposed building.
Ground level Communal open space	**Likely comply**	**May not comply without appropriate mitigation**	This area could encounter heightened winds from the NE. Additionally, the proposed buildings may create some channelling and downwash onto this area. This impact can be alleviated by the large trees with a generous canopy and landscaping along the footpath.
Pedestrian walkways along the new pathway within the development	**Likely comply**	**Likely comply**	The upcoming developments could cause wind channelling along these Pathways. To further minimize the impact of high-speed winds on the footpaths, the strategic placement of landscaping and sizable trees in the vicinity will be instrumental in enhancing wind reduction efforts.
Building Entries	**May not comply**	**Borderline Compliance (NE facing entries)**	Although NE winds are generally mild, downwash from building facades above may create wind conditions that are close to limits for building entry points (standing comfort) facing east or north.
Elevated communal open areas	Locations not relevant to "existing" built environment	**May not comply without appropriate mitigation**	The communal open spaces are exposed to strong winds from NE with insufficient shielding. Consequently, some vertical windbreaks on the outer perimeter of this area are required to restrict the impact of the prevailing winds.
Upper Level Corner Balconies		**May not comply without appropriate mitigation**	Due to the exposure of this balcony to strong winds from the prevailing winds without adequate shielding, an effective wind mitigation strategy is necessary to minimize the impact of prevailing winds and reduce their effects on this area.

Prevailing Wind Direction: **SOUTHEAST (& SOUTH) Winds**

Period of Annual Cycle: **Summer (Southeast) All-Year-Round (South)**

Location	Existing Compliance	Future Compliance	Key Factors
Trafalgar Avenue Footpath	**May not comply**	**May not comply without appropriate mitigation**	SE wind downwash may create adverse wind conditions in terms of long-exposure stationary activities (sitting, dining, etc). Planned trees at seating areas will assist in moderating these winds
Ground level Communal open space	**May not comply**	**May not comply without appropriate mitigation**	The upcoming developments could cause wind channelling and downwash within the communal open space. To minimize the impact of high-speed winds on the proposed siting/dining/standing areas, the strategic placement of landscaping and sizable trees in the vicinity will be instrumental in enhancing wind reduction efforts.
Pedestrian walkways along the new pathway within the development	**May not comply**	**May not comply without appropriate mitigation**	High-speed S/SE winds swirling around the corners of the proposed building can increase the wind level in this area. This impact can be alleviated by the large trees with a generous canopy and landscaping along the footpath.
Building Entries	**May not comply**	**Borderline Compliance (S/SE facing entries)**	Downwash from building facades above may create wind conditions that are close to limits for building entry points (standing comfort) facing south or east.
Elevated Communal open areas	Locations not relevant to "existing" built environment	**May not comply without appropriate mitigation**	SW and NW winds may experience accelerated shearflow as they pass through the elevated communal spaces. Consequently, some vertical windbreaks on the outer perimeter of this area are required to restrict the impact of the prevailing winds.
Upper Level Croner Balconies		**May not comply without appropriate mitigation**	Due to the exposure of this balcony to strong winds from the prevailing winds without adequate shielding, an effective wind mitigation strategy is necessary to minimize the impact of prevailing winds and reduce their effects on this area.

Prevailing Wind Direction:
WESTERLY Winds (SW-NW)

Period of Annual Cycle:
Winter / Early Spring

Location	Existing Compliance	Future Compliance	Key Factors
Trafalgar Avenue Footpath	**May not comply**	**May not comply without appropriate mitigation**	The potential exists for the proposed developments to induce wind channelling onto this walkway during west winds. This impact can be alleviated by the large trees with a generous canopy and landscaping along the street footpath.
Ground level Communal open space	**May not comply**	**May not comply without appropriate mitigation**	The potential for wind channelling onto this area exists with the proposed development. Consequently, effective wind mitigation strategies are essential in this zone to diminish the wind levels. Landscaping planned for this area will assist in mitigating these winds.
Pedestrian walkways along the new pathway within the development	**May not comply**	**May not comply without appropriate mitigation**	This pathway could encounter heightened winds from SW-NW. Additionally, the proposed buildings may create some wind channeling onto this area. Therefore, additional measures such as integrating trees and landscaping are necessary to provide adequate shielding for this area.
Building Entries		**May not comply without appropriate mitigation for west facing entries**	Downwash from building facades above may create wind conditions that are close to limits for building entry points (standing comfort) facing west (SW-NW).
Elevated Communal open areas	Locations not relevant to "existing" built environment	**May not comply without appropriate mitigation**	SW and NW winds may experience accelerated shearflow as they pass through the elevated communal spaces. Consequently, some vertical windbreaks on the outer perimeter of this area are required to restrict the impact of the prevailing winds.
Upper Level Corner Balconies		**May not comply without appropriate mitigation**	Due to the exposure of this balcony to strong winds from the prevailing winds without adequate shielding, an effective wind mitigation strategy is necessary to minimize the impact of prevailing winds and reduce their effects on this area.

7.0 MITIGATION AND TREATMENT RECOMMENDATIONS

On the basis of the expected wind impacts outlined in **Section 6**, the following recommendations for wind amelioration features are made in areas where winds are expected to approach or exceed the relevant 10 m/s, 13 m/s or 16 m/s criterion depending on the designed use for that area.

Lower ground level, Ground Level, Upper Ground Level and Level 1 – refer Figure 8, Figure 9, Figure 10 and Figure 11

- Uphold the proposed trees/landscaping within and on the sides of the development to mitigate the impact of local wind speeds. It is recommended that all recommended (or proposed) landscaping to be evergreen and densely foliating to maintain its effectiveness throughout the year.
- Keep setbacks at ground-level entrances to reduce wind speeds from potential downwash and redirect airflow away from pedestrian paths.
- Introduce overhead canopies at ground-floor entry points to provide shelter from downwash effects and help deflect airflow away from pedestrian circulation areas.
- Ground-level seating in publicly accessible areas should be provided with overhead windbreak, such as pergolas or large-canopy trees, to mitigate wind level and minimise the impact of façade downwash.

Elevated Communal open areas on ground level – refer Figure 12, Figure 13 and Figure 14

- It is recommended to incorporate 1.8m high vertical windbreaks around the perimeter of elevated communal spaces in Level 7, Level 8 and roof level. These windbreaks may consist of balustrades or a combination of walls and planters/trees of equivalent height, strategically placed around the edges.

Elevate Private Balconies

- Ensure vertical windbreaks are installed around the edges of individual balconies. Additionally, retain a single open aspect for the elevated balconies.
- Incorporating a 1.1-meter solid balustrade involves non-adjustable vertical louvres or fixed glazing to offer screening on the northwest and south sides. This approach can be particularly effective, especially for the corner elevated balconies side most susceptible to wind exposure.
- Alternatively Incorporate 1.5m high vertical windscreens around the outer edge of these elevated corner balconies.

During the Detailed Design phase of the project, once the design of the various building facades is finalised, further modelling could be carried out to confirm zones of the building, by height and by plan view location (eg which building corners), where wind mitigation (ie beyond the standard balustrade height) may be beneficial IF it is intended for balconies to be used all-year-round. The preference here would be for detailed 3D CFD Simulation Modelling rather than Wind Tunnel Testing, given the issue of balcony scaling at typical 1:400 wind tunnel test scales.

Figure 8 Wind Mitigation for the Development – Lower ground level

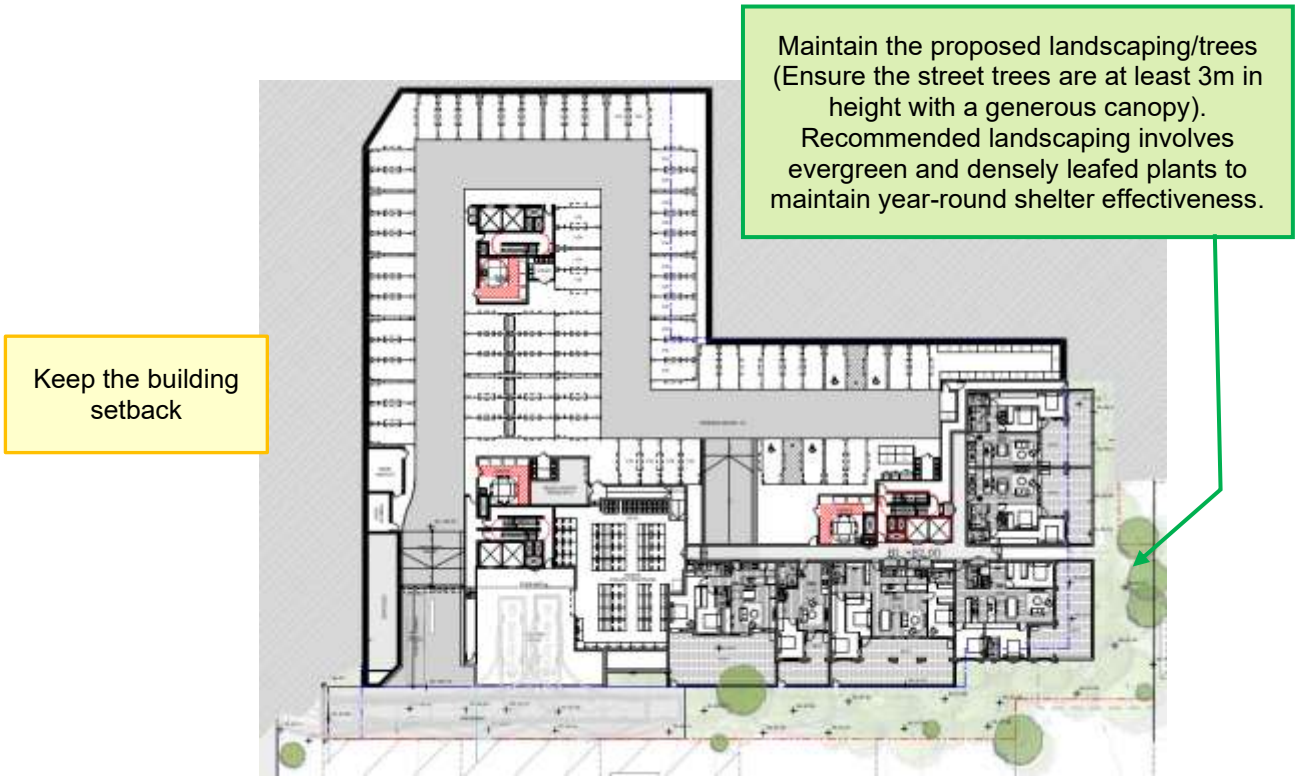


Figure 9 Wind Mitigation for the Development – Ground level

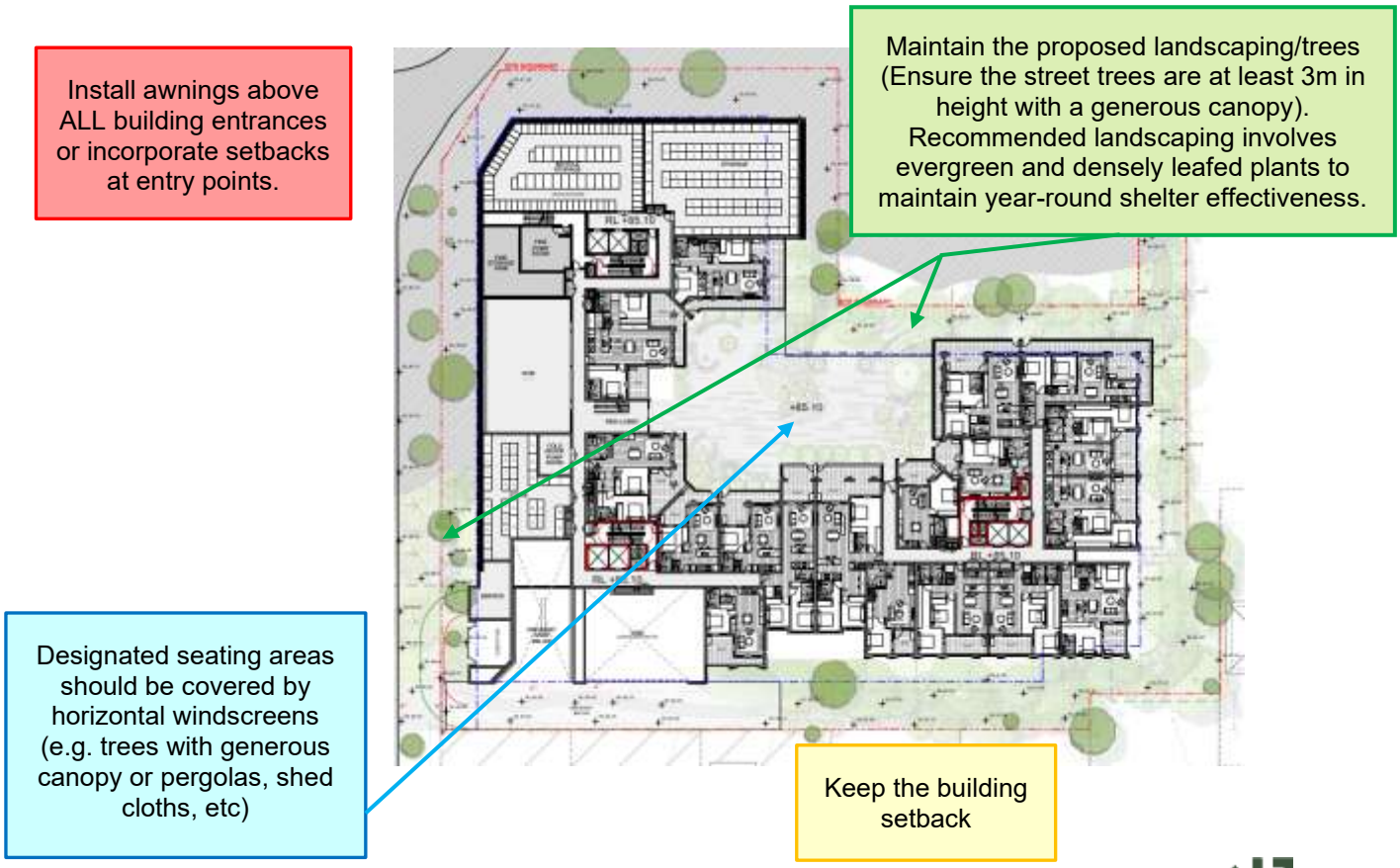


Figure 10 Wind Mitigation for the Development – Upper ground level

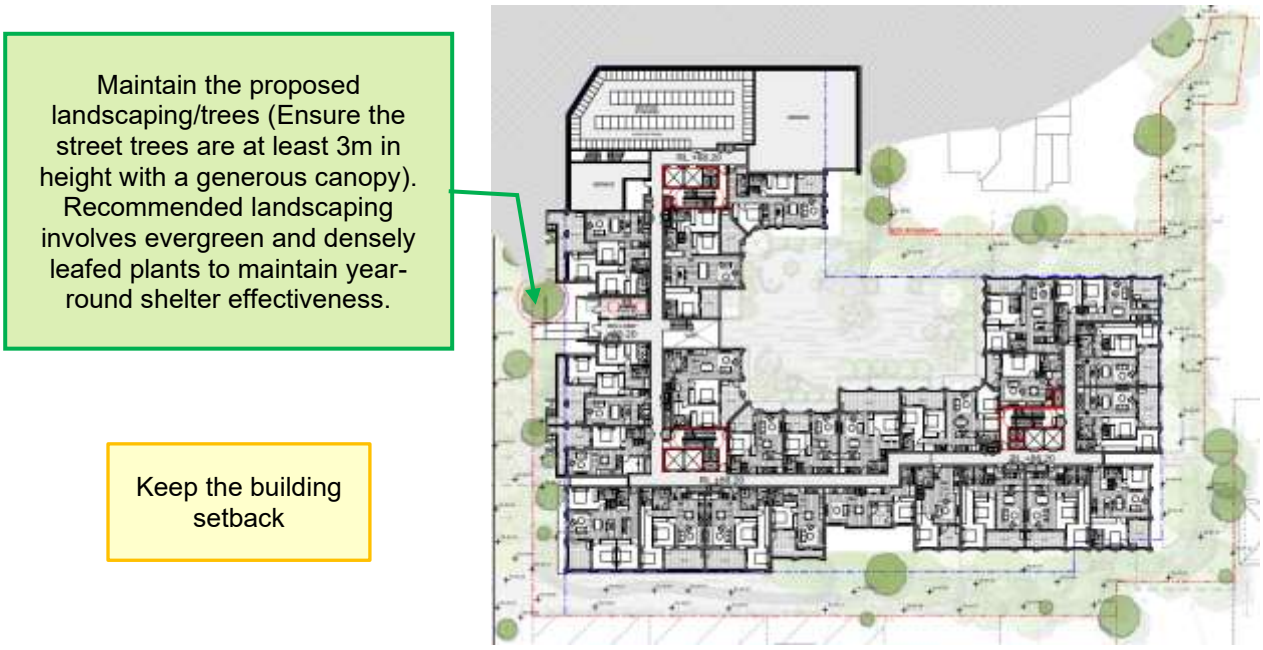


Figure 11 Wind Mitigation for the Development – Level 1

Figure 12 Wind Mitigation for the Development – Level 7

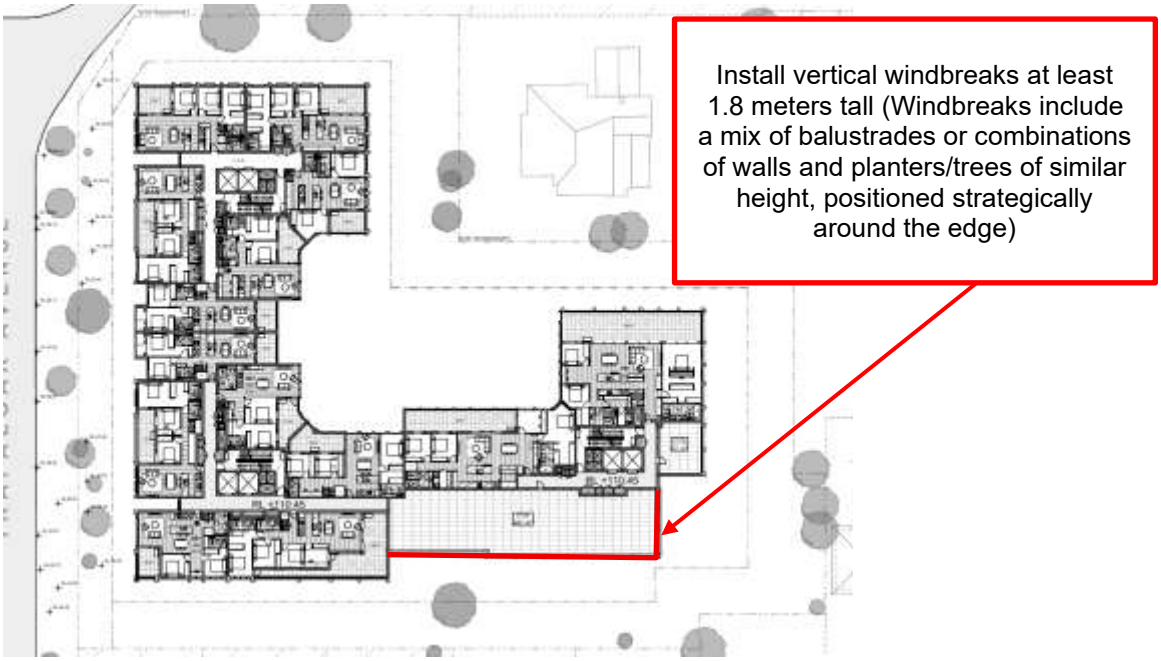


Figure 13 Wind Mitigation for the Development – Level 8

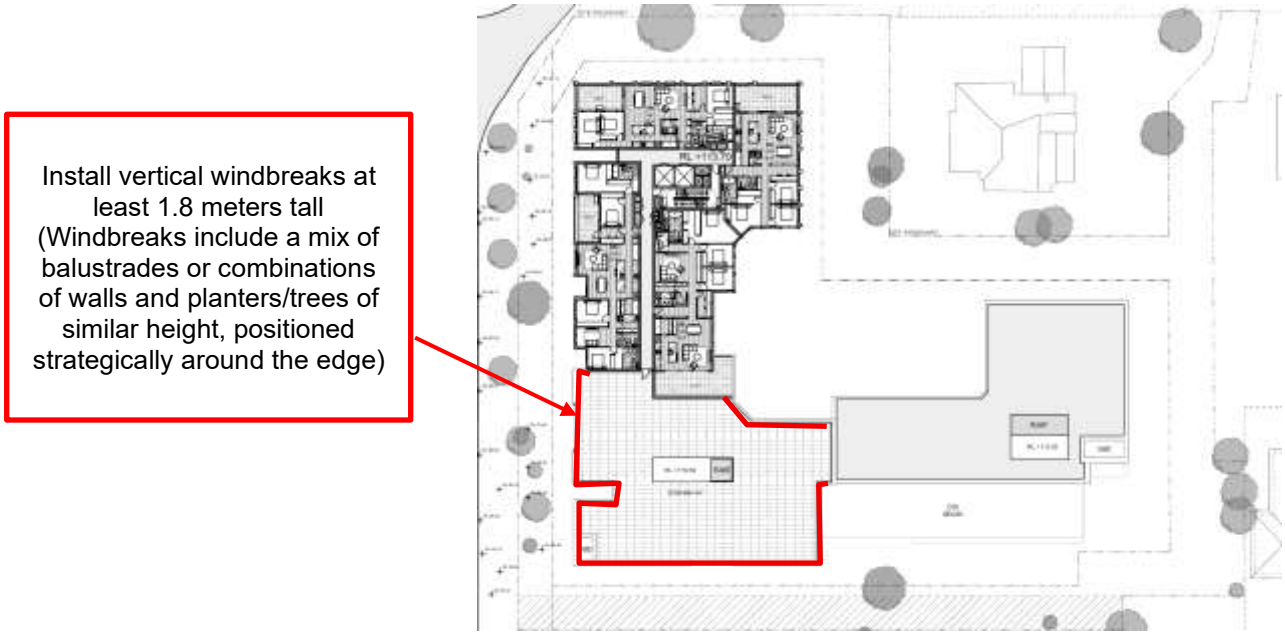
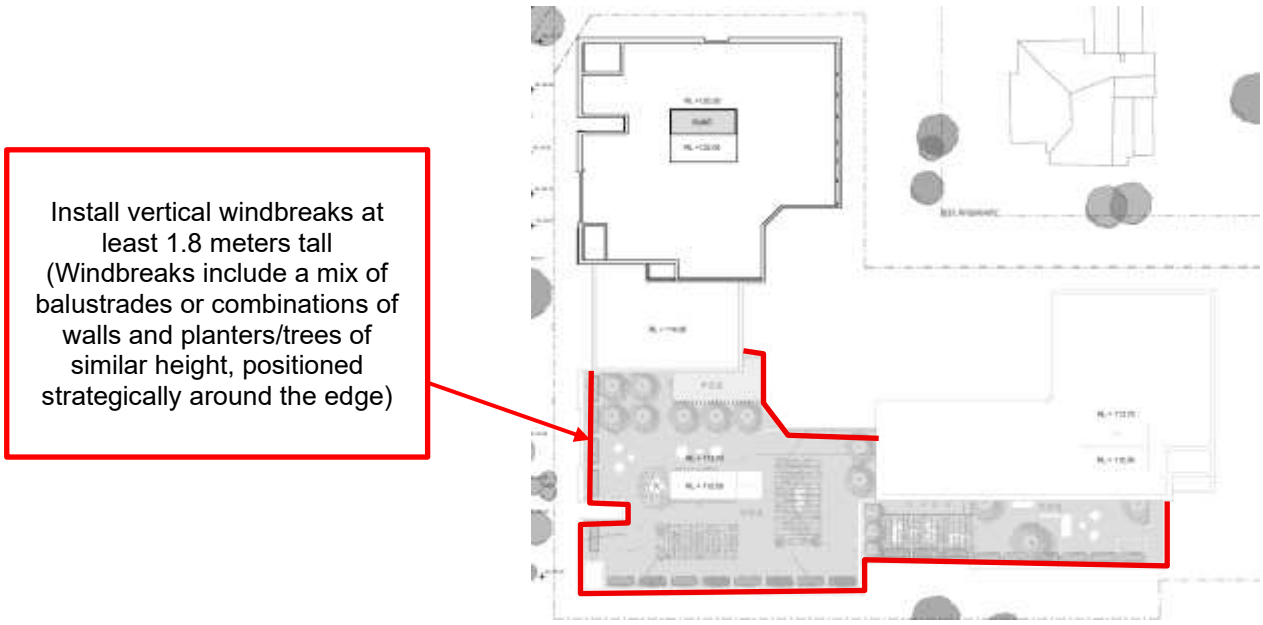


Figure 14 Wind Mitigation for the Development – Roof



8.0 Conclusion

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Landmark Group Australia Pty Ltd to provide a qualitative (expert opinion) study assessing the environmental wind impact of a proposed development at 59-63 Trafalgar Avenue & 1A-1B Valley Road Linfield, NSW 2070, Australia.

The assessment has been made on the basis of our best engineering judgment and on the experience gained from (decades of) scale-model Wind Tunnel Testing and CFD Simulation analysis of a range of similar scale developments.

The site is bounded by Trafalgar Avenue to the west and is surrounded on the remaining sides by predominantly low-rise residential developments, with low- to mid-rise buildings located to the northwest. The surrounding topography features a gentle downward slope extending from the northwest to the southeast along Trafalgar Avenue.

Linfield Wind Climate

Using long-term wind records obtained from nearby Bureau of Meteorology stations at Bankstown Airport and Sydney Kingsford Smith Airport, SLR has determined that determined that Linfield has local winds characteristics somewhat closer to Sydney (KS) Airport than Bankstown Airport, given Linfield's distance inland being almost identical to Sydney Kingsford Smith Airport. Accordingly, key prevailing wind directions of interest are the northeast, southeast and south for summer and mainly west quadrant winds for winter.

Existing 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.

- As noted in **Section 1.3**, the site is currently surrounded by low-rise residential developments to all directions.
- The site will, therefore, receive minimal wind shielding, leaving it exposed to stronger winds from multiple directions.

Future Wind Environment

In terms of the *future* wind environment with the proposed Development, the following features of the development are noted as being of most significance:

Lower Ground, Ground, Upper Ground and Level 1 – refer Figure 8, Figure 9, Figure 10 and Figure 11

- Retain the proposed landscaping within and along the edges of the development to help moderate local wind conditions. Landscaping should consist of evergreen species with dense foliage to ensure year-round effectiveness.
- Maintain setbacks at building entrances to reduce wind downwash and assist in diverting airflow away from pedestrian pathways.
- Provide overhead canopies at entry points to further shelter against downwash and redirect airflow away from circulation areas.

- Publicly accessible seating areas at ground level should be supported by overhead wind protection, such as pergolas or trees with broad canopy cover, to minimise façade downwash effects and enhance comfort.

Elevated Communal Open Areas – refer Figure 12, Figure 13 and Figure 14

- Vertical wind protection of 1.8 m in height is recommended around the perimeter of communal spaces on Level 7, Level 8, and the roof level. These may be achieved using balustrades or a combination of solid walls and densely planted trees/planters of equivalent height, positioned strategically along exposed edges.

Private Balconies

- Install vertical windbreaks along the edges of individual balconies, while maintaining a single open aspect to preserve usability.
- A 1.1 m solid balustrade incorporating fixed glazing or non-adjustable vertical louvres is recommended along the northwest and south-facing sides, providing effective screening, particularly for corner balconies most exposed to wind.
- As an alternative, 1.5 m high vertical windscreens may be introduced along the outer edges of elevated corner balconies to deliver additional protection.

With the incorporation of proposed windbreak mitigation treatments, all amenity locations within the proposed development including ground and all terrace level locations are expected to achieve the target Lawson Comfort Criteria and Melbourne Safety Criterion established for the project.

The above analysis has been made on the basis of our best engineering judgment and on the experience gained from scale model wind tunnel testing or computational fluid dynamics analysis of a range of developments.

Summary

On the basis of the above, the overall effect of the proposed development on the local wind microclimate is predicted to be “not significant” (refer **Section 3.2**) and the proposed development should satisfy the nominated Wind Acceptability criteria for the project.

9.0 Feedback

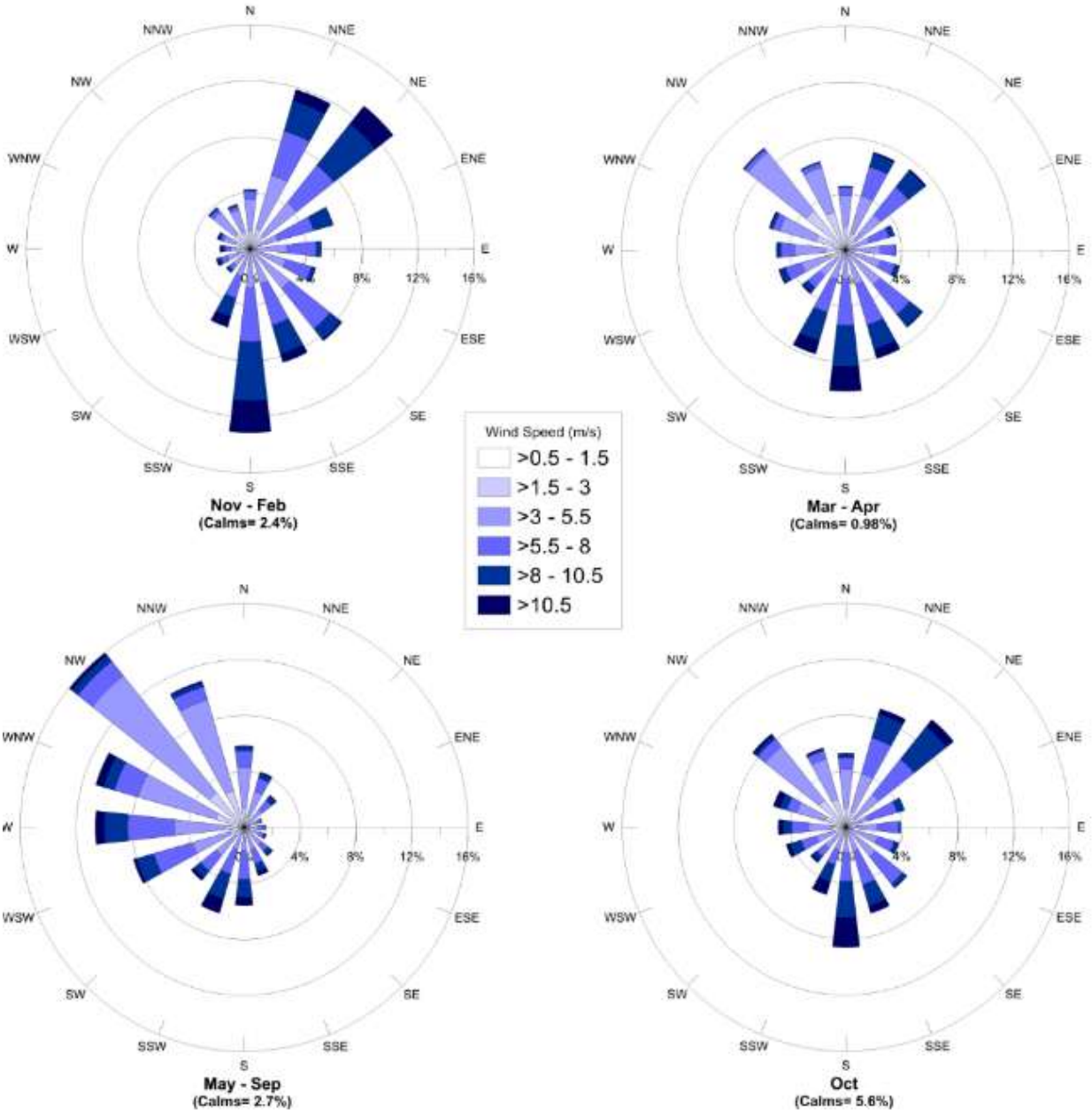
At SLR, we are committed to delivering professional quality service to our clients. We are constantly looking for ways to improve the quality of our deliverables and our service to our clients. Client feedback is a valuable tool in helping us prioritise services and resources according to our client needs.

To achieve this, your feedback on the team's performance, deliverables and service are valuable and SLR welcome all feedback via https://www.slrconsulting.com/en/feedback.

We recognise the value of your time and we will make a $10 donation to our Charity Partner - Lifeline, for every completed form.

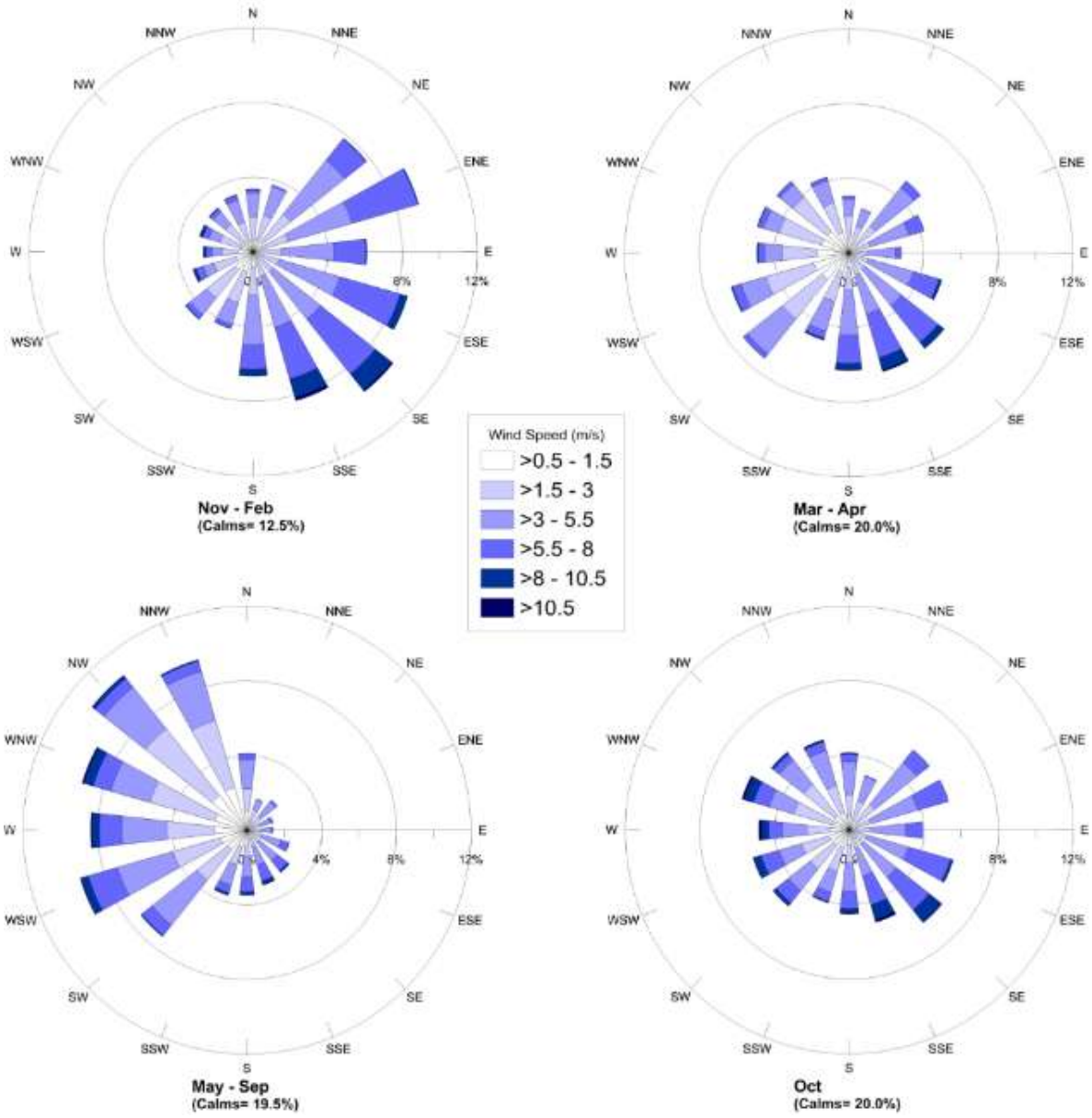
Appendix A Seasonal Wind Roses for Bureau of Meteorology Met Stations at Sydney (Kingsford Smith) Airport and Bankstown Airport

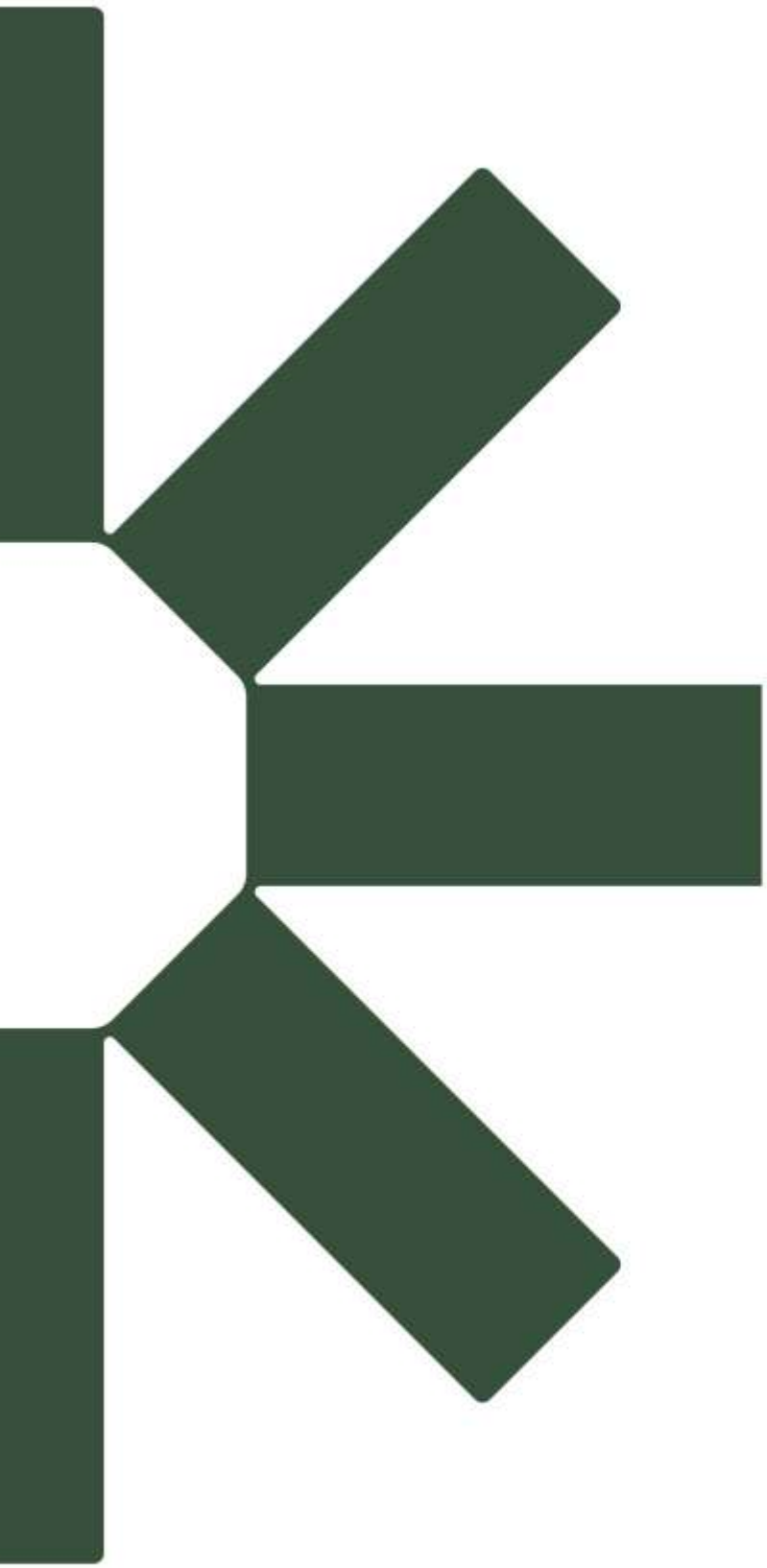
Sydney Airport AWS
(Observations)
1999-2017
600.09300



Bankstown Airport AWS
(Observations)
1999-2017
600.09300

Bankstown Airport AWS
(Observations)
1999-2017
600.09300





Making Sustainability Happen