

170 PACIFIC HIGHWAY GREENWICH, NSW



PEDESTRIAN WIND ASSESSMENT

PROJECT # 2508389

19 JUNE 2025

SUBMITTED TO

Realside 170 Pac Pty Ltd

SUBMITTED BY

RWDI Australia Pty Ltd.

Suite 602, Level 6, 80 William Street,
Woolloomooloo NSW 2011, Australia
ABN 86 641 303 871

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A	Initial	16 May 2025	RL	AMC
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QUALITY ASSURANCE

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering, air quality and wind engineering; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.

1. INTRODUCTION



RWDI Australia Pty Ltd (RWDI) was retained to undertake a pedestrian wind assessment for proposed development located at 170 Pacific Highway in Greenwich, NSW. The development site is bordered by Pacific Highway to the east, Elcedo Lane to the west, and mid-rise commercial buildings to the north and south. The site is located south of an industrial precinct and to the west of the St Leonard's business district. The major transport hub is St Leonard's station, situated approximately 600 meters away. The location of the site within its broader existing surrounding context is shown in Image 1.

The proposed development comprises of the existing 5-storey commercial building which will be repurposed for residential use with an additional 4 storeys added, making up a 9-storey residential building. The ground level spaces include a mix of commercial use and residential amenities with the lobby entrance situated at the north-east with access from Pacific Highway and communal spaces to the north and south of the development (refer to landscape drawing in Image 2). Above the ground level are 8 residential storeys with rooftop amenities and a perimeter outdoor terrace located on level 9.

This desk-based report provides a review of the potential wind conditions around the site and offers conceptual wind control measures and design advice suitable for early design of the development. The key outdoor pedestrian accessible areas of interest associated with the development include the pedestrian footpaths around the site, the entrances to the development, and the amenity spaces on ground and upper levels.



Image 1: Project Site Location and Existing Context

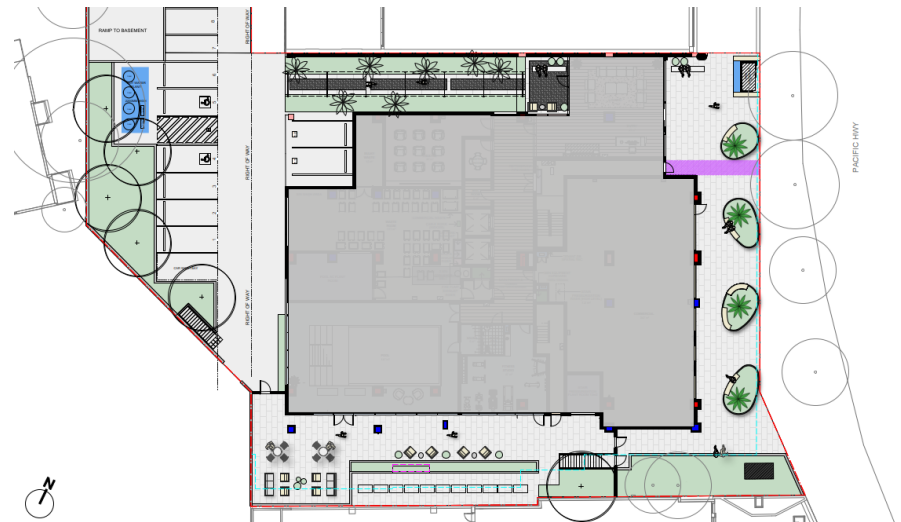


Image 2: Landscape Drawing – Ground Level

2. METHODOLOGY



Predicting wind speeds and occurrence frequencies around a building is a complex process, encompassing an assessment of factors such as building geometry, orientation, surrounding building heights and positions, terrain upstream, and the local wind climate. RWDI has amassed extensive expertise through conducting numerous wind tunnel studies and Computational Fluid Dynamics (CFD) assessments specifically focused on pedestrian wind conditions around buildings. This wealth of experience, complemented by comprehensive literature, facilitates a reliable and efficient desktop estimation of pedestrian wind conditions for concept designs without the need for wind-tunnel testing or detailed CFD studies.

Note that this approach delivers a preliminary assessment of potential wind conditions around the site. It offers a conceptual framework for wind control measures aimed at enhancing wind comfort, if and where necessary. To further validate and refine the predicted conditions discussed in this report or to fine-tune the suggested wind control measures, physical scale model tests in a boundary layer wind tunnel or CFD simulations will be required. These detailed studies offer a quantitative validation and enable a more detailed assessment, ensuring the accuracy and effectiveness of proposed wind control strategies.

Therefore, RWDI's assessment is based on the following:

- A review of the regional long-term meteorological data;
- Drawings and information received by RWDI in May 2025.
- Wind-tunnel studies, CFD simulations, and desktop assessments undertaken by the microclimate team for projects in the region;
- RWDI's engineering judgement, experience, and expert knowledge of wind flows around buildings^{1, 2}; and,
- Assessment against a suitable criteria for pedestrian wind comfort and safety.

Note that other microclimate issues such as those relating to cladding and structural wind loads, door operability, building air quality, noise, vibration, etc. are not part of the scope of this assessment.

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1. H. Wu and F. Kriksic (2012). "Designing for Pedestrian Comfort in Response to Local Climate", *Journal of Wind Engineering and Industrial Aerodynamics*, vol.104-106, pp.397-407.
 2. C.J. Williams, H. Wu, W.F. Waechter and H.A. Baker (1999), "Experience with Remedial Solutions to Control Pedestrian Wind Problems", 10th International Conference on Wind Engineering, Copenhagen, Denmark.

3. METEOROLOGICAL DATA



Meteorological data recorded at Sydney International Airport from 1995 to 2022 were used as a reference to assess wind conditions in the study area. The distributions of wind frequency and directionality for the summer (November through April) and winter (May through October) seasons are shown in Image 3. The records indicate that winds from the northeast and the southern sectors are predominant during the summer season. Winds from the west and northwest directions are predominant in the winter season and can have an impact on the perceived outdoor thermal comfort of a space. Strong winds, with mean speeds exceeding 30 km/h (measured at the airport at an anemometer height of 10 m), occur more frequently in summer than in winter. During both seasons, strong winds predominantly originate from the south while winds from the northeast are common in summer and winds from west to northwest are common in winter. These winds can potentially be the source of uncomfortable / unsafe wind conditions, depending on the site exposure or development design.

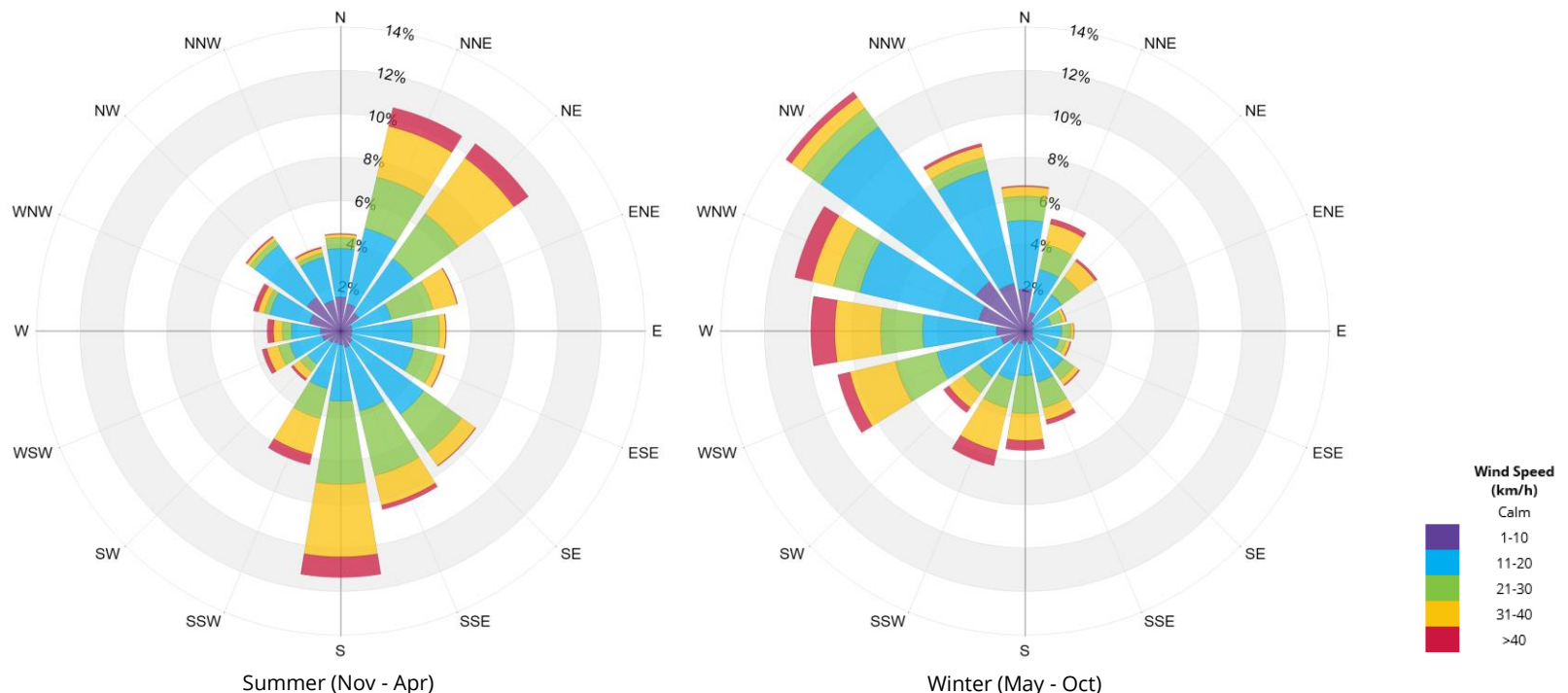


Image 3: Directional Distribution of Winds Approaching Sydney International Airport
Recorded from 1995-2022

4. PEDESTRIAN WIND CRITERIA



A review of the pedestrian wind criteria, as specified in *The Lane Cove DCP 2009* indicates that these are based on annual maximum gusts. However, the criteria do not define the probability of occurrence for these wind speeds when assessing wind comfort or safety. It is understood that these are derived from the work of Melbourne¹, which used a 3-second gust occurring 0.1% of the time annually (equivalent to two to three occurrences per year) for both wind comfort and safety assessments.

While the gust-based approach is suitable for evaluating wind safety as it focusses on infrequent, strong winds that may affect a pedestrian's stability, it is not typically recommended for assessing pedestrian comfort. Current industry best practices is for using gust-equivalent mean wind speeds which account for both mean winds and gusts when evaluating pedestrian comfort. The frequency of occurrence is also more relevant to understanding pedestrian comfort - ranging from a weekly recurrence to daily recurrence of adverse winds during the relevant assessment periods.

For this assessment, the following criteria are applied::

- **Pedestrian safety** is evaluated using a threshold of 3-second gusts exceeding 83 km/h (23 m/s), occurring more than 0.1% of the time, equivalent to approximately 9 hours per year. This aligns with the *Australasian Wind Engineering Society Guidelines for Pedestrian Wind Effects Criteria* (2024).
- **Pedestrian wind comfort** is assessed using the criteria developed by Soligo et al.^{2,3} which are illustrated in Image 4. These criteria, established by RWDI through extensive research and consulting since 1974, are based on gust-equivalent mean wind speeds. Wind comfort levels are categorised according to the typical/intended pedestrian activity such that higher the activity level, higher the wind speed tolerable while engaged in the activity. Wind conditions are assessed at a typical pedestrian chest height and are considered suitable for the intended use of the space if the associated winds for the category are expected for at least 80% of the time. Wind control measures are recommended for areas where the occurrence frequencies of wind speeds are expected to exceed the threshold values for specific pedestrian activities.

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1. W. Melbourne (1978). "Criteria for Environmental Wind Conditions," *Journal of Industrial Aerodynamics*, vol. 3, pp. 241-249.
 2. M.J. Soligo, P.A. Irwin, and C.J. Williams (1993). "Pedestrian Comfort Including Wind and Thermal Effects," *Third Asia-Pacific Symposium on Wind Engineering*, Hong Kong.
 3. M.J. Soligo, P.A. Irwin, C.J. Williams, and G.D. Schuyler (1998). "A Comprehensive Assessment of Pedestrian Comfort Including Thermal Effects," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 77&78, pp. 753-766.

4. PEDESTRIAN WIND CRITERIA



Sitting ≤ 10 km/h			Calm or light breezes desired for outdoor seating areas where one can read a paper without having it blown away
Standing ≤ 14 km/h			Gentle breezes suitable for main building entrances, bus stops and locations where pedestrians may linger such as communal terraces
Strolling ≤ 17 km/h			Moderate winds that would be appropriate for strolling along a downtown street, plaza or park and where the objective is not to linger
Walking ≤ 20 km/h			High Winds that can be tolerated if one's objective is to walk, run or cycle without lingering - Also suitable for certain sporting activities
Uncomfortable > 20 km/h			None of comfort categories above are met - Represents conditions that might be dangerous to the elderly and children and are of a considerable discomfort to others

Image 4: Pedestrian Wind Comfort Criteria

5. RESULTS AND DISCUSSION



5.1 General Wind Flow around Buildings

In the discussion of wind conditions on and around the proposed development, reference may be made to the following generalised wind flows (see Image 5). If these building / wind combinations occur for prevailing winds, there is a greater potential for increased wind activity and uncomfortable or potentially unsafe conditions. Design details such as setting back a tower from the edges of a podium for a prevailing wind direction, deep canopies close to ground level, wind screens / tall trees with dense landscaping, etc. can help reduce high wind activity. The choice and effectiveness of these measures would depend on the exposure and orientation of the site with respect to the prevailing wind directions and the size and massing of the proposed buildings.

Conversely, in areas where higher wind velocities are desired, design measures can be implemented to enhance wind flow. For instance, channels aligned with prevailing wind directions can be integrated into the design to promote increased wind infiltration in regions prone to stagnant conditions. Such measures are particularly beneficial in areas with generally milder climates and high humidity levels, such as those closer to the equator.

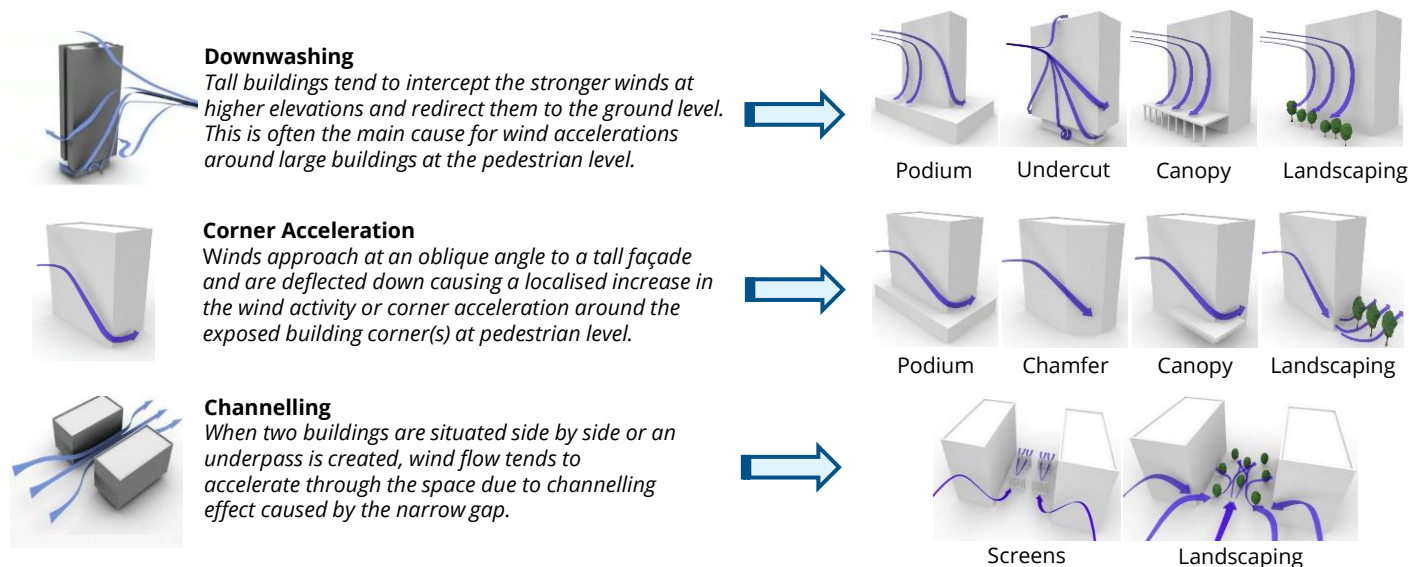


Image 5: General Wind Flow around Buildings with Examples of Common Wind Measures

5. RESULTS AND DISCUSSION



5.2 Site Exposure and Existing Site Conditions

The exposure of the site to regional prevailing winds is illustrated in Image 6 and discussed below:

1. Immediate to the north-east lies the Gore Hill Cemetery, which provides the site with upwind terrain that is relatively flat and open. This can allow prevailing north-easterly winds to approach the site with the only potential obstruction from the large row of trees along Pacific Highway.
2. The site is predominantly surrounded by low-rise residential buildings to the south and west providing reduced protection to any exposed buildings from the prevailing winds flowing from the river. The rise in terrain from these directions can also increase wind speeds.
3. The north-west of the site is similarly comprised of predominantly low-rise residential buildings providing minimal protection from the prevailing north-westerly winter winds. However, the fall in terrain to the south and west is expected to reduce these winds.

The existing site is part of a row of low to mid-rise commercial buildings with trafficable footpaths along Elcedo Lane to the west and Pacific Highway to the east. These commercial buildings are north-south aligned which is expected to divert the prevailing north-easterly and north-westerly winds along the adjacent footpaths but also provide shielding to the footpaths along Pacific Highway from the prevailing southerly summer winds. Given the above wind exposure at the project site and surrounding context, the wind impact is anticipated to be moderate with wind conditions along the Elcedo Lane and Pacific Highway footpaths ranging from standing to strolling use throughout the year.



Image 6: Exposure of Site to Regional Prevailing Winds

Top: Summer | Bottom: Winter

5. RESULTS AND DISCUSSION



5.3 Proposed Site Conditions

5.3.1 Ground Level

Wind flows on the ground level are indicated in Image 7 and discussed below:

1. The lobby entrance is recessed into the building form which is expected to create a protected area suitable for short-duration activities.
2. The north-easterly winds are expected to flow largely unobstructed over the cemetery to the north-east and divert along Pacific Highway. The existing tree planting along Pacific Highway is expected to assist in buffering these flows with conditions likely to be moderately windy.
3. Corner wind acceleration is likely to occur at the indicated locations with potential downwash from north-easterly and west to north-westerly winds affecting the southern corners of the development. Wind speed around the corners can exceed the comfort limits.
4. With the inclusion of the proposed development, a corridor is created along the south which is susceptible to strong channelling winds with conditions expected to range from walking-use to uncomfortable.
5. The prevailing north-westerly winds are expected to flow down Elcedo Lane along the western aspects of the existing and proposed buildings. The inclusion of the proposed development is not expected to significantly change the wind conditions.
6. The trafficable area to the north of the development is sheltered from direct winds with conditions expected to be calm and comfortable for passive amenity use throughout the year.

Expected Wind Comfort Levels

-  Generally calm and well-sheltered areas suitable for passive activation. Low wind risk.
-  Moderately windy. Likely to be suitable for active use. Too windy for long-duration use. Medium wind risk.
-  Windy with potential for localised strong winds. High wind risk.

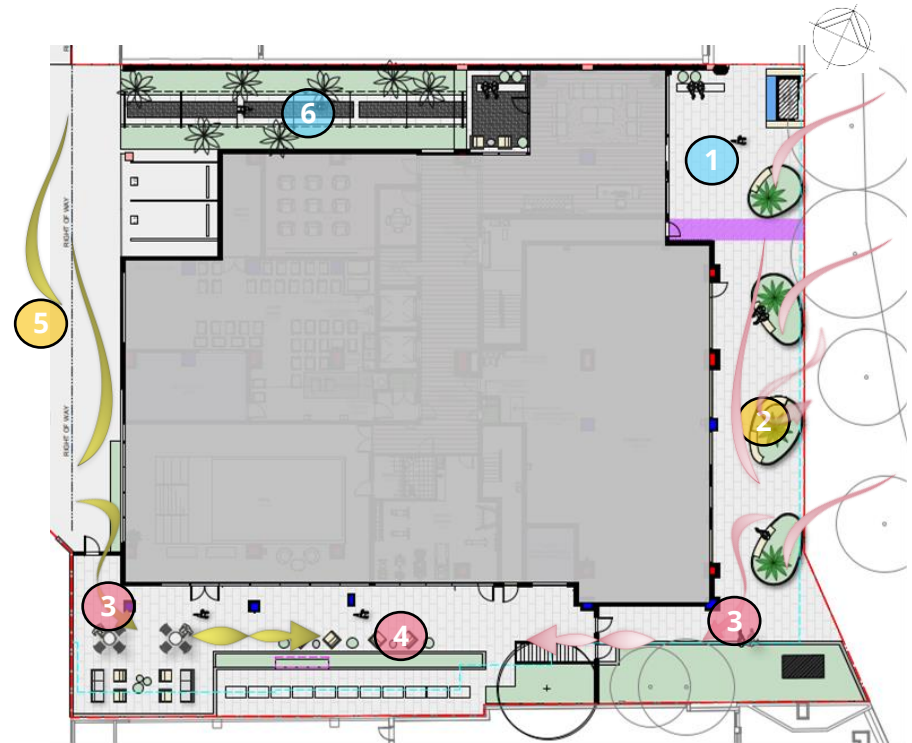


Image 7: Ground Level Wind Flows

5. RESULTS AND DISCUSSION



5.3 Proposed Site Conditions

5.3.2 Level 9 – Rooftop Terrace

The rooftop communal terrace is directly exposed to prevailing winds due to its height above the surrounding buildings. Localised wind effects such as corner wind acceleration are also expected to occur within the terrace. The proposed design of the rooftop terrace incorporates perimeter planter areas and a trellis. It is assumed that the rooftop terrace incorporates a perimeter palisade. The proposed trellis is not expected to provide a high degree of shelter due to its open design. Similarly, the perimeter palisade is not likely to provide significant shielding due to its porosity. The perimeter planting may assist in reducing winds to an extent for the parts of the terrace depending on the density and height of the planting. Hence, overall wind comfort levels are likely to be adverse ranging from walking use to potentially uncomfortable conditions.

5.3.3 Private Balconies

Most of the private balconies are inset within the planform and benefit from a single aspect design. Wind conditions within these spaces will likely be comfortable for passive use throughout the year. The south-western corner balconies, however, are exposed on the western and southern aspects and have the potential to be impacted by corner acceleration from the prevailing winds from west and north-west directions. The wind conditions within these corner balconies are expected to range from walking use to uncomfortable during winters, particularly for balconies located on Levels 5 and above.

5. RESULTS AND DISCUSSION



5.4 Design Advice and Recommendations

Based on the discussions provided and review of the proposed landscape plans (shown in Images 8 and 9), the following design advice and wind control measures are recommended (examples shown in Image 10):

5.4.1 Ground Level

- It is recommended to retain the landscaping along the Pacific Highway frontage and within the planters of the southern trafficable areas as detailed in the landscape plans. It is recommended to ensure that the trees are of an evergreen species and densely foliating.
- It is recommended to also include impermeable localised screening around the various seating areas along the southern perimeter of the site.

5.4.2 Level 9 – Rooftop Terrace

- Incorporating a perimeter impermeable screen 1.5-2 m high around the Level 9 rooftop terrace is expected provide shielding from the direct prevailing winds impacting the terrace areas.
- It is recommended to reduce the porosity of the proposed trellis to a maximum of 30% to effectively 'catch' reattaching wind flows

within the terrace areas.

- It is recommended to retain the landscaping along the perimeter of the Rooftop Garden as detailed in the landscape plans. However, the proposed trees should be of an evergreen species and densely foliating. Interspersed landscaping apart from the proposed planter boxes is also recommended to improve wind comfort levels within the spaces and, in particular, around seating spaces.

5.4.3 Private Balconies

Inclusion of impermeable or porous screening along the southern exposed aspect of the south-western corner balconies on Levels 5 and above is expected to buffer corner accelerated flows.

5. RESULTS AND DISCUSSION

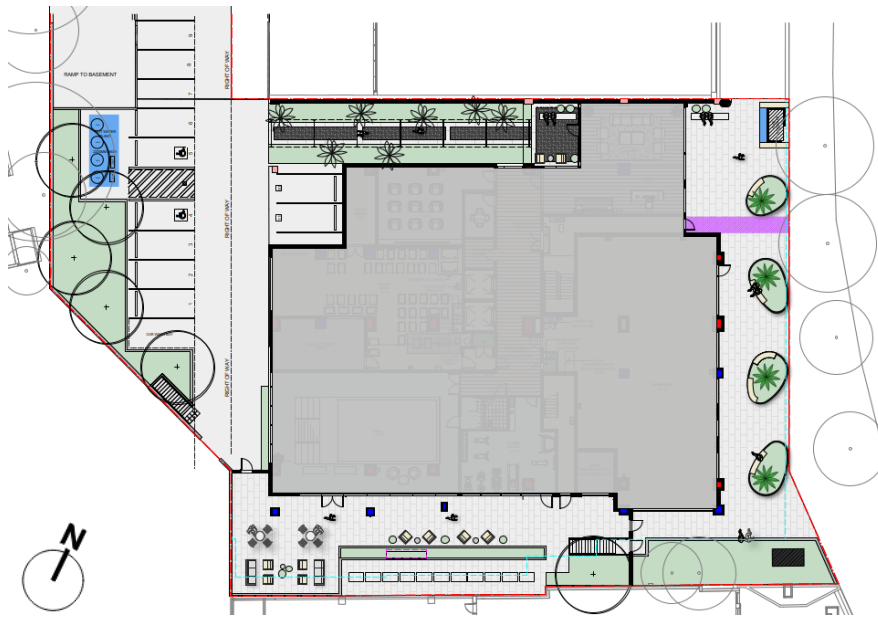


Image 8: Ground Level Landscape Layout Detail

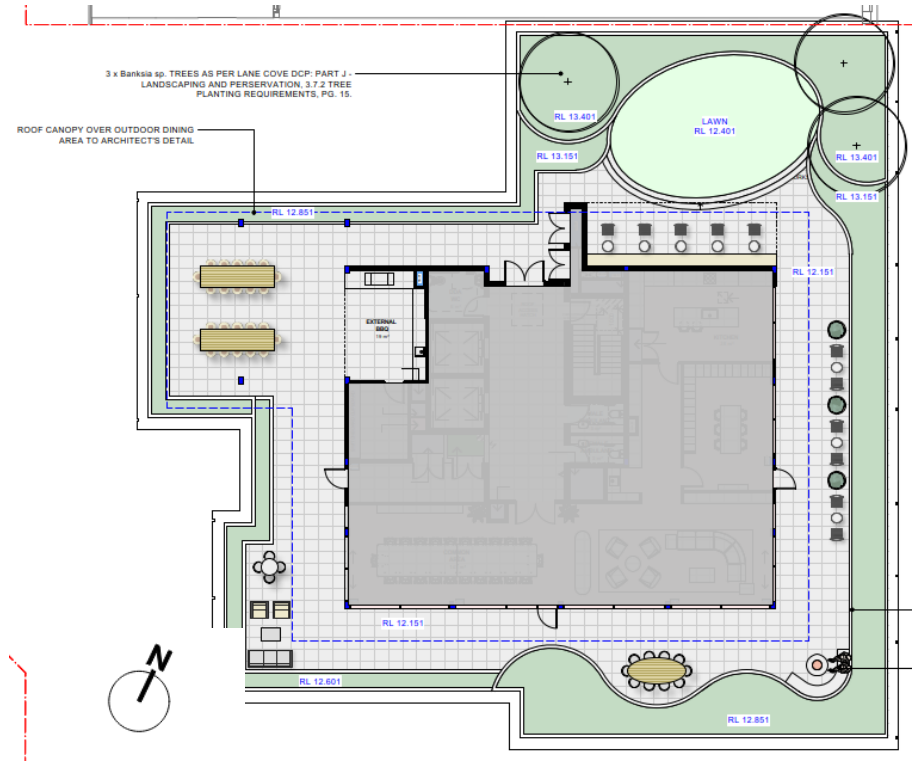


Image 9: Rooftop Garden Landscape Layout Detail

5. RESULTS AND DISCUSSION

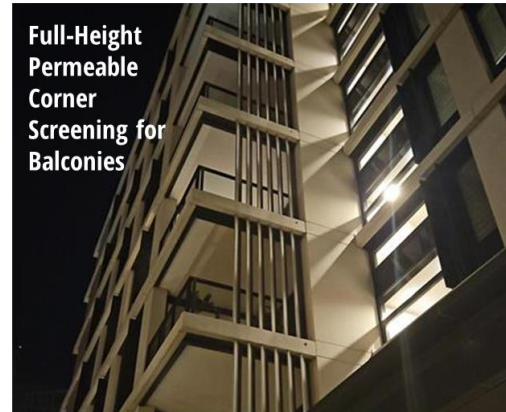
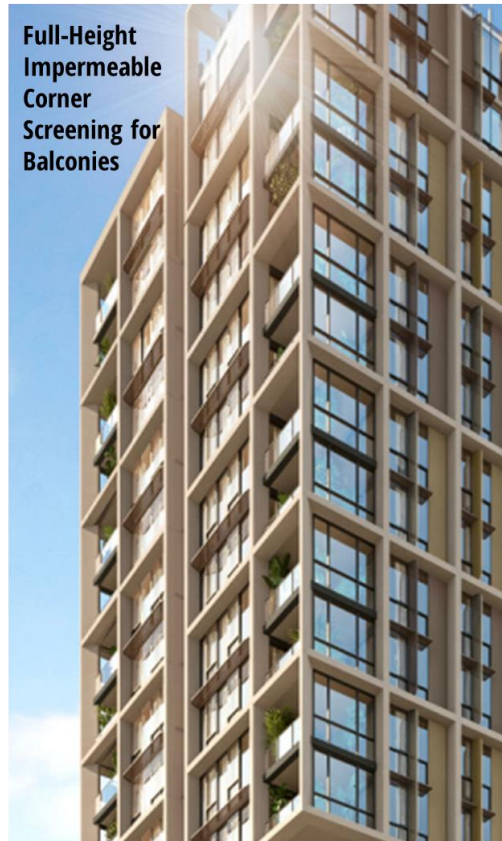


Image 10: Examples of Wind Control Measures

6. SUMMARY



Wind conditions within and around the proposed development located at 170 Pacific Highway Greenwich, NSW are discussed in this report. The qualitative assessment is based on the review of local wind climate and the current design of the proposed development. The impact of the surrounding buildings and the local land topography has also been considered. The assessment is based on RWDI's experience with wind tunnel testing and CFD analysis of similar buildings within the region.

Conceptual wind interactions around the proposed development are discussed in the report for the prevailing wind directions to identify key wind sensitive areas. The assessment indicates that the development site is generally exposed to the prevailing winds and there is minimal shielding from its surrounding context which comprises of relatively flat terrain and low-rise buildings. The assessment indicates that wind conditions around the site are expected to be adverse on some ground level trafficable areas. Furthermore, the south-western corner balconies are also expected to experience high winds during the winter season. Strong winds are also expected on the Level 9 rooftop garden areas due to its exposure to the prevailing winds.

Conceptual mitigation strategies have been provided in the report based on the proposed landscape plans. These include ground level screens around the southern seating areas, full-height screening along one of the open aspects of southwest corner private balconies on Level 5 and above, and recommendations for rooftop screening and trellises. With the inclusion of these measures, wind conditions are expected to better align with the intended use and comfort levels across the various outdoor areas of the site.

Note that this qualitative approach provides a screening-level estimation of potential wind conditions around the site and offers advice suitable for early design of buildings. To quantify and validate the predicted conditions, wind tunnel testing or computational wind simulations will be required.

7. APPLICABILITY OF ASSESSMENT



The assessment discussed in this report pertains to the proposed development in accordance with the drawings and information received on May 2025. In the event of any significant changes to the design, construction or operation of the building or addition of surroundings in the future, RWDI could provide an assessment of their impact on the wind conditions discussed in this report. It is the responsibility of others to contact RWDI to initiate this process.

Statement of Limitations

This report entitled '*170 Pacific Highway Pedestrian Wind Assessment*', dated 16 May 2025, was prepared by RWDI Australia Pty Ltd. ("RWDI"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilise the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provide.



RWDI Australia Pty Ltd (RWDI)
Suite 602, Level 6, 80 William Street
Woolloomooloo NSW 2011

Tel: +61 2 9437 4611
ABN: 86 641 303 871

1 December 2025

Realside 170 Pac Pty Ltd

Re: 170 Pacific Highway, Greenwich, NSW
RWDI Project #2508389
Pedestrian Wind Report Memo

RWDI Australia Pty Ltd (RWDI) has previously undertaken a qualitative review of the potential wind conditions around the proposed development located at 170 Pacific Highway, Greenwich NSW (Report Ref: 20250619 RWDI 2508389 REP Microclimate 170PacificHighway).

Since this initial assessment, the design has evolved and the latest Architectural drawings representing the current design of the development dated 31/10/25 (Revision B) and 16/11/25 (Revision C) have been reviewed. This review finds that the overall design of the current Proposed Development remains similar with the previously assessed design with the following key modifications relevant to wind:

- The total height of the proposed development has reduced by one storey, from 9 storeys to 8 storeys.
- The lobby entrance at the north-eastern corner of Ground Level is no longer recessed into building form, however includes a 1.8m tall impermeable wall along the north-eastern corner.
- Removal of outdoor communal areas on Level 9.
- Addition of planter areas at the south-western corner of Ground Level around seating areas.
- Addition of tree planting along the northern perimeter of Ground Level.

With the above changes to the design of the development it is expected that the wind conditions within and around the trafficable spaces of the Proposed Development will remain similar as described and assessed in the previous report. The additional proposed planting in the current design is expected to improve wind conditions within the local vicinity. While the lobby entrance is no longer recessed into the building form, the proposed impermeable wall at the north-eastern corner is expected to provide shielding to the entrance to create conditions suitable for intended uses.

RWDI confirms that the findings and recommendations provided in the previous reporting still apply to the current design of the development.





Please do not hesitate to contact us if you have any questions.

A handwritten signature in black ink, appearing to read 'Michael Pieterse'.

Michael Pieterse, M.A.Sc., CPEng, RPEN
Senior Project Manager | Associate Principal

A handwritten signature in black ink, appearing to read 'Raymond Lau'.

Raymond Lau, MIEAust
Scientist Engineer