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Metrics Real Estate Partners c/- Tango Projects

Alfred Rd & Boundary Rd, North Melbourne

Wind Impact Assessment

30N-25-0036-TNT-98280-6

29 April 2026

Job Title:	Alfred Rd & Boundary Rd, North Melbourne
Report Title:	Wind Impact Assessment
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Prepared For:	**Prepared By:**
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Revision History:

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Rev. 00	Original issue	13 Feb 2025	
Rev. 01	Updated drawings	06 Mar 2025	RI
Rev. 02	Report Update	21 Aug 2025	ZX
Rev. 03	Report Update	05 Feb 2026	ZX
Rev. 04	Minor Amendment	12 Feb 2026	ML
Rev. 05	Figure 16 Fix	27 Mar 2026	ML
Rev. 06	Updated Drawings	29 Apr 2026	ML

Executive Summary

Metrics Real Estate Partners c/- Tango Projects commissioned Vipac Engineers and Scientists Ltd to prepare a high-level review of wind effects for the ground level areas adjacent to the proposed development at **Alfred Rd & Boundary Rd**, **North Melbourne.** This appraisal is based on Vipac's experience as a wind-engineering consultancy.

Updated drawings of the proposed development were provided by **Cera Stribley** and **Fender Katsalidis** in **April 2026**.

The findings of this study can be summarized as follows:

- Wind conditions in the ground level footpath areas and access ways would be expected to be within the **walking** comfort criterion.
- The main entrances would be expected to be within the **standing** comfort criterion.
- The outdoor sitting areas would be expected to be within the **Sitting** criterion.
- The terraces/balconies would be expected to be within the recommended **walking** comfort criterion.
- The rooftop communal terraces (Level 03, Level 04, Level 06 and Level 12) are expected to have wind conditions within the recommended **standing** comfort criterion.
- The wind gusts are predicted to be within the safety criterion.

As a general statement, educating occupants about wind conditions at open terrace/balcony areas during high-wind events and fixing loose, lightweight furniture on the terrace is highly recommended.

The assessments provided in this report have been made based on experience of similar situations in Melbourne and around the world. As with any opinion, it is possible that an assessment of wind effects based on experience and without experimental validation may not account for all complex flow scenarios in the vicinity.

Vipac recommends a scaled wind tunnel study or CFD simulations be conducted in the detail design stage to quantity the wind conditions and determine the proper wind control measures wherever necessary.

Table of Contents

1 Introduction

Vipac Engineers and Scientists has been commissioned by **Metrics Real Estate Partners c/- Tango Projects** to carry out a high level review of the pedestrian wind effects at the ground level of the proposed development at **Alfred Rd & Boundary Rd**, **North Melbourne.**

Strong winds in pedestrian areas are frequently encountered in central business districts of cities around the world, including Sydney, Melbourne, and Brisbane. Wind characteristics such as the mean speed, turbulence and ambient temperature determine the extent of disturbance to users of pedestrian areas. These disturbances can cause both comfort and safety problems and require careful consideration to mitigate successfully.

The proposed development has 3 precincts: Precinct 01- Lower and Ground + 15 levels, Precinct 02- Lower and Ground + 14 levels and Precinct 03- Lower and Ground + 15 levels. The roof height of Precinct 01 is 58.6 m from the ground level. The site is bounded by Alfred Street to the north, City Link (Toll Road) to the west, Boundary Road to the east and existing development to the south. A site plan of the proposed development and the north elevation of the buildings are shown in Figure 1 and Figure 2, respectively.

This report details the opinion of Vipac as an experienced wind engineering consultancy regarding the wind effects in ground level footpath areas adjacent to the development as proposed. No wind tunnel testing has been carried out for this development at this stage. Vipac has carried out wind tunnel studies on many developments of similar shape and having similar exposure to that of the proposed development. These serve as a valid reference for the prediction of wind effects. Empirical data for typical buildings in boundary layer flows has also been used to estimate the likely wind conditions on the ground level areas of the proposed development [2] & [3].

Updated drawings of the proposed development were supplied to Vipac by **Cera Stribley** and **Fender Katsalidis** in **April 2026**. A list of drawings supplied is provided in Appendix C of this report.

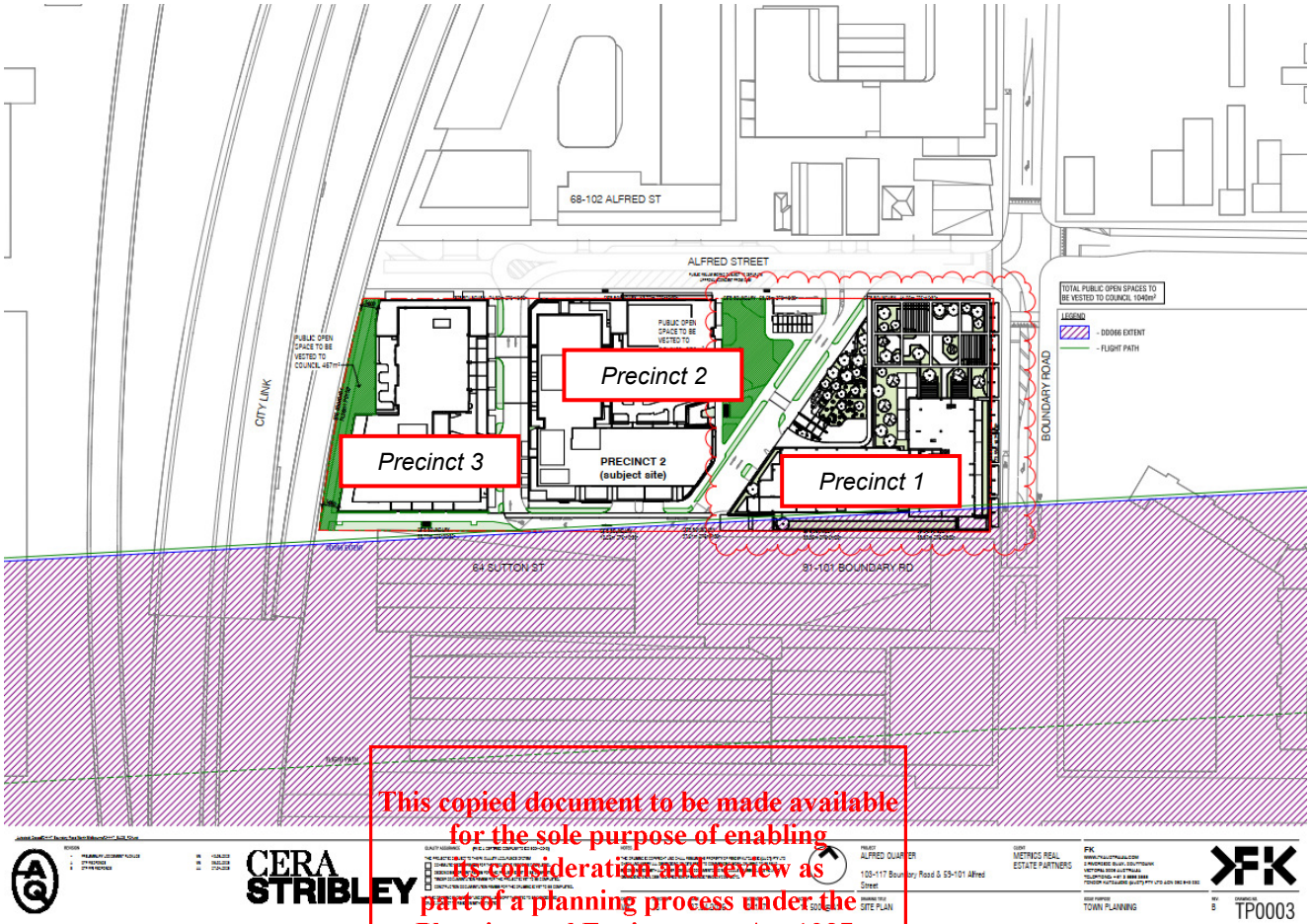


Figure 1: Aerial view of the proposed development site.

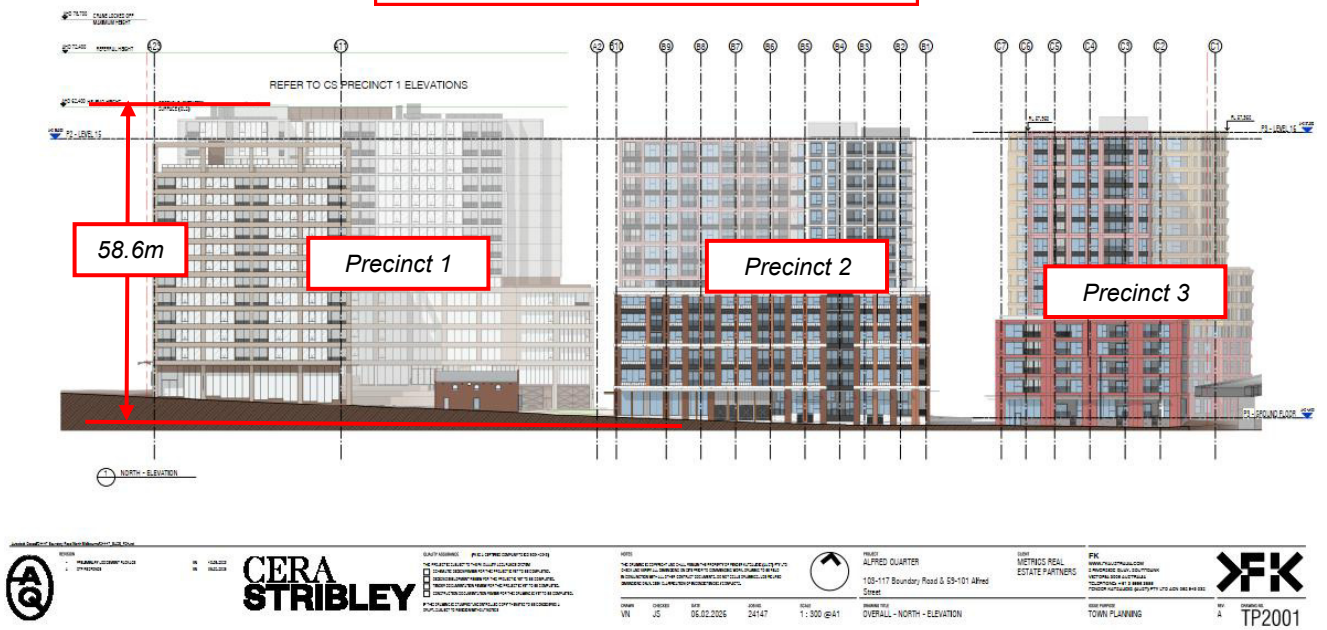


Figure 2: North elevation of the proposed development.

2 Analysis Approach

In assessing whether a proposed development is likely to generate adverse wind conditions in ground level footpath areas, Vipac has considered the following five main points:

- The exposure of the proposed development to wind.
- The regional wind climate.
- The geometry and orientation of the proposed development.
- The interaction of flows with adjacent developments.
- The assessment criteria determined by the intended use of the areas affected by wind flows generated or augmented by the proposed development.

The pedestrian wind comfort at specific locations of ground level footpath areas may be assessed by predicting the gust and mean wind speeds with a probability of 0.1% and 20% expected at that location. The location may be deemed generally acceptable for its intended use while gust and mean wind speeds are within the threshold values noted in Section 2.5. Where Vipac predicts that a location would not meet its appropriate comfort criterion, the use of wind control devices and/or local building geometry modifications to achieve the desired comfort rating may be recommended. For complex flow scenarios or where predicted flow conditions are well more than the recommended criteria, Vipac recommends scale model wind tunnel testing to determine the type and scope of the wind control measures required to achieve acceptable wind conditions.

2.1 Site Exposure

The proposed development is surrounded within an approximately 3 km radius by a range of industrial and residential low to mid rise buildings with the Melbourne CBD to the southeast and parklands and golf course to the east containing numerous closely spaced obstructions. A satellite image of these site surroundings is shown in Figure 3.

Considering the immediate surroundings and terrain, for the purposes of this study, the site of the proposed development is assumed to be within Terrain Category 3.5 for southeast to SSE directions (130 – 170 azimuthal degrees) and the Terrain Category 3 for other directions (Figure 3).

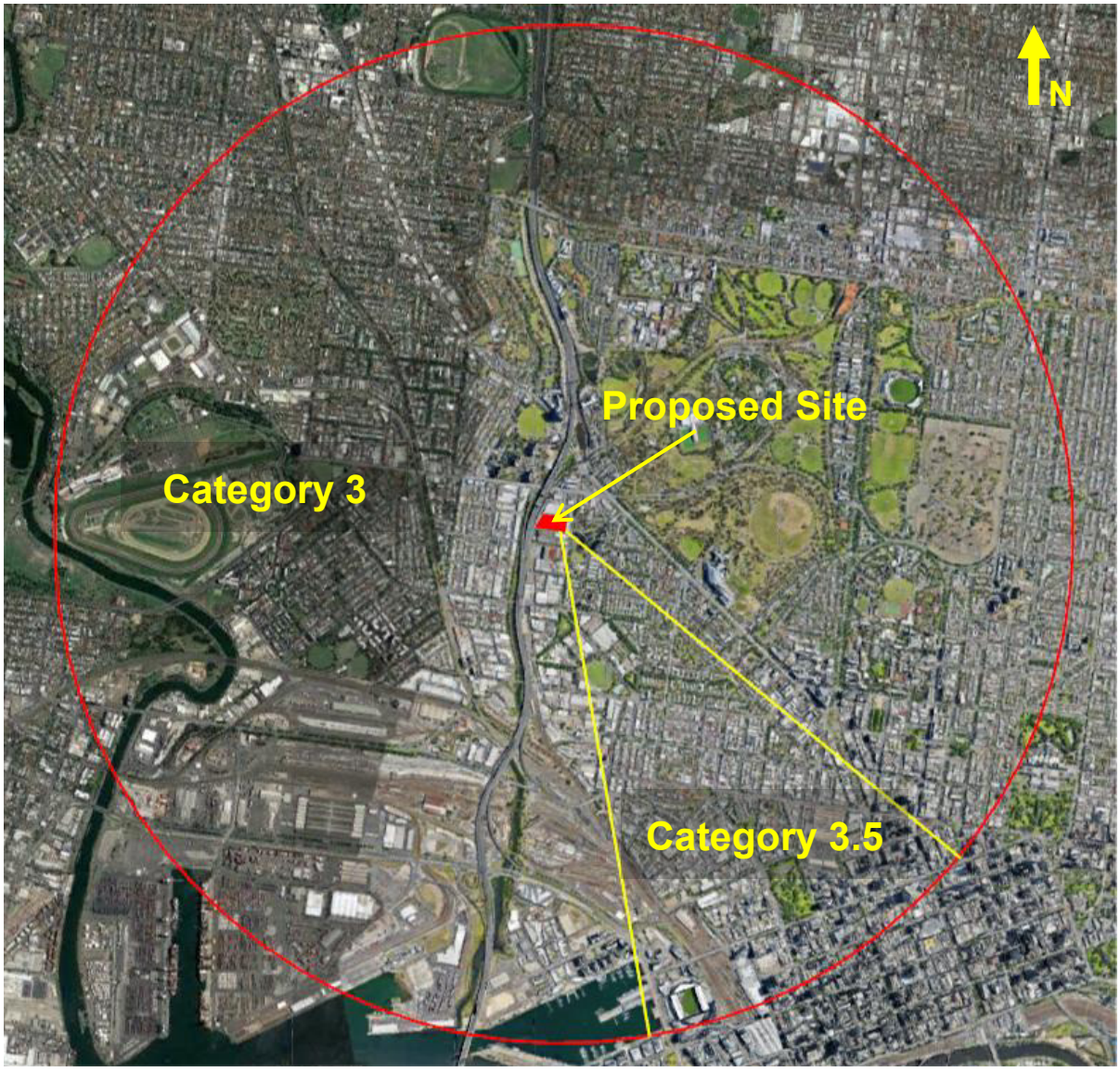


Figure 3: Assumed terrain categories for wind speed estimation.

2.2 Regional Wind Climate

The mean and gust wind speeds have been recorded in the Melbourne area for over 30 years. This data has been analysed and the directional probability distribution of wind speeds has been determined. The directional distribution of hourly mean wind speed at the gradient height, with a probability of 0.1% of time and 20% of time exceeded are shown in Figure 4. The wind data at this free stream height is common to all Melbourne city sites and may be used as a reference to assess ground level wind conditions at the site.

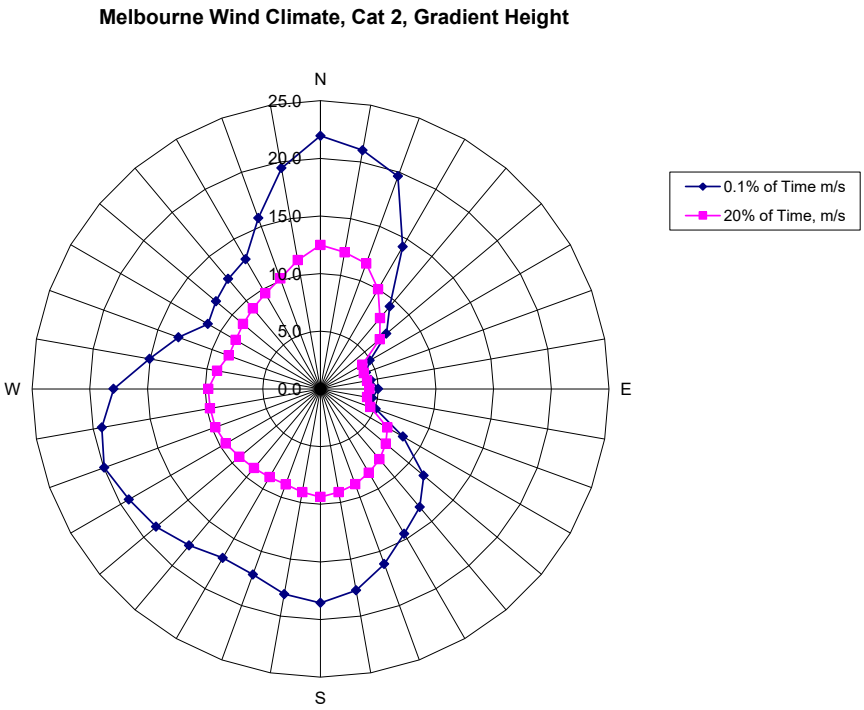


Figure 4: Directional Distribution of Mean Hourly Wind Velocities (m/s) for 0.1% and 20% exceeded at Gradient Height for Melbourne.

2.3 Building Geometry and Orientation

The proposed development has 3 precincts. The overall plan-form dimensions of the site are approximately 73.5 m x 198.7 m as shown in Figure 5. The main entrances for the buildings are shown in Figure 5 as *marked with the red circles*. The development incorporates tower setbacks on a podium from most surrounding street boundaries.

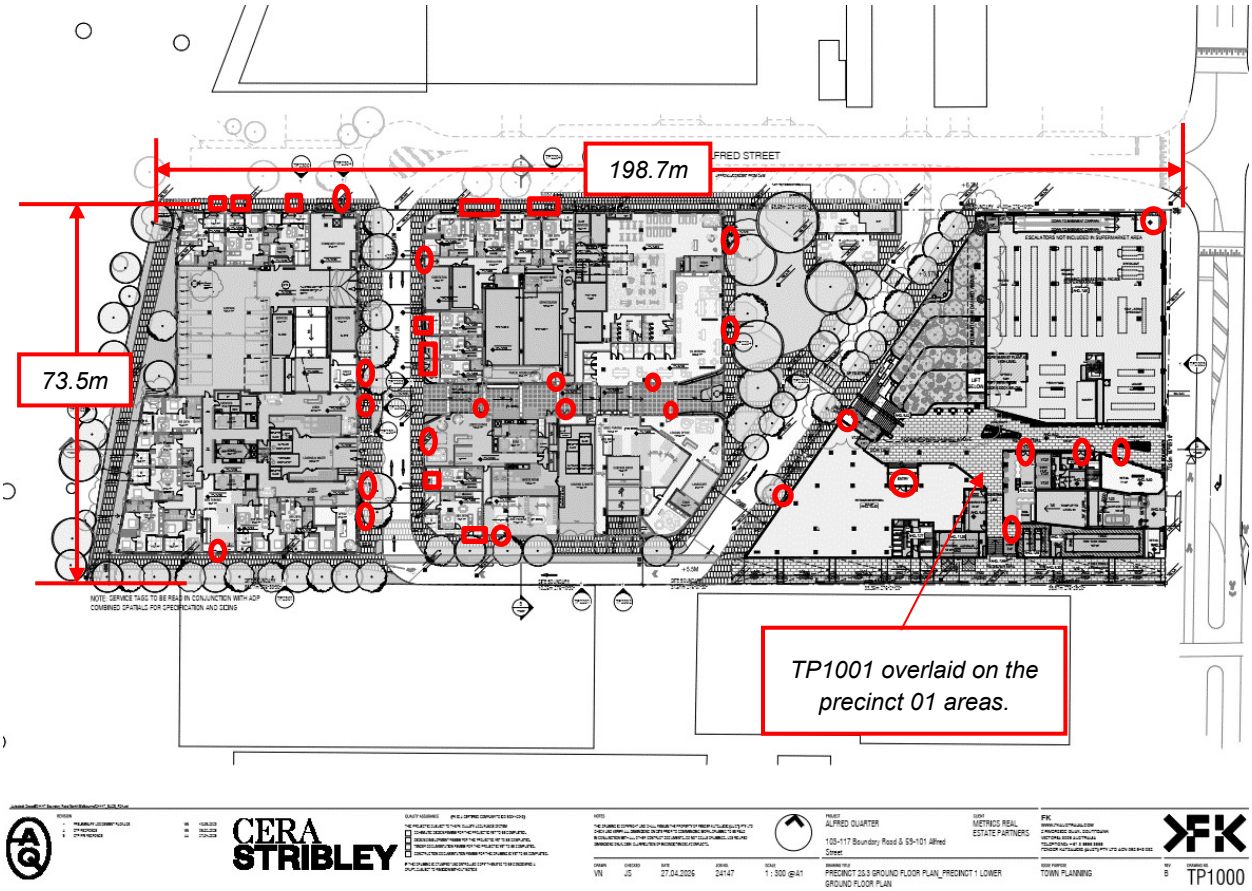


Figure 5: Ground floor plans with the overall dimensions overlaid.

2.4 Flow interactions with Adjacent Developments

The immediately adjacent developments are shown in Figure 6. There are buildings varying from 1-2 storeys surrounding the development, with a 40 m tower to the southeast and raised highway to the west. The development is exposed to winds from all directions and is expected to experience downwash and corner acceleration effects for northerly and westerly winds. There are also future developments planned in for the buildings immediately adjacent to the site at 68-102 Alfred St, 103-109 Boundary Road, and 115-117 Boundary Road. These will provide some shielding in the future. The communal terraces are also very exposed to winds from multiple directions.

Figure 6: Immediately adjacent surroundings and their approximate height in meters.

2.5 Assessment Criteria

The following wind comfort criteria detailed in Table 1 were applied in this study.

Table 1: Wind Comfort Criteria as per Clause 58.04-4

Unsafe	Comfortable
Annual maximum 3 second gust wind speed exceeding **20m/sec** with a probability of exceedance of 0.1% considering at least 16 wind directions.	Hourly mean wind speed or gust equivalent mean speed from all wind directions combined with probability of exceedance less than 20% of the time, equal to or less than: **3m/sec** for sitting areas (outdoor cafés) **4m/sec** for standing areas (window shopping, queuing) **5m/sec** for walking areas (steady steps for most pedestrians)

This criterion specifically calls for the safety criterion to be used to assess infrequent winds (e.g. peak event of ≤ 0.1% of the time); and the perceived pedestrian comfort to be assessed based on frequently occurring winds (e.g. winds that occurs 80% of the time).

In Table 1, the mean wind velocity is defined as the maximum of hourly mean or gust equivalent mean (Gust/1.85)

This criterion specifies that safe and comfortable wind conditions must be achieved in publicly accessible areas within a distance equal to half the longest width of the building measured from all facades or half the overall height of the building, whichever is greater, as shown in Figure 7.

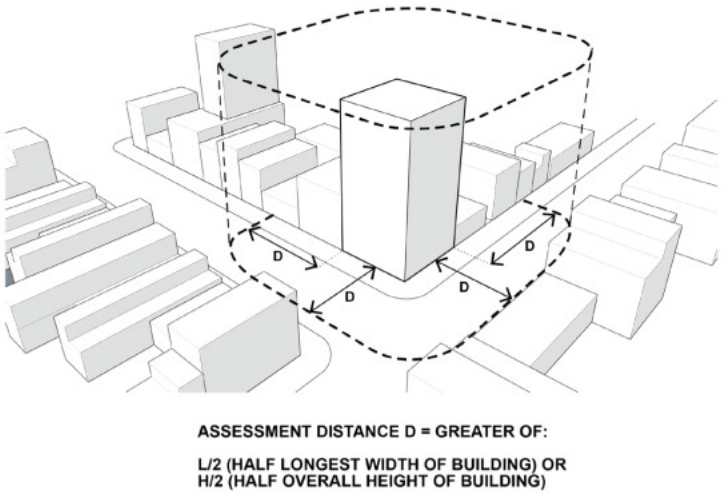


Figure 7: Assessment distance.

2.5.1 Use of Adjacent Pedestrian Occupied Areas & Recommended Comfort Criteria

The consideration of the (intended) function of the environment heavily influences the appropriateness of the recommended wind comfort criteria. For example, people frequenting locations such as parks are will likely tolerate a windier environment when compared to people dining at an outdoor café.

This is partly due to the pedestrian's judgement in clothing and predetermined expectation of the wind environment and partly due to the sensitivity of their activities to wind. For example, patrons at outdoor dining areas are highly sensitivity to wind due to the stationary nature of the activity; whereas pedestrians on the public footpaths may maintain a level of comfort under otherwise uncomfortable conditions by partaking in general activities performed on the footpath such as walking.

The following table lists the specific areas adjacent to the proposed development and the corresponding recommended criteria.

Table 2: Recommended application of criteria

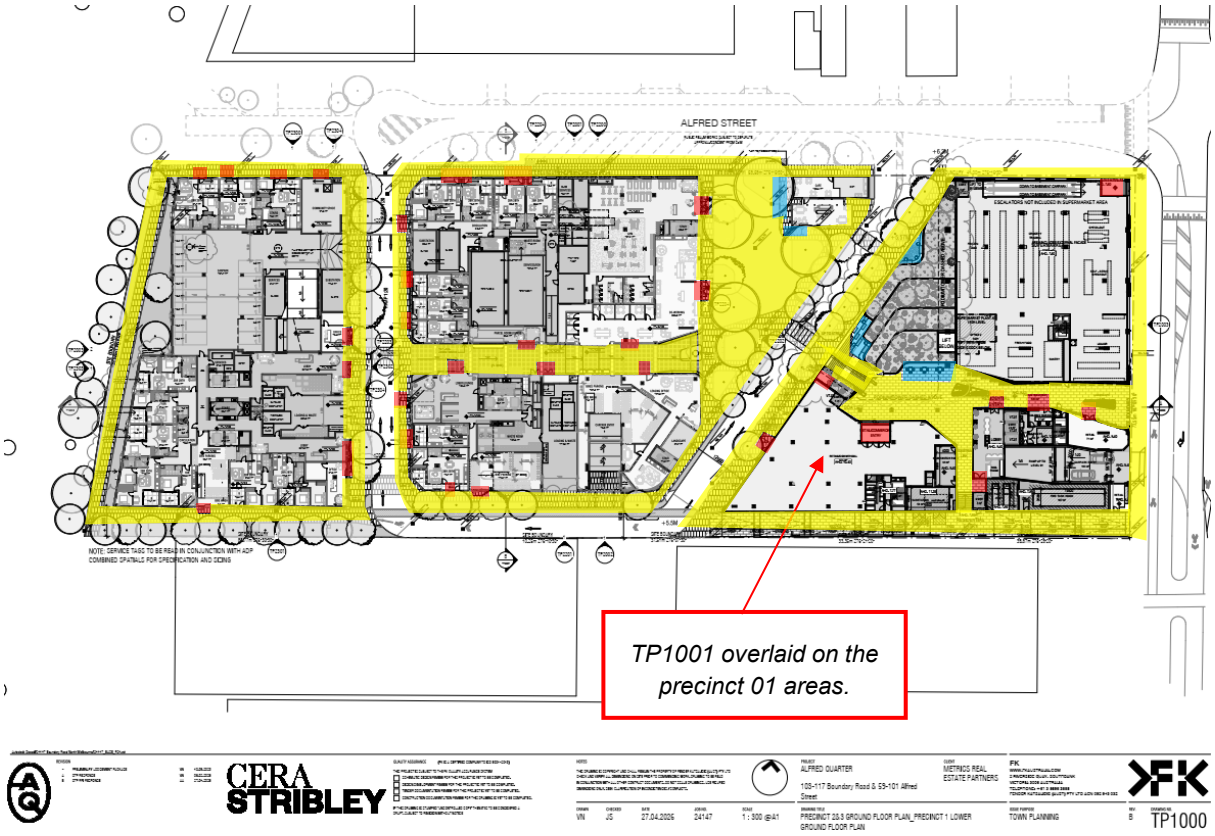
Area	Specific location	Recommended Criteria
Public Footpaths, Access ways	Along Alfred Street, Boundary Road, Access spaces between buildings and covered arcade (Figure 8)	Walking
Building Entrances	Main building entrances throughout site (Figure 8)	Standing
Seated Areas	Between Precinct 1 and Precinct 2	Sitting
Terraces/balconies	Most levels	Walking (see discussion below)
Communal Terrace	Level 3 of Precinct 2 (Figure 9), Level 4 of Precinct 3 (Figure 10) Level 6 (Figure 11) and Level 12 of precinct 1 (Figure 12)	Standing (see discussion below)

2.5.2 Terrace / Balcony Recommended Criterion Discussion

There are open landscaped terraces and communal terraces located at Levels 3, 4 and 12 of the development and private balconies/terraces at various levels. Vipac recommends as a minimum that balcony/terrace areas meet the criterion for walking since:

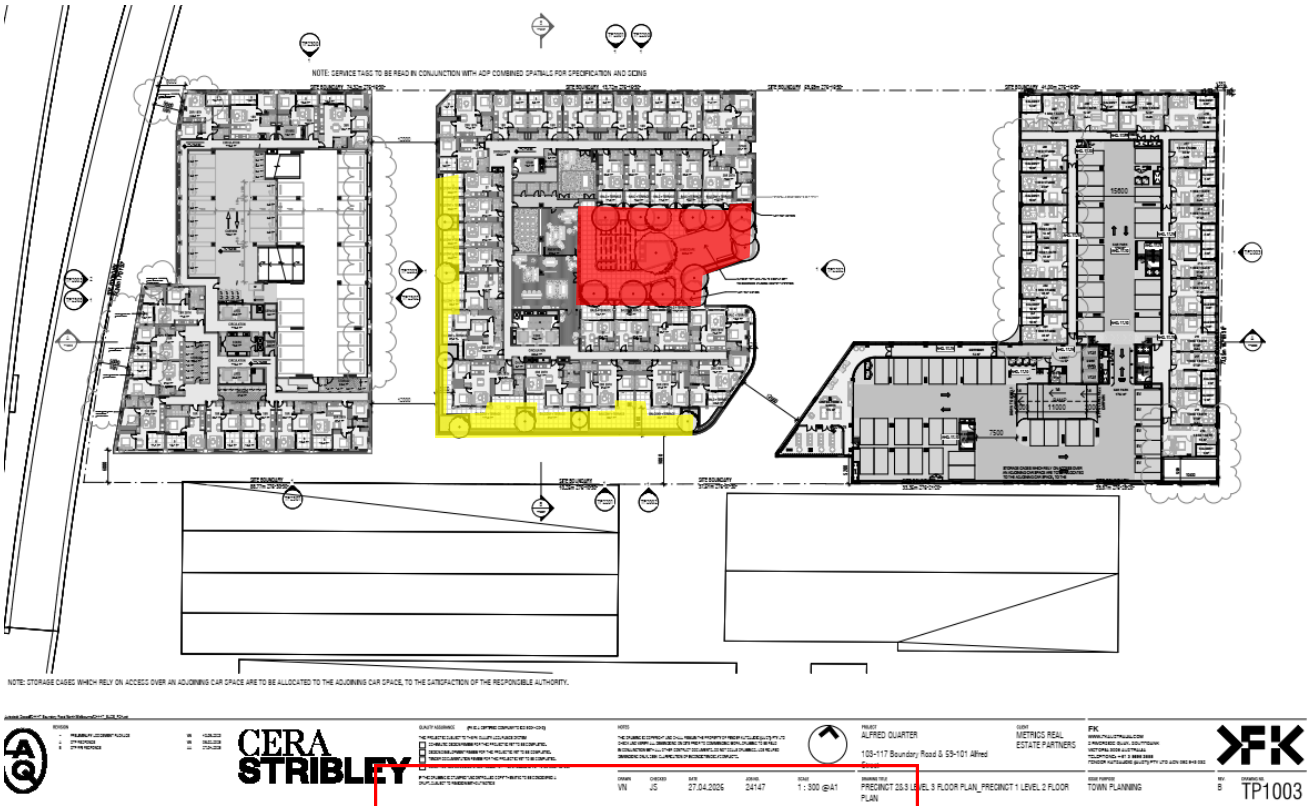
- these areas are not public spaces;
- the use of these areas is optional, and only intended to be used on fair weather days with calm winds;
- residents at private open spaces can chose to retreat indoors during uncomfortable wind conditions, whiel a pedestrian or person using a public area may not have this option.
- many similar developments in Melbourne and other Australian capital cities experience wind conditions on balconies and elevated deck areas in the vicinity of the criterion for walking.

In this study, the communal terrace at Level 3, Level 4 and Level 12 are assessed against the more stringent standing criterion.



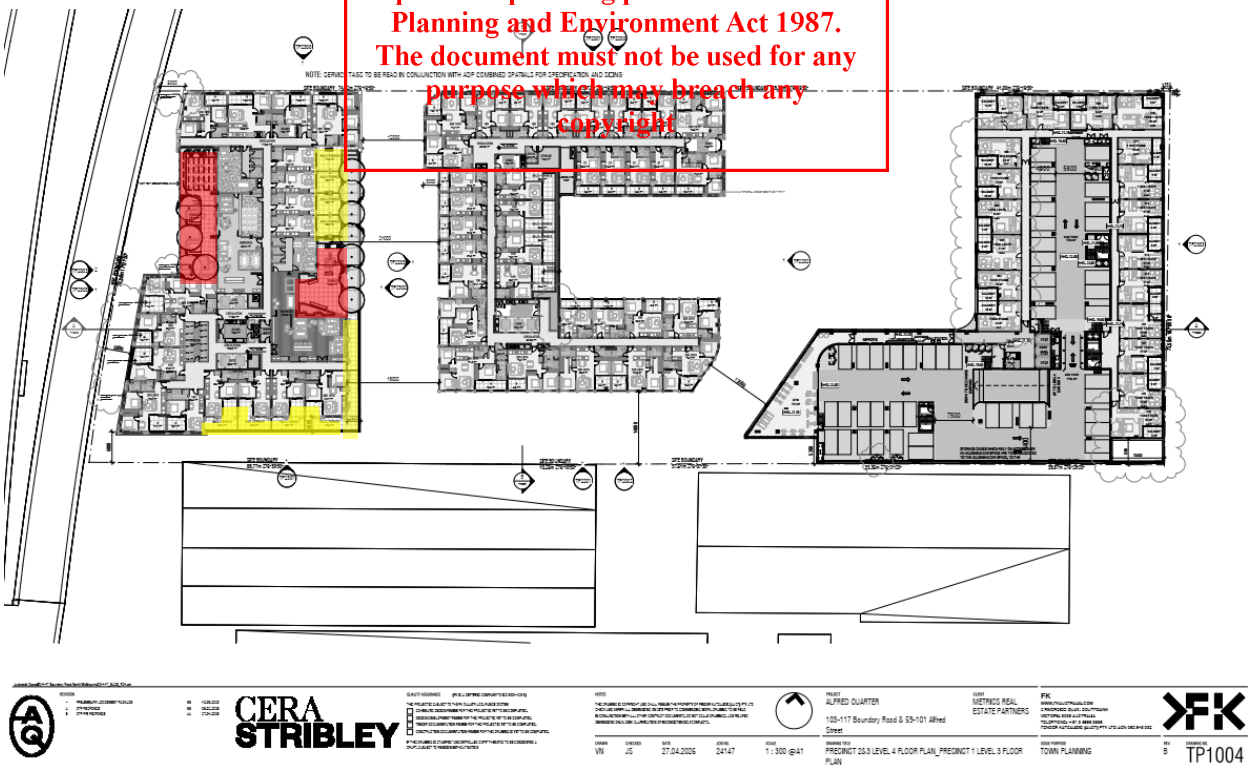
Recommended to fulfil Walking *Recommended to fulfil Standing* *Recommended to fulfil Sitting*

Figure 8: Ground floor plans with recommended wind criteria overlaid.



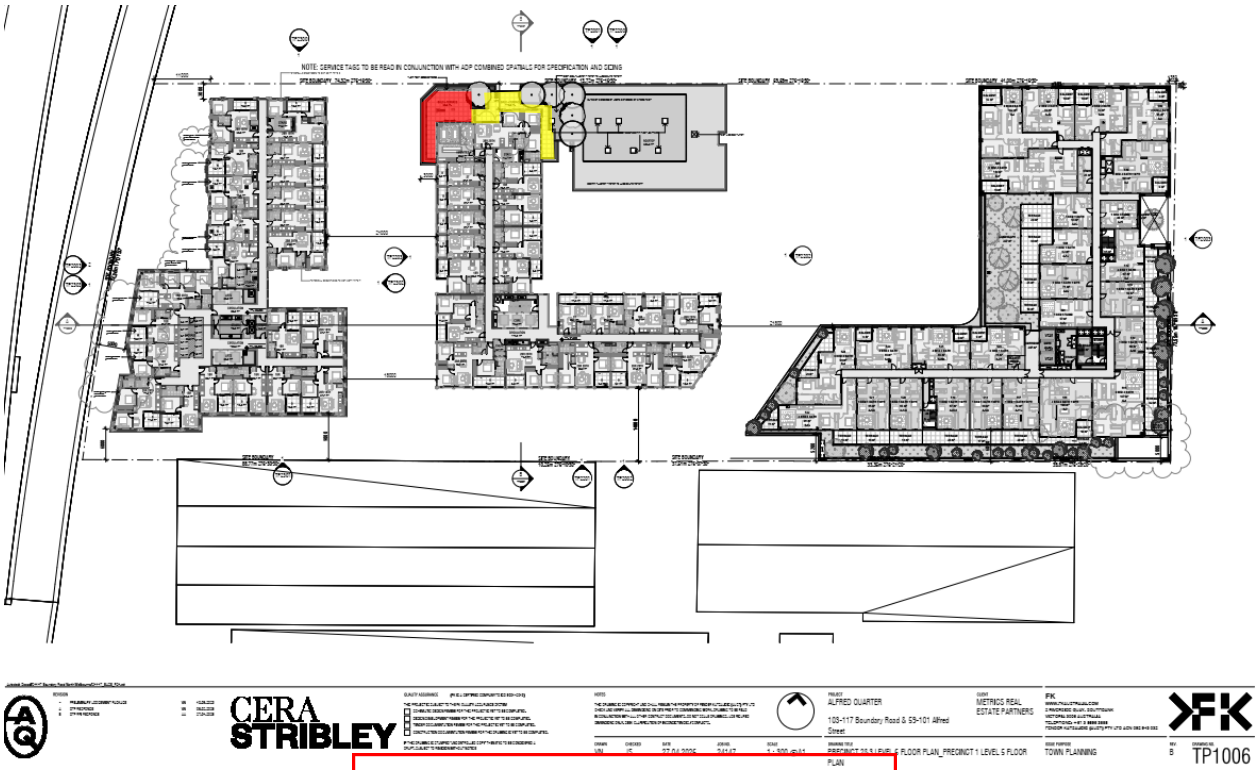
Recommended to fulfil Walking Recommended to fulfil Standing

Figure 9: Level 3 plan (Precinct 2) with recommended wind criteria overlaid.



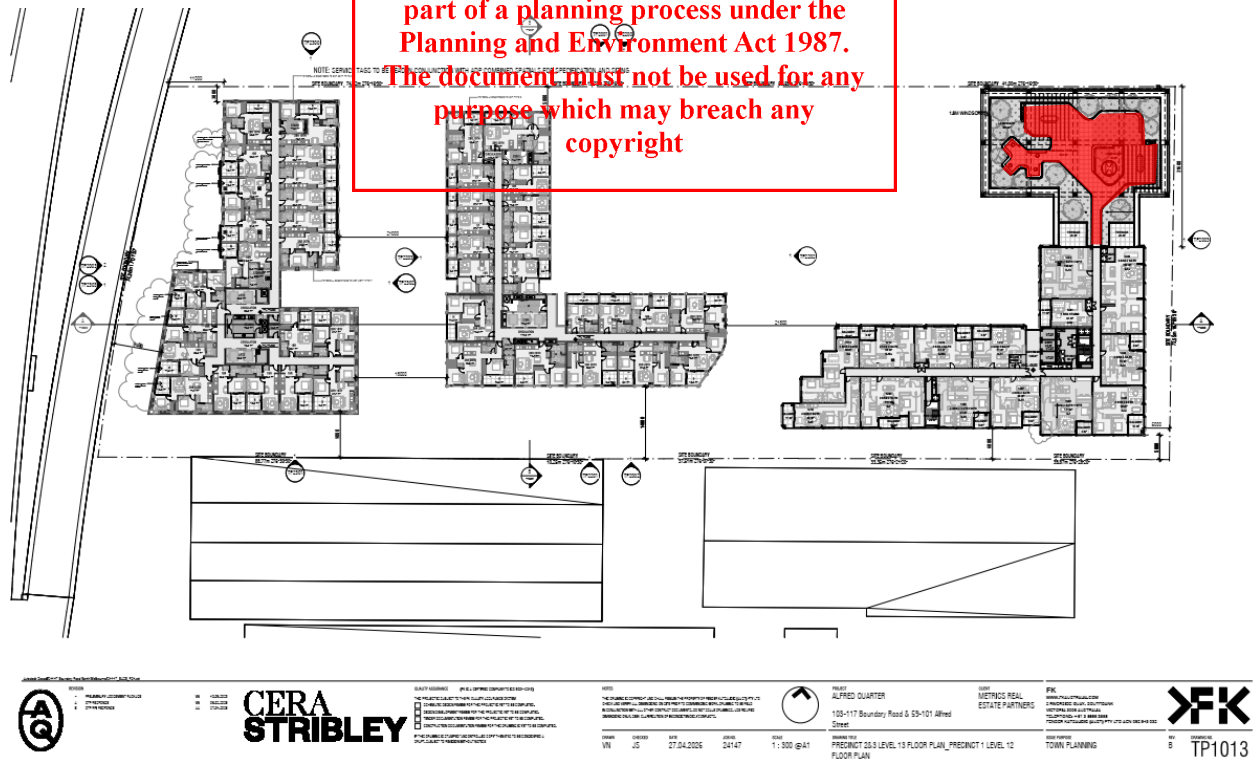
Recommended to fulfil Walking Recommended to fulfil Standing

Figure 10: Level 4 plan (Precinct 3) with recommended wind criteria overlaid.



Recommended to fulfil Walking *Recommended to fulfil Standing*

Figure 11: Level 6 plan (Precinct 1) with recommended wind criteria overlaid.



Recommended to fulfil Standing

Figure 12: Level 12 plan (Precinct 1) with recommended wind criteria overlaid.

3 Pedestrian Level Wind Effects

3.1 Discussion & Recommendations

Due to the proposed height above the surrounding areas, the proposed development is particularly exposed to adverse northerly winds. Such that high wind levels are expected along Alfred Street and the two northeast corners of Precinct 1 and Precinct 2. The Precincts 1, 2 and 3 have a setback design from some of the boundaries from level 5, level 4, and level 5, respectively. These tower setbacks are expected to be beneficial to the wind environment on the ground floor; such that the surrounding pedestrian streetscape is expected to be within the recommended walking comfort criterion. The Precinct 1 building does not have set back from north and east boundaries. As such, the wind conditions at the northeast corner areas are expected to be the highest. It is recommended that a 2 m deep canopy to be applied around this corner (Figure 13).

Main entrances are expected to be within the recommended standing comfort criterion.

The outdoor seating areas might have some high wind conditions. Thus, 1.2m windscreens/box-planters are recommended at the edge of the sitting areas (Figure 13).

The garden areas at Level 3 of Precinct 2 are expected to fulfil the recommended standing criterion or better.

The western communal terrace at Level 4 of precinct 3 is relatively exposed to westerly winds. With the standing comfort criterion is targeted, it is recommended that the balustrades along the outer boundaries be raised to 1.5m high (Figure 14).

The northwest communal terrace at Level 6 of precinct 2 is relatively exposed to north-westerly winds. With the standing comfort criterion is targeted, it is recommended that the balustrades along the outer boundaries be raised to 1.5m high (Figure 15).

The rooftop communal terrace at Level 12 of precinct 1 is relatively exposed to northerly and westerly winds. With the proposed 1.8 m high windscreens along the outer boundaries and landscaping (Figure 16), the terrace is expected to fulfil the recommended standing comfort criterion. Some areas of the terrace might achieve sitting conditions.

The gusts generated by the proposed development are expected to be within the safety criterion.

It should be noted that this study is based on experience only and has not utilised any experimental data for the analysis.

Vipac recommends a scaled wind tunnel study or CFD simulations to be conducted in design stage to quantity the wind conditions and determine the proper wind control measures wherever necessary.

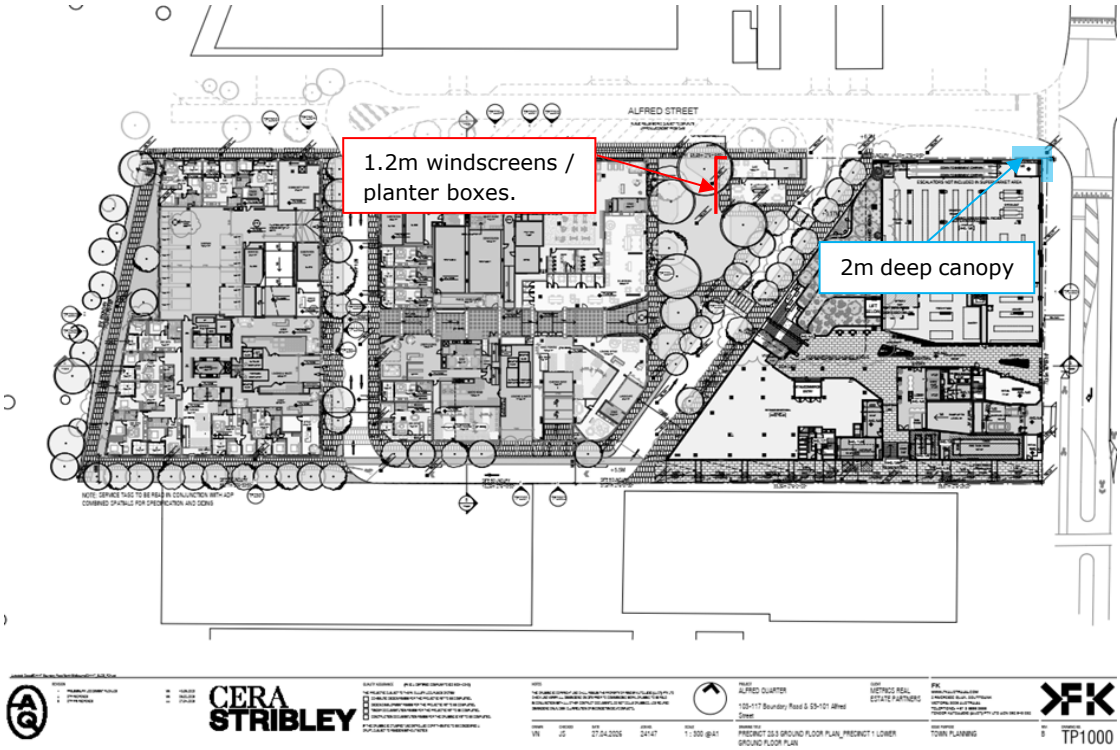


Figure 13: Ground floor plans with the recommended wind control measures overlaid.

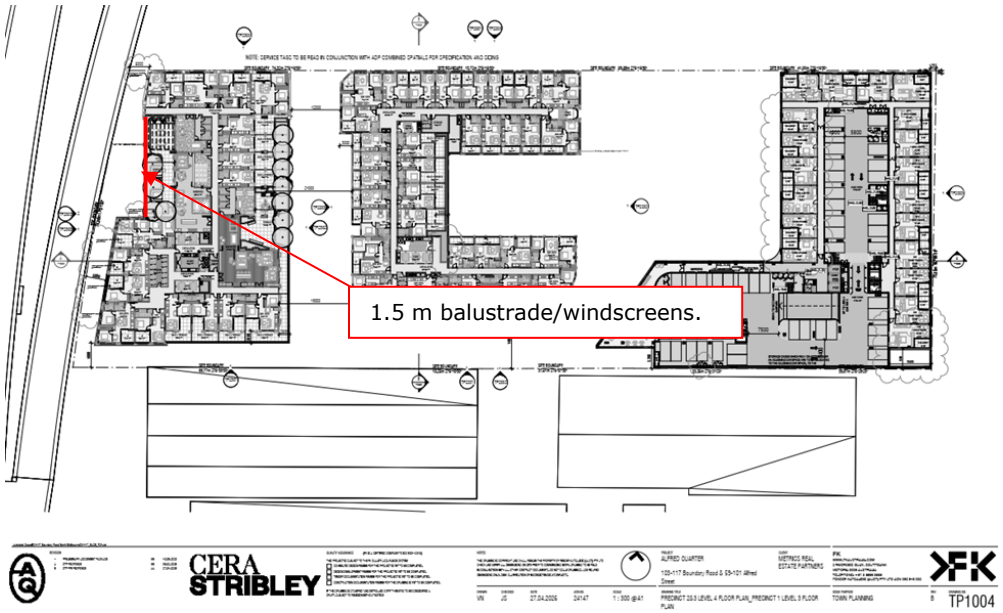


Figure 14: Level 4 (precinct 03) plan with the recommended wind control measures overlaid.

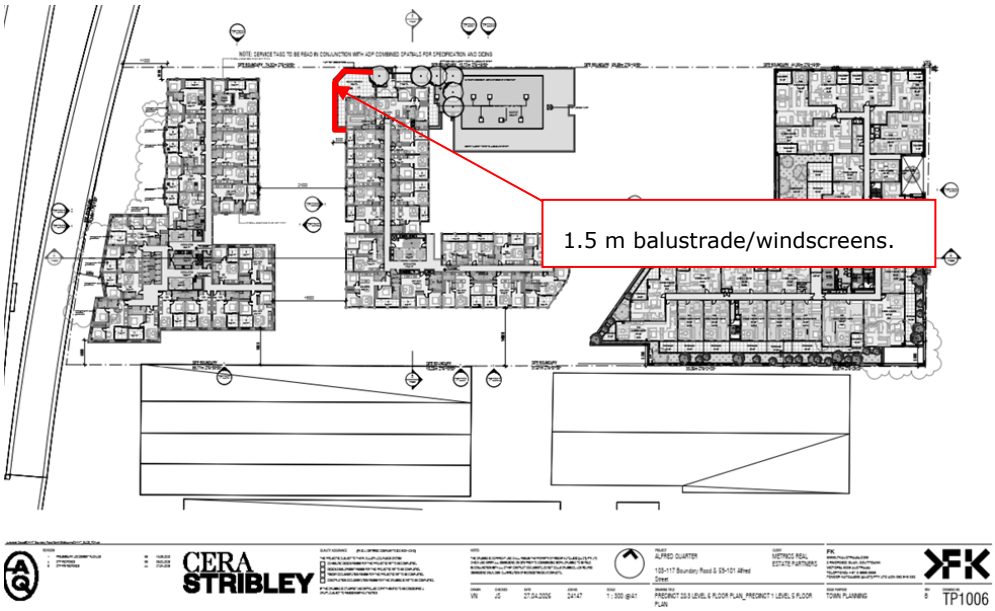


Figure 15: Level 6 (precinct 02) plan with the recommended wind control measures overlaid.

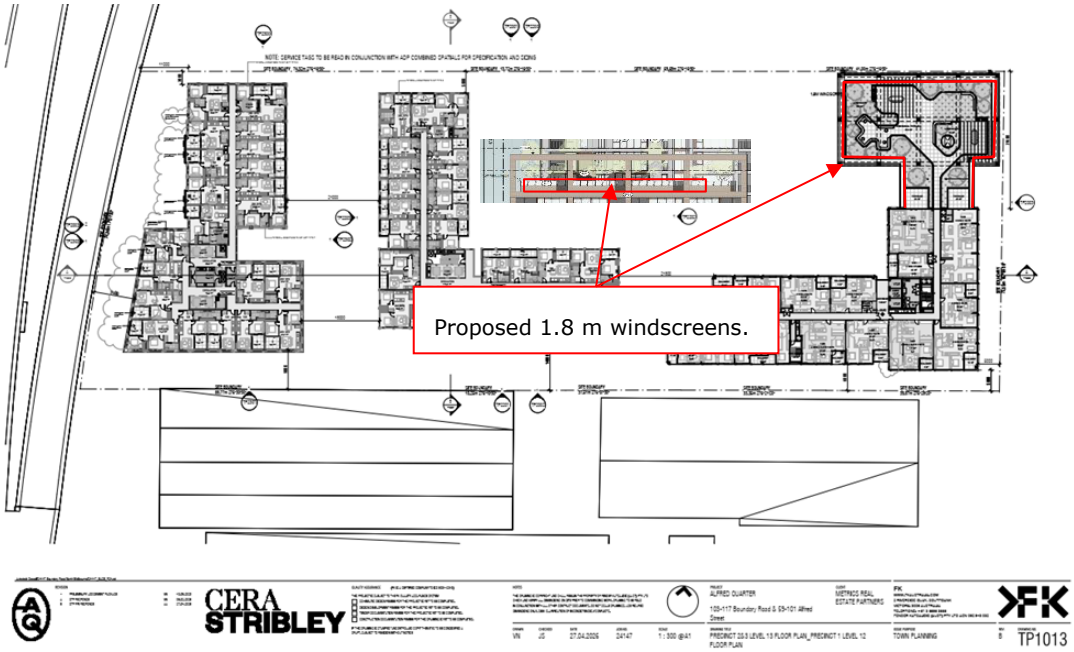


Figure 16: Level 12 plan (precinct 01) with the proposed wind control features overlaid.

4 Conclusions

An appraisal of the likely wind conditions at the pedestrian ground level and terrace areas of the proposed development at **Alfred Rd & Boundary Rd**, **North Melbourne** has been made.

Vipac has carefully considered the form and exposure of the proposed development, nominated criteria for various public areas according to their function and referred to past experience to produce our opinion of likely wind conditions.

The findings of this study can be summarised as follows:

With proposed design and the recommendations:

- Wind conditions in the ground level footpath areas and access ways would be expected to be within the **walking** comfort criterion.
- The main entrances would be expected to be within the **standing** comfort criterion.
- The outdoor sitting areas would be expected to be within the **Sitting** criterion.
- The terraces/balconies would be expected to be within the recommended **walking** comfort criterion.
- The rooftop communal terraces (Levels 03, 04, 06 and 12) are expected to have wind conditions within the recommended **standing** comfort criterion.
- The wind gusts are predicted to be within the safety criterion.

As a general statement, educating occupants about wind conditions at open terrace/balcony areas during high-wind events and fixing loose, lightweight furniture on the terrace is highly recommended.

The assessments provided in this report have been made based on experience of similar situations in Melbourne and around the world. As with any opinion, it is possible that an assessment of wind effects based on experience and without experimental validation may not account for all complex flow scenarios in the vicinity.

Vipac recommends a scaled wind tunnel study or CFD simulations be conducted in the detail design stage to quantity the wind conditions and determine the proper wind control measures wherever necessary.

This Report has been Prepared

For

Metrics Real Estate Partners c/- Tango Projects

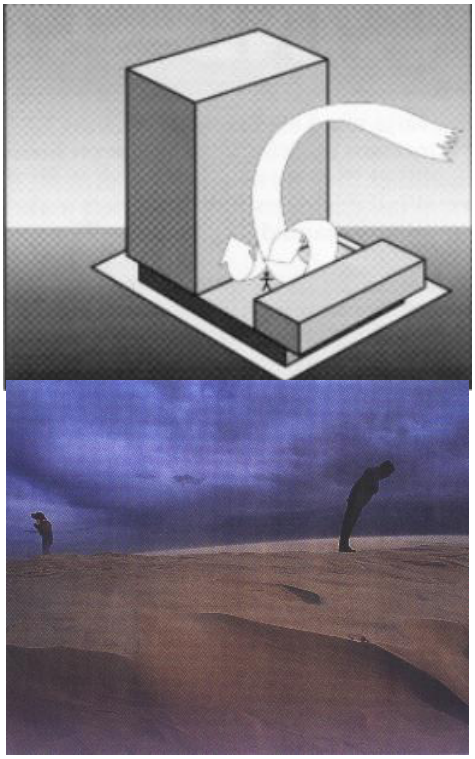
By

VIPAC ENGINEERS & SCIENTISTS PTY LTD.

Appendix A Environmental Wind Effects

Atmospheric Boundary Layer

As wind flows over the earth it encounters various roughness elements and terrain such as water, forests, houses and buildings. To varying degrees, these elements reduce the mean wind speed at low elevations and increase air turbulence. The wind above these obstructions travels with unattenuated velocity, driven by atmospheric pressure gradients. The resultant increase in wind speed with height above ground is known as a wind velocity profile. When this wind profile encounters a tall building, some of the fast-moving wind at upper elevations is diverted down to ground level resulting in local adverse wind effects.



The terminology used to describe the wind flow patterns around the proposed development is based on the aerodynamic mechanism, direction and nature of the wind flow.

Downwash – refers to a flow of air down the exposed face of a tower. A tall tower can deflect a fast-moving wind at higher elevations downwards.

Corner Accelerations – when wind flows around the corner of a building it tends to accelerate in a similar manner to airflow over the top of an aeroplane wing.

Flow separation – when wind flowing along a surface suddenly detaches from that surface and the resultant energy dissipation produces increased turbulence in the flow. Flow separation at a building corner or at a solid screen can result in gusty conditions.

Flow channelling – the well-known "street canyon" effect occurs when a large volume of air is funnelled through a constricted pathway. To maintain flow continuity the wind must speed up as it passes through the constriction. Examples of this might occur between two towers, in a narrowing street or under a bridge.

Direct Exposure – a location with little upstream shielding for a wind direction of interest. The location will be exposed to the unabated mean wind and gust velocity. Piers and open water frontage may have such exposure.

Appendix B References

[1] *Structural Design Actions, Part 2: Wind Actions*, Australian/New Zealand Standard 1170.2:2021

[2] *Wind Effects on Structures* E. Simiu, R Scanlan, Publisher: Wiley-Interscience

[3] *Architectural Aerodynamics* R. Aynsley, W. Melbourne, B. Vickery, Publisher: Applied Science Publishers

[4] *The Aerodynamic Characteristics of Windbreaks, Resulting in Empirical Design Rules* J. Gandemer, Publisher: *Journal of Wind Engineering and Industrial Aerodynamics*

[6] *Wind Protection by Model Fences in a simulated Atmospheric Boundary Layer* J.K. Rain, D.C. Stevenson, Publisher: *Journal of Industrial Aerodynamics, 2*

[7] *Criteria for Environmental Wind Conditions* W.H Melbourne, Publisher: *Journal of Wind Engineering and Industrial Aerodynamics*

[8] *Wind Design Guide* J. Bennett Publisher: *BBSC 433 – Architectural Aerodynamics*

[9] *Central City Built Form Review: Wind Assessments*, Global Wind Technology Services

[10] *Wind Guidelines for Planning Applicants* H. Fricke Publisher: *Moonee Valley City Council*

Appendix C Drawings List

Drawings Received: **April 2026**

260428 Alfred Quarter - Statement of Changes.pdf

260428 Alfred Quarter - Town Planning Set.pdf

260428 Alfred Quarter - Urban Context Report.pdf