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AA Crown Holdings Pty Ltd c/- 360 Property Agency

Wollongong Private Hospital Extension Project

15, 17, 19, 21 and 23 Urunga Parade and 360-364, 366 and 368 Crown Street, Wollongong

Application Number: SSD-30240120

Application Type: State Significant Development Application (SSDA)

Wind Impact Assessment

30N-22-0018-TNT-30014-7

16 December 2025

Job Title:	Wollongong Private Hospital Extension Project
Report Title:	Wind Impact Assessment
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Revision History:

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Rev. 00	Original issue	10 Mar 22	
Rev. 01	Plans updated	26 Apr 22	S. Lamande
Rev. 02	Plans updated	13 Dec 22	R. Islam
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Rev. 04	Plans updated	14 Oct 2025	ZX
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Rev. 06	Minor Amendments	04 Dec 2025	ML
Rev. 07	Minor Amendment	16 Dec 2025	ML

Executive Summary

AA Crown Holdings Pty Ltd c/- 360 Property Agency commissioned Vipac Engineers and Scientists Ltd to prepare a statement of wind effects for the ground level areas adjacent to the proposed **Wollongong Private Hospital Extension Project.** This appraisal is based on Vipac's experience as a wind-engineering consultancy.

Updated drawings of the proposed development were provided by **360 Property Agency** in **Sep 2025.**

The findings of this study with the proposed design can be summarised as follows:

- Wind conditions by the proposed development would be expected to be within the **safety** criterion.
- Wind conditions in the ground level footpath areas and access ways would be expected to be within the **walking** comfort criterion.
- Wind conditions in the main entrances would be expected to be within the **standing** comfort criterion;
- The balcony on Level 2 would be expected to be within the recommended **walking** comfort criterion.
- The rooftop sky garden on Level 7 is expected to have wind conditions within the recommended **standing** comfort criterion. Additional treatment is recommended should the sitting criterion be required.

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 are highly recommended.

The assessments provided in this report have been made based on experience of similar situations in Wollongong 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.

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1 Introduction

This application seeks consent for lot consolidation, demolition of five dwellings, excavation, construction of a new twelve (12) storey western wing to the existing hospital, extension of the existing basement levels and an additional three (3) basement levels for parking and a new radiation oncology, and retention of two existing buildings, including the existing heritage item on the site, to be leased to the Illawarra Aboriginal Medical Service (IAMS) for medical use.

The extension will consist of a new emergency department, satellite imaging, radiation oncology, additional patient units, expanded intensive care unit, operating theatres, recovery and central sterile supply department, meeting-conference spaces, tenancies with waiting rooms and amenities, offices and administration areas, plant and servicing areas. Furthermore, the proposal will provide medical accommodation at the upper levels of the expansion.

The proposal will largely retain the form and internal layout of the existing hospital building including an existing radiology, pharmacy, café, kitchen and store, day surgery, oncology, in-patient units, cath lab, tenancy's, administration and plant room.

The proposal will also provide new vehicular access from Urunga Parade with one entry lane and two exit lanes off each street. Existing access from Crown Street will be maintained and lead to the ground level consisting of an ambulance bay, doctors parking and a public emergency drop off area exclusively for the Emergency Department only near the main entry lobby, which is to be retained as existing. The access from Urunga Parade will lead to the basement parking levels with drop off area for hospital patients and visitors and doctors parking and loading dock with turntable.

The proposal will also provide considerable landscaping cross the site and provide opportunities for public artwork.

Notably, the heritage building at No. 366 Crown Street and the existing building at No. 368 Crown Street will both be retained and existing uses as medical tenancy's maintained and leased to IAMS. Specifically, it is understood that the tenancy at No. 366 will be utilised as a birthing centre for expecting mothers of the Indigenous community whilst the tenancy at No. 368 will be utilised as a general medical centre for the Indigenous community, whereby both tenancy's will refer patients to the hospital where necessary. No changes are proposed to the existing buildings, however, landscaping and parking design will be enhanced which will improve upon the existing arrangements and ensure the sites are well-integrated with the hospital development.

Table 2 Lot and DP

Street Address	Legal Address
15 Urunga Parade	Lot D in DP 402234
17 Urunga Parade	SP 73256
19 Urunga Parade	Lot A in DP 343680
21 Urunga Parade	Lot 47 Section 1 in DP 5507
23 Urunga Parade	Lot 46 Section 1 in DP 5507
360-364 Crown Street (existing Wollongong Private Hospital)	Lot 1 in DP 1212956 Lot 2 in DP 1212956
366 Crown Street	Lot B in DP 343680
368 Crown Street	Lot 9 in Section 1 in DP 5507

Vipac Engineers and Scientists has been commissioned by **AA Crown Holdings Pty Ltd c/- 360 Property Agency** to carry out an appraisal of the pedestrian wind effects at the ground level of the proposed development at **Wollongong Private Hospital Extension Project.**

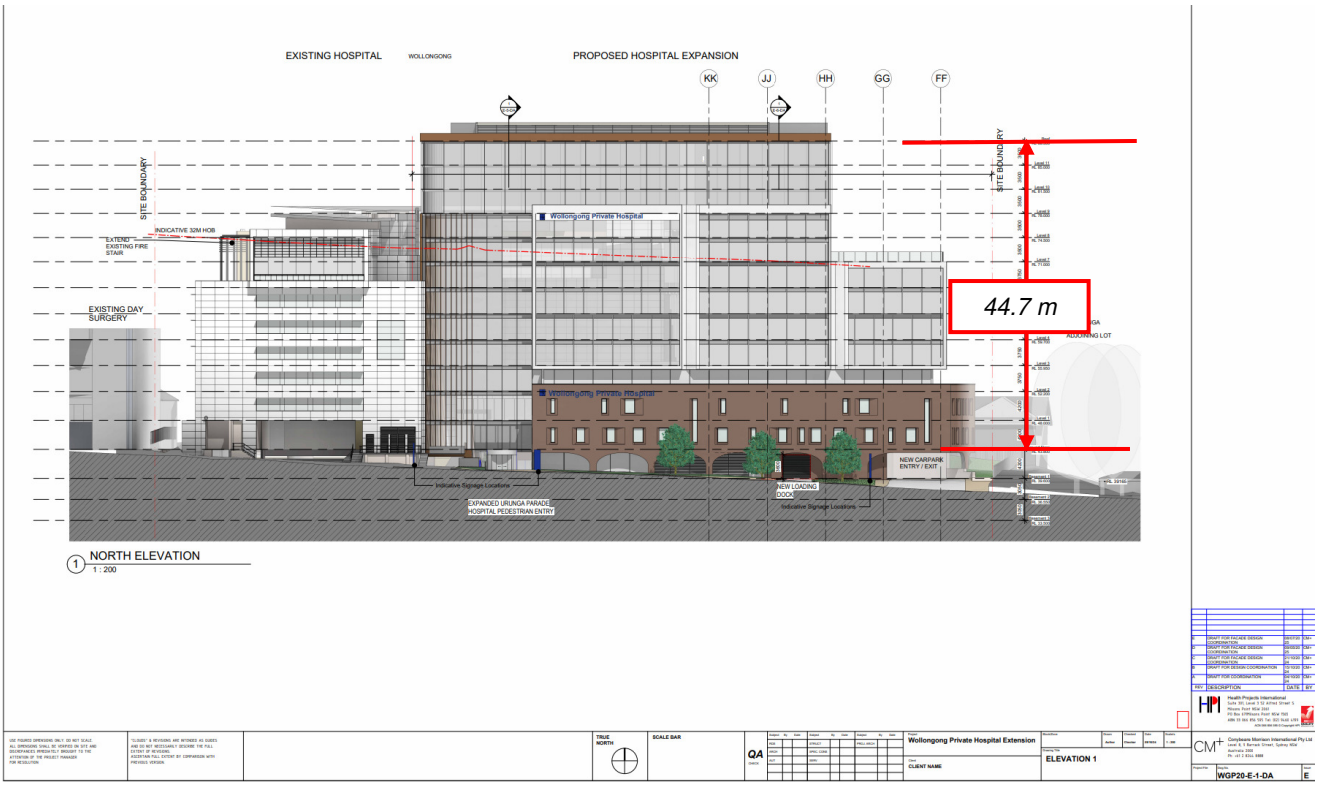
Strong winds in pedestrian areas are frequently encountered in central business districts of cities around the world; including Sydney, Melbourne and Brisbane. Wind characteristics such as the mean speed, turbulence and ambient temperature determine the extent of disturbance to users of pedestrian areas.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

The proposed development is an extension to the existing private hospital and incorporates 6 storey building expansion and 2 additional levels of inpatient unit beds on the existing hospital, with a maximum height of approximately 48.9 m from the lower ground level (basement 1). The site is bounded by Urunga Parade to the north, Crown Street to the south, and existing developments in the other directions. A satellite image of the proposed development site, the north and west elevations of the building 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 **360 Property Agency** in **Sep 2025.** A list of drawings supplied is provided in Appendix C of this report.

Figure 1: Aerial view of the proposed development site.



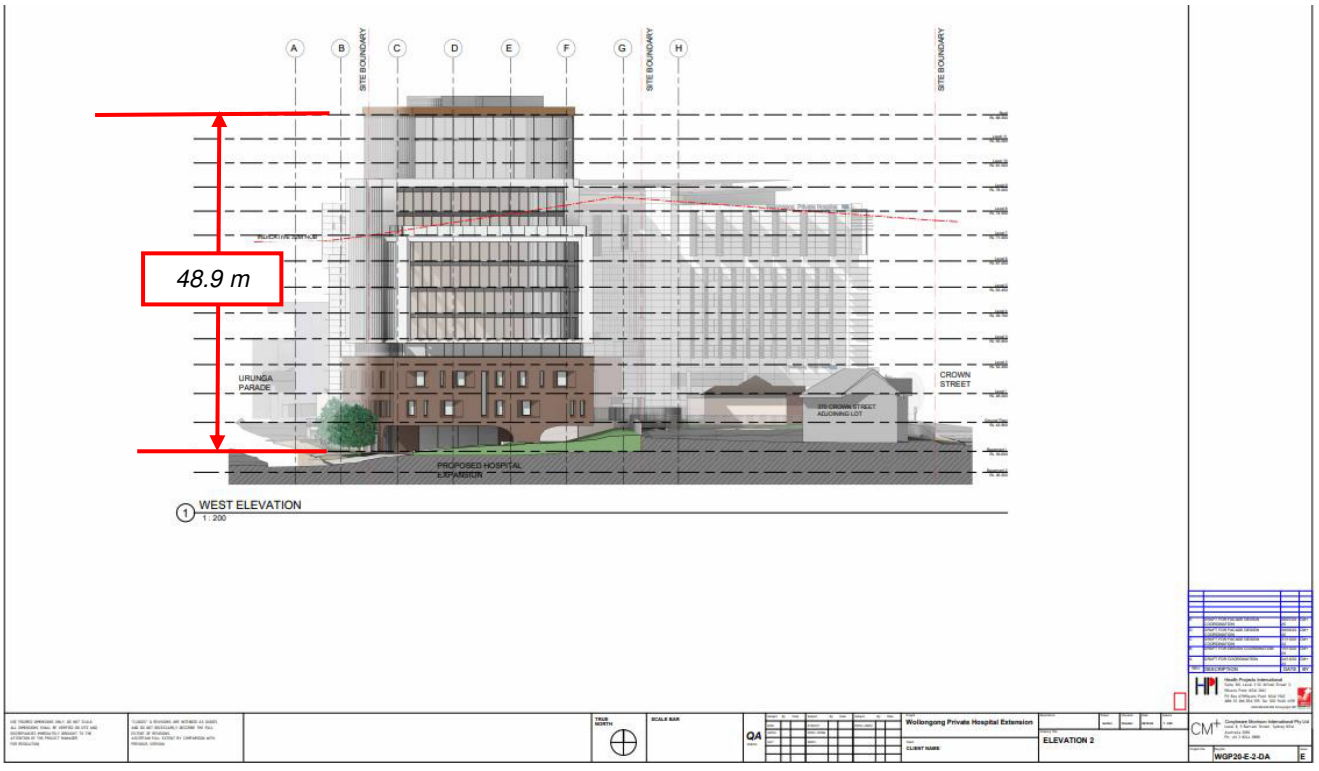


Figure 2: North and west elevations of the proposed development.

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; and
- 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 wind speed of one year return period and mean wind speeds with a probability of 5% 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 in excess of 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 site is located on hilly terrain and is surrounded within an approximately 2 km radius by low-rise developments, with the Wollongong Public Hospital nearby to the east. A satellite image showing these site surroundings is shown in Figure .

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 for all wind directions (Figure 3).

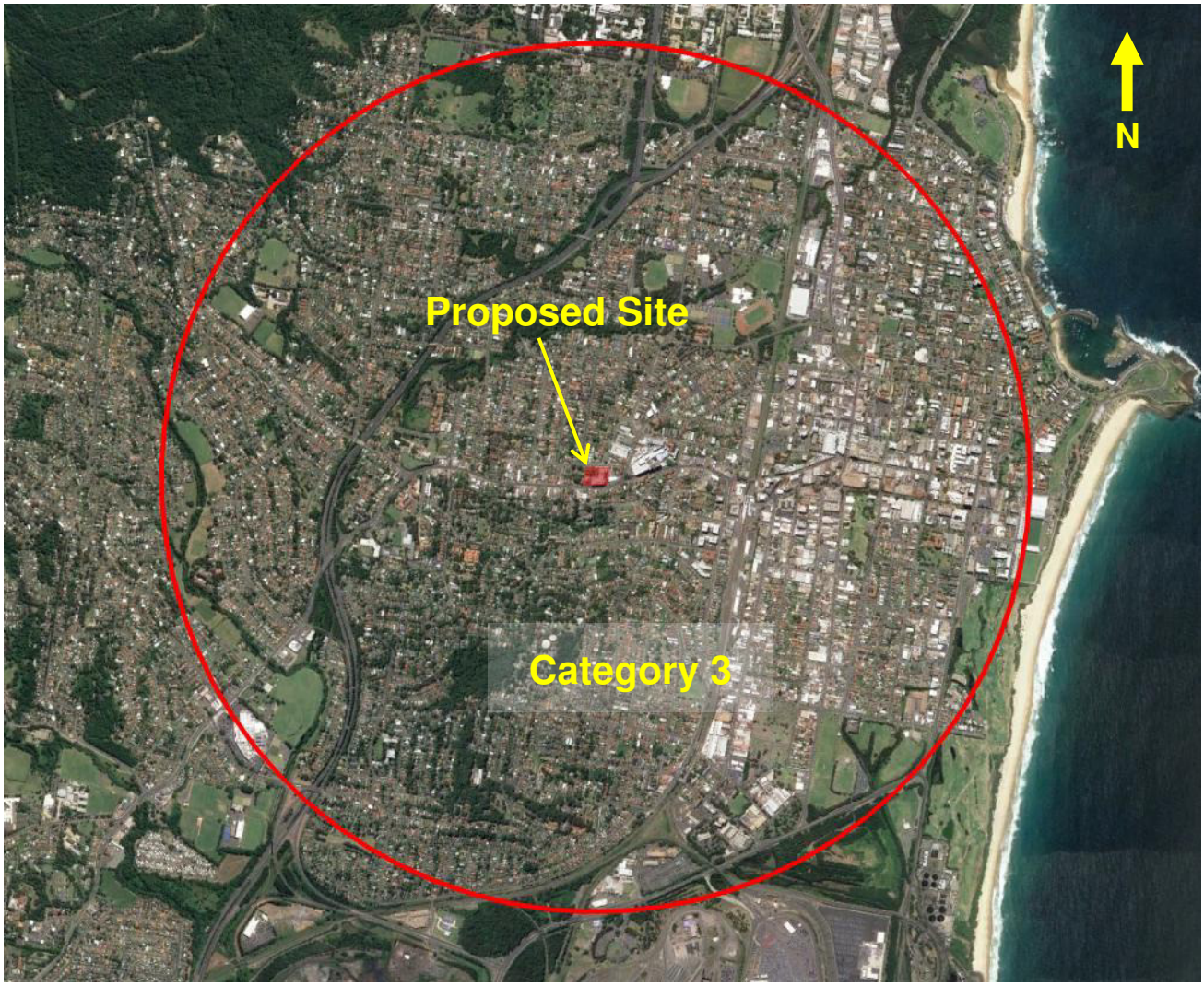


Figure 3: Assumed terrain categories for wind speed estimation.

2.2 Regional Wind Climate

The mean and gust wind speeds have been recorded in the Wollongong area (Wind Station ws-068188) 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 yearly return and a probability of 5% of time exceeded are shown in Figure 4. The wind data at this free stream height is common to all Wollongong city sites and may be used as a reference to assess ground level wind conditions at the site.

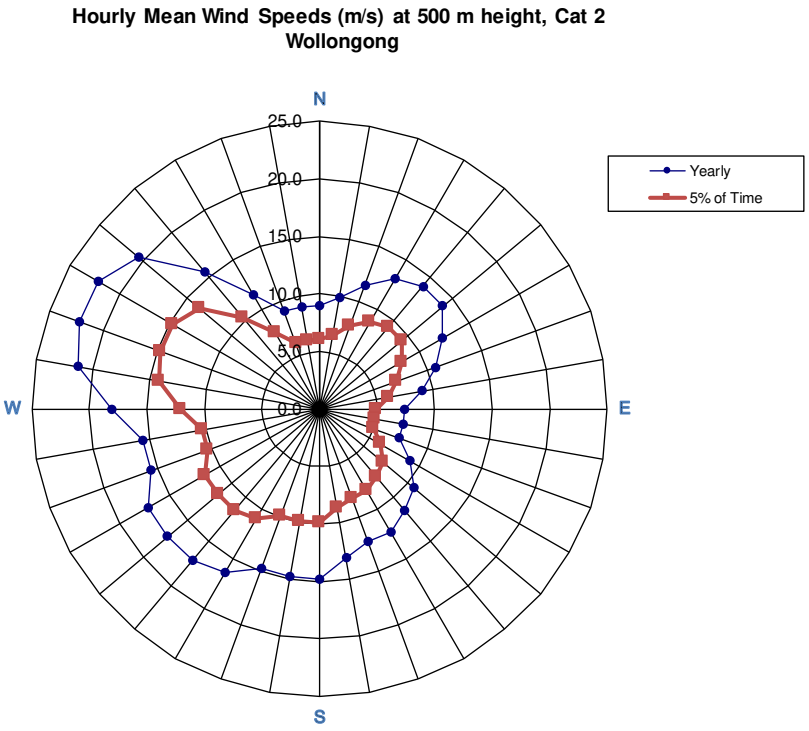


Figure 4: Directional Distribution of Mean Hourly Wind Velocities (m/s) of Annual Return Period and 5% of time at the gradient height for Wollongong.

2.3 Building Geometry and Orientation

The proposed redevelopment is a B+G+11-storey hospital with overall plan-form dimensions of approximately 80m x 100m as shown in Figure 5. The main entrances are located on Urunga Parade and Crown Street.

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

2.4 Flow interactions with Adjacent Developments

The immediately adjacent developments are shown in Figure . At ground level, the site is exposed to direct winds from all directions. The public hospital will be expected to provide some shielding from north-easterly winds. The development is taller than the surrounding buildings and so is exposed to winds from all directions at the upper levels.

Figure 6: Immediately adjacent surroundings and their approximate number of floors (F).

2.5 Assessment Criteria

The wind comfort criteria from the Central Sydney Planning Strategy (Attachment B7: 4 Implementation) has been applied to this study. The document recommends the following wind safety and comfort criteria (Table 1):

Table 1: Wind Criteria summarized from Central Sydney Planning Strategy

Measurements	**Result on Perceived Pedestrian Comfort**
Peak wind speed (0.5 second gust) once per year, **≤24m/sec** for any direction*.	Accepted international criterion for human safety to avoid a healthy pedestrian losing balance
Hourly ***mean*** wind speed, 5% of the time, **≤8m/sec**, for any directions.	Acceptable for **walking** (steady steps for most pedestrians)
Hourly ***mean*** wind speed, 5% of the time, **≤6m/sec,** for any directions.	Acceptable for **standing** (wind shopping, vehicle drop off)
Hourly ***mean*** wind speed, 5% of the time. **≤4m/sec,** for any directions.	Acceptable for **sitting** (outdoor cafes, gardens, park benches)

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

2.5.1 Use of Adjacent Pedestrian Occupied Areas & Recommended Comfort Criteria

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

Table 2: Recommended application of criteria

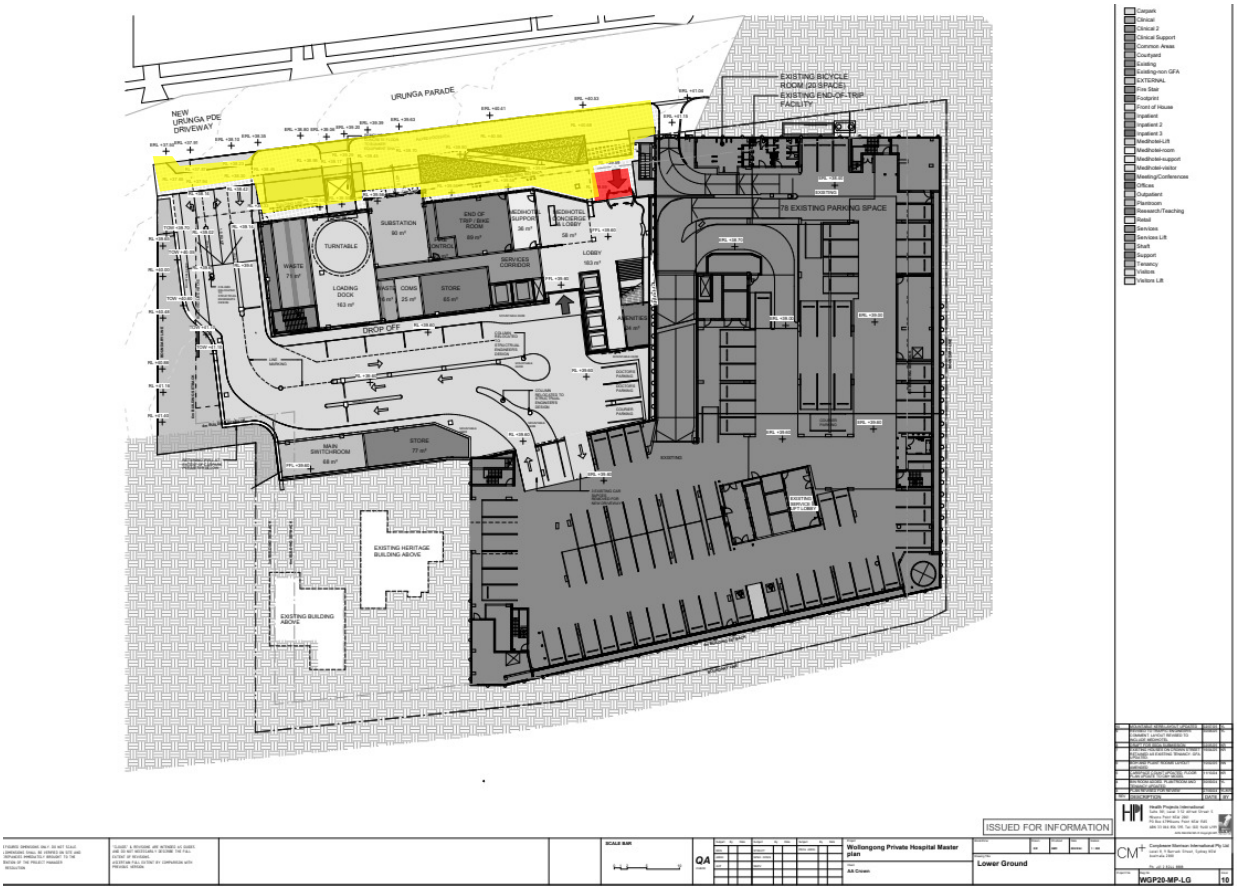
Area	Specific location	Recommended Criteria
Public Footpaths, Access ways	Along Crown Street, Urunga Parade and access ways around the building (Figure 7 & Figure 8)	Walking
Building Entrances	Main Building Entrances off Crown Street and Urunga Pde (Figure 7 & Figure 8)	Standing
Balcony/Terraces	Balcony on Level 2 (Figure 9), rooftop sky-garden on Level 7 (Figure 10)	Walking/Standing (see discussions below)

2.5.2 Terrace / Balcony Recommended Criterion Discussion

There are terraces located up the height of the development. Vipac recommends as a minimum that balcony/terrace areas meet the criterion for walking since:

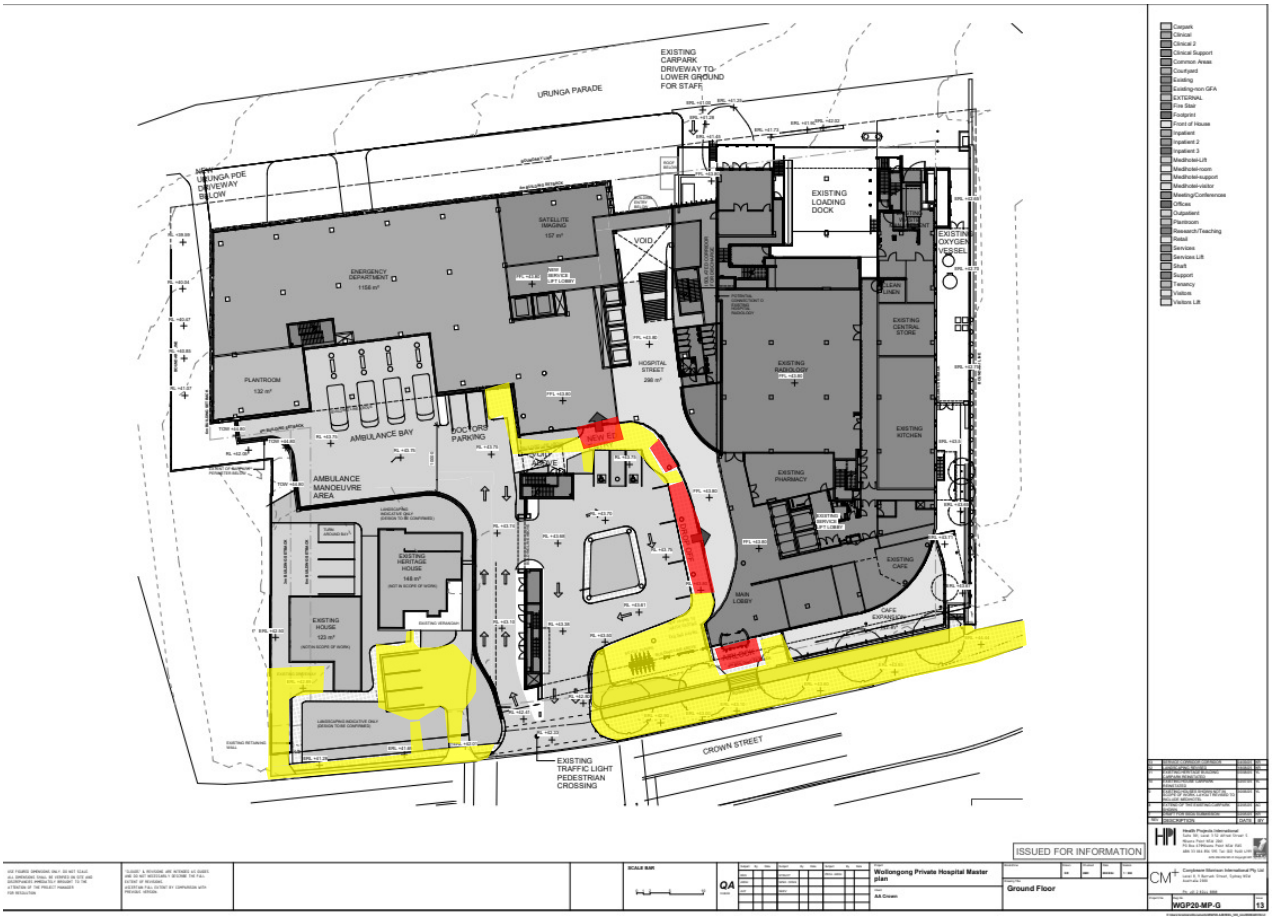
- these areas are not public spaces;
- the use of these areas is optional, and only intended to be used on fair weather days with calm winds;
- residents at private open spaces can chose to retreat indoors during uncomfortable wind conditions, whiel a pedestrian or person using a public area may not have this option.
- many similar developments in Wollongong 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 level 7 skygarden is assessed against the more stringent standing criterion.



Recommended to fulfil Walking *Recommended to fulfil Standing*

Figure 7: Lower Ground Plan with recommended wind criteria overlaid.

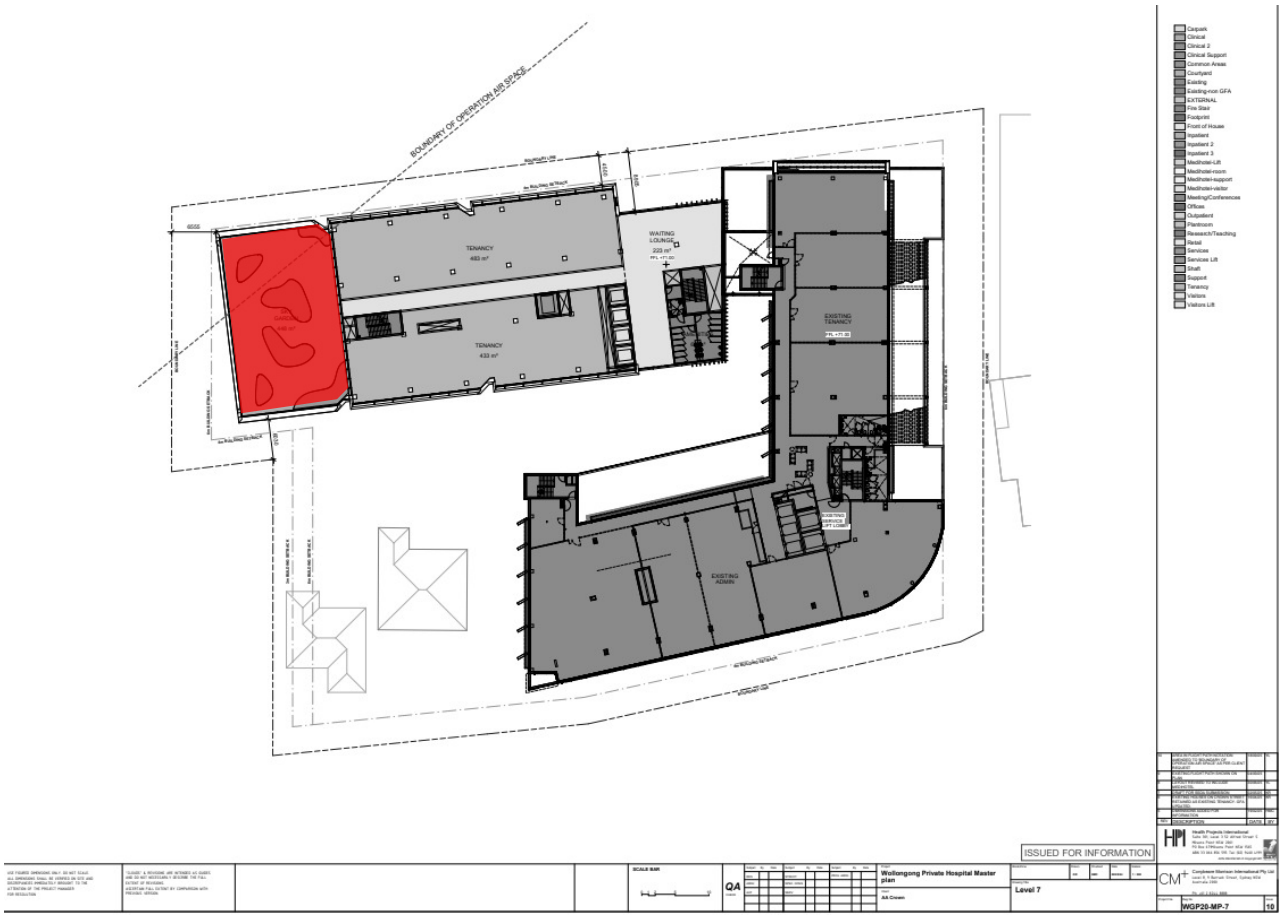


Recommended to fulfil Walking *Recommended to fulfil Standing*

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

Recommended to fulfil Walking *Recommended to fulfil Standing*

Figure 9: Level 2 plan with recommended wind criteria overlaid.



Recommended to fulfil Walking *Recommended to fulfil Standing*

Figure 10: Level 7 Sky-garden with recommended wind criteria overlaid.

3 Pedestrian Level Wind Effects

3.1 Discussion & Recommendations

The proposed extension is expected to result in increased wind levels along Urunga Pde particularly near the NW corner of the development. However, wind levels in the pedestrian footpaths are expected to be within the recommended walking comfort criterion. The footpaths on Crown Street are expected to be similar to the existing wind environment with the proposed extension.

The building entrances are located off Crown Street, Urunga Pde and the new Hospital Drop off on the south side of the building. These entrances are located away from the building corners, under awnings or the setback underneath the building above, and so are expected to be generally well sheltered from adverse winds. We expect that with the proposed design, the building entrances will be within the recommended standing comfort criterion.

The balcony located on Level 2 are mostly sheltered by the building above and, would be expected to be within the recommended walking comfort criterion. The rooftop sky-garden on Level 7 is exposed to most of wind directions and wind levels will be within the recommended standing comfort criterion with the proposed design (1.5m balustrade). However, if the calmer wind conditions (Sitting criterion) is required, the balustrade height of ≥ 1.8 m is recommended (Figure 11).

The wind gusts 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.

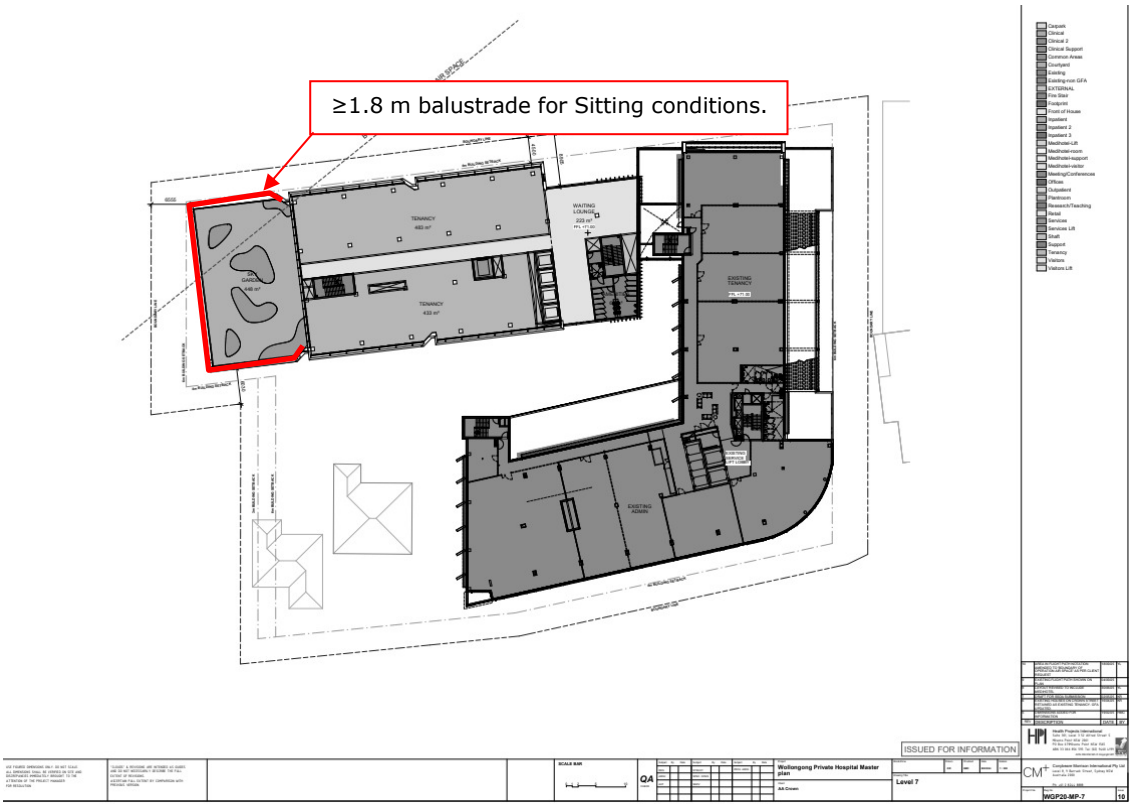


Figure 11: Level 7 sky-garden with the recommended wind control measures overlaid.

4 Conclusions

An appraisal of the likely wind conditions at the pedestrian ground level and terrace areas of the proposed **Wollongong Private Hospital Extension Project** 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:

- Wind conditions by the proposed development would be expected to be within the **safety** criterion.
- Wind conditions in the ground level footpath areas and access ways would be expected to be within the **walking** comfort criterion.
- Wind conditions in the main entrances would be expected to be within the **standing** comfort criterion;
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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 are highly recommended.

The assessments provided in this report have been made based on experience of similar situations in Wollongong 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.

This Report has been Prepared

For

AA Crown Holdings Pty Ltd c/- 360 Property Agency

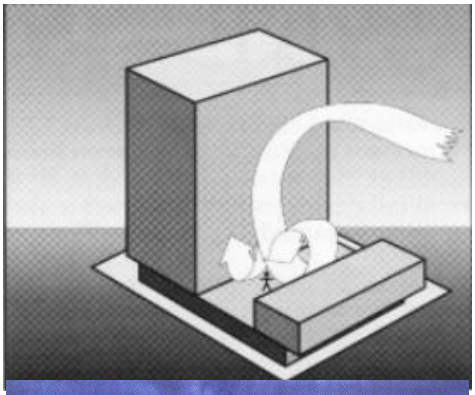
By

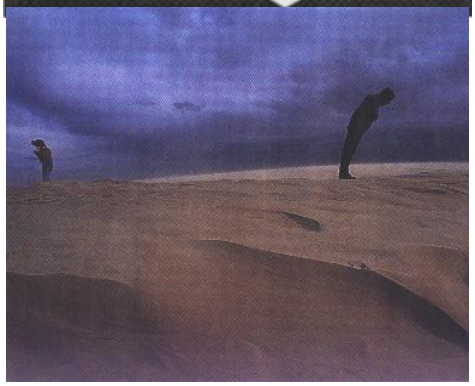
VIPAC ENGINEERS & SCIENTISTS PTY LTD.

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 1170.2:2011

[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

Appendix C Drawings List

Drawings Received: **Sep 2025**

Name	Date modified
20250926 WPH Combined SSDA Plans	9/30/2025 9:19 AM