



WIND ENGINEERING
CONSULTANTS

QUALITATIVE WIND ASSESSMENT
CPP PROJECT 19379
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691-699 Pacific Highway

Chatswood, NSW

CPP Wind Engineering
Consultants

2/500 Princes Highway
St Peters NSW 2044

Info-syd@cppwind.com

cppwind.com

PREPARED FOR:

Develotek Property Group
Suite 1003, 97-99 Bathurst St
Sydney NSW 2000

Joanne Bezzina
0477 258 621
joanne@develotek.com.au

PREPARED BY:

Jordan Black
Project Engineer
jblack@cppwind.com

Joe Paetzold, PhD
Engineering Manager
jpaetzold@cppwind.com

Executive Summary

A qualitative assessment of the 691-699 Pacific Highway development to be built in Chatswood, NSW was conducted to provide an initial assessment of the surrounding pedestrian wind environment. The assessment was based on the local wind climate, CPP's experience in the region and on comparable projects, and the characteristics of the proposed development.

The wind environment around the development is likely to be generally suitable for Pedestrian Standing to Walking style activities from a comfort perspective with reference to the Lawson criteria. No major adverse impacts to pedestrian comfort or amenity are foreseen as a result of the proposed development. Areas intended for long term stationary activity such as seating and dining are likely to require treatment to ensure they are suitable for their intended use. All areas in the public domain in the vicinity of the subject site are expected to satisfy the relevant wind safety criterion.

Slightly stronger wind conditions are expected to occur at ground level areas near building corners and on the podium rooftop area during higher winds. Mitigation may be necessary for areas that will be used for medium to long term stationary occupation within these spaces, and some suggested strategies are provided.

Windier conditions are often found on residential balconies for developments of this type, particularly on exposed corner balconies due to cross flow. The proposed residential balconies, at the tower corners, may occasionally experience strong wind conditions. The proposed balconies situated away from the tower corners are well located and sized from a wind comfort perspective. Residential balconies are expected to be generally calm and typical of comparable buildings in the region.

This report is a high-level qualitative assessment based on basic features of the local wind climate and proposed built environment.

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1. Introduction

GENERAL INFORMATION

The assessment of the wind environment around developments can ensure adverse impacts are minimised and inform designers about the suitability of outdoor areas for their intended uses. Where necessary, design modifications can be made, or intervention measures added to mitigate areas with the potential for excessive wind speeds.

The proposed development is located in Chatswood, approximately 250 metres to the south of the Chatswood CBD. The surrounding terrain is comprised primarily of low-rise suburban development, with several developments of similar size proposed to the south of the site, Figure 1

The proposed development is comprised of a single prismatic tower set back over a podium, reaching a maximum height of about 115 m above ground level, Figure 2. As it is slightly larger than most of the surrounding structures, the addition of the proposed development is expected to have some impact on the local wind conditions, and the extents are broadly discussed in this report.

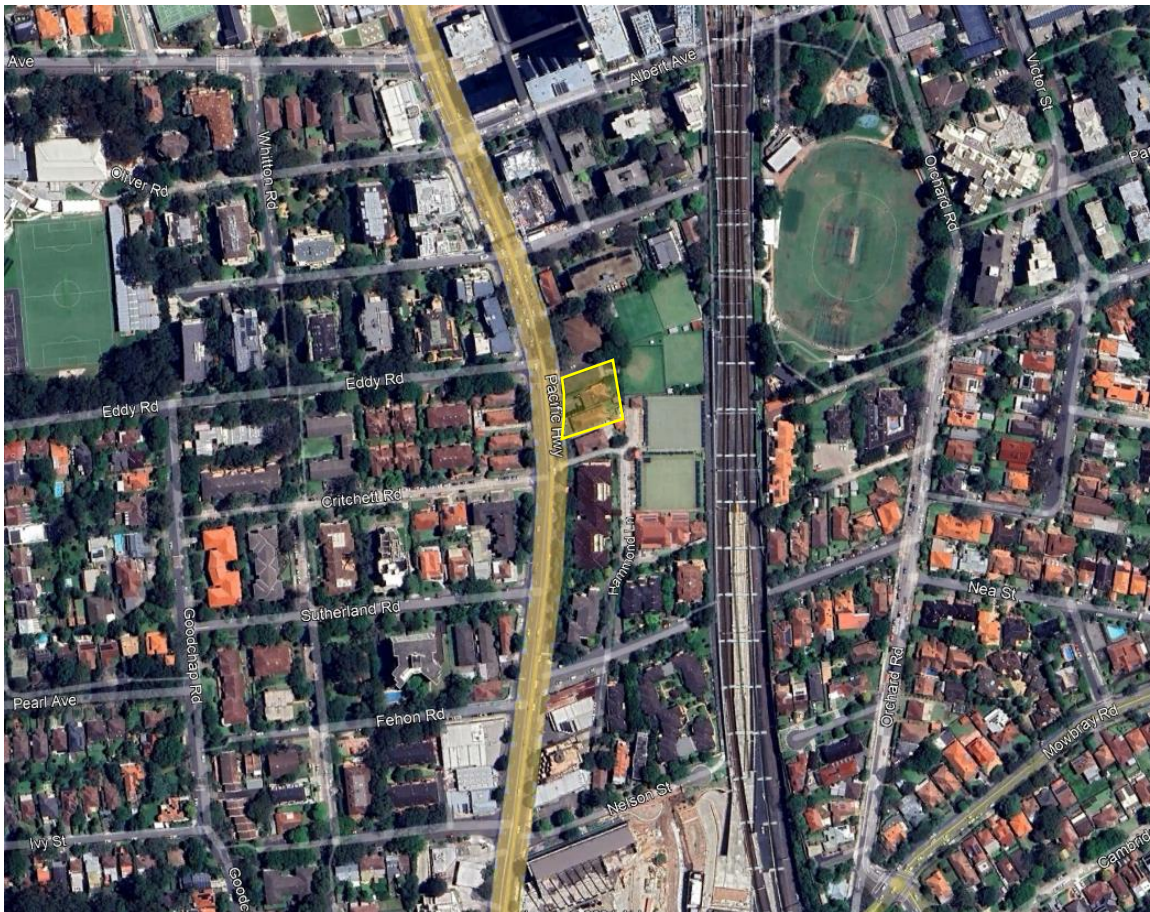


Figure 1: Aerial view of proposed development site (Google Earth, 2024)

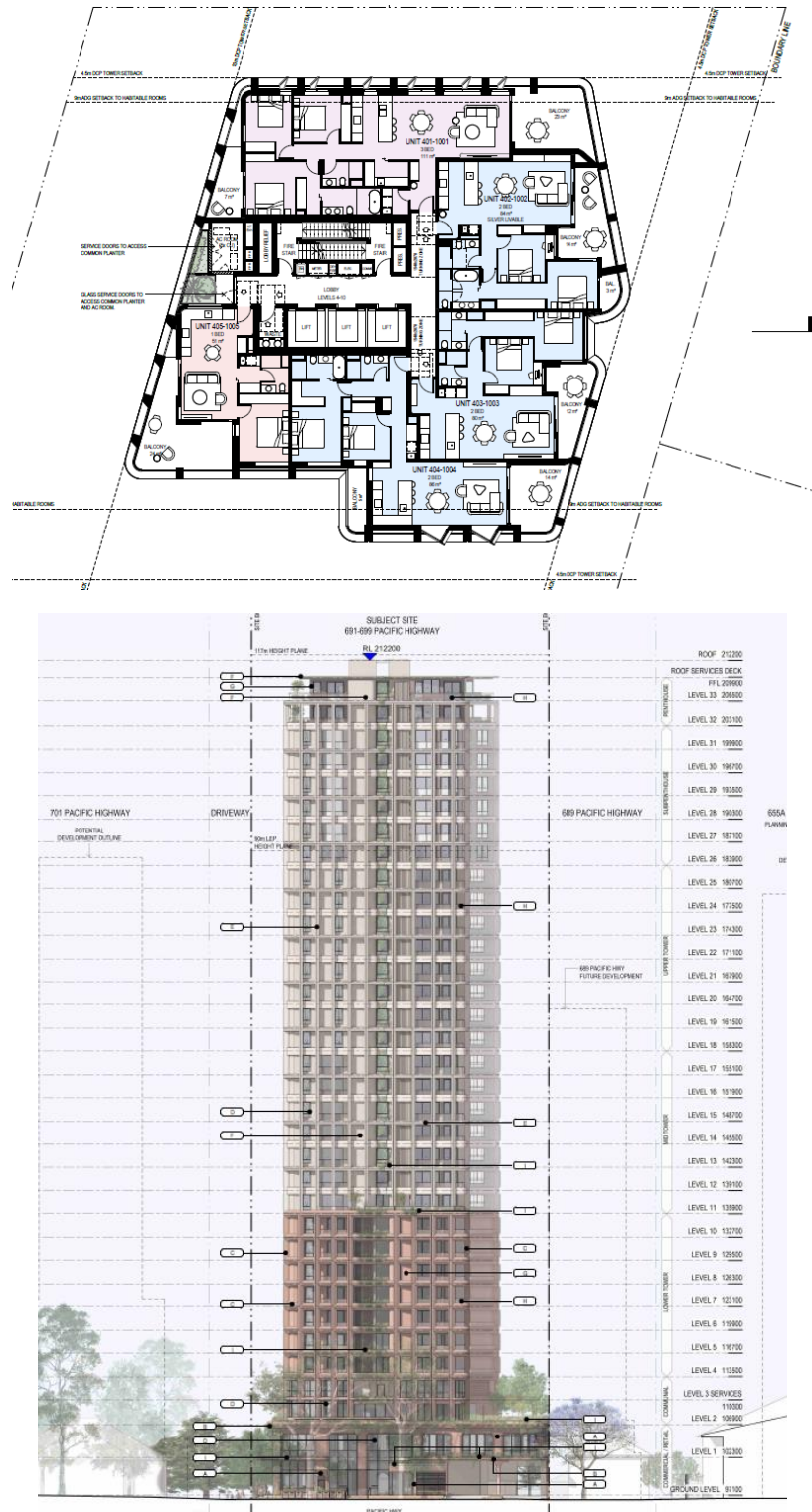


Figure 2: Level 4-10 Floor plan (top) and west Elevation (bottom) of proposed development

2. Wind Climate

The proposed development lies approximately 16 km to the north of the Sydney Airport Bureau of Meteorology anemometer, which provides the best source of historical wind data for the project. To enable a qualitative assessment of the wind environment, the wind frequency and direction information measured by the Bureau of Meteorology at a standard height of 10 m from 1995 - 2023 have been used in this analysis.

The wind rose for Sydney Airport is shown in Figure 3. The arms of the wind roses point in the direction from where the wind is blowing, the width and colour of the arm represent the wind speed, and the length of the arm indicates the percent of the time that the wind blows for that combination of speed and direction.

The distribution and frequency of winds on an annual basis were analysed to assess the project with regards to wind comfort and safety. As can be seen from the wind rose in Figure 3, winds from the north-east, south and west directions are predominant. This wind assessment is structured around these prevailing wind directions.

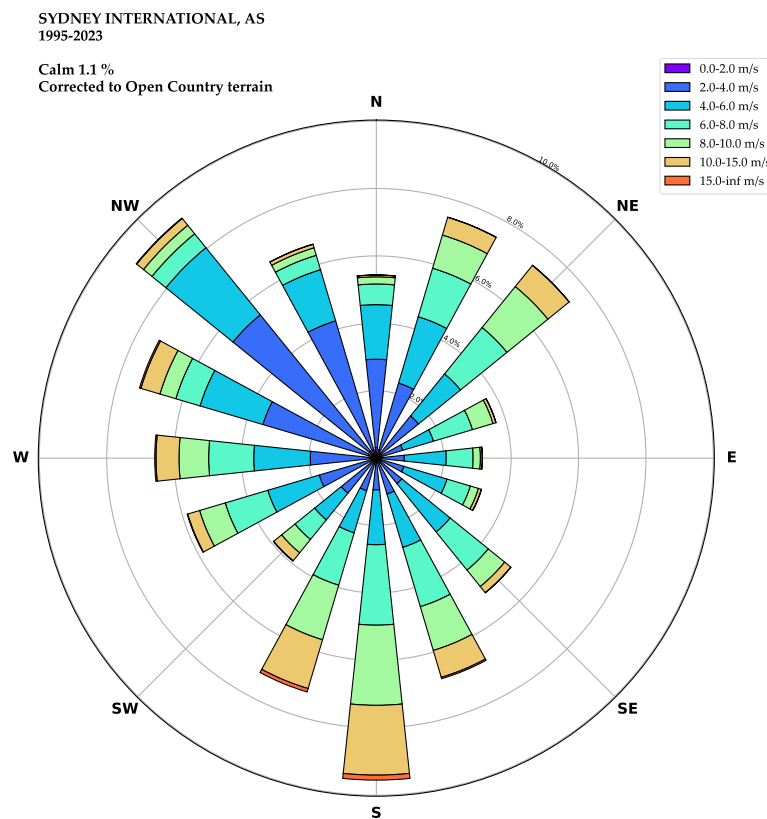


Figure 3: Probability of Wind Speeds by Direction Sydney Airport –(1995 - 2023, All Hours)

3. Wind Assessment Criteria

A number of researchers have suggested quantitative methods for assessing wind comfort and safety based on estimated wind speeds and local climate statistics. These criteria provide a means of evaluating the wind amenity of location based on the frequency of threshold wind speeds, noting that pedestrians will tolerate higher wind speeds for a shorter time period than lower speeds. The comfort criteria also allow planners to assess the usability, with respect to the wind environment, of different locations for various purposes.

The Willoughby City Council DCP (2016) does not specify a method of assessing wind comfort or safety for this site. CPP uses a modified form of the widely-accepted pedestrian-level wind criteria developed by Lawson (1990). Lawson's criteria are divided into separate categories of comfort and distress (safety).

Lawson's criteria are based on wind speeds exceeded 5% of the time, and are described as categories for comfort ranging from 'Pedestrian Sitting' to 'Business Walking', allowing planners to judge the usability of locations for various intended purposes. The criteria also include a distress rating, for safety assessment, which is based on occasional (once or twice per year) wind speeds, to identify locations where wind speeds may be hazardous to pedestrians.

The categories and criteria are specified in Table 1. In general, wind conditions comfortable for Sitting and Standing are considered appropriate for areas such as entrances where pedestrians are likely to gather for longer durations, while wind conditions comfortable for Casual Walking and Business Walking are more appropriate for sidewalks where pedestrians are actively in transit. Locations rated as Uncomfortable are generally less suitable for most pedestrian activities and wind control solutions are often sought. Whether mitigation is needed at a location depends upon the intended pedestrian use of the location.

Satisfaction of the safety rating is generally required for areas accessible to the general public. A rating of 'Able-Bodied' may be acceptable for areas with managed access or where pedestrians are unlikely to be present under adverse conditions.

Assessment using the Lawson criteria is preferred to methods based on once per annum gust speeds such as Melbourne (1978) as it is based on more regularly occurring wind speeds relevant to perception by pedestrians and uses a combined probability integrated over all directions. In addition, it is less susceptible to variations in turbulence levels in urban environments while still considering the impact of short-duration gusts.

Pedestrians' perception of wind can often be subjective and vary depending on regional difference in wind climate and thermal conditions, as well as by individual. Calibration to the local wind environment should be taken into account when evaluating predicted wind comfort conditions. Note that the ratings of 'Uncomfortable' and 'Safety' are the words of the published wind criteria and applicability may vary by project and location.

Table 1: Wind Comfort and Safety criteria (after Lawson, 1990)

COMFORT RATING	U_{EQUIV}^*	DESCRIPTION
 Dining**	< 2 m/s	Calm / light breezes suitable for outdoor restaurant uses, seating areas, and other amenities based on CPP experience.
 Sitting	2-4 m/s	Calm or light breezes suitable for long duration seating areas, and other amenities.
 Standing	4-6 m/s	Gentle breezes suitable for sitting for shorter periods, main entrances and bus stops where pedestrians may linger.
 Pedestrian Walking	6-8 m/s	Moderate winds appropriate for window shopping and strolling along a downtown street, or park.
 Business Walking	8-10 m/s	Relatively high speeds that can be tolerated if one's objective is to walk, run, or cycle.
 Uncomfortable	> 10 m/s	Strong winds unacceptable for all pedestrian activities; wind mitigation is typically required.

* $U_{Equiv} = \text{Max}(U_{Mean}, U_{Gust} / 1.85)$.

* U_{Equiv} speeds are based on an annual exceedance of 5% (~8 hours / week) assessed over all hours.

** For regular outdoor dining, and in semi-enclosed spaces, it has been the experience of CPP that the comfort rating of Sitting may be windier than desired and a comfort criterion of 2 m/s or less may be more applicable.

SAFETY RATING	U_{EQUIV}^*	DESCRIPTION
 Pass	< 15 m/s	Meets wind safety criterion.
 Able-Bodied	15-20 m/s	Acceptable where only able-bodied people would be expected; not acceptable for frail persons or cyclists
 Fail	>20 m/s	Excessive wind speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is often required.

* $U_{Equiv} = \text{Max}(U_{Mean}, U_{Gust} / 1.85)$.

* U_{Equiv} speeds are based on an annual exceedance of 0.022% (~2 / year or 1 / season) assessed over all hours.

4. Assessment

SITE DESCRIPTION

The development site is surrounded in most directions by low-rise buildings, with the high-rise massing of the Chatswood CBD to the immediate north of the site. Several similar sized developments are also proposed to the south of the site including the adjacent plots at 655A, 689, and 701 Pacific Highway. Topography surrounding the site is relatively flat from a wind perspective and unlikely to significantly affect the wind climate at the site. Winds in such surrounds tend to experience less channelling than areas with many tall structures, with local effects instead being dictated by exposed buildings and their relation to prevailing strong wind directions. Several wind flow mechanisms such as downwash and channelling flow are described in Appendix A and the effectiveness of some common wind mitigation measures are described in Appendix B.

The subject site is located on the eastern side of Pacific Highway, on a block bounded by Hammond Lane to the south, and Ellis Street to the north. The proposed development consists of a single prismatic tower with a rectangular planform and rounded corners on top of a two-story podium. A ground floor plan is shown in Figure 4.

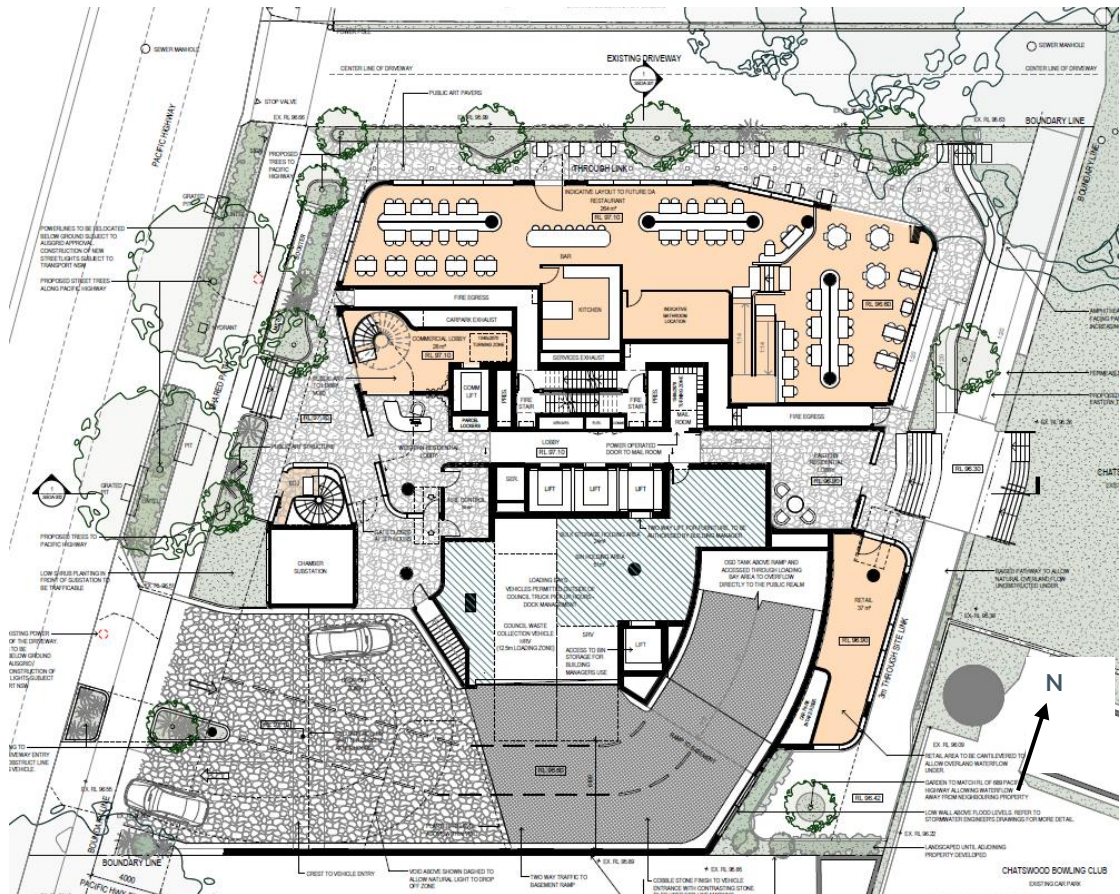


Figure 4: Ground floor plan of proposed development

WINDS FROM THE NORTH-EAST

Winds from the north quadrant will approach over the low- to mid-rise buildings of Chatswood passing just south of the Chatswood CBD. The area to the immediate north-east of the site is relatively open with Chatswood Park and empty lots lying between the railway line and the site. As a result, approaching winds from the north-east are relatively unimpeded upon reaching the site. Direct winds from the north-east could cause breezy conditions on the eastern side of the development as well as on the podium rooftop. The proposed perimeter landscaping will help mitigate the impact of strong winds from the north-east provided the planting is sufficiently high and dense.

As the tower is taller than the upwind surrounds, winds from the north-east are likely to be directed toward the ground in the form of downwash. The pedestrian through link at the north-western side of the development including the outdoor seating area indicated in this area would be affected by such flow, with elevated wind speeds in these areas for wind from the north-east. Local screening would be beneficial for the outdoor seating area, particularly if this is intended for commercial use. The small setback at the north-east corner and the open podium level will reduce the impact of downwash at the north-east corner of the development. However, some accelerated downwash flow would be expected to reach ground level on the eastern side of the building, potentially causing an increase in wind speeds outside the eastern residential lobby area. The existing trees and proposed landscaping at the north-east corner of the site will provide some beneficial effect on ground level wind conditions and are recommended to be retained.

Relatively high wind speeds would be expected on the podium roof near to the windward corners of the towers and under the overhang during winds from the north-east. Downwash off the north-eastern façade would accelerate through the recessed space in the undercut and result in increased wind speed through the Communal Open Space. The booth style seating, wind breaks, and heavy landscaping at the podium perimeter will help to reduce the impact of such flow and are recommended to be retained.

The main entrance to the lobby is located on the western side of the development and inset into the floor plate. For winds from the north-east, the main entrance area on the western side of the development, as well as public domain areas on the southern side of the development would experience mild wind conditions.

For winds from the north-east quadrant, conditions around the proposed development site are expected to remain similar to the existing wind conditions.

WINDS FROM THE SOUTH

Winds from the south quadrant will pass over primarily low-rise buildings before reaching the site, though it is noted that several buildings of similar height to the proposed development are proposed for sites to the south. Prior to completion of these developments, the proposed tower would be relatively exposed to winds from the south which would impact the south façade. Pedestrian areas along the eastern and western boundaries of the development may be affected by stronger breezes as the proposed development massing directs wind flow to these regions.

Due to the height of the tower, incoming winds from the south are likely to be directed toward the ground in the form of downwash. The setback of the tower from the podium edge will reduce the impact of such flows on ground level by redirecting them horizontally, however windier conditions may arise on the podium rooftop level. These winds could cause windy conditions over most of the communal podium rooftop area including the space underneath the tower overhang with the BBQ and pool area. Upon completion of the future buildings to the south, including the towers at the adjacent sites on 655A and 689 Pacific Highway, wind impinging on southern façade of the proposed development would be significantly reduced and the wind conditions on the podium would improve. If mitigation of the wind impacts on the podium is desired for the existing context of the site, an overhead awning above podium level to the south and wrapping around the southern building corners would help reducing wind speeds on the podium by deflecting downwash winds above podium height. The proposed landscaping at the podium perimeter will have a beneficial effect on the wind conditions on the western parts of the podium terrace, the commercial terrace and the outdoor gym, and is recommended to be retained.

Depending on the extent of the future upwind buildings, strong winds may still affect parts of the podium terrace and ground level locations. On completion of the other towers of similar height to the south of the site, some channelling of southerly winds up Pacific Highway would be expected which is likely to generally increase wind speeds for pedestrian areas along this frontage, though the individual contribution of the proposed development would be relatively minor.

As the podium rooftop would deflect the majority of the downwash on the south façade before the flow reaches ground level, the impact of the tower on ground level wind conditions is minimal for winds from the south quadrant. The entrance area is well protected by its inset location winds from the south. For these wind directions the wind conditions at most locations around the site are expected to remain similar to the existing wind conditions.

WINDS FROM THE WEST

Winds from the west quadrant will pass over primarily low-rise buildings leaving the tower relatively unprotected from winds from these directions. The through site link at the northern side of the development including the indicated seating area, as well as pedestrian areas in the southern region of the site may be affected by stronger breezes as the proposed development massing directs wind flow to these locations.

The tower façade is approximately normal to winds from this direction, which would lead to some downwash flow though this may be slightly reduced by the rounded tower corners. The tower setback above the podium on the western side would redirect portion of the downwash flow over the podium area impacting primarily the outdoor gym and the commercial terrace, and therefore reduce impact to ground level. The covered wellness area on the southern side of the podium would also be affected by strong cross flow and would benefit from a wind screen to the west and potentially south for additional wind protection.

Relatively high wind speeds would be expected on the podium terrace near windward corners of the tower for winds from the west. The communal open space on the eastern side of the podium terrace is mostly shielded by the tower massing and is expected to remain relatively calm. The dense landscaping on the western side of the podium terrace will have a beneficial effect on podium level wind conditions and is suggested to be retained.

Upon completion of the adjacent tower to the south, wind speeds on the podium terrace and in the ground level space between the towers are expected to increase due to channelled flow between the towers. For winds from the west quadrant, wind conditions in some locations the proposed development site may become slightly windier than the existing wind conditions due to the addition of the proposed development. Mitigation in the form of overhead canopies or local screening for intended seating areas is recommended.

Ground level locations on the eastern side of the site will remain mostly calm during winds from this direction.

SUMMARY – PUBLIC DOMAIN

For most locations, wind conditions within the proposed development site are expected to remain similar to the existing wind conditions. Wind impacts of the tower would mostly affect the podium rooftop due to the setbacks above podium level to the west, south, and east. From a pedestrian comfort perspective, the wind environment around the proposed development site is likely to be classified as acceptable for Pedestrian Standing or Walking under Lawson in most locations. These pedestrian comfort levels would be suitable for public accessways, and for stationary short-term exposure activities. Localised amelioration measures would be suggested if calmer areas are desired for particular locations, such as for communal seating. Most locations would be expected to satisfy the safety/distress criterion.

WIND CONDITIONS WITHIN THE DEVELOPMENT

PODIUM TERRACE

The Communal Open Space on the podium rooftop is effective in deflecting any downwash flow generated on the tower facades away from ground level and will experience windy conditions for some incoming wind directions as a result. This may particularly be an issue in the large area under the tower overhang, as expectations are typically that covered areas are less windy than more open areas. Vertical elements that partially enclose this space would be recommended to create recessed areas suited to longer term stationary activity. The addition of full height screens for the partial enclosure of the pool deck and communal open area to the north and south would be beneficial to limit the amount of cross flow over this space and allow for milder wind conditions, Figure 5. Other possible mitigation measures were discussed in the previous sections. The proposed landscaping at the terrace perimeter will have a minor beneficial effect on wind conditions and is recommended to be retained.

BALCONIES

Windier conditions are often found on residential balconies for developments of this type, particularly on exposed corner balconies. Corner balconies open to more than one side can experience strong cross flow for some wind directions. Balconies that are recessed into the façade and situated away from tower corners are generally better protected and experience calmer conditions.

The balconies as proposed are generally well designed and located from a wind perspective, representing relatively small volumes and recessed within the floor plate. The fins on the south-east and north-east corner balconies are beneficial for the wind conditions on these balconies. For exposed upper-level balconies indicated on the Level 32 floor plan, as well as for the south-west corner balconies on all levels, and for the roof terraces, strong cross flow may occur for some wind directions. Porous or solid screening on one aspect of these corner balcony and terrace spaces, perpendicular to the façade, will provide a beneficial effect by reducing cross flow. It is noted that the Level 32 balconies are all part of the same unit, so for any incident wind direction some balcony space of that unit would experience relatively mild wind conditions, with cross flows likely to affect one or two balconies at a time.

Wind conditions are expected to be typical of similar residential balconies in this part of Sydney, and no issues are foreseen for normal discretionary use.

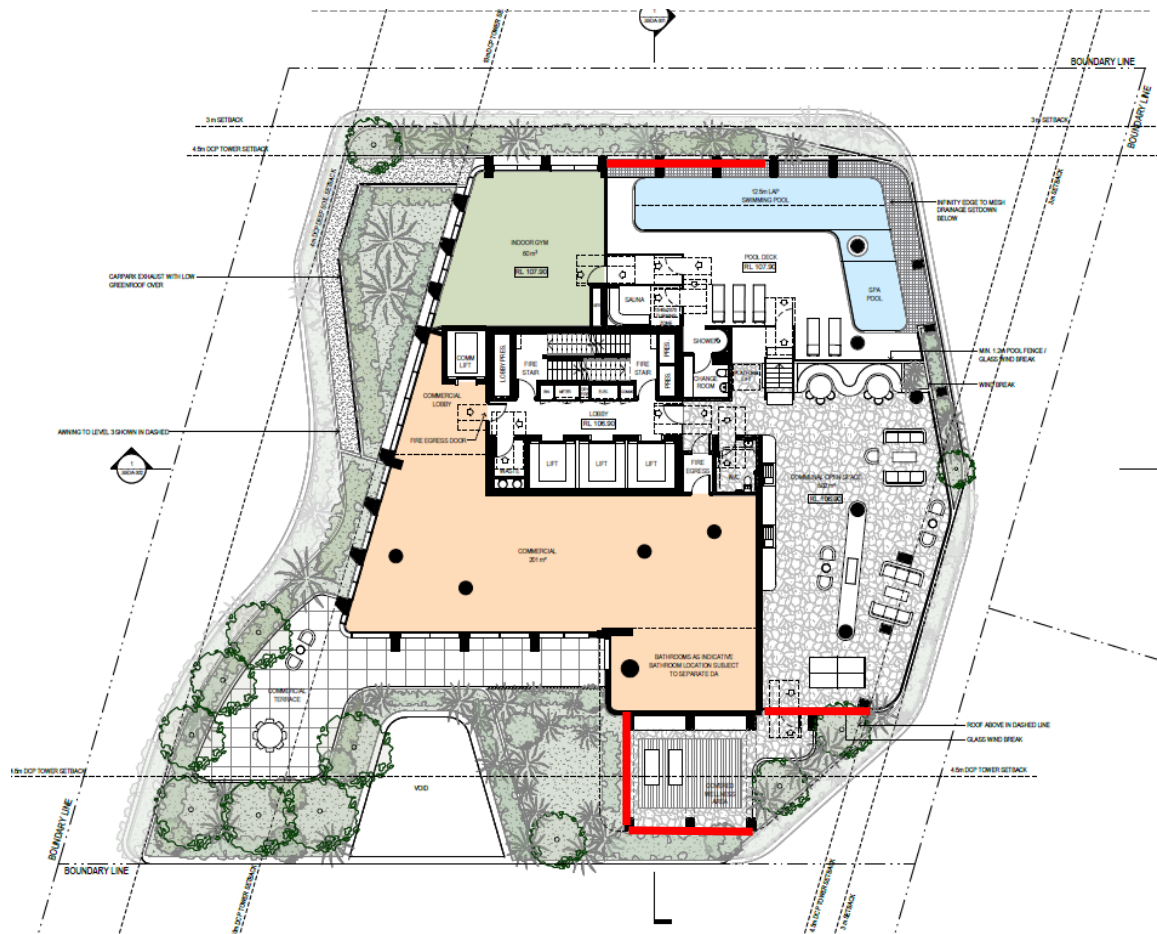


Figure 5: Level 2 floor plan of proposed development with indicative locations of additional screens.

5. Conclusion

Cermak Peterka Petersen Pty. Ltd. has provided a qualitative assessment of the impact of the proposed 691-699 Pacific Highway project on the local wind environment in and around the development site. Being slightly larger than most surrounding structures, the proposed development will have some effect on the local wind environment, though any changes are not expected to be significant from the perspective of pedestrian comfort or safety. Wind conditions around the development are expected to be classified as acceptable for Pedestrian Standing or Walking from a Lawson comfort perspective and pass the distress/safety criterion in most locations. No significant adverse conditions requiring specific mitigation are foreseen, however local amelioration may be advised for areas intended for long-term stationary or outdoor dining activities.

References

Lawson, T.V. (1990), "The Determination of the Wind Environment of a Building Complex before Construction" Department of Aerospace Engineering, University of Bristol, Report Number TVL 9025.

Melbourne, W.H., 1978, Criteria for Environmental Wind Conditions, Journal of Wind Engineering and Industrial Aerodynamics, Vol.3, No.2-3, pp.241-249.

Penwarden, A.D. (1973), "Acceptable wind speeds in towns", Building Science, Vol.8, pp. 259-267.

Standards Australia (2021), *Australian/New Zealand Standard, Structural Design Actions, Part 2: Wind Actions* (AS/NZS1170.2:2021).

Willoughby City Council (2006), "Willoughby Development Control Plan"

Appendix A – Wind Flow Mechanisms

When the wind hits a large isolated building, the wind is accelerated down and around the windward corners, Figure A1 this flow mechanism is called downwash and causes the windiest conditions at ground level on the windward corners and sides of the building. In Figure A1 smoke is being released into the wind flow to allow the wind speed, turbulence, and direction to be visualised. The image on the left shows smoke being released across the windward face, and the image on the right shows smoke being released into the flow at about third height in the centre of the face.

Techniques to mitigate the effects of downwash winds on pedestrians include the provision of horizontal elements, the most effective being a podium to divert the flow away from pavements and building entrances. Awnings along street frontages perform a similar function, and the larger the horizontal element, the more effective it will be in diverting the flow.

Channelling occurs when the wind is accelerated between two buildings or along straight streets with buildings on either side.

Figure A2 shows the wind at mid and upper levels on a building being accelerated substantially around the corners of the building. When balconies are located on these corners, they are likely to be breezy, and will be used less by the owner due to the regularity of stronger winds. Owners quickly become familiar with when and how to use their balconies. If the corner balconies are deep enough, articulated, or have regular partition privacy fins, then local calmer conditions can exist.

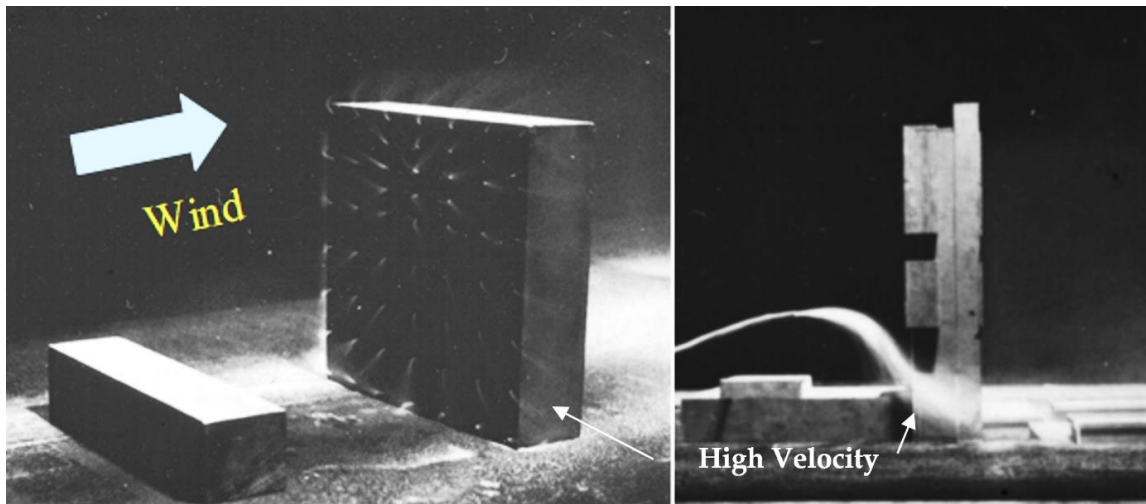


Figure A1: Flow visualisation around a tall building.



Figure A2: Channelling between buildings (L) and visualisation through corner balconies (R).

Appendix B - Wind Impact Planning Guidelines

It is well known that the design of a building will influence the quality of the ambient wind environment at its base. Below are some suggested wind mitigation strategies that should be adopted into precinct planning guidelines and controls (see also Cochran, 2004).

Building form – Canopies

A large canopy may interrupt the flow as it moves down the windward face of the building. This will protect the entrances and sidewalk area by deflecting the downwash at the second storey level, Figure B1. However, this approach may have the effect of transferring the breezy conditions to the other side of the street. Large canopies are a common feature near the main entrances of large office buildings.

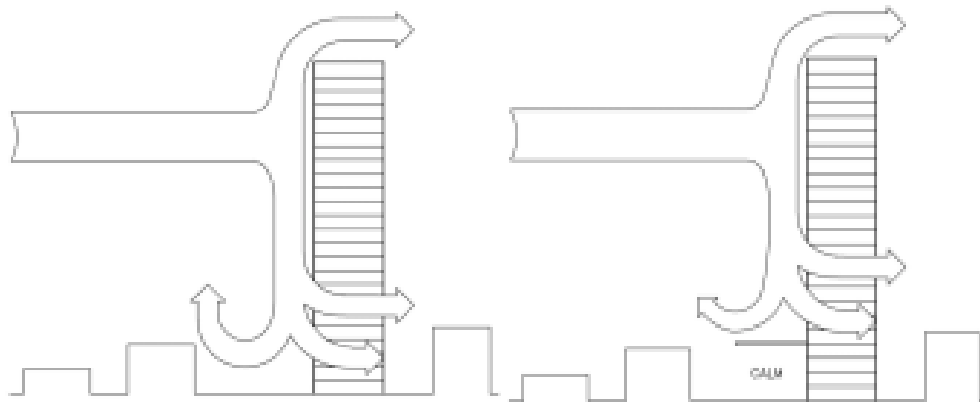


Figure B1: Canopy Windbreak Treatment. (L) Downwash to street level may generate windy conditions for pedestrians. (R) A large canopy is a common solution to this pedestrian-wind problem at street level.

Building form – Podiums

The architect may elect to use an extensive podium for the same purpose, Figure B2, if it complies with the design mandate. This is a common architectural feature for many major projects, but it may be counterproductive if the architect wishes to use the podium roof for long-term pedestrian activities, such as a pool or tennis court.

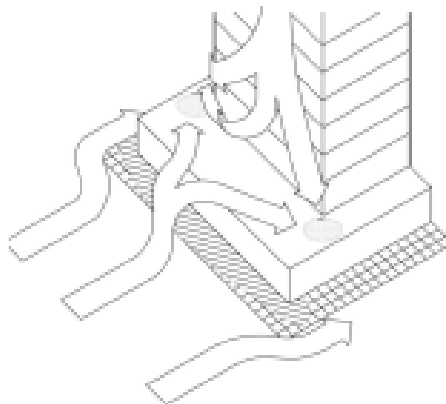


Figure B2: The tower-on-podium massing often results in reasonable conditions at ground level, but the podium may not be useable.

Building form – Arcades

Another massing issue, which may be a cause of strong ground-level winds, is an arcade or thoroughfare opening from one side of the building to the other. This effectively connects a positive pressure region on the windward side with a negative pressure region on the lee side; a strong flow through the opening often results, Figure B3. The uninvitingly windy nature of these open areas is a contributing reason behind the use of arcade airlock entrances (revolving or double sliding doors).

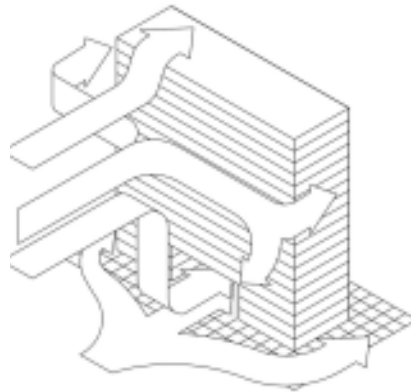


Figure B3: An arcade or open column plaza under a building frequently generates strong pedestrian wind condition.

Building form – Alcove

An entrance alcove behind the building line will generally produce a calmer entrance area at a mid-building location, Figure B4(L). In some cases, a canopy may not be necessary with this scenario, depending on the local geometry and directional wind characteristics. The same undercut design at a building corner is usually quite unsuccessful, Figure B4 (R), due to the accelerated flow mechanism described in Figure B1 and the ambient directional wind statistics. If there is a strong directional wind preference, and the corner door is shielded from those common stronger winds, then the corner entrance may work. However, it is more common for a corner entrance to be adversely impacted by this local building geometry. The result can range from simply unpleasant conditions to a frequent inability to open the doors.

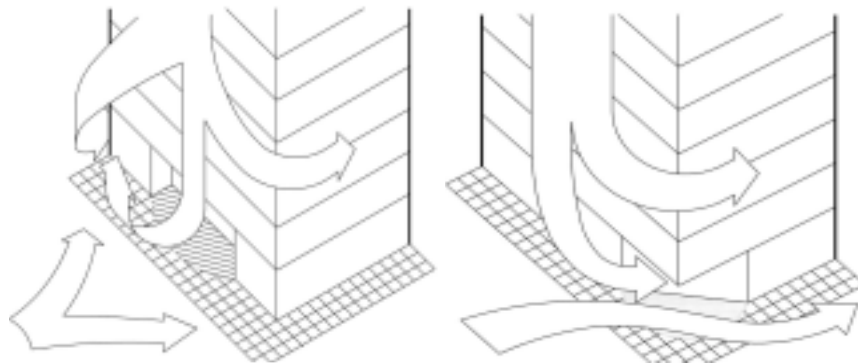


Figure B4: Alcove Windbreak Treatment. (L) A mid-building alcove entrance usually results in an inviting and calm location. (R) Accelerated corner flow from downwash often yields an unpleasant entrance area.

Building form – Façade profile and balconies

The way in which a building's vertical line is broken up may also have an impact. For example, if the floor plans have a decreasing area with increased height the flow down the stepped windward face may be greatly diminished. To a lesser extent the presence of many balconies can have a similar impact on ground level winds, although this is far less certain and more geometry dependent. Apartment designs with many elevated balconies and terrace areas near building ends or corners often attract a windy environment to those locations. Mid-building balconies, on the broad face, are usually a lot calmer, especially if they are recessed. Corner balconies are generally a lot windier and so the owner is likely to be selective about when the balcony is used or endeavours to find a protected portion of the balcony that allows more frequent use, even when the wind is blowing.

Use of canopies, trellises, and high canopy foliage

Downwash Mitigation – As noted earlier, downwash off a tower may be deflected away from ground-level pedestrian areas by large canopies or podium blocks. The downwash then effectively impacts the canopy or podium roof rather than the public areas at the base of the tower, Figure B2. Provided that the podium roof area is not intended for long-term recreational use (e.g. swimming pool or tennis court), this massing method is typically quite successful. However, some large recreational areas may need the wind to be deflected away without blocking the sun (e.g. a pool deck), and so a large canopy is not an option. Downwash deflected over expansive decks like these may often be improved by installing elevated trellis structures or a dense network of trees to create a high, bushy canopy over the long-term recreational areas. Various architecturally acceptable ideas may be explored in the wind tunnel prior to any major financial commitment on the project site.

Horizontally accelerated flows between two tall towers may cause an unpleasant, windy, ground-level pedestrian environment, which could also be locally aggravated by ground topography. Horizontally accelerated flows that create a windy environment are best dealt with by using vertical porous screens or substantial landscaping. Large hedges, bushes or other porous media serve to retard the flow and absorb the energy produced by the wind. A solidity ratio (i.e. proportion of solid area to total area) of about 60-70% has been shown to be most effective in reducing the flow's momentum. These physical changes to the pedestrian areas are most easily evaluated by a model study in a boundary-layer wind tunnel.

References

Cochran L., (2004) Design Features to Change and/or Ameliorate Pedestrian Wind Conditions, Proceedings of the ASCE Structures Congress, Nashville, Tennessee, May 2004.