



20 August 2020

CPP Project 14821

Mosca Pserras Architects Pty Ltd
203-209 Northumberland Street,
Liverpool, NSW, 2170
Australia

Attn: Mr Gregory Koutoulas
Project: 431 Macquarie Street

Dear Mr Koutoulas,

Please find herein a qualitative assessment of the impact of the proposed 431 Macquarie Street development in Liverpool on the wind environment surrounding the subject site. The proposed development consists of a single massing, combining two commercial tower blocks and a 5-storey shared podium. Inclusive of the shared podium, the two tower blocks, namely main office tower and office tower wing, are 27-storeys and 18-storeys, respectively.

Liverpool Wind Climate and Criteria

The subject site lies approximately 6 km to the west of the Bankstown Airport Bureau of Meteorology anemometer. 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 at Bankstown Airport from 1995 to 2019 have been used in this assessment. The corresponding wind rose for Bankstown Airport is shown in Figure 2 and is considered to be representative of prevailing winds at the development site. It is noted from Figure 2 that strong prevailing winds typically approach from the south-east, west and to a lesser extent the north-east quadrants. This wind assessment is focused on these prevailing strong wind directions.

The Liverpool Development Control Plan (LDCP, 2008) contains wind assessment criteria for the City Centre based on the maximum allowable wind velocities for certain areas, specifically:

“1. To ensure public safety and comfort, the following maximum wind criteria are to be met by new buildings:

- 10m/second in retail streets,*
- 13m/s in along major pedestrian streets, parks and public places, and*
- 16 m/s in all other streets.”*

It is unclear whether these conditions relate to the mean or gust wind speed and the percentage of time that these can occur. It is expected that this metric is derived from the work of Melbourne (1978), which specifies that this is a maximum 3 s gust wind speed in an hour, occurring for 0.1% of the year from each direction. With reference to Figure 3, it is evident that the maximum 10-minute mean wind speed at Bankstown Airport exceeds the DCP conditions, and hence without any obstruction to accelerate the flow, the Liverpool area would not meet the conditions as stated in the DCP.

Wind Assessment

The development is located amidst a series of high-rise structures stretching from the north-east to the south-west of the subject site, Figure 1. Additionally, two high-rise residential towers are situated to the immediate south-east. Therefore, some level of shielding is expected from these wind directions, though this depends on the size and orientation of each massing relative to the wind direction. A region generally dominated by low-rise development is noted for the other directions, with open fields to the immediate west. Topography surrounding the development site is relatively flat from a wind perspective and unlikely to significantly affect the local wind climate. The assessment is mainly focused on the wind conditions at the ground level, with the final section commenting on the podium level.

Winds from the south-east

A significant part of the main office tower will be shielded from south-easterly winds by the adjacent high-rise buildings to the south-east, reducing the amount of generated downwash, Figure 3. Nevertheless, the eastern part of the south façade remains exposed to such winds and is further impacted by the generated wake of the upstream tower. Some flow acceleration over the podium terrace, along the southern part of Short Street, and in the vicinity of the lobby entrance would be expected as the generated downwash dissipates.

However, the proposed awning along the south-east apex of the tower, in addition to relatively dense landscaping on Short Street are expected to improve conditions. Moreover, the revolving doors at the lobby entrance will significantly assist in preventing pressure driven flows and improving door operability. The office tower wing and the remaining parts of the podium are shielded by the main office tower.



Figure 1: Site plan (EagleView, 2020) (top) and north-east aerial view (MPA architects) (bottom) of the proposed development

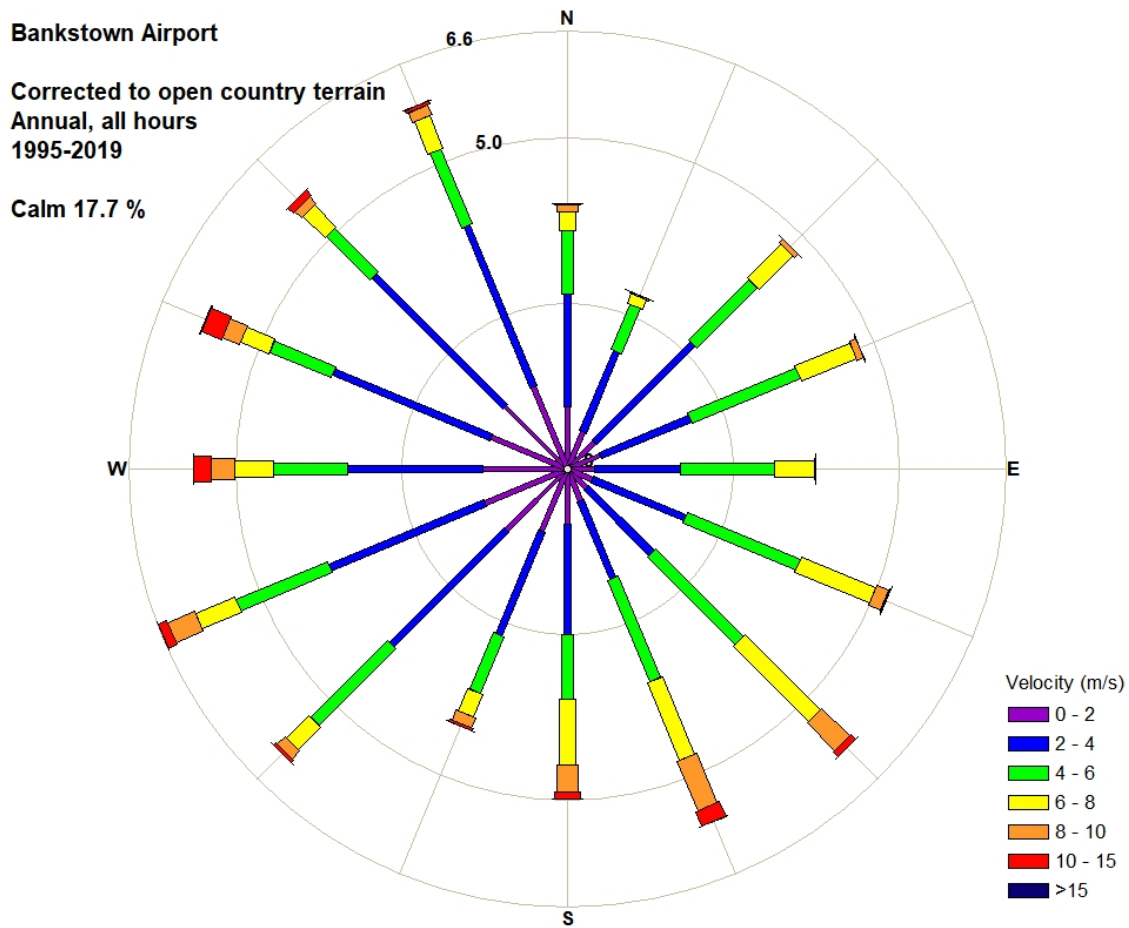


Figure 2: Wind rose for Bankstown Airport

Winds from the west

Winds from the west quadrant reach the subject site relatively unimpeded over the flat, open fields before impinging on the west façade of the office tower wing and the south-west apex of the main tower. Significant portions of the generated downwash are expected to disperse over the rooftops of the podium and office wing, Figure 3, with some flow reaching the ground level. Marginally higher wind speeds on Copeland Street and the corner of Macquarie Street, caused by dispersing downwash may be expected. Due to the exposed nature of the area, existing conditions at pedestrian level would be windy, predominantly determined by direct winds from the west.

Therefore, it is recommended to avoid the usage of the above regions for long-term activities without implementing significant mitigation methods. Plan drawings from the drawing set provided by MPA architects do not indicate any entrances or plans for long duration activities in this area. Furthermore, significant landscaping has been proposed which will assist in maintaining suitable conditions for pedestrian thoroughfare.

Winds from the north-east

Winds from the north-east quadrant are relatively lower in frequency and strength in comparison to the west and south-east. Moreover, such winds approach the proposed development over a number of newly developed/under construction high-rise structures, providing some shielding. Notwithstanding, there are no high-rise towers in the immediate vicinity of the subject site, with the concave side of the L-shape configuration of the two proposed tower blocks aligned with winds from the north-east. Downwash from both tower blocks would mainly disperse at the podium level due to the setback of the tower above the podium, though some flow from the tower wing can be expected to reach the ground level in the vicinity of the building entrance on the Civic Plaza. Nevertheless, based on the frequency of north-east winds, in addition to the proposed landscaping and overhead coverage of the seating area on Civic Plaza, suitable wind conditions for the intended use of this region would be expected. If calmer conditions are desired on Civic Plaza, localised amelioration strategies such as vertical screens or dense foliage landscaping can be implemented in the detailed design stage. It is worth noting that the revolving door at the entrance would assist in preventing any internal flow issues.

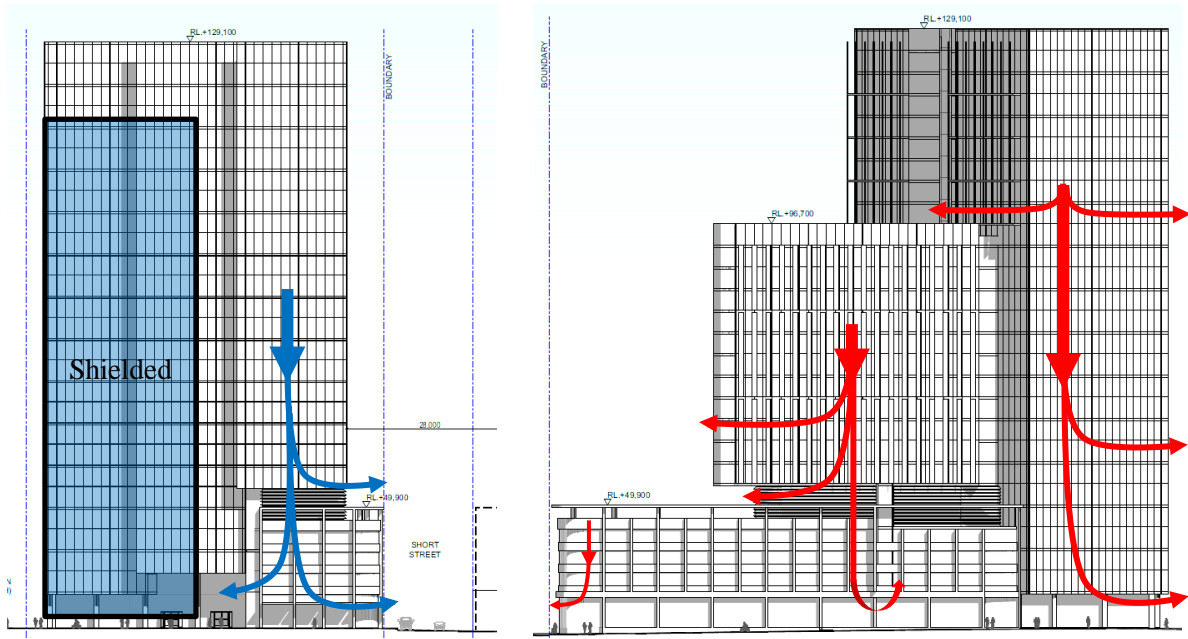


Figure 3: Proposed development elevations and flow paths: south-east (left) and west (right)

Wind conditions on the podium rooftop

The outdoor terrace on the podium rooftop is exposed to direct winds from the west and north-east, in addition to generated downwash from the tower blocks for all prevailing winds. Depending on the proposed usage of the terrace, wind mitigation may be required for this space such as the implementation of tall balustrades (>1.8m), in addition to an awning stretching across the north apex of the tower wing. As this area is not intended for public access, strict guidelines do not apply and over time, occupants will manage and optimise use of the terrace based on experience.

Summary

In overview, the wind conditions at the subject site are not expected to be significantly altered by the proposed development, with a slight increase in wind speeds for localised regions where downwash will disperse. Localised mitigation strategies for the seating area on the Civic Plaza may be considered in the detailed design if calmer conditions are desired. Impacts of the proposed development on the wind conditions in the public domain, including potential mitigation measures, can be addressed in wind tunnel tests with the detailed development application.

Please do not hesitate to contact me if you have any questions regarding any aspect of this letter.

Yours sincerely,



Parsa Enshaei
Project Engineer

cc: Joe Paetzold, Engineering Manager

REFERENCES

Drawing set for 431 Macquaire Street, Liverpool, Mosca Pserras Architects, 18.03.2020

Liverpool City Council (2008), "Liverpool Development Control Plan 2008 - Part 4 - Development in Liverpool City Centre", 25 July 2014.

Melbourne, W.H., 1978, Criteria for Environmental Wind Conditions,