SYNERGETICS

360-372 South Road, Moorabbin, pedestrian wind comfort study

prepared for

Melbourne Development Acquisitions Pty Ltd

21 March 2024

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for

MDA

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Executive summary

Melbourne Development Acquisitions Pty Ltd (MDA) are proposing the construction of a 15-storey office development at 360-372 South Road, Moorabbin. As part of the planning process MDA have requested that Synergetics conduct a desktop assessment of the likely pedestrian wind comfort impacts of this development.

Based on the design of the building, the surrounding buildings and the local wind conditions proposed development is expected result in pedestrian wind comfort similar that current experienced at the site under most circumstances and is unlikely to cause unfavourable wind impacts.

1 Introduction

Melbourne Development Acquisitions Pty Ltd (MDA) are proposing the construction of a 15-storey office development at 360-372 South Road, Moorabbin. As part of the planning process MDA have requested that Synergetics conduct a desktop assessment of the likely pedestrian wind comfort impacts of this development.

This report contains the findings of this desktop assessment.

2 Site description

The proposed site is shown in Figure 1. It is bordered by residential buildings and commercial buildings ranging from one to 12 storeys (on the south border). In the nearby vicinity, there are several taller residential buildings, including a nine-story apartment 150 m to the south. A 12 storey residential development has been approved for the adjacent site at 374-380 South Road

Figure 1 - The proposed residential site is shown by the blue box. The approved, but not yet built adjacent building is shown by the pink box. Image sourced from Google Earth. North is to the top of the image.

The proposed development is a fifteen storey office building and is approximately 60 m high (KUD, 2024). All four elevations of the proposed development are shown in Figure 2 and Figure 3. The building includes a setback between the 2nd and 3rd floor on all sides. Figure 4 shows the plan view of the ground and first level of the proposed development. The development includes cafes and retail in addition to office spaces. The proposed building includes two balconies on level 7 and 11.

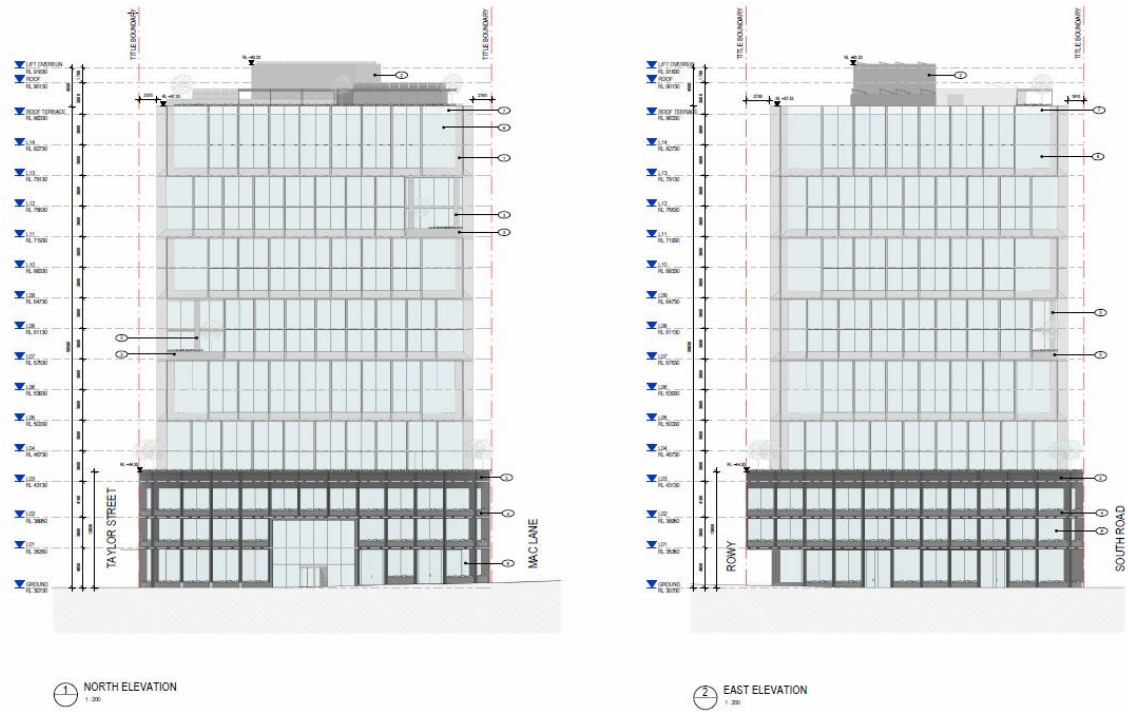

Figure 2 – North (left) and East (right) elevation of the proposed development (KUD, 2024).

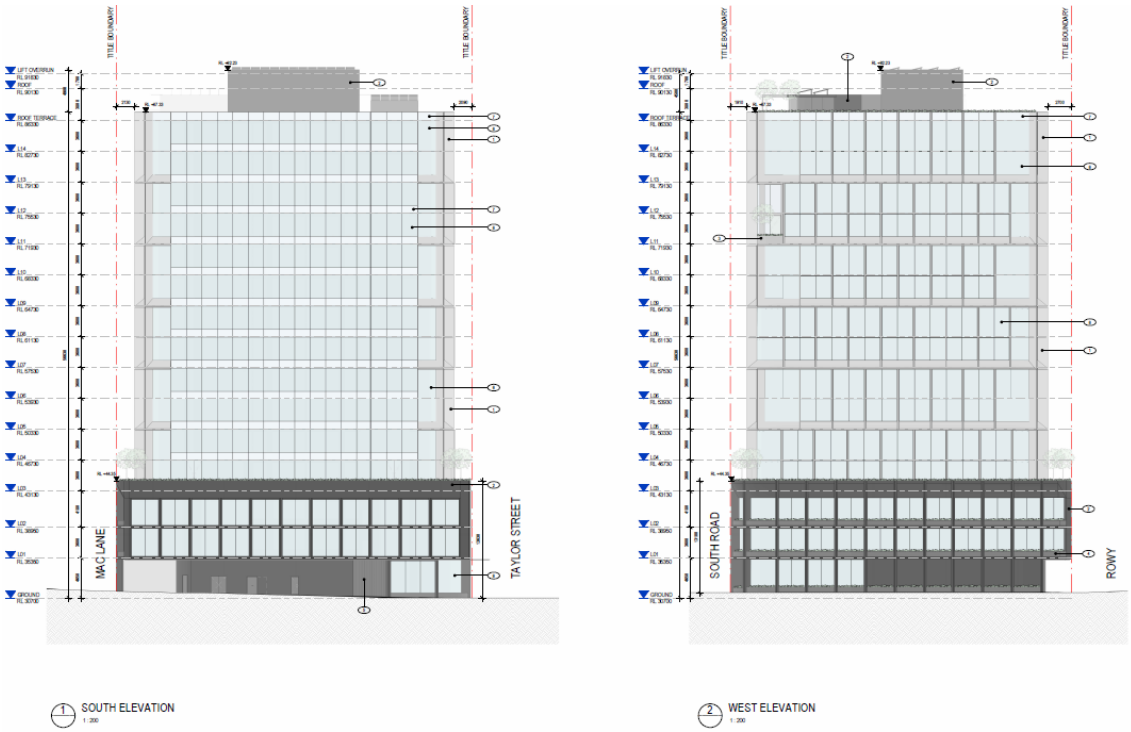

Figure 3 – South (left) and West (right) elevation of the proposed development (KUD, 2024).

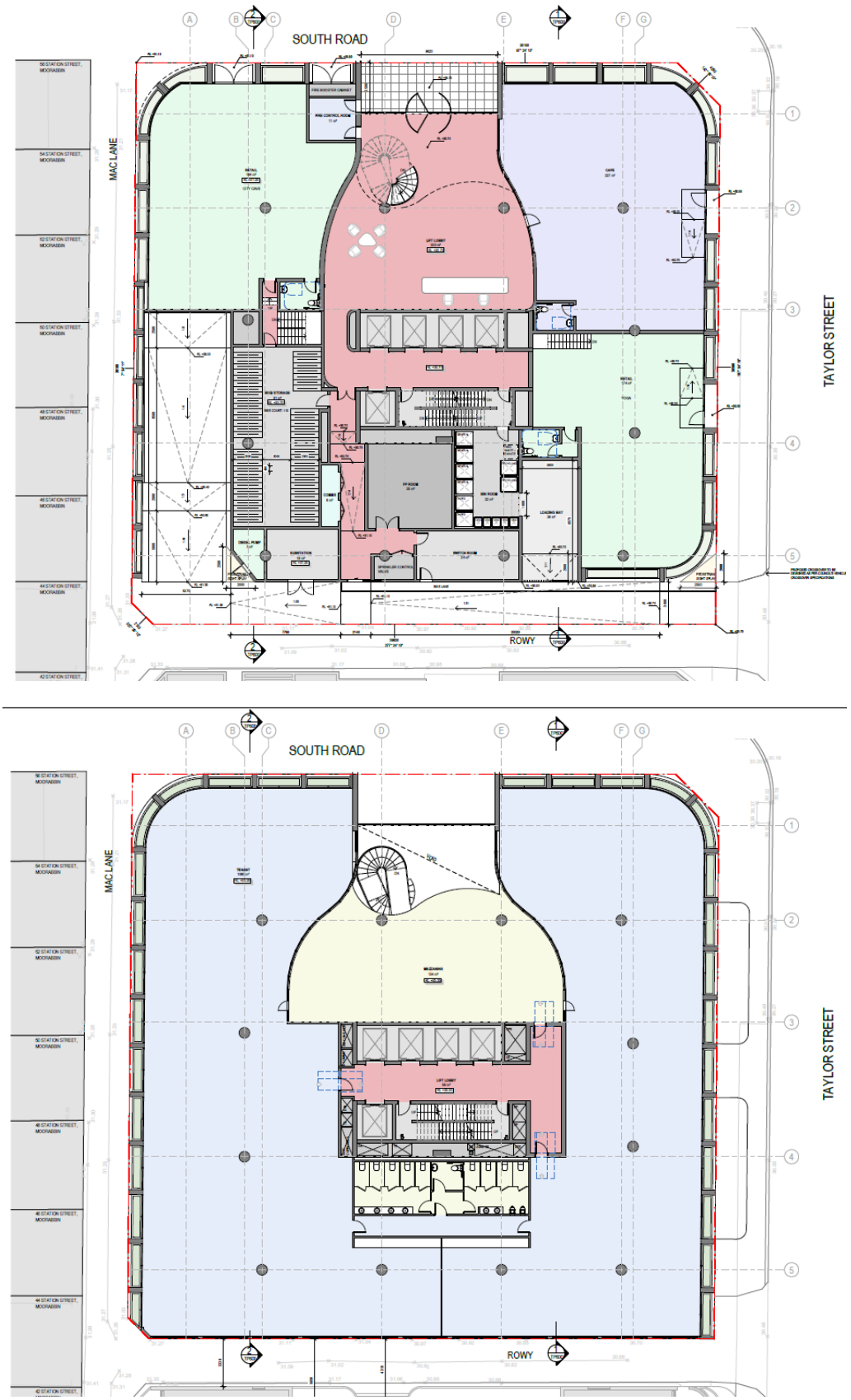

Figure 4 - Plan view of the ground (top) and 1st (bottom) level of the proposed development (KUD, 2024).

3 Weather data

The office development site is located approximately 6 km from the Bureau of Meteorology (BOM) weather observation station at Moorabbin Airport, Victoria.

Analysis of wind conditions over the period from Jan 2010 to Dec 2019 for Moorabbin Airport BOM weather station indicated the following observations:

- wind speeds below 10 km/h account for 27% of conditions;
- wind speeds between 10 and 20 km/h account for 38 % of conditions;
- wind speeds between 20 and 30 km/h account for 27% of conditions;
- wind speeds between 30 and 40 km/h account for 6% of conditions;
- winds from the north-east and east tend to be less common;
- winds from the north are the most common and strong.

The wind roses are shown in Figure 5. As the Moorabbin Airport BOM weather station records wind speeds at 10 m above ground, wind speeds at pedestrian levels will be considerably lower, typically about half, of those measured.

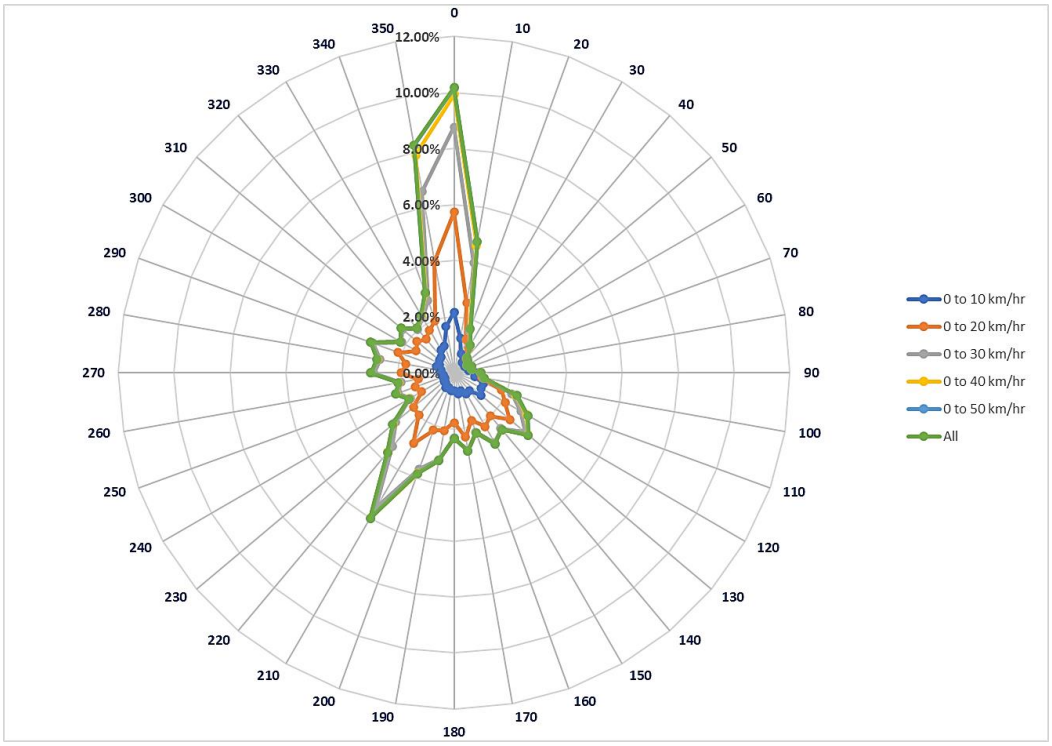

Figure 5 – Wind rose at the BOM weather observation station at Moorabbin Airport. Wind speeds are measured by BOM at 10 m above ground level.

4 Methodology

This study is a desktop wind comfort study, and is based on the experience and expert opinion of Synergetics' engineers with airflow around large-scale developments.

Winds from all wind directions have been considered as the site does not have any strong biases to particular wind directions, as demonstrated in Figure 5. For the purpose of the assessment, winds have been divided into the eight cardinal and ordinal wind directions (N, NE, E etc.).

The assessment has been restricted to ground level impacts, and balconies, other locations, which might be access by maintenance staff, have not been considered.[1]

There are a wide range of quantitative comfort criteria described in the literature, and the most appropriate criteria for any space are dependent upon the intended use of the space. For example, an outdoor eating area is likely to be most commonly used by diners who are sitting down. Parks are likely to be a mixed-use space, with people using it as a thoroughfare and also for resting and socialising while seated or lying. Streets and adjacent footpaths would be mostly used as a thoroughfare.

For desktop studies, such as this, quantitative criteria may not apply, however, they still provide a valuable guide to the sensitivities of different activities to wind speeds. With this in mind, the comfort criteria for this assessment have been based on the Lawson Criteria (Lawson, 1975). These criterion are based on mean and gust equivalent mean wind speeds which should not be exceeded any more than 95% of the time. The surrounds of the proposed development are primarily footpaths used for walking, with no outdoor dining areas identified in our survey, and therefore the walking criteria is considered the most applicable.

Table 1 - The adopted wind comfort criteria.

Activity	Mean wind speed	
	(m/s)	(km/h)
Walking	8.0	28.8
Standing	6.0	21.6
Sitting	4.0	14.4

The 95% limit of these criteria allows for uncomfortable wind effects to occur occasionally during periods of unusually high wind speeds. During these high wind events, conditions are unlikely to be comfortable in most unsheltered outdoor locations regardless of any nearby developments.

Balconies do not commonly have comfort criteria applied to them. It can be expected that balconies will be uncomfortable during windy conditions. As they are private or semi-public spaces this is not necessarily an issue.

[1] If a more detailed high accuracy assessment is required, this would be most cost effectively achieved by application of computational fluid dynamics (CFD).

5 Predicted wind comfort impacts by wind direction

5.1 Building downwash

When wind hits the wall of a wide building, some of the incoming air flow is deflected downwards, towards the ground, resulting in increased wind speeds at ground level and windward corners of the building.

Downwash will occur to some extent during all wind directions, however as the proposed building design is relatively narrow, with rounded aerodynamic shaped corners, which will mitigate the downwash by directing air around the building instead of up and down. Additionally, the setback of the higher storeys on the south, and the apartments to the west, will mitigate downwash by deflecting downwashed wind away from ground. This effect is shown in Figure 6.

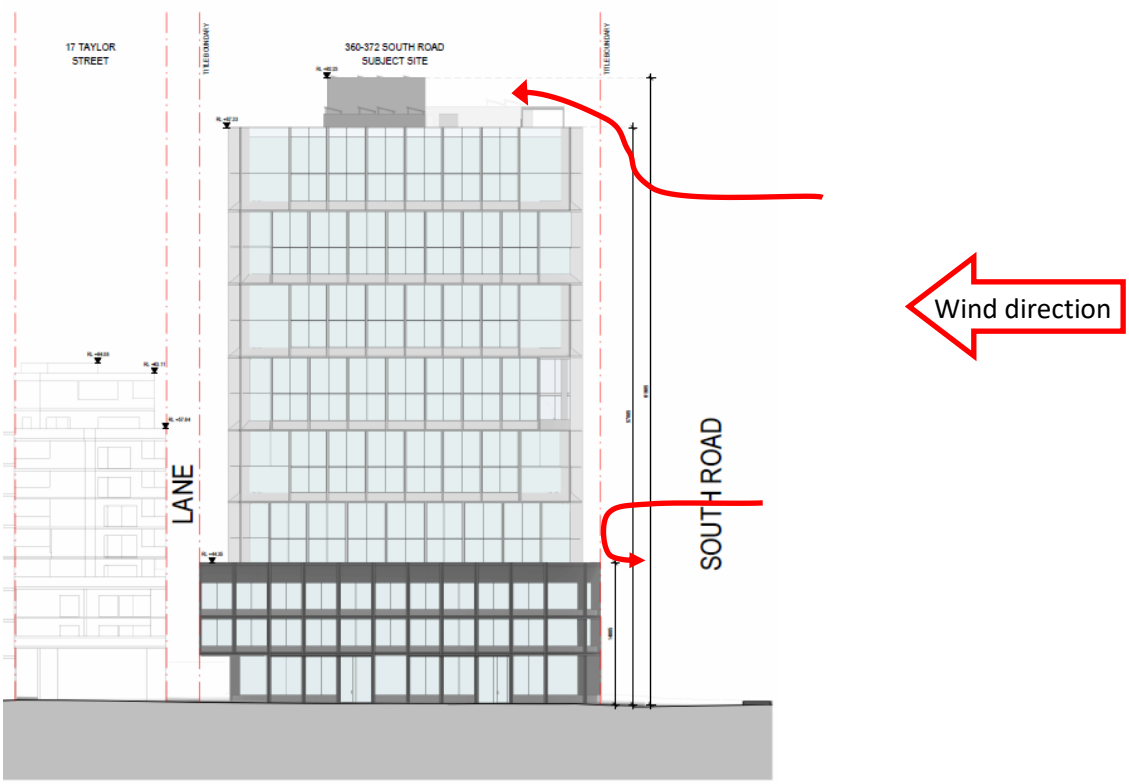

Figure 6 - Building downwash effects for a northerly wind direction. The setback deflects most of the downwash before it reaches ground level.

5.2 Northerly wind direction

Northerly winds are more frequent and stronger in proposed building area. For winds from the north, the proposed building would receive some shielding from the surrounding buildings. There will be wind channelling along the east side of the building due to the approved residential building adjacent to the site. Wind channelling down the adjacent Taylor Street will occur. Due to the moderately wide width of the street (approximately 13 m including footpaths) this is not expected to result in uncomfortable local winds during common weather.

5.3 North-easterly and Easterly wind direction

North-easterly and easterly winds are less common and no significant wind impacts are expected on the proposed development due to existing and approved surrounding buildings.

5.4 South-easterly and southerly

South-easterly and southerly winds are relatively less common in the Moorabbin area. For winds from the south and south-east, the proposed building would receive some shielding from the surrounding buildings. There will be minor wind channelling along the east side of the building.

5.5 South-westerly wind directions

South-westerly winds are frequent in proposed building area. Some of the wind flow from these wind directions will strike the exposed upper levels of the building and generate some downwash. The shape of the proposed building will deflect the flow and reduce the overall effect of the downwash. Ground level winds will be largely sheltered by the existing buildings.

5.6 Westerly and north-westerly wind directions

The proposed building will be shielded by surrounding buildings for westerly and north-westerly winds. For these wind directions the proposed building will have very little change in impact on pedestrian wind comfort compared to the existing building, with no large-scale wind channelling.

6 Conclusion

Synergetics have conducted a desktop wind comfort assessment for a proposed 15 storey office development at 360-372 South Road, Moorabbin.

Based on the design of the building, the surrounding buildings and the local wind conditions proposed development is expected result in pedestrian wind comfort similar that current experienced at the site under most circumstances and is unlikely to cause unfavourable wind impacts.

7 References

KUD. (2024). *360-372 South Road, Moorabbin Vic 3189, Drawing set, Issue for review, 16 March 2024.*

Lawson, T. V. (1975). *The determination of the wind environment of a building complex before construction.* Bristol University, Department of Aeronautical Engineering.