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Memorandum

Attention	Mark Smith	File No.	Memo_TPC Response on Wind
Company	Macquarie Point Development Corporation	Date	4-Mar-2025

Memorandum No.	Item
Memo_TPC Response on Wind	**TPC Response on Wind**

1.0 Summary

The purpose of this Notice of Advice (NOA) is to provide a response to the TPC query:

Evidence or analysis should be provided on wind effects and pedestrian comfort levels associated with the proposed building design, or any measures to minimise or manage wind effects (section 8.1 of the Guidelines).

To which assessment of the wind effects and pedestrian comfort at the project site is based on an analysis of the regional wind climate at the nearest meteorological station at Hobart City, Ellerslie Rd (WMO 949700) only about 1.3 km southwest from the Stadium and a detailed study of wind velocity changes due to the influence of the surrounding buildings. The latter is investigated through a wind tunnel study in a boundary layer wind tunnel using a model of the proposed Stadium and its surroundings.

The result of the assessment will address the wind effect requirements outlined in the Wind Comfort Assessment for Visitors and the Precinct Area Report prepared by Wacker Ingenieure Wind Engineering Consultants, dated 21 August 2024.

The preliminary findings from the assessment work so far can be summarised as follows:

Safety criterion

- The safety criterion is satisfied at each measuring point inside and outside the Stadium. The proposed buildings within the project area provide a general sheltering effect, resulting in similar or improved pedestrian comfort conditions compared to the scenario without the new buildings. Thus, a potential wind-induced risk according to the defined criterion is not likely to occur.

Pedestrian comfort outside the Stadium

- At all investigated locations, pedestrian comfort is at least suitable for sidewalks and potential wind-induced risk according to the defined criterion is not likely to occur. The comfort level would be further enhanced by incorporating shelter elements such as plantings, shade structures, and similar features into the landscape.

Pedestrian comfort inside the Stadium

- No significant wind comfort issues are expected at the lower and upper tiers.
- On the Level 1 concourse, wind speeds are slightly higher compared to the tiers. However, most measurement locations do not indicate significant wind comfort issues. Only at the northeastern edge do higher wind conditions occur occasionally, but the assessed wind comfort remains suitable for waiting areas.

2.0 Wind Tunnel Testing

The assessment of the pedestrian comfort at the project site is based on an analysis of the regional wind climate at the nearest meteorological station at Hobart City, Ellerslie Rd (WMO 949700) only about 1.3 km southwest from the Stadium and a detailed study of wind velocity changes due to the influence of the surrounding buildings. The latter is investigated through a wind tunnel study in a boundary layer wind tunnel using a model of the proposed Stadium and its surroundings performed in accordance with standard procedure for wind tunnel testing as described in codes and standards including American Society of Civil Engineers (ASCE) standards ASCE 7-16, ASCE 49-12, WtG 1996, EN 1991-1-4 2005 and Australian Wind Engineering Society AWES-QUAM-1-2019.

To measure the flow velocities, a 1:300 scale rigid model of the Stadium, and its surroundings (Figure 1) is built based on the current design drawings.

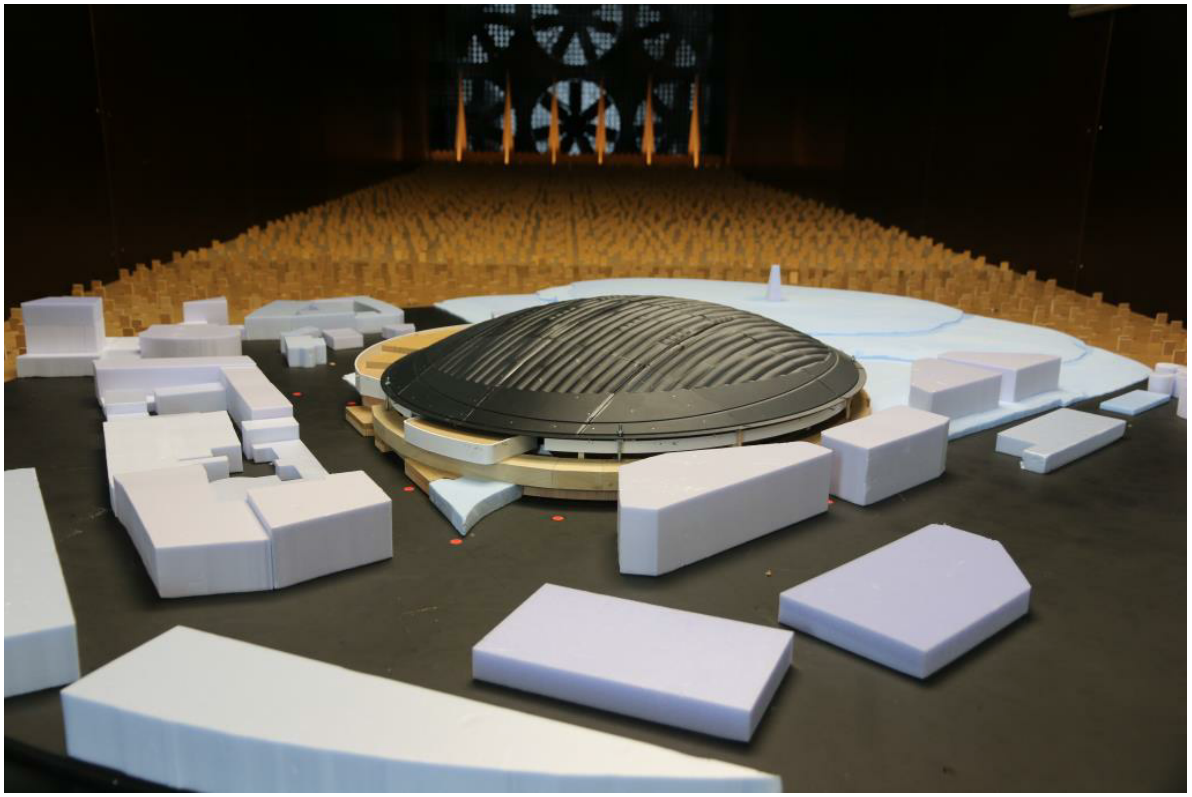

Figure 1 - Wind Tunnel Model of the Stadium with Surroundings (scale 1:300)

The tests are conducted in a low-speed, open-circuit boundary layer wind tunnel with a test section measuring 12m (L), 2.5m (W), and 1.85m (H). To simulate the atmospheric boundary layer flow at the project site, vortex generators are placed at the entrance of the test section, and roughness elements are added to the tunnel floor.

The model is positioned on a turntable with a large inertial mass, enabling the simulation of any wind direction by rotating the model to the desired angle within the wind tunnel. This setup allows for exposure to 24 different wind directions, spaced at 15-degree intervals (from 0° to 345°).

Wind velocity measurements were taken at various locations on the ground within the precinct, as well as at the concourse level and seating areas. Irwin probes and hot wire sensors were utilised for these measurements. Refer figures 2, 3 and 4 below.

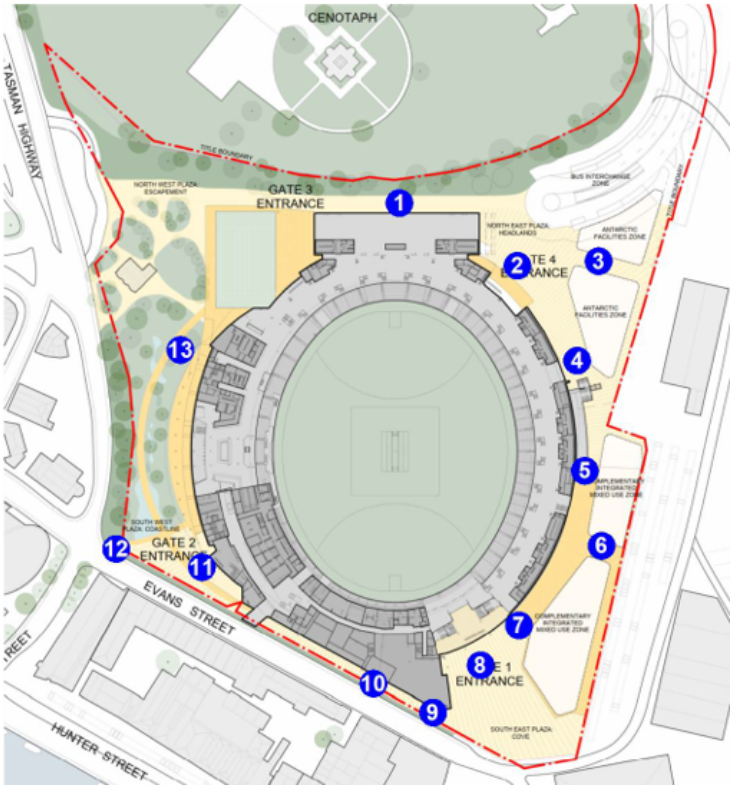

Figure 2 - Locations of measuring points - Outer Precinct

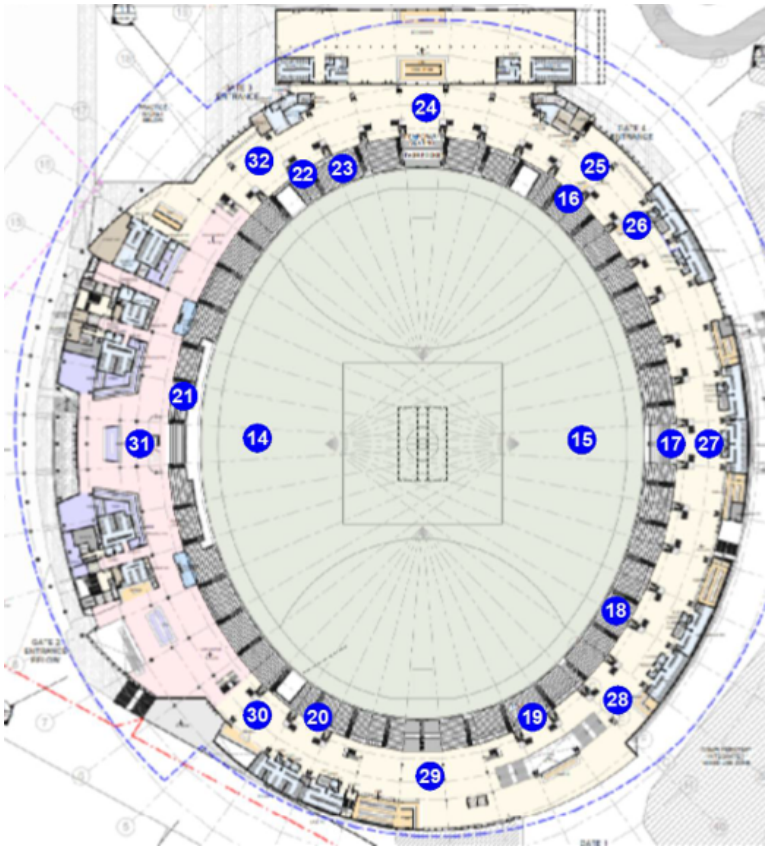

Figure 3 - Locations of measuring points - Lower Tier and Concourse Level 1

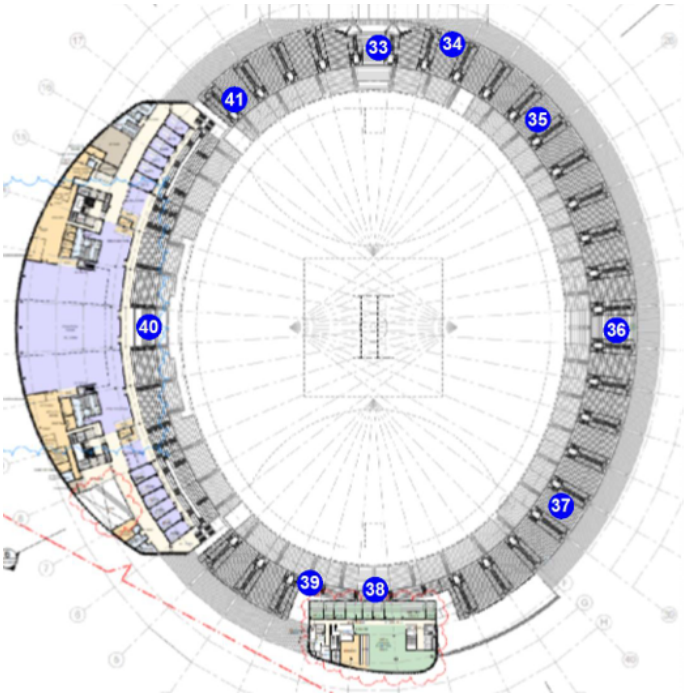

Figure 4 - Locations of measuring points - Upper Tier

Consequently, wind speeds with specific probabilities of exceedance, representative of various locations of interest, are obtained. These results are then evaluated using standard wind comfort criteria to predict the wind comfort level for the study site outlined in the Wind Comfort Assessment for Visitors and the Precinct Area Report prepared by Wacker Ingenieure Wind Engineering Consultants.

3.0 Wind Comfort Analysis

Pedestrian comfort is assessed separately for the summer and winter seasons. Besides evaluating wind comfort, the study also considers safety criteria. This safety classification helps estimate wind danger and predict if unacceptable wind conditions might occur. In this context, an unacceptable condition is defined as winds strong enough to knock people over.

The standard wind comfort criteria used to predict the wind comfort level for the Stadium is shown below in Table 1.

Windcomfort criteria						Example for possible usage
Wind velocity [m/s]	Probability of exceedence [% - hours per year]	Quality Class	Activity			
			Traversing	Strolling	Sitting	
U_{mean} = 5 m/s	< 2.5	1	Good	Good	Good	cafes, seating areas
$U_{gust,eff}$ = 6 m/s	< 5.0					
U_{mean} = 5 m/s	2.5 - 5.0	2	Good	Good	Moderate	waiting areas, parks
$U_{gust,eff}$ = 6 m/s	5.0 - 10.0					
U_{mean} = 5 m/s	5.0 - 10.0	3	Good	Moderate	Poor	shopping areas, entrance areas
$U_{gust,eff}$ = 6 m/s	10.0 - 20.0					
U_{mean} = 5 m/s	10.0 - 20.0	4	Moderate	Poor	Poor	side walks
$U_{gust,eff}$ = 6 m/s	> 20.0					
U_{mean} = 5 m/s	> 20.0	5	Poor	Poor	Poor	wind shelter recommended
U_{mean} = 15 m/s	> 0.05					
$U_{gust,eff}$ = 13 m/s	> 1.0					
Safety criteria						
U_{mean} = 15 m/s	> 0.3	6	potential risk			wind shelter necessary
$U_{gust,peak}$ = 25 m/s	> 0.1					

Table 1 - Wind Comfort Criteria

4.0 Preliminary Findings

The wind comfort measurements were carried out at 41 measuring points of which measuring points 1-13 are located outside at the precinct, points 14 and 15 on the playing field, points 16-23 on the lower tier, points 24-32 on the concourse in Level 1 and points 33-41 on the upper tier. The locations of the measuring points are shown in Figures 2, 3 and 4.

4.1 Results for the Project Site without Buildings

For reference, the wind comfort is assessed for the vacant condition at the project site, assuming the buildings do not affect the airflow (while considering the general roughness around the site). Consequently, the wind comfort level was classified as comfort class 4 for both the summer and winter halves of the year, according to the pedestrian comfort classification (refer Table 1).

This indicates that, without the influence of nearby buildings and the Stadium, the wind comfort at the project site is moderately suitable for walking in both seasons, with uncomfortable wind speeds occurring slightly more frequently during the summer.

4.2 Pedestrian Comfort Outside and Inside the Stadium

Pedestrian comfort was assessed separately for the summer season (October to March) and the winter season (April to September). In most locations, the predicted wind comfort class for the summer is similar to or slightly worse than that for the winter.

Pedestrian comfort outside the Stadium

The pedestrian comfort classes observed in the outer precinct area range from class 2 to 4 in both seasons. This indicates that, in most cases, the proposed buildings within the project area provide a general sheltering effect, resulting in similar or improved pedestrian comfort conditions compared to the scenario without the new buildings.

At all investigated locations, pedestrian comfort is at least suitable for sidewalks. The comfort level would be further enhanced by incorporating shelter elements such as plantings, shade structures, and similar features into the landscape as follows:

- The northeastern areas near the planned Antarctic Facilities Zone are the windiest (comfort class 4).
- Wind comfort classes between 2 and 3 were assessed at the entrance areas. Generally, this is considered satisfactory; however, the southwestern Gate 2 is the windiest (comfort class 3).

Pedestrian comfort inside the Stadium

Inside the stadium, wind speeds are noticeably lower compared to outside. Both the lower and upper tiers achieved the highest comfort class 1 at all measuring points, indicating no significant wind comfort issues.

On the Level 1 concourse, wind speeds are slightly higher than in the tiers, but most locations still do not show wind comfort problems. Only at the northeastern edge do higher wind conditions occasionally occur, but the assessed wind comfort remains acceptable for waiting areas.

4.3 Conclusions and Recommendations

The safety criterion is satisfied at each measuring point inside and outside the Stadium. The proposed buildings within the project area provide a general sheltering effect, resulting in similar or improved pedestrian comfort conditions compared to the scenario without the new buildings. Thus, a potential wind-induced risk according to the defined criterion is not likely to occur.

At all investigated locations outside the Stadium, pedestrian comfort is at least suitable for sidewalks. The comfort level would be further enhanced by incorporating shelter elements such as plantings, shade structures, and similar features into the landscape.