

**201 ELIZABETH STREET
SYDNEY, AUSTRALIA**

ENVIRONMENTAL WIND ASSESSMENT

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1. INTRODUCTION

The proposed development at 201 Elizabeth Street will be a 50 level (~163m) mixed use development including ground level retail, a 5-star hotel within the podium element and a 37 storey residential tower element atop the podium in the northern portion of the site. The proposed development would be located on the southwest corner side of the intersection of Park and Elizabeth Streets, in Sydney, as shown in Figure 1.

The proposed design concept will involve the demolishing of the existing 163m high rectangular planform building.

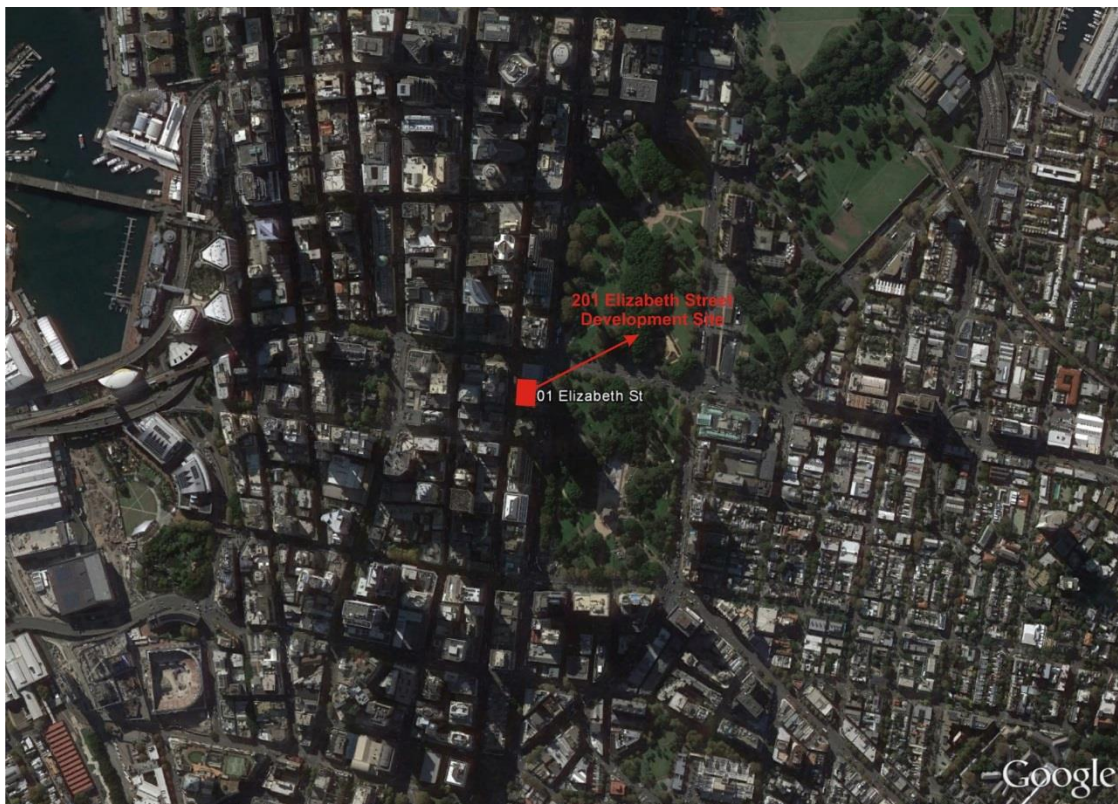


Figure 1: The 201 Elizabeth Street Development site location

This desktop wind assessment is based on concept drawings by Francis-Jones Morehen Thorp (FJMT) architects dated 10th November, 2016. This assessment is based on MEL Consultants knowledge of wind flow around buildings and structures from undertaking numerous wind tunnel model and full scale studies. A specific wind tunnel study has not been undertaken for the proposed development.

2. ASSESSMENT CRITERIA

This desktop assessment of the environmental wind conditions will be based on the following criteria:

In main public access-ways wind conditions are considered

- (a) unacceptable/safety limit if the peak gust speed during the hourly mean with a probability of exceedance of 0.1% in any 22.5° wind direction sector exceeds 23ms⁻¹ (the gust wind speed at which people begin to get blown over);
- (b) generally acceptable for walking in urban and suburban areas if the peak gust speed during the hourly mean with a probability of exceedance of 0.1% in any 22.5° wind direction sector does not exceed 16 ms⁻¹ (which results in half the wind pressure of a 23 ms⁻¹ gust). This will be referred to as the criterion for walking comfort in this assessment.

For more recreational activities wind conditions are considered

- (c) generally acceptable for stationary short exposure activities (window shopping, standing or sitting in plazas) if the peak gust speed during the hourly mean with a probability of exceedance of 0.1% in any 22.5° wind direction sector does not exceed 13 ms⁻¹. This will be referred to as the short term stationary criterion in this assessment.
- (d) generally acceptable for stationary long exposure activities (outdoor restaurants, theatres) if the peak gust speed during the hourly mean with a probability of exceedance of 0.1% in any 22.5° wind direction sector does not exceed 10 ms⁻¹. This will be referred to as the long term stationary criterion in this assessment.

The probability of exceedance of 0.1% relates approximately to the annual maximum mean wind speed occurrence for each wind direction sector. The above criteria relate to the wind conditions in the outdoor streetscapes surrounding a development.

3. WIND ENVIRONMENT AND EXPOSURE

The strongest and most frequent winds in the Sydney CBD Region come from the south sectors with secondary strong winds coming from the west and northeast sectors.

The proposed development at 201 Elizabeth Street will have good shielding from the surrounding existing high-rise buildings of Sydney CBD, especially from the west-northwest through to north, and south-southwest through to west-southwest wind directions. There would be exposure to the north-northeast through east to southeast and west directions, especially as the building extends over surrounding buildings.

4. WIND ASSESSMENT

4.1 Elizabeth Street

The majority of the east face of the development would be directly exposed to the secondary strong north-easterly winds. The orientation of the proposed elongated hexagonal shape of the tower above the podium would mean that some downwash from the broad face of the tower would be deflected by the podium above pedestrian level.

The broad face of the podium would induce additional wind flow towards the lower levels which would be expected to accelerate towards the corners and thus wind conditions near the northeast and southeast corners of the development would be expected to be above the walking comfort criterion for the north-easterly wind directions and within for the remaining wind directions.

The proposed development would be expected to increase the wind conditions in the surrounding streetscapes compared to those of the existing structure. Potential wind mitigation strategies include the addition of canopies and/or local wind break screens for minor exceedances of the criterion for walking comfort wind conditions. However, for major exceedances of the criterion for walking comfort wind conditions modifications to the massing of the development such as cut-outs, reducing the tower height and introducing porosity on podium levels. Away from the corners the wind conditions would be expected to be within the criterion for walking comfort for all wind directions.

It should be noted that the existing large trees in Hyde Park and along the east side of Elizabeth Street would assist with ameliorating wind conditions along Elizabeth Street.

Based on the above scenarios, wind tunnel model measurements to quantify the pedestrian level wind conditions near the northeast and southeast corners of the development along Elizabeth Street would be recommended and, if required, investigate wind mitigation strategies to achieve the desired comfort criterion. A wind tunnel test would also be required to determine the utilization of the ground floor.

4.2 Park Street

The north face of the proposed development would not be expected to induce downwash into Park Street due to the normal to near normal wind directions to the north face would approach over taller buildings to the north along Elizabeth Street. The main effect on the Park Street wind conditions would be the funnelling of wind flow into Park Street for the easterly and westerly wind directions as the podium (street wall) effectively narrows the street for wind flow. This funnelling would be somewhat mitigated by the large trees of Hyde Park for the easterly wind directions and the buildings of the Sydney CBD for the westerly wind directions. Therefore, wind conditions near the northwest corner (southeast corner of Park and Castlereagh Streets) and along Park Street away from the northeast corner of the development would be expected to be either on or within the walking comfort criterion for all wind directions.

4.3 Castlereagh Street

The orientation of the tower would mean that the broad face of the tower would be exposed to the west wind direction. Due to the broad west face of the tower being set back from the western edge of the podium, most of the west wind induced downwash will be deflected by the podium above pedestrian level. This deflection combined with the lower levels being shielded by upstream buildings would mean that wind conditions along Castlereagh Street would be expected to be either on or within the walking comfort criterion for all wind directions.

5. CONCLUSIONS

We have assessed the likely environmental wind conditions around the proposed 201 Elizabeth Street Development, Sydney, detailed in drawings dated to 10th November 2016. The proposed development would have good shielding from direct wind flow from the west-northwest through to north, and south through to west-southwest wind directions provided by the surrounding tall buildings of Sydney CBD.

It has been assessed that the wind conditions along the streetscapes surrounding the development would be expected to achieve the criterion for walking comfort for all wind directions except near the corners of the building for which wind conditions have been assessed to be above the walking comfort criterion.

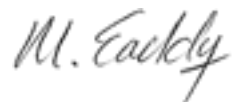
Wind tunnel model measurements to quantify the pedestrian level wind conditions near the northeast and southeast corners of the development along Elizabeth Street would be recommended and, if required, investigate wind mitigation strategies to achieve the desired comfort criterion.

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