



PEDESTRIAN WIND ENVIRONMENT STATEMENT

25-27 GEORGE STREET, THE ROCKS

WD895-01F02(REV1)- WS REPORT

NOVEMBER 2, 2017

Prepared for:

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DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
October 27, 2017	Initial.	0	AC	KP	HK
November 2, 2017	Revised treatments	1	AC	KP	HK

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EXECUTIVE SUMMARY

This report is in relation to the proposed development located at 25-27 George Street, The Rocks and presents an opinion on the likely impact of the proposed design on the local wind environment to the critical outdoor areas within and around the subject development. The effect of wind activity is examined for the three predominant wind directions for the Sydney region; namely the north-easterly, southerly and westerly winds. The analysis of the wind effects relating to the proposed development was carried out in the context of the local wind climate, building morphology and land topography.

The conclusions of this report are drawn from our extensive experience in this field and are based on an examination of the architectural drawings which have been prepared by the project architect Welsh+Major, received on October 18, 2017. No wind tunnel tests have been undertaken for the subject development, and hence this report addresses only the general wind effects and any localised effects that are identifiable by visual inspection. Any recommendations in this report are made only in-principle and are based on our extensive experience in the study of wind environment effects.

The results of the assessment indicate the ground level areas along George Street and Gloucester Walk are shielded from the dominant winds due to the neighbouring developments and vegetation. However, the proposed rooftop terrace space is exposed to the dominant north-easterly and southerly winds. These winds are expected to directly impact the open space and side-stream along the proposed built-form creating adverse wind conditions within the open space. To mitigate these effects, we recommend the following:

- Retention of proposed awning over the roof terrace on the eastern aspect.
- Extension of proposed vegetation along the north-eastern and south-eastern corners of the proposed rooftop terrace space.
- Inclusion of planting along the eastern perimeter of the proposed rooftop terrace space where the impermeable balustrade is smaller than 1.2m.

1 DESCRIPTION OF THE DEVELOPMENT AND SURROUNDINGS

The proposed development site is situated at 25-27 George Street, The Rocks. The subject development is bounded by George Street to the east and Gloucester Walk to the west. The site is in close proximity to the Sydney Harbour Bridge to the north and the Circular Quay to the east. The development site can be considered to be located within a region of high building density. The surrounding developments are mostly low and medium-rise residential or commercial buildings. The Sydney CBD is located further towards the south. A survey of the local land topography around the site indicates a slight uphill slope towards the north-west along George Street and a general downhill slope along the Gloucester Walk towards the north. An aerial image of the site and the local surroundings is shown in Figure 1.

The subject development consists of four storeys with the existing Mercantile Hotel comprising the first three levels and a proposed rooftop development intended to be used as restaurant and bar. The present report assesses the impact of the proposed redevelopment on the ground level pedestrian footpaths and entries as well as within the proposed rooftop terrace.

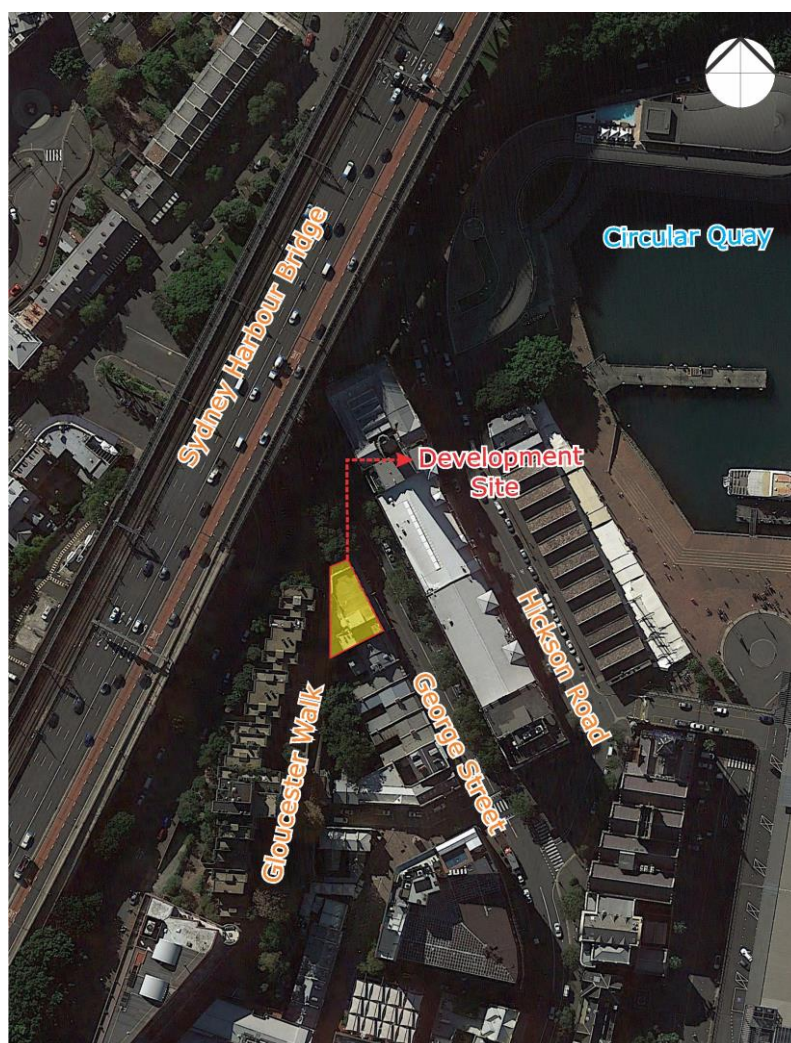


Figure 1: Aerial Image of the Site Location

2 WIND CLIMATE OF THE SYDNEY REGION

The Sydney region is governed by three principal wind directions, and these can potentially affect the subject development. These winds prevail from the north-east, south and west. A summary of the principal time of occurrence of these winds throughout the year is presented in Table 1 below. This summary is based on a detailed analysis undertaken by Windtech Consultants of recorded directional wind speeds obtained at the meteorological station located at Kingsford Smith Airport (Sydney Airport) by the Bureau of Meteorology. The data has been collected from this station from 1995 to 2016, and corrected so that it represents winds over standard open terrain at a height of 10m above ground level. From this analysis, a directional plot of the annual and weekly recurrence winds for the Sydney region is also determined, as shown in Figure 2. The frequency of occurrence of these winds is also shown in Figure 2.

As shown in Figure 2, the southerly winds are by far the most frequent wind for the Sydney region, and are also the strongest. The westerly winds occur most frequently during the winter season for the Sydney region, and although they are typically not as strong as the southerly winds, they are usually a cold wind since they occur during the winter and hence can be a cause for discomfort for outdoor areas. North-easterly winds occur most frequently during the warmer months of the year for the Sydney region, and hence are usually welcomed within outdoor areas since they are typically not as strong as the southerly or westerly winds.

Table 1: Principal Time of Occurrence of Winds for Sydney

Month	Wind Direction		
	North-Easterly	Southerly	Westerly
January	X	X	
February	X	X	
March	X	X	
April		X	X
May			X
June			X
July			X
August			X
September		X	X
October	X	X	
November	X	X	
December	X	X	

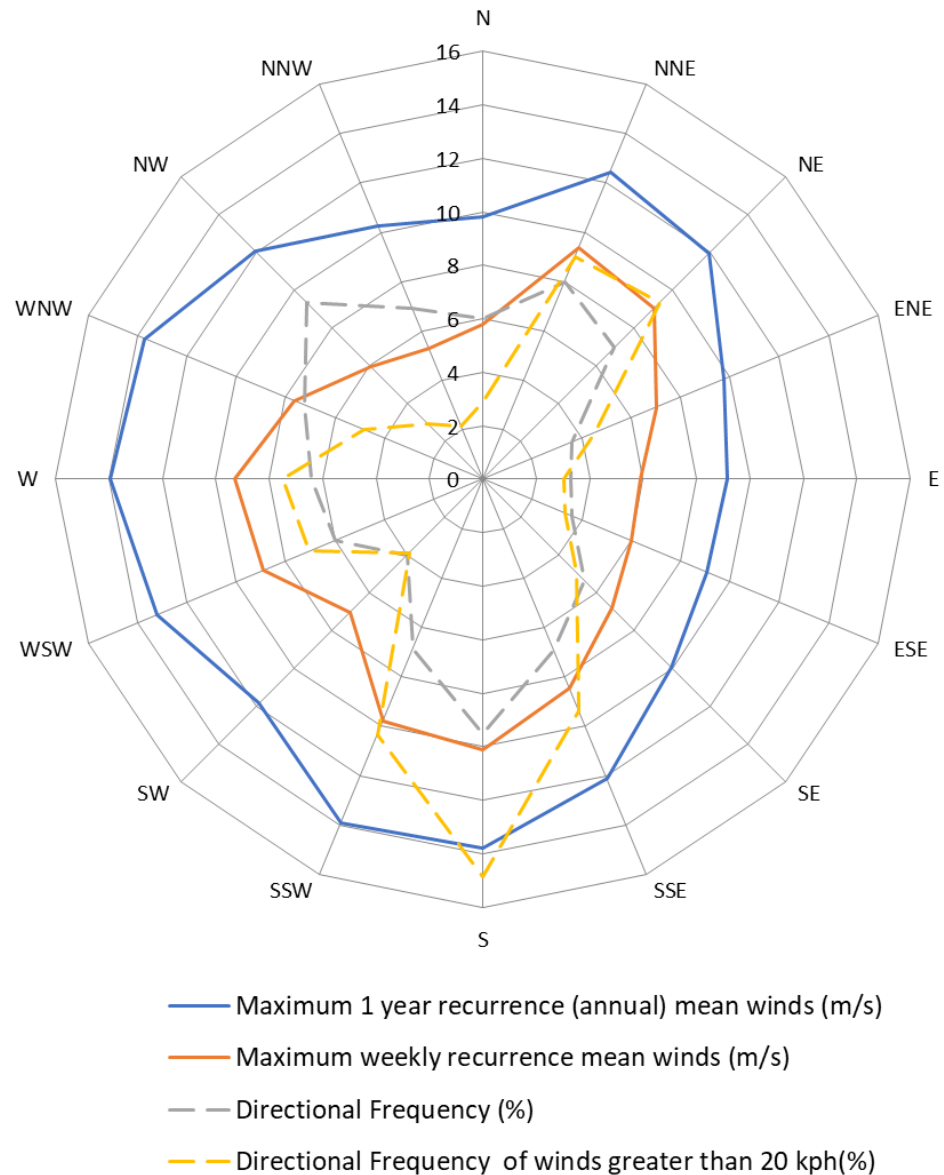


Figure 2: Annual and Weekly Recurrence Mean Wind Speeds, and Frequencies of Occurrence, for the Sydney Region (Observations from Kingsford Smith Airport from 1995 to 2016, corrected to open terrain at 10m)

3 WIND EFFECTS ON PEOPLE

The acceptability of wind in any area is dependent upon its use. For example, people walking or window-shopping will tolerate higher wind speeds than those seated at an outdoor restaurant. Various other researchers, such as Davenport, Lawson, Melbourne, Penwarden, etc, have published criteria for pedestrian comfort for pedestrians in outdoor spaces for various types of activities. Some Councils and Local Government Authorities have adopted elements of some of these into their planning control requirements in Australia.

The following table is an example, which was developed by Penwarden in 1975, and describes the effects of various wind intensities on people. Note that the applicability column relates to the indicated wind conditions occurring frequently (exceeded approximately once per week on average). Higher ranges of wind speeds can be tolerated for rarer events.

Table 2: Summary of Wind Effects on People (Penwarden, 1975)

Type of Winds	Mean Wind Speed (m/s)	Effects	Applicability
Calm, light air	0 - 1.5	Calm, no noticeable wind.	Generally acceptable for Stationary, long exposure activities such as in outdoor restaurants, landscaped gardens and open air theatres.
Light breeze	1.6 - 3.3	Wind felt on face.	
Gentle breeze	3.4 - 5.4	Hair is disturbed, Clothing flaps.	
Moderate breeze	5.5 - 7.9	Raises dust, dry soil and loose paper. Hair disarranged.	Generally acceptable for walking & stationary, short exposure activities such as window shopping, standing or sitting in plazas.
Fresh breeze	8.0 - 10.7	Force of wind felt on body.	Acceptable as a main pedestrian thoroughfare
Strong breeze	10.8 - 13.8	Umbrellas used with difficulty, Hair blown straight, Difficult to walk steadily, Wind noise on ears unpleasant.	Acceptable for areas where there is little pedestrian activity or for fast walking.
Near gale	13.9 - 17.1	Inconvenience felt when walking.	
Gale	17.2 - 20.7	Generally impedes progress, Great difficulty with balance.	Unacceptable as a public accessway.
Strong gale	20.8 - 24.4	People blown over by gusts.	Completely unacceptable.

It should be noted that wind speeds can only be accurately quantified with a wind tunnel study. This assessment addresses only the general wind effects and any localised effects that are identifiable by visual inspection and the acceptability of the conditions for outdoor areas are determined based on their intended use (rather than referencing specific wind speeds). Any recommendations in this report are made only in-principle and are based on our extensive experience in the study of wind environment effects.

4 RESULTS AND DISCUSSION





The expected wind conditions discussed in this report pertain to the various critical trafficable outdoor areas within and around the subject development for each of the three predominant wind directions for the Sydney region. The interaction between the wind and the building morphology in the area is considered and important features taken into account including the distances between the surrounding buildings and the proposed building form, their overall heights and bulk, as well as the surrounding landform. Note that only the potentially critical wind effects are discussed in this report, and the extent of the treatments recommended are only in-principle in nature.

The impact of the proposed rooftop development on the ground level is expected to be minimal particularly due to the setback of the proposed development from the George Street front. In addition, the ground level areas along George street and Gloucester Walk are well-shielded by the neighbouring development and existing vegetation from the predominant winds.

The open rooftop terrace space is mostly shielded from the westerly winds due to the neighbouring developments to the west of the subject development, and the development itself. This area also benefits from some shielding from the north-easterly direction from the adjacent development, but to a lesser extent. However, it is still expected that the north-easterly winds will impact the open rooftop terrace space. Similarly, the southerly winds are also expected to directly impact the open rooftop terrace by accelerating around the southern corner and then side-streaming along the proposed built form and impacting the roof terrace. Westerly and north-easterly winds also have the potential to adversely affect the roof terrace area by accelerating around the proposed fire stairs. To ameliorate these potentially adverse wind effects, it is recommended that the following treatments, also shown in Figure 3, are incorporated in to the final design:

- Retention of proposed awning over the roof terrace on the eastern aspect.
- Extension of proposed vegetation along the north-eastern and south-eastern corners of the proposed rooftop terrace space. The proposed vegetation should include planter boxes of at least 1.2m with densely foliating shrubs reaching a total height of at least 2m.
- Inclusion of planting along the eastern perimeter of the proposed rooftop terrace space where the impermeable balustrade is smaller than 1.2m.

Recommended Treatment

	Inclusion of planting along the eastern aspect where the existing impermeable balustrade is smaller than 1.2m	
	Retention of proposed awning	
	Extension of proposed vegetation along the northern and southern ends of the rooftop terrace. The proposed vegetation should include planter boxes of at least 1.2m with densely foliating shrubs (total height of at least 2m)	

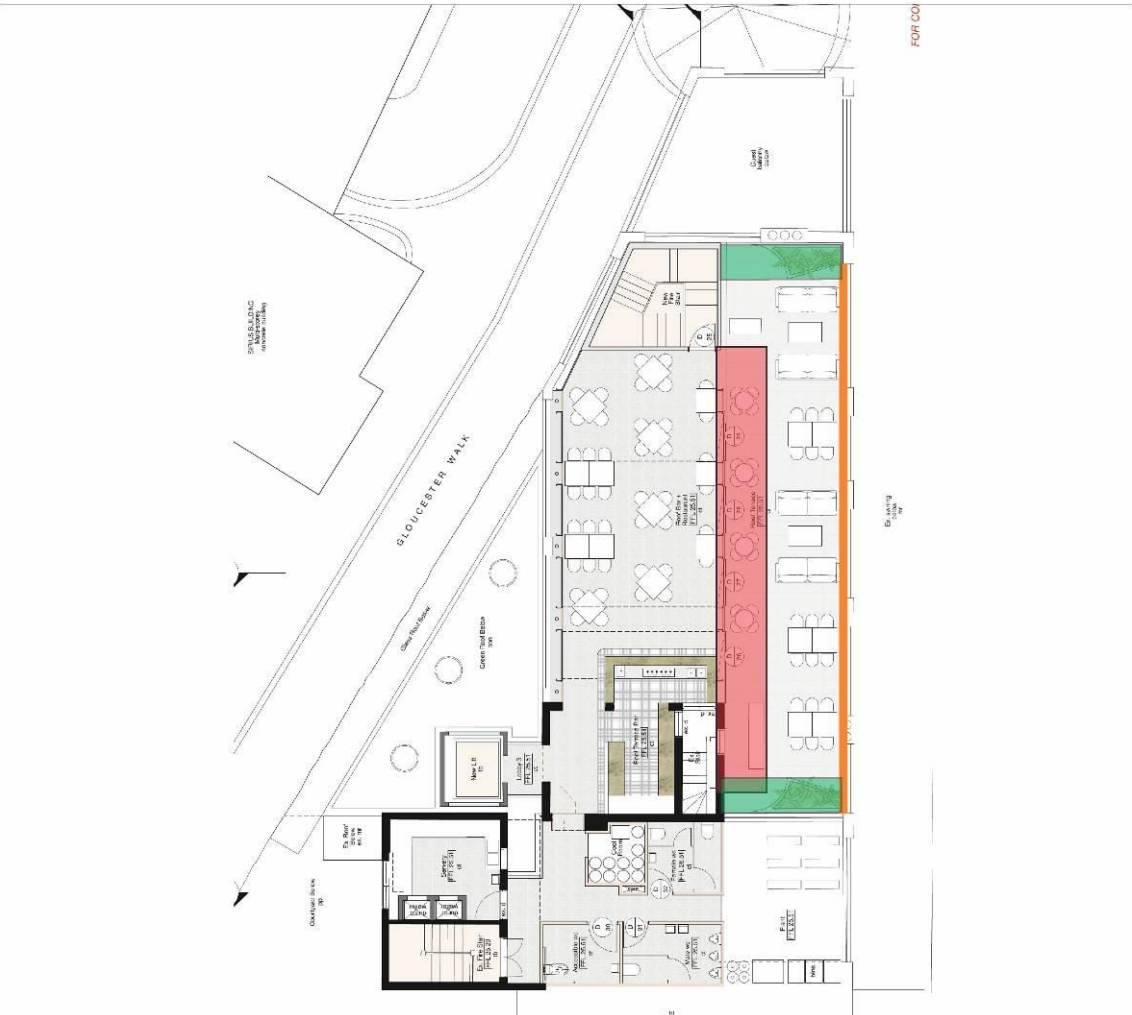


Figure 3: Recommended in-principle treatments for the proposed Rooftop Terrace