WINDTECH

Wind Environment Statement

for the proposed development known as

Site 4B, Sydney Olympic Park, Homebush Bay

December 8, 2010

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Document Control

Revision Number	Date	Revision History	Prepared By (initials)	Reviewed & Authorised By (initials)
0	08/12/2010	Initial	AL	AB

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1.0 Introduction

This report is in relation to the proposed development known as Site 4B, Sydney Olympic Park, Homebush Bay, 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 development.

The effect of wind activity within and around the proposed development is examined for the three predominant wind directions for the Sydney region; north-easterly, southerly and westerly winds. The analysis of the wind effects relating to the proposal 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 Bates Smart, received November 29, 2010. No wind tunnel tests have been undertaken for the subject development. As such, 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.

2.0 Regional Wind Climate for Sydney

The Sydney region is governed by three principle 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 an analysis of wind rose data obtained by the Bureau of Meteorology from Kingsford Smith Airport between 1939 and 2000. The wind roses are attached in the appendix of this report.

Table 1: Principal Time of Occurrence of Winds for Sydney

Month(s)	Prevailing Wind Direction		
	North-Easterly	Southerly	Westerly
January through to March	X	X	
April		X	X
May through to August			X
September		X	X
October through to December	X	X	

A directional plot of the annual and weekly recurrence winds for the Sydney region is shown in Figure 1 below. The frequency of occurrence of these winds is also shown in Figure 1. This plot has been produced based on an analysis of recorded wind speed data obtained from Kingsford Smith Airport from 1939 to 2008.

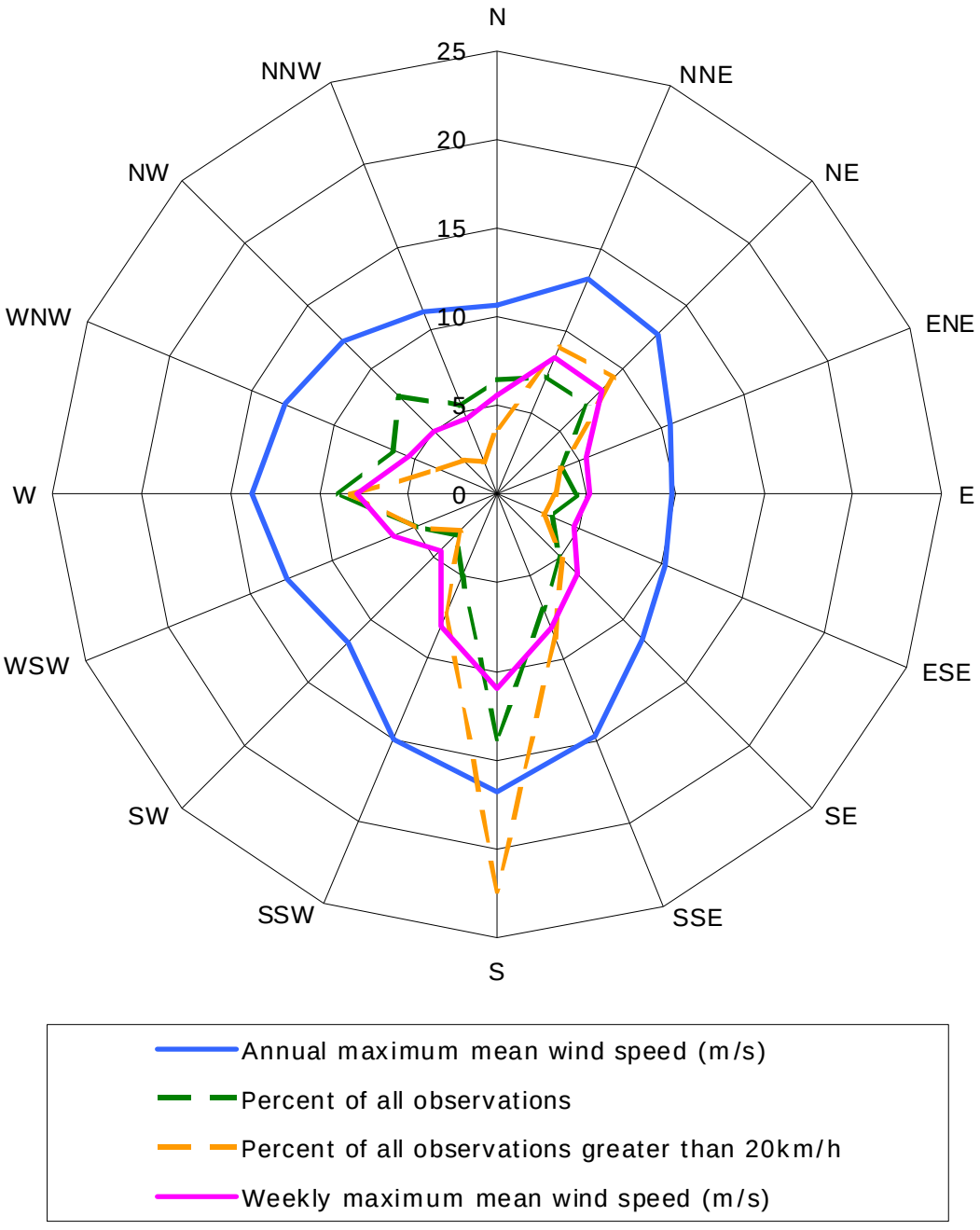


Figure 1: Annual and Weekly Recurrence Mean Wind Speeds, and Frequencies of Occurrence, for the Sydney Region (based on 10 minute mean observations from Kingsford Smith Airport from 1939 to 2008, corrected to open terrain at 10m)

3.0 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.

The following table, developed by Penwarden (1975), 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 (after Penwarden, 1975)

Type of Winds	Gust 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.

4.0 Description of the Site and Surrounds

The proposed development site consists of two main blocks; the north-eastern block is 8 levels in height and the south-western block is 10 levels in height. The development site is located at the intersection of Olympic Boulevard and Herb Elliot Avenue. No outdoor balcony or terrace areas are proposed for the development.

Neighbouring the site to the north-west is the Sofitel Hotel development, as indicated in the architectural drawings. This forms an outdoor corridor between the proposed development and the neighbouring hotel, allowing pedestrian access from Herb Elliot Avenue to Olympic Boulevard. Neighboring the site to the north-west, on the northern side of Herb Elliot Avenue, is the Ibis hotel tower, Various other buildings with similar heights to the proposed development are located to the east and south-east of the site, within the Australia Centre precinct (which is bounded by Australia Avenue, Sarah Durack Avenue, Olympic Boulevard and Dawn Fraser Avenue). Trees line most of the surrounding streets of the proposed development site.

Further away from the site to the north-west is ANZ Stadium and the Acer Arena. To the north is the Sydney Showground main arena and the Olympic Park Railway Station. To the south is the State Sports Centre, and to the south-west is the Sydney Aquatic Centre. The landform in the local vicinity of the site is relatively flat. An aerial image of the site is shown in Figure 2 below.

Figure 2: Aerial Image of the Proposed Development Site

5.0 Results of the Analysis

For each of the three predominant wind directions for the Sydney region, the interaction between the wind and the building morphology in the area was considered. Important features taken into account include the distances between the proposed building forms, their overall heights and bulk, as well as the landform. Only the potentially critical wind effects are discussed in this report.

5.1 North-Easterly Winds

North-easterly winds occur most frequently during the warmer months of the year for the Sydney region. They are typically not as strong as the southerly winds, and are usually welcomed within outdoor areas since they typically occur when it can be quite warm during the summer.

It is not expected that the proposed development will cause north-easterly winds to produce any adverse effects to the surrounding streets and buildings within the local area. The ground-level link between the two components of the development is expected to mitigate any funneling of the north-easterly winds between the two blocks at ground level.

The existing trees along the southern side of Herb Elliot Avenue will provide a shielding effect to the proposed development from north-easterly winds. Wind conditions within the outdoor areas of the site are expected to be acceptable for their intended uses. Any additional planting of trees within and around the site will further enhance wind conditions.

The northern end of the proposed development will shield north-easterly winds from being funneled into the outdoor corridor between the study building and the neighbouring Sofitel Hotel development.

5.2 Southerly Winds

As shown in Figure 1 of this report, the southerly winds are by far the most frequent wind for the Sydney region, and are also the strongest.

It is not expected that the proposed development will cause southerly winds to produce any adverse effects to the surrounding streets and buildings within the local area.

The existing trees along the north-eastern side of Olympic Boulevard will provide a shielding effect to the proposed development from southerly winds. Wind conditions within the outdoor areas of the site are expected to be acceptable for their intended uses. Any additional planting of trees within and around the site will further enhance wind conditions.

The south-western end of the proposed development will shield southerly winds from being funneled into the outdoor corridor between the study building and the neighbouring Sofitel Hotel development.

5.3 Westerly Winds

Westerly winds occur most frequently during the winter season for the Sydney region. 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.

The proposed development is relatively exposed to westerly winds. The existing trees along Olympic Boulevard will provide some shielding to the outdoor areas along the western side of the site.

Since the proposed development is taller than the podium of the neighbouring Sofitel Hotel development, it is likely that westerly winds could be downwashed and funneled into the outdoor corridor area. It is noted in the architectural drawings that trees are proposed within the outdoor corridor area. Assuming that these trees are retained in the final landscape plan, wind conditions within the outdoor corridor area are expected to be suitable for its intended use.

Since westerly winds predominantly occur during the winter months for Sydney it is recommended that these trees are selected from an evergreen species. These trees should also be densely foliating to ensure their effectiveness in wind mitigation. Palm trees, for example, would not be effective in ameliorating local ground level wind conditions.

Any additional planting of trees within and around the site will further enhance wind conditions.

6.0 Conclusions

An analysis of the wind environment impact with respect to the three principal wind directions for the Sydney region has been completed for the proposed development known as Site 4B, Sydney Olympic Park, Homebush Bay. 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 Bates Smart, received November 29, 2010. No wind tunnel tests have been undertaken for the subject development. As such, 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 study indicate that the wind conditions within all ground level areas around the site are expected to be acceptable for their intended uses. It is noted in the architectural drawings that trees are proposed within the outdoor corridor area. It is recommended that these trees be retained in the final landscape plan to mitigate against adverse winds from the west. It is recommended that trees be densely foliating and of an evergreen variety to ensure their effectiveness during the winter months.

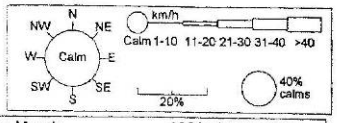
Furthermore, it is not expected that the proposed development will cause any adverse effect to the wind conditions to the local surrounding streets and other outdoor areas around the site.

Appendix

Wind Roses for the
Sydney Region

Wind Roses using available data between 1939 and 2000 for SYDNEY AIRPORT AMO

Site Number 066037 • Locality: SYDNEY AIRPORT • Opened Jan 1929 • Still Open
Latitude 33°56'28"S • Longitude 151°10'21"E • Elevation 6m



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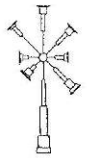
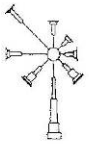
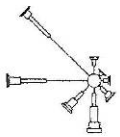
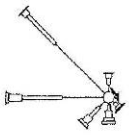
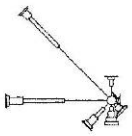
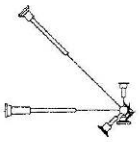
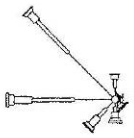
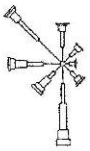
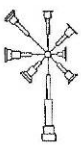
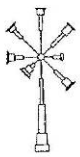
		
9 am April 1834 observations	**9 am May 1866 observations**	**9 am June 1806 observations**
		
9 am July 1873 observations	**9 am August 1876 observations**	**9 am September 1814 observations**
		
9 am October 1901 observations	**9 am November 1835 observations**	**9 am December 1906 observations**
		

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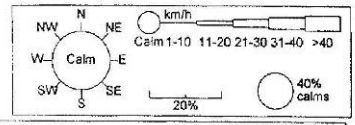

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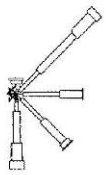
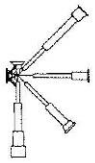


3 pm February 1771 observations

3 pm March 1925 observations



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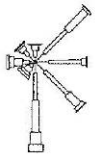

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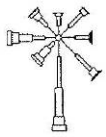

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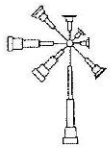

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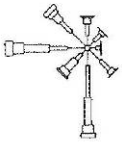

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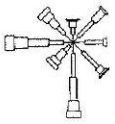

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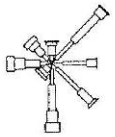

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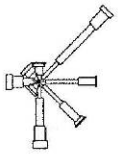

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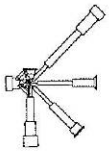

3 pm December 1906 observations