

Pedestrian Wind Environment Statement

for the proposed development known as
Westmead Millennium Institute &
Research Hub, NSW

August 26, 2010

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Document Control

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0	24/08/2010	Initial	DYF	TR
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1.0 Introduction

This report is in relation to the proposed development known as Westmead Millennium Institute and Research Hub, located at the intersection between 195 Hawkesbury Road and Hospital Road in NSW, and presents an opinion on the likely impact of proposed design on the local wind environment within and around the site.

The effect of wind activity within and around the proposed development is examined for the three predominant wind directions for Sydney, i.e. north-east, south and west. 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 prepared by the project architect BVN Architecture, received on August 17, 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 Wind Climate for Sydney

The Sydney region is governed by three principal wind directions. 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 – Sydney Region

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	

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.

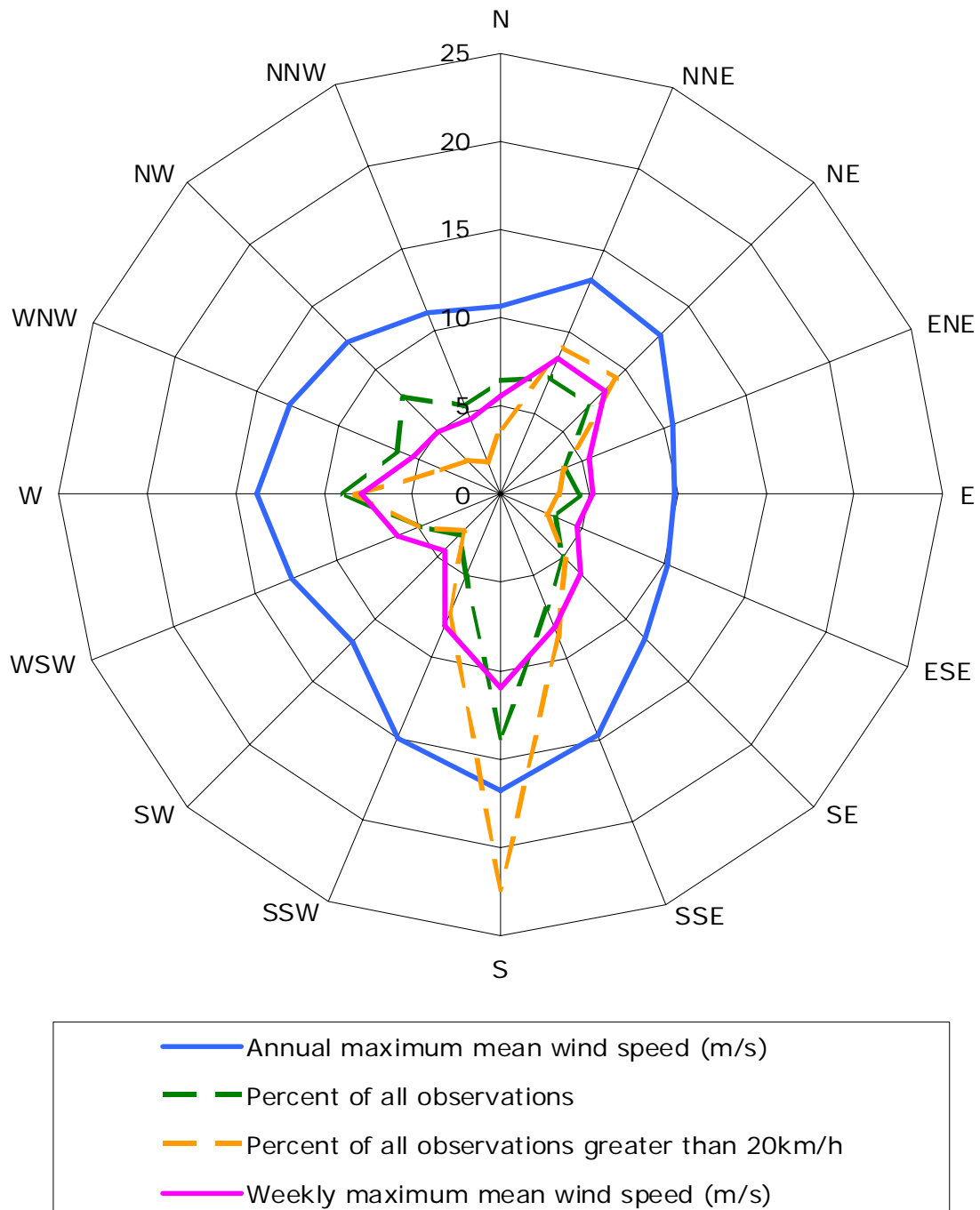


Figure 1: Annual and Weekly Recurrence Mean Wind Speeds, and Frequencies of Occurrence, for the Sydney Region (based on 10 minute mean observations from Kingsford Smith Airport from 1939 to 2008, corrected to open terrain at 10m)

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), is a modified version of the Beaufort Scale, and describes the effects of various wind intensities on people. Note that the applicability column related to 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	Beaufort Number	Gust Speed (m/s)	Effects	Applicability
Calm, light air	1	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	2	1.6 - 3.3	Wind felt on face	
Gentle breeze	3	3.4 - 5.4	Hair is disturbed, Clothing flaps	
Moderate breeze	4	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	5	8.0 - 10.7	Force of wind felt on body	Acceptable as a main pedestrian thoroughfare
Strong breeze	6	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	7	13.9 - 17.1	Inconvenience felt when walking.	
Gale	8	17.2 - 20.7	Generally impedes progress, Great difficulty with balance.	Unacceptable as a public accessway.
Strong gale	9	20.8 - 24.4	People blown over by gusts.	Completely unacceptable.

4.0 Description of the Site and the Proposed Development

4.1 Description of the Site Location and Surrounds

The proposed development site is located at 195 Hawkesbury Road, Westmead, at the north-western corner of the intersection of Hawkesbury Road and Hospital Road. The site is bounded by the Hospital Road to the north and Hawkesbury Road to the south. Figure 2 shows an aerial image of the site location.

The local land topography is relatively flat in all directions immediately surrounding the site. The adjacent buildings to the east and south-east consist of several low-rise residential buildings generally of three storeys in height. To the north of the site are medical buildings which are approximately two to four storeys in height above ground. To the west of the site is Westmead Main Hospital building which is 3 storeys in height above ground. There are no significant variations in the local land topography within or around the site, with the exception of a slight increase in the general landform further to the south-east of the site.

4.2 Description of the Proposed Development

The site is currently used as an outdoor car parking area. It is proposed to construct a 7-storey L-shaped building on the site, with the total height being 36.1m above lower ground level. A link is proposed on Level 1 (upper ground level) of the development which connects the proposed development to the existing CMRI Existing building. It is proposed that the development will primarily be used for laboratory uses.

The critical outdoor areas associated with the development, which are the focus of the assessment of pedestrian wind effects in this report, are described as follows:

- The pedestrian footpath from the car park on the north-western frontage of the site.
- The pedestrian footpath along Hawkesbury Road, on the southern frontage of the site.
- The Level 1 courtyard and garden at the western corner of the development, including the café seating area.
- Helipad located on the multi-storey car park north-western of the site.

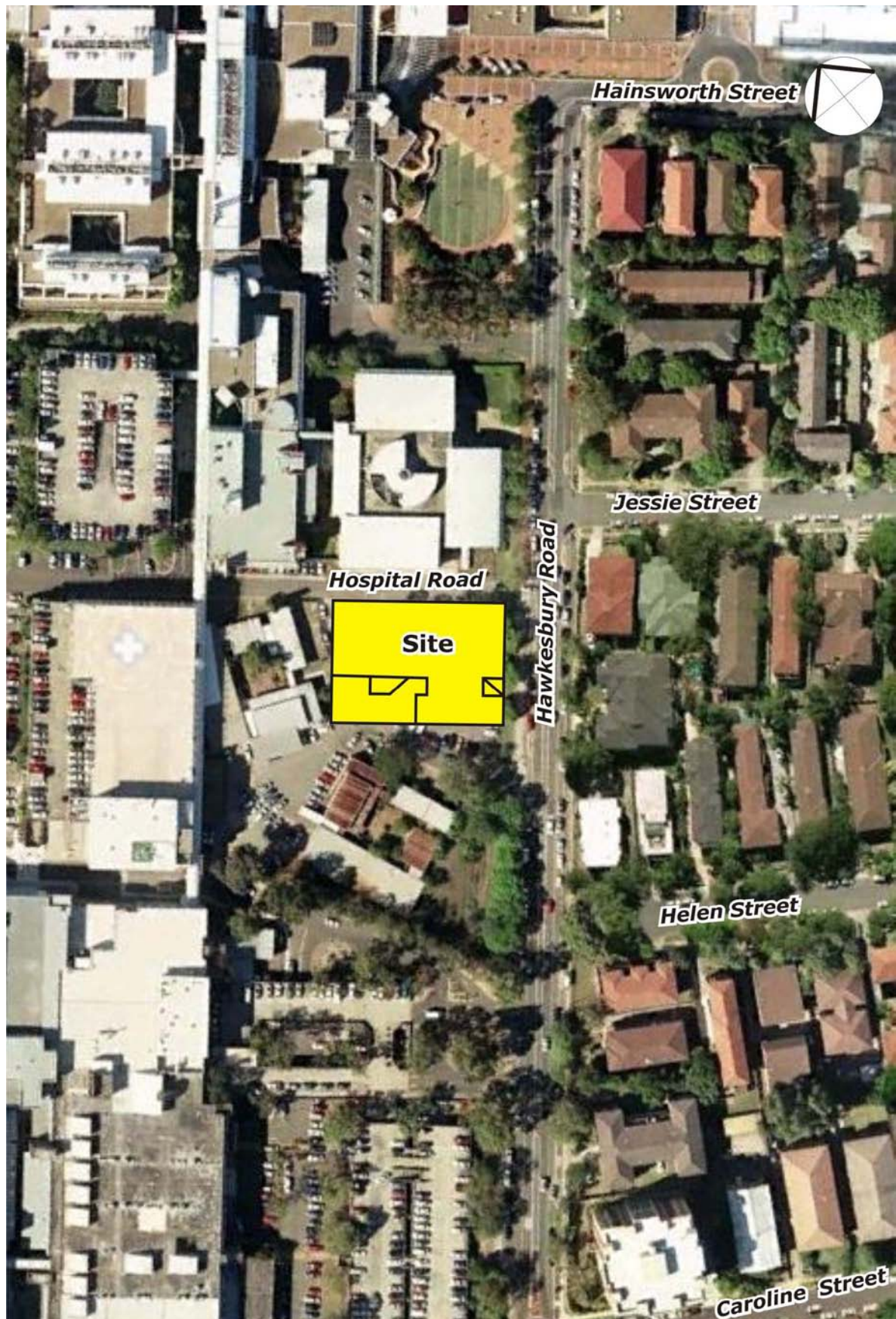


Figure 2: Aerial Image of the Site Location

5.0 Results of the Analysis

For each of the three predominant wind directions for the Sydney region, the interaction between the prevailing 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

Wind conditions for the pedestrian accessible areas within and around the ground level areas of the site are expected to be similar to the existing wind conditions, and it is expected that they will be generally suitable for their intended uses as pedestrian thoroughfares. It is noted that the architectural drawings indicate trees along Hawkesbury Road and proposed trees or shrubs along the western aspect of the development at the car park. Retaining these trees or shrubs in the final landscaping plan will further enhance wind conditions in these areas. Note that for trees to be effective in improving adverse wind conditions, they must be of a densely foliating variety.

The courtyard, garden and café seating area on Level 1 are well-shielded from the north-easterly winds by the proposed development itself. Hence wind conditions at these areas are expected to be suitable for their intended uses.

It is noted that the architectural drawings include flue exhausts on the roof level. It is recommended that a detailed wind tunnel study be conducted at the design development phase to determine the dispersion characteristics of the exhausts and whether will be entrapped between the hospital buildings or re-entered through the air intakes.

With the abovementioned recommendations incorporated into the final design, it is not expected that there will be any adverse wind effects caused by the north-easterly winds to the various outdoor areas within and around the proposed development.

5.2 Southerly Winds

The entry to the proposed development along Hawkesbury Road is potentially exposed to adverse winds from the south. It is recommended that an impermeable screen or signage of the same height as the door be used to prevent direct southerly winds from funneling through the entrance. Two alternative arrangements are presented in Figure 3a below. Either of these recommendations are expected to mitigate the funneling of the southerly winds through the entrance.

The courtyard, garden and café seating area on Level 1 is potentially exposed to adverse winds from the south. This is caused by the lack of shielding from the neighbouring buildings to the south and side streaming of the south-westerly winds by the subject building. The proposed large tree in this area is expected to provide some protection from this wind effect. In addition, it is recommended that either 2m high impermeable screen or blade wall and/or densely foliating evergreen

trees be provided along the northern edge of this area, as shown in Figure 3b. Note that for tree to be effective in improving the wind conditions in the courtyard, they must be of a densely foliating variety and capable of growing in a windy environment.

Please refer to the note relating to the flue exhausts on the roof level mentioned in the section dealing with the north-easterly winds.

The proposed development could potentially generate turbulence on the helipad in the event of a south-easterly or south-westerly wind. Wind tunnel testing will identify specific areas of the building which cause turbulence that may impact on the helipad operations. Engineering solutions can be developed to resolves these issues and wind tunnel testing allows these ameliorative measures to be tested and positively influence these conditions if required. Wind tunnel testing can be undertaken in the design development stage of the project.

With the abovementioned treatments incorporated into the final design, it is not expected that there will be any adverse wind effects caused by southerly winds to the various outdoor areas within and around the proposed development.

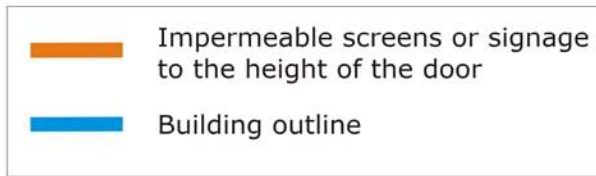
5.3 Westerly Winds

Wind conditions for the ground level pedestrian access areas within and around the site are expected to be similar to the existing wind conditions, and it is expected that they will be generally suitable for their intended uses as pedestrian thoroughfares. It is noted from the architectural drawings that there are proposed shrubs or trees along the north-western aspect of the development at the car park area. Retaining these shrubs or trees in the final landscaping plan will further enhance wind conditions in these areas.

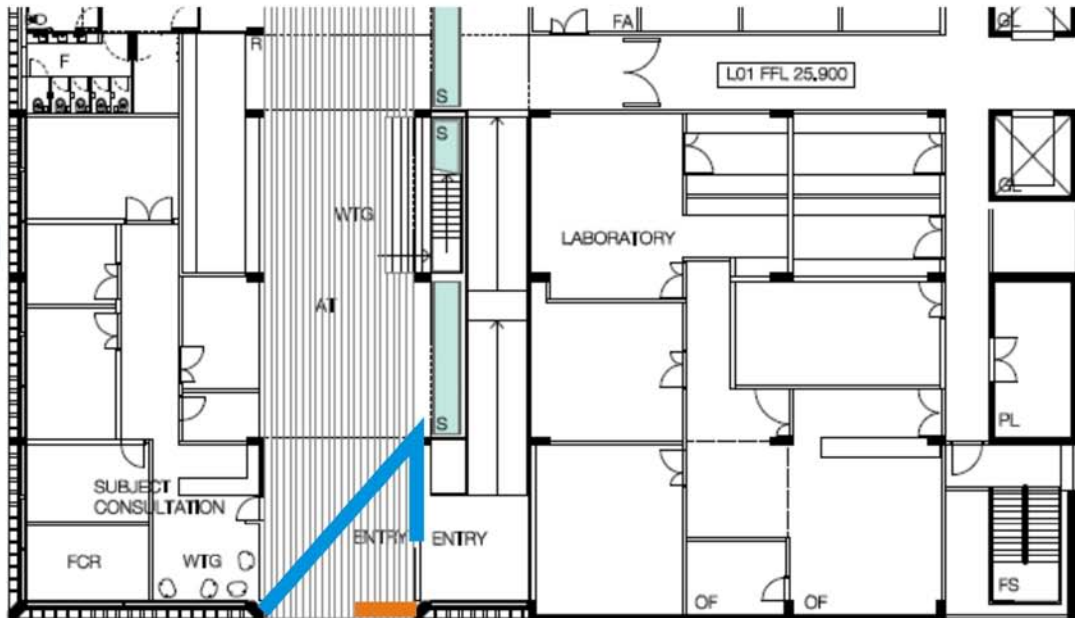
The courtyard, garden and café seating area on Level 1 are exposed to adverse winds from the west. This is caused by the lack of shielding from the neighbouring buildings to the west. It is recommended that either 2m high impermeable blade walls and/or densely foliating evergreen trees, similar to Figure 3b, to be included in the final design to prevent direct exposure to the westerly winds. It is noted that the architectural drawings include trees planting in the courtyard. Retaining these trees in the final landscaping plan will further enhance wind conditions in these areas. Note that for trees to be effective in improving adverse wind conditions, they must be of a densely foliating variety.

Please refer to the note relating to the flue exhausts on the roof level mentioned in the section dealing with the north-easterly winds.

With the abovementioned treatments incorporated into the final design, it is not expected that there will be any adverse wind effects caused by westerly winds to the various outdoor areas within and around the proposed development.



Option A



Option B

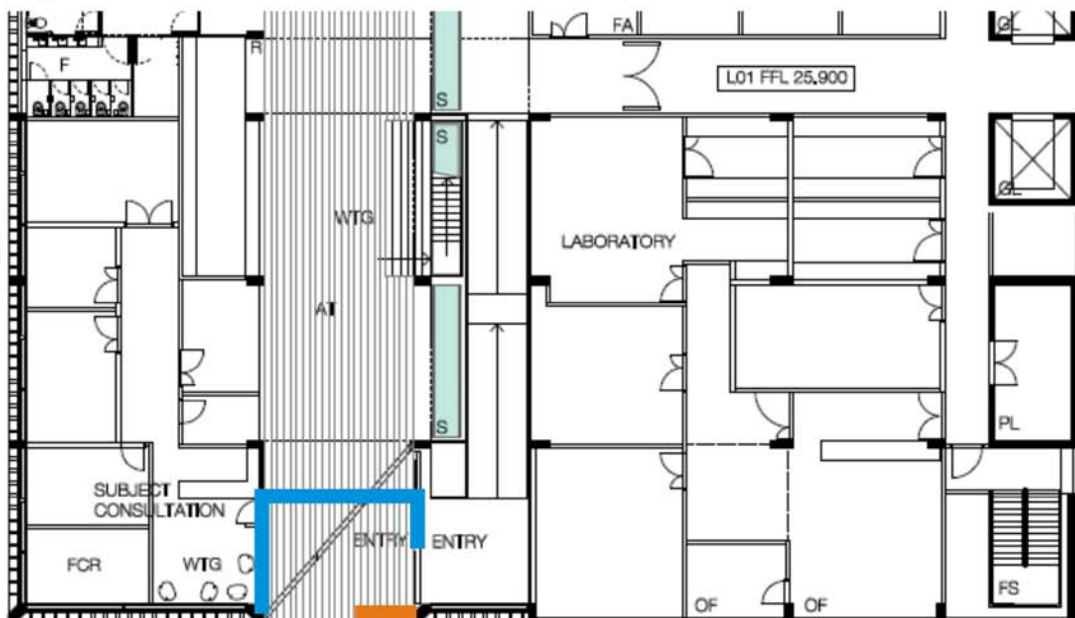


Figure 3a: Recommended Treatments to Level 1 Entrance Along Hawkesbury Road

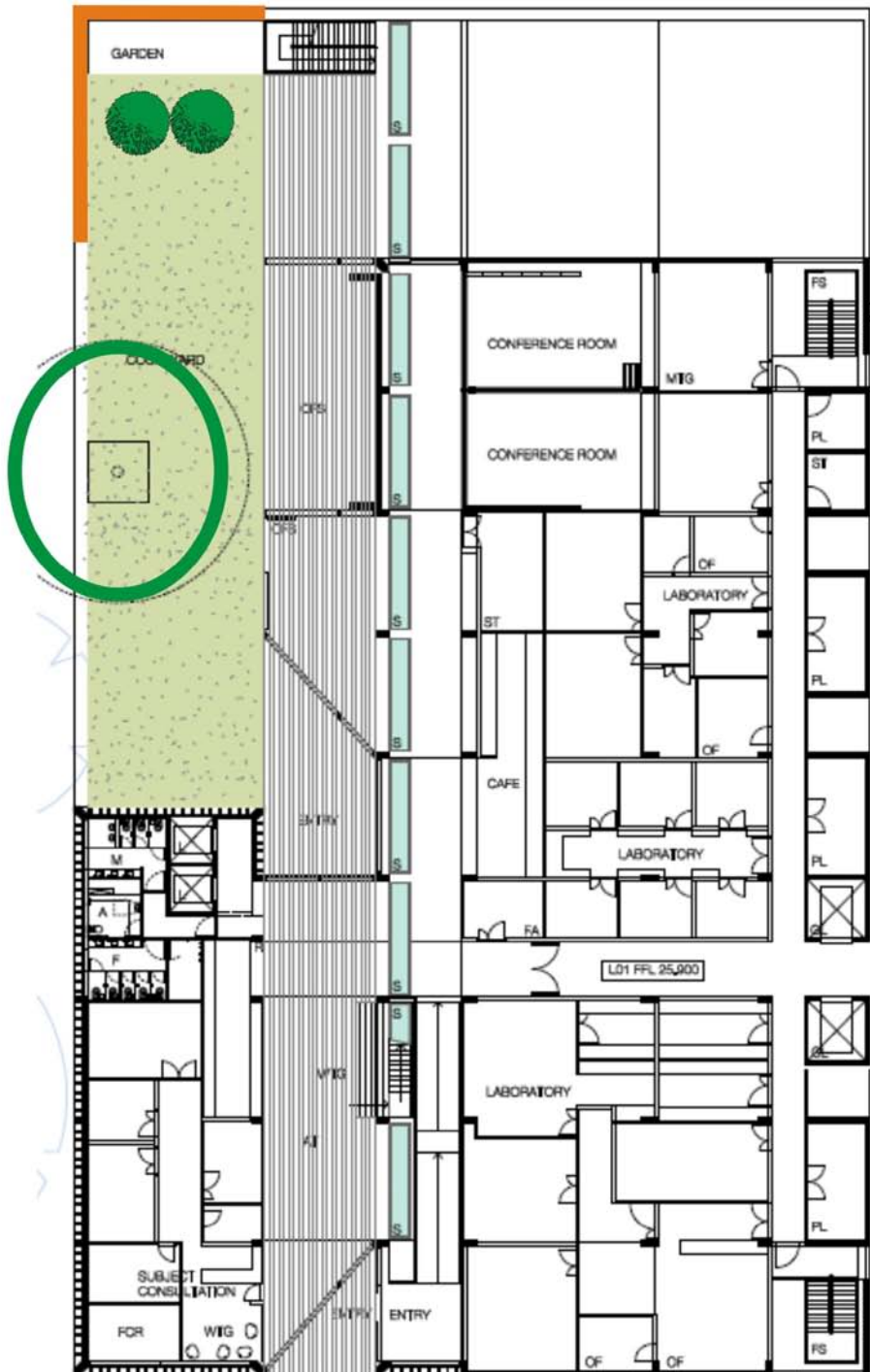
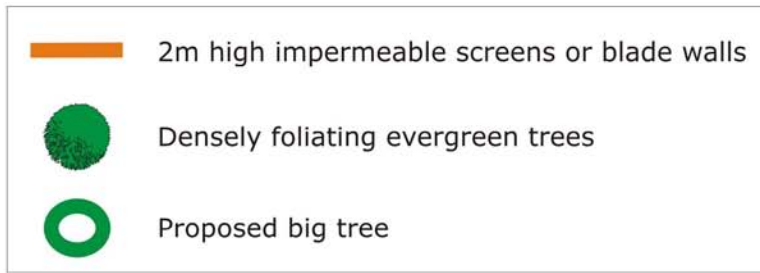


Figure 3b: Recommended Treatments to the Critical Outdoor Areas at Level 1

6.0 Conclusions

An analysis of the wind environment impact with respect to the principal wind directions for the Sydney region has been completed for the proposed development known as Westmead Millennium Institute and Research Hub, located at 195 Hawkesbury Road in NSW.

The conclusions of this report are drawn from our extensive experience in this field and are based on an examination of the architectural drawings prepared by the project architect BVN Architecture, received on August 17, 2010. No wind tunnel tests have been undertaken for the subject development. As such, this report addresses only the general wind effects and any localized 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 following treatments are recommended to mitigate potentially adverse wind effects:

- Impermeable screens or signage of the same height as the door for the entrance along Hawkesbury Road at Level 1.
- A strategic layout of 2m high impermeable screens or blade walls and/or densely foliating trees or shrubs for the Level 1 courtyard, garden and café seating area.
- It is recommended that a wind tunnel study be conducted to evaluate the impact of the proposed development on the helipad. Ameliorative measures can be tested in the wind tunnel to positively influence conditions on the helipad if required.
- It is also recommended that a wind tunnel study be conducted to determine the dispersion characteristics of the exhausts from the proposed stack.

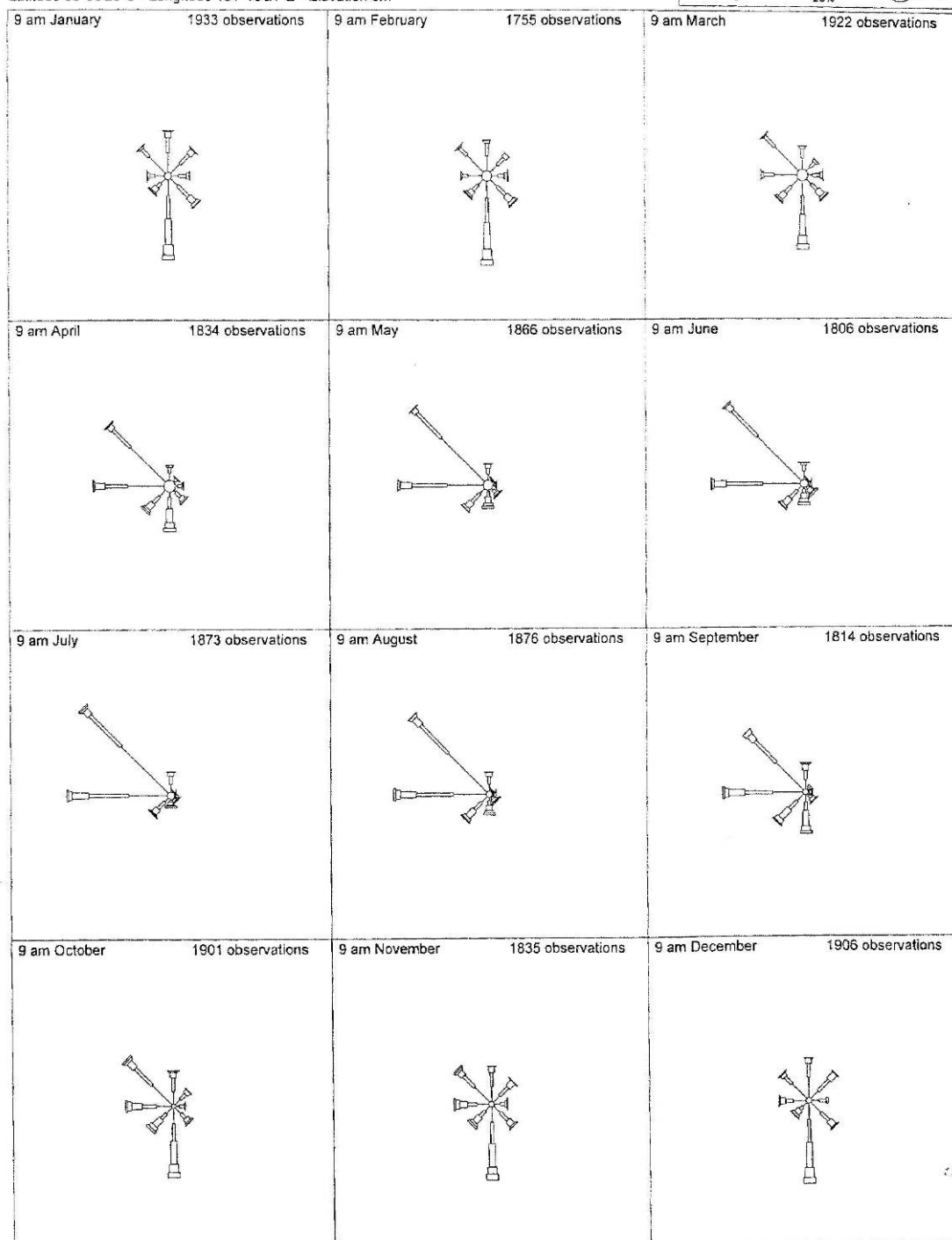
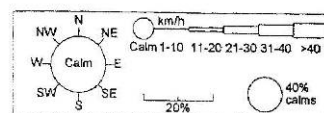
With the abovementioned treatments incorporated into the design, wind conditions for the various outdoor areas of the proposed development are expected to be acceptable for the intended uses of those areas. Furthermore, it is not expected that the proposed development will cause any adverse effect to the wind conditions to the local surrounding streets and other outdoor areas around the site.

Appendix

Wind Roses for Sydney Airport
1939-2000

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

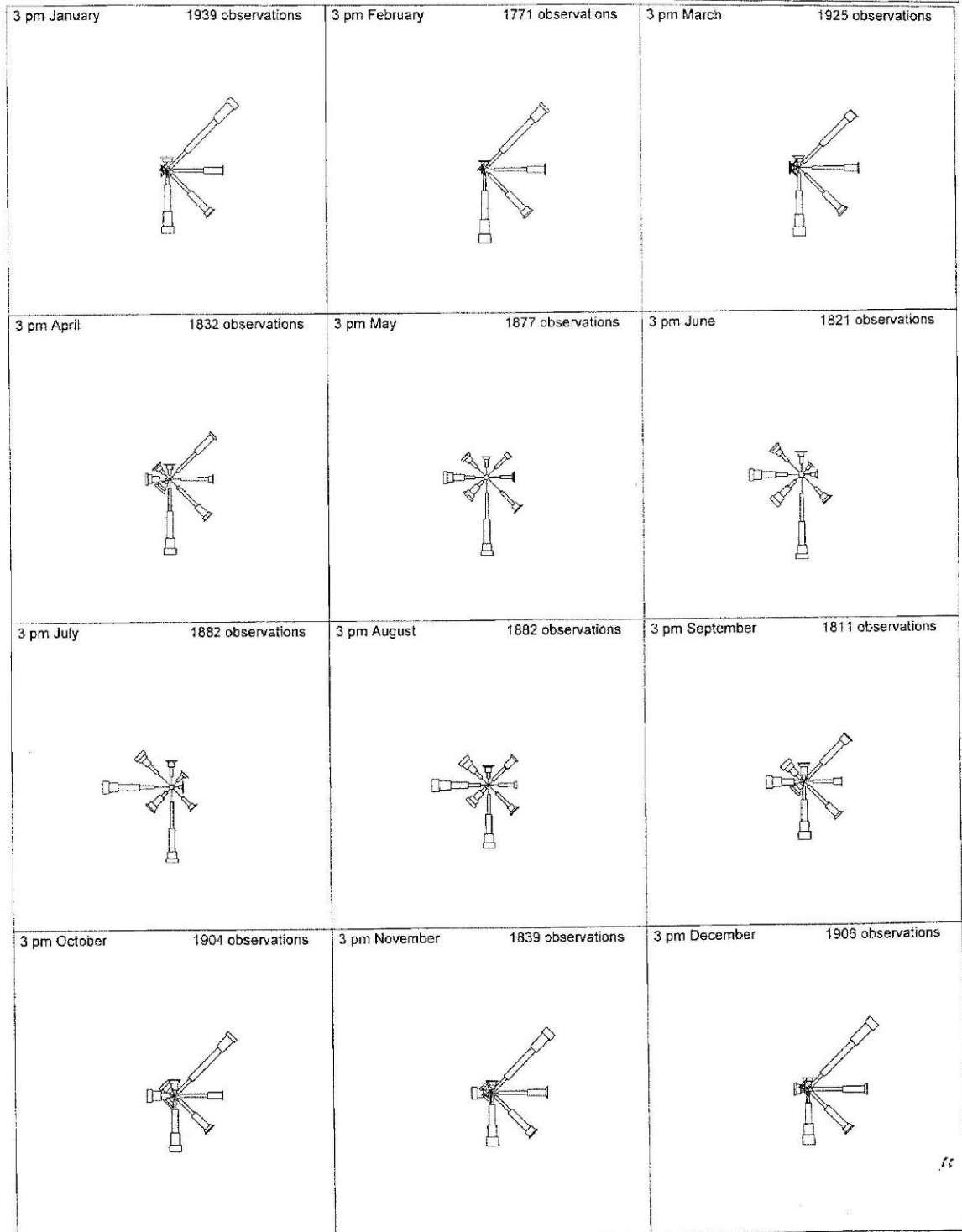
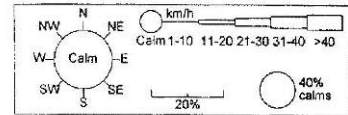


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Contact us by fax 02 9296 1567, or by email on regnsw@bom.gov.au
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