

Pedestrian Wind Environment Statement
for the proposed development known as the
Prince of Wales Medical Research Institute,
Neuroscience Research Precinct, Randwick

March 2, 2009

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Document Control

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1	17/12/2008	Update images	AL	-	TR
2	15/1/2009	Modify recommendations to suit architectural requirements	AL	-	TR
3	16/1/2009	Modify recommendations to suit architectural requirements	AL	-	TR
4	02/03/2009	Addition of Option D for the Southern Entrance	AL	AB	

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1.0 Introduction

This report is prepared in relation to the proposed development known as the Prince of Wales Medical Research Institute, Randwick. This report presents an opinion on the likely impact of proposed design on the wind environment within and around the site.

The effect of wind activity within and around the site of the proposal 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 proposal was carried out in the context of the local wind climate, building morphology and land topography.

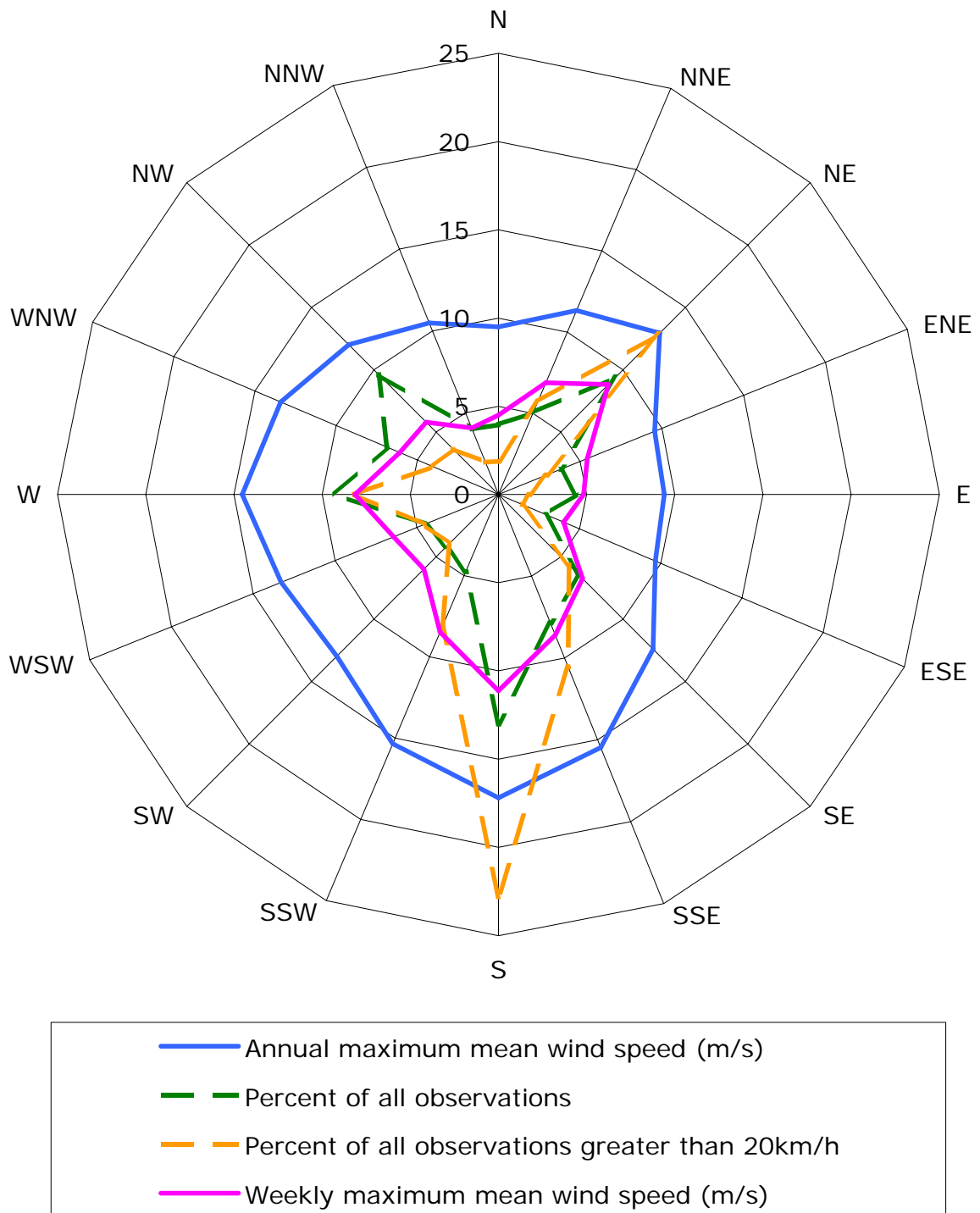
The conclusions of this report are drawn from our extensive experience in this field and are based on an examination of the drawings produced by Cox Richardson received November 24. No wind tunnel tests have been undertaken for the subject development. As such, this report addresses only the general 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 Local Wind Climate

Three principal wind directions potentially affect the development. These winds prevail from the north-east, south and west, Table 1 is a summary of the principal time of occurrence of these winds. This summary is based on data obtained by the Bureau of Meteorology from Sydney Airport, between 1939 and 1992. Table 1 presents a summary of the principal time of occurrence of these winds.

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	



**Figure 1: Reference Wind Speeds and Frequencies for Sydney
(based on 3 hourly mean observations at Kingsford
Smith Airport, from 1939 to 1992, corrected for
10m height in open terrain)**

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 Proposed Development

The proposed development consists of the construction of a new building on the site bounded by Easy Street to the east, Barker Street to the south, Hospital Road to the west and adjacent buildings to the north. The highest roof point is approximately 29m in height above ground. It is proposed that the various levels of the development will be used for the following:

- Ground Floor level is used commercial purposes and mainly consists of, patient drop off, goods handling, function, storage and maintenance areas.
- Levels above ground are used for commercial purposes and mainly consist of office and laboratory space.

Outdoor pedestrian access areas include the street level locations surrounding the site, the ground level garden area and level 3 terrace. Images of the proposed development are shown in Figure 2. Figure 3 shows the location of the site.

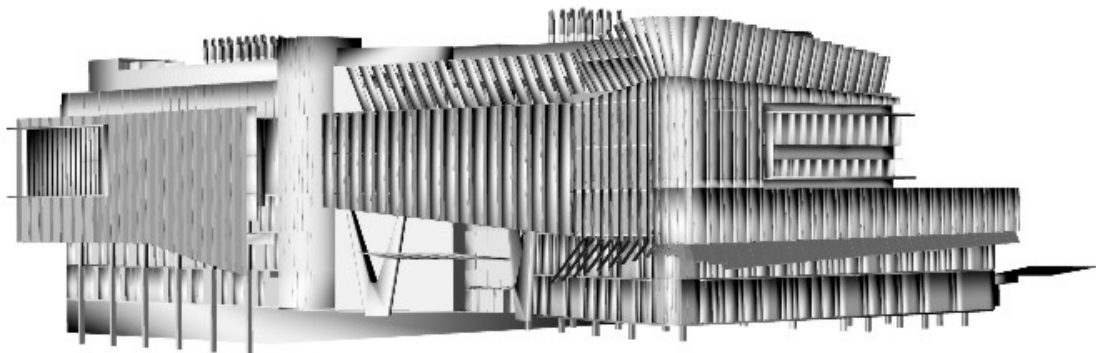


Figure 2a: South-Eastern Corner Perspective Image

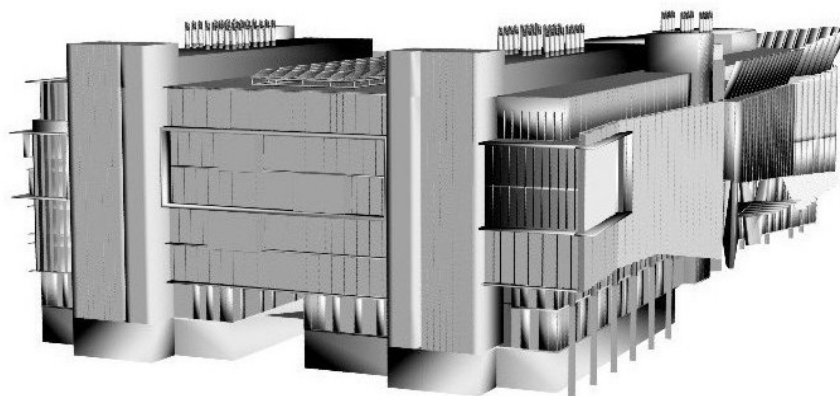


Figure 2b: South-Western Corner Perspective Image

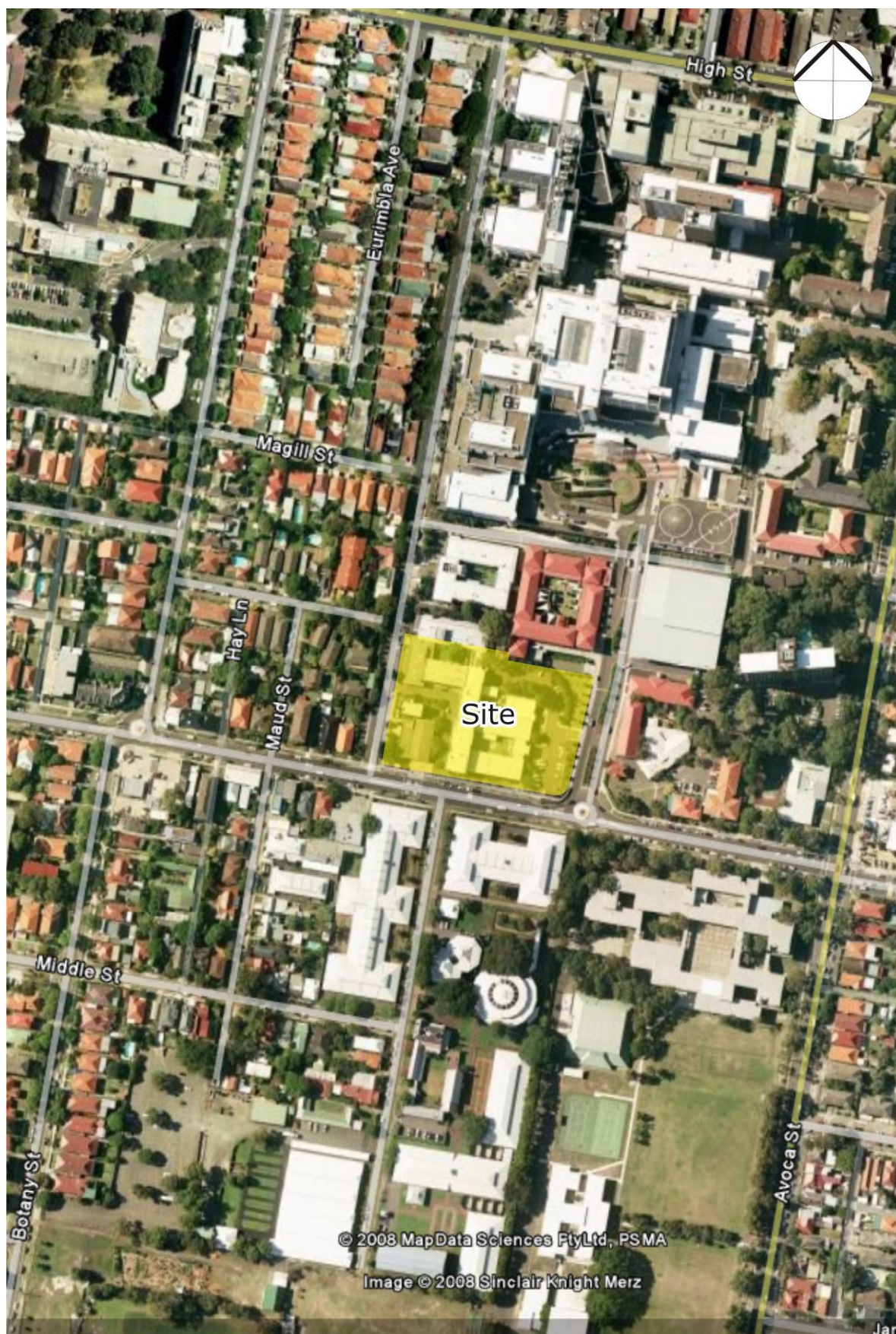


Figure 3: Aerial Photograph of the Site

5.0 Site Analysis

The site is located bounded by Easy Street to the east, Barker Street to the south and Hospital Road to the west. The adjacent buildings to the north, east, south and west are considered to be low-rise, between one to two floors in height in height. The metro car park immediately to the north-east is a three level development. Further away to the north of the development is the Campus Centre and the Dickson Building which are both comparable in height to the proposed development. Densely foliating trees, approximately 4m in height, line the majority of the western edge of Hospital Road.

6.0 Results

For each of the three predominant wind directions, 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.

6.1 North-Easterly Winds

The ground level locations are relatively well shielded by the local surrounding buildings to the north-east of the site and by the proposed development itself. It is not expected that the ground level areas around or within the site including the ground level garden area will be adversely affected by the north-easterly winds. The recessed design of the ground level garden area at the north-eastern corner of the site into the building envelope is expected to create a stagnation effect to the north-easterly winds. It is expected that wind conditions on the ground level areas can be further enhanced with the addition of densely foliating trees along the adjacent footpaths and within the ground level garden.

The Level 3 terrace may be somewhat exposed to the north-easterly winds. To mitigate any potentially adverse wind effects to this area it is recommended that a 1.2m high impermeable balustrade be used. Alternatively, it is expected that the strategic use of vegetation on the terrace area will also provide a mitigating effect.

It is not expected that the proposed development will have any adverse effects to the wind conditions to the local surrounding streets and pedestrian footpaths and thoroughfares due to the effect of the north-easterly winds.

6.2 Southerly Winds

The ground level locations, including the ground level garden, are relatively well shielded by the local surrounding buildings to the south of the site and by the proposed development. It is not expected that the ground level areas around or within the site including the ground level garden area will be adversely affected by the southerly winds. It is expected that wind conditions on at the street level locations can be further enhanced with the addition of densely foliating trees in the

locations specified by Figure 4. The proposed vertical fins over the majority of the southern façade and as well as the inclined fins at the base of the south-eastern corner of the building will also assist in reducing the sidestream effects at the south-eastern corner of the site.

The Level 3 terrace is shielded by the proposed development, and hence it is not expected that the Level 3 terrace will be adversely affected by the southerly winds.

It is expected that there may be wind entry effects at the southern airlock entrance due to the small depth of the airlock. Assuming a non-revolving airlock is to be used, it is recommended that the airlock be of sufficient depth to ensure that at least one of the airlock doors is closed, under normal use, when pedestrians pass through. Figure 5 shows recommended options for the southern entrance. With the above recommendation, it is expected that the likelihood of a wind entry problem occurring at the southern entrance will be significantly reduced. Alternatively, the entry doors can be spaced closer if they are arranged in a baffle arrangement, so that if both doors are open at the same time the wind is stagnated.

It is not expected that the proposed development will have any adverse effects to the wind conditions to the local surrounding streets and pedestrian footpaths and thoroughfares.

6.3 Westerly Winds

Most of the ground level locations, including the ground level garden, are relatively shielded by the local surrounding buildings and densely foliating trees to the west of the site, and by the proposed development itself. The wind conditions along the Barker Street pedestrian footpath along the southern edge of the site are expected to be similar to the existing conditions due to the exposure of this area to westerly winds coming along Barker Street, since this street has an east-west orientation. It is expected that the wind conditions for the ground level areas within and around the site will be suitable for their intended uses. However it is expected that wind conditions on Barker Street can be further enhanced with the addition of densely foliating trees in the locations specified by Figure 4.

Note that for vegetation to be effective in wind mitigation for westerly winds in Sydney, which predominantly occur during the winter months, evergreen varieties should be selected.

The Level 3 terrace is well shielded by the proposed development. It is not expected that the Level 3 terrace will be adversely affected by the westerly winds.

It is not expected that the proposed development will have any adverse effects on the wind conditions to the local surrounding streets and pedestrian footpaths and thoroughfares.

 Densely foliating trees capable of growing to 8m in height with canopy diameter of at least 5m.

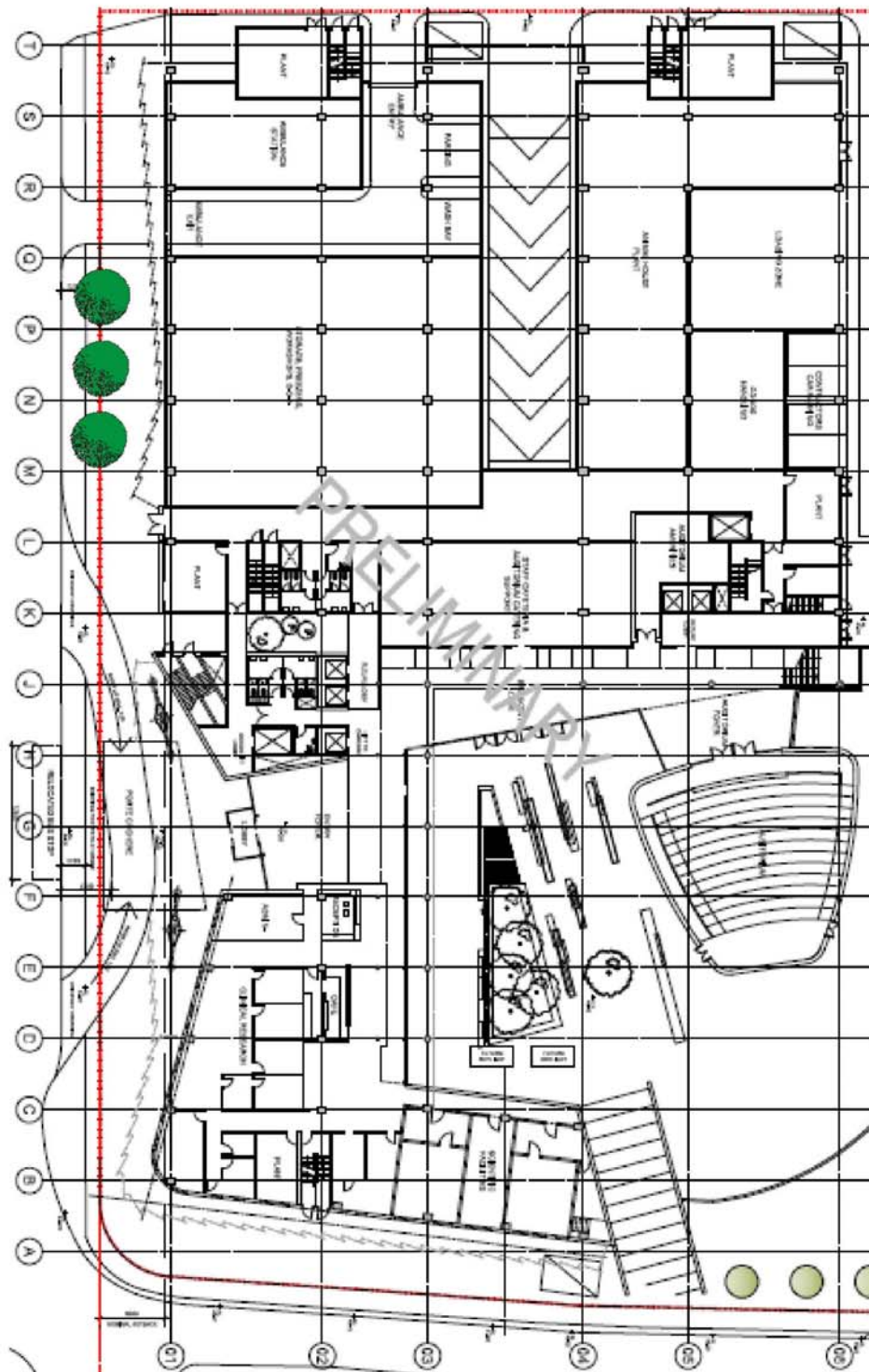


Figure 4: Recommended Planting Scheme

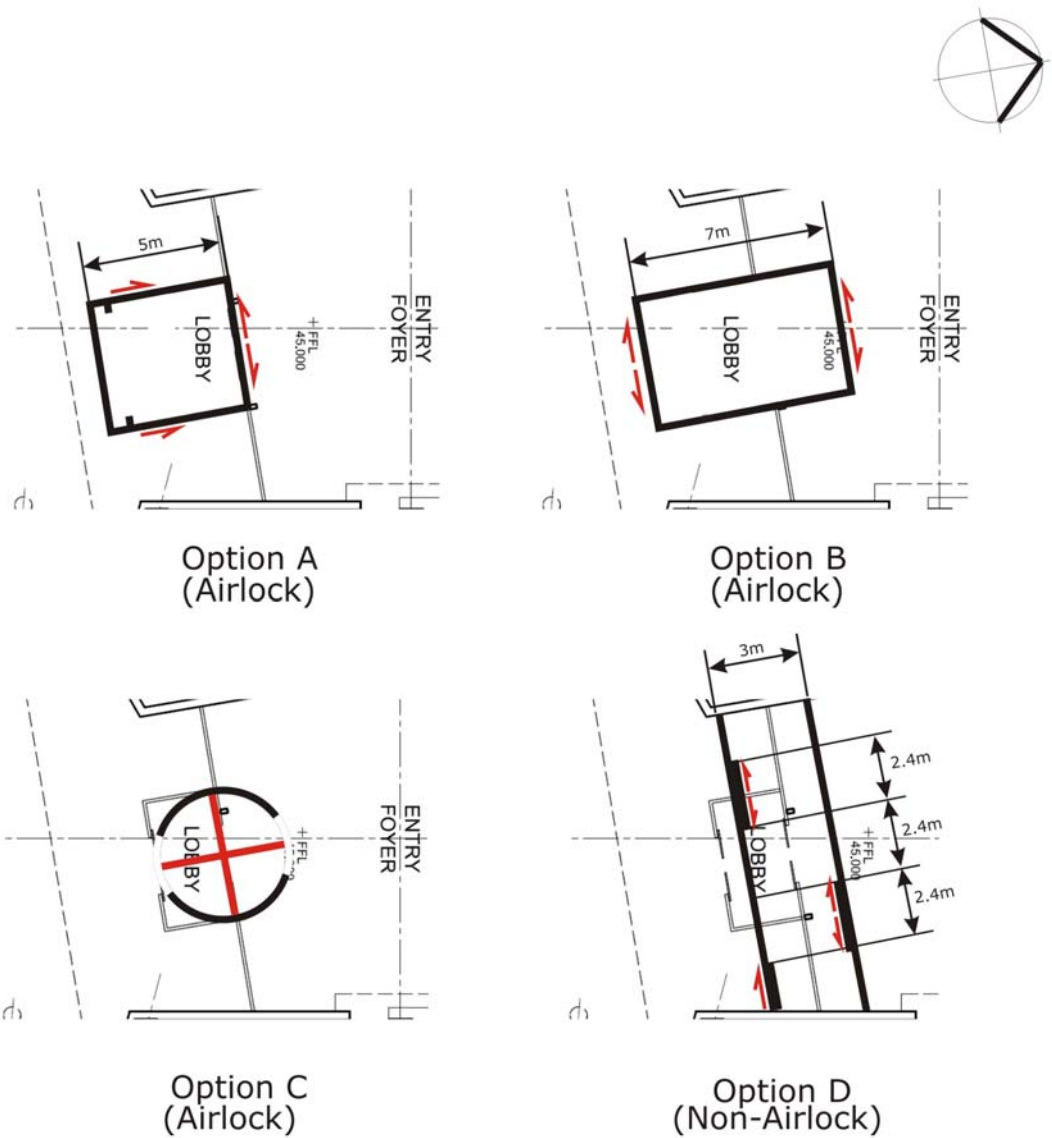


Figure 5: Recommended Options for the Southern Entrance

7.0 Conclusions

An analysis of the wind environment impact with respect to the principal wind directions for Sydney has been completed for the proposed development known as Prince of Wales Medical Research Institute, Randwick.

The conclusions of this report are drawn from our extensive experience in this field and are based on an examination of the drawings produced by Cox Richardson received November 24. 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.

It has been recommended in this report that the Level 3 terrace on the eastern side of the site has a 1.2m high impermeable balustrade to provide additional shelter from adverse winds. The ground level locations benefit from shielding effects of the surrounding buildings, the proposed development and the existing densely foliating trees which line the majority of the western edge of Hospital Road. However, it is recommended to add three additional densely foliating trees be included along the Barker Street frontage of the development site.

With these recommended treatments included into the final design of the proposed development it is expected that wind conditions within and around the various outdoor accessible areas of the site will be suitable for their intended uses. Note that for vegetation to be effective in wind mitigation for westerly winds in Sydney, which predominantly occur during the winter months, evergreen varieties should be selected.

To avoid adverse wind entry effects through the ground level entrance to the development from Barker Street it has been recommended to use one of the following designs for the entryway:

- A revolving door. With this design the entrance will always remain effectively sealed to wind.
- An airlock design, whereby two sets of automatic sliding doors are used and spaced sufficiently far apart (7m has been recommended in this report), so that the first door will close by the time the second one opens.
- A set of two automatic sliding doors that are staggered in a baffle arrangement, so that even if both doors are open at the same time the wind will be sufficiently stagnated by the baffle arrangement.

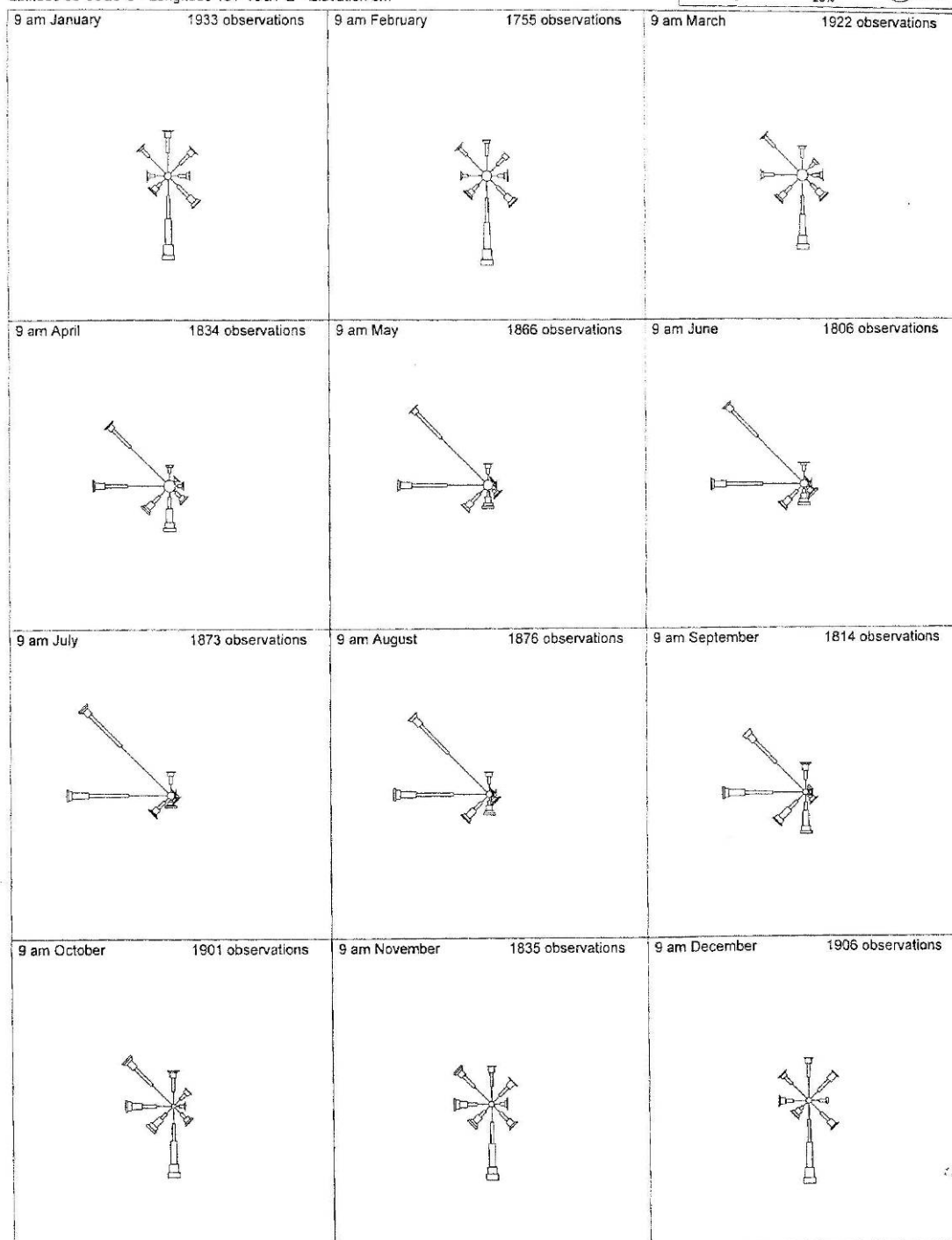
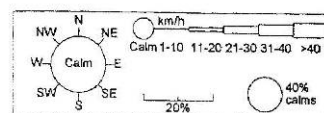
With one of the above entryway designs incorporated into the final design of the development it is expected that there will be no adverse wind entry effects.

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

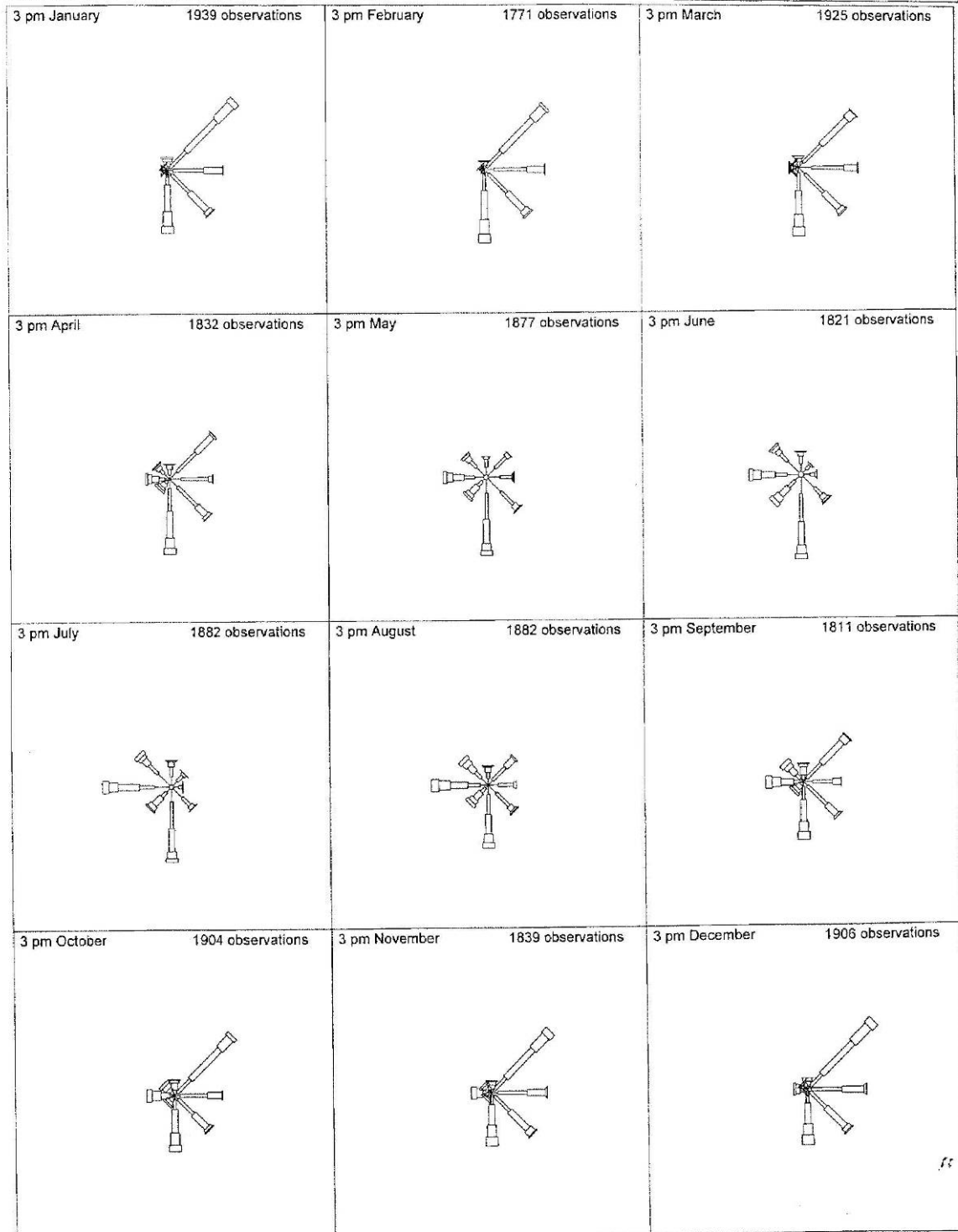
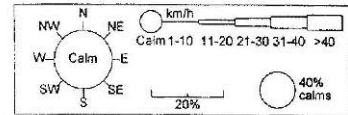


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