

Pedestrian Wind Environment
Statement
for the proposed development known as the
Peter Johnson Building,
UTS Student Accommodation, Ultimo

July 14, 2009

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Document Control

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1	27/02/2009	Update Roof Terrace Description	AL	AB	TR
2	02/03/2009	Cover JPEG Removed	AL	AB	TR
3	17/03/2009	Remove sentence from Section 6.1	AL	AB	TR
4	14/07/2009	Include references to the Beaufort Scale in the assessment	AB	-	TR

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1.0 Introduction

This report is in relation to the proposed expansion of the development known as the Peter Johnson Building, UTS Student Accommodation, located in Ultimo, Sydney. The report presents an opinion on the likely impact of proposed design on the wind environment within and around the various outdoor areas of the site.

The effect of wind activity for 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.

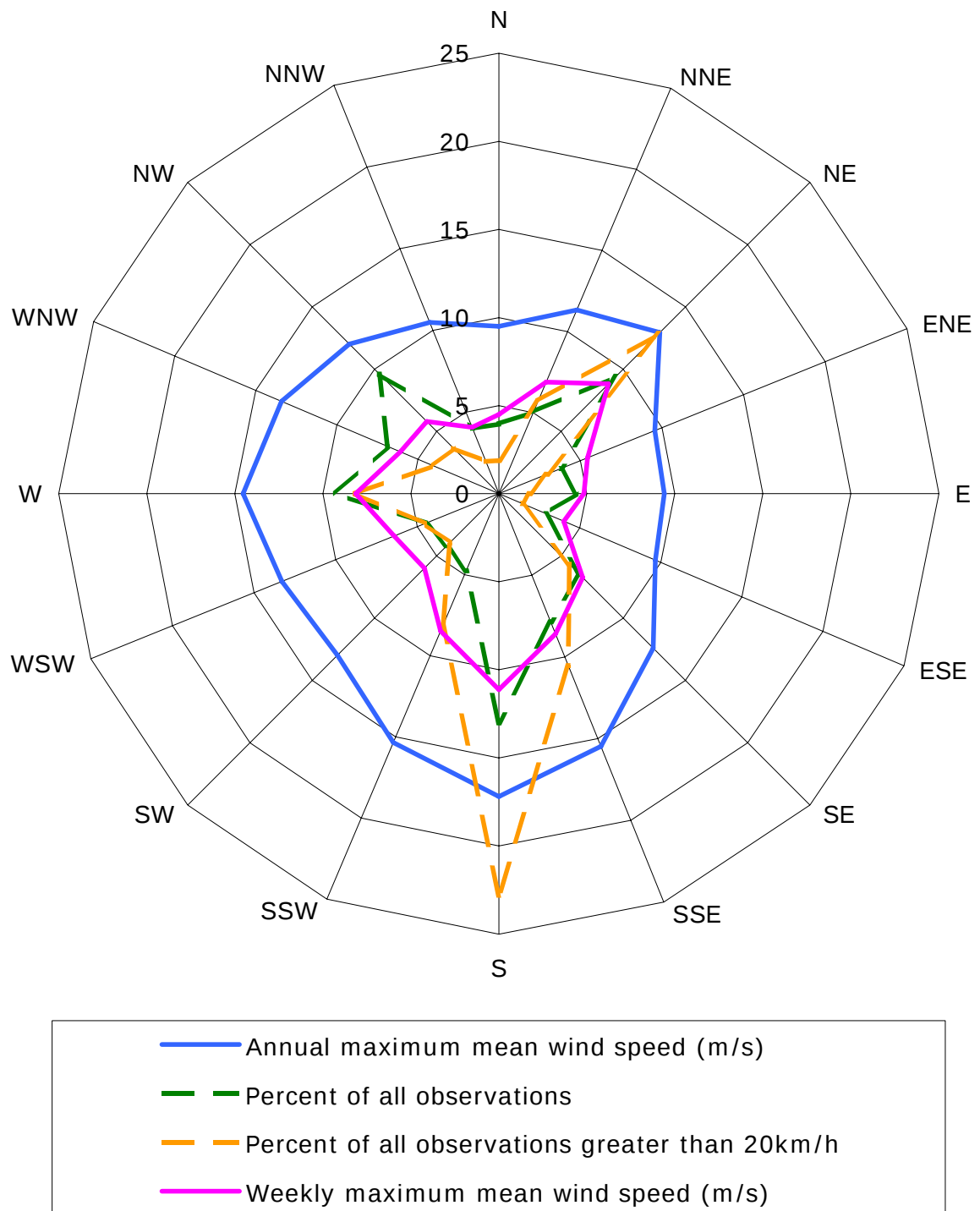
The conclusions of this report are drawn from our extensive experience in this field and are based on an examination of the architectural drawings prepared by Nettleton Tribe Architects, dated February 23, 2009. No wind tunnel tests have been undertaken for the subject development. As such, this report 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 pedestrian 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 for the Sydney region. This summary is based on data obtained by the Bureau of Meteorology from Kingsford Smith Airport, between 1939 and 1992. Figure 1 shows the directions reference wind speeds and frequencies of occurrence for Sydney.

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 Development

The proposed expansion of the Peter Johnson Building consists of an extension to the north-eastern corner of the existing podium, and a new high-rise residential tower constructed on top of the existing podium. The proposed expansion of the podium and the new proposed high-rise tower has a total height of approximately 68m above ground.

The architectural drawings indicate three main outdoor trafficable areas, summarised as follows:

- Level 4 consists of two existing open space courtyards. The western side of the southern courtyard includes a small retail/café style area.
- Level 8, on the east side of the building consists of a communal residential terrace with the proposed use as a retail/café style area. The architectural drawings indicate that majority of the communal residential terrace is shaded by the soffit of the upper tower.
- The Roof Terrace includes a covered outdoor BBQ and communal area.

5.0 Site Analysis

The site is located at 702-730 Harris Street, Ultimo. Figure 3 shows an aerial image with the location of the site.

The site is bounded by Ultimo Pedestrian Network to the east and Harris Street to the west. The adjacent buildings immediately to the north of the site vary between 18m to 58m in height above ground. The adjacent buildings to the south of the site vary between 15m to 53m in height above ground. South across Harris Street the buildings vary between 21m and 31m. To the north-east across the Ultimo Pedestrian Network, the buildings are of comparable height to the proposed development. There are no large changes in the local land topography around the site, although the land does slope slightly downwards in a westerly direction.

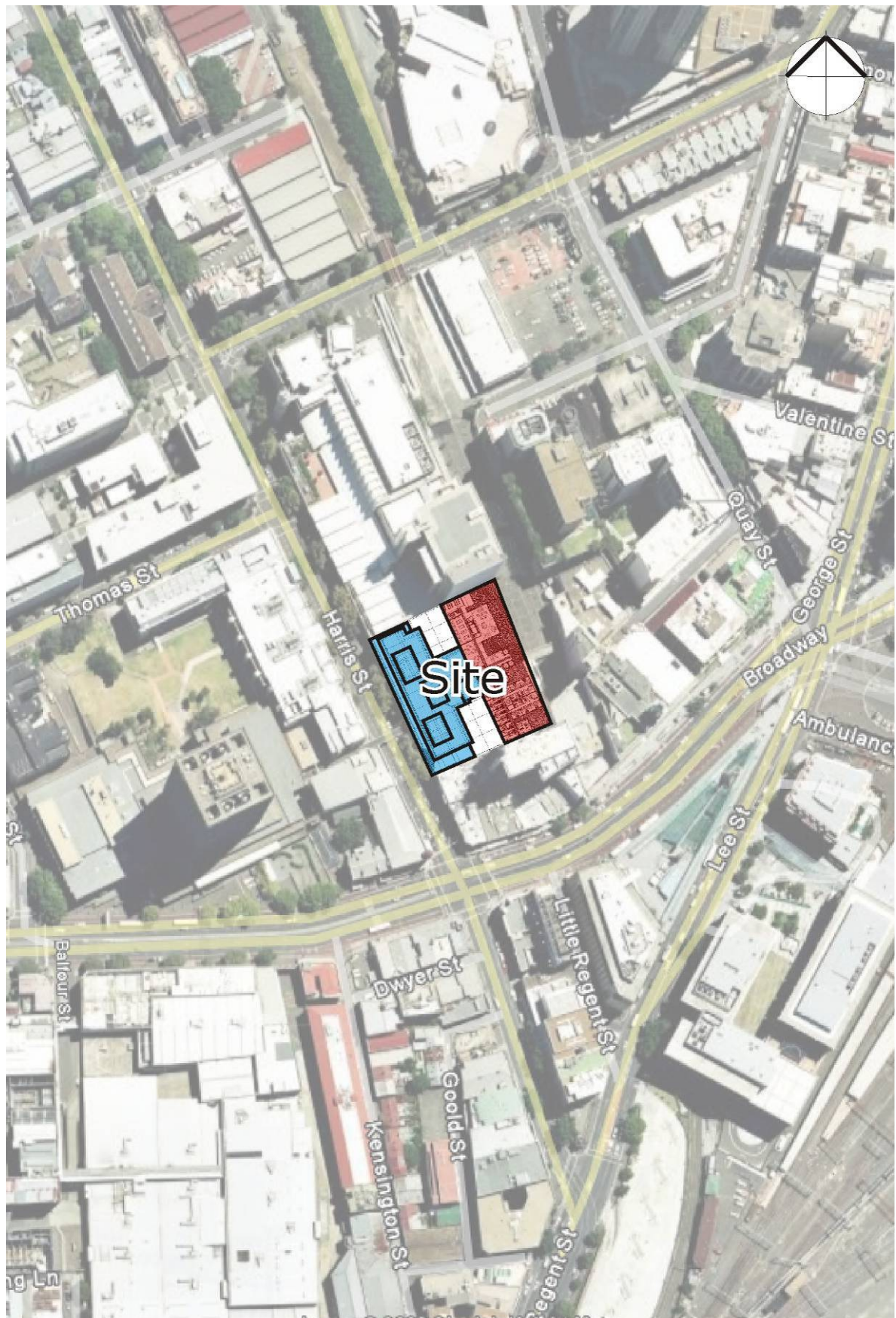


Figure 3: Aerial Image of the Site

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 proposed development is relatively well shielded by the local surrounding buildings to the north-east of the site. It is not expected that the proposed expansion of the podium and the new residential tower will significantly affect wind conditions at the ground level locations around and within the site. It is expected that the ground level wind conditions will generally satisfy a Beaufort Number of 4 or 5, which is appropriate for these areas.

The existing open space courtyards on Level 4 are mostly enclosed and will be shielded by the subject development. It is expected that the proposed expansion of the podium and the new residential tower will not have an adverse effect on the wind conditions within the open space courtyards on Level 4. Hence both areas are expected to be acceptable for their intended uses. It is expected that wind conditions for these courtyards will generally satisfy a Beaufort Number of 4, which is appropriate for the intended uses of these areas.

It is expected that the communal residential terrace on Level 8 will be well shielded by the large surrounding buildings north-east of the site. The majority of the communal residential terrace is located within the covered area under the residential tower. The barrier at the opposite end of the Level 8, beneath the proposed tower, is expected to stagnate downwashed winds that may potentially downwash to the terrace area. Therefore it is not expected that the Level 8 communal residential terrace will be exposed to adverse wind conditions. It is recommended that an impermeable balustrade 1.2m in height be placed around the extents of the Level 8 terrace area to further help with the stagnation of potential downwash. With this balustrade, it is expected that wind conditions for this communal terrace will generally satisfy a Beaufort Number of 4, which is appropriate for the intended use of this areas.

The BBQ and communal outdoor area on roof level will be somewhat exposed to the north-easterly winds. It is recommended that an impermeable balustrade 1.2m in height be placed around the perimeter of the trafficable areas of the roof terrace. With this recommendation incorporated in the final design, it is expected that there will be no adverse wind conditions in the covered outdoor BBQ and communal area. With the addition of densely foliating vegetation to this area, and the abovementioned impermeable balustrades, it is expected that wind conditions can be further enhanced, and is expected that a Beaufort Number of 4 to 5 will be satisfied, which is appropriate for the intended uses of this area.

It is not expected that the proposed expansion of the Peter Johnson Building will have any adverse impact on the wind conditions in the local surrounding streets and pedestrian footpaths and thoroughfares.

6.2 Southerly Winds

The development is relatively well shielded by the local surrounding buildings to the south. It is not expected that the proposed expansion of the podium and the construction of the proposed residential tower will have a significant effect on the wind conditions at the ground level locations around and within the site. It is expected that the ground level wind conditions will generally satisfy a Beaufort Number of 4 or 5, which is appropriate for these areas.

The existing open space courtyards on Level 4 are mostly enclosed and will be shielded by the subject development. It is expected that the proposed expansion of the podium and the new residential tower will not affect existing wind conditions within the open space courtyards on Level 4. Hence both areas are expected to be acceptable for their intended uses. It is expected that wind conditions for these courtyards will generally satisfy a Beaufort Number of 4, which is appropriate for the intended uses of these areas.

It is expected that the communal residential terrace on Level 8 will be well shielded by the large building to the south of the site. Hence it is not expected that the Level 8 communal residential terrace will be exposed to adverse wind conditions as a result of the southerly winds. It is expected that wind conditions for this communal terrace will generally satisfy a Beaufort Number of 4, which is appropriate for the intended use of this areas.

The BBQ and communal outdoor area on roof level will be somewhat exposed to the southerly winds. It is recommended that an impermeable balustrade 1.2m in height be placed around the perimeter of the trafficable areas of the roof terrace. With this recommendation incorporated in the final design, it is expected that there will be no adverse wind conditions in the covered outdoor BBQ and communal area. With the addition of densely foliating vegetation to this area it is expected that wind conditions can be further enhanced. With the addition of densely foliating vegetation to this area, and the abovementioned impermeable balustrades, it is expected that wind conditions can be further enhanced, and is expected that a Beaufort Number of 4 to 5 will be satisfied, which is appropriate for the intended uses of this area.

It is not expected that the proposed expansion of the Peter Johnson Building will have any adverse impact on the wind conditions in the local surrounding streets and pedestrian footpaths and thoroughfares.

6.3 Westerly Winds

The development is well shielded by the local surrounding buildings to the west. It is not expected that the proposed expansion of the podium and the new residential tower will significantly affect wind conditions at the various ground level locations around and within the site. If densely foliating trees are added around the footpath areas of the site it is expected that wind conditions on the ground level areas can be further enhanced. Note that for vegetation to be effective in mitigating westerly winds for the Sydney region they should be of an evergreen variety, since westerly winds tend to be most prevalent during the winter months. It is expected that the ground level wind conditions will generally satisfy a Beaufort Number of 4 or 5, which is appropriate for these areas.

The existing open space courtyards on Level 4 are mostly enclosed and will be shielded by the subject development. It is expected that the proposed expansion of the podium and the new residential tower will not adversely affect the wind conditions within the open space courtyards on Level 4. Hence both areas are expected to be acceptable for their intended uses. It is expected that wind conditions for these courtyards will generally satisfy a Beaufort Number of 4, which is appropriate for the intended uses of these areas.

The communal residential terrace on Level 8 is well shielded from westerly winds by the proposed residential tower component of the development. Hence it is not expected that the Level 8 communal residential terrace will be exposed to adverse wind conditions as a result of westerly winds. It is expected that wind conditions for this communal terrace will generally satisfy a Beaufort Number of 4, which is appropriate for the intended use of this areas.

The BBQ and communal outdoor area on roof level will be somewhat exposed to the westerly winds. It is recommended that an impermeable balustrade 1.2m in height be placed around the perimeter of the trafficable areas of the roof terrace. With this recommendation incorporated in the final design, it is expected that there will be no adverse wind conditions in the covered outdoor BBQ and communal area. With the addition of densely foliating vegetation to this area it is expected that wind conditions can be further enhanced. With the addition of densely foliating vegetation to this area, and the abovementioned impermeable balustrades, it is expected that wind conditions can be further enhanced, and is expected that a Beaufort Number of 4 to 5 will be satisfied, which is appropriate for the intended uses of this area.

It is not expected that the proposed expansion of the Peter Johnson Building will have any adverse impact on the wind conditions in the local surrounding streets and pedestrian footpaths and thoroughfares.

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 the Peter Johnson Building, UTS Student Accommodation, located in Ultimo, Sydney.

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 Nettleton Tribe Architects, dated February 23, 2009. 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 proposed development is generally well shielded from the predominant prevailing winds by the local surrounding buildings of the site. Wind conditions for most of the various outdoor areas within and around the site are expected to be acceptable for the intended uses without the need for ameliorative treatments. Note that it is expected that wind conditions can be further enhanced with the addition of densely foliating vegetation to outdoor areas. However, for vegetation to be effective in mitigating westerly winds for the Sydney region, evergreen varieties should be selected to ensure their effectiveness during the winter months. For the ground level areas, it is expected that wind conditions will satisfy a Beaufort Number of 4 to 5, which is acceptable for the intended uses of those areas. Wind conditions on the communal terrace areas on Levels 4 and 8 of the proposed development are expected to satisfy the Beaufort Number 4, which is appropriate for the intended uses of those areas.

The BBQ and communal outdoor area on roof level of the development will be somewhat exposed to winds from all three predominant wind directions for the Sydney region. It has been recommended to include an impermeable 1.2m high balustrade around the perimeter of all accessible areas of the roof terrace, and some densely foliating vegetation. With this recommendation incorporated in the final design, it is expected that there will be no adverse wind conditions for the covered outdoor BBQ and communal area, and a Beaufort Number of 4 to 5 is expected to be satisfied, which is appropriate for the intended uses of this area.

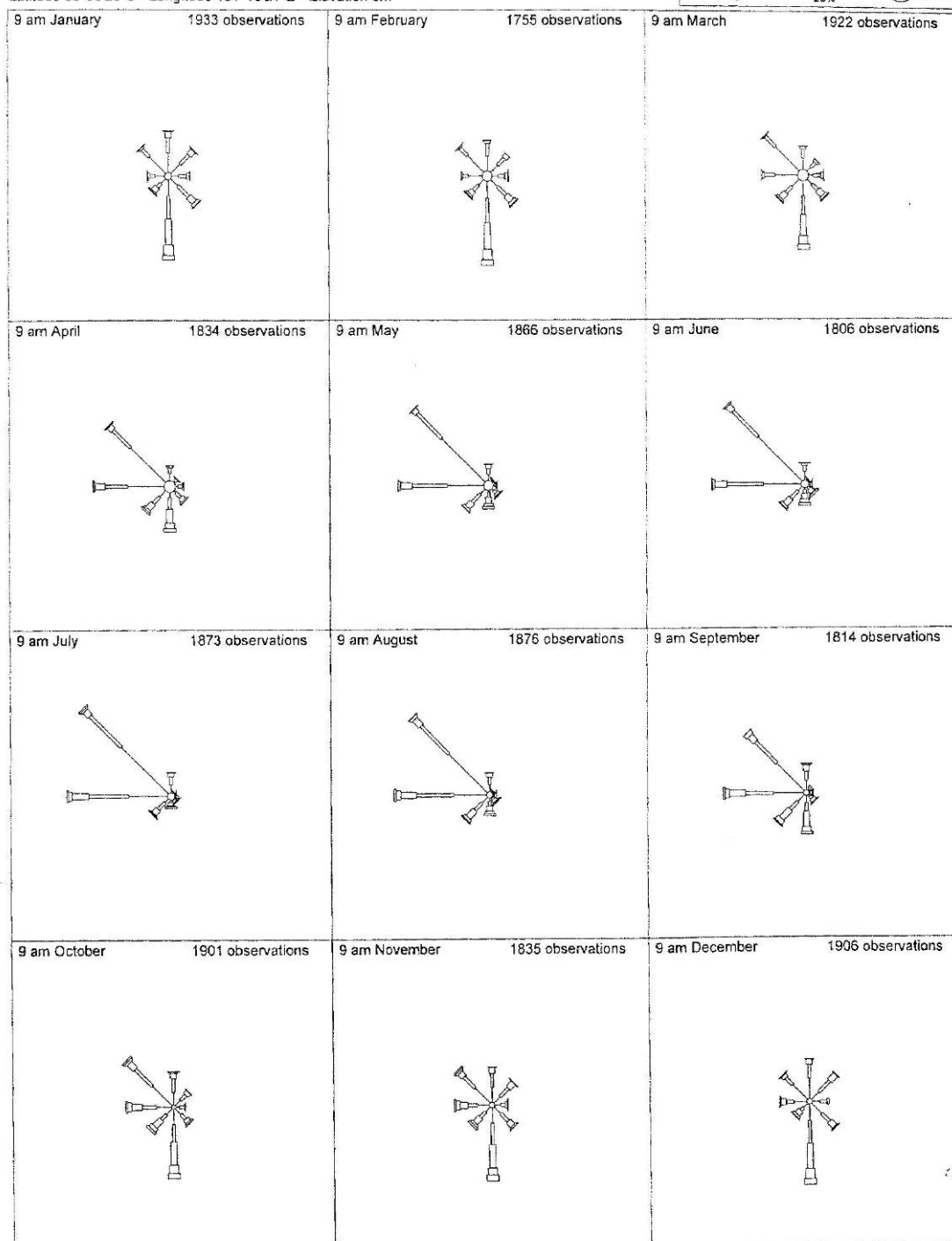
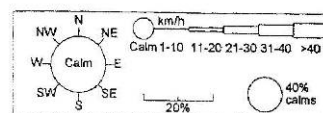
It is not expected that the proposed redevelopment will have any adverse effects to the wind conditions to the local surrounding streets and pedestrian footpaths and thoroughfares.

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

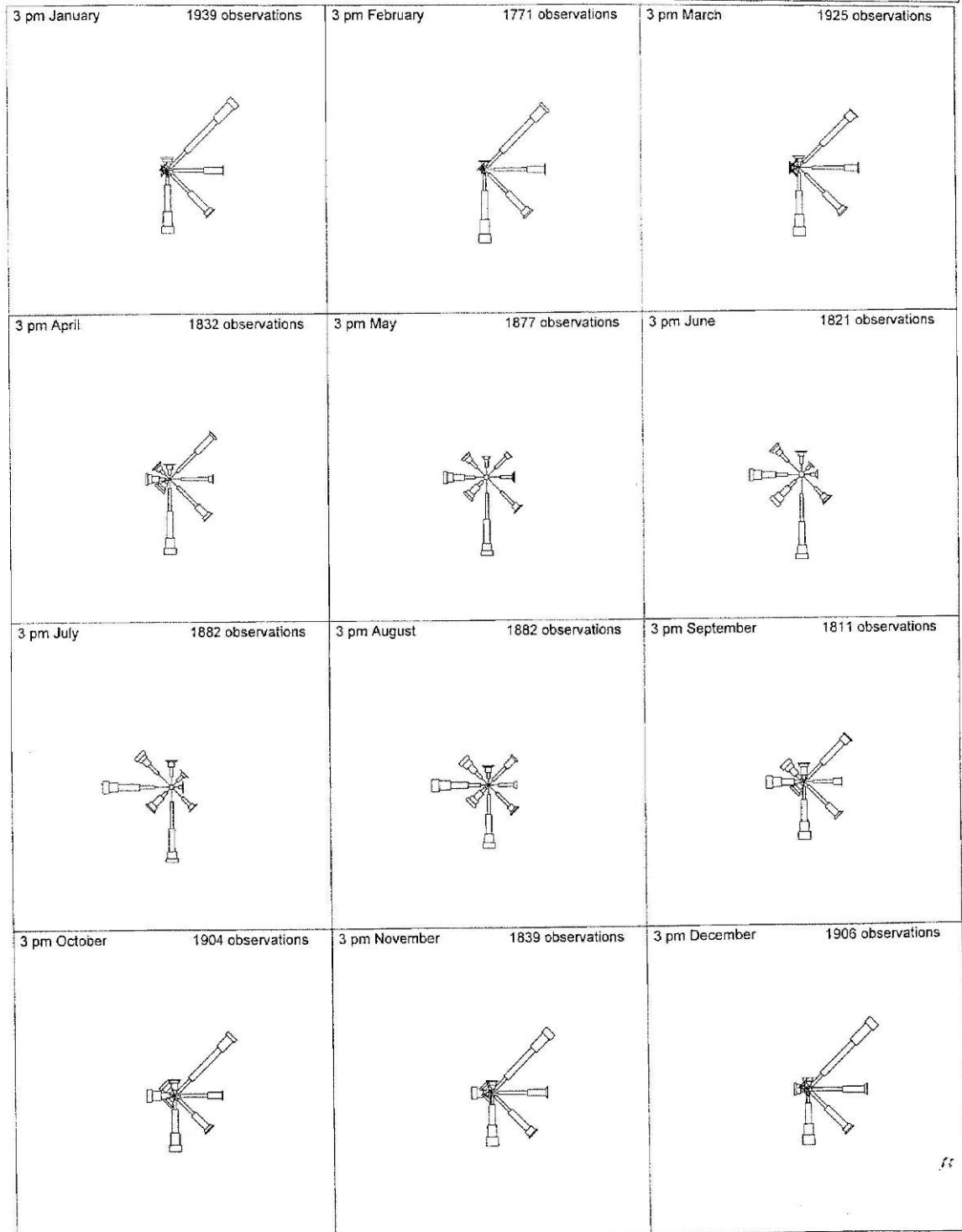
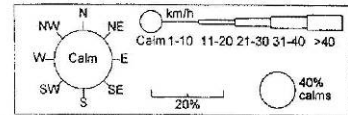


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Wind Roses using available data between 1939 and 2000 for SYDNEY AIRPORT AMO

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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