WINDTECH

Pedestrian Wind Environment Statement

for the proposed development located at

2 Australia Avenue, Homebush Bay

October 6, 2011

Report Reference No. WB007-02F01(rev0)- WS Report

Sydney • Melbourne • Singapore • Mumbai • Abu Dhabi **www.windtech.com.au**
WINDTECH Consultants Pty Ltd: 19 Willis St, Wolli Creek NSW 2205 Australia ABN 72 050 574 037
T: (61.2) 9567 0722 **F:** (61.2) 9567 0733 **E:** reception@windtech.com.au

Document Control

Revision Number	Date	Revision History	Prepared By (initials)	Reviewed & Authorised By (initials)
0	06/10/2011	Updated from Previous WS report (ref: WB007-01F02(rev0)- WS Report)	-	TH

The work presented in this document was carried out in accordance with the Windtech Consultants Pty Ltd Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

This document is issued subject to review and authorisation by the Team Leader noted by the initials printed in the last column above. If no initials appear, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for our Client's particular requirements which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Windtech Consultants Pty Ltd. This report should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

The information contained herein is for the purpose of wind, thermal and or solar effects only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the scope of this report.

Table of Contents

	Page
1.0 Introduction	4
2.0 Regional Wind Climate for Sydney	4
3.0 Wind Effects on People	6
4.0 Description of the Site and Surrounds	7
5.0 Description of the Proposed Development	10
6.0 Results of the Analysis	10
6.1 North-Easterly Winds	10
6.2 Southerly Winds	11
6.3 Westerly Winds	12

Appendix: Wind Roses for the Sydney Region

1.0 Introduction

This report is in relation to the proposed mixed-use development located at 2 Australia Avenue, 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 Architectus Sydney, dated 26th August, 2011. 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.

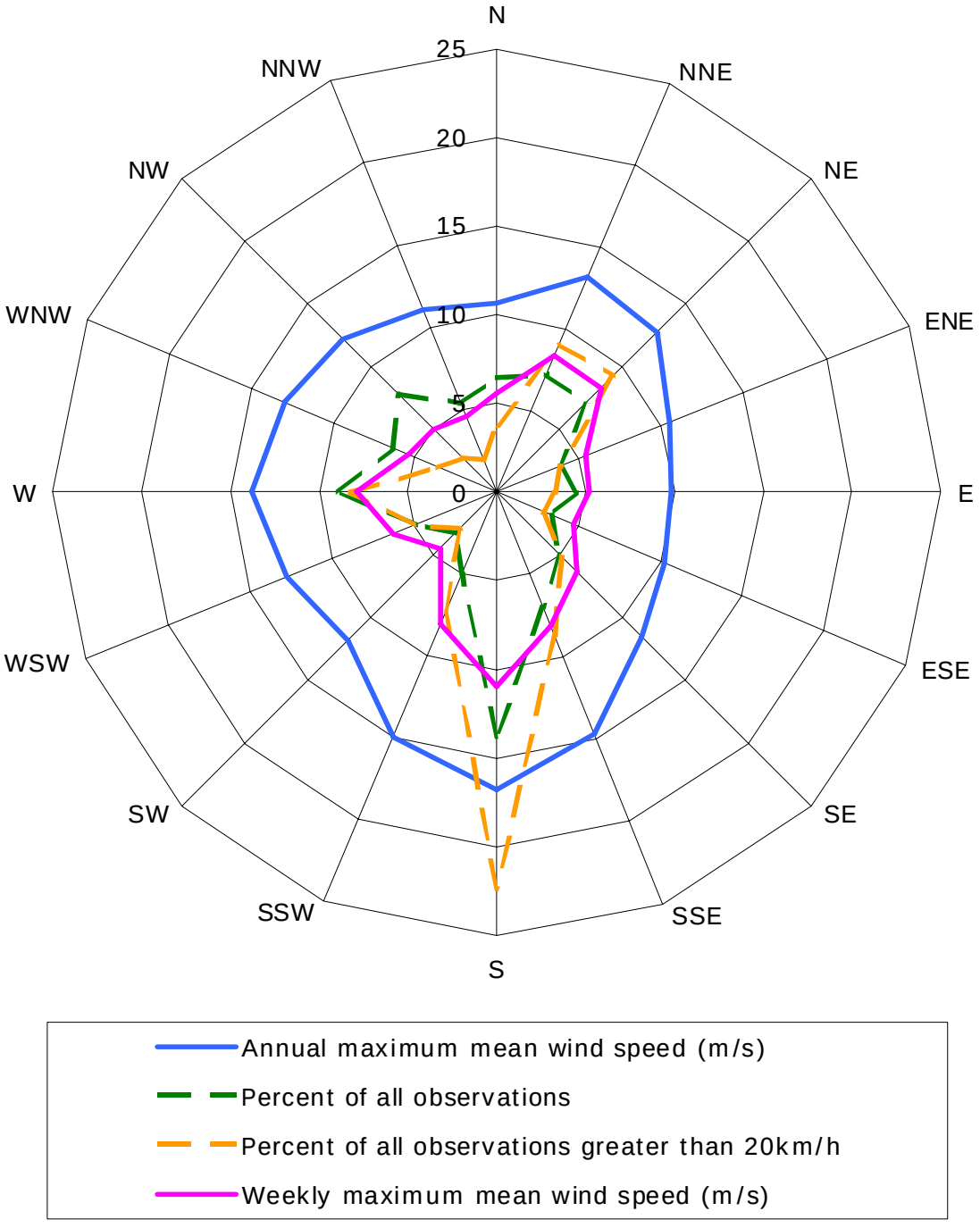


Figure 1: Annual and Weekly Recurrence Mean Wind Speeds, and Frequencies of Occurrence, for the Sydney Region (based on 10 minute mean observations from Kingsford Smith Airport from 1939 to 2008, corrected to open terrain at 10m)

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 is located on the south-western side of the intersection of Australia Avenue and Herb Elliott Avenue in Homebush Bay. To the east of the site is an ongoing construction which, when completed, will be 50m above ground. To the north-east of the site is a medium-rise building of approximately 11-storey above ground. Surrounding the site to the south are low-rise buildings of approximately 3-storey high.

The landform in the local vicinity of the site is relatively flat. Aerial images of the site are shown in Figures 2a to 2c.

Figure 2a: Aerial Image of the Site Location (view from the south, facing north)

Figure 2b: Aerial Image of the Site Location
(view from the north, facing south)

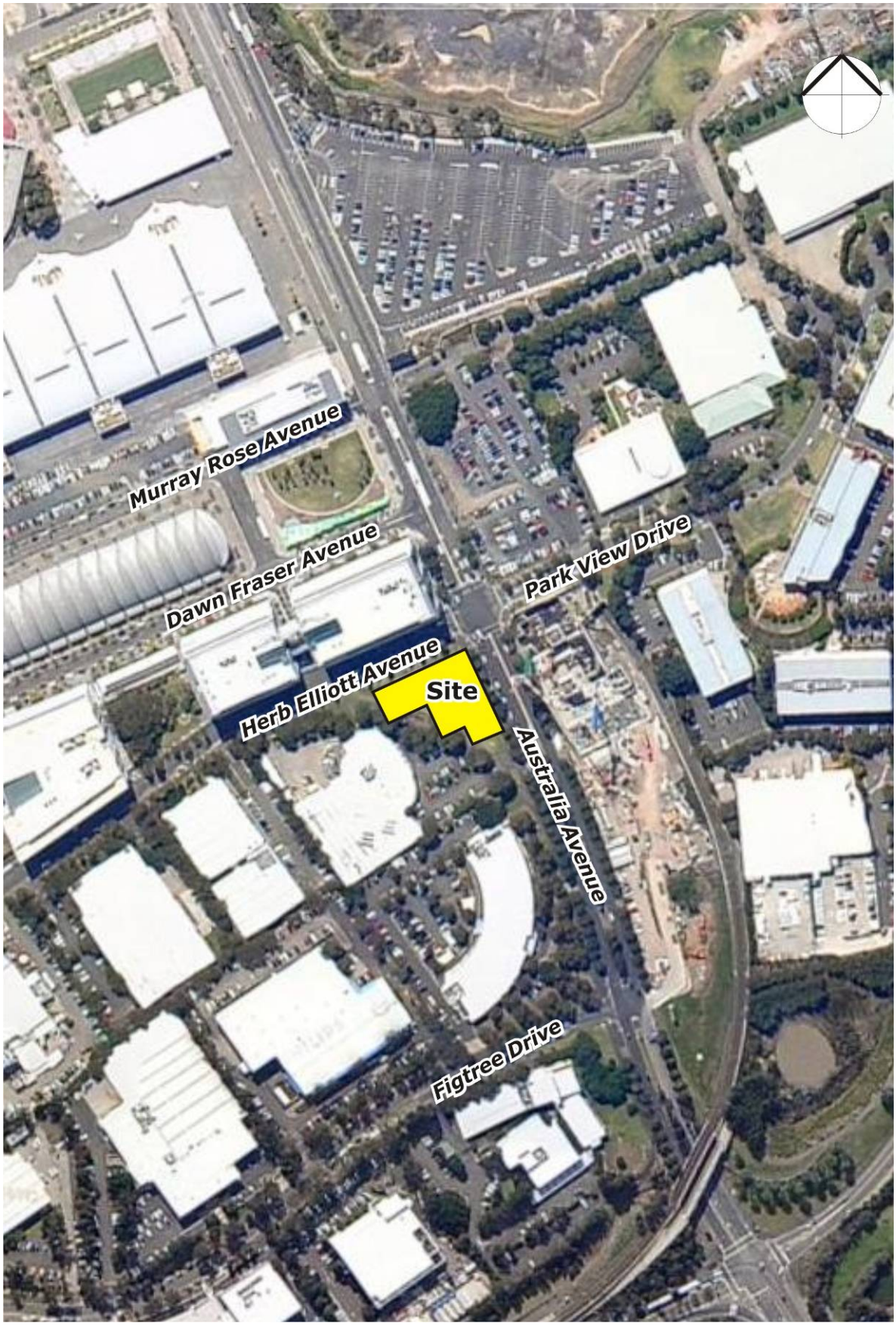


Figure 2c: Aerial Image of the Site Location

5.0 Description of the Proposed Development

The proposed development is a mixed-use building with 8 storeys consisting of office commercial space and a roof mounted plant above. Retail tenancies are proposed for the Ground Level, and commercial tenancies are proposed on the remaining levels above ground. Two basement levels are also proposed, which will be used for car parking.

The various outdoor trafficable areas of the development are summarised as follows:

- Pedestrian footpaths along Herb Elliott Avenue and Australia Avenue frontages of the site.
- An undercroft is proposed at the western end of the site from Ground Level to Level 3.
- Balconies are proposed on the eastern aspect of the development, overlooking the Australia Avenue.
- Balconies are also proposed on the northern aspect of the development, overlooking of Herb Elliott Avenue.

6.0 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.

6.1 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.

Pedestrian Footpaths around the Site

The pedestrian footpath along Herb Elliott Avenue and Australia Avenue frontages of the site are exposed to the north-easterly winds. It is noted that the architectural drawings include existing trees along Herb Elliott Avenue and Australia Avenue. It is recommended that these trees be retained in the final design. These trees are effective in mitigating the north-easterly winds and providing adequate wind conditions for pedestrians on these sections of the footpath of Herb Elliott Avenue and Australia Avenue.

Trafficable Outdoor Areas within the Site

The proposed undercroft area at the western end of the site is not directly aligned to the direction of the north-easterly winds and is thus partially shielded from north-easterly winds by the proposed development itself. It is noted that the architectural drawings include

existing trees along Herb Elliott Avenue. Retaining these trees in the final landscaping plan will further enhance wind conditions in this area.

Wind conditions for the proposed balconies on the northern and eastern aspects of the development are expected to be ideal. These balconies will benefit from being recessed into the building form.

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

6.2 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.

Pedestrian Footpaths around the Site

The pedestrian footpath along Herb Elliott Avenue frontage of the site is well shielded from the southerly winds by the proposed development itself.

The Australian Avenue pedestrian footpath of the site is exposed to side-streaming effects of the southerly winds. However, it is noted that the architectural drawings include existing trees along Australia Avenue. It is recommended that these trees be retained in the final design. These trees are effective in mitigating the side-streaming effect of the southerly winds and provide adequate wind conditions for pedestrian on this section of the footpath of Australia Avenue.

Trafficable Outdoor Areas within the Site

The proposed undercroft area at the western end of the site is partially exposed to the southerly winds. It is noted that the architectural drawings include existing trees along the southern edge of the site. Retaining these trees in the final landscaping plan will further enhance wind conditions in this area. In addition, it is recommended that additional tree planting, similar in layout to that shown in Figure 3, be included in the final design to mitigate the effect of adverse southerly winds to this area.

Wind conditions for the proposed balconies on the northern and eastern aspects of the development are expected to be ideal due to shielding by the proposed development itself.

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.

6.3 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.

Pedestrian Footpaths around the Site

The pedestrian footpath along Herb Elliott Avenue frontage of the site is exposed to the westerly winds. It is noted that the architectural drawings include existing trees along Herb Elliott Avenue. It is recommended that there trees be retained in the final design. These trees are effective in mitigating the adverse westerly winds and providing adequate wind conditions for pedestrians on this section of the footpath of Herb Elliott Avenue.

The pedestrian footpath along Australia Avenue is well protected from direct westerly winds by the proposed development itself.

Trafficable Outdoor Areas within the Site

The proposed undercroft area at the western end of the site is not directly aligned to the direction of the westerly winds and is thus partially shielded from the westerly winds. It is noted that the architectural drawings include existing trees along Herb Elliott Avenue. Retaining these trees in the final landscaping plan will help to mitigate the adverse westerly winds.

Wind conditions for the proposed balconies on the northern and eastern aspects of the development are expected to be ideal. These balconies will benefit from being recessed into the building form.

With the abovementioned recommendations 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.

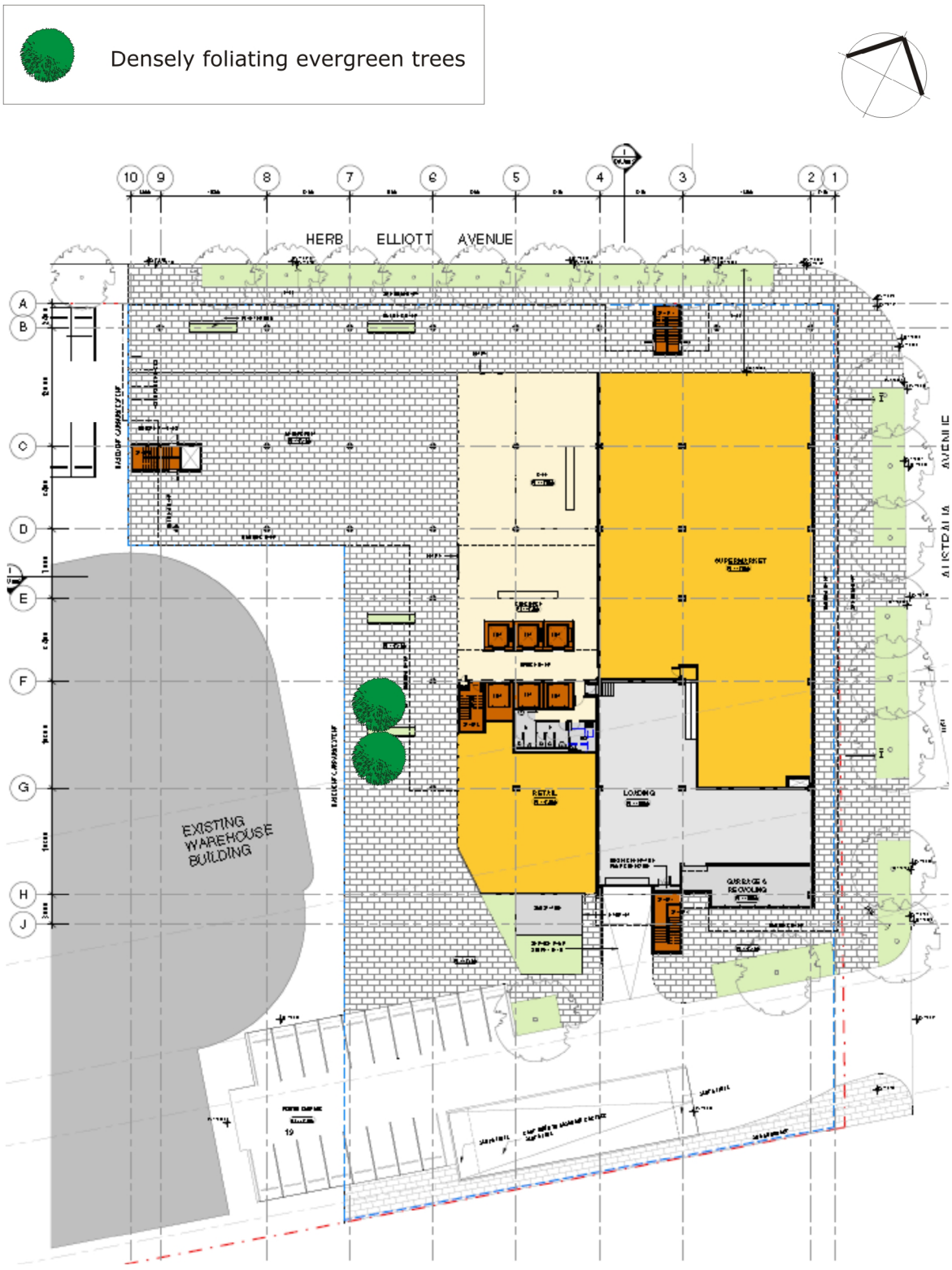


Figure 3: Recommended Treatments to Ground Level

7.0 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 located at 2 Australia Avenue, 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 Architectus Sydney, dated 26th August, 2011. 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.

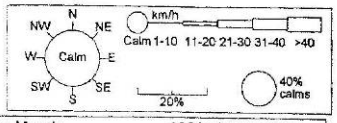
The results of this study indicate that wind conditions for all trafficable areas within and around the site will be acceptable with the retention of the existing trees along the Herb Elliott Avenue, Australia Avenue and southern edge of the site frontage of the site. In addition, additional strategic tree planting on the south-western aspect of the proposed development is recommended to mitigate potentially adverse southerly winds to the undercroft area. Wind conditions for the proposed balconies on the northern and eastern aspects of the development will be ideal due to the effective use of recesses and building setbacks.

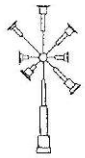
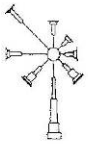
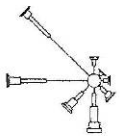
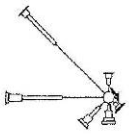
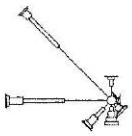
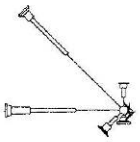
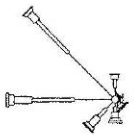
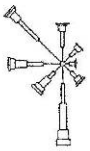
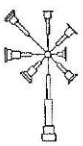
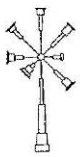
Appendix

Wind Roses for the
Sydney Region

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

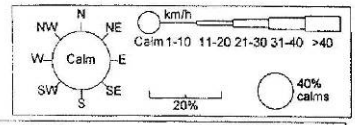
Site Number 066037 • Locality: SYDNEY AIRPORT • Opened Jan 1929 • Still Open
Latitude 33°56'28"S • Longitude 151°10'21"E • Elevation 6m



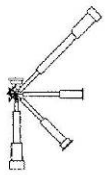
9 am January 1933 observations	9 am February 1755 observations	9 am March 1922 observations
		
9 am April 1834 observations	**9 am May 1866 observations**	**9 am June 1806 observations**
		
9 am July 1873 observations	**9 am August 1876 observations**	**9 am September 1814 observations**
		
9 am October 1901 observations	**9 am November 1835 observations**	**9 am December 1906 observations**
		

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

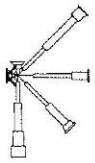


3 pm January 1939 observations

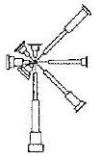


3 pm February 1771 observations

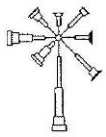
3 pm March 1925 observations



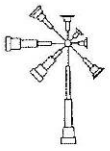
3 pm April 1832 observations



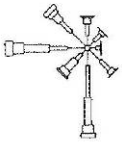
3 pm May 1877 observations



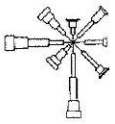
3 pm June 1821 observations



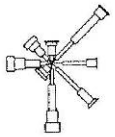
3 pm July 1882 observations



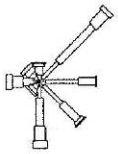
3 pm August 1882 observations



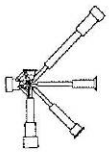
3 pm September 1811 observations



3 pm October 1904 observations



3 pm November 1839 observations



3 pm December 1906 observations