WINDTECH

Pedestrian Wind Environment Statement

for the proposed development known as

Welles Thomas Plaza, Chatswood

June 22, 2010

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Document Control

Revision Number	Date	Revision History	Prepared By (initials)	Initial Review By (initials)	Reviewed & Authorised By (initials)
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1	15/08/08	Minor Updates (WA492-01F01(rev1))	AL	-	TR
2	9/10/09	New Design (WA492-03F01(rev0))	NT	-	AB
3	12/10/09	Comments (WA492-03F01(rev1))	NT		
4	20/10/09	Alternative Scheme Added (WA492-03F01(rev2))	NT		TR
5	22/6/10	Final Drawings (WA492-03F01(rev3))	NT		TR

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1.0 Introduction

This report is in relation to the proposed development known as Welles Thomas Plaza, located on Albert Avenue and Thomas Street, Chatswood, and 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 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 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 PTW Architects, dated December 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.

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	

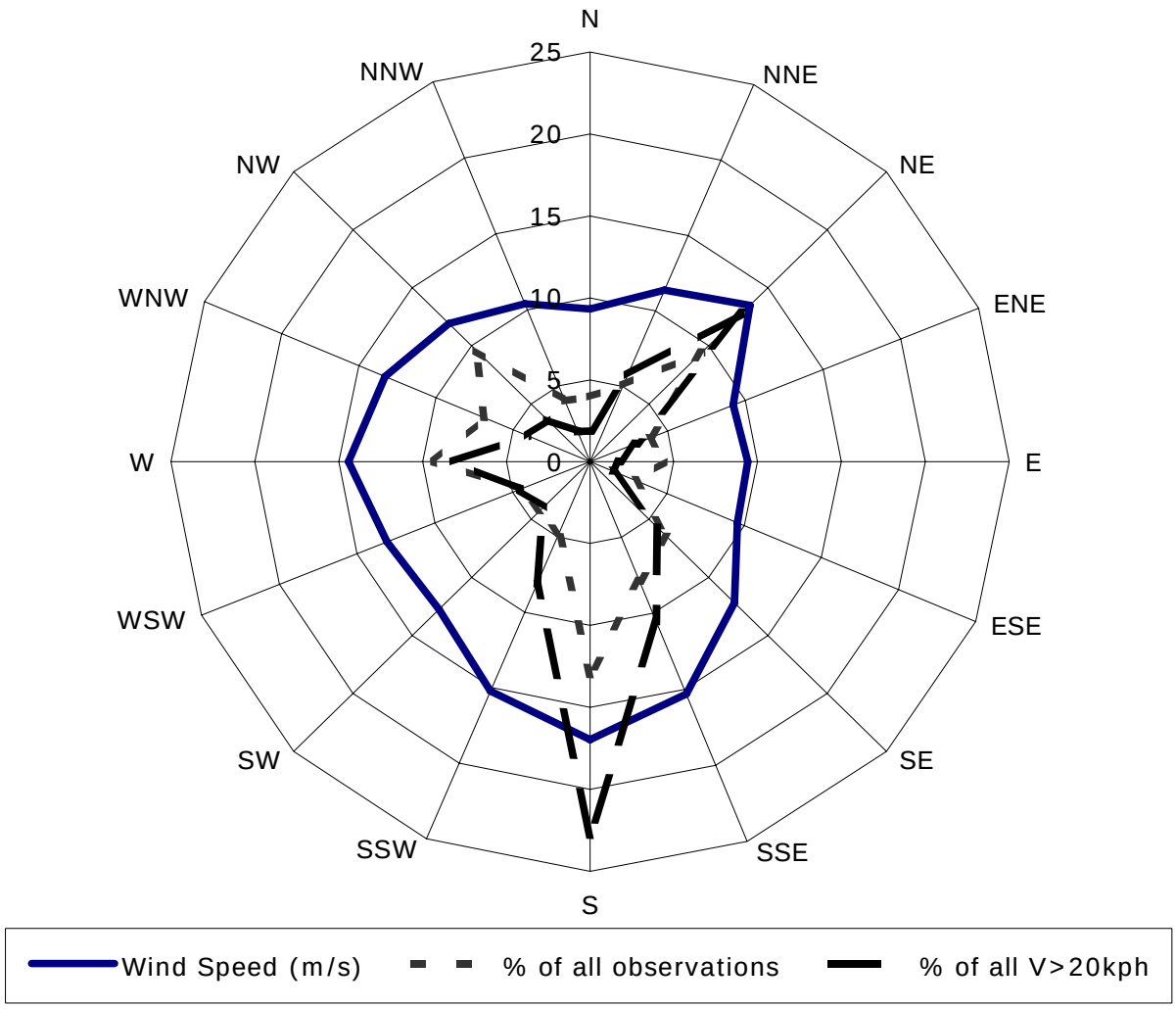


Figure 1: Basic Mean Wind Speed Data for Sydney, 1939-1992 (in metres per second, based on 3 hourly mean wind speeds, at 10m height at Kingsford Smith Airport)

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 an Office Tower and a Residential Tower approximately 92m and 101m respectively above ground level. Between the two towers is a ground level public common area with its primary use as a pedestrian thoroughfare between Albert Avenue and Thomas Street. The architectural drawings indicate potential outdoor seating close to the northern and western edges of the common area.

A trafficable terrace is proposed on the Residential Tower Level 2 floor plan. Private outdoor spaces in the form of balconies are proposed on the north, east, south and west aspects of the proposed Residential Tower.

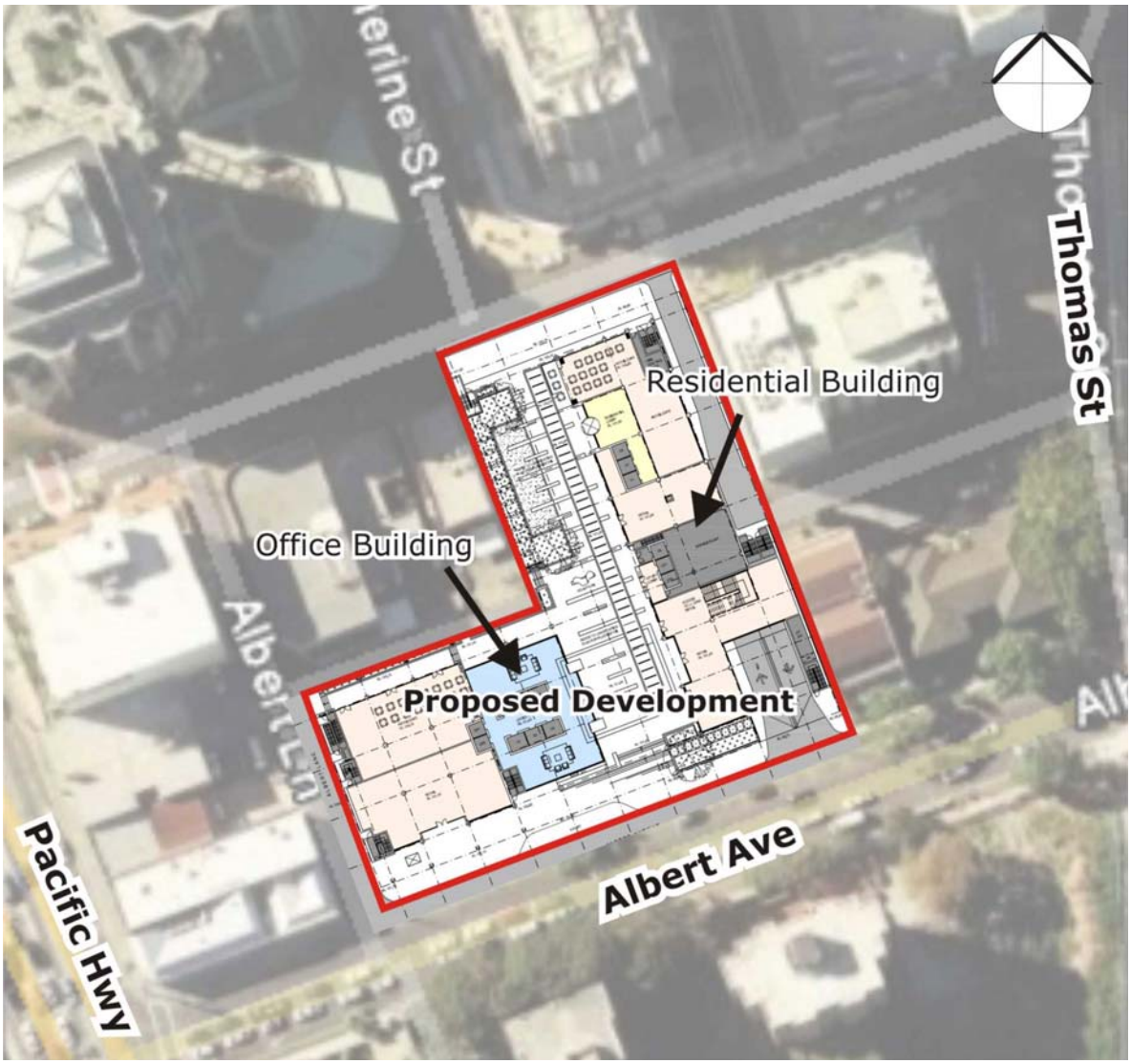


Figure 2: Site Plan of the Proposed Development

5.0 Site Analysis

The landform around the site is generally flat in all directions around the site, although further to the west the landform falls away down towards Lane Cove National Park. Adjacent buildings to the north of the site range between 2 to 22 levels in height. To the east, south and west of the site are several buildings ranging between the 2 levels to 8 levels. Chatswood Railway Station which consists of an elevated platform and train line is located to the east of the site.

Further away to the north and east are several high rise buildings. A large shopping center is located to the east of the site. Low to medium rise residential dwelling surround the site to the west and south.

Figure 3: Site Location of the Proposed Development

6.0 Analysis

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 north-easterly winds may create unfavorable wind conditions where café style outdoor seating is proposed at the northern entrance to the site. With the addition of two densely foliating trees as indicated in Figure 4a it is expected that wind conditions at this location will be suitable for its intended use. Wind conditions within the remaining ground floor public areas are expected to be acceptable for their intended uses due to the shielding of north-easterly winds by the local surrounding buildings and the proposed development.

An alternative to the planting of the two densely foliating trees is the extension of the awning above the north-west corner of the residential building as shown in Figure 5b, in combination with a planting scheme similar to that reproduced in Figure 4b.

The corner balconies on the northern face of the residential tower may be impacted by north-easterly winds. With the addition of impermeable balustrades as shown in Figure 7 it is expected that they will be suitable for their intended use.

Wind conditions along the surrounding streets and pedestrian footpaths around the site are expected to be acceptable for their intended uses due to the shielding provided by the local surrounding buildings and the proposed development.

6.2 Southerly Winds

It is expected that the combination of the neighbouring buildings on the southern side of Albert Avenue, the proposed awning on the southern aspect of the office building (Figure 5a), and the glass canopy between the office building and the residential building (Figure 6) will mitigate potential ground-level funneling of southerly winds between the two buildings, resulting in wind conditions at the southern half of the ground floor public walkway being suitable for its intended use. However, the northern end of the ground floor public walkway may be adversely affected by southerly winds which have been funneled between the two buildings or re-directed by the glass canopy. With the addition of strategic planting as shown in Figure 4a, it is expected that the northern half of the ground floor public walkway will be suitable for its intended use. The design of this ground level planting scheme should be verified by a tunnel study.

An alternative to the planting of densely foliating trees along the ground floor public walkway is the extension of the awning located on the

western aspect of the residential building as shown in Figure 5b, in combination with a planting scheme similar to that reproduced in the Figure 4b. The design of these awnings should be confirmed with a wind tunnel test.

The southern entrance to the ground floor public walkway may be impacted by the southerly winds. With the retention of the awning on the southern aspect of the office building as highlighted in Figure 5a it is expected that wind conditions at these locations will be suitable for there intended use. Wind conditions within the remaining ground floor public areas are expected to be acceptable for their intended uses due to the shielding of southerly winds by the local surrounding buildings and the proposed development.

The proposed balcony on the south-west corner of the residential buildings will be exposed to southerly winds. With the addition of an impermeable balustrade as indicated in Figure 6 it is expected that this area will be acceptable for its intended use.

The corner balconies on the northern face of the residential tower may be impacted by southerly winds. With the addition of impermeable balustrades as shown in Figure 7 it is expected that they will be suitable for their intended use. It is expected that the retention of the blade wall between the balconies on the southern face will enhance wind conditions on these balconies.

Wind conditions along the surrounding streets and pedestrian footpaths around the site are expected to be acceptable for their intended uses due to the shielding provided by the local surrounding buildings, the existing densely foliating trees, and the proposed development.

6.3 Westerly Winds

Wind conditions at the western café seating area are expected to be suitable for their intend uses due to adequate shielding of the area by the proposed vegetative screen. The ground floor public walkway may be impacted by the westerly winds down washing from the residential building. With the additional of the strategic planting indicated in Figure 4a and the retention of the proposed awnings shown in Figure 5a it is expected that wind conditions on the ground floor public walkway will be suitable for their intended use. To be effective in mitigating the westerly winds the awning on the northern end of the residential building should be extended to the northern face as indicated in Figure 5a. It is expected that wind conditions at the north-east corner of the residential building will be further enhanced by the previously recommended planting at this location shown in Figure 4a. The design of the awnings on the western aspect of the residential building should be verified by a tunnel study.

An alternative to the planting of densely foliating trees along the ground floor public walkway is the extension of the awning located on the western aspect of the residential building as shown in Figure 5b in combination with a planting scheme similar to that reproduced in the

Figure 4b. The design of these awnings should be confirmed with a wind tunnel test.

Note for trees to be effective in mitigating westerly winds which typically occurring during the winter months they must be an evergreen variety.

It is expected that the proposed awning on the northern aspect of the office building (Figure 5a) and the glass canopy between the office building and the residential building (Figure 6) will mitigate any potential funneling of westerly winds between the two buildings, resulting in wind conditions at the southern half of the ground floor public walkway being suitable for its intended use. Wind conditions within the remaining ground floor public areas are expected to be acceptable for their intended uses due to the shielding of westerly winds by the local surrounding buildings and the proposed development.

The proposed balcony on the south-west corner of the residential buildings will be exposed to westerly winds. The design of these awnings should be verified by a tunnel study. With the addition of an impermeable balustrade and awning as indicated in Figure 6 it is expected that this area will be acceptable for its intended use.

The corner balconies on the northern face of the residential tower may be impacted by southerly winds. With the addition of impermeable balustrades as shown in Figure 7 it is expected that they will be suitable for their intended use. It is expected that the retention of the blade wall between the balconies on the southern face will enhance wind conditions on these balconies.

Wind conditions along the surrounding streets and pedestrian footpaths around the site are expected to be acceptable for their intended uses due to the shielding provided by the local surrounding buildings and the proposed development.

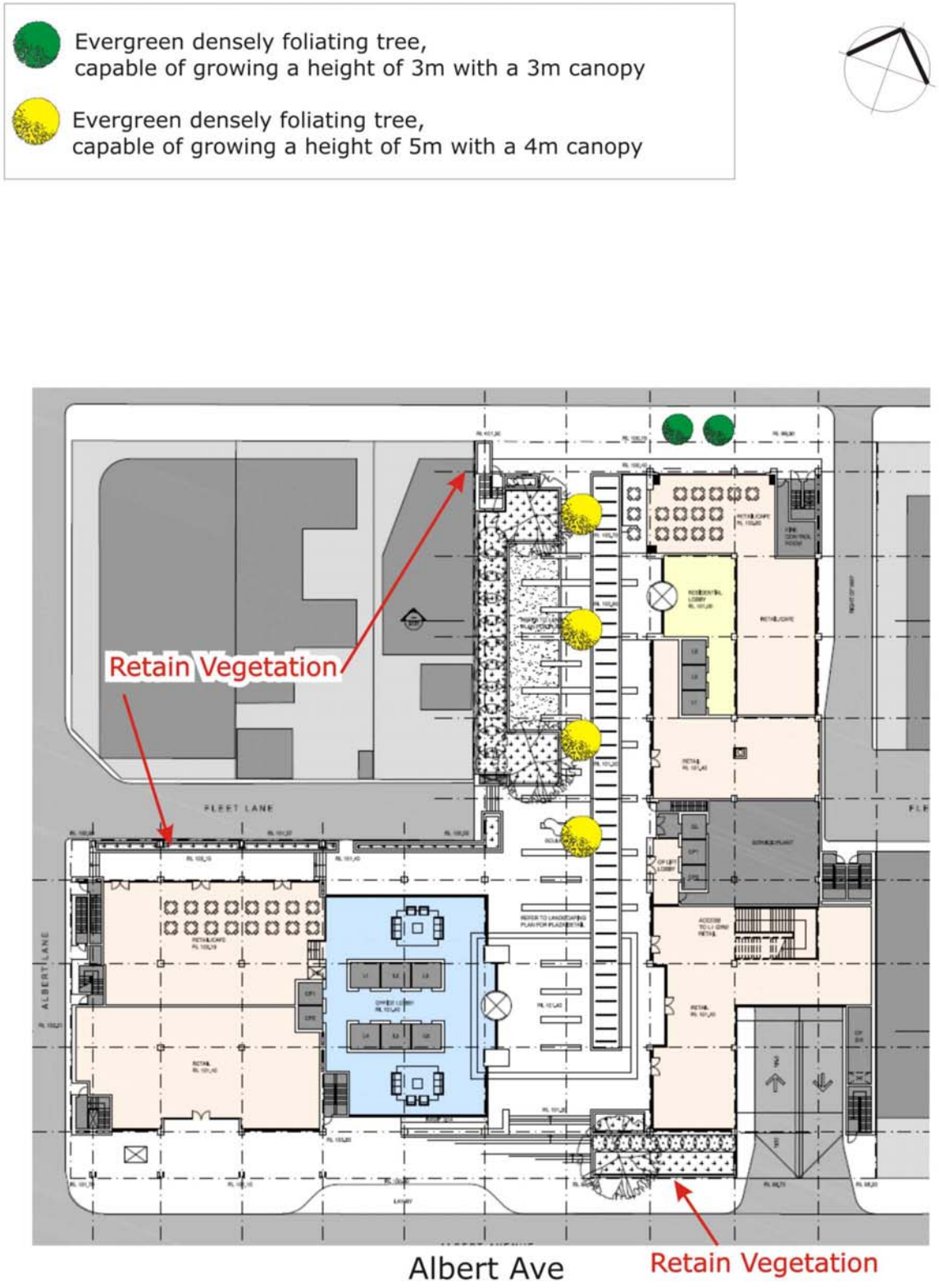


Figure 4a: Recommended Treatments for Ground Level (Option A)

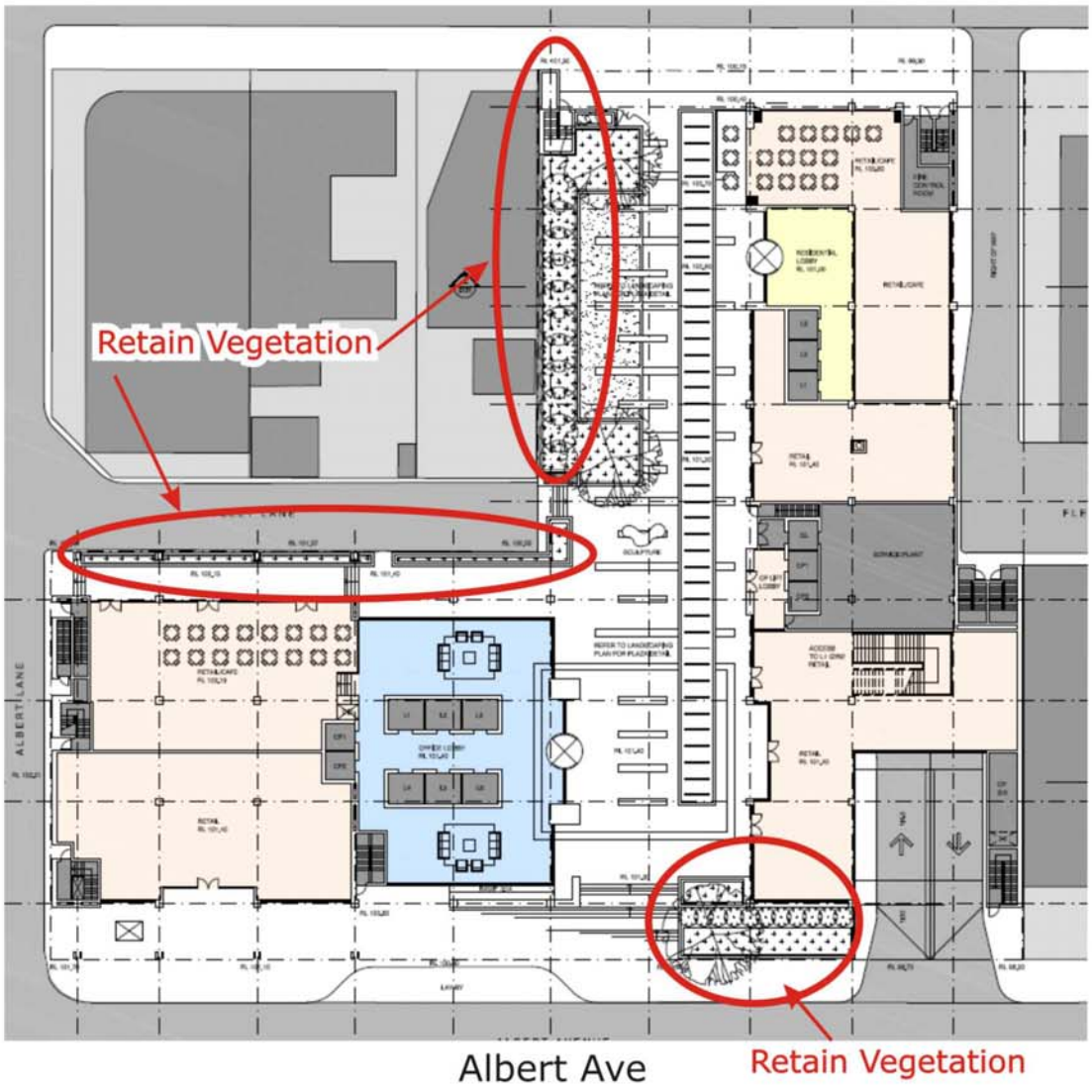


Figure 4b: Recommended Treatments for Ground Level (Option B)

Figure 5a: Recommended Treatments for Level 1 (Option A)

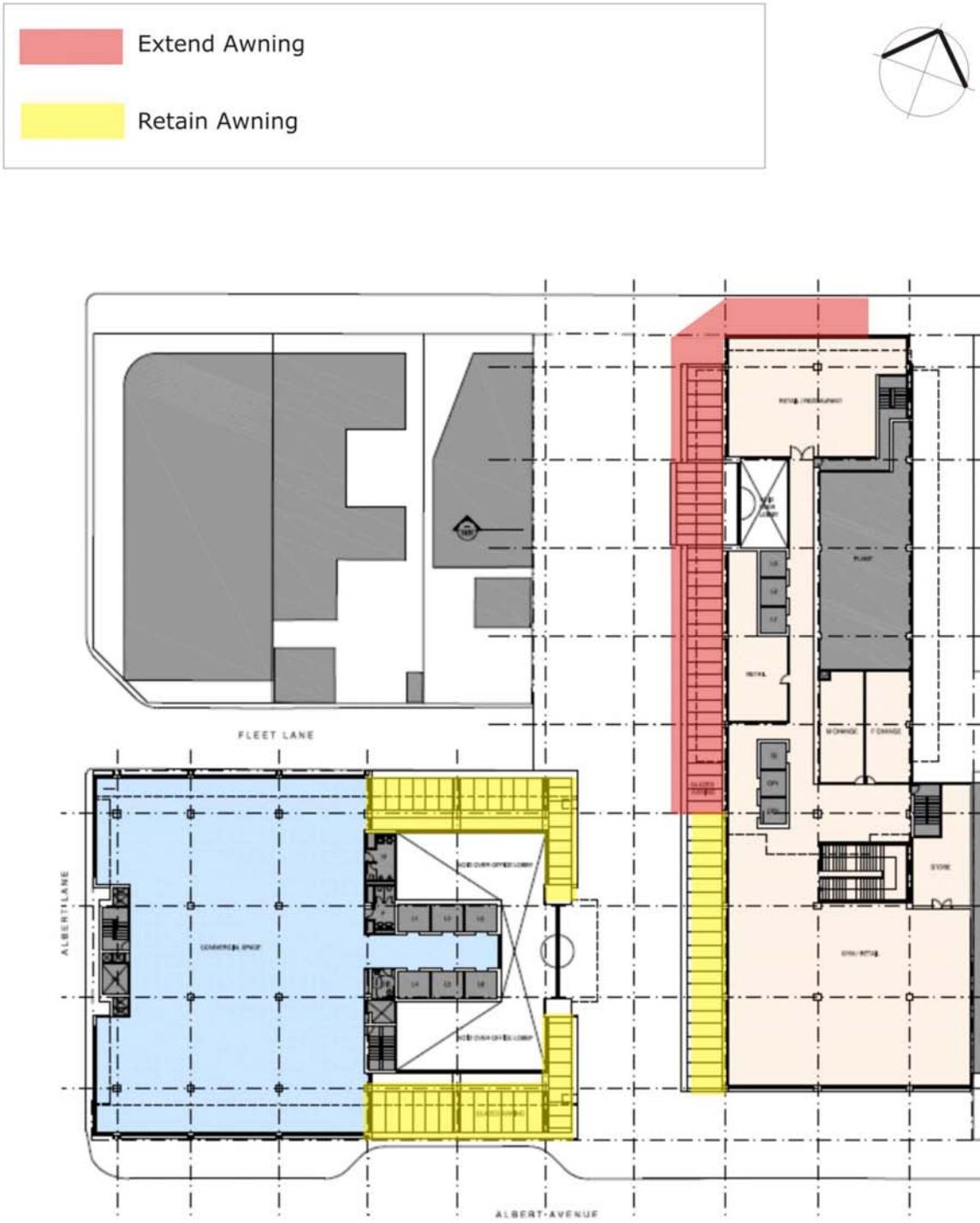


Figure 5b: Recommended Treatments for Level 1 (Option B)

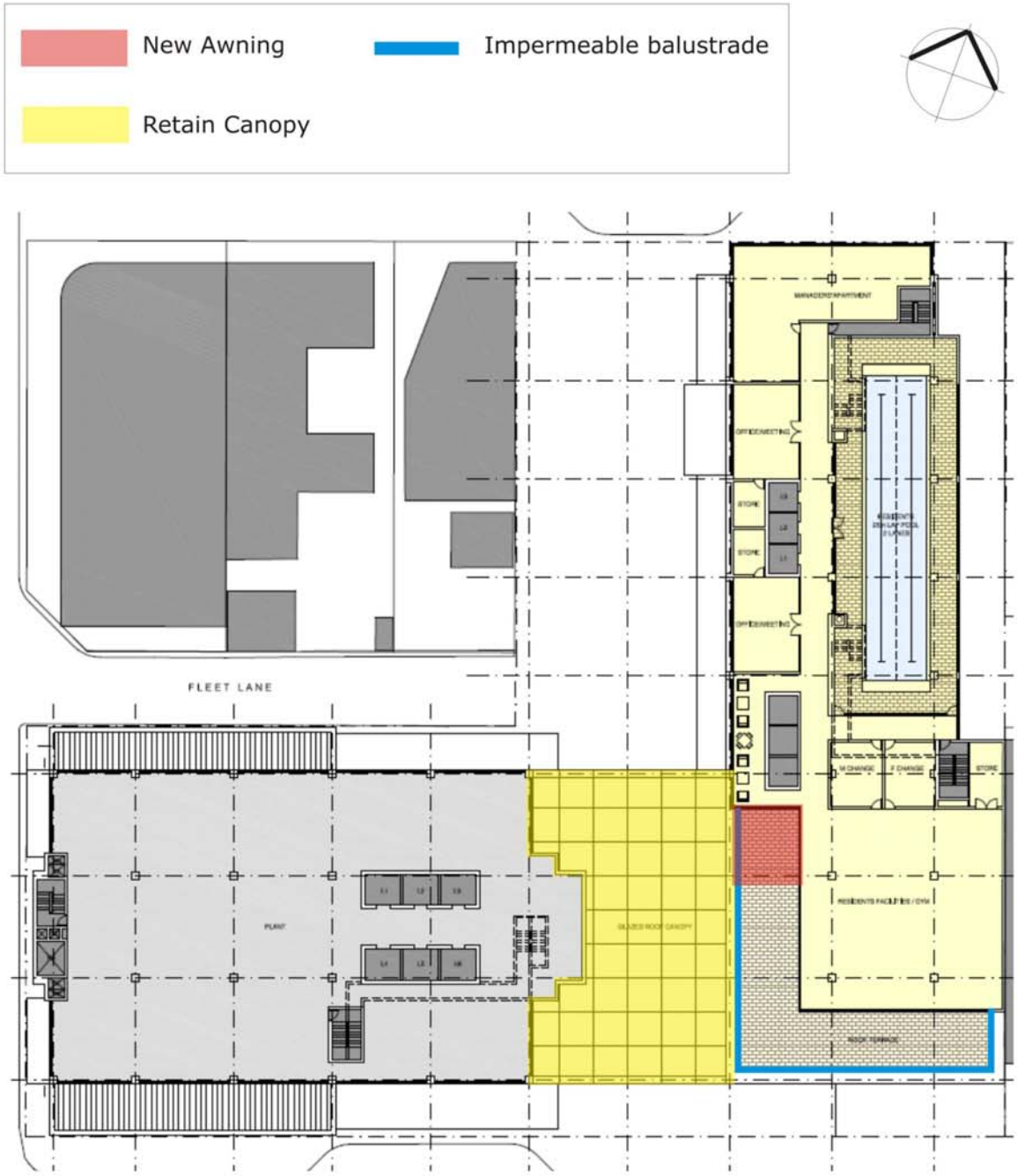


Figure 6: Recommended Treatments for Level 2

Figure 7: Recommended Treatments for Level 3 and above

7.0 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 Welles Thomas Plaza, located on Albert Avenue and Thomas Street, Chatswood.

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 PTW Architects, dated on December 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 results of the study indicate that the following treatments are recommended to mitigate potentially adverse wind effects:

- Retention of Level 1 awning on the western face of the residential building. Extension of this awning to the northern face of the residential building.
- Retention of Level 1 awnings on Level 1 of the office building.
- Retention of the proposed glass canopy between the office and residential buildings
- Addition of balustrades and awnings to the Level 2 balconies of the residential tower.
- Addition of balustrades to the northern corner balconies of the residential tower and retention of the blade wall between the balconies on the southern face of the residential building.
- Retention of current planting scheme, with the addition of strategic ground level planting of trees and/or shrubs along the public walkway and close to the northern and southern entrances.

  OR

  Retention of a planting scheme similar to that currently proposed and extension of the awnings located on the western and northern aspects of the residential building.

Note for trees to be effective in mitigating westerly winds which typically occurring during the winter months they must be an evergreen variety.

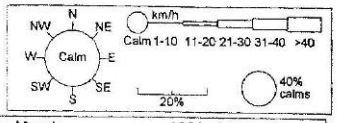
With the addition of the above listed treatments, wind conditions to all of the various outdoor areas of the proposed development are expected to be acceptable. Wind conditions along the surrounding streets and pedestrian footpaths around the site are also expected to be acceptable for their intended uses. However, note that due to the scale and exposure of the proposed development a wind tunnel study of the final development scheme is recommended to verify the effectiveness and design of the abovementioned treatments.

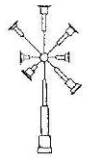
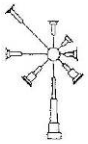
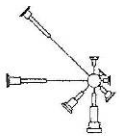
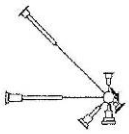
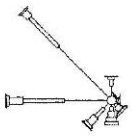
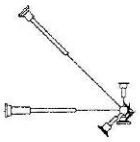
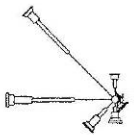
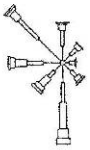
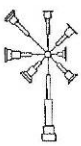
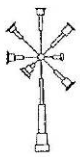
Appendix A

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



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**
		

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Site Number 066037 • Locality: SYDNEY AIRPORT • Opened Jan 1929 • Still Open
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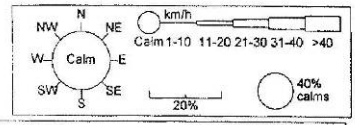

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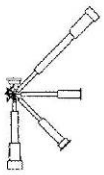
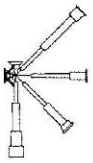


3 pm February 1771 observations

3 pm March 1925 observations



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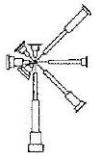

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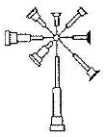

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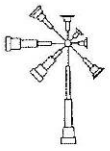

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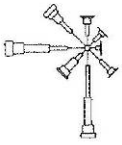

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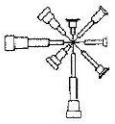

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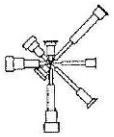

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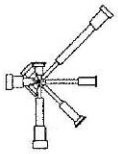

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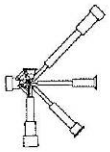

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