



HEGGIES

REPORT 10-8766-R2

Revision 0

**Proposed SAH Day Surgery Hornsby
Redevelopment
Northcote Road/ Palmerston Road Hornsby
Qualitative Wind Impact Assessment**

PREPARED FOR

Morris Bray Architects Pty Ltd
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14 JULY 2010

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Proposed SAH Day Surgery Hornsby Redevelopment Northcote Road/ Palmerston Road Hornsby Qualitative Wind Impact Assessment

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
10-8766-R2	Revision 0	14 July 2010	Sophie Wong Kai In	Neihad Al-Khalidy	Neihad Al-Khalidy



EXECUTIVE SUMMARY

Heggies Pty Ltd (Heggies) has been engaged by Morris Bray Architects Pty Ltd (Morris Bray) to assess the environmental impact of a proposed SAH Day Surgery Hornsby redevelopment, part of the Hornsby Adventist Hospital, located at the corner of Northcote and Palmerston Road, Hornsby, with respect to Environmental Wind Effects.

The proposed development site is currently occupied by SAN Day Surgery, Professional Rooms, On-Balance Physiotherapy, Air Liquide Healthcare and AMX Health buildings. These buildings will be demolished to make way to the new SAH Day Surgery Hornsby building that will be constructed in two stages. The development site is bounded by Northcote Road to the north, Palmerston Road to the east and Balmoral Street to the west. Low rise development are located south to the development site and the Hornsby Adventist Hospital main campus is located on the east of Palmerston Road.

The proposed Hornsby Adventist Hospital SAH Day Surgery redevelopment will be constructed in two stages with Stage 1 being the east part and Stage 2 the west part of the redevelopment. The proposed development comprises of:

- 1 Basement carparking Level
- 1 open carparking area on ground floor
- Kitchen, rubbish room, storage areas, switch room on lower ground floor
- Public Entry to building on ground floor via Palmerston Road
- Café, Admission Centre and Public Lobby on ground floor
- Surgical rooms on ground and Level 1
- Operating Theatres, utilities and recovery beds on Level 2
- Plant room and Doctor's lounge and terrace on Level 3 (top floor)

Sydney is affected by two primary wind seasons:

- Summer winds occur mainly from the northeast, southeast and south.
 - While northeast winds are the more common prevailing wind direction (occurring typically as offshore land-sea breezes), southeast and south winds generally provide the strongest gusts during summer.
- Winter/Early spring winds occur mainly from the west and the south.
 - West quadrant winds (southwest to northwest) provide the strongest winds during winter and in fact for the whole year.

Existing Winds

In relation to *existing* ground level conditions at the site, wind conditions are likely to be below the 16 m/s “walking comfort” criterion for most onshore prevailing wind conditions given the nature of the surrounding developments.

Future Wind Environment

In terms of the *future* wind environment with the proposed development (Stage 1 and 2), the following features of the development are noted as being of most significance:

- The development site receives reasonable shielding at lower levels from the low rise developments and existing landscaping surrounding the development site.



EXECUTIVE SUMMARY

- The proposed development features a large awning over the main entry which will minimise the potential for “downwash” winds to occur, ie winds which impact on any facades of the development and are then deflected back towards the ground.
- Pedestrian areas located on the west, north and east side of the development are protected from adverse winds by abundant landscaping.
- The outdoor dining area for the café is shielded by the propose development itself and existing and planned landscaping.

Some areas have been identified as being potentially prone to winds close to or even exceeding the standard 16 m/sec walking comfort criterion or 10 m/sec outdoor dining. Additional amelioration measures (refer **Section 4.3** and **Figure 4** and **Figure 5**) have been recommended to mitigate windflow in these areas. The redevelopment being constructed in two stages will not bear additional requirements during the construction stages.

Accordingly, it has been predicted that ground levels wind speeds along all surrounding public footpaths and public access areas within the development itself will either remain at their present levels or decrease slightly with the addition of the proposed development and its wind mitigation treatments.

The above analysis has been made on the basis of our best engineering judgment and on the experience gained from model scale wind tunnel testing of a range of developments of similar magnitude to the currently proposed development. The analysis can be confirmed via model scale wind tunnel testing during the detailed design phase of the project.



TABLE OF CONTENTS

1	INTRODUCTION	6
1.1	Development Site	6
1.2	Proposed Development Description	7
2	SYDNEY'S WIND CLIMATE	8
2.1	Seasonal Winds	8
2.2	Wind Exposure at the Site – the “Local” Wind Environment	8
3	WIND ACCEPTABILITY CRITERIA	9
3.1	Standard Local Government Criteria	9
3.2	Application of Standard Council Wind Criteria	9
4	WIND IMPACT OF THE PROPOSED DEVELOPMENT	10
4.1	Existing Winds – Wind Impact and Effects	10
4.2	Future Winds - Predicted Windflow Patterns	10
4.2.1	Northeast Winds	13
4.2.2	South and Southeast Winds	14
4.2.3	Westerly Winds	15
4.3	Wind Amelioration Recommendations	16
5	CONCLUSION	18
Table 1	Standard Local Government Wind Acceptability Criteria	9
Table 2	Wind Impacts and Windbreaks Recommendations Summary	16
Figure 1	Aerial View of Proposed Development Site	6
Figure 2	Points of Interest Regarding Public Access	11
Figure 3	Proposed Landscape Plan	12
Figure 4	Recommended Wind Treatments for Ground Floor	17
Figure 5	Recommended Wind Treatments for Level 3 Terrace	17

Appendix A Sydney Wind Roses



1 INTRODUCTION

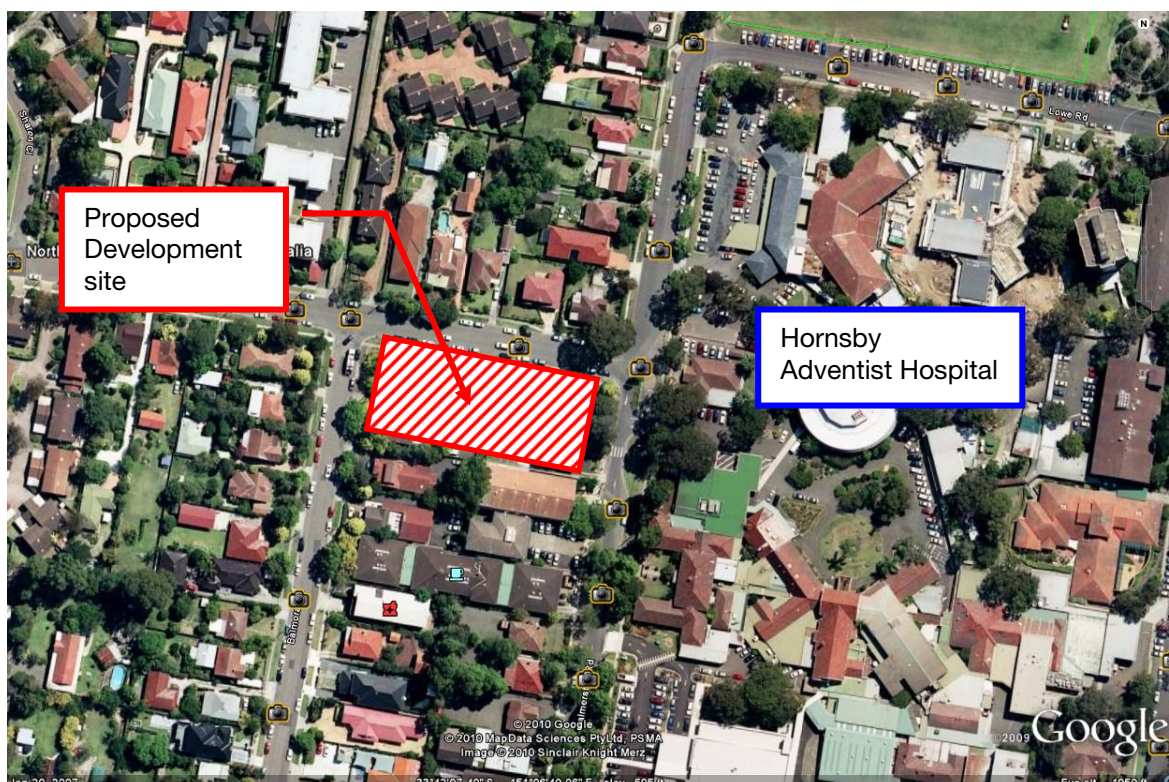
Heggies Pty Ltd (Heggies) has been engaged by Morris Bray Architects Pty Ltd (Morris Bray) to assess the environmental impact of a proposed SAH Day Surgery redevelopment, part of the Hornsby Adventist Hospital, located at the corner of Northcote and Palmerston Road, Hornsby, with respect to Environmental Wind Effects.

The following report is based on drawings (09009-A/EA-101 to 109, 09009-A/EA-201 to 209) sent by Morris Bray, dated 28 June 2010.

1.1 Development Site

The proposed development site is currently occupied by SAN Day Surgery, Professional Rooms, On-Balance Physiotherapy, Air Liquide Healthcare and AMX Health buildings. These buildings will be demolished to make way to the new SAH Day Surgery Hornsby building that will be constructed in two stages. The development site is bounded by Northcote Road to the north, Palmerston Road to the east and Balmoral Street to the west. Low rise development are located south to the development site and the Hornsby Adventist Hospital main campus is located on the east of Palmerston Road. An aerial view of the site is shown in **Figure 1**.

Figure 1 Aerial View of Proposed Development Site





1.2 Proposed Development Description

The proposed Hornsby Adventist Hospital SAH Day Surgery redevelopment will be constructed in two stages with Stage 1 being the east part and Stage 2 the west part of the redevelopment. The proposed development comprises of:

- 1 Basement carparking Level
- 1 open carparking area on ground floor
- Kitchen, rubbish room, storage areas, switch room on lower ground floor
- Public Entry to building on ground floor via Palmerston Road
- Café, Admission Centre and Public Lobby on ground floor
- Surgical rooms on ground and Level1
- Operating Theatres, utilities and recovery beds on Level 2
- Plant room and Doctor's lounge and terrace on Level 3 (top floor)



2 SYDNEY'S WIND CLIMATE

The data of interest in this study are the annual extreme, mean hourly wind speeds and largest gusts experienced throughout the year, how these winds vary with azimuth, and the seasonal break-up of winds into the primary Sydney wind seasons.

2.1 Seasonal Winds

In relation to key characteristics of the Sydney Region Wind Climate (refer wind roses provided in **Appendix A**) relevant to the wind impact assessment of the proposed development, we note that Sydney is affected by two primary wind seasons:

- Summer winds occur mainly from the northeast, southeast and south.
 - While northeast winds are the more common prevailing wind direction (occurring typically as offshore land-sea breezes), southeast and south winds generally provide the strongest gusts during summer.
- Winter/Early spring winds occur mainly from the west and the south.
 - West quadrant winds (southwest to northwest) provide the strongest winds during winter and in fact for the whole year.

2.2 Wind Exposure at the Site – the “Local” Wind Environment

Close to the ground, the “regional” wind patterns described above are affected by the local terrain and topography.

- The development site receives reasonable shielding at lower levels from the low rise developments surrounding the development site.



3 WIND ACCEPTABILITY CRITERIA

3.1 Standard Local Government Criteria

The choice of suitable criteria for evaluating the acceptability of particular ground level conditions has been the subject of relatively recent research. The acceptability criteria, that have been developed from this research and currently referenced by most Australian Local Government Development Control Plans, including those of Sydney City Council, have been summarised below in **Table 1**.

Table 1 Standard Local Government Wind Acceptability Criteria

Type of Criteria	Limiting Gust Wind Speed Occurring Once Per Year	Activity Concerned
Safety	24 m/s	Knockdown in Isolated Areas
	23 m/s	Knockdown in Public Access Areas
Comfort	16 m/s	Comfortable Walking
	13 m/s	Standing, Waiting, Window Shopping
	10 m/s	Dining in Outdoor Restaurant

The primary objectives relating to the above wind impact criteria are as follows:

- The general objective is for annual 3-second gust wind speeds to remain at or below the so-called 16 m/sec “Walking Comfort” criterion. Whilst this magnitude may appear somewhat arbitrary, its value represents a level of wind intensity which the majority of the population would find unacceptable for comfortable walking on a regular basis at any particular location.
- In many urban locations, either because of exposure to open water conditions or because of street “canyon” effects, etc, the 16 m/sec “Walking Comfort” level may already be currently exceeded. In such instances a new development should ideally not exacerbate existing adverse wind conditions and, wherever feasible and reasonable, ameliorate such conditions.
- As it is proposed to have a café on the ground floor on the northeast corner of the building, outdoor dining area may be located outside of the café and should meet the “Dining out Outdoor Restaurant” wind criterion of 10 m/sec.

3.2 Application of Standard Council Wind Criteria

The criteria provided in **Table 1** should not be viewed as “hard” numbers as the limiting values were generally derived from subjective assessments of wind acceptability. Such assessments have been found to vary with the height, strength, age, etc, of the pedestrian concerned.

A further factor for consideration is the extent of windy conditions, and some relaxation of the above criteria may be acceptable for small areas under investigation provided the general site satisfies the relevant criteria.

Finally, it is noted that the limiting wind speed criteria in **Table 1** are based on the maximum wind gust occurring (on average) once per year. Winds at all other times, ie monthly winds, weekly winds, etc, would be of lesser magnitude. So for example, a location with a maximum annual gust of 10 m/sec would experience winds throughout the year of a generally very mild nature, conducive to stationary activities (seating, dining, etc).



4 WIND IMPACT OF THE PROPOSED DEVELOPMENT

4.1 Existing Winds – Wind Impact and Effects

Existing street level wind conditions in the vicinity of the site are likely to be either close to or under the 16 m/sec “*walking comfort*” criterion for many prevailing wind directions given the varying degree of shielding afforded to the site by surrounding buildings.

Northeast Winds

Reasonable shielding is available to the northeast from Hornsby Adventist Hospital on the east of the proposed development site as well as other developments further upstream. In addition, northeast winds are generally mild and the potential therefore for exceedance of the 16 m/sec criterion along the pedestrian pathways at the site is small, ie occurrences, if any, are likely to be very infrequent.

Southeast Quadrant (Southeast to South) Winds

Good shielding is available to the south from the low rise developments immediately upstream resulting in wind conditions close to the ground being below the 16 m/sec criterion from these directions. Winds at elevated heights however will tend to be considerably stronger.

West Quadrant (Northwest to Southwest) Winds

Westerly winds, which provide the highest winds affecting the Sydney region, have the potential to approach the 16 m/sec criterion even at ground level for winds which approach the site from the west and move along Northcote Road. Winds at elevated heights will tend to be stronger.

4.2 Future Winds - Predicted Windflow Patterns

The following sections analyse the expected impacts of the proposed development on the pedestrian wind environment in the adjacent streetscape.

The wind impact of the proposed development is described by examining the impact of prevailing wind conditions on all public access areas of interest within and external to the development.

The analysis is made on the basis of our best engineering judgement and on the experience gained from model scale wind tunnel testing of a range of developments of similar magnitude to the currently proposed development.

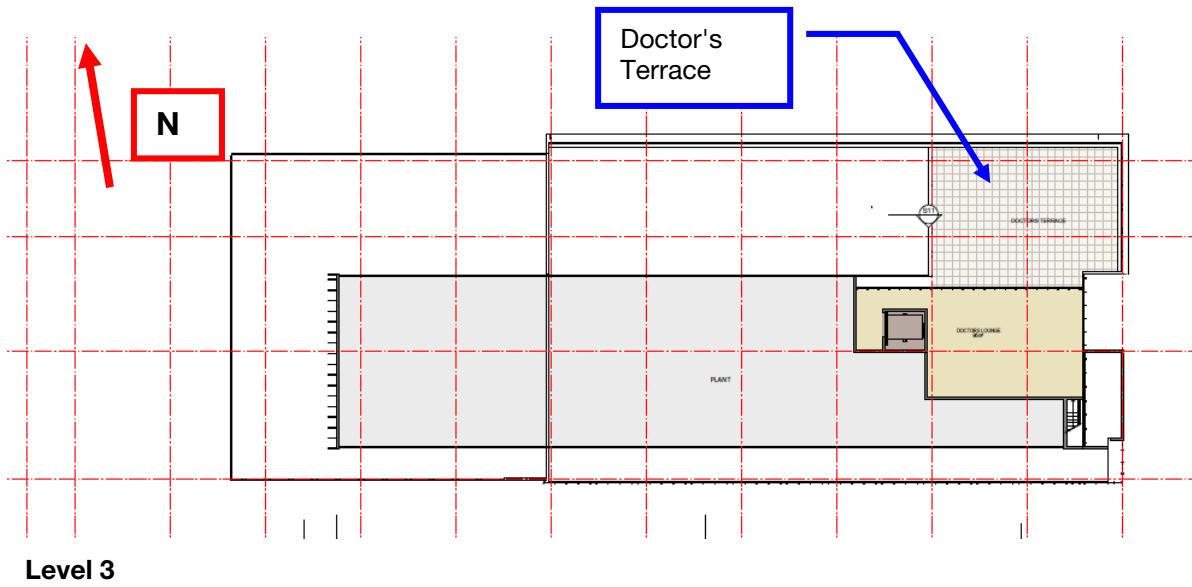
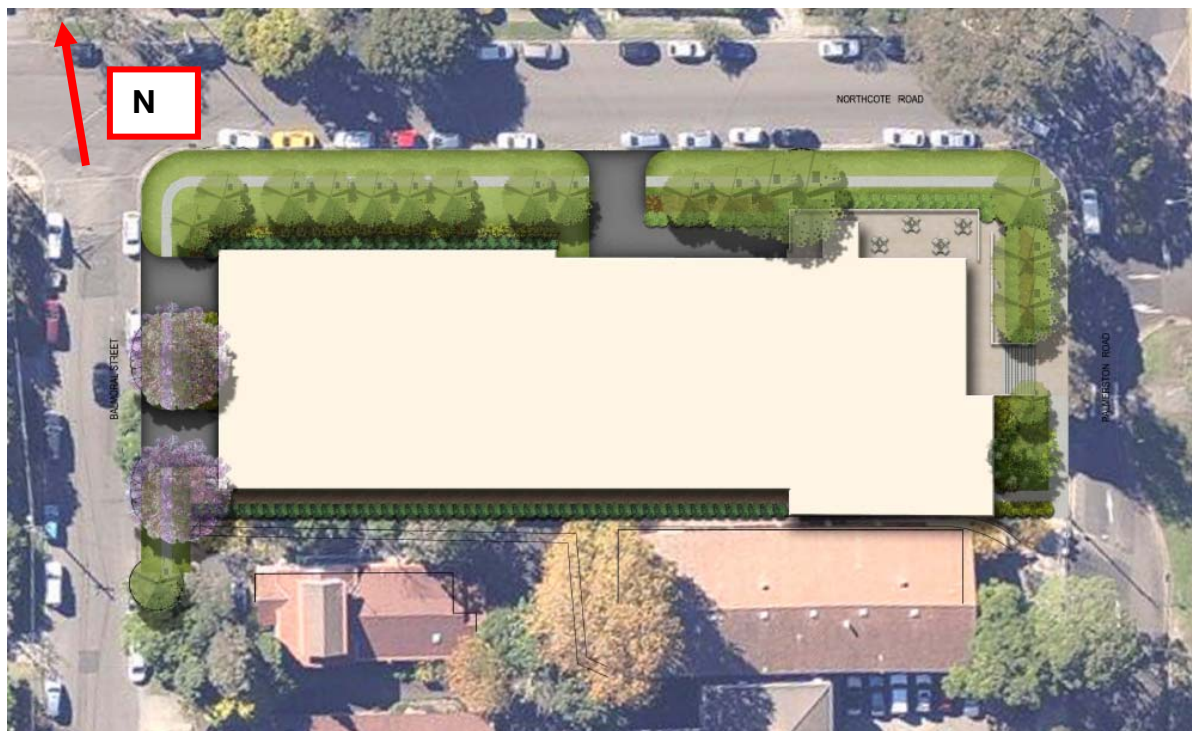


Figure 3 shows the proposed landscape plan designed by Site Image Landscape Architects.

Figure 3 Proposed Landscape Plan





4.2.1 Northeast Winds

Location	Wind Impact
Lower Ground Carpark	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings.• Shielding from along the Northcote Road footpath• Wind flowing and dispersed through the open carpark.
Footpath along Balmoral Street	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings and the development itself.• Landscaping already planned along footpath
Footpath along Northcote Road	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings.• Landscaping already planned along footpath
Footpath along Palmerston Road	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings.• Landscaping already planned along footpath
Entry Lobby	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings and the development itself• Landscaping already planned along Palmerston Road.• Proposed canopy above entry mitigates any downwash caused by winds impacting the eastern façade
Café Outdoor Terrace	Potential impact here should be close to 10 m/sec outdoor dining criterion , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings and existing landscaping.• Landscaping already planned along Palmerston Road on the east of the café terrace• Downwash generated by winds impacting on the northern-facing façade then diverted downwards towards the terrace – “undercroft” effect
Doctor's Terrace	Potential impact here should be exceeding the 10 m/sec , affected by: <ul style="list-style-type: none">• Winds accelerating over the roofs of the development, being generally mild but with occasional higher wind speeds.



4.2.2 South and Southeast Winds

Location	Wind Impact
Lower Ground Carpark	Potential impact here should be well below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings.
Footpath along Balmoral Street	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Channelling of winds along Balmoral Street.• Landscaping already planned along footpath
Footpath along Northcote Road	Potential impact here should be well below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings and the development itself.• Landscaping already planned along footpath
Footpath along Palmerston Road	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Channelling of winds along Palmerston Road.• Landscaping already planned along footpath
Entry Lobby	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Landscaping already planned along Palmerston Road.• Channelling of winds along Palmerston Road
Café Outdoor Terrace	Potential impact here should be below 10 m/sec outdoor dining criterion , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings and the development itself• Landscaping already planned along Palmerston Road on the east of the café terrace
Doctor's Terrace	Potential impact here should be close to the 10 m/sec , affected by: <ul style="list-style-type: none">• Strong seasonal southerly winds accelerating over the development roofs and impacting on the Doctor's terrace.• Shielding from horizontal winds from the development's itself



4.2.3 Westerly Winds

Location	Wind Impact
Lower Ground Carpark	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings.• Landscaping already planned along Balmoral Street
Footpath along Balmoral Street	Potential impact here should be below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings.• Landscaping already planned along footpath
Footpath along Northcote Road	Potential impact here should be below or close to 16 m/sec , affected by: <ul style="list-style-type: none">• Channelling of winds along Northcote Road..• Landscaping already planned along footpath
Footpath along Palmerston Road	Potential impact here should be well below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings and the development itself.
Entry Lobby	Potential impact here should be well below 16 m/sec , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings and the development itself
Café Outdoor Terrace	Potential impact here should be below 10 m/sec outdoor dining criterion , affected by: <ul style="list-style-type: none">• Shielding from the upstream buildings.• Landscaping already planned along Palmerston Road on the east of the café terrace
Doctor's Terrace	Potential impact here should be exceeding the 10 m/sec , affected by: <ul style="list-style-type: none">• Strong seasonal westerly winds accelerating over the development roofs



4.3 Wind Amelioration Recommendations

On the basis of the expected wind impacts outlined in **Section 4.2**, recommendations for windbreak features are made in areas where winds are expected to approach or exceed:

- the 16 m/sec walking comfort criterion; or
- the 10 m/sec outdoor dining criterion around the proposed café

Table 2 Wind Impacts and Windbreaks Recommendations Summary

Location of Interest	Wind Impact Potential	Windbreak Treatment Recommendations
Lower Ground Carpark	Mild Winds likely below 16 m/s for all wind directions.	Landscaping is already planned around the carpark Consideration for potential mitigation • Nil.
Footpath along Balmoral Street	Mild Winds likely below 16 m/s for all wind directions.	Landscaping is already planned along footpath Consideration for potential mitigation • Nil.
Footpath along Northcote Road	Mild Winds likely below 16 m/s for all wind directions.	Landscaping is already planned along footpath Consideration for potential mitigation • Nil.
Footpath along Palmerston Road	Mild Winds likely below 16 m/s for all wind directions.	Landscaping is already planned along footpath Consideration for potential mitigation • Nil.
Entry Lobby	Mild Winds likely below 16 m/s for all wind directions.	Landscaping and canopy over entry door are already planned. Consideration for potential mitigation • Nil.
Café Outdoor Terrace	Mild to Moderately High Winds likely close to 10 m/s for north quadrant winds only. Winds for other directions will be below 10 m/s.	The high wind condition is mainly due possible downwash towards the terrace from wind impacting the north facing façade. Consideration for potential mitigation • Canopy over terrace
Doctor's Terrace	Moderate to High Winds likely close to or exceeding the 10 m/s for most wind directions	High wind conditions are due to elevated windflows accelerating over the roofs of the development and only modest shielding from surrounding buildings. Consideration for potential mitigation • Vertical windbreaks on the west and north of the Doctors Terrace plus horizontal windbreak elements (eg canopies, shade cloths, etc)



Figure 4 Recommended Wind Treatments for Ground Floor

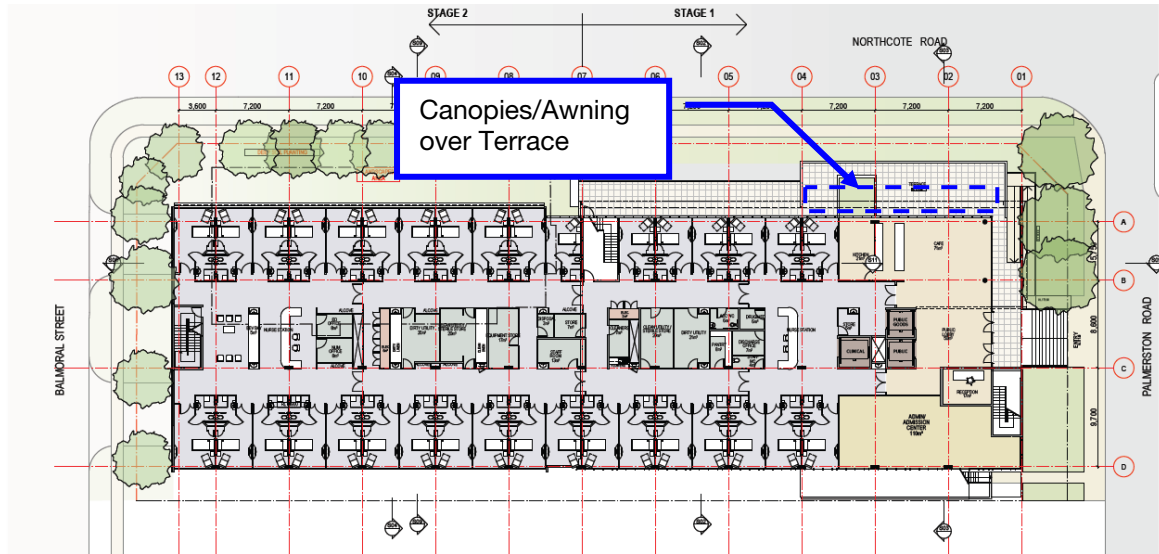
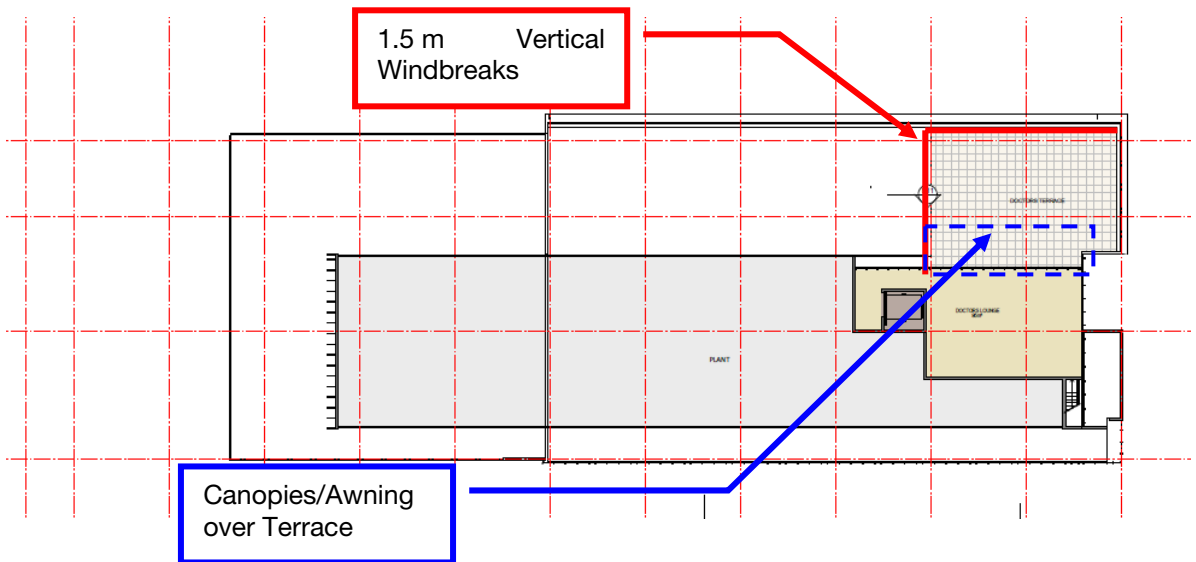


Figure 5 Recommended Wind Treatments for Level 3 Terrace





5 CONCLUSION

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In terms of the *future* wind environment with the proposed development (Stage 1 and 2), the following features of the development are noted as being of most significance:

- The development site receives reasonable shielding at lower levels from the low rise developments and existing landscaping surrounding the development site.
- The proposed development features a large awning over the main entry which will minimise the potential for “downwash” winds to occur, ie winds which impact on any facades of the development and are then deflected back towards the ground.
- Pedestrian areas located on the west, north and east side of the development are protected from adverse winds by abundant landscaping.
- The outdoor dining area for the café is shielded by the propose development itself and existing and planned landscaping.

Some areas have been identified as being potentially prone to winds close to or even exceeding the standard 16 m/sec walking comfort criterion or 10 m/sec outdoor dining. Additional amelioration measures (refer **Section 4.3** and **Figure 4** and **Figure 5**) have been recommended to mitigate windflow in these areas. The redevelopment being constructed in two stages will not bear additional requirements during the construction stages.

Accordingly, it has been predicted that ground levels wind speeds along all surrounding public footpaths and public access areas within the development itself will either remain at their present levels or decrease slightly with the addition of the proposed development and its wind mitigation treatments.



The above analysis has been made on the basis of our best engineering judgment and on the experience gained from model scale wind tunnel testing of a range of developments of similar magnitude to the currently proposed development. The analysis can be confirmed via model scale wind tunnel testing during the detailed design phase of the project.

Appendix A

Report 10-8766-R2

Page 1 of 1

SYDNEY WIND ROSES

