



PEDESTRIAN WIND ENVIRONMENT STATEMENT

KENT ROAD PUBLIC SCHOOL

WE364-01F02(REV3)- WS REPORT

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Prepared for:

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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

This report is in relation to the proposed redevelopment of the Kent Road Public School, Marsfield, and presents an opinion on the likely impact of the proposed design on the local wind environment on the critical outdoor areas within and around the subject development. The effect of wind activity is examined for the three predominant wind directions for the Sydney region; namely the northerly, southerly and westerly winds. The analysis of the wind effects relating to the proposed development 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 project architects Gardner Wetherill Associates & Butler & Co Architects, received September 2018. No wind tunnel testing has been undertaken for the subject development, and hence 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 assessment indicate the subject development benefits from shielding provided by the subject building, the existing densely foliating street trees proposed to be retained and the use of effective wind mitigating design such as the recessing the passive outdoor areas into the overall building footprint, the inclusion of densely foliating vegetation, full-height impermeable screens and balustrades as indicated in the architectural drawings. Furthermore, the inclusion of the proposed redevelopment is expected to have a minimal impact upon the existing wind conditions within a majority of the outdoor trafficable areas of the site. Hence the wind conditions within the various outdoor trafficable areas of the subject development site are expected to be acceptable for its intended uses.

Note the proposed densely foliating vegetation is recommended to be of an evergreen species to ensure their effectiveness in wind mitigation throughout the year. The inclusion of additional wind mitigation elements such as and densely foliating vegetation such as trees or shrubs/hedge planting, baffle screens or pergolas within and around the subject development; particularly around areas intended for stationary activities such as the amphitheatre outdoor seating, is expected to be effective in further enhancing the localised wind conditions.

1 DESCRIPTION OF THE SSD DEVELOPMENT AND SURROUNDINGS

The Development Application (DA) seeks approval for the redevelopment of Kent Road Public School, including:

- Site preparation;
- Construction of three (3) new two (2) to three (3) storey buildings to allow for increased student population from 750 to 1,000, containing;
 - o 34 Homebase spaces;
 - o Canteen;
 - o Administration facilities;
 - o Special program/counselling rooms;
- Construction of a new entry canopy
- Reconfiguration of car drop off / pick up arrangements on Kent Road;
- Landscaping and fencing and
- Tree removal.

The development site is bounded by Kent Road to the east, Herring Road to the north and low-rise private residential housing along the remaining boundaries. Surrounding the site are predominantly low-rise private residential housing with the open parkland of ELS Hall Park and the Ryde Community Sports Centre located along the eastern boundary. A survey of the land topography indicates a rise in elevation through the site towards the north. The site location is shown in Figure 1.

The existing public school development site is comprised of a series of low-rise buildings and demountable units spread throughout the site.

The critical trafficable areas associated with the proposed development, which are the focus of this assessment with regards to wind effects, are detailed as follows:

- The pedestrian footpath along the Herring Road and Kent Road frontages of the site.
- The ground level trafficable areas within the subject development site.
- The covered walkways on Levels 1 and 2.
- The passive outdoor areas on Levels 1 and 2.

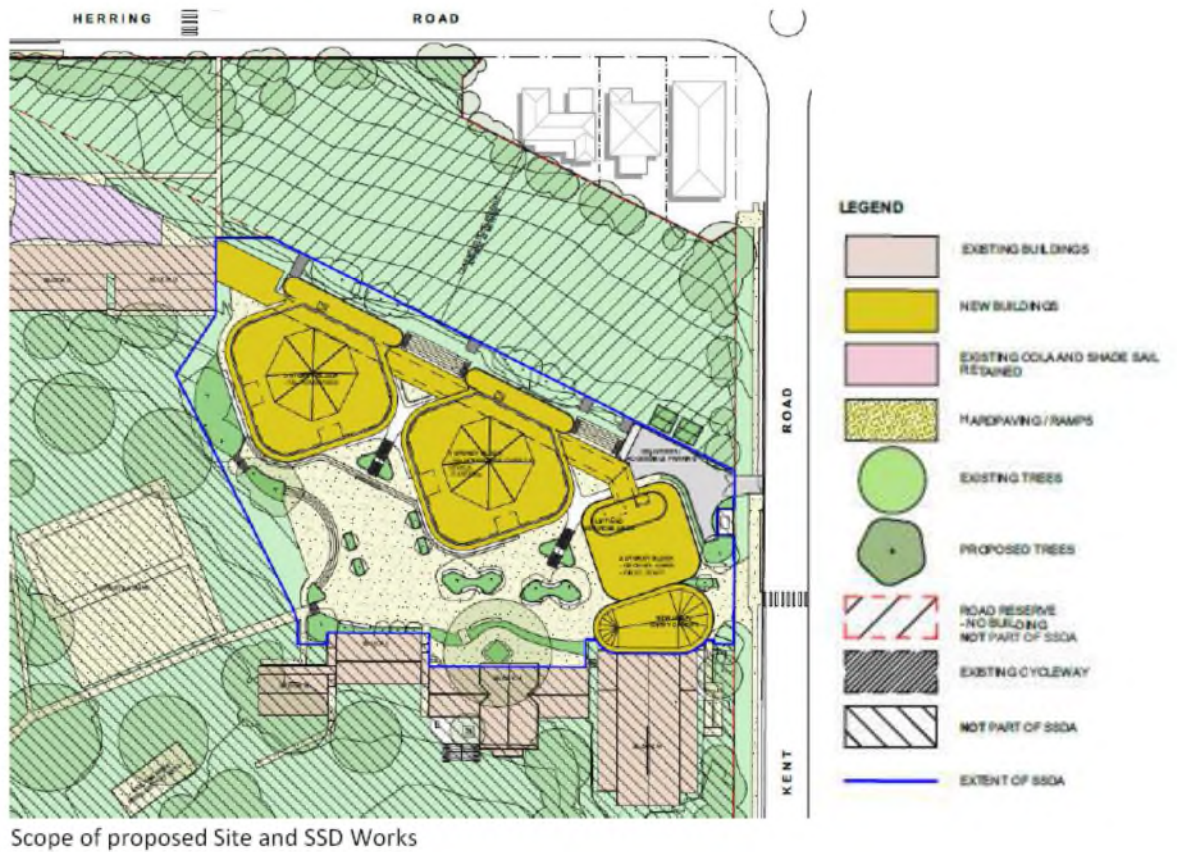


Figure 1: Site Location

2 WIND CLIMATE OF THE SYDNEY REGION

The Sydney region is governed by three principal wind directions, and these can potentially affect the subject redevelopment. 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 a detailed analysis undertaken by Windtech Consultants of recorded directional wind speeds obtained at the meteorological station located at Kingsford Smith Airport by the Bureau of Meteorology (recorded from 1995 to 2016). From this analysis, directional probabilities of exceedance and directional wind speeds for the region are determined. The directional wind speeds and corresponding directional frequencies of occurrence are presented in Figure 2.

As shown in Figure 2, the southerly winds are by far the most frequent wind for the Sydney region, and are also the strongest. The westerly winds occur most frequently during the winter season for the Sydney region, and 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. North-easterly winds occur most frequently during the warmer months of the year for the Sydney region, and hence are usually welcomed within outdoor areas since they are typically not as strong as the southerly or westerly winds.

Table 1: Principal Time of Occurrence of Winds for 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	

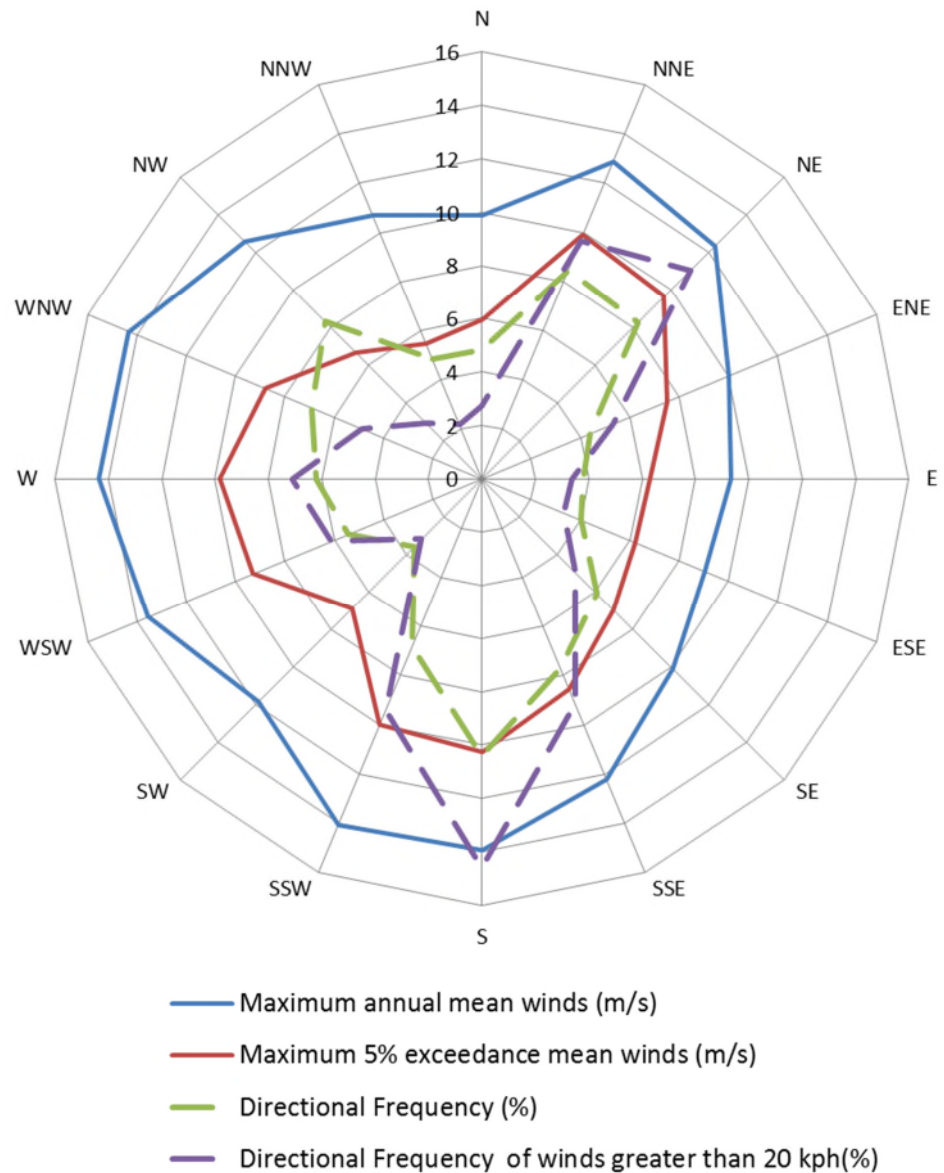


Figure 2: Annual and 5% Exceedance Hourly Mean Wind Speeds, and Frequencies of Occurrence, for the Sydney Region (referenced to 10m above ground in standard open terrain)

3 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. Various other researchers, such as A.G. Davenport, T.V. Lawson, W.H. Melbourne, and A.D. Penwarden, have published criteria for pedestrian comfort for pedestrians in outdoor spaces for various types of activities. Some Councils and Local Government Authorities have adopted elements of some of these into their planning control requirements in Australia.

For example, A.D. Penwarden (1973) developed a modified version of the Beaufort scale which describes the effects of various wind intensities on people. Table 2 presents the modified Beaufort scale. Note that the effects listed in this table refers to wind conditions occurring frequently over the averaging time (a probability of occurrence exceeding 5%). Higher ranges of wind speeds can be tolerated for rarer events.

Table 2: Summary of Wind Effects on People (A.D. Penwarden, 1973)

Type of Winds	Beaufort Number	Hourly Mean Wind Speed (m/s)	Effects
Calm	0	0 - 0.25	-
Calm, light air	1	0.25 - 1.55	No noticeable wind
Light breeze	2	1.55 - 3.35	Wind felt on face
Gentle breeze	3	3.35 - 5.45	Hair is disturbed, clothing flaps, newspapers difficult to read
Moderate breeze	4	5.45 - 7.95	Raises dust, dry soil and loose paper, hair disarranged
Fresh breeze	5	7.95 - 10.75	Force of wind felt on body, danger of stumbling
Strong breeze	6	10.75 - 13.85	Umbrellas used with difficulty, hair blown straight, difficult to walk steadily, wind noise on ears unpleasant
Near gale	7	13.85 - 17.15	Inconvenience felt when walking
Gale	8	17.15 - 20.75	Generally impedes progress, difficulty balancing in gusts
Strong gale	9	20.75 - 24.45	People blown over

It should be noted that wind speeds can only be accurately quantified with a wind tunnel study. This assessment addresses only the general wind effects and any localised effects that are identifiable by visual inspection and the acceptability of the conditions for outdoor areas are determined based on their intended use (rather than referencing specific wind speeds). Any recommendations in this report are made only in-principle and are based on our extensive experience in the study of wind environment effects.

4 RESULTS AND DISCUSSION

The expected wind conditions are discussed in the following sub-sections of this report for the various outdoor areas within and around the subject development for each of the three predominant wind directions for the Sydney region. The interaction between the wind and the building morphology in the area is considered and important features taken into account including the distances between the surrounding buildings and the proposed building form, their overall heights and bulk, as well as the surrounding landform. Note that only the potentially critical wind effects are discussed in this report.

4.1 Ground Level Trafficable Areas

The wind conditions on the pedestrian footpath along the Herring Road frontage of the site are expected to be similar to the existing wind conditions with the proposed removal of the demountable units adjacent to the Herring Road. This is due to the relative distance of the demountable units away from the pedestrian footpath and the existing trees along Herring Road ameliorating any potential increase in wind conditions from the southerly direction.

Upon completion of construction, the proposed removal of the demountable units along the Kent Road frontage of the site and inclusion of Blocks P, Q and R are not expected to adversely affect the existing wind conditions on the pedestrian footpath along Kent Road frontage of the site due to the separation distance and existing trees along the street frontage.

Blocks J and I, and the existing large tree are expected to be effective in stagnating direct southerly wind effects.

The removal of the demountable units to the west of Block H along the existing bitumen footpath is expected to exacerbate the existing wind conditions along the Kent Road footpath, as the demountable units were providing a shielding effect to these areas when the prevailing wind direction is located upstream of the units. However the wind conditions are expected to be suitable for pedestrian use due to the wind mitigation provided by the surrounding existing trees around the footpath, existing tennis court and existing mesh cricket areas. The inclusion of additional densely foliating vegetation such as trees or shrubs/hedge planting is expected to be effective in further enhancing the local wind conditions; in particular along the southern boundary of the property end.

The wind conditions within the majority of the outdoor trafficable areas around the proposed Blocks P, Q and R; including the amphitheatre, handball courts, new quadrangle and entry forecourt, are expected to be acceptable for its intended uses due to the shielding provided by subject buildings of the site and proposed and existing trees to be retained as indicated in the architectural drawings. Hence the proposed trees are recommended to be retained in the final design of the development. However, due to the removal of Block F, part of a separate planning pathway the main platform and the southern trafficable areas around Block P are potentially exposed to the direct southerly winds travelling over the open court areas and accelerating

flows around Block P. The proposed trees around the southern corner of Block P as indicated in the architectural drawings are expected to be effective in mitigating the corner accelerations, hence they are recommended to be retained. Furthermore, the covered walkway areas between Blocks P and Q are potentially exposed to the southerly winds funnelling in between the buildings. The inclusion of the proposed full-height impermeable screen along the northern perimeter edge of the proposed void; as indicated in the architectural drawing is expected to be effective in mitigating the potential funnelling wind effects within the exposed area of the covered walkway.

The wind conditions within the remaining outdoor trafficable areas of the site are expected to be similar to the existing site conditions as the proposed redevelopment is expected to have a negligible impact on these areas.

Note the proposed densely foliating vegetation is recommended to be of an evergreen species to ensure their effectiveness in wind mitigation throughout the year. The inclusion of additional wind mitigation elements such as and densely foliating vegetation such as trees or shrubs/hedge planting, baffle screens or pergolas within and around the subject development; particularly around areas intended for stationary activities such as the amphitheatre outdoor seating, is expected to be effective in further enhancing the localised wind conditions.

4.2 Level 1 and 2 Covered Walkways

The wind conditions on the majority of the Levels 1 and 2 covered walkways are expected to be acceptable for its intended uses due to the shielding provided by the subject buildings. The proposed balustrade and vertical fin elements are expected to be effective in further enhancing the local wind conditions on the covered walkways, hence they are recommended to be retained. The covered walkway between Blocks P and Q on Level 1 however may potentially be exposed to the prevailing southerly winds funnelling in between Blocks P and Q, and under the covered walkway above. The proposed full-height impermeable screen along the northern perimeter edge of the proposed void; as indicated in the architectural drawing, is expected to be effective in mitigating the potential funnelling wind effects within the exposed area of the covered walkway.

4.3 Level 1 and 2 Passive Outdoor Areas

The wind conditions within the various passive outdoor areas on Levels 1 and 2 are expected to be acceptable for its intended uses due to the shielding provided by the subject buildings and the recessed design of the passive outdoor areas into the overall building footprint that is effective in stagnating direct and side-stream wind effects. The proposed balustrade along the exposed perimeter edges is expected to be effective in further enhancing the local wind conditions, hence they are recommended to be retained.