



NEW ULTIMO PYRMONT PUBLIC SCHOOL PEDESTRIAN WIND ENVIRONMENT STATEMENT

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School Infrastructure NSW

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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

This report is in relation to the proposed redevelopment of the New Ultimo Pyrmont Public School, located at Quarry Street, Ultimo, and presents an opinion on the likely impact of the proposed design on the local wind environment affecting the trafficable 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 north-easterly, 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 latest architectural drawings. 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 that the site benefits from the shielding provided by the neighbouring buildings to the north, east and south, and from the large densely foliating trees lining the surrounding footpaths and located within the park further to the west of the site. The addition of scattered landscaping features (ie: shrubs, planter boxes, etc) across the larger breakout areas on Level 3 of the development could be utilised to further enhance wind conditions on those areas. Hence, with the development as proposed, it is expected that no adverse wind conditions will be experienced within the various trafficable outdoor areas within and around the development site, and that wind conditions will be suitable for the intended uses of those areas.

1 DESCRIPTION OF THE DEVELOPMENT AND SURROUNDINGS

The development site is located at Quarry Street, Ultimo, and is bounded by Quarry Street to the north, Jones Street to the east, and Wattle Street to the west. The land topography across the site rises from Wattle Street to Jones Street, with Jones Street being approximately 5 storeys higher than Wattle Street. The majority of the nearby surrounding buildings are medium-rise. The neighbouring building to the north, on the northern side of Quarry Street, has a height ranging from approximately 3 to 7 storeys above ground. On the eastern side of Jones Street are buildings ranging between 4 and 5 storeys above ground, and so the south of the development site is a residential building complex ranging in height from approximately 4 to 9 storeys above ground. To the west of the site is open parklands, although large densely foliating trees line the western side of Wattle Street, as well as several more large trees scattered across the parkland.

The proposed development is for the Ultimo Pyrmont Public School, and will contain classrooms, common areas, a library, etc. The development will have a height of 6 storeys at the Wattle Street end of the site, but due to the topography across the site the height of the development will be just 1 storey above Jones Street. The development features two wide corridors cut through the development, which allows for natural light and airflow through the development. The two open corridors through the development are parallel with Wattle Street, and open voids are included within the open corridors to allow natural light and airflow to reach the lower levels. Pathways and breakout areas are proposed adjacent to these open voids on the Ground Level and on Levels 1, 2 and 3. A basketball/netball court is proposed on the western side of the development, on Level 3, approximately 3 storeys above Wattle Street. A large outdoor space is proposed across the northern end of the site on Level 4 (overlooking Quarry Street), although this will be covered by the roof above (it is a Covered Outdoor Learning Area; COLA). A childcare centre is proposed on the eastern side of the site as part of the development on Level 4, adjacent to Jones Street, and an outdoor play area is proposed adjacent to the childcare centre.

The critical outdoor 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 footpaths along Quarry Street, Jones Street and Wattle Street.
- The various trafficable pathways and breakout areas associated with the development on the Ground Level, and on Levels 1, 2 and 3.
- The basketball/netball court on the western side of Level 3.
- The COLA on Level 4.
- The childcare centre outdoor area, at the eastern end of the site on Level 4.

2 WIND CLIMATE OF THE SYDNEY REGION

The Sydney region is governed by three principal 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 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, a directional plot of the annual and weekly recurrence winds for the Sydney region is also determined, as shown in Figure 1. The frequency of occurrence of these winds is also shown in Figure 1.

Although there is a meteorological recording station located at the nearby Bankstown Airport, the extent of data available from that station is not as extensive compared to the data from Kingsford Smith Airport. Furthermore, an investigation of the recorded data from Bankstown Airport indicates that similar trends are observed compared with Kingsford Smith Airport. Hence it is suitable for this assessment to utilise regional wind climate trends obtained from Kingsford Smith Airport.

As shown in Figure 1, 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

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	

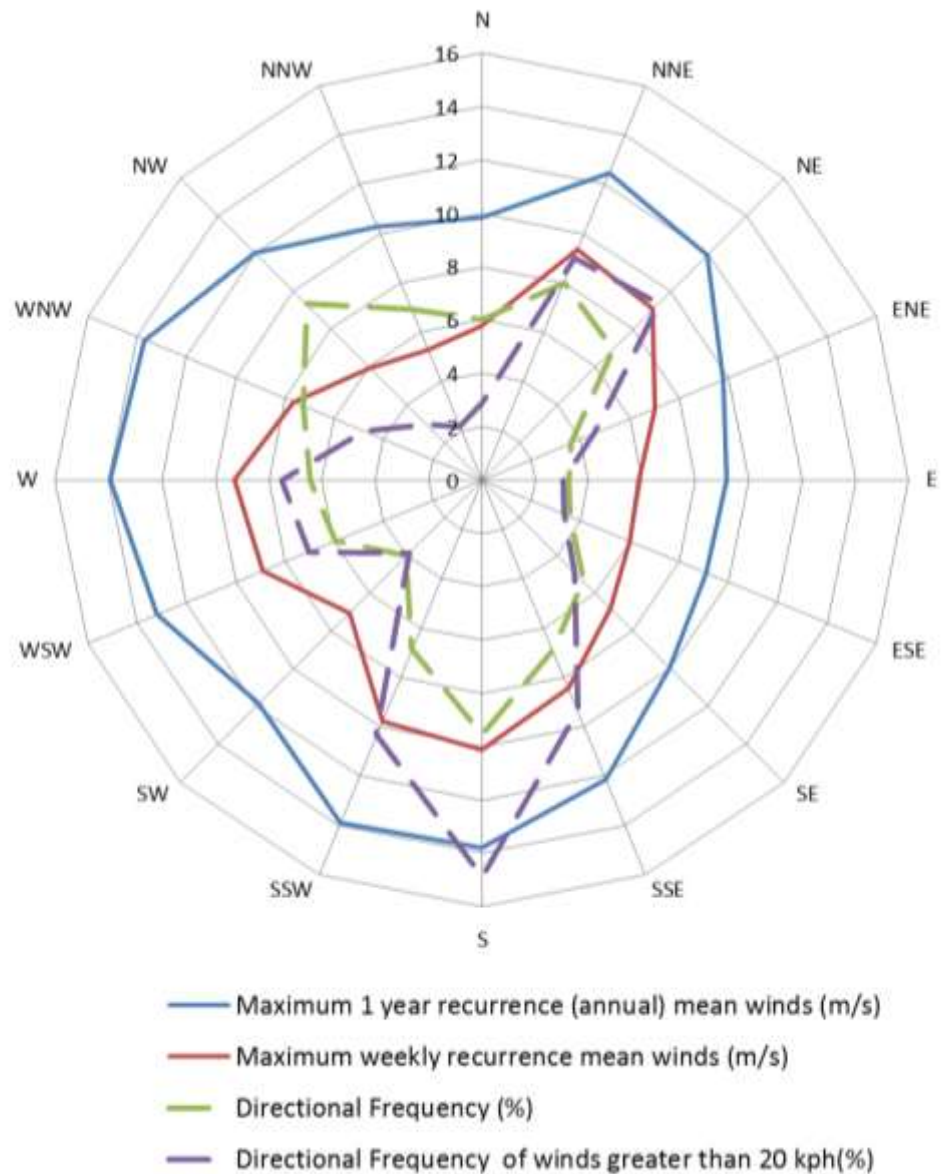


Figure 1: Annual and Weekly Recurrence Mean Wind Speeds, and Frequencies of Occurrence, for the Sydney Region (based on 10-minute mean observations from Kingsford Smith Airport from 1995 to 2016, corrected to open terrain at 10m)

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 Davenport, Lawson, Melbourne, Penwarden, etc, 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.

The following table is an example, which was developed by Penwarden in 1975, and 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 (Penwarden, 1975)

Type of Winds	Mean Wind 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.

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 trafficable 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 include 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 Pedestrian Footpaths along Quarry Street, Jones Street and Wattle Street

Due to the alignment of Quarry Street, the pedestrian footpath along Quarry Street is exposed to north-easterly and westerly winds which will tend to flow along the street. Similarly, due to the alignment of Jones Street and Wattle Street, the pedestrian footpaths along those streets are exposed to southerly winds which will tend to flow along these streets. However, it should be noted that these are existing effects of the site, and it is not expected that the construction of the proposed development will adversely affect the wind conditions along these pedestrian footpaths. The large densely foliating trees which line these footpaths are highly effective in providing shielding from strong winds. Additionally, the nearby buildings, particularly the building on the northern side of Quarry Street, on the eastern side of Jones Street, and the residential complex to the south of the subject development, will be effective in providing shielding to the subject development from the prevailing winds.

Hence with the inclusion of the subject development it is expected that suitable wind conditions will be experienced by pedestrians along the pedestrian footpaths surrounding the site. Furthermore, it is not expected that the subject development will cause any adverse wind effects to the local surrounding area.

4.2 Trafficable Pathways and Breakout Areas of the Development

The trafficable pathways and breakout areas of the development, located on the Ground Level and on Levels 1, 2 and 3, are mostly well shielded from the prevailing regional winds by the built form of the development itself, the neighbouring buildings to the north, east and south, and the large densely foliating trees to the west of the site. The larger breakout areas on Level 3 of the development may still be exposed to the westerly winds, even with the shielding provided by the tree foliage of the large trees to the west, and scattered landscaping features (ie: shrubs, planter boxes, etc) across those large breakout areas could be effective at providing a localised ameliorating effect if required.

4.3 Basketball/Netball Court on Level 3

The basketball/netball court on the western side of Level 3 is well shielded from the north-easterly winds by the subject development itself and the neighbouring building on the northern side of Quarry Street. Similarly, the neighbouring residential complex to the south provides shielding from the southerly winds, and the large trees along the western side of Wattle Street will provide shielding from the westerly winds. Hence suitable wind conditions are expected to be achieved on the basketball/netball court on Level 3.

4.4 Covered Outdoor Learning Area (COLA) on Level 4

The COLA on Level 4 will be mostly shielded from the prevailing westerly winds by the Communal Hall at the western end of the COLA, and will be well shielded by the neighbouring building to the north from the north-easterly winds. When the prevailing wind is from the south, the COLA will benefit from the combined effect of shielding from the residential complex neighbouring the development site to the south, and the stagnating effect of the neighbouring building to the north combined with the COLA roof is expected to encourage the southerly winds to flow over the roof rather than under. Hence it is expected that suitable wind conditions will be experienced within the COLA on Level 4.

4.5 Childcare Outdoor Area on Level 4

The childcare outdoor area of the development is well shielded from the prevailing winds. The built form of the childcare centre, and the overhang of the roof above, will protect the outdoor area of the childcare centre from the north-easterly winds. The southerly winds will be shielded by the built form of the infant play room on the southern side of this outdoor area, and by the residential complex neighbouring the site to the south. The westerly winds will be partially shielded by the large trees to the west of the site, and the stagnating effect of the combination of the built form of the childcare centre and the overhang of the roof above. Hence it is expected that suitable wind conditions will be experienced within the outdoor area of the childcare centre on Level 4 of the development.

4.6 Outdoor Areas of the Adjacent Buildings

Surrounding the school are a number of residential buildings with outdoor private and communal spaces, as such consideration has been made of the potential impact of the redevelopment of the school on these conditions experienced by the residents. It is noted that the built form of the proposed redevelopment will result in wind conditions for the surrounding areas expected to be similar to the existing wind conditions.