



WIND ENVIRONMENT ASSESSMENT
MOLECULAR AND LIFE SCIENCES BUILDING, UNIVERSITY
OF WOLLONGONG

WD486-01F02(REV2)- 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 development known as the Molecular and Life Sciences Building located in Wollongong, 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 subject development. The effect of wind activity is examined for the principal wind directions for the Wollongong region; the north-easterly and south-easterly 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 architects Jacobs and Denton Corker Marshall, received March, 2017. 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 suitable wind conditions are expected to be experienced along the various ground level pedestrian footpaths and within the Level 2 communal terrace along the eastern aspect of the South Wing. These outdoor trafficable areas benefits from the shielding provided by the numerous surrounding buildings and the inclusion of the existing and proposed densely foliating trees as indicated in the landscape drawing set and proposed balustrade along the Level 2 communal terrace. Hence these design elements are recommended to be retained in the final design of the development.

However the covered rainforest garden located along the eastern aspect of the North Wing is potentially exposed to a combination of direct and down-washing wind effects off the building façade. It is expected that suitable wind conditions can be achieved for all outdoor trafficable areas within and around the site with the inclusion of the following treatments outlined in this report and summarised as follows:

Ground level areas:

- The retention of the proposed densely foliating landscape scheme. The proposed planting along the southern boundary of the covered rainforest landscape area and along the north-eastern corner of the south MLS building is recommended to be populated with densely foliating vegetation such as shrubs/hedge planting.

Level 2 Communal Terrace:

- The retention of the proposed balustrades along the terrace perimeter edge.

With the inclusion of the abovementioned recommendations within the final design, it is expected the wind conditions for the various outdoor trafficable within and around the subject development to be acceptable for its intended uses.

1 DESCRIPTION OF THE DEVELOPMENT AND SURROUNDINGS

The proposed development site is located along the northern boundary of the main campus of the University and is bounded by Building 32 Illawarra Health and Medical Research Institute (IHMRI) to the north, Building 43 Science Teaching Facility (STF) to the east, Building 42 (The Sciences Annex) and Science Road to the south and Building 41 (Faculty of Science, Medicine & Health) to the west. Further away from the site to the north is the low-rise University Recreation and Aquatic Centre and its associated recreation playing fields such tennis courts and open ovals. Towards the east is the open playing field of Oval No.2 with the low to mid-rise university buildings of the campus along the remaining boundaries. Further away from the site is Mount Keira towards the east with private residential properties and open fields along the remaining boundaries. A survey of the local land topography indicates a general rise from east to west towards Mount Keira. An aerial image of the site and the surroundings is shown in Figure 1.

The proposed development consists of a five storey high; plus double height plant room, building for the Molecular and Life Sciences facility that will be located atop of the existing Ovals car park and Building 42 (to be demolished). 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:

- Pedestrian footpaths around the site.
- The covered rainforest garden.
- The external informal learning terrace.
- The Level 2 outdoor terrace along the eastern aspect of the South Wing.

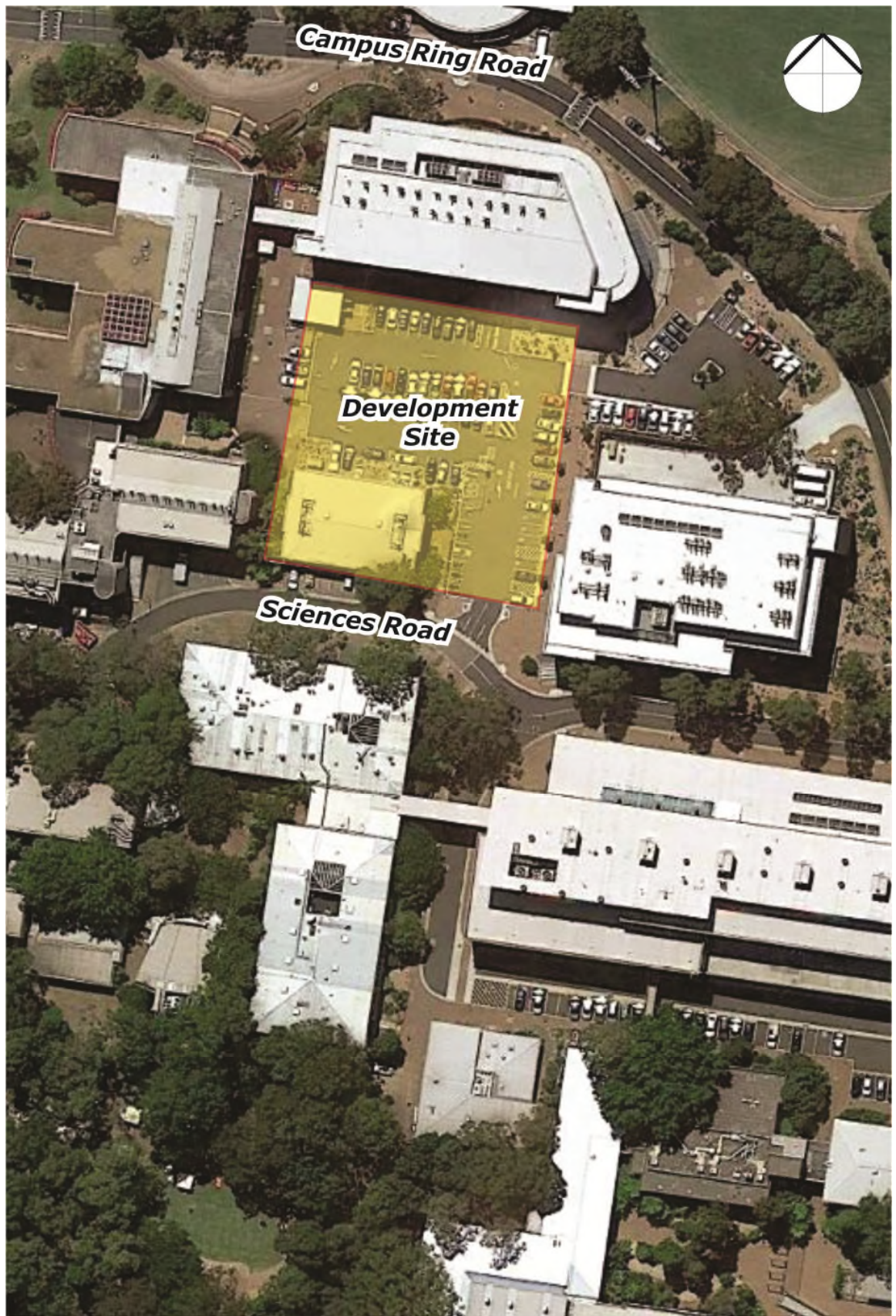


Figure 1: Aerial Image of the Site Location

2 WIND CLIMATE OF THE WOLLONGONG REGION

The Wollongong 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 directional plot of the annual and weekly recurrence winds for the Wollongong region is shown in Figure 2. The frequency of occurrence of these winds is also shown in this figure. This plot has been produced based on an analysis of recorded wind speed data obtained from Automatic Weather Station located at Bellambi Point, located approximately 7.5km north of the town centre of Wollongong, between 1989 and 2011.

As shown in Figure 2 of this report, the most frequently occurring winds for the region are the southerly winds, followed by the north-easterly and westerly winds. The westerly winds are the strongest for the region and prevail during the winter months whilst the north-easterly and southerly winds generally occur during the summer months.

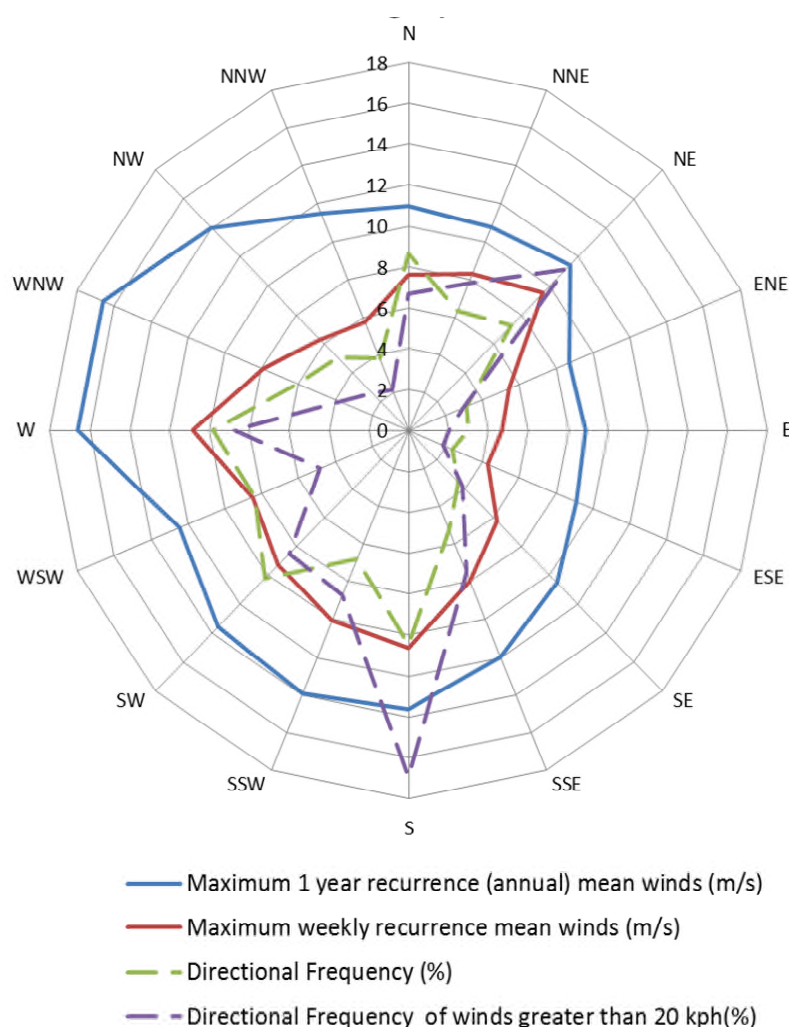


Figure 2: Annual and Weekly Recurrence Mean Wind Speeds, and Frequencies of Occurrence, for the Wollongong Region (based on 10 minute mean observations from Bellambi from 1989 to 2011, corrected to open terrain at a reference height of 10m)

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 A.G. Davenport, T.V. Lawson, W.H. Melbourne, A.D. 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 A.D. 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 (A.D. 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 outdoor areas within and around the subject development for each of the three predominant wind directions for the Wollongong region. The interaction between the wind and the building morphology in the area was considered, and important features taken into account include the distances between the proposed building form, their overall heights and bulk, as well as the landform. Note that only the potentially critical wind effects are discussed in this report.

4.1 Ground Level Pedestrian Footpaths

The wind conditions along the various footpaths surrounding the subject development are expected to be acceptable for its intended uses due to the shielding provided by the surrounding buildings and the existing and proposed densely foliating trees as indicated in the landscape drawing set. Hence the landscape scheme is recommended to be retained in the final design of the development.

4.2 Ground Level Covered Pedestrian Footpath and Rainforest Garden

The covered pedestrian footpath and rainforest garden located along the eastern aspect of the North Wing benefits from the shielding provided by the surrounding buildings to the prevailing westerly winds. The covered rainforest garden is potentially exposed to the direct north-easterly winds and the southerly winds travelling along the existing car park and Entry Square respectively. Furthermore the rainforest garden is potentially exposed to down-washing wind effects captured off the southern building façade above the rainforest garden. It is expected the retention of the proposed densely foliating landscape scheme to be effective in enhancing the wind conditions within the covered areas. The proposed planting along the southern boundary of the covered rainforest garden is recommended to be populated with densely foliating vegetation such as shrubs/hedge planting to mitigate the potential direct ground level wind effects into the landscape area.

4.3 Ground Level Outdoor Informal Learning Terrace

The outdoor informal learning terrace located at the centre of the site benefits from the shielding provided by the subject and surrounding buildings to the prevailing westerly winds. The inclusion of the proposed densely foliating landscape scheme is expected to be effective in further enhancing the wind conditions within the terrace area. The proposed planter located along the north-eastern corner of the South MLS building is recommended to be populated with densely foliating vegetation such as shrubs/hedge planting to be effective in ameliorating the potential accelerating flows around the corner of the building.

4.4 Level 2 Communal Outdoor Terrace

The wind conditions within the communal outdoor terrace along the eastern aspect of the South Wing is expected to be acceptable for its intended uses due to the shielding provided by the subject and surrounding building to the prevailing winds. The inclusion of the proposed balustrade along the perimeter edge is expected to be effective in enhancing the local wind conditions, hence it is recommended to be retained in the final design of the development.