PEDESTRIAN WIND ENVIRONMENT STATEMENT

TOWERS C & F, 23 BENNELONG PARKWAY, WENTWORTH POINT

W382-61F03(REV1)- WS REPORT

MARCH 25, 2020

Prepared for:

Wentworth Point 1 Pty Ltd

Suite 802, 117 York Street,
Sydney NSW 2000

WINDTECH Consultants Pty Ltd
Head Office: 607 Forest Road, Bexley, NSW 2207, Australia
P +61 2 9503 0300 **E** reception@windtechglobal.com **W** www.windtechconsult.com

Sydney | Dubai | London | Melbourne | Mumbai | New York | Hong Kong | Singapore

DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
March 24, 2020	Initial.	0	PT	SWR	HK
March 25, 2020	Inclusion of Building F Level 09 Treatment Recommendations	1	PT	SWR	HK

EXECUTIVE SUMMARY

This report is in relation to Towers C and F of the proposed development located at 23 Bennelong Parkway, Wentworth Point, 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 Bankstown region; namely the north-easterly, south to south-easterly 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 was 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 subject development is relatively exposed to the three prevailing wind directions affecting the site. As a result, there is a possible impact on the wind comfort at the communal open space to the north-east of Tower C. Impacts on wind comfort will also be felt around the lobby of Tower F and at the communal open space to the south-east of Tower F. It is expected that the wind effects identified in the report can be ameliorated with the consideration of the following treatment strategies into the design of the development:

Tower C

- The inclusion of 1.5 metre high impermeable balustrades along the eastern edges of the private balconies on Level 16, and standard height impermeable balustrades for the remaining edges.
- The inclusion of an impermeable screen of at least 2m height at the edge of the communal area between Tower B and Tower C.
- The retention of the proposed trees to the south of the building. The trees should be of a densely foliating evergreen species.

Tower F

- The inclusion of an awning above the Ground Level Lobby, protruding at least 2 metres outward from the main building façade, be installed at the height of the Level 01 slab.
- The inclusion of an impermeable screen of at least 2m height at the edge of the communal area between Tower F and Tower G.

- The retention of the proposed trees to the north of the building. The trees should be of a densely foliating evergreen species.
- The inclusion of 1.5 metre high impermeable balustrades on the eastern and western aspects of the outdoor section of the Sky Club on the northern side of the development on Level 09.

With the inclusion of the abovementioned treatments, it is expected that adequate wind conditions will be achieved for all outdoor trafficable areas within and around the site. Furthermore, the development is not expected to have any adverse impact onto the wind conditions for the local surrounding area.

CONTENTS

1 INTRODUCTION

An opinion on the likely impact of the proposed design on the local wind environment affecting pedestrians within the critical outdoor areas within and around the subject development is presented in this report. The analysis of wind effects relating to the proposed development was carried out in the context of the predominant wind directions for the region, building morphology of the development and nearby buildings, and local land topography. The conclusions of this report are drawn from our extensive experience in the field of wind engineering and studies of wind environment effects.

No wind tunnel testing was undertaken for this assessment. Hence this report addresses only the general wind effects and any localised effects that are identifiable by visual inspection, and any recommendations in this report are made only in-principle.

2 DESCRIPTION OF THE DEVELOPMENT AND SURROUNDINGS

The development site, which is known as Bay Park, is located at 23 Bennelong Parkway in Wentworth Point, which is within the Homebush Bay district and consists of 9 residential buildings. The site is bounded by Bennelong Parkway from the south-west to the north-west, Stromboli Straight to the north-east and The Piazza to the south-east. In addition, Amalfi Drive cuts through the site, thus separating it into two sections.

The local land topography is relatively flat around the site, although the Bennelong Parkway ground level is one storey lower than the Amalfi Drive ground level. Directly adjacent to the north-east through to the south-east of the proposed site are many residential buildings that vary in height up to 8 stories. The north-west through to south-west directions upstream of the site are generally open field areas. An aerial photograph of the local precinct is given in Figure 1, below.

The following outdoor trafficable areas within and around Tower C and Tower F have been considered in this report:

- The various private balconies of Tower C and Tower F
- The Tower C Communal Open Space on Level 01
- The Tower F Entrance Lobby
- The Tower F Communal Open Space on Level 01
- The Tower Sky Club on Level 09.

Figure 1: Aerial Image of the Site Location

3 REGIONAL WIND

The Bankstown region is governed by three principal wind directions, and these can potentially affect the subject development. These winds prevail from the north-east, south to south-east and west. These wind directions were determined from an analysis undertaken by Windtech Consultants of recorded directional wind speeds obtained at the meteorological station located at Bankstown Airport by the Bureau of Meteorology. The data has been collected from this station from 1993 to 2016 and corrected to represent the winds over a standard open terrain at a height of 10m above ground level. Figure 2 shows a summary of this analysis in the form of a directional plot of the annual and 5% exceedance mean winds for the Bankstown region. The frequency of occurrence of these winds is also shown in Figure 2.

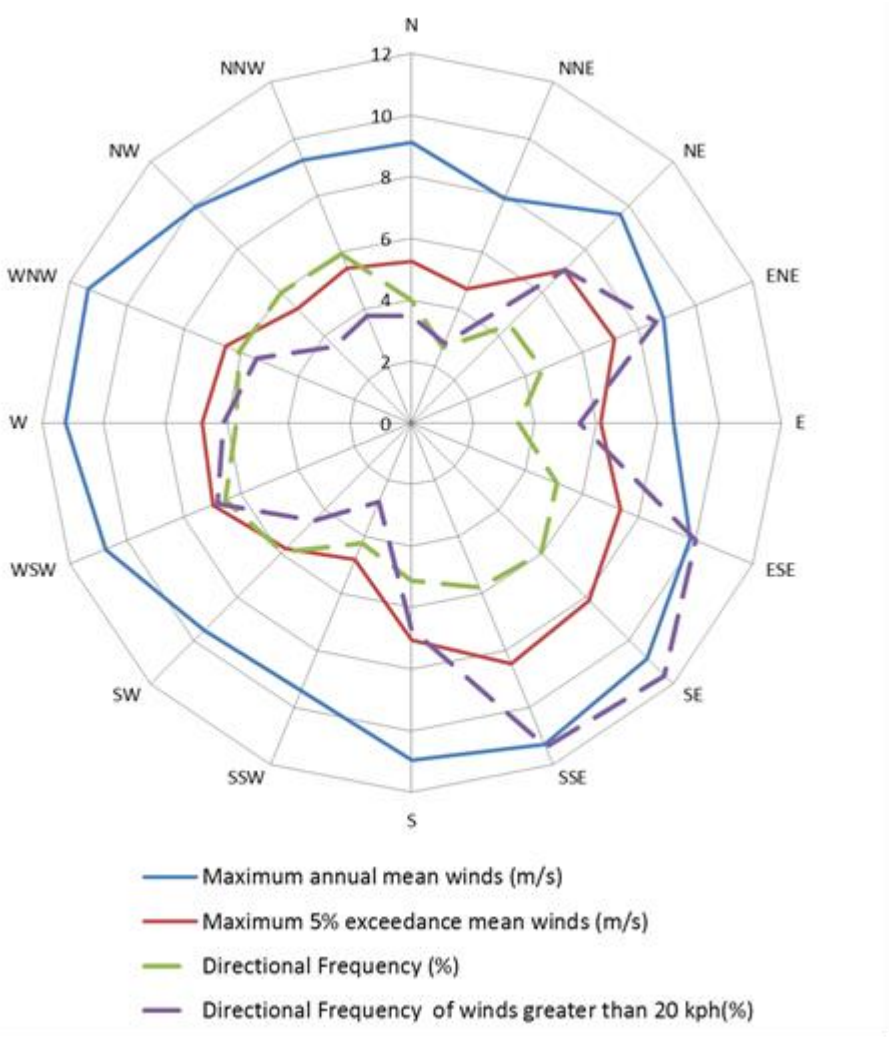

Figure 2: Annual and 5% Exceedance Hourly Mean Wind Speeds, and Frequencies of Occurrence, for the Bankstown Region (Observations from Bankstown Airport from 1993 to 2016, corrected to open terrain at 10m)

4 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.

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 1 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 1: Summary of Wind Effects on People (A.D. Penwarden, 1973)

Type of Winds	Beaufort Number	Mean Wind Speed (m/s)	Effects
Calm	0	Less than 0.3	Negligible.
Calm, light air	1	0.3 – 1.6	No noticeable wind.
Light breeze	2	1.6 – 3.4	Wind felt on face.
Gentle breeze	3	3.4 – 5.5	Hair is disturbed, clothing flaps, newspapers difficult to read.
Moderate breeze	4	5.5 – 8.0	Raises dust, dry soil and loose paper, hair disarranged.
Fresh breeze	5	8.0 – 10.8	Force of wind felt on body, danger of stumbling
Strong breeze	6	10.8 – 13.9	Umbrellas used with difficulty, hair blown straight, difficult to walk steadily, wind noise on ears unpleasant.
Near gale	7	13.9 – 17.2	Inconvenience felt when walking.
Gale	8	17.2 – 20.8	Generally impedes progress, difficulty balancing in gusts.
Strong gale	9	Greater than 20.8	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. Any recommendations in this report are made only in-principle and are based on our extensive experience in the study of wind environment effects.

5 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. 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, as well as the surrounding landform. Note that only the potentially critical wind effects are discussed in this report.

The ground plane will be used primarily for circulation. However there are potential seating areas such as in the communal open spaces. The recommended criterion for wind conditions for the circulation area is 7.5m/s with a 5% probability of exceedance, whereas the proposed seating areas will need to satisfy a more stringent comfort criterion of 5.5m/s with a 5% probability of exceedance. Although this assessment is of a qualitative nature, the abovementioned criteria are considered when assessing the wind environment impacts.

5.1 Private Balconies

Wind conditions for the majority of private balconies of the building are expected to be suitable for their intended uses due to the shielding provided by the subject development and the effective use of wind mitigating devices such as recessing the private balcony areas into the building form and the inclusion of blade walls. However, the private balconies on Level 16 are exposed to the north-easterly, south to south-easterly and westerly winds. It is therefore recommended that 1.5 metre high impermeable balustrades be installed along the eastern edges of the balconies, as shown in Figure 3. It is also recommended that the remaining balcony edges on Level 16 be fitted with standard height impermeable balustrades.

Note the use of loose glass-tops, light-weight sheets or covers (including loose BBQ lids) is not appropriate on the high level private balconies. Furthermore, lightweight furniture is not recommended unless it is securely attached to the terrace floor slab.

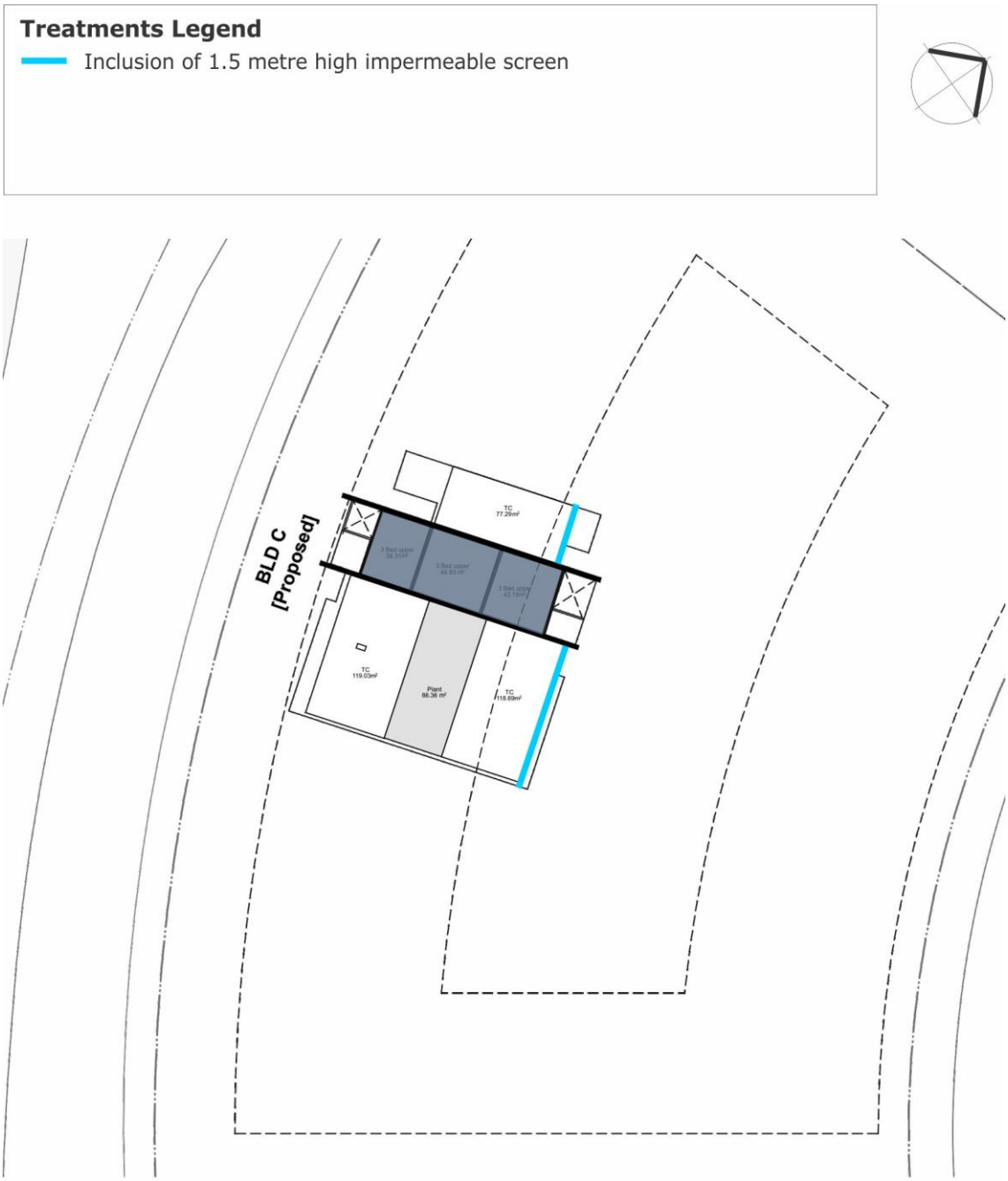

Figure 3 – Suggested Treatments for the Private Terraces on Level 16 of Tower C

5.2 Tower C Level 01 Communal Open Space

The Tower C communal open space is exposed to north-easterly winds washing down from the façade of the building before acceleration around the south-eastern corner of the building. It is also exposed to westerly winds funnelling between Tower B and Tower C. It is recommended that an impermeable screen of at least 2m height be installed between Towers B and C, and that the proposed trees to the south of Tower C be retained in the final design, as shown in Figure 4. The trees should be of a densely foliating evergreen species.

Figure 4 – Suggested Treatments for the Tower C Communal Open Space

5.3 Tower F Lobby Entrance Area and Level 01 Communal Open Space

The area around the entrance lobby to Tower F is anticipated to be subject to adverse wind conditions. This will be caused by both downwash from the building and side streaming along the façade due to the westerly prevailing winds. This will be further exacerbated by the proposed building overhang of this area from Level 02 upwards. It is proposed that an awning, protruding at least 2 metres outward from the main building façade, be installed at the height of the Level 01 slab, which will work in conjunction with the trees to the north of the building to deflect and decelerate the abovementioned winds, as shown in Figure 5. Therefore, it is recommended to retain the trees, which should be of a densely foliating evergreen species.

The Tower F communal open space is exposed to south to south-easterly winds downwashing from the façade of the building before accelerating around the north-eastern corner of the building. It is recommended that an impermeable screen of at least 2 metres height be installed between buildings F and G, and that the proposed trees to the north of Tower F be retained in the final design, as shown in Figure 5. The trees should be of a densely foliating evergreen species.

Figure 5 – Suggested Treatments for the Tower F Lobby Entrance Area and Communal Open Space

5.4 Tower F Level 09 Sky Club

The outdoor portion of the Sky Club that is located on the northern side of the development is relatively exposed and is expected to experience strong wind conditions. This is due to the prevailing north-easterly and westerly winds directly impacting this area. It is recommended to include 1.5 metre high impermeable balustrades along the eastern and western aspects of this area, as shown in Figure 6.

Figure 6 – Suggested Treatments for the Tower F Level 09 Sky Club

6 REFERENCES

Davenport, A.G., 1972, "An approach to human comfort criteria for environmental conditions". Colloquium on Building Climatology, Stockholm.

Lawson, T.V., 1973, "The wind environment of buildings: a logical approach to the establishment of criteria". Bristol University, Department of Aeronautical Engineering.

Lawson, T.V., 1975, "The determination of the wind environment of a building complex before construction". Bristol University, Department of Aeronautical Engineering.

Lawson, T.V., 1980, "Wind Effects on Buildings - Volume 1, Design Applications". Applied Science Publishers Ltd, Ripple Road, Barking, Essex, England.

Melbourne, W.H., 1978, "Criteria for Environmental Wind Conditions". *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 3, pp241-249.

Penwarden, A.D. (1973). "Acceptable Wind Speeds in Towns", Building Science, vol. 8: pp259–267.

Penwarden, A.D., Wise A.F.E., 1975, "Wind Environment Around Buildings". Building Research Establishment Report, London.