

**THE GLEN REDEVELOPMENT
GLEN WAVERLEY**

DESKTOP ENVIRONMENTAL WIND ASSESSMENT

by
M. Eaddy
and
W. H. Melbourne

CONTENTS

1.	Introduction	3
2.	Assessment Criteria	5
3.	Wind Environment and Exposure	6
4.	Wind Assessment.....	7
4.1.	Kingsway Axial Building	7
4.2.	Urban Building	8
4.3.	Signature Tower.....	9
5.	Conclusions	11

1. INTRODUCTION

The Glen Shopping Centre is located in eastern suburbs of Melbourne and is proposed to undergo a redevelopment to increase the retail tenancy area and construct three residential apartment towers at the south end of the site. The changes to the shopping centre will be the addition of retail tenancies on the existing car park along Springvale Road that will be the same height as the existing shopping centre. From an environmental wind perspective the changes to the low rise retail area along Springvale Road would not be of concern. Therefore, this desktop environmental wind assessment will focus on the residential apartment buildings/Tower at the south end of the site. Figure 2 shows an image of the three residential towers at the south end of the site. The residential buildings are as follows:

Kingsway Axial Building (8 to 12 Levels)

Urban Building (8 Levels)

Signature Tower (19 Levels)

This desktop environmental wind assessment will be based on the town planning drawings by NH Architecture dated January, 2015.

The Glen Waverley shopping precinct has a number of potential and approved future developments that are to the south of The Glen Shopping Centre. This desktop environmental wind assessment will only consider the existing building forms surrounding The Glen Shopping Centre as our experience is often the permitted developments change before they are built. We understand a high-rise building development has recently been approved on O'Sullivan Road. The effect of this future building on the proposed The Glen redevelopment would be assessed separately once an understanding of the built form and wind mitigation strategies that are to be incorporated into this development are obtained.



Figure 1: The Glen Shopping Centre



Figure 2: The three proposed residential towers at The Glen Shopping Centre

2. ASSESSMENT CRITERIA

This desktop assessment of the environmental wind conditions will be based on the following criteria:

In main public access-ways wind conditions are considered

- (a) unacceptable if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector exceeds 23ms⁻¹ (the gust wind speed at which people begin to get blown over);
- (b) generally acceptable for walking in waterfront locations if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector does not exceed 20 ms⁻¹ (which results in 83% of the wind pressure of a 23 ms⁻¹ gust).
- (c) generally acceptable for walking in urban and suburban areas if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector does not exceed 16 ms⁻¹ (which results in half the wind pressure of a 23 ms⁻¹ gust).

For more recreational activities wind conditions are considered

- (d) generally acceptable for stationary short exposure activities (window shopping, standing or sitting in plazas) if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector does not exceed 13 ms⁻¹;
- (e) generally acceptable for stationary long exposure activities (outdoor restaurants, theatres) if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector does not exceed 10 ms⁻¹.

The probability of exceedence of 0.1% relates approximately to the annual maximum mean wind speed occurrence for each wind direction sector.

3. WIND ENVIRONMENT AND EXPOSURE

The strongest and most frequent winds in the Melbourne Region come from the north and west sectors with secondary strong winds coming from the south sector; east sector winds are relatively light and infrequent.

The wind approaches The Glen Shopping Centre over suburban housing for all wind directions and with some elevation for the north-easterly wind directions. The exposure to direct wind flow for the low-rise shopping centre buildings would not be expected to be significantly different to the existing buildings. However, the multi-level residential apartment buildings would be exposed to direct wind flow for the full height for all wind directions.

4. WIND ASSESSMENT

4.1. Kingsway Axial Building

The Kingsway Axial Building will be located on the west side of the site orientated with the wide faces towards the east and west, and the narrow faces towards the north and south. The north and south faces of the building have the roof of the shopping centre and a podium element below them respectively. These features would be expected to deflect any additional wind flow induced towards lower levels by these building faces above pedestrian level. The east face of the building would be exposed to the relatively light and infrequent easterly wind directions and would not be expected to induce any significant additional wind flow towards lower levels.

The west face would be exposed to the strong westerly wind directions and would be expected to induce significant additional wind flow towards lower levels. The design of the building has incorporated a set-back at the south end of the west face, for approximately a third of the face, and no set-back for the remaining width of the face. Therefore, the wind induced towards lower levels would reach pedestrian level in Sneddon Drive and would be expected to flow south towards the Town Square. This wind flow would be expected to combine with the wind flow induced into the Town Square by the Urban Building and this will be discussed in Section 4.2. The wind conditions along the west face would be expected to achieve the criterion for walking comfort and increase to be above the criterion at the southwest corner of the Kingsway Building. The wind conditions in the Town Square away from the southwest corner would be expected to achieve the criterion of walking comfort with the proposed trees. It should be noted that wind conditions achieving the criterion for walking would be well above the conditions suitable for short or long term stationary activities.

Potential wind mitigation strategies for the Kingsway Axial Building would be to continue the set-back at the south end of the west face for the entire length of the face, planting of large mature evergreen street trees with canopy density of at least 80% (solid area) along the length of the west face, creating venting through the building at lower levels, or

making the built form more aerodynamic. The effectiveness of these mitigation strategies would need to be quantified by wind tunnel model measurements.

4.2. Urban Building

The Urban Building would have similar exposure to the Kingsway Axial Building, but with increased shielding from the easterly wind directions provided by the Signature Tower. Any wind flow deflected by the north and east faces towards lower levels would be expected to be deflected over the roof of the low-rise shopping centre buildings. However, the close proximity of the Urban Building to the Kingsway Axial Building could cause the northerly wind flow to be accelerated between the buildings and into the Town Square and entrance area of the shopping centre. It is difficult to conclusively assess the wind conditions in the entrance area and Town Square due to the interaction of the buildings, but there would be some expectation that wind conditions would be around, but above, the criterion for walking comfort for the northerly wind directions. If necessary, these conditions may be mitigated by a canopy over the area or large dense tree planting.

The west face, much like the west face of the Kingsway Axial Building, would be exposed to direct wind flow from the westerly wind directions. The exposure would be expected to induce additional wind flow towards lower levels and into the Town Square. The design has canopies along the west face but these would not be expected to deflect enough of the additional wind flow above pedestrian level. As mentioned in Section 4.1, the additional wind flow would be expected to add to the wind flow deflected into the Town Square by the Kingsway Axial Building, and this volume wind would flow towards the south into O'Sullivan Road. The flow would be expected to be accelerated through the Lane between the Urban Building and the low-rise building in the Town Square. The wind conditions through the lane would be expected to be well over the long and short term stationary criteria, and expected to be over the criterion for walking comfort. The corner of the lane where it connects to O'Sullivan Road would be expected to be over the criterion for walking comfort for westerly wind directions.

Potential strategies to mitigate the wind flow deflected towards ground level by the west face could be; increased planting of large dense trees (80% solid area) in the plaza

below the west face, increasing the area of the plaza covered by the canopy, having the ability to close the lane between the Urban building and the low-rise building during adverse wind conditions, and provision of local wind break screening to areas where stationary activities are intended.

The south face would be exposed to direct wind flow for the immediate future and would be expected to deflect additional wind flow into O'Sullivan Road. The town planning images show street tree planting along O'Sullivan Road. If these are proposed as large dense continuous canopy street trees that touch the building canopy the wind conditions along O'Sullivan Road adjacent to the Urban Building would be expected to achieve the criterion for walking comfort.

4.3. Signature Tower

The Signature Tower will be the tallest building of the development and set-back by at least 5m from the south edge of the podium building. The building will be exposed to direct wind flow from all wind directions with little significant shielding provided by surrounding buildings.

The north face would be expected to induce additional wind flow towards lower levels but this would be expected to be deflected above pedestrian level over the podium roof area. However, the separation of wind flow off the northeast corner of the tower may deflect additional wind towards the east side of Springvale Road south of the O'Sullivan Road intersection. Since the existing buildings on the east side of Springvale Road are low-rise and the road is wide, the wind conditions where the wind flow reaches ground level would be expected to achieve the criterion for walking comfort.

The east face would be orientated towards the relatively light and infrequent easterly wind directions and would not be expected to induce any significant additional wind flow towards lower levels. Therefore, the wind conditions at street level for the easterly wind directions would be expected to achieve the criterion for walking comfort.

The south face would be expected to induce significant additional wind flow towards lower levels. The set-back of the tower from the podium edge would be expected to assist with deflecting some of the additional wind flow above pedestrian level. However, an amount of the additional flow would be expected to reach O'Sullivan Road. The town planning images show tree landscaping along O'Sullivan Road. If these are proposed as large dense continuous canopy street trees that touch the building canopy the wind conditions along O'Sullivan Road adjacent to the Signature Tower would be expected to achieve the criterion for walking comfort. Without the trees the wind conditions near and at the corner of Springvale and O'Sullivan Roads would be expected to be above the criterion for walking comfort.

For south sector winds the separation of wind flow off the southeast corner of the tower may deflect additional wind towards the east side of Springvale Road north of the O'Sullivan Road intersection. Since the existing buildings on the east side of Springvale Road are low-rise and the road is wide, the wind conditions where the wind flow reaches ground level would be expected to achieve the criterion for walking comfort.

5. CONCLUSIONS

We have assessed the environmental wind conditions around the proposed redevelopment of The Glen Shopping Centre, Glen Waverley based on Town Planning drawings dated January, 2015. The shopping centre would have exposure to wind flow over suburban housing for most wind directions with some medium height commercial buildings to the south.

The additional shopping mall area to be developed along Springvale Road would not be of concern from an environmental wind perspective. The wind conditions along the new building would be expected to be similar to the existing wind conditions along the existing shopping centre building.

The focus this desktop assessment has been the taller buildings and tower at the southern end of the site. These elements of the re-development will be taller than the surrounding buildings and as such would be expected to induce additional wind flow into the surrounding streetscapes. The wind conditions along Sneddon Drive would be expected to achieve the criterion for walking comfort and increase to above the criterion at the south end of the Kingsway Axial Building. The wind flow deflected off the Urban Building would be expected to add to the wind flow deflected into the Town Square by the Kingsway Axial Building, creating wind conditions in the Town Square well above the long and short term stationary criteria. The wind conditions along O'Sullivan Road with large dense continuous canopy street trees would be expected to achieve the criterion for walking comfort.

The exposure of the residential towers and the activation of the surrounding streetscapes for stationary activities, it would recommended that the proposed development have the environmental wind conditions quantified using wind tunnel model measurements. A number of potential environmental wind issues have been identified along with potential wind mitigation strategies to address these issues. We have worked with NH Architecture on many projects and the collaboration has always developed high quality architectural wind mitigation strategies.

M. Eaddy

M. Eaddy

20 March 2015