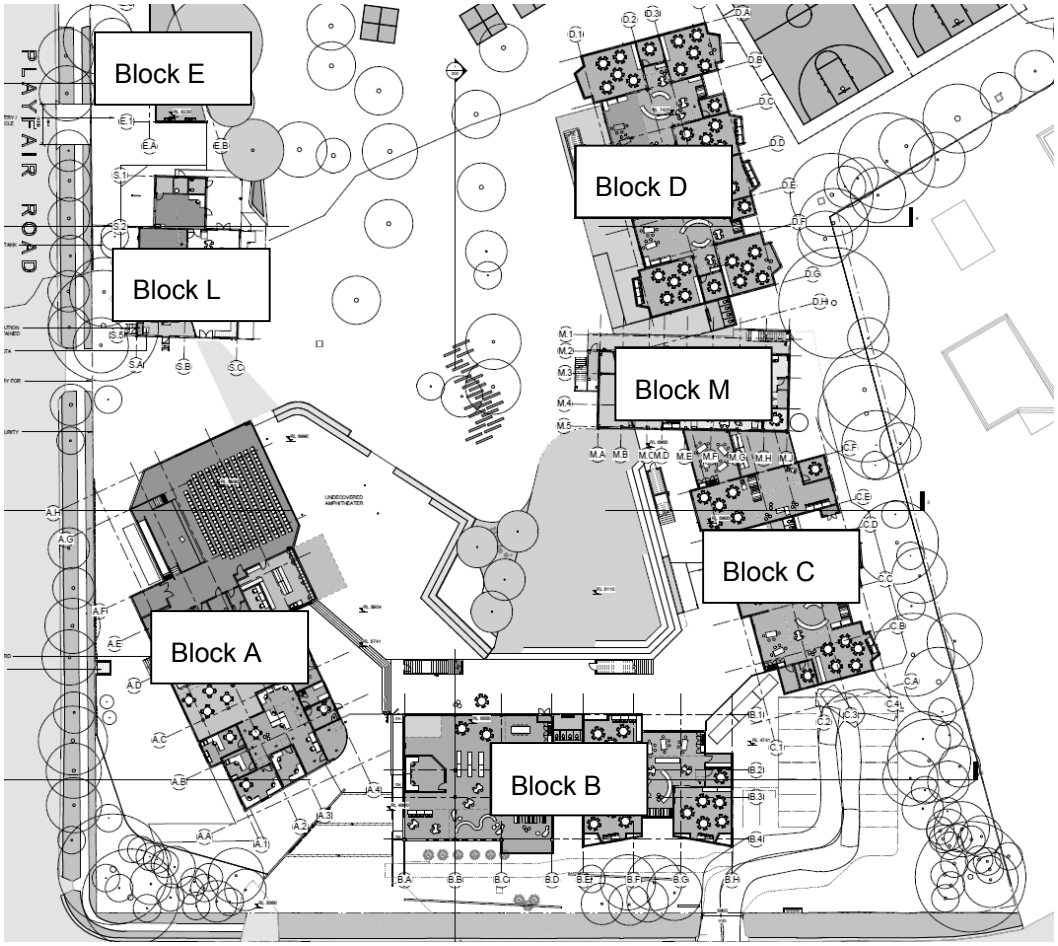


Figure 9: Schematic plan view of the ground floor with the building designations overlaid

3 PEDESTRIAN LEVEL WIND EFFECTS

3.1 DISCUSSION

The proposed development incorporates a number of wind mitigating features, including

- Canopies above outdoor use areas;
- Extensive landscaping at the ground level;

Ground Floor

The development is shielded by the adjacent buildings from the eastern direction; however it is relatively exposed to north and south westerly winds, due to the location of the open outdoor recreational areas.

As there are no buildings north of Block E and Block D (refer to Figure 9 for building designations); the sporting grounds and play equipment are expected to have wind conditions within the recommended criteria for walking.

The proposed development has three main entrance ways into the school area. The main entrance way to the school is located near the south western corner along Abbotts Road. There is also a Secondary School Entrance along Playfair Road, and a secondary entrance through an adjacent development in the west. These areas are expected to experience wind speeds within the recommended criterion of walking due to the extensive use of landscaping on the south western corner, and along the eastern border. It is expected that the adjacent existing developments along Playfair Road and the landscaping on the south western corner will provide adequate shielding from predominate westerly winds, and therefore no recommendations are made for the public entranceways and footpaths around the proposed development.

The majority of the entrances into the school blocks are facing the internal courtyard, and therefore providing shielding to each other. They are also under extensive canopies which help reduce the effects of downwash. Therefore no recommendations are made.

There are many outdoor amenity areas in the school grounds. These include the student undercover walkways in-between Blocks A, B, C and M; the Staff Break out Zone south west of Block A; the Undercover Amphitheatre north eastern of Block A; the Internal Courtyard north of Block B; the outdoor learning space east of Block M and Block C; and the Productive Garden between Block E and Block L (see Figure 9). Most of these areas are expected to experience wind speeds within the recommended wind comfort criterion of standing due to the surrounding landscaping; however southerly winds channelling between Blocks A and Blocks B are expected to increase the wind speed level of this area to be above the recommended walking criterion. Thus recommendations have been made to ameliorate these winds.

The outdoor sitting areas around the internal courtyard are well shielded by the surrounding school blocks and the surrounding landscaping, and therefore expected to be within the criterion of sitting. Therefore no recommendations have been made for these areas.

Level 1 Student Walkways

The student walkways on Level 1 are under cover, and assumed to have a balustrade height around the parameter of 1100mm. No adverse wind speeds exceeding the recommended criterion for standing is expected for these areas, so therefore no recommendations have been made.

3.2 RECOMMENDATIONS

After careful consideration of the areas at the base of the proposed development, Vipac predicts that the proposed development will present some changes to existing wind conditions in adjacent ground level areas.

Southern winds channelling between Block A and Block B are expected to increase the wind speeds in this area to be above the recommended wind comfort criteria for standing. Therefore, landscaping (such as a tree) is recommended to help ameliorate these winds (see Figure 10)

It should be noted that this study is based on experience only and has not utilised any experimental data for the analysis.

Figure 10: Schematic plan view of the ground floor with wind control measures overlaid

4. CONCLUSIONS

An appraisal of the likely wind conditions at the pedestrian ground level, and open learning areas of the proposed development at **Curl Curl North Public School,** at **Playfair Road, North Curl Curl, NSW** has been made.

Vipac has carefully considered the form and exposure of the proposed development, nominated criteria for various public areas according to their function and referred to past experience to produce our opinion of likely wind conditions.

The findings of this study can be summarised as follows:

- The proposed development would be expected to generate wind conditions in the ground level footpath areas within the walking criterion.
- The proposed development would be expected to generate wind conditions in the building entrance areas within the standing criterion.
- The proposed development would be expected to generate wind conditions at the outdoor seating areas to be within the recommended sitting criterion.
- The proposed development **with recommendations** would be expected to generate wind conditions at the ground level student walkway areas within the recommended standing criterion
- The proposed development would be expected to generate wind conditions at the Level 1 student walkway areas within the recommended standing criterion.
- The proposed development would be expected to generate wind conditions at the various ground level outdoor amenity areas within the recommended standing criterion.

The assessments provided in this report have been made based on experience of similar situations in Melbourne and around the world. As with any opinion, it is possible that an assessment of wind effects based on experience and without wind tunnel model testing may not account for all complex flow interactions in the vicinity.

This Report has been Prepared

For

Tanner Kibble Denton Architects Pty Ltd

By

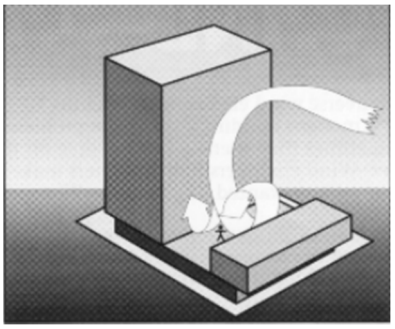
VIPAC ENGINEERS & SCIENTISTS LTD.

Appendix A: ENVIRONMENTAL WIND EFFECTS

Atmospheric Boundary Layer

As wind flows over the earth it encounters various roughness elements and terrain such as water, forests, houses and buildings. To varying degrees, these elements reduce the mean wind speed at low elevations and increase air turbulence. The wind above these obstructions travels with unattenuated velocity, driven by atmospheric pressure gradients. The resultant increase in wind speed with height above ground is known as a wind velocity profile. When this wind profile encounters a tall building, some of the fast moving wind at upper elevations is diverted down to ground level resulting in local adverse wind effects.

The terminology used to describe the wind flow patterns around the proposed Development is based on the aerodynamic mechanism, direction and nature of the wind flow.



Downwash – refers to a flow of air down the exposed face of a tower. A tall tower can deflect a fast moving wind at higher elevations downwards.

Corner Accelerations – when wind flows around the corner of a building it tends to accelerate in a similar manner to airflow over the top of an aeroplane wing.

Flow separation – when wind flowing along a surface suddenly detaches from that surface and the resultant energy dissipation produces increased turbulence in the flow. Flow separation at a building corner or at a solid screen can result in gusty conditions.

Flow channelling – the well-known “street canyon” effect occurs when a large volume of air is funnelled through a constricted pathway. To maintain flow continuity the wind must speed up as it passes through the constriction. Examples of this might occur between two towers, in a narrowing street or under a bridge.

Direct Exposure – a location with little upstream shielding for a wind direction of interest. The location will be exposed to the unabated mean wind and gust velocity. Piers and open water frontage may have such exposure.

Appendix B: REFERENCES

[1] *Structural Design Actions, Part 2: Wind Actions*, Australian/New Zealand Standard 1170.2:2011

[2] *Wind Effects on Structures* E. Simiu, R Scanlan, Publisher: Wiley-Interscience

[3] *Architectural Aerodynamics* R. Aynsley, W. Melbourne, B. Vickery, Publisher: Applied Science Publishers

Appendix C: DRAWING LIST

Title	Dwg. No.	Date
Site Plans	AR-SK 1101	Feb 17
Ground Plan	AR-SK 2001	Feb 17
First Floor Plan	AR-SK 2002	Feb 17
Roof Plan	AR-SK 2003	Feb 17
Elevations	AR-SK 3001	Feb 17
3D Perspectives	AR-SK 7201	Feb 17
Landscape master Plan	L101	18/03/17