WINDTECH

PEDESTRIAN WIND ENVIRONMENT STATEMENT

LOT 303 CROATIA AVE, EDMONDSON PARK

WJ258-01F02(REV4)- WS REPORT

APRIL 1, 2025

Prepared for:

LANDCOM

PARRAMATTA RIVERBANK CORPORATE PARK CENTRE, LEVEL 14, 60 STATION STREET, PARRAMATTA, NSW 2150

AT THE LEADING EDGE

WINDTECH CONSULTANTS

www.windtechconsult.com

reception@windtechglobal.com

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

DOCUMENT CONTROL

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February 20, 2025	Project Background.	1	CT/AFM	MM	AFM
March 13, 2025	Updated Treatments.	2	AFM	MM	AFM
March 26, 2025	Updated Treatments.	3	AFM	MM	AFM
April 1, 2025	Updated Treatments.	4	AFM	MM	AFM

EXECUTIVE SUMMARY

This report presents an opinion on the likely impact of the development proposed at Lot 303 Croatia Avenue, in Edmondson Park, on the local wind environment at the critical outdoor areas within and around the subject site. The effect of wind activity has been examined for the three predominant wind directions for the region, namely the south-easterly, north-easterly, and westerly winds. The analysis of the wind effects relating to the proposed development have been 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 desktop report addresses only the general wind effects and any localised effects that are identifiable by visual inspection of the architectural (received February 26, 2025) and landscape drawings (received March 14, 2025) provided. 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 development has incorporated several design features and wind mitigating strategies and is expected to be suitable for the intended use for the majority of the outdoor trafficable areas. However, there are some areas that are likely to be exposed to stronger winds. 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:

Ground Level:

- Retention of the proposed trees around the site, ensuring that the trees are of an evergreen and densely foliating species, capable of growing to a height of at least 3-5m, with 3-5m wide canopies.
- Retention of the proposed porous fencing along the eastern aspect (max. porosity = 30-40%).
- Retention of the proposed setbacks to the northern and western facades to ensure comfortable walking conditions with the public footpath areas.
- Retention of the set-back nature of the lobby entrance to ensure standing comfort conditions in the vicinity of the entrance zone.

Private Balconies:

- Retention of the proposed 1.1m high impermeable balustrades along the exposed perimeters.

With the inclusion of the abovementioned recommendations in the final design, it is expected that the wind conditions for the various trafficable outdoor areas within and around the development will be suitable for their intended uses, and that the wind speeds will satisfy the applicable criteria for pedestrian comfort and safety.

In particular, with the inclusion of the recommended treatment measures, the wind conditions within the public footpaths surrounding the subject development are expected to be suitable for walking activities, and the building entrance zone located to the north is expected to satisfy the standing criterion. With the recommended treatments, the wind conditions within the various private balconies are expected to be suitable for walking activities.

CONTENTS

1 INTRODUCTION

This pedestrian wind comfort assessment report has been prepared by Windtech Consultants to accompany an application for a State Significant Development (SSD-77211717) for infill Affordable Housing at Part Lot 303 Croatia Avenue, Edmondson Park.

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 has been 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 has been undertaken for this assessment. Hence this report addresses only the general wind effects and any localised effects that are identifiable by visual inspection of the drawings provided (received February 26, 2025 and March 14, 2025, as referenced in Appendix B), and any recommendations in this report are made only in-principle.

1.1 Project Overview

As the NSW Government's land and property development organisation, Landcom has a mandate to take a lead role in improving the supply, diversity, and affordability of new housing in NSW.

Landcom aims to create innovative and productive places that demonstrate global standards of liveability, resilience, inclusion, affordability, and environmental quality, and uses its sites and close working relationships with the private sector to deliver quality, socially inclusive community places, where people can grow and thrive regardless of income levels and stages of life.

In response to the NSW Government's commitment to increasing the supply of Affordable Housing under the National Housing Accord, Landcom has committed to delivering 1,800 affordable rental housing dwellings by 2029. As part of this commitment, Lot 303 Croatia Avenue has been earmarked as a suitable site for infill affordable housing.

1.2 Project Objectives

Landcom's objectives for the project are:

- Delivery of sustainable high quality affordable accommodation.
- Provide a sense of place within the development to ensure good high-quality accommodation.
- The use of robust materials that allow for long service life of the building.
- A building that meets the need of the community and serves the requirements of the area.
- Seamless integration of cultural and sustainable objectives that align to Landcom's key principles.

1.3 Proposed Development

Landcom is seeking development consent to construct an infill affordable housing development. Development consent is sought for:

- Site preparation works
- Civil bulk earthworks
- Removal of trees and vegetation
- Construction of:
    - A nine (9) storey residential flat building, comprising 58 infill affordable dwellings, of which 100% will be designated affordable rental housing for key workers.
    - Single level basement to accommodate 18 car parking spaces, 30 bicycle parking spaces and two (2) car share parking spaces.
    - landscaping; and
    - utilities and infrastructure services.

The proposed development has an estimated development cost that exceeds $30million and 100% of the gross floor area of the development will be used for the purposes of affordable housing. Accordingly, the proposal is SSD for the purposes of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP).

1.4 Report Purpose

This Report has been prepared to address the following 'Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Industry on 24 October 2024.

Table1: Secretary's Environmental Assessment Requirements

Item	SEARS Requirement	Report Reference
5	Environmental Amenity • Address how good internal and external environmental amenity is achieved, including access to natural daylight and ventilation, pedestrian movement throughout the site, access to landscape and outdoor spaces. • Assess amenity impacts on the surrounding locality, including lighting impacts, reflectivity, solar access, visual privacy, visual amenity, view loss and view sharing, overshadowing and **wind impacts**. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated. • Provide a solar access analysis of the overshadowing impacts of the development within the site, on surrounding properties and public spaces (during summer and winter solstice and spring and autumn equinox) at hourly intervals between 9am and 3pm, comparing the proposed development, existing situation and a development with no bonuses applied.	Section 5 of this Report

2 DESCRIPTION OF DEVELOPMENT AND SURROUNDINGS

The proposed development site is in the Liverpool Local Government Area within the Town Centre North precinct of Edmondson Park South. Edmondson Park South is identified in the Western City District Plan as a Local Centre in recognition of its proximity to the Southwest Rail Line and the Edmondson Park Railway Station. It borders the motorway intersection of the M31, M5 and M7 with Camden Valley Way, providing excellent road access to a large extent of the Greater Sydney Metropolitan Area.

The proposed development site is a 2,043m^2 parcel of land currently known as Block 24 and part of Lot 303 in DP 1259974, Croatia Avenue, Edmondson Park (Figure 1a). A Site Plan is provided at Figure 1b, and an aerial image of the subject site and the local surroundings is shown in Figure 1c, with the frequency and magnitude of the prevailing winds is superimposed for each wind direction.

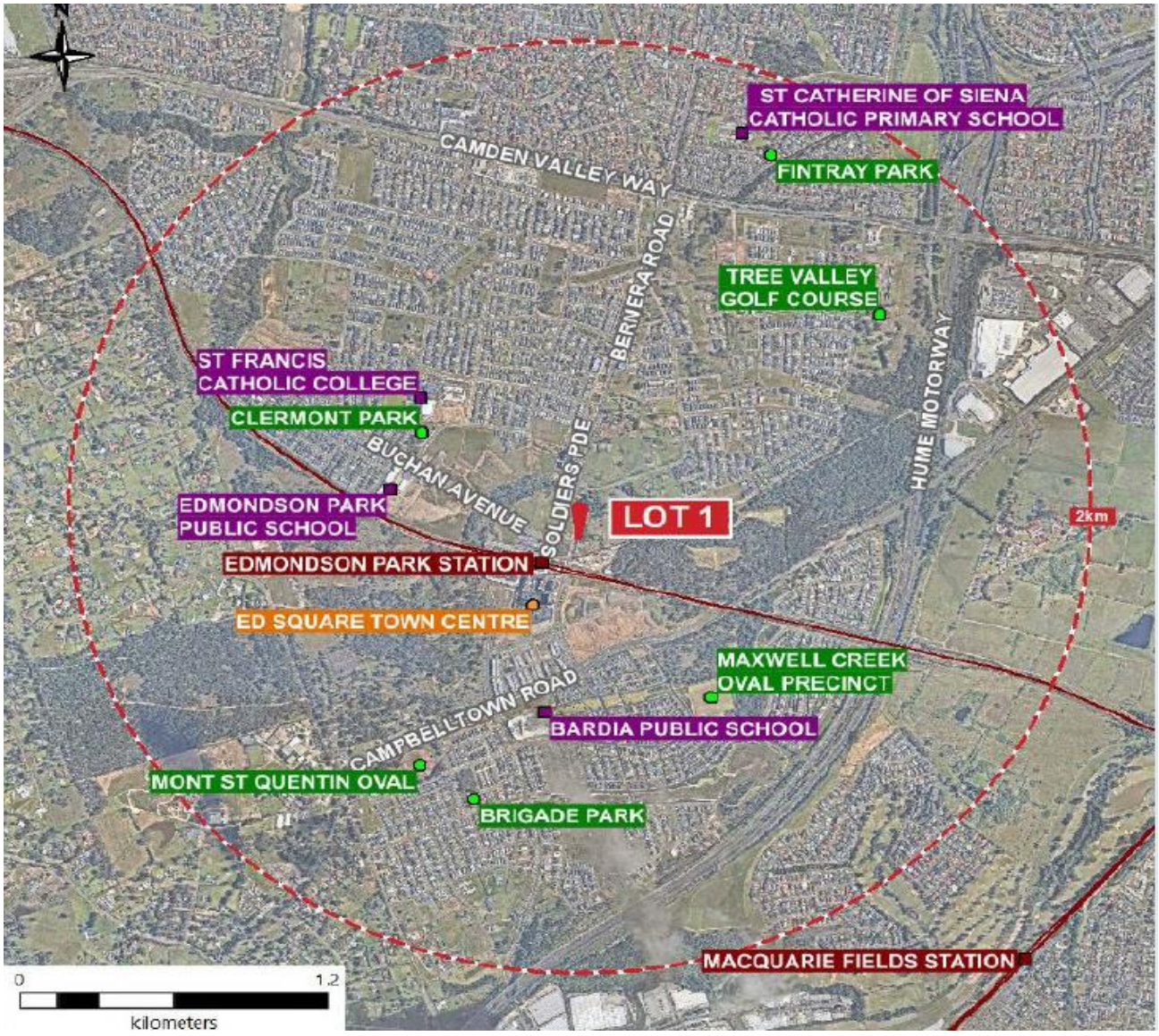

Figure 1a: Site Location

Figure 1b: Site Plan

The site bounded by Macdonald Road to the north, Soldiers Parade to the west, and parklands to the south and east. The buildings in the areas further away from the subject site are surrounding are predominately low-rise residential and commercial buildings, with the exception of mid-rise apartment buildings further to the south. A survey of the land topography indicates a gradual upward slope from north to south, although, there are no major elevation changes in the area immediately surrounding the site.

The critical outdoor trafficable areas associated with the proposed development, which are the focus of this assessment with regards to wind effects, are listed as follows:

- Ground Level areas and the surrounding pedestrian footpaths.
- Private balconies and terraces.

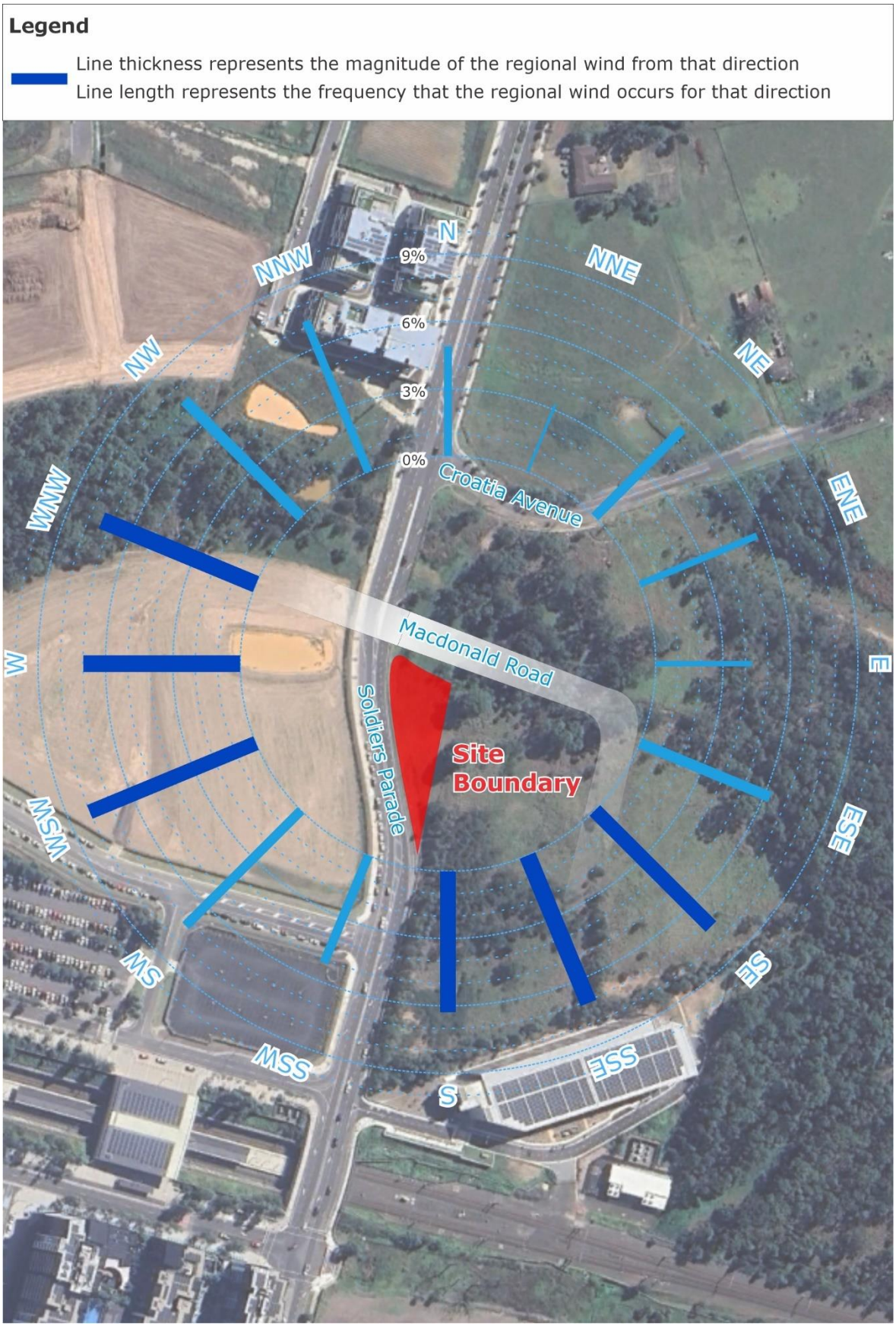

Figure 1c: Aerial Image of the Site Location and Prevailing Wind Directions

3 PROJECT BACKGROUND

The Edmondson Park Concept Plan (MP 10_0118), initially approved in August 2011 under the former Part 3A of the EP&A Act, provides for a new diverse and sustainable urban community covering an area of 605.4 hectares. Once complete, Edmondson Park South is expected to accommodate a mix of land uses, a diversity of housing, a new town centre incorporating retail, business and commercial floor space with employment opportunities, multi-purpose community and education facilities, a new 150-hectare regional park, several other local parks, and environmental conservation areas.

The Concept Plan has been modified several times to date. Since the Concept Plan's approval, staged development applications have also been determined and constructed, with Edmondson Park now comprising a growing local centre with shops and supporting community services, residential dwellings and open space and public domain.

Within the Edmondson Park Concept Plan, the town centre comprises two precincts - Town Centre North and Town Centre South. Landcom owns the Town Centre North site situated within the northern portion of Edmondson Park South to the north of the Southwest Railway Line, which is being developed for local centre and residential purposes.

The Edmondson Park Concept Plan was most recently modified on 14 February 2025 by MP 10_0118 MOD 5. MOD 5 modified the Edmondson Park Concept Plan as it applies to Town Centre North including:

- Reducing the size of land allocated to a school site from 8ha to 6ha;
- Allowing residential use on the 2ha of land formerly identified as school land;
- Introducing a maximum gross floor area limit of 140,389m^2 for the Station Precinct;
- Increasing the anticipated number of dwellings from 440 to 3,030;
- Increasing maximum building heights to between 12m and 50m in nominated locations and up to 67m for one landmark building;
- Amending the Town Centre North road layouts, bushfire asset protection zones and dwelling typology;
- Introducing car, motorcycle and bicycle parking rates;
- Introducing a Design Excellence Strategy, Design Guidelines and a Public Domain and Landscaping Plan;
- Adjusting and increasing the Concept Plan site boundary; and
- Amending conditions and Statement of Commitments.

As Block 24 is located within Town Centre North, the Edmondson park Concept Plan as approved under MOD 5 applies to the proposed development.

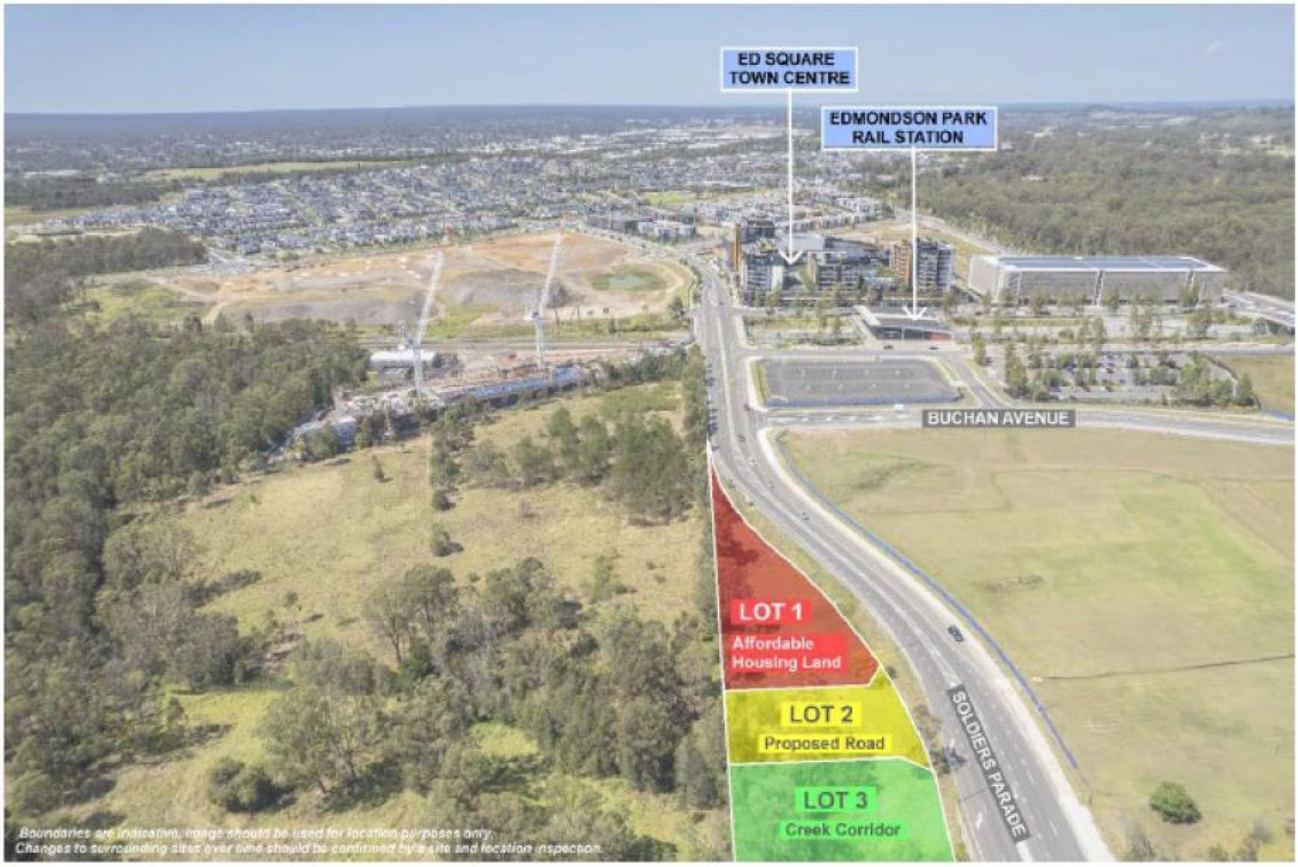

Figure 1d: Layout plan showing Affordable Housing Land in context of the Landcom wider precinct

4 REGIONAL WIND

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

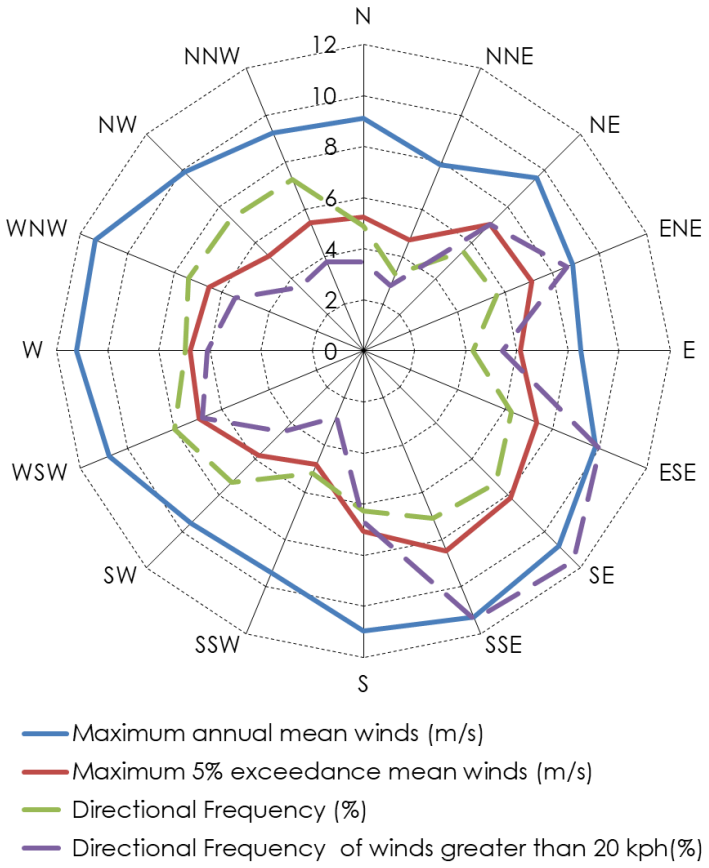

Figure 3: Directional Annual and 5% Exceedance Hourly Mean Wind Speeds (referenced to 10m height in standard open terrain), and Frequencies of Occurrence, for the Edmondson Park Region

5 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 2 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 2: 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 affecting this particular development 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.

6 RESULTS, DISCUSSION AND RECOMMENDATIONS

The expected wind conditions affecting the development 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. A glossary of the different wind effects described in this report included in Appendix A.

For this assessment, the wind speed criteria for pedestrian comfort that are considered are listed as follows:

- Walking Criterion (8m/s with a 5% probability of exceedance)
  for general circulation and pedestrian thoroughfares, e.g. footpaths, private balconies/terraces, through-site links etc.

- Standing (Short Exposure) Criterion (6m/s with a 5% probability of exceedance)
  for stationary activities generally less than an hour, e.g. waiting areas, communal terraces, main entries, café seating etc.

- Sitting (Long Exposure) (4m/s with a 5% probability of exceedance)
  for stationary activities longer than an hour, e.g. outdoor cinemas, outdoor fine dining etc.

Note that the above wind comfort levels are derived from the Lawson (1975) criteria. Although this assessment is qualitative in nature, the abovementioned criteria for pedestrian comfort are considered when assessing the wind environment impacts. However, all areas are also assessed with consideration to a pedestrian safety criterion of 23m/s for the annual maximum gust.

6.1 Ground Level Areas

The pedestrian footpath along the Macdonald Road is exposed to the north-easterly and westerly prevailing winds. Given the alignment of the building envelope against the westerly winds, the effects of these winds on the Macdonald Road footpath are expected to be comparable to the existing wind conditions. Furthermore, the orientation of the northern built form is expected to promote the partial stagnation of direct north-easterly winds around the north facing lobby entrance zone. The built-up areas to the north are also set-back from the site boundary to a considerable extent. Any corner acceleration effects (around the NW corner, as well as to the east of the 'Booster Assembly') caused by the prevailing winds are expected to be ameliorated by the proposed dense landscaping (trees) around the site. The north facing building lobby entrance at the Lower Ground Level is set-back into the building form, and in the presence of the proposed trees around this zone, the wind conditions in the vicinity of the entrance area are expected to satisfy the standing comfort criterion.

The pedestrian footpath along the Soldiers Parade is exposed to the westerly winds, which may be caught by the western façade and side-stream along the footpath. However, the proposed set-back of the built form from the site boundary along this aspect, as well as the proposed dense vegetation to either side of the footpath are expected to promote comfortable wind conditions for walking within the footpath.

The following treatment measures are recommended to be included in the design to ameliorate the above discussed wind effects, and to ensure safe and comfortable wind conditions within and around the ground plane of the proposed development.

Ground Level:

- Retention of the proposed trees around the site, ensuring that the trees are of an evergreen and densely foliating species, capable of growing to a height of at least 3-5m, with 3-5m wide canopies (refer to Figure 3).
- Retention of the proposed porous fencing along the eastern aspect (max. porosity = 30-40%).
- Retention of the proposed setbacks to the northern and western facades to ensure comfortable walking conditions with the public footpath areas (refer to Figure 3).
- Retention of the set-back nature of the lobby entrance to ensure standing comfort conditions in the vicinity of the entrance zone.

6.2 Private Balconies

The majority of the private balconies of the development are expected to be suitable for their intended use due to the inclusion of various wind mitigation features such as their overall recessed design, balustrades, and end screens. These features should be retained in the final design. However, some corner balconies are subjected to stronger side streaming wind effects and acceleration of the prevailing winds around the façade corners. The wind conditions within these balconies can be ameliorated with the retention of balustrades as follows:

Private Balconies:

- Retention of the proposed 1.1m high impermeable balustrades along the exposed perimeters.

6.3 Concluding Remarks

With the inclusion of the abovementioned recommendations in the final design, it is expected that the wind conditions for the various trafficable outdoor areas within and around the development will be suitable for their intended uses, and that the wind speeds will satisfy the applicable criteria for pedestrian comfort and safety.

In particular, with the inclusion of the recommended treatment measures, the wind conditions within the public footpaths surrounding the subject development are expected to be suitable for walking activities, and the building entrance zone located to the north is expected to satisfy the standing criterion. With the recommended treatments, the wind conditions within the various private balconies are expected to be suitable for walking activities.

Figure 3: Recommended Treatments (Lower/Upper Ground Level)
(Illustrated on the Site Plan)

7 REFERENCES

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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.

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APPENDIX A WIND EFFECTS GLOSSARY

A.1 Downwash and Upwash Effects

The downwash wind effect occurs when wind is deflected down the windward face of a building, causing accelerated winds at pedestrian level. This can lead to other adverse effects as corner acceleration as the wind attempts to flow around the building, as seen in Figure A.1.

This can also lead to recirculating flow in the presence of a shorter upstream building, causing local ground level winds to move back into the prevailing wind.

The upwash effect occurs near upper level edge of a building form as the wind flows over the top of the building. This has the potential to cause acceleration of winds near the leading edge, as well as potentially reattaching onto the roof area. This effect causes wind issues particularly near the leading edges of tall building and on the rooftop areas if there is sufficient depth along the wind direction. Upwash is more apparent in taller towers and podia.

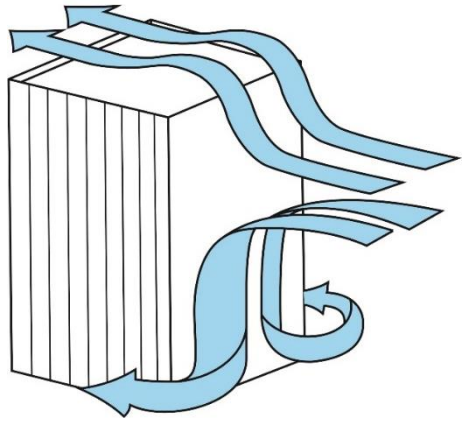

Figure A.1: Downwash Leading to Corner Wind Effect, and Upwash Effects

A.2 Funnelling/Venturi Effect

Funnelling occurs when the wind interacts with two or more buildings which are located adjacent to each other, which results in a bottleneck, as shown in Figure A.2. This causes the wind to be accelerated through the gap between the buildings, resulting in adverse wind conditions and pedestrian discomfort within the constricted space. Funnelling effects are common along pedestrian links and thoroughfares generally located between neighbouring buildings that have moderate gaps between them.

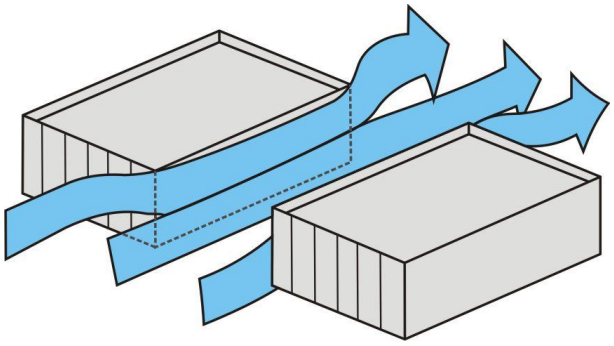

Figure A.2: Funnelling/Venturi Wind Effect

A.3 Gap Effect

The gap effect occurs in small openings in the façade that are open to wind on opposite faces, as seen in Figure A.3. This can involve a combination of funnelling and downwash effects. Presenting a small gap in the façade on the windward aspect as the easiest means through which the wind can flow through can result in wind acceleration through this gap. The pressure difference between the windward façade and the leeward façade also tends to exacerbate the wind flow through this gap.

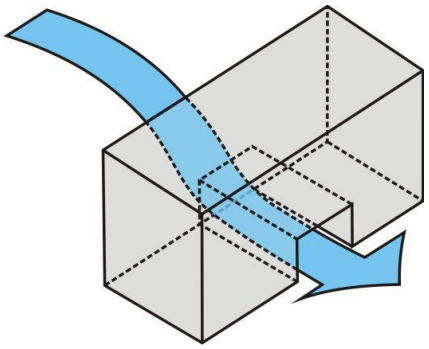

Figure A.3: Gap Wind Effect

A.4 Sidestream and Corner Effects

The sidestream effect is due to a gradual accumulation of wind shearing along the building façade that eventuates in an acceleration corner effect. The flow is parallel to the façade and can be exacerbated by downwash effects as well, or due to corner effect winds reattaching on the façade.

This is shown in Figure A.4. The corner refers to the acceleration of wind at the exterior vertical edge of a building, caused by the interaction of a large building massing with the incident wind, with the flow at the corner being accelerated due to high pressure differentials sets up between the windward façade and the orthogonal aspects. It can be further exacerbated by downwash effects that build up as the flow shears down the façade.

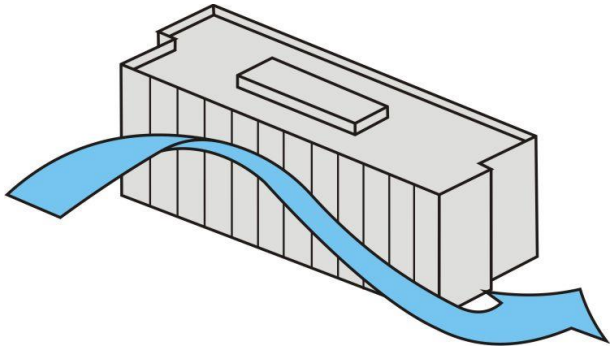

Figure A.4: Sidestream and Corner Wind Effect

A.5 Stagnation

Stagnation in a region refers to an area where the wind velocity is significantly reduced due to the effect of the flow being impeded by the bluff body. For a particular prevailing wind direction, this is typically located near the middle of the windward face of the building form or over a short distance in front of the windward face of a screen or fence. Concave building shapes tend to create an area of stagnation within the cavity, and wind speeds are generally low in these areas.

APPENDIX B LIST OF ARCHITECTURAL DRAWINGS REFERENCED

Table B1: List of Architectural Drawings Referenced (Received February 26, 2025, and March 14, 2025)

Drawing Number	Drawing Title	Revision	Date Issued
DA103	Site Plan	A	19/02/2025
DA200	Lower Ground Level	A	19/02/2025
DA201	Upper Ground Level	A	19/02/2025
DA202	Level 1	A	19/02/2025
DA203	Level 2-3	A	19/02/2025
DA204	Level 4	A	19/02/2025
DA205	Level 5-7	A	19/02/2025
DA206	Level 8	A	19/02/2025
DA207	Roof Level	A	19/02/2025
DA300-DA305	Elevations	A	19/02/2025
Sheet L03	Landscape Plan – Upper Ground	4	13/03/2025