WINDTECH

PEDESTRIAN WIND ENVIRONMENT STATEMENT

618-624 MOWBRAY RD AND 25-29 MINDARIE STREET, LANE COVE NORTH (SSD-71687208)

WI919-01F02(REV2)- WS REPORT

OCTOBER 2, 2024

Prepared for:

Homes NSW

4 Parramatta Square, 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

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
August 05, 2024	Initial.	0	JAF	MM	GC
September 06, 2024	Updated with new architectural drawings and excluding discussion related to the internal amenity of the development	1	JAF	MM	GC
October 02, 2024	Updated with new architectural/landscaping drawings	1	JAF	MM	GC

EXECUTIVE SUMMARY

This report presents an opinion on the likely impact of the proposed development at 618-624 Mowbray Rd and 25-29 Mindarie Street, Lane Cove North 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 north-easterly, south to south-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 report addresses only the general wind effects and any localised effects that are identifiable by visual inspection of the architectural drawings provided (received 27 September 2024). 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 wind conditions for majority of the ground level outdoor trafficable areas are expected to be suitable for their intended use. 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 trafficable areas:
    - Retention of existing tree planting to the south of the development site.
    - Introduction of new tree planting to the north-east, east, and south of the site.

With the inclusion of these measures, it is expected that wind conditions for the various trafficable outdoor areas 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.

CONTENTS

1 INTRODUCTION

This Pedestrian Wind Environment Statement has been prepared by Windtech Consultants on behalf of Homes NSW for a State Significant Development Application (SSD-71687208) for construction of a five-storey residential flat building with a total of 86 social and affordable housing apartments at 618-624 Mowbray Rd and 25-29 Mindarie Street Lane Cove North.

The purpose of this Pedestrian Wind Environment Statement is to present an opinion on the likely impact of the subject development on the local wind environment at the critical outdoor areas within and around the subject site. 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, and any recommendations in this report are made only in-principle.

A list of the architectural drawings reference for this assessment is provided in Table 1 below.

Table 1: List of Architectural Drawings Referenced

Drawing name	Drawing No.	Revision number	Date Received
Floor Plan - Lower Ground	LD-DA100	1	01/Oct/2024
Floor Plan - Upper Ground	LD-DA102	1	01/Oct/2024
Lower Ground Floor Plan	Landscape Architecture Development Application Design Report SSD-71687208	N/A	01/Oct/2024
Upper Ground Floor Plan	Landscape Architecture Development Application Design Report SSD-71687208	N/A	01/Oct/2024

1.1 Site Description

The site is located at 618-624 Mowbray Rd and 25-29 Mindarie Street Lane Cove North, in the Lane Cove Local Government Area (LGA).

The site has a total site area of 4,198 square metres (sqm) and has frontages to Mowbray Road to the north, Hatfield Place to the east and Mindarie Street to the south. Refer to Figure 1.

The site currently contains seven single storey dwellings which are currently unoccupied. It is one of the final remaining sites to be developed within the Mowbray Precinct, an area of new residential flat buildings located along Mowbray Road with recent five storey apartment buildings located to the east and west of the site.

The site is located opposite Mindarie Park, which includes children's playgrounds, recreation areas and access to walking paths in Lane Cove National Park. Mowbray Public School is located to the north of the site on Mowbray Road. The site is accessible by public transport with services that run along Mowbray Road with frequent services to Chatswood and Sydney CBD.

Figure 1: Site location

The proposed development comprises demolition of existing buildings and construction of a new residential flat building to accommodate 86 social and affordable housing apartments, a communal room and basement car parking including excavation, tree removal and associated landscaping and public domain works.

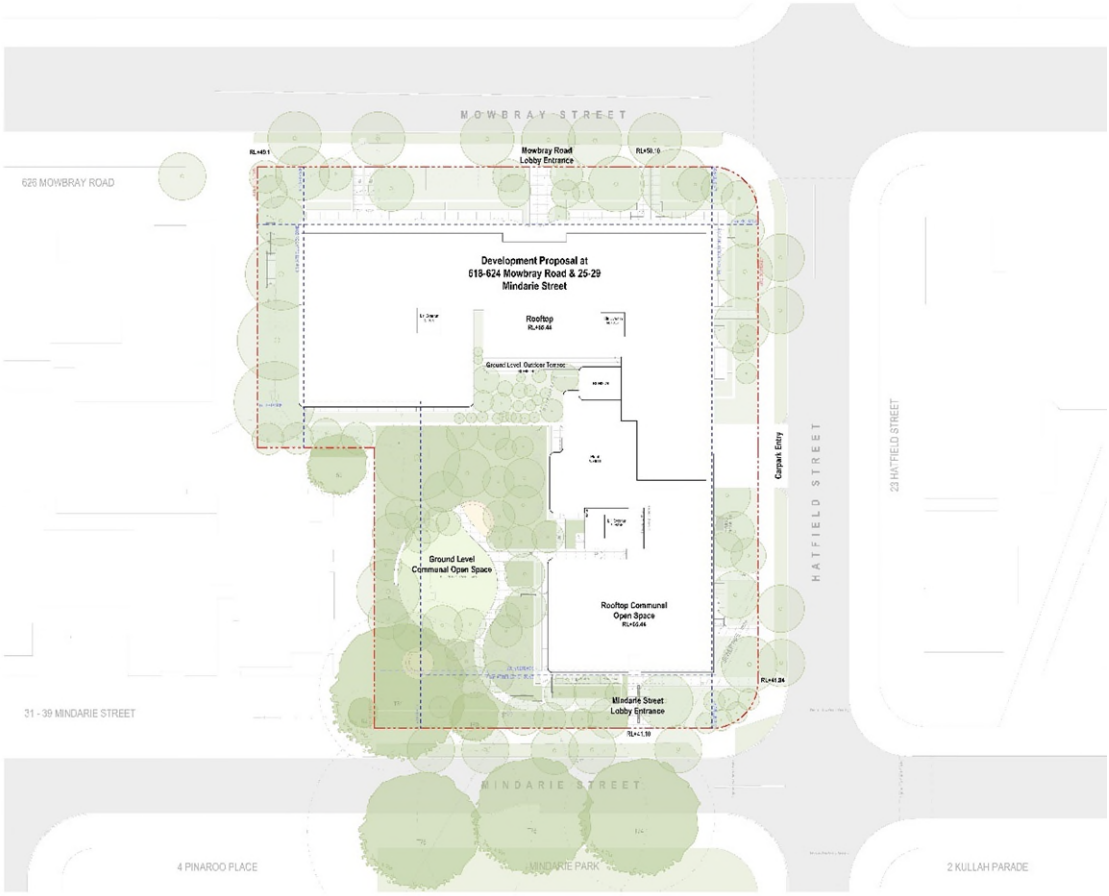

Figure 2: Site Plan

1.2 Planning Secretary's Environment Assessment Requirements

This report addresses the Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 18 June 2024 which identified the following specific assessment requirements:

Table 2: SEARs and Relevant Reference

Item	SEARS Requirement	Report Reference
5	Environmental Amenity • 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.	Pedestrian Wind Environment Assessment, Section 5
7	Public Space • Demonstrate how the development maximises the amenity of public spaces in line with their intended use, such as through adequate facilities, solar access, shade and wind protection.	Pedestrian Wind Environment Assessment, Section 5

2 DESCRIPTION OF DEVELOPMENT AND SURROUNDINGS

The site is located at 618-624 Mowbray Rd and 25-29 Mindarie Street Lane Cove North, in the Lane Cove Local Government Area (LGA).

The site has a total site area of 4,198 square metres (sqm) and has frontages to Mowbray Road to the north, Hatfield Place to the east and Mindarie Street to the south.

The site currently contains seven single storey dwellings which are currently unoccupied. It is one of the final remaining sites to be developed within the Mowbray Precinct, an area of new residential flat buildings located along Mowbray Road with recent five storey apartment buildings located to the east and west of the site.

The site is located opposite Mindarie Park, which includes children's playgrounds, recreation areas and access to walking paths in Lane Cove National Park. Mowbray Public School is located to the north of the site on Mowbray Road. The site is accessible by public transport with services that run along Mowbray Road with frequent services to Chatswood and Sydney CBD.

The proposed development comprises demolition of existing buildings and construction of a new residential flat building to accommodate 86 social and affordable housing apartments, a communal room and basement car parking including excavation, tree removal and associated landscaping and public domain works.

A survey of the land topography indicates a steep incline along Hatfield field Street with the terrain rising to the north.

An aerial image of the subject site and the local surroundings is shown in Figure 3, with the frequency and magnitude of the prevailing winds is superimposed for each wind direction.

The existing site consists of single storey residential buildings. The proposed development is 5 residential levels over basement car parking.

The ground level areas and pedestrian footpaths are the focus of this assessment with regards to the wind effects.

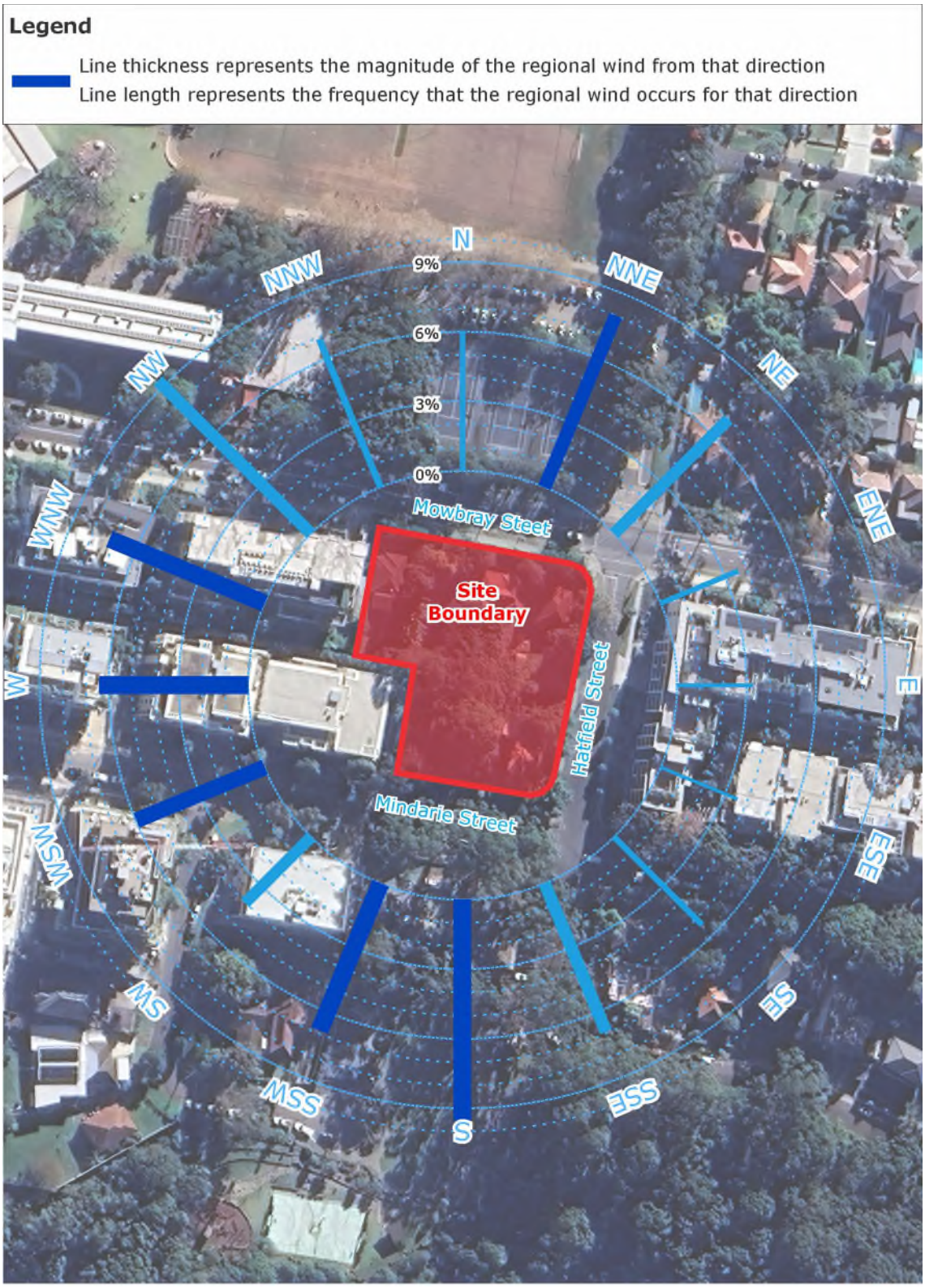

Figure 3: Aerial Image of the Site Location and Prevailing Wind Directions

3 REGIONAL WIND

The Sydney region is governed by three principal wind directions that 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 from the meteorological station located at Kingsford Smith Airport by the Bureau of Meteorology (recorded from 1995 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 4 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 4.

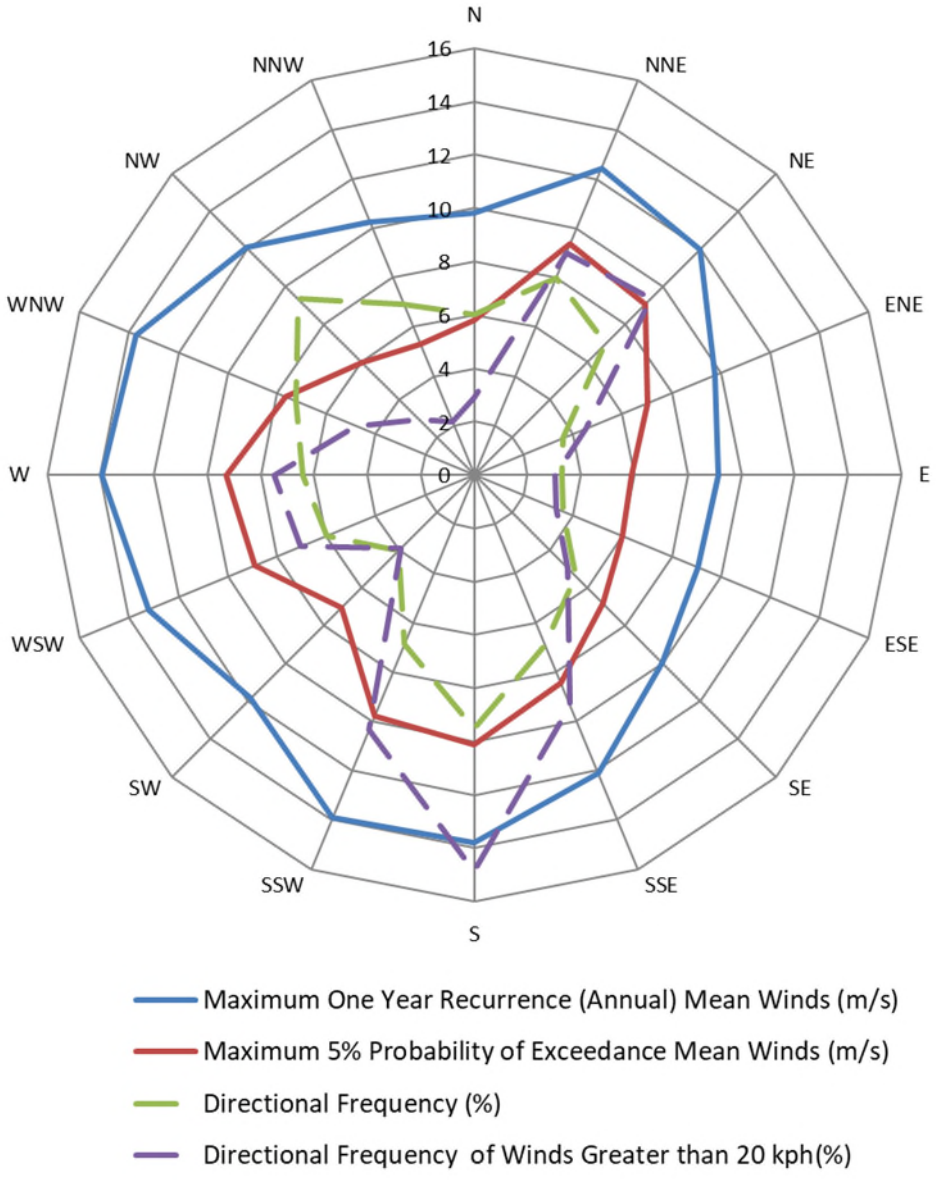

Figure 4: Directional Annual and 5% Exceedance Hourly Mean Wind Speeds (referenced to 10m height in standard open terrain), and Frequencies of Occurrence, for the Sydney Region

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 3 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 3: 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.

5 RESULTS AND DISCUSSION

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.

5.1 Ground Level Areas

The pedestrian footpath along Mowbray Street is primarily exposed to north-easterly prevailing winds. Due to the setback of the tower form, the wind conditions are expected to remain suitable and/or equivalent to the existing conditions despite potential sidestreaming on the northern facade.

In westerly winds, adverse wind conditions are not expected due to the northern façade orientation with respect to winds from this direction which does not encourage sidestreaming. Additional shielding is provided by the buildings to the west.

In south to south-easterly winds, the footpath is shielded by the subject development, however potential corner acceleration as a result of side-streaming on the eastern end of the footpath may occur. Proposed tree planting near the north-eastern corner of the development should mitigate the adverse effects. The abovementioned treatments are shown in Figure 6 below.

Along Hatfield Street, the footpath is mostly shielded from westerly winds, however corner acceleration effects may potentially occur on the south-eastern corner of the development. The proposed tree planting as shown in Figure 6 and Figure 6 below will mitigate the effect of corner acceleration impact.

In north-easterly winds, the building to the east of the subject development should provide shielding, and the setback of the building form makes north-easterly winds less likely to side-stream and impact pedestrians.

The footpath along Mindarie Street is mostly susceptible to north-easterly winds sidestreaming along the eastern aspect then corner accelerating at the south-eastern corner of the development. To mitigate this, trees should be planted in the corner area such that their canopies are interlocking to slow down the side-streaming and prevent adverse effects. The footpath is not expected to experience negative wind impacts in westerly or southerly winds as the width of the exposed aspect is not expected to encourage oncoming winds to side-stream.

The open space to the south-west of the development is shielded against north-easterly winds by the development itself, and the design of the building is expected to encourage the westerly winds to stagnate. However, this space is likely to be affected by impacting southerly winds flowing through the open park to the south of the site. Also, corner acceleration at the southwestern corner of the building is likely to occur. The proposed tree planting as shown in Figure 6 below will provide a sufficient barrier to deflect impacting southerly winds and ensure the open space is suitable for pedestrian activities.

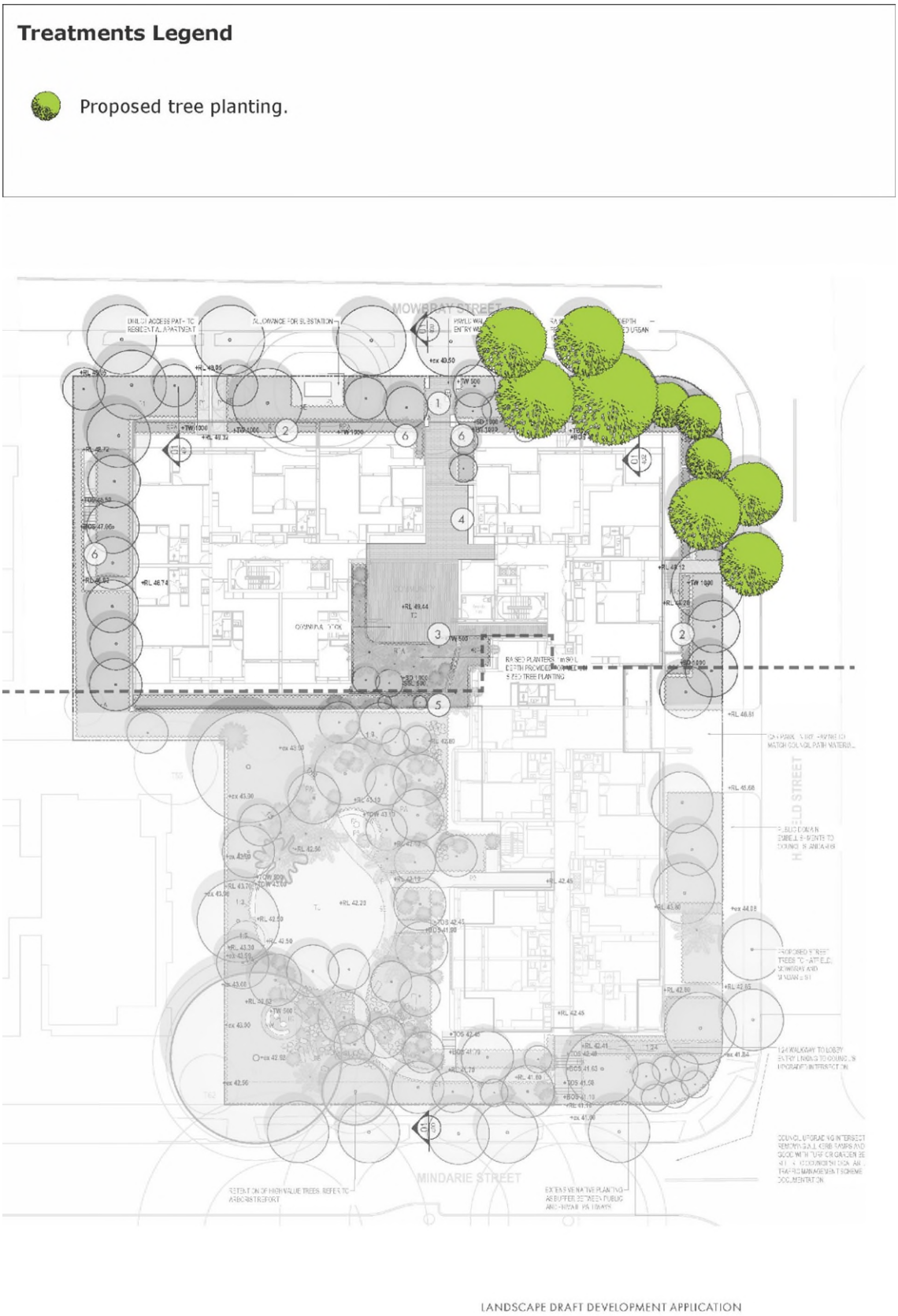

Figure 5: Recommended Treatment for the Upper Ground Level

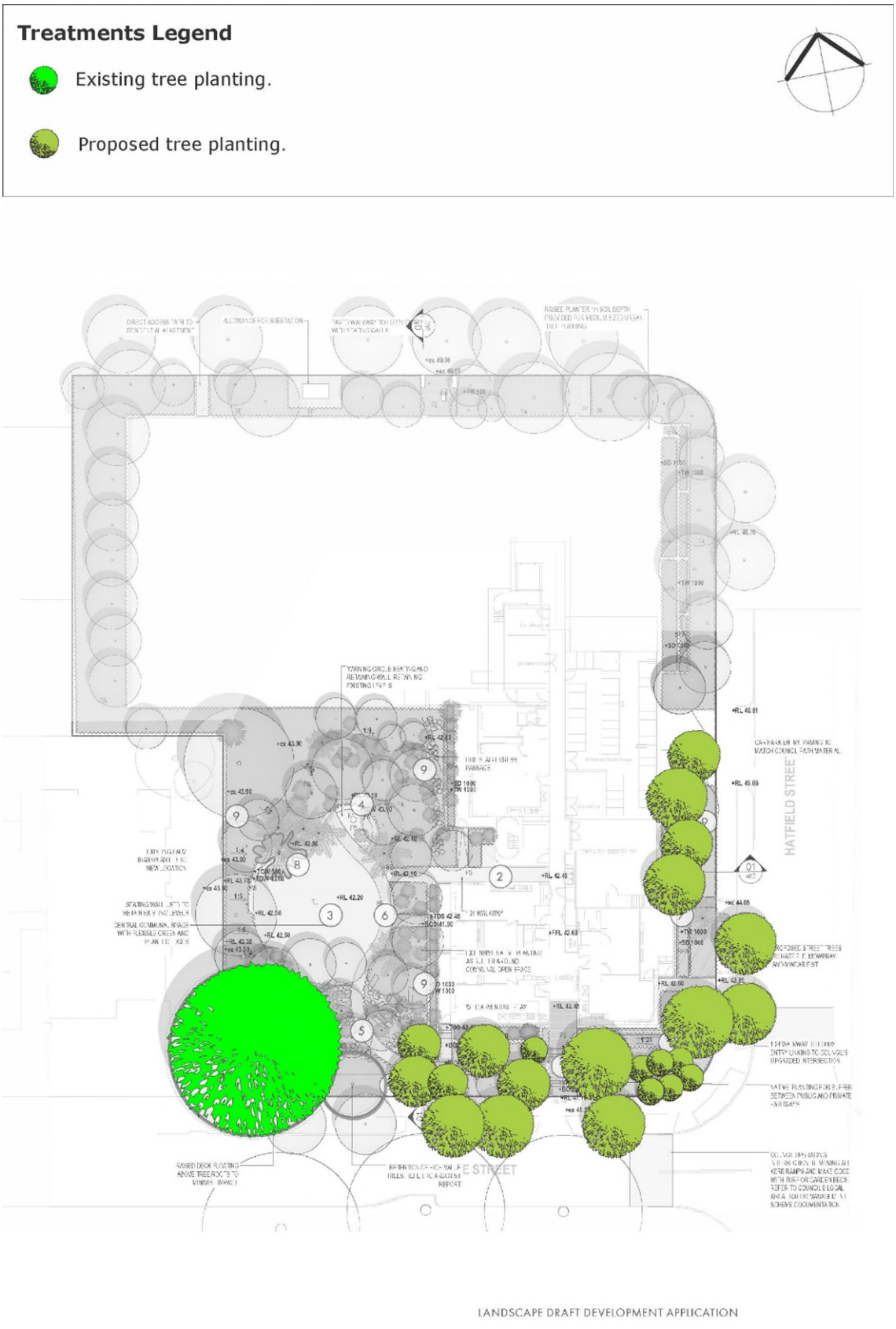

Figure 6: Recommended Treatment for the Lower Ground Level

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.

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.

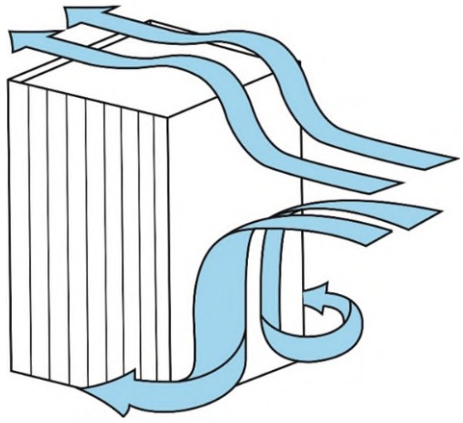

Figure A.1: Downwash Leading to Corner Wind Effect, and Upwash Effects

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.

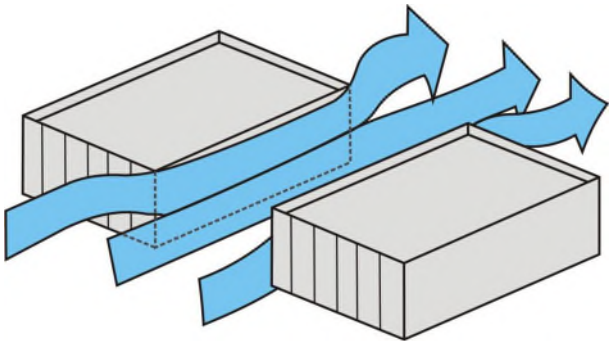

Figure A.2: Funnelling/Venturi Wind Effect

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.

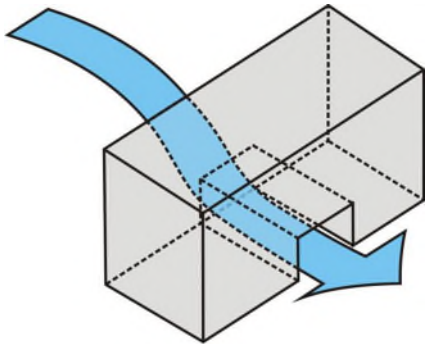

Figure A.3: Gap Wind Effect

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.

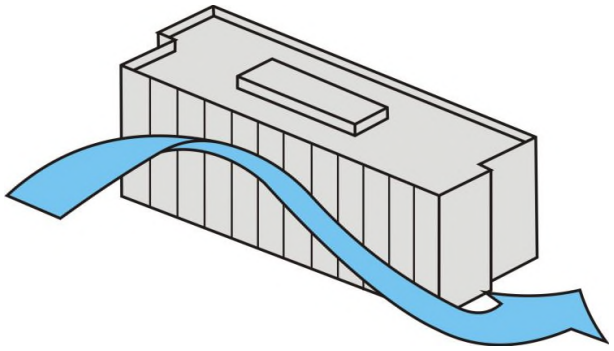

Figure A.4: Sidestream and Corner Wind Effect

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.