

# TELOPEA MASTERPLAN

## Qualitative Wind Assessment

### Prepared for:

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## BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Frasers Property Australia Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

## DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.19382-R03-v1.1	25 June 2021	James Cleary	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
610.19382-R03-v1.0	9 July 2020	James Cleary	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy

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## EXECUTIVE SUMMARY

SLR Consulting Pty Ltd (SLR) has been engaged by Frasers Property Australia Pty Ltd to undertake an initial qualitative wind assessment of the proposed Telopea Masterplan.

The site situated just east of Oatlands golf course, and predominantly sits within the bounds of Sophie Street to the north, Evens Road to the east, Kissing Point Road to the south and Adderton Road to the west. In terms of the surrounding built environment, low-level development exists in all directions. Additionally, there are some more open areas dispensed throughout the surrounding environment, with Oatlands golf course and a number of local parks being the primary examples. Generous and densely foliated existing landscaping is present throughout the local area.

### Wind Climate

On the basis of long-term wind records obtained from Bureau of Meteorology stations at Bankstown Airport and Sydney Kingsford Smith Airport, SLR has determined that project site has local winds characteristics closer to Bankstown Airport than Sydney (KS) Airport, given Telopea's distance inland from the coast. Accordingly, key prevailing wind directions of interest are the northeast, southeast and south for summer and mainly west quadrant winds for winter.

### Existing Wind Environment

Existing street level wind conditions in the vicinity of the site could be close to or greater than 16 m/s "walking comfort" criterion for some prevailing wind directions, resulting from channelling of winds along aligning streets.

### Future Wind Environment

SLR has worked with the design team throughout the initial phases of the proposed masterplan. Many of the recommendations put forward have been taken into account and incorporated into the design. The provided recommendations and comments for specific areas of the site within the scope of this report should be viewed as design principles for the proposed site and considered wherever possible throughout the ongoing design of the masterplan.

In terms of the future wind environment with the proposed development, the following features of the development are noted as being of most significance:

- The proposed building heights will generally have a positive impact on adverse wind conditions, particularly throughout the Central precinct, with taller western towers serving to shelter eastern buildings from adverse wind conditions.
- The winds along the surrounding footpaths should remain at similar levels providing appropriate landscaping is employed.
- The proposed masterplan should retain the current emphasis on preserving existing trees and landscaping wherever possible.
- Horizontal and vertical wind breaks are recommended for specified building entries, to protect against potential downwash and channelling winds.

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## EXECUTIVE SUMMARY

- Vertical windbreaks to the through site link and retail street of the proposed site. The wind shielding proposed is to be a mix of landscaping and wind screens, with the full extent of required shielding to be assessed further during the development application stage of respective masterplan lots.
- Façade setbacks and horizontal windbreaks are proposed to certain buildings to mitigate downwash wind impacting surrounding pedestrian pathways.
- Wind mitigations are recommended to identified balconies from level 4 and above. SLR recommends that all proposed balconies be provided with only a single open aspect.

The above analysis has been made on the basis of our best engineering judgment and on the experience gained from scale model wind tunnel testing or computational fluid dynamics analysis of a range of developments. Detailed windflow modelling via either Wind Tunnel Testing or Computational Fluid Dynamics (CFD) Simulation will be used during the Development Application stage to confirm wind speed levels at specific locations and determine the extent of treatment required.

*Taking into account all of the above, it is believed that the proposed Master Plan will likely comply with the adopted wind acceptability criteria at pedestrian and public access locations within and around the Development.*

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### APPENDICES

Appendix A Sydney Region Wind Roses

# 1 Introduction

SLR Consulting Pty Ltd (SLR) has been engaged by Frasers Property Australia Pty Ltd to undertake a qualitative wind assessment of the proposed Telopea Masterplan.

The contents of this report will address the wind environment associated with the proposed North, Central & East and South precincts of the proposed masterplan. A separate report has been prepared for the Site 1A development.

## 1.1 Site and Surrounds

The site situated just east of Oatlands golf course, and predominantly sits within the bounds of Sophie Street to the north, Evens Road to the east, Kissing Point Road to the south and Adderton Road to the west. In terms of the surrounding built environment, low-level development exists in all directions. Additionally, there are some more open areas dispensed throughout the surrounding environment, with Oatlands golf course and a number of local parks being the primary examples. Generous and densely foliated existing landscaping is present throughout the local area.

**Figure 1 Masterplan Location**

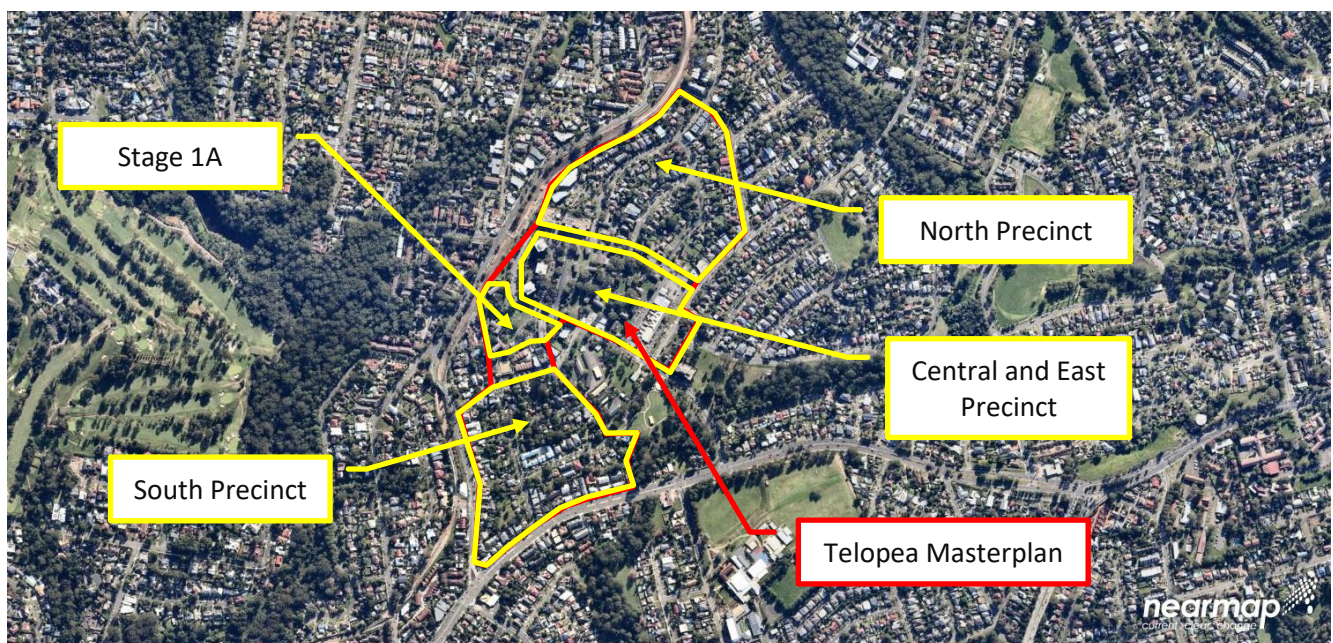


Image: Nearmap, 1 June 2020



## 1.2 Development Description

The proposed masterplan will comprise three precincts, with the summary of each as follow.

The Central and Eastern Precinct with:

- An allocation for several communal facilities predominantly split between lots C1 and C2, including; Library, Supermarket, Community Centre, Church, Aged Care Facility, Medical Facility, Gym, Communal Spaces along with retail and commercial tenancies;
- Four towers, the maximum heights being 86m, shared between the two tallest buildings of the development (C1 and C2);
- Lot C3 and C4 with max building heights of 58m and 60m respectively;
- Lot C5 to C8 with max building heights varying between 40m and 47m, with 5 buildings proposed between the 4 lots;
- Lot E1 and E2 with building heights of 28m; and
- Lot C9.1 and C9.2 which have been detailed within the wind report produced for Stage 1A.

The North Precinct with:

- A mix of residential towers and townhouses;
- Lot N1, N2, N4 and N5 with buildings heights of 22m;
- Lot N3 with max height of 32m;
- Lot N6, N7 and N8 with max heights of 28m; and
- Lot N9 and N10 with max building heights of 19m.

The South Precinct with:

- 8 residential buildings;
- Lot S1, S2, S4 and S7 with buildings heights of 22m;
- Lot S3 with max height of 28m;
- Lot S5, S6 and S8 with max heights of 15m.

Precinct envelopes shown in **Figure 2** to **Figure 4**.



**Figure 2 Central and East Precinct Envelope Plan**



**Figure 3 North Precinct Envelope Plan**





**Figure 4 South Precinct Envelope Plan**



## 2 Teloepa Wind Climate

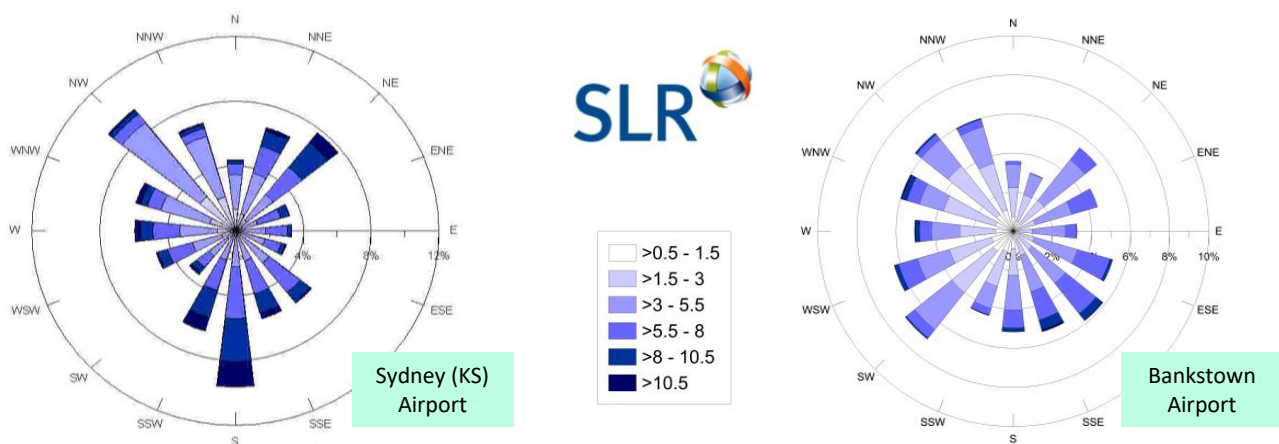
The data of interest in this study are the annual extreme, mean hourly wind speeds and largest gusts experienced throughout the year, how these winds vary with azimuth, and the seasonal break-up of winds into the primary Sydney wind seasons.

### 2.1 Sydney Region Seasonal Variations

Key characteristics of Sydney's Regional Wind Climate are illustrated in two representative wind roses shown in **Figure 5**, taken from Bureau of Meteorology (BoM) data recorded during the period 1999-2017 at Sydney (Kingsford Smith) Airport and Bankstown Airport. A review of the associated seasonal wind roses (refer **Appendix A**) shows that Sydney is affected by two primary wind seasons with relatively short (1-2 month) transition periods in between:

- Summer winds occur mainly from the northeast, southeast and south. While northeast winds are the more common prevailing wind direction (occurring typically as offshore land-sea breezes), southeast and southerly winds generally provide the strongest gusts during summer. Northeast sea breeze winds and stronger southerly winds associated with "Southerly Busters" and "East Coast Lows" typically have a significantly greater impact along the coastline. Inland, these systems lose strength and have altered wind direction characteristics.
- Winter/Early Spring winds occur mainly from west quadrants and to a lesser extent from the south. West quadrant winds provide the strongest winds during winter and in fact for the whole year, particularly at locations away from the coast.

**Figure 5 Annual Wind Roses for Sydney (KS) Airport and Bankstown Airport (BoM Data)**



### 2.2 Local Wind Characteristics

For the project site, SLR has determined that local upper level winds reflective of the weather systems experienced at the site have characteristics closer to Bankstown Airport than Sydney (KS) Airport, given Teloepa's distance inland being almost identical to Bankstown Airport. This implies that Teloepa would have relatively lower strength characteristics from the northeast and south and correspondingly higher relative strengths from the southeast and southwest/northwest compared to Sydney (KS) Airport.

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## 2.3 Wind Exposure at the Site – the “Local” Wind Environment

Close to the ground, the “regional” wind patterns described above are affected by the local terrain and topography.

- Lower level shielding from landscaping and vegetation along neighbouring streets and open park land.
- Significant existing vegetation to the west around Oatlands Golf Club.
- Generous lower level shielding provided from existing residential development surrounding the area.
- Some potential for wind channelling along surrounding streets.
- Some sites of the masterplan will protect others from adverse wind conditions.

## 3 Wind Acceptable Criteria

### 3.1 Standard Local Government Criteria

The choice of suitable criteria for evaluating the acceptability of particular ground level conditions has been the subject of relatively recent research. The acceptability criteria that have been developed from this research and currently referenced by most Australian Local Government Development Control Plans have been summarised below in **Table 1**.

**Table 1 Standard Local Government Wind Acceptability Criteria**

Type of Criteria	Limiting Gust Wind Speed Occurring Once Per Year	Activity Concerned
Safety	24 m/s	Knockdown in Isolated Areas
	23 m/s	Knockdown in Public Access Areas
Comfort	16 m/s	Comfortable Walking
	13 m/s	Standing, Waiting, Window Shopping
	10 m/s	Dining in Outdoor Restaurant

The primary objectives relating to the above wind impact criteria are as follows:

- The general objective is for annual 3-second gust wind speeds to remain at or below the so-called 16 m/sec "Walking Comfort" criterion. Whilst this magnitude may appear somewhat arbitrary, its value represents a level of wind intensity which the majority of the population would find unacceptable for comfortable walking on a regular basis at any particular location.
- In many urban locations, either because of exposure to open water conditions or because of street "canyon" effects, etc., the 16 m/s "Walking Comfort" level may already be currently exceeded. In such instances a new development should ideally not exacerbate existing adverse wind conditions and, wherever feasible and reasonable, ameliorate such conditions.

It can be seen in **Table 1** that the recommended limiting wind speeds for spaces designed for activities such as seating, outdoor dining, etc., are lower than for "walking comfort".

### 3.2 Practical Application of Wind Criteria

The criteria provided in **Table 1** should not be viewed as "hard" numbers as the limiting values were generally derived from subjective assessments of wind acceptability. Such assessments have been found to vary with the height, strength, age, etc., of the pedestrian concerned.

A further factor for consideration is the extent of windy conditions, and some relaxation of the above criteria may be acceptable for small areas under investigation provided the general site conditions satisfy the relevant criteria.

Finally, it is noted that the limiting wind speed criteria in **Table 1** are based on the maximum wind gust occurring (on average) once per year. Winds at all other times, i.e. monthly winds, weekly winds, etc., would be of lesser magnitude. So for example, a location with a maximum annual gust of 10 m/sec would experience winds throughout the year of a generally very mild nature, conducive to stationary activities (seating, dining, etc).

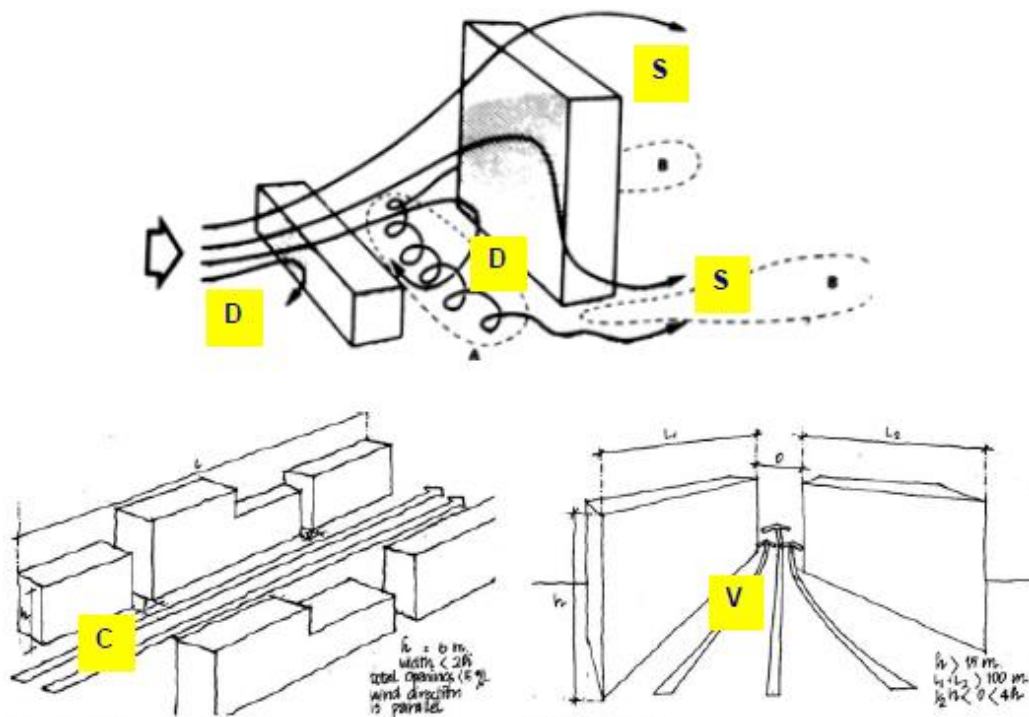
## 4 Building-Wind Interaction – Some General Observations

The impact of wind flowing past buildings has well known general impacts at ground level – refer **Figure 6**:

- **Downwash winds “D”** are the winds which impact on the windward face of a building and are then deflected downwards to ground level in a vertical direction
- Accelerating **Shearflow winds “S”** are the winds which experience an acceleration as they pass by the building edges and roof, as the wind flow moves around and past the building

In general, the taller the building, the more pronounced the impact on ground level winds. Local building details can also influence winds in the immediate vicinity; eg building undercrofts are often associated with local acceleration of winds.

**Figure 6 Wind Flow Patterns past Regular Shaped Buildings**

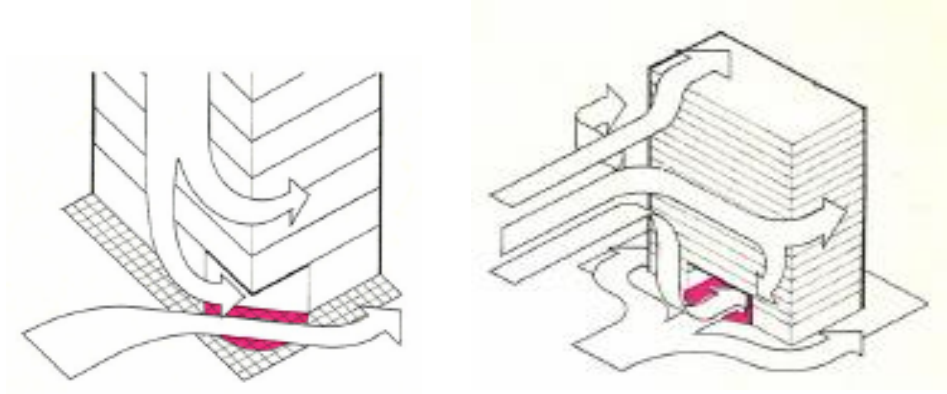


The grouping of buildings can also have an impact on resulting pedestrian winds – refer **Figure 6**:

- **Canyon Effect winds “C”** result when there are rows of parallel buildings (especially taller ones) where the gaps in between line up with prevailing wind directions.
- **Venturi Effect winds “V”** result when wind flow is forced to pass between two converging buildings or groups of buildings with a resulting increase in flow.
- **“Undercroft”** effect is a well-known adverse building-wind characteristic as depicted in the generic building wind effect diagrams shown in **Figure 7**. The winds are induced towards the negative pressure area within the undercroft, creating concentrated adverse wind flow through undercrofts.



**Figure 7 Undercroft Wind**



**Building Undercrofts (left) and Building Cross-Façade Openings (right) can induce concentrated adverse wind flow past and through a building.**

## 5 Wind Impact of the Proposed Development

### 5.1 Existing Winds – Wind Impact and Effects

Existing street level wind conditions in the vicinity of the site could be close to or greater than 16 m/s “walking comfort” criterion for some prevailing wind directions, resulting from channelling of winds along aligning streets. The surrounding built environment which consists of dense low-level residential development provides generous wind shielding to the majority of prevailing wind directions.

#### Northeast Winds

Lower level shielding is provided to the northeast, consisting predominantly of low-level residential housing and existing scattered vegetation along surrounding streets. Northeast winds are generally mild and the potential for exceedance of the 16 m/s criterion along pedestrian pathways is small, i.e. occurrences, if any, are likely to be very infrequent. However, there is some potential that wind channelling could occur through the corridor presented along Adderton Road/light rail line and along Evans Road, this could result in some exceedances being recorded around the site.

#### Southerly Winds

Low level shielding to the south is generous and should provide shielding to the majority of the site and neighbouring pedestrian areas. Similar to winds from the northeast, there remains some risk for channelling of winds along streets throughout the masterplan area, which could result in exceedances of the 16 m/s along the western site boundary.

#### Westerly Winds

There is currently dense vegetation provided west of the site and combining this with the neighbouring residential development, provides significant shielding to the existing site. Exceedances of the 16 m/s criterion are considered to be minimal, i.e. occurrences, if any, are likely to be very infrequent and localised to streets running west to east.

#### Upper Level Winds

Existing upper level wind conditions at the site are likely to exceed the 10 m/s “outdoor eating” comfort criterion for some prevailing wind directions at elevations above the height limits of surrounding buildings.

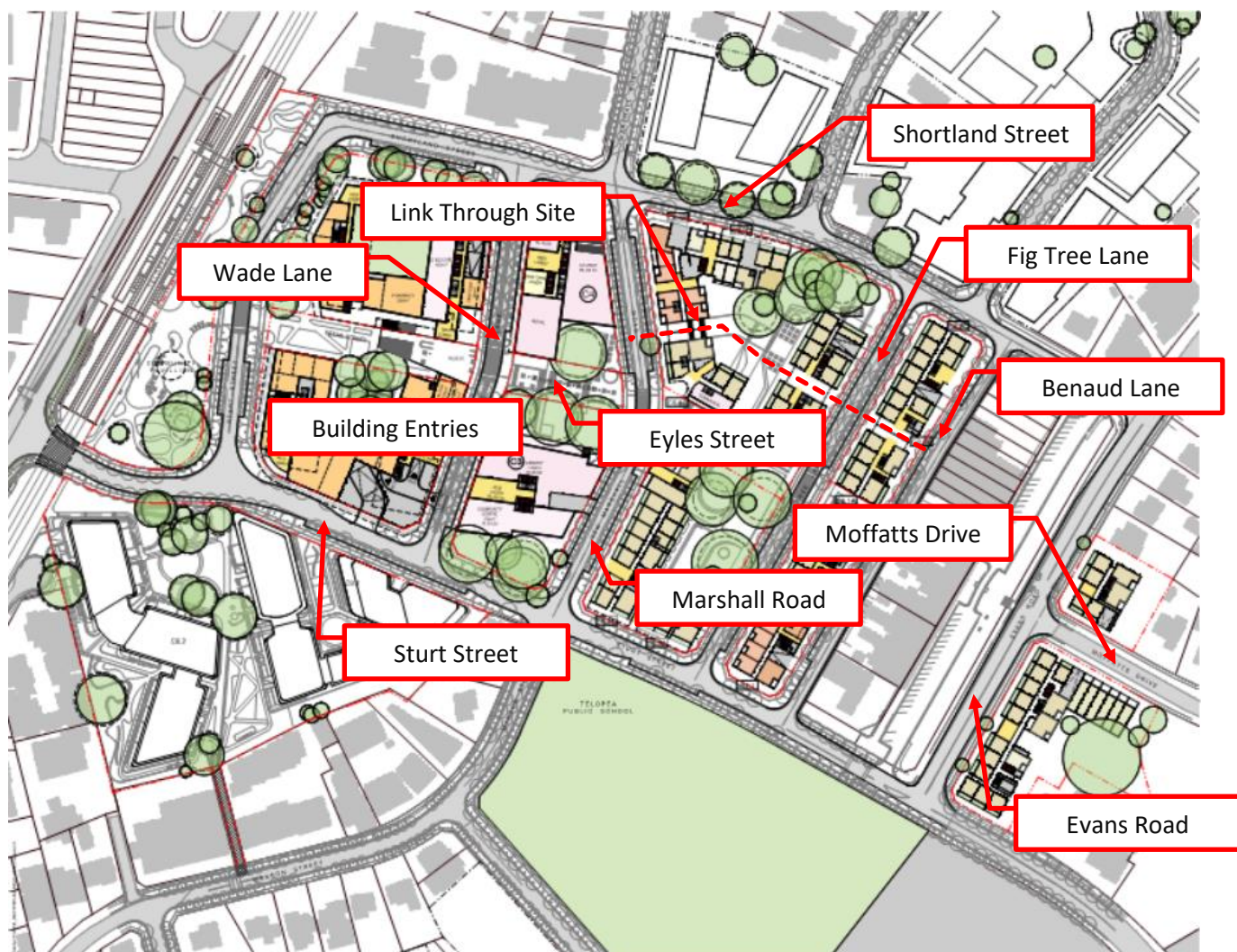
### 5.2 Future Winds – Predicted Wind Flow Patterns

The following sections analyse the expected impacts of the proposed development on the pedestrian wind environment in the adjacent streetscape.

The wind impact of the proposed development is described by examining the impact of prevailing wind conditions on all public access areas of interest within and external to the development.

Areas of interest (i.e. surrounding footpaths, primary entry points, internal public access areas, seating and dining areas, etc) are identified in **Figure 8** to **Figure 11**.

**Figure 8 Areas of Interest Lower Ground Level (Central and East Precinct)**





**Figure 9 Areas of Interest Level 1 (Central and East Precinct)**

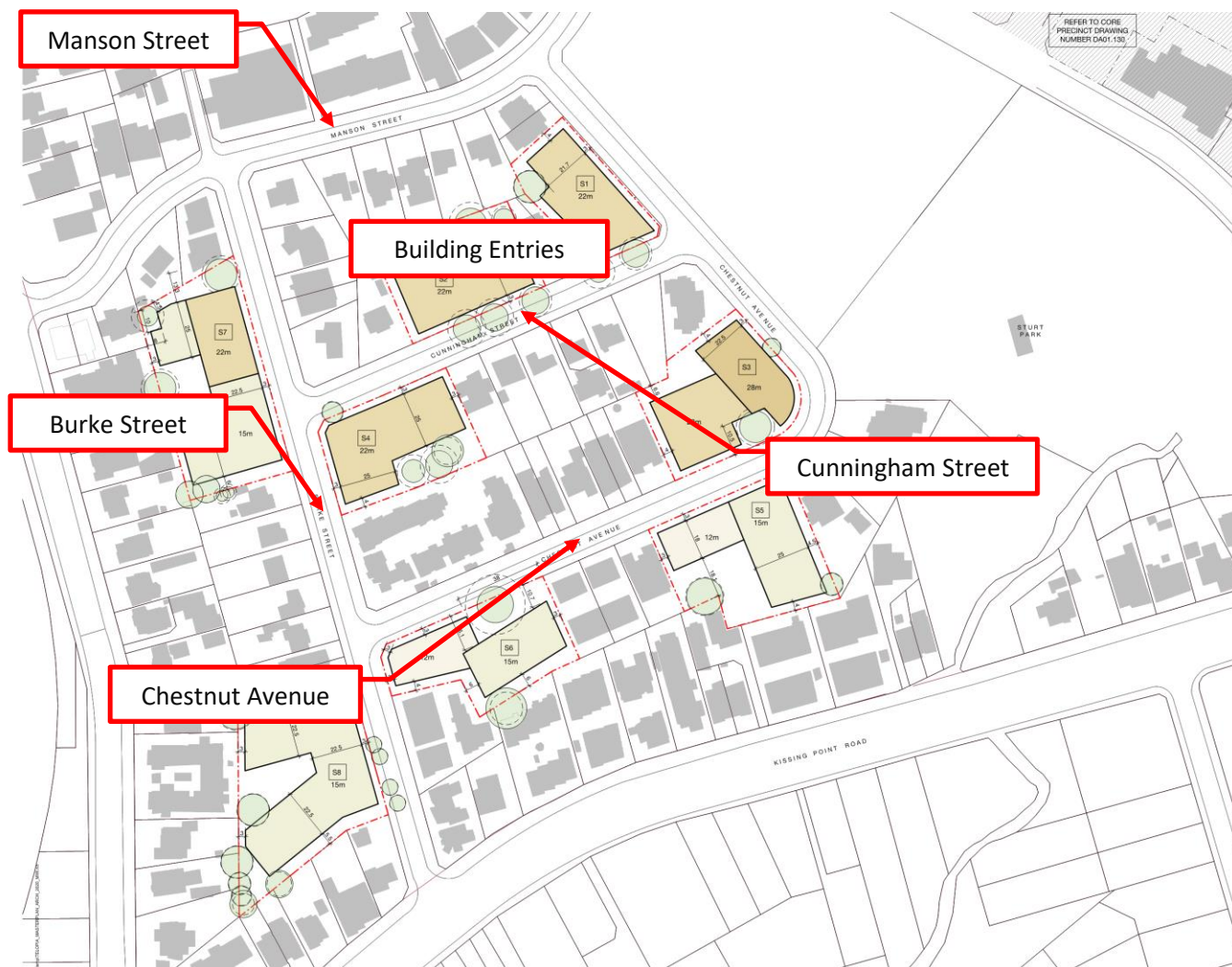


**Figure 10 Areas of Interest Ground Level (North Precinct)**





**Figure 11 Areas of Interest Ground Level (South Precinct)**



### 5.2.1 Northeast Winds

Location	Wind Impact
Wade Lane	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from existing landscaping.</li> </ul>
Sturt Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from existing landscaping.</li> </ul>
Eyles Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from existing landscaping.</li> </ul>
Marshall Road	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from existing landscaping.</li> </ul>
Shortland Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Potential for downwash winds off some northern aspect development facades.</li> <li>Setback of buildings from pedestrian pathways.</li> <li>Awnings over pedestrian pathways.</li> </ul>
Fig Tree Lane	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Potential for wind channelling along street.</li> </ul>
Benaud Lane	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Potential for wind channelling along street.</li> </ul>
Evans Road	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Potential for wind channelling along street.</li> </ul>
Moffatts Drive	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from existing landscaping.</li> </ul>
Fig Tree Avenue	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from existing landscaping.</li> </ul>



Location	Wind Impact
The Parade	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from existing landscaping.</li> </ul>
Manson Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from other masterplan precincts.</li> </ul>
Burke Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from other masterplan precincts.</li> <li>Shielding from the development itself.</li> </ul>
Chestnut Avenue	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from other masterplan precincts.</li> <li>Shielding from the development itself.</li> <li>Potential for downwash winds from the development façade.</li> </ul>
Cunningham Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from other masterplan precincts.</li> <li>Shielding from the development itself.</li> </ul>
Building Entries (Central and East Precinct)	Potential impact here could be <b>close to or exceeding 13 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from other masterplan precincts.</li> <li>Shielding from the development itself.</li> <li>Potential for downwash winds from the development façade.</li> </ul>
Building Entries (North Precinct)	Potential impact here should be <b>less than 13m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from the development itself.</li> </ul>
Building Entries (South Precinct)	Potential impact here could be <b>close to or exceeding 13 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from the development itself.</li> <li>Potential for downwash winds from the development façade.</li> </ul>
Retail Street	Potential impact here should be <b>less than 13m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from other phases of the development.</li> <li>Shielding from existing landscaping.</li> <li>Landscaping which mitigates potential adverse pressure driven winds.</li> </ul>

Location	Wind Impact
Through Site Link	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> <li>• Potential for wind channelling and pressure differences to create accelerated wind conditions.</li> </ul>
C1 Level 1 Podium	Potential impact here should be <b>less than 10m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> </ul>
C3 Level 1 Podium	Potential impact here should be <b>less than 10m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> </ul>
Upper Level Balconies (Level 5 and above)	Potential impact here could be <b>close to or exceeding 10 m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Stronger upper level wind conditions.</li> <li>• Varying degrees of shielding at different heights of the development.</li> <li>• Facades potentially having multiple open aspects.</li> <li>• Wind channelling between buildings.</li> <li>• Wind channelling as a result of pressure difference induced flow.</li> </ul>

### 5.2.2 South and Southeast Winds

Location	Wind Impact
Wade Lane	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from Stage 1A of proposed masterplan.</li> <li>• Shielding from existing landscaping.</li> </ul>
Sturt Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from Stag 1A of the proposed masterplan.</li> <li>• Potential for downwash winds off some northern aspect development facades.</li> <li>• Set back of building facades from pedestrian pathways.</li> <li>• Awnings provided over pedestrian pathways/</li> </ul>
Eyles Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> </ul>
Marshall Road	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> <li>• Potential for wind channelling along between buildings.</li> </ul>

Location	Wind Impact
Shortland Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> </ul>
Fig Tree Lane	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> <li>• Potential for wind channelling along between buildings.</li> </ul>
Benaud Lane	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> <li>• Potential for wind channelling along street.</li> </ul>
Evans Road	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> <li>• Potential for wind channelling along street.</li> </ul>
Moffatts Drive	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> </ul>
Fig Tree Avenue	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from Central and East Precinct of the propose masterplan.</li> </ul>
The Parade	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from Central and East Precinct of the propose masterplan.</li> </ul>
Manson Street	Potential impact here should be <b>less than 13m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> </ul>
Burke Street	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Potential for wind channelling along street.</li> </ul>

Location	Wind Impact
Chestnut Avenue	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from the development itself.</li> <li>Potential for wind channelling along street.</li> </ul>
Cunningham Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from the development itself.</li> </ul>
Building Entries (Central and East Precinct)	Potential impact here could be <b>close to or exceeding 13 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from other masterplan precincts.</li> <li>Shielding from the development itself.</li> <li>Potential for downwash winds from the development façade.</li> </ul>
Building Entries (North Precinct)	Potential impact here should be <b>less than 13m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from the development itself.</li> <li>Shielding from other masterplan precincts.</li> </ul>
Building Entries (South Precinct)	Potential impact here could be <b>close to or exceeding 13 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from the development itself.</li> <li>Potential for downwash winds from the development façade.</li> </ul>
Retail Street	Potential impact here should be <b>less than 13m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from other phases of the development.</li> <li>Shielding from existing landscaping.</li> <li>Landscaping which mitigates potential adverse pressure driven winds.</li> </ul>
Through Site Link	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from the development itself.</li> <li>Potential for wind channelling and pressure differences to create accelerated wind conditions.</li> </ul>
C1 Level 1 Podium	Potential impact here should be <b>less than 10m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from the development itself.</li> <li>Shielding from Stage 1A of the masterplan.</li> <li>Potential wind channelling between buildings.</li> </ul>
C3 Level 1 Podium	Potential impact here should be <b>less than 10m/s</b> , affected by: <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> </ul>

Location	Wind Impact
Upper Level Balconies (Level 5 and above)	<p>Potential impact here could be <b>close to or exceeding 10 m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>Stronger upper level wind conditions.</li> <li>Varying degrees of shielding at different heights of the development.</li> <li>Facades potentially having multiple open aspects.</li> <li>Wind channelling between buildings.</li> <li>Wind channelling as a result of pressure difference induced flow.</li> </ul>

### 5.2.3 Westerly Winds

Location	Wind Impact
Wade Lane	<p>Potential impact here should be <b>less than 16m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from dense upstream vegetation.</li> <li>Shielding from existing landscaping.</li> </ul>
Sturt Street	<p>Potential impact here should be <b>less than 16m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from dense upstream vegetation.</li> <li>Potential for wind channelling along street.</li> <li>Potential for downwash winds from some development facades.</li> <li>Set back of building facades from pedestrian pathways.</li> <li>Awnings provided over pedestrian pathways.</li> </ul>
Eyles Street	<p>Potential impact here should be <b>less than 16m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from dense upstream vegetation.</li> <li>Potential for wind channelling along street.</li> </ul>
Marshall Road	<p>Potential impact here should be <b>less than 16m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from dense upstream vegetation.</li> <li>Shielding from existing landscaping.</li> </ul>
Shortland Street	<p>Potential impact here should be <b>less than 16m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from existing landscaping.</li> <li>Shielding from dense upstream vegetation.</li> <li>Potential for wind channelling along street.</li> </ul>
Fig Tree Lane	<p>Potential impact here should be <b>less than 16m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>Shielding from upstream buildings.</li> <li>Shielding from the development itself.</li> <li>Shielding from dense upstream vegetation.</li> <li>Shielding from existing landscaping.</li> </ul>

Location	Wind Impact
Benaud Lane	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from dense upstream vegetation.</li> <li>• Shielding from existing landscaping.</li> </ul>
Evans Road	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from dense upstream vegetation.</li> <li>• Shielding from existing landscaping.</li> </ul>
Moffatts Drive	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from dense upstream vegetation.</li> <li>• Shielding from existing landscaping.</li> <li>• Some potential for wind channelling along street.</li> </ul>
Fig Tree Avenue	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> </ul>
The Parade	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> </ul>
Manson Street	Potential impact here could be <b>close to or exceeding 16 m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Potential for wind channelling along street.</li> </ul>
Burke Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from existing landscaping.</li> </ul>
Chestnut Avenue	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> </ul>
Cunningham Street	Potential impact here should be <b>less than 16m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> </ul>
Building Entries (Central and East Precinct)	Potential impact here should be <b>less than 13m/s</b> , affected by: <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> </ul>

Location	Wind Impact
Building Entries (North Precinct)	<p>Potential impact here could be <b>close to or exceeding 13 m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> <li>• Potential for downwash winds from the development façade.</li> </ul>
Building Entries (South Precinct)	<p>Potential impact here should be <b>less than 13m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> <li>• At risk entries set back from development façade above.</li> </ul>
Retail Street	<p>Potential impact here could be <b>close to or exceeding 13 m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Potential for wind channelling between buildings.</li> </ul>
Through Site Link	<p>Potential impact here should be <b>less than 16m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> <li>• Shielding from large trees upstream of through site link, mitigating channelling winds.</li> </ul>
C1 Level 1 Podium	<p>Potential impact here should be <b>less than 10m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> </ul>
C3 Level 1 Podium	<p>Potential impact here should be <b>less than 10m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>• Shielding from upstream buildings.</li> <li>• Shielding from existing landscaping.</li> <li>• Shielding from the development itself.</li> </ul>
Upper Level Balconies (Level 5 and above)	<p>Potential impact here could be <b>close to or exceeding 10 m/s</b>, affected by:</p> <ul style="list-style-type: none"> <li>• Stronger upper level wind conditions.</li> <li>• Varying degrees of shielding at different heights of the development.</li> <li>• Facades potentially having multiple open aspects.</li> <li>• Wind channelling between buildings.</li> <li>• Wind channelling as a result of pressure difference induced flow.</li> </ul>



## 6 Wind Amelioration Recommendations

On the basis of the expected wind impacts outlined in previous four sections, recommendations for wind break features are made in areas where winds are expected to

- Approach or exceed 10 m/s, 13 m/s or 16 m/s depending on the designed use for that area.

These wind mitigation recommendations are summarised in **Table 2**.

SLR has worked with the design team throughout the initial phases of the proposed masterplan. Many of the recommendations put forward have been taken into account and incorporated into the design. The comments put forward for specific areas of the site within **Table 2** should be viewed as design principles for the proposed site and considered wherever possible throughout the ongoing design of the masterplan.

**Table 2 Recommended Wind Mitigation**

Location of Interest	Wind Impact Potential	Windbreak Treatment/Recommendation
Wade Lane	<b>Low</b> Winds should be below 16 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Sturt Street	<b>Low</b> Winds should be below 16 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> It is recommended that building facades maintain set back from the neighbouring pedestrian pathways to minimise the impact of downwash winds impacting on passing pedestrians. Set back is recommended to be set at 3m where possible. Additionally, horizontal wind breaks, such as awnings or other practical wind shielding, are recommended to be retained over neighbouring pedestrian pathways. Awnings should extend 3m over the pathway, or an alternatively appropriate distance given the width of the pathway.

Location of Interest	Wind Impact Potential	Windbreak Treatment/Recommendation
Eyles Street	<b>Low</b> Winds should be below 16 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Marshall Road	<b>Moderate</b> Winds could be above 16 m/s for southerly and south-easterly winds.	<b>Mitigation Required</b> SLR recommends that additional trees and landscaping be placed around the corner of Sturt Street and Marshall Road. The western half of the corner does have generous landscaping provided through existing trees to be retained. However, additional landscaping is recommended to the eastern half to mitigate adverse wind channelling effects. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Shortland Street	<b>Low</b> Winds should be below 16 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> It is recommended that building facades maintain set back from the neighbouring pedestrian pathways to minimise the impact of downwash winds impacting on passing pedestrians. Set back is recommended to be set at 3m where possible. Additionally, horizontal wind breaks, such as awnings or other practical wind shielding, are recommended to be retained over neighbouring pedestrian pathways. Awnings should extend 3m over the pathway, or an alternatively appropriate distance given the width of the pathway.

Location of Interest	Wind Impact Potential	Windbreak Treatment/Recommendation
Fig Tree Lane	<b>Moderate - High</b> Winds could be above 16 m/s for northeast, southerly and south-easterly winds.	<b>Mitigation Required</b> SLR recommends that additional trees and landscaping be placed around the corner of Sturt Street and Fig Tree Lane to mitigate potentially adverse wind impact associated with wind channelling between buildings and along street from impacting pedestrians on surrounding pathways. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Benaud Lane	<b>Moderate - High</b> Winds could be above 16 m/s for northeast, southerly and south-easterly winds. <i>This is an existing condition.</i>	<b>No Mitigation Required</b> The potentially adverse wind channelling effects experienced alone Benaud Lane are an existing condition and it is not predicted the proposed masterplan will make wind conditions worse. However, in the interest of improving the all-around site amenity, additional trees are recommended to Benaud Lane, particularly around the corners of Sturt Street and Shortland Street. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Evans Road	<b>Moderate - High</b> Winds could be above 16 m/s for northeast, southerly and south-easterly winds. <i>This is an existing condition.</i>	<b>No Mitigation Required</b> The potentially adverse wind channelling effects experienced alone Evans Road are an existing condition and it is not predicted the proposed masterplan will make wind conditions worse. However, in the interest of improving the all-around site amenity, additional trees are recommended to Evans Road, particularly around the corners of Sturt Street and Shortland Street. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.

Location of Interest	Wind Impact Potential	Windbreak Treatment/Recommendation
Moffatts Drive	<b>Low</b> Winds should be below 16 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Fig Tree Avenue	<b>Low</b> Winds should be below 16 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
The Parade	<b>Low</b> Winds should be below 16 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Manson Street	<b>Moderate</b> Winds could be above 16 m/s for Westerly winds. <i>This is an existing condition.</i>	<b>No Mitigation Required</b> Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Burke Street	<b>Moderate</b> Winds could be above 16 m/s for southerly and southeast winds. <i>This is an existing condition.</i>	<b>No Mitigation Required</b> Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Chestnut Avenue	<b>Moderate - High</b> Winds could be above 16 m/s for south, south-easterly and north-easterly winds. <i>S/SE adverse wind potential is an existing condition.</i>	<b>Mitigation Required</b> Horizontal wind breaks, such as awnings or other practical wind shielding, are recommended over neighbouring pedestrian pathways where shown. Awnings should extend 3m over the pathway, or an alternatively appropriate distance given the width of the pathway.

Location of Interest	Wind Impact Potential	Windbreak Treatment/Recommendation
Cunningham Street	<b>Low</b> Winds should be below 16 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Building Entries (Central and East Precinct)	<b>Moderate - High</b> Winds could be above 16 m/s for south, south-easterly and north-easterly winds.	<b>Mitigation Required</b> It is recommended that building entries be set back from the development façade with wing walls and awnings provided to protect entry area from adverse downwash or channelling impacts. In place of this, features such as air lock entries or revolving doors could also provide appropriate mitigation where required. Alternatively, SLR recommends quantitative assessment, such as Computational Fluid Dynamics or Wind Tunnel Testing, of ground level winds be carried out during the development application phase of the project to quantify wind speeds at entries and determine appropriate wind shielding.

Location of Interest	Wind Impact Potential	Windbreak Treatment/Recommendation
Building Entries (North Precinct)	<b>Moderate</b> Winds could be above 16 m/s for westerly winds.	<b>Mitigation Required</b> It is recommended that building entries be set back from the development façade with wing walls and awnings provided to protect entry area from adverse downwash or channelling impacts. In place of this, features such as air lock entries or revolving doors could also provide appropriate mitigation where required. Alternatively, SLR recommends quantitative assessment, such as Computational Fluid Dynamics or Wind Tunnel Testing, of ground level winds be carried out during the development application phase of the project to quantify wind speeds at entries and determine appropriate wind shielding.
Building Entries (South Precinct)	<b>Moderate - High</b> Winds could be above 16 m/s for south, south-easterly and north-easterly winds.	<b>Mitigation Required</b> It is recommended that building entries be set back from the development façade with wing walls and awnings provided to protect entry area from adverse downwash or channelling impacts. In place of this, features such as air lock entries or revolving doors could also provide appropriate mitigation where required. Alternatively, SLR recommends quantitative assessment, such as Computational Fluid Dynamics or Wind Tunnel Testing, of ground level winds be carried out during the development application phase of the project to quantify wind speeds at entries and determine appropriate wind shielding.

Location of Interest	Wind Impact Potential	Windbreak Treatment/Recommendation
Retail Street	<b>Moderate</b> Winds could be above 13 m/s for westerly winds.	<b>Mitigation Required</b> It is recommended additional landscaping be added around opening and intersections leading to the retail street. Landscaping should have a canopy height of 3m and be densely foliated evergreen species. Further, it is recommended that any proposed outdoor seating, eating or areas that promote public gathering have vertical wind breaks, in the form of wind screens or other practical wind shielding, installed to provide additional protection.
Through Site Link	<b>Moderate - High</b> Winds could be above 16 m/s for south, south-easterly and north-easterly winds.	<b>Mitigation Required</b> It is recommended additional landscaping and vertical windbreaks, such as wind screens, be added around openings to the through site link. Landscaping should have a canopy height of 3m and be densely foliated evergreen species. The full extent of wind impact around the through site link will be investigated further during the development application stage of the project, with the appropriate mitigations to be determined through numerical assessment of wind speeds.
C1 Level 1 Podium	<b>Low</b> Winds should be below 10 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> Additional wind shielding in the form of pergolas and wind screens around seating areas could further reduce wind speed to patrons. Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.



Location of Interest	Wind Impact Potential	Windbreak Treatment/Recommendation
C3 Level 1 Podium	<b>Low</b> Winds should be below 10 m/s for all prevailing wind directions.	<b>No Mitigation Required</b> Additional wind shielding in the form of pergolas and wind screens around seating areas could further reduce wind speed to patrons. Additional landscaping could further protect against adverse winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.
Upper Level Balconies (Level 5 and above)	<b>High</b> Winds could be 10 m/s for all prevailing wind directions.	<b>Mitigation Required</b> For levels 5 and above SLR recommends that corner and balconies with multiple open aspects be converted to nested balconies with a single open aspect, this can be achieved using full height balustrade, wing walls, wind screens or other practical shielding. Alternatively, SLR recommends quantitative assessment, such as Computational Fluid Dynamics, of balconies be carried out during the development application phase of the project to quantify wind speeds at balconies and determine appropriate wind shielding.

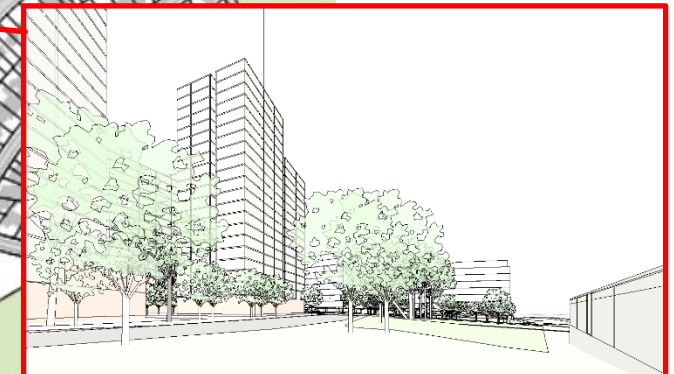
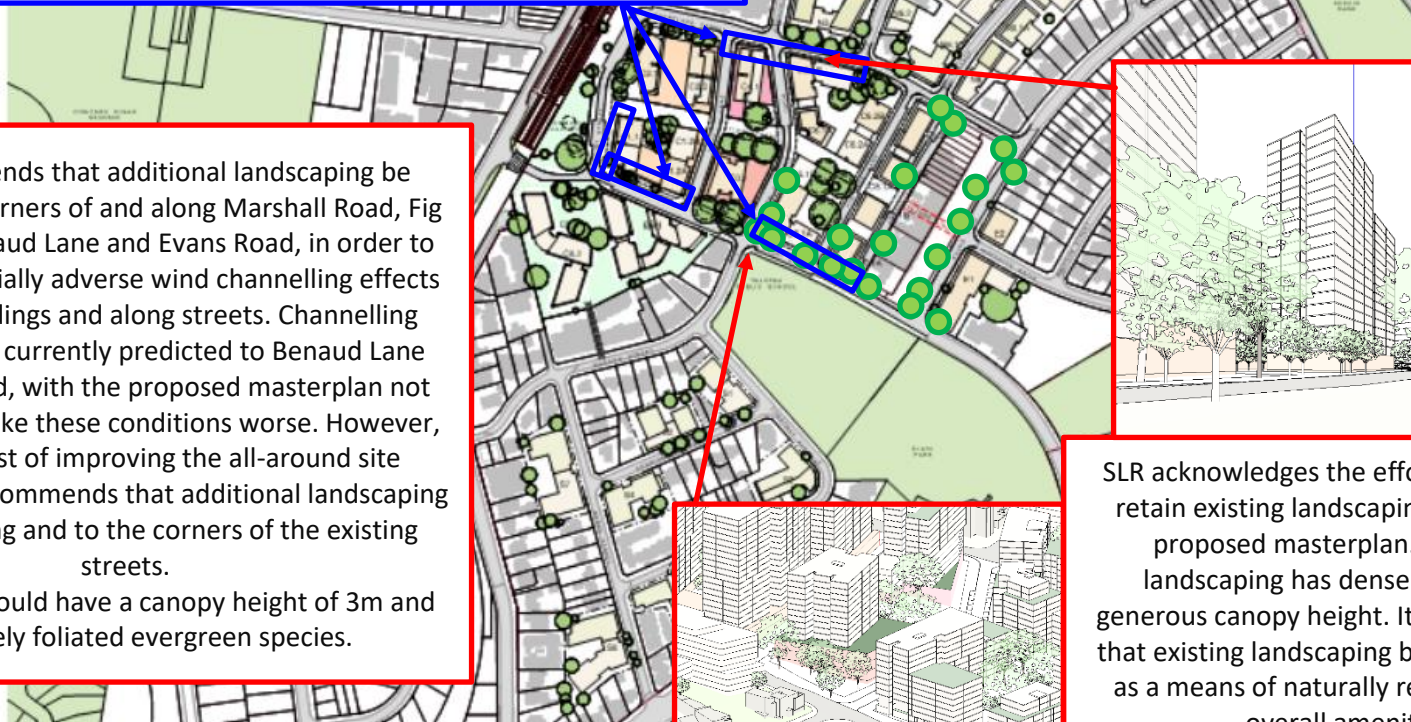
**Figure 12 Mitigation Recommendations Façade Treatments**

It is recommended that building facades maintain set back from the neighbouring pedestrian pathways to minimise the impact of downwash winds impacting on passing pedestrians. Additionally, horizontal wind breaks, such as awnings or other practical wind shielding, are recommended to be retained over neighbouring pedestrian pathways.

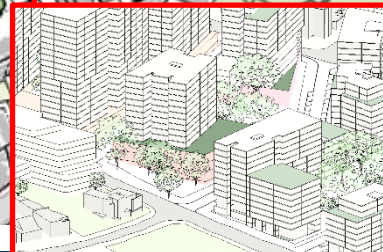


SLR has noted the advantageous design of the proposed site, particularly around the tallest towers located within the Central Precinct of the proposed masterplan. The tallest of the proposed towers are located to the west of the precinct which will greatly aid in mitigating adverse wind conditions from the west by shielding eastern towers from downwash and higher wind speeds.

SLR recommends that additional landscaping be placed to the corners of and along Marshall Road, Fig Tree Lane, Benaud Lane and Evans Road, in order to mitigate potentially adverse wind channelling effects between buildings and along streets. Channelling wind impact is currently predicted to Benaud Lane and Evans Road, with the proposed masterplan not predicted to make these conditions worse. However, in the interest of improving the all-around site amenity, SLR recommends that additional landscaping be added along and to the corners of the existing streets. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.



SLR acknowledges the effort that has been made to retain existing landscaping around and within the proposed masterplan. Much of the existing landscaping has dense evergreen foliage and generous canopy height. It is strongly recommended that existing landscaping be retained where possible as a means of naturally reducing wind speeds and overall amenity for the site.

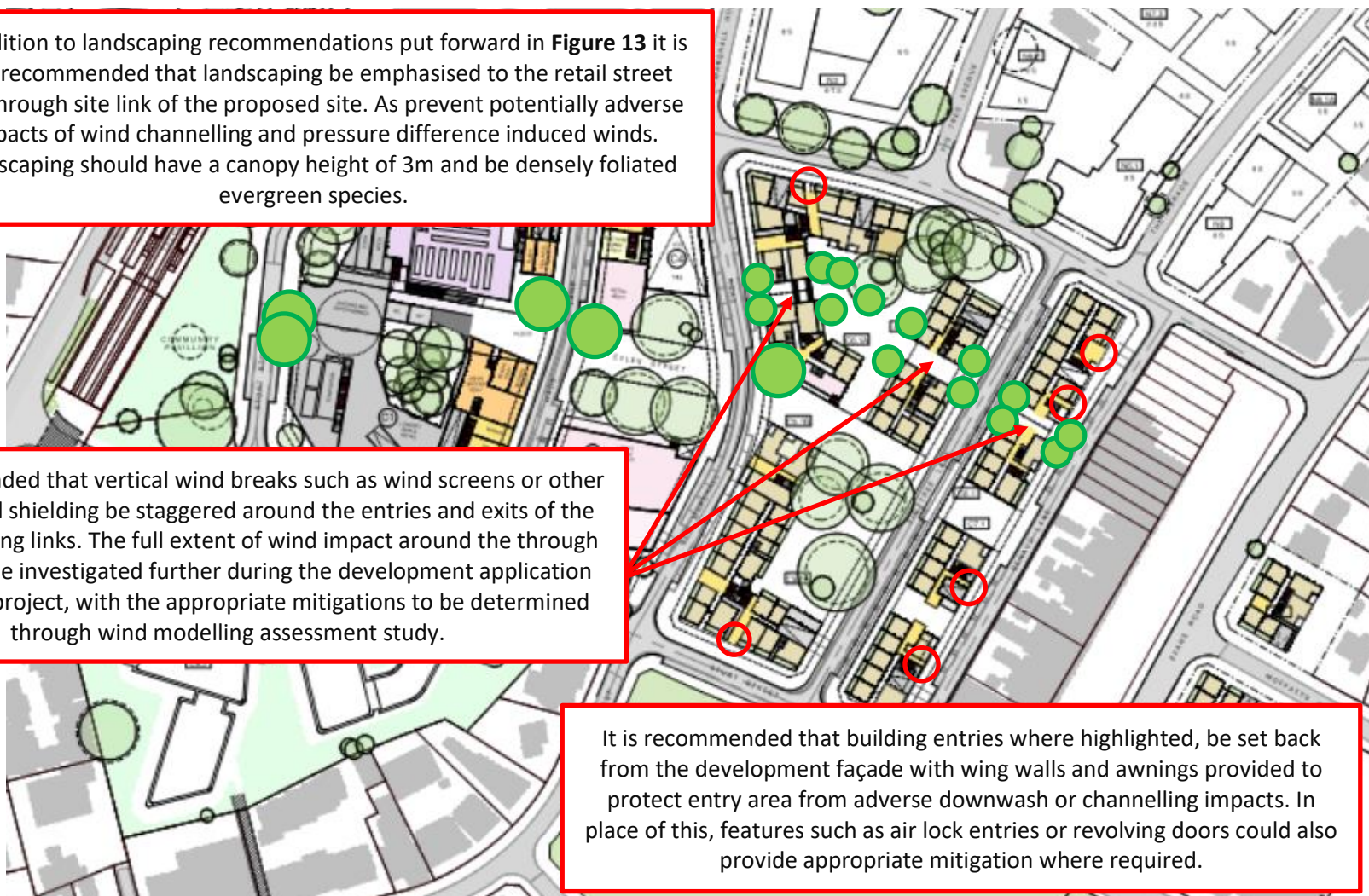


**Figure 13 Mitigation recommendations - Central and East Precinct**

In addition to landscaping recommendations put forward in **Figure 13** it is also recommended that landscaping be emphasised to the retail street and through site link of the proposed site. As prevent potentially adverse impacts of wind channelling and pressure difference induced winds. Landscaping should have a canopy height of 3m and be densely foliated evergreen species.

It is recommended that vertical wind breaks such as wind screens or other practical wind shielding be staggered around the entries and exits of the through building links. The full extent of wind impact around the through site link will be investigated further during the development application stage of the project, with the appropriate mitigations to be determined through wind modelling assessment study.

It is recommended that building entries where highlighted, be set back from the development façade with wing walls and awnings provided to protect entry area from adverse downwash or channelling impacts. In place of this, features such as air lock entries or revolving doors could also provide appropriate mitigation where required.





**Figure 14 Mitigation Recommendations – North Precinct**

It is recommended that building entries where highlighted, be set back from the development façade with wing walls and awnings provided to protect entry area from adverse downwash or channelling impacts. In place of this, features such as air lock entries or revolving doors could also provide appropriate mitigation where required.



**Figure 15 Mitigation Recommendations – South Precinct**





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## 7 Conclusion

SLR Consulting Pty Ltd (SLR) has been engaged by Frasers Property Australia Pty Ltd to undertake an initial qualitative wind assessment of the proposed Telopea Masterplan.

The site situated just east of Oatlands golf course, and predominantly sits within the bounds of Sophie Street to the north, Evens Road to the east, Kissing Point Road to the south and Adderton Road to the west. In terms of the surrounding built environment, low-level development exists in all directions. Additionally, there are some more open areas dispensed throughout the surrounding environment, with Oatlands golf course and a number of local parks being the primary examples. Generous and densely foliated existing landscaping is present throughout the local area.

### Wind Climate

On the basis of long-term wind records obtained from Bureau of Meteorology stations at Bankstown Airport and Sydney Kingsford Smith Airport, SLR has determined that project site has local winds characteristics closer to Bankstown Airport than Sydney (KS) Airport, given Telopea's distance inland from the coast. Accordingly, key prevailing wind directions of interest are the northeast, southeast and south for summer and mainly west quadrant winds for winter.

### Existing Wind Environment

Existing street level wind conditions in the vicinity of the site could be close to or greater than 16 m/s "walking comfort" criterion for some prevailing wind directions, resulting from channelling of winds along aligning streets.

### Future Wind Environment

SLR has worked with the design team throughout the initial phases of the proposed masterplan. Many of the recommendations put forward have been taken into account and incorporated into the design. The provided recommendations and comments for specific areas of the site within the scope of this report should be viewed as design principles for the proposed site and considered wherever possible throughout the ongoing design of the masterplan.

In terms of the future wind environment with the proposed development, the following features of the development are noted as being of most significance:

- The proposed building heights will generally have a positive impact on adverse wind conditions, particularly throughout the Central precinct, with taller western towers serving to shelter eastern buildings from adverse wind conditions.
- The winds along the surrounding footpaths should remain at similar levels providing appropriate landscaping is employed.
- The proposed masterplan should retain the current emphasis on preserving existing trees and landscaping wherever possible.
- Horizontal and vertical wind breaks are recommended for specified building entries, to protect against potential downwash and channelling winds.

- 
- Vertical windbreaks are recommended to the through site link and retail street of the proposed site. The wind shielding proposed is to be a mix of landscaping and wind screens, with the full extent of required shielding to be assessed further during the development application stage of respective masterplan lots.
  - Façade setbacks and horizontal windbreaks are proposed to certain buildings to mitigate downwash wind impacting surrounding pedestrian pathways.
  - Wind mitigations are recommended to identified balconies from level 4 and above. SLR recommends that all proposed balconies be provided with only a single open aspect.

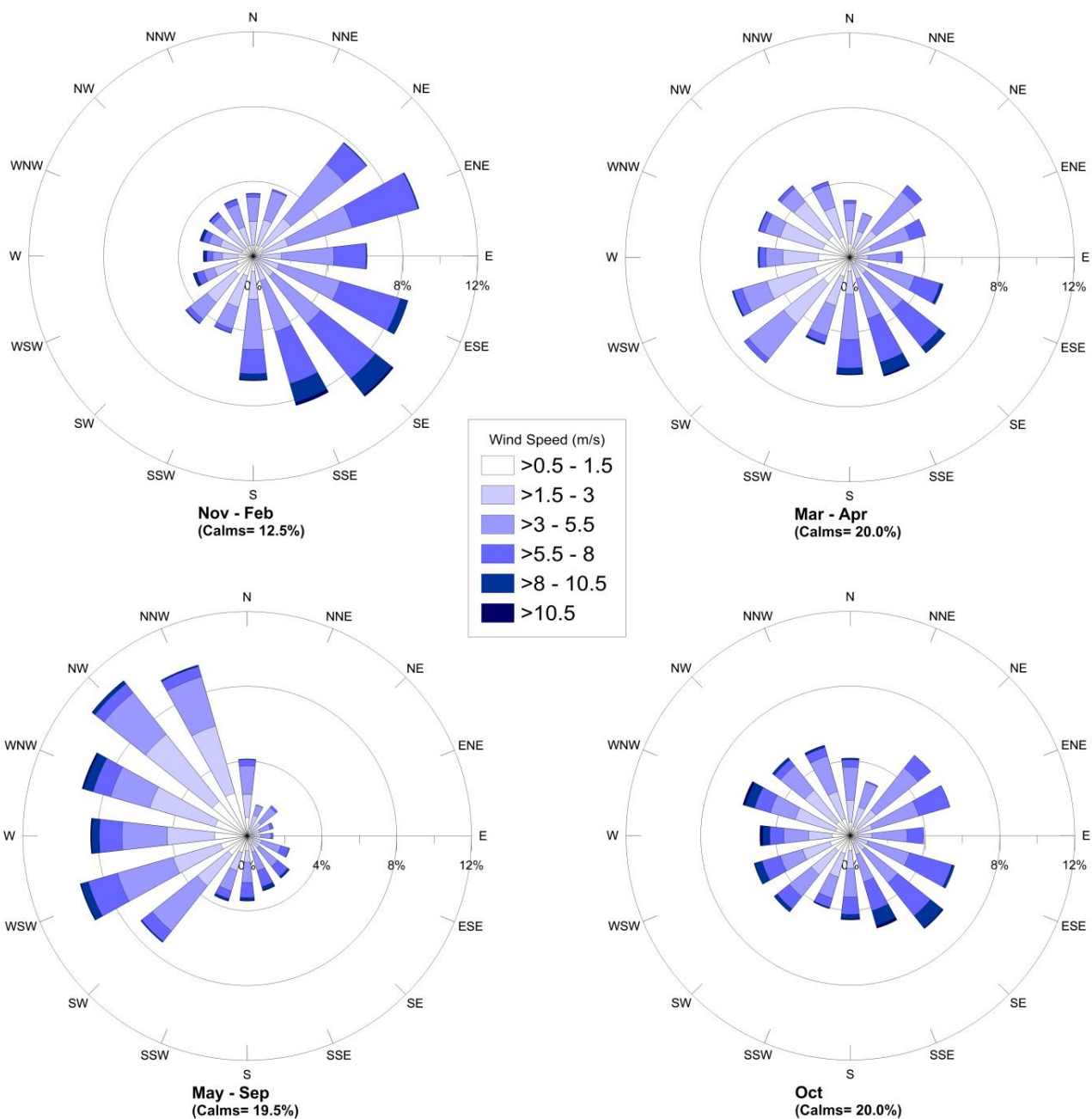
The above analysis has been made on the basis of our best engineering judgment and on the experience gained from scale model wind tunnel testing or computational fluid dynamics analysis of a range of developments. Detailed windflow modelling via either Wind Tunnel Testing or Computational Fluid Dynamics (CFD) Simulation will be used during the Development Application stage to confirm wind speed levels at specific locations and determine the extent of treatment required.

*Taking into account all of the above, it is believed that the proposed Master Plan will likely comply with the adopted wind acceptability criteria at pedestrian and public access locations within and around the Development.*

# APPENDIX A

## Seasonal Wind Roses for Bureau of Meteorology Met Stations at Bankstown Airport and Sydney (Kingsford Smith) Airport

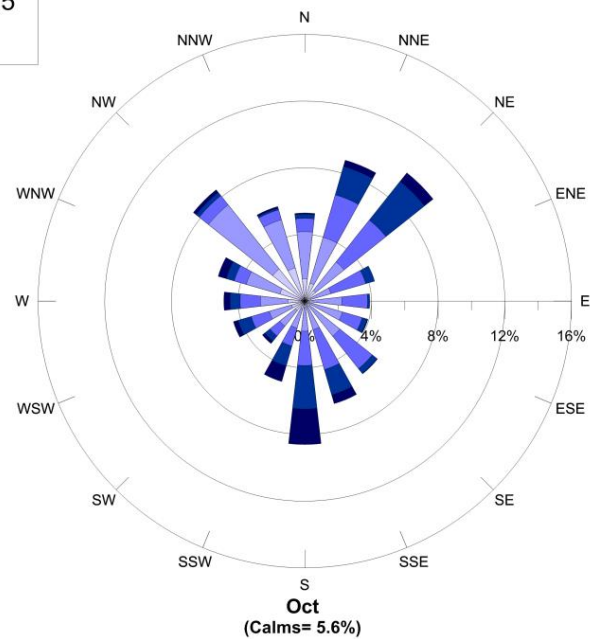
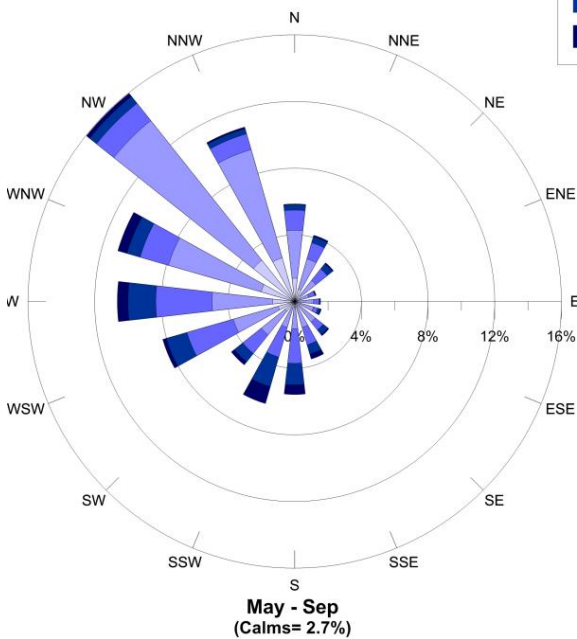
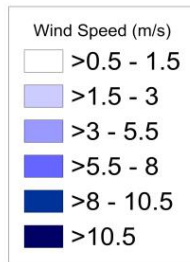
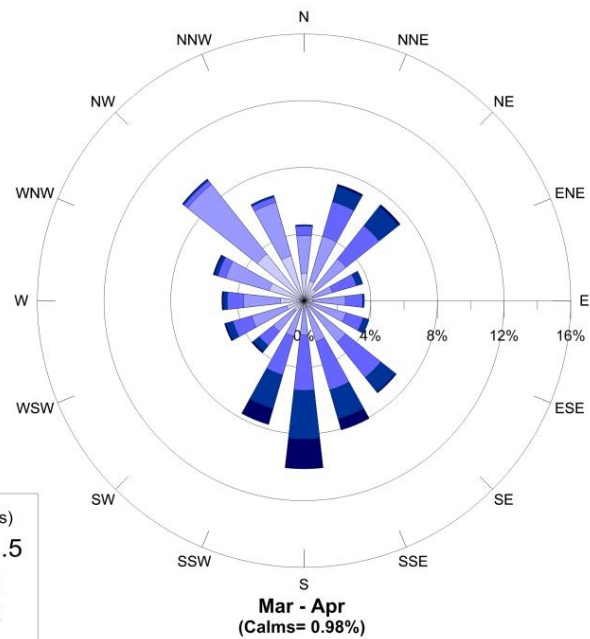
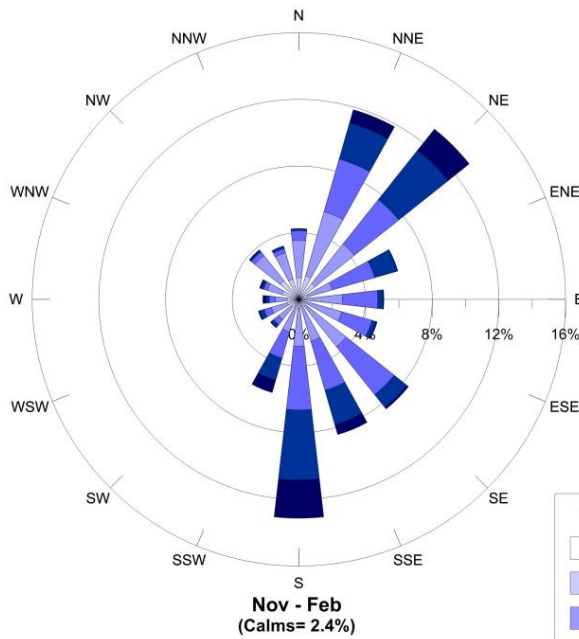
Bankstown Airport AWS  
(Observations)  
1999-2017  
600.09300



# APPENDIX A

## Seasonal Wind Roses for Bureau of Meteorology Met Stations at Bankstown Airport and Sydney (Kingsford Smith) Airport

Sydney Airport AWS  
(Observations)  
1999-2017  
600.09300



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