



Doc Ref: WE691-06F01 (rev2)- WE Memo

Date: August 14, 2020

To: Walker Corporation

Address: Level 21, Governor Macquarie Tower,  
1 Farrer Place, Sydney NSW 2000

RE: BANKSTOWN CITY CAMPUS, WSU  
PEDESTRIAN WIND ENVIRONMENT STUDY MEMO

This technical memo presents an assessment of the updated design for the Bankstown City Campus development of the Western Sydney University (WSU) located at 74 Rickard Road, Bankstown.

Windtech Consultants have previously undertaken detailed wind tunnel testing for this development, as presented in the pedestrian wind environment study provided in December 2019 (report reference: WE691-01F02(rev3)- WE Report). This report assessed the wind environment conditions for pedestrian trafficable areas within and around the subject development with reference to the relevant wind comfort and safety criteria. Wind tunnel testing was utilised for the pedestrian wind environment assessment to quantitatively assess the wind comfort and safety conditions around the subject development. Further in-principle recommendations were provided in the technical memo provided December 2019 for an updated design to address potential wind entry issues (appended report reference: WE691-03F02(rev2)- Wind Entry Memo).

Since the time of issuance of the abovementioned reports, there have been some design changes to the development. Windtech has reviewed the design changes to the development based on the latest set of architectural drawings prepared by Lyons, received 24 July 2020.

The wind conditions for the updated design are not expected to be significantly different to the results of the previous wind tunnel assessment undertaken in December 2019. Therefore, the wind speed results are expected to be the equivalent, and thus recommended in-principle mitigation strategies have remained similar to the previous assessment.

Based on the results of the previous wind tunnel testing, it is expected that the majority of trafficable outdoor locations within and around the development will be suitable for their intended uses. However, some areas are expected experience strong winds which will exceed the relevant criteria for comfort and/or safety. The following in-principle treatments are

recommended to be included and/or retained in the final design, to ensure suitable wind conditions can be achieved in all assessed pedestrian trafficable areas:

- Retain proposed densely foliating, evergreen trees along Appian Way and Paul Keating Park, as shown in Figure 1a. The selected trees (spotted gum) along Appian Way are suitable to offset the wind impact.
- Recommended inclusion of a cluster of densely foliating, evergreen shrubs at the south-western building corner on the Ground Level, as shown in Figure 1a.
- Inclusion of 3m high screens (impermeable or up to 20-30% porosity) near the south-eastern corner entrance on the Ground Level, as shown in Figure 1a.
- Retention of proposed revolving door at the northern entrance on the Ground Level, as shown in Figure 1a.
- Retention of proposed planters and undergrowth near the north-eastern and south-eastern entries on the Ground Level, as shown in Figure 1a.
- Recommended inclusion of a 1.6m high, impermeable balustrade along the perimeter of the balcony located on Level 02, as shown in Figure 1b.
- Recommended inclusion of an impermeable, full-height screen along the eastern perimeter of the north-eastern corner terraces located on Levels 05 and 16, as shown in Figures 1c and 1f.
- Recommended inclusion of an impermeable, full height screen along the northern perimeter of the north-eastern corner terrace located on Level 11, as shown in Figure 1d.
- Recommended inclusion of a 2.1m high impermeable balustrade along the perimeter of the southern terrace located on Level 14, as shown in Figure 1e.
- Recommended inclusion of strategically located densely foliating evergreen landscaping along the southern perimeter of the southern terrace on Level 14, as shown in Figure 1e.
- Recommended inclusion of a 1.2m high impermeable balustrade along the southern perimeter of the terrace located on Level 18, as shown in Figure 1g.

It should be noted that for any points that are exceeding the safety limit (annual peak), the treatment solutions recommended (in-principle) do not rely solely on planting or vegetation. If an area exceeds the safety limit and the treatment recommendation includes planting or vegetation, it should be noted that this is made in combination with solid element treatment solutions, such that the planting/vegetation assists with the comfort levels and the solid element treatment mitigates the annual peak winds.

With the inclusion of these treatments to the final design, it is expected that wind conditions for all outdoor trafficable areas within and around the development will be suitable for their intended uses.

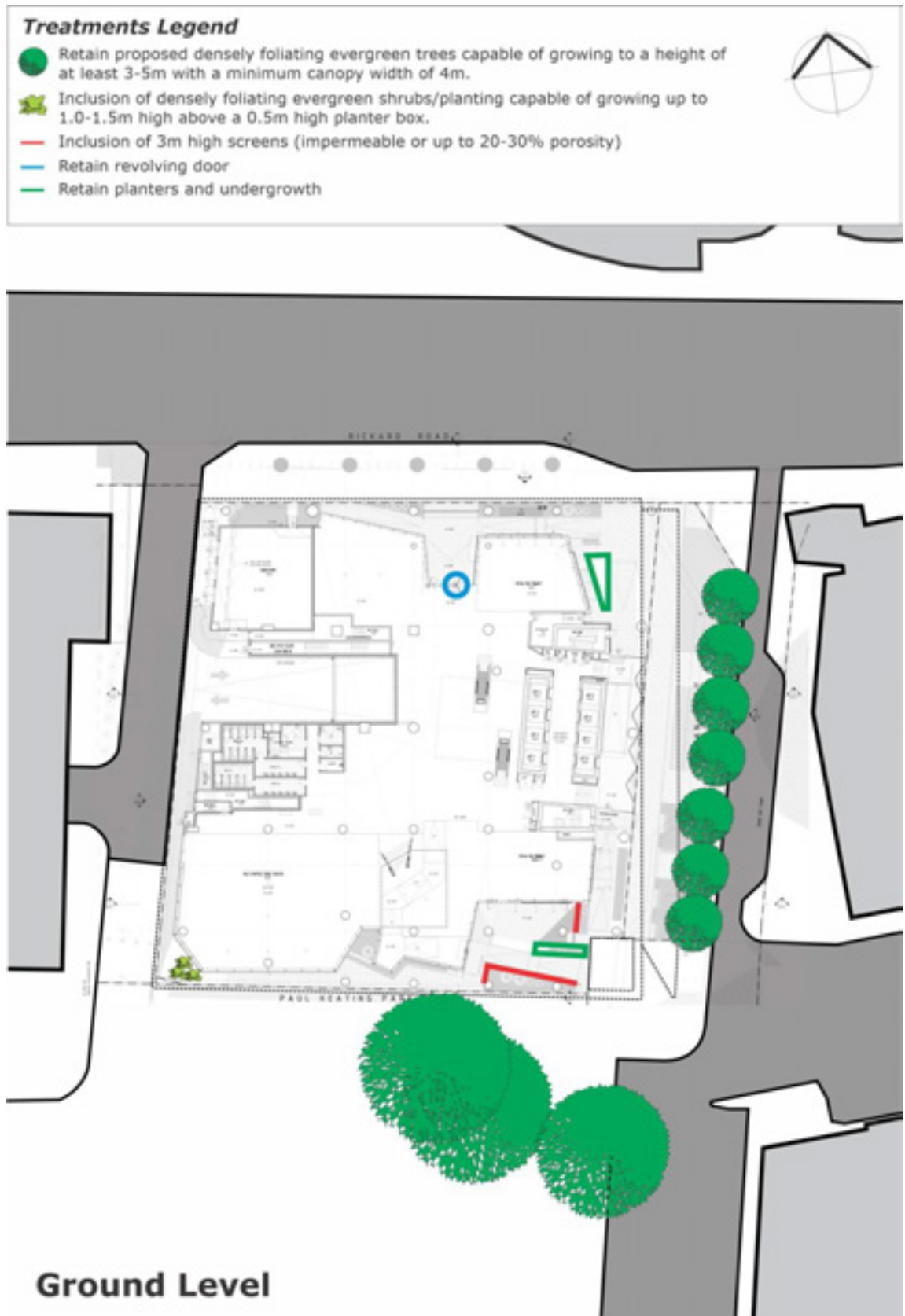


Figure 1a: In-Principle Recommended Treatments for Ground Level

### **Treatments Legend**

— Recommended inclusion of 1.6m high impermeable balustrade along the western and southern perimeter of the balcony

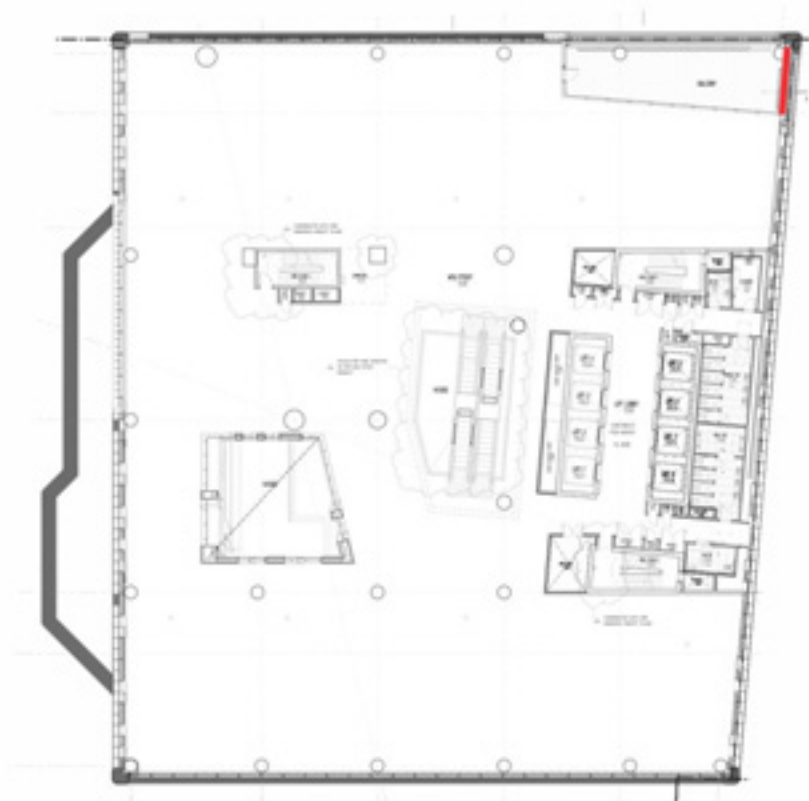


## **Level 02**

Figure 1b: In-Principle Recommended Treatments for Level 02

### **Treatments Legend**

- Recommended inclusion of impermeable full height screen along eastern perimeter



## **Level 05**

Figure 1c: In-Principle Recommended Treatments for Level 05

### **Treatments Legend**



- Recommended inclusion of impermeable full height screen along northern perimeter



## **Level 11**

Figure 1d: In-Principle Recommended Treatments for Level 11

### **Treatments Legend**

-  Recommended inclusion of strategically positioned densely foliating, evergreen planters capable of growing to a height of 2.0-2.5m above the floor slab
-  Recommended inclusion of a 2.1m high, impermeable balustrade along the perimeter of the terrace



## **Level 14**

Figure 1e: In-Principle Recommended Treatments for Level 14

### **Treatments Legend**

- Recommended inclusion of impermeable full height screen along eastern perimeter



## **Level 16**

Figure 1f: In-Principle Recommended Treatments for Level 16



### **Treatments Legend**

- Recommended inclusion of a 1.2m high impermeable balustrade along the southern perimeter of the terrace.



## **Level 18**

Figure 1g: In-Principle Recommended Treatments for Level 18

## DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
July 24, 2020	Initial.	0	HK	MV	JG
July 30, 2020	Updated treatment figures	1	HK	MV	JG
August 14, 2020	Updated for comments	2	HK	MV	JG

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## Appendix



Doc Ref: WE691-03F02(rev2)- Wind Entry Memo

Date: December 20, 2019

To: Archerfield Partners

Address: Level 5, 139 Macquarie Street  
Sydney NSW, 2000

RE: NEW WESTERN SYDNEY UNIVERSITY BANKSTOWN CITY CAMPUS  
WIND ENTRY MEMO

## 1 Introduction

This technical memo is in relation to the wind entry performance of the proposed design of the main ground level, terrace and balcony entries into the new Western Sydney University (WSU), Bankstown Campus located at 74 Rickard Road along with a portion of 375 Chapel Road, Bankstown. This technical memo is based on the entry design from drawings provided by the project architect Lyons, received on the 2<sup>nd</sup> of July, 2019. The high level commentary on the wind entry issues affecting the current design and the effectiveness of the treatment strategies recommended in this technical memo can be quantitatively assessed through wind tunnel analysis.

WSU, Bankstown is a new university campus, 19 levels in height with four large terraces located on Levels 3, 7, 13 and 16 as well as corner terraces and recessed balconies located on the majority of building levels. The main ground level entries allow access into the primary building, retail areas and Appian Way lobby.

The ground level entries comprise one revolving door located in the centre of the recessed façade to the north and another five sliding doors providing access via the eastern side of the development. Doors which are located on balconies and terraces are either auto-sliding or swing-out in nature. All other entries are generally service entries, staff entries or fire escapes, which are expected to remain closed for the majority of the time during normal operating hours.

## 2 Wind Climate

The wind climate for the Bankstown region is shown in Figure 1. It can be seen that the prevailing wind directions for this region are from the north-easterly, south-easterly and westerly sectors. The south-easterly winds are by far the most frequent, and are also relatively the strongest. The westerly winds have a lower probability of occurrence, however, the winds are slightly stronger than the wind conditions experienced from the south-easterly directions. The north-easterly sector winds are weaker but more frequent than the westerly winds.

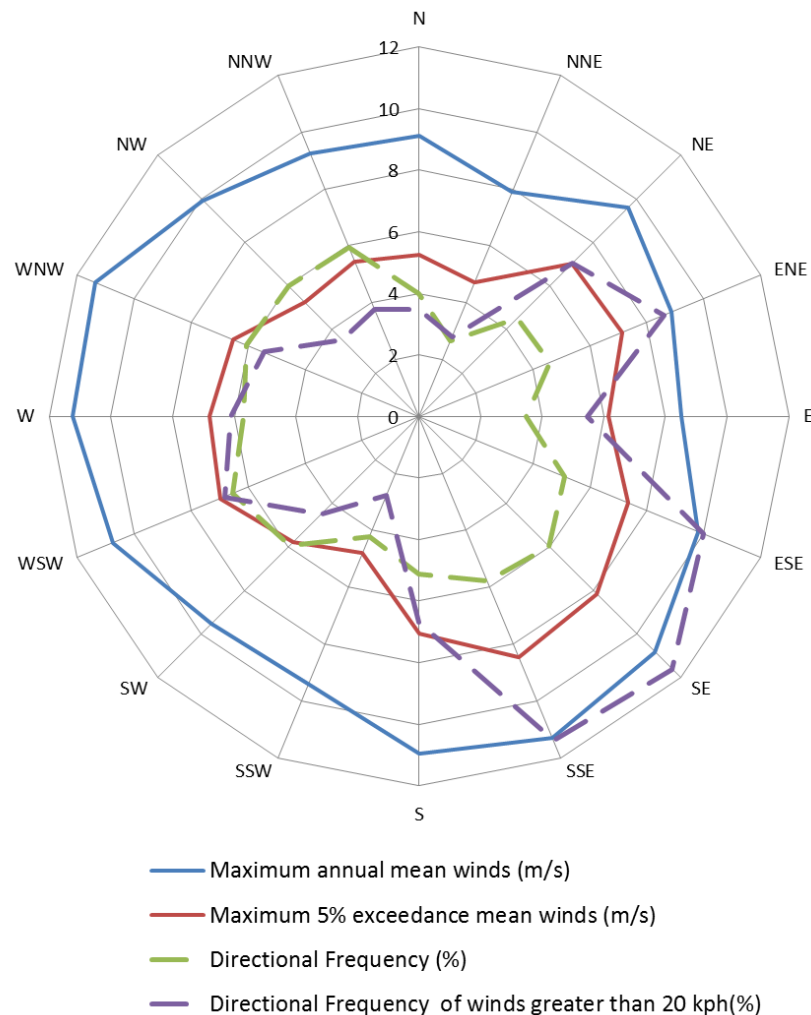


Figure 1: Annual and 5% Exceedance Hourly Mean Wind Speeds, and Frequencies of Occurrence, from Bankstown Airport (referenced to 10m above ground in standard open terrain and corrected for local interference effects)

### 3 Analysis

The development is bounded by predominantly open pavement and roads with parkland to the south. Further from the site are mid to high-rise buildings in the form of residential, commercial and retail developments which provide a degree of shielding from the predominant winds for the Bankstown region.

Wind entry issues arise primarily due to pressure differences between different openings to an internal space. The characteristics and locations of the external and internal openings determine the pressure-driven flow of air, whereby the mass flow rate of air into the internal space is equal to the mass flow rate of air out of the internal space.

It is expected that wind entry conditions would be excessive for the following areas:

- Ground Level entries
- Level 3 terrace north-western central entry

All other elevated outdoor entries are expected to experience suitable wind conditions as they are either sufficiently recessed within the building form, oriented away from the prevailing winds, or shielded by proposed awnings and/or planting.

#### Ground Level

At ground level, the central northern entry will experience adverse wind effects due to the north-easterly winds. The alignment of the façade towards the north will result in the entry being exposed to strong positive pressurisation. As internal spaces are generally negatively pressurised, the internal pressure is expected to exacerbate the effect of positive pressurisation of the entries exposed to the prevailing winds, which would result in flow directed inwards, creating uncomfortable conditions at the entryway.

These conditions are expected to be exacerbated due to the concave design of the northern building entry which is expected to accentuate the positive pressurisation of those two entries in the event of a north-easterly wind.

Similar wind effects are expected to occur at the north-eastern retail entry, however retention of the proposed planting layout and inclusion of the new awning will provide adequate mitigation to reduce pressure driven flow. The entries into the Appian Way lobby will likewise benefit from their recessed position and the awning above Appian Way.

The south-eastern entries are expected to experience strong direct impact effects particularly from the south-easterly winds. There is the potential for consistently strong pressure driven flow due to the alignment with the prevailing winds and the recessed façade facilitating the capture of these winds. However, the proposed revolving door proposed for the northern aspect entry will minimise the pressure differential at the entrance and thus reduce pressure driven flows. Hence, the revolving door will prevent drafts and create comfortable wind conditions for pedestrians and it is recommended that it be retained as shown in Figure 2. Nevertheless, the opening on the eastern aspect and the overall negative internal pressure is likely to result in excessive wind entry at these two south-east facing entries. Hence, it is recommended that two 3m high screens (impermeable of 20-30% porous in nature) be included on both

sides of the ramp to dampen the prevailing wind impacts as indicated by Figure 2. It is important that the southern screen extends to the bottom of the ramp as any reduction in the extent of this screen will significantly compromise the effectiveness of this mitigation strategy. Other options were assessed but were found to be not as effective as the layout presented in Figure 2.

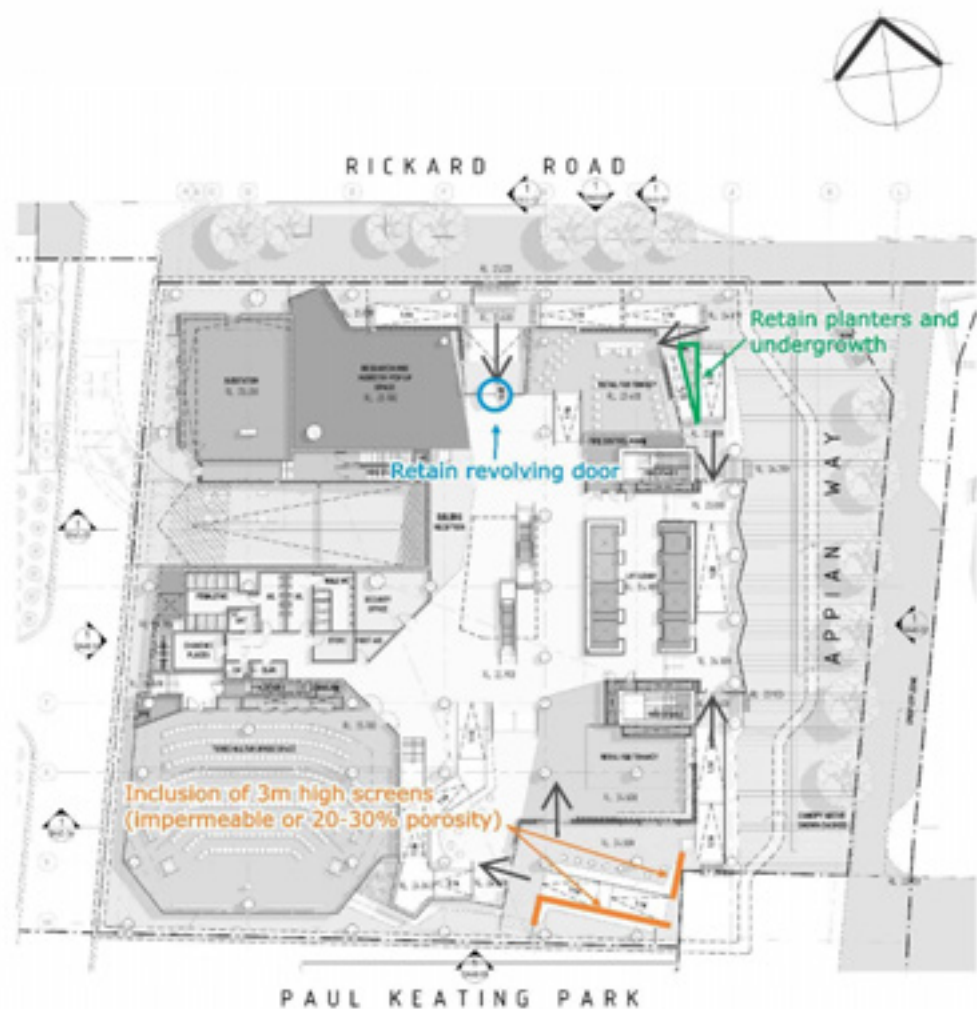


Figure 2: Treatment Recommendations - Ground Level

## Level 3 Terrace

The critical winds for the Level 3 terrace are the south-easterly and westerly winds. These winds have the potential to produce positive pressurisation against these windward facing entries. Along the western façade the potential for adverse winds may be exacerbated by the concave façade, which promotes funnelling of the westerly winds. These conditions are expected to be alleviated by the introduction of the proposed awning along the western aspect of the building (updated design) and overhang of the southern aspect of the tower. The awning serves to reduce the pressure differential between the negative internal pressure and the positive flow acting on the entry door by reducing the contributions of downwash winds. As the westerly winds impact the tower and cascade down (downwash) they are deflected away from the western entry by the proposed awning. However, as the awning extends close to the western edge of the terrace, the lengthy extent may capture winds flowing over the podium and funnel them towards the entry. Hence, it is recommended that the extent of the awning be reduced as per Figure 3.

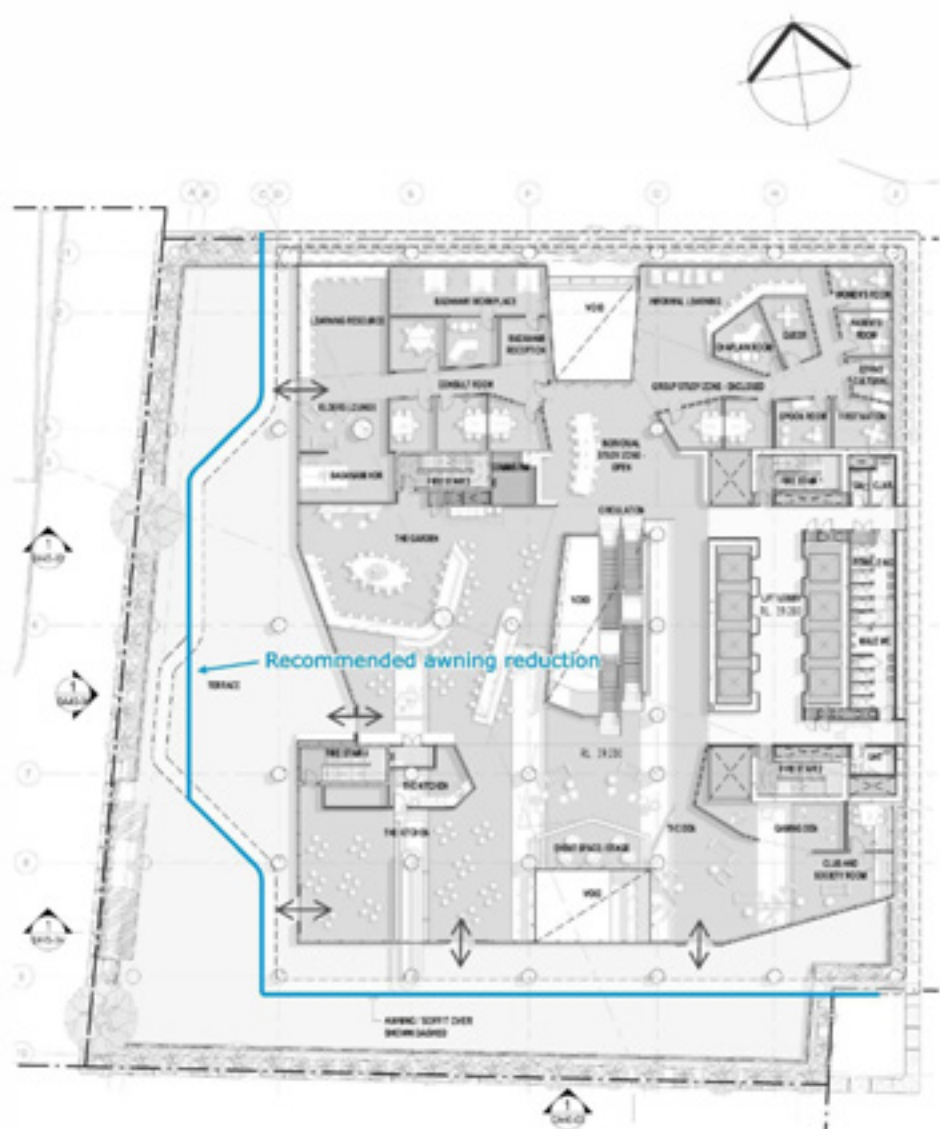


Figure 3: Treatment Recommendations – Level 3



## DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
June 27, 2019	Initial	0	NR	SWR	NT
July 26, 2019	Updated drawings and treatments	1	NR	SWR	TR
December 20, 2019	Review treatments	2	NR	SWR	TR

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