ATLASSIAN CENTRAL

SYDNEY, AUSTRALIA

PEDESTRIAN WIND STUDY
RWDI # 2100277
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SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed Atlassian Central development located on Block A of the Central Station Western Gateway Precinct in Sydney, NSW. The pedestrian level wind assessment was conducted for five configurations:

Configuration 1: Existing Site with Existing Surrounding Buildings;

Configuration 2: Proposed Development with Existing Surrounding Buildings;

Configuration 3: Proposed Development and Dexus/Fraser with Existing Surrounding Buildings;

Configuration 4: Proposed Development, Dexus/Fraser and Toga with Existing Surrounding Buildings; and,

Mitigation: Proposed Development with Existing Surrounding Buildings, Proposed Landscaping and Wind Mitigation Measures.

The Western Gateway Sub-Precinct is undergoing rapid transformation and as part of the recent rezoning of the Precinct, draft Design Guidelines have been developed which provide specific wind mapping and comfort criteria's for the boundary of the area within the Precinct. While the Design Guidelines and wind mapping is understood to yet be finalized, this report references the draft version of the wind mapping and design guidance proposed. This report has sought to model wind impacts from the proposed development with respect to this precinct boundary.

At the time of writing this report, only Blocks A (Atlassian) and Block B (DEXUS/Frasers) have been rezoned. The wind analysis has examined the detailed design of Block A. However, at this stage has only modelled the building envelope for Block B, as the detailed design is not currently available. The Adina Hotel (TOGA) is not currently rezoned, but this may be a potential future consideration from a wind perspective.

The potential wind conditions at pedestrian level within and around the Site were predicted using the results from a boundary-layer wind tunnel test combined with historical meteorological wind records for the area. Wind conditions have been tested at all locations in the local vicinity, however in response to the draft Western Gateway Design Guidelines, this report only presents the results of the wind conditions in response to the draft wind mapping proposed within the boundaries of the Western Gateway 'Precinct', as shown on site plans in Figures 9 through 22, while the associated wind speeds are listed in Table 1. The results can be summarised as follows:

- The relevant wind criteria established in the draft Western Gateway Design Guidelines for the specific public domain areas around the site are generally satisfied. Some select areas of the proposal will require carefully design mitigation measures, which have been examined in close detail by the project team.
- The existing baseline wind conditions generally satisfy the appropriate comfort criteria as identified in the Western Gateway Design Guideline wind mapping. The probe at location 23 to the east of Lee Street was noted to exceed the safety threshold criteria.
- The inclusion of the Atlassian Central development would result in a slightly windier environment off-site; however, it would continue to meet the criteria with the majority of areas being suitable for sitting to walking use annually. On-site wind conditions would be windier than suitable for a number

of amenity spaces on ground level (probe locations 46, 47 and 49) and on the OSD Podium (probe locations 94-97, 103, 108 and 109). Some of these areas on and off-site would also exceed the safety threshold (probe locations 2, 13, 16, 23, 41, 92, 94-97, 103 and 108) and would thus require mitigation to ensure the safety criteria is met. The Atlassian building will have a minor impact on the wind conditions in the northern area of the Western Gateway Precinct. Under the scenario modeled, the probes located at points 47, 48. 49 will not achieve a wind comfort criteria of sitting (as required under the proposed Western Gateway Design Guidelines). For the purposes of this report, Atlassian has only modeled the existing built form condition to the north of the site and as such has made no assumptions about the design of the future proposed public space. It is understood that through the redevelopment of the public space to the north of the site that there will be the ability to improve the wind comfort criteria in this area.

- With the introduction of Dexus/Fraser envelope, wind conditions off-site along Lee Street, Henry Dean Plaza and between Atlassian Central and Dexus/Fraser envelope would be windier than Configuration 2, however would continue to meet the standing/walking criteria annually. The exception to this would be at probe location 23, which would have uncomfortable wind conditions due to the introduction of Dexus/Fraser. On-site wind conditions would improve at ground level with all the areas meeting sitting and standing use conditions suitable for an outdoor area, however on the OSD Podium probe locations 94-97, 103, 108, 109 and 113 would persist to be windier than suitable for the intended use and would require mitigation. Conditions in the future Central Square will continue to meet the standing conditions. The number of safety exceedances off-site would also increase from 3 locations in Configuration 2 to 8 locations (2, 23, 28-30 and 62-64), but safety exceedances on-site would reduce from 9 to 5 and would all be concentrated at the OSD Podium level of the proposed development. It is understood that the Dexus/Frasers team are working through the safety exceedances as part of the ongoing design of their development. . It is understood that Dexus/Frasers are investigating local wind mitigation measures and adjustments to building envelopes to address these exceedances. The Atlassian Development does not contribute to the exceedences noted.
- With the inclusion of Toga building envelopment with the Atlassian Central development and Dexus/Fraser envelopes, wind condition would further increase between the developments due to flow channeling causing uncomfortable wind conditions at probe locations 9, 10 and 28 at ground level. On-site wind conditions would improve at certain locations (12, 96 and 109), however would remain unsuitable at probe locations 13, 14, 94-97, 103 and 108. Conditions in the future Central Square will continue to meet the standing conditions. As a result of the windier environment at ground level safety exceedances would increase from 10 in Configuration 3 to 11 (9, 10, 23, 28-30 and 62-64), but again safety exceedances on-site would reduce from 5 in Configuration 3 to only 3 at probe location 94, 96 and 103.
- The wind assessment was conducted devoid of landscaping to assess the “worst-case” scenario of the wind microclimate. A proposed landscaping scheme and wind mitigation measures (that included soft and hard elements in the form of trees, canopies and porous screens distributed around the site) would improve the wind conditions at the majority of locations. As with the above, all parties are working together to address these wind exceedances through the ongoing design of the buildings and landscape beyond Block A.

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1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed development known as the Atlassian Central development located on Block A of the Central Station Western Gateway Precinct in Sydney, NSW. This report presents the project objectives, background and approach, and discusses of the results from RWDI's wind tunnel assessment and provides conceptual wind control measures, where necessary.

1.1 Project Description

The project (Site shown in Figure 1) is located at the north-western corner of the Central Station Western Precinct at the south-eastern side of the Upper Carriage Lane just of Lee Street. Block B (Dexus/Fraser) located to the south and Block C (Toga) is located to the north-west of the Site. The proposed development will replace the existing building and is approximately 126 m in height.

1.2 Objectives

The objective of the study was to assess the effect of the proposed development on local conditions in pedestrian areas within and around the study site and provide recommendations to minimise adverse effects, if needed. This quantitative assessment was based on wind speed measurements of a scale model of the proposed development and surrounding buildings in one of RWDI's boundary-layer wind tunnels. These measurements were combined with the local wind records and compared to appropriate criteria to gauge the level of wind comfort and safety in pedestrian areas. The assessment focused on critical pedestrian areas, including public footpaths

Figure 1: Aerial View of site (approximate extent of the site highlighted in blue) and Surrounding Environment (Photo Courtesy of Google™ Earth)

2 BACKGROUND AND APPROACH

2.1 Wind Tunnel Study Model

To assess the wind environment around the proposed development, a 1:300 scale model of the development site and surroundings was constructed for wind tunnel testing of the following configurations:

Configuration 1: Existing Site with Existing Surrounding Buildings;

Configuration 2: Proposed Development with Existing Surrounding Buildings;

Configuration 3: Proposed Development and Dexus/Fraser with Existing Surrounding Buildings;

Configuration 4: Proposed Development, Dexus/Fraser and Toga with Existing Surrounding Buildings;

Mitigation 1: Proposed Development with Existing Surrounding Buildings, Proposed Landscaping and Wind Mitigation Measures; and

The wind tunnel model included all relevant surrounding buildings and topography within an approximately 360 m radius of the study site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were also simulated in RWDI's wind tunnel. The wind tunnel model was instrumented with 129 specially designed wind speed sensors to measure mean and gust speeds at a full-scale height of approximately 1.5 m above local grade with 110 sensors located within the Western Gateway 'precinct', in the pedestrian accessible areas. Wind speeds were measured for 36 directions at 10-degree increments. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the mean wind speed at a reference height above the model. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for this site and reviewed by the client.

A publicly accessible privately owned space is proposed above the Parcels Shed Roof. This is referred to as the "OSD Podium". This is is noted to provide an additional open space element within the Site, and also provides an opportunity to pedestrian linkages to future over rail development to the east of the site. The OSD Podium comprises a mix of landscaping, tiered seating and an enclosed pavilion on the eastern portion of the Parcels Shed roof.

The five topmost levels of the building for the Tower Crown which combine a mix of enclosed and open-air space, aligned with the sun access plane. These levels will accommodate a mix of amenities including health and wellness, café and dining, meeting and lounge spaces as well as planted 'Roof Terraces'.

Figure 2: View from the south of the Existing Site with Existing Surrounding Buildings in the wind tunnel

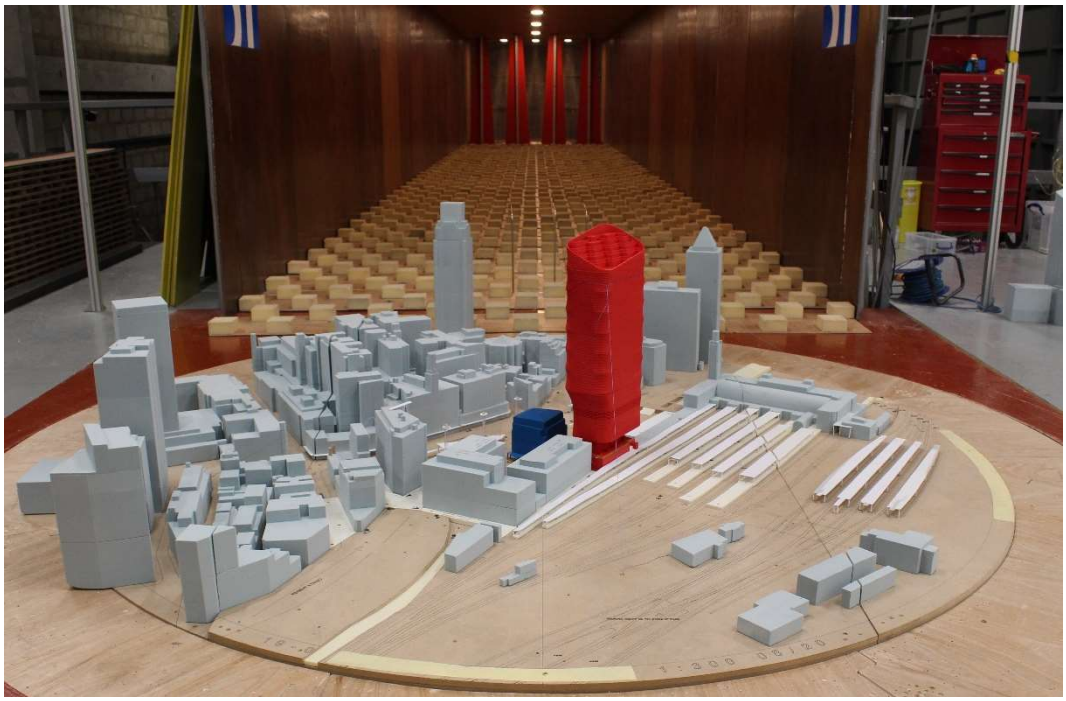

Figure 3: View from the south of the Proposed Development with Existing Surrounding Buildings in the wind tunnel

Figure 4: View from the south of the Proposed Development and Dexus/Fraser massing envelope with Existing Surrounding Buildings in the wind tunnel

Figure 5: View from the south of the proposed development, Dexus/Fraser and Toga massing envelopes with Existing Surrounding Buildings in the wind tunnel

2.2 Meteorological Data

Wind statistics recorded at Sydney International Airport between 1995 and 2018, inclusive, were analysed for the Summer (November to April) and Winter (May to October) seasons. Figure 6 graphically depicts the directional distributions of wind frequencies and speeds for these two seasons. Winds from the north-northeast, south-southeast are predominant during Summer season while winter winds tend to originate from the northwest quadrant, west-southwest and south-southwest as indicated by the wind roses. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10 m) occur for 10.6 % and 8 % of the time during the summer and winter seasons, respectively.

Wind statistics were combined with the wind tunnel data to predict the frequency of occurrence of full-scale wind speeds. The full-scale wind predictions were then compared with the wind criteria for pedestrian comfort and safety.

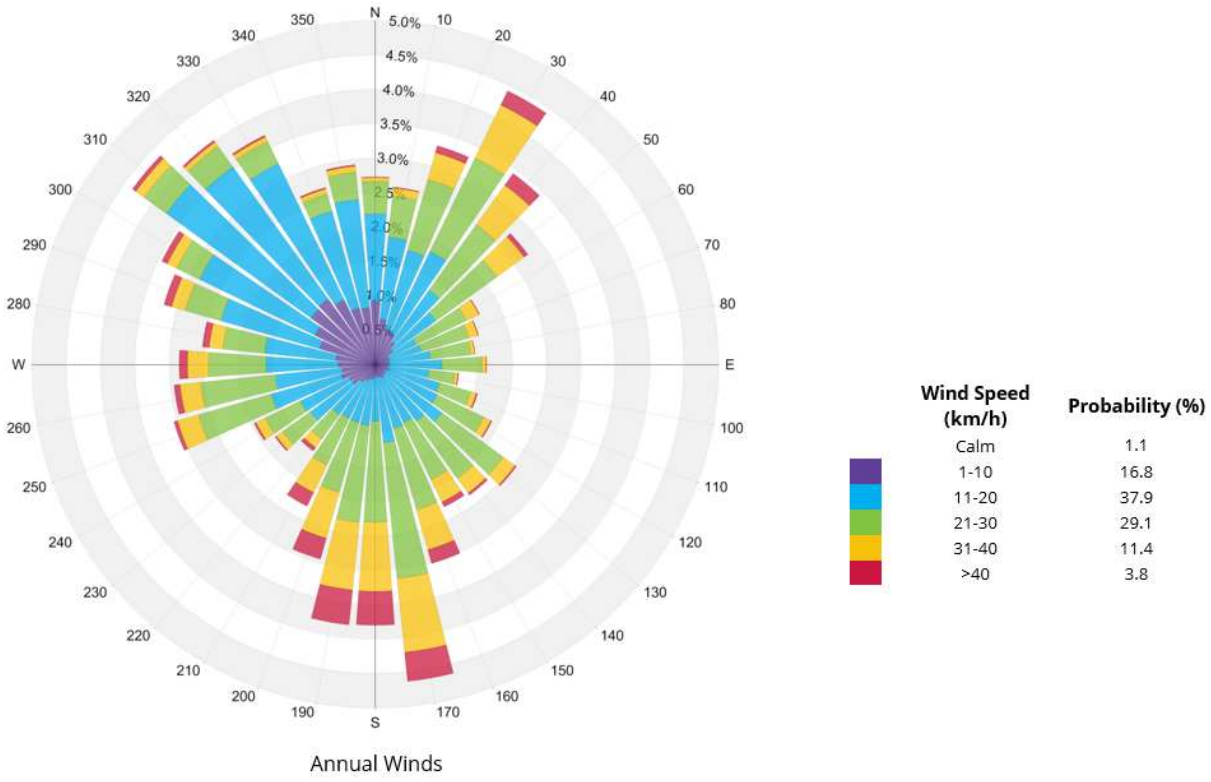

Figure 6: Directional Distribution (%) of Winds Approaching Sydney International Airport from 1995 to 2018

2.3 The Draft Sydney Planning Strategy 2016-2036 wind criteria

The assessment of wind comfort and safety is based on the criteria described in the Draft Sydney Planning Strategy 2016 – 2036. The criteria state the following:

> *Define the mandatory **Wind Safety Standard** as an annual maximum peak 0.5 second gust wind speed in one hour measured between 6am and 10pm Eastern Standard Time (EST) of **24 metres per second.***
>
> *Define the mandatory **Wind Comfort Standard for Walking** as an hourly mean wind speed, or gust equivalent mean wind speed, whichever is greater for each wind direction, for no more than 292 hours per annum measured between 6am and 10pm EST (i.e 5 percent of those hours) of **8 metres per second**.*
>
> *Define the mandatory **Wind Comfort Standard for Sitting** in Parks as an hourly mean wind speed, or gust equivalent mean wind speed, whichever is greater for each wind direction, for no more than 292 hours per annum measured between 6am and 10pm EST of **4 metres per second** and applies to parks protected by Sun Access Planes and/or No Additional Overshadowing Controls.*
>
> *Define the desirable **Wind Comfort Standard for Sitting and Standing** as an hourly mean wind speed, or gust equivalent mean wind speed, whichever is greater for each wind direction, for no more than 292 hours per annum measured between 6am and 10pm EST of:*
>
> ***4 metres per second for Sitting***
> ***6 metres per second for Standing***

2.4 Western Gateway Wind Comfort Criteria

A Wind Comfort Criteria Map has been developed for the Western Gateway precinct and is noted in Figure 7 below. While the Western Gateway Design Guidelines are yet to be endorsed, the proposed Wind Comfort Criteria Map outlined in this document has been used as the basis of this report. Based on the Draft Sydney Planning Strategy 2016 – 2036 wind speeds for wind comfort, the wind criteria map notes that all areas should satisfy the walking comfort criteria, with building entry points to satisfy the standing comfort criteria. Furthermore, sitting conditions are desired for the future Central Square at the northern portion of the precinct. It is noted that these conditions can be achieved with the inclusion of the future proposed landscaping for the precinct.

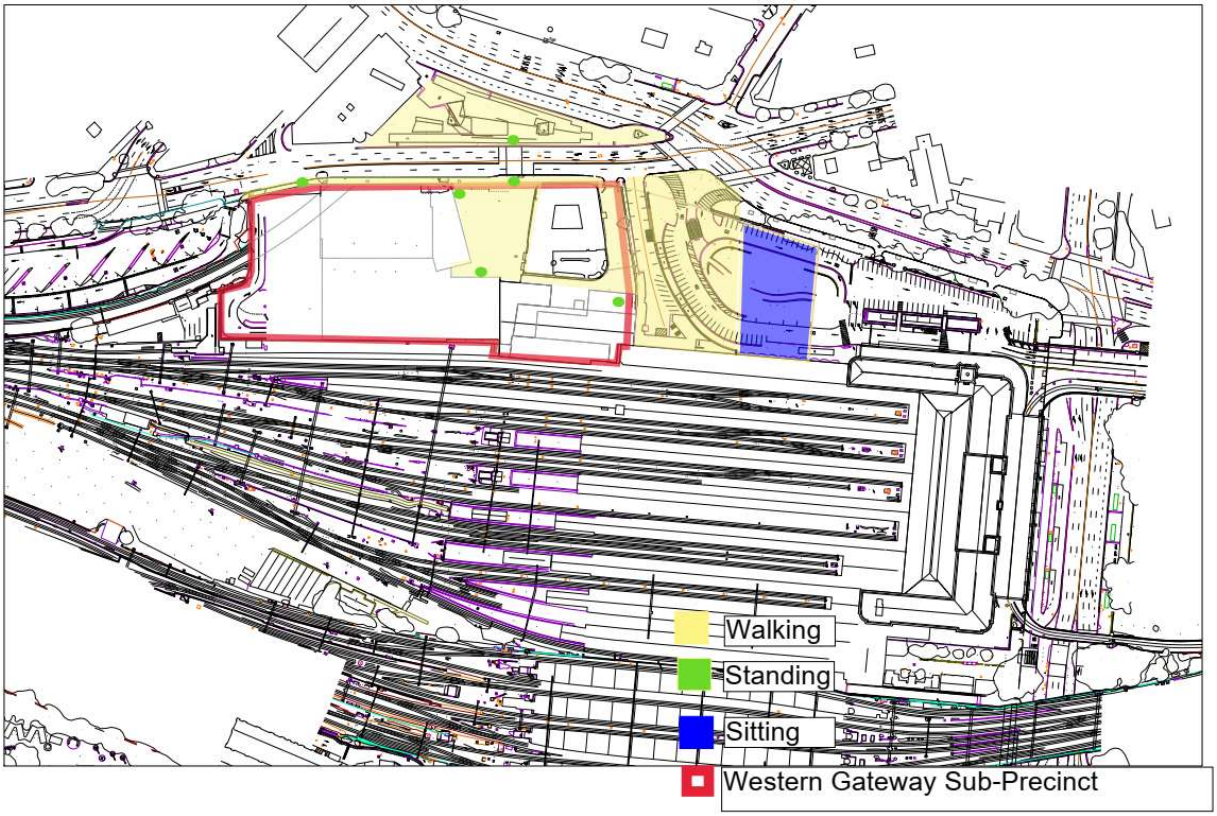

Figure 7: Draft Wind Comfort Criteria Map for the Western Gateway Precinct (NB: This is yet to be endorsed)

3 RESULTS AND DISCUSSION

The predicted wind conditions are shown on site plans in Figures 9-22 located in the "Figures" section of this report. Existing conditions are shown in Figures 9 and 10, with the inclusion of the proposed Atlassian Central development conditions are shown in Figures 11-14; the proposed Atlassian Central development with the Dexus/Fraser massing envelope conditions are shown in Figures 15-18; and the proposed Atlassian Central development with the Dexus/Fraser and Toga massing envelope conditions are shown in Figures 19-22. The figures are split into annual comfort conditions and safety conditions.

These conditions and the associated wind speeds are also represented in Table 1, located in the "Tables" section of this report. The following is a detailed discussion of the suitability of the predicted wind conditions for the anticipated pedestrian use of each area of interest. While wind conditions have been tested at all locations in the local vicinity of the Atlassian Central site which may be influenced by the development, this report only presents the results of the wind conditions within the Western Gateway 'Precinct' boundaries, hence excludes the station platforms and nearby areas.

3.1 Configuration 1: Existing Site with Existing Surrounding Buildings

3.1.1 Pedestrian Comfort (Figure 9)

The majority of wind conditions within and around the project site range from suitable for sitting to standing use throughout the year. Two probe locations (23 and 64) at the south-western corner of Block B (adjacent to the intersection of Lee Street and Little Regent Street) are noted to have walking use wind conditions, which suitable for the intended use. Wind conditions around the site are generally driven by the north-north-easterly and southerly winds, as such conditions are windier during the summer months of the year when these wind directions are more prevalent.

3.1.2 Strong Winds (Figure 10)

There are occurrences of strong winds which exceed the 24 m/s for more than one-hour per year at probe locations 23 and 64. These areas are modelled devoid of landscaping and thus are exposed to the prevailing wind direction in the baseline scenario.

3.2 Configuration 2: Atlassian Central with Existing Surrounding Buildings

3.2.1 Pedestrian Comfort (Figures 11 and 12)

3.2.1.1 Pedestrian Footpaths

Wind conditions along George Street (represented by probe locations 50-56, 59, 60 and 67-70) would have standing use wind conditions, suitable for the intended use. These conditions would be consistent with the existing site wind conditions, representing a minimal impact with the inclusion of the proposed development for these footpath areas.

The majority of wind conditions along the eastern side of Lee Street would be suitable for standing use, apart from probe locations 2, 18 and 23 which would be suitable for walking use. These wind conditions would satisfy the Sydney criteria for comfort along pedestrian footpaths.

The areas along the western side of Lee Street (represented by probe locations 57, 58 and 61-64) would generally satisfy the standing criteria, with walking conditions noted at the corner of Little Regent Street and Lee Street (probe location 64). These conditions are consistent with Configuration 1 and hence noted to be a result of the existing site context and not affected by the inclusion of the proposed development.

3.2.1.2 Henry Dean Plaza

Wind conditions within Henry Dean Plaza (represented by probe locations 4, 7-10, 31, 32 and 34) would be suitable for standing or sitting throughout the year, with similar conditions to the baseline scenario.

3.2.1.3 Western Forecourt

Wind conditions within the proposed Western Forecourt precinct (Locations 35-49 and 83) to the north of the Western Gateway Precinct would be slightly windier at probe locations 35-38, 41-47, 49 and 83 than the baseline scenario, with these locations suitable for standing use. Walking use conditions would occur at probe location 39 on Lee Street, suitable for the intended use. It is noted that this precinct is proposed to include notable landscaping as part of the future development of this area and hence sitting conditions are likely expected in the final scenario.

3.2.1.4 OSD Podium and Ground Level Amenity

Ground level amenity spaces to the north-west of the proposed development would have wind conditions suitable for sitting to standing use at probe locations 12, 15, 99, 100, 115-118, however probe locations 13, 14 and 16 would be suitable for walking use which slightly windier than suitable for amenity space and would require mitigation. Further modelling has been undertaken for this area with the suitable outcome presented in Section 3.3.

OSD podium level amenity spaces (represented by probe locations 93-98, 101-105, 107, 108, 111-114 and 129) would generally be suitable for standing use annually and probe locations 95, 97 and 108 suitable for walking use. Uncomfortable wind conditions would occur at probe locations 94, 96 and 103. The uncomfortable and walking use wind conditions would occur directly at the building corners which are symptoms of wind flows being accelerated due to the sharpness of the corner. While these will be outdoor areas associated with the development, further investigation has been carried out to ensure suitable conditions can be achieved for this space, which has been discussed in Section 3.3.

3.2.1.5 Roof Terrace Amenity

All of the roof terrace areas would satisfy the sitting and standing use criteria and as such will be suitable for the intended outdoor use.

3.2.2 Strong Winds (Figures 13 and 14)

There are occurrences of strong winds which exceed the 24 m/s for more than one-hour per year at probe locations 2, 13, 16, 23, 41, 94-97, 103, 108. These areas would be a safety concern to pedestrians and would require mitigation with the exception of probe location 23 as it is a function of the existing context and not the proposed development.

3.3 Future Precinct Massing Configurations

3.3.1 Configuration 3: Atlassian Central and Dexus/Fraser Massing Envelope with Existing Surrounding Buildings

With the introduction of Dexus/Fraser massing envelope, the cumulative impacts to the wind conditions along Lee Street, Henry Dean Plaza and between Atlassian Central and the Dexus/Fraser site will become windier than noted with just the Atlassian Central development. The increase in windiness is due to the large cluster of building massing which drives the high-speed winds at height (that are undistributed) to ground level. These winds are also channeled between the surrounding built environment and accelerated at the exposed corner locations. As stated, the final Dexus/Fraser design has not been tested and the impact of these conditions will need to be managed through the future design of these buildings.

3.3.1.1 Pedestrian Comfort (Figures 15 and 16)

3.3.1.1.1 Pedestrian Footpaths

Wind conditions along George Street (represented by probe locations 50-56, 59, 60 and 67-70) will experience standing use wind conditions, suitable for the intended use. These conditions would be consistent with the existing site wind conditions.

The majority of wind conditions along the eastern side of Lee Street would be suitable for standing use, apart from probe locations 2 and 23 which would be suitable for walking use. These wind conditions would satisfy the Sydney criteria for pedestrian comfort along pedestrian footpaths.

The areas along the western side of Lee Street represented by probe locations 57, 58 and 61 would satisfy the standing criteria, with walking conditions noted at probe locations 62-64. These conditions would be windier than Configuration 2 and are noted to be a result of Dexus/Fraser development causing flow channeling along the western side of Lee Street, likely due to the wider southern aspect of the tower form and exposure to this prevailing wind direction.

3.3.1.1.2 Henry Dean Plaza

Wind conditions within Henry Dean Plaza (represented by probe locations 4, 7-10, 31, 32 and 34) would be suitable for standing or sitting throughout the year, with similar conditions to the baseline scenario.

3.3.1.1.3 Western Forecourt

Wind conditions within the proposed Western Forecourt precinct (Locations 35-49 and 83) to the north of the Western Gateway Precinct would be slightly windier at probe locations 35, 37-39, 41-47, 49 and 83 than

the baseline scenario, with these locations appropriate for standing use. It is noted that this precinct is proposed to include notable landscaping as part of the future development of this area and hence sitting conditions are likely expected in the final scenario.

3.3.1.1.4 OSD Podium and Ground Level Amenity

Ground level amenity spaces to the north-west of the proposed development would have wind conditions suitable for sitting to standing use at probe locations 15, 16, 99, 100, 115-118, however probe locations 12-14 would be suitable for walking use which is one category windier than suitable for amenity space and would require mitigation.

OSD Podium level amenity spaces (represented by probe locations 93-98, 101-105, 107, 108, 111-114 and 129) would generally be suitable for standing use annually and probe locations 95, 97, 108 and 113 suitable for walking use. Uncomfortable wind conditions would occur at probe locations 94, 96 and 103. Uncomfortable and walking use wind conditions would occur directly at the building corners which are symptoms of wind flows being accelerated due to the sharpness of the corner, these conditions would require mitigation as demonstrated in Section 3.4.

3.3.1.1.5 Roof Terrace Amenity

All of the roof terrace would satisfy the sitting and standing use criteria, suitable for the intended outdoor use.

3.3.1.2 Strong Winds (Figures 17 and 18)

There are occurrences of strong winds which exceed the 24 m/s for more than one-hour per year at probe locations 2, 23, 26, 28-30, 62-64, 94-97 and 103. These areas would be a safety concern to pedestrians and would require mitigation with the exception of probe location 23 as it is a function of the existing context and not the proposed development.

3.3.2 Configuration 4: Atlassian Central Design, Dexus/Fraser and Toga Massing Envelopes with Existing Surrounding Buildings

The introduction of a massing envelope for the Toga site with the other buildings is noted to result in cumulative impacts to the wind conditions along Lee Street, Henry Dean Plaza and between Atlassian and Dexus/Fraser to become windier in some locations as the wind funneling effect is further exacerbated due to the increased building massing. However locations closer to the Toga site and to the north of the precinct was found to benefit from this cluster effect of buildings providing a downstream buffer. Safety exceedances on site are also noted to reduce with the introduction of the massing envelopes associated with the Dexus/Fraser and Toga sites. The final Dexus/Fraser and Toga design schemes have not been tested at this stage, with the impact of these conditions to be managed through the future design of these buildings.

3.3.2.1 Pedestrian Comfort (Figures 19 and 20)

3.3.2.1.1 Pedestrian Footpaths

Wind conditions along George Street (represented by probe locations 50-56, 59, 60 and 67-70) would have standing use wind conditions, suitable for the intended use.

The majority of wind conditions along the eastern side of Lee Street would be suitable for standing use, apart from probe locations 18 and 23 which would be suitable for walking use. These wind conditions would satisfy the wind criteria for pedestrian comfort along pedestrian footpaths.

The areas along the western side of Lee Street (represented by probe locations 57, 58 and 61-66) would generally satisfy the standing criteria, with walking conditions noted at the corner of Little Regent Street and Lee Street (probe location 64). These conditions will be consistent with the existing conditions and hence noted to be a result of the existing site context and by the inclusion of the proposed development envelopes.

3.3.2.1.2 Henry Dean Plaza

The majority of wind conditions within Henry Dean Plaza (represented by probe locations 4, 7-10, 31, 32 and 34) would satisfy standing conditions or calmer throughout the year, with similar conditions to the existing scenario. The exception to this is probe locations 9 and 10 which would have uncomfortable wind conditions annually and would require review as part of the design schemes by these two future sites.

3.3.2.1.3 Western Forecourt

Wind conditions within the proposed Western Forecourt precinct (Locations 35-49 and 83) to the north of the Western Gateway Precinct would be slightly windier at probe locations 38, 41, 43, 45, 47 and 83 than the baseline scenario, however, these locations would remain satisfactory to the standing use conditions.

3.3.2.1.4 OSD Podium and Ground Level Amenity

Ground level amenity spaces to the north-west of the proposed development would have wind conditions suitable for sitting to standing use at probe locations 12, 15, 99, 100, 115-118, however probe locations 13 and 14 would be suitable for walking use which is one category windier than suitable for amenity space. As such, the future neighbouring developments should consider the impact to these areas as part of their development and ensure minimal impact occurs.

OSD Podium level amenity spaces (represented by probe locations 93-98, 101-105, 107, 108, 111-114 and 129) would generally be suitable for standing use annually and probe locations 95-97 and 108 suitable for walking use. Uncomfortable wind conditions would occur at probe locations 94 and 103. The uncomfortable and walking use wind conditions would occur directly at the building corners which are symptoms of wind flows being accelerated due to the sharpness of the corner, these conditions would require mitigation as demonstrated in Section 3.4.

3.3.2.1.5 Roof Terrace Amenity

All of the roof terrace would satisfy the sitting and standing use criteria, suitable for the intended outdoor use.

3.3.2.2 Strong Winds (Figures 21 and 22)

There are occurrences of strong winds which exceed the 24 m/s for more than one-hour per year at probe locations 9, 10, 23, 26, 28-30, 62-64, 94, 96 and 103. These areas would be a safety concern to pedestrians and would require mitigation with the exception of probe location 23 as it is a function of the existing context and not the proposed development.

3.4 Mitigation Measures

This section discusses the mitigation measures recommended and tested by RWDI to mitigate the windy conditions within and around the proposed development and discussed in this report. The approach has considered the proposed landscaping included on site and the planned use of outdoor areas by the client. These measures will be further investigated as the design continues to develop, however this section details workable solutions for these areas.

While the mitigation testing has shown that the public domain wind conditions in the 'precinct' can be mitigated due to the inclusion of the Atlassian Central development, this should be considered from a sub-precinct approach and hence reviewed and further developed once the built forms of Block B and Block C have been further refined.

While the OSD Podium Level is noted as a private outdoor location, which has no specific wind comfort criteria outlined in the Western Gateway Design Guidelines, significant care has been taken to provide a high quality environment for this space. A range of mitigation and operational measures are provided for further information.

3.4.1 Approach 1 – Operational Management

The results from the wind tunnel study indicated that some of the OSD Podium level areas will be exposed to wind conditions that are not suitable for the intended patron uses. The OSD Podium level is not within the public realm of the Western Gateway and has not been identified within the Western Gateway Design Guidelines wind mapping. While there may be some exceedances within this area it should be noted that the space will be a controlled environment and as such will not be fully publicly accessible. These areas are noted to largely be exposed to the west to north-westerly winds that occur during the winter months of the year. Given that the western side of the OSD Podium area is largely an exposed outdoor space, the use of these areas during cold and the more frequent wetter period of the year will be somewhat reduced irrespective of the wind conditions. Given this area will be controlled by the building operator, the access can be controlled during less favourable periods, while the remaining areas of the OSD Podium receives more favourable environmental conditions.

3.4.2 Approach 2 – Mitigation Measures

During the wind tunnel results, flow visualisation was undertaken for the development using smoke modelling. This aided the design team in understanding the wind flow patterns around the subject development but also aid in the development of beneficial mitigation strategies for the development. Subsequently a range of different options were tested in the wind tunnel to verify their effectiveness, with the focus on the ground and upper ground publicly accessible areas.

The mitigation measures recommended below in addition to the proposed landscaping would improve the majority of wind conditions in the context of existing surrounding buildings within the site (Figures 21-24). On-site wind conditions at the ground levels would improve to be overall suitable for sitting and standing use annually. In addition, safety exceedances on-site would be eliminated with the mitigation strategy developed.

- **Probe Locations 13 and 16:** Extended the proposed landscaping at the central square to contain 25 deciduous trees 4-6m tall with shrubs 1.5m in height underneath;
- **Probe Location 23, 75:** No mitigation measures included for these locations;
- **Probe Location 2:** Existing landscaping at the Henry Dean Plaza;

Testing for mitigation measures for the OSD Podium Level with options developed to be able to achieve sitting or standing conditions as well as meet the safety limit winds speeds. This can be further developed during the subsequent design stages of the project when the adjacent site design schemes are further evolved.

3.5 Recommendations

Overall, the wind microclimate around the Proposed Development would improve with the introduction of the wind mitigation strategy developed, however, safety exceedances would persist to occur on the podium of the Proposed Development at probe location 97 and at off-site thoroughfare to the east side of Lee Street at probe location 2. Given this is a slight exceedance, consideration of the existing street trees in this precinct will likely enable suitable conditions for this location.

The inclusion of the massing envelopes associated with the Dexus/Fraser and Toga sites was noted to influence the wind conditions within the precinct, the effect on the mitigation measures for Atlassian Central has been considered and noted to still be suitable. At present, the wind tunnel testing has been undertaken based on the best information available, however acknowledge that the design of the Dexus/Frasers and Toga sites are yet to be finalsied. While some wind conditions in the surrounding areas are noted to increase with the inclusion of these massing envelopes, these are items that will need to be further investigated by these two sites in coordination with Atlassian as they further development their designs to ensure a suitable wind interaction with the overall precinct. Through the Development Application for the adjoining sites, further wind tunnel testing will be required. With ongoing coordination with the relevant stakeholders, a collaborative precinct solutions is expected to be able to be achieved.

4 APPLICABILITY OF RESULTS

The drawings and information listed below were received from Avenor and were used to construct the scale model of the proposed Atlassian Central development in Sydney. The wind conditions presented in this report pertain to the proposed development as detailed in the architectural design drawings listed in the table below. The constructed scale model was reviewed and approved by Avenor prior to commencement of testing.

Should there be any design changes that deviate from this list of drawings, the wind condition predictions presented may change. Therefore, if changes in the design are made, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

File Name	File Type	Date Received (dd/mm/yyyy)
ARCH – BVN_selected_2020-09-11_03-08-47pm	Revit	11/09/2020
ARCH- SHoP_selected_2020-09-11_03-11-14pm	Revit	

5 REFERENCES

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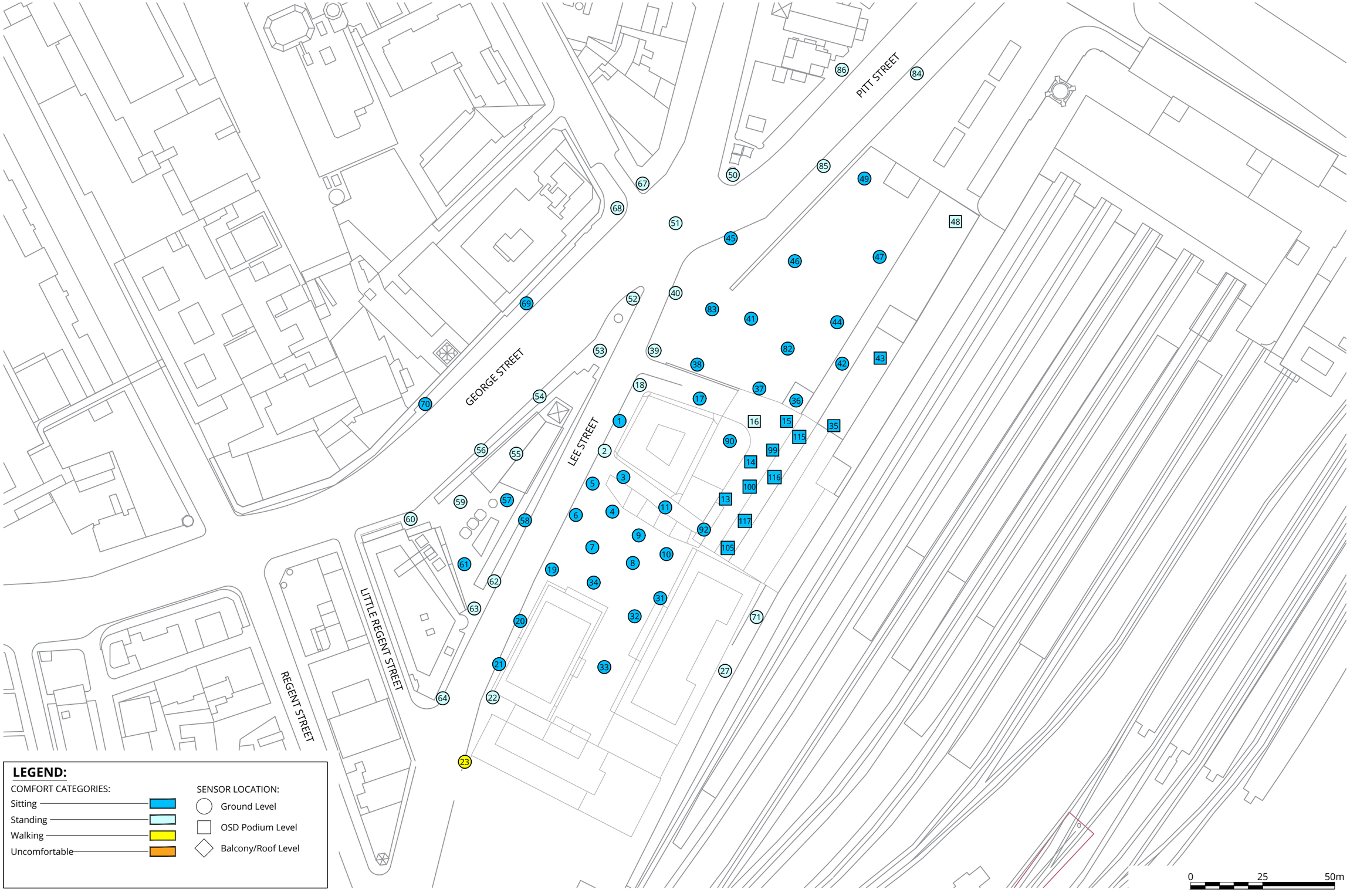
10. Wu, H., Williams, C.J., Baker, H.A. and Waechter, W.F. (2004), "Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions", *ASCE Structure Congress 2004,* Nashville, Tennessee.

11. Williams, C.J., Wu, H., Waechter, W.F. and Baker, H.A. (1999). "Experiences with Remedial Solutions to Control Pedestrian Wind Problems," Tenth International Conference on Wind Engineering, Copenhagen, Denmark.

FIGURES



Pedestrian Wind Comfort Conditions - Ground Floor
Configuration 1: Existing Site with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

True North

Project #2100277

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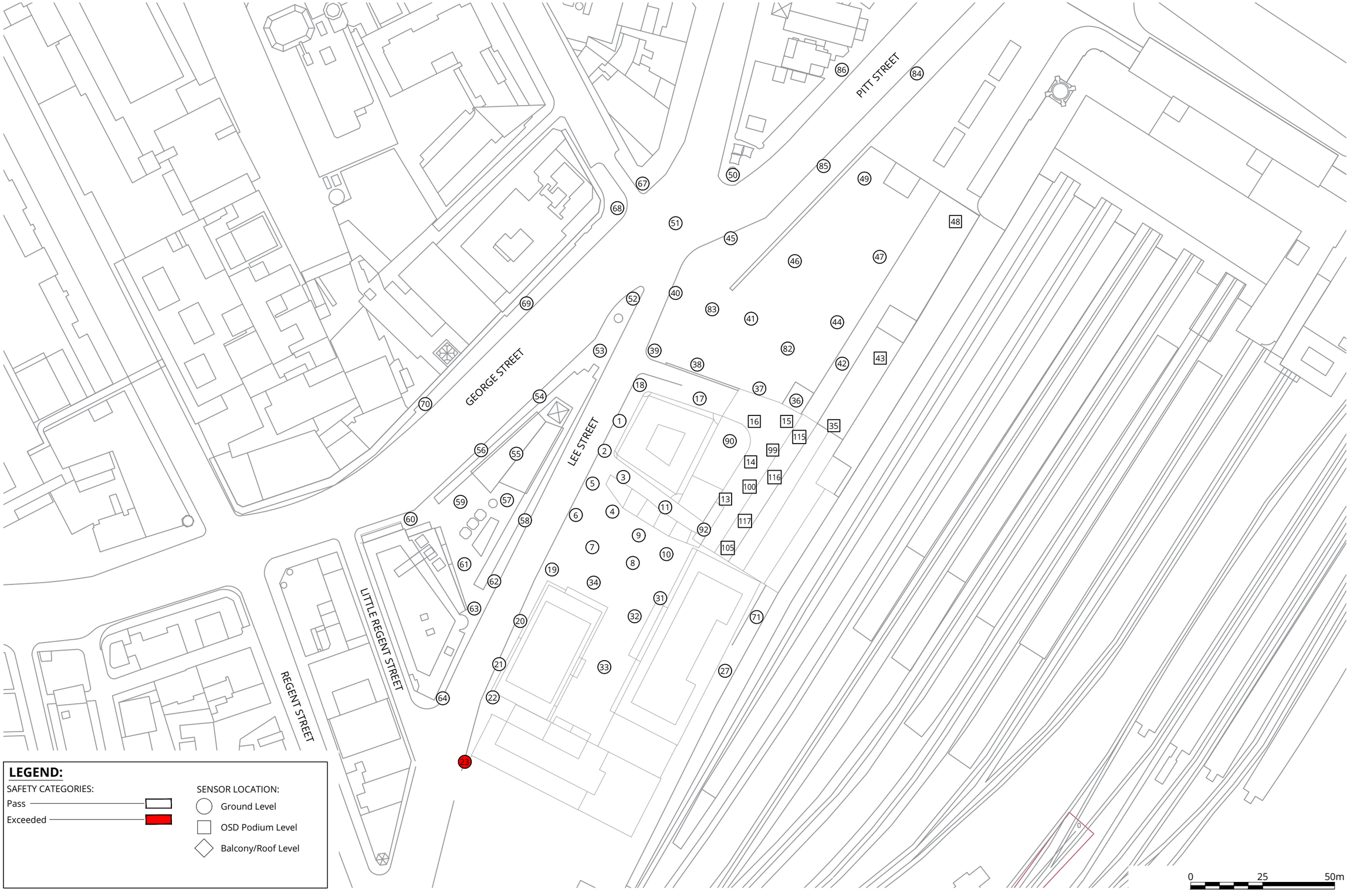
Date Revised:	Oct. 01, 2020		



LEGEND:

SAFETY CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

Pedestrian Wind Safety Conditions - Ground Floor

Configuration 1: Existing Site with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

True North

Project #2100277

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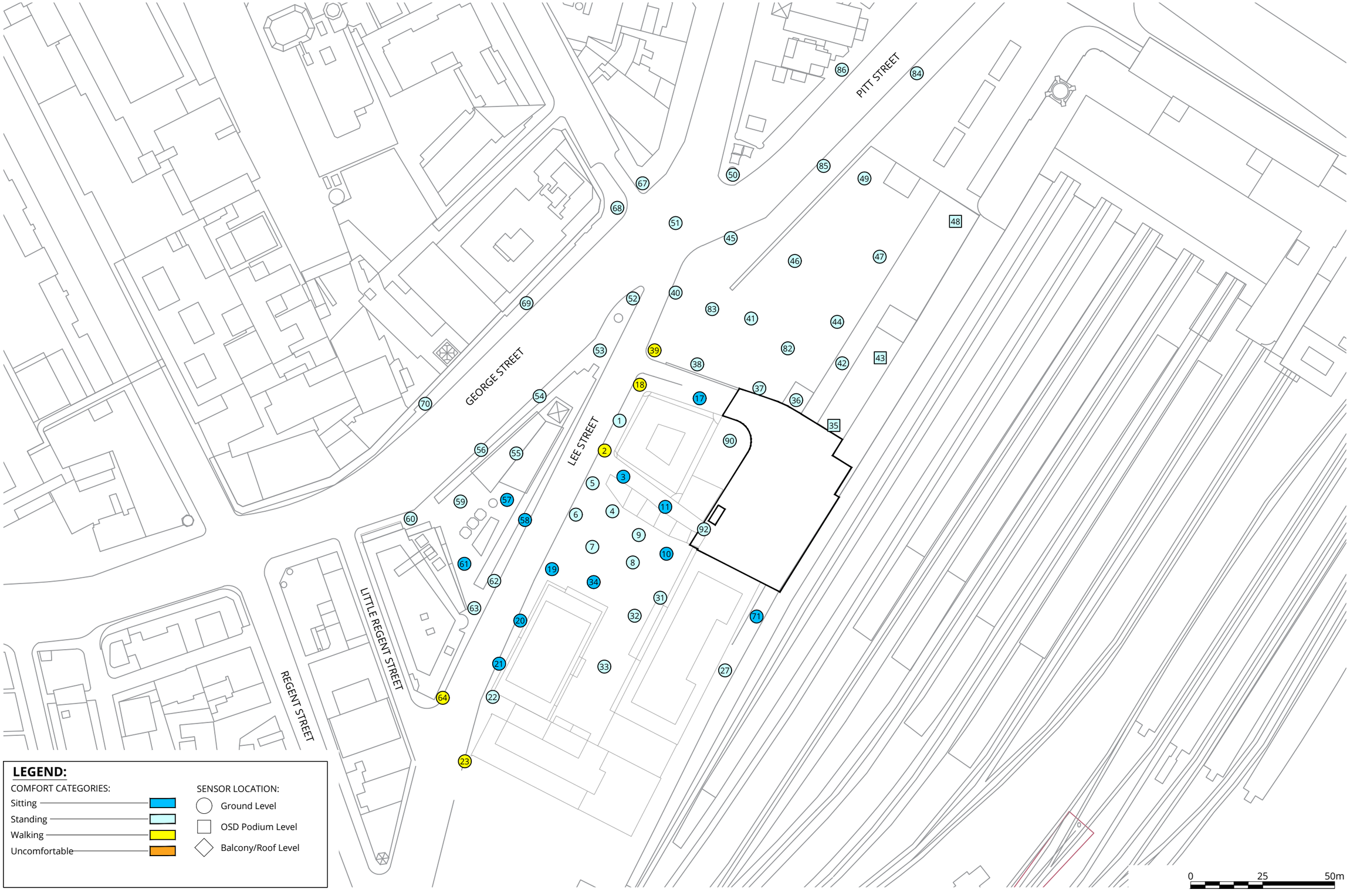

Pedestrian Wind Comfort Conditions - Ground Floor
Configuration 2: Proposed Development with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

True North

Project #2100277

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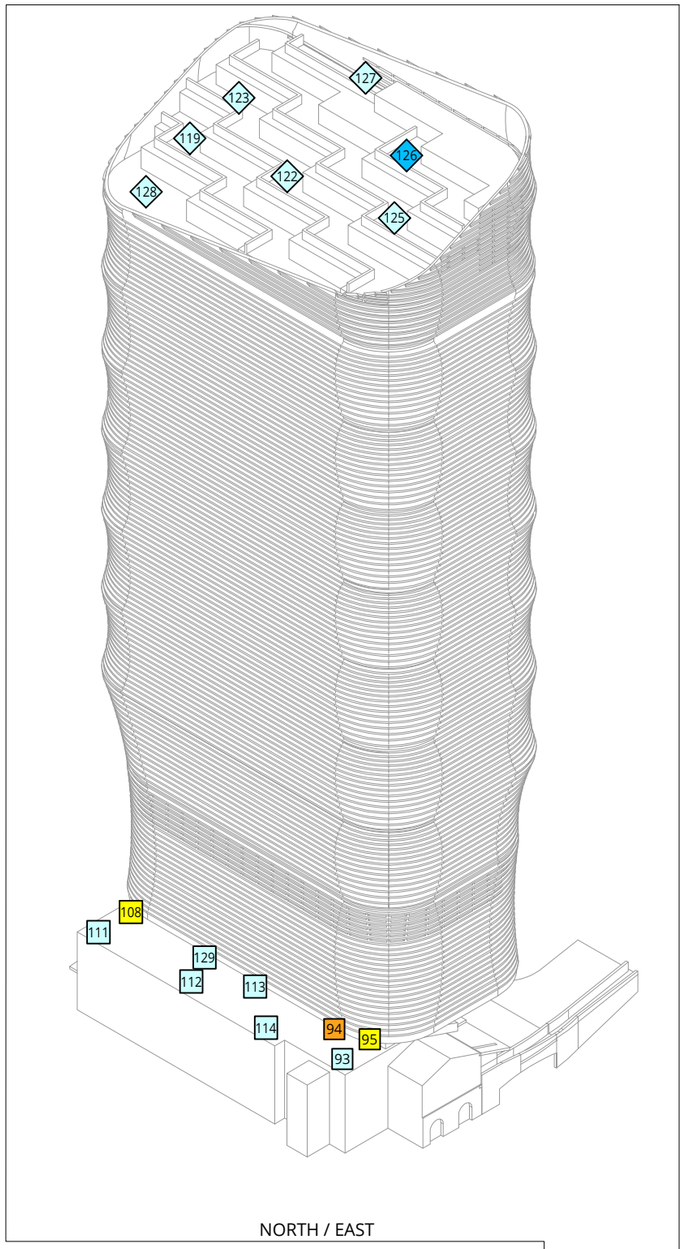

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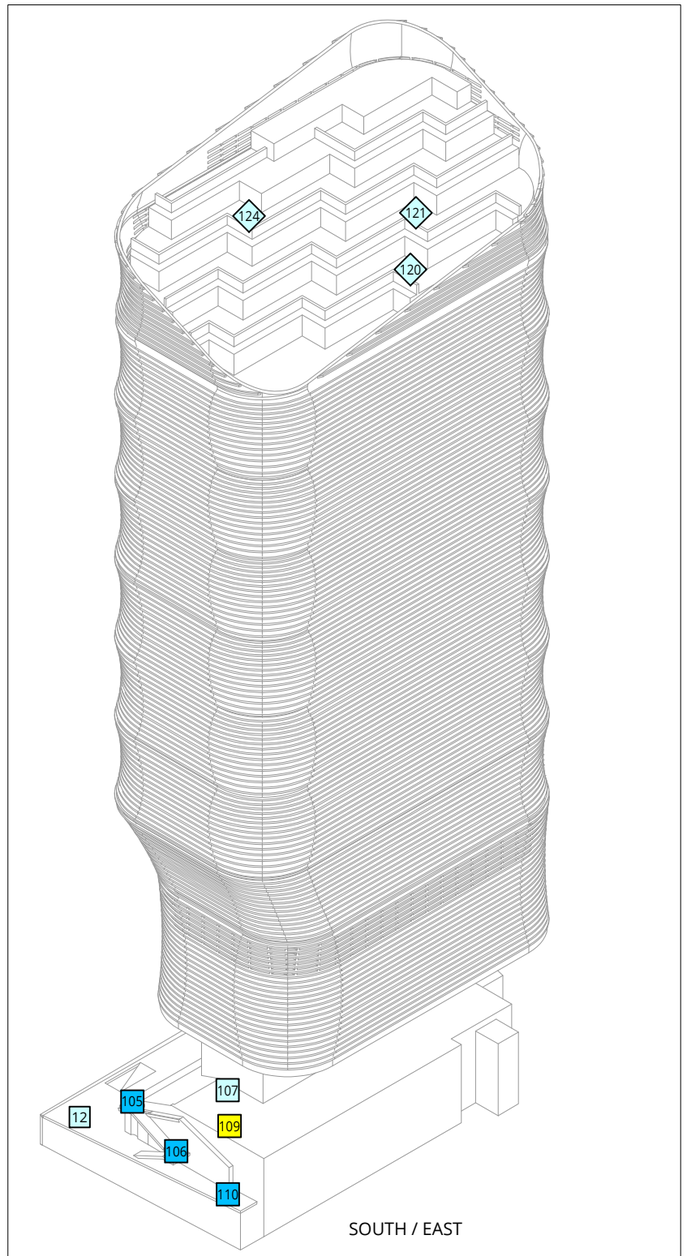

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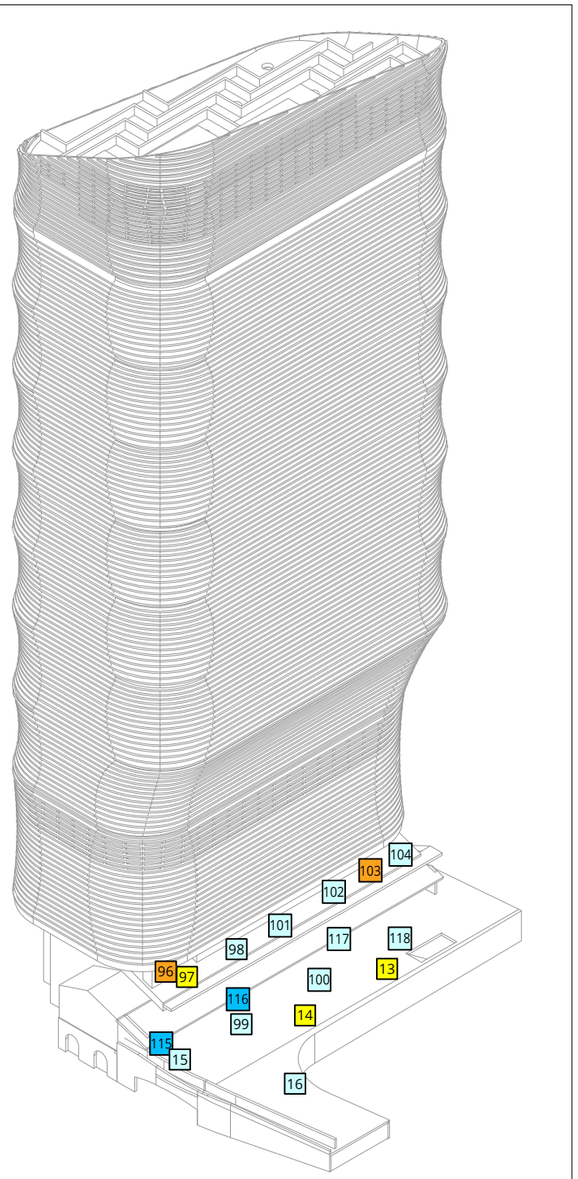

NORTH / WEST

LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

0 25 50m

Pedestrian Wind Comfort Conditions - Elevated Levels
Configuration 2: Proposed Development with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

Project #2100277

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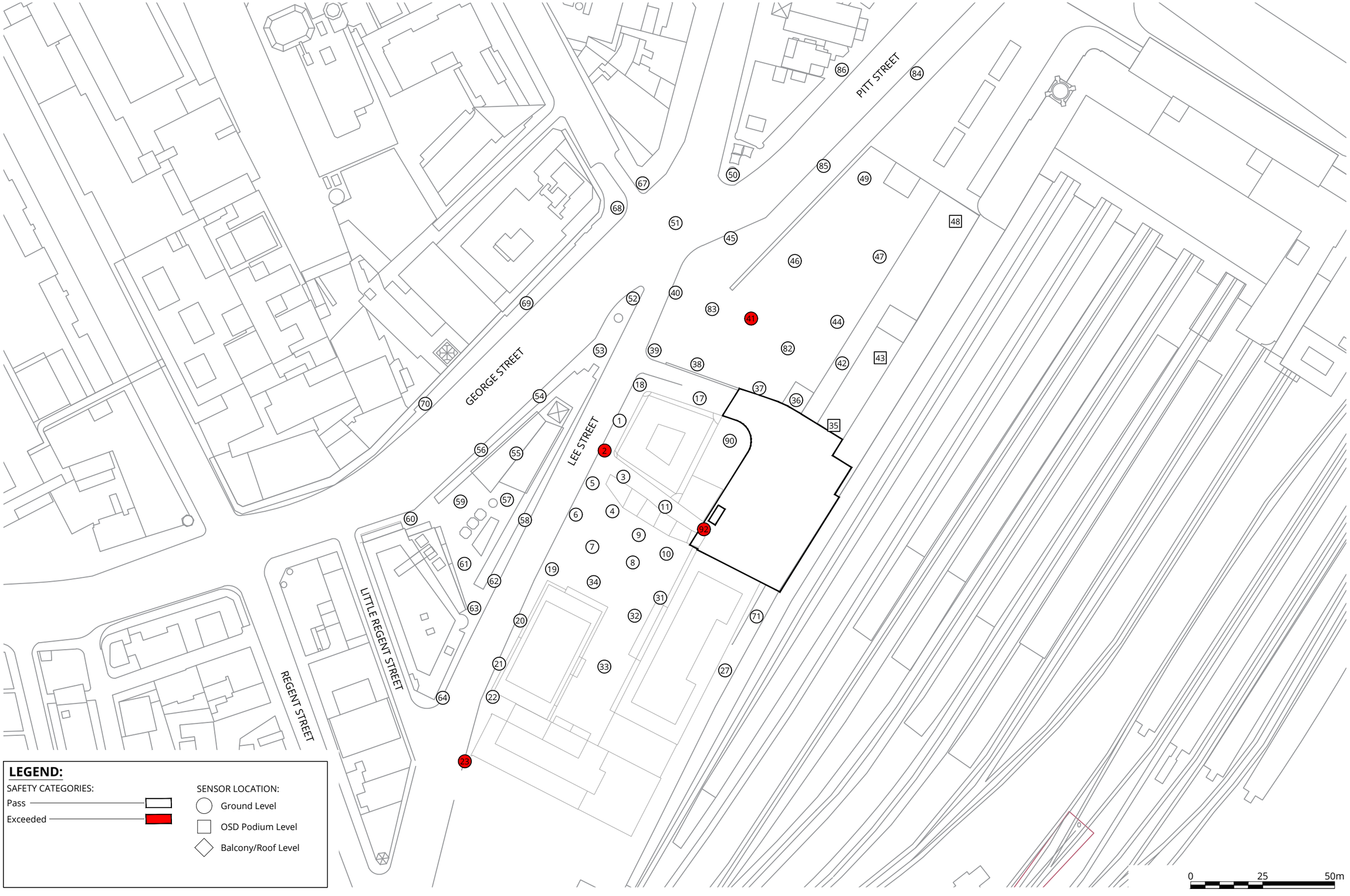

Pedestrian Wind Safety Conditions - Ground Floor
Configuration 2: Proposed Development with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

True North

Project #2100277

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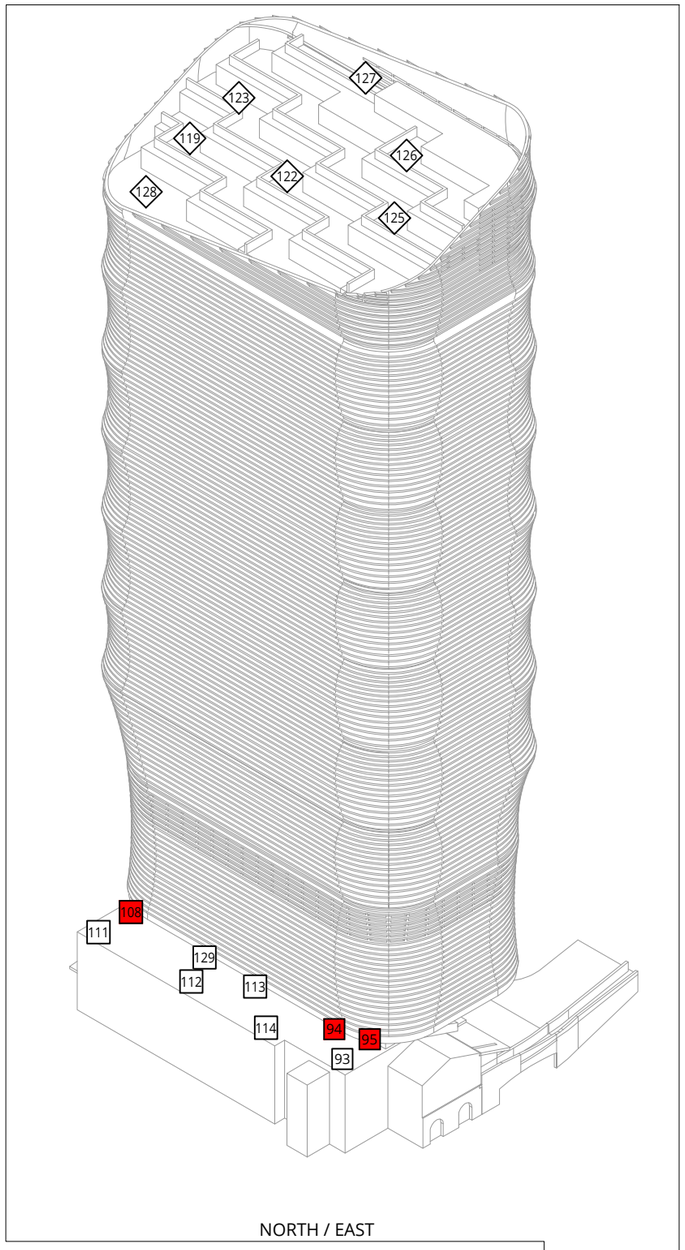

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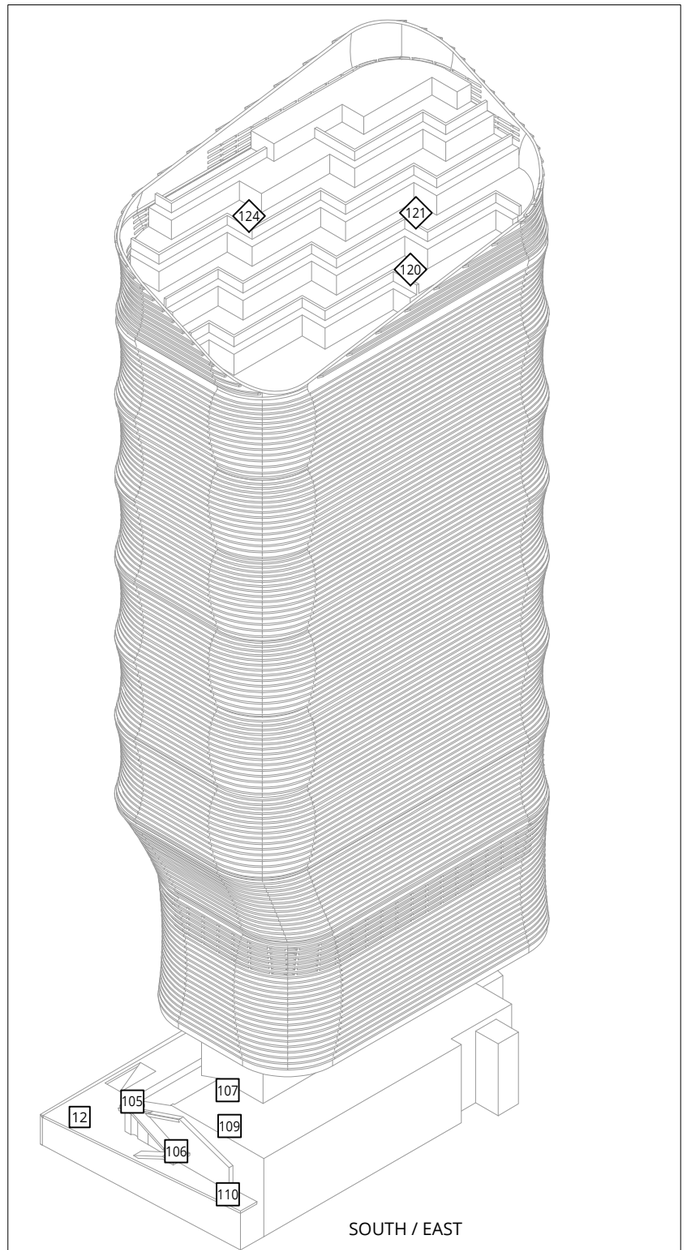

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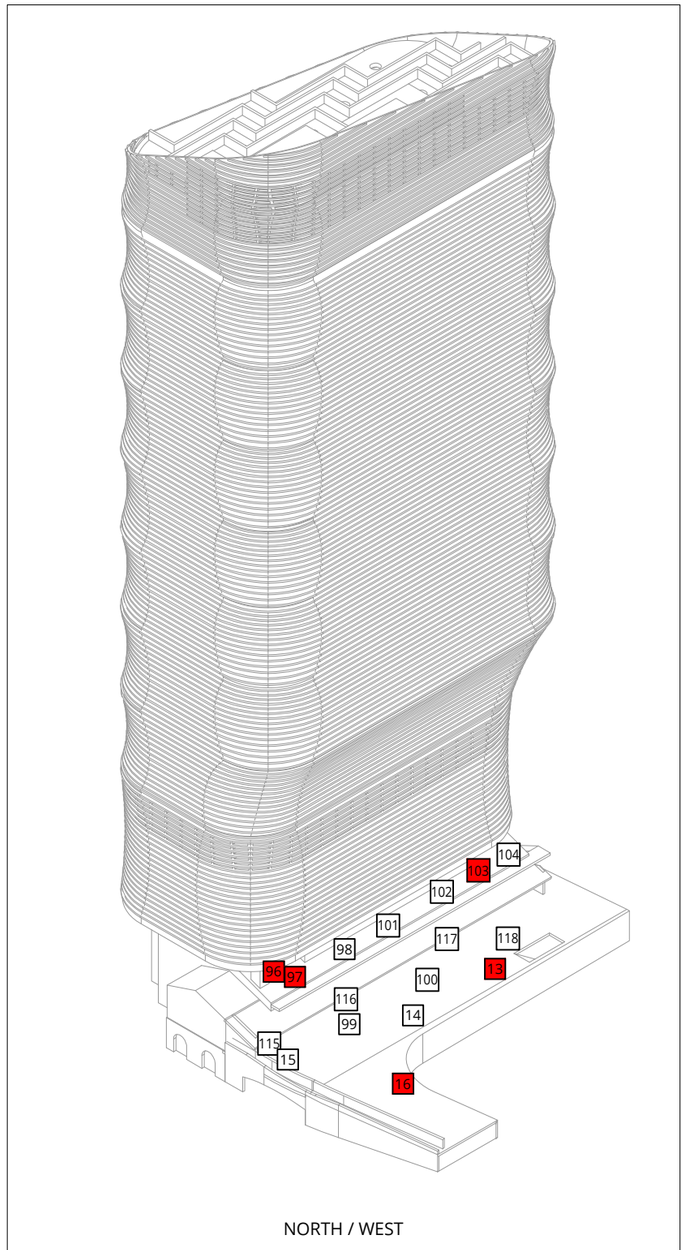

NORTH / WEST

LEGEND:

SAFETY CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

0 25 50m

Pedestrian Wind Safety Conditions - Elevated Levels
Configuration 2: Proposed Development with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

Project #2100277

Drawn by:	JLF	Figure:	14
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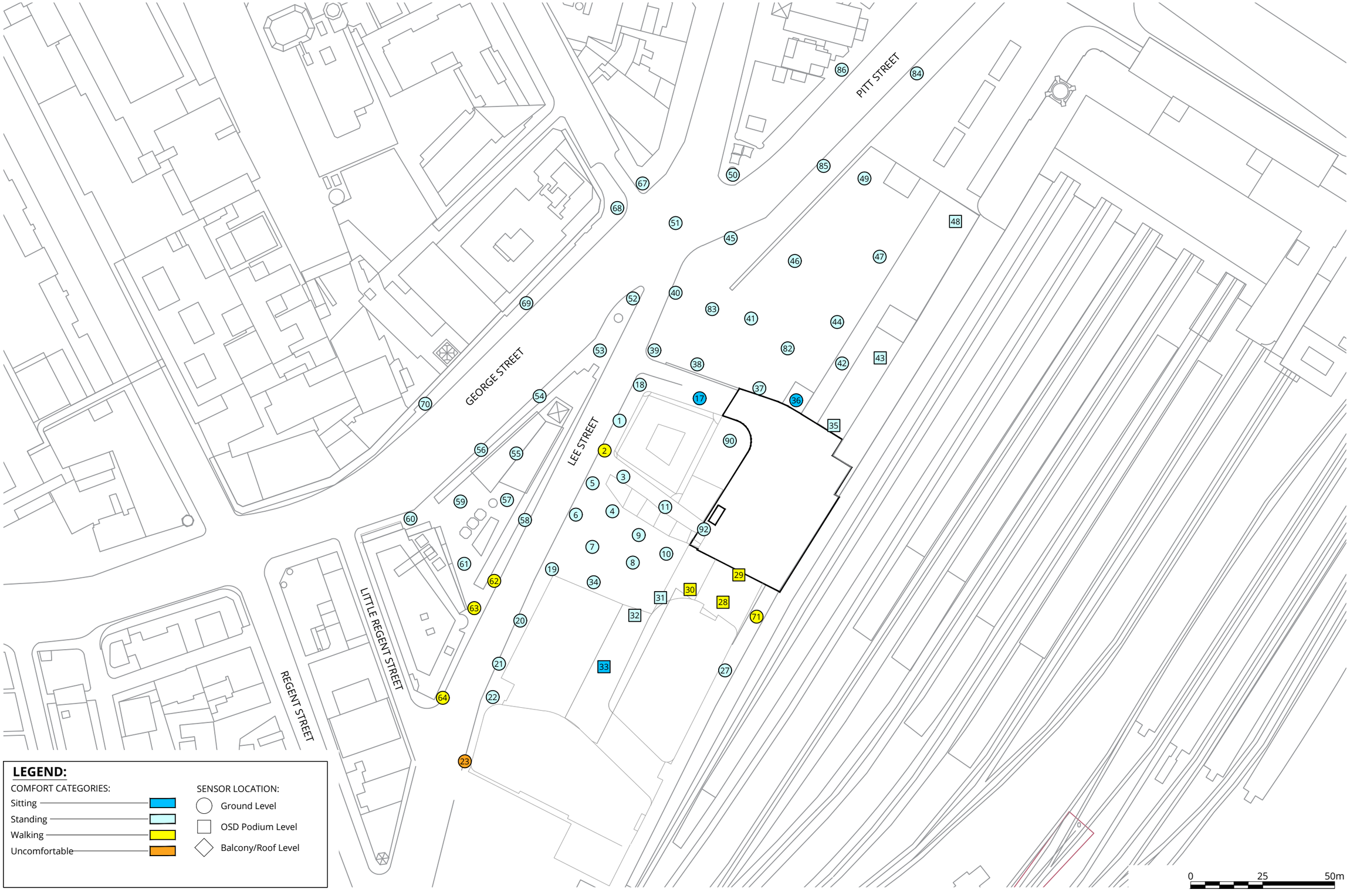

LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

Pedestrian Wind Comfort Conditions - Ground Floor
Configuration 3: Proposed Development and Dexus/ Fraser with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

True North

Project #2100277

Drawn by:	JLF	Figure:	15
Approx. Scale @A3:	1:1250		
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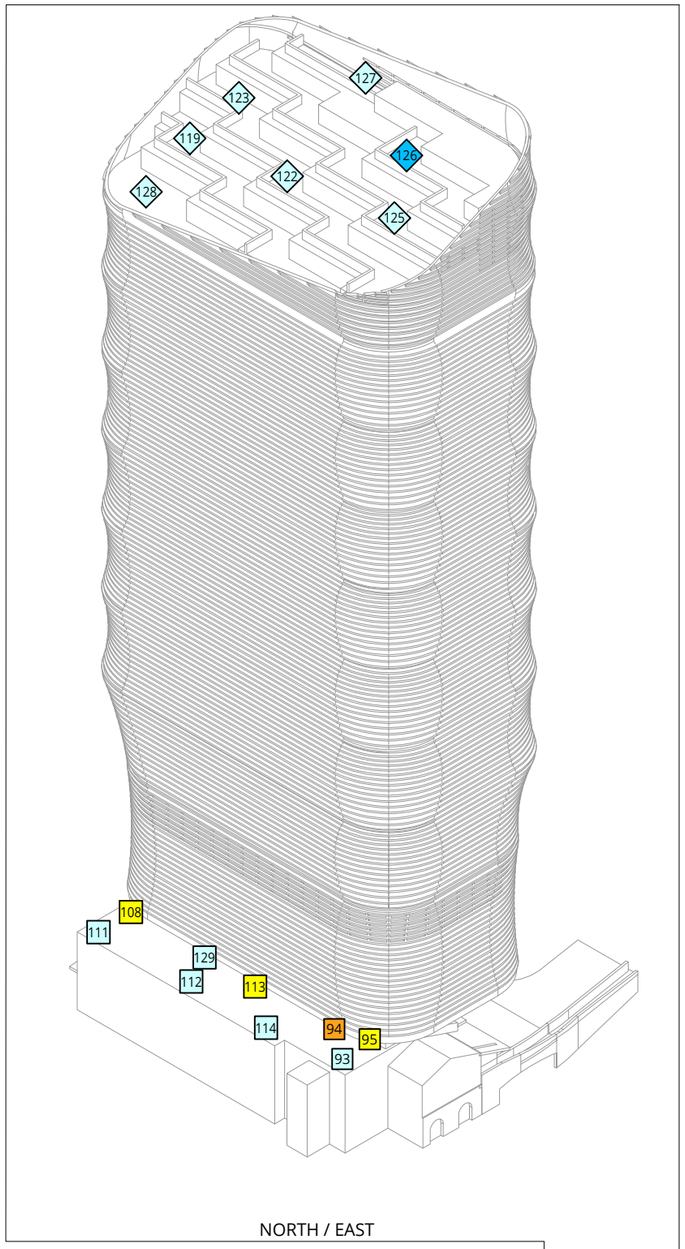

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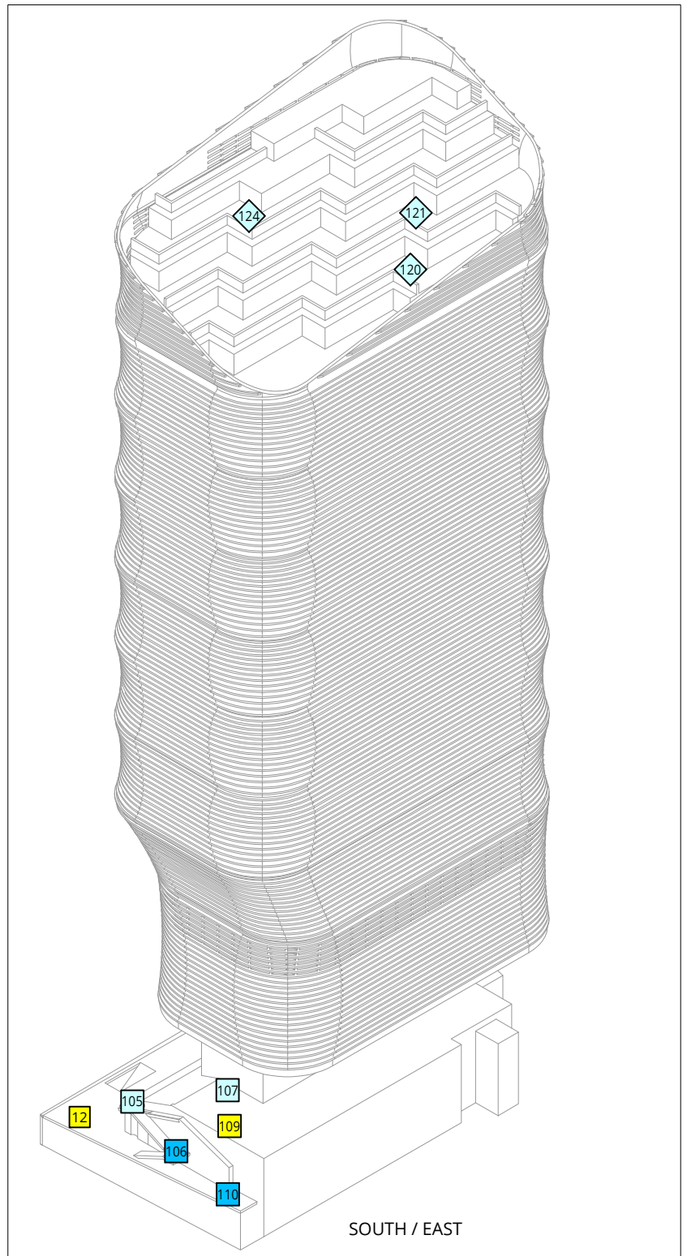

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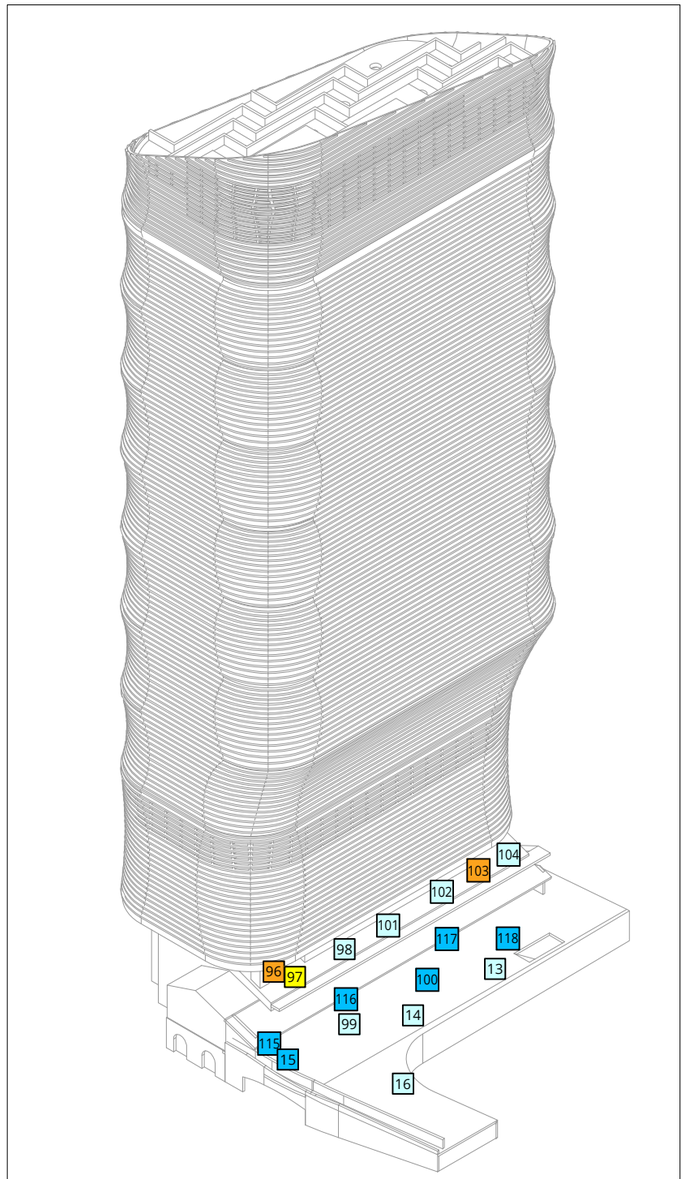

NORTH / WEST

LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

0 25 50m

Pedestrian Wind Comfort Conditions - Elevated Levels
Configuration 3: Proposed Development and Dexus/ Fraser with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

Project #2100277

Drawn by:	JLF	Figure:	16
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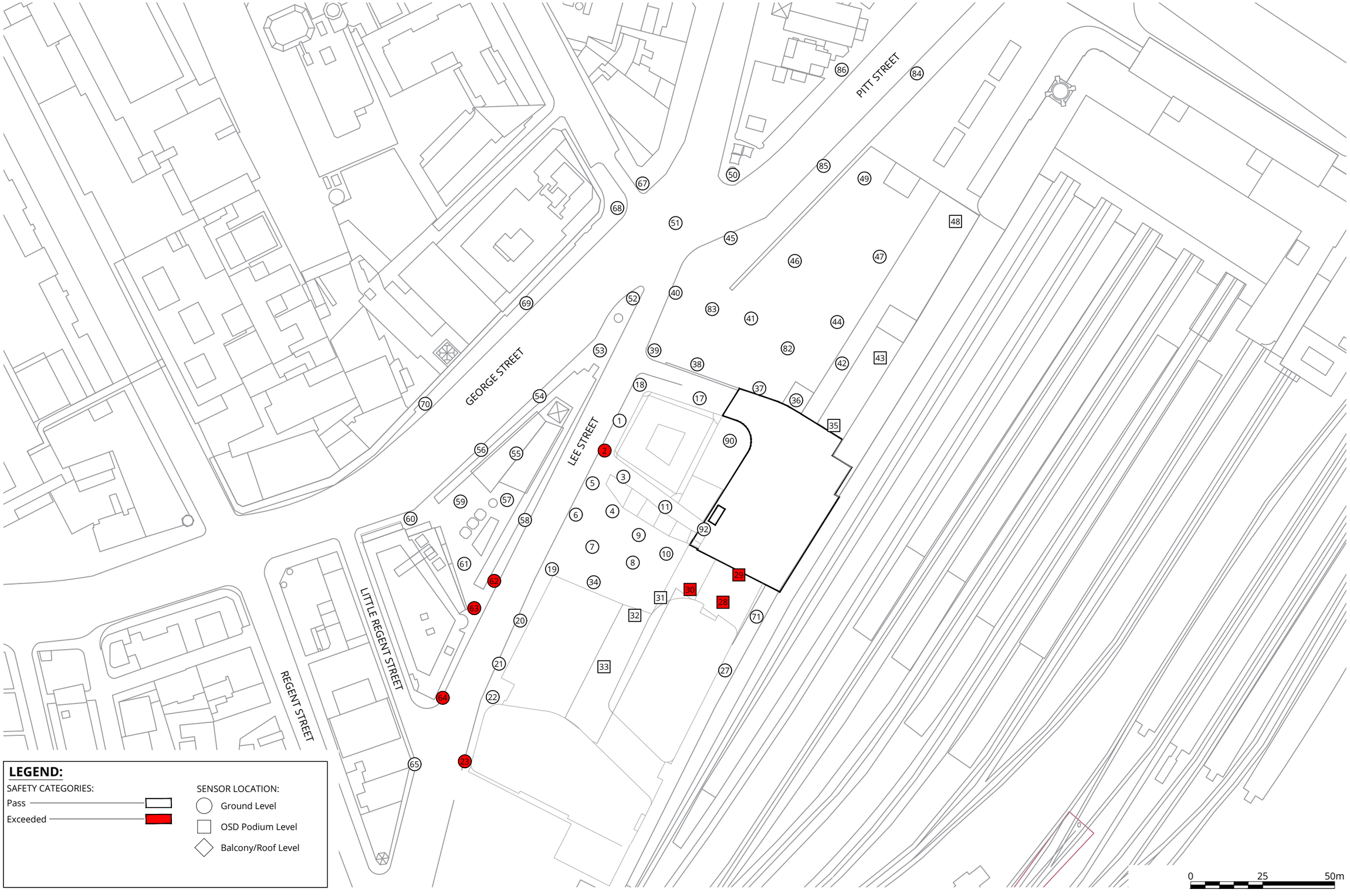

Pedestrian Wind Safety Conditions - Ground Floor
Configuration 3: Proposed Development and Dexus/ Fraser with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

True North

Project #2100277

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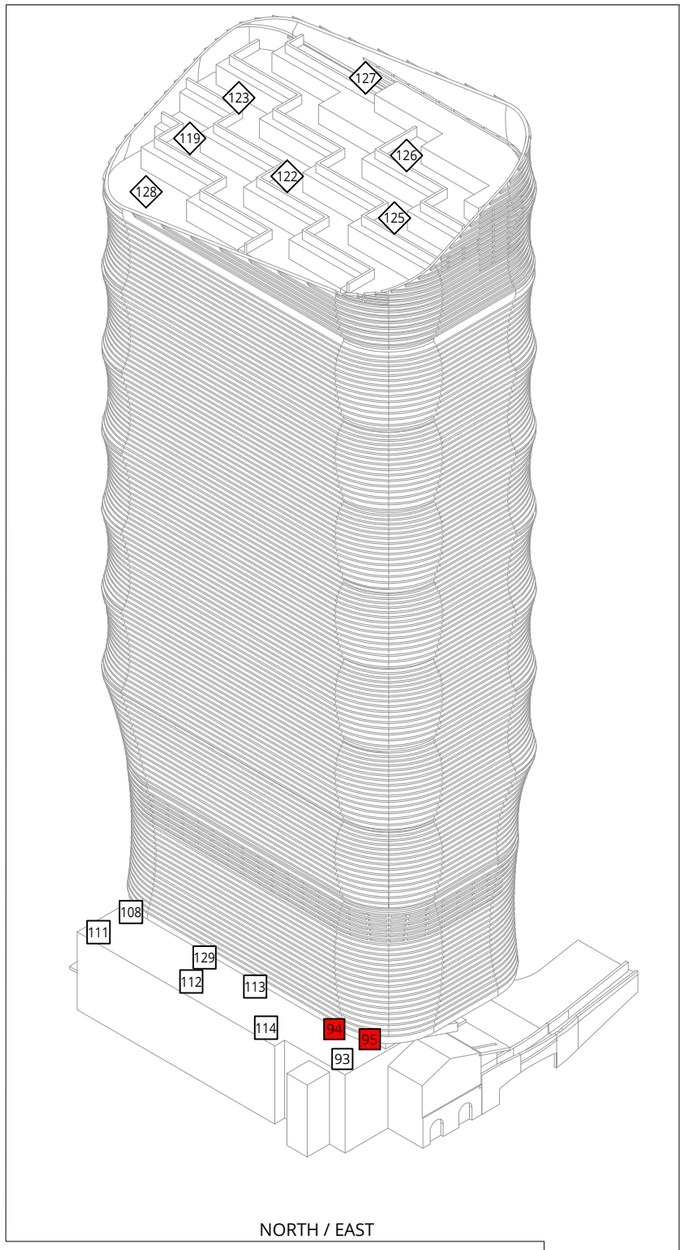

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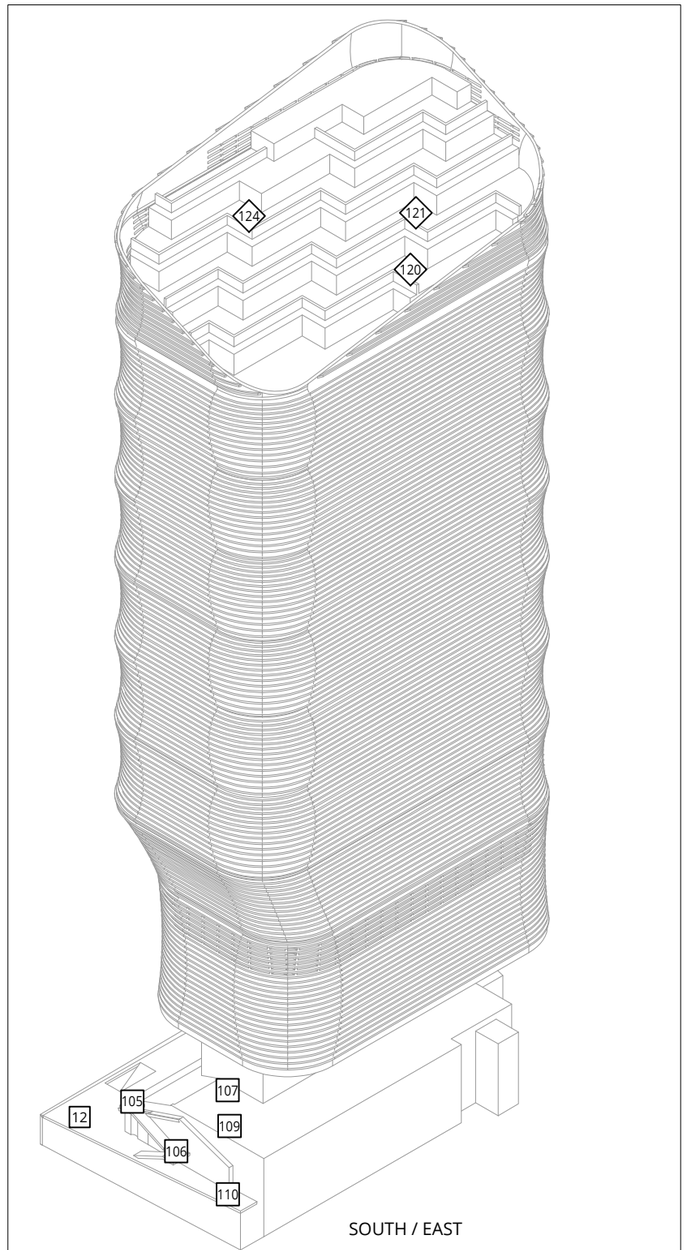

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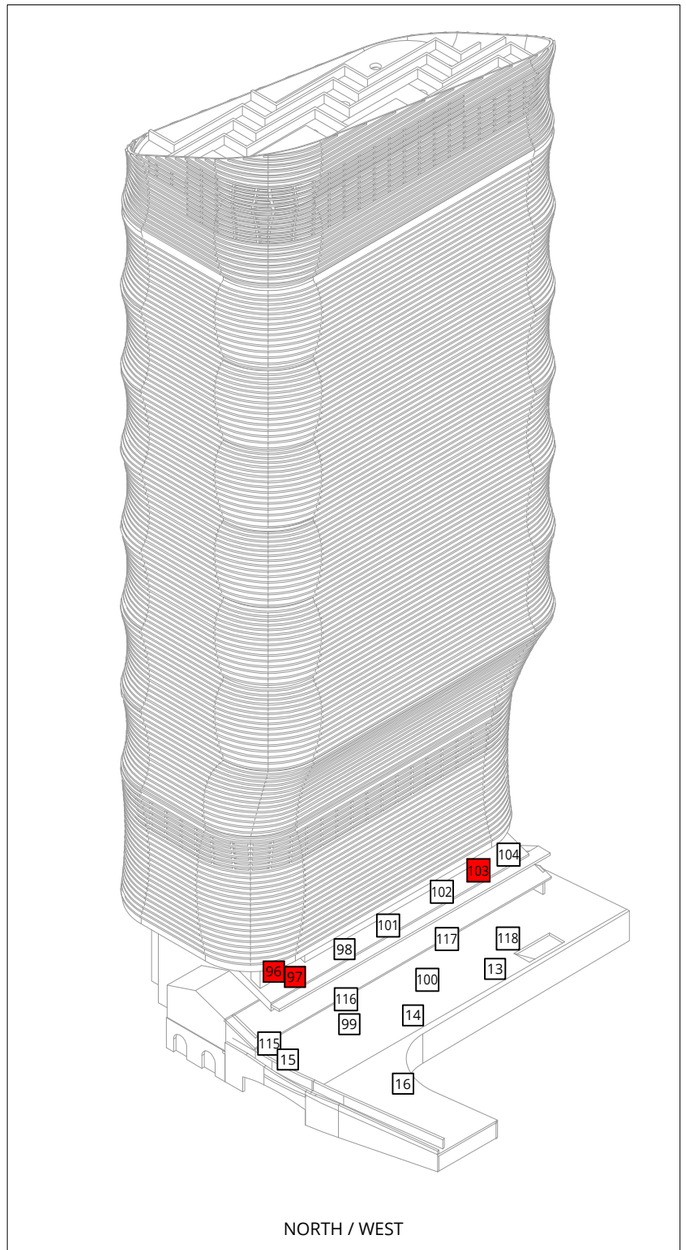

NORTH / WEST

LEGEND:

SAFETY CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

0 25 50m

Pedestrian Wind Safety Conditions - Elevated Levels
Configuration 3: Proposed Development and Dexus/ Fraser with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

Project #2100277

Drawn by:	JLF	Figure:	18
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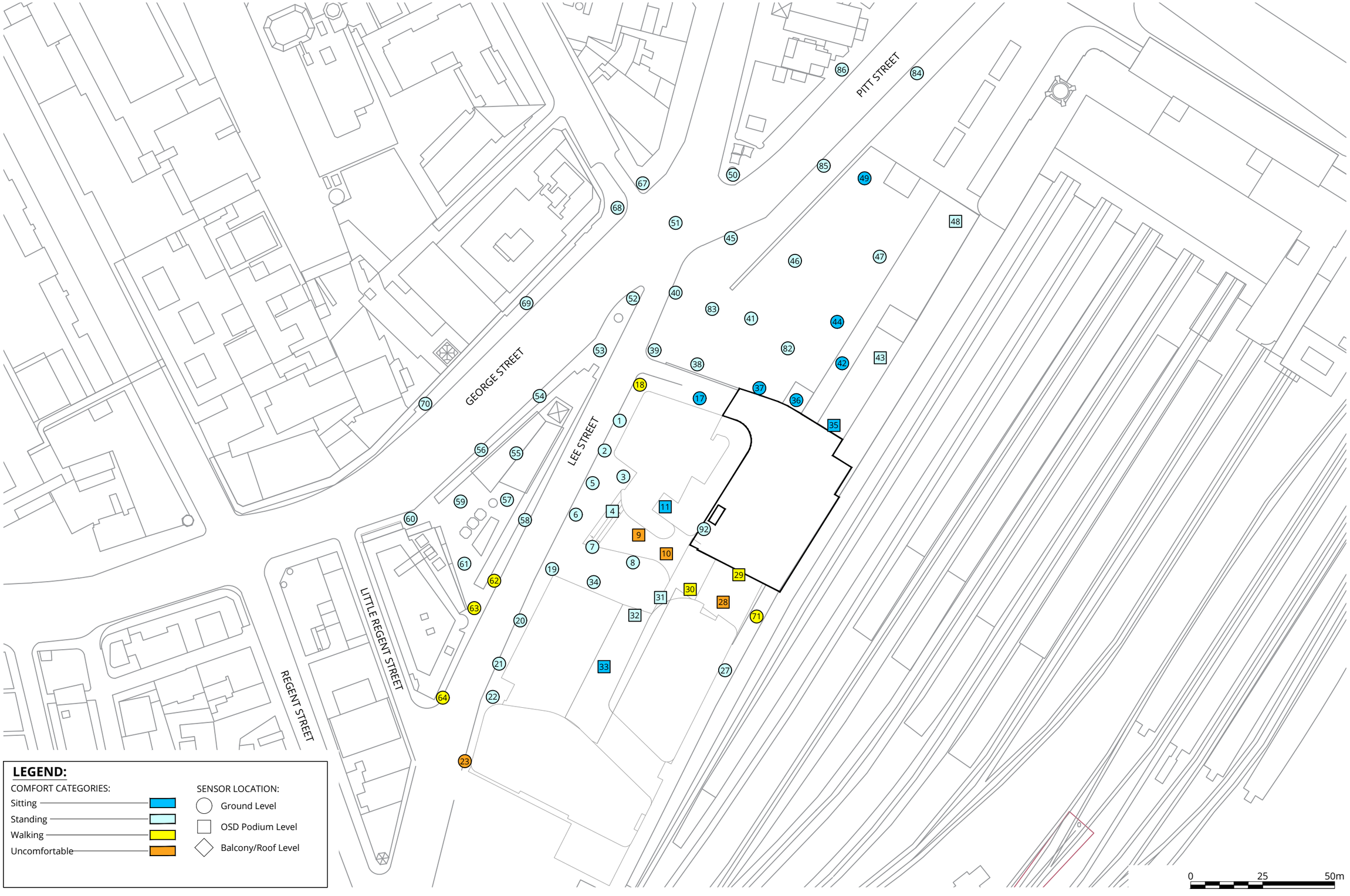

Pedestrian Wind Comfort Conditions - Ground Floor
Configuration 4: Proposed Development, Dexus/ Fraser and Toga with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

True North

Project #2100277

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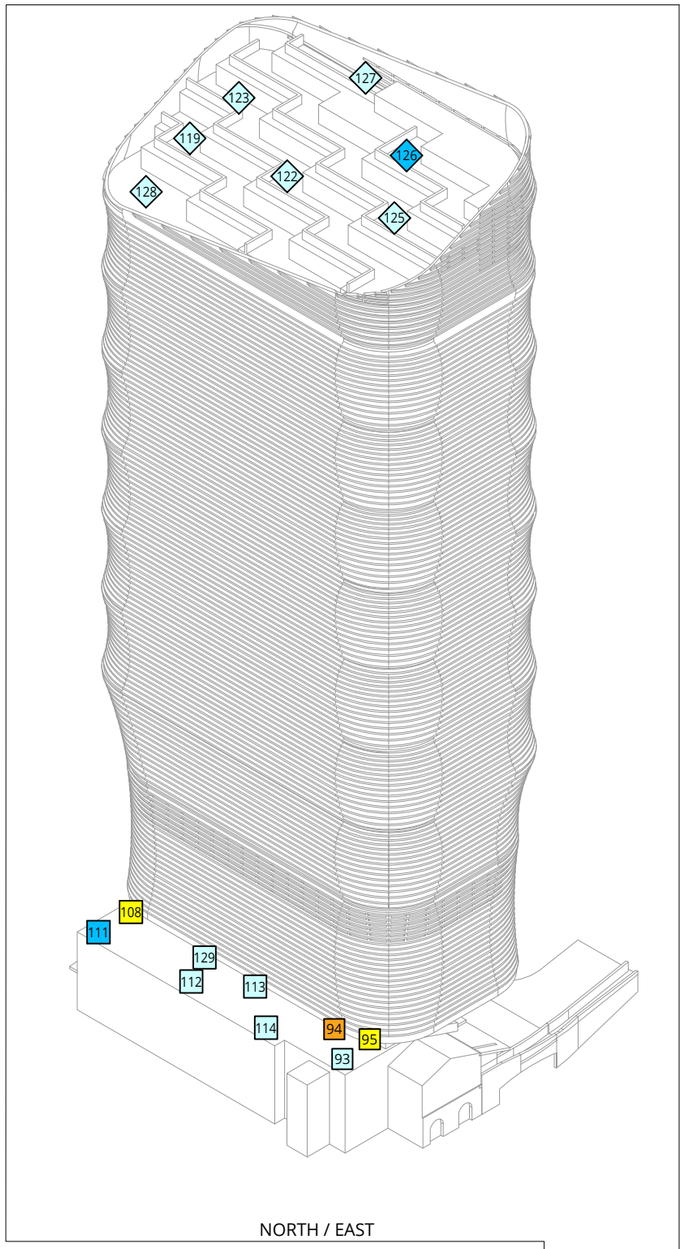

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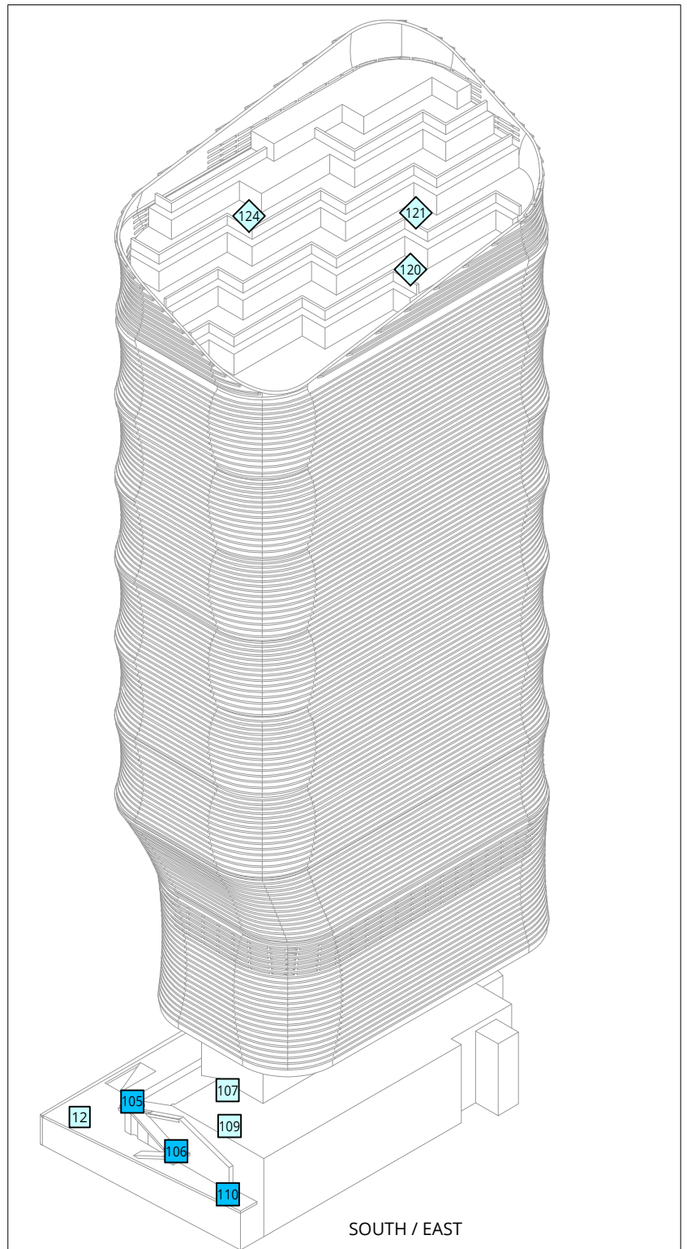

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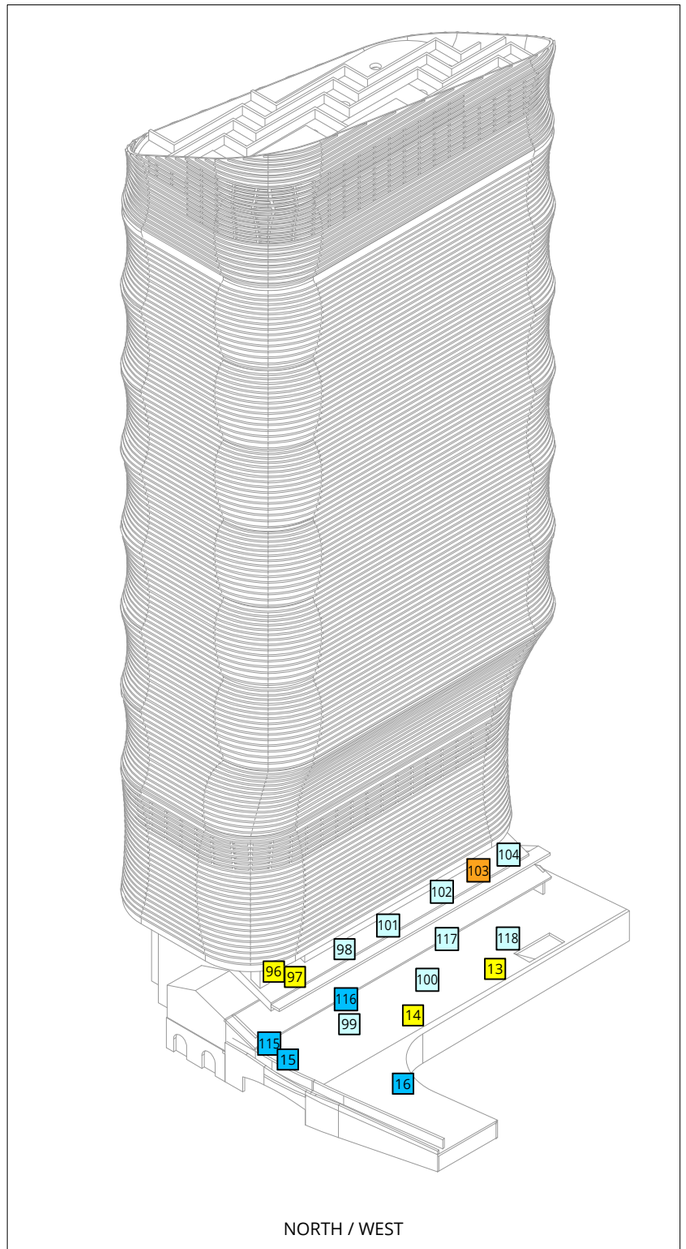

NORTH / WEST

LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

0 25 50m

Pedestrian Wind Comfort Conditions - Elevated Levels
Configuration 4: Proposed Development, Dexus/ Fraser and Toga with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

Project #2100277

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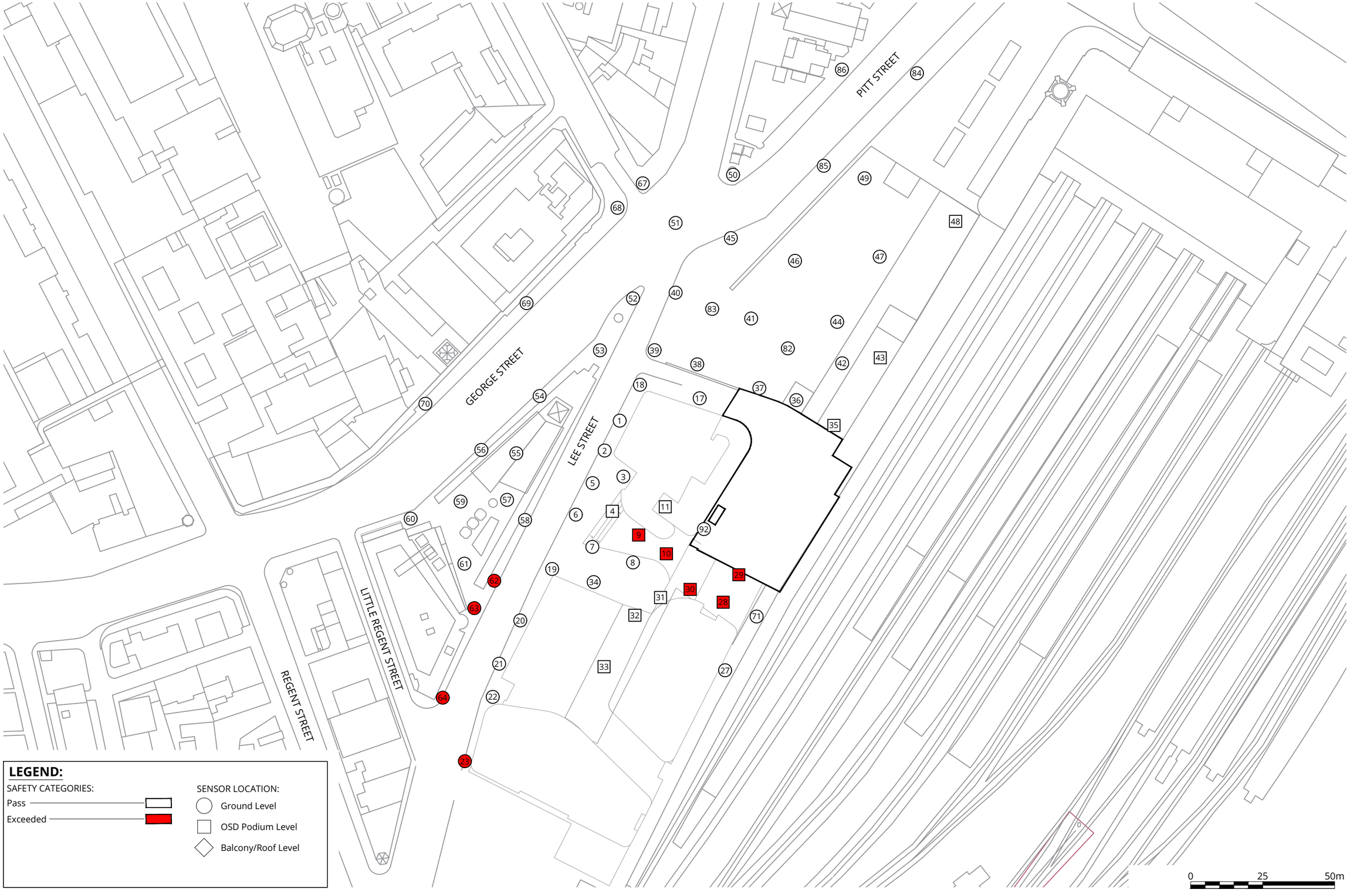

LEGEND:

SAFETY CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

Pedestrian Wind Safety Conditions - Ground Floor

Configuration 4: Proposed Development, Dexus/ Fraser and Toga with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

Project #2100277

True North

Drawn by:	JLF	Figure:	21
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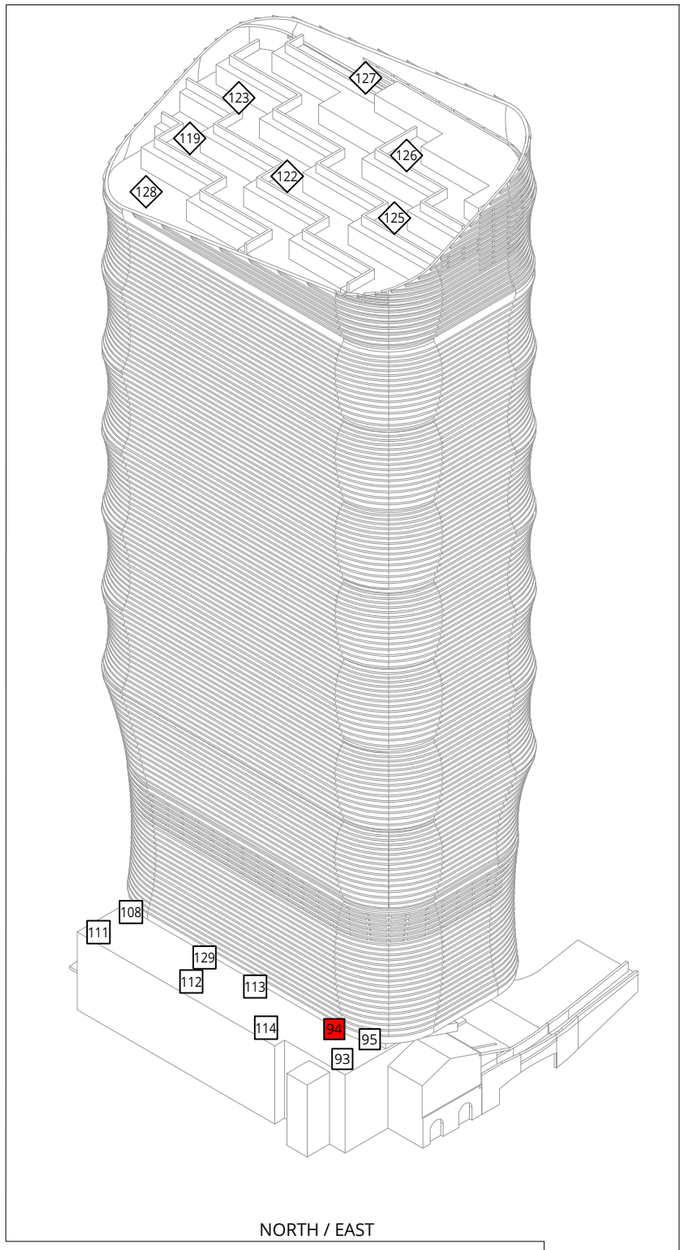

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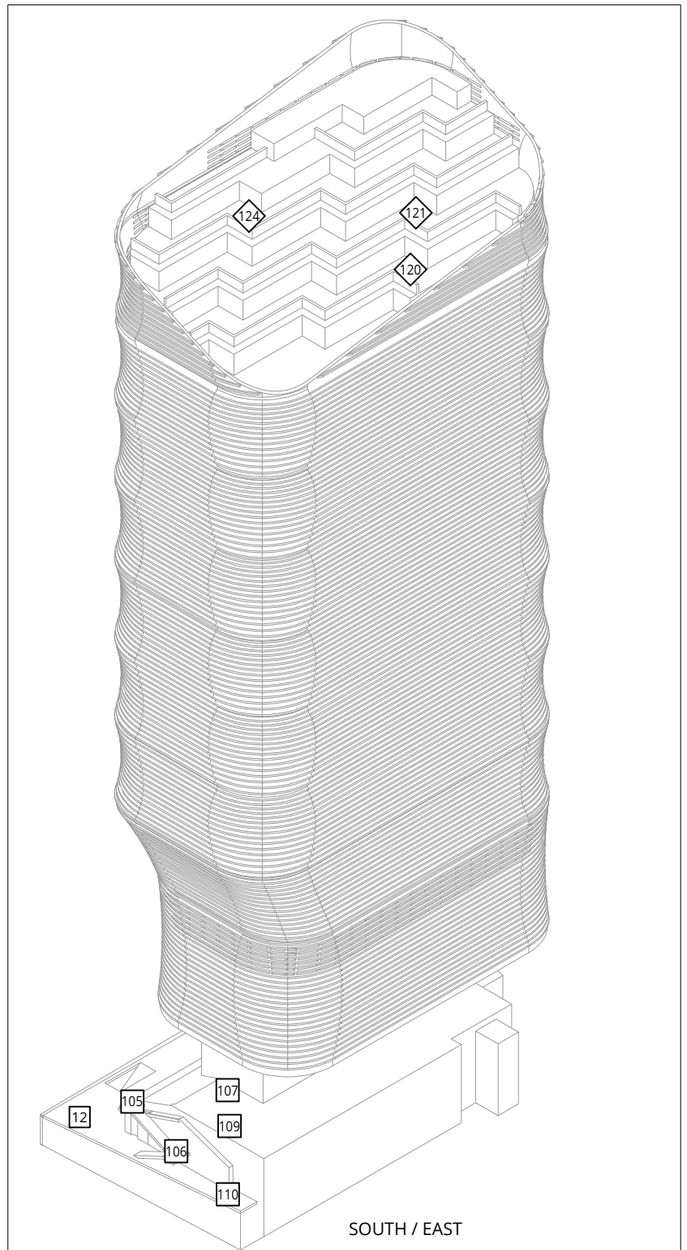

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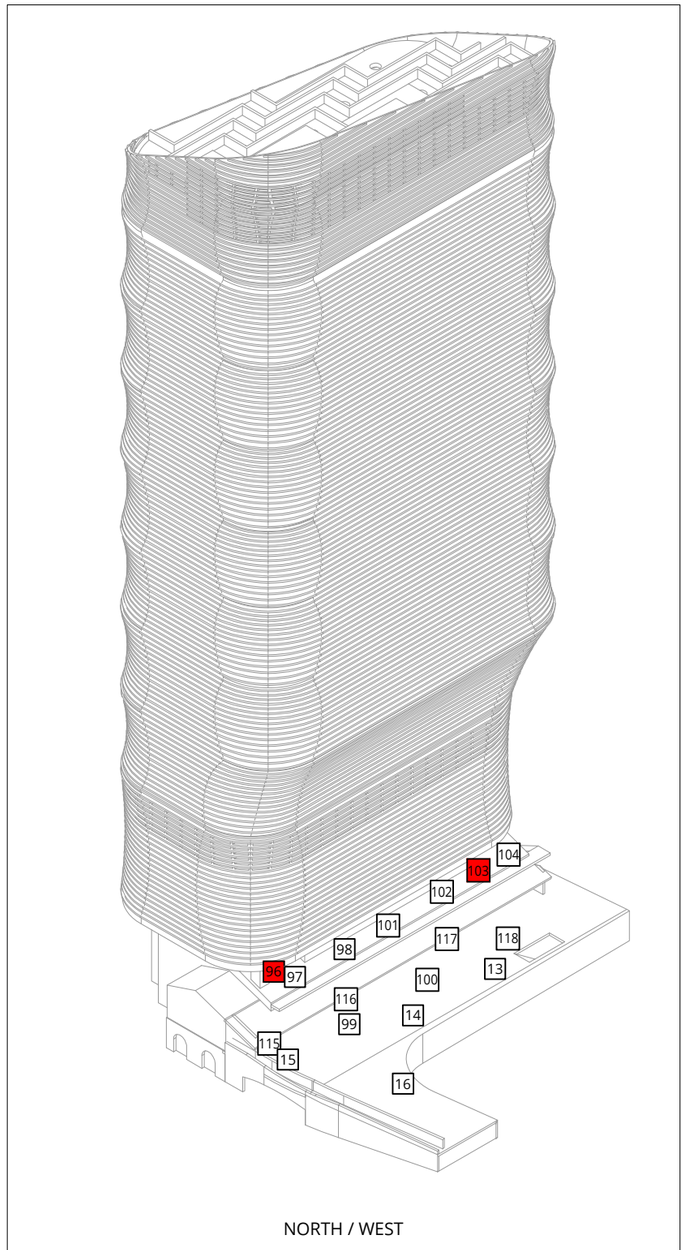

NORTH / WEST

LEGEND:

SAFETY CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

0 25 50m

Pedestrian Wind Safety Conditions - Elevated Levels
Configuration 4: Proposed Development, Dexus/ Fraser and Toga with Existing Surrounding Buildings
Annual

Atlassian Central - Sydney, Australia

Project #2100277

Drawn by:	JLF	Figure:	22
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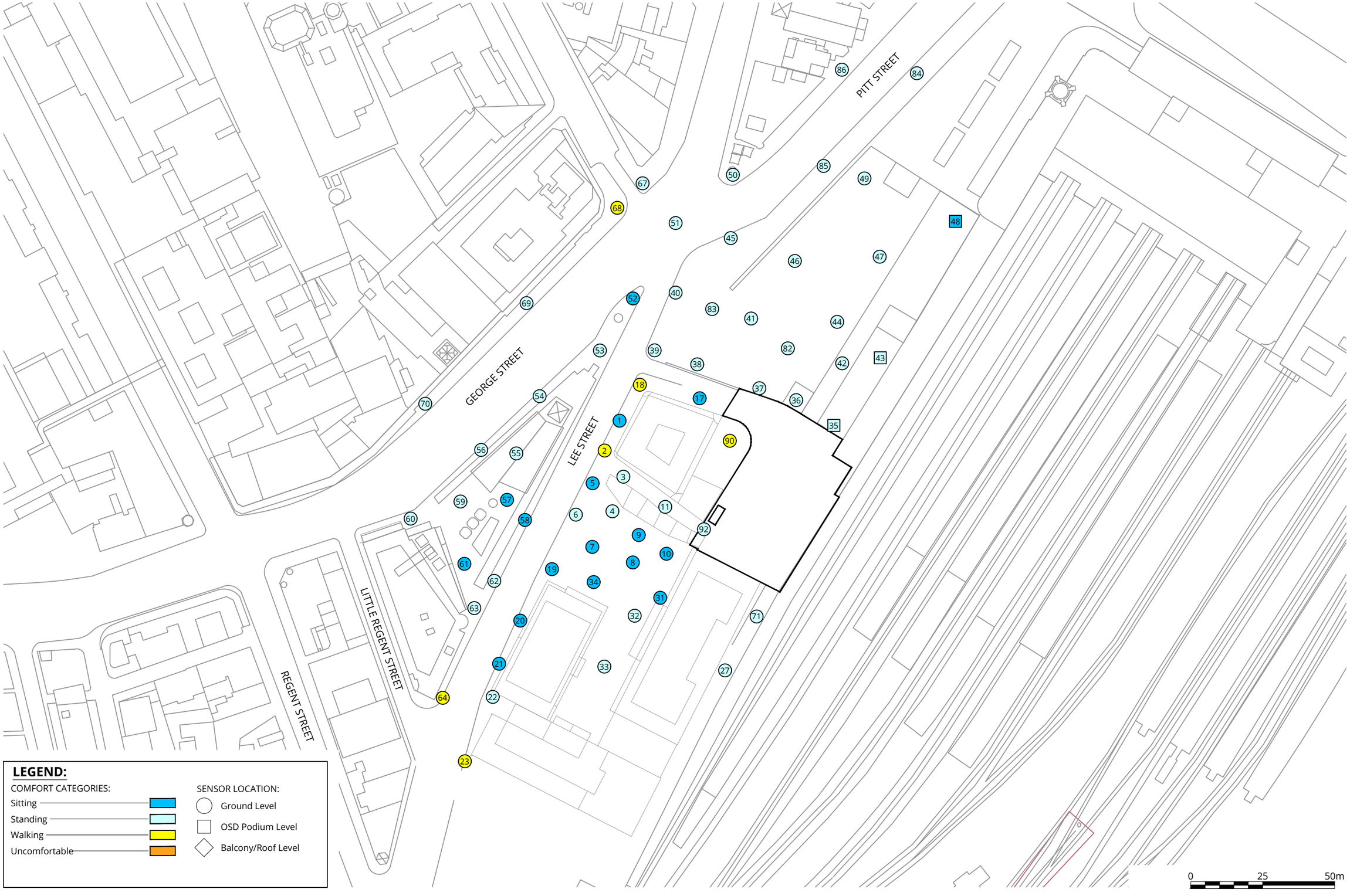
Date Revised:	Oct. 01, 2020		



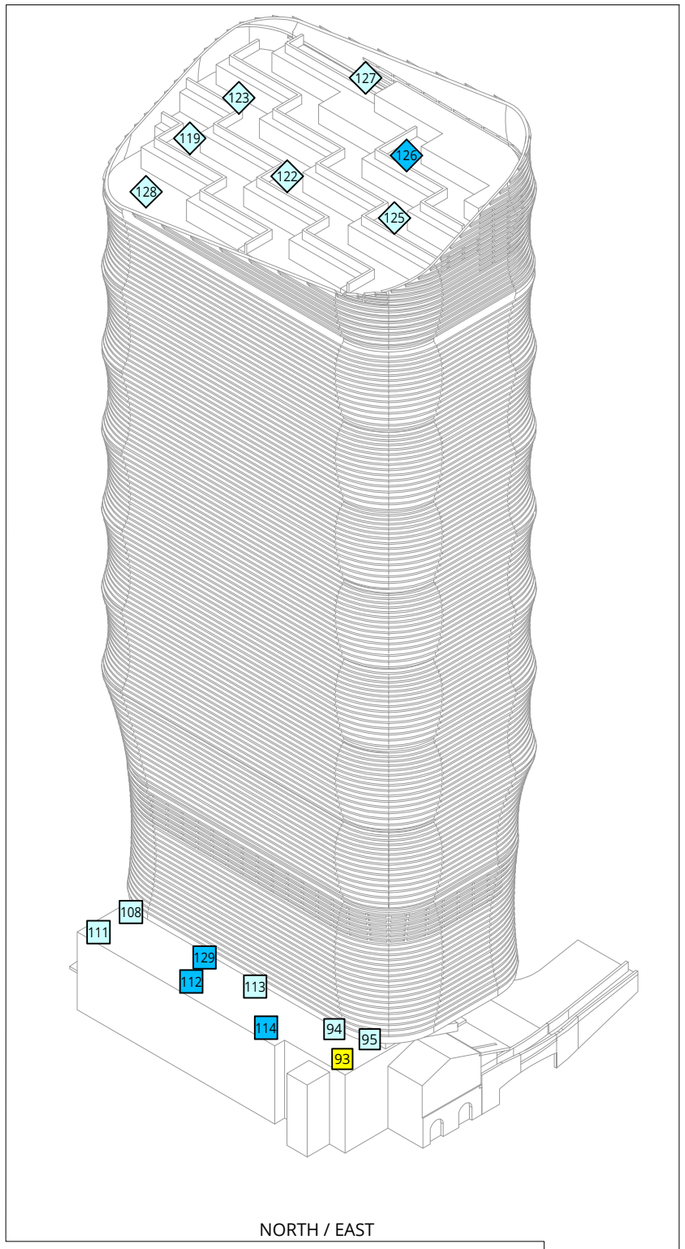
Pedestrian Wind Comfort Conditions - Ground Floor
Configuration M1: Proposed Development with Existing Surrounding Buildings, Landscaping and Wind Mitigation Measures
Annual

Atlassian Central - Sydney, Australia

True North

Project #2100277

Drawn by:	JLF	Figure:	23
Approx. Scale @A3:	1:1250		
Date Revised:	Nov. 17, 2020		



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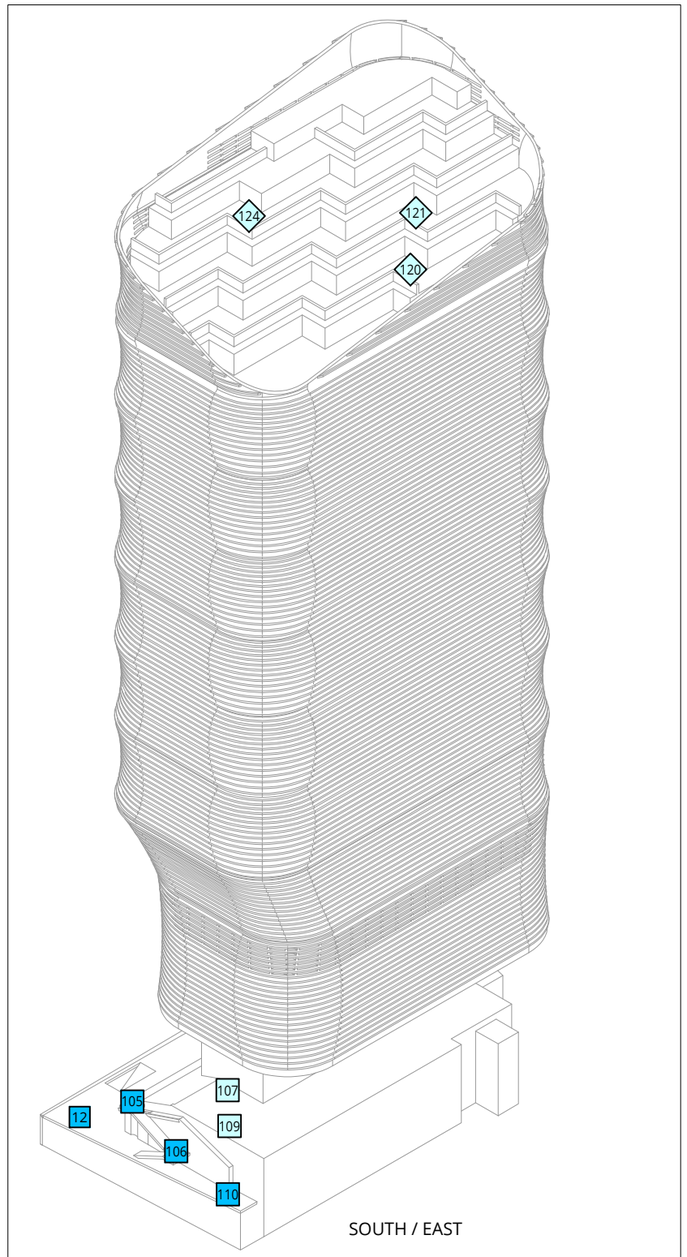

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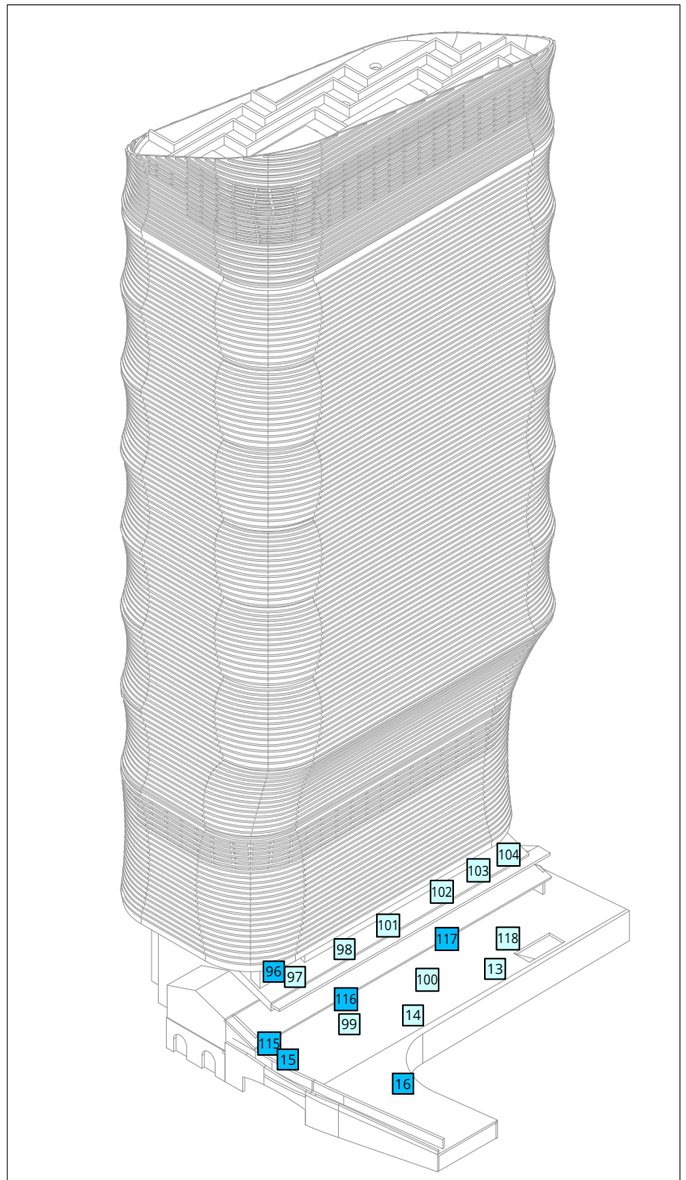

NORTH / WEST

LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

0 25 50m

Pedestrian Wind Comfort Conditions - Elevated Levels
Configuration M1: Proposed Development with Existing Surrounding Buildings, Landscaping and Wind Mitigation Measures
Annual

Atlassian Central - Sydney, Australia

Project #2100277

Drawn by:	JLF	Figure:	24
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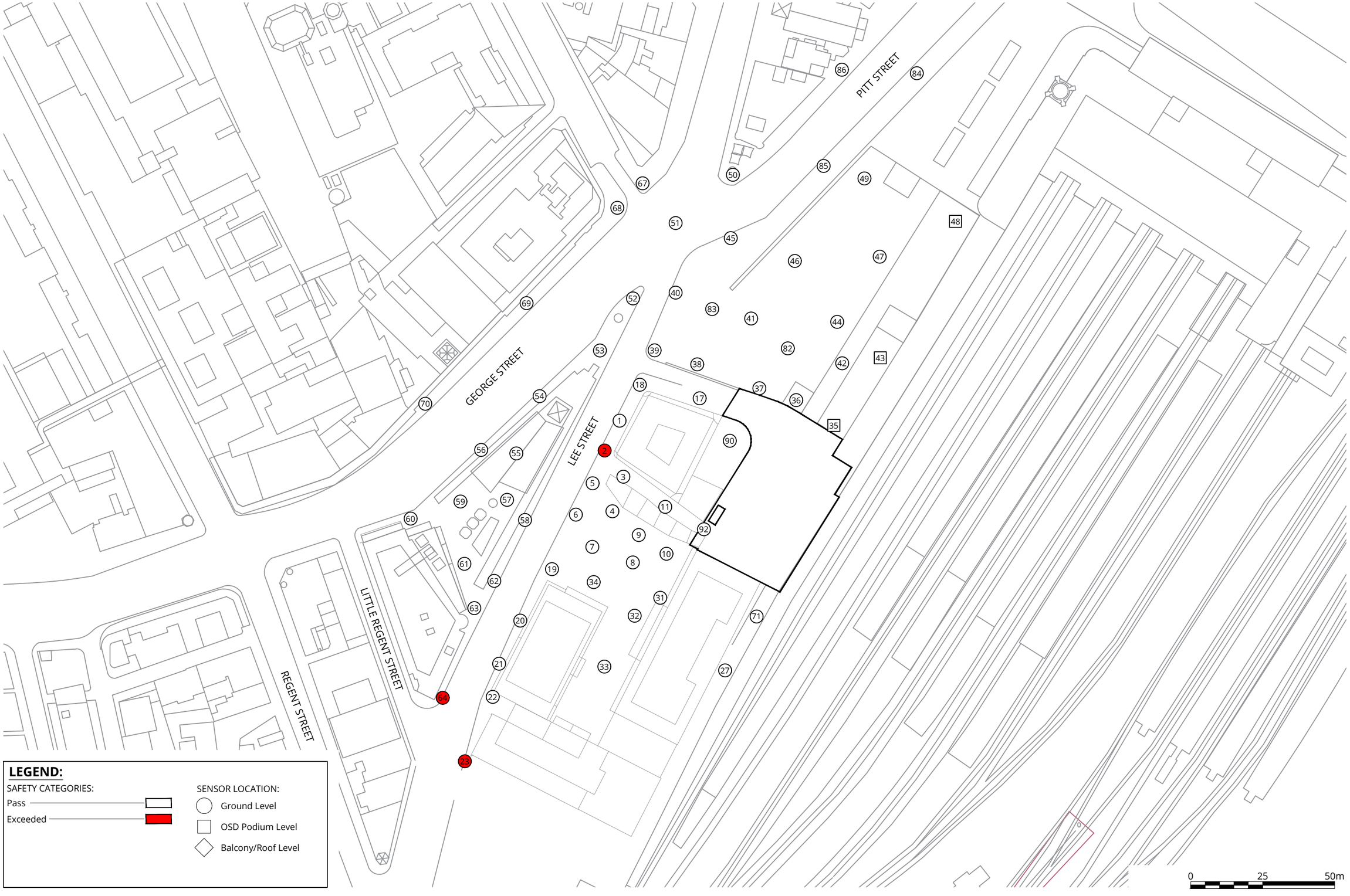
Date Revised:	Nov. 17, 2020		



LEGEND:

SAFETY CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

Pedestrian Wind Safety Conditions - Ground Floor

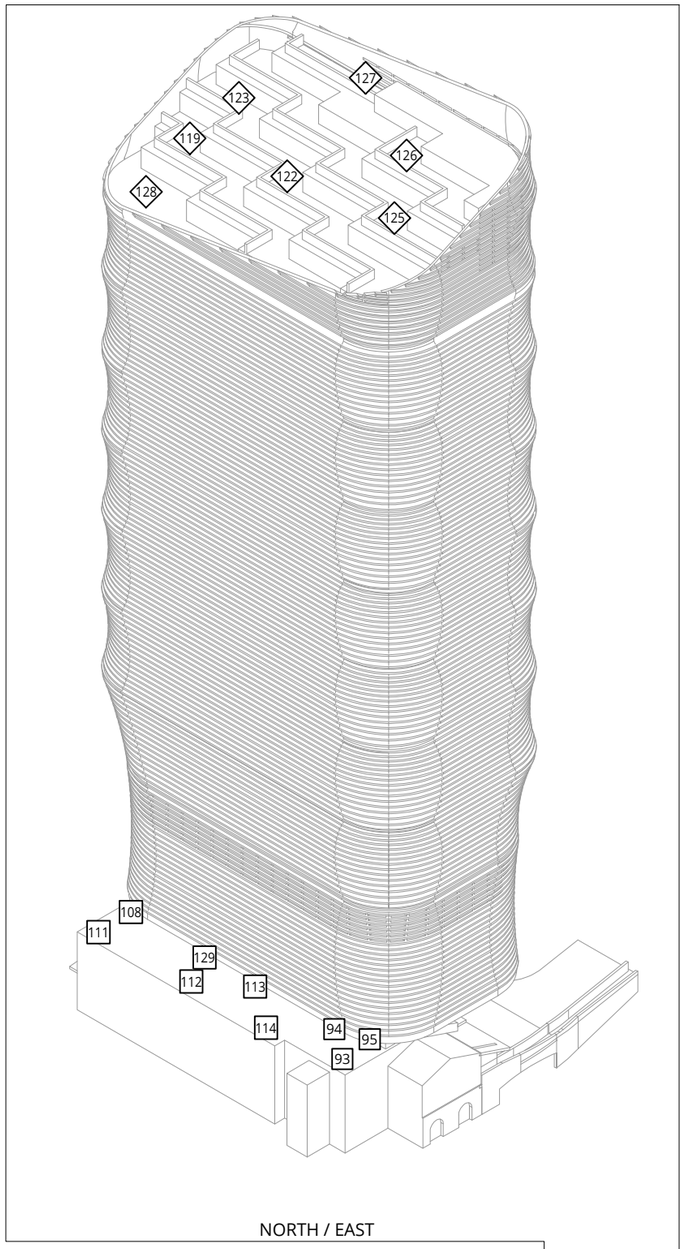
Configuration M1: Proposed Development with Existing Surrounding Buildings, Landscaping and Wind Mitigation Measures
Annual

Atlassian Central - Sydney, Australia

Project #2100277

True North

Drawn by:	JLF	Figure:	25
Approx. Scale @A3:	1:1250		
Date Revised:	Nov. 17, 2020		



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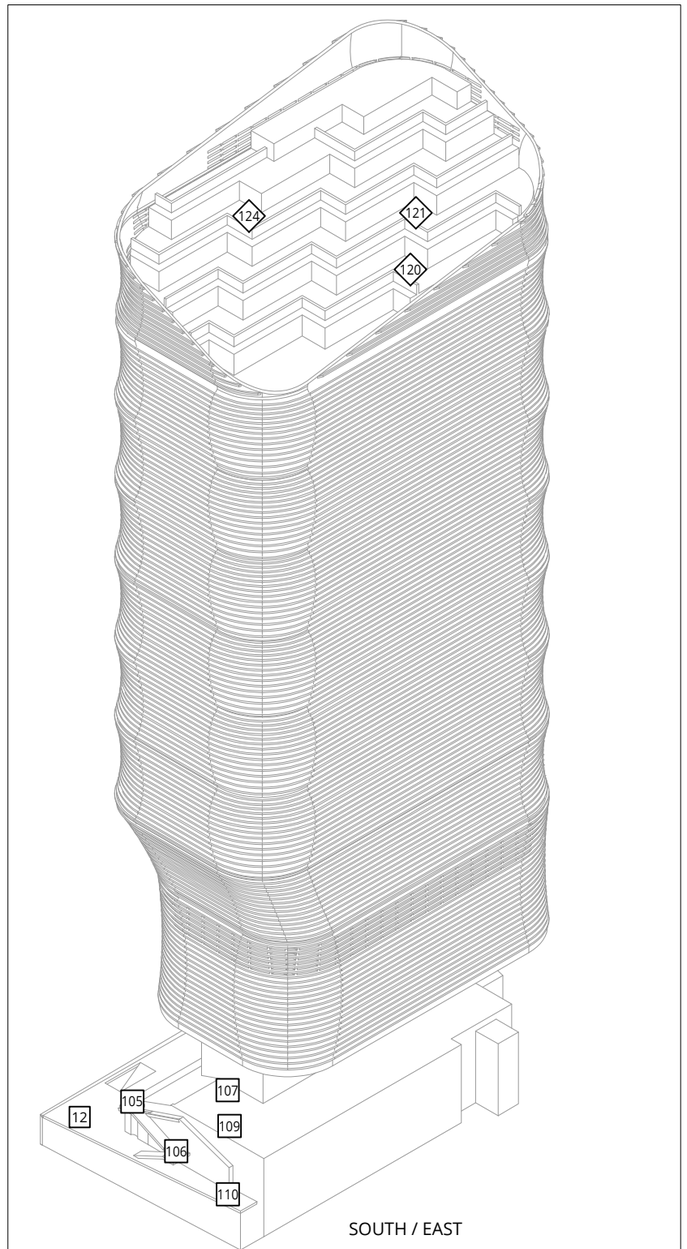

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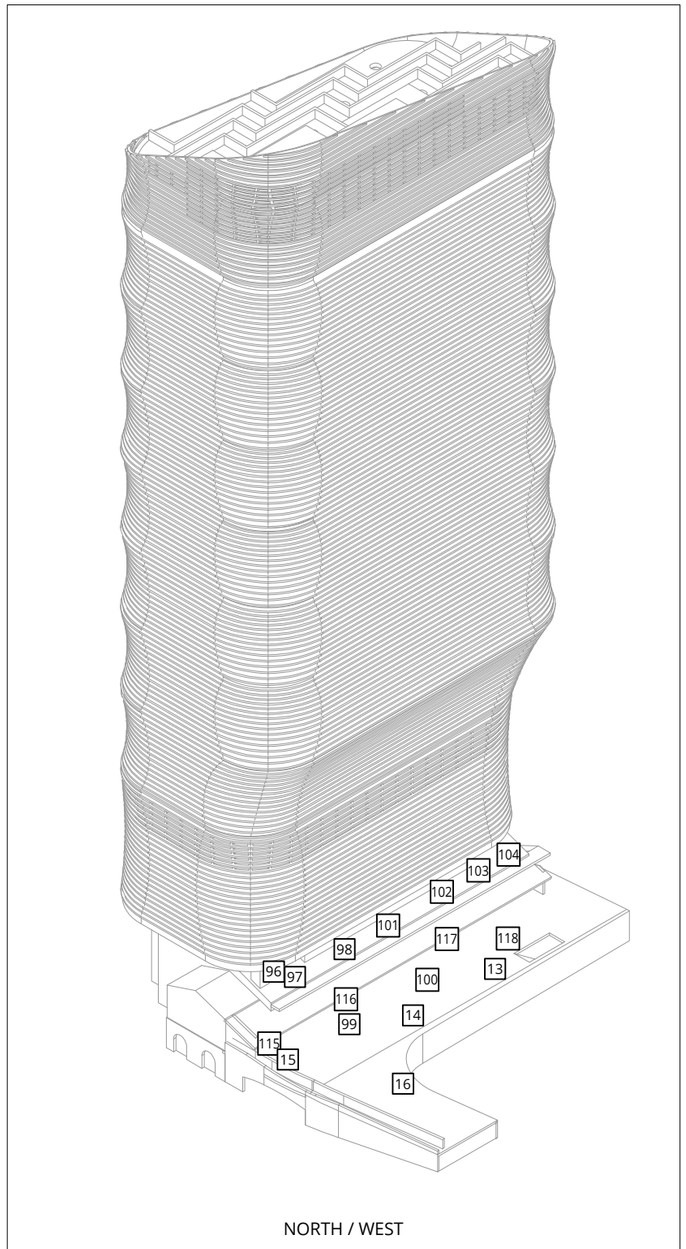

NORTH / WEST

LEGEND:

SAFETY CATEGORIES:
- Pass
- Exceeded

SENSOR LOCATION:
- Ground Level
- OSD Podium Level
- Balcony/Roof Level

0 25 50m

Pedestrian Wind Safety Conditions - Elevated Levels
Configuration M1: Proposed Development with Existing Surrounding Buildings, Landscaping and Wind Mitigation Measures
Annual

Atlassian Central - Sydney, Australia

Project #2100277

Drawn by:	JLF	Figure:	26
Approx. Scale @A3:	1:1250		
Date Revised:	Nov. 17, 2020		

TABLES

Table 1: Pedestrian Wind Comfort and Safety Conditions

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
1	C1	3.8	Sitting	13.6	Pass
	C2	4.6	Standing	19.4	Pass
	C3	4.8	Standing	19.9	Pass
	C4	4.2	Standing	16	Pass
2	C1	4.2	Standing	17	Pass
	C2	7.1	Walking	28.7	Exceeded
	C3	6.4	Walking	26.4	Exceeded
	C4	5.2	Standing	19	Pass
3	C1	3	Sitting	12.8	Pass
	C2	3.8	Sitting	16.9	Pass
	C3	4.5	Standing	18.2	Pass
	C4	4.7	Standing	17.9	Pass
4	C1	3.7	Sitting	15.6	Pass
	C2	4.5	Standing	19.9	Pass
	C3	5.7	Standing	21.3	Pass
	C4	4.5	Standing	20.1	Pass
5	C1	3.6	Sitting	13.5	Pass
	C2	4.2	Standing	18	Pass
	C3	5.8	Standing	23	Pass
	C4	5.8	Standing	21.4	Pass
6	C1	3.6	Sitting	14	Pass
	C2	4.5	Standing	19	Pass
	C3	5.9	Standing	22.8	Pass
	C4	5.7	Standing	21.9	Pass
7	C1	3.8	Sitting	13.8	Pass
	C2	4.3	Standing	17.8	Pass
	C3	5.6	Standing	21.6	Pass
	C4	5	Standing	22.2	Pass
8	C1	3.8	Sitting	15.5	Pass
	C2	4.8	Standing	18.4	Pass
	C3	5.4	Standing	22.8	Pass
	C4	4.4	Standing	21.8	Pass
9	C1	3.7	Sitting	15.1	Pass
	C2	4.4	Standing	17.6	Pass
	C3	5.5	Standing	21	Pass
	C4	8.3	Uncomfortable	27.6	Exceeded
10	C1	3.7	Sitting	14.5	Pass
	C2	3.7	Sitting	15	Pass
	C3	4.7	Standing	19.2	Pass
	C4	8.6	Uncomfortable	25.8	Exceeded

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
11	C1	4	Sitting	16.5	Pass
	C2	4	Sitting	17	Pass
	C3	4.3	Standing	19.2	Pass
	C4	3.1	Sitting	13.3	Pass
12	C1	-	-	-	-
	C2	4.8	Standing	22.1	Pass
	C3	6.6	Walking	23.5	Pass
	C4	6	Standing	21.9	Pass
13	C1	3.7	Sitting	14.6	Pass
	C2	7	Walking	25.2	Exceeded
	C3	4.5	Standing	16.8	Pass
	C4	6.9	Walking	24	Pass
14	C1	3.7	Sitting	12.8	Pass
	C2	6.4	Walking	23.1	Pass
	C3	4.8	Standing	17.6	Pass
	C4	6.1	Walking	21.6	Pass
15	C1	2.9	Sitting	10.9	Pass
	C2	4.1	Standing	17.1	Pass
	C3	3.8	Sitting	15.9	Pass
	C4	3.3	Sitting	13.5	Pass
16	C1	4.4	Standing	17	Pass
	C2	5.9	Standing	24.4	Exceeded
	C3	4.7	Standing	17.4	Pass
	C4	4	Sitting	15.2	Pass
17	C1	3.3	Sitting	11.6	Pass
	C2	3.9	Sitting	14.7	Pass
	C3	3.7	Sitting	14.5	Pass
	C4	3.9	Sitting	15.5	Pass
18	C1	5	Standing	18.8	Pass
	C2	6.5	Walking	21.6	Pass
	C3	5.7	Standing	19.4	Pass
	C4	6.1	Walking	21.7	Pass
19	C1	3.8	Sitting	13.9	Pass
	C2	3.2	Sitting	13.7	Pass
	C3	5.6	Standing	20.1	Pass
	C4	4.8	Standing	17.7	Pass
20	C1	3.3	Sitting	14.1	Pass
	C2	2.9	Sitting	11.8	Pass
	C3	5	Standing	21.5	Pass
	C4	5	Standing	22.2	Pass
21	C1	3.9	Sitting	17	Pass
	C2	3.9	Sitting	17	Pass
	C3	5.6	Standing	23.7	Pass
	C4	5.8	Standing	23.6	Pass

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
22	C1	4.2	Standing	17.6	Pass
	C2	4.5	Standing	17.9	Pass
	C3	5	Standing	21.7	Pass
	C4	5.1	Standing	21.8	Pass
23	C1	6.9	Walking	24.3	Exceeded
	C2	7	Walking	24.5	Exceeded
	C3	9.6	Uncomfortable	31.7	Exceeded
	C4	9.7	Uncomfortable	32.1	Exceeded
24	C1				
	C2				
	C3				
	C4				
25	C1				
	C2				
	C3				
	C4				
26	C1				
	C2				
	C3				
	C4				
27	C1	4.4	Standing	16.4	Pass
	C2	4.6	Standing	16.7	Pass
	C3	5.7	Standing	19	Pass
	C4	5.6	Standing	19.9	Pass
28	C1	1.6	Sitting	5.9	Pass
	C2	-	-	-	-
	C3	7.8	Walking	26.6	Exceeded
	C4	8.4	Uncomfortable	27.6	Exceeded
29	C1	1.6	Sitting	6.1	Pass
	C2	-	-	-	-
	C3	7.3	Walking	25	Exceeded
	C4	7.6	Walking	25.6	Exceeded
30	C1	1.3	Sitting	4.8	Pass
	C2	-	-	-	-
	C3	7.6	Walking	27.1	Exceeded
	C4	7.9	Walking	27.9	Exceeded
31	C1	3.7	Sitting	14.8	Pass
	C2	4.2	Standing	15.9	Pass
	C3	5.1	Standing	19.6	Pass
	C4	4.7	Standing	18.4	Pass
32	C1	3.8	Sitting	14.7	Pass
	C2	4.7	Standing	17.6	Pass
	C3	4.3	Standing	18.9	Pass
	C4	4.6	Standing	18.3	Pass

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
33	C1	4	Sitting	16	Pass
	C2	4.9	Standing	17.9	Pass
	C3	3.3	Sitting	15.7	Pass
	C4	3.5	Sitting	15.5	Pass
34	C1	3.2	Sitting	11.7	Pass
	C2	2.7	Sitting	14.4	Pass
	C3	4.4	Standing	16.9	Pass
	C4	4.5	Standing	16.6	Pass
35	C1	2.9	Sitting	10.6	Pass
	C2	4.4	Standing	22	Pass
	C3	4.7	Standing	23.9	Pass
	C4	3.9	Sitting	18.5	Pass
36	C1	2.9	Sitting	10.9	Pass
	C2	4.4	Standing	20.2	Pass
	C3	3.7	Sitting	18	Pass
	C4	3.3	Sitting	12.6	Pass
37	C1	3.3	Sitting	11.6	Pass
	C2	4.9	Standing	21.8	Pass
	C3	4.3	Standing	17.3	Pass
	C4	3.9	Sitting	14.8	Pass
38	C1	3.6	Sitting	13	Pass
	C2	5.5	Standing	20.4	Pass
	C3	4.8	Standing	16.8	Pass
	C4	4.7	Standing	17.4	Pass
39	C1	4.2	Standing	15.4	Pass
	C2	6.2	Walking	22.3	Pass
	C3	5.4	Standing	20.7	Pass
	C4	5.6	Standing	20.1	Pass
40	C1	4.6	Standing	16	Pass
	C2	5.5	Standing	21.2	Pass
	C3	4.7	Standing	16.9	Pass
	C4	4.9	Standing	18.1	Pass
41	C1	3.7	Sitting	13.3	Pass
	C2	5.9	Standing	24.3	Exceeded
	C3	5	Standing	21.3	Pass
	C4	4.9	Standing	18	Pass
42	C1	2.4	Sitting	9.8	Pass
	C2	4.2	Standing	22.2	Pass
	C3	4.3	Standing	23.8	Pass
	C4	3.5	Sitting	15.6	Pass
43	C1	3.8	Sitting	16.5	Pass
	C2	4.8	Standing	20.9	Pass
	C3	5	Standing	22.1	Pass
	C4	4.7	Standing	18.7	Pass

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
44	C1	3.7	Sitting	14	Pass
	C2	4.6	Standing	19.9	Pass
	C3	4.4	Standing	22	Pass
	C4	3.9	Sitting	17.3	Pass
45	C1	4	Sitting	15.2	Pass
	C2	5.2	Standing	21.6	Pass
	C3	4.8	Standing	19.4	Pass
	C4	4.6	Standing	17.9	Pass
46	C1	4	Sitting	15.6	Pass
	C2	5.1	Standing	20	Pass
	C3	4.8	Standing	18.5	Pass
	C4	4.2	Standing	16.1	Pass
47	C1	3.8	Sitting	15.5	Pass
	C2	4.7	Standing	19.3	Pass
	C3	4.9	Standing	22.6	Pass
	C4	4.3	Standing	16.6	Pass
48	C1	4.3	Standing	18.2	Pass
	C2	5	Standing	19.8	Pass
	C3	5.5	Standing	21.8	Pass
	C4	5.2	Standing	20.6	Pass
49	C1	3.7	Sitting	13	Pass
	C2	4.5	Standing	18.8	Pass
	C3	4.6	Standing	18.6	Pass
	C4	3.9	Sitting	14.6	Pass
50	C1	4.8	Standing	17.9	Pass
	C2	5.4	Standing	21	Pass
	C3	5.3	Standing	21.8	Pass
	C4	5.2	Standing	20.3	Pass
51	C1	4.9	Standing	18.3	Pass
	C2	5.7	Standing	23.1	Pass
	C3	4.9	Standing	19.9	Pass
	C4	4.9	Standing	18.3	Pass
52	C1	4.8	Standing	18	Pass
	C2	6	Standing	23.9	Pass
	C3	5	Standing	18.9	Pass
	C4	4.9	Standing	19.1	Pass
53	C1	4.5	Standing	17.5	Pass
	C2	6	Standing	24	Pass
	C3	5.2	Standing	19.5	Pass
	C4	5.4	Standing	18.2	Pass
54	C1	4.3	Standing	15.4	Pass
	C2	5.4	Standing	18.7	Pass
	C3	4.9	Standing	18.3	Pass
	C4	5.4	Standing	18.1	Pass

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
55	C1	4.2	Standing	18.8	Pass
	C2	4.8	Standing	18.4	Pass
	C3	5.1	Standing	19.8	Pass
	C4	5.3	Standing	20.2	Pass
56	C1	4.8	Standing	19	Pass
	C2	5.1	Standing	19.9	Pass
	C3	4.7	Standing	17.6	Pass
	C4	4.6	Standing	16.8	Pass
57	C1	3.5	Sitting	13	Pass
	C2	3.7	Sitting	13.6	Pass
	C3	5.2	Standing	21.1	Pass
	C4	5.5	Standing	21.9	Pass
58	C1	3.7	Sitting	14.9	Pass
	C2	3.5	Sitting	13.5	Pass
	C3	5.8	Standing	23.3	Pass
	C4	5.9	Standing	24	Pass
59	C1	4.5	Standing	20.7	Pass
	C2	4.5	Standing	19.8	Pass
	C3	4.6	Standing	17	Pass
	C4	4.3	Standing	17.1	Pass
60	C1	4.8	Standing	22	Pass
	C2	4.5	Standing	20.9	Pass
	C3	4.3	Standing	16.9	Pass
	C4	4.1	Standing	16.3	Pass
61	C1	3.4	Sitting	12.8	Pass
	C2	4	Sitting	16.7	Pass
	C3	4.7	Standing	18.2	Pass
	C4	4.9	Standing	20.2	Pass
62	C1	4.8	Standing	20.2	Pass
	C2	4.3	Standing	16.6	Pass
	C3	7.6	Walking	27.8	Exceeded
	C4	7.7	Walking	28.5	Exceeded
63	C1	4.7	Standing	18.2	Pass
	C2	5	Standing	19.8	Pass
	C3	6.6	Walking	24.1	Exceeded
	C4	7.1	Walking	25.2	Exceeded
64	C1	6	Standing	23.6	Pass
	C2	6.1	Walking	23.6	Pass
	C3	7.9	Walking	26	Exceeded
	C4	7.8	Walking	26.2	Exceeded
65	C1				
	C2				
	C3				
	C4				

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
66	C1				
	C2				
	C3				
	C4				
67	C1	4.6	Standing	16.9	Pass
	C2	5.1	Standing	19.9	Pass
	C3	4.4	Standing	17	Pass
	C4	4.4	Standing	16	Pass
68	C1	5	Standing	18.1	Pass
	C2	5.7	Standing	22.2	Pass
	C3	4.6	Standing	16.5	Pass
	C4	4.5	Standing	15.7	Pass
69	C1	3.8	Sitting	15.8	Pass
	C2	4.8	Standing	18.9	Pass
	C3	5.4	Standing	21.2	Pass
	C4	5	Standing	19	Pass
70	C1	4	Sitting	16.5	Pass
	C2	4.5	Standing	17.9	Pass
	C3	4.9	Standing	19	Pass
	C4	5.5	Standing	21.1	Pass
71	C1	4.1	Standing	16.5	Pass
	C2	3.8	Sitting	15.4	Pass
	C3	6.6	Walking	21.9	Pass
	C4	6.7	Walking	21.9	Pass
72	C1				
	C2				
	C3				
	C4				
73	C1				
	C2				
	C3				
	C4				
74	C1				
	C2				
	C3				
	C4				
75	C1				
	C2				
	C3				
	C4				
76	C1				
	C2				
	C3				
	C4				

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
77	C1				
	C2				
	C3				
	C4				
78	C1				
	C2				
	C3				
	C4				
79	C1				
	C2				
	C3				
	C4				
80	C1				
	C2				
	C3				
	C4				
81	C1				
	C2				
	C3				
	C4				
82	C1	3.4	Sitting	12.1	Pass
	C2	5	Standing	22.5	Pass
	C3	4.4	Standing	21.6	Pass
	C4	4.1	Standing	15.9	Pass
83	C1	3.7	Sitting	13.2	Pass
	C2	5.6	Standing	21.6	Pass
	C3	5	Standing	18.8	Pass
	C4	5.1	Standing	18.6	Pass
84	C1	5.4	Standing	19.1	Pass
	C2	5.4	Standing	18.7	Pass
	C3	5.1	Standing	17.6	Pass
	C4	4.9	Standing	17.6	Pass
85	C1	5	Standing	17.8	Pass
	C2	5.4	Standing	19.8	Pass
	C3	5.7	Standing	22.2	Pass
	C4	5.2	Standing	21.8	Pass
86	C1	4.7	Standing	16.9	Pass
	C2	4.8	Standing	17.9	Pass
	C3	5	Standing	20	Pass
	C4	4.7	Standing	17.9	Pass
87	C1				
	C2				
	C3				
	C4				

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
88	C1				
	C2				
	C3				
	C4				
89	C1				
	C2				
	C3				
	C4				
90	C1	3.4	Sitting	12	Pass
	C2	5.8	Standing	23.3	Pass
	C3	4.9	Standing	18.4	Pass
	C4	0	Sitting	4.1	Pass
91	C1				
	C2				
	C3				
	C4				
93	C1	-	-	-	-
	C2	4.5	Standing	17.8	Pass
	C3	4.6	Standing	17	Pass
	C4	4.7	Standing	17	Pass
94	C1	-	-	-	-
	C2	8.9	Uncomfortable	27.4	Exceeded
	C3	9.2	Uncomfortable	26.6	Exceeded
	C4	8.6	Uncomfortable	25.4	Exceeded
95	C1	-	-	-	-
	C2	7.4	Walking	24.8	Exceeded
	C3	7.7	Walking	24.3	Exceeded
	C4	6.2	Walking	23.8	Pass
96	C1	-	-	-	-
	C2	8.4	Uncomfortable	36.2	Exceeded
	C3	9.2	Uncomfortable	42.4	Exceeded
	C4	7.6	Walking	38.6	Exceeded
97	C1	-	-	-	-
	C2	7	Walking	30.3	Exceeded
	C3	7.2	Walking	29	Exceeded
	C4	6.1	Walking	23.9	Pass
98	C1	-	-	-	-
	C2	4.8	Standing	20.1	Pass
	C3	4.5	Standing	20.6	Pass
	C4	5	Standing	19.6	Pass
99	C1	3	Sitting	10.8	Pass
	C2	4.7	Standing	15.8	Pass
	C3	4.5	Standing	15.7	Pass
	C4	4.9	Standing	17.3	Pass

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
100	C1	3	Sitting	12.4	Pass
	C2	5.9	Standing	22.5	Pass
	C3	3.8	Sitting	14.3	Pass
	C4	5.9	Standing	21.3	Pass
101	C1	-	-	-	-
	C2	4.9	Standing	21.7	Pass
	C3	4.5	Standing	20.8	Pass
	C4	5.4	Standing	21.3	Pass
102	C1	-	-	-	-
	C2	5	Standing	22	Pass
	C3	4.4	Standing	19.7	Pass
	C4	5.6	Standing	21.4	Pass
103	C1	-	-	-	-
	C2	8.6	Uncomfortable	25.6	Exceeded
	C3	9	Uncomfortable	26.5	Exceeded
	C4	9	Uncomfortable	27.1	Exceeded
104	C1	-	-	-	-
	C2	4.6	Standing	17.6	Pass
	C3	4.5	Standing	16.2	Pass
	C4	4.1	Standing	15.2	Pass
105	C1	2.2	Sitting	9.4	Pass
	C2	3	Sitting	12	Pass
	C3	4.1	Standing	14.6	Pass
	C4	3.7	Sitting	13.6	Pass
106	C1	-	-	-	-
	C2	3.6	Sitting	14.2	Pass
	C3	2.9	Sitting	13.5	Pass
	C4	2.9	Sitting	12.9	Pass
107	C1	-	-	-	-
	C2	5.4	Standing	20.6	Pass
	C3	5.5	Standing	19.7	Pass
	C4	5.3	Standing	18.5	Pass
108	C1	-	-	-	-
	C2	7	Walking	24.9	Exceeded
	C3	6.6	Walking	23.1	Pass
	C4	6.1	Walking	20.9	Pass
109	C1	-	-	-	-
	C2	6.9	Walking	22.9	Pass
	C3	6.4	Walking	21.2	Pass
	C4	6	Standing	19.4	Pass
110	C1	-	-	-	-
	C2	3.7	Sitting	14.0	Pass
	C3	3.7	Sitting	15.7	Pass
	C4	3.7	Sitting	15	Pass

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
111	C1	-	-	-	-
	C2	4.4	Standing	18.5	Pass
	C3	4.5	Standing	18.5	Pass
	C4	4	Sitting	15	Pass
112	C1	-	-	-	-
	C2	5.6	Standing	22	Pass
	C3	5	Standing	18.2	Pass
	C4	4.8	Standing	17.7	Pass
113	C1	-	-	-	-
	C2	5.9	Standing	21.5	Pass
	C3	6.1	Walking	21.7	Pass
	C4	6	Standing	21.7	Pass
114	C1	-	-	-	-
	C2	5.4	Standing	18.9	Pass
	C3	5.3	Standing	18.7	Pass
	C4	5.1	Standing	18.9	Pass
115	C1	2.5	Sitting	9	Pass
	C2	2.9	Sitting	12.6	Pass
	C3	2.8	Sitting	12.1	Pass
	C4	2.8	Sitting	14.9	Pass
116	C1	2.8	Sitting	10.4	Pass
	C2	3.7	Sitting	13.9	Pass
	C3	3.5	Sitting	16	Pass
	C4	4	Sitting	16.4	Pass
117	C1	2	Sitting	7.8	Pass
	C2	5.2	Standing	18.2	Pass
	C3	3.5	Sitting	16.9	Pass
	C4	4.9	Standing	18.9	Pass
118	C1	-	-	-	-
	C2	5	Standing	19.7	Pass
	C3	4	Sitting	17	Pass
	C4	5.7	Standing	20.5	Pass
119	C1	-	-	-	-
	C2	4.6	Standing	15.7	Pass
	C3	5	Standing	22.4	Pass
	C4	5.3	Standing	23.7	Pass
120	C1	-	-	-	-
	C2	5.9	Standing	22.8	Pass
	C3	5.6	Standing	20.1	Pass
	C4	5.7	Standing	20.7	Pass
121	C1	-	-	-	-
	C2	5.3	Standing	20.3	Pass
	C3	4.9	Standing	16.8	Pass
	C4	5	Standing	17.4	Pass

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
122	C1	-	-	-	-
	C2	4.8	Standing	18.1	Pass
	C3	4.6	Standing	16.9	Pass
	C4	4.7	Standing	17.3	Pass
123	C1	-	-	-	-
	C2	5.2	Standing	18.6	Pass
	C3	5.2	Standing	20.6	Pass
	C4	5.8	Standing	22.9	Pass
124	C1	-	-	-	-
	C2	4.5	Standing	16.4	Pass
	C3	4.3	Standing	14.9	Pass
	C4	4.6	Standing	16.5	Pass
125	C1	-	-	-	-
	C2	5	Standing	19.1	Pass
	C3	4.5	Standing	15.6	Pass
	C4	4.6	Standing	15.8	Pass
126	C1	-	-	-	-
	C2	3.8	Sitting	12.9	Pass
	C3	3.6	Sitting	12.6	Pass
	C4	3.8	Sitting	13.6	Pass
127	C1	-	-	-	-
	C2	5.2	Standing	19.1	Pass
	C3	5.4	Standing	19.4	Pass
	C4	5.6	Standing	20.7	Pass
128	C1	-	-	-	-
	C2	4.9	Standing	18.7	Pass
	C3	4.7	Standing	16.8	Pass
	C4	5	Standing	20.2	Pass
129	C1	-	-	-	-
	C2	4.9	Standing	18.7	Pass
	C3	5.6	Standing	19.9	Pass
	C4	5.5	Standing	19.5	Pass

Table 2: Pedestrian Wind Comfort and Safety Conditions for Configuration 2 Mitigation (M1)

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
1	M1	3.9	Sitting	16	Pass
2	M1	6.9	Walking	27.4	Exceeded
3	M1	4.2	Standing	18.4	Pass
4	M1	4.8	Standing	20.8	Pass
5	M1	3.8	Sitting	16.4	Pass
6	M1	4.1	Standing	15.8	Pass
7	M1	3.5	Sitting	13.2	Pass
8	M1	3	Sitting	12.6	Pass
9	M1	3.9	Sitting	19	Pass
10	M1	2.9	Sitting	12	Pass
11	M1	4.3	Standing	18	Pass
12	M1	3.7	Sitting	13.3	Pass
13	M1	5.5	Standing	22.6	Pass
14	M1	4.2	Standing	15.8	Pass
15	M1	3.9	Sitting	15.7	Pass
16	M1	3.8	Sitting	14.4	Pass
17	M1	3.8	Sitting	14.6	Pass
18	M1	6.2	Walking	21.4	Pass
19	M1	4	Sitting	14.9	Pass
20	M1	3.6	Sitting	14.1	Pass
21	M1	4	Sitting	16.7	Pass
22	M1	4.7	Standing	16.9	Pass
23	M1	7	Walking	25.2	Exceeded
24	M1				
25	M1				
26	M1				
27	M1	4.3	Standing	15.8	Pass
31	M1	3.8	Sitting	15	Pass
32	M1	4.6	Standing	17	Pass
33	M1	4.9	Standing	17.7	Pass
34	M1	3.4	Sitting	12.8	Pass
35	M1	4.6	Standing	24.1	Exceeded
36	M1	4.3	Standing	21.5	Pass
37	M1	5.1	Standing	22.7	Pass
38	M1	5.5	Standing	21.1	Pass
39	M1	5.9	Standing	22	Pass
40	M1	5	Standing	20.3	Pass
41	M1	5.6	Standing	22.9	Pass
42	M1	4.1	Standing	20	Pass
43	M1	5.1	Standing	23.4	Pass
44	M1	4.2	Standing	17	Pass

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
45	M1	5	Standing	19.8	Pass
46	M1	4.9	Standing	18.7	Pass
47	M1	4.8	Standing	19	Pass
48	M1	4	Sitting	15.9	Pass
49	M1	4.5	Standing	18.2	Pass
50	M1	5	Standing	20.2	Pass
51	M1	5.7	Standing	23.4	Pass
52	M1	3.9	Sitting	15.2	Pass
53	M1	5.7	Standing	22.6	Pass
54	M1	5.5	Standing	19	Pass
55	M1	4.7	Standing	18	Pass
56	M1	4.8	Standing	19.3	Pass
57	M1	3.8	Sitting	14.3	Pass
58	M1	3.9	Sitting	15.4	Pass
59	M1	4.6	Standing	20.5	Pass
60	M1	4.6	Standing	20.7	Pass
61	M1	3.8	Sitting	14.7	Pass
62	M1	5	Standing	19.7	Pass
63	M1	5	Standing	18.4	Pass
64	M1	7.3	Walking	25	Exceeded
65	M1				
66	M1				
67	M1	5.6	Standing	21.5	Pass
68	M1	7.3	Walking	23.3	Pass
69	M1	4.9	Standing	17.4	Pass
70	M1	5	Standing	18.1	Pass
71	M1	6	Standing	16.1	Pass
72	M1				
73	M1				
74	M1				
75	M1				
76	M1				
77	M1				
78	M1				
79	M1				
80	M1				
81	M1				
82	M1				
83	M1	5.4	Standing	20.8	Pass
84	M1	4.9	Standing	17.8	Pass
85	M1	4.9	Standing	18	Pass
86	M1	4.9	Standing	18	Pass
87	M1				
88	M1				

Probe Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
89	M1				
90	M1	6.7	Walking	22.7	Pass
91	M1				
93	M1	6.6	Walking	18.5	Pass
94	M1	6	Standing	18.5	Pass
95	M1	4.4	Standing	15.7	Pass
96	M1	3.7	Sitting	17.3	Pass
97	M1	4.6	Standing	23.5	Pass
98	M1	4.4	Standing	19.5	Pass
99	M1	4.3	Standing	15.7	Pass
100	M1	5.7	Standing	23.2	Pass
101	M1	4.8	Standing	20.4	Pass
102	M1	4.9	Standing	20.9	Pass
103	M1	4.8	Standing	19.6	Pass
104	M1	4.7	Standing	17.4	Pass
105	M1	3.5	Sitting	12.7	Pass
106	M1	3.4	Sitting	13.7	Pass
107	M1	5.1	Standing	19.4	Pass
108	M1	4.9	Standing	20	Pass
109	M1	5.8	Standing	21.3	Pass
110	M1	3.7	Sitting	13.7	Pass
111	M1	4.3	Standing	17.7	Pass
112	M1	4	Sitting	15.6	Pass
113	M1	4.9	Standing	17.6	Pass
114	M1	4	Sitting	14	Pass
115	M1	2.7	Sitting	11.3	Pass
116	M1	3.4	Sitting	14	Pass
117	M1	4	Sitting	16.3	Pass
118	M1	5	Standing	19.5	Pass
119	M1	4.6	Standing	15.7	Pass
120	M1	6	Standing	22.9	Pass
121	M1	5.3	Standing	20.1	Pass
122	M1	4.8	Standing	17.7	Pass
123	M1	5.1	Standing	18.7	Pass
124	M1	4.5	Standing	17.1	Pass
125	M1	4.9	Standing	18.3	Pass
126	M1	3.6	Sitting	12.6	Pass
127	M1	5.1	Standing	18.6	Pass
128	M1	4.9	Standing	18.5	Pass
129	M1	3.6	Sitting	13	Pass