WATERLOO COLLECTIVE | mirvac JOHN HOLLAND

WATERLOO METRO QUARTER OVER STATION DEVELOPMENT

Environmental Impact Statement
Appendix I – Wind Impact Assessment

SSD-79307765 Second Amending Concept

Detailed State Significant Development
Development Application

Prepared for **WL Developer Pty Ltd**

September 2025

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
1	Initial	17 September 2025	RL	AMC / MJP
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EXECUTIVE SUMMARY

This report has been prepared by RWDI Australia Pty Ltd (RWDI) on behalf of WL Developer Pty Ltd (the applicant) to accompany State Significant Development Applications (SSDA) for Waterloo Metro Quarter (WMQ) located at 150 Cope Street, Waterloo (the site). This report responds to the Second Amending Concept DA (SSD-79307765) and has been prepared to provide a comparison between the previously assessed Amended Envelope Design Scheme and the current Updated Design Scheme.

The following is a summary of the comparison:

Pedestrian Wind Safety

Both schemes generally meet wind safety criteria across the precinct. In the previously approved Amended Envelope Design Scheme, a marginal exceedance was observed at the south-western corner of Building 2. In the Updated Design Scheme, a similar exceedance occurred at the south-eastern corner of Building 2, which was effectively mitigated through the inclusion of screening elements in Church Square as described in the detailed Central Precinct SSDA (SSD-79307746) and Northern Precinct SSDA (SSD-79307758).

Pedestrian Wind Comfort

Wind comfort conditions in both schemes are shaped by prevailing north-easterly, southerly, and westerly winds. The previously approved Design Scheme showed some uncomfortable conditions at corners of the various Buildings and within Cope Street Plaza. The Updated Design Scheme maintained similar comfort levels overall with improvements in several areas. Notably, Raglan Walk and Cope Street Plaza, previously identified as windier zones, exhibited better comfort performance due to changes in massing. While the Updated Scheme introduced slightly higher wind speeds at the southeast corner of Building 1, this was balanced by improved conditions elsewhere, including more areas suitable for long-duration sitting use around Building 2.

Hence, this report concludes that current Updated Design Scheme performs similar to the previously tested Amended Envelope Design Scheme. Additional measures to improve comfort conditions have been provided in the *Wind Impact Assessment (Appendix I) for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746),* accompanying this report.

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1 INTRODUCTION

This report has been prepared by RWDI Australia Pty Ltd (RWDI) on behalf of WL Developer Pty Ltd (the applicant) to accompany a State Significant Development Application (SSDA) for Waterloo Metro Quarter (WMQ) located at 150 Cope Street, Waterloo (the Project). Specifically, this application relates to the Second Amending Concept DA (SSD-79307765).

This report has been prepared to respond to Item 6 of the Planning Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Infrastructure and Housing (DPHI) on 13 February 2025, the relevant advice by the City of Sydney (CoS) on 3 February 2025, and the relevant advice raised by the State Design Review Panel (SDRP) on 10th July 2025.

The Second Amending Concept DA is a new concept SSDA made under Section 4.22 of the Environmental Planning and Assessment Act 1979 (EP&A Act). It seeks consent for an amendment to the Waterloo Metro Over Station Development (OSD) Concept DA (SSD 9393) (the Concept DA). As the Concept DA has previously been amended by an Amending Concept DA (SSD 10441) (hereafter referred to as the First Amending Concept DA), the subject amending DA is hereafter referred to as the Second Amending Concept DA.

Whilst the Concept DA relates to the whole WMQ site, the changes now proposed under the Second Amending Concept DA only relate to the Northern and Central Precincts of the overall WMQ site. The image below indicates the land to which the Second Amending Concept DA applies.

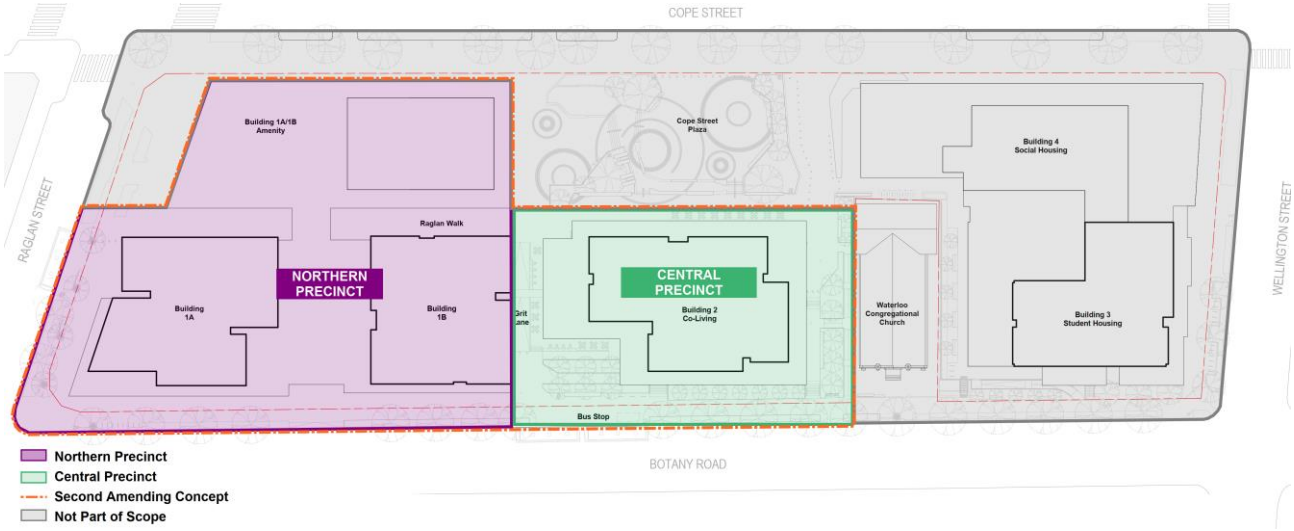

Figure 1: Land to which Scoping Reports Apply

The Second Amending Concept DA seeks consent to modify the existing concept approval as it relates to the Northern and Central Precincts, by amending the building envelopes to redistribute floor space to suit a new mix of land uses. Specifically, the proposal seeks the following:

- Northern Precinct:
  - Change the approved building envelope, building height and concept land use for the Northern Precinct by replacing the 17-storey commercial office building envelope with a revised envelope for 2 residential apartment towers above a non-residential podium.

- The residential towers will include market housing, communal facilities and the provision of 5% affordable housing.

- Central Precinct
  - Change the approved building envelope and conceptual land use for the Central Precinct by replacing the residential apartment tower with a co-living housing tower, still above a non-residential podium, comprising retail and a community facility in the form of a childcare.

There will be no change to the maximum permitted GFA, as the floorspace will be redistributed within the revised envelopes. Further, the amended proposal will not exceed the permissible building height for the site under the SLEP 2012. No detailed design or physical works is proposed under this application.

Separate Detailed SSDAs will be submitted for the detailed design, construction and operation of the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746) of the WMQ site, to be assessed concurrently with the subject amending Concept DA. The detailed SSDAs have been prepared to be consistent with the Concept SSDA as amended by the subject application.

Separately, a Section 4.55 Modification Application will be submitted to modify the approved detailed Basement SSDA (SSD 10438) relating to the basement levels to buildings within the Northern and Central Precinct.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 13 February 2025 and issued for the SSDA (79307765). Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Table 1: SEARs Compliance Table

SEARs Request	Response / Location in Report
Item 6 - Environmental Amenity • Address how good internal and external environmental amenity is achieved, including access to natural daylight and ventilation, pedestrian movement throughout the site, access to landscape and outdoor spaces. • Assess amenity impacts on the surrounding locality, including lighting impacts, reflectivity, solar access, visual privacy, view loss and view sharing, overshadowing and **wind impacts**. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated. • Provide a solar access analysis of the overshadowing impacts of the development within the site, on surrounding properties and public spaces (during summer and winter solstice and spring and autumn equinox) at hourly intervals between 9am and 3pm, when compared to the existing situation and a compliant development (if relevant). • For applicable developments, provide an assessment of the development against the Housing SEPP and the Apartment Design Guide.	Sections 3.2 & 3.3 discuss the wind safety and comfort exceedances for the Amended Envelope Design Scheme and the Updated Design Scheme of the Second Amending Concept DA.
Item 8 - Public Space • Demonstrate how the development maximises the amount, access to and quality of public spaces (including open space, public facilities and streets/plazas within and surrounding the site), reflecting relevant design guidelines and advice from the local council and the Department.	Section 3.3 outlines wind safety and comfort impacts and recommendations to provide wind protection for the Updated Design Scheme of

SEARs Request	Response / Location in Report

• Demonstrate how the development:
  ○ ensures that public space is welcoming, attractive and accessible for all.
  ○ maximises permeability and connectivity.
  ○ maximises the amenity of public spaces in line with their intended use, such as through adequate facilities, solar access, shade and **wind** protection.
  ○ maximises street activation.
  ○ minimises potential vehicle, bicycle and pedestrian conflicts.
• Address how Crime Prevention through Environmental Design (CPTED) principles are to be integrated into the development, in accordance with Crime Prevention and the Assessment of Development Applications Guidelines.
	the Second Amending Concept DA.
	
	Further details on specific recommendations are covered in the Wind Impact Assessment for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746) of the WMQ site.

Prior to the granting of the SEARs, the City of Sydney offered its advice on Request for SEARs, advice for both the Northern and Central Precinct SSDs being provided in letters dated 3 February 2025. The advice relevant to wind is as follows:

Table 2: City of Sydney's Design Advice

CoS Design Advice	Response / Location in Report
Wind • The application must demonstrate how the amended development will achieve the wind safety and comfort criteria established in the Design Guidelines. • The revised wind analysis is also to address the wind environments for the above podium communal open space and outdoor areas. • Draft DCP changes are currently on exhibition which seek to amend the wind effects provisions in Section 3.2.7. The application should be required to assess the potential wind impacts utilising these requirements as a benchmark	Section 3.3 outlines wind safety and comfort impacts, within and around trafficable areas of the Updated Design Scheme of the Second Amending Concept DA including new trafficable areas such as the rooftop podium communal open space on Building 1 and other elevated outdoor areas. Further details on wind conditions and recommendations are covered in the Wind Impact Assessment for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746) of the WMQ site.

This report has also been prepared in response to the following conditions of consent issued for the concept SSD DA (SSD 9393) for the OSD as summarised in the table below.

Table 3: Conditions of Concept Approval

Item	Description of Requirement	Response / Location in Report
B13 – Wind Impact Assessment	Future development applications for aboveground works shall be accompanied by a Wind Impact Assessment including computer modelling of detailed building form and demonstrating compliance with the criteria in Pedestrian Wind Environment Study by Windtech dated September 2019.	Section 3.3 outlines wind safety and comfort impacts, within and around trafficable areas of the Updated Design Scheme of the Second Amending Concept DA with comparison to the conditions of the Approved Reference Design Scheme completed in 2019. Further details on wind conditions and recommendations are covered in the Wind Impact Assessment for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746) of the WMQ site.
B14 – Wind Impact Assessment	The Wind Impact Assessment must consider the locations of future and existing pedestrian crossings and apply standing criteria zones to match the width of crossings and the waiting zones of crossings, including on the opposite side of streets.	Details on wind conditions and recommendations regarding pedestrian crossing waiting areas are covered in the Wind Impact Assessment for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746) of the WMQ site.

2 BACKGROUND

2.1 Wind Tunnel Study Model

To assess the wind environment within and around the Proposed Development, a 1:300 scale models of the project site and surroundings were constructed for the wind tunnel tests of the following configurations:

Amended Envelope Design Scheme:	The previous Amended Envelope Design Scheme (the Concept DA amended by the First Amending Concept DA) with existing surrounding buildings (Image 2A) - Previously tested as part of the Frist Amending Concept DA, RWDI Report Ref: *WMQ-SITE-RWDII-WR-RPT-0001 - Amending DA - Appendix EE - F2 - 200730 - Wind Impact Assessment*)
Updated Design Scheme of the Second Amending Concept DA	The current updated design (Updated Design Scheme of the Second Amending Concept DA) with existing surrounding buildings (Image 2B)

The wind tunnel model included all relevant surrounding buildings and topography within a radius of 360m around the project site. This encompassed both existing structures and those currently under construction, with an expectation that these would likely be present or completed by the time the proposed subject development concludes. Additionally, the wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were simulated in RWDI's wind tunnel, incorporating spires and roughness blocks.

For the Updated Design Scheme, the wind tunnel model was instrumented with 131 specially designed wind speed sensors to measure mean and gust speeds at a full-scale height of approximately 1.5m above local ground in pedestrian areas throughout the study site. The placement of wind measurement sensors was based on our experience and understanding of the pedestrian usage for this site. Wind speeds were measured for 36 directions in 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.

Note that no vegetation was included as part of the configurations tested in accordance with AWES Guidelines (2024). The method for testing scale models in the wind tunnel is consistent with internationally recognised good practice, and meets the requirements set out in the Australasian Wind Engineering Society Quality Assurance Manual (AWES-QAM-2019).

Image 2A: Wind Tunnel Study Model – Amended Envelope Design Scheme

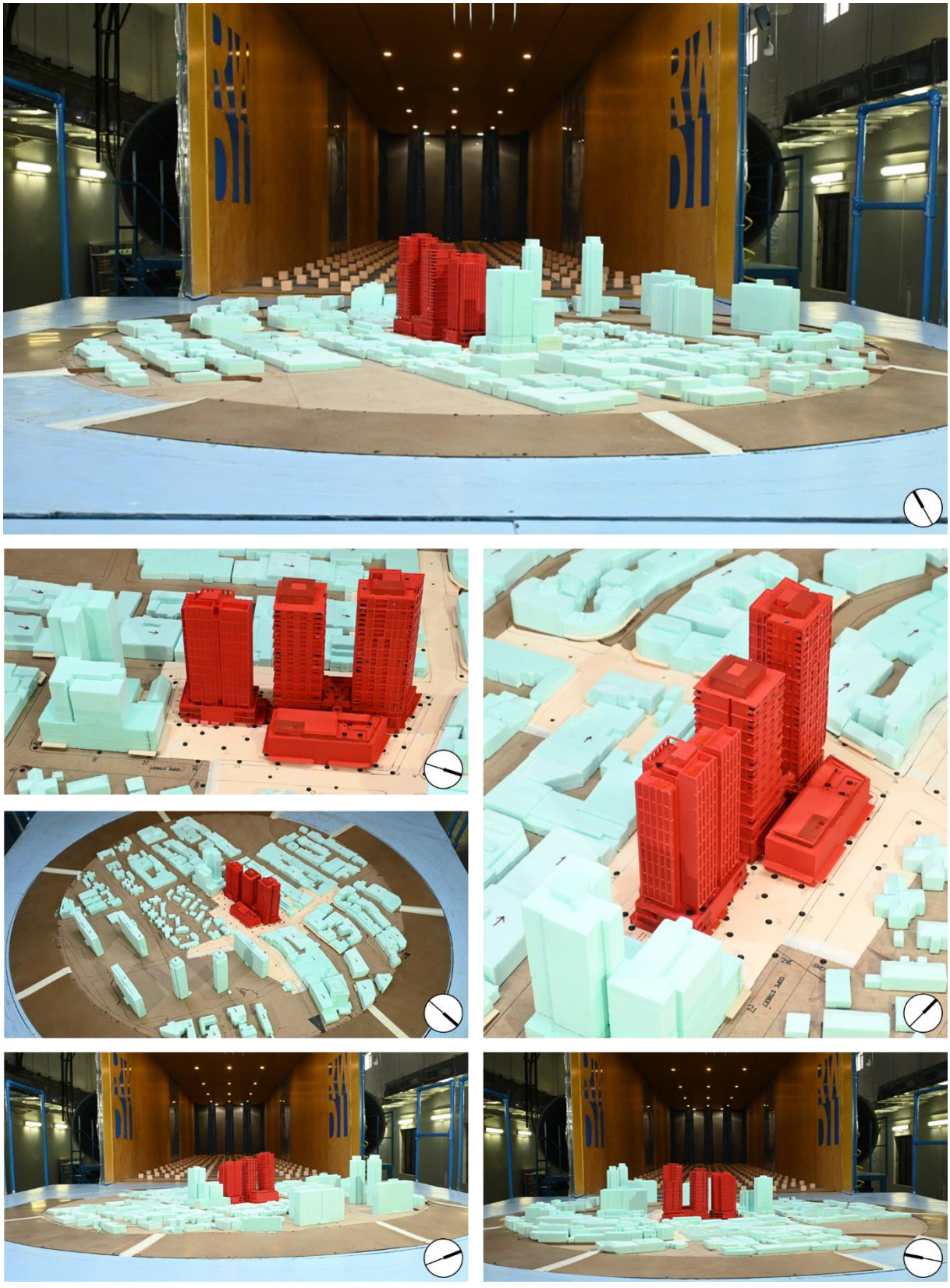

Image 2B: Wind Tunnel Study Model – Updated Design Scheme of the Second Amending Concept DA

2.2 Meteorological Data

Wind statistics recorded at Sydney International Airport between 1995 and 2022, inclusive, were analysed for the study. The observation site is located approximately 7.5 km to the southwest of the project site. Image 3 graphically depicts the annual directional distributions of wind frequencies and speeds recorded at the station. Winds from the northwest, west, northeast, and south directions are predominant throughout the year. Strong winds of a mean speed greater than 8 m/s measured at the airport (at an anemometer height of 10 m) occur for approximately 12.8% of the time throughout the year.

Time-history of the wind for the period above were combined with the wind tunnel data to predict the frequency of occurrence of full-scale wind speeds at the site. The full-scale wind predictions were then compared with the wind criteria for pedestrian comfort and safety.

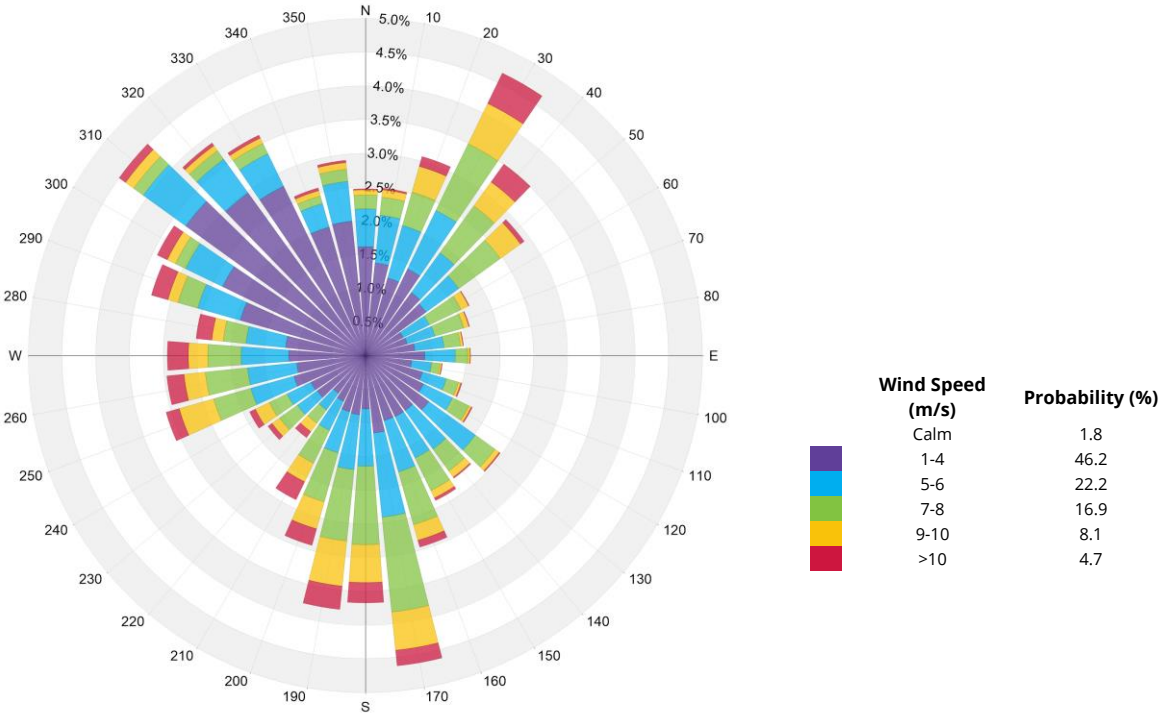

Image 3: Directional Distribution of Winds Approaching Sydney International Airport (1995 to 2022)

2.3 Pedestrian Wind Criteria

The wind design criteria presented in the "*Waterloo Metro Design Quality Guidelines section 3G Wind*", as described in Image 4 and Table 4 below, have been considered to assess the pedestrian wind conditions around the development site for the various configurations. The design criteria specify the following:

> *Mitigate wind impacts on the public domain and achieve the following targets:*
>
> - *At least 50% of the publicly accessible open space meets the wind comfort standard for sitting. Outdoor dining and casual seating areas should correspond with these areas.*
> - *Waiting areas at bus stops and pedestrian crossings is to meet the wind comfort standard for standing.*
> - *Development must not exceed the wind safety standard of 24m/s (gust - 0.1% exceedance).*

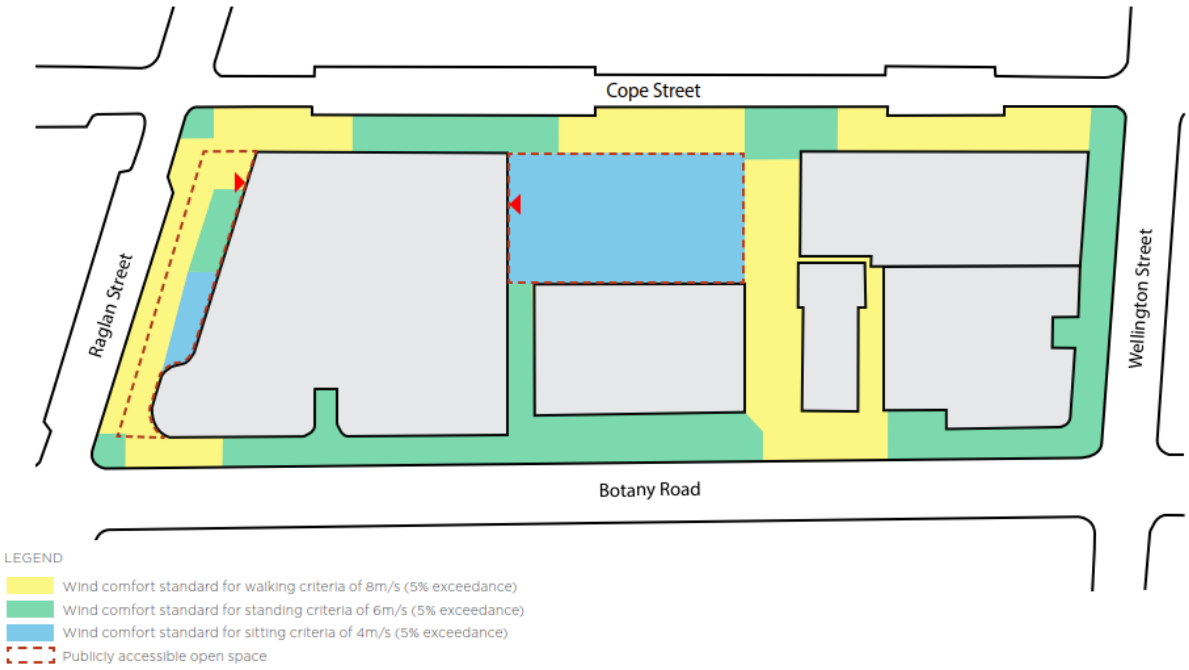

Image 4: Waterloo Metro Design Quality Guidelines
(Figure 20 – Wind Comfort and Safety Targets)

Table 4: Pedestrian Wind Comfort and Safety Criteria

Comfort Category	GEM Speed (m/s)	Description
Sitting	≤ 4	Calm or light breezes desired for outdoor restaurants and seating areas where one can read a paper without having it blown away
Standing	≤ 6	Gentle breezes suitable for main building entrances, bus stops, and other places where pedestrians may linger
Walking	≤ 8	Relatively high speeds that can be tolerated if one's objective is to walk, run or cycle without lingering
Uncomfortable	> 8	Strong winds of this magnitude are considered a nuisance for all pedestrian activities, and wind mitigation is typically recommended

Notes:
(1) GEM speed = max (mean speed, gust speed/1.85); and,
(2) GEM speeds listed above are based on a seasonal exceedance of 5% of the time between 6:00 and 22:00.

Safety Criterion	Gust Speed (m/s)	Description
Exceeded	> 24	Excessive gust speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required.

Notes:
(1) Based on an annual exceedance of 9 hours or 0.1% of the time for 24 hours a day; and,
(2) Only gust speeds need to be considered in the wind safety criterion. These are usually rare events but deserve special attention in city planning and building design due to their potential safety impact on pedestrians.

Note that these criteria for wind forces represent average wind tolerance and can be subjective with regional differences in wind climate and thermal conditions as well as variations in age, health, clothing, etc. also impacting an individual's perception of the wind climate. For an assessment of total human comfort, typically a thermal comfort assessment is recommended.

3 RESULTS AND DISCUSSION

A comparison has been undertaken to understand the expected conditions with regards to the Updated Design Scheme of the Second Amending Concept DA for the Waterloo Metro Quarter. This comparison has focused on changes in wind conditions between the previous Amended Concept Envelope Scheme and the Updated Design Scheme of the Second Amending Concept DA with an aim to show that the current design performs better than or at a similar level to the previously approved Amended Concept Envelope Scheme. The findings are summarised in Images 6 and 7 and compared to the Approved Reference Design Scheme (Image 8) in Section 3.4. Full results for the previous Amended Concept Envelope Scheme and the Updated Design Scheme of the Second Amending Concept DA are presented in Appendix A with wind conditions tabulated in Tables A1 and A2.

3.1 Generalised Wind Flows

In the discussion of wind conditions on and around the proposed development, reference may be made to the following generalised wind flows (see Image 5). If these building/wind combinations occur for prevailing winds, there is a greater potential for increased wind activity and uncomfortable or potentially unsafe conditions. Design details such as setting back a tower from the edges of a podium, deep canopies close to ground level, windscreens / tall trees with dense landscaping, etc. as shown in Image 5 can help to reduce the high wind activity. The choice and effectiveness of these measures would depend on the exposure and orientation of the site with respect to the prevailing wind directions and the size and massing of the proposed buildings.

Conversely, in areas where higher wind velocities are desired, design measures can be implemented to enhance wind flow. For instance, channels aligned with prevailing wind directions can be integrated into the design to promote increased wind infiltration in regions prone to stagnant conditions. Such measures are particularly beneficial in areas with generally milder climates and high humidity levels, such as those closer to the equator.

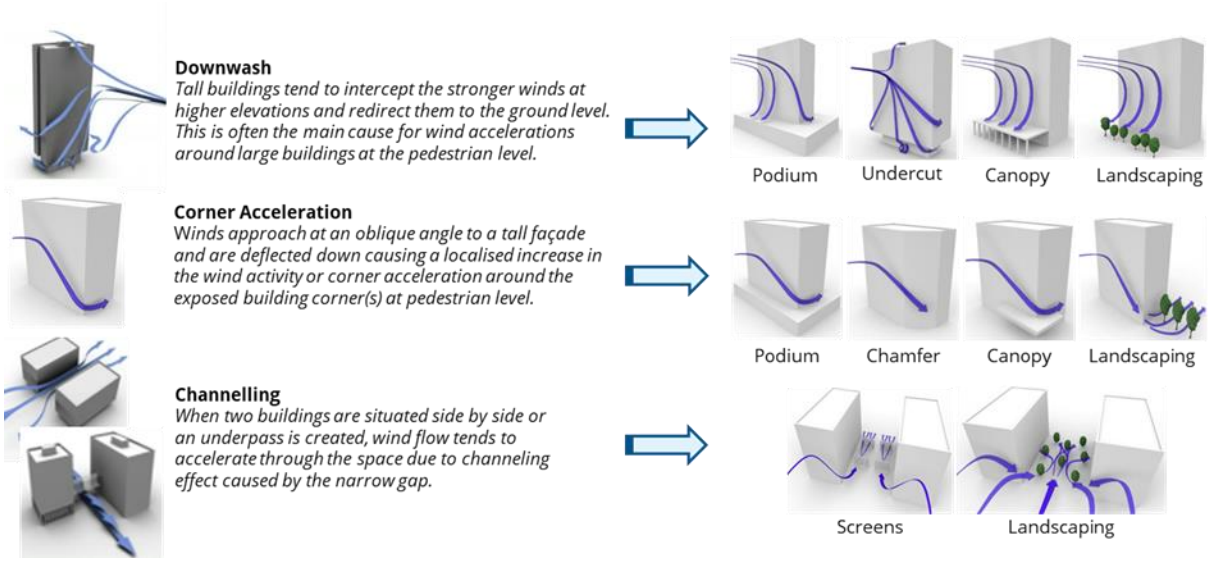

Image 5: General Wind Flows around Buildings and Examples of Wind Control Measures

3.2 Amended Envelope Design Scheme

The wind tunnel study for the Amended Envelope Design Scheme was undertaken by RWDI previously to determine the wind conditions associated with the Amended Envelope Design Scheme for the development (RWDI Report Ref: *WMQ-SITE-RWDII-WR-RPT-0001 - Amending DA - Appendix EE - F2 - 200730 - Wind Impact Assessment*). Annual wind comfort conditions within and around the Amended Envelope Design Scheme of the Waterloo Metro Quarter site are shown in Image 6. Table A1 provides a summary of the comfort criteria achieved throughout the year and an assessment against the wind safety criteria for each location. A summary of the wind conditions detailed in the previous reporting is provided below.

3.2.1 Pedestrian Wind Safety

Within the development site, a marginal exceedance at the south-western corner of Building 2 was observed caused by westerly and southerly winds channelling through the area (Sensor 40 in the Amended Concept Envelope Scheme). All other ground-level areas for the Amended Envelope Design Scheme were observed to meet the safety criteria.

3.2.2 Pedestrian Wind Comfort

Wind conditions throughout the precinct are generally governed by the prevailing north-easterly, southerly and westerly winds for the region. Wind conditions within the laneway connections from Cope Street Plaza to Botany Road to the west and Raglan Street to the north are due to pressure driven funnelling of the prevailing winds. Cope Street Plaza is currently exposed to the southerly winds due to the alignment and exposure of the Plaza upstream (around the eastern aspect of Building 4), and the north-easterly winds across the Plaza and between Building 2 and 3. The final landscaping design for the Plaza will be important in assisting to reduce the wind conditions for this area.

Three locations were observed to have uncomfortable wind conditions. These include the Raglan Street & Botany corner (Sensor 62), at the south-eastern corner of Building 2 (Sensor 32), and at the south-eastern corner of Building 4 (Sensor 16). Higher wind speeds, suitable for active walking use, are also expected at the corners of the various buildings of the development, along Raglan Walk and Grit Lane due to corner acceleration and channelling effects. While the wind conditions within Cope Street Plaza ranges from uncomfortable conditions to standing use, the majority of the plaza area satisfies the standing comfort criteria.

The wind conditions within and around the precinct associated with the Amended Envelope Design Scheme were found to be better than or similar to the wind conditions of the Approved DA Envelope Design Scheme (Reference Scheme), see Image 8.

3.3 Updated Design Scheme

The wind tunnel study for the Updated Design Scheme has been undertaken by RWDI to determine the wind comfort conditions associated with the Amended Envelope Design Scheme for the development. Wind conditions within and around the Updated Design Scheme of the Waterloo Metro Quarter site are shown in Image 7 and Table A2 provides a summary of the comfort criteria achieved throughout the year and an assessment against the wind safety criteria for each location.

In the Updated Design Scheme, the overall wind conditions of the WMQ site remain largely consistent with the Amended Envelope Design Scheme. A summary of the wind conditions detailed in the Wind Impact Assessment

for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746) of the WMQ site, accompanying this report, is provided below.

3.3.1 Pedestrian Wind Safety

Within the development site, a marginal exceedance at the south-eastern corner of the Central Precinct was observed caused by westerly and southerly winds channelling through the area (Sensor 69). This exceedance was shown to be addressed with the inclusion of screening elements within the Church Square space as part of the mitigation studies (now incorporated in the final design) detailed in the Wind Impact Assessment for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746) of the WMQ site, accompanying this report. All other ground-level and elevated areas of the Updated Design Scheme were observed to meet the safety criteria.

3.3.2 Pedestrian Wind Comfort

It is noted that overall wind comfort levels align well with the requirements of Waterloo Metro Design Quality Guidelines with the majority of locations satisfying the target criteria.

Wind conditions at the majority of ground level areas within and around the Proposed Development were observed to range from standing to walking use throughout the year. Wind conditions around key entrances, within Cope Street Plaza and along Raglan Walk are expected to satisfy the standing comfort criteria. An increased number of areas located along the eastern and western perimeters of Building 2 are expected to be comfortable for long-duration sitting use. Furthermore, simliar to the Amended Envelope Design Scheme, the majority of locations within the Cope Street plaza satisfy the standing criteria.

Wind conditions at the majority of ground level areas within and around the Proposed Development were observed to range from standing to walking use throughout the year. Higher winds, suitable for walking use, are likely to occur along Raglan Street frontage, through the various east-west aligned channels between the buildings such as along Grit Lane, and at the corners of the various buildings of the development. This is similar to the high wind areas of the Amended Envelope Design Scheme.

Uncomfortable wind conditions were observed at the north-western corner of Building 1 along Botany Road (Sensor 60) and at the south-eastern corner of Building 1 (Sensors 50 and 51). A comfort exceedance was also observed at the south-eastern corner of Building 2 (Sensor 69) but was ameliorated with the inclusion of screening elements that are now incorporated in the final design – see Image below.

The overall wind environment is, hence, comparable to the Amended Envelope Design Scheme with the current change in massing of Building 1, the opening of the Raglan Walk, a slightly shift in massing of Building 2 towards Botany Road contributing to the increased winds at the southeast corner of Building 1. However, note that this is generally balanced by the improved wind conditions within Raglan Walk and around Building 2 and within Cope Street Plaza where windier conditions were noted for the Amended Envelope Design Scheme.

Elevated locations of the Updated Design Scheme (Building 1 – Northern Precinct and Building 2 – Central Precinct) were found to be predominantly suitable for passive activities. The various terrace areas were found to have localised areas which were suitable for walking use. However, most areas within the private and communal terraces were found to satisfy the sitting and standing criteria. Specifically, the majority of the podium roof areas of Building 1 was found to satisfy the sitting and standing criteria with central areas satisfying the walking criteria. The majority of private balconies of Building 1 were also all found to be suitable

for passive use throughout the year, ranging from sitting to standing use. The detailed wind conditions within these spaces and any additional recommendations to further improve wind conditions are presented in the *Wind Impact Assessment (Appendix I) for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746)* of the WMQ site, accompanying this report.

3.4 Comparison with Approved Reference Design Scheme

Similar to the previously approved Amended Envelope Design Scheme, the general wind conditions within and around the precinct associated with the Updated Design Scheme were found to be better than or similar to the wind conditions for the Approved DA Envelope (Reference Scheme), see Image 8. Wind mitigation strategies which include, landscaping and screening elements, are recommended in the Wind Impact Assessment for the Northern Precinct (SSD-79307758) and Central Precinct (SSD-79307746) of the WMQ site, accompanying this report. These will assist in further improving the overall wind environment around the site with conditions expected to satisfy all the wind design requirements of Waterloo Metro Design Quality Guidelines.

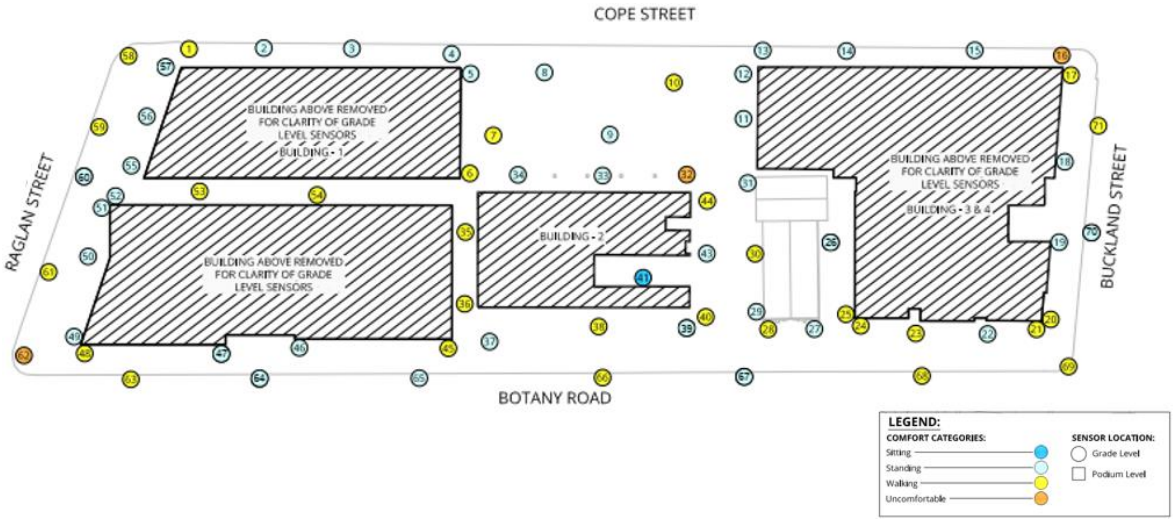

Image 6: Summary of Amended Envelope Design Scheme Wind Tunnel Results

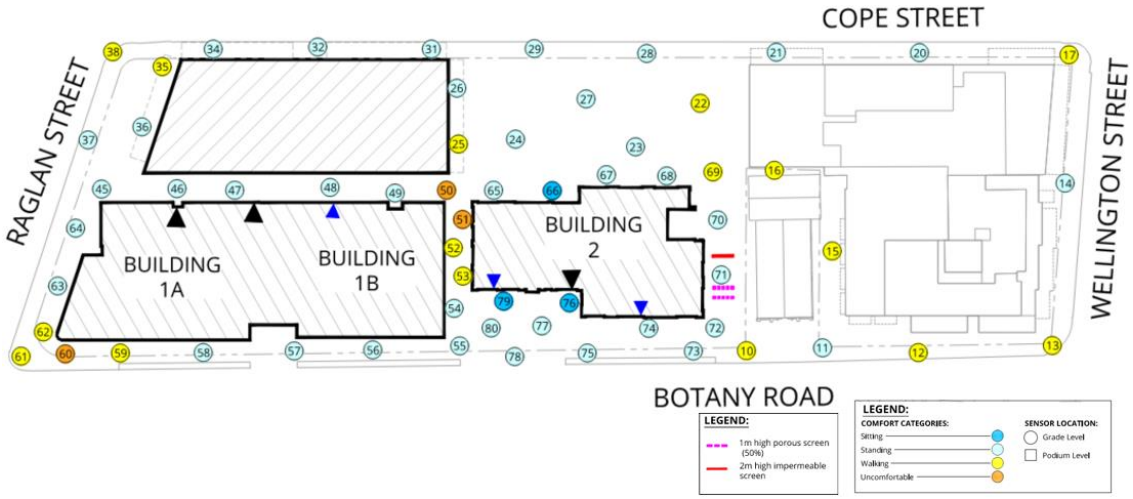

Image 7: Summary of Updated Design Scheme Wind Tunnel Results

Image 8: Summary of Approved Reference Design Scheme Wind Tunnel Results

3.5 Cumulative Impact Assessment (CIA)

As outlined in the Department of Planning, Housing and Infrastructure's "Cumulative Impact Assessment Guidelines for State Significant Projects" project level cumulative impact assessment (CIA) is considered for the impacts of the proposed Waterloo Metro Quarter development ("Proposed Development") in combination with other reasonably foreseeable and wind significant future projects within the vicinity (See Image 10). This CIA is also proportionate to the scale and significance of the Proposed Development and the considered future projects.

The key matters pertaining to wind impacts on the public domain are discussed in the following sections for the various future projects considered, focusing on the difference between the expected future wind conditions with or without the Proposed Development under consideration.

Image 10 – Nearby Future Developments

3.5.1 Waterloo Estate

The Waterloo Estate lies to the east of the Proposed Development and comprises Waterloo North, Central and South developments. Images 11 and 12 below outline the boundaries of these developments including the Proposed Development site boundary.

The six existing buildings within Waterloo North and Central areas are not subject to redevelopment (See Images below). The cumulative impacts of the Waterloo Estate are therefore expected to be focused around the redevelopment of the Waterloo South areas. Images below shows the proposed building heights of the Waterloo South redevelopment area which also includes a proposed park (Main Park) at the northern end of the area directly east of the Proposed Development. The proposed building heights are predominantly mid-rise, ranging from 6-13 storeys throughout the redeveloped area with low rise buildings spread throughout. Three high-rise buildings are proposed along the southern perimeter of the redevelopment area along McEvoy Street and range from 27-33 storeys.

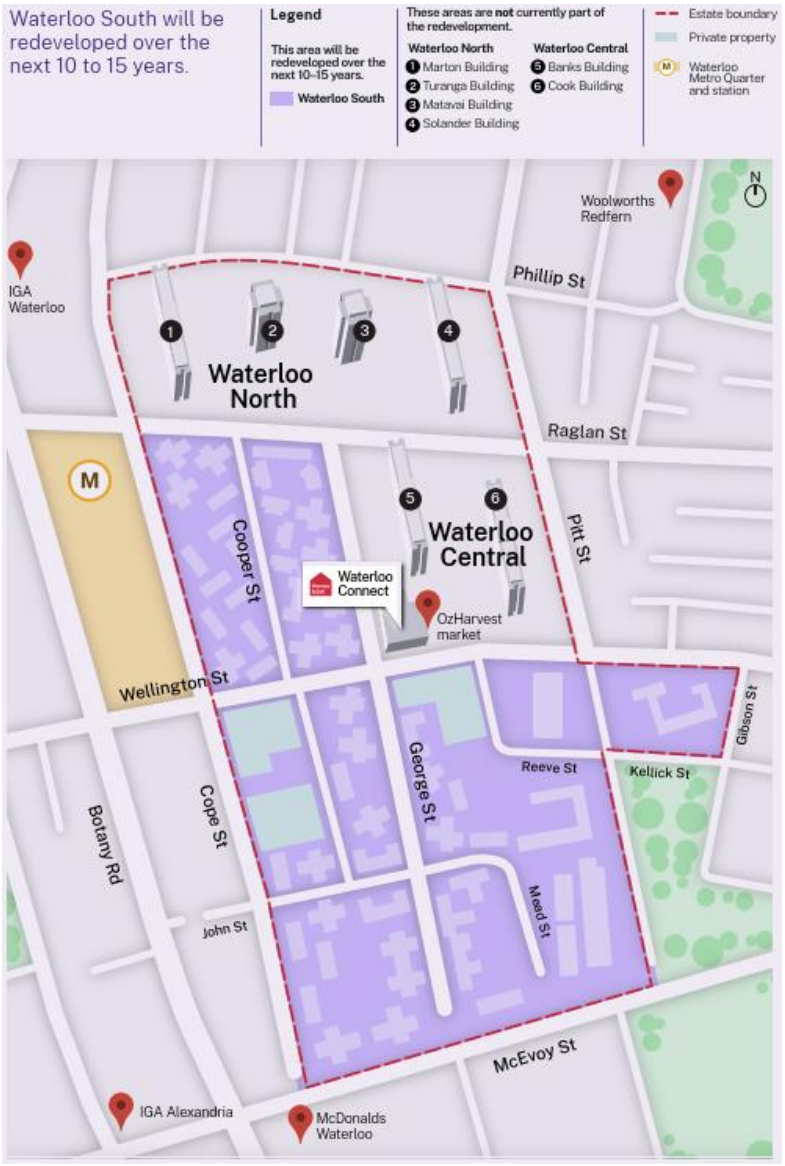

Image 11 – Waterloo Renewal Project Development Areas

(Extract from Waterloo South Relocation and Support Guide February 2025)

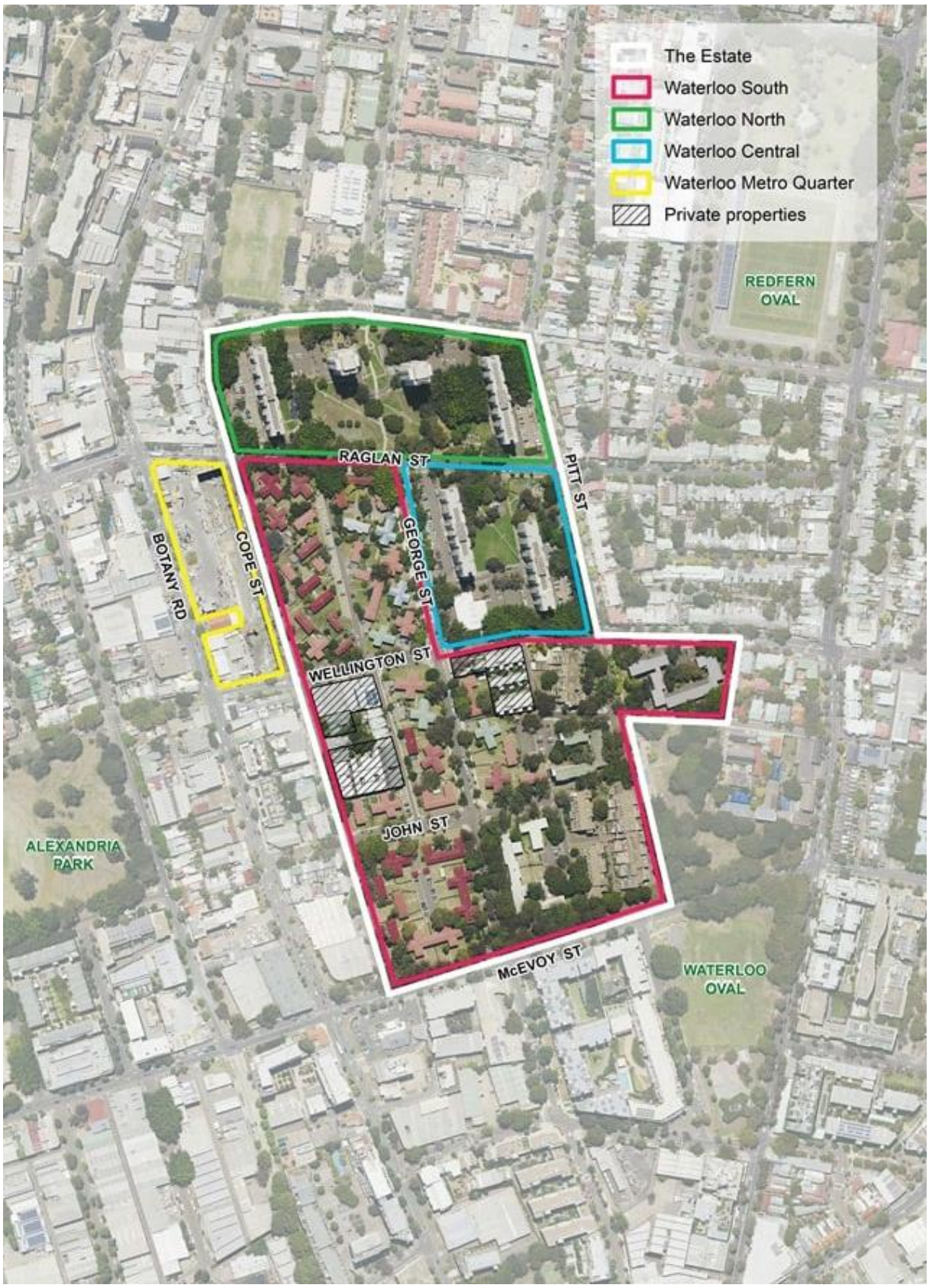

Image 12 – Waterloo Renewal Project Development Areas

(Extract from City of Sydney Planning Proposal Webpage)

Image 13 – Waterloo South Building Heights Map

(Extract from Planning NSW Waterloo South Webpage)

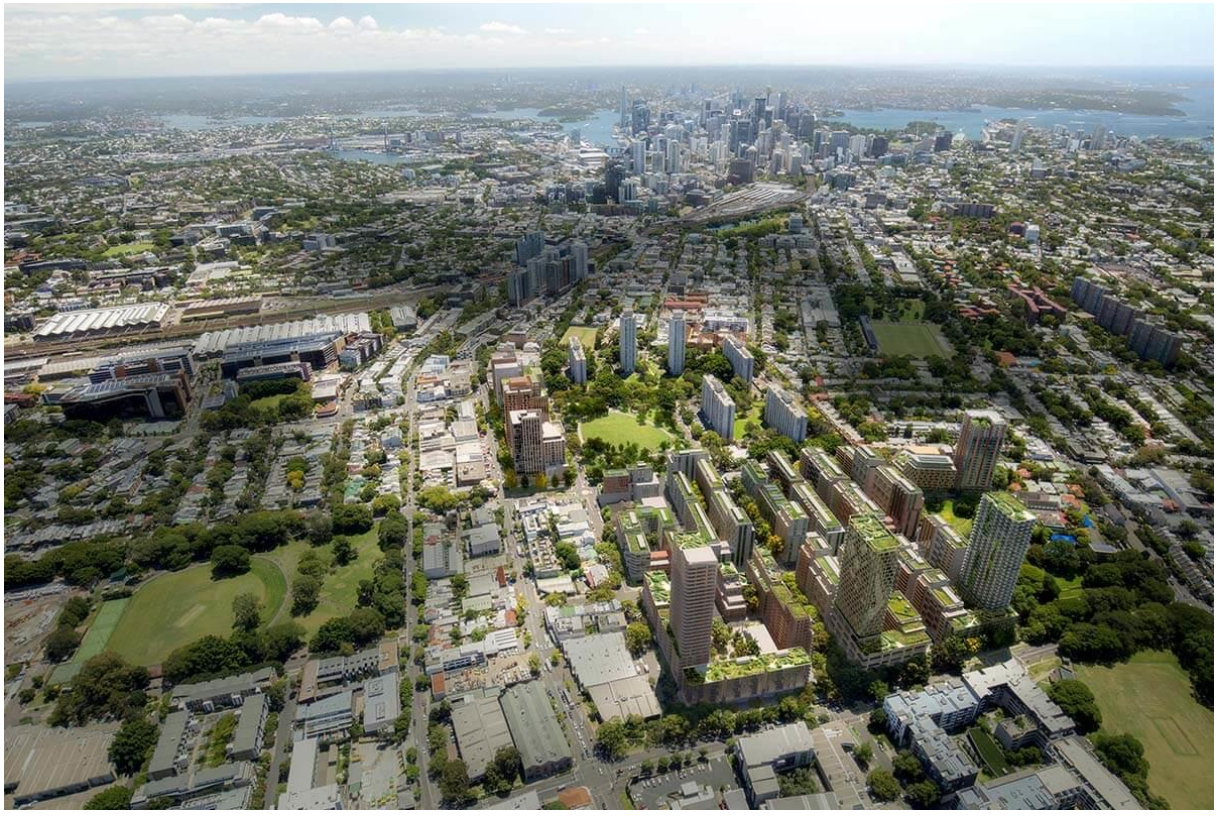

Image 14 – Render of Waterloo South Buildings

(Extract from Planning NSW Waterloo South Webpage)

3.5.1.1 Impacts on Proposed Development Areas

The prevailing winds from the northwest, west and northeast directions are not expected to significantly impact the pedestrian areas of the Proposed Development which lie upwind to the north-west of the Waterloo South buildings for these directions. The Waterloo South buildings have the potential to increase funnelling along the north-south aligned streets which can increase wind speeds along Cope Street, potentially impacting the eastern trafficable areas of the Proposed Development. However, the proposed Main Park to the east of the Proposed Development is expected to allow the prevailing southerly winds to expand into the space and reduce speeds. Landscaping within the Main Park and along Cope Street also has the potential to reduce any high winds flowing from the Waterloo South redevelopment areas. Hence, the overall wind environment in the vicinity of the Proposed Development is not expected to be significantly impacted with the inclusion of the Waterloo South buildings.

3.5.1.2 Impacts on Waterloo South Redevelopment Areas

The public spaces within the Waterloo South redevelopment areas are mostly enclosed within the proposed buildings and shielded from the prevailing winds. These spaces also lie to the south-east of the Proposed Development and are not expected to be impacted by the prevailing winds from the northeast, south and west directions with the inclusion of the Proposed Development. The Proposed Development is expected to provide some shielding from the prevailing north-westerly winds to these open spaces.

The proposed Main Park of the Waterloo South development has the potential to be impacted by the Proposed Development. The prevailing southerly and north-westerly winds may be directed into the park area and along Cope Street; however, wind conditions are not expected to be significantly different to those found in the

previous wind tunnel testing. The Proposed Development is expected to provide a significant buffer to the westerly winds for the park area. Furthermore, any proposed landscaping within the proposed Main Park space is also expected to reduce the strength of any winds that flow into the park space.

3.5.2 Other Significant Developments

Other future developments that are reasonably expected to be built within the vicinity of the Proposed Development which may also impact wind conditions include the Redfern North Eveleigh development (See Image 15) and Redfern Place (See Image 16). These developments lie to the north-west and north-east of the Proposed Development and comprise of high-rise residential buildings. Due to their distance from the project site, these developments are expected to only provide minor shielding to the project site from the north-westerly and north-easterly prevailing winds. Similarly, these future residential developments are also expected to have minimal impact on the public domain within and around the Proposed Development.

Image 15 – Render of Redfern North Eveleigh Buildings

(Extract from Transport of NSW – Paint Shop Sub Precinct: Rezoning Proposal Approval – March 2023)

Image 16 – Render of Redfern Place Buildings

(Extract from Ethos Urban – Environmental Impact Statement – Redfern Place – March 2023)

3.5.3 Concluding Remarks

Separate wind assessments should be undertaken for the future buildings as part of their relevant submissions to verify pedestrian wind conditions specific to that precinct. Preliminary investigations, including computational wind studies, are recommended to help characterise the wind environment and identify any areas requiring wind mitigation strategies as early design interventions. These early-stage assessments will support informed design decisions and ensure pedestrian comfort and safety across key public and private spaces within and around these future buildings.

4 STATEMENT OF LIMITATIONS

Limitations

This report entitled '*Waterloo Metro Quarter- SSDA Pedestrian Wind Environmental Report*' was prepared by RWDI Australia Pty Ltd ("RWDI") for WL Developer Pty Ltd ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilise the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

Design Assumptions

RWDI confirms that the pedestrian wind assessment (the "**Assessment**") discussed herein was performed by RWDI in accordance with generally accepted professional standards at the time when the Assessment was performed and in the location of the Project. No other representations, warranties, or guarantees are made with respect to the accuracy or completeness of the information, findings, recommendations, or conclusions contained in this Report. This report is not a legal opinion regarding compliance with applicable laws.

The findings and recommendations set out in this report are based on the following information disclosed to RWDI. Drawings and information listed below were received and used to construct the scale model of the proposed development **("Project Data**").

File Name	File Type	Date Received
WMQ-BD1-WBG-AR-DRG-DA110M[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA110[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA111[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA112[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA113[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA114[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA115[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA120[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA125[A].dwg	AutoCAD drawing	11 August 2025

File Name	File Type	Date Received
WMQ-BD1-WBG-AR-DRG-DA127[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA128[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD1-WBG-AR-DRG-DA129[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BMT-WBG-AR-DRG-DA091[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BMT-WBG-AR-DRG-DA092[A].dwg	AutoCAD drawing	11 August 2025
WMQ-BD2-BSA-AR-DRG-DA03.101_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.102_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.103_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.104_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.100_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.124_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.125_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.126_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.B01_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA03.B02_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BD2-BSA-AR-DRG-DA10.001_cad[A].dwg	AutoCAD drawing	11 July 2025
WMQ-BLD2-ASA-AR-MDL-0101-RVT-R24[A].rvt	Revit	11 July 2025
WMQ-BLD2-BSA-AR-MDL-0101-RVT-R24[A].rvt	Revit	11 July 2025

At the time this wind study was carried out, the final revision of the architectural drawings had not yet been issued, and the analysis was based on the model fabricated from the drawings available at that time. The design has since remained consistent, with no changes affecting the wind result outcomes. Therefore, the result of this report remain unchanged and are fully applicable to Appendix E Architectural Drawings Revision 01.

The recommendations and conclusions are based on the assumption that the Project Data and Climate Data are accurate and complete. RWDI assumes no responsibility for any inaccuracy or deficiency in information it has received from others. In addition, the recommendations and conclusions in this report are partially based on historical data and can be affected by a number of external factors, including but not limited to Project design, quality of materials and construction, site conditions, meteorological events, and climate change. As such, the conclusions and recommendations contained in this report do not list every possible outcome.

The opinions in this report can only be relied up on to the extent that the Project Data and Project Specific Conditions have not changed. Any change in the Project Data or Project Specific Conditions not reflected in this report can impact and/or alter the recommendations and conclusions in this report. Therefore, it is incumbent upon the Client and/or any other third party reviewing the recommendations and conclusions in this report to contact RWDI in the event of any change in the Project Data and Project Specific Conditions in order to

determine whether any such change(s) may impact the assumptions upon which the recommendations and conclusions were made.

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APPENDIX A - WIND TUNNEL RESULTS

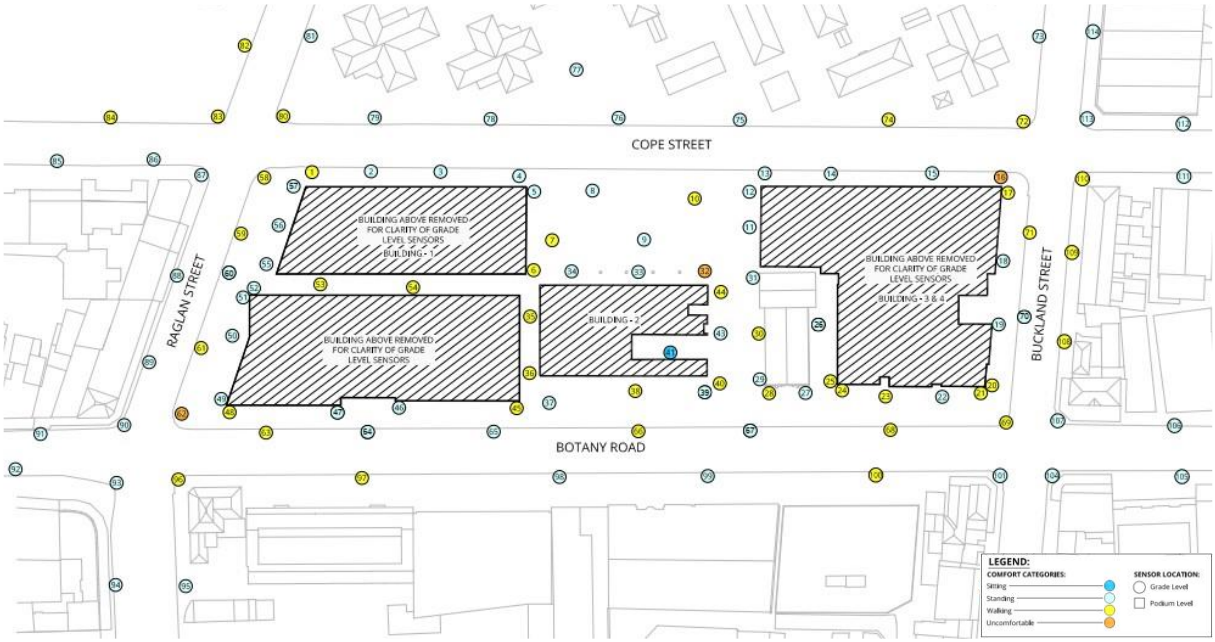

Image A1: Amended Envelope Design Scheme Wind Tunnel Results

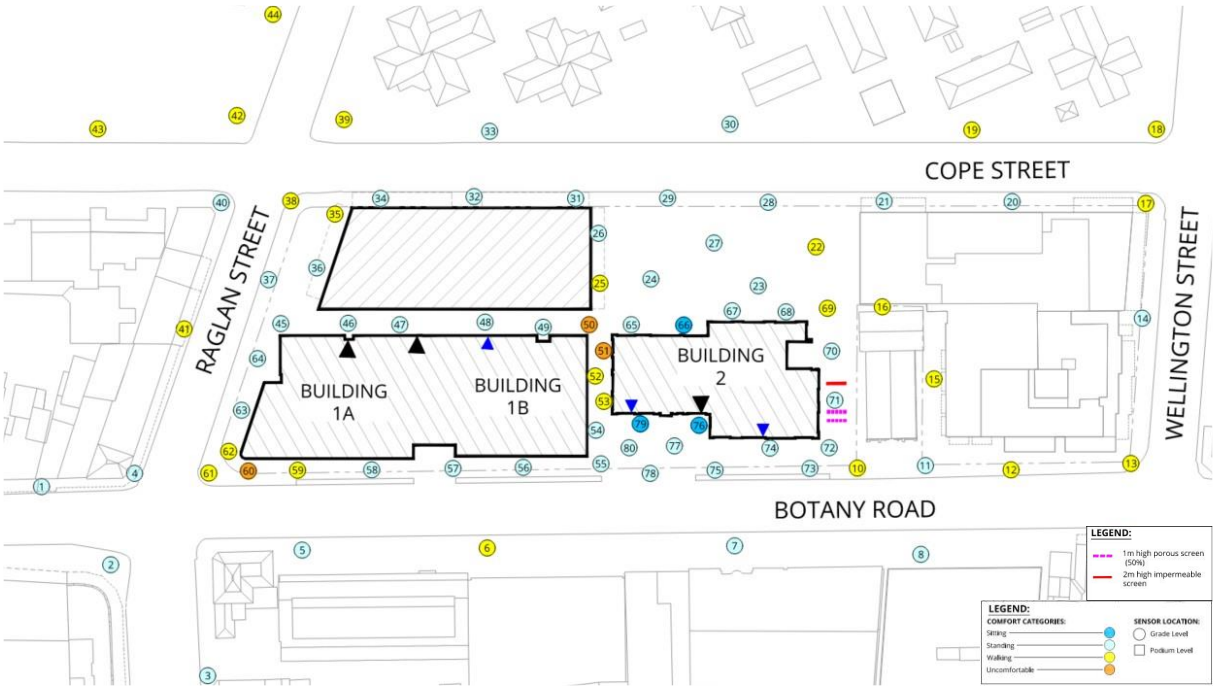

Image A2: Updated Design Scheme Wind Tunnel Results

TABLES

Table A1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort		Wind Safety	
		Summer		Annual	
		Speed (m/s)	Rating	Speed (m/s)	Rating
1	Proposed	7.2	Walking	20.9	Pass
2	Proposed	5.7	Standing	17.8	Pass
3	Proposed	5.0	Standing	15.1	Pass
4	Proposed	5.3	Standing	16.4	Pass
5	Proposed	5.0	Standing	16.1	Pass
6	Proposed	7.7	Walking	22.3	Pass
7	Proposed	6.9	Walking	21.5	Pass
8	Proposed	5.2	Standing	15.8	Pass
9	Proposed	5.3	Standing	17.5	Pass
10	Proposed	7.1	Walking	21.2	Pass
11	Proposed	5.4	Standing	17.9	Pass
12	Proposed	4.6	Standing	13.9	Pass
13	Proposed	4.9	Standing	14.3	Pass
14	Proposed	4.7	Standing	14.4	Pass
15	Proposed	5.3	Standing	16.5	Pass
16	Proposed	8.3	Uncomfortable	22.7	Pass
17	Proposed	6.6	Walking	19.7	Pass
18	Proposed	5.5	Standing	17.8	Pass
19	Proposed	5.2	Standing	17.8	Pass
20	Proposed	7.0	Walking	21.5	Pass
21	Proposed	7.6	Walking	22.3	Pass
22	Proposed	4.9	Standing	15.1	Pass
23	Proposed	6.6	Walking	19.9	Pass
24	Proposed	6.5	Walking	18.9	Pass
25	Proposed	7.8	Walking	22.6	Pass
26	Proposed	6.1	Walking	17.5	Pass
27	Proposed	5.2	Standing	16.4	Pass
28	Proposed	6.2	Walking	18.9	Pass

Table A1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort		Wind Safety	
		Summer		Annual	
		Speed (m/s)	Rating	Speed (m/s)	Rating
29	Proposed	6.0	Standing	16.9	Pass
30	Proposed	6.6	Walking	23.6	Pass
31	Proposed	6.0	Standing	17.6	Pass
32	Proposed	8.2	Uncomfortable	22.1	Pass
33	Proposed	4.3	Standing	13.3	Pass
34	Proposed	4.4	Standing	13.0	Pass
35	Proposed	7.4	Walking	20.6	Pass
36	Proposed	8.0	Walking	21.8	Pass
37	Proposed	5.8	Standing	17.9	Pass
38	Proposed	6.1	Walking	19.5	Pass
39	Proposed	6.1	Walking	21.7	Pass
40	Proposed	7.2	Walking	24.5	Exceeded
41	Proposed	1.6	Sitting	5.3	Pass
43	Proposed	6.0	Standing	17.7	Pass
44	Proposed	7.4	Walking	20.2	Pass
45	Proposed	6.3	Walking	19.4	Pass
46	Proposed	5.3	Standing	16.3	Pass
47	Proposed	6.2	Walking	17.8	Pass
48	Proposed	7.6	Walking	21.0	Pass
49	Proposed	5.3	Standing	16.2	Pass
50	Proposed	4.6	Standing	18.3	Pass
51	Proposed	5.3	Standing	17.4	Pass
52	Proposed	4.9	Standing	19.5	Pass
53	Proposed	6.8	Walking	20.0	Pass
54	Proposed	7.2	Walking	20.8	Pass
55	Proposed	4.8	Standing	17.7	Pass
56	Proposed	4.8	Standing	15.5	Pass

Table A1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort		Wind Safety	
		Summer		Annual	
		Speed (m/s)	Rating	Speed (m/s)	Rating
57	Proposed	6.1	Walking	17.4	Pass
58	Proposed	6.7	Walking	18.8	Pass
59	Proposed	6.3	Walking	19.2	Pass
60	Proposed	6.2	Walking	20.0	Pass
61	Proposed	6.4	Walking	21.1	Pass
62	Proposed	8.3	Uncomfortable	21.7	Pass
63	Proposed	7.1	Walking	19.3	Pass
64	Proposed	6.3	Walking	17.6	Pass
65	Proposed	5.9	Standing	18.8	Pass
66	Proposed	6.3	Walking	19.1	Pass
67	Proposed	6.1	Walking	19.4	Pass
68	Proposed	6.9	Walking	20.4	Pass
69	Proposed	7.5	Walking	20.7	Pass
70	Proposed	6.1	Walking	20.2	Pass
71	Proposed	6.8	Walking	21.3	Pass
72	Proposed	6.7	Walking	19.2	Pass
73	Proposed	5.8	Standing	18.9	Pass
74	Proposed	6.4	Walking	19.8	Pass
75	Proposed	4.9	Standing	15.1	Pass
76	Proposed	5.8	Standing	18.1	Pass
77	Proposed	4.3	Standing	13.4	Pass
78	Proposed	5.4	Standing	15.6	Pass
79	Proposed	5.9	Standing	18.0	Pass
80	Proposed	6.9	Walking	20.9	Pass
81	Proposed	6.0	Standing	20.4	Pass
82	Proposed	6.9	Walking	22.3	Pass
83	Proposed	6.5	Walking	21.3	Pass
84	Proposed	7.3	Walking	22.6	Pass

Table A1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort		Wind Safety	
		Summer		Annual	
		Speed (m/s)	Rating	Speed (m/s)	Rating
85	Proposed	5.7	Standing	16.3	Pass
86	Proposed	4.8	Standing	13.9	Pass
87	Proposed	5.0	Standing	15.0	Pass
88	Proposed	5.8	Standing	19.9	Pass
89	Proposed	5.9	Standing	17.2	Pass
90	Proposed	6.0	Standing	19.3	Pass
91	Proposed	5.1	Standing	15.4	Pass
92	Proposed	4.7	Standing	13.8	Pass
93	Proposed	5.8	Standing	15.4	Pass
94	Proposed	4.8	Standing	14.9	Pass
95	Proposed	4.7	Standing	14.9	Pass
96	Proposed	6.4	Walking	19.3	Pass
97	Proposed	7.0	Walking	20.2	Pass
98	Proposed	5.5	Standing	17.3	Pass
99	Proposed	5.7	Standing	17.2	Pass
100	Proposed	6.1	Walking	18.2	Pass
101	Proposed	5.4	Standing	17.0	Pass
102	Proposed	3.6	Sitting	10.8	Pass
103	Proposed	3.9	Sitting	13.1	Pass
104	Proposed	4.5	Standing	13.6	Pass
105	Proposed	4.2	Standing	12.4	Pass
106	Proposed	4.4	Standing	13.9	Pass
107	Proposed	5.8	Standing	18.2	Pass
108	Proposed	6.5	Walking	20.0	Pass
109	Proposed	7.0	Walking	22.8	Pass
110	Proposed	6.4	Walking	19.7	Pass
111	Proposed	4.7	Standing	14.1	Pass

Table A1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort		Wind Safety	
		Summer		Annual	
		Speed (m/s)	Rating	Speed (m/s)	Rating
112	Proposed	4.5	Standing	13.7	Pass
113	Proposed	5.4	Standing	16.2	Pass
114	Proposed	5.1	Standing	14.9	Pass

Table A2: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
1	Updated Design	5.1	Standing	16	Pass
2	Updated Design	5.7	Standing	16	Pass
3	Updated Design	4.5	Standing	14	Pass
4	Updated Design	6.0	Standing	19	Pass
5	Updated Design	5.6	Standing	15	Pass
6	Updated Design	6.3	Walking	18	Pass
7	Updated Design	5.7	Standing	16	Pass
8	Updated Design	5.2	Standing	16	Pass
9	Updated Design	5.8	Standing	17	Pass
10	Updated Design	7.0	Walking	21	Pass
11	Updated Design	5.9	Standing	17	Pass
12	Updated Design	6.9	Walking	21	Pass
13	Updated Design	7.1	Walking	20	Pass
14	Updated Design	4.5	Standing	15	Pass
15	Updated Design	6.5	Walking	19	Pass
16	Updated Design	6.1	Walking	18	Pass
17	Updated Design	6.8	Walking	19	Pass
18	Updated Design	6.8	Walking	19	Pass
19	Updated Design	6.6	Walking	21	Pass
20	Updated Design	4.5	Standing	14	Pass
21	Updated Design	4.6	Standing	14	Pass
22	Updated Design	6.8	Walking	22	Pass
23	Updated Design	4.6	Standing	14	Pass
24	Updated Design	4.8	Standing	15	Pass
25	Updated Design	7.0	Walking	20	Pass
26	Updated Design	6.0	Standing	19	Pass
27	Updated Design	5.1	Standing	14	Pass
28	Updated Design	4.4	Standing	13	Pass
29	Updated Design	5.1	Standing	16	Pass
30	Updated Design	4.8	Standing	15	Pass
31	Updated Design	4.4	Standing	13	Pass
32	Updated Design	4.2	Standing	13	Pass
33	Updated Design	5.7	Standing	18	Pass
34	Updated Design	4.4	Standing	13	Pass
35	Updated Design	6.1	Walking	18	Pass
36	Updated Design	5.8	Standing	17	Pass
37	Updated Design	6.0	Standing	19	Pass
38	Updated Design	6.2	Walking	18	Pass
39	Updated Design	6.7	Walking	23	Pass
40	Updated Design	4.8	Standing	14	Pass
41	Updated Design	7.4	Walking	21	Pass
42	Updated Design	7.7	Walking	25	Exceeded
43	Updated Design	8.0	Walking	25	Exceeded
44	Updated Design	6.8	Walking	23	Pass
45	Updated Design	5.9	Standing	20	Pass
46	Updated Design	5.7	Standing	20	Pass
47	Updated Design	5.3	Standing	16	Pass
48	Updated Design	5.3	Standing	15	Pass
49	Updated Design	5.3	Standing	15	Pass
50	Updated Design	8.5	Uncomfortable	21	Pass
51	Updated Design	8.2	Uncomfortable	21	Pass
52	Updated Design	7.9	Walking	20	Pass
53	Updated Design	7.4	Walking	20	Pass
54	Updated Design	5.5	Standing	18	Pass
55	Updated Design	5.8	Standing	20	Pass
56	Updated Design	5.5	Standing	17	Pass
57	Updated Design	5.1	Standing	15	Pass
58	Updated Design	6.0	Standing	17	Pass
59	Updated Design	6.8	Walking	19	Pass
60	Updated Design	8.8	Uncomfortable	24	Pass
61	Updated Design	7.7	Walking	20	Pass
62	Updated Design	6.2	Walking	21	Pass
63	Updated Design	5.7	Standing	16	Pass
64	Updated Design	5.2	Standing	19	Pass

Table A2: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort		Wind Safety	
		Speed (m/s)	Rating	Speed (m/s)	Rating
65	Updated Design	4.7	Standing	14	Pass
66	Updated Design	3.4	Sitting	10	Pass
67	Updated Design	4.2	Standing	13	Pass
68	Updated Design	4.3	Standing	13	Pass
69	Updated Design	7.6	Walking	22	Pass
70	Updated Design	4.9	Standing	15	Pass
71	Updated Design	5.1	Standing	15	Pass
72	Updated Design	5.9	Standing	18	Pass
73	Updated Design	5.9	Standing	18	Pass
74	Updated Design	5.2	Standing	16	Pass
75	Updated Design	5.9	Standing	18	Pass
76	Updated Design	2.8	Sitting	11	Pass
77	Updated Design	5.1	Standing	16	Pass
78	Updated Design	5.7	Standing	17	Pass
79	Updated Design	3.9	Sitting	12	Pass
80	Updated Design	5.2	Standing	16	Pass

Seasons	Hours	Wind Comfort (m/s)		Wind Safety (m/s)	
Annual	6:00 - 22:00	(5% Exceedance)		(> 0.1% Annual Exceedance)	
Annual Saf	0:00 - 23:00	≤ 4	Sitting	≤ 24	Pass
		≤ 6	Standing	> 24	Exceeded
		≤ 8	Walking		
		> 8	Uncomfortable		

Configurations	
Proposed	Project with existing surroundings