

40 THE RETREAT

BRINGELLY, NSW



PEDESTRIAN WIND ASSESSMENT

PROJECT # 2401425

JUNE 20, 2024

SUBMITTED TO

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DOCUMENT CONTROL



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A	Draft	27/03/2024	AMC	DAH
B	Final – Updates for minor comments	09/04/2024	JB	AMC
C	Review of latest drawings for wind mitigation measures, report updated to include Section 5.6	03/06/2024	AMC	JB

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RWDI

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QUALITY ASSURANCE

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering, air quality and wind engineering; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.



1. INTRODUCTION



Development Description

This State Significant Development Application seeks consent for the detailed design and delivery (including construction and use) of a new mixed use residential development, to be developed in two (2) stages. Specifically, development consent is sought for:

Stage 1

Overall site clearing and preparation works, including demolition of all existing development on the Site;

The redevelopment of the northern portion of the Site, comprising:

- Temporary Site access to the northern portion of the Site from The Retreat;
- Temporary bin enclosure adjacent the temporary access;
- Excavation works and construction of a shared two (2) storey basement to a maximum depth of RL 60.60, with capacity for 311 vehicle car spaces;
- Construction of three (3) individual mixed use buildings, comprising:
 - Maximum building heights between 30.4m and 39.8m;
 - A total Gross Floor Area (GFA) of 26, 204sqm, comprising 25,744 sqm of residential GFA, 248 sqm of non-residential GFA and 212 sqm of retail GFA, distributed across the three buildings;
 - 254 residential units, distributed across the three buildings

- Associated landscaping, communal open space and embellishment works; and
- Delivery and augmentation of services

Stage 2

The redevelopment of the southern portion of the Site, comprising:

- Removal of the Stage 1 temporary access from The Retreat;
- Connection and access of the Stage 1 basement to the western boundary (to become a future Collector Road);
- Excavation works and construction of a shared three (3) storey basement to a depth of RL 56.35, with capacity for 336 vehicle car spaces;
- Site and basement access from the western boundary (to become a future Collector Road);
- Construction of three (3) individual mixed-use buildings, comprising:
 - Maximum building heights between 23.8m and 39.9m;
 - 279 residential units, distributed across the three buildings.
- Associated landscaping, communal open space and embellishment works; and
- Delivery and augmentation of services.

1. INTRODUCTION



Secretary's Environmental Assessment Requirements

In accordance with section 4.39 of the *Environmental Planning & Assessment Act 1979 (EP&A Act)*, Secretary's Environmental Assessment Requirements (SEARs) for SSD 49645977 were issued on 18 November 2022. This report has been prepared to respond to the relevant issued SEARs, as set out in the table below.

SEAR	Response
<p>4. Environment Amenity</p> <p>Assess amenity impacts on the surrounding locality, including lighting impacts, solar access, visual privacy, visual amenity, view loss and view sharing, overshadowing and wind impacts. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated.</p>	Section 5

1. INTRODUCTION



Summary of Mitigation Measures

In accordance with section 4.39 of the *Environmental Planning & Assessment Act 1979 (EP&A Act)*, Secretary's Environmental Assessment Requirements (SEARs) for SSD 49645977 were issued on 18 November 2022. This report has been prepared to respond to the relevant issued SEARs, as set out in the table below.

ID	Mitigation Measure
Mitigation measure 1	Strategic landscaping around corners should be retained / included to reduce pedestrian movement near areas susceptible to high winds.
Mitigation measure 2	Trees with dense interlocking canopies along the street fronts at the base of the buildings can also act to reduce downwash wind effects and should be retained. These should be evergreen to assist in reducing wind impacts during winters. Alternatively, it is recommended to incorporate awnings along all street fronts to mitigate the impact of the winds redirected by the buildings. Note that the awning design should be continuous with no gaps to reduce the risk of wind reattachment on the ground level.
Mitigation measure 3	Any outdoor seating areas should correspond to favourable wind locations. Therefore, locating these away from corners on the ground level is recommended. Inclusion of localised measures such as planting/screening is also recommended
Mitigation measure 4	It is recommended to recess the lobby entrances to Buildings A, B, E, and F by approximately 1.5 m. This adjustment would facilitate a transitional space for individuals exiting controlled indoor environments to acclimatise to outdoor conditions effectively. Alternatively, the integration of localised planters or screening elements can be considered to mitigate impacts.
Mitigation measure 5	Full-height screening along one of the open aspects is recommended for all corner balconies and wider terraces where applicable. Alternatively, it is recommended to incorporate 1.4 m high impermeable balustrades or intermittent screens around the perimeter to reduce direct wind exposure and improve the usability of these spaces.

1. INTRODUCTION



Summary of Mitigation Measures

ID	Mitigation Measure
Mitigation measure 6	The communal terraces of Buildings B and E will benefit from 2m tall perimeter screening (can be a combination of impermeable screening at base with a 50% porous screen above). Landscaping, particularly around the perimeter, should be retained to buffer the winds further.
Mitigation measure 7	The landscape design for Building E Level 03 terrace features dense planting along the western perimeter. This should be maintained to reduce exposure to winter winds.
Mitigation measure 8	The landscape design for Building F level 04 terrace incorporates shading structures that are expected to reduce the risk of wind reattachment and should be retained. It is also recommended to include 1.5 m tall perimeter screening or hedge along the southern perimeter of the terrace to further reduce channelling winds.

1. INTRODUCTION



RWDI Australia Pty Ltd (RWDI) was retained to undertake a pedestrian wind assessment of the proposed development located at 40 The Retreat in Bringelly, NSW. The development site forms part of the larger Aerotropolis Core Precinct (defined as part of the Western Sydney Aerotropolis Development Control Plan Phase 2). The site is located to the west of the Kelvin Park Homestead heritage site and in close proximity to the proposed Bradfield City Centre and the Western Sydney Airport. The location of the site within its broader existing surrounding context is shown in Image 1.

The proposed development encompasses six mixed-use residential buildings ranging in height from 7-storeys to 12-storeys (Image 2a). The buildings will be bounded by future local streets and roads to the north and south, the future Collector Road to the west. Ground level floor plan of the proposed development site is shown in Image 2b which also indicates the gradual rise in terrain from south to north.

This desk-based report provides a review of the potential wind conditions around the site and offers conceptual wind control measures and design advice suitable for early design of the development. The key outdoor pedestrian accessible areas of interest associated with the development include the open park spaces on the ground level, pedestrian footpaths around the site, the entrances to the buildings, and the amenity spaces on ground and upper levels.



Image 1: Approximate Project Bounds and Existing Surroundings
Source: Nearmap

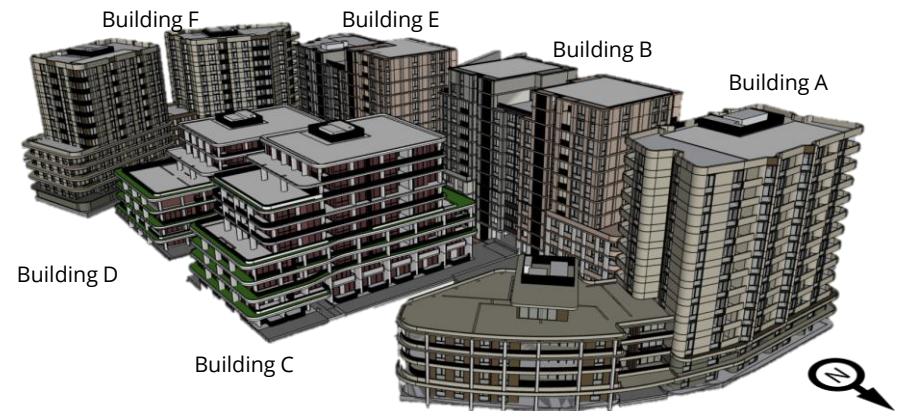


Image 2a: 3D Model of the Proposed Development
Pedestrian Wind Assessment

1. INTRODUCTION



Image 2b: Ground Plane and Topographic Rise
Source: DPE Presentation by DKO (28 Sept 2023)

2. METHODOLOGY



Predicting wind speeds and occurrence frequencies around a building is a complex process and involves the combined assessment of building geometry, orientation, position and height of surrounding buildings, upstream terrain and the local wind climate. Over the years, RWDI has conducted thousands of wind-tunnel model studies and CFD assessments on pedestrian wind conditions around buildings, yielding a broad knowledge base of potential flow behaviour. This knowledge and experience, together with literature, allows for a reliable, consistent and efficient desktop estimation of pedestrian wind conditions without wind-tunnel testing or detailed CFD studies.

This qualitative approach provides a screening-level estimation of potential wind conditions and offers conceptual wind control measures to improve wind comfort, where deemed necessary. In order to quantify and confirm the predicted conditions or to refine any of the suggested conceptual wind control measures, computational simulations or physical scale model tests in a boundary-layer wind tunnel would be required.

RWDI's assessment is based on the following:

- A review of the regional long-term meteorological data;
- Drawings (DA Submission Set) received by RWDI in March 2024. Updated architectural sets, received by RWDI in May 2024, were reviewed to confirm sufficient mitigation elements were introduced in the design.

- Wind-tunnel studies, CFD simulations, and desktop assessments undertaken by the microclimate team for projects in the region;
- Our engineering judgement, experience, and expert knowledge of wind flows around buildings^{1, 2}; and,
- RWDI Pedestrian Wind Comfort and AWES Wind Safety Criteria.

In accordance with the Environmental Planning & Assessment Act 1979 (EP&A Act), Planning Secretary's Environmental Assessment Requirements (SEARs) for SSD-65729209 have been issued. This report has been prepared to respond to the issued SEARs, as set out in the table below.

SEAR	Response
4. Environment Amenity	
Assess amenity impacts on the surrounding locality, including lighting impacts, solar access, visual privacy, visual amenity, view loss and view sharing, overshadowing and wind impacts . A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated.	Section 5

1. H. Wu and F. Kriksic (2012). "Designing for Pedestrian Comfort in Response to Local Climate", Journal of Wind Engineering and Industrial Aerodynamics, vol.104-106, pp.397-407.
2. C.J. Williams, H. Wu, W.F. Waechter and H.A. Baker (1999), "Experience with Remedial Solutions to Control Pedestrian Wind Problems", 10th International Conference on Wind Engineering, Copenhagen, Denmark.

3. METEOROLOGICAL DATA



It is noted that the inland location of the site is less exposed to prevailing sea breezes common in most coastal areas around Sydney. Meteorological data from Camden Airport is, therefore, considered to be representative for the site wind climate. The observation site is located approximately 14 km to the south of the project site and is situated in a similar topography as the project site. The frequency and directional distributions of winds during the summer (Nov - Apr) and winter (May - Oct) seasons are shown in Image 4. The data shows that winds from northeast and from south to southeast are predominant during summer season with secondary winds approaching from the southwest sector. During the winter season, winds from the west to west-southwest are predominant with secondary winds from the south and north. Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10m) occur more commonly in the winter and predominantly originate from the west-southwest and west quadrants.

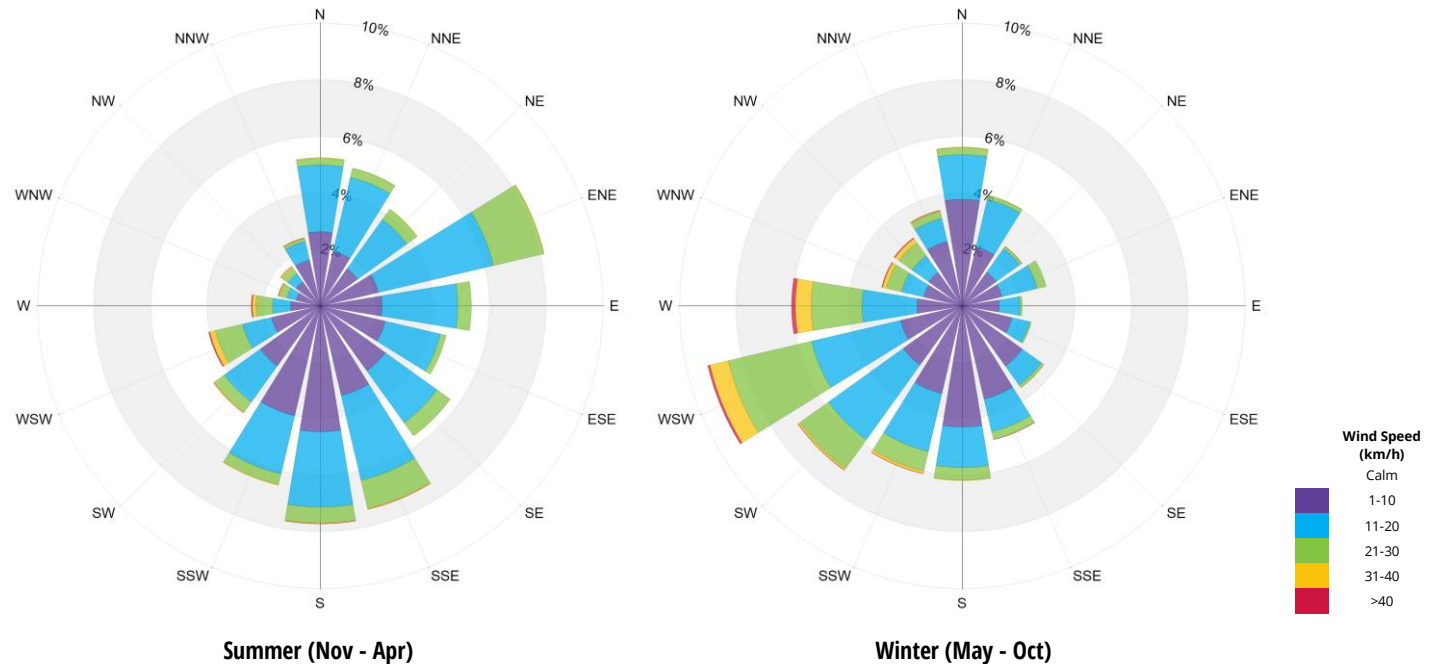


Image 4: Directional Distribution of Winds Approaching Camden Airport
Recorded from 2000-2020

4. RWDI PEDESTRIAN WIND CRITERIA



4.1 Safety Criterion

Pedestrian safety is associated with excessive gusts that can adversely affect a pedestrian's balance and footing. If strong winds, greater than 83 km/h (23m/s) occur more than 0.1% of the time or 9 hours per year, the wind conditions are considered severe and can impact the footing of individuals using the space. These generally coincide with areas of high wind activity noted in the report.

4.2 Pedestrian Comfort Criteria

The RWDI pedestrian wind comfort criteria, depicted in Image 4, are used in the current study. These criteria, developed by RWDI through research and consulting since 1974, are based on gust-equivalent mean wind speeds that combine the impact of mean winds and gusts on pedestrian comfort. Widely accepted by municipal authorities, building designers, and the global city planning community, these criteria offer a comprehensive framework for evaluating pedestrian comfort.

The wind comfort levels are categorised based on typical/intended pedestrian activity and are expressed in terms of their suitability for various levels of human activity. The categorisation is based on conservative wind speeds; higher the activity level, higher the wind speed one can typically tolerate while engaged in the activity. Wind conditions are assessed at a

typical pedestrian chest height and are considered suitable for the intended use of the space if the associated winds are expected for at least 80% of the time. 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 and individual's perception of the wind climate. Wind control measures are typically required at locations where the occurrence frequencies of wind speeds exceed the threshold values for specific pedestrian activities.

Sitting ≤ 10 km/h			Calm or light breezes desired for outdoor seating areas where one can read a paper without having it blown away
Standing ≤ 14 km/h			Gentle breezes suitable for main building entrances, bus stops and locations where pedestrians may linger (private and communal terraces)
Strolling ≤ 17 km/h			Moderate winds that would be appropriate for strolling along a downtown street, plaza or park and where the objective is not to linger
Walking ≤ 20 km/h			High Winds that can be tolerated if one's objective is to walk, run or cycle without lingering - Also suitable for certain sporting activities
Uncomfortable > 20 km/h			None of comfort categories above are met - Represents conditions that might be dangerous to the elderly and children and are of a considerable discomfort to others

Image 4: RWDI Pedestrian Wind Comfort Criteria

5. RESULTS AND DISCUSSION



5.1 General Wind Flow around Buildings

In our 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 for a prevailing wind direction, deep canopies close to ground level, wind screens / tall trees with dense landscaping, etc. can help reduce 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.

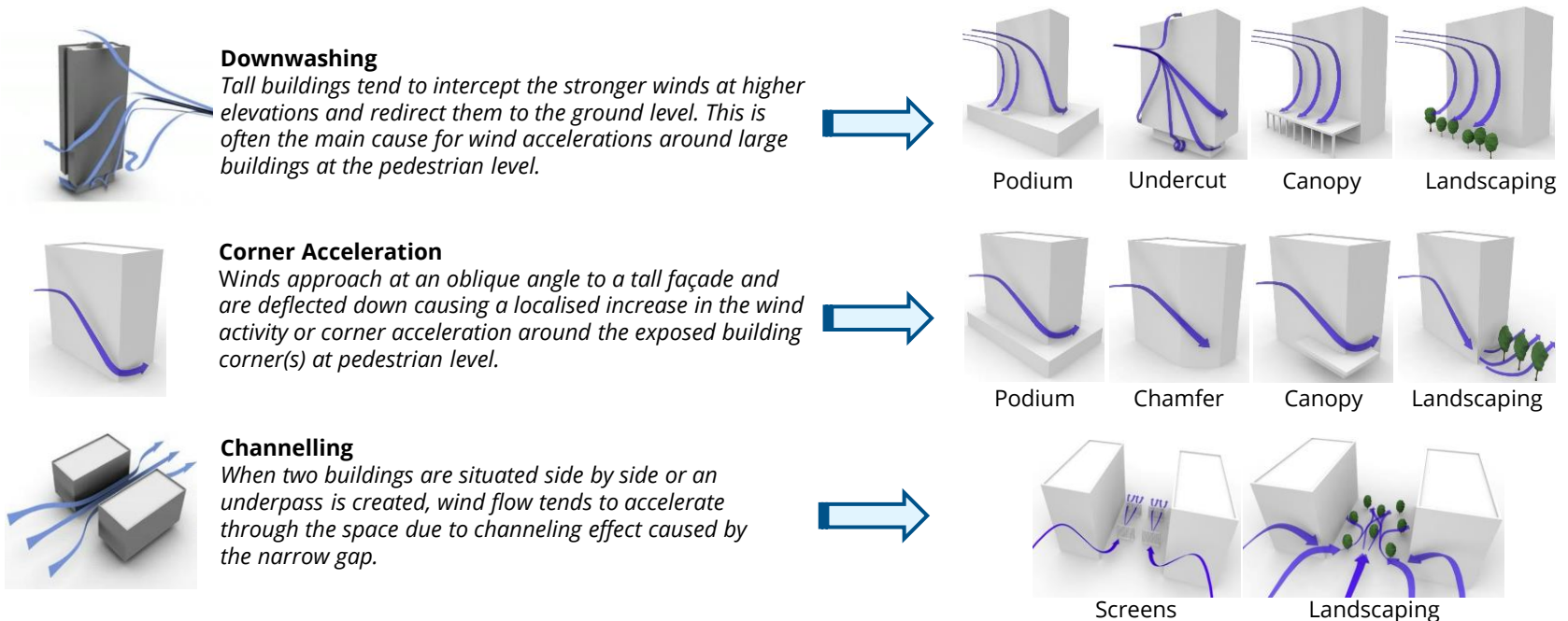


Image 5: General Wind Flow around Buildings with Examples of Common Wind Measures

5. RESULTS AND DISCUSSION



5.2 Site Exposure

The exposure of the site to regional prevailing winds is indicated in Image 6. The project site is relatively exposed to all seasonal winds due to the open terrain in all directions. The ongoing construction of the Aerotropolis Metro Station and other surrounding developments, within the broader Bradfield City Centre, is situated roughly 500 meters southwest of the project site and is likely not to offer substantial protection against prevailing southwest winds. However, the Thompson Creek tree line, indicated in Image 6 is anticipated to serve as a natural barrier, mitigating the impact of ground-level winds from the south and southeast sectors.

5.3 Existing Site Conditions

The existing site is a mostly vacant parcel of land with a single low-rise building. Consequently, the prevailing site conditions are anticipated to be influenced by the natural topography of the area which is characterised by a gradual elevation increase from the southern to the northern end of the site. Considering the local wind climate and site exposure, it is expected that wind conditions across the majority of the open site range from passive standing use during the summers to active strolling use during the winters. High winds exceeding the wind safety criterion are not likely to occur around the existing site due to low-rise nature of the single building onsite.



Image 6: Exposure of Site to Regional Prevailing Winds
Left: Summer | Right: Winter

5. RESULTS AND DISCUSSION

5.3 Proposed Site Conditions (March 2024 Set)

5.3.1 Ground Level Areas

The interactions of the regional prevailing winds with the proposed massing and expected wind flow patterns on the local ground level are shown in Image 7a-7e. Key interactions are noted below with expected wind conditions shown in Image 8:

- The relative position of the taller buildings along the various streets can provide shelter to most internal spaces within the site including both Buildings C / D and the communal outdoor spaces around these buildings. Wind impacts are likely to be small with most areas suitable for passive sitting to standing use during the year.
- The taller buildings around the perimeter are likely to intercept and redirect winds towards the ground level (downwash). With minimal setbacks or awnings, these winds are likely to impact ground level conditions with localised corner wind acceleration effects anticipated around exposed corners of the buildings (high risk areas indicated in Image 8). Wind conditions can be uncomfortable during winters.
- Subsequent wind channeling within the corridors may compromise overall comfort levels, especially within retail areas and around lobby entrances. Individuals transitioning from controlled indoor environments are particularly susceptible to adverse effects from heightened winds.
- Wind channelling is also likely to persist within the through-site links under Buildings A and F throughout the year.

5.3.2 Upper-Level Communal Spaces

- **Building A:** A communal terrace is situated on the rooftop of the east wing (Level 4) and is generally shielded from the prevailing winds from the west and west-southwest during winters. Overall wind conditions are likely to be suitable for short-duration standing use with areas closer to the Building A massing likely to experience slightly stronger winds during summers due to impacts of north winds.
- **Building B:** The communal terrace is located between the north and south wings of Building B on Level 10. The space is exposed to prevailing winds which can channel and impact outdoor conditions. Wind conditions are likely to be uncomfortable during winters and suitable for active strolling to walking use during summers.
- **Building C:** The communal terrace is located along the eastern aspect on Level 7 and is relatively shielded from regional winds during winters. However, its elevated position exposes it to wind impacts during summers leading to conditions suitable for active strolling use. In contrast, conditions during winters are likely to be comfortable for short-duration standing use.
- **Building D:** The communal terrace, positioned on Level 4 along the eastern aspect of the building, benefits from shielding against prevailing winds during winter months, with its lower height likely to mitigate wind impacts in the summer. Consequently, wind conditions are expected to be conducive to short-duration standing use throughout the year.

5. RESULTS AND DISCUSSION



5.3.2 Upper-Level Communal Spaces

- **Building E:** The communal terrace on Level 3 of Building E, positioned to the south of the building, is susceptible to winter winds from the west and southwest. Therefore, higher winds are likely to occur near the western perimeter of the terrace during winters due to winds redirected by the building massing. Wind conditions are likely to be suitable for active strolling use during winters within the space due to likely channelling between Buildings E & F. In contrast, conditions are expected to be suitable for passive use during summers due to shielding afforded by the neighbouring buildings. The communal terrace on Level 10 is situated between the north and south wings of the building. Similar to Building B Level 10 terrace, the space is exposed to regional winds with conditions likely to be uncomfortable during winters and suitable for active strolling to walking use during summers.
- **Building F:** The communal terrace on Level 4 of Building F, situated between the east and west wings, is likely to be exposed to channelling wind impacts. Similar to the lower ground through-site link under the building, the communal terrace is likely to be exposed to regional winds throughout the year. Winter winds from the southwest are likely to lead to adverse winds within the space. Wind conditions are, therefore, likely to range from active strolling use during summers to uncomfortable during winters.

5.3.3 Private Balconies

Private balconies are located within all buildings of the proposed development. Most of these balconies are, however, inset / recessed within the planform of the buildings and, therefore, benefit from a single aspect design. These spaces are expected to have comfortable wind conditions suitable for long-duration sitting use throughout the year.

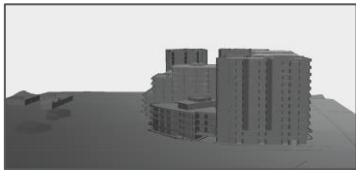
However, the corner balconies of Buildings A, B, E & F are expected to be exposed to stronger wind effects, particularly for balconies situated along the Future Collector Road on Levels 5 and above. This increased exposure stems from the high likelihood of regional winds to accelerate around building corners, potentially adversely impacting both overall wind comfort and safety for balconies situated on higher levels. Similarly, wider balconies (e.g. to Apr B.04.02, C.04.05, etc.) can experience sustained winds that can impact overall comfort if intended for long-duration use.

Note that wind comfort conditions within balconies are difficult to predict and can vary substantially depending on the position of an individual with respect to railings, screens etc. Furthermore, the utilisation of balcony space is discretionary with occupants having the option to retreat indoors during periods of high winds and generally developing an understanding of their balcony's usability based on seasonal variability. Potential safety issues for corner balconies, however, should be proactively addressed through mitigation.

5. RESULTS AND DISCUSSION



Approximate Wind View

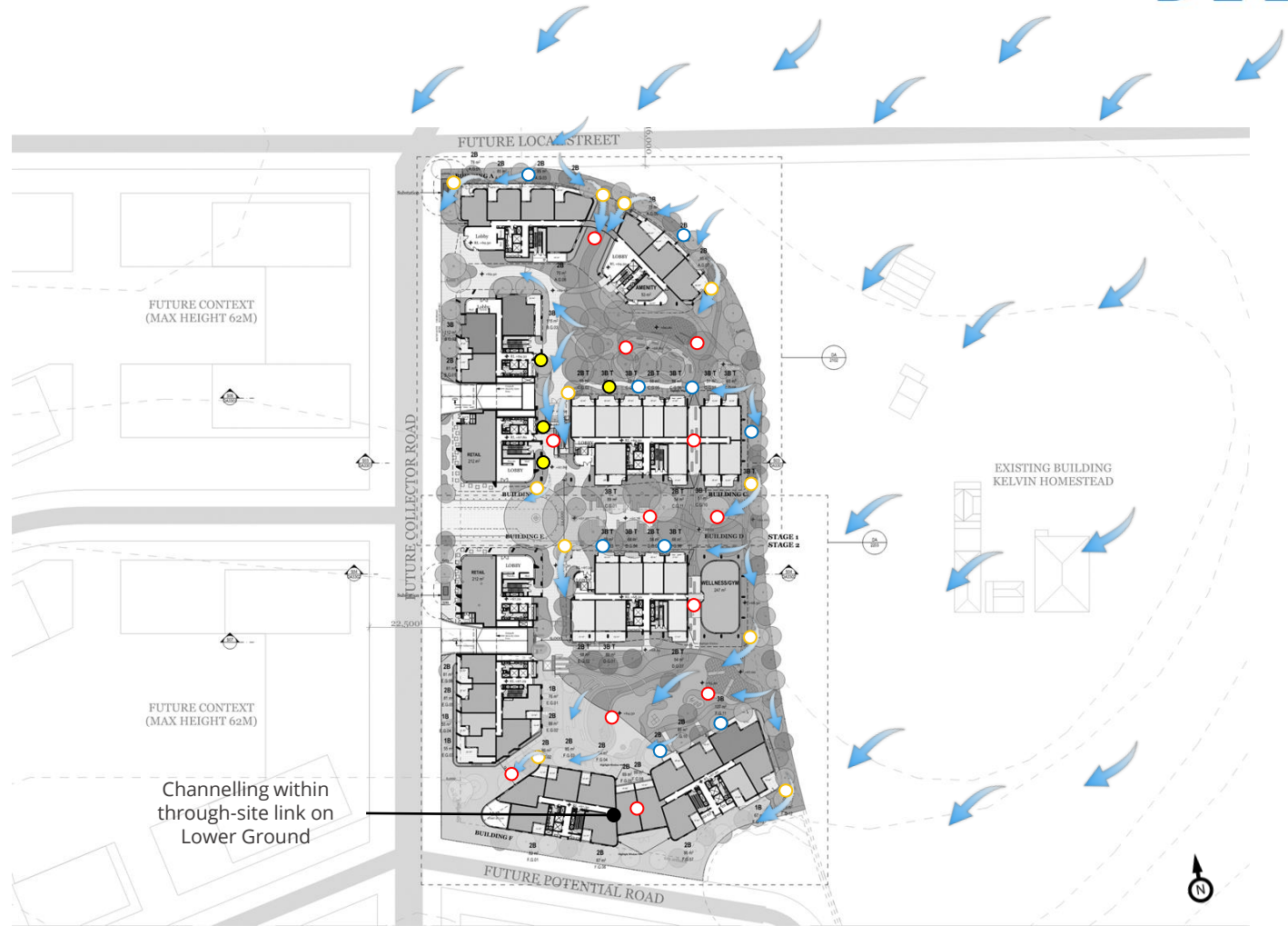


General Wind Effects

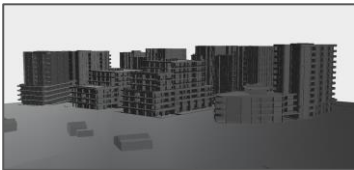
- Corner Acceleration
- Channelling Winds
- Downwash Winds
- Streaming Wind Flows
Tend to pick up speed if left uninterrupted

Image 7a: Expected Wind Flow Patterns within the Proposed Development Site due to North Sector Winds

5. RESULTS AND DISCUSSION



Approximate Wind View



General Wind Effects

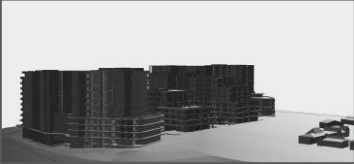
- Corner Acceleration
- Channelling Winds
- Downwash Winds
- Streaming Wind Flows Tend to pick up speed if left uninterrupted

Image 7b: Expected Wind Flow Patterns within the Proposed Development Site due to Northeast Sector Winds

5. RESULTS AND DISCUSSION



Approximate Wind View



General Wind Effects

- Corner Acceleration
- Channelling Winds
- Downwash Winds
- Streaming Wind Flows
Tend to pick up speed if left uninterrupted

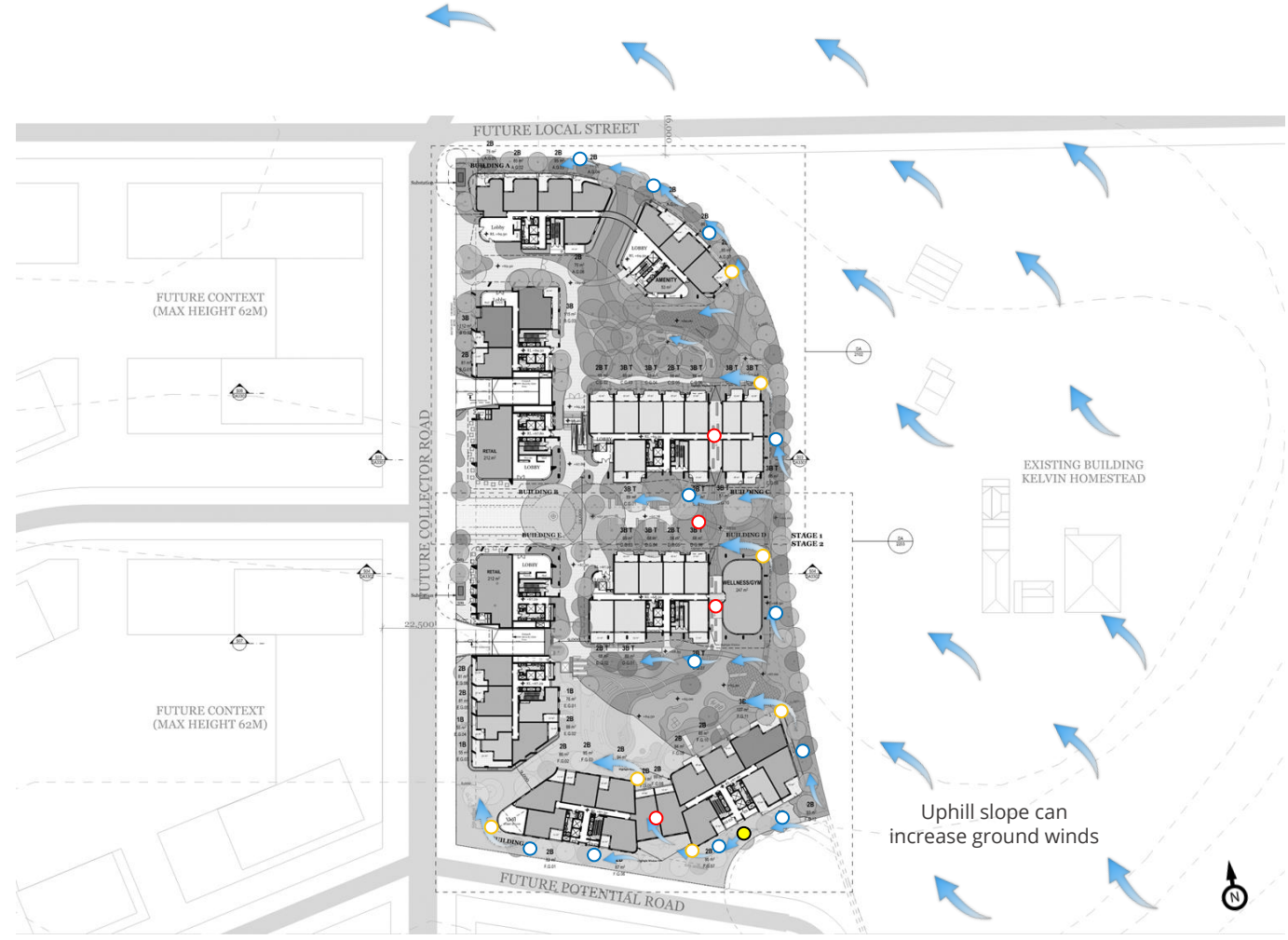


Image 7c: Expected Wind Flow Patterns within the Proposed Development Site due to Southeast Sector Winds

5. RESULTS AND DISCUSSION



- General Wind Effects**
- Corner Acceleration
 - Channelling Winds
 - Downwash Winds
 - Streaming Wind Flows Tend to pick up speed if left uninterrupted

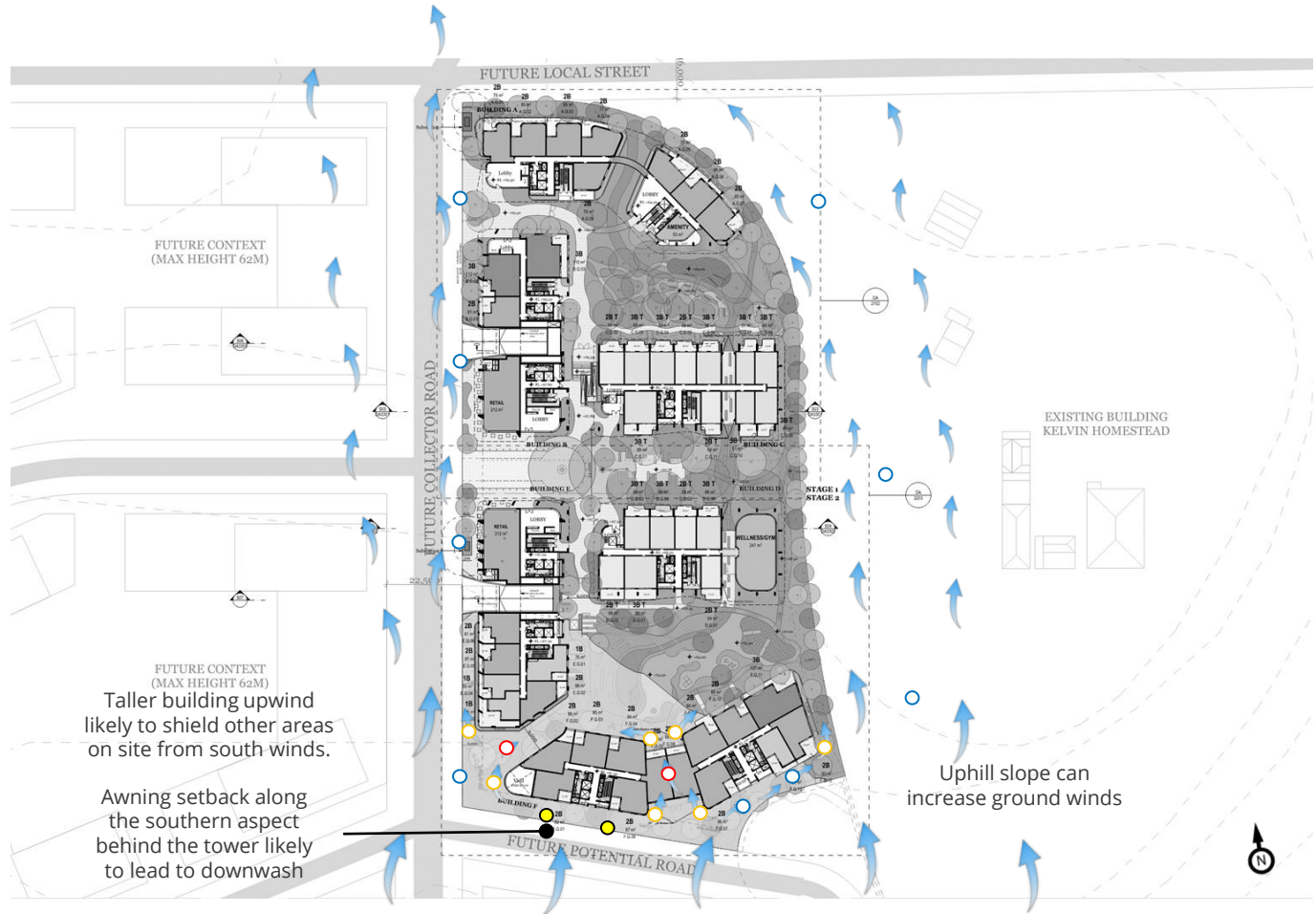
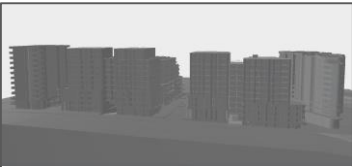


Image 7d: Expected Wind Flow Patterns within the Proposed Development Site due to South Sector Winds

5. RESULTS AND DISCUSSION



Approximate Wind View



General Wind Effects

- Corner Acceleration
- Channelling Winds
- Downwash Winds
- Streaming Wind Flows
Tend to pick up speed if left uninterrupted

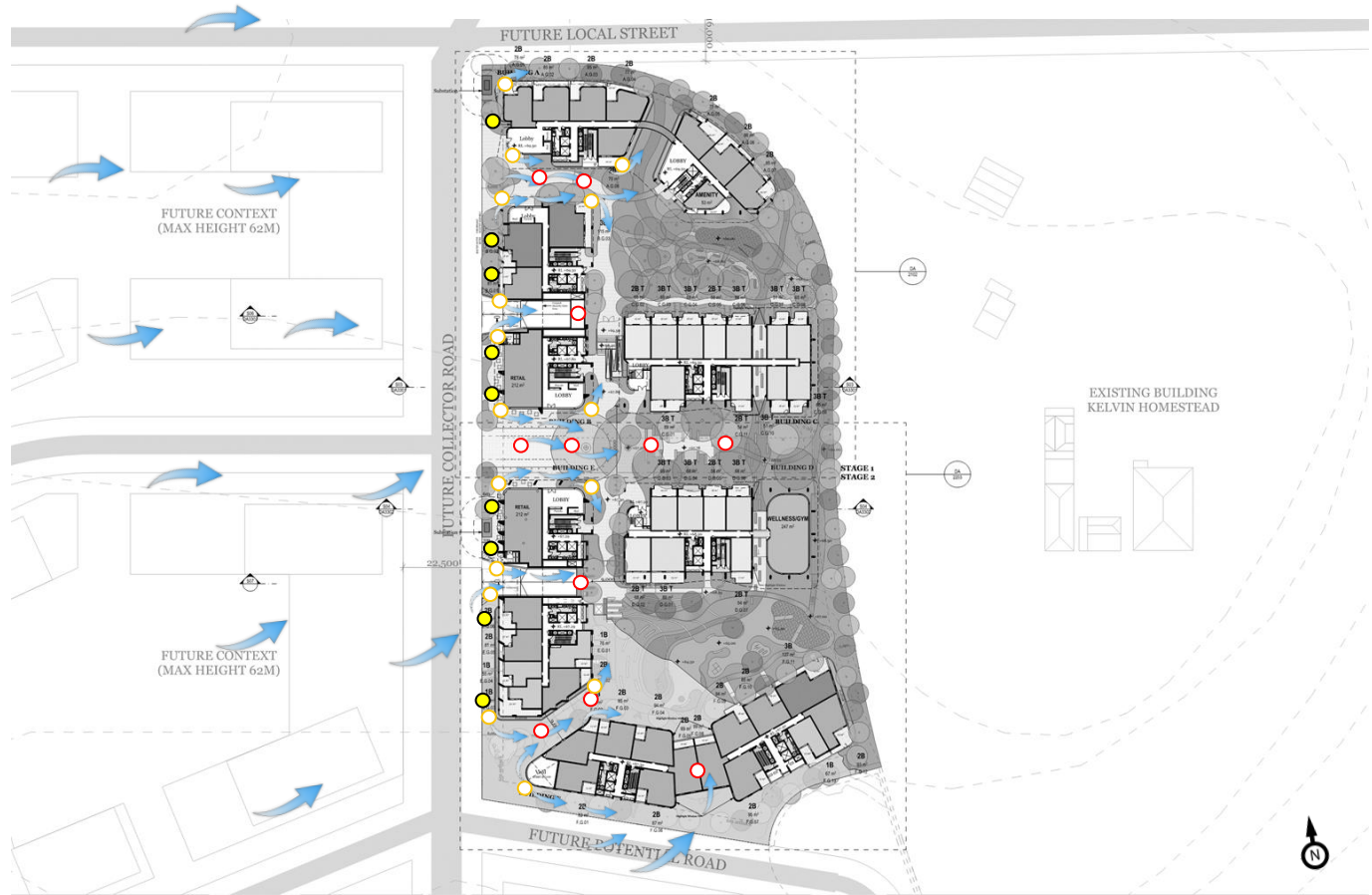


Image 7e: Expected Wind Flow Patterns within the Proposed Development Site due to West-Southwest to West Sector Winds

5. RESULTS AND DISCUSSION



A

Generally calm and well-sheltered areas suitable for passive activation. Low wind risk.

B

Moderately windy. Likely to be suitable for active use. Too windy for long-duration use. Medium wind risk.

C

Windy with potential for localised strong winds. High wind risk.

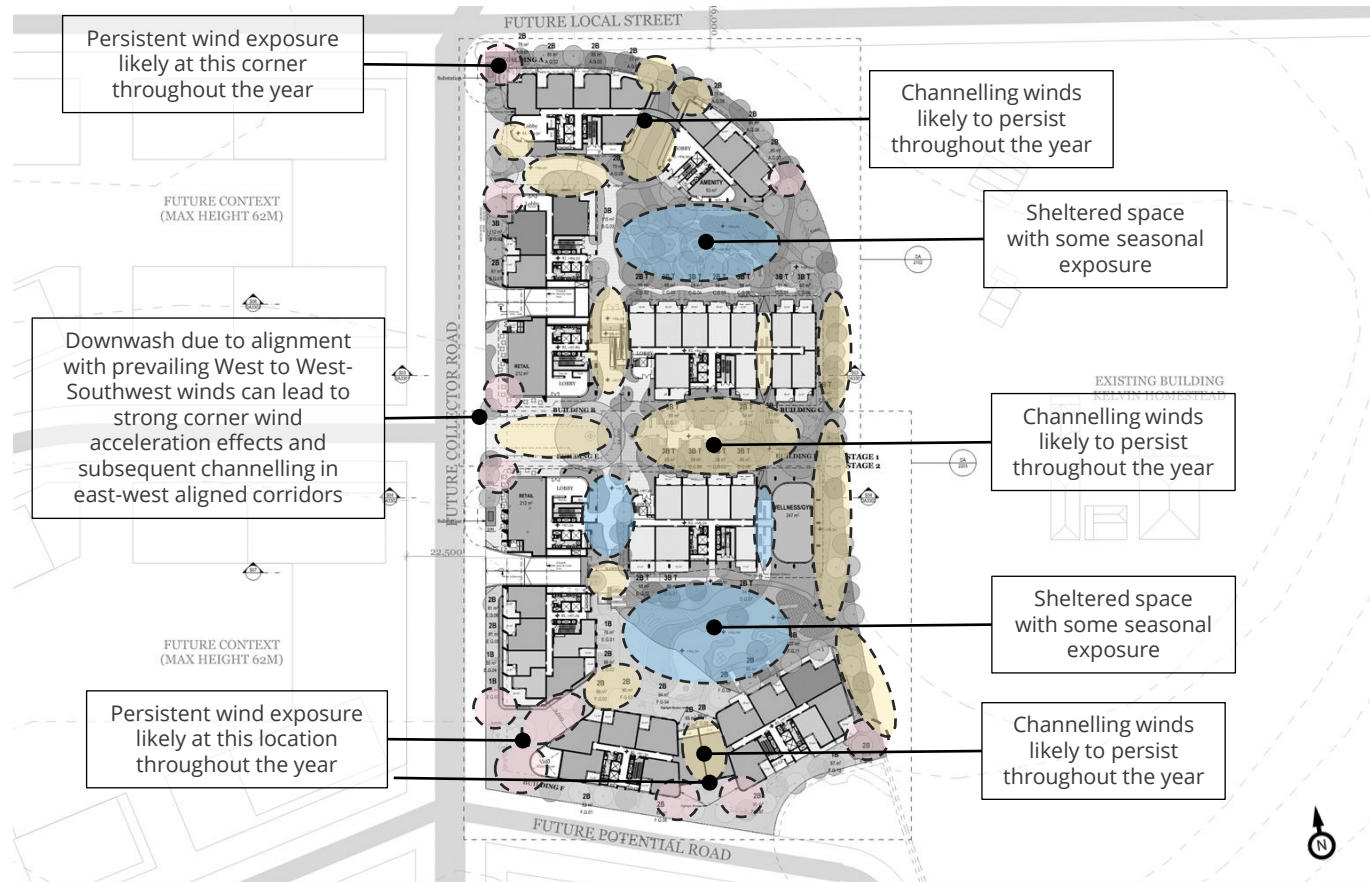


Image 8: Expected Wind Conditions / Risk on Ground Level

5. RESULTS AND DISCUSSION



5.4 Future Wind Conditions

The development site is part of the larger redevelopment of the precinct that forms the Western Sydney Aerotropolis. Adjoining the subject site, both to its North and South, are zones designated for Mixed-Use Residential use with a maximum building height of 56 m, as indicated in Image 9. To the West is the future central business district which is designated for commercial use with a maximum building height limit of 62m.

Image 9 also depicts a comprehensive 3D map showing the anticipated developments, each reaching their maximum allowable height, surrounding the subject site. The inclusion of these future buildings is likely to significantly benefit the overall site wind conditions. We anticipate that the impact of key winds such as those from the west and southwest during winters would reduce in this scenario.

Overall, the wind environment is expected to improve. However, note that Buildings B & E terraces situated on Level 10 may remain susceptible to heightened wind exposure due to their relative elevation.

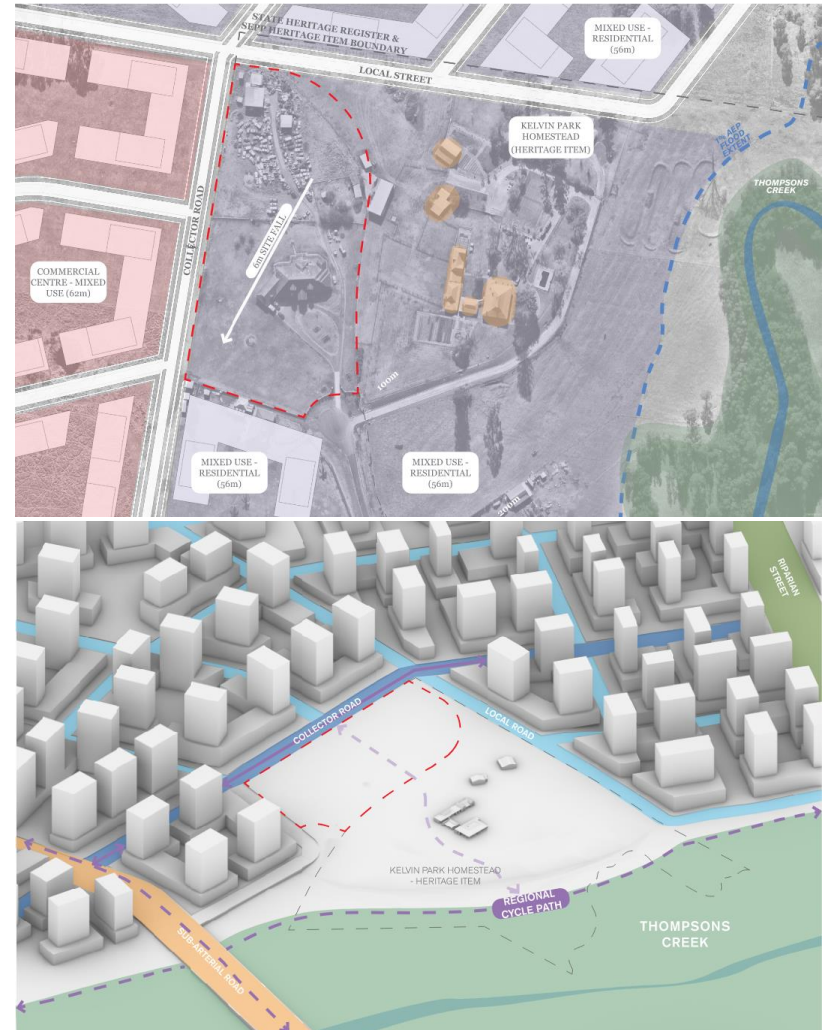


Image 9: Future Surrounding Context

Source: 40 The Retreat Bringelly - Architectural Design Excellence Report

5. RESULTS AND DISCUSSION



5.5 Design Advice and Recommendations

Review of the landscape design (Image 9) shows that the development site will be planted with numerous trees along all street fronts and within the through-site links. Plantings with large crowns and dense foliage, complemented with underplanting to prevent wind flows from accelerating under the crowns, are likely to significantly help reduce wind activity immediately around these areas. Other key recommendations are noted below with examples shown in Image 10:

- Strategic landscaping around corners should be retained / included to reduce pedestrian movement near areas susceptible to high winds.
 - Trees with dense interlocking canopies along the street fronts at the base of the buildings can also act to reduce downwash wind effects and should be retained. These should be evergreen to assist in reducing wind impacts during winters. Alternatively, it is recommended to incorporate awnings along all street fronts to mitigate the impact of the winds redirected by the buildings. Note that the awning design should be continuous with no gaps to reduce the risk of wind reattachment on the ground level.
 - Any outdoor seating areas should correspond to favourable wind locations. Therefore, locating these away from corners on the ground level is recommended. Inclusion of localised measures such as planting/screening is also recommended
- It is recommended to recess the lobby entrances to Buildings A, B, E, and F by approximately 1.5 m. This adjustment would facilitate a transitional space for individuals exiting controlled indoor environments to acclimatise to outdoor conditions effectively. Alternatively, the integration of localised planters or screening elements can be considered to mitigate impacts.
 - Full-height screening along one of the open aspects is recommended for all corner balconies and wider terraces where applicable. Alternatively, it is recommended to incorporate 1.4 m high impermeable balustrades or intermittent screens around the perimeter to reduce direct wind exposure and improve the usability of these spaces.
 - The communal terraces of Buildings B and E will benefit from 2m tall perimeter screening (can be a combination of impermeable screening at base with a 50% porous screen above). Landscaping, particularly around the perimeter, should be retained to buffer the winds further.
 - The landscape design for Building E Level 03 terrace features dense planting along the western perimeter. This should be maintained to reduce exposure to winter winds.
 - The landscape design for Building F level 04 terrace incorporates shading structures that are expected to reduce the risk of wind reattachment and should be retained. It is also recommended to include 1.5 m tall perimeter screening or hedge along the southern perimeter of the terrace to further reduce channelling winds.

5. RESULTS AND DISCUSSION



Image 9: Proposed Landscape Plan

Source: 40 The Retreat Bringelly - Architectural Design Excellence Report

5. RESULTS AND DISCUSSION

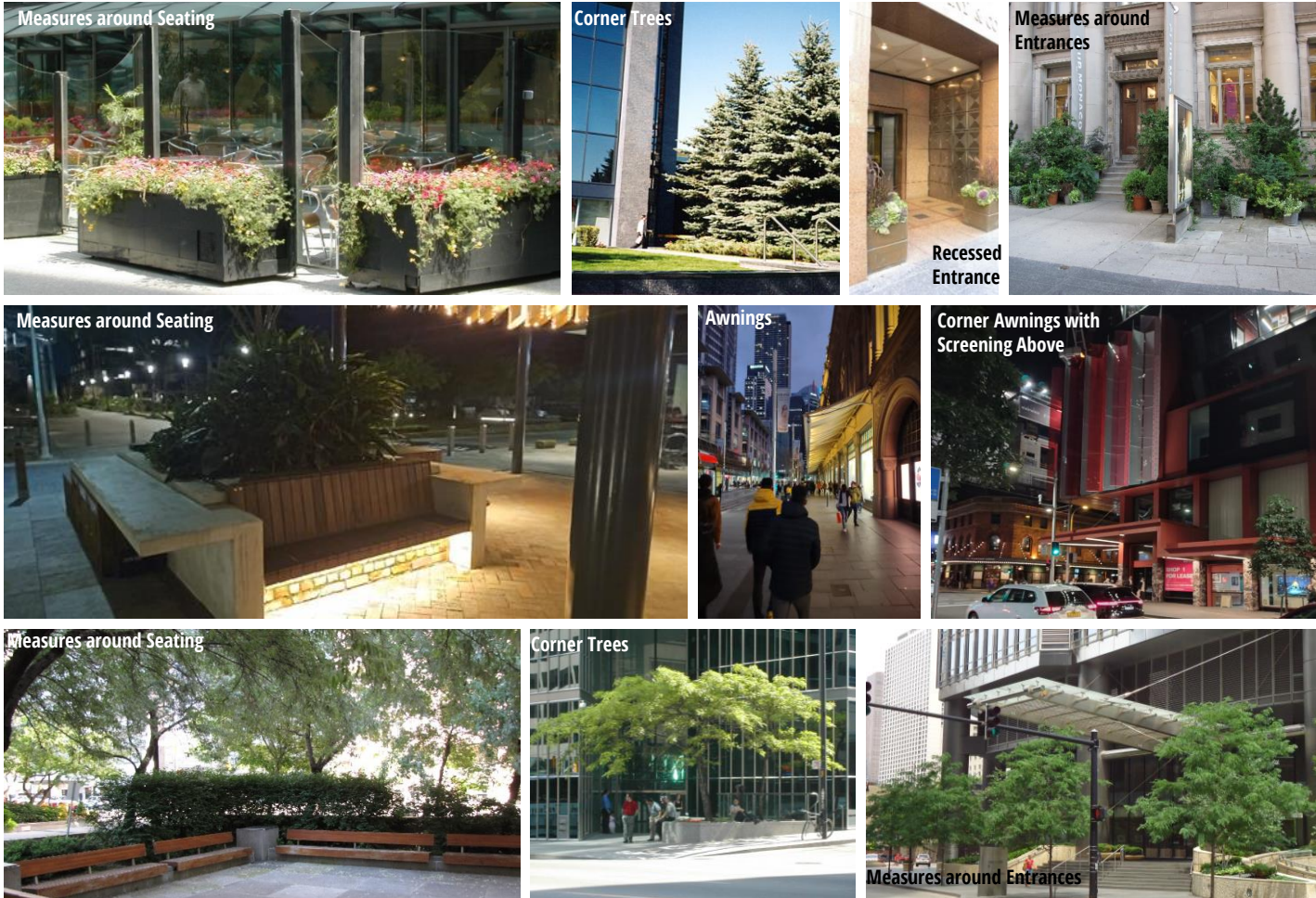


Image 10a: Examples of Wind Control Measures – Landscape, Entrances and Seating Areas

5. RESULTS AND DISCUSSION



Image 10b: Examples of Wind Control Measures – Corner Balconies and Wide Terraces

5. RESULTS AND DISCUSSION



Image 10c: Examples of Wind Control Measures – Rooftop Terraces

5. RESULTS AND DISCUSSION



5.6 Review of Updated Drawings

Following the initial reviews and advice (Sections 5.3 – 5.5), updated architectural drawings have been prepared by DKO (dated 27 May 2024). RWDI has reviewed these drawings and notes that the following mitigation elements have been introduced in the design to improve local wind environment:

- Landscaping has been strategically set in locations to reduce pedestrian movement in areas that are likely to have stronger winds. In addition, trees with dense interlocking canopies along the street fronts have been retained.
- Localised planters and landscaping have been introduced around lobby entrances to ensure comfortable conditions are maintained around these areas.
- Full-height screening or 1.4 m tall impermeable balustrades have been introduced for corner balconies to improve wind comfort levels.
- The communal terraces of Buildings B and E incorporate 2m tall perimeter screening which is expected to reduce wind exposure significantly. Other landscaping features are expected to further buffer winds and improve overall comfort levels within these spaces.
- It is noted that the landscape design for Building E Level 03 terrace includes dense planting along the western perimeter.
- The design for Building F level 04 terrace incorporates shading structures 2 m tall screening along the southern perimeter. These elements are expected to considerably reduce wind impacts.

With the inclusion of these measures, it is anticipated that the wind conditions within the various accessible outdoor spaces within and surrounding the development will align more favourably with their intended use.

6. SUMMARY



Wind conditions on and around the proposed development located at 40 The Retreat in Bringelly, NSW are discussed in this report. The qualitative assessment is based on the review of local wind climate and the current design of the proposed development. The impact of the surrounding buildings (including future proposed buildings) and the local land topography has also been considered. The assessment is based on our experience with wind tunnel testing and CFD analysis of similar buildings within the region.

Conceptual wind flows around the proposed precinct are discussed in the report for the prevailing wind directions to identify key wind sensitive areas. While the overall wind conditions are not expected to be excessively windy, localised areas may experience heightened wind exposure particularly due to the alignment of the buildings along the Future Collector Road with the prevailing winds during winters. However, through targeted mitigation strategies, as indicated in the review of the latest architectural drawings, these challenges can be effectively addressed. Moreover, the landscaping scheme presents opportunities to further ameliorate the winds.

Predicting outdoor wind conditions around a building is a complex process that involves the combined assessment of building geometry and orientation, position and height of surrounding buildings, upstream terrain and the local wind climate. Computational Fluid Dynamics is a useful tool in this regard as it not only combines the impact of these various parameters but can also provide a visual reference for the merits of a particular design of the building. The CFD study can also be layered with a thermal comfort component to provide a more holistic understanding of total human comfort within and around the development site. Undertaking such an assessment can provide an exceptional level of insight into the combination of unique factors that impact a person's comfort, including activity level and clothing, ambient temperature, humidity, wind exposure, solar radiation, and how the space will be used. The information gained can be used to better plan the usage of outdoor spaces and can also assist in understanding the impact of future surrounding buildings.

7. APPLICABILITY OF ASSESSMENT



The assessment discussed in this report pertains to the proposed development in accordance with the drawings and information received in March 2024. Reviews have also been carried out for the updated drawings received by RWDI in May 2024. In the event of any significant changes to the design, construction or operation of the building or addition of surroundings in the future, RWDI could provide an assessment of their impact on the wind conditions discussed in this report. It is the responsibility of others to contact RWDI to initiate this process.

Statement of Limitations

This report entitled '*40 The Retreat Pedestrian Wind Assessment*', dated 03 June 2024, was prepared by RWDI Australia Pty Ltd ("RWDI"). 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. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date

of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

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 utilize 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.