St.Andrew's Gate, Town Centre Extension, Uxbridge
Hybrid Planning Application

Wind Microclimate Impact Assessment

ST. ANDREW'S PARK

UXBRIDGE

VINCI PLC | ST. MODWEN

St. Andrew's Gate,
Town Centre Extension, Uxbridge
Wind Microclimate Impact Assessment

June 2024

Pollard Thomas Edwards

QUALITY CONTROL

Title:	Wind Microclimate Impact Assessment
Description	Assessing Wind Microclimate Impact in the proposed development to confirm adherence to required standards.
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1.0 Executive Summary:

Pollard Thomas Edwards (PTE) has been appointed by Vinci St Modwen (VSM) to carry out a wind impact assessment. This wind impact assessment provides both qualitative and quantitative wind microclimate analysis for the proposed St Andrew's Gate, Town Centre Extension development, using Computational Fluid Dynamics (CFD) simulations. Prepared by the environmental design team at Pollard Thomas Edwards (PTE), the report includes a description of the applied data, methodology, and results. Pedestrian comfort and safety have been analysed using the London Docklands Development Corporation (LDDC) comfort criteria, with visualisations depicting wind comfort ratings. This methodology is recommended for modelling buildings in London and adheres to planning policy guidance for wind microclimate provided by Hillingdon Council and the London Plan 2021.

The assessment shows that the proposed development has no negative impact on off-site conditions; in some areas, it even improves them. The site is found to be mostly comfortable for sitting or standing, with minimal wind impact, with some corner accelerations in block B suitable for walking conditions rather than sitting. Some informal seating is located in areas with standing comfort conditions, but there is adequate seating provided in areas suitable for sitting, allowing residents to choose the appropriate comfort zones depending on wind direction.

The podiums and public realm introduced with the proposed development are fully suitable for their intended comfort use. Further improvements of comfort and wind conditions will be made by tree planting along the west boundary, Squadron Square, and Roundel Place.

The assessment compared the baseline conditions without the effects of the proposed development to those with the effects of the proposed development. The findings indicate that the effects are likely to be minor to negligible, ensuring that the proposed development does not adversely affect the overall wind microclimate conditions of the area.

2.0 Introduction:

This Wind Microclimate Assessment has been prepared by the Sustainability Team at Pollard Thomas Edwards in support of the Hybrid Planning Application which relates to the St. Andrew's Gate, Town Centre (the 'TCE' site), Uxbridge. It provides both a qualitative and quantitative analysis of the proposal, using Computational Fluid Dynamics (CFD) simulations.

The Hybrid Planning Application seeks planning consent for the following:

In outline:

- Creation of up to no. 356 residential dwellings (Class C3) within three new build blocks, of up to 10 storeys.
- Up to 660sqm GIA of flexible commercial space (Use Classes E(a), E(b), E(c), E(e), E(g)(i) and E(g)(ii)) at ground floor level in Building Zones B and C, and up to 440sqm fixed as a convenience store (Use Class E(a)) (GIA) located in Building Zone C; and
- Associated car parking and hard and soft landscaping.

In full:

- Change of use of the former cinema building to reinstate a gym (E(d)) in the Main Hall and associated ancillary rooms and change of use of former squash courts to a café (E(b));
- Associated car parking and hard and soft landscaping and access alterations; and
- External alterations to the building.

This Assessment includes a description of the applied data, methodology and results. Pedestrian comfort and safety have been analysed using the London Docklands Development Corporation (LDDC) comfort criteria, with visualisations depicting wind comfort ratings. This methodology is recommended for modelling buildings in London and adheres to planning policy guidance for wind microclimate.

The report contains a description of the applied data, methodology and results. The pedestrian comfort and safety are analysed using the London Lawson-based comfort criteria, visualised on the proposal to depict wind comfort ratings. This is the recommended methodology for modelling buildings in London, and this report has been written in response to planning policy guidance for wind microclimate by Harrow Council and the London Plan 2021.

This assessment considers the Outline Element on the basis of the illustrative masterplan, which demonstrates how the parameters could be delivered. This has been prepared to demonstrate the overall compliance of the parameters in the context of relevant standards and policy requirements.

An assessment of the illustrative scheme is considered to provide a realistic assessment based on the maximum parameters of built form that could be achieved in future Reserved Matters (RM) applications. The Full Element relates to an existing building, the former Cinema building, which will be retained as part of the proposals.

Figure 01: Site Location Plan

Site boundary for hybrid planning application

Site boundary for full element of Hybrid Planning Application (the Former RAF Cinema Building)

3.0 The Site and Surrounding Context:

3.1 The Site

The Town Centre Extension site is located to the east of Uxbridge High Street.

The existing site forms the final element of the St. Andrew's Park development. It comprises vacant brownfield land other than the Grade II listed former cinema building and car park within the southern part of the TCE site.

The locally listed St. Andrew's Gate is on the western boundary of the TCE site. The TCE site is currently enclosed by construction hoardings and not in active use, other than a temporary public right of way ('PROW') across the TCE site linking St Andrew's Gate to St Andrews Road.

The Full Element of the Hybrid Application relates to the former cinema building and its context, including a strip of land to north, east and west of the building and the car parking area, tarmac and soft landscaping area to the south. The application's Full Element seeks permission for the reinstatement of and change of use and external amendments to the former cinema building and associated car parking and landscaping to the south of the building. The Outline Element of the Hybrid Application covers the majority of the site and comprises the land to the north and east of the former cinema building.

3.2 Surrounding context

The Town Centre Extension (TCE) site is located to the east of Park Road and Hillingdon Road. It is bounded to the north and north-east by St. Andrew's Road, to the east by the Spine Road, the Town Centre West (TCW) phase of development and the locally listed Mons building, and to the south by Burton Road. Residential development which ranges in height from 3 to 8 storeys is located between the TCE site and Dowding Park. The TCW phase of development, extends up to 8 storeys adjacent to the site's boundaries

Figure 02: Master plan.

4.0 The proposed development:

The proposed development comprises up to no. 356 residential dwellings. These are accommodated in three buildings in the illustrative scheme: no. two perimeter blocks (Blocks A and C) and a gateway building (Block C). The perimeter blocks range in height from 3 to 9 storeys and incorporate a podiums which will provide communal residential amenity space. The gateway building extends up to 10 storeys.

The illustrative scheme incorporates commercial uses at ground floor level in Blocks B and C and the Full Element provides a gym and café in the former cinema building. The proposed development includes two new areas of public realm:

Squadron Square

This is the principal area of public realm; it provides a new public square at the heart of the development. It is addressed by Block A, B and C in the illustrative scheme. The entrance to the space is defined by the retained St. Andrew's Gate. The square will connect into wider key movement routes within St. Andrew's Park and facilitate the east-west permeability of the wider area.

Roundel Place

This is a new area of public realm to the south of Block C in the illustrative scheme and to the north and east of the former cinema building. It will form an important part of the setting of the listed building, will provide a Pocket Park and will retain the existing Horse Chestnut Tree. The space will connect Hillingdon Road to the Spine Road.

The scheme provides new street frontages to Park Road, Hillingdon Road, the Spine Road, the Northern Access Road and St. Andrew's Road.

Figure 03: illustrative scheme masterplan.

5.0 Planning Policy:

This wind impact assessment and report meets the following relevant national and local planning policy:

5.1 National Planning Policy Framework (NPPF, 2023):

This contains no specific guidance on wind, although local planning policies are expected to align with the principles of NPPF, 'Achieving well designed places', within which building height and microclimate is a key consideration.

5.2 The London Plan:

The following London Plan (2021) policies are relevant to the wind assessment and its impact on the public realm:

Policy D8 Public Realm (J)

Policy D8 mandates that the microclimate must be considered in the design of public spaces to ensure they are comfortable for people to spend time in. This includes assessing and mitigating adverse wind conditions to create inviting and usable environments.

Policy D9 Tall Buildings (C,3)

Policy D9 requires that tall buildings must not compromise the comfort and enjoyment of the public realm. This includes demonstrating through wind assessments that the development will not lead to unacceptable wind conditions and implementing necessary mitigation measures.

5.3 London Environmental Strategy (2018):

The London Environmental Strategy provides guidance as to how the impacts of a tall building should be assessed:

"Large buildings have the ability to alter their local environment and affect the micro-climate. For example, [...] [tall buildings] can influence how wind travels across a site, potentially making it unpleasant at ground level [...] One way to assess the impact of a large building on the comfort of the street environment is the Lawson Comfort Criteria. This tool sets out a scale for assessing the suitability of wind conditions in the urban environment based upon threshold values of wind speed and frequency of occurrence. It sets out a range of pedestrian activities from sitting through to crossing the road and for each activity defines a wind speed and frequency of occurrence. Where a proposed development is significantly taller that it's surrounding environment, developers should carry out an assessment of its potential impact on the conditions at ground level and ensure the resulting design of the development provides suitable conditions for the intended uses."

5.4 London Borough of Hillingdon Local Plan Part 2 (2020):

Policy DMHB 10 High Buildings and Structure

This requires buildings and structures to not adversely impact on the microclimate, including wind conditions within the site and the surrounding areas, with particular focus on maintaining useable and suitable comfort levels in public spaces

6.0 Methodology:

6.1 Meteorological Data

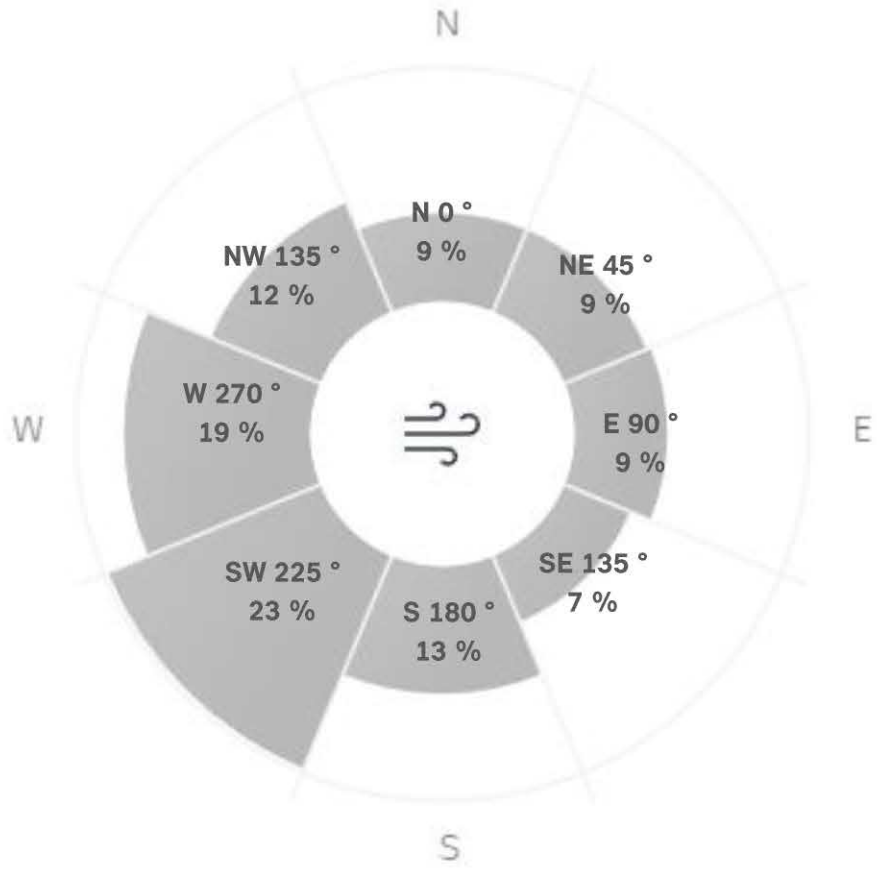
The source of the applied climate data; wind direction, wind magnitude and statistical distribution are crucial. The assessment simulates a whole year with eight wind directions which are equally distributed.

The probability distributions have been developed based on historical wind data from London Heathrow Airport (LHR) and London City Airport (LCY). The data range from LHR covers the period from 1973 to 2017, and the data from LYC covers the period from 1988 to 2017.

The wind speed and its direction is visualised by a wind rose as shown in Figure 04. The wind direction is defined away from the origin e.g. if we compare the wind rose to a clock, a wind from south blows in the direction of midnight. The centred ring represents the percentage in time.

e.g – in Figure 04 below, wind from the South occurs 13% of the time.

Figure 04: Wind rose for the site over a whole year (Image: Autodesk Forma).



6.2 Pedestrian Comfort using CFD

Computational fluid dynamics (CFD) provides quantitative information of fluid flow which is difficult to measure by experiments. The quantification of the complex wind dynamic around buildings can answer questions concerning life quality, security and the development of the surrounding area.

Since there is only limited guidance for modelling landscape, a solid and reliable approach is taken, i.e. no trees are included in the simulations. The goal of this investigation was to ensure the security and comfort of inhabitants and to identify crucial wind effects by numerical simulations. All analysis was conducted at pedestrian level i.e. at 1.75m, for different activities. The report contains a site description, describes details of the applied methodology, presents the obtained results and concludes with the main findings.

6.3 Lawson Comfort Criteria

Different guidelines to quantify the wind conditions for pedestrians have been established. They measure the percentage of exceedance of the wind speed during a defined time period, but they differ in thresholds, consideration or disregard of gusts (local wind speed) and categories of activities. The London LDDC based criteria, illustrated in Figure 05, are used in this report meets the London Plan guidance, and therefore Harrow Council requirements. This analysis uses local weather data and uses eight wind directions to model comfort throughout the year.

The probability exceedance is set to 5%, so conditions will exceed this less than 5% of the time. Six different comfort categories are defined in the Lawson criteria, depending on the velocity magnitude: *Frequent Sitting, Occasional Sitting, Standing, Walking* and *Uncomfortable*

Figure 05: London LDDC pedestrian comfort criteria used in this study.

Key	Category	Mean and GEM wind speed (5% exceedance)	Description
	Frequent sitting	2.5 m/s	Acceptable for frequent outdoor sitting use, e.g. restaurant, cafe'
	Occasional sitting	4 m/s	Acceptable for occasional outdoor seating, e.g. general public outdoor spaces, balconies and terraces intended for occasional use, etc.
	Standing	6 m/s	Acceptable for entrances, bus stops, covered walkways or passageways beneath buildings.
	Walking	8 m/s	Acceptable for external pavements, walkways.
	Uncomfortable	>8 m/s	Not comfortable for regular pedestrian access

6.4 Strong winds (unsafe)

The comfort criteria specify that winds over 15m/s for more than 2.2 hours per year pose risks to sensitive individuals like older adults and young children, requiring possible remedial measures. Winds over 20m/s for the same duration are a safety concern for everyone and need mitigation.

The assessment will include eight wind direction flow patterns with their speeds. Areas with strong winds are usually only acceptable for walking or are uncomfortable. In mixed-use urban developments, these conditions require mitigation to improve pedestrian comfort.

6.5 Target Wind Conditions

The targeted wind conditions are as follows:

Thoroughfare

Wind conditions suitable for walking use or calmer are desirable on main thoroughfares during the windiest season for a mixed-use development in an urban area such as the Proposed Development.

Entrances

Wind conditions for standing or calmer are generally required at entrances throughout the year. However, fire escapes would tolerate slightly windier conditions suitable for strolling use during the windiest season.

Amenity spaces

Wind conditions suitable for sitting in the summer season (when these areas are more likely to be frequently used) are desirable for public amenity spaces. For large amenity spaces, a mixture of sitting and standing use conditions is acceptable provided seating provision is in areas with sitting conditions. Play spaces or outdoor gym areas would tolerate standing use wind conditions during the summer season, although any seating areas in these spaces should be suitable for sitting use.

Balconies, terraces, and private gardens

For private balconies, terraces, and private gardens, standing or calmer wind conditions during the summer season are acceptable.

6.6 Seasonal results

The windiest scenario is presented to show the worst comfort conditions at each site regardless of season. Summer season results have been shown for areas that are mainly used in warmer months of the year.

6.7 Landscaping

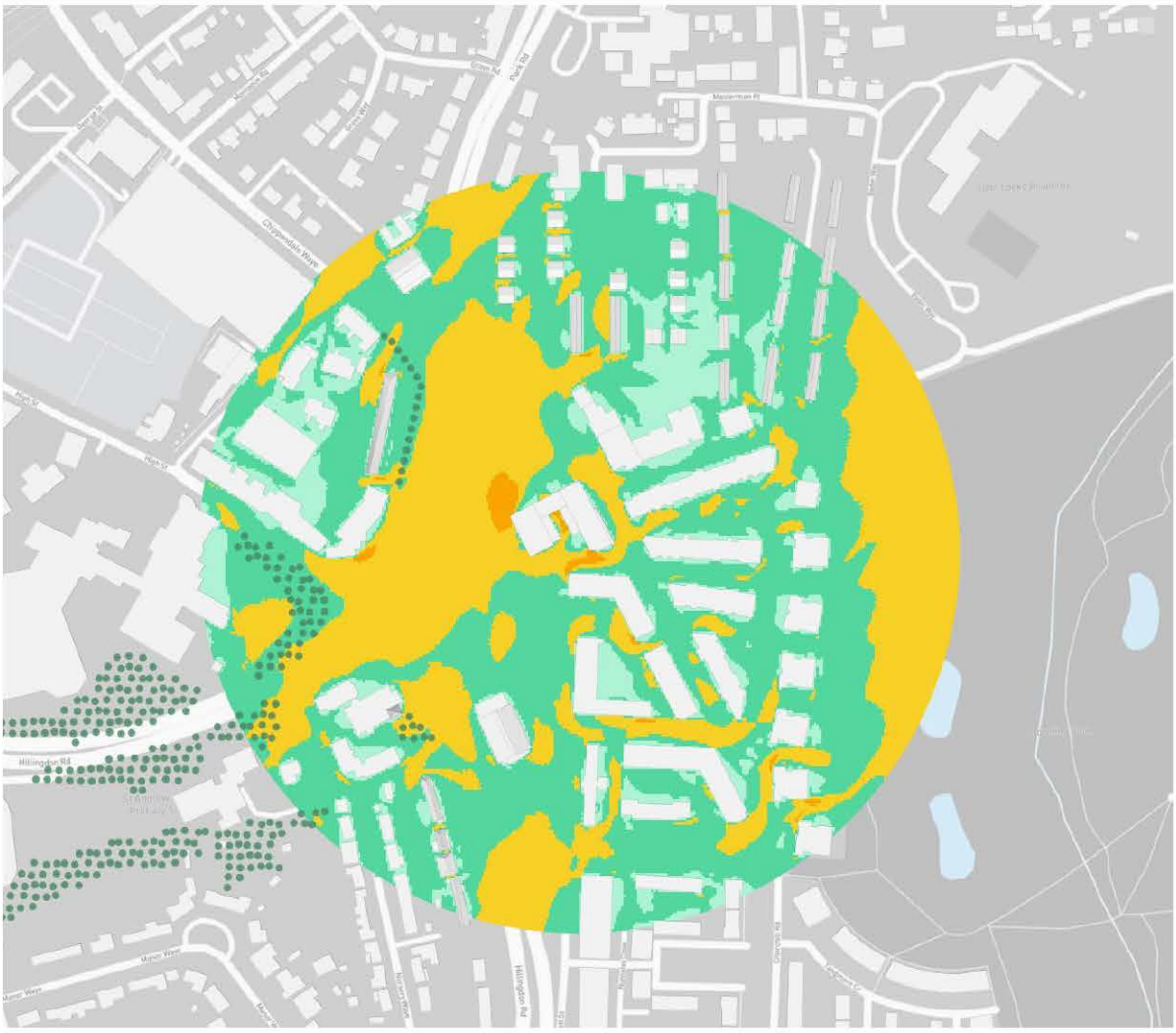
Landscaping has not been included in the assessment as the accuracy of CFD modelling to adequately represent the effects on wind has had limited published guidance. By not including landscaping, the results will be provided as worst case scenario.

7.0 Assessment:

7.1 Future Baseline (Pedestrian comfort)

A "baseline assessment" has been carried out on the site without the proposed development. The wind conditions have been assessed at the site during the windiest period. The CFD wind results are illustrated in Figure 06, indicating that most areas were suitably calm for sitting or standing. There are only a few spots experiencing higher winds more conducive to walking.

Figure 06: Pedestrian Comfort Conditions for Future Baseline – Ground Floor, Windiest Season.



Frequent sitting	Occasional sitting	Standing	Walking	Uncomfortable
2.5 m/s	4 m/s	6 m/s	8 m/s	8 m/s
< 5%	< 5%	< 5%	< 5%	> 5%

7.2 Proposed

7.2.1 Proposed (Pedestrian comfort)

The wind assessment results for the proposed development are depicted in Figure 07. The site continues to exhibit wind conditions that are well within acceptable limits following the development. Comfort levels have been enhanced in the areas east of the development.

For the pedestrian areas, conditions are comfortably within the intended range, accommodating both sitting and standing postures. On Park Road, the wind conditions are consistent with the baseline results. Near Block B, a small section is designated as a walking comfort zone. No mitigation measures are necessary for these ground floor areas since it is within the acceptable limits.

Figure 07: Pedestrian Comfort Conditions for Proposed – Ground Floor, Windiest Season.

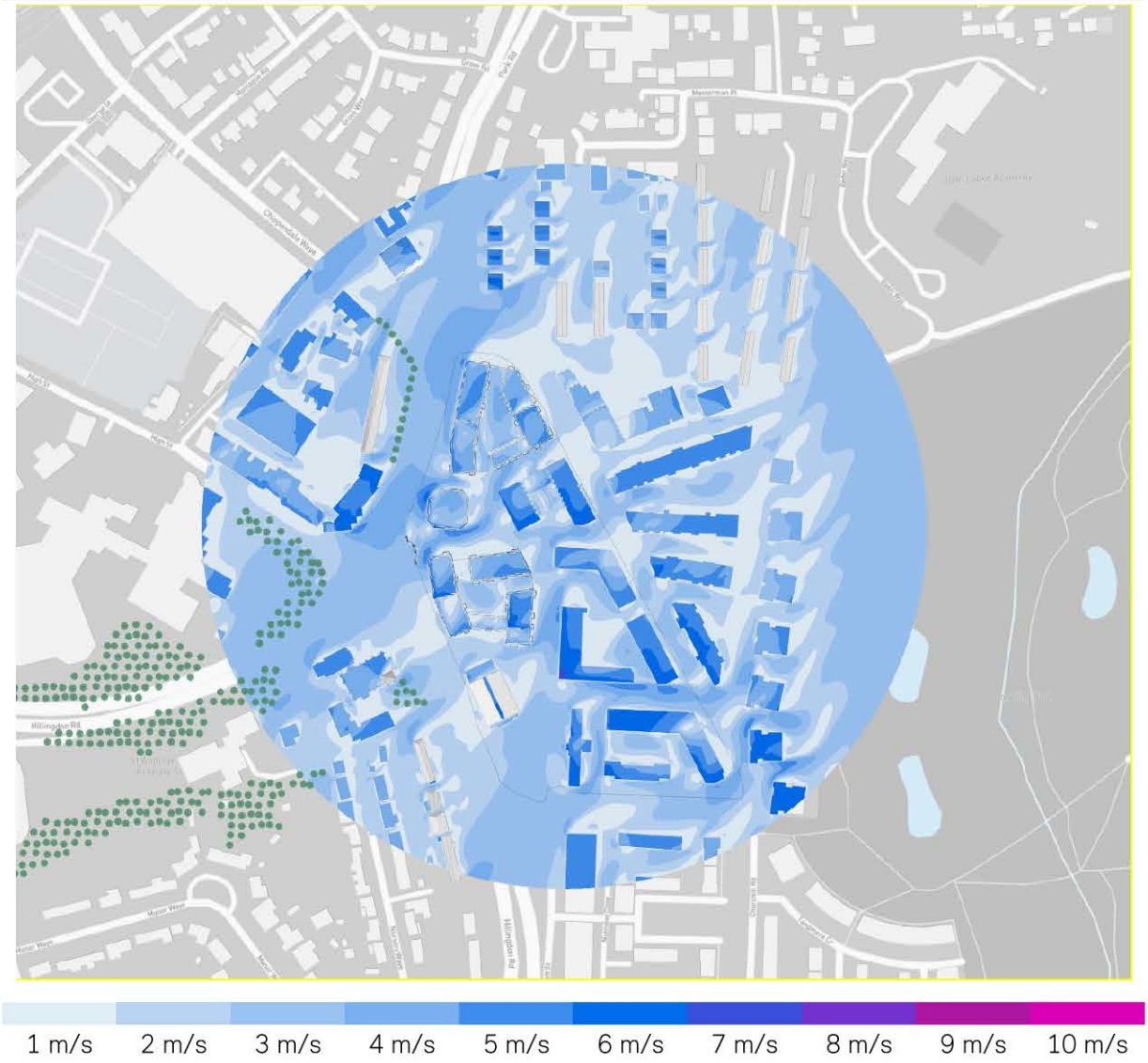
Frequent sitting	Occasional sitting	Standing	Walking	Uncomfortable
2.5 m/s	4 m/s	6 m/s	8 m/s	8 m/s
< 5%	< 5%	< 5%	< 5%	> 5%

7.3 Proposed (Wind Flow patterns)

The wind impact assessment indicates that there are no areas of safety concern within St Andrew's Gate, Town Centre Extension development, and the adjacent areas within a 250-metre radius. This conclusion is based on an analysis using eight wind directions, as illustrated in Figures 08 to 15. The comprehensive evaluation confirms that the wind conditions do not pose any safety risks to pedestrians or residents in these areas, according to the results of the wind flow patterns.

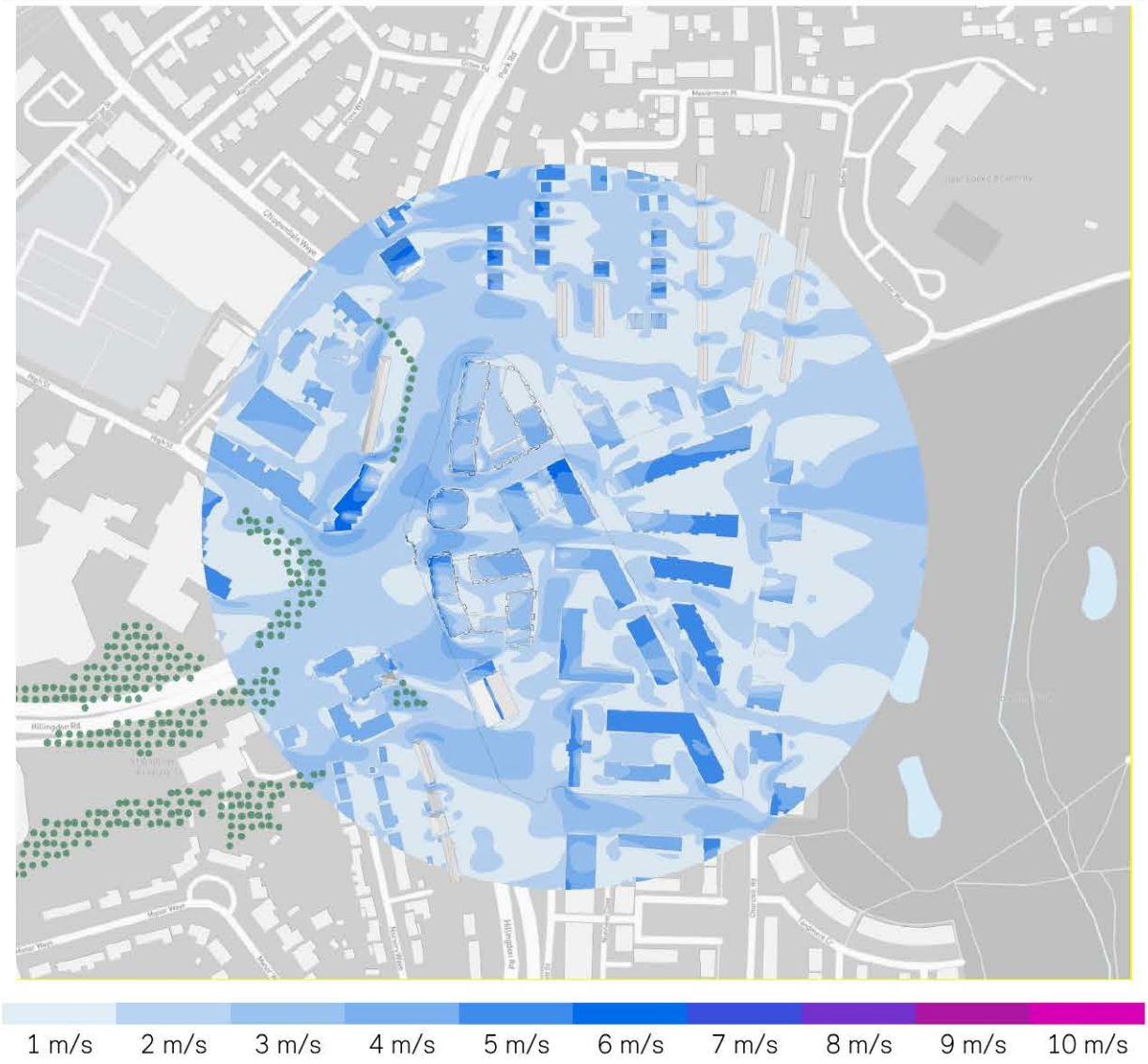
The illustration in Figure 08 shows that winds from the Southwest occur 23% of the time, with a median wind speed of 4.4 m/s.

Figure 08: Wind Flow patterns for Proposed – Windiest Season (South-west Wind).



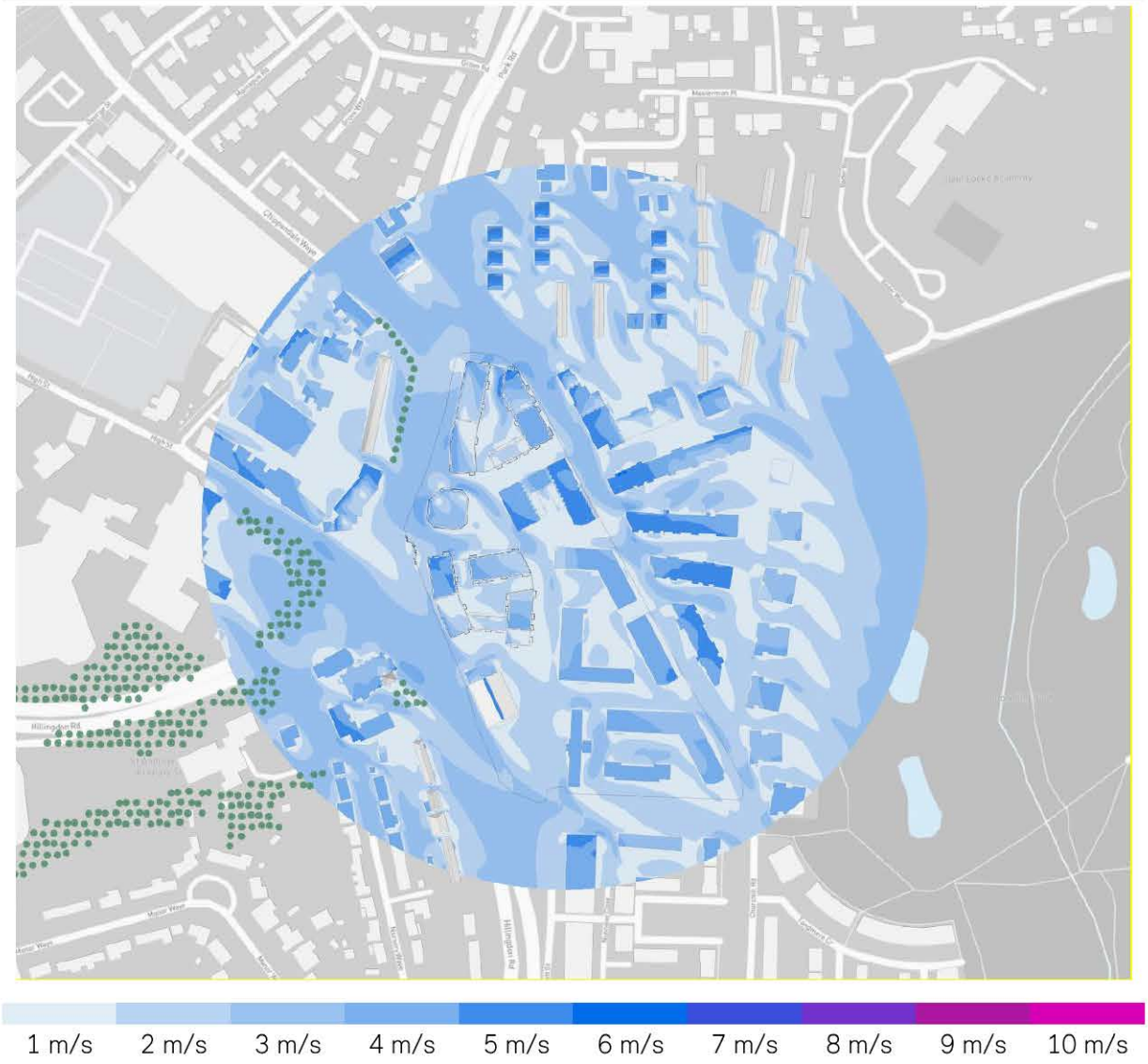
The illustration in Figure 09 shows that winds from the west occur 19% of the time, with a median wind speed of 4.4 m/s.

Figure 09: Wind Flow patterns for Proposed – Windiest Season (west Wind).



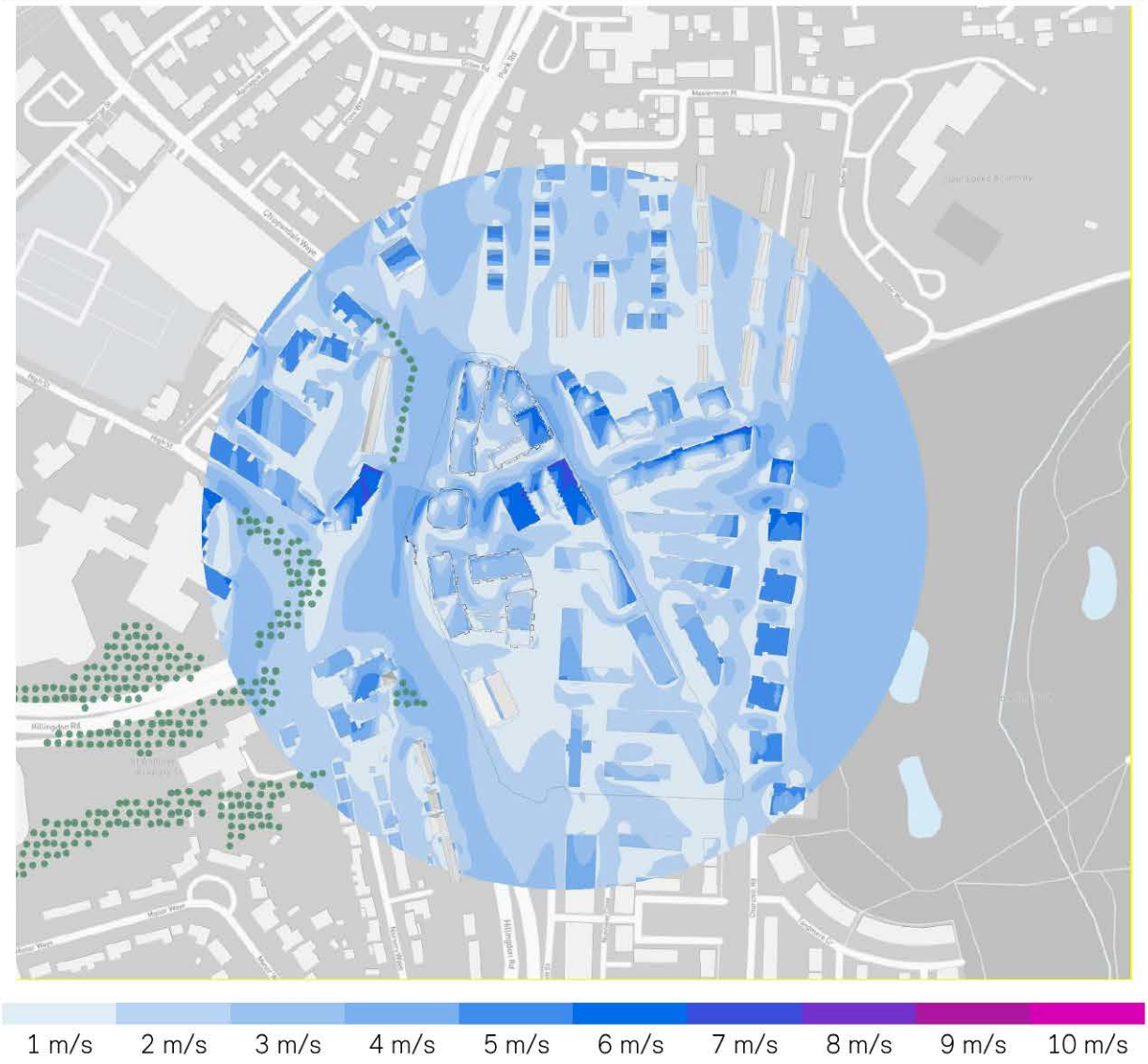
The illustration Figure 10 shows that winds from the northwest occur 12% of the time, with a median wind speed of 4.0 m/s.

Figure 10: Wind Flow patterns for Proposed – Windiest Season (North-West Wind).



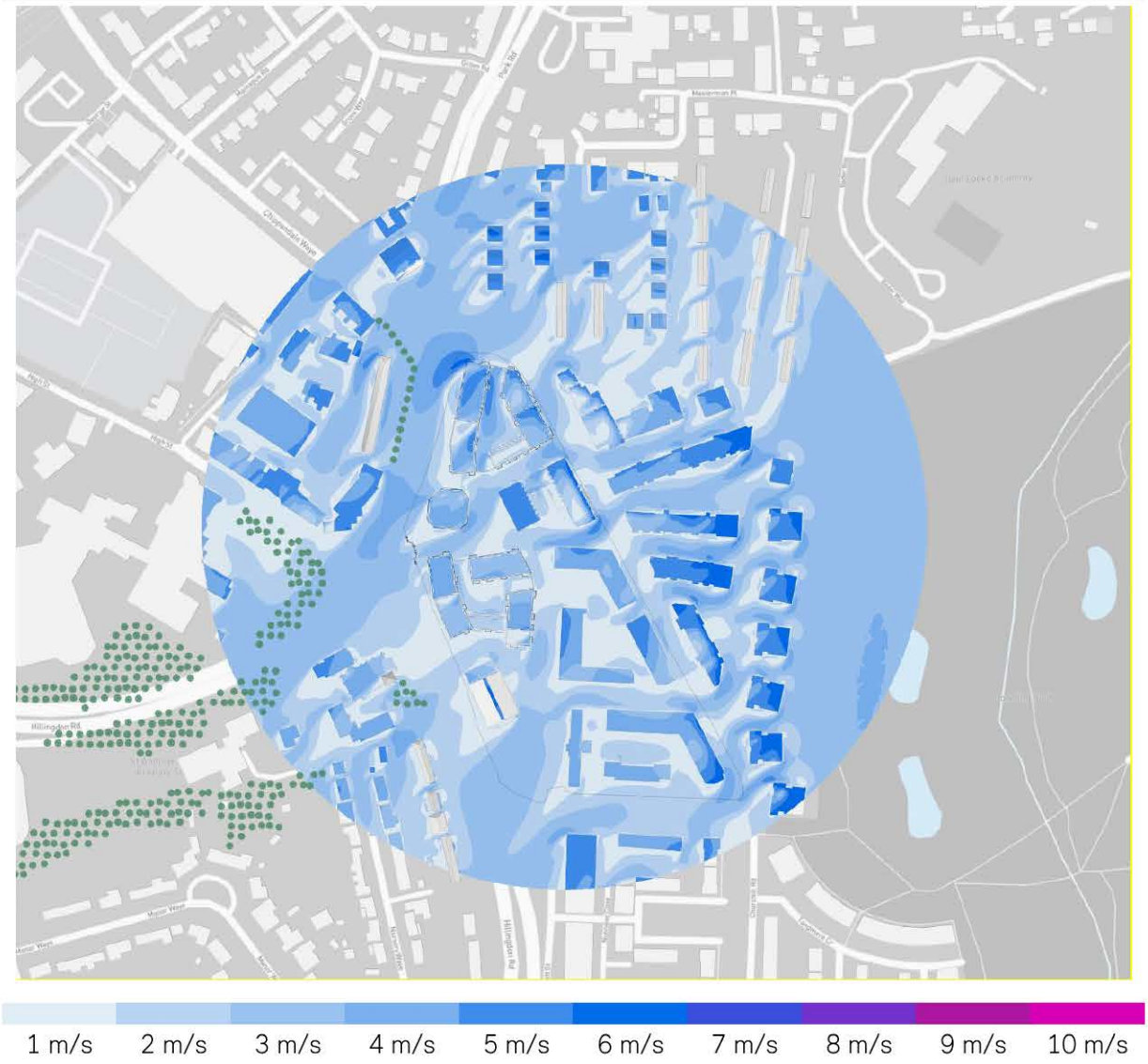
The illustration Figure 11 shows that winds from the north occur 9% of the time, with a median wind speed of 4.3 m/s.

Figure 11: Wind Flow patterns for Proposed – Windiest Season (North Wind).



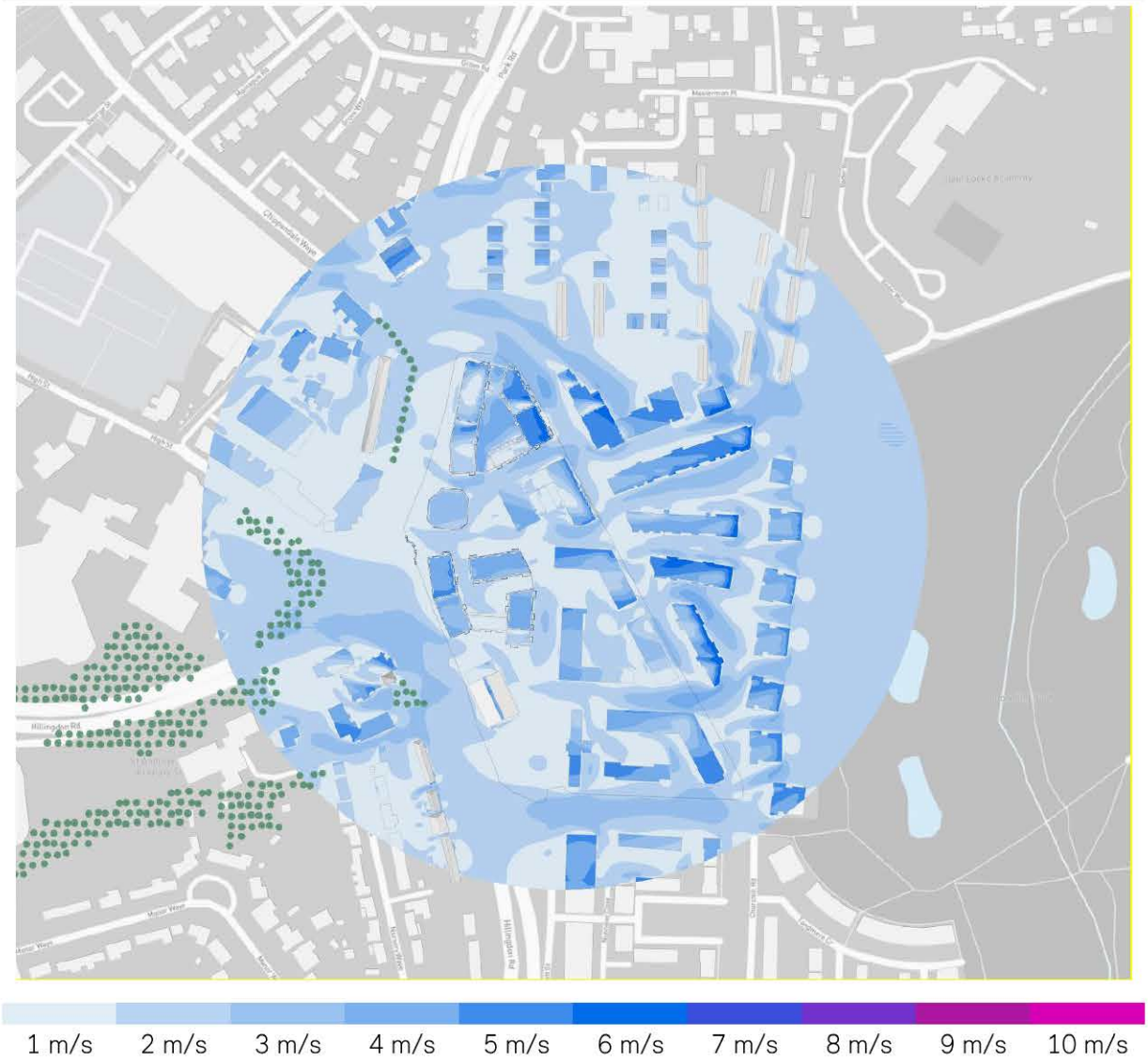
The illustration Figure 12 shows that winds from the northwest occur 9% of the time, with a median wind speed of 4.4 m/s.

Figure 12: Wind Flow patterns for Proposed – Windiest Season (North-East Wind).



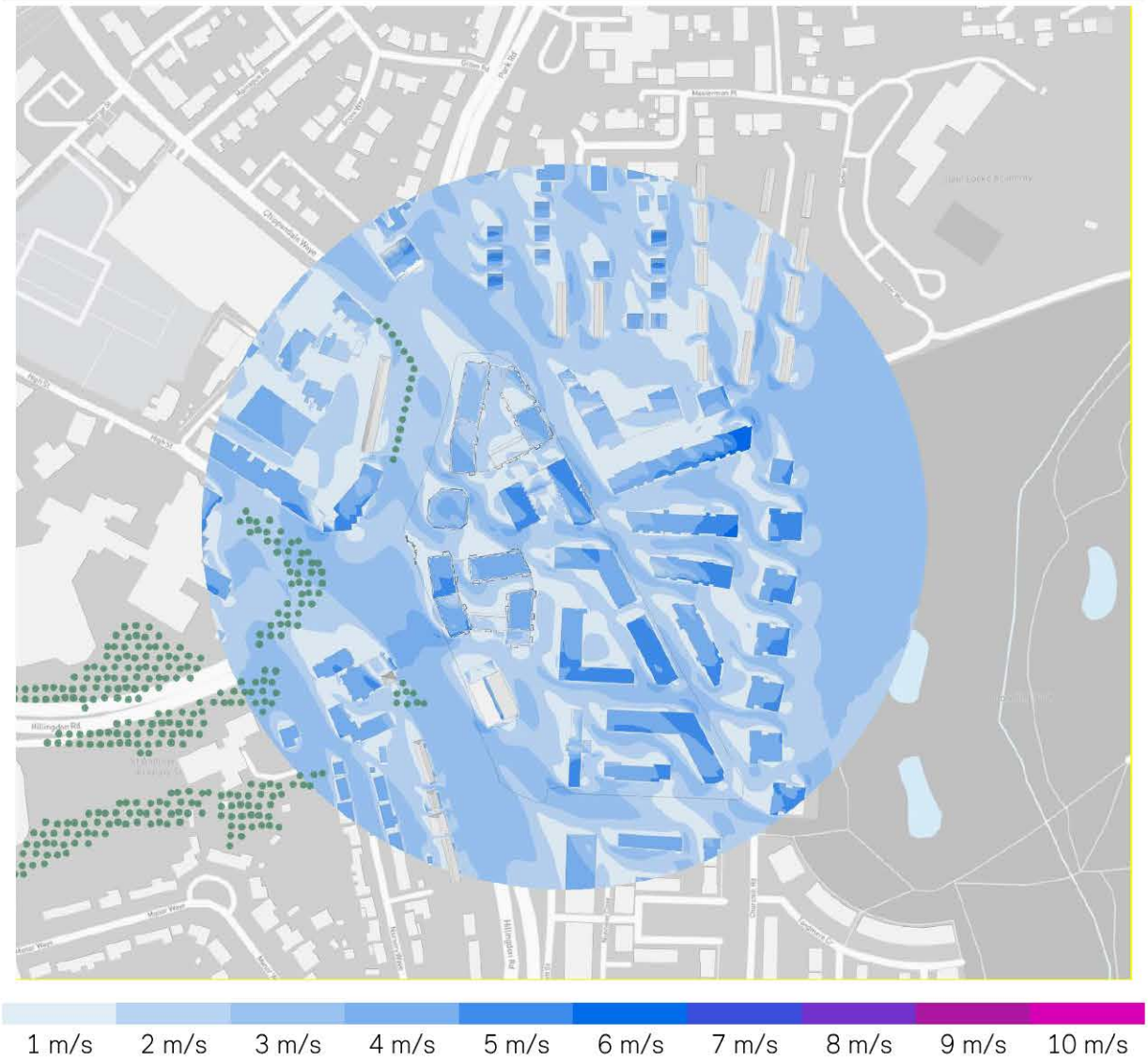
The illustration Figure 13 shows that winds from the east occur 9% of the time, with a median wind speed of 4.1 m/s.

Figure 13: Wind Flow patterns for Proposed – Windiest Season (East Wind).



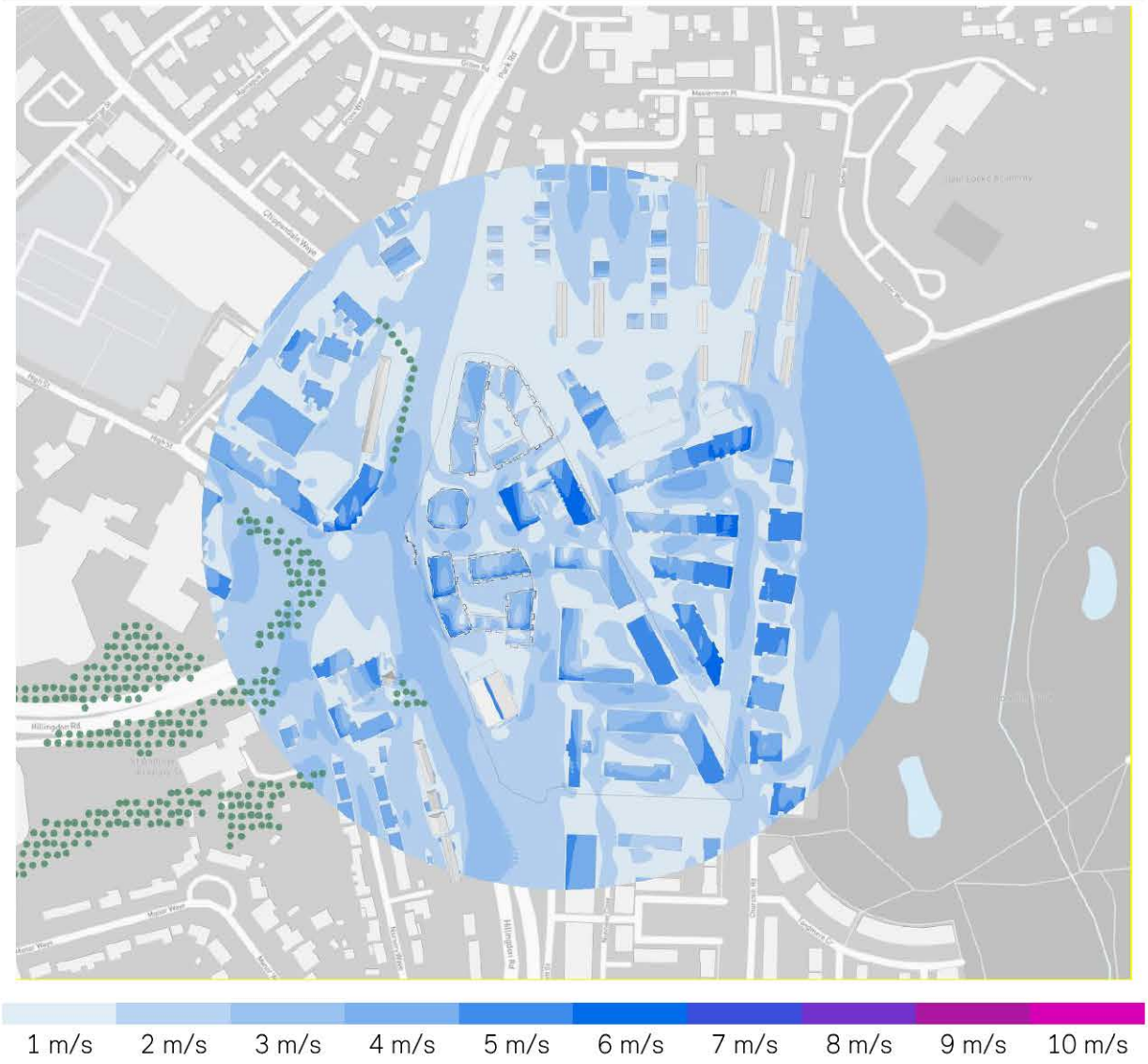
The illustration Figure 14 shows that winds from the southeast occur 7% of the time, with a median wind speed of 4.0 m/s.

Figure 14: Wind Flow patterns for Proposed – Windiest Season (South-East Wind).



The illustration Figure 15 shows that winds from the southeast occur 13% of the time, with a median wind speed of 4.1 m/s.

Figure 15: Wind Flow patterns for Proposed – Windiest Season (South Wind).



7.4 Development impact

The Computational Fluid Dynamics (CFD) analysis conducted for the wind assessment around Block B reveals several key findings regarding wind speed and pedestrian comfort.

St. Andrew's Gate

The illustration (Figure 16) indicates that the gate significantly reduces the speed of the south-west wind. This reduction is particularly noticeable between the gate and Block B, creating more comfortable conditions in this region. The decrease in wind speed in this area is beneficial for pedestrian activities, enhancing overall comfort and usability of the space.

Wind Speed Distribution

A few isolated spots experience slightly higher wind speeds, which are still within acceptable levels for walking. These areas, marked in Figure 16, show increased wind activity conducive to pedestrian movement without posing safety risks.

Wind Conditions Around Block B

The areas to the west and south of Block B maintain wind speeds suitable for walking, staying within acceptable comfort conditions. The CFD analysis shows that these regions are not subjected to excessively high winds, ensuring a safe and pleasant environment for pedestrians.

High-Wind Regions

With the south-west wind direction, the CFD results highlight high-wind regions at the corner of the tall building (Figure 17). These regions, depicted in darker colours, result from corner acceleration caused by the unobstructed fast wind. This phenomenon occurs where the wind streams around the building corners, accelerating due to the lack of obstruction. Although these high-wind areas are noticeable, they are confined to specific corners and do not extend to critical pedestrian zones.

Safety of Entrances

The analysis confirms that the entrances, located on the east side of Block B, remain safe and unaffected by high wind speeds. The wind levels in these areas do not necessitate any additional mitigation measures, ensuring that entry and exit points are always secure and comfortable for use.

Figure 16: Pedestrian Comfort Conditions for Proposed –Block B, Windiest Season.

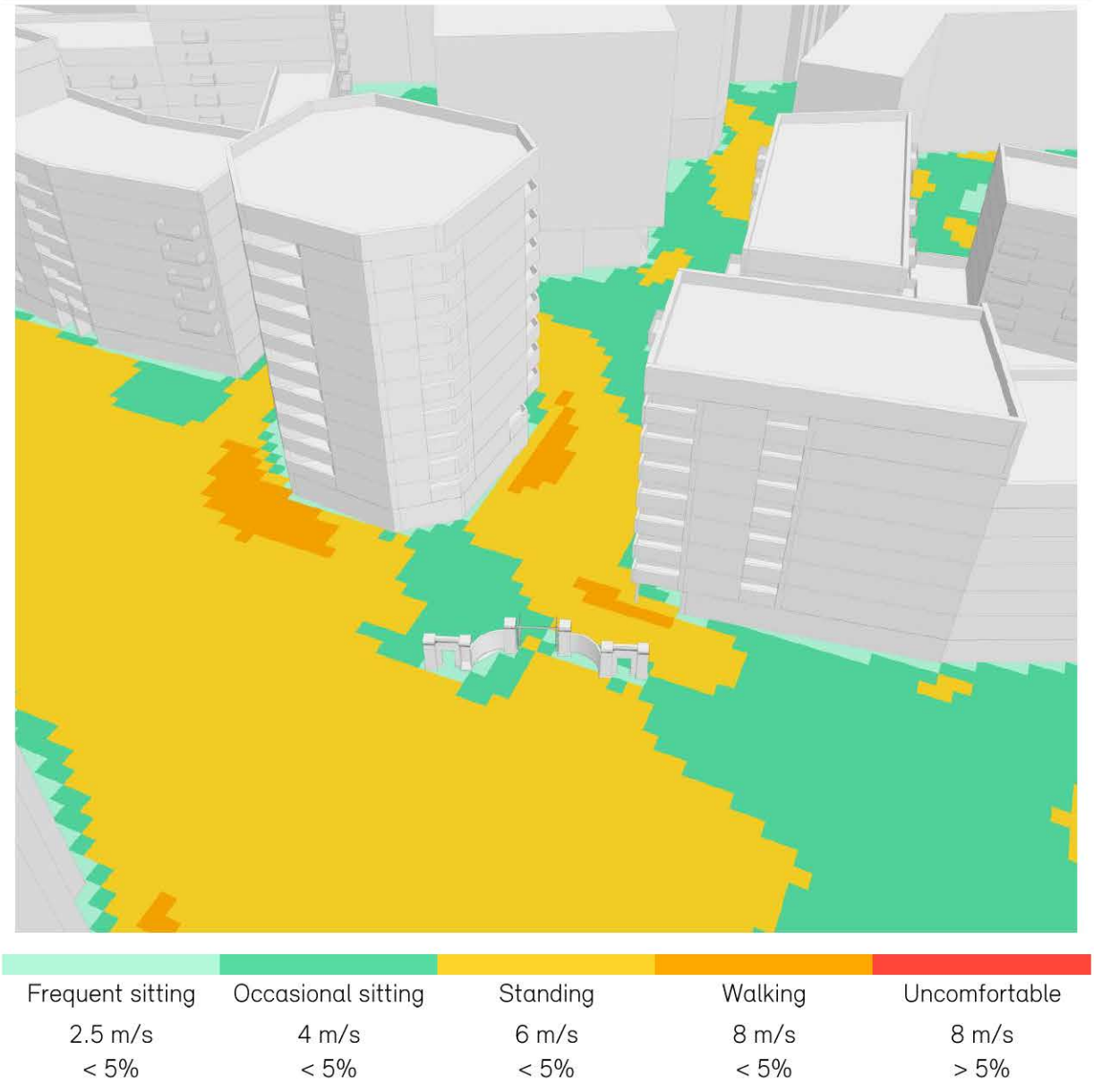
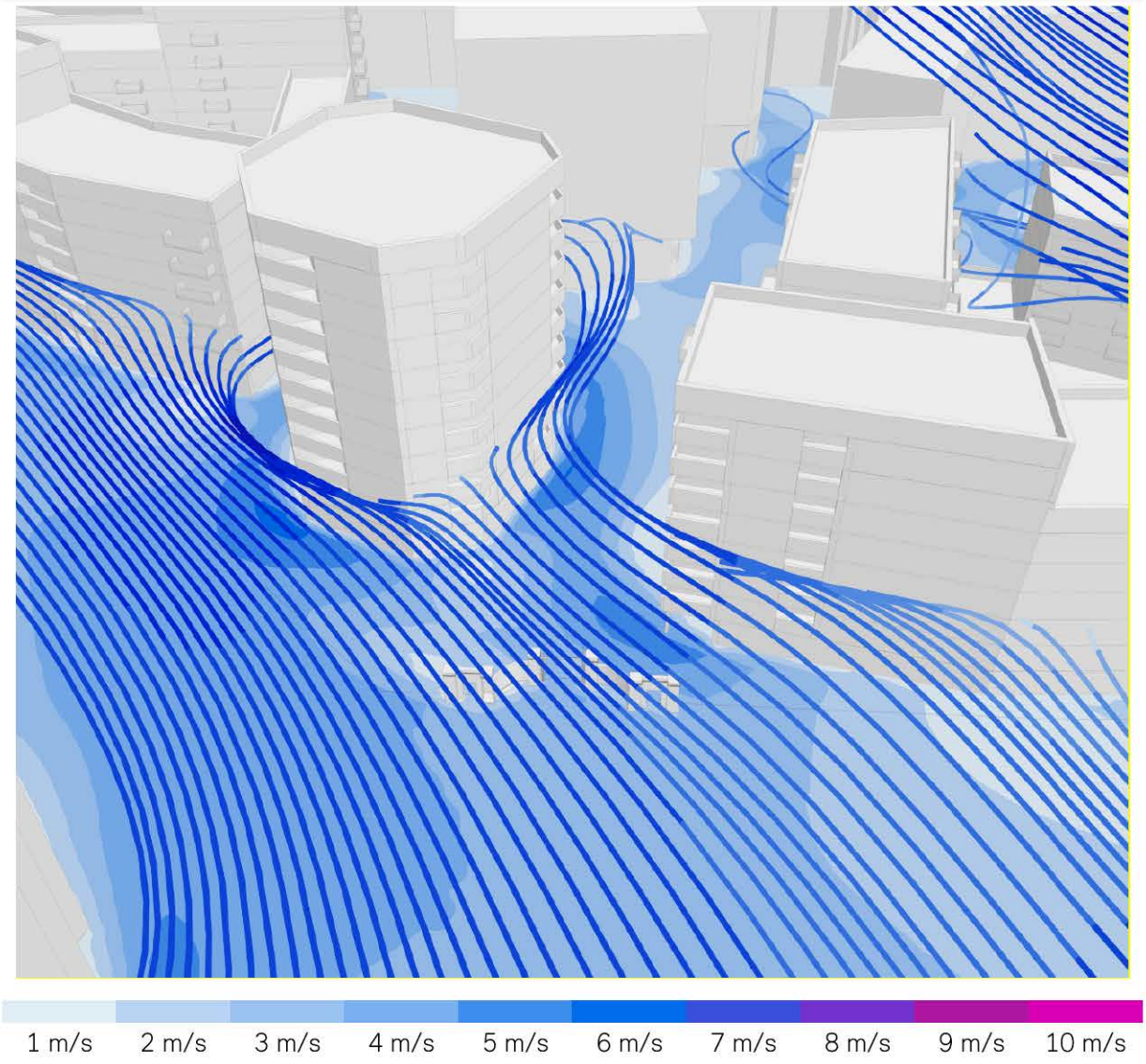


Figure 17: Wind Flow Streamlines for Proposed – South-west wind impact on Block B



7.5 Podium

The Computational Fluid Dynamics (CFD) analysis of the podium areas reveals the following insights regarding wind conditions and their impact on pedestrian comfort:

Wind Conditions on Block A

Block A experiences wind conditions that are suitable for both sitting and standing. The informal play areas on the podium maintain acceptable comfort levels, ensuring a pleasant environment for recreational activities. Additionally, the nearby seating areas are adequately sheltered, providing users the flexibility to choose less windy spots if preferred.

Block C Wind Conditions

Block C benefits from even better wind conditions compared to Block A, with the majority of areas predominantly suitable for sitting. This improvement in wind conditions enhances the usability of outdoor spaces, providing a more comfortable and inviting environment for pedestrians.

Entrance Locations

The entrances from podiums in Block A and B are placed in areas where wind conditions are suitable for sitting or standing, thereby achieving the desired comfort levels for those entering and exiting the building and no mitigation is required.

Figure 18: Pedestrian Comfort Conditions for Proposed – Block A Podium, Windiest Season.

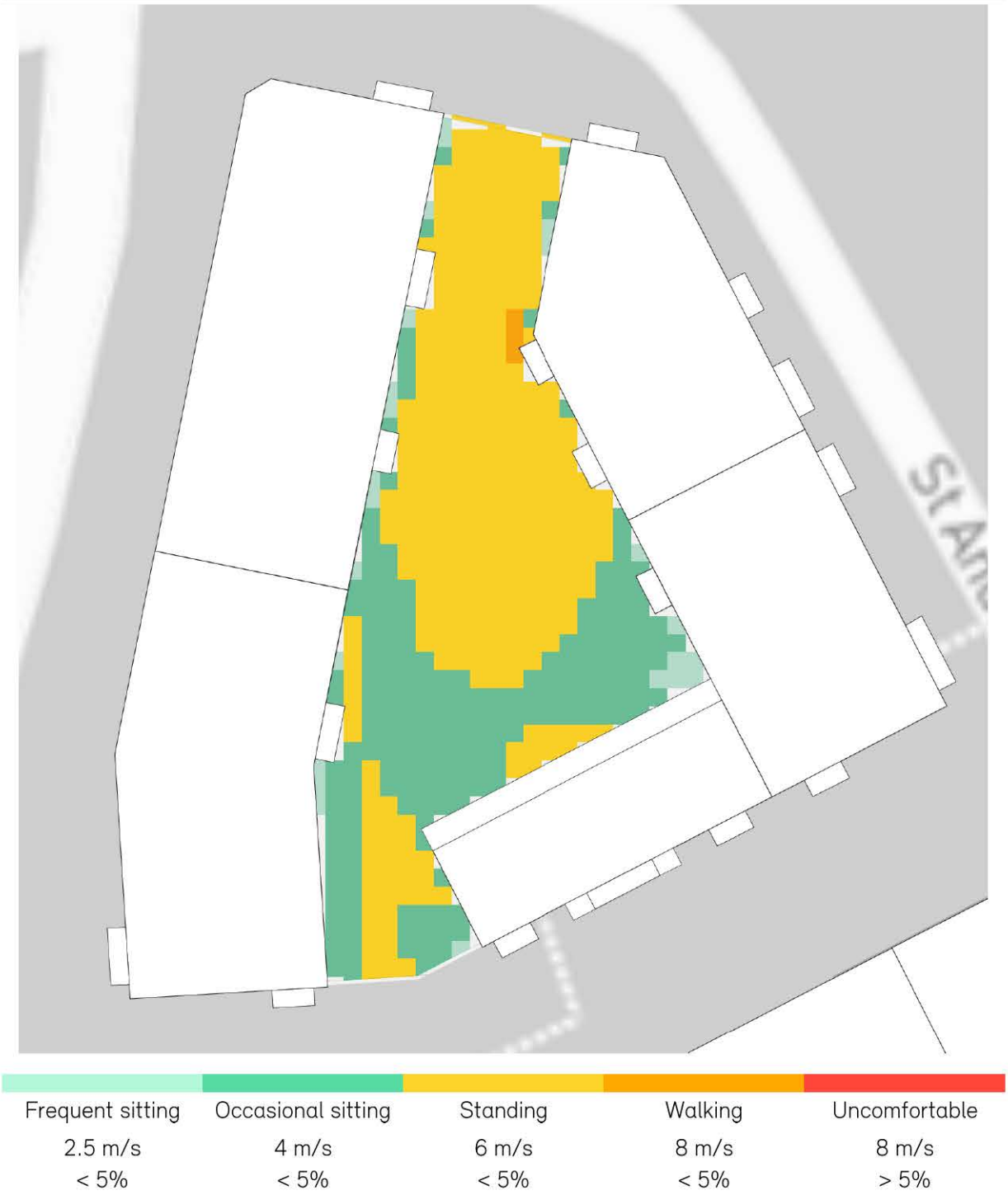
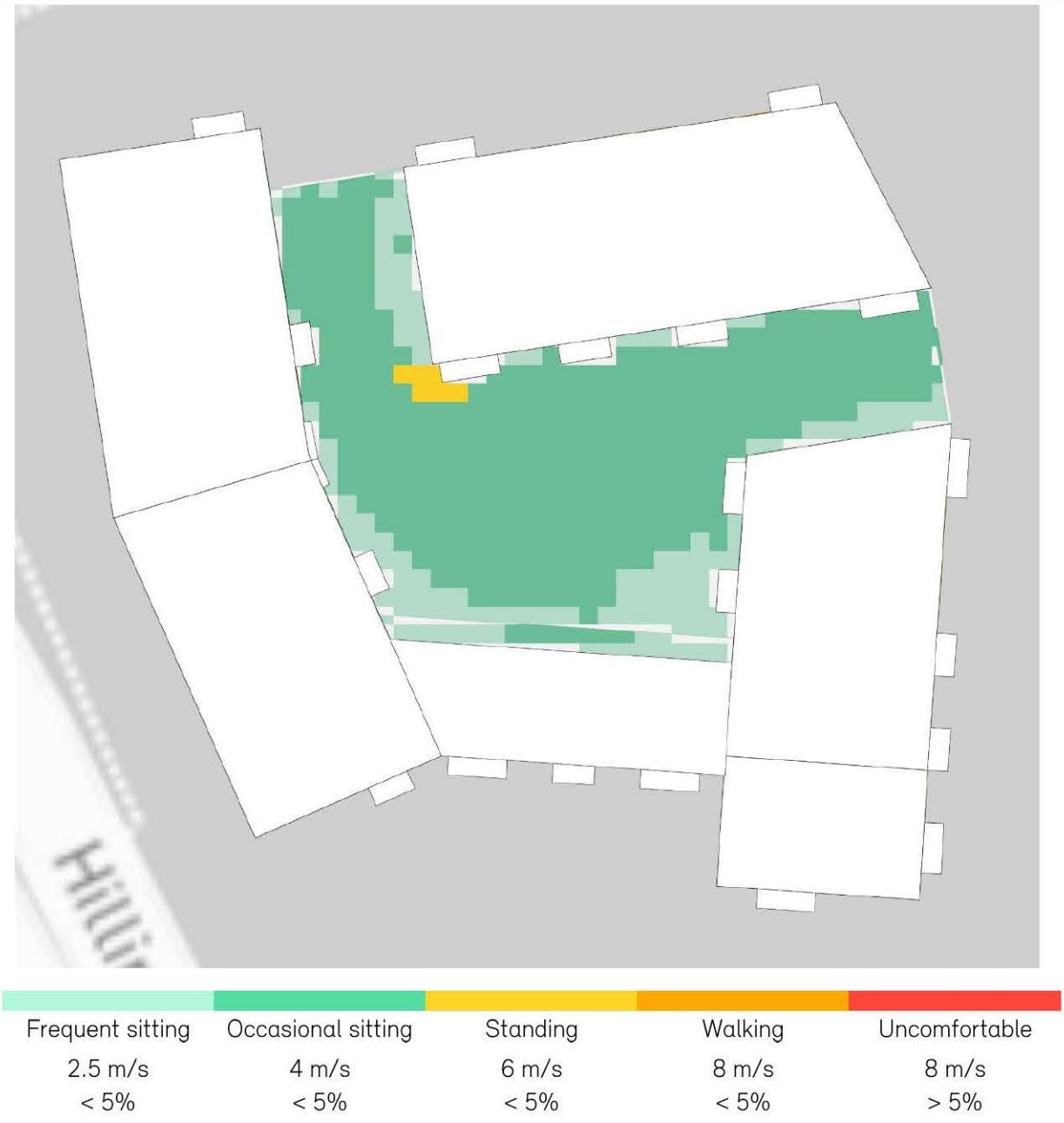


Figure 19: Pedestrian Comfort Conditions for Proposed – Block C Podium, Windiest Season.



7.6 Key public spaces:

The CFD analysis of key public spaces highlights the following findings regarding wind conditions and pedestrian comfort:

Squadron Square

As illustrated in Figure 20, Squadron Square is predominantly comfortable for sitting or standing. Informal seating is placed in areas where standing comfort conditions prevail, ensuring a pleasant environment for brief stops.

Adequate seating is available in zones identified as suitable for sitting, allowing residents to choose the most comfortable spots according to their preferences.

Roundel Place

As illustrated in Figure 21, Roundel Place benefits from superior wind conditions compared to Squadron Square. Most areas are suitable for sitting, with a few spots indicated for standing. The proposed buildings effectively create sheltered areas, enhancing the suitability of these spaces for frequent sitting.

In summary, the CFD analysis demonstrates that the wind conditions in Squadron Square and Roundel Place are within acceptable limits of intended use, and no additional mitigation measures are required. Both spaces offer comfortable conditions for sitting and standing, with adequate seating provided in the optimal areas. Additionally, Planting trees in these areas will further enhance comfort and wind conditions, increasing the area that is suitable for sitting.

Figure 20: Pedestrian Comfort Conditions for Proposed – Squadron Square, Windiest Season.

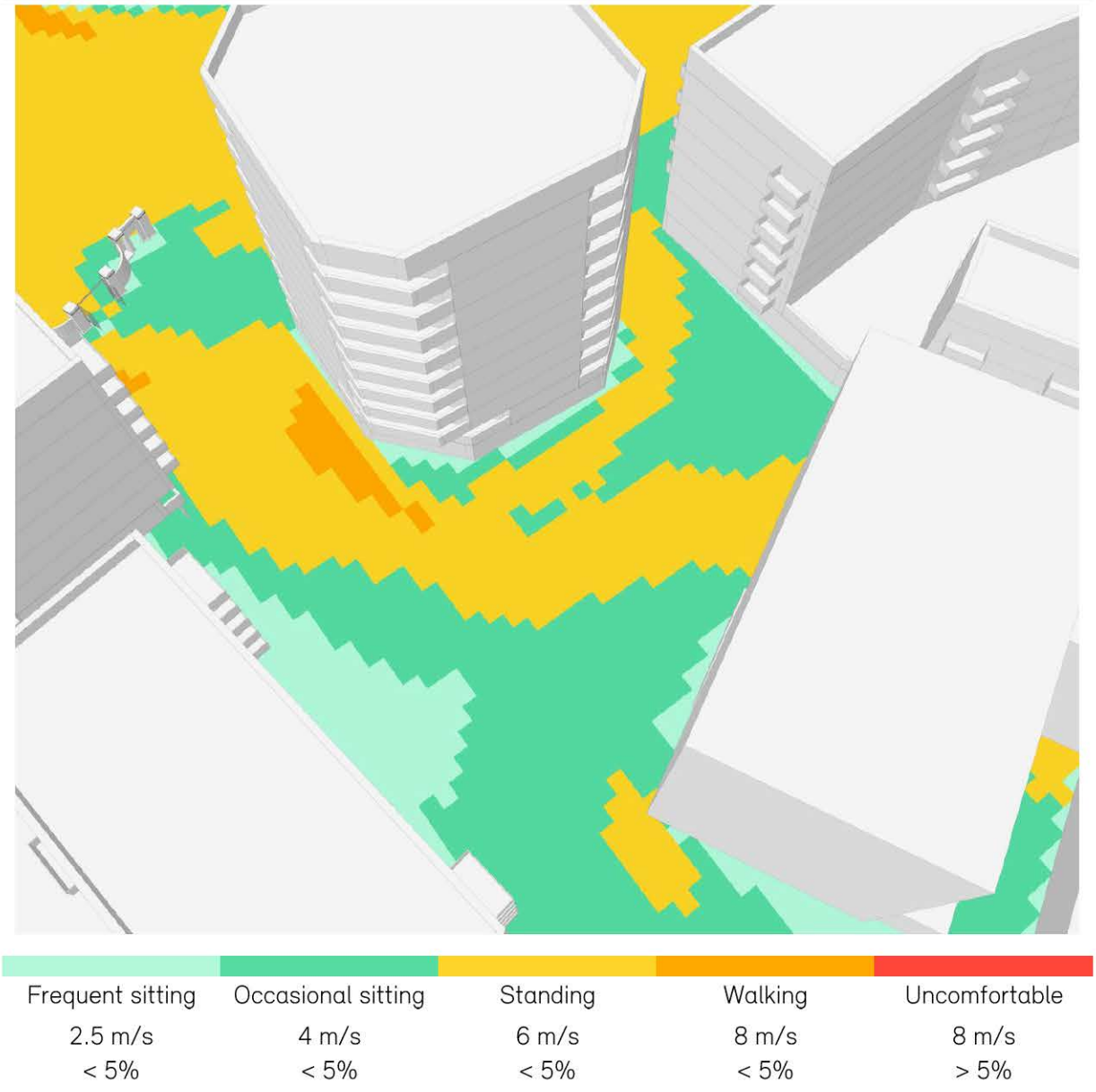
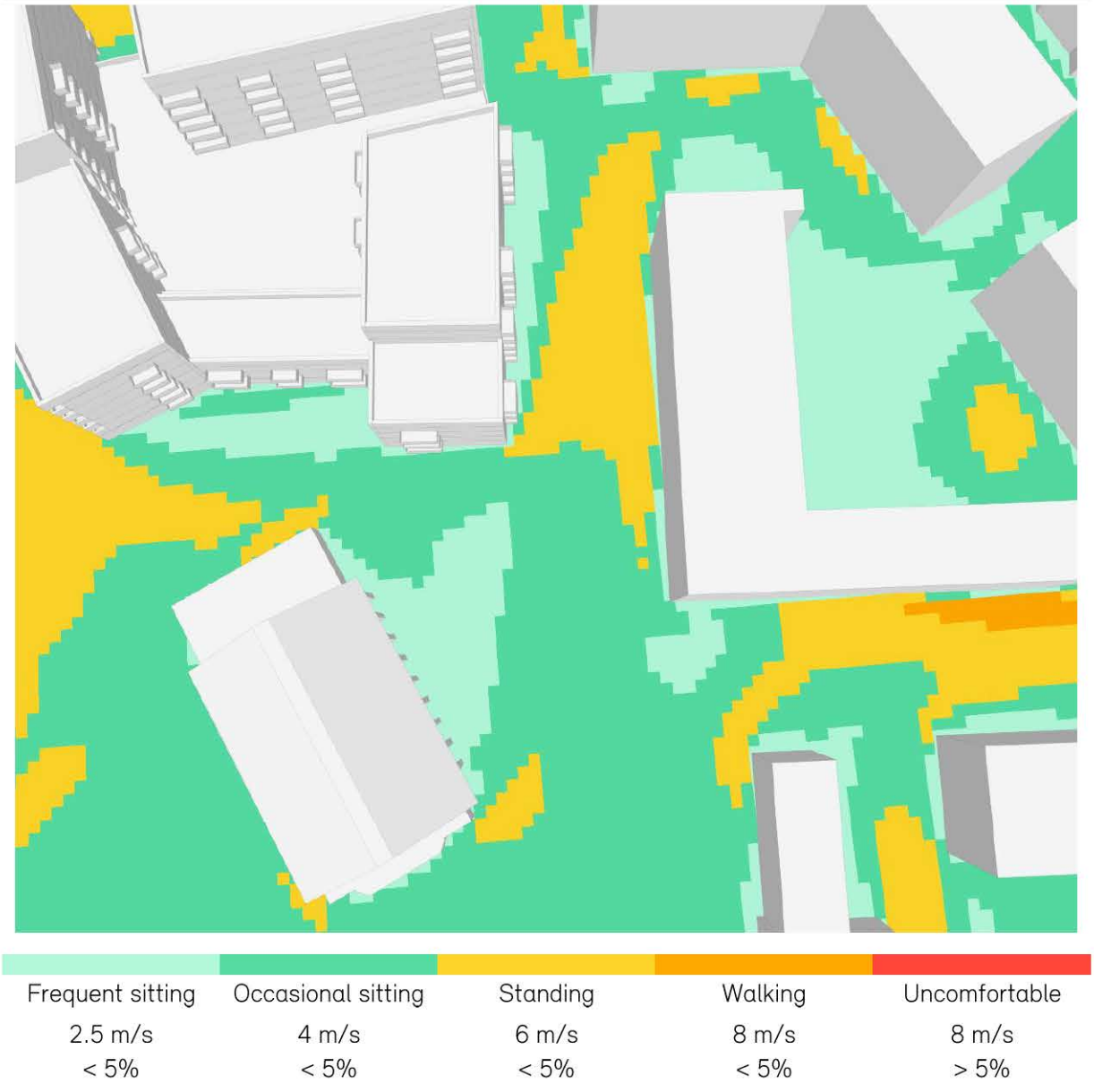


Figure 21: Pedestrian Comfort Conditions for Proposed – Roundel Place, Windiest Season.



8.0 Conclusion:

This report sets out a Wind Microclimate Assessment of the illustrative scheme and full element associated with the Hybrid Planning Application for the St Andrew's Gate site, Town Centre Extension, utilising the Lawson (LDDC) comfort criteria and associated weather data. The key findings of the assessment are as follows:

Wind conditions: The prevailing winds from the southwest and west are effectively managed by the proposed development. The site remains suitable for sitting and standing during the windiest season. The proposal introduces minimal wind impact, with some corner accelerations observed in Block B; however, overall wind speeds remain within acceptable limits.

Development impact: The impact of the development on wind conditions is expected to be negligible compared to the baseline. Pedestrian areas are projected to remain suitable for sitting and standing, with no significant variations in wind patterns. The proposed landscaping and planting measures contribute to maintaining a comfortable environment, aligning with the intended use of the development.

Mitigation measures: Proposed tree planting along the west boundary, Squadron Square, and Roundel Place will enhance site shelter and improve wind conditions. These landscaping efforts will effectively reduce ground-level wind speeds, ensuring pedestrian comfort. The green buffer along Park Road will further enhance pedestrian comfort.

Key public spaces: Squadron Square and Roundel Place, key public spaces within the development, are expected to experience acceptable wind conditions for pedestrian comfort. These areas will be suitable for sitting and standing throughout the year.

Landscaped residential Podium Gardens: The landscaped podium gardens in Blocks A and C are designed to provide comfortable environments for residents. These spaces will be adequately sheltered, ensuring they remain suitable for sitting and standing.

Summary: The wind conditions at St Andrew's Gate are acceptable, ensuring a safe and comfortable environment for pedestrians, particularly in key public spaces and landscaped residential podium gardens. Small sections of the site may experience slightly windier conditions, but these remain within acceptable limits.

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