

WIND AND MICROCLIMATE ANALYSIS REPORT

YLCAN Crouch End

Produced by XCO₂ for YMCA London City and North

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EXECUTIVE SUMMARY

This report assesses the potential effects of the YLCAN Crouch End development on local wind conditions using CFD modelling. Wind conditions were evaluated against the Lawson Criteria to determine pedestrian safety and comfort. The assessment indicates that wind conditions at the site and its neighbouring areas are safe for all pedestrians and as such, the proposed development is not expected to cause any significant adverse impacts. For additional wind protection on the fifth-floor terrace, incorporating a semi-porous design into the latest proposed balustrade detail is being considered.

The wind microclimate analysis for the proposed development assesses the wind conditions within an approximately 400m radius from the proposed site. The assessment evaluated three configurations, the Baseline, Proposed, and Cumulative scenarios, against the industry-standard Lawson Criteria.

ANNUAL SAFETY RESULTS

Across all three scenarios, ground-level wind conditions remain safe for all pedestrians, as wind speeds have been shown not to exceed 15 m/s for more than 0.022% of the year.

While the vast majority of the proposed terraces exhibit safe and comfortable wind conditions, a localised area on the fifth-floor terrace (corner of the Meeting/Board Room) exceeds the pedestrian safety threshold in both the Proposed and Cumulative scenarios. The proposed open metal railings do not sufficiently screen higher-elevation, unobstructed winds. Following the analysis, the design was updated to include a 600mm solid parapet topped with railings up to 1100mm. While effective, incorporating a semi-porous design into the balustrade detail is recommended for additional year-round wind protection.

WORST SEASONAL AND SUMMER COMFORT RESULTS

During the worst-case season, street-level areas remain suitable for sitting or standing, ensuring comfortable conditions around all building entrances, bus stops, and pedestrian walkways.

In the summer, calm wind conditions suitable for outdoor sitting predominate across all ground-level amenity areas, such as school play spaces, neighbouring gardens, and proposed courtyard, demonstrating ideal conditions for the intended uses. Proposed upper-level terraces provide high-quality amenity spaces that are predominantly suitable for sitting and standing during the summer months.

INTRODUCTION

This report considers the potential effect on pedestrian comfort and safety with respect to wind. The analysis used Computational Fluid Dynamic (CFD) modelling to predict what effect the new building will have on wind conditions and relates the findings to industry standards on pedestrian comfort.

OVERVIEW

This report outlines:

- The planning policy context in relation to the wind microclimate;
- The method used to assess the wind conditions;
- An analysis of the baseline case, indicating the current wind conditions on the site and its surrounding area;
- An analysis of the proposed case, i.e. the effect that the proposed development is likely to have on wind conditions at the site and in surrounding areas; and,
- An analysis of the consented scheme effect on local wind conditions with the proposed development in place.



Site Location



Figure 1: Approximate site location.

SITE

The proposed development is a hostel facility within the London Borough of Haringey. The proposed development comprises the demolition of the existing building and erection of a new, improved hostel facility with ancillary office, training and communal facilities within a part four to part six storey building.

Figure 1 illustrates the site location. The figure below shows the wind model with the proposed development on site.



Figure 2: Proposed development highlighted in red.

EMERGING CONTEXT

An analysis of the approved scheme's effect on local wind conditions with the proposed development in place has also been undertaken. This includes future planning developments in close proximity to the proposed site.

The inclusion of the following scheme was agreed upon with the project team in January 2026.

52 ELMFIELD AVENUE

The proposal (planning reference: HGY/2024/2464), granted permission in 2025 comprises minor side, rear and roof extensions to the existing building along with change of use of the C3 dwelling to a C4 small HMO.

The following image indicates the cumulative schemes considered in the model.



Figure 3: Assessment model showing the cumulative context.

PLANNING POLICY CONTEXT

REGIONAL POLICY - THE LONDON PLAN, 2021

The planning guidance contained within the London Plan places great importance on the creation and maintenance of a high-quality environment for London.

Paragraph 3.3.8 states that creating a comfortable pedestrian environment with regard to levels of sunlight, shade, wind, and shelter from precipitation is important.

POLICY D8: PUBLIC REALM

Development plans and proposals should:

- G) *ensure buildings are of a design that activates and defines the public realm and provides natural surveillance. Consideration should also be given to the local microclimate created by buildings, and the impact of service entrances and facades on the public realm.*
- J) *ensure that appropriate shade, shelter, seating and, where possible, areas of direct sunlight are provided, with other microclimatic considerations, including temperature and wind, taken into account in order to encourage people to spend time in a place.*

POLICY D9: TALL BUILDINGS

- A) *Based on local context, Development Plans should define what is considered a tall building for specific localities, the height of which will vary between and within different parts of London but should not be less than 6 storeys or 18 metres measured from ground to the floor level of the uppermost storey.*
- B) *Boroughs should determine if there are locations where tall buildings may be an appropriate form of development. (...) Tall buildings should only be developed in locations that are identified as suitable in Development Plans.*

- C) *3) a) wind, daylight, sunlight penetration and temperature conditions around the building(s) and neighbourhood must be carefully considered and not compromise comfort and the enjoyment of open spaces, including water spaces, around the building.*

LOCAL POLICY – HARINGEY'S DEVELOPMENT MANAGEMENT DPD

The Development Management Development Plan Document (DPD), adopted in July 2017, outlines expectations for privacy and amenity under Policy DM1 (Delivering High Quality Design):

"D. Development proposals must ensure a high standard of privacy and amenity for the development's users and neighbours. The Council will support proposals that:
(...)
c. Address issues of vibration, noise, fumes, odour, light pollution and microclimatic conditions likely to arise from the use and activities of the development."

Paragraph 2.9 further notes that amenity can be compromised in a number of ways through development, including *"detrimental micro-climate effects."* It specifies that buildings should therefore be compatible with their local environment and surrounding conditions.

Additionally, Policy DM6 (Building Heights) outlines that proposals for tall buildings should consider the *"impact on ecology and microclimate"* and *"must be accompanied by an urban design analysis which assesses the proposal in relation to the surrounding context."*

ASSESSMENT METHODOLOGY

The assessment methodology of this report is structured in the following subsections: General Approach, which provides an overview of the assessment; Assessment Criteria, which discusses the criteria used to evaluate wind conditions on site, Input Data, which details the wind data analysed and used for this study; and, Technical Approach, which details the use of CFD for the assessment.

GENERAL APPROACH

A radius neighbouring the site was initially identified and designated for detailed analysis. Wind conditions within this radius (set to be approximately 400m from the centre of the proposed site) were analysed for the following configurations

- Baseline scenario: Assessment of the current condition of the proposed site and its immediate surroundings within the existing context;
- Proposed scenario: Assessment of the proposed site and its immediate surroundings within the existing context, incorporating the proposed development on site;
- Cumulative scenario: Assessment of the proposed site and its immediate surroundings within the existing context, including identified consented schemes, with the proposed development on site.

The wind speeds in the designated radius were predicted using Computational Fluid Dynamics (CFD) and the probability of exceeding set wind speed thresholds were evaluated against the Lawson Criteria.

The underlying technology used to solve the fluid flow around the buildings is the Finite Volume Method (FVM), while the assessment is based on the Eurocode EN 1991-1-4:2005 wind engineering standard.

ASSESSMENT CRITERIA

The assessment of wind conditions requires a standard against which the measurements can be compared. Although there is no official national standard in the UK dedicated to wind microclimate assessment, the Lawson Comfort Criteria are widely used for assessing pedestrian wind comfort and safety and are considered industry best practice.

The criteria define the percentage of time that certain wind speeds are exceeded. These are threshold values of wind speeds for different pedestrian activities as the comfort levels vary significantly depending on the individual's activity. For example, spaces for seating require lower wind speeds, whereas for more transient activities, stronger winds are likely to be tolerated by pedestrians.

The pedestrian activities covered by the Lawson Criteria described in detail on the following tables.

For each of the five wind condition categories, an upper threshold is defined, beyond which conditions would be unacceptable for the intended activity. If the conditions are below the threshold, then they would be suitable for the intended activity. The table below summarises the threshold values for each pedestrian activity. For example, it shows that for pedestrian walking, if the threshold wind speed (8 m/s) is exceeded for more than 5% of the time, the wind conditions would be unsuitable for the stated activity at that location but may be suitable for business walking.

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STRONG WINDS

Under the Lawson Criteria, a strong wind threshold is triggered when wind speeds exceed 15 m/s for approximately 2 hours annually. Because these conditions, typically caused by short, turbulent gusts interacting with buildings, are uncomfortable or unsafe for vulnerable pedestrians like children and older adults, they usually require mitigation. CFD modelling and professional judgment are used to assess these risks where present. Implementing architectural and landscape-led wind mitigation strategies, such as building entrance canopies and strategic tree planting, to improve basic pedestrian comfort will inherently reduce or eliminate these dangerous, high-velocity wind events.

Table 1: Lawson Comfort Criteria

Colour	Comfort Category	Threshold Mean Wind Speed (m/s)	Time Percentage Exceedance (%)	Description	Suitability
	Long-term sitting	< 4	< 5	Appropriate for long-term sitting, such as outdoor café or restaurant seating	Suitable during summer
	Short-term sitting or standing	< 6	< 5	Suitable for building entrances, drop off areas, bus stops, etc	Suitable throughout the year
	Leisure Walking	< 8	< 5	Suitable for walkways and strolling	Suitable throughout the year
	Fast walking	< 10	< 5	Suitable for pedestrian thoroughfares, car parks, or purposeful walking and commuting in business districts	Suitable throughout the year
	Uncomfortable	> 10	> 5	Not suitable for pedestrian use	Unsuitable

Table 2: Lawson Safety Criteria

Colour	Safety Category	Threshold Mean Wind Speed (m/s)	% Annual Exceedance of 15m/s	Description
	Safe	< 15	< 0.022%	Safe for all pedestrians

DOWNWASH EFFECT

The air stream when striking a tall building can flow around it, over it and a part deflected towards the ground. This downward component is called downwash effect and its intensity depends on the pressure difference driving the wind. The higher the building, the higher this pressure difference can be.

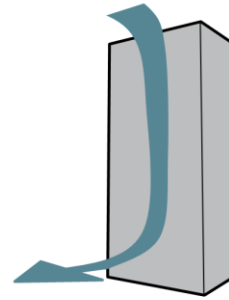


Figure 4: Downwash microclimate effect.

CORNER EFFECT

Wind can accelerate around the corners of the buildings. Pedestrians can experience higher wind speeds as well as more sudden changes in wind speeds. The reason for this is that there are narrow transition zones between the accelerated flows and the adjacent quiescent regions. This effect is linked to the downwash effect as the downward stream component subsequently flows around the corners towards the leeward side of the building.

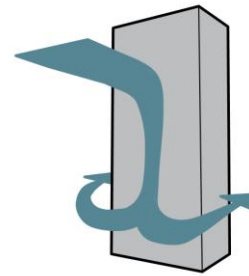


Figure 5: Corner effect.

WAKE EFFECT

Excessive turbulence can occur in the leeward side of the building. This can cause sudden changes in wind velocity and can raise dust or lead to accumulation of debris. This effect is also dependent on the height of the building.

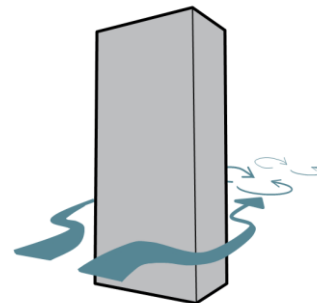


Figure 6: Wake effect.

FUNNELLING EFFECT

The wind can accelerate significantly when flowing through a narrow passage between building structures. The highest speeds are experienced at the point where the restriction of the area is the greatest.

It is important to note that pedestrian comfort, apart from the mechanical effects of the wind and the intended use of external spaces as described above, is also affected by the severity of the thermal effects of the wind.

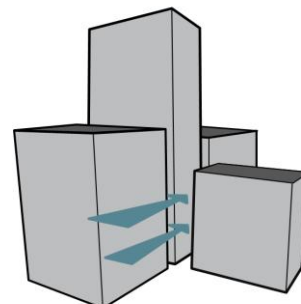


Figure 7: Funnelling effect.

INPUT DATA

GENERAL METEOROLOGICAL DATA

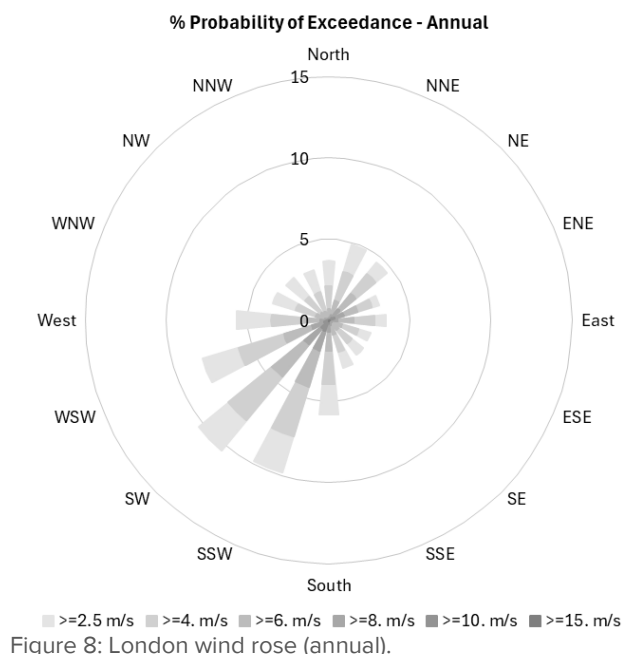
Historic weather data was obtained from the London Heathrow Airport weather station, which is considered the most suitable representation of the local wind climate for the site. The meteorological data used for this assessment covers a recent 20-year historical period.

As demonstrated in the annual wind rose below, there is a dominant wind direction originating from the southwest sector (between 202.5° and 247.5°). Therefore, these wind directions represent the most critical orientations for the site and are the primary contributors to local pedestrian comfort levels.

Within this data, wind speeds meeting or exceeding the 15 m/s threshold are very limited, appearing only as a minor fraction near the centre of the wind rose. This visually confirms that these strong wind events occur well below the 5% probability contour, aligning with the expected Lawson Criteria exceedance frequency of approximately 2 hours of the year.

To evaluate these conditions, CFD simulations were carried out for 16 wind directions at 22.5-degree increments. The Lawson comfort criteria for the assessment model were subsequently analysed based on the outputs of these simulations.

To ensure accuracy, the raw meteorological data was adjusted to account for site specific conditions based on the local terrain category and wind exposure, in accordance with the Atmospheric Boundary Layer profiles defined in the Eurocode standard.



TECHNICAL APPROACH

Specialist computer software for Computational Fluid Dynamics (CFD) was used to numerically simulate wind flows around the complex microclimate of the proposed development.

CFD modelling involves the solution of the equations of fluid motion using numerical techniques. The region of interest is divided into numerous small cells and the equations governing the fluid flow are solved within each cell. This allows a comprehensive assessment of velocity variation within the calculation domain to be derived. To improve the resolution of the results, the CFD mesh is refined in the areas of primary interest, such as building entrances and terraces.

In alignment with wind engineering best practices, a balanced mesh resolution was established to optimise computational efficiency while ensuring high-accuracy results.

Detailed 3D computer models of the baseline, proposed and cumulative scenarios were generated, capturing the overall geometry and massing of the proposed building and surrounding built environment. The main domain of the CFD model extended by approximately 400m from the centre of the proposed development to allow topographic features and buildings in the surrounding area, which can influence wind flow, to be accounted for. Localised wind speed, direction and turbulence intensity profiles were predicted within and around the site.

The results of the CFD simulations consist of comfort colour contour images. They represent a horizontal slice through the modelled domain at predetermined heights, namely 1.5m above ground level.

Another consideration within the assessment is the surface roughness. Wide, open spaces permit the wind to blow down to ground level generating high-velocity conditions similar to that of open countryside, even within a built-up area. For this assessment, the aerodynamic surface roughness beyond the 400m modelling radius was classified as 'urban', reflecting the macro-exposure of the regional terrain. The immediate surrounding buildings were subsequently modelled within the 400m domain to simulate localised context and wind effects. The turbulence effects were modelled using a k-omega SST turbulence model which is an accurate and widely used turbulence model.

The resulting comfort contour plots categorize the site into distinct pedestrian activity comfort zones, evaluated against the thresholds defined in Table 1 and Table 2.

Once the predicted wind speeds across the assessment areas were computed for each wind direction and model configurations, a statistical integration was carried out. This analysis combined the CFD velocity datasets with historical regional wind climate statistics using a Weibull cumulative distribution, which is typically used. This methodology determines the annual and seasonal probability of exceeding specific wind speed thresholds, allowing a direct compliance assessment against the Lawson Criteria.

RECEPTOR MAP

This report focuses on certain sensitive areas such as amenity spaces, entrances, and key pedestrian routes. The map below highlights the locations of particular interest in relation to the proposed site. The following section references these receptors when presenting and discussing the results.



Figure 9: Receptor map.

ASSESSMENT RESULTS

BASELINE SCENARIO

The baseline configuration includes the existing building on the site within its current surrounding context.

ANNUAL SAFETY RESULTS

The wind conditions at the surrounding area assessed is found to be safe, as the wind speeds have been shown not to exceed 15 m/s for more than 0.022% of the year (Figure 10).

WORST SEASONAL RESULTS

The pedestrian comfort results for the worst-case season (Figure 11), which is predominantly driven by winter conditions, indicate that most areas, are suitable for sitting or standing.

SUMMER RESULTS

Figure 12 illustrates the pedestrian comfort results for the summer season. Overall, most areas exhibit calm conditions suitable for outdoor sitting.



Figure 10: Annual safety results (Baseline scenario).

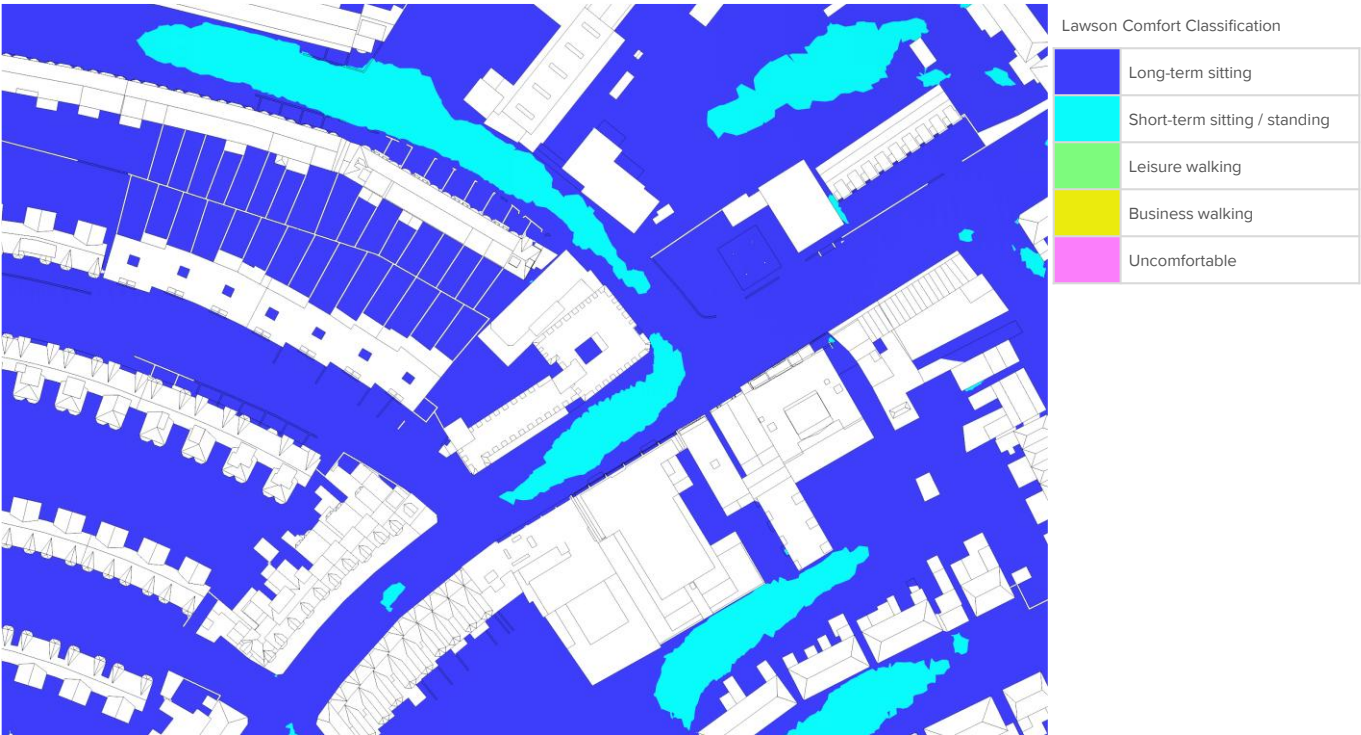


Figure 11: Worst seasonal comfort results (Baseline scenario).

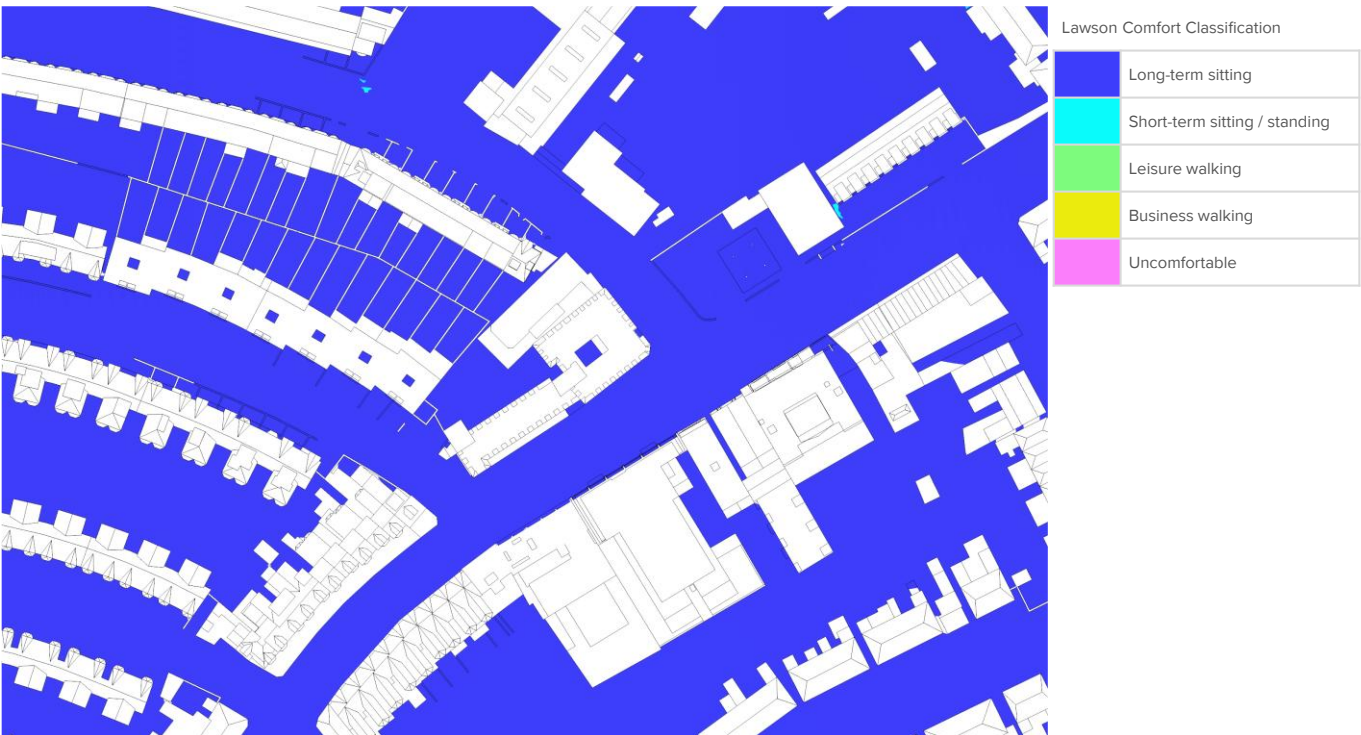


Figure 12: Summer comfort results (Baseline scenario).

PROPOSED SCENARIO

The analysis presented in this section is based on the proposed drawings and 3D model issued in June 2026 by Levitt Bernstein Associates. The CFD model incorporates the proposed development within the existing surrounding context. In addition to assessing the wind microclimate at street level, terraces within the proposed development were also evaluated.

ANNUAL SAFETY RESULTS

Overall, the results show that the street-level areas within and in close proximity to the site are safe for all pedestrians, as the wind speeds have been shown not to exceed 15 m/s for more than 0.022% of the year (Figure 13). Therefore, no mitigation measures are required.

The assessment of the proposed terraces indicates that localised wind conditions will also be safe across most areas (Figure 14). However, one minor localised area on the fifth-floor terrace, at the corner of the Meeting/Board Room, exceeds the pedestrian safety threshold. This is largely due to the proposed metal railings, which do not sufficiently screen the higher, unobstructed winds captured at this elevation. Following this analysis, the design was updated to include a 600mm solid parapet with railings extending to 1100mm above finished floor level. While this is a positive mitigation measure, it is recommended that the balustrade detail incorporates a semi-porous design to provide additional year-round wind protection.

WORST SEASONAL RESULTS

The pedestrian comfort results for the worst-case season (Figure 15), show outcomes generally similar to the Baseline scenario, with only minor variations. This is expected, as the proposal reflects a modest increase in height and massing compared to the existing building and was tailored to respond sensitively to the local context.

The results indicate that the ground level area is suitable for sitting or standing and therefore, suitable for the pedestrian uses around building entrances, walkways, bus stops, and drop-off zones.

More specifically, the areas near the neighbouring entrances (Receptor 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24) remain suitable for sitting and are therefore suitable for their existing use.

The proposed main entrances (Receptors 1, 2, and 3), and all secondary entrances, show wind conditions suitable for sitting, one category calmer than required, hence meeting their intended target comfort criteria.

The bus stops near Receptors 25, 26, and 27 experience conditions appropriate for sitting or standing and are therefore suitable for their use.

All walkways and crossings in the immediate vicinity (such as Receptors 9, 10, 11, 12, and 13) demonstrate conditions suitable for standing and are therefore appropriate for their intended use.

SUMMER RESULTS

Figure 16 illustrates the pedestrian comfort results for the summer season. Overall, all street-level areas exhibit calm conditions suitable for outdoor sitting or standing activities.

The designated amenity areas at the nursery and junior school (near Receptors 7 and 8), have conditions mostly suitable for sitting, indicating optimal microclimate conditions for the proposed outdoor activities. Similarly, calm condition suitable for sitting are observed in the neighbouring gardens (Receptors 5 and 6) and within the proposed courtyard (Receptor 4).

Regarding the proposed terraces, nearly all areas show conditions suitable for outdoor sitting or standing during the summer months (Figure 17), providing a high-quality amenity space for future occupants. Only one small area, at the corner of the Meeting/Board Room, experiences conditions suitable for leisure walking. However, isolated pockets of slightly elevated windiness such as this are common, and the space is still expected to provide high overall quality for occupants.

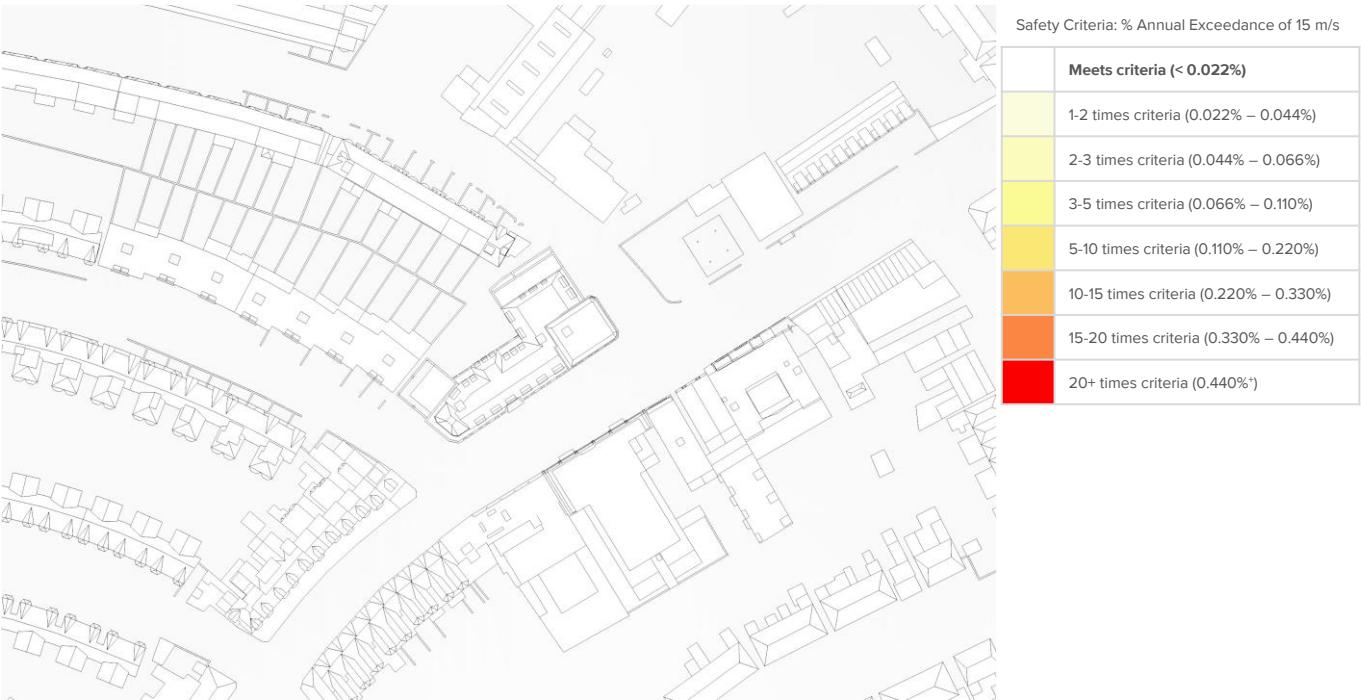


Figure 13: Annual safety results – Street-level (Proposed scenario).



Figure 14: Annual safety results – Terrace levels (Proposed scenario).

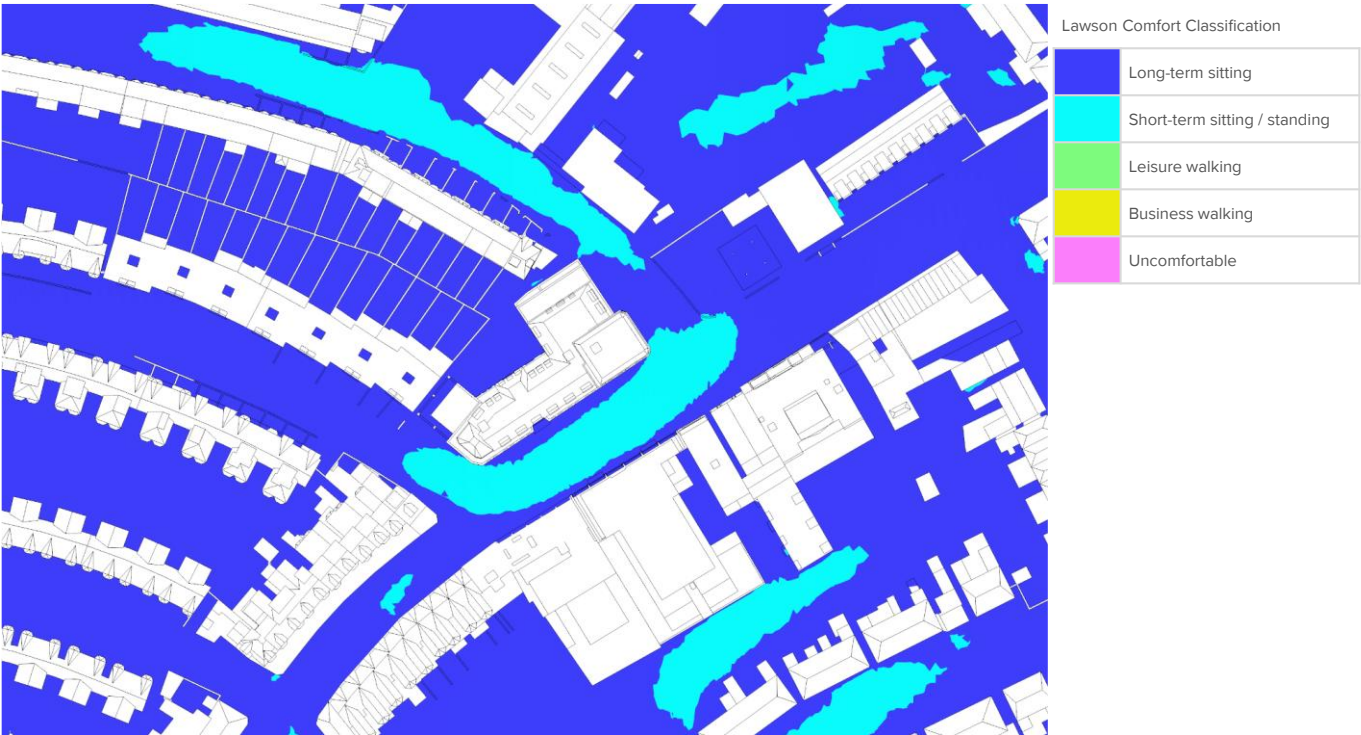


Figure 15: Worst seasonal comfort results (Proposed scenario).

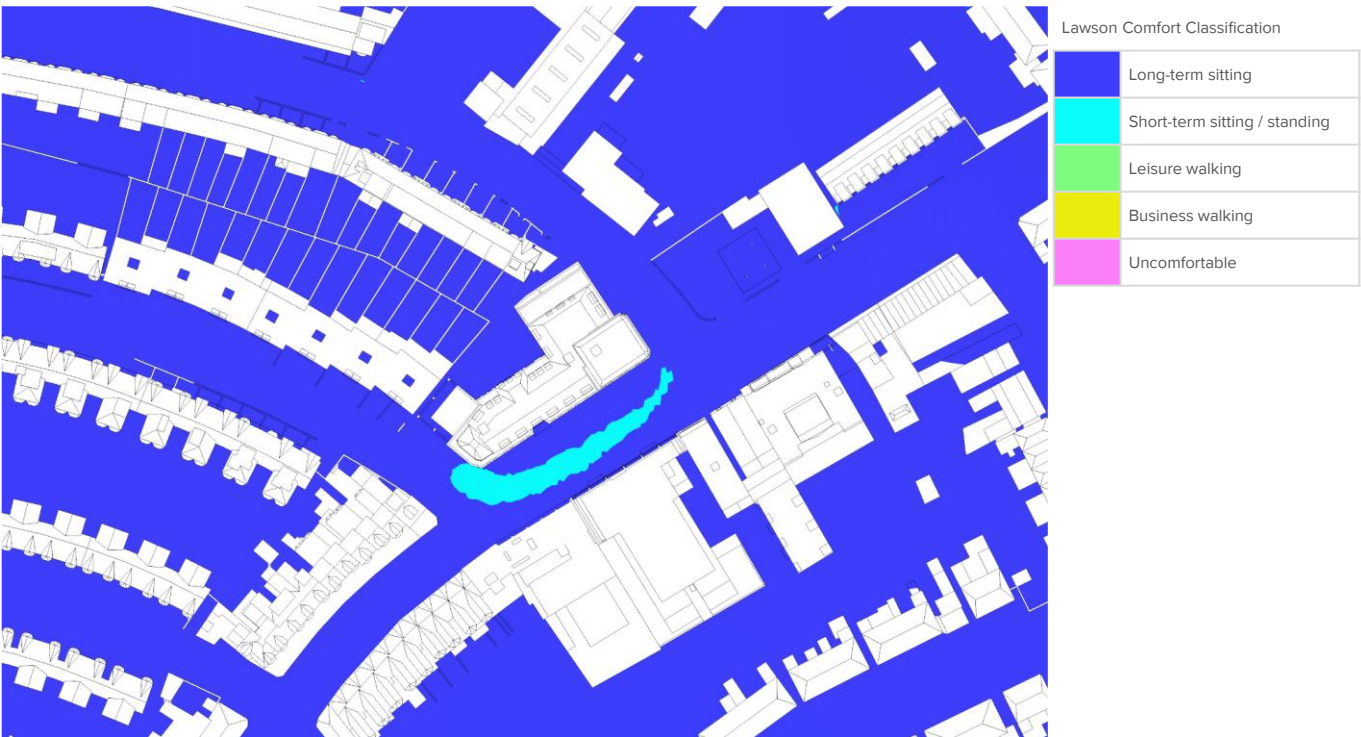


Figure 16: Summer comfort results (Proposed scenario).

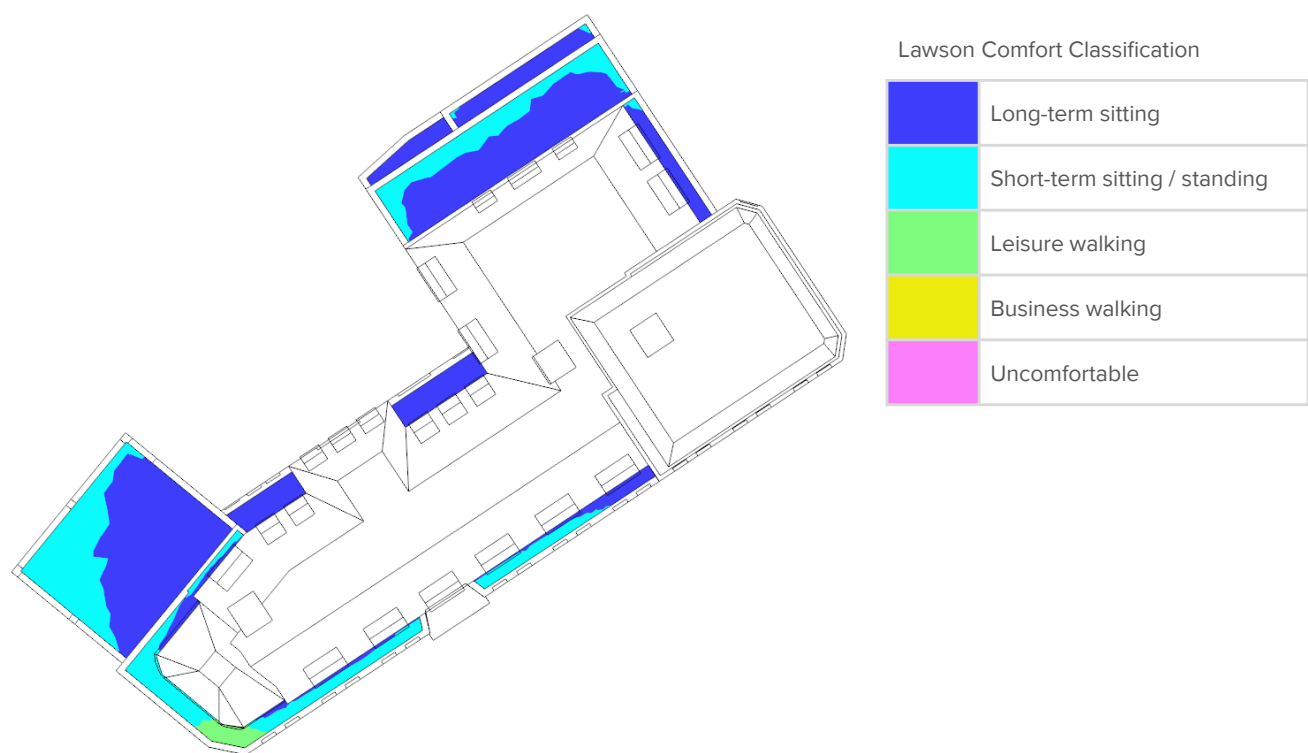


Figure 17: Summer comfort results for terraces (Proposed scenario).

CUMULATIVE SCENARIO

The cumulative assessment considers the future development within the vicinity of the site that has received planning consent at the time of the assessment (Figure 3).

ANNUAL SAFETY RESULTS

The street-level results for both the on-site and off-site locations indicate that the wind environment remains safe for all pedestrians (Figure 18).

The one minor localised area on the fifth-floor terrace (Figure 19), at the corner of the Meeting/Board Room, continues to slightly exceed the pedestrian safety threshold. As established in the Proposed scenario analysis, following this assessment, the design was updated to include a 600mm solid parapet with railings extending to 1100mm above finished floor level. While this is a positive mitigation measure, it is recommended that the balustrade detail incorporates a semi-porous design to provide additional year-round wind protection.

WORST SEASONAL RESULTS

The pedestrian comfort results for the worst-case season (Figure 20) indicate localised wind patterns within the site perimeter and its immediate vicinity that are consistent with the Proposed Scenario.

The area suitable for ‘standing’ between the proposed scheme and the cumulative neighbouring building has expanded slightly due to the narrower passage created between the two structures. However, this change is negligible and introduces no adverse microclimatic impacts.

SUMMER RESULTS

The summer pedestrian comfort results indicate generally calm conditions that align with those identified under the Proposed scenario. All conditions remain suitable for their intended outdoor amenity uses during summer.



Figure 18: Annual safety results – Street-level (Cumulative scenario).



Figure 19: Annual safety results – Terrace levels (Cumulative scenario).

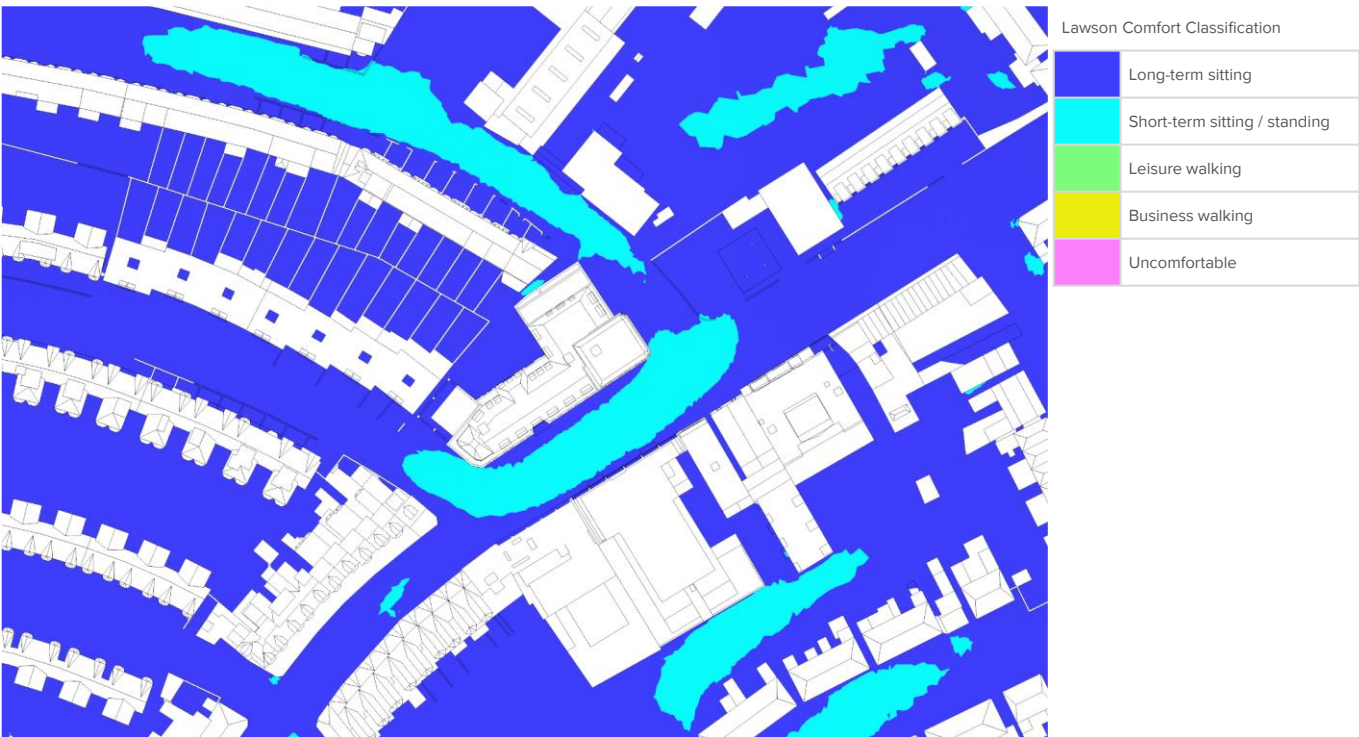


Figure 20: Worst seasonal comfort results (Cumulative scenario).

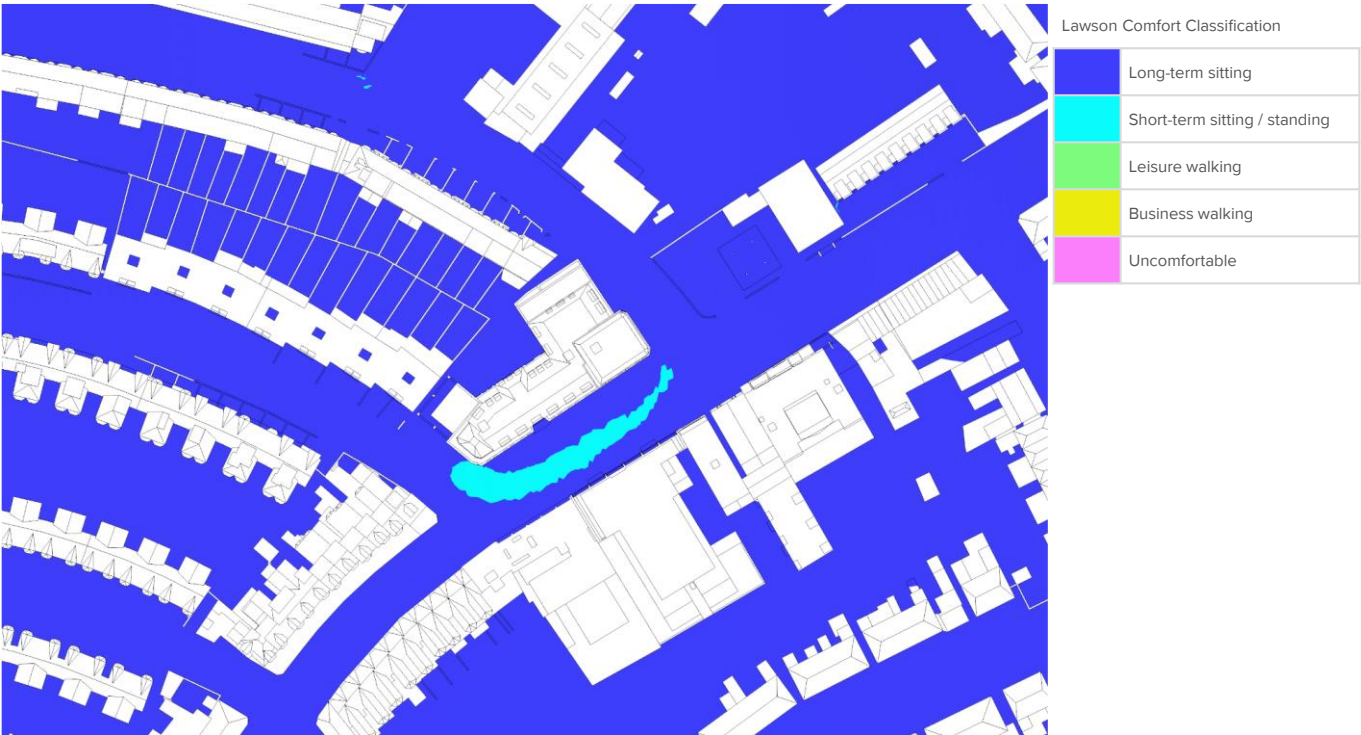


Figure 21: Summer comfort results (Cumulative scenario).

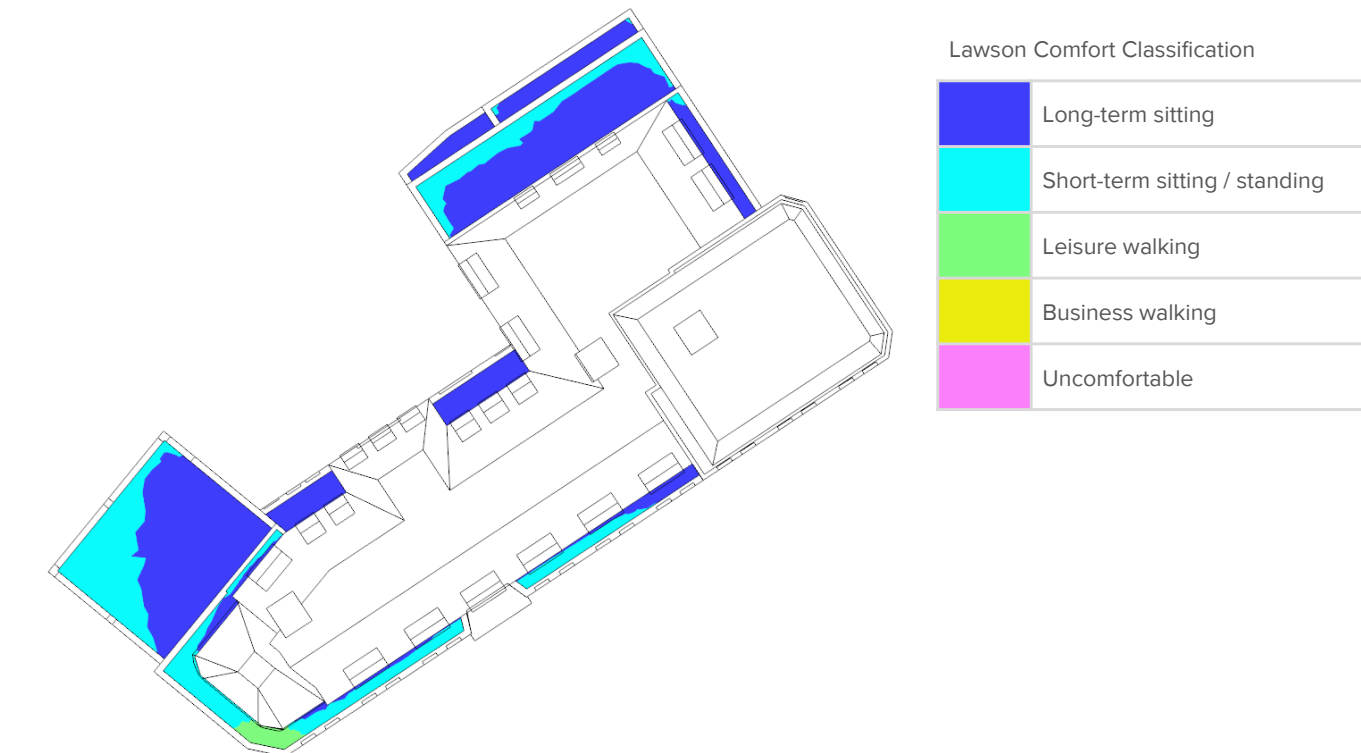


Figure 22: Summer comfort results for terraces (Cumulative scenario).

CONCLUSION

Wind conditions were assessed for the Baseline, Proposed, and Cumulative scenarios to evaluate pedestrian safety and comfort across the study area. The results indicate that wind conditions at the site and its neighbouring areas are safe for all pedestrians and as such, the proposed development is not expected to cause any significant adverse impacts. For additional wind protection on the fifth-floor terrace, incorporating a semi-porous design into the latest proposed balustrade detail is being considered.

ANNUAL SAFETY RESULTS

Across all three scenarios, ground-level wind conditions remain safe for all pedestrians, as wind speeds have been shown not to exceed 15 m/s for more than 0.022% of the year.

While the vast majority of the proposed terraces exhibit safe and comfortable wind conditions, a localised area on the fifth-floor terrace (corner of the Meeting/Board Room) exceeds the pedestrian safety threshold in both the Proposed and Cumulative scenarios. The proposed open metal railings do not sufficiently screen higher-elevation, unobstructed winds. Following the analysis, the design was updated to include a 600mm solid parapet topped with railings up to 1100mm. While effective, incorporating a semi-porous design into the balustrade detail is recommended for additional year-round wind protection.

amenity spaces that are predominantly suitable for sitting and standing during the summer months.

WORST SEASONAL AND SUMMER COMFORT RESULTS

During the worst-case season, street-level areas remain suitable for sitting or standing, ensuring comfortable conditions around all building entrances, bus stops, and pedestrian walkways.

In the summer, calm wind conditions suitable for outdoor sitting predominate across all ground-level amenity areas, such as school play spaces, neighbouring gardens, and proposed courtyard, demonstrating ideal conditions for the intended uses. Proposed upper-level terraces provide high-quality

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