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WIND MICROCLIMATE ASSESSMENT REPORT

Hyde Park, Hayes

May 2025

GIA No: **21740**

PROJECT DATA:

Client	**Columbia Threadneedle**
Project Title	**Hyde Park, Hayes**
Project Number	**21740**

REPORT DATA:

Report Title	**Wind Microclimate Assessment**
GIA Department	**Wind Microclimate**
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Prepared by	**NS**
Checked by	**JW**

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CONTENTS

1 INTRODUCTION

This report outlines the results of a wind microclimate assessment for the Proposed Development at Hyde Park, Hayes in the London Borough of Hillingdon.

1.1 SUMMARY

Wind microclimate conditions for the proposed development at Hyde Park, Hayes were assessed using high resolution Computational Fluid Dynamics (CFD).

The proposed development has a significant beneficial impact on the level of wind safety risk to the north west of the site and will eradicate two pre-existing wind safety risks.

The proposed development will also have a beneficial impact on conditions around two entrance points on the south-east corner at 18 Millington Road, which would be made suitable for the intended use having been unsuitable in the baseline.

Wind comfort conditions would be suitable for all intended uses (or no worse than the baseline conditions) for all thoroughfares, roadways, proposed or existing building entrances, bus stops and proposed mixed amenity spaces.

For proposed seating at ground level, terraces and balconies, there would be some regions which are up to one category windier than the target condition based on the illustrative masterplan. Standard mitigation methods (such as raised planters, screening of baffles) would be expected to resolve these issues, and further testing is recommended at RMA stage by an experienced wind engineer to confirm this.

The inclusion of cumulative schemes makes conditions calmer in the region surrounding Block B and west of Block C.

The proposed development will not have any adverse impacts on long term wind microclimate.

1.2 GUIDANCE

National Planning Policy Framework (2024)

The National Planning Policy Framework (NPFF) was revised December 2024 by the Ministry of Housing, Communities & Local Government (MHCLG) The relevant paragraphs are as follows:

There is no specific planning policy guidance dealing with microclimate in terms of pedestrian comfort set out in the revised NPPF.

Planning Practice Guidance

The Planning Practice Guidance (2021) identifies the potential for tall and large buildings to affect wind microclimate. The National Design Guide (2021) states in Paragraph 71 that:

"Proposals for tall buildings (and other buildings with a significantly larger scale or bulk than their surroundings) require special consideration. This includes their [...] environmental impacts, such as [...] wind. These need to be resolved satisfactorily"

London Plan (2021)

The Greater London Authority (GLA) London Plan (2021) sets out the overall strategy for developments in London over the next 20-25 years. The relevant policies to wind microclimate are as follows:

Policy D8 (Public Realm) of the London Plan states that developments should "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) of the London Plan states that "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.

2 METHOD

To identify the likely effect of the proposed development on the pedestrian level wind environment, a 3D CFD model of the development and surrounding site was created. This section describes the methodology for the creation of this model and the inputs used.

2.1 ASSESSMENT METHODOLOGY

The assessment was performed using GIA's high-resolution Computational Fluid Dynamics (CFD) modelling.

CFD is a digital modelling technique, which simulates the effect of wind for the built environment. The air is divided into hundreds of millions of "cells", within which the equations of motion are solved. GIA uses cloud computing from Amazon Web Services (AWS) to run the simulations, to ensure vast scalability and appropriate resource availability for any project.

A full description of the test methodology is included in Appendix 01.

2.2 ESTABLISHING MICROCLIMATE CONDITIONS

Microclimate conditions were established using a high resolution CFD model, extending 400m radius from the Site.

A model of the development was included within the CFD model and tested to determine the conditions at and around the Site. The model used is shown in Figure 1, Figure 2 and Figure 3.

The model was run at full scale and wind speeds were measured at 1.5m above any surfaces expected to be used for pedestrian activity.

On-site and local wind speeds were combined with wind statistics from 30 years of data recorded at London Heathrow and City airports for variations in terrain between the airports and the site, to obtain annual and seasonal frequency and magnitude of wind speeds across the model. This allows the 'grading' of the pedestrian level winds according to the Lawson Comfort Criteria, which are explained later in this report.

The wind microclimate effects are assessed annually, for the winter months (December, January and February) and for the summer months (June, July, August). Winter conditions are reported as this is the season when the strongest winds are expected, summer conditions are reported as this is the season when pedestrian usage of outdoor spaces is expected to be highest.

2.3 LIMITATIONS AND ASSUMPTIONS

The accuracy of the results is dependent upon the accuracy of the CAD used to construct the model.

The assessment herein is valid to the design as supplied to GIA at the time of the assessment, and does not cover future variations in the design.

There is an inherent assumption that on-site wind speeds will scale linearly with the measured wind speeds at the airport (since all wind probabilities are based on data measured at airfield anemometers).

There is an inherent assumption that the wind speed statistics for the past 30 years will remain applicable for the foreseeable future.

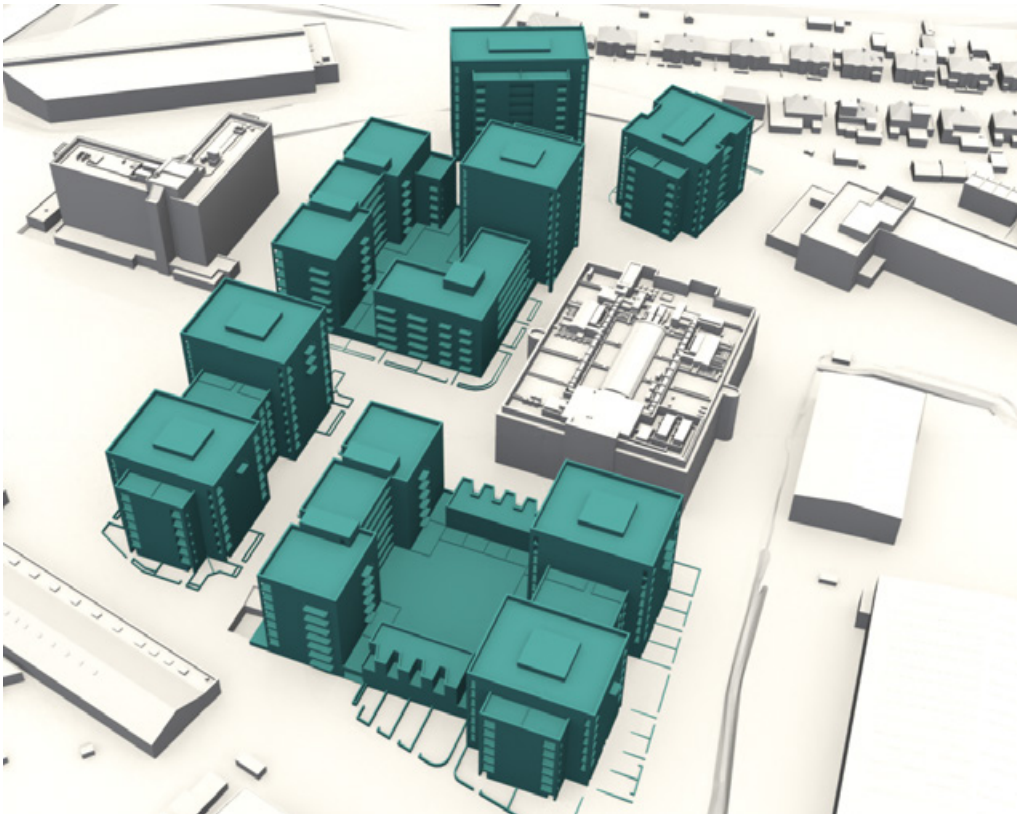

Fig. 01: 3D View of proposed Development

Fig. 02: Proposed Development with Existing Surrounds

Fig. 03: Proposed Development with Cumulative Surrounds

Fig. 04: Sensitive Wind Receptors

2.4 LAWSON COMFORT AND SAFETY CRITERIA

The assessment was graded against the Lawson Comfort and Safety Criteria.

Table 1 and Table 2 show the banding of the various categories within the Lawson Comfort and Safety criteria.

Comfort categories are based on the level of wind speed exceedance for 5% of each season, and safety categories are based on the level of wind speed exceedance for~2 hours per year.

The assessment was performed using the London Docklands Development Corporation (LDDC) variant of the Lawson Comfort Criteria. The Lawson Criteria are well-established in the UK for quantifying wind conditions in relation to build developments and, although not a UK 'standard', the criteria are recognised by local authorities as a suitable benchmark for wind assessments. The Lawson Criteria have been adopted for this assessment.

Table 01: Lawson Comfort Criteria (LDDC variant)

KEY	COMFORT CATEGORY	MEAN WIND SPEED (5% EXCEEDANCE)	DESCRIPTION
	Sitting	4 m/s	Acceptable for outdoor sitting use (e.g. cafés, benches, balconies and terraces)
	Standing	6 m/s	Acceptable for main building entrances, pick-up / drop-off points and bus stops
	Walking (leisure)	8 m/s	Acceptable for strolling
	Walking (business)	10 m/s	Acceptable for external pavements, walking purposefully without lingering
	Uncomfortable	>10 m/s	Not comfortable for regular pedestrian access

Table 02: Lawson Safety Criteria (LDDC variant)

KEY	SAFETY CATEGORY	MEAN WIND SPEED (0.025% EXCEEDANCE)	DESCRIPTION
	No Safety Exceedance	<15 m/s	
	S15 (Distress)	>15 m/s	Unsafe for frail individuals, or cyclists
	S20 (Safety)	>20m/s	Wind conditions considered unsafe for all users

2.5 TARGET CONDITIONS

For a mixed-use urban area within which the site is located, the desired wind microclimate would typically need to have areas acceptable for sitting, standing (including at entrances of buildings) and walking use. A description of the comfort categories to classify wind conditions in accordance with is given below.

Any areas which show up as either unsafe (annually) or uncomfortable (for winter) will require mitigation, unless they are in locations where pedestrian access can be controlled in the event of strong winds. This applies to all thoroughfares (for pedestrians) and roads (for cyclists) around the proposed development.

The areas immediately outside any building entrances should be suitable for standing use during winter to provide a "buffer" between the still conditions in interior spaces and the general thoroughfare. The principal entrances to the proposed development are marked "E" on Figure 4, and principal off-site entrances are marked "O".

There are bus stops on North Hyde Road (marked "B" on Figure 4). These are targeted to be suitable for standing in winter.

There are proposed mixed use amenity spaces in the form of play areas (marked "A1" and "A2" on Figure 4) at ground level. These spaces are targeted to be suitable for a mix of standing and sitting in summer.

There are amenity terraces across the proposed development. These are targeted to be suitable for a mix of sitting and standing in summer.

There are balconies within the proposed development. These are targeted to be suitable for sitting or standing in summer.

The locations of the sensitive receptors are shown in Figure 4.

2.6 SCENARIOS

The purpose of these tests was assess the impact of the proposed development on wind conditions on and around the site.

The following scenarios were tested:

1. Baseline: The existing building on site, with the existing surrounds; and
2. Proposed Development with Existing Surrounds: The completed and operational development with the existing surrounds.
3. Proposed Development with Cumulative Surrounds:
   The completed and operational development with the cumulative surrounds.

The following consented schemes were included in the cumulative scenarios:

- Keith House Eastern Site (27189/APP/2021/2782)
- Keith House Western Site (27189/APP/2020/2181)
- HPH 4 (76655/APP/2021/3039)

Trees and soft landscaping have not been included in the model, to ensure that conditions represent a reasonable worst-case scenario.

The proposed development was tested in the form of the illustrative masterplan, which represents a realistic form of the detailed design within the proposed parameters.

3 RESULTS

3.1 CONDITIONS FOR EXISTING SITE WITH EXISTING SURROUNDS (BASELINE)

Annual safety at ground level for the existing site with existing surrounds is shown in Figure 5. Winter comfort at ground level for the existing site with existing surrounds is shown in Figure 6. Summer comfort at ground level for the existing site with existing surrounds is shown in Figure 7.

There are two instances where the 15 m/s wind safety threshold is exceeded at ground level (marked "1" and "2" in Figure 5) to the north west of the site, along Millington Road. These pose a pre-existing risk to the safety of pedestrians and cyclists.

Conditions range between suitable for sitting, standing, leisure walking and business walking in winter and between sitting, standing and leisure walking in summer.

Conditions for principal off-site entrances (marked "O" in results figures) are suitable for either sitting or standing, with the exception of two entrance points at 18 Millington Road being suitable for leisure walking in winter. This ranges between being suitable and one category windier than the target conditions.

Conditions for the bus stops on North Hyde Road (marked "B" in results figures) are suitable for standing in all seasons. This is suitable for the intended use.

Fig. 05: Annual Safety, Existing Site with Existing Surrounds (Baseline)

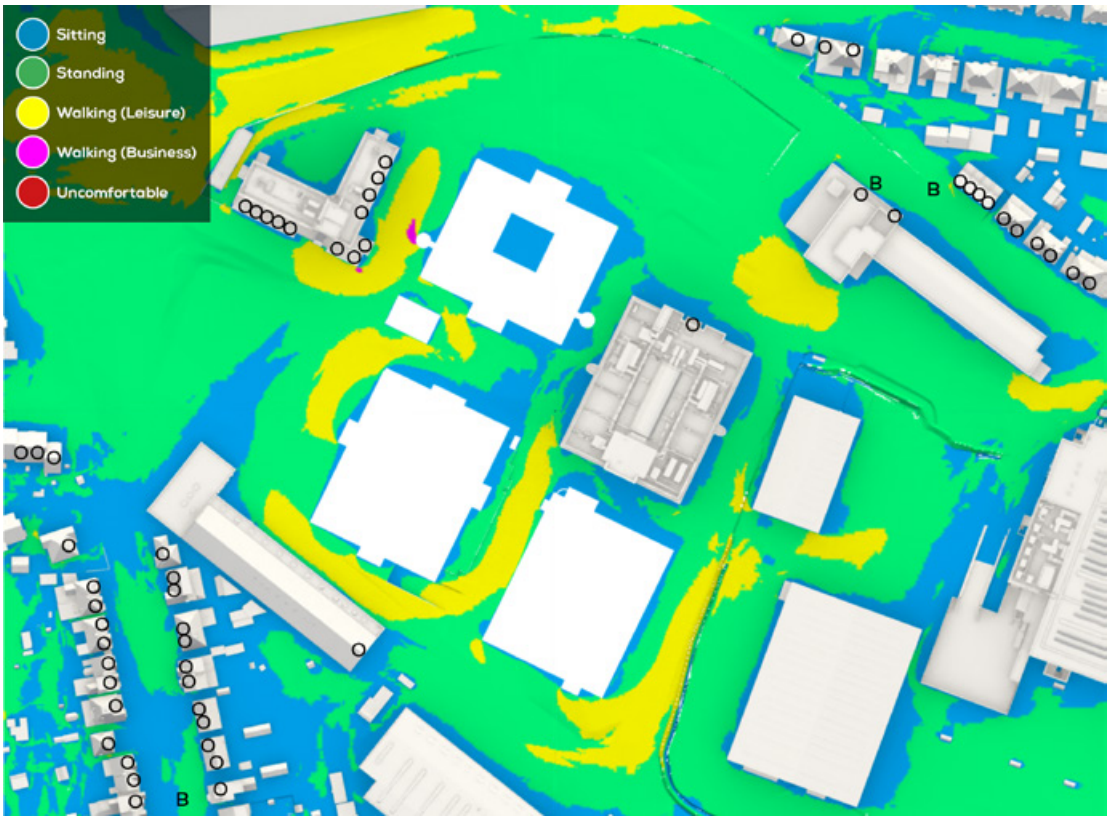

Fig. 06: Winter Comfort, Existing Site with Existing Surrounds (Baseline)

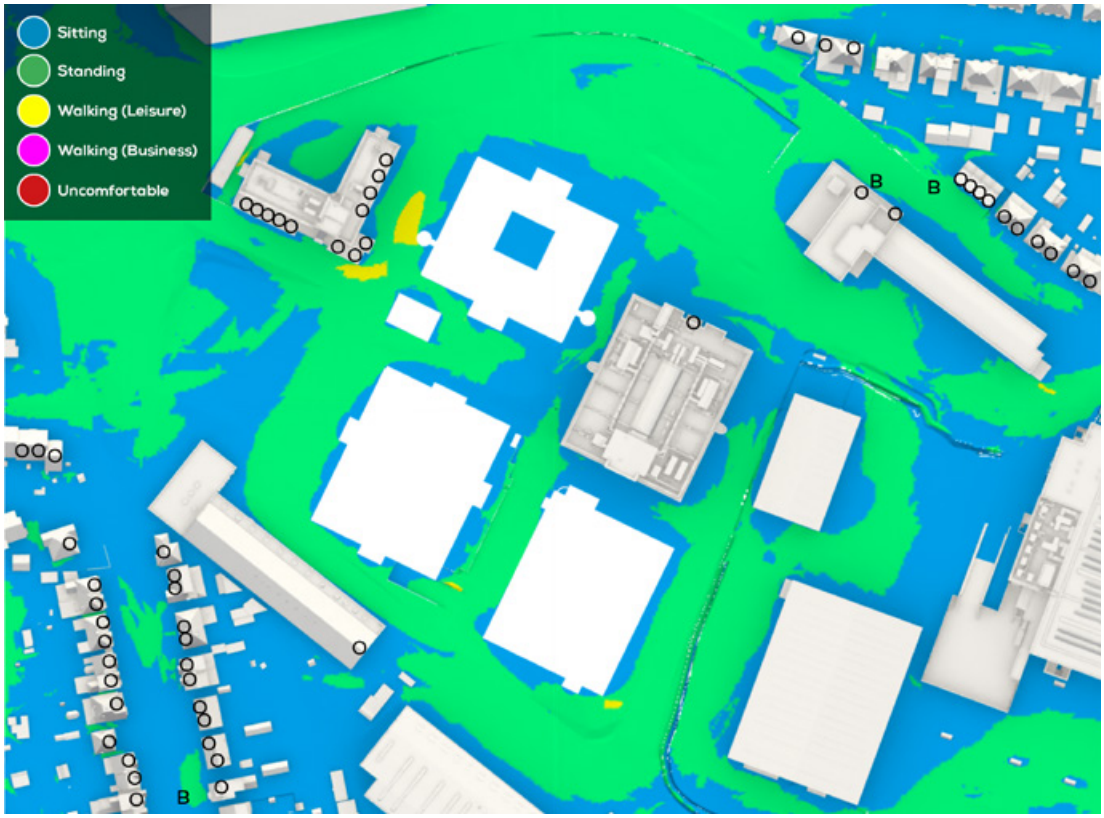

Fig. 07: Summer Comfort, Existing Site with Existing Surrounds (Baseline)

3.2 CONDITIONS FOR PROPOSED DEVELOPMENT WITH EXISTING SURROUNDS

Ground Level Conditions

Annual safety at ground level for the proposed development with existing surrounds is shown in Figure 8. Winter comfort at ground level for the proposed development with existing surrounds is shown in Figure 9. Summer comfort at ground level for the proposed development with existing surrounds is shown in Figure 10.

The locations of the pre-existing exceedances of the wind safety criteria (marked "1" and "2" in Figure 8) are no longer in exceedance of the safety threshold. The wind safety risk to pedestrians and cyclists in these locations would be eradicated by the inclusion of the proposed development, which is a significant beneficial impact.

Conditions range between suitable for sitting, standing and leisure walking in winter and summer. This is one category calmer than the baseline.

Conditions for the principal proposed entrances to the development (marked "E" in results figures) range between being suitable for sitting and standing in the all seasons. This is suitable for the intended use.

Conditions for all principal off-site entrances (marked "O" in results figures) are now suitable for either sitting or standing in all seasons. This is suitable for the intended use and represents a beneficial impact for the previously highlighted entrances to 18 Millington Road which were not suitable in the baseline conditions.

Conditions for the bus stops on North Hyde Road (marked "B" in results figures) are suitable for sitting in all seasons. This is one category calmer than the baseline and is suitable for the intended use.

Conditions for the proposed mixed use amenity spaces (marked "A1" and "A2" in results figures) are suitable for a mix of sitting and standing in summer, which is suitable for the intended use.

The Design Code includes controls that any seating within areas that are suitable for standing in summer should be afforded shelter by mitigation measures such as screens, hedges or raised planters. As conditions may be unsuitable for use without the testing and implementation of further measures, the assessment of appropriate measures by an experienced wind engineer at Reserved Matters stage, if required, should be secured through an appropriately worded planning condition.

Elevated Level Conditions

Annual safety at terrace levels for the proposed development with existing surrounds is shown in Figure 11. Winter comfort at terrace levels for the proposed development with existing surrounds is shown in Figure 12. Summer comfort at terrace levels for the proposed development with existing surrounds is shown in Figure 13.

Annual safety at balcony levels for the proposed development with existing surrounds is shown in Figure 14. Winter comfort at balcony levels for the proposed development with existing surrounds is shown in Figure 15. Summer comfort at balcony levels for the proposed development with existing surrounds is shown in Figure 16.

Balconies and terraces were tested without the inclusion of balustrades, to ensure presentation of the worst case scenarios.

There are no exceedances of the wind safety criteria at any balcony or terrace level.

Conditions for the northern terrace on Block A1, all terraces on Block A2, the terraces on levels 6, 8, and 10 of Block B, the level 7 northern terrace on Block C, and the northern terraces on levels 7 and 8 of Block D are suitable for sitting in summer. This is suitable for the intended use.

Conditions for the southern terrace on Block A1 and the level 7 southern terraces on Blocks C and D are suitable for standing in summer. This is one category windier than the target conditions.

Conditions for the terraces at level 1 of Block B and D are suitable for a mix of sitting and standing in summer, but with the majority area suitable for standing. This is one category windier than the target conditions.

Those terraces mentioned above that exceed comfort conditions would require the inclusion of mitigation measures such as raised perimeter screens, terrace landscaping, screening within the terraces or pergolas. As conditions may be unsuitable for use without the testing and implementation of further measures, the assessment of appropriate measures by an experienced wind engineer at Reserved Matters stage, if required, should be secured through an appropriately worded planning condition.

Conditions for the majority of balconies are suitable for sitting and standing in summer. This satisfies the target conditions.

It should be noted that a number of balconies along the western and southern elevations of Block B and western elevation of Block D are suitable for a mix of standing and leisure walking in summer. Should protruding balconies be included on these elevations, they would require mitigation measures in the form of raised side panels or solid or perforated balustrades. As conditions may be unsuitable for use without the testing and implementation of further measures, the assessment of appropriate measures by an experienced wind engineer at Reserved Matters stage, if required, should be secured through an appropriately worded planning condition.

Fig. 08: Annual Safety, Proposed Development with Existing Surrounds

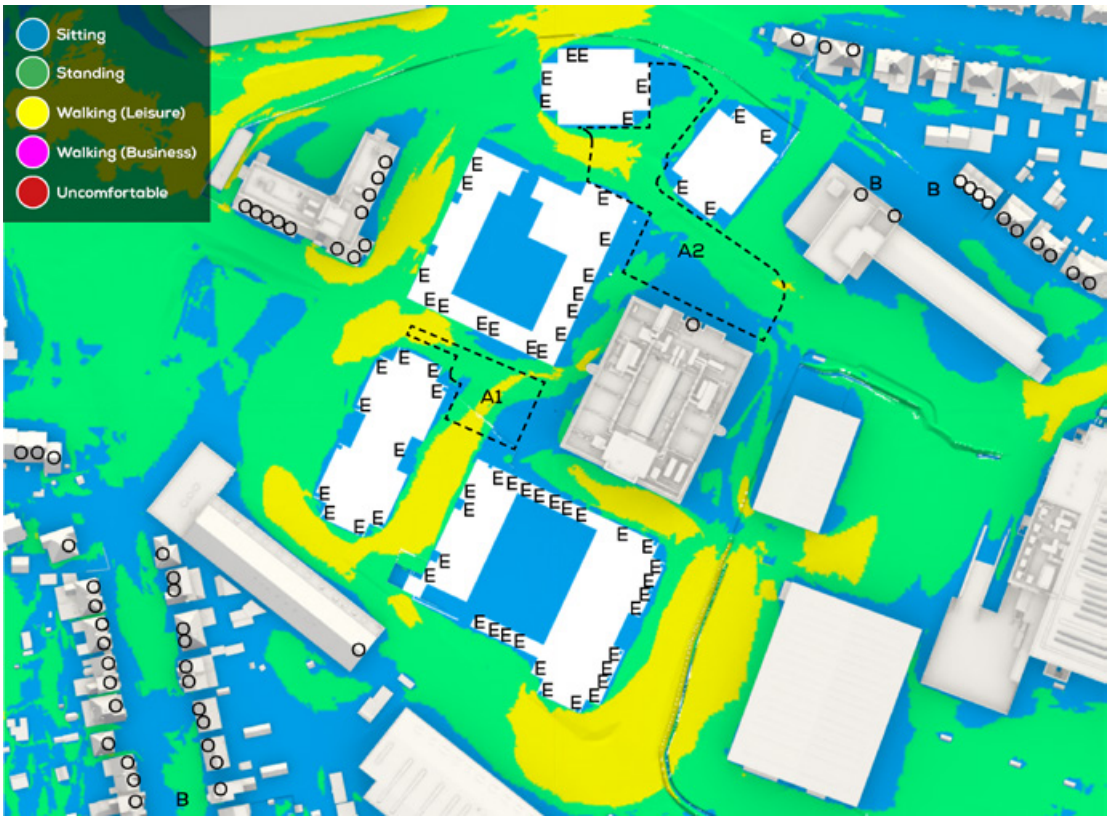

Fig. 09: Winter Comfort, Proposed Development with Existing Surrounds

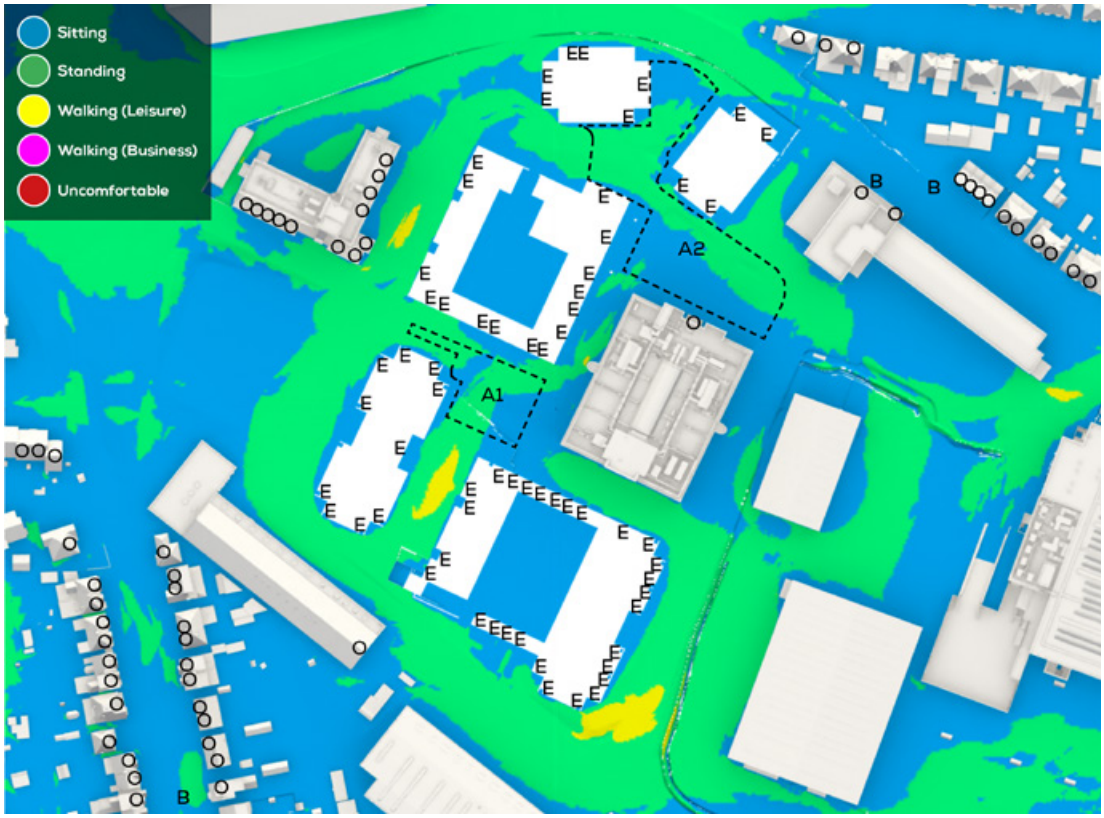

Fig. 10: Summer Comfort, Proposed Development with Existing Surrounds

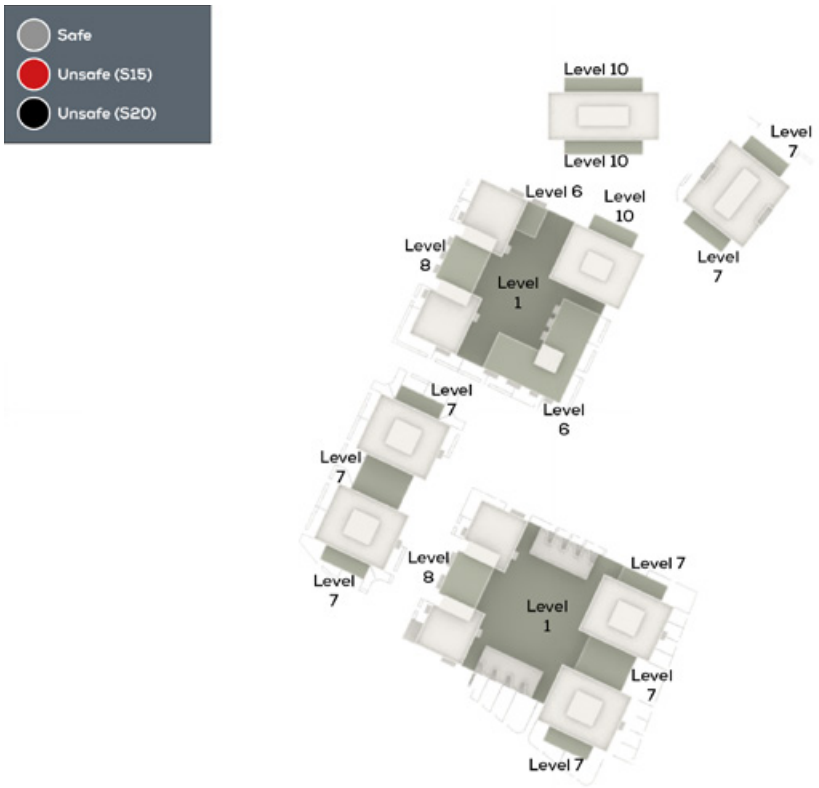

Fig. 11: Annual Safety at Terrace Levels, Proposed Development with Existing Surrounds

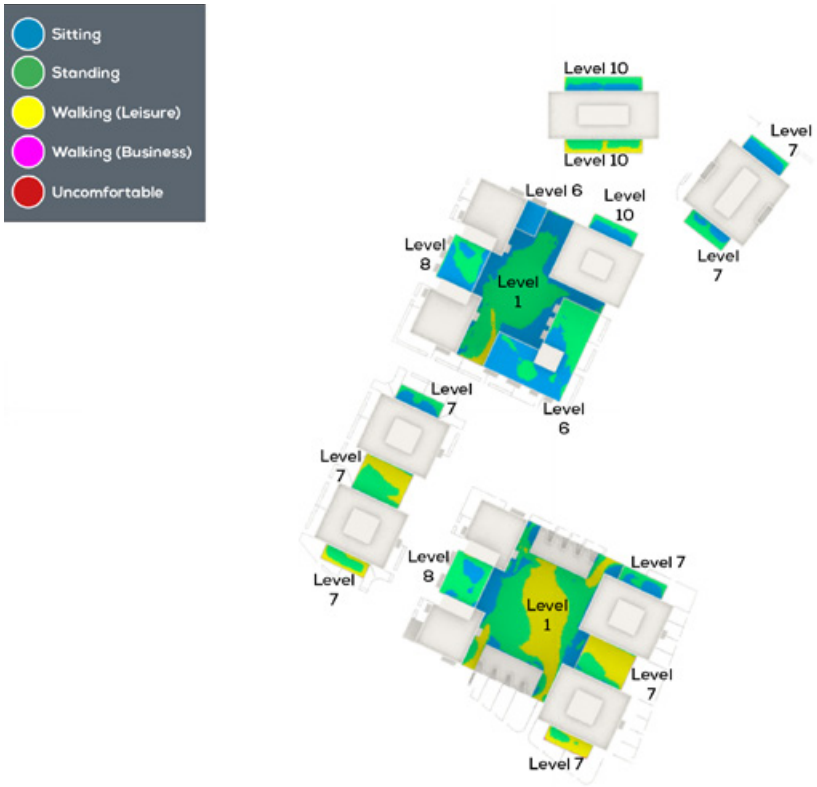

Fig. 12: Winter Comfort at Terrace Levels, Proposed Development with Existing Surrounds

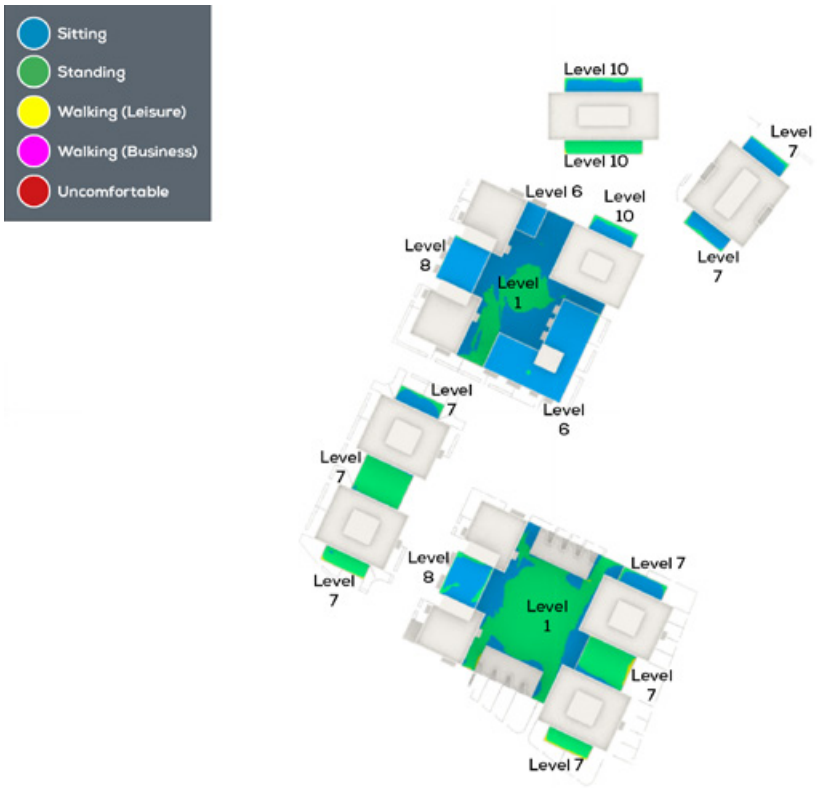

Fig. 13: Summer Comfort at Terrace Levels, Proposed Development with Existing Surrounds

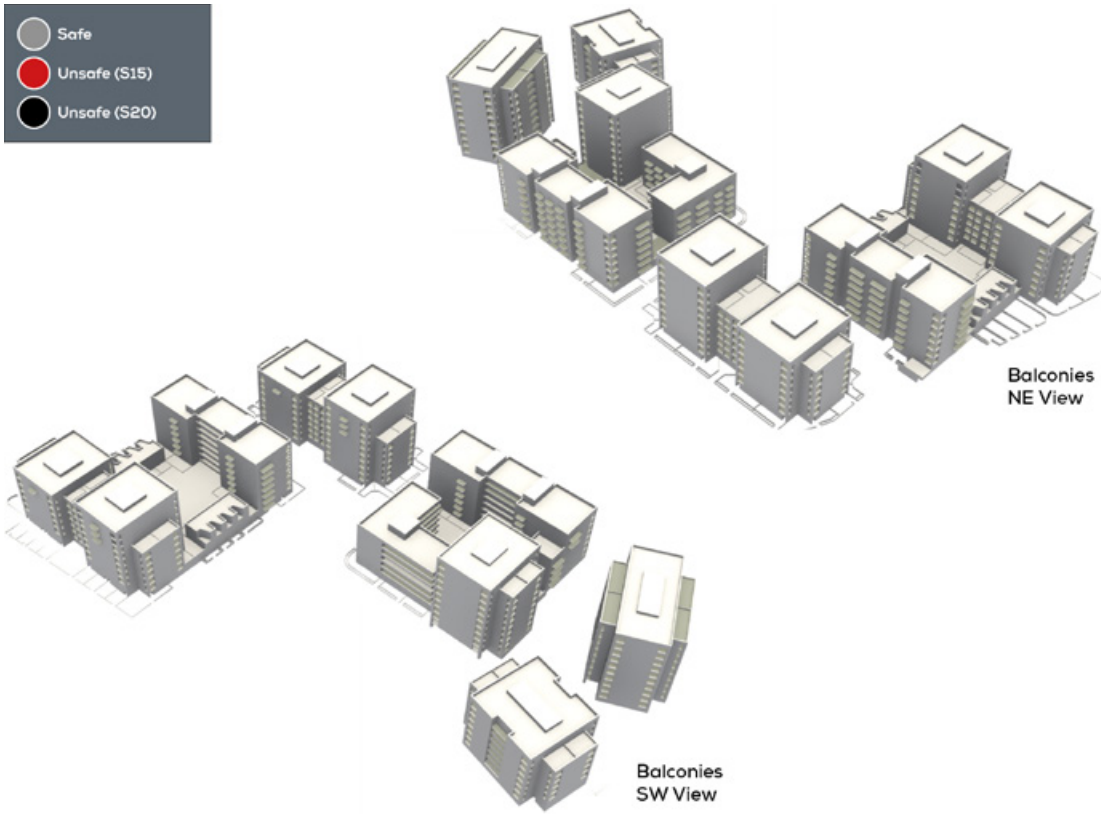

Fig. 14: Annual Safety at Balcony Levels, Proposed Development with Existing Surrounds

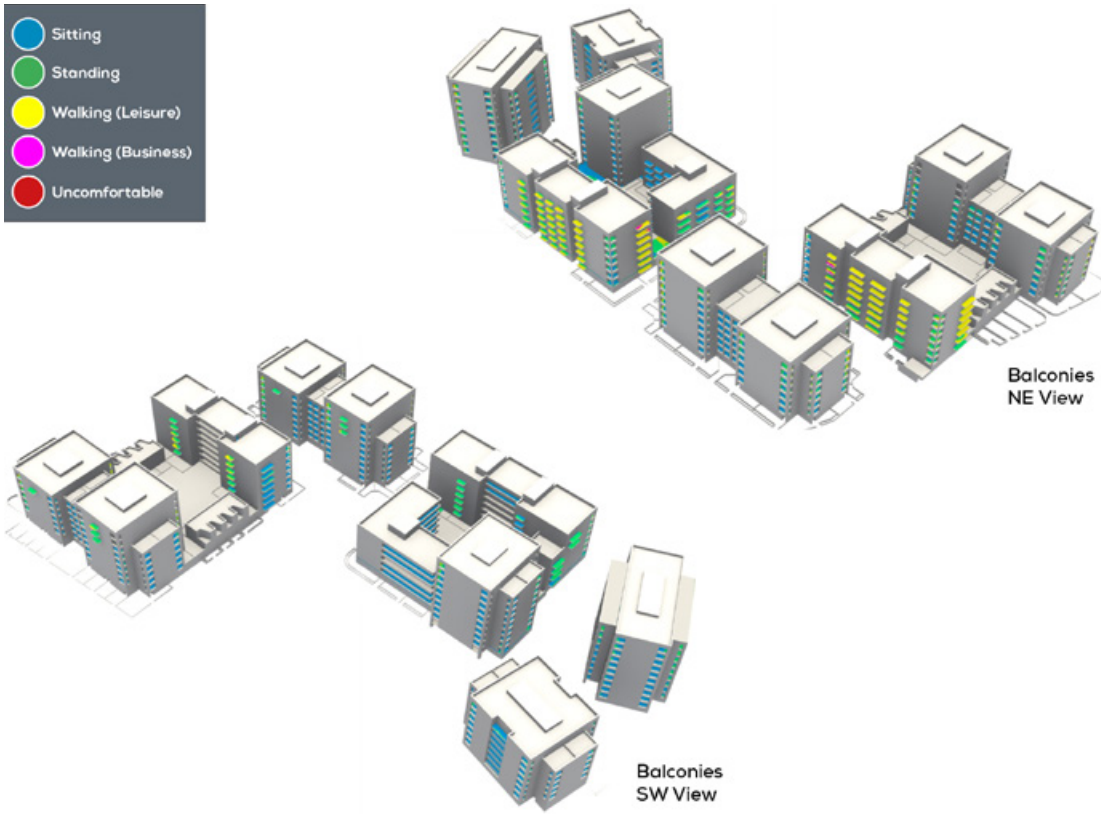

Fig. 15: Winter Comfort at Balcony Levels, Proposed Development with Existing Surrounds

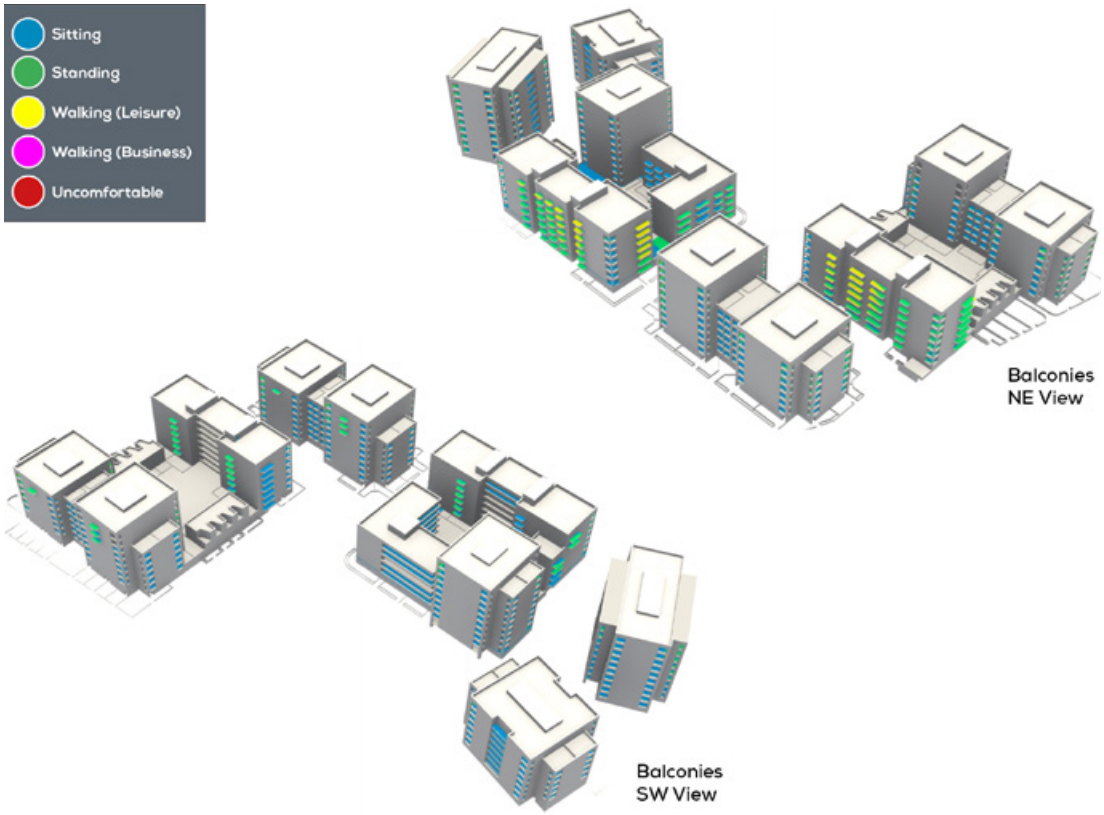

Fig. 16: Summer Comfort at Balcony Levels, Proposed Development with Existing Surrounds

3.3 CONDITIONS FOR PROPOSED DEVELOPMENT WITH CUMULATIVE SURROUNDS

Ground Level Conditions

Annual safety at ground level for the proposed development with existing surrounds is shown in Figure 17. Winter comfort at ground level for the proposed development with existing surrounds is shown in Figure 18. Summer comfort at ground level for the proposed development with existing surrounds is shown in Figure 19.

There are no wind safety risks within the site or surrounding area.

Whilst the inclusion of cumulative schemes results in conditions that are a category windier in off-site locations to the north west of the site and between Block C and HPH 4, conditions are one category calmer at the north of the site and especially west of Block B. Despite the above, the suitability of conditions is unchanged and remains consistent with those reported for the proposed development with existing surrounds in Section 3.2.

Elevated Level Conditions

Annual safety at terrace levels for the proposed development with existing surrounds is shown in Figure 20 Winter comfort at terrace levels for the proposed development with existing surrounds is shown in Figure 21. Summer comfort at terrace levels for the proposed development with existing surrounds is shown in Figure 22.

Annual safety at balcony levels for the proposed development with existing surrounds is shown in Figure 23. Winter comfort at balcony levels for the proposed development with existing surrounds is shown in Figure 24. Summer comfort at balcony levels for the proposed development with existing surrounds is shown in Figure 25.

There are no wind safety risks identified at terrace or balcony levels.

With the inclusion of cumulative schemes, conditions for the protruding balconies have become one category calmer on Block B. balconies on the western and southern elevations of Block B would now be suitable for sitting or standing in summer and would be suitable for the intended use.

The suitability of conditions for remaining balconies is unchanged and remains consistent with those reported for the proposed development with existing surrounds in Section 3.2.

There are no other material differences in wind conditions at elevated levels compared to the scenario with existing surrounds, and the suitability of conditions is consistent with those reported in Section 3.2.

Fig. 17: Annual Safety, Proposed Development with Cumulative Surrounds

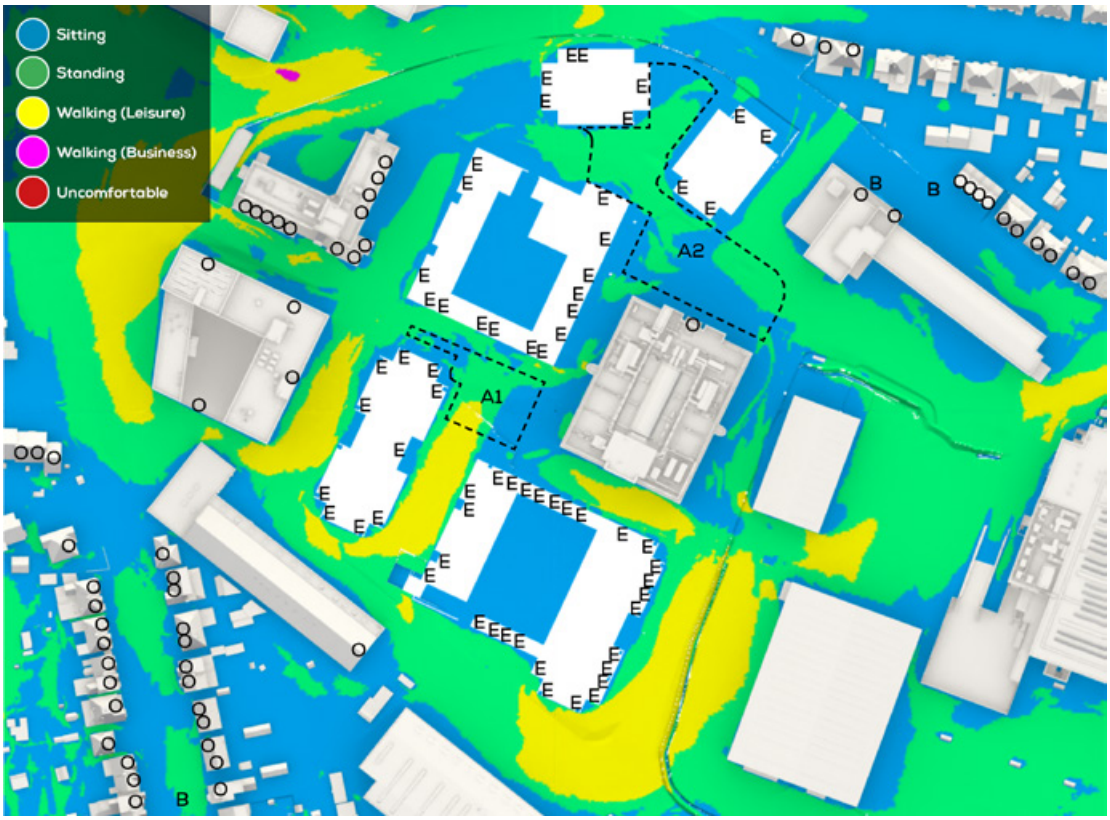

Fig. 18: Winter Comfort, Proposed Development with Cumulative Surrounds

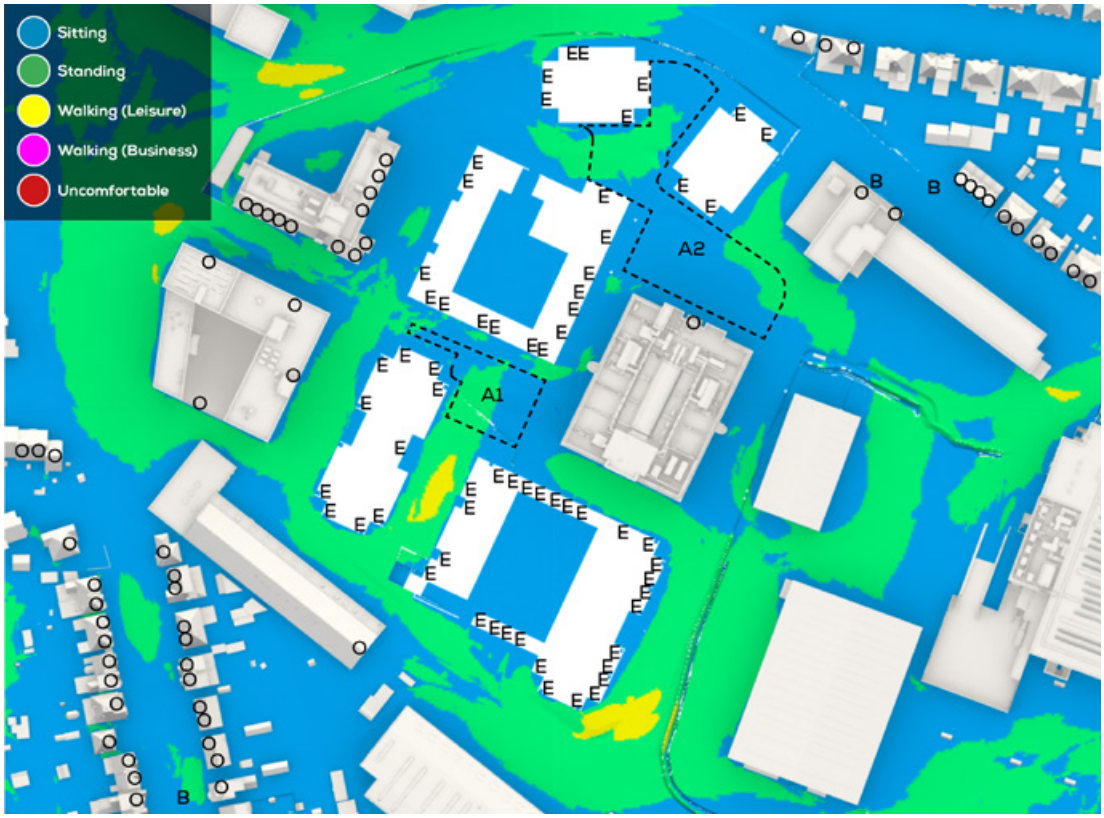

Fig. 19: Summer Comfort, Proposed Development with Cumulative Surrounds

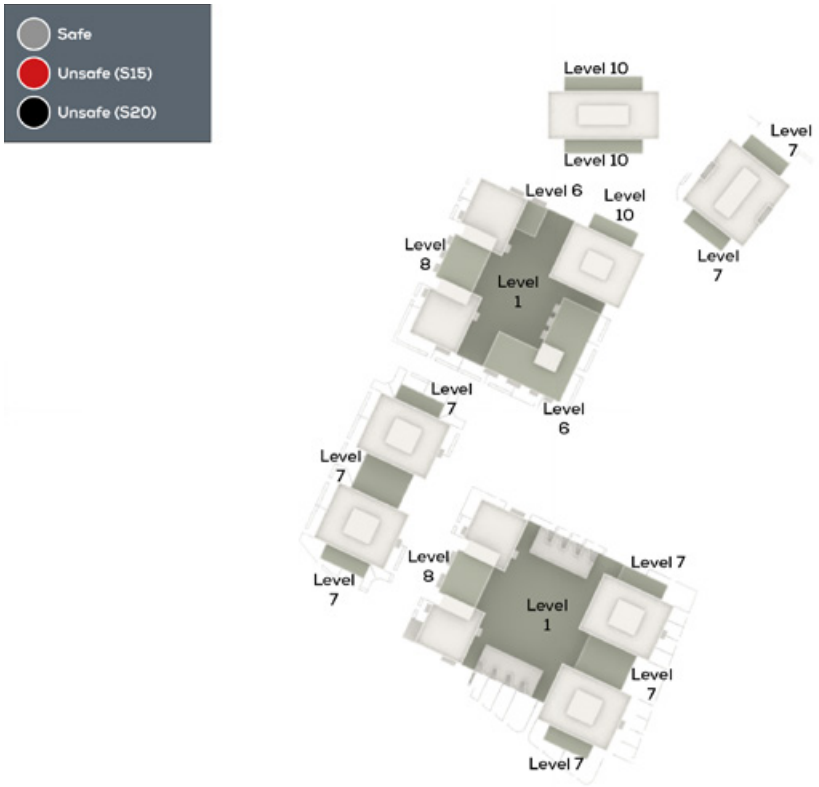

Fig. 20: Annual Safety at Terrace Levels, Proposed Development with Cumulative Surrounds

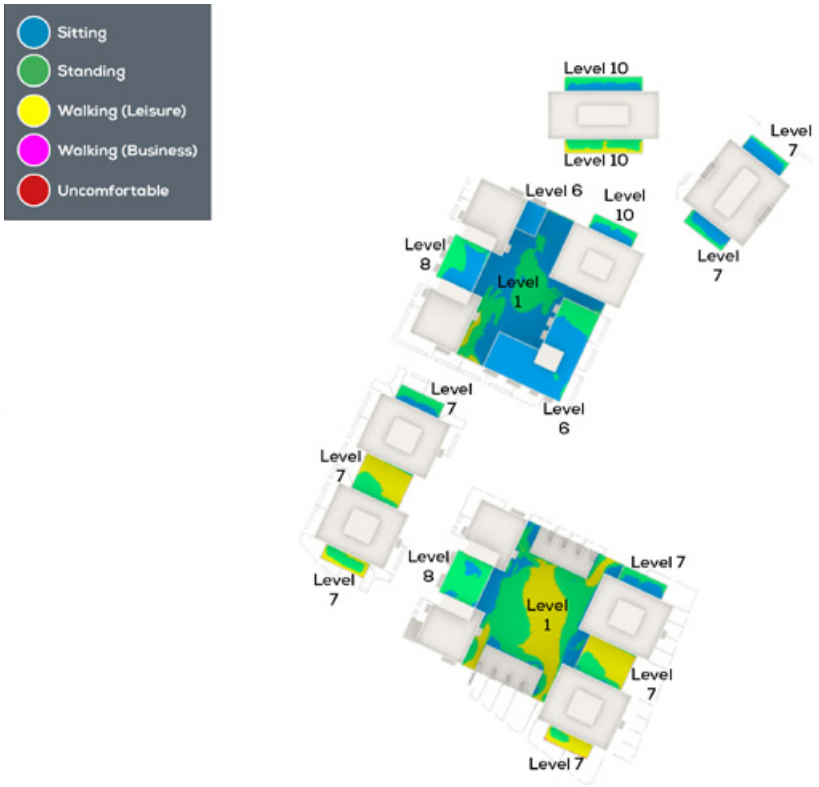

Fig. 21: Winter Comfort at Terrace Levels, Proposed Development with Cumulative Surrounds

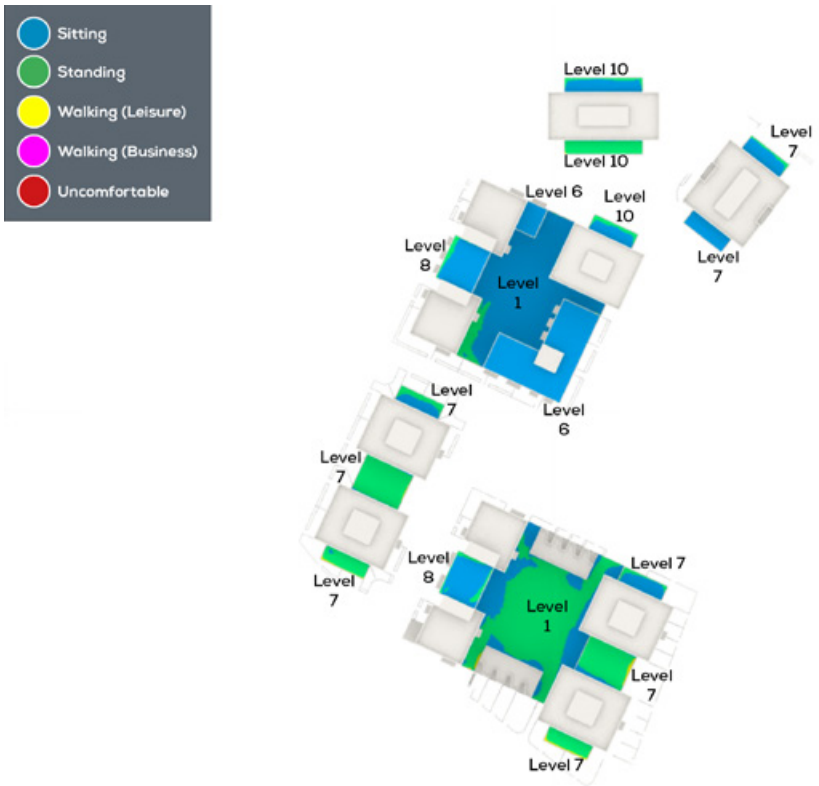

Fig. 22: Summer Comfort at Terrace Levels, Proposed Development with Cumulative Surrounds

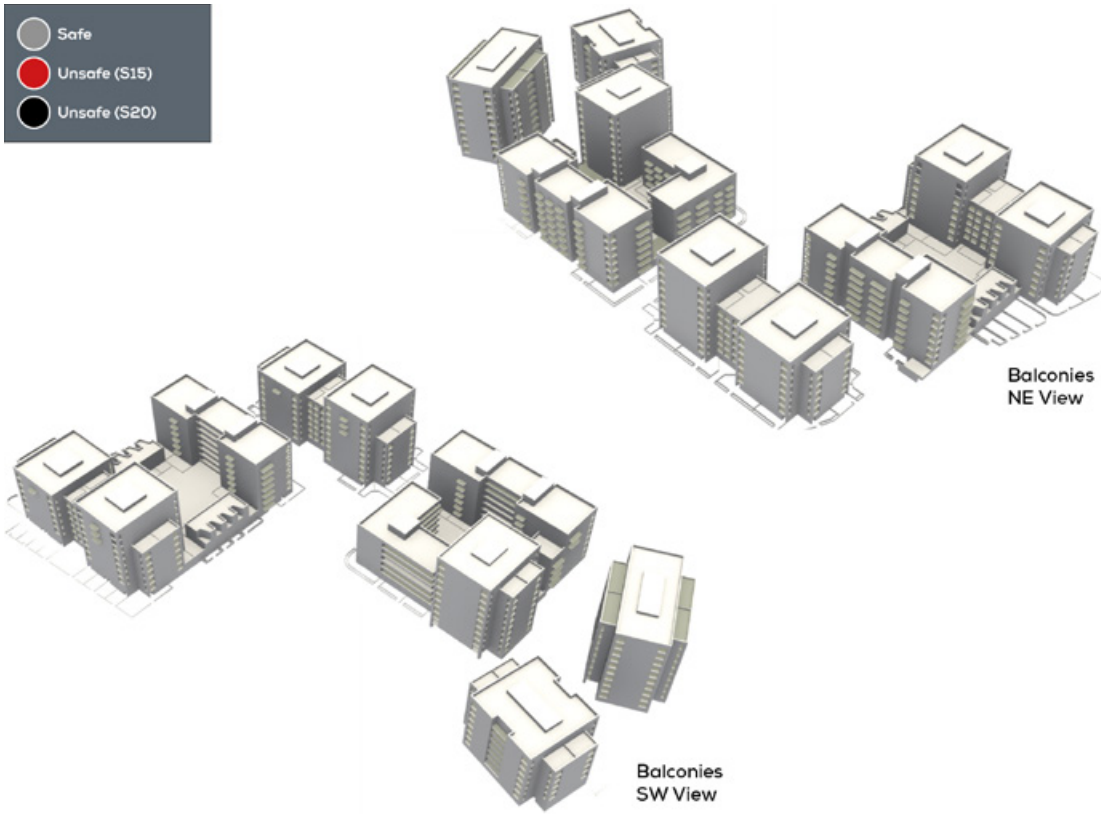

Fig. 23: Annual Safety at Balcony Levels, Proposed Development with Cumulative Surrounds

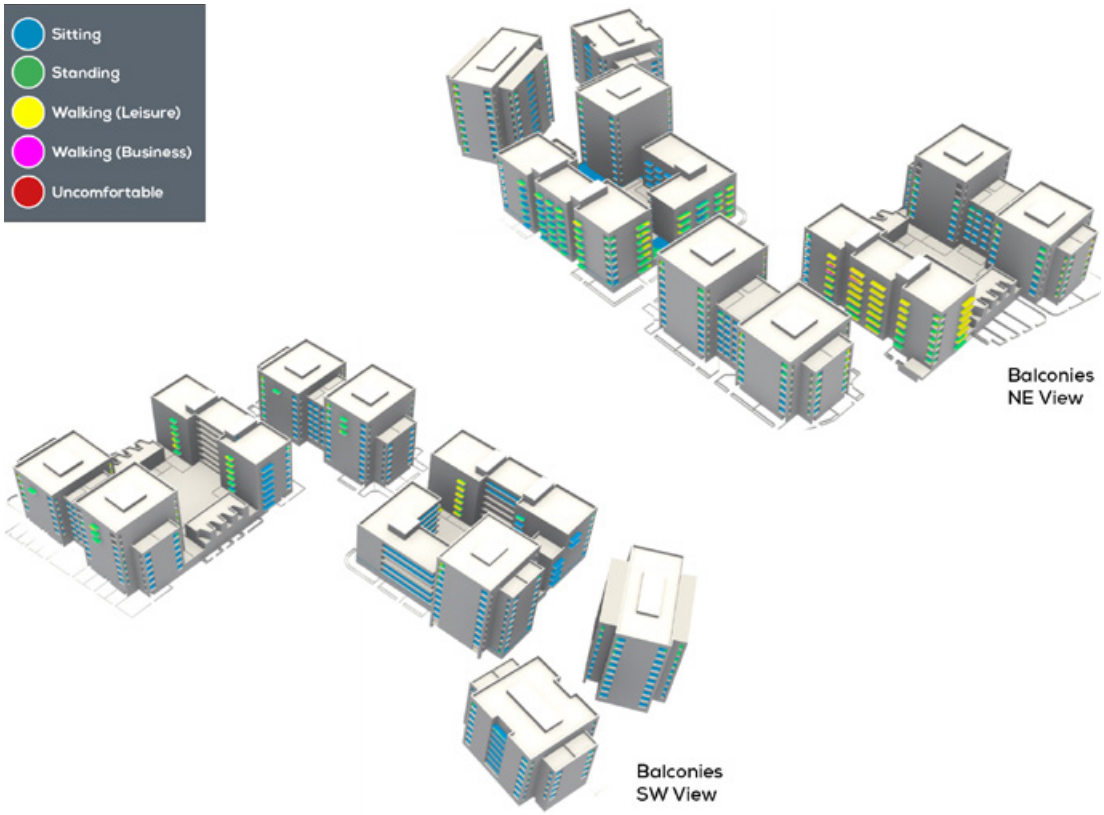

Fig. 24: Winter Comfort at Balcony Levels, Proposed Development with Cumulative Surrounds

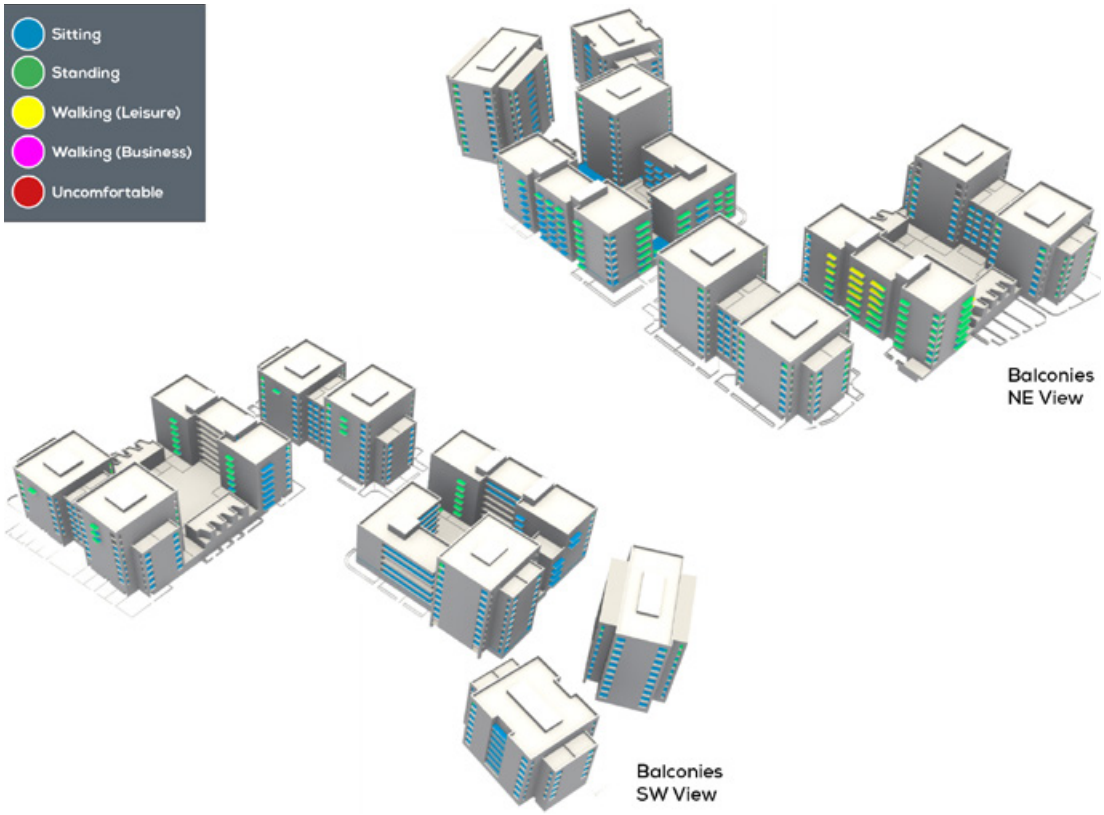

Fig. 25: Summer Comfort at Balcony Levels, Proposed Development with Cumulative Surrounds

4 CONCLUSIONS

Wind microclimate conditions for the proposed development at Hyde Park, Hayes were assessed using high resolution Computational Fluid Dynamics (CFD).

The proposed development has a significant beneficial impact on the level of wind safety risk to the north west of the site and will eradicate two pre-existing wind safety risks.

The proposed development will also have a beneficial impact on conditions around two entrance points on the south-east corner at 18 Millington Road, which would be made suitable for the intended use having been unsuitable in the baseline.

Wind comfort conditions would be suitable for all intended uses (or no worse than the baseline conditions) for all thoroughfares, roadways, proposed or existing building entrances, bus stops and proposed mixed amenity spaces.

For proposed seating at ground level, terraces and balconies, there would be some regions which are up to one category windier than the target condition based on the illustrative masterplan. Standard mitigation methods (such as raised planters, screening of baffles) would be expected to resolve these issues, and further testing is recommended at RMA stage by an experienced wind engineer to confirm this.

The inclusion of cumulative schemes makes conditions calmer in the region surrounding Block B and west of Block C.

The proposed development will not have any adverse impacts on long term wind microclimate.

APPENDIX 01
DETAILED METHODOLOGY

CFD METHODOLOGY

The CFD was performed using OpenFOAM.

Meshed using a hybrid mesh of hexahedral, polyhedral, tetrahedral and prismatic elements:

- On site building edge length: 0.05m - 0.25m
- Surrounding context edge length: 0.25m - 1m

Prismatic cells were used in the boundary layer region, with 4 layers of cells growing with an expansion ratio of 1.15 and aspect ratios between 0.1 and 0.4.

The total mesh size was between 86 and 111 million cells. Mesh detail is shown in Figure 13 and Figure 14.

Buildings within 400m of the site were included.

The domain was 5000mx5000m, with a blockage ratio of 0.5%

The blockage ratio uses a "test section" of 600mx200m (within which detail is captured).

Run using the SST turbulence model with high Re wall functions to ensure mesh suitability.

The simulations were steady state and isothermal.

2nd order discretisation schemes were used.

Convergence was measured as the residuals of the continuity, x-velocity, y-velocity, z-velocity, k and omega equations all falling by at least 2 orders of magnitude, and by measured static pressure on the site buildings varying by less than 1% over the final 100 iterations.

The wind speed is corrected into a "gust-equivalent" mean. The gust-equivalent mean is calculated using an empirical relationship between the gust and mean ratios recorded at over 13,000 data points from wind tunnel tests. This method is found to give a significant correlation improvement over the more traditional methods based on the CFD turbulent kinetic energy field.

WIND CLIMATE METHODOLOGY

The simulations were performed form 18 wind directions, spaced such that no single direction contributed more than 10% of the annual winds.

The directions simulated were 0°,30°,60°,90°,120°,150°,180°,200°,210°,220°,230°,240°, 250°, 260°, 270°, 280°, 300°, 330°.

Seasonal wind roses for London Heathrow and City airports combined are shown in n Figure 15.

Target wind profiles for the site, from each wind direction, were generated using sectoral analysis of the terrain surrounding the site and the local weather stations with ESDU 2010 Item01008 'Computer program for wind speeds and turbulent properties: flat or hilly sites in terrain with roughness changes'. The target wind profiles, compared to the wind speeds measured from the CFD model are shown in Figure 16.

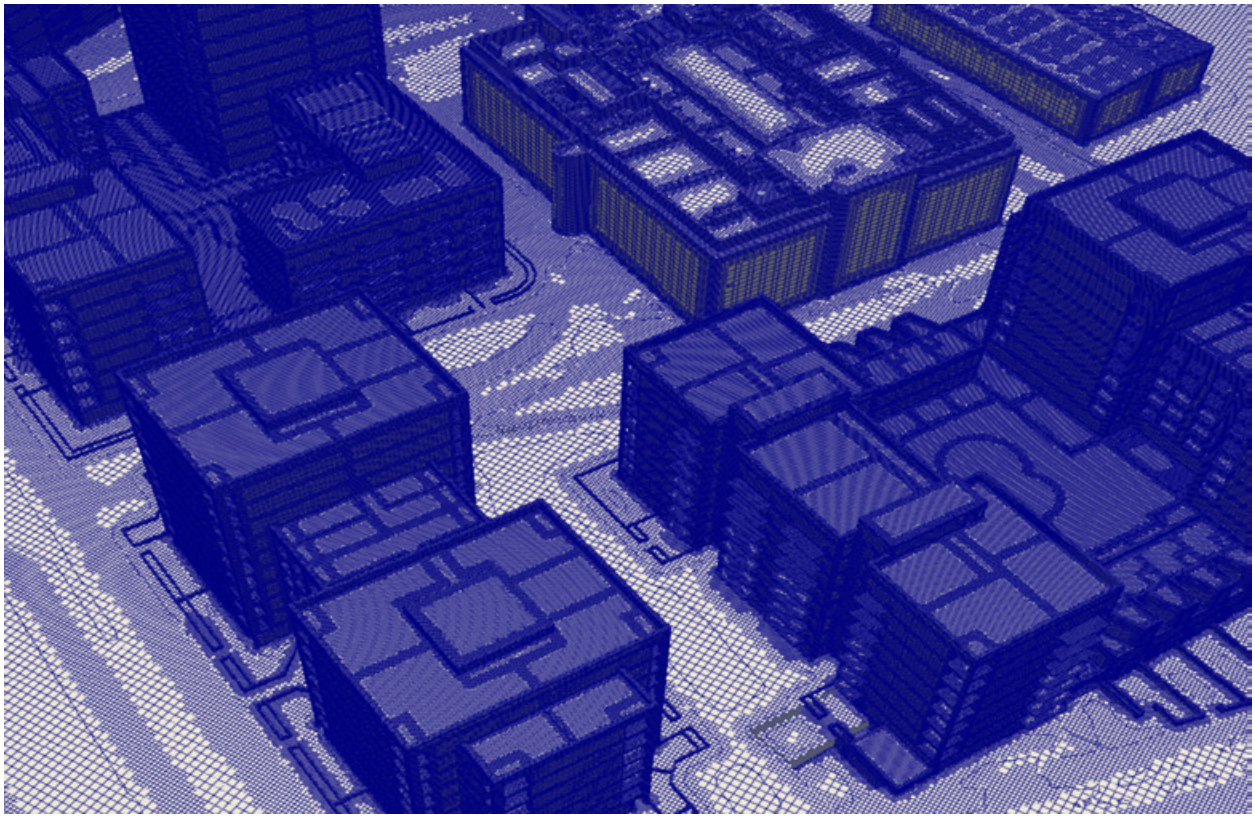

Fig. 26: Mesh Detail on Site Buildings

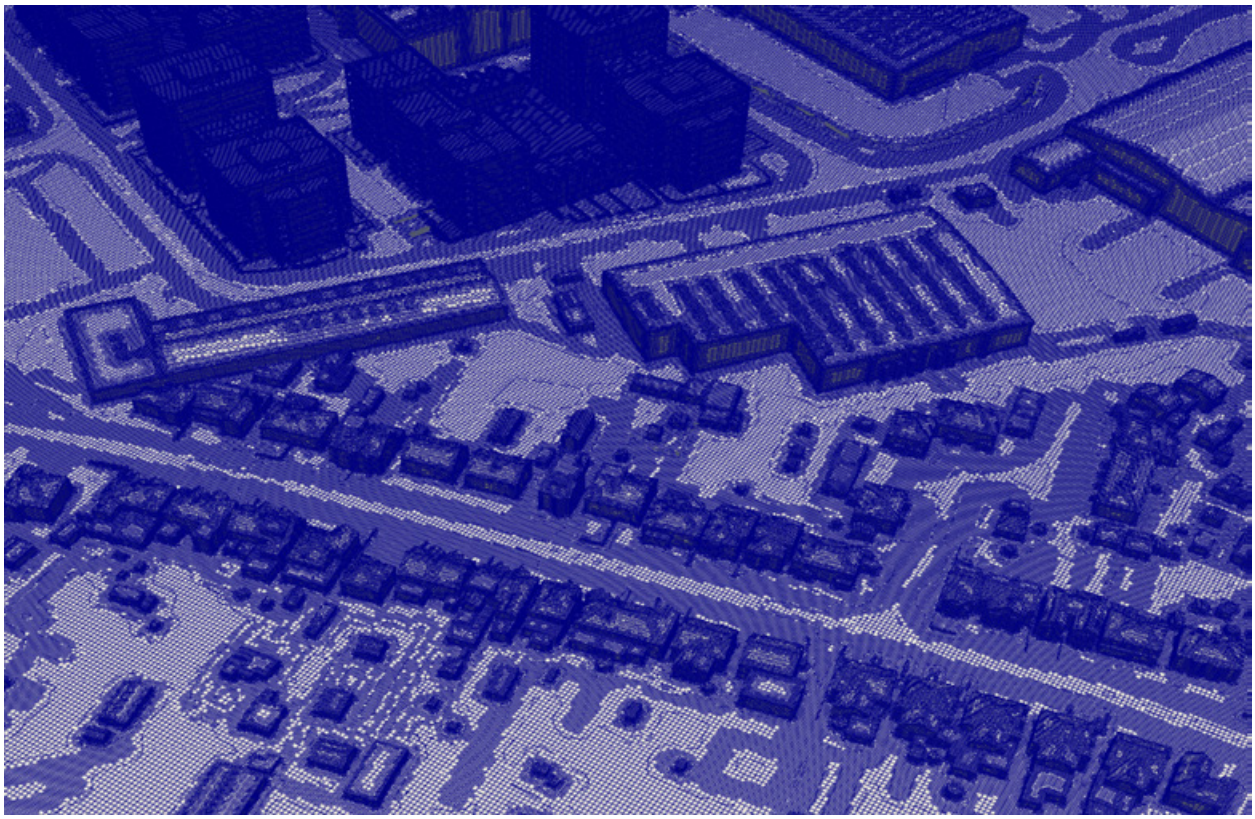

Fig. 27: Mesh Detail on Surrounds

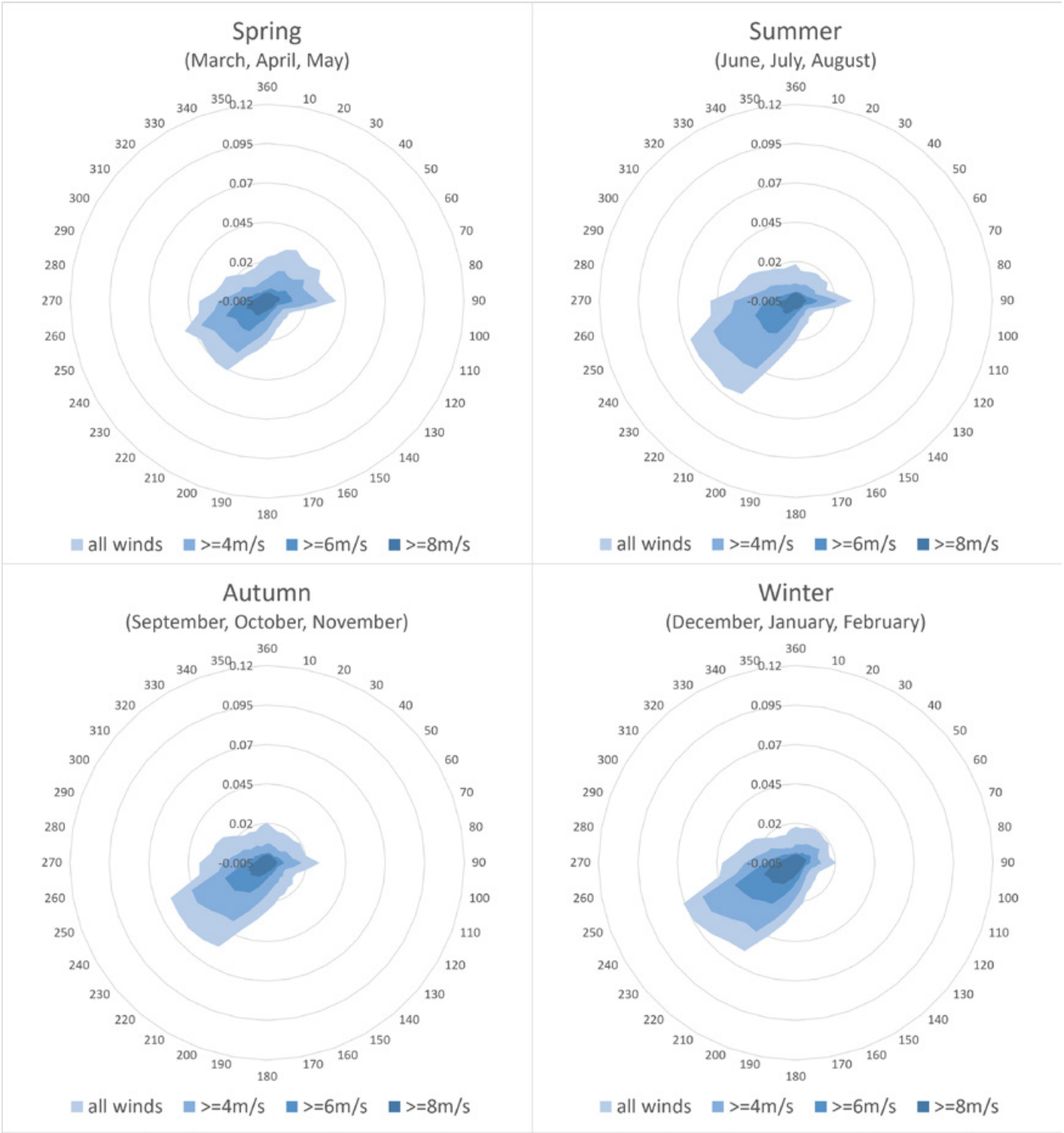

Fig. 28: Seasonal Wind Roses for London (Combined)

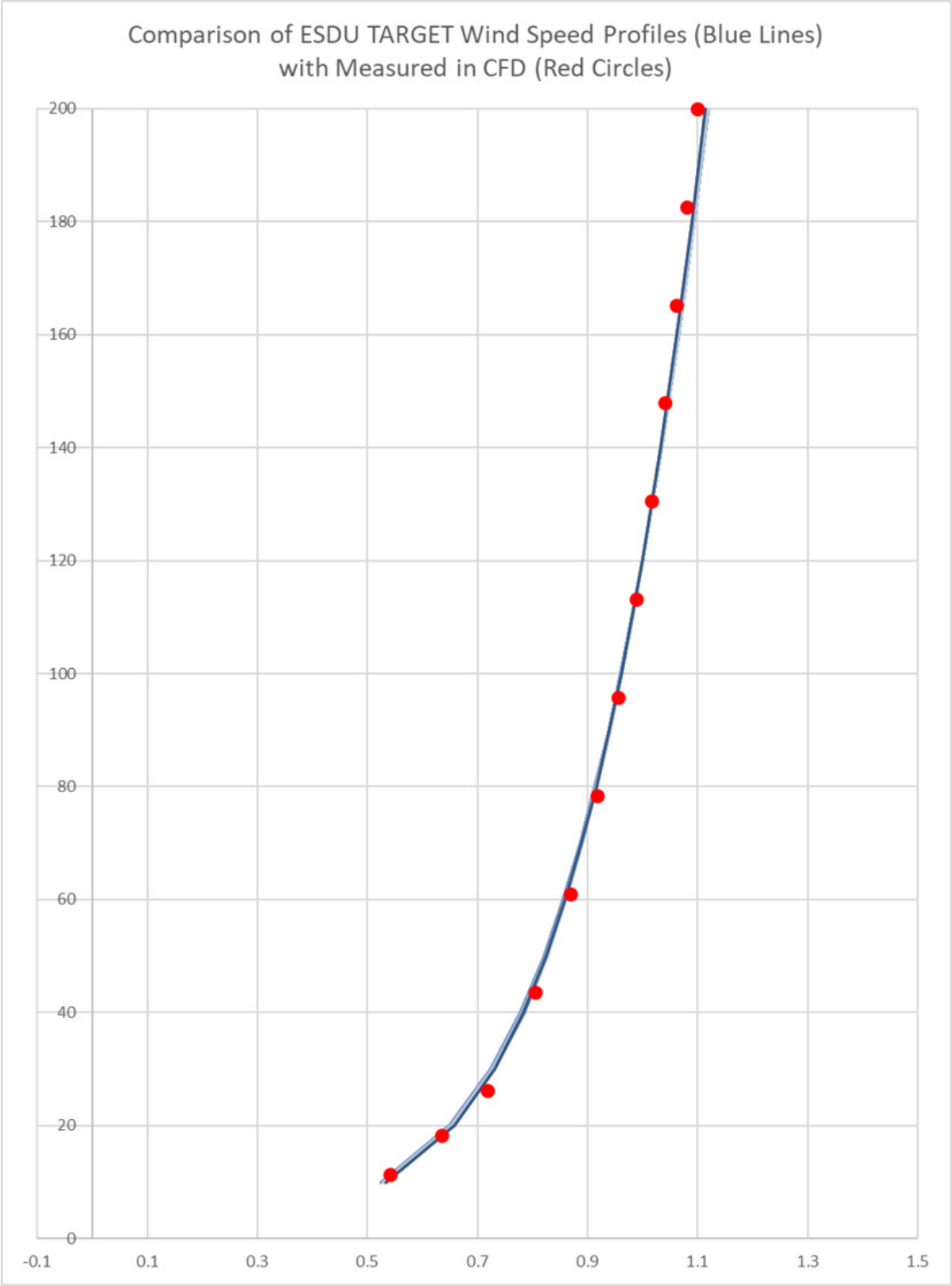

Fig. 29: Wind Profile for Hyde Park Hayes

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What we do:

Building Surveying
Daylight & Sunlight
Light Obstruction Notices
Measured Surveys
Party Wall & Neighbourly Matters
Rights of Light
Solar PV
Wind Analysis

Where we are:

Belfast
Birmingham
Bristol
Dublin
London
Manchester

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