WIND MICROCLIMATE ASSESSMENT REPORT

Highgate Studios

5 March 2024

GIA No: **18261**

PROJECT DATA:

Client	**Hondo Enterprises**
Project Title	**Highgate Studios**
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REPORT DATA:

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Prepared by	**JW**
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CONTENTS

1 INTRODUCTION

This report outlines the results of a wind microclimate analysis for the proposed development at Highgate Studios, in London Borough of Camden.

1.1 SUMMARY

Wind microclimate conditions for the proposed development at Highgate Studios were assessed using high resolution Computational Fluid Dynamics (CFD).

There are no wind safety risks associated with the proposed development at ground level.

Wind comfort conditions will be suitable for the intended use for all thoroughfares, existing building entrances, proposed building entrances, bus stops, existing amenity spaces, and proposed amenity at ground floor.

Conditions for the majority of proposed roof terraces are suitable for use as amenity terraces, but there are some to the west of the site (in particular at levels 5 and 7 for Plot A and level 4 of Plot F) which would require mitigation in order to achieve suitable conditions. This mitigation would be expected to be relatively straightforward (the inclusion a glazed balustrade around the terraces, the inclusion of landscaping on the terraces, or the inclusion of free-standing screens or baffles on the terraces).

GUIDANCE

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.

Camden Local Plan (2017)

Paragraph 6.24 of the Camden Local Plan (2017) states that:

"Large developments can alter the local climate. Buildings can affect the flow of air and cause wind tunnels which can potentially affect the enjoyment of public spaces...Developments should therefore consider local topography and the local microclimate in their design."

Camden Planning Guidance - Amenity (2021)

Section 7 of the Camden Amenity CPG (2021) sets out the requirements for a wind assessment within LBC. The key messages are:

- "New developments should consider the local wind environment, local temperature, overshadowing and glare, both on and off the site;
- Buildings taller than their surroundings may cause excessive wind in neighbouring streets and public areas; and
- Where poor wind conditions already exist reasonable attempts must be made to improve conditions."

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 from 18 wind angles, spaced using 10° or 30° increments such that no sector contributes more than 10% of the annual wind. The wind angles which were run are indicated in Appendix 01.

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 mean correction factors between the site and the airport are shown in Table 1.

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.

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

Table 01: Site Wind Correction Factors

DIRECTION (°N)	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Corr. Factor	1.37	1.4	1.37	1.41	1.36	1.38	1.38	1.47	1.47	1.47	1.37	1.39

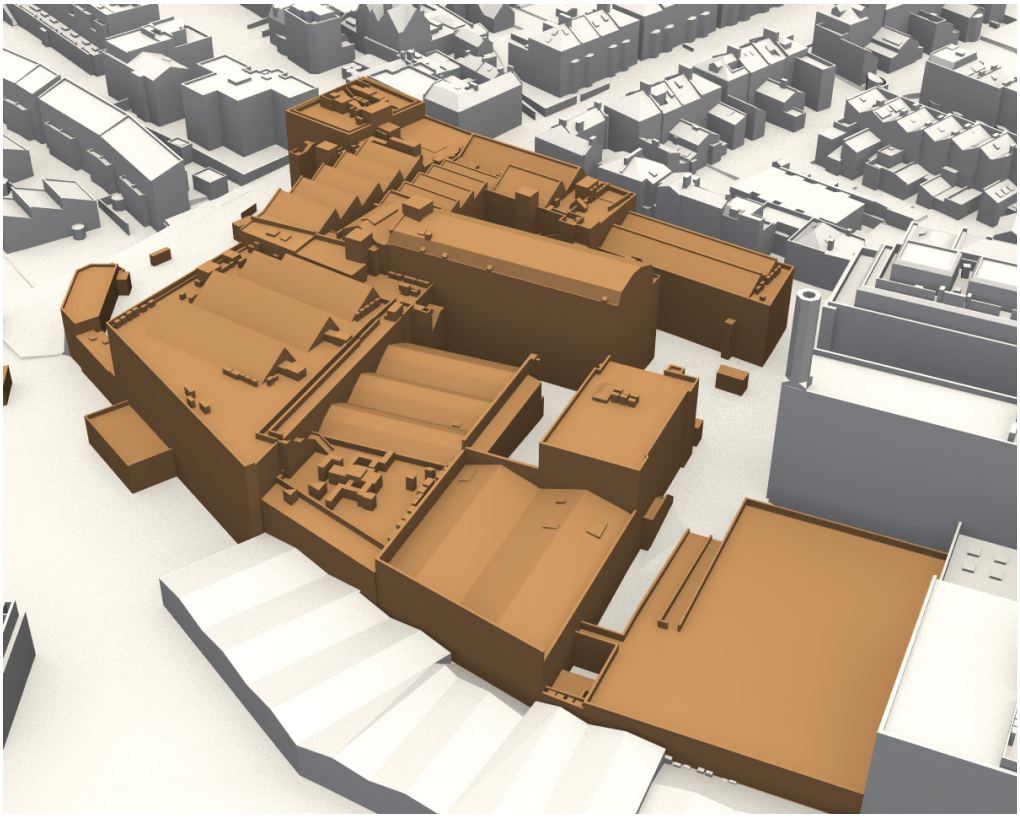

Fig. 01: 3D View of Existing Site

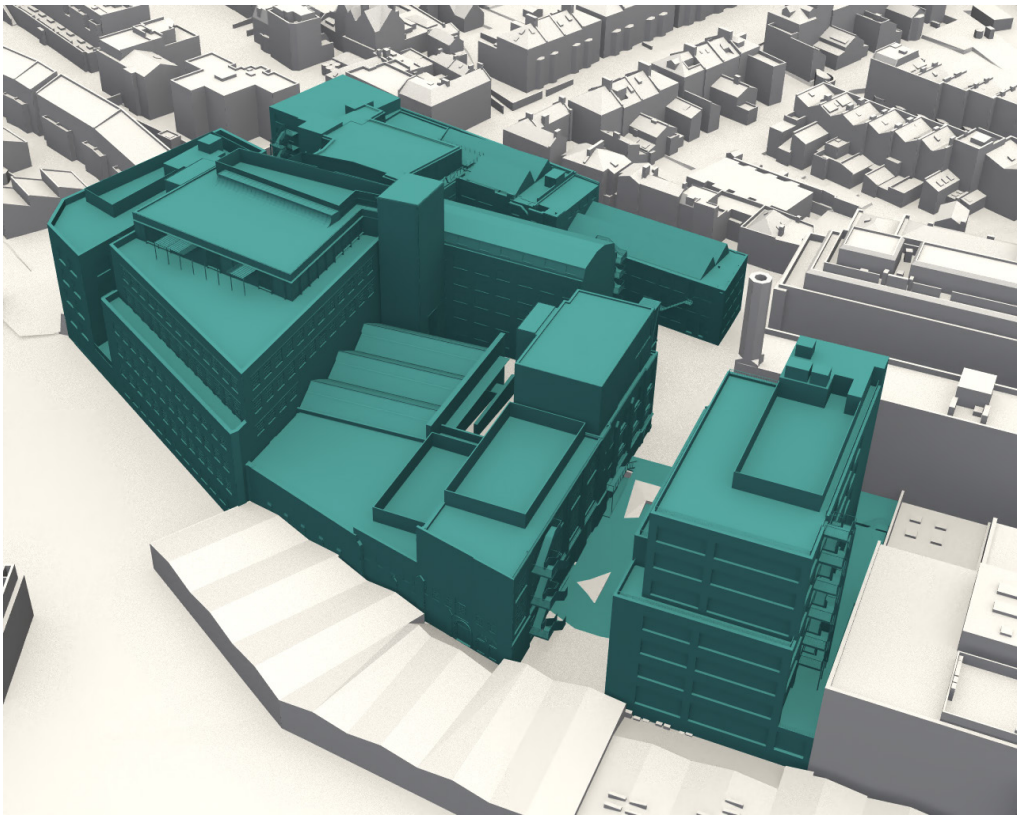

Fig. 02: 3D View of Proposed Development

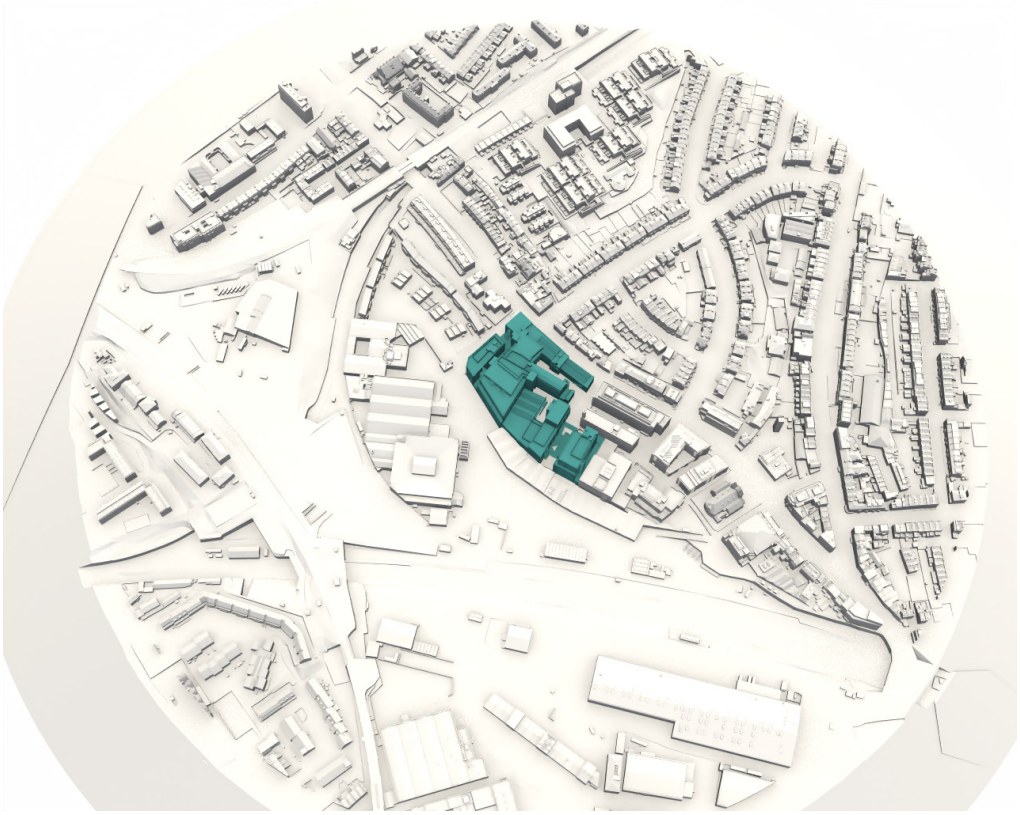

Fig. 03: Proposed Development with Existing Surrounds

Fig. 04: Sensitive Wind Receptors

2.4 LAWSON COMFORT AND SAFETY CRITERIA

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

Table 2 and Table 3 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 02: 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 Proposed 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 03: 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 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 Highgate Road (marked "B"" on Figure 4) within the study area. These are targeted to be suitable for standing.

The proposed public realm on Carker's Lane (marked "CL" on Figure 4) is targeted to be suitable for leisure walking in winter and standing in summer.

There are existing off-site residential gardens (marked "G" in Figure 4), as well as proposed amenity in the form of Sanderson' Yard (marked "SY"), Highgate Passage (marked "HP"), The Secret Garden (marked "SG"), The Water Yard (marked "WY"), Carker's Yard (marked "CY") and roof terraces on Plots A, B, E, F and J. These spaces are targeted to be suitable for a mixture of sitting and standing in summer.

The locations of sensitive receptors are shown in Figure 4.

2.6 TEST SCENARIOS

The purpose of these tests was to compare conditions with and without the proposed development.

The following scenarios were tested:

- Baseline: The existing building on site, with the existing surrounds (including any planning consented schemes which are under construction at the time of writing); and
- Proposed Development with Existing Surrounds: The completed and operational development with the existing surrounds;

The following consented schemes were sufficiently advanced to be included in the baseline:

- 11-12 Ingestre Road (2018/4449/P)
- Greenwood Place Development (2016/5372/P)
- 369-377 Kentish Town Road (2019/0910/P)
- 9 Fortess Road (2005/2242/P)

There are no significant consented schemes within a 400m radius of the proposed development which are not sufficiently advanced to be included in the baseline, so a separate cumulative assessment has not been undertaken at the current juncture.

It should be noted that there have also been plans for the redevelopment of Murphy's Yard (immediately south west of the site) although these have been withdrawn and this is therefore not considered explicitly. Given the location of Murphy's Yard (directly upwind of the site from the dominant south westerly direction) it is likely that any development on this site would obstruct the oncoming winds and create calmer conditions around the site. So the results presented herein represent a reasonable worst case scenario.

Trees or soft landscaping were not included in the assessment, to ensure conservative results.

3 RESULTS

3.1 BASELINE CONDITIONS

Ground Level Conditions

Annual safety at ground level for the baseline scenario is shown in Figure 5. Winter comfort at ground level for the baseline scenario is shown in Figure 6. Summer comfort at ground level for the baseline scenario is shown in Figure 7.

There are no wind safety risks identified within the study area.

Winter conditions range between suitable for sitting, standing and leisure walking. Summer conditions range between suitable for sitting and standing.

All principal off-site entrances (marked "O" in results figures) are suitable for either sitting or standing in all seasons. This is suitable for the intended use.

The bus stops within the study area (marked "B" in results figures) are suitable for sitting in all seasons. This is suitable for the intended use.

The off-site residential gardens (marked "G" in results figures) are suitable for sitting in all seasons (apart from some highly localised regions which are only suitable for standing in winter). This is suitable for the intended use.

Fig. 05: Annual Safety, Baseline

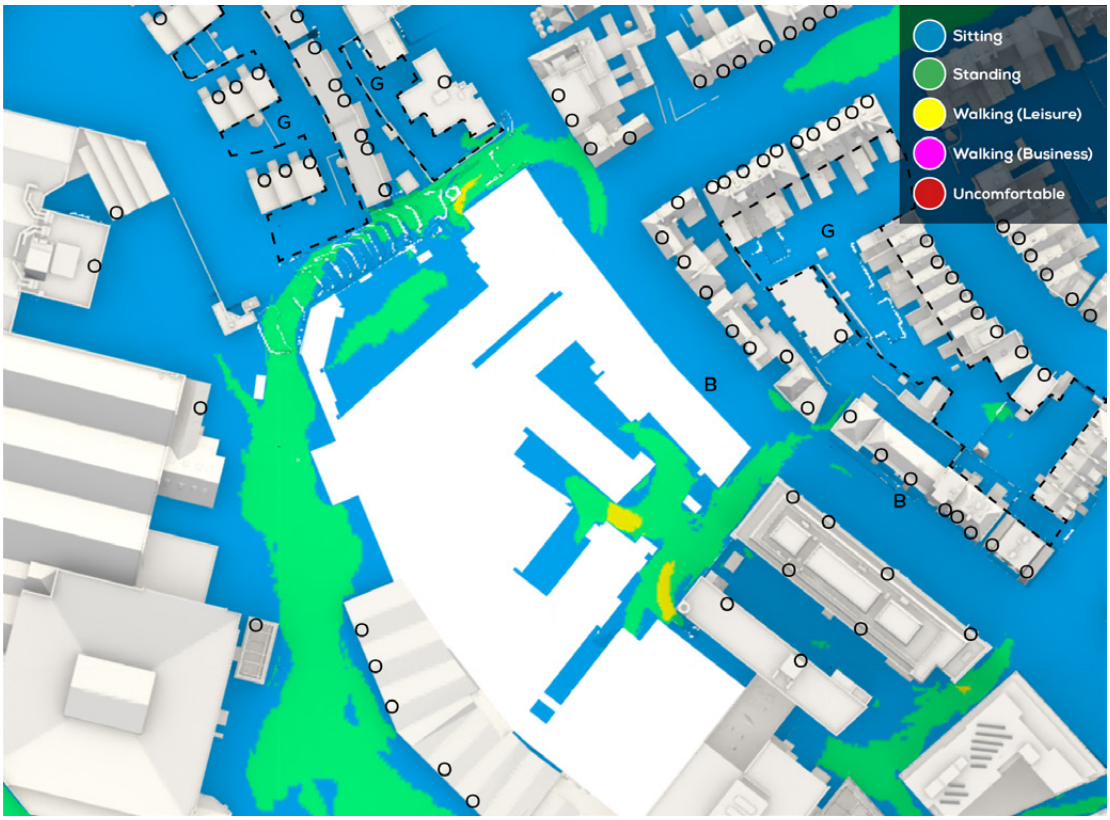

Fig. 06: Winter Comfort, Baseline

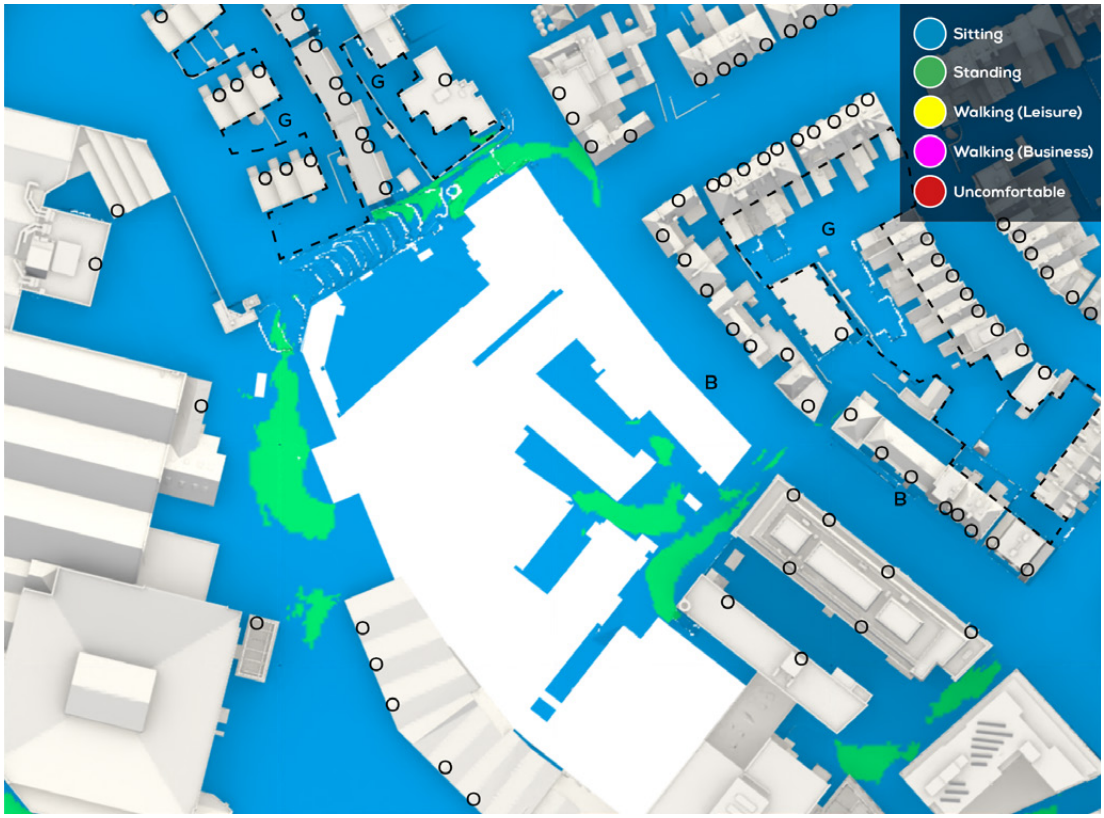

Fig. 07: Summer Comfort, Baseline

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.

There are no wind safety risks identified within the study area.

Winter conditions range between suitable for sitting, standing and leisure walking. Summer conditions range between suitable for sitting and standing.

All principal proposed entrances (marked "E" in results figures) are suitable for either sitting or standing in all seasons. This is suitable for the intended use,

All principal off-site entrances (marked "O" in results figures) are suitable for either sitting or standing in all seasons. This is suitable for the intended use.

The bus stops within the study area (marked "B" in results figures) are suitable for sitting in all seasons. This is suitable for the intended use.

The off-site residential gardens (marked "G" in results figures) are suitable for sitting in all seasons (apart from some highly localised regions which are only suitable for standing in winter). This is suitable for the intended use.

Carker's Lane (marked "CL" in results figures) is suitable for a mix of standing and leisure walking in winter and for a mix of sitting and standing in summer. This is suitable for the intended use.

Sanderson' Yard (marked "SY" in results figures) is suitable for a mix of sitting, standing and leisure walking in winter and for a mix of sitting and standing in summer. This is suitable for the intended use.

Highgate Passage (marked "HP" in results figures) is suitable for a mix of sitting and standing in winter and for sitting in summer. This is suitable for the intended use.

The Secret Garden (marked "SG" in results figures) is suitable for a mix of sitting and standing in winter and for sitting in summer. This is suitable for the intended use.

The Water Yard (marked "WY" in results figures is suitable for a mix of sitting and standing in winter and for sitting in summer. This is suitable for the intended use.

Carker's Yard (marked "CY" in results figures) is suitable for a mix of sitting and standing in winter and for sitting in summer. This is suitable for the intended use.

Terrace Level Conditions

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

There are no safety exceedances on the Plot A level 1 terrace. Conditions are suitable for a mix of sitting, standing and leisure walking in winter and for a mix of sitting and standing in summer. This is suitable for the intended use.

There are no safety risks within the balustrade line of the Plot A level 4 terrace. Conditions are suitable for a mix of sitting, standing and leisure walking in winter and for a mix of sitting and standing in summer. This achieves the target condition, although a greater expanse which is suitable for sitting could be desirable.

There are no safety exceedances on the Plot A level 5 terrace. Conditions are suitable for a mix of sitting, standing and leisure walking in all seasons. This is a category windier than the target condition.

There is a region of safety exceedance across the western corner of the Plot A level 7 terrace. This could pose a risk to the safety of terrace users should the terrace be occupied on windy days. Conditions are suitable for a mix of standing, leisure walking and business walking in winter and for a mix of standing and leisure walking in summer. This is one to two categories windier than the target condition.

There are no safety exceedances on the Plot B level 3 terrace. Conditions are suitable for standing in winter and for a mix of sitting and standing in summer. This is suitable for the intended use.

There are no safety exceedances on the Plot E level 3 terrace. Conditions are suitable for standing in winter and for a mix of sitting and standing in summer. This is suitable for the intended use.

There are no safety exceedances on the Plot E level 5 terrace. Conditions are suitable a mix of sitting and standing in all seasons. This is suitable for the intended use.

There is a region of safety exceedance at the southern corner of the Plot F level 4 terrace. This could pose a risk to the safety of terrace users should the terrace be occupied on windy days. Conditions are suitable for a mix of sitting, standing and leisure walking in all seasons. This is a category windier than the target condition.

There are no safety exceedances at any of the three (north, east and west) Plot J level 4 terraces. Conditions are suitable for sitting in all seasons (apart from some highly localised regions which are only suitable for standing in winter). This is suitable for the intended use.

Overall, terrace conditions are windier towards the western boundary of the site and calmer towards the east. Those terraces which show safety exceedances or unsuitable conditions (at levels 5 and 7 for Plot A and level 4 of Plot F) would require mitigation to create calmer conditions. This could be achieved via a combination of the following measures:

- Glazed balustrades along the western perimeters of the terraces;
- The inclusion of landscaping such as trees or hedges within the terraces; or
- The inclusion of free-standing screens or baffles within the terraces (especially in proximity to any potential seating areas);

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

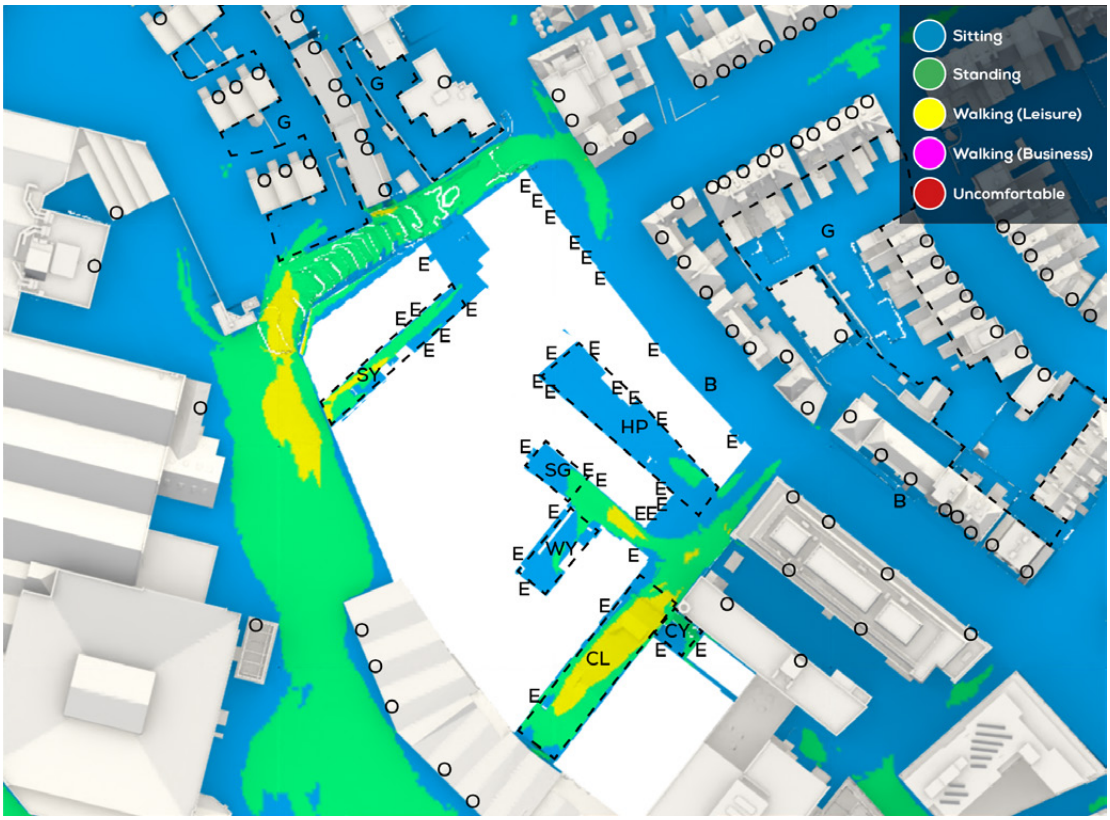

Fig. 09: Winter Comfort, Proposed Development with Existing Surrounds

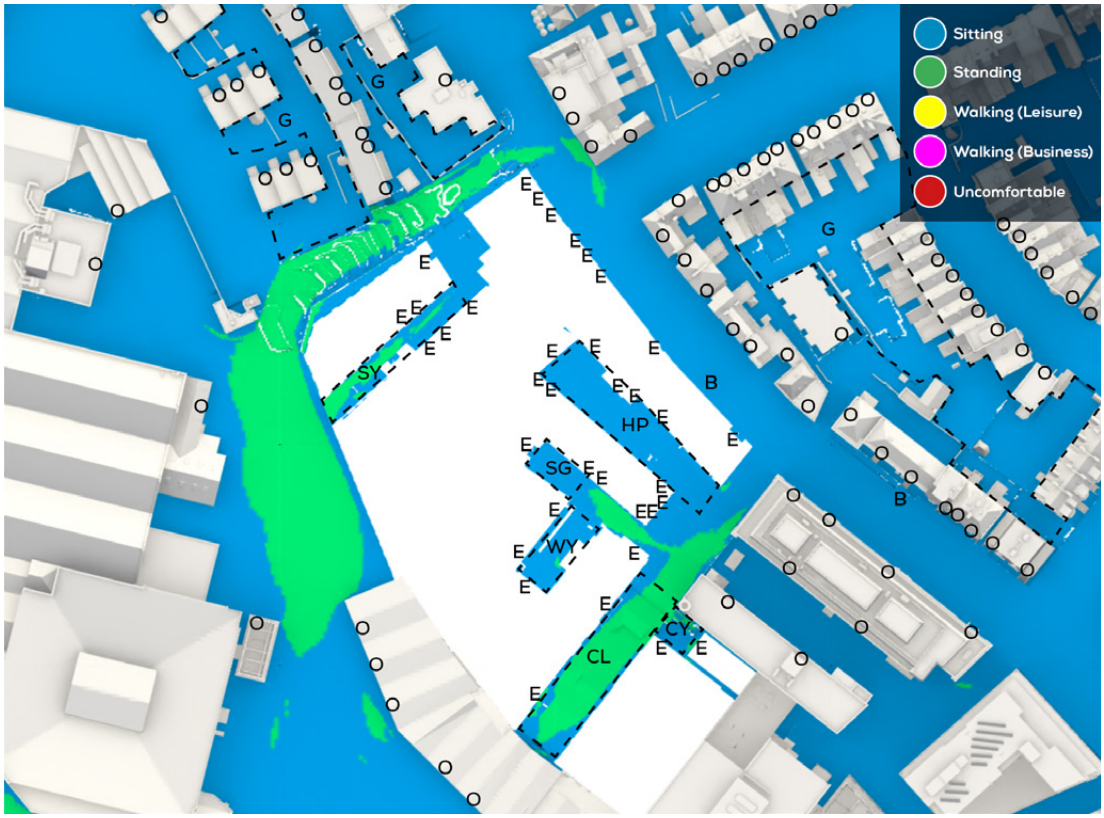

Fig. 10: Summer Comfort, Proposed Development with Existing Surrounds

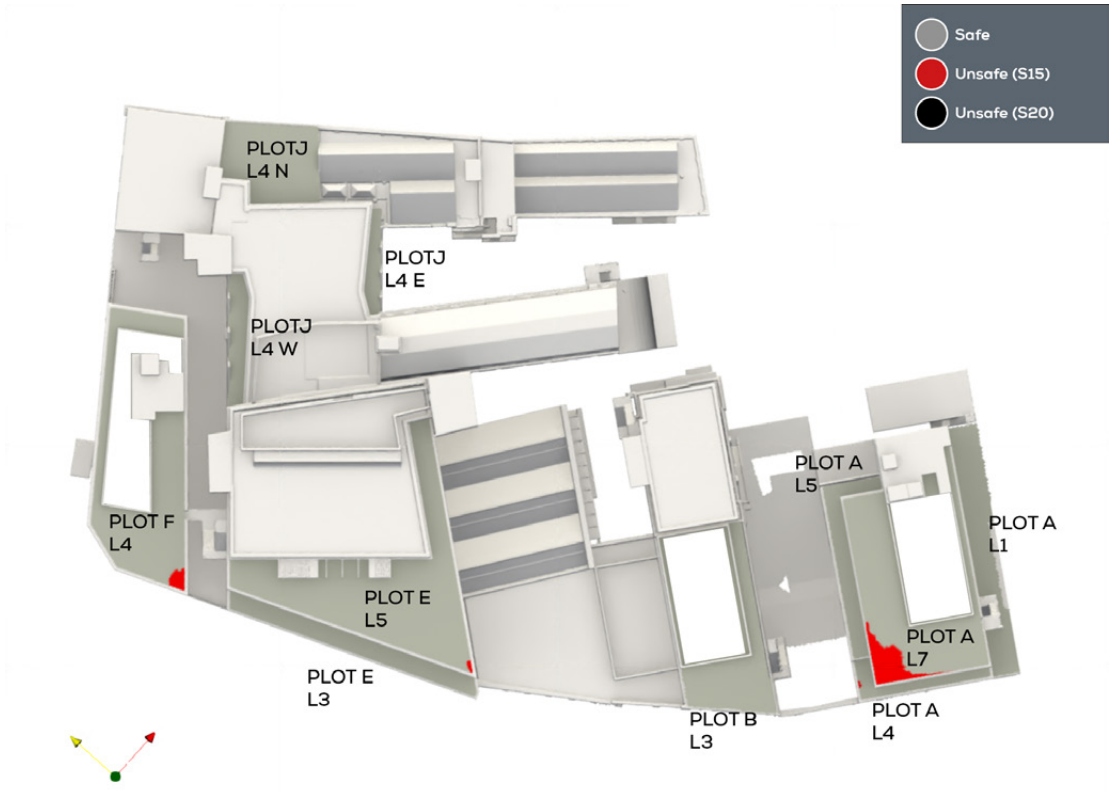

Fig. 11: Annual Safety at Proposed Terrace Levels, Proposed Development with Existing Surrounds

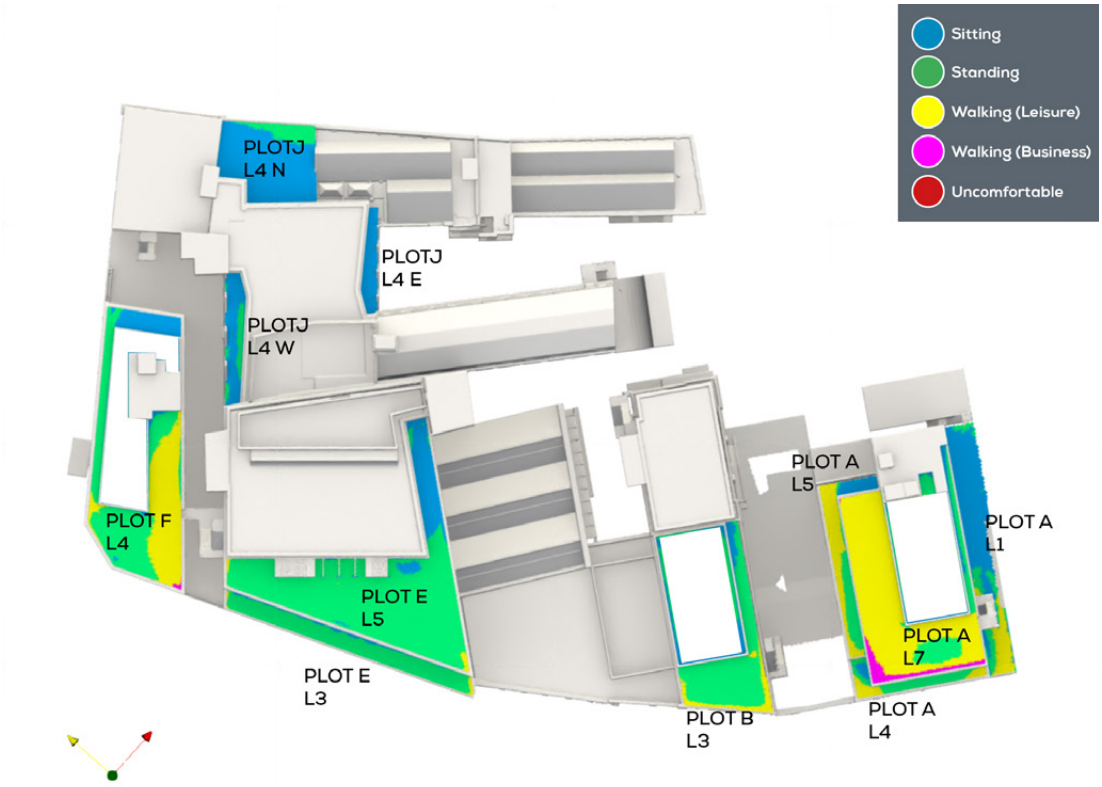

Fig. 12: Winter Comfort at Proposed Terrace Levels, Proposed Development with Existing Surrounds

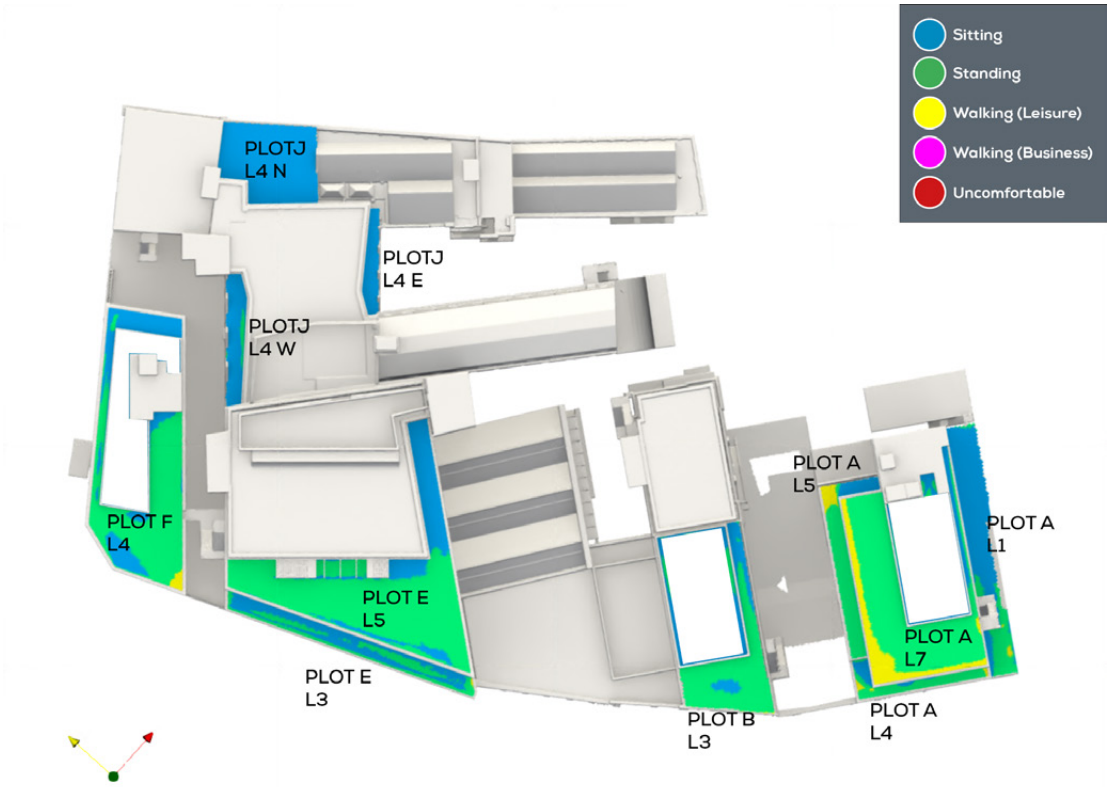

Fig. 13: Summer Comfort at Proposed Terrace Levels, Proposed Development with Existing Surrounds

4 CONCLUSIONS

Wind microclimate conditions for the proposed development at Highgate Studios were assessed using high resolution Computational Fluid Dynamics (CFD).

There are no wind safety risks associated with the proposed development at ground level.

Wind comfort conditions will be suitable for the intended use for all thoroughfares, existing building entrances, proposed building entrances, bus stops, existing amenity spaces, and proposed amenity at ground floor.

Conditions for the majority of proposed roof terraces are suitable for use as amenity terraces, but there are some to the west of the site (in particular at levels 5 and 7 for Plot A and level 4 of Plot F) which would require mitigation in order to achieve suitable conditions. This mitigation would be expected to be relatively straightforward (the inclusion a glazed balustrade around the terraces, the inclusion of landscaping on the terraces, or the inclusion of free-standing screens or baffles on the terraces).

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 95 and 103 million cells. Mesh detail is shown in Figure 14 and Figure 15.

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 Figure 16.

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 17.

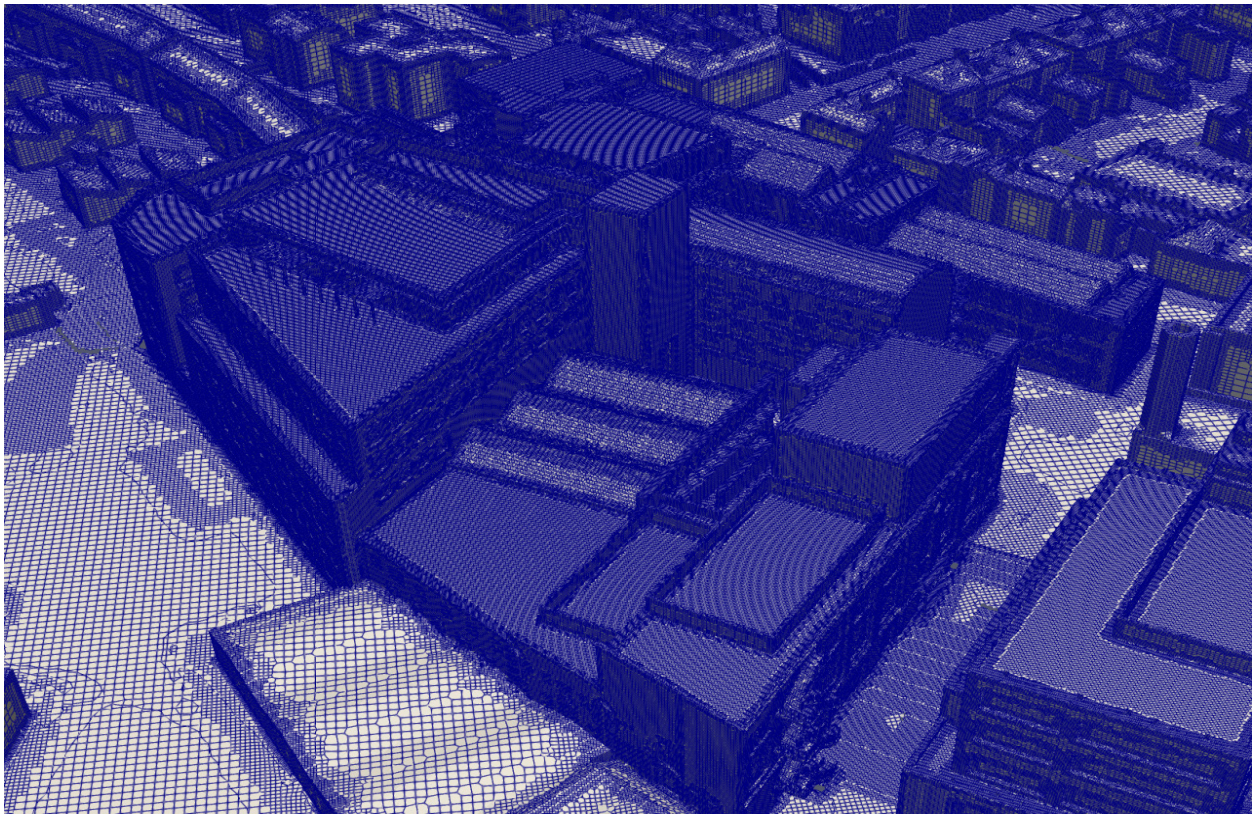

Fig. 14: Mesh Detail on Site Buildings

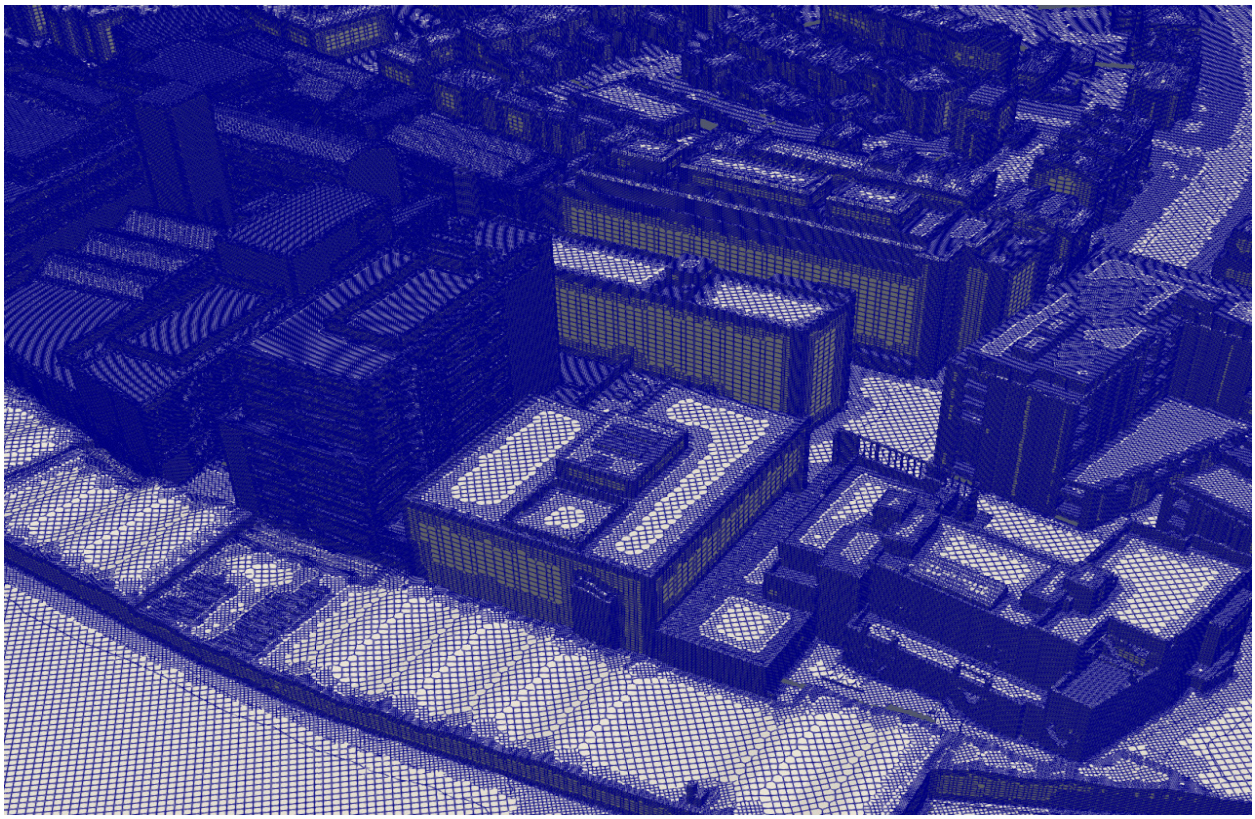

Fig. 15: Mesh Detail on Surrounds

Fig. 16: Seasonal Wind Roses for London Combined (1990-2020)

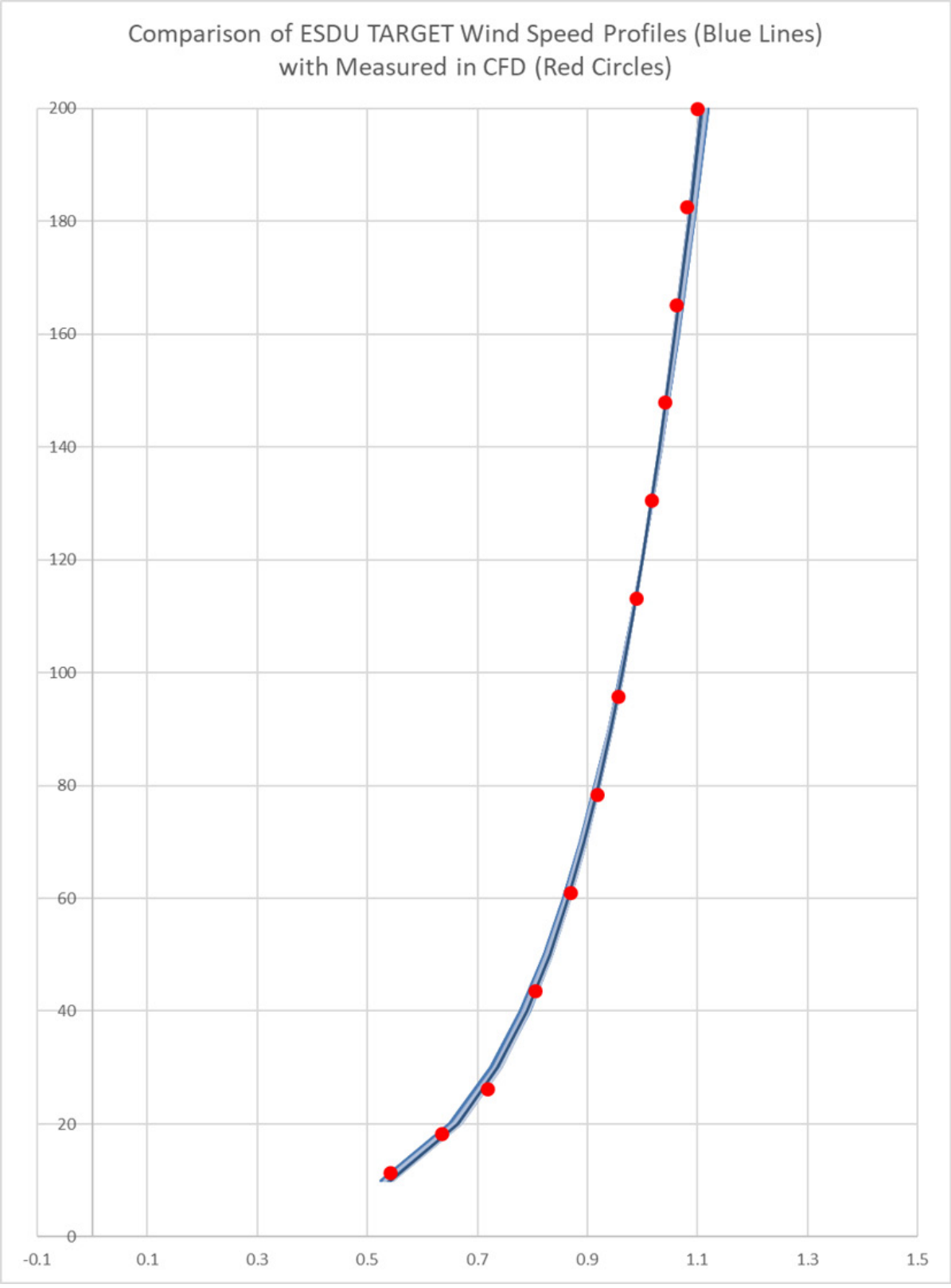

Fig. 17: Wind Profile for Highgate Studios

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