100 Chalk Farm Road

Wind Microclimate Assessment Report

Prepared by GIA

Submitted on behalf of Regal London

May 2024

PROJECT DATA:

Client	**Regal Chalk Farm Limited**
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1 INTRODUCTION

This Wind Microclimate Assessment Report has been prepared by GIA on behalf of Regal Chalk Farm Limited ('the Applicant') in support of an application for full planning permission for the redevelopment of 100 Chalk Farm Road ('the Site') within London Borough of Camden ('LBC').

A listed building consent application accompanies the application for works to the adjacent Roundhouse, which is a Grade II* listed building.

The site is located on the south-western side of Chalk Farm Road and borders the mainline railway into Euston, with the Juniper Crescent Housing Estate to the south. It lies within the Regents Canal Conservation Area, to which the existing building on the site is a neutral contributor. To the west, the site is adjacent to the Grade II* listed Roundhouse theatre and live music venue. Beyond that, to the north-west is Chalk Farm Underground Station. To the east is the Petrol Filling Station site, which forms part of the Camden Goods Yard development and is currently in use as a temporary supermarket.

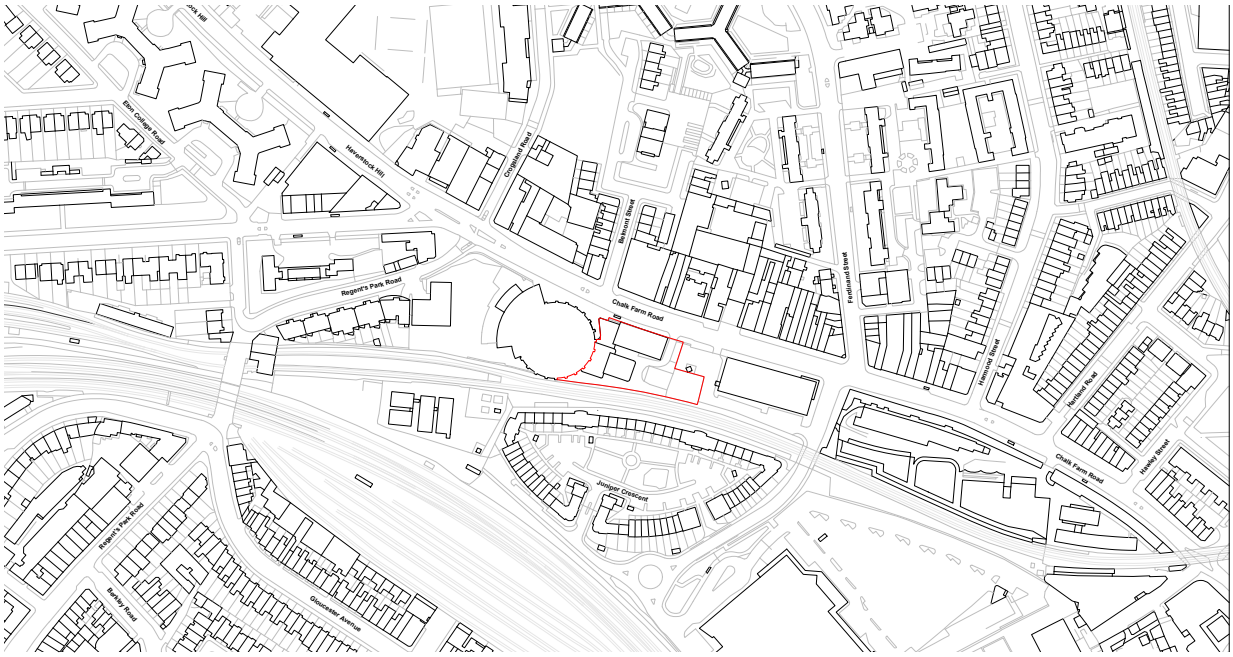
The development will provide 265 student accommodation units, together with 783 sqm (GIA) of commercial space, 24 affordable residential units, with public realm improvements, new areas of landscaping, amenity and play space, and improved accessibility to the site.

The description of development is as follows:

"Demolition of existing buildings and redevelopment of the site to provide two buildings containing purpose-built student accommodation with associated amenity and ancillary space (Sui Generis), affordable residential homes (Class C3), ground floor commercial space (Class E) together with public realm, access, servicing, and other associated works."

Full details and scope of the planning application is described in the submitted Town Planning Statement, prepared by Gerald Eve LLP.

This report sets out the wind microclimate conditions on and around the site, with regards to both wind safety and the suitability for intended pedestrian uses, and compares conditions with and without the proposed development to assess the impact of the proposed development on the local wind microclimate.



1.1 SUMMARY

Wind microclimate conditions for the proposed development at 100 Chalk Farm Road were assessed using high resolution Computational Fluid Dynamics (CFD).

There are no wind safety risks associated with the proposed development at either ground level or elevated levels.

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

For the cumulative scenario, the proposed development is expected to have a beneficial impact both on the Youth Space directly east of the site, and also for the existing cafe and restaurant seating on the opposite side of Chalk Farm Road.

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.

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

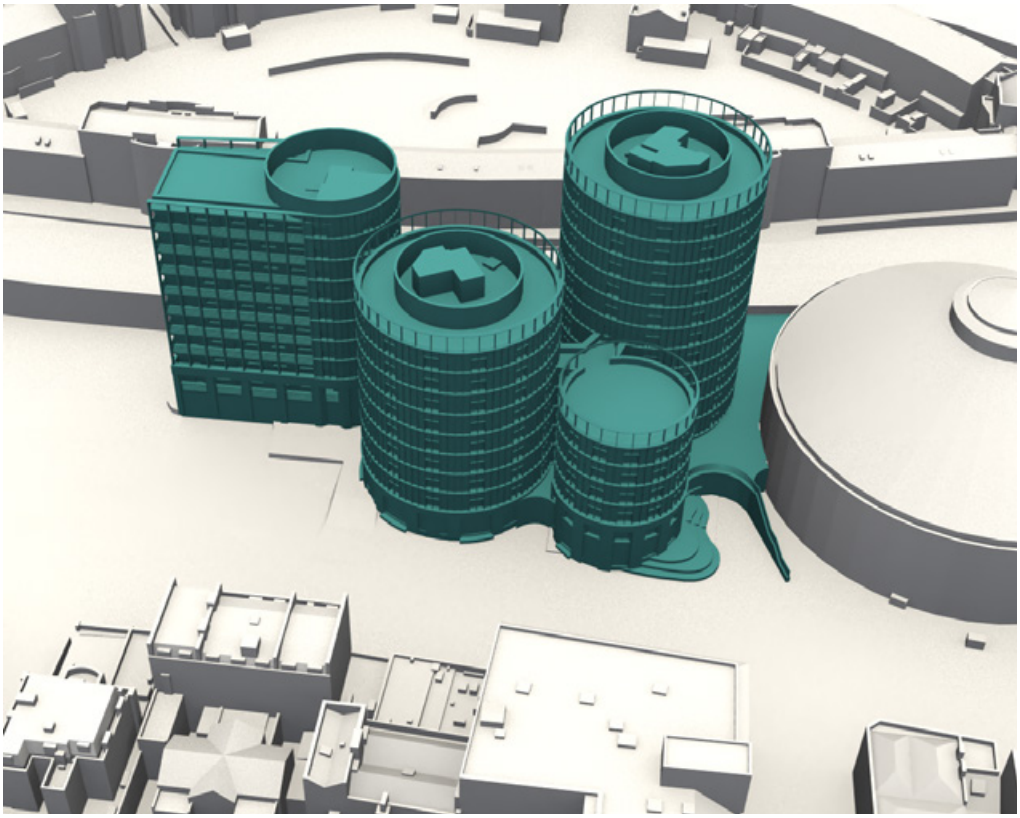


Fig. 01: 3D View of proposed Development

Fig. 02: Proposed Development with Existing Surrounds

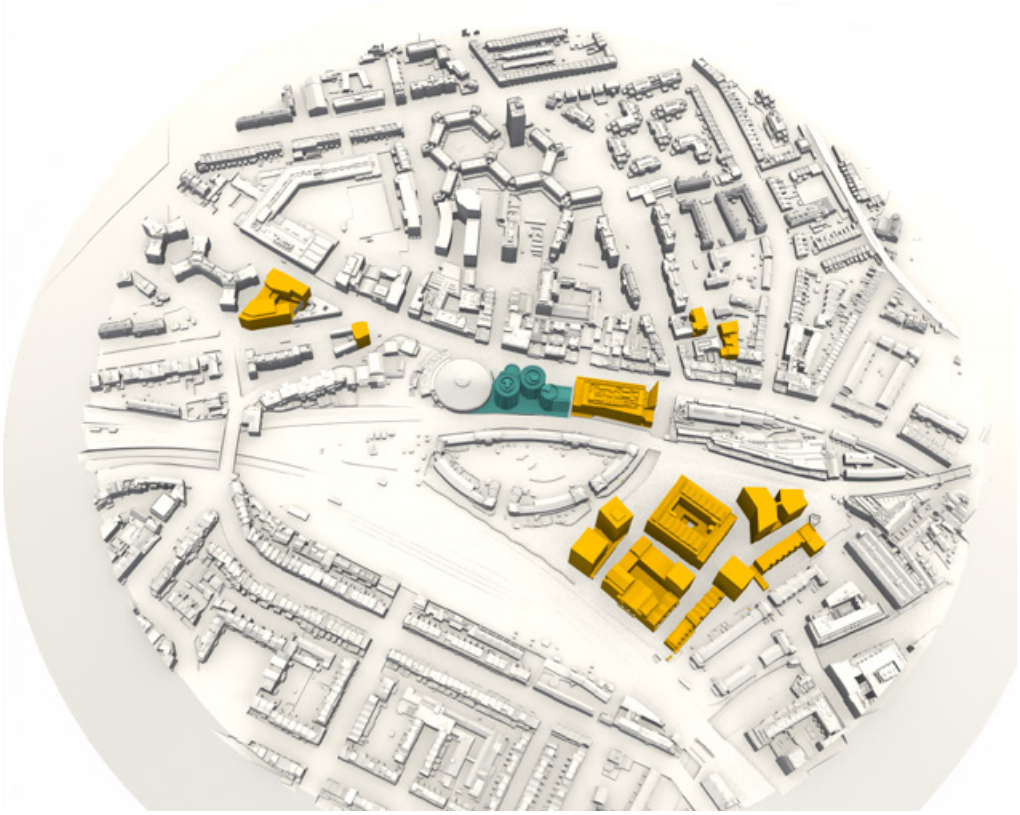


Fig. 04: Proposed Development with Cumulative Surrounds

Fig. 03: Sensitive Wind Receptors at Ground Floor

2.3 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

2.4 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 Chalk Farm Road (marked "B1" and "B2" on Figure 4) within the study area. These are targeted to be suitable for standing.

There are ground floor amenity spaces in the form of existing gardens and play spaces within Juniper Crescent (marked "A1" in Figure 4), the cumulative Youth Space directly east of the site (marked "A2" in Figure 4) and proposed spaces around the site (marked "A3", "A4", "A5" and "A6" in Figure 4). There is also elevated amenity in the form of an external terrace on level 6. These spaces are targeted to be suitable for a mixture of sitting and standing in summer.

There is also spill-out cafe and restaurant seating on Chalk Farm Road (marked "S1" and "S2" on Figure 4), which are targeted to be suitable for sitting in summer.

The locations of sensitive receptors are shown in Figure 4.

2.5 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);
- Proposed Development with Existing Surrounds: The completed and operational development with the existing surrounds;
- Existing Site with Cumulative Surrounds (Future Baseline):The existing building on site with the existing surrounds plus local planning consented schemes; and
- Proposed Development with Cumulative Surrounds: The completed and operational development with the existing surrounds plus local planning consented schemes.

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

- Belmont Street Site (2020/5063/P)
- Camden Market Canopy (2020/5793/P)

The following local consented schemes were included in the cumulative assessment, but not the baseline:

- 155-157 Regents Park Road (2021/0877/P)
- Haverstock Hill (2016/3975/P)
- Ferdinand Place (2016/2457/P)
- Camden Goods Yard Redevelopment (2017/3847/P & 2020/3116/P)

2.6 DEVELOPMENT AMENDMENTS

Since the wind assessment was undertaken in January 2024, a number of minor updates have been made to the proposed development.

These can be described as follows:

- Extending the affordable housing building to the eastern boundary line;
- Increase the number of affordable homes from 24 to 30;
- Ground floor changes to the entrance of the affordable housing building;
- Internal reconfiguration of the basement including location of plant;
- Amendments to the façade of the student accommodation building; and
- Reconfiguration of the wheelchair units in the student accommodation block to improve aspect

The above changes do not substantially change the overall external building envelope, so would not have a material impact on the expected impact of the development on wind conditions on and around the site. As such, the results and analysis described herein would remain robust to these updates.

2.7 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.

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 "B1" and "B2" in results figures) are suitable for sitting in all seasons. This is suitable for the intended use.

The gardens and play areas within Juniper Crescent (marked "A1" in results figures) are suitable for a mix of sitting and standing in all seasons. This is suitable for the intended use.

The cafe and restaurant seating on Chalk Farm Road (marked "S1" and "S2" on results figures) are suitable for sitting in all seasons. This is suitable for the intended use.

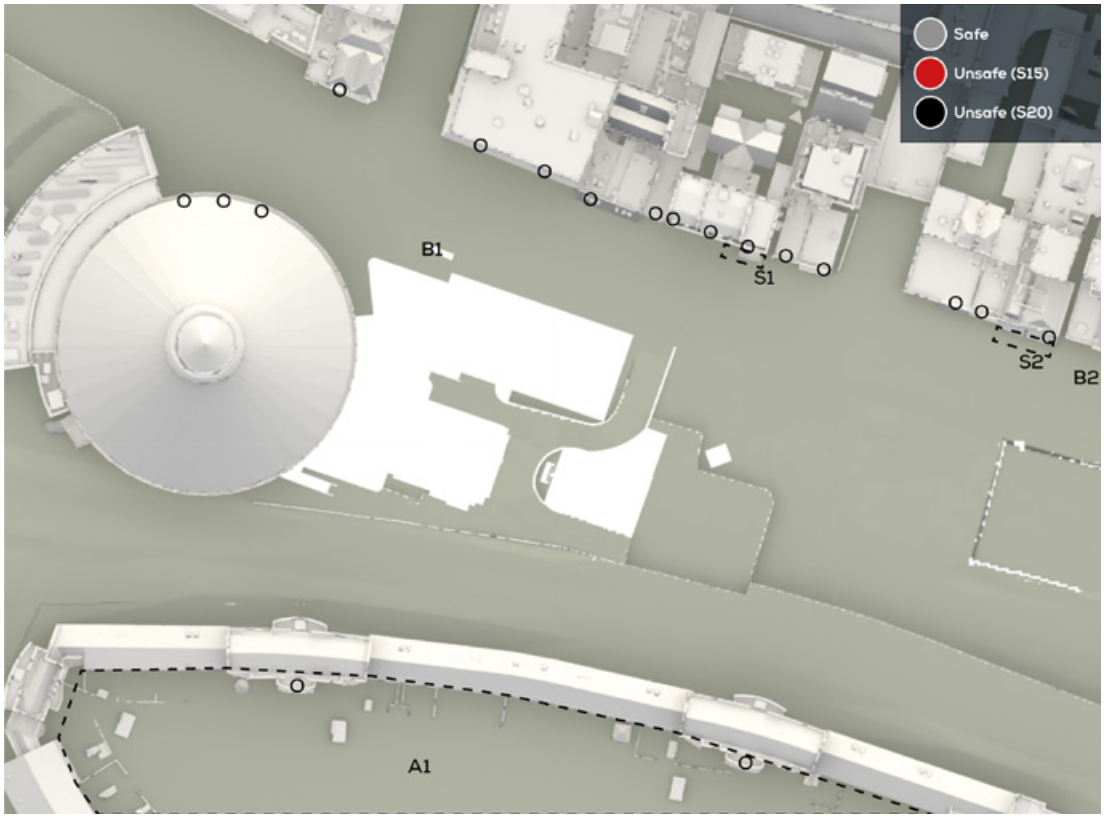


Fig. 05: Annual Safety, Baseline

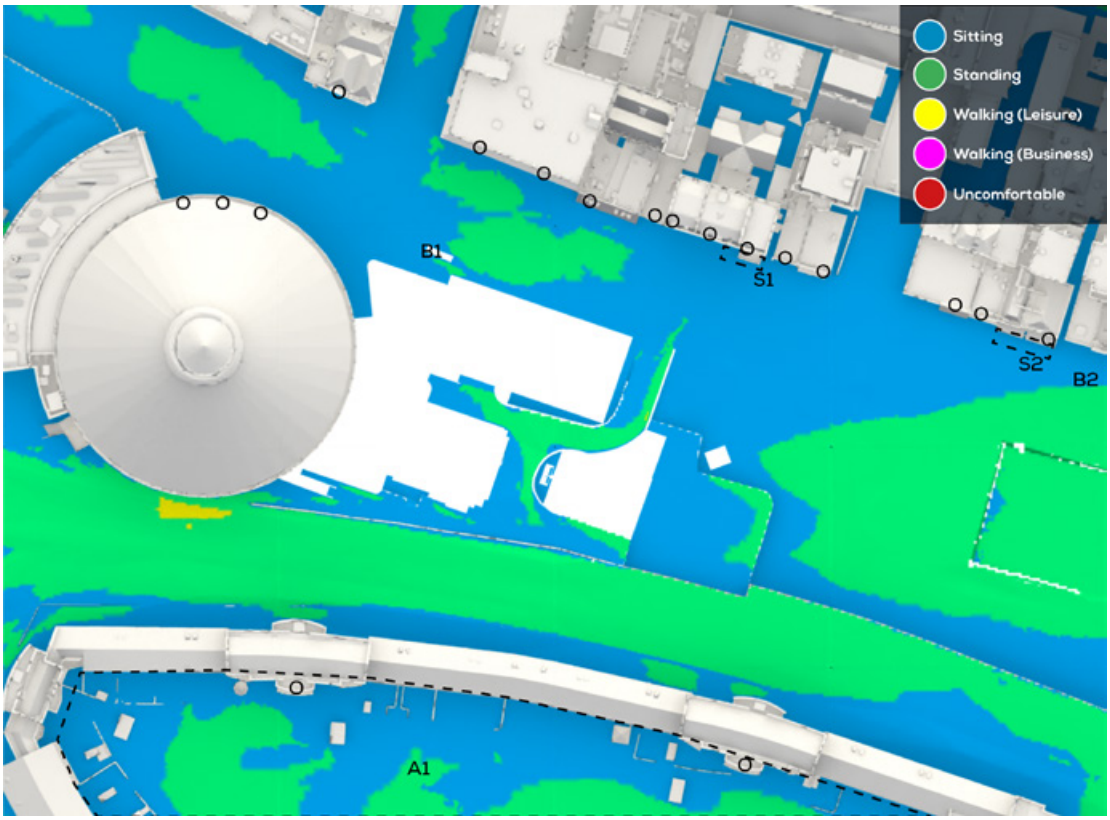


Fig. 06: Winter Comfort, Baseline

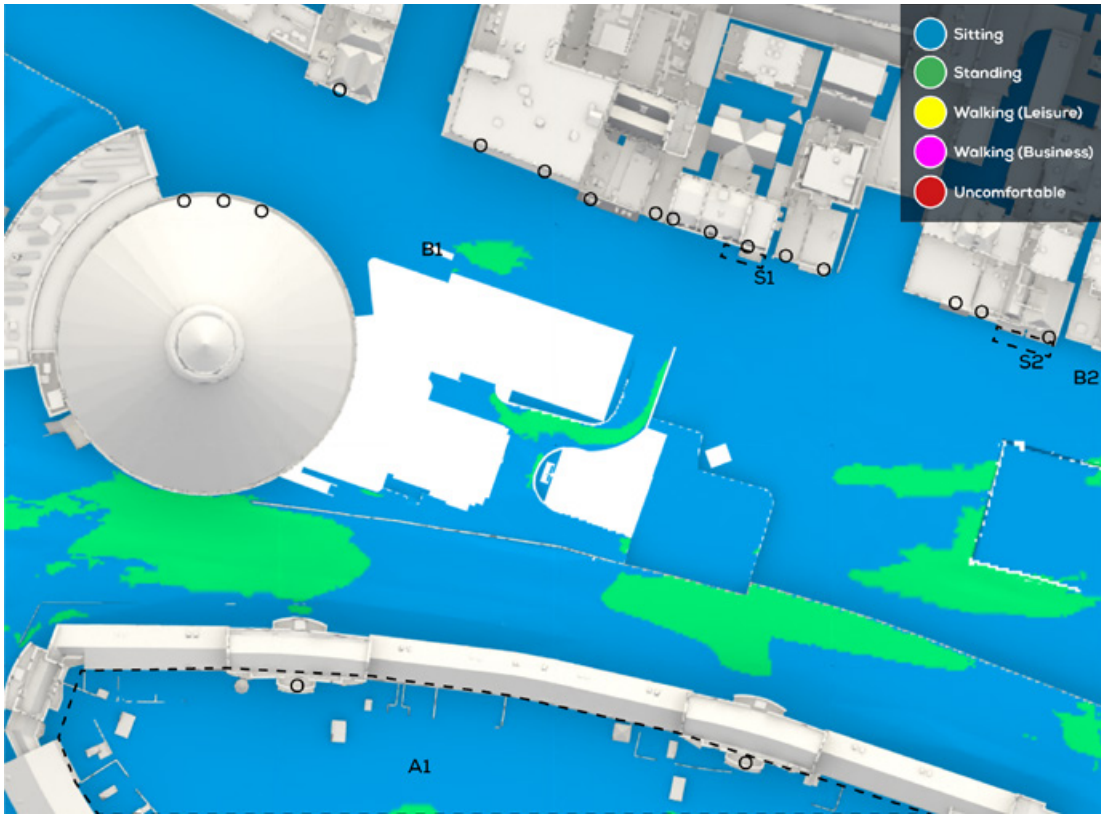


Fig. 07: Summer Comfort, Baseline

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 (and as such no canopies, or similar protection, are required in order to achieve suitable conditions for any entrance).

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 Roundhouse bus stop (marked "B1" in results figures) is suitable for standing in all seasons. This is suitable for the intended use.

The Chalk Farm Road bus stop (marked "B2" in results figures) is suitable for sitting in all seasons. This is suitable for the intended use.

The gardens and play areas within Juniper Crescent (marked "A1" in results figures) are suitable for a mix of sitting and standing in all seasons. This is suitable for the intended use.

The proposed ground and podium level amenity spaces (marked "A3", "A4", "A5" and "A6" in results figures) are suitable for a mix of sitting and standing in all seasons. This is suitable for the intended use,

The cafe and restaurant seating on Chalk Farm Road (marked "S1" and "S2" on results figures) are suitable for sitting in all seasons. 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 wind safety risks identified on the level 6 terrace.

Conditions for the terrace 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.

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

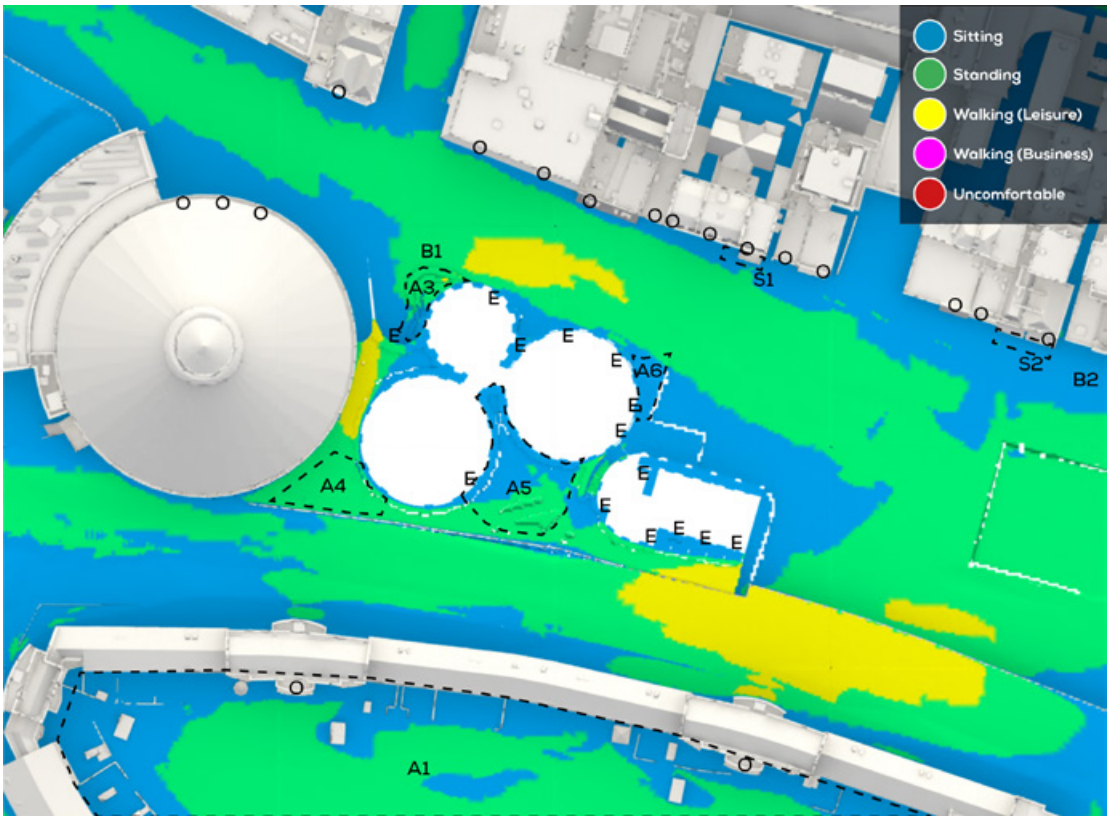


Fig. 09: Winter Comfort, Proposed Development with Existing Surrounds

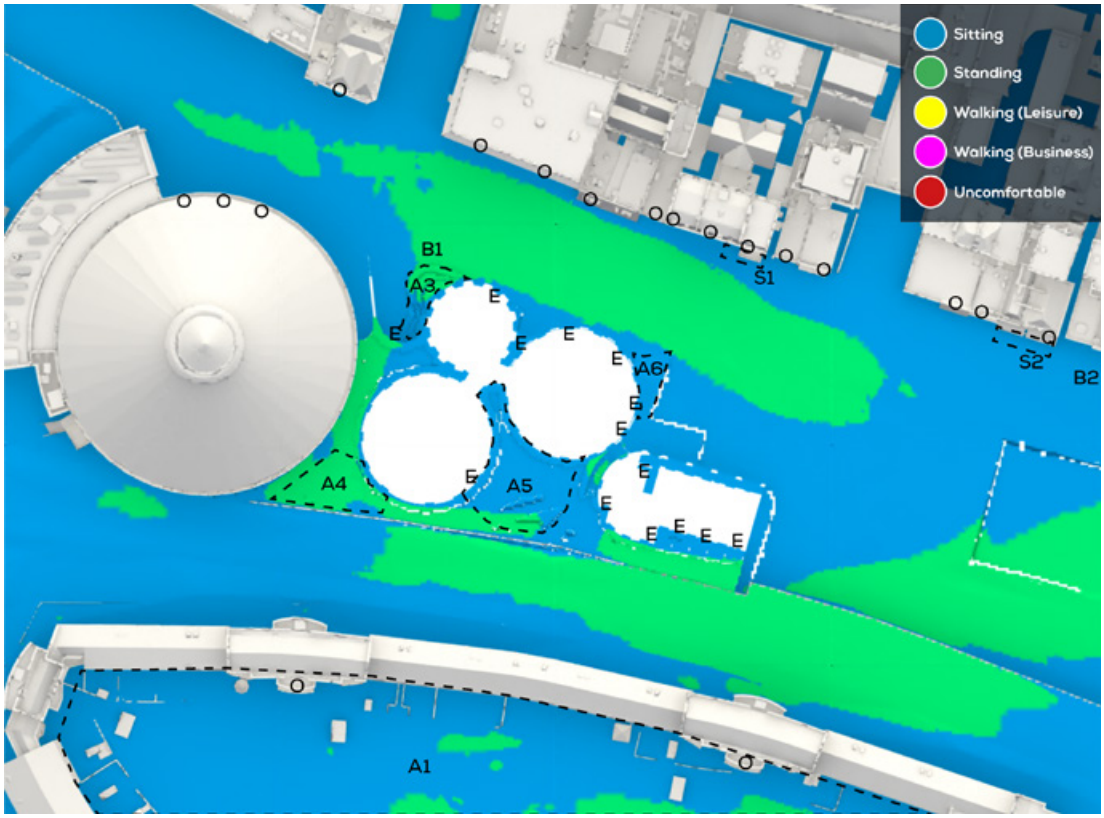


Fig. 10: Summer Comfort, Proposed Development with Existing Surrounds

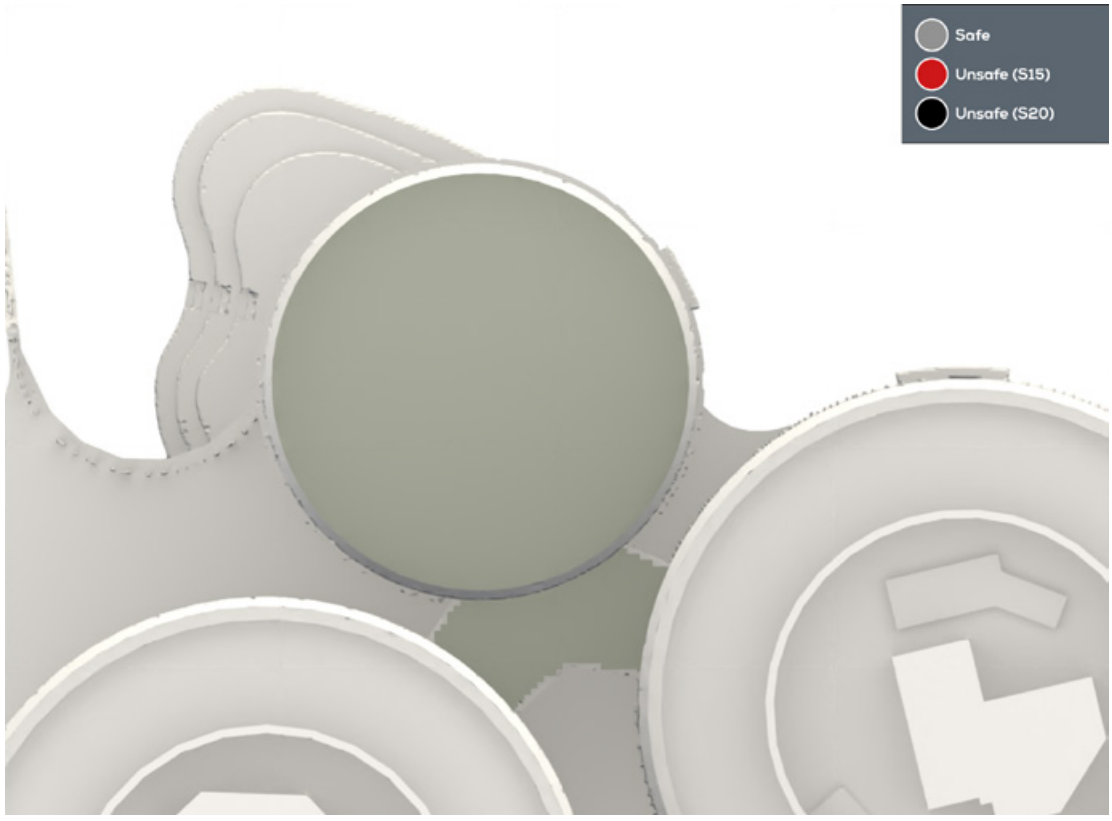


Fig. 11: Annual Safety at Proposed Terrace Levels, Proposed Development with Existing Surrounds

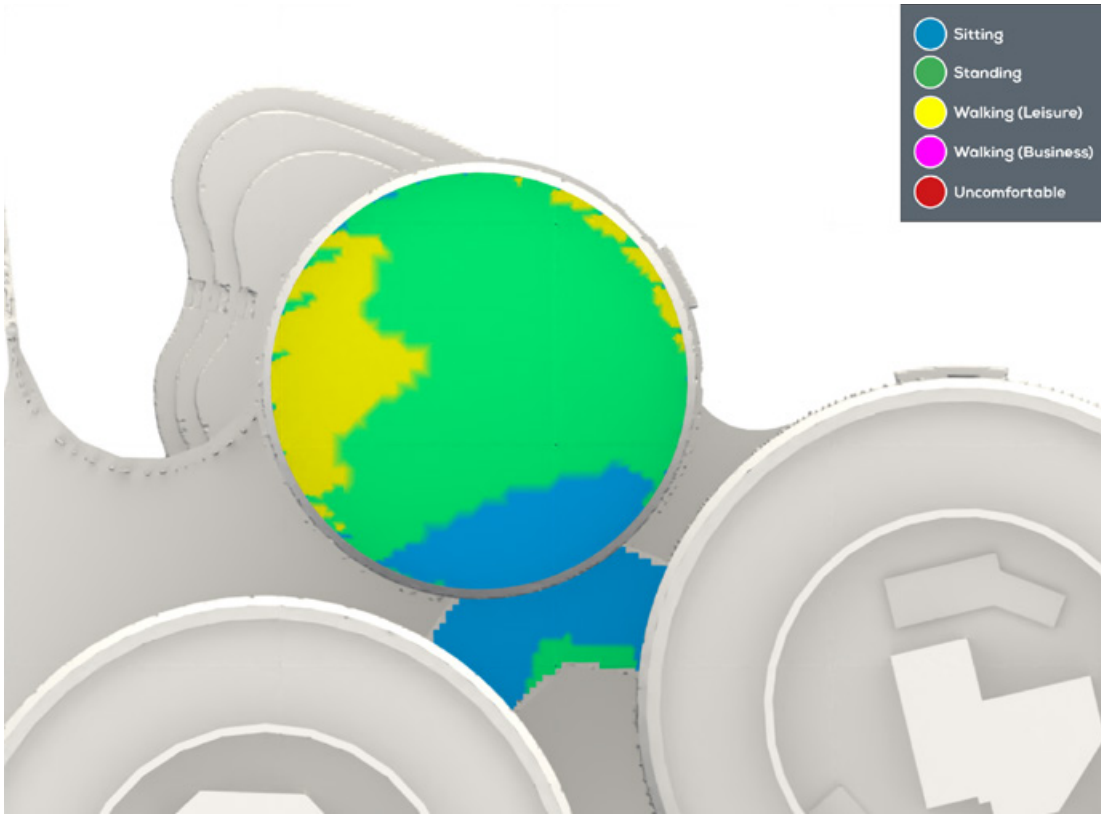


Fig. 12: Winter Comfort at Proposed Terrace Levels, Proposed Development with Existing Surrounds

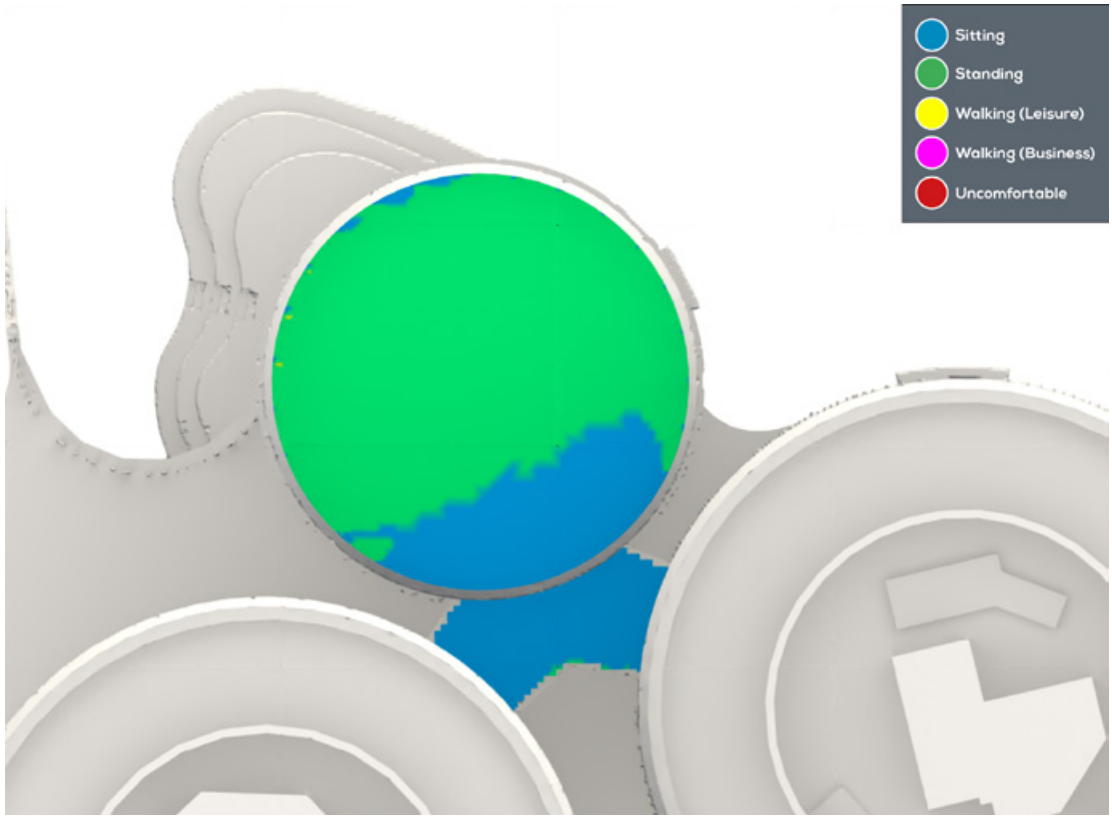


Fig. 13: Summer Comfort at Proposed Terrace Levels, Proposed Development with Existing Surrounds

3.3 CONDITIONS FOR EXISTING SITE WITH CUMULATIVE SURROUNDS (FUTURE BASELINE)

Ground Level Conditions

Annual safety at ground level for the existing site with cumulative surrounds is shown in Figure 14. Winter comfort at ground level for the existing site with cumulative surrounds is shown in Figure 15. Summer comfort at ground level for the existing site with cumulative surrounds is shown in Figure 16.

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 Roundhouse bus stop (marked "B1" in results figures) is suitable for sitting in all seasons. This is suitable for the intended use.

The Chalk Farm Road bus stop (marked "B2" in results figures) is suitable for standing in winter and sitting in summer. This is suitable for the intended use.

The gardens and play areas within Juniper Crescent (marked "A1" in results figures) are suitable for a mix of sitting and standing in all seasons. This is suitable for the intended use.

The Youth Space to the east of the site (marked "A2" 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,

The cafe and restaurant seating outside 67-68 Chalk Farm Road (marked "S1" on results figures) is suitable for sitting in all seasons. This is suitable for the intended use.

The cafe and restaurant seating outside 57-58 Chalk Farm Road (marked "S2" on results figures) are suitable for standing in winter and a mix of sitting and standing in summer. This is a category windier than the target condition.

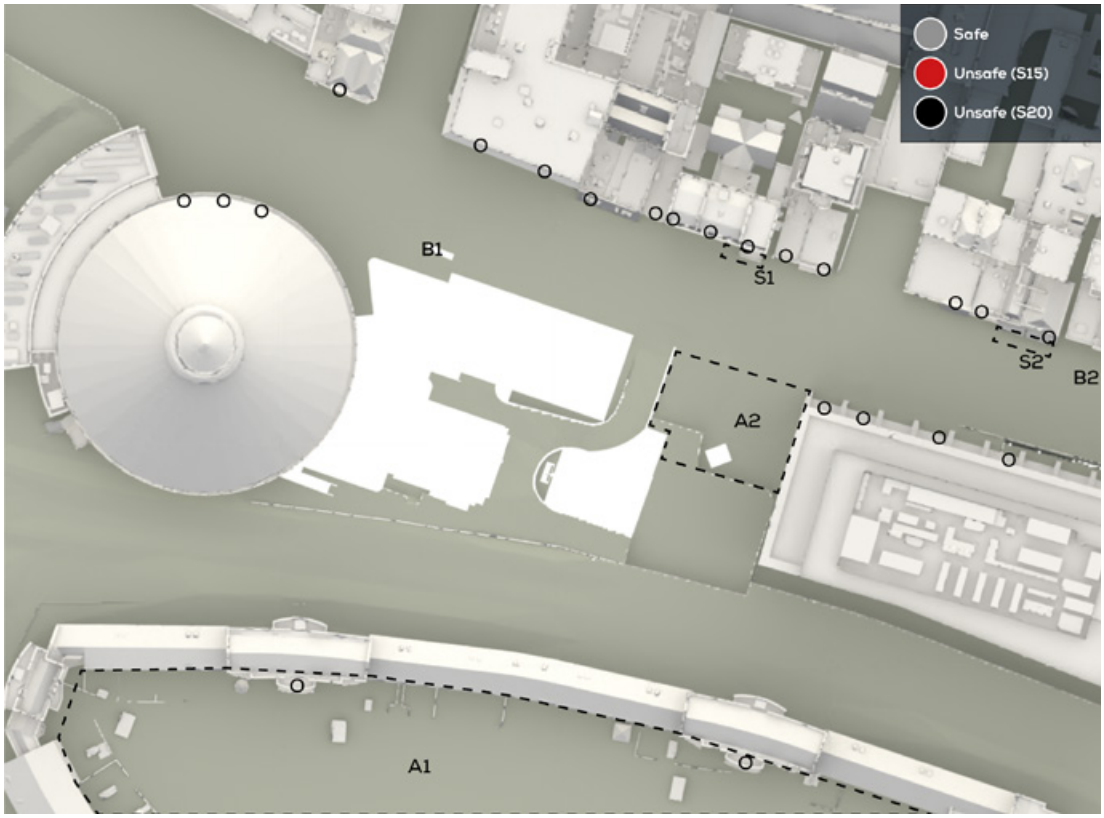


Fig. 14: Annual Safety, Existing Site with Cumulative Surrounds

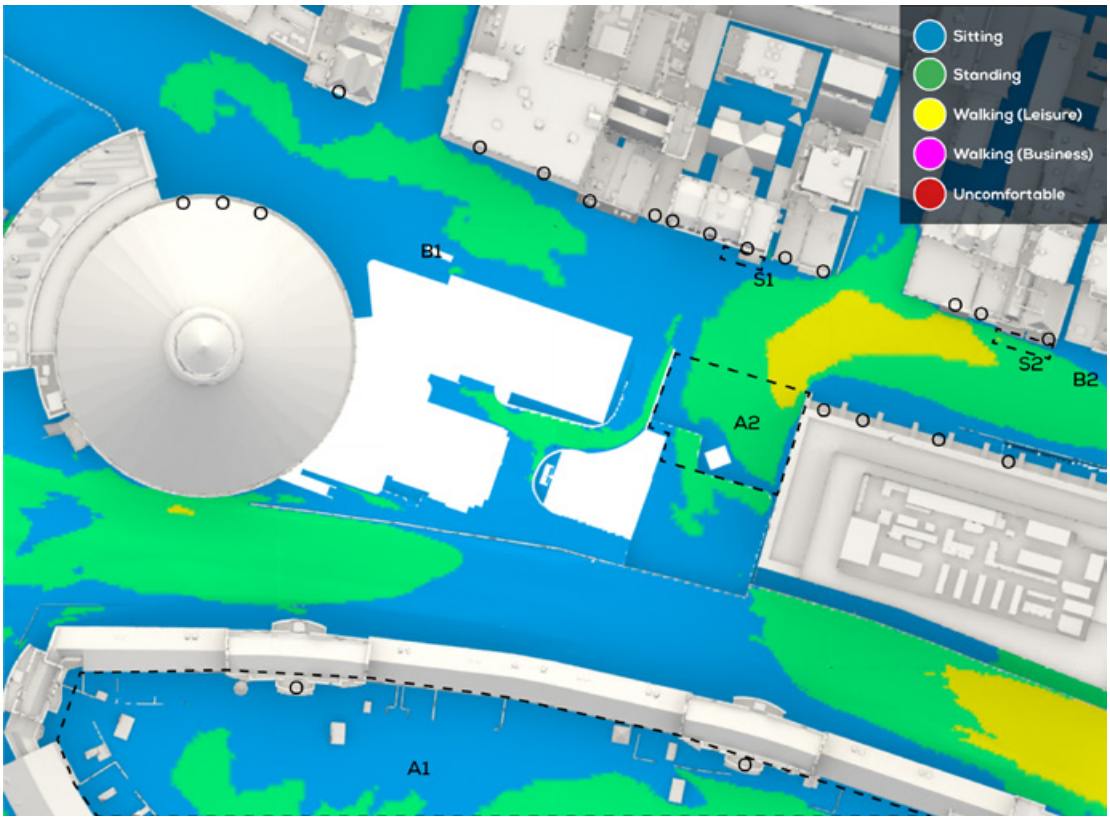


Fig. 15: Winter Comfort, Existing Site with Cumulative Surrounds

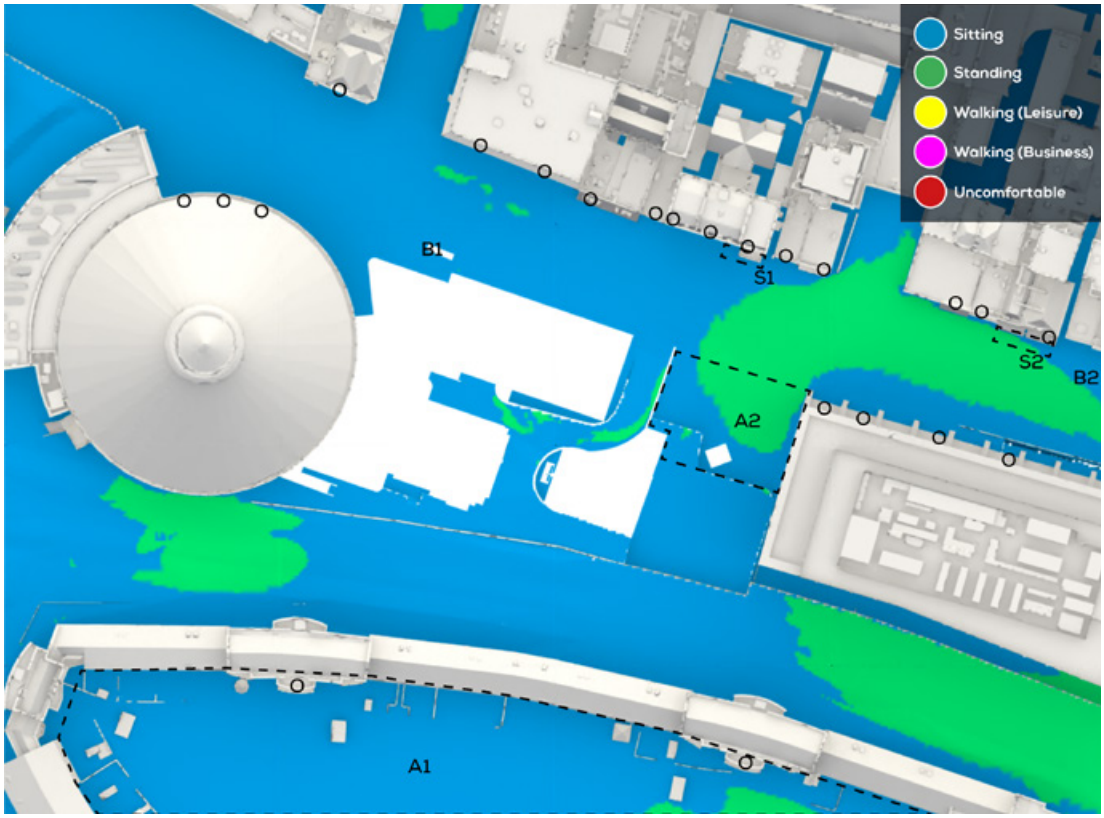


Fig. 16: Summer Comfort, Existing Site with Cumulative Surrounds

3.4 CONDITIONS FOR PROPOSED DEVELOPMENT WITH CUMULATIVE SURROUNDS

Ground Level Conditions

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

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 Roundhouse bus stop (marked "B1" in results figures) is suitable for standing in all seasons. This is suitable for the intended use.

The Chalk Farm Road bus stop (marked "B2" in results figures) is suitable for sitting in all seasons. This is suitable for the intended use.

The gardens and play areas within Juniper Crescent (marked "A1" in results figures) are suitable for a mix of sitting and standing in all seasons. This is suitable for the intended use.

The Youth Space to the east of the site (marked "A2" in results figures) is suitable for a mix of sitting and standing in all seasons. This is suitable for the intended use, and the extent which is suitable for sitting is significantly greater than those of the future baseline conditions. This will allow a greater flexibility of use for the Youth Space, and is a beneficial impact of the proposed development.

The proposed ground and podium level amenity spaces (marked "A3", "A4", "A5" and "A6" in results figures) are suitable for a mix of sitting and standing in all seasons. This is suitable for the intended use,

The cafe and restaurant seating outside 67-68 Chalk Farm Road (marked "S1" on results figures) is suitable for sitting in all seasons. This is suitable for the intended use.

The cafe and restaurant seating outside 57-58 Chalk Farm Road (marked "S2" on results figures) are suitable for sitting in all seasons. This is suitable for the intended use, having been a category too windy in the future baseline conditions, which is a beneficial impact due to the proposed development.

Terrace Level Conditions

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

There are no wind safety risks identified on the level 6 terrace.

Conditions for the terrace 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.

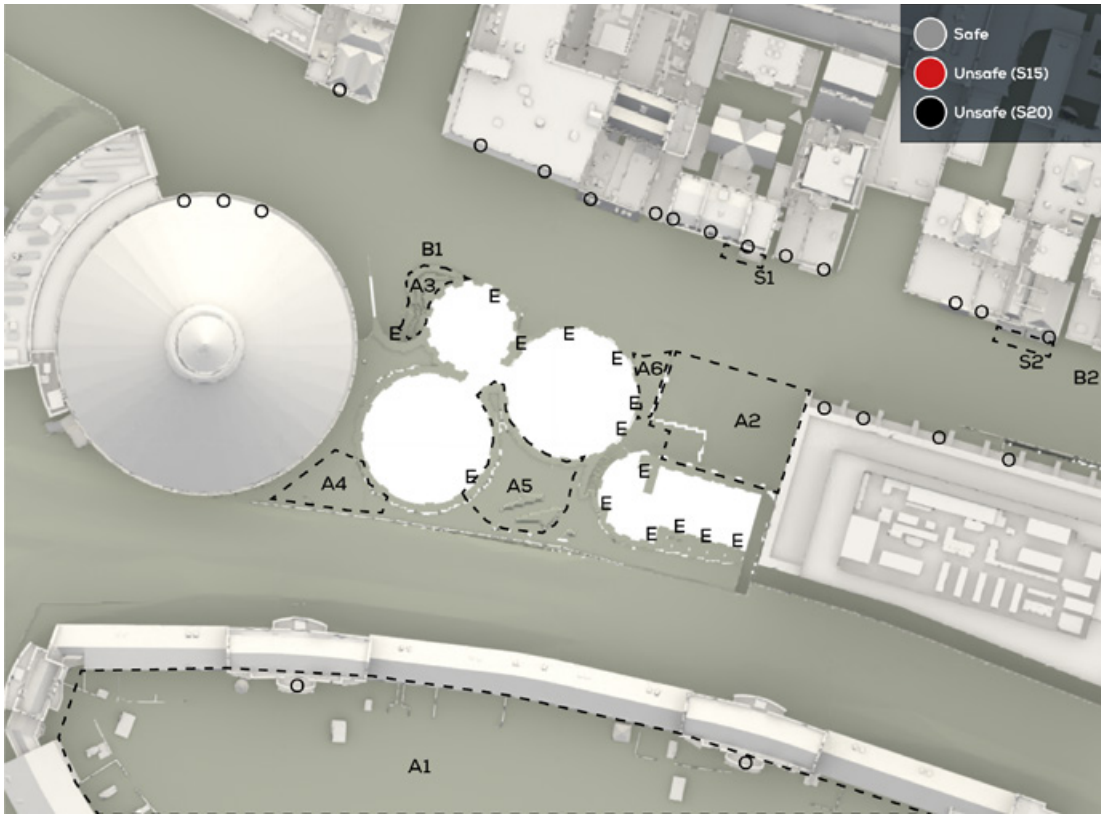


Fig. 17: Annual Safety, Proposed Development with Cumulative Surrounds

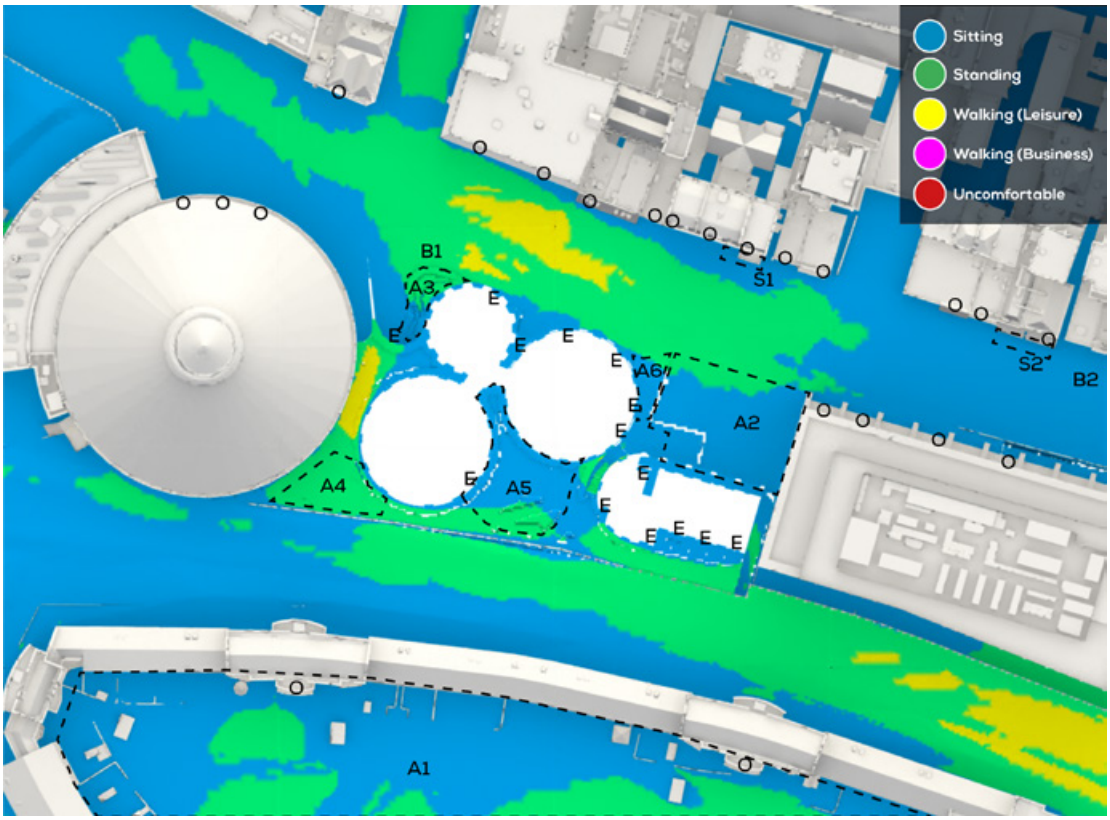


Fig. 18: Winter Comfort, Proposed Development with Cumulative Surrounds

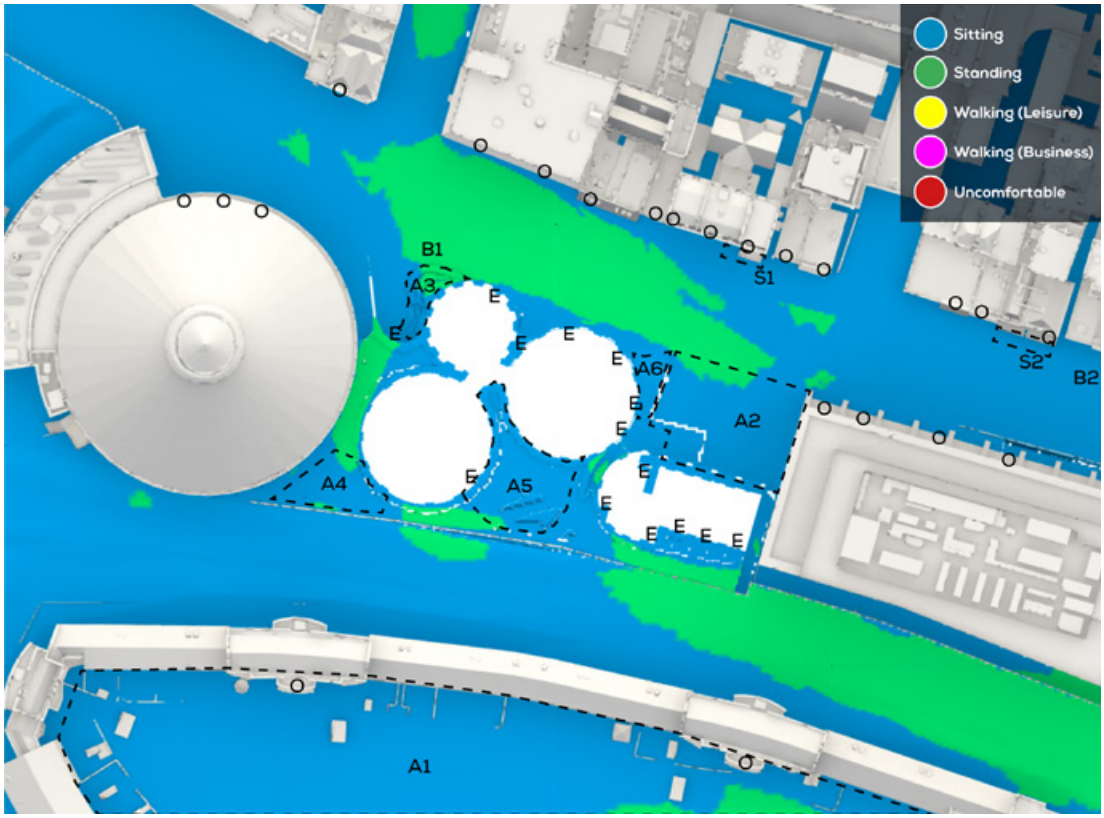


Fig. 19: Summer Comfort, Proposed Development with Cumulative Surrounds

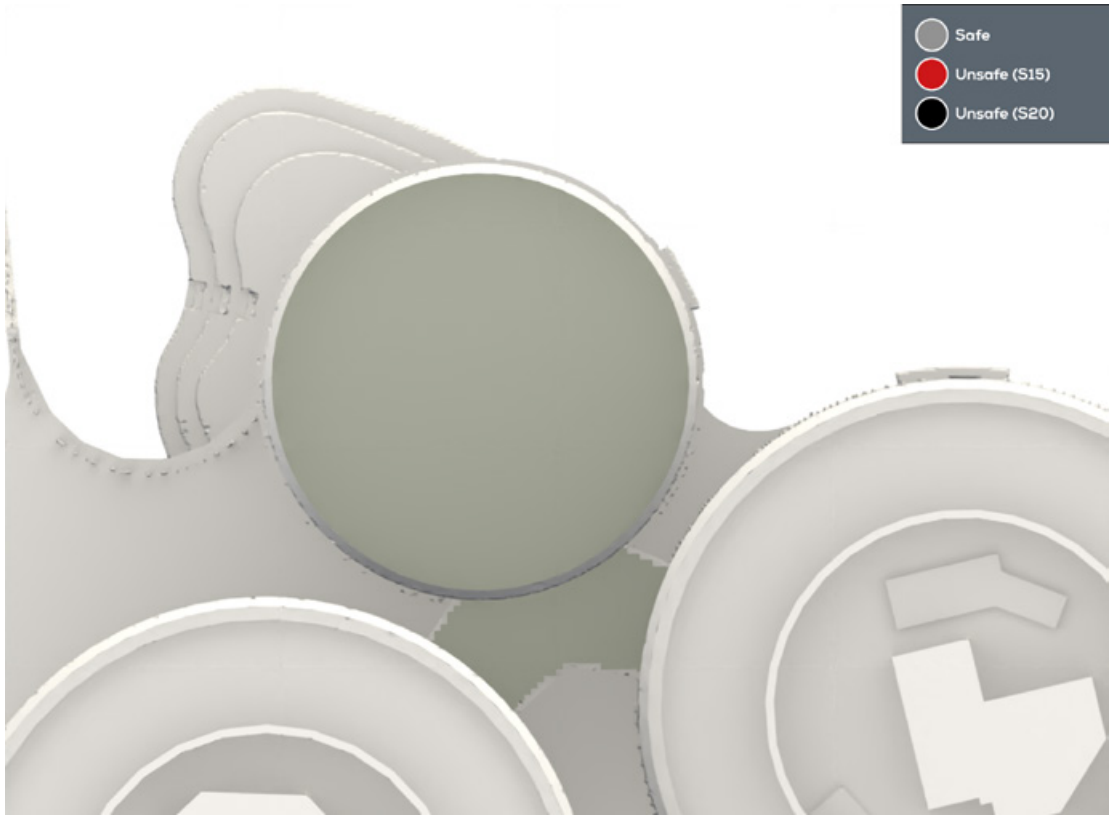


Fig. 20: Annual Safety at Proposed Terrace Levels, Proposed Development with Cumulative Surrounds

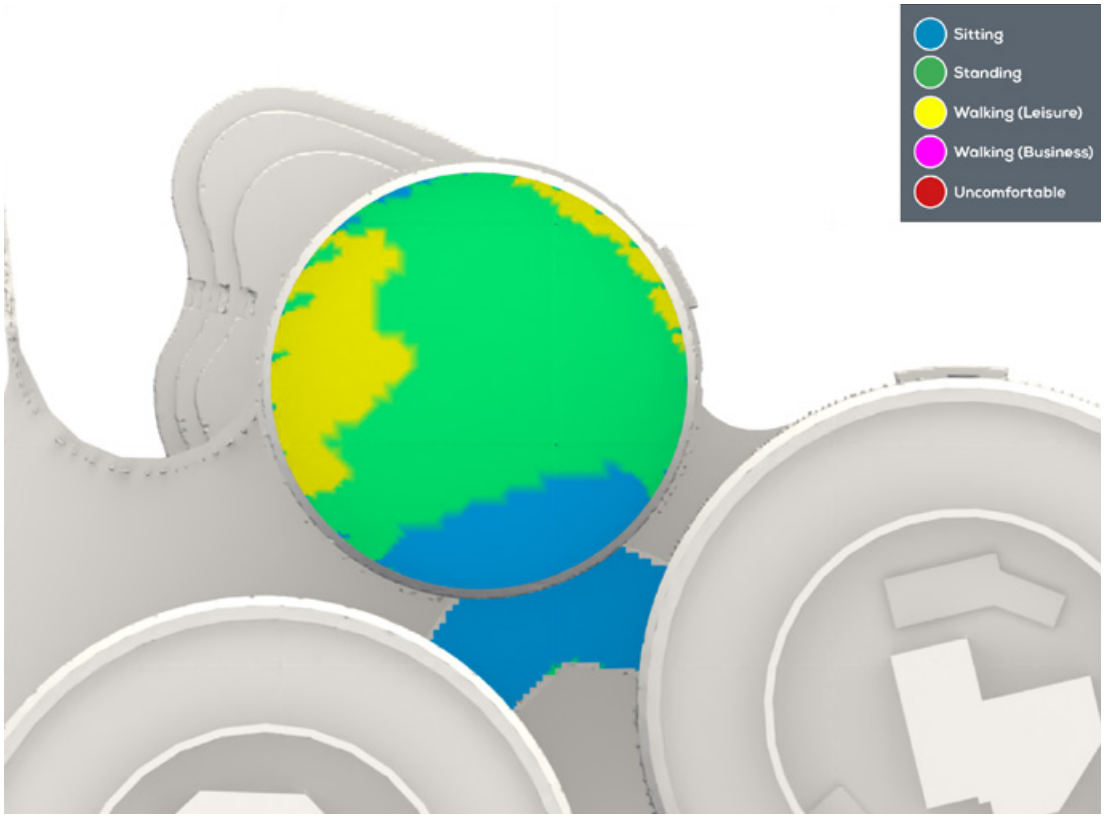


Fig. 21: Winter Comfort at Proposed Terrace Levels, Proposed Development with Cumulative Surrounds

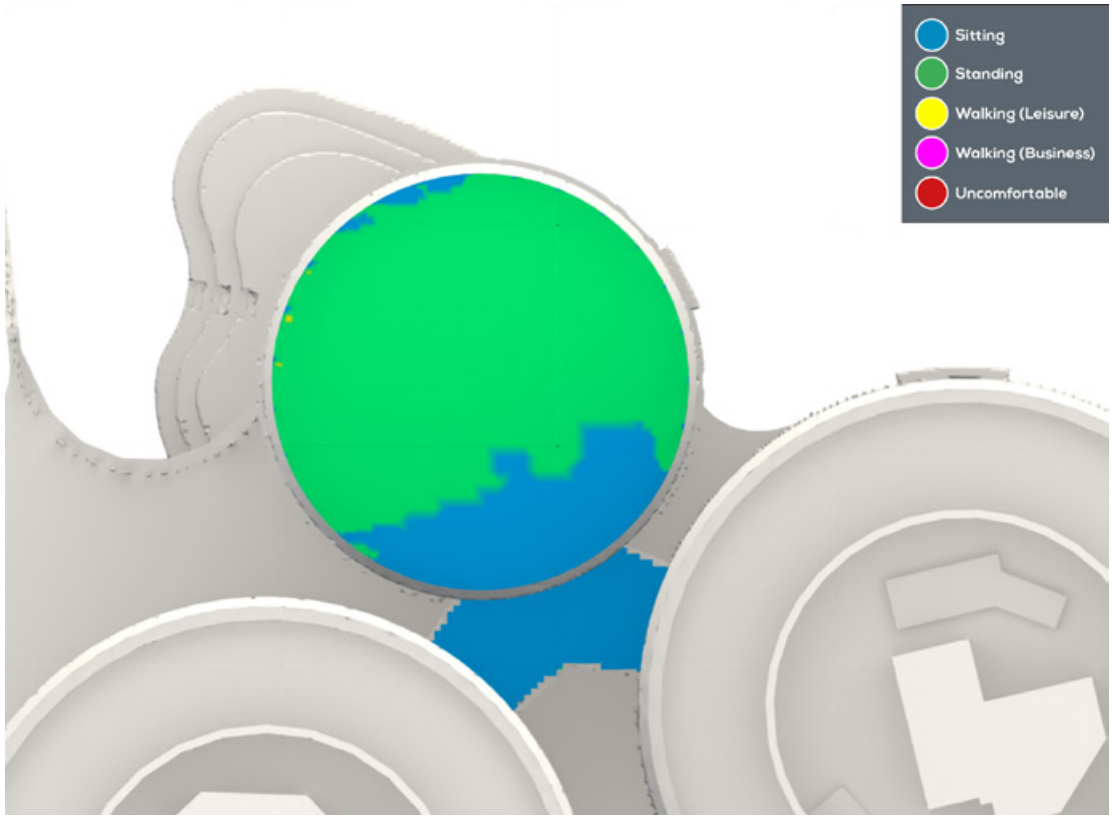


Fig. 22: Summer Comfort at Proposed Terrace Levels, Proposed Development with Cumulative Surrounds

4 CONCLUSIONS

Wind microclimate conditions for the proposed development at 100 Chalk Farm Road were assessed using high resolution Computational Fluid Dynamics (CFD).

There are no wind safety risks associated with the proposed development at either ground level or elevated levels.

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

For the cumulative scenario, the proposed development is expected to have a beneficial impact both on the Youth Space directly east of the site, and also for the existing cafe and restaurant seating on the opposite side of Chalk Farm Road.

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 71 and 80 million cells. Mesh detail is shown in Figure 23 and Figure 24.

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 25.

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 26.

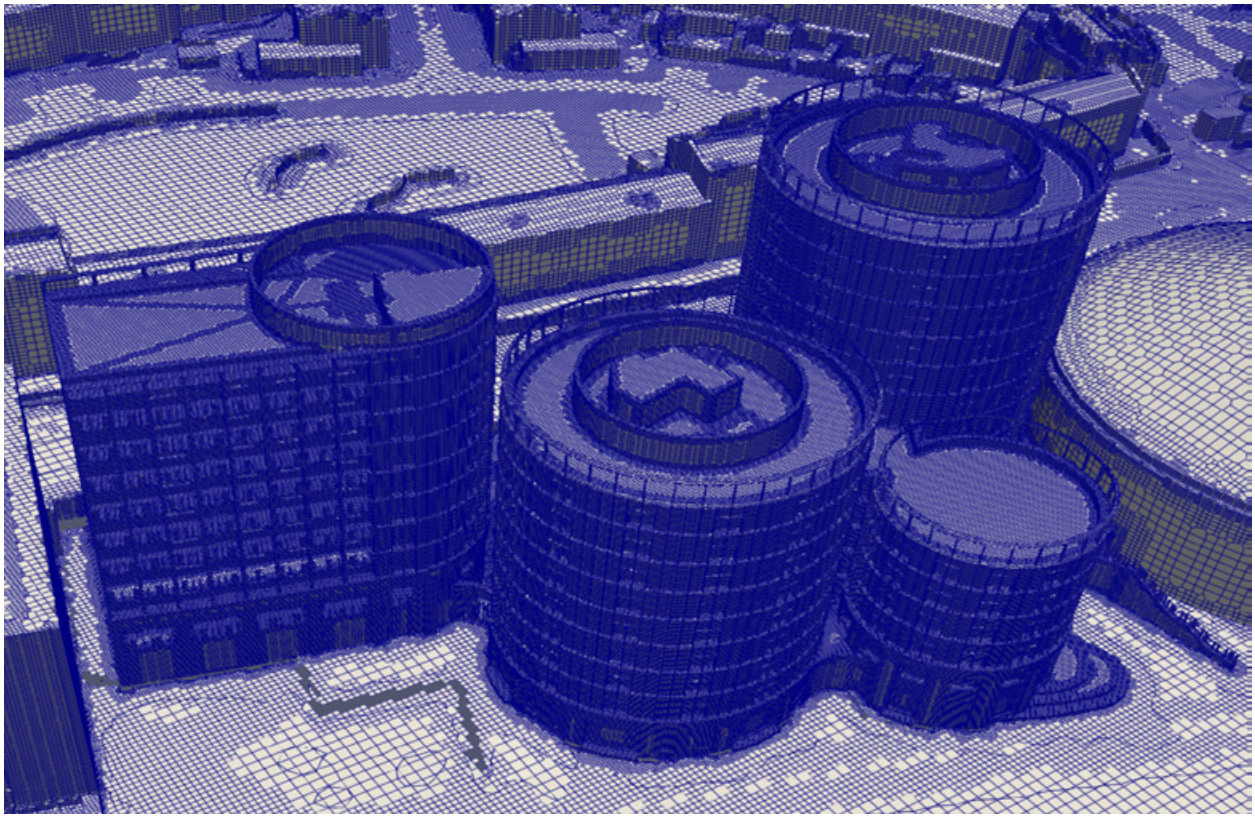


Fig. 23: Mesh Detail on Site Buildings

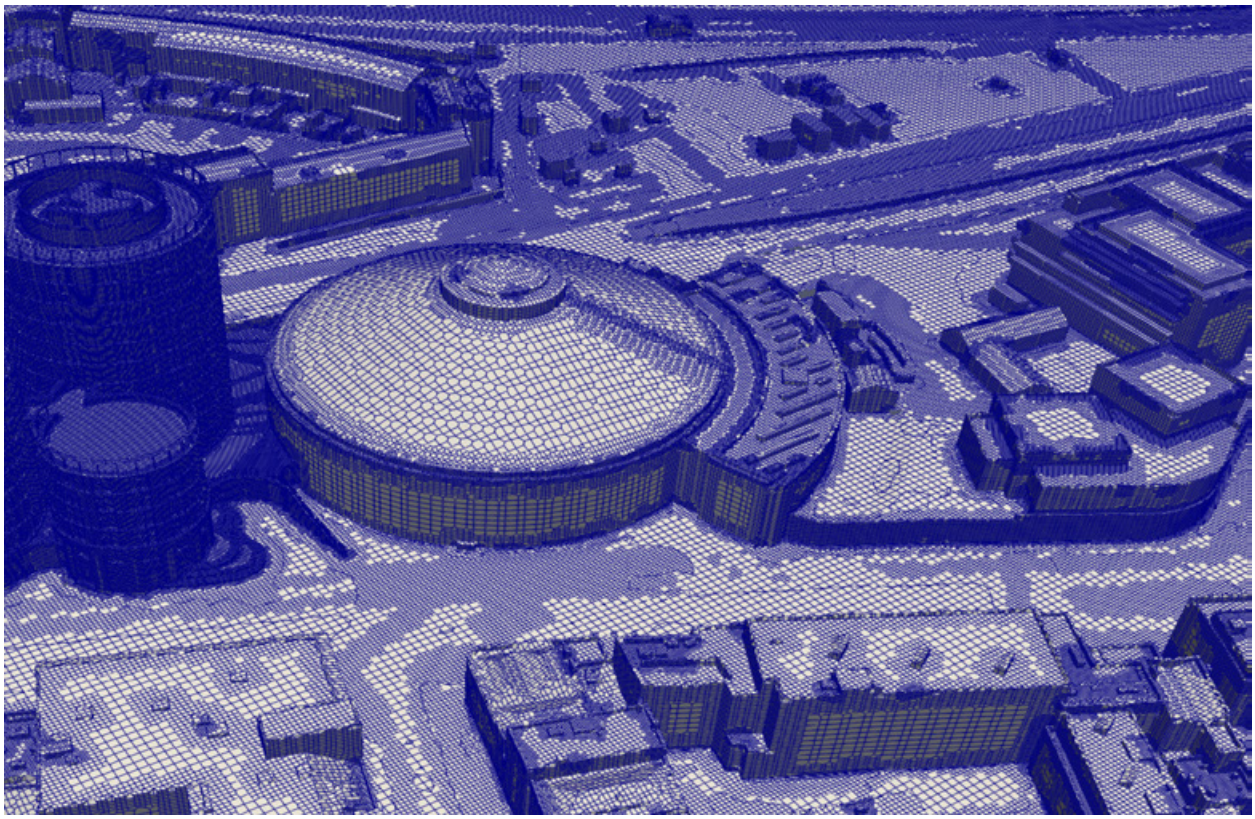


Fig. 24: Mesh Detail on Surrounds

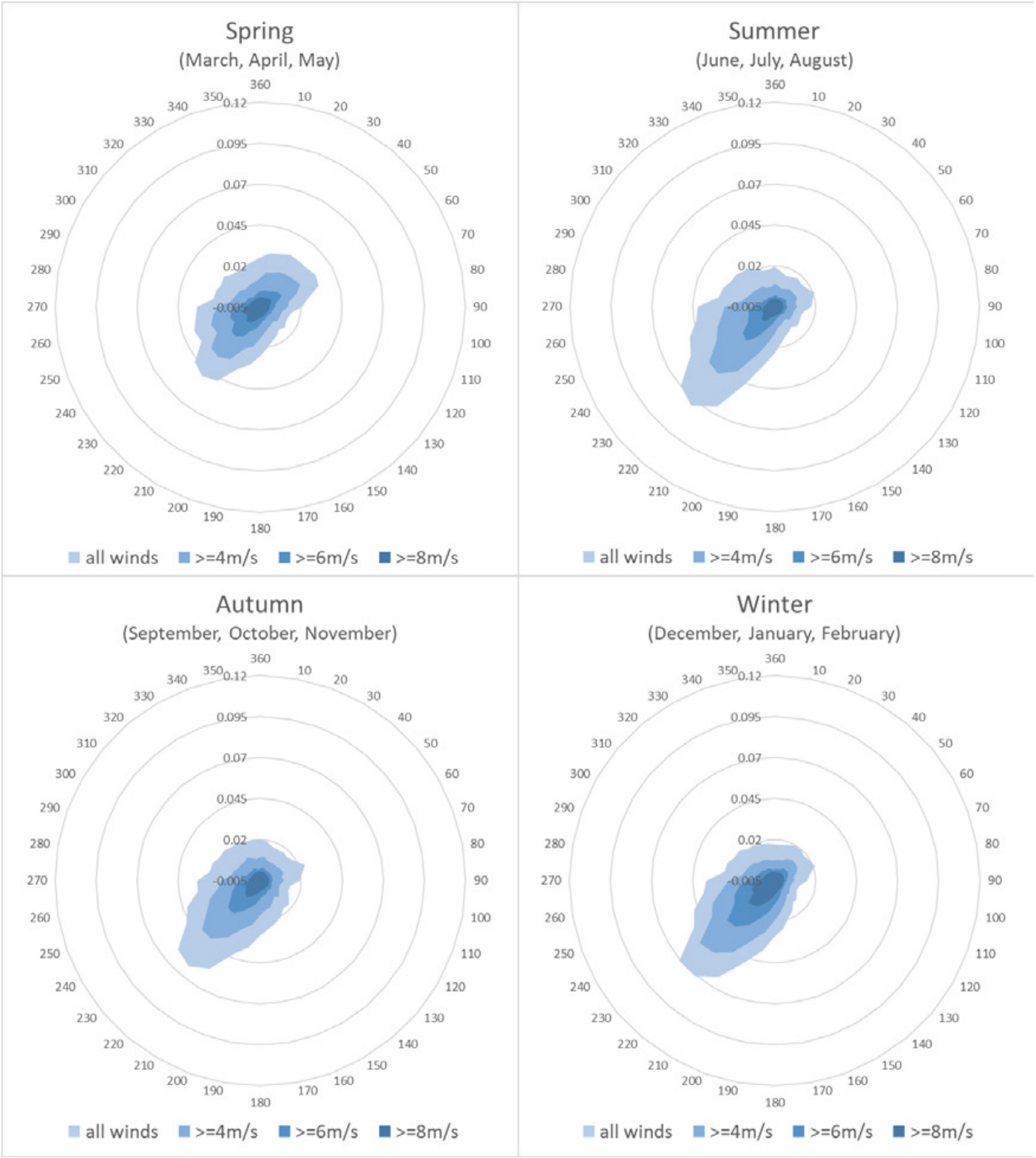


Fig. 25: Seasonal Wind Roses for London Combined (1990-2020)

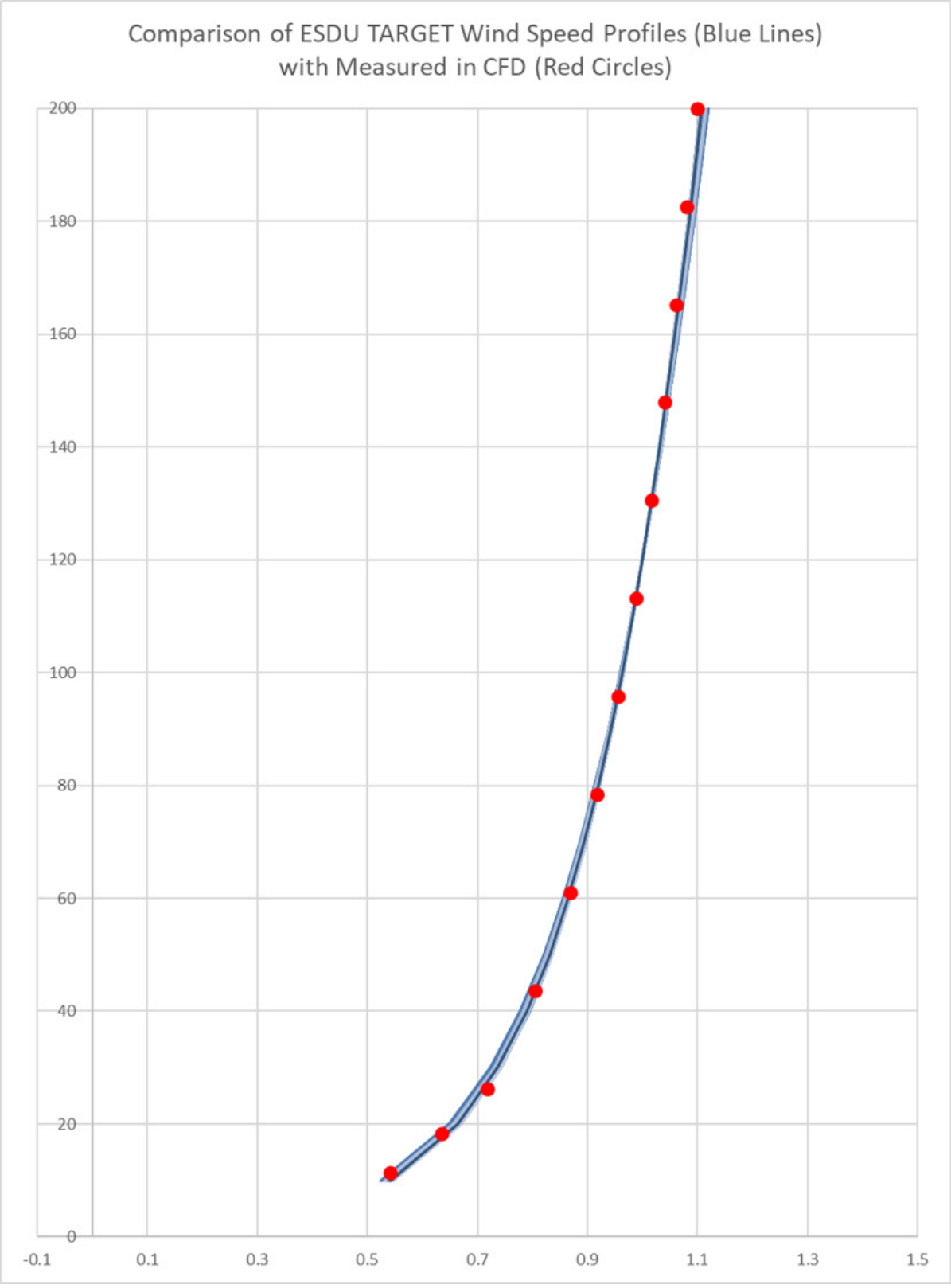


Fig. 26: Wind Profile for Chalk Farm Road

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