# Appendix: Wind Microclimate
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# ANNEX 1 – WIND TUNNEL TESTING METHODOLOGY

## Introduction

This appendix sets out the methodology for assessing the likely significant effects on wind microclimate that would arise from the combined existence and operation of the proposed development. The methodology for assessing cumulative wind microclimate effects is also described.

Excessive windiness at ground level may have significant effects on pedestrian comfort and safety. Success in addressing environmental wind issues can enhance the usability of external public spaces including building entrances.

## Terminology

**ESDU**: a documented methodology and computer program used to estimate the topographic effects on wind speeds as they approach a site. This is used to 'translate' wind speeds measured at an airport or meteorological station to the target Site.

**Irwin probes**: a robust, omnidirectional measurement device used to measure both the mean wind speed and lower-frequency fluctuations of pedestrian-level winds in wind tunnel testing. An Irwin probe consists of a sensor tube that projects above the ground to a scaled height of 1.5m. The tube is mounted within a round sensor hole at ground level and the pressure difference between the sensor hole and the top of the sensor tube is used to calculate the wind speed.

**peed up ratios:** in environmental wind engineering, a speed up ratio or speed up factor is a ratio between the wind speeds measured at ground level and a single reference point. The reference point should be above the area of interest in a part of the flow that is uninterrupted by the mixing happening below. This ratio allows the modelled wind speeds to be applied to the full scale wind models.

## Wind Tunnel Testing

A 1:300 scale model of the proposed (and existing) development and its surroundings was constructed and placed in a boundary layer wind tunnel for testing. A boundary layer wind tunnel is one that reproduces the earth's atmospheric boundary layer by adding roughness elements upstream of the model being tested. Sixteen wind directions have been tested (22.5° each) for each run to satisfy the requirements for the Lawson criteria. The wind data (strength and frequencies) to be used in the wind tunnel is London LDDC at 10m and adjusted to the Site using the ESDU methodology.

Gust and mean wind speeds were obtained using Irwin probes for sixteen equal increments of wind direction. The probe locations were selected either due to wind sensitivity of the expected activity in the area (building entrances, external seating, etc.) or because the Site geometry suggested the possibility of undesirable wind conditions.

The measured wind speed ratios were combined with the wind statistics for the Site to calculate seasonal and annual levels of windiness according to the 'comfort' and 'distress' limits in the Lawson criteria2. These criteria define appropriate levels of windiness according to the type of activity being performed in the area and levels of windiness that may cause distress and have been used to derive significance criteria.

## Assumptions

Physical details less than 1m in size have not been modelled in the physical model used in wind tunnel testing. The model is built at a scale of 1:300 and anything less than 1m in size becomes too small for the model makers to accurately recreate.

Landscaping within the Site boundary has been modelled using scale models of deciduous trees without foliage to represent a worst-case scenario. The final landscaping proposed may be slightly different from what was tested in the wind tunnel. A qualitative assessment of the differences can be carried out by Arup's wind specialists to determine if any adverse wind conditions are expected to arise.

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# ANNEX 2 – POLICY AND LEGISLATION

There is no policy or legislation for wind microclimate conditions or assessment in the UK. However, microclimate is mentioned in national policy and there are guidelines that set out best practice for wind microclimate assessments.

## National Planning Policy

### *National Planning Policy Framework (NPPF)*

The National Planning Policy Framework (NPPF) was first published in March 2012 and most recently updated in September 2023.

The NPPF does not contain any planning policies directly relating to wind microclimate issues. However, the benefits of a high-quality built environment are emphasised in the NPPF. For example, paragraph 185 states *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."*

### *National Planning Practice Guidance (2021)*

The NPPG identifies the potential for tall and large buildings to affect the 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"*

## Regional Policy

### *London Plan (2021)*

**Policy D9 – Tall Buildings** – 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.

## Local Planning Policy

The Wind Microclimate Guidelines for Developments in the City of London was published in August 2019 and *"…provides general guidelines for wind microclimate studies required as part of the planning applications of new development proposals in the City of London (CoL)".* Although the site is not within CoL, the guidance has been referenced during the assessment to ensure consistency with the latest wind microclimate advice.

The Lawson LDDC guidance used in this report is the basis of the methodology used in the CoL Guidelines.