CUNDALL

Hayes Digital Park Data Centre Campus, Building LON6

Microclimate & Wind Assessment

Colt DCS

Job No:	1042145
Doc Ref:	LONUX-CDL-ZZ-XX-RP-Z-00004
Revision:	P01
Revision Date:	14 March 2025

Project title	COLT LON 04 Masterplan	**Job Number**
Report title	Microclimate & Wind Assessment	1042145

Document Revision History

Revision Ref	Issue Date	Purpose of issue / description of revision
P01	14/03/2025	For Planning

Document Validation (latest issue)

12/03/2025	12/03/2025	13/03/2025
X R.Kirwan	X J. Hyland-Knight	X B. Florek
Principal author	Checked by	Verified by
Signed by: r.kirwan	Signed by: j.knight	Signed by: b.florek

Contents

1.0

Introduction

1.0 Introduction

The following report summarises the expected qualitative impact of the proposed development on the local wind conditions, with special regard to pedestrian wind comfort. It is prepared based on the historical weather conditions for the site and consultant's experience in the subject of pedestrian wind comfort. The anticipated most common and worst-case scenarios were considered. The study comprises the following two scenarios:

- Baseline – existing site
- Proposed – proposed scheme with the nearest buildings

The site, which is presented on the Figure 1-1, is located in Hayes, between Uxbridge Road and Bullsbrook Road. The site is in the jurisdiction area of the London Borough of Hillingdon. The following desktop study identifies the areas with an increased risk of pedestrian discomfort as a result of increased wind velocity.

Figure 1-1: Existing site. Proposed site boundary indicated in red

1.1 Legislation, Policy & Guidance

1.1.1 National Planning Policy

There are no specific guidelines in international legislation that could be implemented of environmental wind flows in the built environment. The effects of environmental wind on spaces where people are present and the associated suitability for use are described via Lawson Comfort Criteria (LCC). LCC are recognised by Local Planning Authorities (LPAs) as a suitable benchmark for wind assessments. Lawson Comfort Criteria are described in the Chapter 2.

1.1.2 Regional Planning Policy - The London Plan

Policy D8

Development Plans and development proposals should:

G: Ensure buildings are of a design that activates and defines the public realm and provides natural surveillance. Consideration should also be given to the local microclimate created by buildings, and the impact of service entrances and facades on the public realm.

J: Ensure that appropriate shade, shelter, seating and, where possible, areas of direct sunlight are provided, with other microclimatic considerations, including temperature and wind, taken into account in order to encourage people to spend time in a place.

Policy D9 Tall buildings

[…text omitted…]

3) environmental impact

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

b) air movement affected by the building(s) should support the effective dispersion of pollutants, but not adversely affect street-level conditions

c) noise created by air movements around the building(s), servicing machinery, or building uses, should not detract from the comfort and enjoyment of open spaces around the building

4) cumulative impacts

a) the cumulative visual, functional and environmental impacts of proposed, consented and planned tall buildings in an area must be considered when assessing tall building proposals and when developing plans for an area. Mitigation measures should be identified and designed into the building as integral features from the outset to avoid retro-fitting.

1.1.3 Local Planning Policy – LBH Local Plan: Part 1 - Strategic Policies

Policy BE1: Built Environment

The Council will require all new development to improve and maintain the quality of the built environment in order to create successful and sustainable neighbourhoods, where people enjoy living and working and that serve the long-term needs of all residents. All new developments should:

11. *In the case of tall buildings, not adversely affect their surroundings including the local character, cause harm to the significance of heritage assets or impact on important views. Appropriate locations for tall buildings will be defined on a Character Study and may include parts of Uxbridge and Hayes subject to considering the Obstacle Limitation Surfaces for Heathrow Airport. Outside of Uxbridge and Hayes town centres, tall buildings will not be supported.*

The height of all buildings should be based upon an understanding of the local character and be appropriate to the positive qualities of the surrounding townscape.

1.1.4 Local Planning Policy – LBH Local Plan: Part 2 - Development Management Policies

Policy DMHB 10: High Buildings and Structures

Any proposal for a high building or structure will be required to respond to the local context and satisfy the criteria listed below. It should:

i) be located in Uxbridge or Hayes town centres or an area identified by the Borough as appropriate for such buildings;
[…text omitted…]

vi) not adversely impact on the microclimate (i.e. wind conditions and natural light) of the site and that of the surrounding areas, with particular focus on maintaining useable and suitable comfort levels in public spaces;

vii) be well managed, provide positive social and economic benefits and contribute to socially balanced and inclusive communities;

viii) comply with aviation and navigation requirements and not adversely impact upon telecommunication, television and radio transmission networks; and

ix) demonstrate consideration of public safety requirements as part of the overall design, including the provision of evacuation routes.

1.2 Existing development & Site Description

Colt secured planning permission from the London Borough of Hillingdon (LBH) in 2022 for the redevelopment of the former Trinity Data Centre, Veetec Building, and Tudor Works sites at Beaconsfield Road in Hayes to deliver two data centre buildings (alongside substation and tank rooms) which together provide more than 37,000sqm of floorspace (ref. 38421/APP/2021/4045).

Since the granting of planning permissions for Buildings 1 and 2 (ref. 38421/APP/2021/4045), Colt has acquired Heathrow Interchange and Hayes Bridge Retail Park. The southern boundary of Heathrow Interchange immediately abuts the northern boundary of the site that Colt is presently redeveloping.

The proposed site sits as part of a wider commercial area which is broadly bound to the north by Uxbridge Road, the west by Springfield Road (and Minet Country Park), to the east by the Yeading Brook, and to the south by Beaconsfield Road. The broader area comprises of a mix of commercial operations with retail uses located predominantly in the northern part and industrial, storage, and manufacturing operations across much of the central and southern areas.

The site consists of two distinct parts which together have a site area of approximately 4.4ha but are separated from each other by Bullsbrook Road, an adopted highways which serves other premises within the wider commercial area.

On the northern side of Bullsbrook Road is Hayes Bridge Retail Park. The Hayes Bridge Retail Park consists of a terrace of seven retail units and a standalone commercial bank (Metro Bank) set around a central surface car park which is accessed from the Uxbridge Road. The majority of these units are vacant. It is anticipated that demolition of units within the retail park (save for Metro Bank) will take place whilst this application is being considered in accordance with an application for prior notification of demolition.

To the south of Bullsbrook Road and Hayes Bridge Retail Park is Heathrow Interchange. Heathrow Interchange consists of a series of industrial units arranged into two parallel terraces which are orientated north-south and separated from each other by an open yard with parking and vehicle turning which is served by Bullsbrook Road. Each terrace is split into two units so that there are four units within Heathrow Interchange. Prior notification of demolition of Unit 1 (ref. 71554/APP/2024/2490) and it is envisaged that the unit will be demolished whilst this application is being considered. There is a live application for planning permission for a substation in this location (ref. 71554/APP/2025/47). Unit 2, the southern unit on the eastern terrace, is outside of Colt's ownership and is excluded from this application.

Figure 1-2: The shape of the existing space and the surroundings objects

1.3 Proposed development

Colt is progressing an application for hybrid planning permission. This consists of full planning permission for a data centre building (to be known as LON06) and outline planning permission for two further data centre buildings (to be known as LON07 and LON08) and the Innovation Hub.

LON06, LON07, and the Innovation Hub are to be located on the site of Hayes Bridge Retail Park with LON08 (and the substation for which there is a separate application for full planning permission for) to be located on the site of Heathrow Interchange.

The Metro Bank building and use in the northeast corner of the site will be retained.

Building	Maximum Height	GEA	GIA	Application Type
LON06	41.600 m	25,235 sqm	24,114 sqm	Full
LON07	56.000 m	53,415 sqm	-	Outline
LON08	40.200 m	29,656 sqm	-	
Innovation Hub	28.000 m	2,000 sqm	-	

Table 1-1:

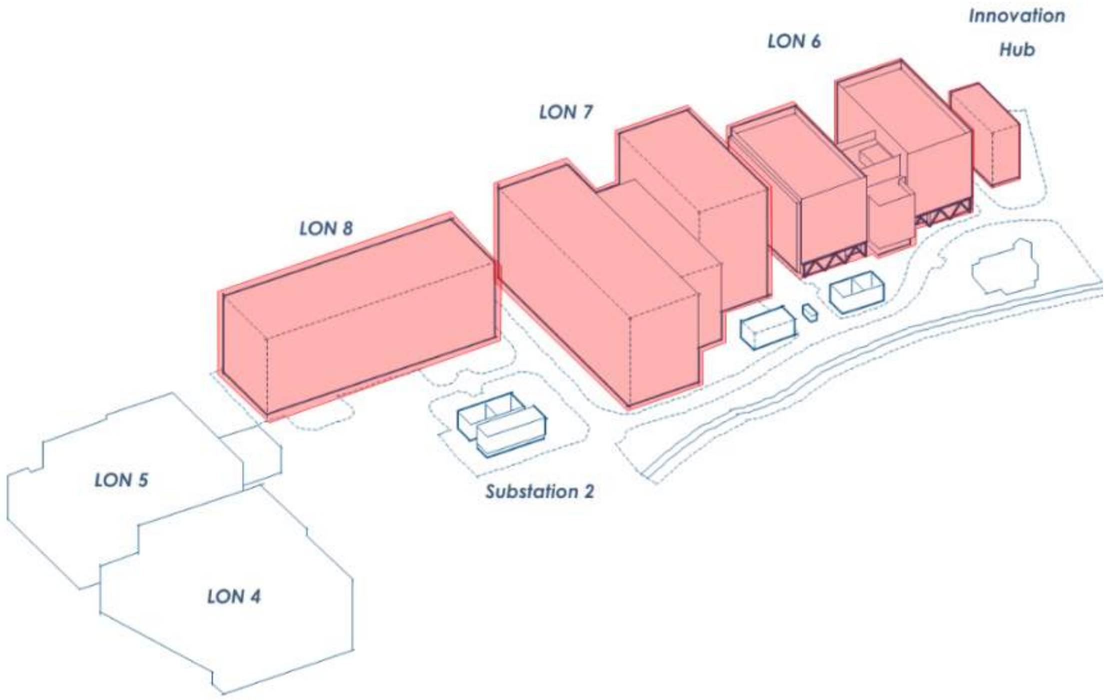


Figure 1-3: The shapes of the proposed buildings and the surroundings

As shown above, most of the existing buildings will be replaced with a proposed construction of the Data Centres. It should be noted that the Innovation Hub, LON7 and LON8 are submitted for outline planning. The building mass allowed for these buildings is the largest that the site parameters allow for, to ensure the study is suitable. Limited space can influence wind conditions around the new development. Therefore, Chapter 4.0 examines its potential impact on the surrounding environment and pedestrian pathways.

1.4 Wind data analysis

In London, UK, prevailing winds are predominantly from the south, west, southwest (about 50% of annual distribution).

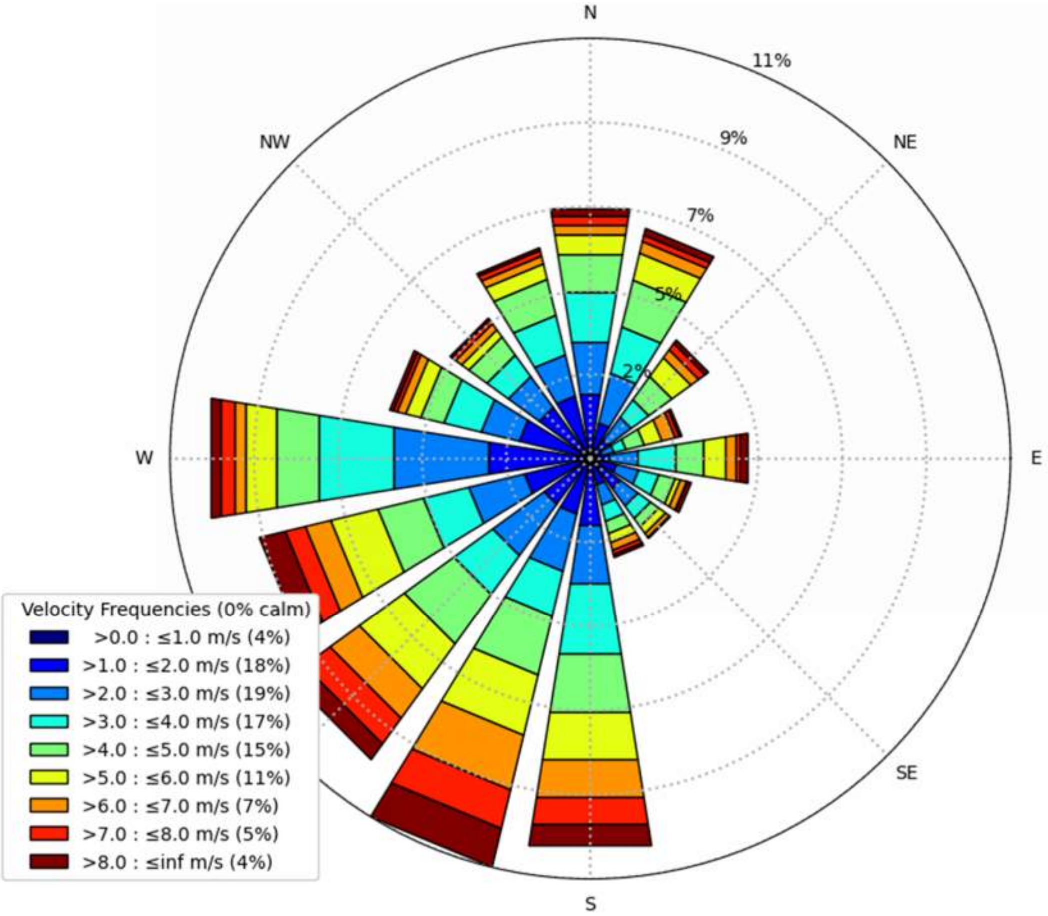
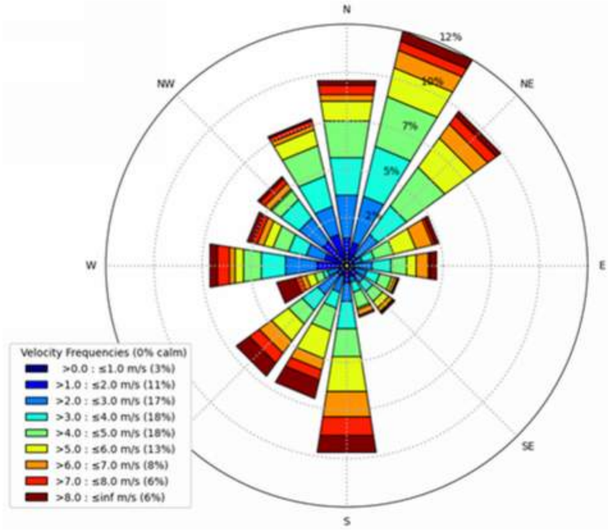
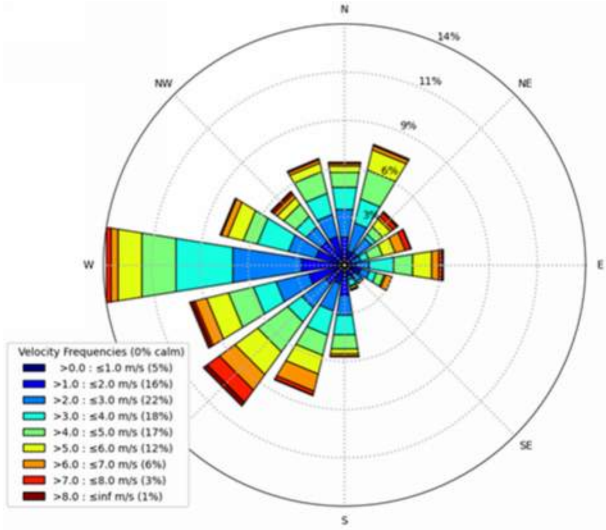


Figure 1-4: Annual wind conditions for London Heathrow, UK

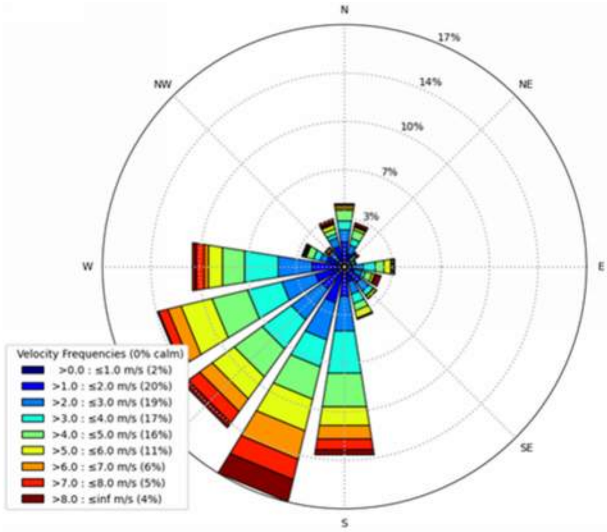
The above wind rose, presented on Figure 1-4, indicates that the south-western façades are the most exposed to the wind.



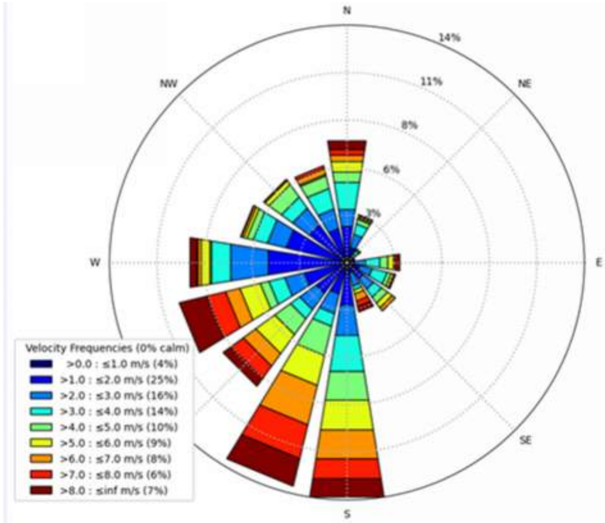
spring



summer



autumn



winter

Figure 1-5: Seasonals wind conditions for London Heathrow, UK

The available data presented on the Figure 1-5 shows that average wind speed in London experiences significant seasonal variation over the course of the year. The windier part of the year lasts from November to April (Figure 1-6).

The yearly average wind speed is approximately 3.8 m/s (8.4mph).

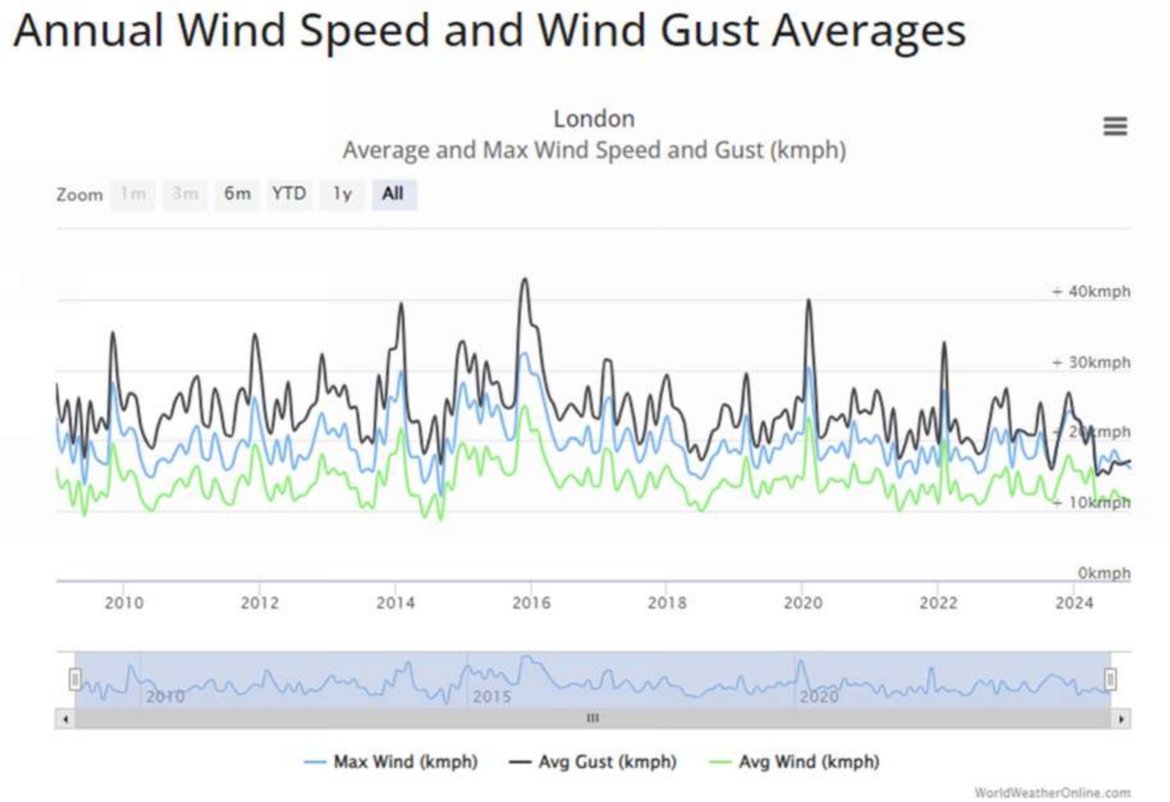


Figure 1-6. Yearly average wind speed

The predominant average hourly wind direction in London varies throughout the year. The weather data indicates that wind in London is most often from the north from April to May. Westerly winds are the most common in the remaining part of a year – Figure 1-7.

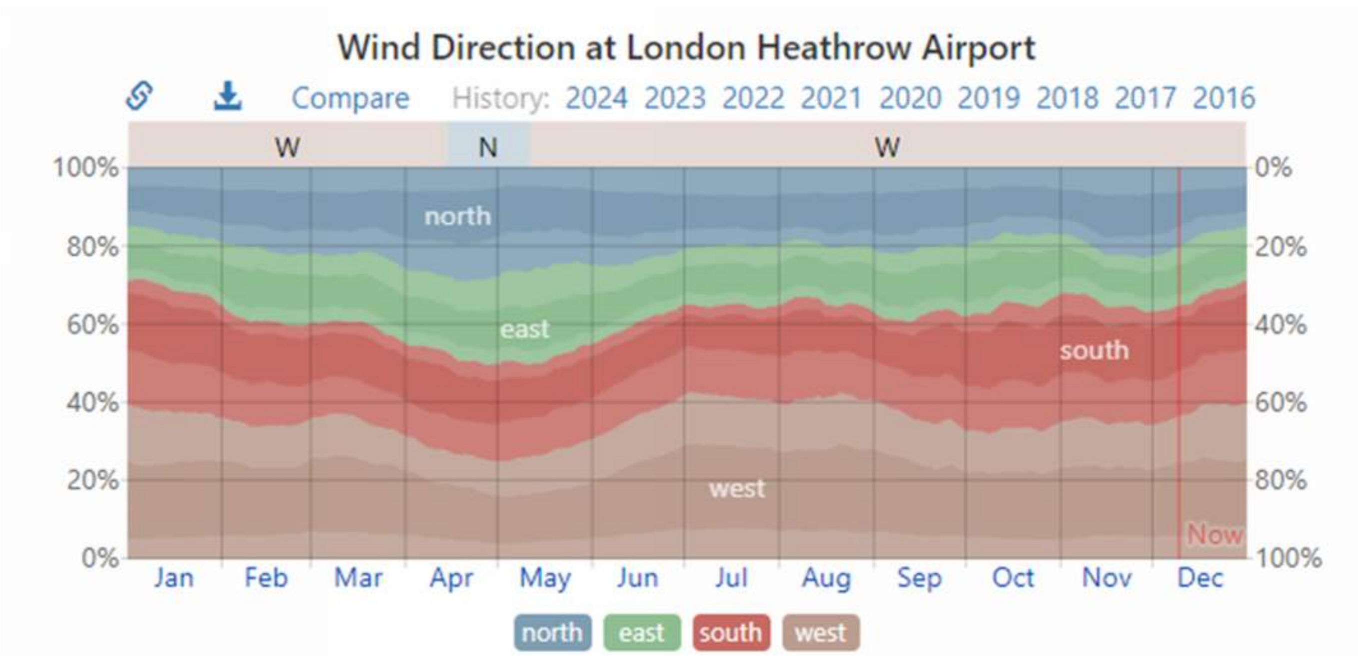


Figure 1-7: The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions, excluding hours in which the mean wind speed is less than 1.0 mph. The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).

2.0

Pedestrian comfort criteria

2.0 Pedestrian comfort criteria

Pedestrian wind comfort can be a significant area of concern in the built environment, and it is assessed typically by using a wind tunnel assessment or by CFD simulations. There are several methodologies that can be followed to assess pedestrian comfort, from which the most common is the Lawson's LDDC Criteria [1]. Other widely used methodologies are the NEN 8100:2006 Standard [2] or the Melbourne Standard [3]. The table below summarises the comfort classes proposed by Lawson LDDC.

Class	Criteria	Description
A	Max 5% hours annually, wind speed > 2.5m/s	Frequent sitting
B	Max 5% hours annually, wind speed > 4m/s	Occasional Sitting
C	Max 5% hours annually, wind speed > 6 m/s	Standing
D	Max 5% hours annually, wind speed > 8m/s	Walking
E	Above 5% hours annually, wind speed > 8m/s	Uncomfortable
S	Above 0.022% hours annually, wind speed > 15m/s	Unsafe

Table 2-1: Pedestrian comfort classes according to LDDC Lawson's criteria

3.0

Wind characteristics around buildings

3.0 Wind characteristics around buildings

For densely developed areas (i.e. cities) wind velocity would be relatively low for lower heights, while for flat and smooth areas, a dynamic velocity growth can be observed directly above the ground level. Figure 3-1 shows the impact of the terrain profile on the corresponding wind profile. Such a relationship is described by the surface roughness coefficient.

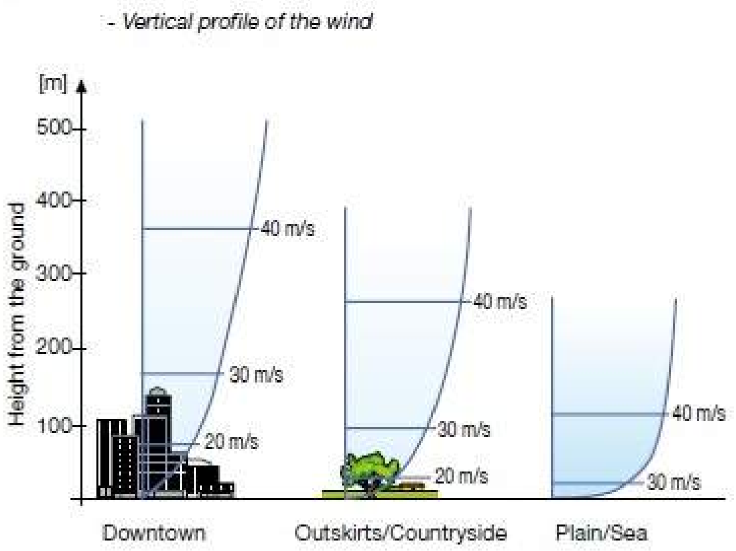


Figure 3-1: Wind profiles for typical surface types

The proposed site is of a low urban density and height, so the wind profile is expected to be average steep. This means, that the expected wind speed at pedestrian level is relatively low, because in vicinity to the site the surrounding buildings constitute a barrier that creates a loss of the wind energy.

Moreover, the buildings arrangement also significantly affects wind directions and speed. Tall buildings can create a wind tunnel effect, where wind is accelerated between narrow spaces. In areas with more spaced-out or shorter buildings, wind can flow evenly and comfortably.

Trees, parks, and others greenery can reduce wind speed, improving wind conditions.

Figure 3-2: The site of the proposed development

The key factors that might impact the change in local wind conditions near the proposed buildings in the urban environment include the occurrence of:

- narrow spaces between the buildings that accelerate the air flow (Figure 3-3)
- higher façades than the existing surrounding buildings that creates potential to direct the mass of air downwards (Figure 3-4)

These factors together create specific local conditions that impact how wind is felt in pedestrian levels. Therefore, in the next chapter of this assessment, further detail of the potential negative impact on the site under examination can be found.

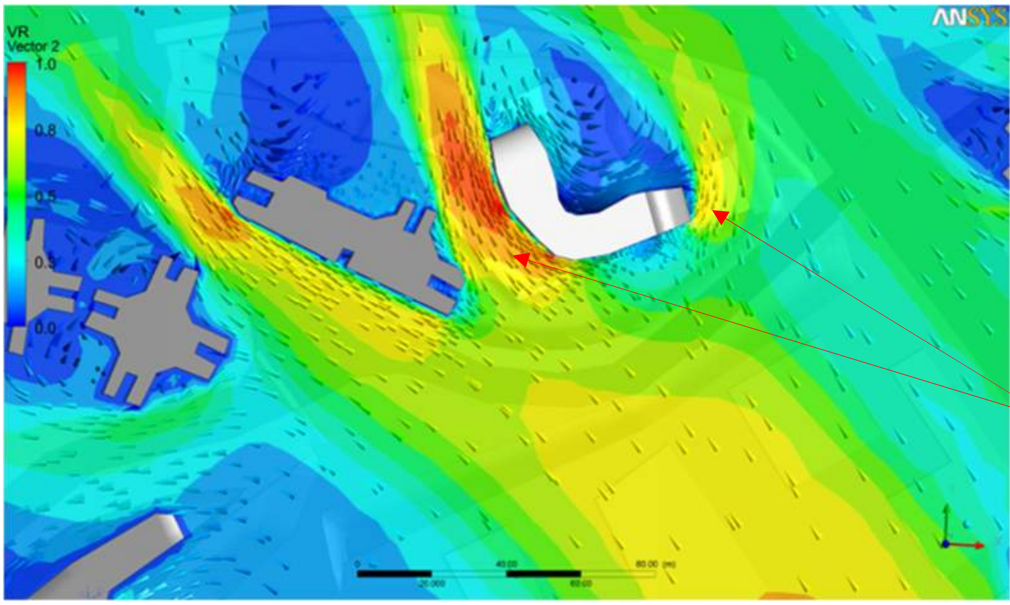


Figure 3-3

Figure 3-3*:* An example from a CFD wind study showing an increase in wind velocity in the narrow passages between the buildings, and on the corners of the buildings. Wind velocity might increase in those areas by 10-50% or even more, depending on the length of the façade, building height, and width of the passage between the buildings.

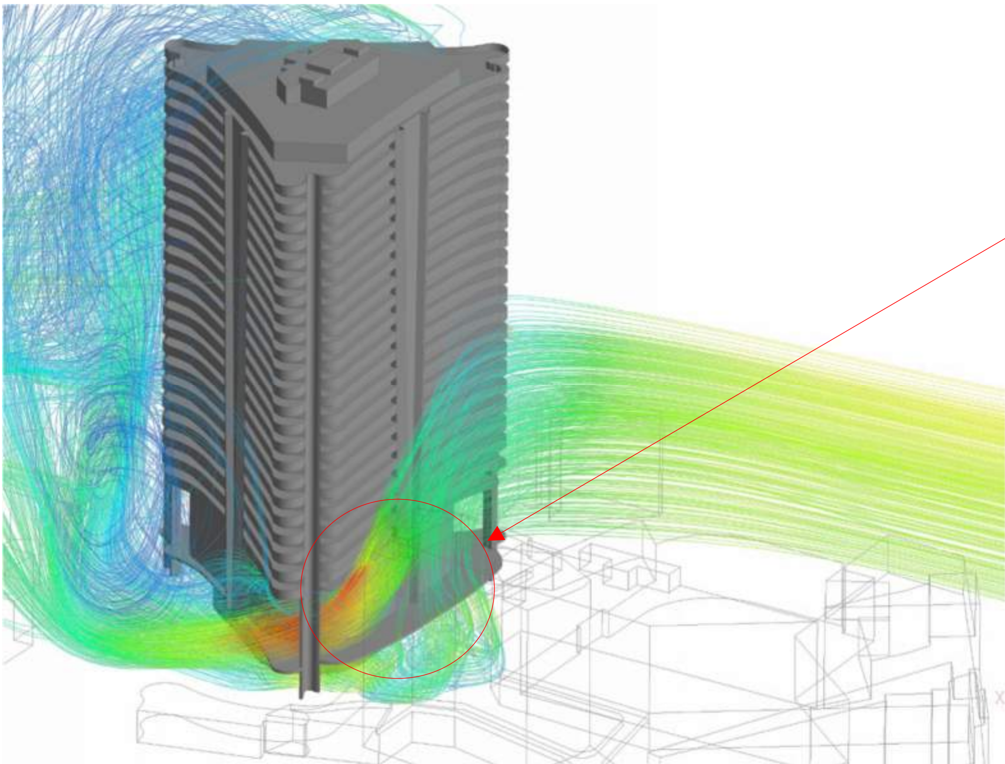


Figure 3-4:

Figure 3-4*:* An example from a CFD wind study. The air flow from above the surrounding buildings is pushed downwards on the façade of the higher building. The air flow is accelerated in the corner area at pedestrian level.

4.0

Site analysis

4.0 Site analysis

The most unfavourable wind directions from a pedestrian wind comfort point of view would be the westerly, southern, and south-western winds that blow about 50% of the time of the year. The wind in this area reaches an average speed of about 3 to 4 m/s, which happens over 30% of the time in the year.

According to the wind rose, higher wind speeds are expected even less frequently, and a wind speed of 6 m/s is exceeded in only 16% of hours in the year (Figure 1-4).

In this chapter, the potential accelerations resulting from the development of new buildings are examined, with particular attention to their impact on wind behaviour at pedestrian level. However, to assess wind conditions, it is also essential to consider the frequency of these accelerations, as this directly influences the overall comfort level. Therefore, this factor has been incorporated into the evaluation process in this study to ensure a comprehensive analysis.

4.1 West wind

Westerly wind is not only crucial due to its frequency but also because of the western facades of the proposed buildings, which due to their heights are exposed to the effects associated with the westerly winds, i.e. from this side there are significantly lower neighbouring buildings. Air masses are likely to hit the western façade, and due to the significant homogeneous surfaces, downdrafts may form. The downward airflow can combine with the air from the streets in front of the building and with the reflected air that was previously directed perpendicular to the building, causing the air speed to accelerate, especially in the narrow passages between the buildings. The greatest negative impact is expected in the corner area highlighted in pink in Figure 4-1 below.

The winds from this direction reach an average speed of 3m/s (at a height of 10 m) and blow about 10% of the time of the year. For this predominant wind direction higher wind speeds above 6m/s are only exceeded in about 1% of the hours each year.

All the above suggests that in most areas, the conditions should be comfortable for sitting or standing and some accelerations resulting from the above-mentioned phenomena are not expected to exceed the wind speed recommended for business walking (Table 2-1), since the expected accelerations rarely exceed 20%-30% at the pedestrian level compared to the conditions 10 meters above the ground.

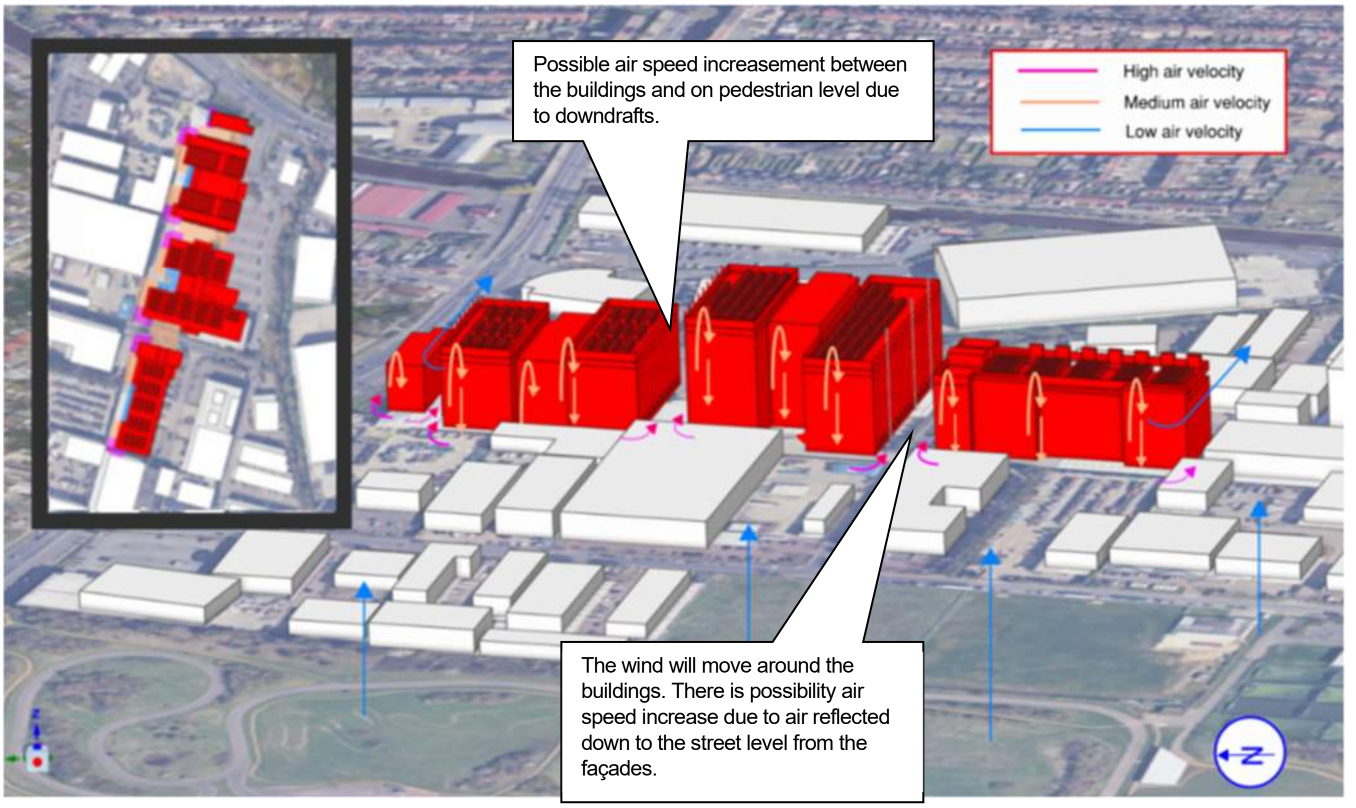


Figure 4-1: Wind from West direction

4.2 South wind

Looking at the wind rose (Figure 1-4), the southern wind direction also occurs frequently in the analysed areas, therefore, this wind direction was also considered.

Figure 4-2 below shows a possible scenario in which the southern facades of the proposed project could be partially sheltered from the southerly winds due to buildings with a height of about 36 m, i.e. lower than planned only by about 2-3 m and located to the south of them. Areas with probably slightly increased air wind speed are marked in orange in the figure below. Winds from the south direction will most likely not have a negative impact on pedestrian levels, as the existing surroundings will prevent creation of significant downdrafts.

The south wind in London prevails in the winter-spring period. It blows at an average speed 3.5 m/s (at a height of 10 m) for more than 10% of the year.

The above suggests that conditions should still remain at comfortable level for sitting or standing in most places near the new development. Only during certain moments of the year, when the wind speed at 10 meters exceeds 6m/s, the business walking conditions can be expected; and according to the available data, winds from this direction occur only 2% of the time during the year.

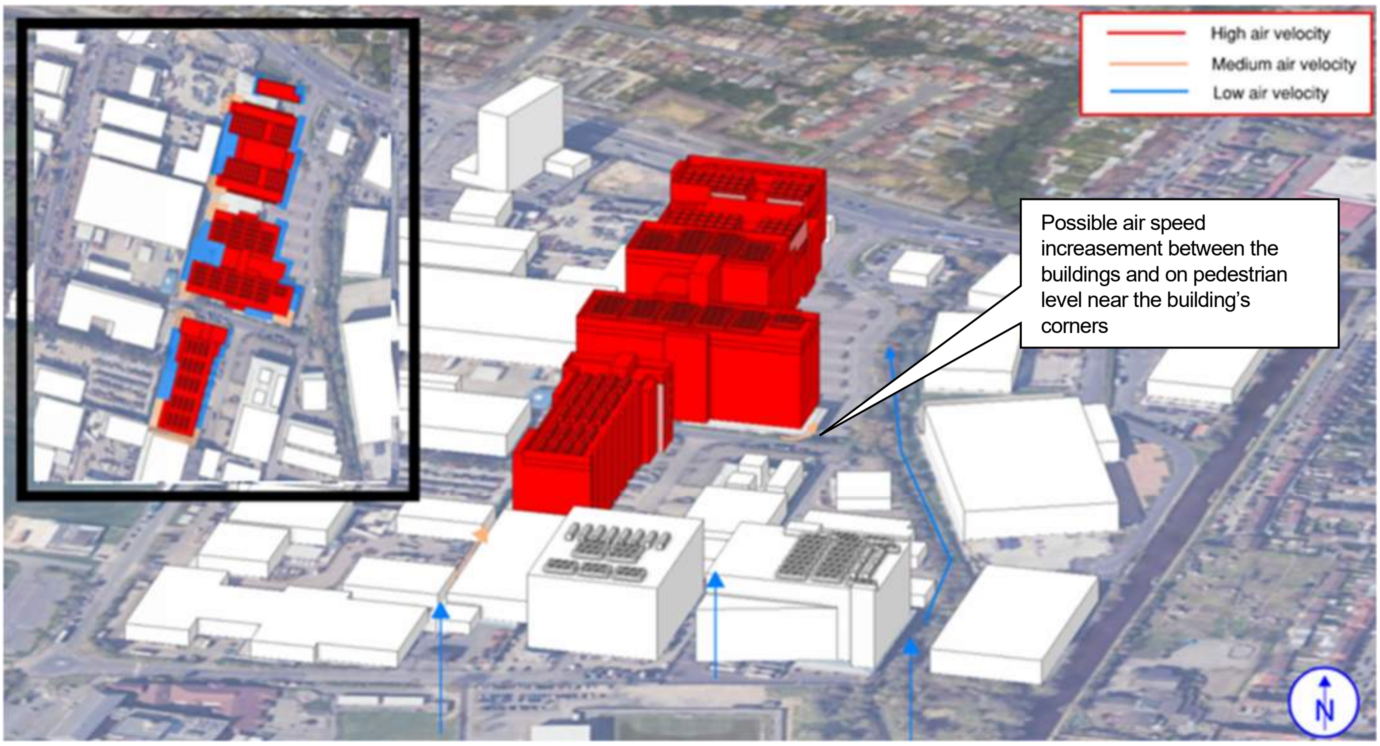


Figure 4-2: Wind from South direction

4.3 South-west wind

The South-west winds in London are the most frequent and blow about 30% of the year; therefore, the following section focuses on considering this case. Average speed is 4.5m/s (at a height of 10 m). Winds exceeding 6m/s for occur for about 8% of the time of the year.

Wind coming from these directions do not hit the façade perpendicular, and those should result in lower downdraft accelerations then in previously analysed cases; when winds strike the building at an angle, they are less likely to create intense downward flow, leading to more moderate wind speed at ground level.

The above suggests that conditions should remain at comfortable level for sitting or standing in most places near the new development. Only during certain moments of the year, when the wind speed at 10 meters exceeds 8m/s, the business walking conditions can locally be expected; and according to the available data, winds from this direction occur only 2.5% of the time during the year.

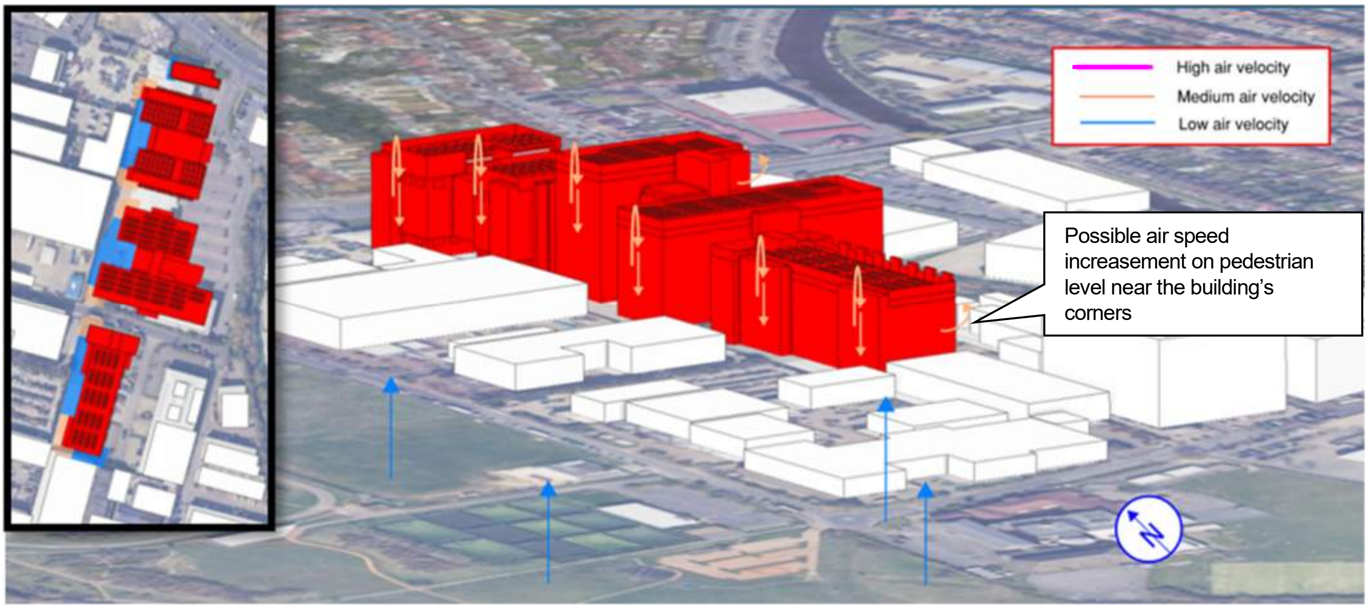


Figure 4-3: Wind from South-West direction

4.4 Summary of wind condition changes

The West, South and South-west façades are quite diverse, so the air streams can break, and reduce the wind speed. However, there are some elements of the building, e.g. corners and spaces between them, where the air speed can increase. The following images illustrate the expected areas where the accelerations might occur in current and proposed development.

Figure 4-4: Current development

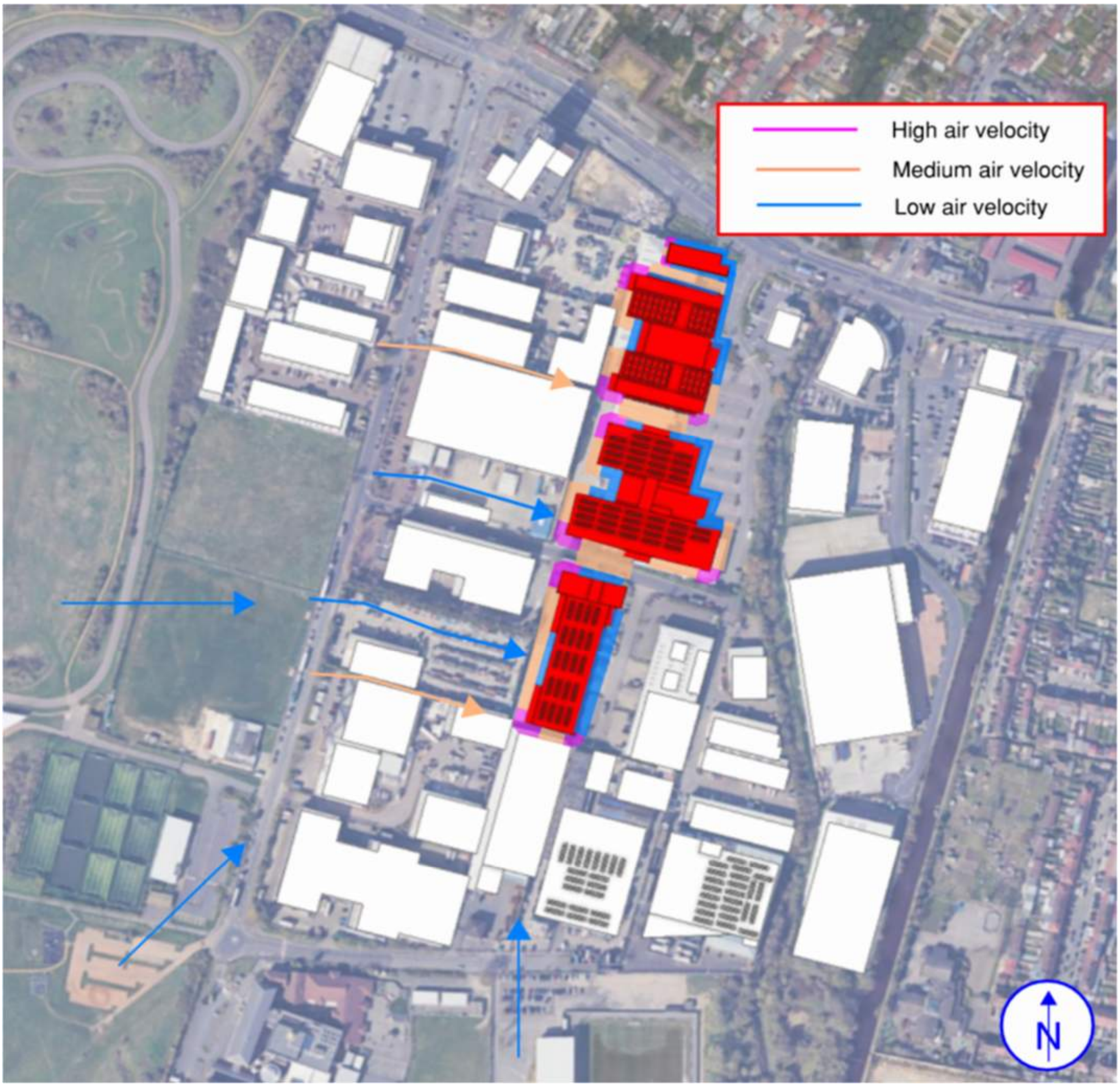


Figure 4-5: Proposed development

Comparing the proposed and the existing site, the wind comfort is expected to be locally deteriorated, however this general impact should not create areas with 'uncomfortable' category from the LCC and the average wind speed around the Data Centre and Innovation Hub buildings should not change drastically. Any potentially significant deterioration of wind comfort is expected to happen only locally.

5.0

Summary

5.0 Summary

The annual prevailing winds for London UK are Southwestern, Sothern and Western, which constitute approximately 50% of annual distribution (@2017 ASHRAE Weather Data Viewer). The annual average wind velocity from these directions is approximately 3.6m/s which should not cause issues with the pedestrian comfort in most of the neighbouring area. Only in narrow passages and in areas near the corners of the new development higher wind velocities might be experienced (20% - 30% velocity increase at the pedestrian level compared to the conditions 10 meters above the ground).

Based on the conducted desktop analysis possibility of downdrafts and accelerations especially around the Data Centre buildings' corners might occur (mainly due to relatively tall, proposed buildings). However, it is worth mentioning that the surrounding buildings are lower than the planned development and provide (to some extent) a protective effect for the proposed area, which limit the negative impact of the proposed development on wind comfort at the pedestrian level.

The wind in London from the north and east blows the least frequently and at the lowest speed, as shown in the wind rose on Figure 1-4. In the case of these winds, the areas of potential discomfort reduction are mainly located in front of the facades that vary in terms of construction (potential wind speed reduction). Therefore, the risk of reducing the comfort for pedestrians in this part of the proposed development is the lowest.

In general, the pedestrian wind comfort conditions will remain at comfortable level for sitting or standing in most places near the new development. Some deterioration is expected (as shown in the visualisations) but is not significant – especially the Lawson category for the pedestrian wind comfort level will not go beyond 'business walking' which is the prescribed category for the area.

6.0 References

1. Lawson T., Penwarden A.D., The effects of wind on people in the vicinity of buildings, Proc. 4th International Conference on Wind Effects on Buildings and Structures, Cambridge University Press, Heathrow, 1975, 605-622
2. NEN 2006. Wind comfort and wind danger in the built environment, NEN 8100 (in Dutch) Dutch Standard
3. Melbourne WH. 1978. Criteria for environmental wind conditions. J Ind Aerodyn 3:241-249

Cundall Johnston & Partners LLP
One Carter Lane London EC4V 5ER
Tel:+44 (0)20 7438 1600
Asia Australia Europe MENA UK and Ireland
www.cundall.com

ZERO CARBON DESIGN 2030