Access Self Storage

Belgrove House

Wind Microclimate Assessment

Issue | 24 August 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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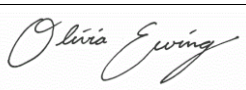
		Signature			
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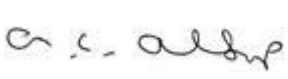
		Signature			
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Contents

1 Introduction

This report describes the assessment of the wind environment around the proposed and existing Belgrove House development. The assessment is based on results of a qualitative desk study.

Arup are responsible for numerous complex environmental wind studies over the last 35 years, including many of the tallest developments in the UK and London. We bring decades of experience and have a good understanding of the windiness at this site including mitigation measures.

The aim of the assessment is to evaluate the impact of the massing and landscaping on the local wind environment at ground level and how the winds impact the proposed and existing external uses.

The assessment is based on the following information:

- drawings and information provided by Allford Hall Monaghan Morris Architects and Bradley-Hole Schoenaich Landscape on the 19th of August 2020 (see Figure 1),
- 3D massing provided by AHMM on the 18th of August 2020
- Aerial views of the site and surroundings

Figure 1 – Render of the Proposed Development as viewed from Kings Cross Square

2 Assessment methodology

2.1 Desk Study

This assessment is a qualitative evaluation of the wind comfort and safety to pedestrians, cyclists and vehicles according to the industry standard Lawson criterion (LDDC version). The assessment is based on decades of experience, grounded in our work and findings from desk top studies, previous wind tunnel tests and planning studies. Arup are responsible for numerous complex environmental wind studies over the last 35 years, including many of the tallest developments in the UK and London.

Long-term regional meteorological data is used to establish wind speeds for the region and develop a statistical model of wind speeds and directions at the site, taking account of surrounding terrain. The wind data used in this assessment is presented in the following sections.

The frequency and directionality of the oncoming winds is then compared to the likely wind mechanisms to occur within the development and surrounding area and an estimation of the likely comfort and/or safety category of the Lawson criteria is discussed.

Conditions during construction are not assessed. Conditions once the development is in place and in use are assessed.

2.2 Criteria to describe the levels of windiness

The criteria used to describe windiness in this study are those of TV Lawson of Bristol University, extracted from “The evaluation of the windiness of a building complex before construction”, TV Lawson, London Docklands Development Corporation. These are used widely in the UK and around the world. Even without wind tunnel testing, these criteria are useful to describe windiness in terms of acceptability for particular activities.

The acceptability of windiness is subjective and depends on a number of factors, most notably the activities to be performed in the area being assessed. The Lawson Criteria describe acceptability for particular activities in terms of 'comfort' and 'distress' (or safety). Acceptable conditions for various activities in order of increasing windiness are described in Table 1.

Criteria	Description
'Sitting'	Reading a newspaper and eating and drinking
'Standing'	Appropriate for short term **sitting**, bus stops, window shopping, building entrances, and parks
Walking or 'Strolling'	General areas of walking and sightseeing
'Business Walking'	Local areas around tall buildings where people are not expected to linger

Table 1 - Lawson comfort criteria

The conditions described above are the limiting tolerable criteria for comfort. For ideal conditions, the windiness in an area with a known activity will be a category better (i.e. tolerable conditions at an entrance will be in the 'Standing' range but ideal conditions will be in the 'Sitting' range). For more sensitive activities, such as regular use for external eating, conditions should be well within the 'Sitting' category.

In the following assessment the words 'Sitting', 'Standing', 'Strolling' and 'Walking' are used to describe comfort levels of windiness as described in Table 1.

The comfort criteria above describe more frequent wind conditions. There is also a distress criterion for 'General Public Access', equivalent to a mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year. This is intended to identify wind conditions which less able individuals or cyclists may find physically difficult. Conditions in excess of this limit may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.

There is a further limiting distress criterion beyond which even 'Able-bodied' individuals may find themselves in difficulties at times. This corresponds to a mean speed of 20 m/s and a gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Gust speed aerodynamic forces approach body weight and it rapidly becomes impossible for anyone to remain standing.

Distress Criteria	Description
'General Public Access'	Above which the less-able and cyclists may at times find conditions physically difficult
'Able-bodied Access'	Within which it may become impossible at times for an able-bodied person to remain standing

Table 2 - Lawson distress criteria

In the following assessment the words 'General public', and 'Able-bodied' are used to describe safety levels of windiness as described in Table 2.

2.3 Wind climate

The strength and directionality of the winds at the site are fundamental aspects of the environmental wind assessment. Historical wind records of strength and direction were obtained from Heathrow Airport and represent the windiness at the site.

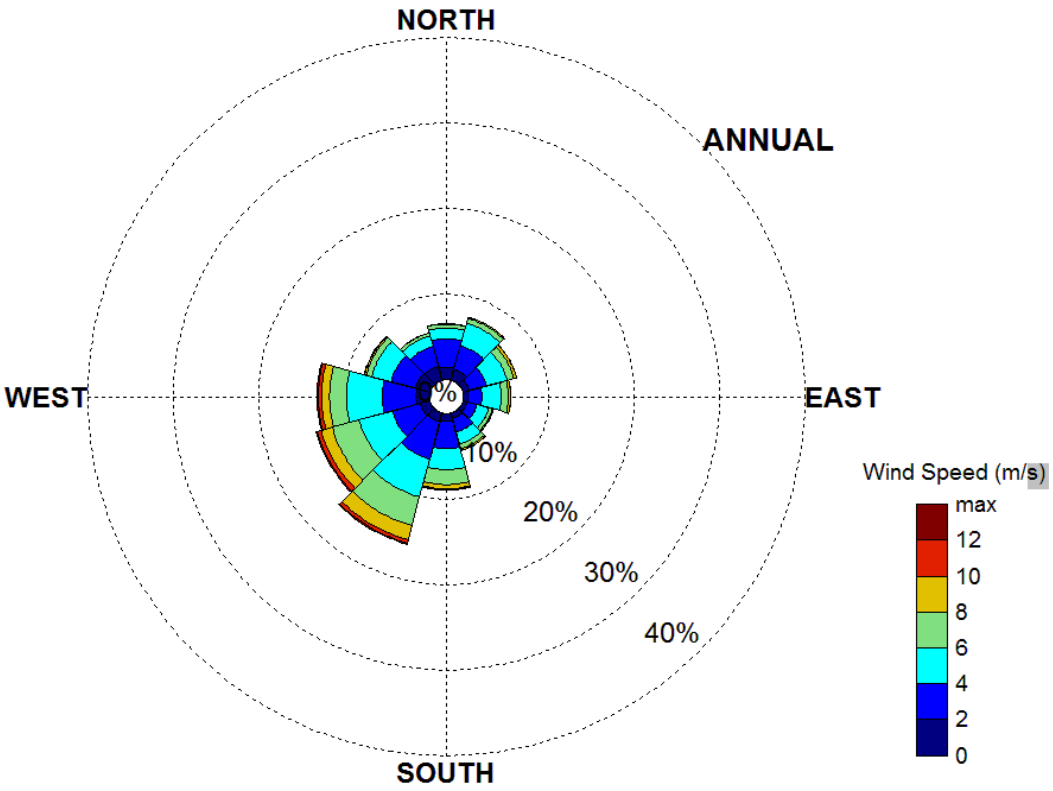

Figure 2 - From Heathrow Airport (1994-2014)

The key aspects of the wind climate in London are as follows:

- The west and west-south-west winds are the most frequent and strongest winds at all times of the year. Most cases of serious annoyance due to strong winds around buildings are caused by these winds.
- North-east winds are almost as common as the south-west winds during the winter months but are weaker.
- South-east winds are generally warm and light and are rarely associated with annoying ground level winds.

The areas around the proposed development are accessed by pedestrians at all times of year. Therefore, the environmental wind assessment has been based on the ‘worst season’ wind conditions, which generally occur during winter.

3 Existing Conditions

The site is surrounded by low to medium-rise urban developments and is relatively sheltered from prevailing west and south-west winds.

The existing site is also low rise and has no public terraces.

Wind conditions immediately around the site are expected to be in the ‘Sitting’ to ‘Strolling’ range, which is safe and acceptable for all uses. Figure 3 shows an aerial view of the existing site and wind conditions. The extent of the conditions shown represent the area influenced by the building and slightly farther north towards Kings Cross Square.

The higher ‘Strolling’ conditions are largely due to winds being funnelled between the existing buildings along Euston Road.

Conditions within Kings Cross Square are also influenced by the winds funnelled along Euston Road by the existing surroundings. Upper ‘Standing’ condition are expected across the square which is acceptable for short-term sitting for most of the year.

Figure 3 – Aerial view of the existing site showing an indicative redline boundary and existing wind conditions.

4 Proposed Development Wind Conditions

4.1 Ground Floor

The proposed development is taller than the existing building and includes a taller element on the north end (see Figure 4 & Figure 5 below). The additional height of the development and the exposure of the site are expected to alter the local wind environment. Wind mechanisms that accelerate airflow such as down-drafting and funnelling are expected to occur along the western façade.

Figure 4 – Elevation from St. Chad's street showing the relative heights of the surroundings

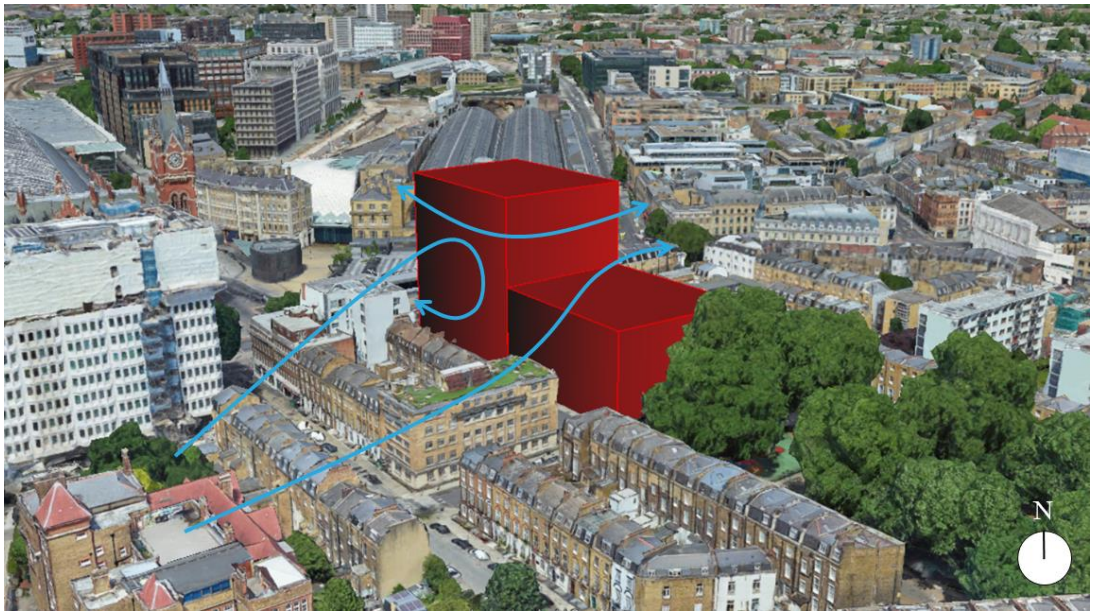

Figure 5 – Sketch of the prevailing south-west wind mechanisms around an outline of the proposed massing in the existing surroundings.

However, the 'stepped' massing of the proposed development takes advantage of the local sheltering provided by upwind buildings. The taller element is a similar

height to the Standard Hotel and the podium terrace is similar to the surrounding residential blocks. This helps reduce downdrafting and subsequent corner accelerations.

All the main entrances are designed as recessed or sheltered by column elements. This ensures that they benefit from local sheltering and achieve acceptably calm 'Sitting' or 'Standing' conditions.

The landscaping includes deciduous trees which are regularly spaced around the site, particularly around pedestrian and cycle routes. The trees help dissipate the wind energy as it passes through and provides additional local shelter to the immediate areas.

Overall, the wind conditions around the proposed development are expected to be in the 'Sitting' to 'Strolling' range (see Figure 6 & Figure 7 below). These conditions are similar to those experienced in the existing scenario but the areas experiencing 'Strolling' conditions extend farther into Belgrove Street and north into Euston Road. However, these conditions are safe and acceptable for both the proposed and existing uses and does not negatively impact the wind conditions within Kings Cross Square. All outdoor seating areas achieve 'Standing' conditions which are acceptable for short-term seating for most of the year and long-term sitting in summer.

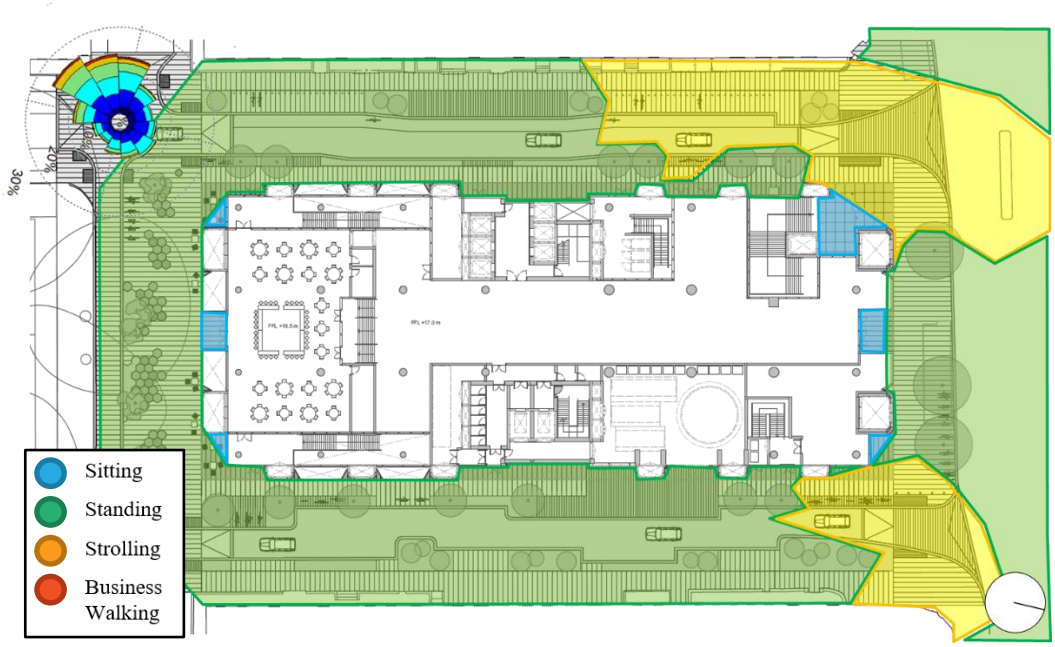

Figure 6 – Ground floor plan of the proposed development showing the wind conditions around the proposed development according to the Lawson Criteria.

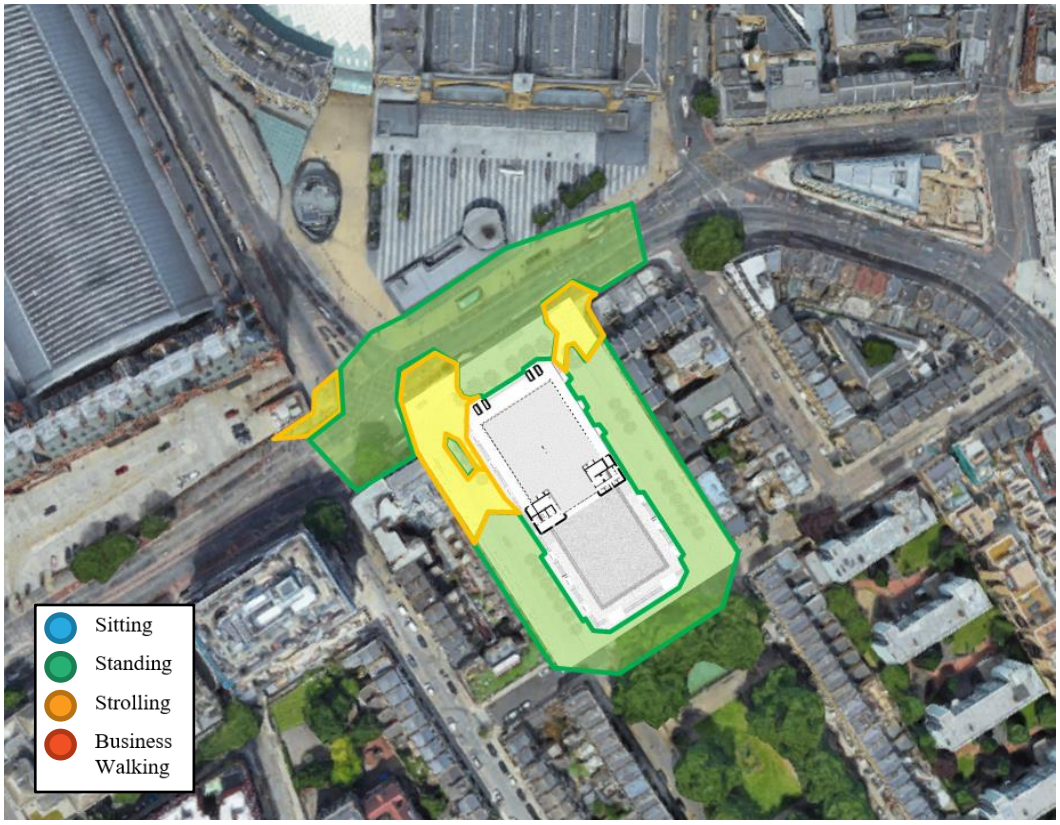

Figure 7 – Aerial view of the of the proposed development in existing surroundings showing the wind conditions around the proposed development according to the Lawson Criteria. The extent of the conditions shown represent the area influenced by the building and slightly farther north towards Kings Cross Square.

4.2 Tube Entrance

An existing pedestrian access to the Tube is located next to the proposed development along Euston Road. It is accessed from the east and is therefore sheltered from prevailing south-west winds. However, it is likely impacted in the winter by weaker but colder winds from the north-east.

Figure 8 – Street-view capture taken from Google Maps, showing the tube entrance.

The introduction of the proposed development does not provide any additional shelter to the entrance. Nor does it negatively alter the wind conditions around this entrance. Therefore, the impact on the tube entrance, if it is retained in its current design, is negligible. It should be noted that changes to the entrance design, such as the removal of a wall, could impact the wind conditions.

4.3 Terrace

4.3.1 Level 4 terraces

The terraces on floor 4 are exposed to both prevailing and secondary winds. However, they are shallow and locally sheltered. The planting around the edge helps by dissipating the winds energy and the balustrade and column massing helps cast a wind ‘shadow’.

Therefore, the terraces on floor 4 are expected to achieve ‘Standing’ to ‘Strolling’ conditions throughout the year and ‘Sitting’ to ‘Standing’ in summer. These conditions are acceptable for access and the expected casual use. It should be noted that the use of this space is dependent on other environmental factors, including; daylight, sunlight, temperature and precipitation.

Figure 9 – Plan view of the terrace spaces and landscaping on level 4

These spaces could incorporate additional local mitigation, such as additional soft landscaping to achieve ‘Sitting’ conditions locally all year-round, if desired.

4.3.2 Level 5 roof terrace

The roof terrace on level 5 is exposed to both prevailing and secondary winds. However, the continuous soft landscaping, including multi-stem trees and hedges, helps dissipate the wind’s energy and provides local shelter to the users.

Therefore, the roof terrace on level 5 is expected to achieve ‘Standing’ to ‘Strolling’ conditions throughout the year and ‘Sitting’ to ‘Standing’ in summer. These conditions are acceptable for access and the expected casual use. It should be noted that the use of this space is dependent on other environmental factors, including; daylight, sunlight, temperature and precipitation.

These spaces could incorporate additional local mitigation, such as additional soft landscaping or temporary side screens around the seating areas to achieve ‘Sitting’ conditions locally all year-round, if desired.

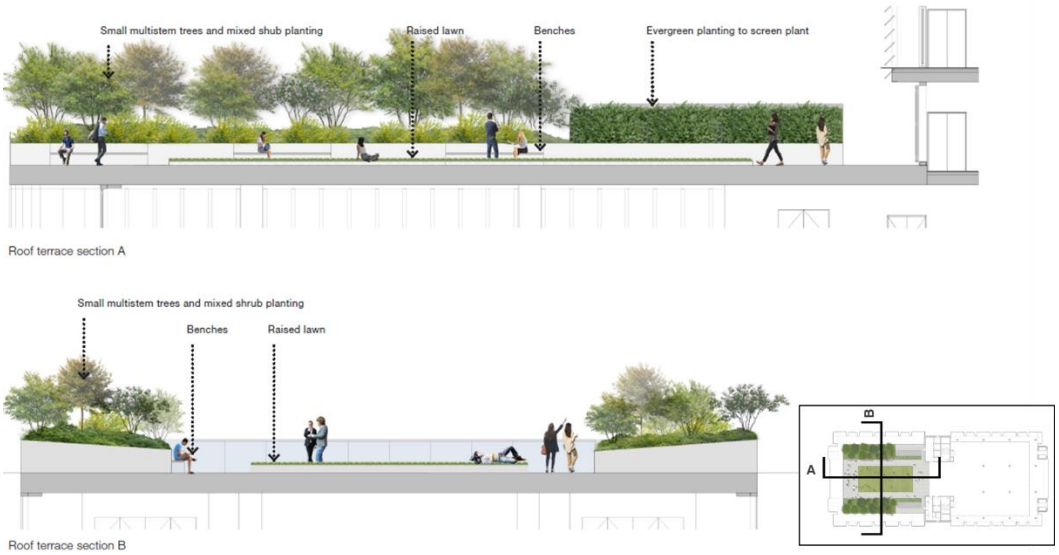

Figure 10 – sections through the roof terrace showing the shelter provided by the landscaping and balustrade.

5 Conclusions

A qualitative desk study was carried out to assess the acceptability of the external wind conditions around the existing and proposed Belgrove House development based on the Lawson LDDC comfort and safety criteria. A summary of the assessment conclusions is as follows:

The additional height of the development and the exposure of the site are expected to alter the local wind environment. However, the design of the development incorporates the following beneficial elements:

- the ‘stepped’ massing of the proposed development take advantage of the local sheltering provided by upwind buildings;
- all the main entrances are designed as recessed or sheltered by column elements; and,
- the landscaping includes deciduous trees which are regularly spaced around the site, particularly around pedestrian and cycle routes.

With the above elements in place, conditions within and around the proposed development at ground level (including Kings Cross Square) are expected to be safe and within acceptable limits for all intended access use without further mitigation.

The terraces on levels 4 and 5 are expected to achieve acceptable conditions for ‘Standing’ or ‘Strolling’ throughout the year and ‘Sitting’ or ‘Standing’ in summer. These spaces could incorporate additional local mitigation to achieve ‘Sitting’ conditions locally all year-round, if desired.