FINAL REPORT

TRANSFORMATION OF THE UGLY BROWN BUILDING

LONDON, UK

PEDESTRIAN LEVEL WIND DESK-BASED ASSESSMENT

RWDI #1603405

AUGUST 7TH 2024

SUBMITTED TO

Luke Thrumble
luke.thrumble@dp9.co.uk
DP9 Ltd
100 Pall Mall
London
SW1Y 5NQ

On behalf of Reef Estates Limited

SUBMITTED BY

RWDI Anemos Ltd.

TABLE OF CONTENTS

VERSION HISTORY

RWDI Project #1603405	Transformation of the Ugly Brown Building, Desk-based Assessment London, UK	
Report	**Releases**	**Dated**
Report	Draft Report Final	March 05, 2018 August 07, 2024
Project Team	KJ FK DH SA	

1. EXECUTIVE SUMMARY

This is a qualitative assessment of the likely wind conditions around the Transformation of The Ugly Brown Building (referred to as the 'Proposed Development') in King's Cross, London Borough of Camden. The Proposed Development consists of 6 new buildings, with the tallest Development (C3) being up to 12 storeys in height.

The report outlines the overall methodology and the use of the Lawson Comfort Criteria to describe the expected wind conditions on the ground-level, the balconies and terraces of each building of the Proposed Development. The assessment is based upon analysis of meteorological conditions for London, adjusted to the Site, and a review of the scheme drawings in the context of the meteorological data.

Since the original assessment in 2018, there have been small adjustments to the building entrances and additional landscaping measures to resolve the windy areas highlighted. Following these changes:

- There will no longer be an entrance at the south-east corner of Plot B where strolling conditions were predicted and therefore not mitigation is required;
- Wind conditions at the south-east corner of Plot C2 would not longer require mitigation (this entrance would be a secondary entrance and therefore less frequently used); and
- Landscaping (in the form of a 3.5-4m trees with }1m high planting underneath) has been added between Plots C2 and C3 which would reduce wind speeds in the undercut at the south-east corner of Plot C3 where an entrance is present, reducing wind speeds to a comfortable category.

The meteorological data for the site indicates prevailing winds from the south-west throughout the year, with colder north-easterly winds in spring months.

For the existing site, the wind microclimate at ground level is expected to be acceptable for the required use during the windiest season. Wind conditions along the Regent's Canal Tow Path and Regent's Canal are anticipated to be suitable for standing during the windiest season; and sitting during the summer season in the existing scenario.

With the Proposed Development built-out, all thoroughfare locations on the Site of the Proposed Development are expected to have conditions ranging from acceptable for sitting use through to strolling use; which are suitable conditions for thoroughfare use during the windiest season.

Three entrances are expected to have strolling conditions, which is one category too windy for the intended use during the windiest season, therefore, mitigation measures like solid side screens or landscaping with a minimum height of 1.5m are required (this has been resolved in the 20224 design changes/landscaping). However; all other entrances are anticipated to have the desired standing or calmer wind conditions during the windiest season.

The amenity areas located at the south-eastern corner of Plot B, Plot C2 and Plot C3 are expected to have standing conditions in the summer season, which is one category too windy. As these amenity spaces are located next to entrances which require mitigation, a successful mitigation of the wind conditions not suitable for entrance use is expected to mitigate the local wind climate in the amenity areas as well (these areas will not be used for seating as per the 2024 design changes and therefore no mitigation is required). All other amenity spaces on the Site are expected to have the desired sitting wind condition.

All terrace and balcony amenity spaces on Plot A, Plot B and Plot C1 are expected to have sitting wind conditions in the summer season; no mitigation measures are required.

For the terrace and balcony amenity spaces on Plot C2 and Plot C3, the anticipated wind conditions range from being suitable for sitting use to standing use. Mitigation measures, like solid screens on the balconies and porous screens and soft landscaping on the terraces, are required in amenity spaces with are expected to have standing wind conditions, as this is one category too windy for the intended amenity usage.

The terrace level on Plot C4 is expected to have a mixture of sitting to standing use conditions. It is noted, that with the proposed landscaping plan (as in '180214_MASTER MODEL FOR MILLER HARE', received on the 15th February 2018) in place the desired sitting conditions are expected throughout the terrace level.

There are no occurrences of strong winds (wind speeds in excess of 15 m/s) anticipated within and around the Site throughout the year with the Proposed Development built-out.

As in the baseline scenario, wind conditions along Regent's Canal Tow Path and Regent's Canal are expected to be suitable for standing during the windiest season; and sitting during the summer season with the Proposed Development built-out.

Overall, with the suggested localised mitigation measures in-situ, the wind microclimate within and around the Proposed Development is expected to be acceptable for its intended use.

2. INTRODUCTION

RWDI was retained by Reef Estates Limited to conduct a desk-based assessment for the Transformation of The Ugly Brown Building (hereafter referred to as the 'Proposed Development'), in King's Cross in the London Borough of Camden. This report presents the background, objectives, results and recommendations from RWDI's assessment. A summary of the overall recommendations from the study are presented in Section 7, "Mitigation Measures".

A planning application, for the redevelopment of the Ugly Brown Building, was submitted to the London Borough of Camden in September 2017. The application is currently pending (ref: 2017/5497/P).

During the course of determination, a number of further design sessions have been held with the London Borough of Camden Planning, Design and Conservation Officers. During these sessions, officers have made a number of suggestions as to how the scheme might be refined. Furthermore, comments from a range of third parties have also been received during the determination process.

In order to address the aforementioned comments, revisions have been made to the scheme accordingly. This Pedestrian Level Wind Desk-based Assessment provides an assessment of the revised scheme, submitted to the London Borough of Camden in March 2018, and supersedes the original Pedestrian Level Wind Desk-based Assessment submitted in September 2017.

3. SITE DESCRIPTION

3.1 Site and Surroundings

The Site is located in King's Cross, within the London Borough of Camden, and is bounded by Granary Street to the south, St Pancras Way to the west and Regent's Canal to the east. The Ordnance Survey Landranger reference for the Site is TQ296837.

The immediate surrounding area consists of a mixture of low- to mid-rise suburban residential and commercial developments. Generally, the oncoming winds are expected to be gusty in nature due to the surrounding developments.

However, winds travelling over open land typically have higher mean wind speeds and less gusty conditions, therefore the open land/parks (in this instance, Regent's Park, for example), particularly in the prevailing south-west direction, may impact the wind microclimate around the Proposed Development.

Figure 1a below, shows an aerial view of the Site and surroundings.

Figure 1a: Aerial Photograph of the Existing site (Approximate extent of the Site highlighted)

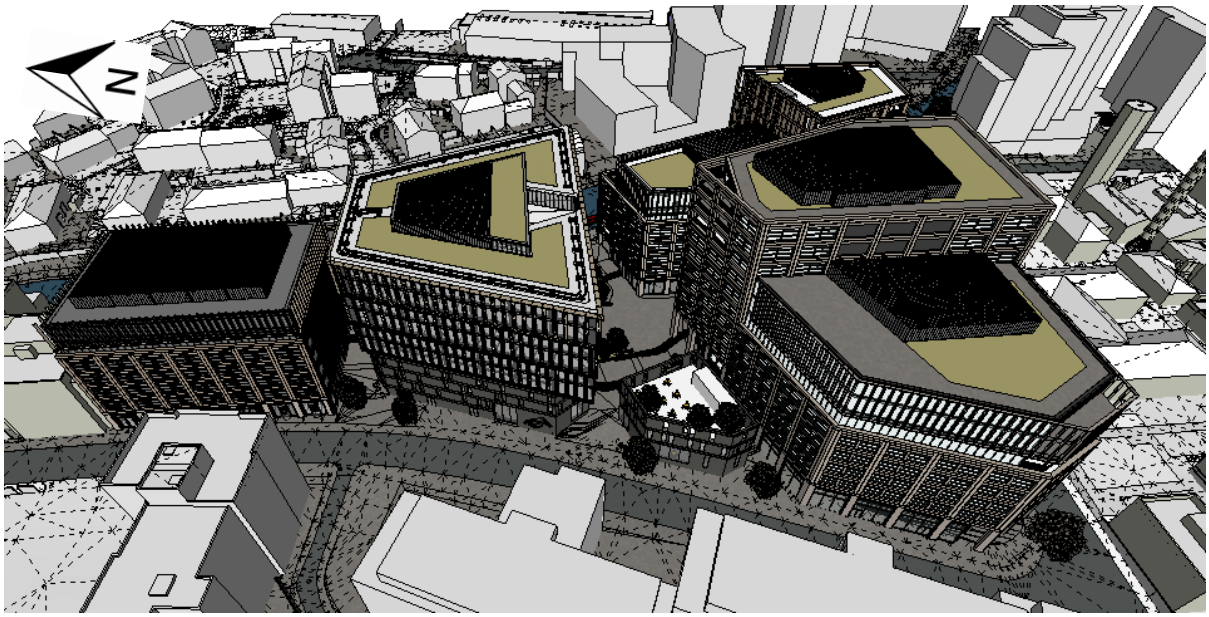

Figure 1b: Proposed Development

3.2 The Proposed Development

The Proposed Development will be a mixed-used Development, with five buildings and a 2-storey pavilion across three plots (Plots A - C) and comprise the following (see Figure 1b):

- Plot A, located to the north of the Site, will be a mixed-use building (Building A1), 7 storeys in height.
- Plot B, which occupies the central part of the Site, new global headquarters building for Ted Baker including a hotel; and be 9 storeys in height.
- Plot C, situated to the south of the Site will have three mixed use buildings with a variety of office / workspace, residential and retail (Buildings C1-C3, from east to west), with the tallest element (Building C2) up to 12 storeys in height. Furthermore, a 2-storey pavilion (Building C4) with an open rooftop terrace is proposed to the north-west of Plot C, and adjacent to St Pancras Way.

Ground-level amenity spaces are proposed to the east of Buildings B and C1/C2, along the canal front, whilst elevated terraces and balconies are proposed on level 1-5 of Plot A, level 8 of Plot B, level1 and 5 of Plot C1, level 1-9 of Plot C2 and level 2-10 of Plot C3.

4. METHODOLOGY AND ASSESSMENT CRITERIA

Knowledge of the prevailing wind direction focuses attention on the likely impact of these winds on the Site except where the proposed building design indicates that winds from other directions are likely to be important.

4.1 General Meteorological Data

Combined meteorological data derived from the meteorological stations of the major London airports (Heathrow, Gatwick and Stansted) have been corrected to standard conditions of 10m above open flat level country terrain. The meteorological station data is then adjusted to the Site conditions using the methodology implemented in the BREVe3.2 software package.

Approximately 30 years of meteorological data for London was used in this report and is presented in as wind roses by season in Figure 2. The assessment presented in this report focusses on winter, the windiest season, representing a 'worst-case' season for windy conditions between December and February and a summer season (representing a time of the year when amenity spaces are expected to be usable between June and August). Wind roses graphically depict the distribution of wind frequency and directionality for the four seasons. The combination of meteorological data, Site altitude and velocity ratios permits the percentage of time that wind speeds are exceeded at ground level on the Site to be evaluated. The locations can then be assessed using 'comfort criteria', as described below.

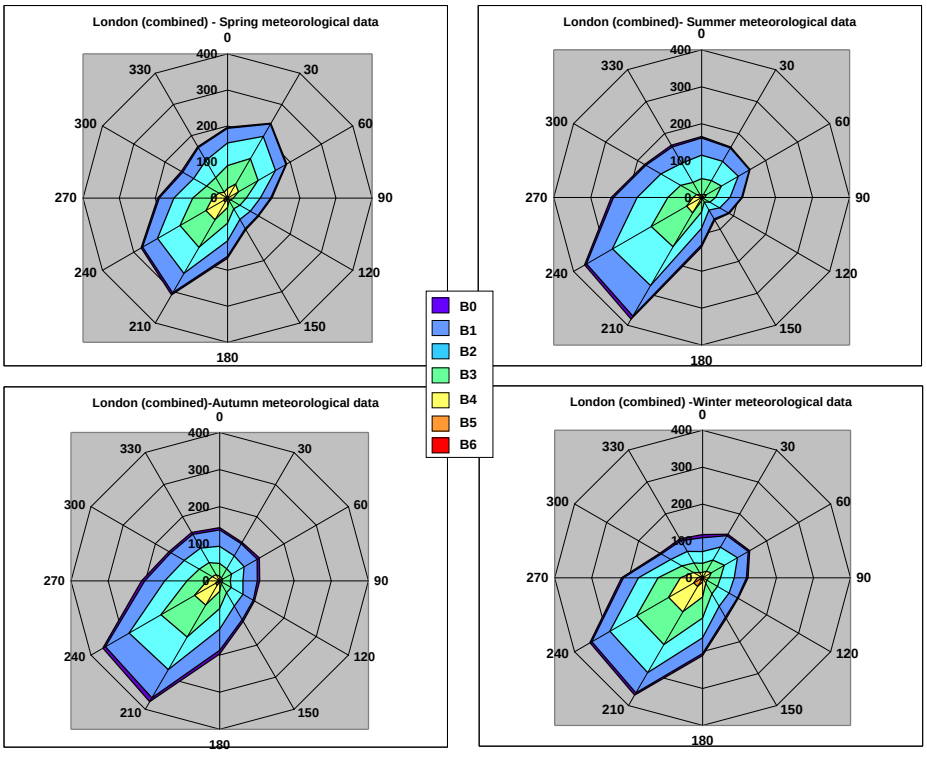

Figure 2: Seasonal wind roses for London (combined) (in Beaufort Force) (Radial axis indicates the hours for which the stated Beaufort Range is exceeded)

The meteorological data indicate that the prevailing wind direction throughout the year is from the south-west. This is typical for many areas of southern England. There is a secondary peak from north-easterly winds, especially during the spring, and these tend to be cold winds.

4.2 Terrain Roughness

Another consideration is the terrain roughness in each wind direction because wide, open spaces permit the wind to blow down to ground level generating conditions similar to those of open countryside even within a built-up area. An assessment of the terrain roughness for the Site was conducted using the BREVe3 software.

Table 1 presents the 'mean factors' for the Site where the mean factor represents the ratio of wind speed on site, at the stated reference height, as a fraction of the wind speed in open, flat countryside at a height of 2m and 10m. The table shows that the terrain is fairly consistent across all directions in relation to its effect on wind speed.

Table 1: BREVe3 mean factors at 2m and 10m above ground level

Wind Direction (N°)	0	30	60	90	120	150	180	210	240	270	300	330
Mean Factor at 2m	0.42	0.42	0.43	0.44	0.42	0.41	0.43	0.57	0.56	0.56	0.42	0.42
Mean Factor at 10m	0.79	0.80	0.80	0.81	0.77	0.77	0.79	0.88	0.87	0.86	0.77	0.77

4.3 Comfort Criteria

The assessment of the wind conditions requires a standard against which the measurements can be compared. This report uses the Lawson Comfort Criteria, which have been established for over thirty years. The Criteria, which seek to define the reaction of an average pedestrian to the wind, are described in Table 2.

If the measured wind conditions exceed the threshold wind speed for more than 5% of the time, then they are unacceptable for the stated pedestrian activity and the expectation is that there may be complaints of nuisance or people will not use the area for its intended purpose.

The Criteria set out five categories and reflect the fact that less active pursuits require more benign wind conditions. The five categories are sitting, standing, strolling, walking and uncomfortable, in ascending order of activity level. In other words, the wind conditions in an area for sitting need to be calmer than a location that people merely walk past.

The distinction between strolling and walking is that in the strolling scenario pedestrians are more likely to take on a more leisurely pace, with the intention of taking time to move through the area, whereas in the walking scenario pedestrians are intending to move through the area quickly and are therefore expected to be more tolerant of windier conditions.

The Criteria are derived for open air conditions and assume that pedestrians will be suitably dressed for the season. Thermal comfort is discussed with reference to acceptable wind environments but not evaluated as part of the assessment.

The coloured key in Table 2 corresponds to the presentation of wind tunnel test results described later in this report.

Table 2: Lawson Comfort Criteria

Key	Comfort Category	Threshold	Description
	Sitting	0-4 m/s	Light breezes desired for outdoor restaurants and seating areas where one can read a paper or comfortably sit for long periods
	Standing	4-6 m/s	Gentle breezes acceptable for main building entrances, pick-up/drop-off points and bus stops
	Strolling	6-8 m/s	Moderate breezes that would be appropriate for window shopping and strolling along a city/town centre street, plaza or park
	Walking	8-10 m/s	Relatively high speeds that can be tolerated if one's objective is to walk, run or cycle without lingering
	Uncomfortable	>10 m/s	Winds of this magnitude are considered a nuisance for most activities, and wind mitigation is typically recommended

The Lawson Criteria set out six pedestrian activities and reflect the fact that less active pursuits require calmer wind conditions. In ascending order of activity level, the categories are:

- Sitting;
- Standing or entering/leaving a building[1];
- Strolling;
- Walking; and
- Uncomfortable.

Generally, the target conditions are:

Strolling use during the windiest season on pedestrian thoroughfares (with walking conditions potentially being tolerated in areas where pedestrians would not linger);

Standing use conditions at entrances, drop off areas or taxi ranks, and bus stops throughout the year; and

Sitting use conditions at outdoor seating and amenity areas during the summer season when these areas are more likely to be frequently used by pedestrians. It is noted that in large mixed use amenity spaces a mixture of sitting use and standing use can be considered acceptable as users can choose to sit in 'calmer' areas, with 'windier' areas acceptable for more active pursuits.

The wind conditions in an area for sitting need to be calmer than a location that people merely walk past and this is reflected in the Comfort Criteria. The Criteria are derived for open air conditions and assume that pedestrians will be suitably dressed for the season. The criteria address the force of the wind on a person, or activity, they do not take account of thermal factors.

4.4 Strong Winds

Lawson[2] also specified a lower limit strong wind threshold when winds exceed 15m/s for more than 2 hours of the year. Exceedance of this threshold may indicate a need for remedial measures or a careful assessment of the expected use of that location; e.g. is it reasonable to expect elderly or very young pedestrians to be present at the location on the windiest day of the year? Wind Speeds that exceed 20m/s for more than 2 hours of the year represent safety issue for all members of the population, which would require mitigation to provide an appropriate wind environment.

Strong winds are generally associated with areas which would be classified as acceptable for walking or as uncomfortable. In a mixed-use urban development scheme, walking and uncomfortable conditions would not usually form part of the 'target' wind environment and would usually require mitigation due to pedestrian comfort considerations. This mitigation would also reduce the frequency of, or even eliminate, any strong winds.

[1] Note that the standing and entrance classifications have the same benchmark wind condition and are combined in the discussion that follows.

[2] Lawson T.V. (April 2001), Building Aerodynamics, Imperial College Press

5. BASELINE CONDITIONS

Often a new Development will alter the pedestrian activity (i.e. intended use) on site. Occasionally, although wind conditions may not change after the Proposed Development is completed (e.g. stay at strolling level), mitigation would still be required if on the new Development the location of interest is intended for a critical activity (e.g. a main entrance) for which the wind condition would be unsuitable. Assessment in terms of the desired pedestrian activity on or around a site takes into consideration any change of use and this is where the comfort criteria are particularly helpful.

5.1 Pedestrian Comfort

Based on the terrain roughness analysis presented in section 3.2, the baseline conditions at 2m above ground level at the Site are acceptable for standing use in the windiest season and sitting use in summer. Baseline conditions at 10m above ground level for the summer season are classified as acceptable for standing use.

5.1.1 Thoroughfares

The, wind conditions along thoroughfares around the existing Site at ground level are expected to range from acceptable for sitting use through to acceptable for strolling use during the windiest season. Localised strolling conditions are expected at the south-east corner of the existing Ugly Brown Building during the windiest season.

5.1.2 The Regent's Canal Tow Path and Regent's Canal

Regent's Canal Tow Path

The Regent's Canal Tow Path, which runs along the other side of Regent's Canal in regard to the Proposed Development, is a thoroughfare and an amenity space through Camden and King's Cross, where several canal boats are moored. The tow path is expected to have conditions suitable for standing use during the windiest season, whilst conditions are expected to be suitable for the sitting use during the summer season. Sitting conditions are acceptable for the intended amenity space usage as well as other activities in relation to the use of the canal boats in the area.

Regent's Canal

Regent's Canal is a 13.8km long canal across an area just north of central London which empties into the River Thames. Wind conditions along Regent's Canal are expected to be suitable for standing use the windiest season and sitting use during the summer season.

5.2 Strong Winds

There are no occurrences of strong winds (winds speeds in excess of 15 m/s) anticipated within and around the Site throughout the year in the existing scenario.

6. WIND CONDITIONS AROUND THE PROPOSED DEVELOPMENT

Wind conditions suitable for strolling use or calmer are desirable on main thoroughfares during the windiest season, for a mixed-use Development in an urban area. Standing use wind conditions or calmer are generally required at entrances throughout the year. Wind conditions acceptable for sitting in the summer season are desirable for public amenity spaces.

Occurrences of strong winds in excess of 15m/s are expected to be limited when wind conditions are suitable for pedestrian comfort, meeting the above criteria.

The assessment made below is based on a worst-case assessment of the expected wind conditions at the Site. This worst-case assessment assumes no landscaping to be present.

6.1 Pedestrian Comfort

Lawson comfort plots are appended to the end of this report. The expected comfort levels, for the windiest season (i.e. winter) at ground level are shown in Figure 4. Figures 5 to 8 show the expected comfort levels for the summer season (at ground and elevated levels) when wind comfort levels are generally one category calmer than the windiest season. The expected wind microclimate is discussed below.

6.1.1 Thoroughfares

As shown in Figure 4, wind conditions along thoroughfares within and around the Proposed Development at ground level are expected to range from acceptable for sitting use through to acceptable for strolling use during the windiest season.

Localised strolling conditions are expected at the south-east corner of Building A, the north-east and south-east corners of Building B, the south-east corner of Building C2, the north-west and the south-east corners of Building C3 and the north-east corner of the Building C4 pavilion.

These 'windier' conditions are likely due to the wind flow acceleration at the corners from the prevailing wind direction. All other locations around the Proposed Development are expected to have conditions ranging from suitable for standing use or calmer during the windiest season.

During the summer season, conditions along all thoroughfares (as shown in Figure 5) are expected to be one category calmer than the windiest season, and therefore are anticipated to be suitable for sitting and standing uses.

6.1.2 Entrances

All entrance locations are expected to have wind conditions suitable for entrance use or calmer in the summer season.

6.1.3 Ground-level Amenity Spaces

On the Site of the Proposed Development, amenity spaces are provided to the west of the passage way between Plot A and Plot B, in the passage way between Plot B and Plot C, at the south-eastern corner of Plot C3 on Canary Street and alongside the canal front; these would have suitable sitting or standing use wind conditions (no areas of seating would be located in areas of standing use wind conditions and therefore no mitigation is required).

6.1.4 Plot C4 Pavilion

Ground-level and elevated seating is proposed for the Plot C4, located to the north of Plot C3.

Conditions in this area of the Proposed Development at ground level are anticipated to be suitable for sitting use during the summer season (Figure 5). As these conditions are suitable for the indented amenity space. No mitigation measures are required.

However, conditions at the rooftop terrace level (Level 2) of the pavilion are expected to be part suitable for standing use, part suitable for sitting use during the summer (Figure 6). It is noted, that with the proposed landscaping (as in '180214_MASTER MODEL FOR MILLER HARE', received on the 15th February 2018) in place the wind conditions are most likely to be suitable for sitting use throughout the terrace-level.

6.1.5 Elevated amenity spaces

Amenity space terraces and balconies are proposed at level 1-5 of Plot A, level 8 of Plot B, level 1 and 5 of Plot C1, level 1-9 of Plot C2 and level-10 of Plot C2.

Wind conditions at these locations of the Proposed Development are anticipated to range from suitable for sitting use to standing use during the summer season (Figures 6-8 for the elevations 1-10), the conditions aimed for amenity areas are sitting use conditions.

<u>Plot A:</u>

The balconies on level 1-4 are expected to have wind conditions suitable for sitting use, no mitigation measures required.

The terrace amenity space on level 5 is expected to have wind conditions suitable for sitting use in the summer season. No mitigation measures are required.

Plot B:

As the terrace on level 8 is sheltered from the prevailing winds, the wind conditions are anticipated to be suitable for sitting use in the summer season. No mitigation measures are required.

Plot C1:

The terrace amenity space on level 1 and 5 are expected to have wind conditions suitable for sitting use. No mitigation measures are required.

Plot C2:

The wind conditions on the balconies and terraces of Plot C2 are consistent for all levels.

The 'recessed' terrace to the north-east and the balconies in the centre of the development are expected to have sitting conditions in the summer season. No mitigation measures are required.

The balconies located in the south-east are anticipated to have wind conditions suitable for standing use in the summer season due to their exposed location on the edge of the development, without any shelter of upstream developments. Mitigation measures are required to create a calmer wind condition on these balconies.

Plot C3:

The terraces facing south-west and south-east as well as the roof-top terraces (Figure 7) are expected to have standing wind conditions, which is one category too windy for amenity usage. Mitigation measures are required.

The terraces facing in the north-eastern direction are expected to have sitting conditions; no mitigation measures are required.

Examples of mitigation recommendations for these locations are discussed in Section 7 of this report.

6.1.6 The Regent's Canal Tow Path and Regent's Canal

Regent's Canal Tow Path

Wind conditions along the Regent's Canal Tow Path are expected to be suitable for sitting use during the summer season once the Proposed Development is built (Figure 5).

These conditions are similar to those anticipated in the baseline scenario, and it can be determined that the Proposed Development is unlikely to have any significant adverse effect on the local wind conditions on the tow path.

Regent's Canal

The wind conditions across Regent's Canal are expected to be suitable for standing use during the windiest season (Figure 4) and sitting use during the summer season (Figure 5) following the presence of the Proposed Development. These conditions are comparable as those anticipated as part of the existing scenario.

The presence of the Proposed Development is not expected to have a significant effect on the amenity of the tow path or navigation of the canal boats along Regent's Canal throughout the year.

6.2 Strong Winds

There are no occurrences of strong winds (winds speeds in excess of 15 m/s) for more than .2 hours per annum anticipated within and around the Site throughout the year with the Proposed Development built-out.

7. MITIGATION MEASURES

Although the wind microclimate throughout the majority of the Proposed Development would be acceptable for its intended use, localised occurrences of windy conditions will require mitigation in order to provide comfortable conditions for the respective intended uses.

The following measures are expected to mitigate the undesirable conditions and improve the wind microclimate to a comfortable category.

7.1 Elevated amenity spaces

The corner balconies at the south-eastern corner of Plot C2 and C3 are expected to have standing use wind conditions in the summer season, which is one category too windy for the intended amenity purpose. As the prevailing winds in the London area are from the south-westerly direction throughout the year, a solid screen is recommended on the southern façade to deflect these prevailing winds and create a calm area on the balconies.

The terraces on the 5-7 level of Plot C3 are facing in the prevailing wind direction. To create shelter on the terraces, a solid screen is required.

On the roof-top level terraces of Plot C3, soft landscaping with a minimum height of 1.5m and porous screens of the same height are recommended.

It should be noted that the absence of such measures would result in conditions windier than desired for the intended (sitting) use at these balcony and terrace locations during the summer season.

8. CONCLUDING REMARKS

In conclusion:

1. The meteorological data for the site indicates prevailing winds from the south-west throughout the year, with colder north-easterly winds in spring months.
2. For the existing site, the wind microclimate at ground level is expected to be acceptable for the required use during the windiest season.
3. Wind conditions along the Regent's Canal Tow Path and Regent's Canal are anticipated to be suitable for standing during the windiest season and sitting during the summer season in the existing scenario.
4. There are no occurrences of strong winds (winds speeds in excess of 15 m/s) anticipated within and around the Site throughout the year in the existing scenario.
5. All thoroughfare in and around the Proposed Development are expected to have conditions ranging from acceptable for strolling use or calmer; which are suitable conditions for the intended use during the windiest season.
6. All entrances to the developments, edit, are expected to experience the desired standing or calmer wind conditions during the windiest season, which is suitable for the intended entrance use.
7. All ground level amenity spaces would have suitable wind conditions.
8. All terrace and balcony amenity spaces on Plot A, Plot B and Plot C1 are expected to have sitting wind conditions in the summer season, no mitigation measures are required.
9. For the terrace and balcony amenity spaces on Plot C2 and Plot C3, the anticipated wind conditions range from being suitable for sitting use to being suitable for standing use. Mitigation measures are required on amenity spaces with expected standing wind conditions.
10. The terrace level on Plot C4 is expected to have a mixture of sitting to standing use conditions. It is noted, that with the proposed landscaping plan in place the desired sitting conditions are expected throughout the terrace level.
11. There are no occurrences of strong winds (winds speeds in in excess of 15 m/s) anticipated within and around the Site throughout the year in the proposed scenario.
12. As in the baseline scenario, wind conditions along the Regent's Canal Tow Path and Regent's Canal are expected to be suitable for standing during the windiest season; and sitting during the summer season with the Proposed Development built-out.
13. Overall, with the suggested mitigation measures in-situ, the wind microclimate within and around the Proposed Development is expected to be acceptable for its intended use.

9. REFERENCES

1. Lawson T.V. (April 2001), Building Aerodynamics, Imperial College Press