AGAR GROVE

WIND MICROCLIMATE REPORT

DECEMBER 2013

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Agar Grove, Camden

Wind Microclimate Assessment

On behalf of **London Borough of Camden**

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1 Introduction

1.1 Proposed Development

1.1.1 The London Borough of Camden (LBC) has commissioned Peter Brett Associates LLP (PBA) to undertake a desktop wind study in support of the planning application for the proposed redevelopment of the Agar Grove Estate in Camden.

1.1.2 Agar Grove Estate was constructed by the London Borough of Camden in the 1960s and comprises 249 residential units; two small retail units; and community facilities. The Estate consists of a series of low / medium rise blocks of flats and an 18 storey tower (Lulworth House) along with areas of open space and surface car-parking. The site is centrally located in the borough to the east of Camden town centre in a predominantly residential area which comprises a mix of period housing; post-war municipal estates; 20th century in-fill; and some remnants of light-industrial activity.

1.1.3 The Estate is bordered to the north by Agar Grove beyond which sits an area of mid-to-late 19th century high-quality terraces and villas focused around Camden Square. To the east lies Camley Street which is occupied by low rise light-industrial units. Beyond Camley Street lies the mainline railway into St Pancras and then the 1960s Benson and Forsyth Maiden Lane Estate which is also undergoing refurbishment as part of the Council's estate programme. Further to the south-east is the Kings Cross development area. To the south is the London Overground railway line beyond which sits a pocket of low rise late 20th century housing. To the west is a predominantly residential area heading back towards Camden town.

1.1.4 The Agar Estate Regeneration project forms part of Camden's 'Community Investment Programme' (CIP) which aims to generate investment, deliver new homes and regenerate neighbourhoods. A detailed description of the application proposals is provided in the Design and Access Statement which, in broad terms, comprises:

- Demolition of the existing low-rise blocks (with the exception of the children's centre) and comprehensive refurbishment of Lulworth House
- Creation of 493 new homes [net increase of 244 units] including a mix of social rent, shared-ownership and private units designed to meet current housing needs and space standards (including a single decant for the majority of existing tenants)
- Replacement community and retail facilities along with new small-scale business space; and
- Landscaped open and amenity spaces to support the development and contribute towards the creation of a high-quality environment.

1.2 Scope

1.2.1 This report assesses the potential impact of the proposed development on wind conditions across the site and the surrounding area in terms of pedestrian comfort and safety. It presents the findings of a desk-based wind assessment to identify areas of the site where wind conditions may be unacceptable and proposed mitigation.

2 Legislation and Policy

2.1 National Policy

2.1.1 The National Planning Policy Framework was published in March 2012. This sets out the Government's planning policies for England and how they are expected to be applied. The NPPF does not include any policies relating to wind microclimate issues.

2.2 The London Plan

2.2.1 The London Plan[1] provides strategic planning guidance for Greater London. Each Borough's development plans must be in 'general conformity' with it.

2.2.2 Policy 7.6, section B, of the London Plan, states that "Buildings and structures should:… not cause unacceptable harm to the amenity of surrounding land and buildings, particularly residential buildings, in relation to privacy, overshadowing, wind and microclimate. This is particularly important for tall buildings".

2.2.3 Policy 7.7, section D, of the London Plan, states that "*Tall buildings: should not affect their surroundings adversely in terms of microclimate, wind, turbulence…*".

2.3 Local Policy

2.3.1 The Camden Core Strategy and Development Policies documents were adopted in 2010. Alongside the Mayor's London Plan, the Core Strategy and other Development Plan documents set out the basis for planning decisions in the borough.

2.3.2 Policy CS14, Promoting high quality places and conserving our heritage, states that:

"The Council will ensure that Camden's places and buildings are attractive, safe and easy to use by:

a) requiring development of the highest standard of design….

d) seeking the highest standards of access in all buildings and places and requiring schemes to be designed to be inclusive and accessible

e) protecting important views…"

2.3.3 Policy DP24, Securing high quality design, states that:

"*The Council will require all developments, including alterations and extensions to existing buildings, to be of the highest standard of design and will expect developments to consider:*

a) Character, setting, context and the form and scale of neighbouring buildings;

b) *The character and proportions of the existing building, where alterations and extensions are proposed*".

[1] Available at: www.london.gov.uk/priorities/planning/londonplan

2.4 Guidance

2.4.1 There are no statutory requirements or criteria for assessing the wind microclimate around buildings, however it is common practice to assess wind impacts using the Lawson Criteria presented below.

2.4.2 The comfort and safety criteria used are defined in terms of hourly average wind speeds. There are no criteria for turbulence or gustiness of the wind, which occur on timescales of less than an hour.

Pedestrian Comfort

2.4.3 Winds can affect pedestrian comfort via a number of factors, including wind chill and wind force. There are no official guidelines for tolerable wind flows around buildings and the assessment will therefore be, at least partially, subjective. The criteria developed by the London Docklands Development Corporation (Lawson, 2001), referred to here as the Lawson Criteria, for pedestrian comfort have, however, been widely accepted for investigations of urban wind flows within the UK, and compare well with international guidance.

2.4.4 The tolerable wind speed varies depending on the proposed use of a space. For example, an area to be used for sitting has a lower acceptable wind speed than an area that is designed as a thoroughfare for brisk walking.

2.4.5 **Table 2.1** presents the Lawson criteria for pedestrian comfort. For example, the criteria for an area designated for pedestrian walking (normal walking or strolling such as sightseeing) should not experience a wind speed of greater than 8m/s for more than 5% of the time, whilst the comfort criteria for an area that is to be used for sitting is only 4m/s.

2.4.6 Although an area may be categorised for, say, 'business walking', this area may be suitable for more sensitive activities depending on the wind speed and direction on any particular day.

Table 2.1: Main Pedestrian Comfort Criteria (Lawson, 2001)

Category	Mean Hourly Wind Speed not to be Exceeded More Than 5% of the Time (m/s)	Activity
Sitting	4	Sitting for a long duration e.g. sitting at an external café
Standing	6	Standing or sitting for a short time e.g. during window shopping or waiting at bus stops
Pedestrian Walking	8	Normal walking or strolling e.g. sightseeing
Business Walking	10	Walking from one place to another quickly or where individuals pass rapidly through local areas around buildings

Rooftop Amenities Criteria

2.4.7 The suitability of rooftop amenity areas for recreational activity has been assessed using threshold wind speeds defined by the Beaufort Scale, adapted to land use. **Table 2.2** presents the wind speed ranges considered suitable or unsuitable for such activities.

2.4.8 This assessment considers the likely proportion of time rooftop amenity areas experience wind speeds within each range to determine the overall suitability of the proposed amenity areas.

Table 2.2: Rooftop Amenity Criteria

Wind Speed Range (m/s)	Suitability
0-3.35	Outdoor Seating
0-5.45	Outdoor Viewing
>5.45	Unsuitable for Recreational Uses

Safety

2.4.9 Strong winds have the potential to make walking difficult and, in extreme cases, to risk the safety of pedestrians and occupants of rooftop amenity areas.

2.4.10 Lawson also defined limits for the hourly average wind speed. If values exceed these limits then distress may be experienced. These criteria are for 'able-bodied' and the 'general public'. For the general public a wind speed greater than 15m/s is deemed unsafe as less able members of the public, including the elderly and children, may be blown over. Able-bodied users are more likely to be capable of defending themselves against extreme winds and experience distress at a higher threshold of 20m/s.

2.5 Building Research Establishment (BRE) Guidance

2.5.1 BRE Digest 350 (Climate and Site Development, 1990) and BRE Digest 520 (Wind Microclimate around Buildings, 2011) both provide guidance on assessing wind flows around buildings.

2.5.2 BRE Digest 350 provides guidance on how microclimate is affected by the arrangement of buildings and landscape features and reviews techniques for designing a site to maximise benefit from fine weather whilst providing shelter from adverse conditions.

2.5.3 BRE Digest 520 provides further details of the impact of tall buildings on local airflows and suggests measures to achieve a satisfactory environment around buildings.

2.5.4 British Standard (BS) 6399-2 provides information for assessing the baseline wind conditions across the UK. However, it only considers the effect of wind loading on buildings (structures), not the effect of wind flows on people (safety and comfort).

3 Methodology

3.1 Introduction

3.1.1 Consideration is given to the current and proposed massing and scale of the buildings on the site, and long term meteorological data.

3.1.2 This assessment has been prepared based on the proposed Masterplan, elevations and massing. The proposals include the demolition of many of the low to medium-rise buildings currently on site, with the retention and extension of Lulworth tower to provide an enclosed roof garden. The proposed buildings comprise predominantly 4 to 7 storey buildings, with an additional 18 storey tower within Block B.

3.1.3 This assessment covers the following:

- the suitability of the site for the proposed uses, looking specifically at:
  - the tallest buildings (Lulworth Tower, extended up to 20 storeys and a new 18 storey tower in Block B); hereafter described as the 'tallest' buildings; and
  - proposed amenity areas and the routes leading through the site.
- the impact of the development on the surrounding area.

3.2 Baseline Data Collection

3.2.1 The overall wind environment across the site and surrounding area has been assessed using data from the following sources:

- the wind map in BS 6399; and
- the meteorological station located at London City Airport.

3.2.2 The wind map in BS 6399 provides an estimate of the basic wind speed across the UK to give an indication of expected wind conditions across the site and the surrounding area.

3.2.3 London City Airport is approximately 12km southeast of the site and is considered the most representative weather station with data available for assessing the large scale meteorological conditions across the site.

3.2.4 The estimated annual average wind speed at a height of 10m from the NOABL wind speed database gives an indication of wind conditions across the site; data are also provided for heights of 25m and 45m. These data are estimated from an air flow model which accounts for the effects of topography on wind speed and are available on a 1km grid. It should be noted that these estimated wind speeds do not take account of small scale surface roughness such as trees and buildings.

3.3 Wind Conditions with the Proposed Development

3.3.1 Drawings of the proposed massing and layout, along with photos taken during site visits, and images available from Google Streetview were used, as well as available wind speed and direction data and knowledge of the interaction of buildings with wind fields.

3.3.2 This assessment uses hourly average wind speed and direction data. Wind turbulence and gustiness (the short term fluctuations in speed and direction) mean that wind speeds

measured on a shorter timescale can be significantly higher than the hourly average speeds. There have been a number of studies relating hourly mean wind speeds and maximum gustiness although these are typically site specific and/or apply to specific meteorological conditions. A robust general relationship between hourly average wind speeds and maximum gusts has yet to be determined. It is therefore difficult to predict the occurrence and magnitude of short term higher wind speeds. This assessment focuses on hourly average wind speeds.

3.4 Limitations of Methodology

3.4.1 This assessment uses third party information from a number of different sources. No guarantee can be given for the accuracy or completeness of this information, however to minimise the risk reputable suppliers were used.

3.4.2 It has been assumed that the wind patterns at the site are the same as at the meteorological station at London City Airport.

3.4.3 The hourly average wind data from London City Airport does not provide information on the wind turbulence and gustiness. It should be noted that it is also difficult to accurately represent turbulence within computer-based or scaled wind tunnel modelling. It is also not possible to predict atypical wind conditions.

3.4.4 This assessment has not taken into account the impacts of climate change on future local wind patterns, due to the uncertainty of such impacts on wind speeds, direction and gusts.

3.4.5 Any recommendations given in this report are based on the desktop wind assessment work only, unless stated otherwise. In practice, other issues may have to be taken into account when designing public spaces including public safety and pedestrian movement in an emergency.

3.4.6 Whilst confident in the findings detailed within this report, there are limitations associated with the assessment of local wind flows; whether assessed through a desktop study, computer modelling or wind tunnel modelling.

3.5 Significance Criteria

3.5.1 There are no standard significance criteria for wind. In this assessment the criteria set out in **Table 3.1** were used and consider the risk of unsuitable wind conditions developing across the site and surrounding area in terms of pedestrian comfort and safety.

3.5.2 The effects may be either beneficial or adverse by increasing or reducing the risk of unsuitable wind conditions, respectively.

Table 3.1: Wind significance criteria

Significance Level	Description
Severe	Increased wind conditions occurring in the site as a result of the proposed development which are likely to affect all of the proposed outdoor uses on the site and the current existing use in the surrounding area.
Major	Increased wind conditions occurring in the site and the surrounding area as a result of the proposed development which are likely to affect some of the proposed outdoor uses and the current existing use in the surrounding area.
Moderate	Increased wind conditions occurring in the site and the surrounding area as a result of the proposed development but unlikely to affect proposed

Significance Level	Description
	outdoor uses on the site but could affect the current existing use in the surrounding area.
Minor	Increased wind conditions occurring in the site as a result of the proposed development but unlikely to affect proposed outdoor uses on the site, and little impact of the proposed development on wind conditions across the surrounding area.
Not Significant	Little impact of the proposed development on wind conditions occurring anywhere in the site and across the surrounding area.

Note: applies to where there may be relevant public exposure unless indicated otherwise

4 Baseline Conditions

4.1.1 The majority of buildings currently on the site are low to medium-rise (four to six storeys in height), and will be demolished. One tall building currently exists (Lulworth tower, 18 storeys in height), and this building will remain, with proposals including refurbishment and extension (to 20 storeys).

4.1.2 The surrounding area is characterised by predominantly low-rise residential properties (two to six storeys). Exceptions to this are the St Pancras Way Estate (northwest of the site), where buildings are seven to eight storeys in height, and the Camley Street industrial site immediately east of the site and the Elm Village Estate to the south of the site, where buildings are one to two storeys in height.

4.1.3 The wind map from BS 6399 shows that the basic wind speed across Camden are some of the lowest experienced across the UK due to the inland position. Wind conditions in the south of England are typically slightly less severe than more coastal and northern areas of the UK.

4.1.4 A wind rose for the 10 year period 2000 - 2009 (**Figure 1**) from London City Airport shows that the most dominant wind directions are from the south through to the west. Wind from this direction (191 to 281°) occurs on average for 39% of the time. The next dominant direction is southeast through east; winds from this direction occur for less than 10% of the time, and mainly occur during the spring.

4.1.5 The average wind speed during the years 2000 to 2009 was 3.8m/s and the 95th percentile of hourly average wind speeds fell within the range 6 to 8m/s at a height of 10m. Wind speeds of greater than 10m/s were measured 1% of the time. The NOABL database predicts that wind speeds at London City Airport are 4.5m/s at 10m from the ground. This suggests that the NOABL predictions are overestimates, due to the lack of inclusion of local surface roughness (e.g. trees).

4.1.6 Wind roses for each season during the 10 year period 2000 – 2009 at the London City Airport station are presented in **Figure 2**. **Table 4.1** provides a breakdown of the proportions that wind blows from each sector for each season, as well as on average.

4.1.7 **Table 4.1** shows that in all seasons, the most dominant wind directions are from the southwest (12.5 – 16.2%) and west-southwest (12.6 – 17.7%). Wind from other directions across all seasons occurs for less than 9.1% of the time. This is with the exception of Spring where there is a stronger component of winds from the east (10.2%) and Summer where there is a strong component of winds from the west (11.8%).

4.1.8 The seasonal average wind speed during the 2000 to 2009 period ranges between 3.6m/s in Summer and Autumn, and 4.1m/s in Winter. The 95th percentile of hourly average wind speeds fell within the range from 6 to 8 m/s in Summer and Autumn, and in the 8 to 10 m/s range in Spring and Winter.

4.1.9 The NOABL database gives a wind speed of 4.8m/s at a height of 10m for the Agar Grove site, which indicates that speeds may be higher than those measured at the London City Airport site. In addition, Digest 520 states that buildings can increase wind speeds by between 1.2 to 2 times (building downwash), and up to 2.5 times close to corners of tall buildings.

4.1.10 Complaints have been made by residents of the Agar Grove Estate that wind conditions around the base of Lulworth tower are unacceptable on occasions. This is most likely to be due to the large height differential (surrounding buildings are low-rise, whilst Lulworth tower extends to 18 storeys), and the orientation of the building such that the largest façade more or less faces the prevailing wind for a proportion of time, which will deflect higher wind speeds

down to ground level, with building downwash further increasing the wind speed, and the creation of 'corner streams' close to the corners of the tower, particularly to the north east. Between Lulworth tower and the Children's Centre, there is the potential for this effect to be further exacerbated due to funnelling between the buildings caused by the distance between these buildings extending to only approximately 6m.

4.1.11 Between buildings, there is a mix of paved and turfed open areas, and a number of established trees.

Table 4.1: Seasonal and annual proportions of time wind blows from each sector (%)

Wind Direction	Proportion of winds (%)				
	Spring	Summer	Autumn	Winter	Annual
North	4.4	2.8	3.7	3.5	3.6
North-Northeast	5.5	2.1	3.3	3.8	3.6
Northeast	6.1	2.1	3.5	4.6	4.1
East-Northeast	6.9	3.5	3.7	5.4	4.9
East	10.2	8.7	5.8	6.5	7.8
East-Southeast	2.6	3.3	2.8	2.4	2.8
Southeast	2.1	2.1	3.2	1.9	2.3
South-Southeast	2.5	2.5	3.4	2.5	2.7
South	4.2	3.7	4.4	4.4	4.2
South-Southwest	8.2	8.9	9.0	9.1	8.8
Southwest	12.5	15.8	16.2	14.8	14.8
West-Southwest	12.6	17.7	17.6	17.9	16.4
West	9.1	11.8	8.9	9.1	9.7
West-Northwest	5.0	7.0	5.8	6.0	5.9
Northwest	4.1	5.0	4.7	4.9	4.7
North-Northwest	4.1	3.2	4.0	3.4	3.7

5 Potential Effects

5.1 Description of the Site

5.1.1 The proposals buildings are predominantly low to medium-rise (ranging from 3 to 6 storeys, with two 7 storey blocks). Lulworth Tower will be refurbished and extended to 20 storeys, providing an enclosed roof garden. An additional 18 storey tower is proposed at the southeast corner of the site, within Block B

5.1.2 The majority of the buildings proposed for the site are low to medium-rise (6 storeys or less). These buildings are unlikely to adversely affect the wind conditions within the surrounding pedestrian areas and thoroughfares. Conditions within and around these low to medium-rise buildings are not therefore considered further.

5.2 Impacts on the Site

Pedestrian Comfort and Safety

5.2.1 The site occupies a wedge shape, widening from the west to the east. The approaching southwesterly winds pass over existing four storey properties in Wrotham Road and Agar Place, and an elevated railway line. These features shelter the site. Block A will extend the unbroken façade to the south of Wrotham Road, which will in turn shield the interior of the site, improving ground level wind conditions.

5.2.2 Complaints have been made by residents of Agar Grove Estate that wind conditions around the base of Lulworth Tower are unacceptable on occasions. The proposals include a new façade ('jacket') for the building, and an extension up to 20 storeys.

5.2.3 The landscape strategy proposed includes the retention of a large number of existing, established trees on site, and also the introduction of a large number of additional trees, including many around Lulworth Tower, many of which will be planted semi-mature. The number of trees on site will double with the development in place. These trees will improve wind conditions around the base of the Tower. A rain garden is proposed immediately to the west of Lulworth Tower, which is inaccessible to pedestrians. Along with the proposed landscape structure (rose arbour / climbing plants) immediately to the west of the rain garden, effects of building downwash alongside the western façade are unlikely to be significant.

5.2.4 There is a slight risk that corner streams may develop around the south-eastern corner of Lulworth Tower, with the potential to affect the garden proposed opposite the existing Children's Centre. The garden will be edged with shrubs and a fence, and a tree will be planted at the south western corner, all of which will reduce the impact of any corner effects which are generated, and provide protection to the occupants of the garden. Trees planted between Lulworth Tower and the Children's Centre will reduce the risk of tunnelling in this area, and improve wind conditions relative to those currently experienced in this thoroughfare. In addition, the sheltering effect of Block A, which effectively closes the gap between the existing properties in Wrotham Road and the Children's Centre, will lead to improvements in this area.

5.2.5 The potential for Lulworth Tower to generate building downwash effects during the spring, when there is a higher proportion of wind from an easterly direction, is minimised through the sheltering effect of Blocks C, D and E, which reduce the height differential. The landscape proposals around the garden to the east of the Tower (described above) will reduce any impacts which may be felt by users of the garden during the spring. It is considered that the proposals have the potential to improve the pedestrian environment around the base of the tower.

5.2.6 Tall buildings should, where possible be orientated with their narrow face into the prevailing wind to minimise downwash. This is the case for the proposed Block B tower, as upwind of the 18 storey tower, Block B also includes a 7 storey tower. These towers are joined by a 2 storey podium. The 7 storey tower reduces the effective height of the tower exposed to the predominant wind direction and reduces the effect of building downwash; the podium prevents the resultant downwash from reaching ground level. There is a risk of building downwash impacting on wind conditions adjacent to the eastern façade of Block B when easterly winds occur. Commercial development is proposed for the ground floor adjacent to Camley Street (offices). The proposals include the planting of shrubs and retention of a wall. This barrier will reduce the likelihood of effects on the pavement adjacent to the eastern façade of Block B, and conditions are likely to be suitable for walking.

Amenity Areas

5.2.7 There are a number of amenity areas proposed across the site. The majority are within areas where the proposed buildings are low to medium-rise, and therefore conditions within these areas are unlikely to be unsafe or unacceptable for the proposed use (sitting/standing).

5.2.8 The park and play space, and terrace areas to the west of Lulworth Tower (Lulworth Gardens West), and the garden proposed to the east of the tower (Lulworth Gardens East), have the potential to be affected by building downwash created by the tower itself. As discussed above, the introduction of a rain garden and landscape structure adjacent to the western façade of the tower as part of the landscape strategy will minimise the likelihood of unacceptable conditions, as will the increase in trees across the site as a whole. To the east of the tower, a number of trees are proposed between the Tower and the garden, and the garden itself will be enclosed by a fence and planted shrubs. Consequently, the garden will be sheltered from the potential downwash effects generated by easterly winds, most common during springtime, and conditions are likely to be acceptable within the garden. The effect of corner streams on the garden will also be effectively mitigated by the landscape proposals.

5.2.9 The landscape proposals around and within both these areas, along with sheltering from Blocks A, C, D and E, will lead to improved conditions within relative to the existing situation. It is likely that conditions would be tolerable, and unsafe winds are considered unlikely.

Entrances

5.2.10 The majority of buildings proposed for the site are low to medium-rise and wind conditions at their entrances are therefore likely to be acceptable. Entrances for the proposed tall buildings are, however, considered.

5.2.11 Entrances proposed along the southern façade of Block B are sheltered from the predominant winds by existing trees. Entrances for general pedestrian access on the northern façade, include the entrance to the community hall and the entrance to the proposed commercial use. The community entrance includes a lobby, and therefore the risk of wind effects affecting this entrance is low. The commercial entrance lies adjacent to the northeast corner of the building, and a lobby is not currently proposed. This entrance is sheltered for the majority of the time, however there is a risk that under certain conditions, the transition between the outdoor area and the inside of the building may be uncomfortable. Should these conditions be experienced, retro-fitting screens or planters either side of the entrance will improve conditions.

5.2.12 Entrances on Lulworth Tower either have a lobby or are sheltered by trees introduced by the proposed landscape strategy. An uncomfortable transition is therefore unlikely.

Balconies and Rooftop Areas

5.2.13 Wind conditions within balconies and rooftop amenity areas proposed for the tall buildings are considered (Lulworth Tower and Block B). Balconies on Lulworth Tower are recessed, and the rooftop amenity areas are enclosed. Unsafe or unacceptable wind conditions are therefore unlikely in these locations.

5.2.14 Block B includes corner balconies for the residential properties and terraces along the northern façade on the eighth floor and the eastern façade on the twelfth floor. There is a risk that wind will blow through the corner balconies, creating unacceptable conditions for sitting, in particular within the higher levels of the proposed 18 storey tower. Additional screening is recommended to improve conditions in these balconies.

5.2.15 There is also a risk that during easterly winds, conditions on the terrace proposed for the eastern façade will be unacceptable as a result of building downwash, although as this is more than halfway up the façade, conditions may be acceptable; a canopy and taller screens would improve conditions within this terrace and increase the amount of time the balconies are available for use. For the proposed terrace on the northern façade, sheltering by the building itself will mean that conditions are likely to be acceptable for their proposed use, apart from close to the corners of the buildings. Additional screening on the corners could mitigate this effect.

5.3 Impacts on the Surrounding Area

5.3.1 As the majority of the development is low to medium-rise, adverse wind effects in the surrounding area are unlikely for the majority of the site. The only exception to this is adjacent to the proposed Block B tower, which has the potential to increase wind speeds at the base of the tower in Camley Street due to building downwash effects from easterly winds. Although the predominant wind direction is southwesterly, during Spring, easterly winds are more common. The risk of unacceptable wind conditions will be reduced through the retention of a wall and additional shrub planting alongside the wall.

5.4 Summary

5.4.1 Wind conditions within the site are likely to be acceptable for their proposed uses, and conditions around Lulworth Tower are likely to be better than currently experienced due to the significant landscape improvements proposed.

5.4.2 It is, however, recommended that, due to the risk to safety of occupants, a wind tunnel study is carried out to determine the wind conditions within the balconies and terraces of Block B, and to test the effectiveness of proposed mitigation measures. This can be carried out at the detailed design stage of the development. Whilst testing is underway, the conditions at the proposed commercial entrance, and within the pedestrian environment in Camley Street could also be tested, and additional mitigation identified where necessary.

6 Mitigation and Enhancement

6.1.1 The assessment has determined that due to much of the development being low to medium-rise, and with the proposed landscape strategy in place, the risk of unacceptable wind conditions throughout much of the development and within the surrounding areas is unlikely.

6.1.2 Conditions within and around Block B are, however, at risk of experiencing unacceptable wind conditions, and a wind tunnel study is recommended to ensure that adequate mitigation is identified, in particular for the proposed balconies and terraces.

7 Residual Effect

7.1.1 For the majority of the site and the surrounding area, wind conditions are likely to remain acceptable or be improved relative to the existing situation through the introduction of additional sheltering (trees and buildings). The desktop wind study has, however, identified that a number of locations within and around Block B may require additional measures to improve wind conditions and increase the amount of time these areas are able to be utilised.

7.1.2 It should be noted that inclement weather conditions during autumn, winter and spring (wet and cold conditions) often coincide with windy conditions, and thus future users will not expect to be able to use these areas during these time periods.

8 Summary

8.1.1 A desktop wind study has been carried out considering local wind conditions, the proposed changes to layout and massing of buildings, the proposed landscape strategy and the anticipated use of each area of the site in order to identify whether unacceptable or unsafe winds will be experienced with the development site and the surrounding areas. Reference is made to guidance provided by the BRE.

8.1.2 The majority of the proposed buildings are low to medium-rise and are unlikely to bring about unacceptable wind conditions.

8.1.3 Proposed corner balconies and terraces on the 18 storey tower proposed for Block B are at risk of experiencing unacceptable wind conditions. With additional screening and a canopy, conditions within these areas are likely to be acceptable. A wind tunnel study to test the effectiveness of the balcony and terrace screens and safety of these areas should be undertaken at the detailed design stage for this Block.

Appendix A References

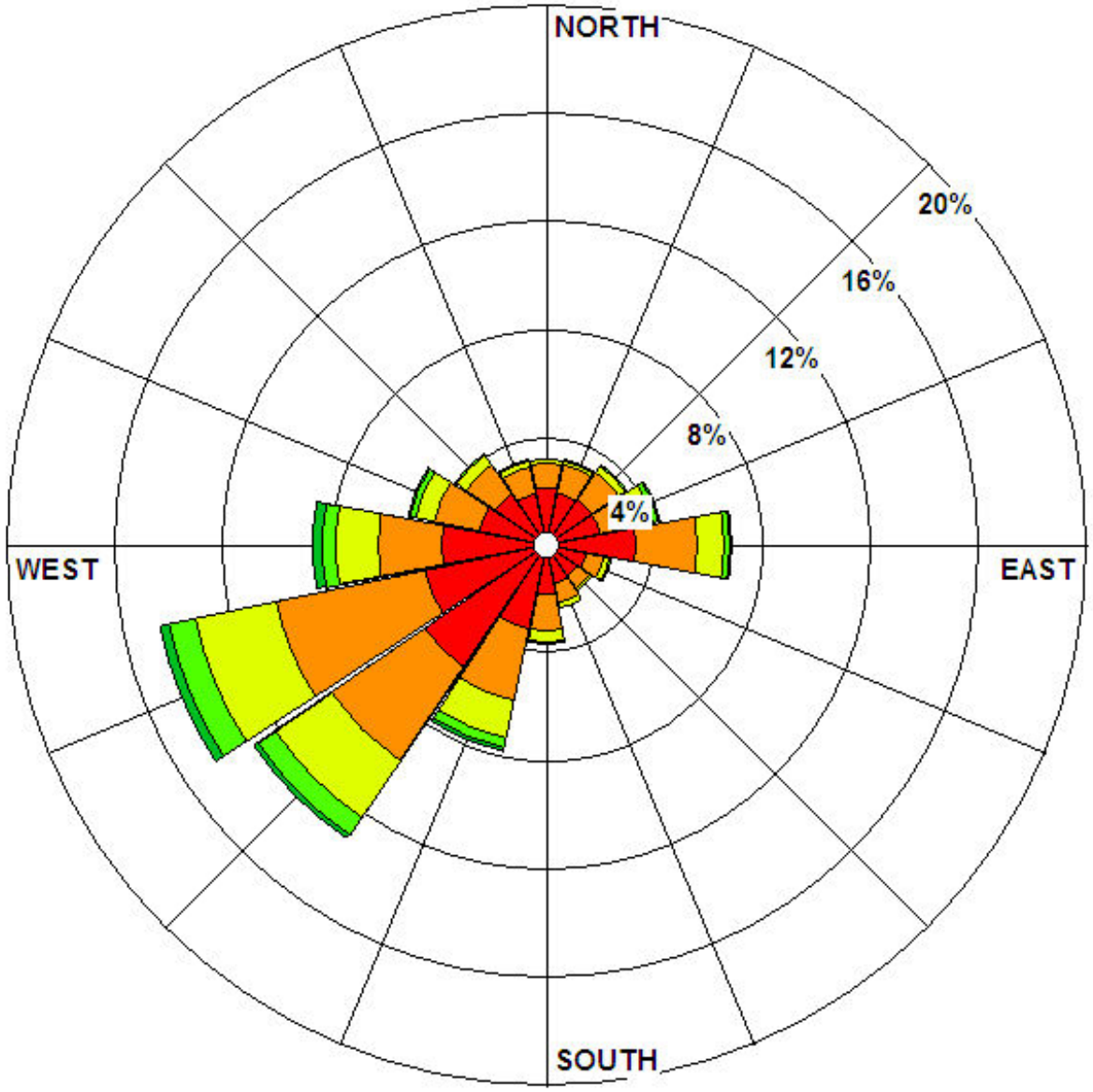
Lawson, T, 2001, Building Aerodynamics, Imperial College Press, London

Building Research Establishment, 1990, Digest 350: Climate and Site Development, Building Research Establishment, Garston

Building Research Establishment, 2011, Digest 520: Wind Microclimate Around Buildings, Building Research Establishment, Garston

British Standard (BS) 6399-2, 1997, Loading for buildings – Part 2: Code of Practice for wind loads, British Standards Institution, London

Appendix B Figures



London City Airport 2000-2009 (Annual)

Wind Speed (m/s)

- >= 10.0
- 8.0 - 10.0
- 6.0 - 8.0
- 4.0 - 6.0
- 0.5 - 4.0

Calms: 11.27%

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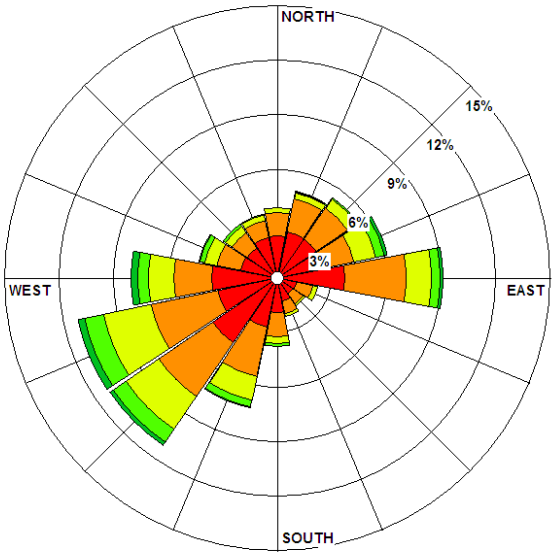
Client
London Borough of Camden

Agar Grove, Camden

London City 10 Year Annual Windrose

Date	November 2013
Scale	N.T.S.
Drawn By	ZR
Checked By	DW
Figure Number	**Figure 1**

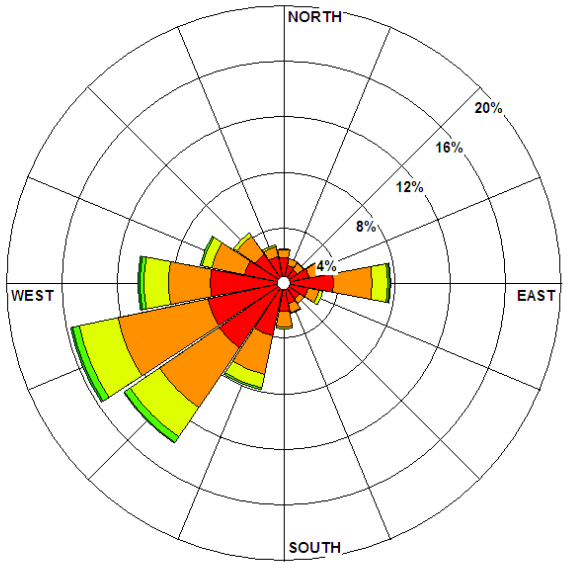


London City Airport 2000-2009 (Spring)

Wind Speed (m/s)

- >= 10.0
- 8.0 - 10.0
- 6.0 - 8.0
- 4.0 - 6.0
- 0.5 - 4.0

Calms: 11.22%

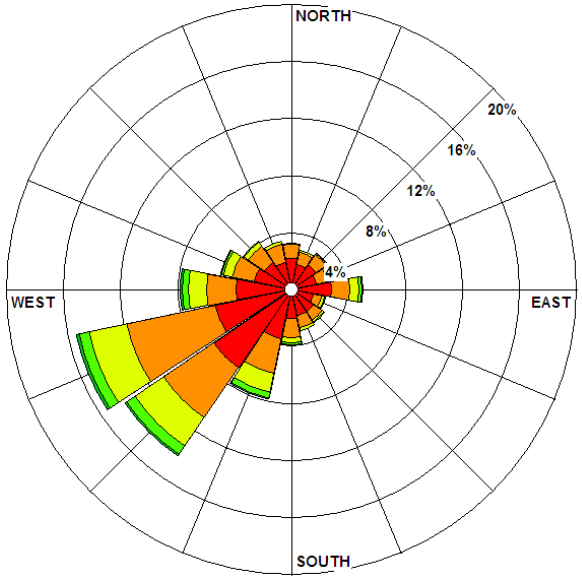


London City Airport 2000-2009 (Summer)

Wind Speed (m/s)

- >= 10.0
- 8.0 - 10.0
- 6.0 - 8.0
- 4.0 - 6.0
- 0.5 - 4.0

Calms: 11.30%

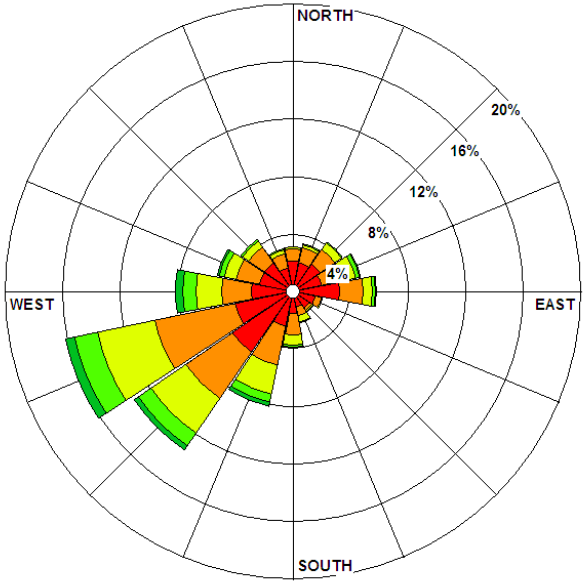


London City Airport 2000-2009 (Autumn)

Wind Speed (m/s)

- >= 10.0
- 8.0 - 10.
- 6.0 - 8.0
- 4.0 - 6.0
- 0.5 - 4.(

Calms: 12.49%



London City Airport 2000-2009 (Winter)

Wind Speed (m/s)

- >= 10.0
- 8.0 - 10.0
- 6.0 - 8.0
- 4.0 - 6.0
- 0.5 - 4.0

Calms: 10.06%

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Client
London Borough of Camden

Agar Grove, Camden

London City 10 Year Seasonal Windroses

Date	November 2013
Scale	N.T.S.
Drawn By	ZR
Checked By	DW
Figure Number	**Figure 2**