



Napier Court, Reading

Wind Microclimate

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Executive Summary

An experience-based desk study has been carried out to assess the likely impact of the proposed Napier Court development on pedestrian level wind conditions in and around the site. The assessment considers the proposed development massing and exposure in conjunction with long-term wind climate statistics applicable to the site and provides an expert review of the likely suitability of wind conditions based on the industry standard Lawson criteria for pedestrian comfort and safety.

The proposed development is of relatively modest height with regards to potential wind effects and is substantially sheltered from prevailing south-westerly winds. The development is also well orientated relative to the most frequent strong winds from the southwest and west-south-west. Key wind effects are therefore expected to be largely limited to channelling of prevailing winds along the south elevation of the development and through the north-to-south passages between the buildings and between the development and the neighbouring buildings to the west and east.

As a result, the proposed development is not expected to have any significant impact on pedestrian level wind conditions with regards to pedestrian safety, and conditions in and around the site are expected to rate as safe for all users.

In terms of pedestrian comfort, with respect to wind force, thoroughfares within and alongside the site are expected to be suitable for pedestrian access to, and passage through or past, the proposed development.

Main entrances to the proposed development are expected to enjoy suitable conditions for pedestrian ingress / egress and secondary entrances are expected to be at least tolerable.

Recreational spaces are generally expected to have acceptable conditions for planned activities, including children's play across the extent of the play areas and outdoor seating within the communal space on the south side of Blocks A and B. The proposed roof-top terrace and a single private terrace at ground level are however expected to require purposely developed mitigation measures, during the detailed design stages, to ensure amenable conditions for proposed recreational uses.

The proposed development is not expected to have any significant impact on the pedestrian level wind conditions within the surrounding area and no significant cumulative effects with the future surrounding developments are expected.

1. Introduction

Urban Microclimate Ltd. has been commissioned by Peveril Securities Ltd. to assess the likely impact of the proposed Napier Court development in Reading, on the pedestrian level wind environment in and around the site.

The assessment comprises an experience-based desk study and is based on details of the proposed development issued by the design team from October 2023 to June 2024.

The proposed development comprises demolition of the existing three office buildings, and construction of new 11 storey buildings, with amenity space at roof level (part indoor and set back), to provide 576 residential dwellings consisting of 1, 2 and 3-bedroom apartments. The development will include ancillary facilities for residents, such as a residents' lounge, gym and communal workspace. The buildings will be set in landscaping to the front and between the buildings together with roof terraces. Parking is proposed for 39 cars and 6 motorbikes. Three internal storage spaces are proposed at ground floor for 289 bicycles and an additional 20 cycle spaces are provided externally for visitors. The site is 1.26 ha in size and stretches east to west along Napier Road, bound by the railway line to the south, Napier Road and Kings Meadow to the north, Thames Quarter to the west and a Network Rail site to the east. The site is located within the administrative boundary of Reading Borough Council and is very well connected to the train station, bus services and town centre facilities.

The scheme considered is illustrated in Figures 1.1, below.

Figure 1.1a: Proposed Development (Viewed from Southwest)



Figure 1.1b: Proposed Development (Viewed from Northeast)

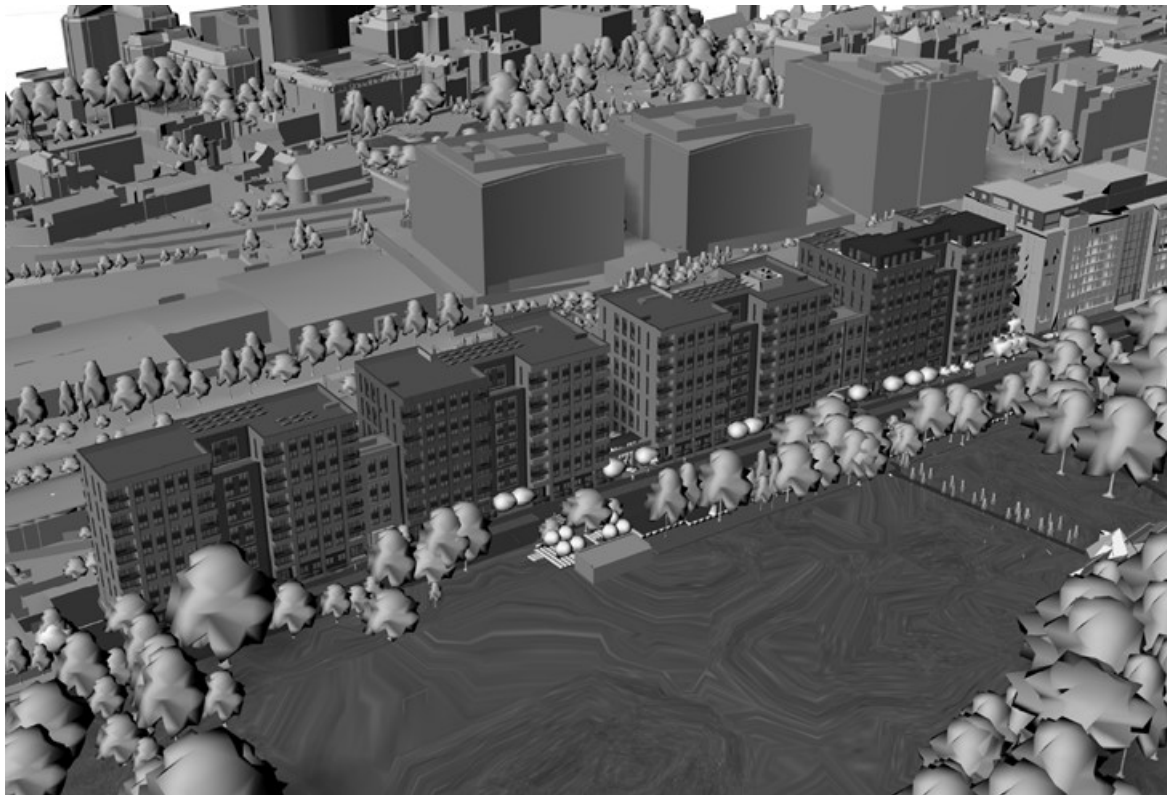


Figure 1.1c: Proposed Siteplan and Landscaping Scheme

2. Methodology and Criteria

2.1. Policy and Guidelines

National Planning Policy and Guidelines

There are no national planning policies directly relating to wind microclimate issues. However, the National Planning Policy Framework (updated in December 2023) emphasises the benefits of a high-quality built environment. An example of this is presented in Section 12, which states that developments should:

“establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit”

The National Design Guide (January 2021) forms part of the associated planning practice guidance. Within this guide, the section Built Form B2 ‘Appropriate building types and forms’ states that:

“Proposals for tall buildings (and other buildings with a significantly larger scale or bulk than their surroundings) require special consideration. This includes their location and siting; relationship to context; impact on local character, views and sight lines; composition - how they meet the ground and the sky; and environmental impacts, such as sunlight, daylight, overshadowing and wind. These need to be resolved satisfactorily in relation to the context and local character.”

The section Context C1 ‘Understand and relate well to the site, its local and wider context’ goes on to state:

“Well-designed new development responds positively to the features of the site itself and the surrounding context beyond the site boundary. It enhances positive qualities and improves negative ones. Some features are physical, including:

- *environment – including landscape and visual impact, microclimate...”*

Local Planning Policy

The Reading Borough Local Plan (adopted November 2019) includes Policy CC8: Safeguarding Amenity, which states:

“Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:

- *Wind, where the proposals involve new development of more than 8 storeys.”*

The Local Plan also goes on to discuss wind microclimate within Section 5. Central Reading. In particular, it is noted that:

“Wind should be assessed against the Lawson Criteria.”

Additional Standards and Guidance

The assessment of environmental wind flows lies outside the scope of BS EN 1991-1-4:2005, the current UK and European Standard for wind actions on structures, which focuses on wind loading issues.

The impact of environmental wind on pedestrian spaces and the consequent suitability of these spaces for planned usage are described by and compared against the industry standard Lawson criteria, which are recognised by Local Authorities as a suitable benchmark for wind assessments.

2.2. Assessment Criteria

Details of the Lawson criteria for pedestrian comfort are presented in Table 2.1 and are based on the exceedance of threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring less than 5% of the time. The thresholds represent upper bounds of acceptability for a range of common activities. The value of 5% has been established as giving a reasonable allowance for extreme and relatively infrequent winds that are acceptable within each category.

Table 2.1: Lawson Criteria for Pedestrian Comfort

Threshold Mean-hourly Wind Speed Exceeded < 5% of the Time	Comfort Rating / Activity		Qualifying Comments
4 m/s	C4	Long-term Sitting	Reading a newspaper and eating and drinking.
6 m/s	C3	Standing or short-term Sitting	Appropriate for bus stops, window shopping and building entrances.
8 m/s	C2	Walking and Strolling	General areas of walking and sightseeing.
10 m/s	C1	Business walking	Local areas around tall buildings where people are not likely to linger.

Details of the Lawson criteria for pedestrian safety, or distress, are presented in Table 2.2 and are based on the exceedance of the threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring once per annum. These thresholds represent wind speeds with the potential to destabilise the less able or more susceptible members of the public (including elderly, cyclists and children) and able-bodied users.

Table 2.2: Lawson Criteria for Pedestrian Safety or Distress

Threshold mean-hourly wind speed exceeded once a year	Safety Rating		Qualifying Comments
15 m/s	S2	Unsuitable for general public	Less able and cyclists find conditions physically difficult.
20 m/s	S1	Unsuitable for able-bodied	Able-bodied persons find conditions difficult. Physically impossible to remain standing during gusts.

2.3. Assessment Methodology

An experience-based desk study has been carried out to provide a qualitative assessment of the likely effects of the proposed development on the pedestrian level wind environment. This assessment represents a professional opinion of likely effects. A detailed quantitative assessment, to confirm conditions in terms of pedestrian comfort and safety ratings, would require wind tunnel testing of a physical scale model. This would not typically be required for the scale of development proposed and lies outside the scope of the current study.

The current study considers the proposed development massing and exposure in conjunction with long-term wind climate statistics applicable to the site. The assessment is benchmarked against, and draws on the extensive experience in the assessment of wind flows gained from, wind tunnel testing of similarly massed schemes (often forming part of larger masterplans) within similar urban / suburban settings. These detailed studies were based on the aforementioned Lawson criteria for pedestrian comfort and safety.

In accordance with standard practice, the surrounding context considered for the assessment of existing and proposed site conditions includes developments currently under construction, for which significant above-ground works has been completed, in their completed states. Potential cumulative effects with future developments are also considered.

To determine the general wind properties for the site, a standard statistical probability distribution (Weibull distribution) was applied to long-term wind frequency statistics from Heathrow Airport, with annual and seasonal data derived for 16 evenly spaced sectors. The Weibull parameters were corrected to open-country terrain at sea-level and then corrected to apply directly at the site, taking account of differences in upwind terrain and altitude between the weather centre and the site based on the widely-accepted Deaves and Harris log law wind model of the atmospheric boundary layer and BS EN 1991-1-4:2005. Historical data is used as standard practice due, in part, to a lack of certainty in potential future changes in wind patterns, though any changes are expected to be minor.

The pedestrian level wind environment assessment is then summarised in terms of suitability for various activities, based on expected seasonal comfort and annual safety ratings in accordance with the above criteria. The assessment takes full account of seasonal variations in wind conditions and pedestrian activities. Thus, conditions for recreational

activities focus on summer, but also consider spring and autumn. Recreational activities do not consider winter comfort ratings as it is anticipated that users would not demand suitable conditions 95% of the time in winter but would instead be satisfied to use the amenity spaces on occasions when conditions, including precipitation and temperature, permit. Conditions for pedestrian thoroughfare, access or waiting (for example at bus stops) consider all seasons, with winter being predominantly the critical season due to generally higher wind speeds in the winter months.

The activities considered, and their relation to the comfort criteria detailed above, are shown in Table 2.3. The table is ordered in terms of decreasing sensitivity to wind speeds. Conditions considered suitable for the more sensitive activities would also be suitable for the subsequent, less sensitive, uses.

Table 2.3: Suitability Assessment

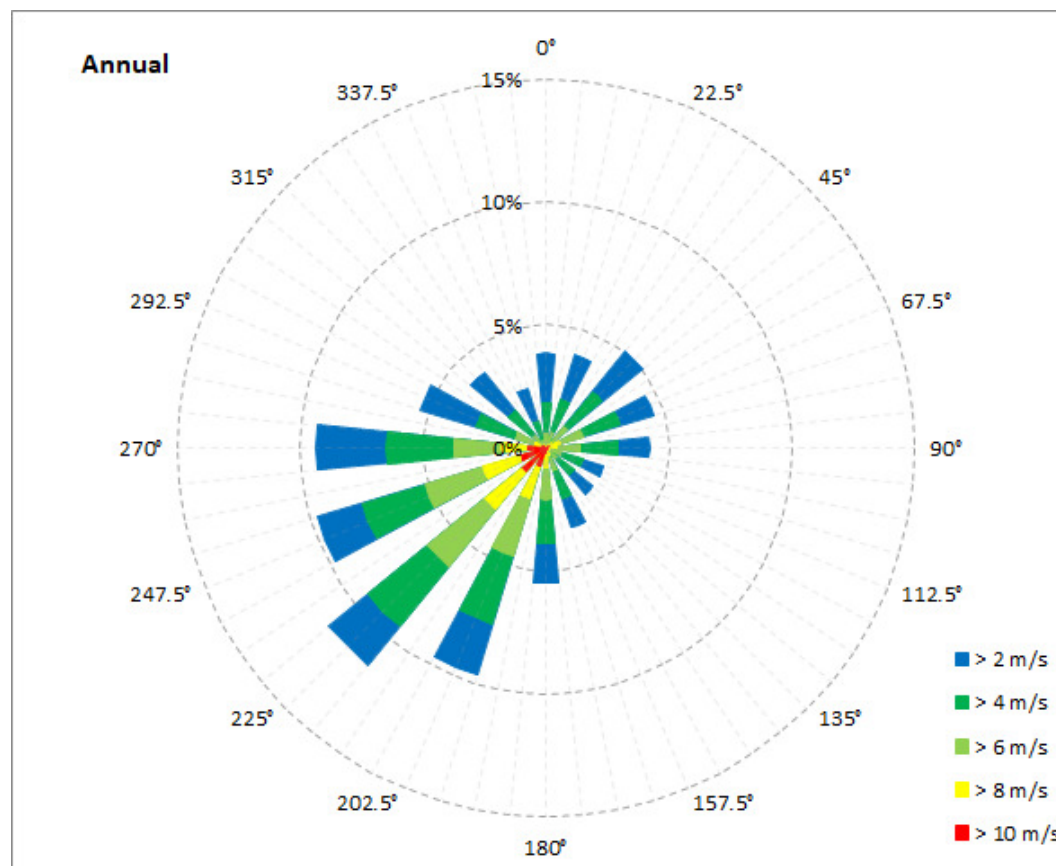
Suitability		Target Lawson comfort and safety criteria for specified seasons
Outdoor seating	For long periods of sitting, such as for an outdoor café or picnic area.	'Long-term sitting' (C4) in at least summer.
Entrances, waiting areas	For pedestrian ingress / egress at entrances, or short periods of sitting or standing such as at a bus stop, taxi rank, meeting point, window shopping, etc.	'Standing or short-term sitting' (C3) in all seasons.
General leisure (excluding seating areas)	For leisure uses excluding long periods of outdoor sitting, such as active leisure, general park spaces, children's play area, etc.	'Standing or short-term sitting' (C3) from spring to autumn.
Thoroughfare	For pedestrian access to, and passage through, the site and surrounding area.	'Business walking' / 'Walking or strolling' (C1/C2) in all seasons - 'Walking or strolling' (C2) desired but 'Business walking' (C1) may be acceptable in some areas.
Unsuitable	Unsuitable for all activities.	Exceeds comfort criterion for 'Business walking' (C1) or safety criteria (S1/S2).

3. Assessment

3.1. Existing Site Conditions

The wind climate expected at the site is summarised in Figure 3.1 in terms of the annual wind speed and direction probability distributions at a reference height of 40 m, corresponding to the approximate maximum roof height of the proposed development relative to local ground level. Seasonal wind speed and direction probability distributions are presented in Appendix A.

Figure 3.1: Wind Climate at Site (at reference height of 40 m)



Based on the wind climate statistics, the prevailing winds at the site blow from the south-westerly sector. Wind speeds are generally highest during winter, when the most frequent strong winds blow from the southwest and west-south-west. Wind speeds are generally lower during summer. North-easterly winds are common during spring but, although potentially cold, these winds are generally light. South-easterly winds are generally light, rarely occurring and usually do not cause adverse impacts on pedestrian level conditions.

Applying these wind statistics at the site, an area free from localised building effects (either sheltering or acceleration) would generally be expected to experience pedestrian level wind conditions rated (in accordance with the Lawson criteria) as comfortable for 'standing or short-term sitting' throughout the year. More exposed areas could potentially rate as comfortable for "walking and strolling" in winter, albeit only marginally.

The existing site comprises a series of 2-storey office buildings with associated car parking. The site is substantially sheltered from prevailing south-westerly winds by the existing buildings to the south and west of the site and, at lower levels, the railway embankment. The neighbouring Thames Quarter development does represent a dominant structure within the immediate surrounding area. However, the tallest part is located at the opposite end of the scheme and the wind study submitted in support of the planning application for the Thames Quarter development concluded that potential winds accelerating around the southeast corner of the building and into the existing site would not create any unsuitable pedestrian level conditions.

As a result, conditions in and around the existing site are expected to rate as safe for all users, in accordance with the Lawson criteria for pedestrian safety.

In terms of pedestrian comfort, conditions are expected to be suitable for at least leisurely strolling on thoroughfares and car parks in and around the site.

Entrances to the existing and surrounding buildings are expected to generally enjoy suitable conditions for pedestrian ingress / egress.

Kings Meadow, to the north of the site, is expected to have suitable conditions for general recreational activities, such as children's play within the playground and active leisure on the sports pitches. However, suitable conditions for long periods of outdoor sitting, such as for picnics, during summer is expected to be limited to areas locally sheltered by soft landscaping.

3.2. Impact of Proposed Development

The proposed development is of relatively modest height with regards to potential wind effects and is substantially sheltered from prevailing south-westerly winds by the existing buildings to the south and west of the site and, at lower levels, the railway embankment. Despite this, there is still potential for prevailing winds to spill over the surrounding obstructions and impact on the development. The development is well orientated relative to the most frequent strong winds from the southwest and west-south-west, which is expected to limit the potential for downdraughts (where higher speed winds from higher levels are deflected down towards the ground). However, there is still potential for channelling of these winds along the south elevation of the development and through the north-to-south passages between the buildings and between the development and the neighbouring buildings to the west and east.

The development is more exposed to winds from the north-westerly, northerly and north-easterly sectors, and presents a wide obstruction to these winds, creating potential for channelling of winds along the north elevations and through the passages between the buildings. However, these winds are less frequent and are generally lighter than prevailing south-westerly winds, though north-easterly winds are common in spring and are often cold. The development is also partially exposed to south-easterly winds, at least at mid-to-

upper levels. However, these winds are generally light, rarely occurring and usually do not cause adverse impacts on pedestrian level conditions.

The proposed landscaping has been purposely developed to respond to the potential for channelling of winds through the site, and key features include:

- 5 – 6 m high, semi-mature, trees (expected to be of a deciduous species with significant retained solidity in winter, i.e. substantial canopies with numerous branches) distributed:
 - within the communal amenity space on the south side of Blocks A and B;
 - across the communal amenity space between Blocks B and C; and
 - around the perimeter of the site.
- retained existing trees around the northwest corner of Block A;
- a fence, with climbing plants to enhance the solidity, across the north end of the communal amenity space between Blocks B and C; and
- mature hedges (to heights equivalent to the private terrace railings):
 - across the communal amenity space on the south side of Blocks A and B;
 - around the communal amenity space between Blocks B and C; and
 - around private ground-level terraces.

The expected pedestrian level wind environment in and around the site, resulting from the above effects, is discussed below and indicatively presented in terms of suitability for pedestrian activities in Figure 3.2 (based on the categories described in Table 2.3).

Pedestrian Safety

As discussed above, the proposed development is of relatively modest height and is substantially sheltered from prevailing south-westerly winds. As a result, pedestrian level wind conditions in and around the site are expected to remain rated as safe for all users.

The proposed development is thus expected to have no significant impact with respect to pedestrian safety.

Pedestrian Comfort

In terms of pedestrian comfort, with regards to wind force, conditions in and immediately around the site are expected to be suitable for at least leisurely strolling. Conditions are therefore expected to be suitable for pedestrian access to, and passage through or past, the development.

The main entrances to the development are located away from areas of potential accelerated pedestrian level winds, around exposed corners, and are expected to enjoy suitable conditions for pedestrian ingress / egress. The cycle store entrances on the south elevations of Blocks A and C are located close to areas that may be suitable only for strolling

in winter, but conditions are expected to be at least tolerable for a pedestrian ingress / egress at these secondary entrances. All other secondary entrances are expected to have suitable conditions for associated uses.

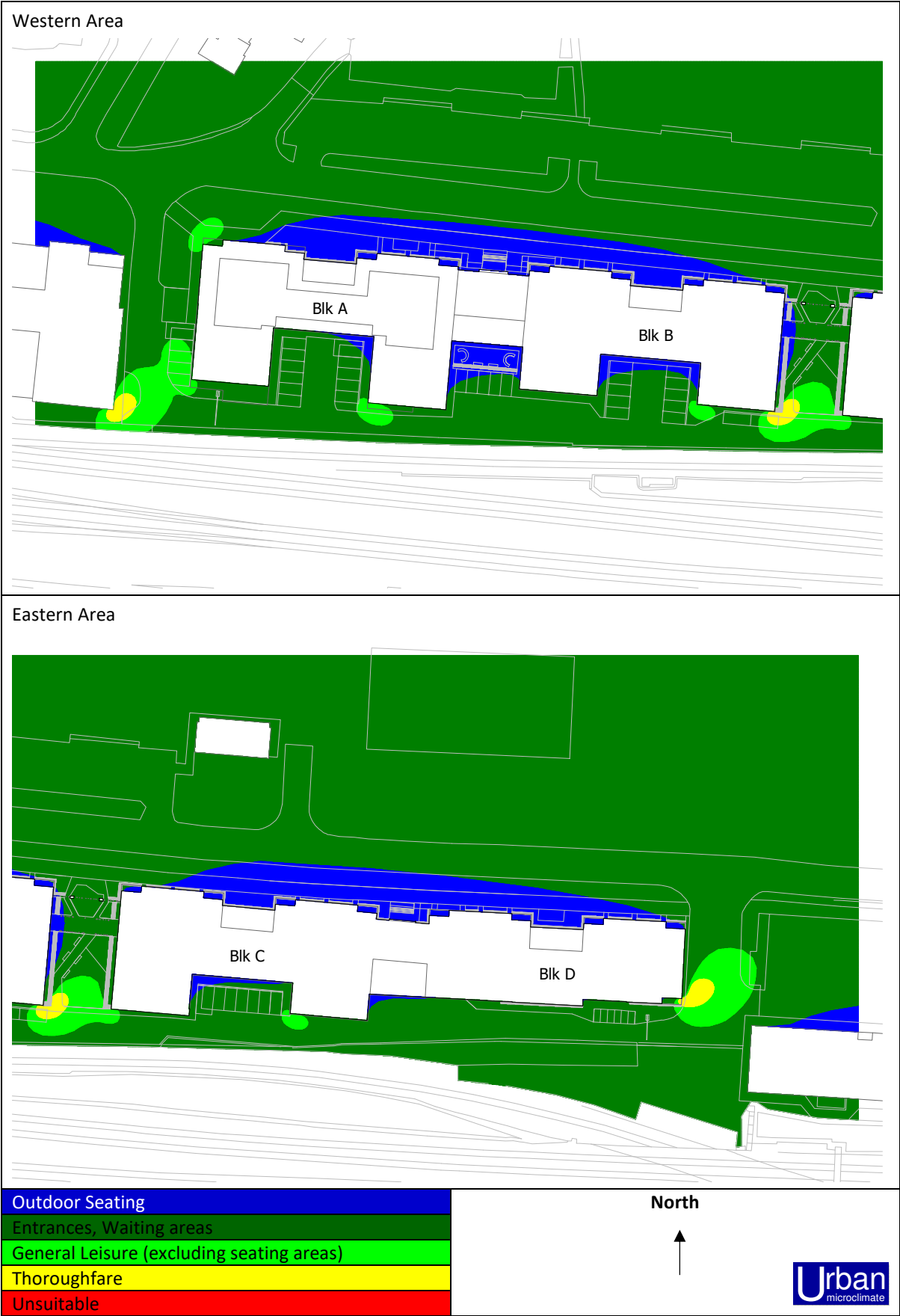
The communal amenity space on the south side of Blocks A and B is located within a deep recess and benefits from substantial soft landscaping. Resulting conditions are expected to be suitable for recreational activities including long periods of outdoor sitting, such as for picnics for example, during at least summer. Conditions are therefore expected to be considered acceptable for the proposed recreational uses.

The communal amenity space between Blocks B and C is potentially susceptible to winds channelling between the blocks but benefits from substantial soft landscaping and a fence (with climbing plants to create greater solidity) across the northern end. Conditions are expected to be suitable for recreational activities including at least short periods of sitting or standing from spring through to autumn, at least away from the immediate vicinity of Block B's southeast corner. Conditions are therefore expected to be suitable for children's play at the play space. The benches are expected to have suitable conditions for at least short periods of outdoor sitting throughout the year. These conditions are considered suitable for uses such as a meeting point and are expected to be acceptable for proposed pedestrian activities.

The private, ground-level, terraces are all at least partially sheltered by hedges and are largely expected to enjoy amenable conditions for outdoor seating during at least summer. The outer edges of the terrace at the northwest corner of Block C may be slightly windy for long periods of outdoor sitting but the terrace is, overall, expected to be considered at least tolerable for proposed recreational uses. Away from the outer edges, the terrace at the southeast corner of Block D is expected to have suitable conditions for short periods of sitting, but this terrace may be considered windy for proposed recreational uses and would likely benefit from additional shelter (see subsequent sections).

The proposed development is not expected to have any significant effect on the suitability of wind conditions within the surrounding area. Surrounding thoroughfares are expected to remain suitable for at least leisurely strolling. Entrances to surrounding buildings are expected to generally remain suitable for pedestrian ingress / egress and Kings Meadow is expected to have suitable conditions for general recreational activities, such as children's play within the playground and active leisure on the sports pitches. As for existing site conditions, suitable conditions for long periods of outdoor sitting, such as for picnics, during summer is expected to be limited to areas of the park locally sheltered by soft landscaping.

Figure 3.2: Suitability Assessment



Roof-Top Terrace

Block A's roof-top area is largely exposed to winds approaching from all directions. However, the terraces benefit from 1.5 m high glazed balustrades around the perimeters of the amenity spaces and channelling of winds around the pavilion, extending above the terraces, is also expected to be limited by the pavilion's single storey height. Landscaping proposals are also expected to be developed during the detailed design stages.

In the absence of purposely developed landscaping, suitable conditions for outdoor seating during summer is expected to be limited to the more sheltered areas midway along the north and east frontages of the pavilions, away from the outer corners. Elsewhere, conditions are expected to be suitable for recreational activities including short periods of sitting or standing from spring through to autumn, such as for viewing or children's play, though the areas immediately around the exposed northwest and southeast pavilion corners may be too windy for sedentary uses during winter.

Overall, purposeful development of the landscaping proposals is expected to be required to maximise the potential for recreational uses and ensure amenable conditions for proposed uses.

3.3. Cumulative Effects

Surrounding developments recently completed or with significant above ground construction works completed have been considered, in their completed states, in the above assessments of existing site conditions and the effects of proposed development within the existing surrounding context. This includes the neighbouring Thames Quarter development on Kings Meadow Road.

Consented future surrounding developments all lie a significant distance (> 400 m) from the site and are not considered to have potential for any significant cumulative effects with the proposed development.

The only identified future development with potential for cumulative effects with the proposed development is Forbury Retail Park (application reference 230822), which is not currently consented.

The Forbury Retail Park site lies more than 60 m to the south / southeast of the Napier Court site. Any accelerated winds emanating from either development would be expected to dissipate before reaching the other scheme, and any increase in shelter would mainly occur for non-prevailing winds. The spacing between the buildings, and their modest heights, would also limit the potential for any channelling of westerly or easterly winds along the railway lines, between the sites.

Potential cumulative effects are therefore considered insignificant.

3.4. Mitigation Measures

The private, ground-level, terrace at the southeast corner of Block D would likely benefit from additional shelter, such as a full-height end screen (to the soffit of the balcony above). This could comprise a porous screen (ideally ~50%, but at least 35% solid) or a solid glazed screen. This will be reviewed during the detailed design stages.

Otherwise, pedestrian level wind conditions are expected to be generally suitable, and at least tolerable, for planned pedestrian activities and no further mitigation measures, beyond those already designed-in to the proposed development, are considered to be required.

As discussed above, landscaping proposals are expected to be developed for the roof-top terrace during the detailed design stages. For this, it is recommended that seating uses should be located away from the pavilion's outer corners. The larger terrace spaces would also ideally be split into smaller pockets through the introduction of porous screening (ideally around 50% solid), hedging or planters with tall shrubs (ideally around 1.5 m high).

3.5. Residual Effects

With the introduction of an end-screen the private, ground-level, terrace at the southeast corner of Block D is expected to enjoy suitable conditions for associated recreational uses.

Otherwise, as no ground-level mitigation measures are expected to be required, the residual effects on pedestrian level conditions are as discussed above for the proposed development.

With purposeful development of the roof-top terrace landscaping, it is expected that conditions could be enhanced to be generally suitable for proposed recreational activities, though outdoor seating may still need to be located in the more sheltered areas and away from the pavilion's outer corners.

4. Conclusions

Existing Site Conditions

Pedestrian level wind conditions in and around the existing site are expected to rate as safe for all users and are expected to be comfortable for at least leisurely strolling. Entrances are generally expected to enjoy suitable conditions for pedestrian ingress / egress and Kings Meadow, to the north of the site, is expected to have generally suitable conditions for current recreational activities.

Impact of Proposed Development

The proposed development is not expected to have any significant impact on wind conditions with regards to pedestrian safety.

In terms of pedestrian comfort, thoroughfares within and alongside the site are expected to be suitable for pedestrian access to, and passage through or past, the proposed development.

Main entrances to the proposed development are expected to enjoy suitable conditions for pedestrian ingress / egress and secondary entrances are expected to be at least tolerable.

Recreational spaces at pedestrian level are generally expected to enjoy suitable conditions for planned activities. A single private terrace at ground level and the proposed roof-top terrace are however expected to require purposely developed mitigation measures, to ensure amenable conditions for proposed recreational uses.

The proposed development is not expected to have any significant impact on the pedestrian level wind conditions within the surrounding area.

No significant cumulative effects with the known future surrounding developments are expected.

Appendix A – Wind Climate at Site

Figure A.1: Autumn Wind Speed and Direction Distribution (at ref height of 40 m)

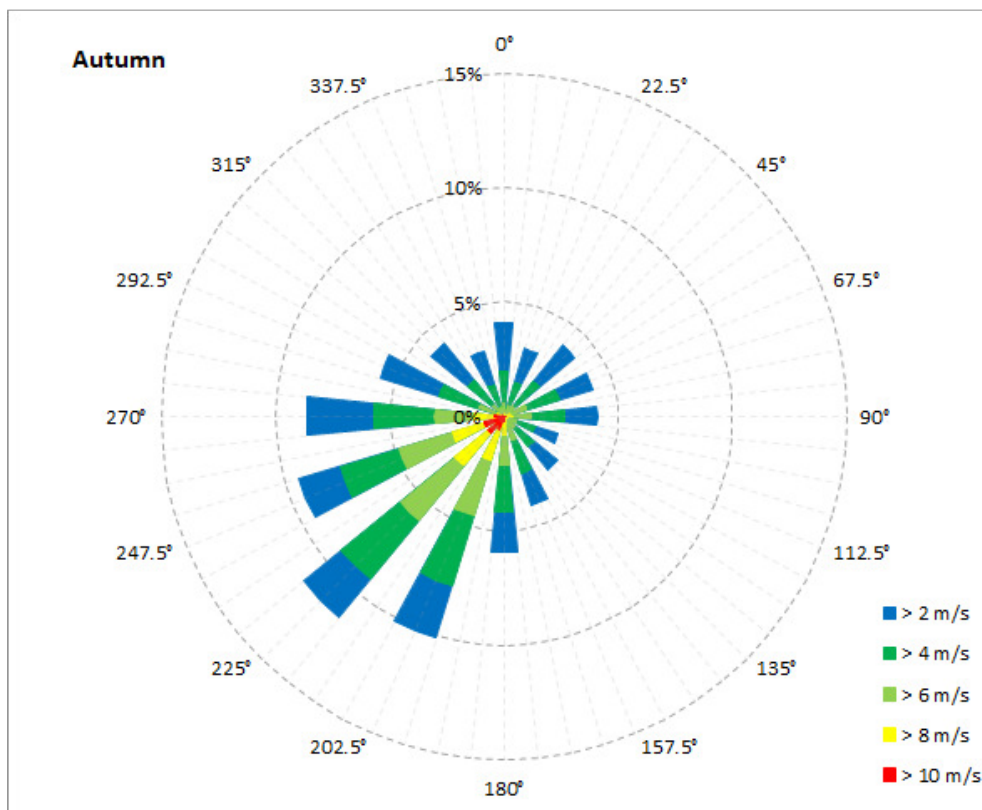


Figure A.2: Winter Wind Speed and Direction Distribution (at ref height of 40 m)

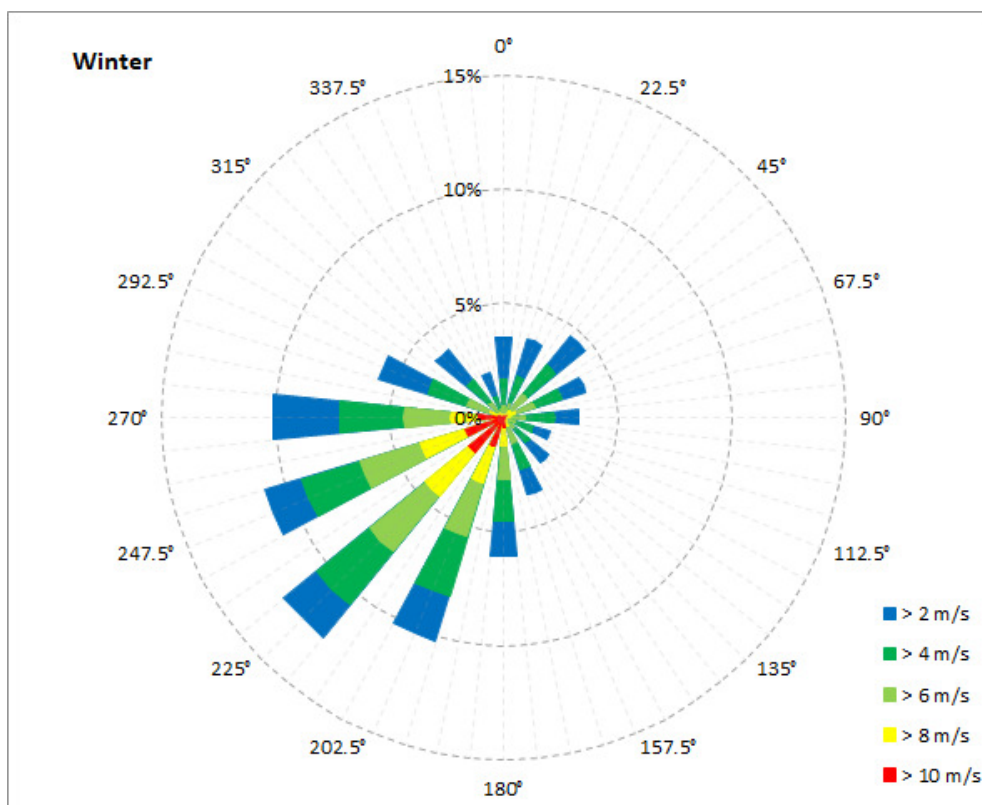
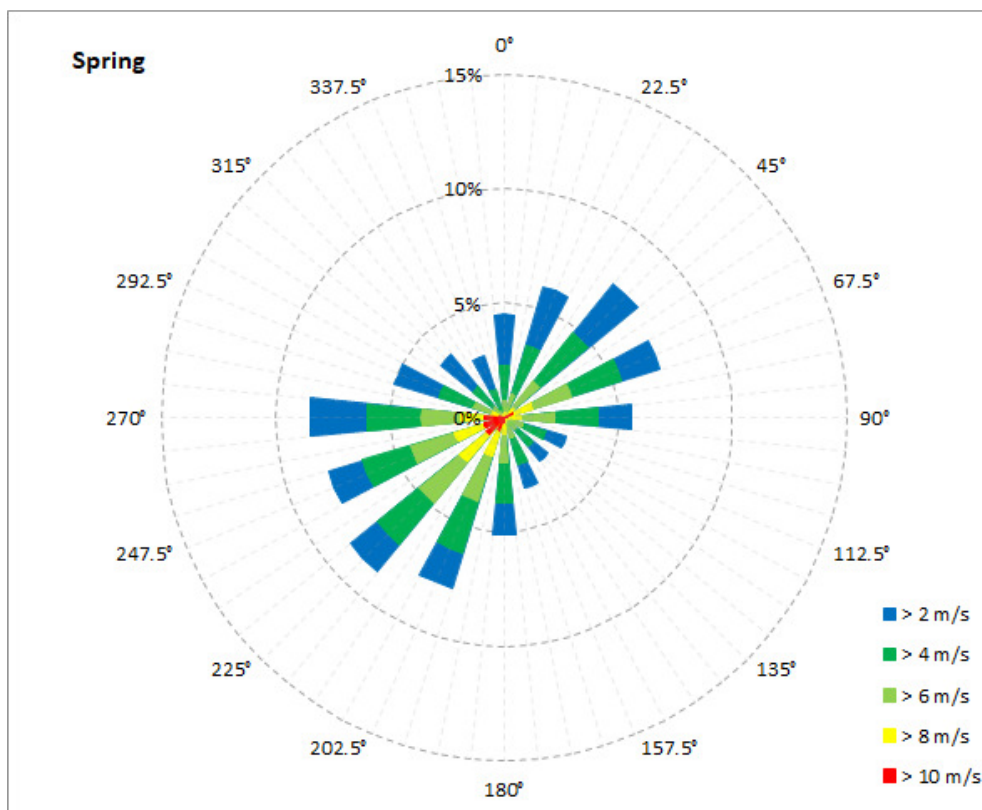
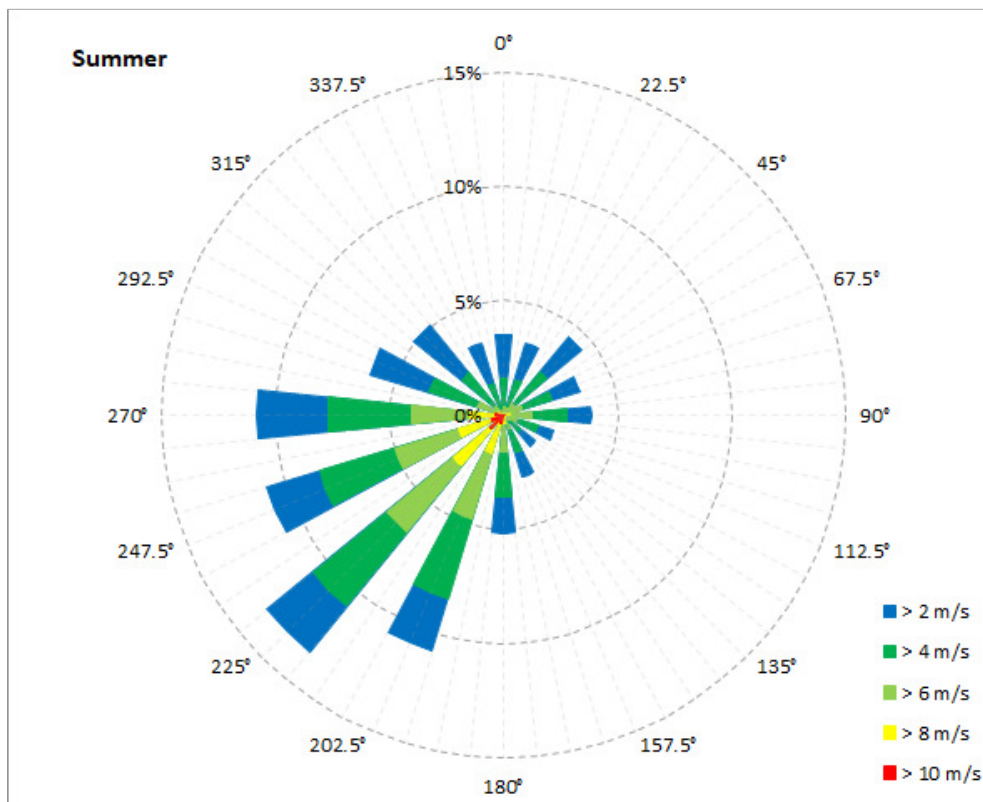


Figure A.3: Spring Wind Speed and Direction Distribution (at ref height of 40 m)**Figure A.4: Summer Wind Speed and Direction Distribution (at ref height of 40 m)**

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