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MEMORANDUM

DATE:	2020-04-24	RWDI REFERENCE #: 1901994
TO:	Joseph Harding	EMAIL: Joseph.Harding@berkeleygroup.co.uk
FROM:	David Hamlyn Andrew Proud	Email: David.Hamlyn@rwdi.com Andrew.Proud@rwdi.com
RE:	Peer Review Responses Vastern Road Reading, UK	

Introduction

During 2019 RWDI were retained by Berkeley Homes to conduct a pedestrian level wind microclimate assessment of the proposed Vastern Road development in Reading, UK (hereafter referred to as the 'Proposed Development'). Assessment of the Proposed Development was undertaken using Computational Fluid Dynamics (CFD) methods to determine the influence of the Proposed Development on the local wind environment and the suitability of the wind microclimate for the intended pedestrian uses, with results referencing the widely used Lawson Comfort Criteria.

Following a peer review of RWDI's methodology by BRE (report appended to this document), this document seeks to provide responses to the points raised by the reviewer.

RWDI Responses

BRE Comment	RWDI Response
The report provides a quantitative CFD assessment of the wind microclimate around the proposed development. The assessment is based on the 'Lawson' LDDC criterion for pedestrian comfort. However, the RWDI analysis only presents the mean wind speed effects. The Lawson approach requires a gust equivalent mean wind speed (GEM) analysis to be carried out. See for example Ref 1, which presents best practice guidelines for CFD studies.	As noted, CFD modelling provided mean wind speeds for the predicted wind microclimate around the Proposed Development. For the Lawson LDDC criteria Lawson states a 5% exceedance of equivalent hourly average (i.e. mean) wind speed. In areas where winds speeds would be highest, experience of wind tunnel tests around the UK and more specifically in Reading, has been used to make a judgement on the effect of the GEM/gusts in these areas. As such, we do not expect there to be a change in wind conditions

	due to the GEM/gusts in these areas and that the overall wind conditions would be as presented from the CFD modelling.
The Lawson methodology requires an assessment of both mean and gust windspeeds (where the gust wind speeds are presented as gust equivalent values, GEM). The report only presents mean wind speed results.	As response 1, above.
There is limited information provided regarding the CFD modelling, such as, for example, the extent of the calculation domain, the calculation grid size, etc.	Section 4 states that surrounding building models were included within a 400m radius of the centre of the Site and a computational grid composed of approximately 20 million cells was used. Further to this, the computational domain extended to at least 1000m from the centre of the Site and a height of 600m above the ground plane.
It is stated that the CFD RANS simulation used in this assessment does not have the ability to predict the fluctuating or gusty nature of the wind. This is justified by the argument that 'As comfort is a function of average conditions, this model is more suited to help analyse this'.	As response 1 above.
This assessment uses 'informed engineering judgement' to 'determine the potential for strong winds leading to potential safety issues'. The assumption is that strong winds are generally associated with areas which would be classified as acceptable for walking or as uncomfortable. However, the assessment appears to assume that only the lower 15m/s safety threshold can be exceeded in these areas. The possibility of exceedance of the 20m/s threshold appears to have been totally ignored.	As any exceedance of the lower safety threshold (winds exceeding 15m/s for more than 0.025% of the time) within pedestrian accessible areas of the Proposed Development would highlight the requirement for wind mitigation measures, and has been considered universally in this assessment, the 20m/s threshold becomes superfluous (the lower threshold would have to be breached to reach the higher threshold).
General comment: the report discusses various specific locations such as entrances and the open air café. These locations are not marked on the figures in the report.	Please see plans 446.SK.100 and 446.SK.101 attached.
Section 6.2. Figure 6 shows an area where wind conditions are suitable for walking. This location appears to be a footpath along Vasten Road. This is not specifically discussed in the report.	There would indeed be a small area (approx. 1.5m ²) of conditions suitable for walking use on Vasten Road south-east of Building B. As noted in Configuration 3 (6.3.1.1), wind mitigation measures would be required. Section 7 details that the proposed landscaping scheme (in particular those elements to the south of the Proposed Development) would be expected to improve wind conditions such that they would

	be suitable of the intended use in this area.
The discussion of wind conditions in amenity areas and on balconies is limited to the summer season. (this comment also applies to Section 6.3)	Assessment of the suitability of balconies for amenity use is limited to the summer season, as is RWDIs standard practice. Balcony locations are expected to be most frequently used during the summer season. Outwith the summer season other factors, such as temperature and precipitation would be likely to limit the use of these spaces. Likely exceedance of the safety threshold as specified by Lawson on balconies as has been assessed throughout the year as discussed in sections 6.2.2 and 6.3.2.
Section 6.3.1 This section states: 'Wind conditions around the Proposed Development during the windiest season would range from suitable for sitting to walking use. These conditions would be suitable for all entrance locations as they would have conditions suitable for standing use or calmer'.	This statement is incorrect. As stated in section 6.3.1.2, wind conditions at entrances would be suitable for strolling use. Section 7 details wind mitigation measures and the application of the proposed landscaping scheme to improve conditions such that entrances would be suitable for standing use or calmer.
Section 6.3.1.1 This section states: 'an area to the south-east of Building B would have walking use wind conditions during the windiest season'.	It is true to say cumulative interactions would result in walking use conditions outside the entrance building to Sovereign House. While this is not a frequently accessible pedestrian area (the entrance to Sovereign House would have sitting use conditions on the eastern side of the reception block) and as such would be suitable for the intended use, provided there were no strong winds likely to occur, as the assessment was undertaken devoid of landscaping in order to assess a worst-case scenario, it would be expected that inclusion of the substantial existing landscaping west of the reception block would reduce the occurrence of walking use conditions in this area.
Section 6.3.2 This section identifies areas where mitigation might be required but fails to mention the area along Vasten Road adjacent to the existing building where walking wind conditions occur.	As above.
Failure to include a GEM windspeed analysis	As response 1 above.
It is not possible to read the text on the proposed landscaping scheme (Figure 17 of Appendix B) and the entrance to the café and the seating area are not shown so this cannot be reviewed.	Please see proposed landscaping scheme 448.LA.101 attached.



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Yours truly,

A handwritten signature in dark ink, appearing to read 'D. Hamlyn'.

David Hamlyn

Senior Project Manager

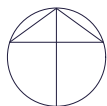
A handwritten signature in dark ink, appearing to read 'A. Proud'.

Andrew Proud

Project Engineer



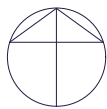
00 - Ground Floor



project Vastern Road Reading			revision	date	prepared	description		
drawing Proposed Floor Plans 00 - Ground Floor							Berkeley Designed for life Berkeley House Farnham Lane Farnham Royal SL2 3RQ T: 01753 784400 F: 01753 646855 www.berkeleygroup.co.uk	
date August 2019	scale @ a3 1:500	drawn DMT						
drawing number 446.SK.100			revision /					



01 - First / Upper Ground Floor



project Vastern Road Reading			revision date		prepared description	
drawing Proposed Floor Plans 01 - First / Upper Ground Floor						
date August 2019	scale @ a3 1:500	drawn DMT				
drawing number 446.SK.101		revision /				
			Berkeley Designed for life Berkeley House Farnham Lane Farnham Royal SL2 3RQ T: 01753 784400 F: 01753 646855 www.berkeleygroup.co.uk			

Jonathan Markwell
Principal Planning Officer
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Directorate for Economic Growth and Neighbourhood Services
Reading Borough Council
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RG1 2LU

7th April 2020

Our Ref. P117633-1000

Dear Mr Markwell

Independent Peer Review of a Microclimate Assessment for Planning Application 200188 at 53-55 Vasten Road, Reading, RG1 8BU

1. Introduction

BRE have been appointed by Reading Borough Council (RBC) to undertake an independent peer review of RWDI report #1901994 Pedestrian Level Wind Comfort Assessment of 55 Vasten Road, Reading, dated 29th January 2020.

The scope of this review was carried out with particular reference to the following:

- a) Is the level and nature (including the methodology) of information submitted sufficient and proportionate to the proposed level of development sought in this instance?
- b) Is the analysis and conclusions reached by the microclimate report reasonable and robust, set within the adopted local policy context of:
Relevant components of Policies CC3 (Adaption to Climate Change) and CC8 (Safeguarding Amenity) of the Reading Borough Local Plan (Adopted November 2019).
- c) If it is considered that the analysis / conclusions are not reasonable and robust, guidance as to what measures (e.g. alternative mitigation measures) / information would be required to address any concerns raised (if any)?

This report provides BRE's review of RWDI report #1901994 Pedestrian Level Wind Comfort Assessment of 55 Vasten Road, Reading.



BRE's Quality Management System is approved to BS EN ISO9001:2008, certificate number LRQ 10000513.

BRE's Environmental Management System is approved to BS EN ISO14001:2004, certificate number LRQ 10000536.

2. Peer Review of Wind Comfort Assessment Report

Issue Considered	BRE Comments	Action Required
Compliance with RBC Policies CC3 and CC8	The proposed development is below the 12 storey height limitation of Policy CR10. However, Policy CC8 requires wind impacts to be considered for buildings >8 storeys tall. The submitted wind microclimate assessment fulfils the requirement of Policy CC8.	No action required.
Compliance with Appropriate Methodology	The report provides a quantitative CFD assessment of the wind microclimate around the proposed development. The assessment is based on the 'Lawson' LDDC criterion for pedestrian comfort. However, the RWDI analysis only presents the mean wind speed effects. The Lawson approach requires a gust equivalent mean wind speed (GEM) analysis to be carried out. See for example Ref 1, which presents best practice guidelines for CFD studies.	The Lawson methodology is appropriate, however, the RWDI assessment does not adequately implement the Lawson methodology. Provide an assessment of GEM wind speeds, Without this, the assessment cannot be considered to be robust.
Level and Nature of Information Submitted	The report is generally well written and easy to understand and provides an acceptable level of detail and information, subject to the clarifications and omissions described below.	Minor issues as discussed below
Scope of Assessment	The scope of the assessment is as expected for a CFD study of this type The assessment includes the baseline site, the proposed development and the cumulate scenario.	No action required This follows normal best practice – no further action required.
Assumptions	In line with standard methodology, and consistent throughout the report.	No action required
Analysis	The assessment uses meteorological data from Heathrow Airport. These data appears to be appropriate for this assessment. The Lawson methodology requires an assessment of both mean and gust windspeeds (where the gust wind speeds are presented as gust equivalent values, GEM). The report only presents mean wind speed results.	No action required Provide an assessment of GEM wind speeds, (either quantitative or qualitative).

Ref 1 Wind Microclimate Guidelines for Developments in the City of London, August 2019

	There is limited information provided regarding the CFD modelling, such as, for example, the extent of the calculation domain, the calculation grid size, etc. The assessment has been carried out for 18 wind directions. Current best practice is to use 36 wind directions. It is stated that the CFD RANS simulation used in this assessment does not have the ability to predict the fluctuating or gusty nature of the wind. This is justified by the argument that <i>'As comfort is a function of average conditions, this model is more suited to help analyse this'</i>. This assessment uses <i>'informed engineering judgement'</i> to <i>'determine the potential for strong winds leading to potential safety issues'</i>. The assumption is that strong winds are generally associated with areas which would be classified as acceptable for walking or as uncomfortable. However, the assessment appears to assume that only the lower 15m/s safety threshold can be exceeded in these areas. The possibility of exceedance of the 20m/s threshold appears to have been totally ignored.	Confirm whether the CFD modelling complies with best practice in these respects, see for example Ref 1. Given the massing and height of the proposed development, 18 wind directions is considered reasonable in this case. No further action required. This is an erroneous argument. Pedestrian comfort is not just a function of average conditions. In regions where highly turbulent flow occurs, for example near building corners, then pedestrian comfort tends to be dominated by gust wind speeds. A GEM analysis must be carried out. This approach is not best practice in a quantitative study but can be considered acceptable providing the authors of the report have extensive wind engineering experience to draw on. However, consideration must be given to the possibility of exceedance of the 20m/s safety threshold.
Results	General comment: the report discusses various specific locations such as entrances and the open air café. These locations are not marked on the figures in the report. Section 6.2. Figure 6 shows an area where wind conditions are suitable for walking. This location appears to be a footpath along Vasten Road. This is not specifically discussed in the report. The discussion of wind conditions in amenity areas and on balconies is limited to the summer season. (this comment also applies to Section 6.3) Section 6.3.1 This section states: <i>'Wind conditions around the Proposed Development during the windiest season'</i>	Mark up on the appropriate figures all specific locations discussed in the report. The expected pedestrian activity on this footpath is likely to be Strolling. In which case the wind conditions will be unsuitable for this activity. Please discuss and advise on appropriate mitigation measures. It is reasonable to assume that the public/residents would expect to be able to use these areas during other times such as spring and autumn. Consideration should be given to assessing the wind conditions in other seasons when the public will use these areas. It is not correct to say that these wind conditions would be suitable for standing

	would range from suitable for sitting to walking use. These conditions would be suitable for all entrance locations as they would have conditions suitable for standing use or calmer’. Section 6.3.1.1 This section states: ‘an area to the south-east of Building B would have walking use wind conditions during the windiest season’. Section 6.3.2 This section identifies areas where mitigation might be required but fails to mention the area along Vasten Road adjacent to the existing building where walking wind conditions occur.	use, when clearly some locations are only suitable for walking. Figure 10 shows four separate areas where walking use wind conditions occur. One of which is some 60m away from the proposed development along Vasten Road adjacent to an existing building. Consider the need for mitigation at this location.
Omissions	Failure to include a GEM windspeed analysis	As discussed in previous sections
Mitigation	It is not possible to read the text on the proposed landscaping scheme (Figure 17 of Appendix B) and the entrance to the café and the seating area are not shown so this cannot be reviewed. The efficacy of the proposed mitigation measures are based on judgement. The report recommends further testing to assess mitigation measures.	Provide a readable and annotated landscaping plan We agree that further testing would be beneficial.
Conclusions	The conclusions reached with regard to the expected wind comfort effects around the proposed development are reasonable subject to the points raised above and below. The assessment of exceedance of the 15m/s wind safety threshold is based on judgement. However, exceedance of the 20m/s safety threshold has not been considered. The third bullet point states: With the Proposed Development, wind conditions would range from suitable for sitting to strolling use on- and off-Site at ground and podium levels during the windiest season. The conclusions give detailed and specific guidance on type and location of mitigation measures.	We expect the safety assessment to be generally conservative with regard to the 15m/s threshold. The 20m/s threshold should be considered. There is an area to the south east of the site where the wind conditions are only suitable for walking. Correct this bullet point. These measures appear to be reasonable and well judged.

3. General Summary

Several relatively minor issues have been identified with the RWDI report as noted above. However, the main issue is that the assessment methodology only presents mean wind speed results and therefore does not comply with the Lawson methodology which requires an assessment of both mean and gust (GEM) wind speeds. The omission of a gust wind speed analysis could result in an underestimate of the wind conditions in relation to both pedestrian comfort and pedestrian safety. An analysis of gust wind speeds must be included. This is not possible with the CFD modelling methodology used; therefore this could be a qualitative assessment in a similar way to the qualitative assessment of wind safety used in the RWDI assessment.

Yours sincerely



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Approved by: Gordon Breeze
Head of Wind Engineering
For and on behalf of BRE