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4th April 2022
Your Ref. 200328
Our Ref. P122264-1001

Dear Brian

BRE Review of March 2022 Revision of Wind Microclimate Reports in Respect of Outline Planning Application 200328 at Vastern Court, Caversham Road, Reading

1. Background and Scope of this Review

An application for outline planning permission (Ref 200328) has been submitted to Reading Borough Council (RBC) for a site known as Vastern Court. The site lies immediately adjacent to the railway station at the northern edge of Reading town centre. The River Thames is to the North of the site, with the open green spaces of Christchurch Meadows beyond that. The site is located at the centre of a planned pedestrian and cycle route north from the station to the river.

BRE reviewed the following two documents in January 2022¹:

- Technical Appendix 9.1 Wind Microclimate prepared by Xi Engineering Consultants Ltd, dated 25th March 2022
- Volume 1: Environmental Statement Main Report, Chapter 9: Wind Microclimate, prepared by Ramboll, 1700003910 Issue: Draft

There were several areas of concern with regard to the predicted wind microclimate in these two original reports which were expected to lead to unsafe and wind conditions around much of the proposed development at both ground and rook terrace level.

On 25th March the applicant issued a revised Technical Appendix 9.1 and revised ES Chapter 9. BRE have been appointed by RBC to undertake an independent peer review of these two

¹ BRE Report number P122264-1000, issued on 31st January 2022



BRE's Quality Management system is certified to ISO 9001:2015 Certificate Number LRQA 10049560.

BRE's Environmental Management System is certified to ISO14001:2015 certificate number 10056985.

BRE's Health and Safety Management System Is certified to OHSAS 18001:2007 LRQA 10007555.

revised reports and to consider whether the issues identified in BRE Report P122264-1000 have been adequately addressed.

2. Review of the Technical Appendix 9.1 Wind Microclimate (dated 25th March 2022) prepared by Xi Engineering Consultants Ltd

The results presented in the 25th March version of Technical Appendix 9.1 are significantly different from those presented in the 13/02/2020 version as previously reviewed by BRE. No specific reasons for these large differences in predicted wind conditions have been given.

The Applicant has not specifically addressed the main issues identified in BRE's review of the 13/02/2020 version of Technical Appendix 9.1. Instead, a completely new report has been submitted which addresses the issues raised by BRE within the body of the revised report.

In this chapter, we have considered the Applicants responses to the main issues identified in the BRE review, and because the results represented are so different from the version previously reviewed we have also included a review of the new results.

2.1 Legislation and Planning Policy Context

The previous assessment did not consider Reading Borough Council Local Policy CR10 (Tall Buildings). This has now been considered.

BRE Comment: no further action required.

2.2 Methodology and Modelling

The original report was unclear regarding the level of detail used in the modelling of the target buildings. The current report now makes this clear and states that the modelling does not include landscaping or mitigation features, and elevated areas do not include parapets or other small structures. This is acceptable for an outline planning application and will tend to give a conservative result.

BRE Comment: no further information required.

2.3 Assessment Criteria

The original study used a non-standard version of the Lawson Criteria. The current report now uses the Lawson LDDC Comfort Criteria. There are several versions of the Lawson criteria in use. The LDDC version is considered to be acceptable for a site in Reading.

BRE Comment: The Lawson criteria used for pedestrian comfort is acceptable – no further action required.

The original study failed to include an assessment of the Gust Equivalent Mean (GEM) wind speeds. The current study now includes a GEM analysis. This analysis has been provided using the in-built GEM analysis feature in SimScale. It is normal best practice to present wind speed plots of both mean and GEM wind speeds separately. Only the GEM plots are included in the current report. We are not familiar with the GEM feature of the SimScale package, however, providing this presents the worst case of either the mean or GEM wind speeds then this is acceptable.

BRE Comment: *The effects of GEM wind speeds has been included – no further action required.*

2.4 Meteorological Data

The original report used simulated (predicted) weather data, which BRE considered to be unsuitable and did not explain how these data were transformed to the application site. The current study uses wind data from London Heathrow Airport and the BREVe package for transforming the data. This is a robust and acceptable approach.

BRE Comment: *no further action required.*

2.5 Results

BRE raised concerns that some of the results presented in the original report at both ground level and roof terrace level were unexpected. It was recommended that the modelling be checked to confirm these results. No specific comment on how the modelling has changed have been presented, although we note that the number of cells used in the current modelling is less than those used in the original modelling. However, the revised results are more consistent and are within the range of results expected for a scheme of this massing in a built-up environment.

BRE Comment: *The results included appear to be within the expected range – further discussion of these results is included in Section 2.6.*

The original report stated that it contained details of mitigation measures, but none were actually included. The current report makes it clear that mitigation measures are now discussed in the ES Wind Chapter.

BRE Comment: *no further action required.*

2.6 Review of Results Presented in the Revised Report

The original report predicted large areas of unsafe wind speeds at both ground level and roof terrace level on and around the proposed development and unexpected areas of unsafe wind speeds around existing buildings further away from the proposed development. BRE did not believe that these results were credible. Results in the original report were also only presented for a single scenario, which was assumed to be the worst-case conditions for the year as a whole.

The results for wind comfort presented in the revised report are now more believable and consistent with our expectations for a scheme of this height and massing. The report now includes wind speed plots for both the summer and winter seasons which is consistent with accepted best practice. Confusingly on page 18 of the revised report there is a plot of

wind comfort conditions (“Figure 12”); this figure appears to be included in error since it appears to be the same as the plot included later as the Figure 12 shown on page 21. The wind speed plots of winter and summer conditions presented in Figure 11 seem to be in the wrong order. The figure title says *Top: Winter. Bottom: Summer* we believe that this should be *Top: Summer. Bottom: Winter*. It appears that the plots in Figures 16 and 17 are also similarly incorrectly labelled.

The wind conditions around the proposed development and cumulative development scenarios are now generally suitable for “Pedestrian Walking” or other more sedentary pedestrian activities at the majority of ground level locations. During the winter, there are some small areas of increased wind speed in Configurations 2 and 3 where the conditions are suitable for “Business Walking” and one small area in Figure 11 (Configuration 2: Existing Baseline + Proposed Development) where the conditions are “Uncomfortable”. Appropriate mitigation will need to be considered for these areas.

Figures 13 and 14 show that there are several areas on the roof terraces where the wind conditions are suitable only for “Business Walking” and also some areas where they will be “Uncomfortable” for any pedestrian activity. These unpleasant wind conditions also persist during the summer in some roof areas. The wind conditions for Configuration 3 are worse than Configuration 2, this seems to be due to the close proximity of the 80 Caversham Road development. These roof terrace wind conditions will need to be mitigated if it is intended to use these areas for general pedestrian access. However, we note that no parapets were included in the modelling – these will have a beneficial impact on the roof terrace wind conditions.

The plots of “Unsafe” ground level wind conditions presented in the original report showed areas of “Unsafe” wind conditions around the baseline scenario as well as the two scenarios with the proposed development. These results were not credible. The revised report now predicts no areas of “Unsafe” wind conditions around the baseline scenario (Figure 15) and only small areas of “Unsafe” conditions in configurations 2 and 3 (Figures 16 and 17). Appropriate mitigation will need to be considered for these areas.

The areas of “Unsafe” wind conditions on the roof terraces are also significantly reduced in the revised analysis. As already noted, no parapets were modelled in these simulations. Nevertheless appropriate mitigation will be required if these roof terraces are intended to be used for general pedestrian access.

2.7 Summary of Comments on Technical Appendix

The revised (25th March) version of the Technical Appendix has addressed all of BRE’s main concerns regarding the methodology and technical approach. The report now follows accepted best practice for a quantitative wind microclimate assessment and correctly implements the Lawson criteria.

The revised assessment of pedestrian wind comfort and pedestrian safety now appear to be consistent with the results expected for a development of this height and massing.

There are some areas of “Unpleasant” and/or “Unsafe” wind conditions identified. These will need to be mitigated to provide acceptable wind conditions for the intended pedestrian activities. No mitigation strategies are discussed in the Technical Appendix.

3. Review of Changes to ES Chapter 9 Wind Microclimate

The ES Wind Chapter remains largely the same in structure and content as the previous version reviewed by BRE. The specific content has changed in some areas to reflect the changes in the CFD modelling results. BRE raised several issues with the previous ES Wind Chapter. The specific headings from the previous BRE review under which further information was required are listed below, note that if a heading is not included below then no further information was required.

3.3 Meteorological data

The original assessment used Meteoblue simulated (predicted) weather data. The revised Chapter now uses actual wind data from London Heathrow Airport anemograph station.

BRE Comment: *This issue has been resolved – no further action required.*

3.4 Assessment Methodology

The previous assessment did not consider GEM wind speeds. This is now included in the current assessment.

The previous assessment used a non-standard variant of the Lawson criteria. The current assessment uses the Lawson LDDC criteria. This is now appropriate.

Notwithstanding the above comment, the Technical Scope states that the Lawson Comfort Criteria given in the 2001 book written by Lawson was “benchmarked” (i.e. used). It has been assumed that this is a typographical mistake carried over from the previous ES Chapter 9 submitted to RBC.

It is also worth noting that the definition of the Gust Equivalent Mean (GEM) given in section 9.24 (Step 4) is not consistent with Lawson’s definition (see page 127 of Lawson’s 2001 book). Nevertheless, it is judged that the probabilistic approach used is likely to be conservative, and if so then some of the findings presented in this ES Chapter are also likely to be conservative.

BRE Comment: *Within the overall context of this review these issues have been resolved – no further action required.*

3.5 Target Wind Conditions

The previous results for pedestrian comfort and safety were only presented as annual averages for the year as a whole. This is not best practice. The Lawson assessment methodology requires a seasonal approach in order to allow the wind conditions to be assessed for suitability for every season and for the year as a whole.

The current assessment now includes results for the summer and winter seasons.

BRE Comment: *This issue has been resolved – no further action required.*

Further information was also requested under Headings 3.7.1 to 3.7.3. However because the results from the CFD assessment have changed so significantly the previous comments raised by BRE are no longer relevant.

4.0 Review of revised content in ES Chapter 9 Wind Microclimate

The revised CFD analysis generally predicts lower wind speeds in all configurations assessed. At the majority of ground level measurement locations the predicted wind speeds fall within the range of target intended pedestrian usage shown in Figure 9.3 of the ES Wind Chapter.

The discussion included under 'Assessment of Effects' presented in the ES Chapter from paragraphs 9.55 to 9.94 and the discussion of Residual Effects starting at paragraphs 9.66 and 104 generally represent a fair and accurate assessment of the expected effects on pedestrian wind comfort and wind safety based on the revised CFD simulation. Some specific instances where we disagree with the assessment are listed below:

Figure 9.3, included for convenience below, shows an area to the south of the proposed development between measurement locations 21 and 37 and a large area around measurement location 15 which are designated as assumed outdoor dining areas.

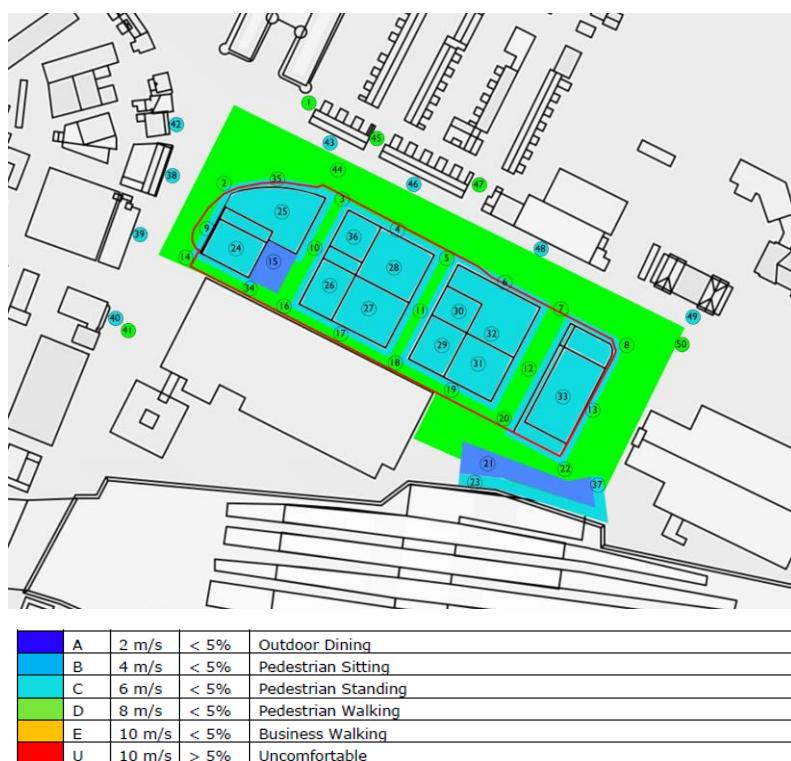


Figure 9.3 Proposed Development Assumed Intended Pedestrian Use

There does not appear to be a discussion of the suitability of wind effects in these two areas for outdoor dining. The wind conditions at measurement location 15 are classed as “Uncomfortable”, this is five categories more severe than the target category and would be major adverse (note that major adverse is classed as being three categories worse than the target category – so this is a very severe major adverse condition). The wind conditions in the area between measurement locations 21 and 37 is classed as suitable for “Pedestrian Walking”, again a major adverse condition.

BRE Comment: A discussion of the usage of these two outdoor dining areas and appropriate mitigation must be specifically included

Paragraph 9.64 states: *The pavement on Troopers Port Way measurement locations 13 and 22 would achieve wind conditions for pedestrian standing/pedestrian walking and therefore the effect would be Minor Beneficial to Negligible.* Between locations 13 and 22 is an area that is classed as being suitable only for “Business Walking”. This is windier than the target category of “Pedestrian Walking”, therefore the effect is Minor Adverse rather than Negligible.

BRE Comment: Revise Paragraph 9.64

Paragraph 9.80 states: *Modelled wind conditions at measurement locations 4, 6, 9, 13, 15, and 19 would be most suitable for entrances as they would achieve pedestrian standing wind conditions which would be suitable for this use. Accordingly, the effect at these locations would be Negligible to Minor Beneficial.* Location 15 is close to an area where uncomfortable conditions are predicted. The effect of at entrance close to this location should be classed as Major Adverse.

BRE Comment: Revise Paragraph 9.80 to include a warning regarding locating a door near to location 15

For both the Proposed Development (Configuration 2), and the Proposed Development + Cumulatives (Configuration 3), without mitigation there only appear to be a few localised ground level locations where Strong Wind conditions are likely to occur. It is judged that if appropriate mitigation measures are adopted, then suitable wind conditions could be created at these ground level locations.

It is recognised that balustrades have not been modelled, and these are likely to have localised beneficial effects upon the roof top wind conditions. However, for the Plot D building, there are extensive areas of “uncomfortable” and “unsafe” roof top wind conditions (as shown in Figures 9.9 and 9.11 of this ES Chapter, and Figures 18 and 19 of Technical Appendix 9.1). These wind conditions are such that we judge it likely that – even after balustrades are added - the wind conditions in this area would be unsuitable for its intended purpose. Despite this judgement, conditioned future wind tunnel testing might show that this area can be used. The point is that even after mitigation the Plot D building roof is not guaranteed to have suitable wind conditions, and the Appellant needs to have a robust back-up plan for this eventuality.

BRE Comment: Add comment about Plot D roof top wind conditions, and state the back-up plan

The sections considering Assessment of Residual Effects makes it clear that this assessment is outline in nature and that mitigation measures would be explored and incorporated during the detailed design stage. Paragraph 9.99 presents a list of potential mitigation measures. This list is reasonably comprehensive, although it does not appear to include mitigation measures

specific to roof terraces. A further omission is that mitigation by control (e.g. not allowing people to use areas in wind conditions, or preventing access to a windy location) is not included.

It is stated that *wind tunnel testing would be secured by means of an appropriately worded planning condition and undertaken at the detailed design stage to refine and demonstrate the effectiveness of these measures*. We agree that if appropriate mitigation measures employed then it is likely that they could successfully mitigate the significant adverse and unsafe effects identified at ground level within this assessment.

However, for reasons explained earlier, we are not convinced that the residual Plot D roof top wind conditions will be suitable, and the Appellant therefore needs to have a robust back-up plan for this eventuality

BRE Comments: *we agree that conditioning a wind tunnel study at the detail design stage would be an appropriate course of action. We believe that a robust back-up plan should be provided in case the Plot D roof top wind conditions prove not be suitable.*

4 Concluding Comments

The wind microclimate Technical Appendix and ES Chapter as reviewed herein are for an outline planning application.

The relevant components of Policies CC3 (Adaption to Climate Change) and CC8 (Safeguarding Amenity) of the Reading Borough Council Local Plan 2019 and Policy CR10 (Tall Buildings) have now all been considered.

The predictions of wind speeds around the proposed development presented in the current version of the Technical Appendix are significantly different from those presented in the original version reviewed by BRE. In general the predicted wind speeds have reduced at all measurement locations and for all scenarios modelled.

The revised Technical Annex has addressed all of the major concerns that BRE raised in our review of the previous version. The level and nature of information submitted in the revised Technical Appendix is now considered to be sufficient and robust and BRE do not have any further specific comments.

The analysis and conclusions reached within the revised wind microclimate chapter of the ES (Chapter 9) are generally reasonable and robust and the issues previously raised by BRE have been addressed. Based on our review of the new information included in the ES Wind Chapter we believe some additional clarification should be supplied with regard to the assessment of wind effects, Nevertheless, within the context of this being an outline planning application, these are relatively minor issues.

Overall, BRE agree with the assessment of wind microclimate and the effects as presented in the ES Wind Chapter, subject to the minor issues noted above.

Mitigation measures are likely to be required at some locations at ground level and roof terrace level. We suggest that wind tunnel testing be carried out at the detailed design stage secured via an appropriately worded planning condition.

Yours sincerely



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