



TECHNICAL NOTE 1

DATE:	27 April 2023	CONFIDENTIALITY:	Confidential
SUBJECT:	Wind Microclimate Review - WSP response		
PROJECT:	Berol Quarter	AUTHOR:	AMcL, JVC
CHECKED:	JNM, CD	APPROVED:	CD

Introduction

Further to the submission of the Wind Microclimate report issued in November 2022 for the Proposed Development of the Berol Quarter, comprising the Berol House and 2 Berol Yard buildings, WSP have been asked to provide clarifications in relation to the wind assessment. An independent review of the wind assessment has been carried out by ArcAero. The review concludes that the assessment represents a plausible appraisal of the wind microclimate upon the introduction of the Proposed Development. A number of queries and requests for clarification have been raised, but the assessment and associated predictions appear reasonable, and as such, it is expected that provided satisfactory clarification and / or further details, the conclusions can be considered to be robust.

This Technical Note provides responses to the queries raised. The paragraph numbers have been retained as per the review report for easy cross reference and only the paragraphs that require a response have been included.

Query 1.1.a *Please clarify if and how a gust-equivalent mean wind speed has been derived.*

Response: a 'gust' wind speed has been estimated as:

$$U_{gust} = \bar{U}_{scalar} + g \sqrt{\frac{2}{3}k}$$

Where g is a peak gust factor that was set to 3.0, $\bar{U}_{scalar}$ is the scalar mean velocity and k is the turbulence kinetic energy. This gust wind speed was divided by 1.85 to give a gust equivalent mean (GEM) value. The maximum of the GEM and the scalar mean wind speed at each sampled cell was the quantity used in the analysis.

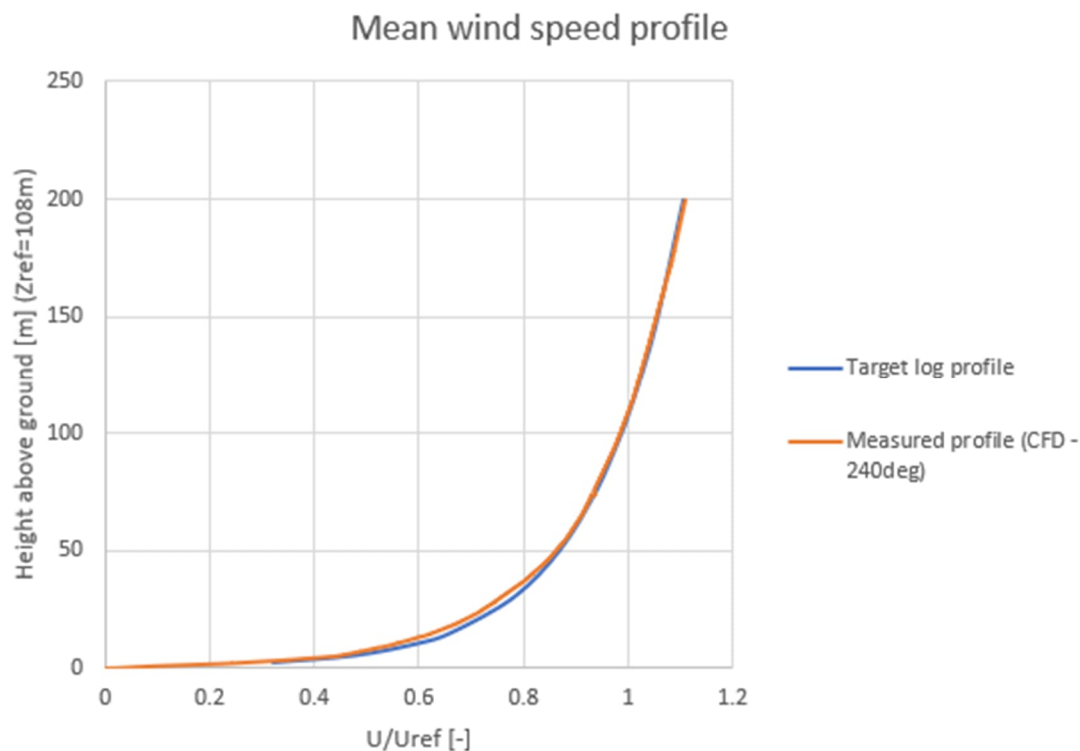
Query 1.1.b *Please provide the simulated and targeted profile for the CFD simulation*

Response: Figure 1 shows a comparison between the target profile and the measured profile in the simulations for the 240° wind direction.

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Figure 1: Input and measured velocity profile



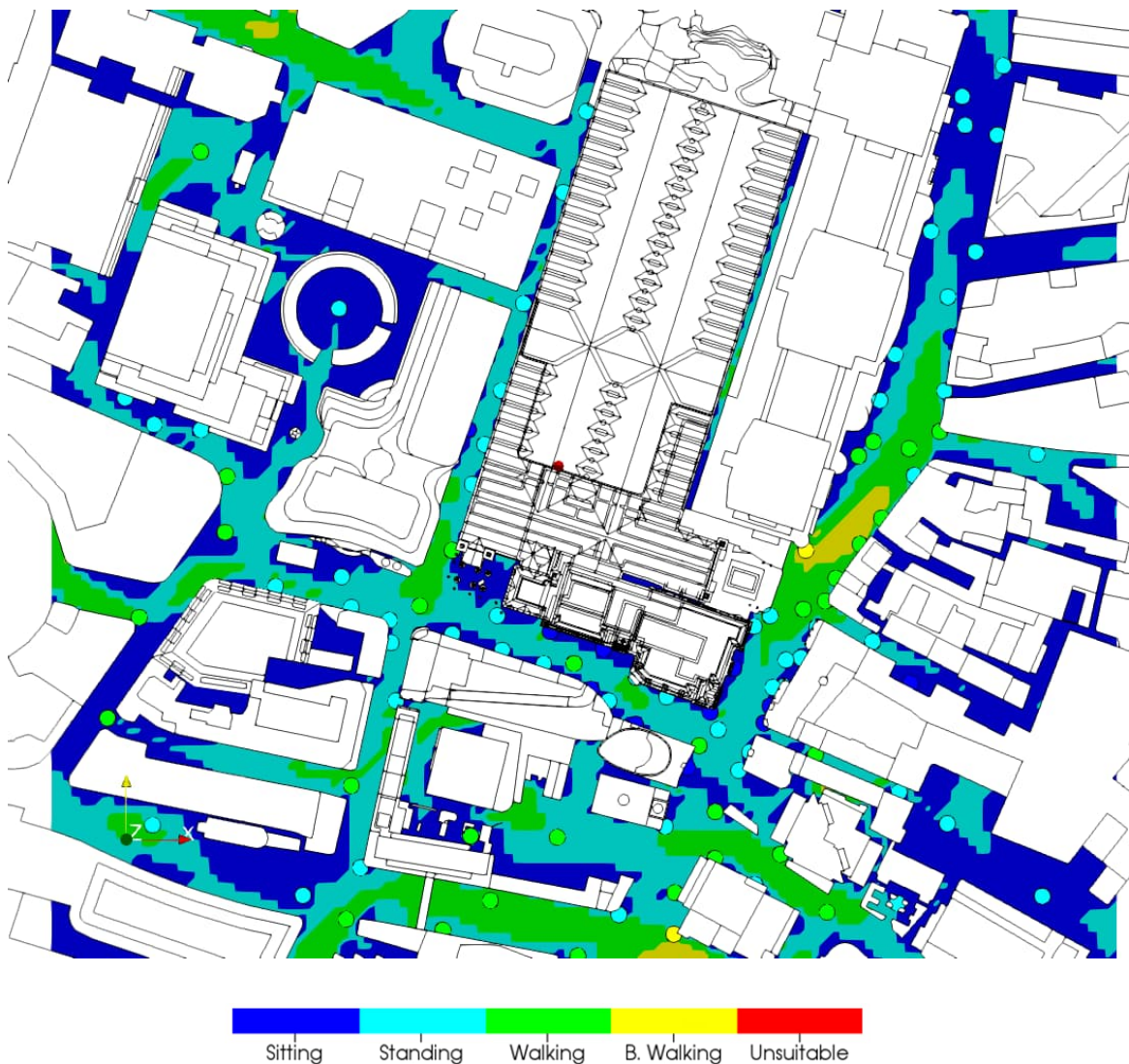
Query 1.2 Clarification is sought as to why a CFD only approach was selected for this assessment. In addition, it would provide some confidence in the assessment if a comparison between CFD results and wind tunnel results could be provided.

Response: Based on WSP's experience and professional judgment, the adoption of CFD was considered appropriate for this assessment. WSP have extensive experience both in wind tunnel and CFD testing, including many projects where both methods are used. A typical output of the two models is shown in Figure 2 for a different project, performed at a similar time to this assessment, utilising an identical gust model as the gust model used in the current project, showing a good agreement. The plot shows qualitatively comparable results between CFD and WTT for a more complex geometry with much taller buildings. The results in our example comparison between CFD and WTT shown in Fig 2 are well within the normal variation we would expect between consultants. WSP are confident that the agreement proves that the choice of analysis tool does not affect conclusions drawn from the results.

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Figure 2: Contours of comfort using CFD with point data from a wind tunnel test



Query 1.4 Clarification is sought on whether soft and / or hard landscaping was modelled within the assessment scenarios.

Response: The assessment has been carried out without soft or hard landscape, which represents a worst-case scenario.

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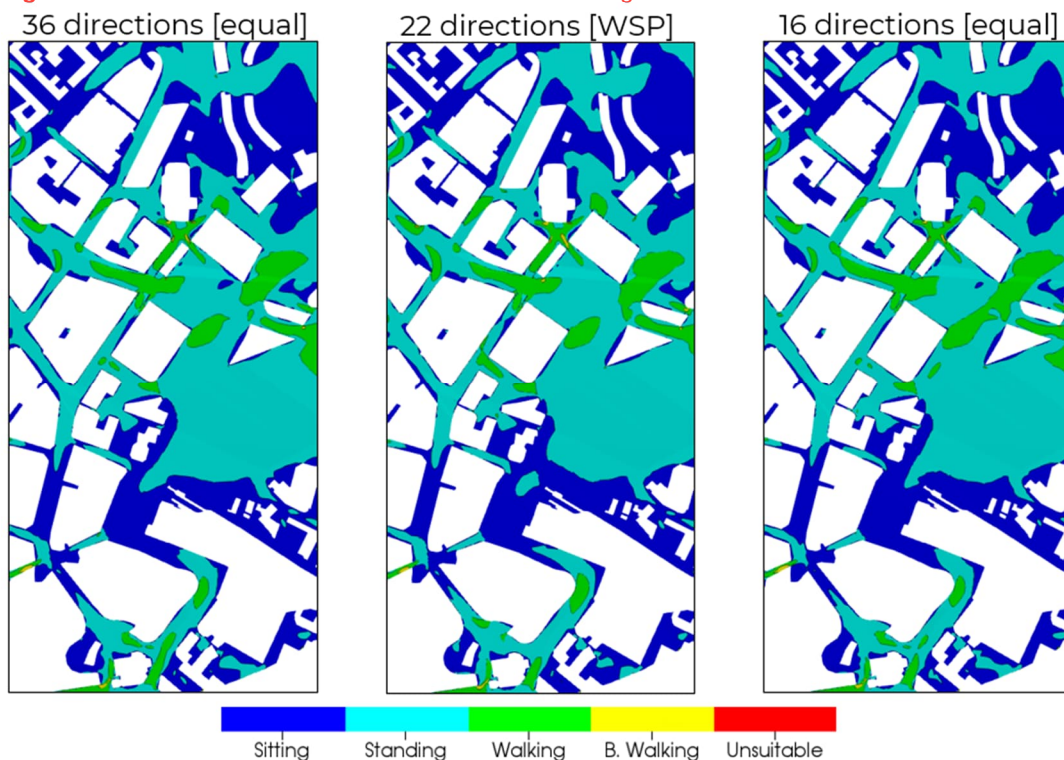
Query 1.7 *It is noted that the simulated direction of 0° (representative of the 0, 10, and 350° bins), which represents the highest combined frequency of 7.131%, is higher than the frequency of any individual prevailing directions. Ideally, this specific wind direction should have a lesser number of bins included.*

Response: The reviewer is correct. The algorithm allows for this value to be exceeded slightly in order to maintain 0° as the starting point. This approach has been tested to ensure it does not affect results.

Query 1.8 *Please clarify if the “Combined frequency [%]” values in Table 3-6 correspond to the “p” values within paragraph 3.6.4, and please clarify the methodology used to select the c and k values for the simulated wind directions that consist of grouped wind directions (ie, was it the maximum / minimum / average of the c and k values that were selected?).*

Response: The ‘c’ and ‘k’ terms are averaged over the bin. Extensive testing has been carried out to verify the accuracy of this method. The plot below shows the results of one of our studies into the directions binning and averaging of the c and k Weibull terms. Results for 36 directions have c and k values for each 10degree segment and 22 directions have c and k values averaged across the bin. Results are near identical.

Figure 3: Contours of annual comfort at 1.5m above local ground



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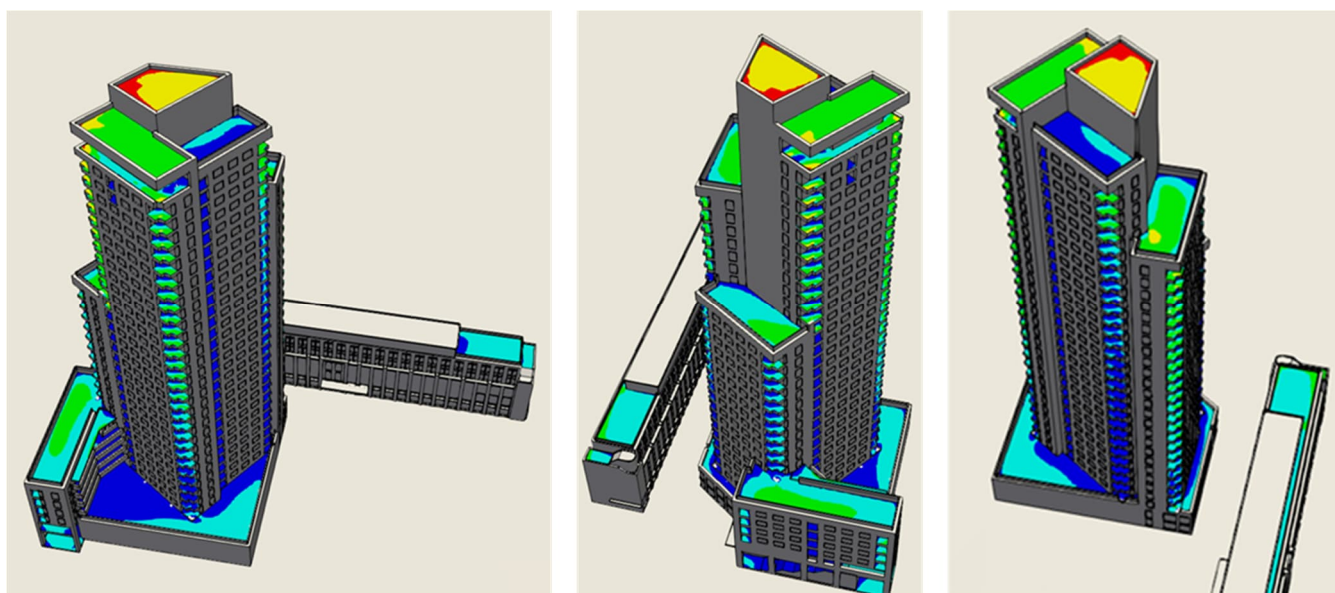
Query 2.1 *Clarification is sought if the winter comfort criteria contour plots are representative of the worst-case seasonal comfort criteria at all locations – this is assumed as such, within this review of the conditions predicted.*

Response: Yes, worst case.

Query 2.2 *Provide comfort criteria contour plots of elevated terraces in winter (or worst-case seasonal), to assess the conditions at the entrances to the elevated terrace areas.*

Response: All entrances to accessible terraces at elevated levels are suitable at least for standing. Contour plots of elevated terraces in winter are provided in Figure 3 below.

Figure 3: *Contours of comfort in winter for elevated levels*



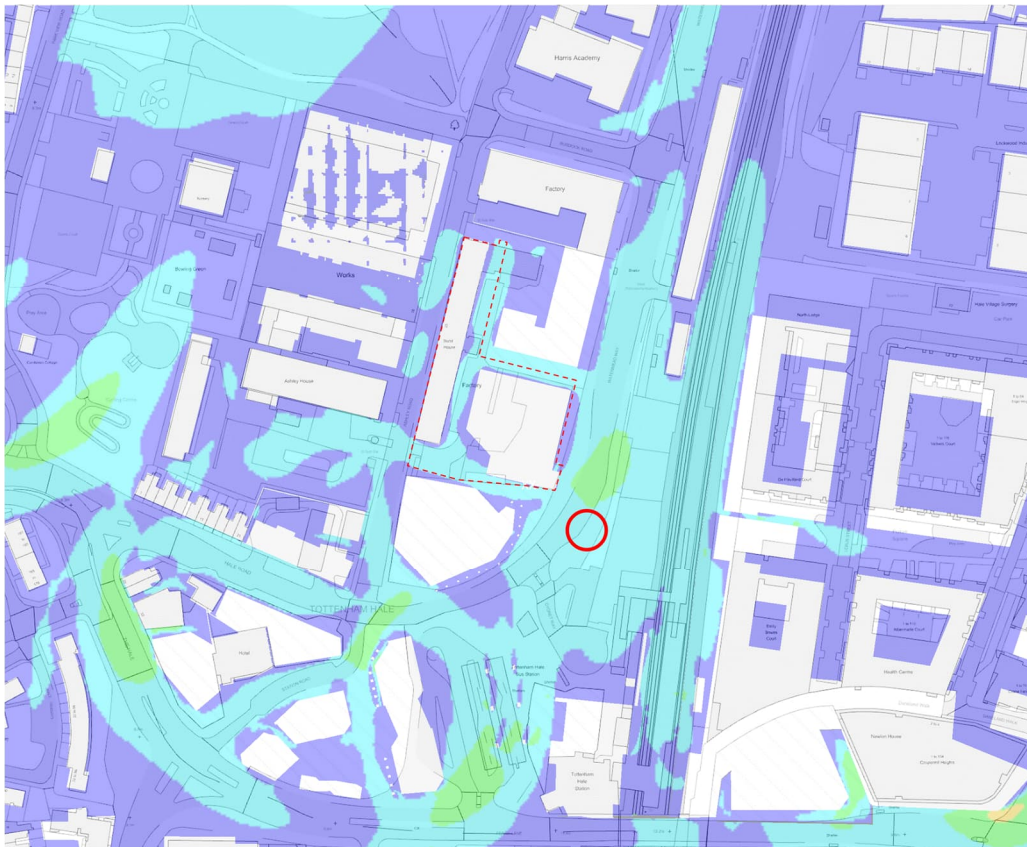
Query 2.6 *Please clarify if this region of leisure strolling conditions overlap with this bus stop area, and if such, mitigation measures will need to be recommended and validated for this area.*

Response: The region of leisure strolling conditions does not overlap with the bus stop area and as such, the wind conditions remain suitable. Contours of comfort in winter for street level highlighting the conditions at the Tottenham Hale Bus Station (Stop F) are provided in see Figure 4.

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Figure 4: Contours of comfort in winter for street level highlighting the conditions at the Tottenham Hale Bus Station (Stop F)



Query 2.9 *If WSP are able to demonstrate that the business walking area adjacent to location 26 is not due to a contribution from the Proposed Development, the results as presented will be considered as plausible and will be accepted.*

Response: The region of leisure walking adjacent to location 26 is not due to a contribution from the Proposed Development as this effect was present in the Baseline Scenario (existing conditions). The same applies to location 35 which reports business walking. Contours of comfort in winter for street level highlighting the conditions at location 26 are provided in Figure 5.

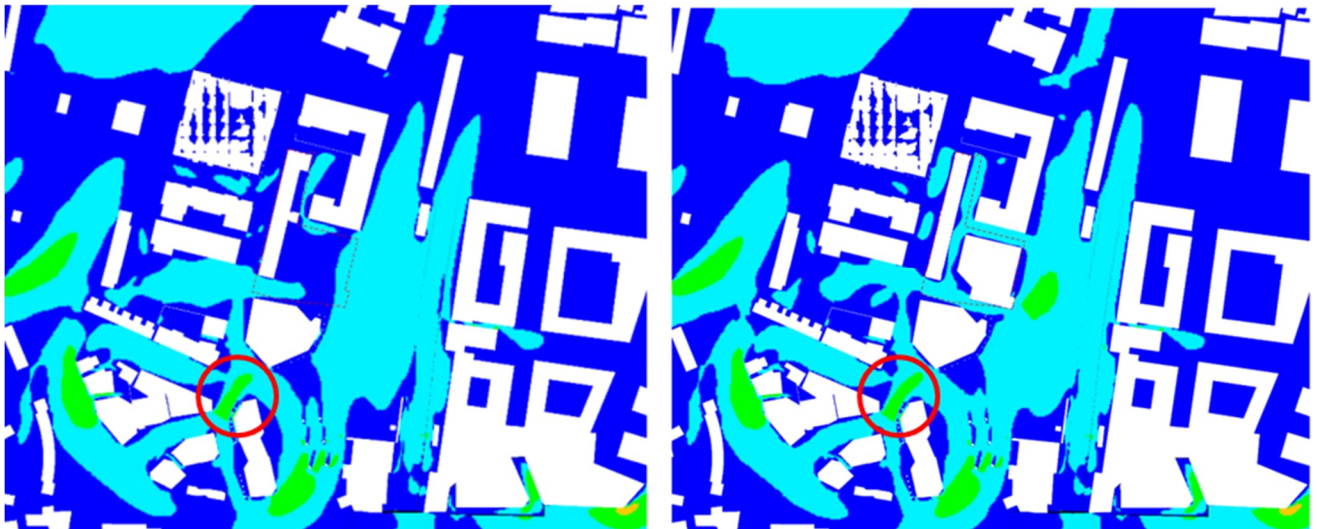
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Figure 5: Contours of comfort in winter highlighting location 26 (circled)

Existing baseline scenario

Proposed scenario



Query 3.1 Clarification is sought if any form of balustrade (whether porous or solid) was modelled on any of the elevated terraces or balconies within this current assessment. Wind conditions at these areas will need to be mitigated to the point where safety exceedances no longer persist and that conditions are considered comfortable for proposed usages and validated quantitatively.

Response: The following balustrades/perimeter screens were modelled for the assessment:

- Balconies: open railing, not modelled given their high exposure to wind.
- Terraces at podium level (receptors A and D): 2.04m and 1.15m high solid balustrade/perimeter screen/parapet, respectively.
- Roof terrace at level 5 (receptors E and F): 0.91m high solid balustrade/parapet.
- Block E roof terrace at level 6: 2.04m high solid perimeter screen/parapet.
- Block A roof terrace (receptor C): 2m high solid perimeter screen/parapet.
- Block B roof terrace: 2.04m high solid perimeter screen/parapet.
- Block C roof terrace: 2.04m high solid perimeter screen/parapet.
- Block D terrace (receptor B): no balustrade.
- Block D roof terrace: 1m high solid balustrade/perimeter screen.
- Roof: 0.7m high solid parapet.

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Measures to mitigate the identified exceedances of the safety and comfort criteria on the accessible terraces and balconies will be tested and validated quantitatively via further CFD modelling during the detailed design stage to assess and optimise their performance. It is expected that once these measures are incorporated, the wind conditions will be suitable for the designated activities.

Query 3.2 *At the podium (receptor A) and terraces (receptors C, E and F), where seating furniture is located outside the areas rated as suitable for 'sitting', mitigation measures appear to be broadly appropriate – however, these will need to be validated quantitatively.*

Response: The actual position and size of the proposed mitigation measures will be refined and tested during the detailed design stage to assess and optimise their performance. However, it is expected that once these measures are incorporated, the wind conditions will be suitable for the designated activities.

Query 3.3. *With the likely need for mitigation measures, a study put forward in support of a planning submission would also be expected to demonstrate, quantitatively, the validity and viability of wind mitigation measures. Please clarify if the mitigation measures have been validated quantitatively either via further CFD modelling or wind tunnel testing, which is the industry standard methodology for a robust assessment of this nature.*

Response: The proposed mitigation measures will be tested and validated quantitatively via further CFD modelling during the detailed design stage to assess and optimise their performance. It is expected that once these measures are incorporated, the wind conditions will be suitable for the designated activities.