BRILL PLACE

WIND MICROCLIMATE STUDY

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Dear Hugh,

BRILL PLACE, LONDON – WIND MICROCLIMATE STUDY

This technical letter summarises the outcome of WSP's review of the pedestrian & elevated level wind microclimate conditions for the '2019' version of the proposed Brill Place development in London.

As part of WSP UK's Specialists Group, the Wind Engineering team - headed up by Stefano Cammelli - provides specialised experimental and numerical wind engineering services in support of most of the major multi-disciplinary projects of the business and it is also uniquely positioned to offer independent and unbiased technical advice directly to end clients. The team has extensive experience in assisting developers with pre- and post-planning *wind microclimate* studies and has great knowledge of the specific technical requirements of the various London boroughs on the subject matter.

Urban Wind Effects

The wind microclimate within the urban canopy of a city is affected by terrain, buildings and other obstructions. The introduction of a new development can affect the local wind flow patterns, which can produce uncomfortable and/or unsafe wind environment at pedestrian level. This is particularly important for buildings which are taller than their surroundings. Fast-moving high-level winds can downdraft to street level along windward faces of buildings. As air then moves into the low-pressure wake of the building, it can accelerate around corners and/or through restrictions, causing localised regions of relatively high wind speed.

Methodology

The assessment of environmental wind flows in the built environment lies outside the scope of BS EN 1991-1-4:2005 and NA to BS EN 1991-1-4:2005 + AI:2010, the current UK code of practice for the assessment of wind effects on buildings, which focuses on wind loading. Also, there are no handbooks or engineering methods from which reliable assessments of the complex environmental wind flows that shape the pedestrian level wind conditions can be derived. Experience-based desktop studies, Computational Fluid Dynamics (CFD) simulations or atmospheric boundary layer wind tunnel tests (or a combination of the three) are therefore commonly used to assess wind microclimate conditions for new proposed developments. Local wind speeds (including gusts) at key areas within and around the site of a proposed development derived from these specialised

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studies are then combined with long-term wind frequency statistics transposed from the nearest suitable weather station to determine the probability of local wind speeds exceeding comfort and safety thresholds for a range of common pedestrian activities.

For the proposed Brill Place development, wind tunnel tests were conducted by BMT Fluid Mechanics Ltd. [BMT] on the '2015' version of the scheme (which was granted planning on 04.01.2016, London Borough of Camden application ref.: 2015/2704/P).

Weather Data

The weather data which was used to construct the wind climate model that was used in the original study conducted by BMT was obtained from London Heathrow Airport. The present review draws on the same dataset.

Assessment Criteria

The assessment criteria that were referred to in the original study conducted by BMT and that have been considered in the present review are the so-called LDDC (London Docklands Development Corporation) variant of the Lawson criteria, which currently represents best industry practice in the UK.

Like most criteria used in assessments of pedestrian wind conditions, they relate a threshold wind speed and a threshold frequency to the suitability of an activity. The frequency threshold for each criterion is 5% - or about three weeks per year (see Table 1 for further details). It is also often useful to assess frequency on a seasonal basis. For example, an outdoor seating area may require wind conditions suitable for sitting or standing in summer, but not in winter when the seating is unlikely to be used. For season-specific results, the criteria are based on 5% of hours across the months in that season.

Table 1 - Comfort criteria.

Criteria	Suitability	Threshold mean wind for 5% of hours [m/s]
Pedestrian sitting	Outdoor seating and areas one can occupy comfortably for long periods	4
Pedestrian standing	Main building entrances, pickup/drop-off points	6
Pedestrian walking	Appropriate for strolling	8
Business walking	Can be tolerated if one's objective is to walk, run or cycle without lingering	10
Unsuitable	Nuisance for most pedestrian activities	>10

Additionally, criteria for distress are defined based on approximately two hours' exceedance per year. These are areas where someone could find walking difficult or even lose their footing. These criteria are reproduced in Table 2.

Table 2 - Distress criteria.

Criteria	Description	Threshold mean wind speed for 2.2hr/year [m/s]
S15	Unsuitable for frail persons, cyclists etc	15
S20	Unsuitable for all pedestrians	20

Information Reviewed

The documents which were considered in preparation of this technical letters are listed below:

- BMT's wind tunnel testing report (Project No. 431914) dated 07.10.2015 (filename: *Wind Study.pdf*).
- Planning drawings dated 15.11.2019, specifically:
  - ✓ **01-100 SITE PLAN PLANS** (Drawing No.: 01-100 Site Plan)
  - ✓ **02-100 GENERAL ARRANGEMENT PLANS** (Drawings No.: 02-099 Basement Plan, 02-100 Ground Floor Plan, 02-10M Mezzanine Plan, 02-101 Level 01 Plan, 02-102 Level 02 Plan, 02-103 Level 03, 05, 07, 09, 11, 13 Plan, 02-104 Level 04, 06, 08, 10, 12, 14 Plan, 02-115 Level15 Plan, 02-116 Level 16 Plan, 02-117 Level 17 Plan, 02-118 Level 18 Plan, 02-119 Level 19 Plan, 02-120 Level 20 Plan, 02-121 Level 21 Plan, 02-122 Level 22 Plan and 02-123 Level 23 Roof Plan)
  - ✓ **03-100 GENERAL ARRANGEMENT ELEVATIONS** (Drawings No.: 03-100 North Elevation - As Now Proposed 1:100 A1 P0 P1, 03-101 East Elevation - As Now Proposed 1:100 A1 P0 P1, 03-102 South Elevation - As Now Proposed 1:100 A1 P0 P1 and 03-103 West Elevation - As Now Proposed 1:100 A1 P0 P1)
  - ✓ **04-100 GENERAL ARRANGEMENT SECTIONS** (Drawings No.: 04-101 Section A-A - As Now Proposed 1:100 A1 P0 P1 and 04-102 Section B-B - As Now Proposed 1:100 A1 P0 P1)
- Floorplans comparison against the consented scheme (filename: *4451-A-02-100s-GA-Plans.pdf*).
- Layout of existing and proposed trees (filename: *TLG-281-GA-01.pdf* and *TLG-281-DA-03.pdf*).

Outcome of Previous Studies

The wind microclimate study conducted by BMT in 2015 concluded the following:

- *Wind conditions across the proposed development are considered suitable, in terms of pedestrian safety, for all users throughout the year.*
- *Wind conditions across the proposed development are considered suitable, in terms of comfort, for the planned pedestrian activities. Exceptions to this are the entrance located at the southwest and the balconies at the west of the proposed development* ***[respectively probe location 25 & 102, see Figure 1]****. In order to improve the local wind microclimate and to ensure the presence of amenable conditions, it might be beneficial to introduce further mitigation measures*.

- *With the introduction of masterplan landscaping within future surrounds, the proposed development is relatively shielded from the south-westerly winds, creating slightly calmer conditions throughout the development / site and consequently comfort criteria are met at the south entrance of proposed development*.

Review of the '2019' Scheme

The review of the information listed in a previous section of this letter showed that the current '2019' version of the scheme does not introduce any change to the following key compositional elements of the approved '2015' scheme:

- Overall height & number of storeys.
- Massing approach and plan form.
- Vertical form (including the 'scissor' profile at the top of the building).
- Recessed ground floor plan.

The review of the information also showed that the key envelope changes in comparison to the previously consented scheme are as follows:

- Larger (less than 1m) overall footprint at levels 01 and above.
- Roof pitches 28 degrees rather than 30 degrees.
- Balcony positions at levels 01-14 now stacked.
- Minor change to footprint at ground floor.
- Four (4) additional columns at ground floor.

Discussions

In our experience, the aerodynamic impact of the key envelope changes listed in the previous section can be considered minimal, except for the change of the balcony positions at levels 01-14: the current stacked arrangement is, in fact, likely to further ameliorate the impact of downdraft at ground level, specifically in the context of the southwest-facing entrances (***probe location 25***). Also, the layout of existing trees (see Figure 2) appears denser than what was modelled in the wind tunnel in 2015 (see Figure 3). As trees, and vegetation in general, have the natural ability of reducing the strength of the wind by dissipating its energy, it is expected that the existing tress – especially the ones positioned immediately to the southwest of the proposed development – will have a positive impact on the southwest-facing entrances (***probe location 25***).

The current scheme has no balconies on the northwest corner of the building so the safety concern raised in BMT's report in relation to ***probe location 102*** does not apply anymore. In general, the level of porosity of the railings adopted on the private balconies of the current scheme, combined with the implementation of balcony planters, have the potential to improve the level of amenability of the local wind conditions in such spaces compared to what presented in BMT's report.

Figure 1 – Locations of wind speed sensors taken from BMT's report.

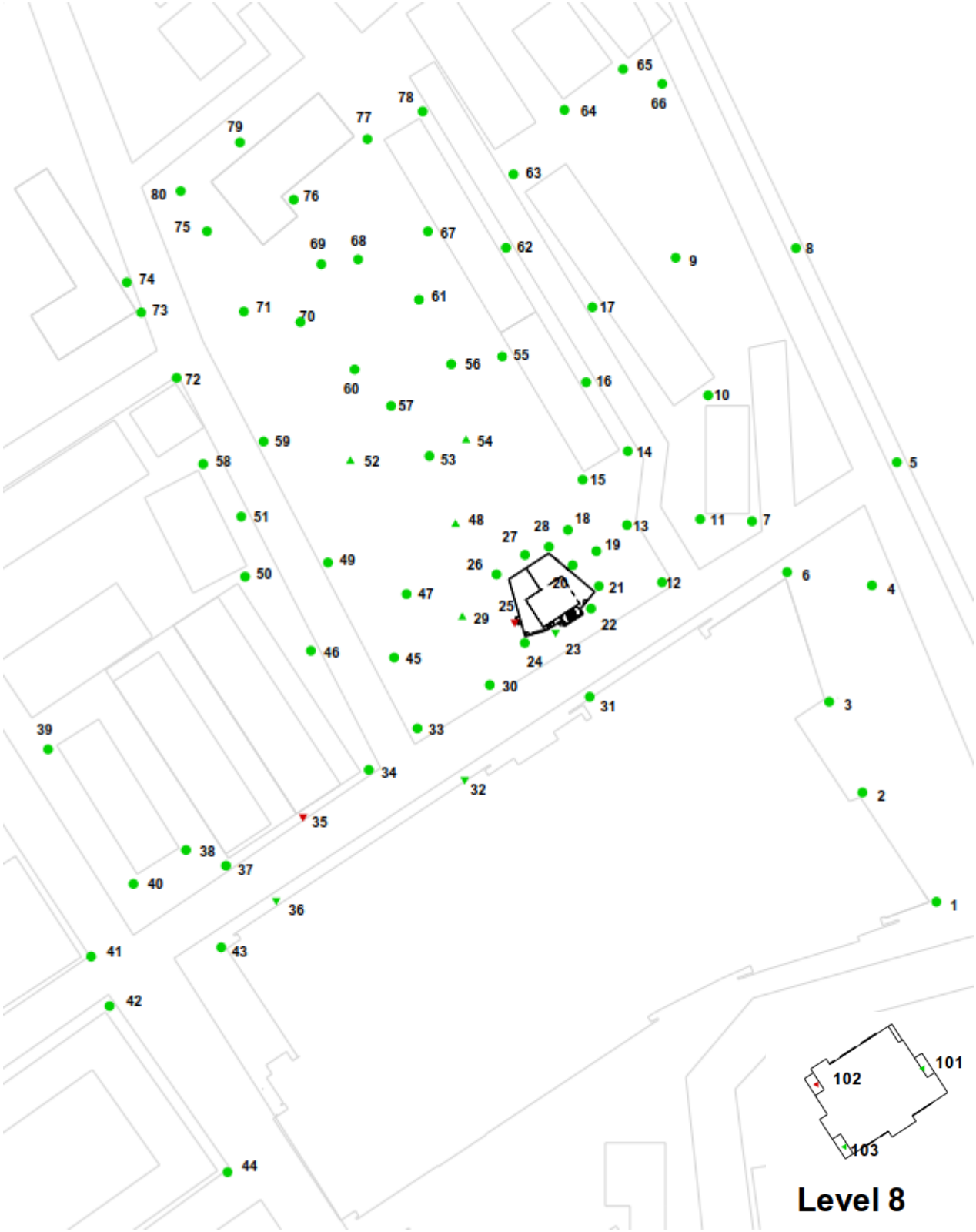
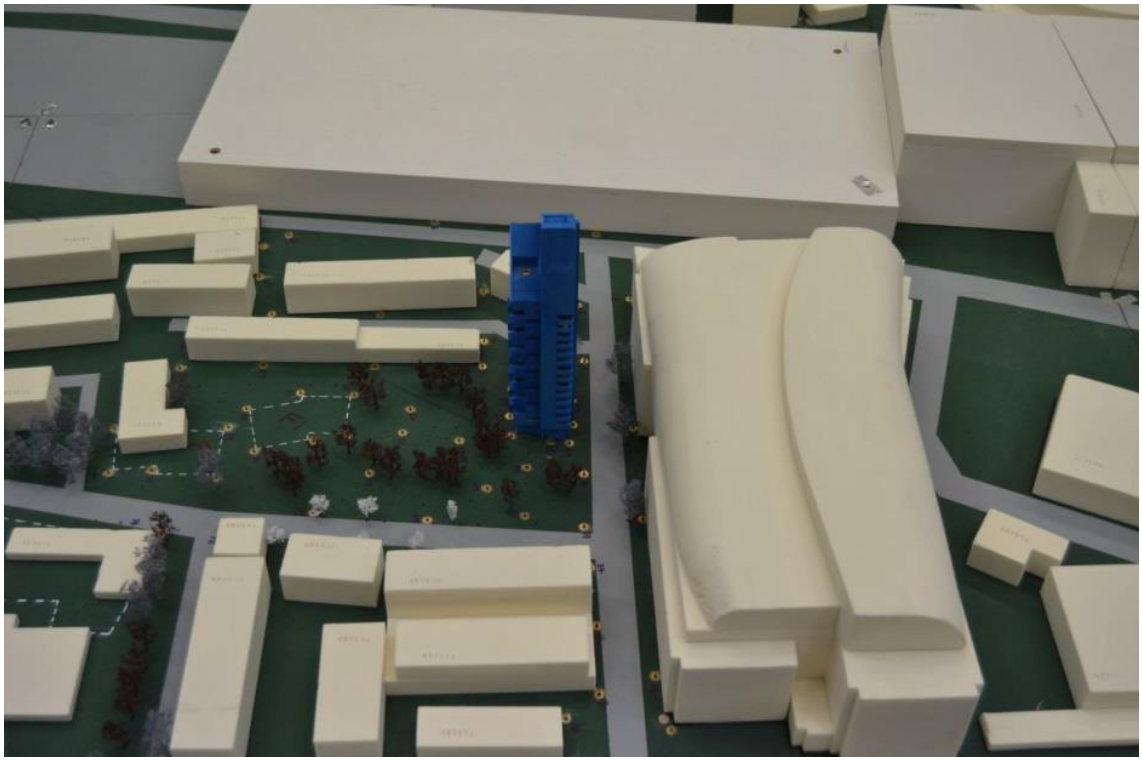


Figure 2 - Soft landscaping plan.

Figure 3 - Close-up of BMT's wind tunnel model (proposed tower in the context of the existing surrounds).



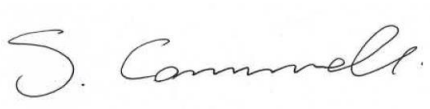
Conclusions

Based on all the above, the following conclusions can be drawn:

- Wind conditions around the revised scheme of the proposed development – in the context of the existing surrounds as well as within the masterplan scenario – remain suitable, in terms of pedestrian safety, for all users throughout the year.
- Wind conditions around the revised scheme of the proposed development – in the context of the existing surrounds as well as within the masterplan scenario – are considered suitable, in terms of pedestrian comfort, for the planned pedestrian activities: this now also includes the southwest-facing entrances which will not require any further mitigation.
- The level of porosity of the railings adopted on the private balconies, combined with the implementation of balcony planters, have the potential to improve the level of amenability of the local wind conditions in such spaces compared to what presented in BMT's report without the need to raise the height of the parapets as originally suggested in BMT's report.

I remain available to answer any question that may be raised as part of the planning submission of this scheme.

Best___Stefano



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