BMT Fluid Mechanics

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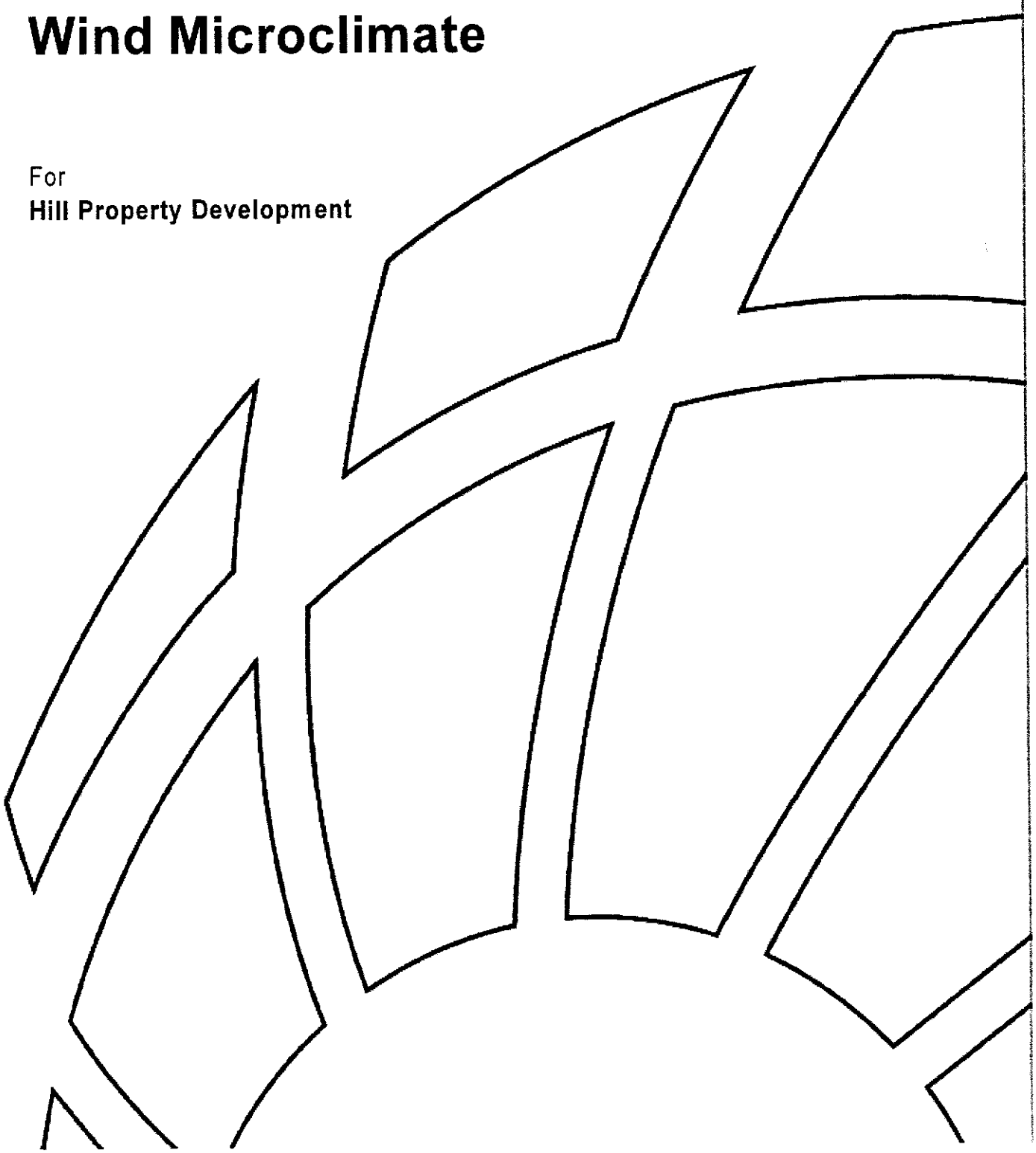
Great Northern Tower Mezzanine Extension Wind Microclimate

For
Hill Property Development



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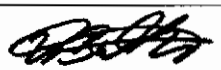
Approved by:	Dr V Buttgereit		20th November, 2007

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1. Introduction

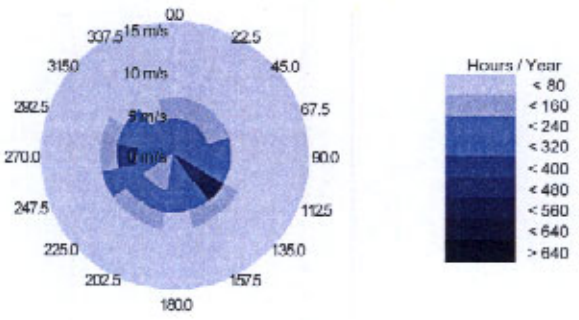
This report summarises the results of an experience-based desk study, commissioned by Cobe Consulting Ltd, on behalf of Hill Property Development, to provide a review of the likely impact of the proposed Mezzanine Extension on the pedestrian level wind environment in and around the Great Northern Tower in Manchester, UK.

The review is based on drawing details of the proposed extension provided by Assael Architecture in November 2007, and also draws on BMT's considerable experience in the assessment of wind effects in the built environment in the UK.

2. Wind Climate At The Site

Illustrated below is the wind climate to be expected at the site based on long-term wind climate data obtained by BMT from the UK Met Office. The wind data from the weather station at Aughton Weather Station has been transposed to the site, accounting for the general upwind terrain for each wind direction. The illustration indicates the annual frequency, direction and speed of winds, at a height of 10 metres, above local ground level in the area of the site. The wind speed is shown by the distance from the graph centre and approaching wind direction is indicated around the circumference.

Annual Wind Frequency Data for Site (at height of 10 metres above local ground level)



The most frequent winds at the site blow from the southeast (135.0° E of N) for all times of the year, whilst the strongest winds blow from west-south-west (247°E of N). These WSW winds will be the most common cause of problematic wind comfort conditions due to strong ground level wind acceleration around buildings.

North-westerly winds are common during summer.

3. Assessment

The proposed development comprises an additional floor above the existing single-floor block that protrudes from the northeast corner of the tower. This proposed mezzanine extension would enclose the current roof-top terrace.

The existing Great Northern Tower represents the dominant structure, with respect to pedestrian level winds, in the vicinity of the site. The highest wind speeds are generally expected to occur around the northwest corner of the tower created by prevailing south-westerly winds being deflected down to ground level by the western façade, and subsequently accelerated around the corner. With regards to these stronger prevailing south-westerly winds, the mezzanine extension is sheltered by the tower and would not be expected to have any significant impact on pedestrian level wind conditions.

The proposed development is also sheltered by the tower from north-westerly winds, which are common during summer, and would not be expected to have any significant impact on pedestrian level wind conditions.

For the prevailing south-easterly winds there is potential for downdraughts from the east façade of the existing Great Northern Tower to impact on the northeast corner of the development. For existing site conditions the resulting low-level winds are expected to partially lift up and over the roof-top terrace. The proposed additional floor on the protruding northeast corner block would have the potential to accentuate the channelling of the low-level winds around the corner of the extension, at ground level. However south-easterly winds are generally light and do not usually create unsuitable wind conditions. This potential localised impact is thus deemed insignificant.

Overall, wind conditions around the proposed extension would be expected to remain suitable at least for pedestrian access to the building, in relation to recreational activities, and passage through the site.

4. Conclusions

It is concluded that the proposed Mezzanine Extension will have no significant impact on pedestrian level wind conditions in and around the existing Great Northern Tower.