CHAPTER 11

MICROCLIMATE / WIND STUDY

11.0 MICROCLIMATE / WIND STUDY

11.1 INTRODUCTION

This chapter assesses the microclimate effects associated with the proposed development which comprises a Strategic Housing Development of 344 no. residential units (comprising 54 no. 1 beds, 30 no. 2 beds, 210 no. 3 beds and 50 no. 4 beds), a 2 no. storey childcare facility with a GFA of c. 369 sq.m, public and communal open space, landscaping, car and cycle parking spaces, provision of an access road from Dublin Road and Shinkeen Road, associated vehicular accesses, internal roads, pedestrian and cycle paths, bin storage, pumping station and all associated site and infrastructural works.

All units (Duplex and houses)
- 54 no. 1 beds
- 30 no. 2 beds
- 210 no. 3 beds
- 50 no. 4 beds

Breakdown
- 4 no. 3 bed two storey detached houses;
- 28 no. 3 bed two storey semi-detached houses;
- 48 no. 3 bed two storey terraced houses;
- 50 no. 4 bed three storey semi-detached houses
- 214 no. duplex apartments / apartments (54 no. 1 beds, 30 no. 2 beds, and 130 no. 3 beds)

AWN were commissioned to prepare a review of the Potential Risks of Elevated Wind speed (microclimate) associated with this proposed development. This chapter has been prepared by Dr Fergal Callaghan, Director with AWN Consulting, who holds a BSc in Industrial Chemistry and a PhD in Chemical Engineering.

The aim of the assessment was to determine if there was considered to be a risk of elevated wind speeds occurring at ground level as a result of the proposed development.

This assessment comprises the following:

- Determination from available data of the baseline (current) classification of the site with respect to The Beaufort Scale for Wind on Land.
- Examination of the proposed development and the potential for wind-speed amplification factors.
- Assessment for the potential for elevated wind speeds to occur.

11.2 STUDY METHODOLOGY

This study has been undertaken with reference to relevant guidance including:

- Sustainable Design and Construction, The London Plan Supplementary Planning Guidance, 2006, Mayor of London's Office,

- T.V. Lawson in Building Aerodynamics, Imperial College London, Imperial College Press, 2001,

- The UK Buildings Research Establishment (BRE Digest 520: Wind Microclimate Around Tall Buildings, BRE, 2011)

11.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

The Beaufort Scale for Wind on Land is which used to express the wind speed velocity recorded as a value which can be related to possible wind related impacts such as tree movement or building damage.

The nearest representative weather station collating detailed weather records is Casement Aerodrome, which is located approximately 10km south east of the subject site. Casement Aerodrome metrological data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 11.1 below). For data collated during five representative years (2017-2021), the predominant wind direction is west/south-west with an average daily wind speed of approximately 5 to 6 m/s.

The Beaufort scale and its relationship to wind speed in metres/second is shown in Table 11.1 below. It can be seen that the site typically experiences Beaufort 3 to Beaufort 4 (B3/B4) wind conditions for much of the time.

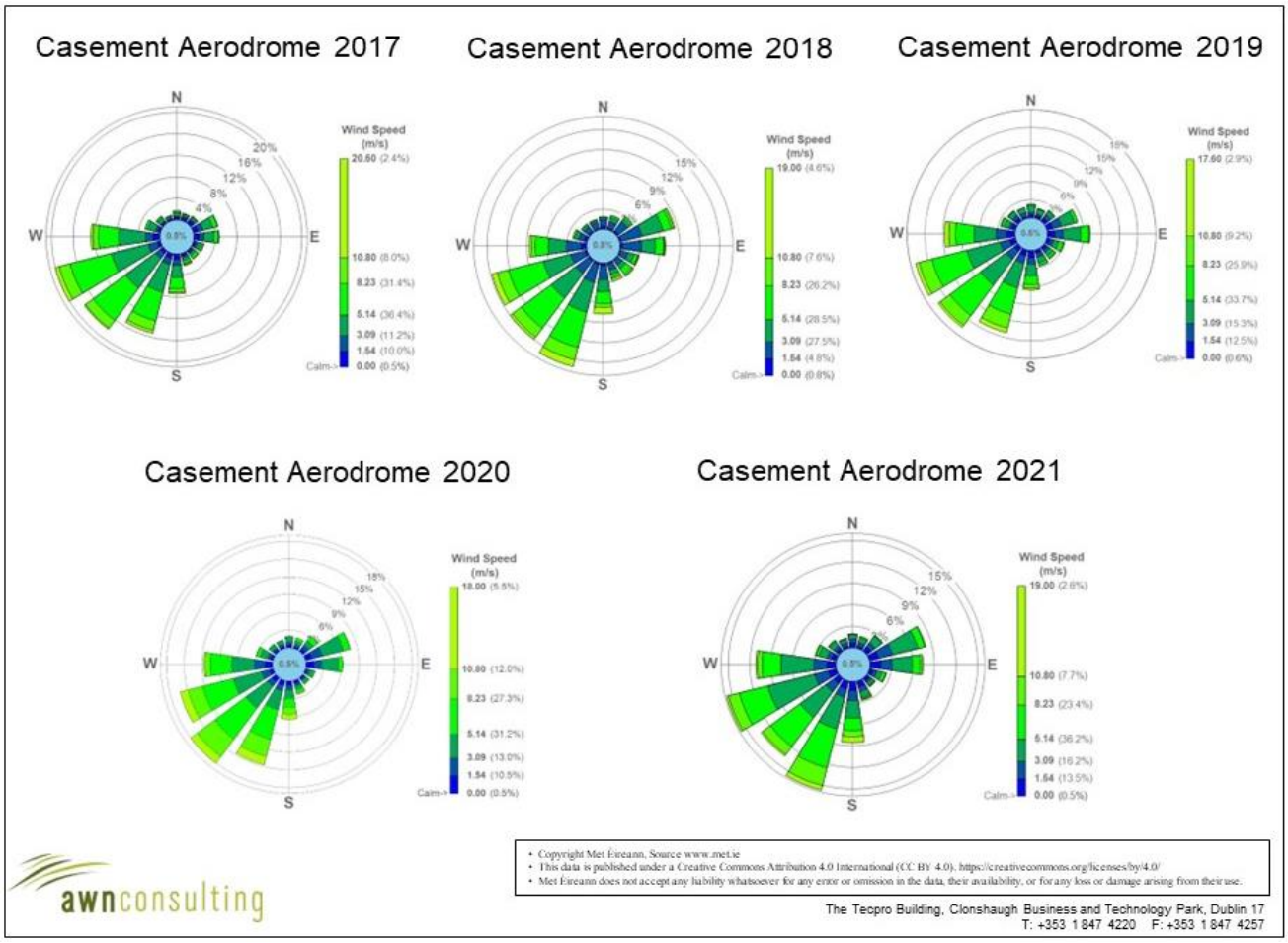

Table 11.1: Beaufort Scale and Wind speed

Beaufort Scale	Wind speed(m/s)
0	<0.3
1	0.3-1.5
2	1.6-3.3
3	3.4-5.4
4	5.5-7.9
5	8.0-10.7
6	10.8-13.8

7	13.9-17.1
8	17.2-20.7
9	20.8-24.4
10	24.5-28.4
11	28.5-32.6
12	>32.7

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development comprises a Strategic Housing Development of 344 no. residential units (comprising 54 no. 1 beds, 30 no. 2 beds, 210 no. 3 beds and 50 no. 4 beds), a childcare facility with a GFA of c. 369 sq.m, public and communal open space, landscaping, car and cycle parking spaces, provision of an access road from Dublin Road and Shinkeen Road, associated vehicular accesses, internal roads, pedestrian and cycle paths, bin storage, pumping station and all associated site and infrastructural works.

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11.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

Construction phase

A building under construction is largely porous to the wind due to window openings and is surrounded by scaffolding which is also porous, therefore wind tends to flow through a building under construction and therefore there are no construction microclimate impacts of significance associated with the construction phase.

Operational Phase

A relevant guidance document on wind speeds and tall buildings notes that tall buildings are generally taken to mean buildings more than 10 storeys high, “Sustainable Design and Construction, The London Plan Supplementary Planning Guidance, 2006, Mayor of London’s Office”. Section 2.4.5 notes that a wind environment assessment should be carried out for every tall building (e.g. a building over 10 storeys)”. Sustainable Design and Construction, Supplementary Planning Guidance, April 2014” published by the Mayor of London’s office provides further guidance in this regard. It will be noted from the description of the proposed development that it consists of 2 and 3-storey buildings and is therefore not classed as a tall building development.

Wind is normally described by its speed, either as a mean or gust speed. However, people sense the effect of the wind force, which is what we can feel, see and hear during windy conditions. Wind force is proportional to

wind speed squared, therefore a relatively small increase in the wind speed can have a large effect on pedestrian comfort.

All buildings obstruct the free flow of the wind, causing it to be deflected and accelerated, resulting in very complex flow patterns. When the wind strikes the front face of a building, it will produce positive pressures that reach a maximum value at a point between about two thirds and three-quarters of the building height.

Below this height the wind will tend to be deflected down the front face towards the ground, often called 'downwash', and accelerated around the corners at ground level potentially producing areas of high wind speed and strong negative pressure. Above this height the wind will be deflected upwards and accelerated over the roof, again causing areas of high wind speed and increased turbulence. This can be a concern for roof gardens and roof terraces. A significant proportion of the wind will also spill around the side faces. Downwind, the flows around the building will recombine into a region of negative pressure known as the 'wake'.

Wind speed increases with height above ground; it follows, therefore, that the taller a building the higher the wind speeds acting on it. However, not all tall (where tall is greater than 10 storeys) buildings cause wind problems; what is important is the relative height of the building compared with that of neighbouring buildings.

A tall building in a group of tall buildings might not cause problems whereas a mid-rise building can cause unacceptable conditions if it is adjacent to an open area. When the wind strikes a building, it will generate positive pressures on the windward face and suctions on the side, roof and leeward faces.

T.V. Lawson in Building Aerodynamics, Imperial College London, Imperial College Press, 2001, has noted that when wind approaches a built-up area it is displaced upwards to roof level and generally flows across landscape at roof level, with gusts down to street level that are a function of the relative height to width of the street canyon.

It will be noted that the area up-wind (that is, west and south west of the proposed development) of the proposed development is dominated by a large residential area of two-storey houses. Wind flow down-wind of this residential area (down-wind being the site of the proposed development) will be pre-dominantly at two storey level due the presence of the existing development and therefore with the proposed development being predominantly 2-storey with some 3-storey, the overall wind regime will remain unchanged.

11.6 POTENTIAL CUMULATIVE IMPACTS

AWN have reviewed the other developments proposed for the area, and described in Chapter 2 of this EIAR. Following our review and given that the proposed development is not expected to have any significant effects on the wind regime, no cumulative effects are predicted.

11.7 'DO NOTHING' IMPACT

The Do-Nothing scenario involved the site not being developed and therefore, the microclimate at the site would remain as it currently is.

11.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

Construction Phase

No mitigation measures required.

Operational Phase

The impact of the proposed development on microclimate will be imperceptible. Thus, no site-specific mitigation measures are required.

11.9 MONITORING

No monitoring will be required.

11.10 REINSTATEMENT

No re-instatement is required.

11.11 INTERACTIONS

No interactions of relevance were noted.

11.12 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered.

11.13 REFERENCES

T.V. Lawson in Building Aerodynamics, Imperial College London, Imperial College Press, 2001

Oke (T.R. Oke), Boundary Layer Climates, Routledge, 1987