

Chapter 10:
MicroClimate

10.0 MICROCLIMATE

10.1 INTRODUCTION

Planning permission is being sought for a residential extension consisting of three levels over the Frascati Centre, which is currently at an advance stage of construction under the permission granted for the rejuvenation of the Frascati Shopping Centre in Blackrock, Co. Dublin.

AWN were commissioned to prepare a desktop review of the Potential Risks of Elevated Wind speed (microclimate) associated with the proposed residential extension at the Frascati Shopping Centre. 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 residential extension proposed as part of the re-development of the Frascati Centre. 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.
- Risk assessment of the potential for elevated wind speeds to occur at the Frascati Shopping Centre with the additional residential development in place.

10.2 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)

10.3 EXISTING RECEIVING ENVIRONMENT

Characterisation of the Current Frascati Site with Respect to the Beaufort Scale for Wind on Land

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 Dublin Airport, which is located approximately 13 km north of the site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 10.1 below). For data collated during five representative years (2012-2016), the predominant wind direction is west/south-west with an average daily wind speed of approximately 5.3 m/s.

The Beaufort scale and its relationship to wind speed in metres/second is shown in Table 10.1 below. It can be seen that the site typically experiences Beaufort 3 (B3) wind conditions for much of the time.

Figure 10.1: Dublin Airport Windspeeds

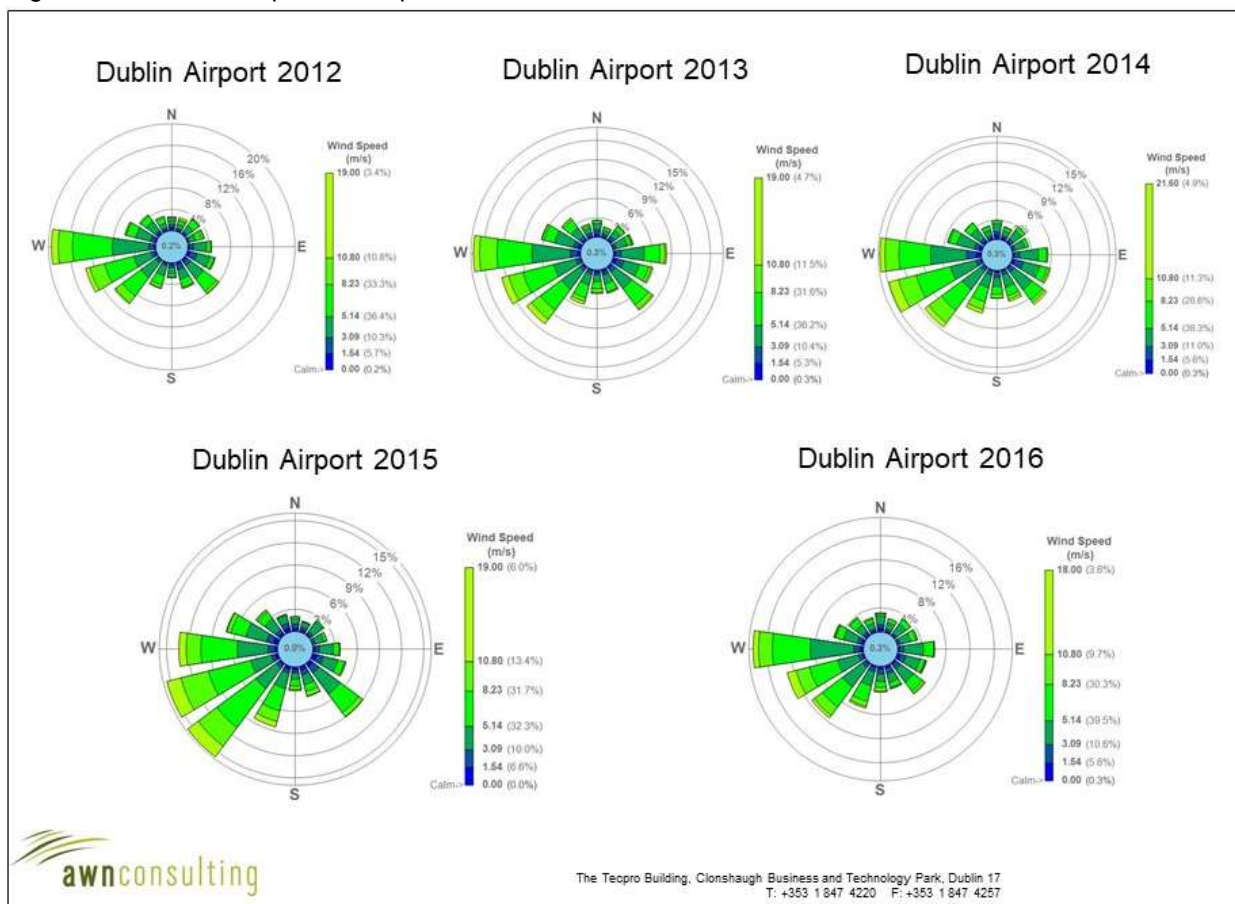


Table 10.1 Beaufort Scale and Wind speed

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

The site of the current Frascati Shopping Centre (and hence the site of the proposed residential development) can be characterised as a site which experiences average wind speeds of B3, which corresponds to gentle breeze on the Beaufort Scale.

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Planning permission is being sought for a residential extension to the Rejuvenated Frascati Shopping Centre, which is at an advanced stage of construction at present, within the designed district centre of Blackrock.

The proposal is for a residential development of 45 no. apartment units over 3 no. storeys, from second to fourth floor level, over the permitted ground and first floor levels of retail / restaurant floorspace and permitted lower ground floor car park. The proposal will be an extension of the Rejuvenation Scheme permitted under Reg. Ref.: D14A/0134 (which was the subject of an EIS), as amended by Reg. Ref.: D16A/0235 / ABP Ref.: PL 06D.246810, Reg. Ref.: D16A/0798, Reg. Ref.: D16A/0843 and Reg. Ref.: D17A/0599.

It is proposed to provide 3 storeys of residential development over the permitted two levels of retail, above a lower ground floor car park, equating to 5 no. storeys in total on the front portion of the subject site. The proposed residential use will replace the permitted restaurant at second floor level and include two additional storeys above.

The subject proposal, at five storeys (three additional floors of development to the permitted shopping centre including one no. replacing the second floor restaurant) is 20.6m in height to the main fourth floor level and 23.45 - 24.45 metres in height to the stepped back lift/stair cores and plant area.

The proposed apartment mix consists of 3 no. 1 bed units, 36 no. 2 bed units and 6 no. 3 bed units. Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations. Access to the residential units will be provided via a stair and lift core from lower ground and ground floor level. 51 no. car parking spaces within the lower ground floor car park will be allocated to the residential units. The development includes 54 no. bicycle parking spaces for the apartments, located at lower ground floor level and the proposed first floor level podium car park. The development also includes a bin store and plant area at lower ground floor level, two communal terrace areas at second floor level and roof level and plant enclosures at roof level. The development includes an associated reduction to the permitted footprint of the lower ground floor level. The proposal will result in the omission of the second floor level restaurant unit and storage floorspace permitted under the Rejuvenation Scheme.

The proposal includes a first floor level podium car park, over the permitted podium car park, located at the north west of the site, which will provide 81 no. car parking spaces. The total car parking provision for the scheme as amended by this permission will be 604 no. spaces, which comprises of 51 no. spaces for the proposed residential units and 553 no. spaces for the permitted retail and restaurant floorspace. The application site area is 0.625 ha.

The proposal is an extension of the Rejuvenation of Frascati Shopping Centre, which is currently at an advanced stage of construction, and which related to an overall application site area of approximately 3.41 hectares, including the Frascati Road area included in the red line boundary of that application, the development site area, i.e. excluding Frascati Road, is 2.7 hectares. The development comprises primarily of the improvement of the current retail offer within the centre, along with the inclusion of additional retail services floorspace, the provision of additional café/restaurant floorspace and the reorganisation of the current car parking provision and access and circulation system.

The basement area, which will accommodate the car parking area for the residential units, has been constructed and the replacement car parking for the retail floorspace is proposed in an additional podium level as part of this residential extension application.

10.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

Construction phase

There are no construction microclimate impacts of significance.

Operational Phase

The Potential for Windspeed Amplification Factors: The UK Buildings Research Establishment has noted that wind speeds in the vortex between a tall building and a lower building (this occurs in the space in front of a tall building behind the lower building) can be up to 1.5 times the free wind speed (free wind speed being that measured in an open area with no buildings).

Wind speeds in the corner streams around either side of a tall building can be up to 2.5 times the free wind speed.

Tall buildings are, however generally taken to mean buildings more than 10 storeys high. In the planning guidance document on wind speeds and tall buildings, "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)" – this equates to a building of 30m or more high. The proposed residential extension to the rejuvenated Frascati Shopping Centre is still considerably less than 10 storeys and is not classed as a high building.

The Frascati Centre including the proposed residential development will remain below 30m in height after redevelopment, with maximum heights in the region of 24m for the highest part. It can be concluded that the proposed development at the Frascati Centre is therefore not a high building and that its shape will not lead to a significant acceleration of wind-speeds.

The space between the Blackrock and Frascati Shopping Centres was examined and was also found not to be of a width which would lead to acceleration of windspeeds. It was concluded that the proposed development would have no significant impact on windspeeds in the area.

The construction of new buildings can lead to changes to the local wind environment around the building. Generally elevated wind speeds around tall buildings are generated at two main points, either at ground level in the space behind a lower building and in front of a tall building or at building corners. Elevated wind speed can also be generated where a street runs between two tall buildings, leading to a "canyon effect".

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.

When the Height to Width Ratio is greater than 0.7, the Skimming Flow Regime tends to predominate, with little in the way of wind flow down to street level.

When the H to W ratio drops to 0.4 or less, the wind speed at ground level tends to increase and the street behaves more as if it were in open country, with much more of the wind now gusting down into the street.

The proposed additional residential development at Frascati does not change the H (where H is height of building) to W (where W is width of the street) ratio for the development nor does it lead to an additional tall or small building, nor does it create a canyon effect, therefore it can be concluded that the proposed residential development at Frascati will not lead to elevated wind-speeds.

10.6 DO NOTHING IMPACT

The Do Nothing scenario includes retention of the current site and development of the Rejuvenation Scheme without the proposed residential development in place. The previous assessment of the Rejuvenation Scheme without the proposed residential extension found that the impact on microclimate would be negligible. Therefore, the microclimate at the site will remain as per the baseline.

10.7 AVOIDANCE, REMEDIAL AND 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.

10.8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

Construction Phase

No impacts will occur.

Operational Phase

The impact on microclimate for the operational stage is *imperceptible* and *not significant* for the long and short term.

Cumulative Impacts

The overall cumulative impact associated with the Frascati development under construction and the proposed residential development is considered *imperceptible, long-term* and *not significant*.

10.9 MONITORING

No monitoring is required.

10.10 REINSTATEMENT

Not Applicable

10.11 INTERACTIONS

There are no interactions of concern.

10.12 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered in the course of this assessment.