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MICROCLIMATE ASSESSMENT IN SUPPORT OF A PLANNING APPLICATION FOR THE PROPOSED GLENAGEARY GATE LRD

Report Prepared For

Red Rock Glenageary Ltd

Technical Report Prepared By

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EXECUTIVE SUMMARY

AWN were commissioned by Red Rock Glenageary Limited to undertake an assessment with regard to Microclimate Effects associated with the proposed Glenageary LRD development on a site at the junction of Sallynoggin Road and Glenageary Avenue. The aim of the assessment was to determine if there was considered to be potential microclimate effects with a particular focus on wind-speed impacts.

The site of the proposed development was characterised as a site which experiences average wind speeds of B3/B4, which corresponds to gentle to moderate breeze on the Beaufort Scale.

Based on the analysis conducted it was concluded the proposed development would have no significant effects with regard to microclimate, either on amenity spaces in the vicinity of the development or within the development, or on balconies.

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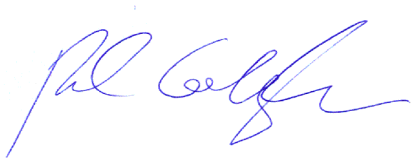
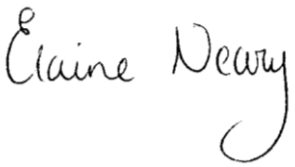
Signature		
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1.0 INTRODUCTION

AWN were commissioned by Red Rock Glenageary Limited to undertake an assessment with regard to Microclimate Effects associated with the proposed Glenageary LRD development on a site at the junction of Sallynoggin Road and Glenageary Avenue.

The proposed development will consist of a new neighbourhood centre to include apartments, commercial and retail units, public plaza, childcare facility and all associated residential amenity spaces in buildings of 4 to 7 storeys in height.

The aim of the assessment was to determine if there was considered to be potential microclimate effects with a focus on wind-speed impacts. The assessment comprised:

- 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 of the impacts with regard to Microclimate

The proposed development includes:

Development Description – Glenageary Gate LRD

Red Rock Glenageary Ltd., intend to apply to Dún Laoghaire Rathdown County Council for a Large-Scale Residential Development on a site of 0.74 ha at Junction of Sallynoggin Road and Glenageary Avenue, and Glenageary Roundabout, Glenageary, Co. Dublin.

The proposed development will consist of a new neighbourhood centre to include apartments, commercial and retail units, public plaza, childcare facility and all associated residential amenity spaces.

The proposed development includes:

a) Construction of 138 no. residential apartment units (37 no. 1-bedroom units, 68 no. 2-bedroom (4 person units), 6 no. 2-bedroom (3 person units) and 27 no. 3-bedroom

units) in 2 no. interlinked blocks at third to fifth floor level (ranging in height from four to seven storeys over basement level) consisting of:

i. Block A (5-6 storeys) comprising 41 no. apartments (8 no. 1-bedroom units, 17 no. 2-bedroom (4 person) units, 2 no. 2-bedroom (3 person) units and 14 no. 3-bedroom units).
ii. Block B (4-7 storeys) containing 97 no. apartments (29 no. 1-bedroom units, 51 no. 2-bedroom (4 person) units, 4 no. 2-bedroom (3 person) units and 13 no. 3-bedroom units).

Each residential unit has associated private open space in the form of a balcony/terrace.

b) Residential amenity areas of approx. 342 sqm are proposed in the form of resident support services, concierge services, co-working space, social/activity spaces and gym at the ground floor level of Blocks A and B.
c) Open Space (approx. 2,806.6 sqm) is proposed in the form of (a) public open space (c. 1,848.4 sqm) in the form of a public plaza accommodating outdoor seating, planting, pedestrian footpaths and cyclist links and (b) residential/communal open space (approx. 958.2 sqm) including c. 750.6 sqm at surface level (incl. playground), roof terrace at fifth floor level of link between Blocks A and Block B (c. 151 sqm) and roof terrace (c. 56.6 sqm) at fifth floor level of Block B. 1.8 m opaque screens are proposed around both roof gardens.
d) Commercial and retail uses at ground floor level of Blocks A and B (c. 996 sqm) to include (a) 2 no. restaurants (c. 267 sqm and 295 sqm) in Block A, (b) a retail – clothing unit (c. 142 sqm), (c) retail - florist unit (c. 66 sqm), (d) retail - pharmacy unit (c. 126 sqm) and (e) hairdresser unit (c. 100 sqm) all in Block B.
e) Childcare facility (c. 263 sqm) with dedicated open space and children's play area (c. 39.5 sqm) at ground floor level of Block B.
f) Basement areas (total approx. 3,411 sqm) are proposed on one level and include car and bicycle parking areas, waste management and plant areas. An ESB substation (approx. 31.7 sqm) is proposed at surface level at the top of the basement ramp accessed off Glenageary Avenue. Commercial bin stores (c. 47.9 sqm) are proposed to be located at ground floor level of both Blocks A and B.
g) A total of 80 no. car parking spaces at basement level are proposed to include 3 no. accessible parking spaces, 2 no. GoCar spaces and 17 no. EV charging spaces. 5 no. motorcycle parking spaces are also proposed at basement level.
h) A set down area/loading bay is proposed at surface level at Sallynoggin Road and 2 no. set down areas/loading bays including 1 no. accessible car parking space are proposed at surface level at Glenageary Avenue.
i) A total of 310 no. bicycle parking spaces to include 254 no. bicycle parking spaces at basement level including 10 no. cargo bicycle spaces and 56 no. bicycle parking spaces including 16 no. cargo bicycle spaces at surface level.
j) The development shall be served via a new vehicular access point to the basement level from Glenageary Avenue. New pedestrian and cyclist access points will be provided onto Sallynoggin Road and Glenageary Avenue from the site.
k) Removal of existing cycle path and footpath and dropped kerb pedestrian crossing at Glenageary Avenue to be reinstated by soft landscaping and replaced by a new shared cyclist and pedestrian raised table crossing point located on Glenageary Avenue linking to the existing signalised crossing on the R118. Existing 1.2 m pedestrian crossing on Glenageary Avenue to be widened to 2 m.

l) Emergency services/servicing access is proposed from Sallynoggin Road and Glenageary Avenue.
m) All associated site and infrastructural works include provision for water services; foul and surface water drainage and connections; attenuation proposal; permeable paving; all landscaping works; green roofs; roof plant room and general plant areas; photovoltaic panels; landscaped boundary treatment; footpaths; public lighting; and electrical services.

The site location and layout is shown in Figure 1.1 below.

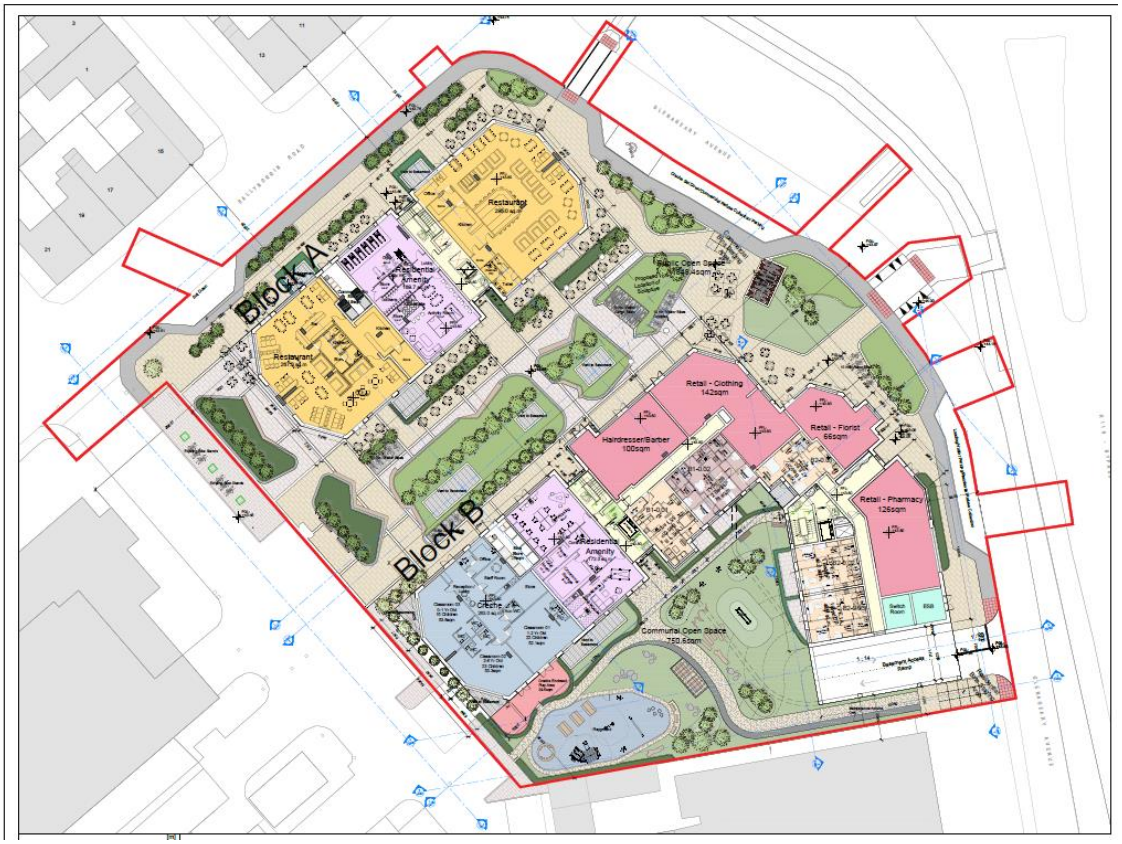

Figure 1.1 Site Plan and Location

The project sections and elevations are shown in Figures 1.2 to 1.4.

Figure 1.2 Elevation North-west Block A

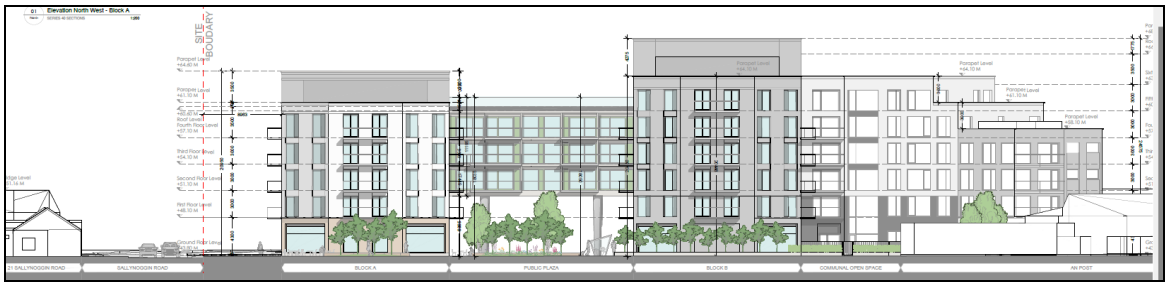

Figure 1.3 South-west elevation Block A and B

Figure 1.4 Elevation South, Block B

2.0 CHARACTERISATION OF THE SITE

The Beaufort Scale for Wind on Land is 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 16km 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 2.1 below). For data collated during five representative years (2018-2022), the predominant wind direction is south-westerly with an average wind speed of approximately 3-5 m/s, measured at a height of 10m above ground.

The Beaufort scale and its relationship to wind speed in metres/second is shown in Table 2.1 below. It can be seen that the site typically experiences Beaufort 3 to 4 (B3 to B4) wind conditions for much of the time.

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

Table 2.1 Beaufort Scale and Wind speed

The site of the proposed development can therefore be characterised as a site which experiences average wind speeds of B3/B4, which corresponds to gentle to moderate breeze on the Beaufort Scale.

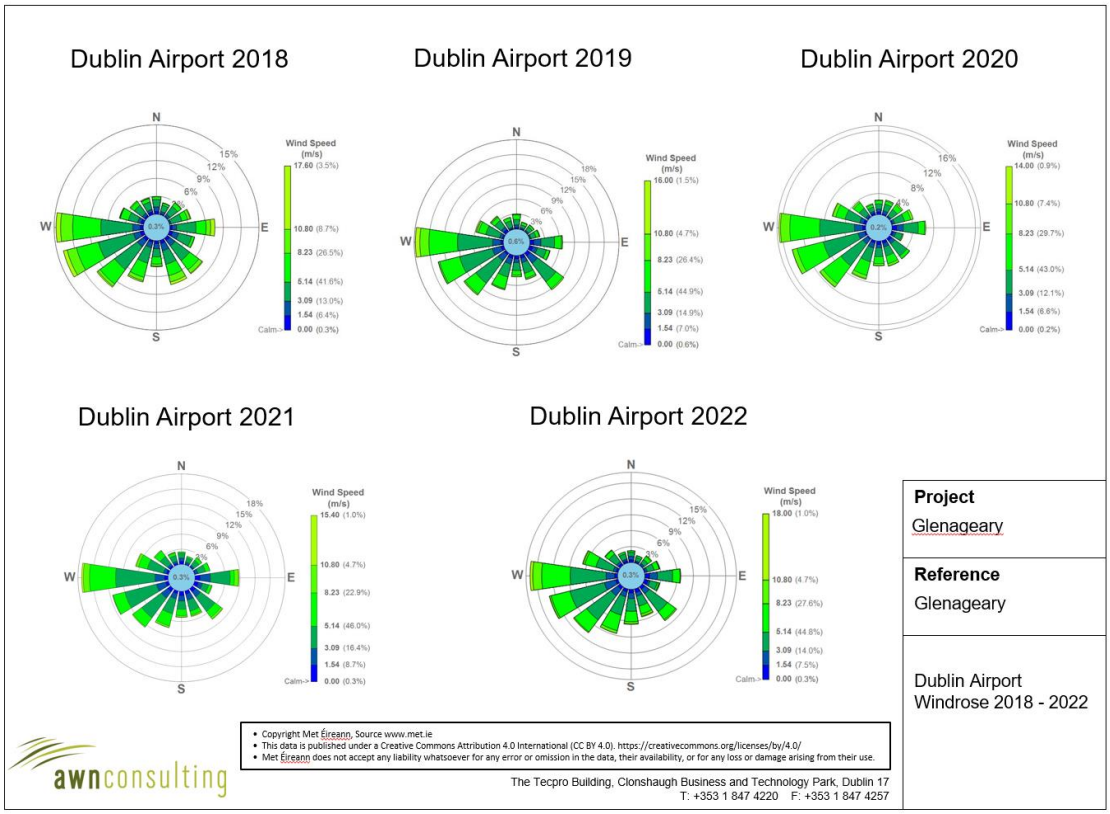

Figure 2.1 Wind-Rose Data

3.0 THE PROPOSED DEVELOPMENT AND MICROCLIMATE IMPACTS

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 or has features or openings at ground level which can accelerate wind speed. When the wind strikes a building, it will generate positive pressures on the windward face and suction on the side, roof and leeward faces.

The wind will flow in the direction of decreasing pressure gradient, that is, from areas of high pressure to areas of lower pressure. As noted above, this causes wind flow down the front face, which brings high-speed wind from higher levels down to ground level. This can significantly increase ground-level wind speeds. The downwash on

the windward face will tend to 'roll up' in front of a building, creating a windward vortex. The highest wind speed-up will occur near the centre of the face a short distance in front of the building, where the wind speed-up factor, S, can vary between about 1.2 and 2.0 depending on the building height. The flow then accelerates around the sides towards the low-pressure area in the wake. The S factor can reach 2.0 to 2.5 close to the corners of tall buildings, although values closer to 1.5 are likely for mid-rise buildings.

In general, tall, rectangular, sharp-edged buildings will generate the highest local ground-level wind speeds and the largest 'footprint' area of unpleasant wind speeds.

The UK Buildings Research Establishment (BRE DG 520: Wind Microclimate Around Buildings) 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.

A useful document on wind speeds and tall buildings notes that tall buildings are generally taken to mean buildings more than 25m high, "Wind Microclimate Guidelines for Developments in the City of London (August 2019)".

The development will be provided in 2 No. blocks (A and B) ranging in height from 4 to 7 storeys – with heights ranging from 20 to 28 metres.

It is acknowledged that 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 three main points, either at ground level in the space behind a lower building and in front of a tall building, at an opening within the building envelope at ground level such as a tunnel or mall through the 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.

It will be noted from the windrose presented as Figure 2.1 that as the predominant wind directions are from the west and from the south west, wind striking the proposed development will therefore already have travelled across the built-up landscape of the environs of Dublin City and therefore wind-flow across the landscape will be tend to be predominantly at 2-storey roof level.

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

Similarly, the BRE DG 520 document notes that H to W ratio of > 0.65 should be a target to minimise any wind related impacts.

The proposed building height is up to 28 metres above ground. The predominant wind directions are from the west and south west so the predominant downwind direction will be east and north east of the development. The area east and north east of the development includes road space and a roundabout – areas which do not have uses which could be sensitive to wind impacts (such sensitive uses would include open air seated areas), the area further down-wind is low rise, circa 2-storey buildings.

Given the low-rise nature of the development (less than 10 storeys) the skimming regime will tend to predominate with little in the way of elevated windspeed at street level and therefore the proposed development is not expected to lead to elevated windspeeds at street level, in addition to the fact that the area downwind of the proposed development is not considered sensitive with regard to wind-speed.

A Microclimate assessment accompanying an application should address the safety and comfort of communal residential amenity spaces, including podium level and roof gardens and balconies, both within the site and on adjoining lands. Any required mitigation or other design measures arising from such assessment should be clearly detailed in the application.

Communal Residential Amenity Spaces – within the development

As has been noted above, a skimming regime is expected to predominate for the proposed development so elevated windspeeds are not expected at ground level in any amenity areas within the development.

Balconies

Windspeed above ground will be higher compared to a measured value closer to the ground. The Danish Wind Industry Association Online windspeed calculator http://xn--drmstrre-64ad.dk/wp-content/wind/miller/windpower%20web/en/ indicates that for a Roughness Class 3 landscape (a landscape defined by low rise buildings as opposed to a city scape defined by tall buildings) a windspeed range of 3-5 m/sec at 10m above ground will be a windspeed of 3.7 to 6.01 m/second at circa. 20 m above ground – the approximate height above ground of the highest balcony. This corresponds to Beaufort B4 (Moderate Wind Speed, which will raise dust and papers and move small branches on trees) which is only one windspeed class above that experienced at ground level. It is therefore considered that this is a relatively minor increase in wind-speed likely to be experienced and it is considered to be acceptable with regard to the proposed balcony uses.

4.0 CONCLUSION

It was concluded that:

The existing environment experiences B3/B4 conditions for much of the time which correspond to a gentle breeze.

Based on the analysis conducted, it was concluded the proposed development would have no significant effects with regard to microclimate, either in the vicinity of the development or within the development or on balcony areas.

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