

11 Wind & Microclimate

11	WIND & MICROCLIMATE	1
11.1.	INTRODUCTION	2
11.2.	STUDY METHODOLOGY	2
11.3.	THE EXISTING RECEIVING ENVIRONMENT (BASELINE)	4
11.4.	CHARACTERISTICS OF THE PROPOSED DEVELOPMENT	4
11.5.	POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT	8
11.6.	POTENTIAL CUMULATIVE IMPACTS	8
11.7.	DO NOTHING SCENARIO	9
11.8.	RISKS TO HUMAN HEALTH	9
11.9.	MITIGATION MEASURES	9
11.10.	PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT	9
11.11.	MONITORING	21
11.12.	REINSTATEMENT	22
11.13.	INTERACTIONS	22
11.14.	DIFFICULTIES ENCOUNTERED	22
11.15.	REFERENCES	22

11.1. Introduction

This chapter has been prepared by IES Consulting.

IES Consulting have been commissioned to investigate the potential impact of wind movement on pedestrian comfort around the proposed Rent Strategic Housing Development on lands (c. 2.14ha) at Cornelscourt Village, Old Bray Road, Cornelscourt Dublin 18.

The analysis is to study:

- The effect of building layout on acceleration and/or deceleration of wind as it passes through the site.
- Determine the effect from air movement on amenity spaces within the development including walkways, breakout spaces, restaurant/café outdoor seating and building entrances.

11.2. Study Methodology

The methodology for the analysis was as follows:

- 1) The annual mean wind speed was determined from the local weather data.
- 2) 8 steady state CFD simulations were performed corresponding to the 8 directions – SW, W, NW, N, NE, E, SE and S respectively.
- 3) The local air speed at various designated locations around the site was recorded for each of the simulations.
- 4) This value was compared to the meteorological wind speed used and the magnification factor at that location for the corresponding wind direction was determined.
- 5) The magnification factor was used to determine the air speed at the designated locations for the various recorded values of the wind speed and direction in the weather file, thus generating the local air speeds at designated locations for a year.
- 6) These recorded values were compared to the Lawson Pedestrian Comfort/Safety Criteria.

Lawson Pedestrian Comfort/Safety Criteria

The Lawson Criteria¹ was used as a reference to assess the wind effects. It is the most widely used reference for assessment of pedestrian comfort. It considers the air speed at the location as well as the frequency of the occurrence of this air speed. It consists of two assessment criteria:

- The first criteria assesses whether the air movement will be comfortable for the pedestrian for different types of activities.
- The second criteria assess the feeling of safety or distress by the pedestrian at higher air speeds.

Following table gives the values for the Lawson's pedestrian comfort assessment criteria for various activities.

Category	Pedestrian Activity	Threshold mean hourly wind speed not to be exceeded for more than 5% of the time (m/s)
C1	Business Walking	10
C2	Leisurely Walking	8
C3	Standing	6
C4	Sitting	4

Following table gives the values for Lawson’s Pedestrian Safety Assessment criteria.

Category	Pedestrian Type	Threshold mean hourly wind speed not to be exceeded more than once per annum ² (m/s)
S1	Typical Pedestrian	20
S2	Sensitive Pedestrian	15

CFD Software

The CFD simulations were carried out in OpenFOAM CFD package. OpenFOAM is the free, open source CFD software released and developed primarily by OpenCFD Ltd since 2004. It has a large user base across most areas of engineering and science, from both commercial and academic organisations. OpenFOAM has an extensive range of features to solve anything from complex fluid flows involving chemical reactions, turbulence and heat transfer, to acoustics, solid mechanics and electromagnetics.

11.3. The Existing Receiving Environment (Baseline)

The existing site is an empty land bounded by residential settlements to the east and south, and the N11 road to the north.

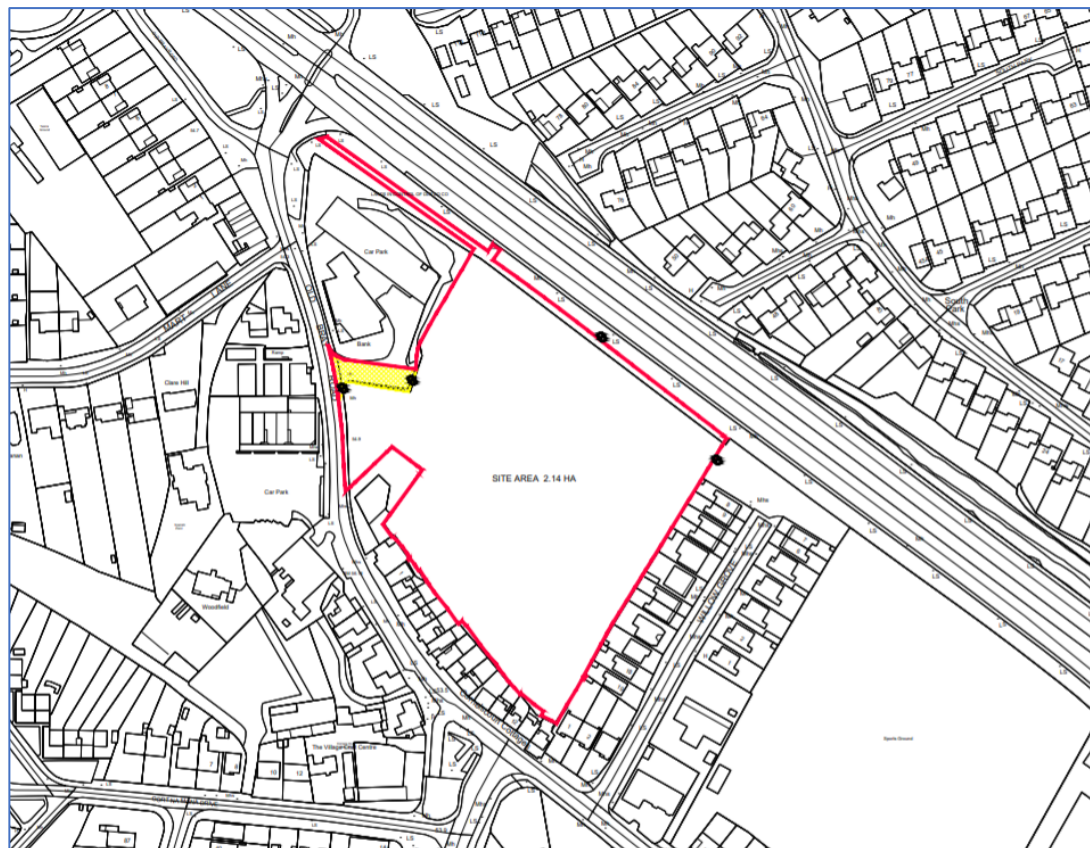


Figure 11.1 - Existing Site

As such the site is quite flat and without any obvious characteristics from wind point of view.

11.4. Characteristics of the Proposed Development

Cornel Living Limited intends to apply to An Bord Pleanála for permission for a Build - to - Rent Strategic Housing Development on lands (c. 2.14 ha) at Cornelscourt Village, Old Bray Road, Cornelscourt Dublin 18.

The proposed development shall provide for the construction of a new residential development of 468 no. units in the form of 452 no. apartment units (41 no. studio apartment units, 257 no. 1 bed apartment units, 136 no. 2 bed apartment units; and 18 no. 3 bed apartment units) and 16 no. house units (10 no. 3 bed semi-detached house units and 6 no. 1 bed bungalow units). A café / restaurant of c. 140 sq m; office space of 149 sq m; concierge of c. 149 sq m and central residential tenant amenity space of c. 458 sq m is also proposed.

The following build - to - rent residential development is provided:

1. 452 build to rent apartment units (ranging from 1 - 12 storeys in height) in the form of 8 no. new residential blocks (Blocks A - H) as follows:
 - Block A (8 - 12 storeys) comprising 134 no. apartments (12 no. studio units, 93 no. 1 bed units and 29 no. 2 bed units);
 - Block B (2 - 9 storeys) comprising 103 no. apartments (18 no. studio units, 65 no. 1 bed units; 14 no. 2 bed units and 6 no. 3 bed units);
 - Block C (6 - 7 storeys) comprising 82 no. apartments (6 no. studio units, 60 no. 1 bed units and 16 no. 2 bed units);

- Block D (5 storeys) comprising 36 no. apartments (1 no. studio unit, 5 no. 1 bed units; and 30 no. 2 bed units);
 - Block E (4 storeys) comprising 29 no. apartments (4 no. 1 bed units; and 25 no. 2 bed units);
 - Block F (2 - 4 storeys) comprising 56 no. apartments (4 no. studio units, 24 no. 1 bed units; and 16 no. 2 bed units and 12 no. 3 bed units);
 - Block G (3 storeys) comprising 6 no. apartments (3 no. 1 bed units and 3 no. 2 bed units); and
 - Block H (3 storeys) comprising 6 no. apartments (3 no. 1 bed units and 3 no. 2 bed units).
2. 10 no. 3 bed semi-detached houses (2 storey) and 6 no. 1 bed bunaglows (1 storey) are proposed.

Adjacent to the existing pedestrian and vehicular access point from Old Bray Road there will be a café/restaurant of 140 sq m and residential amenity area at ground and first floor providing resident support services and concierge services of 149 sq m. At first floor level is a proposed commercial office space of c. 149 sq m. Located centrally within the development attached to the southern gable of Block B there is a two storey residential amenity space of c. 458 sq m; providing for resident support facilities and amenities including reading room, lounge, gym and terrace.

Each residential unit will be afforded with private open space in the form of a balcony/terrace/roof terrace or private rear garden area. Public open space is also proposed in the form of external residential amenity spaces, play areas, courtyards and gardens.

274 car parking spaces (273 at basement level and 1 at ground level), 616 bicycle parking spaces (512 at basement level and 104 at ground level) and 12 motorcycle spaces (12 at basement level) are proposed.

Basement areas of c. 9,024 sq m are proposed (Level -1) and include car parking, waste management areas and plant areas. 3 no. ESB substations and 3 no. Switch Rooms (c. 77 sq m combined) are proposed at ground level.

The development shall be served via the existing vehicular access point from the Old Bray Road. Upgrade works are proposed to this vehicular access point to facilitate the proposed development and to provide for improved access and egress for the overall development.

Provision is made for new pedestrian connections to Willow Grove; the N11; and Cornelscourt Village. Provision is also made for a new cyclist connection to the N11. A drop-off zone is also proposed at the entrance to the site.

The associated site and infrastructural works include provision for water services; foul and surface water drainage and connections; attenuation proposals; permeable paving; all landscaping works; boundary treatment; internal roads and footpaths; and electrical services.



Figure 11.2 - Plan view of the Development



Figure 11.3 - Site as seen from the south



Figure 11.4 - Site as seen from the west

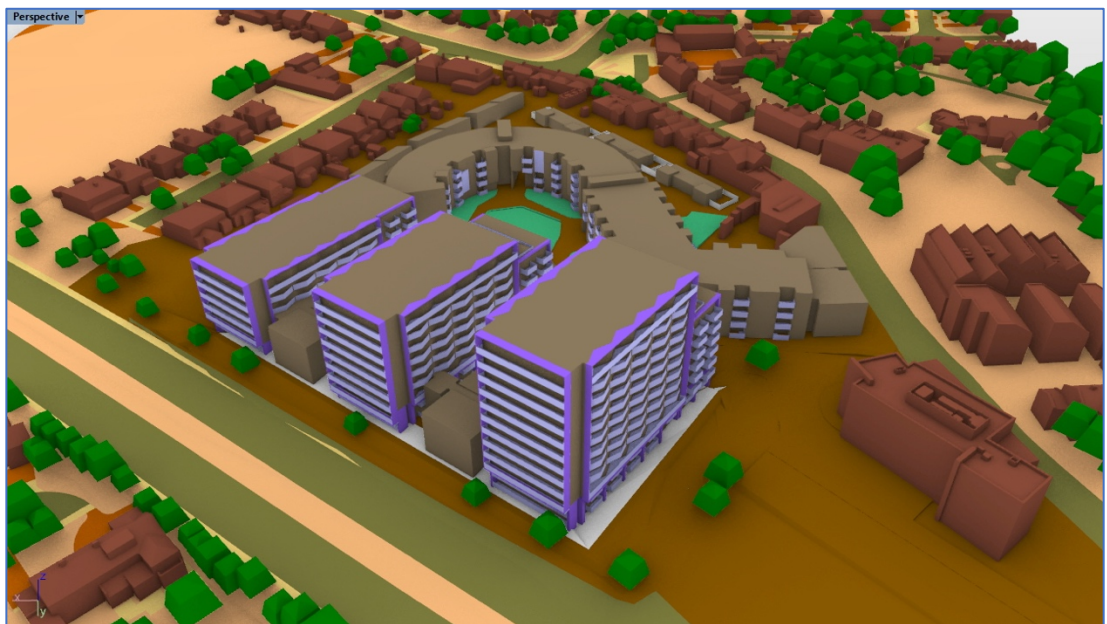


Figure 11.5 - Site as seen from the north

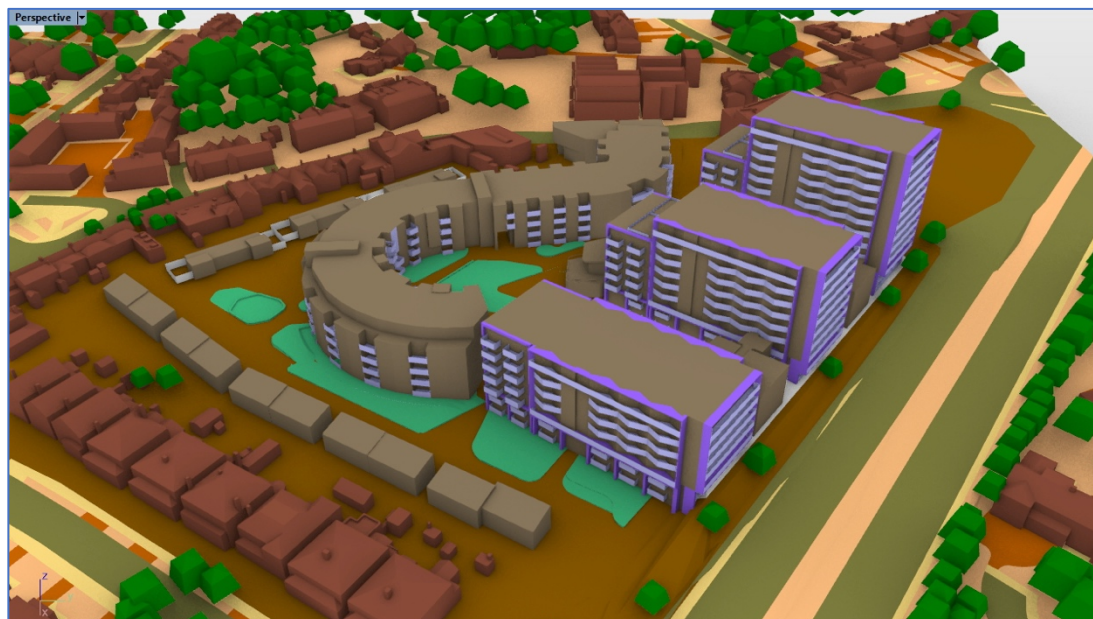


Figure 11.6 - Site as seen from the east

11.5. Potential Impact of the Proposed Development

Construction Phase

During construction phase, the site could be subject to higher wind along the ground during initial stage of construction i.e. before the lower levels of the development are constructed. As the site is quite open, the wind would be expected to flow through without any reduction in speed. As the construction moves through its phases, the wind will start being obstructed and reduce the impact on any construction machinery on the ground.

Major impact of this could be:

- Blowing up of dust during excavation
- Panels shaking due to wind through the site.
- Discomfort during colder season as the wind chill effect could increase

Operational Phase

Once the development is operational, it will act as a wind barrier for the surrounding site, especially the N11 which is to the north of the site. The surrounding sites beyond the N11 will not be subjected to unabated winds over the plain site. The development as such has the ground level amenities surrounding by the various buildings of the development. This courtyard style cocooning will help in ensuring the amenities are not adversely affected by winds for a major part of the year.

11.6. Potential Cumulative Impacts

As the neighbouring sites are well developed, this development will have no potential cumulative impacts from other developments.

11.7. Do Nothing Scenario

If the development were not be constructed, the site would not provide any obstruction to the wind to the surrounding residential development to the north of N11.

11.8. Risks to Human Health

The development does not possess any risk to human health.

11.9. Mitigation Measures

Construction Phase

During the construction phase, it will be recommended to have the site surrounded by large panels up to 3m high. This will prevent any dust being blown from the site on to the neighbouring locations. This could be of concern especially on the N11 if not contained.

Operational Phase

Additional mitigation features are unlikely to be required in the operational phase of the development.

11.10. Predicted Impacts of the Proposed Development

Construction Phase

Direct impacts of construction phase were not simulated. As mitigation measures described in section 11.9 will be implemented, safe working conditions will result. So the impacts will be kept to a minimum during the construction phase.

Operational Phase

Safety Criterion:

Figures 11.7 to 11.14 below show the results for the various safety criterion of the Lawson's criterion as outlined in section 11.2 above. As observed all locations – ground level amenities and the balconies show compliance with safety criterion.

The normal pedestrian safety criterion applies to able bodied adults. The sensitive pedestrian safety criterion applies to children, older people and people with movement related disabilities.



Figure 11.7 - Safety Criterion: Normal Pedestrian

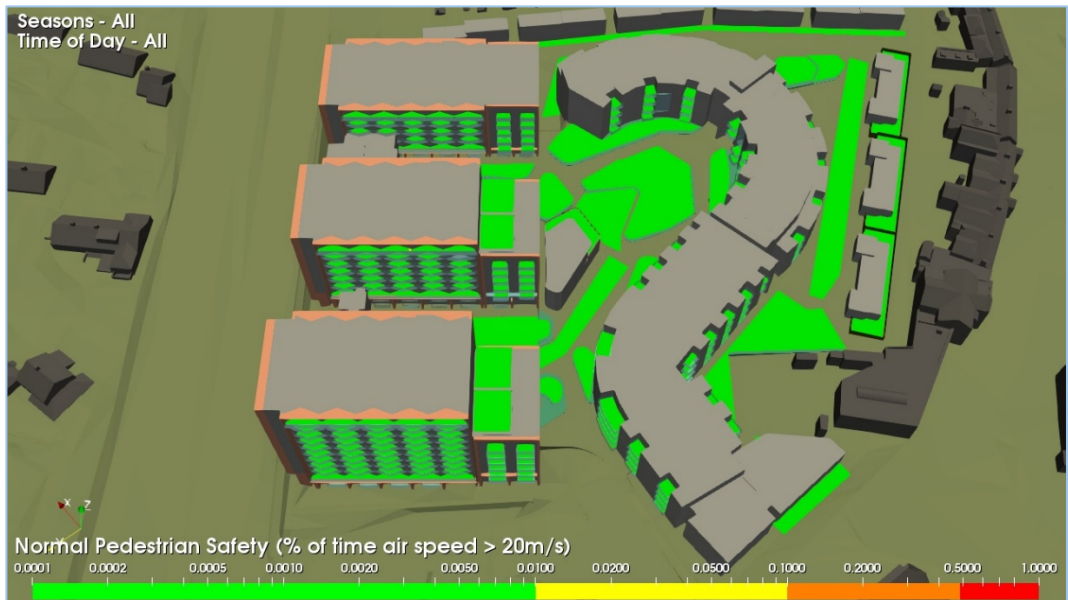


Figure 11.8 - Safety Criterion: Normal Pedestrian

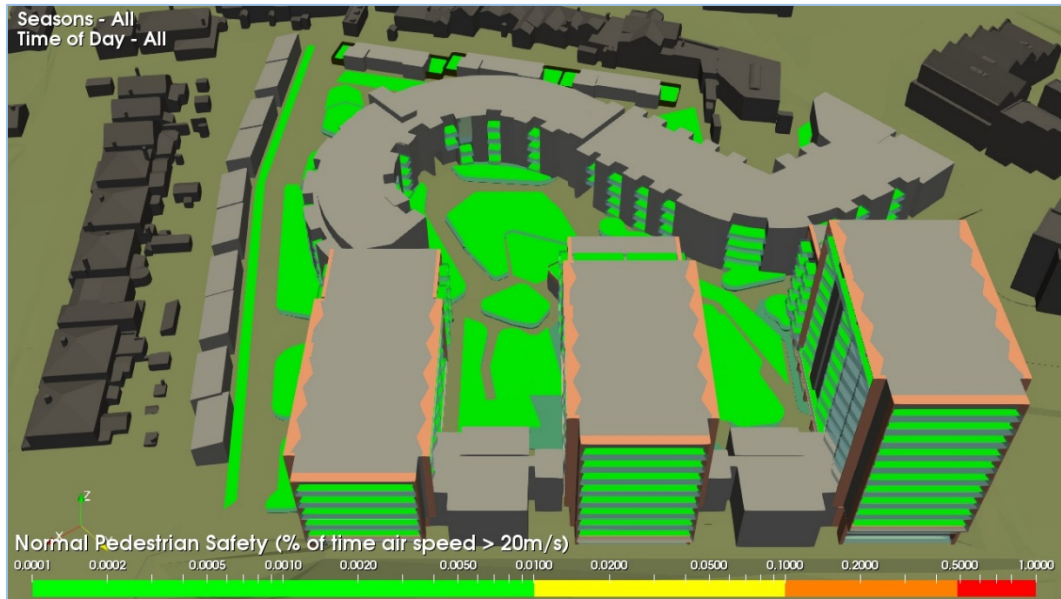


Figure 11.9 - Safety Criterion: Normal Pedestrian



Figure 11.10 - Safety Criterion: Normal Pedestrian

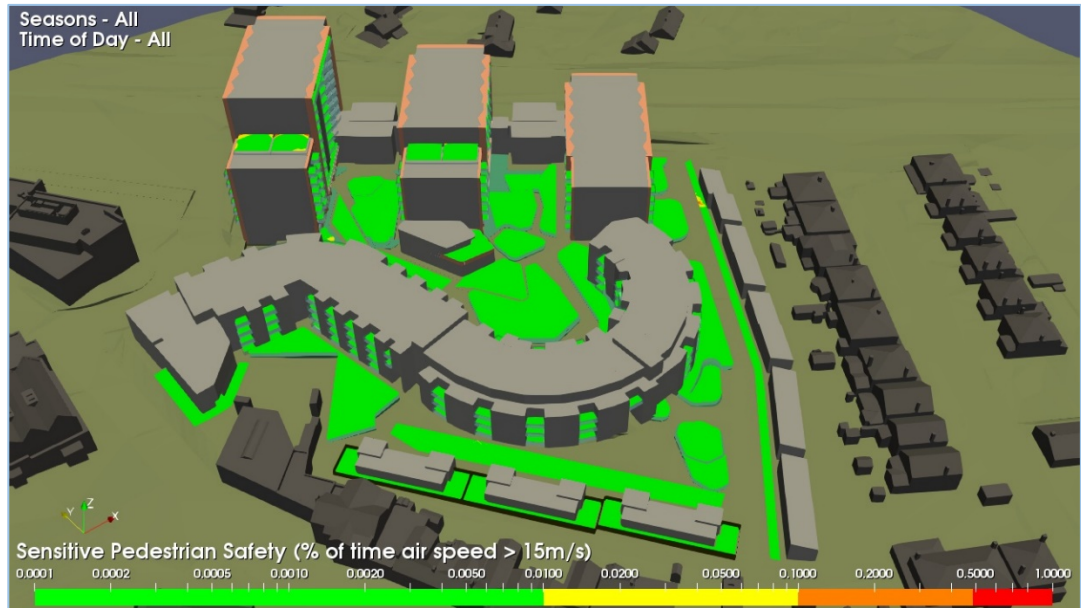


Figure 11.11 - Safety Criterion: Sensitive Pedestrian



Figure 11.12 - Safety Criterion: Sensitive Pedestrian



Figure 11.13 - Safety Criterion: Sensitive Pedestrian



Figure 11.14 - Safety Criterion: Sensitive Pedestrian

Walking Criteria:

There are two walking criteria: leisure and business. The leisure walking criterion applies to people out for a stroll, people jogging or people walking their dogs on the site. The business walking criterion applies to people moving in and out of the buildings as part of their commute and generally walking briskly.

Figures 11.15 to 11.22 below demonstrate the site shows excellent compliance with both walking criteria on all ground level amenity spaces.

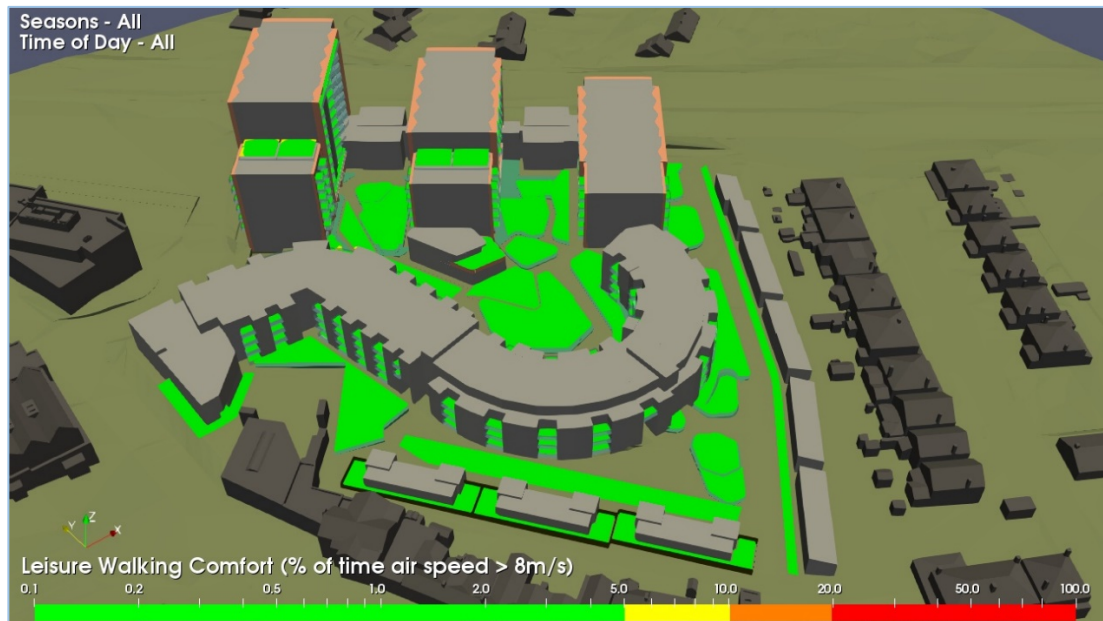


Figure 11.15 - Leisure Walking Criterion

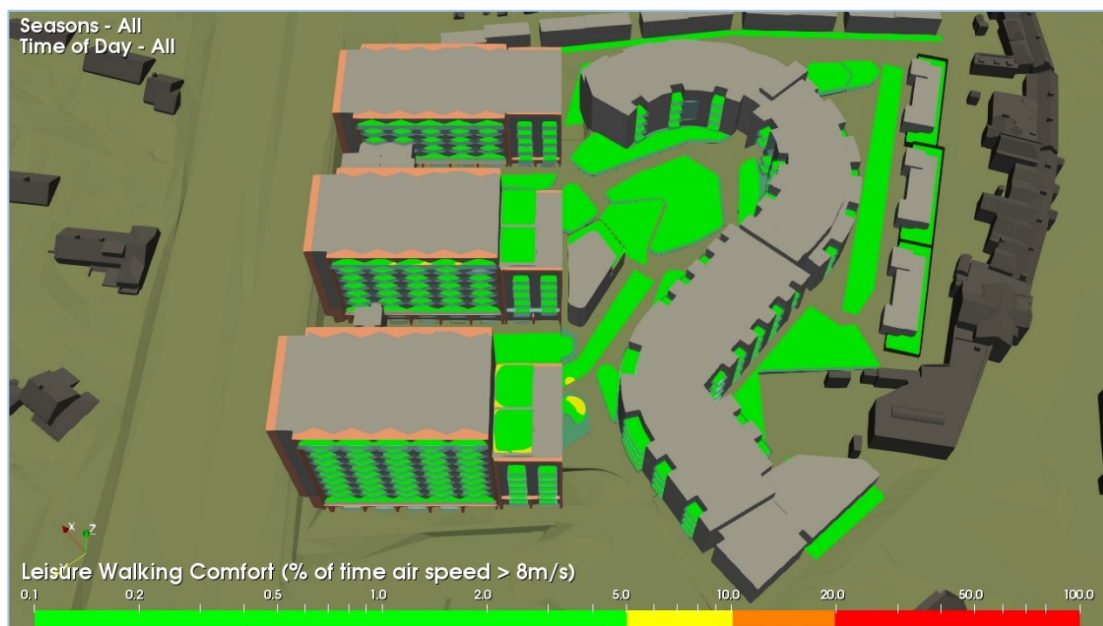


Figure 11.16 - Leisure Walking Criterion

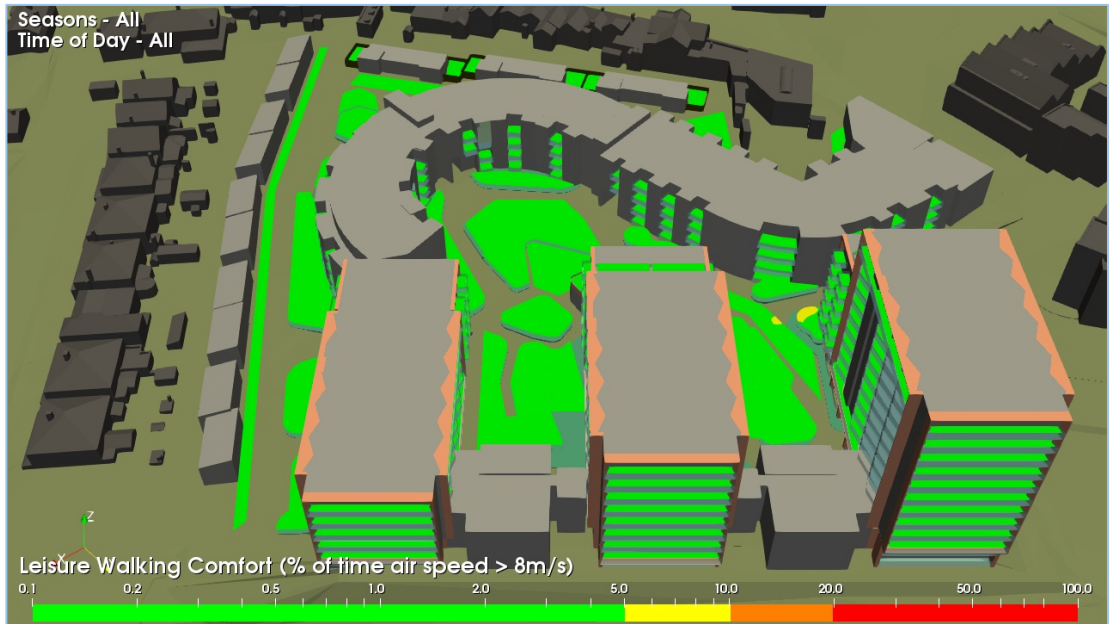


Figure 11.17 - Leisure Walking Criterion



Figure 11.18 - Leisure Walking Criterion

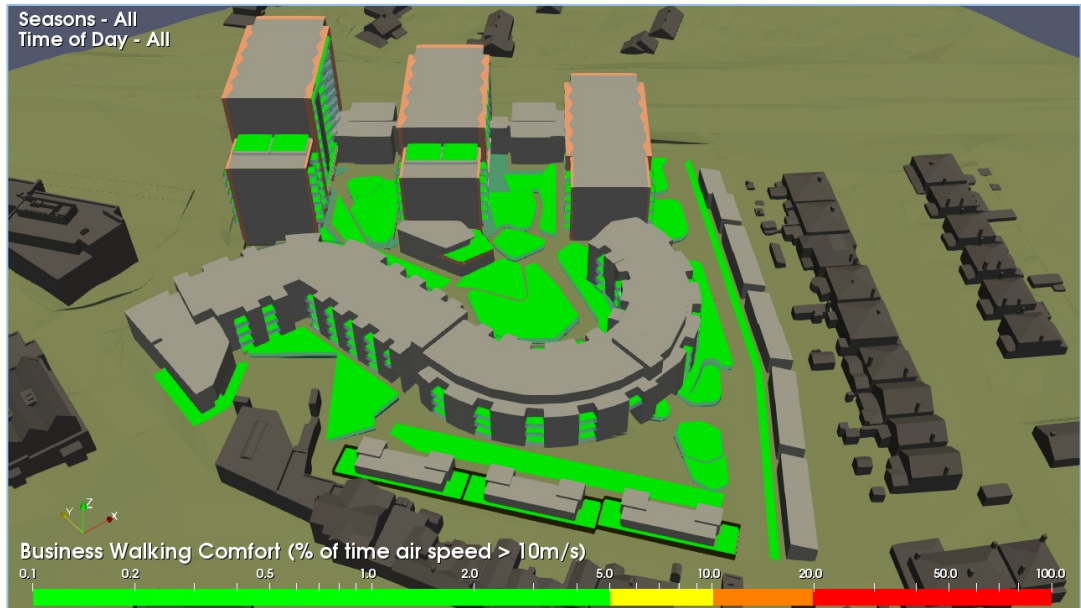


Figure 11.19 - Business Walking Criterion

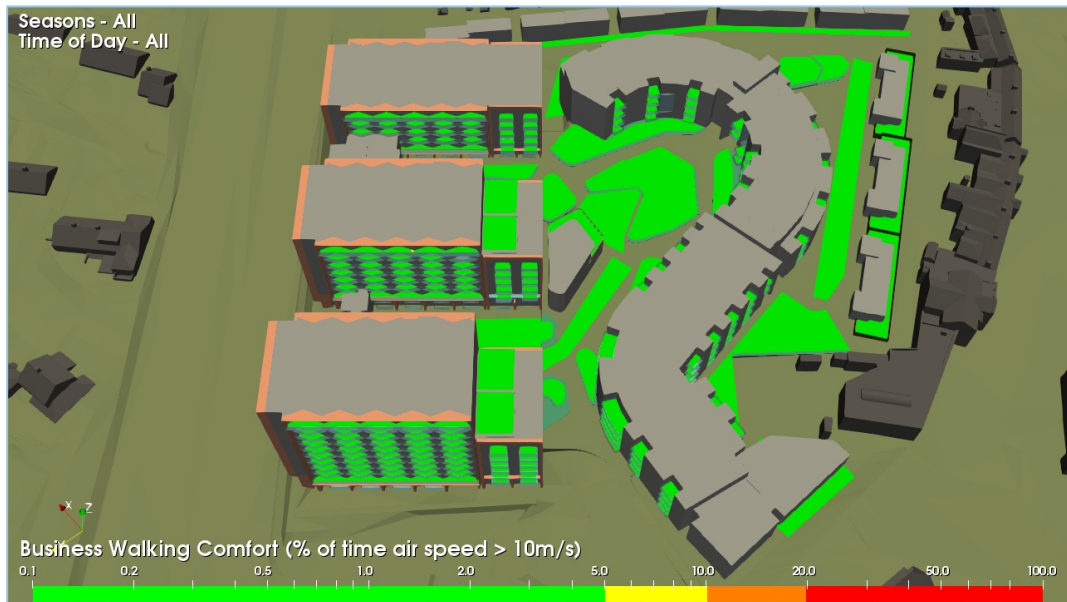


Figure 11.20 - Business Walking Criterion

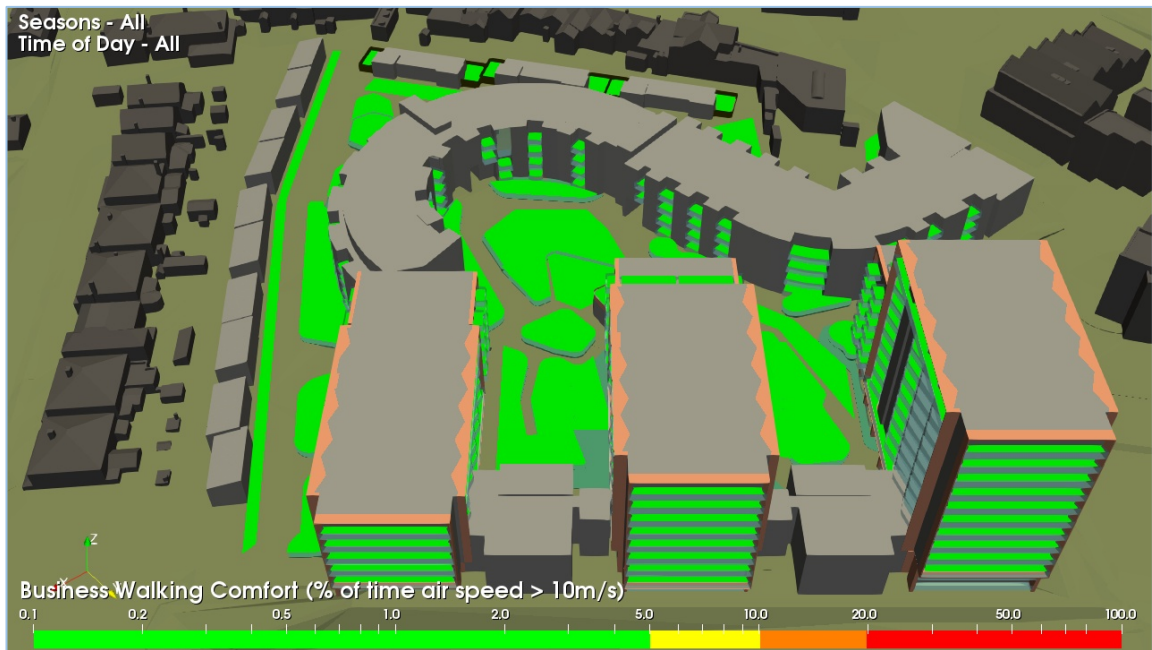


Figure 11.21 - Business Walking Criterion



Figure 11.22 - Business Walking Criterion

Standing Criterion:

The standing criteria applies to locations where leisure standing can occur for a long duration of time. Major locations for such criteria are balconies and public amenity spaces. Activities that would fall under standing would be waiting while walking the dog and conversations between residents.

Figures 11.23 to 11.26 below show the results for standing criterion. Most of the locations – balconies and public amenity spaces show good compliance.

Marginal compliance was observed in the space between blocks A and F (circled in red in figure 25), and between block H and the semi-detached houses (circled in blue in figure 25).

These locations experience slight acceleration of wind due to the reduction in width of the passage as air travels through. However, it is below 10% of the year, so the locations remain usable for a major proportion of the year.

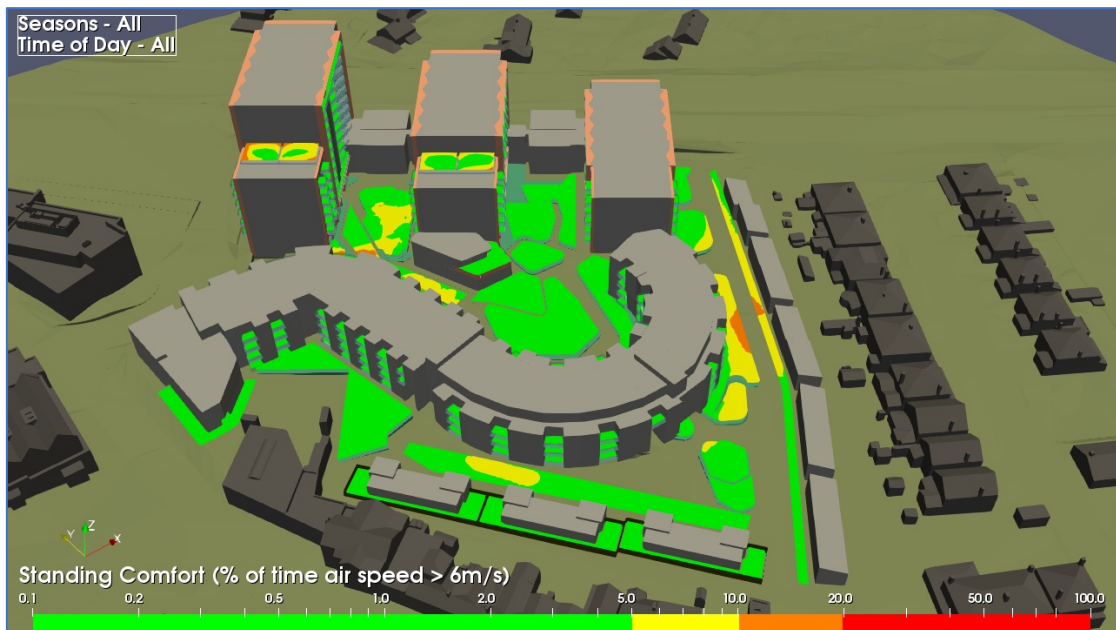


Figure 11.23 - Standing Criterion

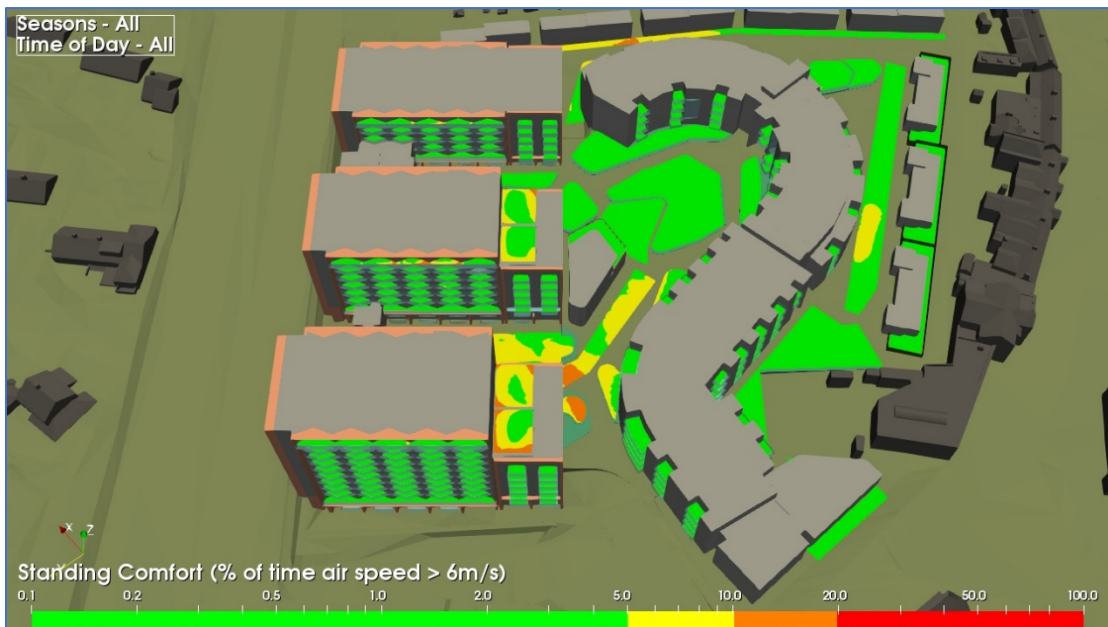


Figure 11.24 - Standing Criterion



Figure 11.25 - Standing Criterion



Figure 11.26 - Standing Criterion

Sitting Criterion:

The sitting criterion applies to locations where prolonged seating will occur. Such locations include public gardens, cafes and roof terraces.

Sitting activities also are likely to occur in warmer conditions like spring to autumn rather than winter. Further popular times for sitting activities are the afternoon and evenings rather than early mornings or late night.

As such we have looked at these most optimum sitting times for the analysis.

As seen in figures 11.27 to 11.30 below, the balconies of all blocks show excellent compliance with the requirements of the sitting criterion. Most of the courtyard also shows good compliance with the sitting criterion. The only locations where the criterion is exceeded is the space between blocks A and

F (circled in red in figure 11.29), and between block H and the semi-detached houses (circled in blue in figure 11.29)

As seen with the standing criterion results, these locations experience slight acceleration of wind due to the reduction in width of the passage as air travels through. However both locations may be classed more as locations of people movement rather than static locations. So marginal compliance would not be a concern.

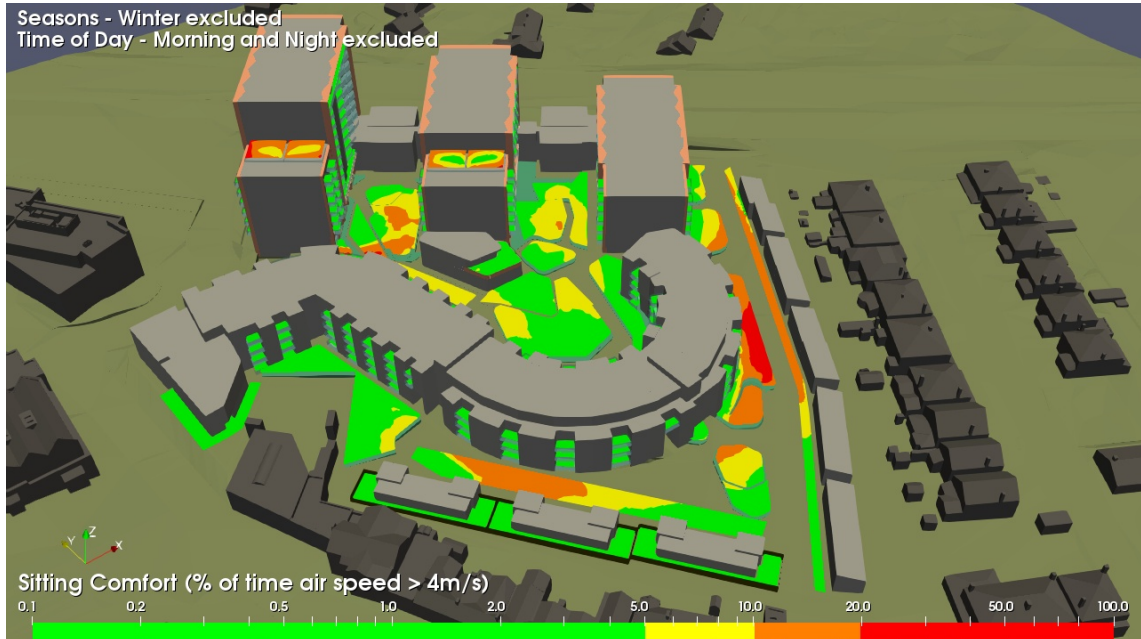


Figure 11.27 - Sitting Criterion

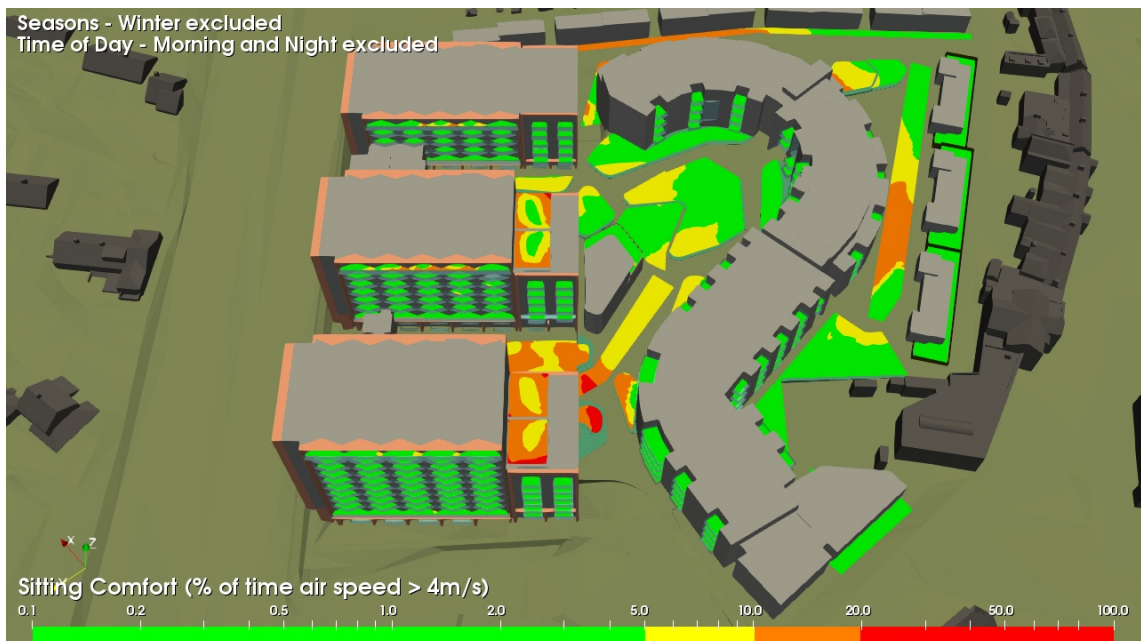


Figure 11.28 - Sitting Criterion



Figure 11.29 - Sitting Criterion

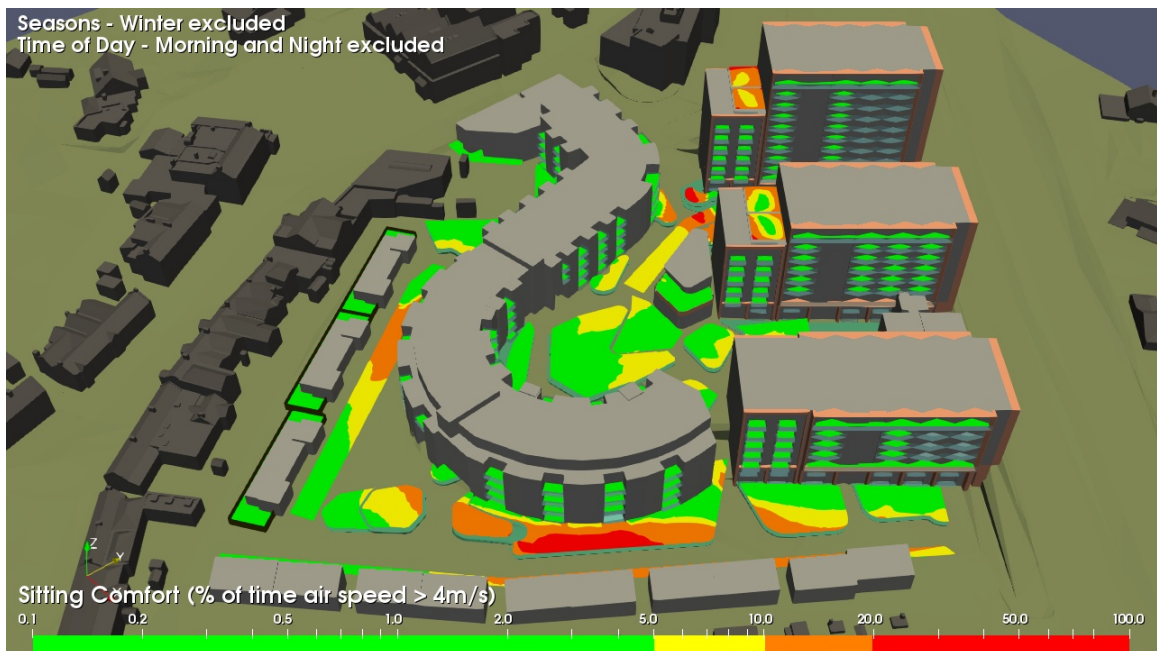


Figure 11.30 - Sitting Criterion

11.11. Monitoring

Construction Phase

Monitoring measures are not recommended as long as the wind panels are implemented around the periphery of the development boundary.

Operational Phase

Monitoring measures are not recommended for the operational phase of the development.

11.12. Reinstatement

No reinstatement is required to offset any negative effects arising to wind microclimate arising from this development.

11.13. Interactions

There are interactions between the Wind & Microclimate chapter and the landscaping chapters. Any change in landscaping plans i.e. reduction in vegetation may affect the results obtained in the wind study and could make them worse. Any additions are likely to only improve the results seen here.

11.14. Difficulties Encountered

No difficulties were encountered in compiling this assessment.

11.15. References

¹T. V. Lawson (2001) *Building Aerodynamics*, Imperial College Press, London.